
















Volkswagen Jetta, Golf, GTI Service Manual

1999, 2000, 2001, 2002, 2003, 2004, 2005

1.8L turbo, 1.9L TDI and PD diesel

2.0L gasoline, 2.8L VR6



Volkswagen	Audi	BMW
	Golf, GTI, Jetta 1999-2004, Jetta Wagon 2001-2004, R32	Subscription expires 2005 Feb 13
	Golf, GTI, Jetta 1993-1999, Cabrio 1995-2002	 Click here to purchase
	Passat, Passat Wagon 1995-1997	 Click here to purchase
	Passat, Passat Wagon 1998-2004	 Click here to purchase
	New Beetle 1998-2004, New Beetle Convertible 2004	 Click here to purchase
	Eurovan 1992-2004	 Click here to purchase
	Touareg	 Click here to purchase
	Phaeton	 Click here to purchase

Select a topic

- 00 - General, Technical data
- 10 - Engine - Assembly
- 13 - Engine - Crankshaft, Cylinder block
- 15 - Engine - Cylinder head, Valvetrain
- 17 - Engine - Lubrication
- 19 - Engine - Cooling system
- 20 - Fuel Supply
- 26 - Exhaust system, Emission controls

Additional Information

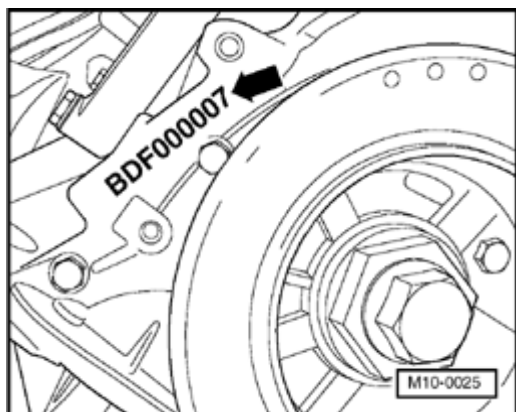
System Overviews

Other Topics

[24-Valve VR6 Variable Camshaft Timing Operation](#)

Technical data

Engine number



- ◀ The engine number (engine code and serial number) are located next to the vibration damper on the cylinder block.

The engine number consists of up to nine characters (alphanumeric). The first part (maximal 3 characters) makes up the engine code and the second part (6 characters), the serial number. If more than 999,999 engines with the same engine code are produced, the first of the six characters is replaced with a letter.

Additionally there is a sticker on the intake manifold with the engine code and serial number.

The engine code is additionally included on the vehicle data plate.

Engine data

Engine code		BDF
Manufactured		08.01 ➤
Cylinder application		VR ¹⁾
Cylinder angle		15.0 °
Capacity	ltr.	2.8
Output	kW at rpm	147/6200
Torque	Nm at rpm	265/3200
Bore	diameter mm	81.0
Stroke	mm	90.3
Compression ratio		10.75
RON	min.	98 unleaded ²⁾
System designation		Motronic ME7.1.1

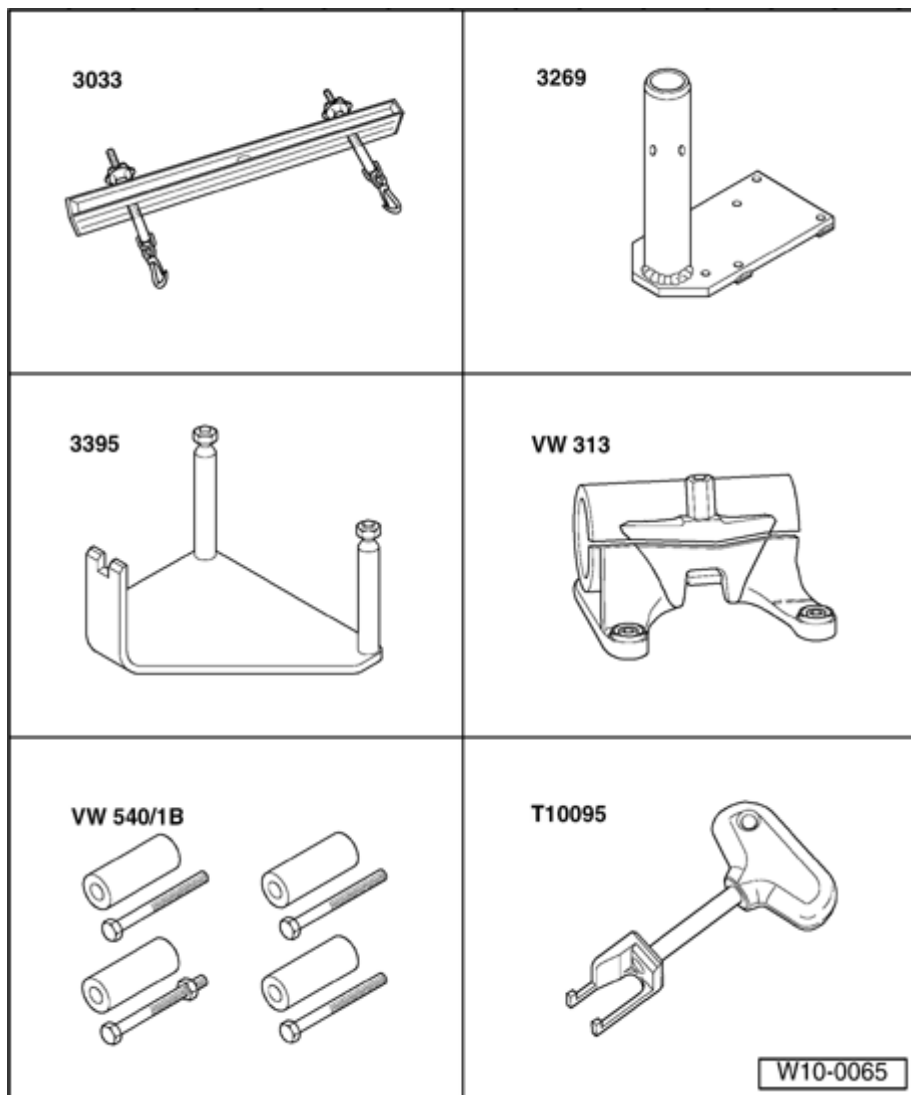
1) VR = V-arrangement in compact in-line design

2) 91 and 95 RON are also permitted, but with reduced output

Engine code	BDF
Exhaust emissions level	LEV ¹⁾
On Board Diagnostic (OBD)	OBD II
Knock regulation	2 knock sensors
Oxygen sensor control	2 sensors
Catalytic converter	yes
Exhaust gas recirculation	no
Charging	no
Secondary air system	yes
Electronic power control (EPC)	yes
Variable intake manifold	yes
Variable valve timing	yes ²⁾

1) LEV = Low Emission Vehicles (exhaust emissions max. 0.075 g/mi HC).

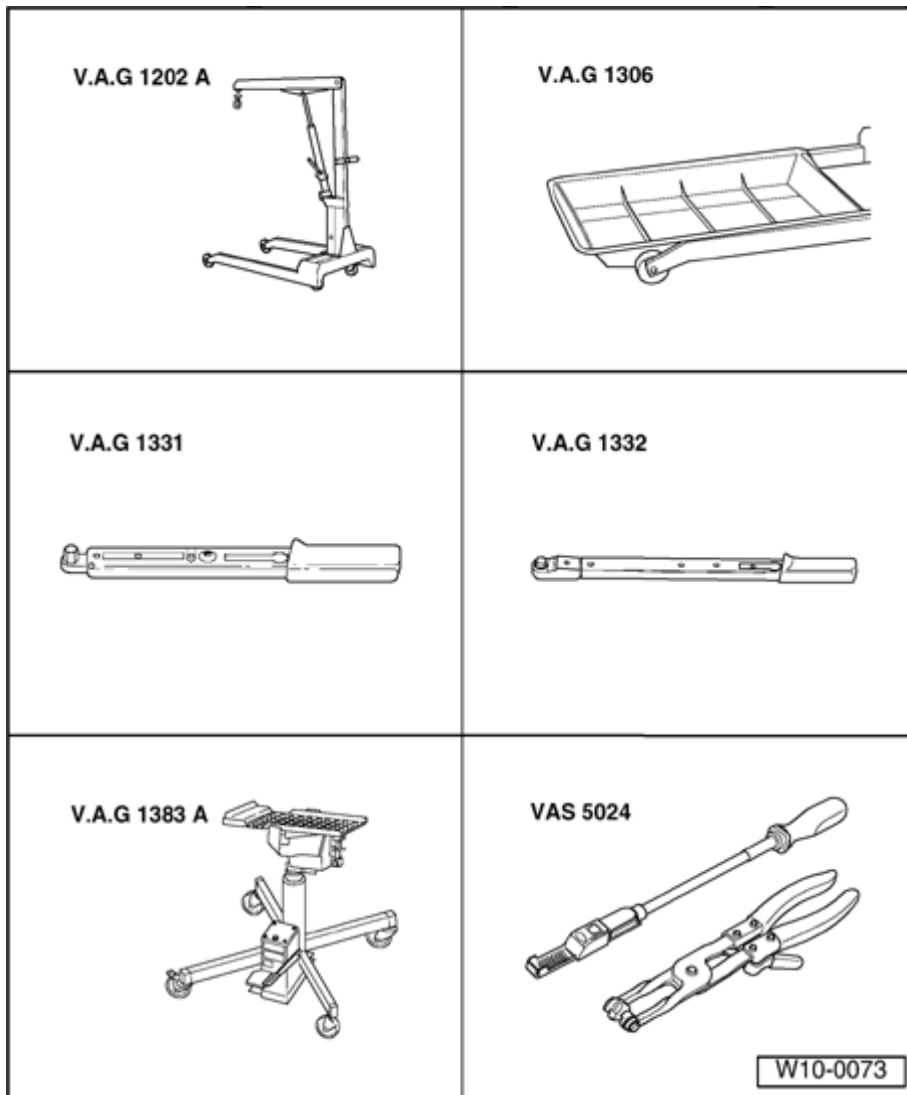
2) Two independently variable camshafts.



Engine, removing and installing

Special tools and equipment

- ◆ 3033 Lifting tackle
- ◆ 3269 Engine bracket
- ◆ 3395 Engine bracket
- ◆ VW 313 Support clamp
- ◆ VW 540/1 B Supplementary set
- ◆ T10095 Puller



- ◆ VAG 1202 A Workshop crane
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ VAG 1332 Torque wrench (40...200 Nm)
- ◆ VAG 1383 A Engine/transmission jack
- ◆ VAS 5024 Assembly tool for spring-type clips
- ◆ VAS 5085 Step ladder
- ◆ G 000 100 Grease gun (models with manual transmission)
- ◆ Cable tie

Notes on removing

The engine is removed downward together with the transmission.

CAUTION!

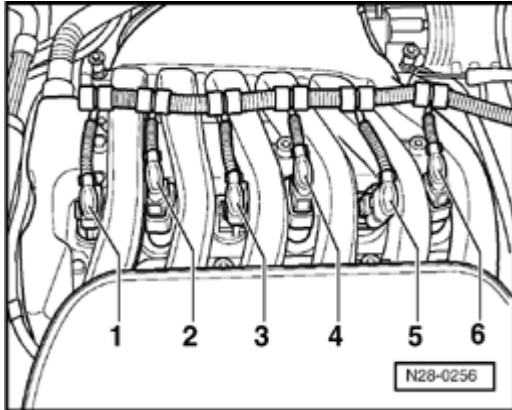
When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- ◆ ***Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.***
- ◆ ***Ensure sufficient clearance to all moving or hot components.***

All cable ties which are opened or cut open when removing engine, must be replaced in the same position when installing the engine.

Work sequence

- Remove engine cover.
- First check whether a coded radio is installed. If so, obtain anti-theft coding.



- With ignition switched off disconnect battery Ground strap.

- Disconnect connectors from ignition coils

Note:

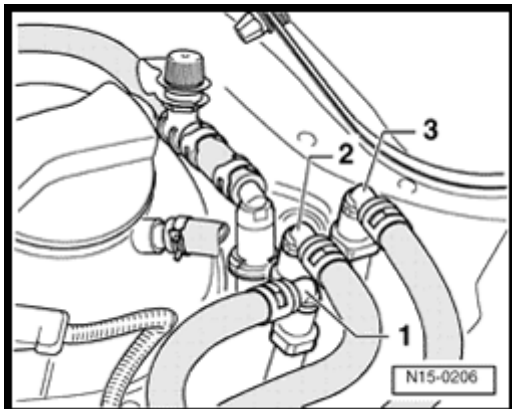
Mark connector and component before disconnecting.

- Remove ignition coils with final out stage cylinders 1...6 using puller T10095.

- Remove battery and battery retainer.

- Remove air cleaner with intake hose:

⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF, Repair (24



- Disconnect following hose connections and collect fluids that may leak out with a cloth

1 - vacuum hose to Throttle valve control motor (J338-),

2 - fuel return hose (with blue markings),

3 - fuel supply hose (with white markings).

Note:

Press buttons on hose couplings to disconnect.

WARNING!

Fuel system is under pressure! Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.

- Seal lines to avoid contamination of fuel system.
- Observe rules for cleanliness ⇒ [Page 20-14](#) .
- Remove center, left and right insulation trays:
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)
- Pull connectors off thermal switch and coolant fan.
- Remove front bumper:
⇒ [Repair Manual, Body Exterior, Repair Group 63](#)
- Bring lock carrier into service position:
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)

- Remove intake manifold ⇒ [Page 15-16](#) ,
Removing and installing cylinder head cover.

Note:

Seal the intake ports in the intake manifold or in the cylinder head with a clean cloth.

- Remove ribbed belt ⇒ [Page 13-19](#) .
- Remove power steering pump on compact bracket and place to side; hoses remain connected:

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 48](#)

- Remove securing clamps for power steering pressure line.

Vehicles with air conditioning

- Observe additional information and removal work ⇒ [Page 10-22](#) .

Models with a manual transmission

- Disconnect selector mechanism from transmission:

⇒ [Repair Manual, 5 & 6 Spd. Manual Transmission 02M, Repair Group 34](#)

- Separate hydraulic line to slave cylinder for hydraulic clutch:

⇒ [Repair Manual, 5 & 6 Spd. Manual Transmission 02M, Repair Group 30](#)

Models with an automatic transmission

- Remove gate selector lever cable from transmission:

⇒ [Repair Manual, 5 Spd. Automatic Transmission 09A, Repair Group 37](#)

Continuation for all vehicles

- Disconnect vacuum and breather hoses from engine.
- Separate connectors on following components:

Note:

Mark connector and component before disconnecting.

- ◆ Engine Coolant Temperature (ECT) sensor - G62- with Engine Coolant Temperature (ECT) sensor -G2-,
- ◆ After-run coolant pump -V51-,
- ◆ Valve -1- for camshaft adjustment -N205-,

- ◆ Camshaft adjustment valve 1 (exhaust) - N318-,
- ◆ Camshaft Position (CMP) sensor -G40-,
- ◆ Camshaft Position (CMP) sensor 2 -G163-
,
- ◆ Injectors (-N30- to -N33-, -N83- and -N84-
),
- ◆ Engine speed (RPM) sensor -G28-,
- ◆ Knock Sensor (KS) 1 -G61-,
- ◆ Knock Sensor (KS) 2 -G66-,

Installation locations:

⇒Repair Manual, 2.8 Liter VR6 4V Engine
Mechanical, Engine Code(s): BDF, Repair Group
24

- Disconnect all electric wires from transmission, alternator and starter and them move clear.
- Disconnect all other electrical connections from engine as necessary and place to one side.
- Drain coolant ⇒ [Page 19-15](#) .
- Disconnect coolant hoses quick release couplings from radiator.

- Pull all coolant hoses off to engine using assembly tool for spring-type clamps VAS 5024.

- Removing drive shafts:

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

- Remove pendulum support:

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

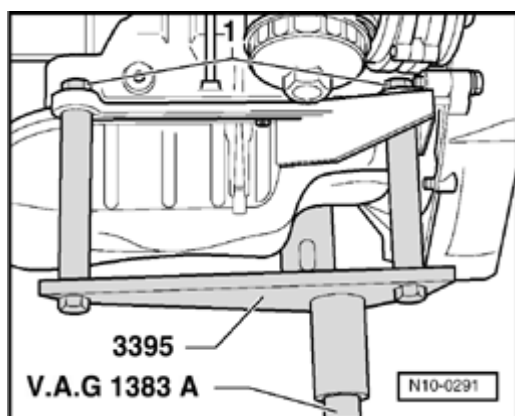
- Remove front exhaust pipe with catalytic converter ⇒ [Page 26-1](#) , Removing and installing parts of the exhaust system.

- Remove alternator and compact bracket:

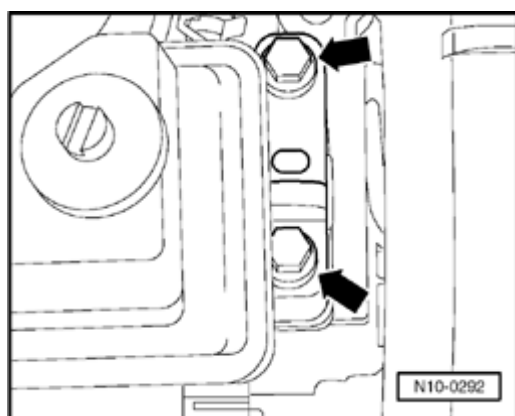
⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#)

- Unscrew bracket for Secondary Air Injection (AIR) pump motor -V101- from oil pan and cylinder block ⇒ [Page 26-26](#) , item - 17 -.

- Install engine bracket 3395 onto engine/transmission jack VAG 1383 A.



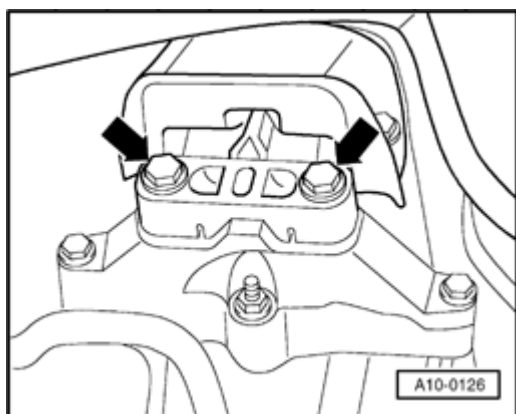
- Install engine bracket 3395 to cylinder block and tighten securing nuts -1- to 40 Nm.
- Lift engine and transmission slightly using engine/transmission jack VAG 1383 A.



- Unbolt engine side of assembly mounting from engine bracket at top (arrows).

Note:

Use ladder VAS 5085 to remove securing bolts.



- Unbolt transmission side of assembly mounting from top of transmission carrier (arrows).

Note:

Use ladder VAS 5085 to remove securing bolts.

- Carefully lower engine with transmission.

Note:

Engine with transmission must be guided carefully, when lowering, to prevent damage to bodywork.

Securing engine to assembly stand

Note:

When working on the engine it should be secured to assembly stand VW 313 using bracket 3269 or VW 540 and supplementary set 540/1 B.

Work sequence

- Remove transmission.

Models with an automatic transmission

- Secure torque converter to prevent it falling after engine and transmission are separated.

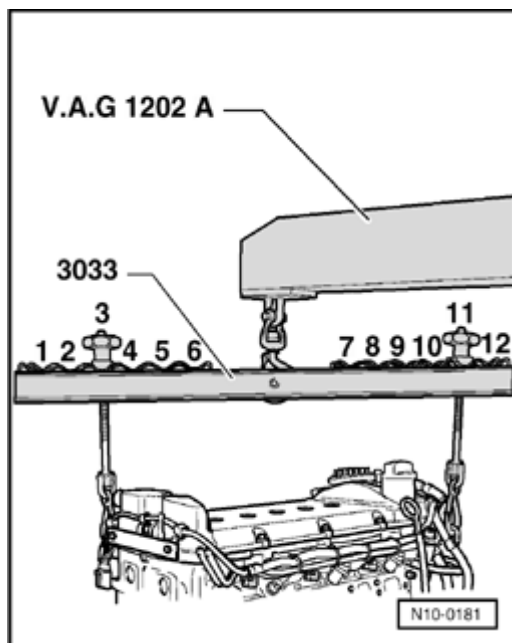
Continuation for all vehicles

- Install engine bracket 3269 or VW 540 or supplementary set 540/1 B to cylinder block.
- Attach lifting device 3033 as follows and lift engine from engine/transmission jack using workshop crane VAG 1202.

Vibration damper end: Position 3

Flywheel end: Position 11

- Install engine in support clamp VW 313 using workshop crane VAG 1202 A.



Notes on installation

Install in reverse sequence ; note the following points:

- Check whether dowel sleeves for centering engine/transmission are installed in cylinder block and install if necessary.

Models with a manual transmission

- Check clutch and clutch operating mechanism and install:

⇒ [*Repair Manual, 5 & 6 Spd. Manual Transmission 02M, Repair Group 30*](#)

- Clean drive shaft splines and lightly grease with G 000 100.

Models with an automatic transmission

- When securing torque converter to drive plate, only use nuts which are authorized for this purpose, ⇒ Parts catalog.

Continuation for all vehicles

- When installing engine/transmission assembly, ensure sufficient clearance to engine and transmission mountings and radiator.
- Align engine and transmission mountings ⇒ [Page 10-18](#) .

Note:

Torque settings for assembly mountings ⇒ [Page 10-21](#) .

- Install compact bracket and alternator:
⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#)
- Install front exhaust pipe with catalytic converter
⇒ [Page 26-1](#) , Removing and installing parts of the exhaust system.
- Install pendulum support:
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)
- Install drive shafts:
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

Models with a manual transmission

- Install gear selector mechanism:

⇒ [*Repair Manual, 5 & 6 Spd. Manual Transmission 02M, Repair Group 34*](#)

- If necessary adjust gear selector cables:

⇒ [*Repair Manual, 5 & 6 Spd. Manual Transmission 02M, Repair Group 34*](#)

- Install hydraulic line to hydraulic clutch slave cylinder:

⇒ [*Repair Manual, 5 & 6 Spd. Manual Transmission 02M, Repair Group 30*](#)

- Bleed clutch system:

⇒ [*Repair Manual, 5 & 6 Spd. Manual Transmission 02M, Repair Group 30*](#)

Models with an automatic transmission

- Install gate selector lever cable on transmission, adjust if necessary:

⇒ [*Repair Manual, 5 Spd. Automatic Transmission 09A, Repair Group 37*](#)

Continuation for all vehicles

- Install power steering pump:

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 48](#)

- Install intake manifold ⇒ [Page 15-16](#) , Removing and installing cylinder head cover.

- Install air cleaner with intake hose:

⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF, Repair Group 24

- Install battery and battery retainer.

- Install ribbed belt ⇒ [Page 13-19](#) .

- Check electrical connections and routing:

⇒ [Repair Manual, Electrical Equipment, Repair Group 97](#)

- Install center, left and right insulation trays:

⇒ [Repair Manual, Body Exterior, Repair Group 50](#)

- Top up coolant level ⇒ [Page 19-15](#) .

- Perform test drive and check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Adapt (match) engine control module to throttle valve control module:

⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF, Repair Group 24

- Perform work sequence "Procedure after interrupting voltage supply":

⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF, Repair Group 24

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- If DTC memory has been erased or engine control module separated from permanent positive supply, generate readiness code again:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

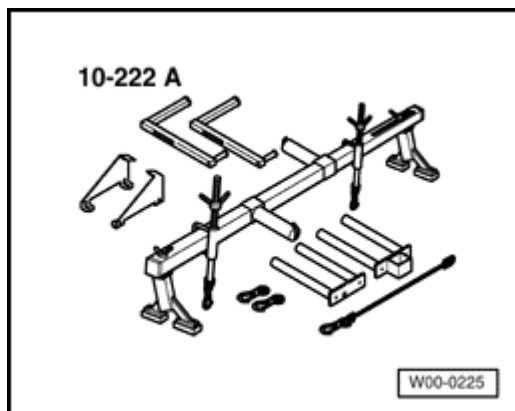
Models with an automatic transmission

- Perform adaptation for Transmission Control Module (TCM):

⇒ [Repair Manual, 5 Spd. Automatic Transmission 09A On Board Diagnostic \(OBD\), Repair Group 01](#)

Aligning engine and transmission mountings

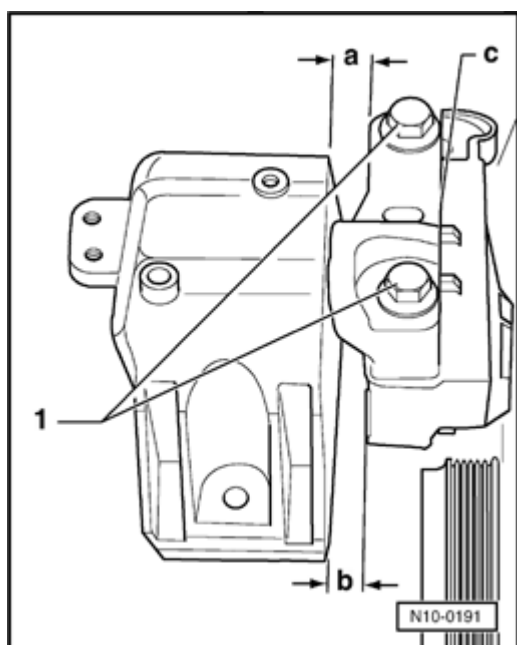
Special tools and equipment



- ◆ Support device 10-222 A with legs 10-222 A/1 and adapter 10-222 A/3

WARNING!

Before loosening bolts, secure assembly using support device 10-222A.

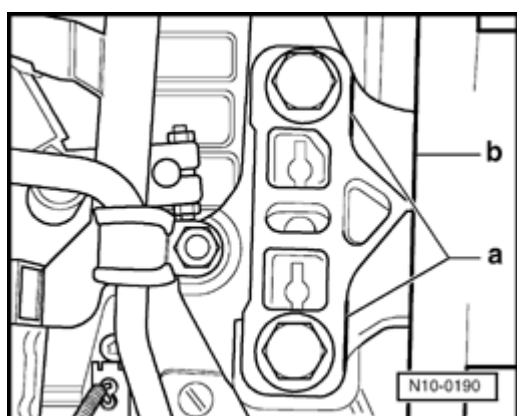


◀ Engine mounting

a = 14.0 mm

b = at least 10.0 mm

Both bolt heads -1- must be flush with edge -c-.



◀ Transmission assembly mounting

Edges -a- and -b- must be parallel to each other.

Note:

Torque settings for assembly mountings ⇒ [Page 10-21](#) .

Torque settings

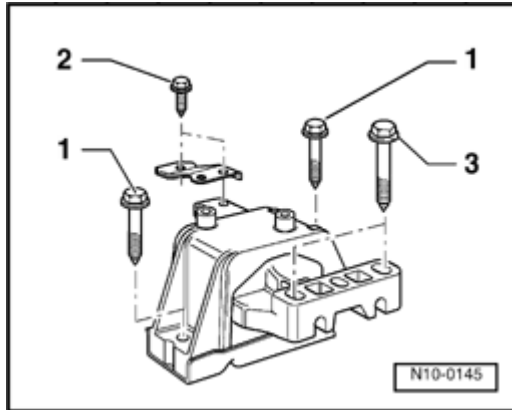
Bolted connections		Torque setting
Bolts, nuts	M6	10 Nm
	M7	15 Nm
	M8	25 Nm
	M10	40 Nm
	M12	60 Nm
Deviations		
Connecting bolts, engine to transmission	M10	60 Nm
Connecting bolts, engine to transmission	M12	80 Nm
Starter to engine and transmission		45 Nm

Note:

Torque settings for assembly mountings ⇒ [Page 10-21](#).

Assembly mounting

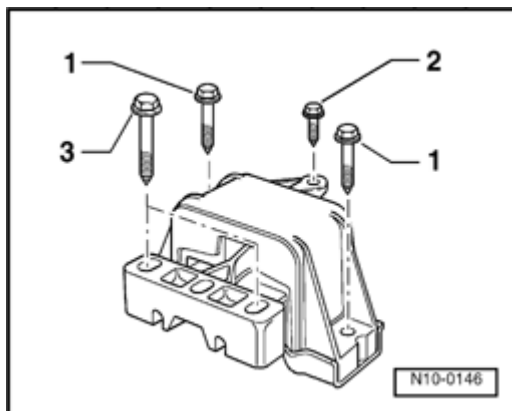
Torque settings



Engine mounting

- | | | |
|---|---------------------------------------------------|------------------------------|
| 1 | Mounting to
- body ¹⁾ | 40 Nm +
90° (1/4
turn) |
| 2 | Support to
- mounting at
body ¹⁾ | 20 Nm +
90° (1/4
turn) |
| 3 | Mounting to
- engine bracket | 100 Nm |

1) Replace bolts



Transmission assembly mounting

- | | | |
|---|------------------------------------------|------------------------------|
| 1 | Mounting to
- body ¹⁾ | 40 Nm +
90° (1/4
turn) |
| 2 | Mounting to
- body ¹⁾ | 20 Nm +
90° (1/4
turn) |
| 3 | Mounting to
- transmission
console | 100 Nm |

1) Replace bolts

Additional information and assembly work on models with air conditioning

WARNING!

The air conditioning refrigerant circuit must not be opened.

Note:

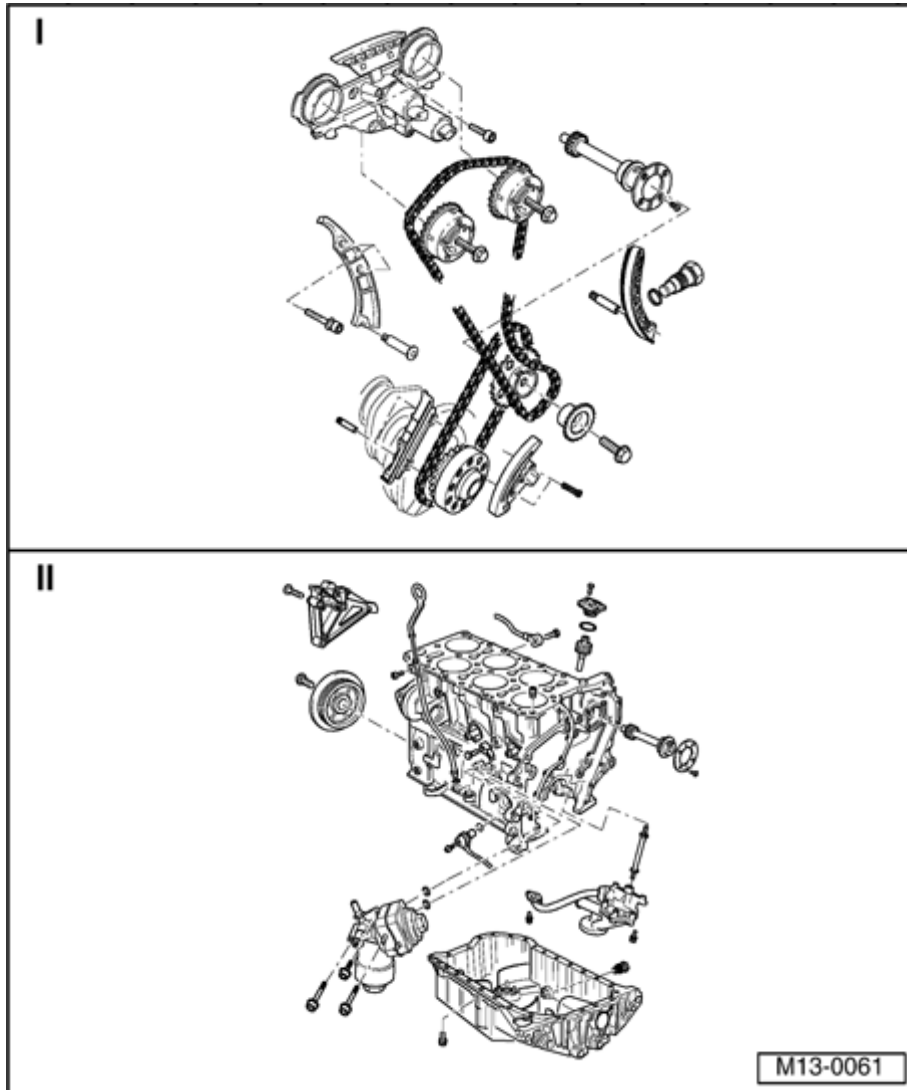
- ◆ *The refrigerant circuit must only be opened in workshops with trained personnel and the necessary range of tools and workshop equipment.*
- ◆ *To prevent damage to the condenser as well as to the refrigerant lines/hoses, ensure that lines and hoses are not stretched, kinked or bent.*

To facilitate removal and installation of the engine without having to open the refrigerant circuit:

- Remove retaining clamp(s) from refrigerant lines.
- Remove air conditioner compressor:

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87; Removing and installing compressor bracket*

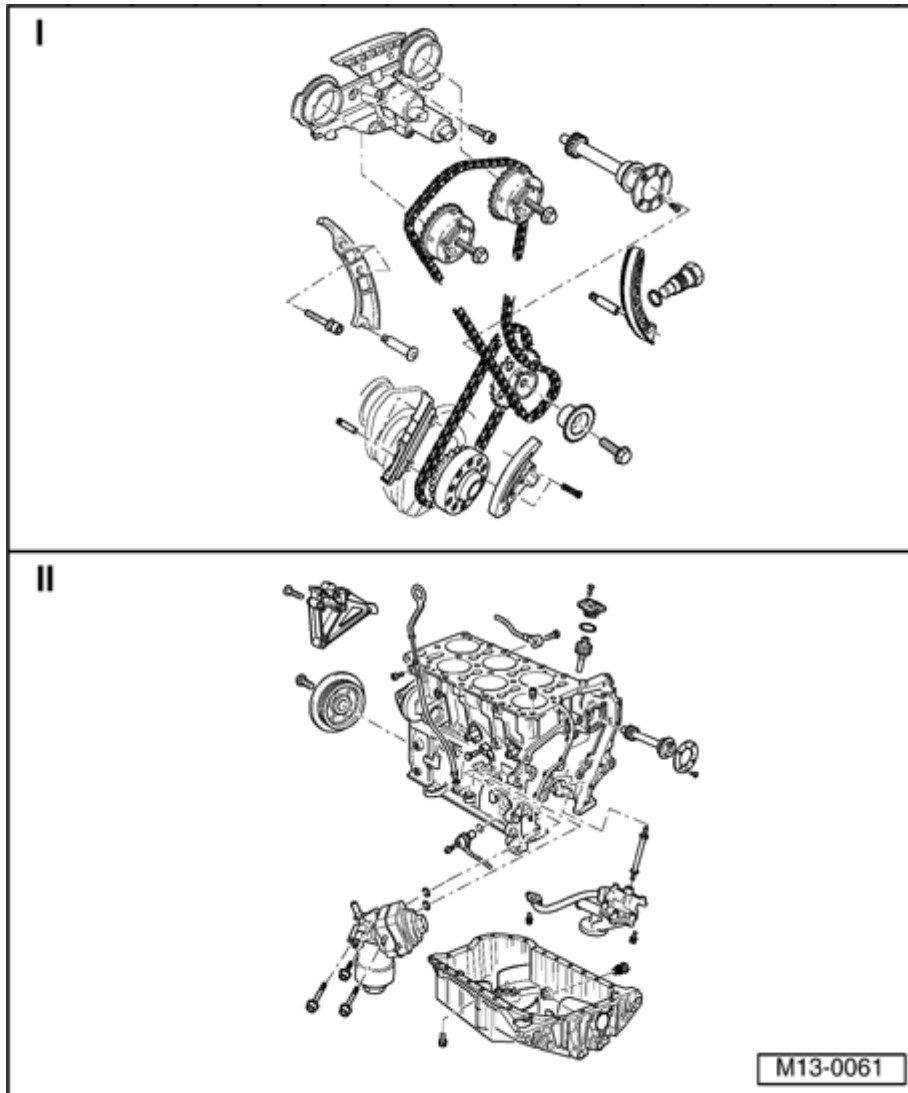
- Secure air conditioning compressor to body so that refrigerant lines/hoses are not under stress.



Engine, disassembling and assembling

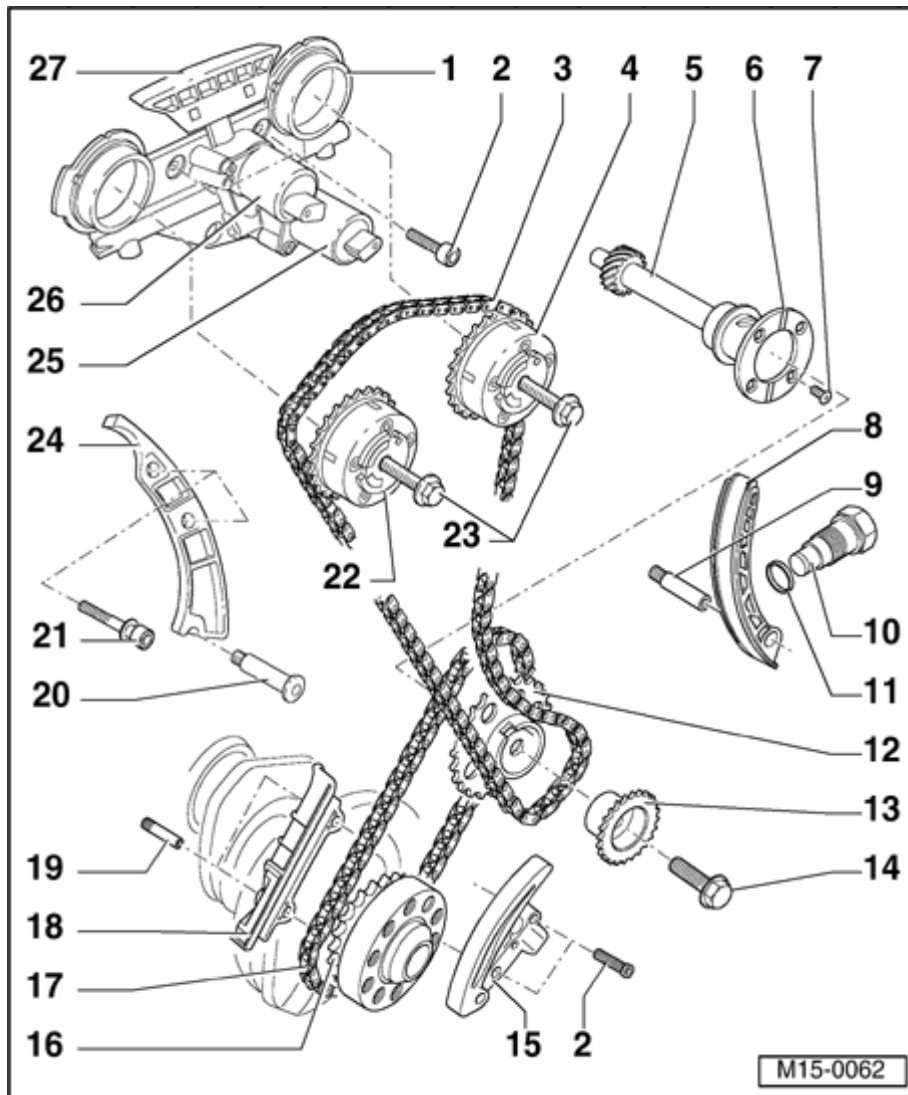
Note:

- ◆ When working on the engine it should be secured to assembly stand VW 313 using engine bracket 3269 or VW 540 and supplement set 540/1 B.
- ◆ If when repairing engine, metal shavings or large amounts of small metal particles are found in the engine oil, caused by partial seizure of crankshaft or conrod bearings perform the following work sequences to prevent consequential damage once repairs are complete:
 - - Thoroughly clean oil passages
 - - Replace oil spray jets
 - - Replace oil cooler
 - - Replace oil filter
 - - Replace oil non-return valve



I ⇒ [Page 13-3](#)

II ⇒ [Page 13-12](#)



Part I

1 - Control housing

- ◆ Lubricate contact surfaces of oil seal when installing
- ◆ Removing and installing ⇒ [Page 15-69](#), Removing and installing camshaft
- ◆ Disassembling and assembling ⇒ [Page 15-64](#), Fig. 6
 - ◆ Check screen of control housing for soiling before installing ⇒ [Page 15-64](#), Fig. 7

2 - 8 Nm

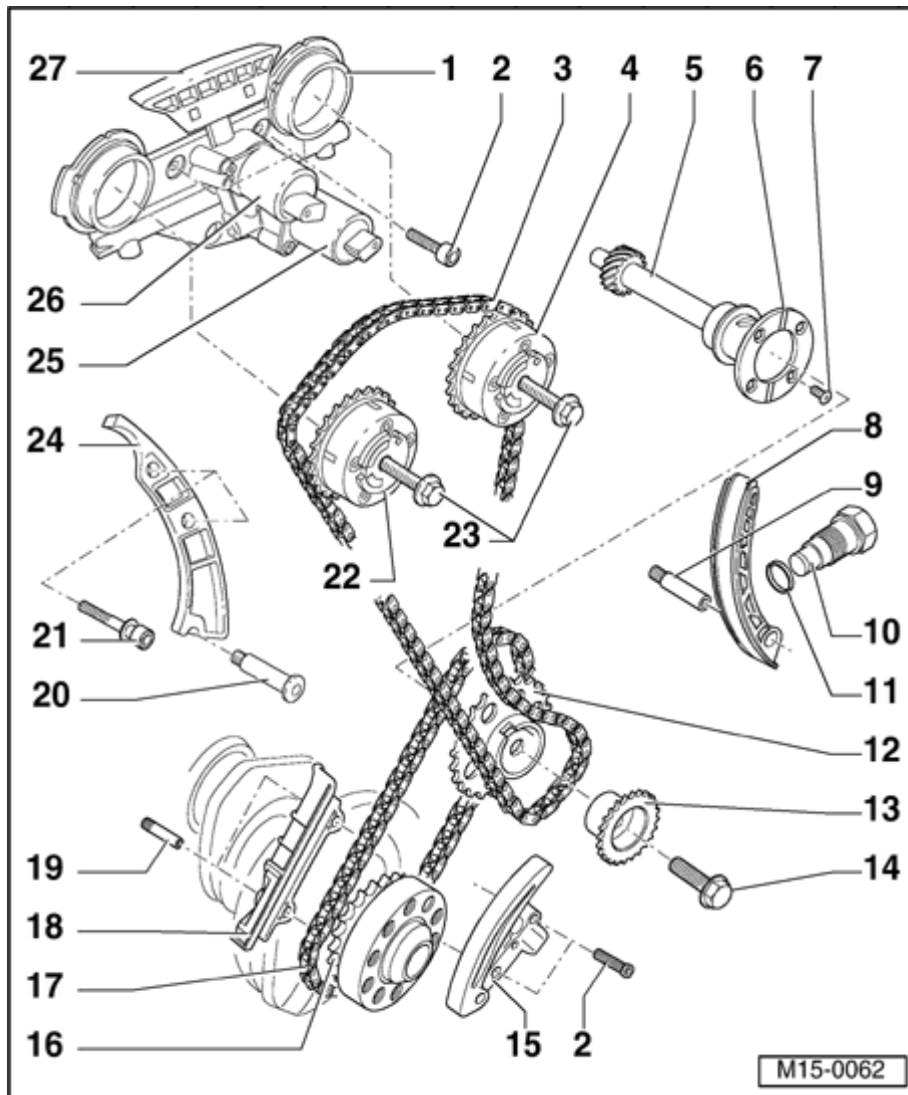
- ◆ Replace

3 - Camshaft roller chain

- ◆ Mark direction of rotation before removing (installation)

position) ⇒
[Fig. 1](#)

- ◆ Installing
⇒ [Page
15-39](#) ,
Adjusting
valve
timing



4 - Exhaust camshaft timing adjuster

- ◆ Marking: 32A
- ◆ Turn engine over only when camshaft timing adjuster is installed
- ◆ Check camshaft timing adjustment ⇒ [Page 15-82](#)
- ◆ Installing ⇒ [Page 15-39](#) , Adjusting valve timing

5 Intermediate - shaft

6 - Thrust washer

7 - 8 Nm

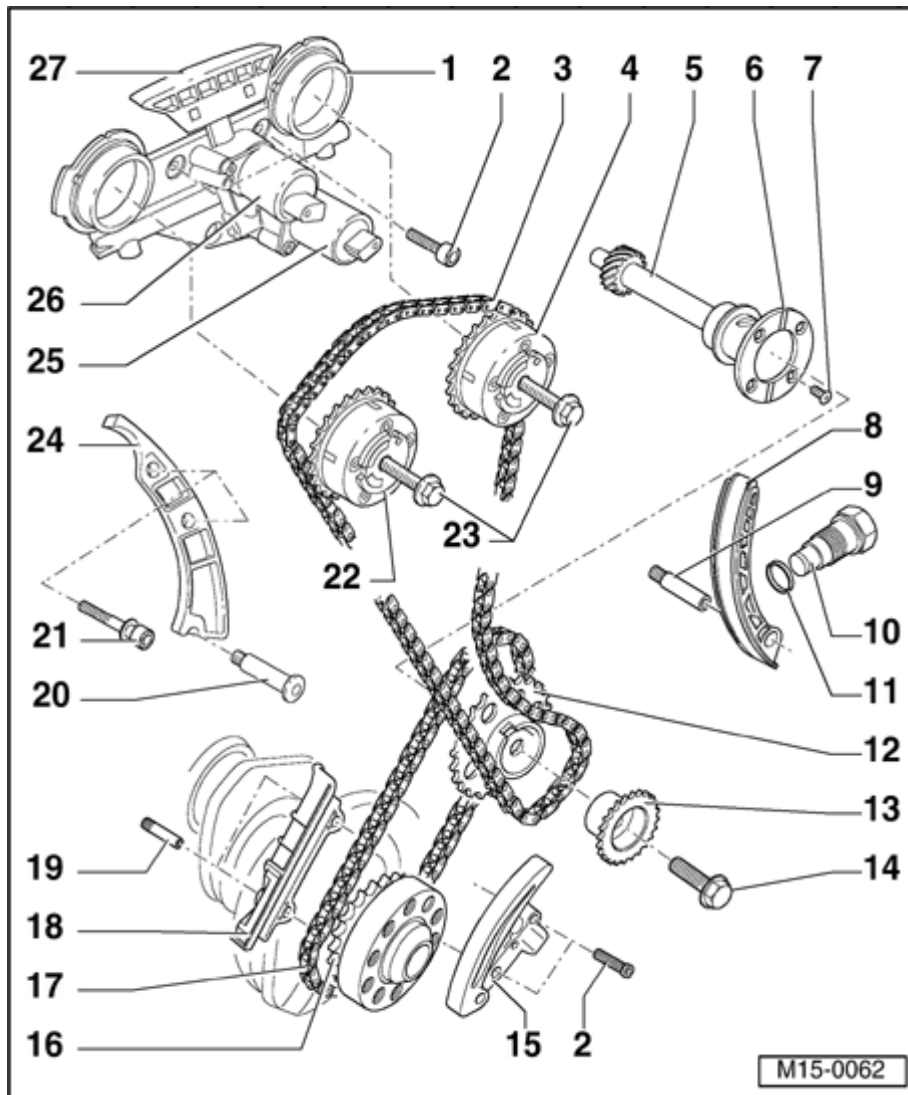
- ◆ Insert with locking compound D 000 600 A2

8 - Tensioning plate

- ◆ For camshaft roller chain item 3

**9 - Mounting
stud, 10
Nm**

- ◆ For
tensioning
plate item
8



10 Chain - tensioner, 40 Nm

- ◆ For camshaft roller chain item 3
- ◆ Turn engine over only when chain tensioner is installed

11 - Seal

- ◆ Replace if damaged or leaking

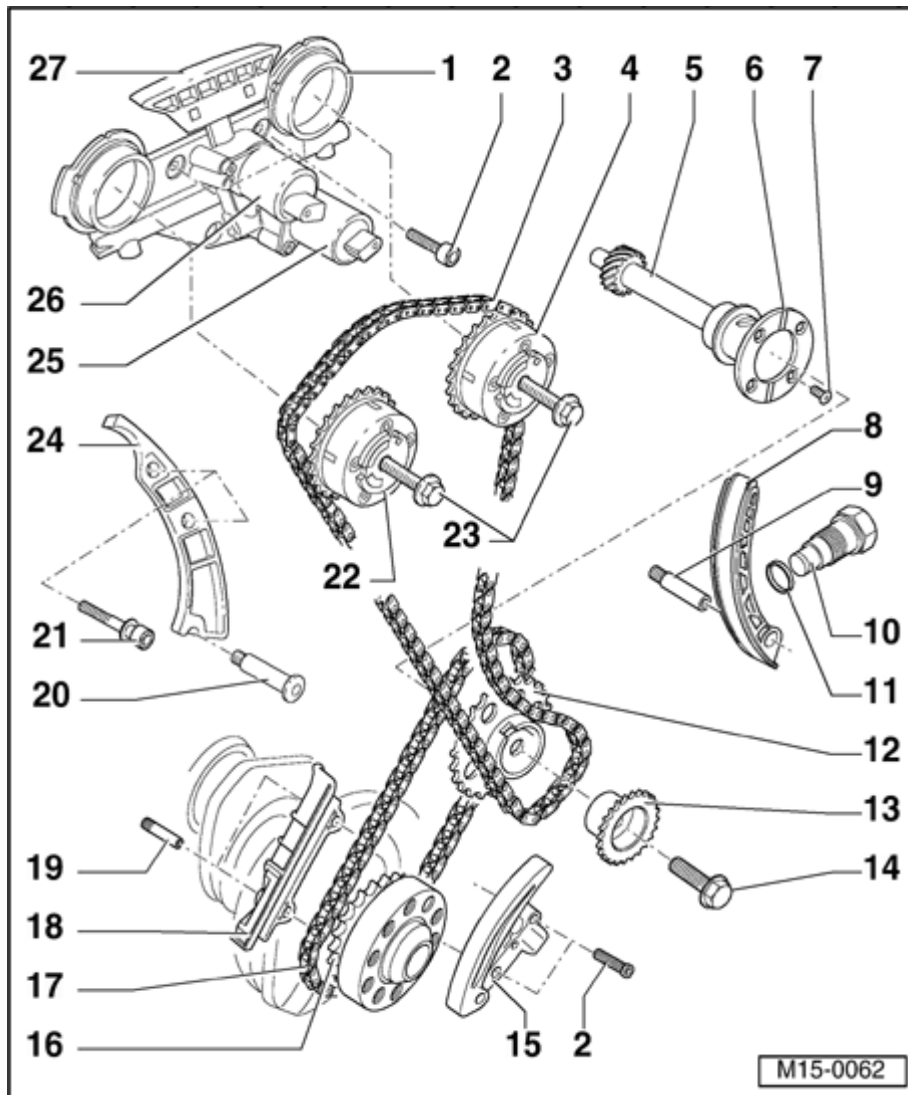
12 - Chain sprocket

- ◆ For roller chain item 17
- ◆ Installing ⇒ [Page 15-39](#), Adjusting valve timing

13 - Chain sprocket

- ◆ For camshaft roller chain item 3
- ◆ Installing ⇒ [Page](#)

[15-39](#) ,
Adjusting
valve
timing



14 60 Nm
- plus
additional
1/4 turn
(90 °)
further

◆ Replace

◆ Use counter support T10069 to loosen and tighten ⇒ [Page 15-39](#), Adjusting valve timing

15 Chain
- tensioner
with
tensioning
rail

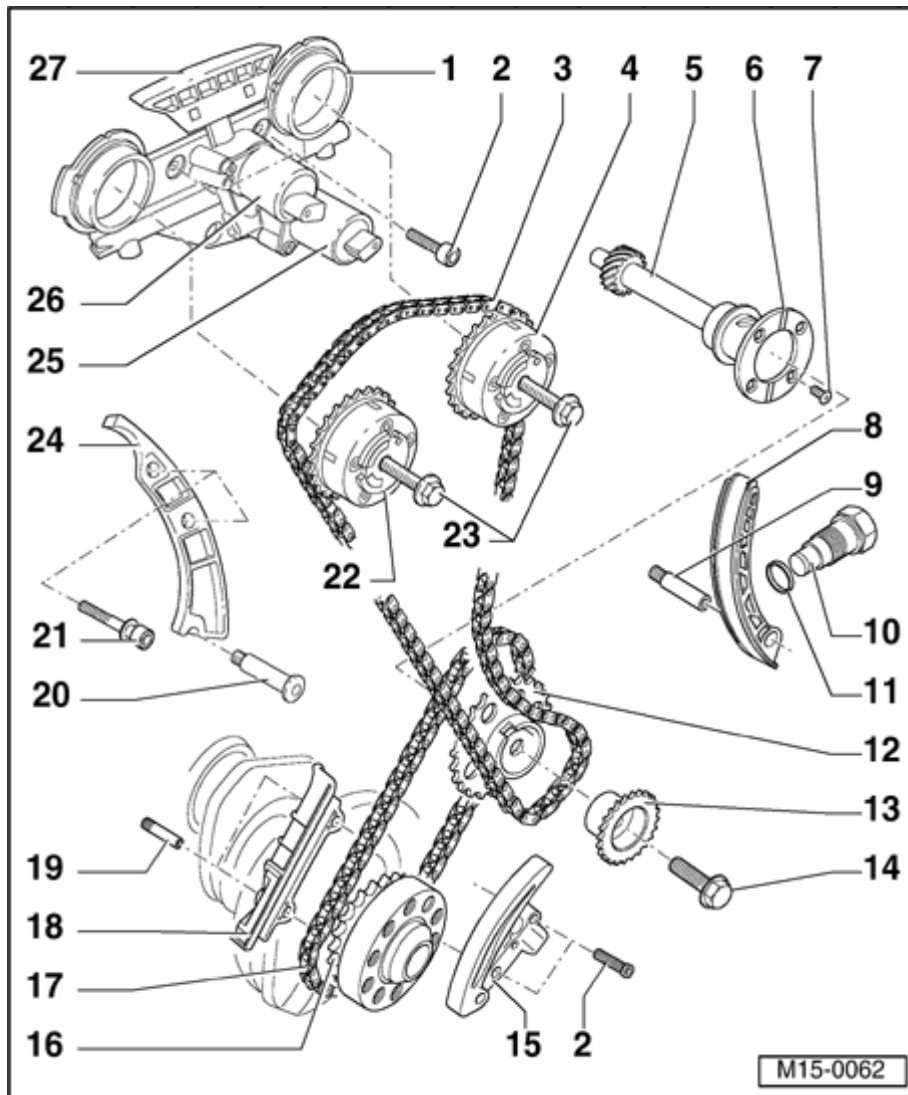
◆ For roller chain item 17

◆ Before installation release the locking device in the chain tensioner with a small screwdriver and press the tensioning plate against the chain tensioner

- ◆ Turn engine over only when chain tensioner is installed

16 - Drive sprocket

- ◆ Integral part of crankshaft
- ◆ Ground down tooth aligned with main bearing joint = TDC cyl.
1 ⇒ [Page 15-39](#) , Adjusting valve timing



17 - Roller chain

◆ Mark direction of rotation before removing (installation position) ⇒ [Fig. 1](#)

◆ Installing ⇒ [Page 15-39](#), Adjusting valve timing

18 - Guide rail

◆ For roller chain item 17

◆ Remove and install together with roller chain ⇒ [Page 15-39](#), Adjusting valve timing

19 - Stud without collar, 10 Nm

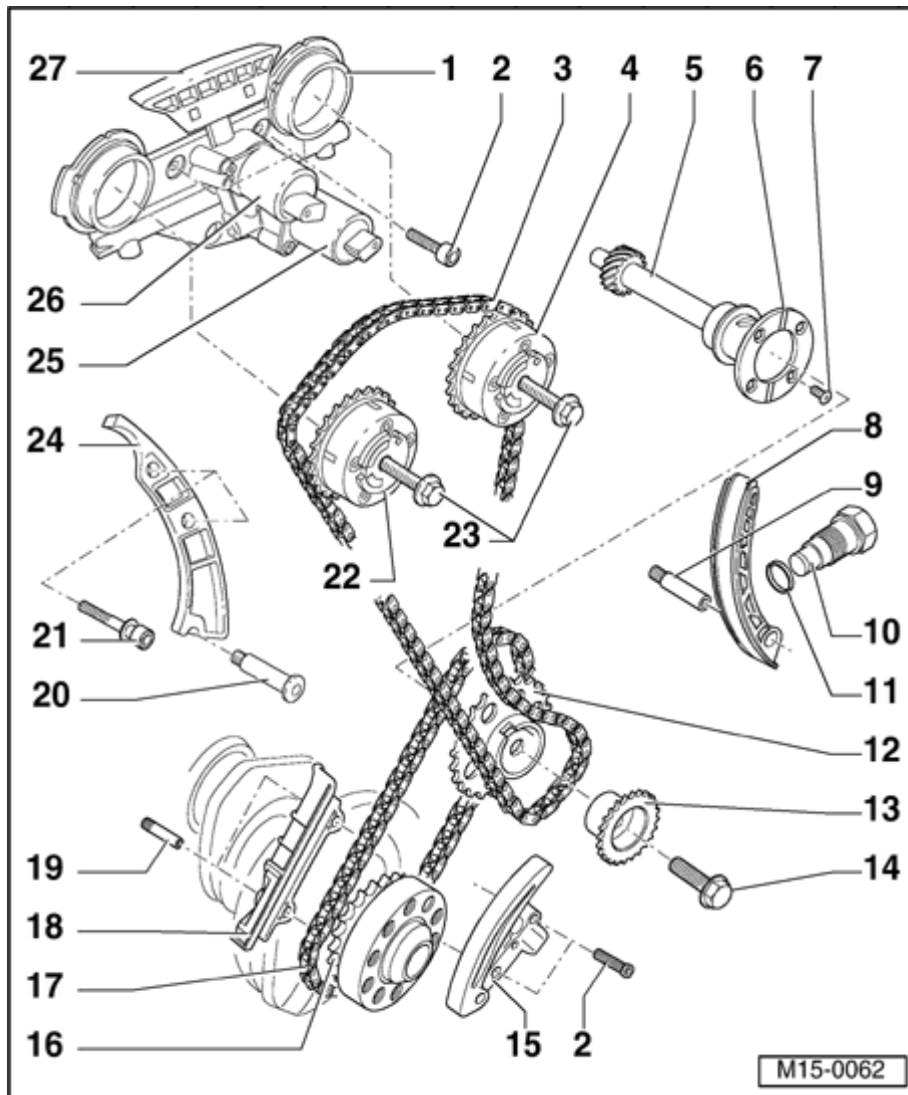
◆ For guide rail item 18

20 - 10 Nm

◆ For
guide
rail
item
24

21 - 23 Nm

◆ For
guide
rail
item
24



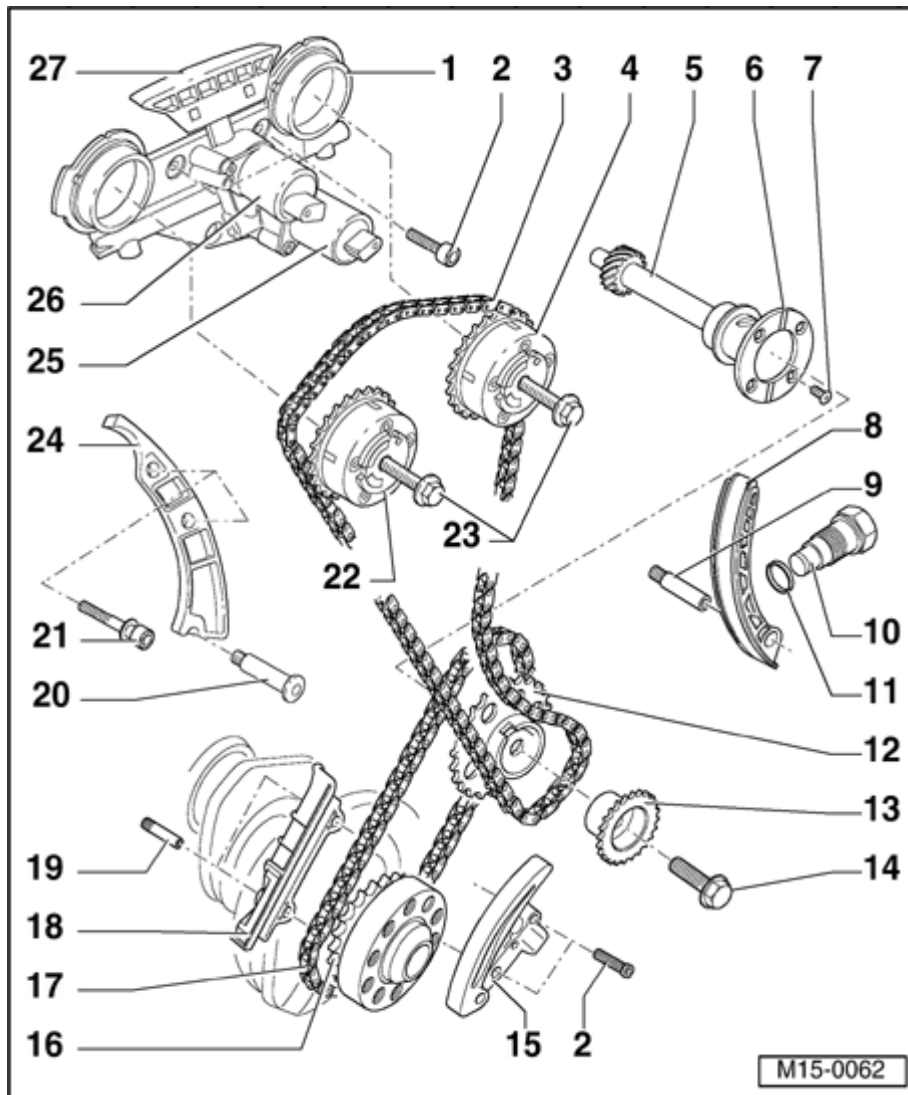
**22 Intake
- camshaft
timing
adjuster**

- ◆ Marking:
24E
- ◆ Turn engine over only when camshaft timing adjuster is installed
- ◆ Check camshaft timing adjustment ⇒ [Page 15-82](#)
- ◆ Installing ⇒ [Page 15-39](#) , Adjusting valve timing

**23 60 Nm
- plus
additional
1/4 turn
(90°)
further**

- ◆ Replace
- ◆ Contact surface of sensor wheel on bolt head must be dry for assembly
- ◆ To remove

and
install,
use a 32
mm open
jaw
spanner
on
camshaft
to counter
support
⇒ [Page
15-69](#) ;
Removing
and
installing
camshaft



24 - Guide rail

- ◆ For camshaft roller chain item 3

25 Camshaft - adjustment valve 2 (exhaust) - N318-

- ◆ Check camshaft timing adjustment ⇒ [Page 15-82](#)
- ◆ Mark connector and component before pulling connector off
- ◆ Checking activation:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

26 Valve 1 for - camshaft adjustment -N205-

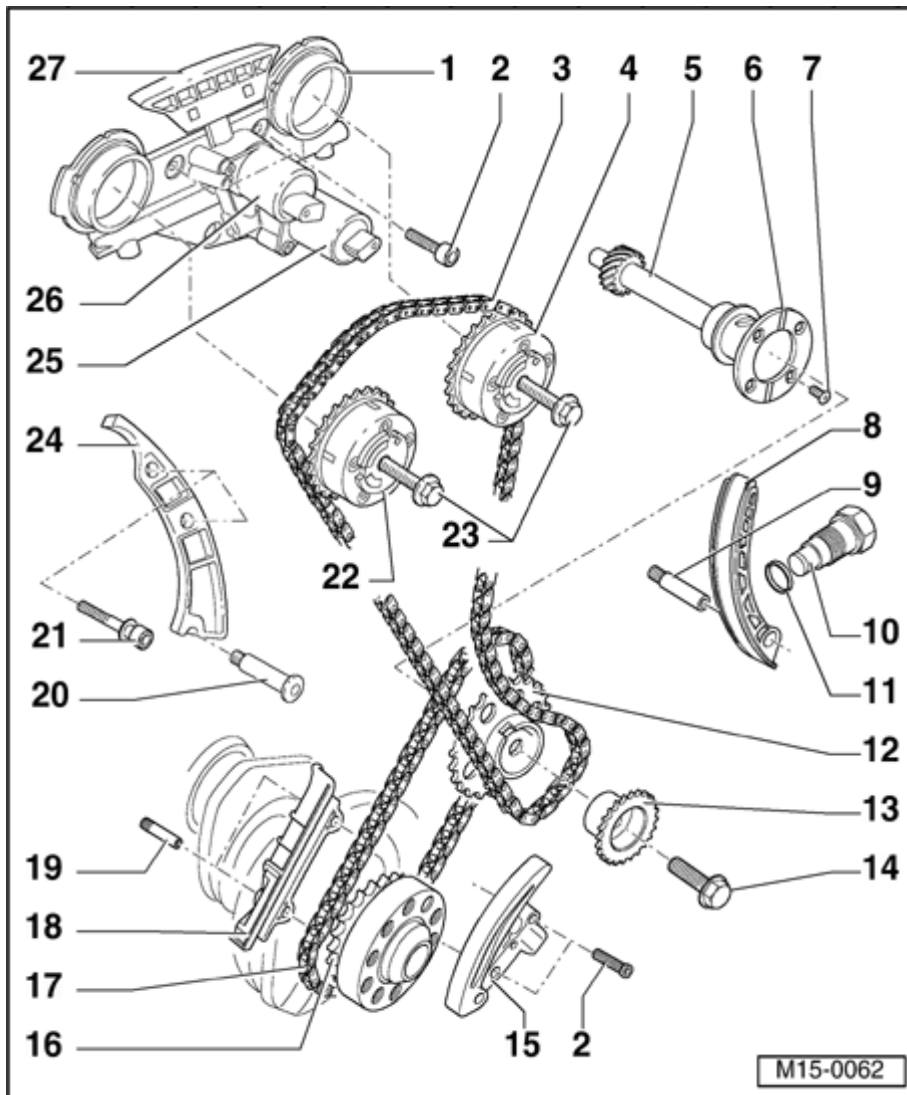
- ◆ For intake camshaft
- ◆ Check camshaft

timing
adjustment
⇒ [Page
15-82](#)

◆ Mark
connector
and
component
before
pulling
connector
off

◆ Checking
activation:

⇒ [Repair
Manual, 2.8
Liter VR6 4V
Fuel Injection &
Ignition, Engine
Code\(s\): BDF,
Repair Group
01](#)



27 - Guide rail

- ◆ For camshaft roller chain item 3
- ◆ Clipped into control housing

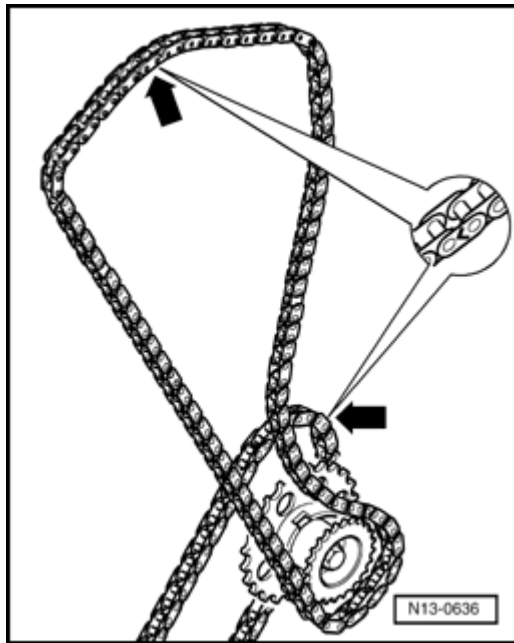
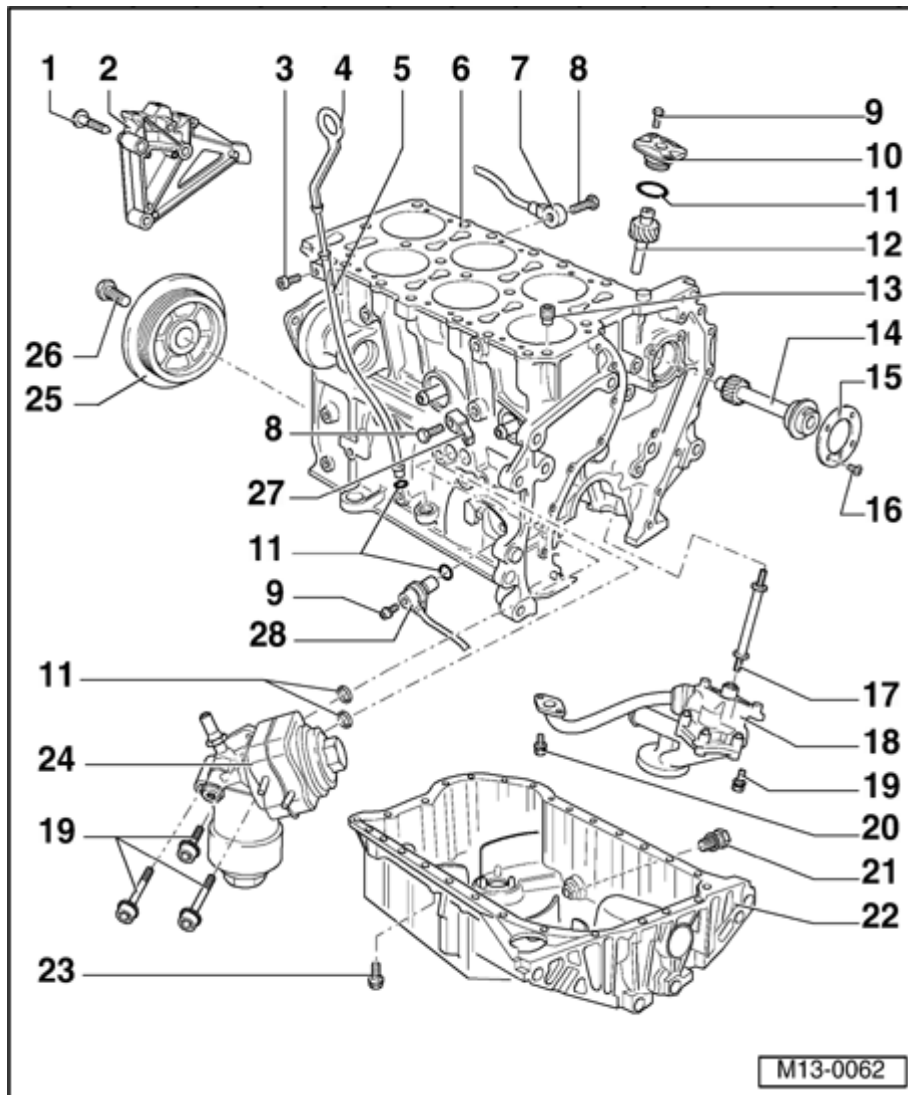


Fig. 1 Marking roller chains

- Mark roller chains before removing (e.g. with paint, arrow pointing in direction of rotation).

Note:

Do not mark chain with a punched mark, notch or similar!



Part II

1 - 45 Nm

2 - Engine bracket

3 - 8 Nm

◆ Secured to intake manifold

4 - Dipstick

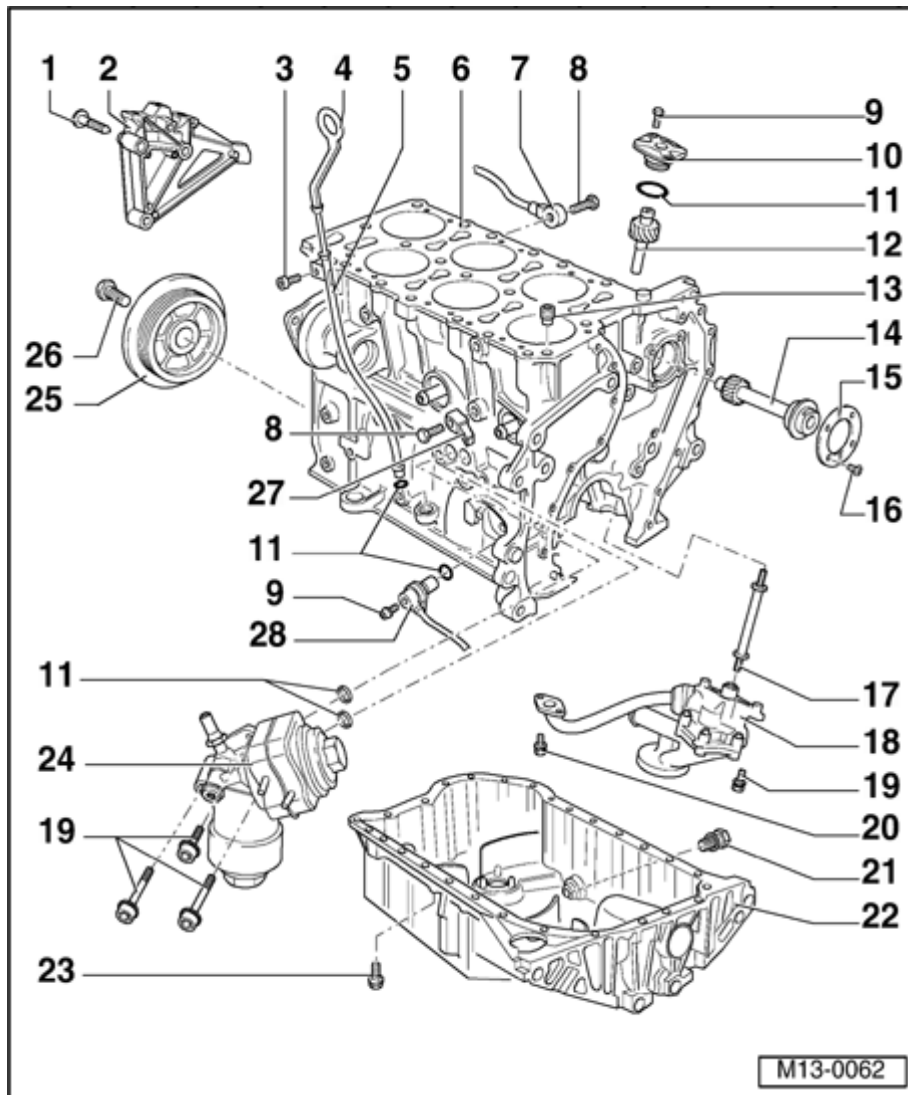
◆ The oil level must not exceed the max. mark!

◆ Markings ⇒ [Page 17-8](#), Fig. 2

5 - Guide tube

◆ For dipstick

◆ Secured by a bolt to intake manifold



6 - Cylinder block

- ◆ Removing and installing sealing flange and dual-mass flywheel ⇒ [Page 13-22](#)
- ◆ Removing and installing crankshaft ⇒ [Page 13-34](#)
- ◆ Disassembling and assembling piston and conrod ⇒ [Page 13-39](#)

7 - Knock Sensor (KS) 1 - G61-

- ◆ 3-pin
- ◆ Installation location: Between cyl. 1 and cyl. 3
- ◆ The contact surfaces between knock sensor and cylinder block must be free of

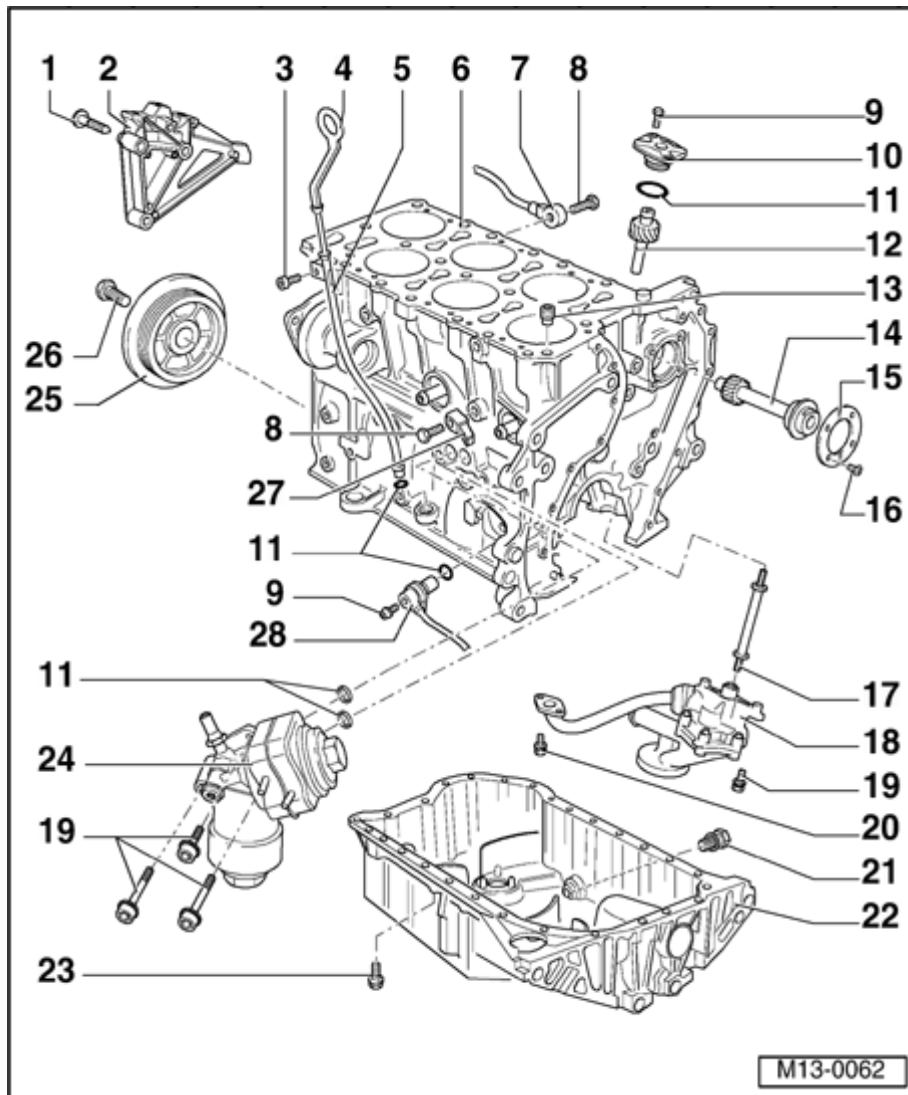
corrosion,
dirt and
grease.

◆ Checking:

⇒ [Repair Manual,
2.8 Liter VR6 4V
Fuel Injection &
Ignition, Engine
Code\(s\): BDF,
Repair Group 01](#)

8 - 20 Nm

◆ Torque
setting
influences
the
function
of knock
sensor



9 - 10 Nm

10 - Oil pump drive cover

11 - O-ring

◆ Replace

◆ Lubricate before installing

12 - Oil pump drive

13 - Oil non-return valve, 5 Nm

◆ Observe installation position

◆ Clean if badly soiled

◆ See note ⇒ [Page 13-1](#)

14 Intermediate - shaft

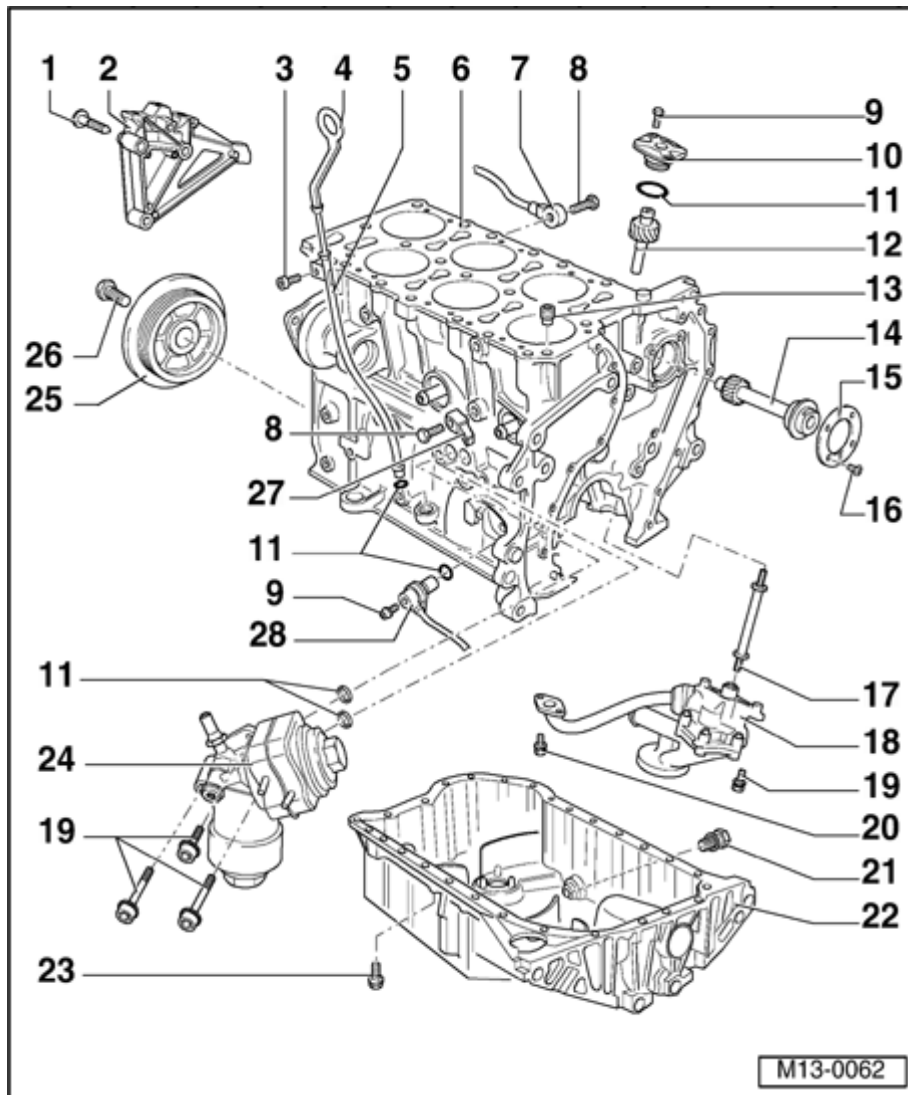
15 - Thrust washer

16 - 10 Nm

◆ Install with locking compound "D6"

17 - Drive shaft

◆ For oil pump drive



18 - Oil pump

◆ Disassembling and assembling ⇒ [Page 17-12](#)

- ◆ Coat oil pressure pipe at cylinder block and oil pump housing with sealing compound AMV 188 001 02

19 - 23 Nm

20 - 8 Nm

- ◆ Insert with locking compound D 000 600 A2

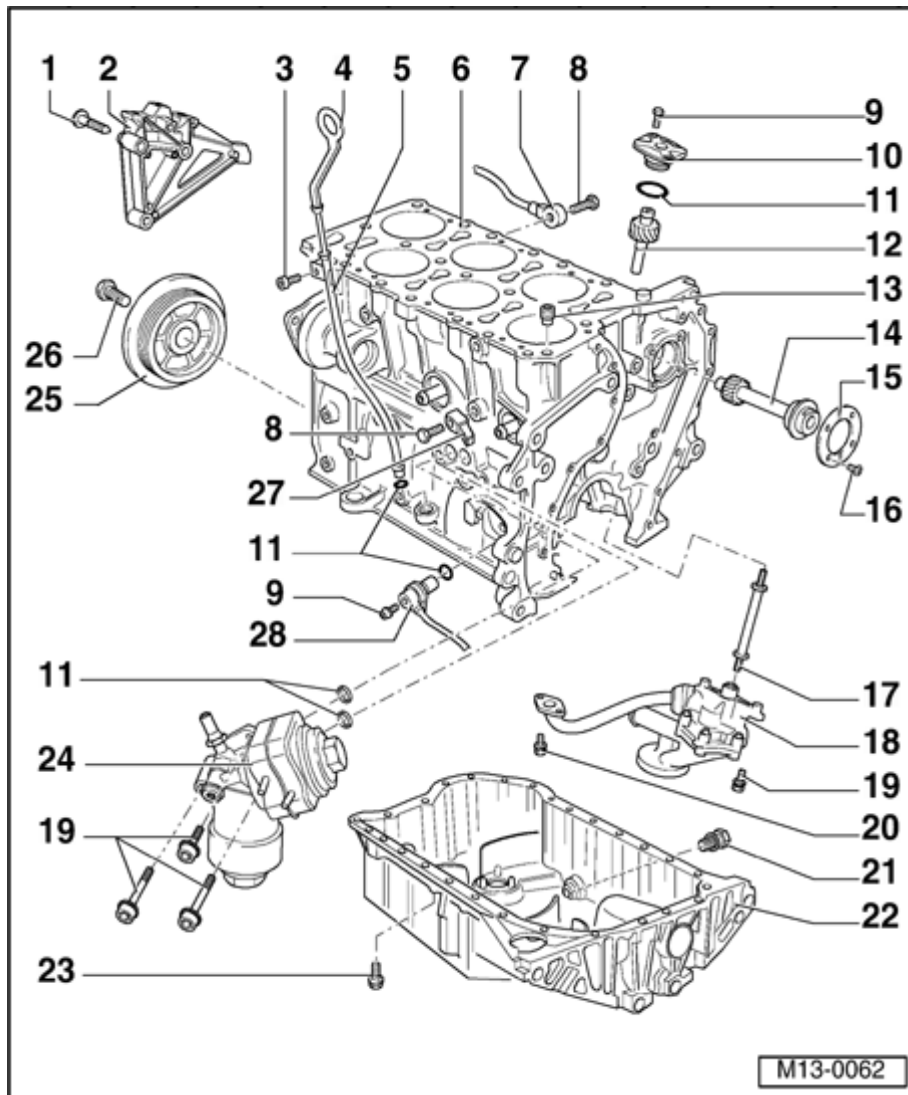
21 - Oil drain plug, 30 Nm

- ◆ Replace if leaking

22 - Oil pan

- ◆ Removing and installing ⇒ [Page 17-15](#)

23 - 12 Nm



24 - Oil filter housing

- ◆ See note
⇒ [Page 13-1](#)
- ◆ Disassembling and assembling ⇒ [Page 17-9](#)
- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

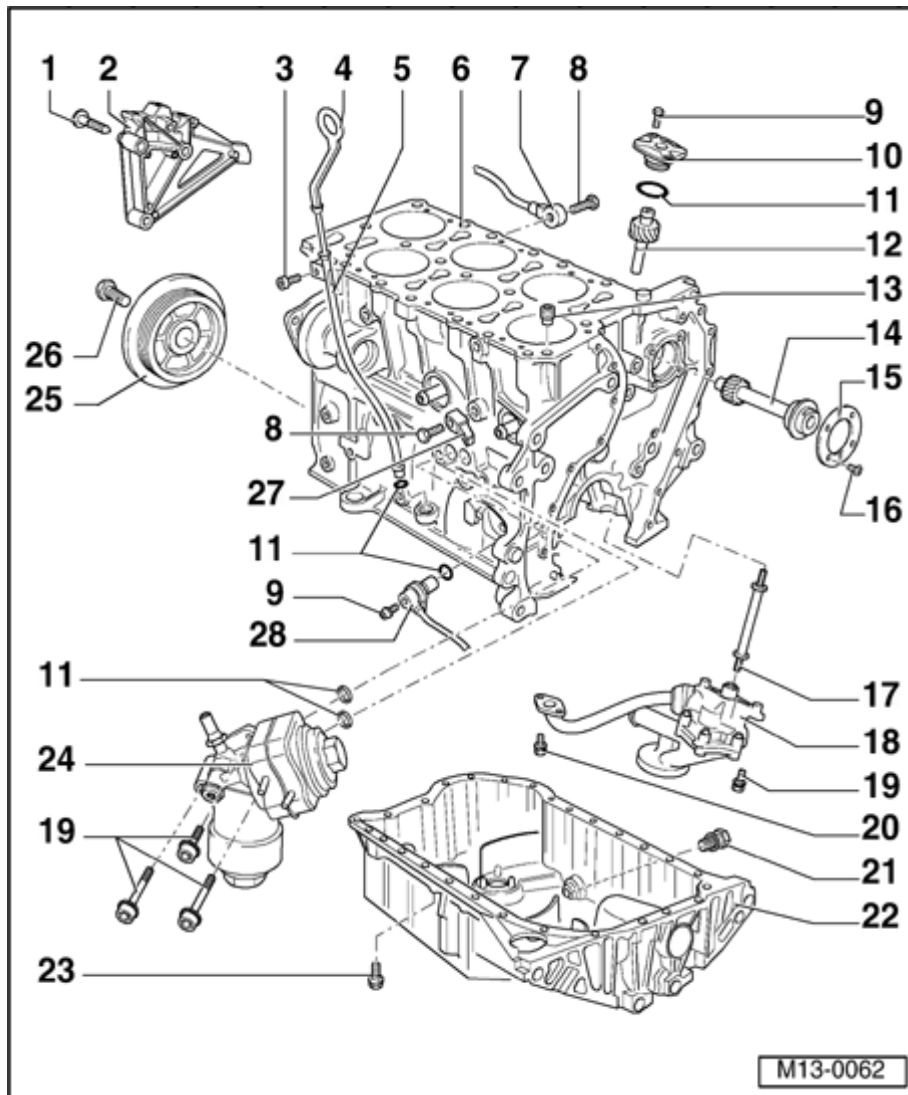
25 - Vibration damper

- ◆ Removing and installing ribbed belt ⇒ [Page 13-19](#)

26 - 100 Nm plus additional 1/4 turn (90°) further

- ◆ Replace
- ◆ Use counter support T10069 to loosen and tighten ⇒ [Fig. 1](#)
- ◆ Tighten using torque wrench VAG

1601



27 - Knock Sensor (KS) 2 - G66-

◆ 2-pin

◆ Installation location:
Between cyl. 4 and cyl. 6

◆ The contact surfaces between knock sensor and cylinder block must be free of corrosion, dirt and grease.

◆ Checking:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code \(s\): BDF, Repair Group 01](#)

28 - Engine speed (RPM) sensor -G28-

◆ Checking:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition,](#)

Engine Code
(s): BDF,
Repair Group
01

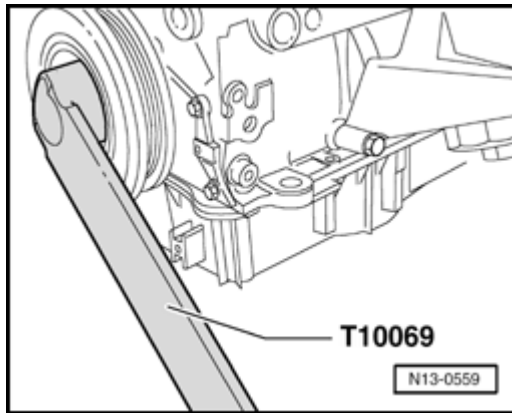


Fig. 1 To loosen and tighten securing bolt, hold vibration damper with counter support T10069

Note:

- ◆ *Vibration damper securing bolt must be replaced.*
- ◆ *Tighten securing bolt with torque wrench VAG 1601.*

Ribbed belt, removing and installing

Special tools and equipment

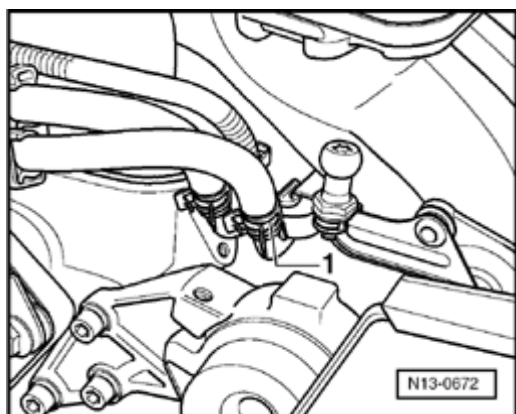
- ◆ VAS 5024 Assembly tool for spring-type clips
- ◆ Hex bolt M8x45

Removing ribbed belt

Note:

Mark ribbed belt direction of rotation before removing. Make sure ribbed belt is seated correctly in belt pulley when installing.

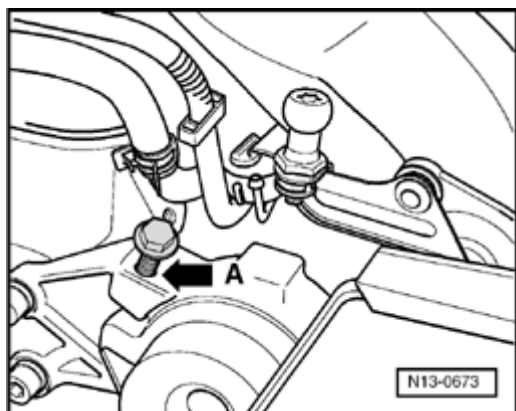
- Remove engine cover.



- ✦ - Pull off return hose -1- (with blue marking) and collect fuel that may leak out with a cloth.
- Seal lines to avoid contamination of fuel system.
- Observe rules for cleanliness ⇒ [Page 20-14](#) .
- Removing right hand insulation tray:

⇒ [Repair Manual, Body Exterior, Repair Group 50](#)

- Mark direction of rotation of ribbed belt.



- ✦ - Screw M8x45 bolt into threaded hole -A- of tensioning element until ribbed belt is no longer under tension.

Note:

Screw bolt in sufficiently so that the ribbed belt can be removed and no further, otherwise the tensioner element housing may be damaged.

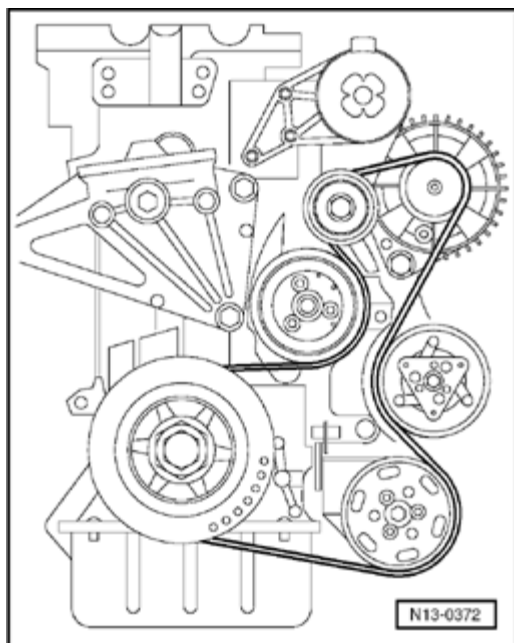
- Remove ribbed belt.

Installing ribbed belt

- Install in reverse order.

Note:

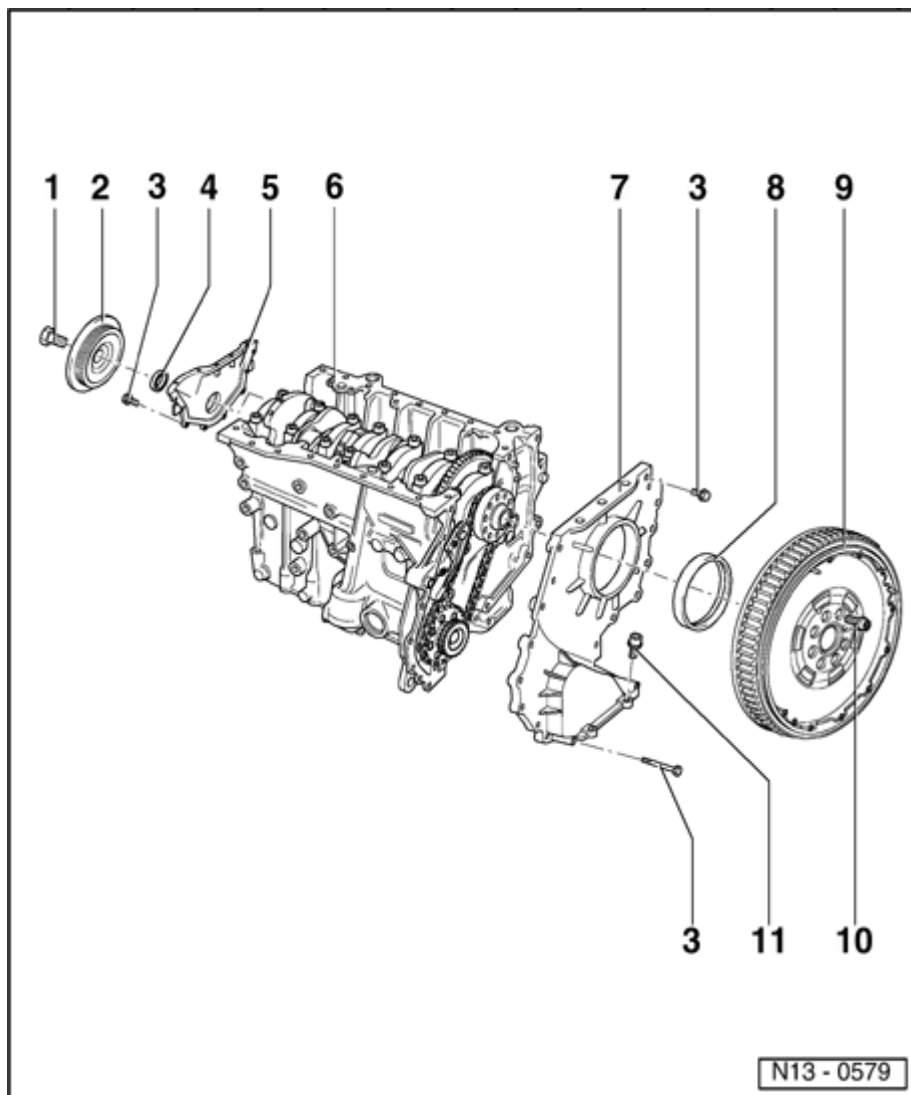
- ◆ *Make sure, before installing ribbed belt, ancillaries (alternator, air conditioning compressor, power steering pump) are s tightly.*
- ◆ *When installing the ribbed belt observe l direction of rotation and that the belt is s correctly in the belt pulleys.*



- Install ribbed belt.
- Remove M8 bolt from tensioner!

After completing repairs always:

- Start engine and check belt running.
- Install right-hand insulation tray:
⇒ [Repair Manual, Body Exterior, Repair Gr](#)
- Install engine cover.



Sealing flanges and dual-mass flywheel, removing and installing

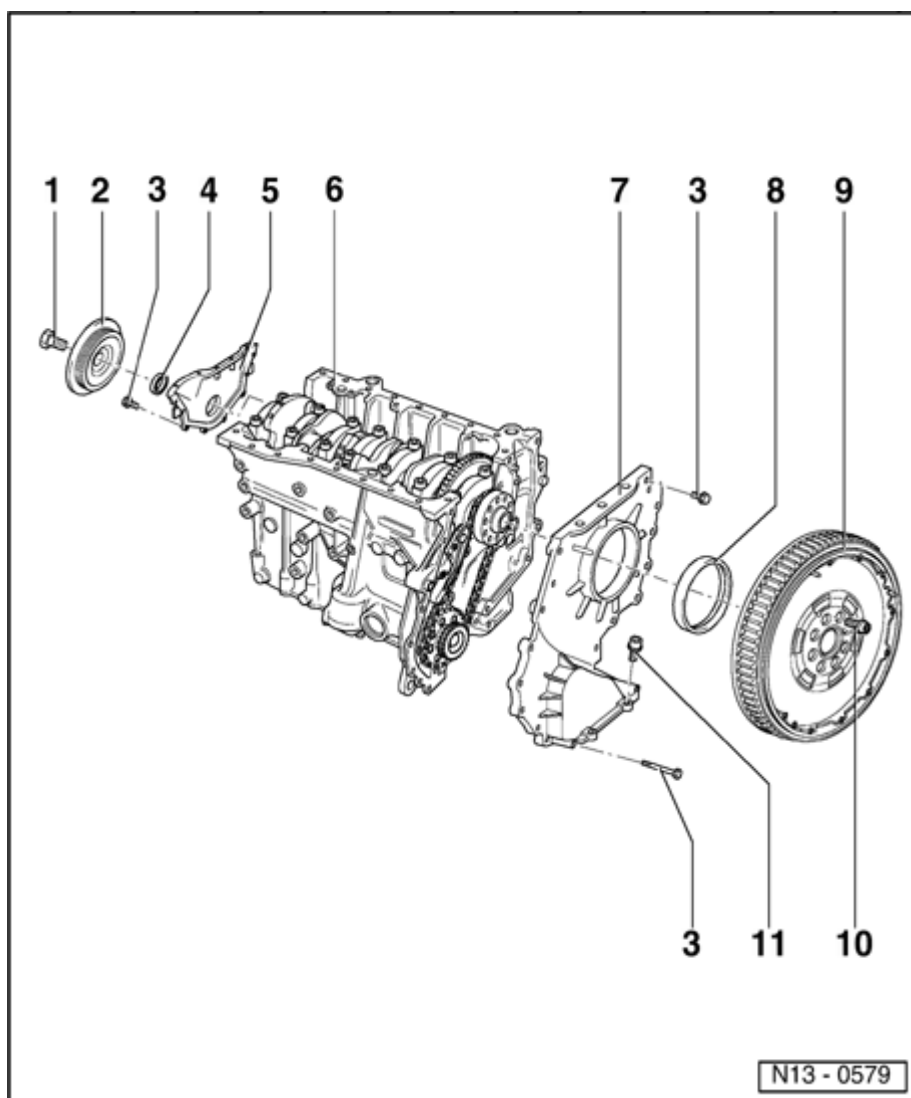
Note:

- ◆ Servicing clutch:

⇒ [Repair Manual, 5 & 6 Spd. Manual Transmission 02M, Repair Group 30](#)

- ◆ When working on the engine it should be secured to assembly stand VW 313 using engine bracket 3269 or VW 540 and supplementary set 540/1 B.
- ◆ The sealing flange (item 7) can be removed and installed when cylinder head is installed.

13-23



**1 - 100 Nm
plus
additional
 $\frac{1}{4}$ turn
(90°)
further**

◆ Replace

◆ Use counter support T10069 to loosen and tighten ⇒ [Page 13-27](#), Replacing crankshaft oil seal - vibration pulley end

◆ Tighten using torque wrench VAG 1601

2 - Vibration damper

◆ Removing and installing ribbed belt ⇒ [Page 13-19](#)

3 - 8 Nm

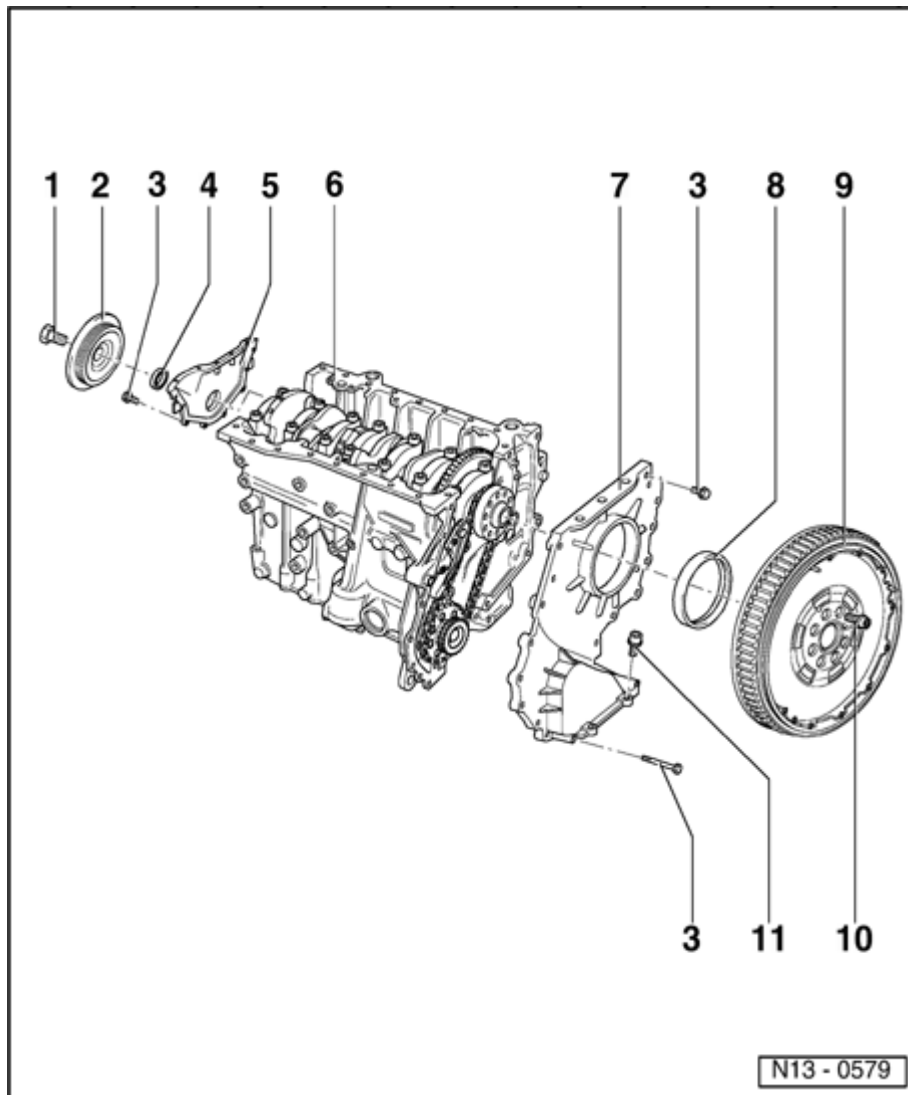
4 - Seal

◆ PTFE seal version

◆ Marking: With no inner

coil
spring

- ◆ Do not additionally lubricate the oil seal sealing lip
- ◆ Before installing, remove oil remains from crankshaft journal with a clean cloth
- ◆ Replacing
⇒ [Page 13-27](#)



5 - Sealing flange

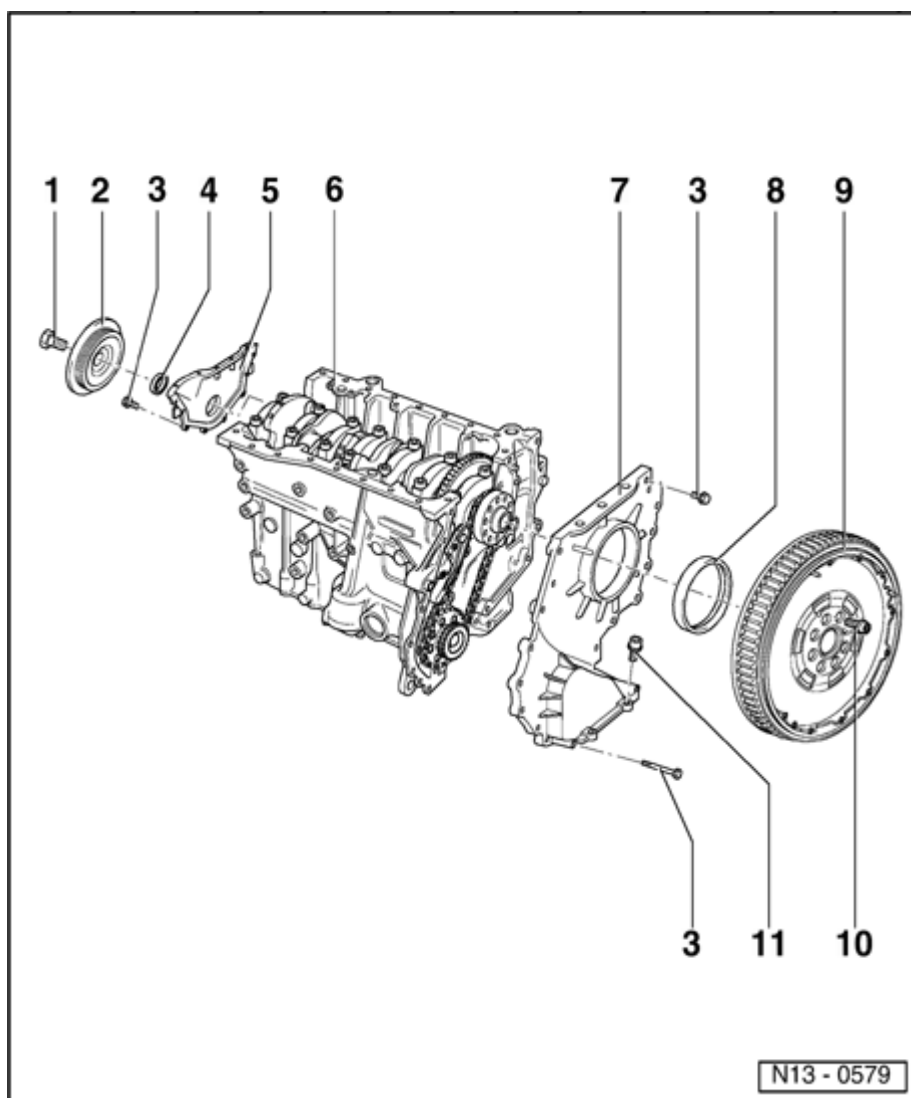
- ◆ Coat sealing surfaces with sealing compound AMV 188 001 02

6 - Cylinder block

- ◆ Removing and installing crankshaft ⇒ [Page 13-34](#)
- ◆ Disassembling and assembling piston and connecting rod ⇒ [Page 13-39](#)

7 - Sealing flange

- ◆ Coat sealing surfaces with sealing compound AMV 188 001 02
- ◆ Seal sealing surface to cover ⇒ [Page 15-39](#) , Adjusting timing



8 - Seal

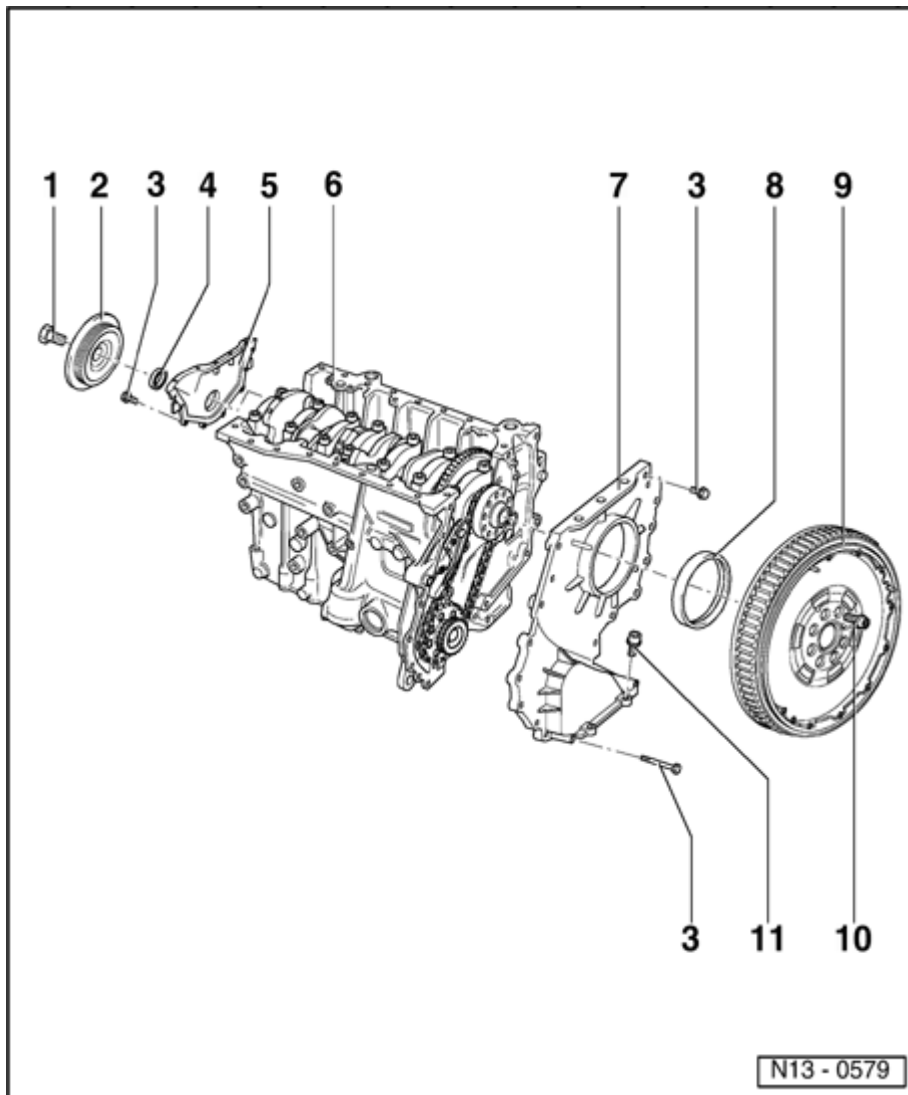
- ◆ PTFE seal version
- ◆ Marking: With no inner coil spring
- ◆ Do not additionally lubricate the oil seal sealing lip
- ◆ Remove with extractor hook 2086
- ◆ Before installing, remove oil remains from crankshaft journal with a clean cloth.
- ◆ Install over sleeve 2003/2A
- ◆ Pull in onto limit stop with press sleeve 2003/1

9 Dual-mass - flywheel/drive plate

- ◆ Removing and installing

drive
plate ⇒
[Page 13-
31](#)

13-26



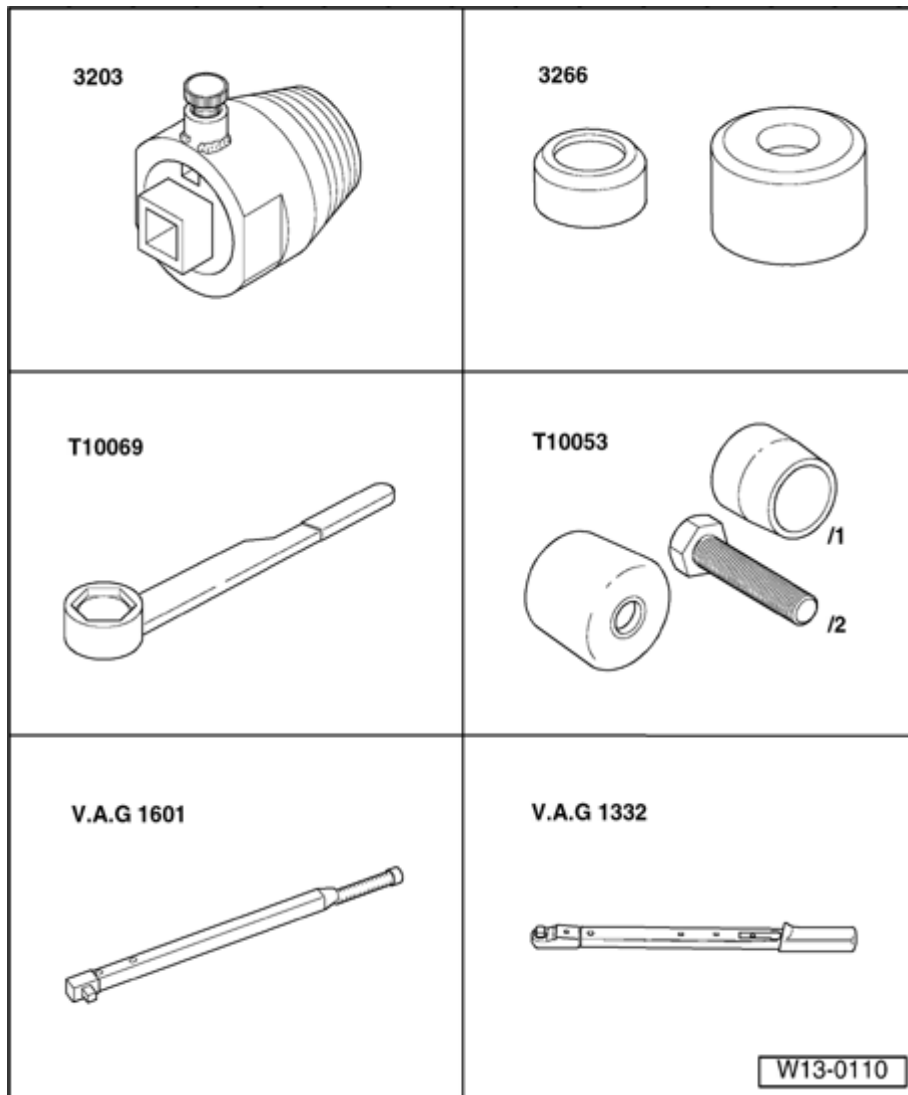
10 60 Nm
- plus
additional
1/4 turn
(90°)
further

◆ Replace

◆ Use counter support T10069 to loosen and tighten

11 - 23 Nm

13-27



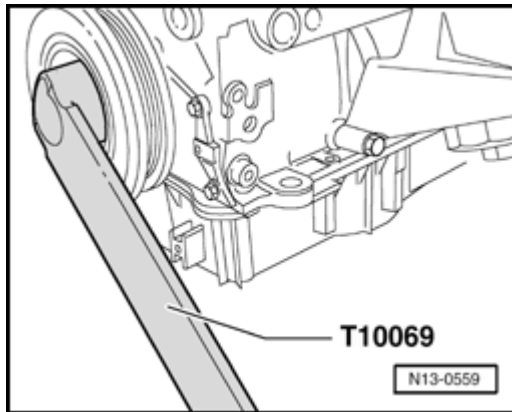
Crankshaft oil seal (vibration damper end), replacing

Special tools and equipment

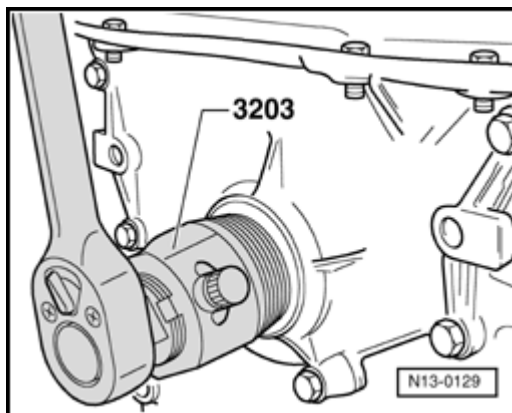
- ◆ 3203 Oil seal extractor
- ◆ 3266 Sleeve
- ◆ T10069 Counter support
- ◆ T10053/1 Guide sleeve
- ◆ VAG 1601 Torque wrench (150...800 Nm)
- ◆ VAG 1332 Torque wrench (40...200 Nm)

Removing

- Remove ribbed belt ⇒ [Page 13-19](#).



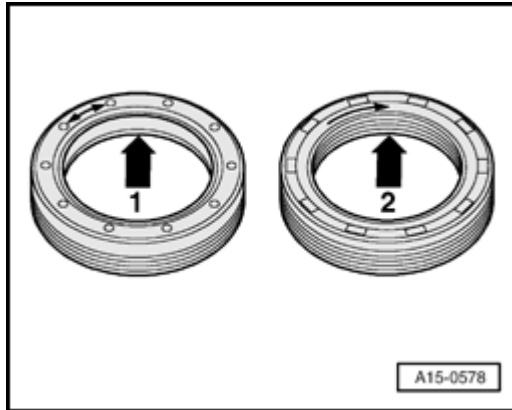
- Remove vibration damper. To do this, hold vibration damper with counter support T10069.
- Unscrew inner part of oil seal extractor 3203 three turns (approx. 4 mm) out of the outer part and lock with knurled screw.



- Lubricate threaded head of oil seal extractor 3203, place it in position and exerting firm pressure screw it as far as possible into oil seal.
- Loosen knurled screw and turn inner part against crankshaft until oil seal is pulled out.

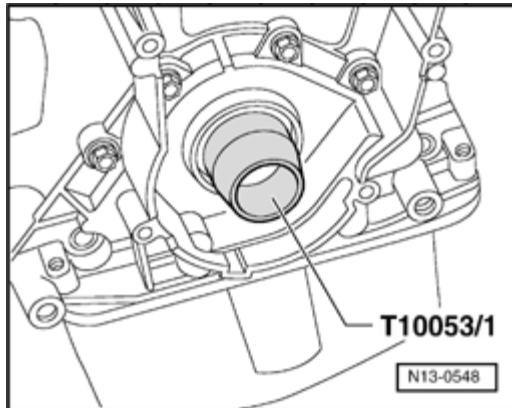
Installing

Note:



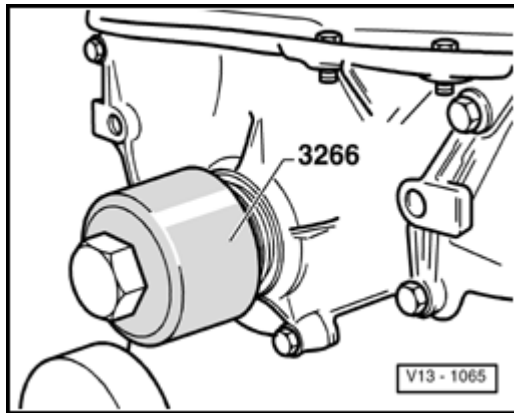
✦ A PTFE seal (Teflon) -2- is gradually being introduced instead of the inner coil spring type seal-1-. This has a wider sealing lip. PTFE seals are fitted free of oil and grease. When a PTFE seal is installed, then only such a seal may be installed as a replacement part!

- Before installing, remove oil remains from crankshaft journal with a clean cloth.

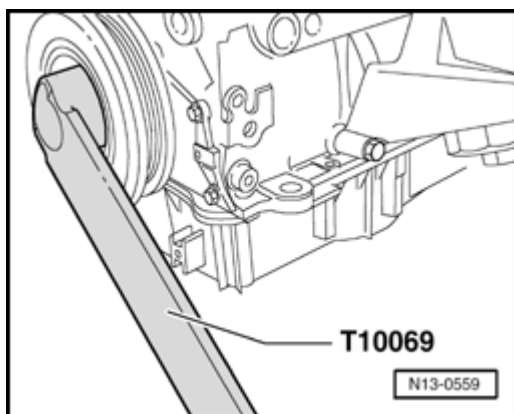


- ✦ - Install guide sleeve T10053/1 onto crankshaft journal and carefully slide seal onto guide sleeve

13-30



- Press seal against limit stop using press sleeve from 3266. Use old mounting bolt for vibration damper for this purpose.



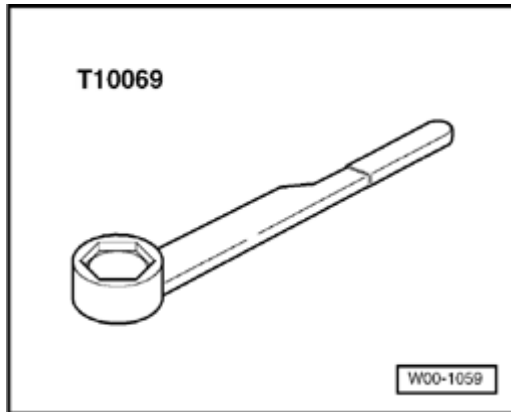
- Install vibration damper and lock it with counter support T10069.
- Tighten new bolt to 100 Nm plus additional 90° (1/4 turn - turning further can be done in several stages).

Note:

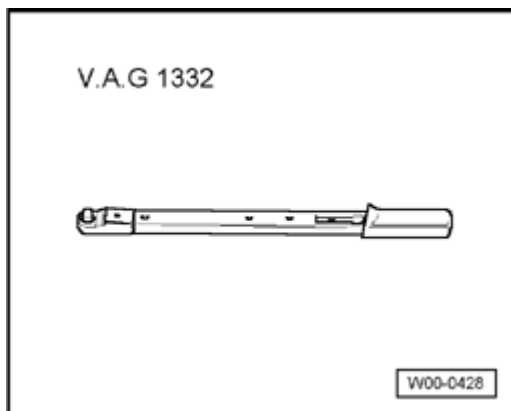
- ◆ *Vibration damper securing bolt must be replaced.*
- ◆ *Tighten securing bolt with torque wrench VAG 1601.*
- Install ribbed belt ⇒ [Page 13-19](#) .

Drive plate, removing and installing

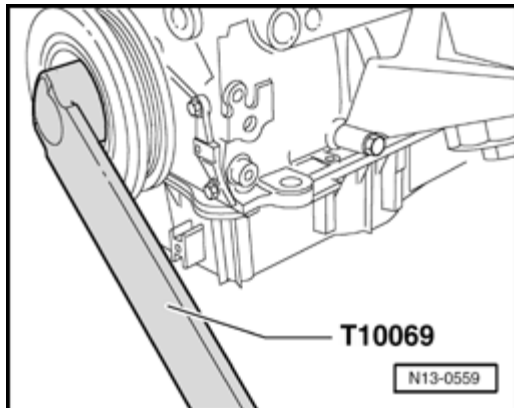
Special tools and equipment



- ◆ T10069 Counter support



- ◆ VAG 1332 Torque wrench (40...200 Nm)
- ◆ Depth gauge
- ◆ Straight edge

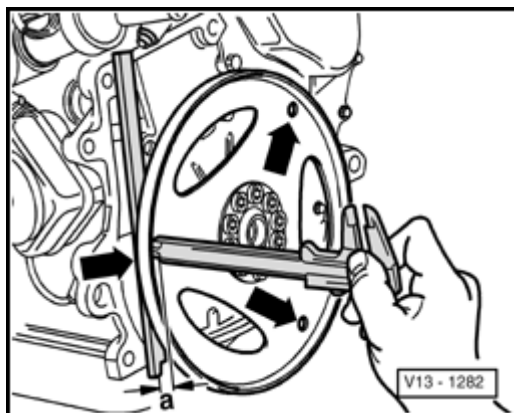


Removing

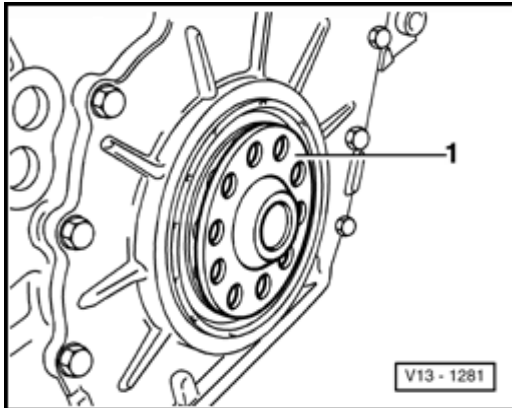
- ✦ - Remove drive plate. To do this, hold vibration damper with counter support T10069.
- Loosen drive plate securing bolts using cross-over sequence and remove them.
- Remove drive plate.

Installing

- Position drive plate on crankshaft
- Insert at least 3 old bolts and tighten to 30 Nm.



- ✦ - Check dimension -a- through three holes for securing torque converter using a straightedge and depth gauge and calculate average.
 - Compare average (measured distance + thickness of straightedge) with specification.
- Specification: 15.7...16.5 mm



If the specification is not obtained:



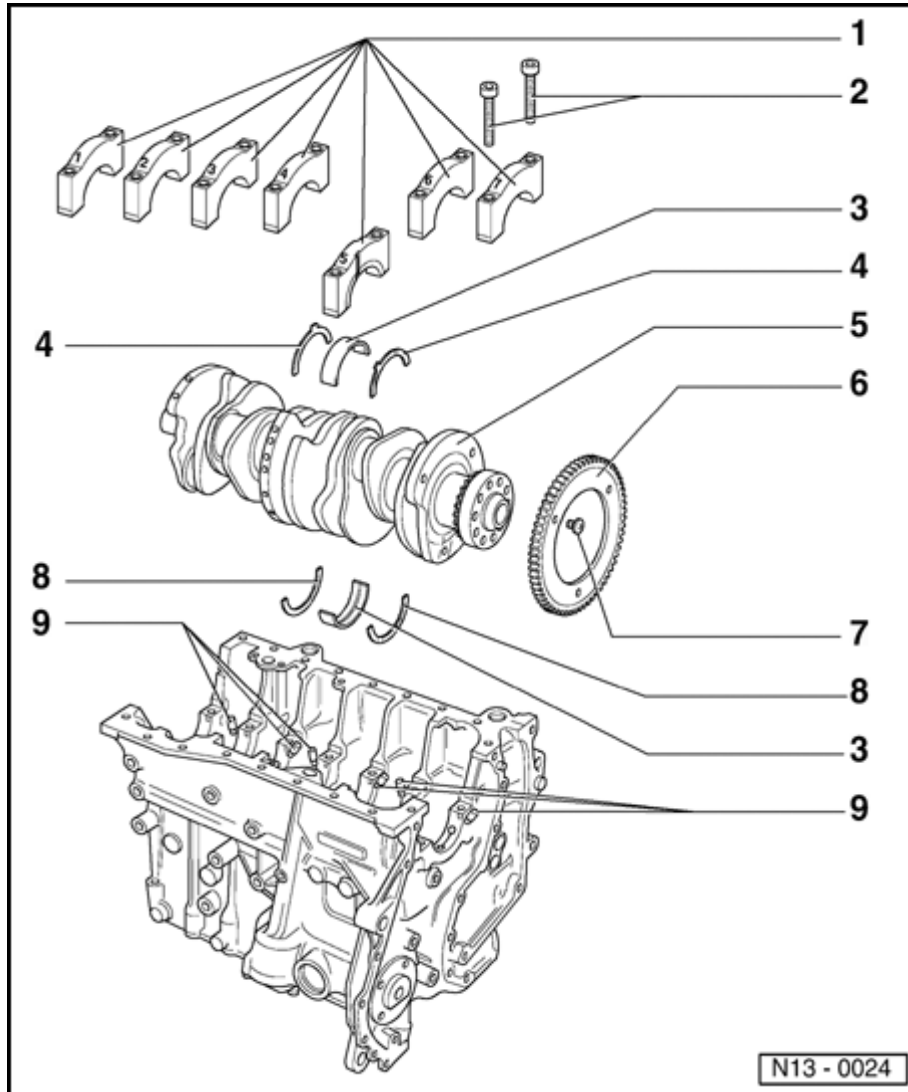
- Remove drive plate again and install appropriate shim -1-

Note:

Only one shim of the appropriate thickness may be used to compensate.

If the specification is obtained:

- Install new cylinder head bolts and tighten hand tight.
- Tighten securing bolt to 60 Nm plus additional 90° (1/4 turn - turning further can be done in several stages).



Crankshaft, removing and installing

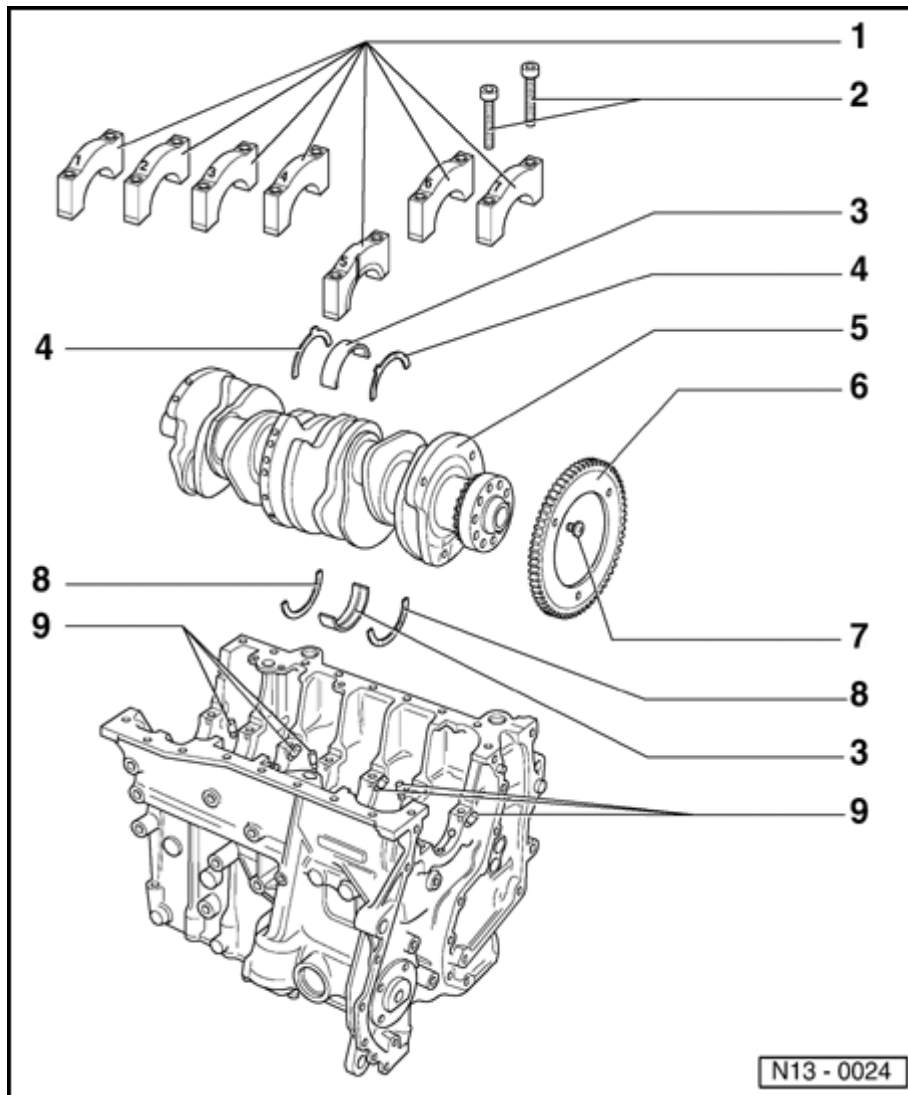
Note:

- ◆ *When working on the engine it should be secured to assembly stand VW 313 using engine bracket 3269 or VW 540 and supplementary set 540/1 B.*
- ◆ *Before removing the crankshaft, ensure that a suitable place has been prepared to ensure that the sensor wheel (item - 6 -) does not make contact or become damaged.*
- ◆ *When changing bearing shells ensure that bearing shells of same color code are used.*

1 - Bearing cap

- ◆ Bearing cap 1: Vibration damper end

- ◆ Bearing cap 5 with recesses for thrust washers
- ◆ Bearing shell retaining lugs (cylinder block/bearing cap) must be on the same side



**2 - 30 Nm
plus
additional
 $\frac{1}{2}$ turn
(180°)
further**

◆ Replace

◆ Turning 2
x 90
° further is
permitted

**3 - Bearing
shells
1...7**

◆ Observe
note
before
removing
⇒ [Page
13-34](#)

◆ For
bearing
cap
without
oil
groove

◆ For
cylinder
block
with oil
groove

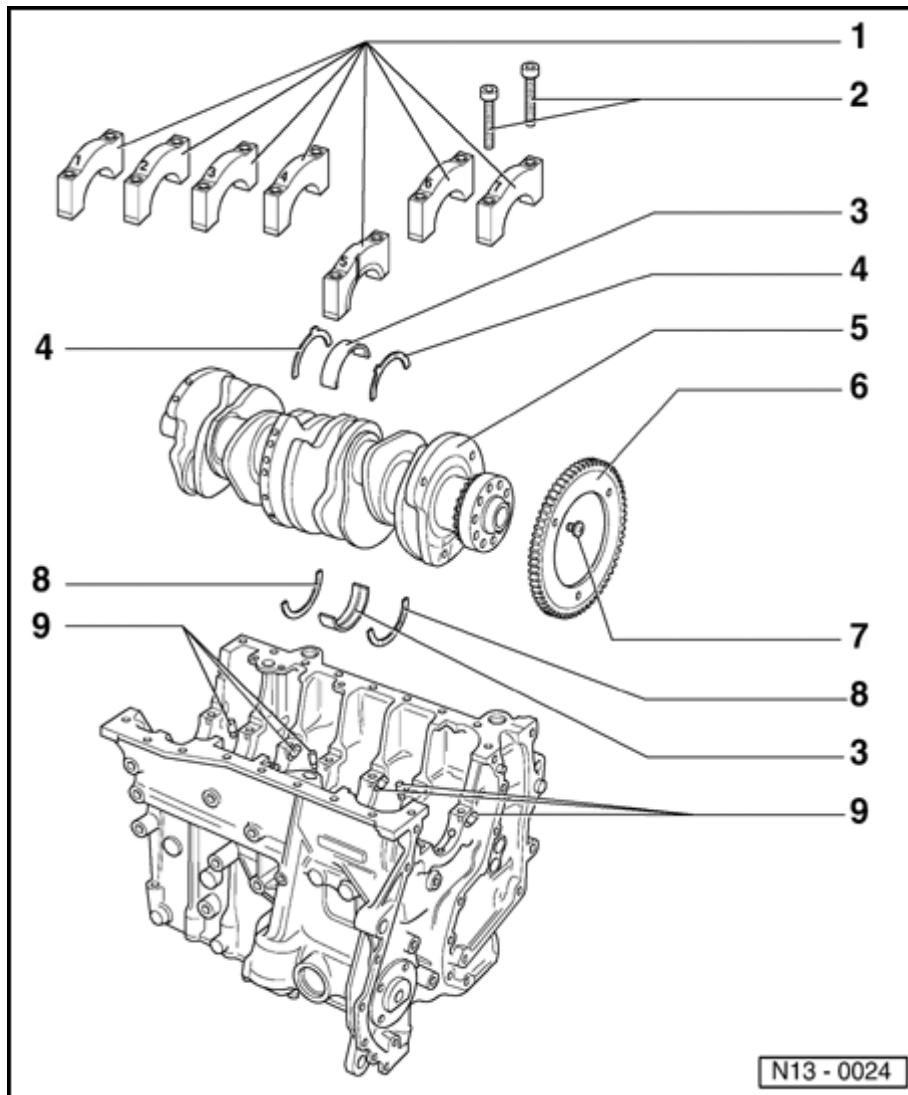
◆ Do not
interchange
used
bearing
shells
(mark
location)

**4 - Thrust
bearing**

◆ For
bearing
cap 5

- ◆ Check locating point

13-36



5 - Crankshaft

- ◆ Observe note before removing ⇒ [Page 13-34](#)
- ◆ Axial clearance new: 0.07...0.24 mm, Wear limit: 0.30 mm
- ◆ Check radial clearance with Plastigage, New: 0.02...0.06 mm, Wear limit: 0.10 mm
- ◆ Do not turn crankshaft when checking the radial clearance
- ◆ Crankshaft dimensions:
Main bearing: 59.958...59.978 mm
Conrod bearing: 53.958...53.978 mm

6 - Sensor wheel

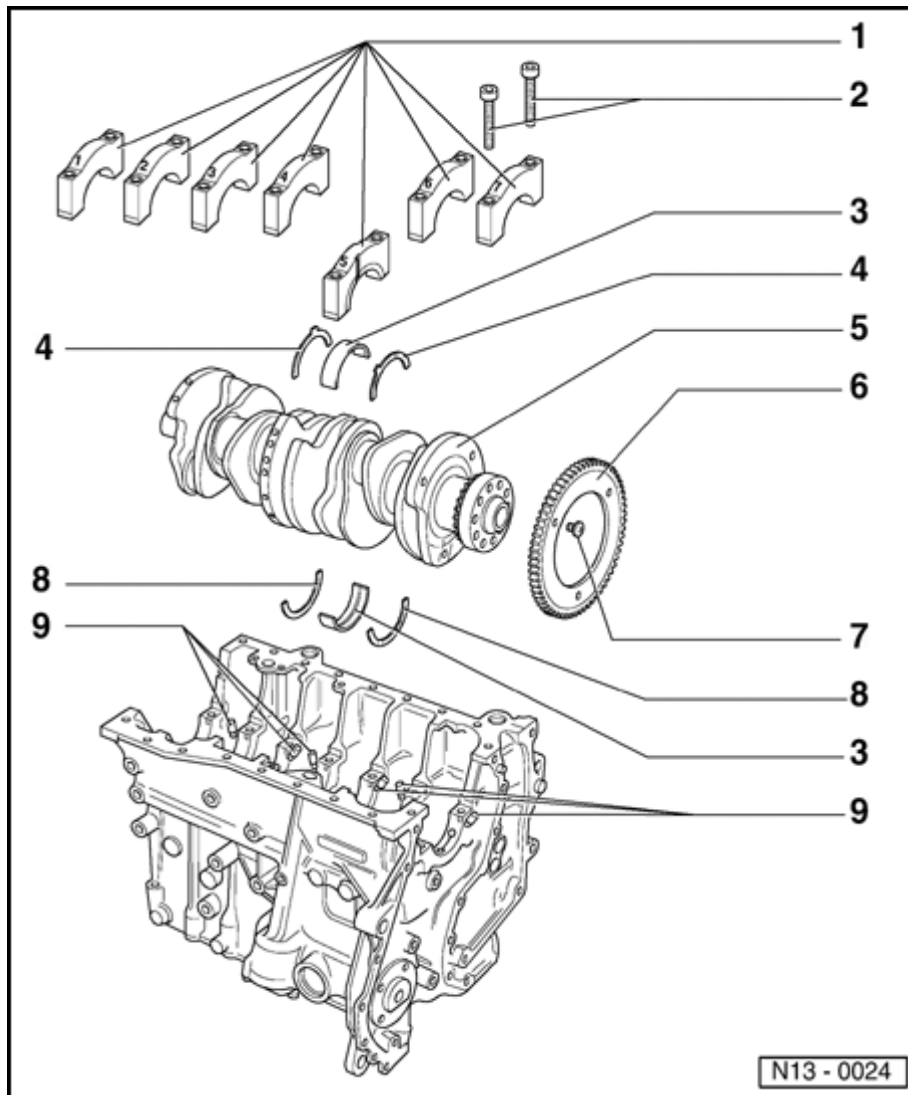
- ◆ For Engine speed (RPM)

sensor -
G28-

◆ Replace

◆ Installing
⇒ [Fig. 1](#)

13-37



**7 - 10 Nm
plus
additional
1/4 turn
(90°)
further**

◆ Replace

◆ Observe
sequence
when
tightening
⇒ [Fig. 1](#)

**8 - Thrust
bearing**

◆ For
bearing
cap 5

◆ Check
locating
point

**9 - Oil
spray
jet**

◆ For
crankshaft
bearings
2...7

◆ For
piston
cooling

◆ Opening
pressure:
2.0 bar

◆ Removing
and
installing
⇒ [Page
17-7](#) , Fig.
1

◆ See
note
⇒

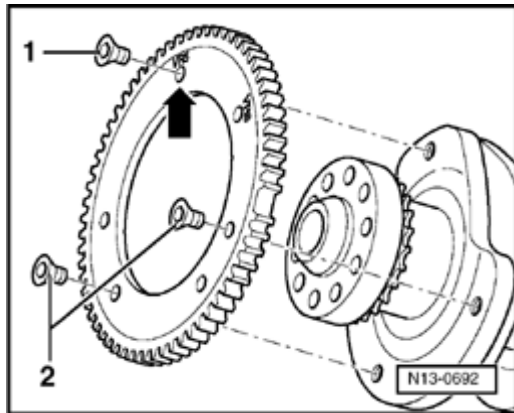


Fig. 1 Installing sensor wheel to crankshaft

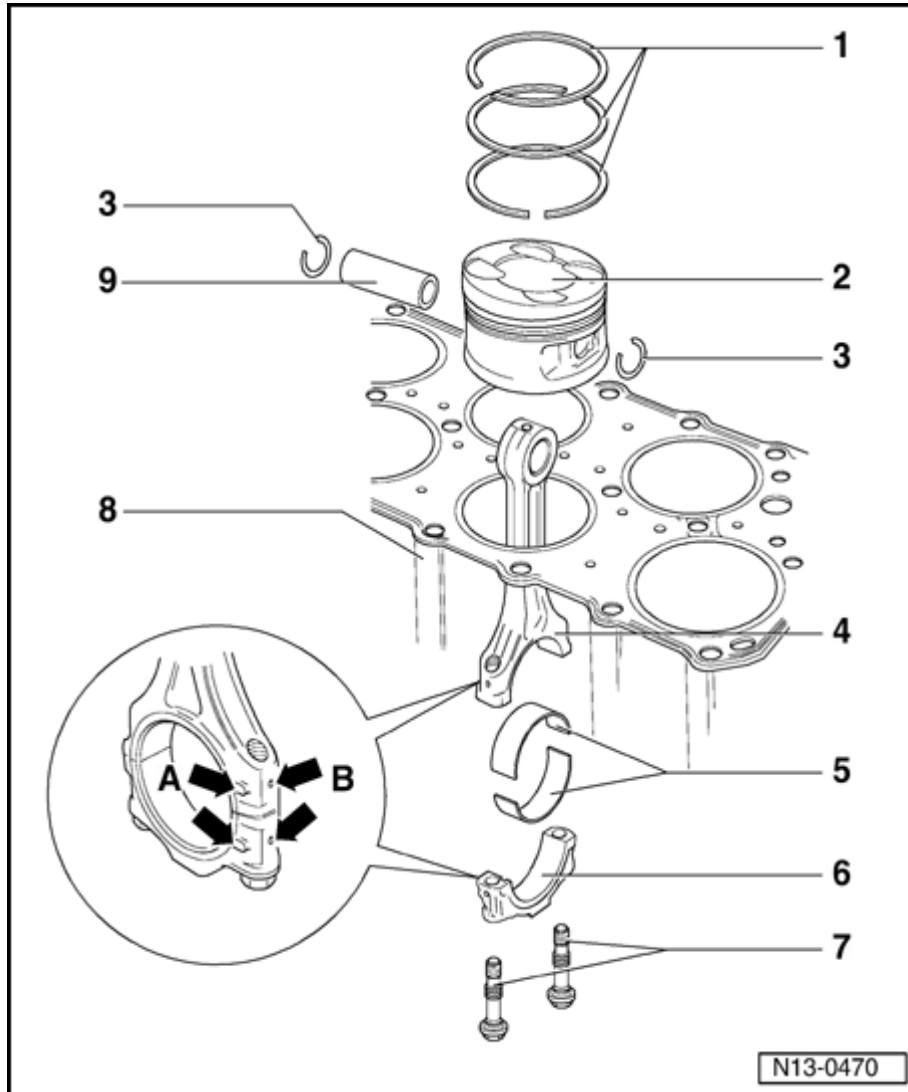
Special tools and equipment

- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ D 000 600 A2 Locking compound

Work sequence

Make sure crankshaft/sensor wheel contact surfaces are free of oil and grease.

- Apply a thin coat of locking compound D 000 600 A2 to contact surfaces of crankshaft and sensor wheel for additional security.
- Check that when installing "VR6" (arrow) is marked at individual threaded holes.
- Tighten all new securing bolts lightly by hand.
- Tighten securing bolt -1- to 10 Nm plus additional 90° (1/4 turn).
- Tighten securing bolts -2- to 10 Nm plus additional 90° (1/4 turn).



Piston and connecting rod, disassembling and assembling

1 - Piston rings

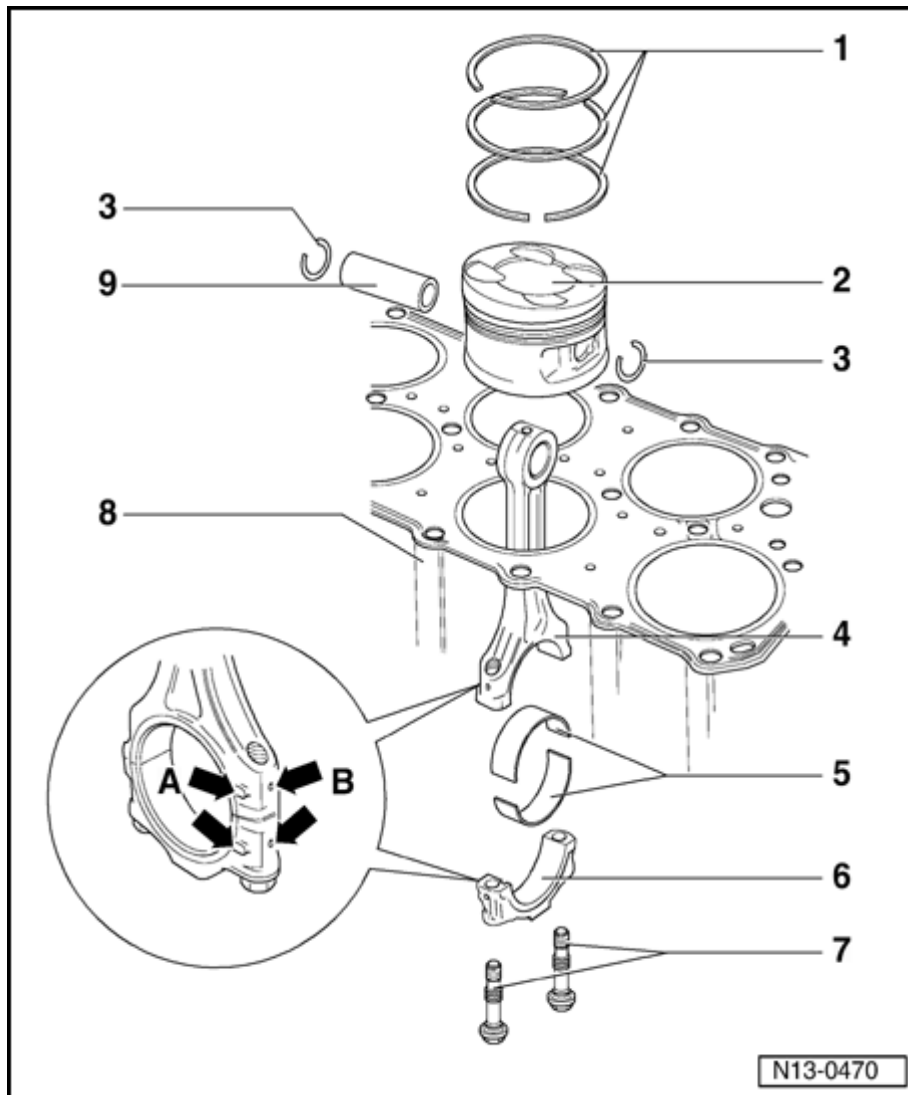
- ◆ Offset gaps 120°
- ◆ Use piston ring pliers to remove and install
- ◆ "TOP" face towards piston crown
- ◆ Checking ring gap \Rightarrow [Fig. 1](#)
- ◆ Checking ring to groove clearance : [Fig. 2](#)

2 - Piston

- ◆ Checking = [Fig. 3](#)
- ◆ Mark installation position to connecting rod and cylinder
- ◆ Flatter side piston crown faces towards center of cylinder block
- ◆ Install with piston installation (funnel) 32° \Rightarrow [Fig. 5](#)

3 - Snap ring

13-40

**4 - Conrod**

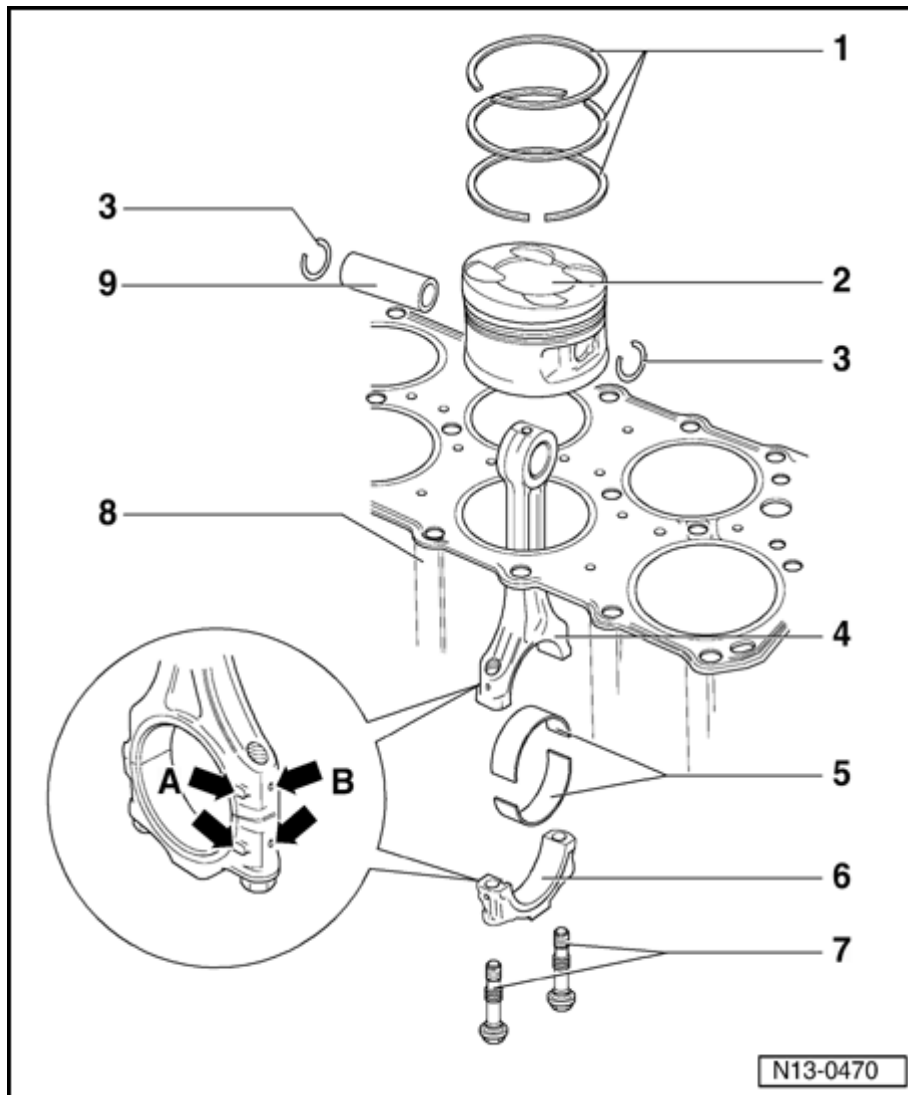
- ◆ Only replace as a set
- ◆ Mark position to cylinder -B-
- ◆ Installation position: Marks -A- must be aligned above one another

5 - Bearing shell

- ◆ Observe installation position
- ◆ Do not interchange used bearing shells
- ◆ Lugs on bearing shells must fit tightly in recesses
- ◆ Axial clearance, New: 0.05...0.35 mm, Wear limit: 0.40 mm
- ◆ Check radial clearance with

Plastigage:
New:
0.02...0.07
mm, Wear
limit: 0.10
mm. Do
not turn
crankshaft
when
checking
radial
clearance

13-41



6 - Conrod bearing cap

- ◆ Mark position to cylinder -B-
- ◆ Installation position: Marks -A- must be aligned above one another
- 7 - 30 Nm plus additional $\frac{1}{4}$ turn (90°) further**
- ◆ Replace
- ◆ Oil thread and contact surface

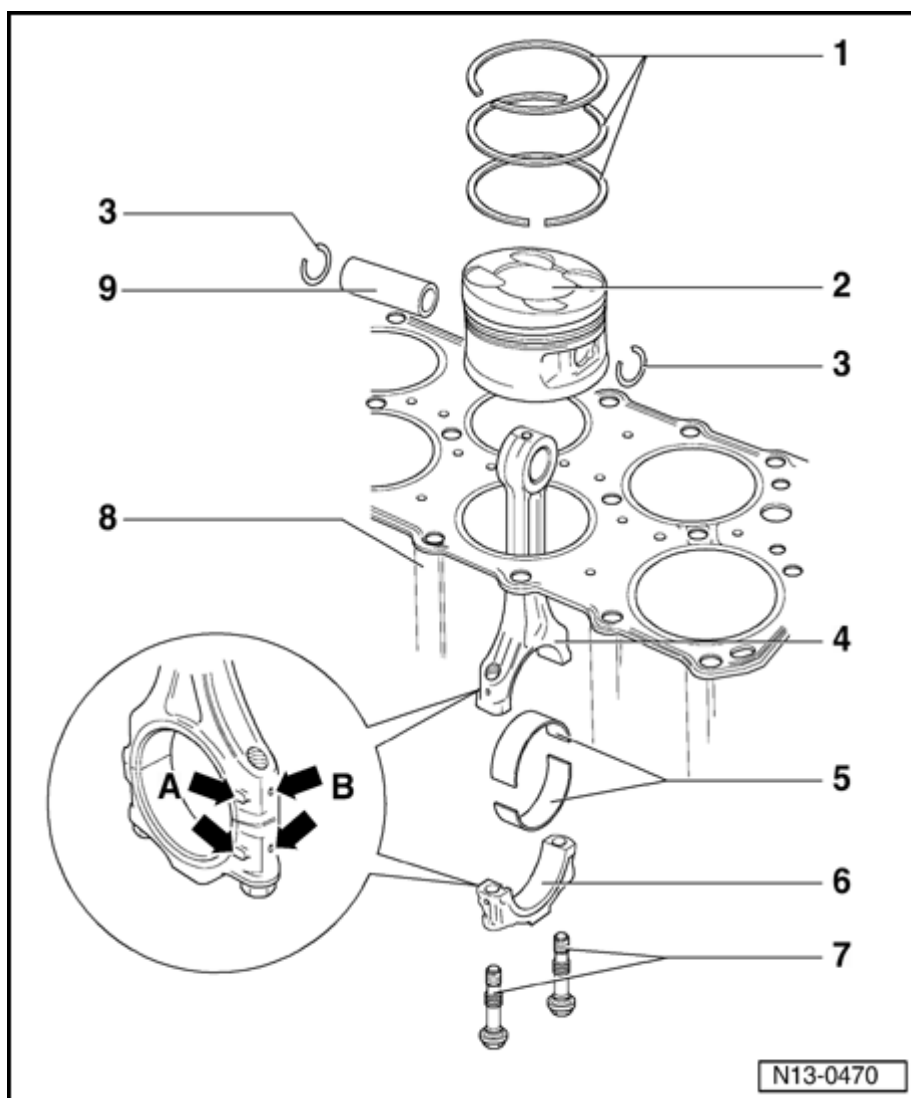
- ◆ To measure radial clearance tighten to 30 Nm, but do not turn further

8 - Cylinder block

- ◆ Checking cylinder bore \Rightarrow [Fig. 4](#)
- ◆ Removing and

installing
crankshaft
⇒ [Page
13-34](#)

◆ Piston and
cylinder
dimensions
⇒ [Page
13-48](#)



9 - Piston pin

◆ If difficult to remove, heat piston to 60 °C

◆ Remove and install with drift VW 222a

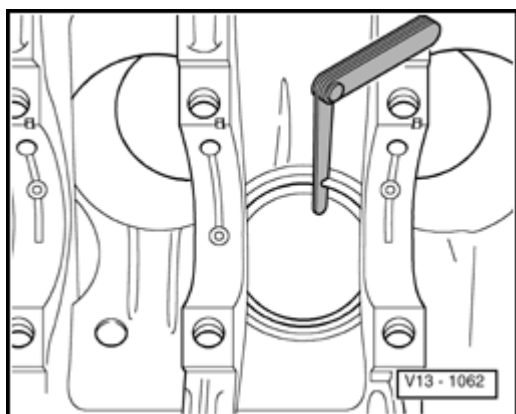


Fig. 1 Checking piston ring gap

Special tools and equipment

- ◆ Feeler gauge

Test sequence

- Push ring squarely from above down to approx. 15 mm from bottom end of cylinder. To do this use a piston without rings.

Piston ring		Gap	
		New	Wear limit
Compression ring	mm	0.20...0.40	1.0
Tapered-stepped ring	mm	0.20...0.40	1.0
Oil scraper ring	mm	0.25...0.50	1.0

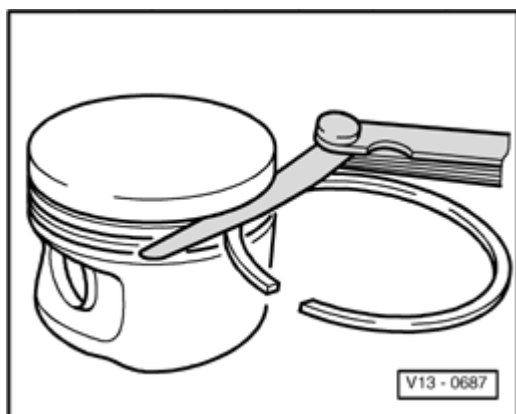


Fig. 2 Checking ring to groove clearance

Special tools and equipment

- ◆ Feeler gauge

Test sequence

- Clean ring groove before checking.

Piston ring		Ring to groove clearance	
		New	Wear limit
Compression ring	mm	0.04...0.08	0.15
Tapered-stepped ring	mm	0.02...0.06	0.15
Oil scraper ring	mm	0.03...0.06	0.15

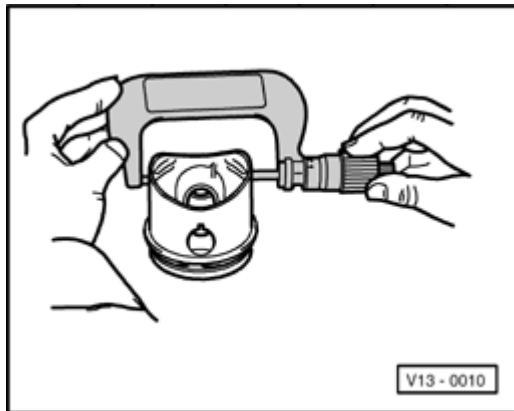


Fig. 3 Checking piston

Special tools and equipment

- ◆ External micrometer 75...100 mm

Test sequence

- Take measurement approx. 6 mm from lower edge of piston skirt and offset 90 ° to piston axis.

Deviation from nominal dimension: max. 0.04 mm

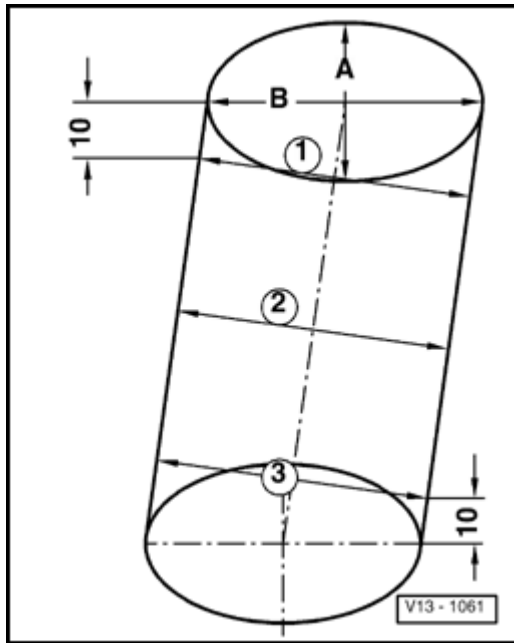


Fig. 4 Checking cylinder bores

Special tools and equipment

- ◆ Internal dial gauge 50...100 mm

Test sequence

- Measure bores at 3 locations in both directions -A- across engine and -B- in line with crankshaft.

Deviation from nominal dimension: max. 0.08 mm

Note:

The cylinder bores must not be measured if the cylinder block is mounted on a repair stand with engine bracket 3269 or VW 540, as incorrect measurements would then result.

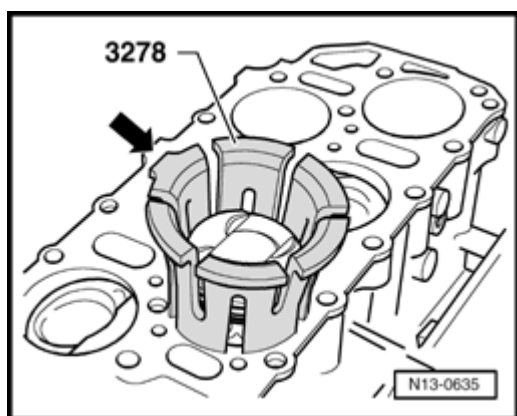


Fig. 5 Installing pistons with piston installation tool (funnel) 3278

Special tools and equipment

- ◆ 3278 Funnel

Note:

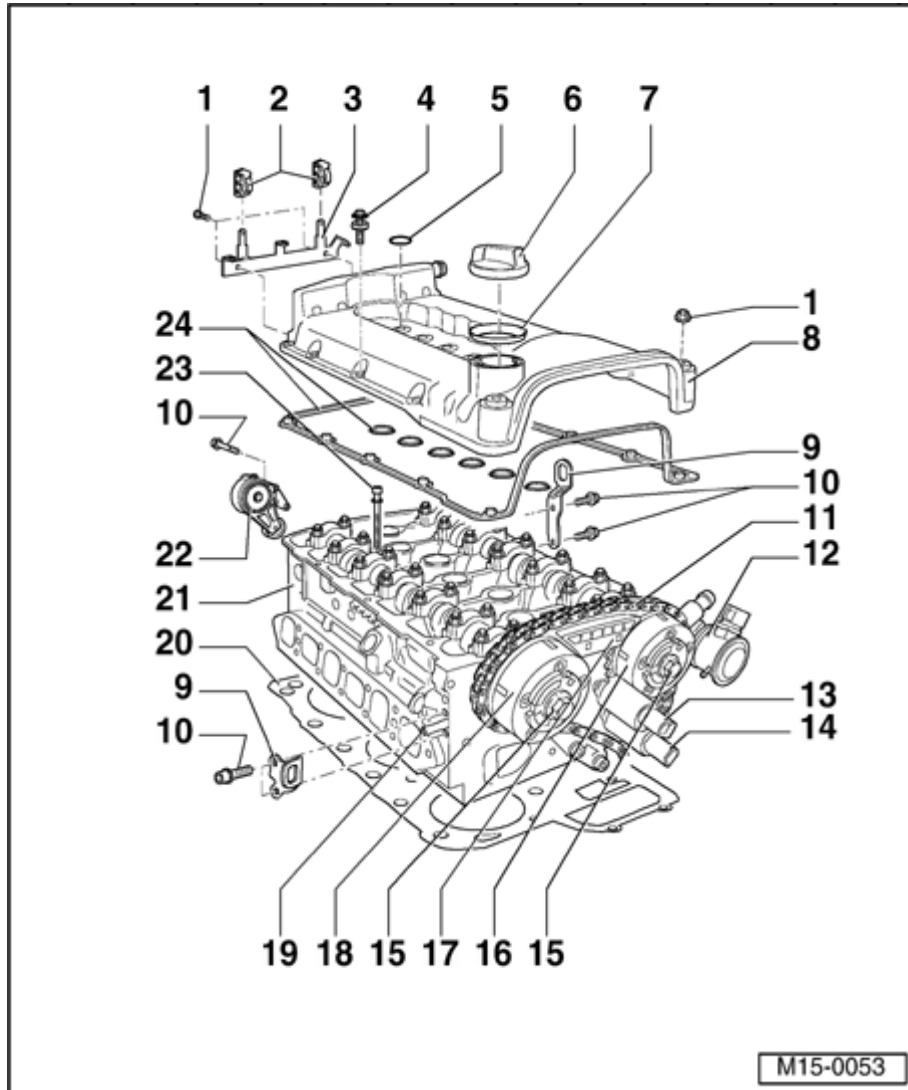
If a new installation tool (funnel) is used to install the pistons, first pass piston with oiled piston rings through the funnel twice and remove the resulting metal shavings if necessary. Only then install piston with piston rings.

Work sequence

- Push piston by hand into oiled installation tool (funnel). Flat side of piston crown must face toward tab on funnel (arrow).
- Hold installation tool (funnel) on upper edge and press piston in with both thumbs.
- Push piston in until it protrudes approx. 15 mm from lower edge of tool (funnel).
- Insert piston into appropriate cylinder bore. Tab on tool (arrow) must face center of cylinder block.
- Press installation tool (funnel) tightly against cylinder block and push piston in.

Piston and cylinder dimensions

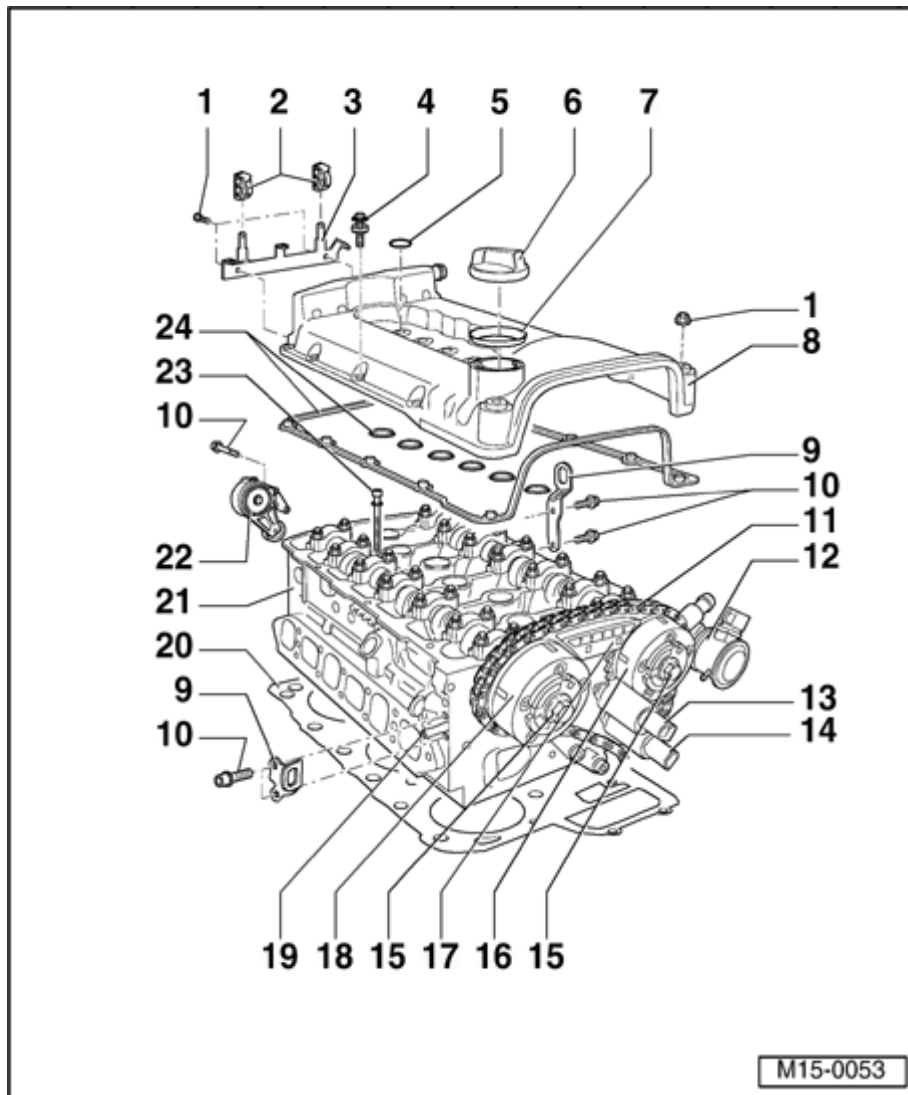
Honing dimension		Piston diameter	Cylinder bore diameter
Basic dimension	mm	80.965	81.010
1st oversize	mm	81.465	81.510
2nd oversize	mm	81.965	82.010



Cylinder head, servicing

Note:

- ◆ If an exchange cylinder head is installed, all contact surfaces between bearing elements, roller rocker fingers and cam running surfaces of camshaft must be oiled before installing cylinder head cover.
- ◆ The plastic protectors installed to protect the open valves must only be removed immediately before installing the cylinder head.
- ◆ When replacing the cylinder head the entire coolant quantity must be replaced.



◆ Removing and installing intake manifold ⇒ [Page 15-16](#) ; Removing and installing cylinder head.

◆ Disassembling and assembling intake manifold:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

◆ Removing and installing cover ⇒ [Page 15-11](#) .

◆ Checking compression pressure ⇒ [Page 15-48](#) .

1 - 8 Nm

2 - Bracket

◆ For fuel lines

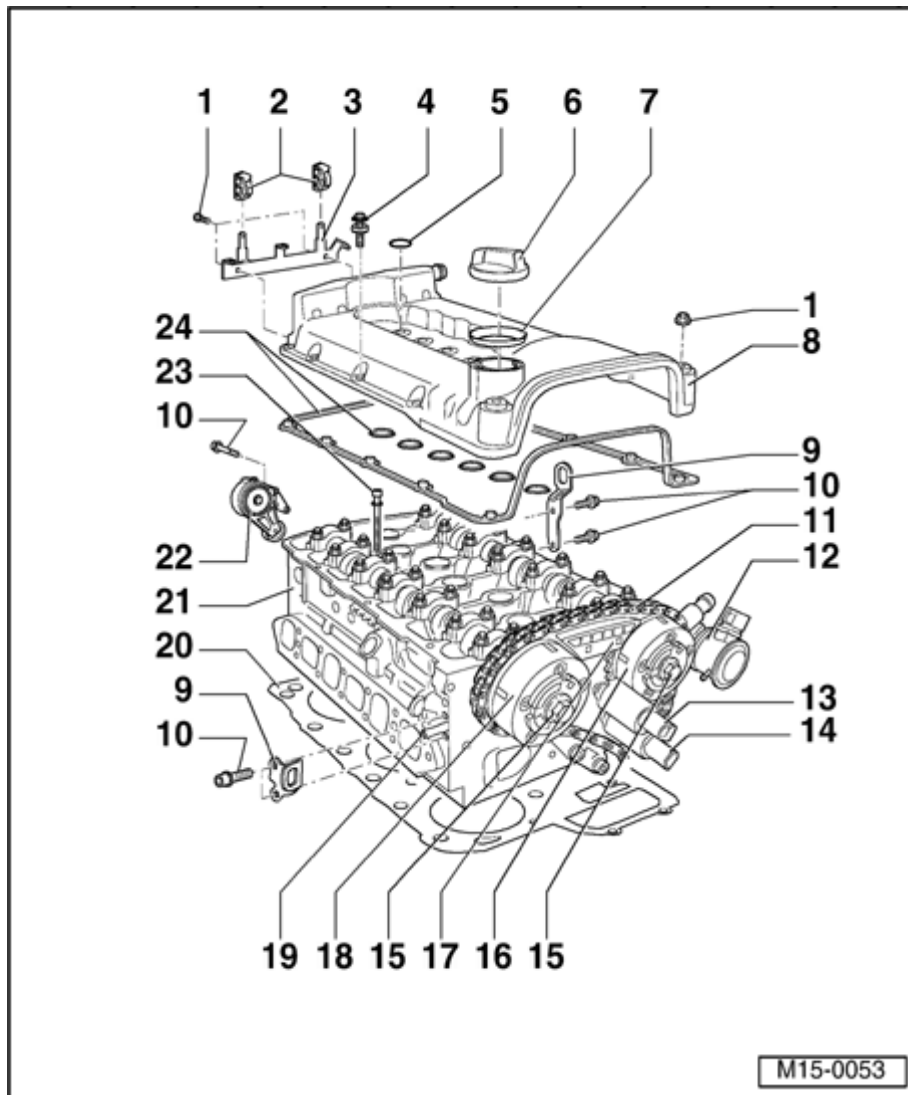
3 - Supporting frame

4 - 8 Nm

◆ With spacer sleeve and sealing ring

◆ Replace sealing ring if

damaged

**5 - O-ring**

- ◆ Replace if damaged
- ◆ Lubricate before installing
- ◆ For ignition coils with final output stage

6 - Sealing cap

- ◆ Replace seal if damaged

7 - Boot

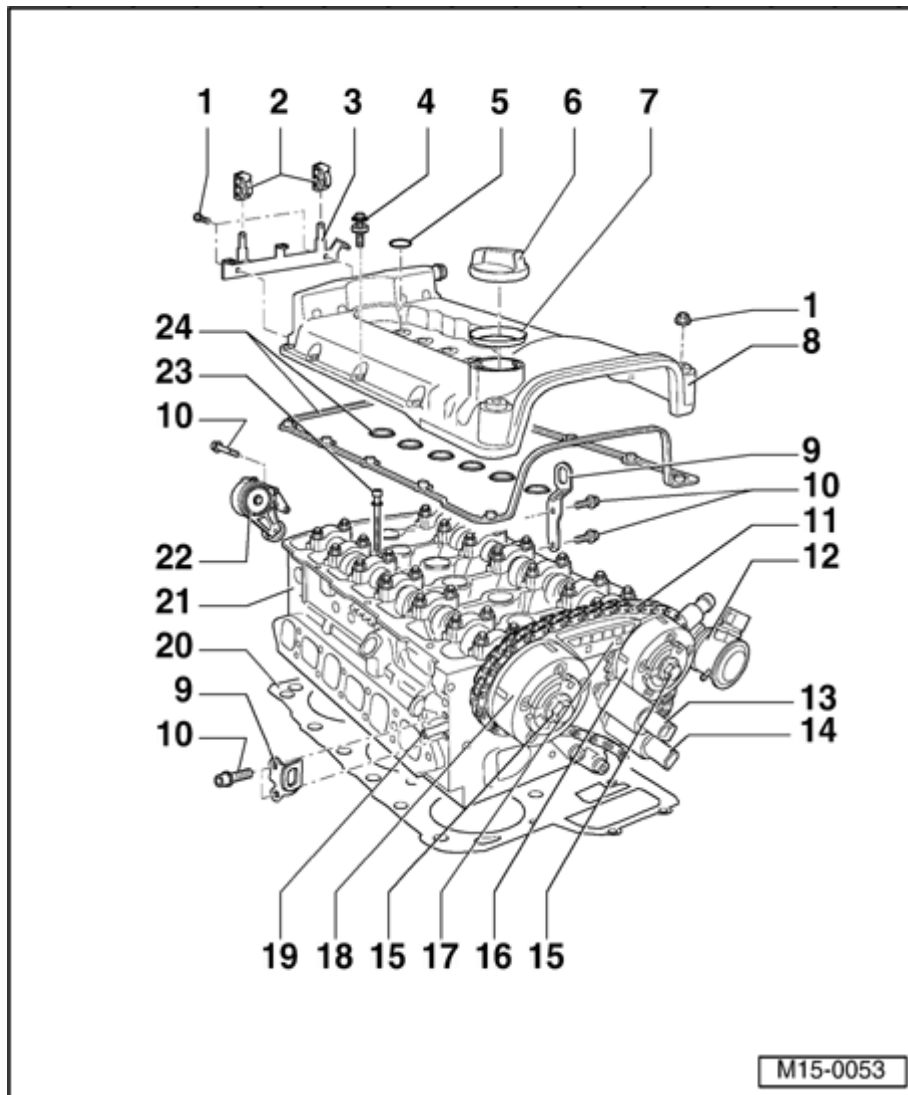
- ◆ Replace if damaged

8 - Cylinder head cover

- ◆ Replace if damaged

- ◆ Removing and installing
⇒ [Page 15-16](#)

9 - Lifting eye**10 - 23 Nm**



11 - Camshaft roller chain

- ◆ Mark direction of rotation. before removing (installation position) ⇒ [Page 13-11](#), Fig. 1
- ◆ Installing ⇒ [Page 15-39](#), Adjusting valve timing

12 - Combi-valve

- ◆ Removing and installing ⇒ [Page 26-24](#), Removing and installing parts of the secondary air system
- ◆ Checking ⇒ [Page 26-41](#)

13 - Valve -1- for camshaft adjustment -N205-

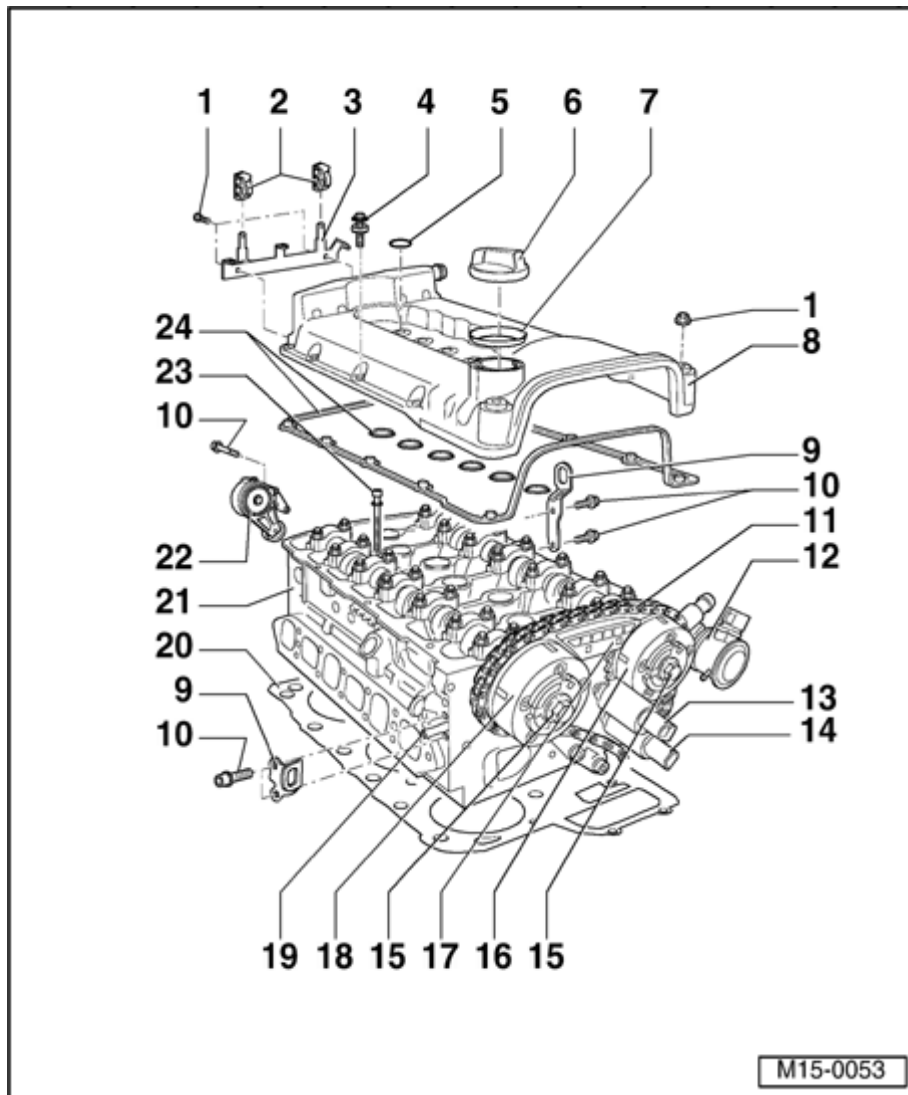
- ◆ For intake camshaft
- ◆ Check camshaft

timing
adjustment
⇒ [Page
15-82](#)

◆ Mark
connector
and
component
before
disconnecting

◆ Checking
activation:

⇒ [Repair
Manual, 2.8 Liter
VR6 4V Fuel
Injection &
Ignition, Engine
Code\(s\): BDF,
Repair Group 01;
Output
Diagnostic Test
Mode](#)



14 - Camshaft adjustment valve 1 (exhaust) - N318-

- ◆ Check camshaft timing adjustment
⇒ [Page 15-82](#)

- ◆ Mark connector and component before disconnecting

- ◆ Checking activation:

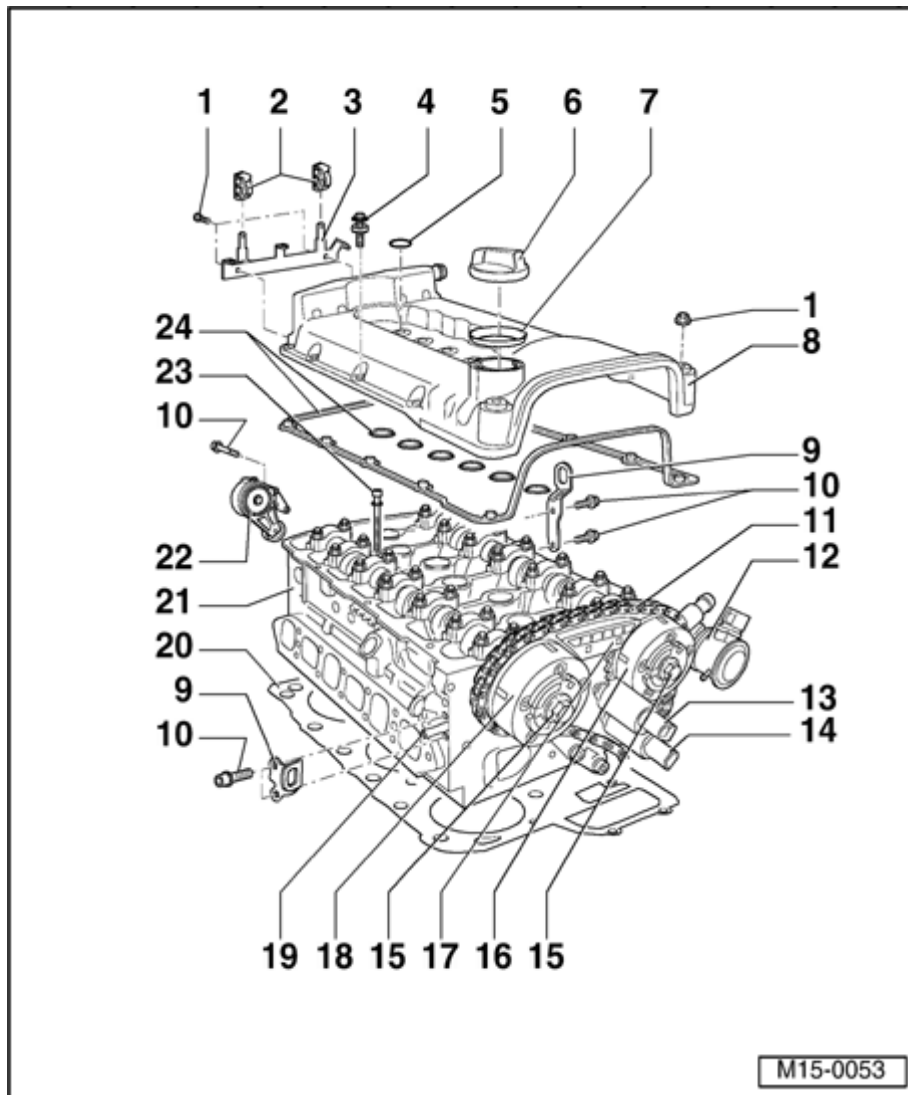
⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01: Output Diagnostic Test Mode](#)

**15 - 60 Nm +
1/4 turn
(90 °)
further**

- ◆ Replace
- ◆ Contact surface of sensor wheel on bolt head must be dry for assembly

- ◆ To remove

and
install,
use a 32
mm open
jaw
wrench
on
camshaft
to counter
support
⇒ [Page
15-69](#) ,
Removing
and
installing
camshaft



16 Exhaust - camshaft timing adjuster

- ◆ Marking:
32A
- ◆ Turn engine over only when camshaft timing adjuster is installed
- ◆ Check camshaft timing adjustment ⇒ [Page 15-82](#)
- ◆ Installing ⇒ [Page 15-39](#) , Adjusting valve timing

17 - Slide rail

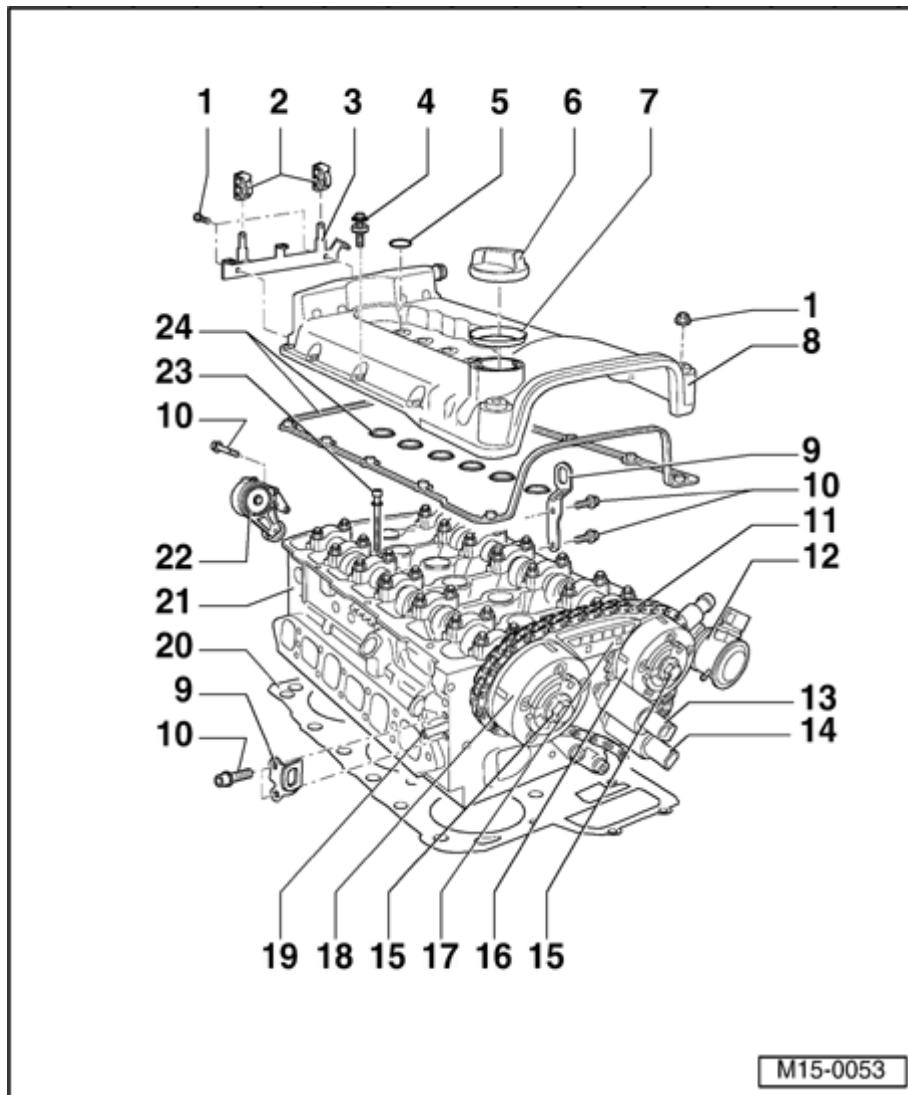
- ◆ For camshaft roller chain item - 11 -
- ◆ Clipped into control housing

18 Intake - camshaft timing adjuster

- ◆ Marking:

24E

- ◆ Turn engine over only when camshaft timing adjuster is installed
- ◆ Check camshaft timing adjustment ⇒ [Page 15-82](#)
- ◆ Installing ⇒ [Page 15-39](#) , Adjusting valve timing



19 - Unions

- ◆ For air shrouding of injectors

20 - Cylinder head gasket

- ◆ Metal gasket

- ◆ Replace

- ◆ Preparing cylinder head gasket for installation ⇒ [Fig. 2](#)

- ◆ After replacement replace entire coolant

21 - Cylinder head

- ◆ Check for distortion ⇒ [Fig. 1](#)

- ◆ Removing and installing ⇒ [Page 15-25](#)

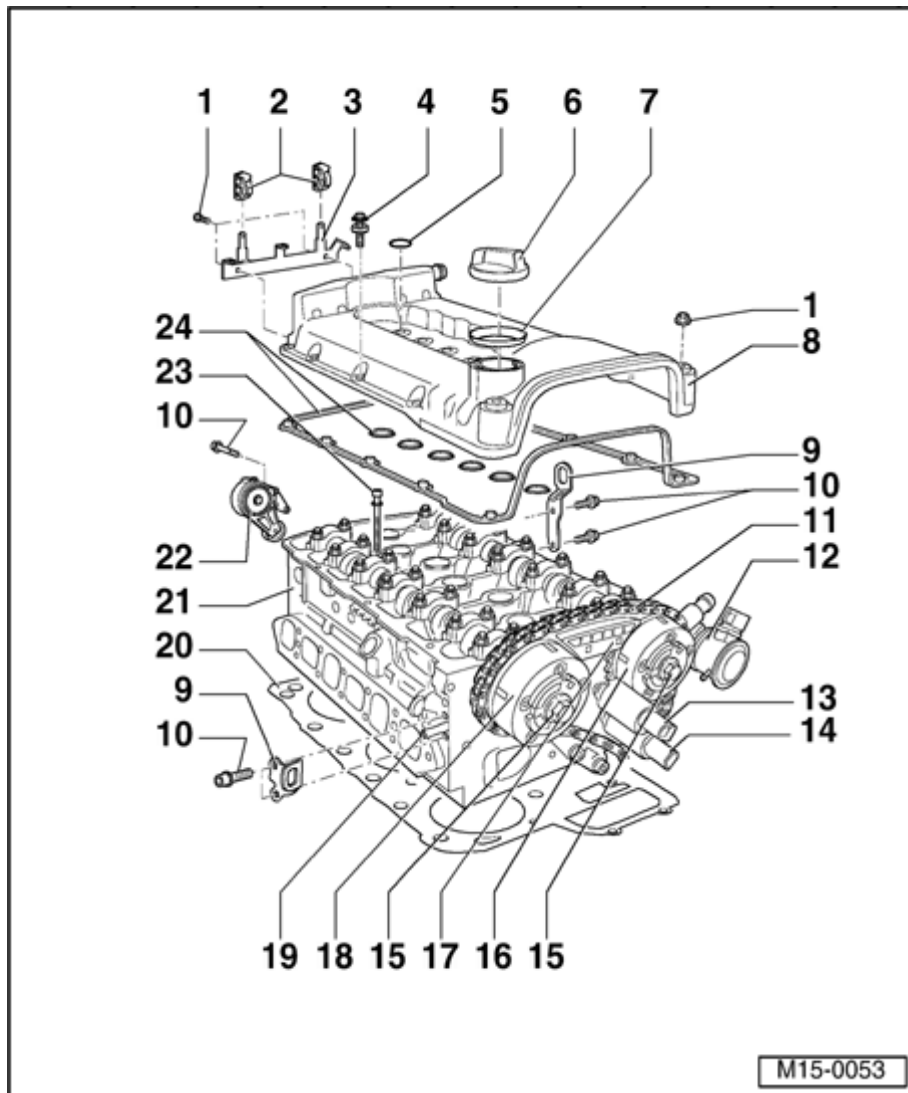
- ◆ After replacement replace entire coolant

22 Tensioning - element

- ◆ For ribbed

belt

- ◆ Removing and installing ribbed belt ⇒ [Page 13-19](#)



23 - Cylinder head bolt

- ◆ Replace
- ◆ Observe installation instructions and sequence when loosening and tightening ⇒ [Page 15-25](#), Removing and installing cylinder head

24 - Cylinder head cover gasket

- ◆ Replace if damaged or leaking
- ◆ Observe installation position

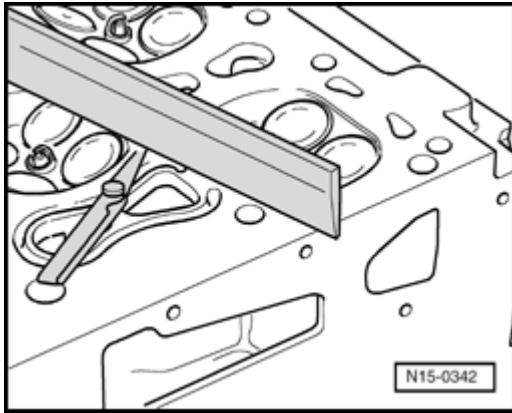


Fig. 1 Checking cylinder head for distortion

Special tools and equipment

- ◆ Straightedge
- ◆ Feeler gauge

Max. permissible distortion: 0.05 mm

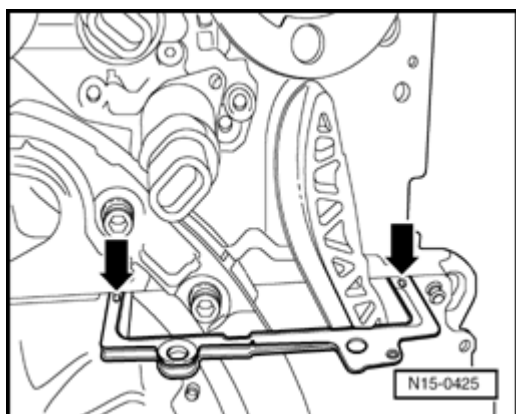


Fig. 2 Preparing cylinder head gasket for installation

Special tools and equipment

- ◆ AMV 174 004 01 Sealing compound
- ◆ AMV 188 001 02 Sealing compound

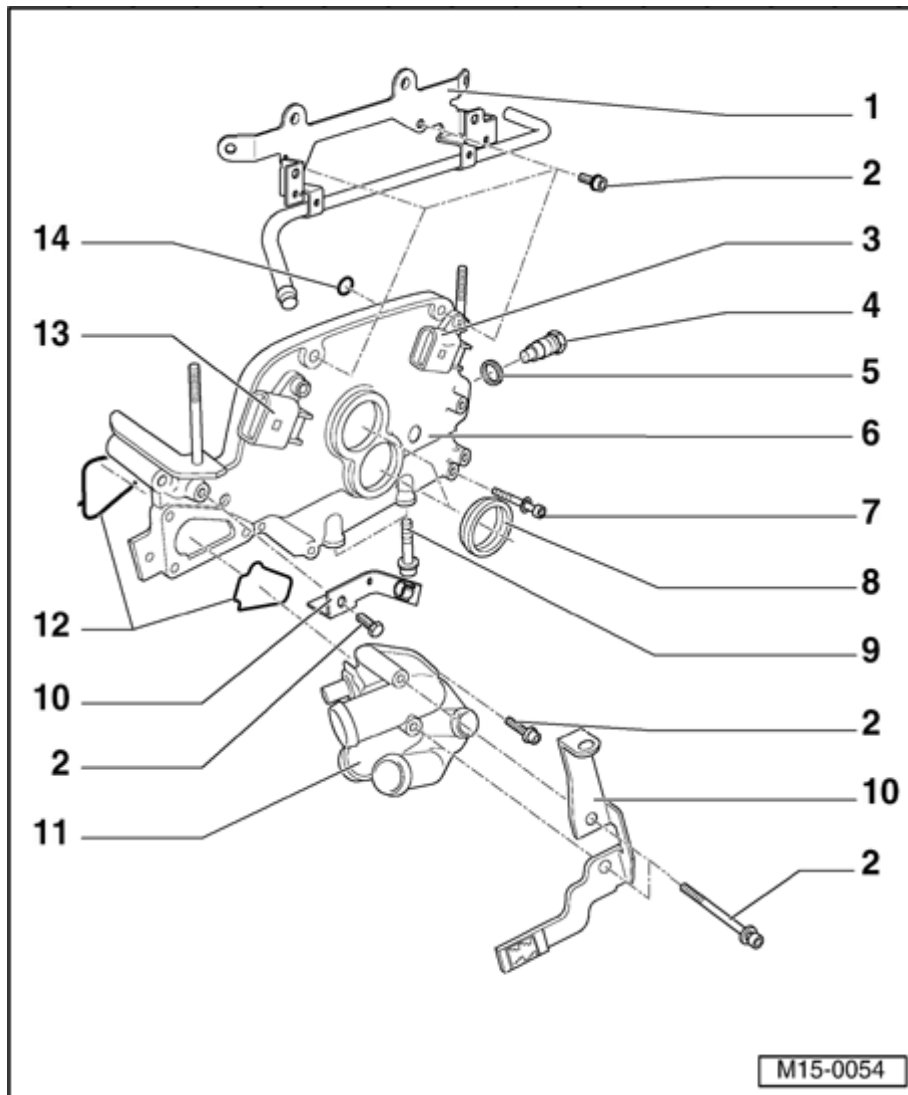
Work sequence

- Clean old sealing compound from 3 mm holes in cylinder head gasket (arrows).
- Fill 3 mm holes in cylinder head gasket with sealing compound AMV 174 004 01. Coat sealing surfaces on cover and seal flywheel/drive plate flange with sealing compound AMV 188 001 02. Install cover immediately.

Note:

When the cylinder head is installed the holes in the cylinder head gasket are only half visible.

15-11



Cover, removing and installing

1 - Cable guide

- ◆ For coolant hoses and wiring harness

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

2 - 8 Nm

3 - Camshaft Position (CMP) sensor 2- G163-

- ◆ For exhaust camshaft

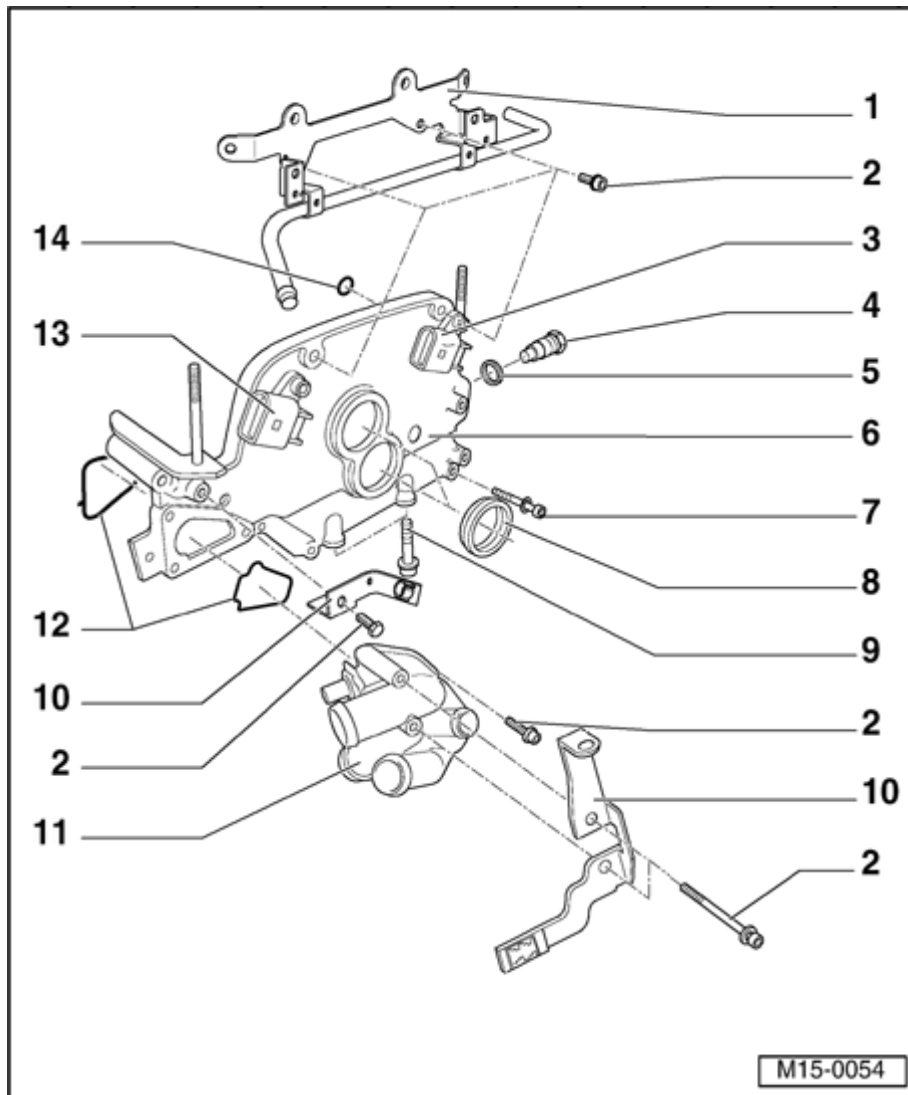
- ◆ Mark connector and component before disconnecting

- ◆ Checking:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

4 - Chain tensioner, 40 Nm

- ◆ For camshaft roller chain ⇒ [Page 15-4](#), item - 11 -
- ◆ Turn engine over only when chain tensioner is installed

**5 - Seal**

- ◆ Replace if damaged or leaking

6 - Cover

- ◆ Can be removed and installed with cylinder head fitted

- ◆ Coat sealing surfaces with sealing compound AMV 188 001 02

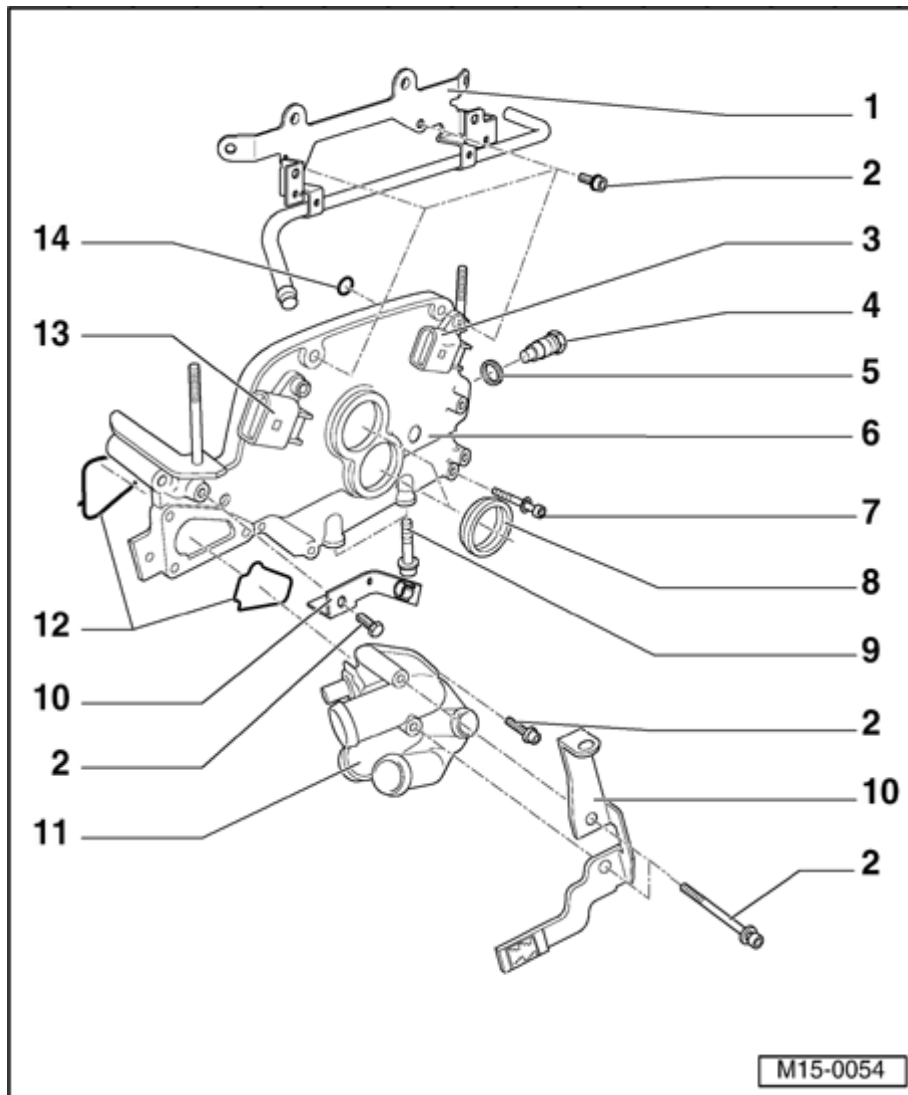
- ◆ With O-ring for sealing oil passage, item - 14 -

- ◆ If only cover has been removed, prepare cylinder head gasket for assembly
⇒ [Page 15-10](#) ,
⇒ [Fig. 2](#)

7 - 8 Nm

- ◆ First

tighten
securing
bolts
(item - 9
-) to 23
Nm

**8 - Seal**

- ◆ Valve -1- for camshaft adjustment -N205-, ⇒ [Page 15-4](#), item - 13 - and Camshaft adjustment valve 1 (exhaust) - N318-, ⇒ [Page 15-5](#), item - 14 -

- ◆ Replace if damaged or leaking

- ◆ Installing ⇒ [Fig. 1](#)

9 - 23 Nm**10 - Bracket**

- ◆ For wiring harness

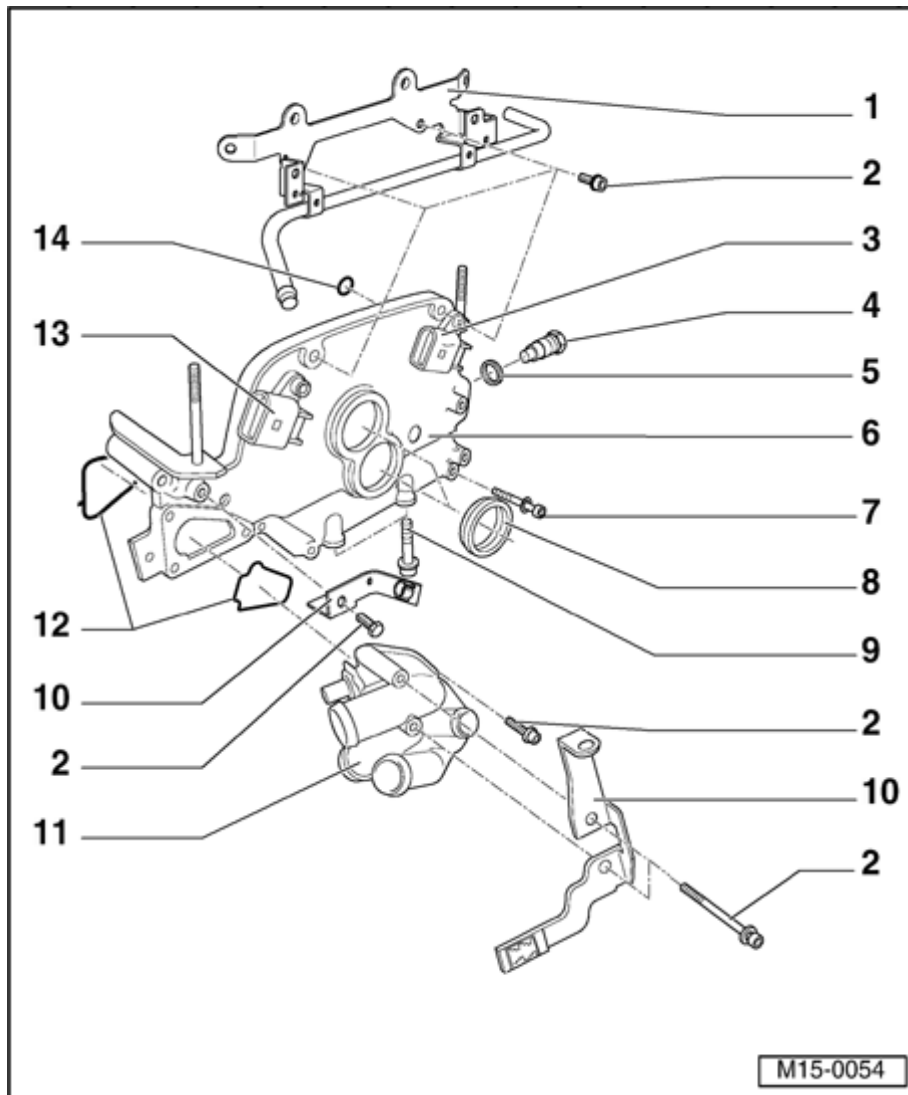
11 - Thermostat housing

- ◆ Disassembling and assembling ⇒ [Page 19-13](#)

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

12 - Seal

- ◆ Replace



13 - Camshaft Position (CMP) sensor - G40-

- ◆ For intake camshaft
- ◆ Mark connector and component before disconnecting
- ◆ Checking:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

14 - O-ring

- ◆ For oil channel seal
- ◆ Replace
- ◆ Lubricate before installing

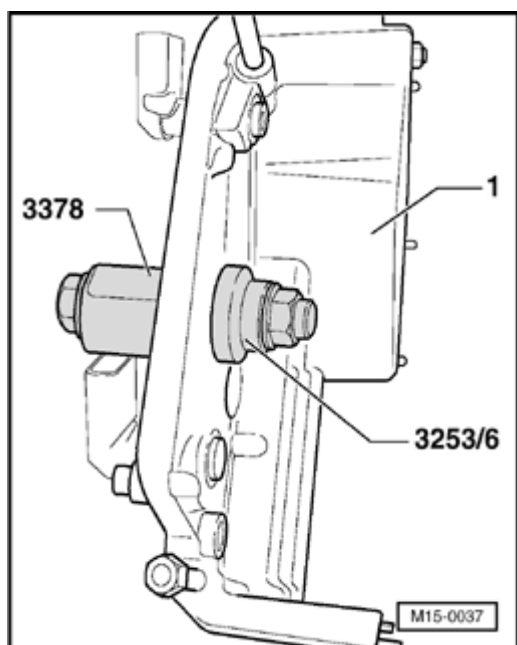


Fig. 1 Installing seals for cover

Special tools and equipment

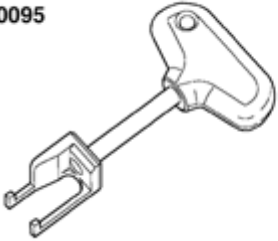

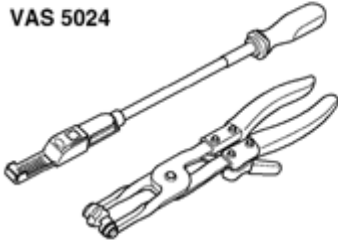
- ◆ 3378 Puller sleeve
- ◆ 3253/6 Puller sleeve from fitting device 3253

Installing

Note:

Do not oil seal.

- Position seal in cover -1- using puller sleeve 3378 and pull in flush using puller sleeve 3253/6 from fitting device 3253.

<p>T10095</p> 	<p>V.A.G 1331</p> 
<p>VAS 5024</p> 	
	<p style="text-align: right;">W15-0199</p>

Cylinder head cover, removing and installing

Special tools and equipment

- ◆ T10095 Puller
- ◆ V.A.G 1331 Torque wrench (5...50 Nm)
- ◆ VAS 5024 Assembly tool for spring-type clips
- ◆ Cable tie

Removing

CAUTION!

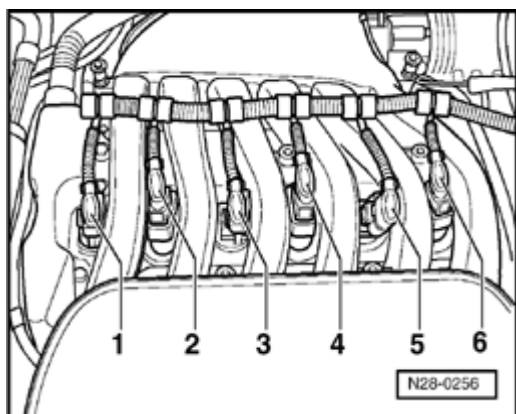
When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- ◆ ***Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.***
- ◆ ***Ensure sufficient clearance to all moving or hot components.***

Note:

All cable ties which are opened or cut open during disassembly, must be replaced in the same position during installation.

- Remove engine cover.
- Check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground strap.



- Disconnect connectors from ignition coils 1...6.

Note:

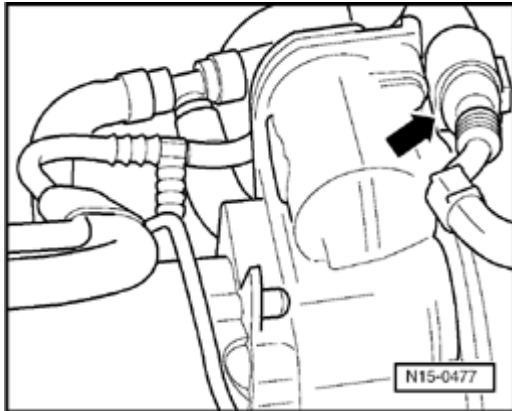
Mark connector and component before disconnecting.

- Unclip ignition coils wiring harness from wiring guide.
- Remove ignition coils with final output stage for cylinders 1...6 using puller T10095.
- Pull off crankcase breather connecting hose between cylinder head cover and intake hose on cylinder head cover.
- Remove intake hose between Mass Air Flow (MAF) sensor and throttle valve control module:

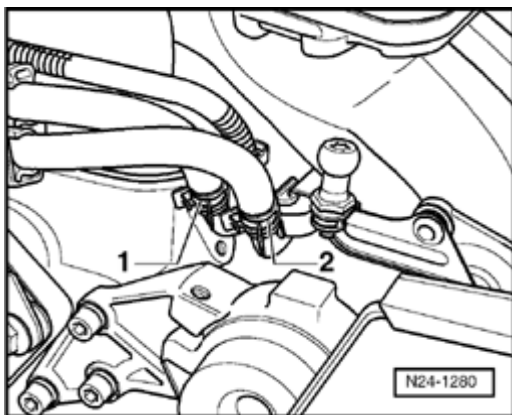
⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

Note:

Press buttons on hose couplings to do so.



- ✦ - Disconnect 6-pin connector from throttle valve control module (arrow).
- Open and close expansion tank cap to release pressure in cooling system.
- Pull coolant hoses off throttle valve control module and seal hose ends.

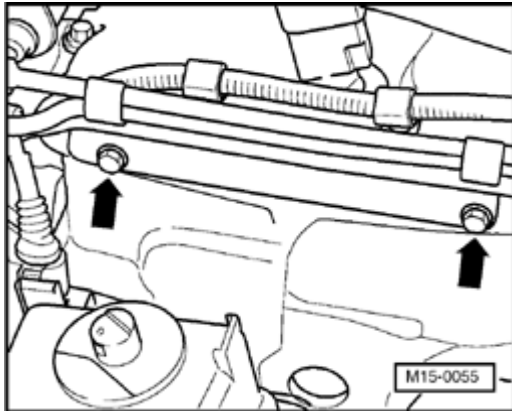


- ✦ - Pull fuel supply hose -1- (with white marking) and fuel return hose -2- (with blue marking) off fuel rail and collect fuel that may leak out with a cloth.

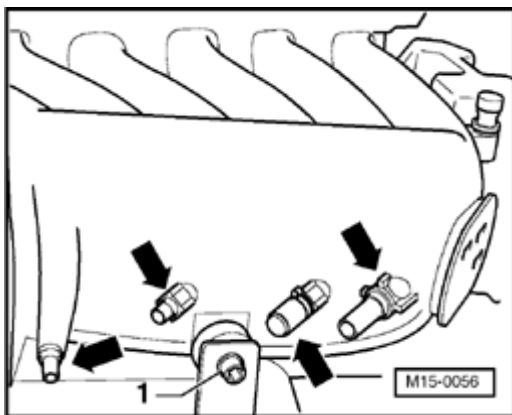
WARNING!

***Fuel system is under pressure!
Before opening the system place a cloth around the connection.
Then release pressure by carefully loosening the connection.***

- Seal lines to avoid contamination of fuel system.
- Observe rules for cleanliness ⇒ [Page 20-14](#) .



- ✦ - Remove retaining frame on cylinder head for fuel lines and wiring harness (arrows).



- ✦ - Disconnect vacuum hoses (arrows) from intake manifold.

Note:

Press buttons on hose couplings to do so.

- Remove rearmost bolt -1- for intake manifold support.
- Unclip pressure hose (between combi-valve and secondary air pump motor) and all other lines from retainers on intake manifold and cylinder head cover.
- Remove guide on cover for coolant hoses and wiring harness ⇒ [Page 15-11](#) , item - 1 -.

- Remove Ground connection on support of combi-valve ⇒ [Page 26-25](#) , item - 9 -.
- Disconnect vacuum hose from variable intake manifold change-over vacuum actuator.
- Remove two lateral intake manifold support bolts.
- Remove center, left and right insulation trays:
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)
- Disconnect connectors from thermal switch and coolant fan.
- Removing front bumper:
⇒ [Repair Manual, Body Exterior, Repair Group 63](#)
- Bring lock carrier into service position:
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)
- Unscrew dipstick guide tube from intake manifold.
- Remove intake manifold securing bolts and remove intake manifold together with throttle valve control module.

- Remove intake manifold and place on a suitable surface so that vacuum actuator is not damaged.

Note:

Seal the intake ports in the intake manifold or in the cylinder head with a clean cloth.

- Remove cylinder head cover.

Installing

Install in reverse sequence ; note the following points:

Note:

- ◆ *Replace cylinder head cover if damaged or leaking.*
- ◆ *First bolt intake manifold to cylinder head. Then tighten both bolts of the manifold support.*
- ◆ *Ensure tight fit of fuel hoses.*
- If necessary replenish coolant ⇒ [Page 19-15](#) .
- Check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Adapting engine control module to throttle valve control module:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

- Perform work sequence "Procedure after interrupting voltage supply":

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

- Read readiness code:

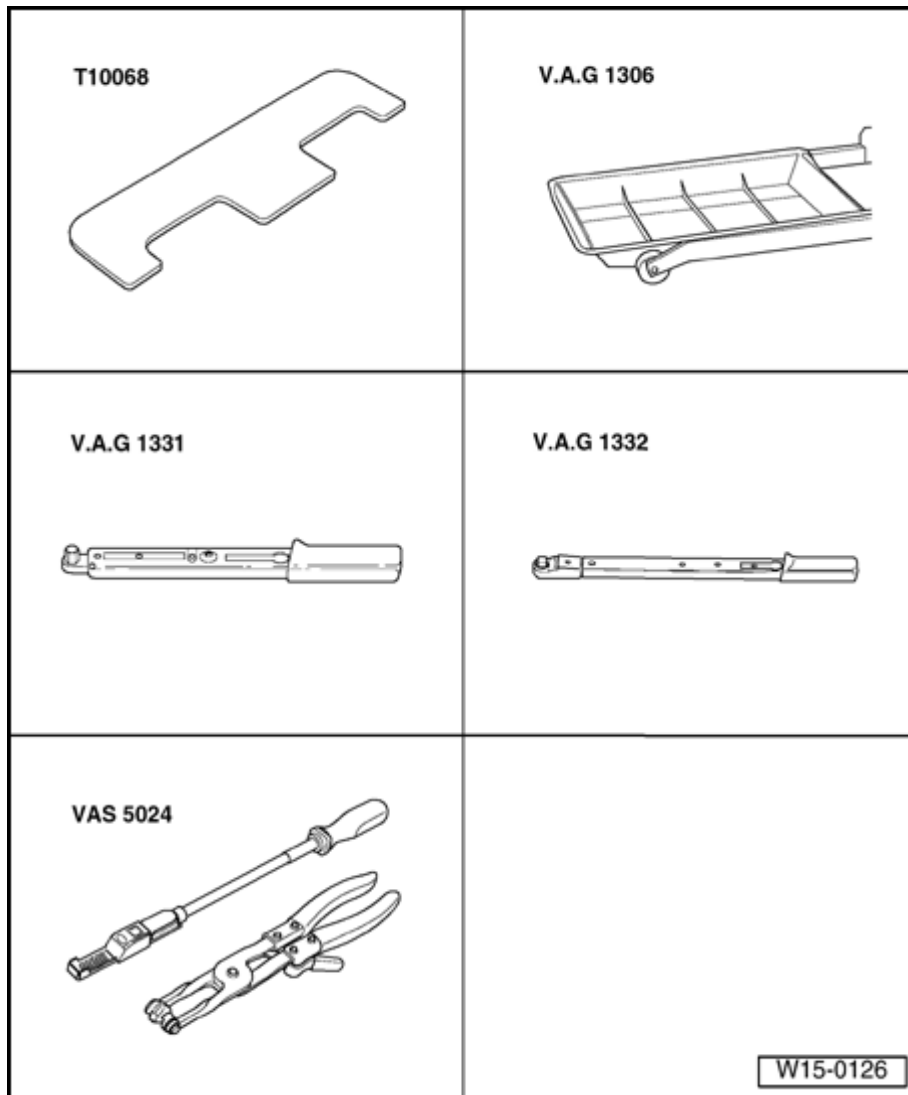
⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- If DTC memory has been erased or engine control module separated from permanent positive supply, readiness code must be generated again:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Torque settings

Bolted connections	Torque setting
Cylinder head cover to cylinder head	8 Nm
Intake manifold to cylinder head	13 Nm
Intake manifold to support	23 Nm
Dipstick guide tube to intake manifold	8 Nm



Cylinder head, removing and installing

Special tools and equipment

- ◆ T10068 Camshaft bar
- ◆ V.A.G 1306 Drip tray
- ◆ V.A.G 1331 Torque wrench (5...50 Nm)
- ◆ V.A.G 1332 Torque wrench (40...200 Nm)
- ◆ VAS 5024 Assembly tool for spring-type clips
- ◆ AMV 174 004 01 Sealing compound
- ◆ AMV 188 001 01 Sealing compound

Conditions

- The engine must only be warm to the touch.

Removing

CAUTION!

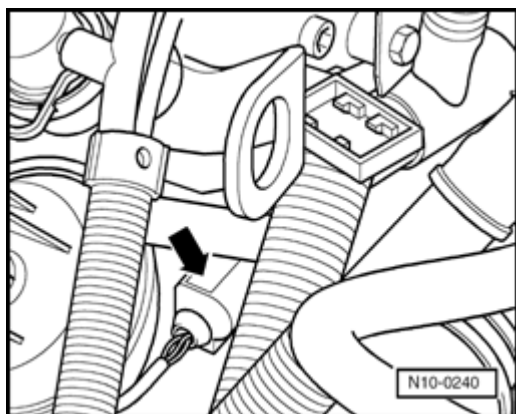
When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- ♦ ***Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.***
- ♦ ***Ensure sufficient clearance to all moving or hot components.***

Note:

All cable ties which are opened or cut open when removing engine, must be replaced in the same position when installing the engine.

- Remove engine cover.
- Check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground strap.

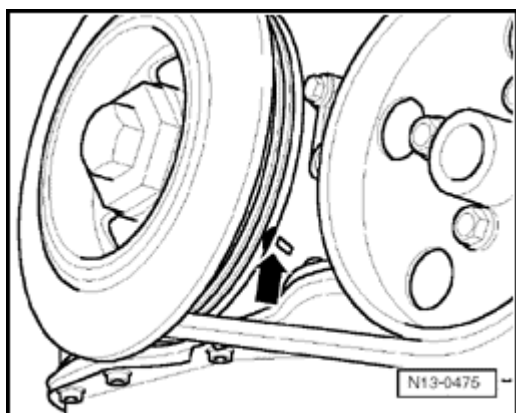


- Remove intake manifold ⇒ [Page 15-16](#) ,
Removing and installing cylinder head co

▲ - Disconnect 4-pin connector (arrow) from
Coolant Temperature (ECT) sensor -G62
Engine Coolant Temperature sensor -G2

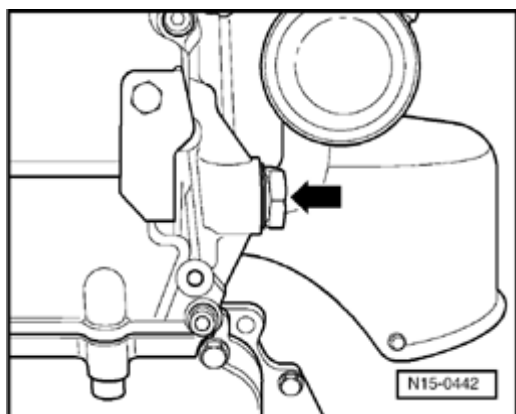
- Drain coolant ⇒ [Page 19-15](#) .

- Remove coolant thermostat housing ⇒ [P
6](#) , Parts of cooling system, engine side.

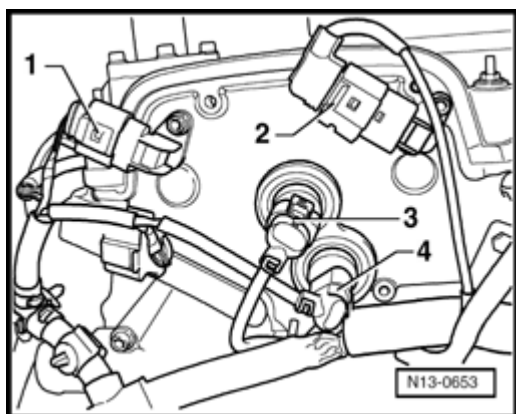


▲ - Turn crankshaft on vibration damper sec
bolt in engine direction of rotation to TDC
(arrow).

- Remove cylinder head cover ⇒ [Page 15](#).



- ✦ - Remove camshaft roller chain tensioner (arrow).



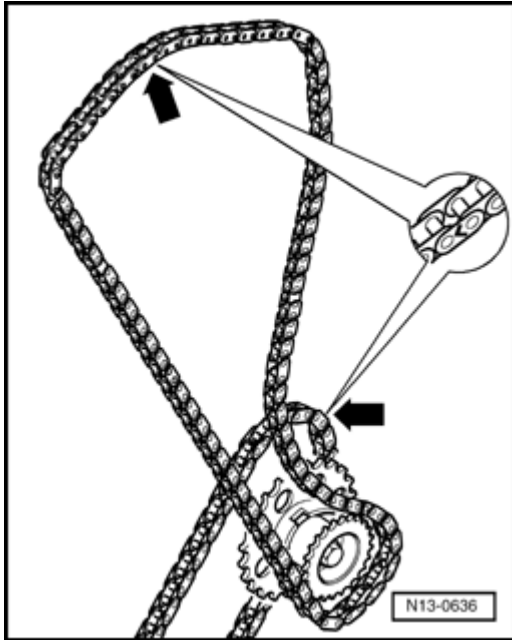
- ✦ - Disconnect connections from following components on cover:
 - ◆ Camshaft Position (CMP) sensor -G40- -1-,
 - ◆ Camshaft Position (CMP) sensor 2 -G163- -2-,
 - ◆ Valve -1- for camshaft adjustment -N205- -3-,
 - ◆ Camshaft adjustment valve 1 (exhaust) -N318- -4-.

Note:

Mark connector and component before disconnecting.

- Release and free wiring harness.

15-29



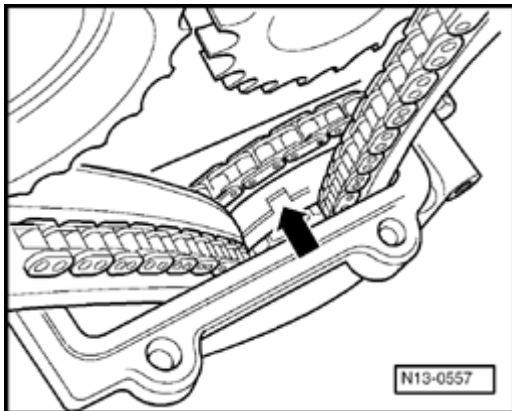
- Remove camshaft cover ⇒ [Page 15-11](#) ; Removing and installing camshaft.

- Mark roller chains before removing (e.g. \ paint, arrow pointing in direction of rotatic

Note:

Do not mark chain with a punched mark, no similar!

- Separate front exhaust pipe from exhaust manifold ⇒ [Page 26-1](#) , Removing and in parts of exhaust system.
- Check timing settings:



- When correctly positioned at TDC cyl. 1, groove (arrow) can be seen in intermedia chain sprockets

Note:

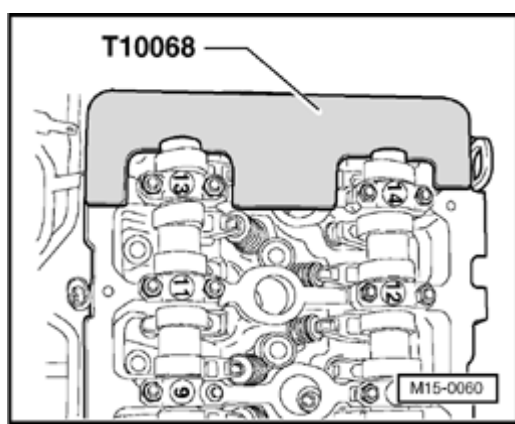
This condition only occurs at every 2nd TDC position.

If the notch cannot be seen:

- Turn crankshaft one full turn further in engine direction of rotation.

Note:

When the crankshaft is turned, the tensioner must be pressed against the camshaft roller chain by hand instead of with the chain tensioner.

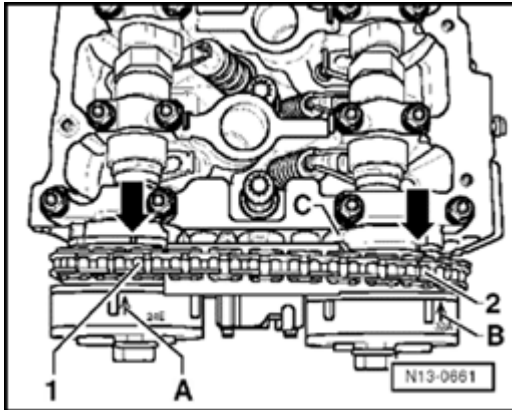


The camshaft bar T10068 must engage in shaft grooves.

Note:

If the camshaft bar cannot be installed, turn crankshaft in engine direction of rotation un approx. 5 mm past the TDC setting for No. (dependent on drive chain tolerances).

Check setting marks of camshaft timing adjusters with marks on control housing:



Marks -A and B- on camshaft timing adjusters must align with notches (arrows) on control housing -C-.

Distance between tooth -1- and tooth -2- of camshaft timing adjuster must be exactly 16 rollers of camshaft roller chain.

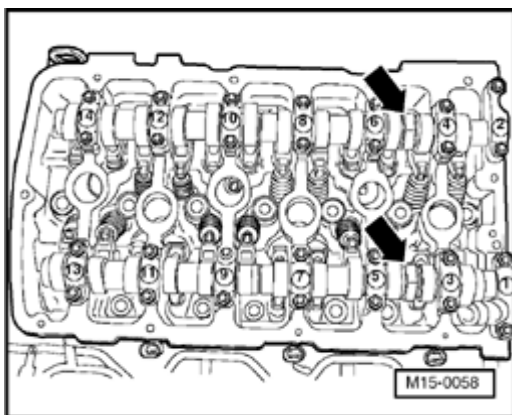
Note:

Illustration shows a cover which has been removed.

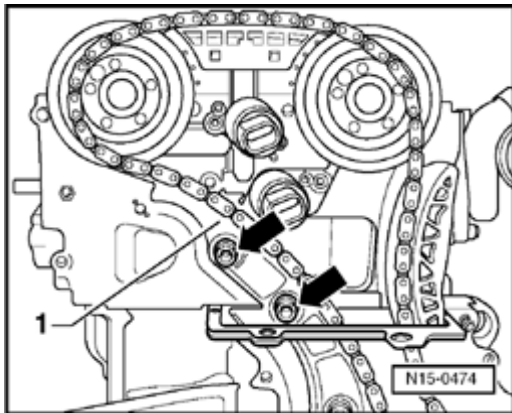
- First remove exhaust camshaft timing adjuster.
- Remove camshaft timing adjuster together with camshaft roller chain from intake camshaft.

Note:

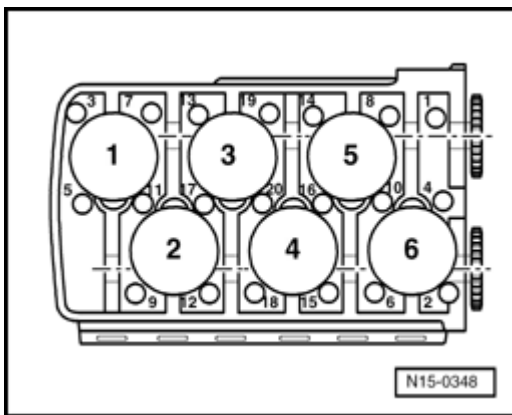
Counter support on camshaft with a 32 mm open end wrench (arrow). Camshaft bar T10068 must not be installed when loosening or tightening camshaft timing adjuster.



15-32



- Remove guide rail securing bolts (arrow) and remove guide rail -1-.
- Place camshaft roller chain to side.



- Loosen socket head bolts in sequence given and then remove.

Note:

Use tool 3452 for Polydrive cylinder head bolts.

- Carefully lift cylinder head off.

Installing

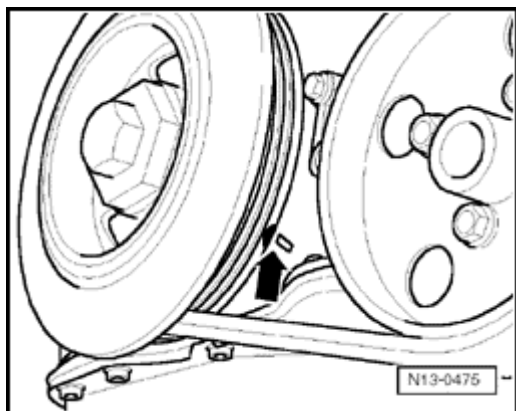
- Place a clean cloth into cylinders so that dirt or emery cloth particles can get in between cylinder wall and piston.

Note:

Also prevent dirt and emery cloth particles from getting into coolant.

- Carefully clean cylinder head and cylinder sealing surfaces. Ensure that no scoring or scratches are formed (when using abrasive paper, grade must not be less than 100).
- Carefully remove metal particles, emery paper and cleaning cloths.

If the piston for No. 1 cylinder is not at TDC



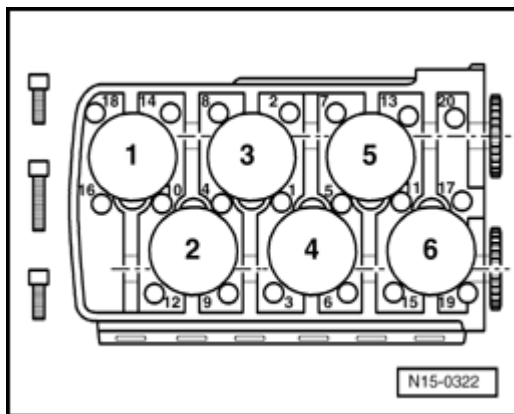
A

- Turn crankshaft on vibration damper securing bolt in engine direction of rotation (arrow)

Note:

- ◆ Only remove the new cylinder head gasket packing immediately before installing.
- ◆ Handle the new gasket with extreme care. Damage will lead to leaks.

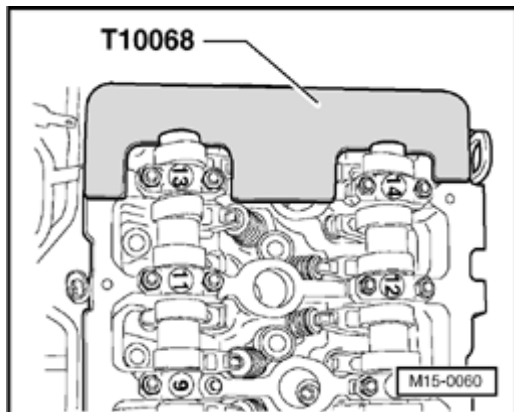
- Install new cylinder head gasket. Inscription (Part No.) must be legible.



- Ensure that dowel sleeves are inserted in cylinder block holes 12 and 20 and that the head gasket is seated.

Camshaft bar has been removed

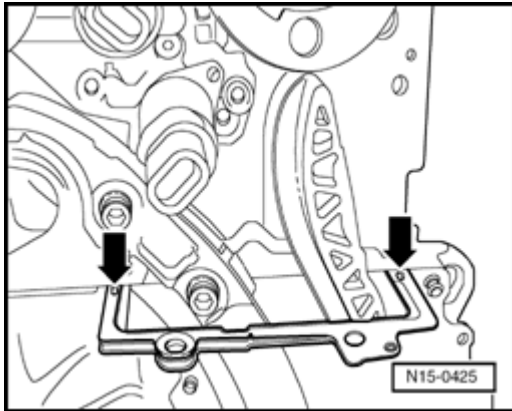
- Position camshafts in cylinder head to TDC No. 1 cylinder.



Camshaft bar T10068 must engage in both grooves.

Note:

If the camshaft bar cannot be installed, turn over (in engine direction of rotation) past TDC No. 1 and then turn back onto TDC No. 1 cyl.

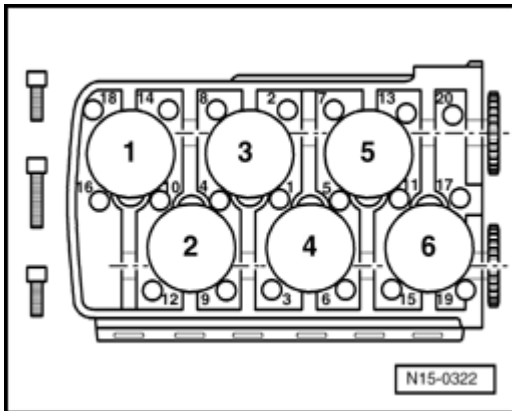


- Fill 3 mm holes in cylinder head gasket with sealing compound AMV 188 001 02.

Note:

When the cylinder head is installed the holes in the cylinder head gasket are only half visible.

- Install cylinder head, insert new cylinder head bolts and tighten by hand.



- Tighten cylinder head bolts in tightening sequence as follows:

Note:

The longer cylinder head bolts must be inserted in the middle holes of the cylinder head.

- Pretighten all bolts to 30 Nm.
- Then tighten all bolts to 50 Nm.
- Then tighten all bolts $\frac{1}{4}$ turn (90°) further with a rigid wrench.
- Then tighten all bolts again $\frac{1}{4}$ turn (90°) further.

The rest of the assembly is basically in reverse order to the disassembling sequence.

Note:

Ensure that the O-ring for sealing the oil channel and the seal in the cover are installed.

- Adjust valve timing ⇒ [Page 15-39](#) .
- Install cylinder head cover and intake manifold ⇒ [Page 15-16](#) ; Removing and installing cylinder head.
- Fill with new coolant ⇒ [Page 19-15](#) .

Note:

Re-tightening cylinder head bolts after repairs is not required.

- Check camshaft timing adjustments ⇒ [Page 15-82](#) .

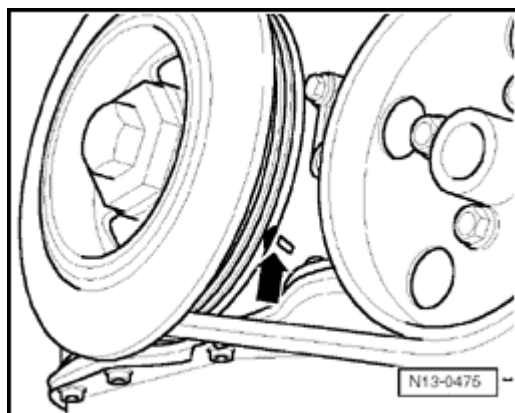
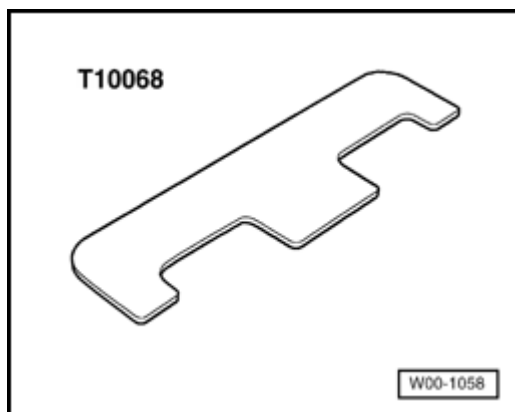
Valve timing, checking

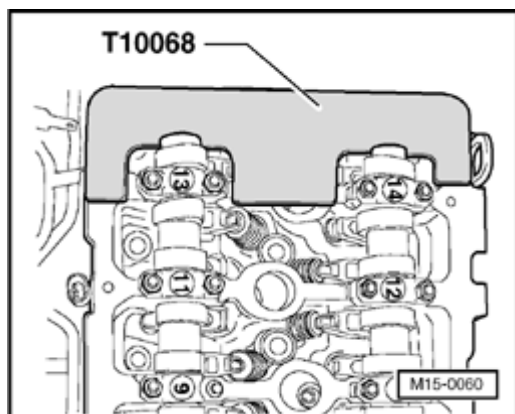
Special tools and equipment

- ◆ T10068 Camshaft bar

Test sequence

- Remove intake manifold and cylinder head cover ⇒ [Page 15-16](#) ; Removing and installing cylinder head.
- Turn crankshaft over on vibration damper securing bolt in engine direction of rotation (arrow).





The camshaft bar T10068 must engage in both shaft grooves.

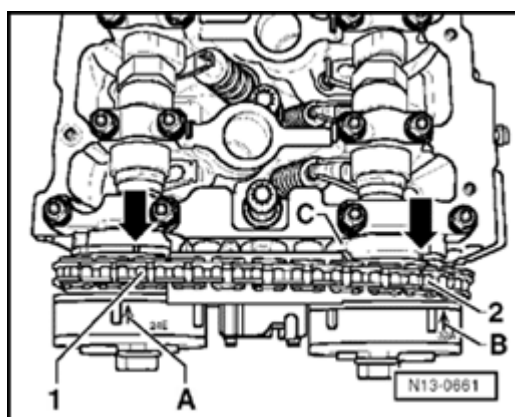
If the camshaft bar will not fit:

- Turn crankshaft one full turn further in engine direction of rotation.

Note:

If the camshaft bar cannot be installed, turn the crankshaft in engine direction of rotation until approx. 5 mm past the TDC setting for No. 1 cyl. (dependent on drive chain tolerances).

Check setting marks of camshaft timing adjusters with marks on control housing:



Marks -A and B- on camshaft timing adjusters must align with notches (arrows) on control housing -C-.

Distance between tooth -1- and tooth -2- of camshaft timing adjuster must be exactly 16 rollers of camshaft roller chain.

Note:

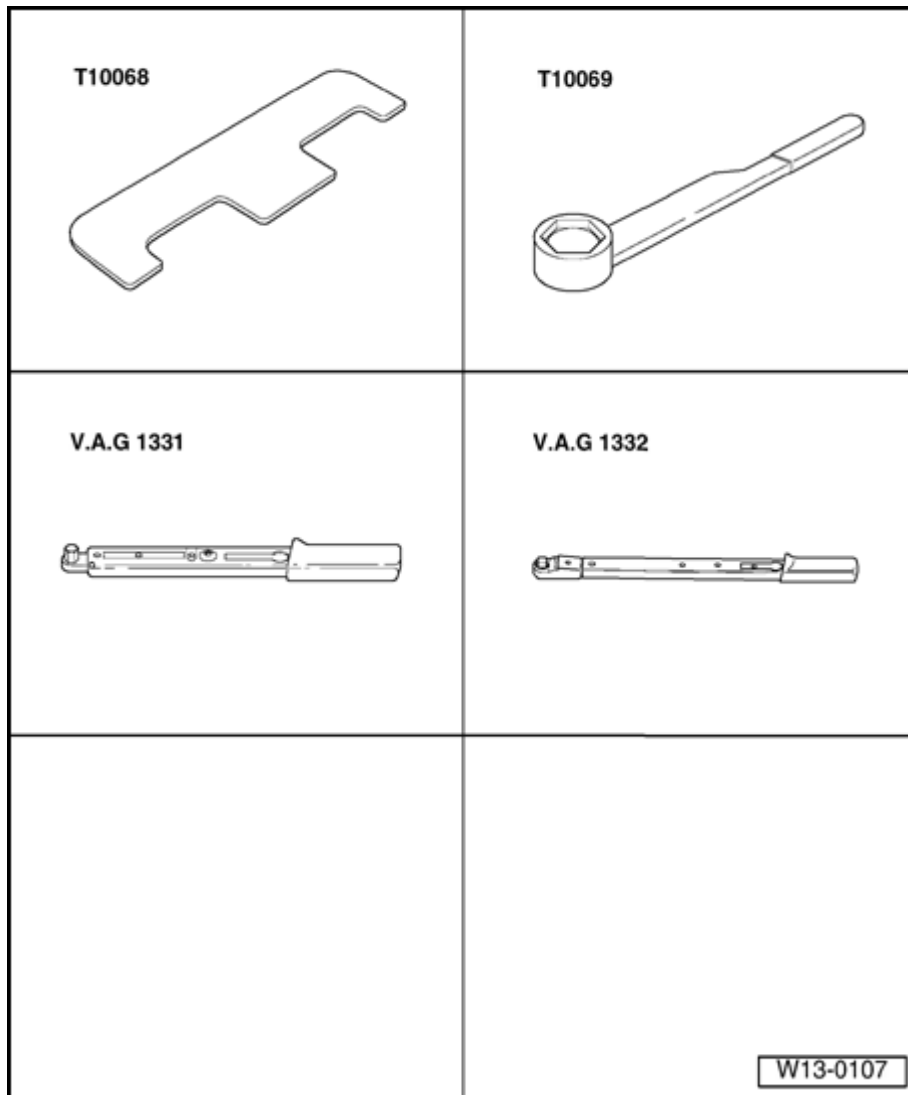
Illustration shows a cover which has been removed.

If the marks do not align:

- Adjust valve timing ⇒ [Page 15-39](#) .

If the marks align:

- Install cylinder head cover and intake manifold ⇒ [Page 15-16](#) ; Removing and installing cylinder head.



Valve timing, adjusting

(Install timing chains)

Special tools and equipment

- ◆ T10068
Camshaft bar
- ◆ T10069
Counter support
- ◆ V.A.G 1331
Torque wrench (5...50 Nm)
- ◆ V.A.G 1332
Torque wrench (40...200 Nm)
- ◆ AMV 174 004 01
Sealing compound
- ◆ AMV 188 001 01
Sealing compound

Work sequence

CAUTION!

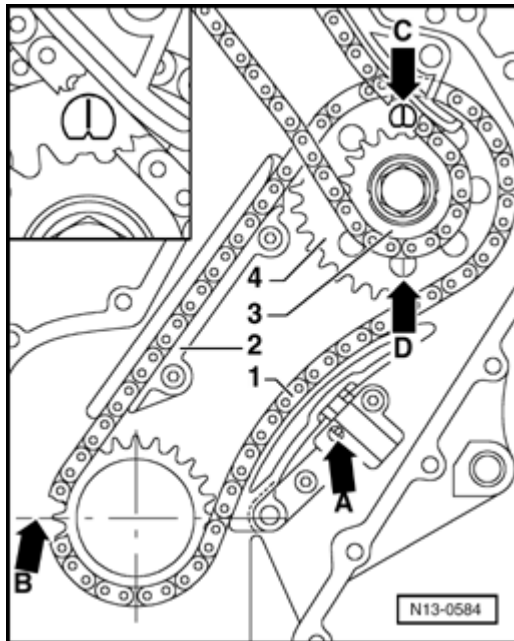
When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- ◆ *Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.*
- ◆ *Ensure sufficient clearance to all moving or hot components.*

Note:

The following work sequence is described for an engine after removal. Start with the adjustments at the relevant position depending on how far the engine has been disassembled.

Install roller chain and chain tensioner with tensioning plate for intermediate shaft drive:



- Adjust position of crankshaft relative to intermediate shaft. To position: Align ground-down tooth of drive chain sprocket -B- with mounting joint (TDC cyl. 1).
- Install both bolts without collar for guide rail -2- and tighten to 10 Nm.

Note:

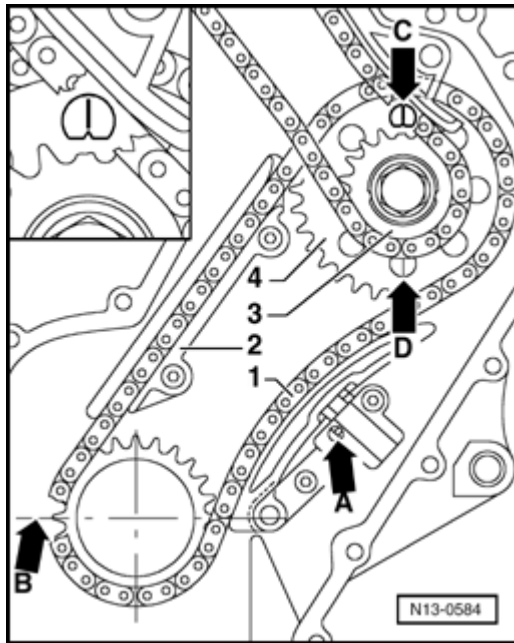
Observe direction of rotation marks of used roller chain ⇒ [Page 13-11](#) , Fig. 1.

- Install guide rail -2- with roller chain -1- and both chain sprockets -3- and -4-.

Marking on sprocket -4- for roller chain must align with notch -C- or -D- on thrust washer of intermediate shaft.

During installation make sure that the roller chain runs completely straight in the guide plate from the crankshaft to the intermediate shaft.

15-42

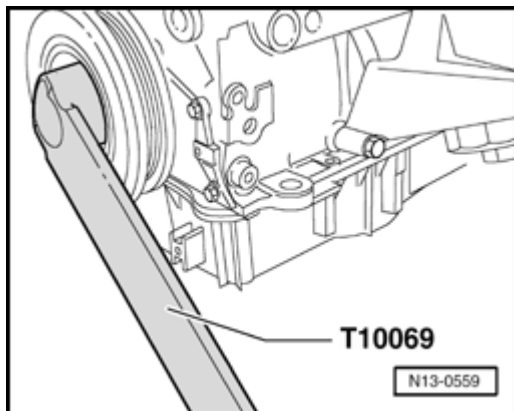


- Tighten chain sprockets -3- and -4- on the intermediate shaft by hand.

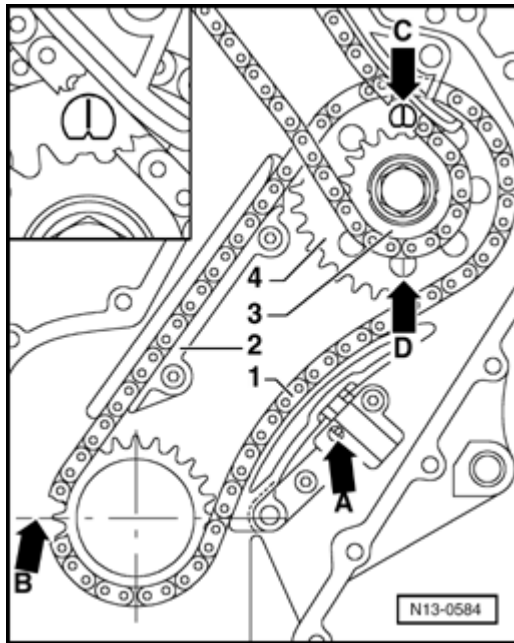
Note:

Please observe that all chain sprocket securing screws/bolts must be replaced.

- Install chain tensioner on opposite side.
- Release locking splines of chain tensioner -A- with a small screwdriver and tensioning plate pressed against chain tensioner.
- Install chain tensioner in this position and tighten to 8 Nm.



- Lock vibration damper with counter support T10069.

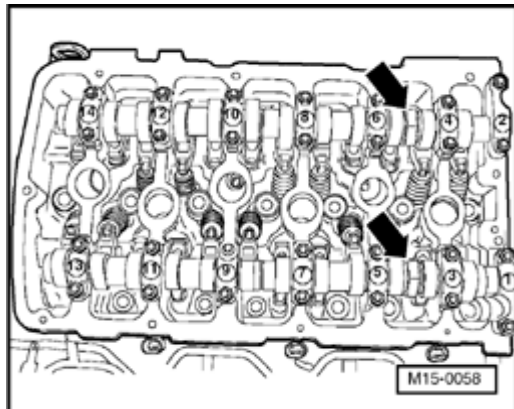


- Tighten new securing bolts of chain sprocket -3- and -4- for intermediate shaft to 60 Nm + 90° (1/4 turn - turning further can be done in several stages).
- Remove counter support T10069.
- Check position of crankshaft -B- to intermediate shaft -C- or -D- once again.
- Set engine again to TDC cyl. 1.

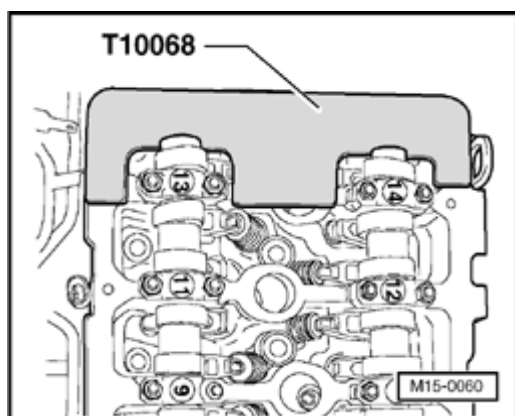
Install roller chain for camshaft drive:

- Position camshafts installed in cylinder head to TDC cylinder 1.

Note:



If necessary use 32 mm open end wrench to turn camshafts (arrows) to the correct position. The camshaft bar T10068 must not be installed when doing this.

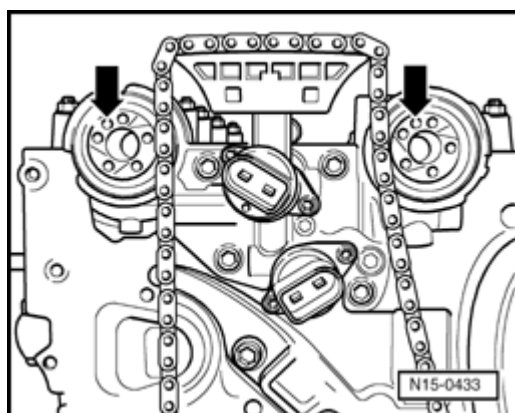


It must be possible to insert camshaft bar T10068 into both shaft slots.

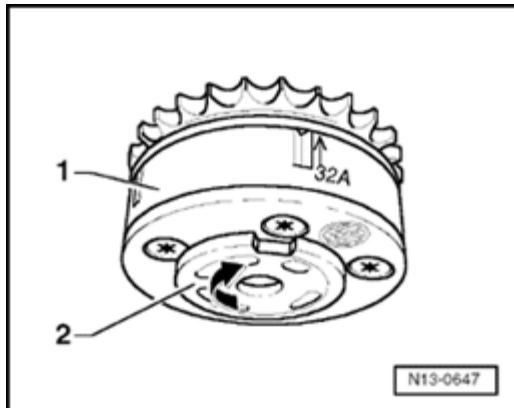
Note:

If the cylinder head is removed: ⇒ [Page 15-25](#) , Removing and installing cylinder head.

- Place camshaft roller chain on intermediate shaft chain sprocket.
- Guide chain between tensioning rail and guide rail toward control housing.
- First install intake camshaft timing adjuster along with fitted camshaft roller chain.

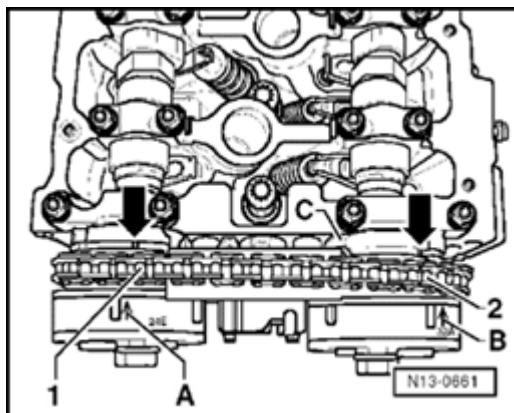


- Position both camshaft timing adjusters (identification: 24E on intake side and 32A on exhaust side) on the camshaft mountings (arrows).

**Note:**

The exhaust camshaft timing adjuster -1- can be turned in two directions. When installing, ensure that the sensor wheel -2- for the CMP sensor -G163- is turned onto limit stop in direction of (arrow). The distance between the two ground-down teeth of the intake and exhaust camshaft timing adjusters (markings 24E and 32A) must be exactly 16 rollers of the camshaft roller chain

- Install exhaust camshaft timing adjuster with fitted camshaft roller chain.



Marks -A and B- on camshaft timing adjusters must align with notches (arrows) on control housing -C-.

- Tighten new securing bolts for camshaft timing adjuster hand tight.
- Check distance between tooth -1- and tooth -2- of camshaft timing adjuster. It must be exactly 16 rollers of camshaft roller chain.
- Remove camshaft bar T10068.
- Turn crankshaft two full turns in engine direction of rotation and check valve timing ⇒ [Page 15-37](#) .

Note:

When the crankshaft is turned, the tensioning rail must be pressed against the camshaft roller chain by hand instead of with the chain tensioner.

If the marks do not align:

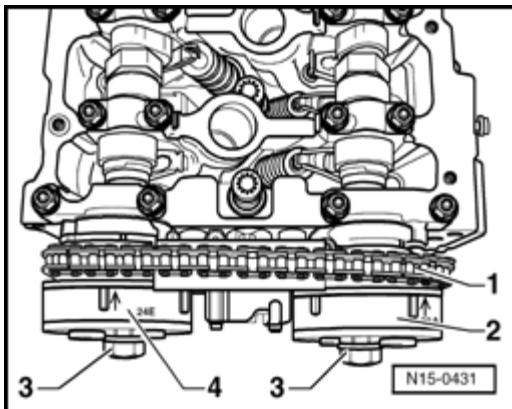
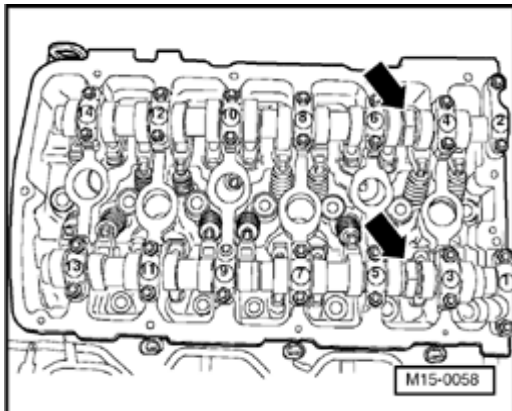
- Repeat timing adjustment.

If the marks align:

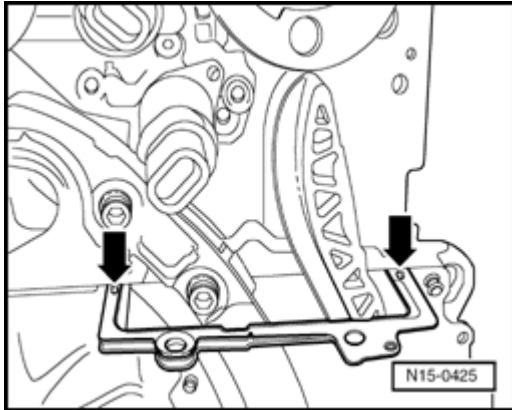
- Hold camshaft to be tightened with a 32 mm open end wrench (arrow).

Note:

The camshaft bar T10068 must not be installed when doing this.



- Tighten new securing bolts -3- for intake and exhaust camshaft timing adjusters -4 and 2- to 60 Nm + 90° (1/4 turn - turning further can be done in several stages).
- Coat sealing surfaces of flywheel/drive plate sealing flange with sealing compound AMV 188 001 02 and install. Tighten securing bolts to 8 Nm.




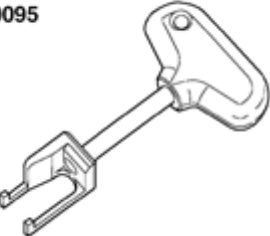


- Replace flywheel/drive plate sealing flange [Page 13-24](#) , item - 7 -.

- Remove old sealing compound from 3 mm in cylinder head gasket (arrows).
- Fill 3 mm holes in cylinder head gasket with sealing compound AMV 174 004 02.

Note:

When the cylinder head is installed the holes in the cylinder head gasket are only half visible.

- Coat sealing surface of cover with sealing compound AMV 188 001 02.
- Lubricate O-ring for oil channel seal and install into cover together with seal ring.
- Install cover, insert all securing bolts and tighten lightly.
- First tighten M8 securing bolt to 23 Nm then tighten the other securing bolts to 8 Nm.
- Install chain tensioner for camshaft roller and tighten to 40 Nm.
- Turn crankshaft two full turns in engine direction of rotation and check valve timing ⇒ [Page 37](#) .
- Install cylinder head cover and intake manifold ⇒ [Page 15-16](#) , Removing and installing cylinder head
- Check camshaft adjustments ⇒ [Page 15](#)

<p>3122 B</p> 	<p>T10095</p> 
<p>V.A.G 1331</p> 	<p>V.A.G 1763</p> 
<p>W15-0200</p>	

Compression pressure, checking

Special tools and equipment

- ◆ 3122 B Spark plug wrench
- ◆ T10095 Puller
- ◆ V.A.G 1331 Torque wrench (5...50 Nm)
- ◆ V.A.G 1763 Compression tester

Test conditions

- Engine oil temperature at least 30 °C
- The battery voltage must be at least 11.5 V.
- All electrical consumers, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- On models with an automatic transmission selector lever in "P" or "N" position

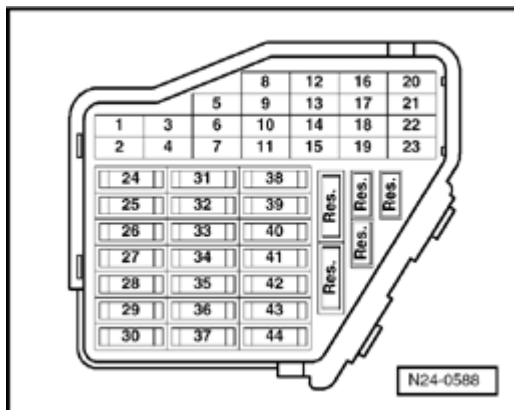
Test sequence

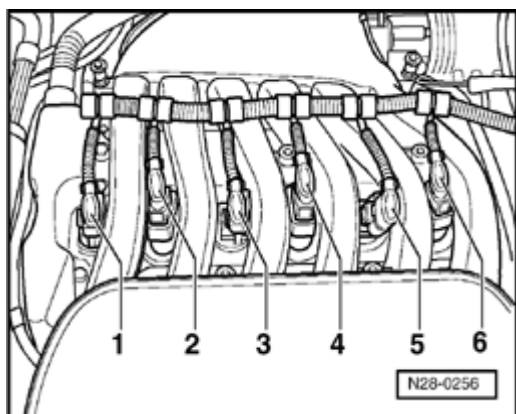
- Remove fuse 29 from fuse holder.

Note:

Removing fuse 29 interrupts the voltage supply to the injectors.

- Remove engine cover.





- Disconnect connectors from ignition coils 1...6.

Note:

Mark connector and component before disconnecting.

- Remove ignition coils with final output stage for cylinders 1...6 using puller T10095.
- Remove spark plugs with spark plug wrench 3122 B.
- Have a second technician fully depress accelerator pedal.
- Check compression pressure with compression tester V.A.G 1763.

Note:

*Using compression tester ⇒
Operating instructions*

- Operate starter until tester shows no further pressure increase.

Compression pressure values

New: 10...13 bar

Wear limit: 7.5 bar

Permissible difference between all cylinders: 3 bar

- Check DTC memory:

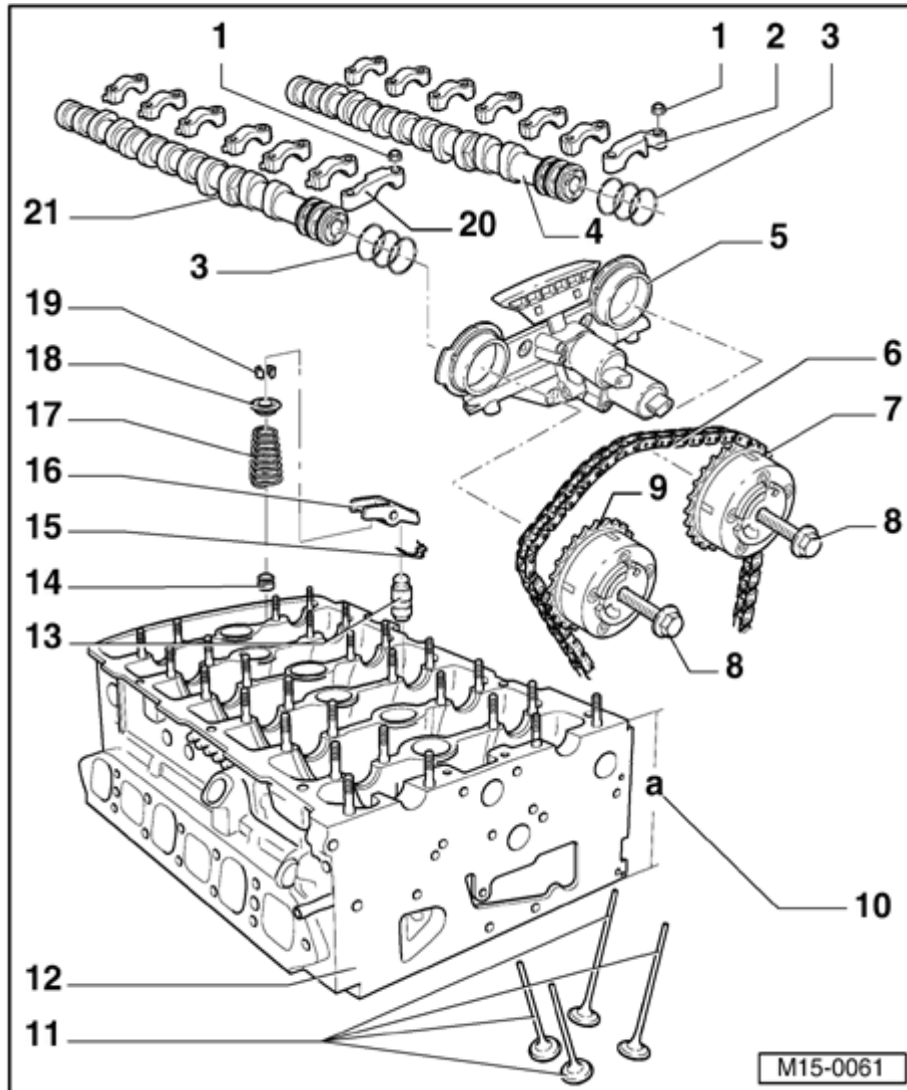
⇒ [*Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01*](#)

- Read readiness code:

⇒ [*Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01*](#)

- Generate readiness code again if DTC memory has been erased or engine control module separated from permanent positive supply:

⇒ [*Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01*](#)



Valve gear, servicing

1 - 5 Nm + $\frac{1}{8}$ turn (45°) further

2 - Exhaust camshaft bearing cap

◆ Before installing the bearing cap 8, grease lightly the contact surface with G 052 723 A2 ⇒ [Fig. 2](#)

◆ Installation position ⇒ [Fig. 3](#)

◆ Installation sequence ⇒ [Page 15-69](#), Removing and installing camshaft

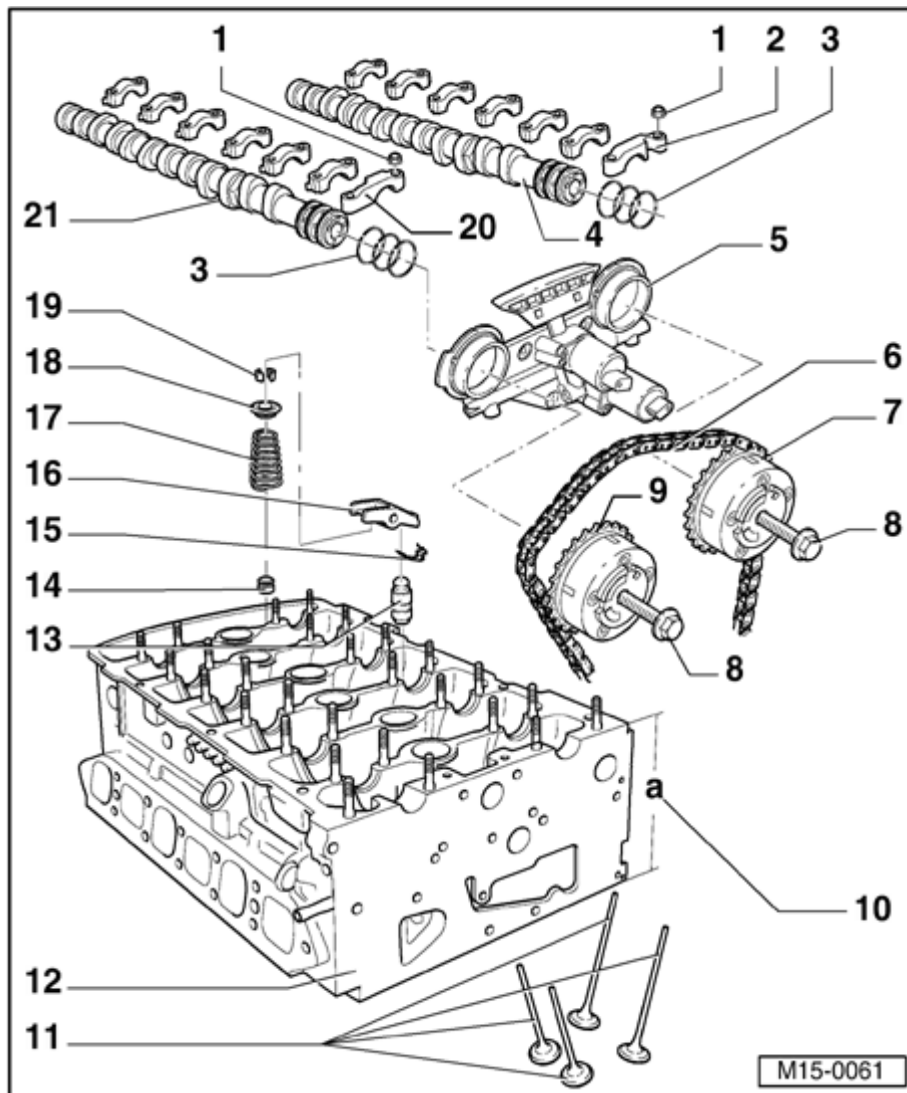
3 - Seal

◆ Replace complete if leaking

◆ Oil contact surfaces of seal lightly when installing

control
housing

- ◆ Spread/stretch seal as little as possible when replacing
- ◆ Offset gaps by 120°



4 - Exhaust camshaft

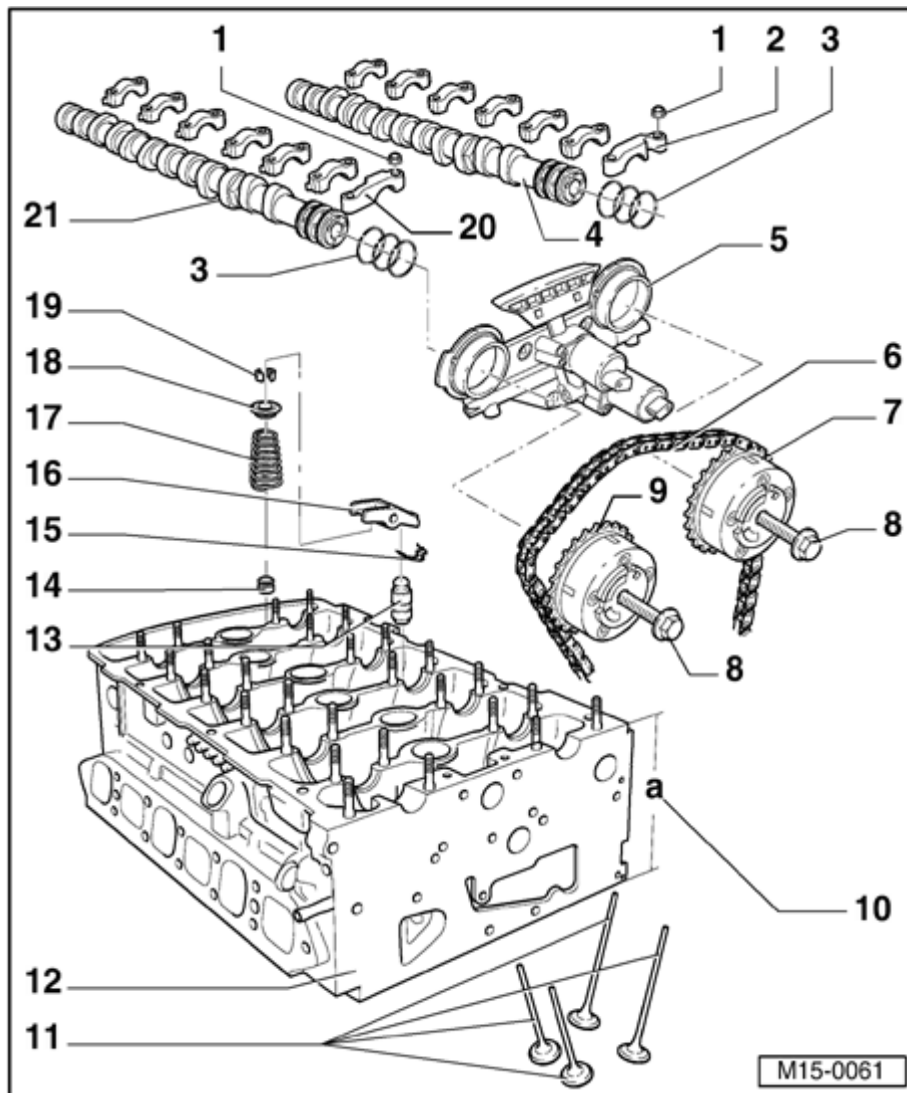
- ◆ Check radial clearance with Plastigage, Wear limit: 0.1 mm
- ◆ Run-out: max. 0.01 mm
- ◆ Checking axial clearance ⇒ [Fig. 1](#)
- ◆ Identification and valve timing ⇒ [Fig. 5](#)
- ◆ Removing and installing ⇒ [Page 15-69](#)

5 - Control housing

- ◆ Lightly lubricate contact surfaces of oil seal when installing
- ◆ Disassembling and assembling ⇒ [Fig. 6](#)
 - ◆ Check screen of control housing for soiling before

installing
⇒ [Fig. 7](#)

- ◆ Removing and installing ⇒ [Page 15-69](#) , Removing and installing camshaft



6 - Camshaft roller chain

- ◆ Mark direction of rotation, before removing (installation position) ⇒ [Page 13-11](#), Fig. 1

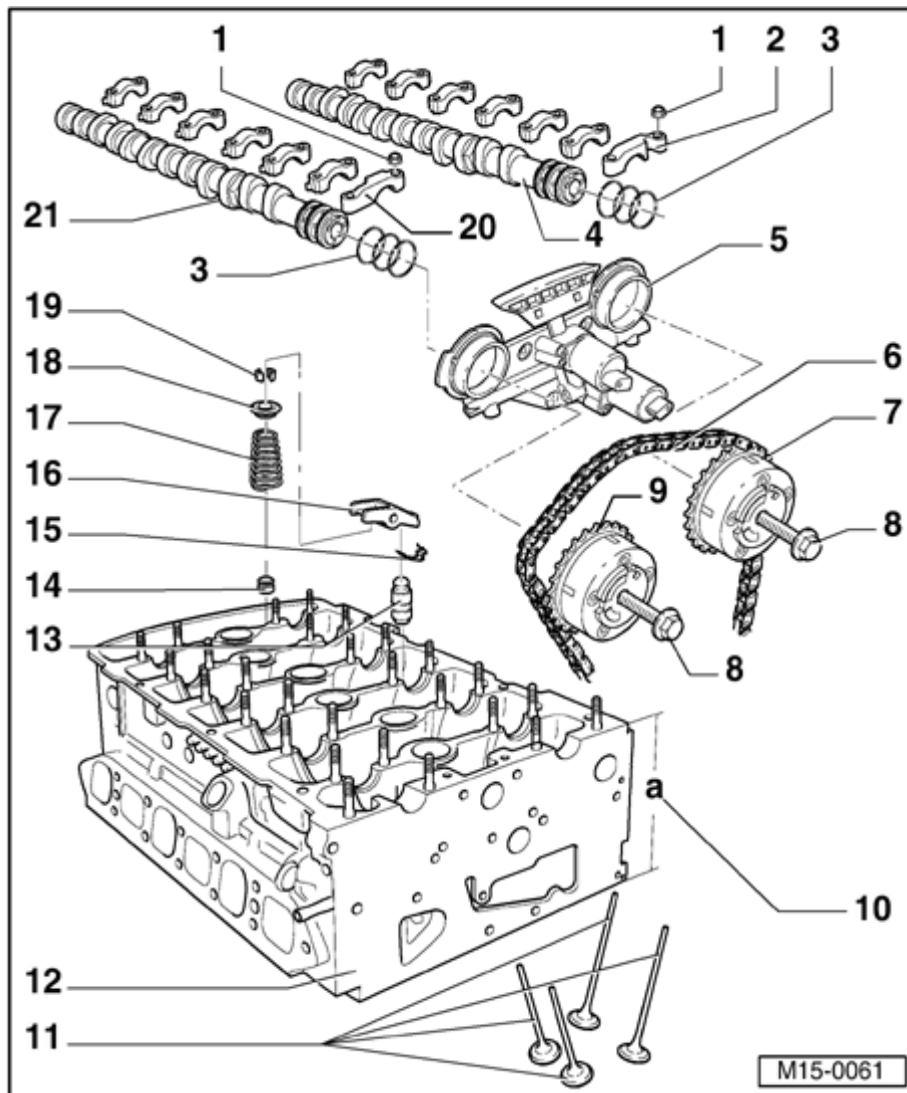
- ◆ Installing ⇒ [Page 15-39](#), Adjusting valve timing

7 - Exhaust camshaft timing adjuster

- ◆ Marking: 32A
- ◆ Turn engine over only when camshaft timing adjuster is installed
- ◆ Checking camshaft timing adjustment ⇒ [Page 15-82](#)
- ◆ Installing ⇒ [Page 15-39](#), Adjusting valve timing

**8 - 60 Nm +
1/4 turn
(90 °)
further**

- ◆ Replace
- ◆ Contact surface of sensor wheel on bolt head must be dry for assembly
- ◆ To remove and install, use a 32 mm open end wrench on camshaft to counter-support ⇒ [Page 15-69](#) , Removing and installing camshaft



9 - Intake camshaft timing adjuster

- ◆ Markings: 24E
- ◆ Turn engine over only when camshaft timing adjuster is installed
- ◆ Checking camshaft timing adjustment ⇒ [Page 15-82](#)
- ◆ Installing ⇒ [Page 15-39](#) , Adjusting valve timing

10 - Cylinder head height

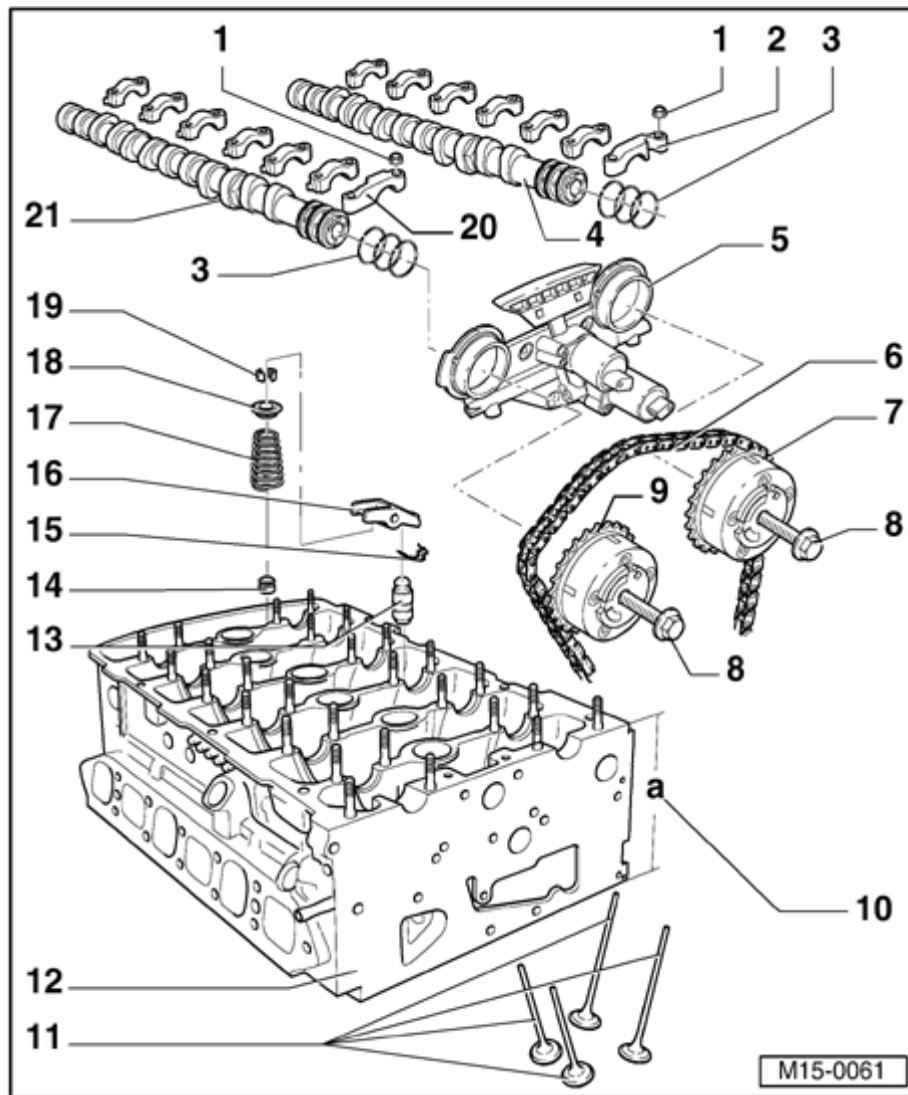
- ◆ Minimum height: a = 139.9 mm

11 - Valves

- ◆ Do not rework, only lapping-in is permitted
- ◆ Valve dimensions ⇒ [Fig. 4](#)

12 - Cylinder head

- ◆ Check for distortion
⇒ [Page 15-9](#), Fig. 1
- ◆ Removing and installing
⇒ [Page 15-25](#)
- ◆ Reworking valve seats ⇒ [Page 15-65](#)
- ◆ After replacement replace the entire coolant



13 - Support element

- ◆ Check axial clearance of camshaft before installation ⇒ [Fig. 1](#)
- ◆ Do not interchange
- ◆ With hydraulic valve clearance compensation

14 - Valve stem seal

- ◆ Replacing ⇒ [Page 15-92](#)

15 - Retaining clip

- ◆ Check seated securely

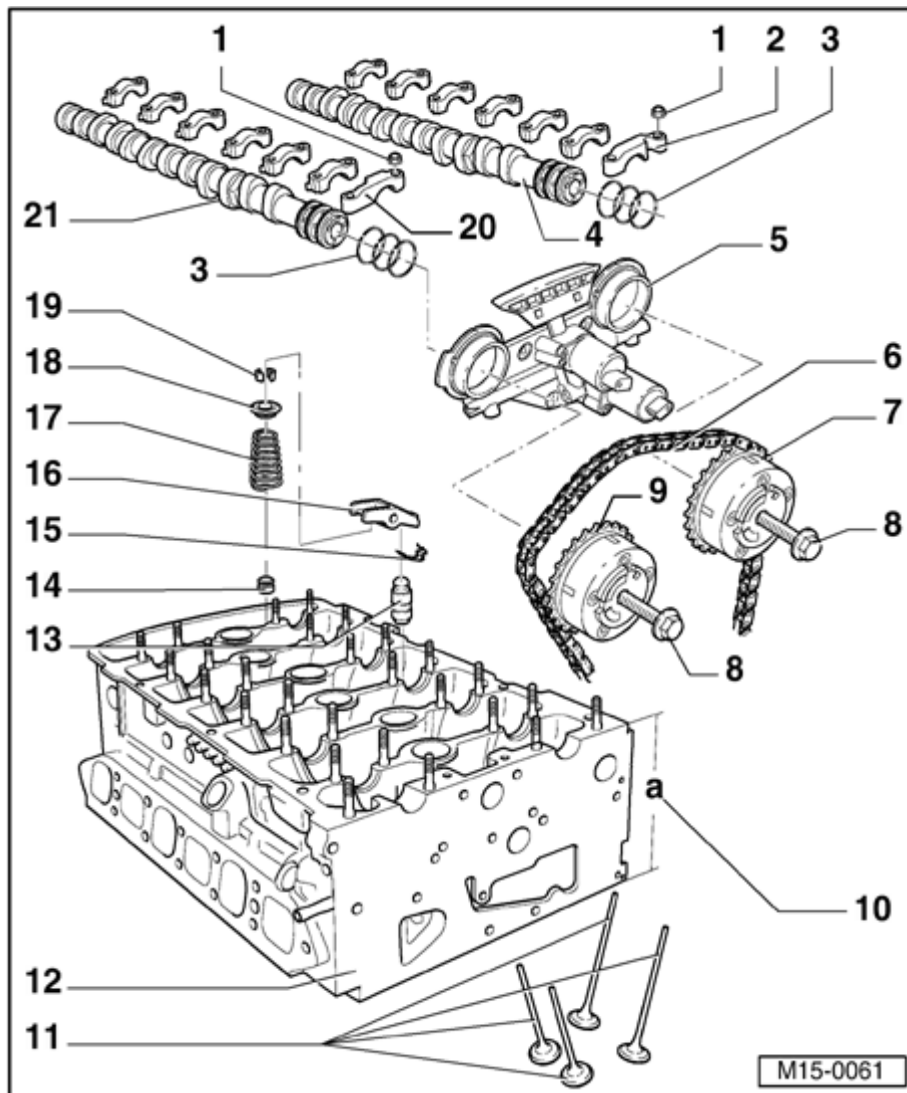
16 - Roller rocker finger

- ◆ Check axial clearance of camshaft before installation ⇒ [Fig. 1](#)
- ◆ Do not interchange
- ◆ Check roller bearing

for easy
movement

- ◆ Oil
running
contact
surfaces

- ◆ Use
securing
clip to
clip onto
support
element
when
installing



17 - Valve spring

- ◆ Observe installation position
- ◆ Removing and installing ⇒ [Page 15-92](#), Replacing valve stem seals

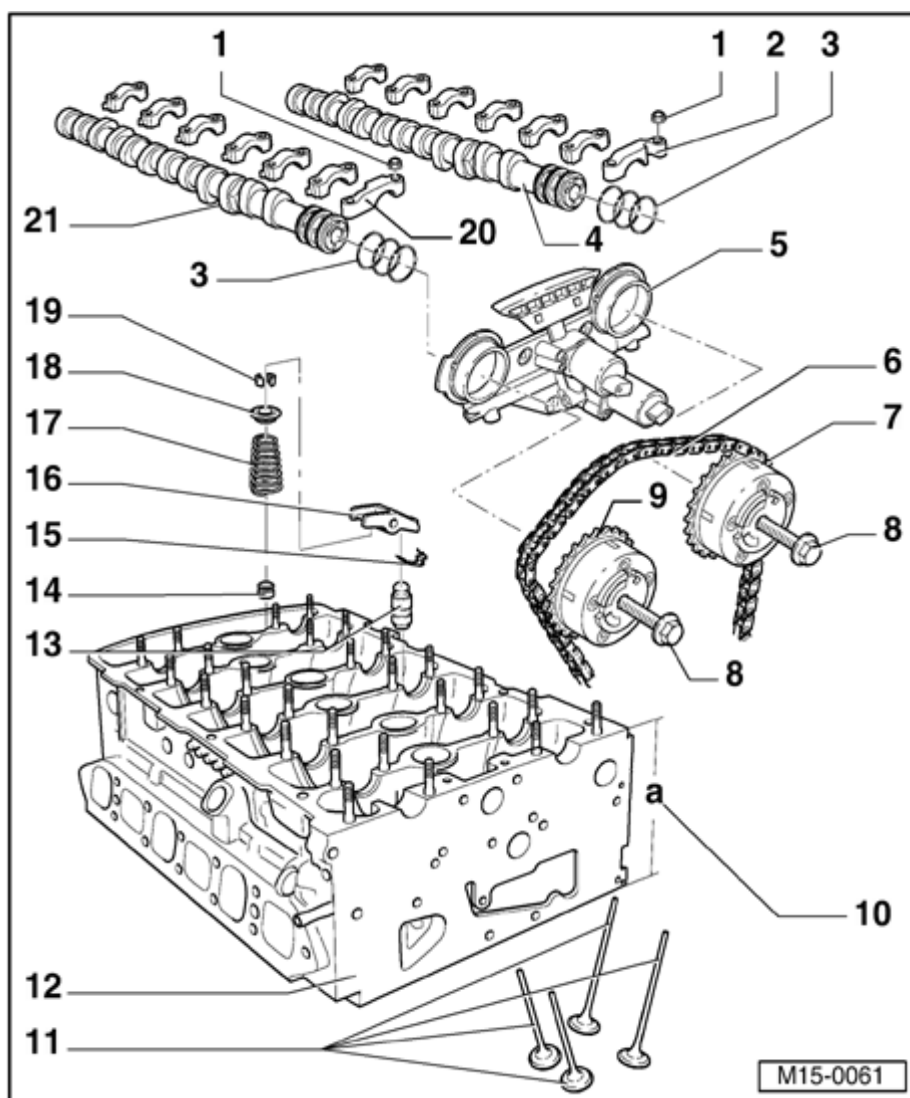
18 - Valve spring plate

19 - Valve cotters

20 Intake - camshaft bearing cap

- ◆ Before installing bearing cap 7, lightly grease the contact surfaces with G 052 723 A2 ⇒ [Fig. 2](#)
- ◆ Installation position ⇒ [Fig. 3](#)
- ◆ Installation sequence ⇒ [Page 15-69](#), Removing and

installing
camshaft



21 - Intake camshaft

- ◆ Check radial clearance with Plastigage, Wear limit: 0.1 mm
- ◆ Run-out: max. 0.01 mm
- ◆ Checking axial clearance ⇒ [Fig. 1](#)
- ◆ Identification and valve timing ⇒ [Fig. 5](#)
- ◆ Removing and installing ⇒ [Page 15-69](#)

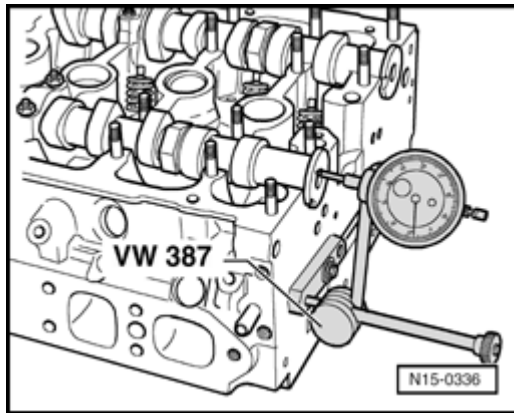


Fig. 1 Camshafts, checking axial clearance

Special tools and equipment

- ◆ VW 387 Universal dial gauge bracket
- ◆ Dial gauge

Test sequence

Perform measurements with support elements and roller rocker fingers removed.

Intake camshaft

- Install bearing cap 7 and tighten to 5 Nm and $\frac{1}{8}$ turn (45°).

Wear limit: max. 0.10 mm

Exhaust camshaft

- Install bearing cap 8 and tighten to 5 Nm and $\frac{1}{8}$ turn (45°).

Wear limit: max. 0.10 mm

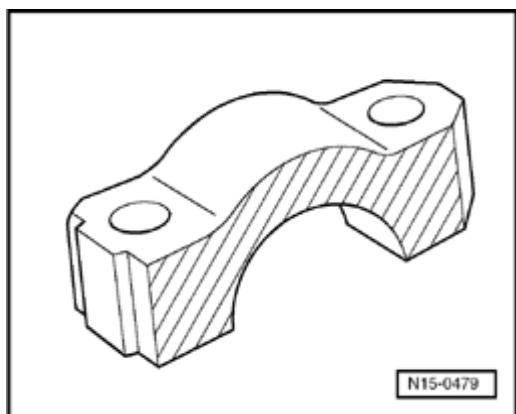


Fig. 2 Greasing contact surfaces of bearing caps 7 and 8 lightly before installing

Special tools and equipment

- ◆ G 052 723 A2 Grease

Work sequence

- Before installing, lightly grease contact surfaces on both sides of bearing caps 7 and 8 (hatched areas only) with grease G 052 723 A2.

15-61

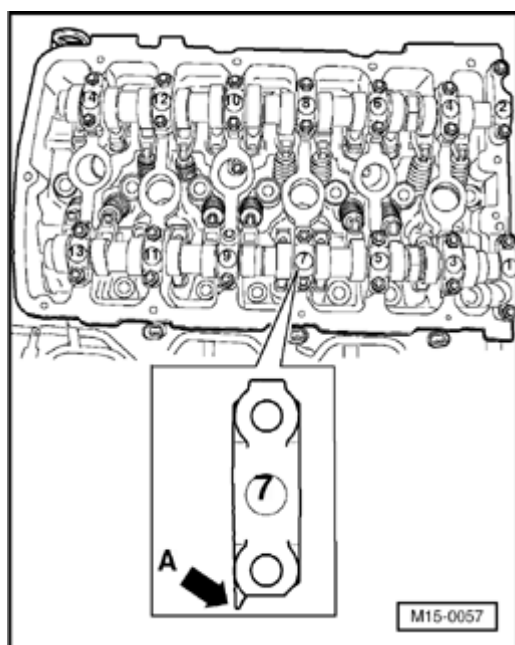


Fig. 3 Installation position of camshaft bearing caps

Points of bearing caps (arrow -A-) of intake and exhaust camshafts face outward.

Identifications on bearing caps are legible when read from intake side.

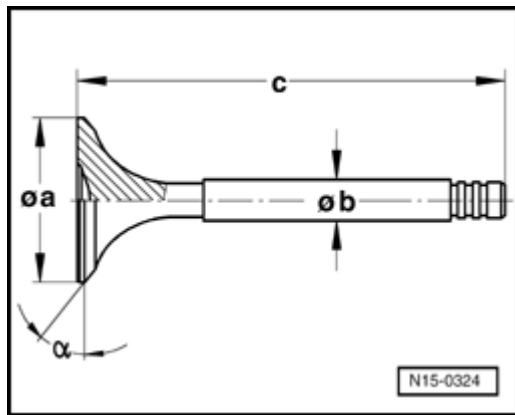


Fig. 4 Valve dimensions

Note:

Valves must not be reworked. Only lapping-in is permitted.

Valve dimensions for intake valves

Dimension		Short intake valve	Long intake valve
diameter a	mm	31.00	31.00
diameter b	mm	5.96	5.96
c	mm	102.20	136.10
α	\angle°	45	45

Valve dimensions for exhaust valves

Dimension		Short exhaust valve	Long exhaust valve
diameter a	mm	27.00	27.00
diameter b	mm	5.94	5.94
c	mm	102.50	136.40
α	\angle°	45	45

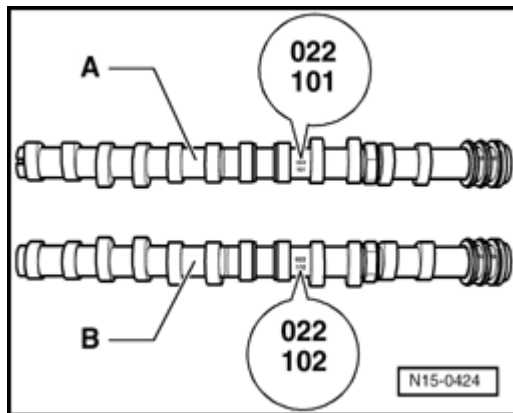


Fig. 5 Camshaft identification, valve timing

Camshaft identification

Identification between No. 4 cyl. and No. 5 cyl. cam pair of respective camshaft.

Camshaft	Identification
A - Exhaust camshaft	022 101 Index
B - Intake camshaft	022 102 Index

Valve timing at 1 mm valve lift

Valve	Intake valve	Exhaust valve
Opens BTDC	---	211.5 °
Closes BTDC	---	6.5 °
Opens ATDC	18.5 °	---
Closes ATDC	223.5 °	---

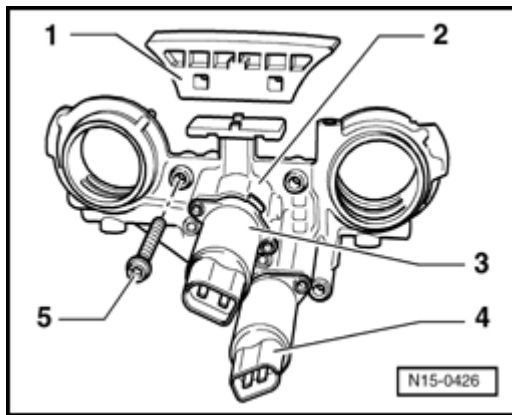


Fig. 6 Disassembling and assembling control housing

1 - Guide rail: Clipped onto control housing

2 - Control housing:

Replaced complete with Valve -1- for camshaft adjustment -N205- and Camshaft adjustment valve 1 (exhaust) -N318-.

3 - Valve -1- for camshaft adjustment -N205-

4 - Camshaft adjustment valve 1 (exhaust) -N318-

5 - 8 Nm: Replace (4 securing bolts)

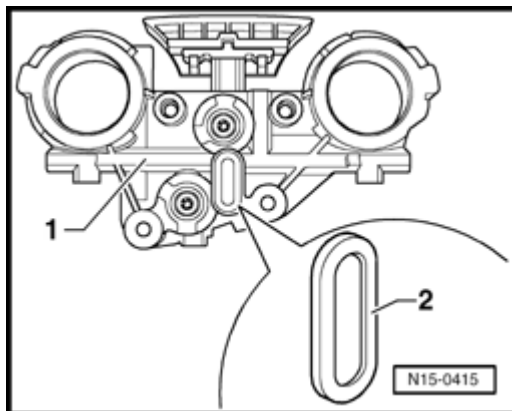


Fig. 7 Checking control housing screen for soiling

- Unclip screen -2- out from rear side of control housing -1- and clean if necessary.

Valve seats, reworking

Special tools and equipment

- ◆ Depth gauge
- ◆ Valve seat refacing tool

Work sequence

Note:

- ◆ *When repairing engines with leaking valves, it is not sufficient to rework or replace valve seats and valves. It is also necessary to check the valve guides for wear. This is particularly important on high mileage engines ⇒ [Page 15-91](#).*
- ◆ *The valve seats should only be reworked just enough to produce a perfect seating pattern. The maximum permissible reworking dimension must be calculated before reworking commences. If the reworking dimension is exceeded, the function of the hydraulic lifters can no longer be guaranteed and the cylinder head should be replaced.*

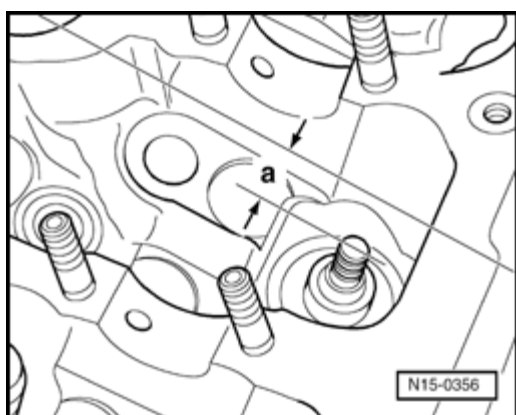
- Remove camshafts ⇒ [Page 15-69](#) .

The maximum permissible reworking dimension is calculated as follows:

- Insert valve and press firmly against seat.

Note:

If the valve is to be replaced as part of a repair, use a new valve for the measuring.



- Measure distance -a- between end of valve stem and upper edge of cylinder head.
- Calculate max. permissible reworking dimension from measured distance -a- and minimum dimension.

Minimum dimensions

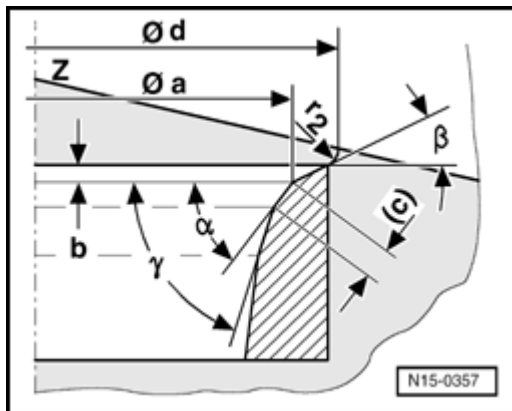
Short intake valve	mm	31.8
Long intake valve	mm	10.2
Short exhaust valve	mm	31.8
Long exhaust valve	mm	10.2

Measured distance minus minimum dimension = Max. permissible reworking dimension.

Example:

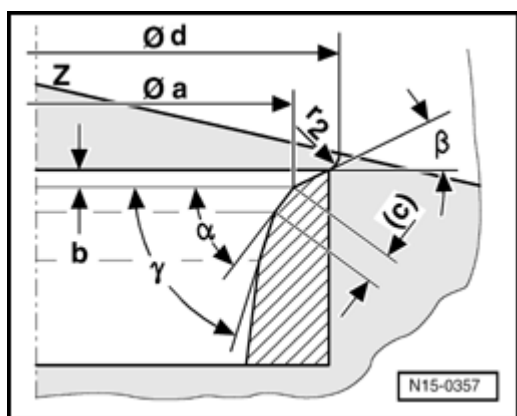
-	Measured distance	10.6	mm
-	Minimum dimension	10.2	mm
=	Max. perm. rework dimension*	0.4	mm

*) The max. permissible reworking dimension is shown as dimension "b" in illustrations for the reworking of valve seats.

**Reworking intake valve seat**

- a = Diameter 30.6 mm
- b = Max. permissible reworking dimension*
- c = 0.9...1.5 mm
- d = Max. diameter 35.0 mm
- r₂ = Radius 2.0 mm
- Z = Lower edge of cylinder head
- α = 45 ° valve seat angle
- β = 30 ° upper correction angle
- γ = 60 ° lower correction angle

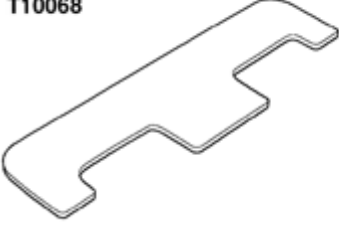


*) How to calculate the max. permissible reworking dimension ⇒ [Page 15-66](#) .



✦ Reworking exhaust valve seat

- a = Diameter 26.7 mm
- b = Max. permissible reworking dimension*
- c = 1.2...1.7 mm
- d = Max. diameter 29.0 mm
- r_2 = Radius 2.0 mm
- Z = Lower edge of cylinder head
- α = 45 ° valve seat angle
- β = 30 ° upper correction angle
- γ = 60 ° lower correction angle

*) How to calculate the max. permissible reworking dimension ⇒ [Page 15-66](#) .

<p>T10068</p> 	<p>V.A.G 1331</p> 
<p>V.A.G 1332</p> 	
	<p style="text-align: right;">W15-0132</p>

Camshafts, removing and installing

(with cylinder
head
installed)

Special tools and equipment

- ◆ T10068
Camshaft
bar
- ◆ V.A.G
1331
Torque
wrench
(5...50
Nm)
- ◆ V.A.G
1332
Torque
wrench
(40...200
Nm)
- ◆ AMV 174
004 01
Sealing
compound
- ◆ AMV 188
001 02
Sealing
compound
- ◆ G 052 723
A2 Grease

Removing

CAUTION!

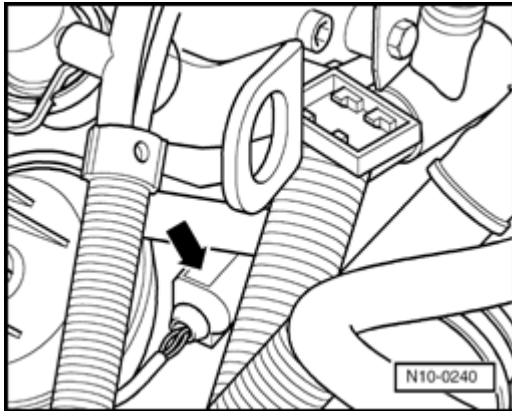
When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- ◆ ***Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.***
- ◆ ***Ensure sufficient clearance to all moving or hot components.***

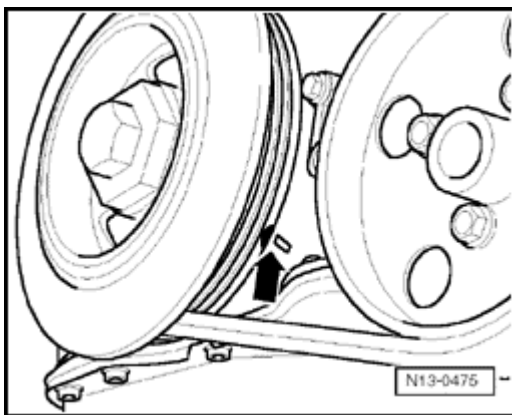
Note:

All cable ties which are opened or cut open during disassembly, must be replaced in the same position during installation.

- Remove engine cover.
- Check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground strap.
- Remove intake manifold ⇒ [Page 15-16](#) ,
Removing and installing cylinder head cover.

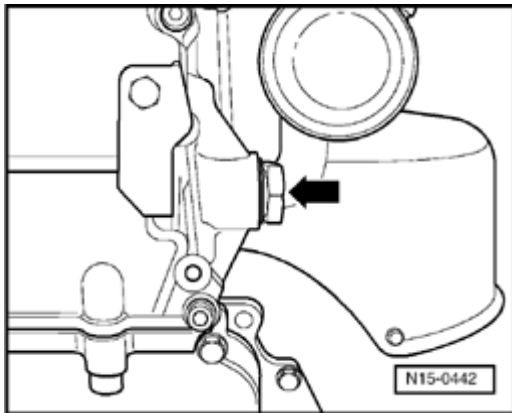


- Disconnect 4-pin connector (arrow) from Engine Coolant Temperature (ECT) sensor -G62- with Engine Coolant Temperature (ECT) sensor -G2-.
- Drain coolant ⇒ [Page 19-15](#) .
- Remove coolant thermostat housing ⇒ [Page 19-6](#) , Parts of cooling system, engine side.

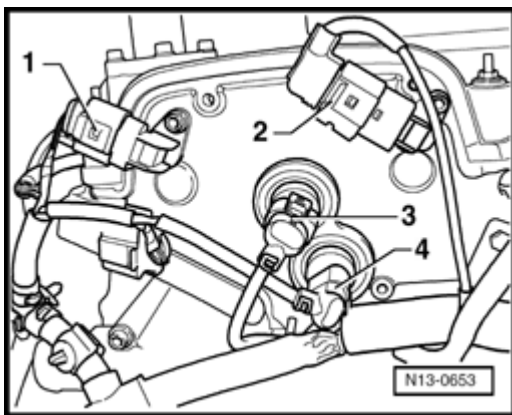


- Set crankshaft to TDC No. 1 Cyl. marks (arrow) by turning crankshaft on vibration damper securing bolt in engine direction of rotation.
- Remove cylinder head cover ⇒ [Page 15-16](#) .

15-72



- ✦ - Remove camshaft roller chain tensioner (arrow).



- ✦ - Disconnect connections from following components on cover:
 - ◆ Camshaft Position (CMP) sensor -G40- -1-,
 - ◆ Camshaft Position (CMP) sensor 2 -G163- -2-,
 - ◆ Valve -1- for camshaft adjustment -N205- -3-,
 - ◆ Camshaft adjustment valve 1 -N318- -4-.

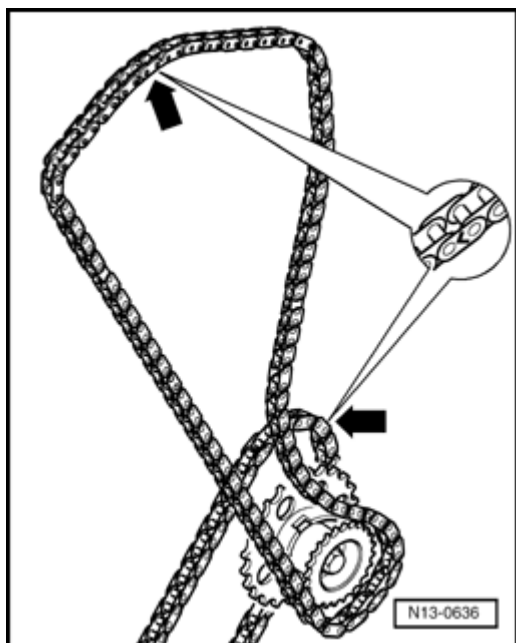
Note:

Mark connector and component before disconnecting.

- Release and free wiring harness.

15-73

- Remove camshaft cover ⇒ [Page 15-11](#) , Removing and installing camshaft.

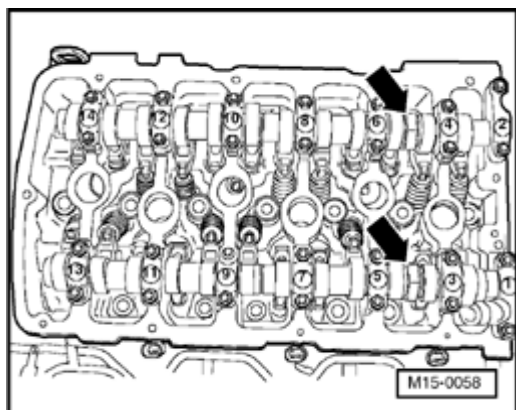


- Mark roller chains before removing (e.g. \ paint, arrow pointing in direction of rotatic

Note:

Do not mark chain with a punched mark, no similar!

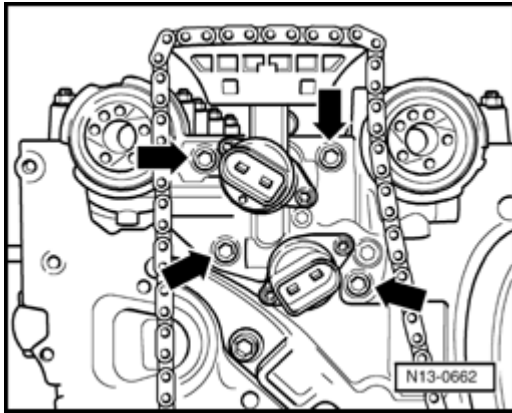
- First remove exhaust camshaft timing adj
- Remove camshaft timing adjuster together camshaft roller chain from intake camsha

Note:

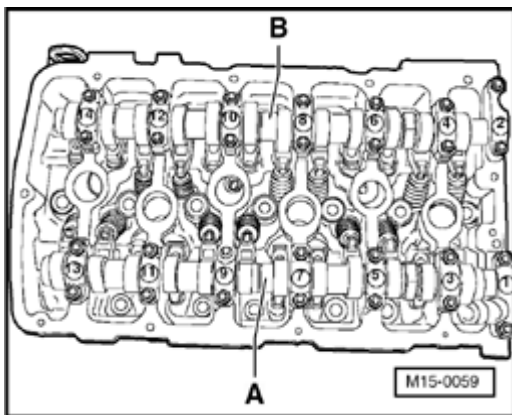
- Counter-support on camshaft with a 32 mm end wrench (arrow). Camshaft bar T10068, not be installed when loosening or tightenin camshaft timing adjuster.

- Place camshaft roller chain to side.

15-74

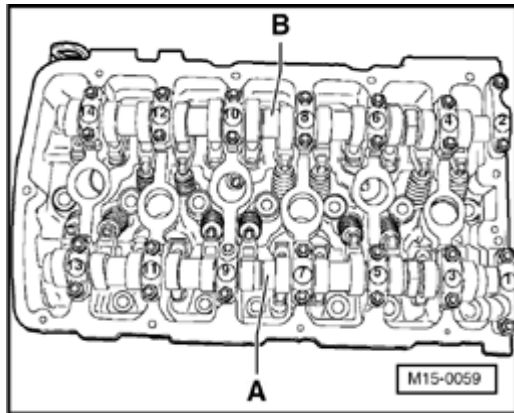


- Remove control housing from cylinder head (arrows).
- Pull control housing carefully of camshaft seals.



A - Intake camshaft

- First remove bearing caps 1 and 13.
- Remove bearing caps 3 and 11.
- Remove bearing cap 7.
- Loosen bearing caps 5 and 9 alternately and diagonally, and remove.

**B - Exhaust camshaft**

- First remove bearing caps 2 and 14.
- Remove bearing caps 4 and 12.
- Remove bearing cap 8.
- Loosen bearing caps 6 and 10 alternately and diagonally.
- Carefully remove camshafts and place on a clean surface.
- Remove roller rocker finger together with support elements and place on a clean surface.

Note:

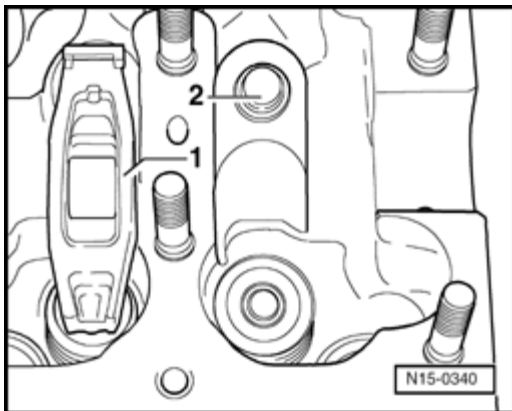
Ensure the roller rocker fingers and the support elements are not interchanged.

Installing

Conditions

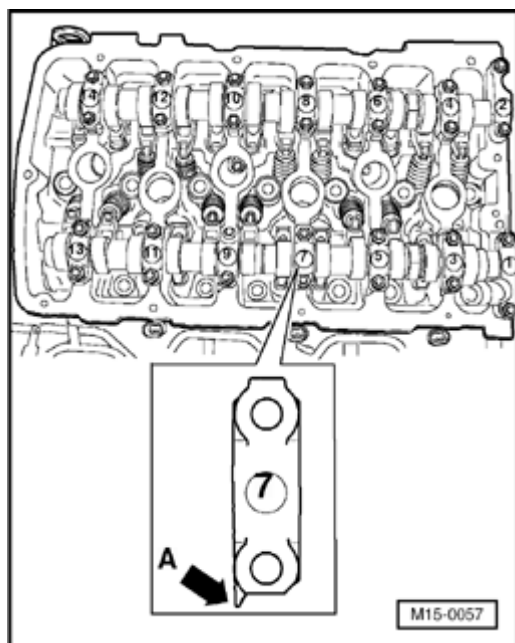
- When camshafts are installed, No. 1 Cy cams must point upward.
- Pistons must not be positioned at TDC.

- Insert support element in cylinder head at roller rocker finger onto respective valve stem end / support element.

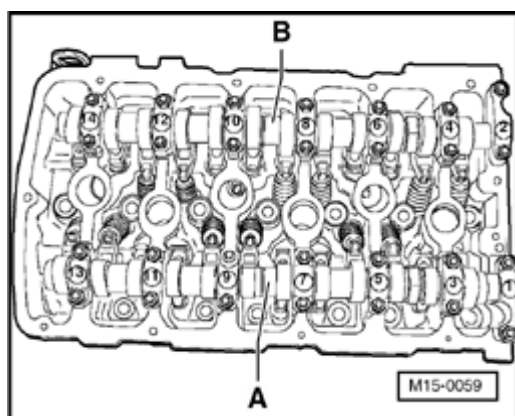


4

- Ensure that all roller rocker fingers -1- are properly installed onto valve stem ends and clipped onto respective support elements
- Oil running surfaces of camshafts.
- Place respective camshaft carefully into camshaft bearings in cylinder head. Observe marks on camshafts ⇒ [Page 15-63](#) , ⇒ F

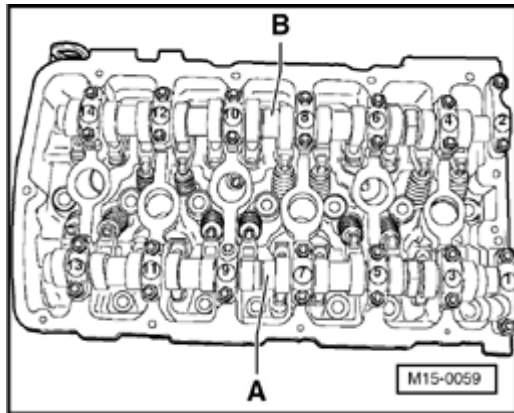
**Note:**

- ◀ Observe installation position of bearing caps:
- ◆ Points of bearing caps (arrow -A-) of intake and exhaust camshafts face outward.
 - ◆ Identifications on bearing caps are legible when read from intake side.



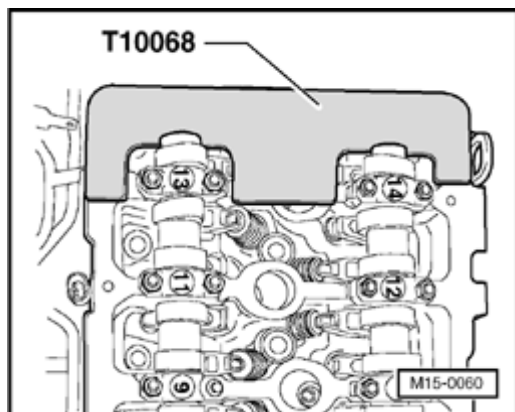
◀ A - Intake camshaft

- Lubricate hatched contact surface of bearing cap 7 from both sides lightly with grease G 052 723 A2 before installation ⇒ [Page 15-60](#) , ⇒ [Fig. 2](#) .
- Tighten bearing caps 5 and 9 alternately and diagonally to 5 Nm and $\frac{1}{8}$ turn (45°).
- Install bearing caps 1 and 13 and tighten to 5 Nm and $\frac{1}{8}$ turn (45°).
- Install bearing cap 7 and tighten to 5 Nm and $\frac{1}{8}$ turn (45°).
- Install bearing caps 3 and 11 and tighten to 5 Nm and $\frac{1}{8}$ turn (45°).



◀ B - Exhaust camshaft

- Lubricate hatched contact surface of bearing cap 8 from both sides lightly with grease G 052 723 A2 before installation ⇒ [Page 15-60](#) , ⇒ [Fig. 2](#) .
- Tighten bearing caps 6 and 10 alternately and diagonally to 5 Nm and $\frac{1}{8}$ turn (45°).
- Install bearing caps 2 and 14 and tighten to 5 Nm and $\frac{1}{8}$ turn (45°).
- Install bearing cap 8 and tighten to 5 Nm and $\frac{1}{8}$ turn (45°).
- Install bearing caps 4 and 12 and tighten to 5 Nm and $\frac{1}{8}$ turn (45°).



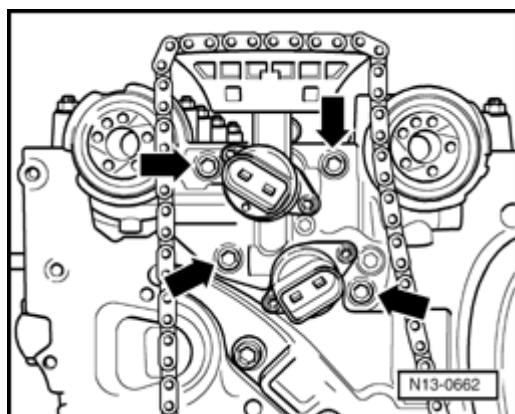
- Position camshafts in cylinder head to TDC No. 1 cylinder.

Camshaft bar T10068 must engage in both grooves.

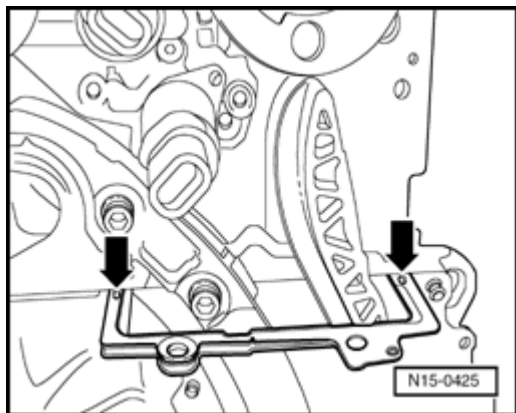
Note:

If the camshaft bar cannot be engaged in the camshafts, turn camshafts in direction of rotation past TDC No. 1 Cyl. and then back to TDC Cyl.

- Before installing, check screen in control housing for soiling ⇒ [Page 15-64](#) , ⇒ [Fig](#)
- Before installing control housing, lightly lubricate contact surfaces in control housing for camshaft seals.
- Lubricate contact surfaces of camshaft seals lightly and slowly push control housing over camshaft seals.



- Install control housing (arrows) and tighten to 10 Nm.



- Remove old sealing compound from 3 mm holes in cylinder head gasket (arrows).

Note:

When the cylinder head is installed the holes in the cylinder head gasket are only half visible.

The rest of the assembly is basically in reverse order to the disassembling sequence.

Note:

Ensure that the O-ring for sealing the oil channel and the seal in the cover are installed.

- Adjust valve timing ⇒ [Page 15-39](#) .
- Install cylinder head cover and intake manifold ⇒ [Page 15-16](#) , Removing and installing cylinder head
- Check camshaft adjustments ⇒ [Page 15-82](#) .

Camshaft adjustment, checking

Function

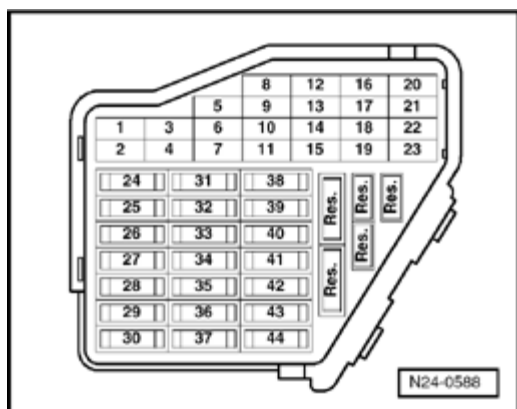
The camshaft timing adjustment is dependent upon load and speed. Oil pressure is directed to the camshaft timing adjuster (mechanical adjustment unit) by the camshaft timing adjustment solenoid valve and the camshaft adjuster then adjusts the camshaft.

Special tools and equipment

- ◆ V.A.G 1551 Scan Tool (or vehicle system tester V.A.G 1552) with cable V.A.G 1551/3

Note:

All functions which could previously be performed with V.A.G 1551/1552 can also be performed with the new tester VAS 5051.



Test conditions

- Fuses must be OK.
- Battery voltage must be at least 11.5 V.
- All electrical consumers, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Engine oil level OK, checking ⇒ [Page 17-8](#) , Fig. 2
- No DTCs may be stored in the DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Checking activation

- Check Valve -1- for camshaft adjustment -N205- and Camshaft adjuster valve 1 (exhaust) -N318- via output Diagnostic Test Mode (DTM):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

If activation is OK.:

Checking function of camshaft timing adjuster

Test conditions

- Coolant temperature must be at least 85 °C, ⇒display group 1, display zone 2.

Test sequence

- Connect V.A.G 1551 Scan Tool (or V.A.G 1552). Start engine and select "Address word" 01 of engine control module. Connect Scan Tool and select engine control module:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Rapid data transfer
Select function XX

HELP



Indicated on display

- Press keys 0 and 4 for function "Initiate basic setting" and confirm entry with Q key.

Basic setting
Input display group number XXX



Indicated on display

- Press keys 0, 0 and 1 for "Display group number 1" and confirm entry with Q key.

System in basic setting 1 →

1 2 3 4



Indicated on display: (1...4 = display zones)

Only continue with the test when:

- Coolant temperature is above 85 °C -Display zone 2-

Checking intake camshaft timing adjustment

- Change to display group 94 as follows:
- Press C key.

Basic setting

Input display group number XXX



Indicated on display

- Press keys 0, 9 and 4 for "Display group number 94" and confirm entry with Q key.

System in basic setting 94 →

1 2 3



Indicated on display: (1...3 = display zones)

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by engine control module to approx. 2300 rpm.

- Hold brake pedal and accelerator down until display in display zone 3 jumps from "Test OFF" to "Test ON".
- Continue to hold brake pedal and accelerator down until display zone 3 displays specification "Syst. OK."..
- Release brake and accelerator pedals.

If "Syst.n.OK." appears in display zone 3:

- Press → key.

- Check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Generate readiness code again if DTC memory has been erased or engine control module separated from permanent positive supply:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

If no DTC is stored in DTC memory:

- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.
- Check Camshaft Position (CMP) sensors -G40- and -G163- (connections may be interchanged):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 28](#)

- Check oil pressure ⇒ [Page 17-19](#) , Checking oil pressure and oil pressure switch.
- Check valve timing ⇒ [Page 15-37](#) .

When no faults can be located:

- Replace intake camshaft timing adjuster ⇒ [Page 15-69](#) , Removing and installing camshaft

If "Sys. OK." appears in display zone 3:

Check exhaust camshaft timing adjustment

- Change to display group 96 as follows:

- Press C key.

Basic setting

Input display group number XXX



Indicated on display

- Press keys 0, 9 and 6 for "Display group number 96" and confirm entry with Q key.

System in basic setting 96

1 2 3 →



Indicated on display: (1...3 = display zones)

- Depress brake pedal and hold.

- Depress accelerator down to wide open throttle position.

Engine speed will be increased by engine control module to approx. 2300 rpm.

- Hold brake pedal and accelerator down until display in display zone 3 jumps from "Test OFF" to "Test ON".

- Continue to hold brake pedal and accelerator down until display zone 3 displays specification "Syst. OK.".

- Release brake and accelerator pedals.

If "Sys. OK." appears in display zone 3:

- Press → key.
- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.

If "Syst.n.OK." appears in display zone 3:

- Press → key.
- Check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Generate readiness code again if DTC memory has been erased or engine control module separated from permanent positive supply:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

If no DTC is stored in DTC memory:

- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.
- Check Camshaft Position (CMP) sensors -G40- and -G163- (connections may be interchanged):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 28](#)

- Check oil pressure ⇒ [Page 17-19](#) , Checking oil pressure and oil pressure switch.
- Check valve timing ⇒ [Page 15-37](#) .

When no faults can be located:

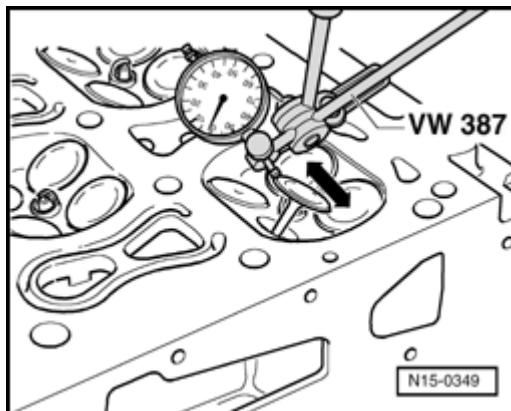
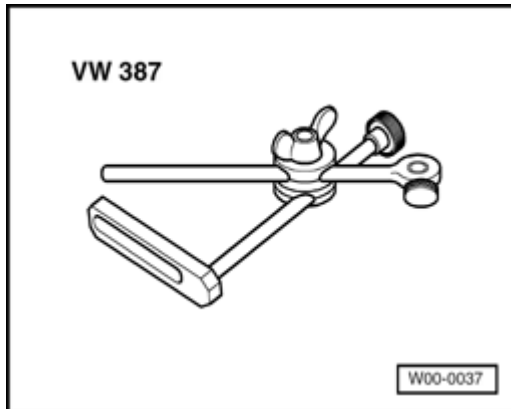
- Replace exhaust camshaft timing adjuster ⇒ [Page 15-69](#) , Removing and installing camshaft

Valve guides, checking

Special tools and equipment

- ◆ VW 387 Universal dial gauge bracket
- ◆ Dial gauge

Test sequence



- Insert a new valve into guide.

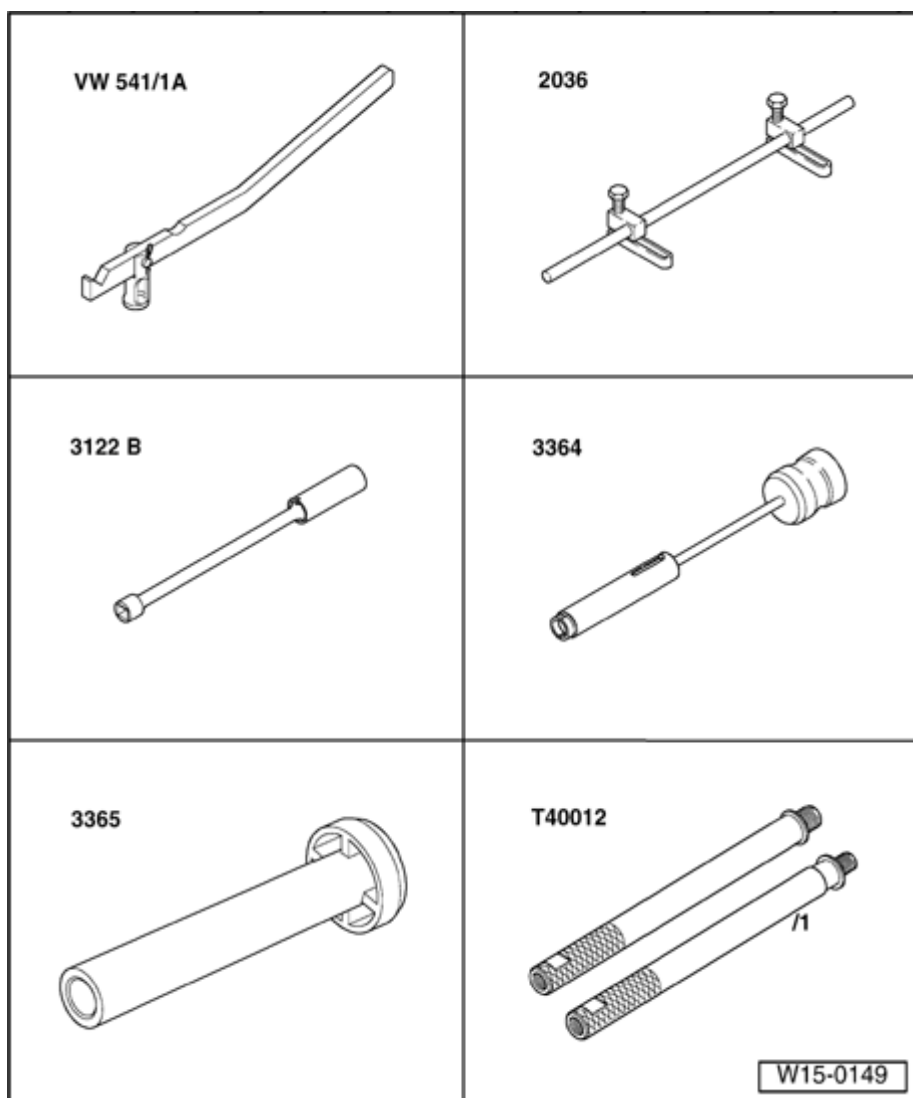
Note:

The end of the valve stem must be flush with the guide. Due to the slight difference in stem diameters, ensure that only an intake valve is used in the intake guide and an exhaust valve in the exhaust guide.

- Determine rock.
Wear limit: 0.8 mm

If rock tolerance is exceeded:

- Replace cylinder head.

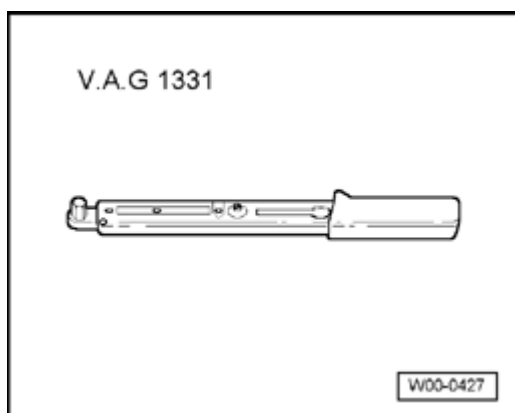


Valve stem seals, replacing

(with cylinder head installed)

Special tools and equipment

- ◆ VW 541/1A Assembly lever with press piece VW 541/6
- ◆ 2036 Assembly tool with adapter plate 2036/1
- ◆ 3122 B Spark plug wrench
- ◆ 3364 Puller
- ◆ 3365 Installation tool
- ◆ T40012 Adapter



- ◆ V.A.G 1331 Torque wrench (5...50 Nm)

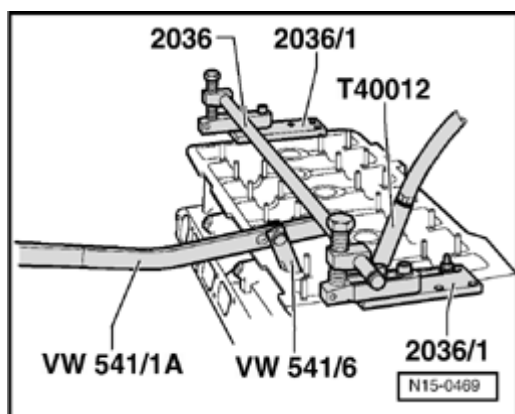
Removing

- Remove camshafts ⇒ [Page 15-69](#).
- Remove roller rocker finger together with support elements and place on a clean surface.

Note:

Ensure the roller rocker fingers and the support elements are not interchanged.

- Remove spark plugs with spark plug wrench 3122B.
- Set piston of corresponding cylinder to "bottom dead center".



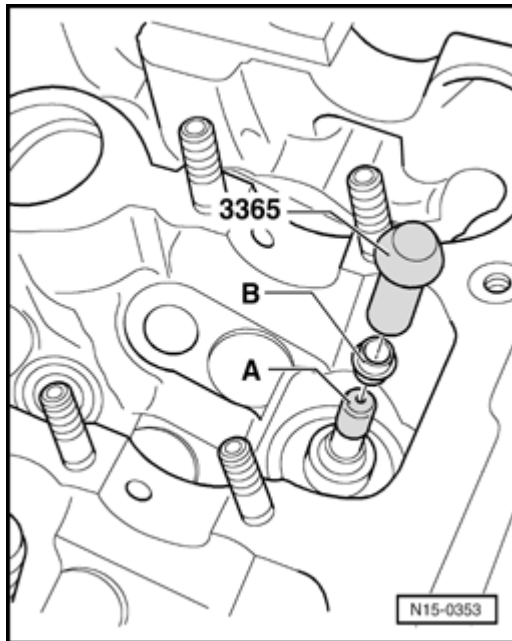
- Fit assembly appliance 2036 with adapter plates 2036/1 and adjust mountings.
- Screw adapter T40012 into threaded hole for spark plug and apply a continuous pressure of at least 6 bar
- Remove valve springs with assembly lever VW 541/1A and thrust piece VW 541/6.

Note:

Tight cotters can be loosened by tapping lightly on the lever with a hammer.

- Pull off valve stem seals with puller 3364.

Installing



- Prevent damage to new valve stem seals by sliding plastic sleeve -A- over valve stem.
- Oil sealing lip of valve stem seal - B- insert in fitting tool 3365 and carefully push onto valve guide.
- Install camshafts ⇒ [Page 15-69](#) .

Lubrication system components, servicing

Note:

- ◆ *When working on the engine it should be secured to assembly stand VW 313 using engine bracket 3269 or VW 540 and supplementary set 540/1 B.*
- ◆ *The oil level must not be above the max. mark - danger of damage to catalytic converter! Marks ⇒ [Page 17-8](#) , ⇒ [Fig. 2](#) .*
- ◆ *If, when repairing an engine, metal shavings or large amounts of small metal particles are found in the engine oil, caused for example by partial seizure of crankshaft or conrod bearings, perform the following work sequences to prevent consequential damage once repairs are complete:*
 - - *Thoroughly clean oil passages*
 - - *Replace oil spray jets*
 - - *Replace oil cooler*
 - - *Replace oil filter*
 - - *Replace oil non-return valve*

Disassembling and assembling oil filter housing ⇒ [Page 17-9](#) .

Disassembling and assembling oil pump ⇒ [Page 17-12](#) .

Checking oil pressure and oil pressure switch ⇒ [Page 17-19](#) .

Oil system capacity

⇒ *Fluid Capacity Chart*

Engine oil specifications

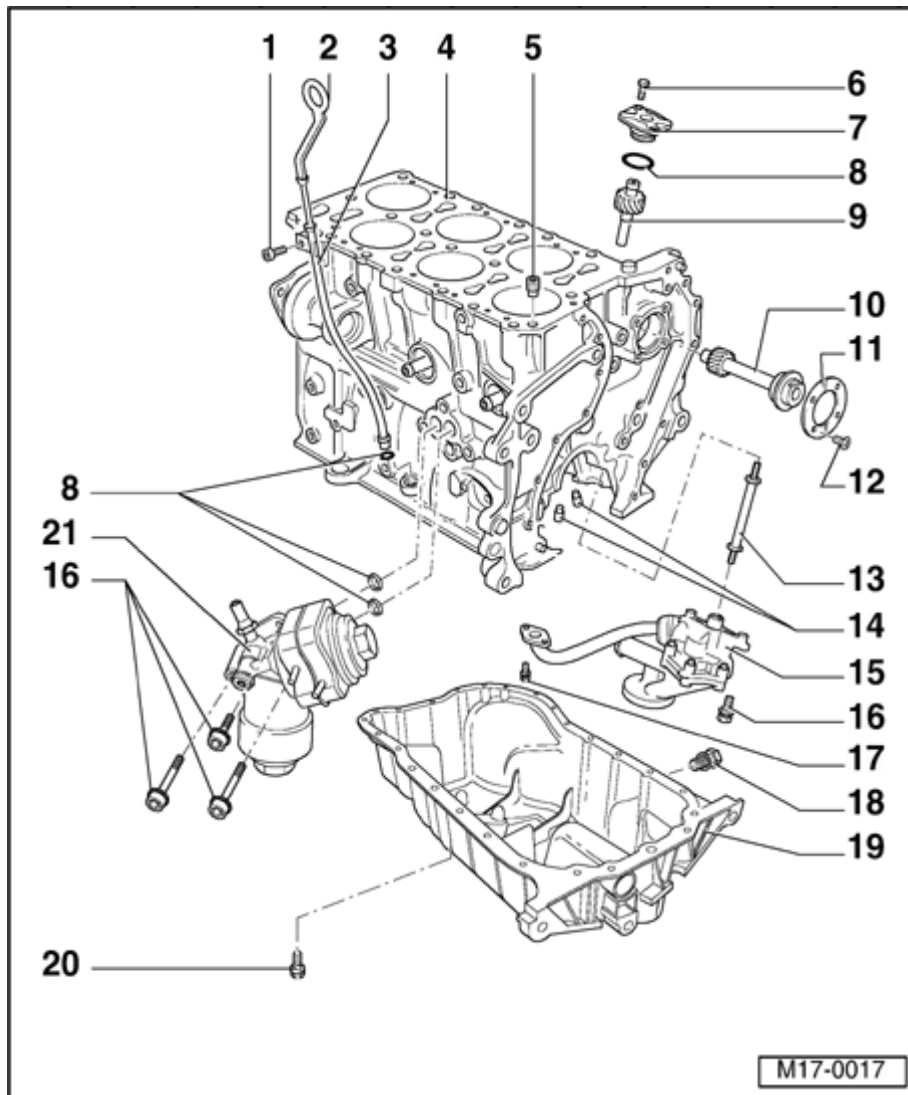
New VW standard (specially developed, age resistant)

Initial filling: VW standard: 503 00 (VW TL 52 173)

Note:

In the factory the engine is filled with engine oil according to VW standard 503 00. This engine oil is adjusted for long service intervals (ESI). However, you can also use the engine oils listed below.

Use engine oils according to VW standard 500 00, 501 01 or 502 00. Multi-grade oils corresponding to API-SJ or SL are also acceptable.

**1 - 8 Nm**

- ◆ Secured to intake manifold

2 - Dipstick

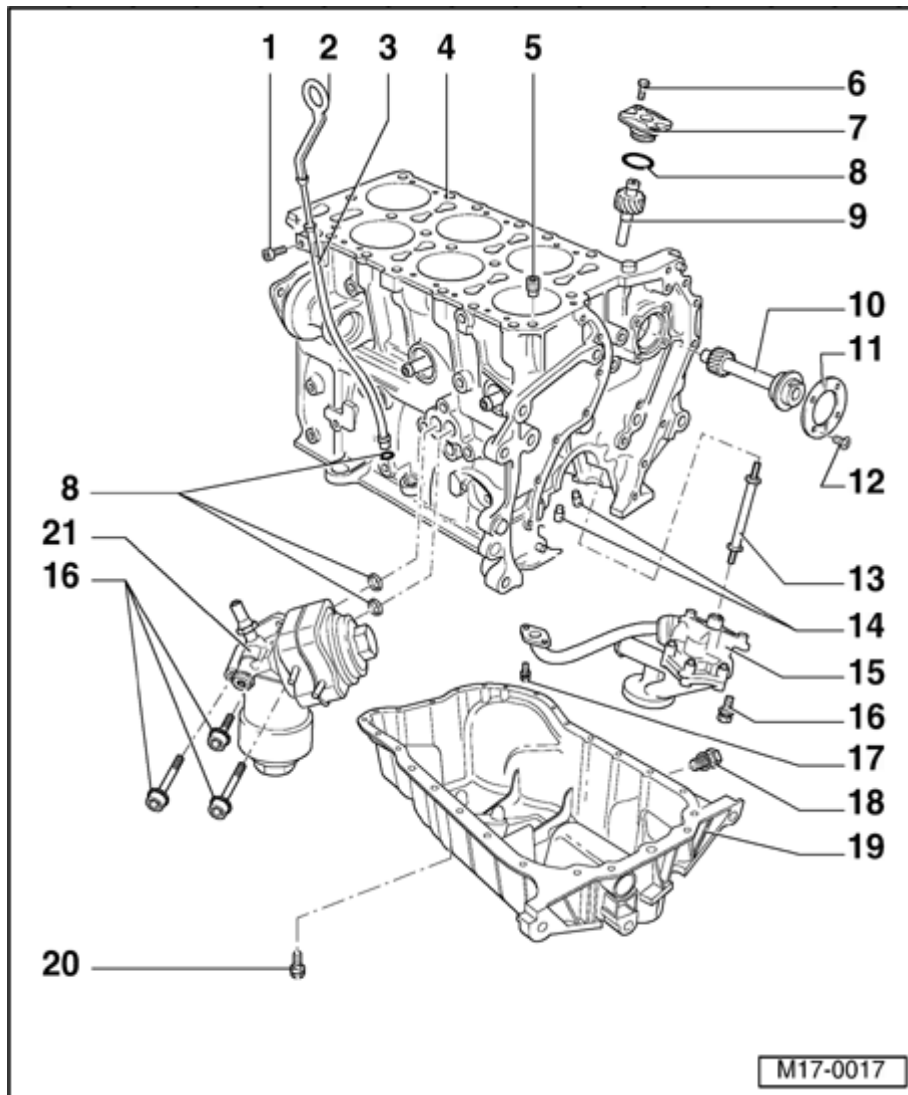
- ◆ Oil level must not exceed the max. mark!
- ◆ Markings ⇒ [Fig. 2](#)

3 - Guide tube

- ◆ For dipstick
- ◆ Secured by a bolt to intake manifold

4 - Cylinder block

- ◆ Removing and installing sealing flange and dual-mass flywheel ⇒ [Page 13-22](#)
- ◆ Removing and installing crankshaft ⇒ [Page 13-34](#)
- ◆ Disassembling and assembling piston and conrod ⇒ [Page 13-39](#)



5 - Oil non-return valve, 5 Nm

◆ Observe installation position

◆ Clean if badly soiled

◆ See note ⇒ [Page 17-1](#)

6 - 10 Nm

7 - Oil pump drive cover

8 - O-ring

◆ Replace

◆ Lubricate before installing

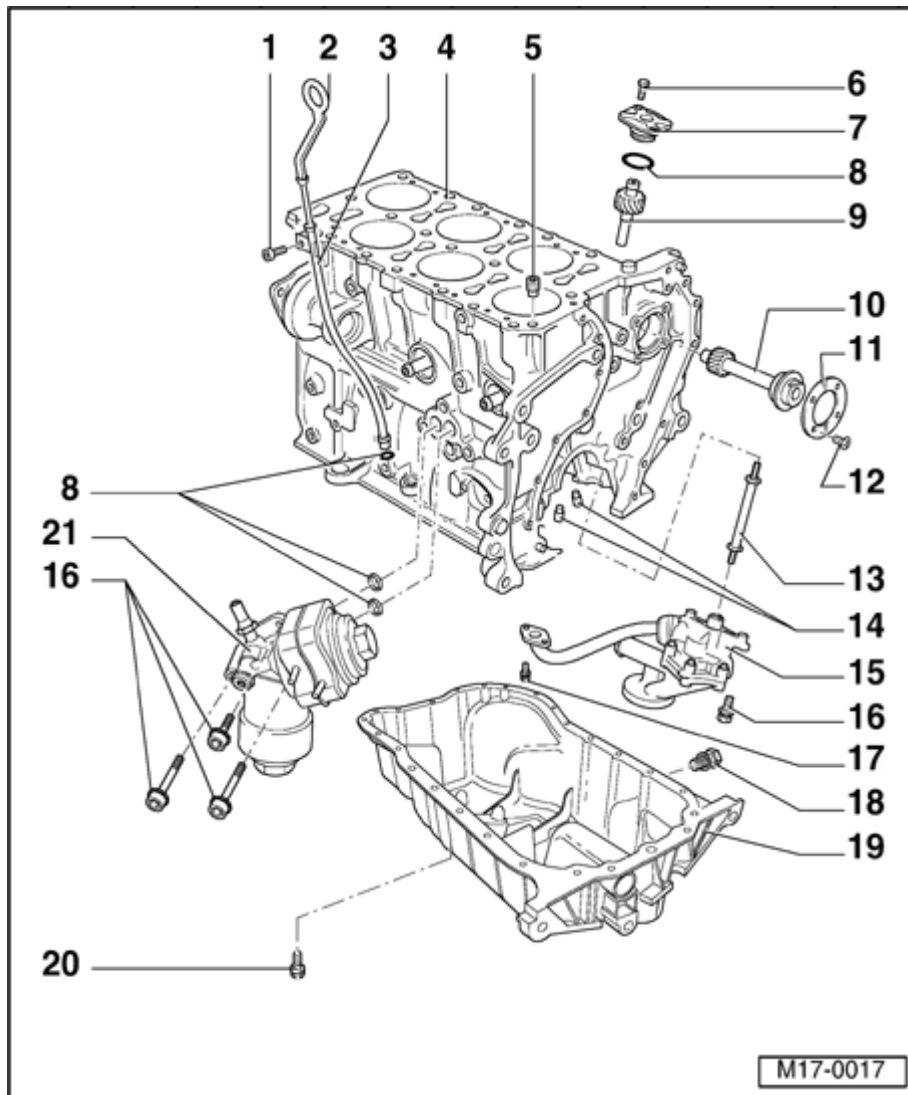
9 - Oil pump drive

10 Intermediate - shaft

11 - Thrust washer

12 - 10 Nm

◆ Install with locking compound D 000 600 A2

**13 - Drive shaft**

- ◆ For oil pump drive

14 - Oil spray jet

- ◆ For crankshaft bearings 2...7
- ◆ For piston cooling
- ◆ Opening pressure: 2.0 bar
- ◆ Removing and installing ⇒ [Fig. 1](#)
- ◆ See note ⇒ [Page 17-1](#)

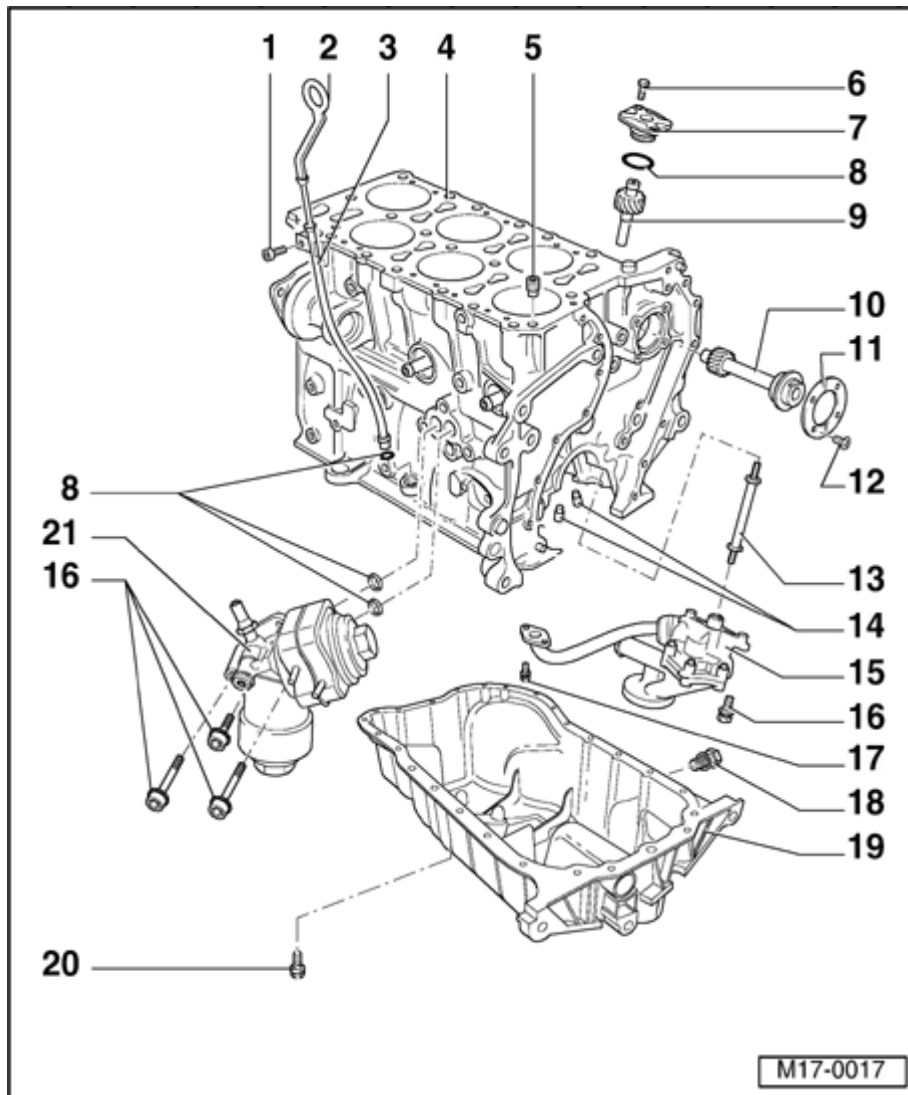
15 - Oil pump

- ◆ Disassembling and assembling ⇒ [Page 17-12](#)
- ◆ Coat oil pressure pipe with sealing compound AMV 188 001 02 at cylinder block and oil pump housing

16 - 23 Nm**17 - 8 Nm**

- ◆ Insert with

locking
compound
D 000 600
A2



18 - Oil drain plug, 30 Nm

- ◆ Replace if leaking

19 - Oil pan

- ◆ Removing and installing ⇒ [Page 17-15](#)

20 - 12 Nm

21 - Oil filter housing

- ◆ See note ⇒ [Page 17-1](#)

- ◆ Disassembling and assembling ⇒ [Page 17-9](#)

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

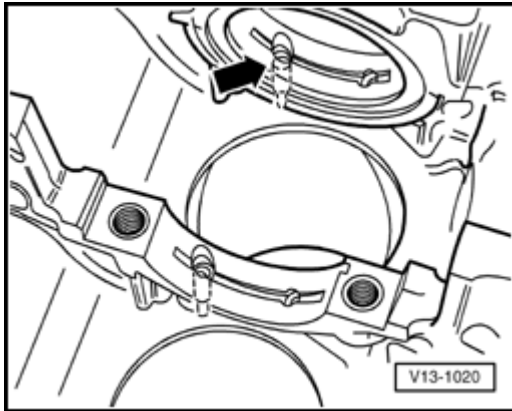


Fig. 1 Removing and installing oil spray jet

Special tools and equipment

- ◆ 4 mm diameter drift
- ◆ 6 mm diameter drift

Note:

Oil spray jets are installed in main bearings 2....7.

Removing

- Press oil spray jet out toward bearing using a 4 mm diameter drift.

Installing

- To install, press oil spray jet in by hand using a 6 mm diameter drift (arrow).

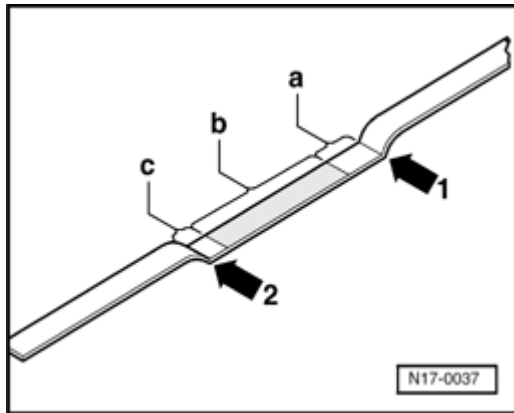


Fig. 2 Dipstick markings

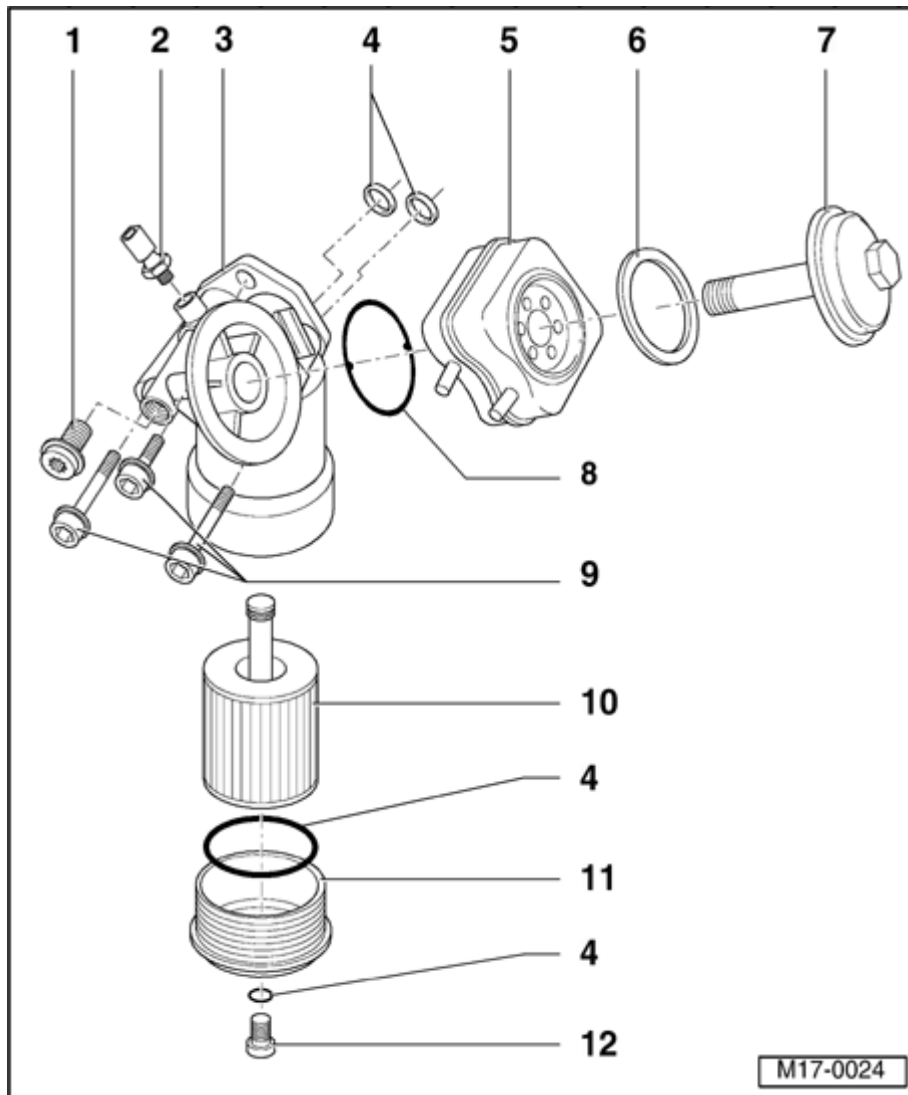
1 - Max. mark

2 - Min. mark

a - Area above hatched field up to max. mark: Do not replenish engine oil!

b - Oil level within hatched field: Engine oil may be replenished

c - Area from min. mark up to hatched field: Replenish with max. 0.5 liters of engine oil!



Oil filter housing, disassembling and assembling

1 - Sealing plug, 10 Nm

- ◆ If seal is leaking nip open and replace.

2 - 1.4 bar Oil pressure switch - F1-, 20 Nm

- ◆ Marking: black
- ◆ If seal is leaking nip open and replace.

- ◆ Checking ⇒ [Page 17-19](#)

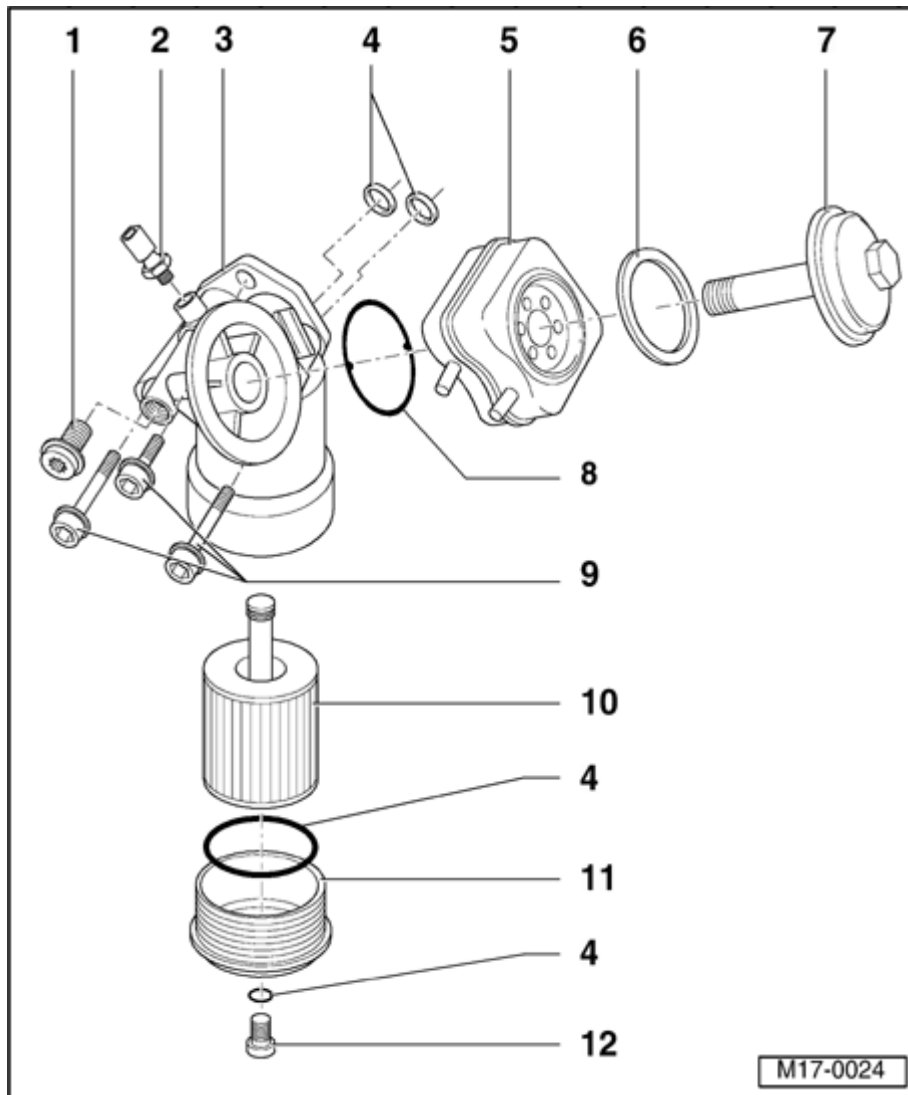
3 - Oil filter housing

- ◆ With non-return valve, Opening pressure: 0.05 bar

4 - O-ring

- ◆ Replace
- ◆ Lubricate before installing

17-10



5 - Oil cooler

- ◆ Ensure clearance to adjacent components
- ◆ Coat contact area outside seal with sealing compound AMV 188 001 02
 - ◆ See Note ⇒ [Page 17-1](#)
- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

6 - Seal

- ◆ Replace
- ◆ Lubricate before installing

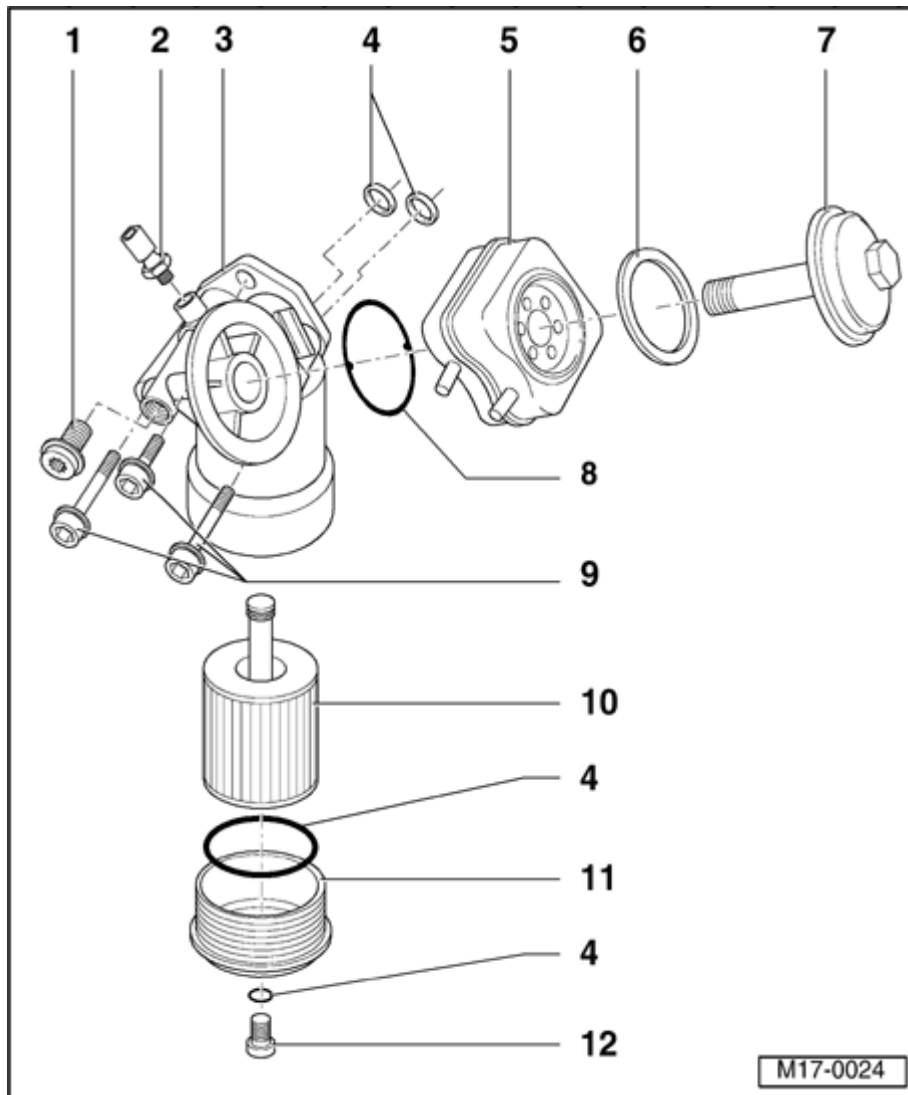
7 - Oil cooler cover, 25 Nm

8 - O-ring

- ◆ Replace
- ◆ Lubricate before installing
- ◆ Insert into oil

cooler
before
installing
oil
cooler

17-11

**9 - 23 Nm****10 - Oil filter element**

- ◆ Observe change intervals

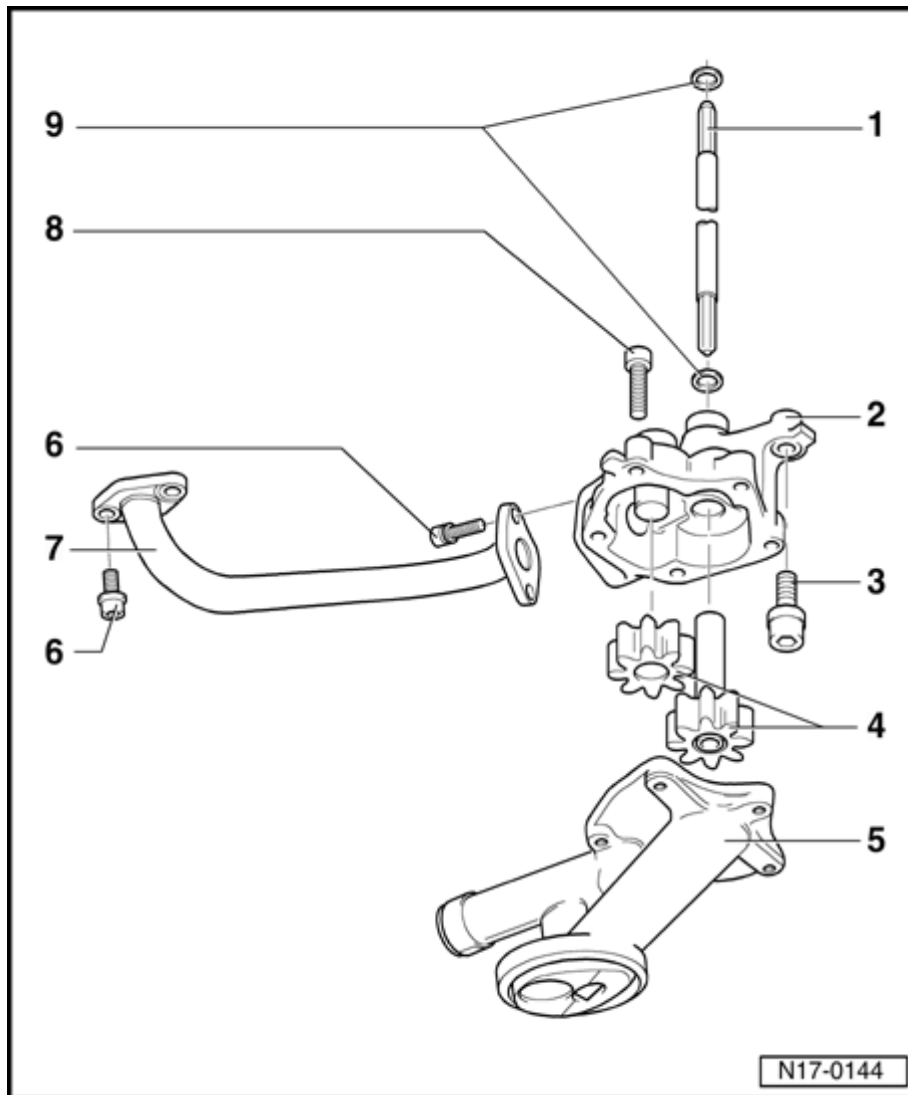
- ◆ See Note
⇒ [Page 17-1](#)

11 - Oil filter lower part, 25 Nm

- ◆ Drain before removing

- ◆ With by-pass valve, Opening pressure: 2.50 bar

12 - Oil drain plug, 10 Nm



Oil pump, disassembling and assembling

1 - Drive shaft

- ◆ For oil pump drive

2 - Oil pump housing

3 - 23 Nm

4 - Gears

- ◆ Checking backlash ⇒ [Fig. 1](#)
- ◆ Checking axial clearance ⇒ [Fig. 2](#)

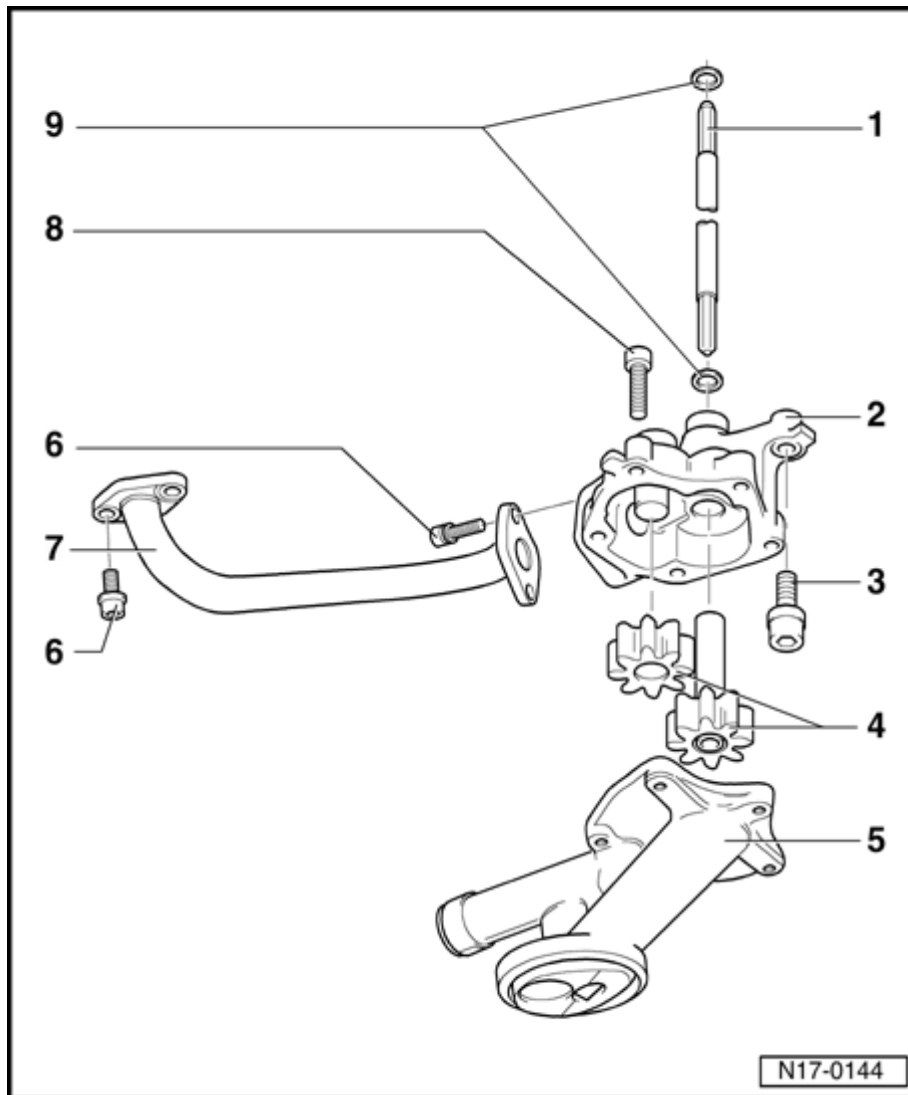
5 - Oil pump cover with pressure relief valve

- ◆ Clean strainer if soiled
- ◆ Opening pressure: 5.3...5.7 bar

6 - 8 Nm

- ◆ Insert with locking compound D 000 600 A2

17-13



7 - Oil pressure pipe

◆ Coat cylinder block and oil pump housing with sealing compound AMV 188 001 02

8 - 8 Nm

9 - Seal

◆ Replace if damaged

N17-0144

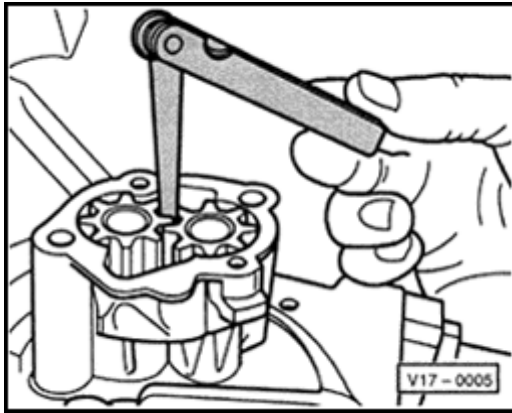


Fig. 1 Checking oil pump backlash

Special tools and equipment

- ◆ Feeler gauge
- Wear limit: 0.20 mm

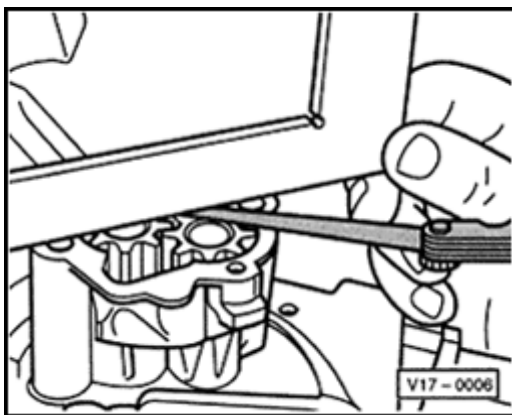


Fig. 2 Checking oil pump axial clearance

Special tools and equipment

- ◆ Straight edge
- ◆ Feeler gauge
- Wear limit: 0.10 mm

Oil pan, removing and installing

Special tools and equipment

- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ D 176 404 A2 Silicone sealing compound
- ◆ Hand drill with plastic brush attachment
- ◆ Flat scraper
- ◆ Protective goggles

Removing

- Remove center, left and right insulation trays:

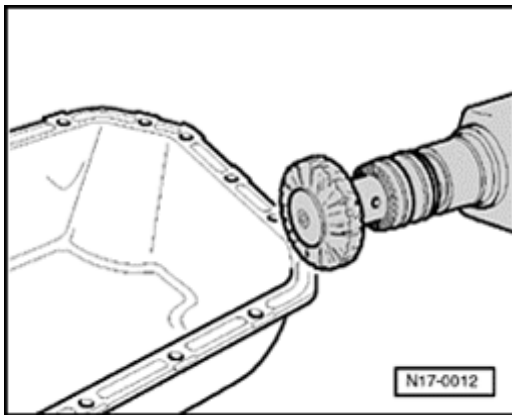
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)

- Unscrew bracket for Secondary Air Injection (AIR) pump motor -V101- from oil pan and from cylinder block ⇒ [Page 26-26](#) , item - 17 -.
- Drain engine oil.

Note:

Observe waste disposal regulations!

- Remove oil pan.



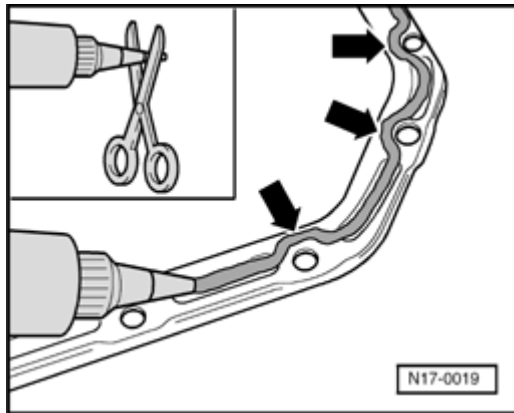
- If necessary loosen oil pan with light blow rubber mallet.
- Remove sealant residue from cylinder block with a flat scraper.
- Remove sealant residue from pan with a brush, e.g. a hand drill with a plastic brush attachment (wear protective goggles).
- Clean sealing surfaces. They must be free of dirt and grease.

Installing

Note:

- ◆ *Note the expiration date of the sealing compound.*
- ◆ *Oil pan must be installed within 5 minutes of applying silicone sealing compound.*

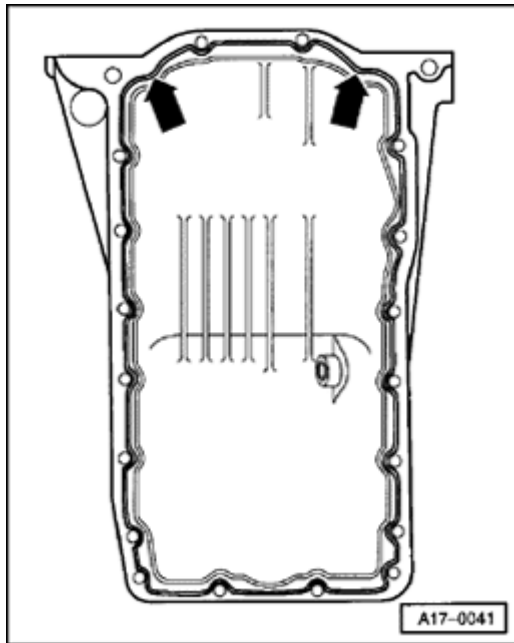
17-17



- Cut off tube nozzle at front marking (nozzle approx. 3 mm diameter).
- Apply silicone sealing compound, as shown, to clean oil pan sealing surface. Sealing compound bead must be:
 - ◆ 2...3 mm thick,
 - ◆ and run on inside of bolt holes (arrows).

Note:

The sealing compound bead must not be thicker, otherwise excess sealing compound will enter the oil pan and may block the oil suction pipe strainer.

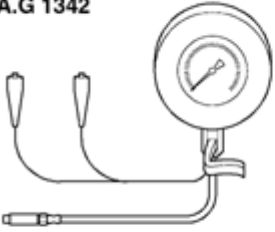
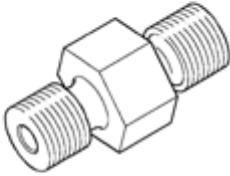
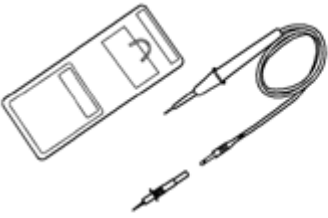
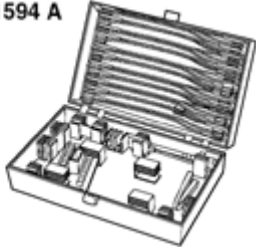


- Apply silicone sealing compound bead as illustrated to clean sealing surface of oil pan.
- Install oil pan immediately and tighten all pan bolts lightly.
- Tighten oil pan bolts to 12 Nm.
- Tighten bolts for pan/transmission to 45 Nm.
- Tighten bracket for secondary air pump motor:
 Securing bolts to oil pan: 8 Nm
 Securing bolts to cylinder block: 20 Nm

Note:

The sealing compound must be allowed to cure for approx. 30 minutes after installing the oil pan. After this time the engine may be filled with engine oil.

The rest of the assembly is basically in reverse order to the disassembling sequence.

<p>V.A.G 1342</p> 	<p>V.A.G 1342/14</p> 
<p>V.A.G 1527 B</p> 	<p>V.A.G 1594 A</p> 
<p style="text-align: right;">W17-0026</p>	

Oil pressure and oil pressure switch, checking

Special tools and equipment

- ◆ VAG 1342 Oil pressure tester
- ◆ VAG 1342/14 Adapter
- ◆ VAG 1527 B Diode test lamp
- ◆ VAG 1594 A Adapter set

Test conditions

- Engine oil level OK, checking ⇒ [Page 17-8](#) , ⇒ [Fig. 2](#) .
- Engine oil temperature at least 80 °C (coolant fan must have run once).
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

Note:

Functional check and servicing the optical and acoustic oil pressure warning:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Checking oil pressure switch

- Remove center, left and right insulation trays:

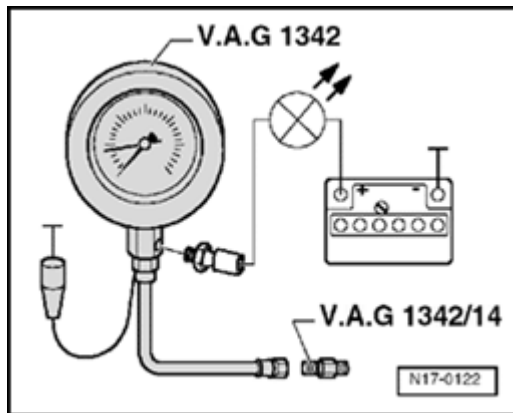
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)

- Remove front bumper:

⇒ [Repair Manual, Body Exterior, Repair Group 63](#)

- Bring lock carrier into service position:

⇒ [Repair Manual, Body Exterior, Repair Group 50](#)



- Remove Oil pressure switch -F1- and screw into tester.
- Screw tester VAG 1342 with adapter VAG 1342/14 into oil filter bracket instead of oil pressure switch.

Note:

Observe installation position of adapter: The tapered connecting socket of the adapter is screwed to the pressure hose of the tester.

- Connect brown wire of tester to Ground (-).
 - Connect diode test lamp VAG 1527 B to battery positive (+) and oil pressure switch using adapter cables from VAG 1594 A.
- LED must not light up.

If the LED lights up:

- Replace Oil pressure switch -F1- ⇒ [Page 17-9](#) , item - 2 -.

If the LED does not light up:

- Start engine and run at idling speed. At 1.2...1.6 bar LED must light up; otherwise replace Oil pressure switch -F1- ⇒ [Page 17-9](#) , item - 2 -.

Checking oil pressure

- Check oil pressure at different revolutions:

2,000 rpm: 3.0...5.5 bar

above 2,000 rpm: maximum 7.0 bar.

If the specifications are not attained:

- Repair mechanical damage, e.g. bearing damage.

At higher engine speeds oil pressure must not exceed 7.0 bar.

If the specification is exceeded:

- Check oil galleries.
- Replace oil pump if necessary ⇒ [Page 17-12](#) ,
Disassembling and assembling oil pump.

Cooling system component servicing

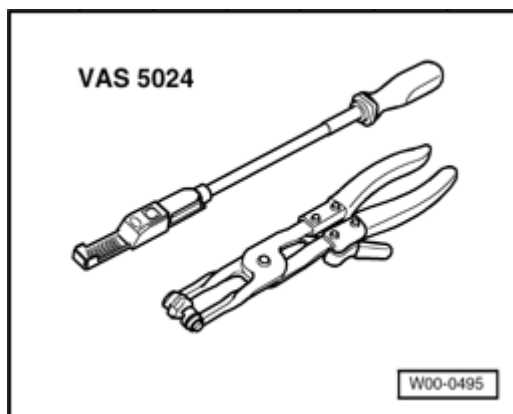
CAUTION!

When performing repair work, especially to the confined conditions in the engine compartment, pay attention to the following:

- ◆ *Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as close as possible to the original positions so that the original positions are restored.*
- ◆ *Make sure sufficient clearance to all moving or hot components.*

Note:

- ◆ *When the engine is warm the cooling system is under pressure. If necessary release pressure before commencing repair work.*
- ◆ *Hoses are secured with spring-type clips; in cases of repair only use spring-type clip.*
- ◆ *Assembly tool VAS 5024 or hose clip pliers VAG 1921 are recommended for installing spring-type clips.*
- ◆ *When installing coolant hoses route them so that they do not come into contact with other components (observe markings on coolant connection and hose).*



Perform cooling system leakage test with cooling system tester VAG 1274 and adapters VAG 1274/8 and VAG 1274/9.

Parts of cooling system, body side ⇒ [Page 19-3](#) .

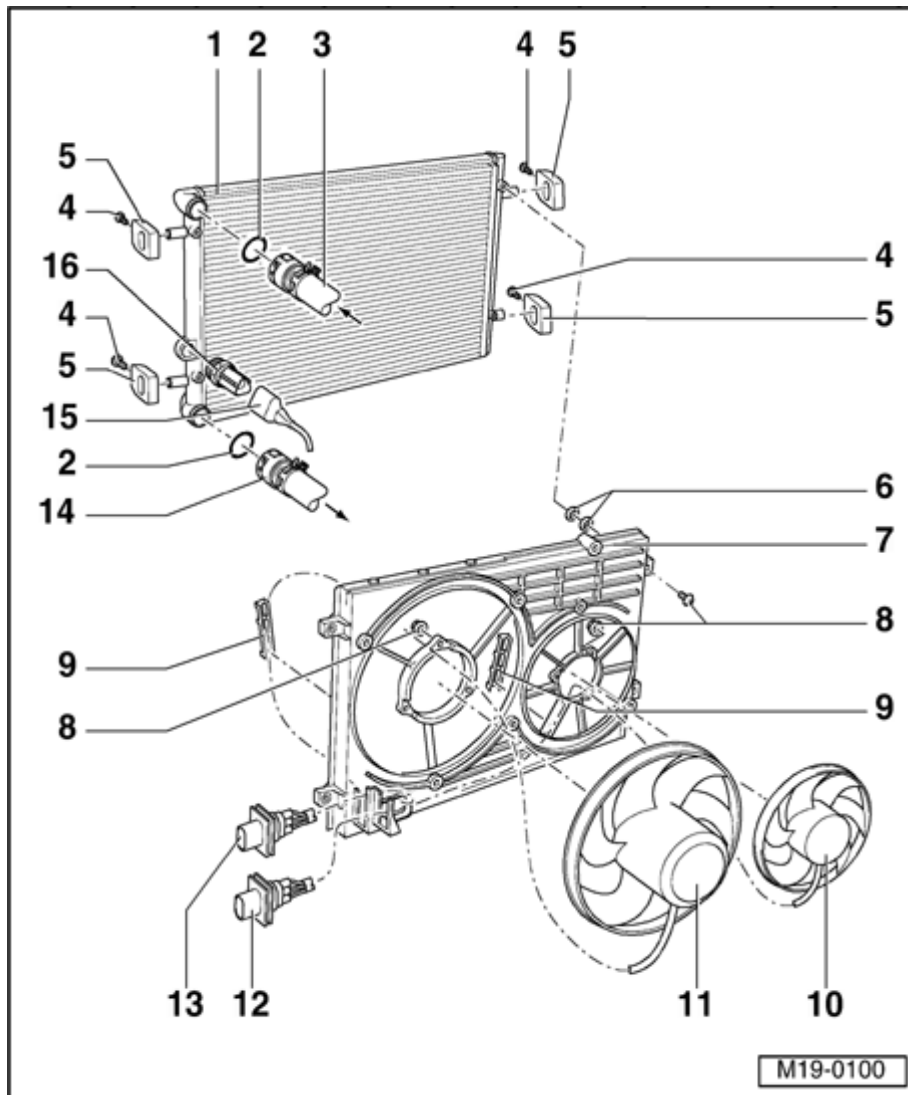
Parts of cooling system, engine side ⇒ [Page 19-6](#) .

Coolant hose connection diagram ⇒ [Page 19-11](#)

Disassembling and assembling coolant thermostat housing ⇒ Page ⇒ [Page 19-13](#) .

Draining and filling coolant ⇒ [Page 19-15](#) .

Coolant mixing ratios ⇒ [Page 19-15](#) ,
Draining and filling coolant.



Components of cooling system, body side

1 - Radiator

- ◆ Removing and installing ⇒ [Page 19-22](#)

- ◆ After replacement also replace entire coolant

2 - O-ring

- ◆ Replace if damaged

3 - Upper coolant hose

- ◆ Secured to radiator with a quick release coupling
- ◆ Check seated securely

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

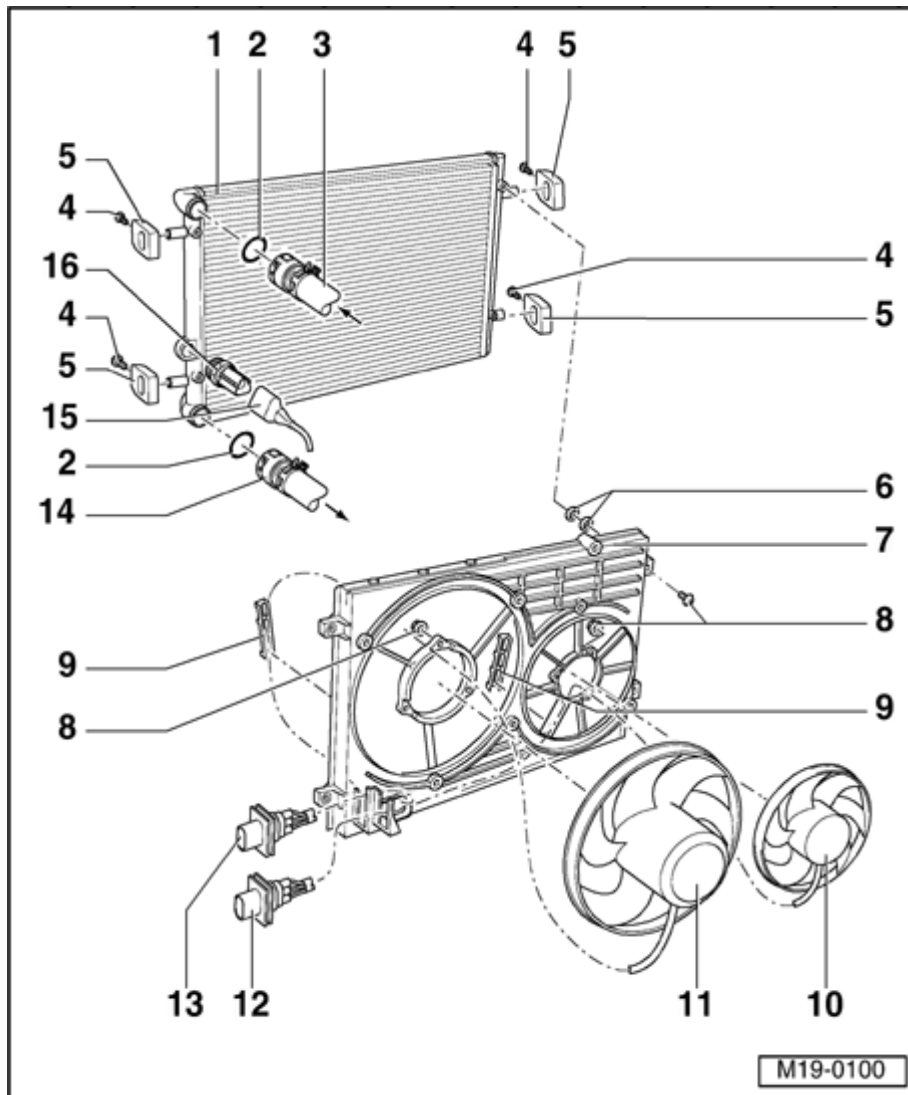
4 - 15 Nm

5 - Bracket

- ◆ For radiator

- ◆ Observe installation position

6 - Washer



7 - Air ducting

8 - 5 Nm

9 - Retaining clip

- ◆ Check for secure seating

10 - Right coolant fan - V35-

- ◆ Checking ⇒ [Page 19-31](#)

- ◆ Removing and installing ⇒ [Page 19-22](#)

11 - Coolant fan -V7-

- ◆ Checking ⇒ [Page 19-31](#)

- ◆ Removing and installing ⇒ [Page 19-22](#)

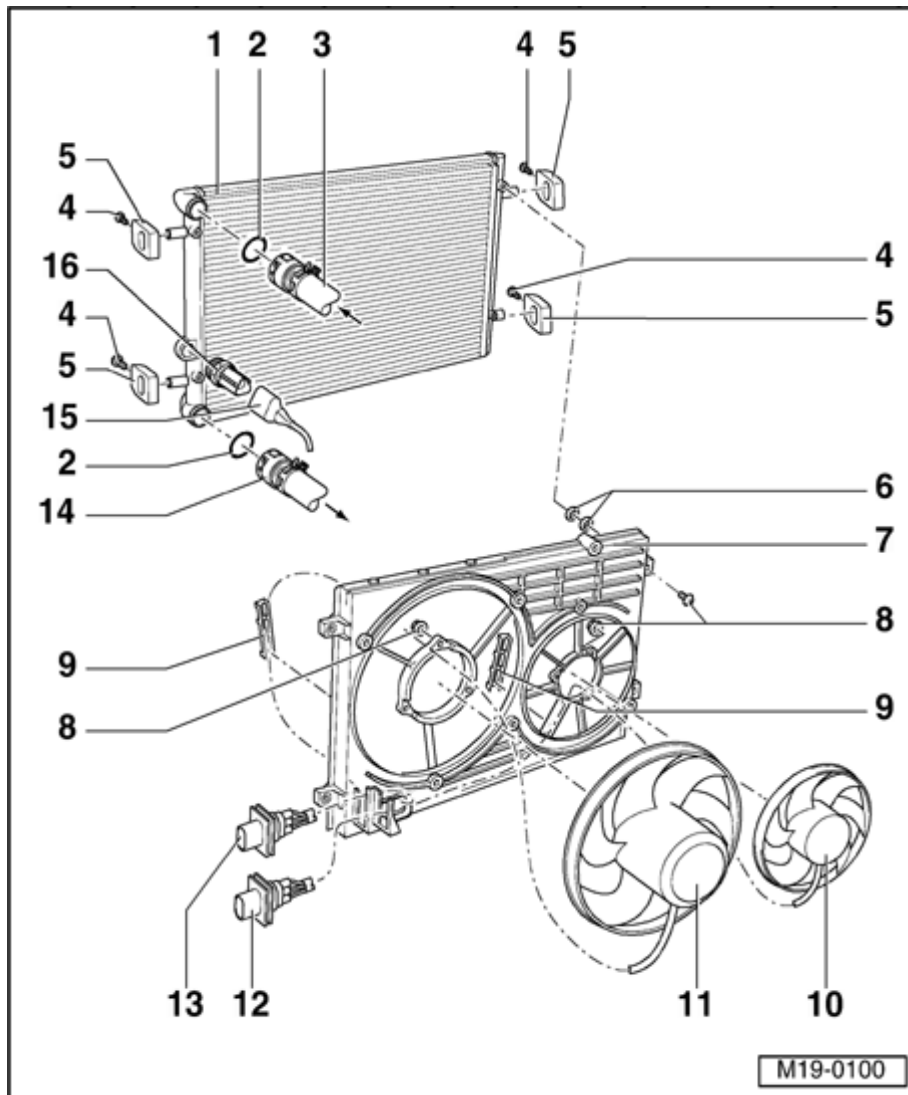
12 - Connector

- ◆ For Right coolant fan - V35-

13 - Connector

- ◆ For Coolant

fan -
V7-



14 - Lower coolant hose

- ◆ Secured to radiator with a quick release coupling

- ◆ Check seated securely

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

15 - Connector

- ◆ For Coolant Fan Control (FC) Thermal switch - F18-

16 - Coolant Fan Control (FC) Thermal switch - F18-, 35 Nm

- ◆ For electric fan

- ◆ Switching temperatures:

1st speed

-

On:

92...97

° C, Off:

84...91

° C

2nd.

speed -

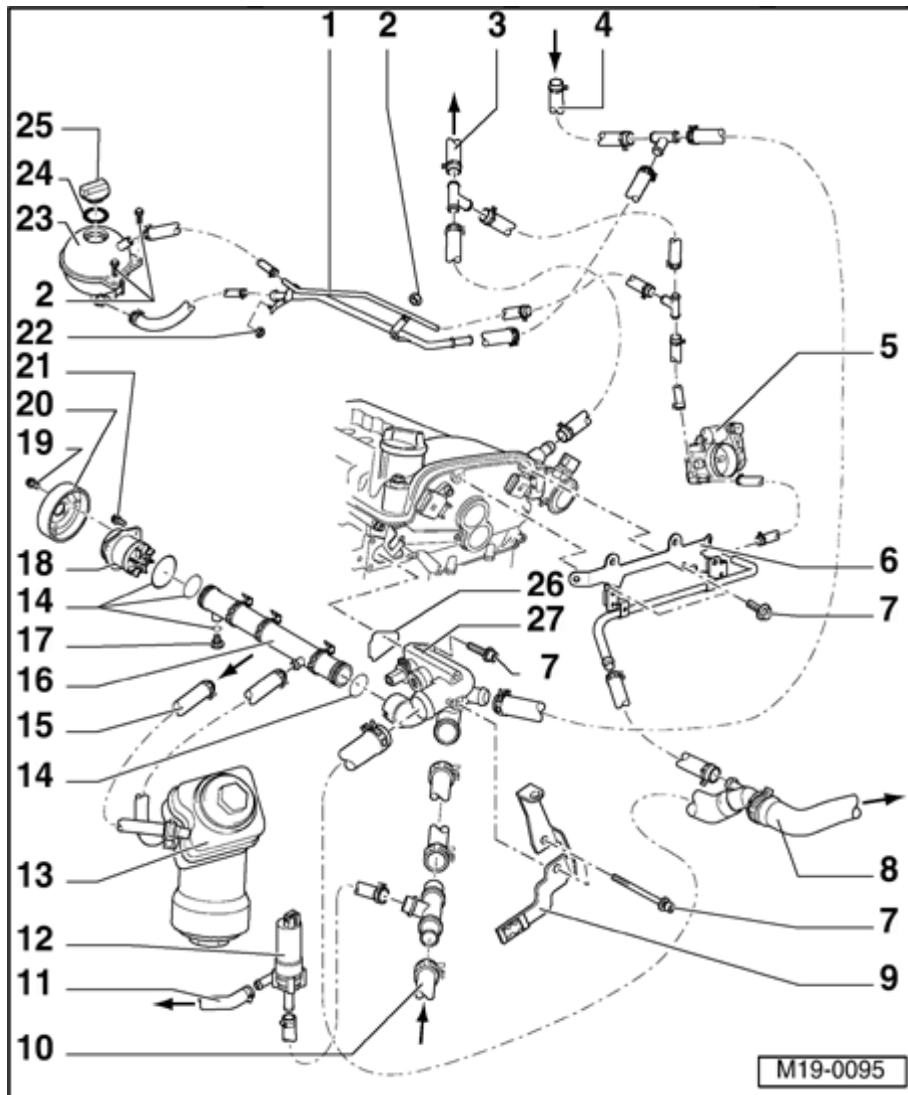
On:

99...105

° C, Off:

91...98

° C



Components of cooling system, engine side

1 - Coolant pipe

- ◆ Secured to exhaust gas manifold together with heat shield

2 - 10 Nm

3 - To heat exchanger

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

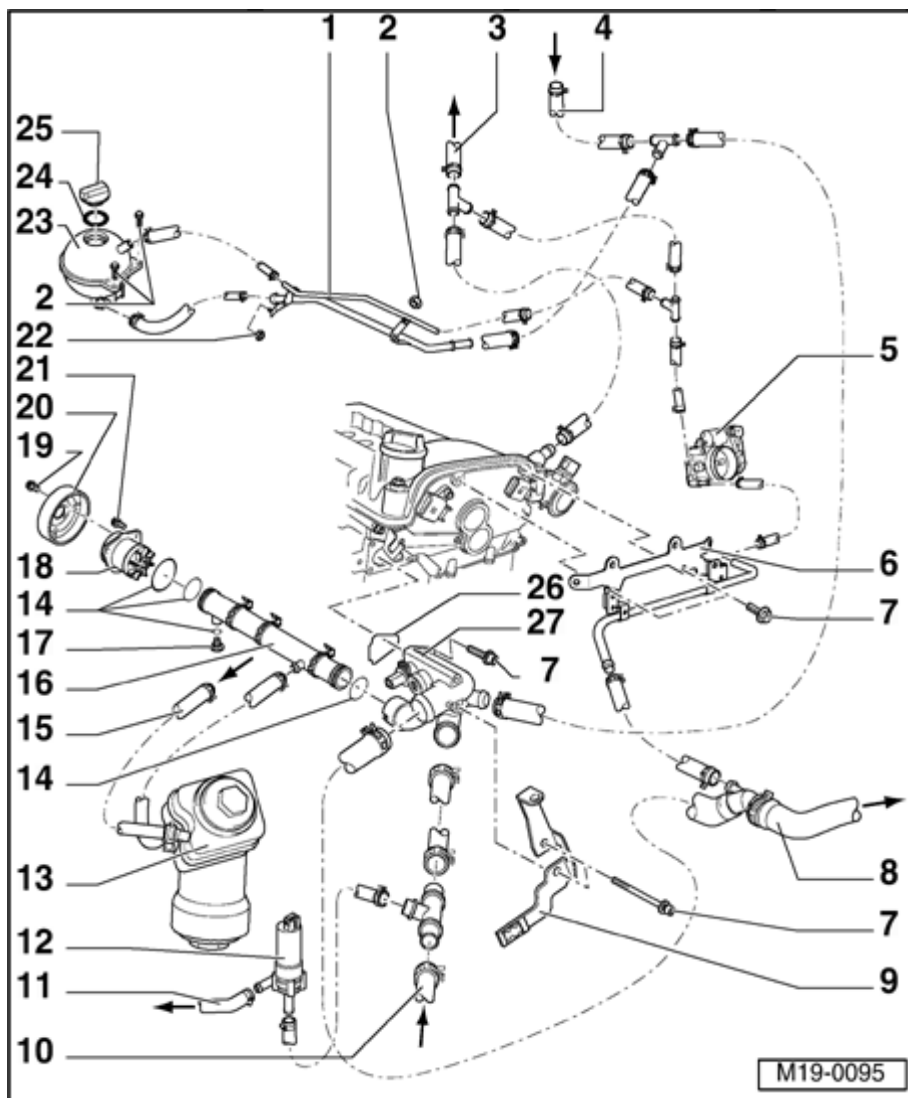
4 - From heat exchanger

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

5 - Throttle valve control module -J338-

- ◆ Heated by coolant
- ◆ Removing and installing:

⇒ [Repair
Manual, 2.8
Liter VR6 4V
Fuel Injection &
Ignition, Engine
Code\(s\): BDF,
Repair Group
24](#)



6 - Cable guide

- ◆ For coolant hoses and wiring harness

7 - 8 Nm

8 - Upper coolant hose

- ◆ To top off radiator
- ◆ Check for secure seating

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

9 - Bracket

- ◆ For wiring harness

10 - Lower coolant hose

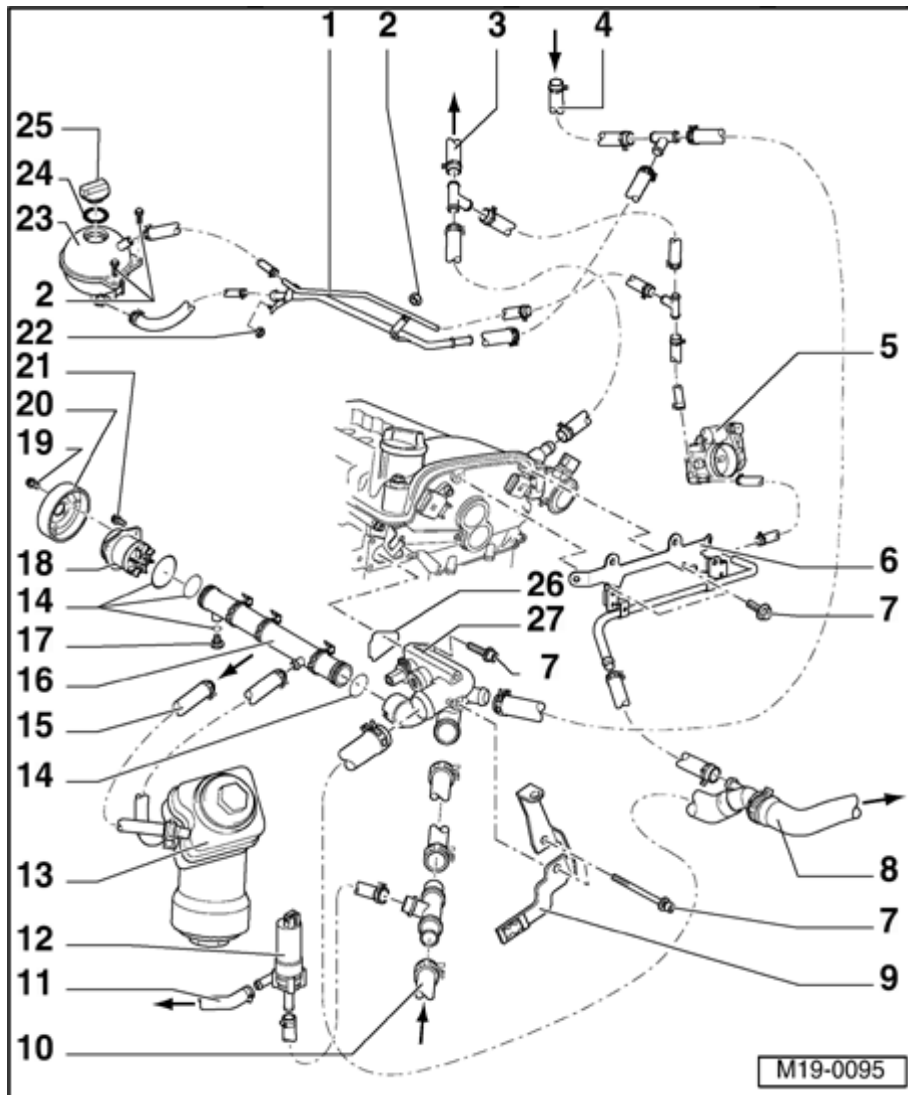
- ◆ From bottom of radiator
- ◆ Check for secure seating

- ◆ Coolant hose

connection
diagram ⇒
[Page 19-
11](#)

**11 - To
cylinder
block**

◆ Coolant
hose
connection
diagram ⇒
[Page 19-
11](#)



12 - After-Run Coolant pump - V51-

- ◆ Secured to cylinder block by a bracket
- ◆ Checking ⇒ [Page 19-33](#)

13 - Oil cooler

- ◆ Disassembling and assembling ⇒ [Page 17-9](#), Disassembling and assembling oil filter housing

14 - O-ring

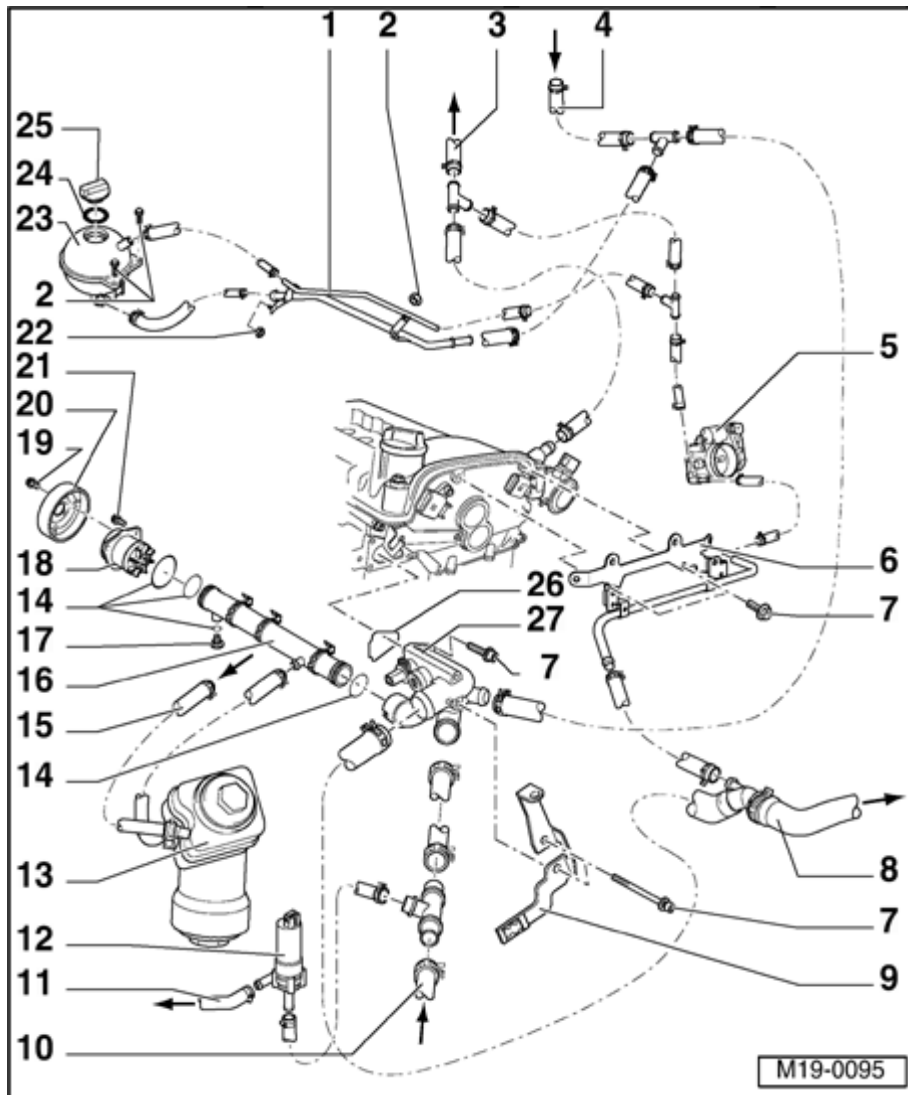
- ◆ Replace

15 - From cylinder block

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

16 - Coolant pipe

17 - Sealing plug, 2 Nm



18 - Coolant pump

- ◆ Observe installation position
- ◆ Check for ease of movement
- ◆ If damaged or leaking replace complete
- ◆ Removing and installing ⇒ [Page 19-26](#)

19 - 20 Nm

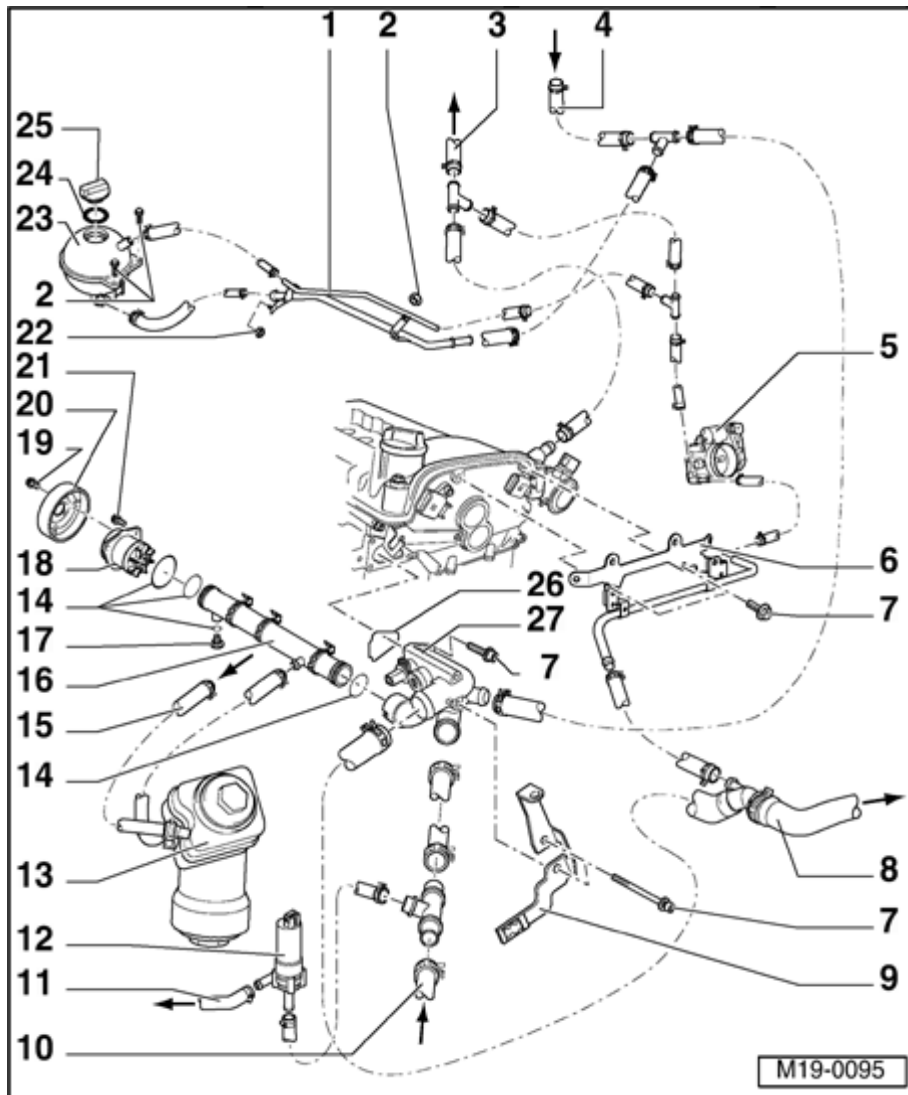
20 - Belt pulley

- ◆ For coolant pump
- ◆ Removing and installing ribbed belt ⇒ [Page 13-19](#)
- ◆ Removing and installing ⇒ [Page 19-26](#), Removing and installing coolant pump

21 - 20 Nm

- ◆ Use coolant pump wrench VAG 1590 to loosen and tighten ⇒ [Page 19-26](#) , Removing and installing coolant pump

22 - 25 Nm



23 - Expansion tank

- ◆ Perform leak test on cooling system with cooling system tester VAG 1274 and adapter VAG1274/8
- ◆ Test pressure: 1.4...1.6 bar
- ◆ Observe markings ⇒ [Page 19-15](#), Draining and filling cooling system

24 - Seal

- ◆ Replace if damaged

25 - Sealing cap

- ◆ Check with cooling system tester VAG 1274 and adapter VAG 1274/9
- ◆ Pressure relief valve must

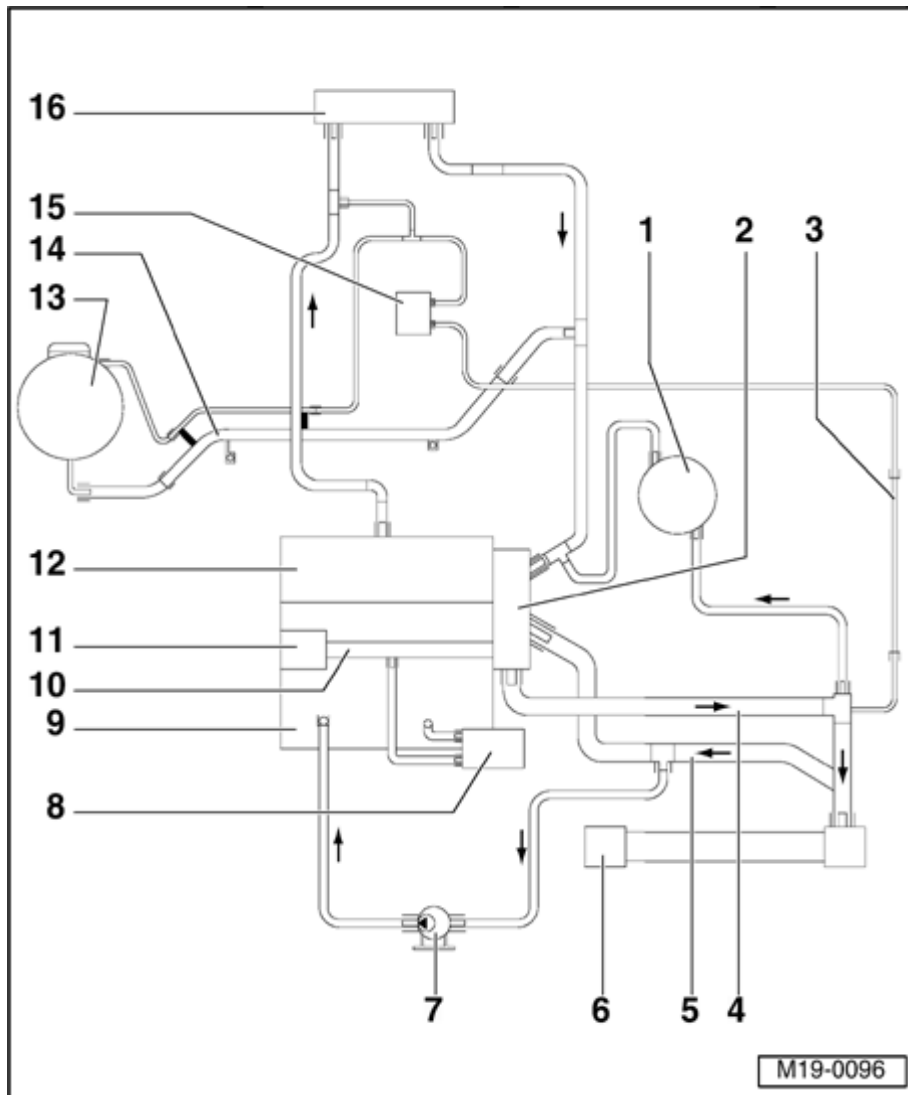
open at a
pressure
of
1.4...1.6
bar

26 - Seal

- ◆ Replace

**27 - Thermostat
housing**

- ◆ Disassembling
and
assembling ⇒
[Page 19-13](#)



Coolant hose connection diagram

1 Transmission - oil cooler

- ◆ Only models with an automatic transmission

2 - Thermostat housing

3 - Cable guide

- ◆ For coolant hoses and wiring harness

4 - Upper coolant hose

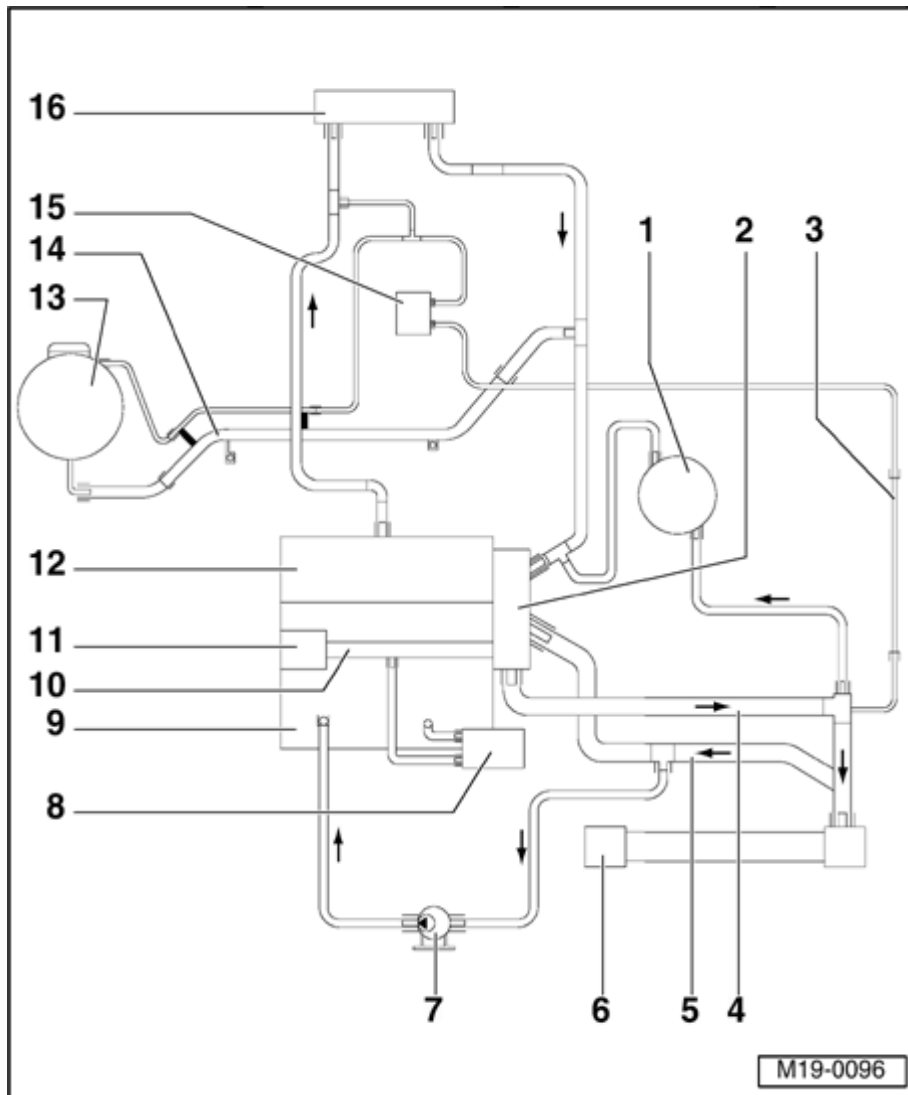
5 - Lower coolant hose

6 - Radiator

7 - After-Run Coolant pump - V51-

8 - Oil cooler

9 - Cylinder block



10 - Coolant pipe

- ◆ Between coolant pump and thermostat housing

11 - Coolant pump

12 - Cylinder head

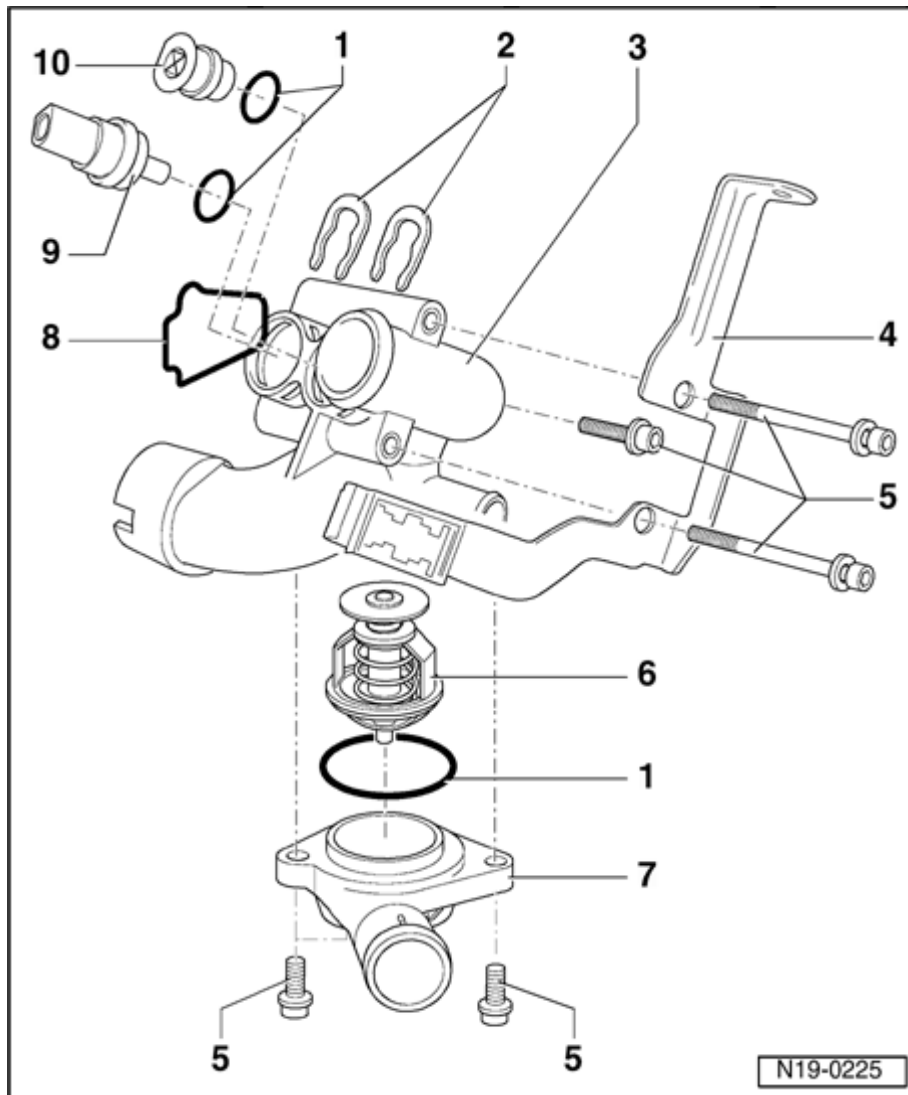
13 Expansion - tank

14 - Coolant pipe

- ◆ Secured to exhaust manifold together with heat shield

15 - Throttle valve control module

16 Heat - exchanger for heating system



Coolant thermostat housing, disassembling and assembling

Note:

Routing coolant hoses to thermostat housing ⇒ [Page 19-6](#), Parts of cooling system, engine side.

1 - O-ring

- ◆ Replace if damaged

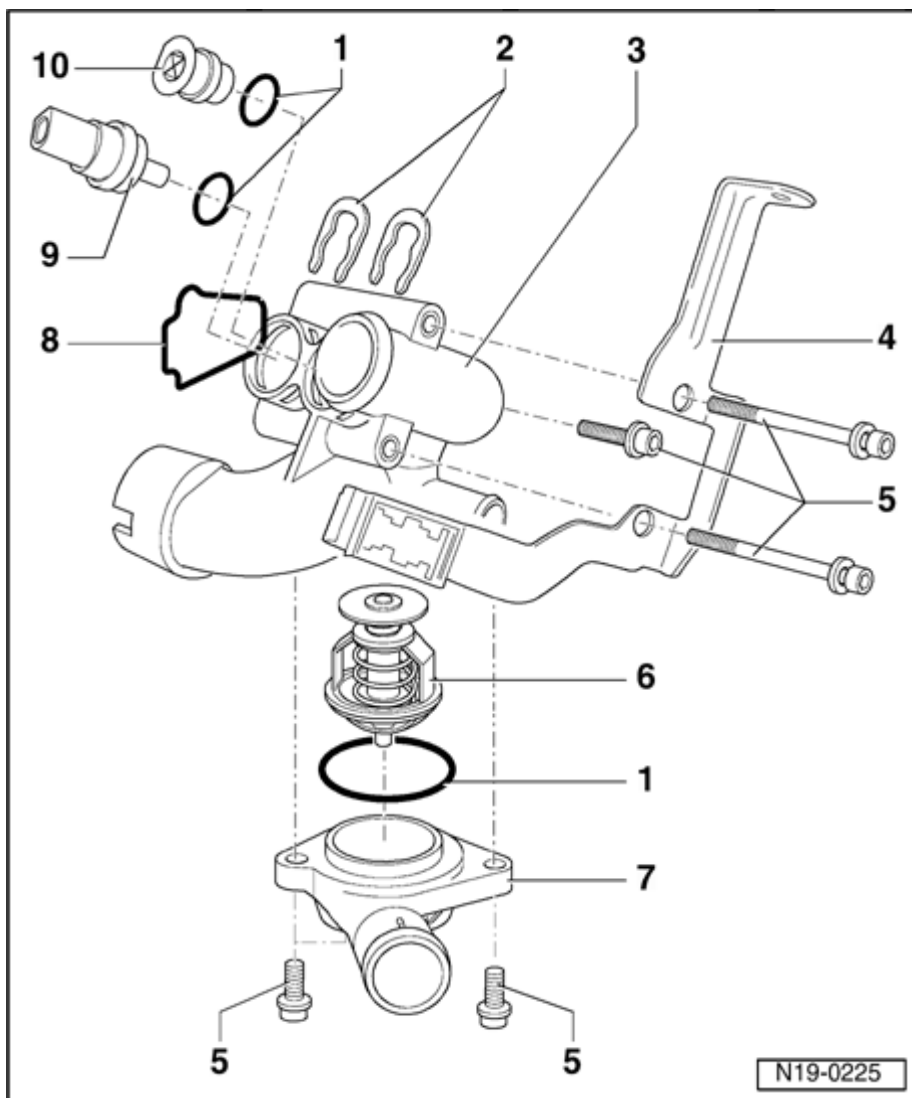
2 - Retaining clip

- ◆ Check seated securely

3 - Thermostat housing

4 - Bracket

5 - 8 Nm



6 - Coolant thermostat

- ◆ Observe installation position
- ◆ Checking: Heat up thermostat in water
 - ◆ Starts to open at approx. 80 °C
 - ◆ Ends at approx. 105 °C
 - ◆ Opening stroke at least 7 mm

7 - Unions

8 - Seal

- ◆ Replace

9 Engine - Coolant Temperature (ECT) sensor - G62-

- ◆ For engine control module
- ◆ With ECT sensor -G2-
- ◆ Release pressure in cooling system if

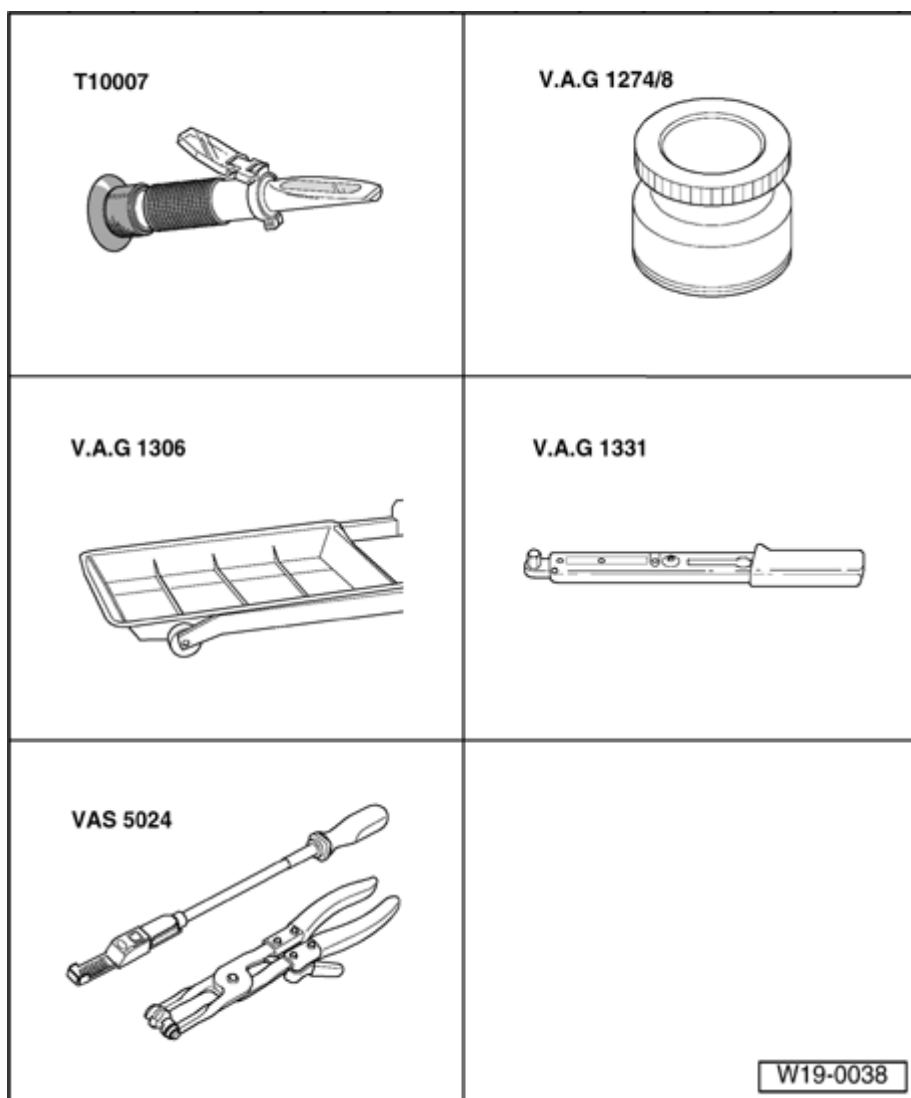
necessary
before
removing
components

◆ Checking:

⇒ [Repair
Manual, 2.8
Liter VR6 4V
Fuel Injection &
Ignition, Engine
Code\(s\): BDF,
Repair Group
01](#)

10 - Plug

◆ Release
pressure in
cooling
system if
necessary
before
removing
components



Cooling system, draining and filling

Special tools and equipment

- ◆ T10007 Refractometer
- ◆ VAG1274/8 Adapter
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ VAS 5024 Assembly tool for spring-type clips

Not illustrated:

- ◆ VAS 6096 Coolant system charging unit

Draining

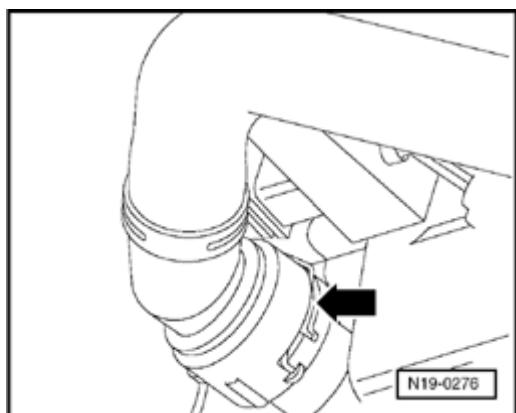
- Open cap on coolant expansion tank.

WARNING!

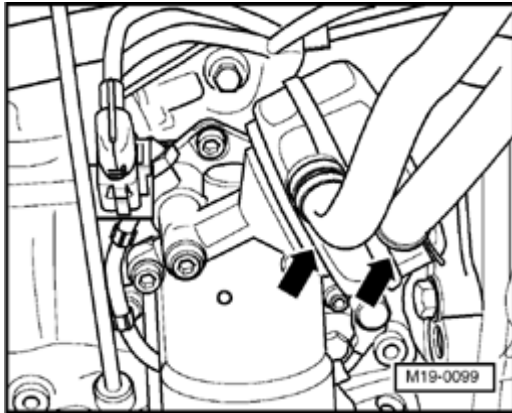
Steam can be released when removing the cap from the expansion tank. Cover the cap with a cloth and open carefully.

- Remove center insulation tray:

⇒ [Repair Manual, Body Exterior, Repair Group 50](#)



- Pull out lower coolant hose retaining clip (arrow) and remove coolant hose from radiator.



- ✦ - To drain coolant from engine also remove coolant hoses from oil cooler (arrows).

Note:

Observe waste disposal regulations!

Filling

Note:

- ◆ *Only use coolant additive G 12 in accordance with TL VW 774 D. Identification color: red*
- ◆ *Under no circumstances must G 12 be mixed with other coolant additives!*
- ◆ *If the fluid in expansion tank is brown, G 12 has been mixed with another coolant. In this case the coolant must be changed.*
- ◆ *G 12 and coolant additives marked "In accordance with TL VW 774 D" prevent frost and corrosion damage, scaling and also raise the boiling point of coolant. For this reason the system must be filled all year round with frost and corrosion protection additives.*
- ◆ *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*

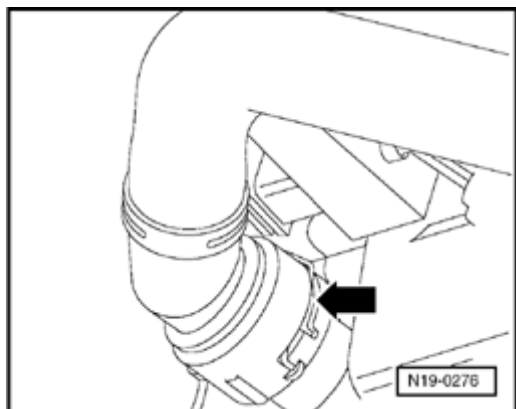
- ◆ *Protection against frost must be assured to approx. -25 ° C (in arctic climatic countries to approx. -35 ° C).*
- ◆ *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The anti-freeze ratio must be at least 40%.*
- ◆ *If for climatic reasons a higher frost protection is required, the amount of G 12 can be increased, but only up to 60% (frost protection to about -40 ° C), as otherwise frost protection is reduced again and cooling effectiveness is also reduced.*
- ◆ *Refractometer T10007 is recommended for determining the current density of the anti-freeze.*
- ◆ *If radiator, heat exchanger, cylinder head or cylinder head gasket are replaced, do not reuse old coolant.*

Recommended mixture ratios:

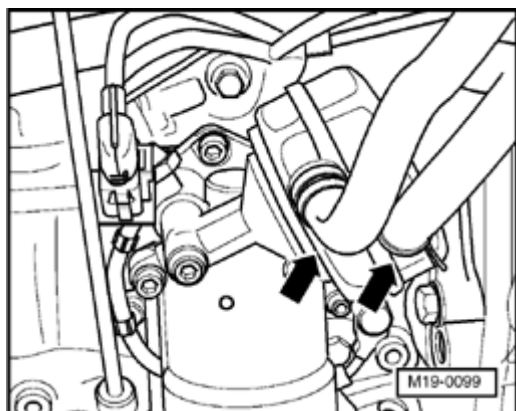
Anti-freeze to	Anti-freeze proportion	G 12 1)	Water 1)2)
-25 ° C	40%	3.7 l	5.5 l
-35 ° C	50%	4.6 l	4.6 l

1) The quantity of coolant can vary in accordance with the equipment fitted to the vehicle.

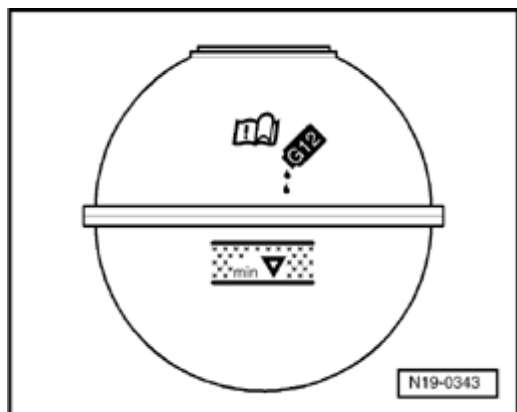
2) Only use clean drinking water.

Work sequence

- ◀ - Install lower coolant hose and secure with retaining clamp (arrow).



- ◀ - Slide coolant hoses onto oil cooler unions (arrows) and secure with spring-type clamps.
- Install center insulation tray:
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)



Without using coolant system charging unit VAS 6096

- Fill coolant slowly up to top mark of hatched field on expansion tank.

Using coolant system charging unit VAS 6096

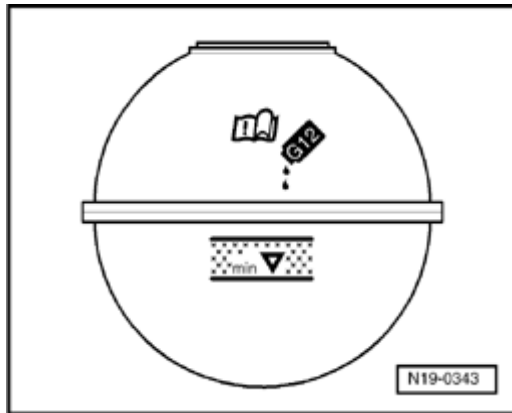
- Screw adapter V.A.G1274/8 onto expansion tank.
- Fill coolant system using coolant system charging unit VAS 6096:

⇒ See instruction manual for coolant system charging unit VAS 6096

With and without coolant system charging unit VAS 6096

- Seal expansion tank.
- Switch off heater and air conditioner.
- Start engine and maintain an engine speed of about 2000 rpm for approx. 3 minutes.
- Allow engine to run at idling speed until lower hose on radiator becomes hot.
- Switch ignition off.

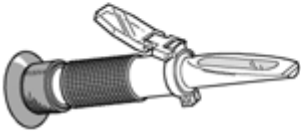


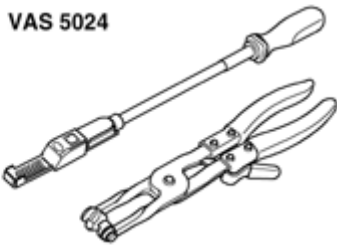
19-21



- Check coolant level and top up coolant if necessary:

At normal engine operating temperature coolant level must reach top mark of hatched field.

When engine is cold coolant level should be around middle of hatched field.

<p>T10007</p> 	<p>V.A.G 1306</p> 
<p>V.A.G 1331</p> 	<p>VAS 5024</p> 
	<p>W19-0019</p>

Radiator and coolant fan, removing and installing

Special tools and equipment

- ◆ T10007 Refractometer
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ VAS 5024 Assembly tool for spring-type clips

Removing

- Remove center, left and right insulation trays:

⇒ [Repair Manual, Body Exterior, Repair Group 50](#)

- Disconnect connectors from thermal switch and coolant fan.

- Remove front bumper:

⇒ [Repair Manual, Body Exterior, Repair Group 63](#)

- Bring lock carrier into service position:

⇒ [Repair Manual, Body Exterior, Repair Group 50](#)

- Drain coolant ⇒ [Page 19-15](#) .

- Pull out upper coolant hose retaining clip (arrow) and remove coolant hose from radiator quick release coupling.

Models with air conditioning:

- Observe additional information and removal work ⇒ [Page 19-24](#) .

- Remove radiator securing bolts from side of radiator and take radiator with fans out downward.

Installing

Install in reverse sequence ; note the following points:

- Check electrical connections and routing:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Fill with coolant ⇒ [Page 19-15](#) .

Additional information and assembly work on models with air conditioning

CAUTION!

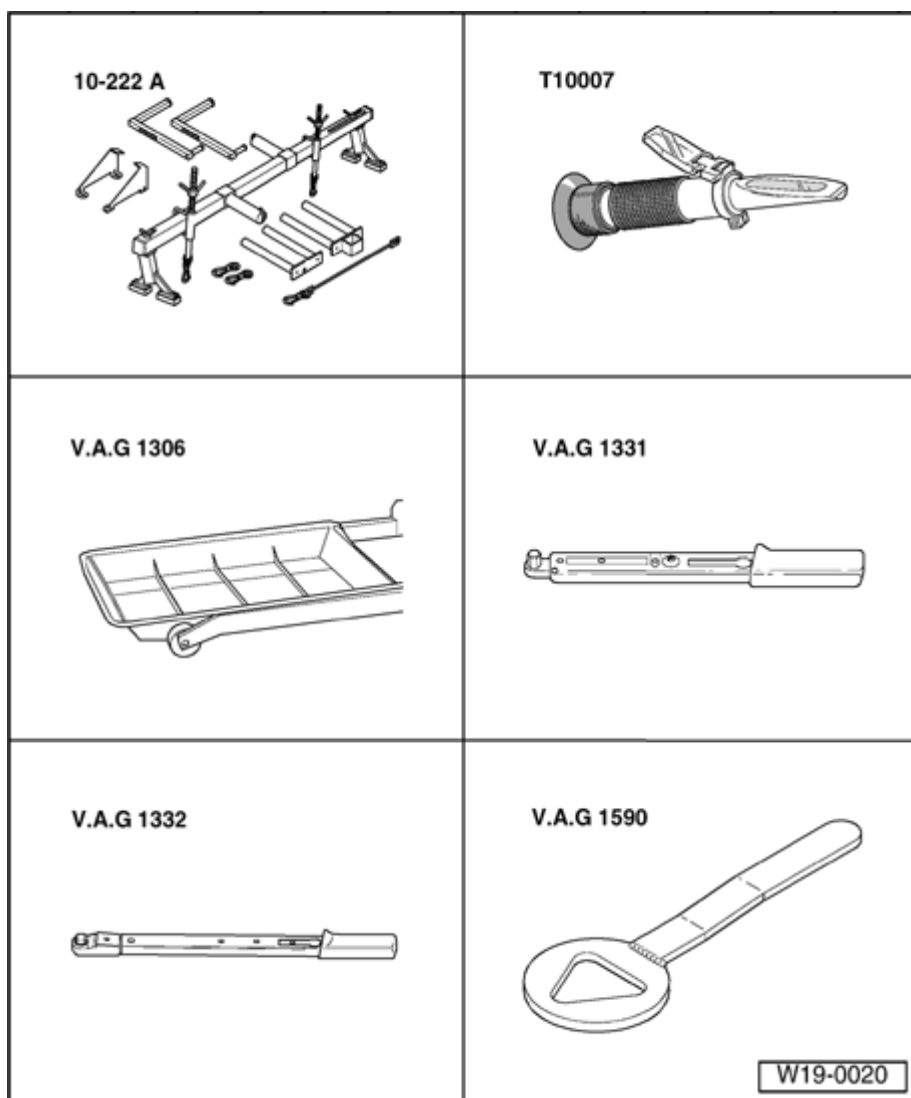
The air conditioning refrigerant circuit must not be opened.

Note:

To prevent damage to the condenser as well as to the refrigerant lines/hoses, ensure that lines and hoses are not stretched, kinked or bent.

- Remove retaining clamp(s) from refrigerant lines.

- Remove securing bolts from fan shroud and remove fan shroud and fan.
- Remove radiator securing bolts from side of radiator.
- Remove condenser from radiator.
- Secure condenser to body, so that refrigerant lines/hoses are not under stress.
- Swing radiator out downward.

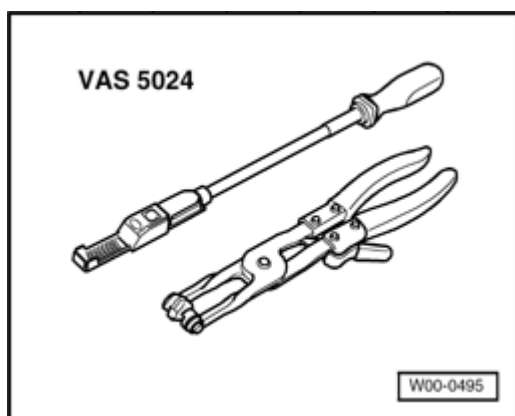


Coolant pump, removing and installing

(with engine installed)

Special tools and equipment

- ◆ 10-222A Engine support bracket with legs 10-222A/1
- ◆ T10007 Refractometer
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ VAG 1332 Torque wrench (40...200 Nm)
- ◆ VAG 1590 Coolant pump wrench



- ◆ VAS 5024 Assembly tool for spring-type clips
- ◆ VAS 5085 Ladder

Removing

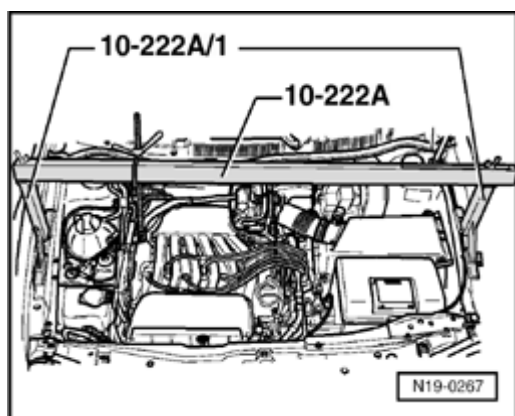
- Remove engine cover.
- Remove center and right insulation trays:
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)
- Remove ribbed belt ⇒ [Page 13-19](#) .
- Pull off crankcase breather connecting hose between cylinder head cover and intake hose on cylinder head cover.

Note:

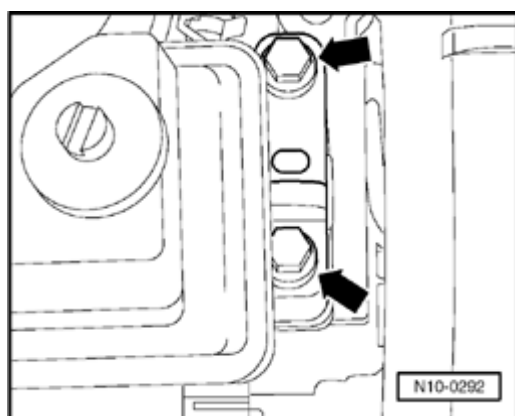
Press buttons on hose couplings to disconnect.

- Drain coolant ⇒ [Page 19-15](#) .

19-28



- Install engine support bracket 10-222A with legs 10-222A/1.
- Insert securing hook of supporting device in right lifting eye of cylinder block and put engine under slight tension.

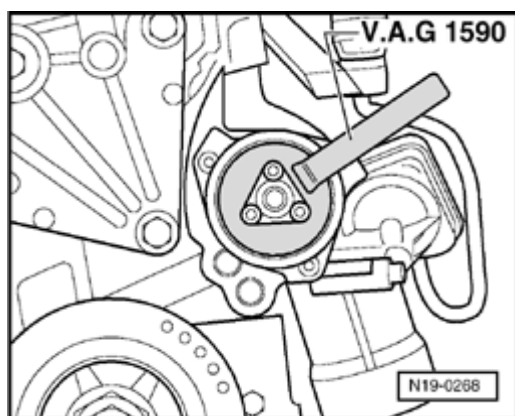


- Unbolt engine side of assembly mounting from top of engine bracket (arrows).

Note:

Use ladder VAS 5085 to remove securing bolts.

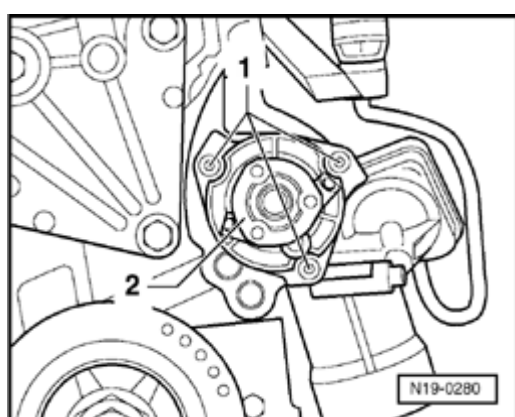
- Lower engine on supporting device only as far as necessary to remove coolant pump.



- ◀ - Remove belt pulley. Counter-support belt pulley with water pump wrench VAG 1590 when doing this.

Note:

If engine has been removed, it is not necessary to remove belt pulley. The coolant pump securing bolts can be unscrewed through the holes in the pulley.



- ◀ - Unscrew coolant pump securing bolts -1- and remove coolant pump -2-.

Note:

To remove the coolant pump, push the engine to one side using a lever if necessary.

Installing

Install in reverse sequence; note the following points:

- Moisten new O-ring with coolant.
- Insert coolant pump into cylinder block and tighten securing bolts to 20 Nm.
- Fit pulley and tighten securing bolts to 20 Nm.
- Align engine assembly mountings ⇒ [Page 10-18](#) , Aligning engine and transmission mountings.

Note:

Torque settings for assembly mountings ⇒ [Page 10-21](#) .

- Install ribbed belt ⇒ [Page 13-19](#) .
- Fill with coolant ⇒ [Page 19-15](#) .

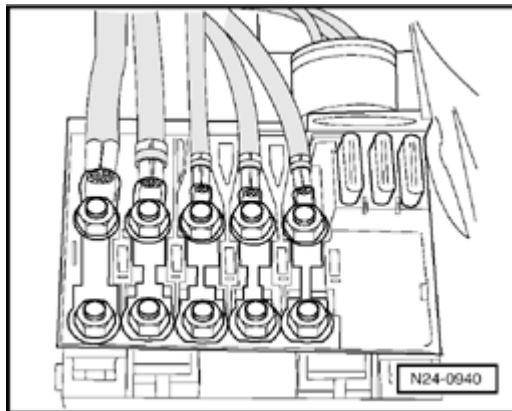
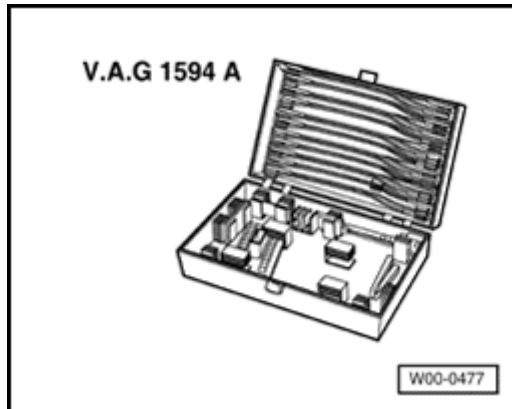
Coolant fan, checking

Special tools and equipment

- ◆ VAG 1594 A Adapter set
- ◆ Wiring diagram

Test conditions

- Main fuses must be OK.
- Coolant Fan Control (FC) Thermal switch -F18- is OK.

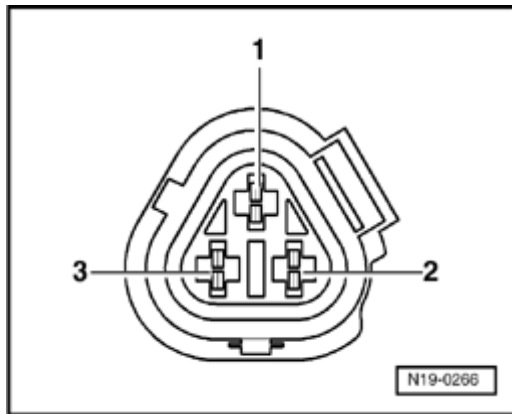


Test sequence

- Remove left-hand insulation tray:

⇒ [Repair Manual, Body Exterior, Repair Gr 50](#)

- Disconnect 3-pin connector from Coolant Control (FC) Thermal switch -F18-.



- Bridge contact -1- and contact -2- of connector using adapter cables from VAG 1594 A.

1st speed for Coolant fans -V7- and -V35 start.

- Switch ignition on.

- Bridge contact -2- and contact -3- of connector with adapter cables from VAG 1594 A.

2nd speed for Coolant fans -V7- and -V35 start.

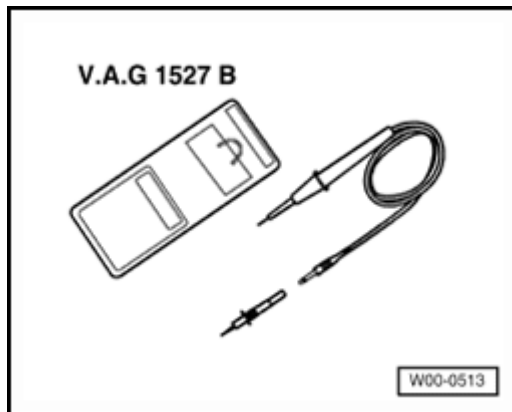
If 1st or 2nd speeds of fans do not run:

- Locate and eliminate open circuit referring wiring diagram:

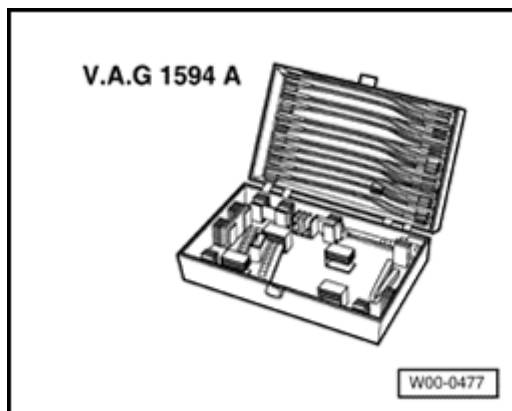
⇒ [Electrical Wiring Diagrams, Troubleshooting Component Locations](#)

If no wiring fault is detected:

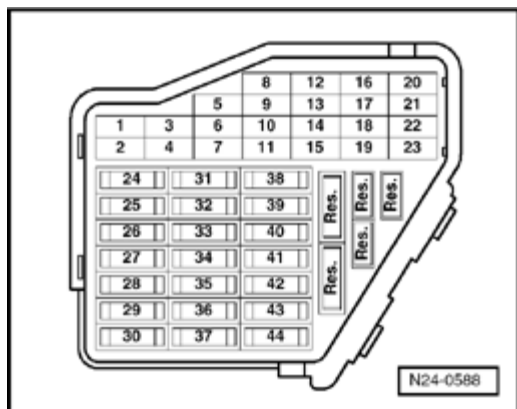
- Replace Coolant fan -V7- or -V35-.

**After-Run Coolant pump -V51-,
checking****Special tools and equipment**

- ◆ VAG 1527 B Diode test lamp



- ◆ VAG 1594 A Adapter set
- ◆ Wiring diagram



Test conditions



- All fuses must be OK.

Test sequence

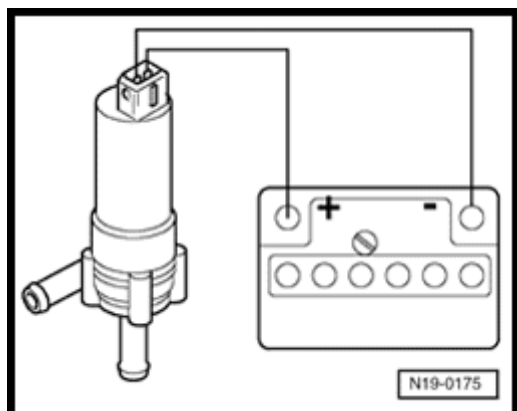
- Remove center insulation tray:
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)
- Disconnect 2-pin connector from After-Run Coolant pump -V51- (arrow).

Checking function



- Connect contacts of After-Run Coolant pump -V51- to battery using adapter cables from VAG 1594.

After-Run Coolant pump -V51- must start.



If the coolant pump does not start:

- Replace After-Run Coolant pump -V51-.

If the coolant pump starts:

Checking activation

- Switch ignition off and on again.
- Connect diode test lamp VAG 1527 B to disconnected connector for After-Run Coolant pump -V51- with adapter cables from VAG 1594 A.

LED must light up.

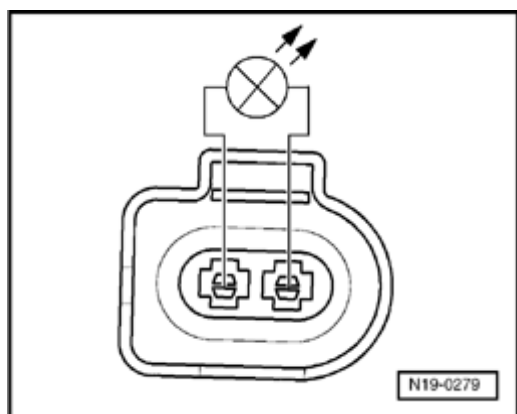
Note:

This check must be performed within 10 minutes after switching ignition off.

If the LED does not light up:

- Locate and eliminate open circuit referring to wiring diagram:

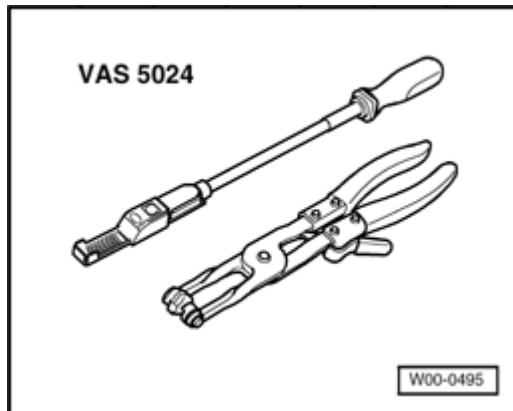
⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*



Components of fuel supply system, servicing

Note:

- ◆ *Hose connections are secured with either spring-type or clamp-type clips.*
- ◆ *Always replace clamp-type clips with spring-type clips.*
- ◆ *Fuel hoses on engine must only be secured with spring-type clips. The use of clamp screw-type clips is not permitted.*
- ◆ *Assembly tool VAS 5024 or hose clip pliers VAG 1921 are recommended for installing spring-type clips.*



Removing and installing fuel tank with attachment and fuel filter ⇒ [Page 20-2](#) .

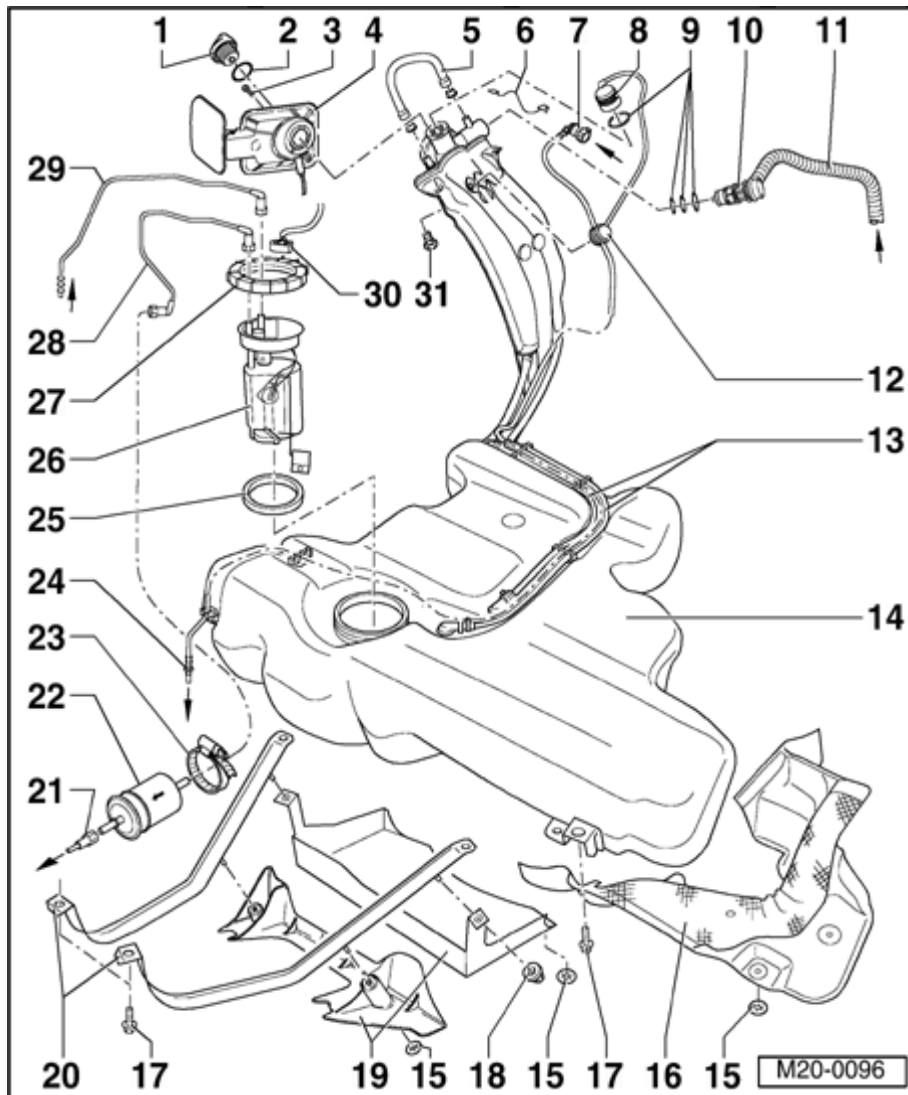
Observe safety precautions ⇒ [Page 20-12](#)

Observe rules for cleanliness ⇒ [Page 20-1](#) .

Observe crash fuel shut-off ⇒ [Page 20-25](#) .

Servicing parts of the EVAP system ⇒ [Page 41](#) .

Servicing parts of Electronic Power Control ⇒ [Page 20-66](#) .



Fuel tank, fuel filler and attachments, removing and installing

1 - Sealing cap

2 - Seal

- ◆ Replace if damaged

3 - Securing bolt

4 - Tank flap unit

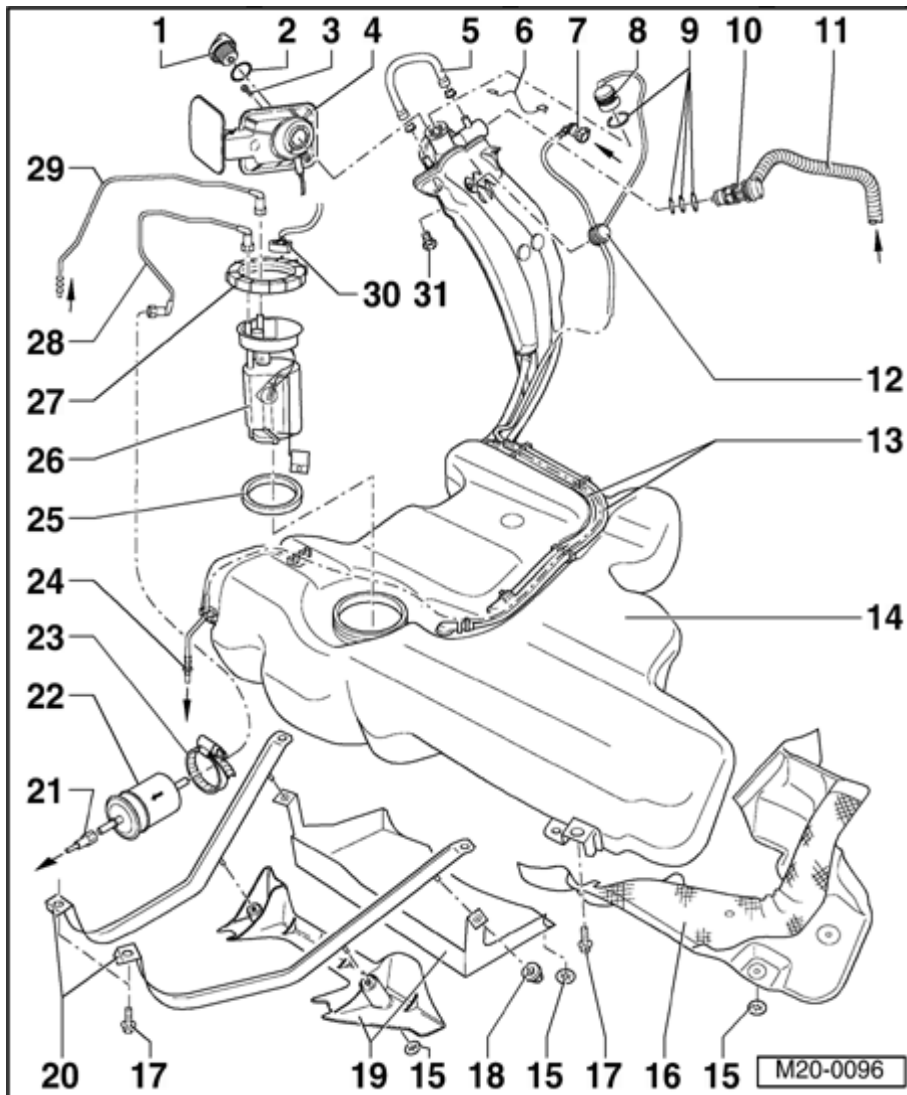
- ◆ With rubber cup

5 - Breather line

- ◆ Black
- ◆ Check if seated securely
- ◆ Clipped onto top of fuel tank

6 Ground - connection

- ◆ Check if seated securely



7 - Breather line

- ◆ White
- ◆ Check for secure seating
- ◆ Press together at front to release
- ◆ From union piece ⇒ [Page 20-41](#), item - 1 -

8 - Gravity valve

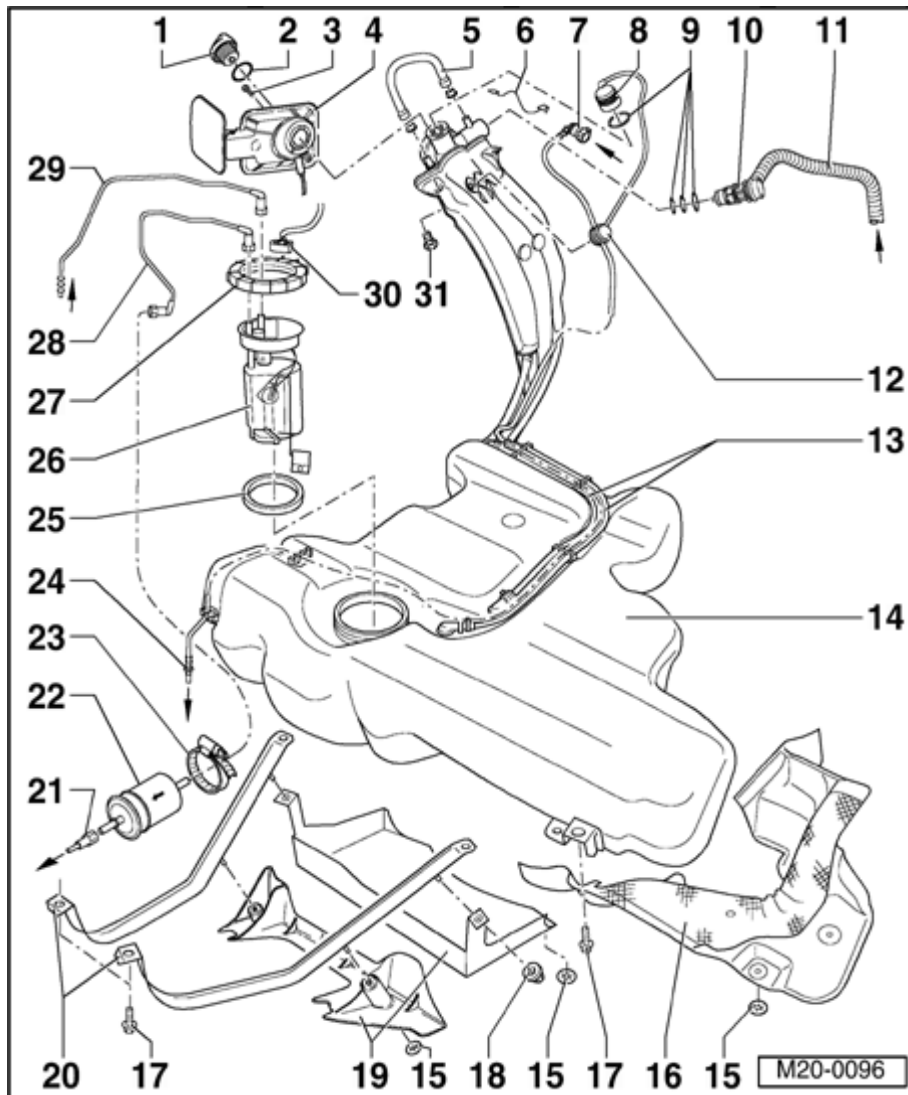
- ◆ To remove valve unclip upward out of support
- ◆ Check valve for through flow
- Valve vertical: Open
- Valve tilted 45°: Closed

9 - Seal

- ◆ Replace if damaged

10 - Change-over valve

- ◆ To remove valve unclip sideways out of socket
- ◆ Before installing remove sealing cap item
- 1 -
- ◆ Checking ⇒ [Fig. 2](#)



11 - Breather line

- ◆ Black
- ◆ Check for secure seal
- ◆ From union piece ⇒ [Page 20-42](#), item -

12 - Pressure retention valve

- ◆ Checking = [Fig. 3](#)

13 - Breather line

- ◆ Black
- ◆ Check for secure seal

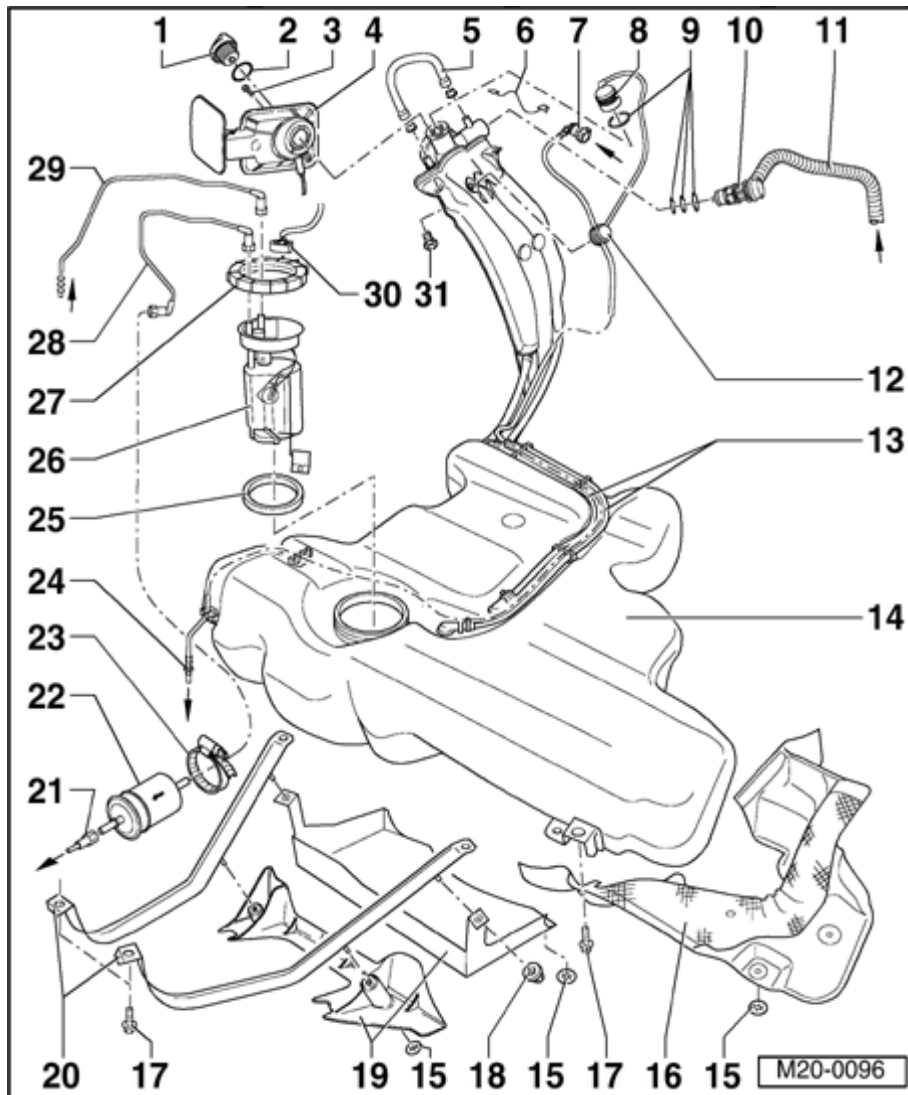
14 - Fuel tank

- ◆ When removing support with engine/transmission jack VAG 1383 ,
- ◆ Removing & installing = [Page 20-20](#)

15 - Clamping washer

16 - Heat shield

- ◆ For fuel tank



17 - 25 Nm

18 Clamping
- nut, 2 Nm

19 - Fuel
tank
cover

20 Securing
- strap

◆ Note
differing
lengths

◆ Installation
position:
Fixing
point
(holes)
point in
direction
of travel
(forward)

21 - Supply
line

◆ Black

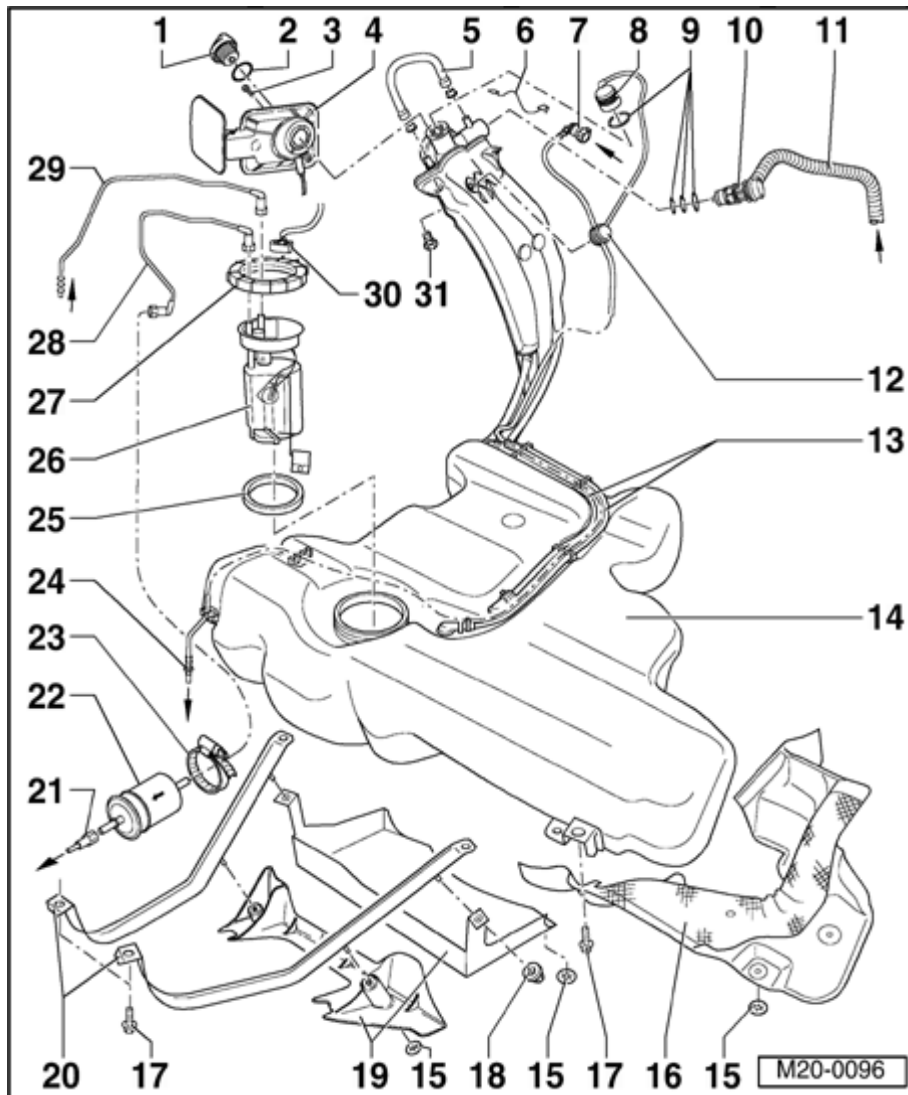
◆ Check for
secure
seating

◆ To pull off
of fuel
filter press
release
buttons on
connecting
piece

◆ To
fuel
supply
pipe
on
fuel
rail:

⇒ [Repair
Manual, 2.8](#)

*Liter VR6 4V
Fuel Injection
& Ignition,
Engine Code
(s): BDF,
Repair Group
24*



22 - Fuel filter

- ◆ Installation position: Arrow points in direction of flow

23 - Screw-type clip

- ◆ Observe installation position ⇒ [Fig. 4](#)

24 - Breather line

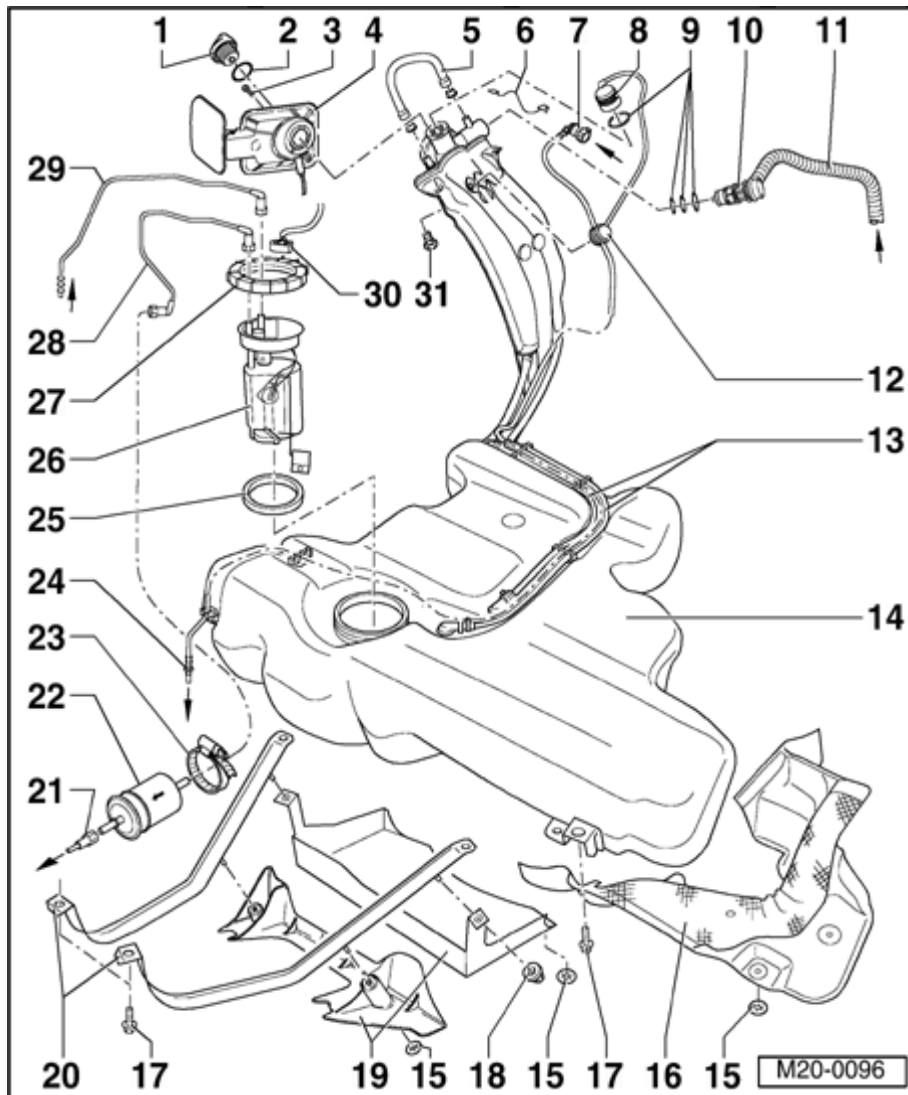
- ◆ White
- ◆ Check for secure seating
- ◆ Clipped onto side of fuel tank
- ◆ To EVAP canister purge regulator valve - N80-

25 - Seal

- ◆ Replace if damaged
- ◆ When installing, insert seal dry into fuel

tank
opening

- ◆ Moisten
with fuel
only
when
installing
fuel
delivery
unit
flange



26 - Fuel delivery unit

- ◆ Observe installation position of flange on fuel tank ⇒ [Fig. 1](#)

- ◆ Removing and installing ⇒ [Page 20-15](#)

- ◆ Removing and installing fuel gauge sender ⇒ [Page 20-19](#)

- ◆ Checking fuel pump ⇒ [Page 20-26](#)

- ◆ Clean strainer if soiled

27 - Union nut, 75 Nm

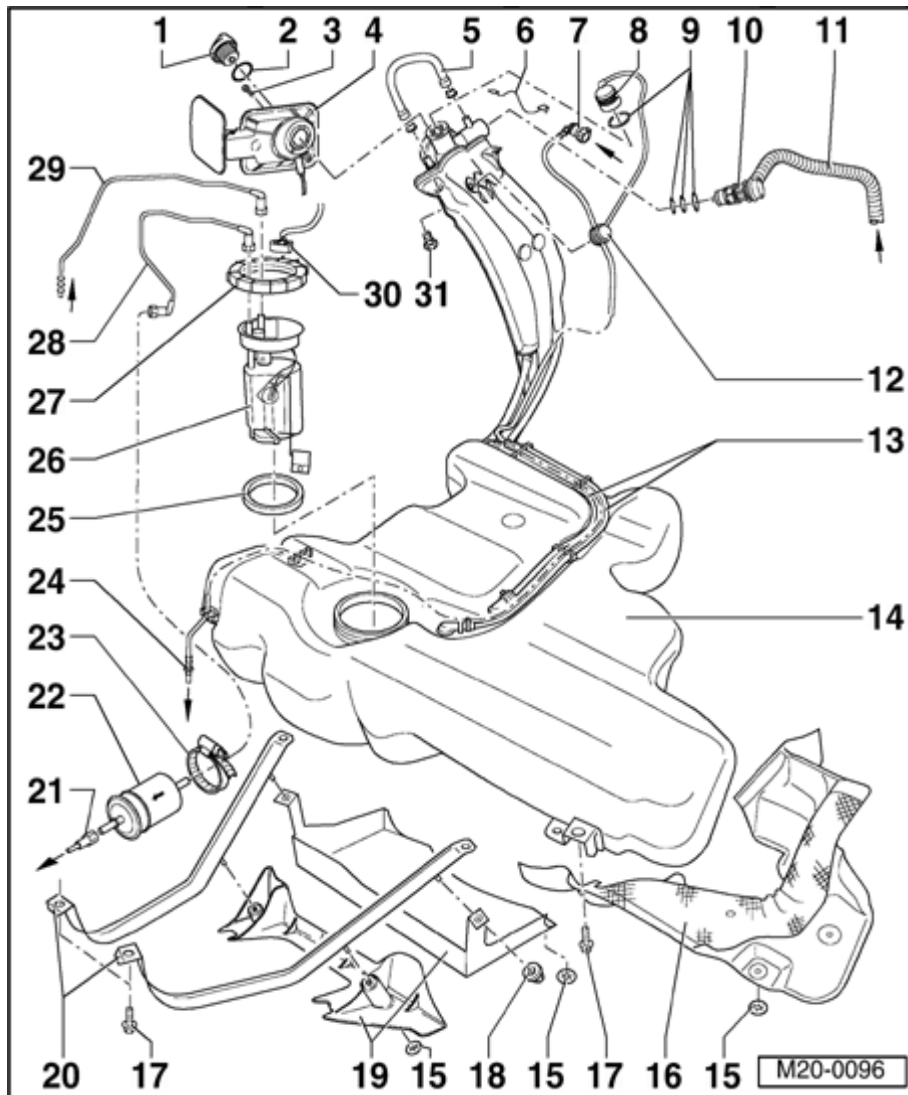
- ◆ Remove and install with key 3217

28 - Supply line

- ◆ Black
- ◆ Check for

secure
seating

- ◆ Clipped onto side of fuel tank
- ◆ When pulling off flange and fuel filter press release button on connecting piece



29 - Return line

- ◆ Blue or with blue marking
- ◆ Clipped onto side of fuel tank
- ◆ Check for secure seating
- ◆ To remove from flange press release button on connecting piece
- ◆ From fuel return pipe on fuel rail:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code \(s\): BDF, Repair Group 24](#)

30 - Connector

- ◆ Black, 4-pin
- ◆ For Sender

for fuel
gauge
-G-
and
Fuel
Pump
(FP) -
G6-

31 - 10 Nm

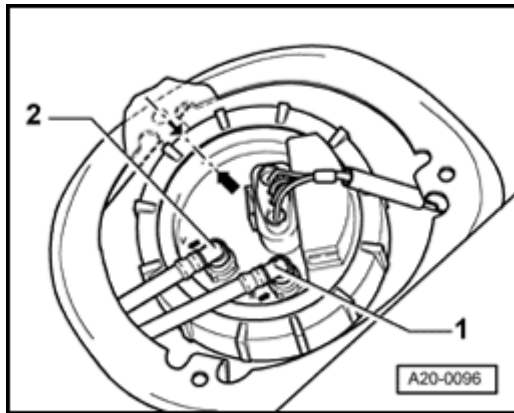


Fig. 1 Installation position of fuel delivery unit flange

Marking on sender must align with marking on fuel tank (arrows).

Blue or blue marked return line -1- to union with identification -R-.

Black supply line -2- to union with identification -V-.

Note:

After installing fuel delivery unit flange, check that the supply, return and breather lines are still clipped onto the fuel tank.

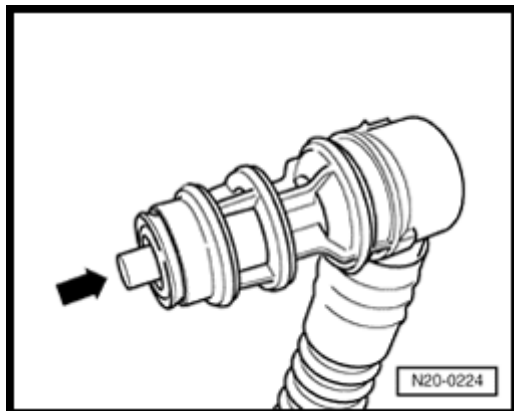


Fig. 2 Checking change-over valve

Lever in rest position: Closed

Lever pushed in direction of arrow: Open

Note:

Before installing breather valve, remove cap from fuel tank.

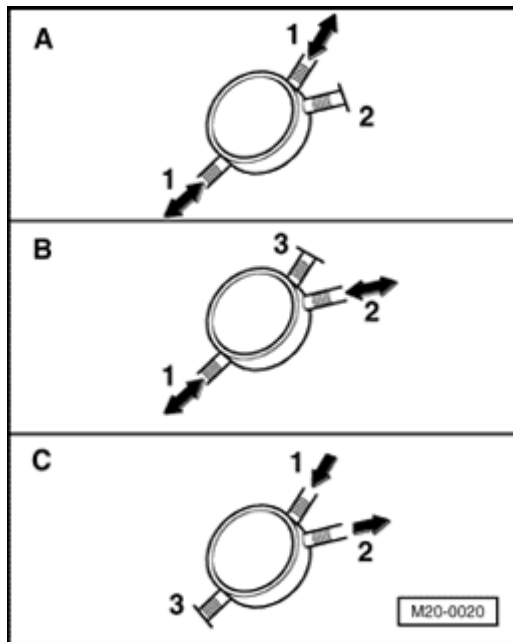


Fig. 3 Checking pressure retention valve

- Check direction of valve flow:

A) Union 1 - 1:

- ◆ Flow in both directions
- ◆ Union -2- is closed

B) Union 1 - 2:

- ◆ Flow in both directions
- ◆ Union -3- is closed

C) Union 1 - 2:

- ◆ Flow in only one direction
- ◆ Union -3- is closed
- ◆ Valve must close when a vacuum is applied to union -1-

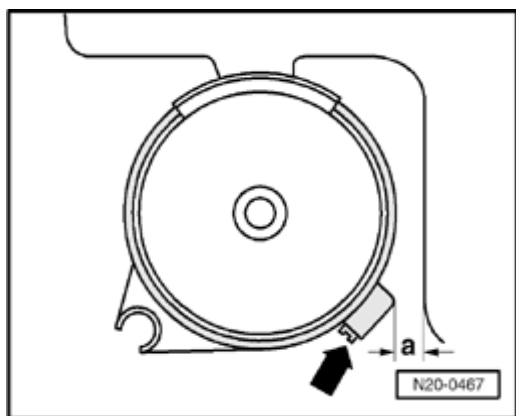


Fig. 4 Installation position of screw-type clip for fuel filter

Note:

The fuel filter is illustrated viewed from the front.

- Install screw-type clip (arrow) as shown in illustration.

Ensure sufficient clearance between clip fastener and fuel tank. Dimension "a" must be at least 5 mm.

Safety precautions when working on the fuel supply system

CAUTION!

When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- ◆ *Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.*
- ◆ *Make sure sufficient clearance to all moving or hot components.*

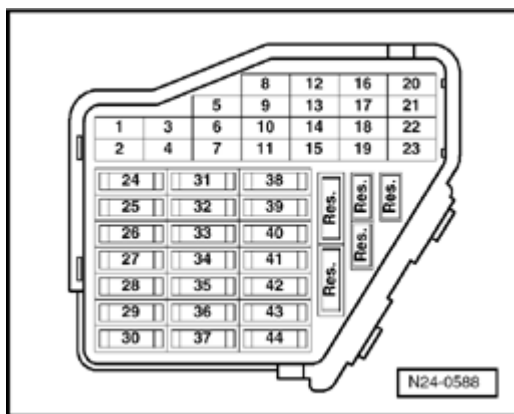
When removing and installing the fuel gauge sender or fuel pump (fuel delivery unit) from a full or partly full fuel tank the following must be observed:

WARNING!

Fuel supply lines are under pressure! Before removing from hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

20-13

- ◆ Before commencing work, switch on exhaust extraction system and place an extractor close to sender opening in the fuel tank to extract escaping fuel fumes. If no exhaust extraction system is available, a radial fan with a displacement greater than 15 m³/h can be used (as long as motor is not in air flow).
- ◆ Prevent skin contact with fuel! Wear fuel resistant gloves!
- ◆ For safety reasons, fuse No. 28 must be removed from fuse holder before opening system as fuel pump can be activated by contact switch in driver's door.



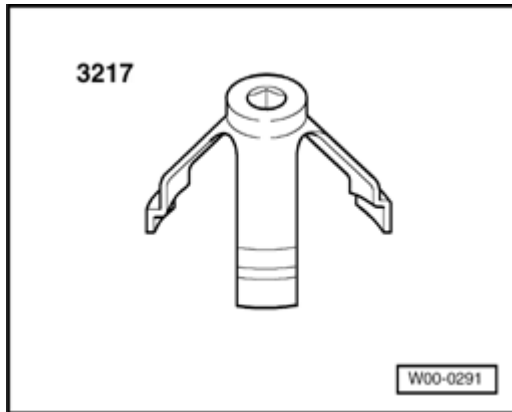
Rules for cleanliness

When working on the fuel supply/injection system, pay careful attention to the following 5 rules:

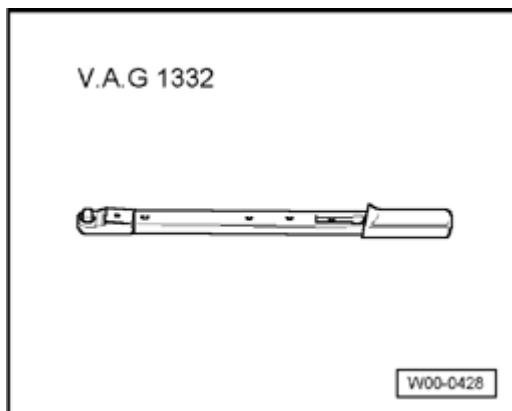
- ◆ Thoroughly clean all unions and the adjacent areas before disconnecting.
- ◆ Place parts that have been removed on a clean surface and cover. Do not use fluffy cloths!
- ◆ Carefully cover opened components or seal, if the repair cannot be carried out immediately.
- ◆ Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- ◆ When the system is open: Do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.

Fuel delivery unit , removing and installing

Special tools and equipment



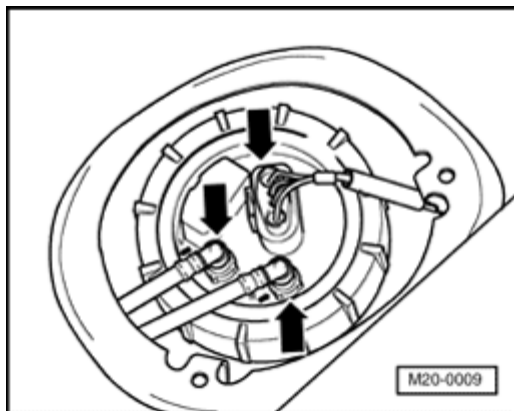
- ◆ 3217 Union nut spanner



- ◆ VAG 1332 Torque wrench (40...200 Nm)

Removing

- Observe safety precautions before starting
⇒ [Page 20-12](#) .
- Check whether a coded radio is installed.
obtain anti-theft coding.
- With ignition switched off disconnect battery
Ground strap.
- Fold rear seat bench forward.
- Remove cover from fuel delivery unit.
- Disconnect 4-pin connector as well as supply
and return lines from flange (arrows).



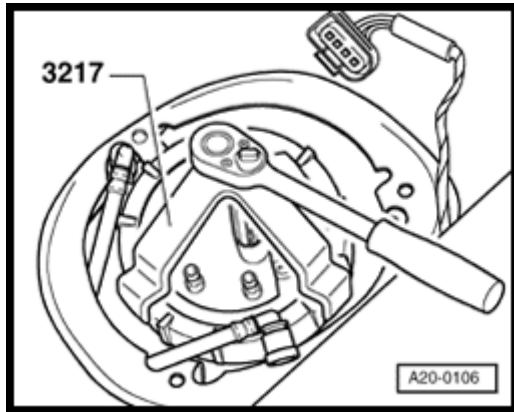
Note:

Press buttons on hose couplings to do so.

WARNING!

***Fuel supply lines are under pressure! Be
removing from hose connections wrap a
around the connection. Then release pressure
by carefully pulling hose off connection.***

20-17



- Seal lines to avoid contamination of fuel system.
- Remove union nut with spanner 3217.
- Pull fuel delivery unit and seal out of opening in fuel tank.

Note:

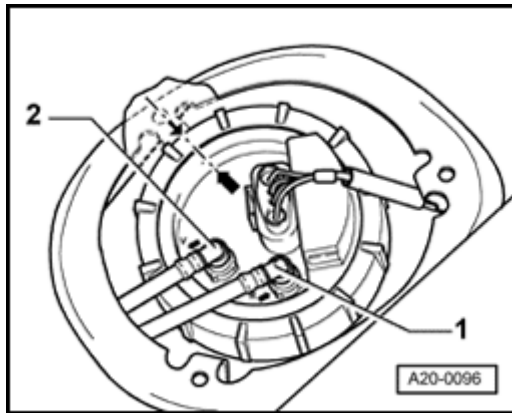
If the delivery unit is to be replaced then drain old delivery unit before disposal.

Installing

- Installation of fuel delivery unit is performed in reverse order.

Note:

- ◆ *Insert seal for fuel delivery unit flange "dry" into opening of fuel tank.*
- ◆ *Moisten inner edges of seal with fuel only when installing fuel delivery unit.*
- ◆ *When inserting fuel delivery unit be careful to ensure that the fuel gauge sender does not become bent/deformed.*



◆ Note installation position of fuel delivery unit flange: The marking on flange must align with marking on fuel tank (arrows).

◆ Make sure tight fit of fuel hoses.

◆ After installing fuel delivery unit, check that the supply, return and breather lines are still clipped onto fuel tank.

- Check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Adapt (match) engine control module to throttle valve control module:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

- Perform work sequence "Procedure after interrupting voltage supply":

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

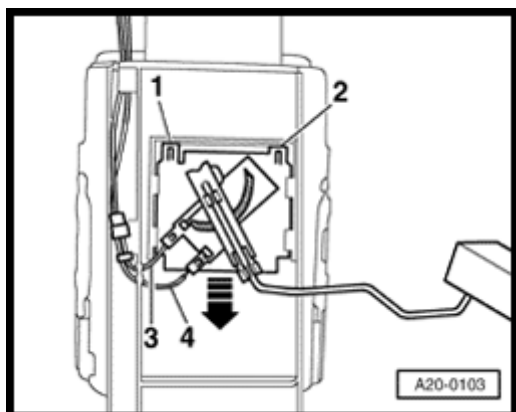
- Generate readiness code again if DTC memory has been erased or engine control module separated from permanent positive supply:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Fuel gauge sender, removing and installing

Removing

- Remove fuel delivery unit ⇒ [Page 20-15](#) .
- Release connections for wires -3- and -4- and disconnect.
- Lift retaining tabs -1- and -2- with a screwdriver and pull fuel gauge sender out downward (arrows).

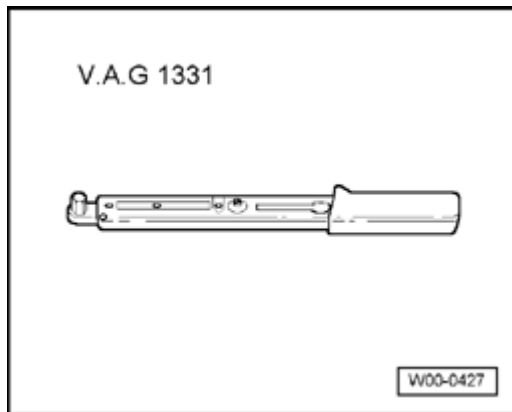


Installing

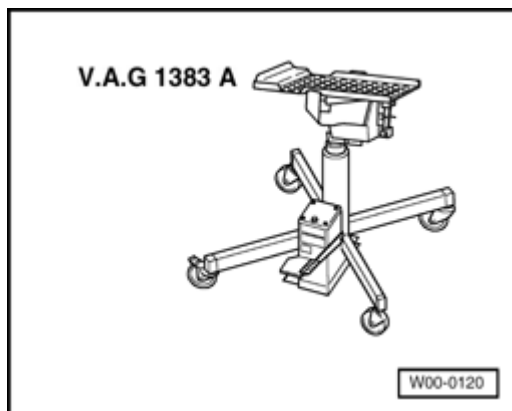
- Insert fuel gauge sender into guides on fuel delivery unit and push up until it engages.
- Install fuel delivery unit ⇒ [Page 20-15](#) .

Fuel tank, removing and installing

Special tools and equipment



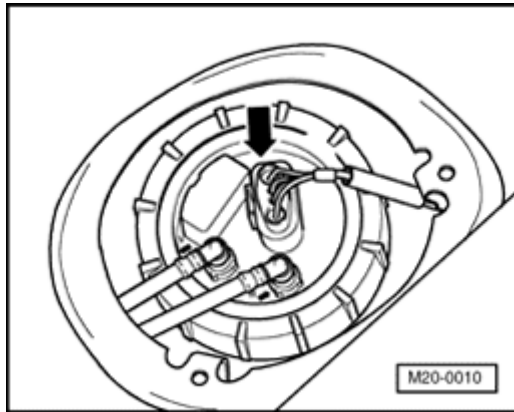
- ◆ VAG 1331 Torque wrench (5...50 Nm)



- ◆ VAG 1383 A Engine/transmission jack

Removing

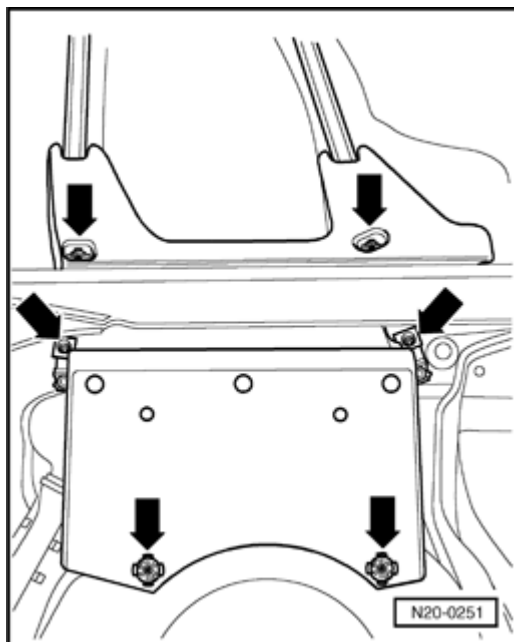
- Observe safety precautions before starting work
⇒ [Page 20-12](#) .
- Check whether a coded radio is installed. If so, obtain anti-theft coding.
- With ignition switched off disconnect battery Ground strap.
- Open fuel flap.
- Remove rear right wheel housing liner:
⇒ [Repair Manual, Body Exterior, Repair Group 66](#)
- Remove rear axle:
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42](#)
- Drain fuel tank, clean fuel filler neck and surrounding area.
- Unscrew mounting screw and remove tank flap unit with rubber cup.
- Remove securing screws on filler neck.
- Fold rear seat bench forward.



- Remove cover from fuel delivery unit.

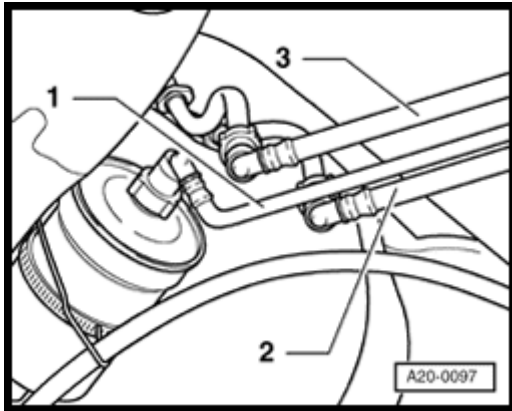


- Remove 4-pin connector from flange (arrow).



- Remove cover for fuel tank (arrows).





- Disconnect return line -2- (blue), supply line -1- (black) and breather line -3- (white) at connecting point.

Note:

Press buttons on hose couplings to do so.

WARNING!

Fuel supply lines are under pressure! Before removing from hose connections wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

- Seal lines to avoid contamination of fuel system.
- Remove tensioning strap. When doing this support fuel tank with engine/transmission jack VAG 1383 A.
- Lower fuel tank.

Installing

Install in reverse sequence ; note the following points:

- ◆ Route breather and fuel hoses kink free.
- ◆ Ensure tight fit of fuel hoses.
- ◆ Do not interchange supply and return hose (return hose blue or blue markings, supply hose black).

Note:

After installing fuel gauge sender, check that the supply, return and breather pipes are still clipped onto the fuel tank.

- Check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Adapt (match) engine control module to throttle valve control module:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

- Perform work sequence "Procedure after interrupting voltage supply":

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Generate readiness code again if DTC memory has been erased or engine control module separated from permanent positive supply:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Crash fuel shut-off

Function

Models with an airbag are installed with a crash fuel shut-off system. It reduces the danger of a fire in a crash as the fuel pump is switched off via the fuel pump relay.

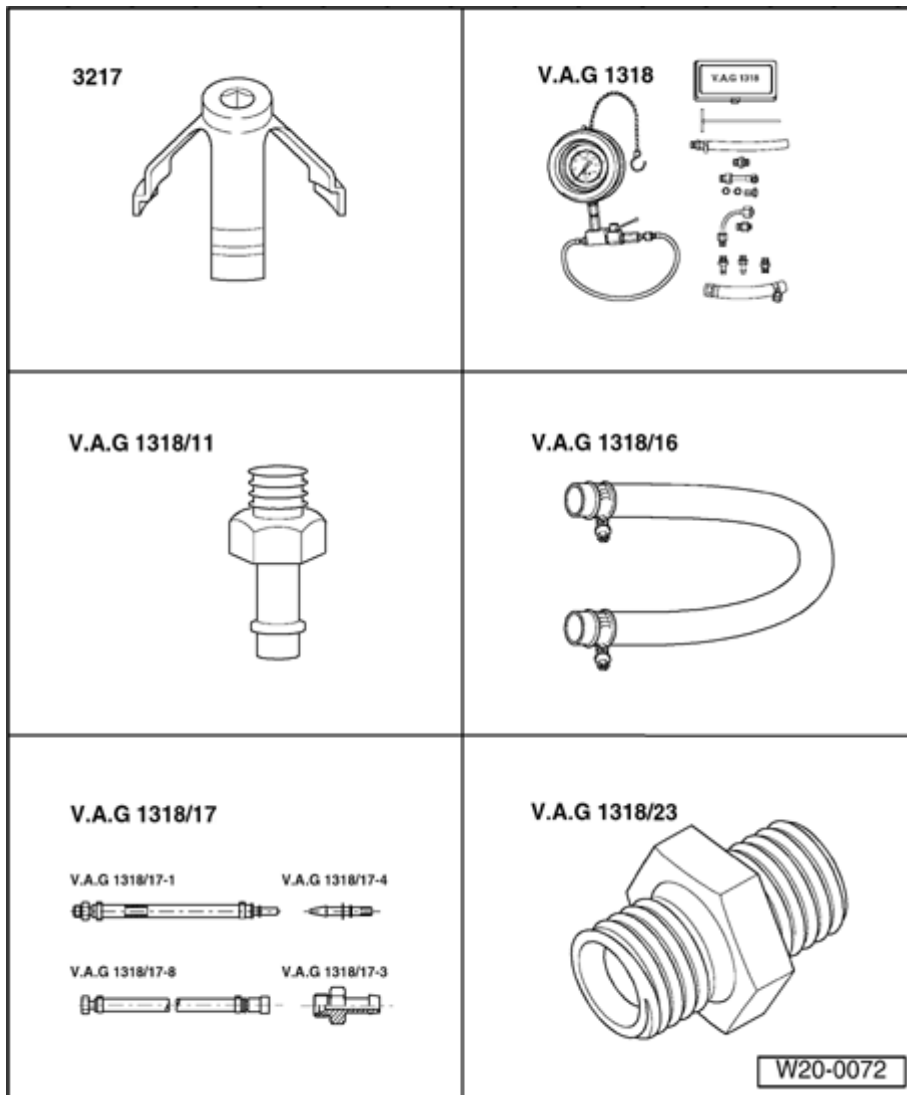
At the same time this system improves starting of the engine. When the door is opened the fuel pump is activated for 2 seconds to build up the pressure in the fuel system.

When opening the fuel system:

Observe safety precautions ⇒ [Page 20-12](#) .

- Check activation of Fuel Pump (FP) relay -J17- with VAG 1466 A referring to wiring diagram:

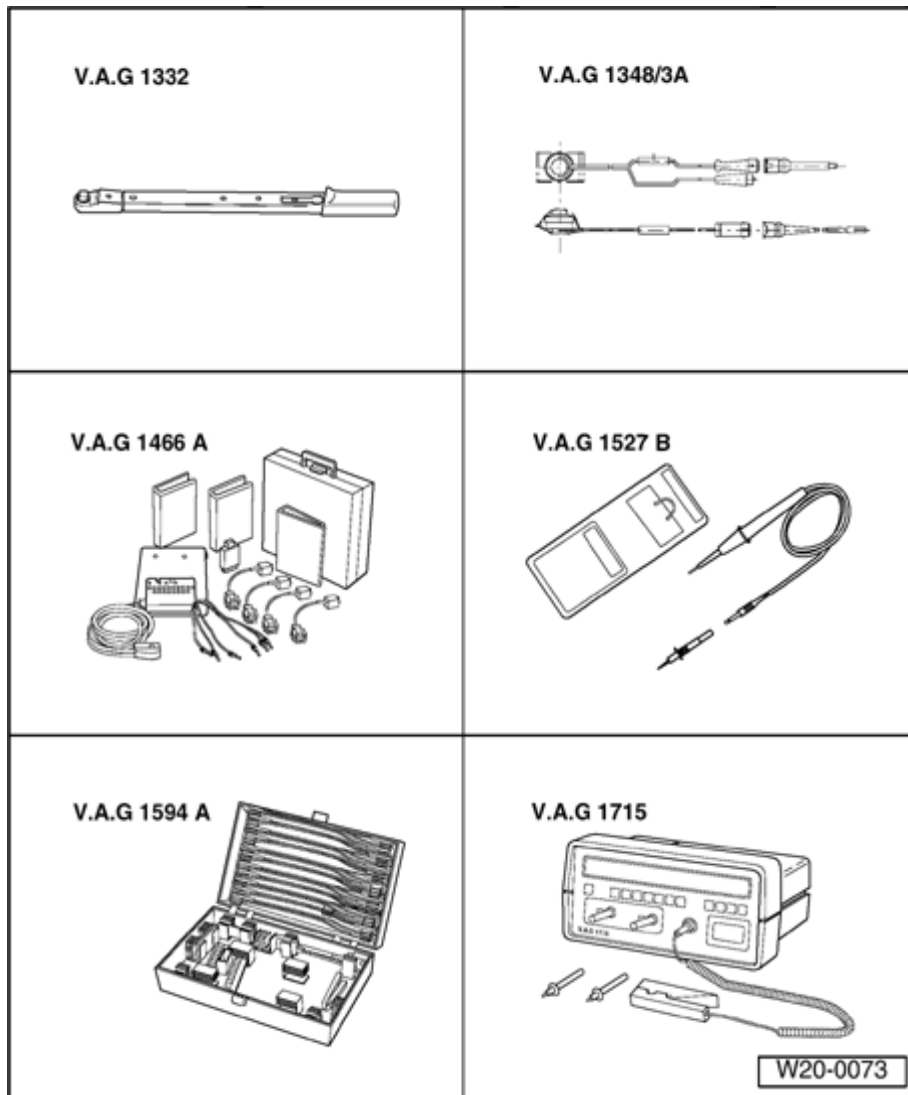
⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*



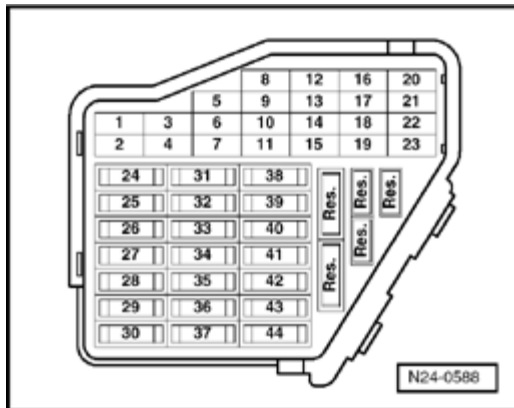
Fuel pump, checking

Special tools and equipment

- ◆ 3217 Union nut spanner
- ◆ VAG 1318 Pressure gauge
- ◆ VAG 1318/11 Adapter
- ◆ VAG 1318/16 Hose adapter
- ◆ VAG 1318/17 Adapter
- ◆ VAG 1318/23 Adapter



- ◆ VAG 1332 Torque wrench (40...200 Nm)
- ◆ VAG 1348/3A Remote control with adapter cable VAG 1348/3-2
- ◆ VAG 1466 A Test system
- ◆ VAG 1527 B Diode test lamp
- ◆ VAG 1594 A Adapter set
- ◆ VAG 1715 Multimeter
- ◆ Measuring container
- ◆ Wiring diagram



Test conditions

- Fuse 28 must be OK.
- Battery voltage must be at least 11.5 V.
- All electrical consumers, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

Note:

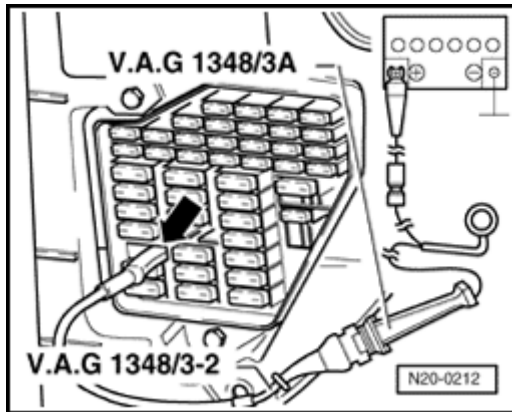
See functional description of crash fuel shut-off ⇒ [Page 20-25](#).

Checking function and voltage supply

- Fold rear seat bench forward.
- Remove cover from fuel delivery unit.
- Briefly operate starter.
Fuel pump must audibly run.
- Switch ignition off.

If the fuel pump does not run:

- Remove cover in front of fuse holder.
- Pull fuse No. 28 (for fuel pump) out of fuse holder.
- Connect remote control VAG 1348/3A to contact 28a to fuel pump and battery positive (+) using adapter cable VAG 1348/3-2.
- Operate remote control.



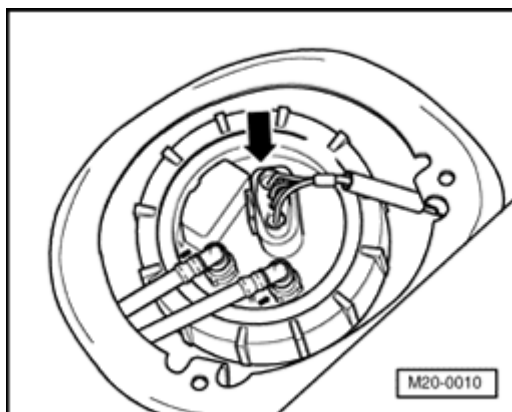
Fuel pump runs:

- Check activation of Fuel Pump (FP) relay -J17- with VA. 1466 A referring to wiring diagram:

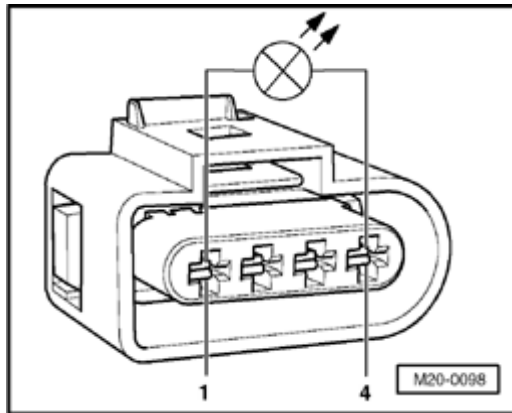
⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Fuel pump does not run:

- Remove 4-pin connector from flange (arrow).



20-30



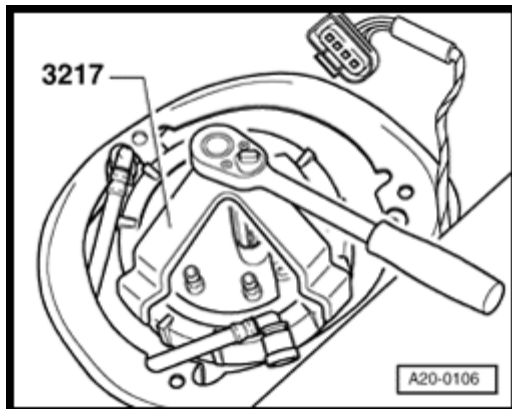
- Connect diode test lamp VAG 1527 B to outer contacts of connector using adapter cables from VAG 1594 A.
- Operate remote control.
LED must light up

LED does not light-up:

- Locate and eliminate open circuit referring to wiring diagram:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

LED lights up (voltage supply OK):



- Remove union nut with spanner 3217.
- Check that electrical wires between flange and fuel pump are connected.

If no open circuit can be found:

- Fuel pump faulty, replace fuel delivery unit ⇒ [Page 20-15](#), Removing and installing fuel delivery unit.

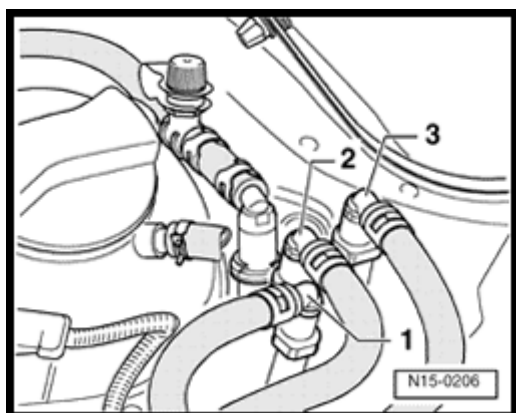
Checking delivery rate

Test conditions

- Voltage supply OK.
- Remote control VAG 1348/3A connected.

Test sequence

- Remove filler cap from fuel tank filler neck.
- Disconnect supply hose -3- (with white marking) and collect fuel that may leak out with a cloth.

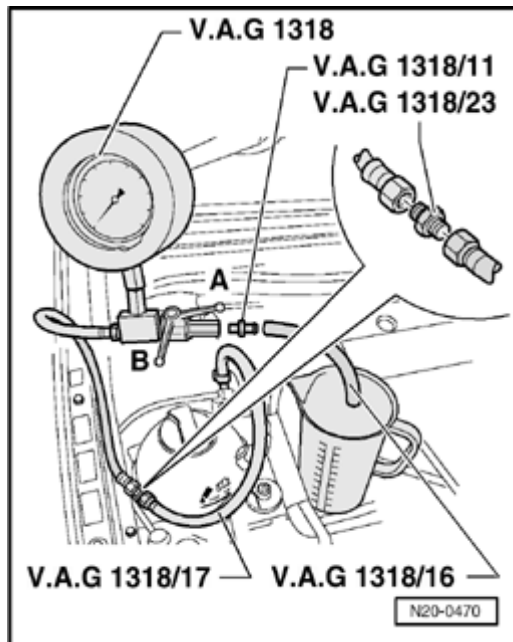


Note:

Press buttons on hose couplings to do so.

WARNING!

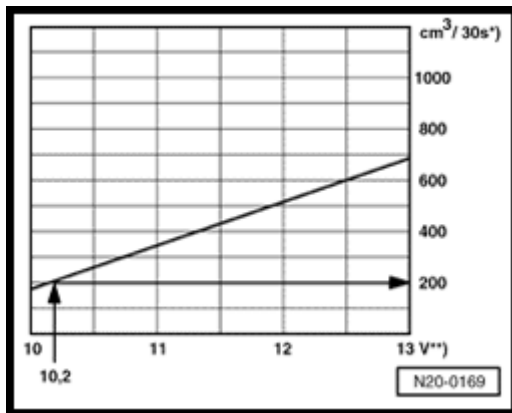
Fuel supply lines are under pressure! Before removing from hose connections wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.



- Connect pressure gauge VAG 1318 to fuel supply pipe using adapter VAG 1318/23 and VAG 1318/17.
- Push hose adapter VAG 1318/16 onto adapter VAG 1318/11 on pressure gauge and hold hose in a measuring container.
- Open shut-off tap on pressure gauge. Lever then points in flow direction -A-.
- Operate remote control VAG 1348/3A. Close shut-off tap slowly, until pressure gauge shows 3 bar. From now on do not alter setting of shut-off tap.
- Empty measuring container.

The quantity of fuel delivered by the fuel pump depends on the battery voltage.

- Connect multimeter to vehicle battery using adapter cables from VAG 1594 A.
- Operate remote control for 30 seconds and measure battery voltage.



- Compare quantity of fuel delivered with nominal value.

*) Minimum delivery $\text{cm}^3/30$ seconds

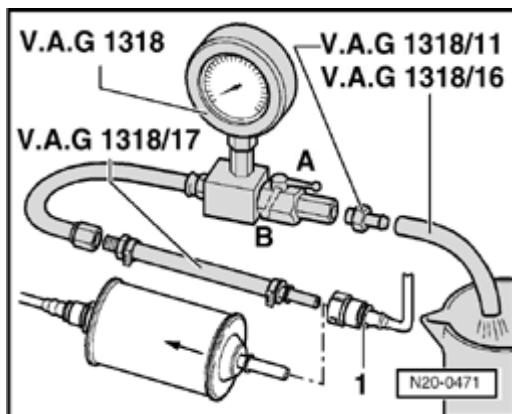
**) Voltage at fuel pump with engine not running and pump running (approx. 2 volts less than battery voltage).

Example:

During the test, a voltage of 12.2 volts is measured at the battery. As the voltage at the pump is approx. 2 volts less than the battery voltage, the result is a minimum delivery of $200 \text{ cm}^3/30$ seconds.

If the minimum delivery rate is not attained:

- Check fuel pipes for possible restrictions (kinks) or blockages.



- Disconnect fuel line -1- from input side of fuel filter.

Note:

Press buttons on hose couplings to disconnect.

- Connect pressure gauge VAG 1318 to hose using adapter 1318/17.

- Repeat delivery rate test.

If the minimum delivery rate is now attained:

- Replace fuel filter.

If the minimum delivery rate is again not attained:

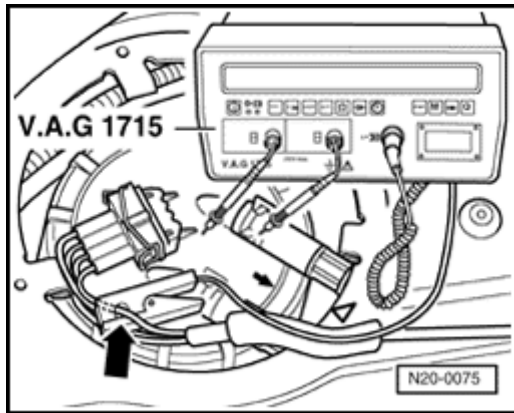
- Remove fuel delivery unit and check strainer filter for soiling.

Only if no faults have been detected up to now:

- Fuel pump faulty, replace fuel delivery unit ⇒ [Page 20-15](#) , Removing and installing fuel delivery unit.

If the delivery rate has been attained but a fuel supply system fault is still suspected (e.g. intermittent failure of fuel supply system):

- Check current draw of fuel pump as follows:
- Reconnect all disconnected fuel lines.



- Connect multimeter VAG 1715 to wire (arrow) for contact 1 of 4-pin connector using current pick-up clamp.
 - Start engine and run at idling speed.
 - Measure current draw of fuel pump.
- Specification: max. 8 amps.

Note:

If the fuel system malfunction is intermittent, perform the check during a test drive with the assistance of a 2nd person.

If the current draw is exceeded:

- Fuel pump faulty, replace fuel delivery unit ⇒ [Page 20-15](#) , Removing and installing fuel delivery unit.

Checking fuel pump non-return valve

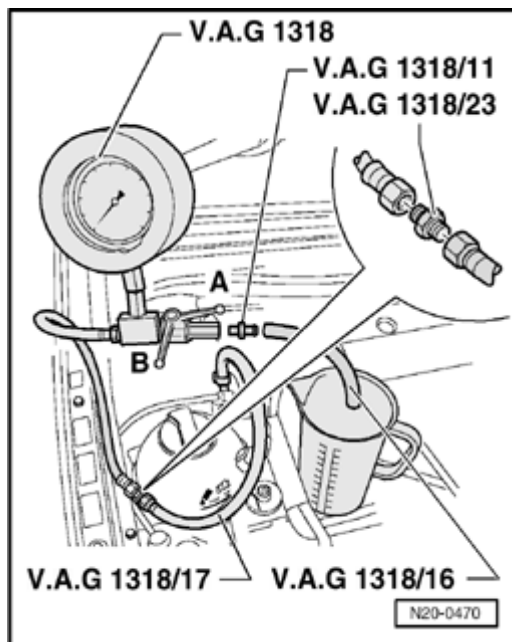
Test conditions

- Remote control VAG 1348/3A is still connected.
- Pressure gauge VAG 1318 is still connected.

Test sequence

Note:

With this check the fuel supply line connections from the fuel delivery unit to the point at which the pressure gauge VAG 1318 is connected will be checked for leaks at the same time.



- Close pressure gauge shut-off tap (lever across flow direction - position B-).
- Operate remote control at short intervals, until a pressure of approx. 3 bar has built up.
- If pressure builds up too high, lower excess pressure by carefully opening shut-off tap.

WARNING!

Danger of spray when opening the shut-off-tap; hold container in front of the free connection on the pressure gauge.

- Observe pressure drop on gauge. Over a duration of 10 minutes pressure must not drop below a 2.5 bar decrease.

If the pressure drops further:

- Check pipe connections for leaks.

If no wiring fault is detected:

- Fuel pump faulty, replace fuel delivery unit ⇒ [Page 20-15](#) , Removing and installing fuel delivery unit.

Evaporative Emissions (EVAP) system

Function

Depending on air pressure and ambient temperature, fuel vapor will form above the level of fuel in the tank.

The EVAP system prevents these HC emissions from escaping into the atmosphere.

In limited quantities, fuel vapors located at the highest point in the tank pass through a gravity valve (which closes at an angle of 45°) and through a pressure retention valve into the EVAP canister.

The activated charcoal in the canister stores these vapors like a sponge.

When the Oxygen sensor control is active when driving (engine warm), the EVAP canister purge regulator valve -N80- (sometimes called regeneration valve), is activated (pulsed) from the engine control module depending upon load and engine speed. The opening period is dependent on the input signals.

Intake manifold vacuum draws fresh air through the vent opening on the underside of the EVAP canister during the purging procedure (regenerating the activated charcoal). The fuel vapors stored in the activated charcoal and fresh air are fed for combustion in dosed quantities.

The pressure retention valve prevents fuel vapors from being drawn from the tank when the solenoid valve is open and an intake manifold vacuum is present. It therefore ensures that the evacuation of the EVAP canister has priority.

When no voltage is applied (e.g. wiring open circuit), the solenoid valve is closed. The EVAP canister will not purge.

The vacuum pipe from the throttle valve control module to the EVAP canister has an additional by-pass which is connected with the crankcase breather valve. The non-return valve integrated in the crankcase breather valve prevents intake air entering into the crankcase during some partial load ranges. This improves the overall crankcase breathing. The by-pass guarantees the crankcase breathing.

Functional description of leak diagnosis

The EVAP system (including the fuel tank) is equipped with a leak diagnosis system. The leak diagnosis system detects leaks in the breather system.

The diagnosis is based on the pressure principle and should detect leaks with a circumference larger than 1 mm.

During the diagnosis the Leak Detection Pump (LDP) -144- creates a pressure of 30 mbar in the EVAP system. When the pressure is attained the pump switches off. If the pressure drops below a predetermined value the pump switches on again. The self-diagnosis monitors the switch periods and sets a code in the Diagnostic Trouble Code (DTC) memory when the period is too short.

Observe safety precautions ⇒ [Page 20-12](#)

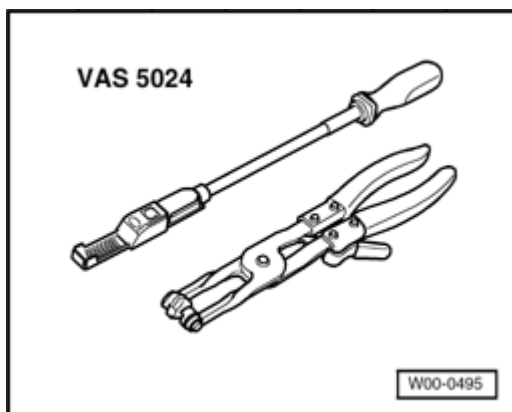
Observe rules for cleanliness ⇒ [Page 20-14](#)

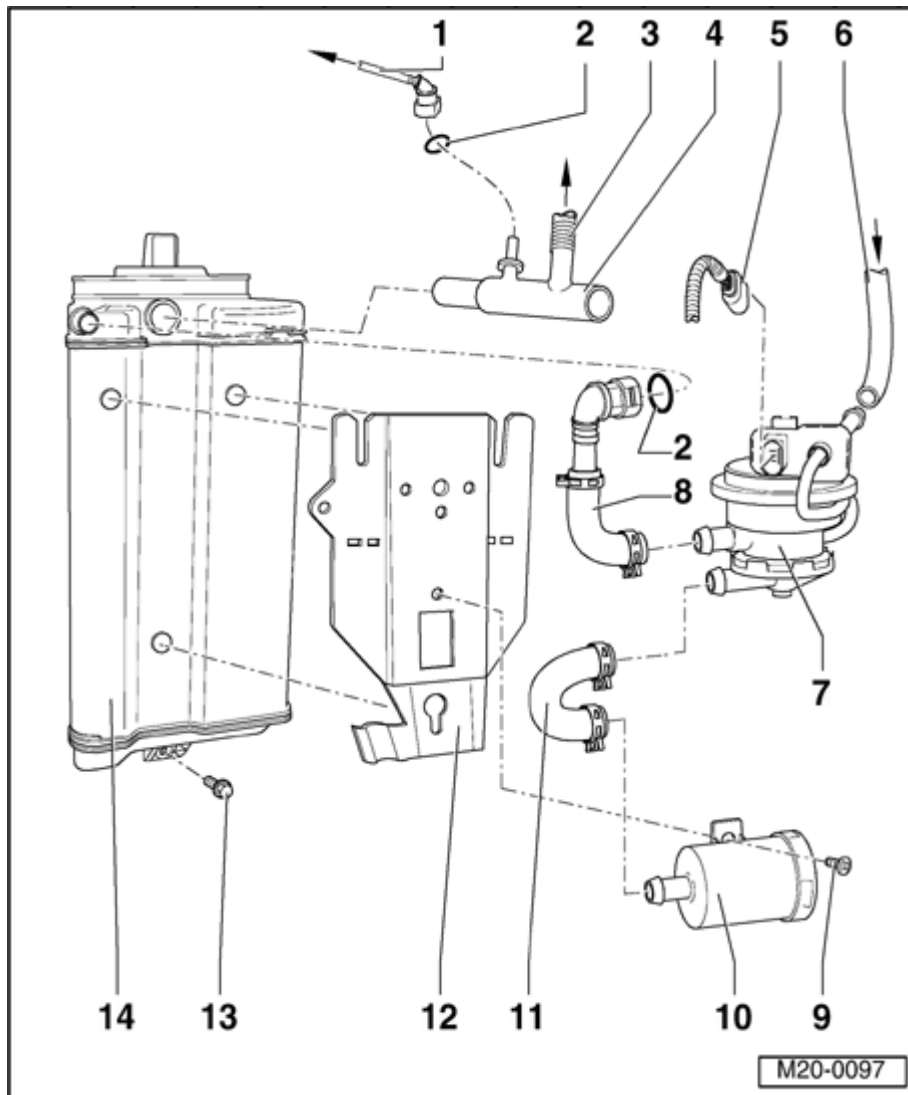
Servicing parts of the EVAP system ⇒ [Page 41](#)

Assembly overview of EVAP system ⇒ [Page 44](#)

Note:

- ◆ *Hose connections are secured with either spring-type or clamp-type clips.*
- ◆ *Always replace clamp-type clips with spring-type clips.*
- ◆ *Assembly tool VAS 5024 or hose clip pliers VAG 1921 are recommended for installing spring-type clips.*





Components of the EVAP system, servicing

Note:

◆ Checking EVAP system for leaks ⇒ [Page 20-47](#).

◆ Components marked with an * are checked by On Board Diagnostic (OBD):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

◆ Components marked with ** are checked by output Diagnostic Test Mode (DTM):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

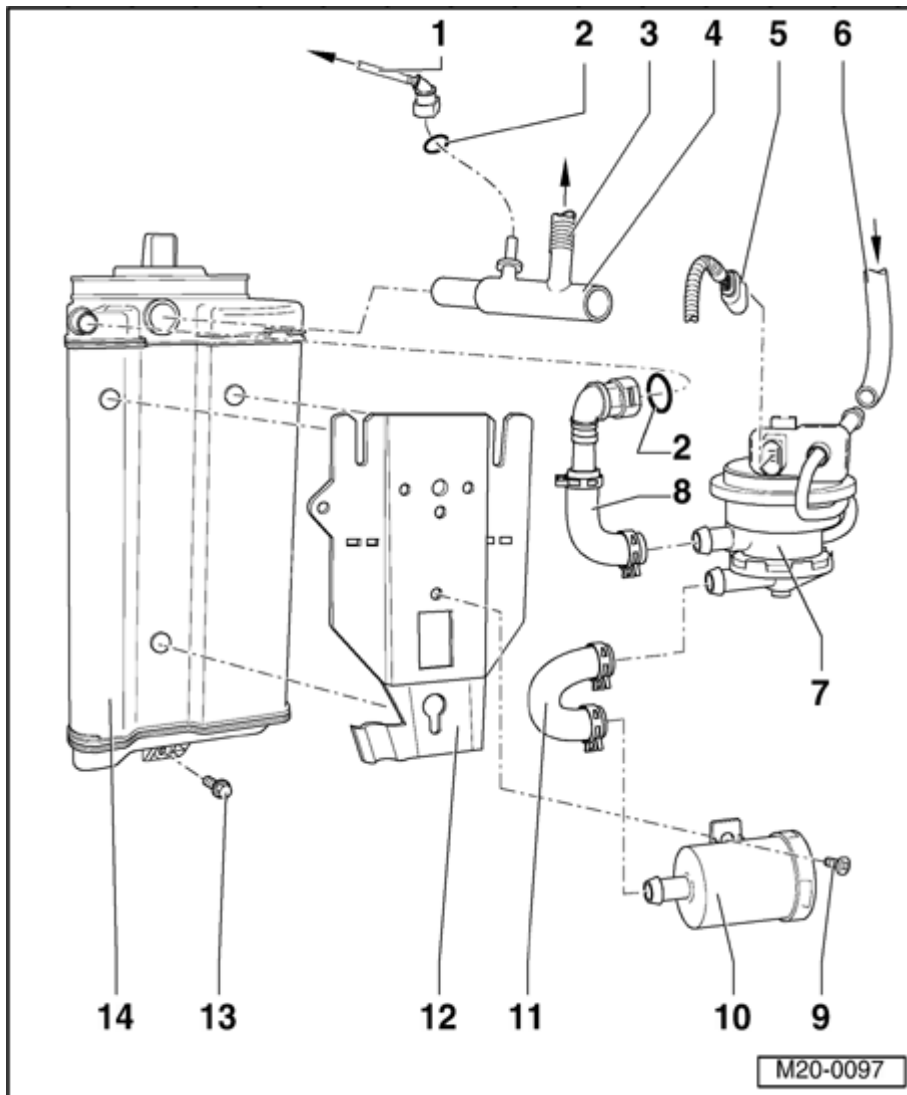
1 - Breather line

◆ White

- ◆ Check seated securely
- ◆ Press together at front to release
- ◆ To pressure retention valve ⇒ [Page 20-3](#), item - 7 -

2 - Seal

- ◆ Replace if damaged



3 - Breather line

- ◆ Black
- ◆ Check seated securely
- ◆ To change-over valve ⇒ [Page 20-4](#), item - 11 -

4 - Junction piece

5 - Connector

- ◆ Black, 3-pin

6 - Vacuum line

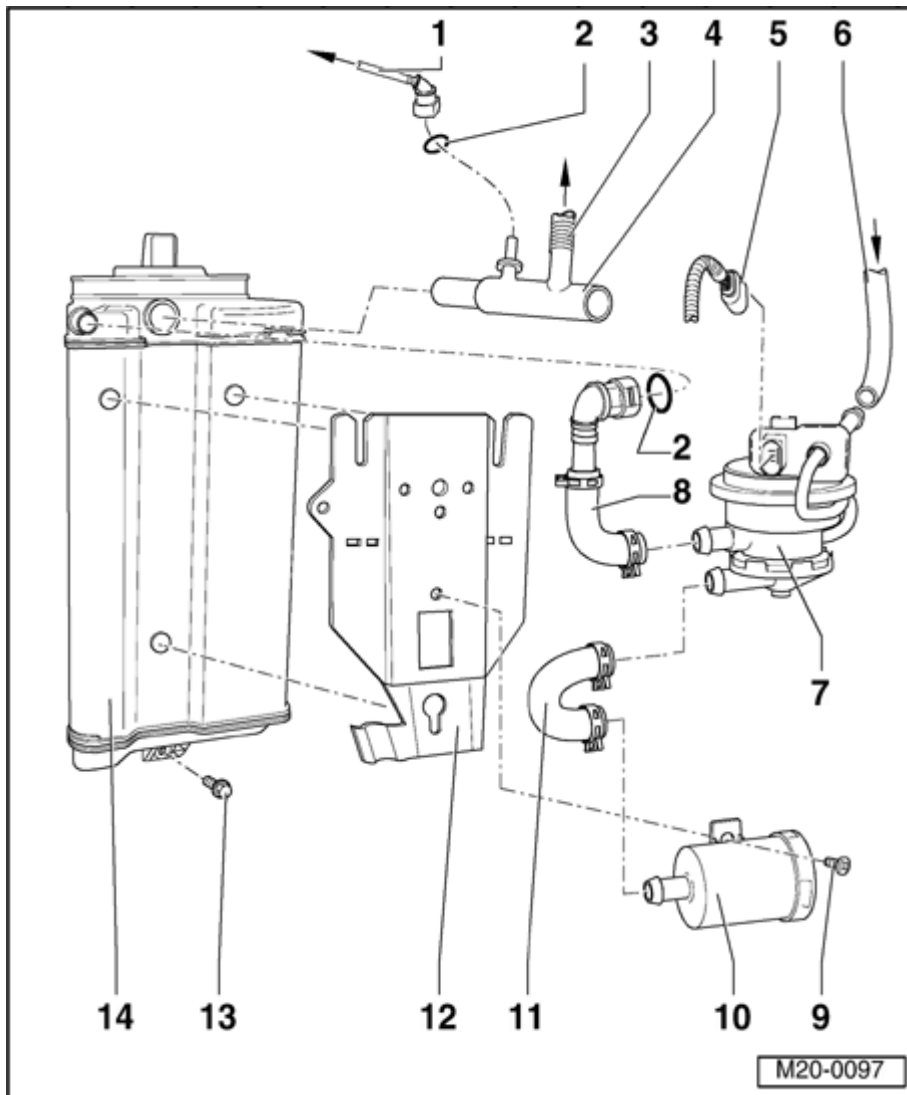
- ◆ To intake manifold ⇒ [Page 20-44](#), item - 4 -

7 - Leak Detection Pump (LDP) - V144-*/**

- ◆ In rear right wheel housing, behind wheel housing liner
- ◆ Valve

will be
activated
by
engine
control
module
(pulsed)

- ◆ Checking
resistance
⇒ [Page
20-60](#)



8 Connecting - hose

◆ Pressure side

9 - 3 Nm

10 - Air filter for LDP

11 Connecting - hose

◆ Suction side

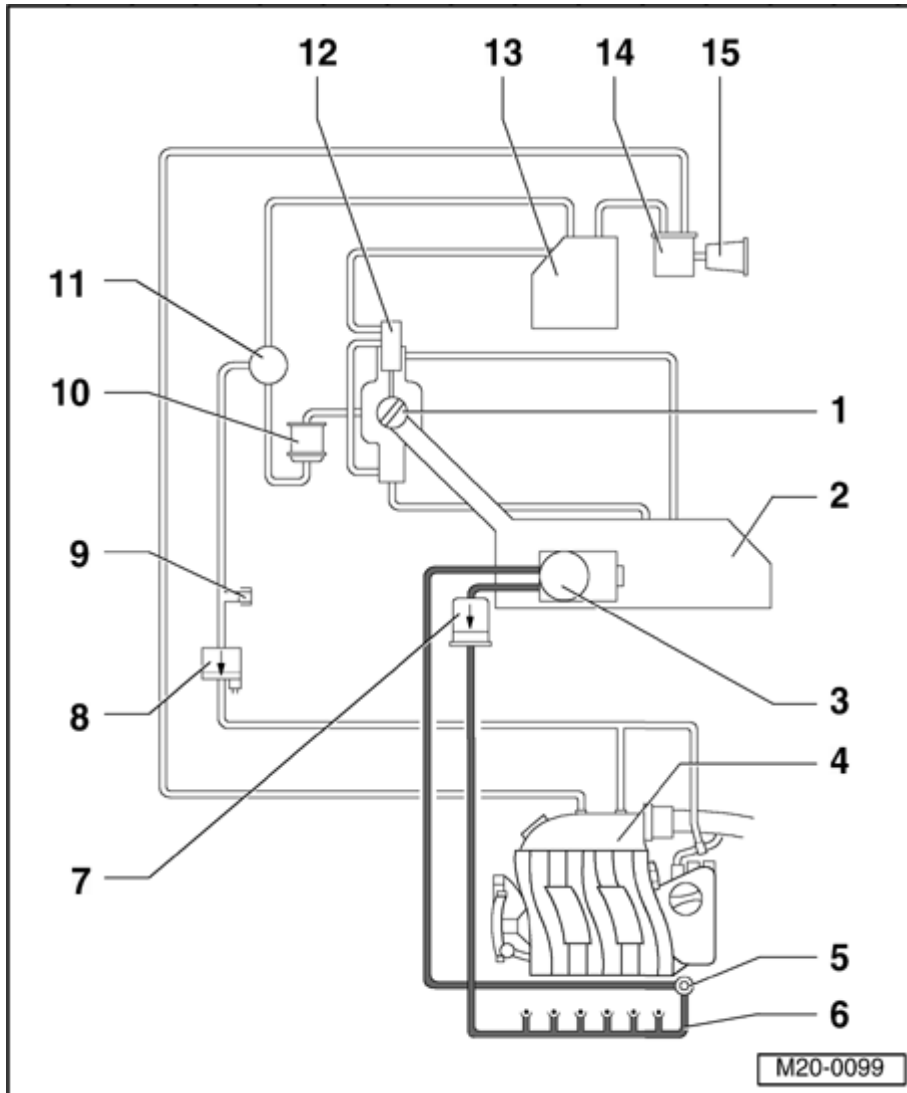
12 - Bracket

13 - 10 Nm

14 - EVAP canister

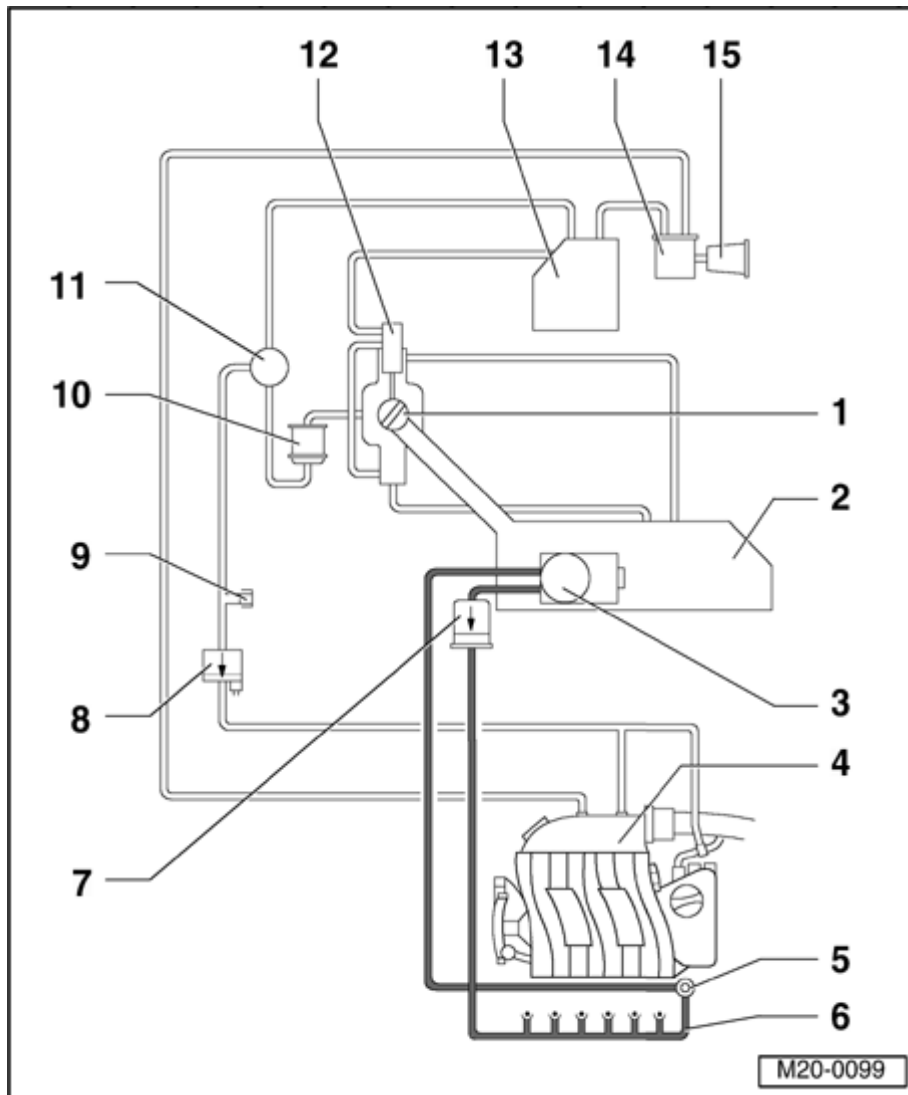
◆ In rear right wheel housing, behind wheel housing liner

M20-0097



**EVAP
canister
system,
assembly
overview**

- 1 - Tank flap unit
 - 2 - Fuel tank
 - 3 - Fuel delivery unit
 - 4 - Intake manifold
 - 5 - Fuel pressure regulator
 - 6 - Fuel rail with injectors
 - 7 - Fuel filter
- ◆ Installation position:
Arrow points in direction of flow



**8 - EVAP
canister
purge
regulator
valve -
N80-**

- ◆ Installation position:
Arrow points in direction of flow
- ◆ Valve will be activated by engine control module (pulsed)
- ◆ Checking function
⇒ [Page 20-54](#)
- ◆ Checking activation:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code \(s\): BDF, Repair Group 01](#)

9 - Test union

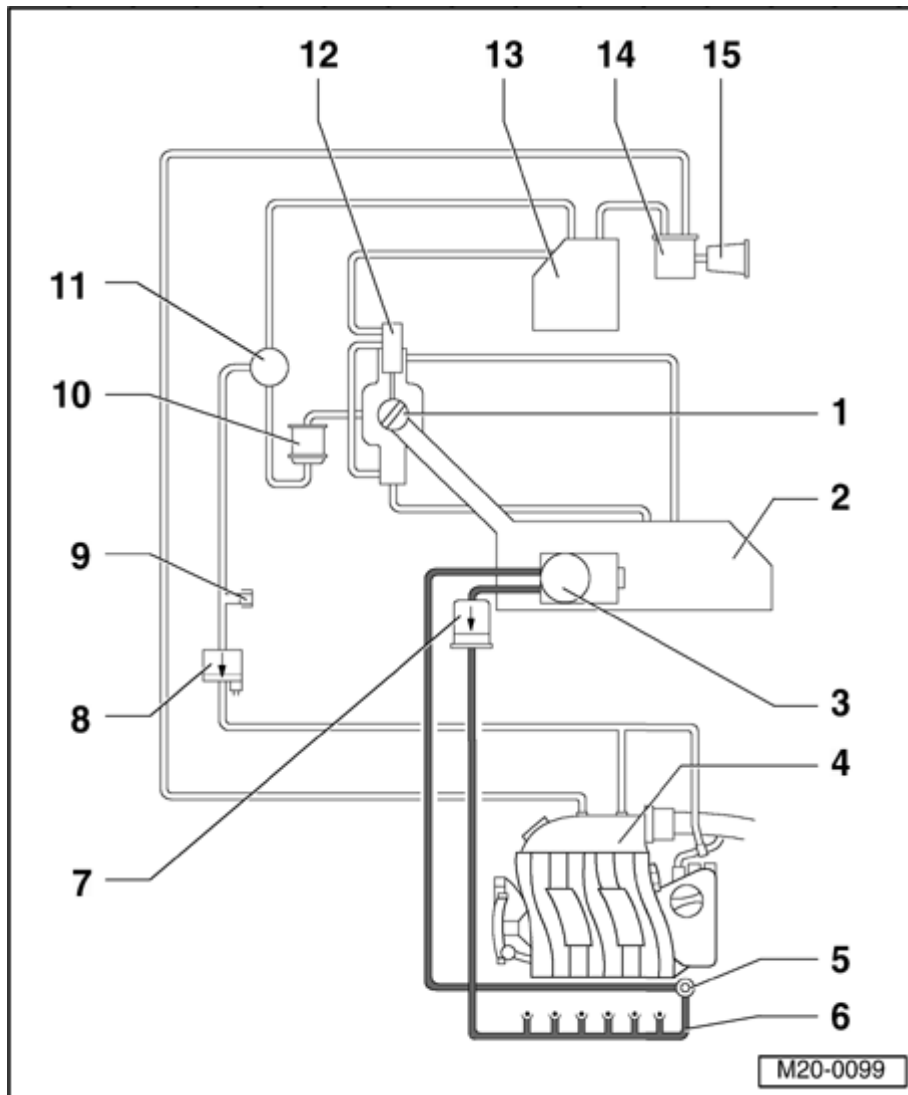
10 - Gravity valve

11 Pressure-retention valve

12 - Change-over valve

**13 - EVAP
canister**

- ◆ In rear
right
wheel
housing,
behind
wheel
housing
liner



14 Leak - Detection Pump (LDP) - V144-

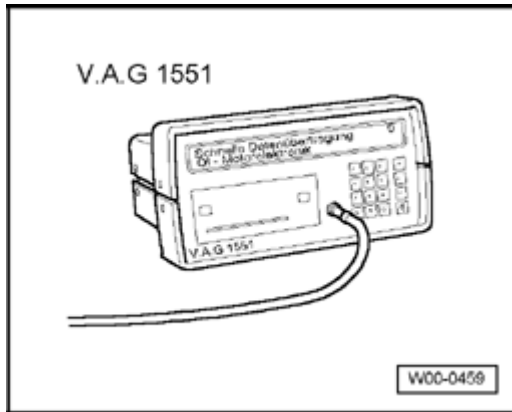
- ◆ In rear right wheel housing, behind wheel housing liner
- ◆ Valve will be activated by engine control module (pulsed)
- ◆ Checking resistance ⇒ [Page 20-60](#)
- ◆ Checking activation:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code \(s\): BDF, Repair Group 01](#)

15 - Air filter for LDP

EVAP system, checking for leaks

Special tools equipment, testers

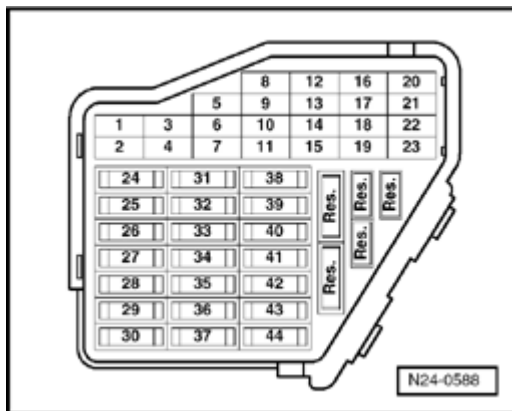


- ◆ V.A.G 1551 Scan Tool (or vehicle system tester V.A.G 1552) with cable VAG 1551/3

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the new tester VAS 5051.

Test conditions



- Fuses must be OK.
- Battery voltage must be at least 11.5 V.
- All electrical consumers, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.

- Selector lever must be in position "P" or "N" on models with an automatic transmission.
- Fuel pump relay -J17- must be OK, checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- No DTCs may be stored in DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Checking activation

- Check activation of LDP -V144- via output Diagnostic Test Mode (DTM):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

If activation is OK:

- Perform functional check ⇒ [Page 20-49](#) .

Functional check

Test conditions

- Throttle valve angle less than 4%, ⇒display group 3, display zone 3.
- Coolant temperature must be 85...110 °C ⇒display group 4, display zone 3.
- Intake air temperature less than 80 °C, ⇒display group 4, display zone 4.

Test sequence

- Connect V.A.G 1551 Scan Tool (or V.A.G 1552). Start engine and select "Address word" 01 of engine control module.

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Rapid data transfer
Select function XX

HELP



Indicated on display

- Press keys 0 and 4 for function "Initiate basic setting" and confirm entry with Q key.

Basic setting

Input display group number XXX



Indicated on display

- Press keys 0, 7 and 1 for "Display group number 71" and confirm entry with Q key.

Note:

The engine must not be loaded during this diagnosis, if this occurs the diagnosis will be interrupted and will not start again until the engine is revved-up.

System in basic setting 71

1 2 3 4



Indicated on display (1...4 = display zones)

If "Reed op." appears in display zone 1:

- Open fuel tank filler cap briefly to release pressure in fuel tank. This will close reed contact.

If the diagnosis is initiated by the engine control module the display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

If the display in display zone 4 jumps from "Test ON" to "Test OFF" during the diagnosis, repeat the diagnosis. When repeating the diagnosis test, the diagnosis can take up to 60 seconds before the display in display zone 4 jumps from "Test OFF" to "Test ON".

- Leave engine running at idling speed until display zone 4 displays specification "Syst. OK."

If "Sys. OK." appears in display zone 4:

- Press → key.
- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.

If "Sm leak or La leak" appears in display zone 2 and "Sys. n.OK." appears in display zone 4:

- Press → key.
- Check DTC memory:

⇒ [*Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01*](#)

- Read readiness code:

⇒ [*Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01*](#)

- Generate readiness code again if DTC memory has been erased or engine control module separated from permanent positive supply:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

If no DTC is stored in DTC memory:

- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.
- Check that fuel tank cap is completely closed or if seal is leaking, replace as necessary.
- Repeat functional check.

If fault is still present:

- Check that fuel delivery unit union nut is tight or if seal is leaking replace as necessary, ⇒ [Page 20-15](#), Removing and installing fuel delivery unit.
- Repeat functional check.

If fault is still present:

- Remove rear right wheel housing liner:

⇒ [Repair Manual, Body Exterior, Repair Group 66](#)

- Check to see if pressure hose between LDP and EVAP canister is leaking ⇒ [Page 20-43](#) , item - 8 - and replace if necessary.
- Check lines and line connections between EVAP canister and fuel tank flap unit or tank breather valve for leaks ⇒ [Page 20-44](#) , Assembly overview of EVAP system.
- Repeat functional check.

If fault is still present:

- Remove EVAP canister and check for cracks and leaks, replace if necessary ⇒ [Page 20-41](#) , Servicing components of EVAP system.
- Repeat functional check.

EVAP canister purge regulator valve -N80-, checking

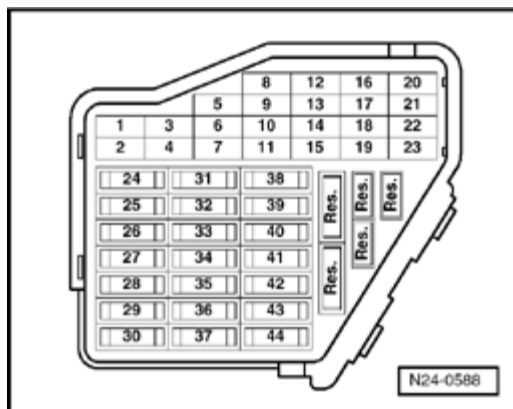
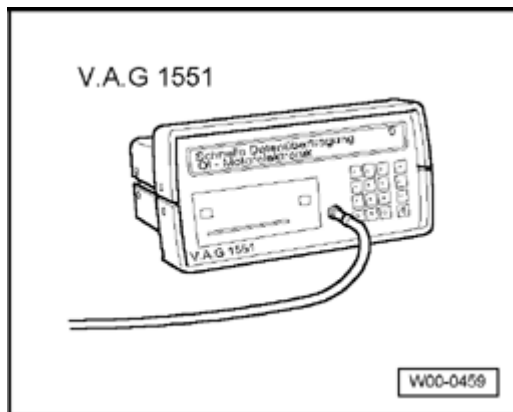
In a no-current situation the solenoid valve is closed.

Special tools and equipment

- ◆ V.A.G 1551 Scan Tool (or vehicle system tester V.A.G 1552) with cable VAG 1551/3

Note:

All functions which could previously be performed with V.A.G 1551/1552 can also be performed with the new tester VAS 5051.



Test conditions

- The fuses must be OK.
- Battery voltage must be at least 11.5 V.
- All electrical consumers, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.

- Selector lever must be in position "P" or "N" on models with an automatic transmission.
- Fuel pump relay -J17- must be OK, checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- No DTCs may be stored in DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Checking activation

- Check activation of EVAP canister purge regulator valve -N80- via output Diagnostic Test Mode (DTM):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

If activation is OK:

- Perform functional check ⇒ [Page 20-56](#) .

Functional check

Test conditions

- Coolant temperature must be at least 85 °C, ⇒ display group 1, display zone 2.

Test sequence

- Connect V.A.G 1551 Scan Tool (or V.A.G 1552). Start engine and select "Address word" 01 of engine control module.

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Rapid data transfer
Select function XX

HELP



Indicated on display

- Press keys 0 and 4 for function "Initiate basic setting" and confirm entry with Q key.

Basic setting
Input display group number XXX



Indicated on display

- Press keys 0, 0 and 1 for "Display group number 1" and confirm entry with Q key.

System in basic setting 1



Indicated on display (1...4 = display zones)

1 2 3 4

Only continue with the test when

- The coolant temperature is above 85 °C -Display zone 2-

- Change to display group 70 as follows:

- Press C key.

Basic setting

Input display group number XXX



Indicated on display

- Press keys 0, 7 and 0 for "Display group number 70" and confirm entry with Q key.

Note:

The engine must not be loaded during this diagnosis, if this occurs the diagnosis will be interrupted and will not start again until the engine is revved-up.

System in basic setting 70



1 2 3 4



Indicated on display (1...4 = display zones)

If the diagnosis is initiated by the engine control module the display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

This process can take approx. 30 seconds.

- Leave engine running at idling speed until display zone 4 displays specification TBV OK.

Note:

TBV stands for tank breather valve (EVAP canister purge regulator valve -N80-).

If "TBV OK" appears in display zone 4:

- Press → key.
- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.

If "TBV n. OK" appears in display zone 4:

- Press → key.
- Check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Generate readiness code again if DTC memory has been erased or engine control module separated from permanent positive supply.

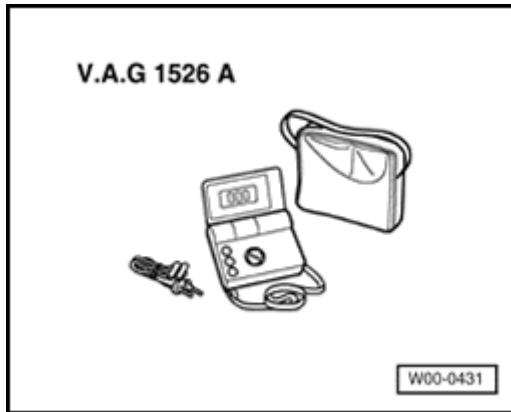
⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

If no DTC is stored in DTC memory:

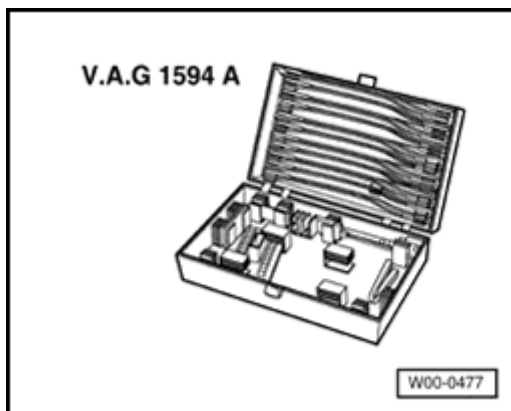
- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.
- Check breather lines to EVAP canister (may be kinked).
- Check EVAP system for leaks ⇒ [Page 20-47](#) .

Leak Detection Pump (LDP) - V144-, checking

Special tools and equipment



- ◆ VAG 1526 A multimeter, Fluke 83 multimeter or equivalent



- ◆ VAG 1594 Adapter set

Test conditions

- No DTCs may be stored in DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Checking activation

- Check activation of LDP -V144- via output Diagnostic Test Mode (DTM):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

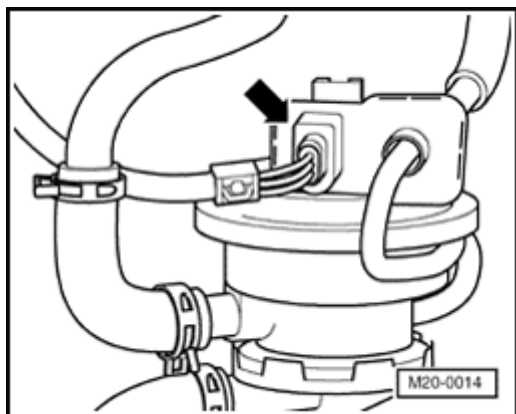
If activation is OK:

- Check resistance at LDP -V144- ⇒ [Page 20-62](#) .

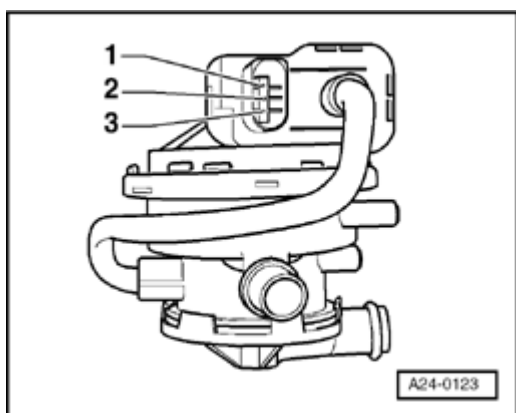
Checking resistance

- Remove rear right wheel housing liner:

⇒ [Repair Manual, Body Exterior, Repair Group 66](#)



- Disconnect 3-pin connector (arrow) for Leak Detection Pump (LDP) -V144-.



- Connect multimeter to measure resistance between contacts 1 and 3 of LDP -V144- using adapter cables from VAG 1594 A.
Specification: 640...720 Ω
- Connect multimeter to measure resistance between contacts 2 and 3 of LDP -V144- using adapter cables from VAG 1594 A.
Specification: 12.5...19.5 Ω

If the specifications are not attained:

- Replace Leak Detection Pump (LDP) -V144- ⇒ [Page 20-42](#) , item - 7 -.

- Check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Generate readiness code again if DTC memory has been erased or engine control module separated from permanent positive supply.

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Electronic Power Control (EPC)

Function of EPC systems

With the EPC system the throttle valve is not operated by the throttle pedal via a cable. There is no mechanical connection between accelerator and throttle valve.

The position of the accelerator is transmitted to the engine control module by two sensors (variable resistors; mounted in one housing) which are connected to the accelerator pedal.

The position of the accelerator (drivers requirement) is the main input value for the engine control module.

An electric motor (throttle actuator) in the Throttle valve control module -J338- actuates the throttle valve over the entire range of engine speeds and load.

The throttle valve is operated by the throttle actuator under instructions from the engine control module.

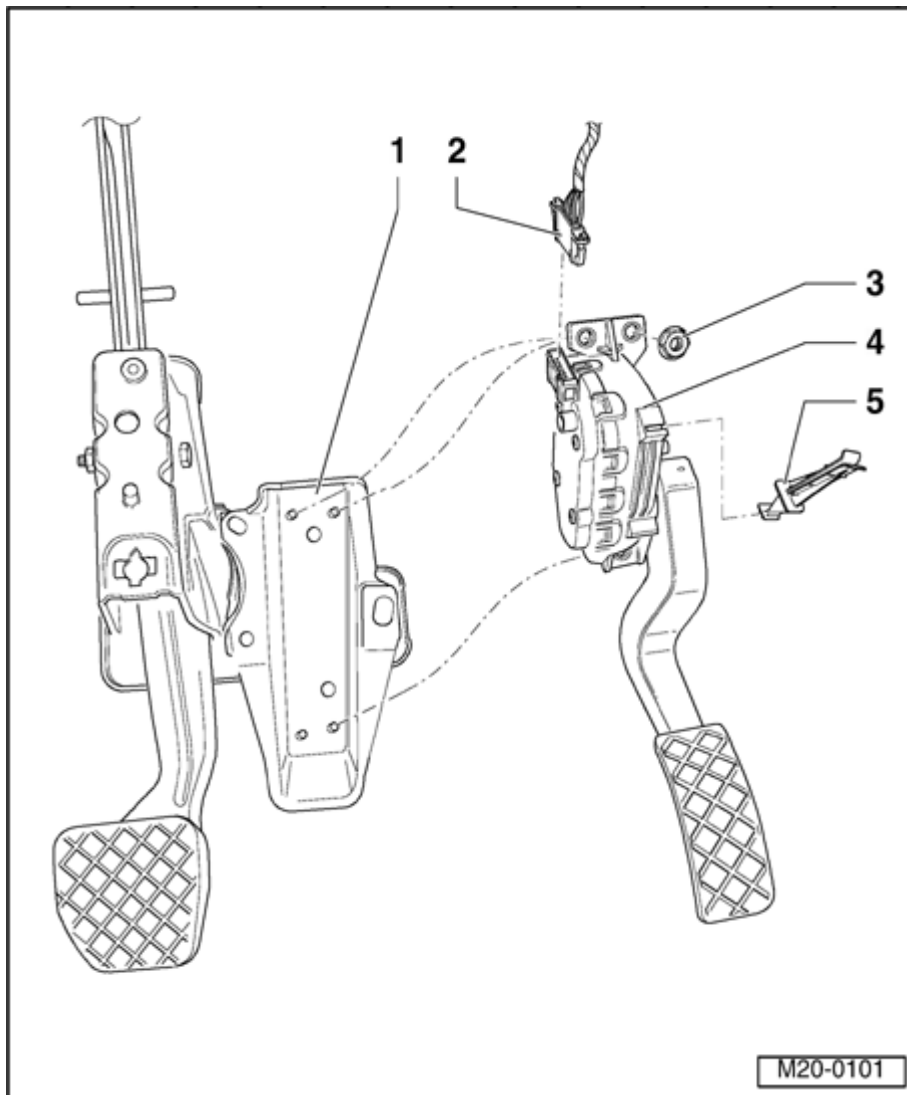
When the engine is not running and the ignition is switched on the engine control module moves the throttle valve exactly as prescribed by the accelerator pedal position sender. This means that when the accelerator is depressed halfway the throttle valve positioner opens the throttle valve by the same amount, the throttle is then approximately half open.

When the engine is running (under load) the engine control module can open or close the throttle valve independently of the accelerator pedal position sender.

This means that the throttle valve can already be completely open even though the accelerator pedal is depressed half way. This has the advantage of preventing throttle losses at the throttle valve.

This also gives vastly improved fuel consumption and exhaust emission levels at certain load conditions.

It is wrong to believe that EPC only consists of two components. It is a system which contains all components needed to help determine, regulate, and supervise the throttle valve position (e.g. the throttle position sensor which measures the accelerator position, the throttle valve control module, the EPC indicator lamp, the engine control module).



Electronic Power Control (EPC), servicing

1 - Mounting bracket

2 - Connector

- ◆ Black, 6-pin
- ◆ Gold plated contacts

3 - 10 Nm

4 - Throttle Position (TP) sensor - G79-

- ◆ Not adjustable
- ◆ TP sensor passes driver's requirements on to engine control module
 - ◆ Remove footwell cover to remove sensor
 - ◆ Checking ⇒ [Page 20-67](#)
 - ◆ If replaced adapt control module for automatic transmission:


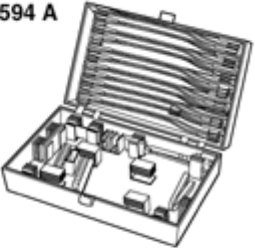

⇒ [Repair](#)

[Manual, 5 Spd. Automatic Transmission 09A On Board Diagnostic \(OBD\); Repair Group 01](#)

5 - Bracket

- ◆ For footwell cover
- ◆ Clipped onto accelerator pedal

20-67

<p>V.A.G 1526 A</p> 	<p>V.A.G 1594 A</p> 
<p>V.A.G 1598/31</p> 	
	<p style="text-align: right;">W20-0033</p>

Throttle Position (TP) sensor -G79- / Sender -2- for accelerator pedal position - G185-, checking

Special tools and equipment

- ◆ VAG 1526 A multimeter, Fluke 83 multimeter or equivalent
- ◆ VAG 1594 A Adapter set
- ◆ VAG 1598/31 Test box
- ◆ V.A.G 1551 Scan Tool or vehicle system tester V.A.G 1552 with cable VAG 1551/3A

Note:

All functions which could previously be performed with V.A.G

*1551/1552
can also be
performed
with the new
tester VAS
5051.*

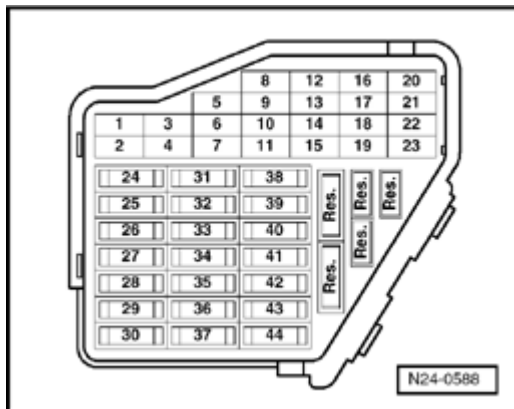
◆ Wiring
diagram

Note:

Only gold plated contacts may be used to service the contacts in the TP sensor / Sender for accelerator pedal position connection.

Function

Both the Throttle Position (TP) sensor -G79- and the Sender -2- for accelerator pedal position -G185- are located on the accelerator pedal and pass the driver's requirements on to the engine control module independently of one another. Both are installed together in a housing.

Test conditions

- Fuses must be OK.
- Battery voltage must be at least 11.5 V.
- All electrical consumers, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on models with an automatic transmission.

Test sequence

- Connect V.A.G 1551 Scan Tool (or V.A.G 1552) and select engine electronics control module with the "Address word" 01. Ignition must be switched on when doing this:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Rapid data transfer
Select function XX

HELP



Indicated on display

- Press keys 0 and 8 for function "Read measured value (data) block" and confirm entry with Q key.

Read measured value block
Input display group number XXX



Indicated on display

- Press keys 0, 6 and 2 for "Display group number 62" and confirm entry with Q key.

Read measured value block 62 →

1 2 3 4



Indicated on display: (1...4 = display zones)

- Check specifications of TP sensor -G79- at idling speed limit stop in display zone 3.
Specification: 12...17%
- Check specifications of Sender -2- for accelerator pedal position -G185- at idling speed limit stop in display zone 4
Specification: 4...10%

Note:

The engine control module calculates the angle sender voltage value as a percent of 5 Volts and displays this percentage. (5 volt supply voltage equals 100%).

- Depress accelerator pedal slowly until fully depressed and observe percentage figures in display zones 3 and 4:

Percentage display in display zone 3 must increase evenly. Tolerance range 12...97% is not fully exploited.

Percentage display in display zone 4 must increase evenly. Tolerance range 4...49% is not fully exploited.

Note:

The figure displayed in display zone 3 must always be approximately double the value displayed in display zone 4.

- Press → key.
- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.

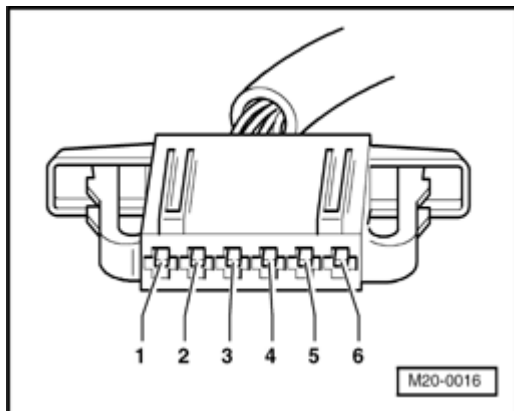
20-71

If the displays do not indicate as described:

- Check Throttle Position (TP) sensor -G79 Sender -2- for accelerator pedal position voltage supply and wiring connections ⇒ [20-71](#) .

Checking voltage supply and wiring to control module

- Remove cover in footwell (driver's side).
- Pull 6-pin connector from TP sensor / Ser accelerator pedal position.
- Switch ignition on.



4

- Connect multimeter to following connectio measure voltage using adapter cables frc 1594.

Contact 1 and Ground

Contact 1 and 5

Contact 2 and Ground

Contact 2 and 3

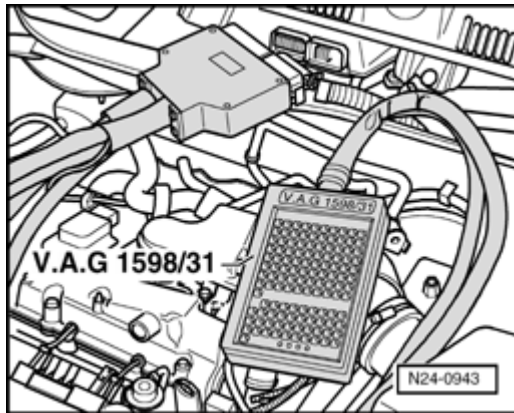
Specification: at least 4.5 V

- Switch ignition off.

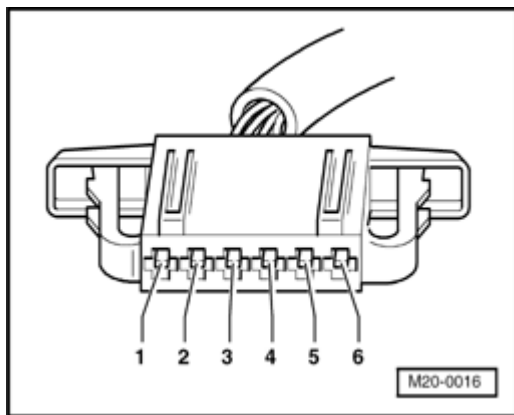
If the specifications are not attained:

- Remove wiper arms and cowl panel:
⇒ [Repair Manual, Electrical Equipment, Re Group 92](#)

20-72



- Connect test box VAG 1598/31 to control module wiring harness. Engine control module remains disconnected.



- Check wiring for open circuit between test box and connector referring to wiring diagram.

Contact 1 and socket 72

Contact 2 and socket 73

Contact 3 and socket 36

Contact 4 and socket 35

Contact 5 and socket 33

Contact 6 and socket 34

Wire resistance: max. 1.5 Ω

- Additionally check wiring for short to battery positive or Ground.
- Additionally check wires for short to one another.

If no wiring malfunction is detected:

- Replace TP sensor / Sender for accelerator pedal position ⇒ [Page 20-66](#) , item - 4 -.
- Check Diagnostic Trouble Code (DTC) memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

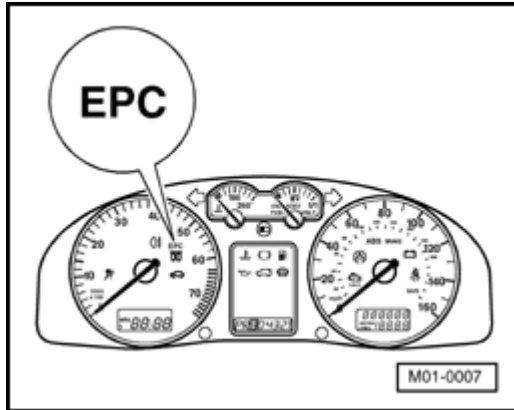
- Generate readiness code again if DTC memory has been erased or engine control module disconnected from permanent positive supply:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Models with an automatic transmission

- Adapt (match) transmission control module:

⇒ [Repair Manual, 5 Spd. Automatic Transmission 09A On Board Diagnostic \(OBD\); Repair Group 01; Basic setting](#)



Significance of Electronic Power Control (EPC) warning lamp



Location of EPC warning lamp

When the ignition is switched on the engine control module checks all components which are important for the correct functioning of the electronic power control.

If malfunctions are detected in the electronic power control system when the engine is running the engine control module will switch on the EPC lamp. These malfunctions are identified accordingly in the Diagnostic Trouble Code (DTC) table. Simultaneously an entry is made in the engine control module DTC memory.

- Check function of EPC warning lamp:

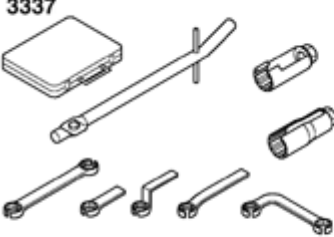


⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Exhaust system components, servicing

Note:

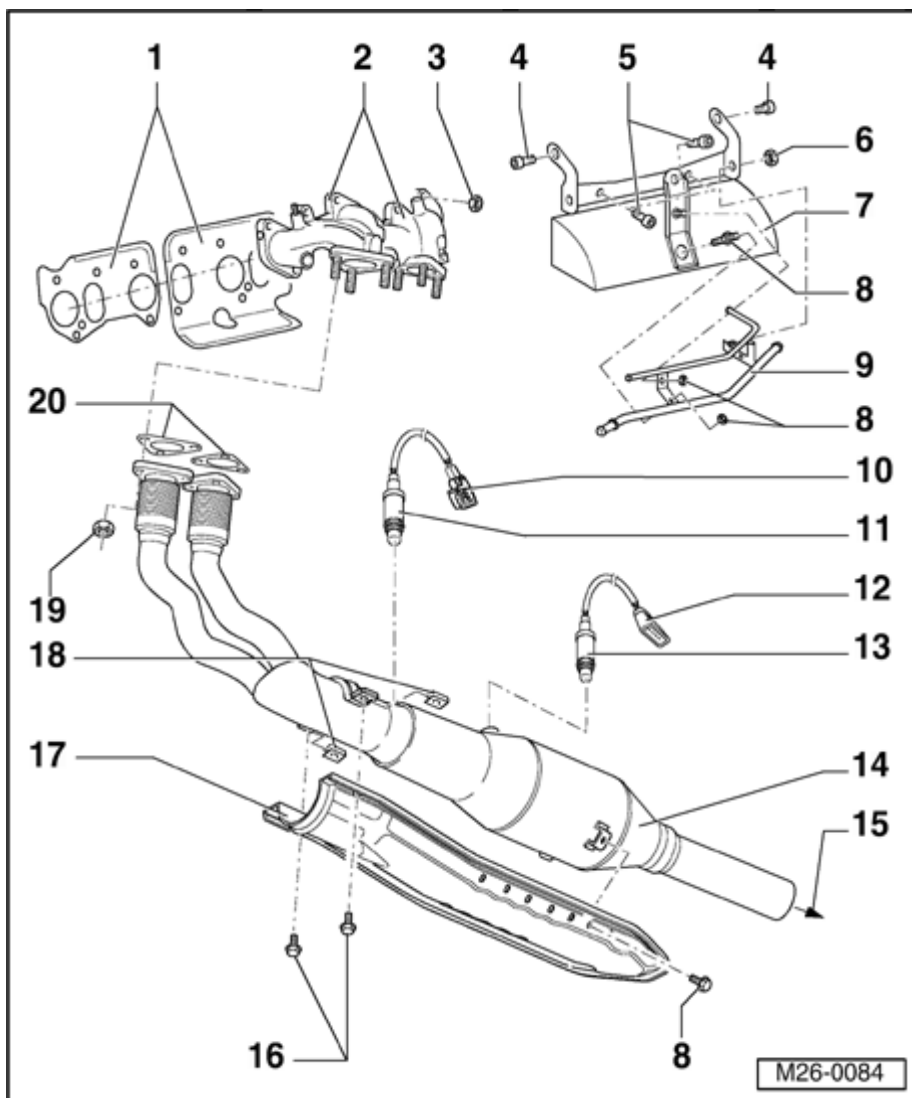
- ◆ *After working on the exhaust system make sure that the system is not under stress, and that it has sufficient clearance to the bodywork. If necessary, loosen double clamp(s) and align muffler and exhaust pipe so that sufficient clearance is maintained to the bodywork and the support elements/mountings are evenly loaded.*

- ◆ *Replace self-locking nuts.*

<p>3337</p> 	<p>V.A.G 1331</p> 
<p>V.A.G 1332</p> 	
	<p>W26-0019</p>

Special tools and equipment

- ◆ 3337
Oxygen sensor ring spanner
- ◆ VAG 1331
Torque wrench (5...50 Nm)
- ◆ VAG 1332
Torque wrench (40...200 Nm)



Exhaust manifold, front exhaust pipe and catalytic converter with attachments

Note:

- ◆ Replace self-locking nuts.
- ◆ Components marked with an * are checked by On Board Diagnostic (OBD):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

1 - Gasket

- ◆ Replace
- ◆ 2-part
- ◆ Observe installation position

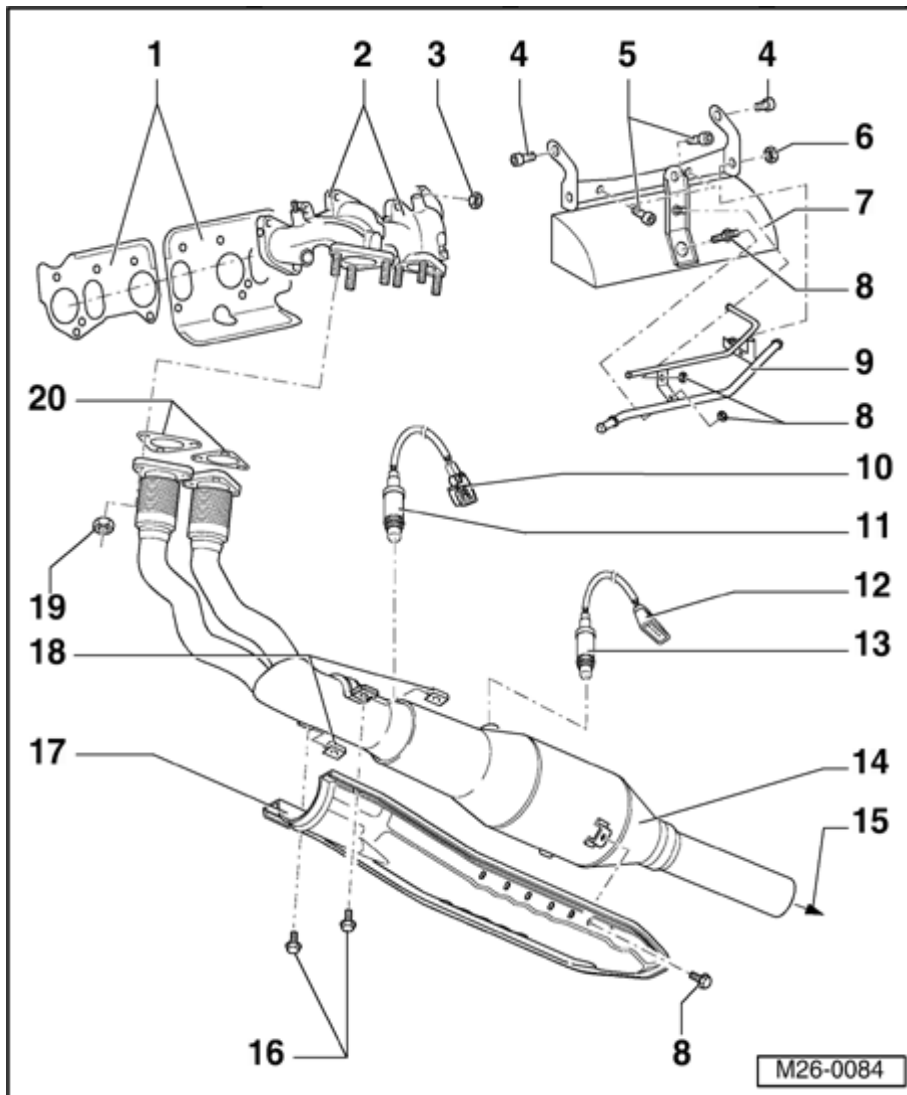
2 - Exhaust manifold

- ◆ 2-part

3 - 25 Nm

- ◆ Replace

4 - 23 Nm



5 - 13 Nm

6 - 25 Nm

7 - Heat shield

8 - 10 Nm

9 - Coolant pipe

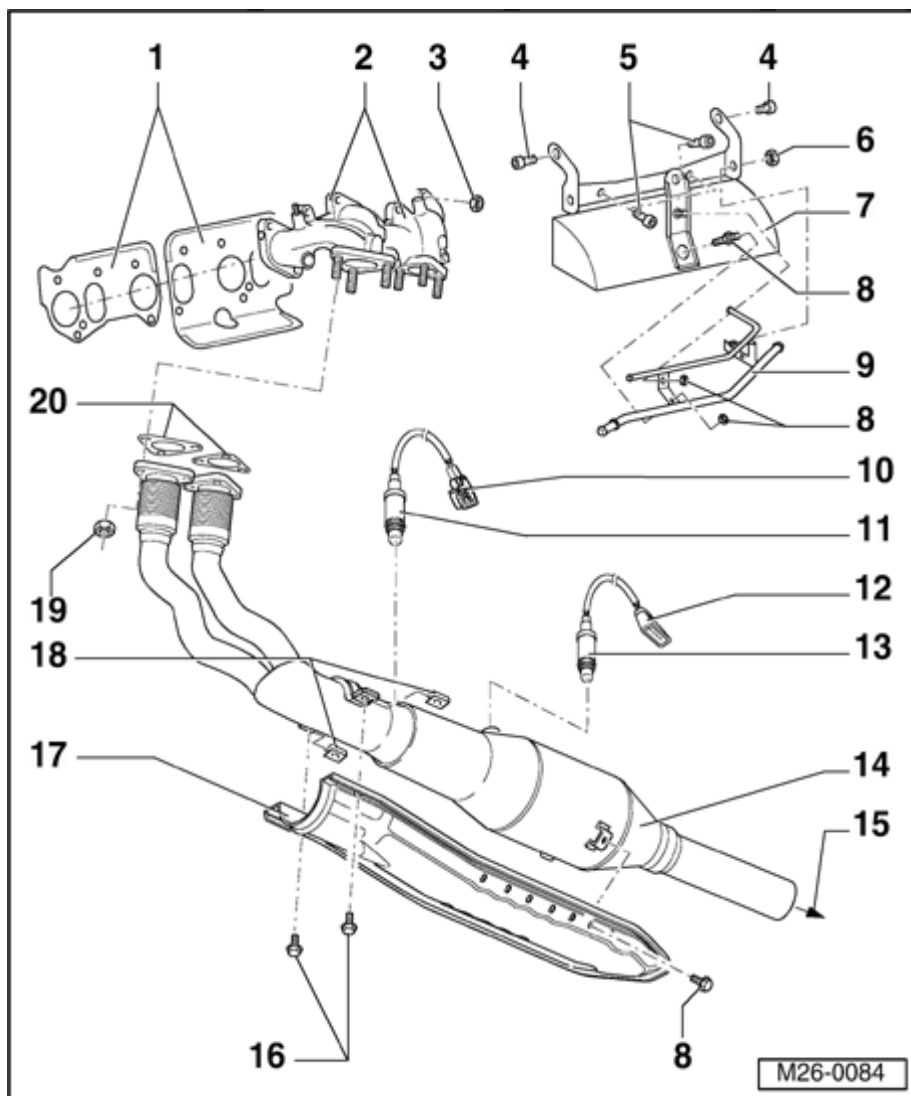
◆ Secured to exhaust gas manifold together with heat shield

◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

10 - Connector

◆ Black, 6-pin

◆ Gold plated contacts



11 - Heated Oxygen Sensor (HO2S) - G39-*, 50 Nm

- ◆ Remove and install with oxygen sensor ring spanner 3337
- ◆ Grease only threads with G 052 112 A3 hot bolt paste (anti-seize compound). Grease must not get into slots on sensor body
- ◆ If seal is leaking cut open and replace.
- ◆ Checking oxygen sensor control:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group](#)

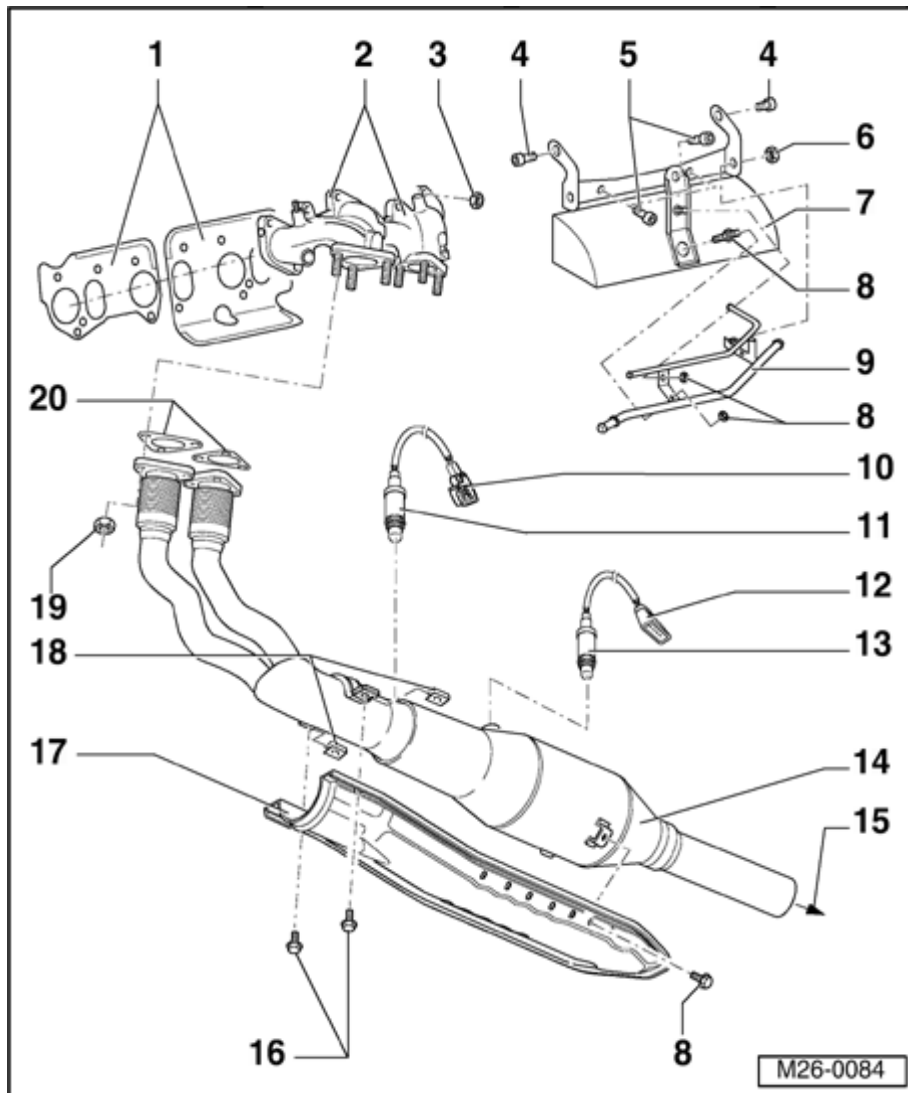
24

12 - Connector

- ◆ Black, 4-pin
- ◆ Contacts 3 and 4 are gold plated

CAUTION!

Part numbers are for reference only. Always check with your Parts Dept. for the latest parts information.



13 Oxygen - Sensor (O2S) Behind Three Way Catalytic Converter (TWC) - G130-*, 50 Nm

- ◆ Remove and install with oxygen sensor ring spanner 3337
- ◆ Grease only threads with G 052 112 A3 hot bolt paste (anti-seize compound). Grease must not get into slots on sensor body
 - ◆ If seal is leaking cut open and replace
 - ◆ Checking oxygen sensor control:

⇒ [Repair Manual, 2.8](#)

[Liter VR6 4V](#)
[Fuel Injection &](#)
[Ignition, Engine](#)
[Code\(s\): BDF,](#)
[Repair Group](#)
[24](#)

**14 - Front
exhaust
pipe with
catalytic
converter**

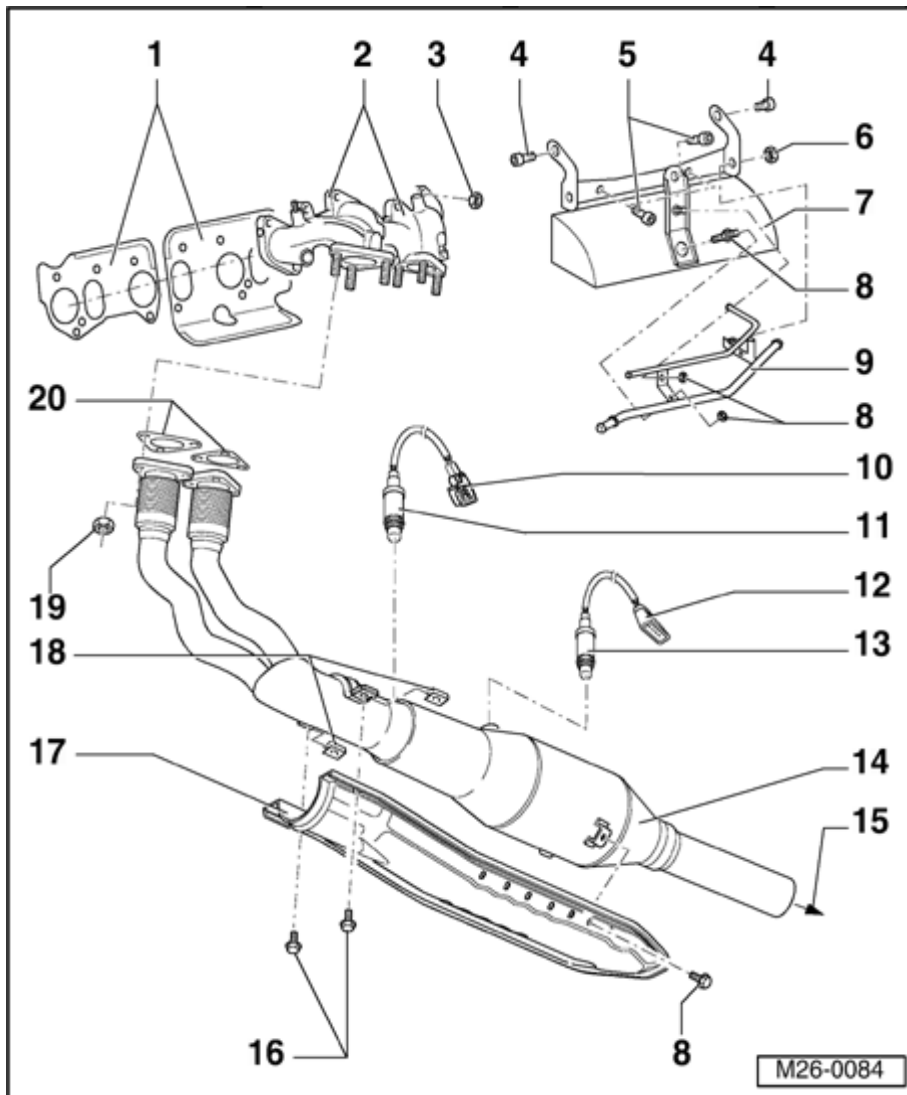
- ◆ Checking catalytic converter
⇒ [Page 26-16](#)

**15 - To
forward
muffler**

- ◆ ⇒ [Page 26-8](#),
item 1

CAUTION!

Part numbers are for reference only. Always check with your Parts Dept. for the latest parts information.



16 - 5 Nm

17 - Heat shield

◆ For catalytic converter

18 Securing - clamp

◆ Replace

◆ Slide onto retainer from rear before tightening clamp

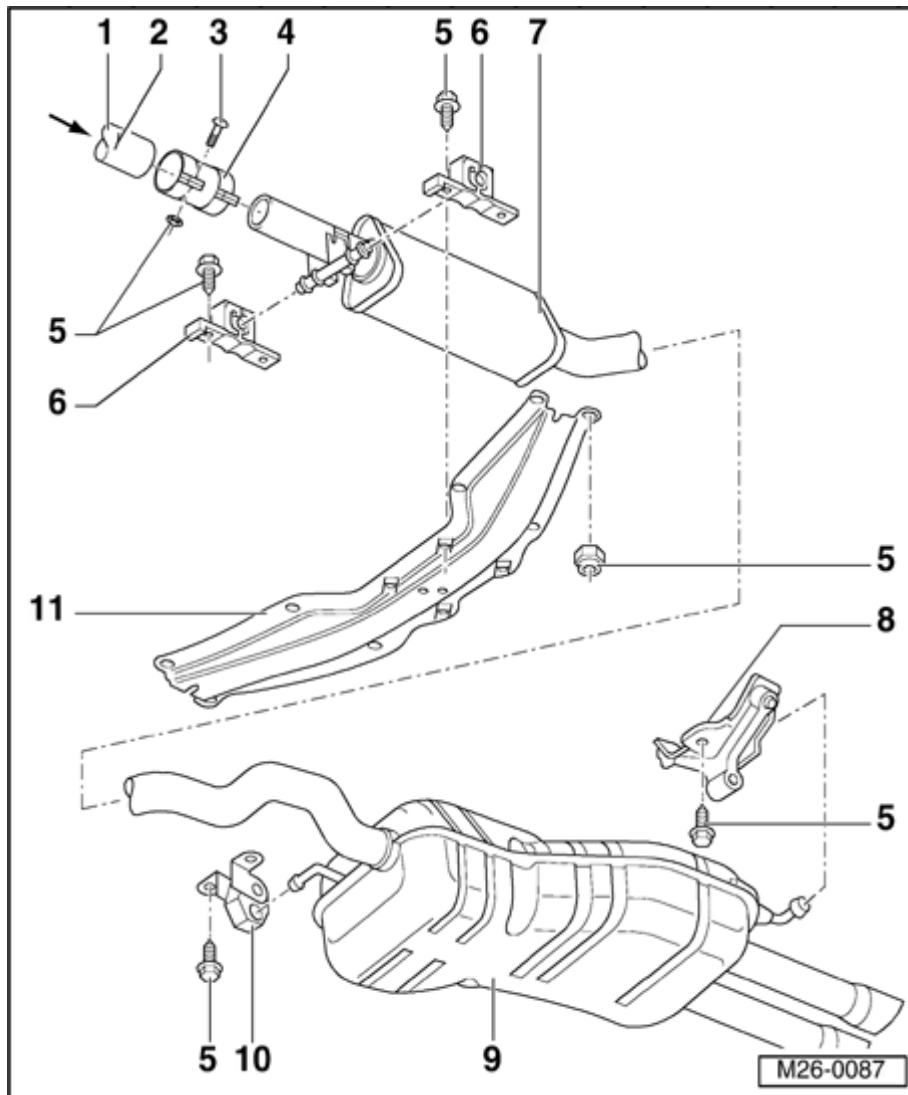
19 - 40 Nm

◆ Replace

20 - Gasket

◆ Replace

◆ 2-part



Muffler with mountings

1 - From catalyt converter

2 - Marking

3 - Flat round head bolt

4 - Double clam

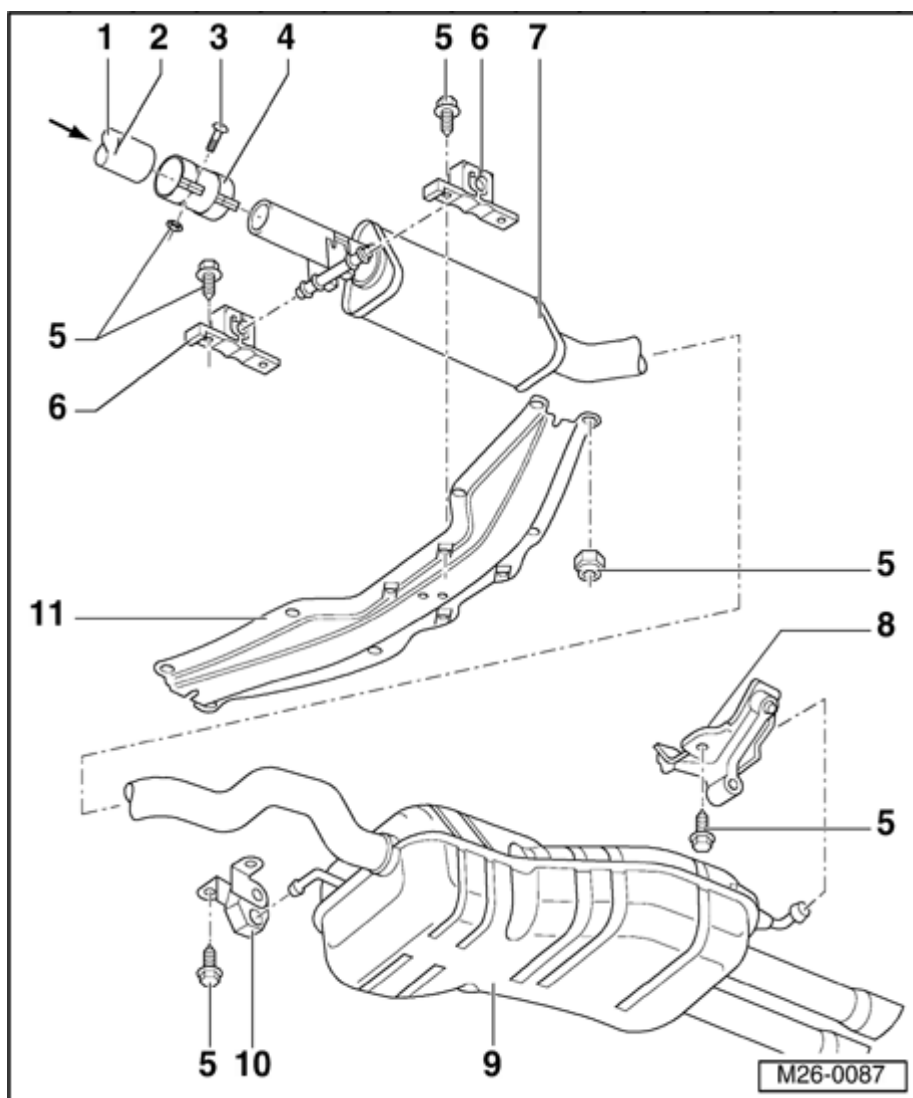
◆ Replace

◆ Observe installation position ⇒ [Fig. 1](#)

5 - M8: 25 Nm, M10: 40 Nm

6 Support - element/mounti

◆ Observe installation position ⇒ [Fig. 3](#)



7 - Forward muffler

- ◆ As standard forward muffler and rear muffler are installed as a single component. In repair cases forward muffler and rear muffler are supplied individually with a double clamp for connecting together.
- ◆ Aligning forward muffler parallel ⇒ [Fig. 2](#)
- ◆ Separating points ⇒ [Fig. 4](#)
- ◆ Aligning exhaust system ⇒ [Page 26-14](#)

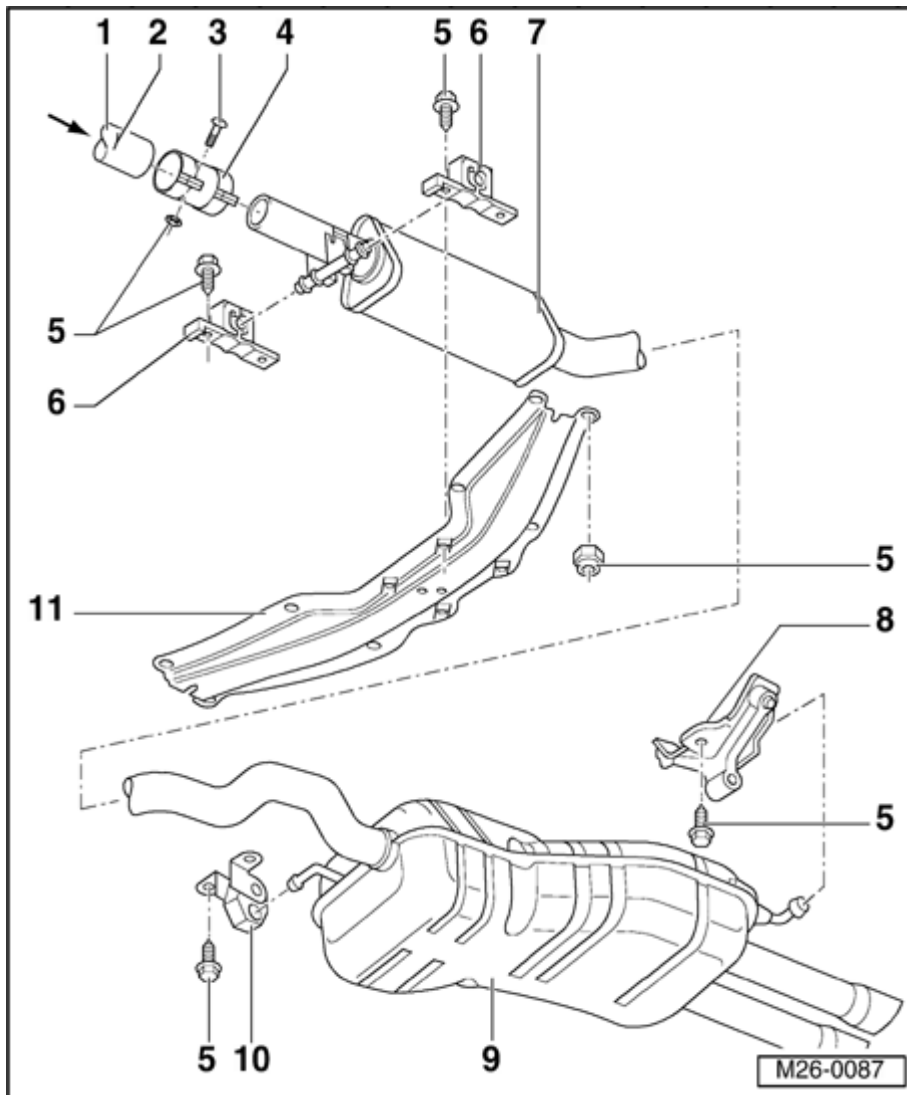
8 Support element/mounting

9 - Rear muffler

- ◆ As standard forward muffler and rear muffler are installed as a single component. In repair cases forward

muffler and rear muffler are supplied individually with a double clamp for connecting together.

- ◆ Separating points ⇒ [Fig. 4](#)
- ◆ Observe installation position of end pipe ⇒ [Fig. 5](#)



**10 Support
- element/mount**

11 - Tunnel bridg

◆ With hole to align exhaust system

◆ Aligning exhaust system ⇒ [Page 26-14](#)

26-11

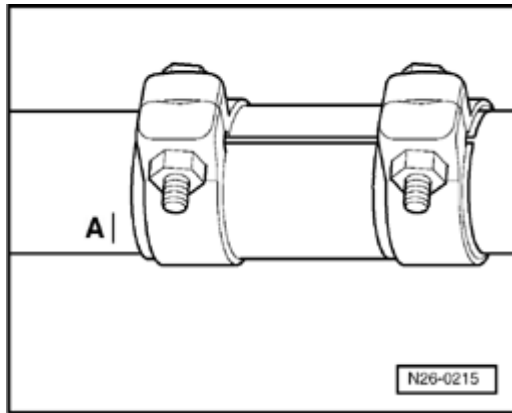


Fig. 1 Installation position of double clamp

- Position new double clamp, as illustrated, approx. 5 mm from markings -A- and tighten.

Tightening torque: 40 Nm

Note:

Mark -A- is valid for models with a manual or an automatic transmission.

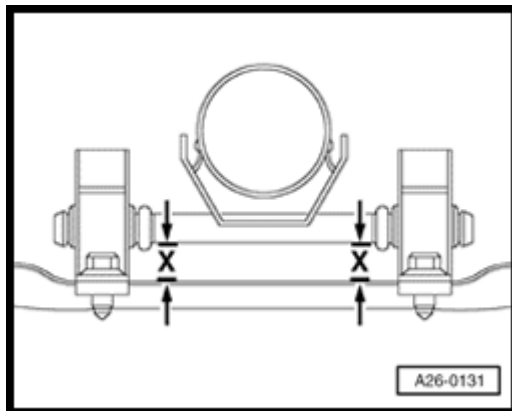
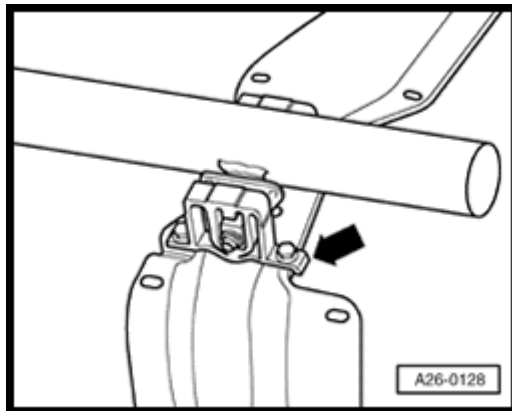


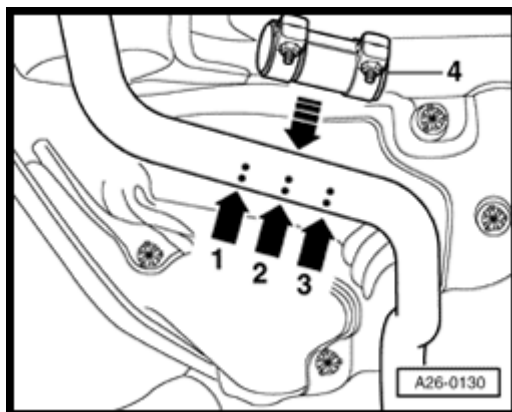
Fig. 2 Aligning forward muffler parallel

Mounting pins on exhaust pipe must run parallel with tunnel bridge (dimension -x- on left and right the same).



✦ **Fig. 3 Installation position of mounting**

Angled side on base of mounting (arrow) points forward.



✦ **Fig. 4 Separating point on exhaust pipe**

Special tools and equipment

- ◆ Body saw e.g. VAG 1523
- Separate exhaust pipe at right angles at separating point (arrow -2-).
- Align repair double clamp -4- in installation position on side markings (arrows -1- and -3-) as illustrated.

Tightening torque: 40 Nm

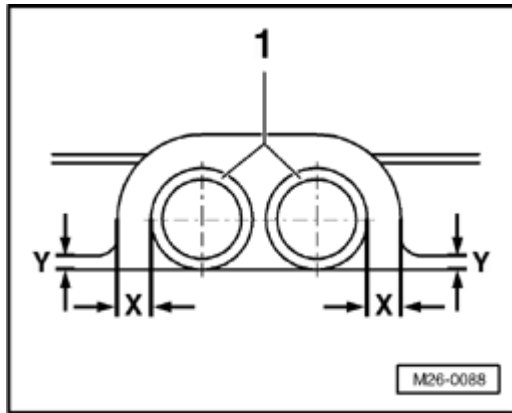


Fig. 5 Installation position of rear muffler end pipes

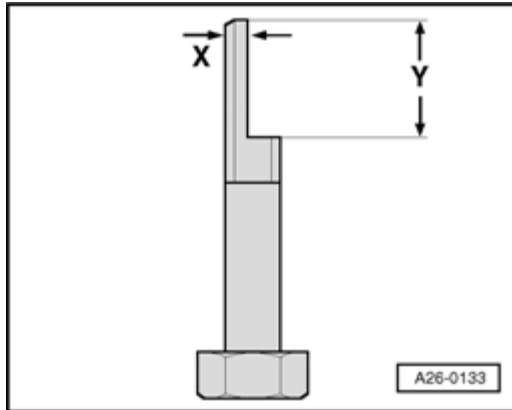
Work sequence

- Align rear muffler so that dimension to body -x- and -y- for end pipes -1- are equal on left and right-hand sides.

Exhaust system, aligning

Special tools and equipment

- ◆ M10x80 hex bolt



- Locally manufacture an alignment tool from an M10x80 hex bolt, to dimensions given.

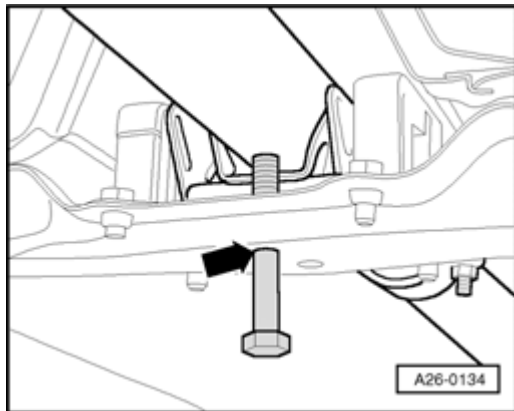
- ◆ Dimension $x = 4 \text{ mm}$
- ◆ Dimension $Y = 25 \text{ mm}$

Work sequence

Note:

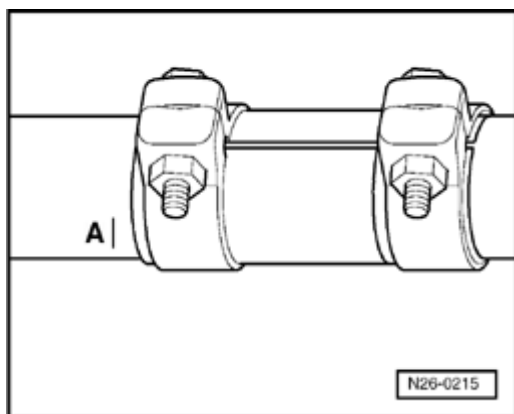
- ◆ *An assistant is required to help in aligning the exhaust system.*
- ◆ *Align the exhaust system when it is cold.*
- ◆ *Pre-tension the exhaust system forward with the locally manufactured tool.*
- Loosen bolts on double clamps ⇒ [Page 26-8](#) , item - 4 - .

26-15



- Slide exhaust system forward until locally manufactured tool can be inserted through rearmost hole in tunnel bridge (arrow).

Flattened side of locally manufactured tool faces toward exhaust system hanger pins.



- Position new double clamp, as illustrated, approx. 5 mm distance from markings -A- and tighten.

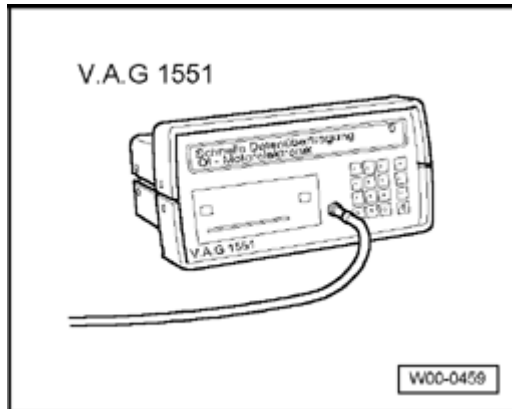
Torque setting 40 Nm

Note:

Mark -A- is valid for models with either a manual or an automatic transmission.

Catalytic converter, checking

Special tools and equipment

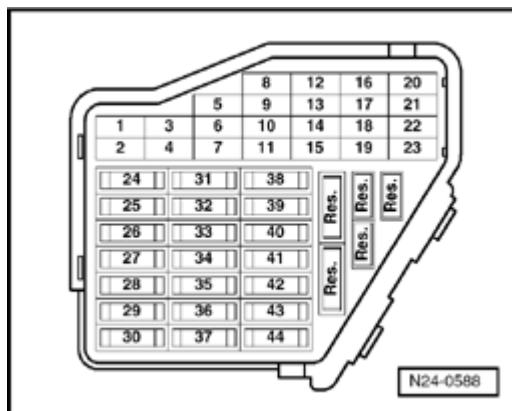


- ◆ V.A.G 1551 Scan Tool (or vehicle system tester V.A.G 1552) with cable VAG 1551/3

Note:

All functions which could previously be performed with V.A.G 1551/1552 can also be performed with the tester VAS 5051.

Conditions



- Fuses must be OK.
- Battery voltage must be at least 11.5 V.
- If vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on models with an automatic transmission.
- Exhaust system between catalytic converter and cylinder head must be free of leaks

- Coolant temperature must be at least 85 °C, ⇒display group 1, display zone 2.
- Catalytic converter temperature must be at least 380 °C, ⇒display group 46, display zone 2.
- No DTCs may be stored in DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Oxygen sensor aging before catalytic converter is OK, checking:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

- Oxygen sensor aging after catalytic converter is OK, checking:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 24](#)

Note:

The diagnosis will only be ended if the oxygen sensor aging diagnosis before and after catalytic converter is completed successfully first.

Test sequence

- Connect V.A.G 1551 (or V.A.G 1552). Start engine and select "Address word" 01 of engine control module.

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Rapid data transfer
Select function XX

HELP



Indicated on display

- Press keys 0 and 4 for function "Initiate basic setting" and confirm entry with Q key.

Basic setting

Input display group number XXX



Indicated on display

- Press keys 0, 0 and 1 for "Display group number 1" and confirm entry with Q key.

System in basic setting 1



Indicated on display: (1...4 = display zones)

1 2 3 4

Only continue with the test when:

- Coolant temperature is above 85 °C -Display zone 2-

Basic setting

Input display group number XXX

- Change to display group 46 as follows:

- Press C key.



Indicated on display

- Press keys 0, 4 and 6 for "Display group number 46" and confirm entry with Q key.

System in basic setting 46



1 2 3 4



Indicated on display: (1...4 = display zones)

- Depress brake pedal and hold.

- Depress accelerator down to wide open throttle position.

Engine speed will be increased by engine control module to approx. 2300 rpm.

Only continue with the test when:

- Catalytic converter temperature is above 380 °C -Display zone 2-
- Hold brake pedal and accelerator down until display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

This process can take approx. 80 seconds.

- Continue to hold brake pedal and accelerator down until display zone 4 displays specification "Cat. B1 OK.".

- Release brake and accelerator pedals.

"Cat B1 OK." appears in display zone 4:

- Press → key.
- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.

"CatB1 n.OK." appears in display zone 4:

- Press → key.
- Check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- Generate readiness code again if DTC memory has been erased or engine control module disconnected from permanent positive supply:

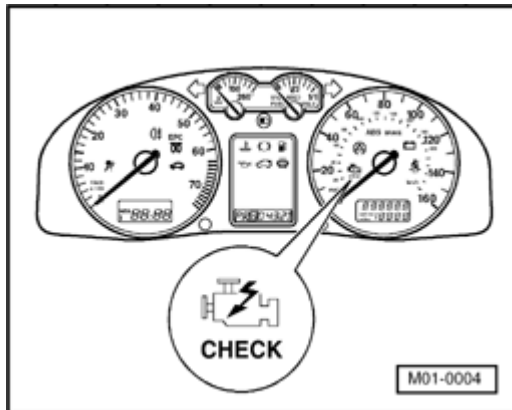
⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

If no DTC is stored in DTC memory:

- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.
- Replace front exhaust pipe with catalytic converter ⇒ [Page 26-6](#) , item - 14 -.

Significance of Malfunction Indicator Lamp (MIL) for exhaust emissions

If the engine control module detects a malfunction it switches on the Malfunction Indicator Lamp (MIL).



Location MIL

Note:

The MIL can switch on in the continuous or flashing mode. Check the DTC memory in every case:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

- ◆ *Flashing mode: There is a malfunction present which can damage the catalytic converter when continuing to drive at this power output. If this occurs, continue driving only at reduced output.*
- ◆ *Continuous mode: There is a malfunction present which causes the emissions to deteriorate. Check the Motronic engine control module and/or transmission control module.*
- ◆ *Check the DTC memory if the customer has a complaint or if there is a driving characteristic problem and the MIL does not light up. This is because malfunctions can be stored which will not switch on the MIL immediately.*

- Check function of Malfunction Indicator Lamp (MIL):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\): BDF, Repair Group 01](#)

Secondary air system

CAUTION!

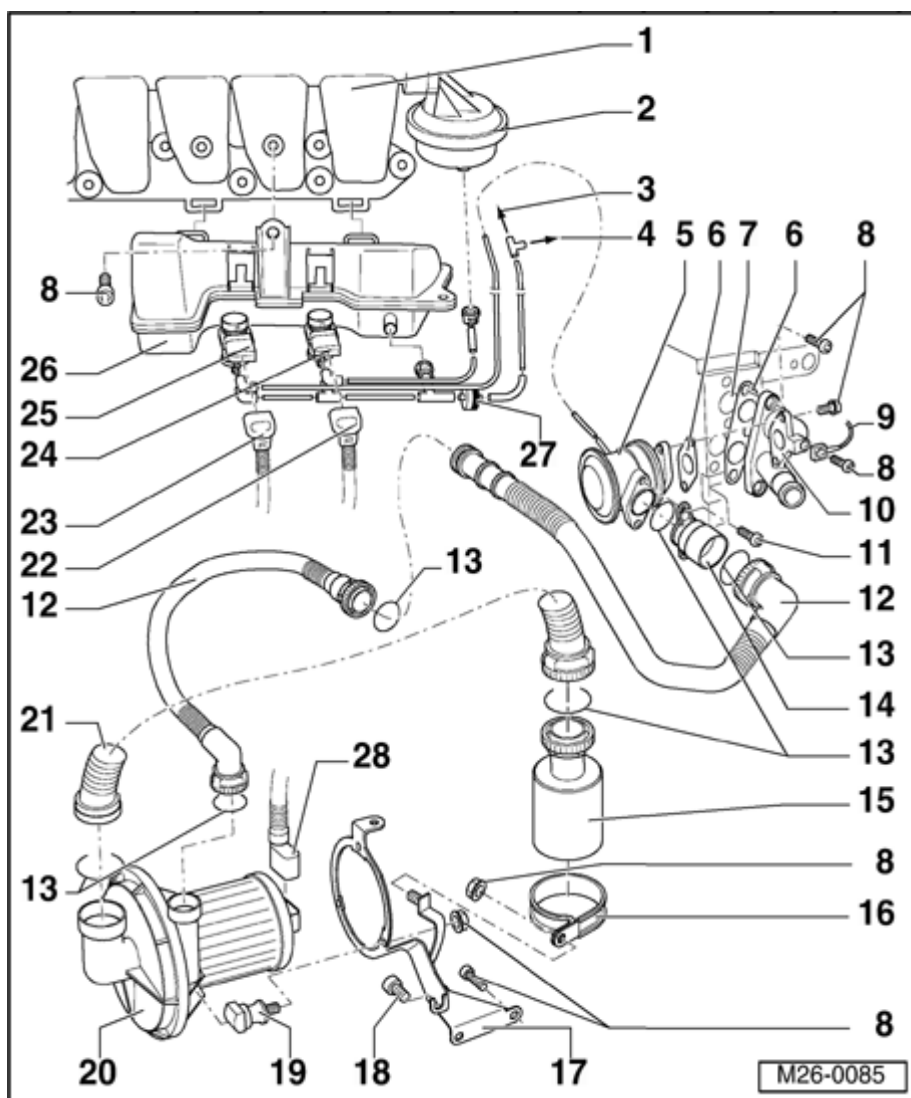
When performing repair work, especially due to the confined conditions in the engine compartment, pay attention to the following:

- ◆ ***Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.***
- ◆ ***Ensure sufficient clearance to all moving or hot components.***

Function

During cold starting the secondary air system blows air in behind the exhaust valves. This produces an oxygen rich exhaust gas, causes afterburning and reduces the heating-up phase of the catalytic converter. Activation is performed by the Motronic Engine Control Module -J220- via the Secondary Air Injection (AIR) pump relay -J299- to the combi-valve.

Checking secondary air system ⇒ [Page 26-31](#) .



Components of the secondary air system, removing and installing

Note:

◆ Components marked with an * are checked by On Board Diagnostic (OBD):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

◆ Components marked with ** are checked by output Diagnostic Test Mode (DTM):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

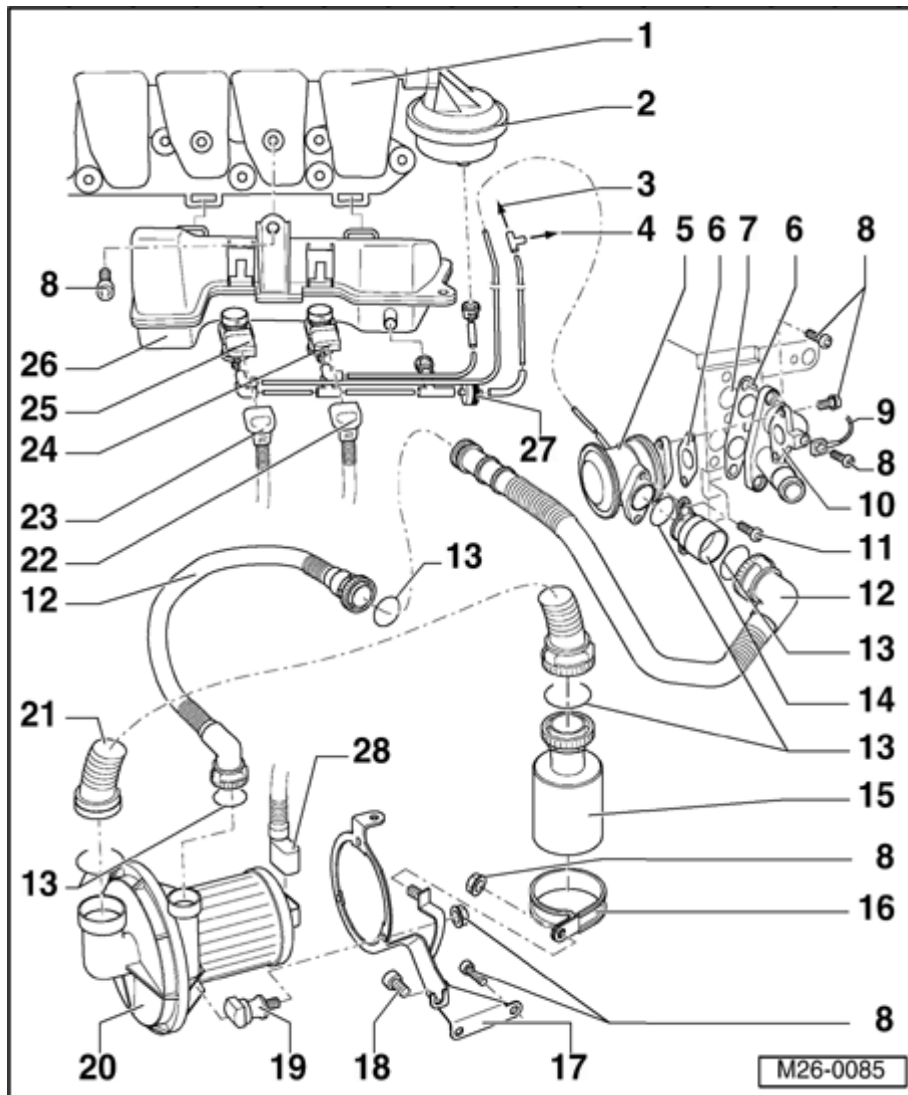
◆ Secondary Air Injection (AIR) pump relay -J299- /*** ⇒ [Fig. 1](#) , Position of relays in protective housing (on left in engine

compartment)

1 - Intake manifold

2 - Vacuum actuator

- ◆ For variable intake manifold change-over



3 - To intake manifold

4 - To fuel pressure regulator

5 - Combi-valve

◆ Checking ⇒ [Page 26-41](#)

6 - Gasket

◆ Replace

7 - Air channel

◆ In cylinder head

8 - 8 Nm

9 Ground - connection

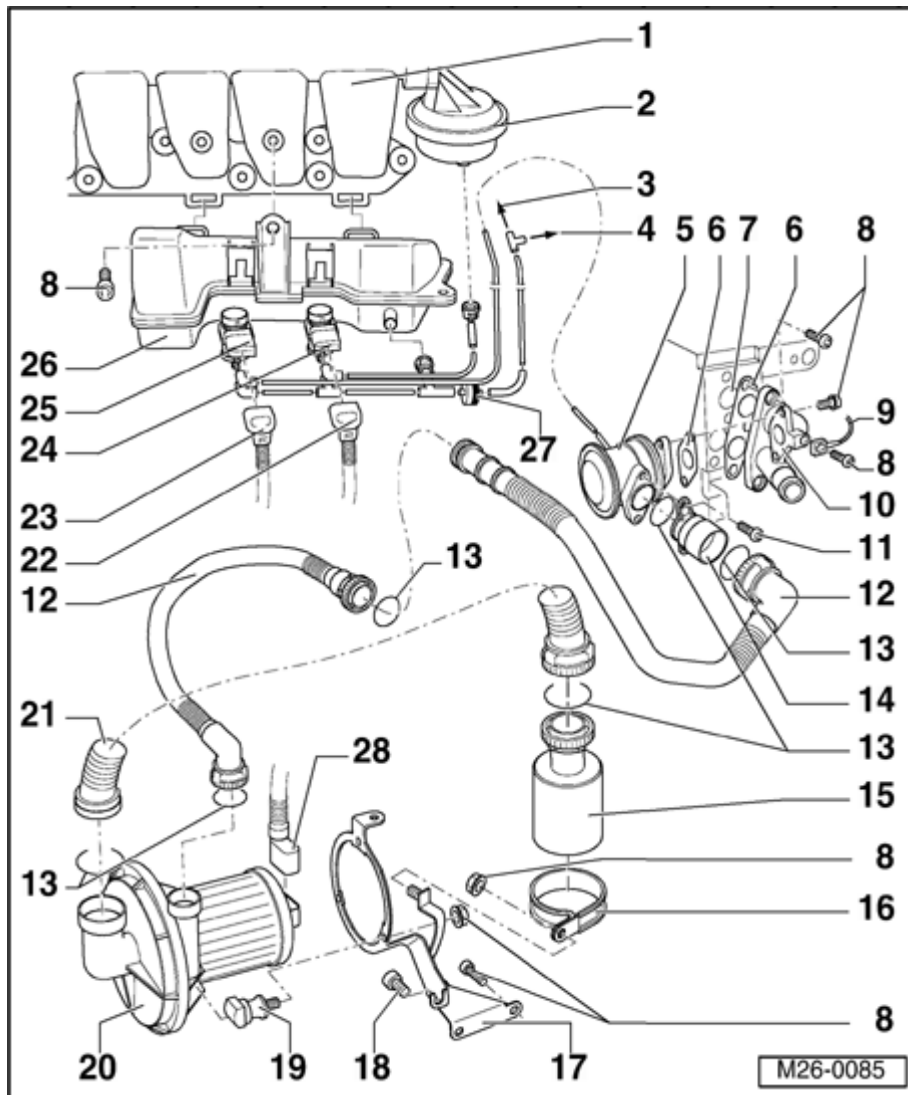
◆ Check for secure seating

10 - Unions

◆ For combi-valve and coolant hose

◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

11 - 5 Nm



12 Pressure - hose

◆ Check seated securely

◆ Press together at front to release

13 - O-ring

◆ Replace if damaged

14 - Union

15 - Air cleaner

◆ Clean if dirty

16 Retaining - clip

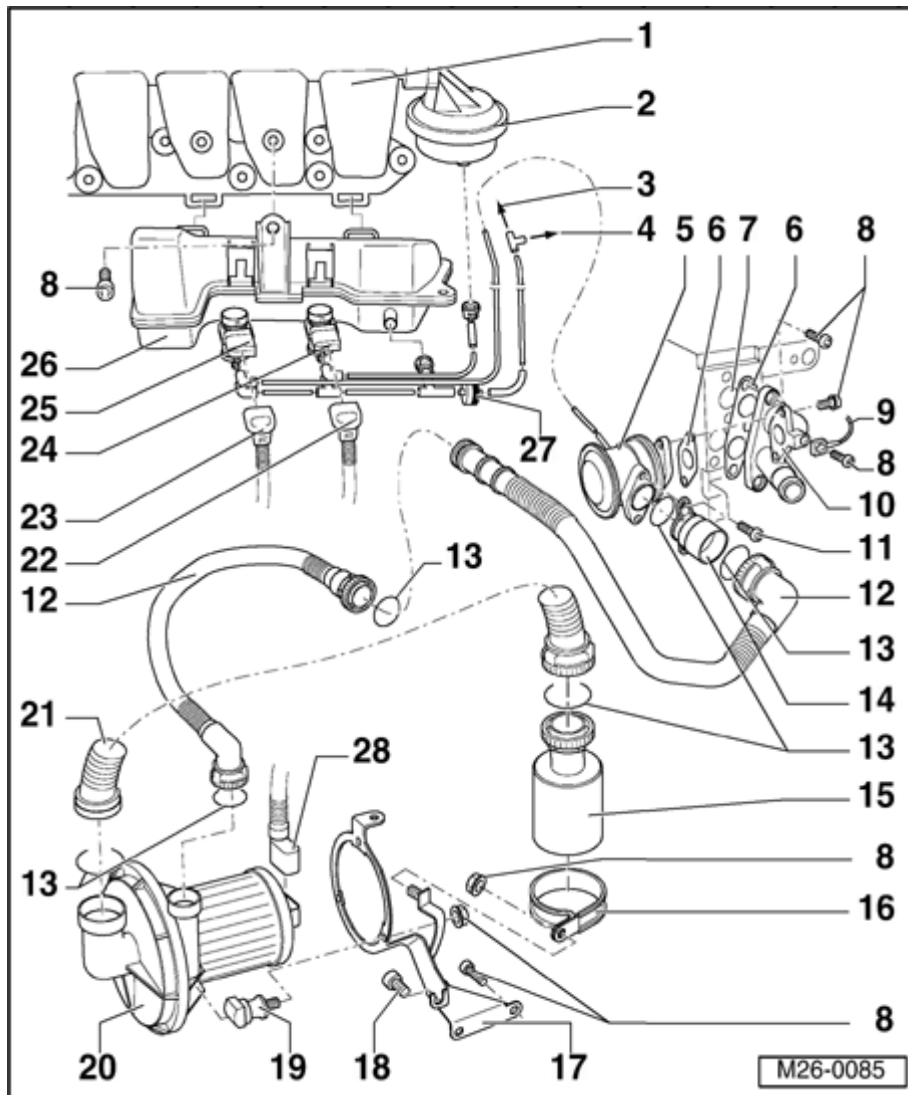
17 - Bracket

◆ For secondary air pump motor

◆ Secured to oil pan and cylinder block

18 - 20 Nm

19 - Rubber bushing



20 Secondary - Air Injection (AIR) pump motor - V101-**

◆ Checking ⇒ [Page 26-38](#)

21 - Intake hose

◆ Check for secure seating

◆ Press together at front to release

22 - Connector

◆ Black, 2-pin

◆ For intake manifold change-over valve

◆ Mark connector and component before pulling connector off.

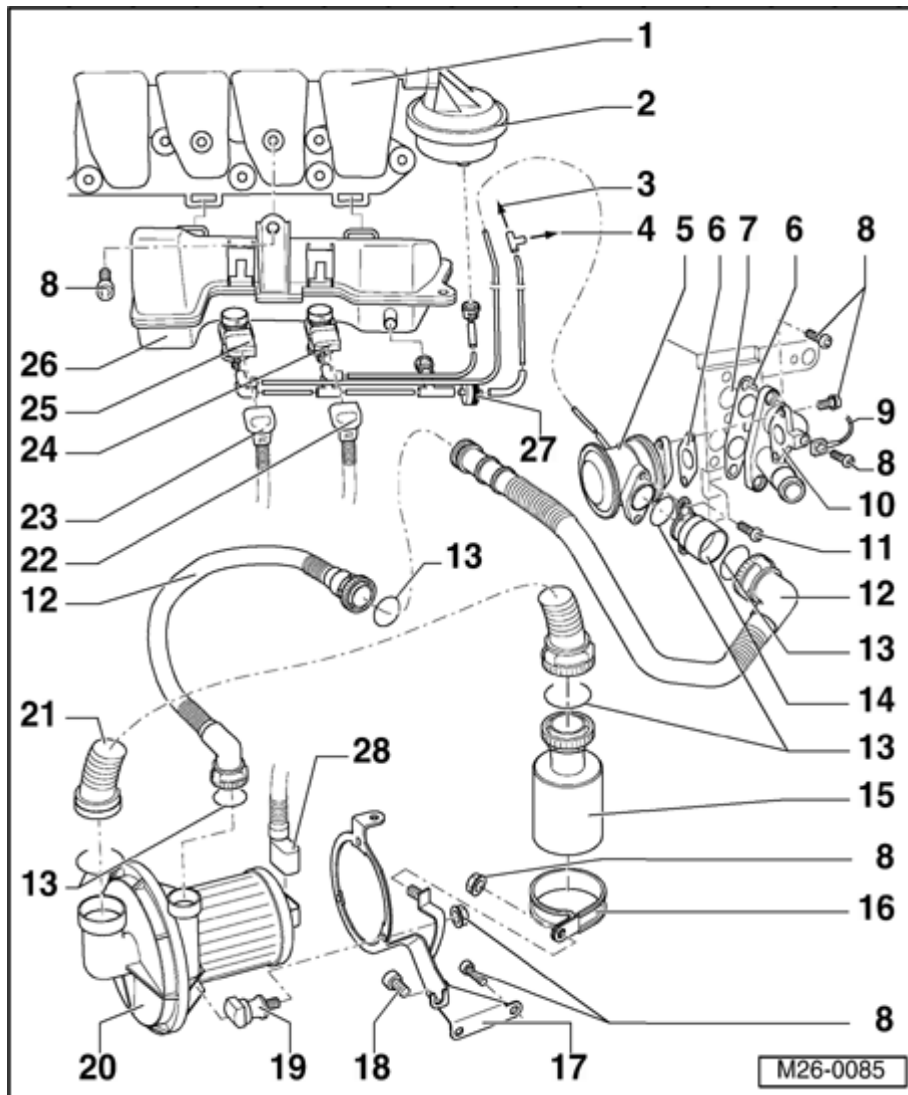
23 - Connector

◆ Black, 2-pin

- ◆ For secondary air solenoid valve
- ◆ Mark connector and component before pulling connector off.

24 - Intake Manifold Change-Over valve - N156-*/**

- ◆ Valve is activated by engine control module (pulsed)



25 Secondary - Air Injection (AIR) solenoid valve - N112-*/**

- ◆ Valve is activated by engine control module (pulsed)

26 - Vacuum reservoir

27 - Non-return valve

- ◆ Observe installation position

- ◆ White connector faces Secondary air injection solenoid valve - N112- /Intake manifold change-over valve -N156-

28 - Connector

- ◆ Black, 2-pin
- ◆ For secondary air injection pump

motor

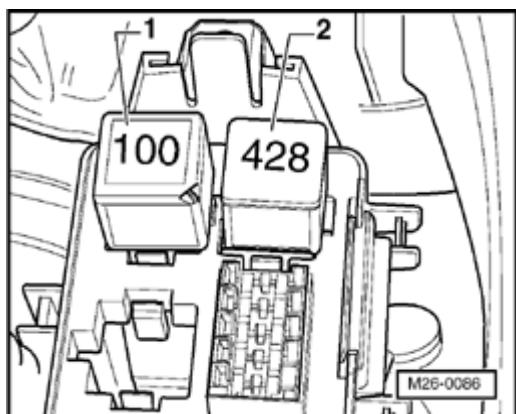


Fig. 1 Position of relays in protective housing (on left in engine compartment)

1 - Secondary Air Injection (AIR) pump relay -J299-*/**

2 - Motronic ECM power supply relay -J271-*

Note:

- ◆ If tools are necessary to pull relays or control modules out of the relay plate, first disconnect the battery Ground strap.
- ◆ Before disconnecting the battery Ground strap obtain the code for radios with anti-theft coding.

Safety precautions

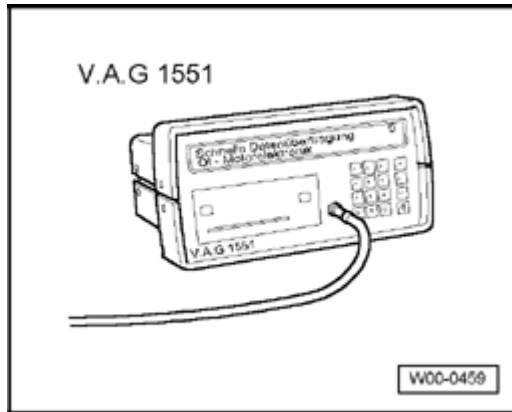
Observe the following if test and measuring instruments are required during a test drive:

- ◆ Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

If test and measuring instruments are operated from the front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

Secondary air system, checking

Special tools and equipment



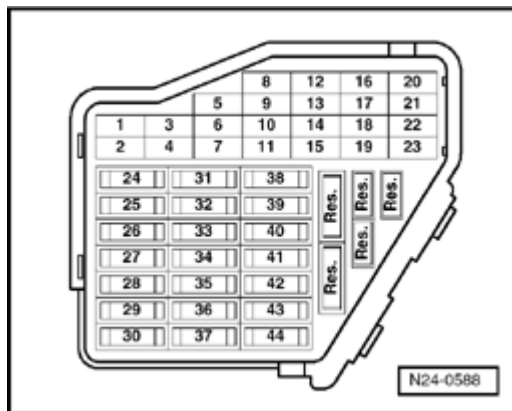
- ◆ V.A.G 1551 Scan Tool (or vehicle system tester V.A.G 1552) with cable V.A.G 1551/3

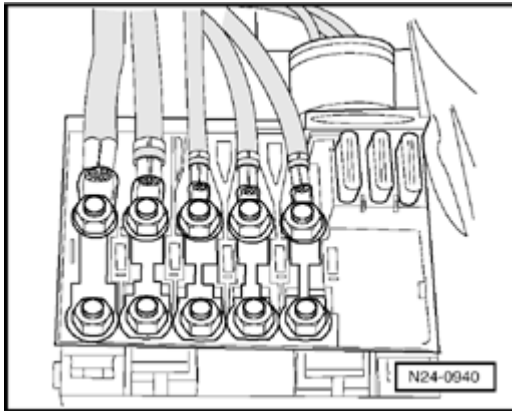
Note:

All functions which could previously be performed with V.A.G 1551/1552 can also be performed with the tester VAS 5051.

Test conditions

- Fuses must be OK.





- Main fuses must be OK.
- Battery voltage must be at least 11.5 V.
- All electrical consumers, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Fuel pump (FP) relay -J17- must be OK, checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- No DTCs may be stored in DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

Checking activation

- Check activation of Secondary air injection solenoid valve -N112- and Secondary air injection pump relay -J299- via On Board Diagnostic (OBD):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

If activation is OK:

- Perform functional check ⇒ [Page 26-33](#) .

Functional check

Test conditions

- Vacuum lines and hose connections free of leaks.
- Vacuum lines not blocked or kinked.
- Selector lever must be in position "P" or "N" on models with an automatic transmission.
- Coolant temperature must be at least 85 °C, ⇒display group 1, display zone 2.
- Oxygen sensor aging before catalytic converter OK, checking:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 24](#)

Note:

The diagnosis will only be ended if the oxygen sensor aging diagnosis before catalytic converter is completed successfully first.

Test sequence

- Test drive vehicle.

Observe the valid safety precautions when road testing ⇒ [Page 26-30](#) .

During the road test the following operating conditions must be fulfilled:

- ◆ The coolant temperature must exceed 85 °C.
- ◆ When the temperature is reached, the operating conditions

Idling

Part throttle

Enrichment

Wide open throttle

Overrun

must be attained several times.

- Then:

- ◆ Continue running engine at idling speed.

- Connect V.A.G 1551 Scan Tool (or V.A.G 1552). Start engine and select "Address word" 01 of engine control module:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press keys 0 and 4 for function "Initiate basic setting" and confirm entry with Q key.

Basic setting
Input display group number XXX



Indicated on display:

- Press keys 0, 0 and 1 for "Display group number 1" and confirm entry with Q key.

System in basic setting 1



Indicated on display: (1...4 = display zones)

1 2 3 4

Only continue with the test when:

- Coolant temperature is above 85 °C -Display zone 2-
- Change to display group 77 as follows:
- Press C key.

Basic setting

Input display group number XXX



Indicated on display

- Press keys 0, 7 and 7 for "Display group number 77" and confirm entry with Q key.

Note:

The engine must not be loaded during this diagnosis, if this occurs the diagnosis will be aborted and will not start again until the engine is revved-up.

System in basic setting 77



1 2 3 4



Indicated on display: (1...4 = display zones)

If the diagnosis is initiated by the engine control module the display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

This process can take approx. 40 seconds.

- Leave engine running at idling speed until display zone 4 displays specification "Syst. OK"..

If "Syst. OK" appears in display zone 4:

- Press → key.

- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.

If "Syst.n.OK." appears in display zone 4:

- Press → key.
- Check DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

- Read readiness code:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

- Generate readiness code again if DTC memory has been erased or engine control module disconnected from permanent positive supply:

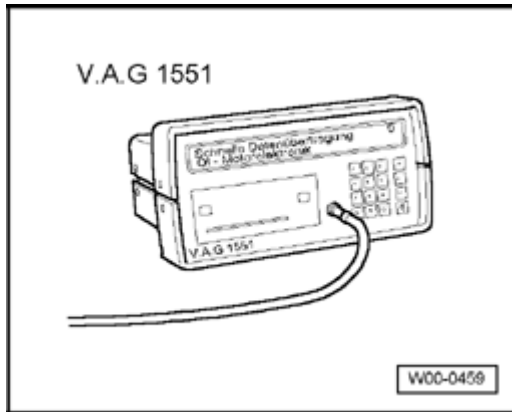
⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

If no DTC is stored in DTC memory:

- Press keys 0 and 6 for function "End output" and confirm entry with Q key.
- Switch ignition off.
- Check combi-valve ⇒ [Page 26-41](#) .

Secondary Air Injection (AIR) pump motor -V101-, checking

Special tools and equipment



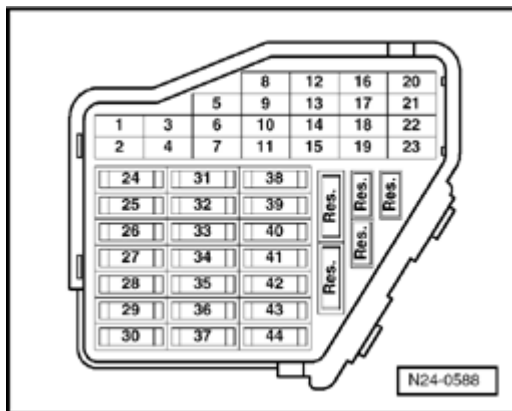
- ◆ V.A.G 1551 Scan Tool (or vehicle system tester V.A.G 1552) with cable V.A.G 1551/3

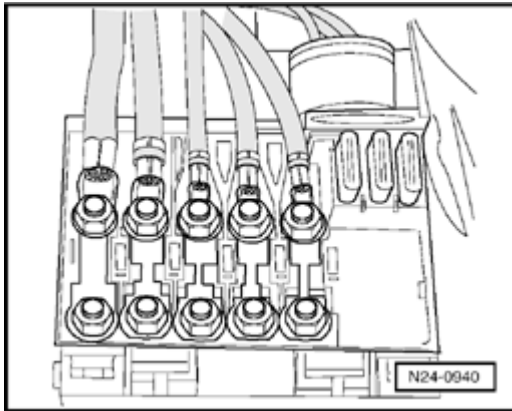
Note:

All functions which could previously be performed with V.A.G 1551/1552 can also be performed with the tester VAS 5051.

Test conditions

- Fuses must be OK.



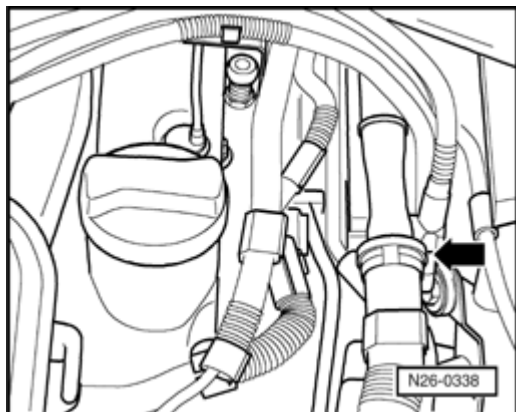


- Main fuses must be OK.
- Battery voltage must be at least 11.5 V.
- All electrical consumers, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on models with an automatic transmission.
- Intake and pressure hoses for secondary air injection pump motor not blocked or kinked
- Fuel Pump (FP) relay -J17- must be OK, checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- No DTCs may be stored in DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)



Test sequence

- Remove engine cover.
- ↳ - Disconnect pressure hose to combi-valve at coupling (arrow).

Note:

To release, press buttons together on hose coupling.

- Activate Secondary Air Injection (AIR) pump relay -J299- via output Diagnostic Test Mode (DTM):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

Secondary air injection pump motor must run at intervals and air must exit at outlet of pressure hose.

If the motor runs, but little or no air exits:

- Press C key to abort output DTM.

Output Diagnostic Test Mode was aborted



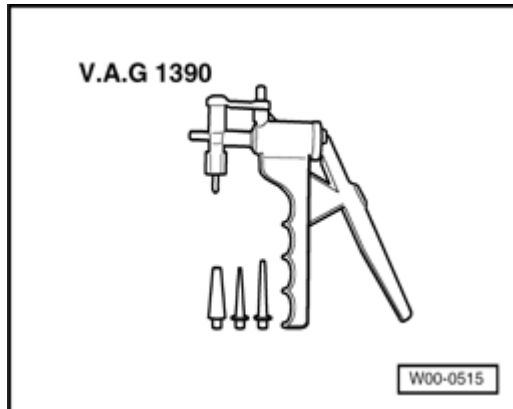
Indicated on display

- Switch ignition off.
- Replace Secondary Air Injection (AIR) pump motor -V101- ⇒ [Page 26-27](#) , item 20 .

If the secondary air injection pump motor does not run at intervals:

- Check activation of Secondary Air Injection (AIR) pump motor - V101-:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)



Combi-valve, checking

Special tools and equipment

- ◆ VAG 1390 Hand vacuum pump

Test conditions

- Vacuum lines and hose connections free of leaks.
- Pressure hose for secondary air injection pump motor not blocked or kinked.
- Vacuum lines not blocked or kinked.
- No DTC stored in DTC memory:

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

- Perform output Diagnostic Test Mode (DTM):

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Injection & Ignition, Engine Code\(s\) BDF, Repair Group 01](#)

Test sequence

Note:

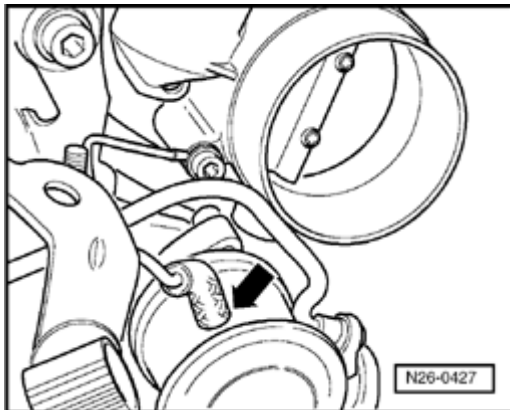
Do not use compressed air during the following check!

- Remove engine cover.

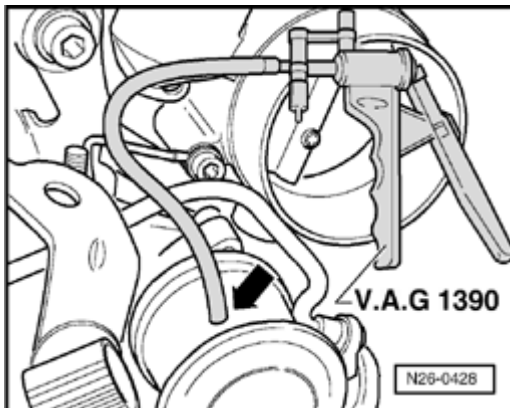
26-42

- Remove intake hose between Mass Air F (MAF) sensor and throttle valve control r

⇒ [Repair Manual, 2.8 Liter VR6 4V Fuel Inj & Ignition, Engine Code\(s\) BDF, Repair Gr 24](#)

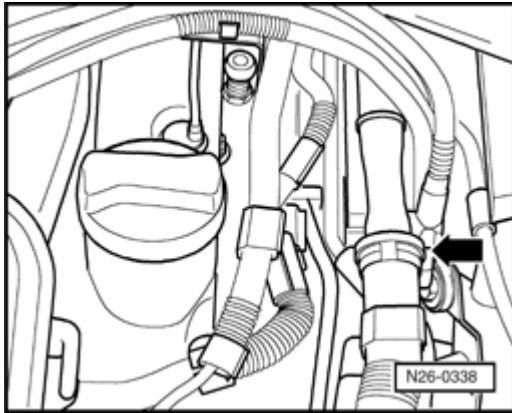


- Pull vacuum hose off Secondary Air Injec (AIR) solenoid valve -N112- and combi-v. (arrow).



- Connect hand vacuum pump VAG 1390 to vacuum hose from combi-valve (arrow).

26-43



- Disconnect pressure hose to combi-valve at coupling (arrow) and blow in using light pressure.

Combi-valve must be closed.

- Operate hand vacuum pump.

Combi-valve must open.

When the combi-valve does not open or is continuously open:

- Replace combi-valve ⇒ [Page 26-25](#), item - 5 -.

EVAP system, checking using KLI 9210 tester

Introduction

The KLI 9210 EVAP tester allows testing using nitrogen to pressurize the EVAP system and a smoke generator or ultrasonic tester to locate the source of EVAP system concerns.

This procedure is intended as a general guide for the use of the EVAP tester. EVAP systems vary between models.

Special tools and equipment

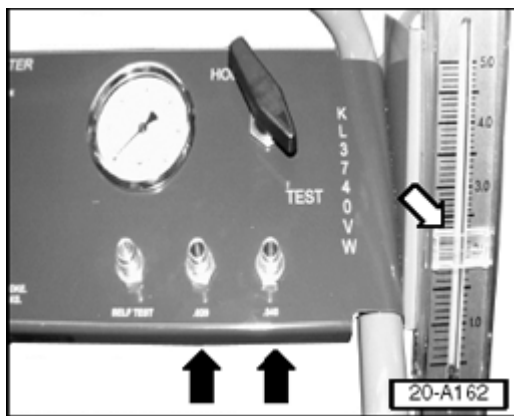
- ◆ VAS 5051 or VAS 5052 diagnostic tester
- ◆ KLI 9210 EVAP system tester (set to 14 in. H₂O)
- ◆ Light source (for viewing smoke)
- ◆ Special tool 3094 or equivalent

Using the KLI 9210 EVAP system tester ⇒
Tester operating instructions

Calibrating the KLI 9210 tester

Determine the vehicle leak threshold:

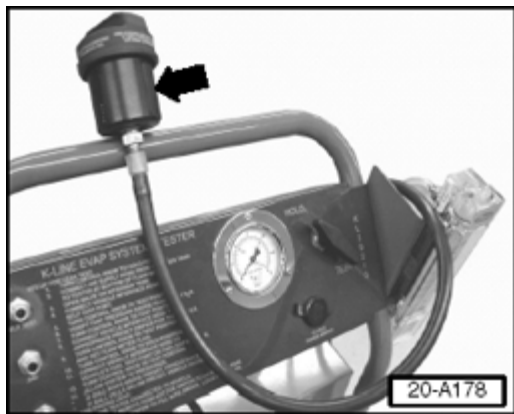
- ◆ Up to and including M.Y. 1999 leak threshold = 0.040 in.
- ◆ From M.Y. 2000 leak threshold = 0.0:



- Attach test hose to appropriate pre-set port (black arrows).
- Turn control valve from "Hold" to "Test".
- Set flow meter flag (white arrow) at indicated value on flow meter.
- Turn control valve to "Hold"; remove test

Testing the fuel cap

- Remove fuel cap.



- Connect fuel cap receiver (arrow) to hose
- Screw fuel cap tightly to cap receiver.
- Turn control valve to "Test" pressurizing circuit.
- Turn valve to "Hold".
- Watch pressure gauge for drop in pressure. If drop is more than 14 inches H₂O.

If no pressure drop is indicated:

- Proceed to "Checking Leak Detection Pump V144- for internal leaks".

If pressure drop is indicated:

- Replace fuel cap and re-test.
- Proceed to "Checking Leak Detection Pump V144- for internal leaks".

Checking Leak Detection Pump -V144- for internal leaks

Basically, in the following procedure the EV system will be filled with smoke, the engine started and the LDP activated using the VAS 5051 or VAS 5052. With the LDP activated, after clearing initial smoke away from the LFI area using compressed air, the system is then filled with smoke again and rechecked for smoke at the LDP filter.

Conditions

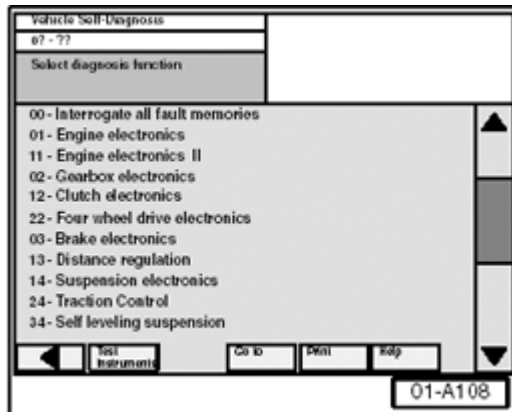
- Ignition switched off
- LDP is visible ⇒ Component Locations
- Tester hose connected to fuel filler neck
- VAS 5051 or VAS 5052 Diagnostic tool connected to vehicle
- Smoke generator connected to battery
- Turn KLI 9210 valve to "Test" and use smoke generator trigger to fill system with smoke until smoke is coming out of the LDP filter



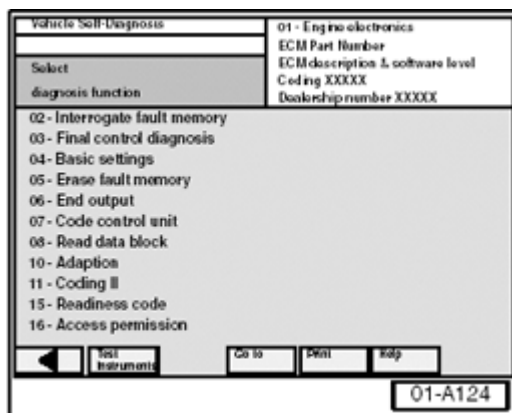
26-47

- Start engine.

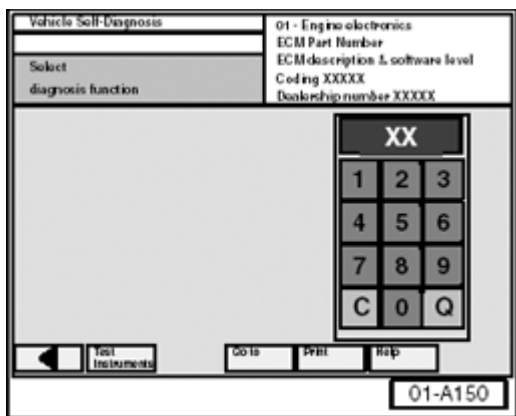
- From VAS 5051 Start-up screen, select "self diagnosis".



- Select vehicle system "01 - Engine electr



- Select Diagnosis Function "04 - Basic set



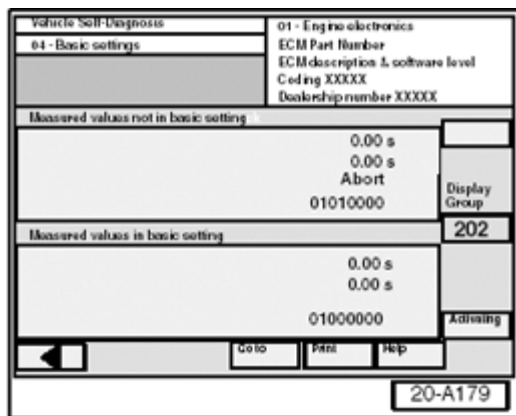
- Input appropriate display group from table below on keypad.

Engine code	Display group
AEB, AEG, AFP, AHA, APH, ATQ, ATW, AUG, AWD, AWM, AWP, AWV, AWW, BDC, BDF, BEV, BGD, BGJ	071
AVH, AZG, BAP, BBW, BDP	202

- Press "Q" on keypad to confirm.
LDP should activate

If LDP does not activate:

For some vehicles using Display group 202 a similar screen appears indicating "Test Off".

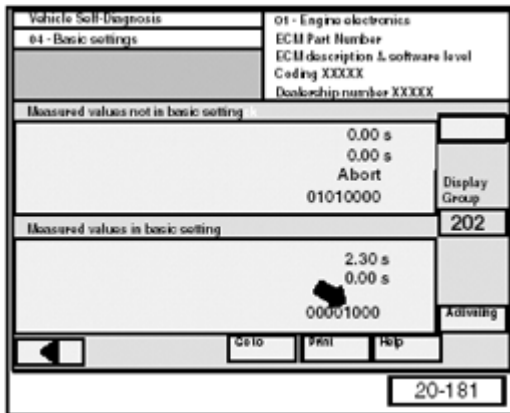


- Select "Activating" button.

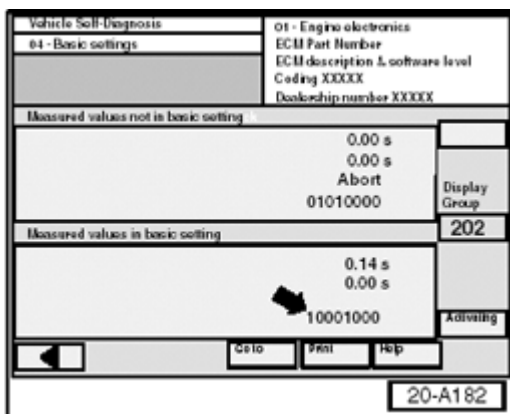
If LDP does not activate:

- Check electrical connections to LDP.
- Check vacuum source to LDP.

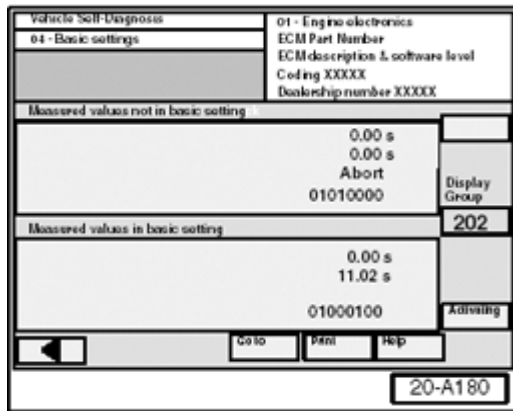
If LDP activates:



↖ A similar screen appears, Test is "ON" (indicated by a "1" in position 5, -arrow-).



↖ Position 1 -arrow- alternates between "0" and "1" during pump operation.



◀ If test is OK:

Indicated by "1" in position 6 and a "0" in position 8 as shown.

LDP has activated and the system is pressurized.

- Using a compressed air blow gun, clear area near LDP and LDP filter of any residual smoke.

If the test aborts and DTCs other than for small or large leaks are stored:

- Check and repair according to DTC listed in DTC table for appropriate engine code.

When "Check end" is indicated on VAS 5051 or VAS 5052:

Note:

Only check LDP during "Check end" phase when "Test OK" was indicated.

- Use smoke generator trigger to fill system with smoke again.
- Check for smoke doming from LDP filter and LDP hose connections.
 - ◆ Smoke coming from filter indicates a faulty LDP
 - ◆ Smoke coming from LDP outlet or hose indicates a faulty hose or clamp

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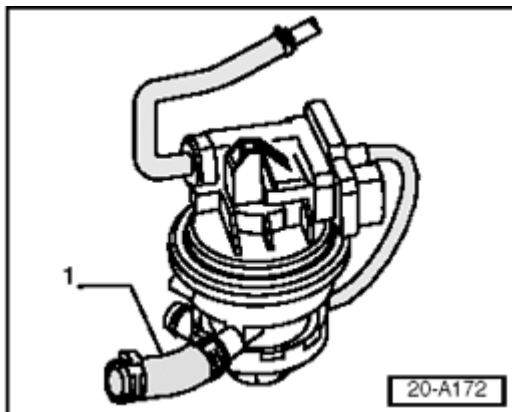
- Make repairs as necessary and check with smoke again.
- ◆ No smoke coming from filter indicates is OK and leak is somewhere else in system

Note:

If the KLI 9210 EVAP system tester is connected in "Test" mode and Basic settings (using Set Diagnosis) and Fault finding are activated, a false "System OK" message may be generated.

If the LDP is OK and a DTC was stored for EVAP system:

- Switch ignition off.
- Continue checking EVAP system as follows:

Checking EVAP system for leaks

- Clamp off LDP outlet (EVAP side) -1- use special tool 3094 or equivalent.

CAUTION!

Clamp only soft rubber lines when isolating a leak. To avoid risk of damage, never clamp plastic lines!

- Turn control valve from "Hold" to "Test".
- Allow fuel system to pressurize.

Note:

Fuel system pressurization depends on volume of fuel system and amount of fuel in tank.

If fuel system pressurization does not stabilize:

- Verify that all fuel system outlets have been sealed before continuing.

Note:

Any flow shown on flow meter indicates a leak. Flow below flow meter flag set at vehicle leak standard may indicate a sporadic DTC.

If flow meter on tester registers flow near or above pre-set pressure:

- Clamp off hose leading from EVAP canister purge regulator valve -N80- to intake manifold.

If flow stops:

- Replace EVAP canister purge regulator valve - N80- and repeat test before continuing.

If meter indicates no flow after test:

- Perform quality check and return vehicle to customer.

If flow continues:

- Use smoke generator trigger to charge fuel system with smoke again.

- Inspect complete EVAP system for escape smoke.

Note:

It may be necessary to move, twist, or wiggle EVAP components around to reproduce leak.

If leak cannot be found using smoke:



- Locate leak with ultrasonic tester.
 - ◆ General search: tester only
 - ◆ Localized search: tester with extensic wand (left)

If leak cannot be located:

- Disconnect and plug or clamp shut EVAP to isolate fuel tank using special tool 309 equivalent before continuing.

CAUTION!

Clamp only soft rubber lines when isolate leak. To avoid risk of damage, never clamp plastic lines!

If flow stops:

- Reconnect EVAP lines and search area to isolated.

When leak has been located:

- Repair leak and repeat EVAP system test

Note:

- ◆ *Because leak may be at top of fuel tank, it may not be possible to locate through fuel pump/sending unit access plate.*
- ◆ *Lower fuel tank if necessary to locate leak.*

CAUTION!

Do not return vehicle to the customer without having performed a proper diagnosis and repair.

Select a topic

01 - On Board Diagnostic (OBD)

On Board Diagnostic (OBD)

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[Electronic Power Control \(EPC\) Warning Light -K132-](#)

[Malfunction Indicator Light \(MIL\) -K83-](#)

[On Board Diagnostic \(OBD\), technical data](#)

[VAG 1551 and Motronic Engine Control Module \(ECM\) -J220-, connecting and selecting](#)

[VAS 5051 and Motronic Engine Control Module \(ECM\) -J220-, connecting and selecting](#)

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[DTC memory, checking and erasing](#)

[Automatic test sequence](#)

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[DTCs P0010 to P0704, VAG 16394 to 17088](#)

DTC table: SAE P1 codes

[DTCs P1047 to P1912, VAG 17455 to 18322](#)

DTC table: SAE P2 codes

[DTCs P2101 to P2138, VAG 18533 to 18570](#)

DTC table: SAE P3 codes

[DTCs P3211 to P3266, VAG 19667 to 19722](#)

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[Engine Coolant Temperature \(ECT\) sensors -G62- and -G2-, checking](#)

[Intake Air Temperature \(IAT\) sensor -G42-, checking](#)

[Engine Speed \(RPM\) Sensor -G28-, checking](#)

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[Oxygen Sensor \(O2S\) Behind Three Way Catalytic Converter \(TWC\) -G130-, checking aging](#)

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["Voltage supply open circuit," followup procedure](#)

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[Ignition coil with power output stage, checking](#)
[Knock sensor, checking](#)
[Misfire detection, checking](#)

On Board Diagnostic (OBD)

On Board Diagnostic (OBD) features

The Motronic Engine Control Module (ECM) -J220- is equipped with a DTC memory.

If Diagnostic Trouble Codes (DTCs) occur in the sensors and components being monitored, they will be stored in the DTC memory together with an indication of the type of malfunction.

After evaluating the information the Motronic Engine Control Module (ECM) -J220- decides between the different Diagnostic Trouble Codes (DTCs) ⇒ DTC table from ⇒ [Page 01-30](#) and stores these until the contents of the DTC memory are erased.

Diagnostic Trouble Codes (DTCs) which only occur sporadically will have the addendum "sporadic fault" on the print out. These Diagnostic Trouble Codes (DTCs) will be indicated on the display by the addendum "/SP". The cause of sporadic Diagnostic Trouble Codes (DTCs) can be e.g. a loose terminal or a brief open circuit. If a "sporadic malfunction" does not occur again within 40 warm-up phases (engine start below 50 ° C coolant temperature - switched off above 72 ° C), it will be erased from the DTC memory.

The Diagnostic Trouble Codes (DTCs) stored can be read-out with the VAG 1551 scan tool, the vehicle system tester VAG 1552 or the vehicle diagnostic, testing and information system VAS 5051 ⇒ [Page 01-23](#) .

The DTC memory must be erased after the malfunction(s) have been repaired ⇒ [Page 01-23](#) and the readiness code must be regenerated ⇒ [Page 01-149](#) .

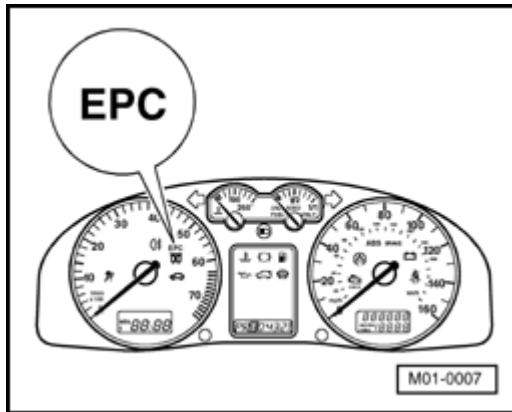
All Motronic Engine Control Module (ECM) - J220- learned values will be erased when the Motronic Engine Control Module (ECM) -J220- connector is pulled off or the battery is disconnected. However the contents of the DTC memory are retained. When the engine is subsequently started the idling could be rough for a brief period. In this case leave the engine running for a few minutes at idle or perform a longer road test, until the learning process is completed. Procedure after voltage supply has been interrupted ⇒ [Page 24-170](#) .

Note:

General information for On Board Diagnosis (OBD) can be found in the instruction manuals for the VAG 1551 scan tool, vehicle system tester VAG 1552 or VAS 5051.

Electronic Power Control (EPC) Warning Light -K132-

"EPC" is the abbreviation for Electronic Power Control.



Location of Electronic Power Control (EPC) Warning Light -K132-

When the ignition is switched on the Motronic Engine Control Module (ECM) -J220- checks all components which are important for the correct functioning of the Electronic Power Control.

If malfunctions are detected in Electronic Power Control system when the engine is running, the Motronic Engine Control Module (ECM) -J220- will switch on the Electronic Power Control (EPC) Warning Light -K132-. (Diagnostic Trouble Codes (DTCs) are identified accordingly in the DTC table). Simultaneously an entry is made in the Motronic Engine Control Module (ECM) -J220- DTC memory.

Functional check:

- Switch on ignition:
Electronic Power Control (EPC) Warning Light -K132- must light-up.

If the Electronic Power Control (EPC) Warning Light -K132- does not light-up with ignition switched on:

- Check instrument cluster and Electronic Power Control (EPC) Warning Light -K132-:

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01](#)

If the Electronic Power Control (EPC) Warning Light -K132- lights up with ignition switched on:

- Start engine and run at idle:

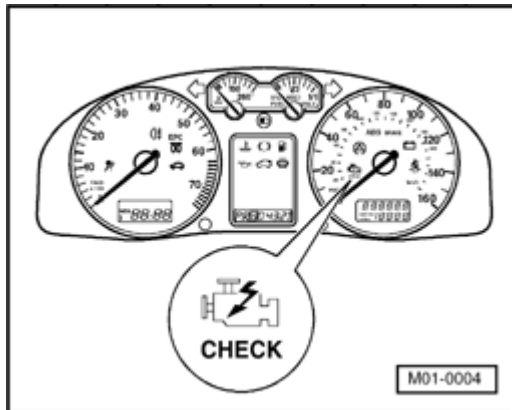
The Electronic Power Control (EPC) Warning Light -K132- must go out after several seconds.

If the Electronic Power Control (EPC) Warning Light -K132- does not go out:

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read off readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

Malfunction Indicator Light (MIL) -K83-

If the Motronic Engine Control Module (ECM) -J220- detects a malfunction this is indicated by switching the Malfunction Indicator Light (MIL) on.



◀ Location of Malfunction Indicator Light (MIL)

Note:

The Malfunction Indicator Light (MIL) can switch on in the continuous or flashing mode. Always check DTC memory ⇒ [Page 01-23](#) .

- ◆ *Flashing mode: There is a malfunction present which can damage the Three Way Catalytic Converter (TWC) when continuing to drive at this power output. If this occurs, continue driving only at reduced output.*
- ◆ *Continuous mode: There is a malfunction present which causes the emissions to deteriorate. check engine or transmission control module in this case.*
- ◆ *Check the DTC memory if the customer has a complaint or there is a driveability problem and the Malfunction Indicator Light (MIL) does not light up, this is because Diagnostic Trouble Codes (DTCs) can be stored which will not switch the Malfunction Indicator Light (MIL) on immediately.*

Functional check:

- Switch on ignition:

Malfunction Indicator Light (MIL) must light-up.

If the Malfunction Indicator Light (MIL) does not light-up with ignition switched on:

- Check instrument cluster and Electronic Power Control (EPC) Warning Light -K132-:

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01](#)

If the Malfunction Indicator Light (MIL) lights-up with ignition switched on:

- Start engine and run at idle:

Malfunction Indicator Light (MIL) must go out after several seconds.

If the Malfunction Indicator Light (MIL) does not go out:

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read off readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

On Board Diagnostic (OBD), technical data

Control module identification

The control module version is displayed when the VAG 1551 scan tool, the vehicle system tester VAG 1552 or the vehicle diagnostic, testing and information system VAS 5051 is connected and Engine Control Module (ECM) selected ⇒ [Page 01-12](#) .

Equipment

Engine code	BDF
System designation	Motronic ME7.1.1
Exhaust emissions fulfil	LEV ¹⁾
On Board Diagnosis (OBD)	OBD II
Output Diagnostic Test Mode (DTM)	yes
Method of data transfer to VAG 1551/1552	Rapid data transfer
DTC memory	Non-volatile memory ²⁾
Memory for learned values	Volatile memory ³⁾

¹⁾ LEV = Low Emission Vehicles (exhaust emissions max. 0.075 g/mi HC).

²⁾ Independent of voltage supply.

³⁾ All values are erased when voltage supply is interrupted.

Engine code	BDF
Oxygen Sensor control	2 sensors
Knock control	2 knock sensors
Three Way Catalytic Converter (TWC)	yes
Exhaust gas recirculation	no
Charging	no
Secondary air system	yes
Electronic Power Control	yes
Variable intake manifold	yes
Variable valve timing	yes ⁴⁾

⁴⁾ Two independently variable camshafts.

Functions which can be selected when using the VAG 1551/1552 or VAS 5051 scan tools

The prerequisites to select the desired functions can be found in the following table.

Function		Prerequisite		
		Engine not running, ignition switched on	Engine running at idle	Vehicle being driven
Functions on VAG 1551/1552 or on VAS 5051				
01	Check control module version ¹⁾	yes	yes	yes
02	Check DTC memory	yes ²⁾	yes	yes
03	Output Diagnostic Test Mode (DTM)	yes	no	no
04	Basic setting ³⁾	yes ⁴⁾	yes	yes
05	Erase DTC memory	yes	no	no
06	End output	yes	yes	yes
07	Code control module	yes	no	no
08	Read measured value block	yes	yes	yes
10	Adaption	yes	no	no
15	Read readiness code	yes	yes	yes

1) Function can not be selected with VAS 5051.

2) Only perform with ignition switched on, when engine does not start (operate starter for at least 6 seconds first).

3) Must be carried out after performing the following work: Replacing Motronic Engine Control Module (ECM) -J220-, Throttle Valve Control Module or engine, or disconnecting battery.

4) When adapting Throttle Valve Control Module

Selecting functions (mode) via address word 33, CARB / OBD II

Function		Prerequisite		
Functions on VAG 1551/1552 or on VAS 5051		Engine not running, ignition switched on	Engine running at idle	Vehicle being driven
Mode 1	Transfer of diagnostic data	yes	yes	yes
Mode 2	Transfer of operating conditions	yes	yes	yes
Mode 3	Check DTC memory	yes	yes	yes
Mode 4	Erase DTC memory (diagnostic data)	yes	no	no
Mode 5	Output of Oxygen Sensor signals	yes	yes	yes
Mode 6	Transfer of measured values	yes	yes	yes
Mode 7	Check DTC memory	yes	yes	yes
Mode 8	Test of tank system	no	yes	no

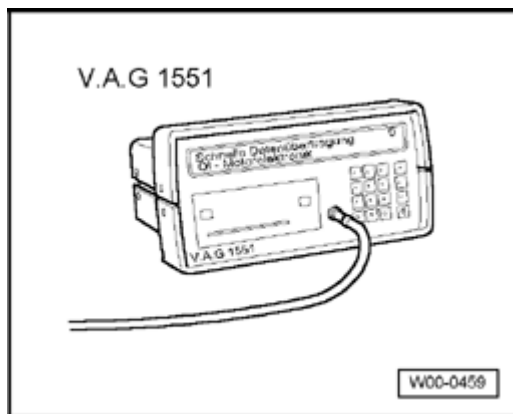
Note:

- ◆ *Individual measured values can be read out in Mode 1. Mode 1 is not recommended for VW dealerships as this data can be more accurately read under 01/function 04 or function 08.*
- ◆ *Mode 2 displays the operating conditions under which the malfunction was detected.*
- ◆ *With Mode 3 the DTC memory can be checked and with Mode 4 the DTC memory (diagnostic data) can be erased.*

- ◆ *Under Mode 5 the static magnitude of the Oxygen Sensor (O2S) (required by the legislator) can be displayed As this magnitude does not have any significance with reference to the Oxygen Sensor (O2S) diagnosis, Mode 5 is of no significance for a VW dealership.*
- ◆ *Under Mode 6, all the measured values of components and systems, which are not continuously monitored, can be checked.*
- ◆ *With Mode 7, Diagnostic Trouble Codes (DTCs) can be checked which have not caused the Malfunction Indicator Light (MIL) to light up (MIL is not switched on, no Diagnostic Trouble Codes (DTCs) under Mode 3).*
- ◆ *Under Mode 9, a check of the software check total and control module identification is made.*

VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required

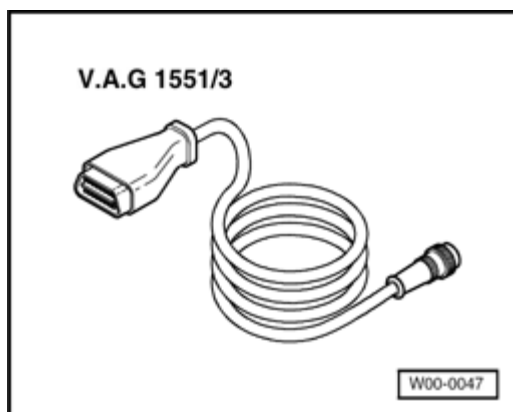


- ◆ VAG 1551 scan tool

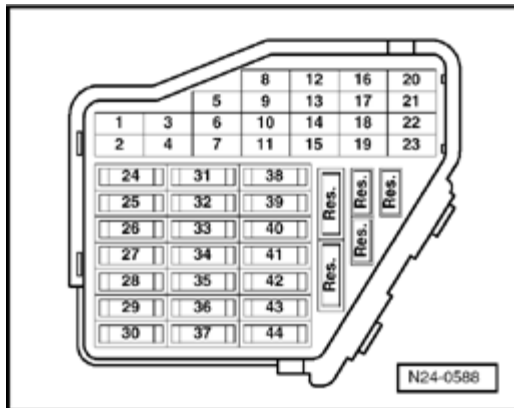
Note:

The vehicle system tester VAG 1552 can be used instead of the VAG 1551 scan tool, however a print-out is not possible.

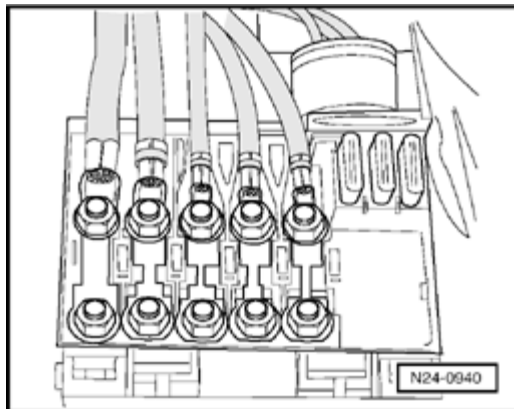
All functions of VAG 1551/1552 can also be carried out with the vehicle diagnostic, testing and information system VAS 5051. Connecting VAS 5051 ⇒ [Page 01-18](#).



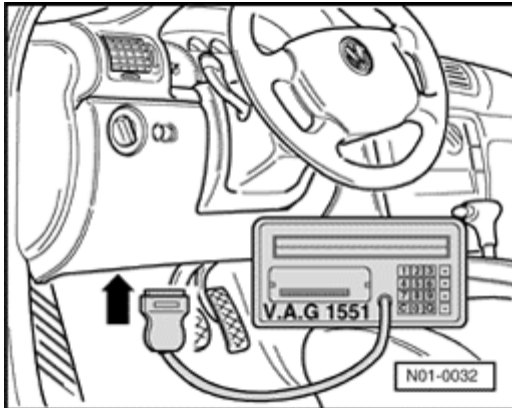
- ◆ VAG 1551/3 Adapter cable

Test prerequisites

- The fuses must be OK.



- The main fuses must be OK.
- The battery voltage must be at least 11.5 V.
- Ground (GND) connection between engine and body must be OK.
- All electrical devices, e.g. lights and rear window heating must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.



Work sequence

- Connect VAG 1551 scan tool ((VAG 1552) with cable VAG 1551/3.

After the scan tool has been connected, depending upon desired function:

- Switch ignition on or Start engine
⇒ [Page 01-9](#) , Table "Selectable functions".

Note:

- ◆ *If the display remains blank, check voltage supply for DLC:*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- ◆ *If the display does not indicate as described in the work sequence:*

⇒ *Scan tool operating instructions*

- ◆ *If due to an input malfunction "Fault in the data transfer!" is displayed, pull wire off scan tool, reconnect and repeat work step.*

VAG SELF-DIAGNOSIS

HELP



1 - Rapid data transfer*

2 - Flash code output*

- Operate scan tool taking into account the information on display:

Indicated on display:

* Appears alternately

- Operate scan tool, taking into account the information on display:
- Press button -1- for "Rapid data transfer".
- Press buttons -0- and -1- for address word "Engine electronics" and confirm entry with -C button.

022906032BL MOTRONIC ME7.1.1 G 0006 →

Coding 00032

WSC 00000



The control module identification and coding are shown on the display, e.g.:

- ◆ 022 906 032 BL = Part No. of the control module (for latest control module version:)

⇒ *Parts catalog*

- ◆ MOTRONIC ME7.1.1 = System designation (Motronic)
- ◆ G = Cruise control system (CCS) activated
- ◆ 0006 = Program level number

- ◆ Coding 00032 = control module coding, coding variants of Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-181](#) .
- ◆ WSC 00000 = Workshop code of VAG 1551 with which the last coding was carried out. (If the factory coding has not been changed, WSC 00000 appears)

Note:

Replace control module if the control module version displayed does not correspond to the vehicle ⇒ [Page 24-173](#) .

A wrong coding of the Engine Control Module results in:

- ◆ *Engine running Diagnostic Trouble Codes (DTCs) (gear change jerks, load change jerks, etc.)*
- ◆ *Increased fuel consumption*
- ◆ *Increased exhaust gas emissions*
- ◆ *Diagnostic Trouble Codes (DTCs) stored in DTC memory which are not actually present (false DTCs)*
- ◆ *Functions will not be performed (Oxygen Sensor (O2S) control, activation of the Evaporative Emissions (EVAP) Canister system, etc.).*
- ◆ *Reduced service life of transmission*

If the coding differs from the vehicle version,
then:

- Check control module coding ⇒ [Page 24-177](#) ,
coding Motronic Engine Control Module (ECM) -
J220-.
- Press → -button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

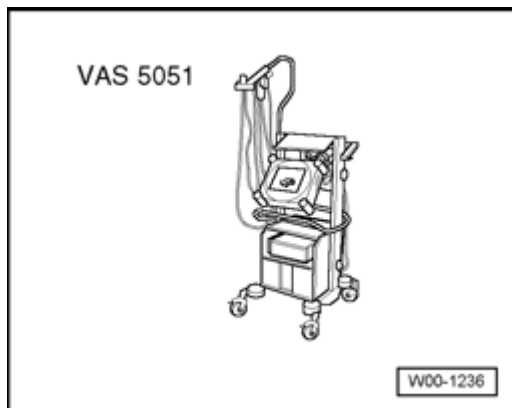
- See repair procedures for further measures.

VAS 5051 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting

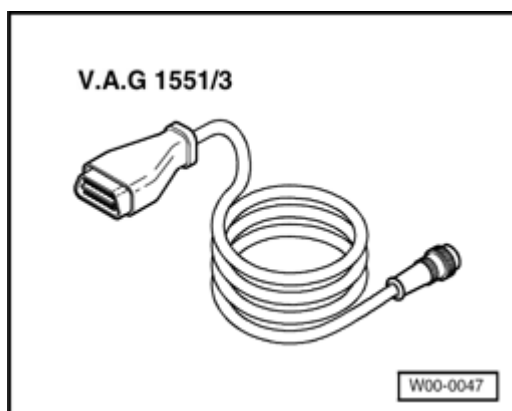
All functions which could previously be performed with VAG 1551/1552 can also be performed with the vehicle diagnostic, testing and information system VAS 5051 in the operating mode vehicle On Board Diagnosis (OBD):

⇒ *Operating instructions for Vehicle Diagnosis, Testing and Information System VAS 5051.*

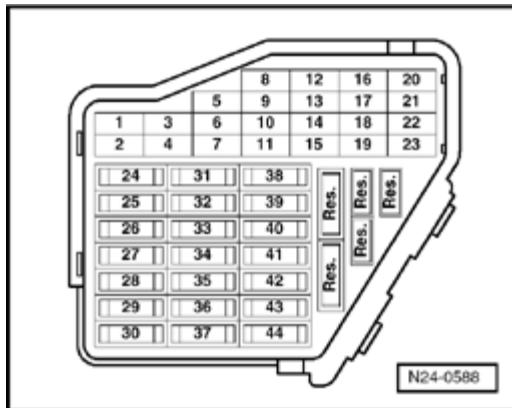
Special tools, workshop equipment, testers, measuring instruments and auxiliary items required



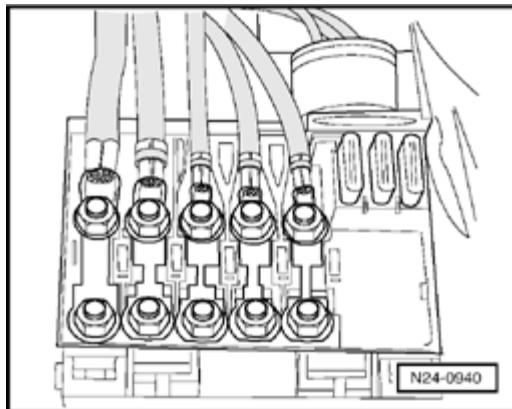
- ◆ VAS 5051 Vehicle Diagnosis, Testing and Information System



- ◆ Diagnostic cable VAS 5051/1 or VAS 5051/3

Test prerequisites

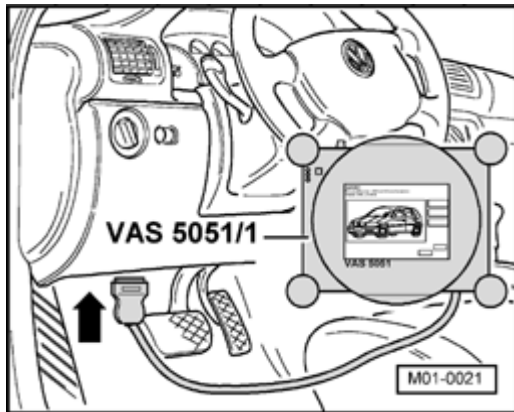
- The fuses must be OK.



- The main fuses must be OK.
- The battery voltage must be at least 11.5 V.
- Ground (GND) connection between engine and body must be OK.
- All electrical devices, e.g. lights and rear window heating must be turned off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

Work sequence

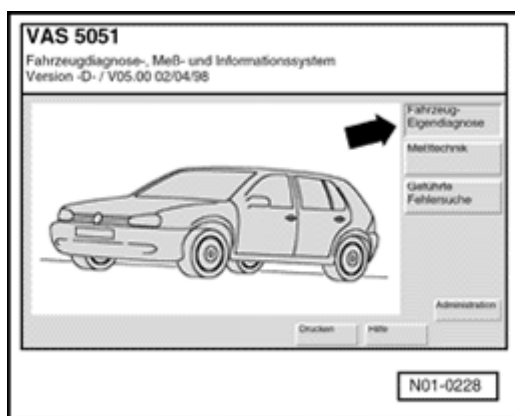
- Connect VAS 5051 using VAS 5051/1 or 5051/3 diagnostic adapter cable as follow
- Connect connector of diagnostic adapter onto DLC.
- Depending upon desired function: Switch ignition on or Start engine ⇒ [Page 01-9](#) , "Selectable functions".



Note:

- ◆ In the functions 04 - Basic setting or 08 - measured value (data) block, the display will be listed from top to bottom.
- ◆ If the display does not indicate as descri the work sequence:
⇒ Operating instructions for VAS 5051.

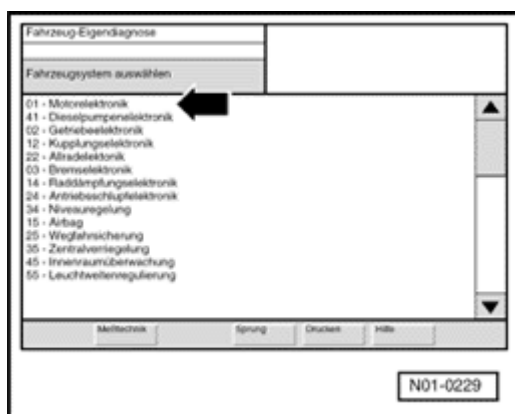
01-21



↙ Indicated on display:

Select operating mode:

- Press button on screen for "Vehicle self-diagnosis".



↙ Indicated on display:

Select vehicle system:

- Press button "01 - Engine electronics" on screen.

01-22



The control module identification and coding are shown on the display, e.g.:

If the coding differs from the vehicle version, then:

- Check control module coding ⇒ [Page 24-177](#) , Coding Motronic Engine Control Module (ECM) - J220-.



Indicated on display:

Select diagnostic function:

At this point all diagnostic functions are available.

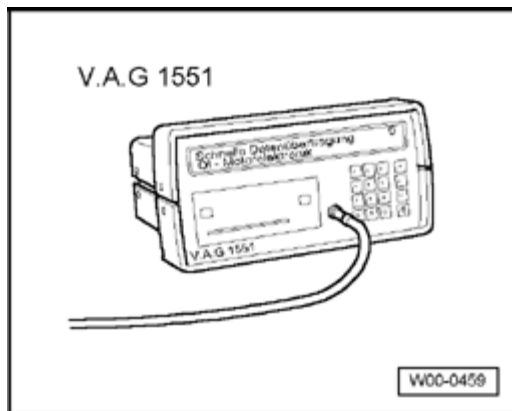
- Press desired function on the display.
- See repair procedures for further measures.

DTC memory

Check DTC memory of all control modules ⇒ [Page 01-27](#) , Automatic test sequence.

DTC memory, checking and erasing

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required



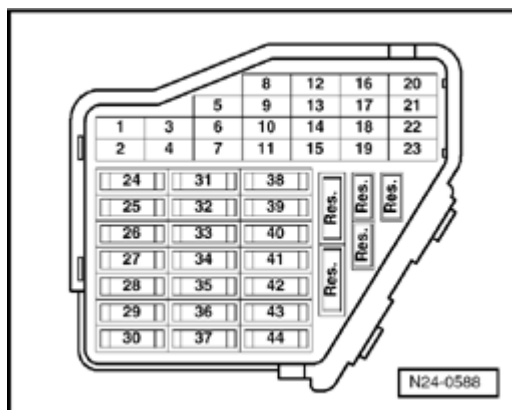
- ◆ VAG 1551 scan tool (or VAG 1552 vehicle system tester) with VAG 1551/3 adapter cable

Note:

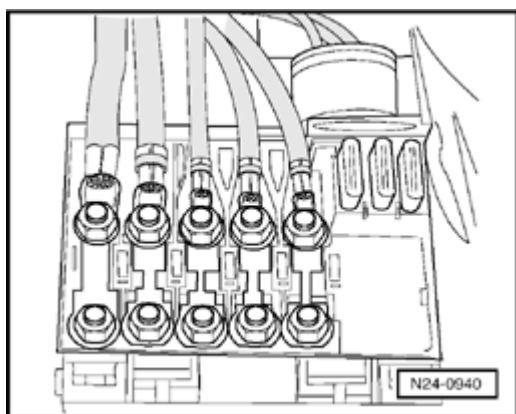
All functions which could previously be performed with VAG 1551/1552 can also be performed with VAS 5051.

Test prerequisites

- The fuses must be OK.



01-24



- The main fuses must be OK.
- The battery voltage must be at least 11.5 V.
- Ground (GND) connection between engine and body must be OK.
- All electrical devices, e.g. lights and rear window heating must be turned off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

Work sequence

- Connect VAG 1551 scan tool (or VAG 1552) and select Engine Control Module (ECM) with the "Address word" 01. When doing this the engine must be running at idle: (Connecting scan tool and selecting Engine Control Module (ECM) ⇒ [Page 01-12](#)).

Note:

Only when engine does not start:

- Operate starter for approx. 6 seconds. Then do not switch the ignition off.

			<ul style="list-style-type: none"> - Switch on scan tool printer with the print button. <p>Warning light in button must light up.</p>
Rapid data transfer Select function XX	HELP	◀	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Operate scan tool, taking into account information on display: - Press buttons -0- and -2- for function "Check DTC memory" and confirm entry with -Q- button.
X Diagnostic Trouble Codes (DTCs) detected!		◀	<p>The number of Diagnostic Trouble Codes (DTCs) stored or "No malfunction detected!" will be shown on the display.</p> <p>Note:</p> <p><i>If no DTC is stored:</i></p> <ul style="list-style-type: none"> - Press the → -button. <p>If one or more Diagnostic Trouble Codes (DTCs) are stored:</p> <p>The stored Diagnostic Trouble Codes (DTCs) will be displayed and printed out one after the other.</p>
Rapid data transfer Select function XX	HELP	◀	<p>After the stored Diagnostic Trouble Codes (DTCs) have been printed out, the display will show:</p>

- Press buttons -0- and -5- for the function "Erase DTC memory" and confirm entry with -Q- button.

Rapid data transfer
DTC memory is erased!



Indicated on display:

Note:

If the ignition is switched off between "Check DTC memory" and "Erase DTC memory" the DTC memory will not be erased.

- Press → -button.

Rapid data transfer
Select function XX

HELP ←

Indicated on display:

- Press buttons -0- and -6- for the function "End output" and confirm entry with -Q- button.

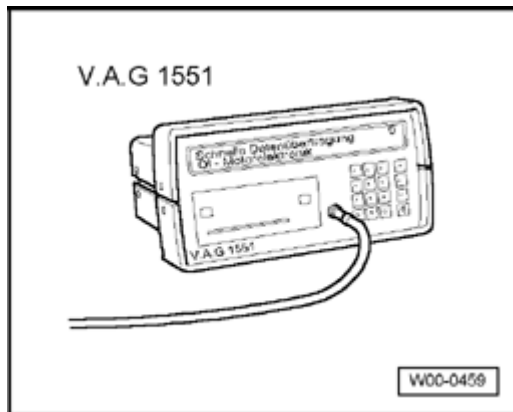
Repair Diagnostic Trouble Codes (DTCs) printed out using DTC table:

- ◆ SAE P0 codes ⇒ [Page 01-30](#) ,
- ◆ SAE P1 codes ⇒ [Page 01-58](#) ,
- ◆ SAE P2 codes ⇒ [Page 01-98](#) ,
- ◆ SAE P3 codes ⇒ [Page 01-99](#) .

- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

Automatic test sequence

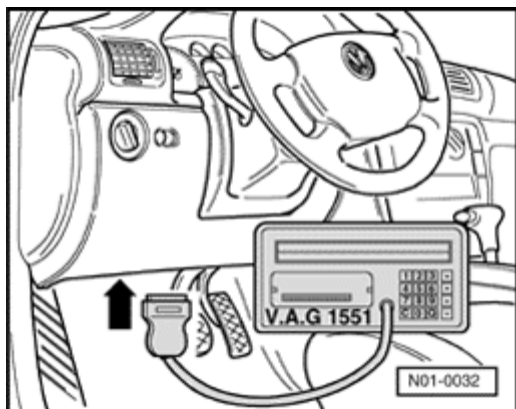
Special tools, workshop equipment, testers, measuring instruments and auxiliary items required



- ◆ VAG 1551 scan tool (or vehicle system tester VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the vehicle diagnostic, testing and information system VAS 5051.



Work sequence

- Connect VAG 1551 scan tool (or VAG 1552) using VAG 1551/3 adapter cable.

During test and assembly work Diagnostic Trouble Codes (DTCs) can be detected from other control modules like e.g. connector disconnected. Therefore on completion the DTC memories of all control modules must be checked and erased. To do this:

- Press button -0- twice for address word "Automatic test sequence" and confirm entry with -Q- button. VAG 1551 transmits all known address words one after another.

When a control module answers with its identification the number of stored Diagnostic Trouble Codes (DTCs) appears on the display or "No fault detected".

Any system Diagnostic Trouble Codes (DTCs) that are stored will be displayed one after the other and printed out. The VAG 1551 will then transmit the next address word.

Rapid data transfer
Select function XX

HELP

The automatic test sequence has ended when following is indicated on display:

- Erase all DTC memories and then perform a road test.

Observe the valid safety precautions when performing a road test ⇒ [Page 01-182](#) .

During the road test the following operating conditions must be fulfilled:

- ◆ The coolant temperature must exceed 85 °C.
- ◆ When the temperature is reached, the operating conditions Idling, Part throttle, Wide open throttle, Overrun must be attained several times.
- ◆ At wide open throttle the speed must exceed 3500 rpm.

- Again check DTC memories of all control modules using "automatic test sequence".

If no DTC is stored:

- Press → -button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

DTC table: SAE P0 codes

Note:

- ◆ *The DTC code overview is listed according to SAE or VAG code.*
- ◆ *Electronic Power Control "EPC" relevant Diagnostic Trouble Codes (DTCs) are indicated additionally by the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster.*
- ◆ *Explanation of the Malfunction types (e.g. "open circuit/short to Ground"):*

⇒ *scan tool operating instructions*

- ◆ *If components are indicated as faulty: First check the wiring and connectors to these components as well as the system Ground (GND) connections referring to Electrical Wiring Diagrams. If no malfunction can be located, replace component. This is particularly relevant if Diagnostic Trouble Codes (DTCs) are output as "occurring sporadically" (SP).*
- ◆ *Erase DTC memory after repairing malfunction ⇒ [Page 01-23](#) and generate readiness code again ⇒ [Page 01-149](#) .*

VAG 1551 print out, e.g.:

16497 P0113 035 Intake Air Temperature (IAT) sensor -G42- Signal too high, Sporadic malfunction

Explanation:

- ◆ *16497 = DTC code*
- ◆ *P0113 = Additional DTC code*
- ◆ *035 = Malfunction type as a number*
- ◆ *Intake Air Temperature (IAT) Sensor -G42-- = faulty circuit or malfunction location*
- ◆ *Signal too high = Malfunction type as text*
- ◆ *Sporadic Diagnostic Trouble Codes (DTCs) = Diagnostic Trouble Codes (DTCs) that are not always present e.g. loose terminal*

Explanation of SAE Diagnostic Trouble Codes (DTCs):**System type:**

- ◆ *Pxxxx = Diagnostic Trouble Codes (DTCs) for the drive*

Standardized code:

- ◆ *P0xxx = Defined Diagnostic Trouble Codes (DTCs) with standardized DTC text according to SAE*
- ◆ *P1xxx = Supplementary emissions relevant Diagnostic Trouble Codes (DTCs) provided by manufacturer*
- ◆ *P2xxx = Defined Diagnostic Trouble Codes (DTCs) with standardized DTC text according to SAE, as of model year 2000*
- ◆ *P3xxx = Supplementary emissions relevant Diagnostic Trouble Codes (DTCs) provided by manufacturer, as of model year 2000*

System group:

- ◆ *Px0xx = Fuel and air measurements and supplementary exhaust gas control*
- ◆ *Px1xx = Fuel and air measurements*
- ◆ *Px2xx = Fuel and air measurements*
- ◆ *Px3xx = Ignition system*
- ◆ *Px4xx = Supplementary exhaust gas control*
- ◆ *Px5xx = Speed and idling control*
- ◆ *Px6xx = Control module and output signals*
- ◆ *Px7xx = Transmission*
- ◆ *Px8xx = Transmission*

◆ *Px9xx = Control module, input and output signals*

DTCs P0010 to P0704, VAG 16394 to 17088**Fuel and air measurements and supplementary exhaust gas control**

DTC code		DTC text	Corrective action
SAE	VAG		
P0010	16394	Bank 1 camshaft timing adjustment Malfunction	- Check camshaft timing adjustment valve ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P0011	16395	Bank 1, Camshaft retarded position Specification not reached	- Check camshaft timing adjustment: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15
P0012	16396	Bank 1, Camshaft advanced position Specification not reached	- Check timing: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15
P0014	16398	Bank 1 camshaft retarded position Exhaust specification not reached	
P0015	16399	Bank 1 camshaft advanced position Exhaust specification not reached	

DTC code		DTC text	Corrective action
SAE	VAG		
P0030	16414	Bank 1, sensor 1 heating element circuit Open circuit	- Check Oxygen Sensor (O2S) heating before Three Way Catalytic Converter (TWC) ⇒ Page 24-38
P0031	16415	Bank 1, sensor 1 heating element circuit Short to Ground (GND)	
P0032	16416	Bank 1, sensor 1 heating element circuit Short to positive	
P0036	16420	Bank 1, sensor 2 heating element circuit Open circuit	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ Page 24-45
P0037	16421	Bank 1, sensor 2 heating element circuit Short to Ground (GND)	
P0038	16422	Bank 1, sensor 2 heating element circuit Short to positive	- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control after Three Way Catalytic Converter (TWC) ⇒ Page 24-140

Fuel and air measurements

DTC code		DTC text	Corrective action
SAE	VAG		
P0101	16485	Mass Air Flow (MAF) Sensor -G70- Implausible signal	- Check Mass Air Flow (MAF) Sensor - G70- ⇒ Page 24-52
P0102	16486	Mass Air Flow (MAF) Sensor -G70- Signal too low	
P0103	16487	Mass Air Flow (MAF) Sensor -G70- Signal too high	
P0112	16496	Intake Air Temperature (IAT) Sensor -G42- Signal too low	- Check Intake Air Temperature (IAT) Sensor -G42- ⇒ Page 24-81
P0113	16497	Intake Air Temperature (IAT) Sensor -G42- Signal too high	
P0116	16500	Engine Coolant Temperature (ECT) sensor -G62- Implausible signal	- Check Engine Coolant Temperature (ECT) sensor -G62- ⇒ Page 24-69 - Check thermostat: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 19
P0117	16501	Engine Coolant Temperature (ECT) sensor -G62- Signal too low	
P0118	16502	Engine Coolant Temperature (ECT) sensor -G62- Signal too high	

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DTC code		DTC text	Corrective action
SAE	VAG		
P0121	16505	Throttle Position (TP) Sensor -G69- Implausible signal	- Check Throttle Valve Control Module - J338- ⇒ Page 24-59
P0122	16506	Throttle Position (TP) Sensor -G69- Signal too low	
P0123	16507	Throttle Position (TP) Sensor -G69- Signal too high	

DTC code		DTC text	Corrective action
SAE	VAG		
P0130	16514	Bank 1 sensor 1 Electrical malfunction	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ Page 24-38
P0131	16515	Bank 1 sensor 1 Voltage too low	- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC) ⇒ Page 24-131
P0132	16516	Bank 1 sensor 1 Voltage too high	
P0133	16517	Bank 1 sensor 1 Signal too slow	
P0134	16518	Bank 1 sensor 1 No activity	
P0135	16519	Bank 1 sensor 1 Electrical malfunction in heater circuit	

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DTC code		DTC text	Corrective action
SAE	VAG		
P0136	16520	Bank 1 sensor 2 Electrical malfunction	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ Page 24-45
P0137	16521	Bank 1 sensor 2 Voltage too low	- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control after Three Way Catalytic Converter (TWC) ⇒ Page 24-140
P0138	16522	Bank 1 sensor 2 Voltage too high	
P0139	16523	Bank 1 sensor 2 Signal too slow	
P0140	16524	Bank 1 sensor 2 No activity	
P0141	16525	Bank 1 sensor 2 Electrical malfunction in heater circuit	

DTC code		DTC text	Corrective action
SAE	VAG		
P0170	16554	Bank 1 fuel measuring system Malfunction	- Check fuel pressure control and holding pressure ⇒ Page 24-110
			- Check fuel injectors ⇒ Page 24-104 , Checking quantity injected and for leaks
			- Check fuel pump: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20; Fuel supply system components, removing and installing
			- Check secondary air system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check hoses and connecting pipes to/between components: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check vacuum lines for leaks

DTC code		DTC text	Corrective action
SAE	VAG		
P0171	16555	Bank 1 fuel measuring system System too lean	- Check fuel pressure control and holding pressure ⇒ Page 24-110
			- Check fuel injectors ⇒ Page 24-104
			- Check fuel pump: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20; Fuel supply system components, removing and installing
			- Check intake system for leaks ⇒ Page 24-121
			- Check exhaust system for leaks: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check secondary air system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check vacuum lines for leaks

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DTC code		DTC text	Corrective action
SAE	VAG		
P0172	16556	Bank 1 fuel measuring system System too rich	- Check fuel pressure control and holding pressure ⇒ Page 24-110
			- Check fuel injectors ⇒ Page 24-104 , Checking quantity injected and for leaks
			- Check Evaporative Emission (EVAP) Canister Purge RegulatorValve -N80- : ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
			- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC) ⇒ Page 24-131
			- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control after Three Way Catalytic Converter (TWC) ⇒ Page 24-140

Fuel and air measurements

DTC code		DTC text	Corrective action
SAE	VAG		
P0201	16585	Cylinder 1 Fuel Injector - N30- Electrical malfunction	- Check fuel injectors ⇒ Page 24-97
P0202	16586	Cylinder 2 Fuel Injector - N31- Electrical malfunction	
P0203	16587	Cylinder 3 Fuel Injector - N32- Electrical malfunction	
P0204	16588	Cylinder 4 Fuel Injector - N33- Electrical malfunction	
P0205	16589	Cylinder 5 Fuel Injector - N83- Electrical malfunction	
P0206	16590	Cylinder 6 Fuel Injector - N84- Electrical malfunction	
P0219	16603	Maximum engine rpm exceeded	- Check and erase DTC memory ⇒ Page 01-23 - Repair mechanical damage

01-42

DTC code		DTC text	Corrective action
SAE	VAG		
P0261	16645	Cylinder 1 Fuel Injector -N30- Short to Ground (GND)	- Check fuel injectors ⇒ Page 24-97
P0262	16646	Cylinder 1 Fuel Injector -N30- Short to positive	
P0264	16648	Cylinder 2 Fuel Injector -N31- Short to Ground (GND)	
P0265	16649	Cylinder 2 Fuel Injector -N31- Short to positive	
P0267	16651	Cylinder 3 Fuel Injector -N32- Short to Ground (GND)	
P0268	16652	Cylinder 3 Fuel Injector -N32- Short to positive	

DTC code		DTC text	Corrective action
SAE	VAG		
P0270	16654	Cylinder 4 Fuel Injector -N33- Short to Ground (GND)	Check fuel injectors ⇒ Page 24-97
P0271	16655	Cylinder 4 Fuel Injector -N33- Short to positive	
P0273	16657	Cylinder 5 Fuel Injector -N83- Short to Ground (GND)	
P0274	16658	Cylinder 5 Fuel Injector -N83- Short to positive	
P0276	16660	Cylinder 6 Fuel Injector -N84- Short to Ground (GND)	
P0277	16661	Cylinder 6 Fuel Injector -N84- Short to positive	

Ignition system

DTC code		DTC text	Corrective action
SAE	VAG		
P0300	16684	Misfire detected	<ul style="list-style-type: none"> - Check fuel injectors ⇒ Page 24-97 - Check spark connectors ⇒ Page 28-15 - Check ignition coils with power output stage ⇒ Page 28-23 - Check misfire detection ⇒ Page 28-40
P0301	16685	Cyl. 1 misfire detected	
P0302	16686	Cyl. 2 misfire detected	
P0303	16687	Cyl. 3 misfire detected	
P0304	16688	Cyl. 4 misfire detected	
P0305	16689	Cyl. 5 misfire detected	
P0306	16690	Cyl. 6 misfire detected	

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DTC code		DTC text	Corrective action
SAE	VAG		
P0318	16702	Heavy duty suspension info/ specified engine torque from ABS CU, Electrical malfunction	- Check DTC memory ABS control module: ⇒ Repair Manual, Brake System On Board Diagnostic (OBD); Repair Group 01; Diagnostic Trouble Code (DTC) memory, checking
P0321	16705	Engine Speed (RPM) Sensor -G28- Implausible signal	- Check Engine Speed (RPM) Sensor - G28- ⇒ Page 24-93
P0322	16706	Engine Speed (RPM) Sensor -G28- No signal	
P0327	16711	Knock Sensor (KS) 1 - G61- Signal too low	- Check knock sensors ⇒ Page 28-30 - Loosen knock sensor and tighten again to 20 Nm
P0328	16712	Knock Sensor (KS) 1 - G61- Signal too high	
P0332	16716	Knock Sensor (KS) 2 - G66- Signal too low	
P0333	16717	Knock Sensor (KS) 2 - G66- Signal too high	

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DTC code		DTC text	Corrective action
SAE	VAG		
P0341	16725	Camshaft Position (CMP) Sensor -G40- Implausible signal	- Check Camshaft Position (CMP) Sensor -G40- ⇒ Page 28-16
P0342	16726	Camshaft Position (CMP) Sensor -G40- Signal too low	
P0343	16727	Camshaft Position (CMP) Sensor -G40- Signal too high	
P0346	16730	Camshaft Position (CMP) Sensor 2 -G163- Implausible signal	

Supplementary exhaust gas control

DTC code		DTC text	Corrective action
SAE	VAG		
P0411	16795	Secondary air system Through flow faulty	- Check Secondary Air Injection (AIR) Pump Motor: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check combi-valve: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check secondary air system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check hoses and connecting pipes to/between components: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26

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DTC code		DTC text	Corrective action
SAE	VAG		
P0412	16796	Secondary Air Injection (AIR) Solenoid Valve - N112- Electrical malfunction	- Check Secondary Air Injection (AIR) Solenoid Valve -N112-- => Page 01-100 , Output Diagnosis Test Mode (DTM)
P0413	16797	Secondary Air Injection (AIR) Solenoid Valve - N112-- Open circuit	
P0414	16798	Secondary Air Injection (AIR) Solenoid Valve - N112-- Short circuit	
P0418	16802	Secondary Air Injection (AIR) Pump Relay - J299-- Malfunction	- Check Secondary Air Injection (AIR) Pump Relay -J299-- => Page 01-100 , Output Diagnosis Test Mode (DTM)

DTC code		DTC text	Corrective action
SAE	VAG		
P0420	16804	Bank 1 Three Way Catalytic Converter (TWC) system Efficiency too low	- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC) ⇒ Page 24-131
			- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control after Three Way Catalytic Converter (TWC) ⇒ Page 24-140
			- Check Oxygen Sensor (O2S) aging before Three Way Catalytic Converter (TWC) ⇒ Page 24-150
			- Check Oxygen Sensor (O2S) aging after Three Way Catalytic Converter (TWC) ⇒ Page 24-154
P0422	16806	Bank 1 main Three Way Catalytic Converter (TWC) Efficiency too low	- Check Three Way Catalytic Converter (TWC): ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26

Note:

If this malfunction is detected on its own i.e. no Oxygen Sensor (O2S) or control malfunction, then the Three Way Catalytic Converter (TWC) must be checked for damage and replaced if necessary.

DTC code		DTC text	Corrective action
SAE	VAG		
P0441	16825	Tank ventilation system	- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
		Flow rate faulty	- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
			- Check hoses and connections from fuel tank to Throttle Valve Control Module: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
P0442	16826	Tank ventilation system Small leak detected	- Check Evaporative Emissions (EVAP) Canister system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20

01-51

DTC code		DTC text	Corrective action
SAE	VAG		
P0444	16828	Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- Open circuit	- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P0445	16829	Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- Short circuit	- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- : ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
P0455	16839	Tank ventilation system Large leak detected	- Check Evaporative Emissions (EVAP) canister system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
P0456	16840	Tank ventilation system Small leak detected	

Speed and idling control

DTC code		DTC text	Corrective action
SAE	VAG		
P0501	16885	Vehicle speed signal Implausible signal	- Check speed signal ⇒ Page 24-188
P0506	16890	Idle speed control Revs below specification	- Check throttle valve control module ⇒ Page 24-59
P0507	16891	Idle speed control Above specifications	
P0513	16897	Incorrect Immobilizer code	- Perform immobilizer On Board Diagnosis (OBD): ⇒ Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01

DTC code		DTC text	Corrective action
SAE	VAG		
P0560	16944	Voltage supply Implausible signal	- Check voltage supply ⇒ Page 24-163
P0562	16946	Voltage supply too low	- Procedure after interrupting voltage supply ⇒ Page 24-170
P0563	16947	Voltage supply too high	
P0568	16952	Cruise control system (CCS) switch -E45- Implausible signal	- Check cruise control system (CCS) ⇒ Page 24-218
P0571	16955	Brake Light Switch -F- - ¹) Implausible signal	- Check signals from Brake Light Switch -F-- and Brake Vacuum Vent Valve Switch -F47- ⇒ Page 24-206

1) The system monitors both Brake Light Switch -F- and Brake Vacuum Vent Valve Switch -F47-.

Control module and output signals

DTC code		DTC text	Corrective action
SAE	VAG		
P0600	16984	Drive train Can-bus Message missing	- Check Can-bus matching resistor ⇒ Page 24-223
P0601	16985	Control module faulty 1)	- Replace Motronic Engine Control Module (ECM) -J220- ⇒ Page 24-173
P0602	16986	Control module programming Malfunction ¹⁾	
P0604	16988	Control module faulty 1)	
P0605	16989	Control module faulty 1)	
P0606	16990	Control module faulty 1)	

¹⁾ The DTC can be set when the vehicle is started and the battery voltage is too low. The engine does start but the Motronic Engine Control Module (ECM) -J220- detects that the voltage is too low. The battery must be recharged and the DTC memory erased. Then Throttle Valve Control Module must be adapted (matched) to the Motronic Engine Control Module (ECM) -J220- and the readiness code regenerated again. If the DTC occurs again after a road test, then replace the control module.

DTC code		DTC text	Corrective action
SAE	VAG		
P0638	17022	Throttle Valve Control Module - J338- Implausible signal	<ul style="list-style-type: none">- Check Throttle Valve Control Module ⇒ Page 24-59 - Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- to throttle valve control module ⇒ Page 24-182 - Check Throttle Position (TP) Sensor: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20

DTC code		DTC text	Corrective action
SAE	VAG		
P0650	17034	Malfunction Indicator Lamp (MIL) -K83- Electrical malfunction	- Check instrument cluster: ⇒ Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01
P0685	17069	Motronic Engine Control Module (ECM) Power Supply Relay -J271- Open circuit	- Check voltage supply ⇒ Page 24-163
P0686	17070	Motronic Engine Control Module (ECM) Power Supply Relay -J271- Short to Ground (GND)	- Procedure after interrupting voltage supply ⇒ Page 24-170
P0687	17071	Motronic Engine Control Module (ECM) Power Supply Relay -J271- Short to positive	- Check Motronic Engine Control Module (ECM) Power Supply Relay -J271-: ⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations
P0686	17072	Motronic Engine Control Module (ECM) Power Supply Relay -J271- load circuit Open circuit	

Transmission

DTC code		DTC text	Corrective action
SAE	VAG		
P0704	17088	Clutch Vacuum Vent Valve Switch -F36- Implausible signal	- Check signal from Clutch Vacuum Vent Valve Switch -F36- ⇒ Page 24-199

DTC table: SAE P1 codes

DTCs P1047 to P1912, VAG 17455 to 18322

Note:

- ◆ The DTC code overview is listed according to SAE or VAG code.
- ◆ Erase DTC memory after repairing malfunction ⇒ [Page 01-23](#) and generate readiness code again ⇒ [Page 01-149](#).

Fuel and air measurements and supplementary exhaust gas control

DTC code		DTC text	Corrective action
SAE	VAG		
P1047	17455	Bank 1, Camshaft Adjustment Valve 1 - N318- Electrical malfunction	- Check Camshaft Adjustment Valve 1 - N318- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P1048	17456	Bank 1, Camshaft Adjustment Valve 1 - N318- Short to positive	- Check camshaft timing adjustment: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15
P1049	17457	Bank 1, Camshaft Adjustment Valve 1 - N318- Short to Ground (GND)	
P1050	17458	Bank 1, Camshaft Adjustment Valve 1 - N318- Open circuit	

Fuel and air measurements

DTC code		DTC text	Corrective action
SAE	VAG		
P1102	17510	Bank 1, sensor 1 heating element circuit Short to positive	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ Page 24-38
P1103	17511	Bank 1, sensor 1 heating element circuit Output too low	- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC) ⇒ Page 24-131
P1105	17513	Bank 1, sensor 2 heating element circuit Short to positive	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ Page 24-45
P1111	17519	Oxygen Sensor (O2S) control (bank 1) System too lean	- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC) ⇒ Page 24-131
P1112	17520	Oxygen Sensor (O2S) control (bank 1) System too rich	

01-60

DTC code		DTC text	Corrective action
SAE	VAG		
P1113	17521	Bank 1, sensor 1 Internal resistance too high	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ Page 24-38
P1114	17522	Bank 1 sensor 2 Internal resistance too high	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ Page 24-45
P1115	17523	Bank 1, sensor 1 heating element circuit Short to Ground (GND)	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ Page 24-38
P1116	17524	Bank 1, sensor 1 heating element circuit Open circuit	
P1117	17525	Bank 1, sensor 2 heating element circuit Short to Ground (GND)	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ Page 24-45
P1118	17526	Bank 1, sensor 2 heating element circuit Open circuit	

01-61

DTC code		DTC text	Corrective action
SAE	VAG		
P1127	17535	Bank 1, mixture adaption (mult.)	- Check fuel pressure control and holding pressure ⇒ Page 24-110
		System too rich	- Check fuel injectors ⇒ Page 24-104
			- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20

Note:

mult. = multiplicative means that the DTC occurs throughout the entire speed range and load range.

01-62

DTC code		DTC text	Corrective action
SAE	VAG		
P1128	17536	Bank 1, mixture adaption (mult.) System too lean	- Check fuel pressure control and holding pressure ⇒ Page 24-110
			- Check fuel injectors ⇒ Page 24-104
			- Check fuel pump: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
			- Check intake system for leaks ⇒ Page 24-121
			- Check exhaust system for leaks: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check secondary air system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check vacuum lines for leaks

Note:

mult. = multiplicative means that the DTC occurs throughout the entire speed range and load range.

01-63

DTC code		DTC text	Corrective action
SAE	VAG		
P1136	17544	Bank 1, mixture adaption (add.), System too lean	- Check fuel pressure control and holding pressure ⇒ Page 24-110
			- Check fuel injectors ⇒ Page 24-104
			- Check fuel pump: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
			- Check intake system for leaks ⇒ Page 24-121
			- Check exhaust system for leaks: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check secondary air system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check vacuum lines for leaks

Note:

add. = additive means, the DTC only occurs at idle.

01-64

DTC code		DTC text	Corrective action
SAE	VAG		
P1137	17545	Bank 1, mixture adaption (add.), System too rich	- Check fuel pressure control and holding pressure ⇒ Page 24-110
			- Check fuel injectors ⇒ Page 24-104
			- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20

Note:

add. = additive means, the DTC only occurs at idle.

01-65

DTC code		DTC text	Corrective action
SAE	VAG		
P1141	17549	Load determination Implausible value	- Check Mass Air Flow (MAF) Sensor -G70- ⇒ Page 24-52
P1142	17550	Load determination Limit not reached	- Check intake system for leaks ⇒ Page 24-121
P1143	17551	Load determination Limit exceeded	- Check Throttle Valve Control Module -J338- ⇒ Page 24-59 - Check Throttle Position (TP) Sensor: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
P1149	17557	Oxygen Sensor (O2S) control, bank 1 Implausible control value	- Checking Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC) ⇒ Page 24-131

01-66

DTC code		DTC text	Corrective action
SAE	VAG		
P1151	17559	Bank 1, mixture adaption region 1 Below lean limit	- Check fuel pressure control and holding pressure ⇒ Page 24-110
			- Check fuel injectors ⇒ Page 24-104
			- Check fuel pump: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
			- Check intake system for leaks ⇒ Page 24-121
			- Check exhaust system for leaks: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check secondary air system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check vacuum lines for leaks

01-67

DTC code		DTC text	Corrective action
SAE	VAG		
P1152	17560	Bank 1, mixture adaption region 2, Below lean limit	- Check fuel injectors ⇒ Page 24-104
			- Check fuel pump: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
			- Check intake system for leaks ⇒ Page 24-121
			- Check exhaust system for leaks: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
			- Check secondary air system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26

01-68

DTC code		DTC text	Corrective action
SAE	VAG		
P1165	17573	Bank 1, mixture adaption region 1	- Check fuel pressure control and holding pressure ⇒ Page 24-110
		Rich limit exceeded	- Check fuel injectors ⇒ Page 24-104
			- Check Evaporative Emission (EVAP) Canister Purge RegulatorValve -N80-: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
P1166	17574	Bank 1, mixture adaption region 2	- Check fuel pressure control and holding pressure ⇒ Page 24-110
		Rich limit exceeded	- Check fuel injectors ⇒ Page 24-104 , Checking quantity injected and for leaks
			- Check Evaporative Emission (EVAP) Canister Purge RegulatorValve -N80-: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20

DTC code		DTC text	Corrective action
SAE	VAG		
P1171	17579	Angle sensor -2- for throttle drive -G188- Implausible signal ¹⁾	- Check Throttle Valve Control Module -J338- ⇒ Page 24-59
P1172	17580	Angle sensor -2- for throttle drive -G188- Signal too low ¹⁾	
P1173	17581	Angle sensor -2- for throttle drive -G188- Signal too high ¹⁾	
P1176	17584	Bank 1 Oxygen Sensor (O2S) correction after Three Way Catalytic Converter (TWC) Control limit reached	- Check aging of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ Page 24-154
			- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control after Three Way Catalytic Converter (TWC) ⇒ Page 24-140
			- Check intake system for leaks ⇒ Page 24-121

¹⁾ If this malfunction occurs, the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

01-70

DTC code		DTC text	Corrective action
SAE	VAG		
P1178	17586	Linear Oxygen Sensor (O2S) / pump current Open circuit	- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC) ⇒ Page 24-131
P1179	17587	Linear Oxygen Sensor (O2S) / pump current Short to Ground (GND)	
P1180	17588	Linear Oxygen Sensor (O2S) / pump current Short to positive	
P1181	17589	Linear Oxygen Sensor (O2S) / reference voltage Open circuit	
P1182	17590	Linear Oxygen Sensor (O2S) / reference voltage Short to Ground (GND)	
P1183	17591	Linear Oxygen Sensor (O2S) / reference voltage Short to positive	
P1184	17592	Linear Oxygen Sensor (O2S) / common Ground (GND) Open circuit	
P1185	17593	Linear Oxygen Sensor (O2S) / common Ground (GND) Short to Ground (GND)	
P1186	17594	Linear Oxygen Sensor	

	(O2S) / common Ground (GND)	
	Short to positive	

01-71

DTC code		DTC text	Corrective action
SAE	VAG		
P1196	17604	Bank 1 sensor 1, heater element circuit Electrical malfunction	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ Page 24-38
P1198	17606	Bank 1 sensor 2, heater element circuit Electrical malfunction	- Check Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ Page 24-45

Fuel and air measurements

DTC code		DTC text	Corrective action
SAE	VAG		
P1250	17658	Fuel level too low ¹⁾	Fuel level in fuel tank less than 5 liter: - Fill fuel tank - Check signal from fuel gauge sensor: ⇒ Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01
P1296	17704	Malfunction in cooling system	- Check Engine Coolant Temperature (ECT) sensor ⇒ Page 24-69 - Check thermostat: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF, Repair Group 19

1) The DTC P1250 "Fuel level in fuel tank too low" is stored when there is insufficient fuel in fuel tank or the DTC is stored permanently in the Motronic Engine Control Module (ECM) -J220- and is not set to sporadic when the fuel tank is filled. Then attributed Diagnostic Trouble Codes (DTCs) may have been detected due to insufficient fuel e.g. misfire or Diagnostic Trouble Codes (DTCs) concerning the Oxygen Sensor (O2S).

Ignition system

DTC code		DTC text	Corrective action
SAE	VAG		
P1325	17733	Knock control cyl. 1 control limit reached	- Check knock sensors ⇒ Page 28-30
P1326	17734	Knock control cyl. 2 control limit reached	- Repair abnormal engine running noises (accessories loose, brackets/bolts broken)
P1327	17735	Knock control cyl. 3 control limit reached	- Loosen knock sensor and tighten again to 20 Nm
P1328	17736	Knock control cyl. 4 control limit reached	- Change type of fuel
P1329	17737	Knock control cyl. 5 control limit reached	
P1330	17738	Knock control cyl. 6 control limit reached	

DTC code		DTC text	Corrective action
SAE	VAG		
P1335	17743	Engine torque monitor 2 Control limit exceeded ¹⁾	- Check Intake Air Temperature (IAT) sensor -G42- ⇒ Page 24-81
P1336	17744	Engine torque monitor Control limit surpassed	- Check Mass Air Flow (MAF) Sensor -G70- ⇒ Page 24-52 - Check Engine Coolant Temperature (ECT) sensor -G62- ⇒ Page 24-69
P1337	17745	Bank 1, Camshaft Position (CMP) Sensor -G40- Short to Ground (GND)	- Check Camshaft Position (CMP) Sensor -G40- ⇒ Page 28-16
P1338	17746	Bank 1, Camshaft Position (CMP) Sensor -G40- Open circuit/Short to positive	
P1340	17748	Camshaft position/crankshaft position sensor Wrong allocation	- Check Camshaft Position (CMP) Sensor -G40- ⇒ Page 28-16
P1347	17755	Bank 2, Camshaft position/crankshaft position sensor Wrong allocation	- Check engine speed sensor ⇒ Page 24-93 - Check timing: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

01-75

DTC code		DTC text	Corrective action
SAE	VAG		
P1355	17763	Ignition timing cyl. 1 Open circuit	- Check ignition coils with power output stage ⇒ Page 28-23
P1356	17764	Ignition timing cyl. 1 Short to positive	
P1357	17765	Ignition timing cyl. 1 Short to Ground (GND)	
P1358	17766	Ignition timing cyl. 2 Open circuit	
P1359	17767	Ignition timing cyl. 2 Short to positive	
P1360	17768	Ignition timing cyl. 2 Short to Ground (GND)	
P1361	17769	Ignition timing cyl. 3 Open circuit	
P1362	17770	Ignition timing cyl. 3 Short to positive	
P1363	17771	Ignition timing cyl. 3 Short to Ground (GND)	

01-76

DTC code		DTC text	Corrective action
SAE	VAG		
P1364	17772	Ignition timing cyl. 4 Open circuit	- Check ignition coils with power output stage ⇒ Page 28-23
P1365	17773	Ignition timing cyl. 4 Short to positive	
P1366	17774	Ignition timing cyl. 4 Short to Ground (GND)	
P1367	17775	Ignition timing cyl. 5 Open circuit	
P1368	17776	Ignition timing cyl. 5 Short to positive	
P1369	17777	Ignition timing cyl. 5 Short to Ground (GND)	
P1370	17778	Ignition timing cyl. 6 Open circuit	
P1371	17779	Ignition timing cyl. 6 Short to positive	
P1372	17780	Ignition timing cyl. 6 Short to Ground (GND)	

01-77

DTC code		DTC text	Corrective action
SAE	VAG		
P1385	17793	Control module faulty ¹⁾	- Replace Motronic Engine Control Module (ECM) -J220- ⇒ Page 24-173
P1386	17794	Control module faulty ¹⁾	
P1387	17795	Control module faulty ¹⁾	
P1388	17796	Control module faulty ¹⁾	
P1391	17799	Bank 2, Camshaft Position (CMP) Sensor -G163- Short to Ground (GND)	- Check Camshaft Position (CMP) Sensor -G40- ⇒ Page 28-16
P1392	17800	Bank 2, Camshaft Position (CMP) Sensor -G163- Open circuit/Short to positive	

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

01-78

Supplementary exhaust gas control

DTC code		DTC text	Corrective action
SAE	VAG		
P1409	17817	Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- Electrical malfunction	- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P1410	17818	Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- Short to positive	
P1420	17828	Secondary Air Injection (AIR) Solenoid Valve - N112- Electrical malfunction	- Check Secondary Air Injection (AIR) Solenoid Valve ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P1421	17829	Secondary Air Injection (AIR) Solenoid Valve - N112- Short to Ground (GND)	

01-79

DTC code		DTC text	Corrective action
SAE	VAG		
P1422	17830	Secondary Air Injection (AIR) Solenoid Valve - N112- Short to positive	
P1424	17832	Bank 1, secondary air system Leak detected	- Check secondary air system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26
P1425	17833	Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- Short to Ground (GND)	- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P1426	17834	Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- Open circuit	

01-80

DTC code		DTC text	Corrective action
SAE	VAG		
P1427	17835	Brake System Vacuum Pump activation Short to positive	- Check Brake System Vacuum Pump ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P1428	17836	Brake System Vacuum Pump activation Short to Ground (GND)	
P1429	17837	Brake System Vacuum Pump activation Open circuit	
P1430	17838	Brake System Vacuum Pump activation Open circuit / Short to positive	
P1431	17839	Brake System Vacuum Pump activation Open circuit / short to Ground (GND)	

01-81

DTC code		DTC text	Corrective action
SAE	VAG		
P1432	17840	Secondary Air Injection (AIR) Solenoid Valve - N112- Open circuit	- Check Secondary Air Injection (AIR) Solenoid Valve -N112- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P1433	17841	Secondary Air Injection (AIR) Pump Relay - J299- Open circuit	- Check Secondary Air Injection (AIR) Pump Relay -J299- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P1434	17842	Secondary Air Injection (AIR) Pump Relay - J299- Short to positive	
P1435	17843	Secondary Air Injection (AIR) Pump Relay - J299- Short to Ground (GND)	
P1436	17844	Secondary Air Injection (AIR) Pump Relay - J299- Electrical malfunction	

01-82

DTC code		DTC text	Corrective action
SAE	VAG		
P1470	17878	Leak Detection Pump (LDP) -V144- Electrical malfunction	- Check Leak detection pump (LDP) - V144- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P1471	17879	Leak Detection Pump (LDP) -V144- Short to positive	
P1472	17880	Leak Detection Pump (LDP) -V144- Short to Ground (GND)	
P1473	17881	Leak Detection Pump (LDP) -V144- Open circuit	
P1475	17883	Leak Detection Pump (LDP) -V144- Malfunction/no signal	
P1476	17884	Leak Detection Pump (LDP) -V144- Malfunction/vacuum insufficient	
P1477	17885	Leak Detection Pump (LDP) -V144- Malfunction	
P1478	17886	Leak Detection Pump (LDP) -V144- Blocked hose detected	
P1479	17887	Brake vacuum system mechanical malfunction	- Check Brake System Vacuum Pump ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)

Speed and idling control

DTC code		DTC text	Corrective action
SAE	VAG		
P1500	17908	Fuel Pump (FP) Relay -J17- Electrical malfunction	- Check Fuel Pump (FP) Relay -J17-: ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations</i>
P1501	17909	Fuel Pump (FP) Relay -J17- Short to Ground (GND)	
P1502	17910	Fuel Pump (FP) Relay -J17- Short to positive	
P1512	17920	Intake Manifold Change-Over Valve - N156- Short to positive	- Check Intake Manifold Change-Over Valve -N156- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
P1515	17923	Intake Manifold Change-Over Valve - N156- Short to Ground (GND)	
P1516	17924	Intake Manifold Change-Over Valve - N156- Open circuit	

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DTC code		DTC text	Corrective action
SAE	VAG		
P1517	17925	Motronic Engine Control Module (ECM) Power Supply Relay -J271- Electrical malfunction	- Check voltage supply ⇒ Page 24-163
			- Procedure after interrupting voltage supply ⇒ Page 24-170
			- Check Motronic Engine Control Module (ECM) Power Supply Relay - J271-: ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations</i>
P1519	17927	Bank 1 camshaft timing adjustment Malfunction	- Check camshaft timing adjustment valve ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM)
			- Check camshaft timing adjustment: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15
			- Check timing: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15

01-85

DTC code		DTC text	Corrective action
SAE	VAG		
P1523	17931	Crash signal from airbag control module, Implausible signal	<ul style="list-style-type: none"> - Check and erase DTC memory ⇒ Page 01-23 - Check airbag system: ⇒ Repair Manual, Body On Board Diagnostic (OBD); Repair Group 01
P1526	17934	Valve -1- for camshaft adjustment -N205- Short to positive	<ul style="list-style-type: none"> - Check Valve -1- for camshaft adjustment -N205- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM) - Check camshaft timing adjustment: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15
P1527	17935	Valve -1- for camshaft adjustment -N205- Short to Ground (GND)	
P1528	17936	Valve -1- for camshaft adjustment -N205- Open circuit	

DTC code		DTC text	Corrective action
SAE	VAG		
P1539	17947	Clutch Vacuum Vent Valve Switch -F36- Implausible signal	- Check signal from Clutch Vacuum Vent Valve Switch -F36- ⇒ Page 24-199
P1541	17949	Fuel Pump (FP) Relay - J17- Open circuit	- Check fuel pump relay: ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations</i>
P1542	17950	Angle sensor -1- for throttle drive -G187- Implausible signal ¹⁾	- Check Throttle Valve Control Module - J338- ⇒ Page 24-59
P1543	17951	Angle sensor -1- for throttle drive -G187- Signal too low ¹⁾	
P1544	17952	Angle sensor -1- for throttle drive -G187- Signal too high ¹⁾	
P1545	17953	Throttle valve control Malfunction ¹⁾	

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

01-87

DTC code		DTC text	Corrective action
SAE	VAG		
P1558	17966	Throttle valve drive - G186- Electrical malfunction ¹⁾	- Check Throttle Valve Control Module -J338- ⇒ Page 24-59
P1559	17967	Throttle Valve Control Module - J338- Malfunction in basic setting ¹⁾	- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- to Throttle Valve Control Module -J338- ⇒ Page 24-182
P1564	17972	Throttle Valve Control Module - J338- Low voltage at basic setting ¹⁾	
P1565	17973	Throttle Valve Control Module - J338- Lower limit stop not reached ¹⁾	- Check Throttle Valve Control Module -J338- ⇒ Page 24-59
P1568	17976	Throttle Valve Control Module - J338- Mechanical malfunction ¹⁾	- Clean Throttle Valve Control Module -J338-

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

DTC code		DTC text	Corrective action
SAE	VAG		
P1569	17977	CCS switch -E45- Implausible signal	- Check cruise control system (CCS) ⇒ Page 24-218
P1570	17978	Motronic Engine Control Module (ECM) -J220- Electronically locked	- Adapt (match) Motronic Engine Control Module (ECM) -J220- to electronic Immobilizer: ⇒ Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01
P1579	17987	Throttle Valve Control Module -J338- Adaption not started ¹⁾	- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- to Throttle Valve Control Module -J338- ⇒ Page 24-182

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

Control module and output signals

DTC code		DTC text	Corrective action
SAE	VAG		
P1602	18010	Voltage supply terminal 30 Voltage supply too low	- Check voltage supply ⇒ Page 24-163
			- Procedure after interrupting voltage supply ⇒ Page 24-170
P1603	18011	Motronic Engine Control Module (ECM) -J220- faulty ¹⁾	- Replace Motronic Engine Control Module (ECM) -J220- ⇒ Page 24-173
P1604	18012	Motronic Engine Control Module (ECM) -J220- faulty ¹⁾	
P1609	18017	Crash cut-off activated	- Check and erase DTC memory ⇒ Page 01-23
			- Check airbag system: ⇒ Repair Manual, Body On Board Diagnostic (OBD); Repair Group 01
P1610	18018	Motronic Engine Control Module (ECM) -J220- faulty ¹⁾	- Replace Motronic Engine Control Module (ECM) -J220- ⇒ Page 24-173

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

DTC code		DTC text	Corrective action
SAE	VAG		
P1612	18020	Motronic Engine Control Module (ECM) -J220- ¹⁾ Incorrect coding	- Code Motronic Engine Control Module (ECM) -J220- ⇒ Page 24-177
P1624	18032	Request for Malfunction Indicator Light (MIL) on activated	- Check DTC memories of all control modules and erase ⇒ Page 01-27
P1626	18034	Drive train Can-bus No message from transmission control module	- Check Can-bus matching resistor ⇒ Page 24-223
P1628	18036	Drive train Can-bus No message from steering angle sensor	

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

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DTC code		DTC text	Corrective action
SAE	VAG		
P1630	18038	Throttle Position (TP) Sensor -G79- Signal too low ¹⁾	- Check Throttle Position (TP) Sensor - G79-: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
P1631	18039	Throttle Position (TP) Sensor -G79- Signal too high ¹⁾	
P1633	18041	Throttle Position (TP) Sensor 2 -G185- Signal too low ¹⁾	
P1634	18042	Throttle Position (TP) Sensor 2 -G185- Signal too high ¹⁾	
P1635	18043	Drive train Can-bus No message from air conditioning control module	- Check Can-bus matching resistor ⇒ Page 24-223 - Check air conditioning system: ⇒ Repair Manual, Heating & Air Conditioning; Repair Group 01

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

DTC code		DTC text	Corrective action
SAE	VAG		
P1636	18044	Drive train Can-bus	- Check Can-bus matching resistor ⇒ Page 24-223
		No message from airbag control module	- Check airbag system: ⇒ Repair Manual, Body On Board Diagnostic (OBD); Repair Group 01
P1639	18047	Throttle Position (TP) Sensors 1 & 2 -G79- + -G185- Implausible signal ¹⁾	- Check Throttle Position (TP) Sensor: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
P1640	18048	Control module faulty	- Replace Motronic Engine Control Module (ECM) -J220- ⇒ Page 24-173

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

01-93

DTC code		DTC text	Corrective action
SAE	VAG		
P1648	18056	Drive train Can-bus faulty	- Check Can-bus matching resistor ⇒ Page 24-223
P1649	18057	Drive train Can-bus No message from ABS control module	- Check Can-bus matching resistor ⇒ Page 24-223
			- Check ABS control module DTC memory: ⇒ Repair Manual, Brake System On Board Diagnostic (OBD); Repair Group 01
P1650	18058	Drive train Can-bus No message from instrument cluster	- Check Can-bus matching resistor ⇒ Page 24-223
			- Check instrument cluster: ⇒ Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01

01-94

DTC code		DTC text	Corrective action
SAE	VAG		
P1654	18062	Please read DTC memory of instrument cluster	- Check instrument cluster: ⇒ Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01
P1677	18085	Electronic Power Control (EPC) Warning Light - K132- Short to positive ¹⁾	- Check Can-bus matching resistor ⇒ Page 24-223
P1678	18086	Electronic Power Control (EPC) Warning Light - K132- Short to Ground (GND) ¹⁾	- Check instrument cluster and Electronic Power Control (EPC) Warning Light -K132-: ⇒ Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01
P1679	18087	Electronic Power Control (EPC) Warning Light - K132- Open circuit ¹⁾	

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

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DTC code		DTC text	Corrective action
SAE	VAG		
P1682	18090	Drive train Can-bus Implausible message from ABS control module	- Check Can-bus matching resistor ⇒ Page 24-223
			- Check ABS control module DTC memory: ⇒ Repair Manual, Brake System On Board Diagnostic (OBD); Repair Group 01
P1683	18091	Drive train Can-bus Implausible message from airbag control module	- Check Can-bus matching resistor ⇒ Page 24-223
			- Check airbag system: ⇒ Repair Manual, Body On Board Diagnostic (OBD); Repair Group 01

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DTC code		DTC text	Corrective action
SAE	VAG		
P1691	18099	Malfunction Indicator Lamp (MIL) -K83- Open circuit	- Check Can-bus matching resistor ⇒ Page 24-223
P1692	18100	Malfunction Indicator Lamp (MIL) -K83- Short to Ground (GND)	- Check instrument cluster and Electronic Power Control (EPC) Warning Light -K132-: ⇒ Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01
P1693	18101	Malfunction Indicator Lamp (MIL) -K83- Short to positive	
P1696	18104	Drive train Can-bus Implausible message from Steering Column Electronic Systems Control Module -J527-	- Check Can-bus matching resistor ⇒ Page 24-223
P1699	18107	Drive train Can-bus No message from Steering Column Electronic Systems Control Module -J527-	- Check Steering Column Electronic Systems Control Module -J527-: ⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations

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control module, input and output signals

DTC code		DTC text	Corrective action
SAE	VAG		
P1912	18320	Brake Booster Pressure Sensor -G294- Short to positive / Open circuit	- Check Brake Booster Pressure Sensor - G294-: ⇒ Repair Manual, Brake System On Board Diagnostic (OBD); Repair Group 01
P1913	18321	Brake Booster Pressure Sensor -G294- Short to Ground (GND)	
P1914	18322	Brake Booster Pressure Sensor -G294- Implausible signal	

DTC table: SAE P2 codes

DTCs P2101 to P2138, VAG 18533 to 18570

Note:

- ◆ The DTC code overview is listed according to SAE or VAG code.
- ◆ Erase DTC memory after repairing malfunction ⇒ [Page 01-23](#) and generate readiness code again ⇒ [Page 01-149](#) .

Fuel and air measurements

DTC code		DTC text	Corrective action
SAE	VAG		
P2101	18533	Throttle valve control Malfunction	- Check Throttle Valve Control Module - J338- ⇒ Page 24-59
P2122	18554	Throttle Position (TP) Sensor -G79- Signal too low ¹⁾	- Check Throttle Position (TP) Sensor: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
P2127	18559	Throttle Position (TP) Sensor 2 -G185- Signal too low ¹⁾	
P2128	18560	Throttle Position (TP) Sensor 2 -G185- Signal too high ¹⁾	
P2138	18570	Throttle Position (TP) Sensors 1 & 2 -G79- + - G185- Implausible signal ¹⁾	

¹⁾ If this malfunction occurs the Motronic Engine Control Module (ECM) -J220- switches on the Electronic Power Control (EPC) Warning Light -K132- in the instrument cluster. Significance of Electronic Power Control (EPC) Warning Light -K132- ⇒ [Page 01-3](#) .

DTC table: SAE P3 codes

DTCs P3211 to P3266, VAG 19667 to 19722

Note:

- ◆ The DTC code overview is listed according to SAE or VAG code.
- ◆ Erase DTC memory after repairing malfunction ⇒ [Page 01-23](#) and generate readiness code again ⇒ [Page 01-149](#).

Fuel and air measurements

DTC code		DTC text	Corrective action
SAE	VAG		
P3211	19667	Exhaust bank 1 sensor 1 Heater feedback	- Check Oxygen Sensor (O2S) heating before Three Way Catalytic Converter (TWC) ⇒ Page 24-38 - Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC) ⇒ Page 24-131 - Check aging of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ Page 24-150
P3255	19711	Bank 1, Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC), Heater current control on upper limit stop	
P3256	19712	Bank 1, Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC), Heater current control on lower limit stop	
P3266	19722	Bank 1, sensor 1 Implausible internal resistance	

Output Diagnosis Test Mode (DTM)

Output Diagnosis Test Mode (DTM), performing

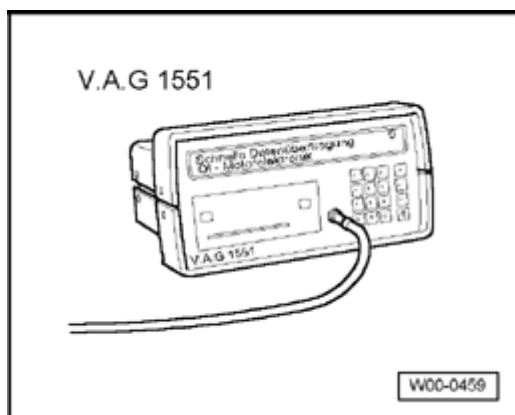
The Output Diagnosis Test Mode (DTM) activates the following components in the stated sequence:

Component		Appears on display
1.	Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-	Fuel tank breather valve -N80-
2.	Secondary Air Injection (AIR) Solenoid Valve -N112-	Secondary air inlet valve -N112-
3.	Secondary Air Injection (AIR) Pump Relay -J299-	Secondary air pump relay -J299-
4.	Intake Manifold Change-Over Valve -N156-	Variable intake manifold change-over valve -N156-
5.	Inlet Valve -1- for camshaft adjustment -N205-	Bank 1 camshaft timing adjustment -N205-
6.	Leak detection pump (LDP) -V144-	Tank breather system leak diagnosis pump
7.	Exhaust Valve -1- for camshaft adjustment -N318-	Bank 1, Exhaust camshaft timing adjustment valve -N318- ¹⁾
8.	Brake System Vacuum Pump -V192- ³⁾	Brake System Vacuum Pump -V192-activation ^{2, 3)}
9.	Cylinder 1 Fuel Injector -N30-	Injector Cyl. 1 -N30-
10.	Cylinder 5 Fuel Injector -N83-	Injector Cyl. 5 -N83-
11.	Cylinder 3 Fuel Injector -N32-	Injector Cyl. 3 -N32-
12.	Cylinder 6 Fuel Injector -N84-	Injector Cyl. 6 -N84-

01-101

Component		Appears on display
13.	Cylinder 2 Fuel Injector -N31-	Injector Cyl. 2 -N31-
14.	Cylinder 4 Fuel Injector -N33-	Injector Cyl. 4 -N33-

- 1) The VAG 1551 scan tool or VAG 1552 display will show "17457 / Literature.
- 2) The VAG 1551 scan tool or VAG 1552 display will show "17836 / Literature.
- 3) Only vehicles with an automatic transmission.



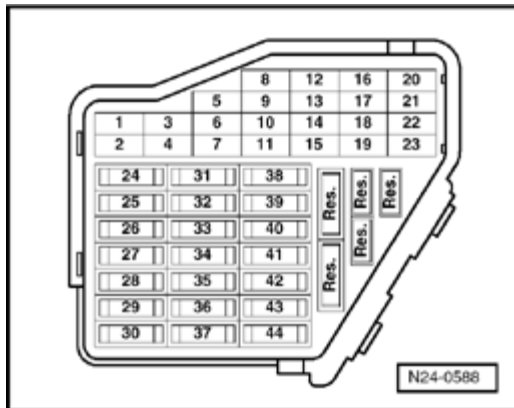
Special tools, workshop equipment, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551 scan tool (or vehicle system tester VAG 1552) with VAG 1551/3 Adapter cable adapter

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the vehicle diagnostic, testing and information system VAS 5051.

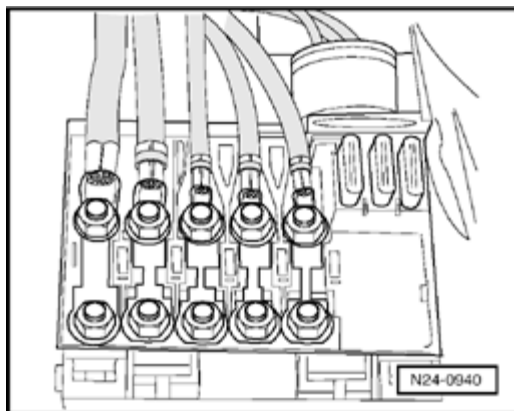
- ◆ VAG 1598/31 Test box
- ◆ VAG 1594 Adapter set
- ◆ VAG 1526 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1527 LED test light
- ◆ Electrical Wiring Diagrams



Test prerequisites



- The fuses must be OK.



- The main fuses must be OK.
- The battery voltage must be at least 11.5 V.
- Ground (GND) connection between engine and body must be OK.
- All electrical devices, e.g. lights and rear window heating must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

- Fuel Pump (FP) relay -J17- must be OK, checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Motronic Engine Control Module (ECM) Power Supply Relay -J271- must be OK., checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Ignition switched on, engine not running.

Note:

- ◆ *The Output Diagnosis Test Mode (DTM) can only be carried out if the engine is not running and ignition is switched on.*
- ◆ *The Output Diagnosis Test Mode (DTM) will be aborted if the engine is started or a rotational impulse is recognized.*
- ◆ *During the Output Diagnosis Test Mode (DTM) the individual control elements will be activated for approx. 60 seconds or until advancing to the next final control by pressing the → button.*
- ◆ *The Output Diagnosis Test Mode (DTM) can be aborted by pressing the -C- button. Therefore there is no need to continue to the end by pressing the → button. This is especially important because the fuel injectors can be actuated with the → button according to the firing order and fuel injector.*
- ◆ *The electric fuel pump will run during the complete Output Diagnosis Test Mode (DTM).*

- ◆ *The Output Diagnostic Test elements are checked by hearing or by feeling.*
- ◆ *The Output Diagnosis Test Mode (DTM) will be aborted after 10 minutes.*
- ◆ *Run engine briefly first if there is a requirement to repeat Output Diagnosis Test Mode (DTM).*

Work sequence

- Connect VAG 1551 scan tool ((VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with the "Address word" 01 (Connecting scan tool and selecting Engine Control Module (ECM) ⇒ [Page 01-12](#)).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Operate scan tool taking into account information on display:
- Press buttons -0- and -3- for function "Output Diagnosis Test Mode (DTM)".

Rapid data transfer
03-Output Diagnosis Test Mode

Q



Indicated on display:

1. Activating Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-:

- Confirm input with -Q- button.

Output Diagnosis Test Mode



Fuel Evaporative Emission (EVAP) Canister Purge Regulator Valve

Indicated on display:

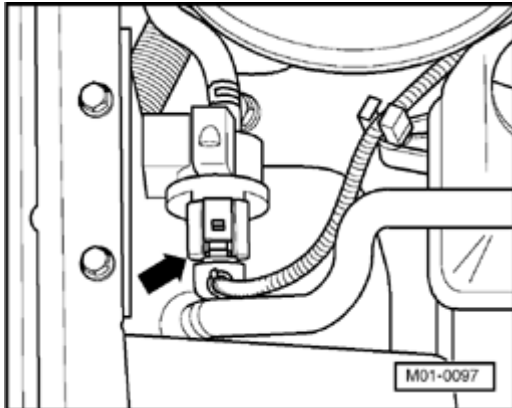
The Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- must click until the next final control element is activated by pressing → button.

The valve clicks but a malfunction is still suspected (valve does not open or close):

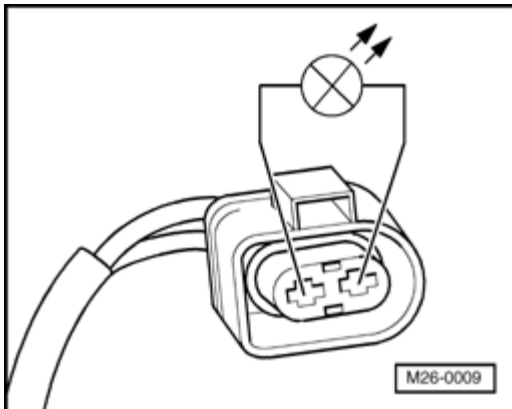
- Disconnect hose from EVAP canister at regulator valve.
- Connect an auxiliary hose to vacant valve connection.
- Blow into adapter hose during Output Diagnosis Test Mode (DTM) (in direction of intake manifold).
- Valve must open and close

01-107

If the solenoid valve does not click:



- Disconnect 2-pin connector from Evaporative Emission (EVAP) Canister Purge Regulator Valve - N80- (arrow).



- Connect LED test light VAG 1527 to disconnected connector using adapter cables from VAG 1594.
LED must flash (bright/darker)

LED flashes:

- Press -C- button to abort output Diagnosis Test Mode (DTM).

Output Diagnosis Test Mode was aborted



Indicated on display:

- Switch off ignition.
- Replace Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

LED does not flash:

- Press -C- button to abort output Diagnosis Test Mode (DTM).

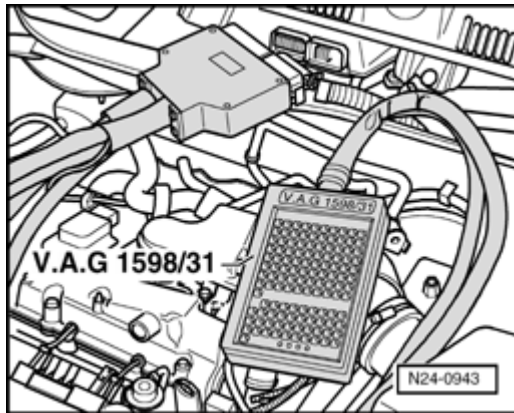
Output Diagnosis Test Mode was aborted



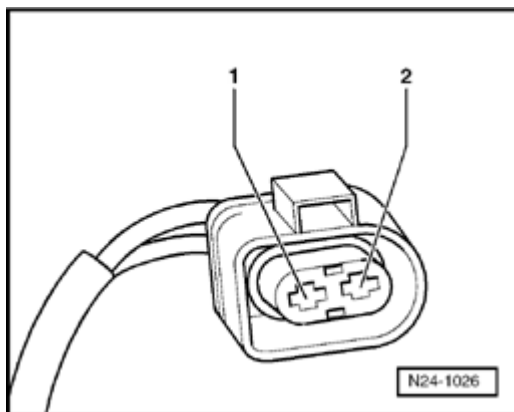
Indicated on display:

- Switch off ignition.
- Remove wiper arms and cowl panel:
⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)

01-109



- Connect test box VAG 1598/31 to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wire for open circuit between test box socket 64 and 2-pin connector terminal 2 referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

- Additionally check wire for short to battery positive and Ground (GND).

Specification: $\infty \Omega$

- Check wire for open circuit between 2-pin connector terminal 1 and Fuel Pump (FP) relay -J17- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no wiring malfunction is found:

- Replace Motronic Engine Control Module (ECM) -J220- \Rightarrow [Page 24-173](#) .

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

2. Activating Secondary Air Injection (AIR) Solenoid Valve -N112-:

- Press → button.

Output Diagnosis Test Mode (DTM) →

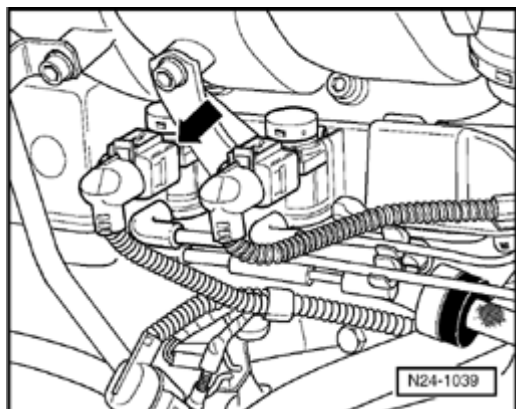


Secondary Air Injection Solenoid Valve

Indicated on display:

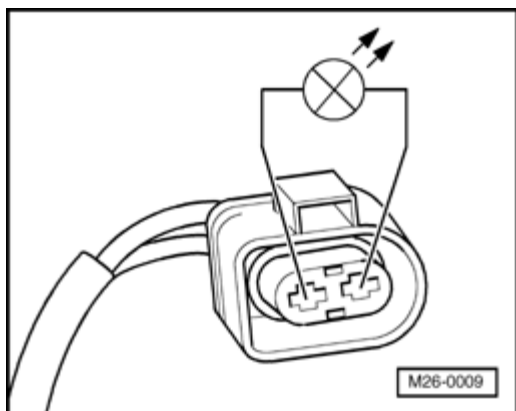
The Secondary Air Injection (AIR) Solenoid Valve must click, until the next final control element is activated by pressing → button.

01-111



If the valve does not click:

- ✦ - Disconnect 2-pin connector from Secondary Air Injection (AIR) Solenoid Valve (arrow).



- ✦ - Connect LED test light VAG 1527 to disconnected connector using adapter cables from VAG 1594.
LED must flash (bright/darker)

LED flashes:

- Press -C- button to abort output Diagnosis Test Mode (DTM).

Output Diagnosis Test Mode was aborted



Indicated on display:

- Switch off ignition.
- Replace Secondary Air Injection (AIR) Solenoid Valve -N112-:
⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 26](#)
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

LED does not flash:

- Press -C- button to abort output Diagnosis Test Mode (DTM).

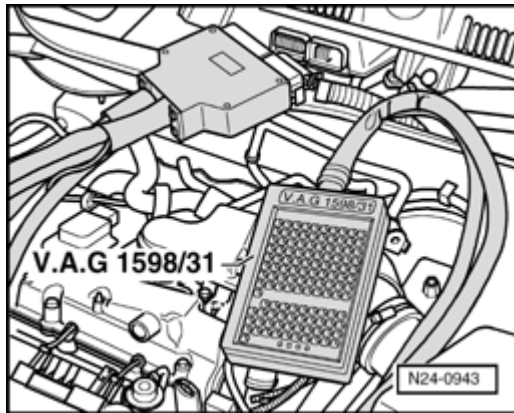
Output Diagnosis Test Mode was aborted



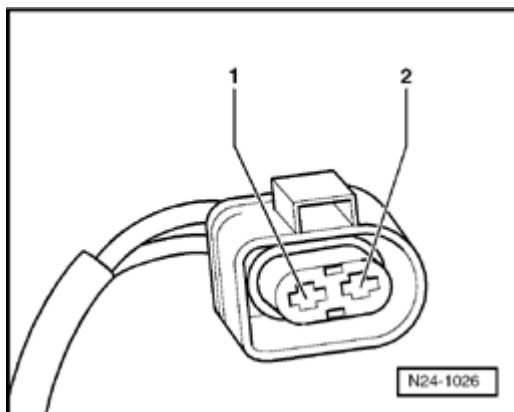
Indicated on display:

- Switch off ignition.
- Remove wiper arms and cowl panel:
⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)

01-113



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wire for open circuit between test box socket 44 and 2-pin connector terminal 2 referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

- Additionally check wire for short to battery positive and Ground (GND).

Specification: $\infty \Omega$

- Check wire for open circuit between 2-pin connector terminal 1 and Fuel Pump (FP) relay -J17- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no wiring malfunction is found:

- Replace Motronic Engine Control Module (ECM) -J220- \Rightarrow [Page 24-173](#) .

01-114

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, check and erasing.
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

3. Activating Secondary Air Injection (AIR) Pump Relay -J299-:

- Press → -button.

Output Diagnosis Test Mode (DTM) →



Indicated on display:

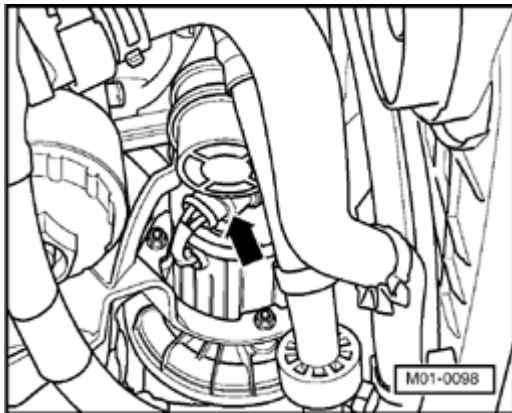
Secondary Air Injection (AIR) Pump Relay -J299-

The Secondary Air Injection (AIR) Pump Relay -J299- activates the Secondary Air Injection (AIR) Pump Motor -V101-, and this must run at intervals until the next control element is activated by pressing the → button.

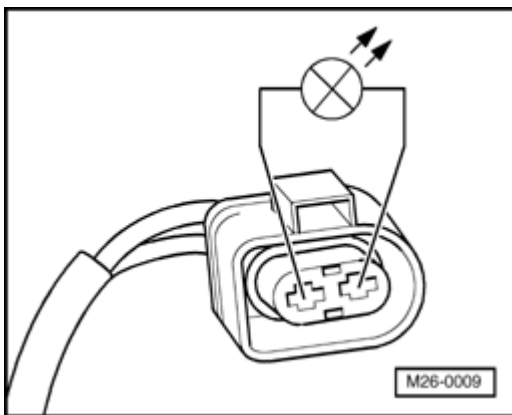
If the Secondary Air Injection (AIR) Pump Motor -V101- does not run at intervals:

- Remove center insulation tray:
⇒ [Repair Manual, Body Exterior; Repair Group](#)

01-115



- ✦ - Disconnect 2-pin connector from Secondary Air Injection (AIR) Pump Motor (arrow).



- ✦ - Connect LED test light VAG 1527 to disconnected connector using adapter cables from VAG 1594.
LED must flash

LED flashes:

- Press -C- button to abort output Diagnosis Test Mode (DTM).

Output Diagnosis Test Mode was aborted



Indicated on display:

- Switch off ignition.
- Replace Secondary Air Injection (AIR) Pump Motor -V101-:
⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 26](#)
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If the LED does not flash but the Secondary Air Injection (AIR) Pump Relay clicks:

- Press -C- button to abort Output Diagnosis Test Mode (DTM).

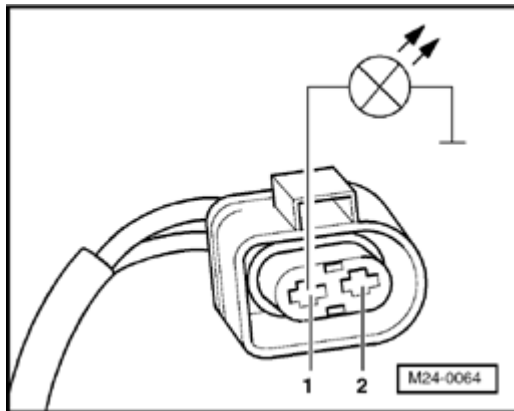
Output Diagnosis Test Mode was aborted



Indicated on display:

- Switch off ignition.

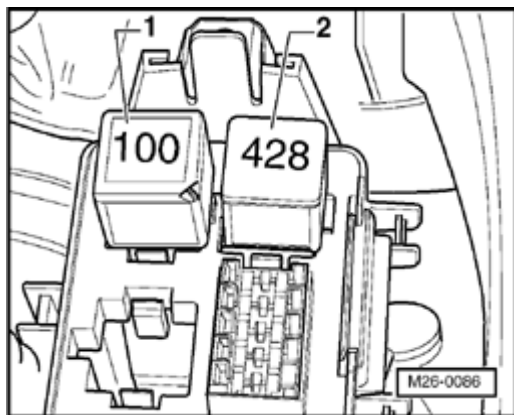
01-117



- ✦ - Check wire for open circuit between Secondary Air Injection (AIR) pump motor -V101- terminal 1 and body Ground (GND).

Wire resistance: max. 1.5 Ω

If no electrical or wiring concerns are found:

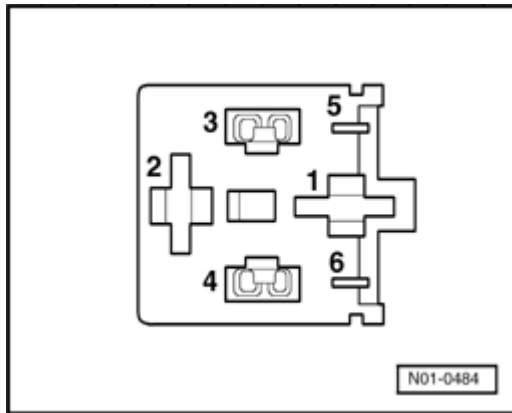


- ✦ - Pull Secondary Air Injection (AIR) Pump Relay -1- out of relay carrier in protective housing for control modules.

Note:

- ◆ *If tools are necessary to pull relays or control modules out of the relay plate, first disconnect battery Ground (GND) strap.*
- ◆ *Before disconnecting battery Ground (GND) strap obtain code for radios with anti-theft coding.*

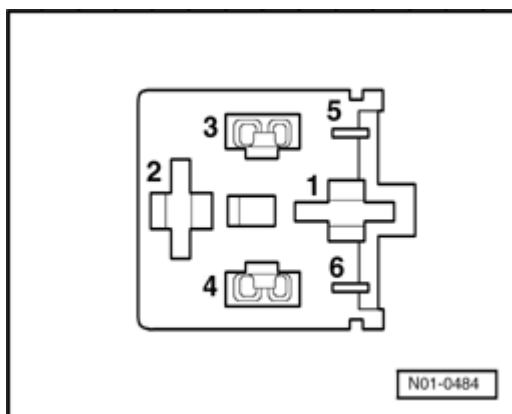
01-118



- Check wiring for open circuit between connector terminal 2 on Secondary Air Injection (AIR) Pump Motor and terminal 2 on relay plate.

- Wire resistance: max. 1.5 Ω

If no electrical or wiring concerns are found:



- Check wire for open circuit between terminal 1 of relay plate and fuel pump (FP) relay -J17- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no electrical or wiring concerns are found:

- Replace Secondary Air Injection (AIR) pump relay -J299-.

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory \Rightarrow [Page 01-23](#), DTC memory, checking and erasing.

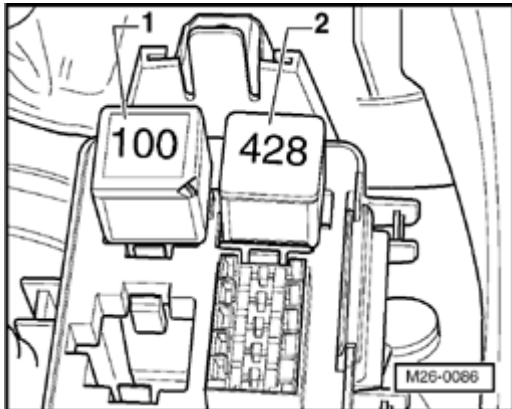
01-119

- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or the Mo Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again [Page 01-149](#) .

If the LED does not flash and the Second Air Injection (AIR) Pump Relay does not click:

- Press -C- button to abort output Diagnosis Mode (DTM).

Output Diagnosis Test Mode was aborted



Indicated on display:

- Switch off ignition.

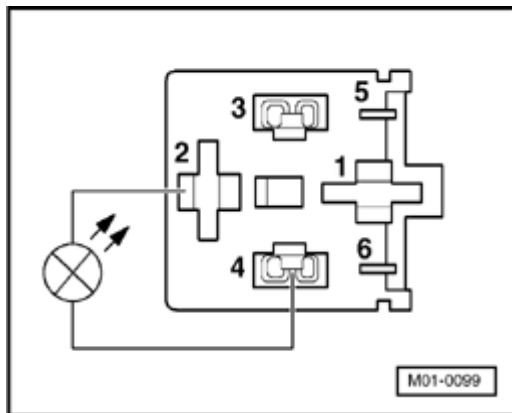


- Pull Secondary Air Injection (AIR) Pump 1- out of relay carrier in protective housing control modules.

Note:

- ◆ If tools are necessary to pull relays or control modules out of the relay plate, first disconnect battery Ground (GND) strap.
- ◆ Before disconnecting battery Ground (GND) strap obtain code for radios with anti-theft coding.

01-120



- Connect LED test light VAG 1527 to terminals 2 and 4 on relay plate using adapter cables from VAG 1594.
- Initiate output Diagnosis Test Mode (DTM) again and activate Secondary Air Injection (AIR) pump relay -J299-.
LED must flash.

Note:

Run engine briefly first if there is a requirement to repeat Output Diagnosis Test Mode (DTM).

LED flashes:

- Press -C- button to abort output Diagnosis Test Mode (DTM).

Output Diagnosis Test Mode was aborted

Indicated on display:

- Switch off ignition.
- Replace Secondary Air Injection (AIR) pump relay -J299-.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.

01-121

- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or the Mo Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again [Page 01-149](#) .

LED does not flash:

- Press -C- button to abort output Diagnosis Mode (DTM).

Output Diagnosis Test Mode was aborted



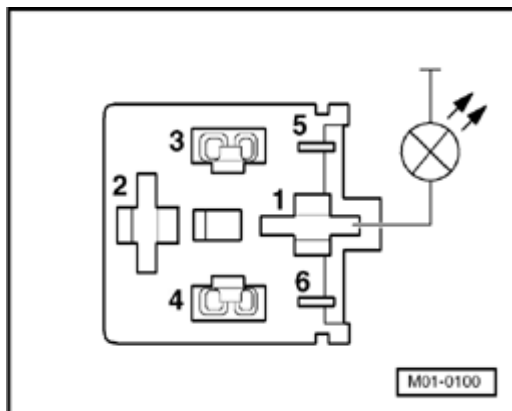
Indicated on display:

- Switch off ignition.

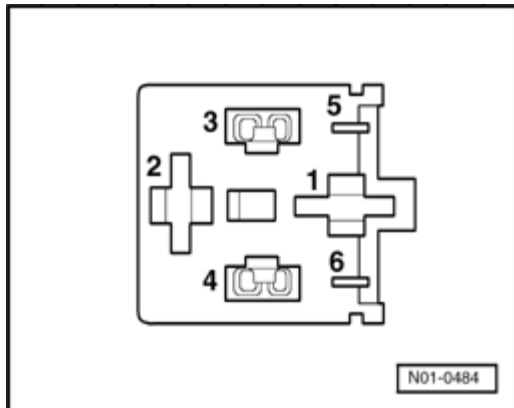


- Connect LED test light VAG 1527 to terminal of relay plate and body Ground (GND) using adapter cables from VAG 1594.

LED must light up



01-122



LED does not light-up:



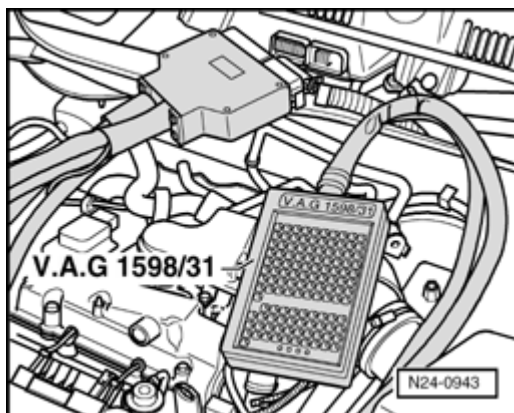
- Check wire for open circuit between terminal 1 of relay plate and fuel pump relay -J17- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

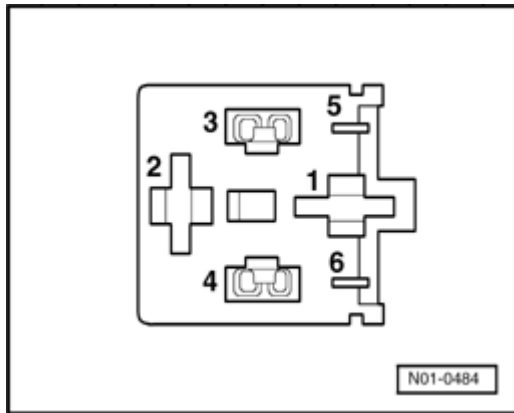
LED lights up:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect test box VAG 1598/31 to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wire for open circuit between test box socket 46 and terminal 4 on relay plate referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no electrical or wiring concerns are found:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

4. Activating Intake Manifold Change-Over Valve -N156-:

- Press → button.

Output Diagnosis Test Mode →
Intake Manifold Change-Over Valve -N156-



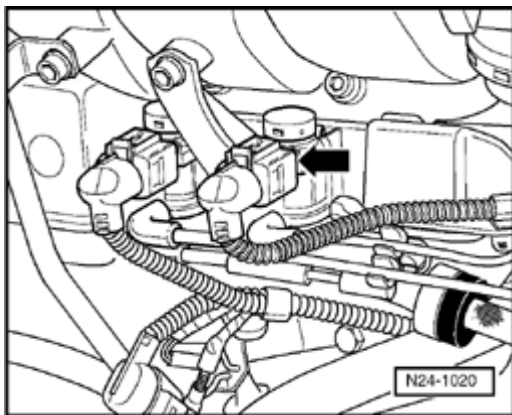
Indicated on display:

The Intake Manifold Change-Over Valve must click until the next final control element is activated by pressing → button.

Note:

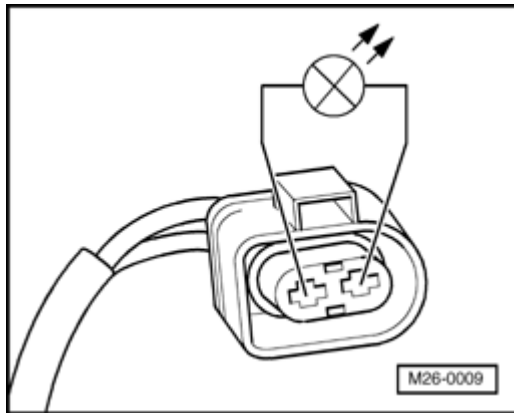
If there is sufficient vacuum the Intake Manifold Change-Over Valve -N156- activates the intake manifold change-over valve actuator. The change-over valve is located below the intake manifold, on right next to the Secondary Air Injection (AIR) Solenoid Valve. Checking variable intake manifold change-over ⇒ [Page 24-117](#).

If the valve does not click:



- Disconnect 2-pin connector from Intake Manifold Change-Over Valve -N156- (arrow).

01-125



Output Diagnosis Test Mode was aborted



- Connect LED test light VAG 1527 to detached connector using adapter cables from VAG 1594.
- LED must flash (bright/darker)

LED flashes:

- Press -C- button to abort output Diagnosis Test Mode (DTM).



Indicated on display:

- Switch off ignition.
- Replace Intake Manifold Change-Over Valve -N156- ⇒ [Page 24-12](#) , item 2 .
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

LED does not flash:

- Press -C- button to abort output Diagnosis Mode (DTM).

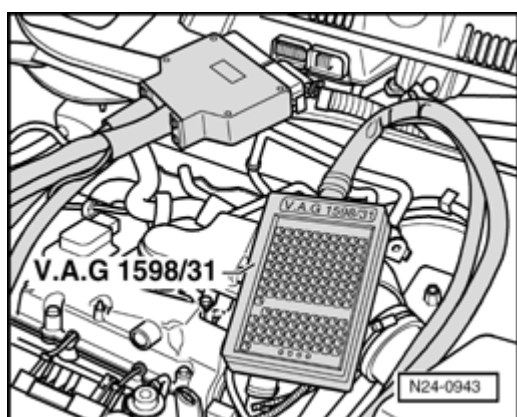
Output Diagnosis Test Mode was aborted



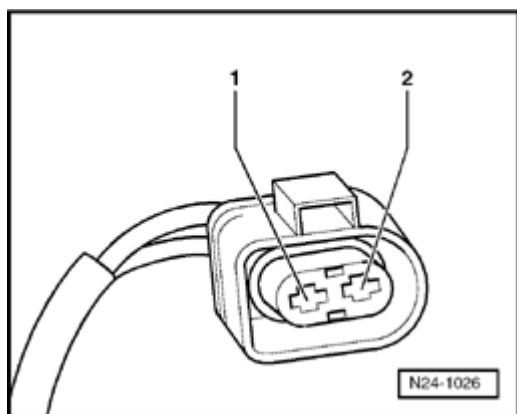
Indicated on display:

- Switch off ignition.
- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Re Group 92](#)



- Connect test box VAG 1598/31 to control module wiring harness. Engine Control M (ECM) -J220- remains disconnected.



- Check wire for open circuit between test box socket 121 and 2-pin connector terminal 2 referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

- Additionally check wire for short to battery positive and Ground (GND).

Specification: $\infty \Omega$

- Check wire for open circuit between 2-pin connector terminal 1 and Motronic Engine Control Module (ECM) power supply relay -J271- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no electrical or wiring concerns are found:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

Output Diagnosis Test Mode →
 Valve -1- for camshaft adjustment -N205-

5. Activating Valve -1- for camshaft adjustment -N205-:

- Press → -button.



Indicated on display:

The Valve -1- for camshaft adjustment must click until the next final control element is activated by pressing → button.

Note:

The Valve -1- for camshaft adjustment -N205- is barely audible when operating.

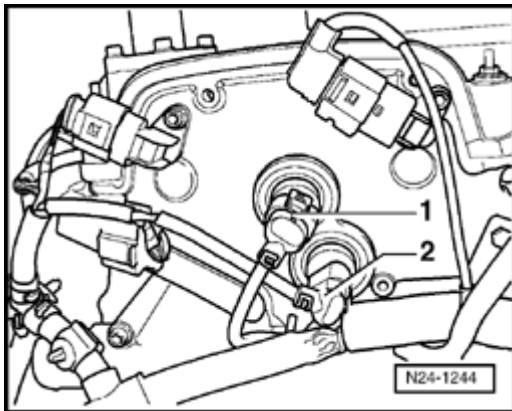
If the valve does not click:



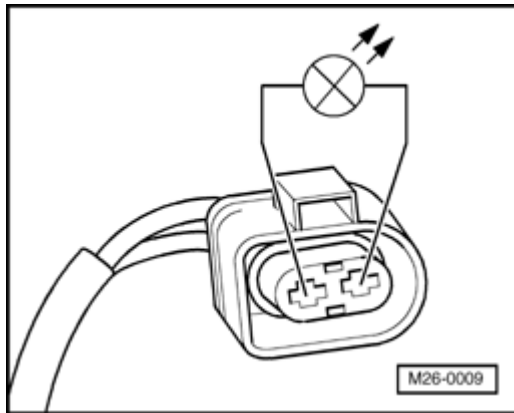
- Disconnect 2-pin connector from Valve -1- for camshaft adjustment -N205- -1-.

Note:

Mark connector and component before pulling connector off.



01-129



Output Diagnosis Test Mode was aborted



- Connect LED test light VAG 1527 to disconnected connector using adapter cables from VAG 1594.

LED must flash (bright/darker)

LED flashes:

- Press -C- button to abort output Diagnosis Test Mode (DTM).



Indicated on display:

- Switch off ignition.
- Replace control housing:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF, Repair Group 15; Valve train, servicing](#)

Note:

The control housing is only replaced complete with Valve -1- for camshaft adjustment -N205- and Camshaft Adjustment Valve 1 (exhaust) -N318-.

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.

- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or the Mo Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again [Page 01-149](#) .

LED does not flash:

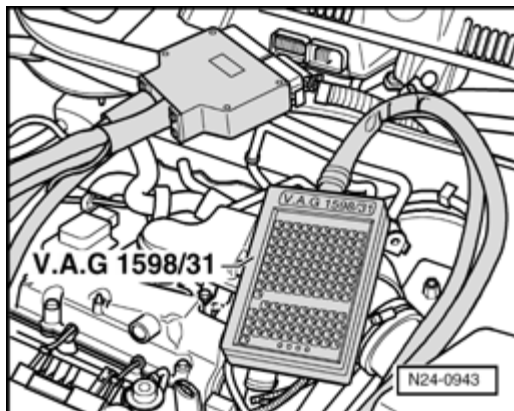
- Press -C- button to abort output Diagnosis Mode (DTM).

Output Diagnosis Test Mode was aborted



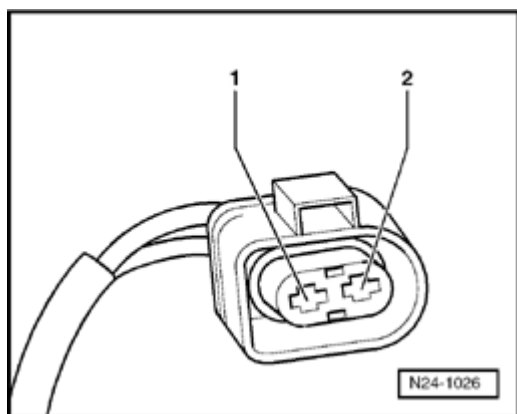
Indicated on display:

- Switch off ignition.
- Remove wiper arms and cowl panel:
⇒ [Repair Manual, Electrical Equipment; Re Group 92](#)



- Connect test box VAG 1598/31 to control module wiring harness. Engine Control Module (ECM) -J220- remains disconnected.

01-131



- Check wire for open circuit between test box socket 115 and 2-pin connector terminal 2 referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

- Additionally check wire for short to battery positive and Ground (GND).

Specification: $\infty \Omega$

- Check wire for open circuit between 2-pin connector terminal 1 and Motronic Engine Control Module (ECM) Power Supply Relay -J271- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no electrical or wiring concerns are found:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

6. Activating Leak detection pump (LDP) -V144-:

- Press → button.

Output Diagnosis Test Mode →
Leak Detection Pump tank ventilation system



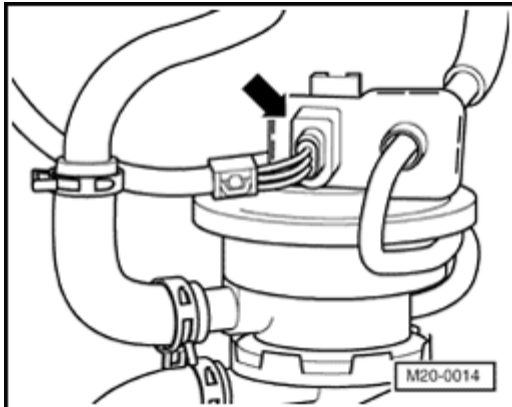
Indicated on display:

The LDP must click, at intervals, until the next final control element is activated by pressing → button.

If the Leak Detection Pump (LDP) - V144- does not run at intervals:

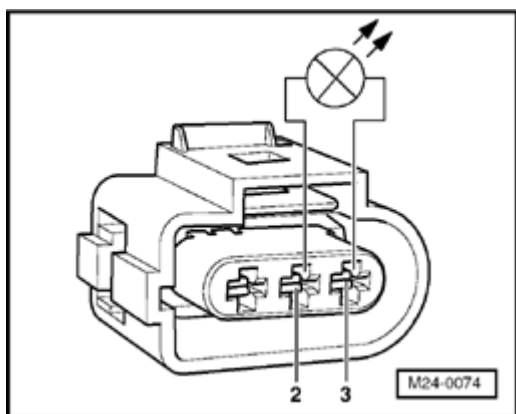
- Remove rear right wheel housing liner:

⇒ [Repair Manual, Body Exterior; Repair Group 66; Exterior equipment, Wheel housing liner](#)



- Disconnect 3-pin connector from Leak Detection Pump (LDP) - V144- (arrow).

01-133



Output Diagnosis Test Mode was aborted



- Connect LED test light VAG 1527 terminals 2 and 3 of detached connector using adapter cables from VAG 1594.

LED must flash (bright/darker)

LED flashes:

- Press -C- button to abort output Diagnosis Test Mode (DTM).



Indicated on display:

- Switch off ignition.
- Replace Leak Detection Pump (LDP) -V144-:
⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20](#)
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

01-134

LED does not flash:

- Press -C- button to abort output Diagnosis Mode (DTM).

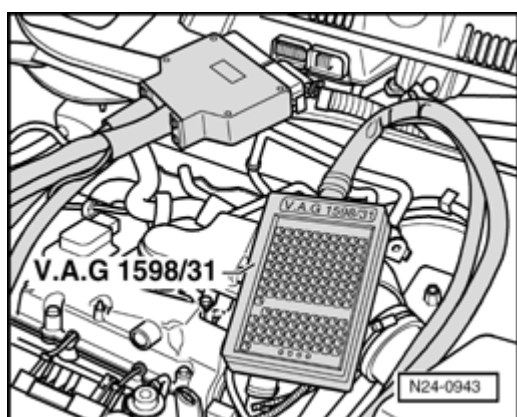
Output Diagnosis Test Mode was aborted



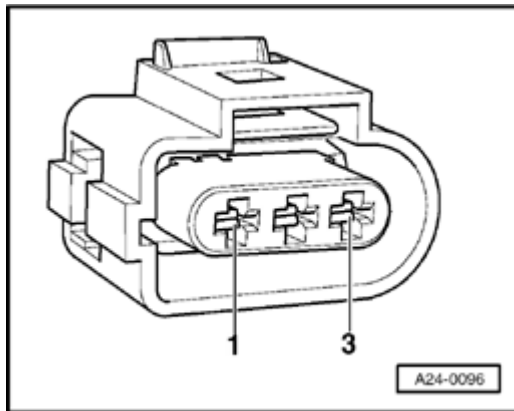
Indicated on display:

- Switch off ignition.
- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Re Group 92](#)



- Connect test box VAG 1598/31 to control module wiring harness. Engine Control M (ECM) -J220- remains disconnected.



- Check wiring for open circuit between test box and 3-pin connector referring to Electrical Wiring Diagrams

Terminal 1 and socket 80

Terminal 2 and socket 25

Wire resistance: max. 1.5 Ω

- Additionally check wire for short to battery positive and Ground (GND). Specification: $\infty \Omega$

- Check wire for open circuit between 3-pin connector terminal 3 and fuel pump relay -J17- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no electrical or wiring concerns are found:

- Replace Motronic Engine Control Module (ECM) -J220- \Rightarrow [Page 24-173](#) .
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory \Rightarrow [Page 01-23](#) , DTC memory, checking and erasing.
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again \Rightarrow [Page 24-182](#) .

- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

7. Activating Camshaft Adjustment Valve 1 (exhaust) -N318-:

- Press → button.

Output Diagnosis Test Mode
17457 / Literature



Indicated on display of VAG 1551 scan tool or VAG 1552:

or

Output Diagnosis Test Mode
Camshaft Adjustment Valve 1 -N318-



Indicated on display of VAS 5051

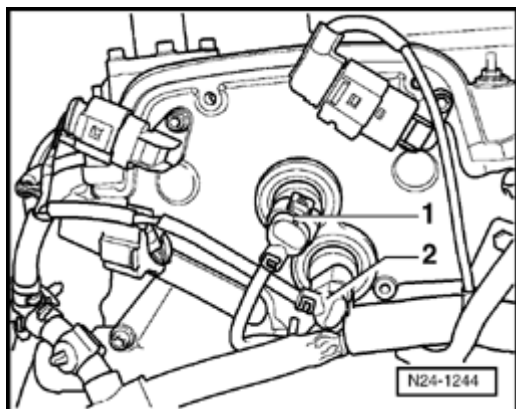
- Press → button.

The Camshaft Adjustment Valve 1 (exhaust) must click until the next Output Diagnostic Test element is activated by pressing → button.

Note:

The Camshaft Adjustment Valve 1 (exhaust) is barely audible when operating.

01-137

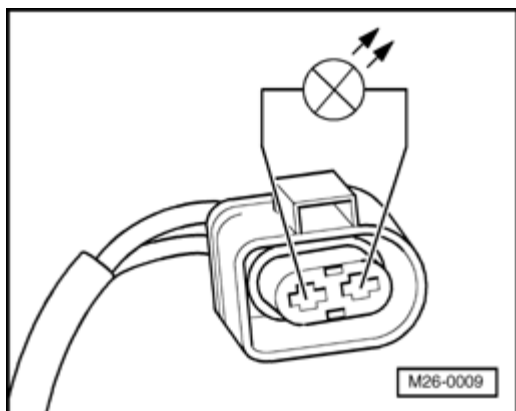


If the valve does not click:

- ⚡ - Disconnect 2-pin connector from Camshaft Adjustment Valve 1 (exhaust) -N318- -2-.

Note:

Mark connector and component before pulling connector off.



- ⚡ - Connect LED test light VAG 1527 to disconnected connector using adapter cables from VAG 1594.
LED must flash (bright/darker)

LED flashes:

- Press -C- button to abort output Diagnosis Test Mode (DTM).

Output Diagnosis Test Mode was aborted



Indicated on display:

- Switch off ignition.
- Replace engine control housing:
⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15, Valve train, servicing](#)

Note:

The control housing is only replaced complete with Valve -1- for camshaft adjustment -N205- and Camshaft Adjustment Valve 1 (exhaust) -N318-

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

LED does not flash:

- Press -C- button to abort output Diagnosis Test Mode (DTM).

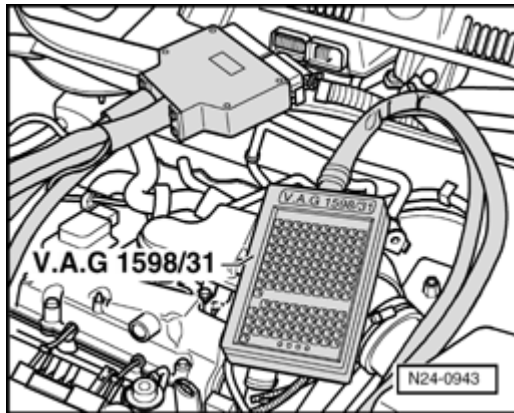
Output Diagnosis Test Mode was aborted



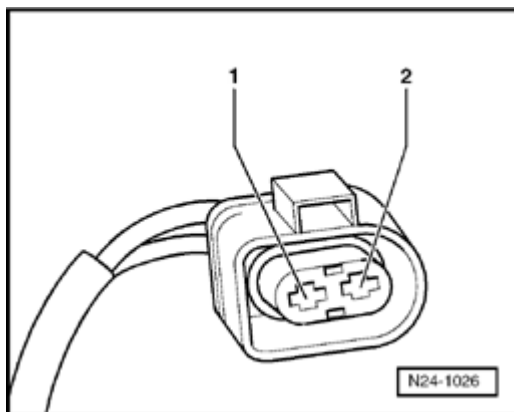
Indicated on display:

- Switch off ignition.
- Remove wiper arms and cowl panel:
⇒ [Repair Manual, Electrical Equipment, Repair Group 92](#)

01-139



- Connect test box VAG 1598/31 to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wire for open circuit between test box socket 120 and 2-pin connector terminal 2 referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

- Additionally check wire for short to battery positive and Ground (GND).

Specification: $\infty \Omega$

- Check wire for open circuit between 2-pin connector terminal 1 and Motronic Engine Control Module (ECM) Power Supply Relay -J271- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no electrical or wiring concerns are found:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Erase learned values and adapt (match) Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

8. Activating Brake System Vacuum Pump - V192- (only vehicles with an automatic transmission):

- Press → button.

Output Diagnosis Test Mode
17836 / Literature



Indicated on display of VAG 1551 scan tool or VAG 1552:

or

Output Diagnosis Test Mode
Brake System Vacuum Pump activation



Indicated on display of VAS 5051:

The Brake Booster Control Module -J542- activates the Brake System Vacuum Pump - V192-, and this must run until the next control element is activated by pressing the → button.

If the Brake System Vacuum Pump -V192- does not run:

- Press -C- button to abort output Diagnosis Test Mode (DTM).

Output Diagnosis Test Mode was aborted



Indicated on display:

- Switch off ignition.
- Check Brake System Vacuum Pump -V192-:
⇒ [Repair Manual, Brake System; Repair Group 47](#)
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

9...14. Activating fuel injectors (-N30-... -N33-, -N83- and -N84-):

Output Diagnosis Test Mode
Cylinder 1 Fuel Injector -N30-



- Press → button.

Indicated on display:

- Press → button again so that fuel injector is actuated five times.

Cylinder 1 Fuel Injector -N30- clicks five times.

Note:

The fuel pump must run and the sound of fuel flowing through the fuel pressure control must be heard clearly.

If the fuel pump does not run:

- Check fuel pump function and voltage supply:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20](#)

Fuel pump runs:

- To activate fuel injectors for cyl. 2 to 6, use procedure, as for fuel injector 1, to activate each subsequent fuel injector.

Using this procedure, each fuel injector can be checked one after the other according to firing order.

If one of the fuel injectors is not activated (does not click):

- Press -C- button to abort output Diagnosis Test Mode (DTM).

Output Diagnosis Test Mode was aborted



Indicated on display:

- Switch off ignition.
- Check injectors ⇒ [Page 24-97](#)
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If all fuel injectors have been activated (clicks):

- Press → button.

Output Diagnosis Test Mode



Indicated on display:

END

01-144

- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.

- Switch off ignition.

Readiness code

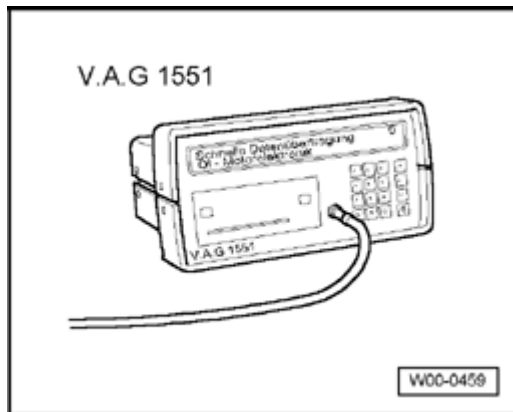
Function

The readiness code is an 8-digit number code which displays the status of the emission relevant diagnosis.

When the diagnosis for a system (e.g. secondary air system) has been successfully completed, the corresponding position in the number code will change from 1 to 0.

The diagnosis is performed at regular intervals during normal driving. It is recommended that the readiness code be generated after performing repairs on an emission relevant system, to guarantee that these systems function correctly. If a malfunction is detected during the diagnosis it will be stored in the DTC memory.

Each time the DTC memory is erased or the voltage supply is interrupted the readiness code will be erased.



Read readiness code

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required

- ◆ VAG 1551 Scan tool (or VAG 1552 vehicle system tester) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the vehicle diagnostic, testing and information system VAS 5051.

Work sequence

- Connect VAG 1551 scan tool ((VAG 1552) and select Engine Control Module (ECM) with the "Address word" 01. Engine must be running at idle: (Connecting scan tool and selecting Engine Control Module (ECM) ⇒ [Page 01-12](#)).

Rapid data transfer
Select function XX

HELP

Indicated on display:

- Press buttons -1- and -5- for function "Readiness code" and confirm entry with -Q- button.

Readiness code
00000000 - Test complete



Must appear on display when all diagnosis functions have been successfully completed:

Indicated on display:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

Readiness code
00101101 - Test not complete



Appears on display:

One of the diagnostic checks has not run through successfully:

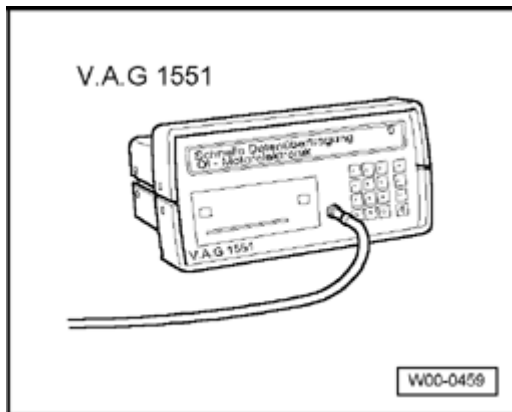
- Press → button.
- Generate readiness code ⇒ [Page 01-149](#) .

Significance of figures in 8 digit number block, display zone 1 - Readiness code

The readiness code is generated only when all display zones show 0								Diagnostic function
1	2	3	4	5	6	7	8	
							0	Three Way Catalytic Converter (TWC)
						0		Three Way Catalytic Converter (TWC) heating (currently no diagnosis/always "0")
					0			Evaporative Emissions (EVAP) Canister system (Tank ventilation system)
				0				Secondary air system
			0					Air conditioner (currently no diagnosis/always "0")
		0						Oxygen Sensor (O2S)s
	0							Oxygen Sensor (O2S) heating
0								Exhaust gas recirculation (not installed/always "0")

Generating readiness code

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required



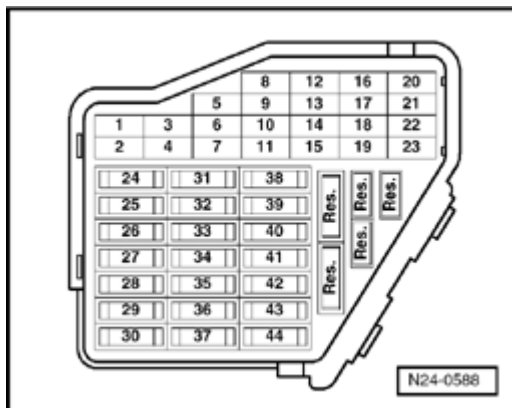
- ◆ VAG 1551 scan tool (or VAG 1552) with VAG 1551/3 Adapter cable

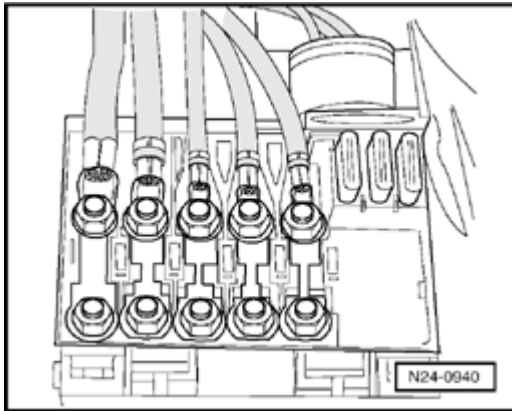
Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the vehicle diagnostic, testing and information system VAS 5051.

Test prerequisites

- All fuses must be OK.





- The main fuses must be OK.
- The battery voltage must be at least 11.5 V.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Exhaust system between Three Way Catalytic Converter (TWC) and cylinder head must be free of leaks
- Ignition switched on, engine not running.
- Fuel Pump (FP) relay -J17- must be OK., checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- The signal from Brake Light Switch -F- and Brake Vacuum Vent Valve Switch -F47- -F85- must be OK., checking ⇒ [Page 24-206](#) .
- Engine Coolant Temperature (ECT) must be 85...110 °C ⇒ display group 4, display zone 3.
- Intake Air Temperature (IAT) less than 80 °C ⇒ display group 4, display zone 4.
- Three Way Catalytic Converter (TWC) temperature must be at least 380 °C ⇒ display group 34, display zone 2.

Work sequence

- Connect VAG 1551 scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with the "Address word" 01. (Connecting scan tool and selecting Engine Control Module (ECM) ⇒ [Pa 01-12](#)).

Work step 1: Check DTC memory

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Operate scan tool taking into account the information on the display:
- Press buttons -0- and -2- for function "Check DTC memory" and confirm entry with Q button

X Diagnostic Trouble Codes (DTCs) detected!



The number of Diagnostic Trouble Codes (DTCs) stored or "No DTC detected!" will be shown on the display.

If a DTC is stored:

Repair Diagnostic Trouble Codes (DTCs) printed out using DTC table:

- ◆ SAE P0 codes ⇒ [Page 01-30](#) ,
- ◆ SAE P1 codes ⇒ [Page 01-58](#) ,
- ◆ SAE P2 codes ⇒ [Page 01-98](#) ,
- ◆ SAE P3 codes ⇒ [Page 01-99](#) .

If no DTC is stored:

- Press → button.
- Continue with work step 3

Work step 2: Erase DTC memory

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -5- for function "Erase DTC memory" and confirm entry with -Q- button.

Note:

The readiness code is reset or erased each time DTC memory is erased.

Rapid data transfer
DTC memory is erased!



Indicated on display:

Note:

If the ignition is switched off between "Check DTC memory" and "Erase DTC memory" the DTC memory will not be erased.

- Press → button.

Work step 3: Adjust the Throttle Valve Control Module -J338- to the Motronic Engine Control Module (ECM) -J220-

Rapid data transfer HELP
Select function XX



Indicated on display:

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

Basic setting
Input display group number XXX



Indicated on display:

- Press buttons -0-, -6- and -0- for "Display group number 60" and confirm entry with -Q- button.

System in basic setting 60 →
xxx.x % xxx.x % x ADP. runs



Indicated on display: (1 to 4 = display zones)

- Check specifications in display zones 3 and 4:

Display zone 3: 0 to 8

Display zone 4: ADP. runs, ADP. OK.

System in basic setting 60 →
xxx % xxx % 8 ADP. OK.



Indicated on display: (1 to 4 = display zones)

- Terminate engine basic setting at earliest after 30 seconds by pressing → button.

If the display does not indicate as described:

- Check Throttle Valve Control Module -J338- ⇒ [Page 24-59](#) .

If the display indicates as described:

- Start engine and run at idle.

Note:

Engine must not be switched again off during work sequence.

Work step 4: Requesting temperature

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with Q button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -4- for "Display group number 4" and confirm entry with -Q- button.

Read measured value block 4



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Read Engine Coolant Temperature value in display zone 3.

Specification: 85 to 110 °C

- Read Intake Air Temperature value in display zone 4.

Specification: Ambient temperature less than 80 °C

If the specifications are obtained:

- Press → button.

Work step 5: Evaporative Emissions (EVAP) Canister system diagnosis (Tank ventilation system)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

Basic setting
Input display group number XXX



Indicated on display:

- Press buttons -0-, -7- and -1- for "Display group number 71" and confirm entry with -Q- button.

Note:

The engine must not be loaded during this diagnosis, if this occurs the diagnosis will be interrupted and will not start again until the engine is revved-up.

System in basic setting 71

1 2 3 4 →



Indicated on display: (1 to 4 = display zones)

If "Reed op." appears in display zone 1:

- Open fuel tank filler cap briefly to release pressure in fuel tank. This will close reed terminal.

If the diagnosis is initiated by the Motronic Engine Control Module (ECM) -J220- the display in display zone 4 jumps from "Test OFF" to "Test ON".

- Leave engine running at idle until specification "Sys. OK." is displayed in display zone 4.

Note:

If the display in display zone 4 jumps from "Test OFF" to "Test ON" during the diagnosis, repeat the diagnosis again. When repeating the diagnosis, the diagnosis can take up to 60 seconds before the display in display zone 4 jumps from "Test OFF" to "Test ON".

If "Sm leak or La leak" (meaning Small leak or Large leak) appears in display zone 2 and "Sys. n.OK." appears in display zone 4:

- Press → button.

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Check Evaporative Emissions (EVAP) Canister system for leaks:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20](#)

If "Sys. OK." appears in display zone 4:

- Press → button.

Work step 6: Oxygen Sensor (O2S) control diagnosis status before Three Way Catalytic Converter (TWC)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block
Input display group number XXX



Indicated on display:

Read measured value block 30

1

2

- Press buttons -0-, -3- and -0- for "Display group number 30" and confirm entry with -Q- button.

Indicated on display: (1 to 2 = display zones)

- Check Oxygen Sensor (O2S) control status before Three Way Catalytic Converter (TWC) (display zone 1):

Specification: 111

Significance of figures in 3 digit number block ⇒ [Page 01-217](#) .

Note:

The bits in display zones 1 will not be set to 1 until the Three Way Catalytic Converter (TWC) temperature rises above 380 °C (⇒ display groups 34, display zone 2).

If the specification is not obtained:

- Press → button.
- Check Oxygen Sensor (O2S) heater of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ [Page 24-38](#) .

If the specification is obtained:

- Press → button.

Note:

This process can take approx. 90 seconds.

- Depress brake pedal and accelerator down until display zone 4 displays specification "B1-P1 OK."
- Release brake and accelerator pedals.

If "B1 P1 n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Check aging of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ [Page 24-150](#) .

If "B1 P1 OK." appears in display zone 4:

- Press C button.

Work step 8: Fuel supply system diagnosis (part load)

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -2-, -1- and -6- for "Display group number 216" and confirm entry with -Q- button.

System in basic setting 216



1 2 3 4



Indicated on display: (1 to 4 = display zones)

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by Motronic Engine Control Module (ECM) -J220- to approx. 2300 rpm.

- Depress brake pedal and accelerator down until display zone 4 displays (after approx. 75 seconds) specification "xxxxx100".
- Release brake and accelerator pedals.

If the display does not indicate as described:

- Press → button.

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If the display indicates as described:

- Press → button.

Work step 9: Oxygen Sensor (O2S) control diagnosis status after Three Way Catalytic Converter (TWC)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -3- and -0- for "Display group number 30" and confirm entry with -Q- button.

Read measured value block 30



Indicated on display: (1...2 = display zones)

1

2

- Check Oxygen Sensor (O2S) control status after Three Way Catalytic Converter (TWC) (display zone 2): Specification: 111

Significance of figures in 3 digit number block ⇒ [Page 01-217](#) .

Note:

The bits in display zone 2 will not be set to 1 until the Three Way Catalytic Converter (TWC) temperature rises above 380 ° C (⇒ display groups 34, display zone 2).

If the specification is not obtained:

- Press → button.
- Check Oxygen Sensor (O2S) heater of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ [Page 24-45](#) .

If the specification is obtained:

- Press → button.

Work step 10: Oxygen Sensor (O2S) aging diagnosis of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

01-164

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -4- and -3- for "Display group number 43" and confirm entry with -Q- button.

System in basic setting 43



1	2	3	4
---	---	---	---



Indicated on display: (1 to 4 = display zones)

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by Motronic Engine Control Module (ECM) -J220- to approx. 2300 rpm.

- Depress and hold brake pedal and accelerator until display in display zone 4 jumps from "Test OFF" to "Test ON", when performing this test the Three Way Catalytic Converter (TWC) temperature in display zone 2 must be at least 380 °C.

Note:

This process can take approx. 30 seconds.

- Depress and hold brake pedal and accelerator until display zone 4 displays specification "B1 P2 OK."
- Release brake and accelerator pedals.

If "B1 P2 n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Check aging of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ [Page 24-154](#) .

If "B1 P2 OK." appears in display zone 4:

- Press -C- button.

**Work step 11: Oxygen Sensor (O2S)
diagnosis after Three Way Catalytic
Converter (TWC) (operational readiness)**

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -3- and -6- for "Display group number 36" and confirm entry with -Q- button.

System in basic setting 36



1

2



Indicated on display: (1...2 = display zones)

If the diagnosis is initiated by the Motronic Engine Control Module (ECM) -J220- the display in display zone 2 jumps from "Test OFF" to "Test ON".

- Leave engine running at idle until display zone 2 shows specification "B1 P2 OK."

Note:

This process can take approx. 30 seconds.

If "B1 P2 n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control after Three Way Catalytic Converter (TWC) ⇒ [Page 24-140](#)

If "B1 P2 OK." appears in display zone 4:

- Press -C- button.

Work step 12: Three Way Catalytic Converter (TWC) diagnosis (checking conversion)

Note:

The diagnosis will only be ended if the Oxygen Sensor (O2S) aging diagnosis for Oxygen Sensor (O2S)s before and after Three Way Catalytic Converter (TWC) is first successfully completed.

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -4- and -6- for "Display group number 46" and confirm entry with -Q- button.

System in basic setting 46



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by Motronic Engine Control Module (ECM) -J220- to approx. 2300 rpm.

Only continue with the test when:

- The Three Way Catalytic Converter (TWC) temperature is above 380 °C (display zone 2).
- Depress brake pedal and accelerator down and hold until display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

This process can take approx. 80 seconds.

- Depress and hold brake pedal and accelerator until display zone 4 displays specification "Cat. B1 OK."
- Release brake and accelerator pedals.

If "CatB1 n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.

- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Press buttons -0- and -6- for the function "End output" and confirm entry with the -Q- button.
- Switch off ignition.
- Replace front exhaust pipe with Three Way Catalytic Converter (TWC):

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 26](#)

If "Cat B1 OK." appears in display zone 4:

- Press -C- button.

Work step 13: Fuel supply system diagnosis (idle speed)

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -2-, -1- and -6- for "Display group number 216" and confirm entry with -Q- button.

System in basic setting 216 →

1 2 3 4



Indicated on display: (1...4 = display zones)

- Observe figure displayed in display zone 4.

Specification: xxxxx100

- Allow engine to run at idle until display zone 4 displays (after approx. 30 seconds):

Specification: xxxx1100.

If the display does not indicate as described:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If the display indicates as described:

- Press -C- button.

01-171

Work step 14: Evaporative Emissions (EVAP) Canister system solenoid valve 1 diagnosis (Tank ventilation system)

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -7- and -0- for "Display group number 70" and confirm entry with -Q- button.

Note:

The engine must not be loaded during this diagnosis, if this occurs the diagnosis will be interrupted and will not start again until the engine is revved-up.

System in basic setting 70



1 2 3 4



Indicated on display: (1 to 4 = display zones)

If the diagnosis is initiated by the Motronic Engine Control Module (ECM) -J220- the display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

This process can take approx. 30 seconds.

- Leave engine running at idle until display zone 4 displays:

Specification: TBV OK..

Note:

TBV stands for Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-.

If "TBV n. OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Press buttons -0- and -6- for the function "End output" and confirm entry with the -Q- button.
- Switch off ignition.
- Check breather lines to EVAP canister (may be kinked).

- Check EVAP canister system for leaks:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20](#)

If "TBV OK." appears in display zone 4:

- Press -C- button.

Work step 15: Secondary air system diagnosis

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -7- and -7- for "Display group number 77" and confirm entry with -Q- button.

Note:

The engine must not be loaded during this diagnosis, if this occurs the diagnosis will be aborted and will not start again until the engine is revved-up.

System in basic setting 77

1 2 3 4 →



Indicated on display: (1 to 4 = display zones)

If the diagnosis is initiated by the Motronic Engine Control Module (ECM) -J220- the display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

This process can take approx. 40 seconds.

- Leave engine running at idle until display zone 4 displays:

Specification: "Syst. OK."

If "Syst.n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Check combi-valve:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 26](#)

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If "Syst. OK." appears in display zone 4:

- Press → button.

Work step 16: Read readiness code

- Read readiness code ⇒ [Page 01-146](#) .

Readiness code, generating (overview)

Work steps 1 to 5:

Work step/ Diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3
1	Check DTC memory	02/---	◆ Ignition on	---	---	---
2	Erase DTC memory	05/---	◆ Ignition on	---	---	---
3	Adapting Throttle Valve Control Module	04/60	◆ Ignition on	Throt. valve angle	Throt. valve angle	Learning step counter
				angle sensor 1	angle sensor 2	
Specification:				3...93 %	97...3 %	8
4	Requesting temperature	08/4	◆ Idle speed	Idle speed	Voltage supply for Motronic Engine Control Module (ECM) - J220-	Coolant temperature
				Specification:		
5	Leak diagnosis	04/071	◆ Idle speed	Reed condition	Text	Text
				Specification:	Reed open	---

01-177

Work steps 6 to 9:

Work step/ Diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3
6	Oxygen Sensor (O2S) control status	08/30	◆ Idle speed	Before Three Way Catalytic Converter (TWC)	After Three Way Catalytic Converter (TWC)	No display
			Specification:	111	xxx	---
7	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) (Oxygen Sensor (O2S) aging)	04/34	◆ Brakes operated	Engine speed	Three Way Catalytic Converter (TWC) temperature	Dynamic factor of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC)
			◆ Accelerator in wide open throttle position.			
8	Fuel supply system (part load)	04/216	◆ Brakes operated	Engine speed	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC)	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC)
			◆ Accelerator in wide open throttle position.			
					lower part load	idle speed

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Work step/ Diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3	Display zone 4
9	Oxygen Sensor (O2S) control status	08/30	◆ Idle speed	Before Three Way Catalytic Converter (TWC)	After Three Way Catalytic Converter (TWC)	No display	No display
			Specification:	xxx	111	---	---

Work steps 10 to 11:

Work step/ diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Dis zon
10	Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) (Oxygen Sensor (O2S) aging)	04/43	<ul style="list-style-type: none"> ◆ Brakes operated ◆ Accelerator in wide open throttle position. 	Engine speed	Three Way Catalytic Converter (TWC) temperature	Oxy Ser (O. volt Oxy Ser (O2S Three Cata Conv (TV
			Specification:	Approx. 2300 rpm	Greater than 380 ° C	0.100. \
11	Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) (operational readiness)	04/36	◆ Idle speed	Oxygen Sensor (O2S) voltage, Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)	Result	No di
			Specification:	0.100...0.900 V	B1 P2 OK.	--

01-180

Work steps 12 to 13:

Work step/ diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3
12	Three Way Catalytic Converter (TWC)	04/46	<ul style="list-style-type: none"> ◆ Brakes operated ◆ Accelerator in wide openthrottle position. 	Engine speed	Three Way Catalytic Converter (TWC) temperature	Three Way Catalytic Converter (TWC) conversion rate
			Specification:	Approx. 2300 rpm	Greater than 380 ° C	0.00...0.99
13	Fuel supply system (idle speed)	04/216	◆ Idle speed	Engine speed	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) lower part load	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) idle speed
			Specification:	---	---	---

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Work steps 14 to 16:

Work step/ diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3
14	Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- (Tank ventilation system)	04/70	◆ Idle speed	Evaporative Emissions (EVAP) Canister regulator valve 1 duty cycle	TBV quality	No display
			Specification:	---	---	---
15	Secondary air system	04/77	◆ Idle speed	Idle speed	Air mass drawn in	Air mass, secondary air system
			Specification:	640...720 rpm	---	---
16	Read readiness code	15/---	◆ Idle speed	---	---	---

1) TBV stands for Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-.

Readiness code

Function

The readiness code is an 8-digit number code which displays the status of the emission relevant diagnosis.

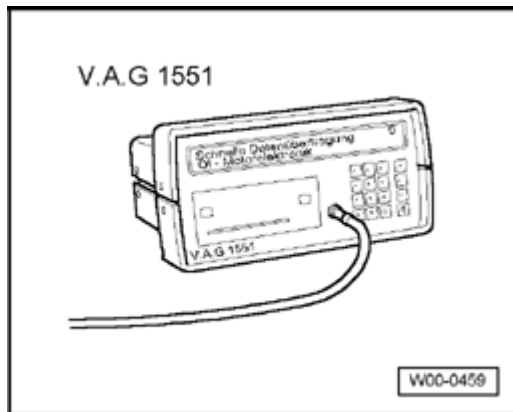
When the diagnosis for a system (e.g. secondary air system) has been successfully completed, the corresponding position in the number code will change from 1 to 0.

The diagnosis is performed at regular intervals during normal driving. It is recommended that the readiness code be generated after performing repairs on an emission relevant system, to guarantee that these systems function correctly. If a malfunction is detected during the diagnosis it will be stored in the DTC memory.

Each time the DTC memory is erased or the voltage supply is interrupted the readiness code will be erased.

Read readiness code

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required



- ◆ VAG 1551 Scan tool (or VAG 1552 vehicle system tester) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the vehicle diagnostic, testing and information system VAS 5051.

Work sequence

- Connect VAG 1551 scan tool ((VAG 1552) and select Engine Control Module (ECM) with the "Address word" 01. Engine must be running at idle: (Connecting scan tool and selecting Engine Control Module (ECM) ⇒ [Page 01-12](#)).

Rapid data transfer
Select function XX

HELP

Indicated on display:

- Press buttons -1- and -5- for function "Readiness code" and confirm entry with -Q- button.

Readiness code
00000000 - Test complete



Must appear on display when all diagnosis functions have been successfully completed:

Indicated on display:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

Readiness code
00101101 - Test not complete



Appears on display:

One of the diagnostic checks has not run through successfully:

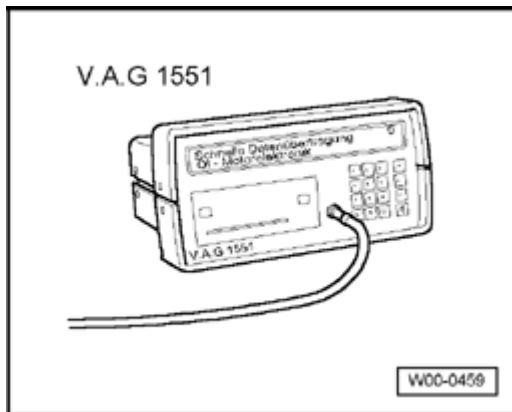
- Press → button.
- Generate readiness code ⇒ [Page 01-149](#) .

Significance of figures in 8 digit number block, display zone 1 - Readiness code

The readiness code is generated only when all display zones show 0								Diagnostic function
1	2	3	4	5	6	7	8	
							0	Three Way Catalytic Converter (TWC)
						0		Three Way Catalytic Converter (TWC) heating (currently no diagnosis/always "0")
					0			Evaporative Emissions (EVAP) Canister system (Tank ventilation system)
				0				Secondary air system
			0					Air conditioner (currently no diagnosis/always "0")
		0						Oxygen Sensor (O2S)s
	0							Oxygen Sensor (O2S) heating
0								Exhaust gas recirculation (not installed/always "0")

Generating readiness code

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required



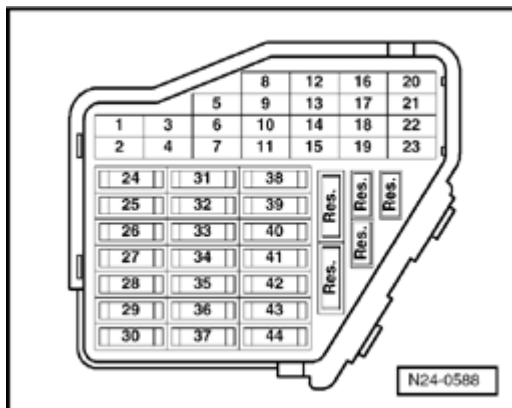
- ◆ VAG 1551 scan tool (or VAG 1552) with VAG 1551/3 Adapter cable

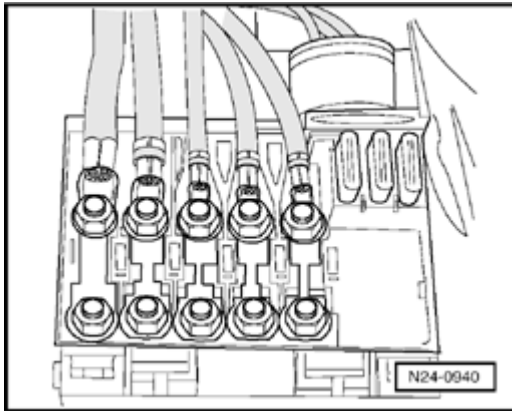
Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the vehicle diagnostic, testing and information system VAS 5051.

Test prerequisites

- All fuses must be OK.





- The main fuses must be OK.
- The battery voltage must be at least 11.5 V.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Exhaust system between Three Way Catalytic Converter (TWC) and cylinder head must be free of leaks
- Ignition switched on, engine not running.
- Fuel Pump (FP) relay -J17- must be OK., checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- The signal from Brake Light Switch -F- and Brake Vacuum Vent Valve Switch -F47- -F85- must be OK., checking ⇒ [Page 24-206](#) .
- Engine Coolant Temperature (ECT) must be 85...110 °C ⇒ display group 4, display zone 3.
- Intake Air Temperature (IAT) less than 80 °C ⇒ display group 4, display zone 4.
- Three Way Catalytic Converter (TWC) temperature must be at least 380 °C ⇒ display group 34, display zone 2.

Work sequence

- Connect VAG 1551 scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with the "Address word" 01. (Connecting scan tool and selecting Engine Control Module (ECM) ⇒ [Pa 01-12](#)).

Work step 1: Check DTC memory

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Operate scan tool taking into account the information on the display:
- Press buttons -0- and -2- for function "Check DTC memory" and confirm entry with Q button

X Diagnostic Trouble Codes (DTCs) detected!



The number of Diagnostic Trouble Codes (DTCs) stored or "No DTC detected!" will be shown on the display.

If a DTC is stored:

Repair Diagnostic Trouble Codes (DTCs) printed out using DTC table:

- ◆ SAE P0 codes ⇒ [Page 01-30](#) ,
- ◆ SAE P1 codes ⇒ [Page 01-58](#) ,
- ◆ SAE P2 codes ⇒ [Page 01-98](#) ,
- ◆ SAE P3 codes ⇒ [Page 01-99](#) .

If no DTC is stored:

- Press → button.
- Continue with work step 3

Work step 2: Erase DTC memory

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -5- for function "Erase DTC memory" and confirm entry with -Q- button.

Note:

The readiness code is reset or erased each time DTC memory is erased.

Rapid data transfer
DTC memory is erased!



Indicated on display:

Note:

If the ignition is switched off between "Check DTC memory" and "Erase DTC memory" the DTC memory will not be erased.

- Press → button.

Work step 3: Adjust the Throttle Valve Control Module -J338- to the Motronic Engine Control Module (ECM) -J220-

Rapid data transfer HELP
Select function XX



Indicated on display:

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

Basic setting
Input display group number XXX



Indicated on display:

- Press buttons -0-, -6- and -0- for "Display group number 60" and confirm entry with -Q- button.

System in basic setting 60 →
xxx.x % xxx.x % x ADP. runs



Indicated on display: (1 to 4 = display zones)

- Check specifications in display zones 3 and 4:
Display zone 3: 0 to 8
Display zone 4: ADP. runs, ADP. OK.

System in basic setting 60 →
xxx % xxx % 8 ADP. OK.



Indicated on display: (1 to 4 = display zones)

- Terminate engine basic setting at earliest after 30 seconds by pressing → button.

If the display does not indicate as described:

- Check Throttle Valve Control Module -J338- ⇒ [Page 24-59](#) .

If the display indicates as described:

- Start engine and run at idle.

Note:

Engine must not be switched again off during work sequence.

Work step 4: Requesting temperature

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with Q button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -4- for "Display group number 4" and confirm entry with -Q- button.

Read measured value block 4



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Read Engine Coolant Temperature value in display zone 3.

Specification: 85 to 110 °C

- Read Intake Air Temperature value in display zone 4.

Specification: Ambient temperature less than 80 °C

If the specifications are obtained:

- Press → button.

Work step 5: Evaporative Emissions (EVAP) Canister system diagnosis (Tank ventilation system)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -7- and -1- for "Display group number 71" and confirm entry with -Q- button.

Note:

The engine must not be loaded during this diagnosis, if this occurs the diagnosis will be interrupted and will not start again until the engine is revved-up.

System in basic setting 71

1 2 3 4 →



Indicated on display: (1 to 4 = display zones)

If "Reed op." appears in display zone 1:

- Open fuel tank filler cap briefly to release pressure in fuel tank. This will close reed terminal.

If the diagnosis is initiated by the Motronic Engine Control Module (ECM) -J220- the display in display zone 4 jumps from "Test OFF" to "Test ON".

- Leave engine running at idle until specification "Sys. OK." is displayed in display zone 4.

Note:

If the display in display zone 4 jumps from "Test OFF" to "Test ON" during the diagnosis, repeat the diagnosis again. When repeating the diagnosis, the diagnosis can take up to 60 seconds before the display in display zone 4 jumps from "Test OFF" to "Test ON".

If "Sm leak or La leak" (meaning Small leak or Large leak) appears in display zone 2 and "Sys. n.OK." appears in display zone 4:

- Press → button.

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Check Evaporative Emissions (EVAP) Canister system for leaks:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20](#)

If "Sys. OK." appears in display zone 4:

- Press → button.

Work step 6: Oxygen Sensor (O2S) control diagnosis status before Three Way Catalytic Converter (TWC)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block
Input display group number XXX



Indicated on display:

Read measured value block 30

1

2

- Press buttons -0-, -3- and -0- for "Display group number 30" and confirm entry with -Q- button.

Indicated on display: (1 to 2 = display zones)

- Check Oxygen Sensor (O2S) control status before Three Way Catalytic Converter (TWC) (display zone 1):

Specification: 111

Significance of figures in 3 digit number block ⇒ [Page 01-217](#) .

Note:

The bits in display zones 1 will not be set to 1 until the Three Way Catalytic Converter (TWC) temperature rises above 380 ° C (⇒ display groups 34, display zone 2).

If the specification is not obtained:

- Press → button.
- Check Oxygen Sensor (O2S) heater of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ [Page 24-38](#) .

If the specification is obtained:

- Press → button.

Note:

This process can take approx. 90 seconds.

- Depress brake pedal and accelerator down until display zone 4 displays specification "B1-P1 OK."
- Release brake and accelerator pedals.

If "B1 P1 n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Check aging of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) ⇒ [Page 24-150](#) .

If "B1 P1 OK." appears in display zone 4:

- Press C button.

Work step 8: Fuel supply system diagnosis (part load)

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -2-, -1- and -6- for "Display group number 216" and confirm entry with -Q- button.

System in basic setting 216

1 2 3 4 →



Indicated on display: (1 to 4 = display zones)

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by Motronic Engine Control Module (ECM) -J220- to approx. 2300 rpm.

- Depress brake pedal and accelerator down until display zone 4 displays (after approx. 75 seconds) specification "xxxxx100".
- Release brake and accelerator pedals.

If the display does not indicate as described:

- Press → button.

- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If the display indicates as described:

- Press → button.

Work step 9: Oxygen Sensor (O2S) control diagnosis status after Three Way Catalytic Converter (TWC)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -3- and -0- for "Display group number 30" and confirm entry with -Q- button.

Read measured value block 30



Indicated on display: (1...2 = display zones)

1

2

- Check Oxygen Sensor (O2S) control status after Three Way Catalytic Converter (TWC) (display zone 2): Specification: 111

Significance of figures in 3 digit number block ⇒ [Page 01-217](#) .

Note:

The bits in display zone 2 will not be set to 1 until the Three Way Catalytic Converter (TWC) temperature rises above 380 ° C (⇒ display groups 34, display zone 2).

If the specification is not obtained:

- Press → button.
- Check Oxygen Sensor (O2S) heater of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ [Page 24-45](#) .

If the specification is obtained:

- Press → button.

Work step 10: Oxygen Sensor (O2S) aging diagnosis of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

01-164

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -4- and -3- for "Display group number 43" and confirm entry with -Q- button.

System in basic setting 43



1	2	3	4
---	---	---	---



Indicated on display: (1 to 4 = display zones)

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by Motronic Engine Control Module (ECM) -J220- to approx. 2300 rpm.

- Depress and hold brake pedal and accelerator until display in display zone 4 jumps from "Test OFF" to "Test ON", when performing this test the Three Way Catalytic Converter (TWC) temperature in display zone 2 must be at least 380 °C.

Note:

This process can take approx. 30 seconds.

- Depress and hold brake pedal and accelerator until display zone 4 displays specification "B1 P2 OK."
- Release brake and accelerator pedals.

If "B1 P2 n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Check aging of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ [Page 24-154](#) .

If "B1 P2 OK." appears in display zone 4:

- Press -C- button.

**Work step 11: Oxygen Sensor (O2S)
diagnosis after Three Way Catalytic
Converter (TWC) (operational readiness)**

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -3- and -6- for "Display group number 36" and confirm entry with -Q- button.

System in basic setting 36



1

2



Indicated on display: (1...2 = display zones)

If the diagnosis is initiated by the Motronic Engine Control Module (ECM) -J220- the display in display zone 2 jumps from "Test OFF" to "Test ON".

- Leave engine running at idle until display zone 2 shows specification "B1 P2 OK."

Note:

This process can take approx. 30 seconds.

If "B1 P2 n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control after Three Way Catalytic Converter (TWC) ⇒ [Page 24-140](#)

If "B1 P2 OK." appears in display zone 4:

- Press -C- button.

Work step 12: Three Way Catalytic Converter (TWC) diagnosis (checking conversion)

Note:

The diagnosis will only be ended if the Oxygen Sensor (O2S) aging diagnosis for Oxygen Sensor (O2S)s before and after Three Way Catalytic Converter (TWC) is first successfully completed.

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -4- and -6- for "Display group number 46" and confirm entry with -Q- button.

System in basic setting 46



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by Motronic Engine Control Module (ECM) -J220- to approx. 2300 rpm.

Only continue with the test when:

- The Three Way Catalytic Converter (TWC) temperature is above 380 °C (display zone 2).
- Depress brake pedal and accelerator down and hold until display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

This process can take approx. 80 seconds.

- Depress and hold brake pedal and accelerator until display zone 4 displays specification "Cat. B1 OK."
- Release brake and accelerator pedals.

If "CatB1 n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.

- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Press buttons -0- and -6- for the function "End output" and confirm entry with the -Q- button.
- Switch off ignition.
- Replace front exhaust pipe with Three Way Catalytic Converter (TWC):

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 26](#)

If "Cat B1 OK." appears in display zone 4:

- Press -C- button.

Work step 13: Fuel supply system diagnosis (idle speed)

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -2-, -1- and -6- for "Display group number 216" and confirm entry with -Q- button.

System in basic setting 216



1 2 3 4



Indicated on display: (1...4 = display zones)

- Observe figure displayed in display zone 4.

Specification: xxxxx100

- Allow engine to run at idle until display zone 4 displays (after approx. 30 seconds):

Specification: xxxx1100.

If the display does not indicate as described:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) - J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If the display indicates as described:

- Press -C- button.

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Work step 14: Evaporative Emissions (EVAP) Canister system solenoid valve 1 diagnosis (Tank ventilation system)

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -7- and -0- for "Display group number 70" and confirm entry with -Q- button.

Note:

The engine must not be loaded during this diagnosis, if this occurs the diagnosis will be interrupted and will not start again until the engine is revved-up.

System in basic setting 70



1 2 3 4



Indicated on display: (1 to 4 = display zones)

If the diagnosis is initiated by the Motronic Engine Control Module (ECM) -J220- the display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

This process can take approx. 30 seconds.

- Leave engine running at idle until display zone 4 displays:

Specification: TBV OK..

Note:

*TBV stands for Evaporative Emission (EVAP)
Canister Purge Regulator Valve -N80-.*

If "TBV n. OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Press buttons -0- and -6- for the function "End output" and confirm entry with the -Q- button.
- Switch off ignition.
- Check breather lines to EVAP canister (may be kinked).

- Check EVAP canister system for leaks:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20](#)

If "TBV OK." appears in display zone 4:

- Press -C- button.

Work step 15: Secondary air system diagnosis

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -7- and -7- for "Display group number 77" and confirm entry with -Q- button.

Note:

The engine must not be loaded during this diagnosis, if this occurs the diagnosis will be aborted and will not start again until the engine is revved-up.

System in basic setting 77



1 2 3 4



Indicated on display: (1 to 4 = display zones)

If the diagnosis is initiated by the Motronic Engine Control Module (ECM) -J220- the display in display zone 4 jumps from "Test OFF" to "Test ON".

Note:

This process can take approx. 40 seconds.

- Leave engine running at idle until display zone 4 displays:

Specification: "Syst. OK."

If "Syst.n.OK." appears in display zone 4:

- Press → button.
- Check DTC memory, repair Diagnostic Trouble Codes (DTCs) if necessary and then erase DTC memory ⇒ [Page 01-23](#) , DTC memory, checking and erasing.
- Read readiness code ⇒ [Page 01-146](#) . If the DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery (B+) positive, the readiness code must be generated again ⇒ [Page 01-149](#) .

If no DTC is stored:

- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Check combi-valve:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 26](#)

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If "Syst. OK." appears in display zone 4:

- Press → button.

Work step 16: Read readiness code

- Read readiness code ⇒ [Page 01-146](#) .

Readiness code, generating (overview)

Work steps 1 to 5:

Work step/ Diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3
1	Check DTC memory	02/---	◆ Ignition on	---	---	---
2	Erase DTC memory	05/---	◆ Ignition on	---	---	---
3	Adapting Throttle Valve Control Module	04/60	◆ Ignition on	Throt. valve angle	Throt. valve angle	Learning step counter
				angle sensor 1	angle sensor 2	
Specification:				3...93 %	97...3 %	8
4	Requesting temperature	08/4	◆ Idle speed	Idle speed	Voltage supply for Motronic Engine Control Module (ECM) - J220-	Coolant temperature
				Specification:		
5	Leak diagnosis	04/071	◆ Idle speed	Reed condition	Text	Text
				Specification:	Reed open	---

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Work steps 6 to 9:

Work step/ Diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3
6	Oxygen Sensor (O2S) control status	08/30	◆ Idle speed	Before Three Way Catalytic Converter (TWC)	After Three Way Catalytic Converter (TWC)	No display
			Specification:	111	xxx	---
7	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) (Oxygen Sensor (O2S) aging)	04/34	◆ Brakes operated ◆ Accelerator in wide openthrottle position.	Engine speed	Three Way Catalytic Converter (TWC) temperature	Dynamic factor of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC)
			Specification:	Approx. 2300 rpm	Greater than 380 °C	1.00...2.50
8	Fuel supply system (part load)	04/216	◆ Brakes operated ◆ Accelerator in wide openthrottle position.	Engine speed	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) lower part load	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) idle speed
			Specification:	---	---	---

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Work step/ Diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3	Display zone 4
9	Oxygen Sensor (O2S) control status	08/30	◆ Idle speed	Before Three Way Catalytic Converter (TWC)	After Three Way Catalytic Converter (TWC)	No display	No display
			Specification:	xxx	111	---	---

Work steps 10 to 11:

Work step/ diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Dis zon
10	Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) (Oxygen Sensor (O2S) aging)	04/43	<ul style="list-style-type: none"> ◆ Brakes operated ◆ Accelerator in wide open throttle position. 	Engine speed	Three Way Catalytic Converter (TWC) temperature	Oxy Ser (O. volt Oxy Ser (O2S Three Cata Conv (TV
			Specification:	Approx. 2300 rpm	Greater than 380 ° C	0.100. \
11	Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) (operational readiness)	04/36	◆ Idle speed	Oxygen Sensor (O2S) voltage, Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)	Result	No di
			Specification:	0.100...0.900 V	B1 P2 OK.	--

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Work steps 12 to 13:

Work step/ diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3
12	Three Way Catalytic Converter (TWC)	04/46	<ul style="list-style-type: none"> ◆ Brakes operated ◆ Accelerator in wide openthrottle position. 	Engine speed	Three Way Catalytic Converter (TWC) temperature	Three Way Catalytic Converter (TWC) conversion rate
			Specification:	Approx. 2300 rpm	Greater than 380 ° C	0.00...0.99
13	Fuel supply system (idle speed)	04/216	◆ Idle speed	Engine speed	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) lower part load	Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) idle speed
			Specification:	---	---	---

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Work steps 14 to 16:

Work step/ diagnosis		Function/group	Test prerequisites	Display zone 1	Display zone 2	Display zone 3
14	Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- (Tank ventilation system)	04/70	◆ Idle speed	Evaporative Emissions (EVAP) Canister regulator valve 1 duty cycle	TBV quality	No display
			Specification:	---	---	---
15	Secondary air system	04/77	◆ Idle speed	Idle speed	Air mass drawn in	Air mass, secondary air system
			Specification:	640...720 rpm	---	---
16	Read readiness code	15/---	◆ Idle speed	---	---	---

1) TBV stands for Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-.

Measured value (data) blocks

Safety precautions

Observe following if test and measuring instruments are required during a road test:

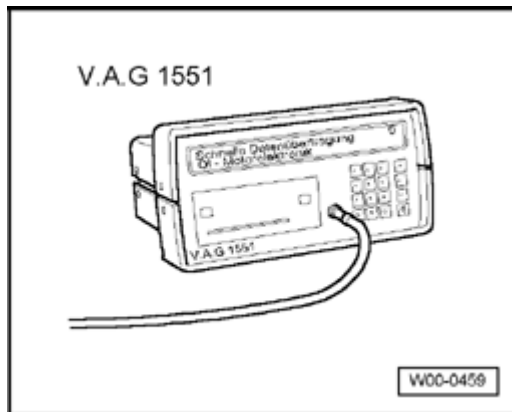
- ◆ Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

If test and measuring instruments are operated from front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

Read measured value (data) block

The measured values in the functions read measured value block and basic setting are described during the individual component test. This table serves only as an overview.

Special tools and equipment



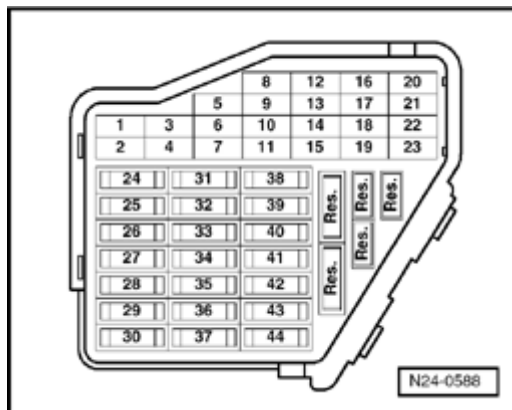
- ◆ VAG 1551 scan tool (or VAG 1552 vehicle system tester) with VAG 1551/3 adapter cable

Note:

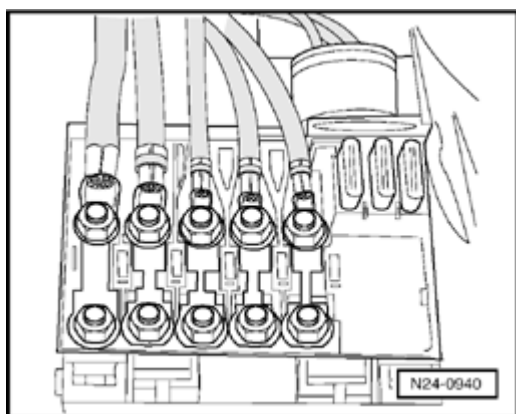
All functions which could previously be performed with VAG 1551/1552 can also be performed with the vehicle diagnostic, testing and information system VAS 5051.

Test requirements

- The fuses must be OK.



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- The main fuses must be OK.
- The battery voltage must be at least 11.5 V.
- Ground (GND) connection between engine and body must be OK.
- All electrical devices, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Coolant temperature must be at least 85 °C, ⇒display group 1, display zone 2.
- Three Way Catalytic Converter (TWC) temperature must be at least 380 °C, ⇒display group 46, display zone 2.
- No Diagnostic Trouble Codes (DTCs) must be stored in DTC memory ⇒ [Page 01-23](#), DTC memory, checking and erasing.

Work sequence

- Connect VAG 1551 scan tool ((VAG 1552) and select Engine Control Module (ECM) with the "Address word" 01. When doing this the engine must be running at idle: (Connecting scan tool and selecting Engine Control Module (ECM) ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value (data) block



Indicated on display:

Input display group number XXX

- Select required display group number.

Note:

The display group number 1 is an example, to illustrate the sequence.

- Press buttons -0-, -0- and -1- for "Display group number 1" and confirm entry with -Q- button.

Read measured value block 1 →
 1 2 3 4



Indicated on display: (1...4 = display zones)

Note:

To change to another display group proceed as follows:

Display group	VAG 1551	VAG 1552
Higher	Press button -3-	↑ -Press button
Lower	Press button -1-	↓ Press button
Skip	Press button -C-	Press button -C-

- If the specifications in all display zones are obtained, → - press button.

Rapid data transfer HELP
 Select function XX



Indicated on display:

- Press buttons -0- and -6- for the function "End output" and confirm entry with the -Q- button.

Note:

Measured value blocks which are not described in this chapter are currently only intended for research and development and production. The values displayed are not relevant for service department troubleshooting.

Measured value blocks, display groups 0...9 - Basic functions, evaluating

Display group 1 - Basic functions																		
<ul style="list-style-type: none"> • Engine running at idle 																		
Read measured value block 1 → xxxx xxx.x xx.x xxxxxxxx rpm °C %			◀ Indicated on display															
1	2	3	<table border="1"> <thead> <tr> <th>◀ Display zones</th> <th>Specification</th> <th>Evaluation</th> </tr> </thead> <tbody> <tr> <td>Prerequisites for basic settings</td> <td>11111111</td> <td>⇒ Page 01-189</td> </tr> <tr> <td>Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC)</td> <td>-10.0...10.0 %</td> <td>⇒ Page 01-224</td> </tr> <tr> <td>Coolant temperature</td> <td>80.0...110.0 °C</td> <td>⇒ Page 01-195</td> </tr> <tr> <td>Engine speed (idle speed)</td> <td>640...720 rpm</td> <td>⇒ Page 01-188</td> </tr> </tbody> </table>	◀ Display zones	Specification	Evaluation	Prerequisites for basic settings	11111111	⇒ Page 01-189	Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC)	-10.0...10.0 %	⇒ Page 01-224	Coolant temperature	80.0...110.0 °C	⇒ Page 01-195	Engine speed (idle speed)	640...720 rpm	⇒ Page 01-188
◀ Display zones	Specification	Evaluation																
Prerequisites for basic settings	11111111	⇒ Page 01-189																
Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC)	-10.0...10.0 %	⇒ Page 01-224																
Coolant temperature	80.0...110.0 °C	⇒ Page 01-195																
Engine speed (idle speed)	640...720 rpm	⇒ Page 01-188																

Evaluating display group 1, display zone 1 - Engine speed (idle speed)

VAG 1551 display	Possible cause	Corrective action
Less than specified	<ul style="list-style-type: none"> ◆ Throttle Valve Control Module - J338- sticking/faulty ◆ Large amount of unmetered air (cannot be compensated for by the idling stabilization) 	<ul style="list-style-type: none"> - Check Throttle Valve Control Module -J338- ⇒ Page 24-59 - Check intake air system for leaks ⇒ Page 24-121 - Perform idle speed check ⇒ Page 24-125
Greater than specified	◆ Idle speed not detected	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Large amount of unmetered air (cannot be compensated for by the idling stabilization)	- Check intake air system for leaks ⇒ Page 24-121
	◆ Throttle Valve Control Module - J338- sticking/faulty	<ul style="list-style-type: none"> - Check Throttle Valve Control Module -J338- ⇒ Page 24-59 - Perform idle speed check ⇒ Page 24-125
	◆ Supply voltage too low, engine tries to reduce charge difference through increased idle speed	- Evaluation ⇒ Page 01-194 , display group 4, display zone 2

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Significance of figures in 8 digit number block, display zone 4 - Adjustment conditions

Significance if display = 1								Significance
1	2	3	4	5	6	7	8	
							1	Coolant temperature above 80 °C
						1		Speed below 2000 rpm
					1			Throttle valve closed
				1				Oxygen Sensor (O2S) control active
			1					Idle speed detected
		1						Air conditioner compressor switched off
	1							Coolant temperature above 380 °C
1								No Diagnostic Trouble Codes (DTCs) detected by On Board Diagnostic (OBD)

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Evaluating display group 2, display zone 4 - Mass Air Flow (MAF)

Appears on display	Possible cause	Corrective action
Less than specified	<ul style="list-style-type: none"> ◆ Large amount of unmeasured air between intake manifold and Mass Air Flow (MAF) Sensor -G70- 	- Repair unmeasured air
Greater than specified	<ul style="list-style-type: none"> ◆ Gear selected (automatic transmission) ◆ Engine loaded due to accessories 	<ul style="list-style-type: none"> - Place selector lever in P or N - Eliminate load (air conditioner, power assisted steering etc.)

Display group 3 - Basic function - Mass Air Flow (MAF)						
• Engine running at idle						
Read measured value block 3				Indicated on display		
xxxx rpm	xx.x g/s	xx.x %	xx.x ° C			
1	2	3	4	Display zones	Specification	Evaluation
				Ignition timing angle	4.0...15.0 ° BTDC	---
				Throttle valve angle		
				Angle sensor -1- for throttle drive -G187-	0.2...4.0 %	⇒ Page 01-202
				Air mass drawn in	3.0...5.0 g/s	⇒ Page 01-191
				Engine speed (idle speed)	640...720 rpm	⇒ Page 01-188

Note on display zone 2:

Displayed is the air mass measured by the Mass Air Flow (MAF) Sensor -G70-.

Note on display zone 3:

Display values must be approx. 100% when accelerator pedal is fully depressed.

Display group 4 - Basic functions						
• Engine running at idle						
Read measured value block 4				◀ Indicated on display		
xxxx rpm	xx.xxx V	xxx.x °C	xxx.x °C			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Intake air temperature	-37.0...126.0 °C	⇒ Page 01-196
				Coolant temperature	80.0...110.0 °C	⇒ Page 01-195
				Voltage supply for Motronic Engine Control Module (ECM) -J220-	11.500...15.000 V	⇒ Page 01-194
				Engine speed (idle speed)	640...720 rpm	⇒ Page 01-188

Note on display zone 4:

The total temperature range is given as the specification. The displayed value must be above ambient temperature.

Evaluating display group 4, display zone 2 - control module voltage supply

Appears on display	Possible cause	Corrective action
Less than specified	◆ Alternator faulty, battery charge state low	- Check alternator and battery voltage, charge battery: ⇒ Repair Manual, Electrical Equipment; Repair Group 27
	◆ Battery heavily loaded shortly after starting due to high charging current and accessories	- Increase revs slightly for a few minutes and switch off accessories
	◆ Transfer resistance in current supply or the Motronic Engine Control Module (ECM) -J220- Ground (GND) connection	- Check Motronic Engine Control Module (ECM) -J220- voltage supply ⇒ Page 24-163
	◆ Current draw when ignition is off	- Eliminate current draw
Greater than specified	◆ Voltage control on alternator faulty	- Check voltage control, replace if necessary: ⇒ Repair Manual, Electrical Equipment; Repair Group 27
	◆ Excess voltage due to slave starting or quick charging unit	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing

Evaluating display group 4, display zone 3 - Engine Coolant Temperature (ECT)

Appears on display	Possible cause	Corrective action
Less than specified	◆ Engine too cold	- If necessary perform road test
	◆ Engine Coolant Temperature (ECT) sensor -G62- faulty	- Check Engine Coolant Temperature (ECT) sensor -G62- ⇒ Page 24-69
Greater than specified	◆ Radiator contaminated	- Clean radiator
	◆ Coolant fan not functioning	- Check coolant fan: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 19
	◆ Thermostat sticking/faulty	- Check thermostat: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 19
	◆ Engine Coolant Temperature (ECT) sensor -G62- faulty	- Check Engine Coolant Temperature (ECT) sensor -G62- ⇒ Page 24-69
Constant - 42.0 °C Constant 136.0 °C	◆ Engine Coolant Temperature (ECT) sensor -G62- faulty	- Check Engine Coolant Temperature (ECT) sensor -G62- ⇒ Page 24-69

Evaluating display group 4, display zone 4 - Intake air temperature (IAT)

Appears on display	Possible cause	Corrective action
Less/greater than specified	◆ Intake Air Temperature (IAT) sensor -G42- faulty	- Check Intake Air Temperature (IAT) sensor -G42- ⇒ Page 24-81
Constant -37.0 °C		
Constant 126.0 °C		

Display group 5 - Basic function			
• Engine running at idle			
Read measured value block 5			→
xxxx rpm	xxx.x %	xxx km/h	Text
◀ Indicated on display			
1	2	3	4
◀ Display zones			
		Operating mode:	
		idling, part throttle, enrichment, overrun, wide open throttle	
		Vehicle speed	
		Engine load	
		Engine speed (idle speed)	
		Specification	Evaluation
		Idle speed	---
		0 km/h	---
		12.0...26.0 %	⇒ Page 01-201
		640...720 rpm	⇒ Page 01-188

Note on display zone 2:

The engine load at idling is given as the specification.

Display group 6 - Basic function						
• Engine running at idle						
Read measured value block 6				→ Indicated on display		
xxxx rpm	xxx.x %	xxx.x °C	xx.x %			
1	2	3	4	Display zones	Specification	Evaluation
				Elevation correction factor	-50.0...20.0 %	---
				Intake air temperature	-37.0...126.0 °C	⇒ Page 01-196
				Engine load	12.0...26.0 %	⇒ Page 01-201
				Engine speed (idle speed)	640...720 rpm	⇒ Page 01-188

Note on display zone 2:

The engine load at idling is given as the specification.

Note on display zone 3:

The total temperature range is given as the specification. The displayed value must be above ambient temperature.

Display group 8 - Basic functions - Brake System Vacuum Pump (automatic transmission only)						
<ul style="list-style-type: none"> Ignition on, engine not running 						
Read measured value block 8 Text xx.xxx Text xxx V mbar				◀ Indicated on display		
1	2	3	4	◀ Display zones	Specification	Evaluation
				Brake servo, absolute pressure	---	---
				Brake System Vacuum Pump -V192- (pump ON / pump OFF)	---	---
				Voltage supply for Motronic Engine Control Module (ECM) -J220-	11.500...15.000 V	⇒ Page 01-194
Brake pedal:						
<ul style="list-style-type: none"> Not operated 					not oper.	---
<ul style="list-style-type: none"> Operated 					operated	---

Measured value blocks, display groups 10...29 - Ignition, evaluating

Display group 10 - Ignition			
<ul style="list-style-type: none"> • Engine running at idle 			
Read measured value block 10 →			◀ Indicated on display
xxxx rpm	xxx.x %	xxx.x %	xx.x ° BTDC
1	2	3	4
◀ Display zones			
Ignition timing angle			
Specification			
Evaluation			
4.0...15.0 ° BTDC			

Throttle valve angle			
Angle sensor -1- for throttle drive -G187-			
0.2...4.0 %			
⇒ Page 01-202			
Engine load			
12.0...26.0 %			
⇒ Page 01-201			
Engine speed (idle speed)			
640...720 rpm			
⇒ Page 01-188			

Note on display zone 2:

The engine load at idling is given as the specification.

Note on display zone 3:

Display values must be approx. 100 % when accelerator pedal is fully depressed.

Evaluating display group 10, display zone 2 - Engine load

Appears on display	Possible cause	Corrective action
Less than specified	◆ Lower values can only occur when driving in overrun	---
Greater than specified	◆ Rough idling (not running on all cylinders)	- Check spark connectors ⇒ Page 28-15 , Test data, spark connectors - Check ignition coils with power output stage ⇒ Page 28-23
	◆ Mass Air Flow (MAF) Sensor -G70- faulty	- Check Mass Air Flow (MAF) Sensor -G70- ⇒ Page 24-52
	◆ Fuel injector faulty	- Check fuel injectors ⇒ Page 24-97
	◆ Throttle Valve Control Module -J338- sticking/faulty	- Check Throttle Valve Control Module -J338- ⇒ Page 24-59
	◆ Electric consumers switched on	- Switch off electric consumers
	◆ Steering wheel at full lock	- Set steering wheel to center position
	◆ Gear selected (automatic transmission)	- Place selector lever in P or N

01-202

Evaluating display group 10, display zone 3 - Throttle valve angle, Angle sensor - 1- for throttle drive

Appears on display	Possible cause	Corrective action
Greater than specified	<ul style="list-style-type: none"> ◆ Motronic Engine Control Module (ECM) -J220- not adapted to Throttle Valve Control Module -J338- 	- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- to Throttle Valve Control Module ⇒ Page 24-182
	<ul style="list-style-type: none"> ◆ Faulty Angle sensor -1- for throttle drive -G187- in Throttle Valve Control Module -J338- 	- Check Throttle Valve Control Module -J338- ⇒ Page 24-59
	<ul style="list-style-type: none"> ◆ Throttle valve sticking 	- Repair cause

Display group 14 - Ignition - Misfire detection			
• While driving			
Read measured value block 14		→	
xxxx rpm	xxx.x %	xxx	Text
1	2	3	4
◀ Indicated on display			
◀ Display zones			
Misfire detection (inactive, activated)		Specification	Evaluation
		Activated	---
Misfire total		0	⇒ Page 01-204
Engine load		12.0...100.0 %	---
Engine speed		640...6500 rpm	---

Note on display zone 3:

The total number of detected misfires is displayed here. No distinction is made over what period of time the misfire was detected. Therefore check the misfire detection during a road test ⇒ [Page 28-40](#) .

Evaluating display group 14, display zone 3 - Total number of misfires

Appears on display	Possible cause	Corrective action
Greater than specified	◆ Spark connector faulty	- Check spark connectors ⇒ Page 28-15
	◆ Ignition coil faulty ◆ Ignition coil final output stage faulty	- Check ignition coils with final output stage ⇒ Page 28-23
	◆ Fuel injector faulty	- Check fuel injectors ⇒ Page 24-97
	◆ Inlet camshaft adjuster sticking/faulty ◆ Exhaust camshaft adjuster sticking/faulty ◆ Inlet Valve -1- for camshaft adjustment -N205- faulty ◆ Exhaust Valve -1- for camshaft adjustment - N318- faulty	- Check camshaft timing adjustment valve ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM) - Check camshaft timing adjustment: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15
	◆ Timing incorrectly set	- Check timing: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15

Display group 15 - Ignition - Misfire detection cyl. 1 to cyl. 3						
• While driving						
Read measured value block 15				→	◀ Indicated on display	
xxx	xxx	xxx	Text			
1	2	3	4	◀ Display zones	Specification	Evaluation
			Misfire detection (inactive, activated)		Activated	---
			Ignition misfire cyl. 3		0	⇒ Page 01-207
			Ignition misfire cyl. 2		0	⇒ Page 01-207
			Ignition misfire cyl. 1		0	⇒ Page 01-207

Display group 16 - Ignition - Misfire detection cyl. 4 to cyl. 6						
• While driving						
Read measured value block 16				→	◀ Indicated on display	
xxx	xxx	xxx	Text			
1	2	3	4	◀ Display zones	Specification	Evaluation
			Misfire detection (inactive, activated)		Activated	---
			Ignition misfire cyl. 6		0	⇒ Page 01-207
			Ignition misfire cyl. 5		0	⇒ Page 01-207
			Ignition misfire cyl. 4		0	⇒ Page 01-207

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Evaluating display group 15, display zones 1 to 3 or display group 16, display zones 1 to 3 - Ignition misfires cyl. 1 to cyl. 6

Appears on display	Possible cause	Corrective action
Greater than specified	◆ Spark connector faulty	- Check spark connectors ⇒ Page 28-15
	◆ Ignition coil faulty ◆ Ignition coil final output stage faulty	- Check ignition coils with final output stage ⇒ Page 28-23
	◆ Fuel injector faulty	- Check fuel injectors ⇒ Page 24-97
	◆ Inlet camshaft timing adjuster sticking/faulty ◆ Exhaust camshaft timing adjuster sticking/faulty ◆ Intake Valve -1- for camshaft adjustment - N205- faulty ◆ Exhaust Valve -1- for camshaft adjustment - N318- faulty	- Check camshaft timing adjustment valve ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM) - Check camshaft timing adjustment: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15
	◆ Timing incorrectly set	- Check timing: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15

Display group 20 - Ignition Knock control cyl. 1 to cyl. 4						
• While driving						
Read measured value block 20				→ Indicated on display		
xx.x ° CA	xx.x ° CA	xx.x ° CA	xx.x ° CA			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Ignition timing retardation cyl. 4 by knock control	0.0...15.0 ° CA	⇒ Page 01-210
				Ignition timing retardation cyl. 3 by knock control	0.0...15.0 ° CA	⇒ Page 01-210
				Ignition timing retardation cyl. 2 by knock control	0.0...15.0 ° CA	⇒ Page 01-210
				Ignition timing retardation cyl. 1 by knock control	0.0...15.0 ° CA	⇒ Page 01-210

Notes on display zones 1 to 4:

The displayed value should be 0.0 ° CA at idling.

Display group 21 - Ignition Knock control cyl. 5 and cyl. 6						
• While driving						
Read measured value block 21			→ ◀ Indicated on display			
xx.x ° CA xx.x ° CA --- ---						
1	2	3	4	◀ Display zones	Specification	Evaluation
				No display	---	---
		No display			---	---
		Ignition timing retardation cyl. 6 by knock control			0.0...15.0 ° CA	⇒ Page 01-210
		Ignition timing retardation cyl. 5 by knock control			0.0...15.0 ° CA	⇒ Page 01-210

Notes on display zones 1 to 2:

The displayed value should be 0.0 ° CA at idling.

01-210

Evaluating display group 20, display zones 1 to 4 and display group 21, display zones 1 and 2 - Ignition timing retardation cyl. 1 to cyl. 6

Appears on display	Possible cause	Corrective action
All cylinders between 8.0...15.0 ° CA and at the same display values	<ul style="list-style-type: none"> ◆ Knock sensor faulty ◆ Connector corroded 	- Check knock sensors ⇒ Page 28-30
	<ul style="list-style-type: none"> ◆ Knock sensor incorrectly tightened 	- Loosen knock sensor and tighten to 20 Nm
	<ul style="list-style-type: none"> ◆ Accessories on engine loose 	- Tighten accessories
	<ul style="list-style-type: none"> ◆ Poor fuel quality 	- Change type of fuel
One cylinder deviates greatly from the others	<ul style="list-style-type: none"> ◆ Connector corroded 	- Check knock sensors ⇒ Page 28-30
	<ul style="list-style-type: none"> ◆ Engine damaged 	- Check compression pressures: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15
	<ul style="list-style-type: none"> ◆ Accessories on engine loose 	- Tighten accessories

Display group 22 - Ignition Knock control cyl. 1 and cyl. 2						
• While driving						
Read measured value block 22				→ Indicated on display		
xxxx rpm	xxx.x %	xx.x ° CA	xx.x ° CA			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Ignition timing retardation cyl. 2 by knock control	0.0...15.0 ° CA	⇒ Page 01-214
				Ignition timing retardation cyl. 1 by knock control	0.0...15.0 ° CA	⇒ Page 01-214
		Engine load			12.0...100.0 %	---
	Engine speed				640...6500 rpm	---

Notes on display zones 3 and 4:

The displayed value should be 0.0 ° CA at idling.

Display group 23 - Ignition Knock control cyl. 3 and cyl. 4						
• While driving						
Read measured value block 23				→ Indicated on display		
xxxx rpm	xxx.x %	xx.x ° CA	xx.x ° CA			
1	2	3	4	Display zones	Specification	Evaluation
				Ignition timing retardation cyl. 4 by knock control	0.0...15.0 ° CA	⇒ Page 01-214
				Ignition timing retardation cyl. 3 by knock control	0.0...15.0 ° CA	⇒ Page 01-214
				Engine load	12.0...100.0 %	---
				Engine speed	640...6500 rpm	---

Notes on display zones 3 and 4:

The displayed value should be 0.0 ° CA at idling.

Display group 24 - Ignition - Knock control cyl. 5 and cyl. 6						
• While driving						
Read measured value block 24				→ Indicated on display		
xxxx rpm	xxx.x %	xx.x ° CA	xx.x ° CA			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Ignition timing retardation cyl. 6 by knock control	0.0...15.0 ° CA	⇒ Page 01-214
				Ignition timing retardation cyl. 5 by knock control	0.0...15.0 ° CA	⇒ Page 01-214
		Engine load			12.0...100.0 %	---
	Engine speed				640...6500 rpm	---

Notes on display zones 3 and 4:

The displayed value should be 0.0 ° CA at idling.

01-214

Evaluating display groups 22 to 24, display zones 3 and 4 - Ignition timing retardation cyl. 1 to 6

Appears on display	Possible cause	Corrective action
All cylinders between 8.0...15.0 ° CA and at the same display values	<ul style="list-style-type: none"> ◆ Knock sensor faulty ◆ Connector corroded 	- Check knock sensors ⇒ Page 28-30
	<ul style="list-style-type: none"> ◆ Knock sensor incorrectly tightened 	- Loosen knock sensor and tighten to 20 Nm
	<ul style="list-style-type: none"> ◆ Accessories on engine loose 	- Tighten accessories
	<ul style="list-style-type: none"> ◆ Poor fuel quality 	- Change type of fuel
One cylinder deviates greatly from the others	<ul style="list-style-type: none"> ◆ Connector corroded 	- Check knock sensors ⇒ Page 28-30
	<ul style="list-style-type: none"> ◆ Engine damaged 	- Check compression pressures: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 15
	<ul style="list-style-type: none"> ◆ Accessories on engine loose 	- Tighten accessories

Display group 28 - Ignition - Knock control			
<ul style="list-style-type: none"> Control module in function "04-Basic setting" Vehicle stationary, engine running at increased idle speed (only with brake and accelerator pedals depressed) 			
System in basic setting 28 →			◀ Indicated on display
xxxx rpm	xxx.x %	xxx.x °C	Text
1	2	3	4
◀ Display zones			
Result of knock control diagnosis			
(Test ON / Test OFF / Sys. OK. / Sys. n.OK.)			
Engine coolant temperature			
85.0...110.0 °C ⇒ Page 01-195			
Engine load			
12.0...100.0 %			
Engine speed			
Approx. 2300 rpm			

Measured value blocks, display groups 30...33, 99 - Oxygen Sensor (O2S) control, evaluating

Display group 30 - Oxygen Sensor (O2S) control			
<ul style="list-style-type: none"> Engine running at idle 			
Read measured value →		← Indicated on display	
xxx	xxx	---	---
1	2	3	4 ← Display zones
			No display
		No display	Specification
		Oxygen Sensor (O2S) control status after Three Way Catalytic Converter (TWC)	111
		<ul style="list-style-type: none"> Three Way Catalytic Converter (TWC) temperature at least 380.0 °C (⇒display group 34, display zone 2) 	⇒ Page 01-217
		Oxygen Sensor (O2S) control status before Three Way Catalytic Converter (TWC)	111
		<ul style="list-style-type: none"> Three Way Catalytic Converter (TWC) temperature at least 380.0 °C (⇒display group 34, display zone 2) 	⇒ Page 01-217

Note on display zone 2:

The 3rd character in the digit number block will not be set to 1 until in part load range.

Significance of characters in 3 digit number block, display zones 1 and 2 - Status of Oxygen Sensor (O2S) control before and after Three Way Catalytic Converter (TWC)

Significance if display = 1			
1	2	3	Significance
		1	Oxygen Sensor (O2S) control active
	1		Oxygen Sensor (O2S) operationally ready
1			Oxygen Sensor (O2S) heating on

Note:

- ◆ *Depending on the status of the Oxygen Sensor (O2S) control, 0 or 1 may appear alternately in the 3 digit block, but the Oxygen Sensor (O2S) must always be operationally ready.*
- ◆ *The 1 set for the Oxygen Sensor (O2S) heating may sporadically be 0 because the heating is pulsed.*

Display group 31 - Oxygen Sensor (O2S) control constantly operating Oxygen Sensors						
• Engine running at idle						
Read measured value block 31				→ ◀ Indicated on display		
x.xx		x.xx		---		---
1	2	3	4	◀ Display zones	Specification	Evaluation
				No display	---	---
				No display	---	---
				Oxygen Sensor (O2S) control, specification	1.00	---
				Oxygen Sensor (O2S) control, current value	0.96...1.04	---

Display group 32 - Oxygen Sensor (O2S) control - Oxygen Sensor (O2S) learned values before Three Way Catalytic Converter (TWC)						
• Engine running at idle						
Read measured value block 32 xx.x % xx.x % --- ---				→ Indicated on display		
1	2	3	4	◀ Display zones	Specification	Evaluation
				No display	---	---
				No display	---	---
				Oxygen Sensor (O2S) learned value at part load (multiple active) before Three Way Catalytic Converter (TWC)	-10.0...10.0 %	⇒ Page 01-221
				Oxygen Sensor (O2S) learned value at idle (additive) before Three Way Catalytic Converter (TWC)	-5.4...5.4 %	⇒ Page 01-221

Note on display zones 1 and 2:

- ◆ *Low values indicate that the engine is running too rich and therefore the Oxygen Sensor (O2S) control is leaning the mixture.*
- ◆ *High values indicate that the engine is running too lean and therefore the Oxygen Sensor (O2S) control enriches the mixture.*
- ◆ *If there is no voltage supply to the control module all the values learned will be reset. DTC memory, checking and erasing ⇒ [Page 01-23](#) .*
- ◆ *add = additive - The effects of the malfunction (e.g. unmetered air) will reduce as the engine speed increases. The injection period will be modified by a fixed amount for additive learned values. This amount is not dependent upon the basic injection period.*
- ◆ *mul. = multiple active - The effects of the malfunction (e.g. faulty fuel injector) will increase as the engine speed increases. A multiple active learned value is a proportional change to the injection period. This change is dependent on the basic injection period.*

01-221

Evaluating display group 32, display zones 1 and 2 - Oxygen Sensor (O2S) learned values before Three Way Catalytic Converter (TWC)

Appears on display	Possible cause	Corrective action
Low Oxygen Sensor (O2S) learned values	◆ Low learned values at idling but with normal learned values at part throttle/load: possible oil dilution (high level of fuel in oil)	- Disappears after freeway/expressway driving or oil change
	◆ Fuel injector leaking	- Check fuel injectors ⇒ Page 24-97
	◆ Fuel pressure too high	- Check fuel pressure control and holding pressure ⇒ Page 24-110
	◆ Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- permanently open	- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM) - Check Evaporative Emissions (EVAP) Canister system: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 20
	◆ Mass Air Flow (MAF) Sensor -G70- faulty	- Check Mass Air Flow (MAF) Sensor -G70- ⇒ Page 24-52
	◆ Oxygen Sensor (O2S) heating faulty or Oxygen Sensor (O2S) contaminated	- Check Oxygen Sensor (O2S) heating before Three Way Catalytic Converter (TWC) ⇒ Page 24-38
Continuation ⇒ next Page		

01-222

Appears on display	Possible cause	Corrective action
High Oxygen Sensor (O2S) learned values	◆ High learned values at idle, not so high learned values at part throttle: Possible unmeasured air in area of intake manifold	- Check intake air system for leaks ⇒ Page 24-121
	◆ Unmeasured air between Mass Air Flow (MAF) Sensor -G70- and throttle valve	- Repair cause
	◆ Fuel injector blocked	- Check fuel injectors ⇒ Page 24-97
	◆ Fuel pressure too low	- Check fuel pressure control and holding pressure ⇒ Page 24-110
	◆ Mass Air Flow (MAF) Sensor -G70- faulty	- Check Mass Air Flow (MAF) Sensor -G70- ⇒ Page 24-52
	◆ Oxygen Sensor (O2S) heating faulty or Oxygen Sensor (O2S) contaminated	- Check Oxygen Sensor (O2S) heating before Three Way Catalytic Converter (TWC) ⇒ Page 24-38
	◆ Unmeasured air at exhaust manifold gasket	- Check exhaust system for leaks: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26

Display group 33 - Oxygen Sensor (O2S) control - Oxygen Sensor (O2S) learned values before Three Way Catalytic Converter (TWC)						
• Engine running at idle						
Read measured value block 33				→ Indicated on display		
xx.X %	x.xxx V	---	---			
1	2	3	4	Display zones	Specification	Evaluation
				No display	---	---
				No display	---	---
				Oxygen Sensor (O2S) voltage, Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC)	1.400...1.600 V	⇒ Page 01-225
				Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC)	-10.0...10.0 %	⇒ Page 01-224

Note on display zone 1:

The display must swing around 0.0%. If 0.0% is constantly displayed, the Oxygen Sensor (O2S) control has switched from control to control because a malfunction has occurred in the Oxygen Sensor (O2S) control. Check DTC memory ⇒ [Page 01-23](#), DTC memory, checking and erasing

01-224

Evaluating display group 33, display zone 1 - Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC)

Appears on display	Possible cause	Corrective action
Outside tolerance range	<ul style="list-style-type: none"> ◆ Minus range: Mixture too rich, Oxygen Sensor (O2S) control weakens mixture ◆ Positive range: Mixture too lean, Oxygen Sensor (O2S) control enriches mixture 	- Wait 30 seconds until display has stabilized
	<ul style="list-style-type: none"> ◆ Oxygen Sensor (O2S) learned value on limit 	- Check Oxygen Sensor (O2S) learned value in display group 32
	<ul style="list-style-type: none"> ◆ Fuel injector faulty 	- Check fuel injectors ⇒ Page 24-97
	<ul style="list-style-type: none"> ◆ Unmetered air 	- Check intake air system for leaks ⇒ Page 24-121

01-225

Evaluating display group 33, display zone 2 - Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC)

Appears on display	Possible cause	Corrective action
Constant 1.5 V	◆ Wiring open circuit via: Oxygen Sensor (O2S), sensor wiring, Ground (GND) wiring, Motronic Engine Control Module (ECM) - J220-	- Check Oxygen Sensor (O2S) heating before Three Way Catalytic Converter (TWC) ⇒ Page 24-138

Display group 34 - Oxygen Sensor (O2S) control - Oxygen Sensor (O2S) aging diagnosis of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC)																		
<ul style="list-style-type: none"> Control module in function "04-Basic setting" Vehicle stationary, engine running at increased idle speed (only with depressed brake pedal and accelerator) 																		
System in basic setting 34 xxxx rpm xxx.x °C		→ Indicated on display																
1	2	3	<table border="1"> <thead> <tr> <th>4</th> <th>Specification</th> <th>Evaluation</th> </tr> </thead> <tbody> <tr> <td> ◀ Display zones Result of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) aging test (Test OFF / Test ON / B1 P1 OK. / B1 P1 n.OK.) </td> <td>B1 P1 OK.</td> <td>⇒ Page 01-227</td> </tr> <tr> <td>Dynamic factor of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC)</td> <td>1.00...2.50</td> <td>---</td> </tr> <tr> <td>Three Way Catalytic Converter (TWC) temperature</td> <td>min. 380.0 °C</td> <td>---</td> </tr> <tr> <td>Engine speed</td> <td>Approx. 2300 rpm</td> <td>---</td> </tr> </tbody> </table>	4	Specification	Evaluation	◀ Display zones Result of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) aging test (Test OFF / Test ON / B1 P1 OK. / B1 P1 n.OK.)	B1 P1 OK.	⇒ Page 01-227	Dynamic factor of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC)	1.00...2.50	---	Three Way Catalytic Converter (TWC) temperature	min. 380.0 °C	---	Engine speed	Approx. 2300 rpm	---
4	Specification	Evaluation																
◀ Display zones Result of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) aging test (Test OFF / Test ON / B1 P1 OK. / B1 P1 n.OK.)	B1 P1 OK.	⇒ Page 01-227																
Dynamic factor of Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC)	1.00...2.50	---																
Three Way Catalytic Converter (TWC) temperature	min. 380.0 °C	---																
Engine speed	Approx. 2300 rpm	---																

Note on display zone 2:

Value calculated from engine speed and engine load.

01-227

Evaluation of display group 34, display zone 4 - Oxygen Sensor (O2S) diagnosis - Oxygen Sensor (O2S) aging before Three Way Catalytic Converter (TWC)

Appears on display	Possible cause	Corrective action
Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) not OK.: "B1 P1 n.OK.	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Oxygen Sensor (O2S) faulty before Three Way Catalytic Converter (TWC)	- Perform a road test to remove possible residue on Oxygen Sensor (O2S) and repeat check. - Perform diagnosis again if result is same: - Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control before Three Way Catalytic Converter (TWC) ⇒ Page 24-131

Display group 36 - Oxygen Sensor (O2S) control - Oxygen Sensor (O2S) diagnosis after Three Way Catalytic Converter (TWC) (operational readiness)						
<ul style="list-style-type: none"> Control module in function "04-Basic setting" Engine running at idle 						
System in basic setting 36 →			◀ Indicated on display			
x.xxx Text --- --- V						
1	2	3	4	◀ Display zones	Specification	Evaluation
			No display		---	---
		No display		---	---	
		Result of operational readiness of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) (Test OFF / Test ON / B1 P2 OK. / B1 P2 n.OK.)		B1 P2 OK.	⇒ Page 01-230	
		Oxygen Sensor (O2S) voltage, Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)		0.100...0.900 V	⇒ Page 01-229	

**Evaluating display group 36, display zone 1 - Oxygen Sensor (O2S)
voltage,Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)**

Appears on display	Possible cause	Corrective action
Constant 1.100 V	◆ Short to positive via: Oxygen Sensor (O2S), sensor wiring, Ground (GND) wiring, Motronic Engine Control Module (ECM) - J220-	- Check basic voltage of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) ⇒ Page 24-146
Constant 0.000 V	◆ Short to Ground (GND) via: Oxygen Sensor (O2S), sensor wiring, Ground (GND) wiring, Motronic Engine Control Module (ECM) -J220-	
Constant between 0.400...0.500 V	◆ Wiring open circuit via: Oxygen Sensor (O2S), sensor wiring, Ground (GND) wiring, Motronic Engine Control Module (ECM) - J220-	

Evaluating display group 36, display zone 2 - Diagnosis of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)

Appears on display	Possible cause	Corrective action
Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) not OK.: "B1 P2 n.OK.	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) faulty	- Perform a road test to remove possible contaminates on Oxygen Sensor (O2S) and repeat check. - Perform diagnosis again if result is same: - Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control after Three Way Catalytic Converter (TWC) ⇒ Page 24-140

Display group 41 - Oxygen Sensor (O2S) control - Oxygen Sensor (O2S) heating						
• Engine running at idle						
Read measured value block 41 --- Text xx.xx Text kΩ				→ Indicated on display		
1	2	3	4	◀ Display zones	Specification	Evaluation
				Oxygen Sensor (O2S) heating after Three Way Catalytic Converter (TWC) (Htg.nC.OFF / Htg.nC.ON)	Htg.nC.ON Htg.nC.OFF sporadically changing	---
				Resistance of Oxygen Sensor (O2S) heating after Three Way Catalytic Converter (TWC)	0.00...25.00 kΩ	---
				Oxygen Sensor (O2S) heating before Three Way Catalytic Converter (TWC) (Htg.bC.OFF / Htg.bC.ON)	Htg.bC.ON Htg.bC.OFF sporadically changing	---
No display					---	---

Note:

The Oxygen Sensor (O2S) heating may be switched on or off depending on the operating conditions of the engine, therefore the display in display zones 2 or 4 may show "Htg.b(a)C.ON" or alternating from "Htg.b(a)C.ON" to Htg.b(a)C.OFF".

Display group 43 - Oxygen Sensor (O2S) control - Oxygen Sensor (O2S) aging diagnosis of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)													
<ul style="list-style-type: none"> Control module in function "04-Basic setting" Vehicle stationary, engine running at increased idle speed (only with depressed brake pedal and accelerator) 													
System in basic setting 43 →		◀ Indicated on display											
xxxx rpm	xxx.x °C	x.xxx V	Text										
1	2	3	4										
◀ Display zones													
<table border="1"> <thead> <tr> <th>Specification</th> <th>Evaluation</th> </tr> </thead> <tbody> <tr> <td>Result of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) aging test (Test OFF / Test ON / B1 P2 OK. / B1 P2 n.OK.)</td> <td>B1 P2 OK. ⇒ Page 01-233</td> </tr> <tr> <td>Oxygen Sensor (O2S) voltage Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)</td> <td>0.100...0.900 V ⇒ Page 01-229</td> </tr> <tr> <td>Three Way Catalytic Converter (TWC) temperature</td> <td>min. 380.0 °C ---</td> </tr> <tr> <td>Engine speed</td> <td>Approx. 2300 rpm ---</td> </tr> </tbody> </table>				Specification	Evaluation	Result of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) aging test (Test OFF / Test ON / B1 P2 OK. / B1 P2 n.OK.)	B1 P2 OK. ⇒ Page 01-233	Oxygen Sensor (O2S) voltage Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)	0.100...0.900 V ⇒ Page 01-229	Three Way Catalytic Converter (TWC) temperature	min. 380.0 °C ---	Engine speed	Approx. 2300 rpm ---
Specification	Evaluation												
Result of Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) aging test (Test OFF / Test ON / B1 P2 OK. / B1 P2 n.OK.)	B1 P2 OK. ⇒ Page 01-233												
Oxygen Sensor (O2S) voltage Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC)	0.100...0.900 V ⇒ Page 01-229												
Three Way Catalytic Converter (TWC) temperature	min. 380.0 °C ---												
Engine speed	Approx. 2300 rpm ---												

Note on display zone 2:

Value calculated from engine speed and engine load.

01-233

Evaluation of display group 43, display zone 4 - Oxygen Sensor (O2S) diagnosis - Oxygen Sensor (O2S) aging after Three Way Catalytic Converter (TWC)

Appears on display	Possible cause	Corrective action
Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) not OK.: "B1 P2 n.OK.	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) faulty	- Perform a road test to remove possible contaminates on Oxygen Sensor (O2S) and repeat check. - Perform diagnosis again if result is same: - Check Oxygen Sensor (O2S) and Oxygen Sensor (O2S) control after Three Way Catalytic Converter (TWC) ⇒ Page 24-140

Display group 46 - Oxygen Sensor (O2S) control - Three Way Catalytic Converter (TWC) diagnosis (conversion test)			
<ul style="list-style-type: none"> Control module in function "04-Basic setting" Vehicle stationary, engine running at increased idle speed (only with depressed brake pedal and accelerator) 			
System in basic setting 46		→	
xxxx rpm	xxx.x °C	x.xx	Text
		◀ Indicated on display	
1	2	3	4
		◀ Display zones	
		Result of Three Way Catalytic Converter (TWC) conversion test (Test OFF / Test ON / CatB1 OK. / CatB1n.OK.)	
		Specification CatB1 OK.	
		Evaluation ⇒ Page 01-235	
		Three Way Catalytic Converter (TWC) conversion rate	
		0.00...0,99	

		Three Way Catalytic Converter (TWC) temperature	
		min. 380.0 °C	

		Engine speed	
		Approx. 2300 rpm	

Note on display zone 2:

Value calculated from engine speed and engine load.

01-235

Evaluating display group 46, display zone 4 - Three Way Catalytic Converter (TWC) diagnosis (conversion test)

Appears on display	Possible cause	Corrective action
Three Way Catalytic Converter (TWC) not OK.: Cat B1 nOK.	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Three Way Catalytic Converter (TWC) faulty	- Perform road test at a constant speed - Perform diagnosis again if result is same: - Replace Three Way Catalytic Converter (TWC): ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code (s): BDF; Repair Group 26

Display group 99 - Oxygen Sensor (O2S) control - Oxygen Sensor (O2S) control operating condition																	
<ul style="list-style-type: none"> • Engine running at idle • Control module in function "04-Basic setting", Oxygen Sensor (O2S) control off • Control module in function "08-Read measured value block", Oxygen Sensor (O2S) control on 																	
System in basic setting 99 →		◀ Indicated on display															
Read measured value block 99																	
xxxx rpm	xxx.x °C	x.xx	Text														
1	2	3	4														
◀ Display zones																	
<table border="1"> <thead> <tr> <th>Specification</th> <th>Evaluation</th> </tr> </thead> <tbody> <tr> <td>Oxygen Sensor (O2S) control operating condition:</td> <td>---</td> </tr> <tr> <td>• in function "04"</td> <td>λ-Reg. ON</td> </tr> <tr> <td>• in function "08"</td> <td>λ-Reg. ON</td> </tr> <tr> <td>Oxygen Sensor (O2S) control, current value</td> <td>0,96...1.04</td> </tr> <tr> <td>Coolant temperature</td> <td>80.0...110.0 °C ⇒ Page 01-195</td> </tr> <tr> <td>Engine speed (idle speed)</td> <td>640...720 rpm ⇒ Page 01-188</td> </tr> </tbody> </table>				Specification	Evaluation	Oxygen Sensor (O2S) control operating condition:	---	• in function "04"	λ-Reg. ON	• in function "08"	λ-Reg. ON	Oxygen Sensor (O2S) control, current value	0,96...1.04	Coolant temperature	80.0...110.0 °C ⇒ Page 01-195	Engine speed (idle speed)	640...720 rpm ⇒ Page 01-188
Specification	Evaluation																
Oxygen Sensor (O2S) control operating condition:	---																
• in function "04"	λ-Reg. ON																
• in function "08"	λ-Reg. ON																
Oxygen Sensor (O2S) control, current value	0,96...1.04																
Coolant temperature	80.0...110.0 °C ⇒ Page 01-195																
Engine speed (idle speed)	640...720 rpm ⇒ Page 01-188																

Notes on display zone 4:

- ◆ For a defined fault finding the Oxygen Sensor (O2S) control is switched off when selecting display group 99 under "04-Basic setting" or switched on under "08-Read measured value block". When the function "04-Basic setting" is exited the Oxygen Sensor (O2S) control is automatically active again.
- ◆ It is possible to switch between the function "04-Basic setting" and the function "08-Read measured value block" by pressing the buttons 4 and 8 on VAG 1551/1552.

Measured value blocks, display groups 50...69 - Speed control, Evaluating

Display group 50 - Speed control - Operating condition						
• Engine running at idle						
Read measured value → block 50				◀ Indicated on display		
xxxx rpm	xxxx rpm	Text	Text			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Air conditioning compressor operating condition (Compr. ON / Compr. OFF)	Compr. ON or Compr. OFF	---
				Air conditioning operating condition (A/C-High / A/C-Low)	A/C-High or A/C-Low	---
				Engine speed (specified idle speed)	700 rpm	---
				Engine speed (actual idle speed)	640...720 rpm	⇒ Page 01-188

Notes on display zones 1 and 2:

- ◆ The rpm in display zone 1 (measured rpm) is the actual engine speed.
- ◆ The rpm in display zone 2 (specified rpm) is theoretical engine speed calculated by the Motronic Engine Control Module (ECM) -J220-. at idle, the Motronic Engine Control Module (ECM) -J220- always tries to adapt the actual engine speed to the specified engine speed.

Notes on display zones 3 and 4:

A/C-High = Air conditioner demands high heating or cooling performance. A/C-Low = Air conditioner not turned on.

- ◆ "Compr. OFF" is always displayed on vehicles with no air conditioner.
- ◆ Check signals to and from air conditioning ⇒ [Page 24-194](#) .

Display group 54 - Speed control						
• While driving						
Read measured value block 54				→ Indicated on display		
xxxx rpm	Text	xxx.x %	xxx.x %			
1	2	3	4	Display zones	Specification	Evaluation
				Throttle valve angle		
				Angle sensor -1- for throttle drive -G187-	0.0...100.0 %	---
				Throttle valve angle	0.0...100.0 %	---
				Throttle Position (TP) Sensor 1 -G79-		
				Operating condition		
				(idling, part throttle, enrichment, overrun, wide open throttle)	---	---
				Engine speed	640...2520 rpm	---

Note on display zone 1:

Above an engine speed of approx. 2520 rpm no indication will appear on display.

Note on display zone 2:

The operating condition is displayed according to engine speed or load. At a higher engine speed, "overrun" is displayed when throttle valve is closed up to 1450 rpm only, and then idle appears thereafter.

Note on display zone 3 and 4:

The specifications do not fully reach the max. min. figures.

Display group 55 - Speed control - Idling stabilization						
• Engine running at idle						
Read measured value block 55 →				◀ Indicated on display		
xxxx rpm	xx.x %	xx.x %	xxxxx			
1	2	3	4	Display zones	Specification	Evaluation
				Operating condition	xxxxx	⇒ Page 01-240
				Idling stabilization learning value	-5.0...5.0 %	---
				Idling control	-5.0...10.0 %	---
				Engine speed (actual idle speed)	640...720 rpm	⇒ Page 01-188

Note on display zone 1:

The rpm in display zone 1 (measured revolutions) is the actual engine speed.

Note on display zone 3:

Displayed is the amount that the idle speed stabilization has moved away from the prescribed average. For a new engine the values lie in the positive range, because of the higher friction and in the negative range with an engine that has run-in.

Significance of figures in 5 digit number block, display zone 4 - Operating conditions

Significance if display = 1					
1	2	3	4	5	Significance
				1	Air conditioner compressor switched on
			1		Drive gear selected
		1			Air conditioning system switched on
	x				Not relevant
x					Not relevant

Display group 56 - Speed control - Idling stabilization						
• Engine running at idle						
Read measured value block 56				◀ Indicated on display		
xxxx rpm	xxxx rpm	xx.x %	xxxxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Operating condition	xxxxx	⇒ Page 01-240
				Idling control	-5.0...10.0 %	---
				Engine speed (specified idle speed)	700 rpm	---
				Engine speed (actual idle speed)	640...720 rpm	⇒ Page 01-188

Notes on display zones 1 and 2:

- ◆ *The rpm in display zone 1 (measured revolutions) is the actual engine speed.*
- ◆ *The rpm in display zone 2 (specified rpm) is theoretical engine speed calculated by the Motronic Engine Control Module (ECM) -J220-. at idle, the Motronic Engine Control Module (ECM) -J220- always tries to adapt the actual engine speed to the specified engine speed.*

Display group 57 - Speed control - Idling stabilization						
• Engine running at idle						
Read measured value → block 57				◀ Indicated on display		
xxxx rpm	xxxx rpm	Text	---			
1	2	3	4	Display zones	Specification	Evaluation
				No display	---	---
				Air conditioning compressor operating mode (Compr. ON / Compr. OFF)	Compr. ON or Compr. OFF	---
				Engine speed (specified idle speed)	700 rpm	---
				Engine speed (actual idle speed)	640...720 rpm	⇒ Page 01-188

Notes on display zones 1 and 2:

- ◆ *The rpm in display zone 1 (measured revolutions) is the actual engine speed.*
- ◆ *The rpm in display zone 2 (specified rpm) is theoretical engine speed calculated by the Motronic Engine Control Module (ECM) -J220-. at idle, the Motronic Engine Control Module (ECM) -J220- always tries to adapt the actual engine speed to the specified engine speed.*

Display group 60 - Speed control - Electronic power control (EPC) system adaption¹⁾						
<ul style="list-style-type: none"> Control module in function "04-Basic setting" Ignition on, engine not running 						
System in basic setting 60				→ ◀ Indicated on display		
xxx %	xxx %	x	Text			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Adaption status		
				(ADP. runs / ADP. OK. / ADP ERROR)	ADP. OK.	---
				Learning step counter	0...8	---
				Throttle valve angle		
				Angle sensor -2- for throttle drive - G188-	100...0 %	---
				Throttle valve angle		
				Angle sensor -1- for throttle drive -G187-	0...100 %	---

¹⁾ Erase learned values and adapt (match) Motronic Engine Control Module (ECM) - J220- to Throttle Valve Control Module ⇒ [Page 24-182](#) .

Note on display group 60:

- ◆ *Adapting the Throttle Valve Control Module -J338- is performed with ignition switched on.*
- ◆ *Motronic Engine Control Module (ECM) -J220- is adapted to throttle valve control module when selecting display group 60 under function "04-Basic setting". This adaption must always be carried out when another Throttle Valve Control Module - J338- (or another complete engine) or another Motronic Engine Control Module (ECM) -J220- is installed.*
- ◆ *The specifications indicated in display zones 1 and 2 do not fully reach the max. min. figures.*
- ◆ *The throttle valve angle sensors are opposed. The values from both angle sensors must always add up to approx. 100 %.*
- ◆ *The counter counts from 0 to 8 in display zone 3 during the adaption.*

Display group 61 - Speed control - Electronic Power Control system						
• While driving						
Read measured value block 61 xxxx rpm xx.xxx V xxx.x % xxxxx				◀ Indicated on display		
1	2	3	4	◀ Display zones	Specification	Evaluation
				Operating condition	xxxxx	⇒ Page 01-240
				Throttle valve angle		
				Angle sensor -1- for throttle drive -G187-	0.0...100.0 %	---
				Voltage supply for Motronic Engine Control Module (ECM) -J220-	11.500...15.000 V	⇒ Page 01-194
Engine speed					640...6500 rpm	---

Note on display zone 3:

The specifications do not fully reach the max./min. figures.

Display group 62 - Speed control - Electronic Power Control system						
• Ignition on, engine not running						
Read measured value block 62				→ Indicated on display		
xxx %	xxx %	xxx %	xxx %			
1	2	3	4	Display zones	Specification	Evaluation
				Sender -2- for accelerator pedal position -G185-	4...49 %	---
				Throttle Position (TP) Sensor -G79-	12...97 %	---
				Throttle valve angle		
				Angle sensor -2- for throttle drive -G188-	100...0 %	---
				Throttle valve angle		
				Angle sensor -1- for throttle drive -G187-	0...100 %	---

Note on display group 62:

- ◆ *The angle sensors for the Throttle Valve Control Module and the Throttle Position (TP) sensor are featured in pairs for reasons of safety. The Motronic Engine Control Module (ECM) -J220- constantly checks the plausibility of the potentiometers.*
- ◆ *The value from Sender -2- for accelerator pedal position -G185- must display approx. half the value of Throttle Position (TP) sensor 1 -G79- at all times.*
- ◆ *The angle sensors for throttle drive are opposed. The values from both angle sensors must always add up to approx. 100 %.*
- ◆ *The specifications do not fully reach the max./min. figures.*

Display group 66 - Speed control - Additional signals						
• Engine running at idle						
Read measured value block 66 →				◀ Indicated on display		
xxx km/h	xxxxxxxx	xxx km/h	xxxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Switch position of CCS controls switch	00000000	⇒ Page 01-249
				Specified vehicle speed (last value stored by CCS)	---	---
Switch position from:						
<ul style="list-style-type: none"> • Clutch Vacuum Vent Valve Switch -F36- • Brake Light Switch -F- and Brake Vacuum Vent Valve Switch -F47- • CCS controls switch 				00001000	⇒ Page 01-248	
Vehicle speed (actual)					0 km/h	---

Note on display zone 2:

- ◆ Check signal from Clutch Vacuum Vent Valve Switch -F36- ⇒ [Page 24-199](#) .
- ◆ Check signals from Brake Light Switch -F- and Brake Vacuum Vent Valve Switch -F47- ⇒ [Page 24-206](#) .

Note on display zone 4:

Check cruise control system (CCS) ⇒ [Page 24-218](#) .

Significance of figures in 8 digit number block, display zone 2 - Switch positions

Significance if display = 1								Significance
1	2	3	4	5	6	7	8	
							1	Brake depressed (Brake Light Switch -F-)
						1		Brake depressed (Brake Vacuum Vent Valve Switch -F47-)
					1			Clutch depressed (Clutch Vacuum Vent Valve Switch -F36-)
				1				Cruise control system operational
			x					Not relevant
		x						Not relevant
	x							Not relevant
x								Not relevant

Note on 4th position in 8 digit number block:

If the cruise control system is not activated:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Significance of figures in 8 digit number block, display zone 4 - CCS controls switch

Significance if display = 1								Significance
1	2	3	4	5	6	7	8	
							0	CCS sliding switch at off (only with detent)
						0		CCS sliding switch at off (not in detent or in detent)
					1			SET button depressed
				1				CCS sliding switch at RES
			x					Not relevant
		x						Not relevant
	x							Not relevant
x								Not relevant

Function of cruise control regulating system:

⇒ *Owner's Manual*

Measured value blocks, display groups 70...77 - Reducing emissions, evaluating

Display group 70 - Reducing emissions - Evaporative Emissions (EVAP) Canister system regulatorvalve diagnosis (Fuel Tank ventilation system)			
<ul style="list-style-type: none"> Control module in function "04-Basic setting" Engine running at idle 			
System in basic setting 70		→	
xxx.x %	xxx.x %	---	Text
1	2	3	4
◀ Indicated on display			
		◀ Display zones	
		Result of Evaporative Emissions (EVAP) Canister regulator valve diagnosis (Test OFF / Test ON / TBV OK. / TBV n.OK.)	
		Specification	
		Evaluation	
		TBV OK. ⇒ Page 01-252	
		No display	

		TBV quality	
		25.0...150.0 %	

		Evaporative Emissions (EVAP) Canister regulator valve duty cycle	
		0.0...100.0 %	

Note:

TBV stands for Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80-. The diagnosis can only be initiated once per engine start.

Note on display zone 1:

The total range is given.

Note on display zone 2:

- ◆ *Oxygen Sensor (O2S) control deviation in negative range: Evaporative Emissions (EVAP) Canister full*

- ◆ *Oxygen Sensor (O2S) control deviation in positive range: Evaporative Emissions (EVAP) Canister empty*

01-252

**Evaluating display group 70, display zone 4 - Evaporative Emissions (EVAP)
Canister system regulator valve diagnosis (Fuel Tank ventilation system)**

Appears on display	Possible cause	Corrective action
Check not performed or has not finished: Test OFF	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Requirements to complete the diagnosis have not been achieved	- Check test conditions, perform diagnosis again
Continuation ⇒next Page		

01-253

Appears on display	Possible cause	Corrective action
Functions Fuel tank breather not OK.: TEV n. OK.	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Breather line between EVAP canister purge regulator valve and intake manifold blocked/no through flow	- Check breather line for through flow, replace if necessary, repeat diagnosis again
	◆ Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- faulty	- Check Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM) - Replace Evaporative Emissions (EVAP) Canister Purge Regulator Valve -N80-, repeat diagnosis

01-255

**Evaluating display group 71, display zone 4 - Evaporative Emissions (EVAP)
Canister diagnosis (leak diagnosis)**

Appears on display	Possible cause	Corrective action
Check not performed or has not finished: Test OFF	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Requirements to complete the diagnosis have not been achieved	- Check test conditions, perform diagnosis again
Continuation ⇒next Page		

01-256

Appears on display	Possible cause	Corrective action
Functions Leak diagnosis not OK.: Syst. n.OK.	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Evaporative Emissions (EVAP) Canister system leaking	- Check Evaporative Emissions (EVAP) Canister system for leaks: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code (s): BDF; Repair Group 20
	◆ Leak Detection Pump (LDP) -V144- faulty	- Check Leak Detection Pump (LDP) -V144- ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM) - Replace Leak Detection Pump (LDP) -V144-: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code (s): BDF; Repair Group 20 - Perform diagnosis again

Evaluating display group 77, display zone 4 - Secondary air system diagnosis

Appears on display	Possible cause	Corrective action
Check not performed or has not finished: Test OFF	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Requirements to complete the diagnosis have not been achieved	- Check test conditions, perform diagnosis again
Continuation ⇒next Page		

01-259

Appears on display	Possible cause	Corrective action
Functions Leak diagnosis not OK.: Syst. n.OK.	◆ DTC stored in DTC memory	- Check DTC memory ⇒ Page 01-23 , DTC memory, checking and erasing
	◆ Secondary Air Injection (AIR) Solenoid Valve - N112- faulty	- Check Secondary Air Injection (AIR) Solenoid Valve ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM) - Replace Secondary Air Injection (AIR) Solenoid Valve: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26 - Perform diagnosis again
	◆ Secondary Air Injection (AIR) Pump Relay - J299- faulty	- Check Secondary Air Injection (AIR) Pump Relay: ⇒ Page 01-100 , Output Diagnosis Test Mode (DTM) - Replace Secondary Air Injection (AIR) Pump Relay: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26 - Perform diagnosis again
	◆ Combi-valve faulty	- Check combi-valve: ⇒ Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code(s): BDF; Repair Group 26 - Perform diagnosis again

Measured value blocks, display groups 86...89, 100 - Readiness code, evaluating

Display group 86 - Readiness code						
• Engine running at idle						
Read measured value block 86 →				◀ Indicated on display		
xxxxxxxx xxxxxxxx xxxxxxxx ---						
1	2	3	4	◀ Display zones	Specification	Evaluation
				No display	---	---
				Diagnosis status	---	---
Diagnosis status					---	---
Readiness code					00000000	⇒ Page 01-261

01-261

Significance of figures in 8 digit number block, display zone 1 - Readiness code

The readiness code is generated only when all display zones show 0								Diagnostic function
1	2	3	4	5	6	7	8	
							0	Three Way Catalytic Converter (TWC)
						0		Three Way Catalytic Converter (TWC) heating (currently no diagnosis/always "0")
					0			Evaporative Emissions (EVAP) Canister system (Tank ventilation system)
				0				Secondary air system
			0					Air conditioner (currently no diagnosis/always "0")
		0						Oxygen Sensor (O2S)s
	0							Oxygen Sensor (O2S) heating
0								Exhaust gas recirculation (not installed/always "0")

Display group 89 - Distance recorder - Malfunction Indicator Light (MIL) on						
• Engine running at idle						
Read measured value block 89				→ Indicated on display		
xxxx	Text	---	---			
1	2	3	4	◀ Display zones	Specification	Evaluation
				No display	---	---
		No display		---	---	
		Level of fuel in fuel tank (OK. / too low)		OK.	---	
Distance travelled (in km) with Malfunction Indicator Light (MIL) switched on					---	---
Malfunction Indicator Light (MIL) on						

Note:

Significance of Electronic Power Control (EPC) Warning Lamp -K132- ⇒ [Page 01-5](#).

Display group 100 - Readiness code																		
<ul style="list-style-type: none"> • Engine running at idle 																		
Read measured value block 100 xxxxxxxx xxx.x xxx.xx xxxxxxxx °C s			← Indicated on display															
1	2	3	<table border="1"> <thead> <tr> <th>Display zones</th> <th>Specification</th> <th>Evaluation</th> </tr> </thead> <tbody> <tr> <td>Diagnosis status</td> <td>---</td> <td>---</td> </tr> <tr> <td>Period since engine started</td> <td>---</td> <td>---</td> </tr> <tr> <td>Engine Coolant Temperature</td> <td>80.0...110.0 °C</td> <td>⇒ Page 01-195</td> </tr> <tr> <td>Readiness code</td> <td>00000000</td> <td>⇒ Page 01-261</td> </tr> </tbody> </table>	Display zones	Specification	Evaluation	Diagnosis status	---	---	Period since engine started	---	---	Engine Coolant Temperature	80.0...110.0 °C	⇒ Page 01-195	Readiness code	00000000	⇒ Page 01-261
Display zones	Specification	Evaluation																
Diagnosis status	---	---																
Period since engine started	---	---																
Engine Coolant Temperature	80.0...110.0 °C	⇒ Page 01-195																
Readiness code	00000000	⇒ Page 01-261																

Measured value blocks, display groups 90...96 - Performance improvement, evaluating

Display group 90 - Performance improvement - Exhaust camshaft timing adjustment						
• While driving						
Read measured value block 90				→ Indicated on display		
xxxx rpm	Text	xx.x ° CA	---			
1	2	3	4	Display zones	Specification	Evaluation
				No display	---	---
				Camshaft timing adjustment angle (actual angle)	0.0...22.0 ° CA	---
				Camshaft timing adjustment operating condition (on / off)	On / Off	---
				Engine speed	640...6500 rpm	---

Notes on display zones 2 and 3:

- ◆ The operating condition and adjustment angle is displayed according to speed or load.
- ◆ Check camshaft timing adjustment:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15, Valve train, servicing](#)

Display group 91 - Performance improvement - Inlet camshaft continuously variable timing adjustment						
• While driving						
Read measured value block 91				→ Indicated on display		
xxxx rpm	xxx.x %	xx.x ° CA	xx.x ° CA			
1	2	3	4	Display zones	Specification	Evaluation
				Camshaft timing adjustment angle (actual angle)	0.0...52.0 ° CA	---
				Camshaft timing adjustment angle (specified angle)	0.0...52.0 ° CA	---
				Camshaft timing adjustment duty cycle	0.0...100.0 %	---
Engine speed					640...6500 rpm	---

Notes on display zones 3 and 4:

◆ Check camshaft timing adjustment:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15; Valve train, servicing](#)

Display group 95 - Performance improvement - Variable intake manifold change over			
• While driving			
Read measured value block 95			→
xxxx rpm	xxx.x %	xxx.x °C	Text
			◀ Indicated on display
1	2	3	4
			◀ Display zones
			Specification
			Evaluation
			Variable intake manifold change-over status (IMC-V OFF / IMC-V ON)
			IMC-V OFF / IMC-V ON

			Coolant temperature
			80.0...110.0 °C
			⇒ Page 01-195
			Engine load
			12.0...100.0 %

			Engine speed
			640...6500 rpm

Note on display zone 4:

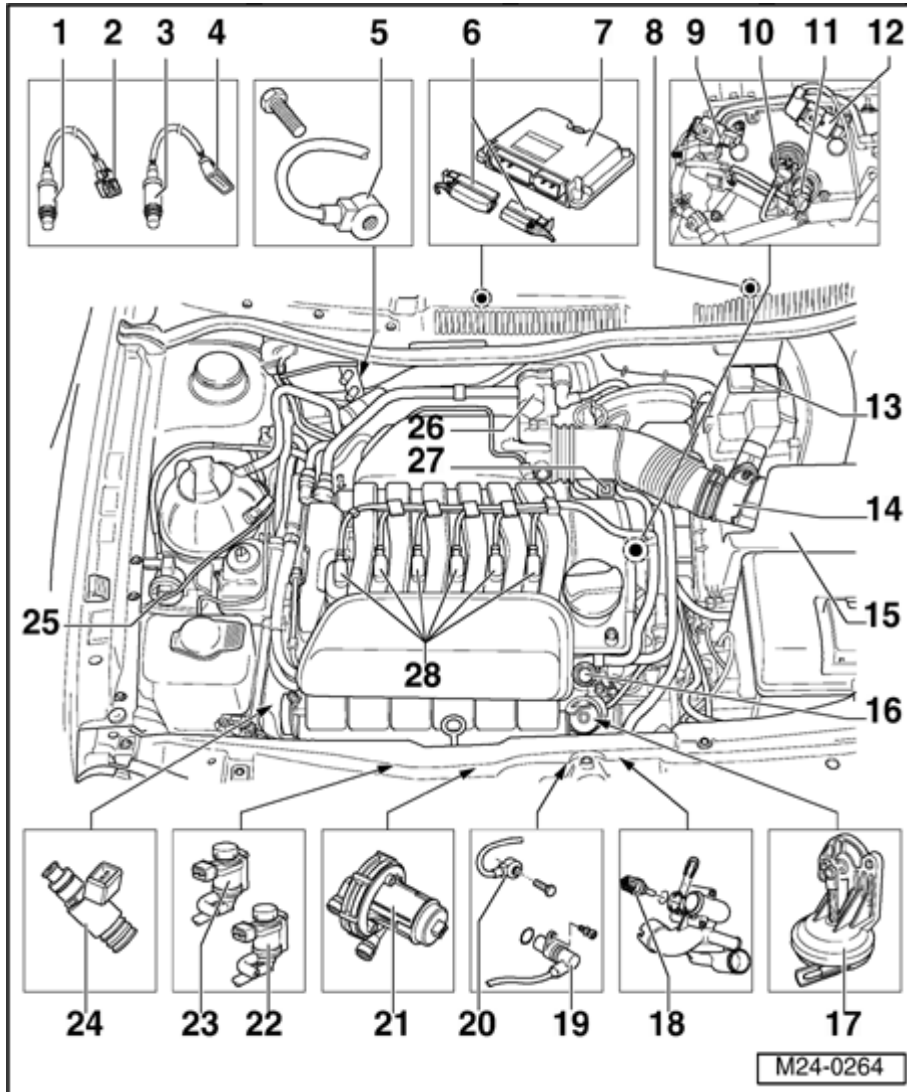
The variable intake manifold change-over can be activated by a strong burst of the throttle below 4400 rpm. If the final control element on the intake manifold does not perform the change-over, check intake manifold change-over ⇒ [Page 24-117](#) .

Measured value blocks, display groups 120...129 - Communication, evaluating

Display group 125 - Communication - Can-bus messages						
• Engine running at idle						
Read measured value block 125				→	◀ Indicated on display	
Text	Text	Text	---			
1	2	3	4	◀ Display zones	Specification	Evaluation
				No display	---	---
				Combi status	Combi 1	---
				ABS status	ABS 1	---
				Transmission status	Gear. 1	---

Note on display group 125:

Specification = 1; control modules with active Can-bus are displayed.



Fuel injection system, servicing

Component locations overview

1 - Heated Oxygen Sensor (HO2S) -G39-, 50 Nm

◆ Component location: In front exhaust pipe

2 - Connector

◆ Gold plated terminals

◆ Black, 6-pin

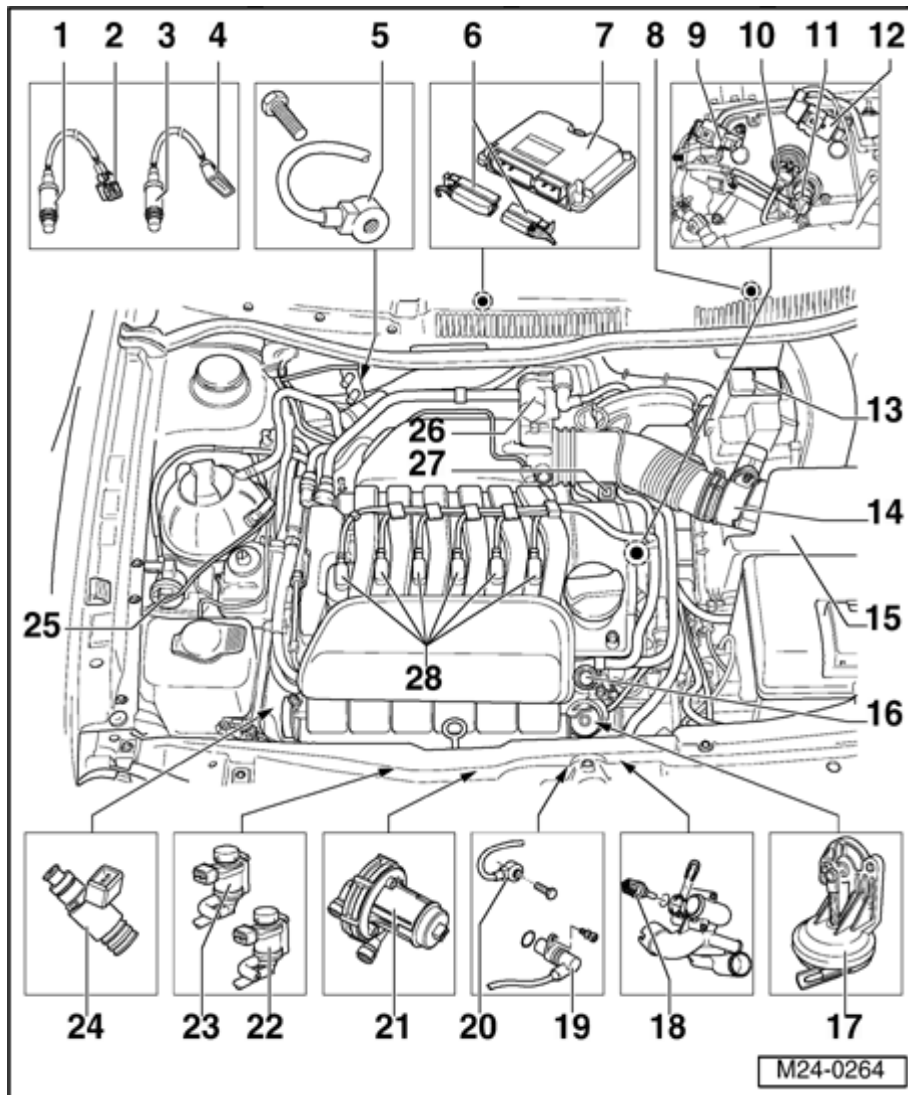
◆ For Heated Oxygen Sensor (HO2S) -G39- and Oxygen Sensor (O2S) Heater -Z19-

◆ Component location: Right on underside of vehicle

3 - Oxygen

**Sensor
(O2S)
Behind
Three
Way
Catalytic
Converter
(TWC) -
G130-, 50
Nm**

- ◆ Component location:
Behind
Three Way
Catalytic
Converter
(TWC) -
G130-



4 - Connector

- ◆ Black, 4-pin
- ◆ Terminals 3 and 4 gold plated
- ◆ For Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) - G130- and Oxygen Sensor (O2S) Heater 1 -Z29-
- ◆ Component location: Right on underside of vehicle

5 - Knock Sensor (KS) 1 - G61-

- ◆ Component location: Between cyl. 1 and cyl. 3 ⇒ [Page 28-4](#) , item 7

6 - Connector

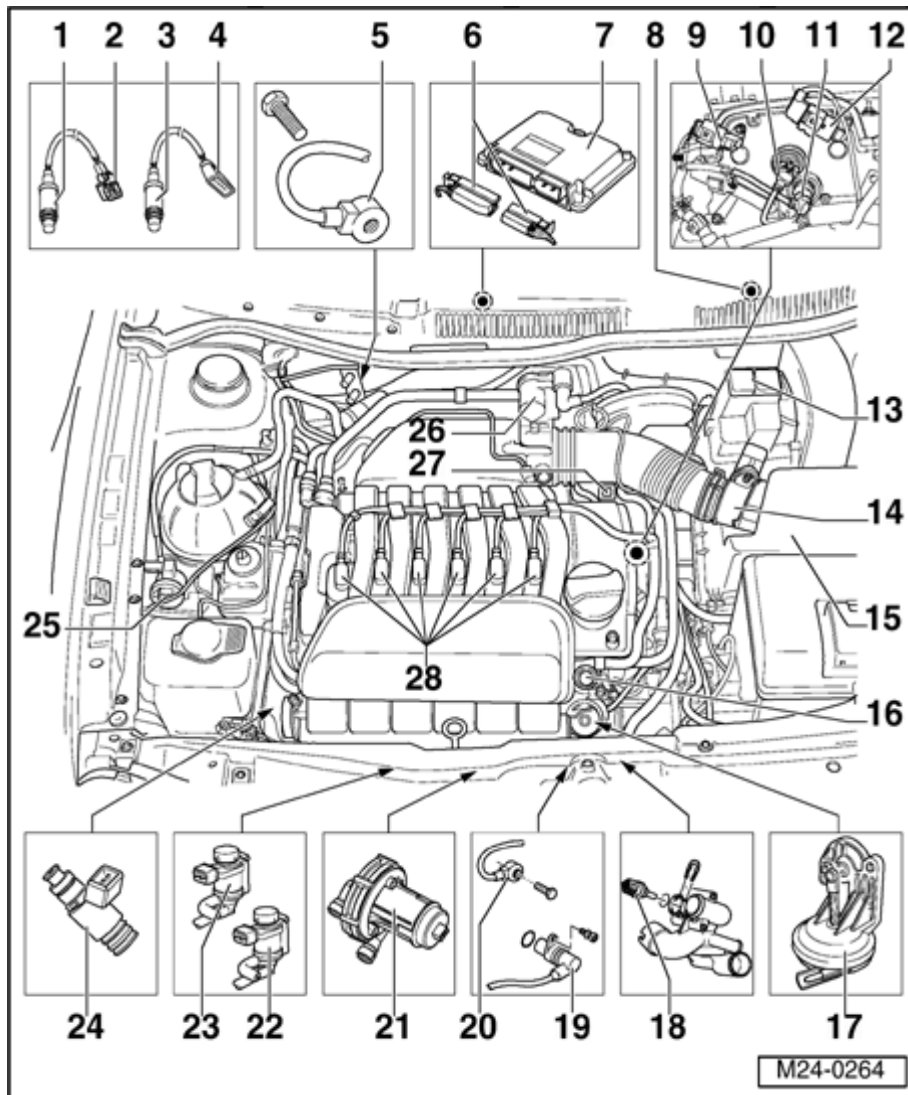
- ◆ For Motronic Engine Control

Module
(ECM) -
J220-

- ◆ Disconnect or connect only with ignition switched off
- ◆ Release to disconnect

**7 - Motronic
Engine
Control
Module
(ECM) -
J220-**

- ◆ Component location: In plenum chamber



8 - Clutch Vacuum Vent Valve Switch - F36-, Brake Light Switch - F- and Brake Vacuum Vent Valve Switch - F47-

◆ Component location: In left footwell

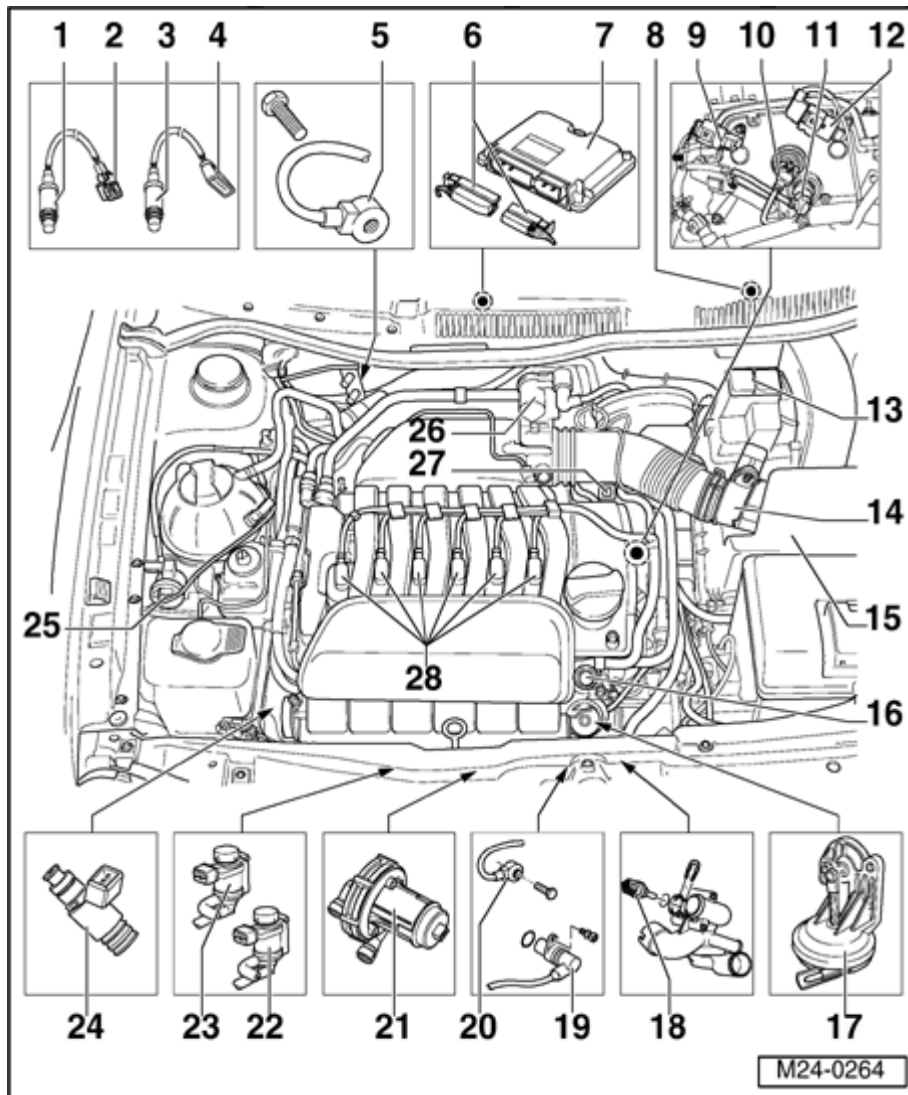
◆ Checking signal from Clutch Vacuum Vent Valve Switch - F36- ⇒ [Page 24-199](#)

◆ Check signals from Brake Light Switch - F- and Brake Vacuum Vent Valve Switch - F47- ⇒ [Page 24-206](#)

9 - Camshaft Position

**(CMP)
Sensor -
G40-**

- ◆ For intake camshaft
⇒ [Page 28-7](#), item 16
- ◆ Mark connector and component before pulling connector off



**10 Valve -1-
- for
camshaft
adjustment
-N205-**

- ◆ For intake camshaft
- ◆ Mark connector and component before pulling connector off.
- ◆ Checking activation ⇒ [Page 01-100](#), Output Diagnosis Test Mode (DTM)
- ◆ Check camshaft timing adjustment:

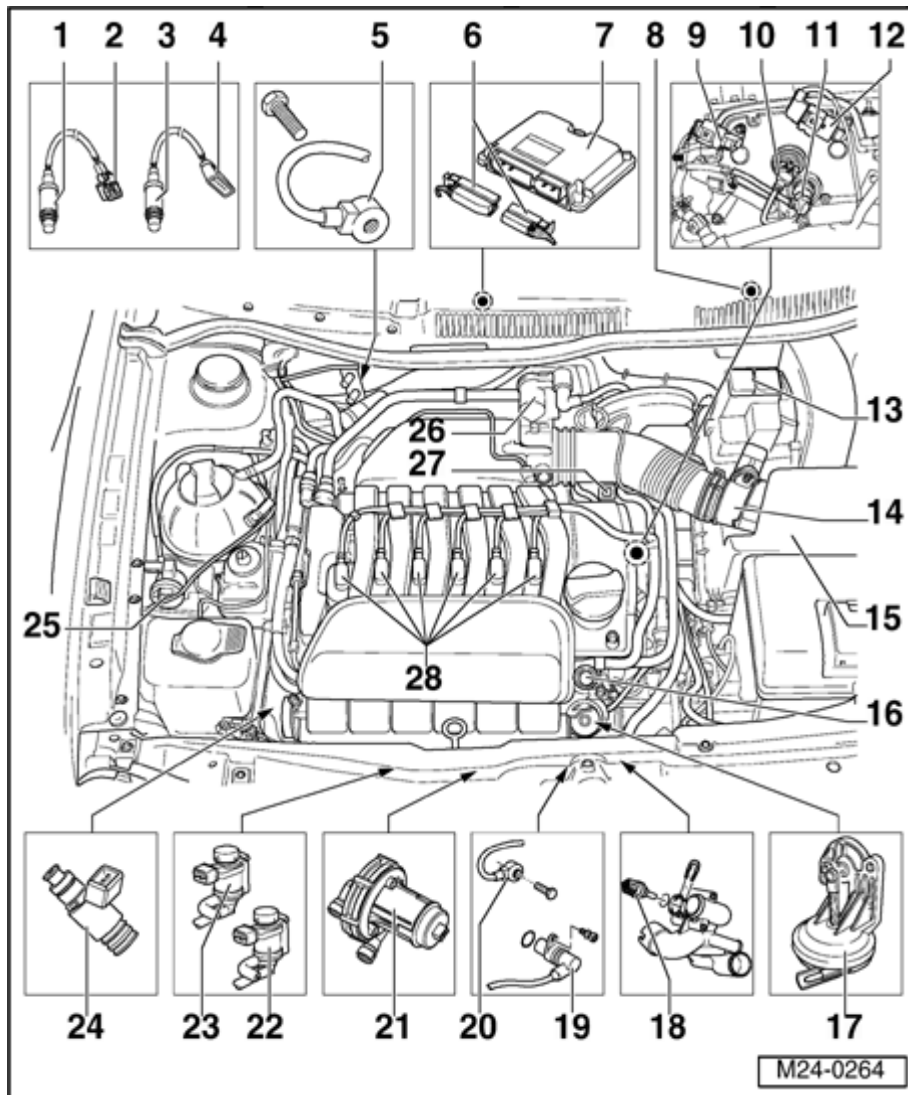
⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15, Valve train, servicing](#)

**11 Camshaft
- Adjustment
Valve 1
(exhaust) -
N318-**

- ◆ For exhaust camshaft

- ◆ Mark connector and component before pulling connector off.
- ◆ Checking activation
⇒ [Page 01-100](#) ,
Output Diagnosis Test Mode (DTM)
- ◆ Check camshaft timing adjustment:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15, Valve train, servicing](#)



12 - Camshaft Position (CMP) Sensor 2 - G163-

- ◆ For exhaust camshaft
- ◆ ⇒ [Page 28-6](#), item 13

- ◆ Mark connector and component before pulling connector off.

13 - Protective housing

- ◆ Relay assignment in protective housing ⇒ [Fig. 1](#)

14 Mass Air - Flow (MAF) sensor - G70- with Intake Air Temperature (IAT) sensor -G42-

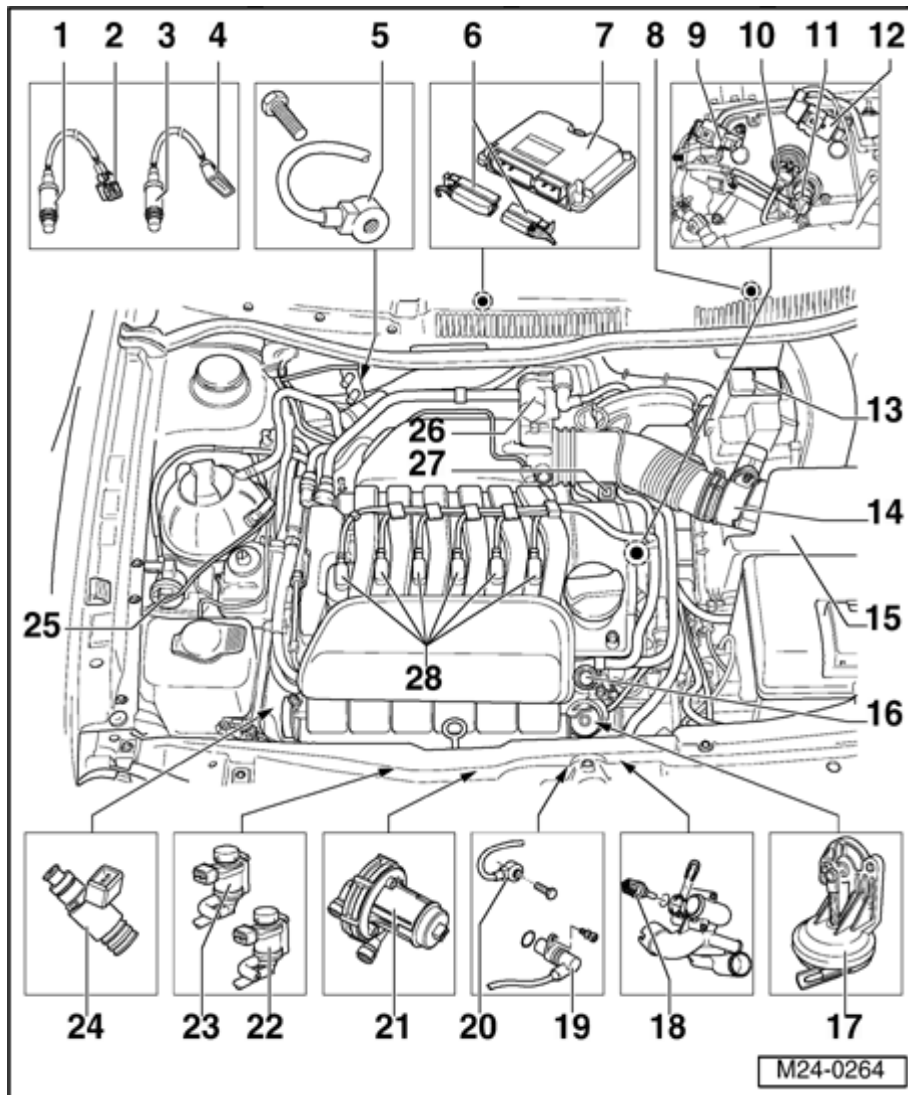
15 - Air cleaner

16 - Fuel pressure regulator

17 - Vacuum actuator

- ◆ For Intake

Manifold
Change-
Over
Valve -
N156-



18 Engine - Coolant Temperature (ECT) sensor - G62-

- ◆ For Motronic Engine Control Module (ECM) - J220-

- ◆ With Engine Coolant Temperature Gauge sensor -G2-

- ◆ Release pressure in cooling system if necessary before removing components

19 - Engine Speed (RPM) Sensor - G28-

20 - Knock Sensor (KS) 2 - G66-

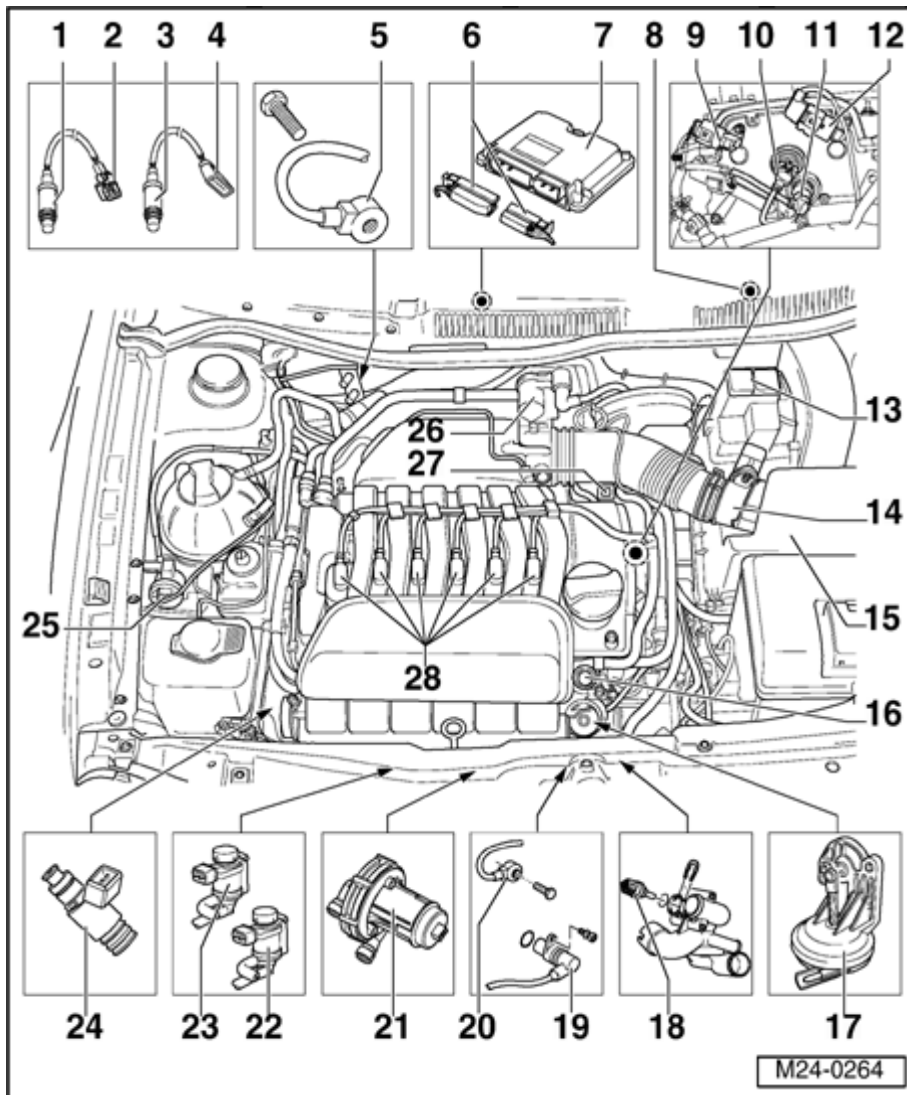
- ◆ Component location: Between cyl. 4 and cyl. 6 ⇒ [Page 28-8](#) , item 17

21 - Secondary Air Injection

**(AIR)
Pump
Motor -
V101-**

- ◆ Checking activation
⇒ [Page 01-100](#) ,
Output
Diagnosis
Test
Mode
(DTM)
- ◆ Secondary air
system:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 26](#)



22 - Intake Manifold Change-Over Valve - N156-

23 Secondary - Air Injection (AIR) Solenoid Valve - N112-

◆ Checking activation ⇒ [Page 01-100](#), Output Diagnosis Test Mode (DTM)

◆ Secondary air system:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 26](#)

24 - Fuel Fuel injector (- N30- ...N33-, - N83-, - N84-)

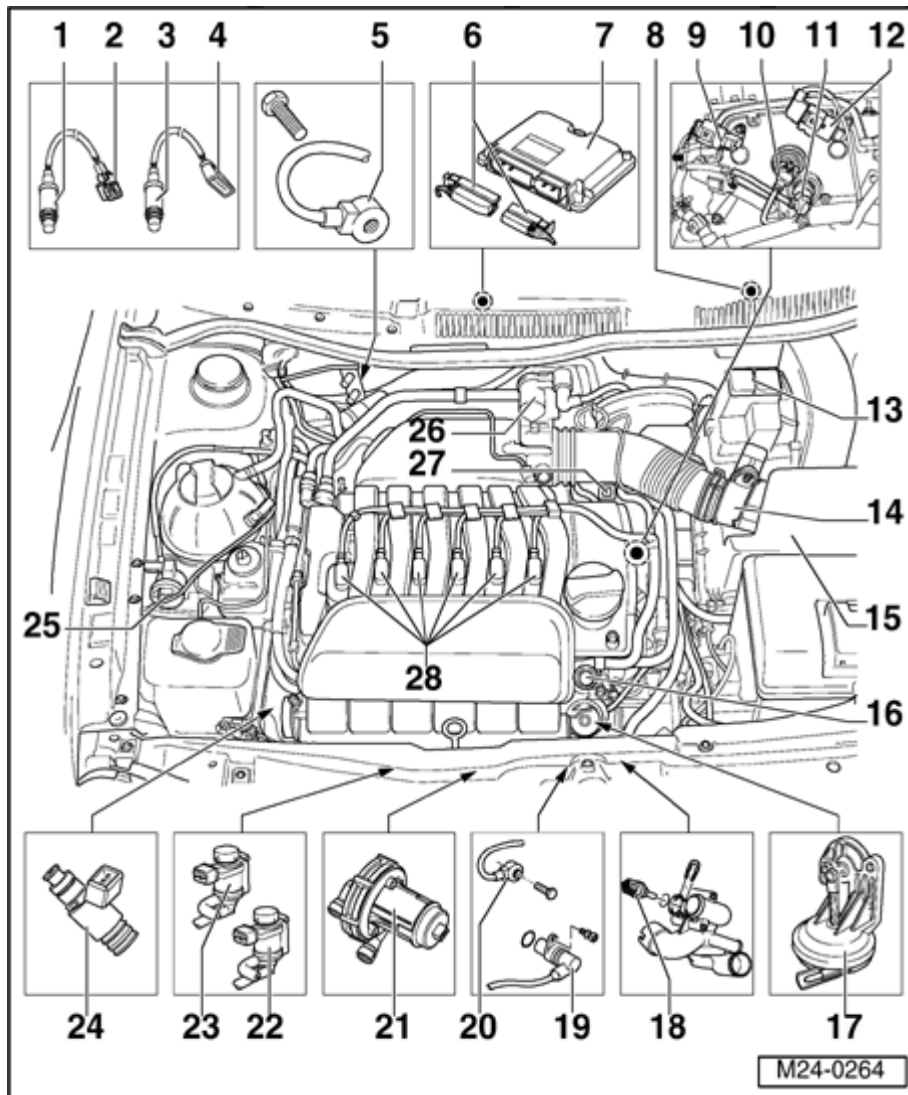
25 Evaporative - Emission (EVAP) Canister Purge Regulator Valve -N80-

◆ Checking

activation
⇒ [Page
01-100](#),
Output
Diagnosis
Test
Mode
(DTM)

◆ Evaporative
Emission
(EVAP)
Canister
system

⇒ [Repair
Manual, 2.8
Liter VR6 4V
Engine
Mechanical,
Engine Code\(s\):
BDF; Repair
Group 20](#)



26 - Throttle Valve Control Module -J338-

◆ Heated by coolant

27 - Combi-valve

◆ Secondary air system:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF; Repair Group 26](#)

28 - Ignition coils with power output stage (-N70-, -N127-, -N291-, -N292-, -N323- and -N324-)

◆ ⇒ [Page 28-3](#), item 2

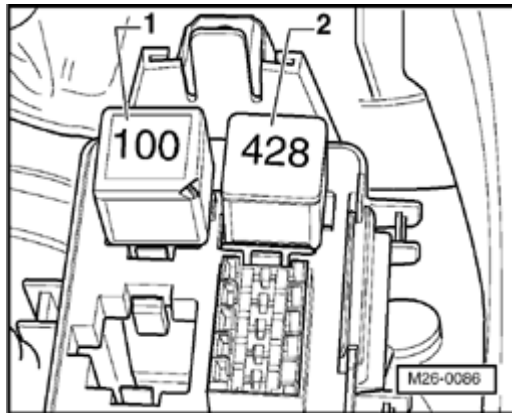


Fig. 1 Relay assignment in protective housing (on left in engine compartment)

1 - Secondary Air Injection (AIR) Pump Relay -J299-

2 - Motronic Engine Control Module (ECM) Power Supply Relay -J271-

Note:

- ◆ *If tools are necessary to pull relays or control modules out of the relay plate, first disconnect battery Ground (GND) strap.*
- ◆ *Before disconnecting battery Ground (GND) strap obtain code for radios with anti-theft coding.*

Fuel injection system, general notes

Servicing ignition parts:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 28](#)

Note:

- ◆ *The Motronic Engine Control Module (ECM) - J220- is equipped with On Board Diagnostic (OBD). Before carrying out repairs and troubleshooting the DTC memory must be checked. Also the vacuum hoses and connections must be checked (unmetered air).*
- ◆ *Fuel hoses in engine compartment must only be secured with spring-type clips. The use of clamp or screw-type clips is not permitted.*
- ◆ *Components marked with * are checked via On Board Diagnostic (OBD) ⇒ [Page 01-23](#) .*
- ◆ *Components marked with **can be checked via Output Diagnosis Test Mode (DTM) ⇒ [Page 01-100](#) .*
- ◆ *Do not use sealing compounds containing silicone. Particles of silicone drawn into the engine, will not be burned in the engine and may damage the Oxygen Sensor(s) (O2S).*
- ◆ *For trouble-free operation of the electrical components, a voltage of at least 11.5 V is necessary.*
- ◆ *Disconnecting and connecting the battery must only be done with the ignition switched off, otherwise the Motronic Engine Control Module (ECM) -J220- could be damaged.*

- ◆ *Check DTC memory before carrying out repairs and when troubleshooting ⇒ [Page 01-23](#) ,
Checking and erasing DTC memory*

- ◆ *During some checks it is possible that the control module will detect and store a Diagnostic Trouble Code (DTC). Therefore, after completing all checks and repairs the DTC memory must be checked and if necessary, erased ⇒ [Page 01-23](#) , Check and erasing DTC memory and then generate the readiness code ⇒ [Page 01-149](#) .*

- ◆ *If the engine starts, runs for a short period and then stops, after troubleshooting, repairs or component tests, then the Diagnostic Trouble Code (DTC) may lie with the Immobilizer which is blocking the Motronic Engine Control Module (ECM) -J220-. In such cases the DTC memory must be checked and, if necessary, the control module adapted.*

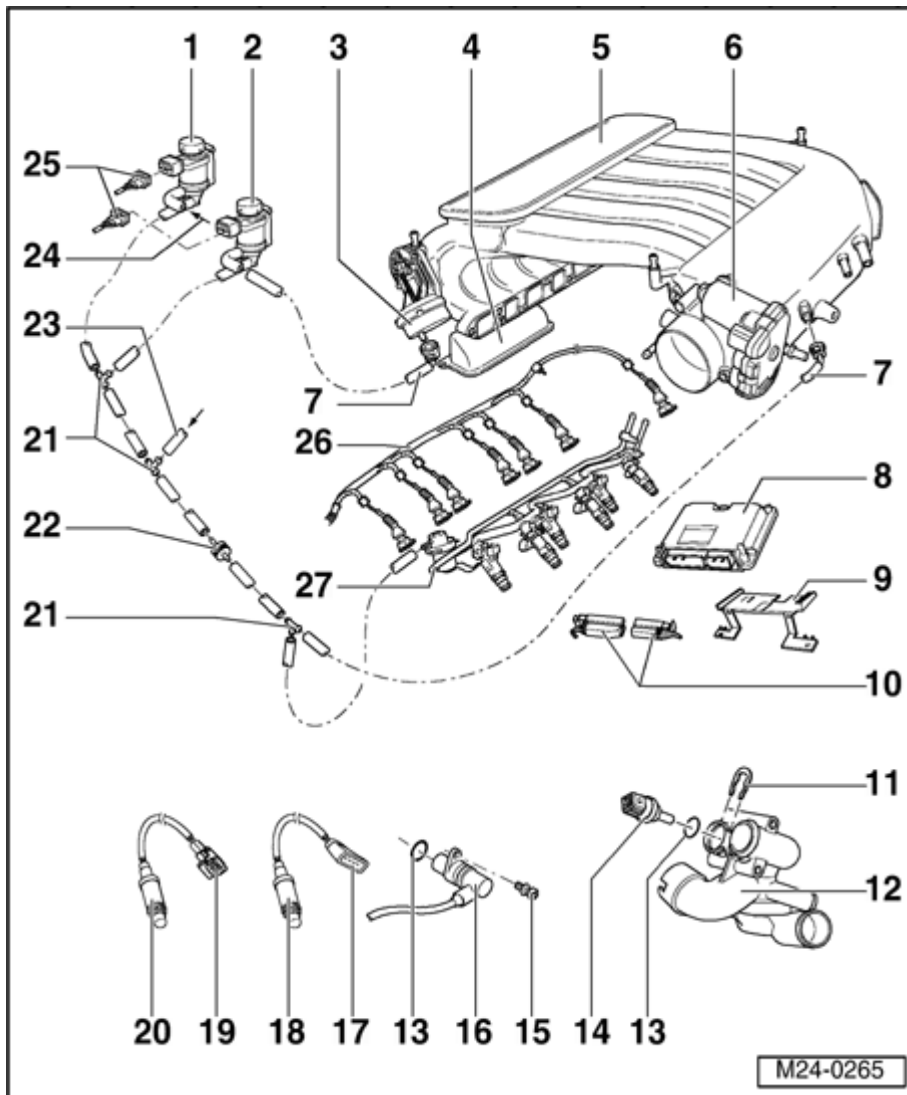
⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\);Repair Group 01](#)

Safety precautions ⇒ [Page 24-33](#) .

Rules for cleanliness ⇒ [Page 24-36](#) .

Technical data ⇒ [Page 24-37](#) .

Checking engine operating condition ⇒ [Page 24-158](#) .



Fuel injection system components, removing and installing

1 - Secondary Air Injection (AIR) Solenoid Valve - N112-*/**

◆ Component location ⇒ [Page 24-1](#), Component locations overview

◆ Valve will be activated by Motronic Engine Control Module (ECM) - J220- (pulsed)

◆ Secondary air system:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF; Repair Group 26](#)

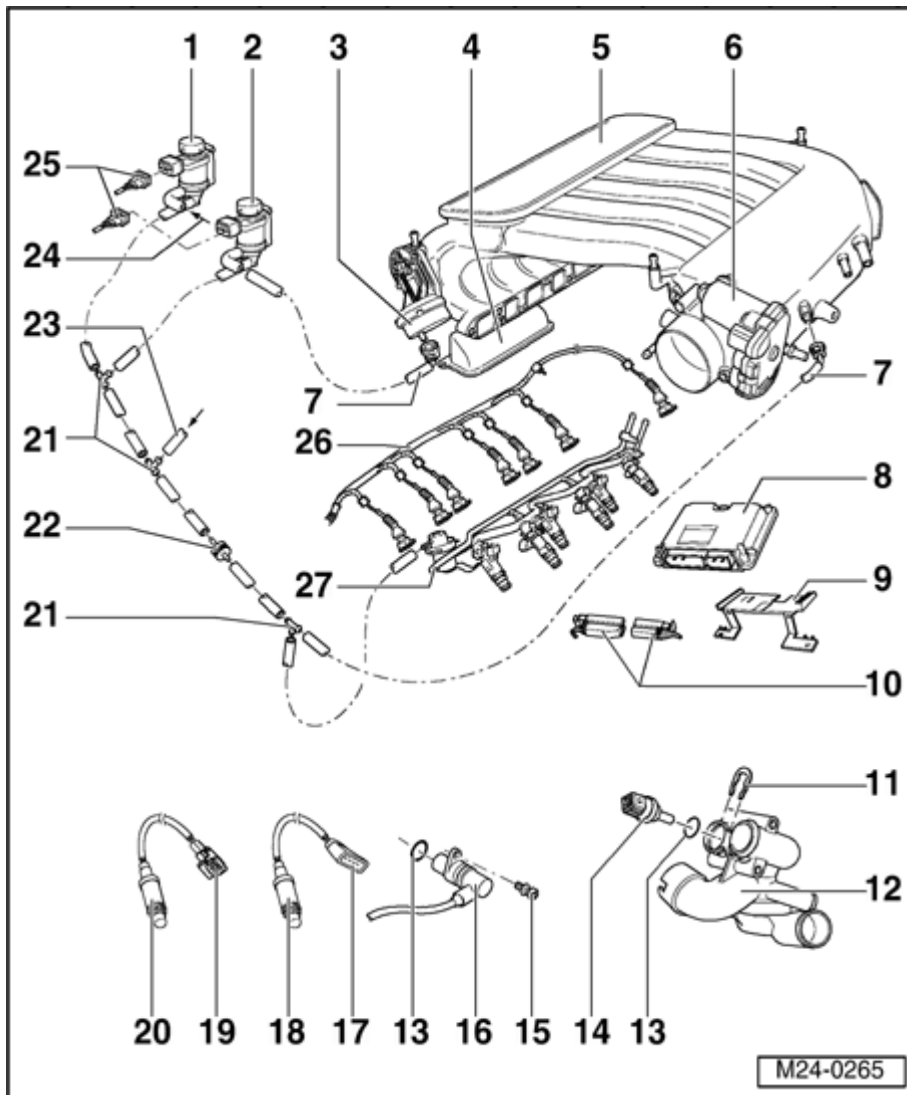
2 - Intake Manifold

Change-Over Valve - N156-*/**

- ◆ Component location ⇒ [Page 24-1](#) , Component locations overview
- ◆ Valve will be activated by Motronic Engine Control Module (ECM) - J220- (pulsed)
- ◆ Checking Intake Manifold Change-Over Valve - N156- ⇒ [Page 24-117](#)

3 - Vacuum actuator

- ◆ For Intake Manifold Change-Over Valve - N156-



4 - Vacuum reservoir

- ◆ For Intake Manifold Change-Over Valve - N156-
- ◆ Removing and installing:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 26](#)

5 - Intake manifold

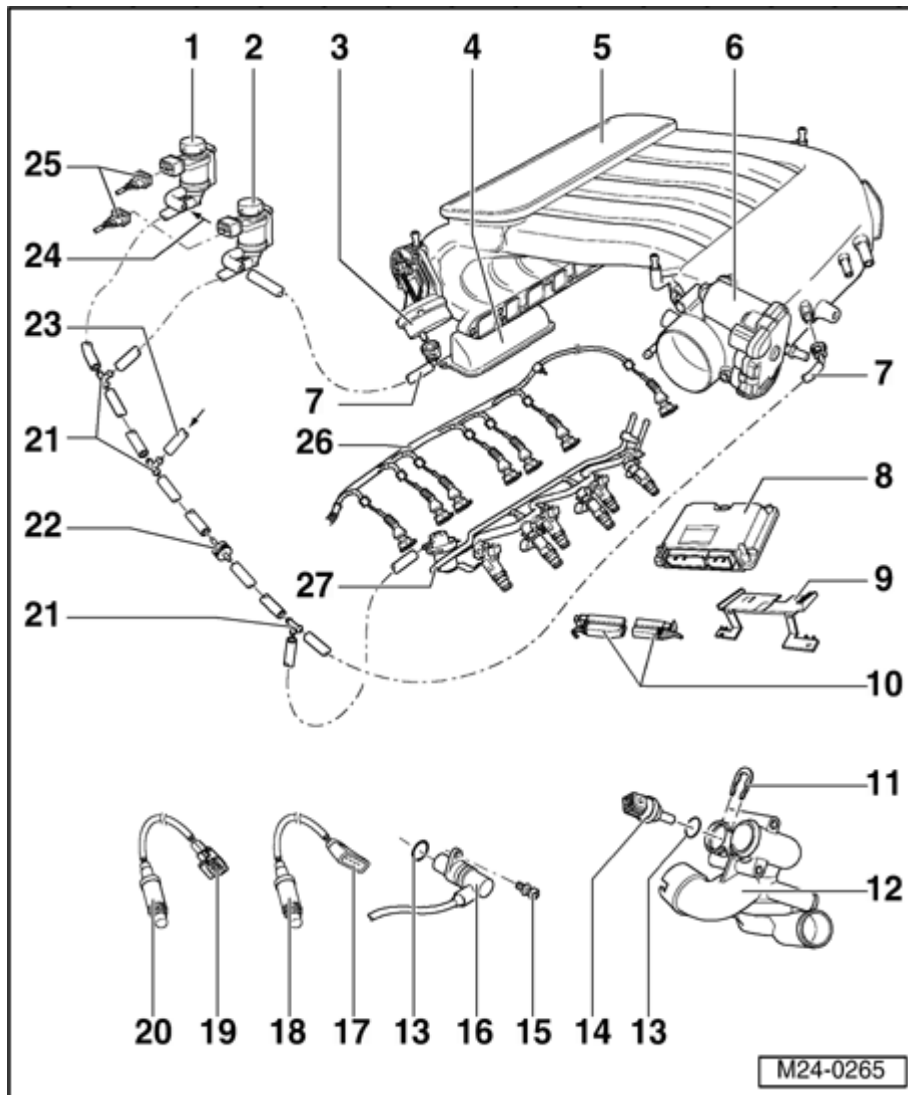
- ◆ Disassembling and assembling ⇒ [Page 24-22](#)
- ◆ Removing and installing:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15](#)

6 - Throttle Valve Control Module - J338-*

- ◆ Heated by coolant
- ◆ Removing

and
installing
⇒ [Page
24-22](#)



7 - Vacuum line

- ◆ Press together at front to release

8 - Motronic Engine Control Module (ECM) - J220-*

(Motronic control module - J220-

- ◆ Component location: In plenum chamber

- ◆ Checking voltage supply ⇒ [Page 24-163](#)

- ◆ Procedure after interrupting voltage supply ⇒ [Page 24-170](#)

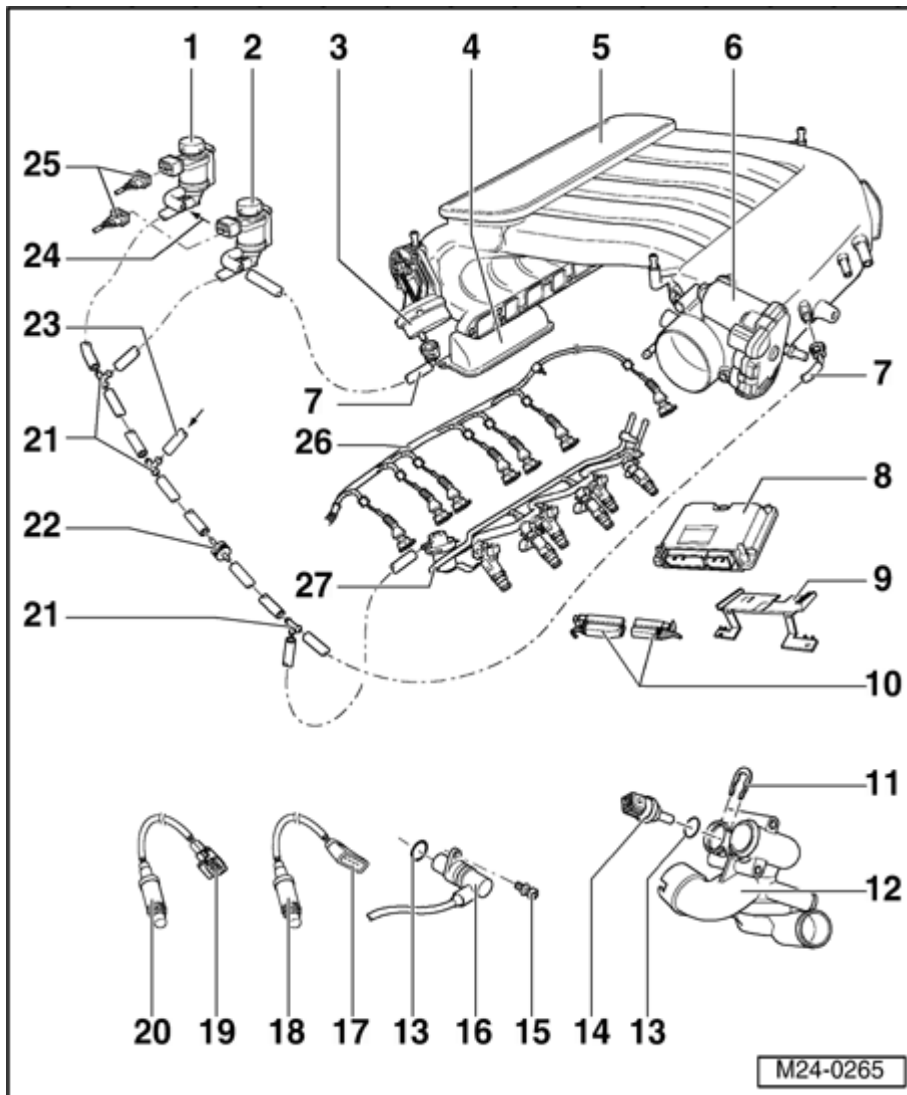
- ◆ Replacing ⇒ [Page 24-173](#)

- ◆ Coding ⇒ [Page 24-177](#)

- ◆ When replacing, erase learned

values
and
adapt
Motronic
Engine
Control
Module
(ECM) -
J220- to
Throttle
Valve
Control
Module -
J338- ⇒
[Page 24-
182](#)

**9 Supporting
- frame**



10 - Connector

- ◆ For Motronic Engine Control Module (ECM) - J220-
- ◆ Disconnect or connect only with ignition switched off
- ◆ Release to disconnect

11 - Retaining clip

- ◆ Check seated securely

12 - Thermostat housing

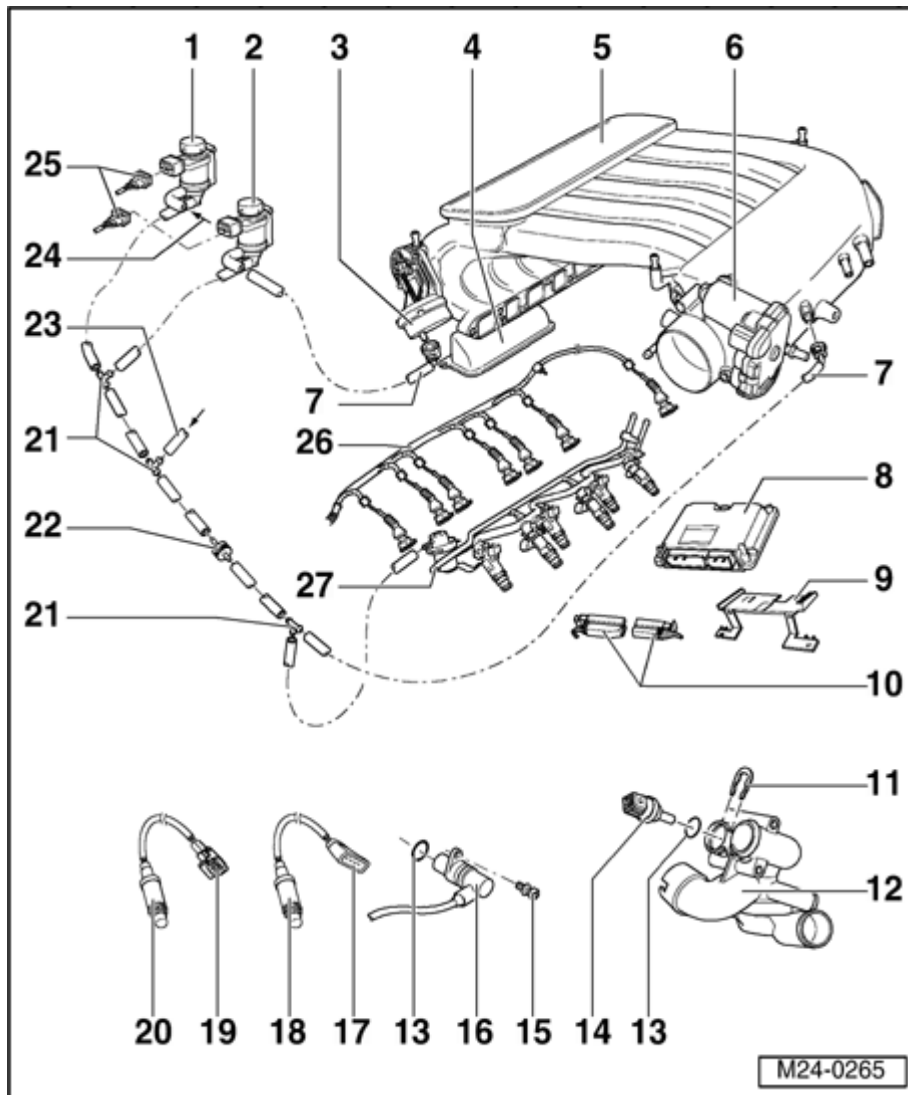
- ◆ Component location ⇒ [Page 24-1](#) , Component locations overview

- ◆ Disassembling and assembling:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 19](#)

13 - O-ring

- ◆ Replace if damaged



14 Engine - Coolant Temperature (ECT) sensor - G62-*

- ◆ For Motronic Engine Control Module (ECM) - J220-
- ◆ With Engine Coolant Temperature (ECT) sensor -G2-
 - ◆ Gold plated terminals
- ◆ Release pressure in cooling system if necessary before removing components
- ◆ Checking ⇒ [Page 24-69](#)

15 - 10 Nm

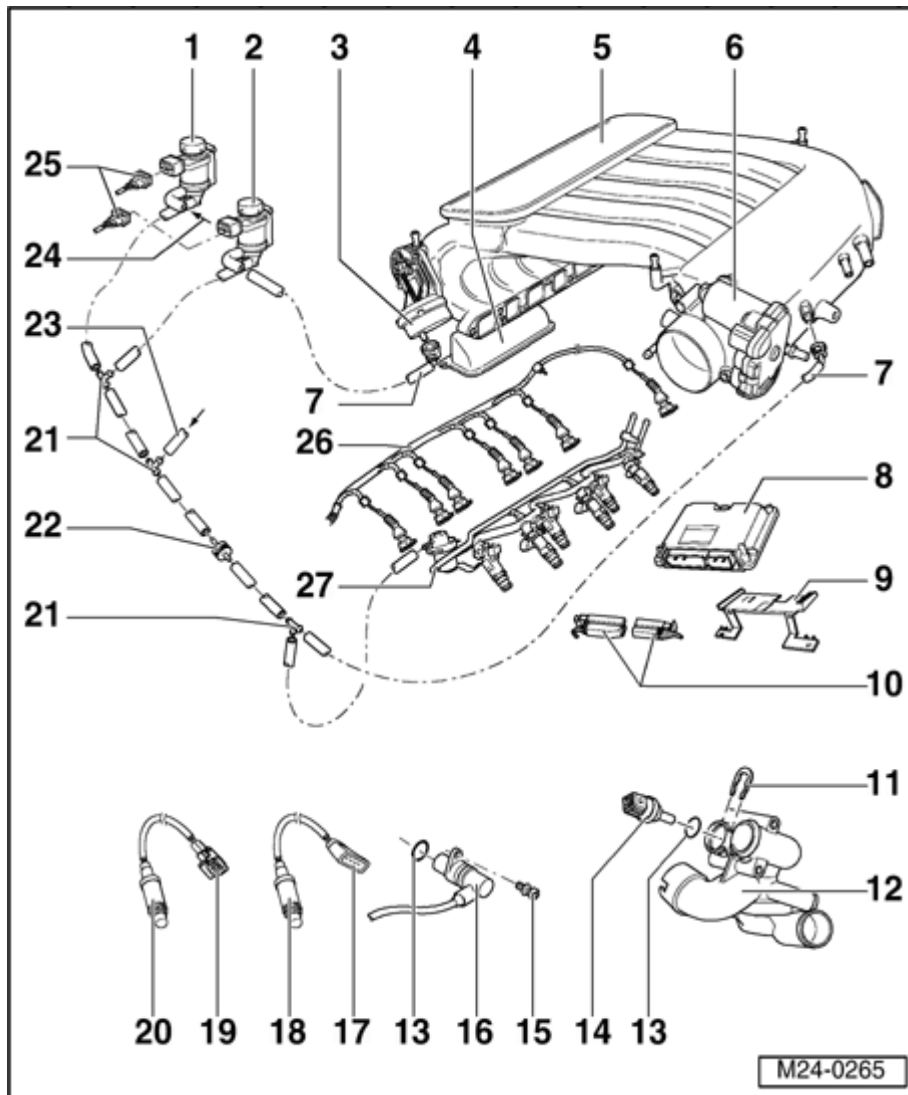
16 - Engine Speed (RPM) Sensor - G28-*

- ◆ Component location ⇒ [Page 24-1](#) , Component locations overview

- ◆ Checking
⇒ [Page
24-93](#)

17 - Connector

- ◆ Black, 4-pin
- ◆ Terminals 3 and 4 are gold plated
- ◆ For Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) - G130- and Oxygen Sensor (O2S) Heater 1 -Z29-
- ◆ Component location:
Right on underside of vehicle



18 Oxygen - Sensor (O2S) Behind Three Way Catalytic Converter (TWC) - G130-*, 50 Nm

◆ Component location: In rear of Three Way Catalytic Converter

◆ Remove and install with ring wrench 3337

◆ Grease only threads with G 052 112 A3 hot bolt paste (anti-seize compound). Grease must not get into slots on sensor body

◆ If seal is leaking, replace seal.

◆ Oxygen Sensor (O2S) heating voltage

supply
via fuel
pump
relay

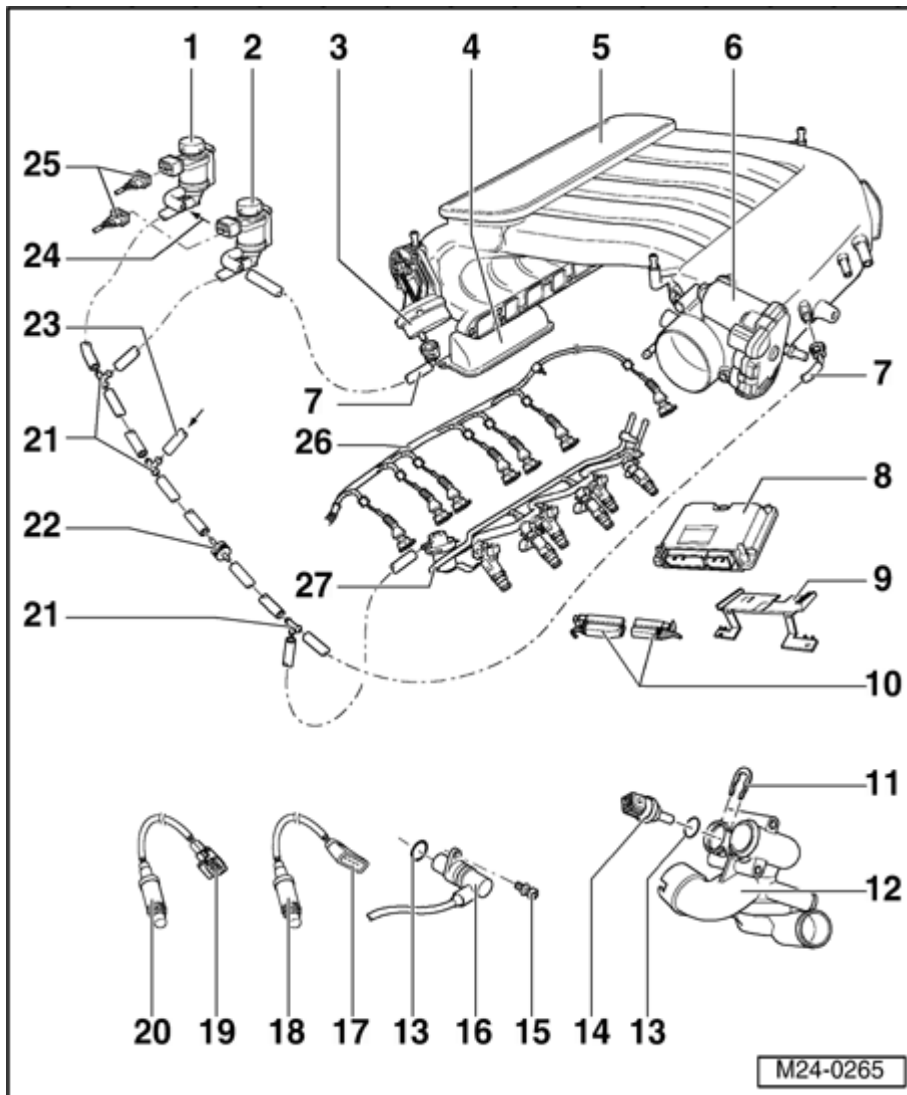
◆ Check
Oxygen
Sensor
(O2S)
heating
for
Oxygen
Sensor
(O2S)
Behind
Three
Way
Catalytic
Converter
(TWC) -
G130- ⇒
[Page 24-
45](#)

◆ Check
Oxygen
Sensor
(O2S)
and
Oxygen
Sensor
control
after
Three
Way
Catalytic
Converter
(TWC) ⇒
[Page 24-
140](#)

◆ Check
aging of
Oxygen
Sensor
(O2S)
Behind
Three
Way
Catalytic
Converter
(TWC) -
G130- ⇒
[Page 24-](#)

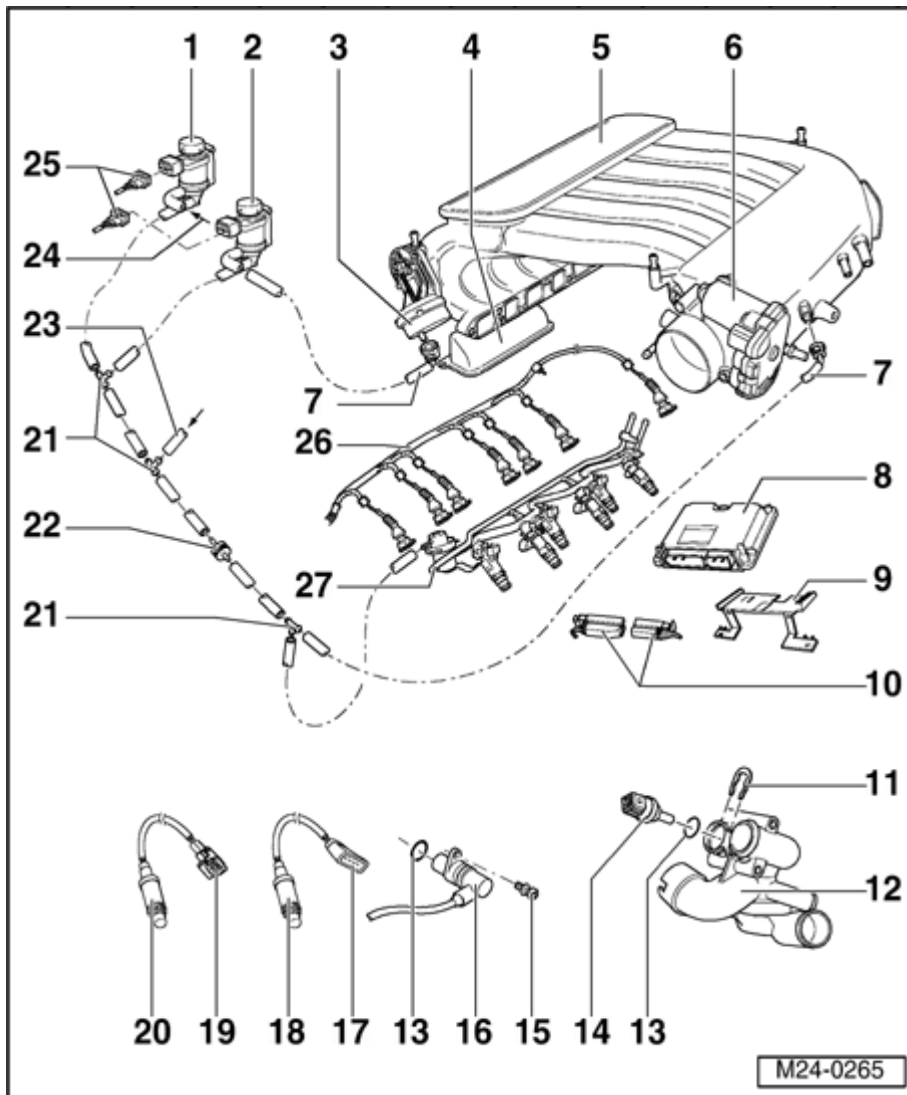
[154](#)

- ◆ When replacing, erase learned values and adapt Motronic Engine Control Module (ECM) - J220- to Throttle Valve Control Module - J338- ⇒ [Page 24-182](#)



19 Connector

- ◆ Gold plated terminals
- ◆ Black, 6-pin
- ◆ For Heated Oxygen Sensor (HO2S) -G39- and Oxygen Sensor (O2S) Heater -Z19-
- ◆ Component location: Right on underside of vehicle



20 - Heated Oxygen Sensor (HO2S) - G39-*, 50 Nm

◆ Component location: In front exhaust pipe

◆ Remove and install with Oxygen Sensor (O2S) ring wrench 3337

◆ Grease only threads with G 052 112 A3 hot bolt paste (ant-seize compound). Grease must not get into slots on sensor body

◆ If seal is leaking, remove and replace seal.

◆ Check Oxygen Sensor (O2S) heating

for
Heated
Oxygen
Sensor
(HO2S)

⇒

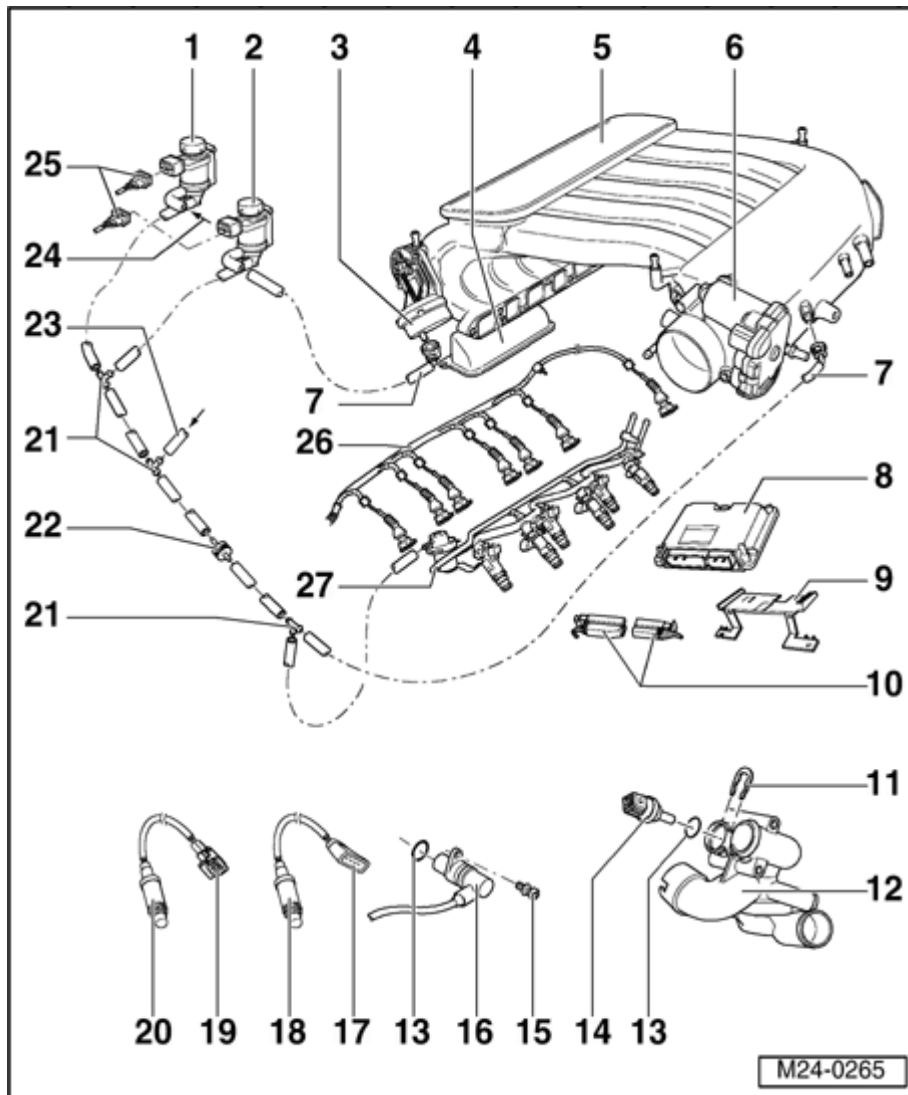
[Page
24-38](#)

◆ Check
Oxygen
Sensor
(O2S)
and
Oxygen
Sensor
control
before
Three
Way
Catalytic
Converter
(TWC) ⇒
[Page 24-
131](#)

◆ Check
aging
of
Heated
Oxygen
Sensor
(HO2S)
⇒
[Page
24-150](#)

◆ When
replacing,
erase
learned
values
and
adapt
Motronic
Engine
Control
Module
(ECM) -
J220- to
Throttle
Valve
Control
Module -

J338- ⇒
[Page 24-
182](#)



21 - Junction piece

22 - Non-return valve

◆ Observe installation position

◆ White connector faces towards Secondary Air Injection (AIR) Solenoid Valve - N112- /Intake Manifold Change-Over Valve - N156-

23 - Vacuum line

◆ From vacuum reservoir: item 4

24 - From combi-valve

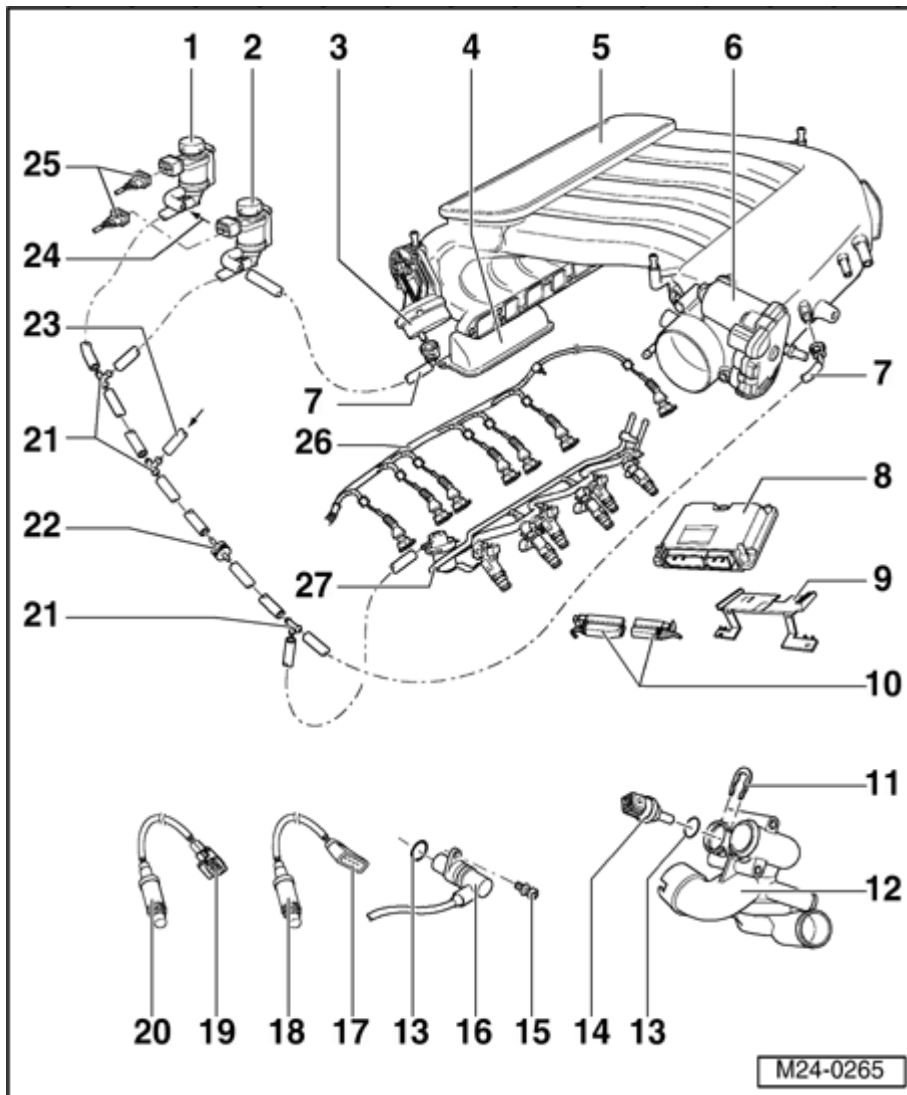
◆ Secondary air system:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF; Repair Group](#)

[26](#)

25 - Connector

- ◆ Black, 2-pin
- ◆ Mark connector and component before pulling connector off.



26 - Wiring harness

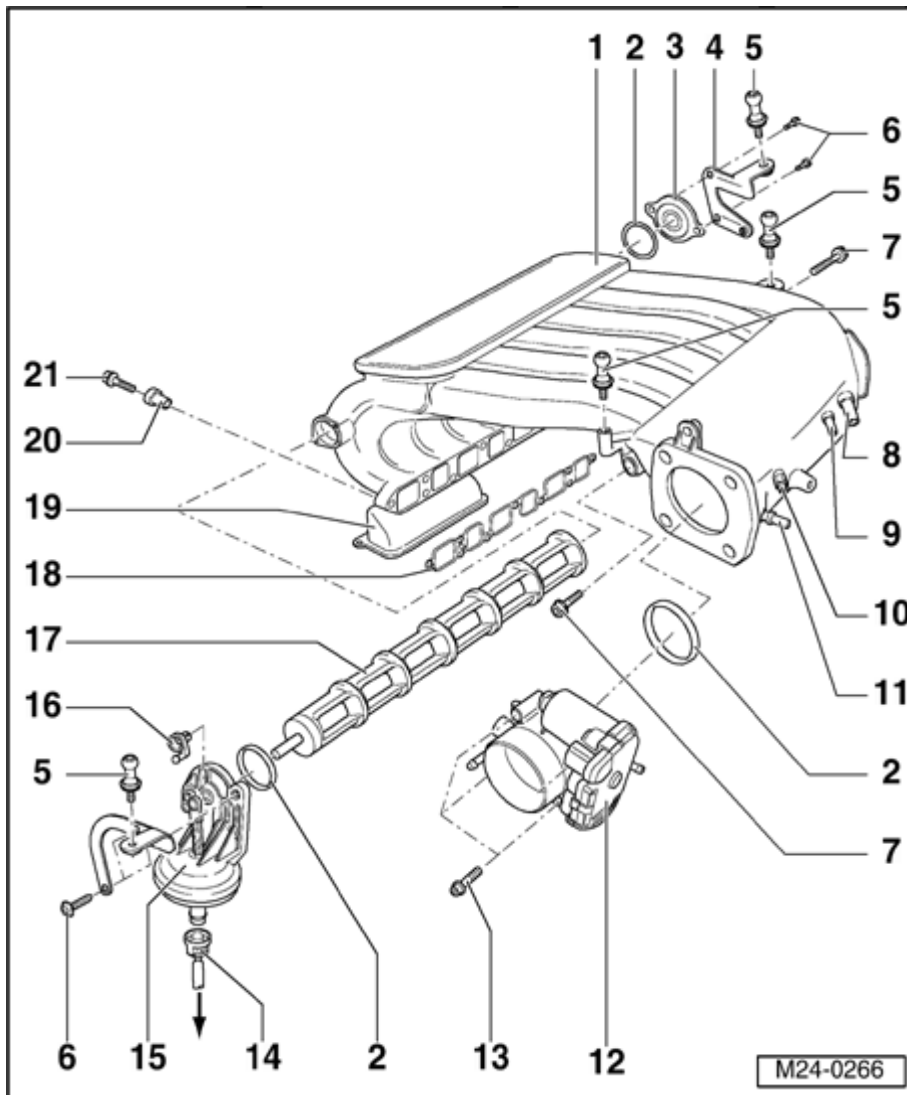
- ◆ With connectors for fuel injectors

27 - Fuel rail

- ◆ Disassembling and assembling ⇒ [Page 24-26](#)

CAUTION!

Part numbers are for reference only. Always check with your Parts. Dept. for the latest parts information.



Intake manifold, disassembling and assembling

1 - Intake manifold

- ◆ Removing and installing:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15](#)

2 - Seal

- ◆ Always replace

3 - Bearing cap

- ◆ For Intake Manifold Change-Over Valve - N156-barrel

4 - Bracket

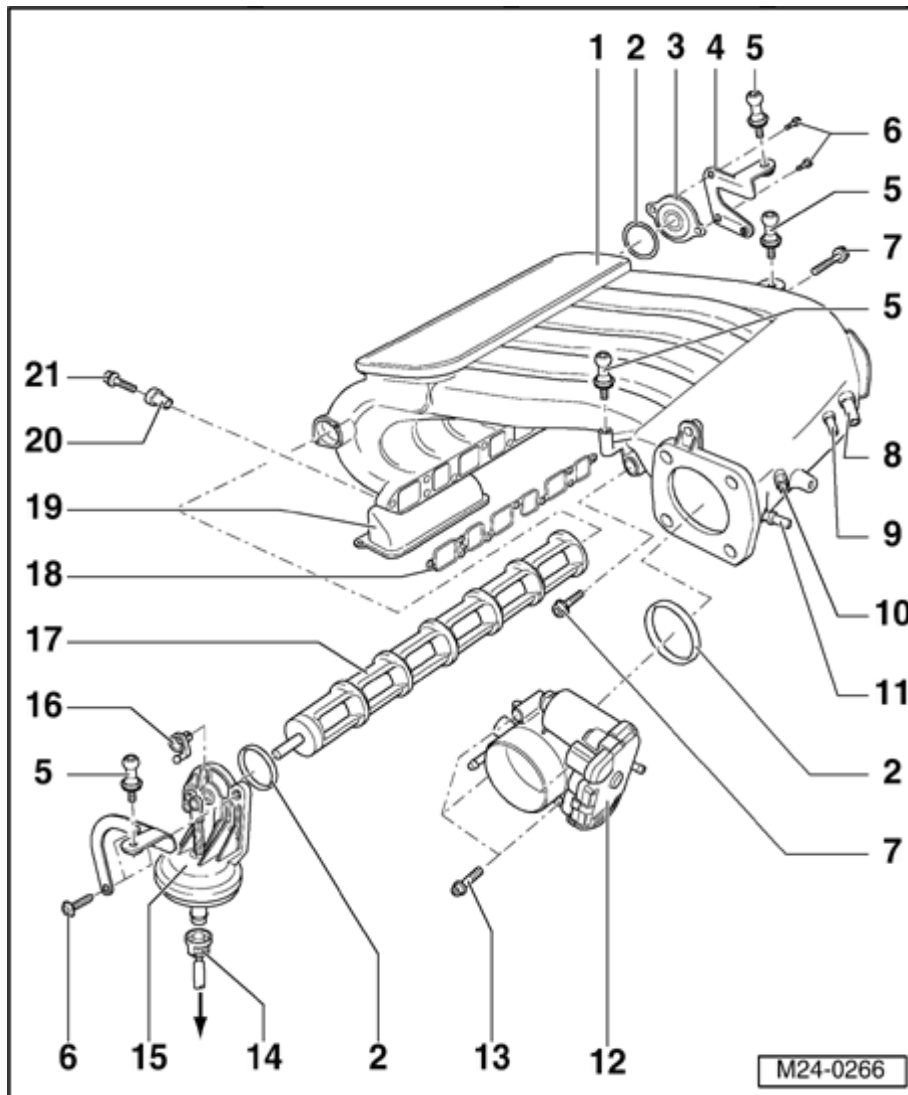
- ◆ For engine cover mounting pin

5 - Mounting pin, 5 Nm

- ◆ For engine cover

6 - 5 Nm

24-23



7 - 23 Nm

8 - Vacuum uni

- ◆ From brake booster

9 - Vacuum uni

- ◆ From fuel system leak detection pu

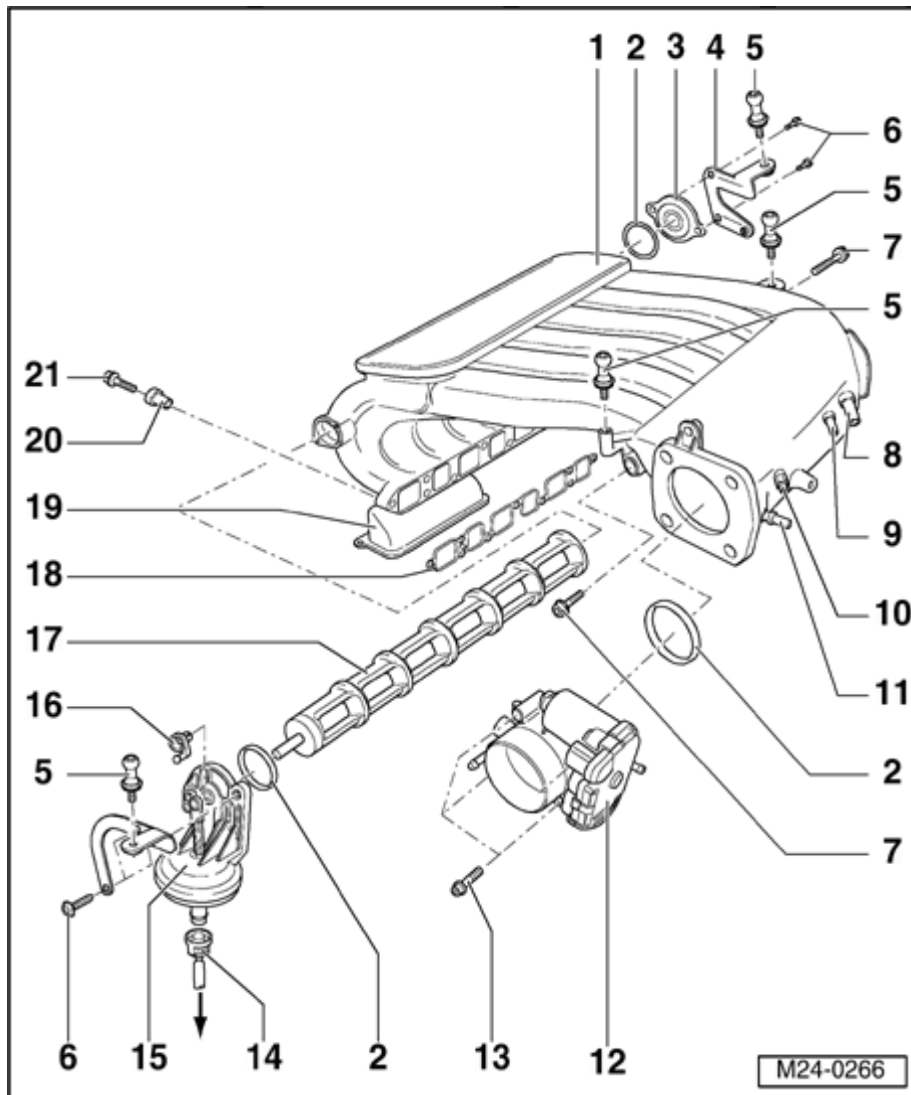
⇒ [Repair Manual, 2 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Rep Group 20](#)

10 - Vacuum uni

- ◆ From fuel pressure regulator junction pie

11 - Vacuum uni

- ◆ From crankcase breather/Evapor Emission (EVAF Canister Purge Regulator Valve vacuum line junction piece



12 - Throttle Valve Control Module - J338-*

◆ No cable cam plate for accelerator cable as this is an EPC system

◆ Checking ⇒ [Page 24-59](#)

◆ When replacing, erase learned values and adapt Motronic Engine Control Module (ECM) - J220- to Throttle Valve Control Module - J338- ⇒ [Page 24-182](#)

◆ 6-pin connector

◆ Gold plated terminals

◆ Heated by coolant

13 - 8 Nm

14 - Vacuum line

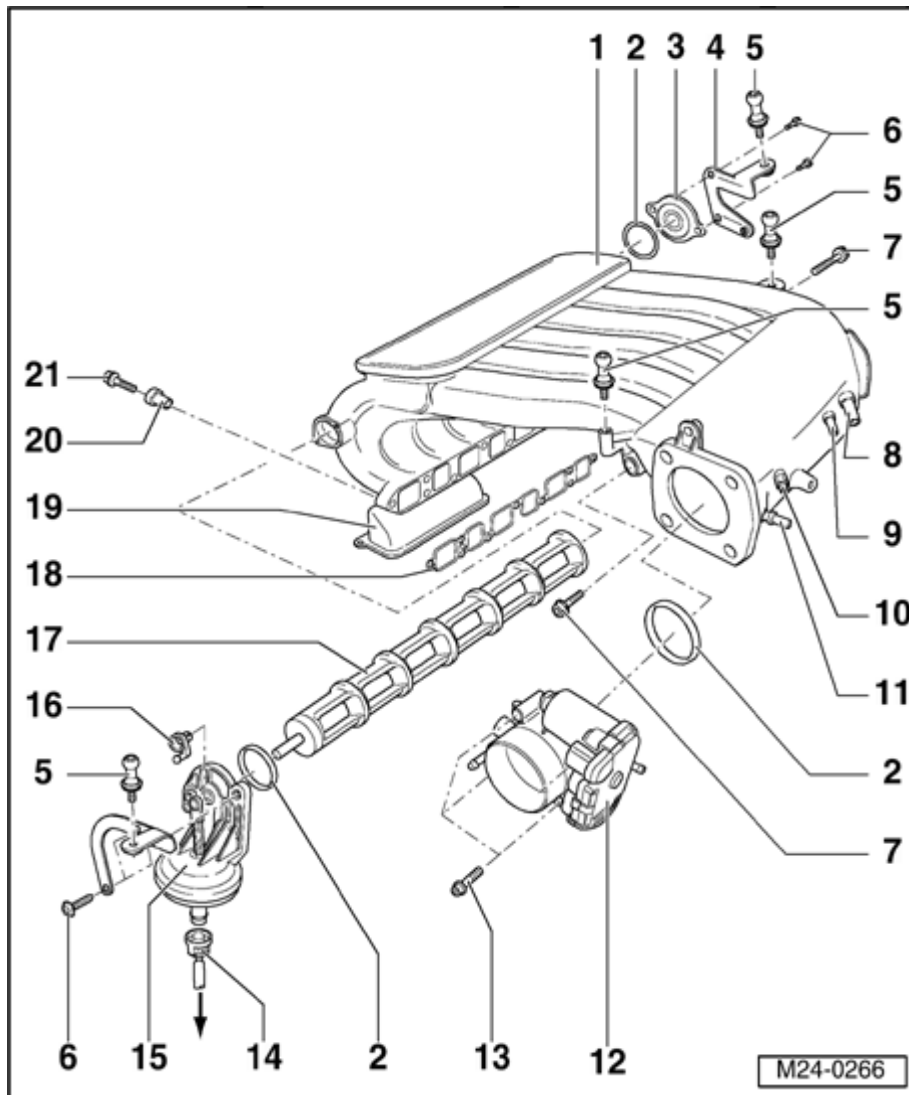
- ◆ To Intake Manifold Change-Over Valve - N156- ⇒ [Page 24-12](#), item 2

15 - Vacuum actuator

- ◆ For Intake Manifold Change-Over Valve - N156-
- ◆ Checking ⇒ [Page 24-117](#)

16 Positioning - lever

- ◆ For change-over barrel
- ◆ Check seated securely



17 - Change-over barrel

18 - Gasket

◆ Observe installation position

◆ replace if damaged

19 Vacuum-reservoir

◆ For Intake Manifold Change-Over Valve - N156-

◆ Removing and installing:

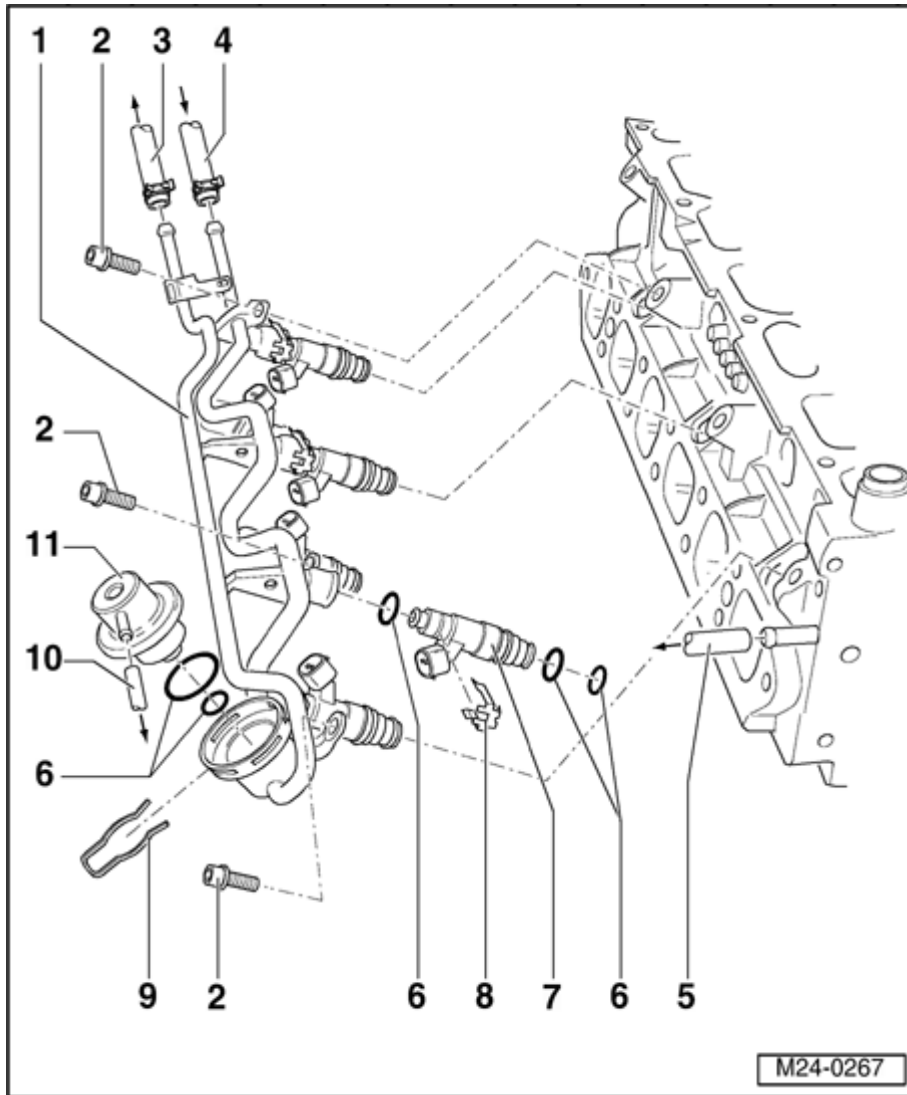
⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF; Repair Group 26](#)

20 - Dowel sleeve

◆ To secure intake manifold

◆ To locate gasket

21 - 13 Nm



Fuel rail, disassembling and assembling

1 - Fuel rail

2 - 8 Nm

3 - Return line

- ◆ Blue or with blue marking

- ◆ Secure with spring-type clips

- ◆ Check seated securely

- ◆ To fuel delivery unit:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20](#)

4 - Supply line

- ◆ Black

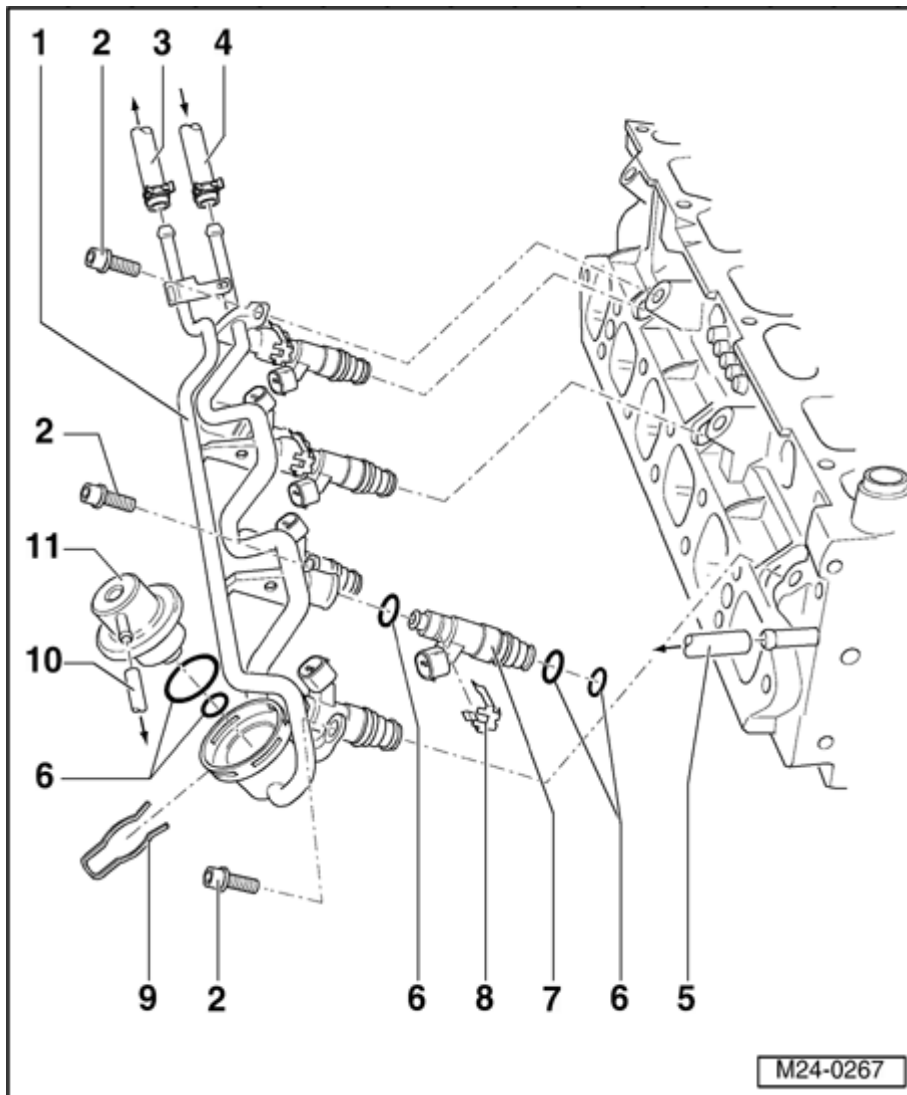
- ◆ Secure with spring-type clips

- ◆ Check seated securely

- ◆ From

fuel filter:

⇒ [Repair
Manual, 2.8 Liter
VR6 4V Engine
Mechanical,
Engine Code\(s\):
BDF; Repair
Group 20](#)



5 Connecting - hose

- ◆ Black
- ◆ Check seated securely
- ◆ Secure with spring-type clips
- ◆ For air shrouding of fuel injectors
 - ◆ To intake hose ⇒ [Page 24-30](#), item 5

6 - O-ring

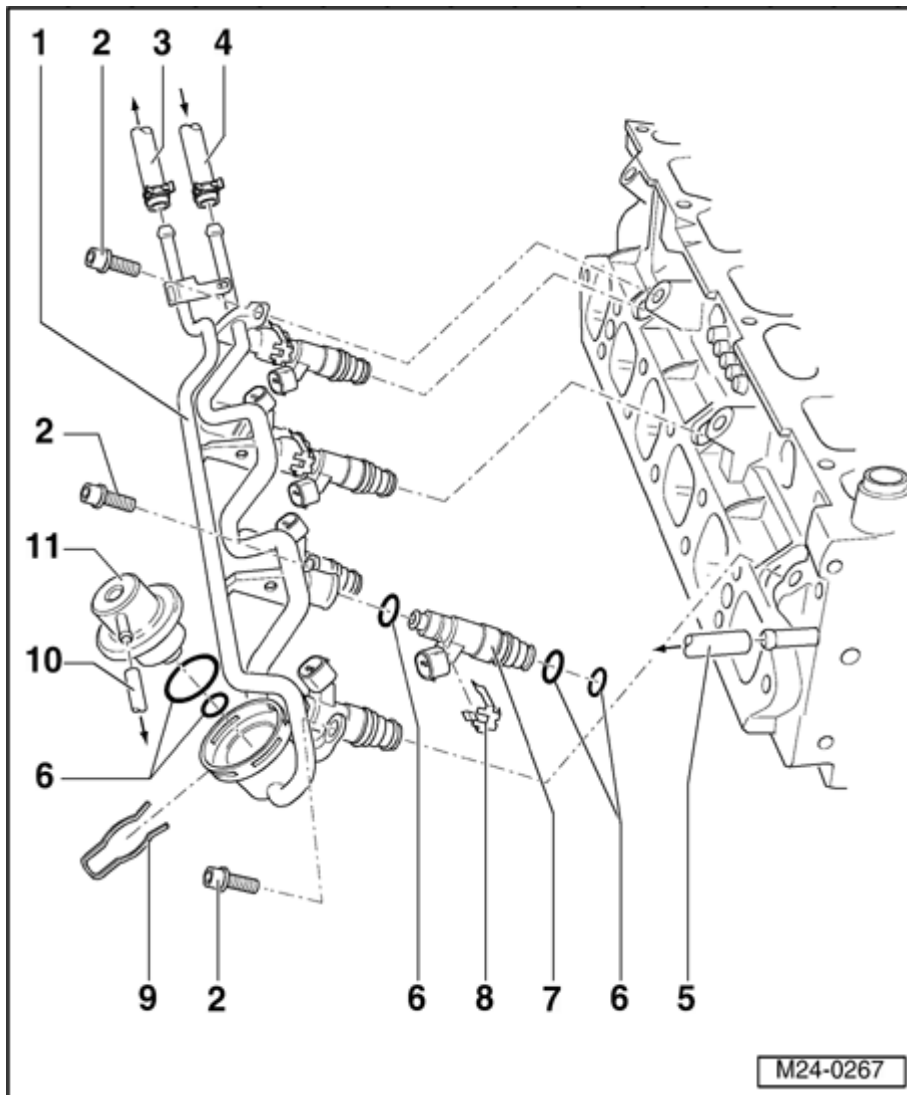
- ◆ Replace
- ◆ Before installing moisten with clean engine oil

7 - Fuel injectors (-N30-...-N33-, -N83- and -N84-)*

- ◆ Air shrouded
- ◆ Checking ⇒ [Page](#)

[24-97](#)

- ◆ When replacing, erase learned values and adapt Motronic Engine Control Module (ECM) - J220- to Throttle Valve Control Module - J338- ⇒ [Page 24-182](#)



8 - Retaining clip

- ◆ Ensure seated correctly at fuel injector and fuel rail

9 - Retaining clip

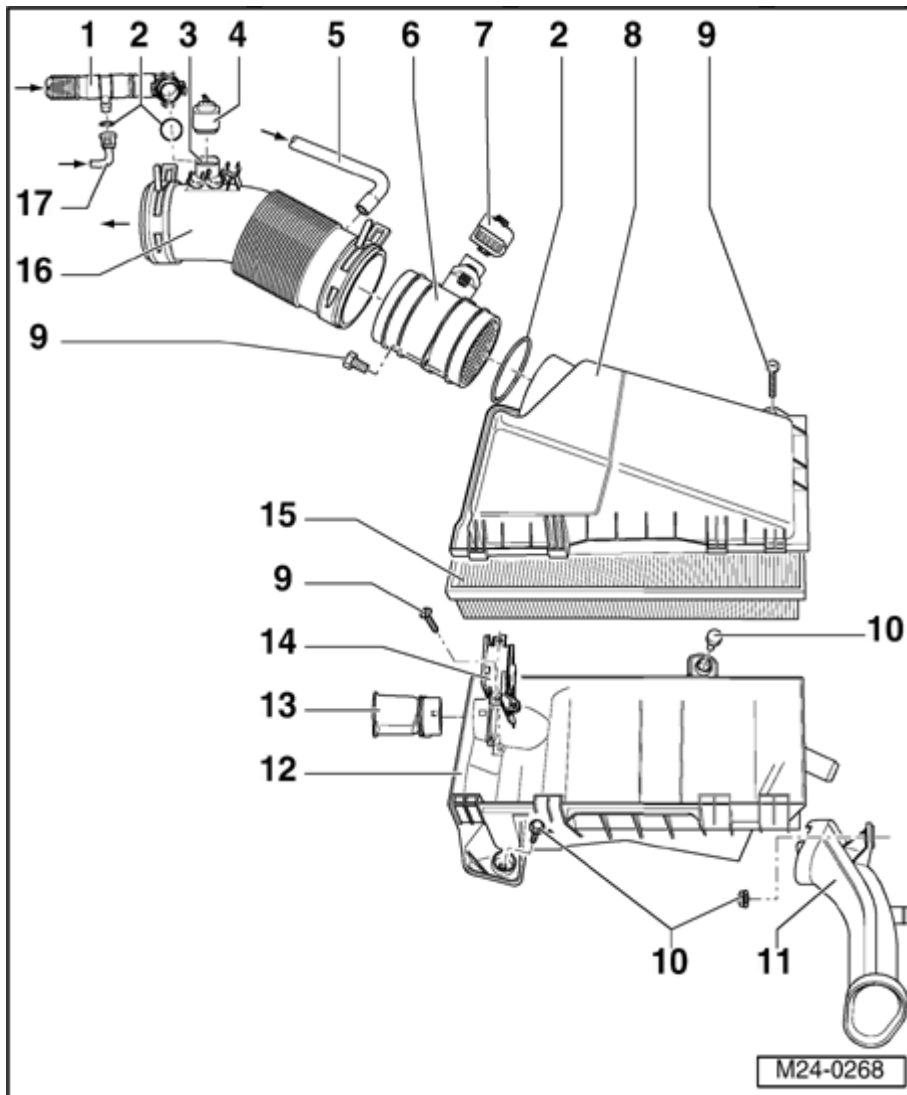
- ◆ Check seated securely

10 - Vacuum line

- ◆ To non-return valve/intake manifold junction piece

11 - Fuel pressure regulator

- ◆ Checking ⇒ [Page 24-110](#)



Air cleaner assembly, disassembling and assembling

1 - Connecting hose

- ◆ Black
- ◆ For crankcase breather
- ◆ Check seated securely
- ◆ Press together at front to release
- ◆ From breather housing on cylinder head cover

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15](#)

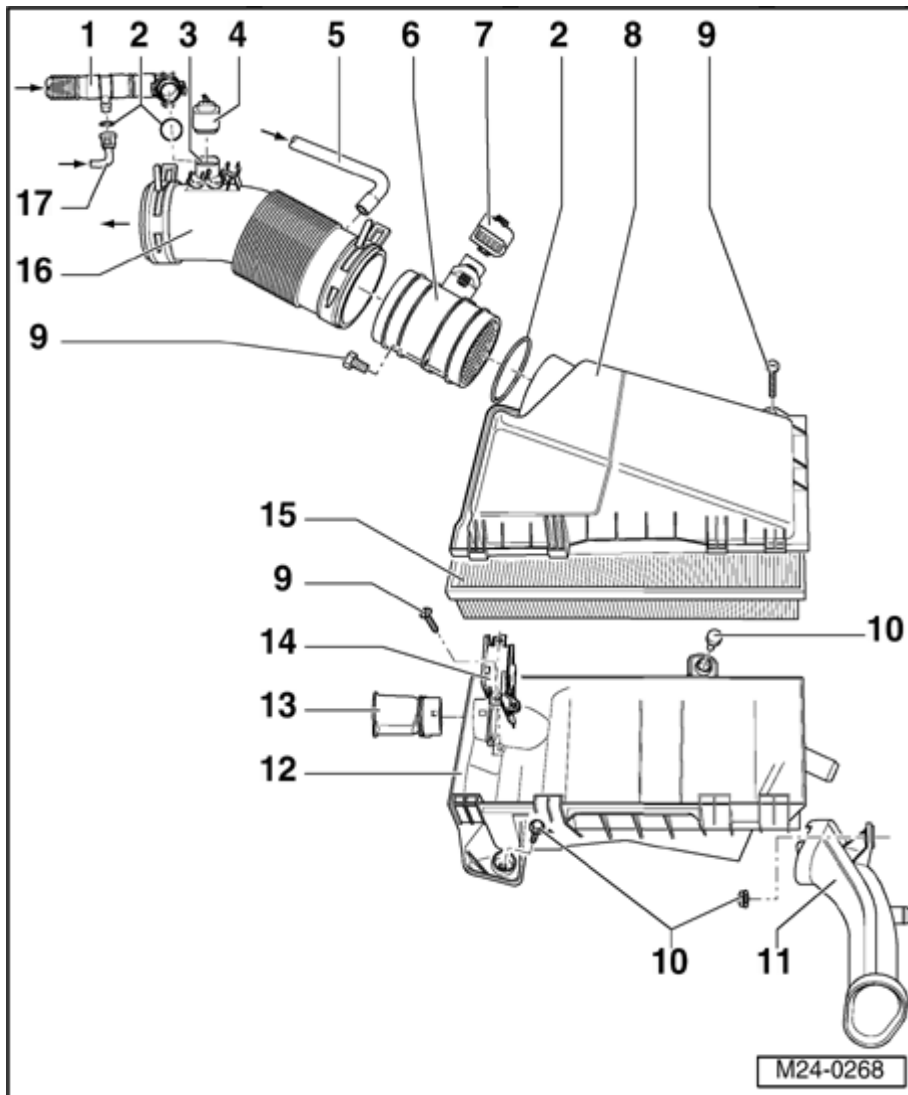
2 - O-ring

- ◆ Replace if damaged

3 - Positive Crankcase Ventilation (PCV) Heating Element -

N79-

- ◆ For
crankcase
breather



4 - Connector

- ◆ Black, 2-pin
- ◆ For Positive Crankcase Ventilation (PCV) Heating Element - N79-
- ◆ Check Positive Crankcase Ventilation (PCV) Heating Element - N79- voltage supply between terminals 1 and 2 with ignition switched on:

Specification:
min. 11.5 V

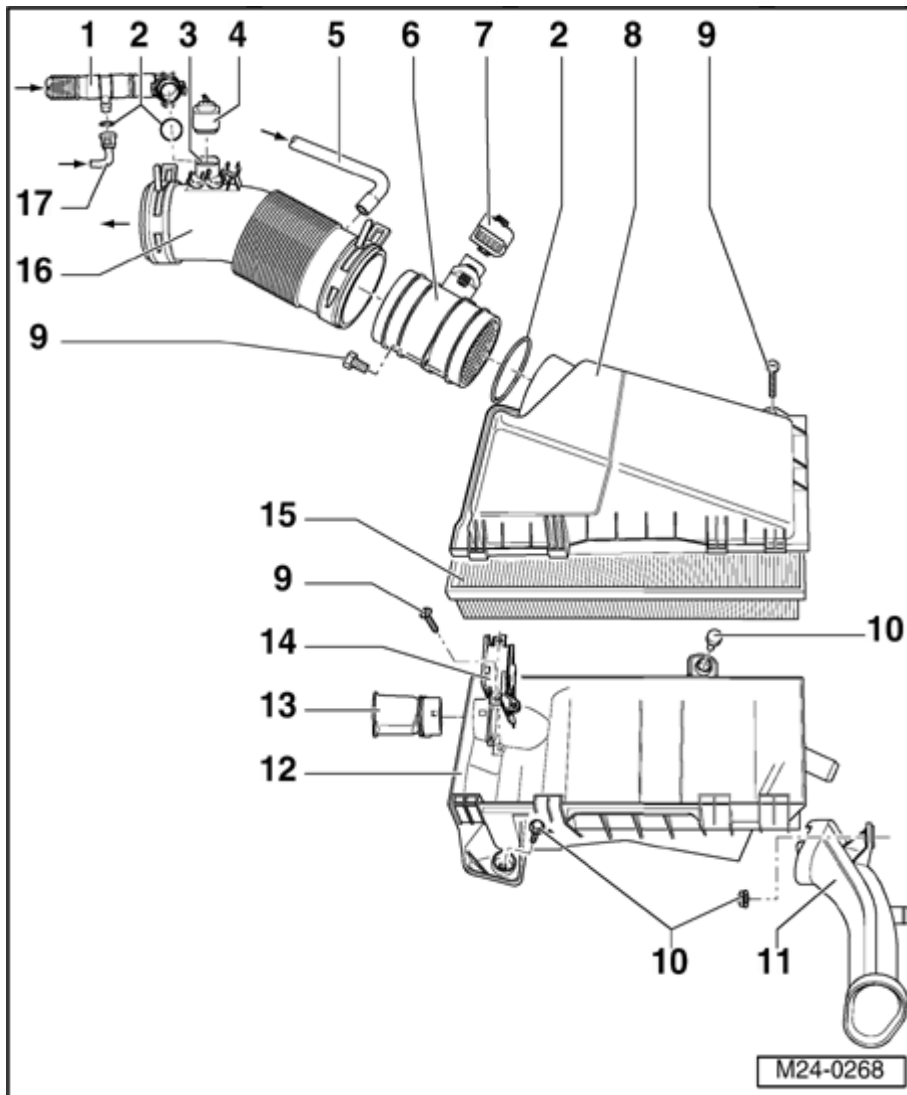
5 - Connecting hose

- ◆ Black
- ◆ Check seated securely
- ◆ For air shrouding of fuel injectors
- ◆ From connection on cylinder head ⇒

[Page 24-27](#), item 5

6 Mass Air - Flow (MAF) sensor - G70-* with Intake Air Temperature (IAT) sensor -G42-*

- ◆ Sensor and connector terminals are gold plated
- ◆ Check Mass Air Flow (MAF) sensor ⇒ [Page 24-52](#)
- ◆ Check Intake Air Temperature (IAT) sensor ⇒ [Page 24-81](#)



7 - Connector

- ◆ Black, 5-pin
- ◆ Terminals from sensor and connector are gold plated

8 - Air cleaner upper part

- 9 - 6 Nm
- 10 - 10 Nm

11 Air intake - connecting piece

- ◆ For cold air intake

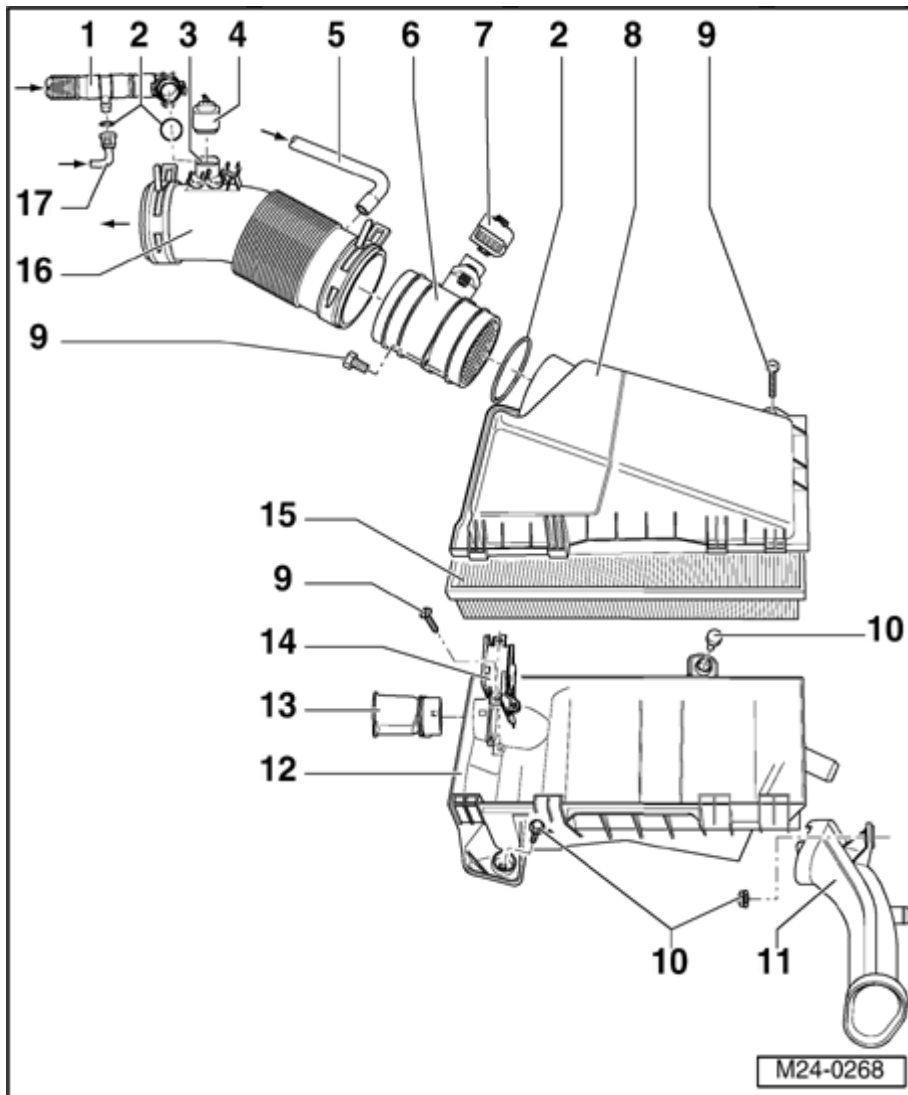
12 - Air cleaner lower part

13 Air intake - connecting piece

- ◆ For warm air intake

14 - Control flap

15 - Filter element



16 - Intake hose

- ◆ Check seat securely
- ◆ Secure with spring-type clips
- ◆ To Throttle Valve Cont Module -J3

17 - Vacuum line

- ◆ From intake manifold/Evapor Emissions (EVA) canister purge regulator valve junction piece
- ◆ Press toget at front to release

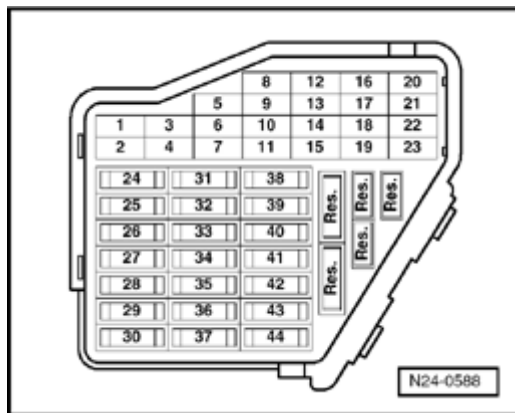
Safety precautions

CAUTION!

When performing repair work, especially to the confined conditions in the engine pay attention to the following:

◆ **Route all types of lines (e.g. for fuel, hydraulics, Evaporative Emissions (EV) system, coolant, refrigerant, brake fluid vacuum) as well as electrical wiring so the original positions are restored.**

◆ **Ensure sufficient clearance to all moving hot components.**



◆ For safety reasons, fuse No. 28 must be removed from fuse holder before opening system because fuel pump can be activated door terminal switch in driver's door.

To prevent injuries to persons and/or damage to the fuel injection and ignition system, the following must be noted:

WARNING!

Fuel system is under pressure! Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.

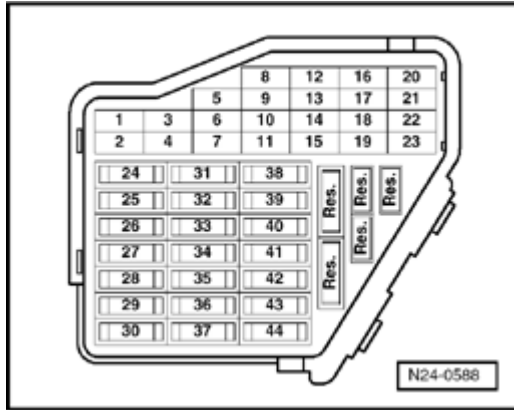
- ◆ Do not touch or disconnect ignition coils when the engine is running or being turned at starter speed.
- ◆ The ignition must be switched off before connecting or disconnecting injection or ignition system wiring or tester cables.

Observe following if test and measuring instruments are required during a road test:

- ◆ Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

WARNING!

If test and measuring instruments are operated from front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.



◆ If the engine is to be turned at starter speed without starting:

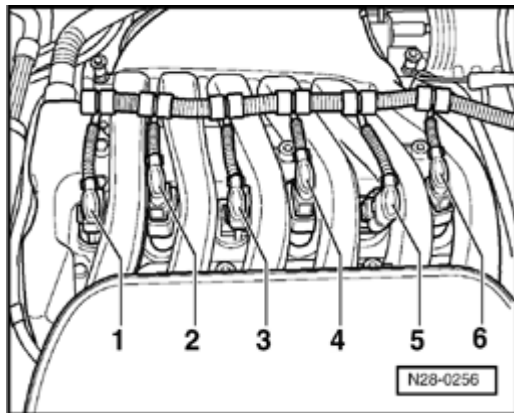


- Remove fuse 29 (fuel pump) from fuse holder.

Note:

Removing fuse 29 interrupts the voltage supply to the fuel injectors.

- Remove engine cover.



- Disconnect connectors from ignition coils through 6.

Note:

Mark connector and component before disconnecting.

Rules for cleanliness

When working on the fuel supply/fuel injection system, pay careful attention to the following 5 Rules of Cleanliness:

- ◆ Thoroughly clean all unions and the adjacent areas before disconnecting.
- ◆ Place parts that have been removed on a clean surface and cover. Do not use fluffy cloths!
- ◆ Carefully cover opened components or seal, if the repair cannot be carried out immediately.
- ◆ Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- ◆ When the system is open: Do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.

Technical data

Engine code		BDF
Idling check		
idle speed ¹⁾	rpm	640 TO 720 ²⁾
Motronic Engine Control Module (ECM) -J220-³⁾		
System designation		Motronic ME7.1.1
Part number		⇒ Parts catalog
Governed speed	rpm	from approx. 6500

1) idle speed check ⇒ [Page 24-125](#)

2) Not adjustable

3) Replacing Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-162](#)

Components, checking

Heated Oxygen Sensor (HO2S), checking

Note:

- ◆ *The vehicle must be raised to gain access to the Oxygen Sensor (O2S) connector.*
- ◆ *Only gold plated terminals may be used to repair the terminals in the Oxygen Sensor (O2S) connectors.*

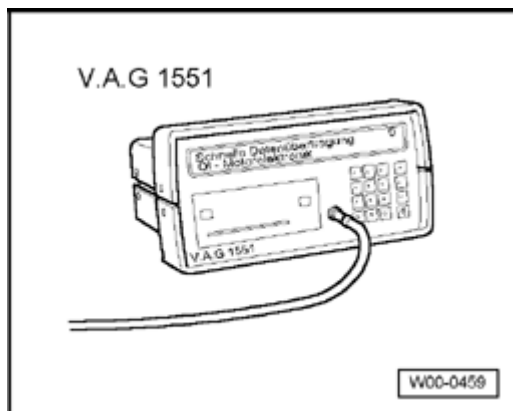
Special tools and equipment

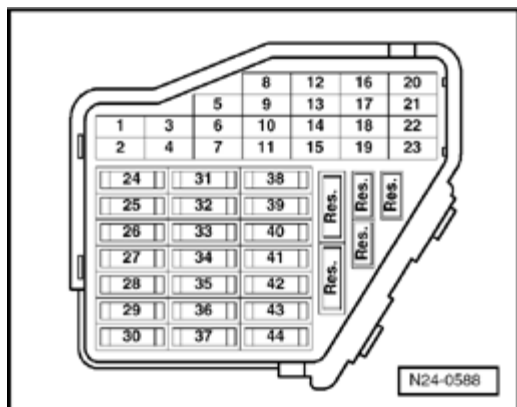
- ◆ VAG 1551 Scan tool (or VAG 1552) with 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 Test box
- ◆ Electrical Wiring Diagrams





Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Fuel Pump (FP) relay -J17- must be OK., checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

- Press buttons -0-, -4- and -1- for "Display group number 41" and confirm entry with -Q- button.

Read measured value block 41



Indicated on display: (1...4 = display zones)

1 2 3 4

- Check status of the Oxygen Sensor (O2S) heating in display zone 2: Display: Htg.bC.ON / Htg.bC.OFF (alternating):

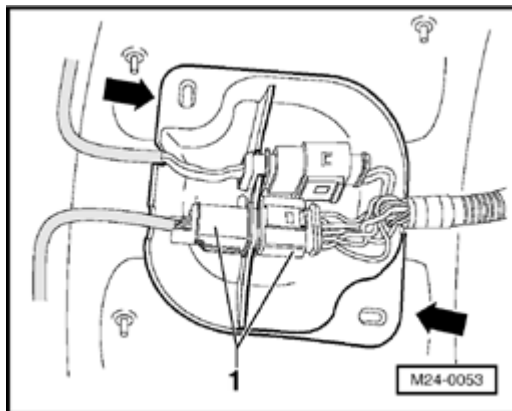
24-41

Note:

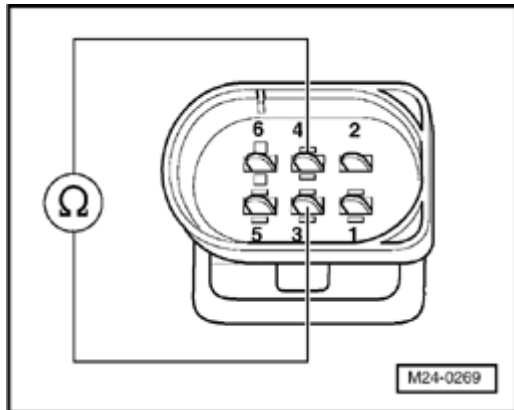
The Oxygen Sensor (O2S) heating may be switched on or off depending on the operating conditions of the engine, therefore the displ. display zone 2 may show "Htg.bC.ON" or alternating from "Htg.bC.ON" to "Htg.bC.OF"

- Press → button.
- Press buttons -0- and -6- for function "En output" and confirm entry with -Q- button.
- Switch off ignition.

If the display does not indicate as described



- Remove protective cover (arrows) and disconnect 6-pin connector (black) -1- to Oxygen Sensor (HO2S) -G39-.



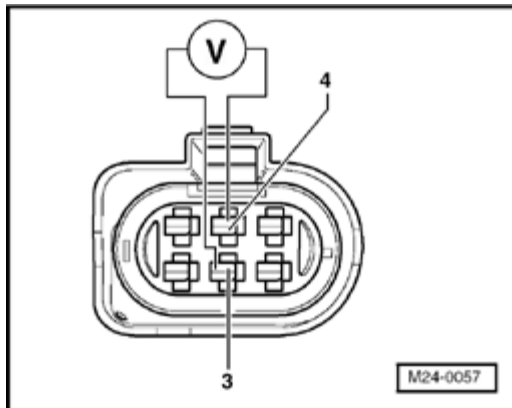
Checking resistance

- Check sensor heater wire resistance at connector terminals 3 and 4 to Oxygen Sensor (O2S). Specification: 2.5 to 10.0 Ω (at room temperature).

If the specification is not obtained:

- Replace Oxygen Sensor (O2S) 1, Bank 1 before Three Way Catalytic Converter (TWC) -G39- \Rightarrow [Page 24-19](#) , item 20 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory \Rightarrow [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again \Rightarrow [Page 24-182](#) .
- Read readiness code \Rightarrow [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again \Rightarrow [Page 01-149](#) .

If the specification is obtained:



Checking voltage supply

- Connect multimeter to measure voltage at terminals 3 and 4 (connector to Motronic Engine Control Module (ECM) -J220-) using adapter cables from VAG 1594.
- Start engine and run at idle speed.
- Measure voltage supply and observe display group 41, display zone 2.

Display Htg.bC.ON: Specification:
11.0 to 14.5 V

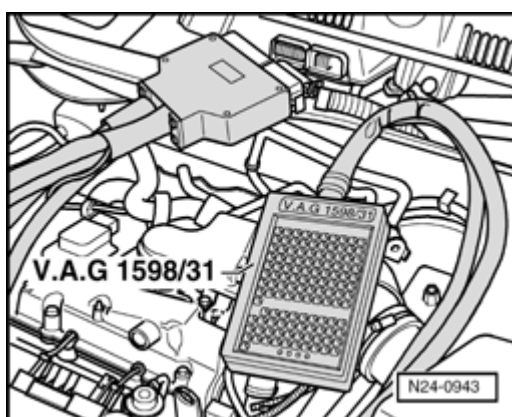
Display Htg.bC.ON / Htg.bC.OFF
(alternating): Specification:
Between 0.0 to 12.0 V fluctuating

- Switch off ignition.

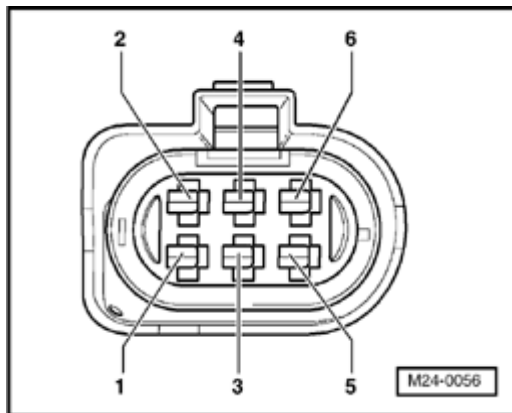
If no voltage is present:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wiring for open circuit between test box and 6-pin connector according to Electrical Wiring Diagrams. Terminal 4 and socket 5

Wire resistance: max. 1.5 Ω

If the specification is obtained:

- Check wire for open circuit between 6-pin connector terminal 3 and Fuel Pump (FP) -J17- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no wiring malfunction is detected:

- Replace Motronic Engine Control Module (ECM) -J220- \Rightarrow [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory \Rightarrow [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again \Rightarrow [Page 24-182](#) .
- Read readiness code \Rightarrow [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again \Rightarrow [Page 01-149](#) .

Oxygen Sensor (O2S) heating for Oxygen Sensor (O2S) Behind Three Catalytic Converter (TWC) -G130-, checking

Note:

- ◆ The vehicle must be raised to gain access to the Oxygen Sensor (O2S) connector.
- ◆ Only gold plated terminals may be used servicing Oxygen Sensor (O2S) connector terminals 3 and 4.

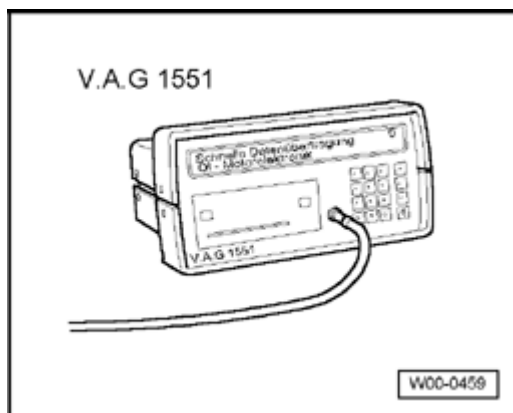
Special tools and equipment

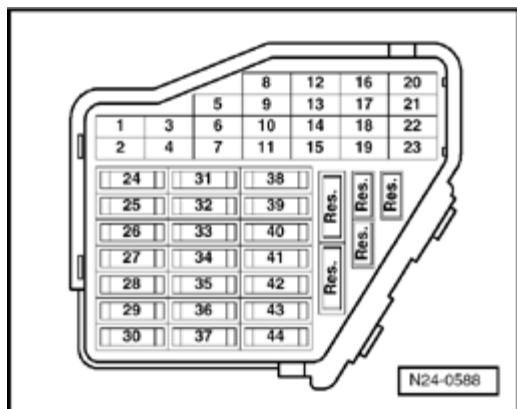
- ◆ VAG 1551 Scan tool (or VAG 1552) with 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 Test box
- ◆ Electrical Wiring Diagrams





Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Fuel Pump (FP) relay -J17- must be OK., checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

- Press buttons -0-, -4- and -1- for "Display group number 41" and confirm entry with -Q- button.

Read measured value block 41



Indicated on display: (1 to 4 = display zones)

1 2 3 4

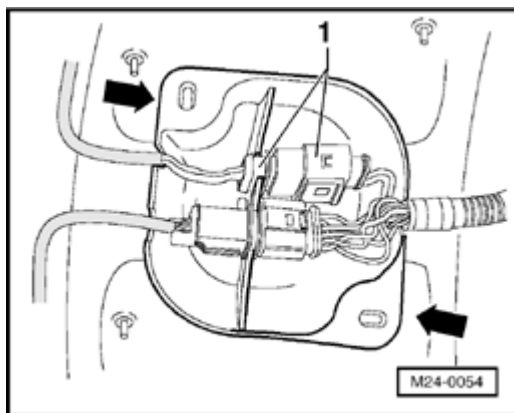
- Check the status of the Oxygen Sensor (O2S) heating in display zone 4: Display: Htg.aC.ON / Htg.aC.OFF (alternating)

Note:

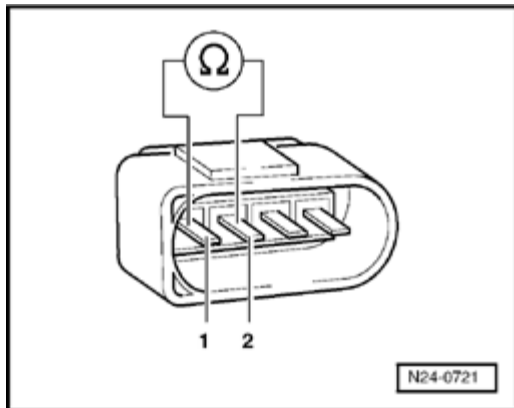
The Oxygen Sensor (O2S) heating may be switched on or off depending on the operating conditions of the engine, therefore the displ. display zone 4 may show "Htg.aC.ON" or alternating from "Htg.aC.ON" to "Htg.aC.OF"

- Press the → button.
- Press buttons -0- and -6- for function "En output" and confirm entry with the -Q- button.
- Switch off ignition.

If the display does not indicate as described



- Remove protective cover -arrows- and disconnect 4-pin connector (black) -1- to Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130-.



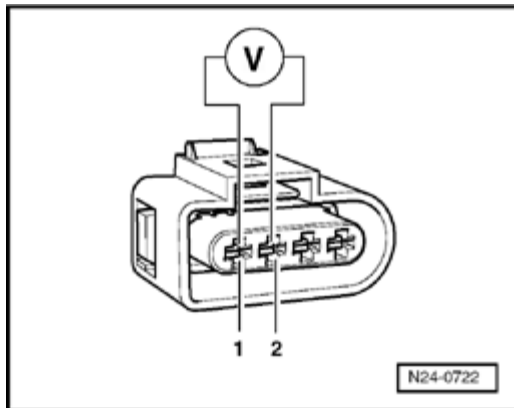
Checking resistance

- Check sensor heater wire resistance at connector terminals 1 and 2 to Oxygen Sensor (O2S).
- Specification: 6,4 to 47,5 Ω (at room temperature).

If the specification is not obtained:

- Replace Oxygen Sensor (O2S) 2, Bank 1 after Three Way Catalytic Converter (TWC) -G130- ⇒ [Page 24-17](#) , item 18 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

If the specification is obtained:



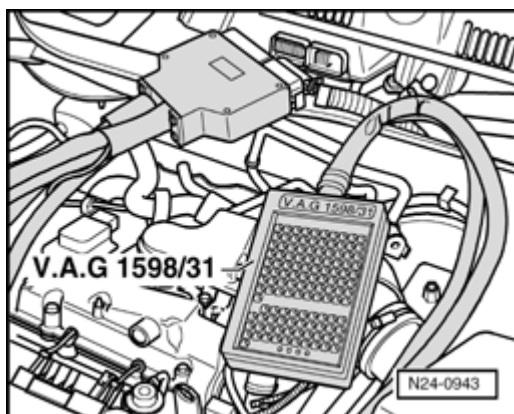
Checking voltage supply

- Connect multimeter to measure voltage at terminals 1 and 2 (connector to Motronic Engine Control Module (ECM) -J220-) using adapter cables from VAG 1594.
- Start engine and run at idle speed.
- Measure voltage supply and observe display group 41, display zone 4.
- Display Htg.aC.ON: Specification: 11.0 to 14.5 V
- Display Htg.aC.ON / Htg.aC.OFF (alternating): Specification: Between 0.0 to 12.0 V fluctuating
- Switch off ignition.

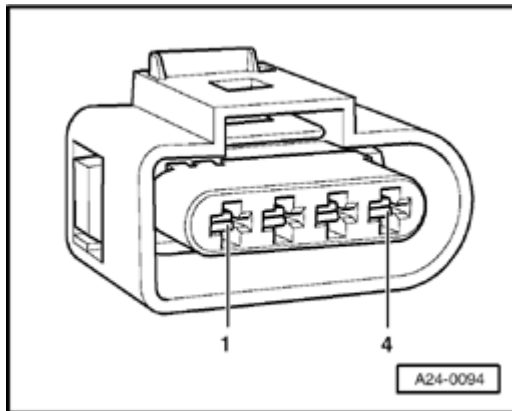
If no voltage is present:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wiring for open circuit between test box and 4-pin connector referring to Electrical Wiring Diagrams.

Terminal 2 and socket 63

Wire resistance: max. 1.5 Ω

If the specification is obtained:

- Check wire for open circuit between 4-pin connector terminal 1 and Fuel Pump (FP) relay -J17- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If no wiring malfunction is detected:

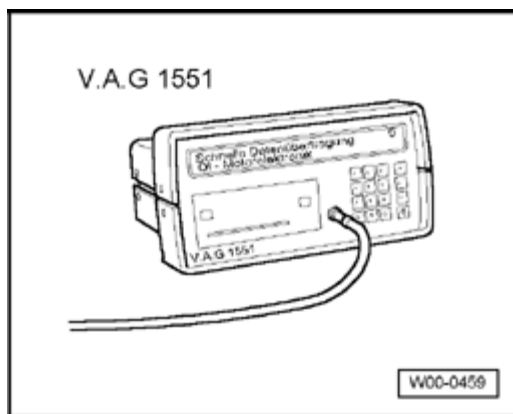
- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Mass Air Flow (MAF) sensor - G70- , checking

Note:

Only gold plated terminals may be used to service terminals in the Mass Air Flow (MAF) sensor connector.

Special tools, materials and equipment

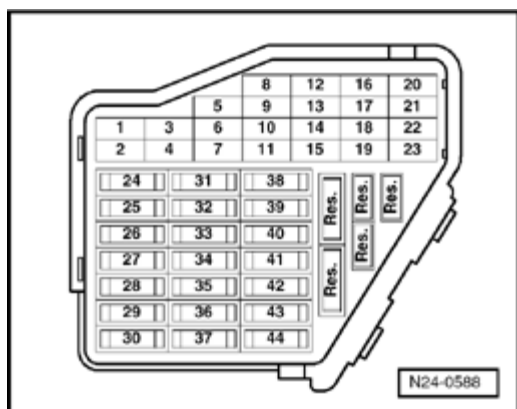


- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 Test box
- ◆ Electrical Wiring Diagrams



Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Fuel Pump (FP) -J17- must be OK., checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Coolant temperature must be at least 85 °C, ⇒display group 1, display zone 2.

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

- Press buttons -0-, -0- and -2- for "Display group number 2" and confirm entry with -Q- button.

Read measured value block 2



Indicated on display: (1...4 = display zones)

1 2 3 4

- Check mass of air drawn in, in display zone 4
Specification: 3.0 to 5.0 g/s
- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.

- Switch off ignition.

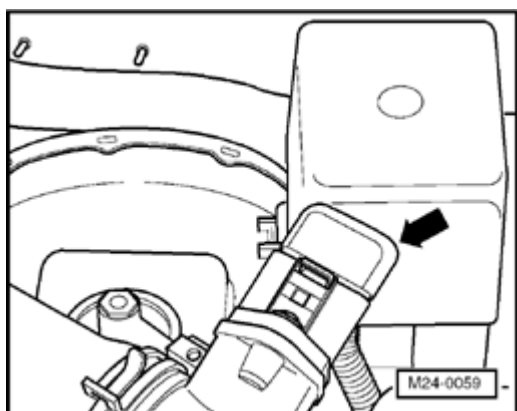
If the specification is achieved but an Mass Flow (MAF) related Diagnostic Trouble Cod (DTC) is registered in Diagnostic Trouble C (DTC) memory:

- Check voltage supply for Mass Air Flow (sensor -G70- ⇒ [Page 24-55](#) .

If the specification is not obtained:

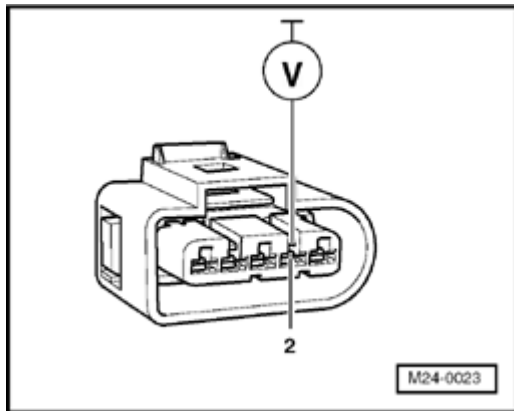
- Check signal and Ground (GND) wires fo Air Flow (MAF) sensor -G70- ⇒ [Page 24](#).

Checking voltage supply for Mass Air Fl (MAF) sensor



- Disconnect 5-pin connector from Mass Ai (MAF) sensor -G70- with Intake Air Temp (IAT) sensor -G42- (arrow).

24-56

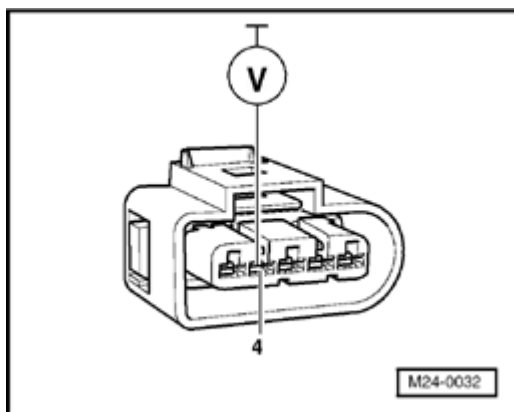


- Connect multimeter to measure voltage at connector terminal 2 and engine Ground (GND).
- Start engine and run at idle speed.
Specification: 11.0 to 15.0 V
- Switch off ignition.

If no voltage is present:

- Check wire for open circuit between 5-pin connector terminal 2 and Fuel Pump (FP) -J17- referring to Electrical Wiring Diagrams.
Wire resistance: max. 1.5 Ω

If the voltage supply and wiring is OK.:



- Connect multimeter to measure voltage at connector terminal 4 and engine Ground (GND).
- Switch on ignition
Specification: at least 4.5 V
- Switch off ignition.

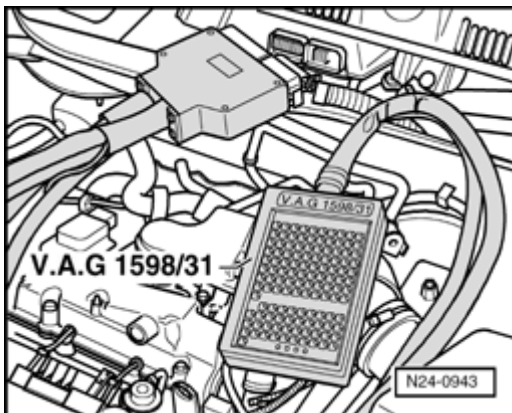
If no voltage is present:

- Check signal and Ground (GND) wires for Air Flow (MAF) sensor ⇒ [Page 24-57](#) .

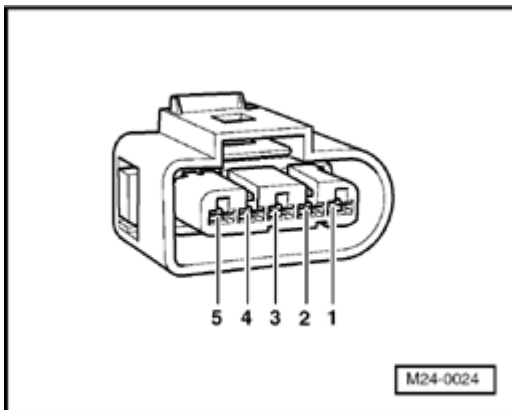
Checking signal and Ground (GND) wire: Mass Air Flow (MAF) sensor

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Re Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control M (ECM) -J220- remains disconnected.



- Check wiring for open circuit between test and 5-pin connector referring to Electrical Diagrams.

Terminal 3 and socket 27

Terminal 4 and socket 53

Terminal 5 and socket 29

Wire resistance: max. 1.5 Ω

- Additionally check wiring for short to one another, to vehicle Ground(GND) and to battery positive.

Specification: $\infty \Omega$

If no wiring malfunction is detected:

- Replace Mass Air Flow (MAF) sensor -G70- ⇒ [Page 24-30](#) , item 6 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Throttle Valve Control Module -J338-, checking

Note:

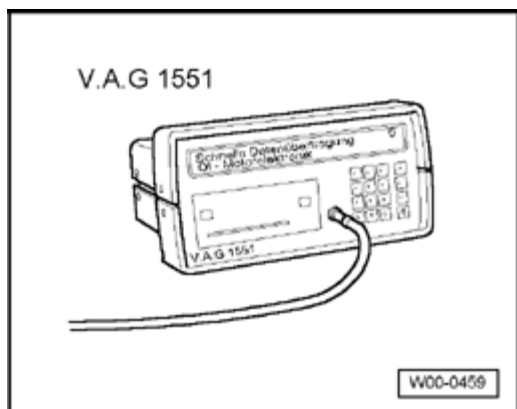
Only gold plated terminals may be used to service the terminals in the connector of the Throttle valve control module -J338-.

Components of Throttle valve control module - J338-: Throttle drive (power accelerator actuation) -G186-, Angle sensor -1- for throttle drive (power accelerator actuation) -G187- and Angle sensor -2- for throttle drive (power accelerator actuation) -G188-.

Note:

- ◆ *If the Throttle valve control module -J338- is replaced, the new control module must be adapted to the Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-182](#) .*
- ◆ *On vehicles installed with an automatic transmission the transmission control module must also be adapted:*

⇒ [Repair Manual, 4 Spd. Automatic Transmission 01M On Board Diagnostic \(OBD\): Repair Group 01](#)



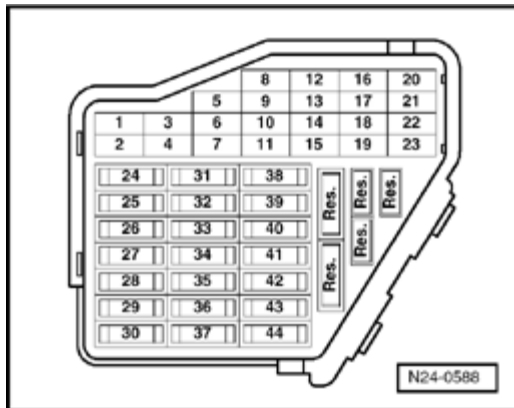
Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 Test box
- ◆ Electrical Wiring Diagrams



Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Fuel Pump (FP) Relay -J17- must be OK., checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Engine Coolant Temperature (ECT) must be at least 85 °C, ⇒display group 1, display zone 2.
- Throttle valve not damaged or contaminated/dirty.

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with "Address word" 01. ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

- Press buttons -0-, -6- and -2- for "Display group number 62" and confirm entry with -Q- button.

Read measured value block 62



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Check throttle valve angle from Angle sensor -1- for throttle drive -G187- at idling stop in display zone 1

Specification: 3 to 93%

- Check throttle valve angle from Angle sensor -2- for throttle drive -G188- at idling stop in display zone 2

Specification: 97 to 3%

- Depress accelerator slowly to wide open throttle position and observe angles displayed in display zones 1 and 2:

Percentage display in display zone 1 must increase evenly. Full tolerance range 3 to 93% is not always displayed.

Percentage display in display zone 2 must drop evenly. Full tolerance range 97 to 3% is not always displayed.

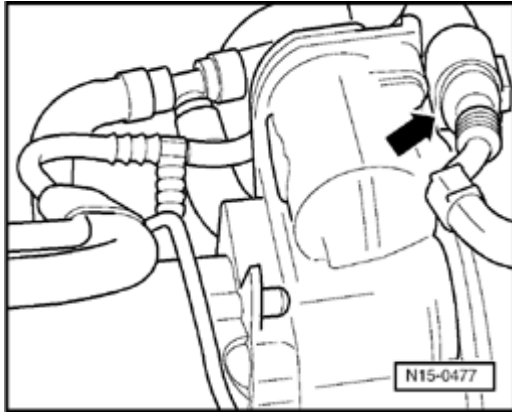
Note:

- ◆ *The reason why the display in display zone 1 increases and the display in display zone 2 decreases is because the potentiometers (angle sensors) in the Throttle Valve Control Module -J338- run in opposite directions.*
- ◆ *This means that the voltage of one angle sensor moves towards 5 volts. (The more the throttle valve is opened the higher the voltage; the percentage figure increases).*
- ◆ *While the voltage of angle sensor 2 decreases from 5 volts towards 0 volts. (The more the throttle valve is opened the lower the voltage; the percentage figure decreases).*

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.

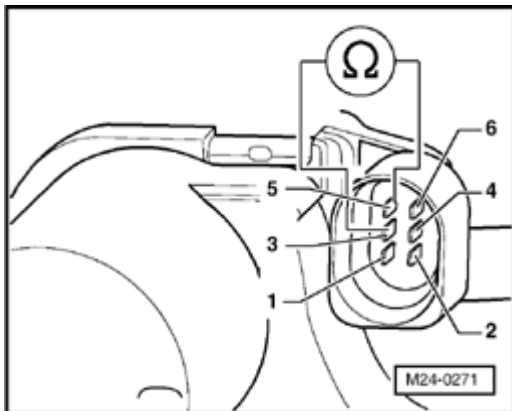
- Switch off ignition.

If the display does not indicate as described:



- Disconnect 6-pin connector from Throttle Valve Control Module - J338- (arrow).

Checking resistance



- Measure resistance from throttle valve drive between terminals 3 and 5
- Specification: 1.0 to 5.0 Ω

If the specification is not obtained:

- Replace Throttle Valve Control Module -J338- ⇒ [Page 24-13](#) , item 6 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Adapt Motronic Engine Control Module (ECM) -J220- to Throttle Valve Control Module -J338- ⇒ [Page 24-182](#) .

- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

If the specification is obtained:

- Check voltage supply of Throttle Valve Control Module -J338- and wiring to control module ⇒ [Page 24-66](#) .

- Check Throttle Position (TP) sensor:

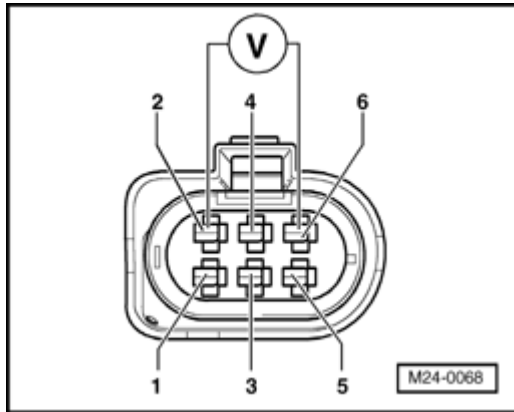
⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20](#)

If the voltage supply and wiring are OK.:

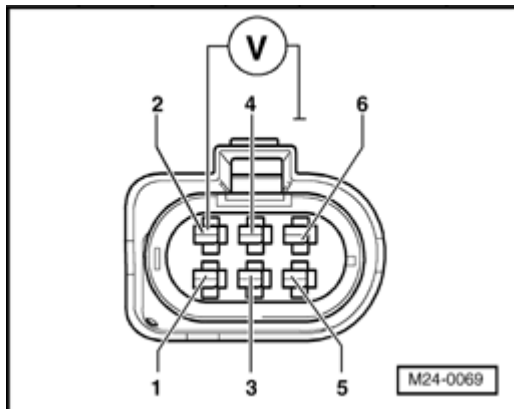
- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .

- Read readiness code ⇒ [Page 01-146](#) . If memory has been erased or Motronic En Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code be generated again ⇒ [Page 01-149](#) .

Checking voltage supply and wiring to control module



- Connect multimeter to measure voltage a connector terminals 2 (positive) and 6 (GND)).
- Switch on ignition.
Specification: at least 4.5 V
- Switch off ignition.

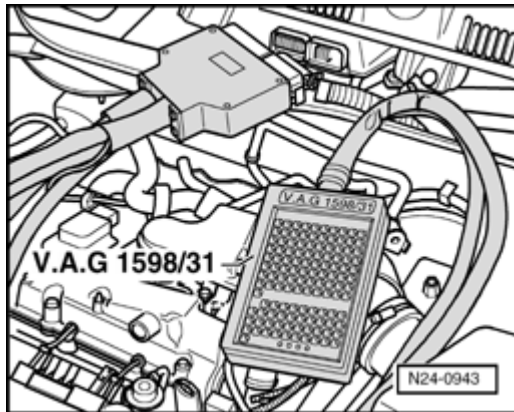


- Connect multimeter to measure voltage a connector terminal 2 (positive) and Groun (GND).
- Switch on ignition.
Specification: at least 4.5 V
- Switch off ignition.

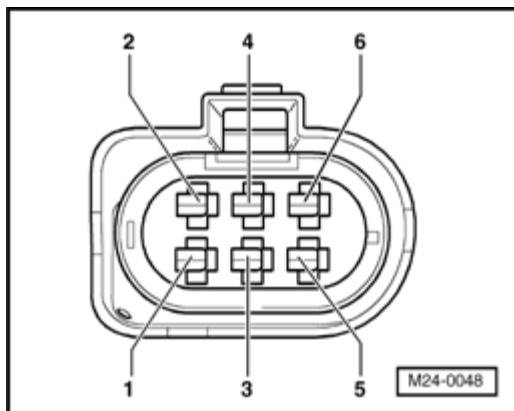
If the specifications are not obtained:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment, Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wiring for open circuit between test box socket and connector referring to Electrical Wiring Diagrams:

Terminal 1 and socket 92

Terminal 2 and socket 83

Terminal 3 and socket 117

Terminal 4 and socket 84

Terminal 5 and socket 118

Terminal 6 and socket 91

Wire resistance: max. 1.5 Ω

- Additionally check wiring for short to one another, to vehicle Ground(GND) and to battery positive.

Specification: $\infty \Omega$

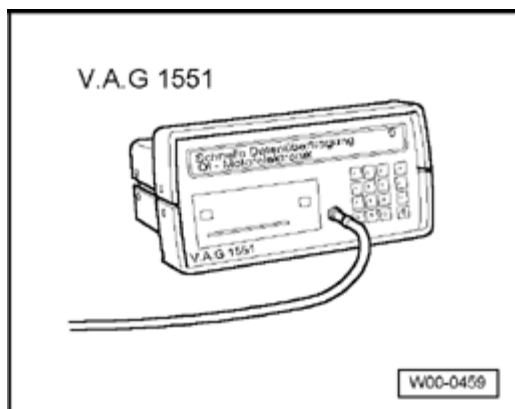
If no wiring malfunction is detected:

- Check Motronic Engine Control Module (ECM) - J220- voltage supply \Rightarrow [Page 24-163](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory \Rightarrow [Page 01-23](#) .
- Read readiness code \Rightarrow [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again \Rightarrow [Page 01-149](#) .

Engine Coolant Temperature (ECT) sensors -G62- and -G2-, checking

Note:

The Motronic Engine Control Module (ECM) -J220- will use a replacement value for an engine start (start temperature replacement value) as soon as there is a Diagnostic Trouble Code (DTC) stored in the DTC memory, which affects the Engine Coolant Temperature (ECT) sensor -G62-. The temperature then rises according to a model stored in the control module. When the engine has reached normal working temperature a fixed replacement value will be displayed after a certain period.



Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 Test box
- ◆ Electrical Wiring Diagrams

Test requirements

- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Engine must be cold.

Test sequence

Note:

Only gold plated terminals may be used when servicing the sensor connector terminals.

- Connect VAG 1551 Scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with "Address word" 01. ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -4- for "Display group number 4" and confirm entry with -Q- button.

Read measured value block 4



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Read coolant temperature value in display zone 3.

Specification: approx. coolant temperature

If the specification is not obtained:

- Check according to following table:

Display ¹⁾	Cause	Continuation of check
Approx. - 42.0 °C	Open circuit or short to positive	⇒ Page 24-74
Approx. 136.0 °C	Short to Ground (GND)	⇒ Page 24-76

¹⁾ If a temperature is displayed which deviates greatly from the ambient temperature of the sensor, check sensor wiring for transfer resistance.

If the specification is obtained:

- Start engine and run at idle speed. Temperature value must increase uniformly

Note:

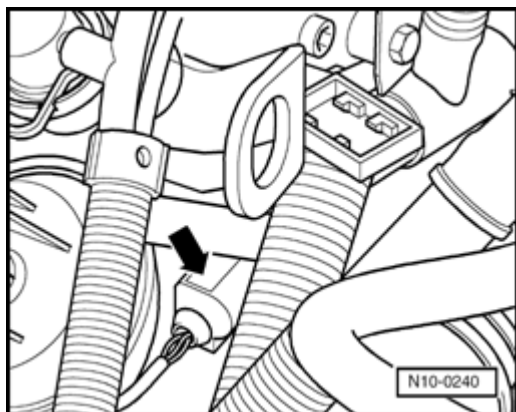
If irregular engine running occurs in certain temperature ranges and the temperature figure does not increase without interruption, the temperature signal is temporarily interrupted and the sensor must be replaced.

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

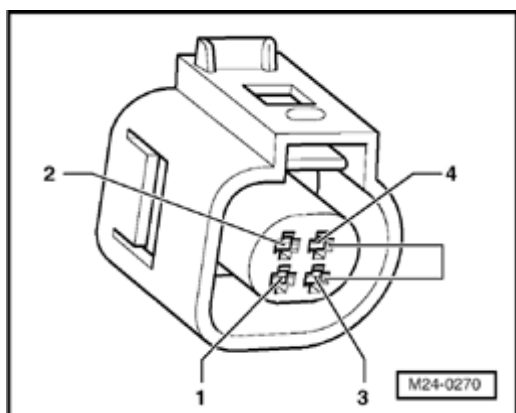
If the display does not indicate as described:

- Replace Engine Coolant Temperature (ECT) sensor -G62- / Engine Coolant Temperature (ECT) sensor -G2- ⇒ [Page 24-16](#) , item 14 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Continuation of check when display reads approx. -42.0°C



- ✦ - Disconnect 4-pin connector (arrow) from Engine Coolant Temperature (ECT) sensor -G62- / Engine Coolant Temperature (ECT) sensor -G2-.



- ✦ - Jumper connector terminals 3 and 4 using adapter cables from VAG 1594 and observe display.

If display jumps to approx. 136.0°C :

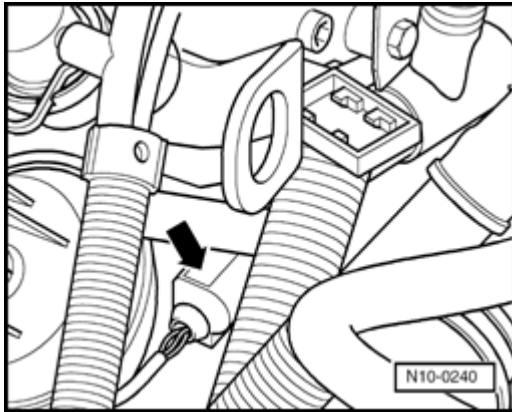
- Press \rightarrow button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

- Replace Engine Coolant Temperature (ECT) sensor -G62- / Engine Coolant Temperature (ECT) sensor -G2- ⇒ [Page 24-16](#) , item 14 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

If display remains at approx. -42.0 °C:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Check wiring referring to Electrical Wiring Diagrams ⇒ [Page 24-77](#) .

Continuation of check when display reads approx. 136.0 °C



- Disconnect 4-pin connector (arrow) from Engine Coolant Temperature (ECT) sensor -G62- / Engine Coolant Temperature (ECT) sensor -G2-.

If display jumps to approx. -42.0 °C:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Replace Engine Coolant Temperature (ECT) sensor -G62- / Engine Coolant Temperature (ECT) sensor -G2- ⇒ [Page 24-16](#) , item 14 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or the Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

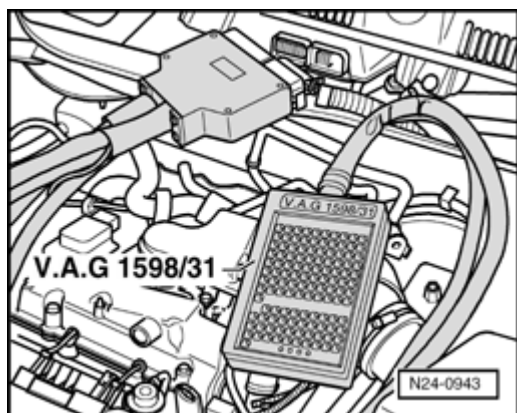
If display remains at approx. 136.0 °C:

- Press → button.
- Press buttons -0- and -6- for function "En output" and confirm entry with -Q- button.
- Switch off ignition.
- Check wiring referring to Electrical Wiring Diagrams ⇒ [Page 24-77](#) .

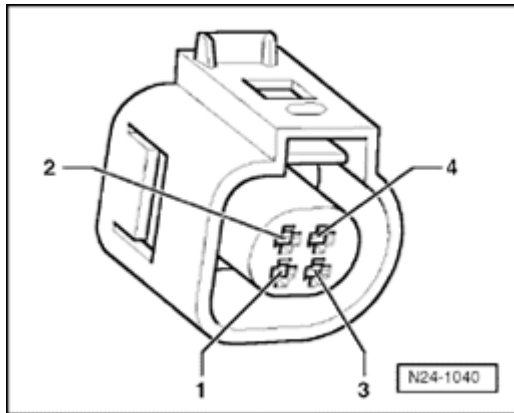
Checking wiring

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Re Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control M (ECM) -J220- remains disconnected.



- Check wiring for open circuit between test box and 4-pin connector referring to Electrical Wiring Diagrams.

Terminal 3 and socket 93

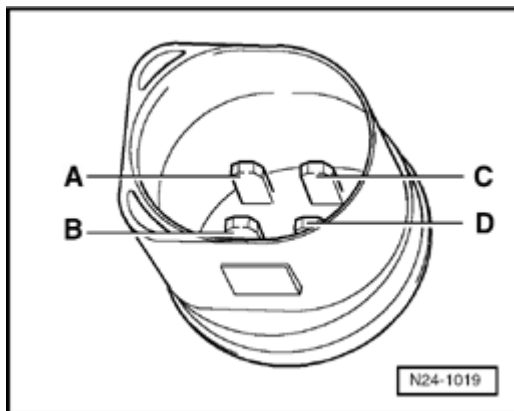
Terminal 4 and socket 108

Wire resistance: max. 1.5 Ω

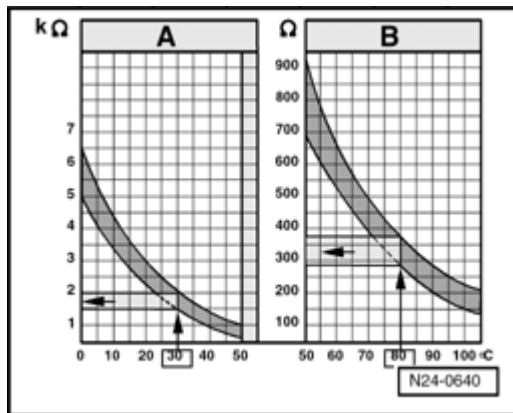
- Additionally check wiring for short to one another, to vehicle Ground (GND) and to battery positive.

Specification: $\infty \Omega$

If no wiring malfunction is detected:



- Perform resistance measurement on Engine Coolant Temperature (ECT) sensor -G62- terminal C (signal) and D (Ground).



Scale A shows resistance values for temperature range 0 to 50 °C and scale B the values for temperature range 50 to 100 °C.

Examples:

- ◆ 30 °C is in range A and corresponds to a resistance of 1.5 to 2.0 kΩ
- ◆ 80 °C is in range B and corresponds to a resistance of 275 to 375 Ω

If the specification is not obtained:

- Replace Engine Coolant Temperature (ECT) sensor -G62- / Engine Coolant Temperature (ECT) sensor -G2- ⇒ [Page 24-16](#) , item 14 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

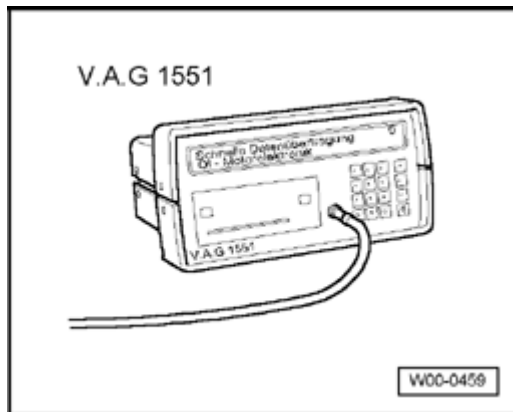
If there is no Diagnostic Trouble Code (DTC) in the wiring and the resistance measurement values are OK.:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Intake Air Temperature (IAT) sensor -G42-, checking

Note:

The Intake Air Temperature (IAT) sensor -G42- is a component part of the Mass Air Flow (MAF) sensor -G70- and cannot be replaced individually.



Special tools, materials and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ VAS 5024 Assembly tool for spring-type clips
- ◆ Electrical Wiring Diagrams
- ◆ Chilling spray (commercially available)

Test requirements

- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

Test sequence

Note:

Only gold plated terminals may be used to service the terminals in the Intake Air Temperature (IAT) sensor.

- Connect VAG 1551 Scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with "Address word" 01. ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -4- for "Display group number 4" and confirm entry with -Q- button.

Read measured value block 4



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Read intake air temperature value in display zone 4.

Specification: approx. ambient temperature

If the specification is not obtained:

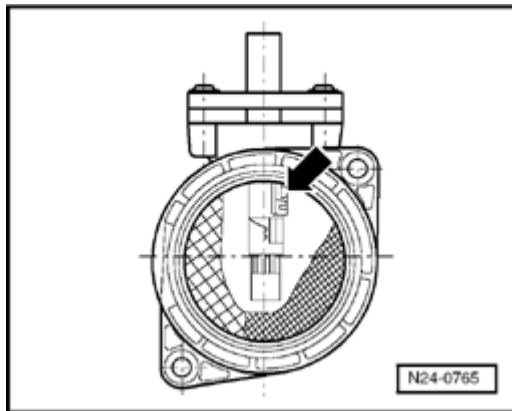
- Check according to following table:

Display ¹⁾	Cause	Continuation of check
Approx. - 37.0 °C	Open circuit or short to positive	⇒ Page 24-86
Approx. 126.0 °C	Short to Ground (GND)	⇒ Page 24-88

1) If a temperature is displayed which is below the ambient air temperature of the sensor, check sensor wiring for transfer resistance. Note when doing this that sensor may be heated from external sources, e.g. radiated heat when engine is not running.

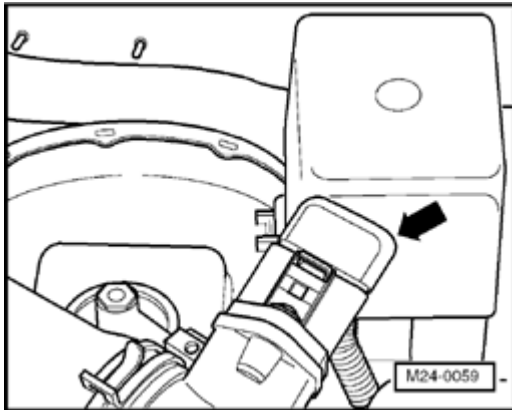
If the specification is obtained:

- Remove intake hose between Mass Air Flow (MAF) sensor and Throttle Valve Control Module -J338- (⇒ [Page 24-32](#) , item 16) using VAS 5024 assembly tool for spring-type clips.
- Note intake air temperature value in display zone 4.

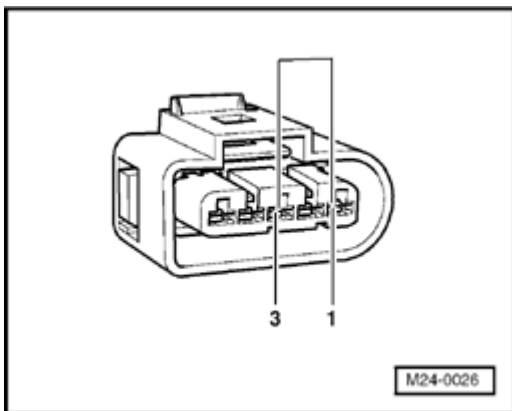


- Spray sensor (arrow) with commercial chilling agent while observing temperature value. Temperature value must decrease.
- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Replace Mass Air Flow (MAF) sensor -G70- ⇒ [Page 24-30](#) , item 6 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Continuation of check when display reads approx. -37.0°C



- Disconnect 5-pin connector (arrow) from Mass Air Flow (MAF) sensor -G70- with Intake Air Temperature (IAT) sensor -G42-.



- Jumper connector terminals 1 and 3 using adapter cables from VAG 1594 and observe display.

If display jumps to approx. 126.0°C :

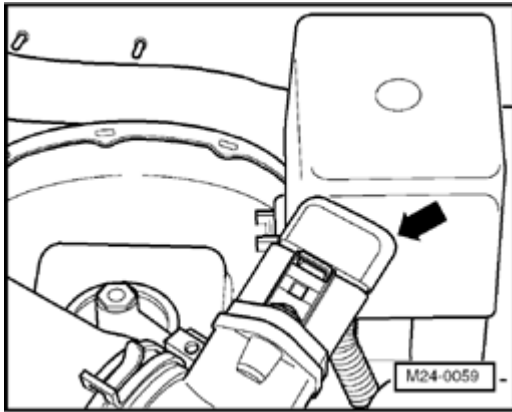
- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

- Replace Mass Air Flow (MAF) sensor -G70- ⇒ [Page 24-30](#) , item 6 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

If display remains at approx. -37.0 °C:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Check wiring referring to Electrical Wiring Diagrams ⇒ [Page 24-89](#) .

Continuation of check when display reads approx. 126.0 °C



- Disconnect 5-pin connector (arrow) from Mass Air Flow (MAF) sensor -G70- with Intake Air Temperature (IAT) sensor -G42-.

If display jumps to approx. -42.0 °C:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Replace Mass Air Flow (MAF) sensor -G70- ⇒ [Page 24-30](#) , item 6 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

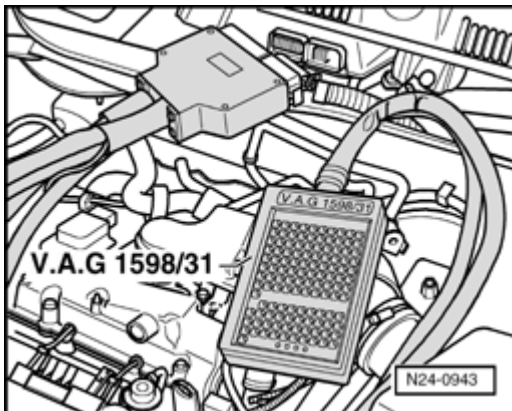
If display remains at approx. 126.0 °C:

- Press → button.
- Press buttons -0- and -6- for function "En output" and confirm entry with -Q- button.
- Switch off ignition.
- Check wiring referring to Electrical Wiring Diagrams ⇒ [Page 24-89](#) .

Checking wiring

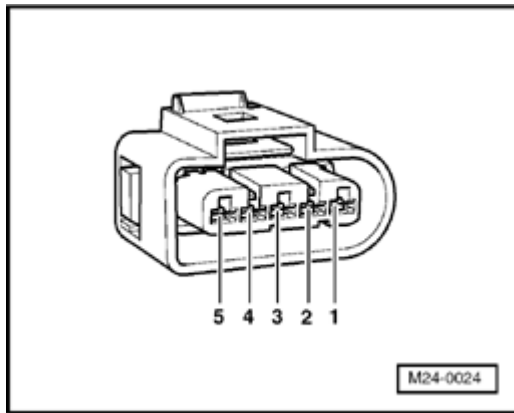
- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Re Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control M (ECM) -J220- remains disconnected.

24-90



- Check wiring for open circuit between test box and 5-pin connector referring to Electrical Wiring Diagrams.

Terminal 1 and socket 26

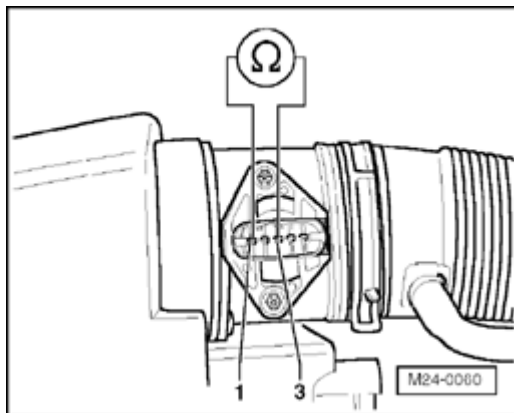
Terminal 3 and socket 27

Wire resistance: max. 1.5 Ω

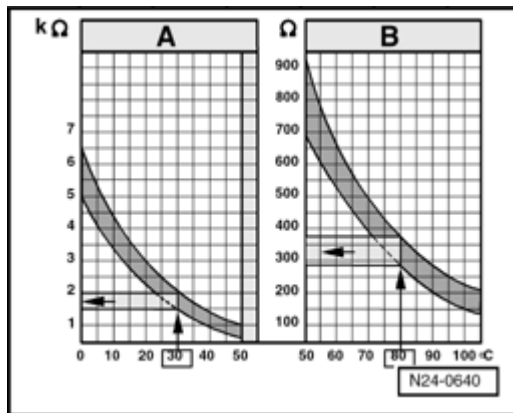
- Additionally check wiring for short to one another, to vehicle Ground (GND) and to battery positive.

Specification: $\infty \Omega$

If no wiring malfunction is detected:



- Perform a resistance measurement on Intake Air Temperature (IAT) sensor -G42- terminals 1 (signal) and 3 (Ground).



Scale A shows resistance values for temperature range 0 to 50 °C and scale B the values for temperature range 50 to 100 °C.

Examples:

- ◆ 30 °C is in range A and corresponds to a resistance of 1.5 to 2.0 kΩ
- ◆ 80 °C is in range B and corresponds to a resistance of 275 to 375 Ω

If the specification is not obtained:

- Replace Mass Air Flow (MAF) sensor -G70- ⇒ [Page 24-30](#) , item 6 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

If there is no Diagnostic Trouble Code (DTC) in the wiring and the resistance measurement values are OK.:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Engine Speed (RPM) Sensor -G28-, checking

Function

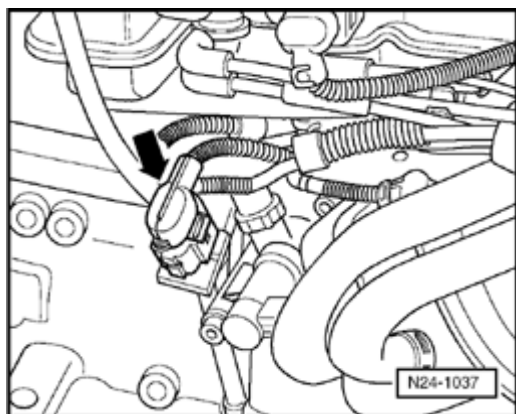
The Engine Speed (RPM) Sensor -G28- is a speed and reference mark sensor. The engine will not start if there is no speed signal. If the speed signal fails when the engine is running, it will cause the engine to stall immediately.

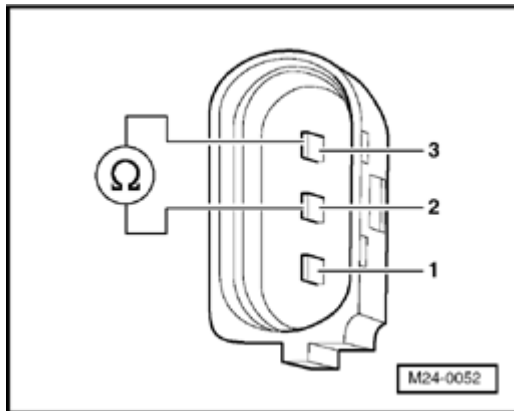
Special tools, materials and equipment

- ◆ VAG 1526 or Fluke 83 Hand multimeter
1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams

Test sequence

- ▲ - Separate gray 3-pin connector (arrow) to Speed (RPM) Sensor.





- Measure sensor resistance between connector terminals 2 and 3 to sensor.
Specification: 480 to 1000 Ω
- Check sensor for short circuit between terminals 1 and 2 as well as 1 and 3.
Specification: $\infty \Omega$

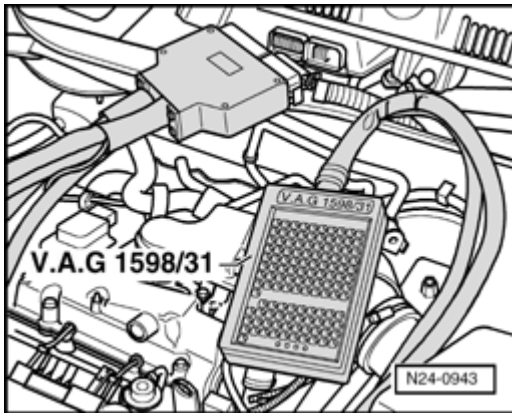
If the specifications are not obtained:

- Replace Engine Speed (RPM) Sensor -G28- ⇒ [Page 24-16](#) , item 16 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

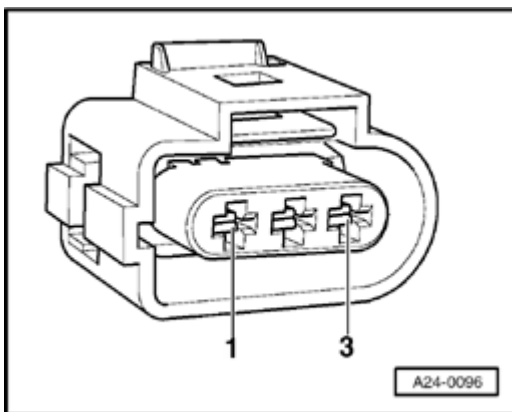
If no sensor Diagnostic Trouble Code (DTC) is detected:

- Remove wiper arms and cowl panel:
⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)

24-95



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wiring for open circuit between test box and 3-pin connector referring to Electrical Wiring Diagrams.
 - Terminal 1 and socket 108
 - Terminal 2 and socket 90
 - Terminal 3 and socket 82
 - Wire resistance: max. 1.5 Ω
- Additionally check wiring for short to one another, to vehicle Ground (GND) and to battery positive.
 - Specification: $\infty \Omega$

If no wiring malfunction is detected:

- Remove sensor and check sensor wheel for secure mounting, damage and run-out.

Note:

There is a larger gap on the sensor wheel. This gap is the reference mark and does not mean that the sensor wheel is damaged.

If no Diagnostic Trouble Code (DTC) is detected on sensor wheel:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

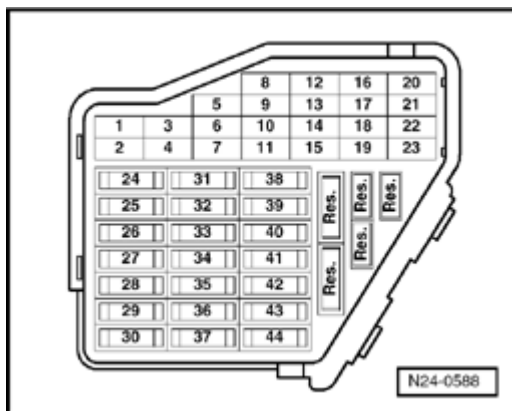
Fuel injectors, checking

Special tools, materials and equipment

- ◆ VAG 1526 or Fluke 83 Hand multimeter
1715 multimeter
- ◆ VAG 1527 LED test light
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams

Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.
- All electrical accessories, e.g. lights and window defroster must be switched off.
- If the vehicle is equipped with air conditioning it must be turned off.
- Selector lever must be in position "P" or vehicles with an automatic transmission



- Fuel Pump (FP) Relay -J17- must be OK., checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Checking activation

- First check activation of fuel injectors via Output Diagnosis Test Mode (DTM) ⇒ [Page 01-100](#) .

If activation is OK:

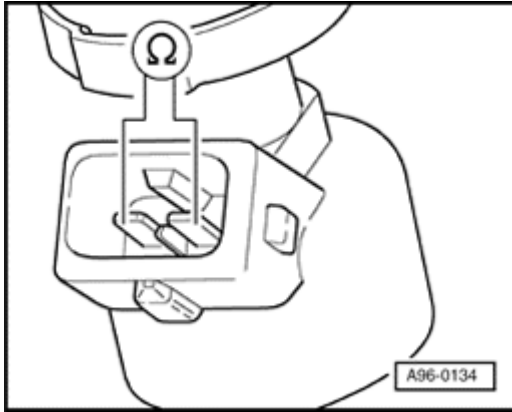
- Remove intake manifold:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15](#)

Note:

Seal the intake ports in the intake manifold or in the cylinder head with a clean cloth.

- Pull connector off all fuel injectors.



Checking resistance of fuel injectors

- Check resistance of fuel injectors between terminals.

Specification: 13.0 to 19.0 Ω

Note:

The resistance value is valid when measured at approx. 20 °C. The resistance value increases at higher temperatures.

If the specification is not obtained:

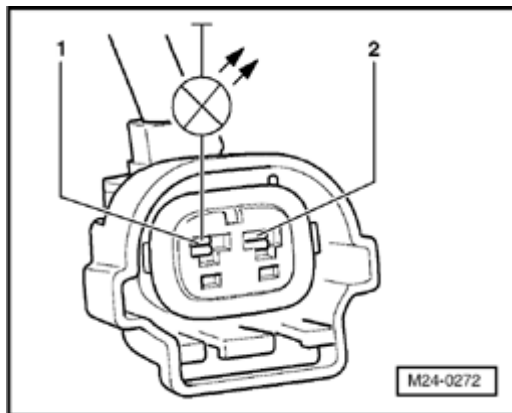
- Replace faulty fuel injector \Rightarrow [Page 24-27](#) , item 7 .

Observe the following when installing fuel injectors:

- ◆ Replace O-rings on all fuel injectors and moisten them lightly with clean engine oil.
- ◆ Insert fuel injectors vertically and in the correct position into the fuel rail and secure with retaining clips.
- ◆ Set fuel rail with secured fuel injectors on cylinder head and press in evenly.
- ◆ The connectors must audibly engage in the fuel injectors when pushed on.

- Check DTC memory, repair malfunctions necessary and then erase DTC memory [01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- ag: [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code be generated again ⇒ [Page 01-149](#) .

Checking voltage supply



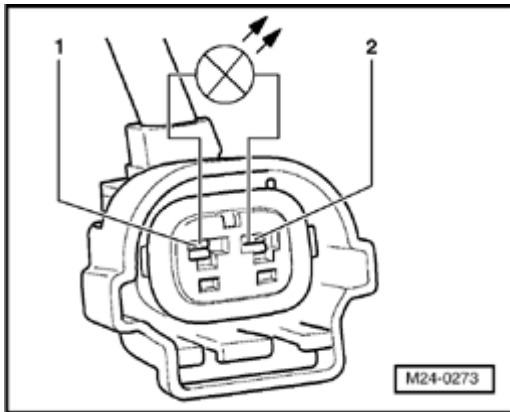
- Connect VAG 1527 LED test light to terminal and Ground (GND) of relevant fuel injector using adapter cables from VAG
- Operate starter and check voltage supply fuel injector.
LED must light up
- Switch off ignition.

If the LED does not light up:

- Check wire for open circuit between 2-pin connector terminal 1 and Fuel Pump (FP) -J17- referring to Electrical Wiring Diagram

Wire resistance: max. 1.5 Ω

Checking activation and voltage supply

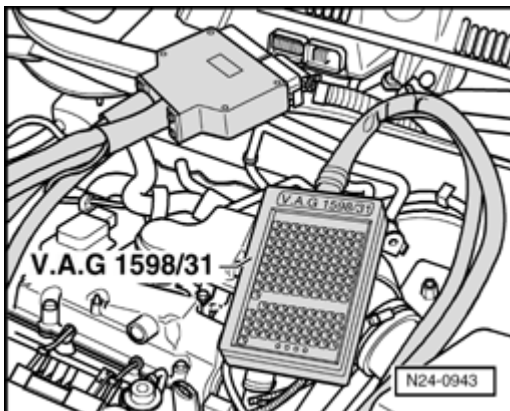


- ◀ - Connect VAG 1527 LED test light to connector terminals of fuel injector to be tested using cables from VAG 1594.
- Operate starter and check activation for fuel injector.
LED must flicker
- Switch off ignition.

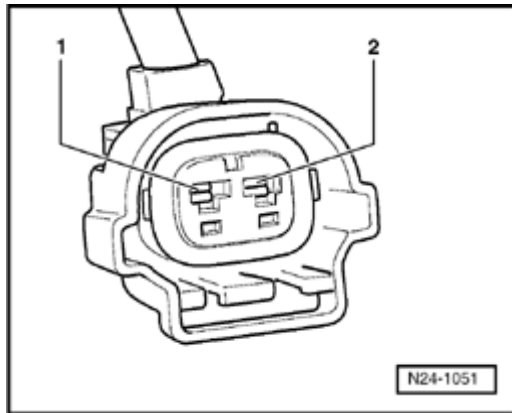
The LED does not flicker:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- ◀ - Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wiring for open circuit between test box and the 2-pin connector for fuel injectors referring to Electrical Wiring Diagrams.

Fuel injector 1: Terminal 2 and socket 96

Fuel injector 2: Terminal 2 and socket 112

Fuel injector 3: Terminal 2 and socket 88

Fuel injector 4: Terminal 2 and socket 113

Fuel injector 5: Terminal 2 and socket 97

Fuel injector 6: Terminal 2 and socket 89

Wire resistance: max. 1.5 Ω

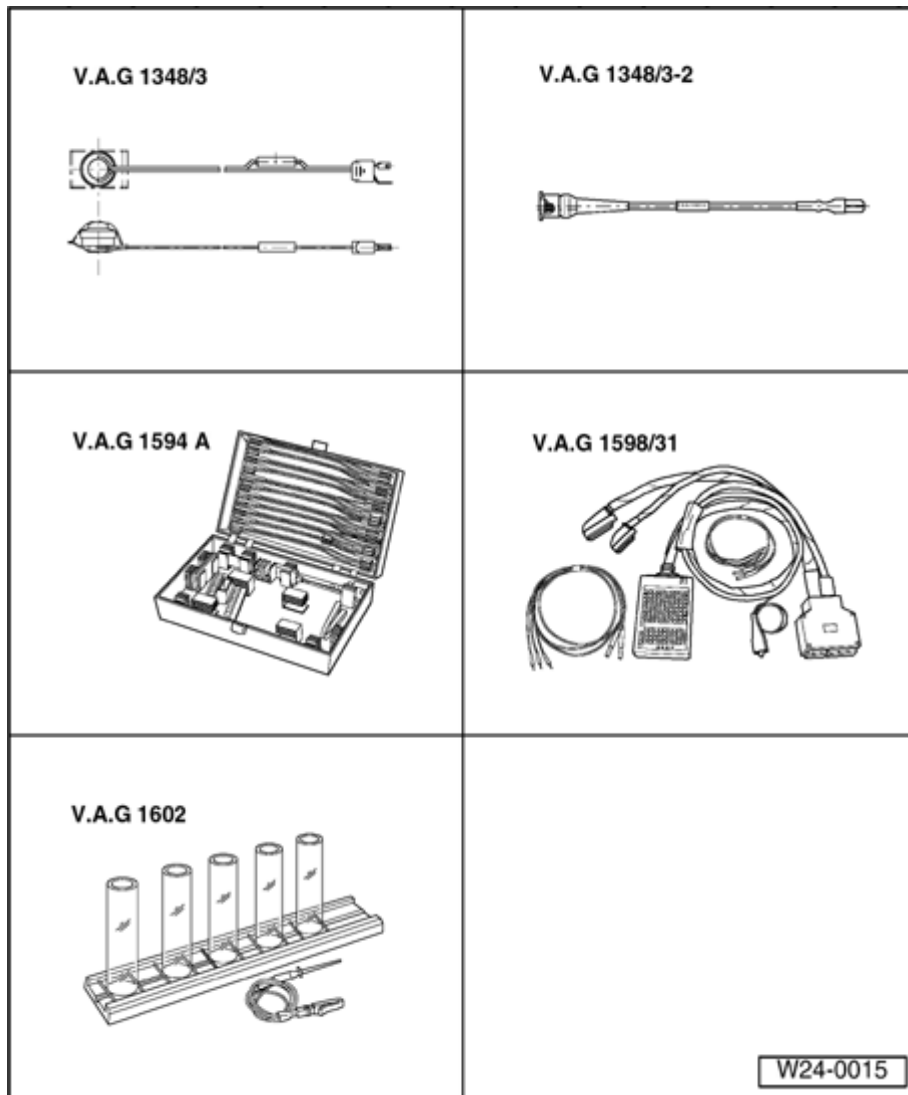
- Additionally check wiring for short to one another, to vehicle Ground (GND) and to battery positive.

Specification: $\infty \Omega$

If there is no Diagnostic Trouble Code (DTC) in the wiring and the resistance measurement values are OK.:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

24-104



Fuel injectors, checking for leaks and quantity injected

Special tools and equipment

- ◆ VAG 1348/3 Remote control
- ◆ VAG 1348/3-2 Adapter
- ◆ VAG 1594 A Adapter set
- ◆ VAG 1598/31 Test box
- ◆ VAG 1602 Calibration tester

Test requirements

- The fuel pressure must be in order, checking
⇒ [Page 24-110](#) .

Test sequence

- Remove intake manifold:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15](#)

- Remove fuel rail complete (fuel lines remain connected) ⇒ [Page 24-26](#) .

Checking for leaks

- Initiate output Diagnosis Test Mode (DTM) ⇒ [Page 01-100](#) ;

Fuel pump must run.

Note:

This work sequence allows the fuel pump to run when the engine is not running.

- Check fuel injector for leaks (visual check).

Only 1 to 2 drops per minute must emit from each fuel injector when fuel pump is running.

- Switch off ignition.

If the fuel loss is greater:

- Replace faulty fuel injector ⇒ [Page 24-27](#) , item 7 .

Observe the following when installing fuel injectors:

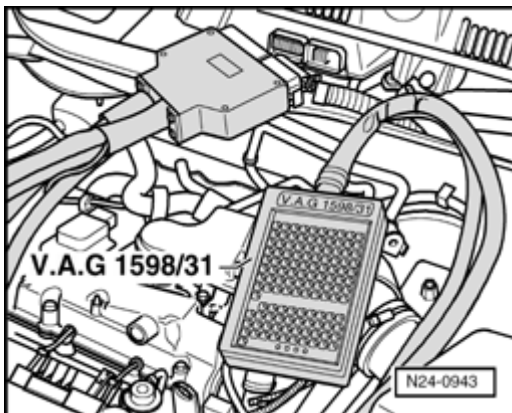
- ◆ Replace O-rings on all fuel injectors and moisten them lightly with clean engine oil.
 - ◆ Insert fuel injectors vertically and in the correct position into the fuel rail and secure with retaining clips.
 - ◆ Set fuel rail with secured fuel injectors on cylinder head and press in evenly.
 - ◆ The connectors must audibly engage in the fuel injectors when pushed on.
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
 - Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .

- Read readiness code ⇒ [Page 01-146](#) . If memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Checking quantity injected

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Reference Group 92](#)

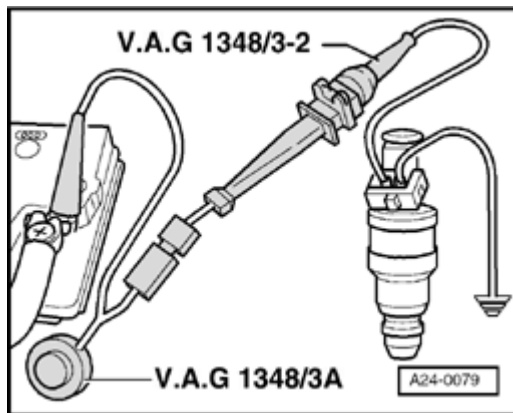


- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) -J220- remains disconnected.
 - Switch on ignition.
 - Jumper test box sockets 2 and 65 using cables from VAG 1594.
- Fuel pump must run.

Note:

This work sequence allows the fuel pump to run when the engine is not running.

- Insert fuel injector to be checked in a measuring glass of calibration tester VAG 1602.



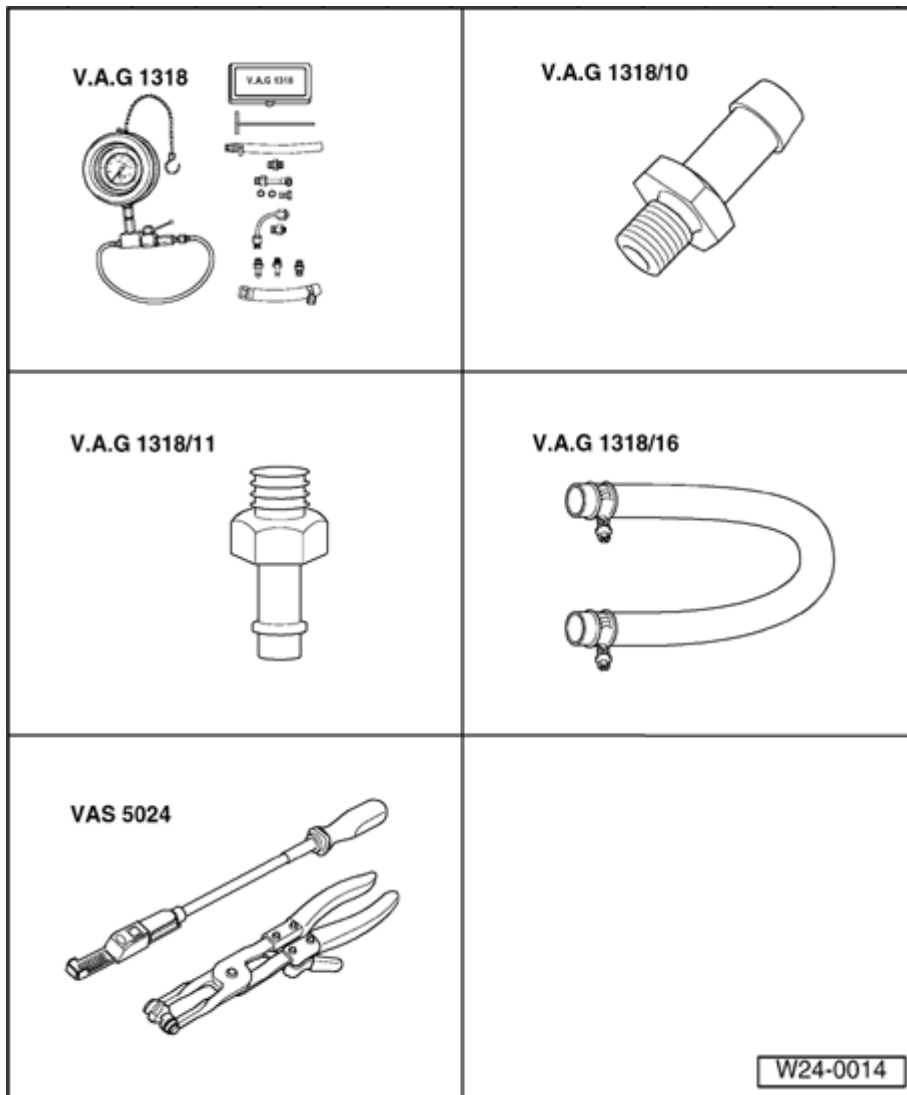
- Connect one terminal of fuel injector to be tested to engine Ground(GND) using adapter cables from VAG 1594.
 - Using adapter cables connect the second fuel injector terminal to remote control VAG 1348/3 with adapter cable VAG 1348/3-2.
 - Connect alligator clip to battery (+).
 - Operate remote control VAG 1348/3 for 30 seconds.
 - Repeat check on other fuel injectors. Use another (clean and dry) measuring beaker for this.
 - After all fuel injectors have been activated, place measuring glasses on a horizontal surface and compare quantity injected.
- Specification: 110 to 130 ml per fuel injector
- Switch off ignition.

If the measured values of one or more fuel injectors are above or below the prescribed specifications:

- Replace faulty fuel injector ⇒ [Page 24-27](#) , item 7 .

Observe the following when installing fuel injectors:

- ◆ Replace O-rings on all fuel injectors and moisten them lightly with clean engine oil.
 - ◆ Insert fuel injectors vertically and in the correct position into the fuel rail and secure with retaining clips.
 - ◆ Set fuel rail with secured fuel injectors on cylinder head and press in evenly.
 - ◆ The connectors must audibly engage in the fuel injectors when pushed on.
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
 - Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
 - Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .



Residual pressure and fuel pressure regulator, checking

Special tools and equipment

- ◆ VAG 1318 Pressure gauge
- ◆ VAG 1318/10 Adapter
- ◆ VAG 1318/11 Adapter
- ◆ VAG 1318/16 Hose adapter
- ◆ VAS 5024 Assembly tool for spring-type clips

Function

The fuel pressure regulator regulates the fuel pressure depending on intake manifold pressure.

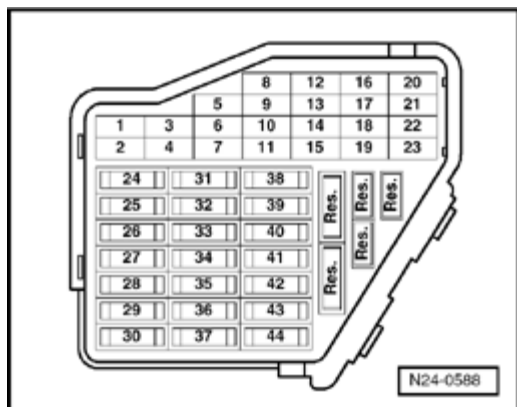
The specification for the check is dependent upon the working pressure of the fuel pump. This is approx. 3.0 bar

Test requirements

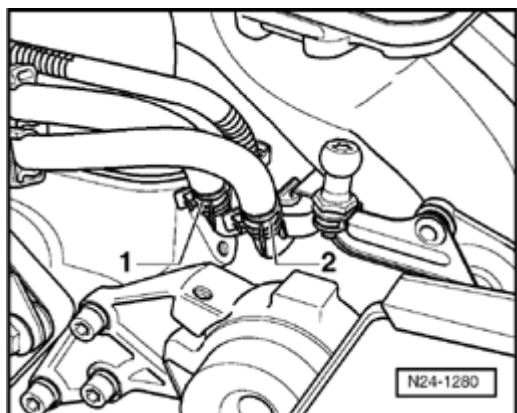
- Fuel pump delivery rate OK., checking:

⇒ [*Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20*](#)

Test sequence



- ▲ - Pull fuse No. 28 (for fuel pump) out of fuse holder.

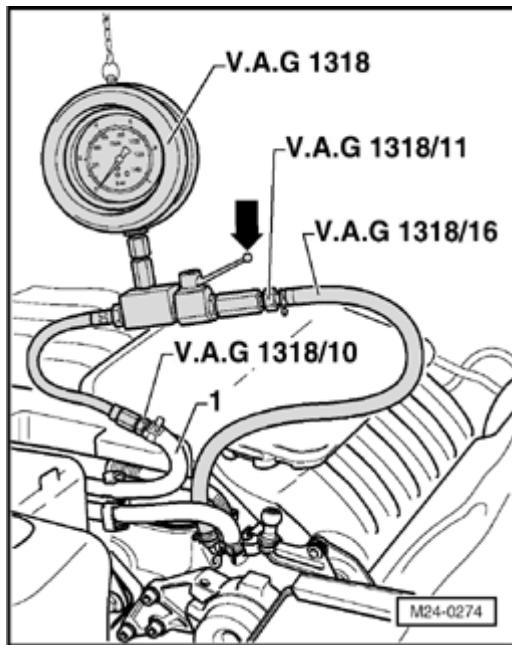


- ▲ - Pull fuel supply hose -1- (black) off fuel rail and collect fuel that leaks out with a cloth.

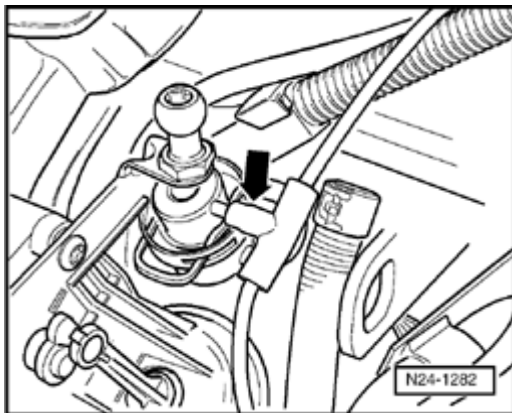
WARNING!

***Fuel system is under pressure!
Before opening the system place
a cloth around the connection.
Then release pressure by
carefully loosening the
connection.***

24-113



- Connect pressure gauge VAG 1318 with adapter, VAG 1318/10 to supply hose -1- and with adapter VAG 1318/11 and VAG 1318/16 hose adapter to supply line.
 - Open shut-off tap on pressure gauge. Handle points in through-flow direction (arrow).
 - Install fuel pump fuse No. 28 into fuse holder.
 - Start engine and run at idle.
 - Measure fuel pressure.
- Specification: Approx. 2.5 bar



- Pull vacuum hose off fuel pressure regulator (arrow).
- Fuel pressure must increase to approx. 3.0 bar.
- Switch off ignition.

If the specification is not obtained:

- Check delivery rate of fuel pump:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair \(20](#)

If the specification is obtained:

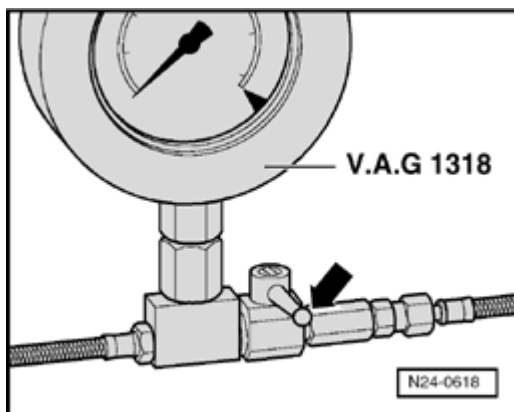
- Now check for leaks and holding pressure. Watch pressure drop on gauge.

After 10 minutes there must be a residual pressure of at least 2.0 bar

If the holding pressure drops below 2 bar:

- Start engine and run at idle.

When the fuel pump has built up the pressure again:



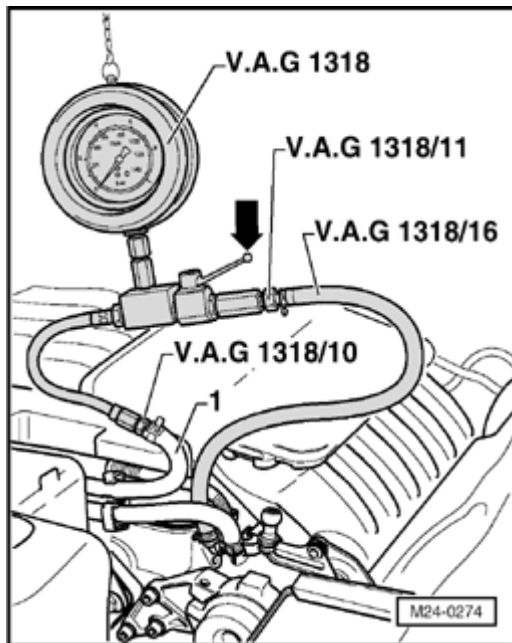
- Switch ignition off after the pressure has built up. Simultaneously close pressure gauge 1318 cut-off tap (handle across through-f direction -arrow-).
- Watch pressure drop on gauge again.

If the pressure does not drop:

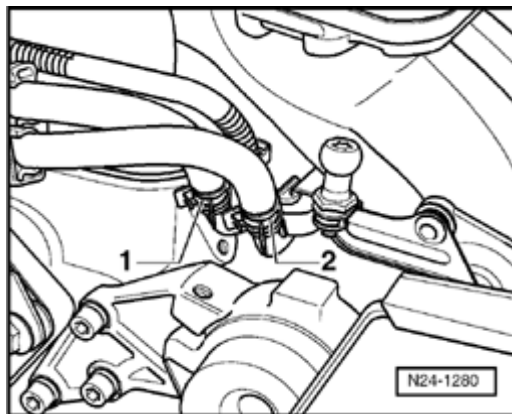
- Check fuel pump non-return valve:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 20](#)

If the pressure drops again:



- Open pressure gauge VAG 1318 shut-off tap (handle in direction of flow -arrow-).
- Start engine and run at idle speed.



- Switch ignition off after pressure has built-up. Simultaneously clamp-off return supply hose (with blue marking) -2-.
- Switch off ignition.

If the pressure does not drop:

- Replace fuel pressure regulator ⇒ [Page 24-28](#) , item 11 .

If the pressure drops again:

- Check line connections, O-rings on fuel rail and fuel injectors for leaks.
- Check pressure gauge for leaks.

When the pressure gauge is removed after completing the test:

- Remove fuse No. 28 from fuse holder again before removing pressure gauge and place a cloth around connections to be loosened.

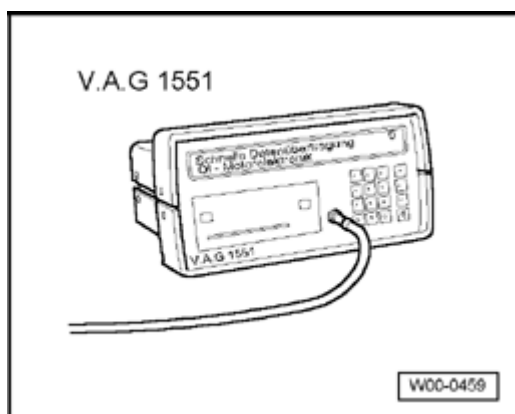
Intake Manifold Change-Over Valve -N156-, checking

The check need only be performed when performance is poor.

The change-over from long to short intake channels occurs at approx. 4400 rpm.

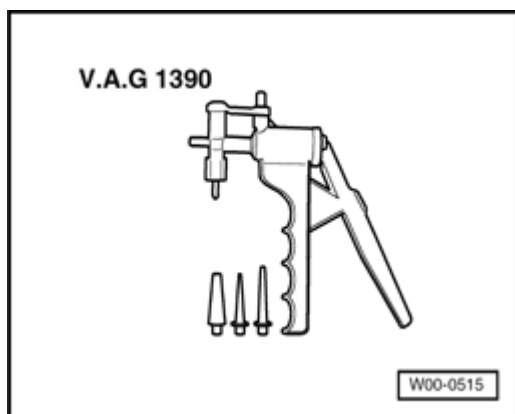
Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable



Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

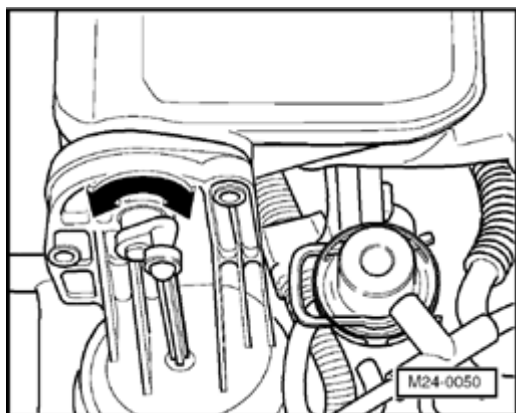


- ◆ VAG 1390 Hand vacuum pump

Checking function

- Start engine and run at idle speed.

Actuator (vacuum unit) on intake manifold holds change-over barrel in position for long intake channel.



- Have a second person press accelerator pedal down fully onto limit stop (throttle burst). Observe vacuum unit for Intake Manifold Change-Over Valve -N156- (location: on left of intake manifold).

Actuating element must rotate barrel in intake manifold (arrow).

- Switch off ignition.

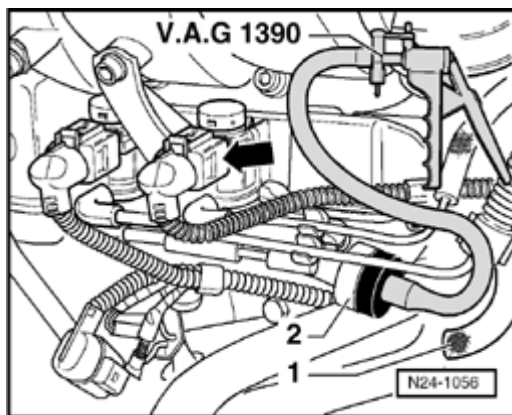
24-119

If the actuating element does not perform the change-over sequence:

- Check activation of Intake Manifold Change Over Valve -N156- via Output Diagnosis Mode (DTM) ⇒ [Page 01-100](#) .

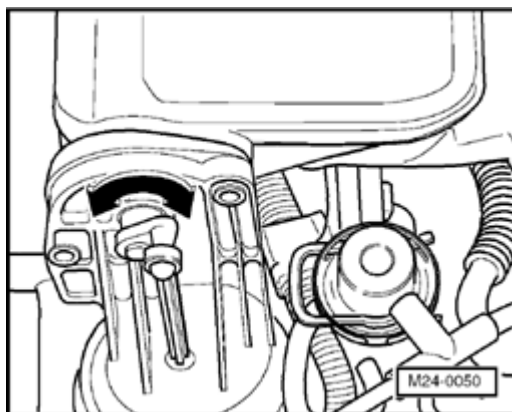
If activation is OK:

- Connect scan tool.
- Pull vacuum hose -1- off non-return valve
- Connect hand vacuum pump VAG 1390 to return valve -2-.



- Perform Output Diagnosis Test Mode (DTM) again. When Intake Manifold Change-Over Valve -N156- valve is activated, operate the pump uniformly.

Actuating element must switch back and forth between both positions.



If the change-over does not function as described:

- Check change-over mechanics for freedom of movement. Move rods by hand.
- Check vacuum pipes for correct connection.
- Check vacuum system including vacuum reservoir.

Note:

The vacuum reservoir is bolted below the intake manifold.

Intake Air system, leak testing

Checking with engine leak detector spray G 001 800 A1

Note:

- ◆ *The vacuum in the intake system will cause the leak detector spray to be drawn in with the unmetered air. The leak detector spray reduces the ignitability of the mixture. This leads to a drop in engine speed and to a change of Oxygen Sensor (O2S) reading.*

- ◆ *The safety precautions listed on the container must be adhered to.*

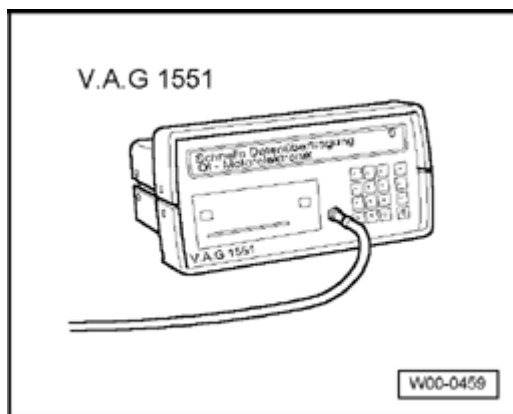
Special tools, materials and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ Engine leak detector spray G 001 800 A



Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block

Input display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -1- for "Display group number 1" and confirm entry with -Q- button.

Read measured value block 1



1 2 3 4



Indicated on display: (1...4 = display zones)

- Check whether the Engine Coolant Temperature (ECT) is above 85 °C in display zone 2.
- Observe engine speed in display zone 1 and Oxygen Sensor control before Three Way Catalytic Converter (TWC) in display zones 3 and 4.
- Observe engine speed in display zone 1 and Oxygen Sensor control before Three Way Catalytic Converter (TWC) in display zone 3.
- Systematically spray parts of intake system with engine leak detector spray.

If the engine speed or the Oxygen Sensor control do not change:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If the engine speed drops or the Oxygen Sensor control changes:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Check sprayed areas of intake system for leaks and correct if necessary.

Functions, checking

Idle speed check

Note:

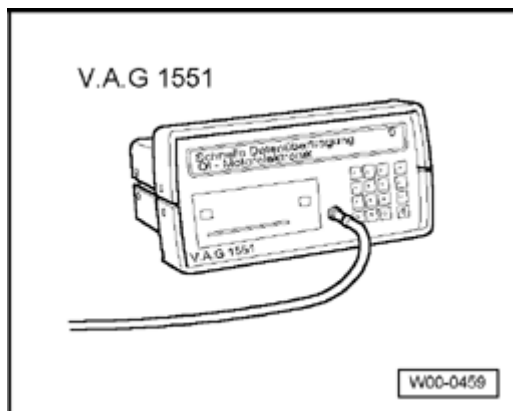
- ◆ *Idle speed, ignition timing and CO content adjustable.*
- ◆ *The idle speed is regulated to specification by the throttle valve positioner in conjunction with the DIS function.*
- ◆ *CO content regulated to specification by the Oxygen Sensor control. Malfunctions in the Oxygen Sensor control are detected by On Board Diagnostic (OBD) and stored in DTC memory.*

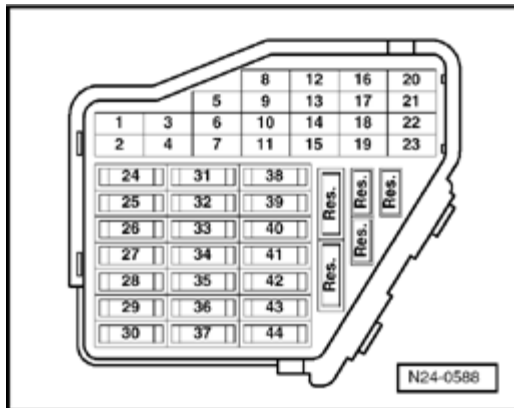
Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.





Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Exhaust system between Three Way Catalytic Converter (TWC) and cylinder head must be free of leaks.
- Engine Coolant Temperature (ECT) must be at least 85 °C, ⇒display group 4, display zone 3.
- Intake air temperature less than 60 °C ⇒display group 04, display zone 4.
- Three Way Catalytic Converter (TWC) temperature must be at least 380 °C, ⇒display group 34, display zone 2.

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Then:
 - Connect scan tool.
 - Continue running engine at idle.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

Basic setting
Input display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -1- for "Display group number 1" and confirm entry with -Q- button.

System in basic setting 1

1 2 3 4 →



Indicated on display: (1 to 4 = display zones)

Note:

In the function "System in basic setting" the Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- is closed and the air conditioner compressor turned off.

- Check adjustment conditions for basic settings in display zone 4:

Specification: 11111111

Significance of figures in 8 digit number block ⇒ [Page 01-189](#) .

- Briefly increase engine speed (rev- up) and then allow engine to run at idle for 2 minutes.

Checking idle speed

- Change to display group 56 as follows:
- Press -C- button.
- Press buttons -0-, -5- and -6- for "Display group number 56" and confirm entry with -Q- button.

System in basic setting 56

1 2 3 4 →



Indicated on display: (1 to 4 = display zones)

- Check operating conditions in display zone 4:

Specification: xx000

Significance of figures in 5 digit number block ⇒ [Page 01-240](#) .

- Check specified idle speed in display zone 2.

Specification: 700 rpm

- Check actual idle speed in display zone 1.

Specification: 640 to 720 rpm

- Press → button.
- Press buttons 0 and 6 for function "End output" and confirm entry with Q button.
- Switch off ignition.

If the idle speed is not obtained:

- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Road test vehicle.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

- Check control module DTC memory again.
- Repeat engine idle speed check.

If the specifications are not obtained again:

- Check Throttle Valve Control Module -J338- ⇒ [Page 24-59](#) .
- Check operating condition of engine ⇒ [Page 24-158](#) .
- Check intake air system for leaks (unmetered air) ⇒ [Page 24-121](#) .
- Check signals from / to air conditioning system ⇒ [Page 24-194](#) .

Oxygen Sensor (O2S) and Oxygen Sensor control before Three Way Catalytic Converter (TWC), checking

Note:

- ◆ *The vehicle must be raised to gain access to the Oxygen Sensor (O2S) connector.*
- ◆ *Only gold plated terminals may be used to service the terminals in the Oxygen Sensor (O2S) connectors.*
- ◆ *The Oxygen Sensor (O2S) before Three Way Catalytic Converter (TWC) has a continuous regulation and can be differentiated from Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130- by its connector.*

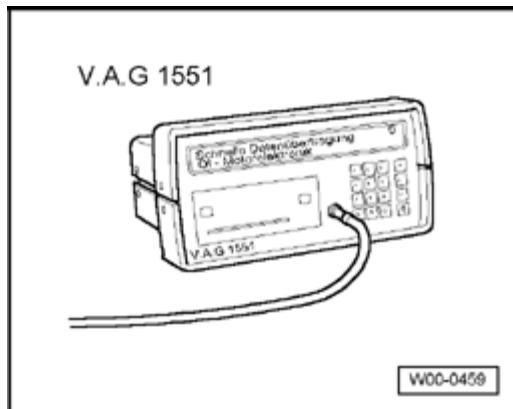
Special tools, materials and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

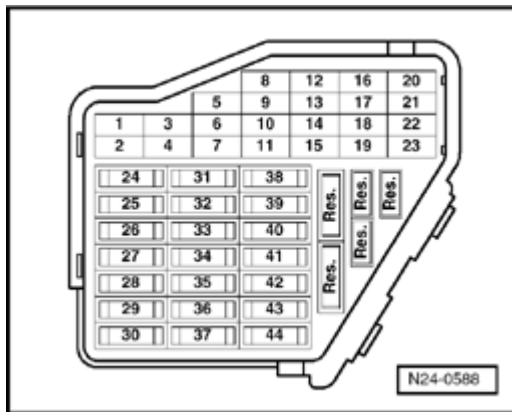
- ◆ VAG 1526 or Fluke 83 Hand multimeter
1715 multimeter
- ◆ VAG 1594 Adapter set



◆ VAG 1598/31 test box

◆ Electrical Wiring Diagrams

Test requirements



- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Exhaust system between Three Way Catalytic Converter (TWC) and cylinder head must be free of leaks.
- Engine Coolant Temperature (ECT) must be at least 85 °C, ⇒display group 1, display zone 2.
- Three Way Catalytic Converter (TWC) temperature must be at least 380 °C, ⇒display group 34, display zone 2.

Functional check

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

- Press buttons -0-, -3- and -0- for "Display group number 30" and confirm entry with -Q- button.

Read measured value block 30



Indicated on display: (1 to 2 = display zones)

1

2

- Check Oxygen Sensor control status before Three Way Catalytic Converter (TWC) (display zone 1):

Specification: 111

Significance of figures in 3 digit number block ⇒ [Page 01-217](#) .

Note:

The bits in display zone 1 will not be set to 1 until the Three Way Catalytic Converter (TWC) temperature rises above 380 ° C (⇒ display groups 34, display zone 2).

If the specification is not obtained:

- Press → button.
- Check Heated Oxygen Sensor (HO2S) ⇒ [Page 24-38](#) .

If the specification is obtained:

- Change to display group 32 as follows:
- Press -C- button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -3- and -2- for "Display group number 32" and confirm entry with -Q- button.

Read measured value block 32 →
1 2



Indicated on display: (1 to 2 = display zones)

- Check Oxygen Sensor learned values at idle speed (additive) in display zone 1.

Specification: -5.4 to 5.4 %

- Check Oxygen Sensor learned values at part load (multiple active) in display zone 2.

Specification: -10.0 to 10.0%

If the specifications are not obtained:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Evaluate display group 32 ⇒ [Page 01-221](#) .

If the specifications are obtained:

- Change to display group 33 as follows:

VAG 1551: Press button -3-

VAG 1552: Press ↑ button

Read measured value block 33



1

2

Indicated on display: (1 to 2 = display zones)

- Check Oxygen Sensor control in display zone 1.
Display must fluctuate in range of -10.0 to 10.0% by at least 2%.
- Check Oxygen Sensor control in display zone 2.
Display must fluctuate in range of 1.400 to 1.600 V.

If the displays in display zones 1 and 2 fluctuate:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If one or both of the displays in zones 1 and 2 display a value constantly:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Check wiring of Heated Oxygen Sensor (HO2S)
⇒ [Page 24-138](#) .

If the Oxygen Sensor control in display zone 1 does not fluctuate in the stated range:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.

- Road test vehicle to remove possible contaminates on Oxygen Sensor (O2S) and repeat check.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

If the specifications in display zone 1 are not obtained even after a road test, or the value does not fluctuate by at least 2%:

- Check Heated Oxygen Sensor (HO2S) for aging ⇒ [Page 24-150](#) .

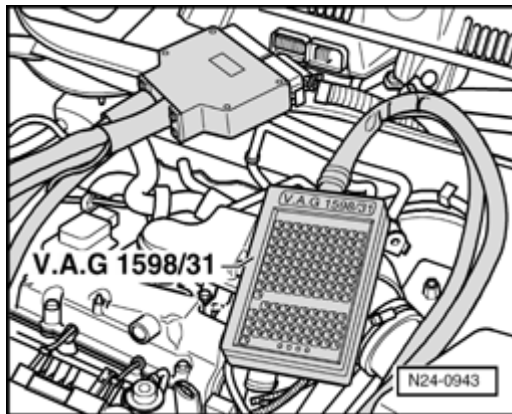
Possible causes of Diagnostic Trouble Code (DTC) when continuous regulation of sensor is too slow:

- ◆ The slots or holes in sensor body are blocked
- ◆ The sensor breather hole in area of connecting cable is blocked
- ◆ The sensor has been overheated (glazed)
- ◆ The sensor has been damaged by leaded fuel

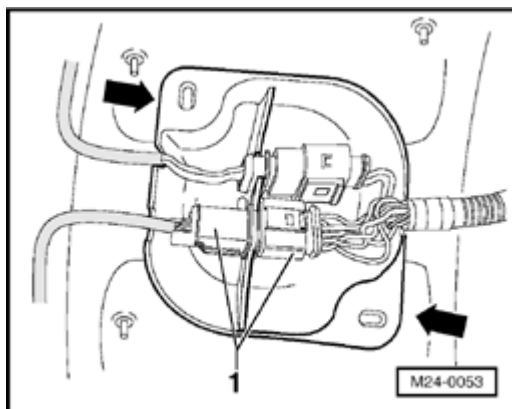
Checking wiring for Heated Oxygen Sensor (HO2S)

- Remove wiper arms and cowl panel:

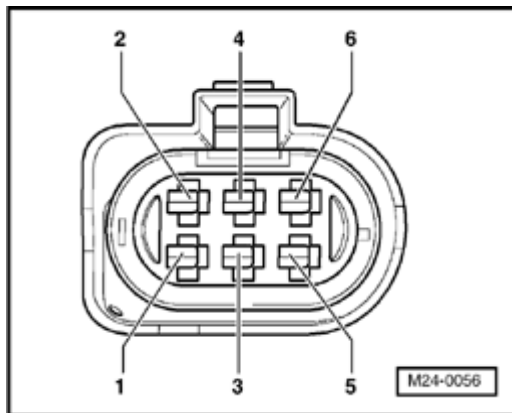
⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Remove protective cover (arrows) and disconnect 6-pin connector (black) -1- to Heated Oxygen Sensor (HO2S) -G39-.



- Check wiring for open circuit between test box and 6-pin connector (to control module) referring to Electrical Wiring Diagrams.

Terminal 1 and socket 70

Terminal 2 and socket 71

Terminal 5 and socket 51

Terminal 6 and socket 52

Wire resistance: max. 1.5 Ω

- Additionally check wires all for short to one another.

Specification: $\infty \Omega$

If no wiring malfunction is detected:

- Replace Heated Oxygen Sensor (HO2S) -G39- \Rightarrow [Page 24-19](#) , item 20 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory \Rightarrow [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again \Rightarrow [Page 24-182](#) .
- Read readiness code \Rightarrow [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again \Rightarrow [Page 01-149](#) .

Oxygen Sensor (O2S) and Oxygen Sensor control after Three Way Catalyst Converter (TWC), checking

Note:

- ◆ *The vehicle must be raised to gain access to the Oxygen Sensor (O2S) connector.*
- ◆ *Only gold plated terminals may be used to service the terminals in the Oxygen Sensor (O2S) connectors.*

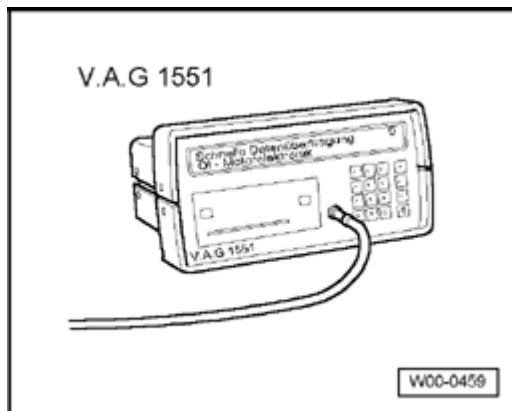
Special tools, materials and equipment

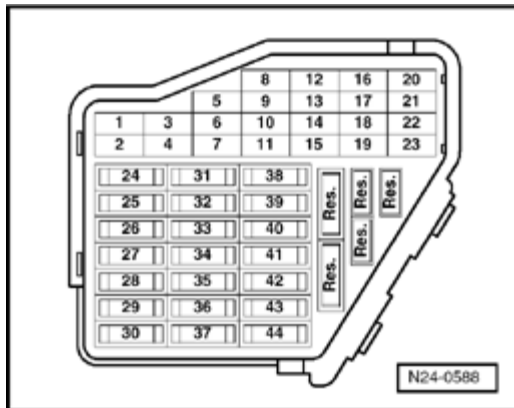
- ◆ VAG 1551 Scan tool (or VAG 1552) with 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams





Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Exhaust system between Three Way Catalytic Converter (TWC) and cylinder head must be free of leaks.
- Engine Coolant Temperature (ECT) must be at least 85 °C, ⇒display group 1, display zone 2.
- Three Way Catalytic Converter (TWC) temperature must be at least 380 °C, ⇒display group 34, display zone 2.

Functional check

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

- Press buttons -0-, -3- and -0- for "Display group number 30" and confirm entry with -Q- button.

Read measured value block 30



Indicated on display: (1 to 2 = display zones)

1

2

- Check Oxygen Sensor control status after Three Way Catalytic Converter (TWC) (display zone 2).

Specification: 111

Significance of figures in 3 digit number block ⇒ [Page 01-217](#) .

Note:

The bits in display zone 1 will not be set to 1 until the Three Way Catalytic Converter (TWC) temperature rises above 380 ° C (⇒ display groups 34, display zone 2) and a part load signal is recognized by the Motronic Engine Control Module (ECM) -J220-.

If the specification is not obtained:

- Press → button.
- Check Oxygen Sensor (O2S) heating after Three Way Catalytic Converter (TWC) ⇒ [Page 24-45](#) .

If the specification is obtained:

- Change to display group 36 as follows:
- Press -C- button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -3- and -6- for "Display group number 36" and confirm entry with -Q- button.

Read measured value block 36 →
1 2 3 4



Indicated on display: (1 to 4 = display zones)

- Check Oxygen Sensor (O2S) voltage after Three Way Catalytic Converter (TWC) in display zone 1:

Specification: 0.100 to 0.900 V (must fluctuate slightly)

If the display in display zone 1 fluctuates:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If the display in display zone 1 remains constantly at a value:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Check basic voltage of Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) - G130- ⇒ [Page 24-146](#) .
- Check Oxygen Sensor (O2S) wiring of Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130- ⇒ [Page 24-148](#) .

If the Oxygen Sensor control in display zone 1 does not fluctuate in the stated range:

- Press → button.

- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Road test vehicle to remove possible residue on Oxygen Sensor (O2S) and repeat check.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

If the specifications in display zone 1 are not obtained even after a road test, or the value does not fluctuate:

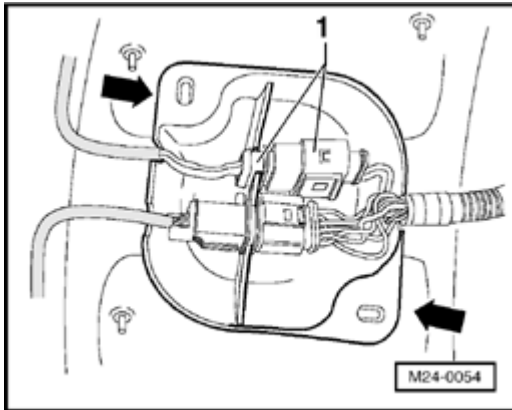
- Check Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130- for aging ⇒ [Page 24-154](#)

Possible causes of Diagnostic Trouble Code (DTC) if sensor regulation frequency is too slow:

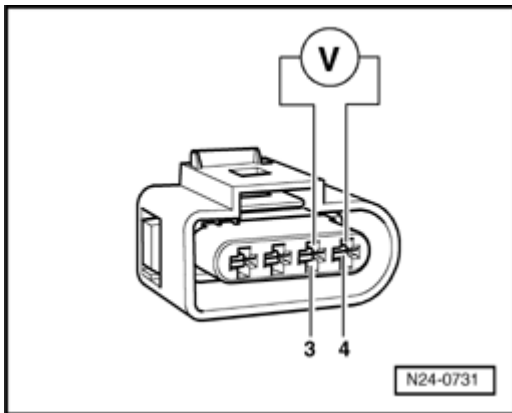
- ◆ The slots or holes in sensor body are blocked
- ◆ The sensor breather hole in area of connecting cable is blocked
- ◆ The sensor has been overheated (glazed)
- ◆ The sensor has been damaged by leaded fuel

24-146

Check basic voltage of Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130-



- Remove protective cover (arrows) and disconnect 4-pin connector (black) -1- to Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130-



- Connect multimeter to measure voltage at terminals 3 and 4 (connector to ECM) using adapter cables from VAG 1594.
- Start engine and measure basic voltage.
Specification: 0.400 to 0.500 V
- Switch off ignition.

If the specification is obtained:

- Replace Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130- ⇒ [Page 24-17](#) , item 18 .

- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

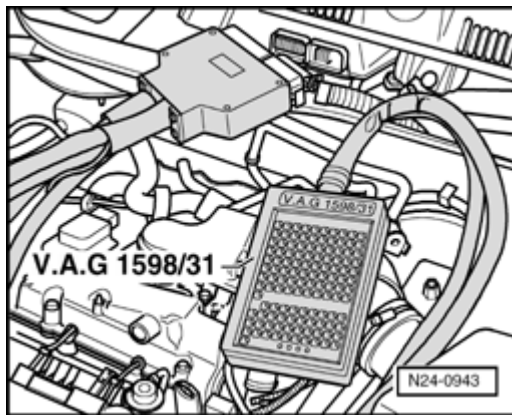
If the specification is not obtained:

- Check Oxygen Sensor (O2S) wiring of Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130- ⇒ [Page 24-148](#) .

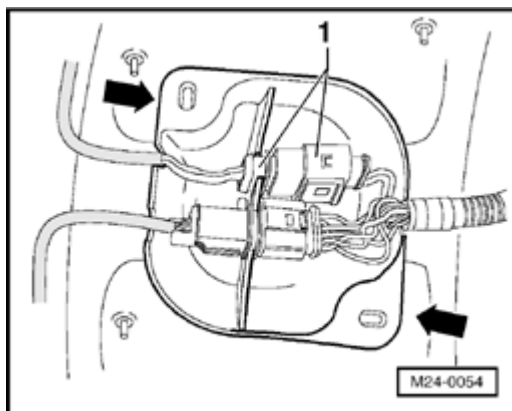
Checking wiring for Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130-

- Remove wiper arms and cowl panel:

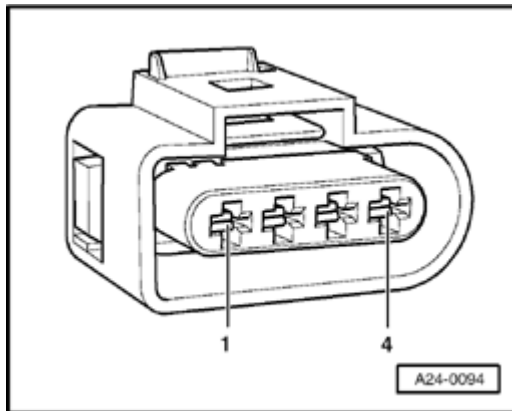
⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Remove protective cover (arrows) and disconnect 4-pin connector (black) -1- to Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130-.



- Check wiring for open circuit between test box and 4-pin connector (to control module) referring to Electrical Wiring Diagrams.

Terminal 3 and socket 68

Terminal 4 and socket 69

Wire resistance: max. 1.5 Ω

- Additionally check wires all for short to one another.

Specification: $\infty \Omega$

If no wiring malfunction is detected:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Heated Oxygen Sensor (HO2S), checking aging

Special tools and equipment

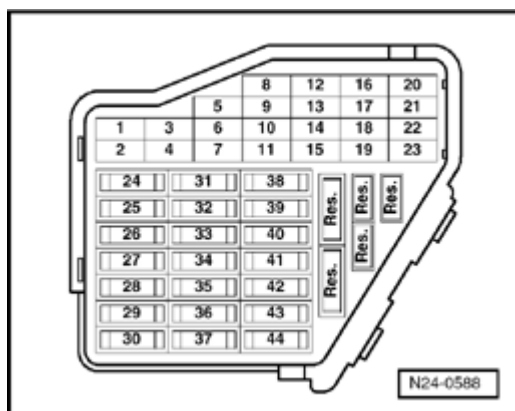
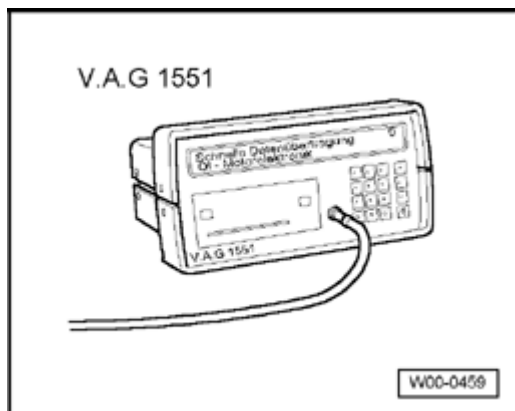
- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.



- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Exhaust system between Three Way Catalytic Converter (TWC) and cylinder head must be free of leaks.
- Engine Coolant Temperature (ECT) must be at least 85 °C, ⇒display group 1, display zone 2.
- Three Way Catalytic Converter (TWC) temperature must be at least 380 °C, ⇒display group 34, display zone 2.

Functional check

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

Basic setting
Input display group number XXX



Indicated on display:

- Press buttons -0-, -3- and -4- for "Display group number 34" and confirm entry with -Q- button.

System in basic setting 34



1 2 3 4



Indicated on display: (1 to 4 = display zones)

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by Motronic Engine Control Module (ECM) -J220- to approx. 2300 rpm.

- Depress brake pedal and accelerator down and hold until display in display zone 4 jumps from "Test OFF" to "Test ON."

When performing this test the Three Way Catalytic Converter (TWC) temperature in display zone 2 must be at least 380 °C.

Note:

This process can take approx. 90 seconds.

- Depress and hold brake pedal and accelerator until display zone 4 displays specification "B1-P1 OK."
- Release brake and accelerator pedals.
- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.

If the display does not indicate as described:

- Road test vehicle to remove possible residue on Oxygen Sensor (O2S) and repeat check.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

If the display does not indicate as described again:

- Check Oxygen Sensor (O2S) and Oxygen Sensor control before Three Way Catalytic Converter (TWC) ⇒ [Page 24-131](#)

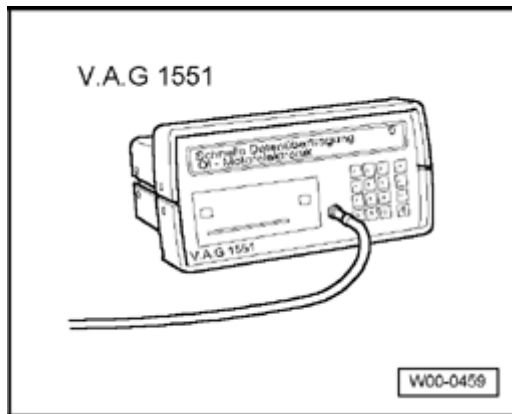
Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130-, checking aging

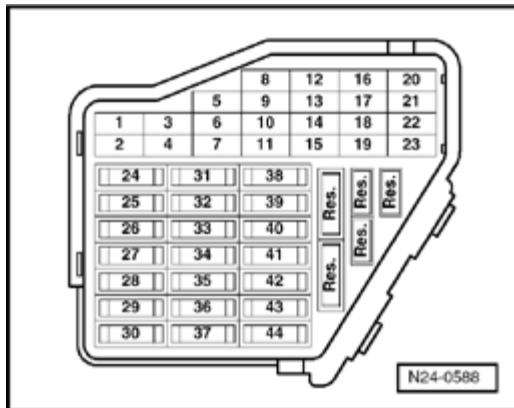
Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.





Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Exhaust system between Three Way Catalytic Converter (TWC) and cylinder head must be free of leaks.
- Coolant temperature must be at least 85 °C, ⇒display group 1, display zone 2.
- Three Way Catalytic Converter (TWC) temperature must be at least 380 °C, ⇒display group 34, display zone 2.

Functional check

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP

Select function XX



Indicated on display:

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

Basic setting

Input display group number XXX



Indicated on display:

- Press buttons -0-, -4- and -3- for "Display group number 43" and confirm entry with -Q- button.

System in basic setting 43



1 2 3 4



Indicated on display: (1...4 = display zones)

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by Motronic Engine Control Module (ECM) -J220- to approx. 2300 rpm.

- Depress brake pedal and accelerator down and hold until display in display zone 4 jumps from "Test OFF" to "Test ON."

When performing this test the Three Way Catalytic Converter (TWC) temperature in display zone 2 must be at least 380 °C.

Note:

This process can take approx. 30 seconds.

- Depress and hold brake pedal and accelerator until display zone 4 displays specification "B1-P2 OK."
- Release brake and accelerator pedals.
- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.

If the display does not indicate as described:

- Road test vehicle to remove possible residue on Oxygen Sensor (O2S) and repeat check.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

If the display does not indicate as described again:

- Check Oxygen Sensor (O2S) and Oxygen Sensor control after Three Way Catalytic Converter (TWC) ⇒ [Page 24-140](#) .

Engine operating mode, checking

Note:

The check establishes whether Motronic Engine Control Module (ECM) -J220- recognizes the engine operating modes idling, overrun, part throttle, wide open throttle and enrichment.

Special tools and equipment

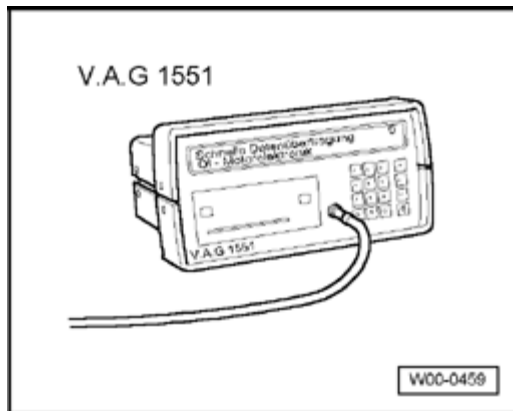
- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

Test requirements

- Engine Coolant Temperature (ECT) must be at least 85 °C, ⇒display group 1, display zone 2.



Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

- Press buttons -0-, -0- and -5- for "Display group number 5" and confirm entry with -Q- button.

Read measured value block 5



Indicated on display: (1...4 = display zones)

1 2 3 4

- Check whether control module recognizes operating conditions (display zone 4):

◆ Idling:

Idling must be displayed as long as the engine is running at idle speed Display: Idling

◆ Part throttle:

- Rev up evenly.

As long as the engine is being revved up evenly, part throttle must be displayed

Display: Part throt.

◆ Enrichment:

- Floor accelerator pedal (onto throttle valve limit stop).

Acceleration enrichment must be displayed briefly

Display: Enrich.

◆ Overrun mode:

- Increase engine speed to above 3000 rpm.
- Close throttle valve abruptly.

Display: Overrun

Note:

A road test may have to be performed to show "Overrun" in display.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

◆ Wide open throttle:

- Floor accelerator pedal (onto throttle valve limit stop).

Full load must be displayed briefly

Display: Full load

Note:

A road test may have to be performed to show "Full load" in display.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.

If the specifications are not obtained:

- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Check Throttle Valve Control Module -J338- ⇒ [Page 24-59](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

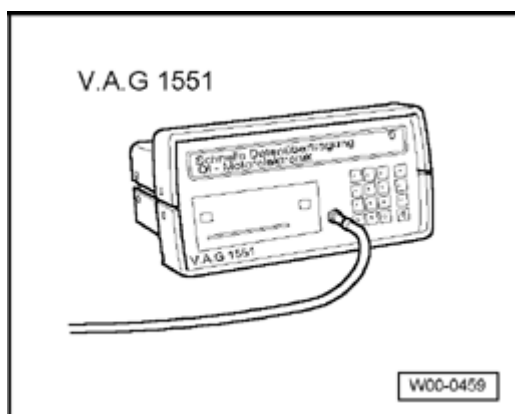
Motronic Engine Control Module (ECM) -J220-

Function

The Motronic Engine Control Module (ECM) -J220- regulates the injection, Throttle Valve Control Module -J338-, Oxygen Sensor control, ignition, knock regulation, Evaporative Emissions (EVAP) canister purge regulator valve, speed limitation via fuel injectors or Fuel Pump (FP) relay, camshaft timing adjustment as well as On Board Diagnostic (OBD).

Engine Control Module (ECM) voltage supply, checking

Special tools, materials and equipment



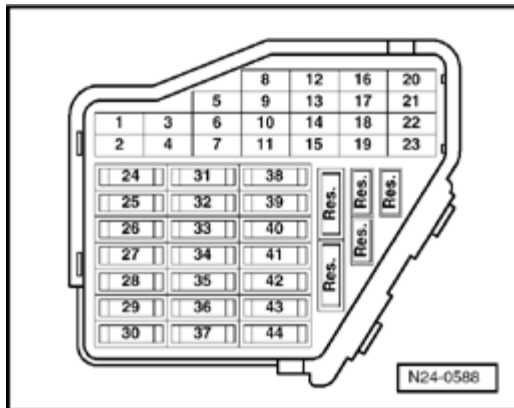
- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

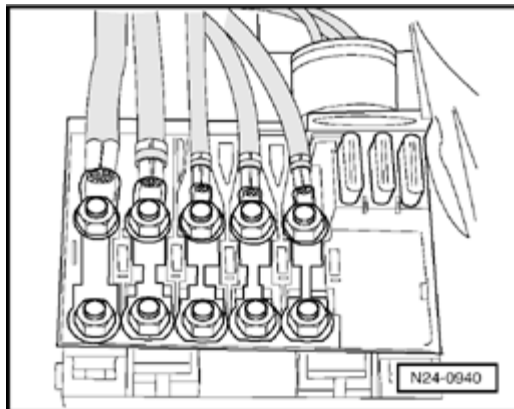
All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams

24-164

Test requirements

- The fuses must be OK.



- The main fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

- Fuel Pump (FP) -J17- must be OK, checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Motronic Engine Control Module (ECM)
Power Supply Relay -J271- must be OK.,
checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Alternator OK., checking:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

24-166

Read measured value block 4 →

1 2 3 4

- Press buttons -0-, -0- and -4- for "Display number 4" and confirm entry with -Q- but



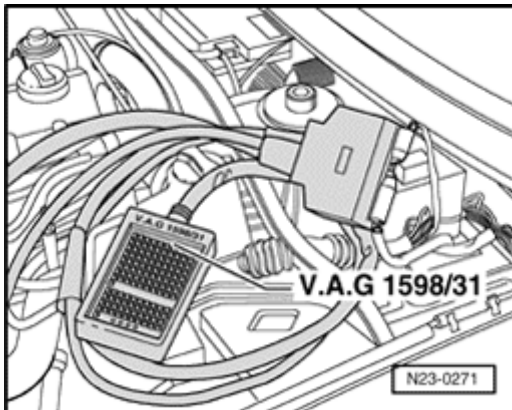
Indicated on display: (1 to 4 = display zone

- Read figure displayed in display zone 2.
Specification: at least 11.500 V
- Press → button.
- Press buttons -0- and -6- for function "En output" and confirm entry with -Q- button.
- Switch off ignition.

Evaluating display group 4, display zone 2 : [01-194](#) .

If the specification is not obtained:

- Remove wiper arms and cowl panel:
⇒ [Repair Manual, Electrical Equipment; Re Group 92](#)
- Connect VAG 1598/31 test box to control module wiring harness. Engine Control M (ECM) -J220- remains disconnected.



Checking voltage supply terminal 30

- Measure supply voltage between sockets 1 and 62, and 2 and 62 of test box using multimeter and adapter cables from VAG 1594:

Specification: at least 11.5 V

If the specification is not obtained:

- Check wiring to fuse holder and Ground (GND) connection of Motronic Engine Control Module (ECM) -J220- referring to Electrical Wiring Diagrams:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Checking voltage supply terminal 15

- Measure supply voltage between test box sockets using multimeter and adapter cables from VAG 1594:

Sockets 1 and 3

Sockets 1 and 21

Sockets 2 and 3

Sockets 2 and 21

- Switch on ignition.

Specification: at least 11.5 V

- Switch off ignition.

If the specification is not obtained:

- Check wiring to fuse holder and Ground (GND) connection of Motronic Engine Control Module (ECM) -J220- referring to Electrical Wiring Diagrams:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Check wiring to Motronic Engine Control Module (ECM) Power Supply Relay -J271- referring to Electrical Wiring Diagrams:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

"Voltage supply open circuit," followup procedure

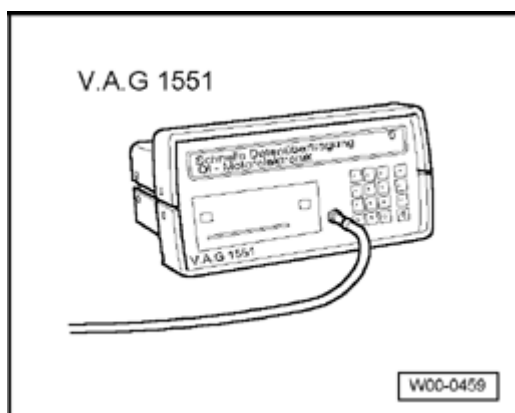
All values learned by the Motronic Engine Control Module (ECM) - J220- and the basic setting values as well as the readiness code will be erased if the voltage supply is interrupted. Therefore, depending upon the vehicle mileage it can lead to serious engine running problems.

Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.



Work sequence

Perform the following operations after interrupting voltage supply:

- Switch ignition on for at least 10 seconds.
- Switch off ignition.
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Perform idle speed check ⇒ [Page 24-125](#) .

Note:

During idle speed check the Evaporative Emission (EVAP) Canister Purge Regulator Valve -N80- and the air conditioner compressor are switched off and the Oxygen Sensor control learning procedure is initiated.

- Generate readiness code ⇒ [Page 01-149](#) .
- Perform a longer road test until poor driving characteristics are eliminated.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

During the road test the following operating conditions must be fulfilled:

- ◆ Engine Coolant Temperature (ECT) must exceed 80 ° C .
- ◆ When the temperature is reached, the operating conditions

Idling

Part throttle

Wide open throttle

Overrun

must be obtained several times.

- ◆ At wide open throttle the speed must exceed 3500 rpm.

24-173

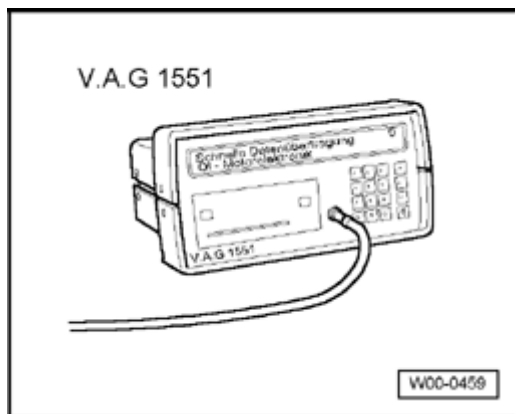
Motronic Engine Control Module (ECM) -J220-, replacing

Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.



Removing

Print out control module identification and thereby previous control module coding as follows:

- Connect VAG 1551 Scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with "Address word" 01. ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

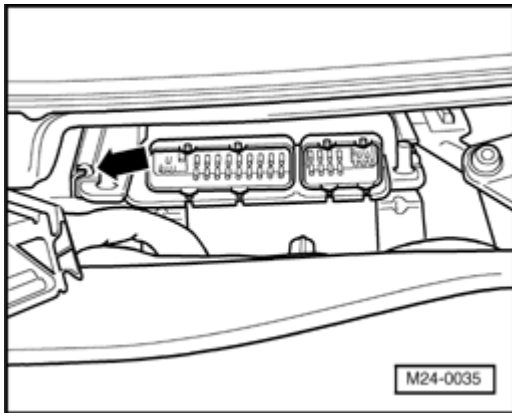
022906032BL MOTRONIC ME7.1.1 G 0006 →
Coding 00032 WSC 00000



The control module identification and coding are shown on the display, e.g.:

- Print out control module identification by pressing Diagnostic Trouble Code (DTC) read print button.
- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Remove wiper arms and cowl panel:
⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)
- Release connector and remove from control module.

24-175



- Press retaining tab (arrow) to left and pull control module out.

Installing

- Place new control module into retaining frame.
- Install control module connector and lock.
- Check previous coding and coding of new control module ⇒ [Page 24-177](#) .

- Adapt new control module to electronic Immobilizer:

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\); Repair Group 01](#)

- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .

Vehicles with cruise control system (CCS)

- Check that system has been activated. If "G" is not evident in control module identification, activate cruise control system:

⇒ [Electrical Wiring Diagrams, Troubleshooting & Component Locations](#)

Vehicles with an automatic transmission

- Also adapt automatic transmission control module:

⇒ [Repair Manual, 5 Spd. Automatic Transmission 09A On Board Diagnostic \(OBD\); Repair Group 01](#)

Continuation for all vehicles

- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Perform idle speed check ⇒ [Page 24-125](#) .
- Generate readiness code ⇒ [Page 01-149](#) .

24-177

Motronic Engine Control Module (ECM) -J220-, coding

Note:

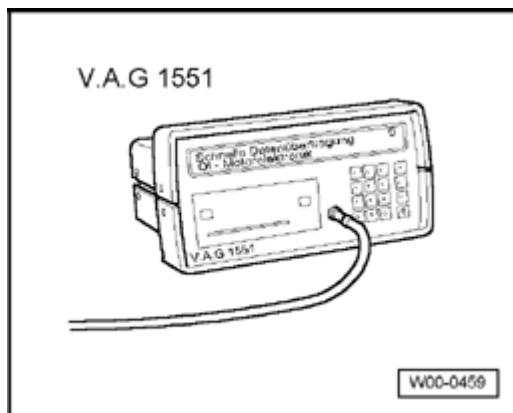
- ◆ A 5-character code must always be displayed during the control module identification.
- ◆ Measured value block 125 indicates which control modules are connected via CAN to the Motronic Engine Control Module (ECM) -J220- ⇒ [Page 01-267](#), Evaluating measured value (data) block, display groups 120 to Communication-.
- ◆ The control module must be coded as for the vehicle relevant coding is not displayed the control module has been replaced.

Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.



Work sequence

- Connect VAG 1551 Scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with "Address word" 01. ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -7- for the function "Code control module" and confirm entry with -Q- button.

Code control module



Indicated on display:

Enter code number XXXXX (0-32000)

022906032BL MOTRONIC ME7.1.1 G 0006 →
Coding 00032 WSC 00000

- Enter relevant code number for vehicle and confirm with -Q- button.

Coding variations of Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-181](#) .

↙ The control module identification and coding are shown on the display, e.g.:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [P 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Function is not recognized or cannot →
be performed at the moment.

↙ Indicated on display when a non-authorized code number has been entered.

Note:

The code entered, and shown on the display, will not be used by the Motronic control module until the ignition has been switched off once. An incorrect coding leads to:

- ◆ *Engine running Diagnostic Trouble Code (DTC)s (gear change jolts, load change jerks, etc.)*
- ◆ *Increased fuel consumption*
- ◆ *Increased exhaust gas emissions*
- ◆ *Diagnostic Trouble Code (DTC)s stored in DTC memory which are not actually present (false DTCs)*
- ◆ *Functions will not be performed (Oxygen Sensor control, activation of the Evaporative Emissions (EVAP) Canister Purge system, etc.).*
- ◆ *Reduced service life of transmission*

Motronic Engine Control Module (ECM) -J220-, coding variations

1. position: vehicle code	2. position: emissions code	3. position: sensor code	4. position: CAN-bus	5. position: transmission code
0 = No coding	0 = No coding	0 = No coding	0 = No coding	0 = No coding
1 = ---	1 = ---	1 = ---	1 = ABS	1 = 5-speed man. transmission
2 = ---	2 = ---	2 = ---	2 = Airbag	2 = 6-speed man. transmission
3 = ---	3 = ---	3 = ---	3 = ABS and airbag	3 = Autom. transmission
4 = ---	4 = ---	4 = ---	4 = ---	4 = ---
5 = ---	5 = ---	5 = ---	5 = ---	5 = ---

Note:

The code number is compiled as shown in the following example:

1. position: Vehicle code (no code at present)	0				
2. position: Emissions code (no code at present)		0			
3. position: sensor code (no code at present)			0		
4. position: CAN-bus code (ABS and airbag)				3	
5: position: transmission code (6-speed manual transmission)					2
Code number:	0	0	0	3	2

Motronic Engine Control Module (ECM) - J220- to Throttle Valve Control Module - J338-, matching

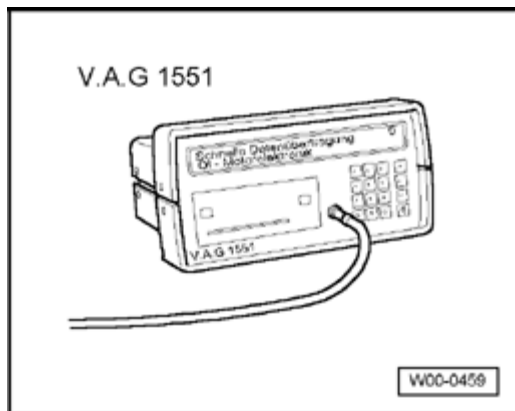
Function

First, old learned values are erased. This is necessary to set learned values, which may be at the limit, to a neutral (Diagnostic Trouble Code (DTC) position. The adaptation teaches the Motronic Engine Control Module (ECM) -J220- the various positions of the throttle unit when the ignition is switched on and the engine is not running. These positions are stored in the control module.

Adapting sequence must be performed if:

- ◆ The voltage supply is interrupted
- ◆ The Throttle Valve Control Module -J338- has been removed and installed or possibly cleaned
- ◆ The Throttle Valve Control Module -J338- is replaced
- ◆ If when installing another engine another Throttle Valve Control Module -J338- is installed
- ◆ The Motronic Engine Control Module (ECM) - J220- is replaced
- ◆ Faulty components such as oxygen sensors or fuel injectors have been replaced.

24-183



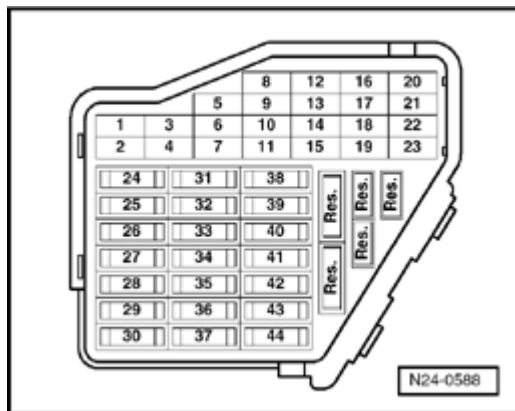
Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

Test requirements



- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- The throttle valve must be at idle speed position (accelerator must not be depressed during test).

- The throttle valve must not be soiled (carbon deposits).
- No Diagnostic Trouble Code (DTC)s must be stored in DTC memory ⇒ [Page 01-23](#) .
- Coolant temperature must be 5 to 110 °C
⇒display group 4, display zone 3.

Work sequence

- Connect VAG 1551 Scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with "Address word" 01. (VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -1- and -0- for function "Adaption" and confirm entry with -Q- button.

Adapting
Feed in channel number XX



Indicated on display:

- Press button -0- button twice- for "Channel number 0" and confirm entry with -Q- button.

Adaption
Erase learned values?

Q



Indicated on display:

- Confirm input with -Q- button.

<p>Adaption → learned values have been erased</p>	<p>← Indicated on display: - Press → button.</p>
<p>Rapid data transfer HELP Select function XX</p>	<p>← Indicated on display: - Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.</p>
<p>Basic setting Input display group number XXX</p>	<p>← Indicated on display: - Press buttons -0-, -6- and -0- for "Display group number 60" and confirm entry with -Q- button.</p>
<p>System in basic setting 60 → xxx.x % xxx.x % x ADP. runs</p>	<p>← Indicated on display: (1 to 4 = display zones)</p> <p>After pressing the -Q- button the throttle valve positioner is switched so that it is not supplied with voltage.</p> <p>In this condition the throttle valve is pulled into an emergency running position by a mechanical spring in the Throttle Valve Control Module - J338-. The values that both angle sensors provide in the emergency running position are stored by the Motronic Engine Control Module (ECM) -J220-.</p>

Thereafter the throttle valve is opened a predetermined value. If this value is achieved, the throttle valve is again switched so that it is not supplied with voltage. Now the mechanical spring must pull the throttle valve to the previously learned emergency running position within a predetermined period (spring test).

Then the throttle valve is closed by the throttle valve positioner and the values, which are supplied by the angle sensors in the Throttle Valve Control Module -J338-, are stored by the Motronic Engine Control Module (ECM) -J220-.

If the Motronic Engine Control Module (ECM) -J220- switches the throttle valve positioner so that it is without voltage during normal operation, this is indicated by the increased and hunting idle speed. The engine reacts slowly to accelerator changes.

- Check specifications in display zones 3 and 4:

Display zone 3: 0 to 8

Display zone 4: ADP. runs, ADP. OK.

System in basic setting 60 →
xxx % xxx % 8 ADP. OK.



Indicated on display: (1 to 4 = display zones)

- Terminate engine basic setting at earliest after 30 seconds by pressing → button.

Adaptation has been performed successfully.

To store the values:

- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.

- Switch off ignition.

Note:

If the basic setting of the control module is aborted, the cause could be one of the following:

- ◆ *The requirements have not been fulfilled.*

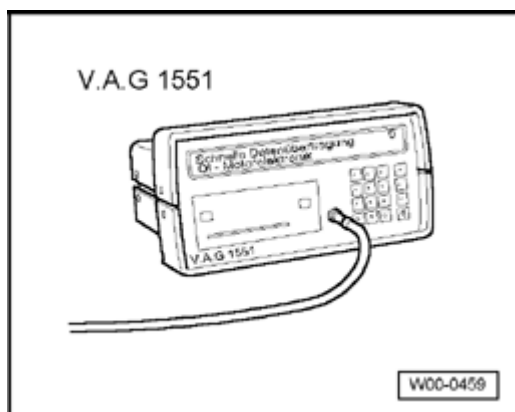
- ◆ *Throttle Valve Control Module -J338- or wiring is faulty. Check ⇒ [Page 24-59](#) .*

After aborting, a Diagnostic Trouble Code (DTC) is stored in DTC memory. When next switching on ignition the basic setting is automatically performed again.

Additional signals, checking

Vehicle Speed Signal, checking

Special tools, materials and equipment

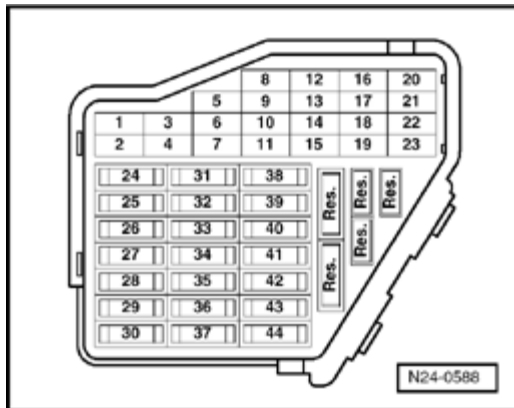


- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams



Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- The speedometer must be OK.

Checking speedometer:

⇒ [Repair Manual, Electrical Equipment; Repair Group 90](#)

- No Diagnostic Trouble Code (DTC)s must be stored in DTC memory ⇒ [Page 01-23](#) .

Test sequence

Note:

To check the vehicle speed signal, the vehicle must be driven. To do this a second person is necessary.

WARNING!

Secure test equipment to rear seat and operate it from this position.

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -5- for "Display group number 5" and confirm entry with -Q- button.

Read measured value block 5 →
1 2 3 4



Indicated on display: (1 to 4 = display zones)

- Road test vehicle with a 2nd person to observe display.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

- Observe figure displayed in display zone 3:

Specification: approx. driven speed

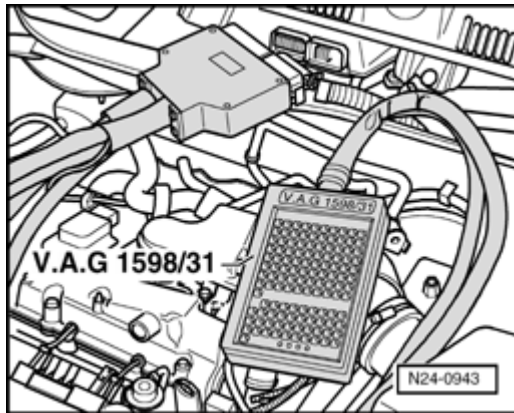
- Drive slower. Displayed value must decrease.
- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If no speed is indicated or the display values do not reduce when driving at a lower speed:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)

24-192



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.
- Connect multimeter to measure voltage between test box sockets 1 (Ground) and 54 (vehicle speed signal) using adapter cables from VAG 1594.
- Raise vehicle at front left.
- Switch on ignition.
- Rotate front wheel and observe voltage display.

Specification: 0.0... at least 4.0 V fluctuating

Note:

Front right wheel must not turn, if necessary, hold to prevent it from turning.

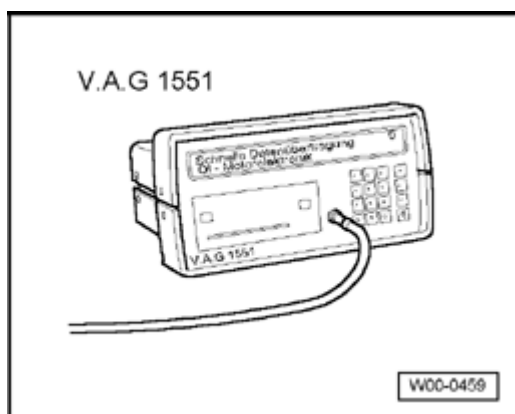
If the display does not fluctuate:

- Check wiring from test box socket 54 to instrument cluster for open/short circuit:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .

- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .



A/C compressor signal, checking

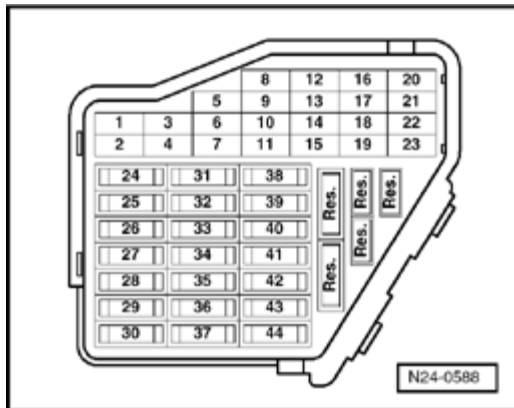
Special tools, materials and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams



Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Air conditioner functioning OK.
- Air conditioner must be turned off.
- Vehicle at room temperature (warmer than + 15 °C).
- No Diagnostic Trouble Code (DTC)s must be stored in DTC memory ⇒ [Page 01-23](#) .

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

- Press buttons -0-, -5- and -0- for "Display group number 50" and confirm entry with -Q- button.

Read measured value block 50



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Check displays in display zones 3 and 4:

Indicated in display zone 3:

A/C-Low

Indicated in display zone 4:

Compr. OFF

- Switch on air conditioning system.
- Select lowest temperature and highest blower speed.

The display in display zone 3 must change to:

A/C-High.

The display in display zone 4 must change to:

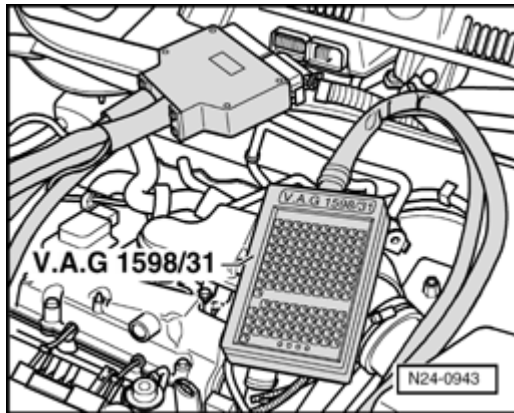
Compr. ON.

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If the displays do not change as described:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.
- Check wiring for open circuit between test box sockets 40 and 41 and air conditioning system referring to Electrical Wiring Diagrams.

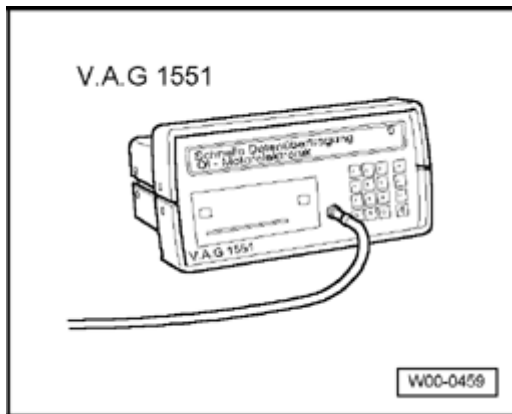
Wire resistance: max. 1.5 Ω

If no malfunctions can be found in the wiring:

- Check function of air conditioning system.
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory \Rightarrow [Page 01-23](#) .
- Read readiness code \Rightarrow [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again \Rightarrow [Page 01-149](#) .

Signal from Clutch Vacuum Vent Valve Switch -F36-, checking

Special tools, materials and equipment

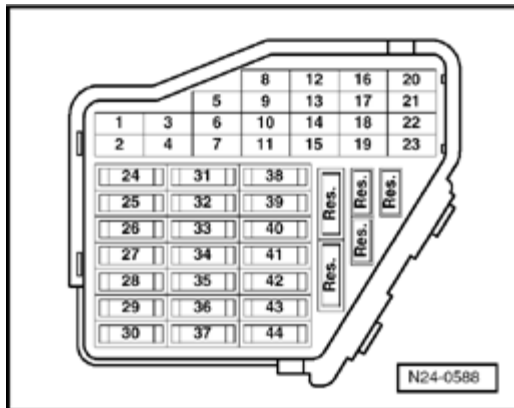


- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams



Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with "Address word" 01. ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP

Select function XX

Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block

Input display group number XXX



Indicated on display:

- Press buttons -0-, -6- and -6- for "Display group number 66" and confirm entry with -Q- button.

Read measured value block 66 →

1 2 3 4



Indicated on display: (1...4 = display zones)

- Observe display in display zone 2 (6th digit from left).

Specification: xxxxx0xx

- Depress clutch pedal fully and observe values in display zone 2.

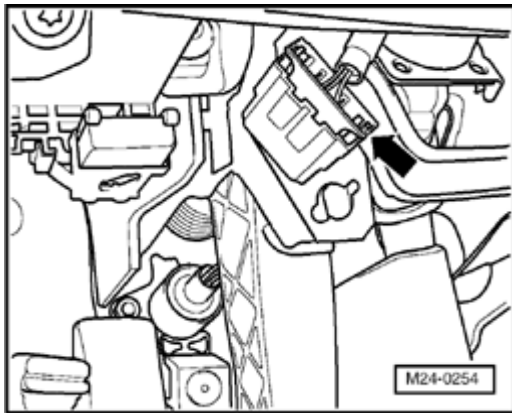
Specification: xxxxx1xx

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

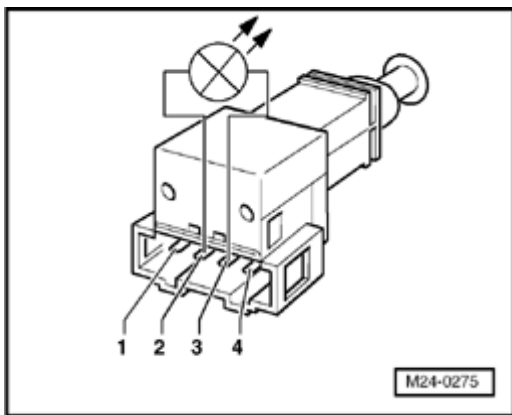
If the specifications are not obtained:

- Remove cover in footwell (driver's side).

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- Disconnect 4-pin connector from Clutch Vacuum Vent Valve Switch -F36- (arrow).



- Measure resistance between switch terminals 2 and 3.
Specification:
Clutch not depressed: max. 1.5 Ω
Clutch depressed: $\infty \Omega$

If the specifications are not obtained:

- Replace Clutch Vacuum Vent Valve Switch -F36-.

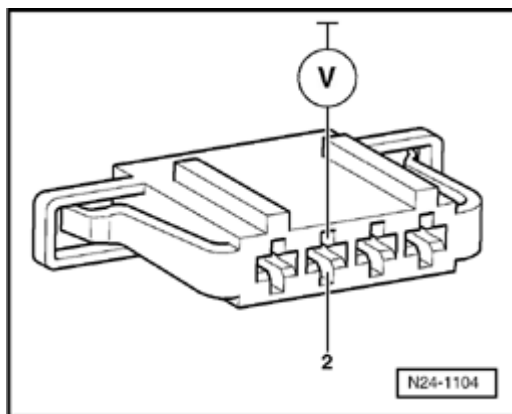
Note:

Observe installation position of Clutch Vacuum Vent Valve Switch - F36- through upper assembly hole of bearing bracket.

24-203

- Check DTC memory, repair malfunctions necessary and then erase DTC memory [01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code will be generated again ⇒ [Page 01-149](#) .

If the specifications are obtained:



- Connect multimeter to measure voltage at connector terminal 2 and engine Ground
- Switch ignition on.
Specification: at least 11.5 V
- Switch ignition off.

If the specification is not obtained:

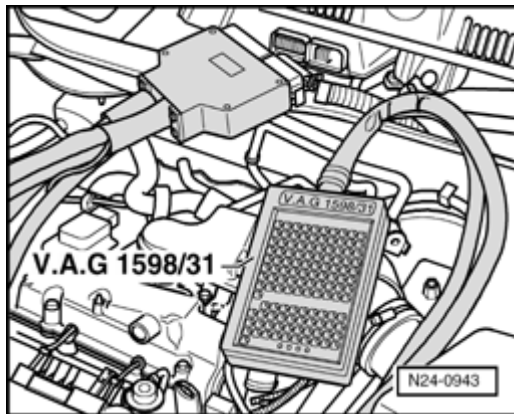
- Check wire for open circuit between 4-pin connector terminal 2 and Fuel Pump (FP) -J17- referring to Electrical Wiring Diagram

Wire resistance: max. 1.5 Ω

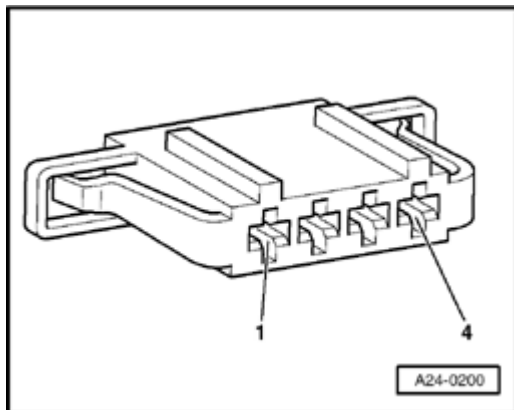
If the specification is obtained:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wiring for open circuit between test box and 4-pin connector referring to Electrical Wiring Diagrams.

Terminal 3 and socket 39

Wire resistance: max. 1.5 Ω

- Additionally check wiring for short to one another, to vehicle Ground (GND) and to battery positive.

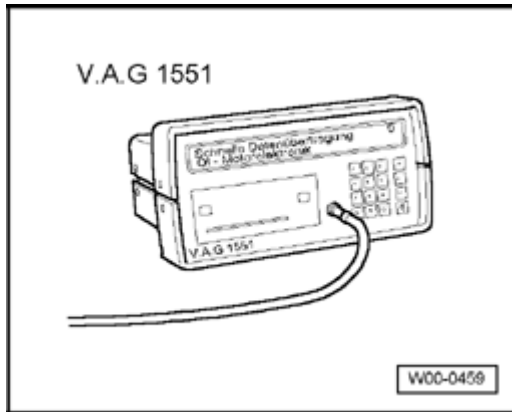
Specification: $\infty \Omega$

If there is no Diagnostic Trouble Code (DTC) in the wiring and the resistance measurement values are OK.:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Brake Light Switch -F- and Brake Pedal Switch (cruise control/Diesel Direct Fuel Injection) -F47- signal, checking

Special tools, materials and equipment

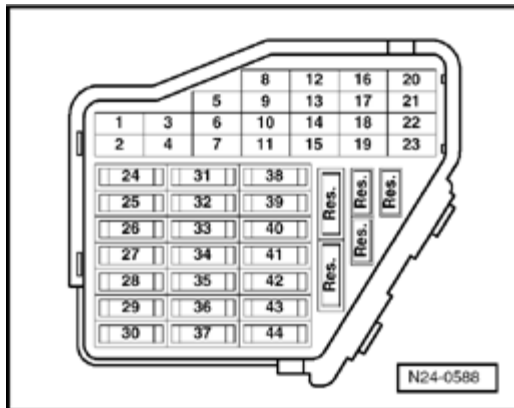


- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams



Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with "Address word" 01. ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP

Select function XX

Indicated on display:

Read measured value block

Input display group number XXX



- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Indicated on display:

- Press buttons -0-, -6- and -6- for "Display group number 66" and confirm entry with -Q- button.

Read measured value block 66



1 2 3 4



Indicated on display: (1 to 4 = display zones)

- Observe display in display zone 2: (7th and 8th positions from left).

Specification: xxxxxx00

- Depress brake pedal and observe display in display zone 2.

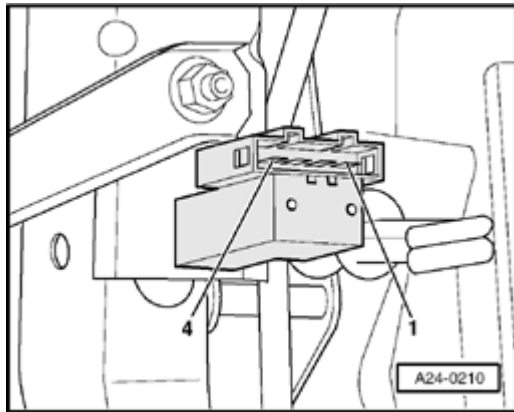
Specification: xxxxxx11

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If the specifications are not obtained:

- Remove cover in footwell (driver's side).

24-209



- Disconnect 4-pin connector from Brake L Switch -F- and Brake Pedal Switch (cruise control/Diesel Direct Fuel Injection) -F47-

- Measure resistance between terminals 1 of switch.

Specification:

Brake pedal not depressed: $\infty \Omega$

Brake pedal depressed: max. 1.5Ω

- Measure resistance between terminals 2 of switch.

Specification:

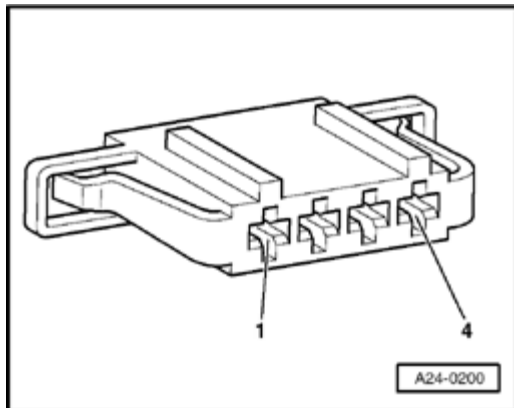
Brake pedal not depressed: Max. 1.5Ω

Brake pedal depressed: $\infty \Omega$

If the specifications are not obtained:

- Replace Brake Light Switch -F- and Brake Switch (cruise control/Diesel Direct Fuel Injection) -F47-.
- Check DTC memory, repair malfunctions necessary and then erase DTC memory [01-23](#) .
- Read readiness code \Rightarrow [Page 01-146](#) . If memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code will be generated again \Rightarrow [Page 01-149](#) .

24-210



If the specifications are obtained:

- Connect multimeter to measure voltage between terminal 1 and Ground (GND).

Specification: at least 11.5 V

If the specification is not obtained:

- Check wiring connections to fuse holder for open circuit referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

If the specification is obtained:

- Connect multimeter to measure voltage between terminal 2 and Ground (GND).

- Switch on ignition.

Specification: at least 11.5 V

- Switch off ignition.

If the specification is not obtained:

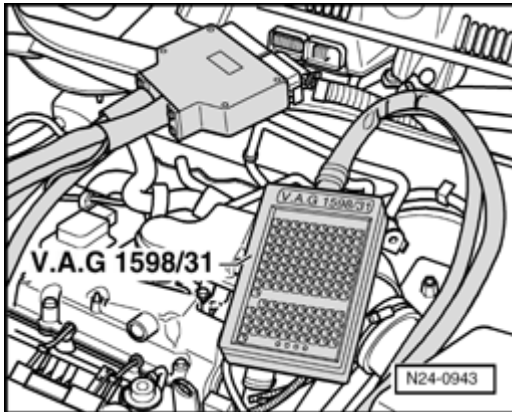
- Check wire for open circuit between 4-pin connector terminal 2 and Fuel Pump (FP) Relay - J17- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

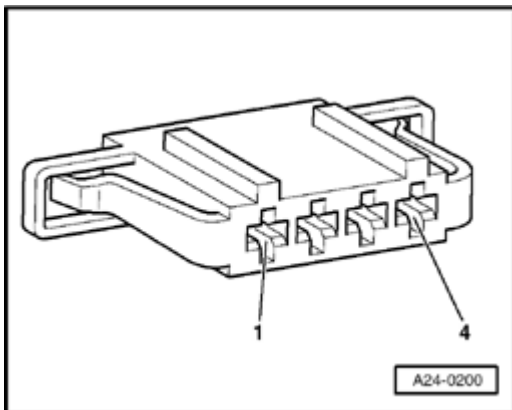
If the specification is obtained:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.



- Check wiring for open circuit between test box and 4-pin connector referring to Electrical Wiring Diagrams.

Terminal 3 and socket 55

Terminal 4 and socket 56

Wire resistance: max. 1.5 Ω

- Additionally check wiring for short to one another, to vehicle Ground (GND) and to battery positive.

Specification: $\infty \Omega$

If there is no Diagnostic Trouble Code (DTC) in the wiring and the resistance measurement values are OK.:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Transmission Range signal, checking

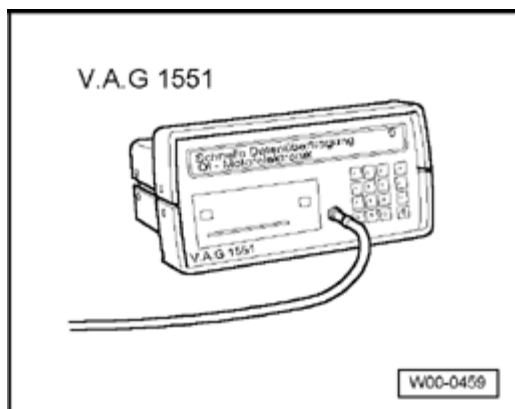
Vehicles with an automatic transmission

The Motronic Engine Control Module (ECM) -J220- receives the following information from the transmission control module:

Driving range selected (selector lever in 2/3/4/R/D)

or

No transmission range selected (selector lever in P or N)

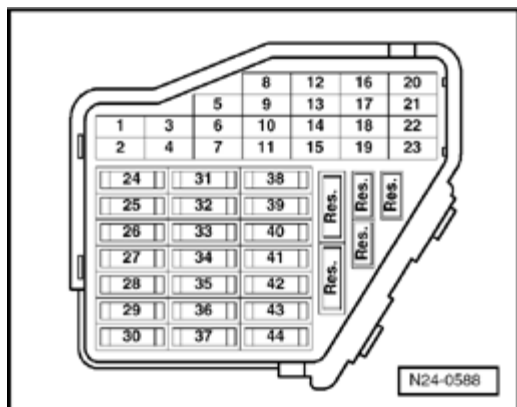


Special tools and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.



Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idle speed: ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block



Indicated on display:

Input display group number XXX

- Press buttons -0-, -5- and -6- for "Display group number 56" and confirm entry with -Q- button.

Read measured value block 56



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Observe display in display zone 4 (4th digit from left).

Specification: xxx0x "Neutral"

- Depress brake pedal and select driving range. Observe figure displayed in display zone 4:

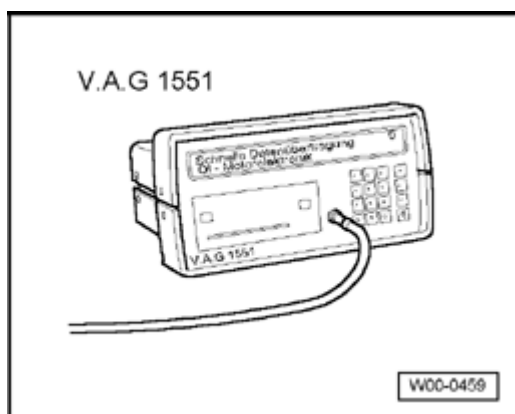
Specification: xxx1x "Driving range selected"

- Press → button.

- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If the specifications are not obtained:

- Check CAN-bus matching resistor ⇒ [Page 24-223](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .



Cruise Control System (CCS), checking

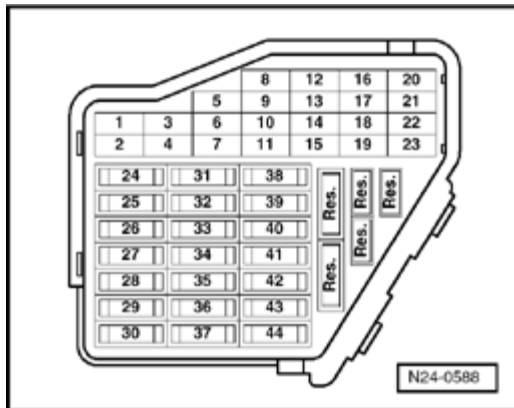
Special tools, materials and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams



Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.

Test sequence

- Connect VAG 1551 Scan tool (or VAG 1552). Then switch ignition on and select Motronic Engine Control Module (ECM) -J220- with "Address word" 01. ((VAG 1551 and Motronic Engine Control Module (ECM) -J220-, connecting and selecting ⇒ [Page 01-12](#)).

Rapid data transfer

HELP

Select function XX

Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block

Input display group number XXX



Indicated on display:

- Press buttons -0-, -6- and -6- for "Display group number 66" and confirm entry with -Q- button.

Read measured value block 66 →

1 2 3 4



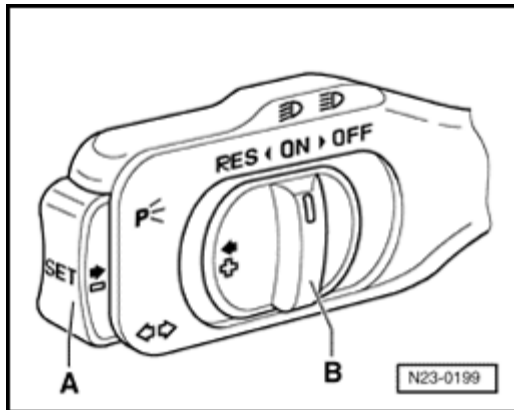
Indicated on display: (1 to 4 = display zones)

Vehicles with an automatic transmission

- Perform a road test and exceed a speed of 25 km/h once then switch engine off and leave selector lever in position 2, 3, or D.

Observe the valid safety precautions when performing a road test ⇒ [Page 24-33](#) .

- Apply parking brake.



Continuation for all vehicles

- Check specification for switch position of CCS operating switch in display zone 4.

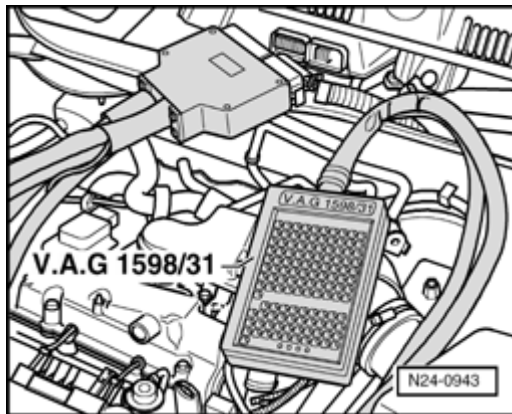
Test requirements	Display zone 4
Switch B at "OFF", in detent	xxxxxxx0
Switch B at "OFF", in detent or not in detent	xxxxxxx0x
Switch B at "ON"	xxxxxxx11
Switch A depressed (Switch B at "ON")	xxxxx1111
Switch B at "RES"	xxxx1xxx

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If the specifications are not obtained:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) - J220- remains disconnected.
- Check wiring for open/short circuit from Motronic Engine Control Module (ECM) -J220- to CCS operating switch:

⇒ [Electrical Wiring Diagrams, Troubleshooting & Component Locations](#)

- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

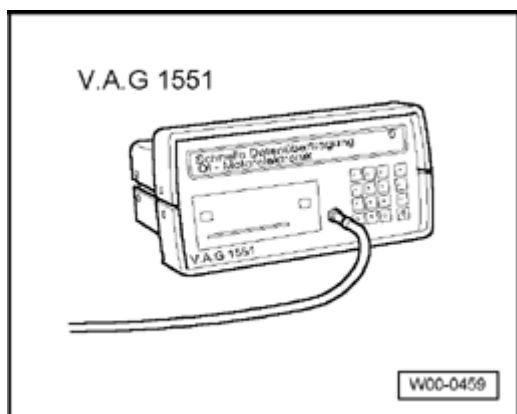
CAN-bus, checking

Function

The Motronic Engine Control Module (ECM) -J220- communicates with other CAN-bus compatible control modules via a CAN-bus.

These CAN-bus-capable components are connected by a pair of twisted CAN-bus wires (CAN high and CAN low) and exchange information (messages). Information missing from the CAN-bus is recognized as an error and stored.

The CAN-bus requires a matching resistor to function fault free. This matching resistor is located in the Motronic Engine Control Module (ECM) -J220-.



Special tools, materials and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 Adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams

Test requirements

- The CAN-bus On Board Diagnostic (OBD) has detected a Diagnostic Trouble Code (DTC).

Test sequence

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)

- Connect VAG 1598/31 test box to Motronic Engine Control Module (ECM) -J220-. ECM wiring harness is not connected by this action.
- Check centralized matching resistor in Motronic Engine Control Module (ECM) -J220-. To do this, check resistance between test box

Sockets 58 and 60.

Specification: 60 to 72 Ω

If the resistance measurement is not within the specified range:

- Replace Motronic Engine Control Module (ECM) -J220- ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

If the resistance value is within the specified range:

- Repair Diagnostic Trouble Code (DTC):

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Motronic Engine Control Module (ECM) -J220- again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Motronic Engine Control Module (ECM) -J220- was disconnected from battery positive (B+), readiness code must be generated again ⇒ [Page 01-149](#) .

Ignition system, servicing

General notes on ignition system

Note:

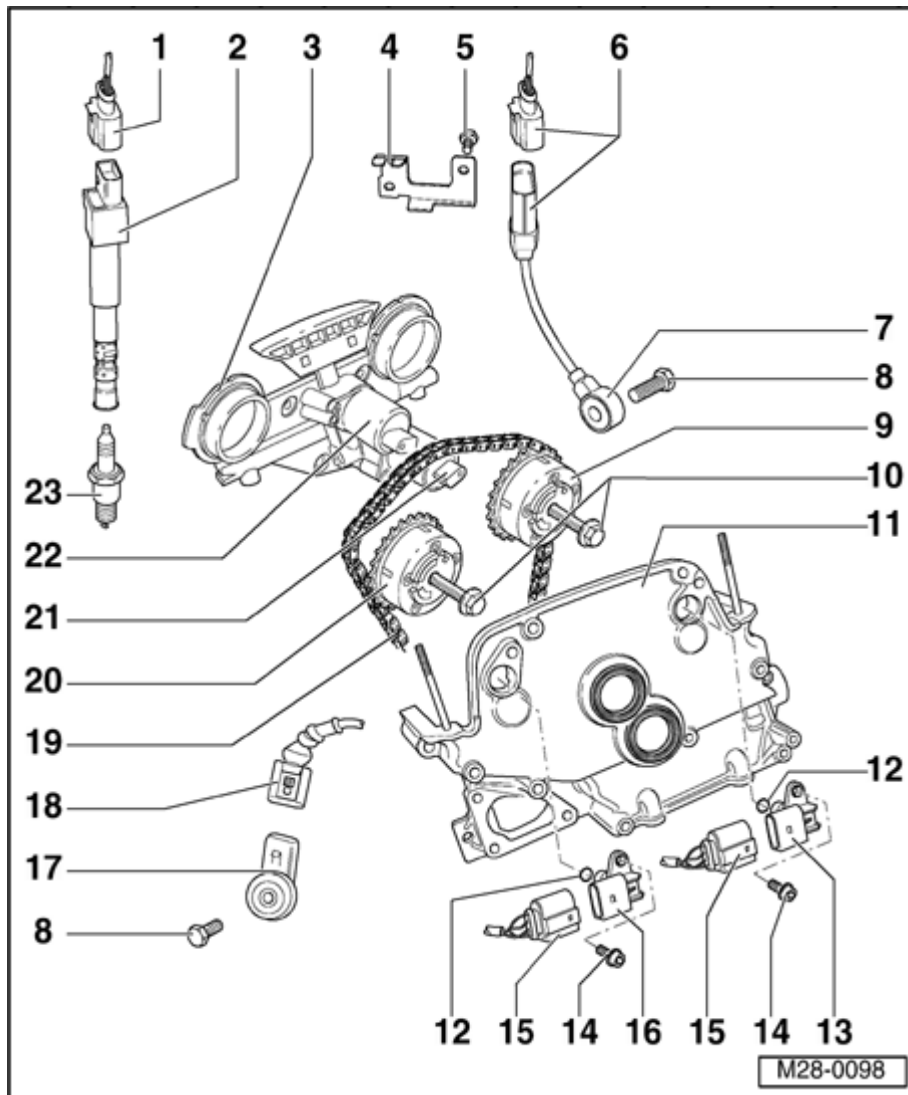
- ◆ *Only the components which specifically relate to the ignition system are dealt with here. For the other components of the injection and ignition system ⇒ Repair Group 24.*
- ◆ *The Engine Control Module (ECM) is equipped with On Board Diagnostic (OBD).*
- ◆ *Components marked with * are checked via On Board Diagnostic (OBD) ⇒ [Page 01-23](#) .*
- ◆ *Components marked with **can be checked via Output Diagnostic Test Mode (DTM) ⇒ [Page 01-100](#) .*
- ◆ *For trouble-free operation of the electrical components, a voltage of at least 11.5 V is necessary.*
- ◆ *Disconnecting and connecting the battery must only be done with the ignition switched off, otherwise the Engine Control Module (ECM) could be damaged.*
- ◆ *Check DTC memory before carrying out repairs and for troubleshooting ⇒ [Page 01-23](#) .*
- ◆ *During some checks it is possible that the control module will detect and store a Diagnostic Trouble Code (DTC). Therefore after completing all checks and repairs the DTC memory must be checked and if necessary erased ⇒ [Page 01-23](#) , and then generate the readiness code ⇒ [Page 01-149](#) .*

- ◆ *If the engine starts, runs for a short period and then stops, after troubleshooting, repairs or component tests, then the malfunction may lie with the Immobilizer which is blocking the Engine Control Module (ECM). In such cases the DTC memory must be checked and, if necessary, the control module adapted.*

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\); Repair Group 01](#)

Safety precautions ⇒ [Page 28-12](#) .

Test data, spark plugs ⇒ [Page 28-15](#) .



Ignition system components, removing and installing

Note:

Engine Control Module (ECM) with connectors ⇒ [Page 24-14](#), item 8.

1 - Connector

- ◆ Black, 4-pin
- ◆ Mark connector and component before pulling connector off.

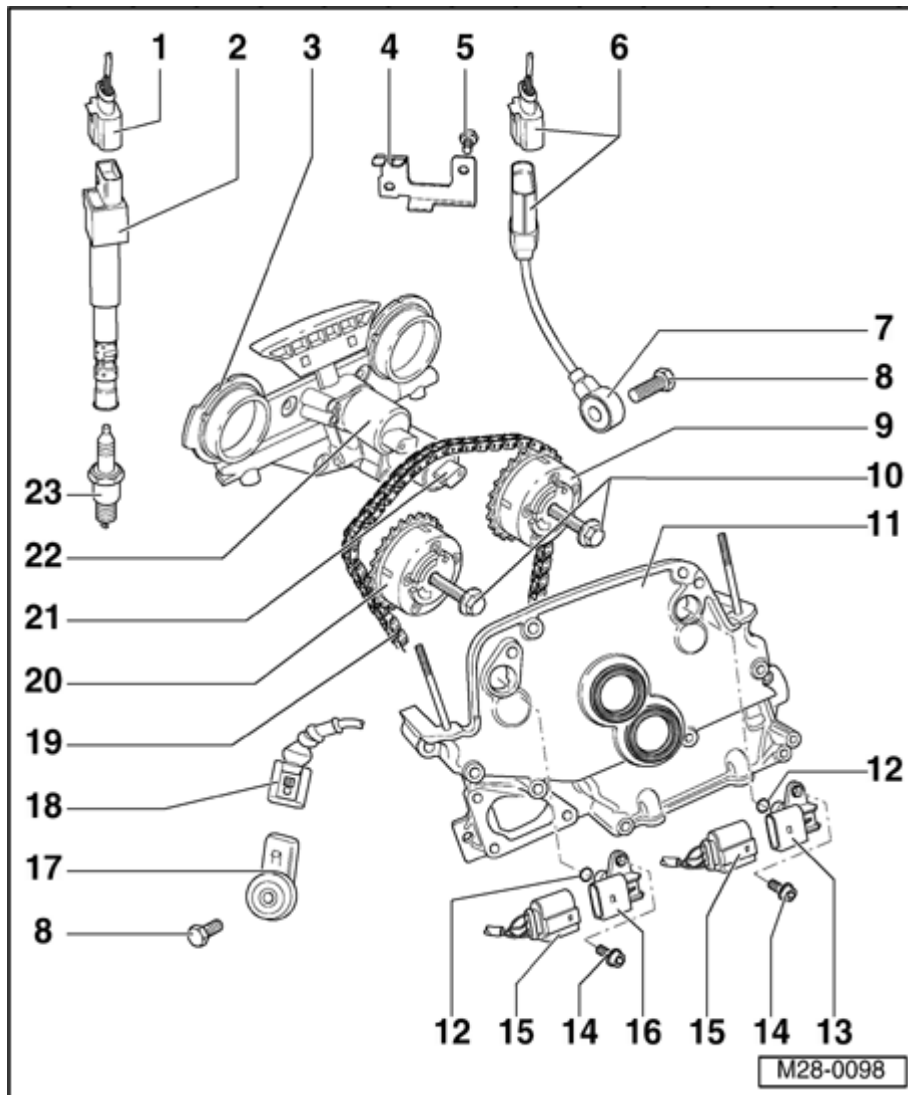
2 - Ignition coil with power output stages (-N70-, -N127-, -N291-, -N292-, -N323- and -N324-)

- ◆ Remove using puller T10095
- ◆ Checking ⇒ [Page 28-23](#)

3 - Control housing

- ◆ For camshaft timing adjustment
- ◆ Removing and installing:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF; Repair Group 15](#)



4 - Bracket

- ◆ For Knock sensor (KS) 1 - G61-connection

- ◆ Component location: on right of cylinder head

5 - 10 Nm

6 - 3-pin connector

- ◆ Black
- ◆ Gold plated terminals

7 - Knock Sensor (KS) 1 - G61-*

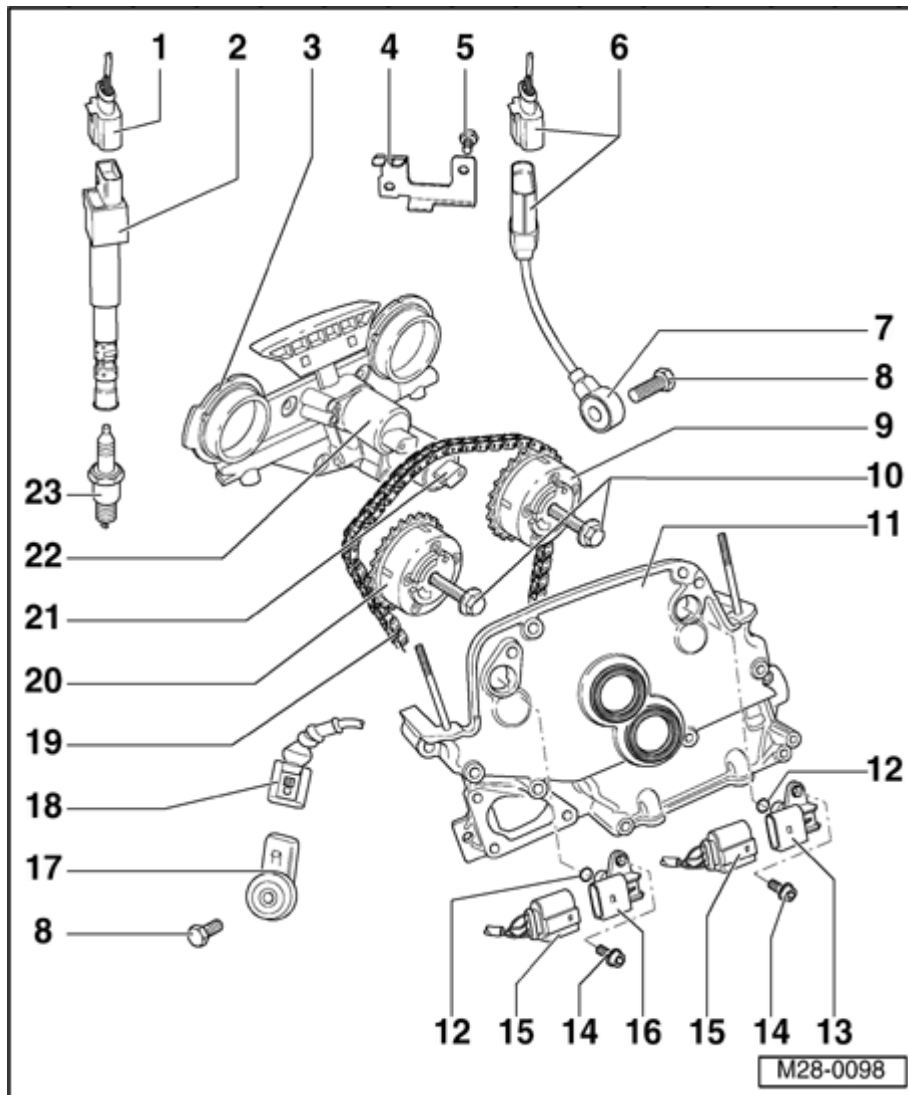
- ◆ Component location: between cyl. 1 and cyl. 3

- ◆ Terminal surfaces between knock sensor and cylinder block must be free of corrosion, dirt and grease.

- ◆ Checking ⇒ [Page 28-30](#)

8 - 20 Nm

- ◆ Torque setting influences function of knock sensor



9 - Exhaust camshaft timing adjuster

◆ Marking: 32A

◆ Turn engine over only when camshaft timing adjuster is installed

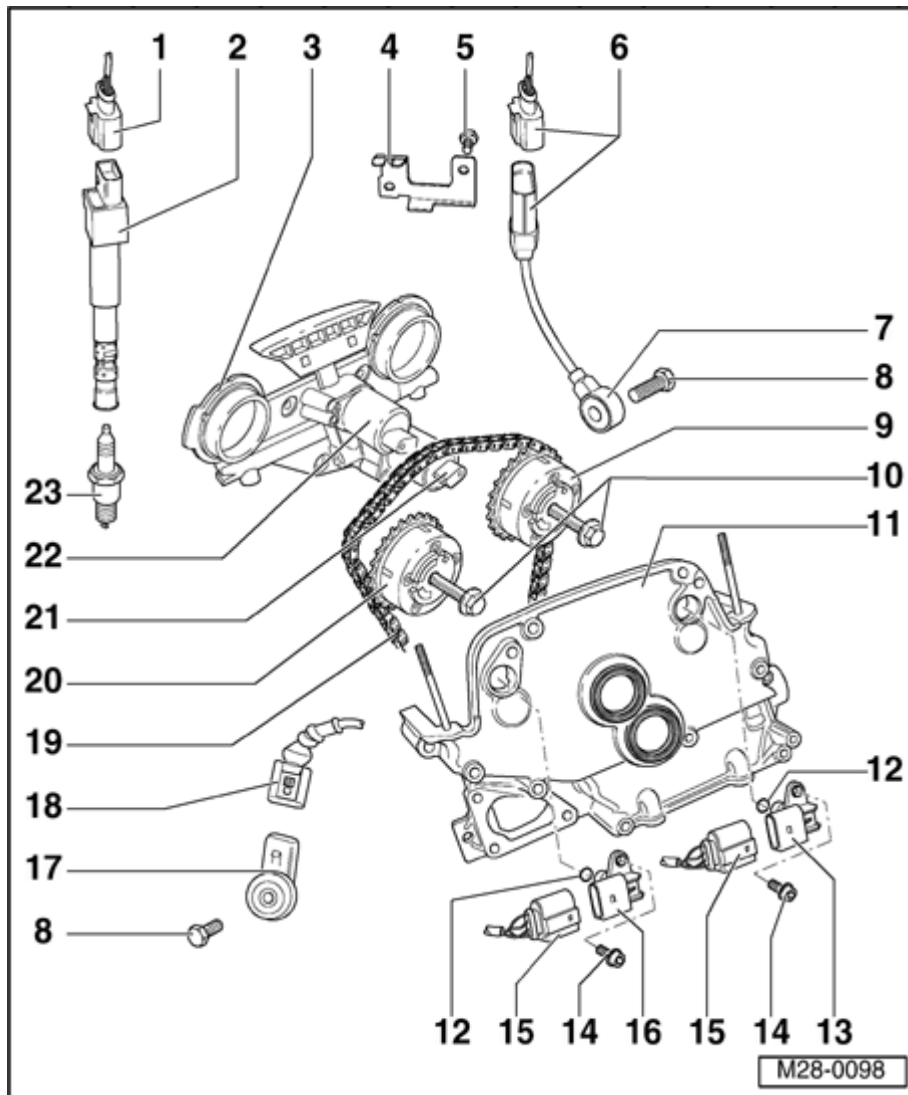
◆ With sensor wheel for Camshaft Position (CMP) Sensor 2 -G163-

◆ If camshaft timing adjuster has been removed, after installing check timing:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF; Repair Group 15](#)

◆ Check camshaft timing adjustment:

⇒ [Repair](#)
[Manual, 2.8](#)
[Liter VR6 4V](#)
[Engine](#)
[Mechanical,](#)
[Engine Code](#)
[\(s\): BDF;](#)
[Repair Group](#)
[15](#)



**10 60 Nm
- plus
additional
90° turn**

◆ Replace

◆ Terminal surface of sensor wheel on bolt head must be dry for assembly

◆ To remove and install, use a 32 mm open jaw wrench on camshaft as a counter-hold:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF; Repair Group 15](#)

11 - Cover

◆ Removing and installing:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF;](#)

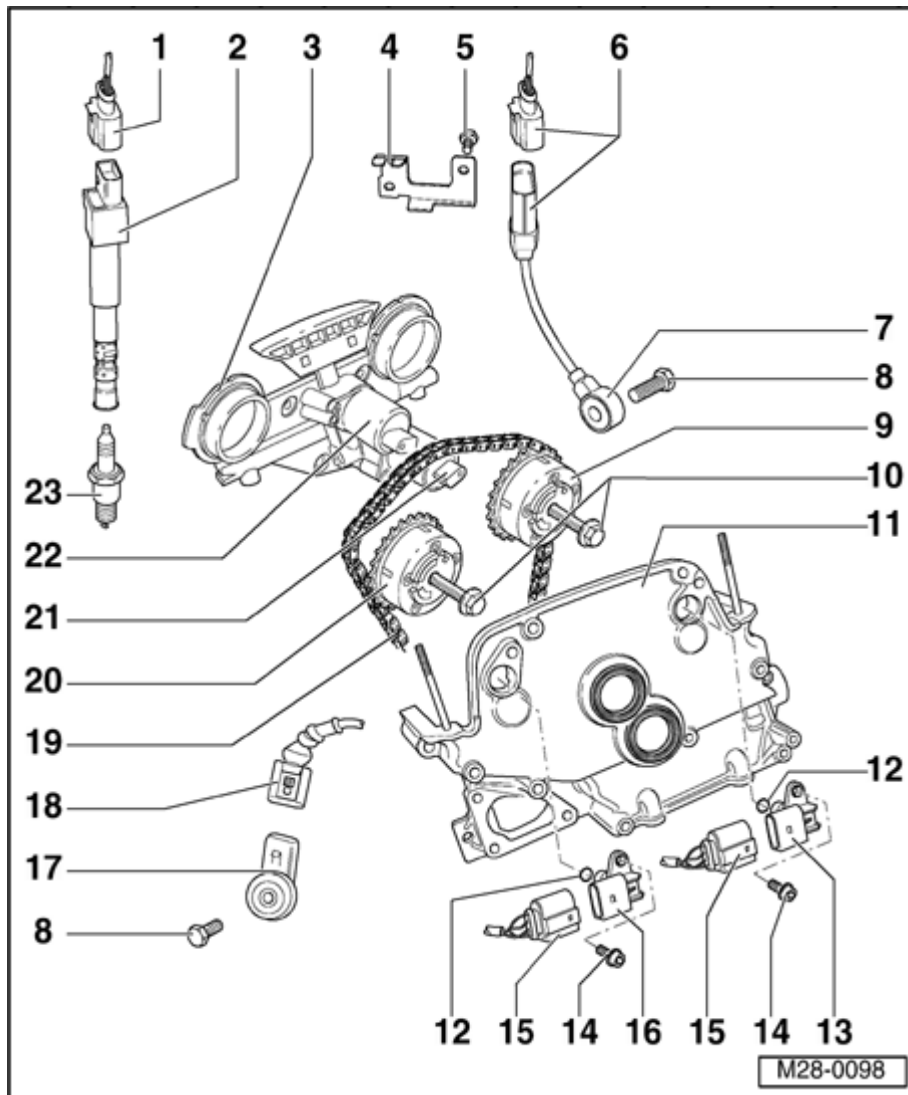
[Repair Group
15](#)

12 - Seal

- ◆ Replace

**13 Camshaft
- Position
(CMP)
Sensor 2
-G163-***

- ◆ For exhaust camshaft
- ◆ Sensor and connector terminals are gold plated
- ◆ Checking ⇒ [Page 28-16](#)



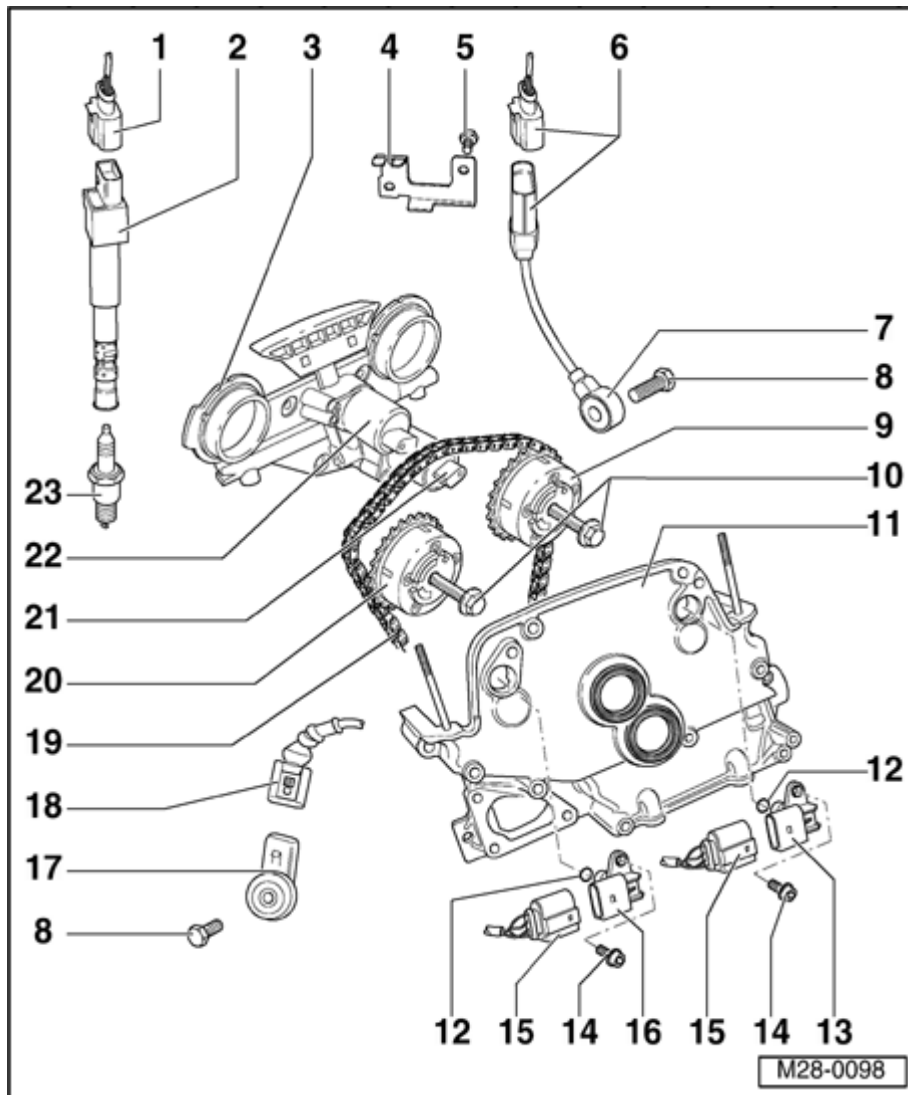
14 - 10 Nm

15 Connector

- ◆ Black, 3-pin
- ◆ Sensor and connector terminals are gold plated
- ◆ Mark connector and component before pulling connector off.

16 Camshaft - Position (CMP) Sensor - G40-*

- ◆ For intake camshaft
- ◆ Sensor and connector terminals are gold plated
- ◆ Checking ⇒ [Page 28-16](#)



17 - Knock Sensor (KS) 2 - G66-*

- ◆ Component location: Between cyl. 4 and cyl. 6
- ◆ Terminal surfaces between knock sensor and cylinder block must be free of corrosion, dirt and grease.
- ◆ Sensor and connector terminals are gold plated
- ◆ Checking ⇒ [Page 28-30](#)

18 - Connector

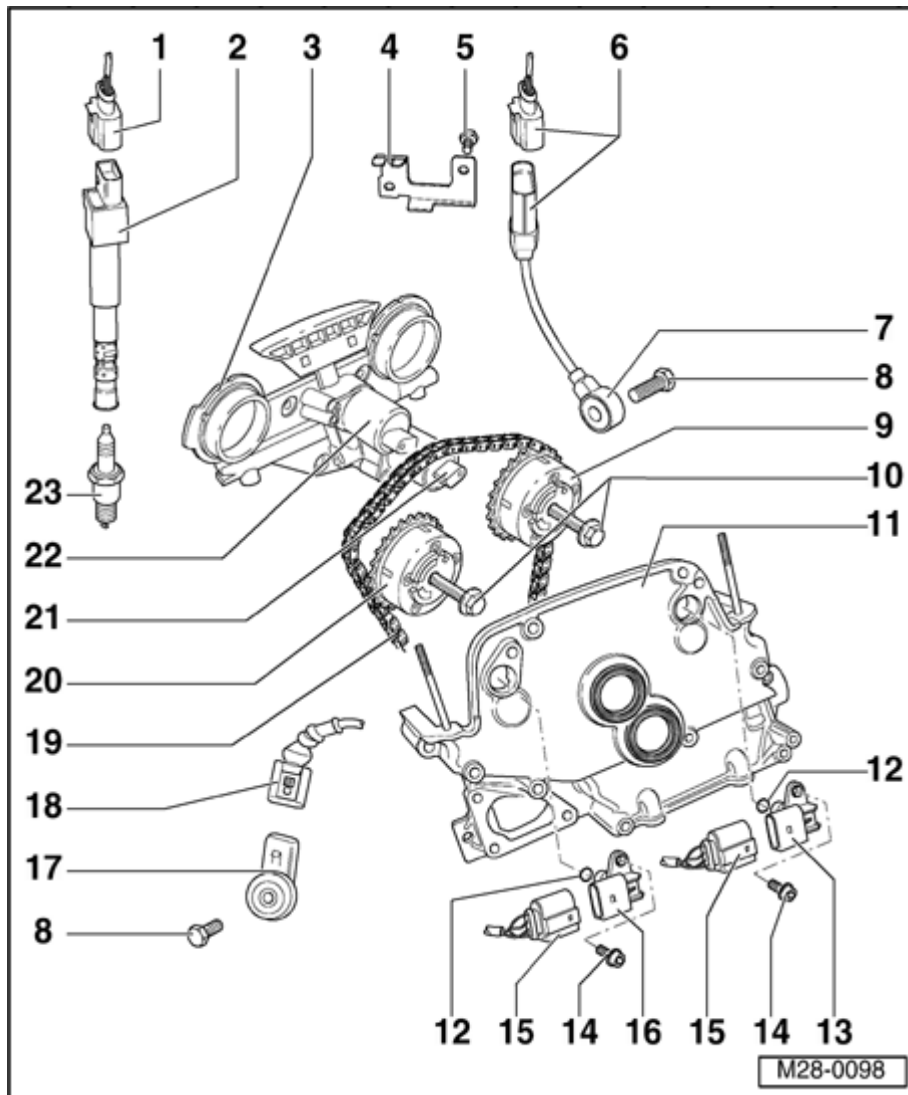
- ◆ Black, 2-pin
- ◆ Sensor and connector terminals are gold plated

19 Camshaft - roller chain

- ◆ Mark direction of rotation before removing (installation position)

- ◆ Installing:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF; Repair Group 15](#)



20 - Intake camshaft adjuster

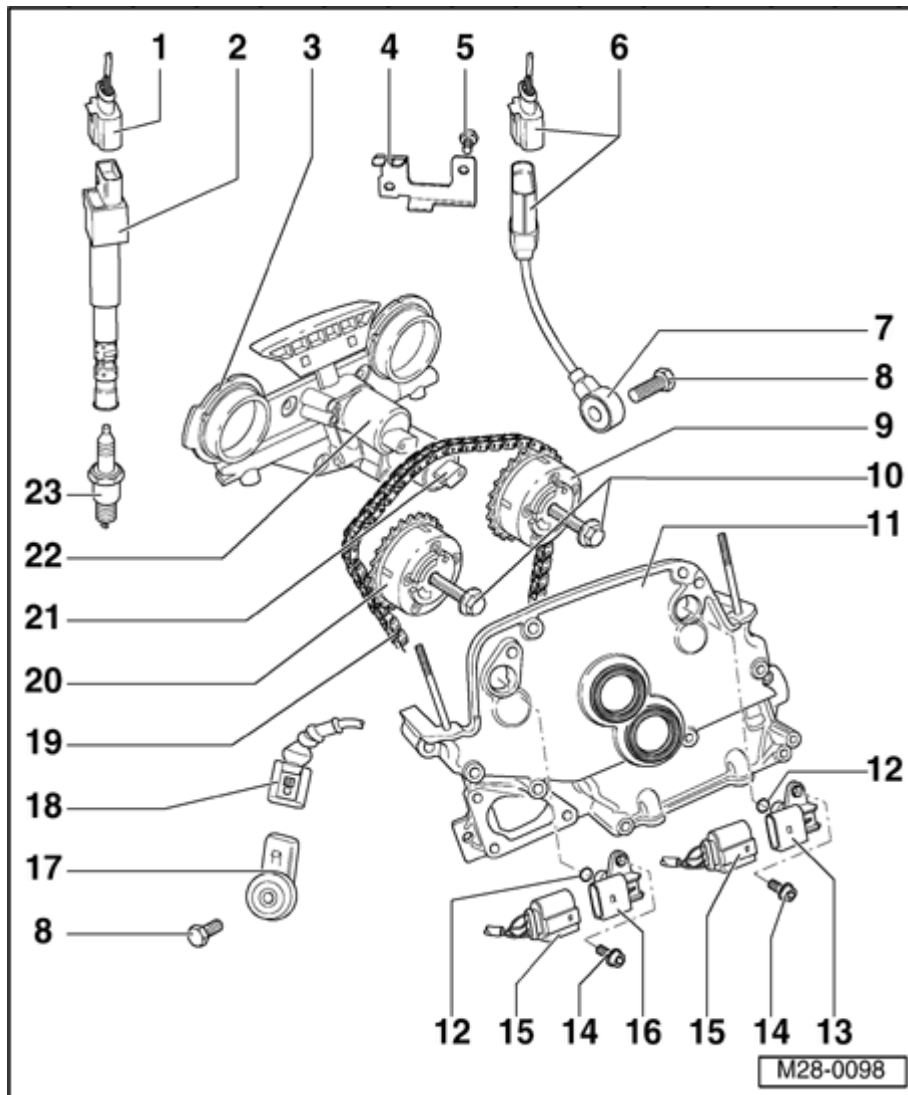
- ◆ Marking: 24E
- ◆ Turn engine over only when camshaft timing adjuster is installed
- ◆ With sensor wheel for Camshaft Position (CMP) Sensor 2 -G163-
- ◆ If camshaft timing adjuster has been removed, after installing check timing:

⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code \(s\): BDF; Repair Group 15](#)

- ◆ Check camshaft timing adjustment:

⇒ [Repair](#)

[Manual, 2.8](#)
[Liter VR6 4V](#)
[Engine](#)
[Mechanical,](#)
[Engine Code](#)
[\(s\): BDF;](#)
[Repair Group](#)
[15](#)



**21 Camshaft
- Adjustment
Valve 1
(exhaust) -
N318-*/****

- ◆ For exhaust camshaft
- ◆ Mark connector and component before pulling connector off.
- ◆ Check camshaft timing adjustment:

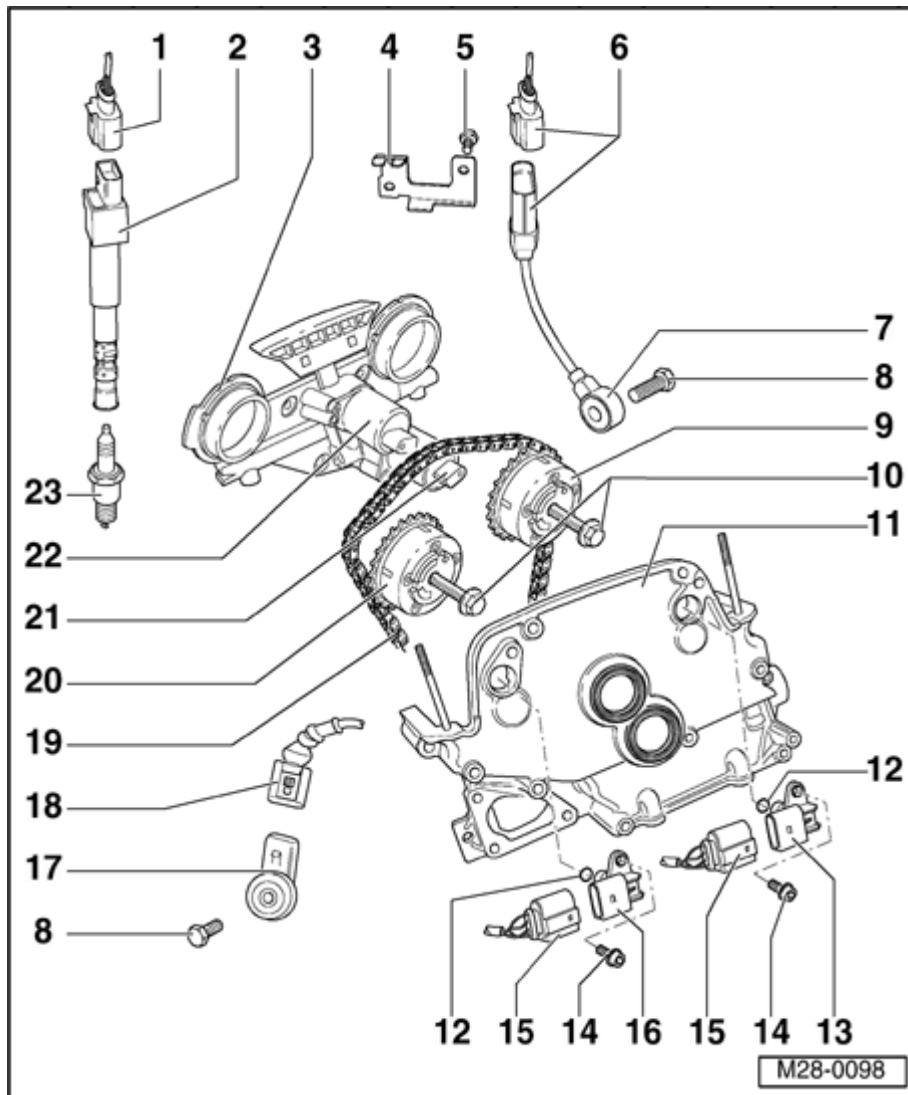
⇒ [Repair Manual, 2.8 Liter VR6 4V Engine Mechanical, Engine Code\(s\): BDF; Repair Group 15](#)

**22 Valve -1-
- for
camshaft
adjustment
-N205-*/****

- ◆ For intake camshaft
- ◆ Mark connector and component before pulling connector off.
- ◆ Check camshaft

timing
adjustment:

⇒ [Repair
Manual, 2.8
Liter VR6 4V
Engine
Mechanical,
Engine Code\(s\):
BDF; Repair
Group 15](#)



23 - Spark plug, 25 Nm

- ◆ Remove and install with spark plug wrench 3122 B
- ◆ Type and electrode gap ⇒ [Page 28-15](#)

Safety precautions

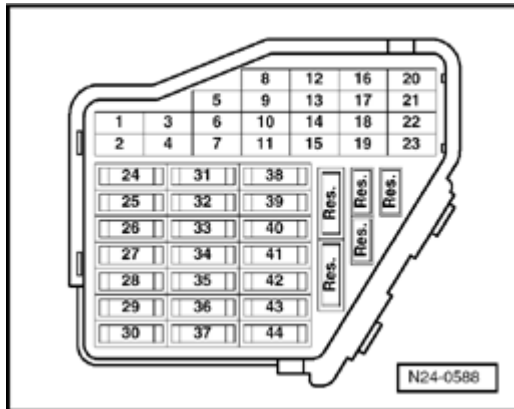
To prevent injuries to persons and/or damage to the fuel injection and ignition system, the following must be noted:

WARNING!

When performing repair work, especially due to the confined conditions in the engine well, pay attention to the following:

- ◆ ***Route all types of lines (e.g. for fuel, hydraulics, EVAPsystem, coolant, refrigerant, brake fluid and vacuum) as well as electrical wiring so that the original positions are restored.***
- ◆ ***Ensure sufficient clearance to all moving or hot components.***
- ◆ Do not touch or disconnect ignition wiring when the engine is running or being turned at starter speed.
- ◆ The ignition must be switched off before connecting or disconnecting fuel injection or ignition system wiring or tester cables.

- ◆ If the engine is to be turned at starter speed without starting:

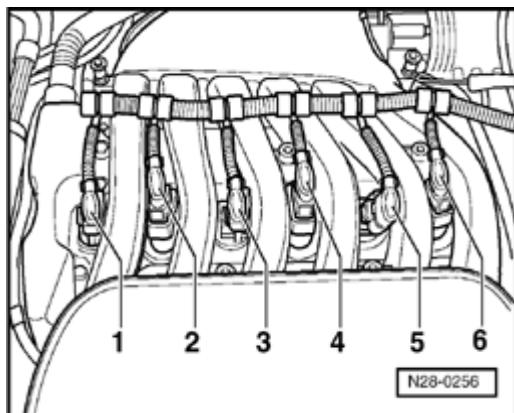


- Remove fuse 29 from fuse holder.

Note:

Removing fuse 29 interrupts the voltage supply to the fuel injectors.

- Remove engine cover.



- Disconnect connectors from ignition coils

Note:

Mark connector and component before removing connector.

Observe following if test and measuring instruments are required during a test drive:

- ◆ Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

If test and measuring instruments are operated from front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

Test Data, Spark plugs

Engine code	BDF
Firing order	1-5-3-6-2-4
Spark plugs¹⁾	
VW No.	101 000 062 AB
Manufacturer's designation	PZF R5D-11
Electrode gap	max. 1.1 mm
Torque setting	25 Nm

1) Remove and install spark plugs with plug wrench 3122 B

Camshaft Position (CMP) Sensor, checking

Note:

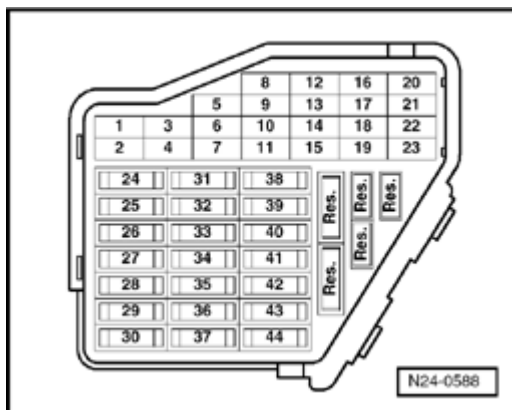
Only gold-plated terminals may be used to service the terminals in the Camshaft Position (CMP) Sensor connector.

Special tools, materials and equipment

- ◆ VAG 1526 or Fluke 83 Hand multimeter
1715 multimeter
- ◆ VAG 1594 adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams

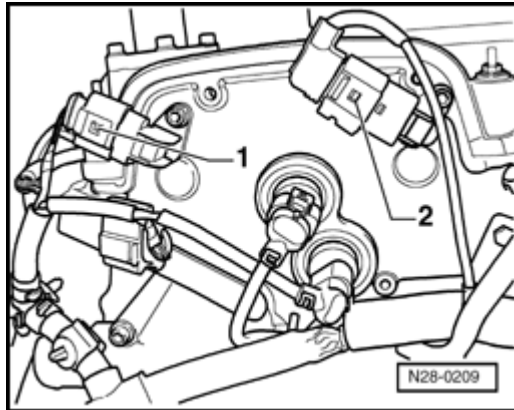
Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.
- All electrical accessories, e.g. lights and window defroster must be switched off.
- If the vehicle is equipped with air conditioning it must be turned off.
- Camshaft Position (CMP) Sensor malfunction detected by On Board Diagnostic (OBD) [Page 01-23](#).



28-17

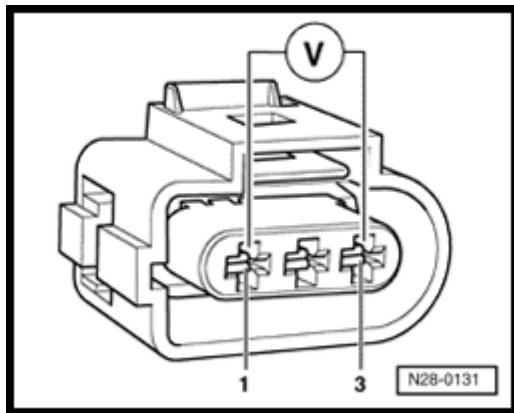
Checking sequence for intake camshaft Camshaft Position (CMP) Sensor -G40-



- ✦ - Disconnect 3-pin connector from Camshaft Position (CMP) Sensor -G40-, -1-.

Note:

Mark connector and component before disconnecting.

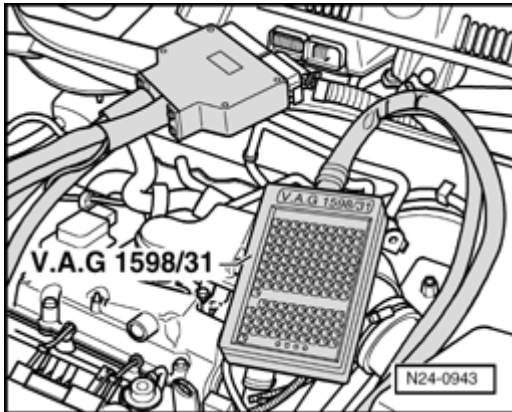


- ✦ - Connect multimeter to measure voltage at terminals 1 (positive) and 3 (Ground) of Camshaft Position (CMP) Sensor connector using adapter cables from V.A.G 1594.
- Switch on ignition.
Specification: at least 4.5 V
- Switch off ignition.

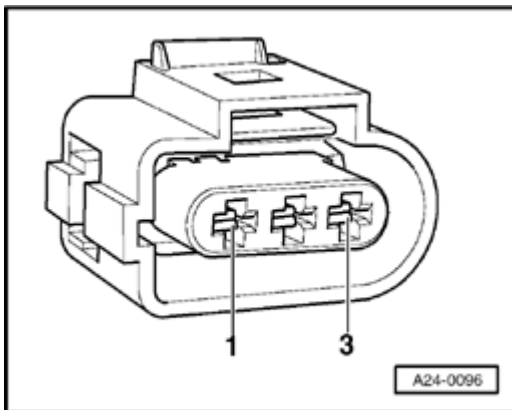
If no voltage is present:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) remains disconnected.



- Check wiring for open circuit between test box and connector referring to Electrical Wiring Diagrams.

terminal 1 and socket 98

terminal 2 and socket 86

terminal 3 and socket 108

Wire resistance: max. 1.5 Ω

- Additionally check wires for short to one another.

Specification: $\infty \Omega$

If no wiring malfunction is detected and voltage was present between terminals 1 and 3:

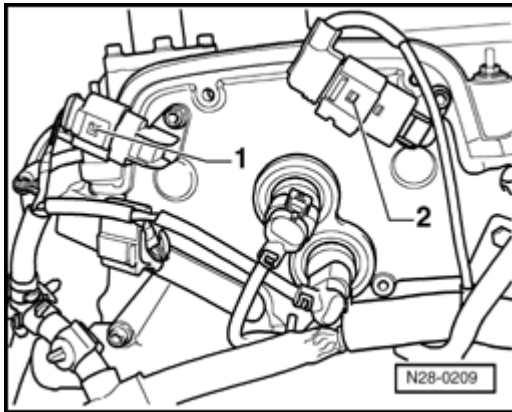
- Replace Camshaft Position (CMP) Sensor -G40-
⇒ [Page 28-7](#) , item 16 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Engine Control Module (ECM) was disconnected from battery positive, readiness code must be generated again ⇒ [Page 01-149](#) .

If no wiring malfunction is detected and no voltage was present between terminals 1 and 3:

- Replace Engine Control Module (ECM) ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Engine Control Module (ECM) again ⇒ [Page 24-182](#) .

- Read readiness code ⇒ [Page 01-146](#) . If memory has been erased or Engine Control Module (ECM) was disconnected from battery positive, readiness code must be generated again ⇒ [Page 01-149](#) .

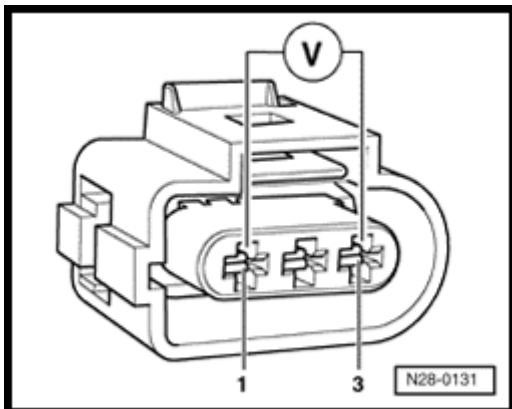
Checking sequence for Camshaft Position (CMP) Sensor 2 -G163-



- Disconnect 3-pin connector -2- from Camshaft Position (CMP) Sensor 2 -G163-.

Note:

Mark connector and component before pulling connector off.

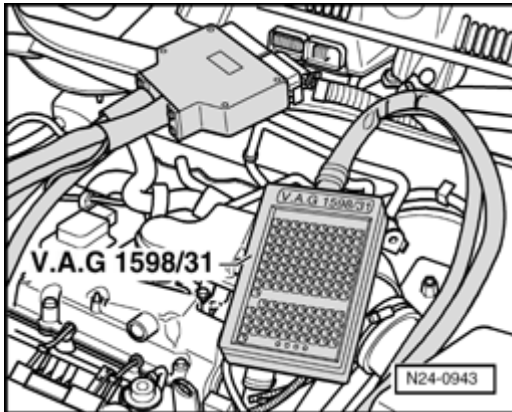


- Connect multimeter to measure voltage across terminals 1 (positive) and 3 (Ground) of Camshaft Position (CMP) Sensor connector using adapter cables from V.A.G 1594.
- Switch on ignition.
Specification: at least 4.5 V
- Switch off ignition.

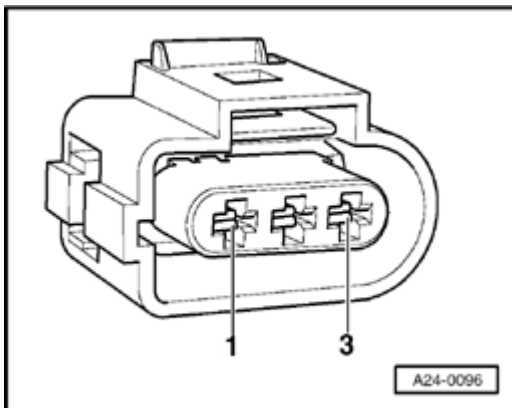
If no voltage is present:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) remains disconnected.



- Check wiring for open circuit between test box and connector referring to Electrical Wiring Diagrams.

terminal 1 and socket 98

terminal 2 and socket 87

terminal 3 and socket 108

Wire resistance: max. 1.5 Ω

- Additionally check wires for short to one another.

Specification: $\infty \Omega$

If no wiring malfunction is detected and voltage was present between terminals 1 and 3:

- Replace Camshaft Position (CMP) Sensor 2 - G163- ⇒ [Page 28-6](#) , item 13 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Engine Control Module (ECM) was disconnected from battery positive, readiness code must be generated again ⇒ [Page 01-149](#) .

If no wiring malfunction is detected and no voltage was present between terminals 1 and 3:

- Replace Engine Control Module (ECM) ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Engine Control Module (ECM) again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Engine Control Module (ECM) was disconnected from battery positive, readiness code must be generated again ⇒ [Page 01-149](#) .

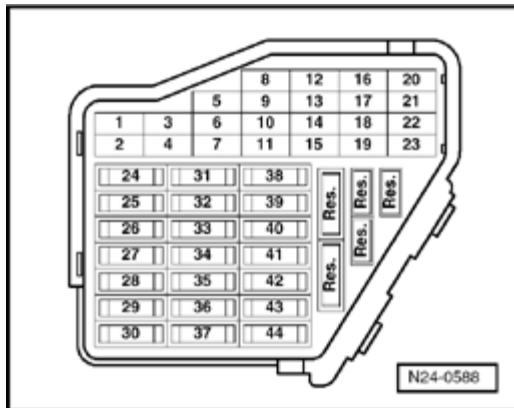
Ignition coil with power output stage, checking

Note:

The ignition coils and power output stage are combined into a single component and cannot be replaced separately.

Special tools, materials and equipment

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1527 LED test light
- ◆ VAG 1594 adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams

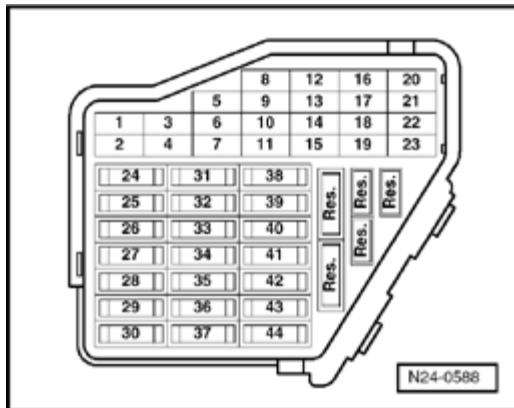


Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, this must be switched off.
- Motronic Engine Control Module (ECM) Power Supply Relay - J271- must be OK., checking:

⇒ *Electrical Wiring Diagrams, Electrical troubleshooting and Component locations*

- Engine speed sensor must be OK, checking ⇒ [Page 24-93](#) .
- Camshaft Position (CMP) Sensor must be OK, checking ⇒ [Page 28-16](#) .



Test sequence

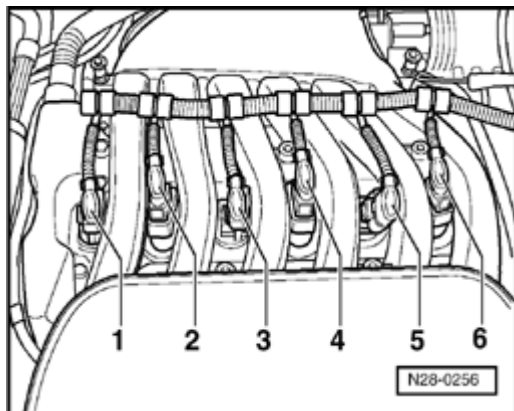


- Remove fuse 29 from fuse holder.

Note:

Removing fuse 29 interrupts the voltage supply to the fuel injectors.

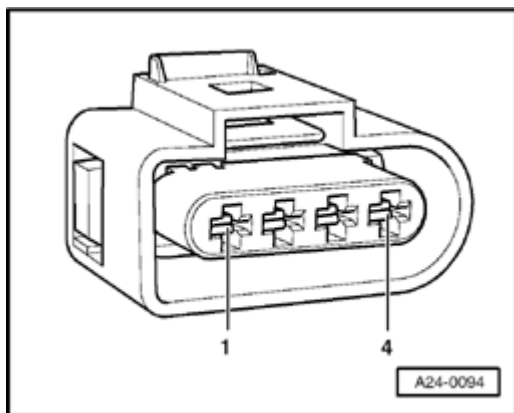
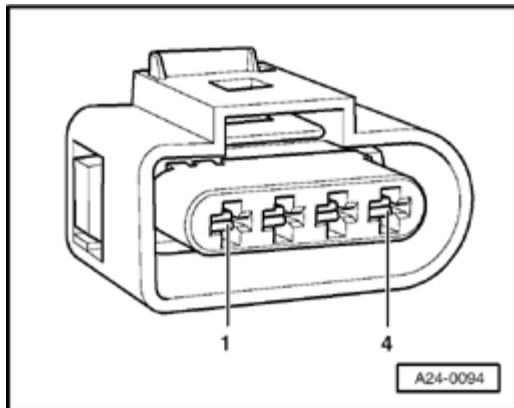
- Remove engine cover.



- Disconnect connectors from ignition coils 1 to 6.

Note:

Mark connector and component before disconnecting.



Checking voltage supply

- Measure supply voltage between terminals 1 and 3, and 2 and 3 of disconnected connector using multimeter and adapter cables from V.A.G 1594.
- Switch on ignition.
 - Specification: at least 11.5 V
- Switch off ignition.

If no voltage is present:

- Check wire for open circuit between 4-pin connector terminal 3 and Motronic Engine Control Module (ECM) Power Supply Relay -J271- referring to Electrical Wiring Diagrams.

Wire resistance: max. 1.5 Ω

- Check wiring for open circuit between 4-pin connector and Ground referring to Electrical Wiring Diagrams.

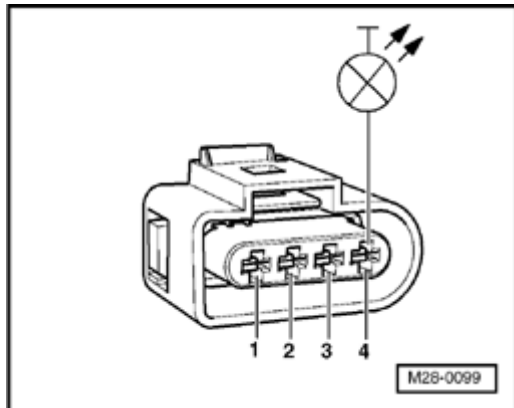
terminal 1 and Ground

terminal 2 and Ground

Wire resistance: max. 1.5 Ω

If there is no malfunction in the supply voltage:

- Check activation \Rightarrow [Page 28-27](#) .



Checking activation

- Connect VAG 1527 LED test light using adapter cables from V.A.G 1594 to terminals 4 and engine Ground of disconnected connector for cylinder 1.
- Operate starter and check ignition signal from Engine Control Module (ECM).
LED must flicker
- Repeat check at fuel injector connectors for Cyls. 2 to 6.
- Switch off ignition.

When the LED flickers and the supply voltage is OK.:

- Replace relevant ignition coil with power output stage ⇒ [Page 28-3](#), item 2.
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#).
- Read readiness code ⇒ [Page 01-146](#). If DTC memory has been erased or Engine Control Module (ECM) was disconnected from battery positive, readiness code must be generated again ⇒ [Page 01-149](#).

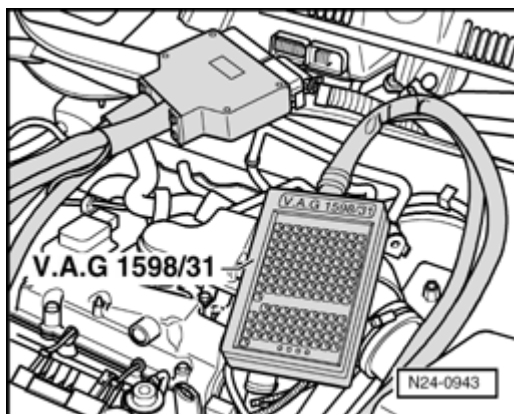
If the LED does not flicker:

- Check wiring ⇒ [Page 28-28](#) .

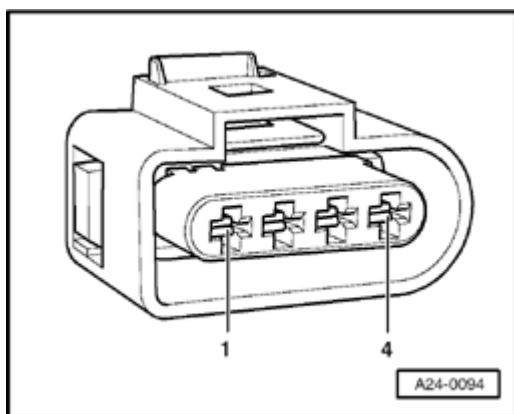
Checking wiring

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) remains disconnected.



- Check wiring for open circuit between test box and 4-pin connector referring to Electrical Wiring Diagrams. For:

Cylinder 1 terminal 4 and socket 102

Cylinder 2 terminal 4 and socket 110

Cylinder 3 terminal 4 and socket 94

Cylinder 4 terminal 4 and socket 111

Cylinder 5 terminal 4 and socket 103

Cylinder 6 terminal 4 and socket 95

Wire resistance: max. 1.5 Ω

- Additionally check wires for short to one another.

Specification: $\infty \Omega$

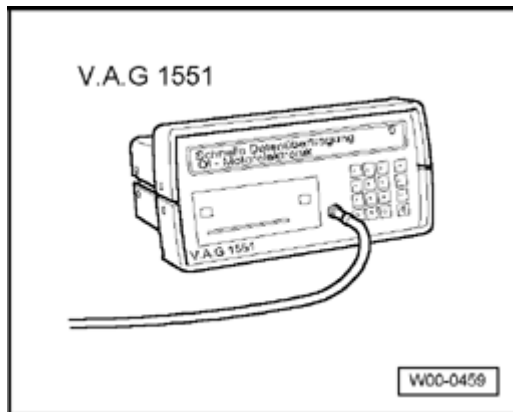
If no malfunction can be found in the wiring:

- Replace Engine Control Module (ECM) ⇒ [Page 24-173](#) .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Erase learned values and adapt Engine Control Module (ECM) again ⇒ [Page 24-182](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Engine Control Module (ECM) was disconnected from battery positive, readiness code must be generated again ⇒ [Page 01-149](#) .

Knock sensor, checking

Note:

- ◆ *The terminal surfaces between knock sensor and cylinder block must be free of corrosion, dirt and grease.*
- ◆ *Knock Sensor (KS) 2 -G66- has a direct 2-pin connector and therefore no terminal for the shielding in the connector.*
- ◆ *It is extremely important to keep to the torque setting of 20 Nm to ensure the knock sensors perform perfectly.*
- ◆ *Only gold-plated terminals may be used when servicing the knock sensor connector terminals.*



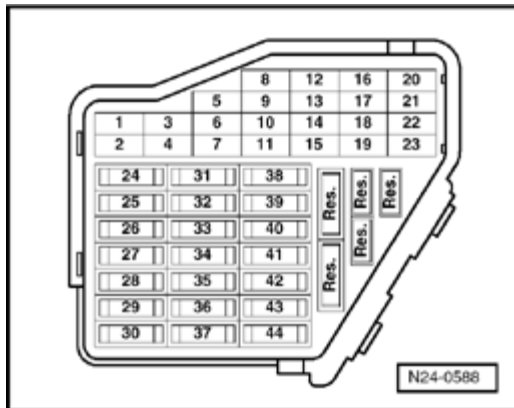
Special tools, materials and equipment

- ◆ VAG 1551 Scan tool (or VAG 1552 Scan tool) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

- ◆ VAG 1526 or Fluke 83 Hand multimeter or VAG 1715 multimeter
- ◆ VAG 1594 adapter set
- ◆ VAG 1598/31 test box
- ◆ Electrical Wiring Diagrams



Test requirements

- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- All electrical accessories, e.g. lights and rear window defroster must be switched off.
- If the vehicle is equipped with air conditioning, it must be turned off.
- Selector lever must be in position "P" or "N" on vehicles with an automatic transmission.
- Knock sensor malfunction detected by On Board Diagnostic (OBD) ⇒ [Page 01-23](#) .
- The signal from brake light switch and brake pedal switch must be OK, Checking ⇒ [Page 24-206](#) .
- Engine Coolant Temperature (ECT) must be at least 85 °C, ⇒display group 28, display zone 3.

Functional check

- Connect VAG 1551 Scan tool ((VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idling speed: (Connecting scan tool and selecting engine electronics control module ⇒ [Page 01-12](#)).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press buttons -0- and -4- for function "Initiate basic setting" and confirm entry with -Q- button.

Basic setting



Indicated on display:

Input display group number XXX

- Press buttons -0-, -2- and -8- for "Display group number 28" and confirm entry with -Q- button.

System in basic setting 28



Indicated on display: (1 to 4 = display zones)

1 2 3 4

Only continue with the test when

- The Engine Coolant Temperature (ECT) is above 85 °C - Display zone 3-

- Depress brake pedal and hold.
- Depress accelerator down to wide open throttle position.

Engine speed will be increased by Engine Control Module (ECM) to approx. 2300 rpm.

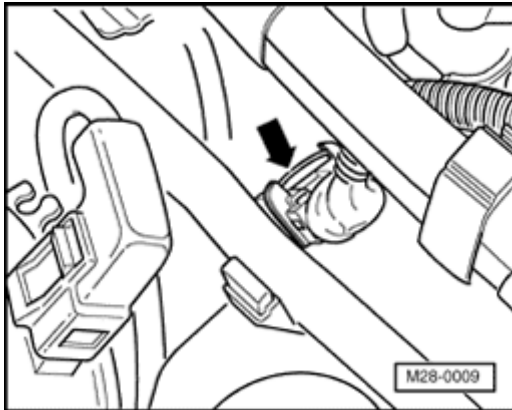
- Depress brake pedal and accelerator and hold until display in display zone 4 jumps from "Test OFF" to "Test ON".
- Depress and hold brake pedal and accelerator until display zone 4 displays specification "Syst. OK."
- Release brake and accelerator pedals.
- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If "Syst.n.OK." appears in display zone 4:

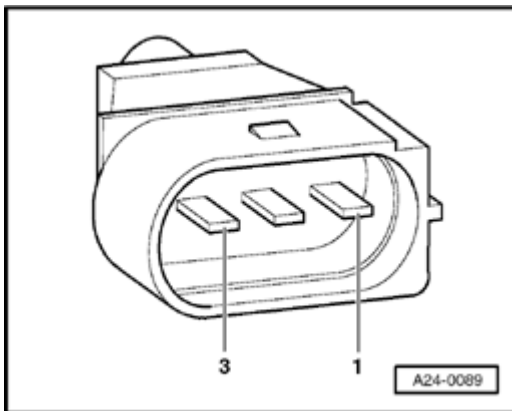
- Check resistance and wiring for knock sensors
⇒ [Page 28-35](#) .

Checking resistance and wiring

Knock Sensor (KS) 1 -G61-



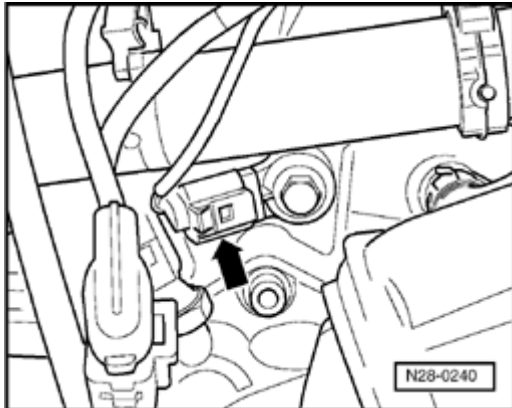
- ✦ - Separate 3-pin connector to Knock Sensor (KS) 1 -G61- (arrow) on right of cylinder head.



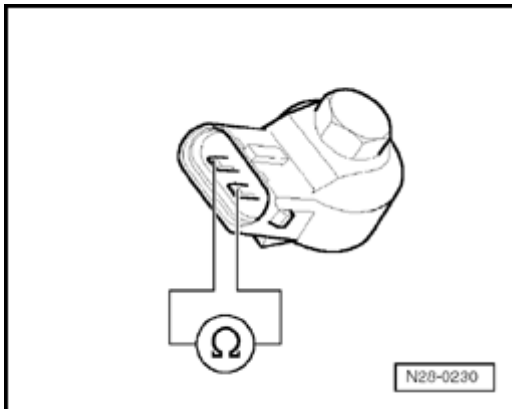
- ✦ - Measure resistance between terminals 1 and 2, 1 and 3, and 2 and 3 at connector to Knock Sensor (KS) 1 -G61-.

Specification: $\infty \Omega$

Knock Sensor (KS) 2 -G66-



- ✦ - Disconnect 2-pin connector from Knock Sensor (KS) 2 -G66- (arrow)(on intake side of cylinder head).



- ✦ - Measure resistance between terminals 1 and 2 at connector to Knock Sensor (KS) 2 -G66-.

Specification: $\infty \Omega$

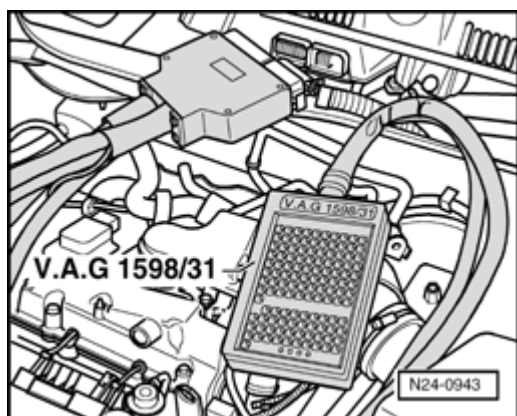
If the specifications are not obtained:

- Replace Knock Sensor (KS) -G61- or -G62- [Page 28-4](#) , item 7 or ⇒ [Page 28-8](#) , item 7
- Check DTC memory, repair malfunctions necessary and then erase DTC memory [01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If memory has been erased or Engine Control Module (ECM) was disconnected from battery positive, readiness code must be generated again ⇒ [Page 01-149](#) .

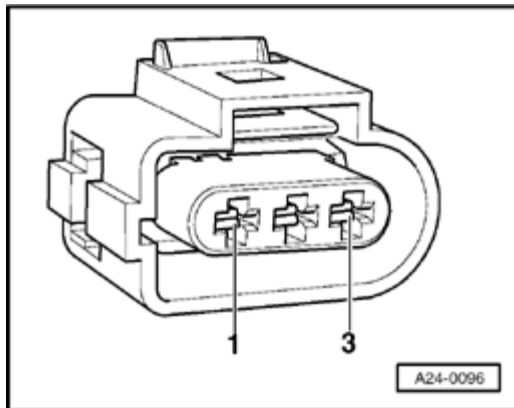
If the specifications are obtained:

- Remove wiper arms and cowl panel:

⇒ [Repair Manual, Electrical Equipment; Repair Group 92](#)



- Connect VAG 1598/31 test box to control module wiring harness. Engine Control Module (ECM) remains disconnected.



Knock Sensor (KS) 1 -G61-

- Check wiring for open circuit between test box and 3-pin connector referring to Electrical Wiring Diagrams

terminal 1 and socket 106

terminal 2 and socket 99

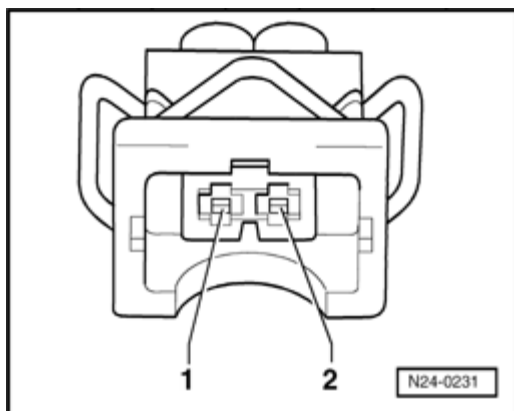
terminal 3 and socket 108

Wire resistance: max. 1.5 Ω

- Additionally check wires for short to one another.

Specification: $\infty \Omega$

Knock Sensor (KS) 2 -G66-



- Check wiring for open circuit between test box and 2-pin connector referring to Electrical Wiring Diagrams.

terminal 1 and socket 107

terminal 2 and socket 99

Wire resistance: max. 1.5 Ω

- Additionally check wires for short to one another.

Specification: $\infty \Omega$

If no wiring malfunction is detected:

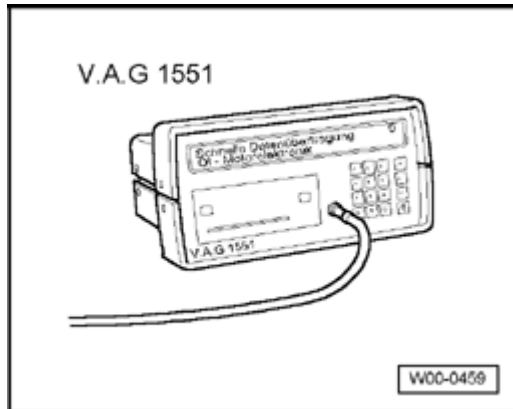
- Loosen knock sensor and tighten again to 20 Nm.
- Repeat functional check.
- Check control module DTC memory again.

If malfunction is still present:

- Replace Knock Sensor (KS) -G61- or -G66- ⇒ [Page 28-4](#) , item 7 or ⇒ [Page 28-8](#) , item 17 .
- Check DTC memory, repair malfunctions if necessary and then erase DTC memory ⇒ [Page 01-23](#) .
- Read readiness code ⇒ [Page 01-146](#) . If DTC memory has been erased or Engine Control Module (ECM) was disconnected from battery positive, readiness code must be generated again ⇒ [Page 01-149](#) .

Misfire detection, checking

Special tools and equipment

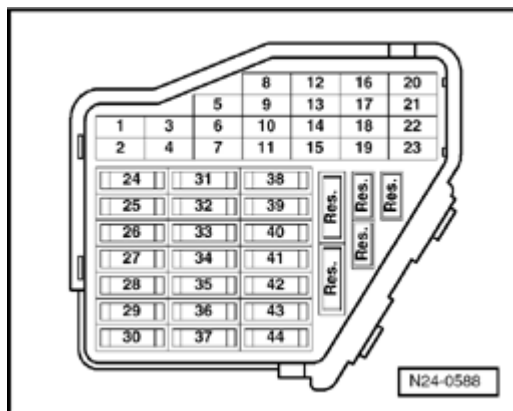


- ◆ VAG 1551 Scan tool (or VAG 1552 Scan tool) with VAG 1551/3 adapter cable

Note:

All functions which could previously be performed with VAG 1551/1552 can also be performed with the VAS 5051.

Test requirements



- The fuses must be OK.
- The battery voltage must be at least 11.5 V.
- Engine mechanically OK.
- No DTCs must be stored in DTC memory ⇒ [Page 01-23](#) .

Test sequence

- Test drive vehicle.

Observe the valid safety precautions when performing a road test ⇒ [Page 28-12](#) .

- Connect VAG 1551 Scan tool (or VAG 1552) and select engine electronics control module with "Address word" 01. Engine must be running at idling speed: (Connecting scan tool and selecting engine electronics control module ⇒ [Page 01-12](#)).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- for function "Read measured value (data) block" and confirm entry with -Q- button.

Read measured value block
Input display group number XXX



Indicated on display:

- Press buttons -0-, -1- and -4- for "Display group number 14" and confirm entry with -Q- button.

Read measured value block 14



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Check misfire detection status in display zone 4.

Specification: "activated"

- Check total number of misfires in display zone 3.

Specification: 0

If the specifications are obtained:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If the specifications are not obtained:

- Change to display group 15 as follows:
 - Press button 3 ((VAG 1551) or button ↑ (VAG 1552).

Read measured value block 15



1 2 3 4

Indicated on display: (1 to 4 = display zones)

- Check misfire detection status in display zone 4.

Specification: "activated"

- Check display zones 1 to 3 for detected misfires in cylinders cylinders 1 to 3.

Specification: 0

If the specifications are not obtained:

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

Evaluating display group 15 and display group 16, ⇒ [Page 01-207](#) .

If the specifications are obtained:

- Change to display group 16 as follows:
 - Press button 3 ((VAG 1551) or button ↑ (VAG 1552).

Read measured value block 16



Indicated on display: (1 to 4 = display zones)

1 2 3 4

- Check misfire detection status in display zone 4.

Specification: "activated"

- Check display zones 1 to 3 for detected misfires in cylinders 4 to 6.

Specification: 0

- Press → button.
- Press buttons -0- and -6- for function "End output" and confirm entry with -Q- button.
- Switch off ignition.

If the specifications are not obtained:

- Evaluate display group 15 and display group 16
⇒ [Page 01-207](#)

Select a topic

00 - General, Technical data

Transmission identification

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30 - Clutch

Clutch mechanism, repairing

[Pedal cluster assembly, overview](#)

[Over-center spring, removing and installing](#)

[Clutch pedal, removing and installing](#)

[Hydraulic components, assembly overview](#)

[Clutch master cylinder, removing and installing](#)

[Clutch system, bleeding](#)

Clutch release mechanism, servicing

Clutch, servicing

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Gear selector mechanism, servicing

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35 - Manual Transmission - Gears, Shafts

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[Input shaft, adjusting](#)

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39 - Final drive, Differential

[Oil seals for flanged shafts, replacing](#)

[Oil seal for left flanged shaft, replacing](#)

[Oil seal for right flanged shaft, replacing](#)

[Differential, disassembling and assembling](#)

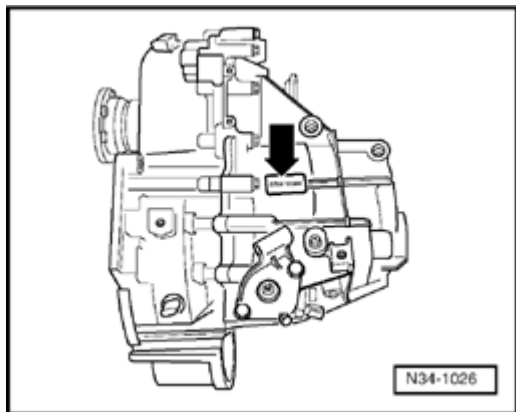
[Adjustment overview](#)

[Differential, adjusting](#)

Transmission identification

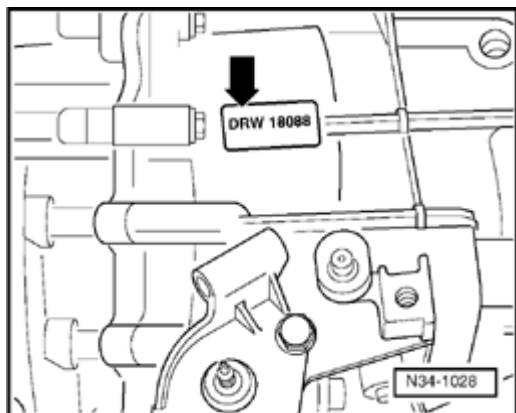
The 02M manual transmission is installed a or 6-speed transmission in conjunction with or 6-cylinder engine in the Golf from 1998 a Jetta from 1999.

Application ⇒ [Page 00-2](#) .



Location on transmission

Code letters and date of manufacture (arrow)



Code letters and date of transmission manufacture (arrow)

Example:	DRW	18	08	8
	Code letters	Day	Month	Year (of manufacture)

Additional data depends on manufacture.

Note:

The transmission code letters are also shown on the vehicle identification plates.

Code letters, application, ratios, capacities

Transmission		5- and 6-speed 02M		
Transmission codes		EDJ	ERR	FML
Manufactured	from	11.01	06.01	06.01
	to	02.02	04.02	06.03
Application	Model	Golf from 1998 Jetta from 1999	Golf from 1998 Jetta from 1999	Golf from 1998 Jetta from 1999
	Engine	2.8 ltr. - 147 kW	1.8 ltr. - 132 kW	1.8 ltr. - 132 kW
Ratios: $Z_2 : Z_1$	Final drive I ¹⁾	60 : 18 = 3.333	62 : 16 = 3.875	71 : 18 = 3.944
	Final drive II ²⁾	60 : 22 = 2.727	62 : 20 = 3.100	71 : 23 = 3.087
	1st gear	42 : 11 = 3.818	41 : 12 = 3.417	47 : 14 = 3.357
	2nd gear	40 : 19 = 2.105	40 : 19 = 2.105	48 : 23 = 2.087
	3rd gear	40 : 28 = 1.429	40 : 27 = 1.481	47 : 32 = 1.469
	4th gear	37 : 34 = 1.088	38 : 33 = 1.152	46 : 40 = 1.150
	5th gear	34 : 31 = 1.097	35 : 30 = 1.167	43 : 36 = 1.194
	6th gear	31 : 34 = 0.912	32 : 33 = 0.970	39 : 40 = 0.975
	Reverse	31 : 11 x 23 : 14 = 4.630	30 : 12 x 23 : 14 = 4.107	34 : 14 x 23 : 14 = 3.990
	Speedometer	electronic	electronic	electronic

1) Final drive for 1st to 4th gears

2) Final drive for 5th, 6th and reverse gears

00-3

Engine codes	EDJ	ERR	FML
Capacity	2.3 ltr.	2.3 ltr.	2.3 ltr.
Specification	Gear oil G51 SAE 75W90 (synthetic oil)	Gear oil G51 SAE 75W90 (synthetic oil)	Gear oil G51 SAE 75W90 (synthetic oil)
Clutch control	hydraulic	hydraulic	hydraulic
Clutch disc diameter	240 mm ¹⁾	240 mm ¹⁾	240 mm ¹⁾
Drive shaft flange diameter	108 mm	108 mm	108 mm
Overall ratio in top gear	2.487	3.007	3.010

¹⁾ Two-part flywheel

Code letters, assembly application, ratios, capacities

Transmission		5- and 6-speed 02M		
Transmission code		FSR	FZQ	FZR
Manufactured	from to	02.02 06.03	06.03	06.03
Application	Model	Golf from 1998 Jetta from 1999	Golf from 1998 Jetta from 1999	Golf from 1998 Jetta from 1999
	Engine	2.8 ltr. - 147 kW	1.8 ltr. - 132 kW	2.8 ltr. - 147 kW
Ratios: $Z_2 :$ Z_1	Final drive I ¹⁾	71 : 18 = 3.944	71 : 18 = 3.944	71 : 18 = 3.944
	Final drive II ²⁾	71 : 23 = 3.087	71 : 23 = 3.087	71 : 23 = 3.087
	1st gear	47 : 14 = 3.357	47 : 14 = 3.357	47 : 14 = 3.357
	2nd gear	48 : 23 = 2.087	48 : 23 = 2.087	48 : 23 = 2.087
	3rd gear	47 : 32 = 1.469	47 : 32 = 1.469	47 : 32 = 1.469
	4th gear	46 : 40 = 1.150	46 : 40 = 1.150	46 : 40 = 1.150
	5th gear	43 : 36 = 1.194	43 : 36 = 1.194	43 : 36 = 1.194
	6th gear	39 : 40 = 0.975	39 : 40 = 0.975	39 : 40 = 0.975
	Reverse	34 : 14 x 23 : 14 = 3.990	34 : 14 x 23 : 14 = 3.990	34 : 14 x 23 : 14 = 3.990
	Speedometer	electronic		

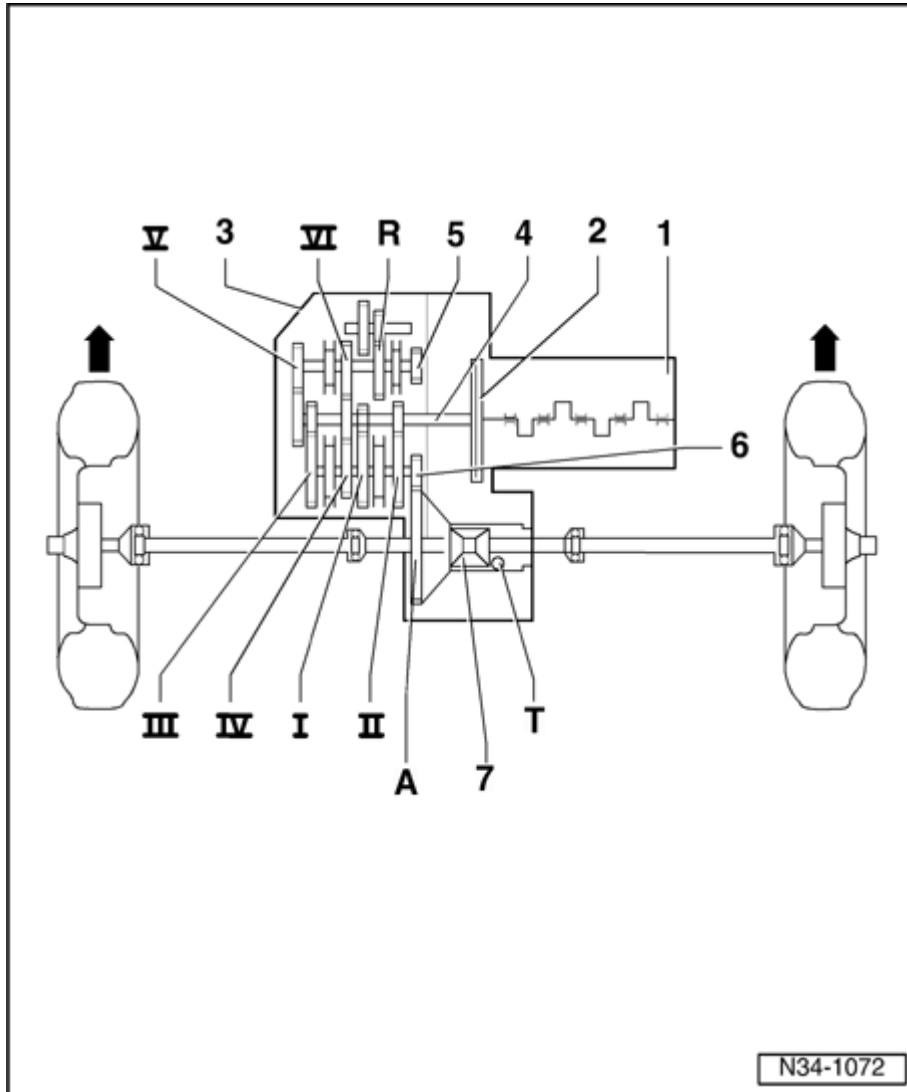
1) Final drive for 1st to 4th gears

2) Final drive for 5th, 6th and reverse gears

00-5

Identification codes	FSR	FZQ	FZR
Capacity	2.3 ltr.		
Specification	Gear oil G51 SAE 75W90 (synthetic oil)		
Clutch control	hydraulic	hydraulic	hydraulic
Clutch disk diameter	240 mm ¹⁾	240 mm ¹⁾	240 mm ¹⁾
Drive shaft flange diameter	108 mm	108 mm	108 mm
Overall ratio in top gear	3.010	3.010	3.010

¹⁾ Two-part flywheel



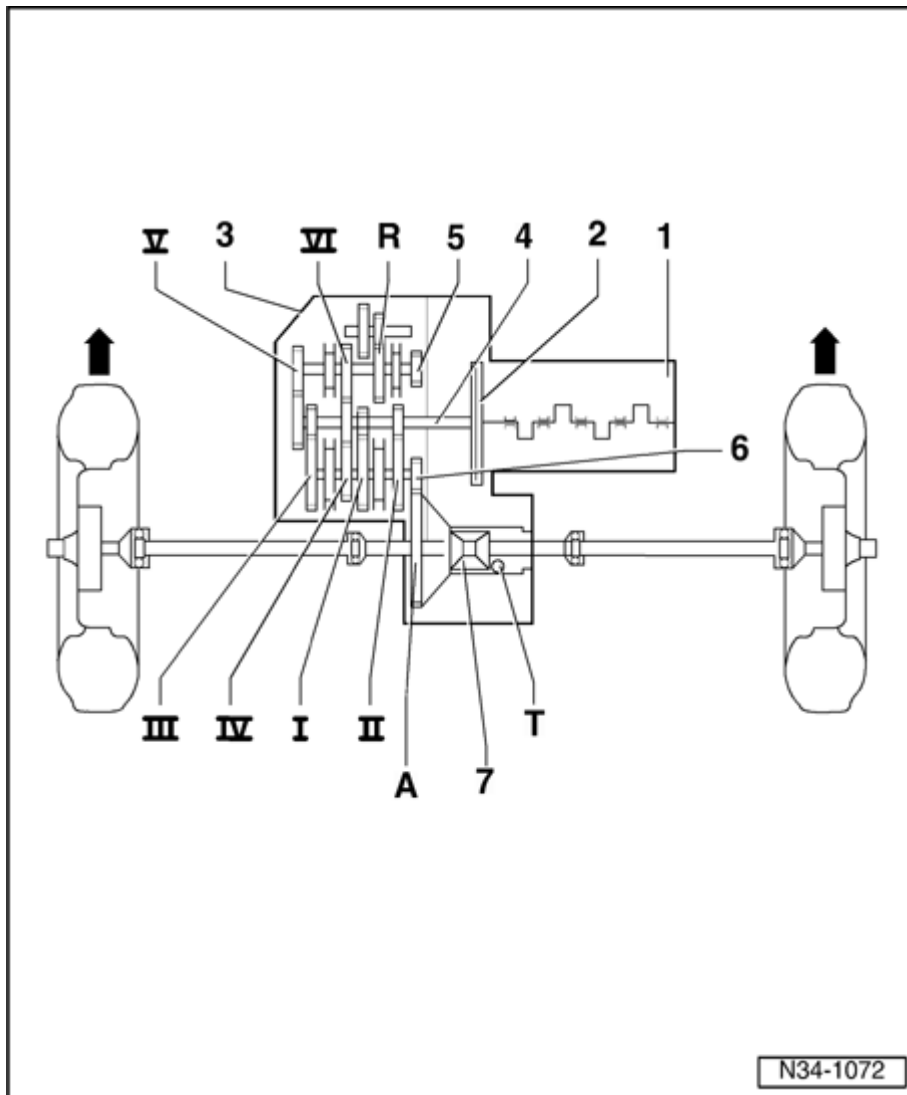
Transmissic layout

Designation

- 1 - Engine
- 2 - Clutch
- 3 - Transmissio
- 4 - Input shaft
- 5 - Output shaft
5th/6th/rever:
gears
- 6 - Output shaft
1st-4th gears
- 7 - Differential

Arrows point in
direction of travel

00-7

**Gear ratios**

I - 1st gear

II - 2nd gear

III - 3rd gear

IV - 4th gear

V - 5th gear

VI - 6th gear

R - Reverse gear

A - Final drive

T - Speedometer drive

Arrows point in direction of travel

Calculating overall ratio "i"

Example: 6-Speed standard transmission 02M

	6th gear	Final drive
Drive gear	$ZG_1 = 36$	$ZA_1 = 26$
Driven gear	$ZG_2 = 29$	$ZA_2 = 68$

$$i = Z_2 \div Z_1^{1)}$$

$$i_G = \text{Gear ratio} = ZG_2 : ZG_1 = 29 : 36 = 0.806$$

$$i_A = \text{Axle ratio} = ZA_2 : ZA_1 = 68 : 26 = 2.615$$

$$\text{overall ratio} = \text{total ratio} = i_G \times i_A = 0.806 \times 2.615 = 2.108$$

1) Z_1 = No. of teeth driving gear, Z_2 = No. of teeth driven gear

General repair instructions

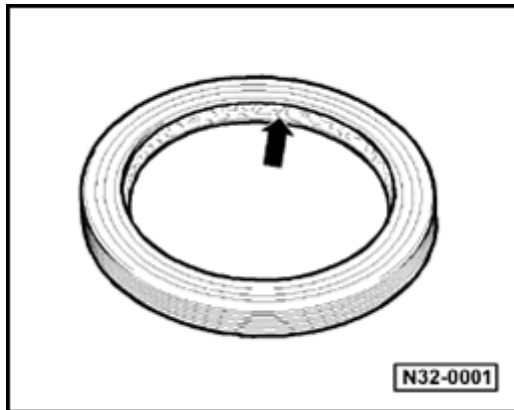
The maximum possible care, cleanliness and proper tools are essential to ensure satisfactory and successful transmission repairs. The usual basic safety precautions also apply when performing vehicle repairs.

A number of generally valid instructions applicable for the various repair procedures - which were previously repeated a number of times at numerous places in the Repair Manual - are summarized here. They apply to this Repair Manual.

Transmission

- ◆ When installing ensure that the dowel sleeves between the engine and the transmission are correctly located.
- ◆ When assembling mounting brackets as well as other waxed components the contact surfaces must be cleaned. Contact surfaces must be free of grease and wax.
- ◆ When changing a transmission fill it with gear oil to the lower edge of the filler hole.
- ◆ Capacities and specifications ⇒ [Page 00-2](#) .

00-10

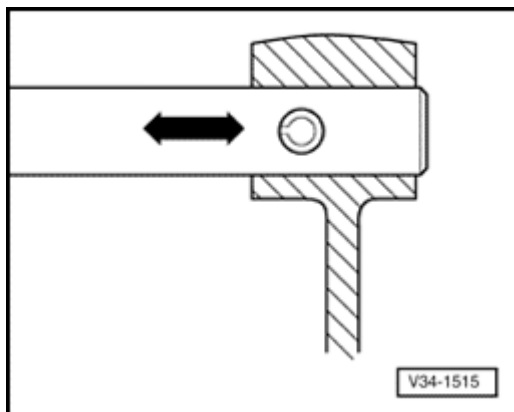


Gaskets, sealing rings

- ◆ Before installing oil seal, fill space between sealing lips with grease G 052 128 A1 -arrows-.
- ◆ After installing, check oil level ⇒ [Page 34-54](#) .
- ◆ Thoroughly clean joint surfaces and apply sealant AMV 188 200 03.
- ◆ Apply sealant uniformly but not too thick.
- ◆ Replace "O-rings".

Locking devices

- ◆ Replace circlips.
- ◆ Do not overstretch circlips.
- ◆ Circlips must locate properly in the groove.
- ◆ Replace spring pins installation position: Slot longitudinal to line of force.



Bolts and nuts

- ◆ Tighten and loosen bolts and nuts for securing covers and housings in a diagonal sequence.
- ◆ Especially delicate parts, such as clutch pressure plates, must not be distorted. Loosen and tighten nuts and bolts in stages in a diagonal sequence.
- ◆ Tightening torques as specified are for uncoiled bolts and nuts.
- ◆ Replace self-locking bolts and nuts.
- ◆ Make sure that on bolted connections the areas around the contact surfaces as well as the visible surfaces of nuts and bolts are rewaxed after assembly, if necessary.

Bearings

- ◆ Install new tapered roller bearings as supplied and do not lubricate additionally.
- ◆ Install needle bearings with lettered side (thicker metal) towards fitting tool.
- ◆ Tapered roller bearings fitted to one shaft must be replaced as a set. Use the same make of bearings.
- ◆ Heat inner races to approx. 100 ° C before installing.
- ◆ Do not interchange outer or inner races of bearings of the same size. The bearings are matched in pairs.

Shims

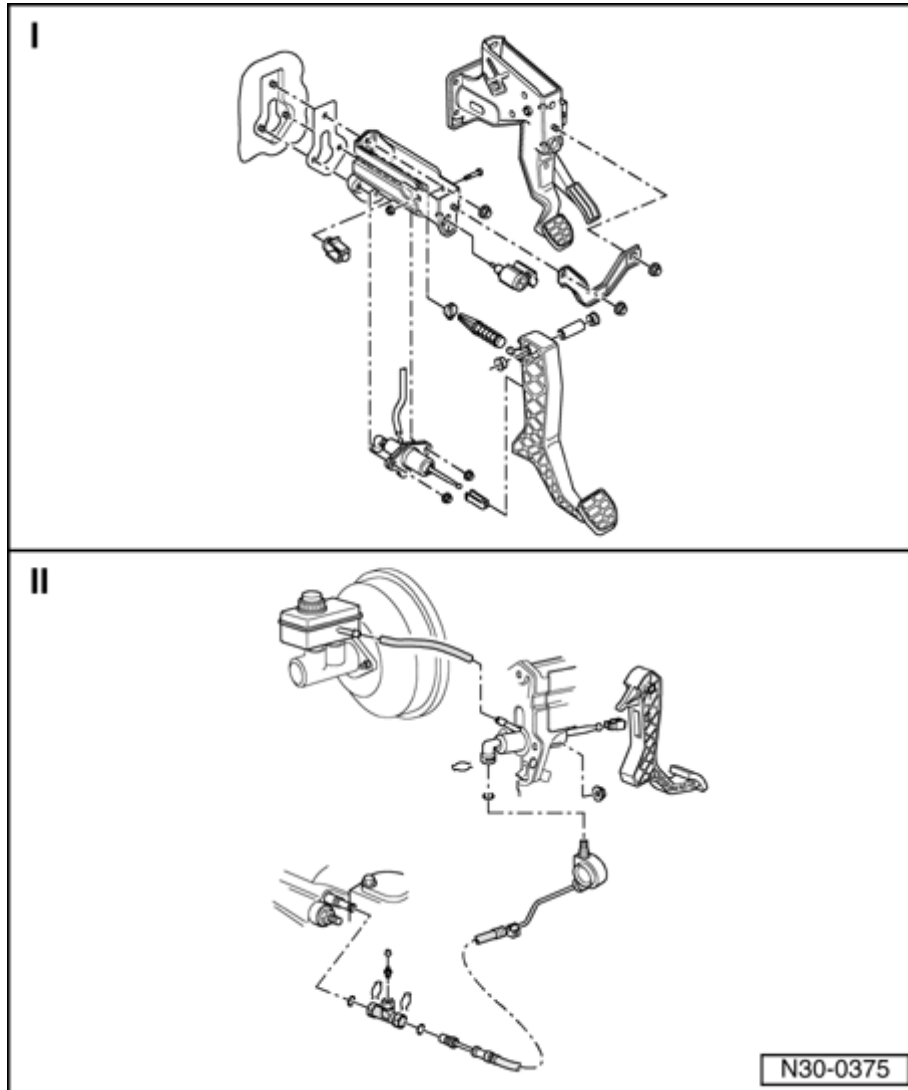
- ◆ Measure shims at several points with a micrometer. Tolerance variations make it possible to find the exact shim thickness required.
- ◆ Check for burrs and damage.
- ◆ Only install perfect shims.

Synchronizer rings

- ◆ Do not interchange. When reusing always fit to the same gear.
- ◆ Check for wear and replace if necessary.
- ◆ Coat with gear oil before installing.

Selector gears

- ◆ Before installing clean and heat on a hot plate to approx. 100 ° C.
- ◆ Temperature can be checked with temperature tester V.A.G 1558.

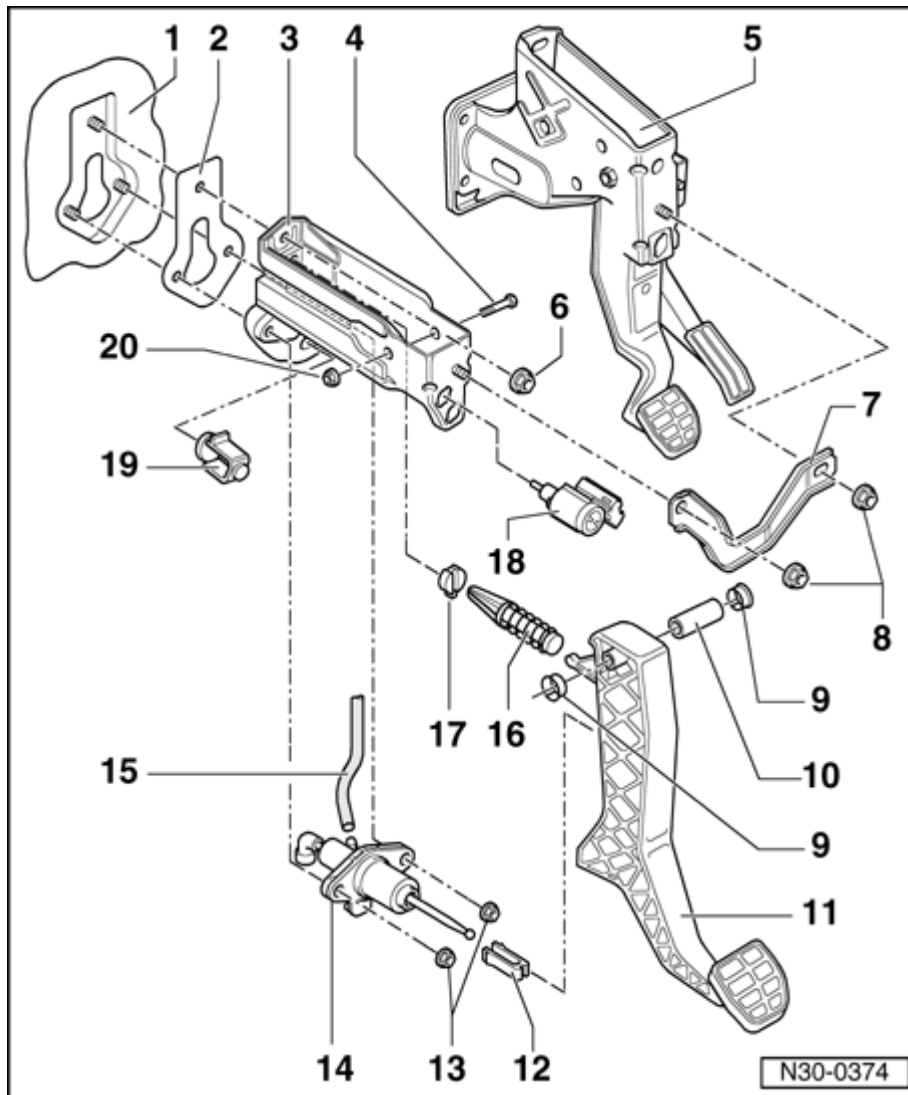


Clutch mechanism, repairing

- I - Assembly overview-pedal ⇒ [Page 30-2](#)
- II - Assembly overview-hydraulics ⇒ [Page 30-10](#)

Note:

- ◆ Disconnect the battery ground strap.
- ◆ For vehicles with a coded radio, obtain the radio code.
- ◆ Lubricate all bearings and contact surfaces with poly resin grease Part No. G 000 450 02.



Pedal cluster assembly, overview

1 - Bulkhead

- ◆ With support and clutch master cylinder housing

2 - Gasket

- ◆ Always replace

3 - Support

- ◆ For clutch pedal housing

4 - Bolt

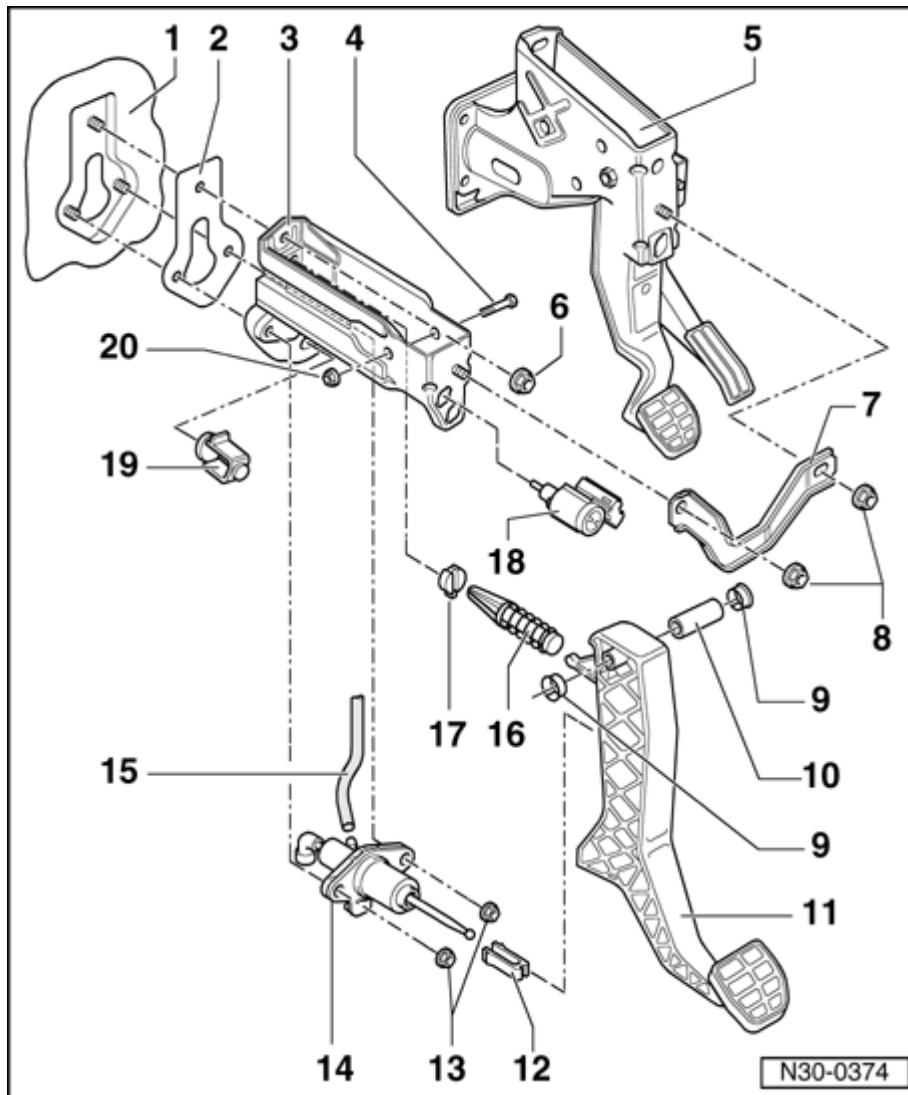
5 - Support

- ◆ For accelerator and brake pedal housing

6 - Hex nut, self-locking 25 Nm

- ◆ Always replace

7 Connecting - plate



8 - Hex nut, self-locking, 25 Nm

◆ Always replace

9 - Mounting bushing

10 - Mounting pin

11 - Clutch pedal

◆ Removing and installing
⇒ [Page 30-8](#)

12 - Bearing bracket

◆ Removing and installing
⇒ [Page 30-10](#)

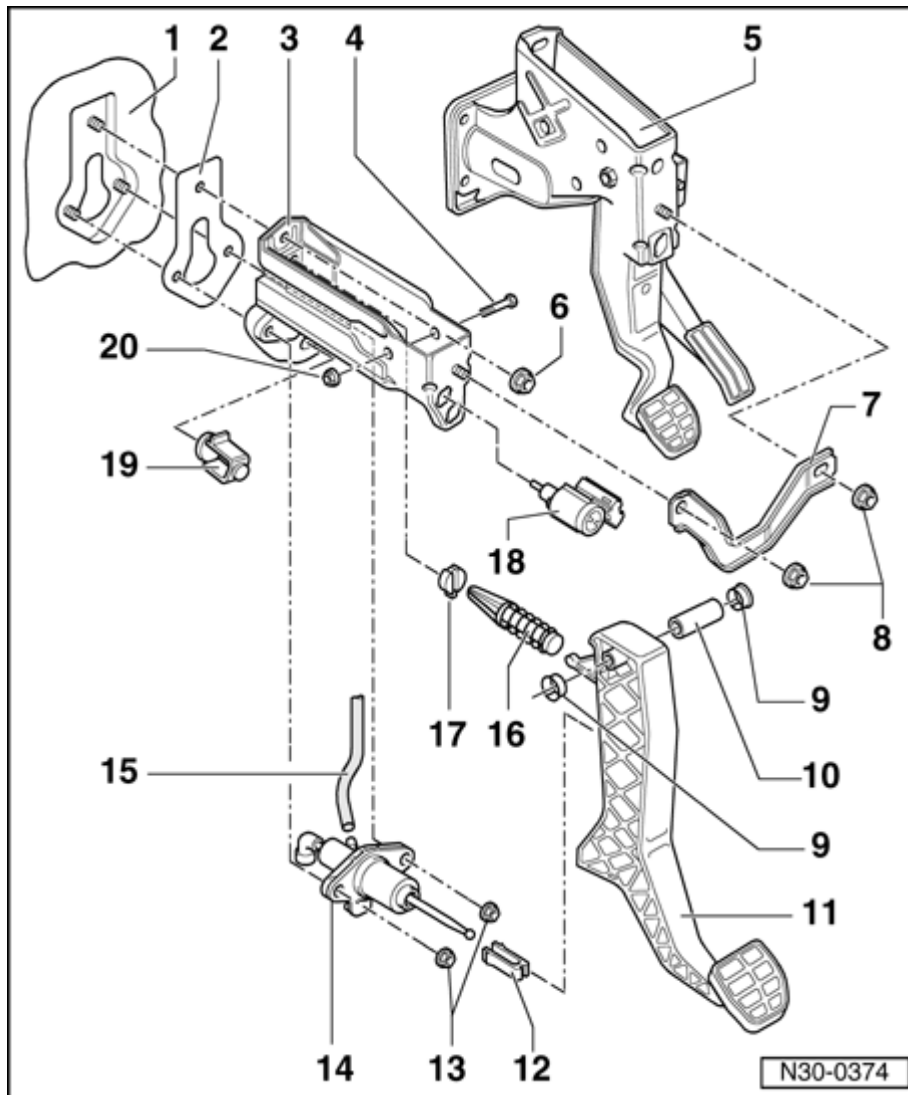
13 - Hex nut, self-locking, 25 Nm

◆ Always replace

14 - Clutch master cylinder

◆ Removing and installing
⇒ [Page 30-14](#)

15 Circulation - hose



16 - Over-center spring

- ◆ Removing and installing
⇒ [Page 30-5](#)

17 - Over-center spring seating

- ◆ Install in mounting bracket
- ◆ To replace, remove and install clutch master cylinder
⇒ [Page 30-14](#)

18 Clutch - vacuum vent valveswitch -F36-

- ◆ When removing and installing switch, push clutch pedal down as far as possible by hand.
- ◆ Before removing clutch

pedal,
remove
switch
with left
turn of
45 ° and
pull out
from
support
through
mounting
hole.

- ◆ Insert
switch in
mounting
hole and
secure
with right
turn of
45. °

19 - Stop flange

- ◆ For
clutch
pedal

- ◆ Installed
position
⇒ [Page
30-19](#)

20 - Hex nut, self- locking 25 Nm

- ◆ Always
replace

Over-center spring, removing and installing

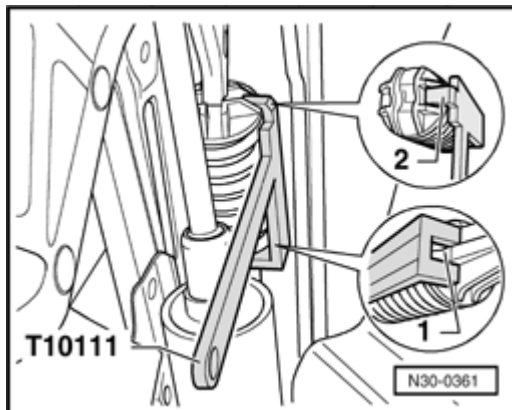
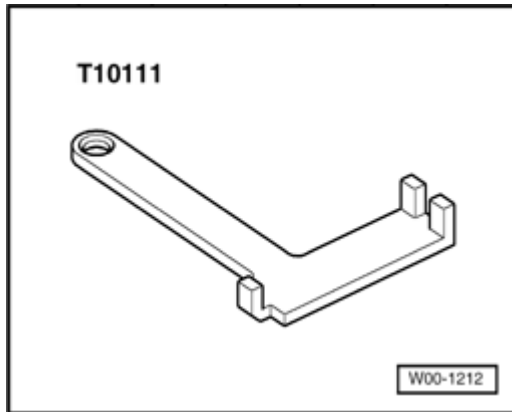
Special tools and equipment

- ◆ T10111 Assembly device

Removing

- Remove cover/lower drivers side.

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



- Insert assembly device T10111 in over-center spring from right side.

- Make sure that assembly device seats correctly on over-center spring:

1 - Assembly device must fit exactly onto over-center spring rear part, with claws over bridge -1-.

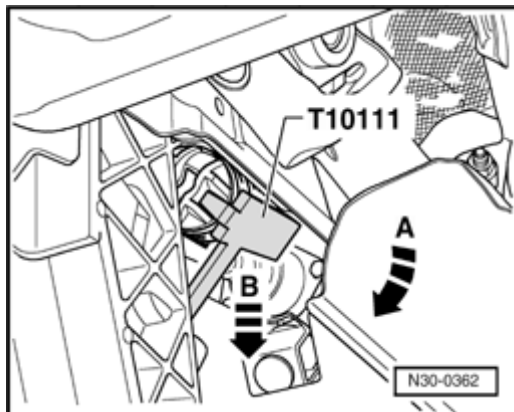
2 - Lightly press clutch pedal in direction of bulkhead.

Hang assembly device tab -2- in over-center spring cut out.

30-6

- Press clutch pedal to bulkhead until over-spring can be taken out of support mount and clutch pedal.

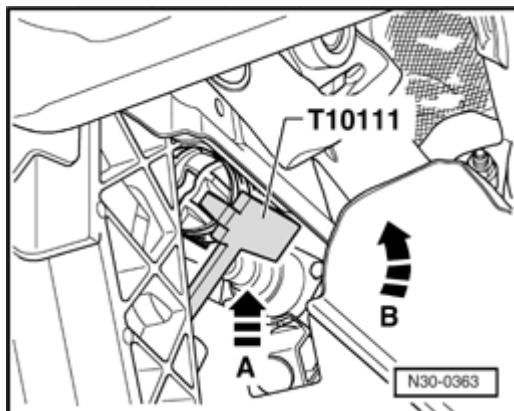
- Make clutch pedal recede even more until rest position.



- Turn over-center spring together with ass device T10111 in direction of arrow -A- and out downward in direction of arrow -B-.

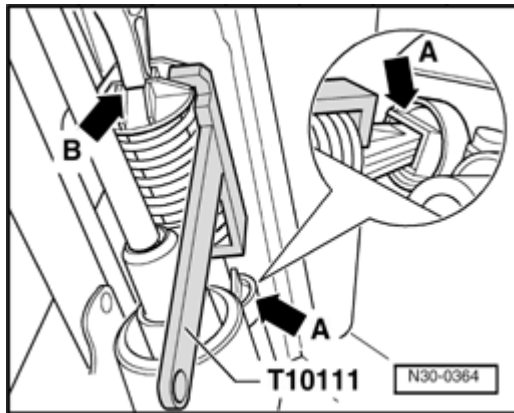
Installing

- Pull clutch pedal toward inside of vehicle.



- Install over-center spring together with as device T10111 in direction of arrow -A- in support. When doing this turn in direction arrow -B-.

30-7

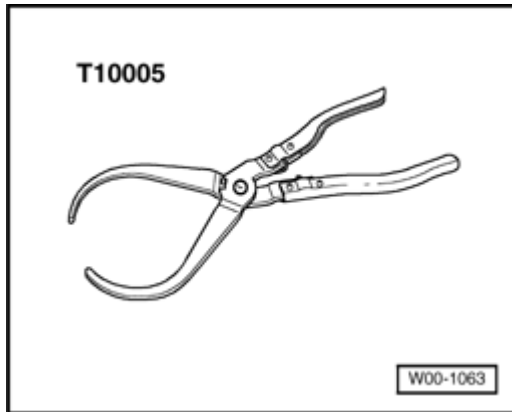


- Install over-center spring on support in rear (arrow -A-).
- Press clutch pedal to bulkhead until over-center spring lies against clutch pedal bearing tab (arrow -B-).
- Move clutch pedal to rest position, and remove assembly device.
- Install cover/lower driver's side.

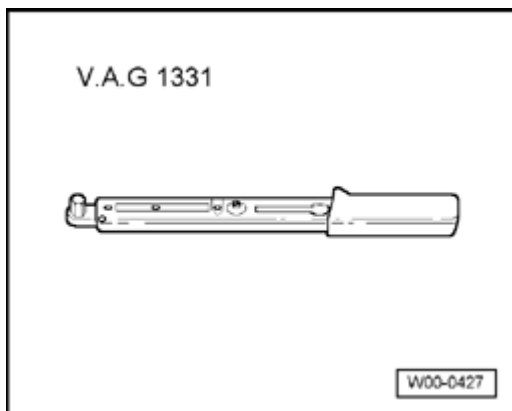
⇒ [Repair Manual, Body Interior, Repair Group 70](#)

Clutch pedal, removing and installing

Special tools and equipment



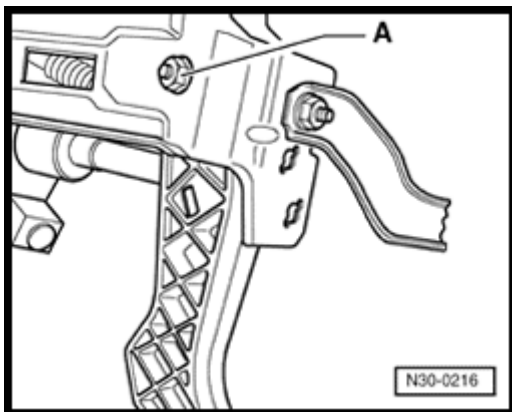
- ◆ T10005 Pliers



- ◆ VAG 1331 Torque wrench

Removing

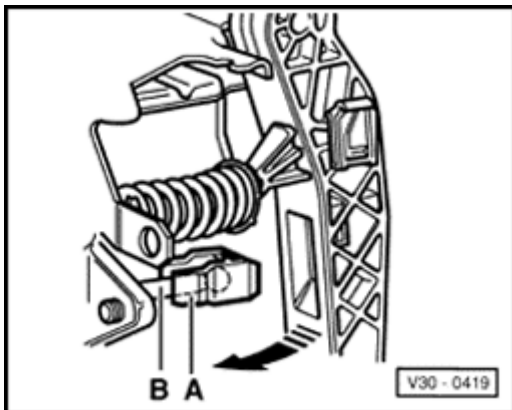
- Turn clutch pedal switch 45 ° to left and pull from support.
- Remove over-center spring ⇒ [Page 30-5](#)
- Separate clutch pedal from clutch master cylinder ⇒ [Page 30-14](#) and push operating rod toward engine compartment onto stop.



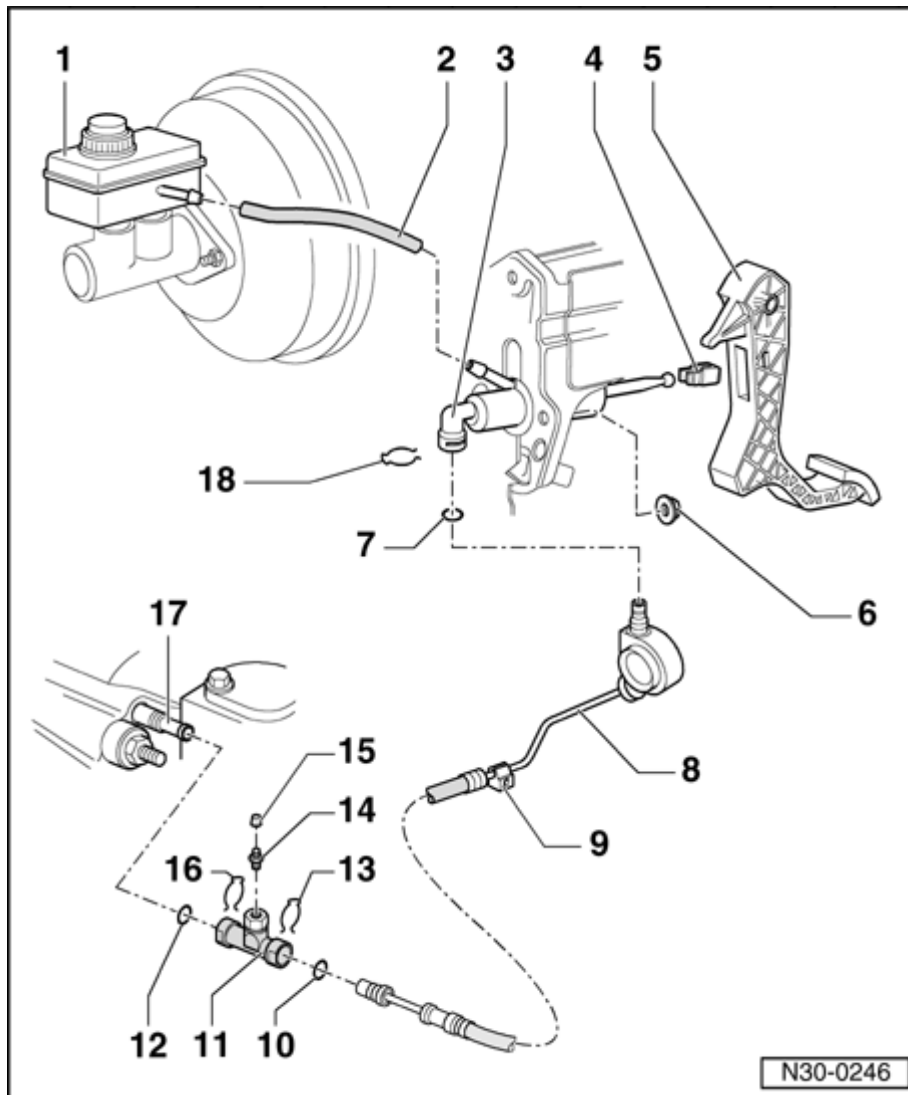
- Remove nut -A-.
- Pull bolt out until clutch pedal can be removed.

Installing

Installation is performed in the reverse sequence. Note the following:



- The bearing bracket -A- must be installed to clutch master cylinder operating rod -B-.
 - Push clutch pedal in direction of arrow to engage it. Make sure it is secure.
- Install over center spring ⇒ [Page 30-5](#).
- Place clutch pedal switch in mounting hole and turn 45 ° to the right.



Hydraulic components, assembly overview

1 - Brake fluid reservoir

2 - Supply hose

3 - Clutch master cylinder

◆ Removing and installing
⇒ [Page 30-14](#)

4 - Bearing bracket

◆ Only replace with clutch master cylinder removed

◆ Remove
⇒ [Fig. 1](#)

◆ Install
⇒ [Fig. 2](#)

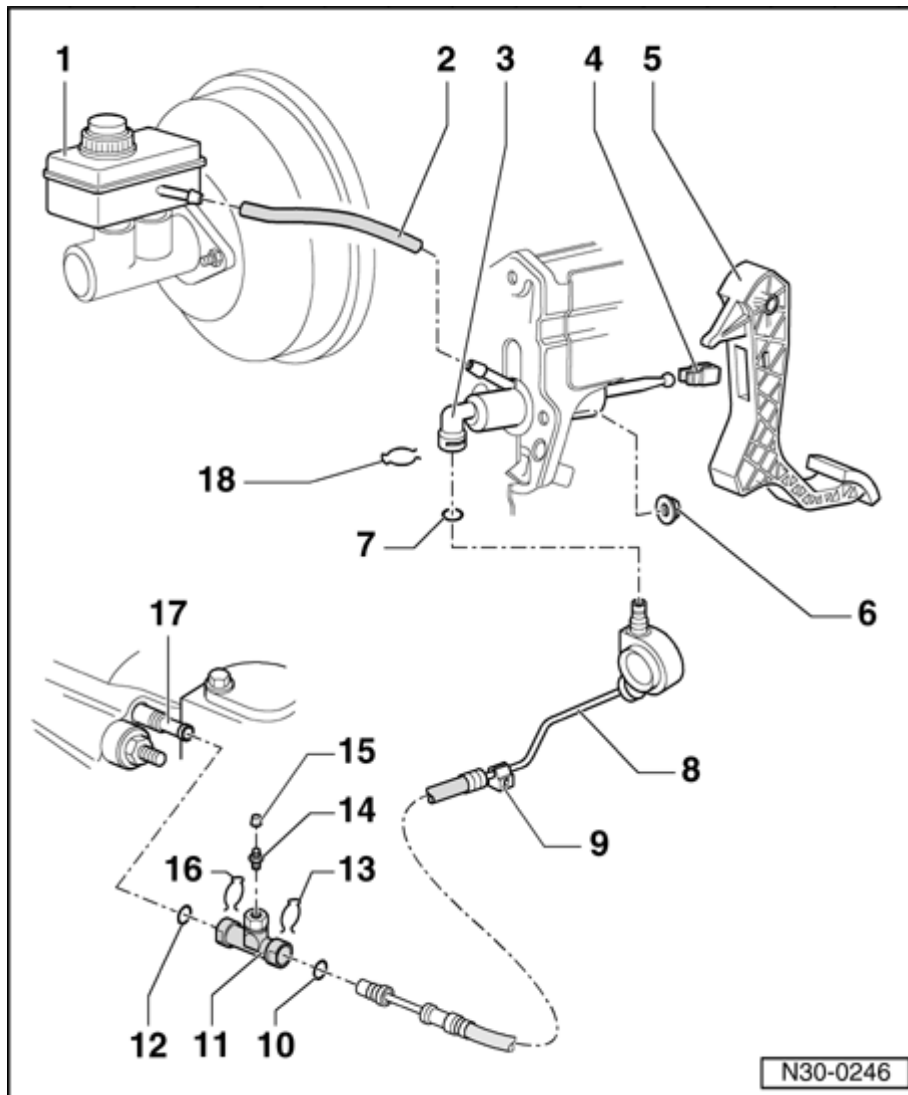
5 - Clutch pedal

◆ Removing and installing
⇒ [Page 30-8](#)

6 - Hex nut, self-locking, 25 Nm

- ◆ Always replace

30-11

**7 - Oil seal**

- ◆ Always replace
- ◆ Pull onto line/hose connection
- ◆ Moisten with brake fluid before installing

8 - Line/hose assembly

- ◆ Check Parts catalog for application

9 - Bracket

- ◆ Secured to body

10 - Oil Seal

- ◆ Always replace

11 - Bleeder**12 - Oil Seal**

- ◆ Always replace
- ◆ Pull onto line/hose connection
- ◆ Moisten with brake fluid before installing

13 - Clip

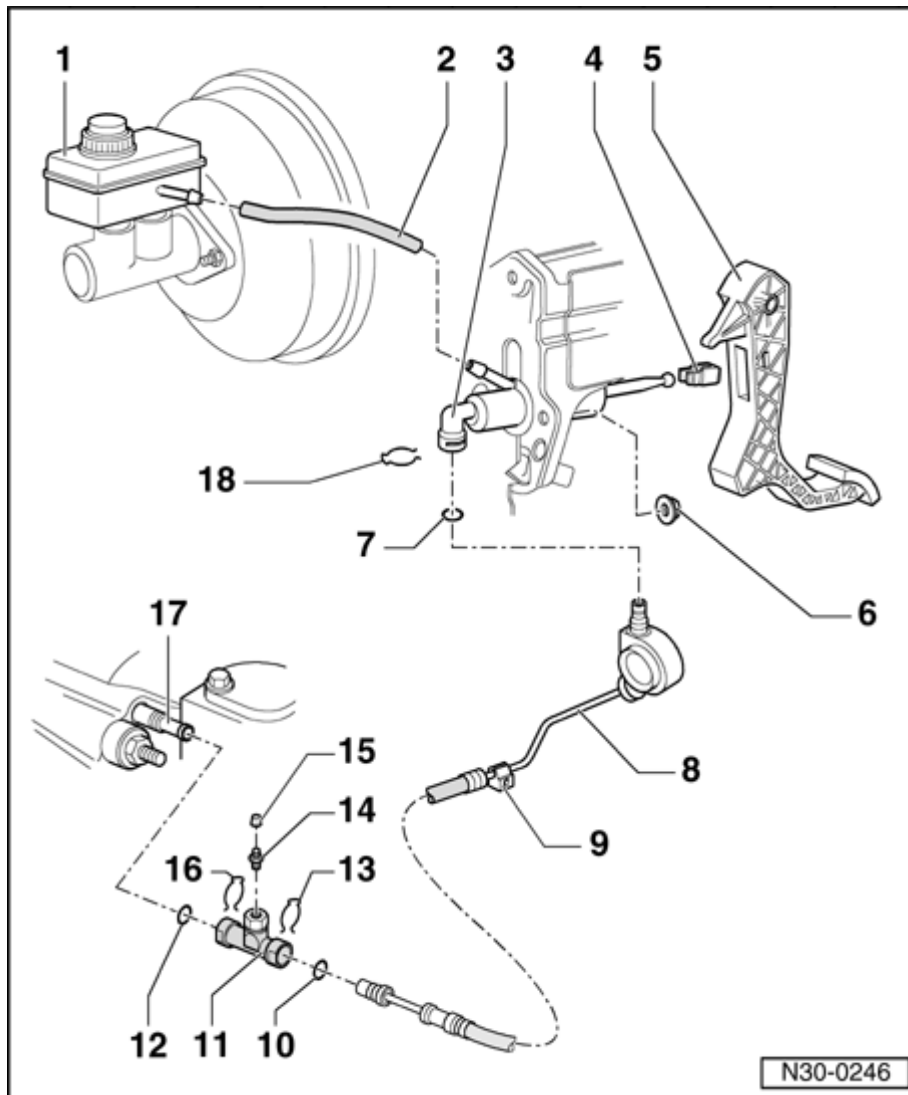
- ◆ To remove

and
install
line/hose
assembly,
pull out
clip onto
stop

**14 - Bleeder
valve**

- ◆ Bleeding
clutch
system:
⇒ [Page
30-20](#)

30-12



15 Protective - cap

16 - Clip

- ◆ To remove and install line/hose assembly, pull out clip onto stop

17 - Slave cylinder

- ◆ Removing and installing ⇒ [Page 34-27](#)

18 - Clip

- ◆ To remove and install line/hose assembly, pull out clip onto stop

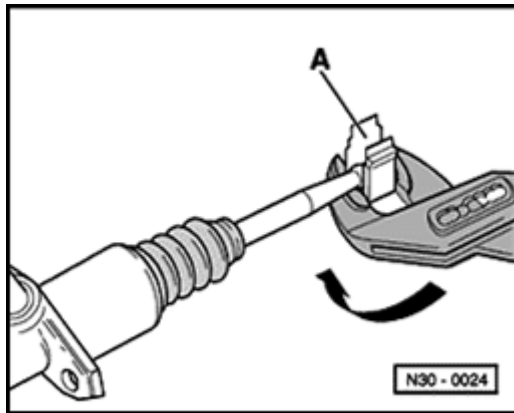


Fig. 1 Remove retainer -A- by prying in direction of arrow

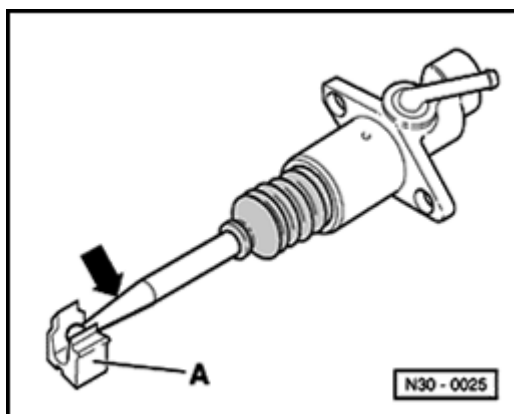
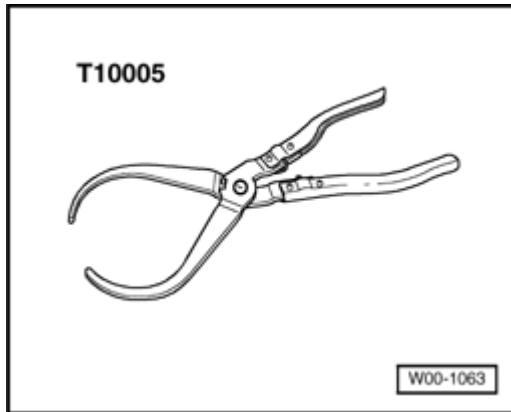


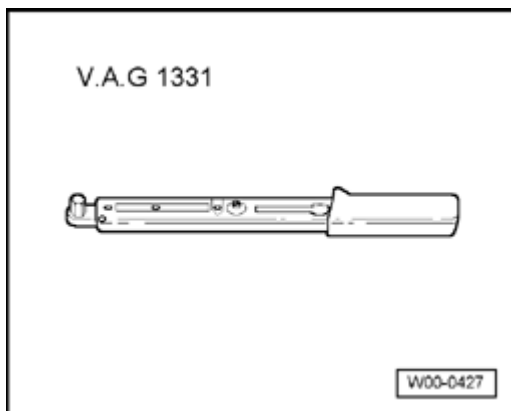
Fig. 2 Install clutch master cylinder operating rod in retainer -A- (direction of arrow)

Clutch master cylinder, removing and installing

Special tools and equipment



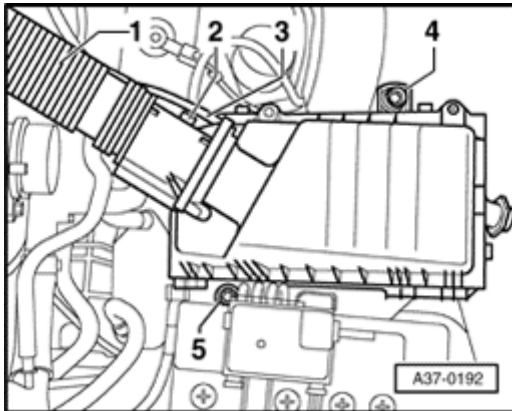
- ◆ T10005 Pliers



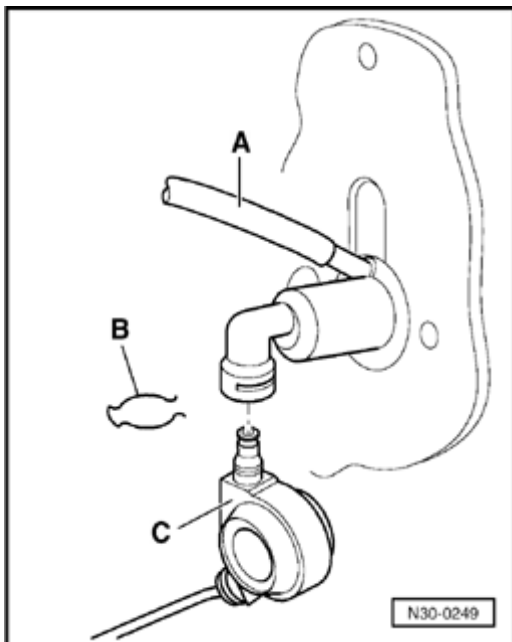
- ◆ VAG 1331 Torque Wrench

Removing

- Request code on vehicles with coded rad necessary.
- Disconnect battery with ignition switched

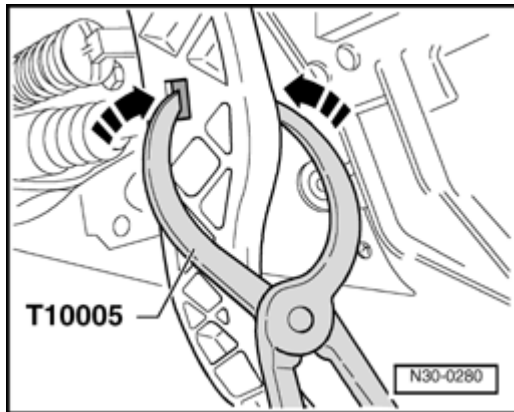


- Remove intake hose -1-, connector -2- and -3- from Mass Air Flow Sensor.
 - Remove complete air cleaner housing, to this, unscrew bolts -4- and -5-
- ⇒ *Repair Manual, Fuel Injection & Ignition, Group 24; Removing and installing air clear*
- Disconnect supply hose -A- to brake fluid reservoir and seal it.



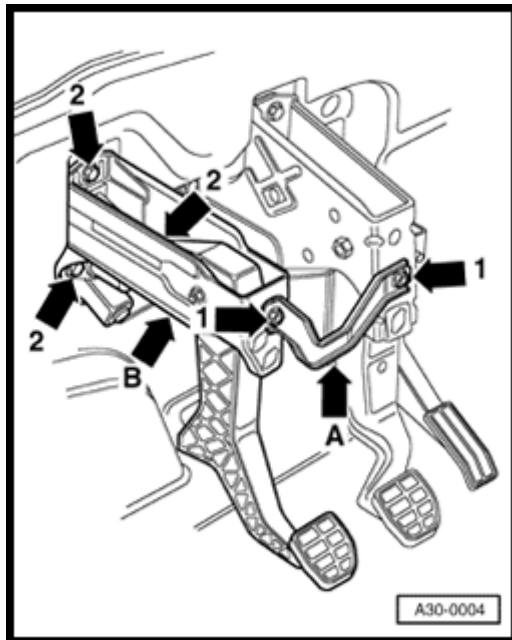
- Remove clip -B-, which secures line/hose clutch master cylinder.
 - Separate line/hose assembly -C- from master cylinder and seal it.
 - Remove covers/lower driver's side.
- ⇒ [Repair Manual, Body Interior, Repair Group 24; Removing and installing instrument panel](#)

30-16

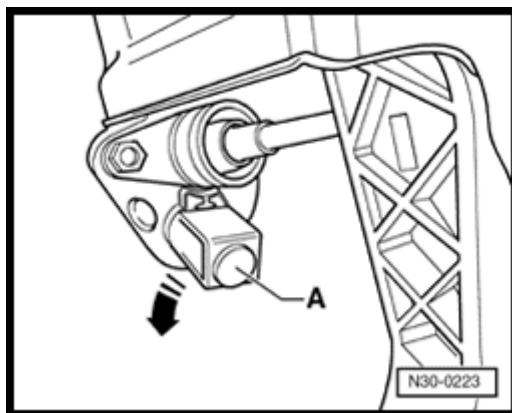


- Turn clutch pedal switch 45° to left and out from support.
- Separate master cylinder operating rod from clutch pedal as follows:
- Pull clutch pedal lightly toward passenger compartment.
- Press both sides of mounting inward using pliers T10005 (arrows).

30-17

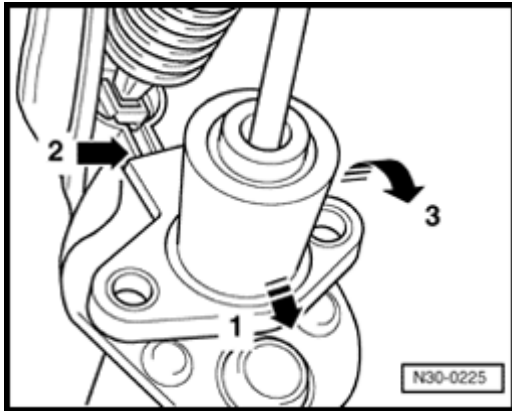


- Remove entire clutch pedal support as follows:
- Remove connecting plate -A- first (arrows -1-).
- Remove securing nuts (arrows -2-) for support -B-.
- Take off mounting bracket.



- Turn stop -A- of clutch pedal in direction of arrow and remove.

30-18



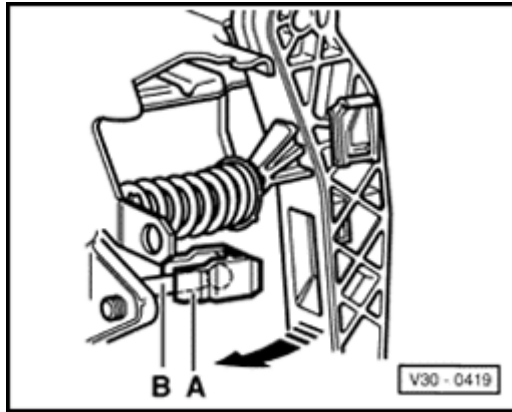
- Push master cylinder first in direction of arrow -1- onto stop.

It must not be covered in upper area by over center spring mounting (arrow -2-).

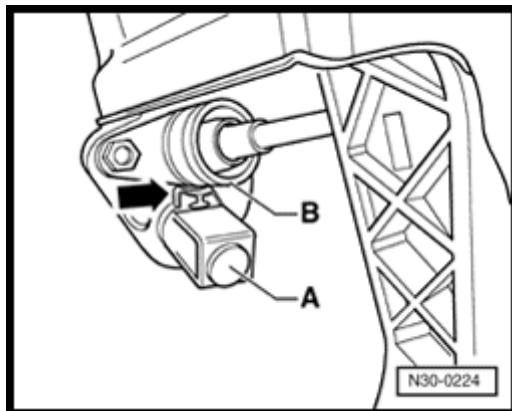
- Swing it in direction of arrow -3- out of mounting bracket.

Installing

Installation is performed in the reverse sequence. When installing note the following:



- ✦ - Retainer -A- must be on clutch master cylinder operating rod -B-.
- Pull piston rod out of master cylinder slightly and hold using a pair of pliers. Avoid damage to piston rod.
- Push clutch pedal in direction of arrow to engage it, and make sure it is located correctly.



- ✦ - Install stop -A- for clutch pedal again.

Installed position:

Arm (arrow) points toward master cylinder -B-.

- After installing clutch master cylinder, bleed clutch system ⇒ [Page 30-20](#) .



Clutch system, bleeding

Special tools and equipment

- ◆ VAS 5234 brake filler and bleeder unit for brakes

Brake fluid specification:

⇒ [Repair Manual, Brake System; Repair Group 47](#)

Note:

Prefilling the system is not necessary!

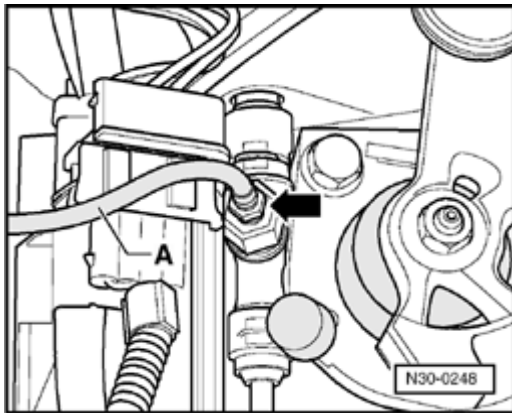
- Connect VAS 5234 brake filler and bleeder unit.

Note:

If necessary, use bleed hose V.A.G 1238/B3 - 670 mm long - to bleed the system.

- Connect bleed hose to brake bleeding appliance collector bottle.

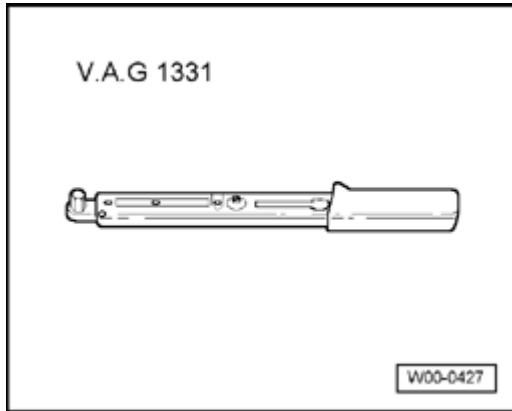
30-21



- Connect bleed hose -A- to bleeder (arrow) and open bleeder valve.
- Pressurize system to 2 bar
- Open bleeder valve
- Bleed off about 100 cm³ brake fluid.
- Rapidly operate pedal from stop to stop 10 to 15 times.
- Bleed off an additional 50 cm³ brake fluid.
- Close bleeder valve.
- Depress clutch pedal several times after completion of bleeding process.

Clutch release mechanism, servicing

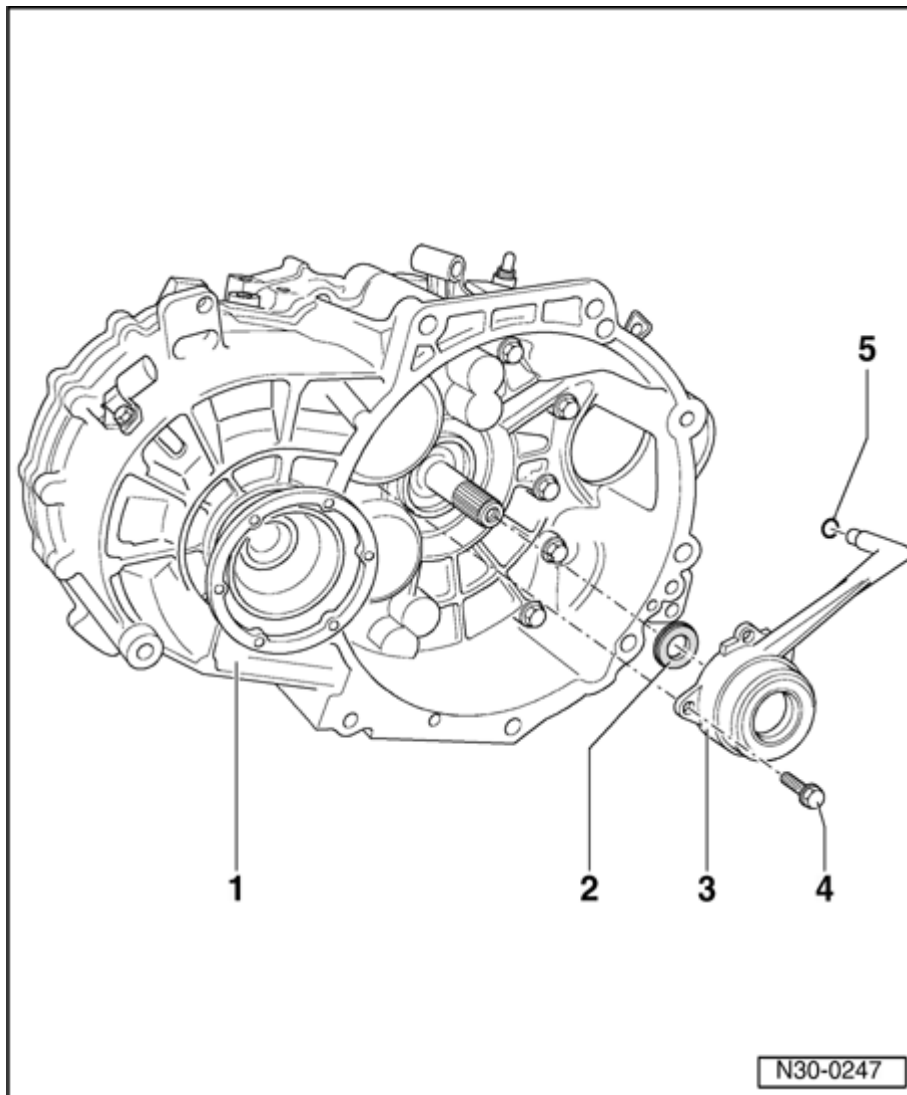
Special tools and equipment



A

- ◆ VAG 1331 Torque wrench or equivalent

30-23



1 - Transmission

2 - Input shaft oil seal

- ◆ Replacing
⇒ [Page 34-90](#)

3 - Slave cylinder with release bearing

- ◆ One unit; can only be replaced together
- ◆ Do not wash out bearing, only wipe
- ◆ Replace noisy bearings together with slave cylinder

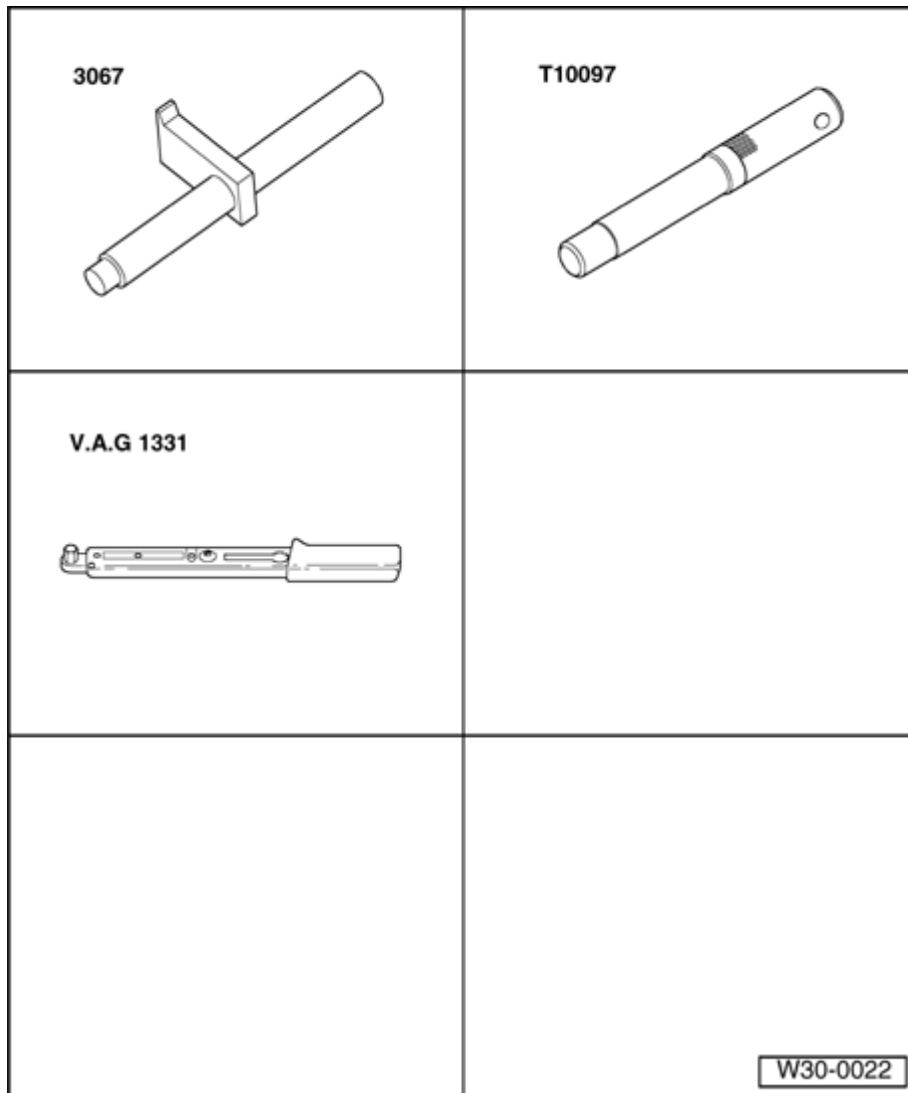
4 - Bolt, 12 Nm

- ◆ Qty. 3

5 - Seal

- ◆ Always replace
- ◆ Pull onto line/hose connection
- ◆ Insert with

brake
fluid

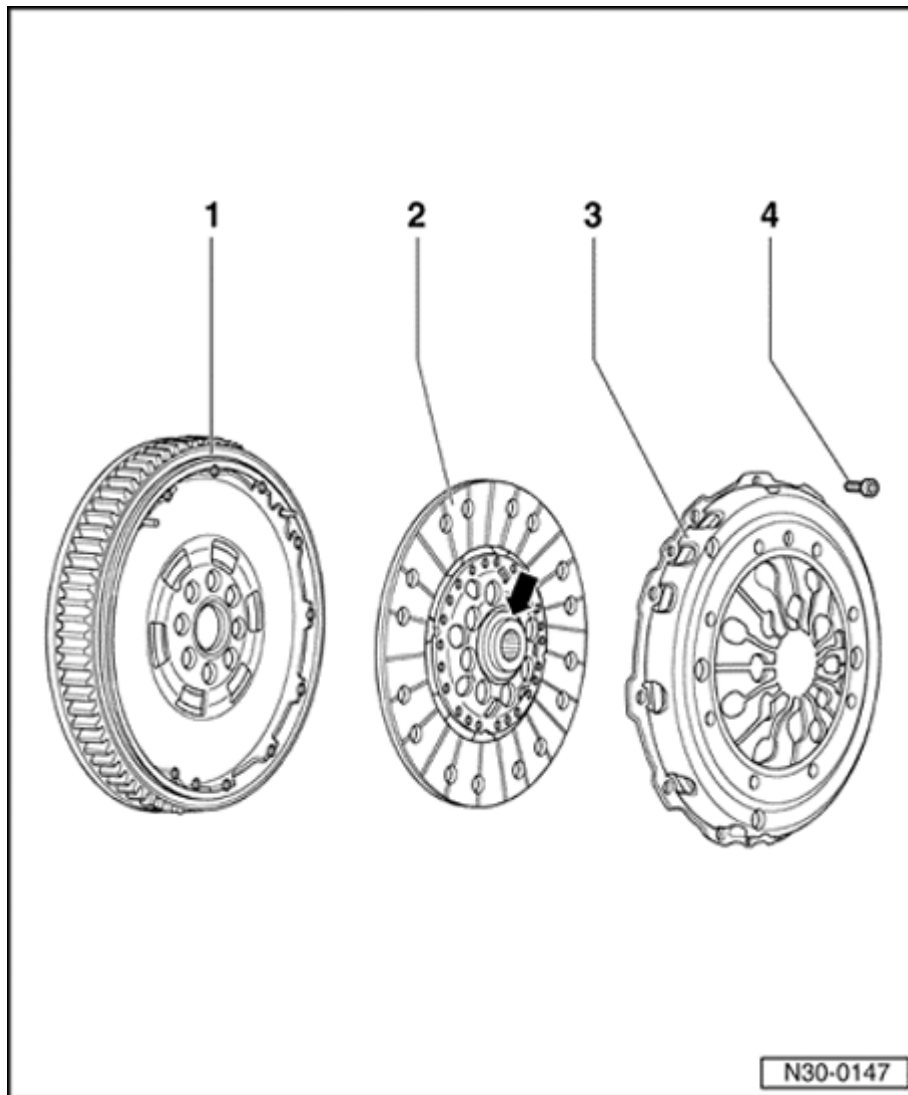


Clutch, servicing

Special tools and equipment

- ◆ 3067
Counter-
hold
- ◆ T10097
Centralizing
mandrel
- ◆ VAG 1331
Torque
wrench or
equivalent

30-25

**(Transmission removed)****Note:**

- ◆ Replace clutch plates and pressure plates that have damaged or loose rivets
- ◆ Select correct clutch plate and pressure plate according to parts list and engine code.

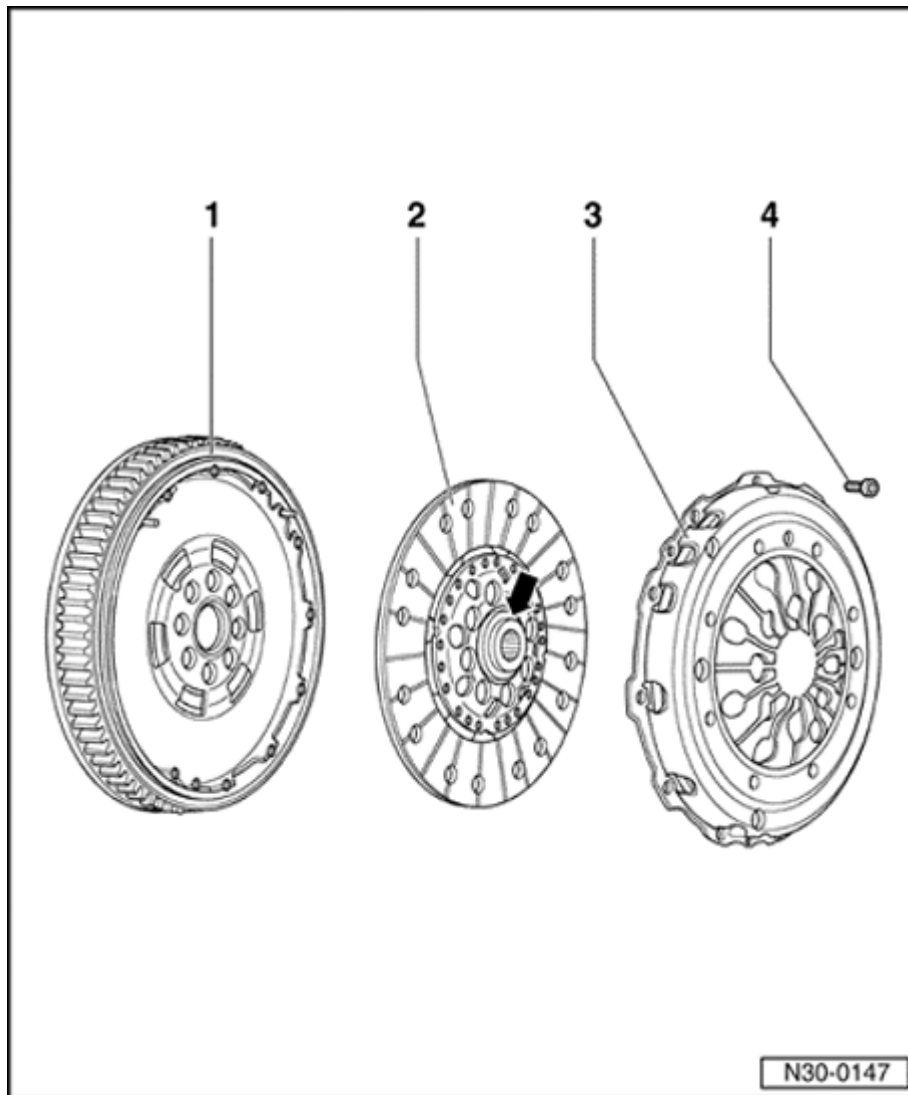
1 - Flywheel

- ◆ Make sure centering pins are a tight fit
- ◆ Contact surface for clutch lining must be free of grooves, oil and grease
- ◆ Removing and installing

⇒ *Repair Manual, Engine Mechanical,*

*Repair Group
13; Sealing
flange and
flywheel/drive
plate,
removing and
installing*

30-26



2 - Clutch plate

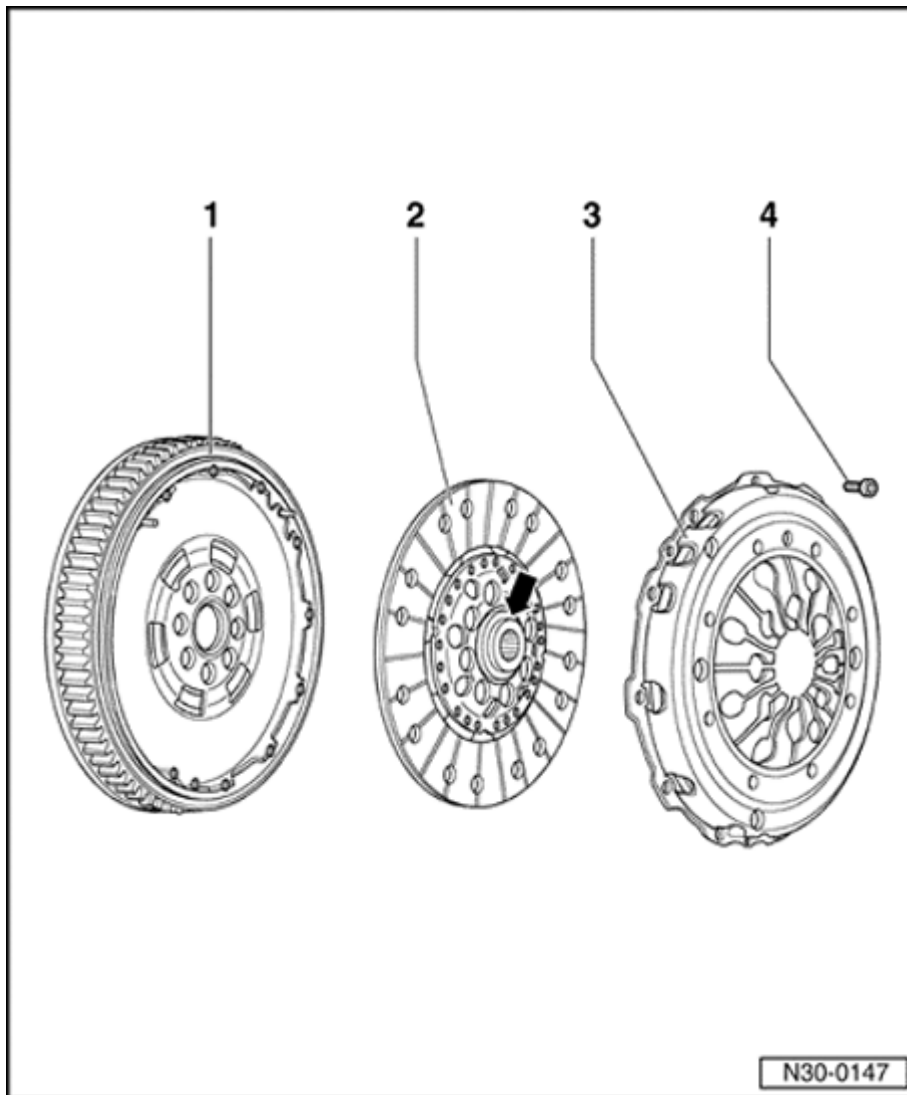
- ◆ Diameter
⇒ [Page 00-2](#)
- ◆ Installed position on two-part flywheel: Shorter hub end (arrow) points toward pressure plate
- ◆ Installed position with single piece flywheel: spring cage faces pressure plate
- ◆ Centering
⇒ [Fig. 1](#)
- ◆ Lightly grease splines

Note:

Clean input shaft splines and, on used clutch plates, the hub splines, remove corrosion and apply only a very thin coating of

*grease, Part
No: G 000
100, to the
input shaft
splines. Then
move clutch
plate back and
forth on the
input shaft
until the hub
moves freely
on the shaft.
Excess grease
must be
removed.*

30-27



3 - Pressure plate

- ◆ Removing and installing ⇒ [Fig. 1](#)
- ◆ Check ends of diaphragm spring ⇒ [Fig. 2](#)

Note:

Pressure plates are protected against corrosion and greased. Only the contact surface may be cleaned, otherwise the service life of the clutch will be considerably reduced.

4 - Bolt

- ◆ Use Parts catalog to check correct application
- ◆ On two-part flywheel: 22 Nm, always replace
- ◆ On single piece flywheel:

20 Nm

- ◆ Loosen and tighten gradually and diagonally

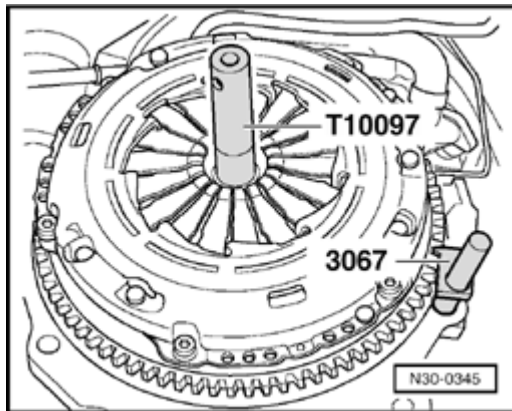


Fig. 1 Centering clutch plate with larger hub diameter and removing and installing pressure plate

- Loosen and tighten bolts gradually and diagonally.
- Reverse position of retainer 3067 when removing.

Note:

Pressure plate contact surface and clutch plate must make full contact with flywheel. Tighten bolts diagonally and evenly to prevent damage to the centering holes in the pressure plate housing and the centering pins in the flywheel.

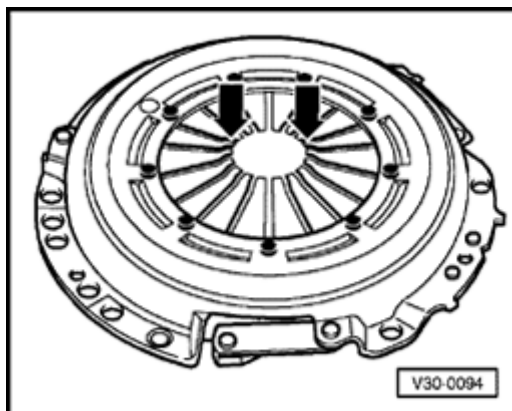
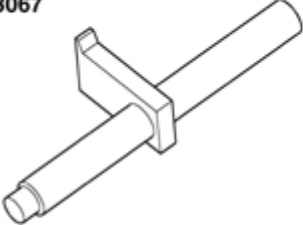
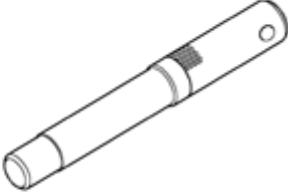



Fig. 2 Checking ends of diaphragm spring

Wear up to half the thickness of the diaphragm spring is permitted.

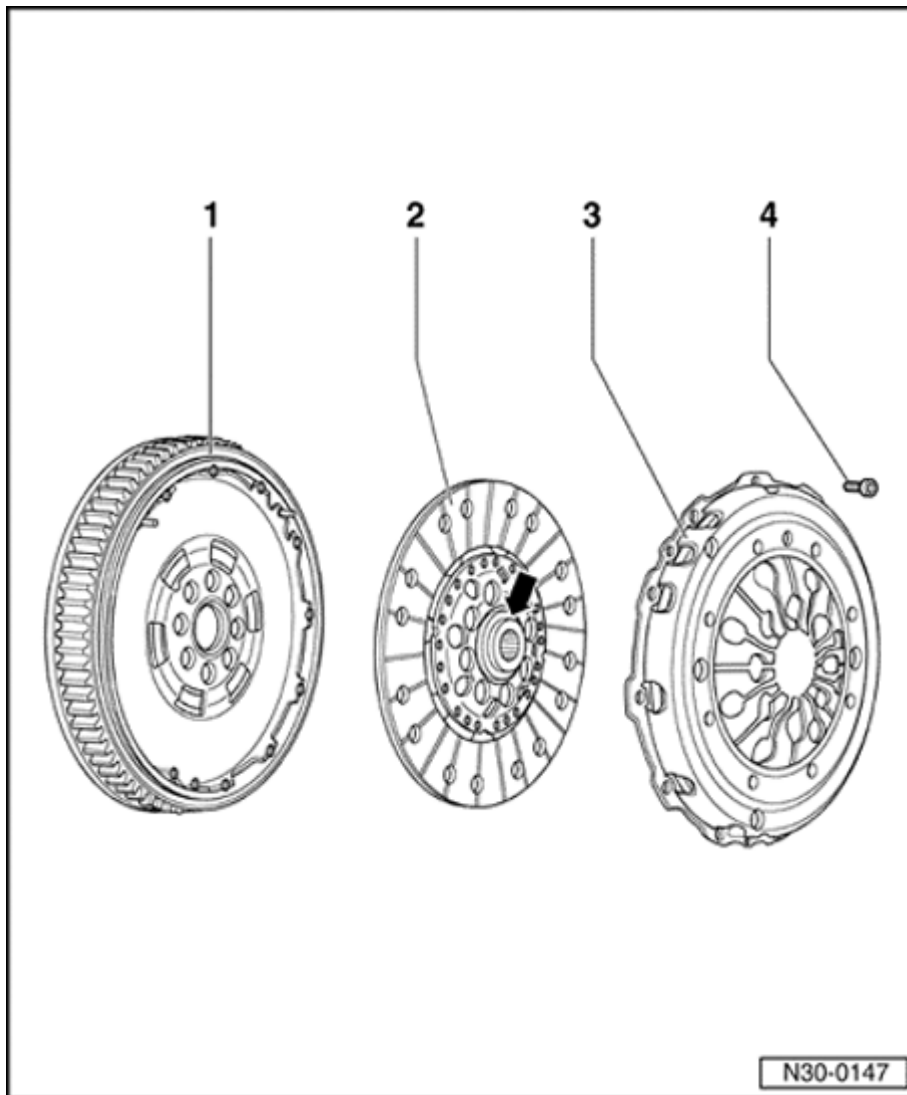
<p>3067</p> 	<p>T10097</p> 
<p>V.A.G 1331</p> 	
	<p>W30-0022</p>

Clutch, servicing

Special tools and equipment

- ◆ 3067
Counter-
hold
- ◆ T10097
Centralizing
mandrel
- ◆ VAG 1331
Torque
wrench or
equivalent

30-25



(Transmission removed)

Note:

- ◆ Replace clutch plates and pressure plates that have damaged or loose rivets
- ◆ Select correct clutch plate and pressure plate according to parts list and engine code.

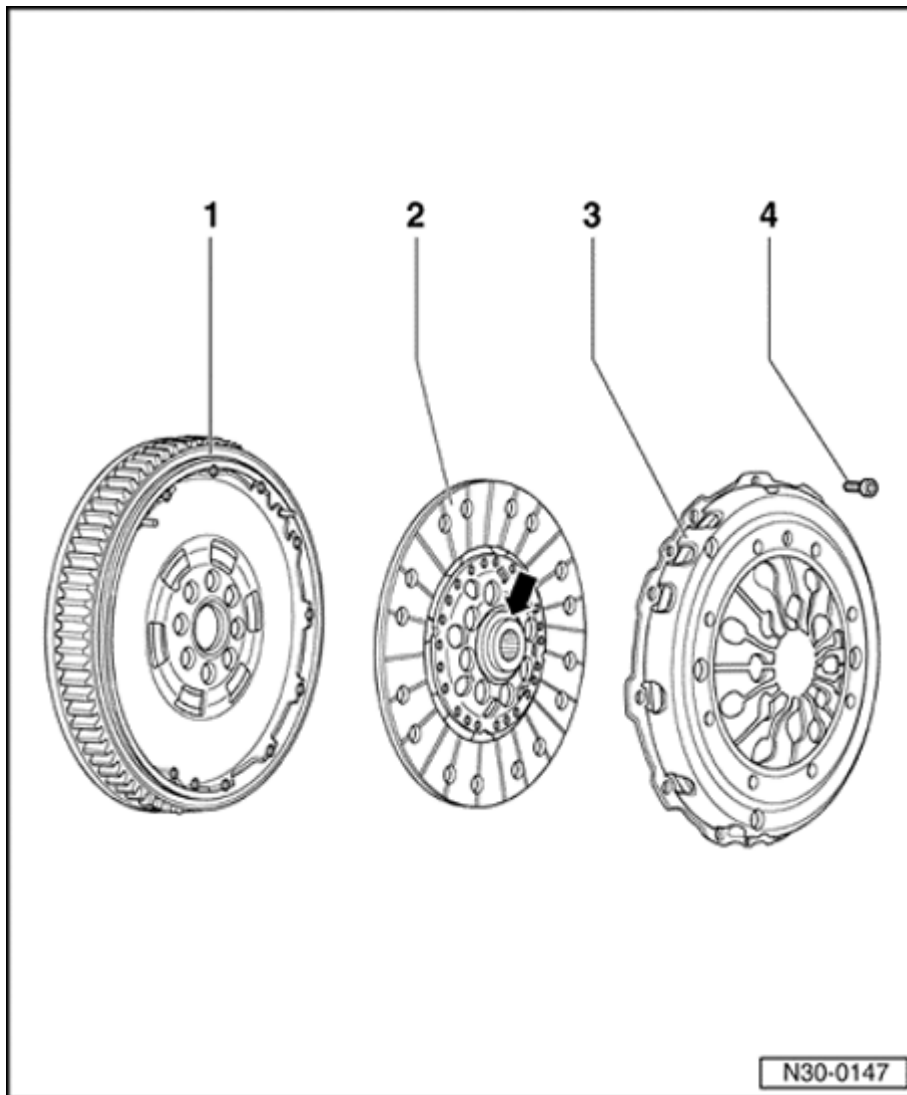
1 - Flywheel

- ◆ Make sure centering pins are a tight fit
- ◆ Contact surface for clutch lining must be free of grooves, oil and grease
- ◆ Removing and installing

⇒ *Repair Manual, Engine Mechanical,*

*Repair Group
13; Sealing
flange and
flywheel/drive
plate,
removing and
installing*

30-26



2 - Clutch plate

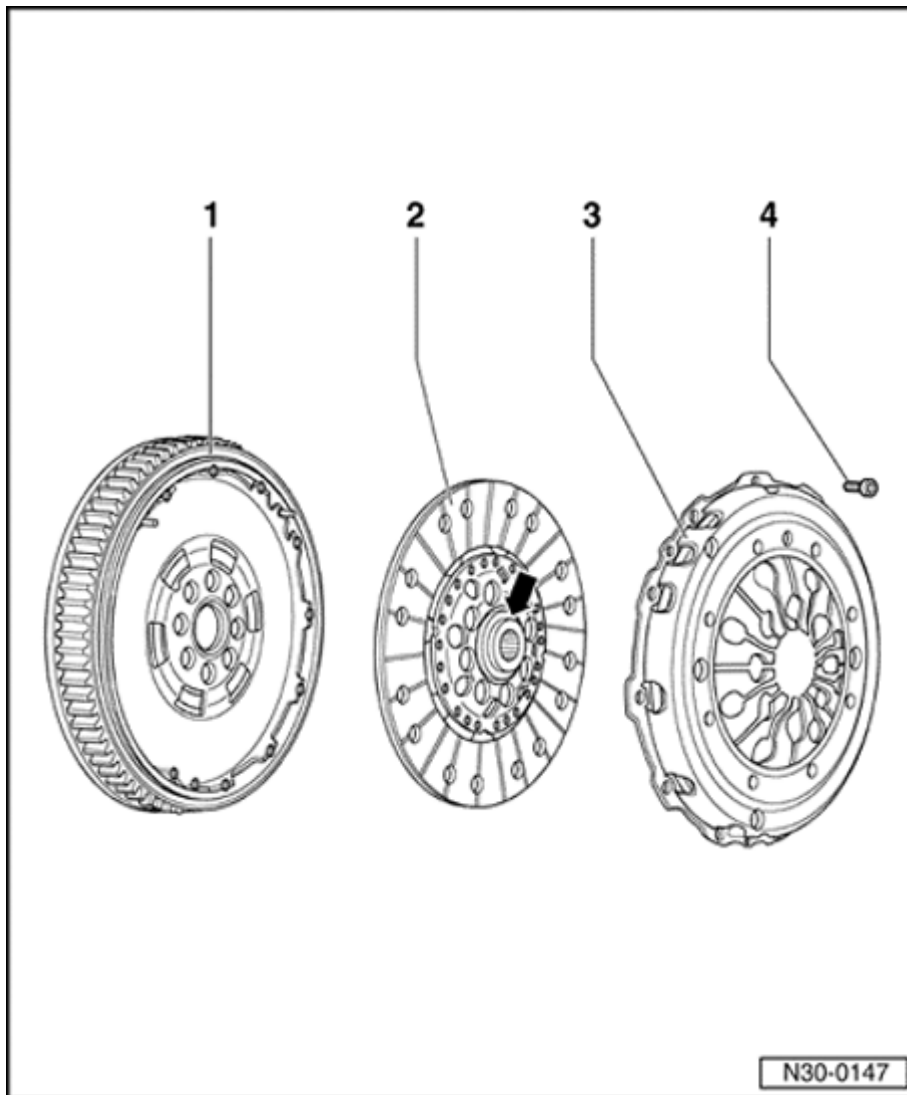
- ◆ Diameter
⇒ [Page 00-2](#)
- ◆ Installed position on two-part flywheel: Shorter hub end (arrow) points toward pressure plate
- ◆ Installed position with single piece flywheel: spring cage faces pressure plate
- ◆ Centering
⇒ [Fig. 1](#)
- ◆ Lightly grease splines

Note:

Clean input shaft splines and, on used clutch plates, the hub splines, remove corrosion and apply only a very thin coating of

*grease, Part
No: G 000
100, to the
input shaft
splines. Then
move clutch
plate back and
forth on the
input shaft
until the hub
moves freely
on the shaft.
Excess grease
must be
removed.*

30-27



3 - Pressure plate

- ◆ Removing and installing ⇒ [Fig. 1](#)
- ◆ Check ends of diaphragm spring ⇒ [Fig. 2](#)

Note:

Pressure plates are protected against corrosion and greased. Only the contact surface may be cleaned, otherwise the service life of the clutch will be considerably reduced.

4 - Bolt

- ◆ Use Parts catalog to check correct application
- ◆ On two-part flywheel: 22 Nm, always replace
- ◆ On single piece flywheel:

20 Nm

- ◆ Loosen and tighten gradually and diagonally

30-28

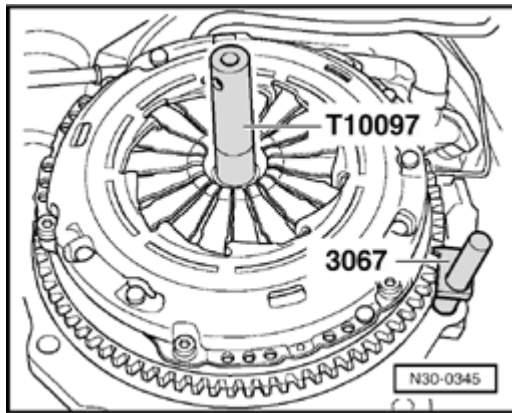


Fig. 1 Centering clutch plate with larger hub diameter and removing and installing pressure plate

- Loosen and tighten bolts gradually and diagonally.
- Reverse position of retainer 3067 when removing.

Note:

Pressure plate contact surface and clutch plate must make full contact with flywheel. Tighten bolts diagonally and evenly to prevent damage to the centering holes in the pressure plate housing and the centering pins in the flywheel.

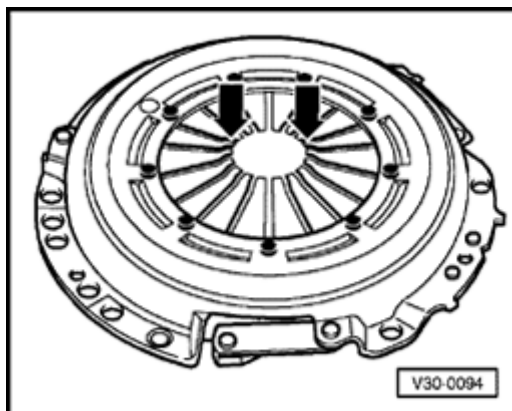
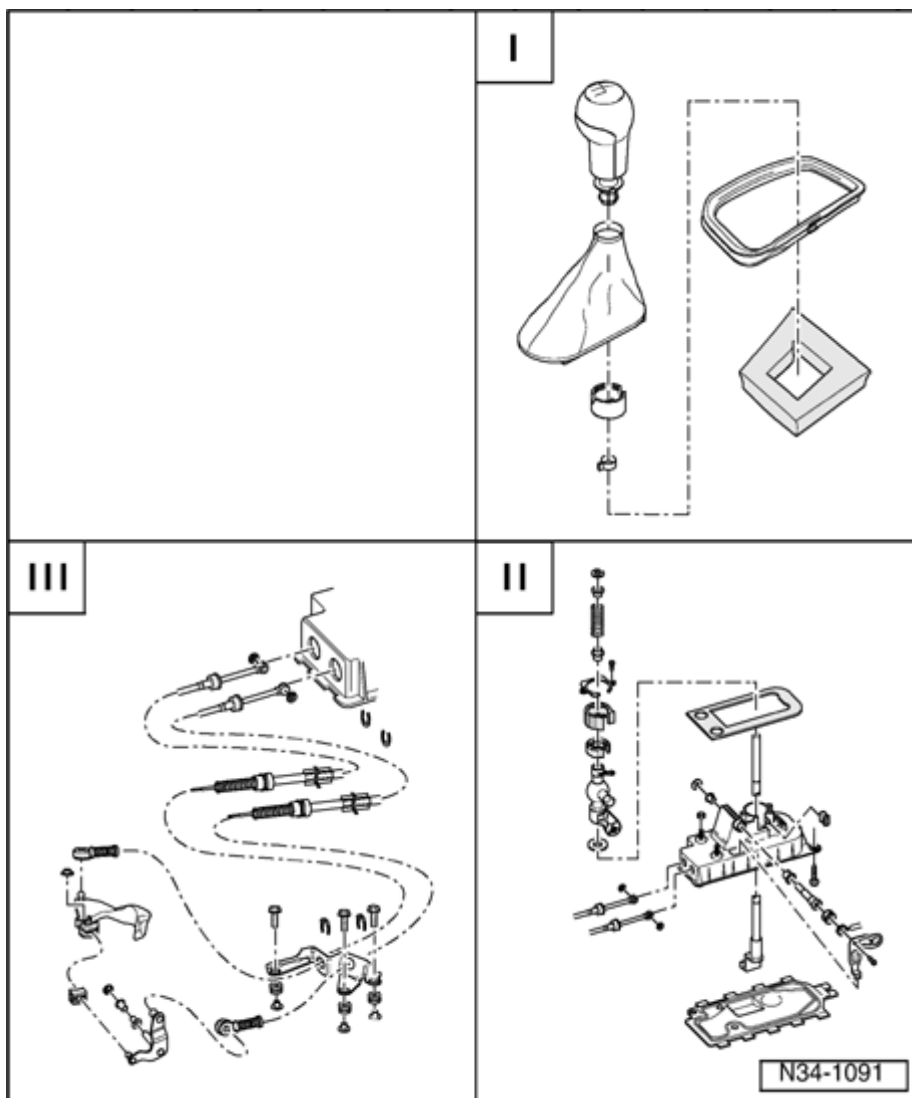


Fig. 2 Checking ends of diaphragm spring

Wear up to half the thickness of the diaphragm spring is permitted.



I - Removing and installing shift knob and cover ⇒ [Page 34-4](#)

II - Servicing shift lever and shift housing ⇒ [Page 34-6](#)

III - Assembly overview: Removing and installing operating cables ⇒ [Page 34-10](#)

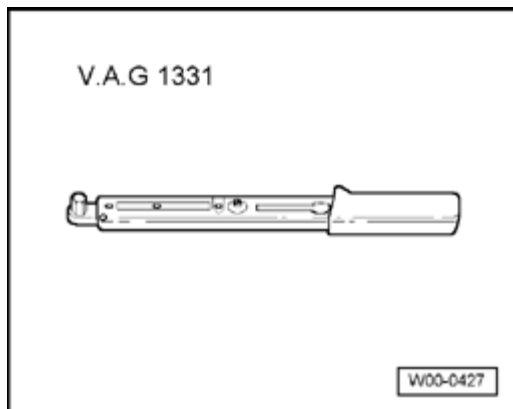
Removing and installing selector mechanism ⇒ [Page 34-15](#)

Adjusting selector mechanism ⇒ [Page 34-22](#)

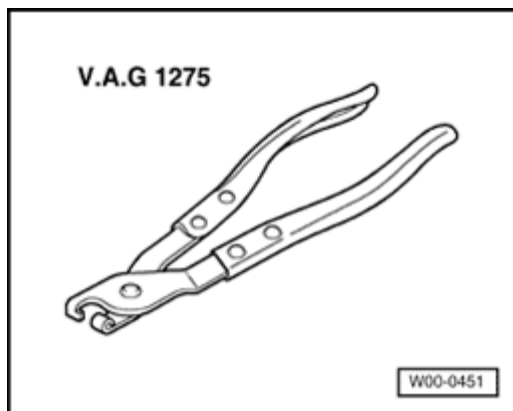
Note:

- ◆ Before working on the selector mechanism, disconnect Ground strap from the battery in the engine compartment.

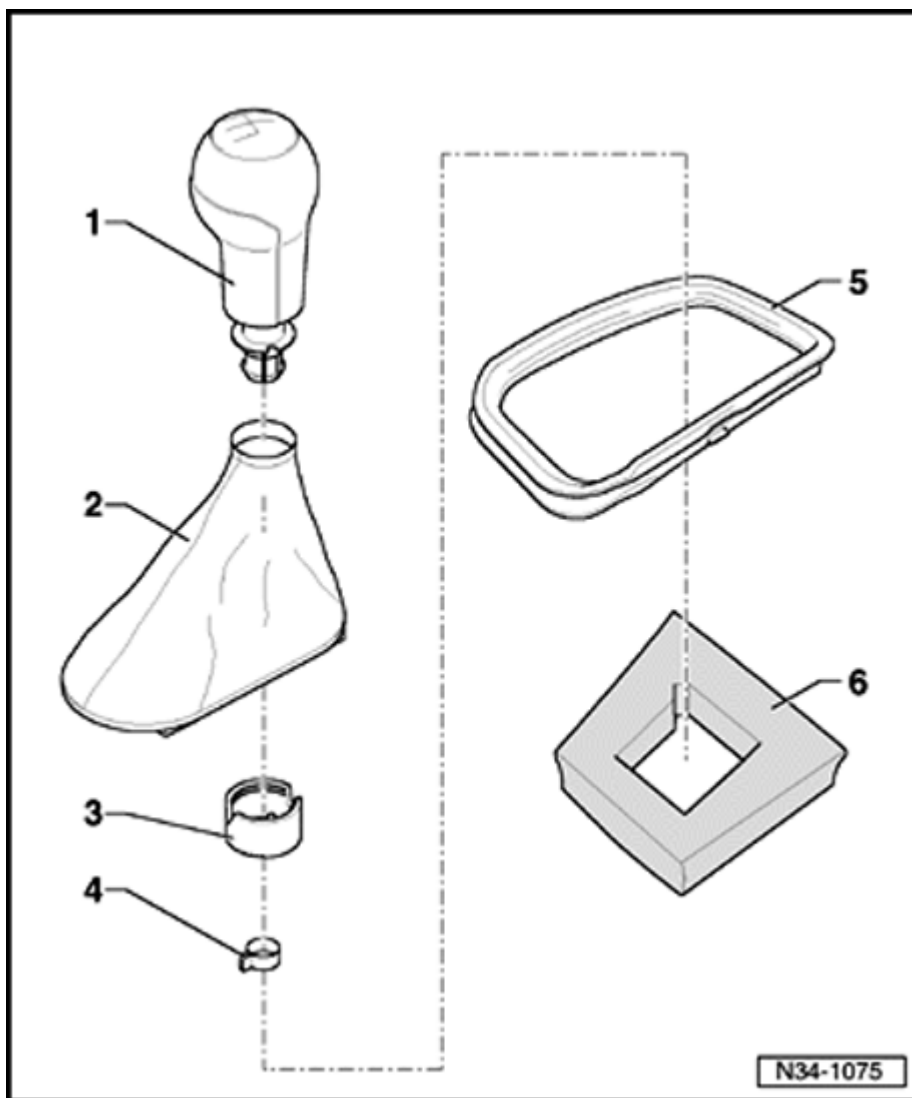
◆ *Note
radio
code on
vehicles
with
coded
radio.*

Special tools and equipment

- ◆ VAG 1331 Torque wrench or equivalent



- ◆ VAG 1275 Pliers



Shift lever knob and cover, removing and installing

1 - Shift lever knob

- ◆ Remove and install together with cover

2 - Cover

- ◆ Separating from shift lever knob ⇒ [Fig. 1](#)
- ◆ Connect to shift lever knob before installing ⇒ [Fig. 1](#)

- ◆ Remove and install together with shift lever knob

3 - Sleeve

4 - Clamp

- ◆ To secure shift lever knob on

gear
lever

- ◆ Secure
on
shift
lever
knob
item 1
using
pliers
VAG
1275

5 - Frame

**6 - Sound
insulation**

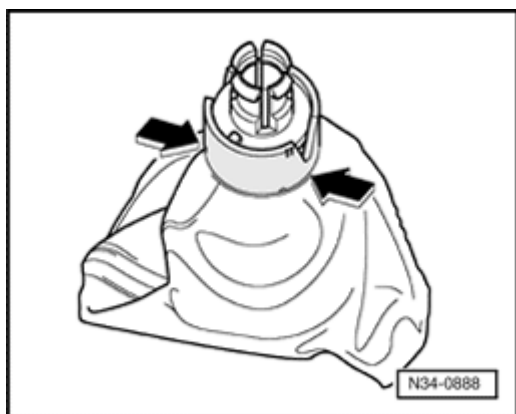
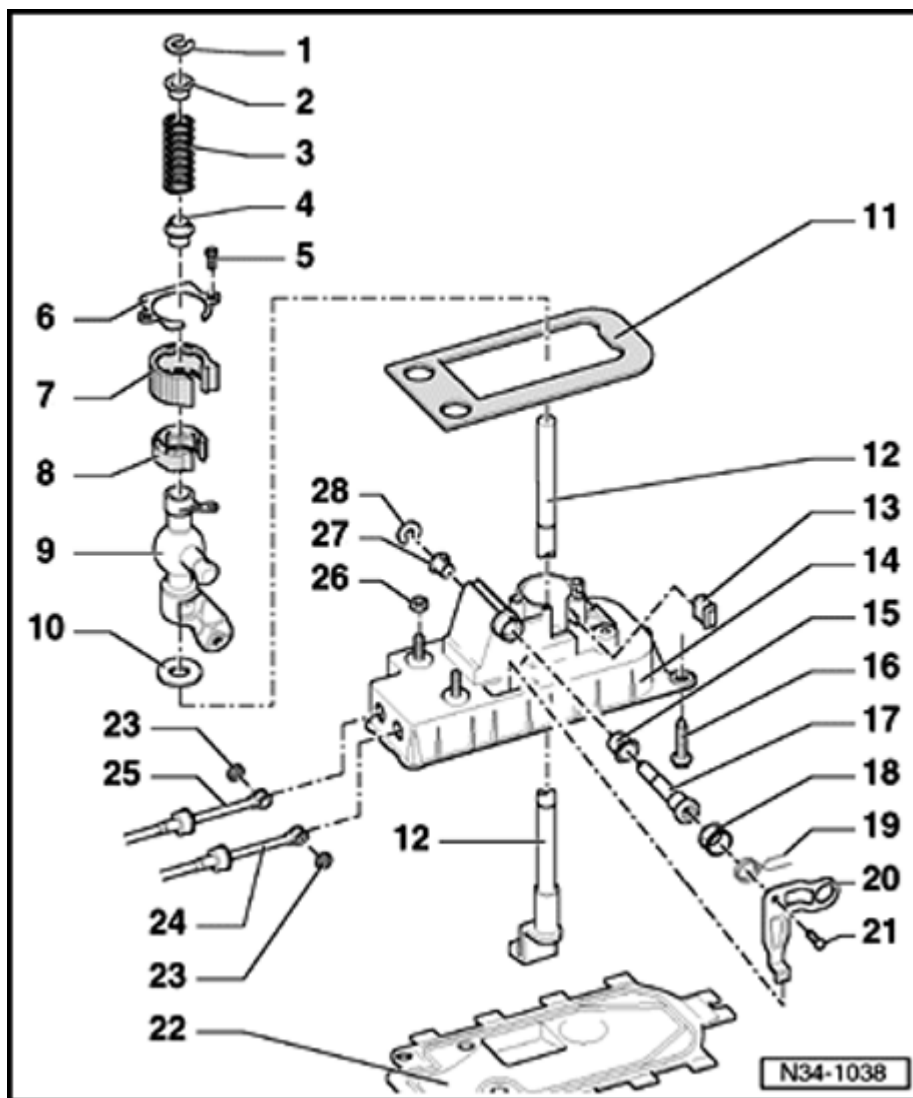


Fig. 1 Shift lever cover, separating and assembling to shift lever knob

- Turn cover inside out.
- Carefully pry clamping sleeve (arrow) off with a screwdriver and pull shift lever knob out.

Installation is performed in the reverse sequence. When installing note the following:

- Insert shift lever knob in cover.
- Push clamping sleeve onto shift lever knob and engage.
- Install shift lever knob and cover together.



Shift lever and shift lever housing, servicing

Note:

Lubricate all mountings and sliding surfaces with Polyurea grease Part No. G 000 450 02.

1 - Circlip

◆ Removing and installing ⇒ [Fig. 1](#)

2 - Bushing

3 - Spring

4 - Bushing

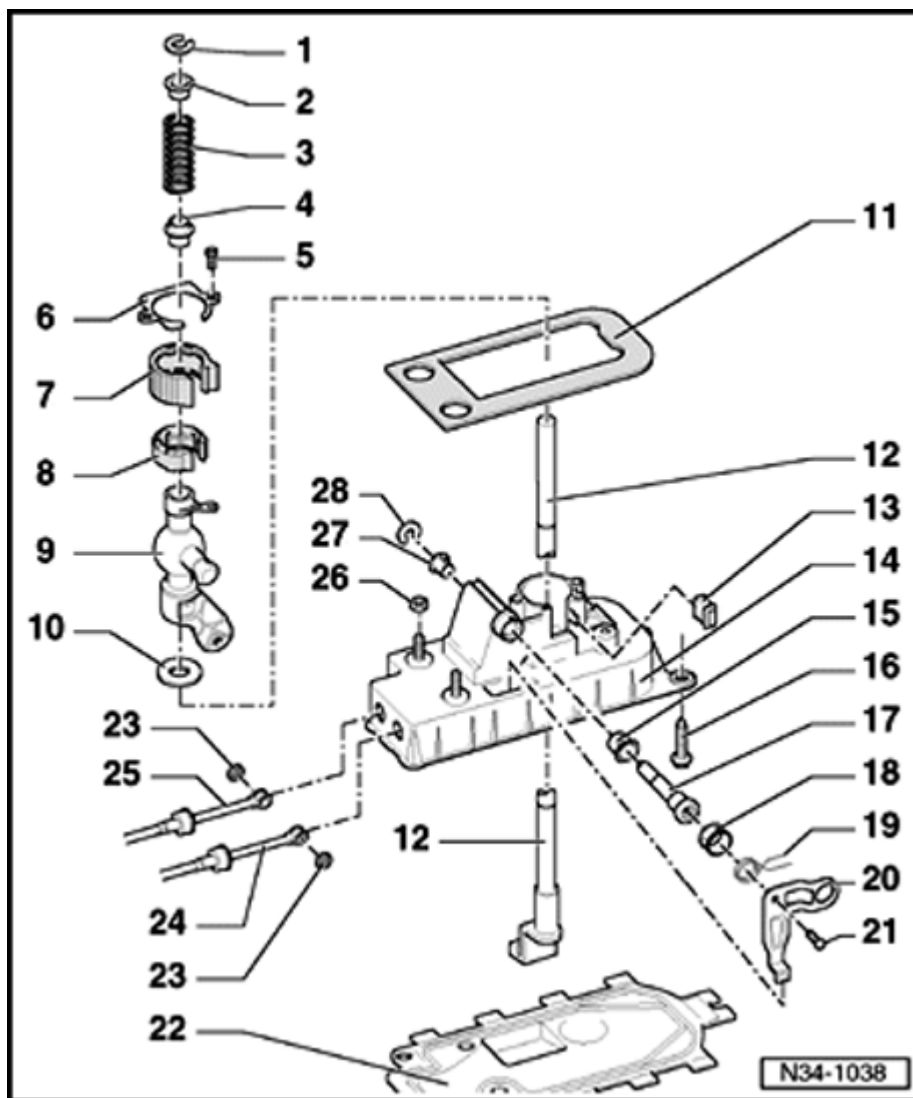
5 - Torx screw, 5 Nm

6 - Cover plate

7 - Damper

8 - Bearing shell

9 - Gear shift guide



10 - Damping washer

11 - Gasket

◆ Between shift housing and floor

◆ Self-adhesive

◆ Bond to shift lever housing

12 Transmission - shift lever

13 - Damper

14 - Shift housing

15 - Bushing

16 - Bolt, 25 Nm

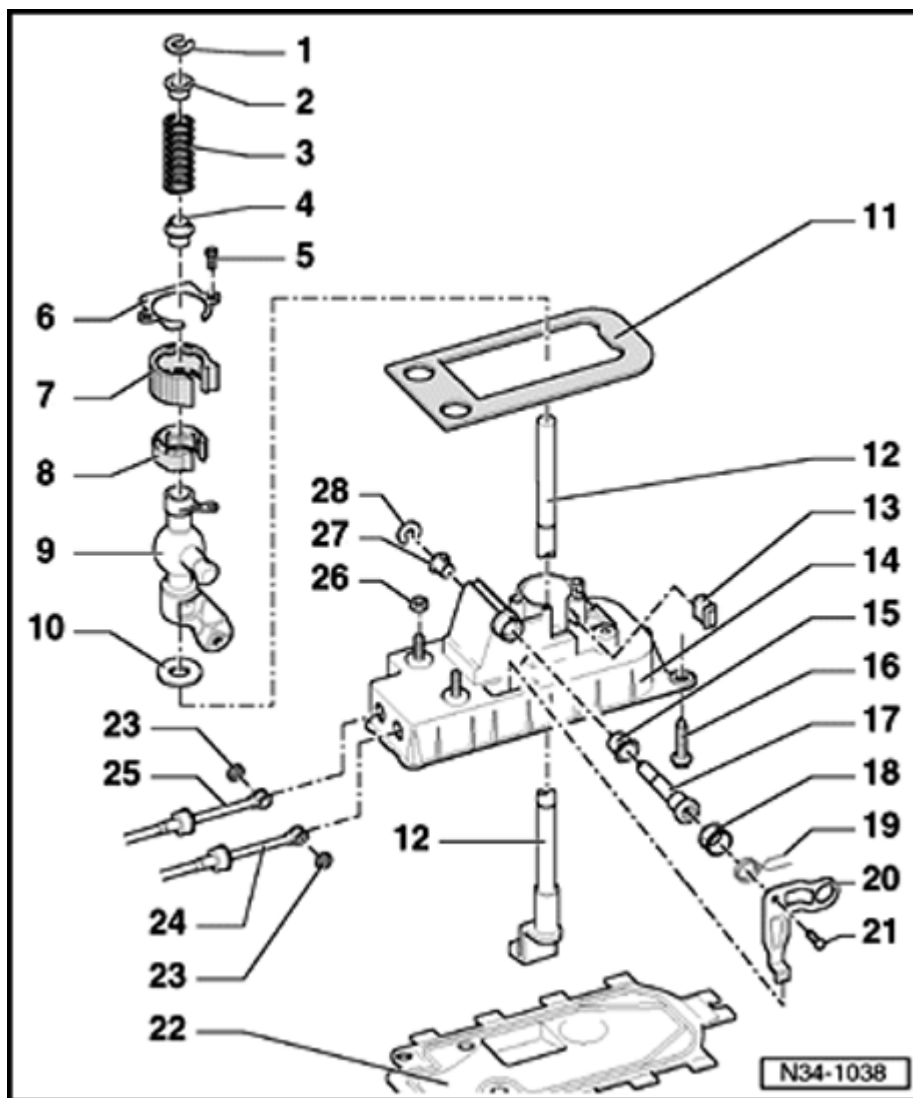
17 - Fulcrum pin

18 - Guide bushing

19 - Spring

◆ Installing ⇒ [Fig. 2](#)

20 - Gate selector bracket



21 - Torx screw, 5 Nm

22 - Base plate

◆ Open tabs to remove

◆ Replace

23 - Lock washer

24 - Gate selector cable

◆ On gate selector bracket

◆ Installed position ⇒ [Page 34-1](#)

25 - Gear selector cable

◆ Press onto gear shift guide

◆ Installed position ⇒ [Page 34-1](#)

26 - Hex nut, 25 Nm

27 - Bushing

◆ Only installs in one position

**28 - Lock
washer**

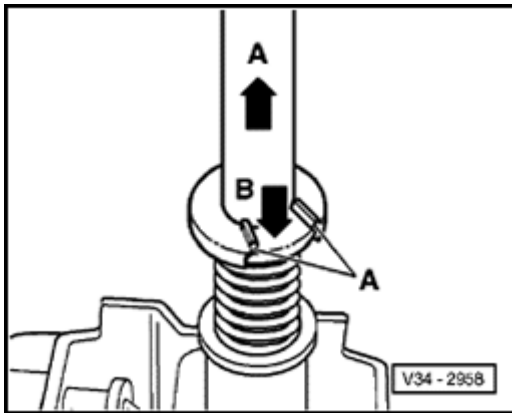


Fig. 1 Removing and installing circlip

- Pull shift lever in arrow direction - A- and at same time push down spacer bushing onto stop with a screwdriver in arrow direction -B-.

Note:

Do not tilt spacer bushing when pushing down. Carefully release pressure at groove in gear lever for circlip.

Carefully release pressure at groove in gear lever for circlip.

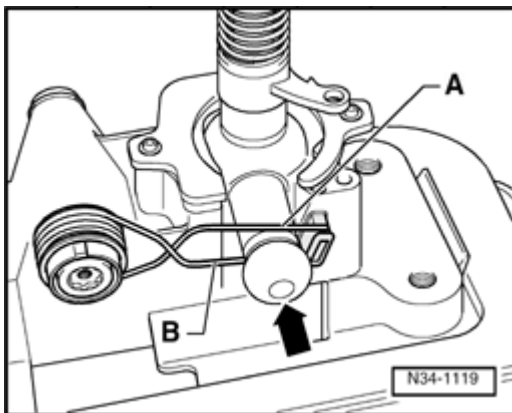
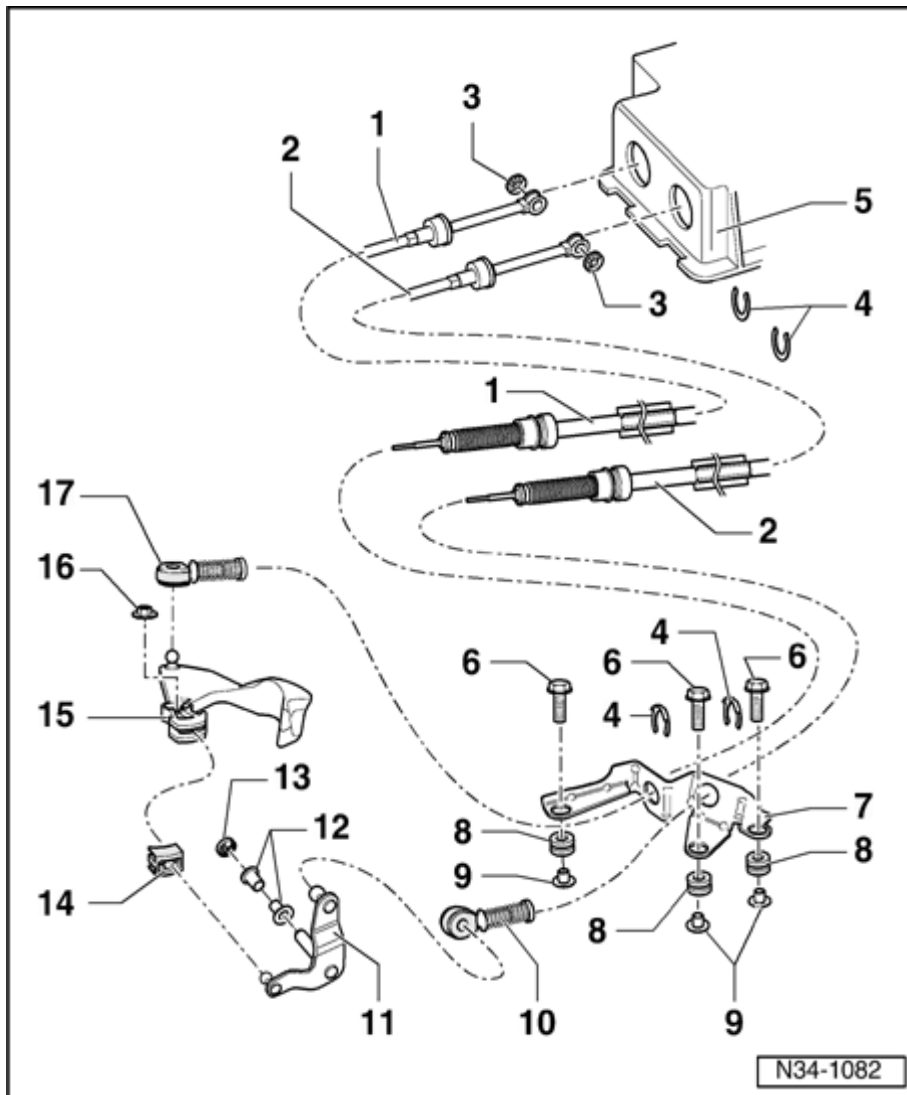


Fig. 2 Installing spring

- Insert spring so that spring extension -A- lies above pin (arrow).
- Pull spring extension -B- down so that it reaches below pin (arrow).



Selector cables, assembly overview

Note:

Lubricate all mountings and sliding surfaces with Polyurea grease Part No. G 000 450 02.

1 - Gear selector cable

◆ Press onto gear shift guide

◆ Installed position ⇒ [Page 34-1](#)

2 - Gate selector cable

◆ On relay lever

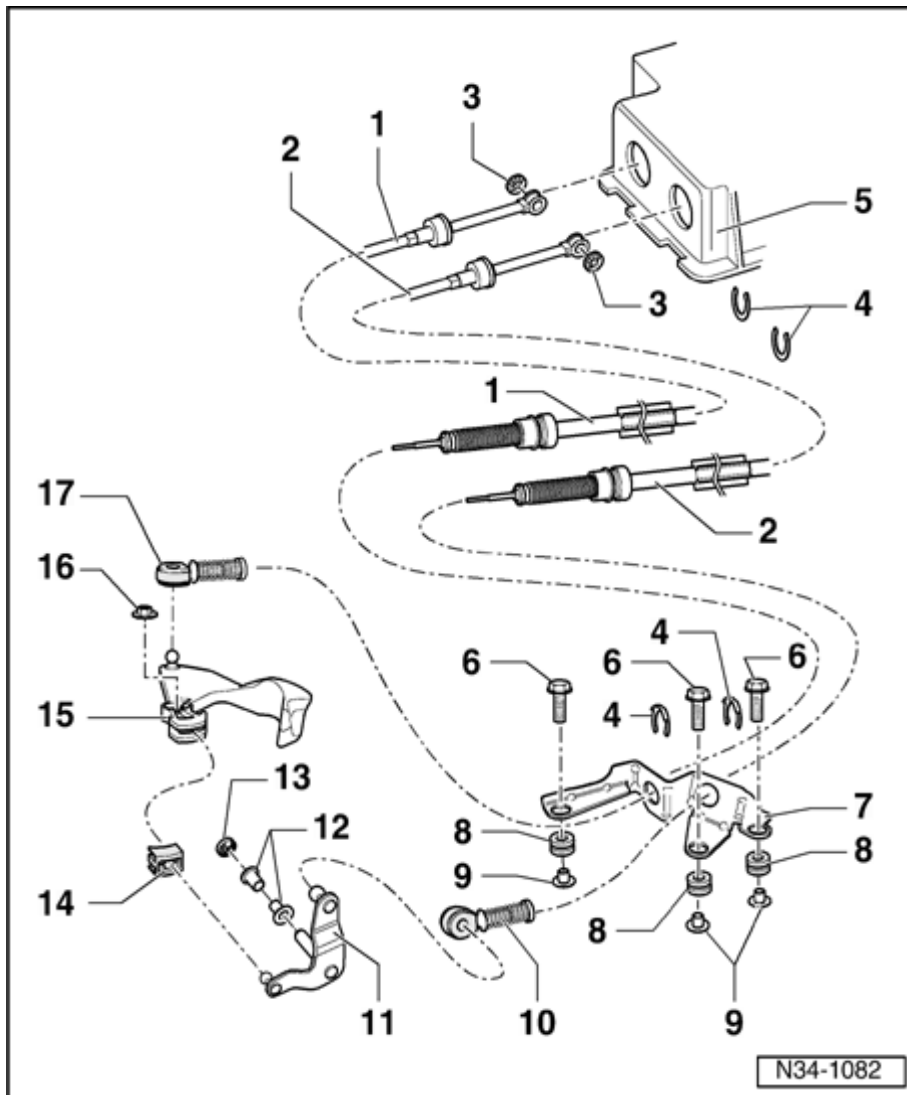
◆ Installed position ⇒ [Page 34-1](#)

3 - Circlip

4 - Circlip

◆ Do not damage cables when

removing



5 - Shift housing

6 - Hex bolt, 25 Nm

◆ For support bracket

7 - Support bracket

8 - Bushing

◆ Support bracket mounting to transmission

9 - Distance piece

10 Cable - locking mechanism

◆ For gate selector cable to relay lever

◆ Replace after removing from relay lever item 11

◆ From 01.01 with holes

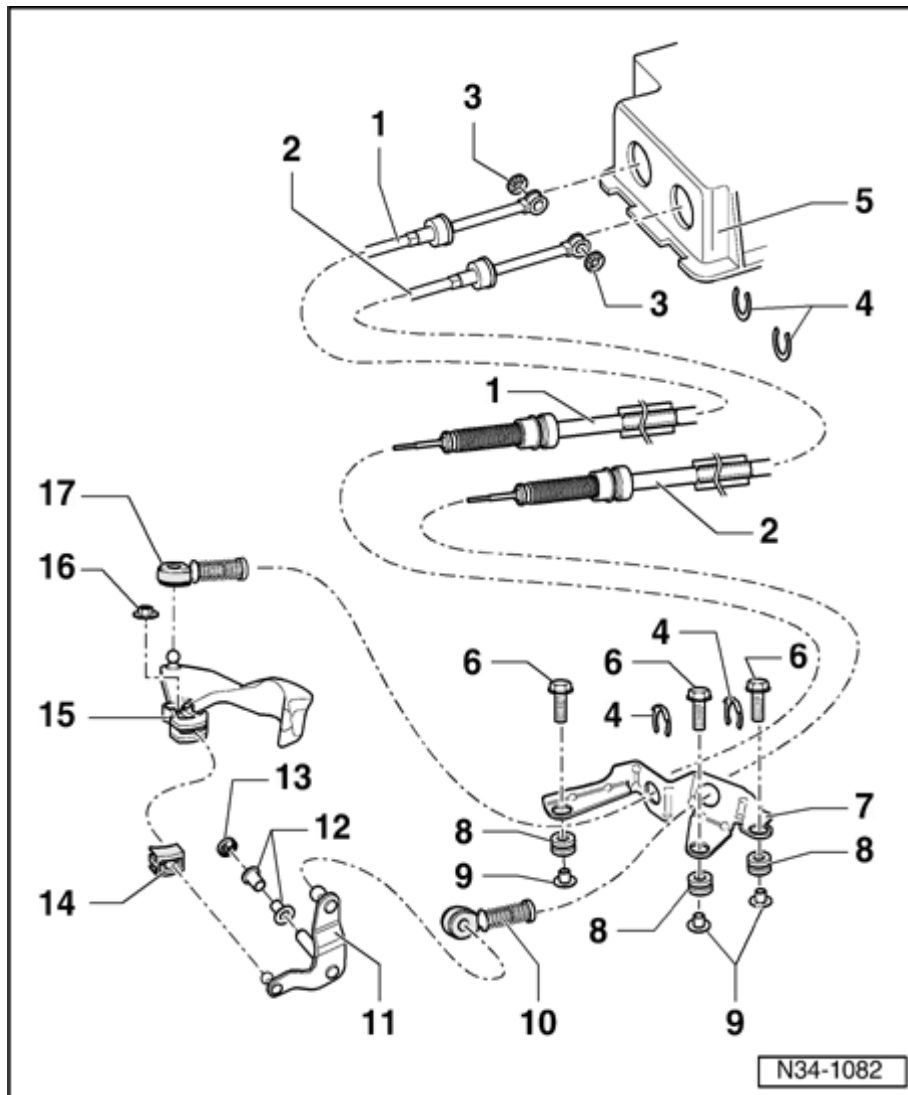
◆ Not necessary to be replaced

◆ Secured with

securing
clip

- ◆ Removing
and
installing
⇒ from ⇒
[Page 34-
15](#)

34-12

**11 - Relay lever**

- ◆ Installed position
⇒ [Page 34-14](#)

12 - Bushing**13 - Circlip****14 - Shoe****15 Transmission selector lever**

- ◆ With balance weight
- ◆ Install so that master spline aligns with selector shaft

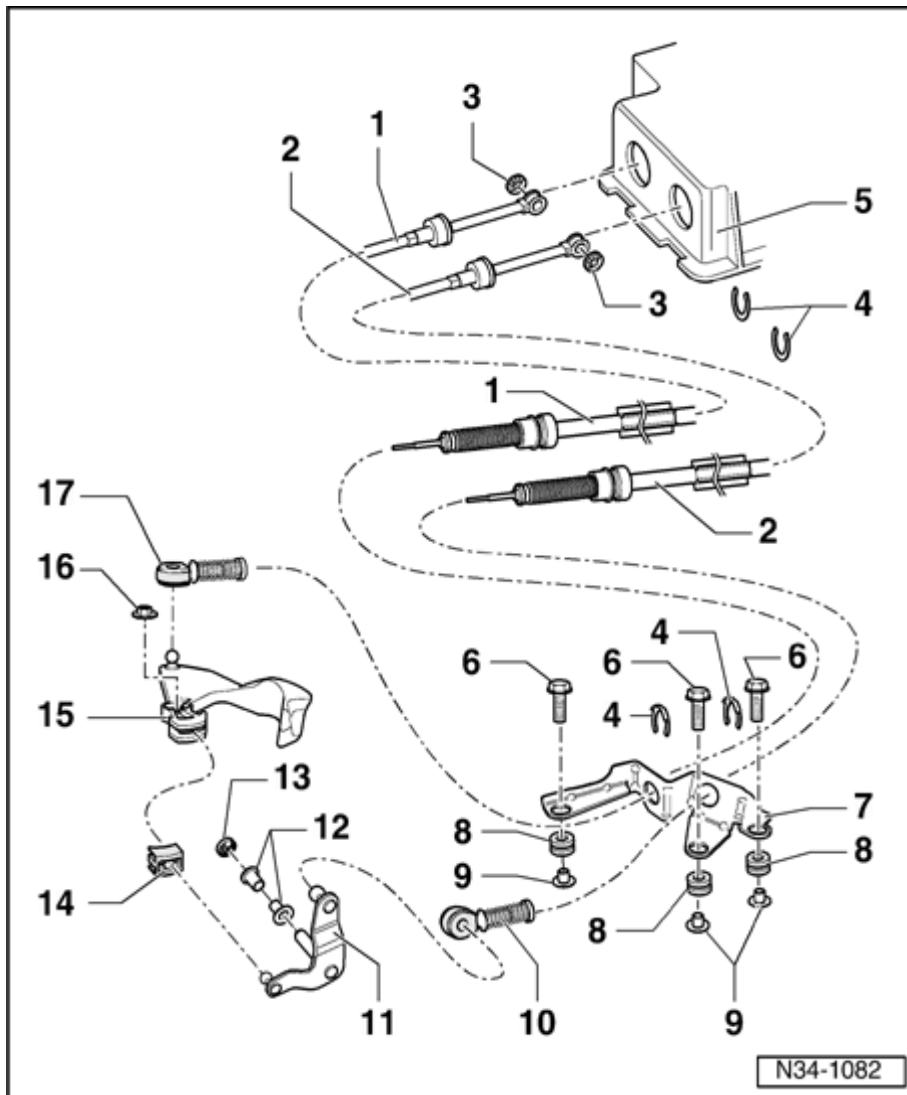
- ◆ After installing adjust gear selector mechanism
⇒ [Page 34-22](#)

- ◆ Installed position
⇒ [Page 34-14](#)

- ◆ Always replace

16 - Hex nut, 20 Nm

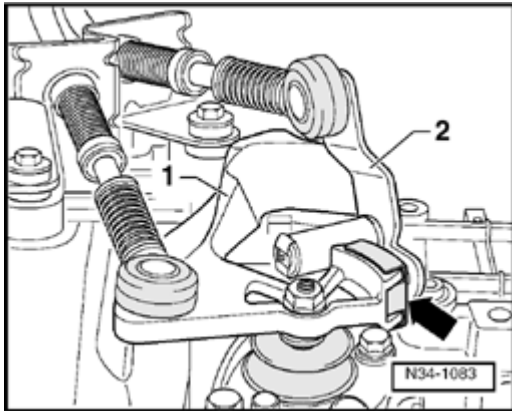
- ◆ Self-locking
- ◆ Always replace



**17 Cable
- locking
mechanism**

- ◆ For gear selector cable to gear selector lever
- ◆ Replace after removing from transmission selector lever item 15
- ◆ From 01.01 with holes
- ◆ Not necessary to be replaced
- ◆ Secured with securing clip
- ◆ Removing and installing ⇒ from ⇒ [Page 34-15](#)

34-14

**Installed position of transmission selector lever/relay lever**

1 - Gear selector lever

With balance weight

2 - Relay lever

Locates in guide rail of gear selector lever via shoe (arrow)

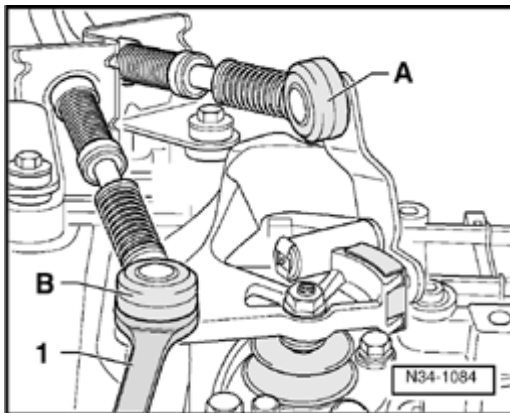
Gear selector mechanism, removing and installing

Removing

Selector mechanism up to 12.00

Note:

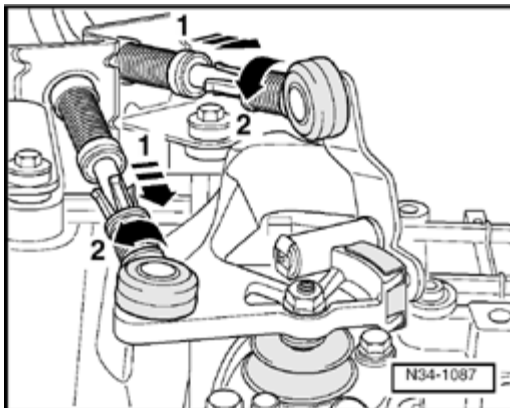
The cable locking mechanisms -A- or -B- may only be pried off if the gear selector cable or gate selector cable or just the cable locking mechanism is to be replaced.



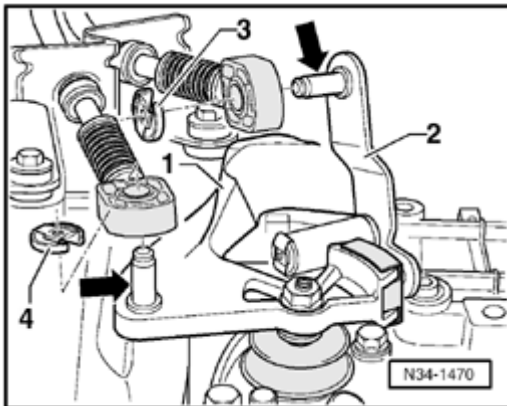
- Pry gate selector cable -A- or gear selector cable -B- off transmission using a 13 mm open end wrench.

1 = 13 mm open end wrench, commercially available

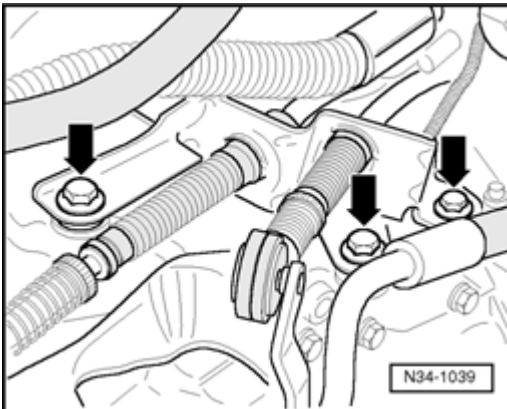
If the above-named parts are not to be replaced:



- Secure locking mechanism on gear selector cable and gate selector cable by pulling forward in direction of arrow -1- onto stop and then turning to left in direction of arrow -2- to lock.

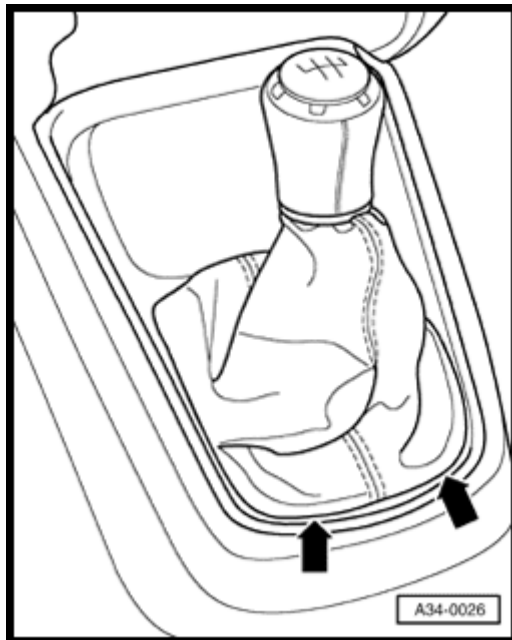
Selector mechanism from 01.01

- ✦ - Remove securing clip -4- for gear selector cable from gear selector lever -1-.
- Remove securing clip -3- for gate selector cable from relay lever -2-.
- Pry gate selector cable and gear selector cable off pin (arrows).

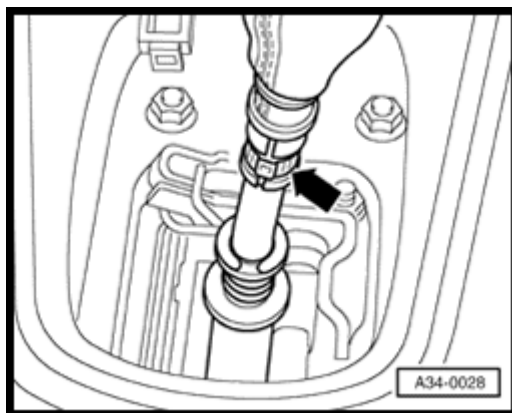
Continued for all selector mechanisms

- ✦ - Remove cable support bracket from transmission (arrows). If necessary, unclip hose at cable support bracket first.

34-17

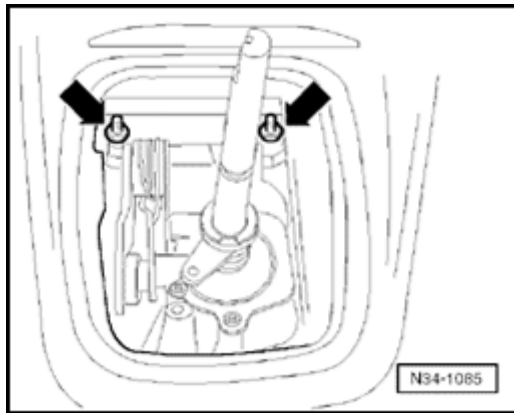


- ✦ - Carefully pry cover off center console (arrows).
- Pull cover to rear off center console.
- Remove sound insulation.

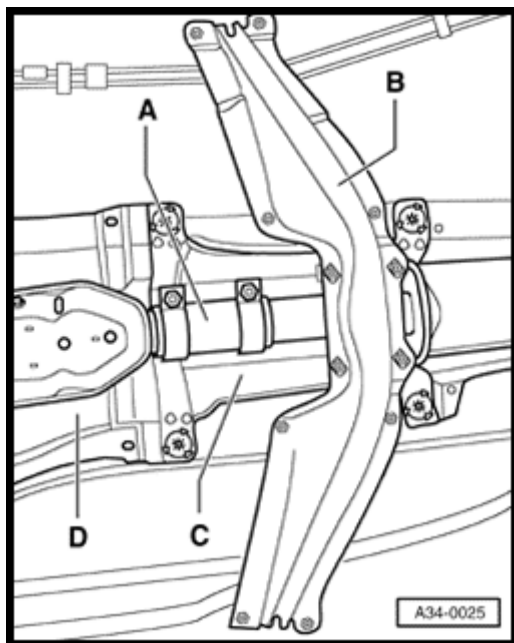


- ✦ - Destroy clip (arrow) and pull shift lever knob off with cover.

34-18



- ✦ - Now remove shift housing front securing nuts (arrows).



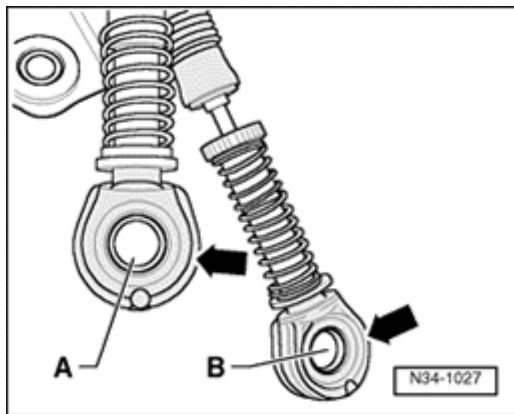
- ✦ - Separate front exhaust pipe -A-
⇒ *Repair Manual, Engine Mechanical, Repair Group 26*
- Remove cross support -B- below exhaust system.
- Loosen heat shield -C- in forward area.
- Remove heat shield -D-.
- Unbolt selector housing from body.
- Swing shift housing down and remove with selector cables.

Installing

Installation is performed in the reverse sequence. When installing note the following:

Selector mechanism up to 12.00

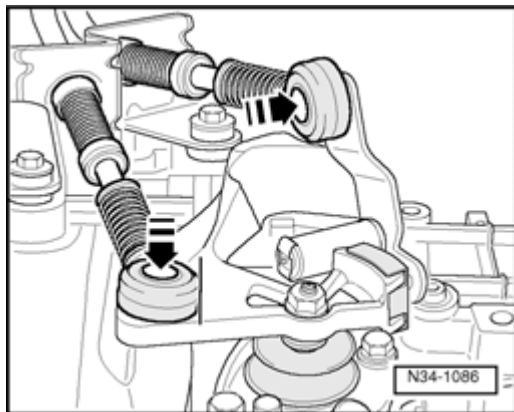
If cables are to be reused, replace cable locking mechanisms.



- Smear a small amount of polyurea grease Part no. G 000 450 02 in recesses of cable locking mechanism -A- and gate cable locking mechanism -B-.

Note:

The seals (arrows) outside the recess must be grease free.

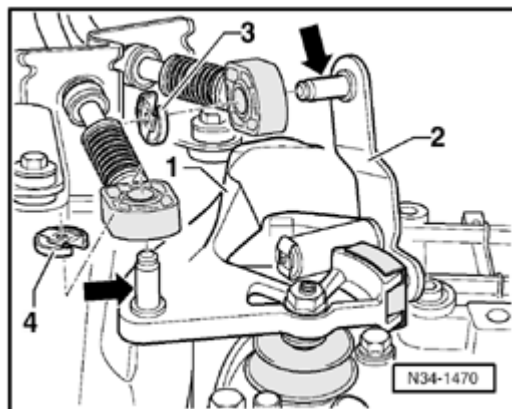
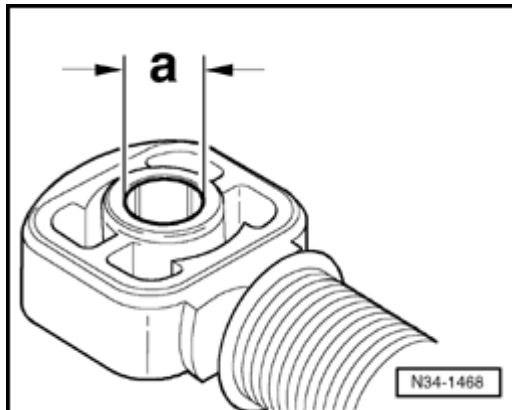


- Press gear selector cable onto transmission selector lever and gate selector cable onto relay lever (arrows).

Selector mechanism from 01.01

The cable locks have holes for securing them on the gear selector lever or the relay lever.

The holes in the cable locks have various diameters.



Application

Cable lock for:	Dimension "a"
Gear selector cable to gear shift lever	10 mm
Gate selector cable to relay lever	8 mm

The cable locks no longer need to be replaced following disassembling.

- Spread a small quantity of polyurea grease Part no. G 000 450 02 on pins (arrows) of gear shift lever -1- and relay lever -2-.

Note:

Always replace securing clips -3- and -4- after disassembling

- Secure gear selector cable with securing clip -3- and gate selector cable with securing clip -4-.

Continued for all selector mechanisms

- Adjust selector mechanism ⇒ [Page 34-22](#) .

Tightening torques

Shift housing to body ⇒ [Page 34-7](#) item 16

Cross support to body:

⇒ *Repair Manual, Engine Mechanical, Repair Group 26*

Selector cable support bracket to transmission ⇒ [Page 34-11](#) item 6

Gear selector mechanism, adjusting

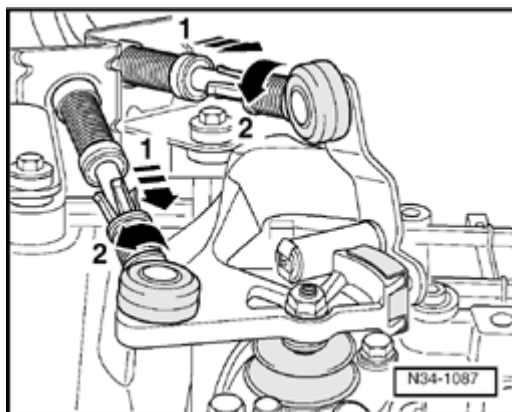
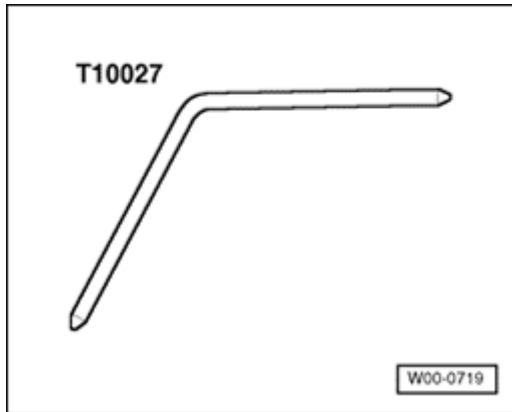
Special tools and equipment

- ◆ T10027 Pin

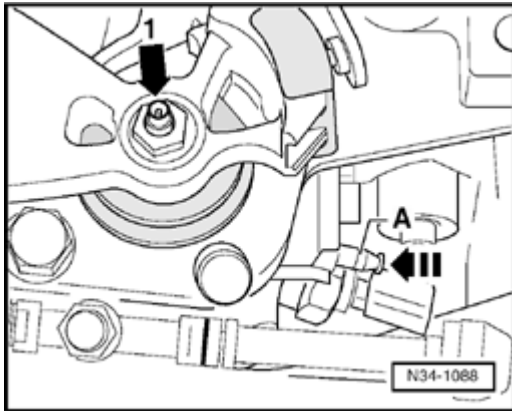
Note:

The following points are essential to ensure correct selector adjustment:

- ◆ *Moving parts of the selector mechanism and transmission elements must be in proper condition.*
- ◆ *Selector mechanism must move freely.*
- ◆ *The transmission, clutch and clutch mechanism must also be in proper condition.*
- ◆ Transmission in neutral position



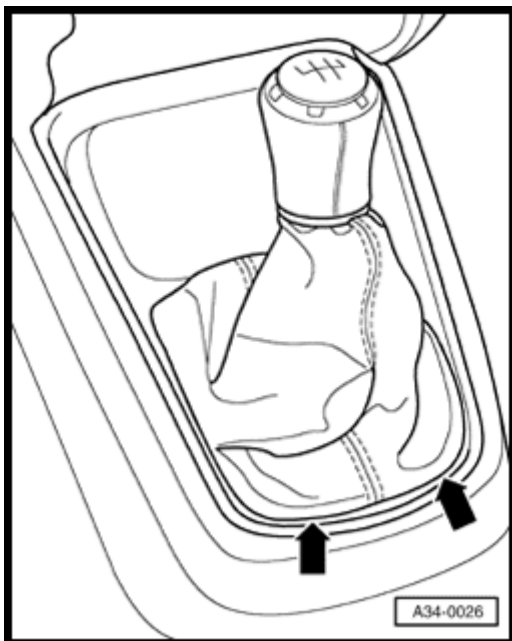
- Secure locking mechanism on gear selector cable and gate selector cable by pulling forward until stop (arrow -1-) and then turning to left to lock (arrow -2-).



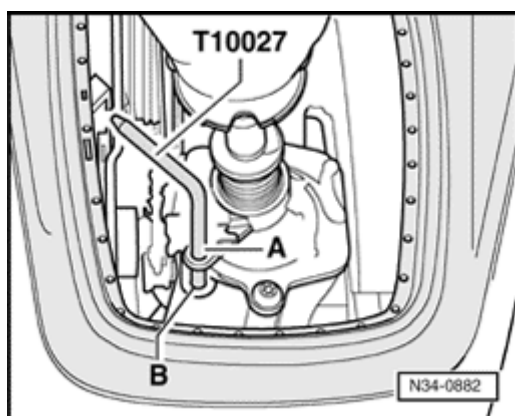
Set selector shaft as follows:

- Carefully press selector shaft down (direction of arrow -1-).
- While pressing selector shaft down, push locking pin -A- into transmission (direction of arrow) until it engages.

Selector shaft is now locked and cannot be moved any more.

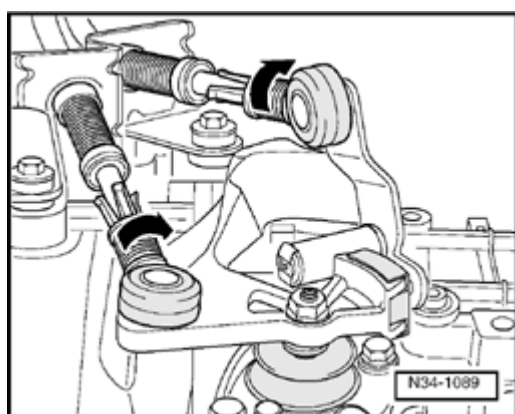


- Pull shift lever cover off center console (arrow).
- Pull cover to rear off center console.



◀ Set shift lever as follows:

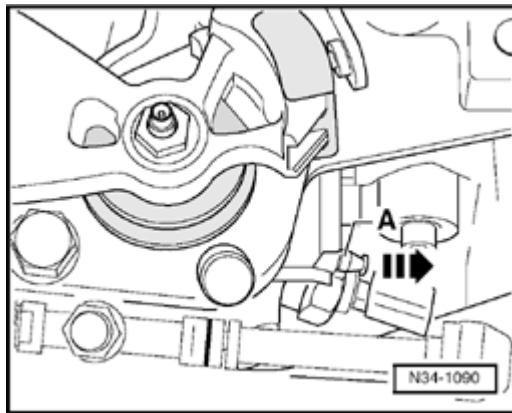
- Guide shift lever in neutral to left into gate for 1st/2nd gear.
- Guide pin T10027 through hole - A- and into hole -B-.



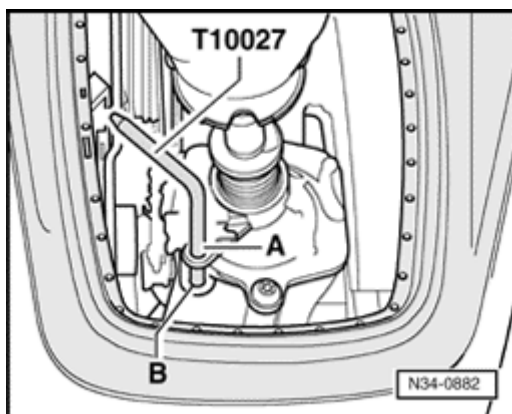
◀ - Turn locking mechanism on gear selector cable and gate selector cable to right onto stop (direction of arrow).

Spring presses locking mechanism into normal position.

34-25



- Pull locking pin -A- back to original position (direction of arrow).



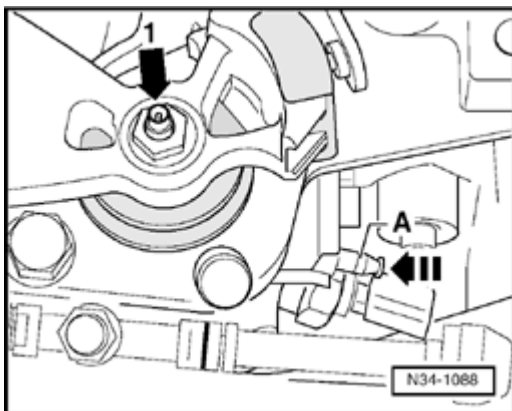
- Pull pin T10027 out of holes -A- and -B-.
- Clip cover into frame.

Functional check

- ◆ Gear shift lever must rest in 3rd/4th gear with transmission in neutral.
- Operate clutch.
- Select all gears several times. Pay particular attention to operation of reverse gear lock

Should a gear fail to engage smoothly after repeated selection of 1st, 2nd, 5th or 6th gear check the following:

- Carefully guide gear shift lever in neutral into gate for 1st/2nd gear.

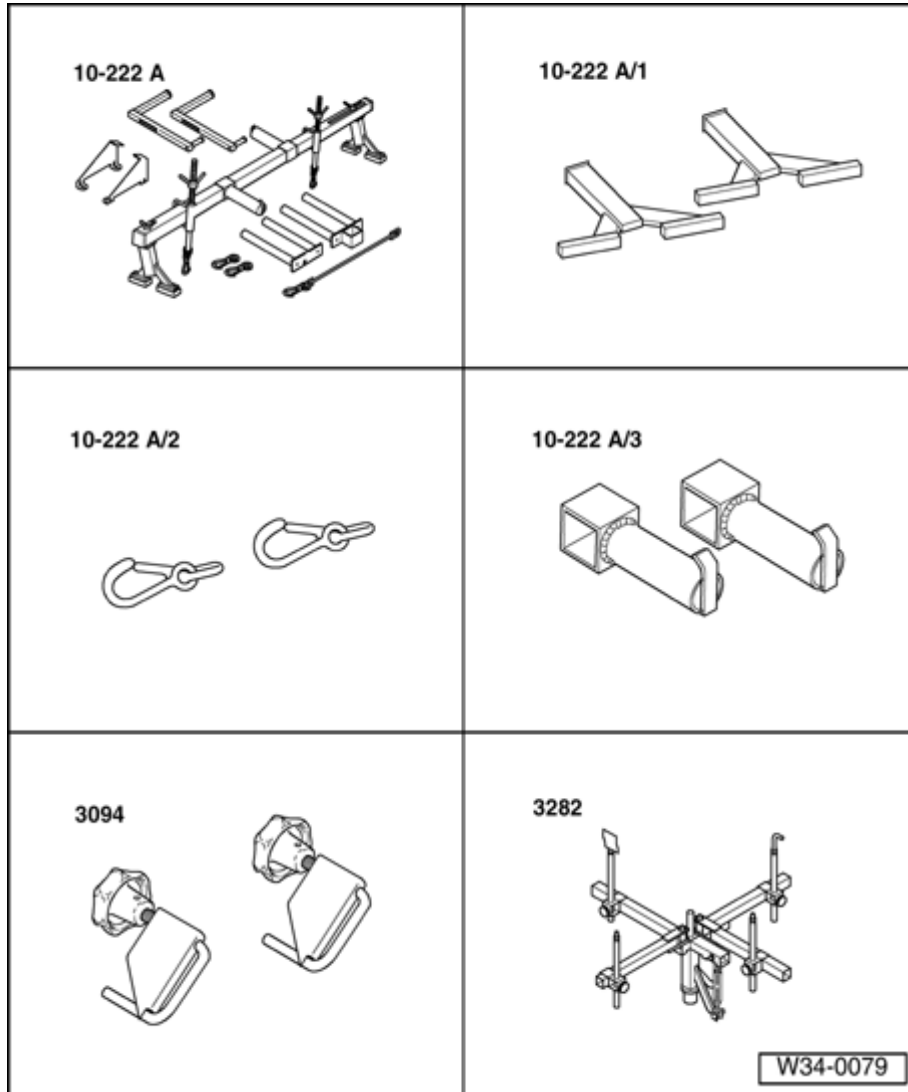


Selector shaft must move downward (arrow)

- To check if shift mechanism is correctly adjusted, have second technician attempt push locking pin -A- into transmission (direction of arrow) and thus into selector shaft gate

If this cannot be accomplished:

- Adjust selector mechanism, ⇒ [Page 34-2](#)

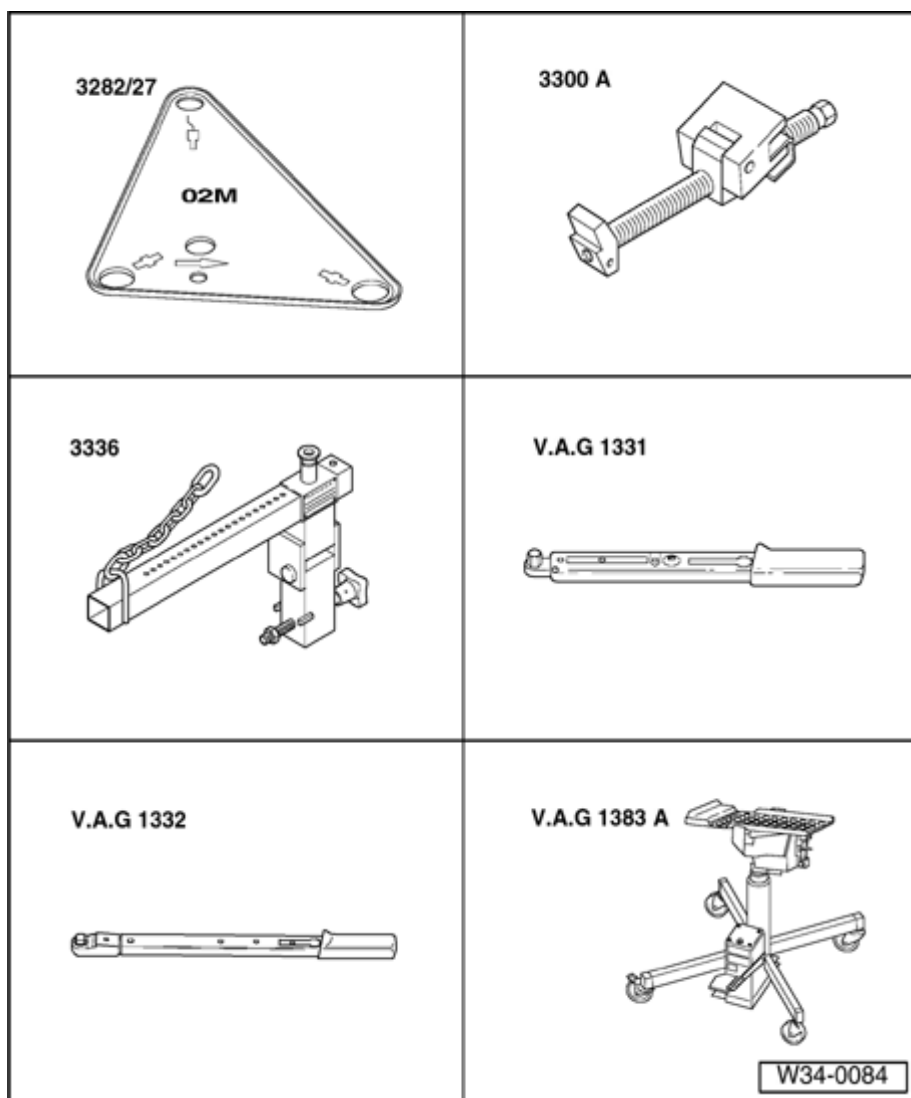


Transmissic removing ar installing

Special tools and equipment

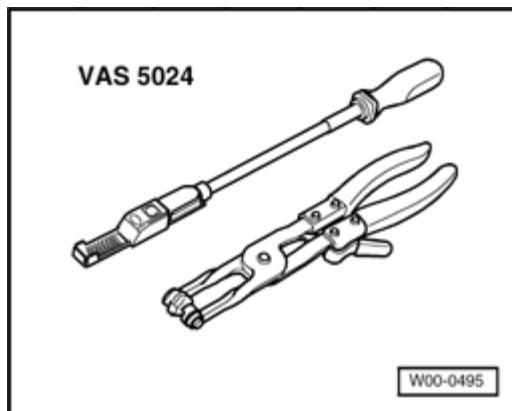
- ◆ 10-222 A Suppoc
- ◆ 10-222 A/1
Support
- ◆ 10-222 A/2 Spe
hook
- ◆ 10-222 A/3
Adapter
- ◆ 3094 Hose clam
- ◆ 3282 Transmiss
support

34-28

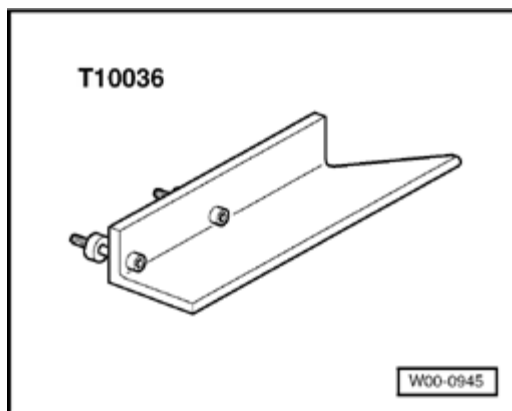


Special tools and equipment

- ◆ 3282/27 Adjustn plate
- ◆ 3282/48 Pins (Q 2)
- ◆ 3282/52 Suppor
- ◆ 3300 A Engine support
- ◆ 3336 Transmiss lifting beam
- ◆ VAG 1331 Torqi wrench
- ◆ VAG 1332 Torqi wrench
- ◆ VAG 1383 A Engine/transmis jack

Special tools and equipment

- ◀ ◆ VAS 5024 Assembly pliers



- ◀ ◆ T10036 Support rail

Removing

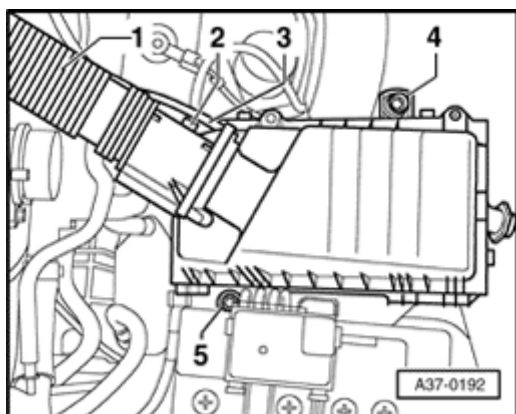
Note:

Check whether a coded radio is installed as during the forthcoming work sequences the battery ground strap must be disconnected. Obtain the radio code first, if necessary.

- Remove cover from engine.
- With ignition switched off disconnect battery ground strap.
- Remove battery and battery carrier.

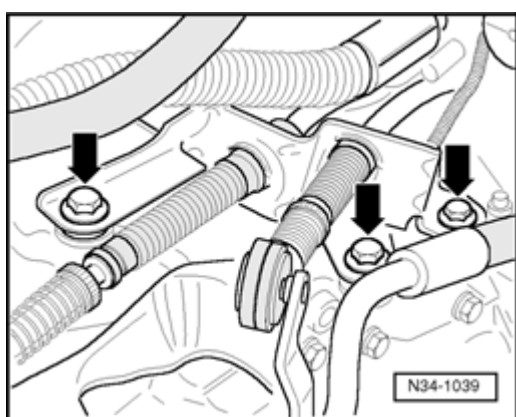
⇒ [Repair Manual, Electrical Equipment, Repair Group 27; Battery, removing and installing](#)

34-31



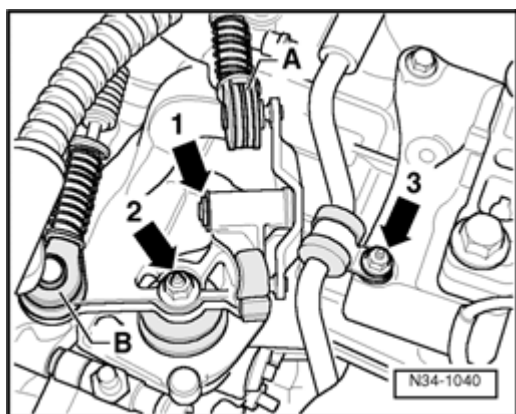
- ✦ - Remove intake hose -1- , connector -2- and hose -3- from Mass Air Flow sensor.
 - Remove complete air cleaner housing by removing bolts -4- and -5-.
- ⇒ *Repair Manual, Fuel Injection & Ignition, Repair Group 24; Removing and installing air cleaner.*

- Remove intake hose -1-.



- ✦ - Remove cable support bracket from transmission (arrows).

34-32

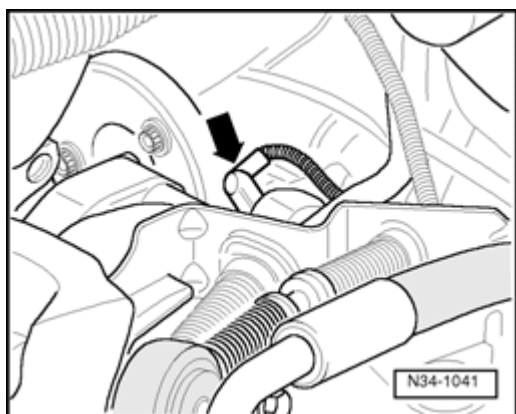


- ✦ - Pull lock washer (arrow -1-) from gate selector cable relay lever -A-
-
- Remove gear selector cable -B- with transmission selector lever by removing nut (arrow -2-).

Note:

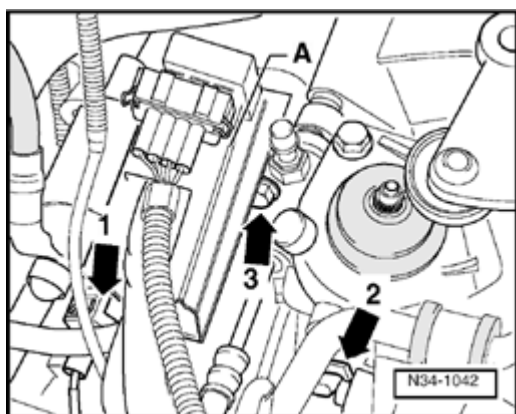
Use a puller such as Kukko 20-10, if necessary.

- Unfasten power steering line (arrow -3-).

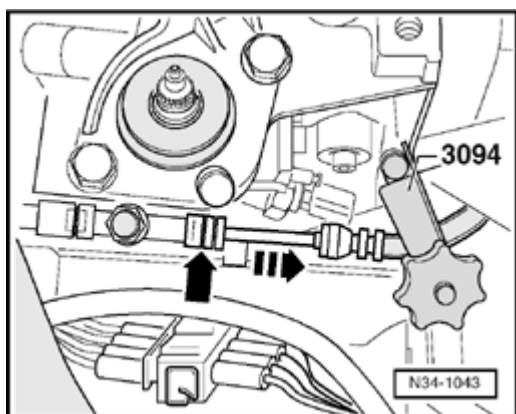


- ✦ - Pull connector off speedometer sensor (arrow).

34-33



- Remove wiring (arrow -1-) from starter.
- Disconnect back-up light connector (arrow -2-).
- Remove cable retainer (arrow -3-) on starter.
- Remove upper securing bolt on starter.

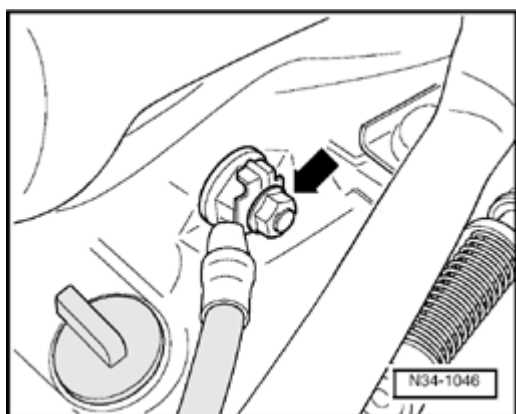


- Clamp clutch slave cylinder hose with special tool 3094.
- Pull out clamp (arrow) and line/hose in direction of arrow.

Note:

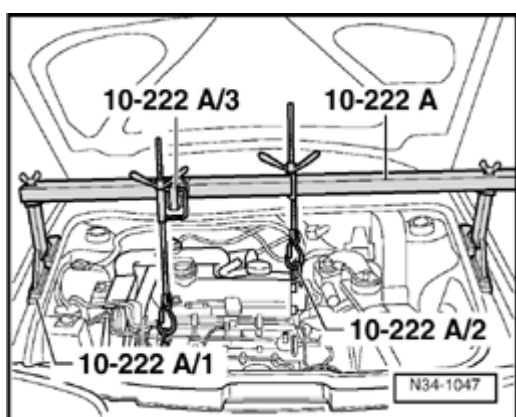
Do not depress clutch pedal.

34-34

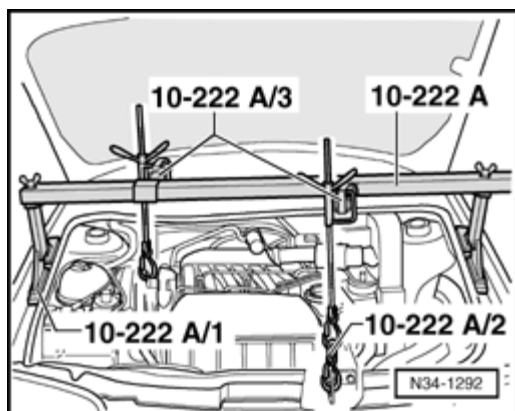


- Remove ground strap at engine/transmission upper securing bolt.
- Remove engine/transmission upper securing bolts.
- Remove hoses and cable connections in area of engine mounting eye for support 10-222A.

Vehicles with 4-Cyl. engines



- Install support bar 10-222A together with legs 10-222 A/1, special hook 10-222 A/2 and adapter 10-222 A/3.

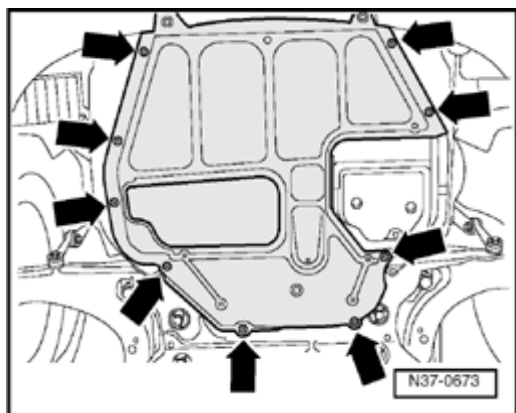


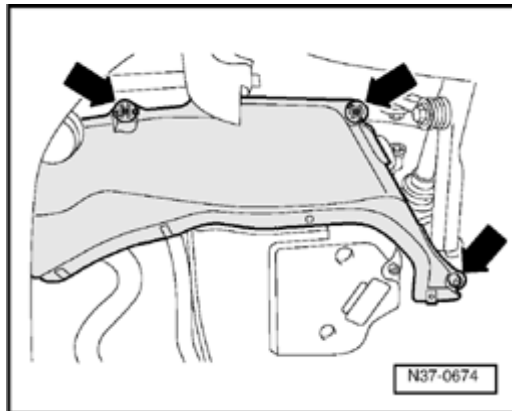
Vehicles with 6-Cyl. engines

- Install support bar 10-222A together with legs 10-222 A/1, special hook 10-222 A/2 and adapter 10-222 A/3.

Continued for all vehicles

- Take weight of engine/transmission assembly on spindles.
 - Turn wheels fully onto left lock.
 - Raise vehicle
-
- Remove sound insulation tray (arrows).





- Remove left sound insulation (arrows).

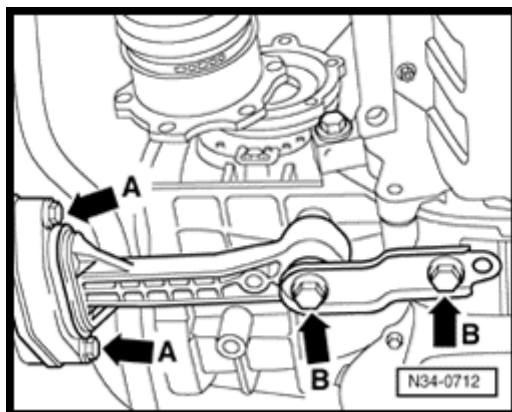
Vehicles with Diesel and 1.8 ltr. Turbo engines

- Remove charge air line between charge air cooler and turbocharger.

Continued for all vehicles

- Remove right sound insulation.
- Disconnect axle shafts from flanged shafts and tie up as high as possible. When tying up shafts do not damage body surface protection.
- Separate exhaust system and if necessary remove from subframe.

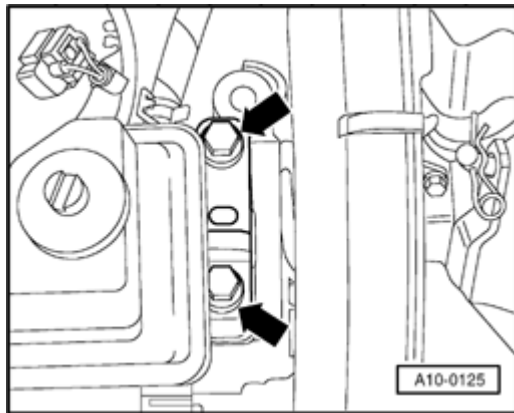
⇒ *Repair Manual, Engine Mechanical, Repair Group 26*



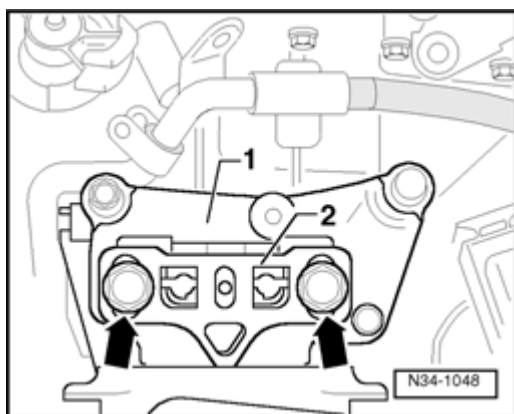
- Remove pendulum support (arrows -A- and -B-).
- Remove power steering line from starter and transmission.
- Remove starter.

⇒ [*Repair Manual, Electrical Equipment, Repair Group 27; Starter motor, removing and installing*](#)

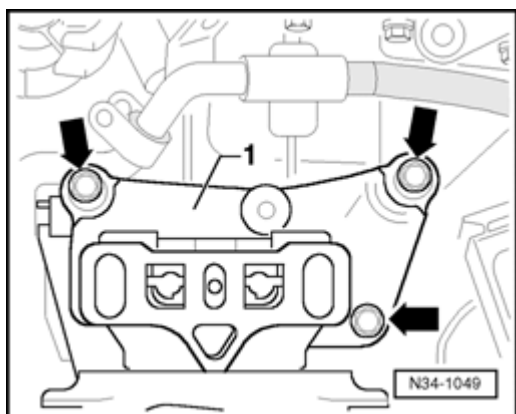
34-37



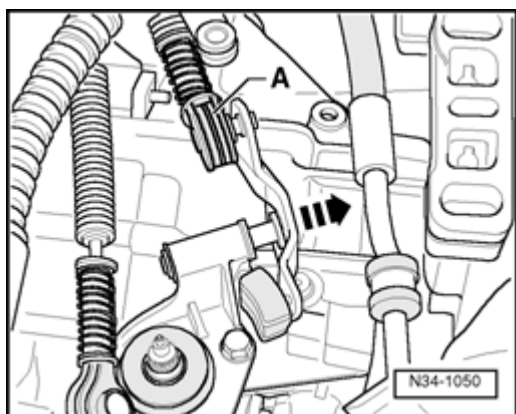
- Unbolt engine side of assembly mounting from engine carrier from above (arrows).



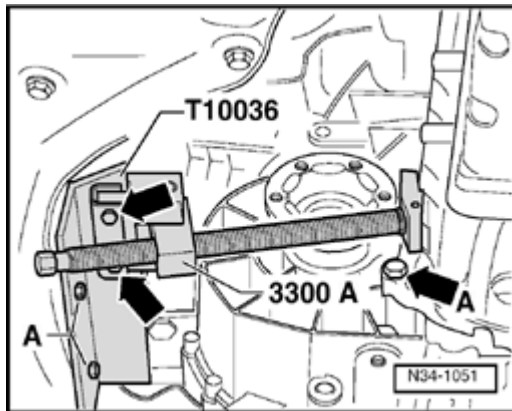
- Remove left assembly mounting - 2- hex bolts (arrows) from left mount -1-.
- Carefully tilt engine and transmission by lowering left side spindle approx. 60 mm on support bar 10-222 A.



- Remove left mount -1- from transmission (arrows).



- Pull off gate selector cable -A- with relay lever in direction of arrow.
- Tie up selector cable with transmission selector lever and gate selector cable with relay lever.
- Incline engine/transmission assembly further by lowering it via left spindle of support bar 10-222A.



- Bolt support rail T10036 to both pendulum support securing holes on subframe (bolts -A-).
- Install support 3300 A so that it is almost touching assembly mounting and secure (arrows).
- Press engine/transmission forward carefully.

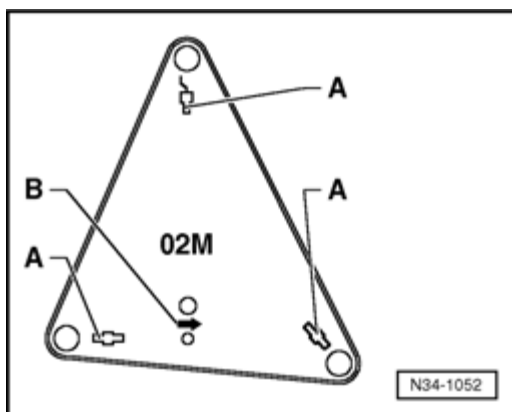
Note:

Do not damage any of the connecting lines and hoses when moving engine/transmission assembly.

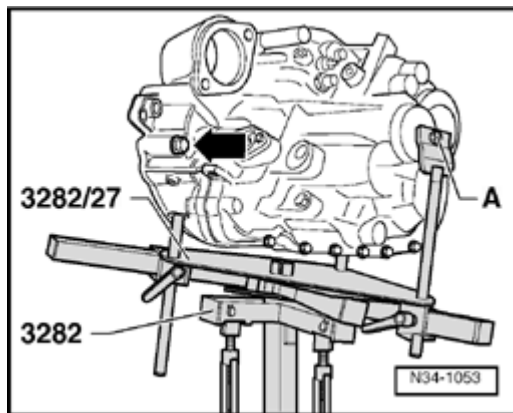
- Remove lower rear engine/transmission securing bolts (arrow -A-).
- Remove lower engine/transmission securing bolts.

Set up transmission support 3282 with adjustment plate 3282/27 to remove transmission 02M.

- Align arms of transmission support according to holes in adjustment plate.



- Bolt support elements -A-, as illustrated, on adjustment plate.

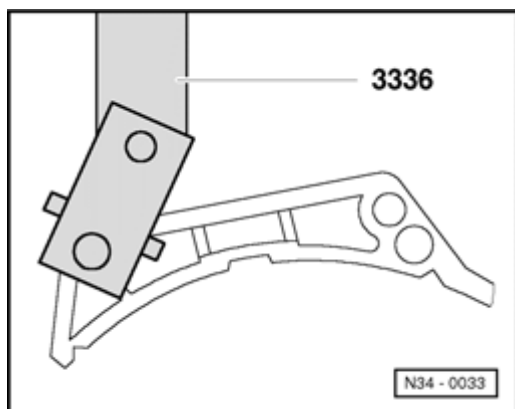


- Place transmission jack under vehicle. Arrow symbol -B- (⇒ Illustration N34-1052) on adjustment plate points to front of vehicle.
- Align adjustment plate parallel to transmission.
- Secure transmission to transmission support 3282 with bolt -A-.
- Remove engine/transmission connecting bolt (arrow).
- Press transmission off dowel sleeves and carefully swing toward subframe.
- Lower transmission slightly and incline to left via spindles of transmission support 3282.
- Lower transmission carefully, guiding right side flanged shaft in area of flywheel and left side flanged shaft in area of subframe.
- When lowering, change position of transmission using transmission support 3282 spindles.

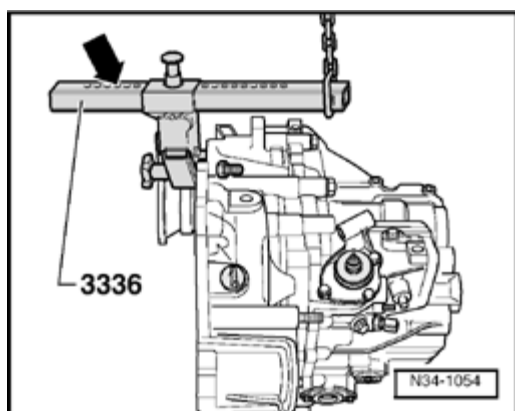
Note:

Do not damage power steering line when lowering transmission.

Transporting the transmission



- Bolt transmission lifting device 3336 to clutch housing.



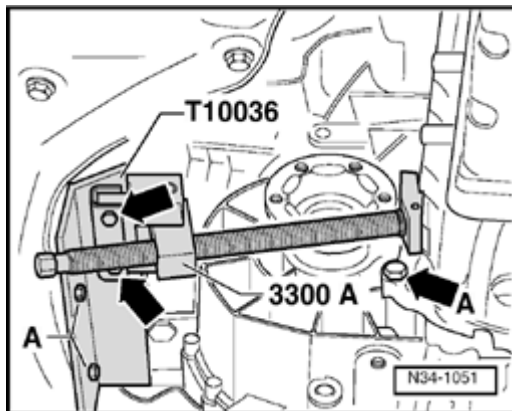
- Set support beam on sliding piece with locking pin (arrow).
No. of holes visible = 6
- Take transmission out with workshop crane and transmission lifting device 3336.
- Lower transmission.

Installing

- Clean input shaft splines and lightly grease with G 000 100 grease.

Clutch plate must be able to slide lightly to and forth on input shaft.

- Check whether dowel sleeves for aligning engine/transmission are installed in cylinder block and install if necessary.
- Make sure that intermediate plate is correctly positioned on engine.

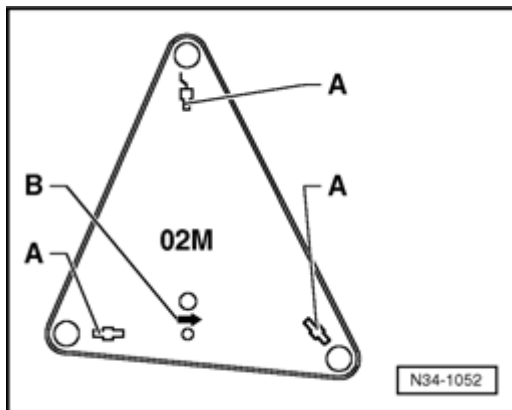


- Bolt support rail T10036 to both pendulum support securing holes on subframe (arrow).
- Install support 3300 A so that it is almost touching assembly mounting and secure (arrows).
- Press engine forward carefully.

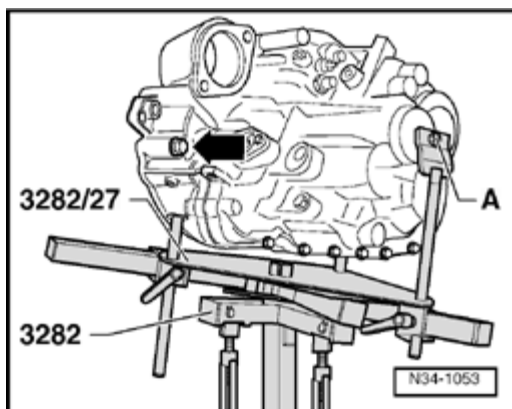
Note:

Do not damage power steering line.

Set up transmission support 3282 with adjustment plate 3282/27 to install transmission 02M.



- Align arms of transmission support according to holes in adjustment plate.
- Bolt support elements -A-, as illustrated, to adjustment plate.
- Place transmission on transmission jack.
- Align adjustment plate and transmission with one another.

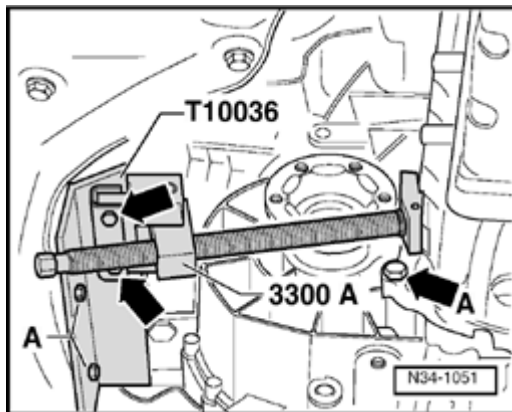


- Place transmission jack under vehicle. An arrow symbol -B- (⇒ Fig. N34-1052) on adjustment plate points to front of vehicle.
- Secure transmission to transmission support 3282 with bolt -A-.
- Incline transmission to left via spindles of transmission mounting 3282.
- Install transmission.

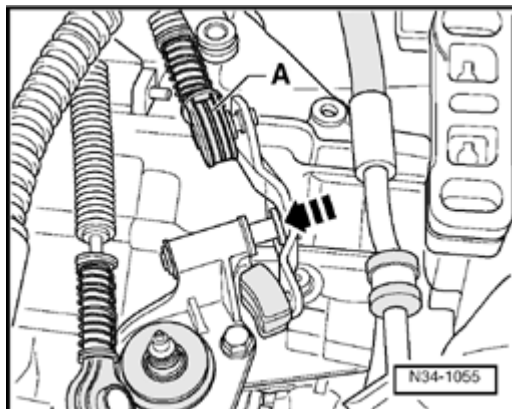
Note:

Do not damage power steering line.

- Install lower rear engine/transmission connecting bolt (arrow -A-).
- Install lower engine/transmission securing bolts.

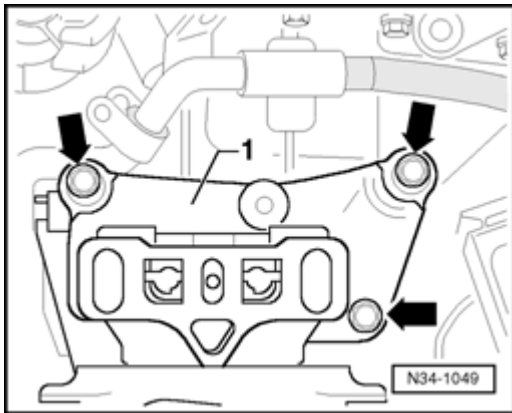


- Remove pressing device 3300 A (arrows).
- Remove bolts -A- and remove support rail T10036.

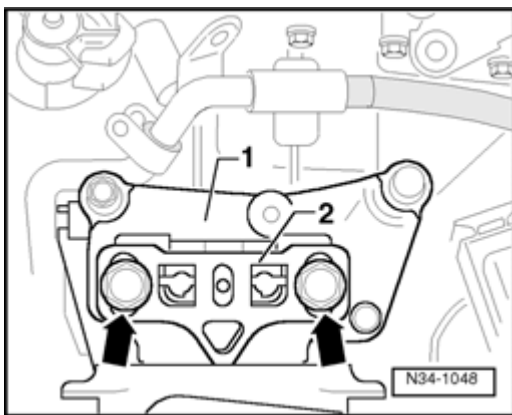


- Install gate selector cable -A- with relay in direction of arrow.

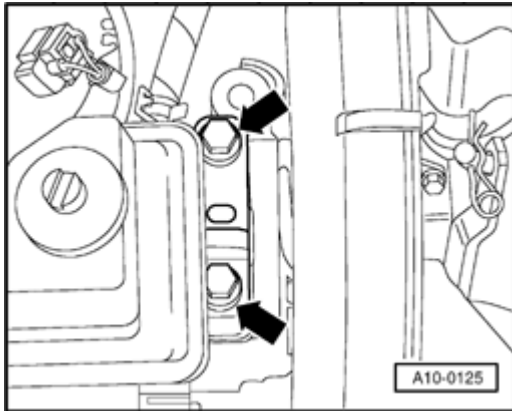
34-45



- Install left mount -1- on transmission (arrows).
- Align engine/transmission in installation position.



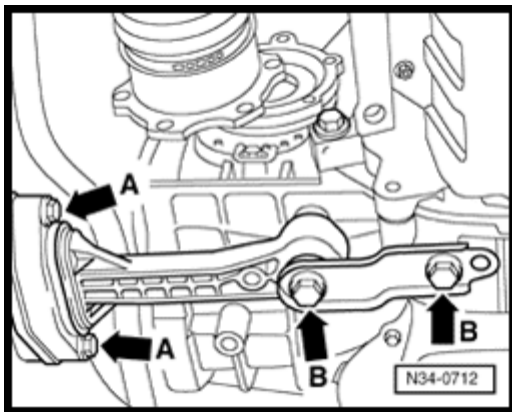
- Install new hex bolts (arrows) for left assembly mounting -2- in mount -1-.



- Install new hex bolts (arrows) for right assembly mounting in engine mounting.

WARNING!

Do not remove support bar 10-222A until the bolts securing the left and right assembly mountings have been tightened to torque setting.



- Use new bolts and install pendulum support (arrows -A- and -B-).

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

- Install axle shafts to transmission.

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

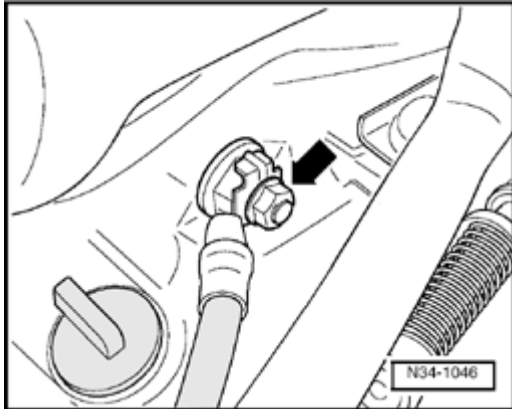
- Reconnect exhaust system.

⇒ [Repair Manual, Engine Mechanical, Repair Group 26](#)

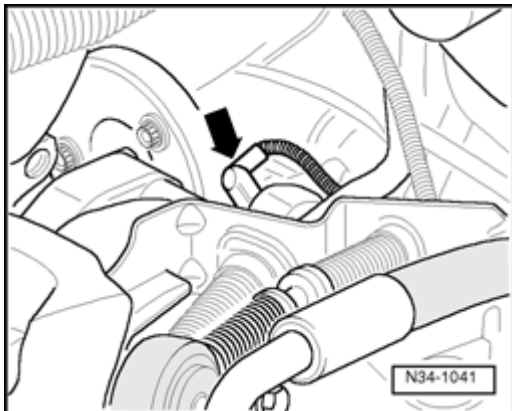
- Install starter and secure with lower bolt.

- Install retainer for power steering line on starter and on transmission.

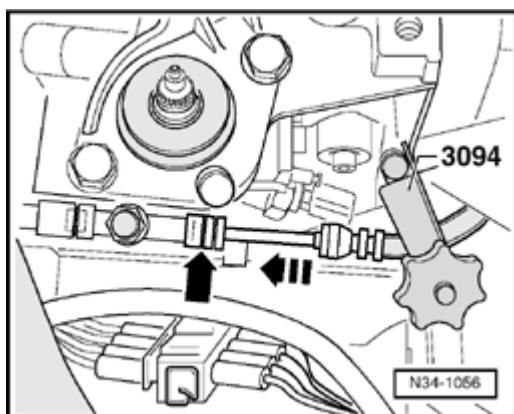
- Install upper engine/transmission securing bolts.
- Tighten upper engine/transmission securing bolts to prescribed torque ⇒ table ⇒ [Page 34-52](#) or table ⇒ [Page 34-52](#)



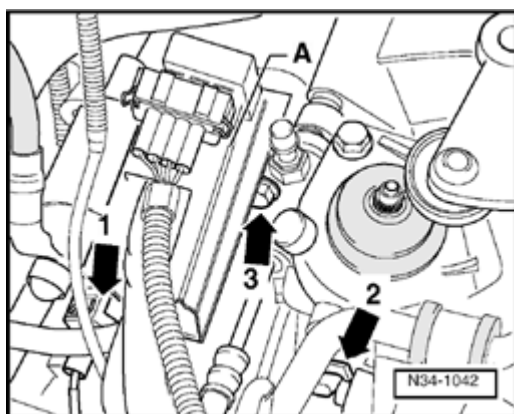
- Install ground strap at upper engine/transmission securing bolt.



- Attach connector to speedometer sensor (



- Push line/hose in direction of arrow and press down clamp (arrow).
- Remove special tool 3094.
- Install upper securing bolt on starter.

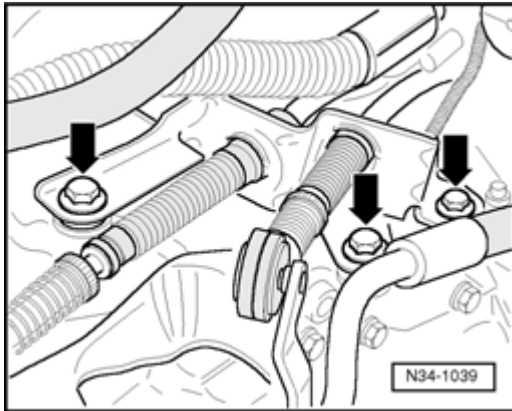


- Install cable retainer -A- on starter (arrow -3-).
- Attach connectors for starter (arrow -1-) and back-up light (arrow -2-).

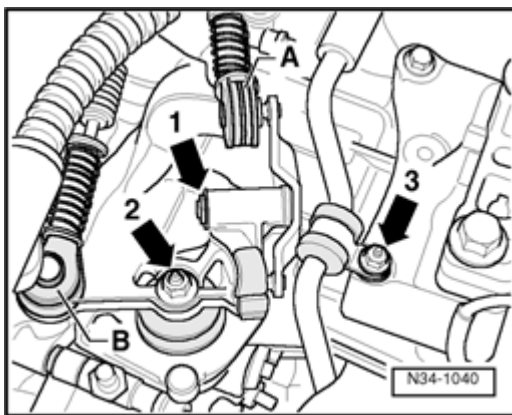
Note:

All repairs on the starter:

⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#)

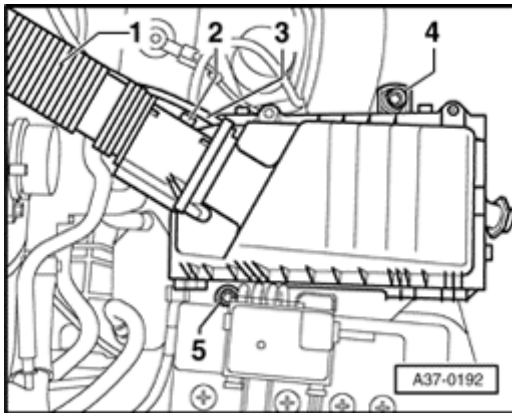


- Install cable support bracket on transmission (arrows) and tighten bolts to torque setting ⇒ [Page 34-11](#) pos. 6 .



- Install gear selector cable -B- with transmission selector lever (arrow -2-).
- Tighten hex nut (arrow -2-) to prescribed torque ⇒ [Page 34-10](#) pos. 16 .
- Secure gate selector cable -A- with relay lever using lock washer (arrow -1-).
- Install power steering line (arrow -3-).
- Install battery carrier.

⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#)



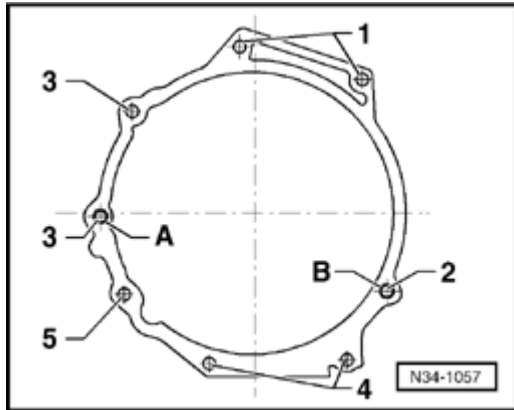
- Install complete air cleaner housing by tightening bolts -4- and -5-.
- Install intake hose -1-.
- Attach connector -2- and hose -3- to Mass Air Flow sensor.
- Install battery.

⇒ [Repair Manual, Electrical Equipment, Repair Group 27; Battery, removing and installing.](#)

Note:

Note radio coding for vehicles with coded radio.

- Check transmission oil ⇒ [Page 34-54](#) .
 - ◆ Specifications ⇒ [Page 00-2](#) .
- Bleed clutch system ⇒ [Page 30-20](#) .
- Adjust gear selector mechanism ⇒ [Page 34-22](#) .
- Install engine cover.
- Install insulation tray below engine/transmission, if so equipped.



Tightening torques

Vehicles with 4-Cyl. engines

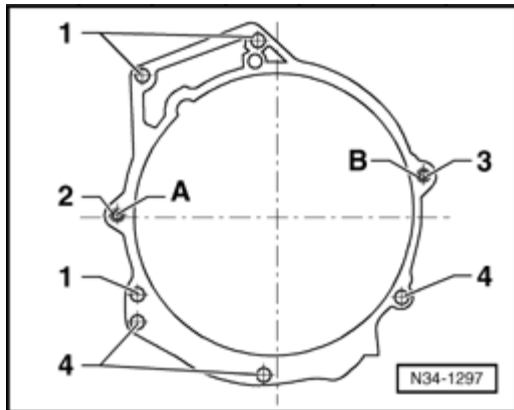
Transmission to engine

Always replace bolts

Item	Bolt	Qty.	Nm
1	M 12 x 55	2	80
2	M 12 x 70	1	80
3 ¹⁾	M 12 x 165	2	80
4	M 10 x 50	2	40
5	M 10 x 105	1	60

¹⁾ Also starter to transmission

Items A + B = Dowel sleeves



⚠ Transmission to engine

Always replace bolts

Item	Bolt	Qty.	Nm
1	M 12 x 55	3	80
2	M 12 x 65	1	80
3	M 12 x 80	1	80
4	M 10 x 50	3	45

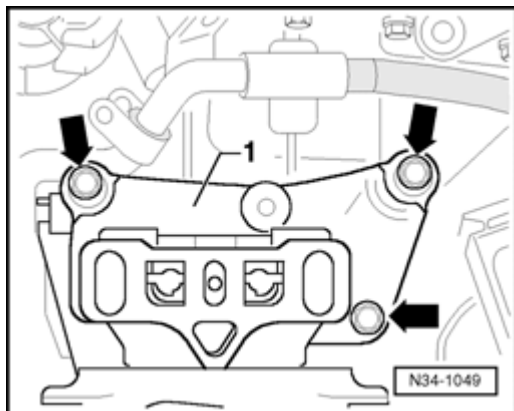
Items A + B - Dowel sleeves

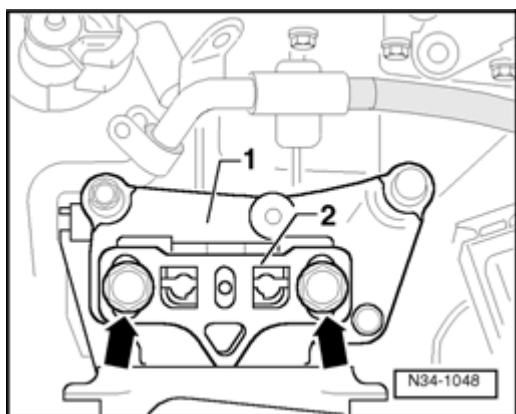
Continued for all vehicles

⚠ Transmission mount -1- to transmission

Replace bolts

Bolts (arrows) 50 Nm + 90°





◀ Transmission to body

Bolts (arrows) 100 Nm

Note:

Install engine/transmission mountings stress-free.

⇒ *Repair Manual, Engine Mechanical, Repair Group 10; Engine, removing and installing*

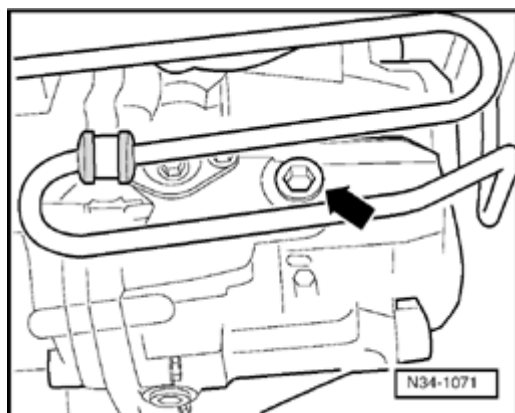
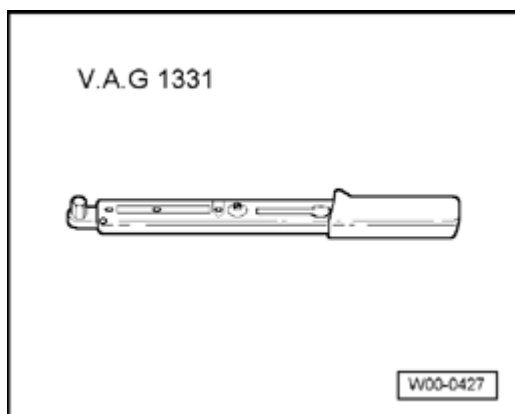
Hydraulic line to transmission 25 Nm

Transmission gear oil, checking

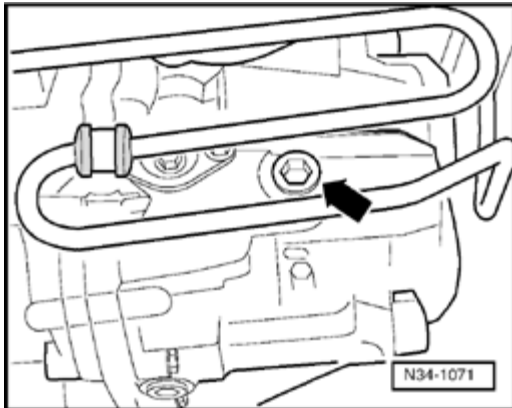
Special tools and equipment

- ◆ VAG 1331 Torque wrench or equivalent

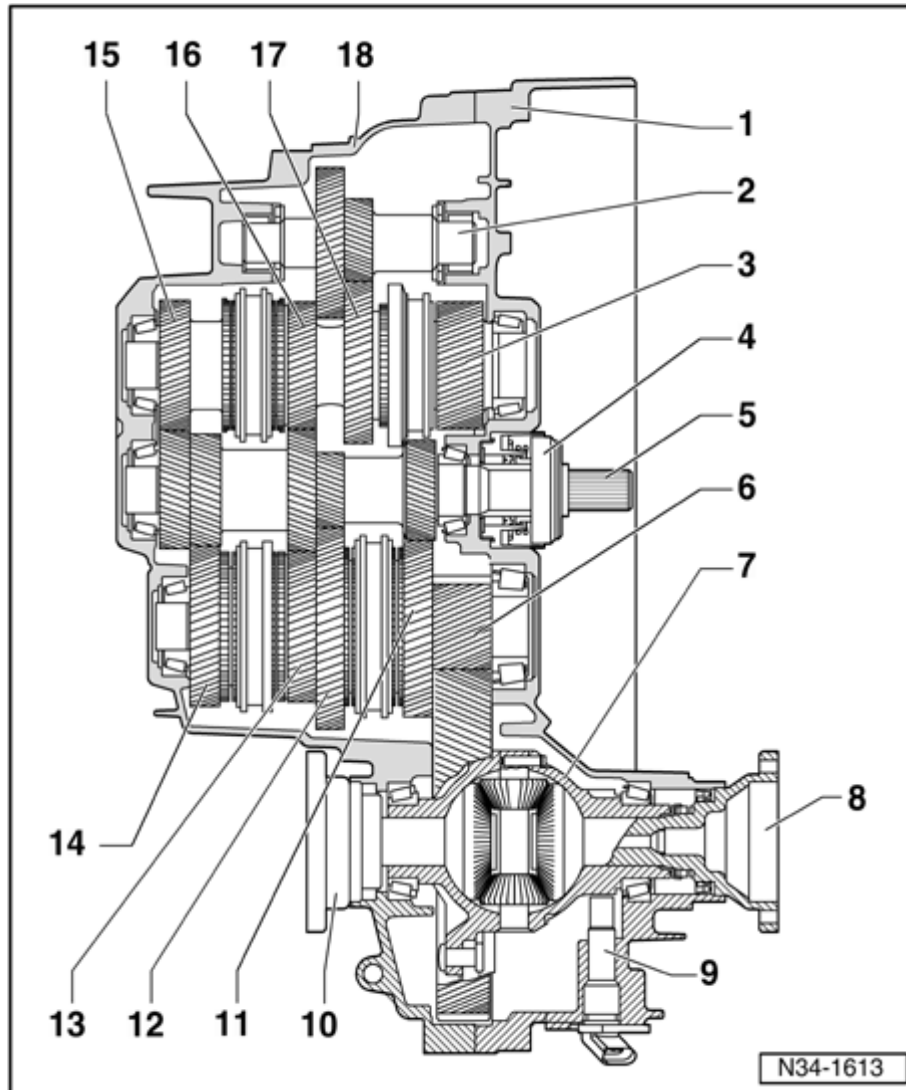
Gear oil specification ⇒ [Page 00-2](#)



- Remove plug (arrow) to check oil
Oil level is correct when transmission is full to lower edge of filler hole.
- Install new plug (arrow).
- Tighten plug to 30 Nm.

**Filling with new oil:**

- Remove plug (arrow).
- Top up with oil to lower edge of filler hole.
- Install new plug (arrow).
- Tighten plug to 30 Nm.



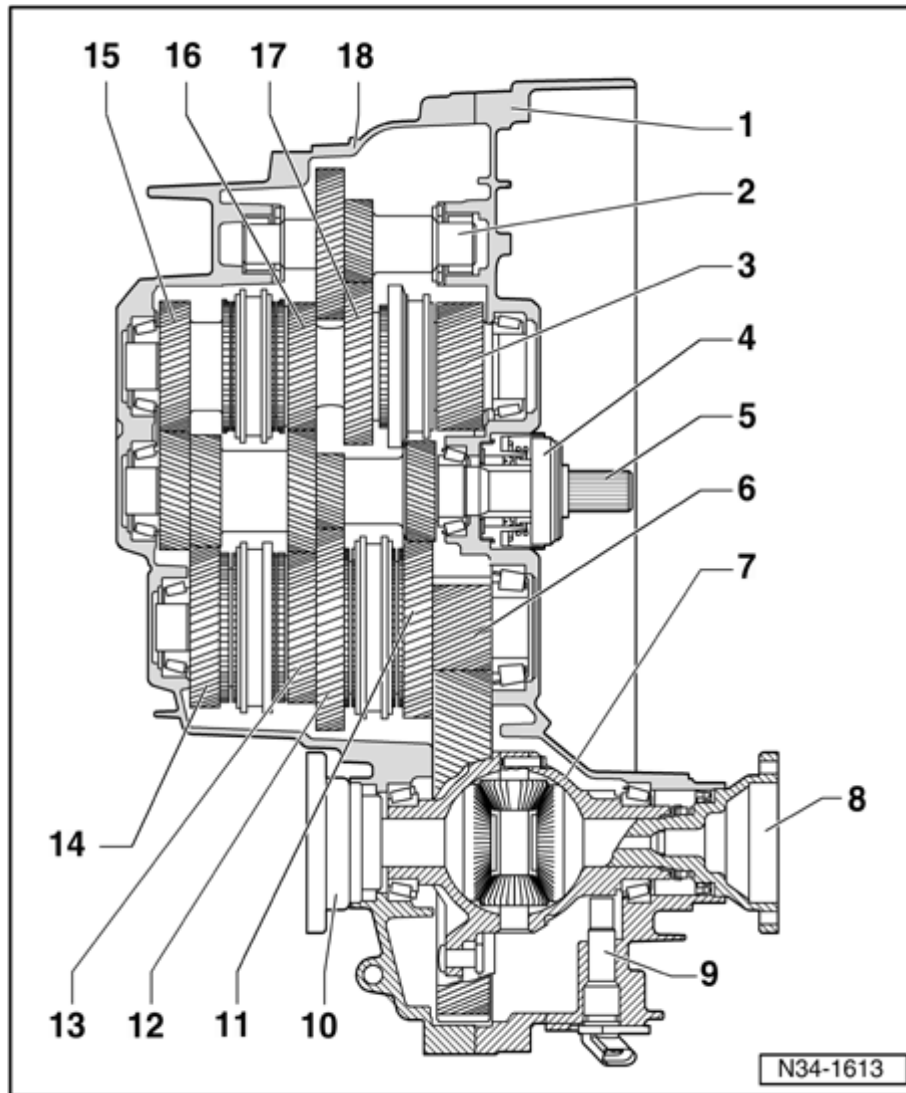
Transmissic disassembli and assembling

Sequence for
disassembling and
assembling ⇒ [Paq
34-67](#)

Component overview

- 1 - Clutch housi
- 2 - Reverse sha
- 3 - Output shaft
5th, 6th and
reverse gear
- 4 - Slave cylin
with release
bearing
- 5 - Input shaft
- 6 - Output shaft
1st-4th gear
- 7 - Differential
- 8 - Flanged sha
right
- 9 - Speedomete
sender

34-57



10 - Flanged shaft, left

11 - 2nd gear

12 - 1st selector gear

13 - Selector gear for 4th gear

14 - Selector gear for 3rd gear

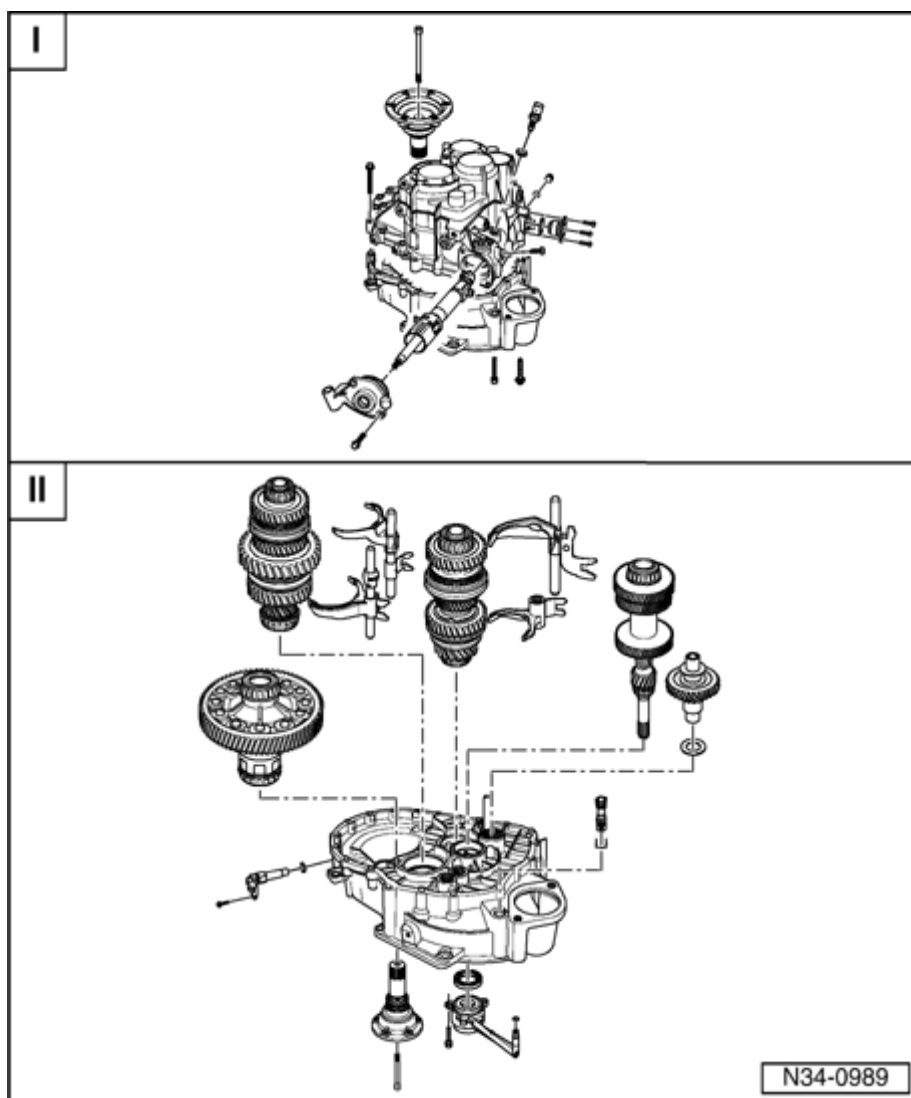
15 - Selector gear for 5th gear

16 - 6th gear wheel

◆ Spacer sleeve installed in 5-speed transmission

17 - Reverse sliding gear wheel

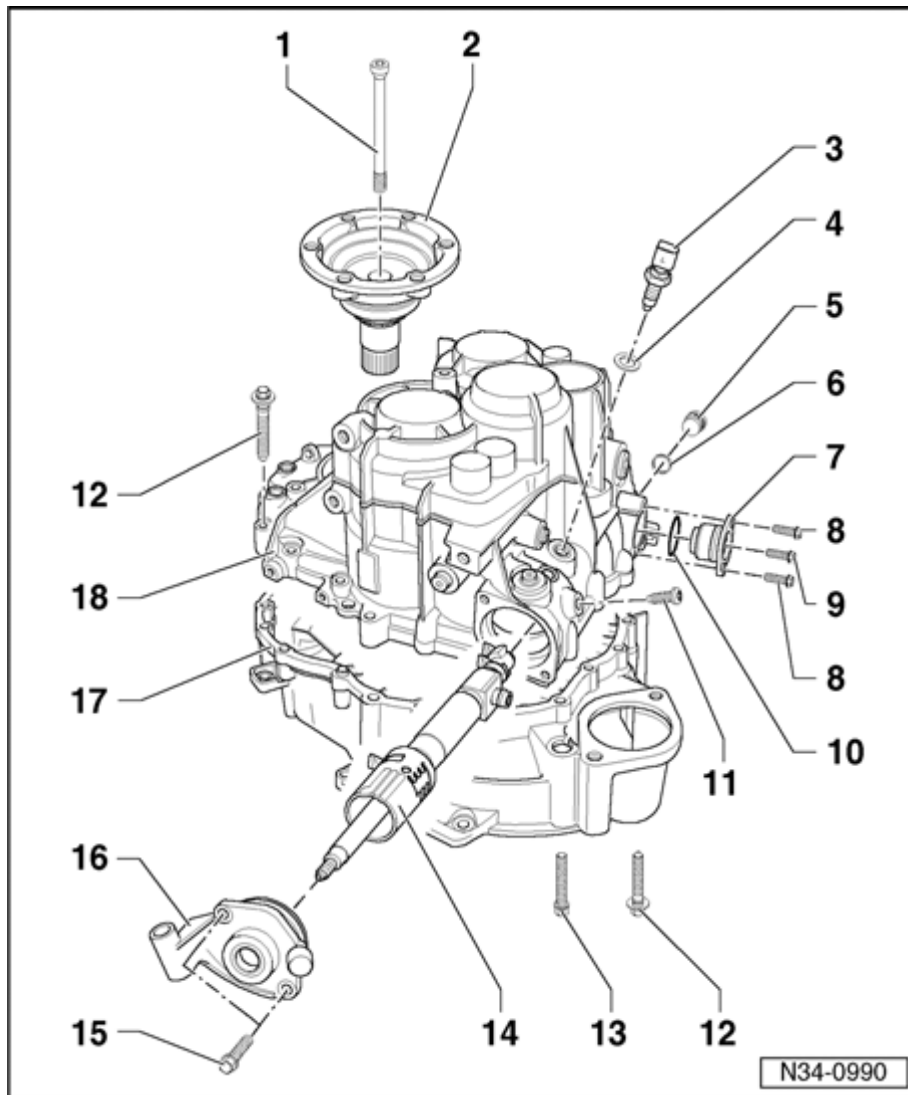
18 Transmission - housing



Assembly overview

I -
Disassembling
and
assembling
transmission
housing and
selector
mechanism ⇒
[Page 34-59](#)

II -
Disassembling
and
assembling
input shaft,
output shafts,
differential
and selector
rods ⇒ [Page 34-62](#)



Transmission housing and selector mechanism, removing and installing

1 Countersunk head bolt, 25 Nm

2 - Flanged shaft with spring

◆ Removing and installing
⇒ [Page 39-1](#)

◆ Assembling ⇒
from ⇒ [Page 39-7](#)

3 - Back-up light switch, 20 Nm

4 - Oil seal

◆ Always replace

5 - Oil drain plug, 30 Nm

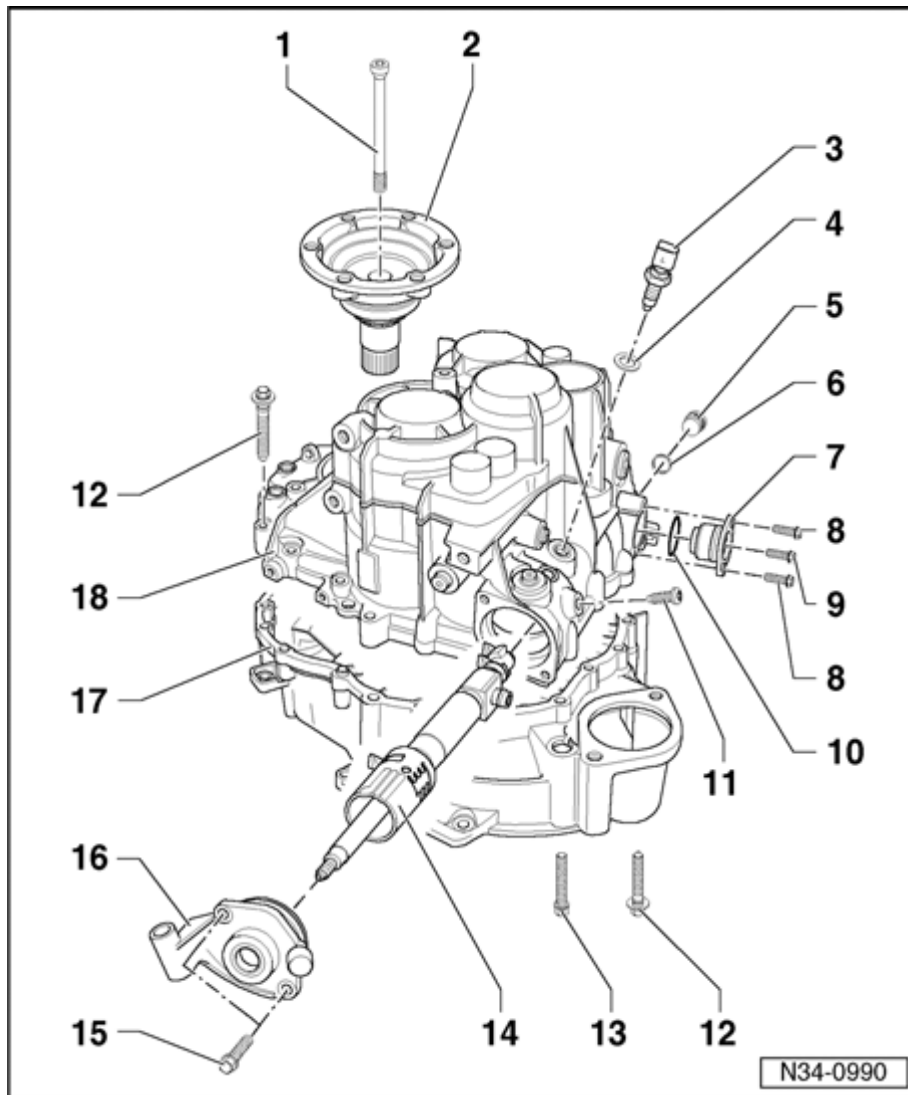
◆ Always replace

6 - Oil seal

◆ Always replace

7 - Cover plate

34-60



8 - Hex bolt, 20 Nm

◆ Always replace

9 - Hex bolt, 20 Nm

◆ For selector shaft item 14 to cover plate

◆ Always replace

10 - O-ring

◆ Always replace

◆ Insert in groove in cover plate

11 - Locking bolt, 15 Nm

◆ For selector shaft gate

◆ Always replace

◆ Insert with locking fluid D 000 600 A2

**12 - Hex
bolt, 25
Nm
plus $\frac{1}{8}$
turn
(45 °)
further**

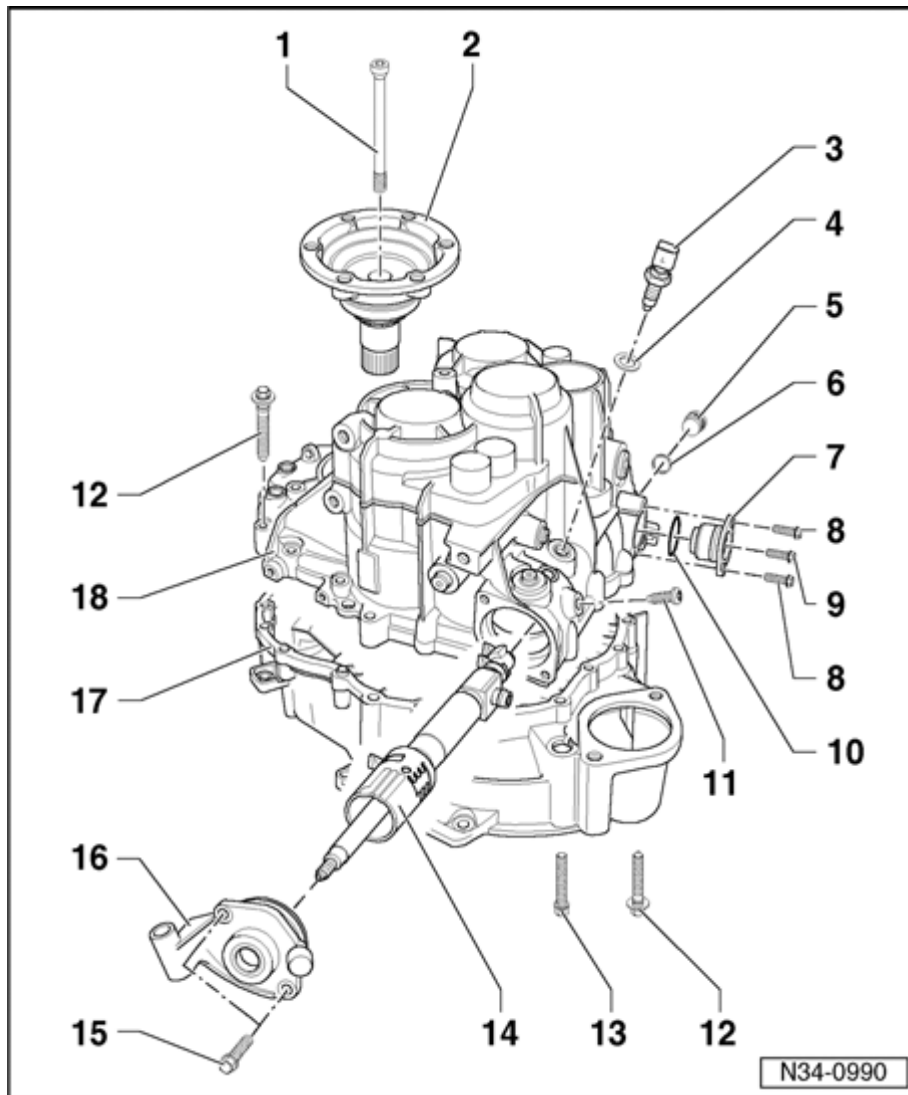
◆ With
attached
washer

◆ Always
replace

**13 - Hex
bolt, 25
Nm
plus $\frac{1}{8}$
turn
(45 °)
further**

◆ Without
washer

◆ Always
replace



14 - Selector shaft

- ◆ Disassembling and assembling ⇒ [Page 34-97](#) , Selector mechanism, disassembling and assembling

15 - Hex bolt, 20 Nm

- ◆ Always replace

16 - Selector mechanism cover

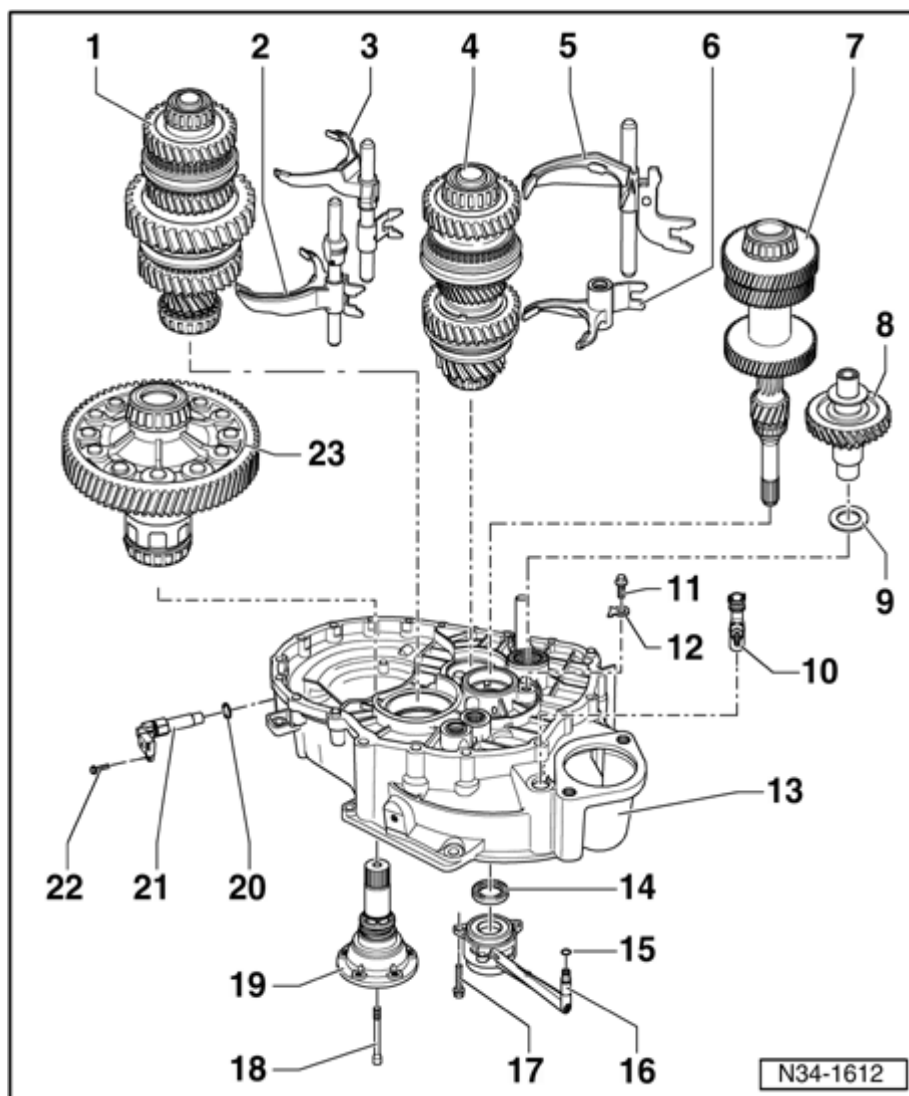
- ◆ Disassembling and assembling ⇒ [Page 34-97](#) , Selector mechanism, disassembling and assembling

17 - Clutch housing

- ◆ Servicing ⇒ [Page 34-88](#)

18 Transmission - housing

- ◆ Servicing ⇒ [Page 34-77](#)



Input shaft, output shafts (pinion shafts), differential and selector rods, disassembling and assembling

1 - Output shaft for 1st-4th gear

◆ Disassembling and assembling ⇒ [Page 35-21](#)

◆ Installed position ⇒ [Fig. 1](#)

2 - Selector rod with selector fork 1st and 2nd gear

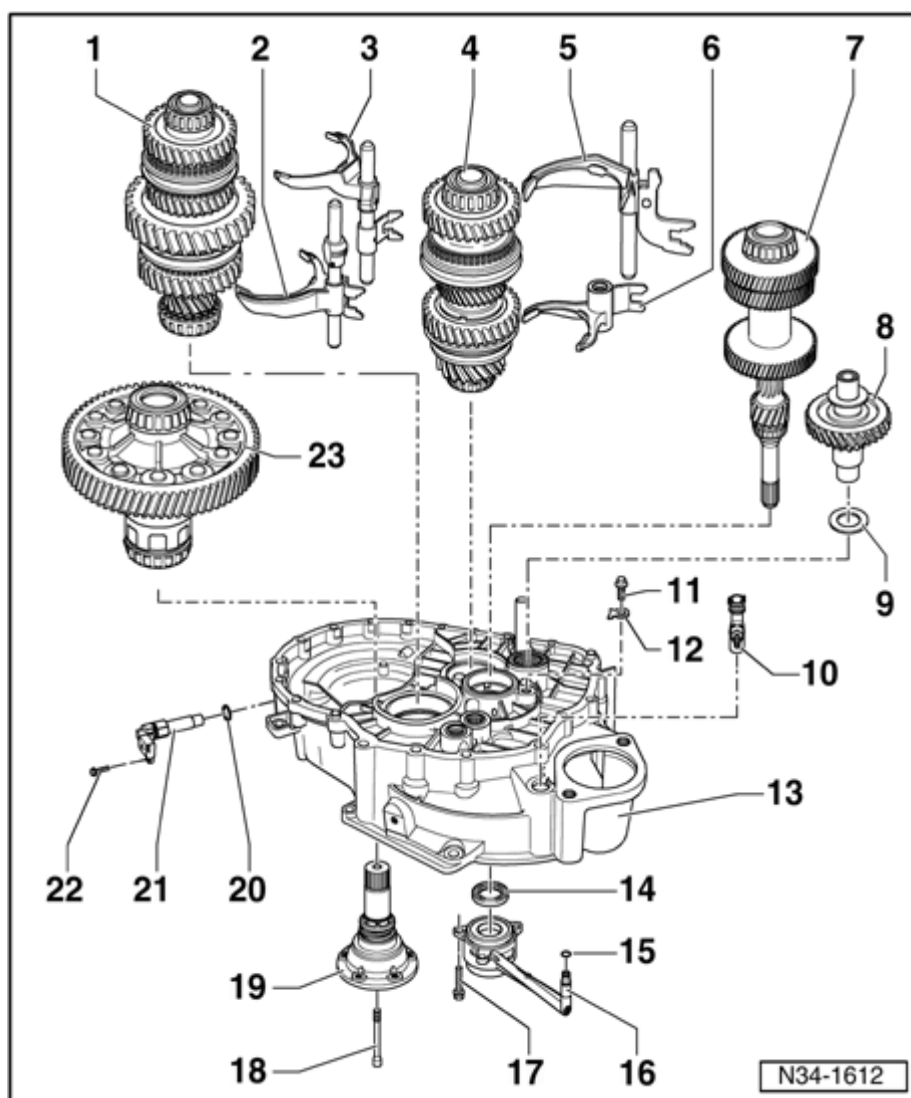
◆ Installed position ⇒ [Fig. 2](#)

3 - Selector rod with selector fork for 3rd and 4th gear

◆ Installed position ⇒ [Fig. 2](#)

4 - Output shaft for 5th, 6th and reverse gear

- ◆ Disassembling and assembling ⇒ [Page 35-54](#)
- ◆ Installed position ⇒ [Fig. 1](#)



5 - Selector rod with selector fork for 5th and 6th gear

- ◆ Installed position ⇒ [Fig. 2](#)

6 - Reverse gear selector fork

- ◆ Installed position ⇒ [Fig. 2](#)

7 - Input shaft

- ◆ Disassembling and assembling ⇒ [Page 35-1](#)

8 - Reverse shaft

- ◆ Removing and installing ⇒ [Page 34-67](#)

9 - Thrust washer

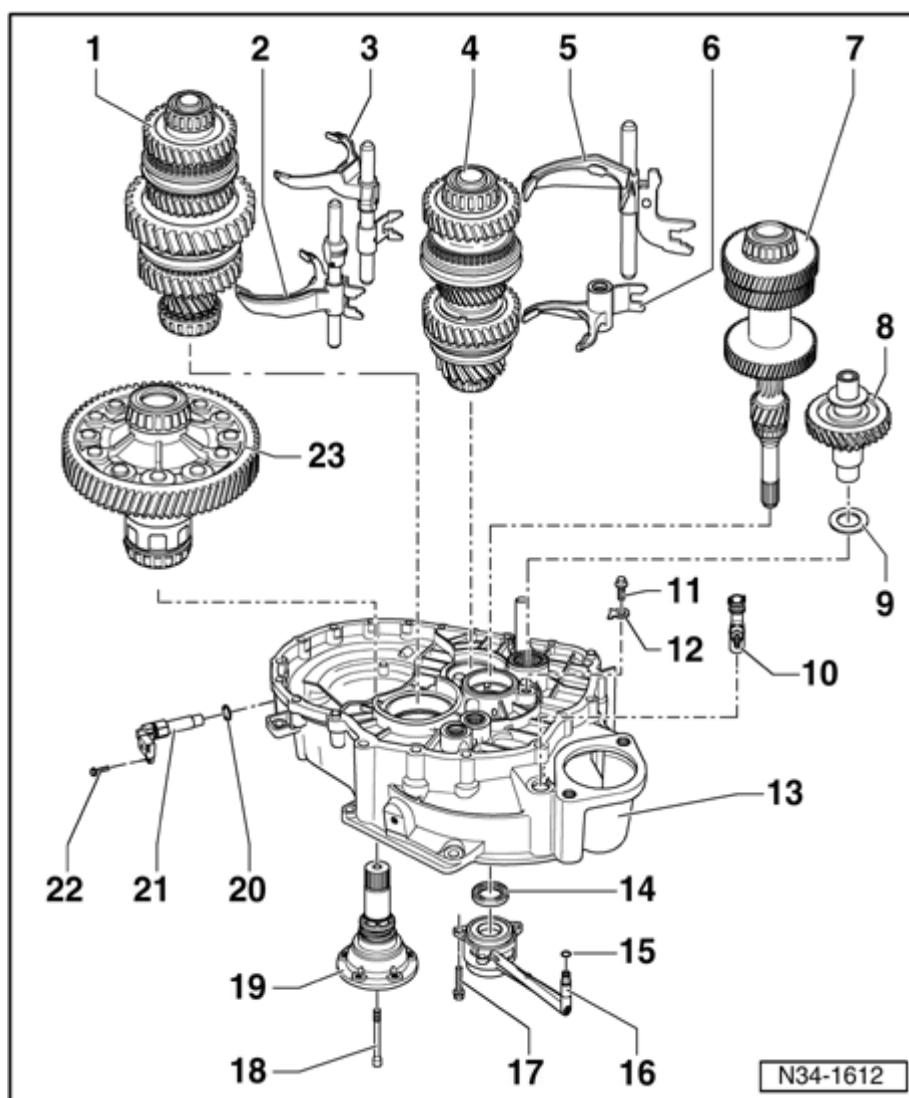
10 - Bleeder

- ◆ Bolt to slave cylinder pipe item 16

11 - Bolt, 12 Nm

- ◆ Self-locking
- ◆ Always replace

◆ Installed in
transmissions
from build
date 06 04 0



12 - Locking plate

- ◆ Secures outer race/tapered roller bearing for input shaft
- ◆ Installed in transmissions from build date 06 04 0

13 - Clutch housing

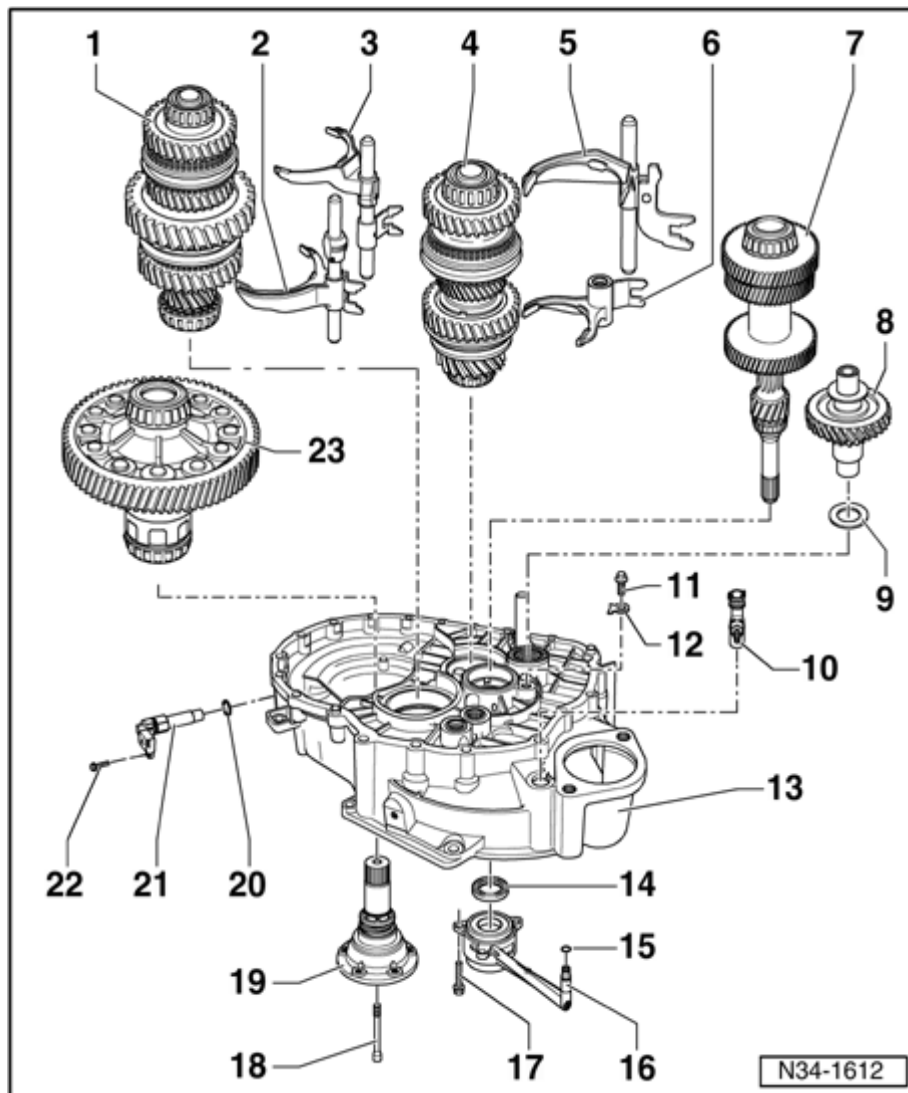
- ◆ Transmissions from build date 06 04 0, with additional threaded hole for bolt item 11 and recess for locking plate item 12

14 - Input shaft oil seal

15 - O-ring

- ◆ Always replace
- ◆ Pull onto line/hose connection
- ◆ Moisten with brake fluid before installing

16 - Slave cylinder with release bearing



**17 - Hex bolt,
12 Nm**

- ◆ Qty. 3
- ◆ Always replace

**18 - Cone head
bolt, 25
Nm**

**19 - Flanged
shaft with
spring**

- ◆ Removing and installing ⇒ [Page 39-1](#)

- ◆ Assembling ⇒ [Page 39-7](#)

20 - O-ring

- ◆ Always replace

**21 Speedometer
- sensor**

**22 - Hex bolt,
12 Nm**

- ◆ Always replace

23 - Differential

- ◆ Disassembling and assembling ⇒ [Page 39-7](#)

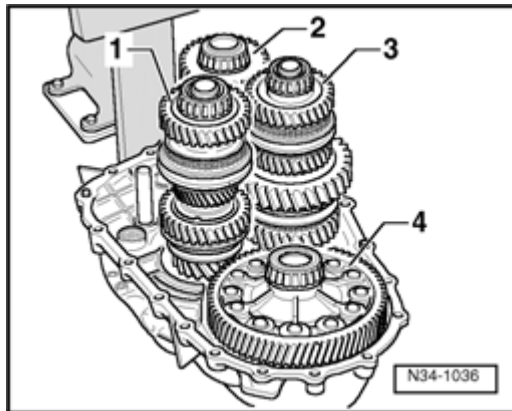


Fig. 1 Installed position of output shafts (pinion shafts) in transmission

1 - Output shaft for 5th/6th and reverse gear

2 - Input shaft

3 - Output shaft for 1st-4th gear

4 - Differential

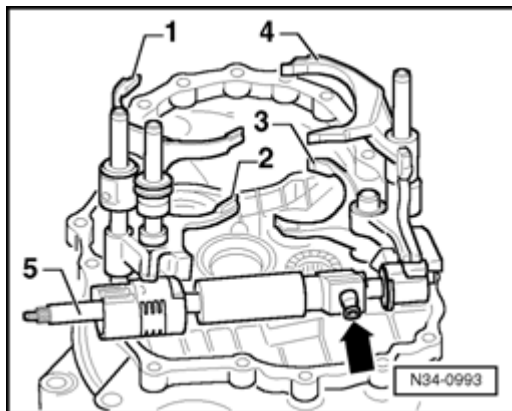


Fig. 2 Installed position of complete selector mechanism in transmission

1 - 3rd and 4th gear selector fork

2 - 1st and 2nd gear selector fork

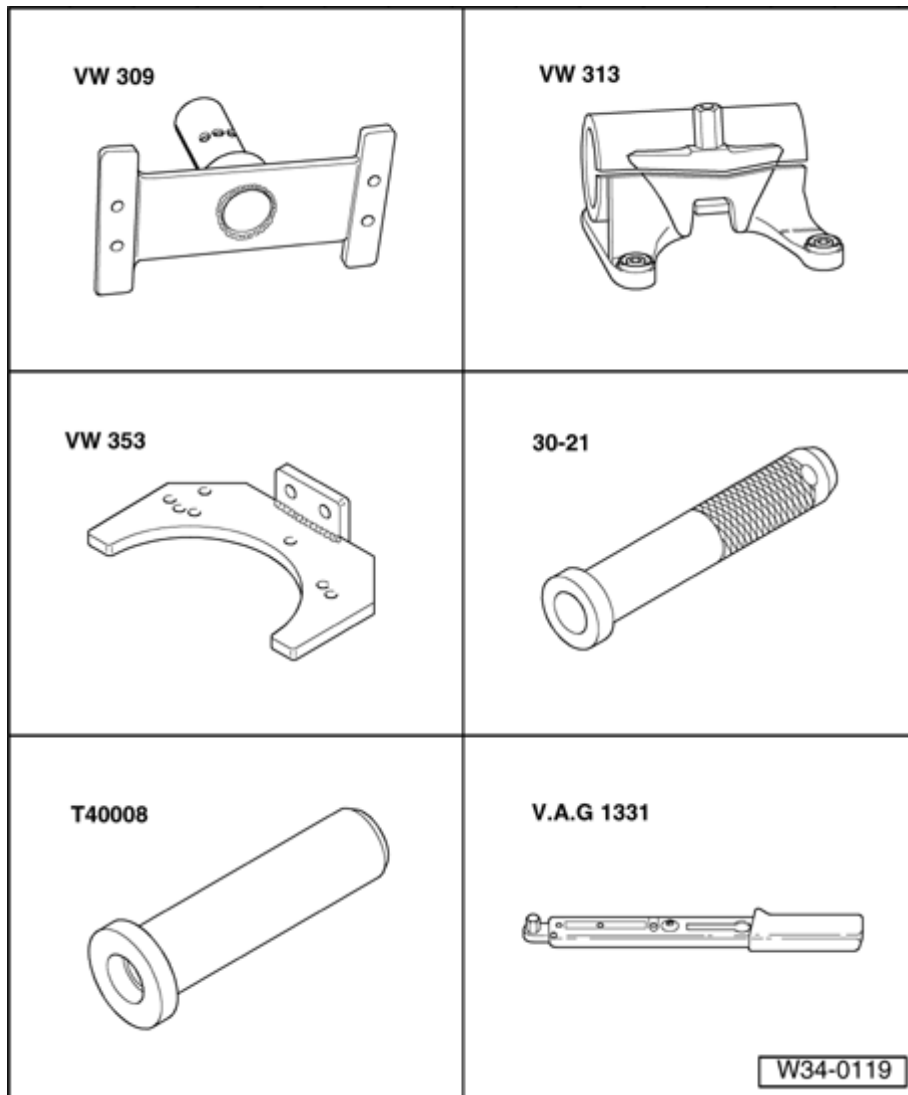
3 - Reverse gear selector fork

4 - 5th and 6th gear selector fork

5 - Selector shaft

The lower selector shaft mounting (arrow) is bolted to the cover plate.

34-67



Assembly sequence

Disassembling and assembling transmission housing, selector mechanism, input shaft, output shafts, differential and selector rods

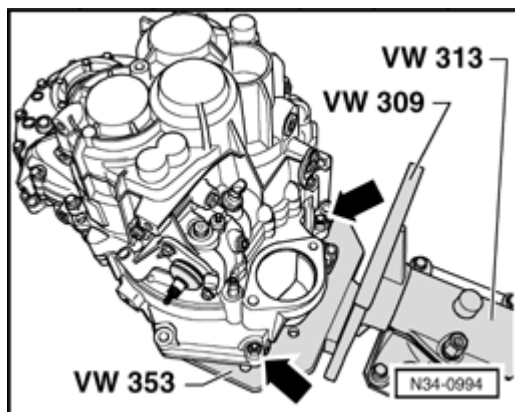
Special tools and equipment

- ◆ VW 309 Holding plate
- ◆ VW 313 Support clamp
- ◆ VW 353 Transmission support
- ◆ 30-21 Sleeve
- ◆ T40008 Press piece
- ◆ V.A.G 1331 Torque wrench

Disassembling

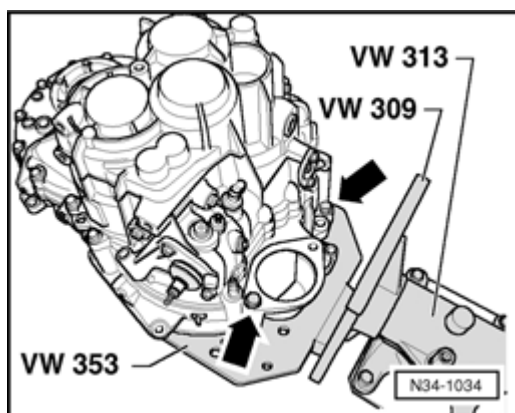
Vehicles with 6-Cyl. engines

- Secure transmission to assembly support with bolts (arrows).



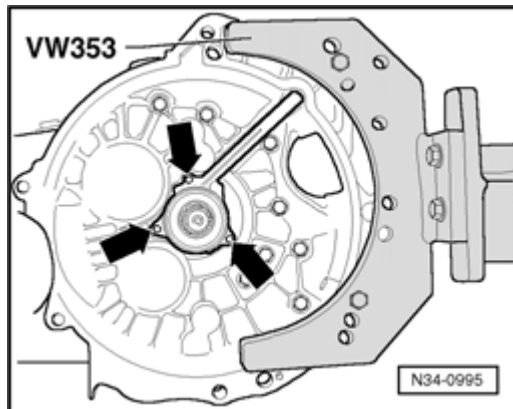
Vehicles with 4-Cyl. engines

- Secure transmission to assembly support with bolts (arrows).

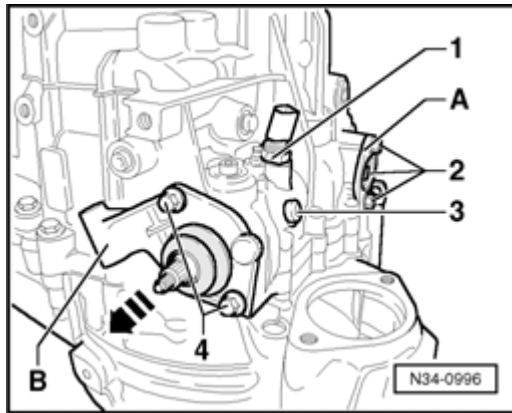


34-69

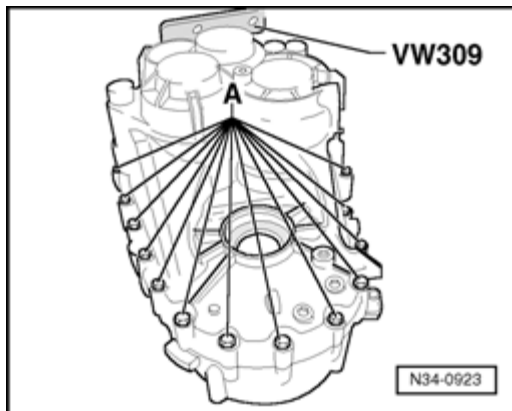
- Turn transmission on assembly support v drain plug downward.
- Place drip tray underneath.
- Drain transmission oil.
- Remove slave cylinder with release bearing (arrows).
- Place selector shaft in neutral position.



34-70

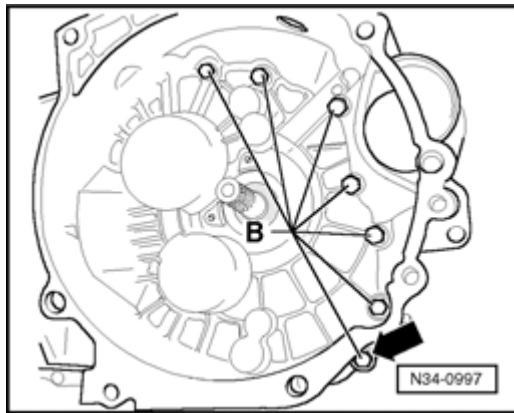


- Remove back-up light switch -1-.
- Remove hex bolts -2- for selector shaft cover plate -A-.
- Carefully pull out cover plate.
- Remove locking bolt -3- for selector shaft gate.
- Remove bolts -4- and press selector shaft cover -B- out of transmission housing.
- Pull selector shaft out of transmission housing.
- Remove both flanged shafts.



- Remove bolts securing transmission housing to clutch housing -A- in area of differential.

34-71

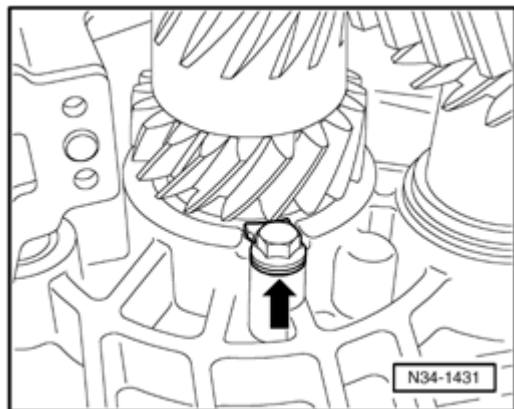


- Remove bolts -B- inside clutch housing for securing clutch housing to transmission housing.

Note:

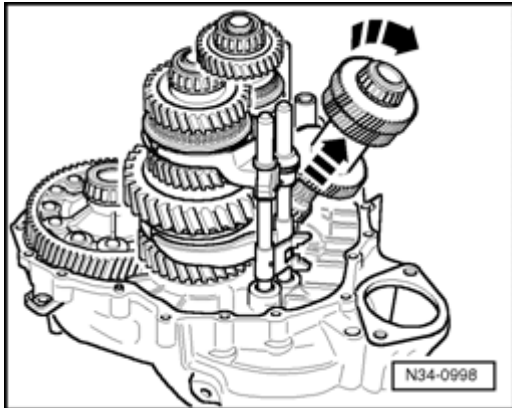
The hex bolt (arrow) is located outside the bolting flange. It is installed with a washer.

- Take off transmission housing. If necessary, carefully pry up all around and alternating between sides on protruding flange taking care not to damage sealing surfaces.

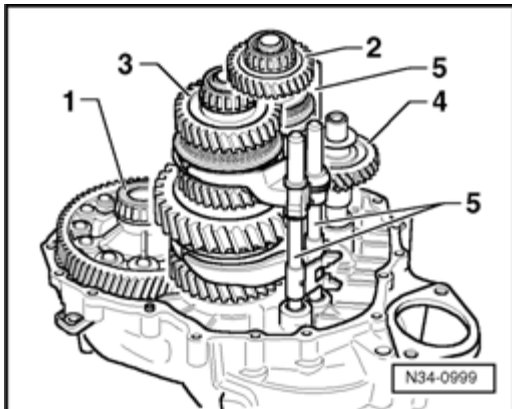
For transmissions from build date 06 04 0

- Unscrew locking plate bolt (arrow) (outer race/tapered roller bearing from input shaft).
- Remove locking plate.

34-72

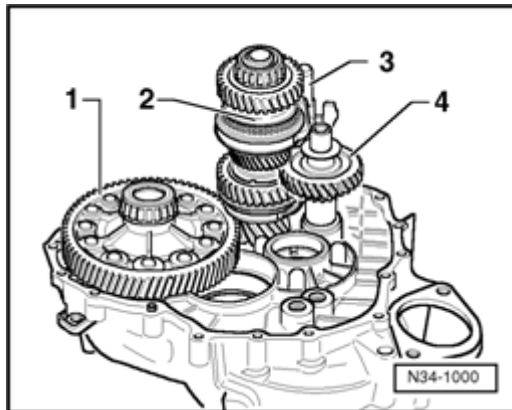
Continued for all transmissions

- Swing input shaft in direction of arrow and take off.
- Remove speedometer drive.

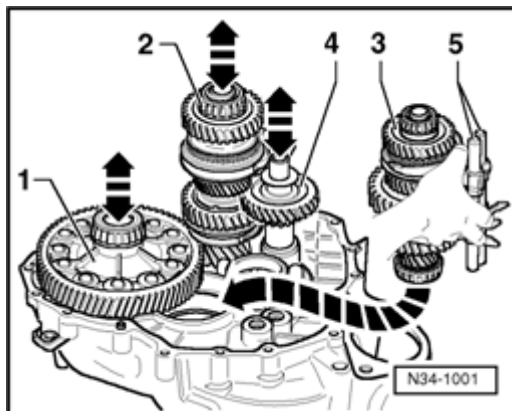


- With help of a second technician, remove differential -1-, output shafts -2- and -3-, reverse shaft -4- and selector rods -5- together from clutch housing.
- Drive out input shaft oil seal with sleeve 30-21.

Assembling



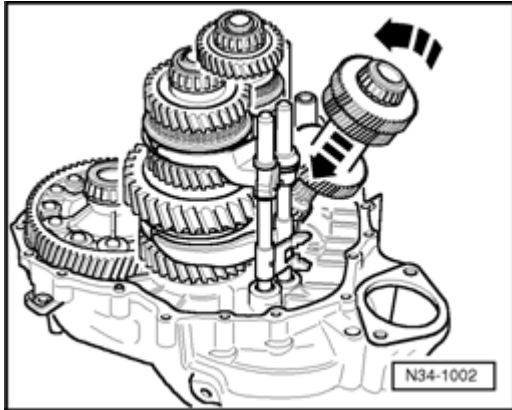
- Install differential -1-.
- Install 5th, 6th and reverse gear output shaft -2- together with reverse selector fork, 5th, 6th and reverse gear selector rod -3- and reverse shaft -4-.



- Take 1st-4th gear output shaft -3- with selector rods -5- in right hand as illustrated.
- With left hand, lift differential slightly.
- At same time, have a second technician slightly lift 5th, 6th and reverse gear output shaft together with reverse shaft -4-.
- Insert 1st-4th gear output shaft in direction of arrow.

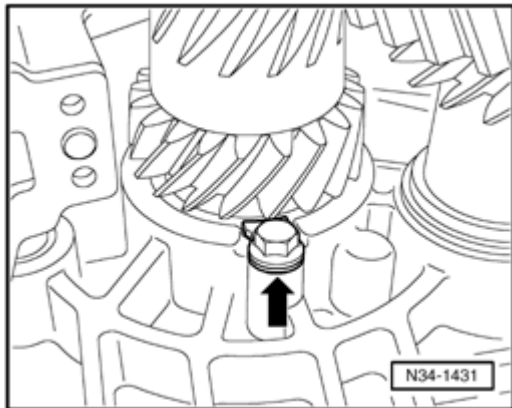
Toothing of output shafts and final drive gear/differential must mesh.

34-74



- Together with second technician, place shaft in their bearing seats.
- Set input shaft in clutch housing and swirl (arrow).
- Install transmission housing.

For transmissions from build date 06 04



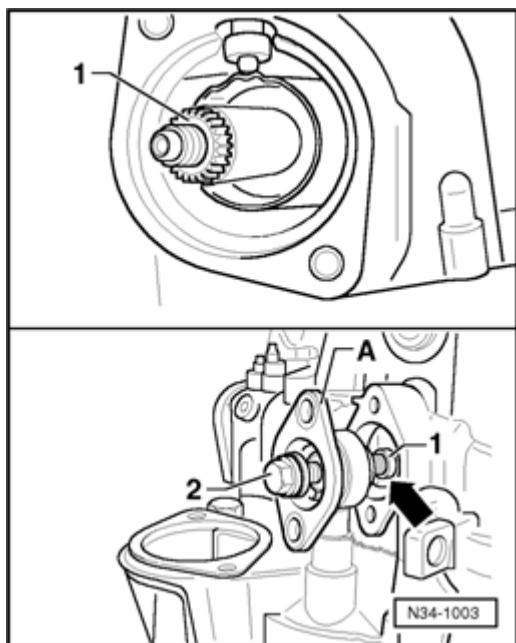
- Insert locking plate (arrow) in outer race/roller bearing recess for input shaft.
- Tighten new bolt to tightening torque ⇒ [F 34-62](#) , item 11

Continued for all vehicles

- Install transmission housing.

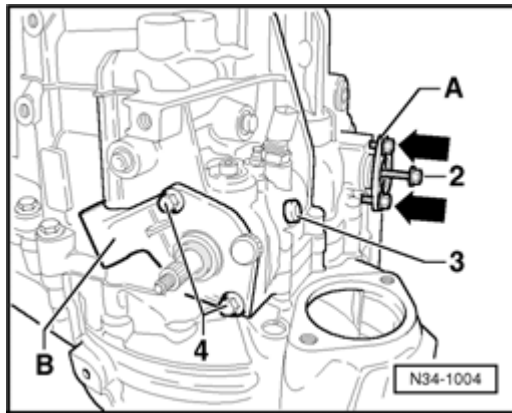
Installing selector shaft

- Bring selector rods into neutral position.

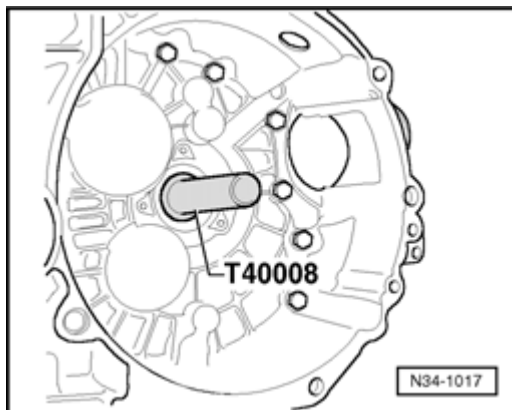


- Insert selector shaft -1-.
- Position selector shaft so that shift fingers are inserted in selector rods ⇒ [Page 34-66](#) , ⇒ [Fig. 2](#) .
- When doing this, align lower selector shaft bearing (arrow) through drilling for cover plate.
- Bolt cover plate -A- to lower selector shaft bearing -1- with bolt -2-, M8 x 60 mm.

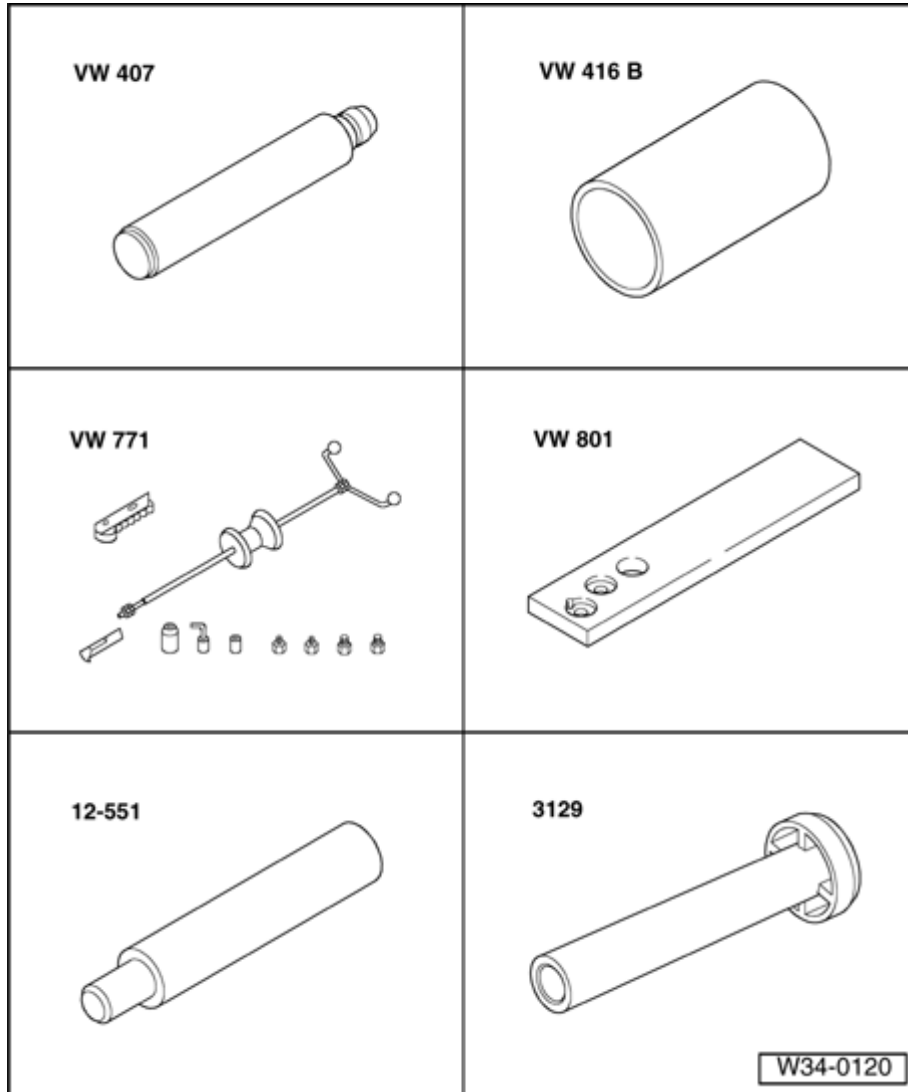
34-76



- Hand tighten cover plate -A- by alternately tightening ($1/2$ turn) bolts (arrows).
- Remove bolt -2- and hand tighten original bolt in its place.
- Install selector shaft cover -B- and tighten hex bolts -4- to torque.
- Tighten cover plate hex bolts.
- Insert locking bolt -3- for selector shaft gate with locking fluid D 000 600 A2.
- Install switch for back-up light.
- Install both flanged shafts with springs, thrust washers and tapered rings.
- Install speedometer sensor.



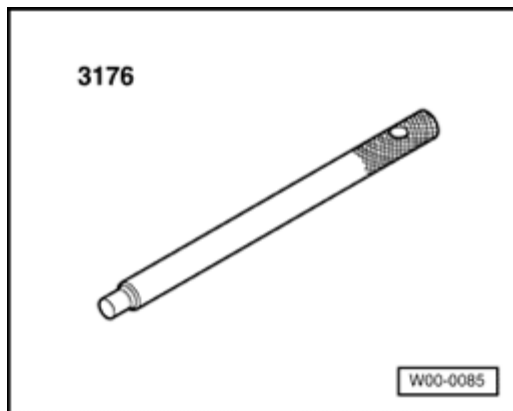
- Press in input shaft oil seal.
- Install slave cylinder with release bearing.



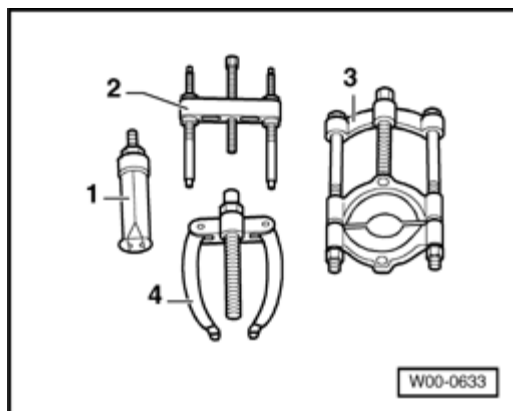
Transmissic housing, servicing

Special tools and equipment

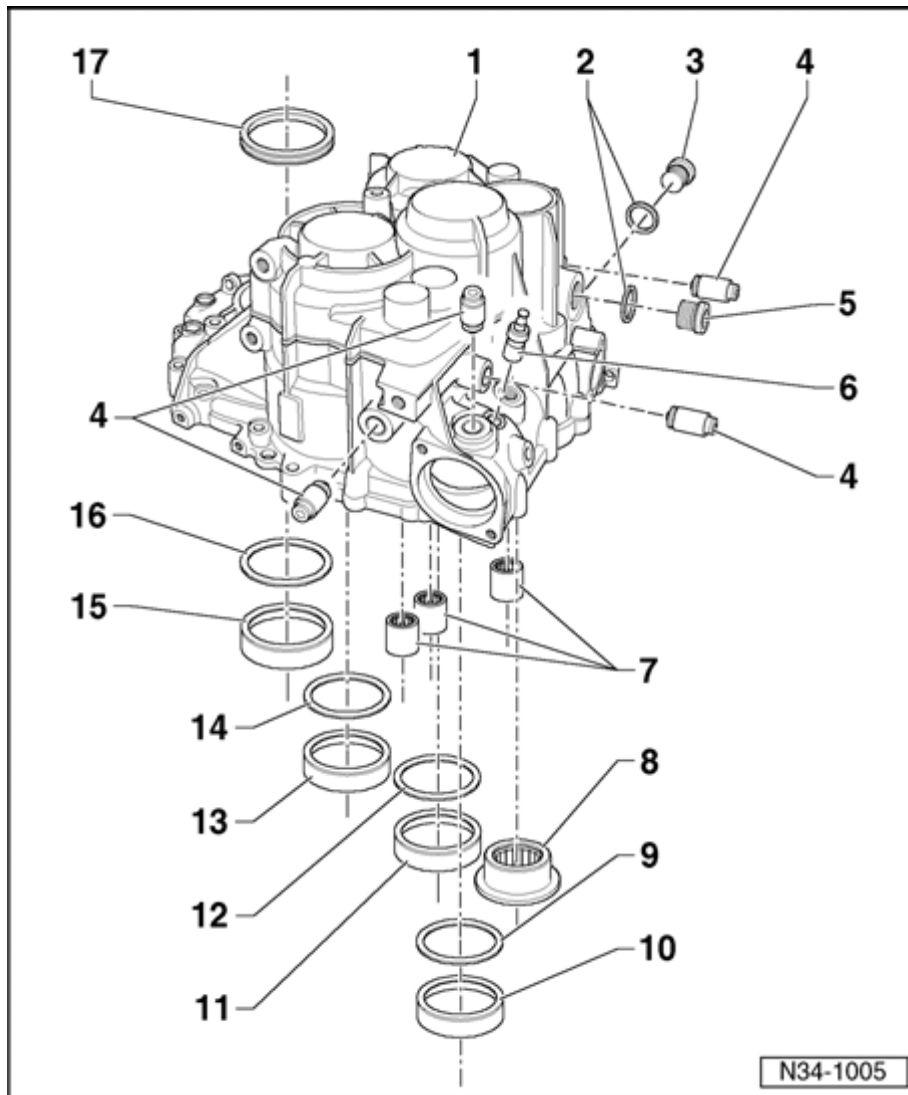
- ◆ VW 407 Press tool
- ◆ VW 416 B Tube
- ◆ VW 771 Multi-purpose tool
- ◆ VW 801 Support plate
- ◆ 12-551 Centerin mandrel
- ◆ 3129 Installator tool

Special tools and equipment

- ◆ 3176 Centering mandrel



- ◆ 1 - Kukko 21/2 Internal puller
- ◆ 1 - Internal puller Kukko 21/4
- ◆ 4 - Kukko 22/2 Counter support



1 Transmission - housing

- ◆ If replaced: adjust input shaft, output shafts and differential
⇒ [Page 39-23](#)

2 - Oil seal

- ◆ Always replace

3 - Oil drain plug, 30 Nm

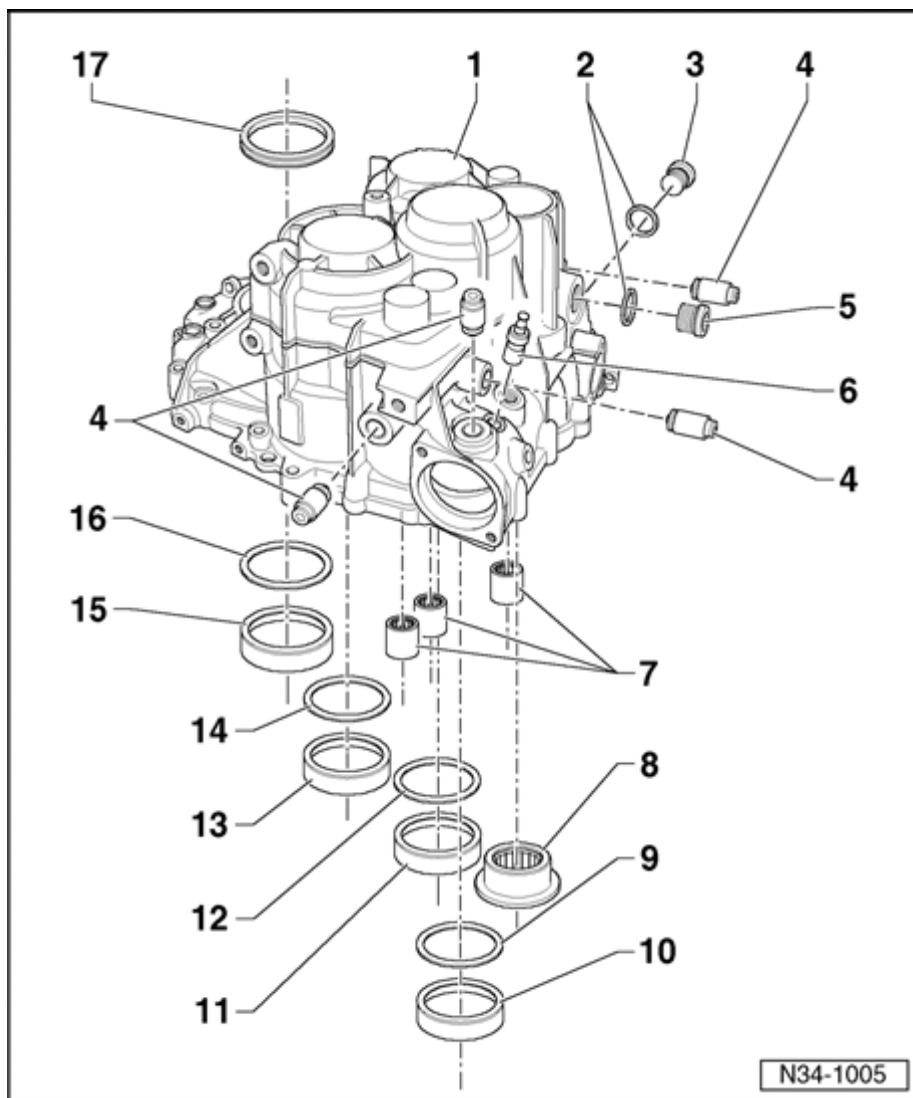
- ◆ Always replace

4 - Stop sleeves

- ◆ Driving out ⇒ [Fig. 1](#)
- ◆ Driving in ⇒ [Fig. 2](#)

5 - Oil filler plug, 30 Nm

- ◆ Always replace



6 - Locking pin

- ◆ Is pressed into gate of selector shaft when adjusting outer selector mechanism ⇒ [Page 34-22](#)

- ◆ Driving out ⇒ [Fig. 3](#)

- ◆ Driving in ⇒ [Fig. 4](#)

7 - Bushing

- ◆ For selector rods

- ◆ Replace each time after removing

- ◆ Pulling out ⇒ [Fig. 5](#)

- ◆ Installing ⇒ [Fig. 6](#)

8 - Needle bearing

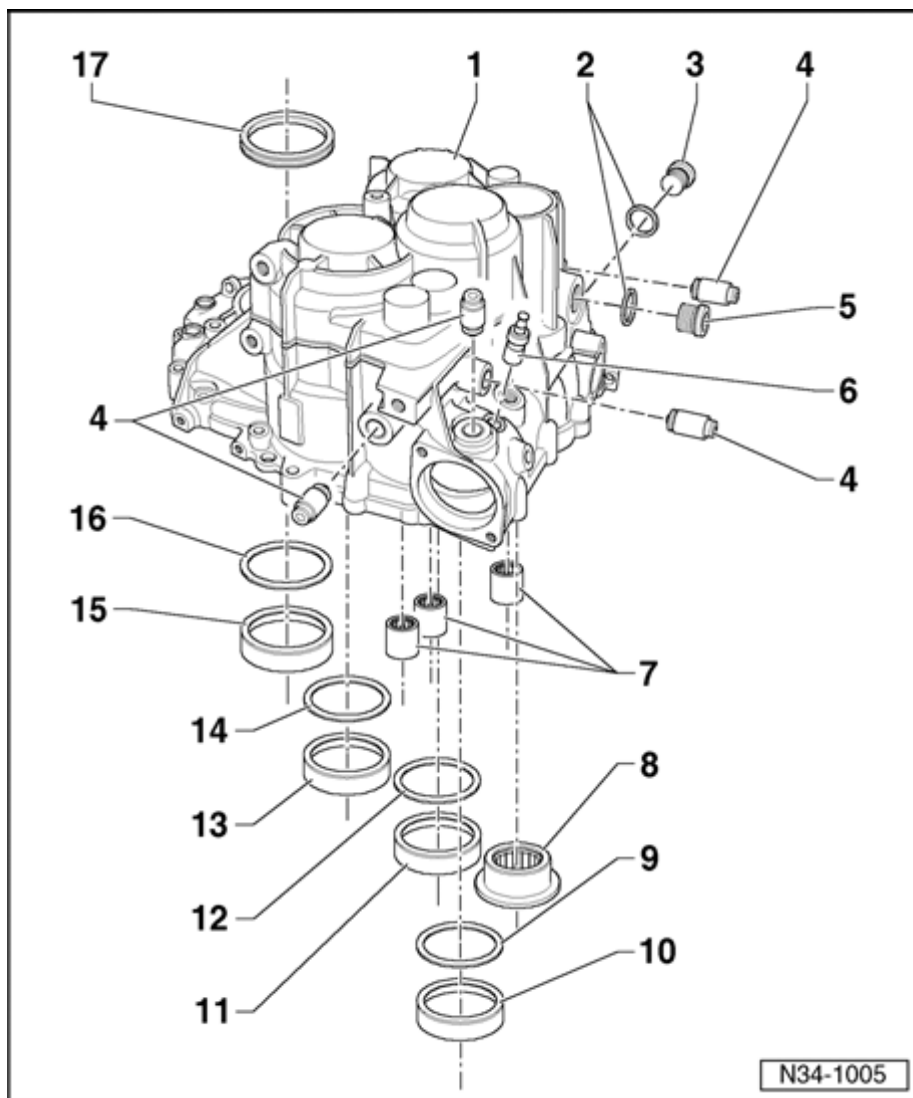
- ◆ Replace each time after removing

- ◆ Pulling out ⇒ [Fig. 7](#)

◆ Pressing
in ⇒
[Fig. 8](#)

9 - Shim

- ◆ For
input
shaft
- ◆ Adjustment
overview
⇒ [Page
39-23](#)



10 Outer - race/tapered roller bearing

- ◆ For input shaft
- ◆ Removing and installing ⇒ from ⇒ [Page 35-1](#)
- ◆ If replaced: Adjust input shaft ⇒ [Page 35-14](#)

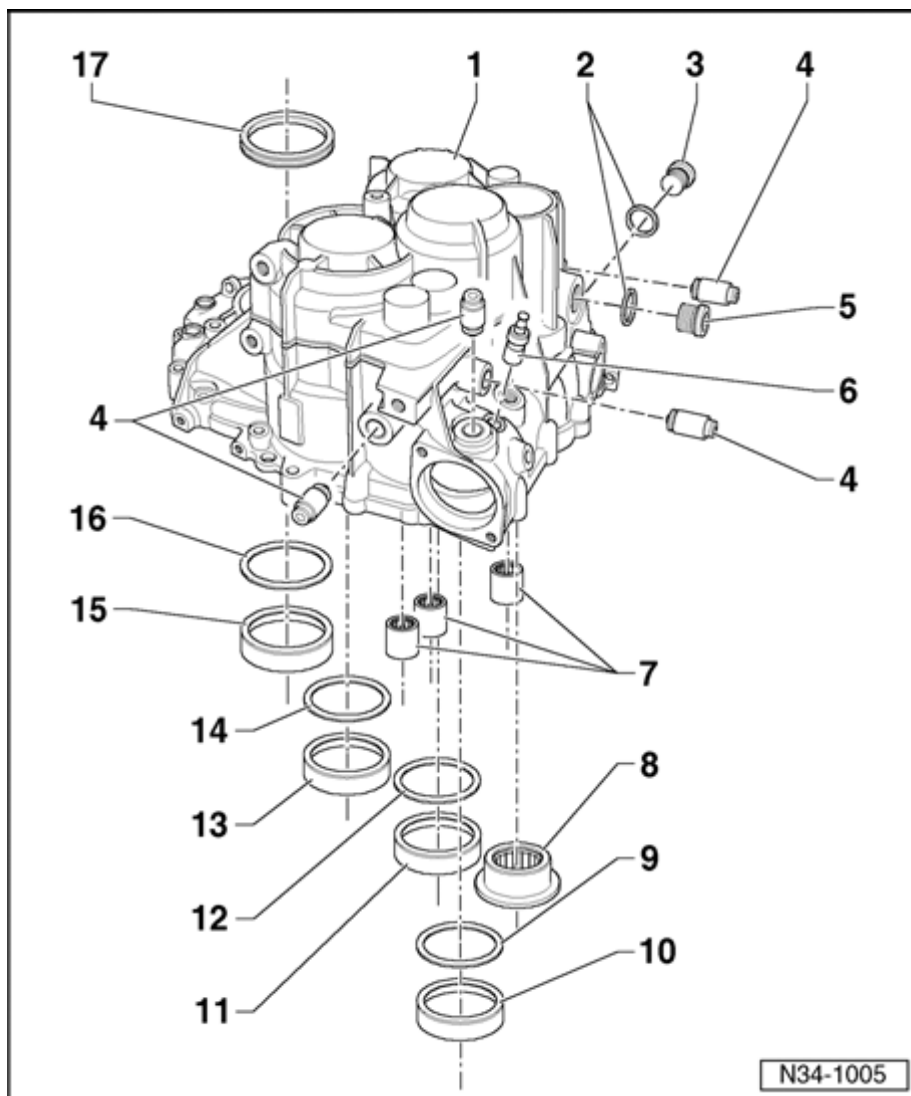
11 Outer - race/tapered roller bearing

- ◆ For 5th, 6th and reverse gear output shaft
- ◆ Removing and installing ⇒ from ⇒ [Page 35-54](#)
- ◆ If replaced: adjust 5th, 6th and reverse gear output shaft ⇒ [Page 35-](#)

[76](#)

12 - Shim

- ◆ For 5th, 6th and reverse gear output shaft
- ◆ Adjustment overview
⇒ [Page 39-23](#)



13 Outer - race/tapered roller bearing

- ◆ For 1st-4th gear output shaft

- ◆ Removing and installing ⇒ [Page 35-12](#)

- ◆ If replaced: Adjust 1st-4th gear output shaft ⇒ [Page 35-46](#)

14 - Shim

- ◆ For 1st-4th gear output shaft

- ◆ Adjustment overview ⇒ [Page 39-23](#)

15 Outer - race/tapered roller bearing

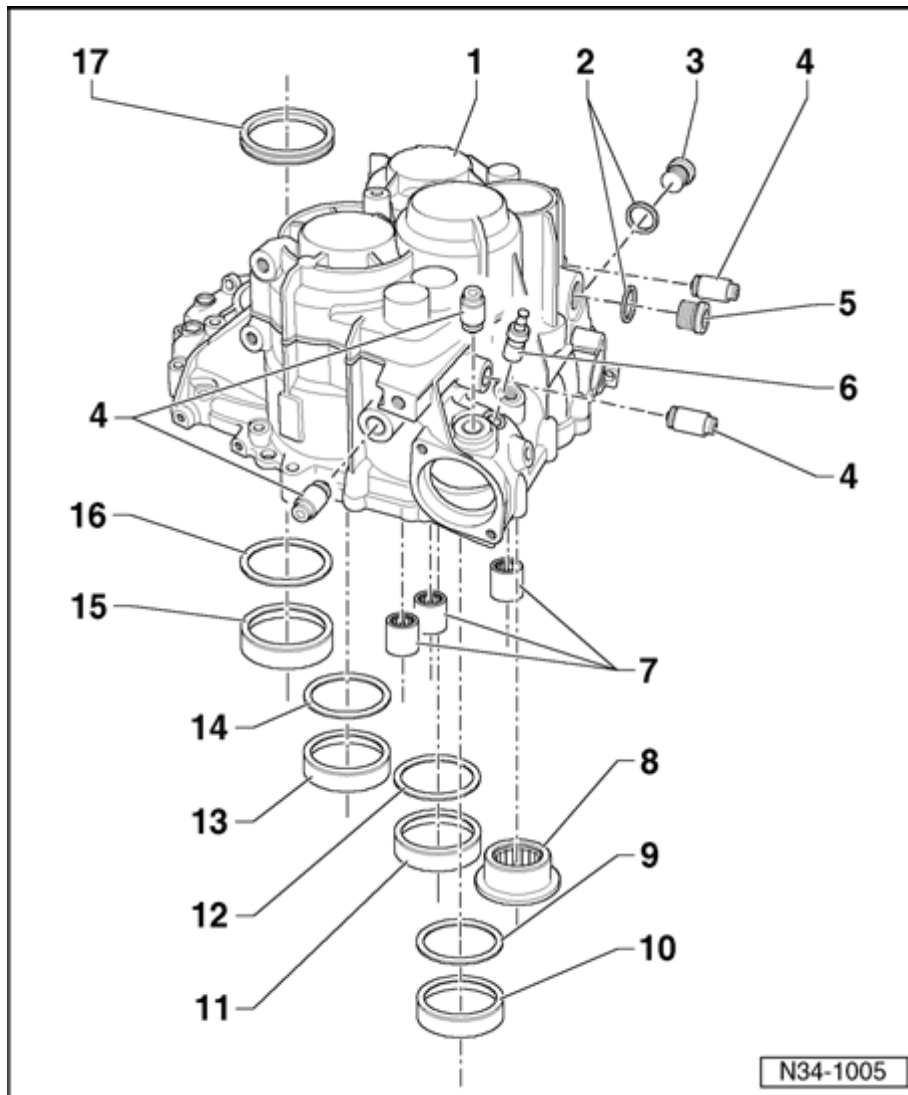
- ◆ For differential

- ◆ Removing and installing ⇒ [Page 39-7](#)

- ◆ If replaced:

adjust
differential
⇒ [Page
39-24](#)

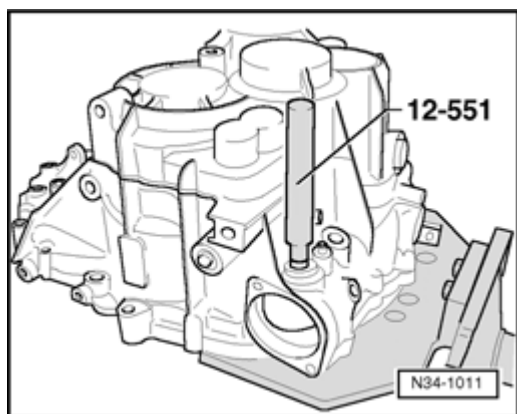
34-83

**16 - Shim**

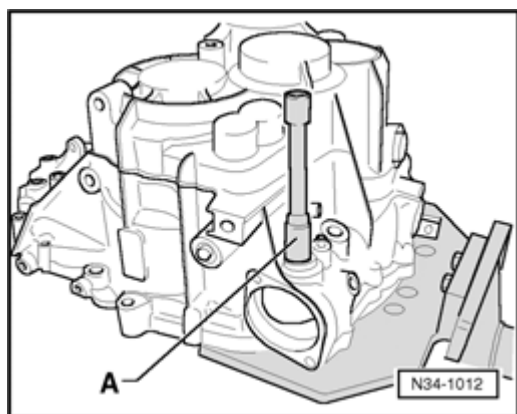
- ◆ For differential
- ◆ Adjustment overview
⇒ [Page 39-23](#)

17 - Oil seal

- ◆ Always replace
⇒ [Page 39-1](#)



✦ **Fig. 1 Driving out stop sleeve**



✦ **Fig. 2 Driving stop sleeve in onto stop**

- Drive stop sleeve in onto stop with 13 mm socket -A- and plastic head hammer.

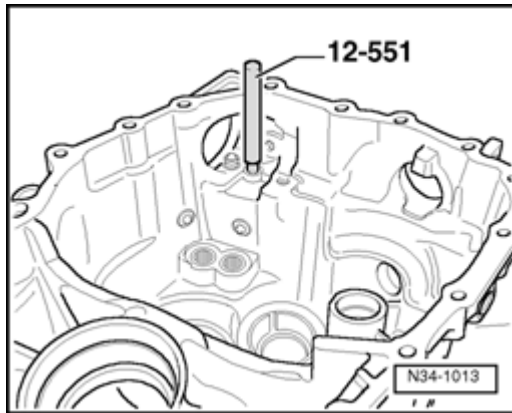


Fig. 3 Driving out locking pin

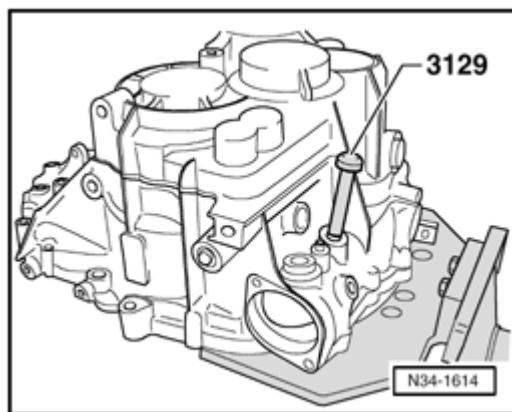


Fig. 4 Driving in locking pin - A- onto stop

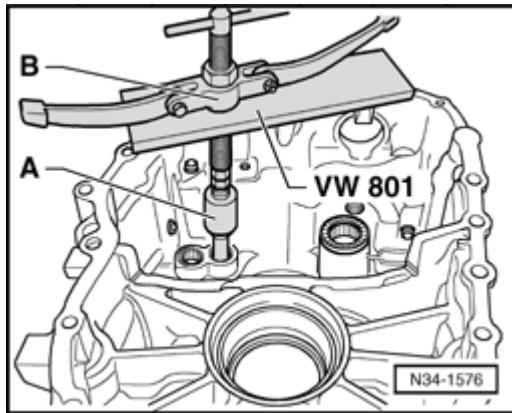


Fig. 5 Pulling out mounting bushing for selector rod

- ◆ A - Internal extractor 14.5 to 18.5 mm, e.g. Kukko 21/2
- ◆ B - Counter support, e.g. Kukko 22/2

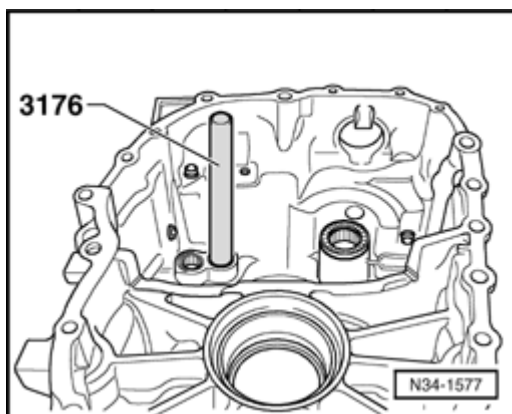


Fig. 6 Driving selector rod mounting bushing in flush

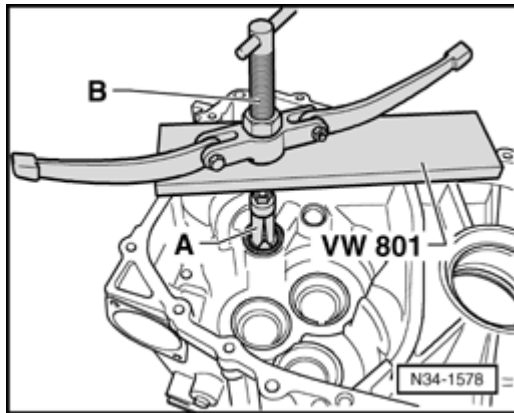


Fig. 7 Pulling reverse shaft needle bearing out of transmission housing

A - Internal extractor 23.5 to 30.0 mm, e.g. Kukko 21/4

◆ Counter support, e.g. Kukko 22/2

Note:

The needle bearing is destroyed during removal and must be replaced.

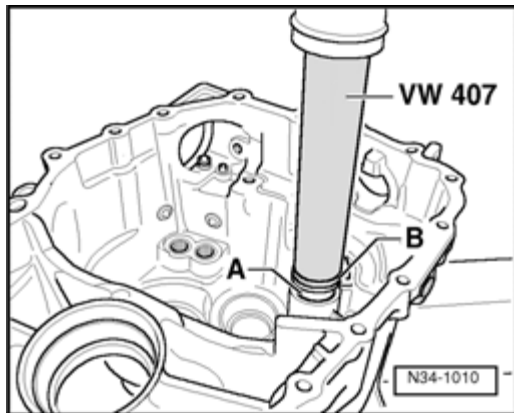
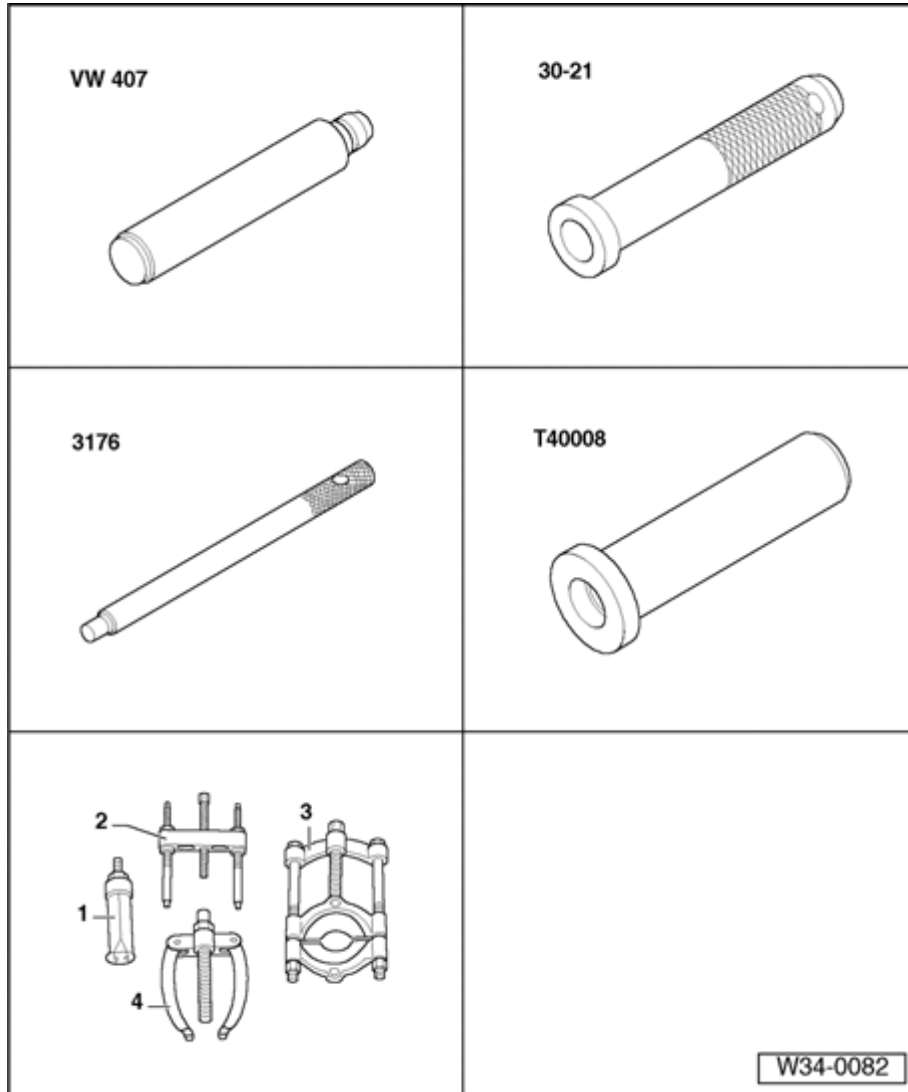


Fig. 8 Pressing needle bearing -A- into transmission housing

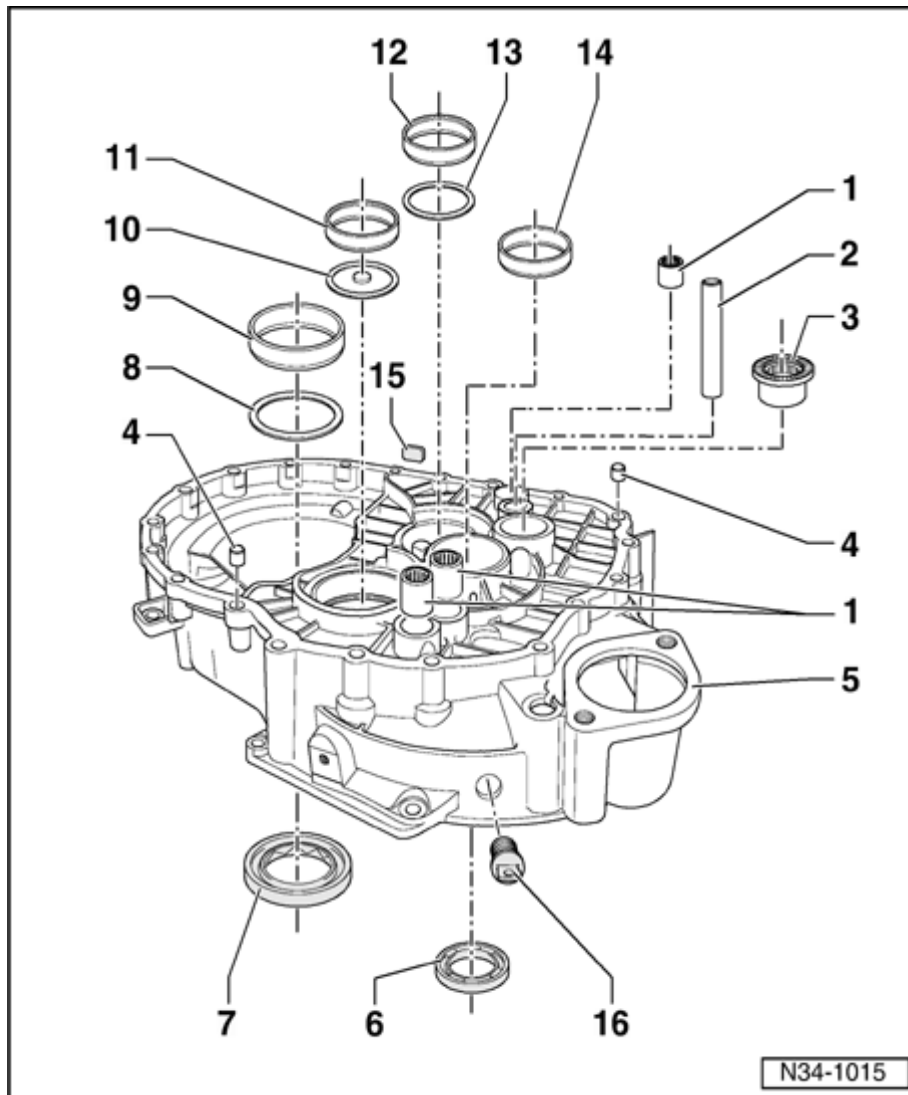
- By pressing in, lay reverse shaft thrust washer -B- on needle bearing.
- Support transmission housing with tube VW 416 B directly below bearing mounting.



Clutch housing, servicing

Special tools and equipment

- ◆ VW 407 Press tool
- ◆ 30-21 Sleeve
- ◆ 3176 Centering mandrel
- ◆ T40008 Press piece
- ◆ 1 - Kukko 21/2 Internal puller
- ◆ 1 - Kukko 21/4 Internal puller
- ◆ 4 - Kukko 22/1 Counter support
- ◆ 4 - Kukko 22/2 Counter support



1 - Bushing

- ◆ For selector rods
- ◆ Replace each time after removing
- ◆ Pulling out ⇒ [Fig. 1](#)
- ◆ Driving in ⇒ [Fig. 2](#)

2 - Reverse gear selector fork axle

- ◆ Axle cannot be removed with workshop tools
- ◆ Pressing axle into clutch housing ⇒ [Fig. 7](#)

3 - Needle bearing

- ◆ Replace each time after removing
- ◆ Pulling out ⇒ [Fig. 3](#)
- ◆ Pressing in ⇒

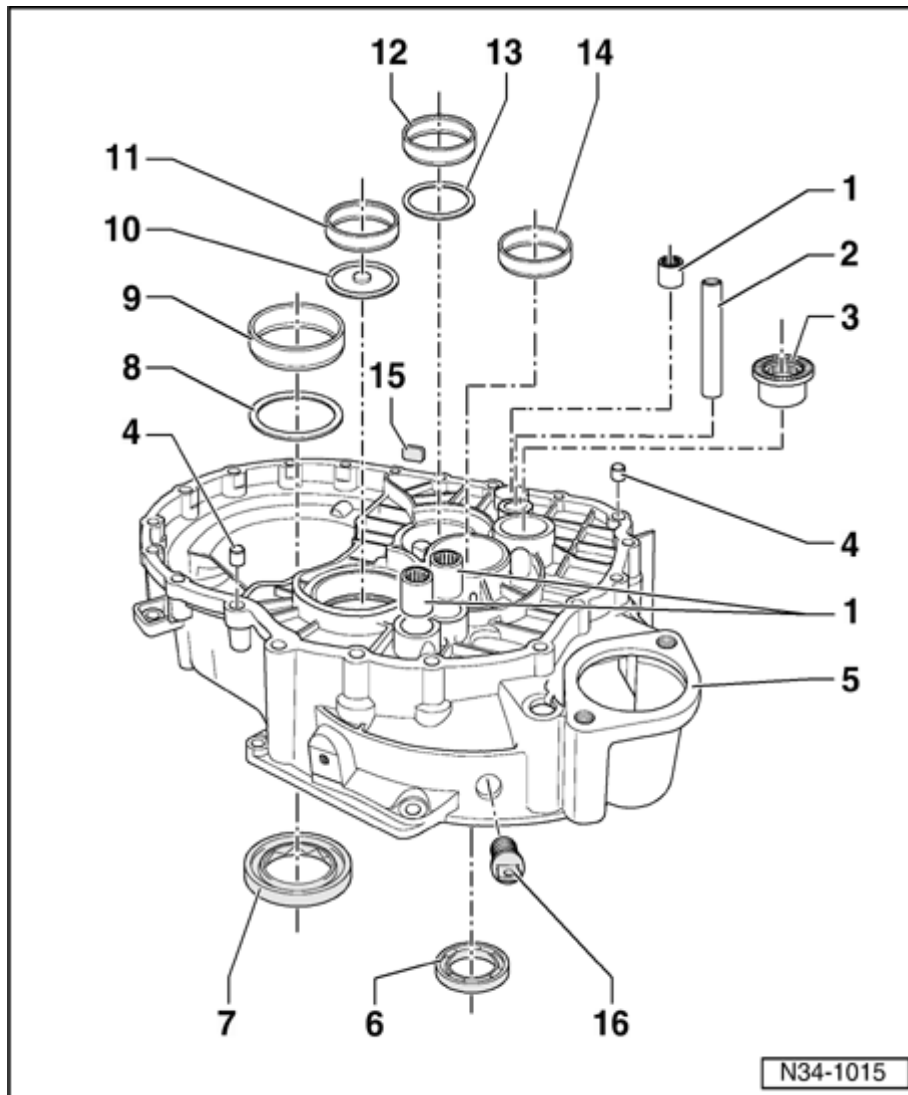
[Fig. 4](#)

4 - Dowel sleeve

◆ Qty. 2

5 - Clutch housing

◆ If replaced:
⇒ Adjustment
overview, ⇒
[Page 39-23](#)



6 - Input shaft oil seal

◆ Removing
⇒ [Fig. 5](#)

◆ Installing
⇒ [Fig. 6](#)

7 - Oil seal

◆ Replace
⇒ [Page 39-1](#)

8 - Shim

◆ For differential

◆ Always 0.65 mm thick

9 Outer race/tapered roller bearing

◆ For differential

◆ Removing and installing
⇒ [Page 39-7](#)

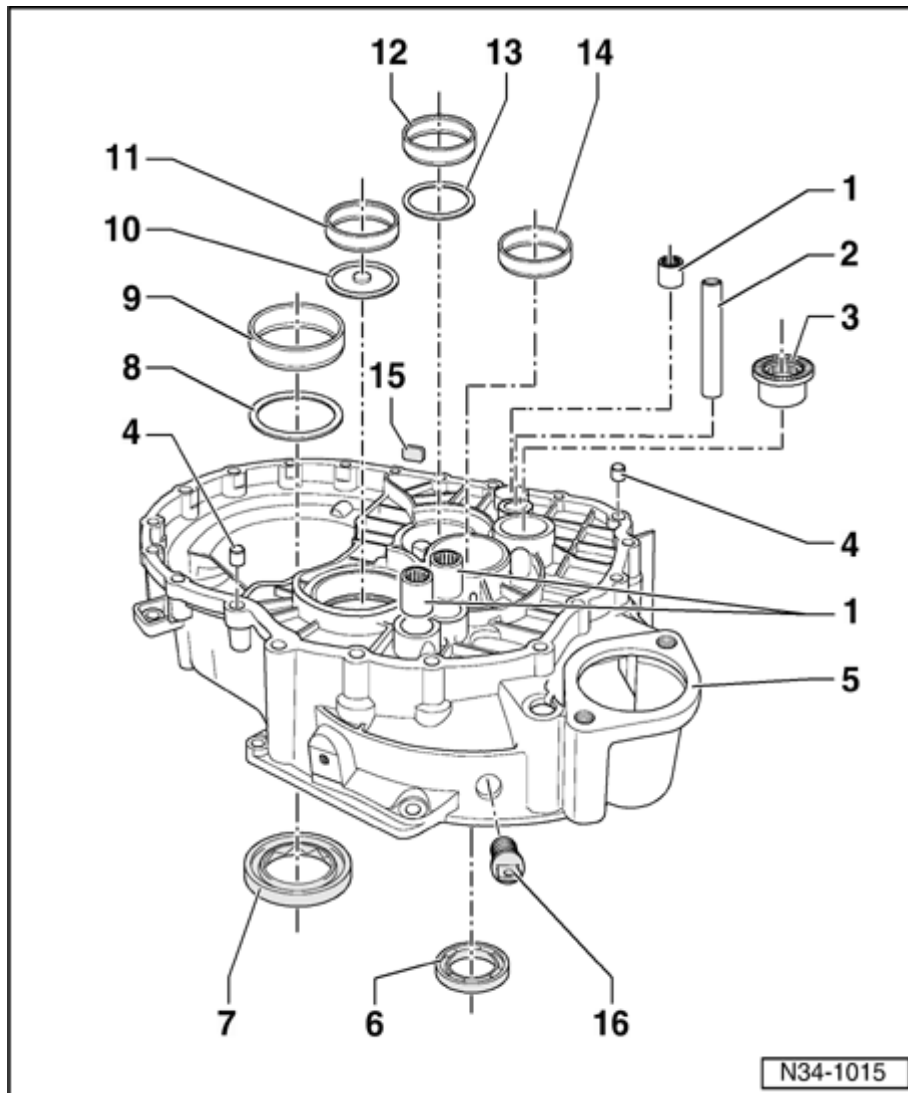
◆ If replaced: adjust differential
⇒ [Page 39-24](#)

10 - Oil deflector ring

◆ Installed position: shoulder on

drilling
faces
output
shaft

34-91



11 Outer - race/tapered roller bearing

- ◆ For 1st-4th gear output shaft
- ◆ Removing and installing ⇒ [Page 35-12](#)
- ◆ If replaced: adjust 1st-4th gear output shaft ⇒ [Page 35-46](#)

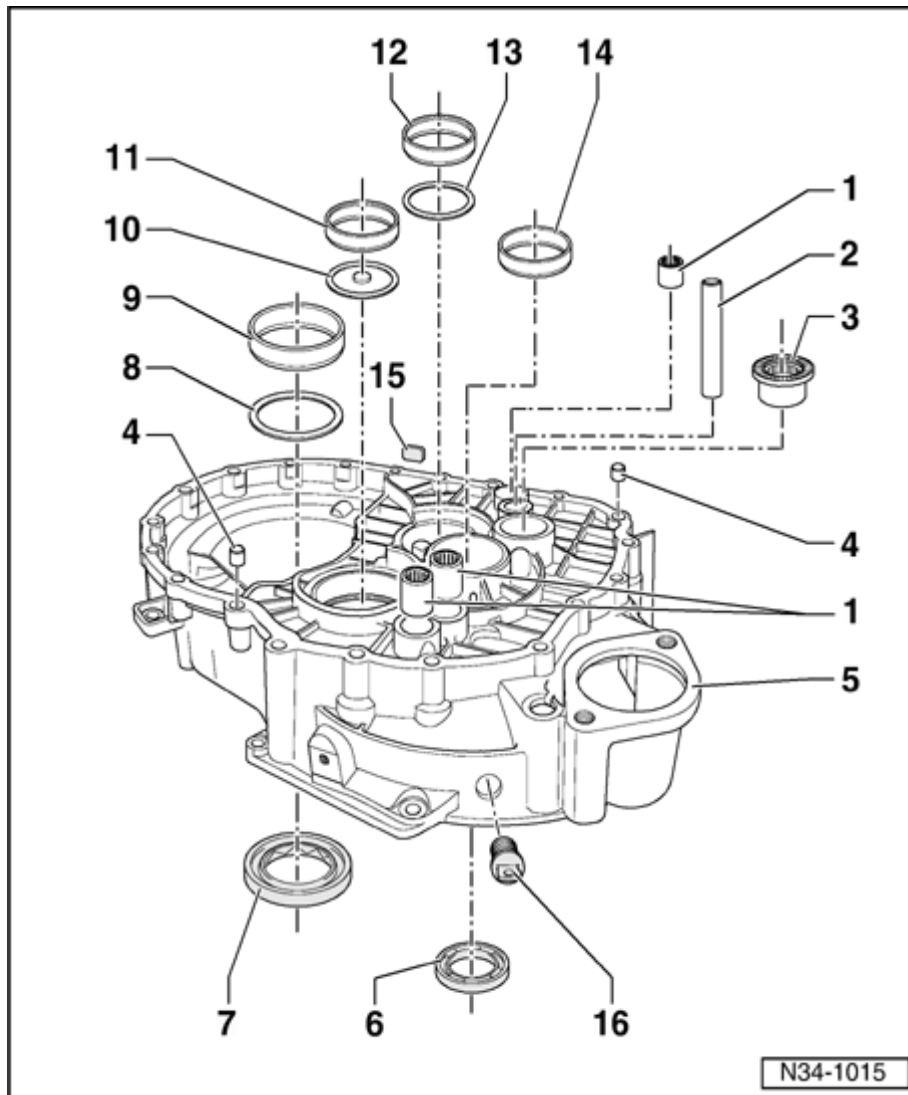
12 Outer - race/tapered roller bearing

- ◆ For 5th, 6th and reverse gear output shaft
- ◆ Removing and installing ⇒ [Page 35-54](#)
- ◆ If replaced: adjust 5th, 6th and reverse gear output

shaft ⇒
[Page 35-76](#)

13 - Shim

- ◆ For output shaft
- ◆ Always 0.65 mm thick



14 Outer - race/tapered roller bearing

- ◆ For input shaft
- ◆ Removing and installing ⇒ [Page 35-1](#)
- ◆ If replaced: adjust input shaft ⇒ [Page 35-14](#)
- ◆ Transmissions from build date 06 04 0 secured with locking plate and bolt
 - ◆ Bolt 12 Nm
 - ◆ Always replace

15 - Magnet

- ◆ Held in place by housing joint surface

16 - Protective cap

- ◆ Installed only in clutch housing of 4-Cyl. engine

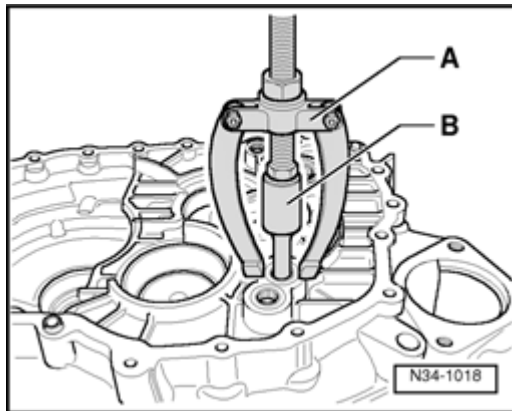


Fig. 1 Pulling out selector rod bushing

A - Counter support, e.g. Kukko 22/1

B - Internal extractor 14.5 to 18.5 mm, e.g. Kukko 21/2

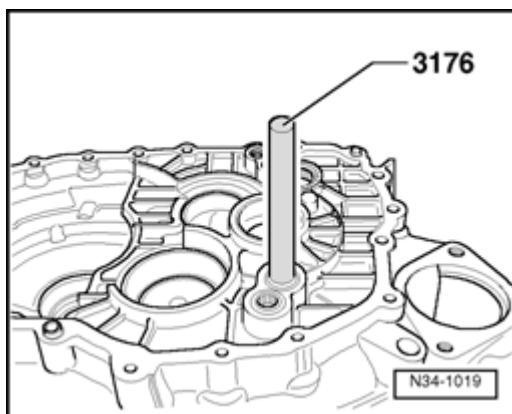


Fig. 2 Driving selector rod mounting bushing in flush

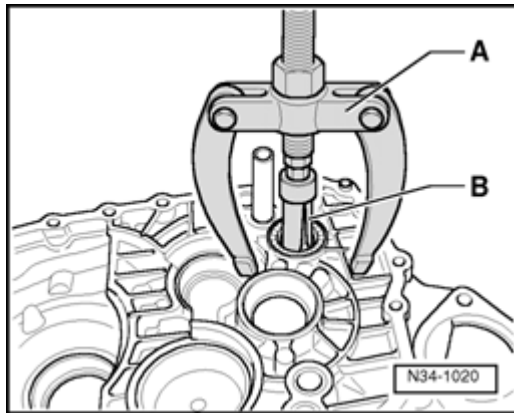


Fig. 3 Pulling needle bearing out of clutch housing

A - Counter support, e.g. Kukko 22/2

B - Internal extractor 23.5 to 30 mm, e.g. Kukko 21/4

Note:

The needle bearing is destroyed during removal and must be replaced.

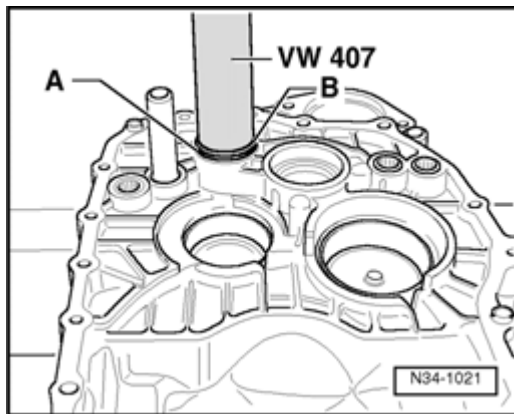


Fig. 4 Pressing needle bearing -A- into clutch housing

- Before pressing in, lay reverse shaft thrust washer -B- on needle bearing.

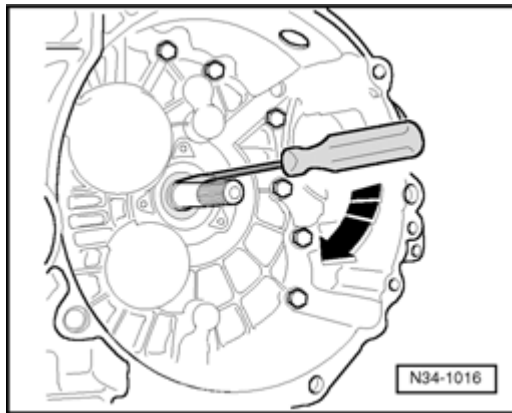


Fig. 5 Removing output shaft oil seal

- Pry oil seal out carefully with a screwdriver.

When transmission is disassembled, oil seal can be removed with sleeve 30-21.

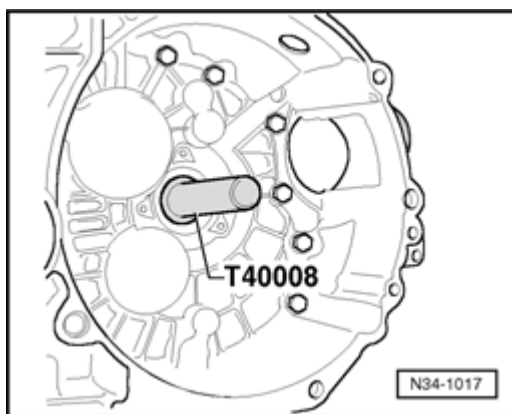


Fig. 6 Driving in input shaft oil seal flush

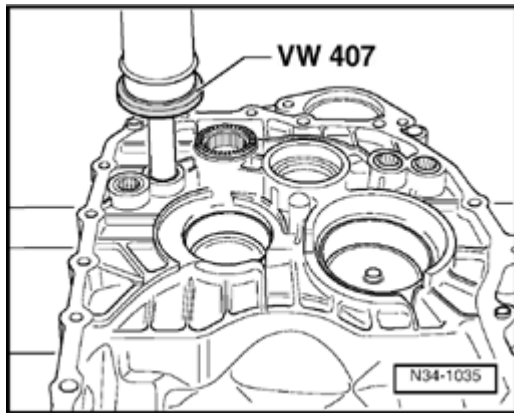
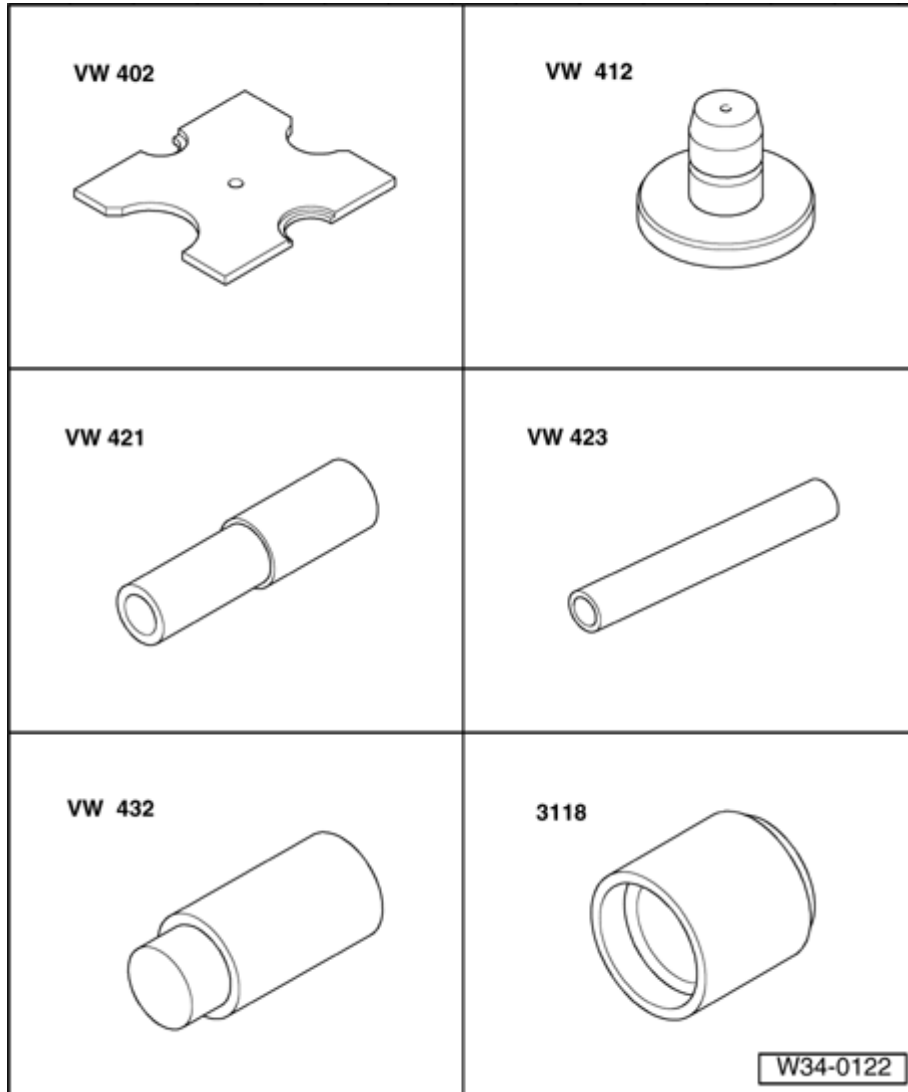


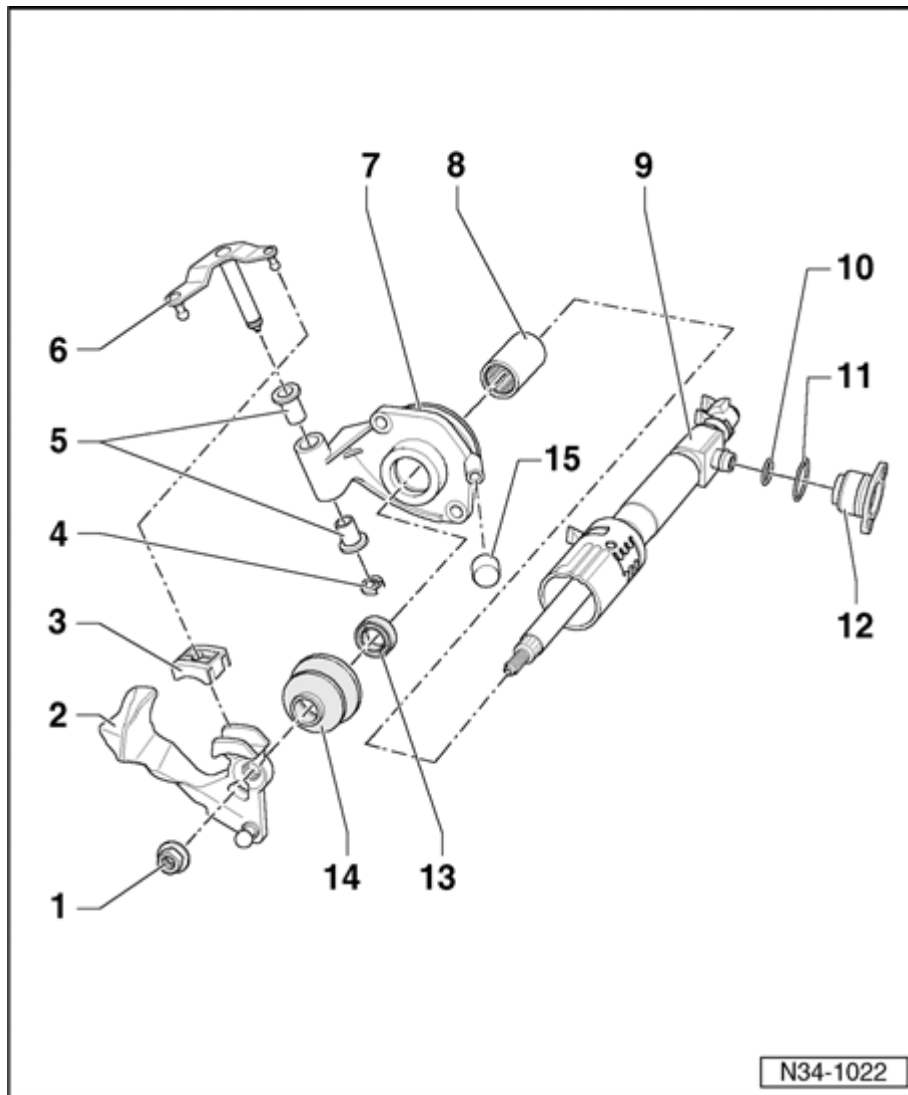
Fig. 7 Pressing reverse gear selector fork shaft into clutch housing



Transmissic selector mechanism, disassembli and assembling

Special tools and equipment

- ◆ VW 402 Thrust plate
- ◆ VW 412 Press tube
- ◆ VW 421 Tube
- ◆ VW 423 Tube
- ◆ VW 432 Press tube
- ◆ 3118 Tube



1 - Hex nut, 20 Nm

◆ ⇒ [Page 34-10](#)
item 16

2 - Gear selector lever

◆ Install so that master spline aligns with selector shaft

◆ Can be replaced with selector mechanism installed

◆ Installed position ⇒ [Page 34-14](#)

3 - Shoe

◆ Clip into relay lever item 6

4 - Lock washer

◆ Removing ⇒ [Fig. 1](#)

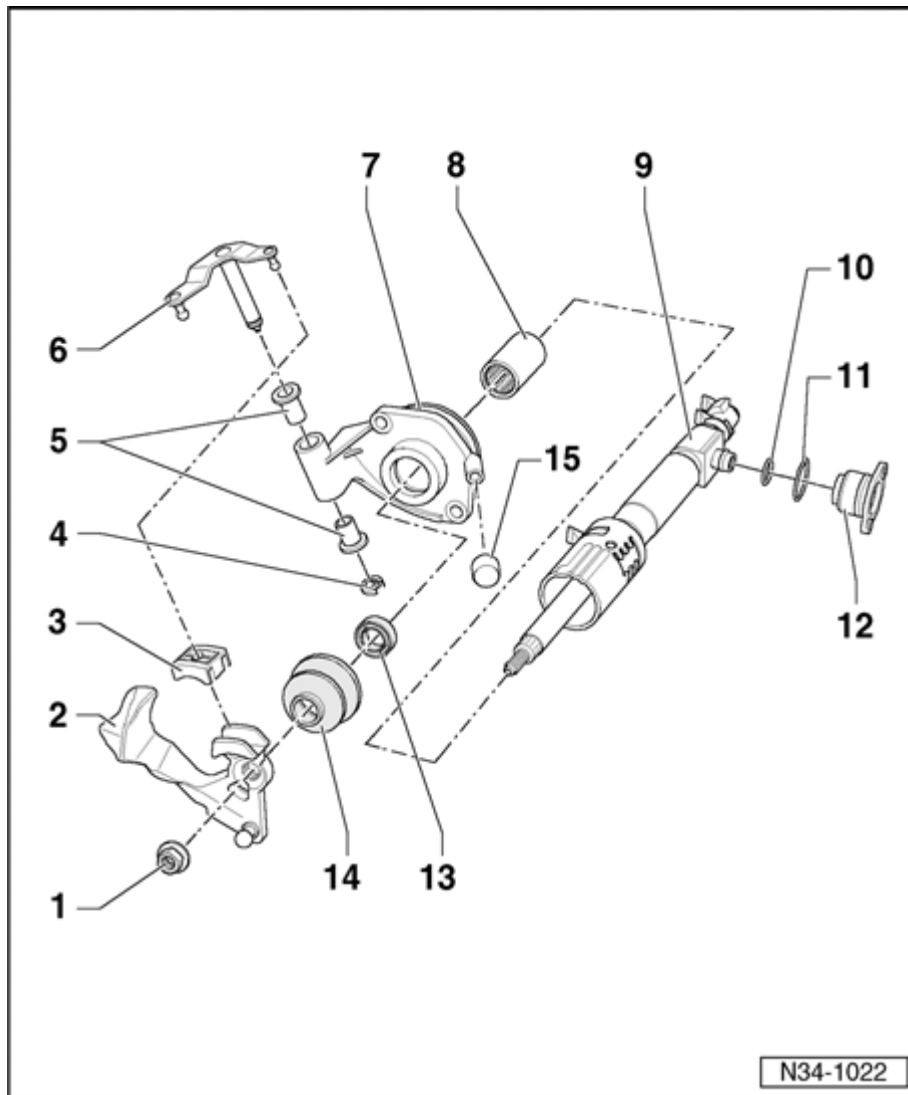
5 - Bushing

6 - Relay lever

◆ Installed
position
⇒ [Page
34-14](#)

**7 Selector
- mechanism
cover**

34-99

**8 - Ball sleeve**

- ◆ For selector shaft

- ◆ Removing ⇒ [Fig. 2](#)

- ◆ Pressing in ⇒ [Fig. 3](#)

9 - Selector shaft**10 - O-ring**

- ◆ Always replace

11 - O-ring

- ◆ Always replace

12 - End cover**13 - Oil seal**

- ◆ Pry out with screwdriver

- ◆ Installing ⇒ [Fig. 4](#)

14 - Protective cap

- ◆ For selector shaft

15 - Cap

- ◆ For transmission breather

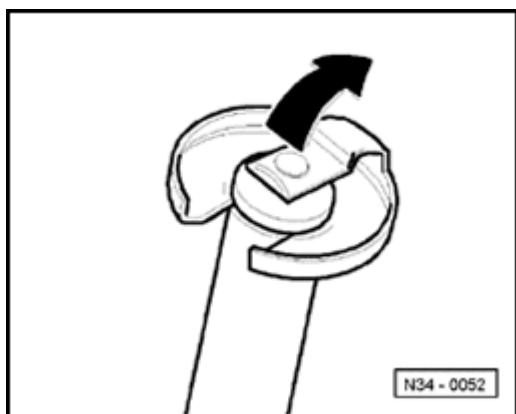


Fig. 1 Removing relay lever lock washer

- Lift tab in direction of arrow.

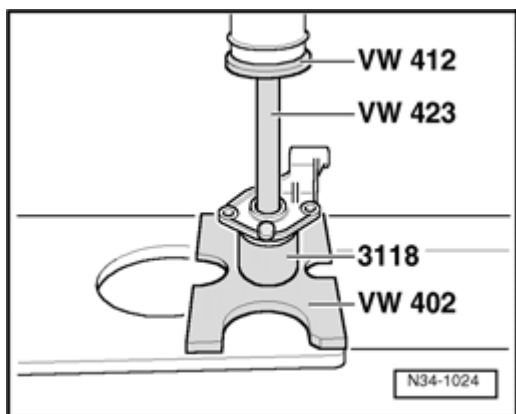


Fig. 2 Pressing ball sleeve from selector mechanism cover

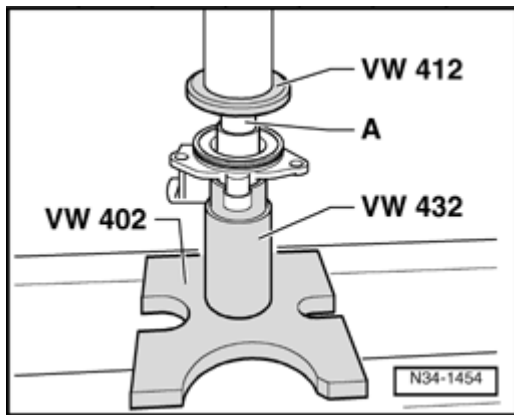


Fig. 3 Pressing ball sleeve into selector mechanism cover

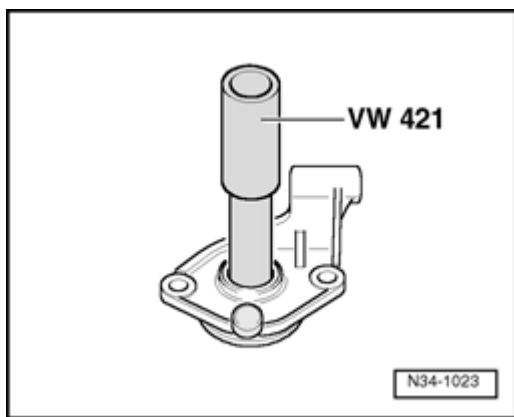
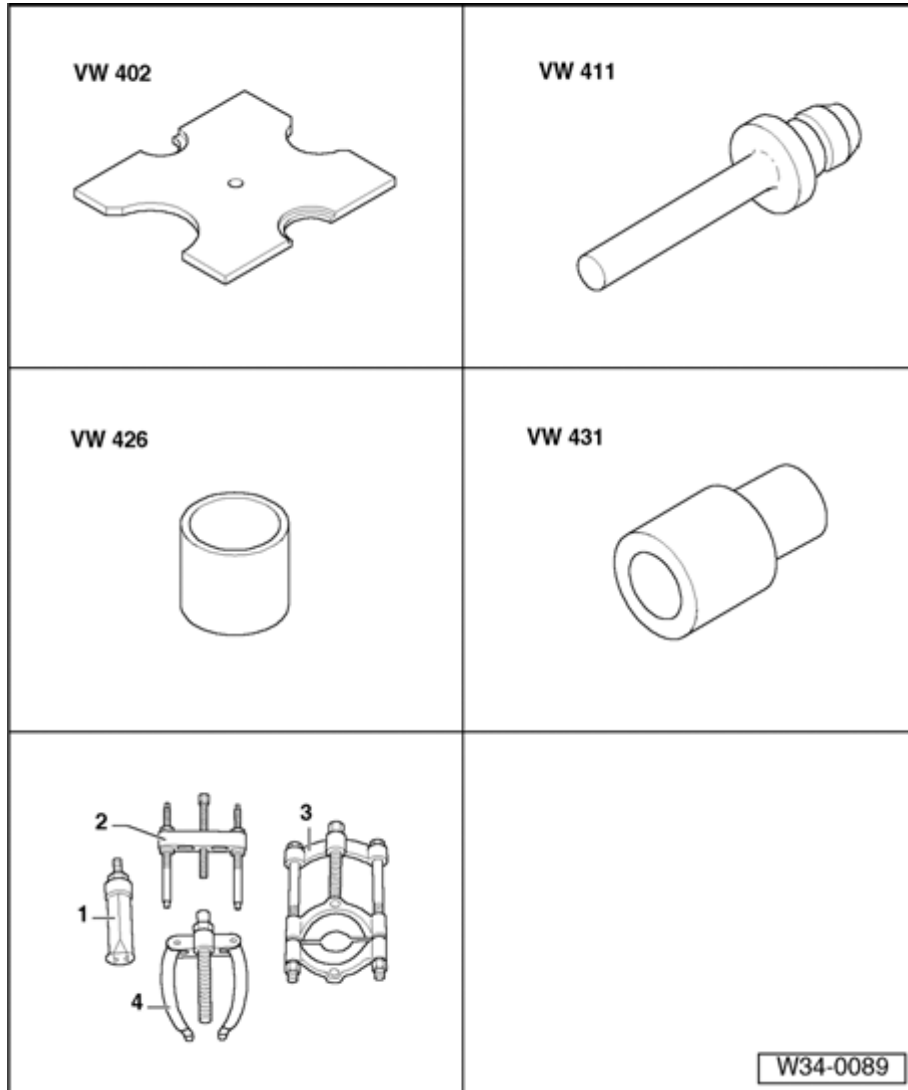


Fig. 4 Pressing ball sleeve into selector mechanism cover

34-102

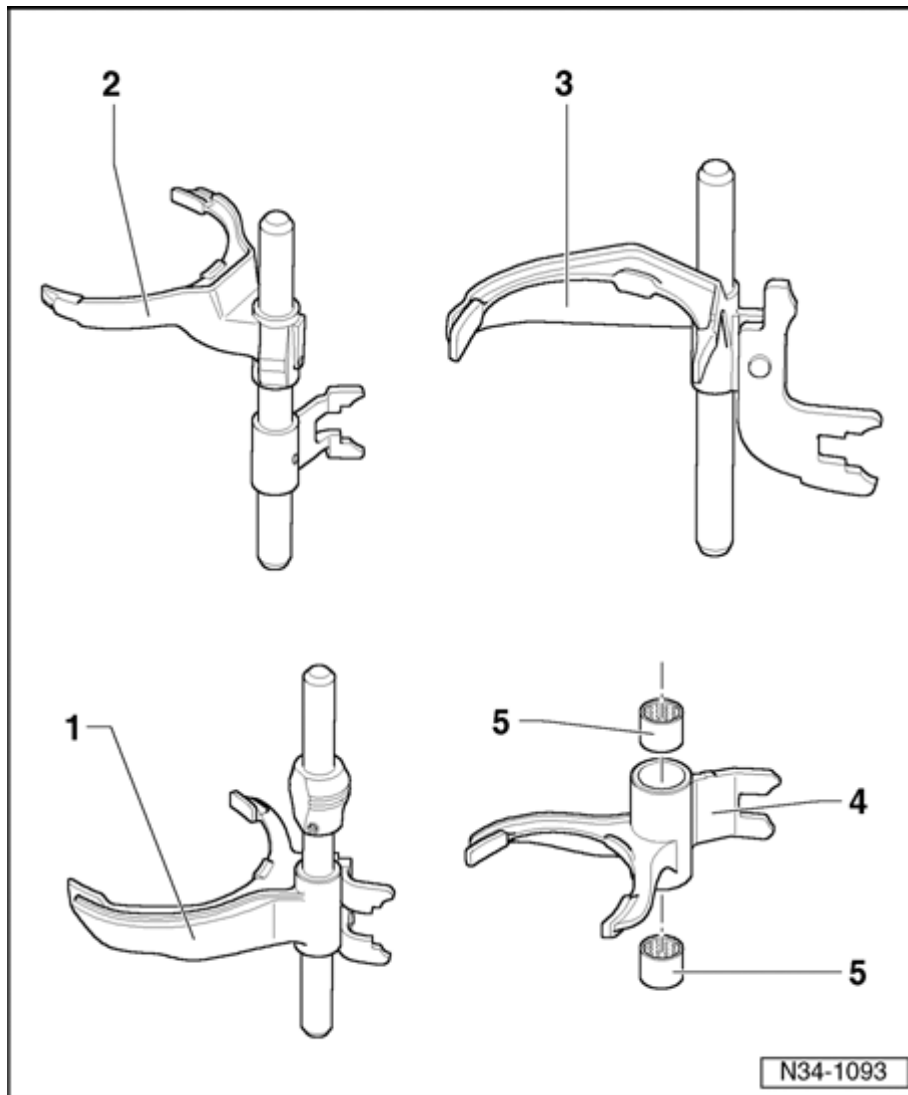


Selector fork disassembly and assembly

Special tools and equipment

- ◆ VW 402 Thrust plate
- ◆ VW 411 Press tool
- ◆ VW 426 Tube
- ◆ VW 431 Press piece
- ◆ 1 - Kukko 21/3 Internal puller
- ◆ 4 - Kukko 22/1 Counter-support

34-103



1 - Selector rod with 1st and 2nd gear selector forks

2 - Selector rod with 3rd and 4th gear selector forks

3 - Selector rod with 5th and 6th gear selector forks

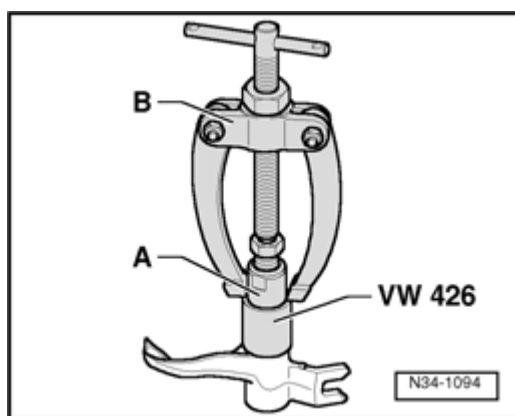
4 - Reverse gear selector fork

5 - Ball sleeve

◆ Pulling out ⇒ [Fig. 1](#)

◆ Pressing in ⇒ [Fig. 2](#)

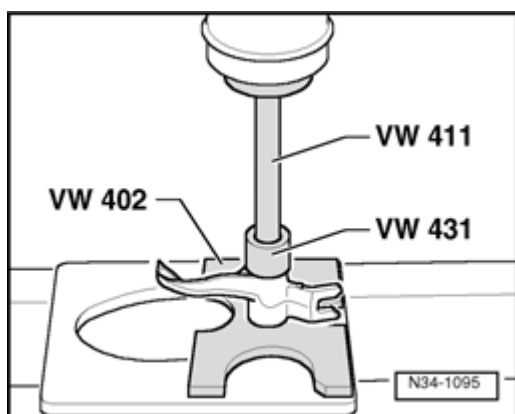
34-104



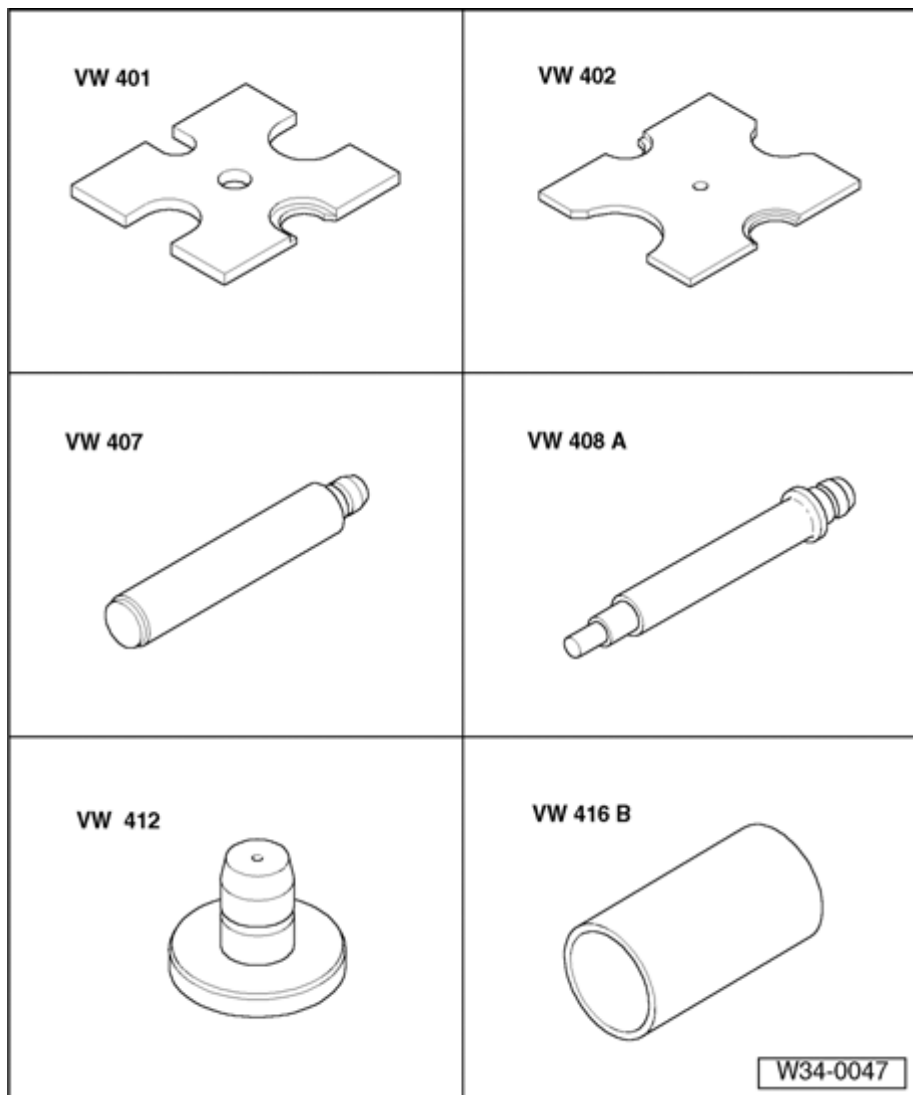
✦ **Fig. 1 Pulling out reverse gear selector fork ball sleeve**

A - Internal extractor 18 to 23 mm, e.g. Kukko 21/3

B - Counter support. e.g. Kukko 22/1



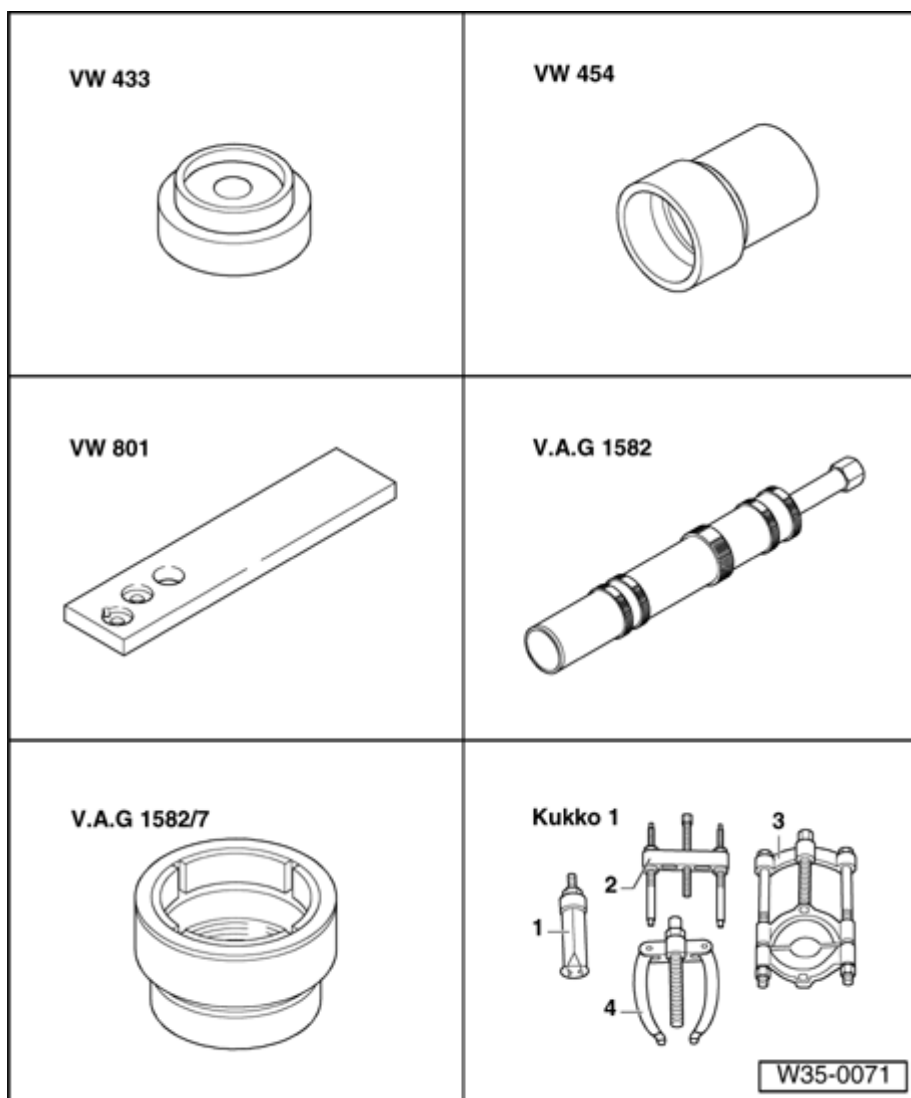
✦ **Fig. 2 Pressing in reverse gear selector fork ball sleeve**



Input shaft, disassembling and assembling

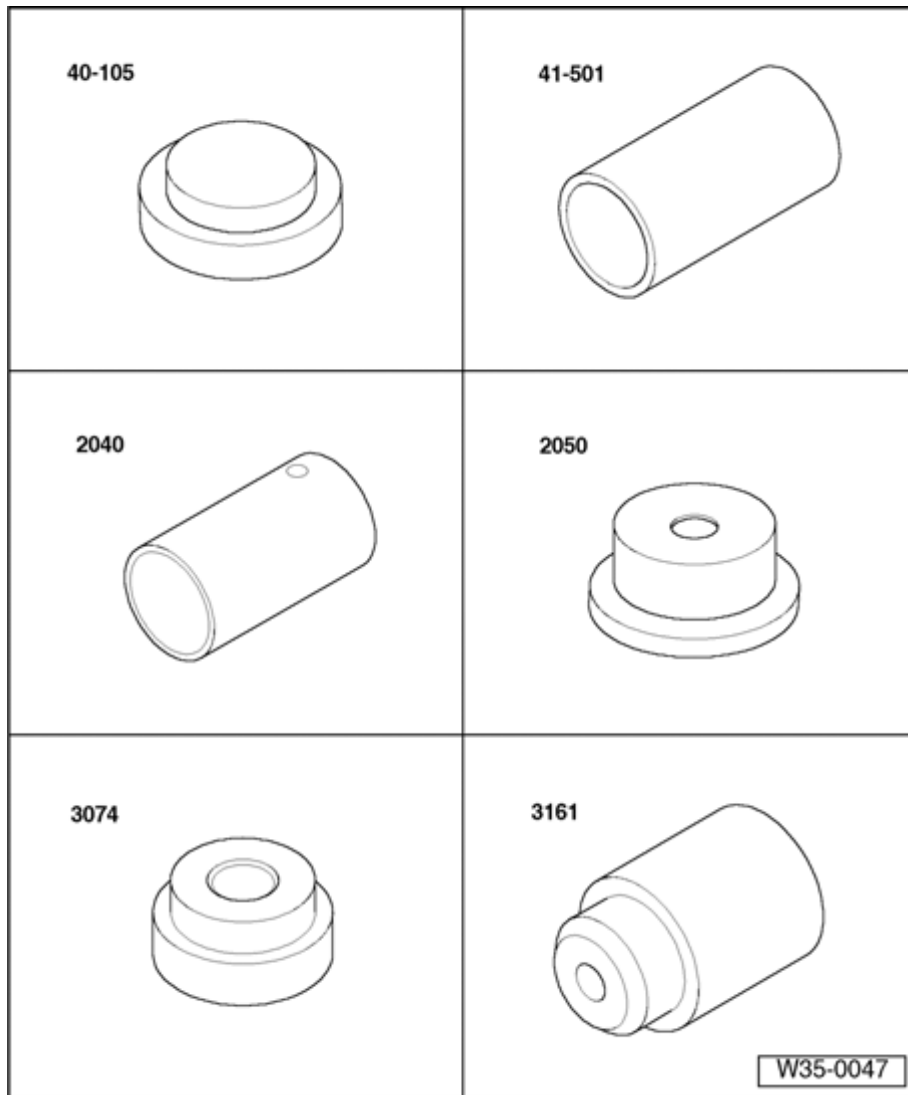
Special tools and equipment

- ◆ VW 401 Thrust plate
- ◆ VW 402 Thrust plate
- ◆ VW 407 Press tool
- ◆ VW 408 A Press tool
- ◆ VW 412 Press tool
- ◆ VW 416 B Tube



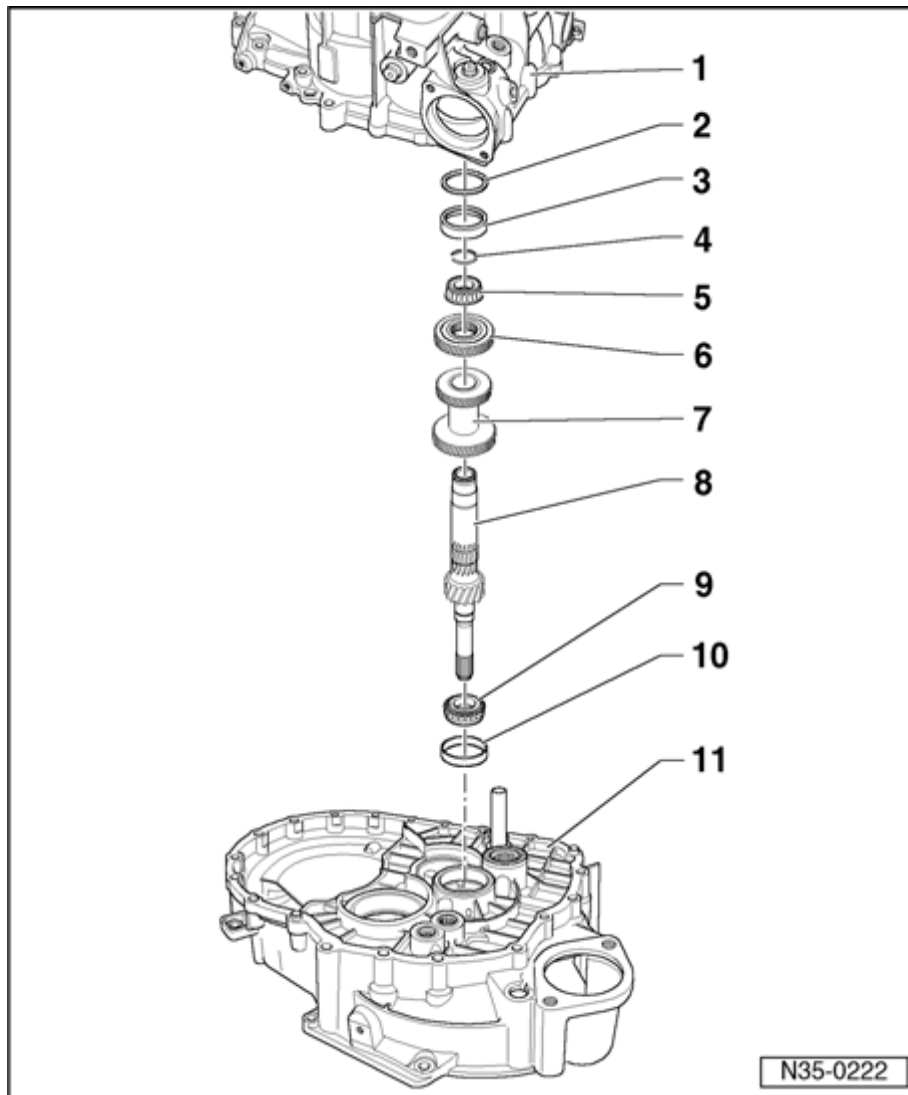
Special tools and equipment

- ◆ VW 433 Press piece
- ◆ VW 454 Press piece
- ◆ VW 801 Holding plate
- ◆ VAG 1582 tapered roller bearing puller
- ◆ VAG 1582/7 Grip
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 3 - Kukko 17/2 Separating device
- ◆ 4 - Kukko 22/2 Counter support



Special tools and equipment

- ◆ 40-105 Thrust plate
- ◆ 41-501 Drift sleeve
- ◆ 2040 Tube
- ◆ 2050 Thrust piece
- ◆ 3074 Press disc
- ◆ 3161 Extension

**Note:**

- ◆ When installing new gears, consult technical data ⇒ [Page 00-2](#).
- ◆ If the position of the tapered roller bearings is affected when exchanging parts, the input shaft must be re-adjusted. See adjustment overview ⇒ [Page 39-23](#)

1 Transmission - housing**2 - Shim**

- ◆ Determining thickness ⇒ [Page 35-14](#)

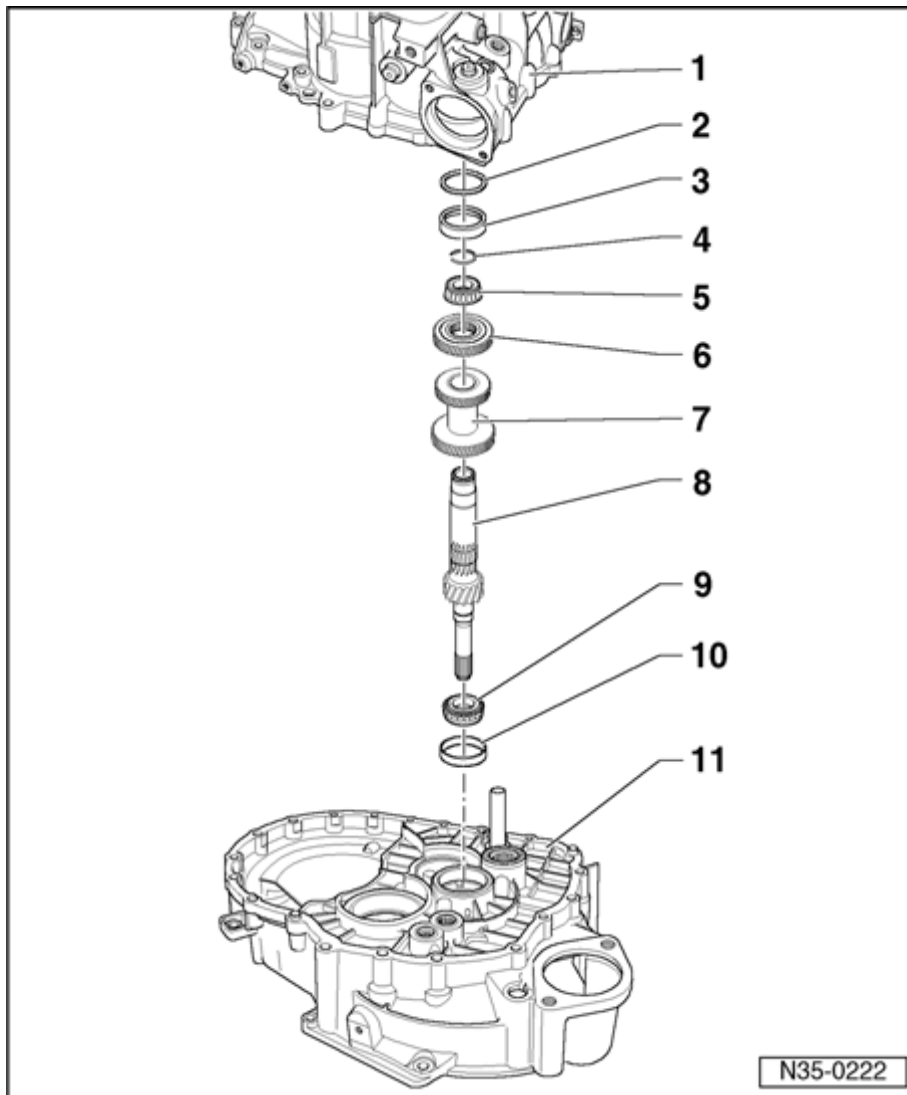
3 - Tapered roller bearing outer race

- ◆ Pulling out ⇒ [Fig. 1](#)
- ◆ Pressing in ⇒ [Fig. 2](#)

4 - Circlip

- ◆ Redetermine if tapered roller bearing item

5 or input
shaft item 8
are replaced
⇒ [Fig. 11](#)



5 - Tapered roller bearing inner race

◆ Pulling off ⇒ [Fig. 3](#)

◆ Pressing on ⇒ [Fig. 10](#)

6 - 5th gear

◆ Pressing off ⇒ [Fig. 4](#)

◆ Pressing on ⇒ [Fig. 9](#)

7 - 3rd, 4th and 6th gear

◆ Pressing off ⇒ [Fig. 5](#)

◆ Pressing on ⇒ [Fig. 7](#)

8 - Input shaft

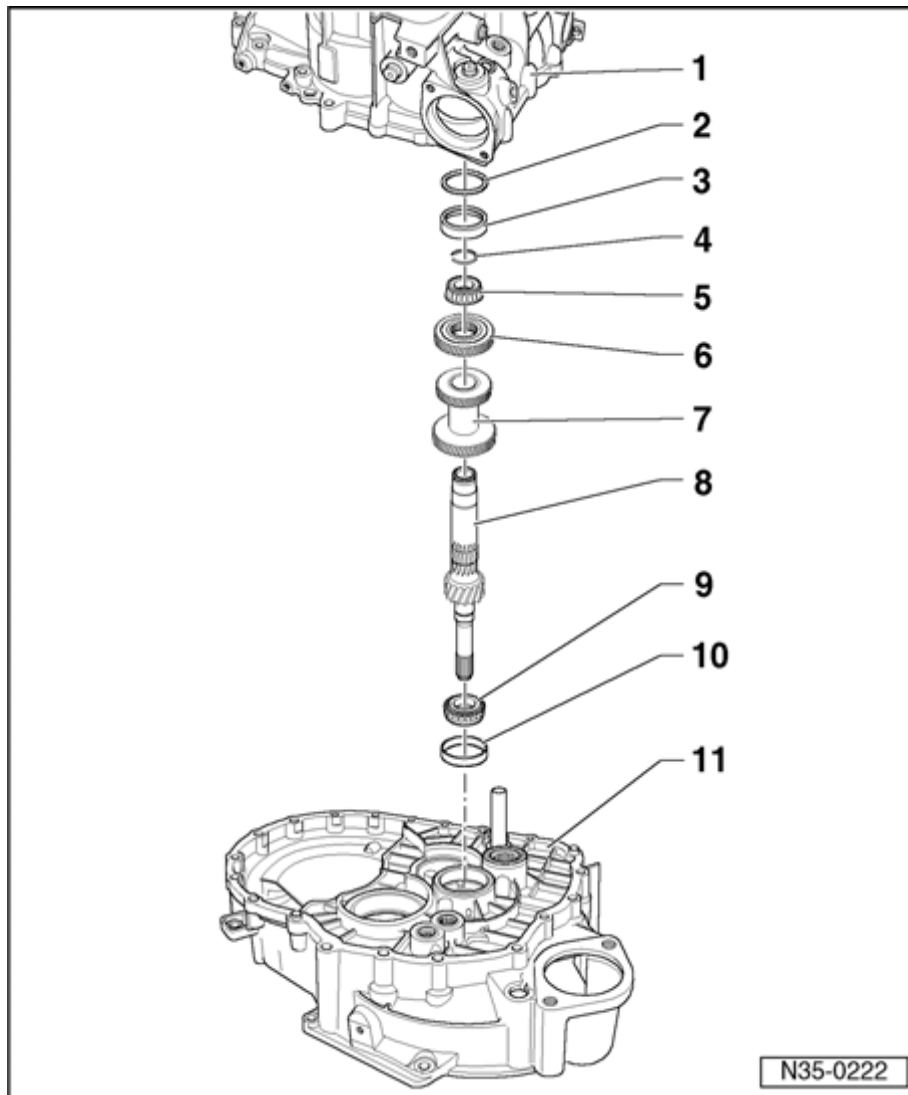
◆ Adjusting ⇒ [Page 35-14](#)

9 - Tapered roller bearing inner race

◆ Pressing off ⇒ [Fig. 6](#)

◆ Pressing

on ⇒
[Fig. 8](#)



10 - Tapered roller bearing outer race

- ◆ Pulling out ⇒ [Fig. 12](#)
- ◆ Installed position ⇒ [Fig. 13](#)
- ◆ Pressing in ⇒ [Fig. 14](#)
- ◆ Transmissions from build date 06 04 0 secured with locking plate and bolt
 - ◆ Bolt 12 Nm
 - ◆ Always replace

11 - Clutch housing

- ◆ Transmissions from 06 04 0, with additional threaded hole and recess for locking plate to secure tapered roller bearing outer race for input shaft, item 10

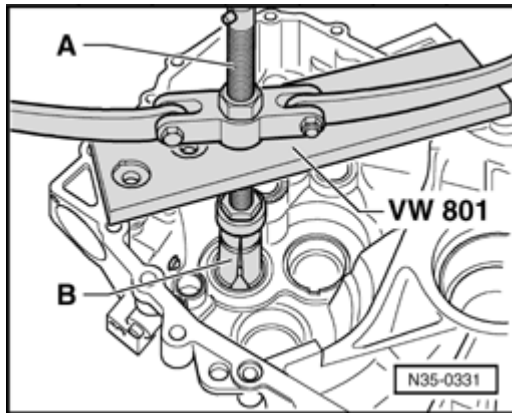


Fig. 1 Pressing tapered roller bearing outer race out of transmission housing

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

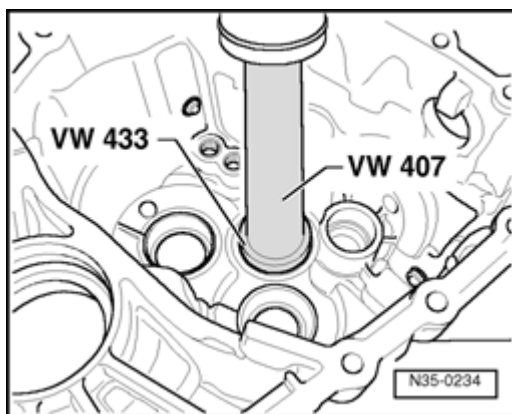


Fig. 2 Pressing tapered roller bearing outer race into transmission housing

- Support transmission housing with press piece 3062 directly below bearing support.

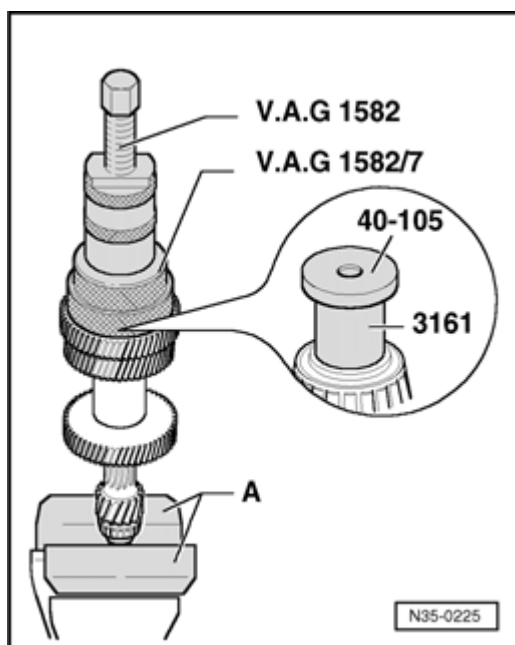


Fig. 3 Pulling off tapered roller bearing inner race

A - Vise clamps/vise

- Remove securing clip.
- Before setting up pulling device, set extension 3161 and thrust plate 40-105 on input shaft.

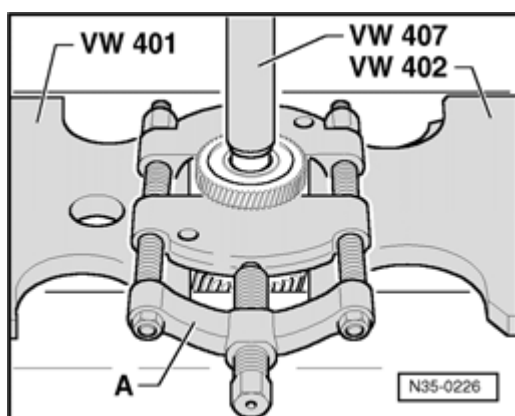


Fig. 4 Pressing off 5th gear

A - Separating device 22 to 115 mm, e.g. Kukko 17/2

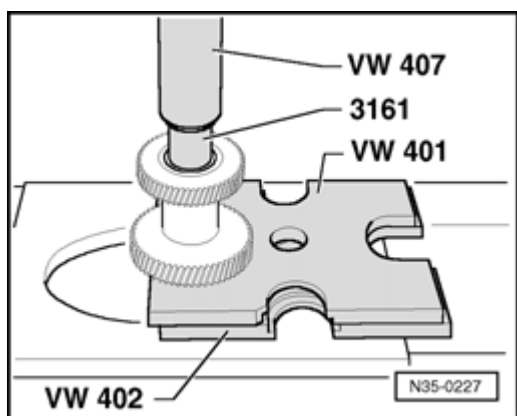


Fig. 5 Pressing off 3rd, 4th and 6th gear

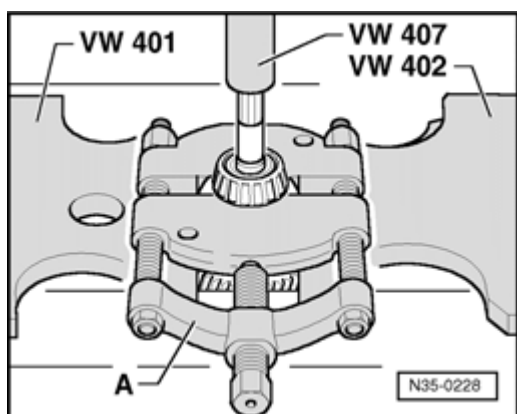
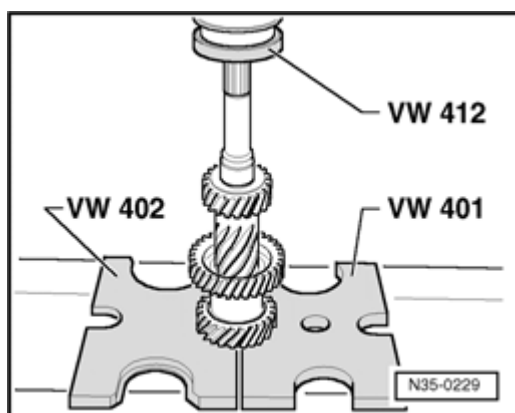


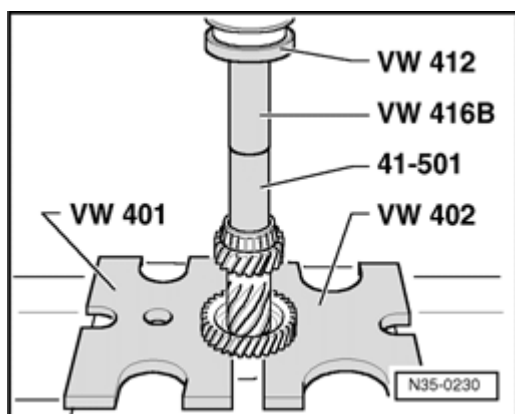
Fig. 6 Pressing off tapered roller bearing inner race

A - Separating device 22 to 115 mm, e.g. Kukko 17/2

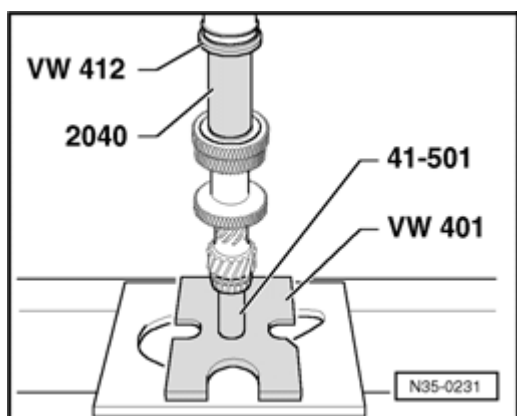


⚡ **Fig. 7 Pressing on 3rd, 4th and 6th gear**

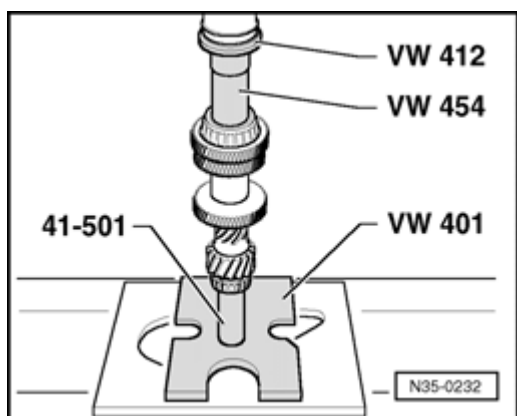
- Heat gear wheel to about 100 °C
- Press on gear wheel quickly so that heat is not immediately transferred to input shaft.



⚡ **Fig. 8 Pressing on tapered roller bearing inner race**



◀ Fig. 9 Pressing on 5th gear



◀ Fig. 10 Pressing on tapered roller bearing inner race

- Determine circlip and install ⇒ [Fig. 11](#) .

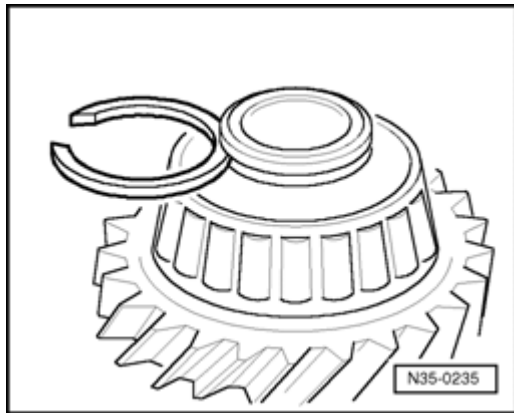


Fig. 11 Determining thickness of circlip

- Determine thickest circlip which will just fit and install it.

The following circlips are available:

Thickness (mm)	Part No.
1.79	02M 311 187 G
1.83	02M 311 187 F
1.86	02M 311 187 E
1.89	02M 311 187 D
1.92	02M 311 187 C
1.95	02M 311 187 B
1.98	02M 311 187 A

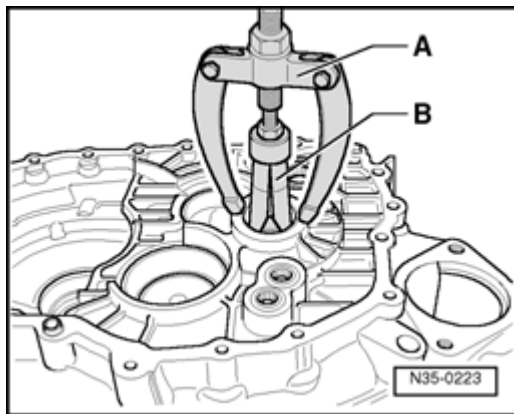


Fig. 12 Pulling tapered roller bearing outer race out of transmission housing

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

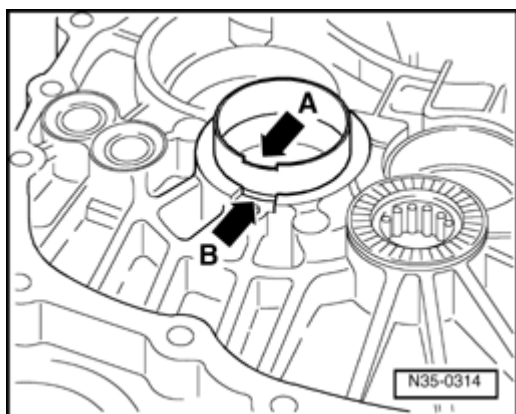


Fig. 13 Outer race/tapered roller bearing installation position in clutch housing

Transmissions from build date 06 04 0

The recesses for locking plate (⇒ [Fig. 14](#)) on outer race/tapered roller bearing (arrow -A-) and clutch housing (arrow -B-) must align.

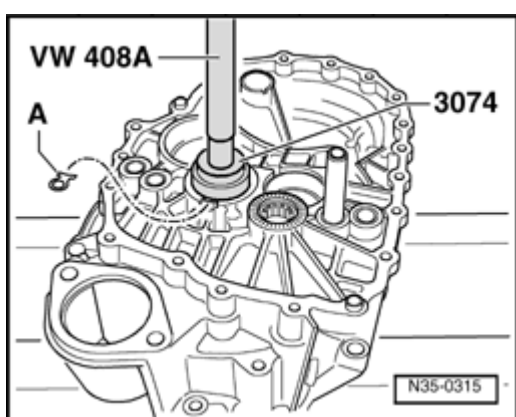
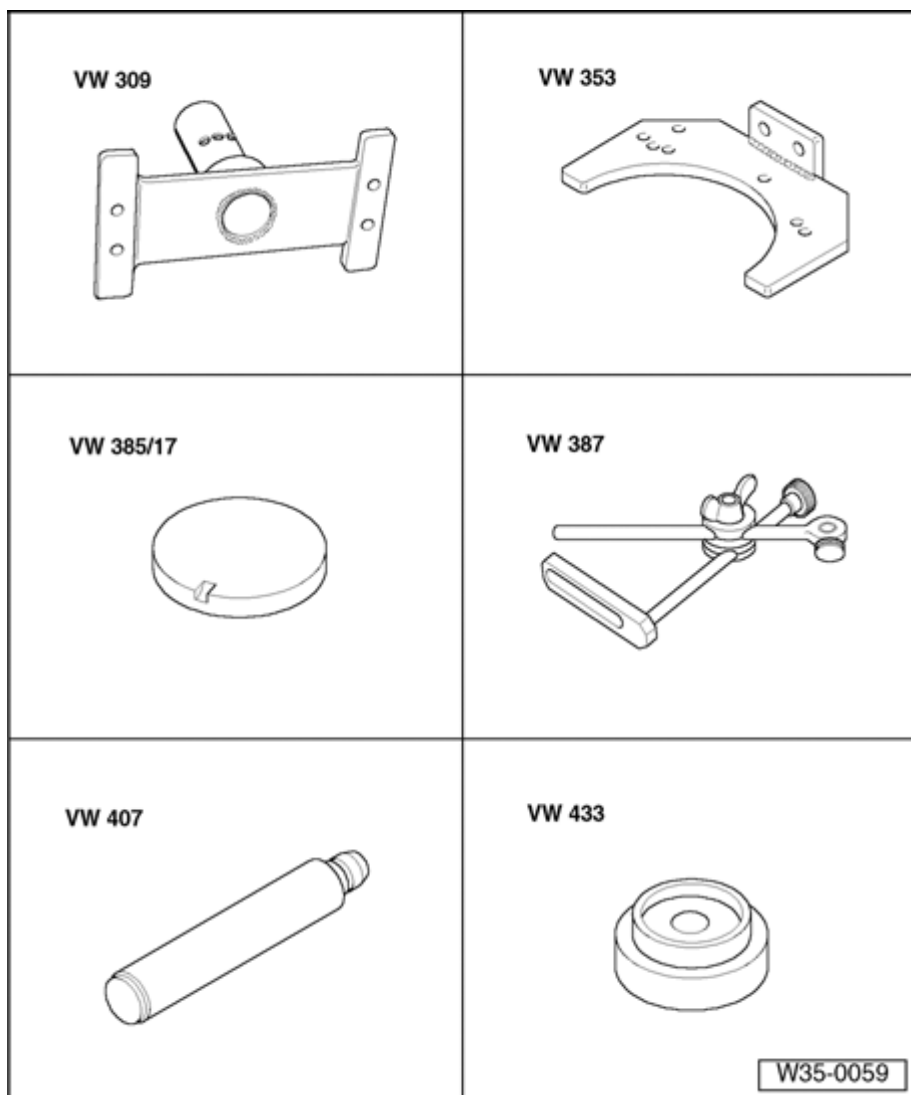


Fig. 14 Pressing in tapered roller bearing outer race

Transmissions from 06 04 0

- After pressing in, check if locking plate -A- can be inserted in recess.
- Before installing and securing locking plate, insert axle shaft.



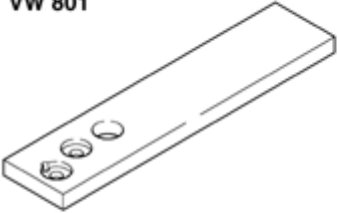

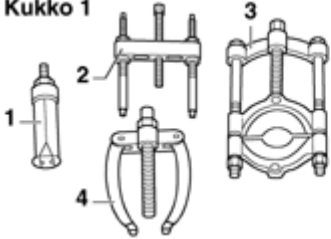
Input shaft, adjusting

(Determining input shaft adjustment shim)

Special tools and equipment

- ◆ VW 309 Holding plate
- ◆ VW 353 Transmission support
- ◆ VW 385/17 End measuring plate
- ◆ VW 387 Universal dial gauge bracket
- ◆ VW 407 Press tool
- ◆ VW 433 Press piece

35-15

<p>VW 801</p> 	<p>V.A.G 1331</p> 
<p>Kukko 1</p> 	
	<p>W35-0072</p>

Special tools and equipment

- ◆ VW 801 Holding plate
- ◆ V.A.G 1331 Torque wrench
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 4 - Kukko 22/1 Counter-support

It is only necessary to readjust the input shaft when the following components are replaced

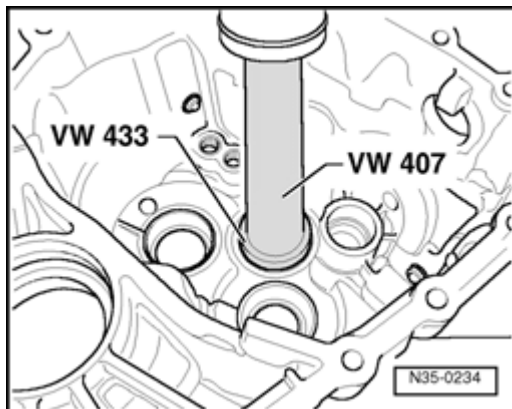
- ◆ Transmission housing
- ◆ Clutch housing
- ◆ Input shaft

or the

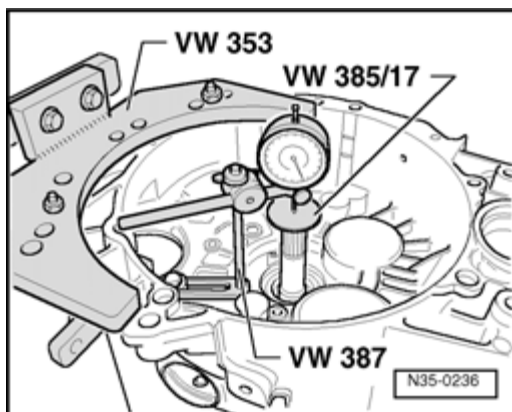
- ◆ Tapered roller bearings

Adjustment overview ⇒ [Page 39-23](#)

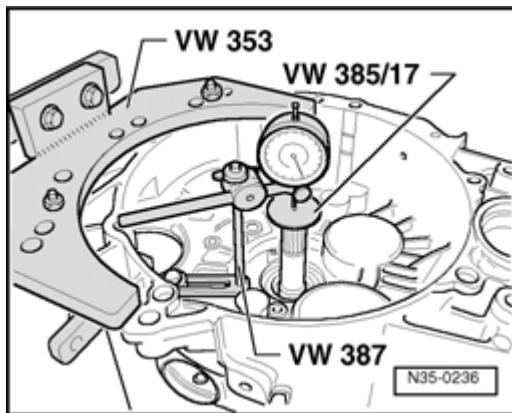
- ◆ Shims of determined thickness are installed on both output shafts.



- Press tapered roller bearing outer race with shim into transmission housing onto stop
- Install both output shafts and input shaft in clutch housing and assemble transmission housing. Tighten hex bolts on head ⇒ [Page item 13](#)



- Mount measuring appliance and dial gauge on clutch housing.

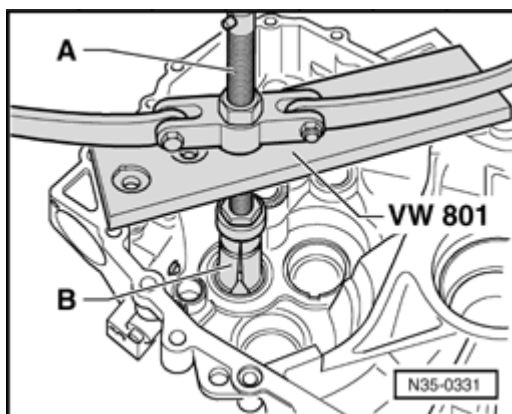


- Install measuring appliance and dial gauge in clutch housing.
- Before taking any measurements, rotate input shaft to allow bearings to settle. Set dial gauge to "0" with 1 mm preload.

Note:

This preparation is to be repeated for each subsequent measurement, otherwise the gauge will not return to the starting position.

- Pull input shaft in direction of dial gauge.
- Read and note clearance indicated on dial gauge (Example: 1.63).
- Determine thickness of shim from table ⇒ [Page 35-18](#) (Example: 1.55).



- Remove transmission housing and pull tapered roller bearing outer race out of transmission housing.

A - Counter support, e.g. Kukko 22/2

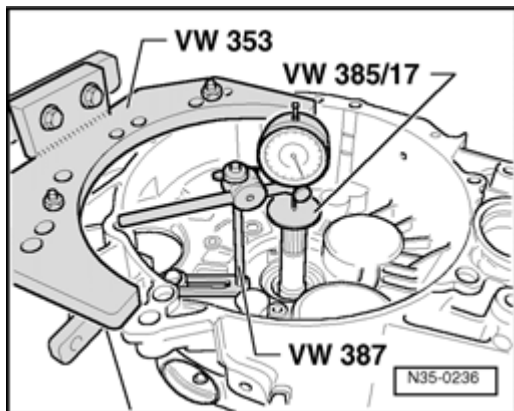
B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

- Press tapered roller bearing outer race together with 1.55 shim into transmission housing.
- Assemble transmission housing. Tighten hex bolts head ⇒ [Page 34-60](#) item 13

Table of adjustment shims

Measured bearing clearance (mm)	Shim	
	Thickness (mm)	Part No.
1.480 ... 1.524	1.40	084 409 383 AF
1.525 ... 1.574	1.45	084 409 383 AG
1.575 ... 1.624	1.50	084 409 383 AH
1.625 ... 1.674	1.55	084 409 383 AJ
1.675 ... 1.724	1.60	084 409 383 AK
1.725 ... 1.774	1.65	084 409 383 AL
1.775 ... 1.824	1.70	084 409 383 AM
1.825 ... 1.874	1.75	084 409 383 AN
1.875 ... 1.924	1.80	084 409 383 AP
1.925 ... 1.974	1.85	084 409 383 AQ
1.975 ... 2.024	1.90	084 409 383 AR
2.025 ... 2.074	1.95	084 409 383 AS

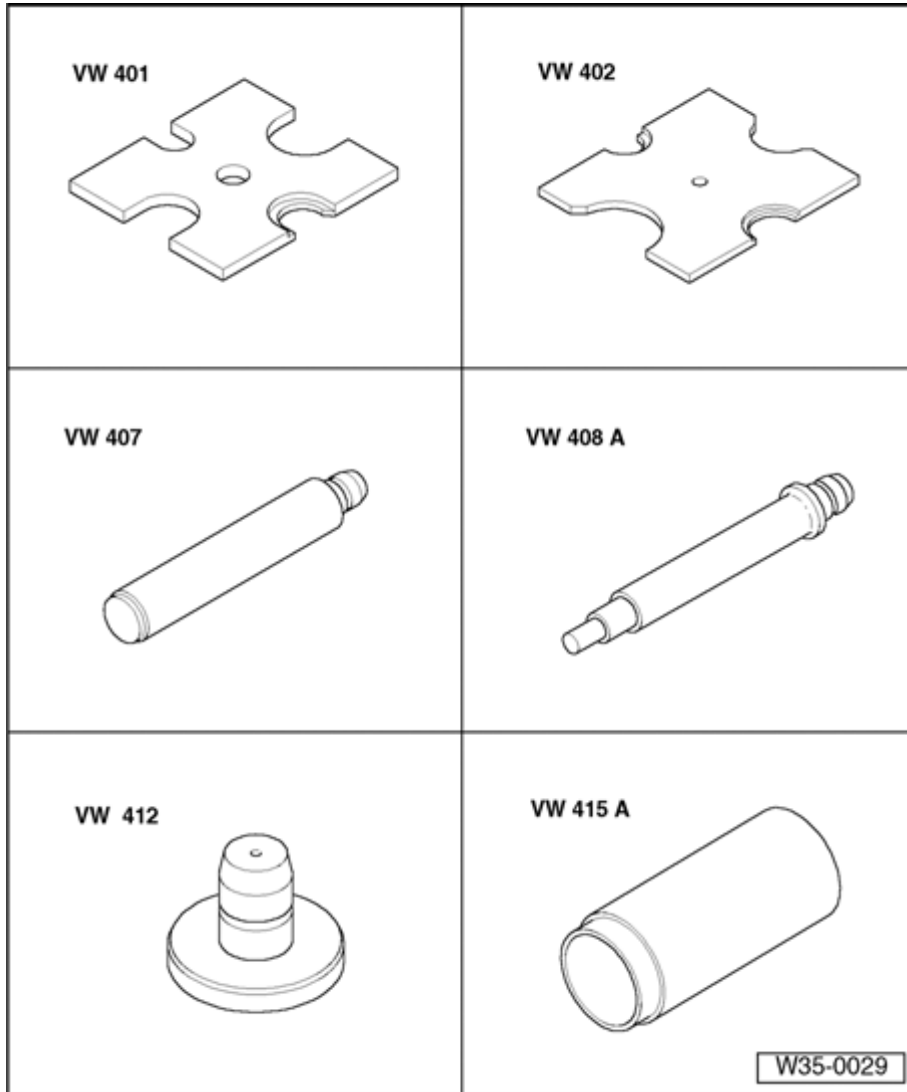
Measured	Shim	
bearing clearance (mm)	Thickness (mm)	Part No.
2.075 ... 2.124	2.00	084 409 383 AT
2.125 ... 2.174	2.05	084 409 383 BA
2.175 ... 2.224	2.10	084 409 383 BB
2.225 ... 2.274	2.15	084 409 383 BC
2.275 ... 2.324	2.20	084 409 383 BD
2.325 ... 2.374	2.25	084 409 383 BE



Measurement check

- Install measuring appliance and dial gauge
- Rotate input shaft so that tapered roller bearings settle.
- Press input shaft in direction of dial gauge.

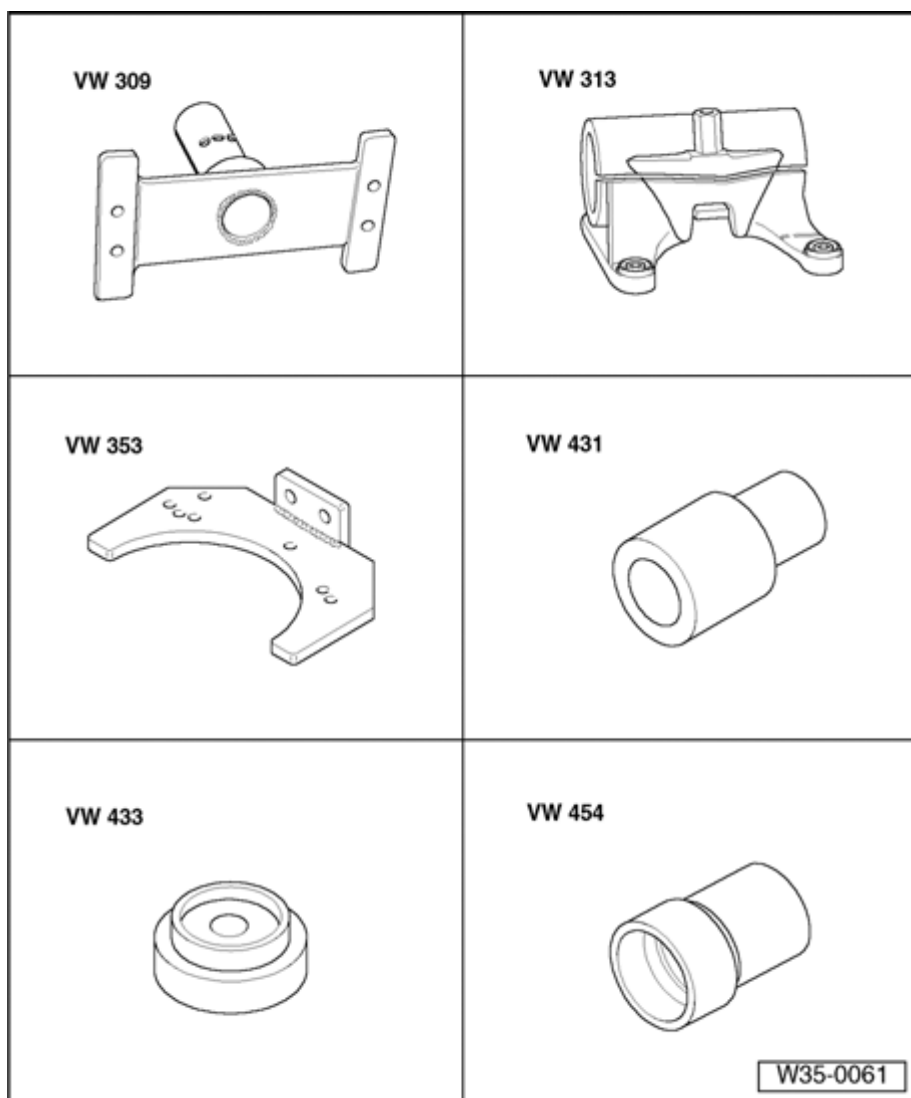
Bearing play should be min. 0.065 to max. 0.150 mm



Output shaft 1st-4th gear disassembling and assembling

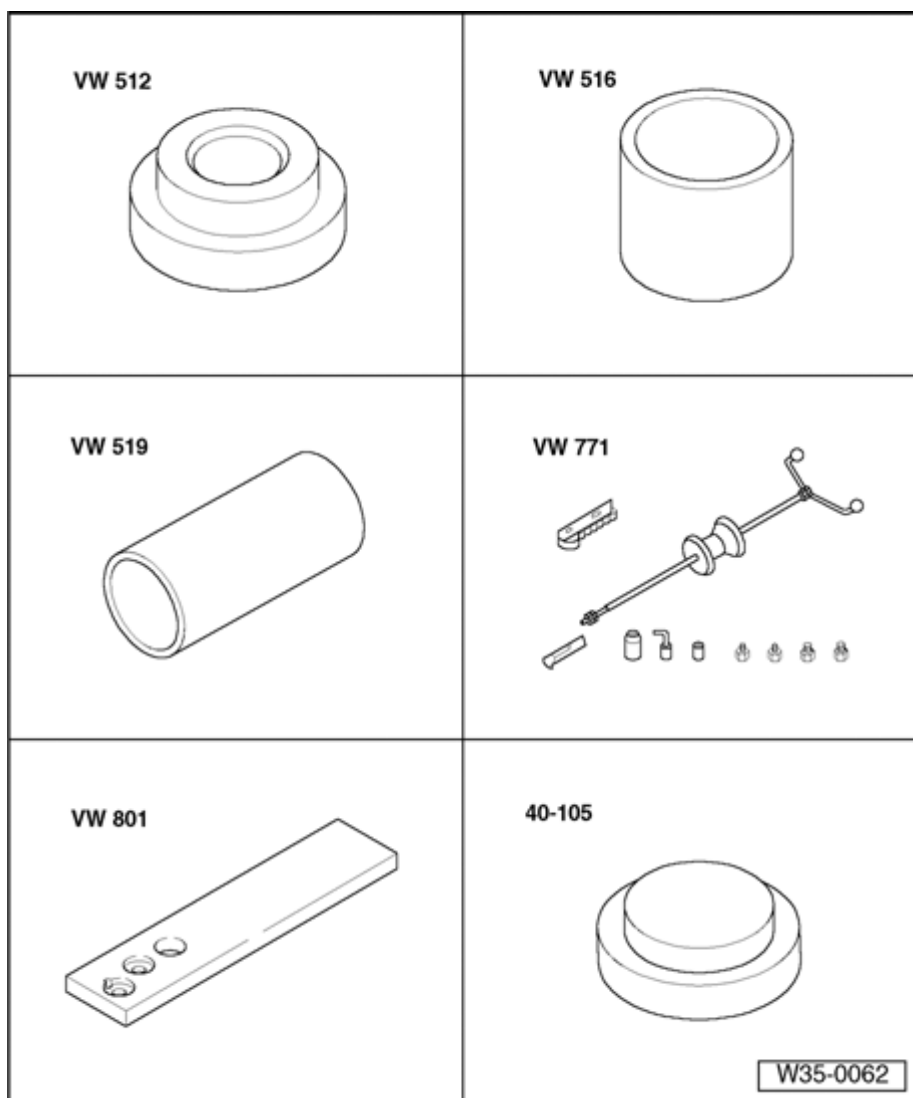
Special tools and equipment

- ◆ VW 401 Thrust plate
- ◆ VW 402 Thrust plate
- ◆ VW 407 Press tool
- ◆ VW 408 A Press tool
- ◆ VW 412 Press tool
- ◆ VW 415 A Tube



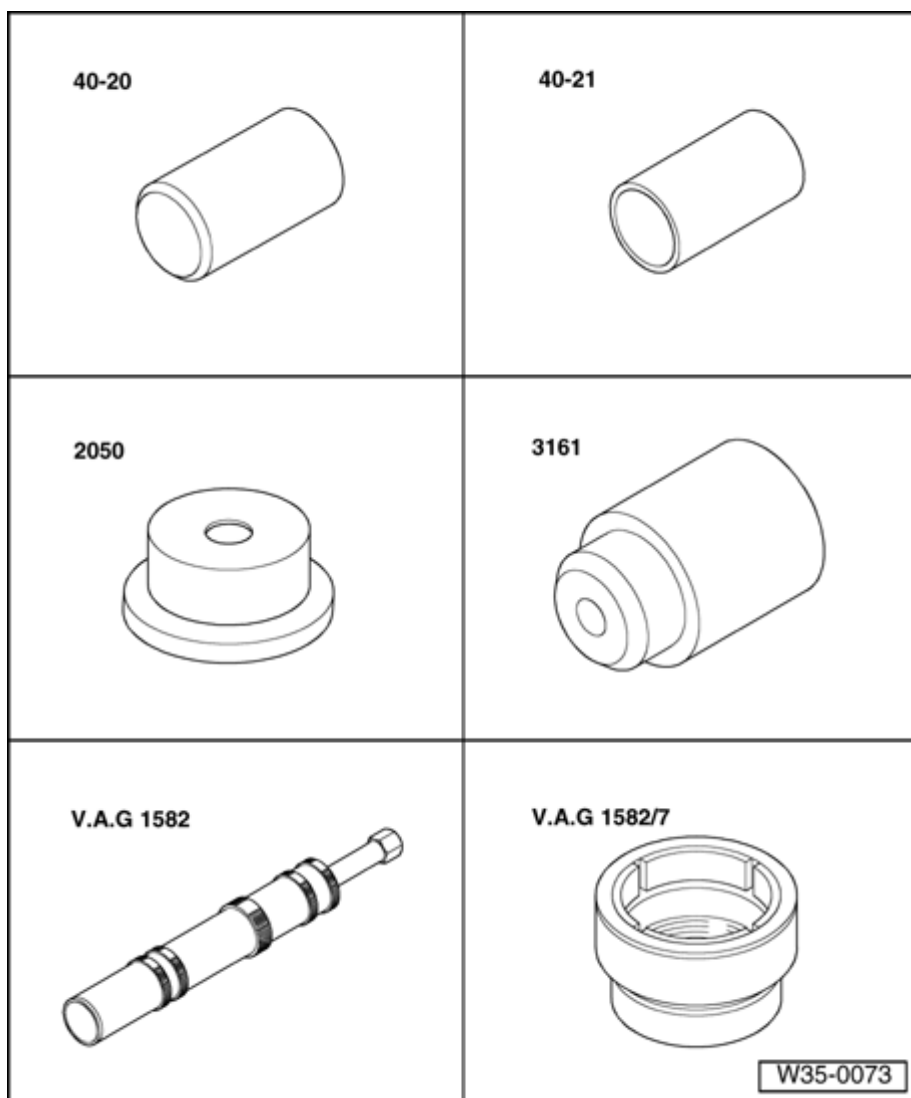
Special tools and equipment

- ◆ VW 309 Holding plate
- ◆ VW 313 Support clamp
- ◆ VW 353 Transmission support
- ◆ VW 431 Press piece
- ◆ VW 433 Press piece
- ◆ VW 454 Press piece



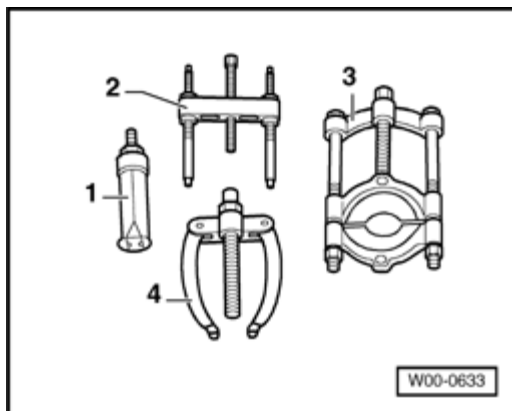
Special tools and equipment

- ◆ VW 512 Press disk
- ◆ VW 516 Tube
- ◆ VW 519 Tube
- ◆ VW 771 Multi-purpose tool
- ◆ VW 801 Holding plate
- ◆ 40-105 Thrust plate



Special tools and equipment

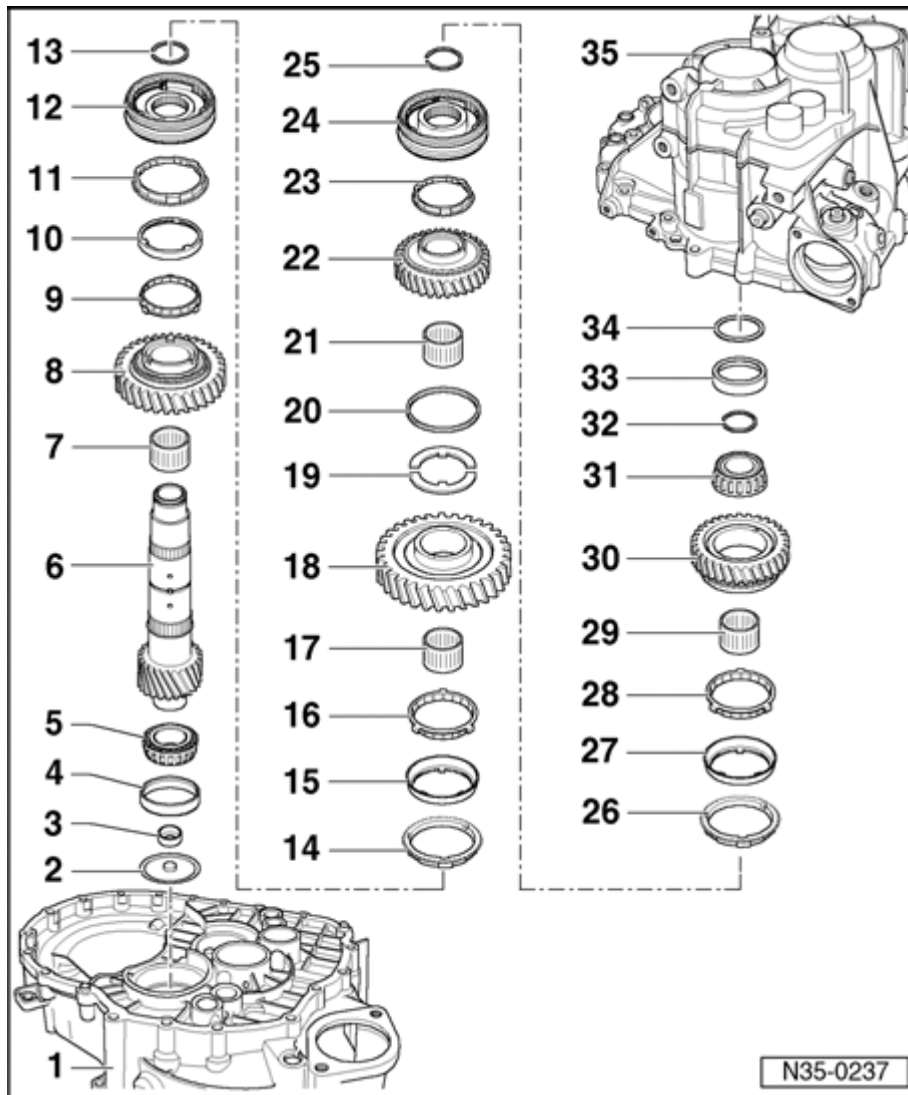
- ◆ 40-20 Press tool
- ◆ 40-21 Press tool
- ◆ 2050 Thrust piece
- ◆ 3161 Extension
- ◆ VAG 1582 Tapered roller bearing puller
- ◆ V.A.G 1582/7 Grip



Special tools and equipment



- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 1 - Internal puller Kukko 21/8
- ◆ 2 - Kukko 18/2 Puller
- ◆ 3 - Kukko 17/2 Separating device
- ◆ 4 - Kukko 22/2 Counter support

**Note:**

◆ When installing new gears or a new output shaft consult technical data ⇒ [Page 00-2](#).

◆ If the output shaft or tapered roller bearings have been replaced then perform output shaft adjustment ⇒ [Page 35-46](#).

1 - Clutch housing

2 - Oil deflector ring

3 - Dished washer

◆ Pulling out ⇒ [Fig. 1](#)

◆ Pressing in ⇒ [Fig. 2](#)

4 Outer - race/tapered roller bearing

◆ Pulling out ⇒ [Fig. 3](#)

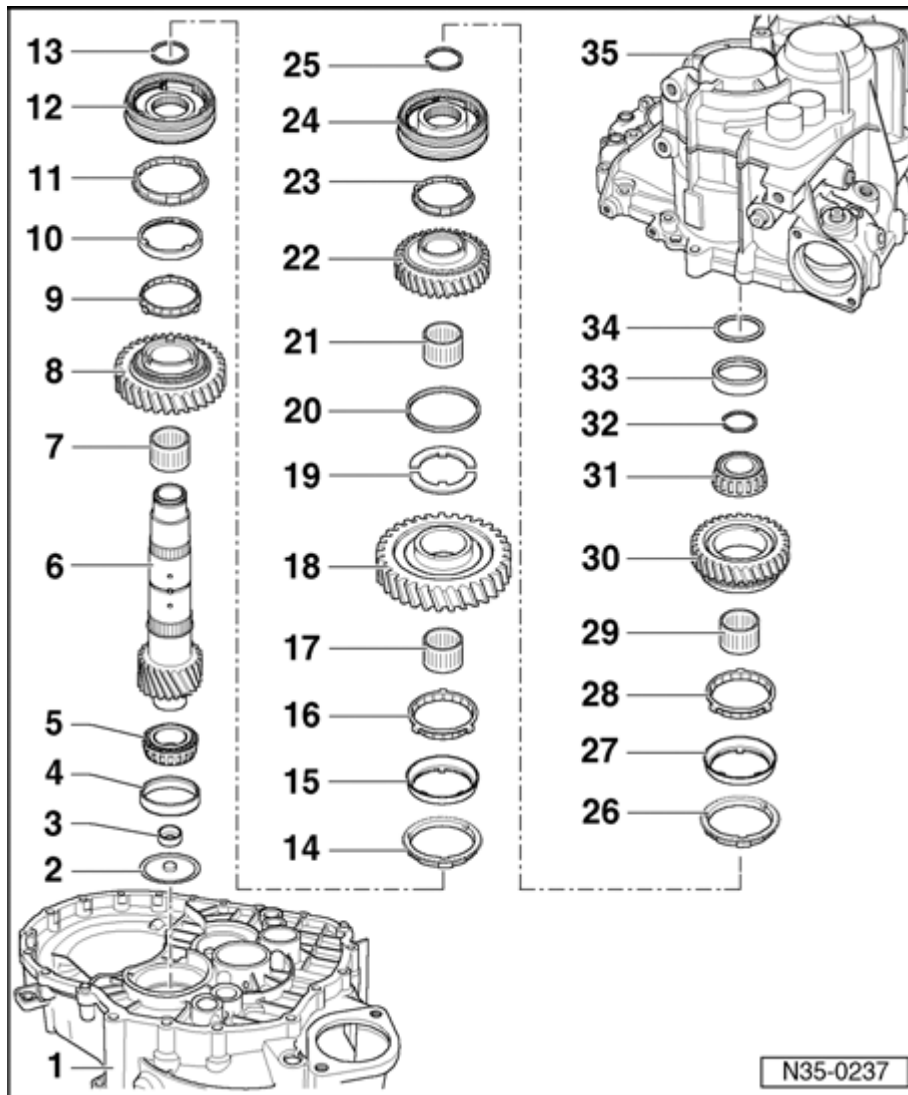
◆ Pressing

in ⇒
[Fig. 4](#)

**5 - Tapered
roller
bearing
inner
race**

◆ Pressing
off ⇒
[Fig. 8](#)

◆ Pressing
on ⇒
[Fig. 9](#)



6 - Output shaft

- ◆ For 1st-4th gear
- ◆ Adjusting ⇒ [Page 35-46](#)

7 - Needle roller bearing

- ◆ For 2nd gear

8 - 2nd gear

9 - Synchro-ring

- ◆ (Inner ring for 2nd gear)
- ◆ Checking for wear ⇒ [Fig. 10](#)
- ◆ Check lugs for scoring

- ◆ Installed position ⇒ [Fig. 12](#)

10 - 2nd gear outer ring

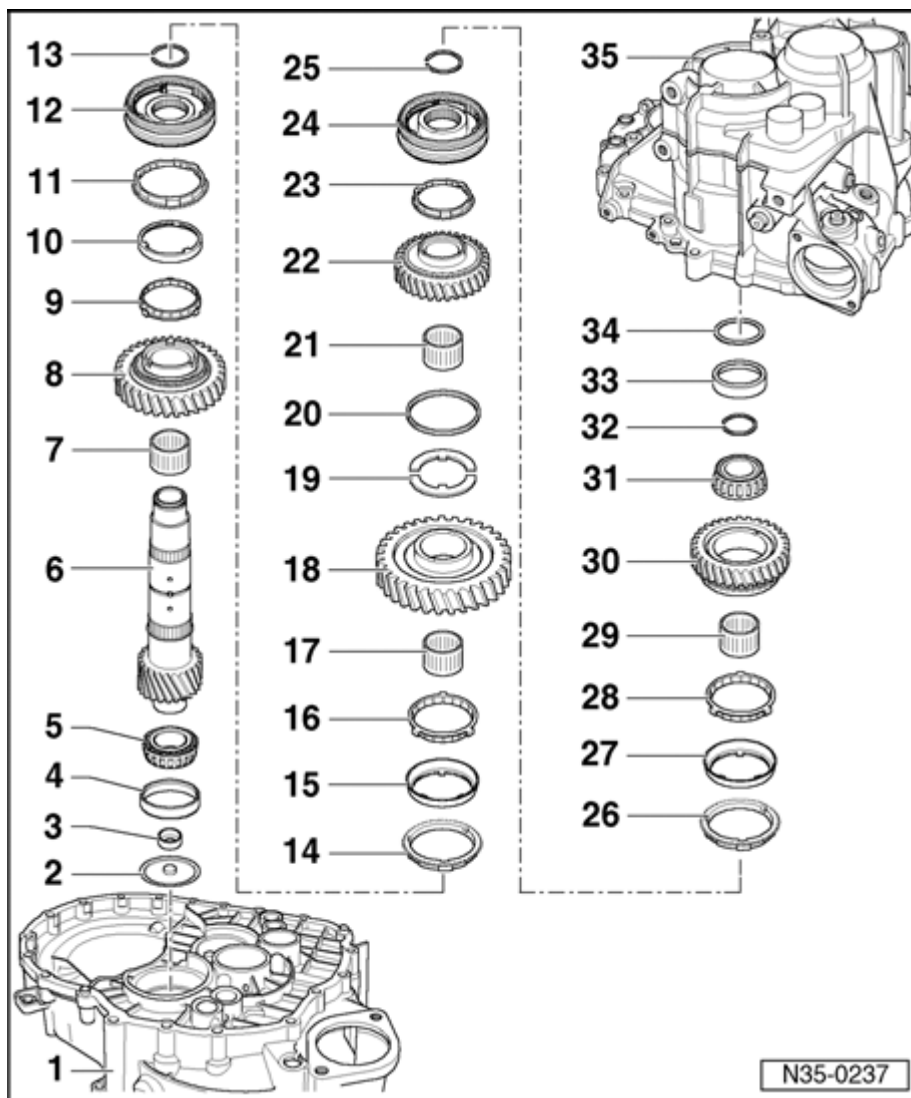
- ◆ Insert in the

synchronizing
(item 9)

- ◆ Replace if scored
- ◆ Installed position ⇒ [Fig. 12](#)

11 2nd gear - synchronizing

- ◆ Checking for wear ⇒ [Fig. 11](#)
- ◆ Installed position ⇒ [Fig. 12](#)



12 - 1st and 2nd gear locking collar with synchro-hub

- ◆ Pull off over bearing support after removing securing clip (item 13) ⇒ [Fig. 7](#)
- ◆ Disassembling ⇒ [Fig. 13](#)
- ◆ Assembling locking collar/synchro hub ⇒ [Fig. 13](#) and ⇒ [Fig. 14](#)
 - ◆ Installed position ⇒ [Fig. 15](#)
 - ◆ Pressing on ⇒ [Fig. 16](#)

13 - Securing clip

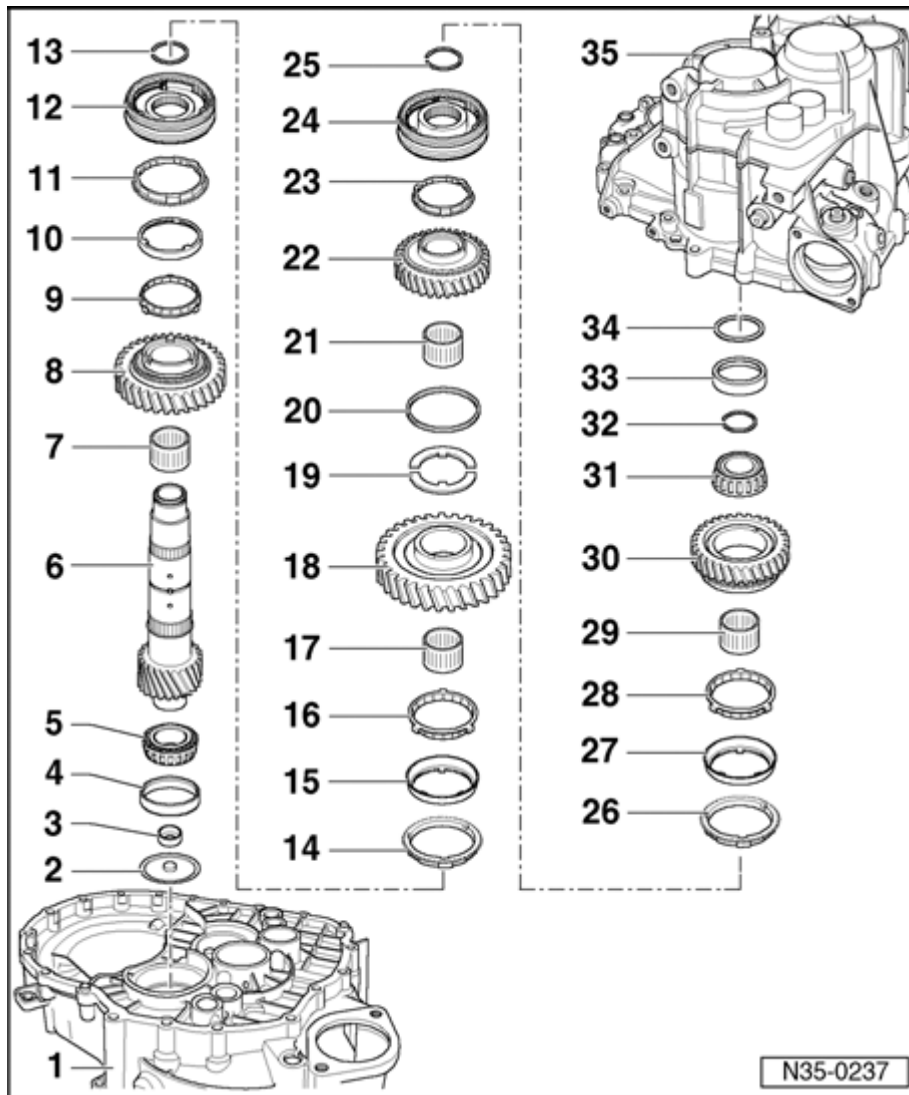
14 - 1st gear synchro-ring

- ◆ Checking for wear ⇒ [Fig. 11](#)
- ◆ Assemble so that recesses locate in locking collar

(item 12)
locking
pieces

**15 - 1st gear
outer ring**

- ◆ Insert in synchro-ring (item 14), installed position ⇒ [Fig. 17](#)
- ◆ Replace if scored



16 Synchro-ring

- ◆ (1st gear inner ring)
- ◆ Checking for wear ⇒ [Fig. 10](#)
- ◆ Check lugs for scoring
- ◆ Installed position ⇒ [Fig. 18](#)

17 - Needle roller bearing

- ◆ For 1st gear

18 - 1st selector gear

- ◆ Installed position ⇒ [Fig. 19](#)

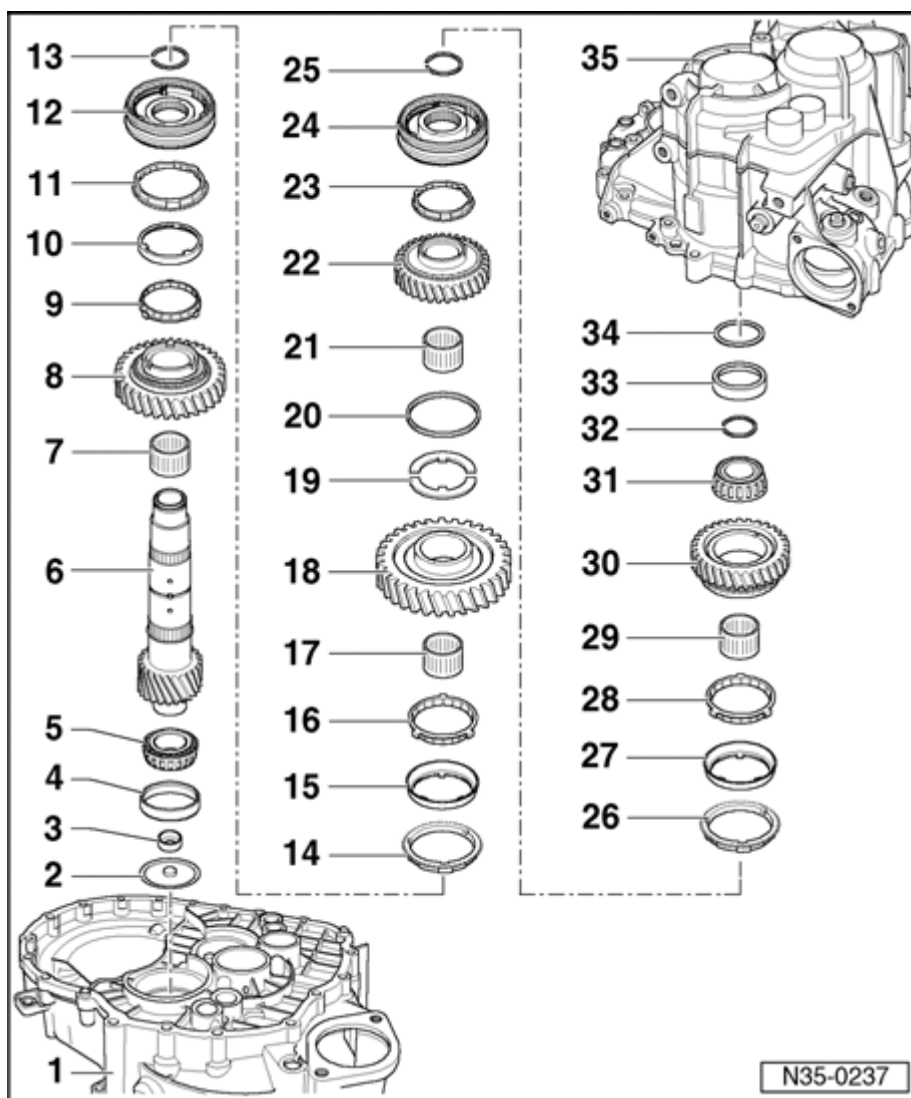
19 - Thrust washer

- ◆ For 1st and 4th gear
- ◆ Insert lugs on thrust washer

in
holes
on
output
shaft

20 - Shim

- ◆ Holds thrust washer (item 19) in position on output shaft



21 - Needle roller bearing

- ◆ For 4th gear

22 - Selector gear for 4th gear

23 - 4th gear synchro-ring

- ◆ Checking for wear
⇒ [Fig. 22](#)

24 - Locking collar with 3rd and 4th gear synchro-hub

- ◆ Pull off by pulling off 4th gear wheel after removing the circlip (item 25)
⇒ [Fig. 6](#)

- ◆ Disassembling
⇒ [Fig. 13](#)

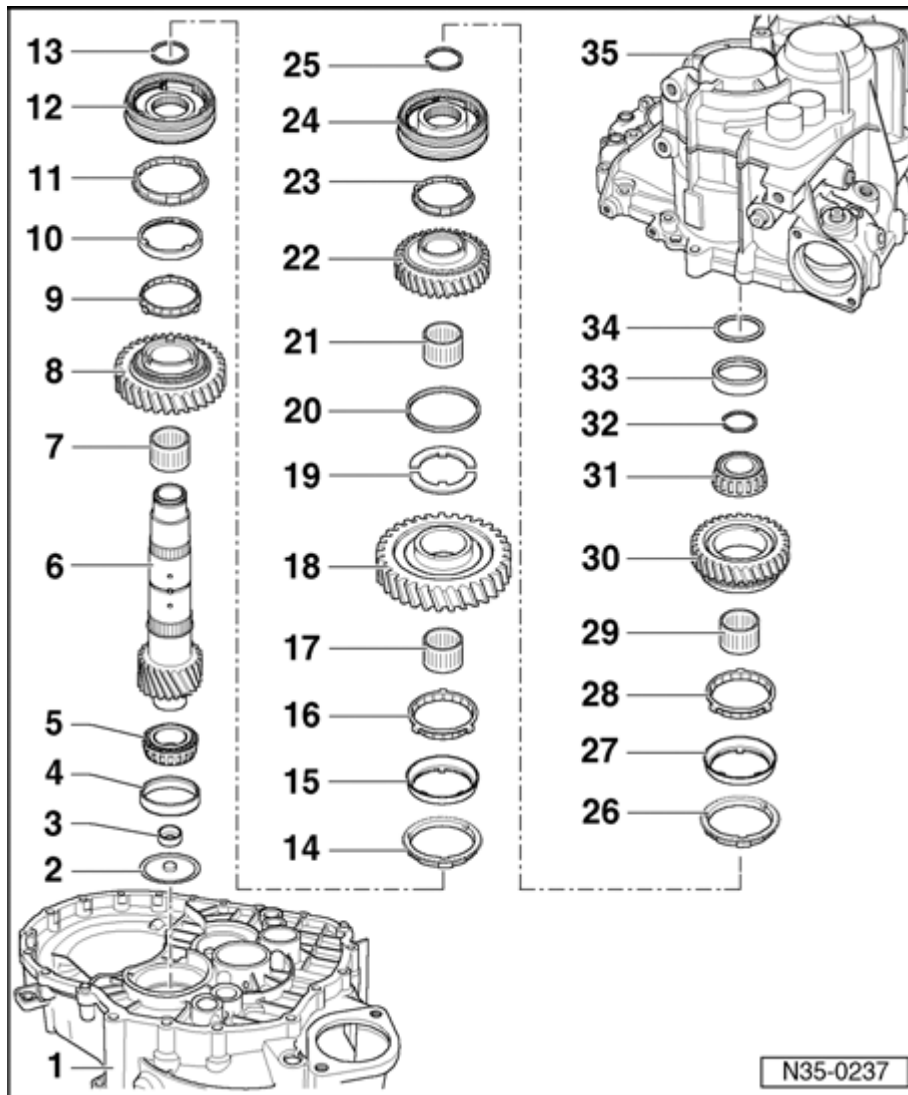
- ◆ Installed position locking collar/synchro-hub ⇒ [Fig. 20](#)

- ◆ Assembling locking collar/synchro hub ⇒ [Fig. 13](#) and ⇒ [Fig. 14](#)

- ◆ Pressing

on ⇒ [Fig.](#)
[21](#)

**25 - Securing
clip**



26 3rd gear - synchro-ring

- ◆ Checking for wear ⇒ [Fig. 11](#)

27 - Outer ring for 3rd gear

- ◆ Insert in synchro-ring (item 26), installed position ⇒ [Fig. 17](#)

- ◆ Replace if scored

28 Synchro-ring

- ◆ (3rd gear inner ring)
- ◆ Checking for wear ⇒ [Fig. 10](#)
- ◆ Check lugs for scoring

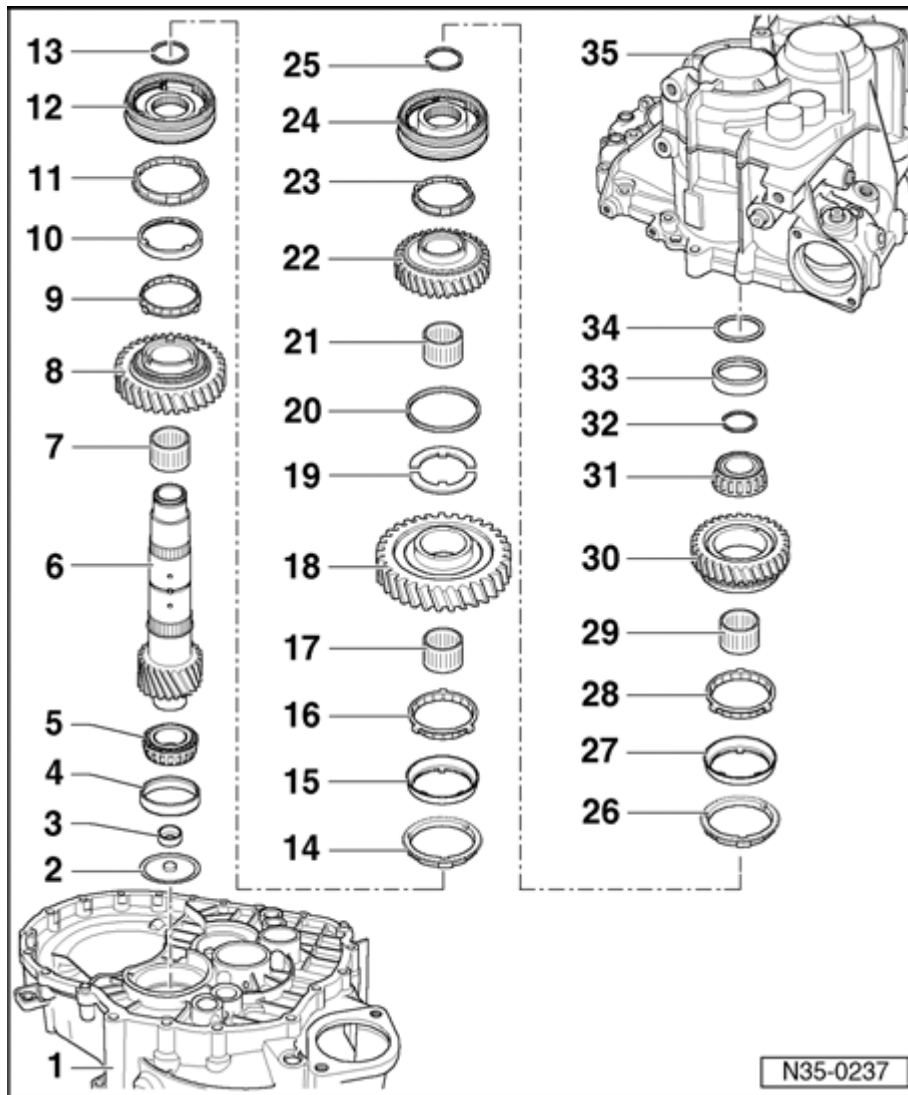
- ◆ Installation position ⇒ [Fig. 18](#)

29 - Needle roller bearing

◆ For
3rd
gear

**30 - Selector
gear for
3rd gear**

◆ Installed
position
⇒ [Fig.
19](#)



31 - Tapered roller bearing inner race

- ◆ Pulling off ⇒ [Fig. 5](#)
- ◆ Pressing on ⇒ [Fig. 23](#)

32 - Securing clip

- ◆ Redetermine thickness if tapered roller bearing (item 31) or output shaft (item 6) are replaced ⇒ [Fig. 24](#)

33 Outer race/tapered roller bearing

- ◆ Pulling out ⇒ [Fig. 25](#)
- ◆ Pressing in ⇒ [Fig. 26](#)

34 - Shim

- ◆ Determining thickness ⇒ [Page 35-46](#)

35 Transmission - housing

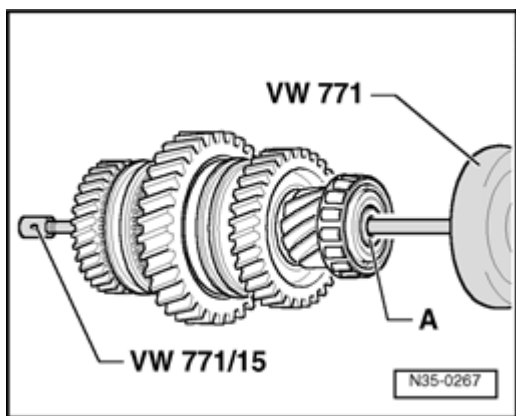


Fig. 1 Pulling dished washer - A- out of output shaft

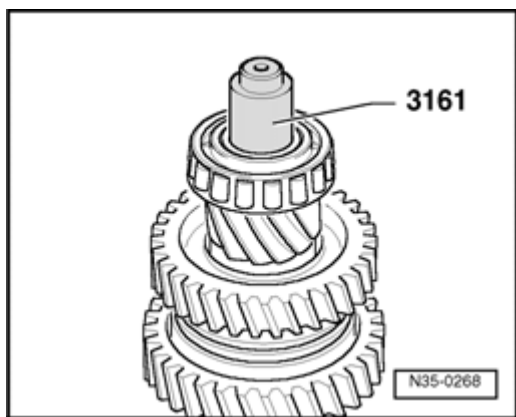


Fig. 2 Pressing dished washer -A- into output shaft onto stop

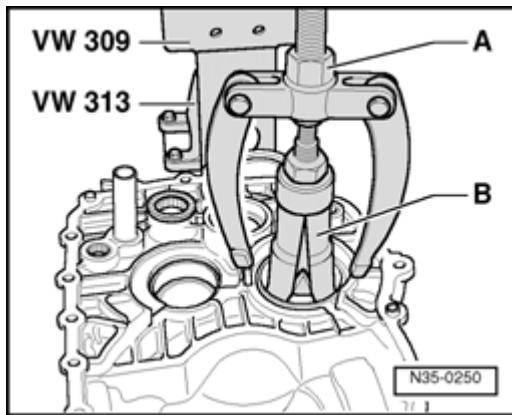


Fig. 3 Pulling tapered roller bearing outer race out of transmission housing

A - Counter support, e.g. Kukko 22/2

A - Internal puller 56 to 70 mm, e.g. Kukko 21/8

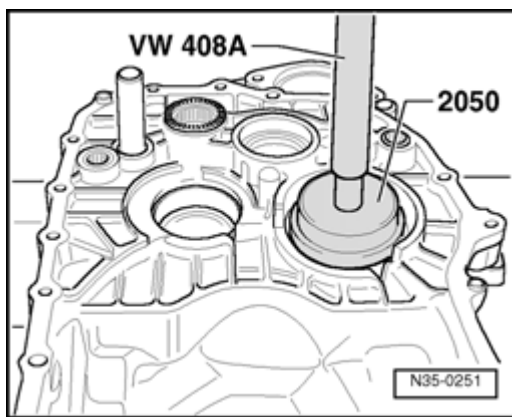


Fig. 4 Pressing tapered roller bearing outer race into transmission housing

- Support transmission housing with press tool 40-20 directly below bearing mounting.

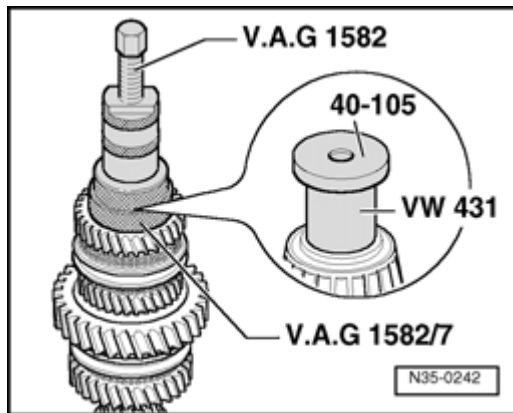


Fig. 5 Pulling off tapered roller bearing inner race

- Remove securing clip.
- Before mounting puller, position press piece VW 431 in output shaft and set thrust plate 40-105 on it.

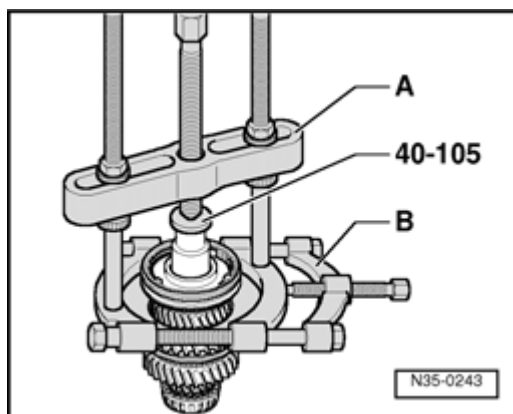


Fig. 6 Pulling off 3rd and 4th gear synchro-hub/locking collar over 4th gear wheel

- Remove securing clip.

A - Puller, e.g. Kukko 18/2

B - Separating device 22 to 115 mm, e.g. Kukko 17/2

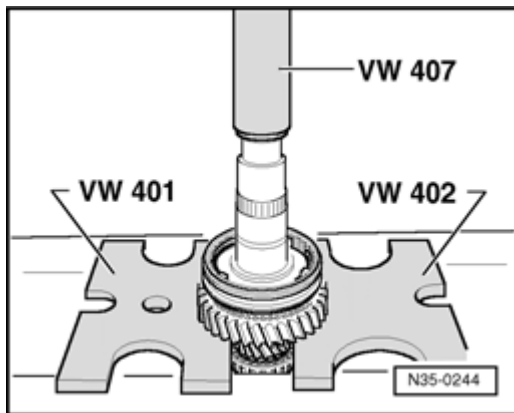


Fig. 7 Pressing off 1st and 2nd gear locking collar and synchro-hub

- After removing securing ring press 2nd selector gear and locking collar/synchro-hub off together.

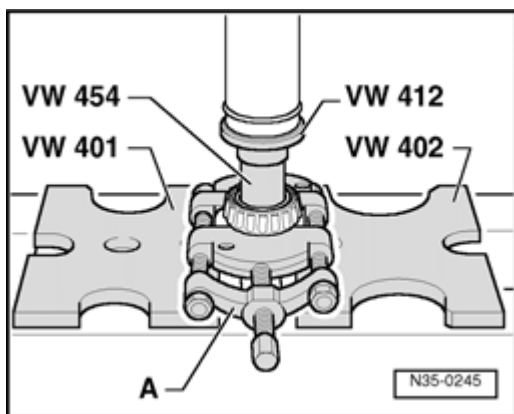


Fig. 8 Pulling off tapered roller bearing inner race

- A - Separating device 22 to 115 mm, e.g. Kukko 17/2

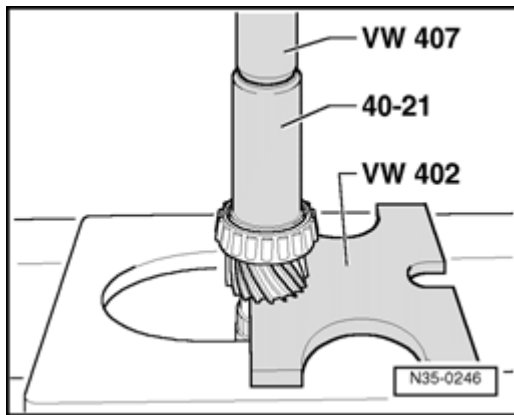


Fig. 9 Pressing on tapered roller bearing inner race

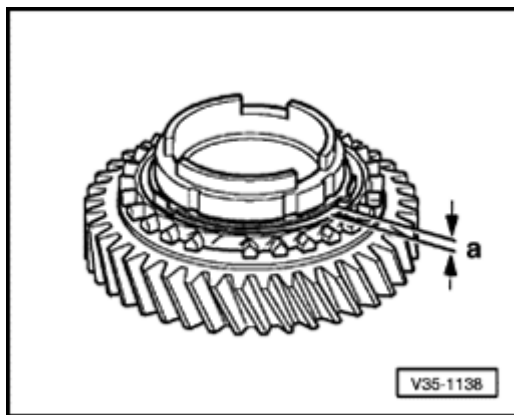


Fig. 10 Checking 1st, 2nd and 3rd gear inner ring for wear

- Press inner ring onto gear wheel cone and measure gap "a" with a feeler gauge.

Gap "a"	New dimension	Wear limit
1st, 2nd and 3rd gear	0.75 ... 1.25 mm	0.3 mm

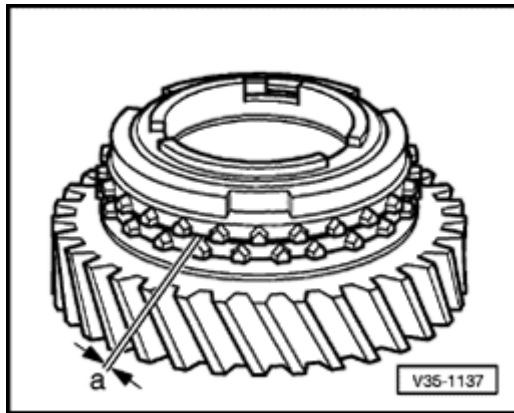


Fig. 11 Checking 1st, 2nd and 3rd gear synchro-rings for wear

- Press synchro-ring, outer-ring and inner-ring onto selector gear cone and measure gap "a" with feeler gauge.

Gap "a"	New dimension	Wear limit
1st, 2nd and 3rd gear	1.2 ... 1.8 mm	0.5 mm

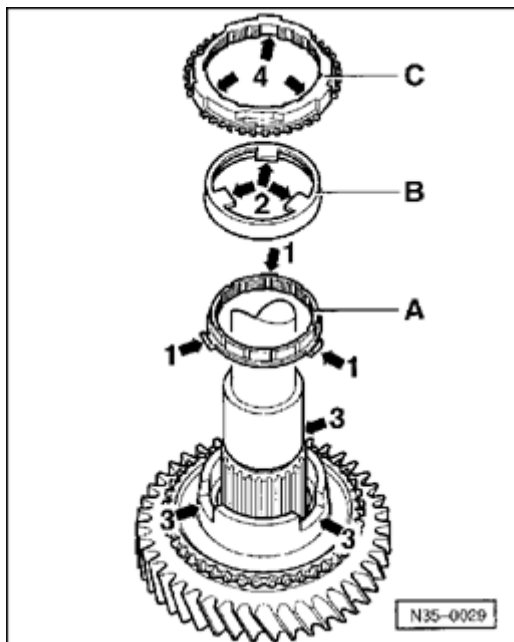


Fig. 12 Installation position of outer ring, inner ring and 2nd gear synchro ring

- Place inner ring -A- on 2nd gear wheel.

Angled lugs (arrow -1-) point toward outer ring -B-.

- Install outer ring -B-.

Lugs (arrow -2-) engage in gear wheel recesses (arrow -3-).

- Install synchro-ring -C-.

Recesses (arrow -4-) engage in lugs (arrow -1-) of inner ring -A-.

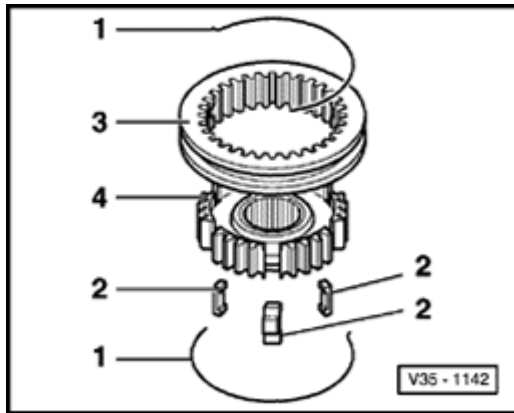


Fig. 13 Disassembling and assembling 1st and 2nd as well as 3rd and 4th gear locking collar and synchro-hub

1 - Spring

2 - Locking piece

3 - Locking collar

4 - Synchro-hub

- Slide locking collar over synchro-hub.

Recesses for locking pieces in synchro-hub and locking collar must align.

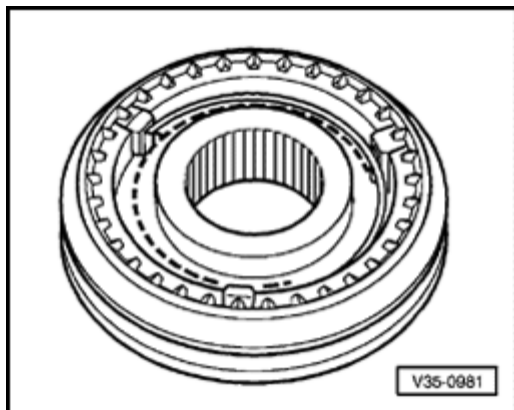


Fig. 14 Assembling 1st and 2nd as well as 3rd and 4th gear locking collar/synchro-hub

The locking collar has been pushed over the synchro-hub.

- Insert locking pieces and install springs 120° offset. Angled end of spring must locate in hollow locking piece.

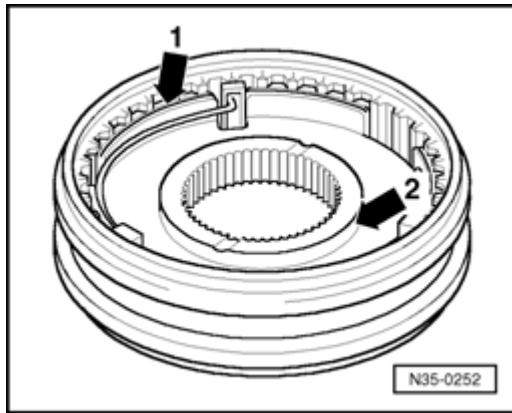


Fig. 15 Installation position of 1st and 2nd gear locking collar/synchro-hub

Identification groove (arrow -1-) and narrow collar (arrow -2-) of synchro-hub point toward 1st gear.

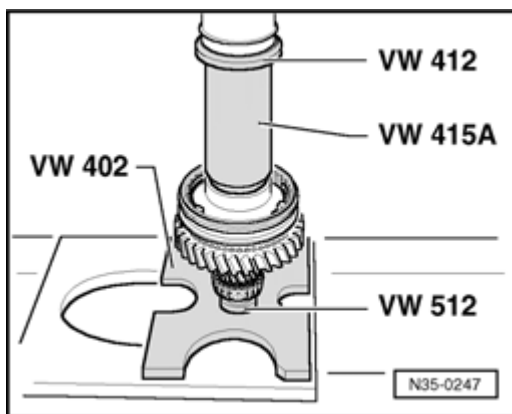


Fig. 16 Pressing on 1st and 2nd gear locking collar/synchro-hub

- Install securing clip.

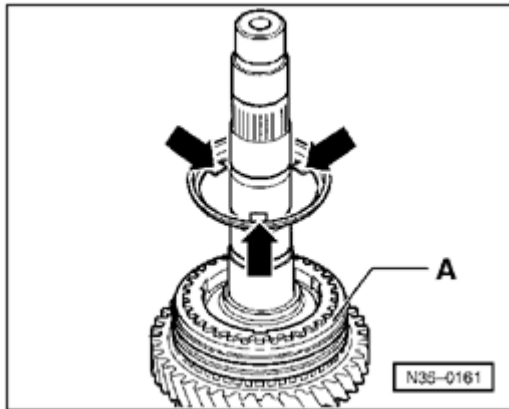


Fig. 17 Installation position for 1st or 3rd gear outer ring

Lugs (arrows) face toward synchrohub/locking collar -A-

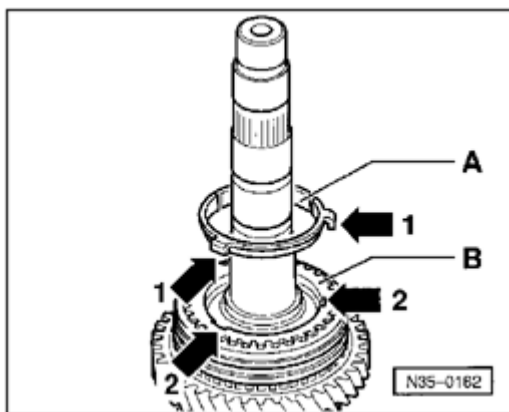


Fig. 18 Installation position synchro-ring (inner ring for 1st or 3rd gear) -A-

The lugs (arrows -1-) engage in the recesses (arrow -2-) in the synchro-ring -B-.

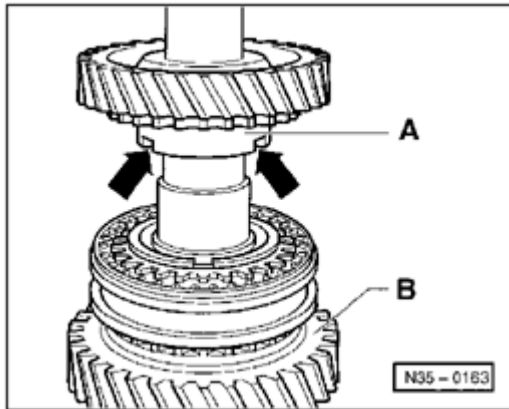


Fig. 19 Installation position 1st and 3rd gear wheel

The higher shoulder -A- faces toward 2nd or 4th gear -B-. The recesses in the shoulder (arrows) engage in the lugs of the outer ring (arrow ⇒ [Fig. 17](#))

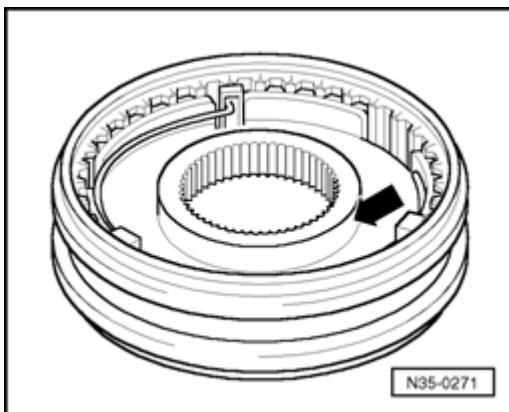


Fig. 20 Installation position 3rd and 4th gear locking collar/synchro-hub

The wider shoulder of the synchro-hub (arrow) faces 3rd gear.

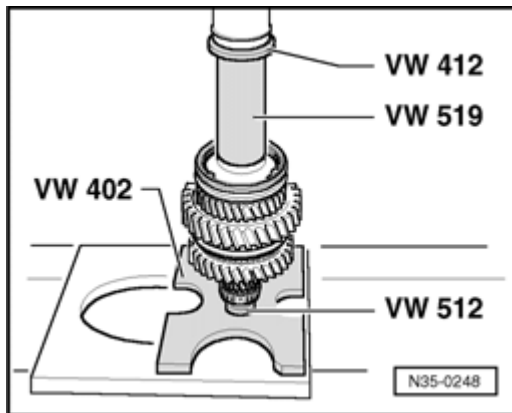


Fig. 21 Pressing on 3rd and 4th gear synchro-hub with locking collar

- Install securing clip.

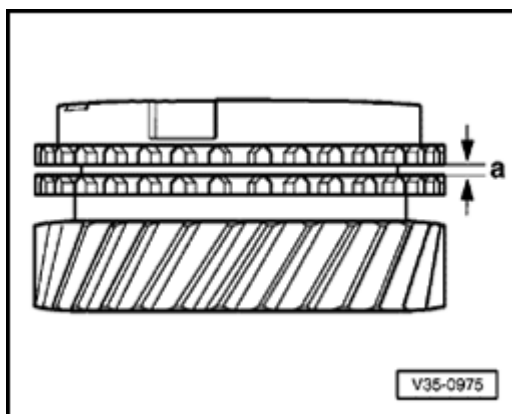


Fig. 22 Checking 4th gear synchro-ring for wear

- Press synchro-ring onto gear cone and measure gap "a" with feeler gauge.

Gap "a"	New dimension	Wear limit
4th gear	1.0 ... 1.7 mm	0.5 mm

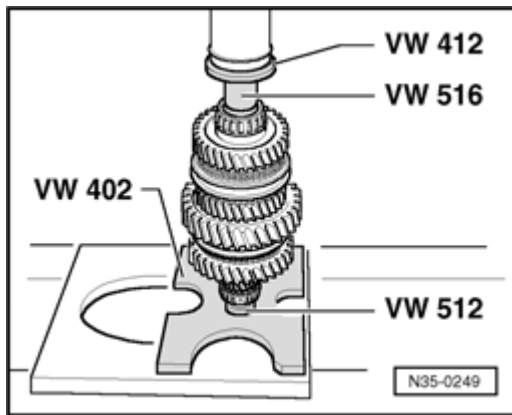


Fig. 23 Pressing on tapered roller bearing inner race

- Determine securing clip ⇒ [Fig. 24](#) and install it.

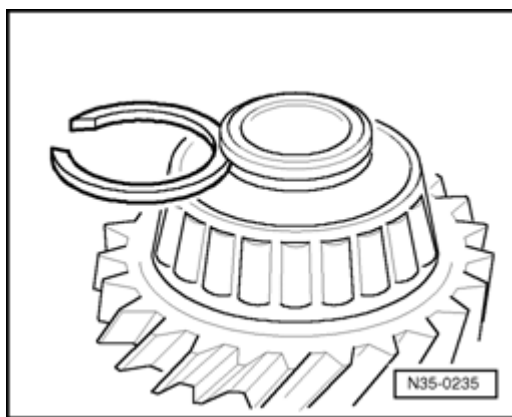


Fig. 24 Determining thickness of circlip

- Determine thickest circlip which will still fit and install it.

The following securing clips are available:

Thickness (mm)	Part No.
1.79	02M 311 187 G
1.83	02M 311 187 F
1.86	02M 311 187 E
1.89	02M 311 187 D
1.92	02M 311 187 C
1.95	02M 311 187 B
1.98	02M 311 187 A

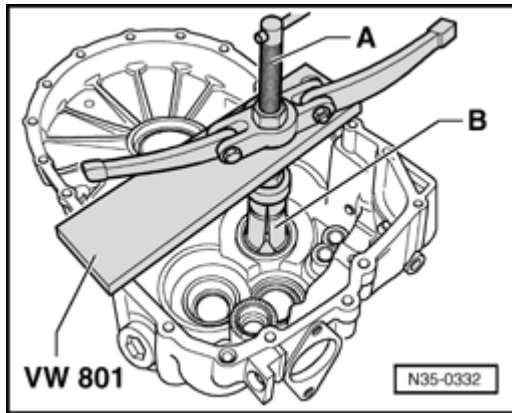


Fig. 25 Pulling tapered roller bearing outer race out from transmission housing

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

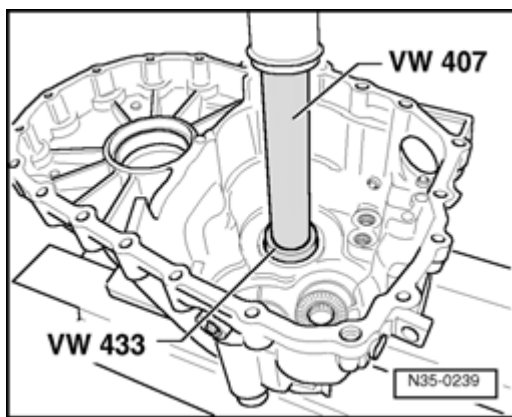
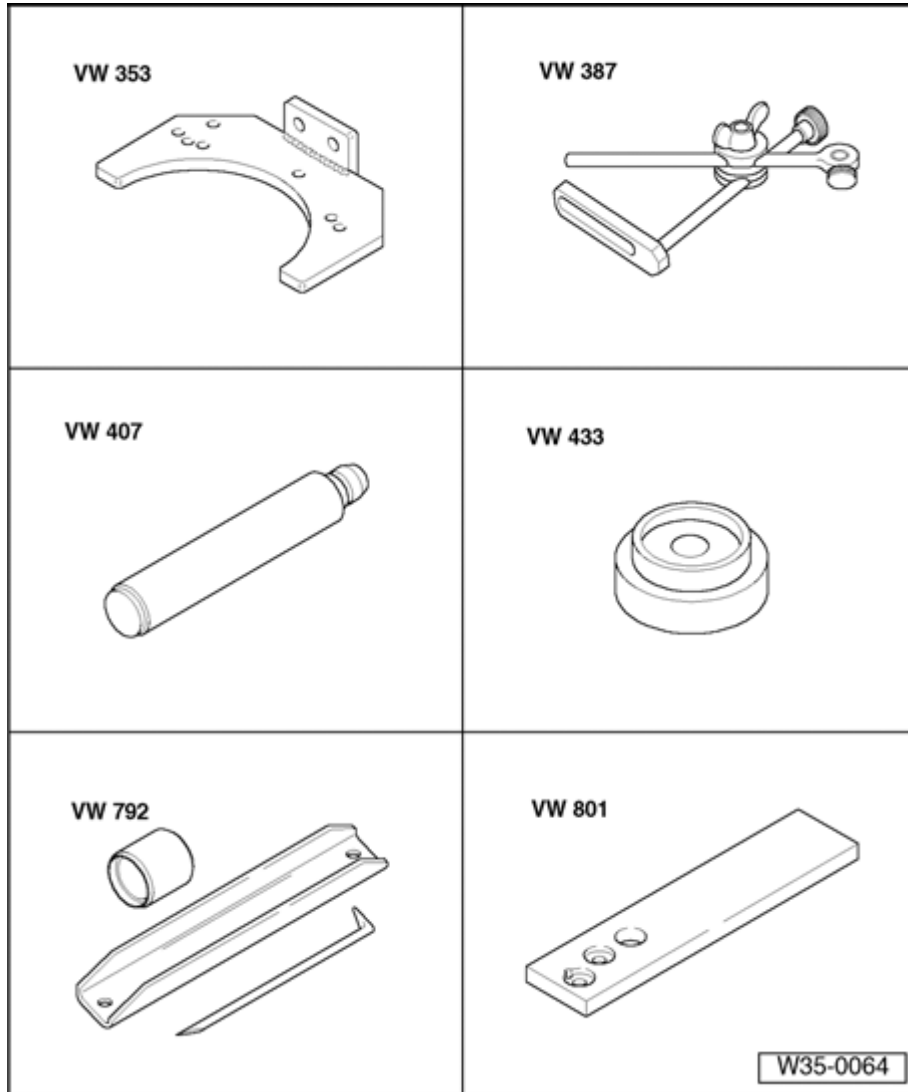


Fig. 26 Pressing tapered roller bearing outer race into transmission housing

- Install shim under outer race.
- Support transmission housing with press piece 2050 directly below bearing support.

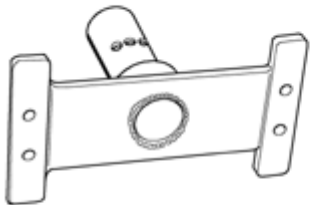


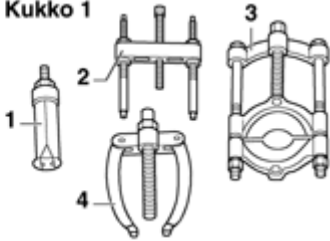


Output shaft for 1st-4th gears, adjusting

(Determining shim for output shaft)

Special tools and equipment

- ◆ VW 353 Transmission support
- ◆ VW 387 Universal dial gauge bracket
- ◆ VW 407 Press tool
- ◆ VW 433 Press piece
- ◆ VW 792 Installation tool
- ◆ VW 801 Holding plate

<p>VW 309</p> 	<p>2050</p> 
<p>V.A.G 1331</p> 	<p>Kukko 1</p> 
	<p style="text-align: right; border: 1px solid black; padding: 2px;">W35-0074</p>

Special tools and equipment

- ◆ VW 309 Holding plate
- ◆ 2050 Press tool
- ◆ VAG 1331 Torque wrench
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 4 - Kukko 22/2 Counter support

It is necessary to readjust the output shaft v
the following components are replaced:

- ◆ Transmission housing
- ◆ Clutch housing
- ◆ Output shaft for 1st-4th gear

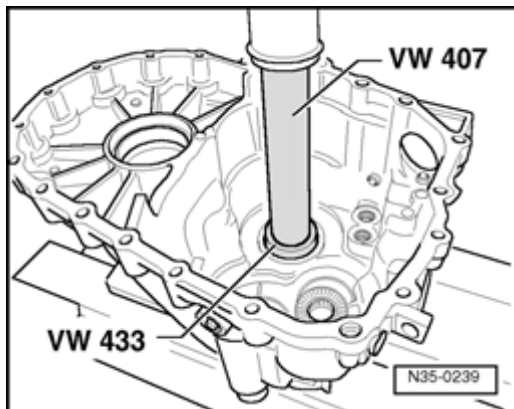
or

- ◆ Tapered roller bearing

Adjustment overview ⇒ [Page 39-23](#)

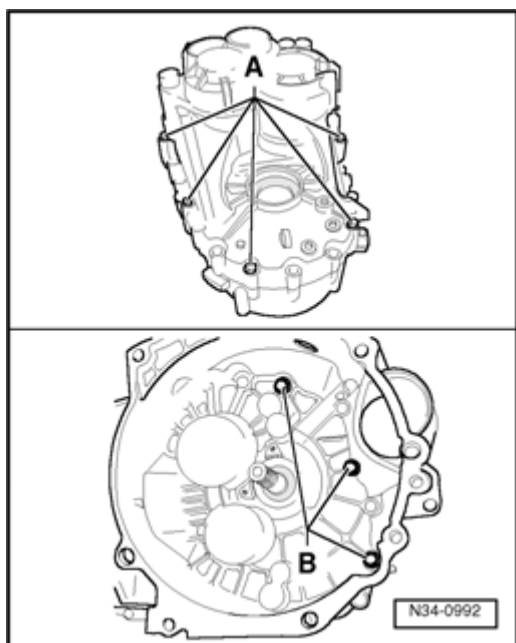
Requirements

- ◆ Sealing surfaces of clutch and transmiss housings must be free of sealant.
- ◆ When taking measurements, install only shaft to be measured.

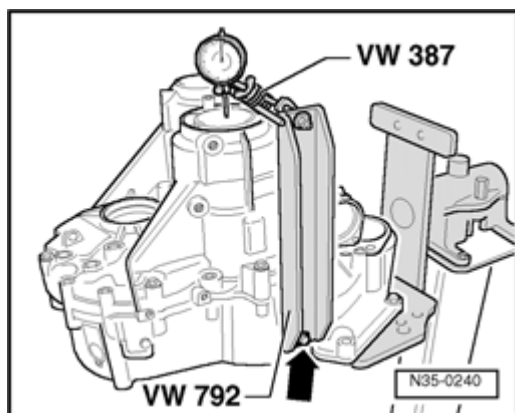


- Press tapered roller bearing outer race w 1.70 mm thick shim into transmission hou supporting transmission housing directly bearing support with thrust piece 2050.
- Set complete 1st-4th gear output shaft in housing.

35-49



- ✦ - Install transmission housing and tighten bolts -A- and -B- diagonally to correct torque.



- ✦ - Install measuring tools and secure with bolt (arrow) to clutch housing.
- Set dial gauge (3 mm measuring range) to zero with 1 mm preload.
- Loosen clutch housing/transmission housing securing bolts diagonally until output shaft is free to move in transmission housing.

- Read play on gauge and note reading (example: 0.14 mm)

Note:

If the dial gauge indicates no value when the clutch housing/transmission housing securing bolts are loosened, install shim 1.95 mm (Part No. 084 409 383 AS) or, if necessary, shim 2.20 mm (Part No. 084 409 383 BD).

Determining thickness of shim

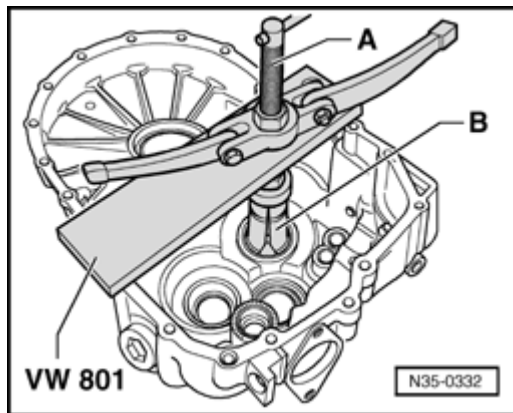
The specified bearing pretension will be attained by subtracting the measured value (0.14 mm) from the inserted shim (1.70 mm) and adding a constant for pressing (0.20 mm).

Example:

Inserted shim	1.70 mm
- Measured value	0.14 mm
+ Preloading (constant)	0.20 mm
Shim thickness	1.76 mm

- Determine thickness of shim from table ⇒ [Page 35-52](#) .

35-51



- Remove transmission housing and pull tapered roller bearing outer race out of transmission housing.

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

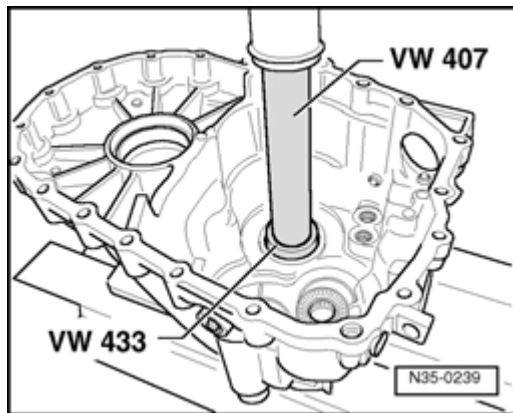
- Remove inserted shim from clutch housing.

Shim table

Size (mm)	Part No.
1.40	084 409 383 AF
1.45	084 409 383 AG
1.50	084 409 383 AH
1.55	084 409 383 AJ
1.60	084 409 383 AK
1.65	084 409 383 AL
1.70	084 409 383 AM
1.75	084 409 383 AN
1.80	084 409 383 AP
1.85	084 409 383 AQ
1.90	084 409 383 AR
1.95	084 409 383 AS
2.00	084 409 383 AT
2.05	084 409 383 BA
2.10	084 409 383 BB
2.15	084 409 383 BC
2.20	084 409 383 BD

Varying tolerances make it possible to obtain the exact shim thickness required.

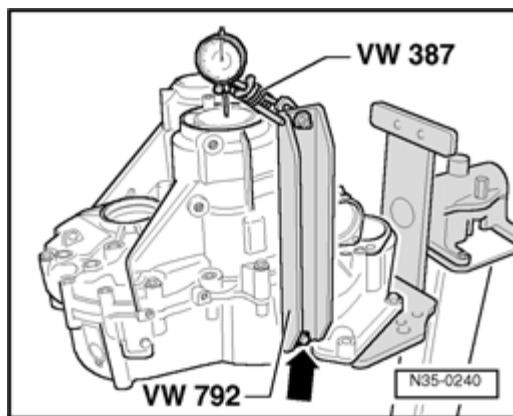
35-53



- Press in tapered roller bearing outer race together with determined shim (in example 1.75 mm) while supporting transmission housing with thrust piece 2050 directly under bearing support.

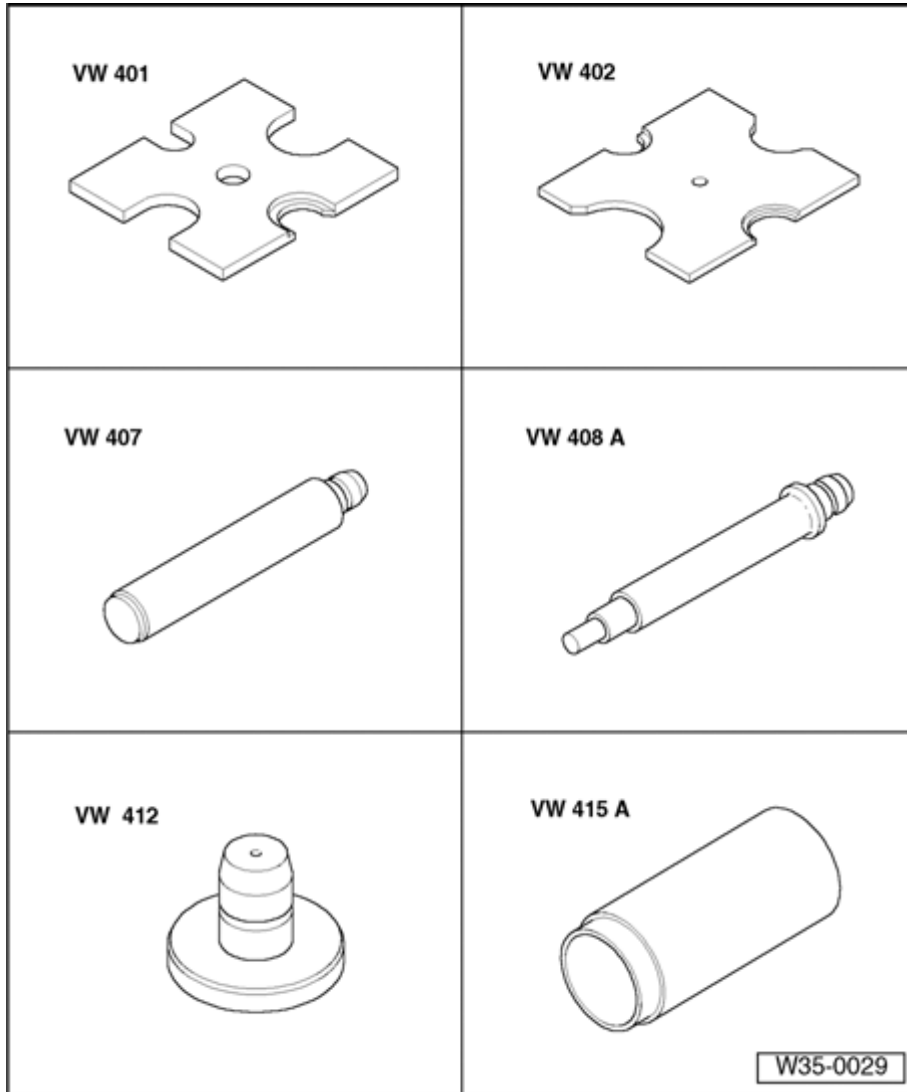
Perform check measurement

- ◆ Determined shim installed.



- Install measuring tools and secure with bolt (arrow) to transmission housing.
- Set dial gauge (3 mm measuring range) to zero with 1 mm preload.
- Loosen clutch housing/transmission housing securing bolts diagonally until output shaft is free to move in transmission housing.

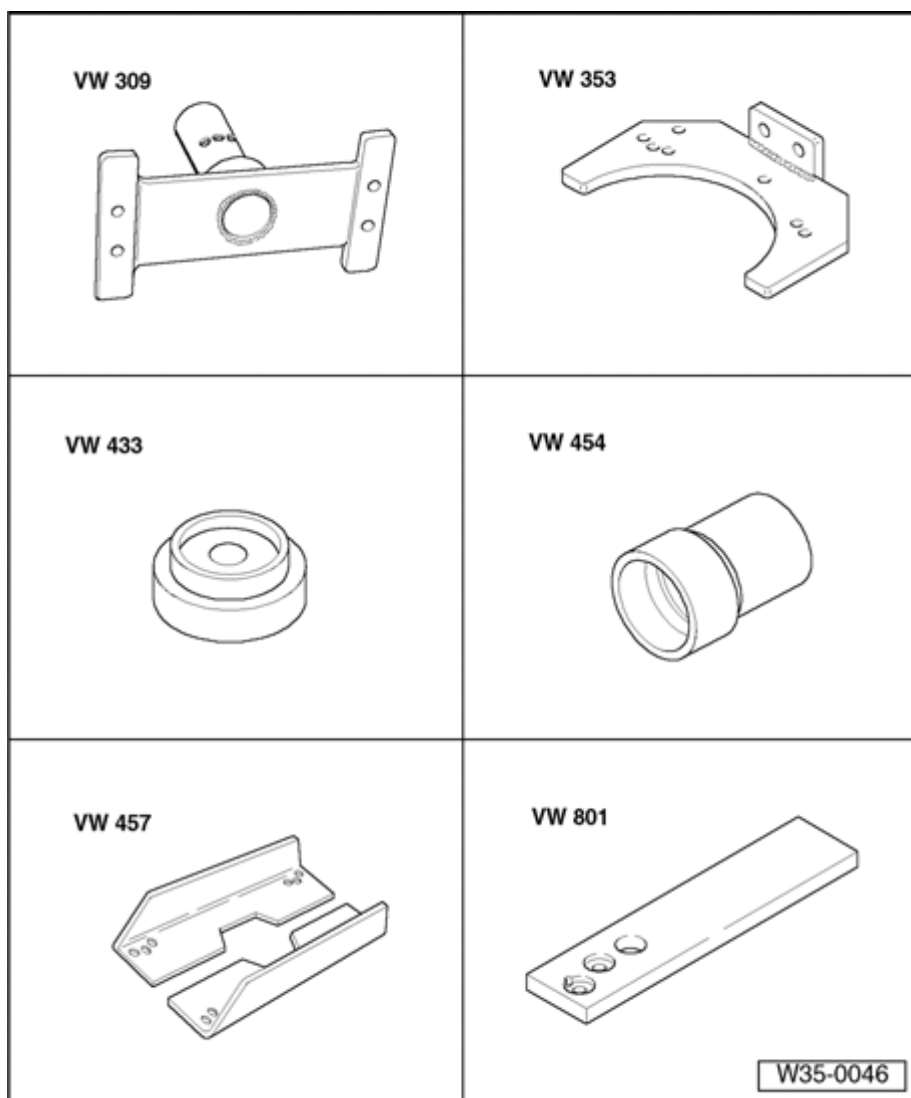
If the correct shim has been selected, the dial gauge will indicate a value of 0.15 mm to 0.25 mm.



Output shaft for 5th, 6th and reverse gear, disassembling and assembling

Special tools and equipment

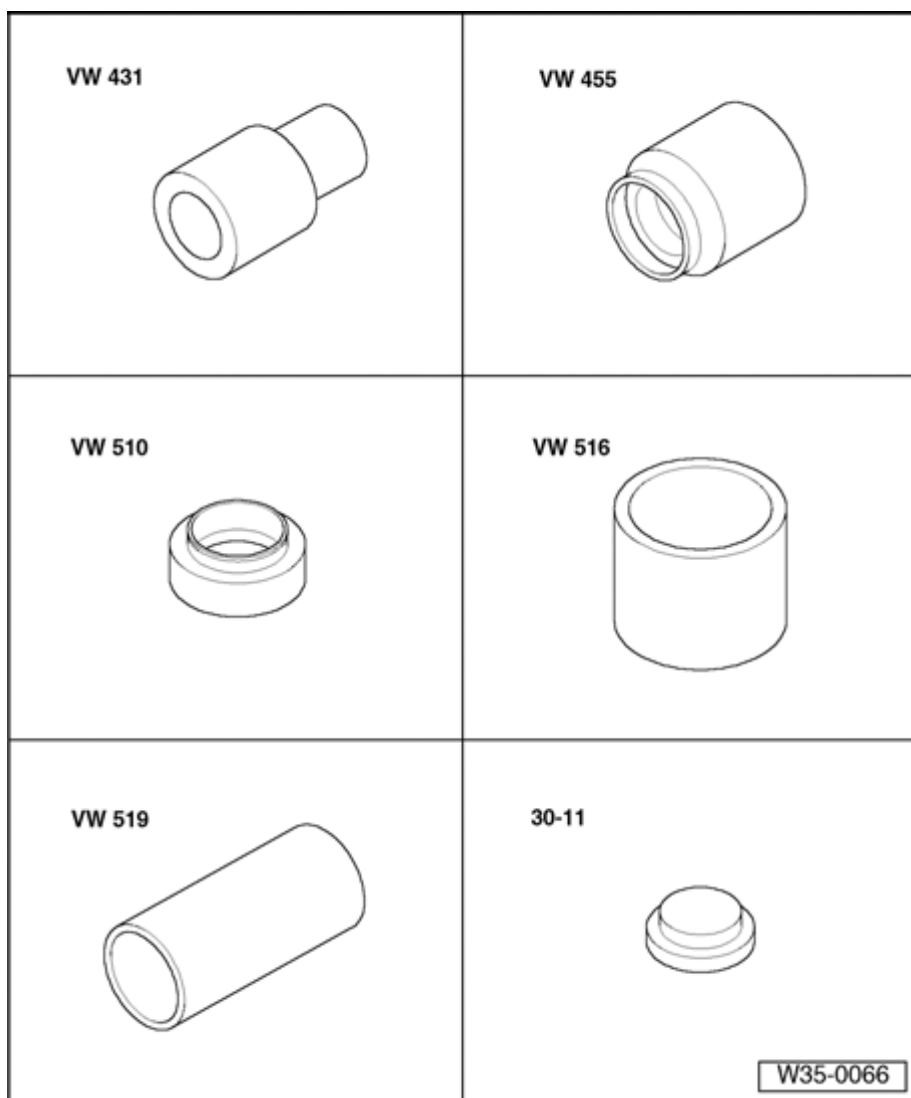
- ◆ VW 401 Thrust plate
- ◆ VW 402 Thrust plate
- ◆ VW 407 Press tool
- ◆ VW 408 A Press tool
- ◆ VW 412 Press tool
- ◆ VW 415 A Tube



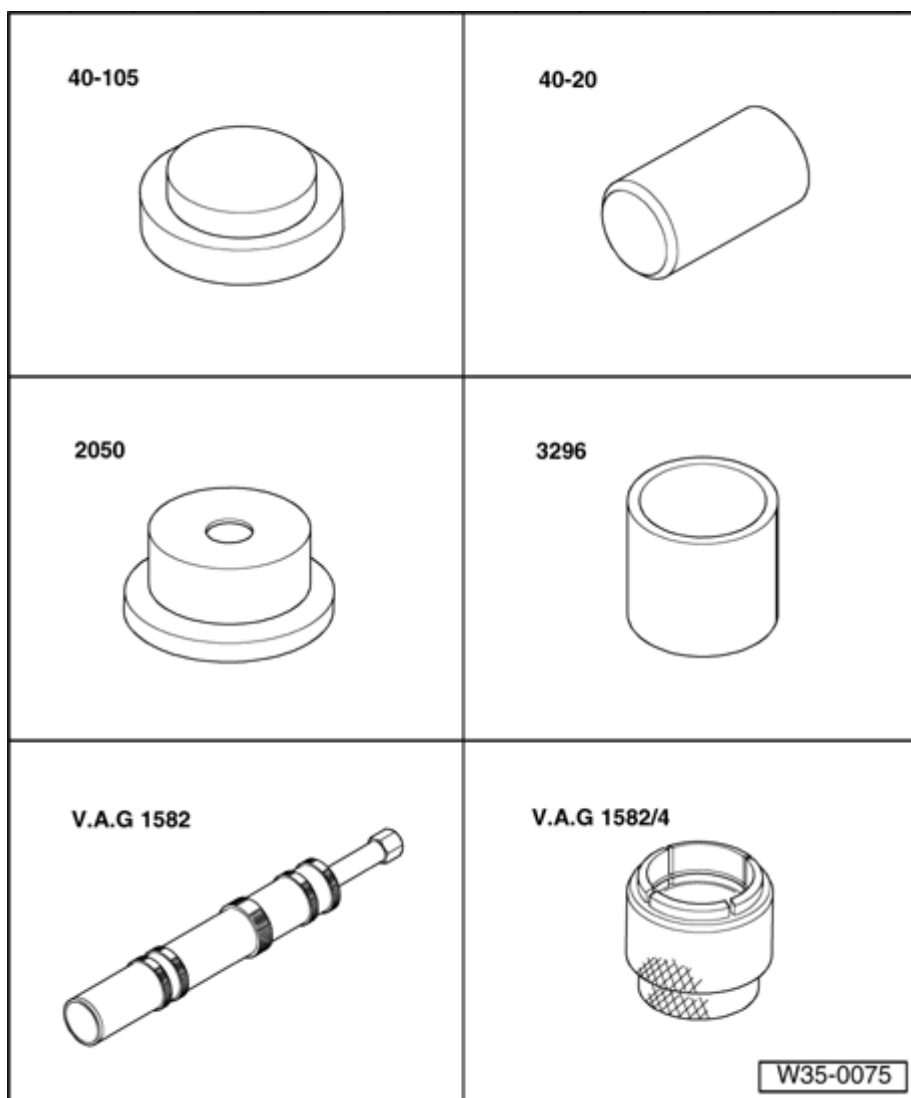
Special tools and equipment

- ◆ VW 309 Holding plate
- ◆ VW 353 Transmission support
- ◆ VW 433 Press piece
- ◆ VW 454 Press piece
- ◆ VW 457 Support rail
- ◆ VW 801 Holding plate

35-56

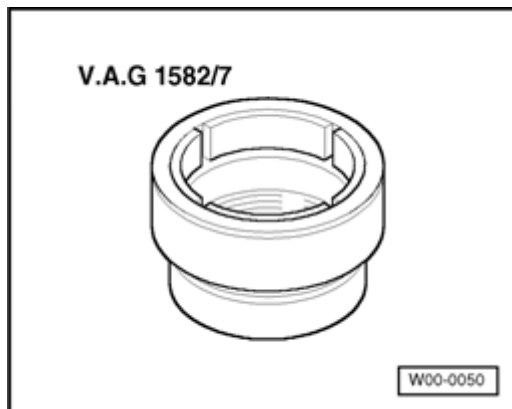
**Special tools and equipment**

- ◆ VW 431 Press piece
- ◆ VW 455 Fitting sleeve
- ◆ VW 510 Press piece
- ◆ VW 516 Tube
- ◆ VW 519 Tube
- ◆ 30-11 Thrust plate

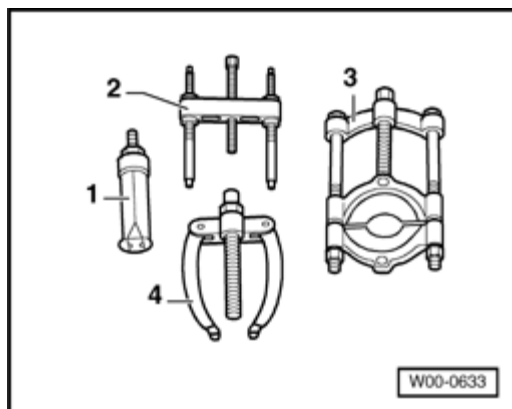


Special tools and equipment

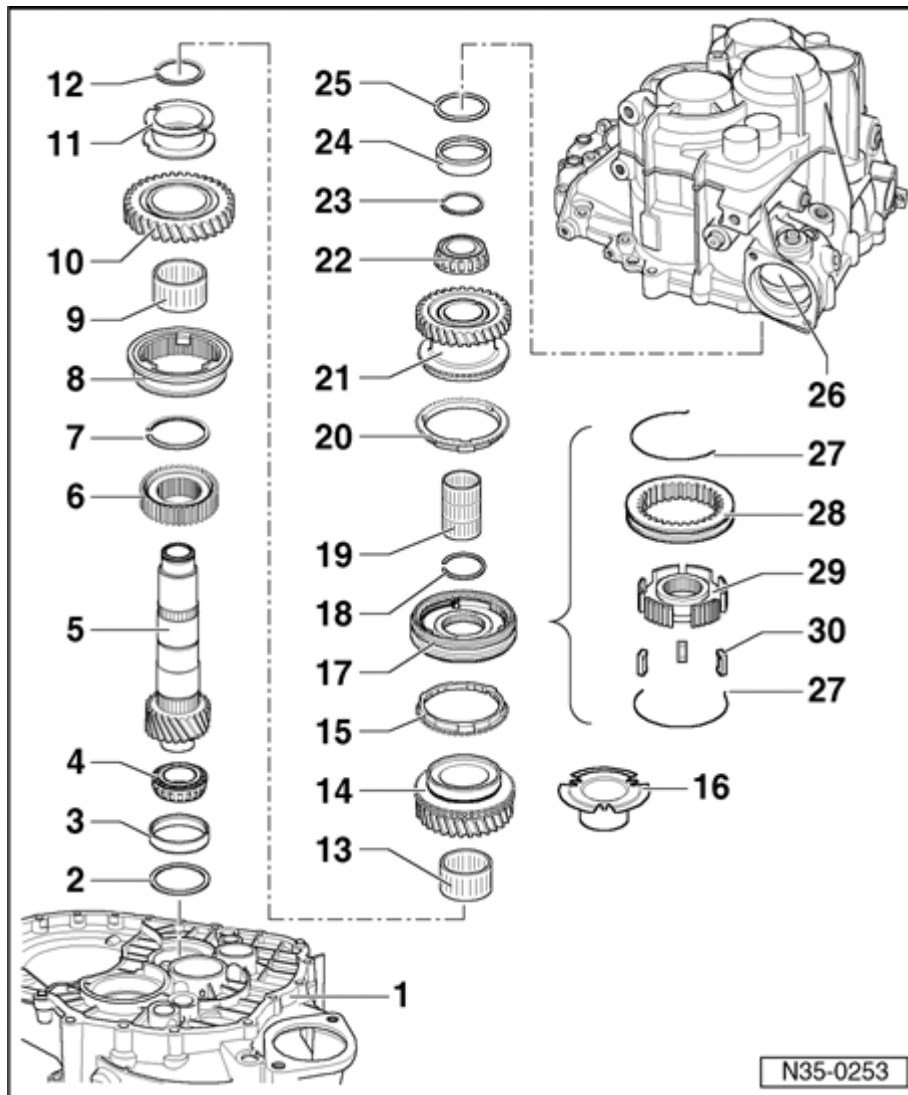
- ◆ 40-105 Thrust plate
- ◆ 40-20 Press tool
- ◆ 2050 Thrust piece
- ◆ 3296 Tube
- ◆ VAG 1582 Tapered roller bearing puller
- ◆ VAG 1582/4 Grip

Special tools and equipment

- ◆ V.A.G 1582/7 Grip



- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 3 - Kukko 17/2 Separating device
- ◆ 4 - Kukko 22/2 Counter support

**Note:**

◆ When installing new gears or a new output shaft consult technical data ⇒ [Page 00-2](#).

◆ If the output shaft or tapered roller bearings have been replaced then perform output shaft adjustment ⇒ [Page 35-76](#).

1 - Clutch housing

2 - Shim

◆ Always 0.65 mm thick

3 Outer race/tapered roller bearing

◆ Pulling out ⇒ [Fig. 1](#)

◆ Pressing in ⇒ [Fig. 2](#)

4 - Tapered roller bearing inner race

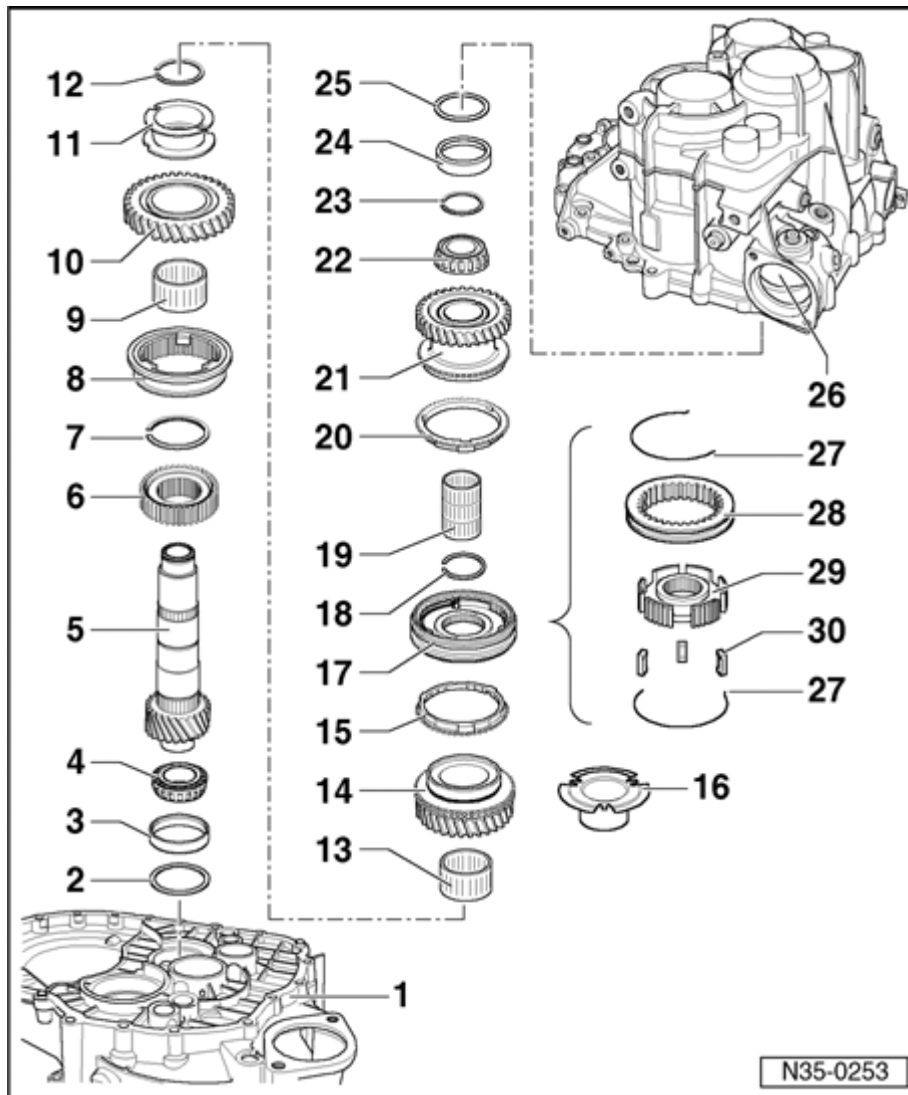
- ◆ Pulling off ⇒ [Fig. 8](#)

- ◆ Pressing on ⇒ [Fig. 20](#)

5 - Output shaft

- ◆ For 5th, 6th and reverse gear

- ◆ Adjusting ⇒ [Page 35-76](#)



6 - Reverse gear synchro-hub

◆ Pressing off ⇒ [Fig. 7](#)

◆ Installed position ⇒ [Fig. 9](#)

◆ Pressing on ⇒ [Fig. 10](#)

7 - Securing clip

8 - Reverse gear locking collar

◆ Securing clip

9 - Needle roller bearing

◆ For reverse gear

10 - Reverse sliding gear

11 - Sleeve

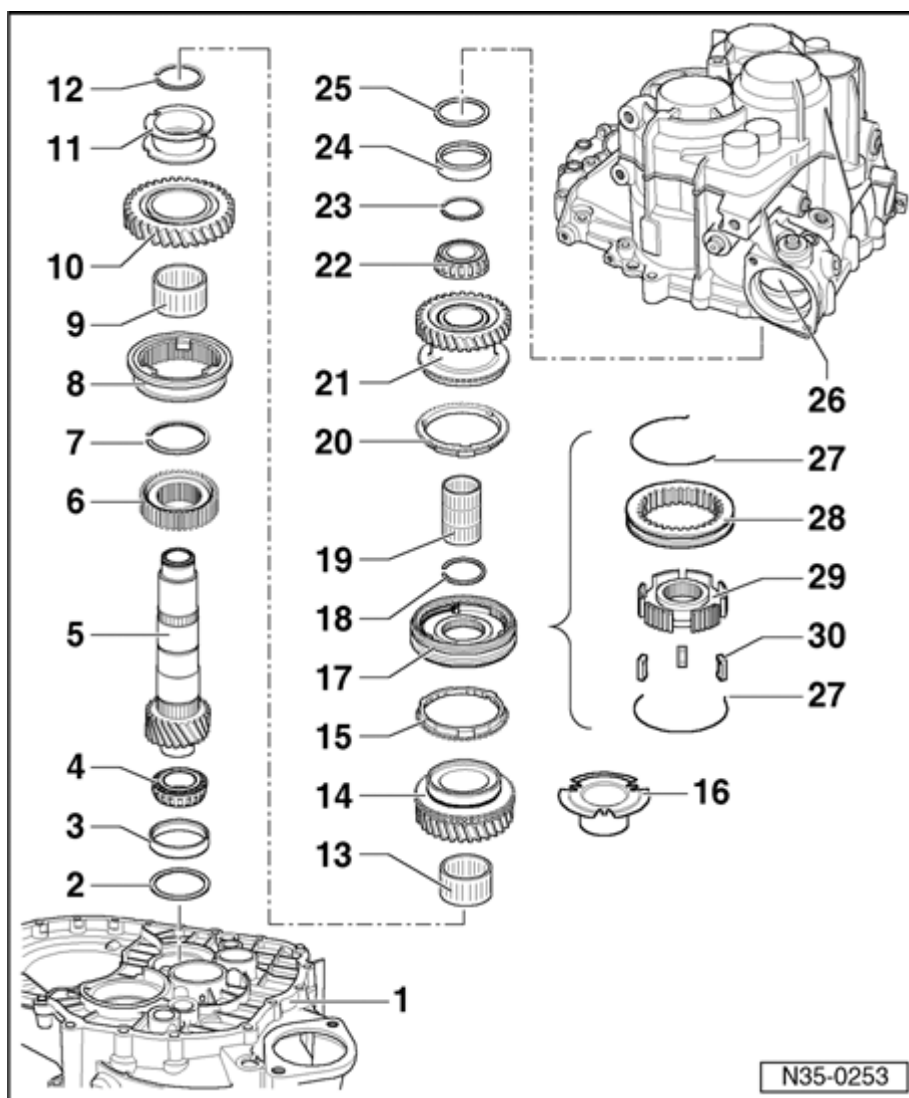
◆ Press off with reverse gear ⇒ [Fig. 6](#)

◆ Installed position: wide shoulder of sleeve

faces
reverse
gear

◆ Pressing
on ⇒
[Fig. 11](#)

**12 Securing
- clip**



13 - Needle roller bearing

- ◆ For 6th gear
- ◆ Not in 5-speed manual transmissions

14 - 6th gear

- ◆ Not in 5-speed manual transmissions

15 - 6th gear synchro-ring

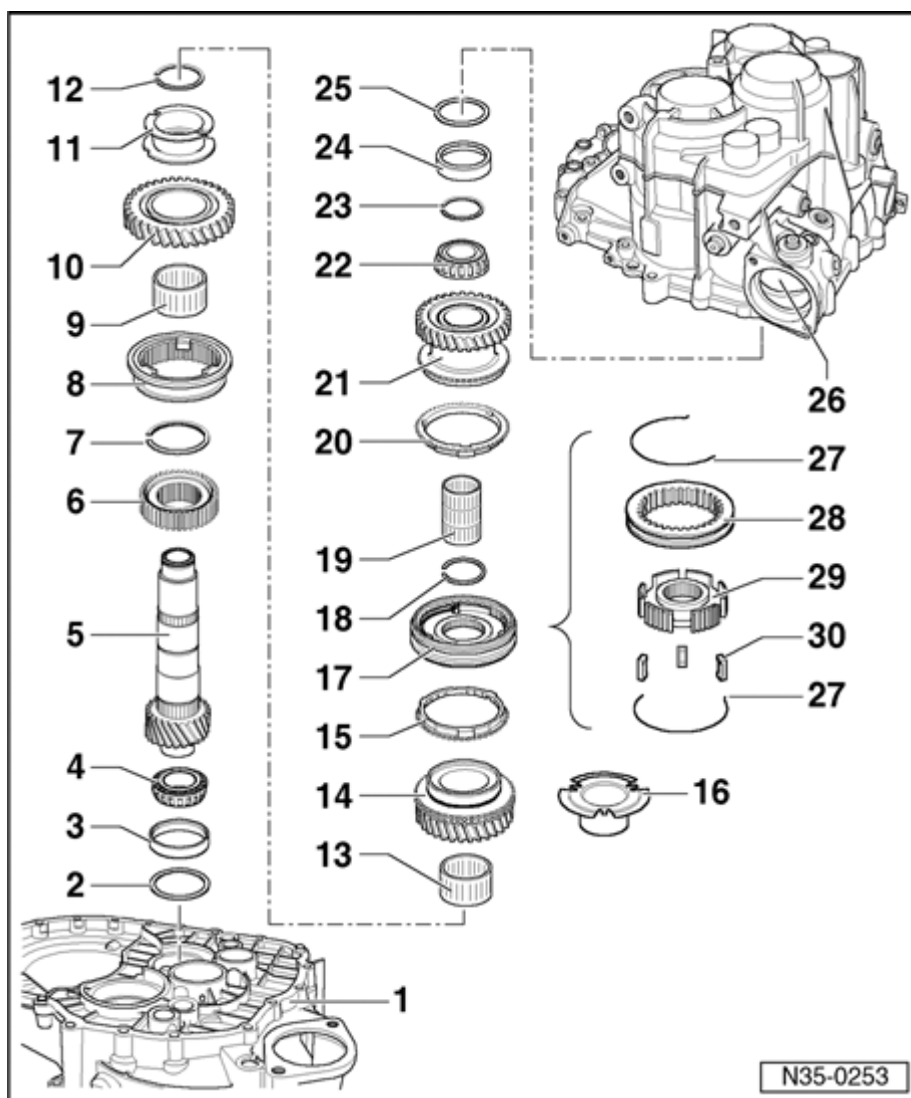
- ◆ Not in 5-speed manual transmissions
- ◆ Checking for wear ⇒ [Fig. 12](#)

16 - Spacer sleeve

- ◆ For 5-speed manual transmission
- ◆ Pull off together with 5th gear locking collar/synchro-hub after removing securing clip (item 18) ⇒ [Fig. 5](#)
- ◆ Position toward 5th gear locking collar/synchro-

hub ⇒ [Fig. 16](#)

- ◆ Press on together with 5th gear locking collar/synchro-hub ⇒ [Fig. 17](#)



17 - 5th and 6th gear locking collar with synchro-hub

- ◆ After removing securing clip, press off together with 6th gear (item 18) ⇒ [Fig. 4](#) or for 5-speed manual transmission, with spacer sleeve ⇒ [Fig. 5](#)

- ◆ Disassembling ⇒ [Fig. 13](#)

- ◆ Assembling locking collar/synchro hub ⇒ [Fig. 13](#) and ⇒ [Fig. 14](#)

- ◆ Pressing off in 6-speed manual transmission ⇒ [Fig. 15](#)

- ◆ Pressing off in 5-speed manual transmission ⇒ [Fig. 17](#)

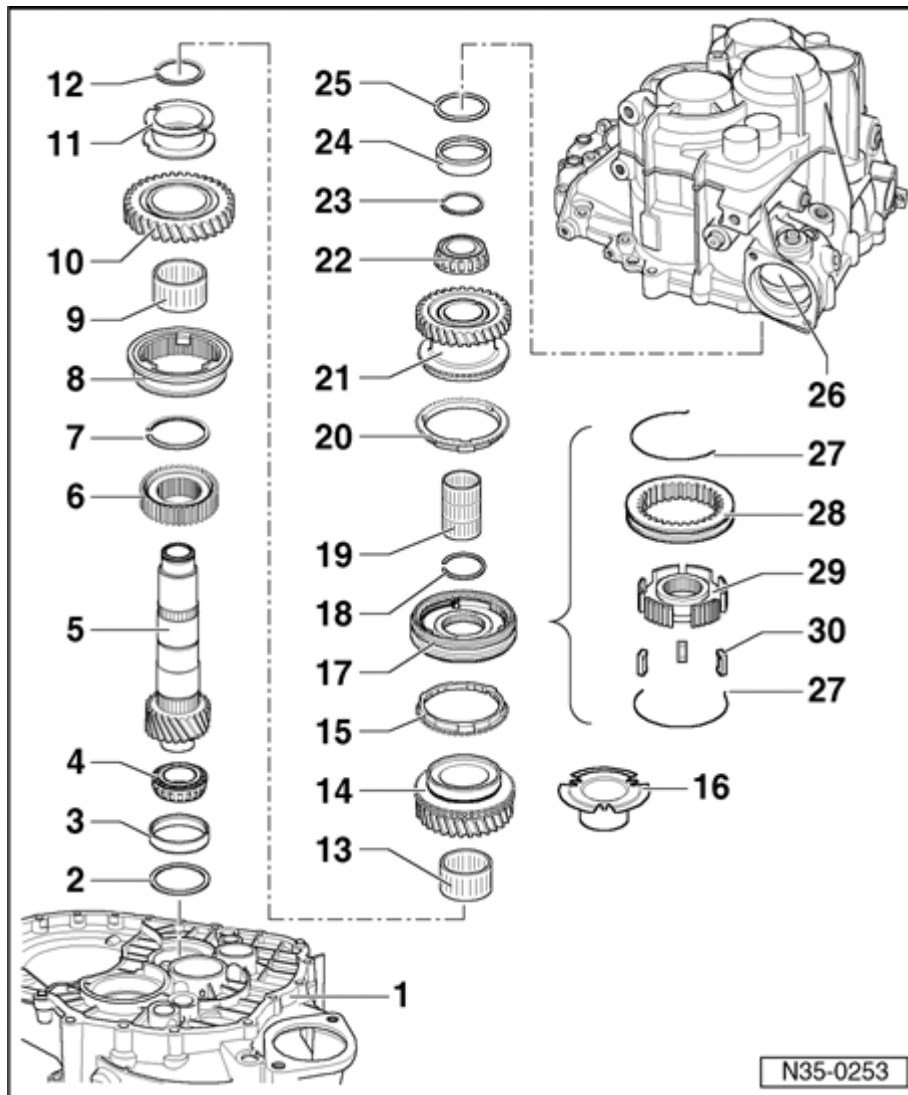
18 - Securing clip

19 - Needle roller bearing

- ◆ For 5th gear

**20 - 5th gear
synchro-
ring**

- ◆ Check for wear ⇒ [Fig. 12](#)



21 - Selector gear for 5th gear

22 - Tapered roller bearing inner race

◆ Pulling off ⇒ [Fig. 3](#)

◆ Pressing on ⇒ [Fig. 18](#)

23 - Securing clip

◆ Redetermine if tapered roller bearing (item 22) or output shaft (item 5) are replaced ⇒ [Fig. 19](#)

24 Outer - race/tapered roller bearing

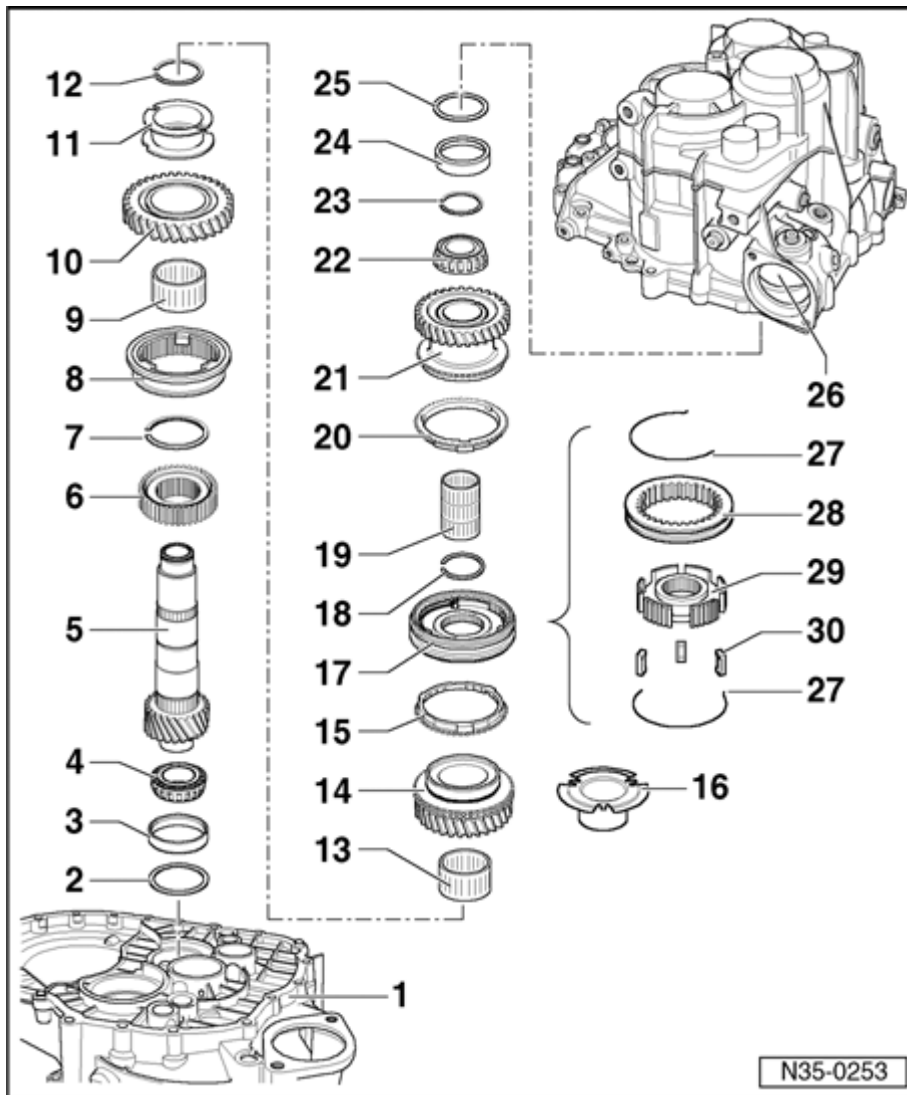
◆ Pulling out ⇒ [Fig. 21](#)

◆ Pressing in ⇒ [Fig. 22](#)

25 - Shim

◆ Determining thickness ⇒ [Page 35-76](#)

26 Transmission - housing



27 - Spring

◆ Installed position
⇒ [Fig. 14](#)

28 - Locking collar

29 Synchro-hub

30 - Locking pieces (Qty. 3)

◆ Installed position
⇒ [Fig. 13](#)

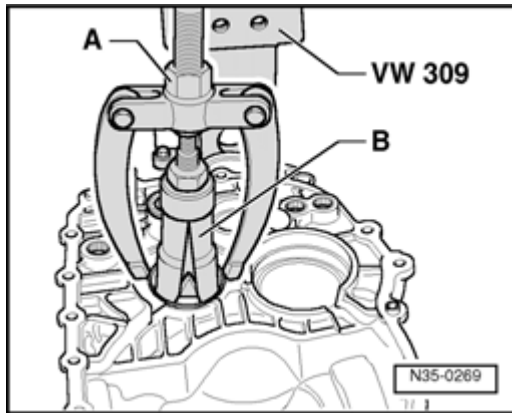


Fig. 1 Pulling tapered roller bearing outer race out of transmission housing

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

Note:

After pressing out, check washer for damage and replace if necessary.

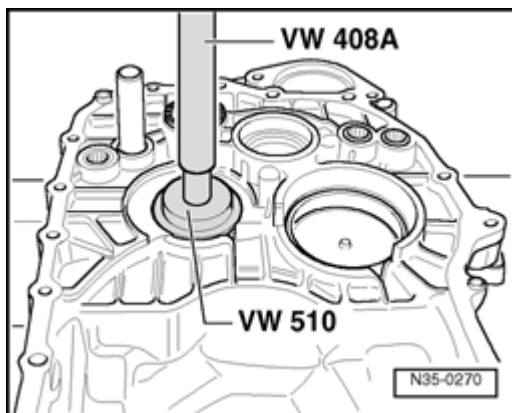


Fig. 2 Pressing tapered roller bearing outer race into transmission housing

- Install washer under outer race.
- Support transmission housing with press tool 40-20 directly below bearing mounting.

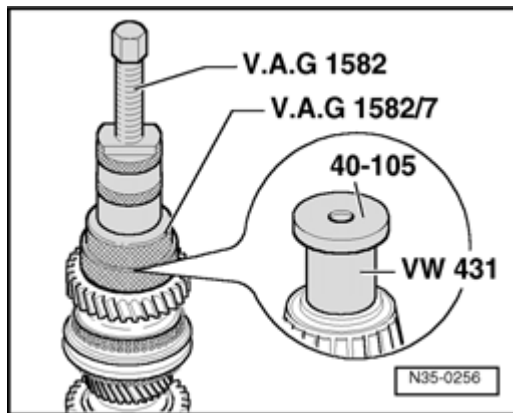


Fig. 3 Pulling off tapered roller bearing inner race

- Before mounting extractor, position press piece VW 431 and thrust plate 40-105 on output shaft.
- Remove securing clip.

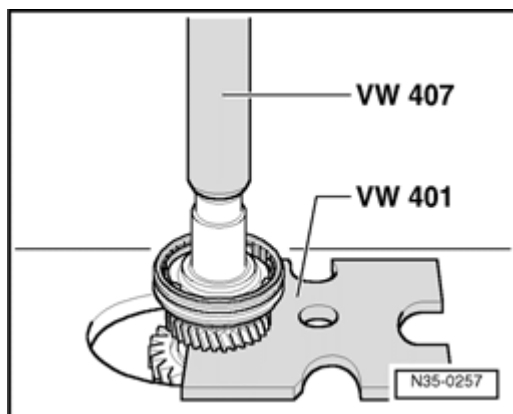


Fig. 4 Pressing off 5th and 6th gear synchrohub/locking collar with 6th gear

- Remove securing clip.

35-67

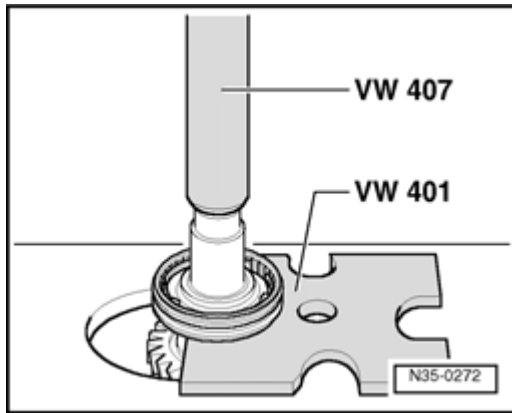


Fig. 5 Pressing off 5th gear synchro-hub/locking collar with spacer sleeve

- Remove securing clip.

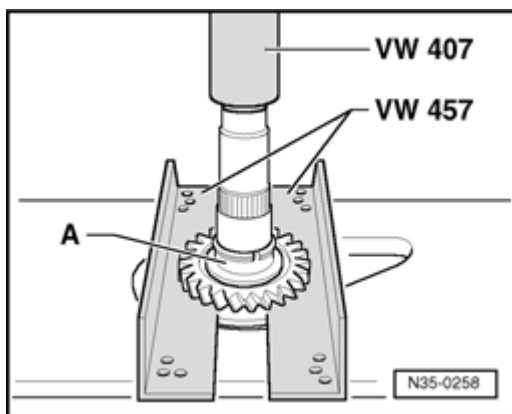


Fig. 6 Pressing off sleeve -A- over reverse gear wheel

- Remove remove securing clip.

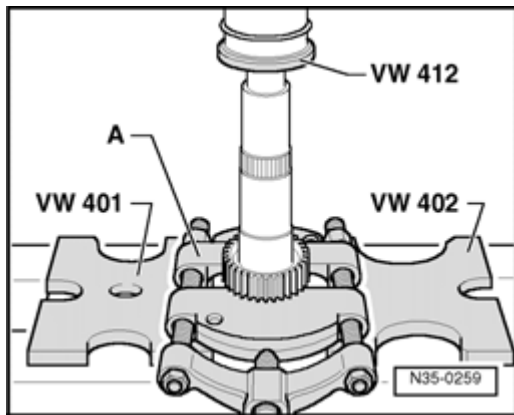


Fig. 7 Pressing off reverse gear synchro-hub

- Remove securing clip.

A - Separating device 22 to 115 mm, e.g. Kukko 17/2

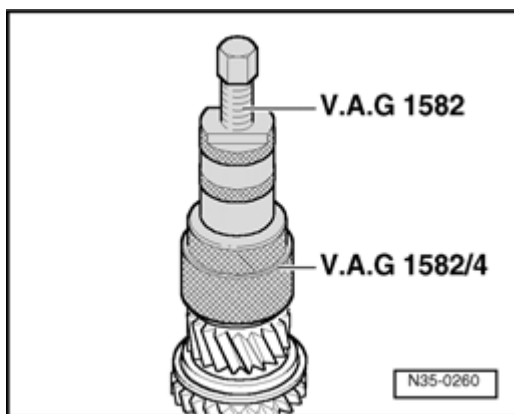


Fig. 8 Pulling off tapered roller bearing inner race

- Before mounting extractor, set thrust plate 30-11 on output shaft.

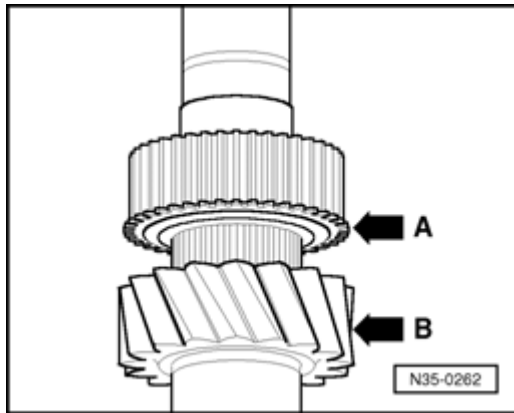


Fig. 9 Installation position of reverse gear synchro-hub

Reverse gear locking collar stop (arrow -A-) faces tothing of output shaft (arrow -B-).

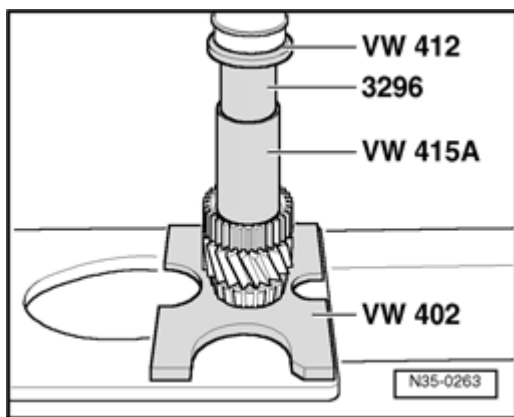


Fig. 10 Pressing on reverse gear synchro-hub

- Install securing clip.

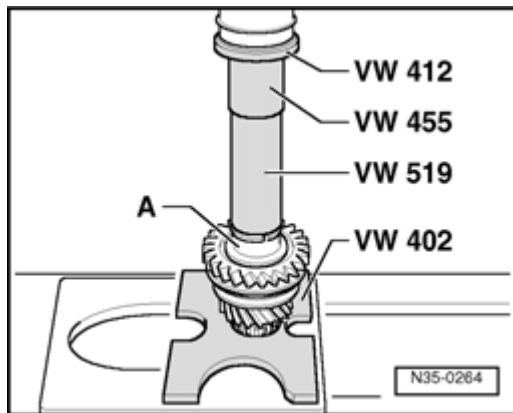


Fig. 11 Pressing on sleeve -A-

Installation position: Wide collar faces reverse gear.

- Install securing clip.

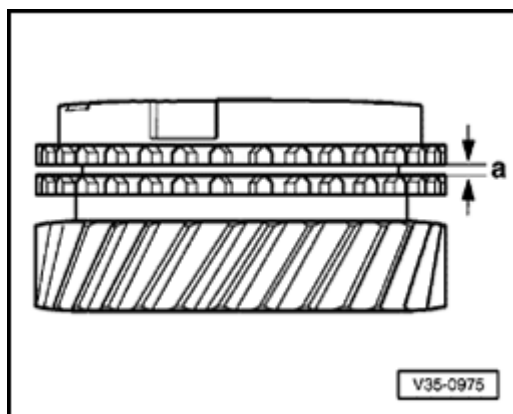


Fig. 12 Checking synchro-ring for 5th and 6th gear for wear

- Press synchro-ring onto gear cone and measure gap "a" with feeler gauge.

Gap "a"	New dimension	Wear limit
5th and 6th gear	1.0 ... 1.7 mm	0.5 mm

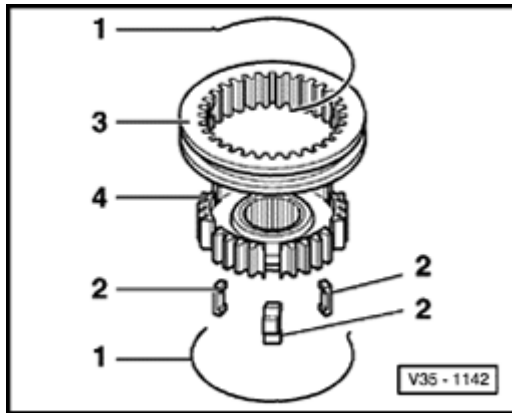


Fig. 13 Disassembling and assembling 5th and 6th gear locking collar and synchro-hub

- 1 - Spring
- 2 - Locking piece
- 3 - Locking collar
- 4 - Synchro-hub

- Slide locking collar over synchro-hub.

Recesses for locking pieces in synchro-hub and locking collar must align.

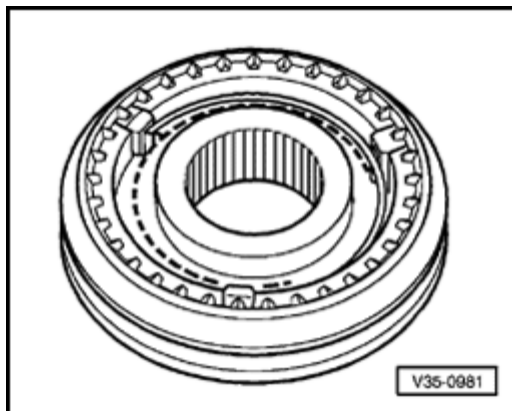


Fig. 14 Assembling 5th and 6th gear locking collar/synchro-hub

The locking collar has been pushed over the synchro-hub.

- Insert locking pieces and install springs 120° offset. Angled end of spring must locate in hollow locking piece.

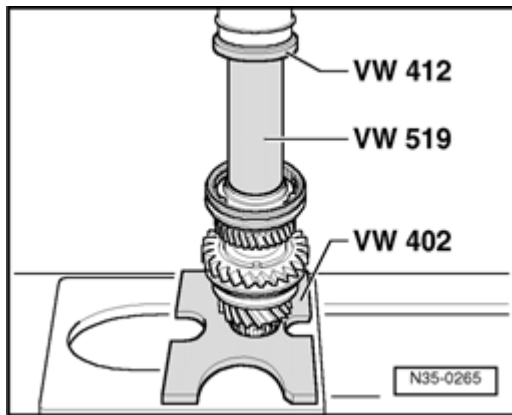


Fig. 15 Pressing on 5th and 6th gear locking collar/synchro-hub

- Install securing clip.

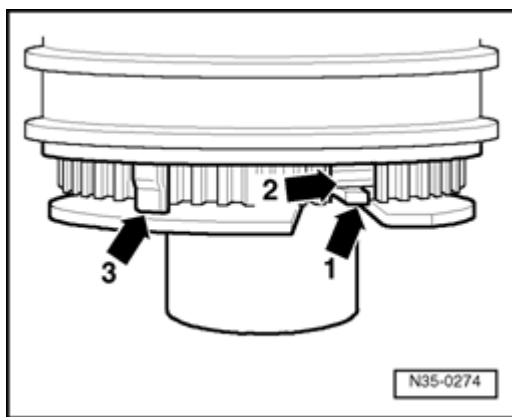


Fig. 16 Positioning spacer sleeve toward 5th gear locking collar/synchro-hub

Lugs (arrow -1-) of spacer sleeve must line up with recesses in synchro-hub (arrow -2-).

Lock pieces (arrow -3-) must rest on collar of spacer sleeve.

35-73

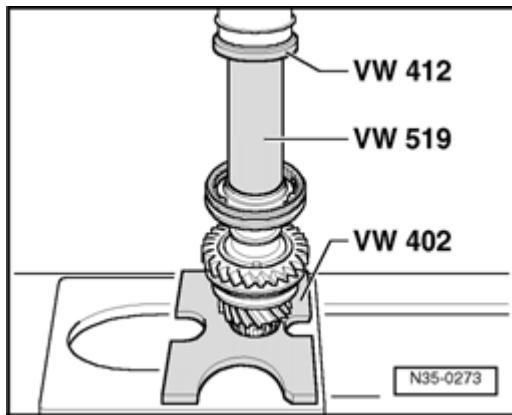


Fig. 17 Pressing on 5th gear locking collar/synchromesh hub together with spacer sleeve

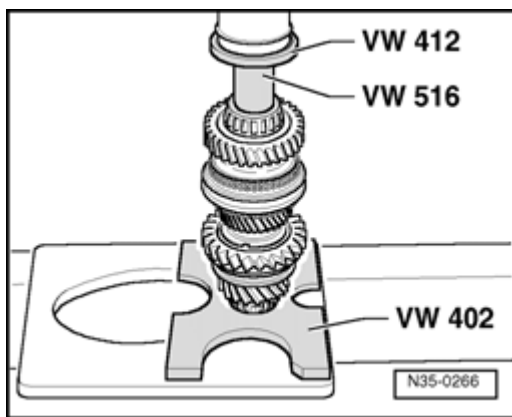


Fig. 18 Pressing on tapered roller bearing inner race

- Determine securing clip ⇒ [Fig. 19](#) and install it.

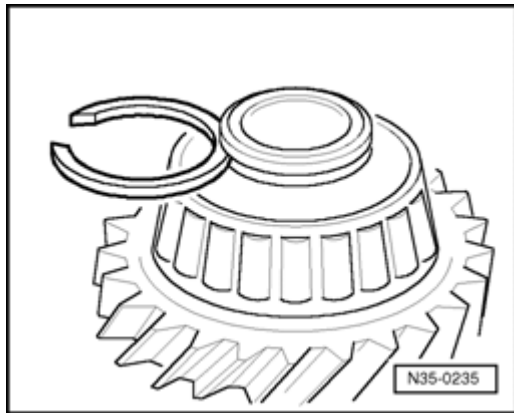


Fig. 19 Determining thickness of circlip

- Determine thickest circlip which will still fit and install it.

The following securing clips are available:

Thickness (mm)	Part No.
1.79	02M 311 187 G
1.83	02M 311 187 F
1.86	02M 311 187 E
1.89	02M 311 187 D
1.92	02M 311 187 C
1.95	02M 311 187 B
1.98	02M 311 187 A

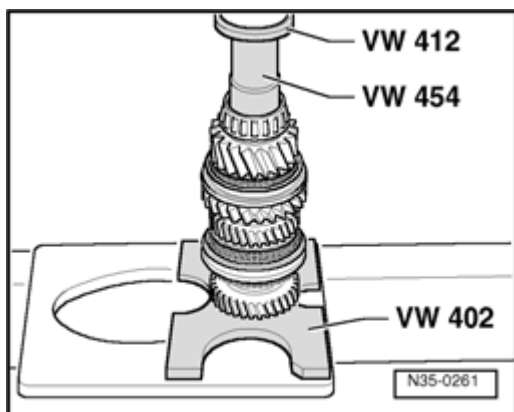


Fig. 20 Pressing on tapered roller bearing inner race

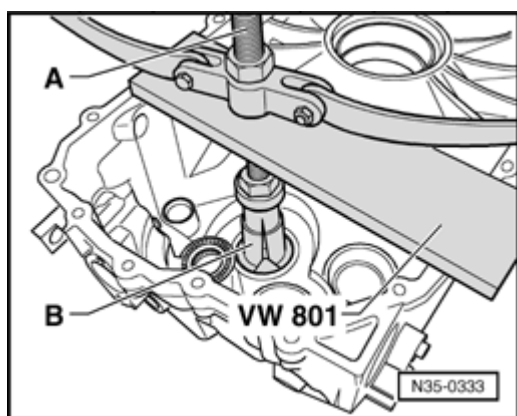


Fig. 21 Pulling tapered roller bearing outer race out of transmission housing

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

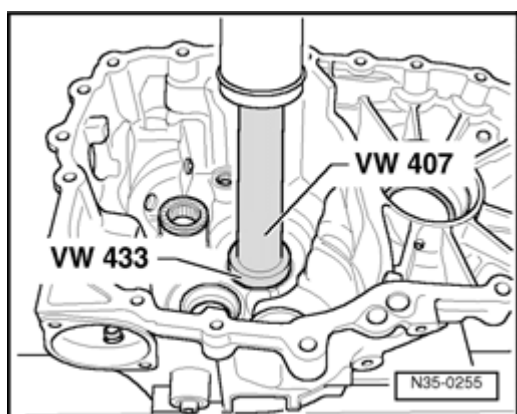
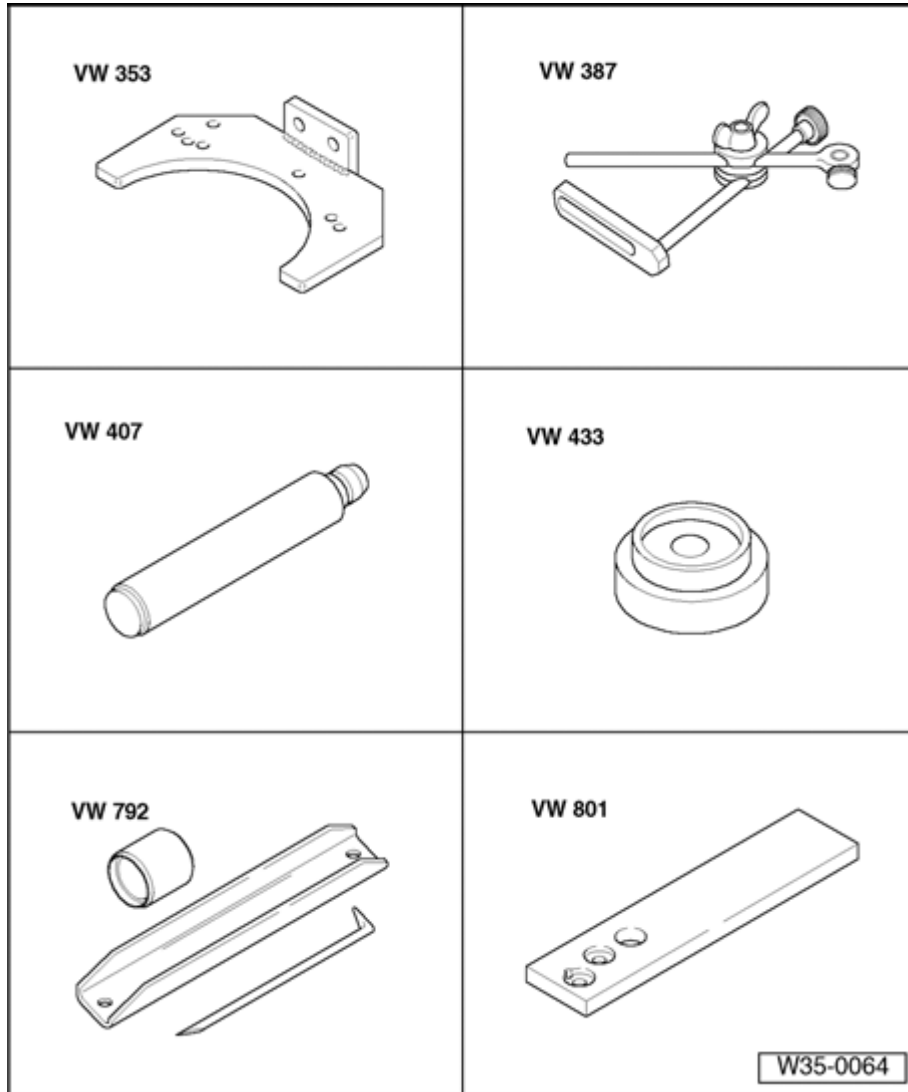


Fig. 22 Pressing tapered roller bearing outer race into transmission housing

- Support transmission housing with press piece 2050 directly below bearing support.



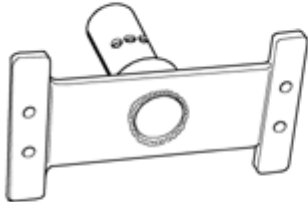


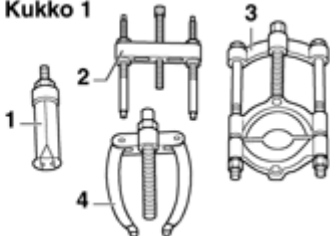
Output shaft for 5th, 6th and reverse gear, adjusting

(Determining shim for output shaft)

Special tools and equipment

- ◆ VW 353
Transmission support
- ◆ VW 387
Universal dial gauge bracket
- ◆ VW 407
Press tool
- ◆ VW 433
Press piece
- ◆ VW 792
Installation tool
- ◆ VW 801
Holding plate

35-77

<p>VW 309</p> 	<p>2050</p> 
<p>V.A.G 1331</p> 	<p>Kukko 1</p> 
	<p>W35-0074</p>

Special tools and equipment

- ◆ VW 309 Holding plate
- ◆ 2050 Thrust piece
- ◆ VAG 1331 Torque wrench
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 4 - Kukko 22/2 Counter support

It is necessary to readjust the output shaft v
the following components are replaced:

- ◆ Transmission housing
- ◆ Clutch housing
- ◆ Output shaft for 5th, 6th and reverse gear

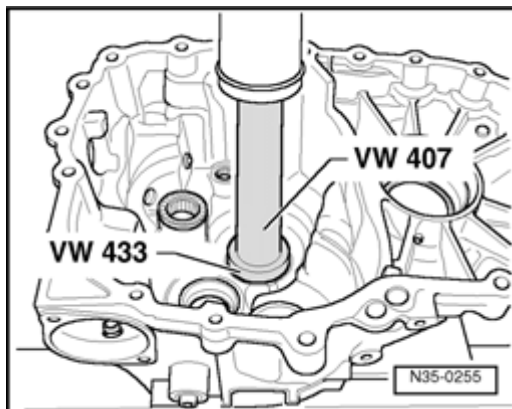
or

- ◆ Tapered roller bearing

Adjustment overview ⇒ [Page 39-23](#)

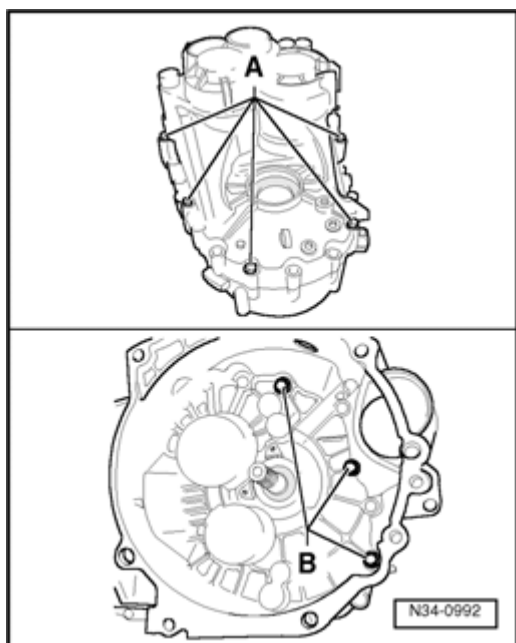
Requirements

- ◆ Sealing surfaces of clutch and transmission housings must be free of sealant.
- ◆ When taking measurements, install only shaft to be measured.

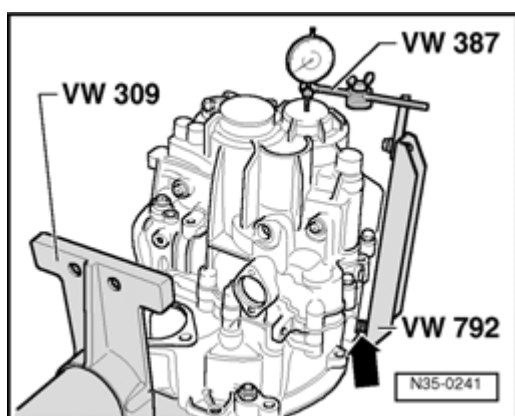


- Press tapered roller bearing outer race with 1.70 mm thick shim into transmission housing supporting housing directly under bearing support with thrust piece 2050.
- Set complete 5th, 6th and reverse gear shaft in clutch housing.

35-79



- Install transmission housing and tighten bolts -A- and -B- diagonally to correct torque.



- Install measuring tools. Put washers with a total thickness of 8 mm on bolt (arrow) securing installation tool VW 792 to clutch housing.
- Set dial gauge (3 mm measuring range) to zero with 1 mm preload.

- Loosen clutch housing/transmission housing securing bolts diagonally until output shaft moves freely in transmission housing.
- Read play on gauge and note reading (Example: 0.27 mm)

Note:

If dial gauge indicates no value when clutch housing/transmission housing securing bolts are loosened, install shim 1.95 mm (Part No. 084 409 383 AS) or, if necessary, shim 2.20 mm (Part No. 084 409 383 BD).

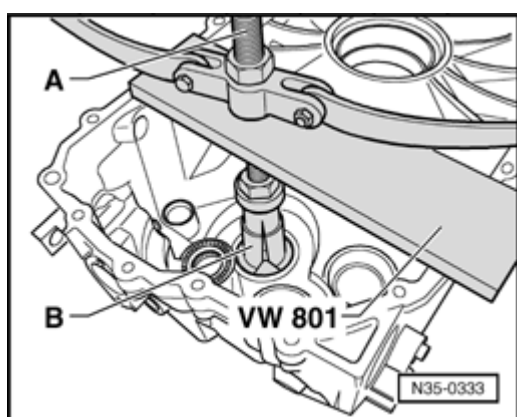
Determining thickness of shim

The specified bearing pretension will be attained by subtracting the measured value (0.27 mm) from the inserted shim (1.70 mm) and adding a constant for pressing (0.20 mm).

Example:

Inserted shim	1.70 mm
- Measured value	0.27 mm
+ Preloading (constant)	0.20 mm
Shim thickness	1.63 mm

- Determine thickness of shim from table = [35-82](#) .



- Remove transmission housing and pull the roller bearing outer race out of housing.

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 2

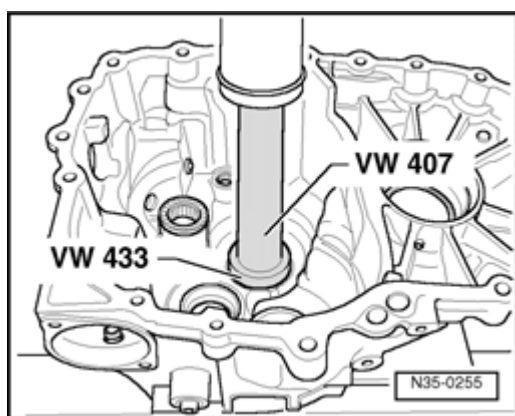
- Remove inserted shim from clutch housing

Shim table

Size (mm)	Part No.
1.40	084 409 383 AF
1.45	084 409 383 AG
1.50	084 409 383 AH
1.55	084 409 383 AJ
1.60	084 409 383 AK
1.65	084 409 383 AL
1.70	084 409 383 AM
1.75	084 409 383 AN
1.80	084 409 383 AP
1.85	084 409 383 AQ
1.90	084 409 383 AR
1.95	084 409 383 AS
2.00	084 409 383 AT
2.05	084 409 383 BA
2.10	084 409 383 BB
2.15	084 409 383 BC
2.20	084 409 383 BD
2.25	084 409 383 BE

Varying tolerances make it possible to obtain the exact shim thickness required.

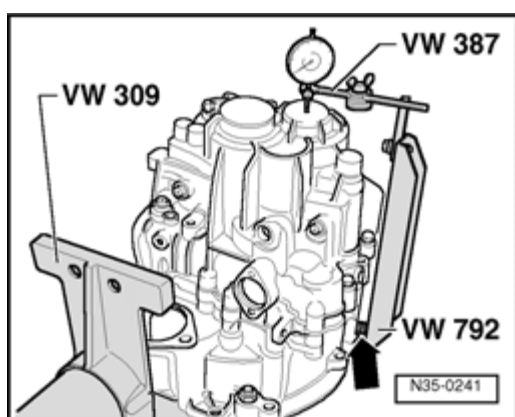
35-83



- ✦ - Press in tapered roller bearing outer race together with determined shim (in Example 1.65 mm) while supporting transmission housing with thrust piece 2050 directly under bearing support.

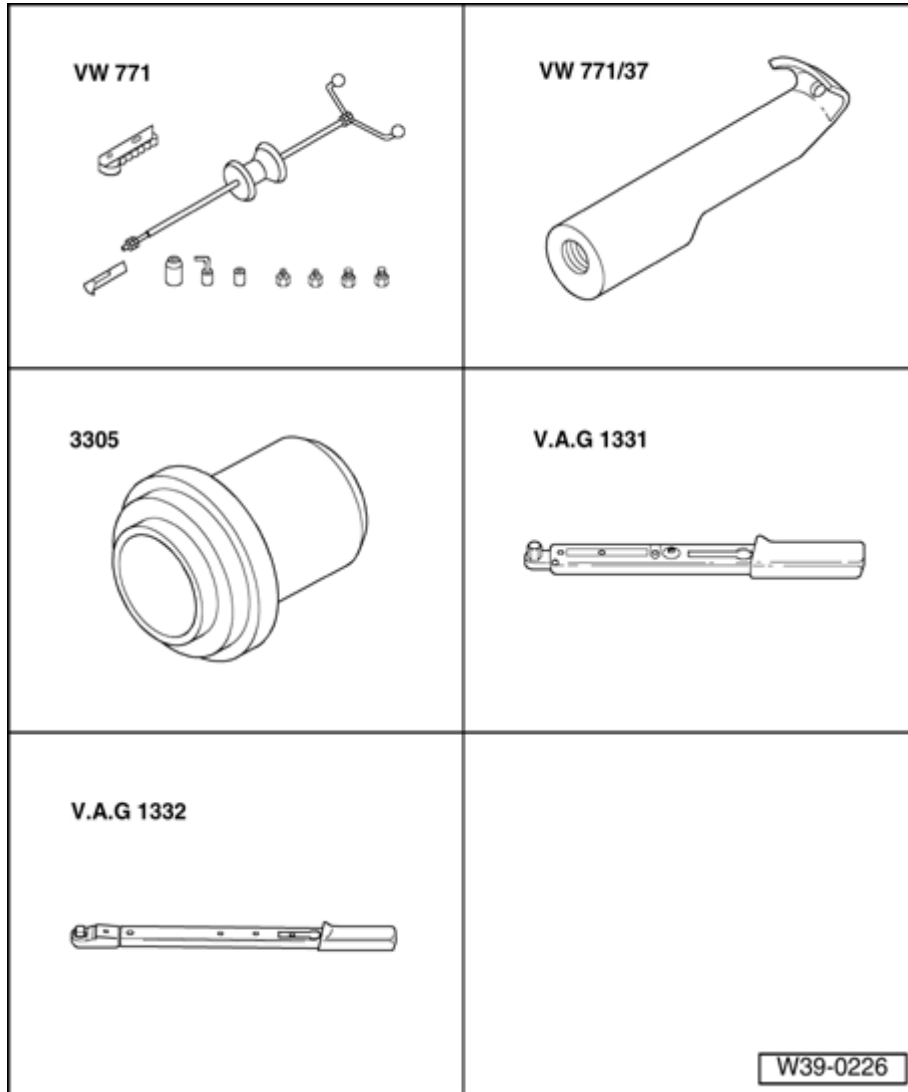
Perform check measurement

- ◆ Determined shim installed.



- ✦ - Install measuring tools. Put washers with a total thickness of 8 mm on bolt (arrow) securing installation tool VW 792 to clutch housing.
- Set dial gauge (3 mm measuring range) to zero with 1 mm preload.
- Loosen clutch housing/transmission housing securing bolts diagonally until output shaft moves freely in transmission.

If the correct shim has been selected, the dial gauge will indicate a value of 0.15 mm to 0.25 mm.



Oil seals for flanged shafts, replacing

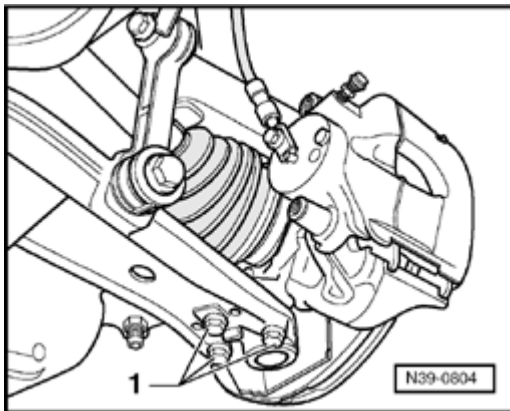
Oil seal for left flanged shaft, replacing

Special tools and equipment

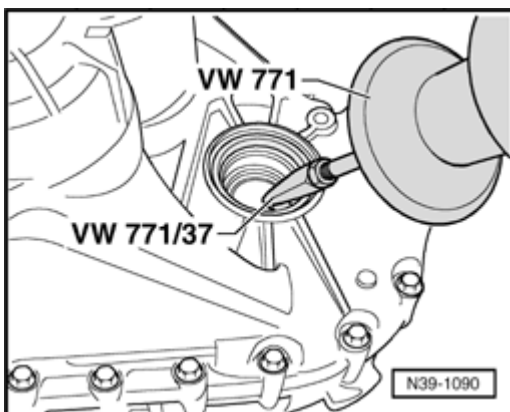
- ◆ VW 771 Multi-purpose tool
- ◆ VW771/37 Puller hooks
- ◆ 3305 Press piece
- ◆ VAG 1331 Torque wrench
- ◆ VAG 1332 Torque wrench

Removing

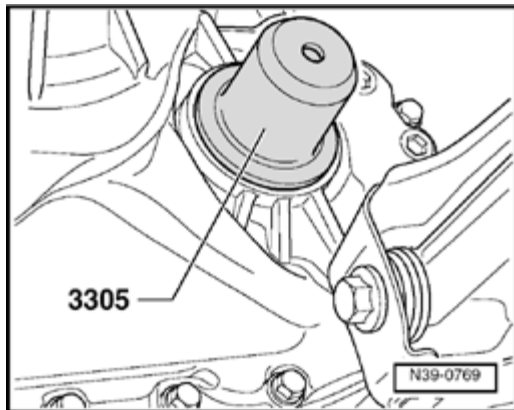
- ◆ Transmission is mounted in vehicle.
- Remove wheel.
- If installed, remove center and left part of insulation tray below engine/transmission
- Turn steering to left lock.
- Disconnect axle shaft from flanged shaft.



- Mark installation position of bolts -1-.
- Remove bolts -1-.
- Tie-up axle shaft as high as possible. Do damage paint on axleshaft.
- Remove flanged shaft securing bolts by threading two bolts into flange and counterholding flanged shaft using a leve
- Place container under transmission.
- Remove flanged shaft with spring.



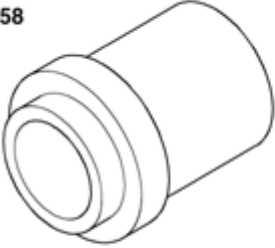


- Pull flanged shaft oil seal out using VW 771 VW 771/37.



Installing

- ◀ - Drive new seal in onto stop. Do not tilt seal when doing this.
- Fill space between sealing lip and dust lip with grease G 052 128 A1.
- Insert flanged shaft.
- Secure flanged shaft with countersunk bolt and tighten to specified torque ⇒ [Page 39-13](#) item 16 .
- Connect ball joint to control arm using new bolts onto old impression marks.
- ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)
- Bolt left axle shaft to flanged shaft.
- ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)
- Install wheel.
- ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)
- Check transmission oil ⇒ [Page 34-54](#) .
- Install sound insulation tray.

39-4

<p>3158</p> 	<p>V.A.G 1331</p> 
<p>V.A.G 1332</p> 	
	<p>W39-0227</p>

Oil seal for right flanged shaft, replacing

Special tools and equipment

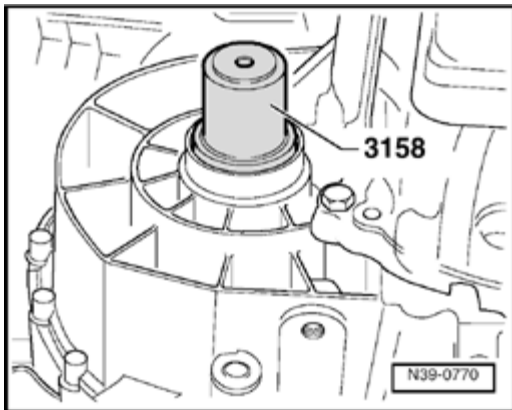
- ◆ 3158 Drift sleeve
- ◆ VAG 1331 Torque wrench or equivalent
- ◆ VAG 1332 Torque wrench or equivalent

Removing

- ◆ Transmission is mounted in vehicle.
- If installed, remove center and right part of sound insulation tray below engine/transmission.
- Turn steering to right onto full lock stop.
- Remove axle shaft.

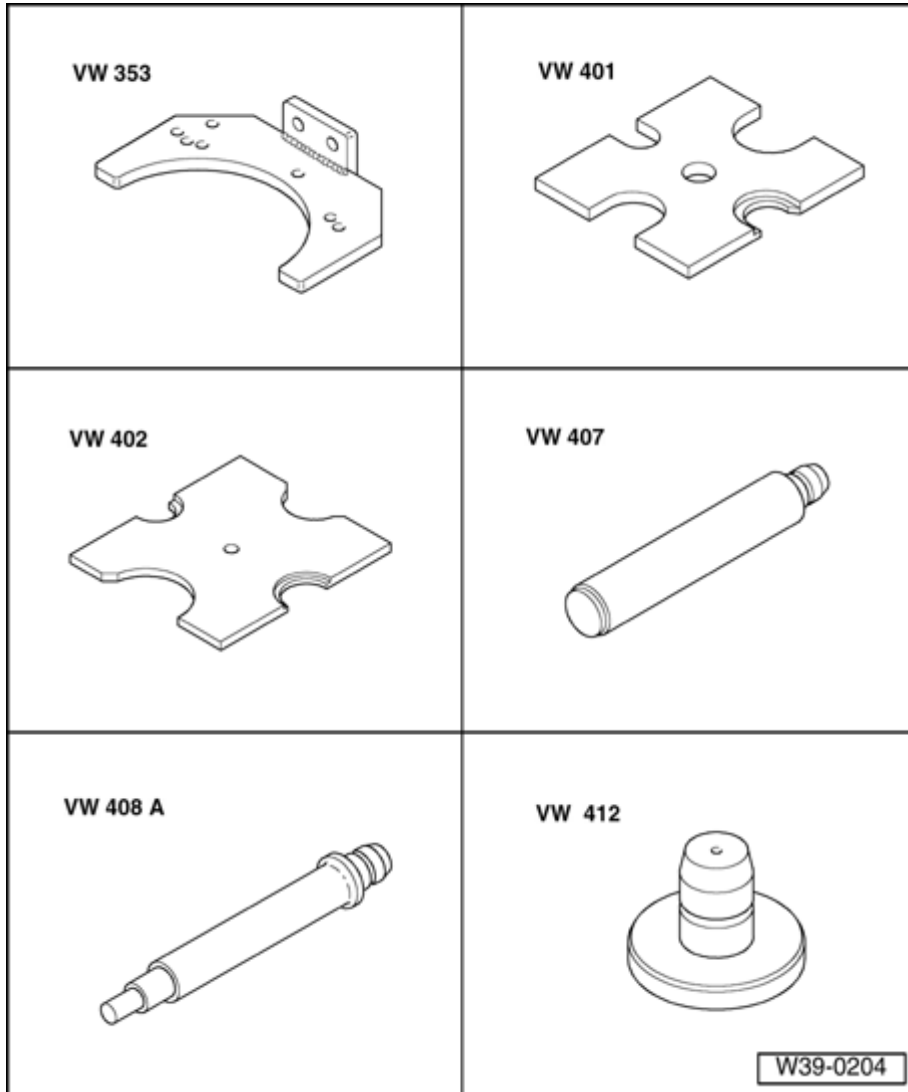
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

- Remove flanged shaft securing bolts by threading two bolts into flange and counterholding flanged shaft using a lever.
- Place container under transmission.
- Remove flanged shaft with spring.
- Pry seal out with lever.



Installing

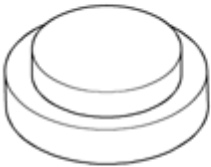
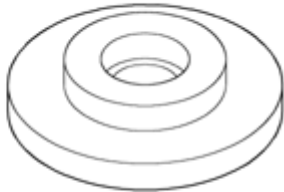




- Drive new seal in onto stop, do not tilt seal when doing this.
- Fill space between sealing lip and dust lip with grease G 052 128 A1.
- Insert flanged shaft.
- Secure flanged shaft with countersunk bolt and tighten to specified torque ⇒ [Page 39-13](#) item 16 .
- Install axle shaft.
- ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)
- Connect ball joint to control arm using new bolts at old impression marks
- ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)
- Install wheel.
- ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)
- Check transmission oil ⇒ [Page 34-54](#) .
- Install sound insulation tray.



Differential, disassembling and assembling



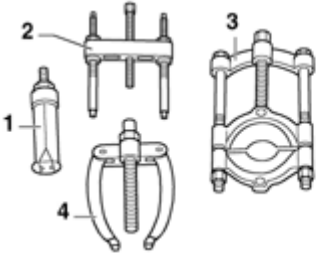
Special tools and equipment

- ◆ VW 353 Transmission support
- ◆ VW 401 Thrust plate
- ◆ VW 402 Thrust plate
- ◆ VW 407 Press tool
- ◆ VW 408 A Press tool
- ◆ VW 412 Press tool

<p>40-105</p> 	<p>3005</p> 
<p>3259</p> 	<p>3296</p> 
<p>3345</p> 	<p>V.A.G 1332</p>  <div style="text-align: right; border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">W39-0218</div>

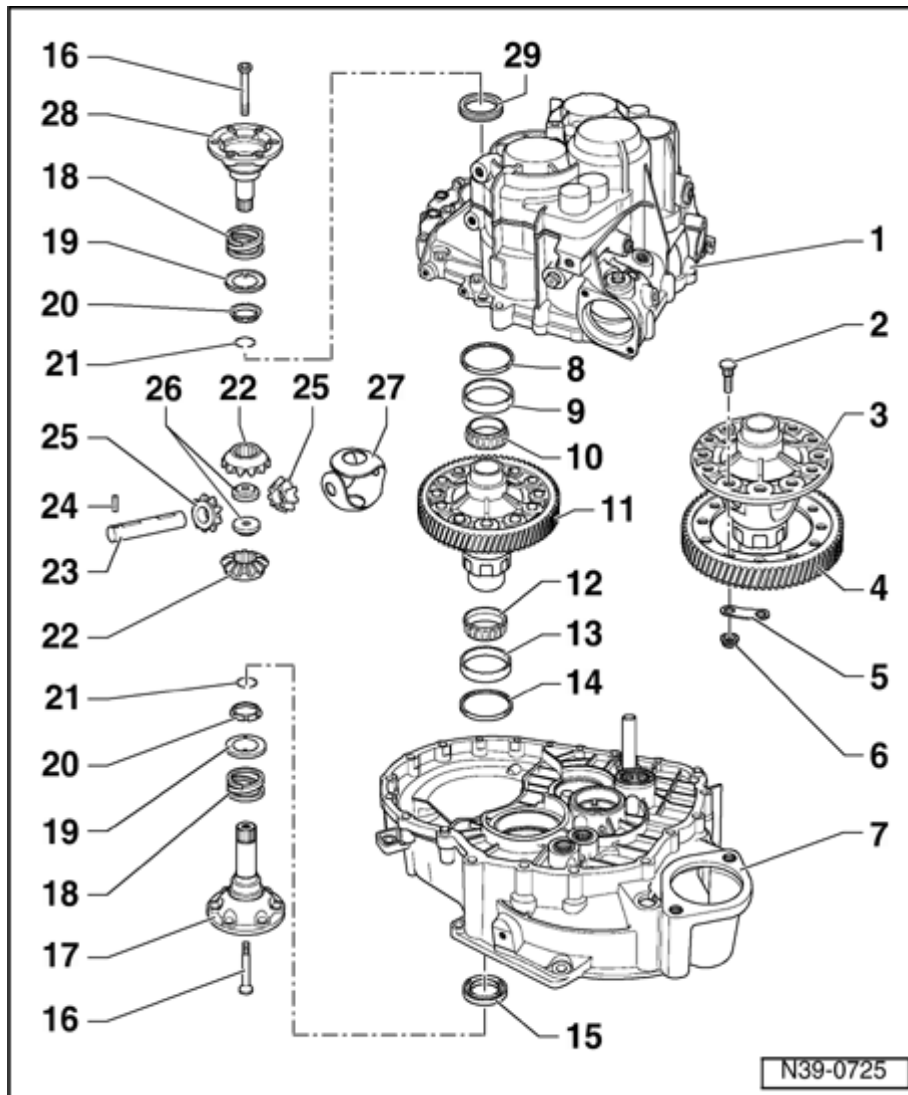
Special tools and equipment

- ◆ 40-105 Thrust plate
- ◆ 3005 Press disk
- ◆ 3259 Tube
- ◆ 3296 Tube
- ◆ 3345 Tube
- ◆ VAG 1332 Torque wrench or equivalent

<p>V.A.G 1582</p> 	<p>V.A.G 1582/6</p> 
	
	<p style="text-align: right; border: 1px solid black; padding: 2px;">W39-0219</p>

Special tools and equipment

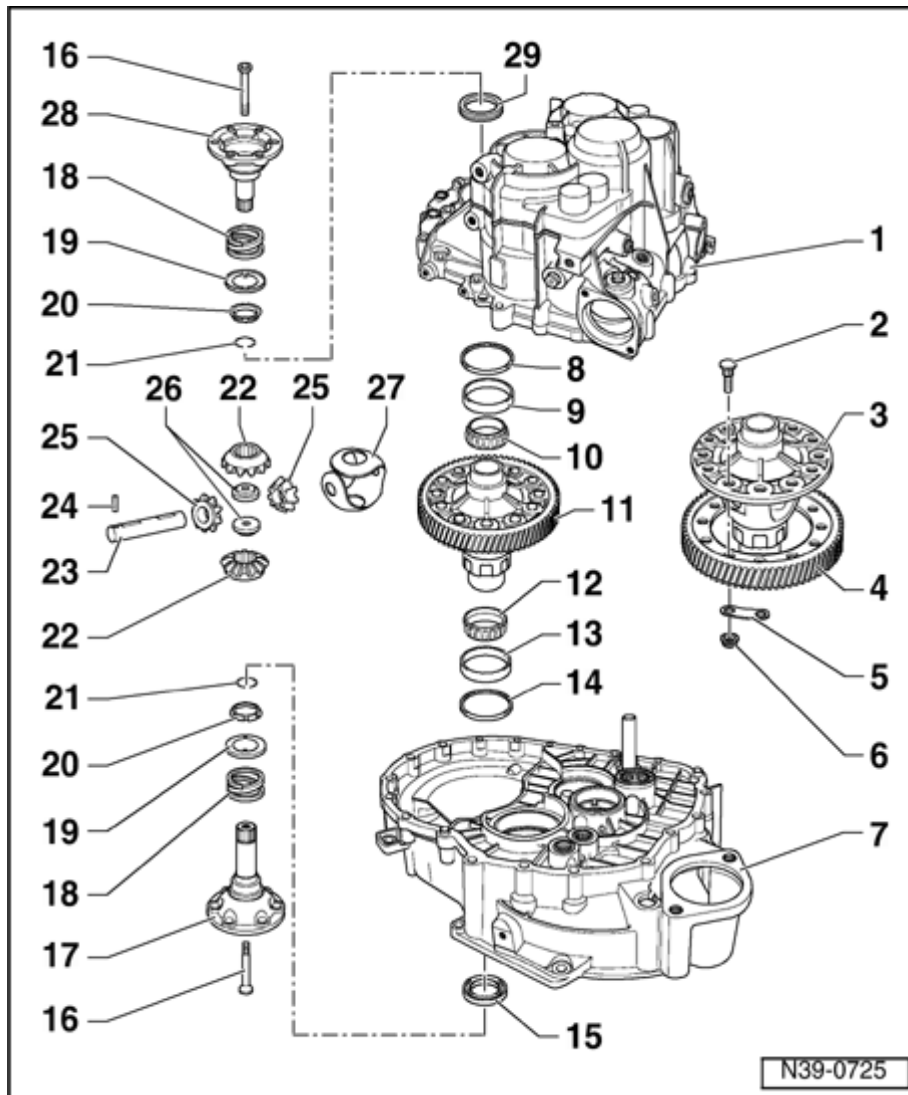
- ◆ VAG 1582
Tapered roller bearing puller
- ◆ VAG 1582/6
Grip
- ◆ 1 - Kukko 21/7
Internal puller
- ◆ 4 - Kukko 22/2
Counter support

**Note:**

- ◆ Heat tapered roller bearing inner race to 100° C before installing.
- ◆ Always replace both tapered roller bearings together as a set.
- ◆ If tapered roller bearings, differential housing, transmission housing or clutch housing are replaced, adjust differential ⇒ [Page 39-24](#).

1 Transmission - housing**2 - Bolt****3 - Differential cage**

- ◆ Bolt to final drive gear ⇒ [Fig. 10](#)
- ◆ Use Parts catalog to check correct application



4 - Final drive gear

◆ Rivetted in production

◆ Pressing off ⇒ [Fig. 8](#)

◆ Installed position: machined side faces bolting surface of differential housing

◆ Heat to 100 °C before installing

◆ Install to differential housing ⇒ [Fig. 9](#)

◆ Bolted ⇒ [Fig. 10](#)

5 - Backing plate

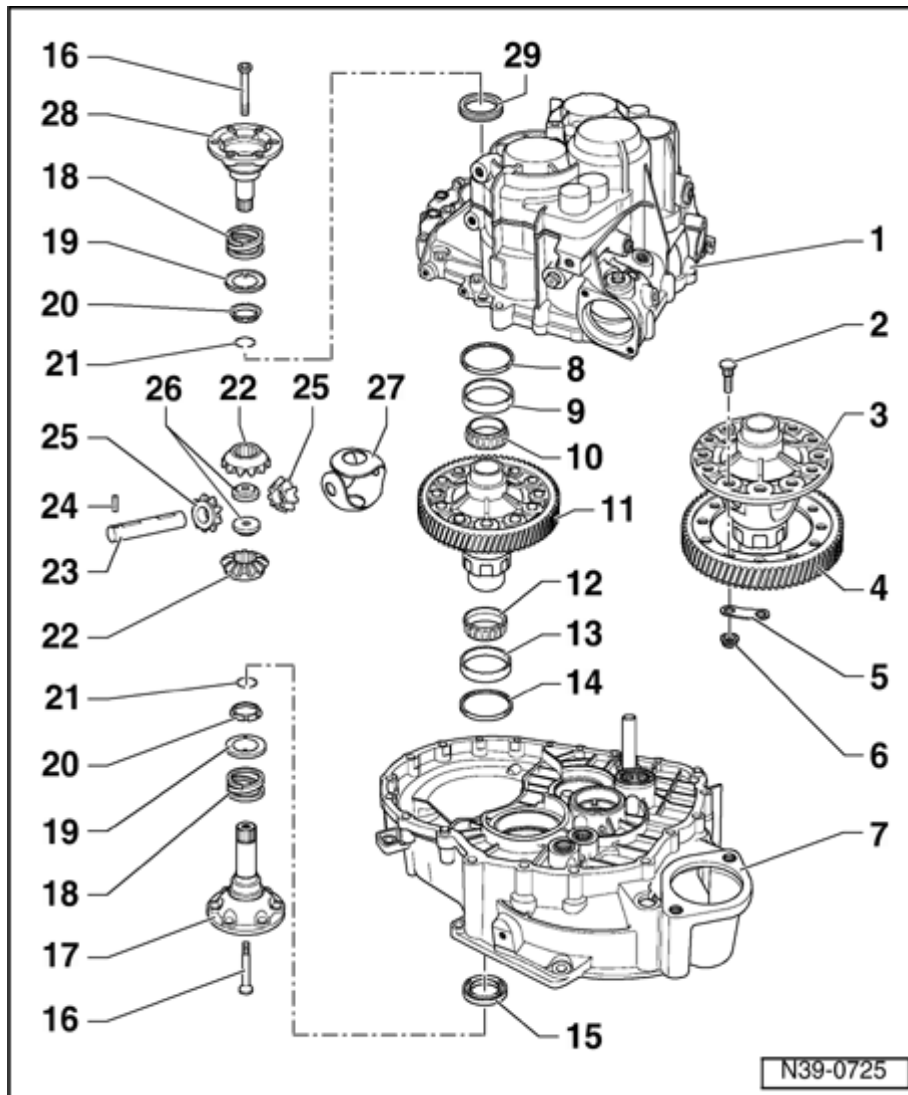
6 - Nut, 40 Nm and $\frac{1}{8}$ turn (45°) further

7 - Clutch housing

8 - Shim

◆ For differential

◆ Determining thickness ⇒



9 - Tapered roller bearing outer race

◆ Pulling out ⇒ [Fig. 5](#)

◆ Pressing in ⇒ [Fig. 6](#)

10 - Tapered roller bearing inner race

◆ Pulling off ⇒ [Fig. 3](#)

◆ Pressing on ⇒ [Fig. 4](#)

11 Differential - housing

◆ With rivetted final drive gear

◆ When replacing final drive gear drill out rivet heads ⇒ [Fig. 7](#)

◆ Attaching final drive gear with bolts ⇒ [Fig. 10](#)

12 - Tapered

**roller
bearing
inner
race**

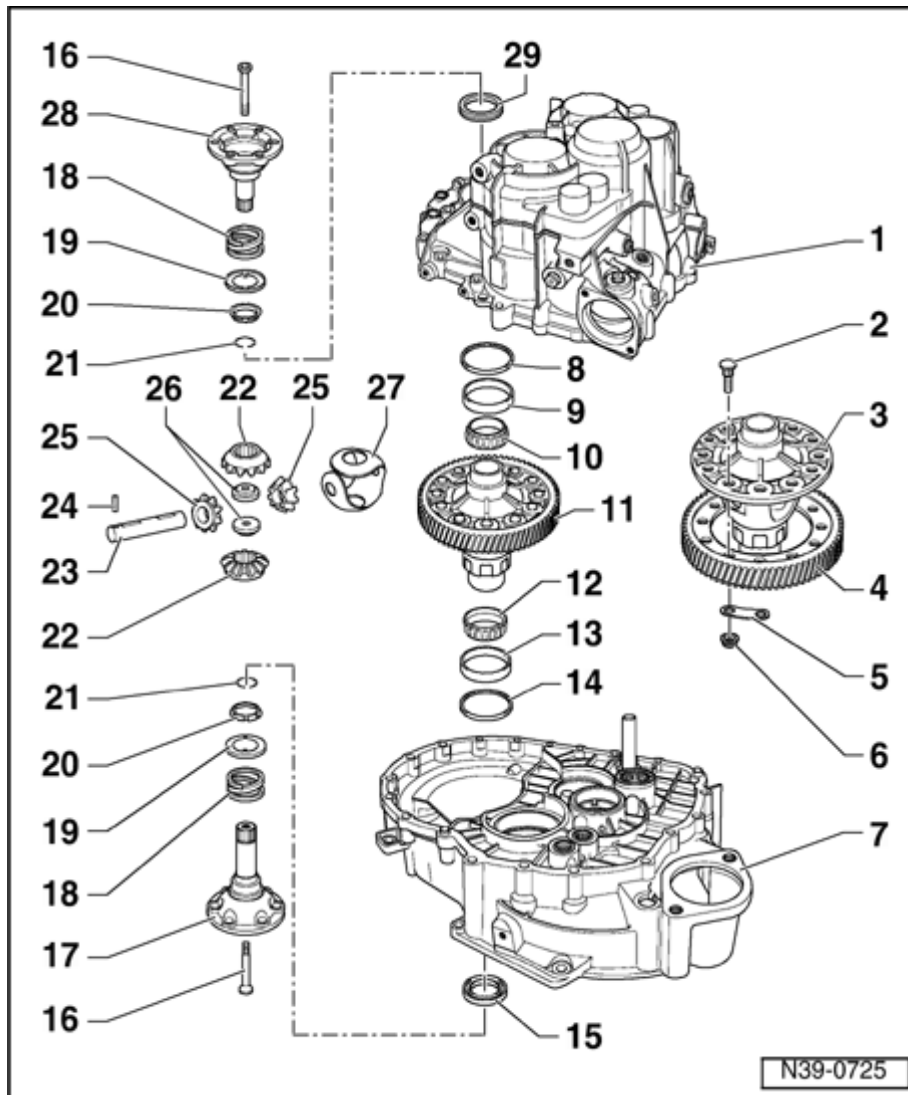
◆ Pulling
off ⇒
[Fig. 3](#)

◆ Pressing
on ⇒
[Fig. 4](#)

**13 - Tapered
roller
bearing
outer
race**

◆ Pulling
out ⇒
[Fig. 1](#)

◆ Pressing
in ⇒
[Fig. 2](#)

**14 - Shim**

- ◆ Always 0.65 mm thick

15 - Oil seal

- ◆ For right flanged shaft

- ◆ Left and right diameters differ

- ◆ Use Parts catalog to check correct application

- ◆ Replacing with transmission installed ⇒ [Page 39-1](#)

16 - Counter-sunk head bolt, 25 Nm

- ◆ Bolt into threaded piece (item 26)

17 - Left flanged shaft

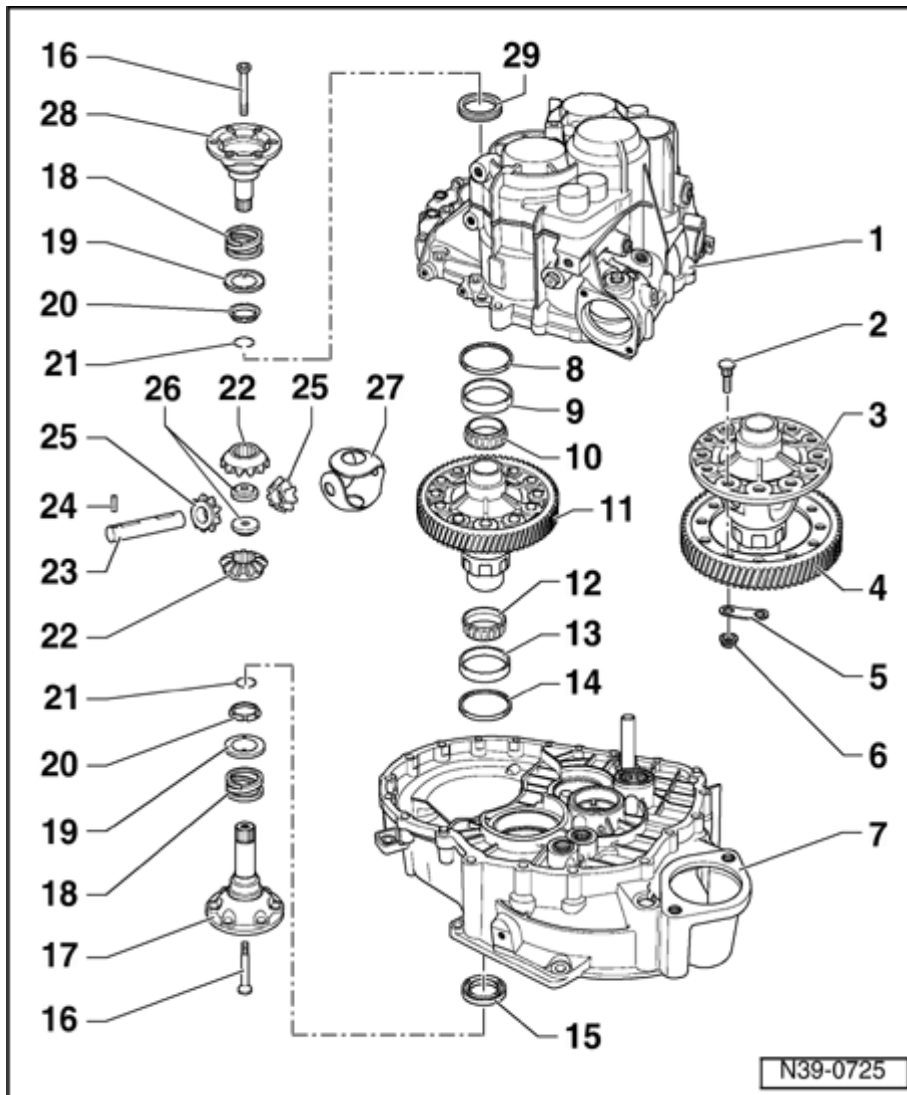
- ◆ Do not interchange, left and right flanged shafts differ

- ◆ Use Parts

catalog to
check
correct
application

**18 - Spring
for
flanged
shaft**

- ◆ Installed
behind
flanged
shafts



19 - Thrust washer

- ◆ Installed position: shoulder toward spring, tongue to tapered ring

20 - Tapered ring

- ◆ With grooves to secure thrust washer

- ◆ Installed position: Taper toward differential housing

21 - Securing clip

- ◆ Make sure that tapered ring, thrust washer and spring are held in position when flanged shaft is removed

22 - Large differential

bevel gear

◆ Installing
⇒ [Fig. 12](#)

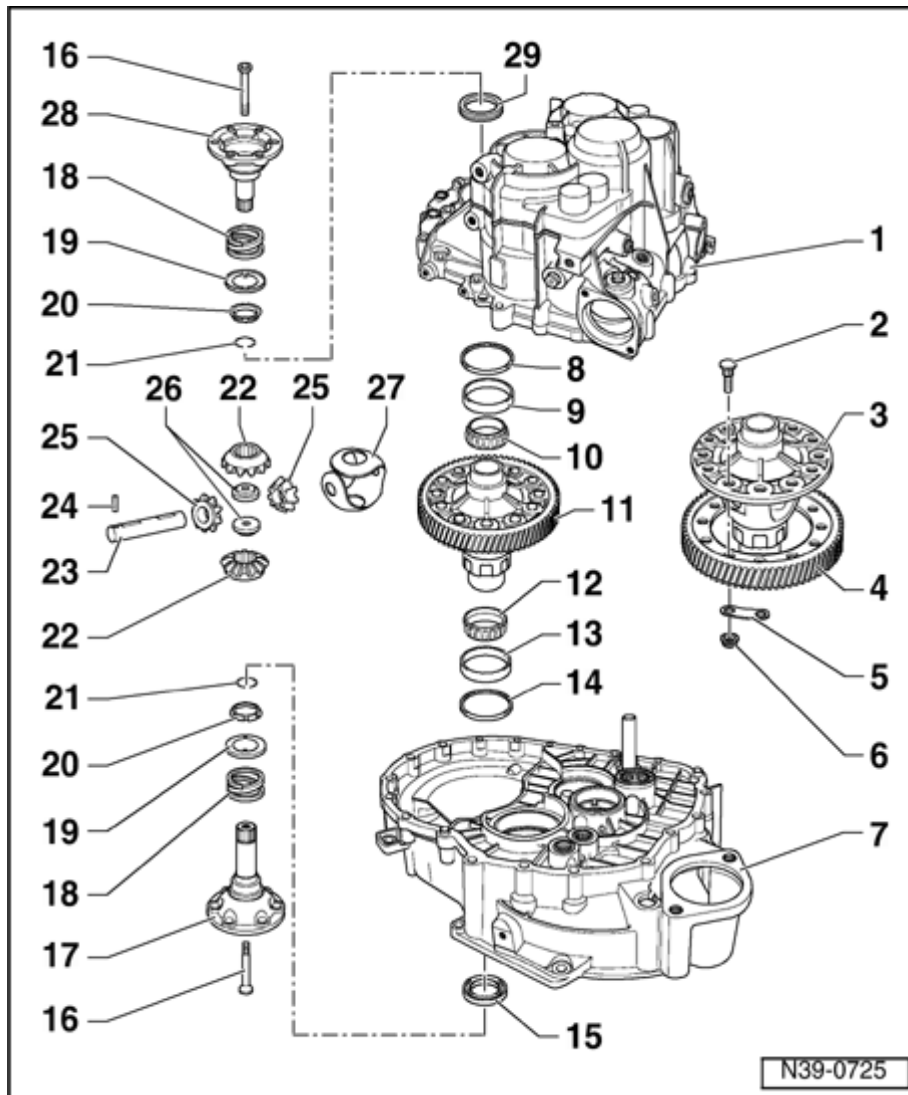
◆ Use Parts catalog to check correct application

23 Differential - bevel gear shaft

◆ Knock out with drift

◆ Installing
⇒ [Fig. 12](#)

◆ Use Parts catalog to check correct application



24 - Spring pin

- ◆ For securing differential bevel gear shaft
- ◆ Use Parts catalog to check correct application
- ◆ Removing and installing ⇒ [Fig. 11](#)

25 Small - differential bevel gear

- ◆ Installing ⇒ [Fig. 12](#)
- ◆ Use Parts catalog to check correct application

26 - Threaded piece

- ◆ Installing ⇒ [Fig. 12](#)

27 - One-piece thrust washer

- ◆ Coat with transmission oil when installing

28 - Left flanged shaft

- ◆ Do not interchange, left and right flanged shafts differ
- ◆ Use Parts catalog to check correct application

29 - Oil seal

- ◆ For left flanged shaft
- ◆ Left and right diameters differ
- ◆ Replacing with transmission installed ⇒ [Page 39-1](#)

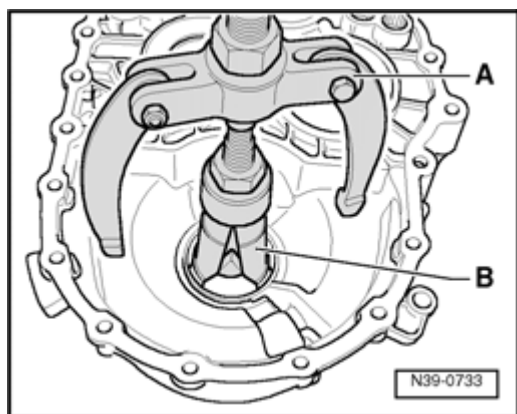


Fig. 1 Pulling tapered roller bearing outer race out of clutch housing

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

Note:

After pulling out, check washer for damage and replace if necessary.

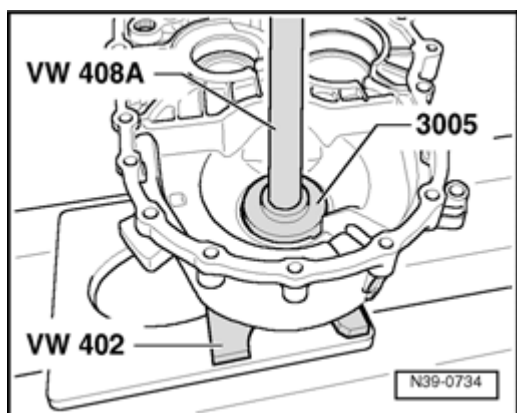


Fig. 2 Pressing tapered roller bearing outer race into clutch housing

- First insert washer.

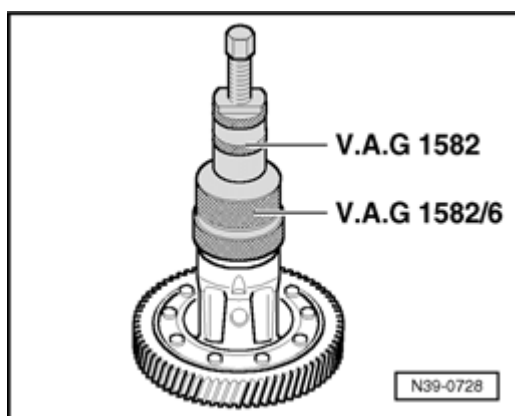


Fig. 3 Pulling off tapered roller bearing inner race

- Before mounting extractor position press piece 40-105 on differential housing.

Note:

Both tapered roller bearing inner races are pulled off the differential housing in the same way.

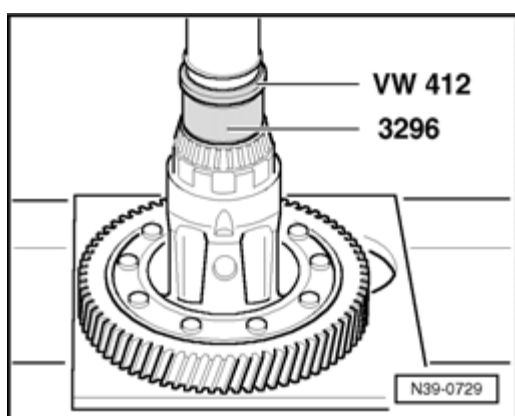


Fig. 4 Pressing on tapered roller bearing inner race

Note:

The tapered roller bearing inner races for the transmission housing and clutch housing are pressed on with the same press tools.

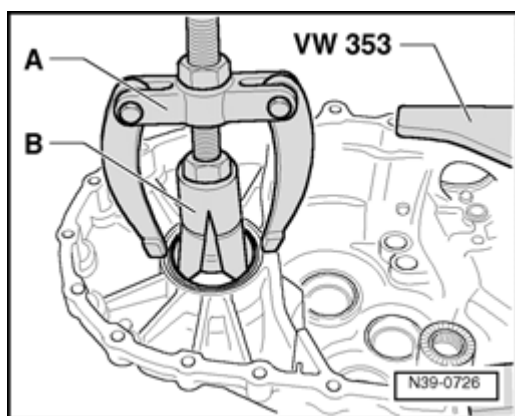


Fig. 5 Pulling tapered roller bearing outer race out of transmission housing

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

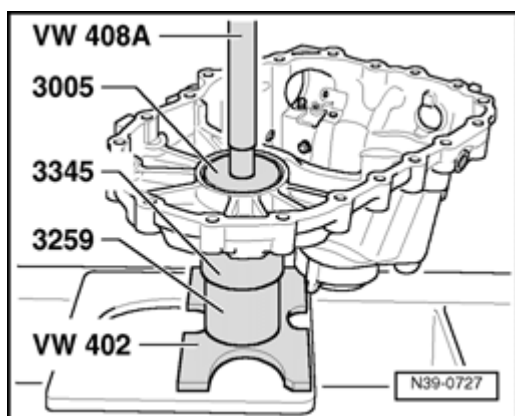
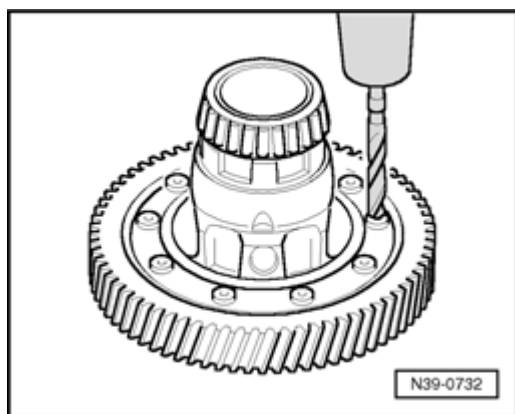


Fig. 6 Pressing tapered roller bearing outer race into transmission housing

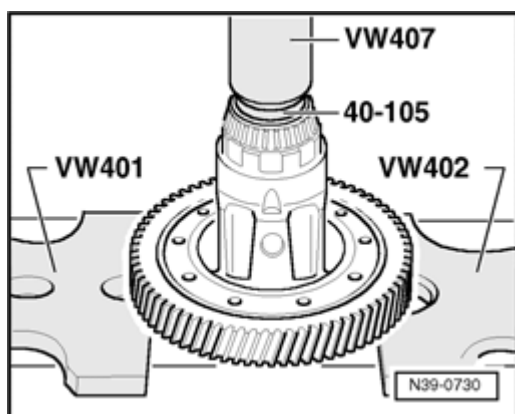
- Support transmission housing with tube 3345 directly below bearing mounting.

**Fig. 7 Drilling out rivet heads**

- Drill out rivet heads with 12 mm drill from countersunk side and drive rivet out with drift.

Note:

Clean differential before and after drilling. Protect tapered roller bearing from metal particles.

**Fig. 8 Pressing off final drive gear**

- Place thrust piece 40-105 on differential housing.

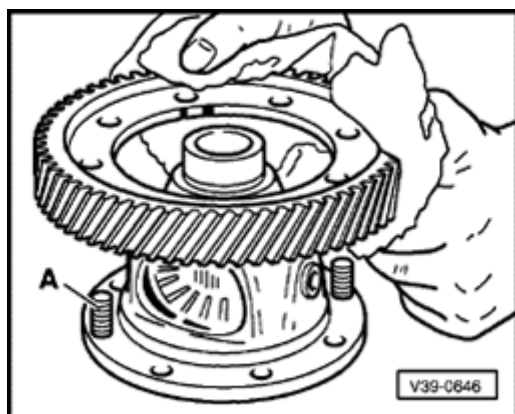


Fig. 9 Heating final drive gear to approx. 100 °C and installing

- Use bolts -A- from repair kit to guide final drive gear into position during installation.

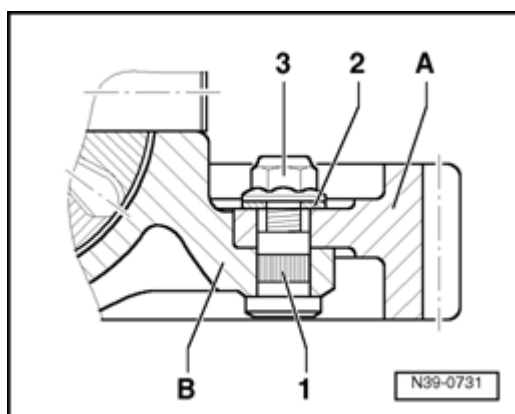


Fig. 10 Bolting final drive gear - A- and differential housing -B- together

Use special bolts -1- with backing plates -2- and nuts -3- according to Parts catalog.

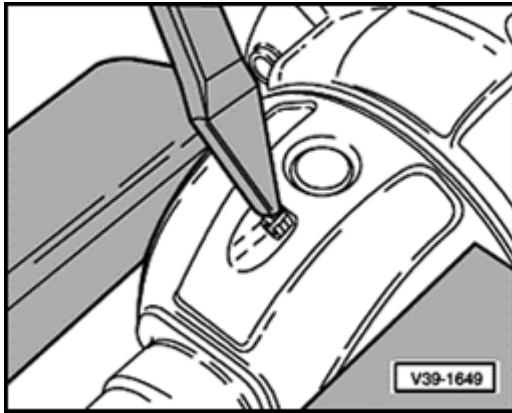


Fig. 11 Removing and installing differential bevel gear shaft spring pin

Removing

- Cover tapered roller bearing inner race to avoid possible damage and ingress of metal particles.
- Knock out spring pin with chisel, inserting chisel into circumferential groove.

Installing

- Knock fully into differential cage.

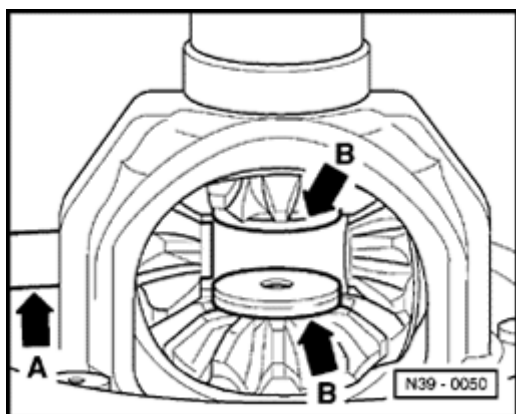


Fig. 12 Installing differential bevel gears

- Lubricate one piece thrust washer with transmission oil and install.
- Install both large differential bevel gears and secure (e.g. with flanged shaft).
- Insert small differential bevel gears (180 ° apart) and pivot into position.
- Push differential bevel gear shaft (arrow -A-) in up to first small bevel gear.
- Position threaded pieces (arrow -B-) in large bevel gears.

Installed position: shoulder to bevel gear

- Drive differential bevel gear shaft into final position and secure with spring pin.

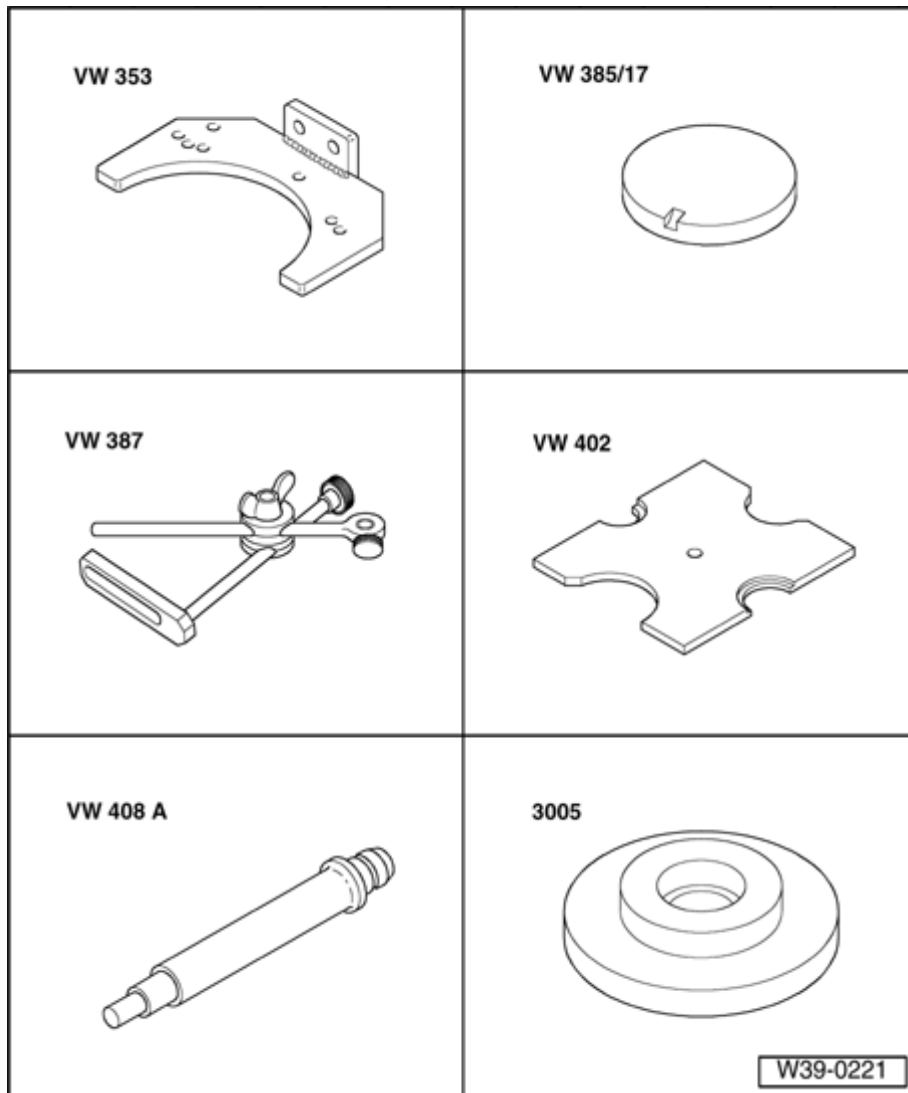
Adjustment overview

Note:

If transmission repairs have been performed, it is only necessary to adjust the input shaft, output shaft for 1st-4th gear, output shaft 5th, 6th and reverse gear or differential if components have been replaced which have a direct effect on the adjustment of the transmission. Refer to the following table to avoid unnecessary adjustment:

		To be adjusted:			
		Input shaft ⇒ Page 35-14	Output shaft 1st-4th gear ⇒ Page 35-46	Output shaft 5th, 6th and reverse gear ⇒ Page 35-76	Differential ⇒ Page 39-24
Replaced part:	Transmission housing	x	x	x	x
	Clutch housing	x	x	x	x
	Input shaft	x			
	Output shaft for 1st-4th gear		x		
	Output shaft 5th, 6th and reverse gear			x	
	Differential housing				x
	Input shaft tapered roller bearing	x			
	Output shaft 1st-4th gear tapered roller bearing		x		
	Output shaft 5th, 6th and reverse gear tapered roller bearing			x	

	Differential tapered roller bearing				x
--	-------------------------------------	--	--	--	---

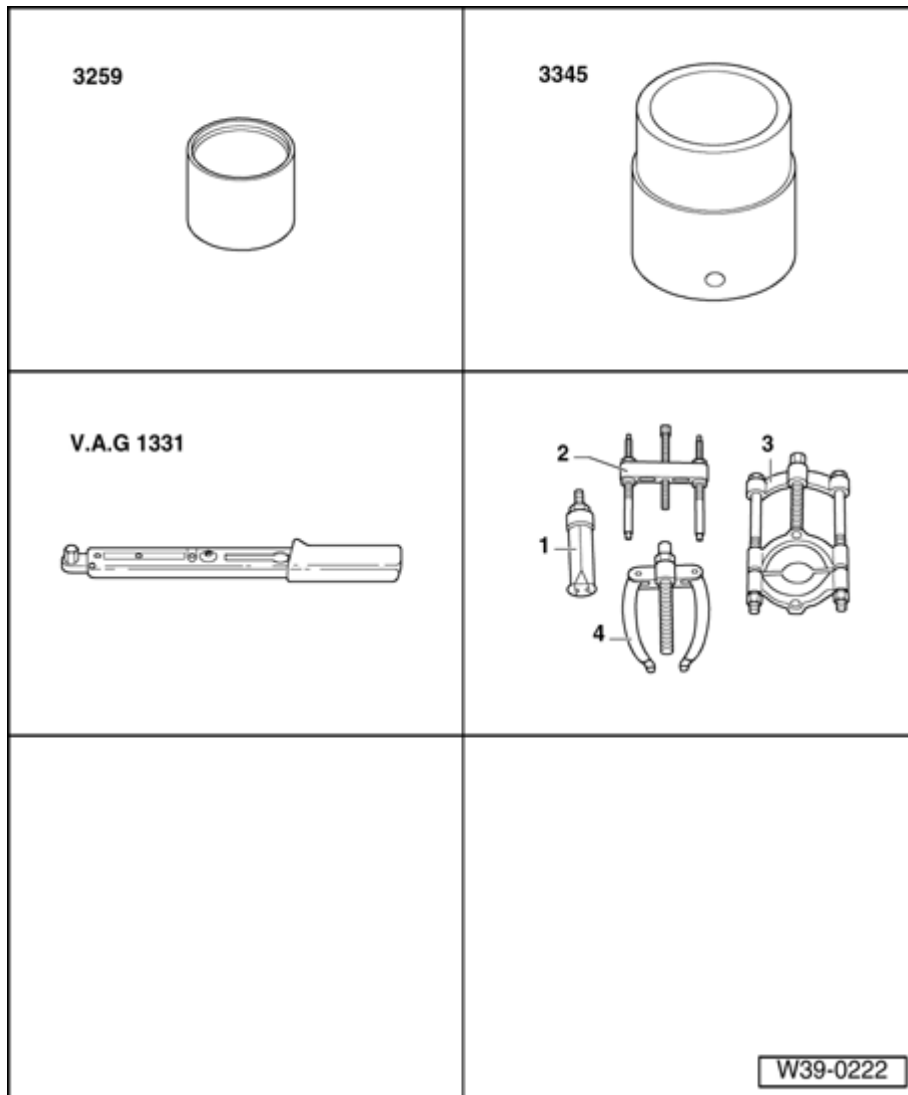


Differential, adjusting

Special tools and equipment

- ◆ VW 353
Transmission support
- ◆ VW 385/17
End measuring plate
- ◆ VW 387
Universal dial gauge bracket
- ◆ VW 402
Thrust plate
- ◆ VW 408 A
Press tool
- ◆ 3005 Press disk

39-25

**Special tools and equipment**

- ◆ 3259 Tube
- ◆ 3345 Tube
- ◆ V.A.G 1331 Torque wrench or equivalent
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 4 - Kukko 22/2 Counter support

The differential must be adjusted, when

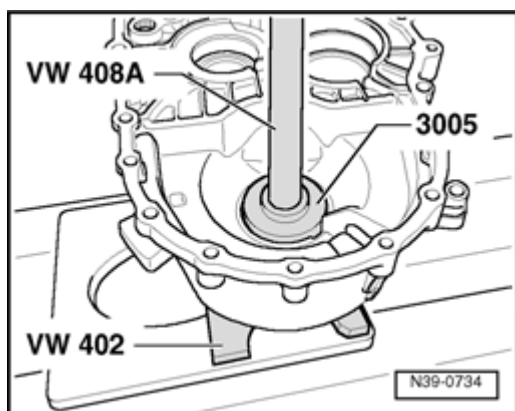
- ◆ Transmission housing
- ◆ Clutch housing
- ◆ Differential housing

or the

- ◆ Differential tapered roller bearing

have been replaced.

Adjustment overview ⇒ [Page 39-23](#).

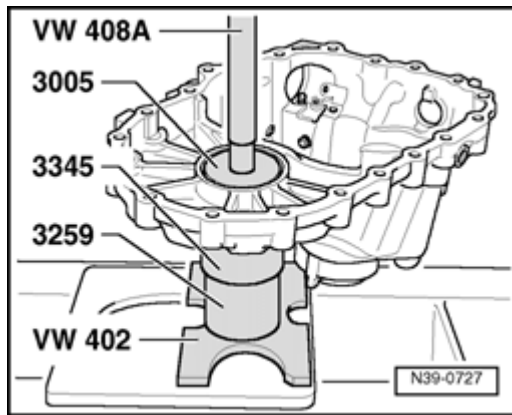


- Press tapered roller bearing outer race with shim (thickness 0.65 mm) into clutch housing ⇒ [Page 39-16](#).

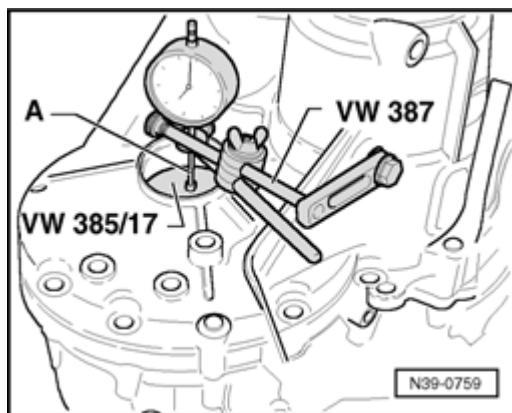
Note:

Inner and outer tapered roller bearing races are a pair. Do not interchange.

39-27



- Press tapered roller bearing outer race without shim into transmission housing.
- Install differential into clutch housing
- Install transmission housing and tighten 5 bolts to torque setting ⇒ [Page 34-60](#) item 13 .
- Press differential in direction of clutch housing and turn it eight times.
- Press differential in direction of transmission housing and when doing this turn it eight times.



- Mount dial gauge and zero with 1 mm preload.

A - Dial gauge extension 30 mm

- Move differential up and down and recall play indicated on dial gauge (Example: 0.70 mm).

Determining shim thickness

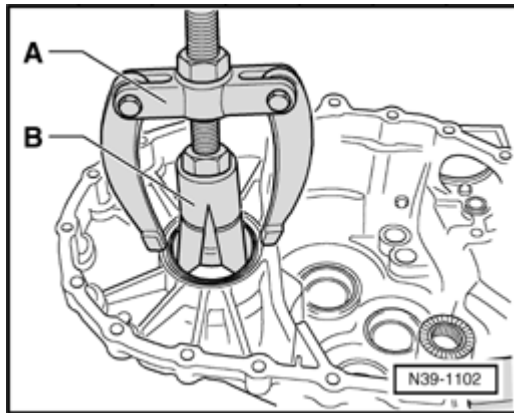
The specified bearing preload is obtained by adding a constant figure (0.30 mm) to the reading obtained.

Example:

Reading	0.70 mm
+ Preload (constant figure)	0.30 mm
Thickness of shim =	1.00 mm

- Take off transmission housing.

39-29



✦ - Pull tapered roller bearing outer race out of transmission housing.

A - Counter support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

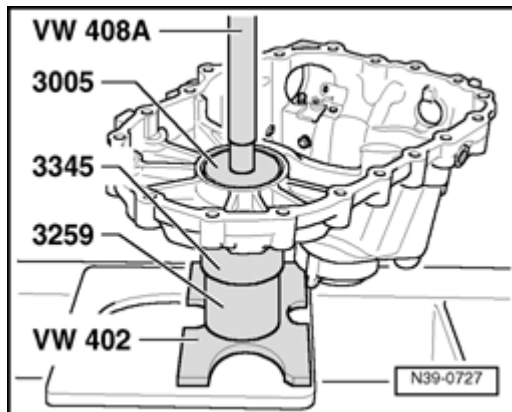
- Insert shims of correct thickness, thickest shim first.

The following shims are available:

Size (mm)	Part No.
0.65	02B 409 210
0.70	02B 409 210 A
0.75	02B 409 210 B
0.80	02B 409 210 C
0.85	02B 409 210 D
0.90	02B 409 210 E
0.95	02B 409 210 F
1.00	02B 409 210 G
1.05	02B 409 210 H
1.10	02B 409 210 J
1.15	02B 409 210 K
1.20	02B 409 210 L
1.25	02B 409 210 M

If the size of shim required is larger than that listed in the table, insert two shims totalling the correct figure.

Varying tolerances make it possible by measuring the shims to obtain the exact shim thickness required.



- Press outer race in again and tighten transmission housing to torque setting ⇒ [Page 34-60](#) item 13 .

Select a topic

01 - On Board Diagnostic (OBD)

[**ABS ITT Mark 20 IE On Board Diagnostic \(OBD\)**](#)

[Function](#)

[Identifying characteristics](#)

[Technical data](#)

[Safety precautions](#)

[On Board Diagnostic \(OBD\) with V.A.G 1551 Scan Tool or Tester](#)

[VAS 5051 \(flow chart\)](#)

[**Electrical/electronic components and locations**](#)

[Diagnostic Trouble Codes \(DTC\) displayed by warning lights -K14-, -](#)

[K47- and -K118-](#)

[**ABS ITT Mk 20 IE On Board Diagnostic \(OBD\) program**](#)

[V.A.G 1551 Scan Tool, connecting and selecting function](#)

[Diagnostic Trouble Code \(DTC\), memory](#)

[Automatic test sequence](#)

[Vehicle Diagnosis, Testing and Information System VAS 5051,](#)

[connecting and selecting ABS control module](#)

[Diagnostic Trouble Code \(DTC\) table](#)

[Diagnostic Trouble Code \(DTC\) memory, erasing and ending output](#)

[ABS control module, coding](#)

[Measured value block, reading](#)

[Safety precautions](#)

[Output Diagnostic Test Mode \(DTM\)](#)

[Basic setting, initiating](#)

[**ABS, ABS/EDL and ABS/EDL/ASR ITT Mark 20 IE, electrical check**](#)

[Multi-pin connector with contact assignment](#)

[Test table](#)

[Brake light switch, adjusting](#)

[**ABS Mark 60 On Board Diagnostic \(OBD\), vehicles from my 10.00**](#)

[Function](#)

[Arrangement of ABS MARK 60](#)

[Technical data](#)

[Safety precautions and fundamental points regarding](#)

[troubleshooting](#)

[Troubleshooting with V.A.G 1551 scan tool or tester VAS 5051 on](#)

[ABS Mark 60 \(flow chart\)](#)

[**Electrical/electronic components and installing locations**](#)

[**Diagnostic Trouble Codes \(DTCs\) displayed by warning lights - K47-, -K118- and -K155-**](#)

[**On Board Diagnostic \(OBD\), performing**](#)

[Test prerequisites for OBD](#)

[Safety precautions](#)

[Scan tool, connecting](#)

[V.A.G 1551 scan tool, connecting and selecting function](#)

[List of selectable functions](#)

[Automatic test sequence](#)

[Diagnostic Trouble Code \(DTC\) memory, checking](#)

[Output Diagnostic Test Mode \(DTM\)](#)

[Diagnostic Trouble Code \(DTC\) table](#)

[Diagnostic Trouble Code \(DTC\) memory, erasing and ending output](#)

[ABS control module, coding](#)

[Vehicle data label](#)

[Measured value block, reading](#)

[Output Diagnostic Test Mode \(DTM\)](#)

[Basic setting, initiating](#)

[Login procedure](#)

Electrical check of Mark 60

[Multi-pin connector with contact assignments](#)

[Test table \(test steps 1 - 16\)](#)

[Test table \(test steps 17 - 23\)](#)

Definitions

Additional Information

System Overviews

Other Topics

[CAN-BUS Operation](#)

[ESP Operation](#)

[VAS 5234 Setup and Operation](#)

ABS ITT Mark 20 IE On Board Diagnostic (OBD)

Function

Since the control modules are interconnected with CAN-bus, always begin OBD by checking the Diagnostic Trouble Code (DTC) memories of all the control modules in the vehicle.

This occurs in the Automatic test sequence and is activated with key function 00.

When doing this, check to see if there are DTCs stored which may influence the ABS.

On Board Diagnostic (OBD) relates to the electrical/electronic part of the ABS, i.e. only malfunctions via the electrical connection to the control module are recognized (e.g. speed sensor open circuit).

The 25-pin ABS Control Module (w/EDL) - J104- forms with the hydraulic unit a compact unit. The unit is located on the left in the engine compartment. The control module is equipped with a DTC memory. The diagnostic connection is located in the center console below the heating/air conditioning controls.

The control module recognizes malfunctions during vehicle operation and stores them in a permanent memory, the contents of which remain even during periods of no battery voltage.

Sporadic (isolated) malfunctions will also be recognized and stored. But if these malfunctions do not occur again within the next 50 vehicle starts and driving off sequences then, with the exception of "control module inoperative", the DTC memory will be erased.

After switching on the ignition and/or starting the engine the ABS warning light -K47- and the warning light for brake system -K118- light up for approx. 2 seconds.

During this period a test sequence (self-check) is run in the control module for the following functions:

- ◆ To check if the supply voltage is at least 10.0 Volt
- ◆ To check control module including the valve windings
- ◆ To check the coding of the control module
- ◆ A static check of the speed sensor (no speed signal)
- ◆ If after driving off and exceeding a speed of approx. 20 km/h (approx. 13 mph) the speed signal is not OK. The ABS warning light -K47- will light up again.

V.A.G 1551 Scan Tool or tester VAS 5051

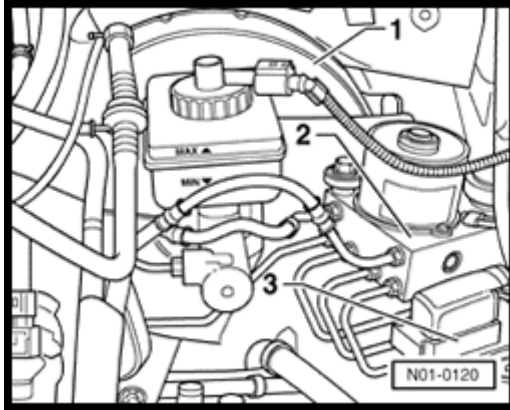
The On Board Diagnostic (OBD) must be initiated always at the commencement of troubleshooting. Electrical malfunctions which influence the braking characteristics will be stored. They can be checked with the V.A.G 1551 Scan Tool or with the tester VAS 5051.

The information displayed is used in conjunction with a DTC table which has information on the possible DTC causes for repair measures.

01-4

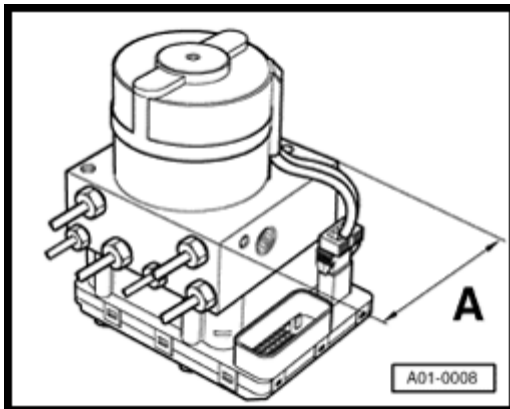
Identifying characteristics

The brake booster boost is produced by vacuum pressure.



Distinguishing features:

- 1 - 10" brake booster
- 2 - Hydraulic unit
- 3 - Control module, 25-pin (bolted to hydraulic unit)



Distinguishing features of ABS, ABS/EDL and ABS/EDL/ASR ITT Mark 20 IE hydraulic unit

- ◆ Dimension -A- 100 mm vehicles with ABS
- ◆ Dimension -A- 130 mm vehicles with ABS/EDL
- ◆ Dimension -A- 130 mm vehicles with ABS/EDL/ASR

Technical data

Control module identification

The control module version is displayed when the V.A.G 1551 Scan Tool or the tester VAS 5051 is connected and the control module for brake electronics is selected ⇒ [Page 01-23](#) .

1J0 907 379 D / G - ABS

1J0 907 379 E / H - ABS/EDL

1J0 907 379 R / J - ABS/EDL/ASR

Diagnostic Trouble Code (DTC) memory

A non-volatile memory ensures that the contents of the DTC memory are retained even without a voltage supply.

Data output is achieved in operating mode 1 (rapid data transfer).

Safety precautions

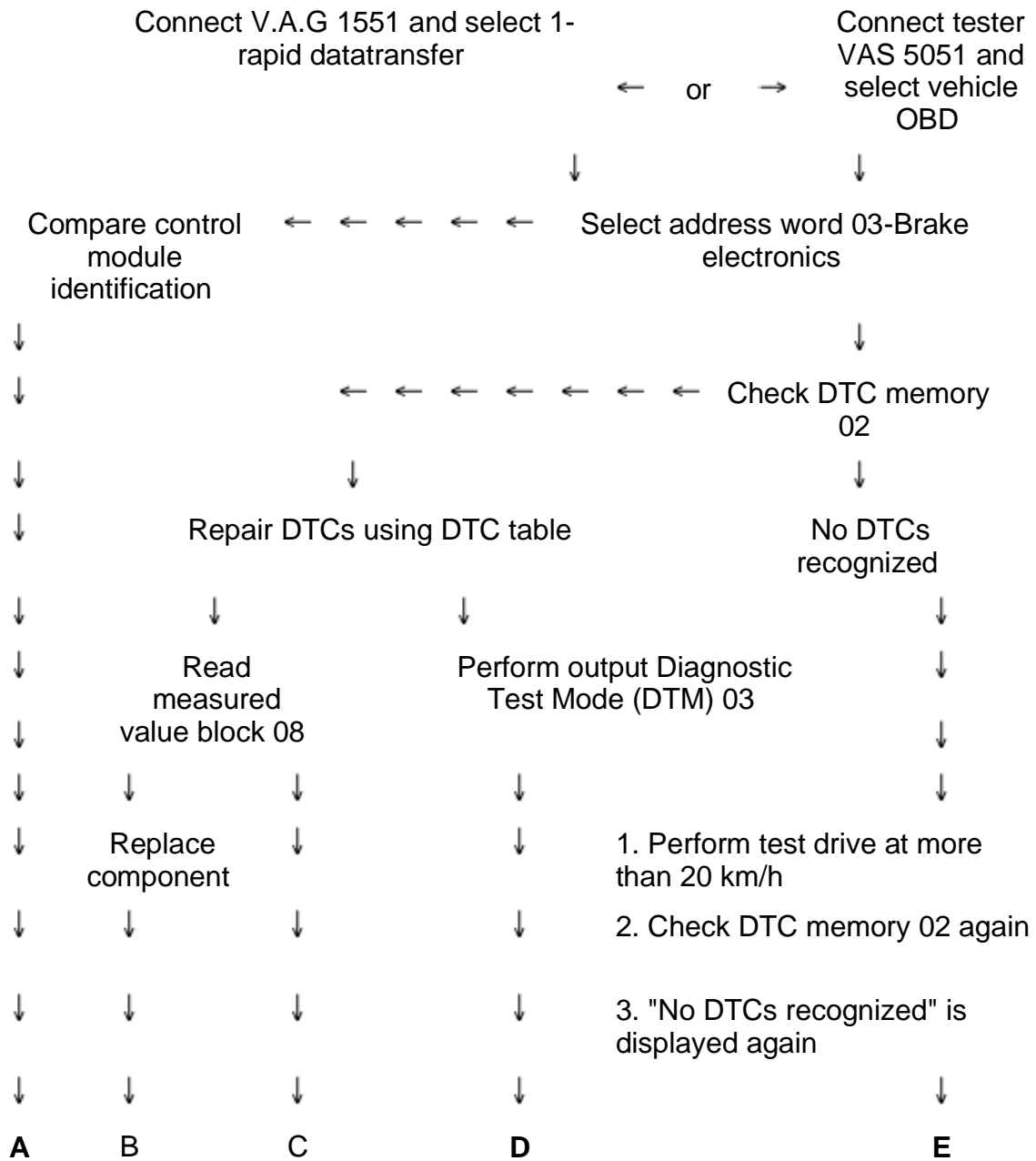
- ◆ The ABS is a vehicle safety system; the appropriate knowledge is necessary to work on the system.
- ◆ In order to check complaints and to be able to carry out pin-pointed troubleshooting, the Diagnostic Trouble Code (DTC) memory must be checked before beginning work on the ABS system.
- ◆ Only separate connectors when the ignition is switched off.
- ◆ Observe the appropriate instructions regarding the handling of brake fluid.

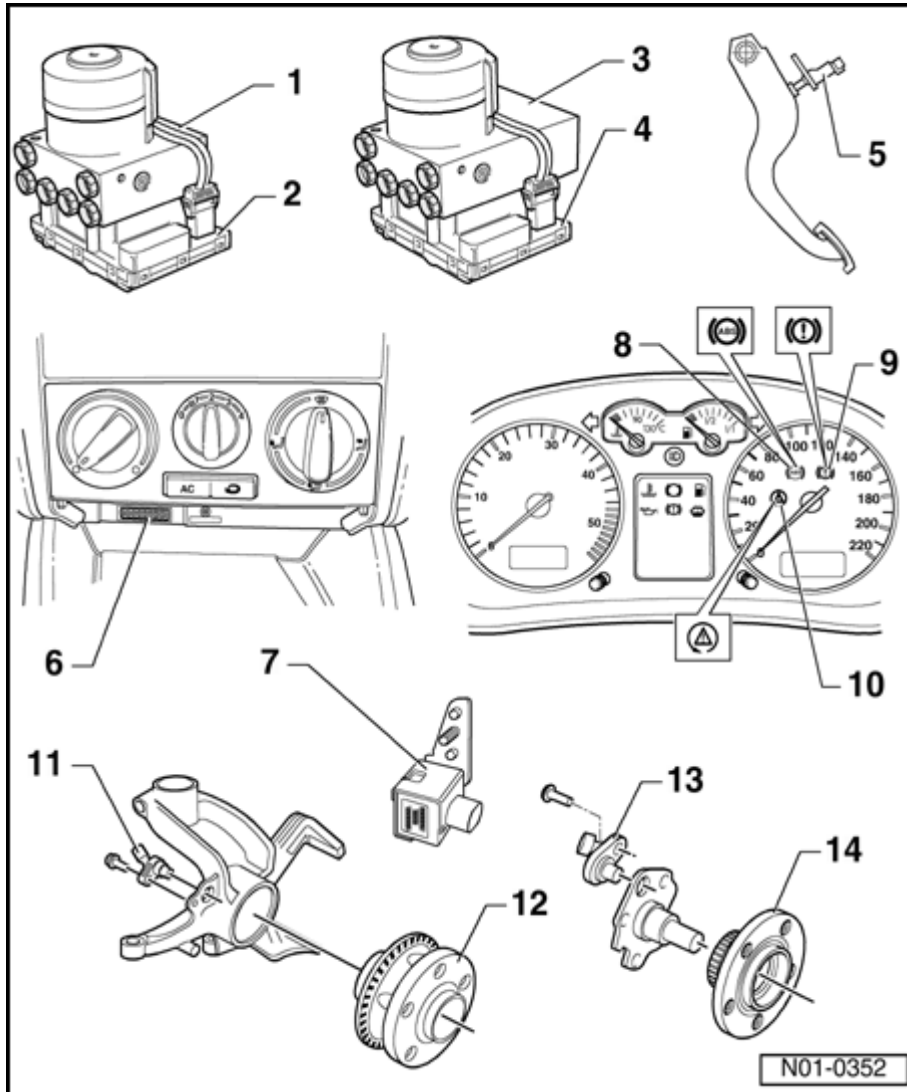
⇒ [Repair Manual, Brake System, Repair Group 47](#)

- ◆ ABS malfunctions are indicated by the ABS warning light illuminating. Certain malfunctions will only be recognized at speeds above 20 km/h (approx. 13 mph) (carry out road test).
- ◆ If the ABS Warning Light -K47- and the warning light for brake system -K118- do not light up, but the brake system is not functioning correctly then the malfunction must be sought in the conventional braking system.

⇒ [Repair Manual, Brake System; Repair Group 45](#)

On Board Diagnostic (OBD) with V.A.G 1551 Scan Tool or Tester VAS 5051 (flow chart)





Electrical/electronic components locations

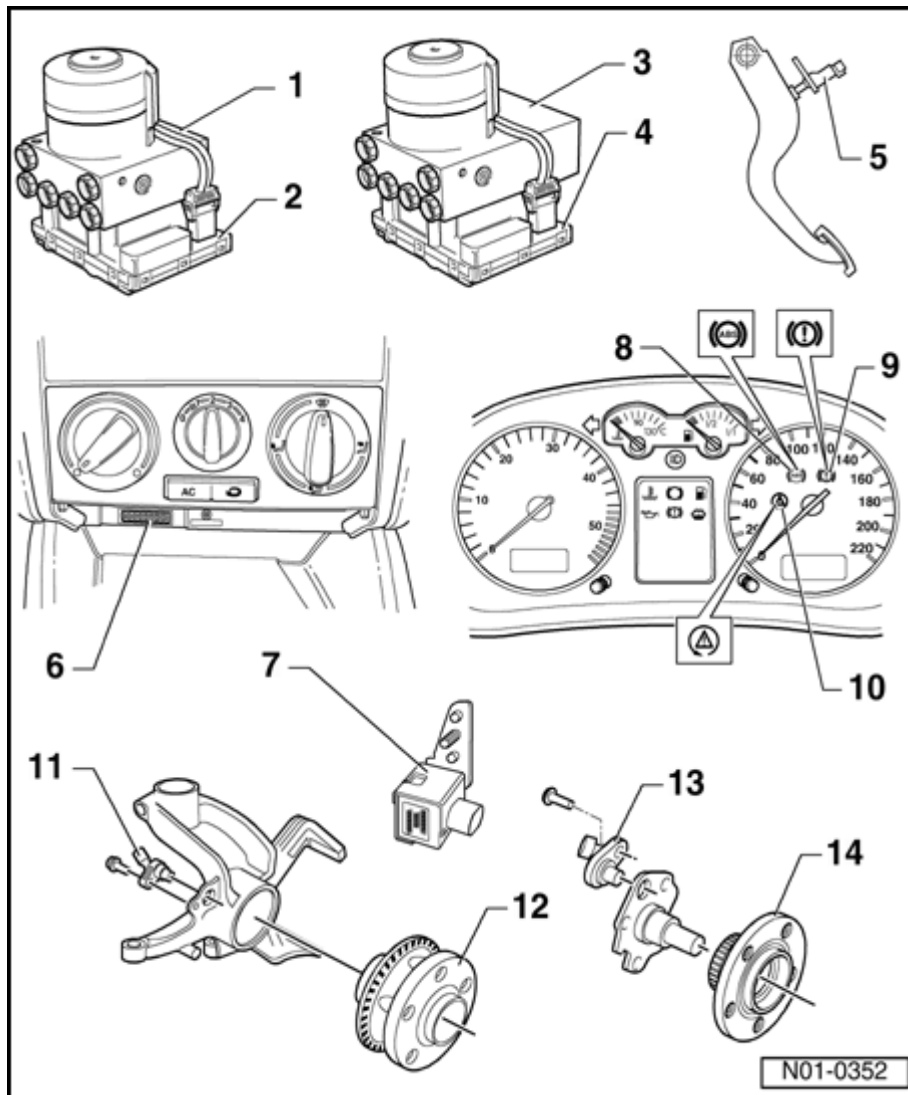
1 - ABS hydraulic N55-

- ◆ Located on engine compartment
- ◆ The ABS hydraulic pump -V64 inlet/outlet hydraulic unit must be checked by Diagnostic
- ◆ The ABS Hydraulic Pump -V64 block must be separated from another
- ◆ Removing and installing:

⇒ [Repair Manual, ABS System, Repair Group](#)

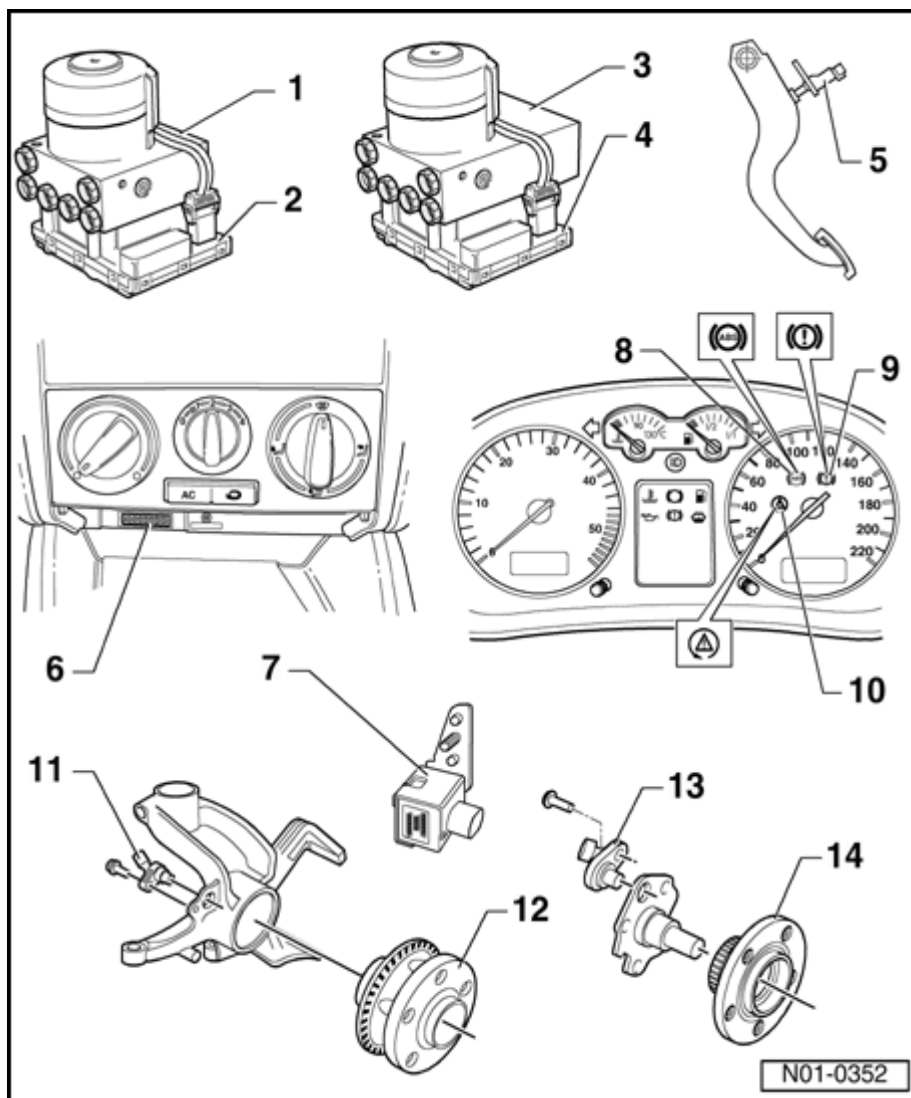
- ◆ When changing hydraulic unit seal the old unit and the plugs from repair set F 698 311 A

01-10



2 - ABS control module (w/EDL) - J104-

- ◆ Location: on hydraulic unit on left of engine compartment
- ◆ Checked by On Board Diagnostic (OBD)
- ◆ Checking the multi-pin connector to control module ⇒ [Page 01-106](#)
- ◆ Do not disconnect connector before successfully completing OBD. Switch ignition off before separating connection.



3 ABS/EDL and -ABS/EDL/ASR hydraulic unit -N55-

◆ Located on left of engine compartment.

◆ The ABS hydraulic pump -V64- and the inlet/outlet valves in the hydraulic unit are checked by On Board Diagnostic (OBD)

◆ The ABS hydraulic pump -V64- and valve block must not be separated from one another

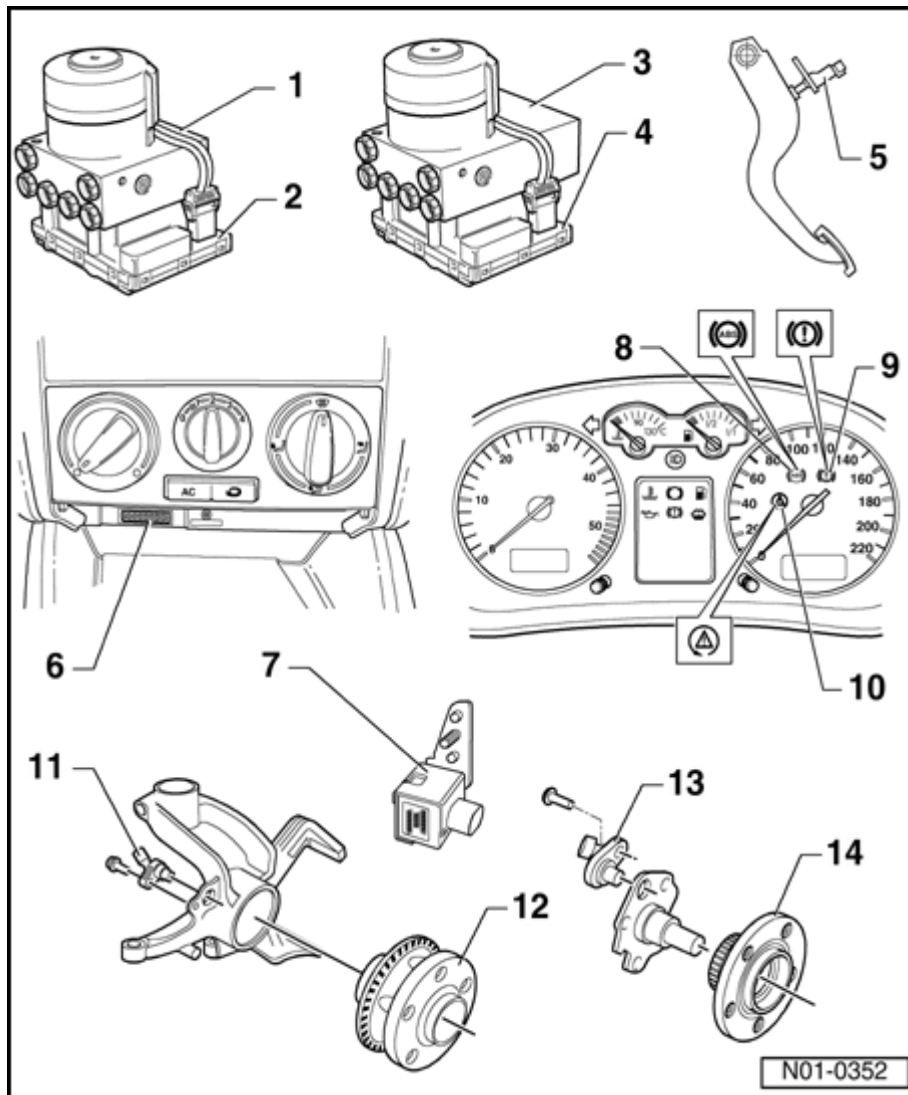
◆ Removing and installing

⇒ [Repair Manual, Brake System, Repair Group 45](#)

◆ When changing the hydraulic unit, always

seal the
old part
with the
plugs
from the
repair set
Part No.
1H0 698
311 A

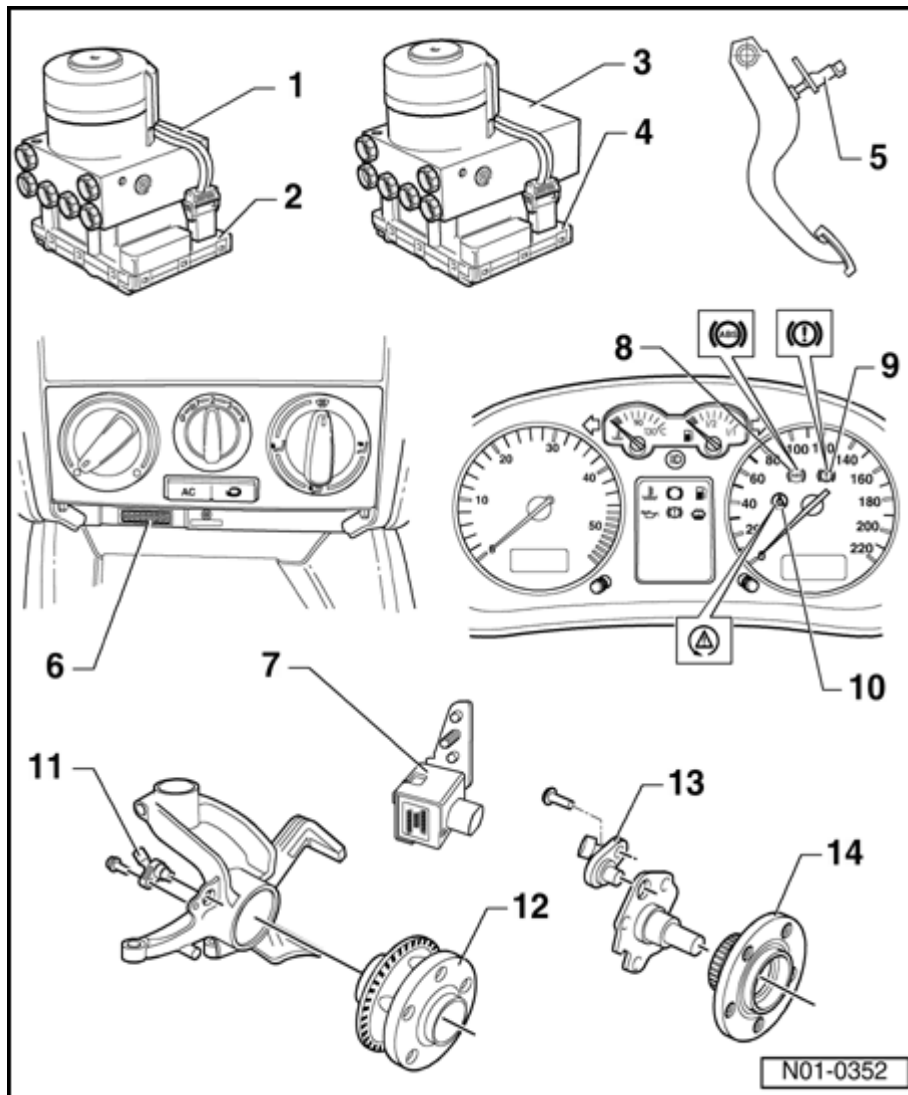
01-12



4 ABS/EDL and - ABS/EDL/ASR Control Module -J104-

- ◆ Location: on hydraulic unit on left of engine compartment
- ◆ Checked by On Board Diagnostic (OBD)
- ◆ Checking the multi-pin connector to control module
⇒ [Page 01-106](#)
- ◆ Do not disconnect connector before successfully completing OBD. Switch ignition off before separating connection.

01-13



5 - Brake light switch - F-

- ◆ The brake light switch is open in the rest position;

- ◆ Adjusting ⇒ [Page 01-131](#)

- ◆ Can be checked via read measured value block ⇒ [Page 01-61](#)

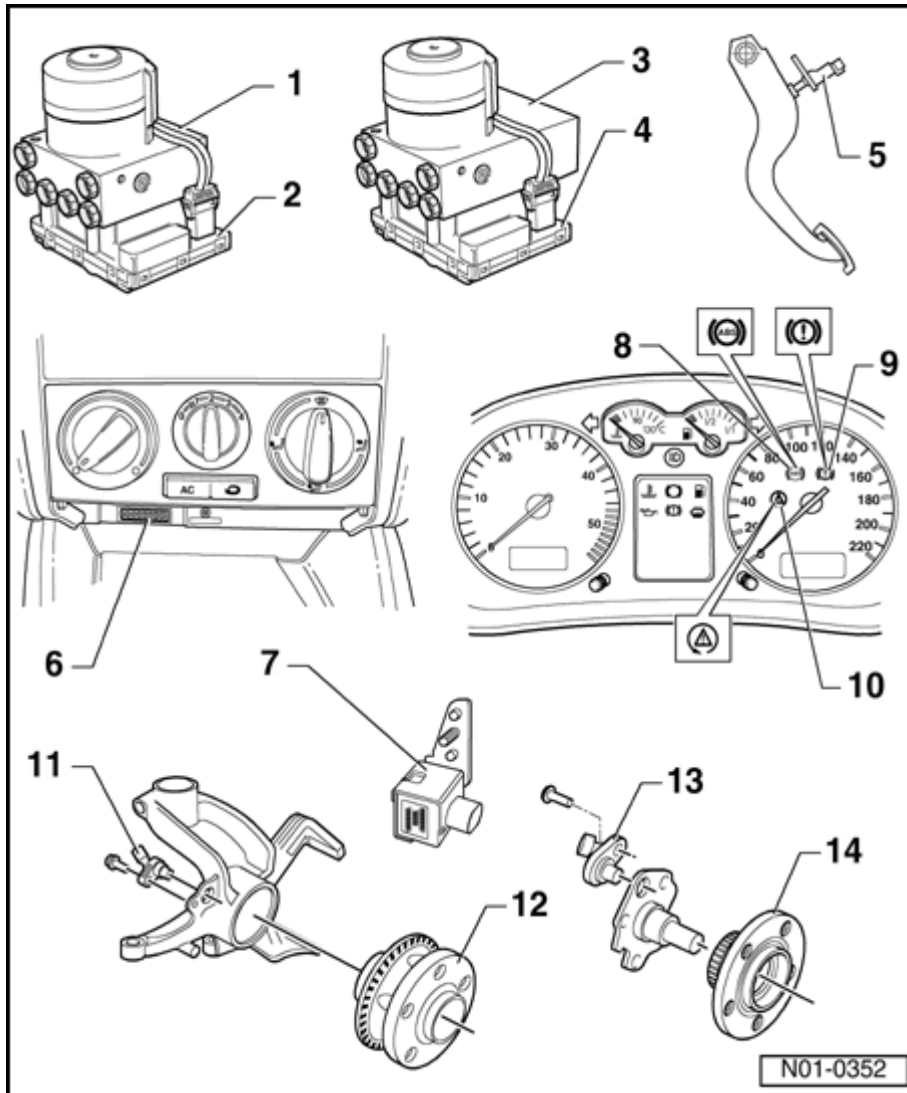
6 - Data Link Connector (DLC)

- ◆ Installation position: in center console below heating/air conditioning controls

7 Longitudinal - acceleration sensor - G251-

- ◆ All-wheel drive vehicles with Haldex coupling

only



8 - ABS warning light - K47-

◆ Location: instrument cluster

Function:
⇒ [Page 01-17](#)

9 - Warning light for brake system -K118-

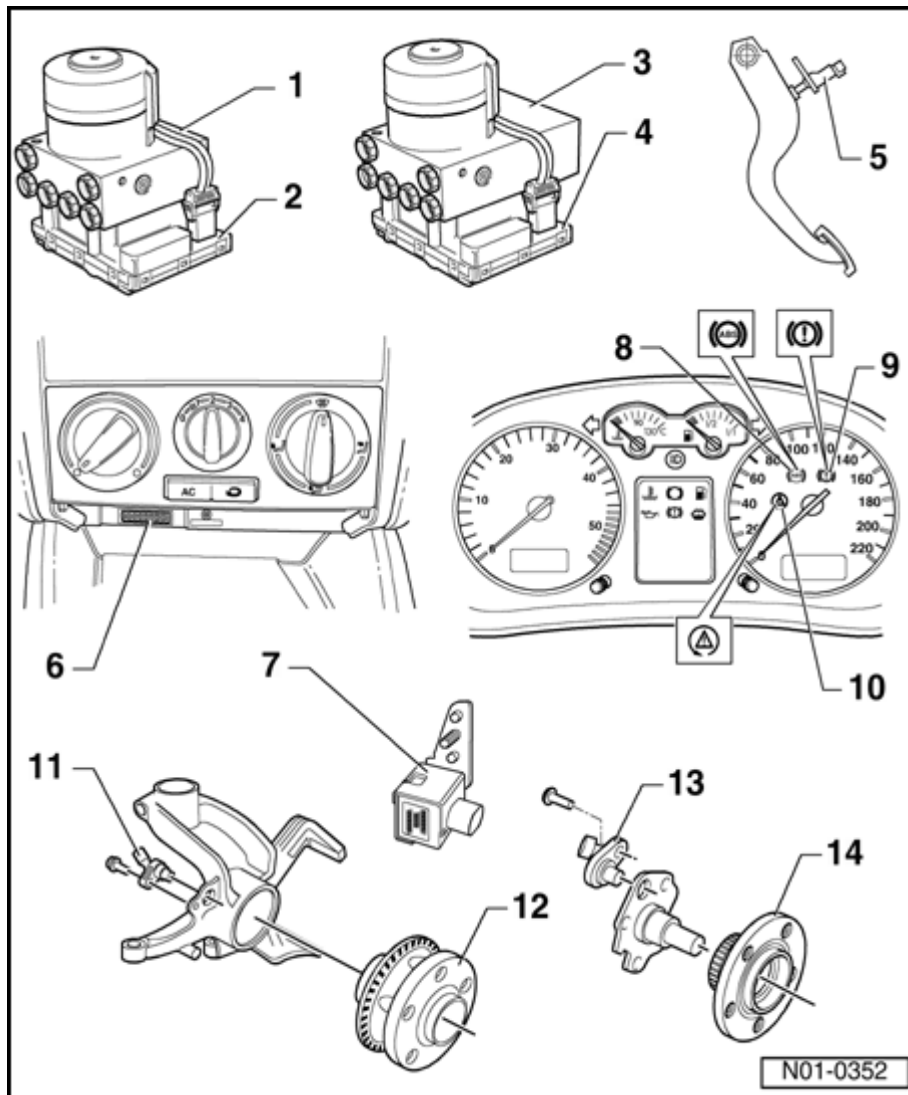
◆ Location: instrument cluster

Function:
⇒ [Page 01-17](#)

10 - ESP control lamp - K155-

◆ Location: instrument cluster

01-15



11 Right/left - front ABS wheel speed sensor - G45-/-G47-

- ◆ Checked by On Board Diagnostic (OBD)
- ◆ Before inserting the sensor clean the inner surface of the sensor mounting and coat with lubricating paste G 000 650
- ◆ When connecting the speed sensor wire ensure it is not twisted in the wheel housing
- ◆ Bolt tightening torque - 10 Nm

12 - Wheel hub with impulse rotor for

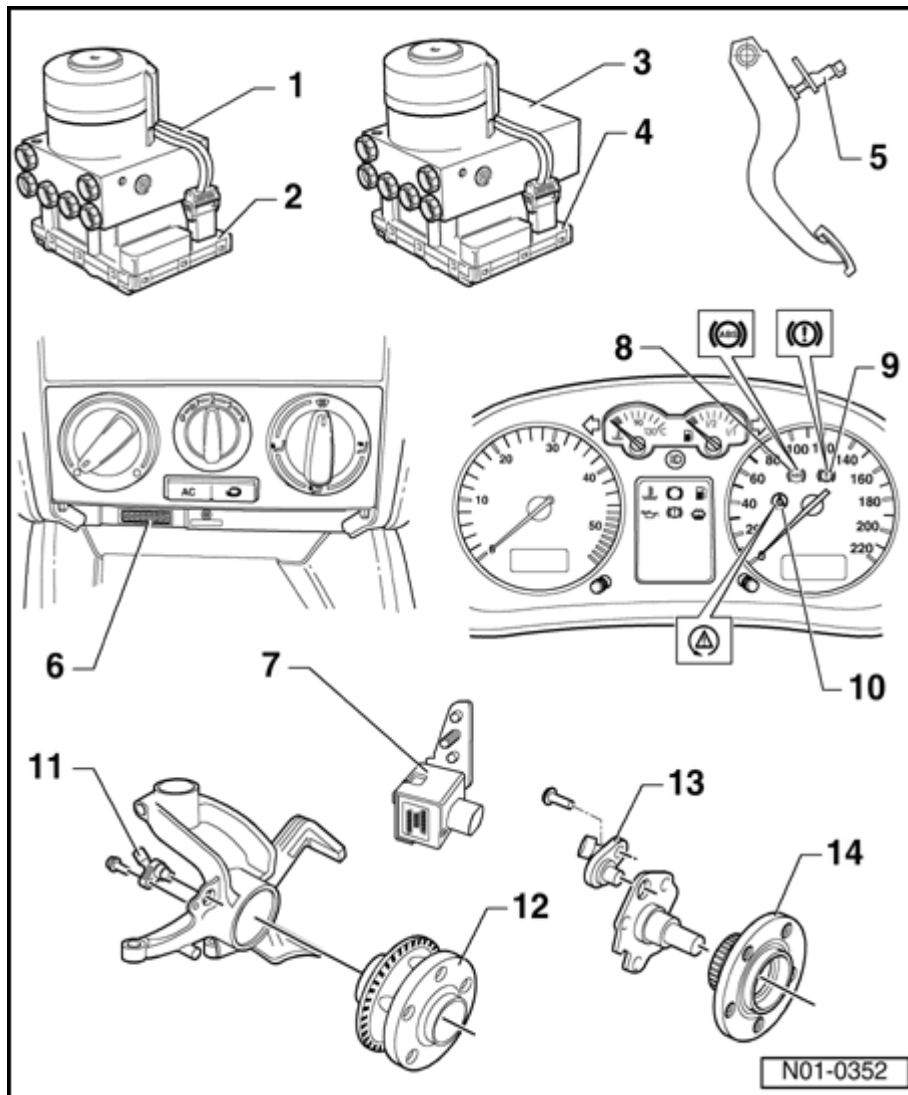
**right/left
front
speed
sensors**

- ◆ Rotor and speed sensors for front left and right-hand sides are identical

- ◆ Removing and installing

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

01-16



13 Right/left - rear ABS wheel speed sensor - G44-/- G46-

- ◆ Checked by On Board Diagnostic (OBD)
- ◆ Before inserting the sensor clean the inner surface of the sensor mounting and coat with lubricating paste G 000 650
- ◆ When connecting the speed sensor wire ensure it is not twisted in the wheel housing
- ◆ Bolt tightening torque - 10 Nm

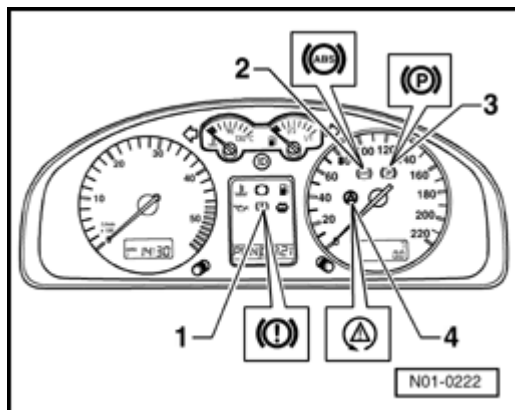
14 - Wheel hub with impulse rotor for right/left

**rear
speed
sensors**

- ◆ Rotor and speed sensors for left and right-hand sides are identical

- ◆ Removing and installing

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42](#)



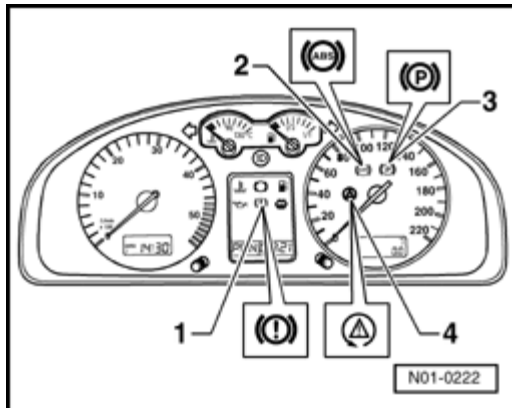
Diagnostic Trouble Codes (DTC) displayed by warning lights -K14-, -K47- and -K118-

Warning lights

Item	Designation
1	Warning light for brake system -K118-
2	ABS warning light -K47-
3	Parking brake indicator light -K14-

For vehicles with ABS/EDL/ASR and/or a radio/navigation system, the warning light for brake system -K118- is at position -3-.

The function of the parking brake warning light -K14- is then taken on by the warning light for brake system -K118-.



ABS warning light -K47-

◆ If the ABS warning light -K47- (-2-) does not go out after switching ignition on and completion of test sequence then the malfunction may be:

- a- Voltage supply is below 10 Volts
- b- There is a malfunction in the ABS

The anti-locking brake system remains switched off with an ABS malfunction -b-, but the brake system remains fully operational.

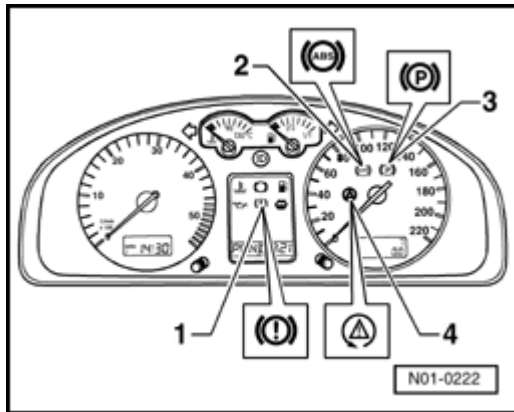
- c- Since the last time the vehicle was started there was a temporary speed sensor malfunction.

In the case of a sensor malfunction -c-, the ABS warning light -K47- will extinguish after restarting the engine and attaining a speed of above 20 km/h (approx. 13 mph).

- d- The connection from instrument cluster to ABS control module (w/EDL) -J104- is interrupted.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- e- Instrument cluster is faulty.



ABS warning lights -K47- and -K118-

- ◆ If the ABS warning light -K47- (-2-) goes out but the warning light for brake system -K118- (-1-) remains on and three warning tones are audible then the malfunction may be:

-a- The brake fluid level is too low.

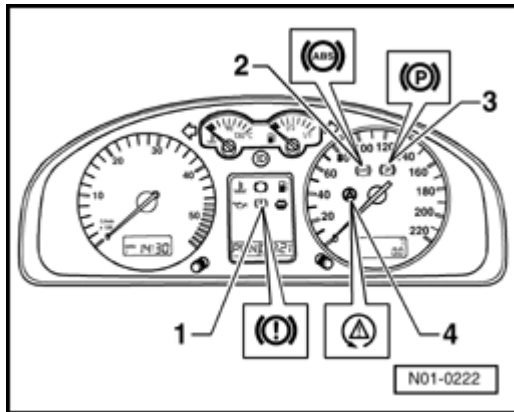
-b- There is a malfunction in the activation of the warning light for brake system -K118-.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ If the ABS warning light -K47- (-2-) and the brake system warning light -K118- (-1-) light up, the ABS system is faulty and the EBD (Electronic Brake pressure Distribution) is not functioning.

WARNING!

After the ABS warning light -K47- and warning light for brake system -K118- have illuminated it is possible that the rear wheels will lock-up earlier when braking.



Parking brake indicator light -K14-

◆ If the parking brake indicator light -K14- -3- does not go out after switching the ignition on, the malfunction may be:

- a- The parking brake is applied.
- b- The parking brake warning light switch -F9- for the parking brake indicator light -K14- is faulty or incorrectly adjusted.
- c- There is a wire routing malfunction.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

Vehicles with ABS/EDL

Malfunction: Vehicle has no EDL function

For this complaint a possible cause may be the brake light switch -F- is incorrectly adjusted. Adjusting brake light switch ⇒ [Page 01-131](#) .

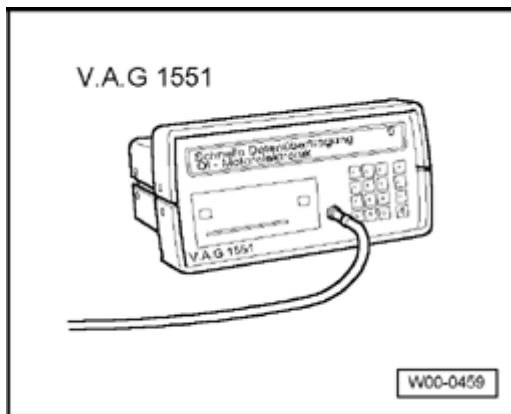
Another possible cause may be the brake light switch -F- is not functioning. The function can be checked in Read measured value block ⇒ [Page 01-61](#) , display group number 003.

01-21

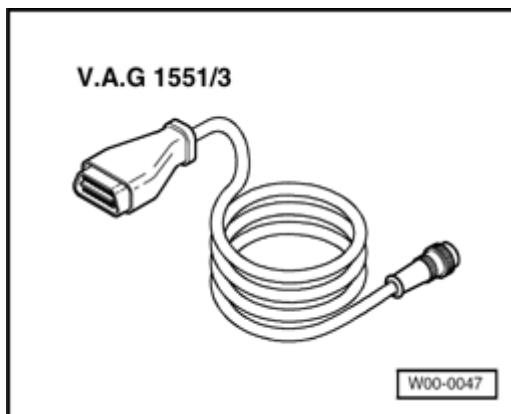
ABS ITT Mk 20 IE On Board Diagnostic (OBD) program

All functions which could previously be performed with V.A.G 1551 can also be performed with the new tester VAS 5051.

Special tools and equipment



- ◆ V.A.G 1551 Scan Tool or V.A.G 1552 vehicle system tester.



- ◆ V.A.G 1551/3 or 1551/3A Adapter cable

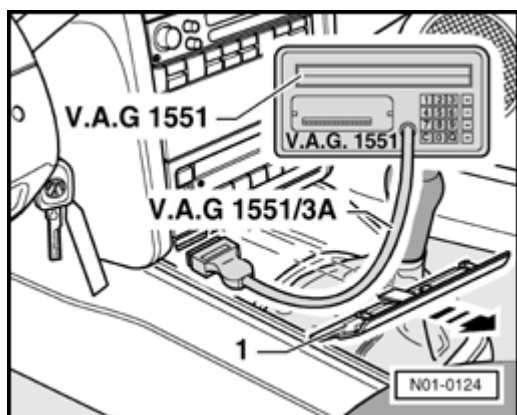
Test requirements

- The tires installed to all wheels must be of the same (approved) size; tires inflated to prescribed pressure.
- Mechanical/hydraulic parts of the brake system including brake light switch and brake lights OK.
- Hydraulic lines and connections not leaking (visual check of hydraulic unit, brake calipers, wheel cylinders, tandem master brake cylinder).
- Wheel bearings and wheel bearing play OK.
- ABS control module (w/EDL) -J104- is correctly bolted to hydraulic unit -N55-.
- Connector on ABS control module (w/EDL) -J104- correctly plugged-in (retainer is engaged).
- Check contacts of ABS components for damage and correct seating.
- All fuses OK according to wiring diagram (remove fuse from fuse holder to check).
- Supply voltage OK (at least 10.0 V).

V.A.G 1551 Scan Tool, connecting a selecting function

Note:

- ◆ All functions which could previously be performed with V.A.G 1551 can also be performed with the new tester VAS 5051
- ◆ The ABS function is switched off in the control module during the On Board Diagnostic
- ◆ The Diagnostic Trouble Code (DTC) memory can be erased after successful checking repair.



- Pull cover -1- off in direction of arrow.
- With ignition switched off connect V.A.G 1551 using cable V.A.G 1551/3(A) to Data Link Connector

Connecting VAS 5051 ⇒ [Page 01-31](#) .

V.A.G - On Board Diagnostic **HELP**

1 - Rapid data transfer1)

2 - Blink code output1)



Indicated on display

1) Is displayed alternately

Note:

If there is no indication on display, check Diagnostic Electrical checks ⇒ [Page 01-102](#) , test step 14 and 15.

- ◆ Depending on the program, additional information can be printed out by pressing the **HELP** key of V.A.G 1551.
- ◆ The **→** key is used for moving forward through the program.

◆ *The PRINT key is used for switching on the printer (warning lamp in key comes on).*

- Switch ignition on.
- Switch on printer with Print key (indicator lamp in key lights up).
- Press key -1- for "Rapid data transfer" operating mode.

Rapid data transfer
Enter address word XX

HELP



Indicated on display

- Press keys -0- and -3-; 03 inputs the address word of the vehicle system to be tested "Brake electronics".

Rapid data transfer
03 - Brake electronics

Q



Indicated on display

- Confirm input with Q key.

1J0 907 379 D ABS 20 IE CAN 0001 →
Coding 03604 WSC XXXXX



Display shows e.g.

Displayed is:

◆ The control module identification number.

e.g. (1J0 907 379 D)

Allocation of control module see Parts catalog

◆ System designation (ABS 20 IE)

◆ Data BUS present. (CAN)

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

◆ Control module code (03604).

Coding control module ⇒ [Page 01-58](#)

◆ Workshop code

⇒ *V.A.G 1551 Scan Tool operating instructions*

If the control module identification number does not appear ⇒ Summary of selectable functions ⇒ [Page 01-27](#)

- Press → key.

Rapid data transfer HELP
Select function XX

◀ Indicated on display (select function, e.g. 02 - Check DTC memory).

Rapid data transfer HELP
Control module does not answer!

◀ Indicated on display

By pressing the HELP key, a list of possible fault causes is printed out.

- After eliminating possible causes of malfunctions, enter the address word 03 for "Brake electronics" again and confirm.

If "Control module does not answer!" again appears:

Rapid data transfer HELP
Control module does not answer!

◀ Indicated on display

- Perform test steps 1, 2 and 3 ⇒ [Page 01-102](#) , Electrical check.

Rapid data transfer →
No signal from control module!

◀ malfunctions have occurred during checking of control module identification (possibly influenced from external sources?)

- Check DLC as well as voltage supply and Ground connection for ABS Control Module (w/EDL) -J104-, Electrical check, ⇒ [Page 01-102](#) .

- After repairing possible causes of malfunction, again enter address word 03 for "Brake electronics" and confirm with Q key.

List of selectable functions

		Page
00 -	Automatic test sequence	⇒ Page 01-30
01 -	Check control module version ⇒Connecting V.A.G 1551 Scan Tool and selecting functions	⇒ Page 01-23
02 -	Check DTC memory	⇒ Page 01-28
03 -	Output Diagnostic Test Mode	⇒ Page 01-74
04 -	Initiate basic setting	⇒ Page 01-91
05 -	Erase DTC memory	⇒ Page 01-56
06 -	End output	⇒ Page 01-56
07 -	Code control module	⇒ Page 01-58
08 -	Read measured value block	⇒ Page 01-61

Diagnostic Trouble Code (DTC), memory

All functions which could previously be performed with V.A.G 1551 can also be performed with the new tester VAS 5051.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press keys -0- and -2-; 02 enters the "Check DTC memory" function.

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display

- Confirm entry with Q key.

X DTCs recognised!



The number of stored DTCs or "No DTCs recognized" appears in the display.

- Press → key.

The stored DTCs are displayed and printed out one after the other.

- With DTC information print-out eliminate malfunctions according to DTC table, ⇒ [Page 01-35](#) .

As with "No DTC recognized", the program returns to the start position after pressing the → key:

Rapid data transfer
Select function XX

HELP



Indicated on display

- End output (Function 06) ⇒ [Page 01-56](#) .

- Switch off ignition and disconnect tester at DLC.

Work sequence if a DTC has been detected:

1. Repair according to DTC table, ⇒ [Page 01-35](#)
2. Check DTC memory (Function 02)
3. Erase DTC memory (Function 05)
4. End output (Function 06)
5. Perform a test drive
6. Check DTC memory again

Automatic test sequence

The automatic test sequence checks all the Diagnostic Trouble Code (DTC) memories of the control modules.

- Switch ignition on.

V.A.G - On Board Diagnostic HELP

1 - Rapid data transfer1)

2 - Blink code output1)



Indicated on display

1) Is displayed alternately

- Press key -1- for "Rapid data transfer" operating mode.
- Switch on printer with the Print key (indicator lamp in key lights up).

Rapid data transfer HELP

Select function XX



Indicated on display

- Press key -0- twice; 00 enters "Automatic test sequence" function.
- Confirm entry with Q key.

1J0 907 379 D ABS 20 IE CAN0001 →

Coding 03604 WSC XXXXX



The V.A.G 1551 Scan Tool display will show the control module identification, e.g.:

Thereafter all control module identifications with eventual DTC memory entries are displayed

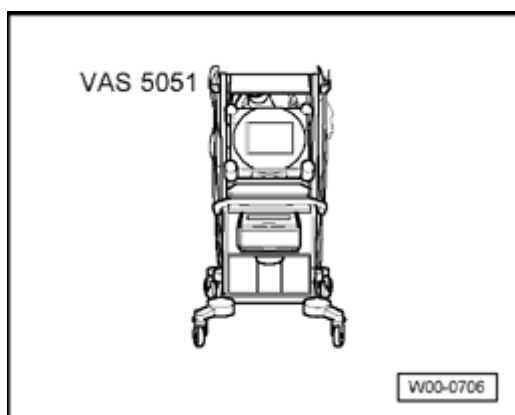
Vehicle Diagnosis, Testing and Information System VAS 5051, connecting and selecting ABS control module

All functions which could previously be performed with V.A.G 1551 can also be performed with the new tester VAS 5051 in the operating mode "Vehicle On Board Diagnostic":

⇒ *Operating instructions for Vehicle Diagnosis, Testing and Information System VAS 5051.*

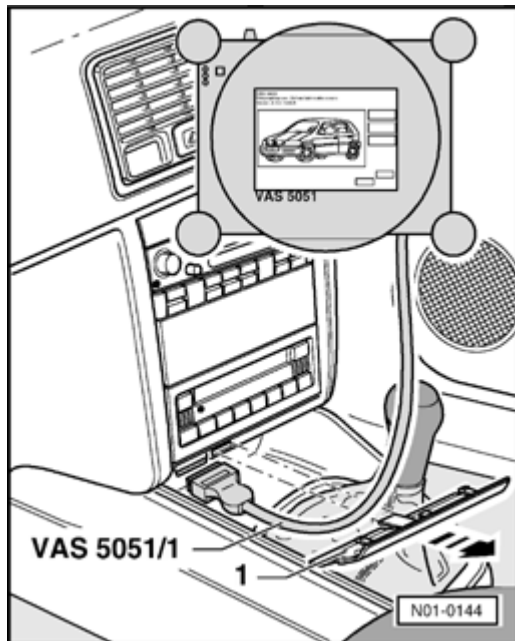
Special tools and equipment

- ◆ VAS 5051 Vehicle Diagnosis, Testing and Information System



Note:

- ◆ *The ABS function is switched off in the control module during the On Board Diagnostic.*
- ◆ *The DTC memory can be erased after successful checking and repair.*



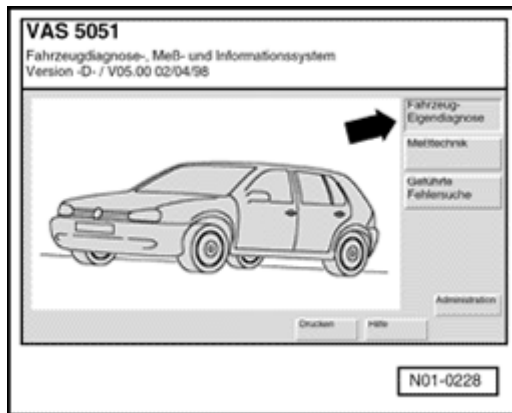
- Pull cover -1- off in direction of -arrow-.
- With ignition switched off, connect tester 5051 to diagnosis connection using diagnostic cable VAS 5051/1 or VAS 5051/3.

Note:

- ◆ *In the functions 04 - Basic setting/08 - Read Measured value block, the display zones listed from top to bottom.*
- ◆ *If the display does not indicate as described the work sequence:*

⇒ *Operating instructions for Vehicle Diagnostic Testing and Information System VAS 5051.*

01-33



Indicated on display

Select operating mode:

- Press button on display for "Vehicle On Board Diagnostic" - arrow-.



Indicated on display

Select vehicle system:

- Press "03 - Brake electronics" on display -arrow-.



← Displayed is

- ◆ The control module identification number.

e.g. (1J0 907 379 D)

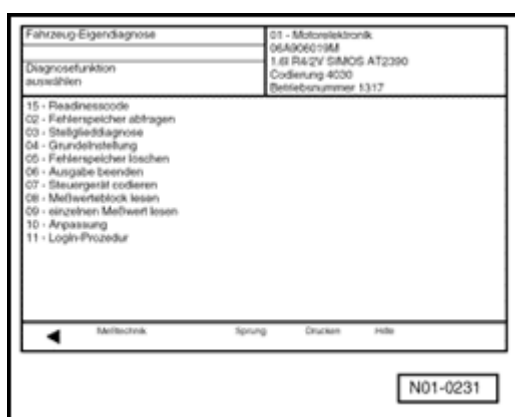
Allocation of control module see Parts catalog

- ◆ System designation (ABS 20 IE)
- ◆ Data BUS present. (CAN)
⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*
- ◆ Control module code (03504).

Coding control module ⇒ [Page 01-58](#)

- ◆ Workshop code

⇒ *Operating instructions for Vehicle Diagnosis, Testing and Information System VAS 5051.*



← Indicated on display

Select diagnostic function:

At this point all diagnostic functions are available.

For further measures see repair procedures.

Diagnostic Trouble Code (DTC) table

Note on DTC table:

- ◆ *When beginning OBD of the vehicle control modules, always start with function "Automatic test sequence" by pressing keys 0 and 0 because the control modules are interconnected with a data bus wire. This checks the DTC memories of the control modules in the vehicle.*
- ◆ *All the possible DTCs which can be recognized by the ABS control module -J104- and printed-out on V.A.G 1551 or VAS 5051, are listed on the following pages according to the 5-digit DTC.*
- ◆ *DTC appears (in the "Rapid data transfer" mode) only on the print-out.*

Example:

DTC	P code	DTC type code
5-digit	5-digit	3-digit
18256	P1848	035

- ◆ *The 5-digit P code which may appear next to the DTC, is for use with the On Board Diagnostic (OBD) II and may be disregarded.*
 - ◆ *The 3-digit DTC type code is a data code and may be disregarded, but the DTC type text is of use.*
 - ◆ *Before replacing components indicated as being faulty, check all the appropriate connectors, wiring and Ground connections using the wiring diagram*
- ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*
- ◆ *On completion of repairs always check the DTC memory with V.A.G 1551 Scan Too. or the tester VAS 5051 and erase.*
 - ◆ *Carry out road test exceeding 20 km/h (13 mph).*
 - ◆ *After the road test check DTC memory again.*

V.A.G 1551 print-out	Possible cause	Repair
No DTC recognized	If "No DTC recognized" appears after carrying out repairs, On Board Diagnostic (OBD) is ended. If, despite "No DTC recognized" appearing in the display, the ABS system does not function properly, then proceed as follows: 1. Carry out road test exceeding 20 km/h (13 mph), 2. Again check DTC memory, if there is still no DTC stored, 3. Continue troubleshooting without OBD and work through the complete Electrical check ⇒ Page 01-102 .	

01-37

V.A.G 1551 print- out	Possible cause	Repair
00283		
Left front ABS wheel speed sensor - G47-	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground, or loose contact in connections between left front ABS wheel speed sensor -G47- and ABS Control Module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical checks ⇒ from ⇒ Page 01-102
	<ul style="list-style-type: none"> ◆ Damaged rotor or left front ABS wheel speed sensor -G47 ◆ Left front ABS wheel speed sensor windings -G47- faulty 	<ul style="list-style-type: none"> - Check left front ABS wheel speed sensor -G47- and rotor for damage - Replace rotor/speed sensor -G47-
		⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles
		If the malfunction occurs again:
	<ul style="list-style-type: none"> ◆ ABS Control Module (w/EDL) - J104- faulty 	<ul style="list-style-type: none"> - Replace ABS Control Module (w/EDL) -J104- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

01-38

V.A.G 1551 print-out	Possible cause	Repair
00283		
Left front ABS wheel speed sensor -G47- Signal outside tolerances ¹⁾	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground, or loose contact in connections between left front ABS wheel speed sensor -G47- and ABS Control Module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical checks ⇒from ⇒ Page 01-102
	<ul style="list-style-type: none"> ◆ Electrical interference from other sources (high frequency radiation e.g. non-insulated ignition cable) 	<ul style="list-style-type: none"> - Read measured value block ⇒ Page 01-61 Display group number 001
	<ul style="list-style-type: none"> ◆ Damaged rotor or left front ABS wheel speed sensor -G47- 	
	<ul style="list-style-type: none"> ◆ Excessive air gap between left front ABS wheel speed sensor-G47- and rotor (signal not OK.) 	<ul style="list-style-type: none"> - Check left front ABS wheel speed sensor -G47- and rotor for damage - Replace rotor/speed sensor ⇒ Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles

¹⁾ Type of DTC, this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-39

V.A.G 1551 print-out	Possible cause	Repair
00283		
Left front ABS wheel speed sensor -G47- Mechanical malfunction ¹⁾	◆ Excessive air gap between left front ABS wheel speed sensor - G47- and rotor (signal not OK.)	<ul style="list-style-type: none"> - Check installation of left front ABS wheel speed sensor -G47- and rotor ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles - Read measured value block ⇒ Page 01-61 Display group number 002 - Perform output Diagnostic Test Mode (DTM) ⇒ Page 01-74
		If the malfunction occurs again:
	◆ Outlet valve in ABS hydraulic unit -N55- faulty	<ul style="list-style-type: none"> - Replace ABS hydraulic unit -N55- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

¹⁾ Type of DTC, this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-40

V.A.G 1551 print- out	Possible cause	Repair
00285		
Right front ABS wheel speed sensor - G45-	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground, or loose contact in connections between right front ABS wheel speed sensor -G45- and ABS Control Module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical checks ⇒from ⇒ Page 01-102
	<ul style="list-style-type: none"> ◆ Damaged rotor or speed sensor -G45 ◆ Speed sensor windings -G45- faulty 	<ul style="list-style-type: none"> - Check right front ABS wheel speed sensor -G45- and rotor for damage - Replace rotor/right front ABS wheel speed sensor -G45- ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles
		If the malfunction occurs again:
	<ul style="list-style-type: none"> ◆ ABS Control Module (w/EDL) - J104- faulty 	<ul style="list-style-type: none"> - Replace ABS Control Module (w/EDL) -J104- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

01-41

V.A.G 1551 print-out	Possible cause	Repair
00285		
Right front ABS wheel speed sensor -G45- Signal outside tolerances ¹⁾	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground, or loose contact in connections between right front ABS wheel speed sensor -G45- and ABS Control Module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical checks ⇒from ⇒ Page 01-102
	<ul style="list-style-type: none"> ◆ Electrical interference from other sources (high frequency radiation e.g. non-insulated ignition cable) 	<ul style="list-style-type: none"> - Read measured value block ⇒ Page 01-61 Display group number 001
	<ul style="list-style-type: none"> ◆ Damaged rotor or right front ABS wheel speed sensor -G45- 	
	<ul style="list-style-type: none"> ◆ Excessive air gap between right front ABS wheel speed sensor-G45- and rotor (signal not OK) 	<ul style="list-style-type: none"> - Check right front ABS wheel speed sensor -G45- and rotor for damage - Replace rotor/speed sensor ⇒ Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles

¹⁾ Type of DTC, this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-42

V.A.G 1551 print-out	Possible cause	Repair
00285		
Right front ABS wheel speed sensor -G45- Mechanical malfunction ¹⁾	◆ Excessive air gap between right front ABS wheel speed sensor-G45- and rotor (signal not OK.)	- Check installation of right front ABS wheel speed sensor -G45- and rotor ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles - Read measured value block ⇒ Page 01-61 Display group number 002 - Perform output Diagnostic Test Mode (DTM) ⇒ Page 01-74
		If the malfunction occurs again:
	◆ Outlet valve in ABS hydraulic unit -N55- faulty	- Replace ABS hydraulic unit -N55- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

¹⁾ Type of DTC, this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-43

V.A.G 1551 print- out	Possible cause	Repair
00287		
Right rear ABS wheel speed sensor - G44-	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground, or loose contact in connections between right rear ABS wheel speed sensor -G44- and ABS Control Module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical checks ⇒from ⇒ Page 01-102
	<ul style="list-style-type: none"> ◆ Damaged rotor or right rear ABS wheel speed sensor -G44- ◆ Right rear ABS wheel speed sensor windings -G44- faulty 	<ul style="list-style-type: none"> - Check right rear ABS wheel speed sensor -G44- and rotor for damage - Replace rotor/right rear ABS wheel speed sensor -G44- ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles
		If the malfunction occurs again:
	<ul style="list-style-type: none"> ◆ ABS Control Module (w/EDL) - J104- faulty 	<ul style="list-style-type: none"> - Replace ABS Control Module (w/EDL) -J104- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

01-44

V.A.G 1551 print-out	Possible cause	Repair
00287		
Right rear ABS wheel speed sensor -G44- Signal outside tolerances ¹⁾	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground, or loose contact in connections between right rear ABS wheel speed sensor -G44- and ABS Control Module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical checks ⇒ Page 01-102
	<ul style="list-style-type: none"> ◆ Electrical interference from other sources (high frequency radiation e.g. non-insulated ignition cable) 	<ul style="list-style-type: none"> - Read measured value block ⇒ Page 01-61 Display group number 001
	<ul style="list-style-type: none"> ◆ Damaged rotor or right rear ABS wheel speed sensor -G44- 	
	<ul style="list-style-type: none"> ◆ Excessive air gap between right rear ABS wheel speed sensor -G44- and rotor (signal not OK.) 	<ul style="list-style-type: none"> - Check right rear ABS wheel speed sensor -G44- and rotor for damage - Replace rotor/speed sensor ⇒ Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles

¹⁾ Type of DTC, this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-45

V.A.G 1551 print-out	Possible cause	Repair
00287		
Right rear ABS wheel speed sensor -G44- Mechanical malfunction ¹⁾	◆ Excessive air gap between right rear ABS wheel speed sensor -G44- and rotor (signal not OK.)	- Check installation of right rear ABS wheel speed sensor -G44- and rotor ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles - Read measured value block ⇒ Page 01-61 Display group number 002 - Perform output Diagnostic Test Mode (DTM) ⇒ Page 01-74
		If the malfunction occurs again:
	◆ Outlet valve in ABS hydraulic unit -N55- faulty	- Replace ABS hydraulic unit -N55- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

¹⁾ Type of DTC, this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-46

V.A.G 1551 print- out	Possible cause	Repair
00290		
Left rear ABS wheel speed sensor - G46-	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground, or loose contact in connections between left rear ABS wheel speed sensor -G46- and ABS Control Module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical checks ⇒ Page 01-102
	<ul style="list-style-type: none"> ◆ Left rear ABS wheel speed sensor windings -G46- faulty ◆ Damaged rotor or left rear ABS wheel speed sensor -G46- 	<ul style="list-style-type: none"> - Check left rear ABS wheel speed sensor -G46- and rotor for damage - Replace rotor/left rear ABS wheel speed sensor -G46- ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles
		If the malfunction occurs again:
	<ul style="list-style-type: none"> ◆ ABS Control Module (w/EDL) - J104- faulty 	<ul style="list-style-type: none"> - Replace ABS Control Module (w/EDL) -J104- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

01-47

V.A.G 1551 print-out	Possible cause	Repair
00290		
Left rear ABS wheel speed Sensor -G46- Signal outside tolerances ¹⁾	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground, or loose contact in connections between left rear ABS wheel speed sensor -G46- and ABS Control Module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical checks ⇒ Page 01-102
	<ul style="list-style-type: none"> ◆ Electrical interference from other sources (high frequency radiation e.g. non-insulated ignition cable) 	<ul style="list-style-type: none"> - Read measured value block ⇒ Page 01-61 Display group number 001
	<ul style="list-style-type: none"> ◆ Damaged rotor or left rear ABS wheel speed sensor -G46- 	
	<ul style="list-style-type: none"> ◆ Excessive air gap between left rear ABS wheel speed sensor - G46- and rotor (signal not OK.) 	<ul style="list-style-type: none"> - Check left rear ABS wheel speed sensor -G46- and rotor for damage - Replace rotor/speed sensor ⇒ Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles

¹⁾ Type of DTC; this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-48

V.A.G 1551 print-out	Possible cause	Repair
00290		
Left rear ABS wheel speed sensor -G46- Mechanical malfunction ¹⁾	◆ Excessive air gap between left rear ABS wheel speed sensor - G46- and rotor (signal not OK.)	- Check installation of left rear ABS wheel speed sensor -G46- and rotor ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles - Read measured value block ⇒ Page 01-61 Display group number 002 - Perform output Diagnostic Test Mode (DTM) ⇒ Page 01-74
		If the malfunction occurs again:
	◆ Outlet valve in ABS hydraulic unit -N55- faulty	- Replace ABS hydraulic unit -N55- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

¹⁾ Type of DTC; this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-49

V.A.G 1551 print-out	Possible cause	Repair
00668		
Vehicle voltage terminal 30 Signal outside tolerances	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground in the wiring 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical checks ⇒ Page 01-102
01044		
Control module incorrectly coded	<ul style="list-style-type: none"> ◆ ABS Control Module (w/EDL) -J104- incorrectly coded ◆ Coding bridge in multi-pin connector has open or short circuit 	<ul style="list-style-type: none"> - Check ABS Control Module (w/EDL) -J104- coding ⇒ Page 01-58 - Check wiring and connections using wiring diagram - Perform electrical checks ⇒ Page 01-102

01-50

V.A.G 1551 print-out	Possible cause	Repair
01130		
ABS operation Implausible signal ¹⁾	◆ Electrical interference from other sources (high frequency radiation e.g. non-insulated ignition cable)	- Erase DTC memory - Perform test drive at more than 20 km/h (13 mph) - Check DTC memory again
	◆ Open circuit, short to positive or Ground in the wiring	- Check wiring and connections using wiring diagram - Perform electrical checks ⇒ Page 01-102
		If the malfunction occurs again:
	◆ ABS Control Module (w/EDL) -J104- faulty	- Replace ABS control module (w/EDL) -J104- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

¹⁾ Type of DTC; this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

V.A.G 1551 print-out	Possible cause	Repair
01276		
ABS hydraulic pump -V64- Signal outside tolerances ¹⁾	◆ ABS hydraulic pump -V64- connector to control module faulty	- Perform output Diagnostic Test Mode (DTM) ⇒ Page 01-74
	◆ Open circuit, short to positive or Ground in the wiring	- Check wiring and connections using wiring diagram
		- Perform electrical checks ⇒from ⇒ Page 01-102
	◆ ABS hydraulic pump -V64- faulty	- If the ABS hydraulic pump -V64- runs free while electrical check test step 18 performed ⇒ Page 01-102 , replace ABS control module (w/EDL) -J104-
	◆ ABS control module (w/EDL) - J104- faulty	- Replace ABS control module (w/EDL) - J104- ⇒ Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit

¹⁾ Type of DTC; this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

V.A.G 1551 print-out	Possible cause	Repair
01312		
Drive train data bus faulty ¹⁾ or:	<ul style="list-style-type: none"> ◆ ABS control module (w/EDL) -J104- incorrectly coded ◆ Engine control module incorrectly coded 	<ul style="list-style-type: none"> - Check ABS control module (w/EDL) -J104- coding ⇒ Page 01-58 - Check engine control module coding ⇒ <i>Repair group 01 for relevant engine code</i>
	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or Ground in the wiring 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram
		<ul style="list-style-type: none"> - Perform electrical checks ⇒ Page 01-102
Drive train data bus faulty ¹⁾ Sporadic	<ul style="list-style-type: none"> ◆ Ignition/starter switch turned too slowly 	<ul style="list-style-type: none"> - Erase DTC memory ⇒ Page 01-56 - No further measures required - Inform customer

1) The DTC "Drive train data bus" will not cause the ABS warning light -K47- or warning light for brake system -K118- to light up. The ABS function is retained over the complete range.

01-53

V.A.G 1551 print-out	Possible cause	Repair
01314		
Engine control module No communication		- Read measured value block ⇒ Page 01-61 display group number 125
	◆ Open circuit, short to positive or Ground in data bus wiring	- Check wiring and connections of data bus wiring using wiring diagram - Perform electrical checks ⇒ Page 01-102
01315		
Transmission Control Module (TCM) ¹⁾ No communication		- Read measured value block ⇒ Page 01-61 display group number 125
	◆ Open circuit, short to positive or Ground in data bus wiring	- Check wiring and connections of data bus wiring using wiring diagram - Perform electrical checks ⇒ Page 01-102

¹⁾ Vehicles with automatic transmission only.

01-54

V.A.G 1551 print-out	Possible cause	Repair
01316		
Brake control module No communication	◆ Open circuit, short circuit to positive or Ground in data bus wiring	- Check data bus wiring and connection using wiring diagram - Perform electrical checks ⇒ Page 01-102

01-55

V.A.G 1551 print-out	Possible cause	Repair
18256		
Check Engine Control Module (ECM) memory	◆ DTC in ECM	- Check engine control module DTC memory ⇒ <i>Repair Manual, Fuel Injection & Ignition, Repair Group 01 for relevant engine code</i>
65535		
Control module faulty	ABS Control Module (w/EDL) -J104- faulty	- Replace ABS control module (w/EDL) -J104- ⇒ <i>Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit</i>

Diagnostic Trouble Code (DTC) memory, erasing and ending output

Note:

All functions which could previously be performed with V.A.G 1551 can also be performed with the tester VAS 5051.

Test requirements:

- ◆ DTC memory checked ⇒ [Page 01-28](#) .

1. Erasing DTC memory

- Press → key.

Rapid data transfer
Select function XX

HELP



Indicated on display

- Press keys -0- and -5-; 05 enters "Erase DTC memory" function.

Rapid data transfer
05 - Erase DTC memory

Q



Indicated on display

- Confirm entry with Q key

Rapid data transfer
DTC memory is erased!

→



Indicated on display

- Press → key.

Rapid data transfer
Select function XX

HELP



Indicated on display

01-57

Warning!

DTC memory was not interrogated.



Indicated on display

Note:

*Adhere exactly to test sequence:
First check DTC memory, then erase*

2. Ending output

- Press keys -0- and -6-, to end output.

Rapid data transfer

Q



Indicated on display

06 - End output

- Confirm input with Q key.

Rapid data transfer

HELP



Indicated on display

Select function XX

- Switch ignition off.
- Disconnect V.A.G 1551 Scan Tool at Data Link Connector (DLC).
- Switch ignition on.

ABS warning light -K47- and warning light for brake system -K118- must go out after approx. 2 seconds.

ABS control module, coding

- ◆ All functions which could previously be performed with V.A.G 1551 can also be performed with the tester VAS 5051.
- ◆ Warning light for ABS -K47- and warning light for brake system -K118- flash when control module is coded with 00000. An entry is not set in the DTC memory.
- ◆ The ABS control module (w/EDL) -J104- must be recoded if the vehicle relevant coding is not displayed or the control module has been replaced.

Coding is only possible after the workshop code (WSC) has been entered into the V.A.G 1551 Scan Tool.

Test sequence

- Connect V.A.G 1551 Scan Tool and select (address word 03) "Brake electronics" with ignition switched on; ⇒ [Page 01-23](#)
- Establish which type of ABS hydraulic control module is installed ⇒ [Page 01-4](#) .
- Establish engine code.

Rapid data transfer Select function XX	HELP	◀	Indicated on display - Input 07 for "Code control module" and confirm with Q key.
Rapid data transfer 07 - Code control module	Q	◀	Indicated on display - Confirm input with Q key.
Coding control module Enter code number XXXXX	Q (0-32000)	◀	Indicated on display - Enter relevant code number for this vehicle and confirm with Q key. Coding variations ⇒ Page 01-60 .
1J0 907 379 D ABS 20 IE CAN 0001 → Coding 03604 WSC 00000		◀	On the display the control module identification and coding are displayed, e.g.:

Coding table

Code number	Engine code	Variant
03504	AEG	ABS
13504	AEG	ABS/EDL
03504	AFP	ABS
13504	AFP	ABS/EDL
13204	AFP	ABS/EDL/ASR
03504	ALH	ABS
13504	ALH	ABS/EDL
13204	APH	ABS/EDL/ASR

Measured value block, reading

Note:

All functions which could previously be performed with V.A.G 1551 can also be performed with the tester VAS 5051.

The control module can transfer a considerable amount of test data. This test data delivers information on the operational condition of the system and/or sensors connected to it. In many cases the transferred test data supports troubleshooting and repair. The test data has been summarized into single display groups because all the information cannot be evaluated at the same time. The information can be selected via display group numbers.

Safety precautions

Observe following if test and measuring instruments are required during a test drive:

- ◆ Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

- ◆ When test and measuring instruments are operated from the front passenger seat there is a danger that the person sitting there could be injured in an accident when the airbag is triggered.

-
- Connect V.A.G 1551 Scan Tool and select address word 03 for "Brake electronics" with ignition switched on; ⇒ [Page 01-23](#)
- Rapid data transfer** **HELP** ◀ Indicated on display
Select function XX
- Press keys 0 and 8 to select function "Read measured value block".
- Rapid data transfer** **Q** ◀ Indicated on display
08 - Read measured value block
- Confirm entry with key Q.
- Read measured value block** ◀ Indicated on display
Enter display group number XXX
- Enter display group number ⇒ List of selectable display group numbers, ⇒ [Page 01-64](#) .

List of selectable display group numbers

Display group number	Display zone	Designation
001	1	Wheel speed at left front wheel sensor (km/h)
	2	Wheel speed at right front wheel sensor (km/h)
	3	Wheel speed at left rear speed sensor (km/h)
	4	Wheel speed at right rear speed sensor (km/h)
002	1	Wheel speed at left front speed sensor (km/h)
	2	Wheel speed at right front wheel sensor (km/h)
	3	Wheel speed at left rear speed sensor (km/h)
	4	Wheel speed at right rear speed sensor (km/h)
003	1	Brake light switch
	2	Vacant
	3	Vacant
	4	Vacant

01-65

Display group number	Display zone	Designation
006	1	Longitudinal acceleration sensor -G251- ¹⁾
	2	Vacant
	3	Vacant
	4	Vacant
125	1	Data bus for engine
	2	Data bus for four-wheel drive ¹⁾
	3	Data bus for transmission ²⁾
	4	Vacant

1) Four-wheel drive vehicles with Haldex coupling only.

2) Vehicles with automatic transmission only.

Test sequence and test tables with measured values

Checking speed sensor allocation

Display group number 001

- Press keys 0, 0 and 1.
- Confirm entry with key Q.

Read measured value block 1 →
→ 1 → 2 → 3 → 4



There are always 4 display zones - arrows- in the measured value block. Decoding the individual values in display zones 1 to 4 can be read from the following tables.

Read measured value block 1 →
0 km/h 0 km/h 0 km/h 0 km/h



Indicated on display: (vehicle stationary)

Press C key for the next display group number entry.

If the → key is pressed, keys 0 and 8 for work sequence "Read measured value block" must be pressed again afterwards to regain entry.

Note:

For display group number 001 remember:

The actual wheel speeds are displayed. They serve to check the speed sensor allocation to the wheel. (The vehicle must be raised and the wheel must be rotated by hand by a 2nd mechanic).

Read measured value block			1 →	Display group number: 001
0 km/h	4 km/h	0 km/h	0 km/h	◀ Indicated on display: (Example)
				Wheel speed at right rear speed sensor ◆ (0 to 255 km/h)
				Wheel speed at left rear speed sensor ◆ (0 to 255 km/h)
		Wheel speed at right front speed sensor ◆ (0 to 255 km/h)		
	Wheel speed at left front speed sensor ◆ (0 to 255 km/h)			

Checking speed sensor

Display group number 002

- Press keys 0, 0 and 2.
- Confirm entry with key Q.

Read measured value block 2 →

→ 1 → 2 → 3 → 4



There are always 4 display zones - arrows- in the measured value block. Decoding the individual values in display zones 1 to 4 can be read from the following tables.

Read measured value block 2 →

255 km/h 255 km/h 255 km/h 255 km/h



Indicated on display: (Vehicle stationary)

Press C key for the next display group number entry.

If the → key is pressed, keys 0 and 8 for work sequence "Read measured value block" must be pressed again afterwards to regain entry.

Note:

For display group number 002 remember:

- ◆ The reading of measured value blocks in display group number 002 must be undertaken when driving off slowly. Then the ABS Control Module (w/EDL) -J104- will store the first usable voltage signals provided by the speed sensors and display these as a fixed value in the measured value block.

Read measured value block			2 →	Display group number: 002
3 km/h ¹⁾	6 km/h ¹⁾	2 km/h ²⁾	1 km/h ²⁾	◀ Indicated on display: (when driving off slowly)
				Wheel speed at right rear speed sensor ◆ (0 to 255 km/h)
				Wheel speed at left rear speed sensor ◆ (0 to 255 km/h)
				Wheel speed at right front speed sensor ◆ (0 to 255 km/h)
				Wheel speed at left front speed sensor ◆ (0 to 255 km/h)

1) If the deviations in display zones 1 and 2 are greater than 6 km/h (approx. 3.75 mph), the following malfunctions may be present:

2) If the deviations in display zones 3 and 4 are greater than 2 km/h (approx. 1.25 mph), the following malfunctions may be present:

Note:

- ◆ Air gap between speed sensor and rotor may be too wide.
- Check that speed sensor is attached correctly to wheel bearing housing.
- ◆ Speed sensor or rotor exterior damaged.
- Change damaged component.

Checking brake light switch for ABS and ABS/EDL function

Display group number 003

- Press keys 0, 0 and 3
- Confirm entry with key Q.

Read measured value block 3 →
→ 1 → 2 → 3 → 4



There are always 4 display zones -
arrows- in the measured value block.
Decoding the individual values in
display zones 1 to 4 can be read
from the following tables.

Read measured value block 3 →
0



Indicated on display

Press C key for the next display
group number entry.

If the → key is pressed, keys 0 and
8 for work sequence "Read
measured value block" must be
pressed again afterwards to regain
entry.

01-71

Read measured value block		3 →	Display group number: 003
0			◀ Indicated on display
			Vacant
		Vacant	
	Vacant		
<p>Brake light switch:</p> <ul style="list-style-type: none"> ◆ 0 → Brake pedal not depressed ◆ 1 → Brake pedal depressed <p>If despite pressed foot brake a -0-, or not pressed foot brake a -1- is displayed on the V.A.G 1551 display; perform test step No. 4 of Electrical check, ⇒ Page 01-102 .</p> <p>There is also a possibility that the brake light switch has not been correctly adjusted. Adjusting brake light switch, ⇒ Page 01-131 .</p>			

Checking data bus wiring**Display group number 125**

- Press keys 1, 2 and 5
- Confirm entry with key Q.

Read measured value block 125 →
 → 1 → 2 → 3 → 4



There are always 4 display zones - arrows- in the measured value block. Decoding the individual values in display zones 1 to 4 can be read from the following tables.

Read measured value block 125 →
 Engine 1 4WD 1 Gear. 1



Indicated on display: (vehicle stationary)

Press C key for the next display group number entry.

If the → key is pressed, keys 0 and 8 for work sequence "Read measured value block" must be pressed again afterwards to regain entry.

Read measured value block			125 →	Display group number: 125
Engine	AWD	Gear.		◀ Indicated on display (example)
1	1	1		
				Vacant
			Data bus connection for transmission ¹⁾	
			<ul style="list-style-type: none"> ◆ 1 → Data bus connection is available. ◆ 0 → Data bus connection is not available. ³⁾ 	
			Data bus for all-wheel drive ²⁾	
			<ul style="list-style-type: none"> ◆ 1 → Data bus connection is available. ◆ 0 → Data bus connection is available. 	
			Data bus for engine	
			<ul style="list-style-type: none"> ◆ 1 → Data bus connection is available. ◆ 0 → Data bus connection is not available. 	

¹⁾ Vehicles with automatic transmission only.

- ◆ Incorrect transmission control module or incorrect transmission control module coding.

- ◆ Transmission control module faulty.

⇒ *Repair Group 01 for relevant transmission code.*

²⁾ All-wheel drive vehicles with Haldex coupling only.

³⁾ Data bus connection is interrupted or data bus wires are interchanged.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder.*

Output Diagnostic Test Mode (DTM)

Note:

- ◆ *All functions which could previously be performed with V.A.G 1551 can also be performed with the tester VAS 5051.*
- ◆ *The pump motor and the correct functioning of the hydraulic circuits (allocation of brake lines to wheel cylinders and function of valves) can be checked via the output DTM for interchange or leaks.*
- ◆ *The vehicle must be raised until all wheels are free to turn. (2nd mechanic required to rotate wheels)*
- ◆ *The -C- key can be used to exit the test sequence at any time.*
- ◆ *After depressing the brake pedal several times the vacuum in the brake booster will be exhausted. Therefore more pressure must be applied to the brake pedal in order to attain the same fluid pressure in brake system, as that attained with vacuum.*
- ◆ *When vacuum in brake booster is exhausted wheels may not lock; start engine and build-up vacuum in brake booster.*

Example:

Indicated on V.A.G 1551 display during output Diagnostic Test Mode (DTM):

(e.g. front left wheel, FL)

Output Diagnostic Test Mode - → IFL: VBAT OFL: 0V Wheel FL locked

IFL = Inlet valve Front Left

VBAT = Voltage Battery; Voltage at valve

OFL = Outlet valve Front Left

0V = 0 Volt; No voltage at valve

Locked/free = Wheel condition; must be checked by 2nd mechanic if required

Output Diagnostic Test Mode - → EDL valves/Hyd-P: VBAT Wheel FL/FR locked

Hydr-P = Hydraulic pump

- Connect V.A.G 1551 Scan Tool.
- Switch ignition on.
- Press key -1- for "Rapid data transfer" operating mode.
- Select brake electronics (address word 03); ⇒ [Page 01-23](#)

Rapid data transfer
03 - Brake electronics

q ← Indicated on display

- Confirm entry with key Q.

Note:

During the next work steps the ABS warning light - K47- flashes.

- Read off control module version in V.A.G 1551 display.
- Press → key.

01-77

Rapid data transfer Select function XX	HELP	←	Indicated on display - Press keys 0 and 3
Rapid data transfer 03 - Output Diagnostic Test Mode	Q	←	Indicated on display - Confirm entry with key Q. • ABS hydraulic pump -V64- must run.
Output Diagnostic Test Mode ABS hydraulic pump - V64	. →	←	Indicated on display - Press → key.
Output Diagnostic Test Mode Operate brakes	. →	←	Indicated on display - Operate brake pedal. - Press → key.
Output Diagnostic Test Mode IFL: 0V OFL: 0V Wheel FL locked	. →	←	Indicated on display - Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel does not lock, there is a possibility that there is a malfunction in the mechanical/hydraulic part of the brake system.

Output Diagnostic Test Mode . →

IFL: VBAT OFL: 0V Wheel FL locked

- Press → key.



Indicated on display

- Press → key.

- ABS hydraulic pump -V64- must run.
- Brake pedal must not give.

If the brake pedal gives, there is a malfunction in the hydraulic unit. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45; Hydraulic unit, brake booster/brake master cylinder - Assembly overview; Removing and installing control module and hydraulic unit](#)

Output Diagnostic Test Mode . →

IFL: VBAT OFL: VBAT Wheel FL free

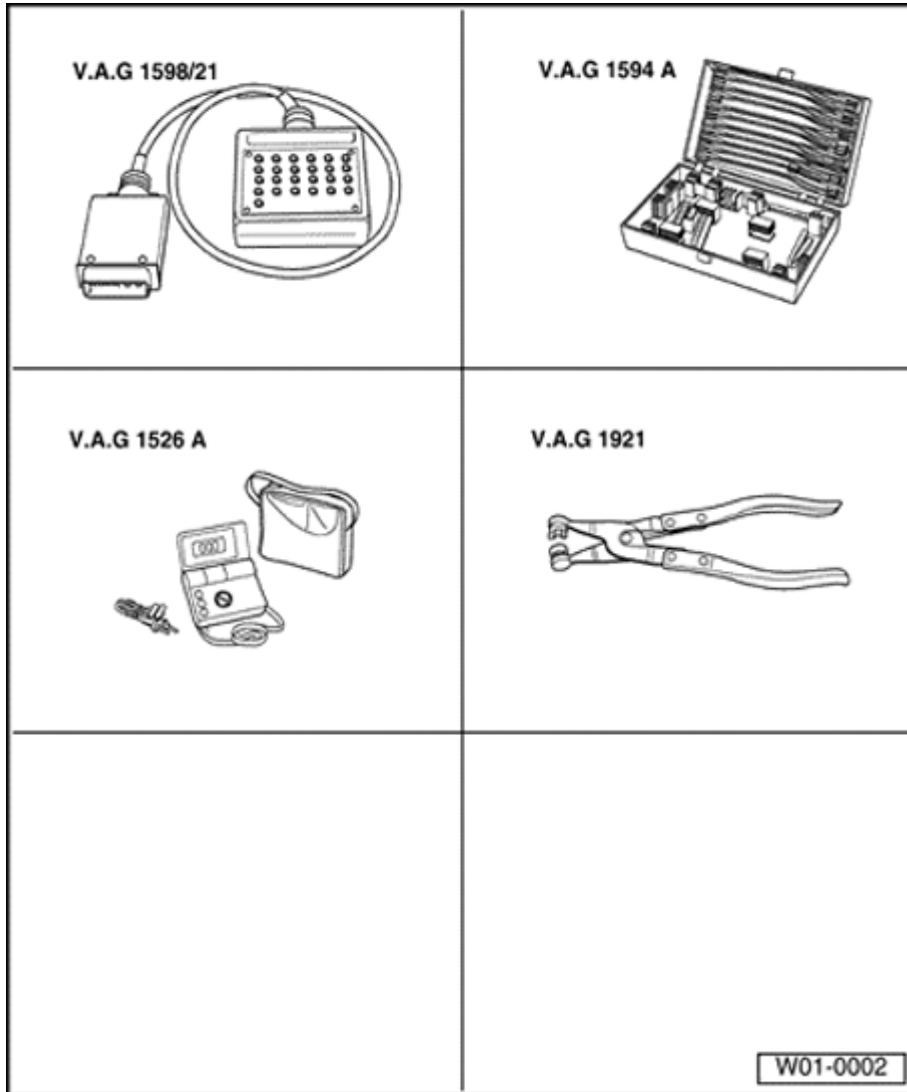


Indicated on display

- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel locks there is a possibility that the brake lines to the wheel calipers/cylinders have been interchanged.



ABS, ABS/EDL an ABS/EDL/ASR ITT Mark 20 IE, electrical check

Special tools and equipment

- ◆ V.A.G 1598/21 Adapter
- ◆ V.A.G 1594 A Adapter set
- ◆ V.A.G 1526 A Multimeter
- ◆ V.A.G 1921 Pliers

The test steps from ⇒ [Page 01-111](#) are valid for:

- ◆ For vehicles on which the On Board Diagnostic (OBD) does not give any indication of the source of the malfunction, work through the complete electrical check.

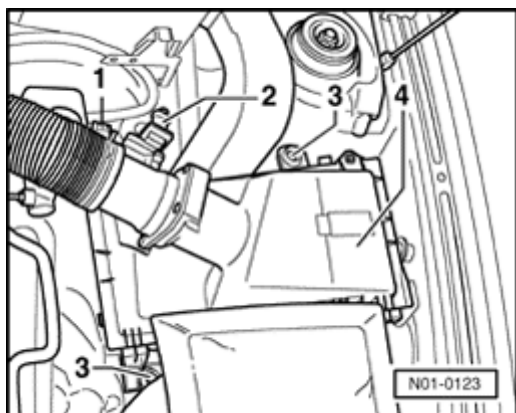
- ◆ For vehicles on which the OBD provides a direct indication of the source of the malfunction, only carry out the test steps recommended in the Diagnostic Trouble Code (DTC) table (directed entry).

An overview of all the test steps in the electrical check can be found on ⇒ [Page 01-109](#) .

Test requirements

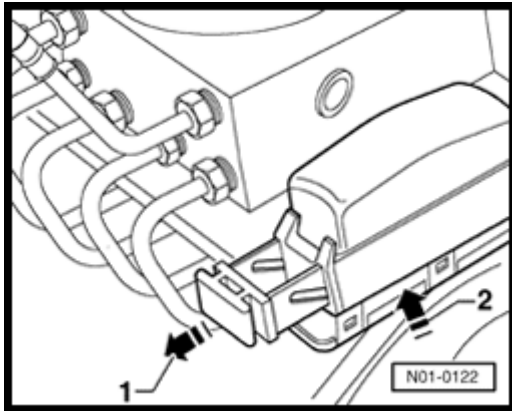
- Switch ignition and electrical consumers off before beginning the check (headlights, lighting, fan ...).
- Fuses S9, S13, S178 and S179 must be OK (remove fuses from fuse holder to check).

Removing air cleaner

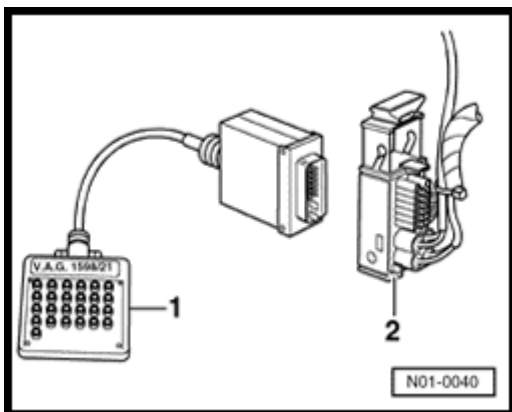


- Pull connector -2- off mass air flow sensor.
- Release spring-type clip -1- on air duct hose with pliers V.A.G 1921 and pull hose off air cleaner.
- Remove air cleaner bolts -3- and take out air cleaner -4-.

01-105



- Release ABS control module (w/EDL) -J104- connector -arrow 1- and pull off -arrow 2-.



- Connect test box V.A.G 1598/21 - 1- to multi-pin connector of ABS control module (w/EDL) -J104- (- 2-).

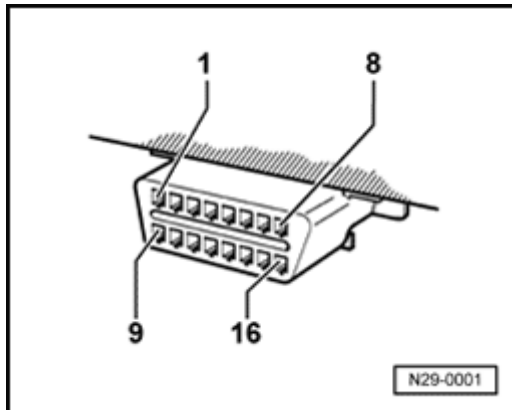
The specified values are matched to the V.A.G 1526 and are not necessarily applicable for other test units.

01-106

Multi-pin connector with contact assignment

Note:

All contacts not listed are currently not assigned and must never be connected to other components!

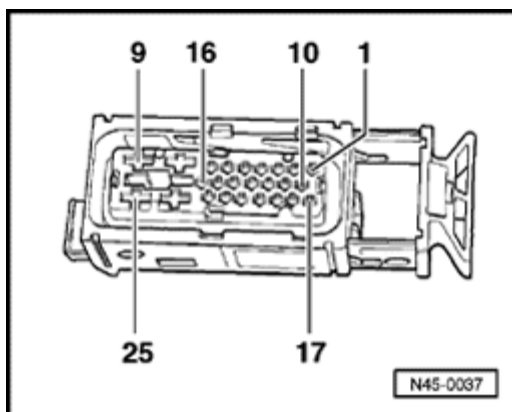


Contact assignment of connectors for voltage supply and On Board Diagnostic (OBD) with V.A.G 1551 Scan Tool

Contact = Ground (terminal 31)
4

Contact = Positive (terminal 30)
16 to S12

Contact = K wire to contact 7 of
7 multi-pin connector T25 of ABS control module (w/EDL) - J104-



Contact assignment of connector T25 wiring harness/ABS control module (w/EDL) -J104-

01-107

Contact	Wiring connection to component ...	
1	⇒	Left front ABS wheel speed sensor -G47-
2	⇒	Left front ABS wheel speed sensor -G47-
3	⇒	Coding bridge to contact 14
4	⇒	Voltage supply to ignition switch
5	⇒	Left rear ABS wheel speed sensor -G46-
6	⇒	Left rear ABS wheel speed sensor -G46-
7	⇒	Connector T16/7, K wire
8	⇒	Ground point left in engine compartment and Ground connection in engine compartment wiring harness
9	⇒	Voltage supply from battery +
10	⇒	Data bus wire ⇒ Wiring diagrams
11	⇒	Data bus wire ⇒ Wiring diagrams
12	⇒	Vehicles with navigation system only

01-108

Contact	Wiring connection to component ...	
13	⇒	Longitudinal acceleration sensor -G251-(all-wheel drive vehicles with Haldex coupling only)
14	⇒	Coding bridge to contact 3
15	⇒	Longitudinal acceleration sensor -G251-(four-wheel drive vehicles with Haldex coupling only)
15	⇒	ESP Control lamp -K155- activation (vehicles with ABS/EDL/ASR only)
16	⇒	ABS warning light -K47- activation
17	⇒	Longitudinal acceleration sensor -G251-(four-wheel drive vehicles with Haldex coupling only)
18	⇒	Brake light switch -F-
19	⇒	Right front ABS wheel speed sensor -G45-
20	⇒	Right front ABS wheel speed sensor -G45-
21	⇒	Vehicles with navigation system only
22	⇒	Right rear ABS wheel speed sensor -G44-
23	⇒	Right rear ABS wheel speed sensor -G44-
24	⇒	Ground point left in engine compartment and Ground connection in engine compartment wiring harness
25	⇒	Voltage supply from battery +

01-109

Test step overview

To test component	
Voltage supply for ABS hydraulic pump -V64- to ABS control module (w/EDL) -J104-	- Perform test step 1
Voltage supply for valves in ABS hydraulic unit -N55- to ABS control module (w/EDL) -J104-	- Perform test step 2
Voltage supply (terminal X) on ABS control module (w/EDL) -J104-	- Perform test step 3
Function of brake light switch -F-	- Perform test step 4
Resistance of right front ABS wheel speed sensor -G45-	- Perform test step 5
Resistance of left front ABS wheel speed sensor -G47-	- Perform test step 6
Resistance of right rear ABS wheel speed sensor -G44-	- Perform test step 7
Resistance of rear left ABS wheel speed sensor -G46-	- Perform test step 8
Voltage signal of right front ABS wheel speed sensor -G45-	- Perform test step 9
Voltage signal of left front ABS wheel speed sensor -G47-	- Perform test step 10

01-110

To test component	
Voltage signal of right rear ABS wheel speed sensor -G44-	- Perform test step 11
Voltage signal of rear left ABS wheel speed sensor -G46-	- Perform test step 12
Coding bridge	- Perform test step 13
Voltage supply for V.A.G 1551, T16 connector	- Perform test step 14
Resistance of K wire for On Board Diagnostic (OBD), T16 connector	- Perform test step 15
Function of ABS warning light -K47-	- Perform test step 16
Function of warning light for brake system -K118-	- Perform test step 17
Function of ABS hydraulic pump -V64-	- Perform test step 18
Check of data bus wiring	- Perform test step 19
Activation of longitudinal acceleration sensor -G251- ¹⁾	- Perform test step 20
Function of ESP Control lamp -K155-	- Perform test step 21

¹⁾ All-wheel drive vehicles with Haldex coupling only.

Test table

Notes on test table

- ◆ *The socket designations of adapter V.A.G 1598/21 are identical to the control module -J104 contact designations in wiring diagram.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ *If the readings obtained deviate from the specifications, carry out repair measure in the right-hand part of the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ *Continuity checks with adapter set V.A.G 1594 A (bridging).*

- ◆ *If the measured figures only deviate slightly from the specifications, clean sockets and connectors of the testers and adapter cables (with contact spray G 000 700 04) and repeat check. Before replacing components, check wiring and connections and also, particularly for specifications of less than 10 Ω , repeat resistance check on the component.*

01-112

Switch to measuring range:					
Voltage measurement (20 V =)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
1	8 + 25	Voltage supply for ABS hydraulic pump -V64- to ABS Control Module (w/EDL) - J104-	<ul style="list-style-type: none"> • Ignition switched off 	10.0 to 14.5 V	<ul style="list-style-type: none"> - Check wire using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
2	9 + 24	Voltage supply for the valves in ABS hydraulic unit -N55- to ABS Control Module (w/EDL) - J104-	<ul style="list-style-type: none"> • Ignition switched off 	10.0 to 14.5 V	<ul style="list-style-type: none"> - Check wire using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-113

Switch to measuring range:					
Voltage measurement (20 V =)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
3	8 + 4	Voltage supply (terminal X) to ABS Control Module (w/EDL) - J104-	<ul style="list-style-type: none"> • Ignition switched on 	10.0 to 14.5 V	<ul style="list-style-type: none"> - Check wire using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
4	8 + 18	Function of brake light switch -F-	<ul style="list-style-type: none"> • Ignition switched off • Brake pedal not depressed 	0.0 to 0.5 V	<ul style="list-style-type: none"> - Check brake light switch -F- and Read measured value block, display group 003 - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
			- Press brake pedal	approx. battery voltage	- Checking brake light switch -F- ⇒ Page 01-131

01-114

Switch to measuring range:					
Resistance measurement (2 k Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
5	19 + 20	Resistance of right front ABS wheel speed sensor -G45-	<ul style="list-style-type: none"> • Ignition switched off 	1.0 to 1.3 k Ω	<ul style="list-style-type: none"> - Separate connector on right front ABS wheel speed sensor -G45- - Check wiring using wiring diagram - Wiggle wiring during test ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> If no malfunction can be located in the wiring: - Replace right front ABS wheel speed sensor -G45- ⇒ Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles

01-115

Switch to measuring range:					
Resistance measurement (2 kΩ)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
6	1 + 2	Resistance of left front ABS wheel speed sensor -G47-	<ul style="list-style-type: none"> • Ignition switched off 	1.0 to 1.3 kΩ	<ul style="list-style-type: none"> - Separate connector on left front ABS wheel speed sensor -G47- - Check wiring using wiring diagram - Wiggle wiring during test ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> If no malfunction can be located in the wiring: - Replace left front ABS wheel speed sensor -G47- ⇒ Repair Manual, Brake System Repair Group 45; Removing and installing parts of ABS system on front and rear axles

01-116

Switch to measuring range:					
Resistance measurement (2 k Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
7	22 + 23	Resistance of right rear ABS wheel speed sensor -G44-	<ul style="list-style-type: none"> • Ignition switched off 	1.0 to 1.3 k Ω	<ul style="list-style-type: none"> - Separate connector on right rear ABS wheel speed sensor -G44 - Check wiring using wiring diagram - Wiggle wiring during test ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> If no malfunction can be located in the wiring: - Replace right rear ABS wheel speed sensor -G44- ⇒ Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles

01-117

Switch to measuring range:					
Resistance measurement (2 k Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
8	5 + 6	Resistance of left rear ABS wheel speed sensor -G46-	<ul style="list-style-type: none"> • Ignition switched off 	1.0 to 1.3 k Ω	<ul style="list-style-type: none"> - Separate connector on left rear ABS wheel speed sensor -G46- - Check wiring using wiring diagram - Wiggle wiring during test ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> If no malfunction can be located in the wiring: - Replace left rear ABS wheel speed sensor -G46- ⇒ Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles

01-118

Switch to measuring range:					
Voltage measurement (2 V ≈)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations	Specification	Measures for deviations from specification
9	19 + 20	Right front ABS wheel speed sensor - G45- voltage signal	<ul style="list-style-type: none"> • Vehicle raised 		- Check installation of right front ABS wheel speed sensor - G45- and rotor.
			<ul style="list-style-type: none"> • Ignition switched off 		
			- Rotate front right wheel at approx. 1 rev./sec.	min. 65 mV alternating voltage	- Check whether right front ABS wheel speed sensor -G45- has been interchanged and Read measured value block ⇒ Page 01-61 , display group number 001
10	1 + 2	Left front ABS wheel speed sensor - G47- voltage signal	<ul style="list-style-type: none"> • Vehicle raised 		- Check installation of left front ABS wheel speed sensor - G47- and rotor.
			<ul style="list-style-type: none"> • Ignition switched off 		
			- Rotate front left wheel at approx. 1 rev./sec.	min. 65 mV alternating voltage	- Check whether left front ABS wheel speed sensor -G47- has been

					interchanged and Read measured value block ⇒ Page 01-61 , display group number 001
--	--	--	--	--	-----------------------------------------------------------------------------------------------------------------

01-119

Switch to measuring range:					
Voltage measurement (2 V ≈)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations	Specification	Measures for deviations from specification
11	22 + 23	Right rear ABS wheel speed sensor - G44- voltage signal	<ul style="list-style-type: none"> • Vehicle raised 		- Check installation of right rear ABS wheel speed sensor - G44- and rotor.
			<ul style="list-style-type: none"> • Ignition switched off 		
			- Rotate rear right wheel at approx. 1 rev./sec.	min. 190 mV alternating voltage	- Check whether right rear ABS wheel speed sensor -G44- has been interchanged and Read measured value block ⇒ Page 01-61 , display group number 001
12	6 + 5	Left rear ABS wheel speed sensor - G46- voltage signal	<ul style="list-style-type: none"> • Vehicle raised 		- Check installation of left rear ABS wheel speed sensor - G46- and rotor.
			<ul style="list-style-type: none"> • Ignition switched off 		
			- Rotate rear left wheel at approx. 1 rev./sec.	min. 190 mV alternating voltage	- Check whether left rear ABS wheel speed sensor -G46- has been

					interchanged and Read measured value block ⇒ Page 01-61 , display group number 001
--	--	--	--	--	-----------------------------------------------------------------------------------------------------------------

01-120

Switch to measuring range:					
Resistance measurement (200 Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
13	3 + 14	Coding bridge	<ul style="list-style-type: none"> • Ignition switched off 	0.0 to 1.0 Ω	
					<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-121

Switch to measuring range:					
Voltage measurement (20 V =)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
14	-	Supply voltage for V.A.G 1551, connector T16 ¹⁾	<ul style="list-style-type: none"> • Ignition switched off - Connect multimeter V.A.G 1526 using adapter set V.A.G 1594 to connector T16¹⁾ 	10.0 to 14.5 V	
					<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

¹⁾ Diagnostic connection contact assignment ⇒ [Page 01-106](#) .

01-122

Switch to measuring range:					
Resistance measurement 200 Ω					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
15	-	Resistance of K wire for V.A.G 1551 connector T16 ¹⁾	<ul style="list-style-type: none"> • Ignition switched off - Disconnect multi-pin connector from ABS control module (w/EDL) - J104- 	max. 1.5 Ω	- Check wiring using wiring diagram
					<i>⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
			- Connect test box V.A.G 1598/21		
			- Connect multimeter V.A.G 1526 to contacts T16/7 ¹⁾ and T25/7 of multi-pin connectors from ABS control module (w/EDL) - J104- using adapter set V.A.G 1594		

¹⁾ Diagnostic connection contact assignment ⇒ [Page 01-106](#) .

01-123

Functional check: ABS warning light -K47-					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
16	-	Function of ABS warning light -K47-	<ul style="list-style-type: none"> • Switch ignition on 	ABS warning light -K47- lights up for approx. 2 seconds and goes out again	
					<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> - Malfunction in instrument cluster ⇒ <i>Repair Manual, Body Interior, Repair Group 70</i>

01-124

Functional check: Warning light for brake system -K118-					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
17	-	Function of warning light for brake system - K118-	<ul style="list-style-type: none"> • Brake fluid level is OK. • Switch ignition on 	Warning light for brake system - K118- lights up for approx. 2 seconds and goes out again	<ul style="list-style-type: none"> - Check brake fluid level warning switch -F34- in sealing cap ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
			<ul style="list-style-type: none"> - Pull connectors off both front speed sensors - Start engine and run at more than 2000 rpm 	Warning light - K118- lights up and 3 warnings are sounded	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> - Malfunction in instrument cluster ⇒ Repair Manual, Body Interior, Repair Group 70
			<ul style="list-style-type: none"> - Reconnect connectors to both front speed sensors again - Check DTC memory and erase 		

01-125

Functional check: ABS hydraulic pump -V64-					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
18	-	Function of ABS hydraulic pump - V64-	<ul style="list-style-type: none"> • Ignition switched off - Pull hydraulic pump -V64- connector T2 off control module 		
			- Connect Ground to connector T2/1 and battery voltage to connector T2/2 on hydraulic pump	Hydraulic pump runs without malfunction (max. 10 secs.)	<ul style="list-style-type: none"> - Perform output Diagnostic Test Mode (DTM) ⇒ Page 01-74 . - Replace control module.
				Hydraulic pump does not run	<ul style="list-style-type: none"> - Replace hydraulic unit. ⇒ Repair Manual, Brake System, Repair Group 45

01-126

Switch to measuring range:**Resistance measurement (200 Ω /20 M Ω)**

Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
19	11 +10	Data bus wiring	<ul style="list-style-type: none"> • Ignition switched off • Set to measuring range 200 Ω 		
			- Disconnect multi-pin connection from a control module which is connected via data bus wiring:		
			- Connect test box V.A.G 1598/21		
			- Check data bus wiring for open circuit	max. 1.5 Ω	- Check wiring using wiring diagram <i>⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
				Test step 19: Continued on next page	

01-127

Continuation of test step 19					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
19			<ul style="list-style-type: none"> • Set to measuring range 20 M Ω 		
			- Remove fuse S9		
			- Check wiring for short circuit to positive or earth	$\infty \Omega$	
					- Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-128

Switch to measuring range:					
Resistance measurement (200 Ω/20 M Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
20	-	Longitudinal acceleration sensor - G251-wiring	<ul style="list-style-type: none"> • Ignition switched off • Select 200 Ω measuring range - Disconnect connector for longitudinal acceleration sensor -G251- - Disconnect multi-pin connector T25 from ABS control module (w/EDL) - J104- - Connect test box V.A.G 1598/21 		
			<ul style="list-style-type: none"> - Check wiring between multi-pin connector for longitudinal acceleration sensor -G251- and multi-pin connector for ABS control module (w/EDL) - J104- for open circuit 	max. 1.5 Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
				Test step 20: Continued on next page.	

01-129

Continuation of test step 20					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
			<ul style="list-style-type: none"> • Set to measuring range 20 M Ω 		
			- Remove fuse S9		
			- Check wiring for short circuit to positive or Ground	$\infty \Omega$	
					- Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-130

Functional check: ESP Control lamp -K155					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
21	-	Function of ESP Control lamp - K155-	<ul style="list-style-type: none"> • Switch ignition on 	ESP Control lamp -K155- lights up for 2 seconds and goes out again	
					<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> - Malfunction in instrument cluster ⇒ Repair Manual, Body Interior, Repair Group 70

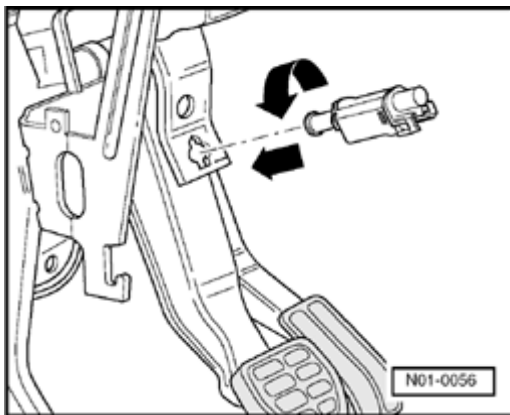
01-131

Brake light switch, adjusting

Vehicle up to my 02.00

⇒ [Repair Manual, Brake System, Repair Group 46; Installing brake light switch](#)

Remove brake light switch to adjust.



- Disconnect connector from brake light switch.
- Remove brake light switch by turning to left through 90 ° .
- Pull brake light switch plunger fully out.
- Press brake pedal down as far as possible by hand.
- Guide brake light switch through assembly opening and reinstall by turning 90 ° to right.
- Release brake pedal.
- Connect brake light switch connector.
- Install driver's side stowage tray if necessary.
- Operate brake pedal.
 - Brake lights light up.
- Take foot off brake pedal.
 - Brake lights do not light up.

Vehicle from my 03.00

- Pull out brake light switch plunger to full extension.
- Keep brake pedal in up position (IMPORTANT! hold pedal up if necessary while installing switch).
- Guide switch through mounting hole (only fits in one position).
- Seat switch fully into opening (pressing plunger against pedal to adjust).
- Seat switch by turning it 45° clockwise. This action also turns the plunger shoe into the correct orientation to make electrical contacts in switch operate as well as locks in plunger adjustment.
- Connect brake light switch connector.
- Operate brake pedal to verify proper function.
- Reinstall lower cover panel.

ABS Mark 60 On Board Diagnostic (OBD), vehicles from my 10.00

There are four versions of the ABS Mark 60.

- ◆ ABS
- ◆ ABS/EDL/ASR
- ◆ ABS/EDL/ASR/ESP with front wheel drive
- ◆ ABS/EDL/ASR/ESP with 4MOTION

Each version has its own control module. The control modules can be coded accordingly through coding bridges via tester VAS 5051 or V.A.G 1551.

The ESP (Electronic Stabilization Program) is an electronic dynamics Program (EDP). It stabilizes the vehicle when oversteering or understeering. The ESP works over the whole speed range. If the ESP is regulating the system the ESP warning lamp will flash 3 times per second.

The ESP is a further extension of the familiar vehicle safety systems.

ESP increases control over the vehicle in critical situations. It reduces the danger of skidding and increases the steering control when compared with familiar vehicle safety systems.

Function

As the control modules are interconnected with a data bus wire, always start troubleshooting by the Diagnostic Trouble Code (DTC) memories of all the control modules in the vehicle.

This occurs in "Automatic test sequence" and is activated with key function 00.

When doing this, check to see if there are DTCs stored which may influence the ABS.

The On Board Diagnostic (OBD) relates to the electrical/electronic part of the ABS, in other words only malfunctions via the electrical connection to the control module are recognized (e.g. speed sensor open circuit).

The 47 pin ABS Control Module (w/EDL) - J104- forms with the hydraulic unit a compact unit. The unit is located on the left of the engine compartment. The control module is equipped with a DTC memory. The Data Link Connector (DLC) is located in the center console below the heating/air conditioning controls.

The control module recognizes malfunctions during vehicle operation and stores them in a permanent memory, the contents of which remain even during periods of no battery voltage.

Sporadic (irregular) malfunctions will also be recognized and stored. But if malfunctions affecting the data bus system do not occur again within the next 15 vehicle start and driving off sequences, or other malfunctions within the next 50 vehicle start and driving off sequences, they will be erased from DTC memory except for the malfunction "Control module faulty" (forget-malfunction counter).

After switching on the ignition and/or starting the engine, the ABS warning light -K47- and the ESP control lamp -K155- will light up for approx. 2 seconds.

During this period a test sequence (self-check) is run in the control module for the following functions:

- ◆ To check if the supply voltage is at least 10.0 Volt,
- ◆ To check control module including the valve windings,
- ◆ To check the coding of the control module,
- ◆ A static check of the speed sensor (no speed signal),
- ◆ If the wheel speed signal is not OK after the car has been driven and a speed of approx. 20 km/h (approx. 13 mph) has been exceeded, the ABS warning light -K47- will light up again.

Features of 4MOTION

In order to utilize the engine's maximum performance for a test, e.g. on a rolling road test bed, the longitudinal acceleration sensor -G251- must be switched off ⇒ [Page 01-264](#) , Initiating basic setting, Display group number 040.

Switch ignition off and on again to reactivate the longitudinal acceleration sensor -G251-.

All-wheel drive vehicles with a Haldex coupling are equipped with EDL (Electronic Differential Lock).

Special detail for bleeding brake systems with ABS/EDL

If a chamber in the brake fluid reservoir has run empty, basic setting must be performed for bleeding the brakes ⇒ [Page 01-264](#) .

V.A.G 1551 scan tool or tester VAS 5051

The On Board Diagnostic must be initiated at the commencement of troubleshooting. Electrical malfunctions which influence the braking characteristics will be stored.

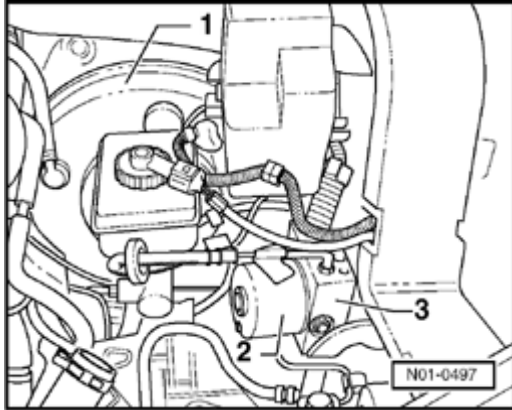
They can be checked with the V.A.G 1551 Scan Tool, Vehicles system tester V.A.G 1552 or Vehicle Diagnosis, Testing and Information System VAS 5051.

The program card in the V.A.G 1551 must be at least version 9.0 and in vehicle system tester V.A.G 1552, at least version 6.0.

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Arrangement of ABS MARK 60

The brake booster boost is produced by vacuum pressure.



Distinguishing features:

- 1 - 10" brake booster
- 2 - Hydraulic unit
- 3 - Control module, 47-pin (bolted to hydraulic unit). Two 4.8 mm wide contacts are located at each end of the connection.

Technical data

Control module identification

The version of the control module is displayed after the V.A.G 1551 scan tool or the tester VAS 5051 has been connected and the control module for brake electronics has been selected ⇒ [Page 01-163](#) .

1C0 907 379 C / ABS
J

1C0 907 379 D / ABS/EDL/ASR
K

1C0 907 379 E / ABS/EDL/ASR/ESP
G

1C0 907 379 F / ABS/EDL/ASR/ESP
H 4MOTION

Diagnostic Trouble Code (DTC) memory

A non-volatile memory ensures that the contents of the DTC memory are retained even without voltage.

Data output takes place on V.A.G 1551 scan tool in operating mode 1 (rapid data transfer), and on tester VAS 5051 in operating mode "vehicle OBD".

Safety precautions and fundamental points regarding troubleshooting

Note:

- ◆ *The ABS is a vehicle safety system; the appropriate knowledge is necessary to work on the system.*
- ◆ *In order to check complaints and to be able to carry out pin-pointed troubleshooting, the Diagnostic Trouble Code (DTC) memory must be checked before commencing work on the ABS system.*
- ◆ *Only separate connectors when the ignition is switched off.*
- ◆ *Observe the appropriate instructions regarding the handling of brake fluid.*

⇒ [Repair Manual, Brake System, Repair Group 47](#)

- ◆ *ABS malfunctions are indicated by the ABS warning light illuminating. Certain malfunctions will only be recognized at speeds above 20 km/h (approx. 13 mph) (carry out road test).*
- ◆ *If the ABS -K47- and the brake system -K118- warning lights do not illuminate, but the brake system is not functioning correctly then the malfunction must be sought in the conventional braking system.*

⇒ [Repair Manual, Brake System, Repair Group 45](#)

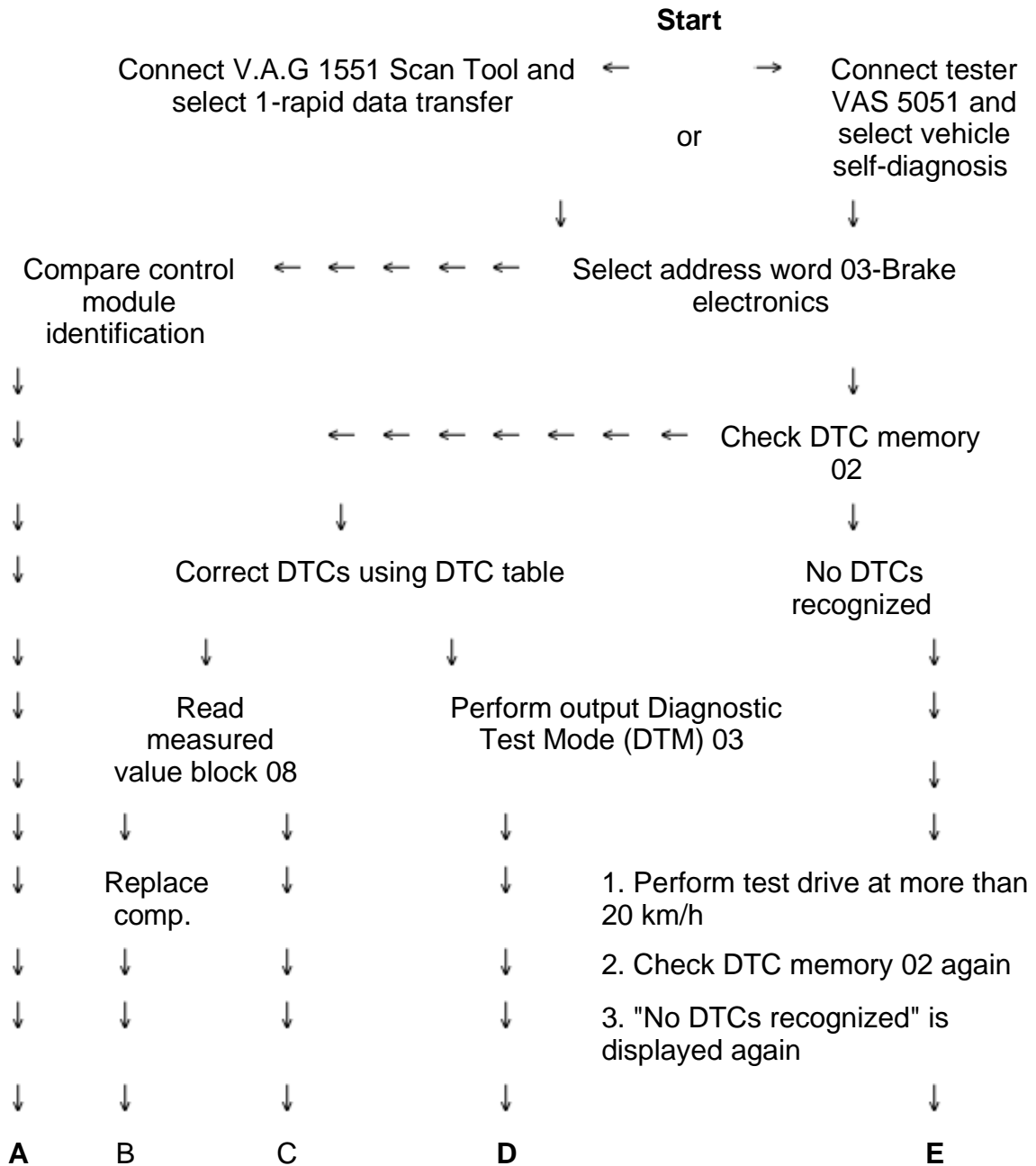
01-140**Technical information**

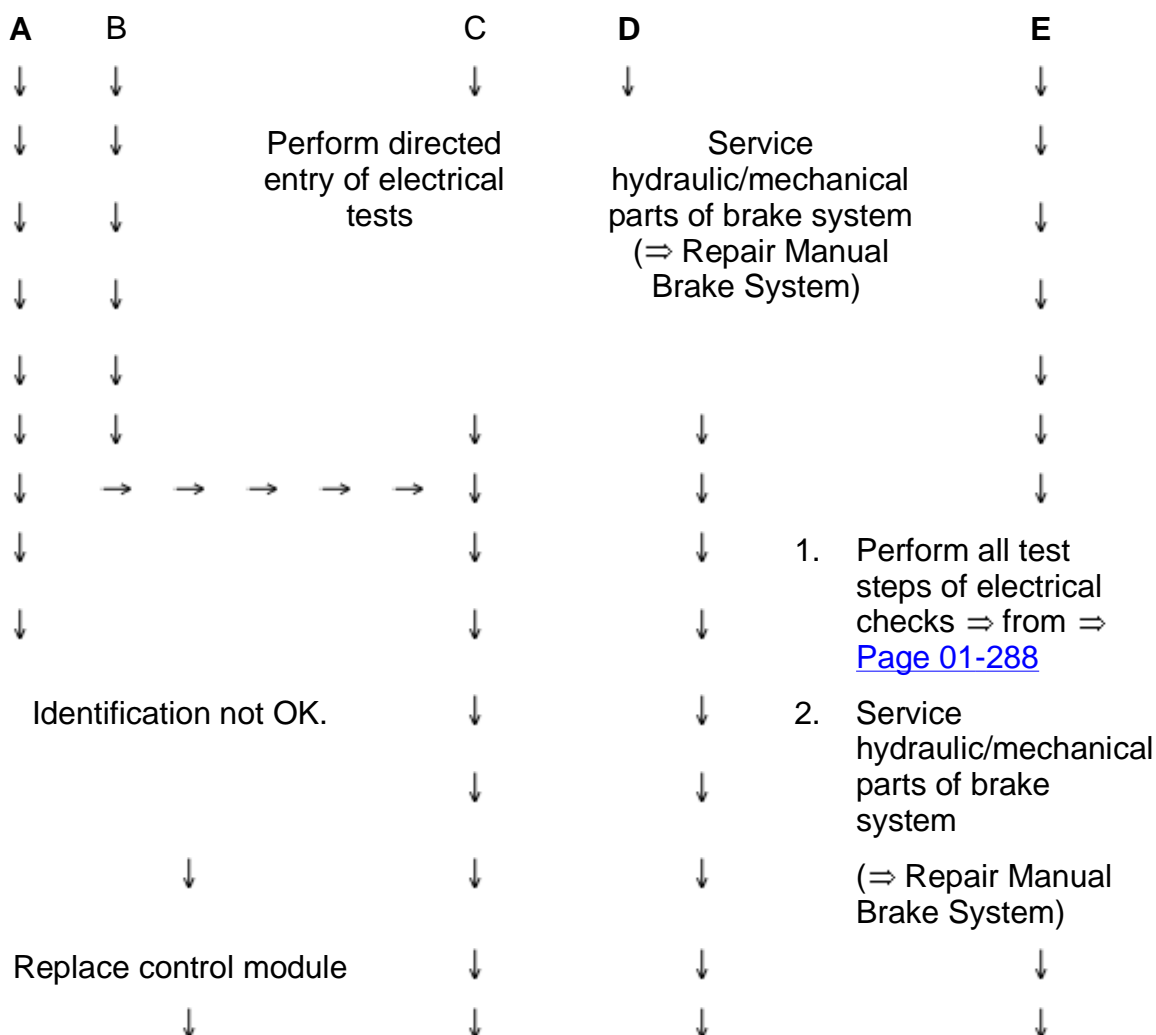
Electrical Wiring Diagrams, Troubleshooting & Component Locations binder

Repair Manual, Brake System

Repair Manual, Suspension, Wheels, Steering

Troubleshooting with V.A.G 1551 scan tool or tester VAS 5051 on ABS Mark 60 (flow chart)



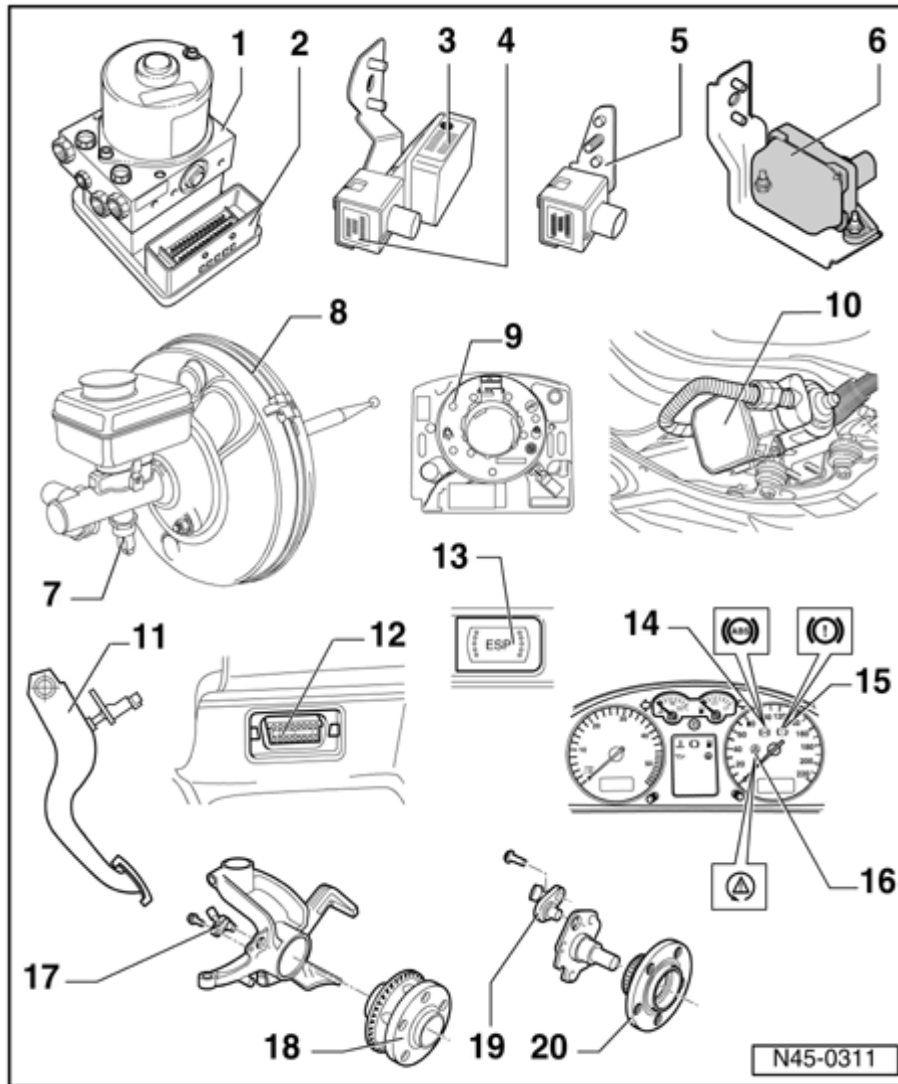


- Connect V.A.G 1551 scan tool or tester VAS 5051 and check DTC memory 02.

- Erase DTC memory (05)

- Perform test drive at more than 20 km/h (13 mph) and allow the ABS regulate braking.

- Check DTC memory after test drive. If "No DTC recognized" appears on display of V.A.G 1551 scan tool or tester VAS 5051 after repair DTCs and perform test drive, the On Board Diagnostic (OBD) is completed.



Electrical/electronic components and installing locations

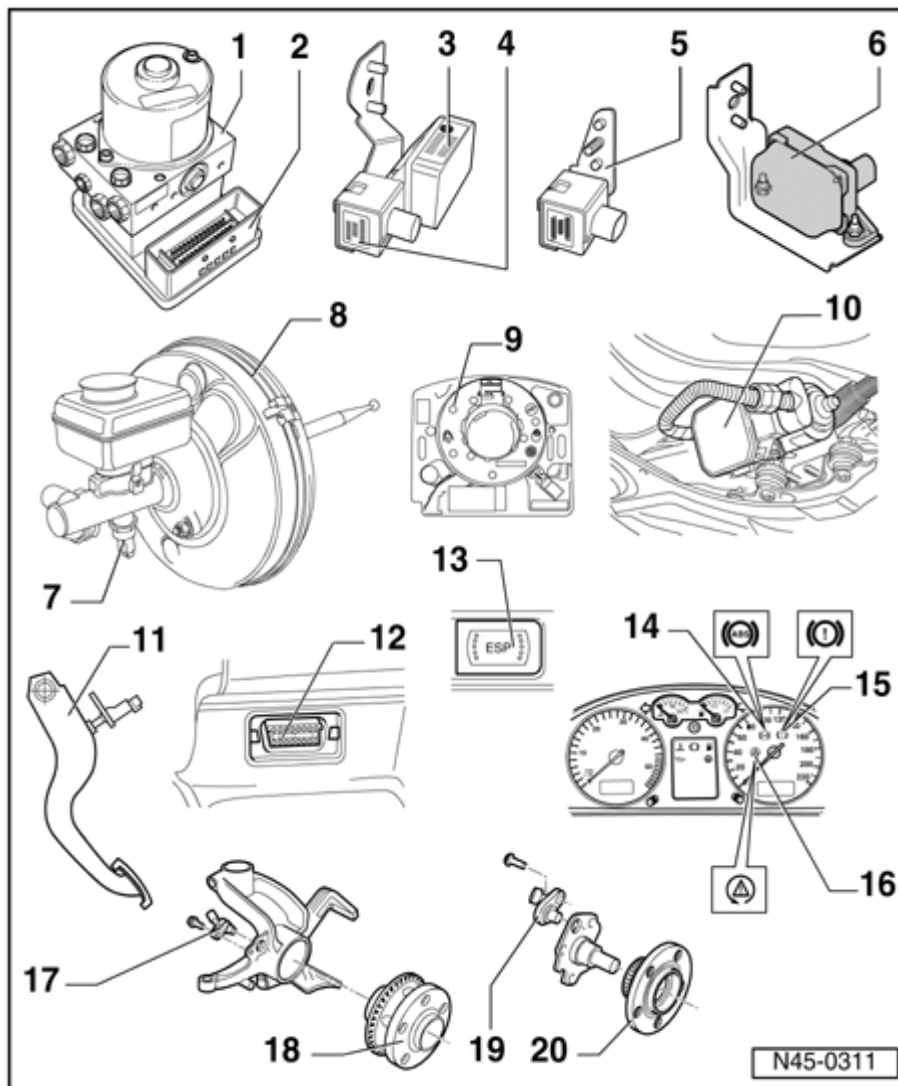
1 - ABS hydraulic unit N55-

- ◆ Located on engine compartment
- ◆ The ABS hydraulic unit -V64 inlet/outlet must be checked by Diagnostic
- ◆ The ABS hydraulic unit -V64 block must be separated from another
- ◆ Removing and installing

⇒ [Repair Manual, ABS System, Repair Group Hydraulic unit, brake booster/master cylinder Assembly overview and installing control and hydraulic control](#)

- ◆ When changing hydraulic unit seal the old one the plugs from repair set F 698 311 A

01-144



2 - ABS Control Module (w/EDL) - J104-

- ◆ Location: on hydraulic unit on left of engine compartment
- ◆ Checked by On Board Diagnostic (OBD)
- ◆ Checking the multi-pin connector to control module ⇒ [Page 01-292](#)
- ◆ Do not disconnect connector before successfully completing On Board Diagnostic (OBD). Switch ignition off before separating connection.

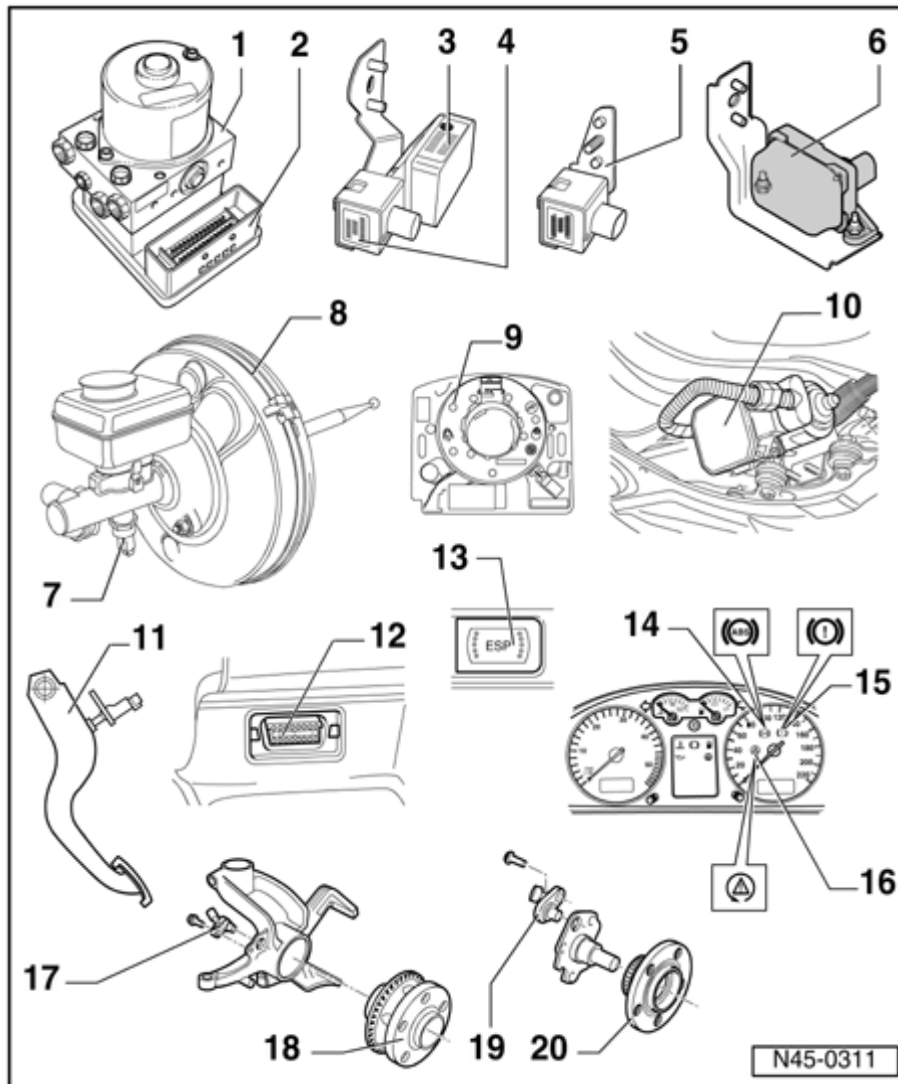
Vehicles with ABS/ESP only

- ◆ When the ABS Control Module (w/EDL) - J104- is replaced, a

zero
compensation
must be
performed

- ◆ Initiate
basic
setting
⇒ [Page
01-264](#) ,
perform
display
group
numbers
060,
063, 066
and 069

01-145

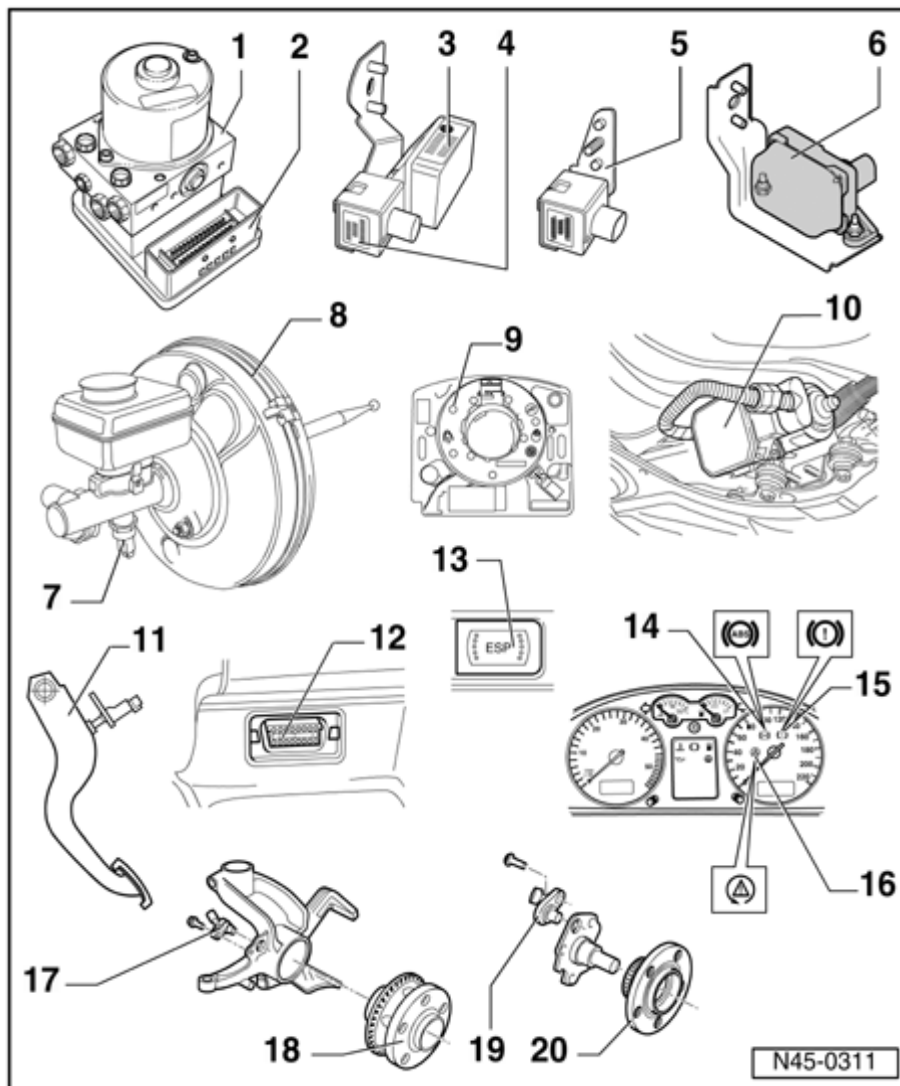


3 - Sender for Rotation Rate G202-

- ◆ Vehicles with ABS/EDL/ASR/I only
 - ◆ Location: Under instrument panel next steering column
 - ◆ Checked by OBD
 - ◆ Can be checked via read measured value block [Page 01-24](#)
 - ◆ Observe installation instructions

⇒ [Repair Manual, Brake System, Repair Group 45; Removing and installing parts ESP system](#)

01-146



4 - Sensor for transverse acceleration G200-

◆ Vehicles with ABS/EDL/ASR/ESP only

◆ Location: Under instrument panel next to steering column

◆ Checked by OBD

◆ Can be checked via read measured value block [Page 01-24](#)

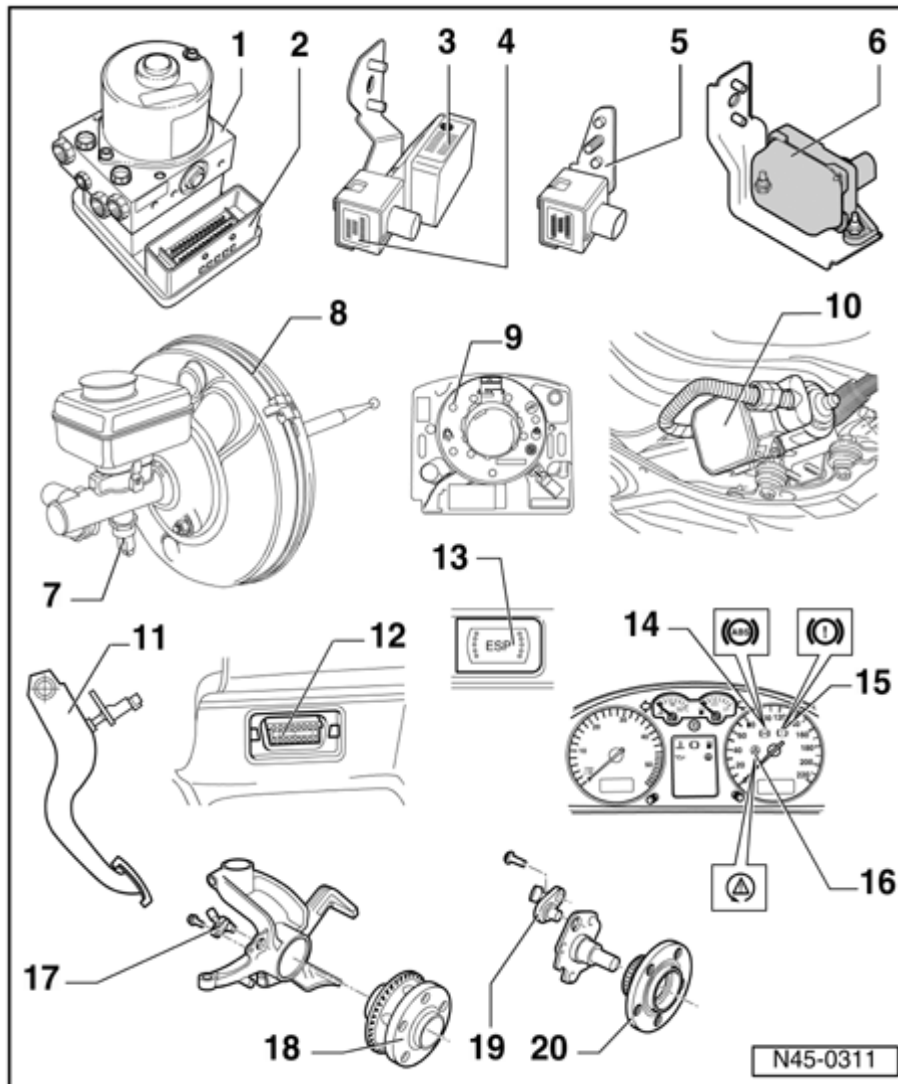
◆ Observe installation instructions

⇒ [Repair Manual, Brake System, Repair Group 45: Removal and installing parts ESP system](#)

◆ When the sensor for transverse acceleration G200- is replaced, a zero compensation must be performed

◆ Initiate basic setting ⇒ [Page 01-26](#) perform display group number 06:

01-147



5 - Longitudinal acceleration sensor - G251-

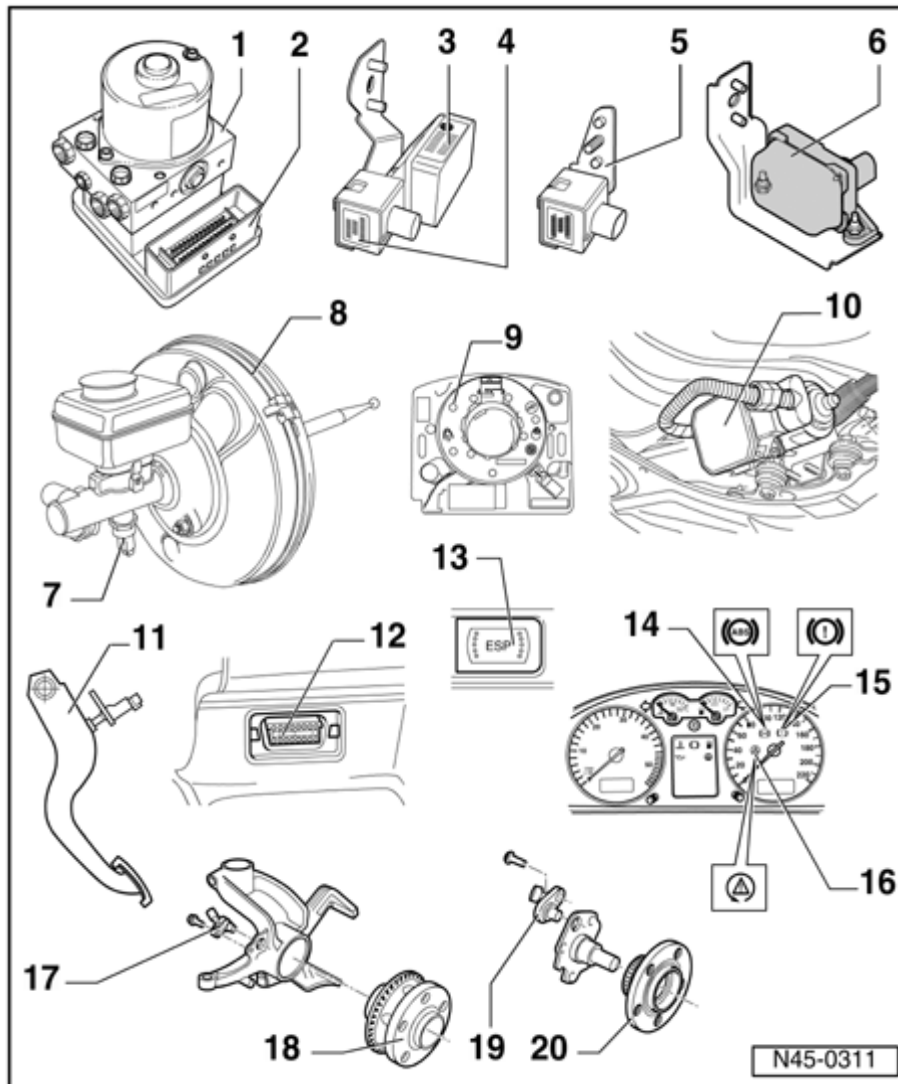
- ◆ Vehicles with 4MOTION only
- ◆ Location: On right A pillar at height of instrument panel
- ◆ Checked by OBD
- ◆ Can be checked via read measured value block ⇒ [Page 01-240](#)
- ◆ Observe installation instructions

⇒ [Repair Manual, Brake System, Repair Group 45](#)

- ◆ When the lateral acceleration sensor - G251- is replaced, a zero compensation must be performed
 - ◆ Initiate basic setting ⇒ [Page](#)

[01-264](#) ,
perform
display
group
number
069

01-148



6 - ESP-Sensor unit -G419-, vehicles for 02.02

◆ Vehicles with ABS/EDL/ASR/ only

◆ Combined sensor for transverse acceleration G200-, sen for rotation rate -G202- and longitudinal acceleration sensor¹⁾ - G251-

◆ Assembled together in housing

◆ Checked electrically On Board Diagnostic (OBD)

◆ Combined i one housin

◆ Can be checked via read measured value block [Page 01-24](#)

◆ Observe installation instructions

⇒ [Repair Manual, Brake System, Rep Group 45; Removir and installing parts ESP system](#)

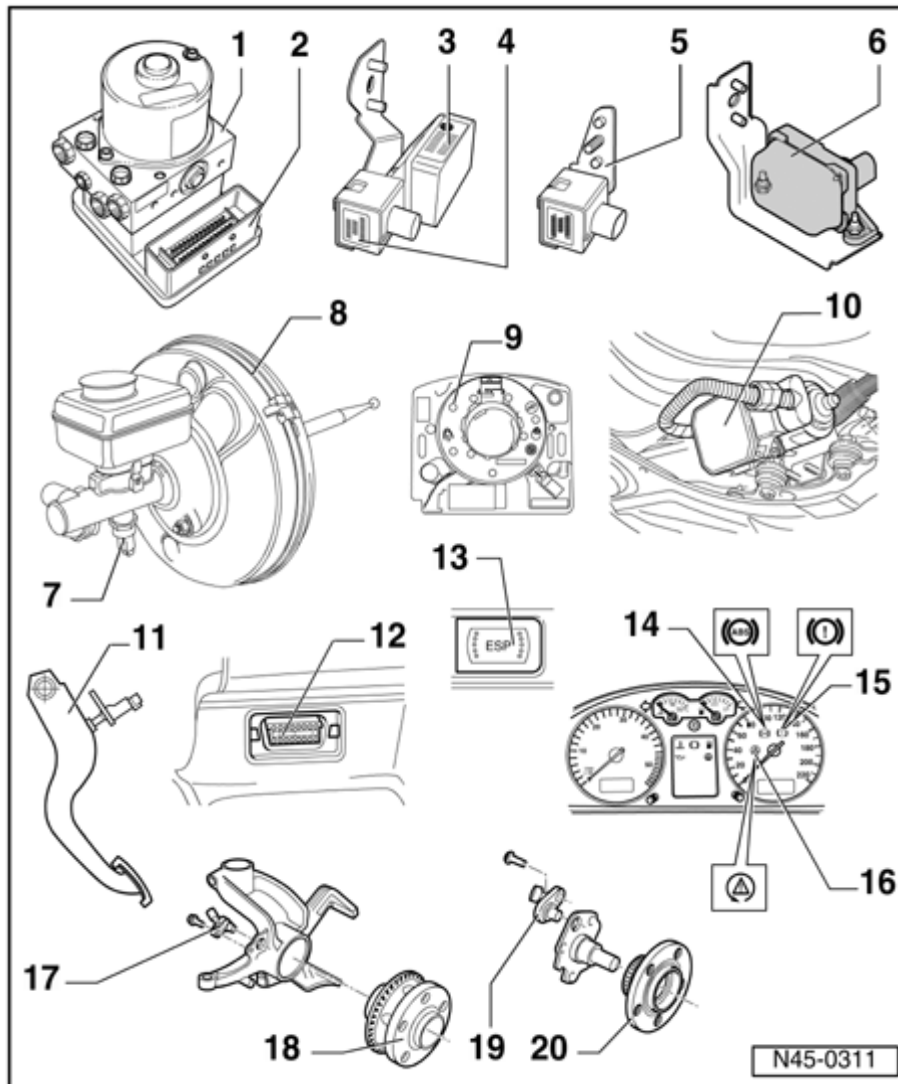
◆ When the

ESP-senso
unit -G419-
replaced, a
zero
compensat
must be
performed

- ◆ Initiate basi
setting ⇒
[Page 01-26](#)
perform
display gro
numbers 06
and 069

1) 4Motion
vehicles with
Haldex clutcl
only

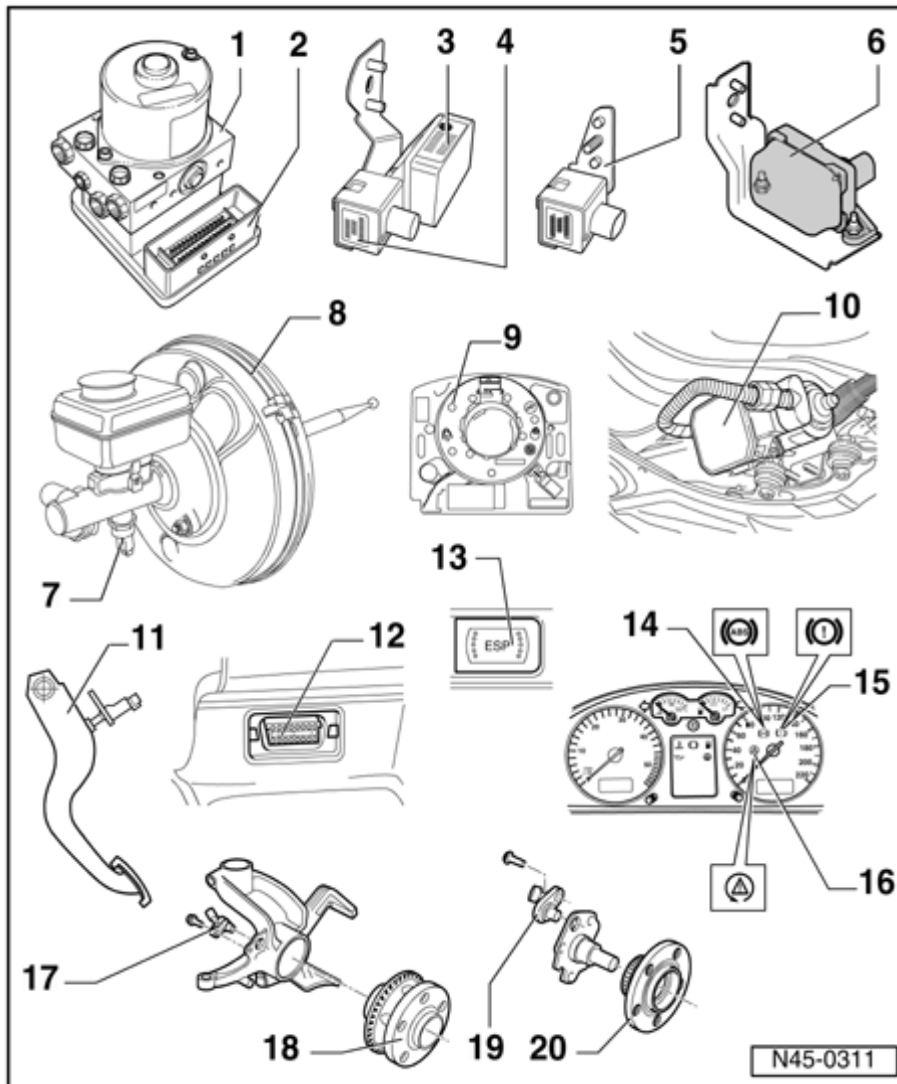
01-149



7 - Sender 1 for brake booster G201-

- ◆ Vehicles with ABS/EDL/ASR/ESP only
 - ◆ Checked by OBD
 - ◆ Can be checked via read measured value block [Page 01-24](#)
 - ◆ Removing & installing
 - ⇒ [Repair Manual, Brake System, Rep Group 47; Assembly overview: Brake booster/brake master cylinder for vehicles with ABS/EDL/ASR/ESP](#)
 - ◆ When the sender 1 for brake booster G201 is replaced, a zero compensation must be performed
 - ◆ Initiate basic setting ⇒ [Page 01-26](#) perform display group number 06

01-150

**8 - Brake booster****9 - Steering angle sensor -G85-**

◆ Vehicles with ABS/EDL/ASR/ESP only

◆ Location: C steering column between steering wheel and steering column switch

◆ Checked by OBD

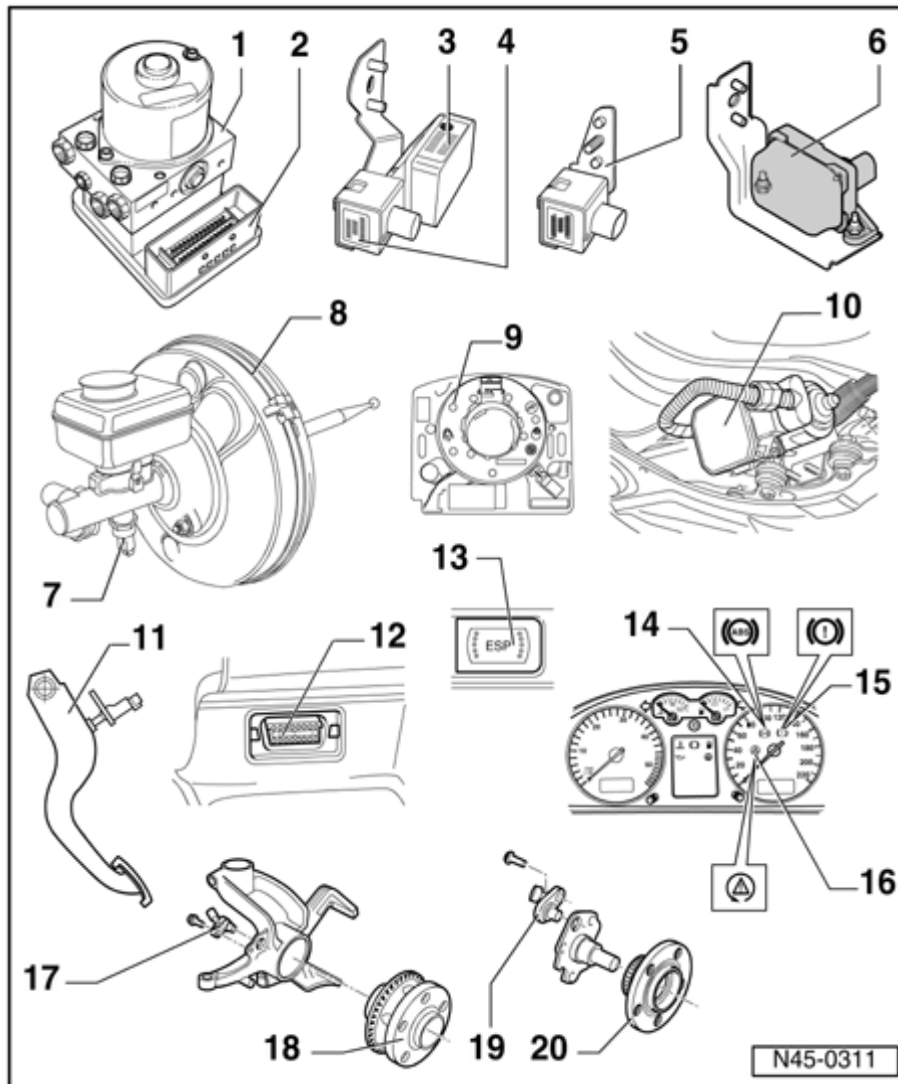
◆ Can be checked via read measured value block [Page 01-24](#)

◆ Observe installation instructions

⇒ [Repair Manual, Brake System, Repair Group 45; Removing and installing parts ESP system](#)

◆ When the steering angle sensor -G85- is replaced, zero compensation must be performed

◆ Introduce basic settings
⇒ [Page 01-264](#), perform display group number 06



10 - Brake system vacuum pump - V192-

- ◆ Not installed in all vehicles
- ◆ Location: left of subframe
- ◆ Checked by OBD in engine control module
- ◆ Removing and installing

⇒ [Repair Manual, Brake System, Repair Group 47; Brake system vacuum pump -V192](#)

- ◆ Checking
- ⇒ [Repair Manual, Brake System, Repair Group 47; Brake system vacuum pump -V192](#)

11 - Brake light switch - F-

- ◆ The brake light

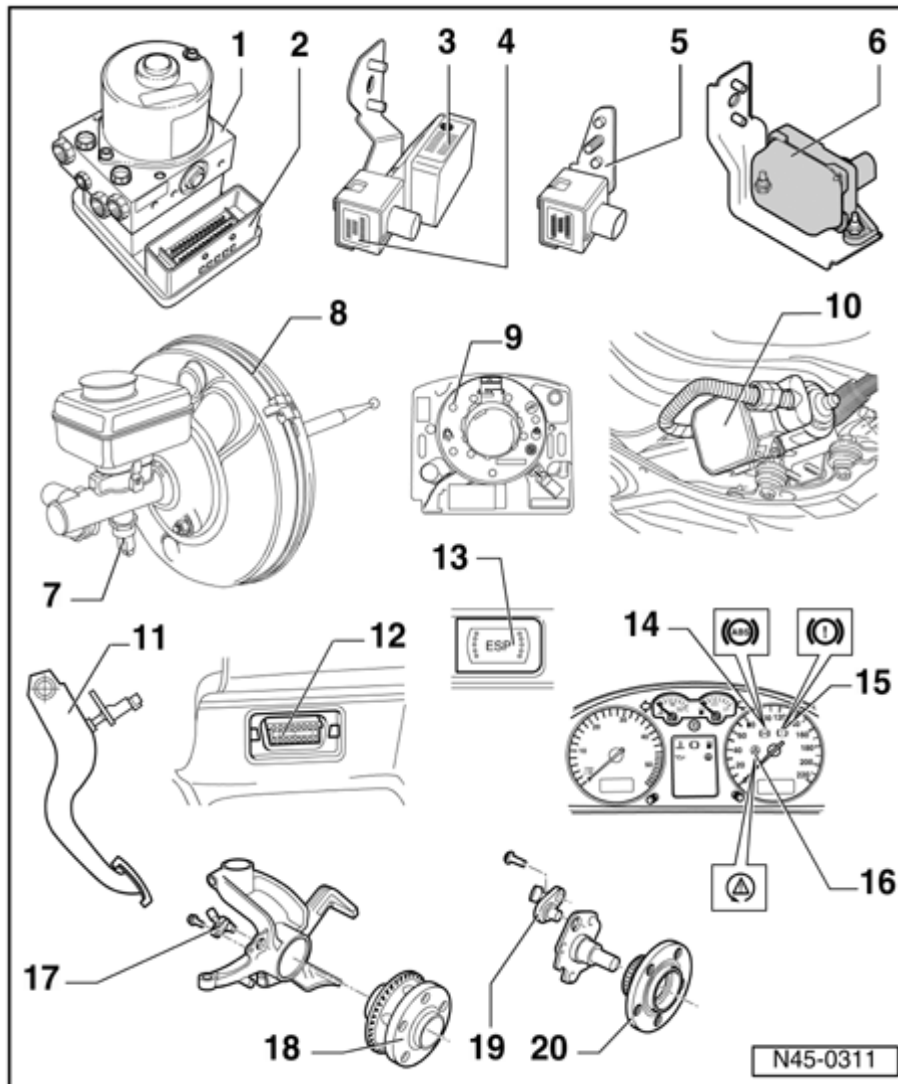
switch
is open
in the
rest
position;

- ◆ Can be checked via read measured value block ⇒ [Page 01-240](#)

- ◆ Adjusting

⇒ [Repair Manual, Brake System, Repair Group 46; Brake pedal - Assembly overview; Adjusting brake light switch](#)

01-152



12 - Data Link Connector (DLC)

- ◆ Location: In center console below heating/air conditioning controls module

13 - Button for ASR/ESP - E256-

- ◆ Vehicles with ABS/EDL/ASR/ESP only

14 - ABS warning light -K47-

- ◆ Location: In the instrument cluster

Function: ⇒ [Page 01-155](#)

15 - Warning light for brake system -K11

- ◆ Location: In the instrument cluster

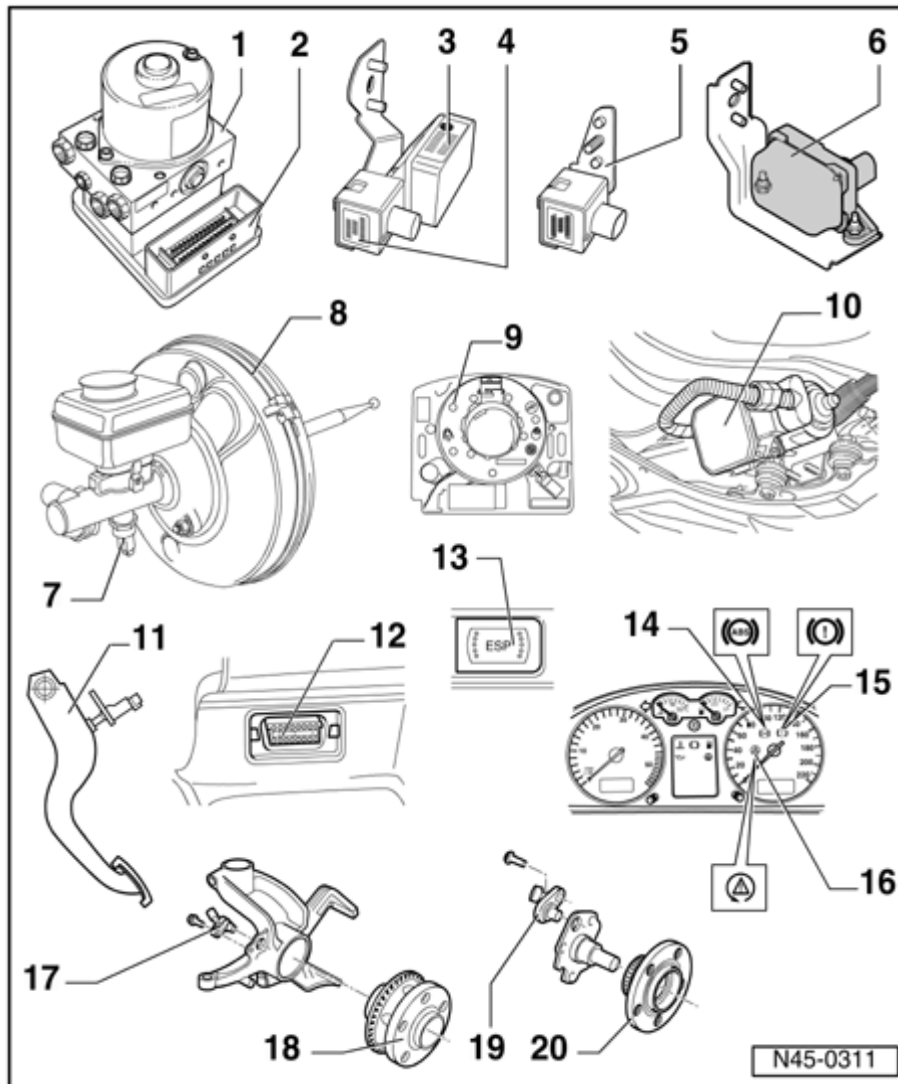
Function: ⇒ [Page 01-155](#)

16 - ASR/ESP Control Lam K155-

- ◆ Location: In the instrument cluster

Function: ⇒ [Page 01-155](#)

01-153



**17 Right/left
- front
ABS
wheel
speed
sensor -
G45/-/
G47-**

- ◆ Checked by OBD
- ◆ Before inserting the sensor clean the inner surface of the sensor mounting and coat with lubricating paste G 000 650
- ◆ When connecting the speed sensor wire make sure it is not twisted in the wheel housing
- ◆ Securing bolt tightening torque - 10 Nm (7.4 ft lb)

**18 - Wheel
hub
with
rotor
for
speed**

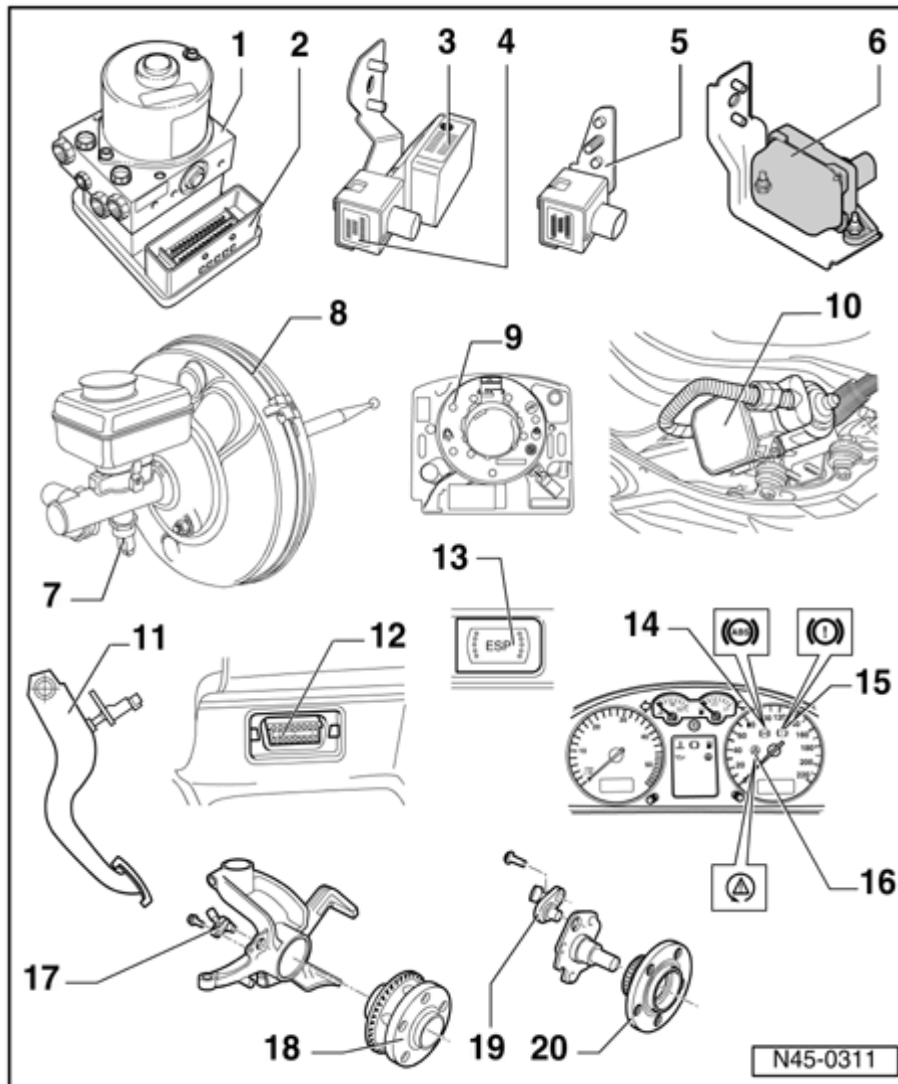
sensors

- ◆ Rotor and speed sensors for left front and right-hand sides are identical

- ◆ Removing and installing

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front suspension; II - Servicing wheel bearings](#)

01-154



19 Right/left - rear speed sensor - G44/- G46-

- ◆ Checked by OBD
- ◆ Before inserting the sensor clean the inner surface of the sensor mounting and coat with lubricating paste G 000 650

- ◆ When connecting the speed sensor wire make sure it is not twisted in the wheel housing

- ◆ Securing bolt tightening torque - 10 Nm (7.4 ft lb)

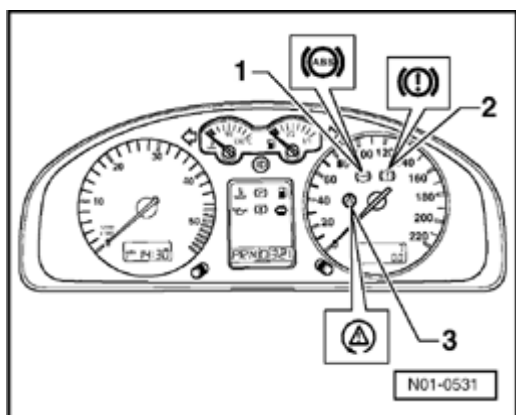
20 - Wheel hub with rotor for speed sensors

- ◆ Rotor and speed sensors for left rear and right-hand sides are identical

- ◆ Removing and installing

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Servicing wheel bearings](#)

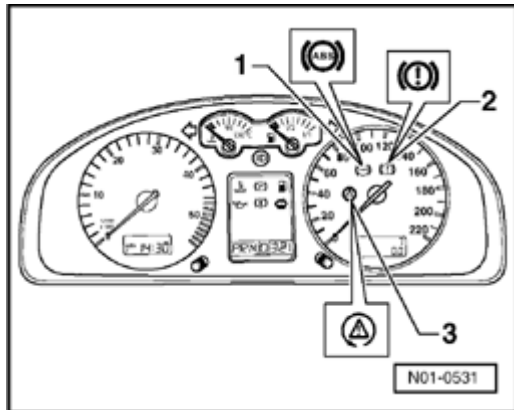
Diagnostic Trouble Codes (DTCs) displayed by warning lights -K47-, -K118- and -K155-



A

Warning lamps

Item	Designation
1	ABS warning light -K47-
2	Warning light for brake system -K118-
3	ASR/ESP Control Lamp - K155-



ABS warning light -K47-

- ◆ If the ABS warning light -K47- -1- does not go out after switching ignition on and completion of test sequence then the malfunction may be:

-a- Voltage supply is below 10 Volt

-b- There is a malfunction in the ABS

The anti-locking brake system remains switched off with an ABS malfunction -b-, but the brake system remains fully operational.

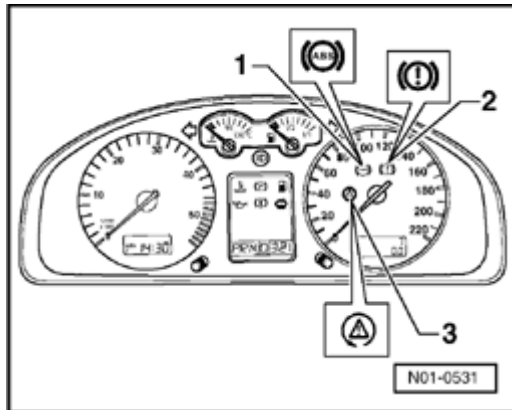
-c- Since the last time the vehicle was started there was a temporary speed sensor malfunction.

In the case of a sensor malfunction -c-, the ABS warning light -K47- will extinguish after restarting the engine and attaining a speed of above 20 km/h (approx. 13 mph).

-d- The connection from instrument cluster to ABS Control Module (w/EDL) -J104- is interrupted (open circuit).

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

-e- Instrument cluster is faulty.



Warning lights -K47- and -K118-

- ◆ If the ABS warning light -K47- -1- goes out but the warning light for brake system -K118- -2- remains on, then the malfunction may be:

-a- The parking brake is applied.

-b- There is a malfunction in the activation of the warning light for brake system -K118-.

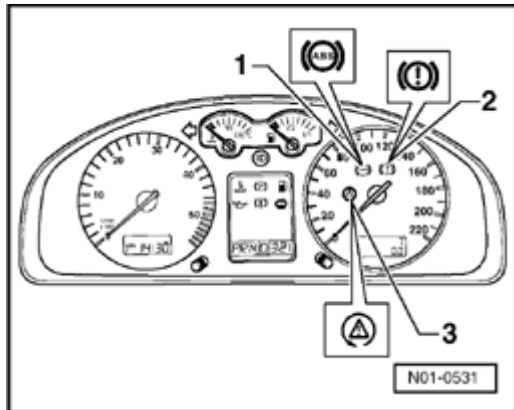
⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

-c- The brake fluid level is too low.

- ◆ If the ABS warning light -K47- -1- and the warning light for brake system -K118- -2- illuminate, the ABS system is faulty and the EBD (Electronic brake pressure distribution) is not functioning.

WARNING!

After the ABS warning light -K47- and warning light for brake system -K118- have illuminated, it is possible that the rear wheels will lock-up earlier when braking.



ASR/ESP Control Lamp -K155-

- ◆ If the ESP control lamp -K155- - 3- does not go out after ignition is switched on and test sequence is completed then the malfunction may be:

-a- Short to positive in ASR/ESP button -E256-.

-b- There is a malfunction in the activation of the ESP control lamp -K155-.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

-c- The ASR/ESP system has been switched off via ASR/ESP button -E256-.

There is a malfunction present which only affects the safety systems of the ASR/ESP. The ABS/EDL and EBD safety systems of the vehicle remain fully functional.

If ASR/ESP control lamp -K155- flashes while driving, the ASR or ESP system is regulating the system.

On Board Diagnostic (OBD), performing

Test prerequisites for OBD

- The tires installed to all wheels must be of the same (approved) size; tires inflated to prescribed pressure.
- Mechanical/hydraulic parts of the brake system including brake light switch and brake lights OK.
- Hydraulic lines and connections not leaking (visual check of hydraulic unit, brake calipers, wheel cylinders, tandem master brake cylinder).
- ABS Control Module (w/EDL) -J104- is correctly bolted to ABS Hydraulic Unit - N55-.
- Connector on ABS Control Module (w/EDL) -J104- correctly plugged-in (retainer is engaged).
- Check contacts of ABS components for damage and correct seating.
- All fuses according to wiring diagram OK (remove fuse from fuse holder to check).
- Supply voltage OK (at least 10.0 V).

- Access to the OBD is only possible when the vehicle is stationary and ignition turned on (or engine running).
- Wheel bearings and wheel bearing play are OK.
- When checking the ABS system make sure that the vehicle electric system is not affected by electro-magnetic interference, i.e. the vehicle is kept away from equipment with a high current draw, e.g. from an electric welding module.

Safety precautions

WARNING!

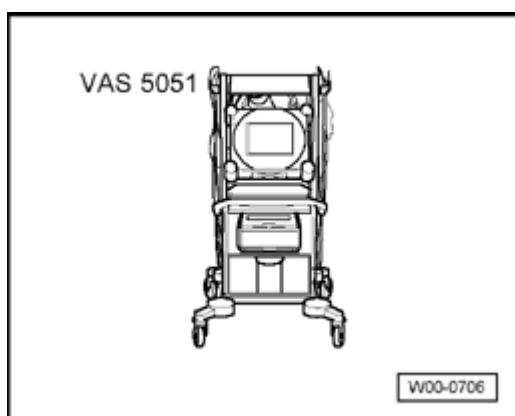
- ♦ ***You must always secure testing and measuring equipment on the rear seat.***
- ♦ ***When vehicle is being driven, a second technician must operate this equipment.***

Scan tool, connecting

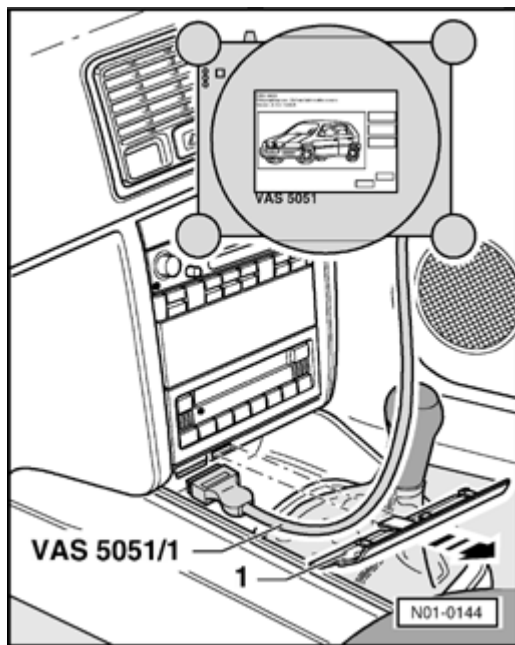
All functions which could previously be performed with V.A.G 1551/1552 can also be performed with the new tester VAS 5051 in the operating mode vehicle OBD.

⇒ *Operating instructions for Vehicle Diagnosis, Testing and Information System VAS 5051.*

Special tools and equipment



- ◆ VAS 5051 Vehicle Diagnosis, Testing and Information System
- ◆ Diagnostic cable VAS 5051/1 or VAS 5051/3
- ◆ The ABS function is switched off in the control module during the On Board Diagnostic (OBD).
- ◆ The Diagnostic Trouble Code (DTC) memory can be erased after successfully checking and repair.



Connecting VAS 5051

- Pull cover -1- off in direction of - arrow-.
- With ignition switched off, connect tester VAS 5051 to Data Link Connector using diagnosis cable VAS 5051/1 or VAS 5051/3.

Selecting operating mode:

- Press button on display for "Vehicle On Board Diagnostic (OBD)".

Selecting vehicle system:

- Press button "03 - brake electronics" on the display.

The control module identification and coding are indicated on the display.

Selecting diagnosis function:

All diagnostic functions available are indicated on the display.

- Press button on display for desired function.
- Further measures see repair procedures.

Note:

The following test sequences are for V.A.G 1551 scan tool.

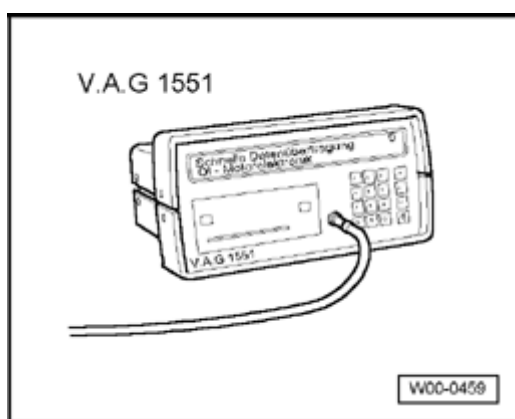
01-163

V.A.G 1551 scan tool, connecting and selecting function

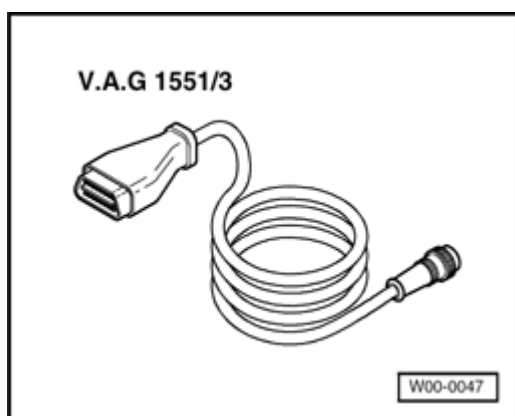
Note:

All functions that have so far been carried out with V.A.G 1551 can now also be carried out with the tester VAS 5051.

Special tools and equipment



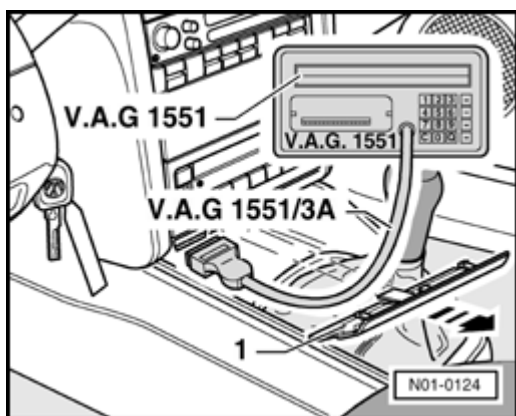
- ◆ V.A.G 1551 or V.A.G 1552 scan tool vehicle system tester.



- ◆ V.A.G 1551/3 or 1551/3A adapter cable

Note:

- ◆ The ABS function is switched off in the control module during the OBD. This is indicated by flashing of ABS warning light -K47- and light for brake system -K118-. If there is a malfunction currently, it will be indicated by lights being on constantly.
- ◆ The DTC memory can be erased after successful check and repair.



- ◀ - With ignition switched off, connect V.A.G to diagnostic connection using cable V.A. 1551/3 A.
- Connect VAS 5051 ⇒ [Page 01-31](#) .

V.A.G - On Board Diagnostic HELP

1 - Rapid data transfer1)

2 - Blink code output1)

◀ Indicated on display:

1) Is displayed alternately

If the display remains blank, check Data Link Connector connection, Electrical check, ⇒ [01-288](#) , test steps 21 and 22.

Note:

- ◆ Depending on the program, additional information can be printed out by pressing the HELP key of V.A.G 1551.
- ◆ The → key is used for moving forward through the program
- ◆ The PRINT key is used for switching on the printer (warning lamp in key comes on).

- Switch on ignition.
- Switch on printer with the Print key (indicator lamp in key lights up).
- Press key -1- for "Rapid data transfer" operating mode.

Rapid data transfer
Enter address word XX

HELP



Indicated on display:

- Press keys -0- and -3-; 03 to input address word of vehicle system to be tested: "Brake electronics".

Rapid data transfer
03 - Brake electronics

Q



Indicated on display:

- Confirm input with Q key.

1C0 907 379 E ESP FRONT MK60 0103 →
Coding 0011266 WSC XXXXX



And then the display shows e.g.:

Displayed is:

- ◆ The control module identification number.

e.g. (1C0 907 379 E).

Allocation of control module see Parts catalog

◆ System designation (ESP).

◆ Type of drive (front wheel).

◆ ABS (Mark 60).

◆ Control module coding
(0011266).

Coding control module ⇒ [Page 01-232](#) .

◆ Workshop code

⇒ *V.A.G 1551 scan tool operating instructions*

If the control module identification number does not appear; Summary of functions ⇒ [Page 01-168](#) .

- Press → key.

Rapid data transfer HELP
Select function XX



Indicated on display (select function, e.g. 02 - Interrogate fault memory).

Rapid data transfer HELP
Control module does not answer!



Indicated on display:

- By pressing the HELP key, a list of possible fault causes is printed out.
- After eliminating the possible causes of malfunctions, enter the address word 03 for "Brake electronics" again and confirm.

Rapid data transfer HELP
control module does not answer!

If "control module does not answer!"
again appears:



Indicated on display:

- Perform test steps 1, 2 and 3 ⇒
[Page 01-288](#) , Electrical check.

Rapid data transfer →
No signal from control module!



Control module identification
influenced during checking (possibly
influenced from external sources?)

- Check diagnostic wire as well as
voltage supply and Ground
connection for ABS Control
Module (w/EDL) -J104-, Electrical
check, ⇒ [Page 01-288](#) .
- After repairing the possible
causes of the malfunction, again
enter the address word 03 for
"Brake electronics" and confirm
with Q key.

List of selectable functions

		Page
00 -	Automatic test sequence	⇒ Page 01-169
01 -	Check control module version ⇒Connecting V.A.G 1551 scan tool and selecting function	⇒ Page 01-163
01 -	Check control module version ⇒ Connecting tester VAS 5051 and selecting function	⇒ Page 01-31
02 -	Check Diagnostic Trouble Code (DTC) memory	⇒ Page 01-170
03 -	Output Diagnostic Test Mode (DTM)	⇒ Page 01-74
04 -	Initiate basic setting	⇒ Page 01-264
05 -	Erase DTC memory	⇒ Page 01-230
06 -	End output	⇒ Page 01-230
07 -	Code control module	⇒ Page 01-232
08 -	Read measured value block	⇒ Page 01-240
11 -	Login procedure	⇒ Page 01-287

Automatic test sequence

The automatic test sequence checks all the Diagnostic Trouble Codes (DTC) memories of the control modules.

- Switch on ignition.

V.A.G - On Board Diagnostic

HELP



Indicated on display:

1 - Rapid data transfer1)

2 - Blink code output1)

1) Is displayed alternately

- Press key -1- for "Rapid data transfer" operating mode.
- Switch on printer with the Print key (indicator lamp in key lights up).

Rapid data transfer

HELP



Indicated on display:

Select function XX

- Press key -0- twice; 00 to enter "Check automatic test sequence" function.
- Confirm entry with Q key.

032906026BI 1.6I R4 MONO 1.3 D1 TEV

Coding 00002 WSC XXXXX



The V.A.G 1551 scan tool will show the engine control module identification is displayed first e.g.

Thereafter all control module identifications with eventual DTC memory entries are displayed.

Diagnostic Trouble Code (DTC) memory, checking

Note:

All functions which could previously be performed with V.A.G 1551 can now also be carried out with the tester VAS 5051.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press keys -0- and -2-; 02 enters the "Check DTC memory" function.

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Confirm entry with Q key.

X DTCs recognized!



The number of stored DTCs or "No DTC recognized" appears in the display.

- Press → key.

The stored DTCs are displayed and printed out one after the other.

- With DTC information print-out, eliminate malfunction according to DTC table, ⇒ [Page 01-189](#) .

As with "No DTC recognized", the program returns to the start position after pressing the → key:

Rapid data transfer

HELP



Select function XX

Indicated on display:

- End output (Function 06) ⇒ [Page 01-230](#) .
- Switch off ignition and unplug diagnostic connector.

Work sequence if a DTC has been recognized:

1. Repair malfunction according to DTC table, ⇒ [Page 01-189](#)
2. Check DTC memory (Function 02)
3. Erase DTC memory (Function 05)
4. End output (Function 06)
5. Perform a test drive
6. Check DTC memory again

Output Diagnostic Test Mode (DTM)

Note:

- ◆ *All functions which could previously be performed with V.A.G 1551 can now also be carried out with the tester VAS 5051.*
- ◆ *The pump motor and the correct functioning of the hydraulic circuits (allocation of brake lines to wheel cylinders and function of valves) can be checked via the output DTM for interchange or leaks.*
- ◆ *The vehicle must be raised until all wheels are free to turn. (2nd mechanic required to rotate wheels)*
- ◆ *The -C- key can be used to exit the test sequence at any time.*
- ◆ *After depressing the brake pedal several times the vacuum in the brake booster will be exhausted. Therefore more pressure must be applied to the brake pedal in order to attain the same fluid pressure in brake system, as that attained with vacuum.*
- ◆ *When vacuum in brake booster is exhausted it can happen that the wheels do not lock; start engine and build-up vacuum in brake booster.*

Example:

Indicated on V.A.G 1551 display during
Output DTM:

(e.g. front left wheel, FL)

Output Diagnostic Test Mode - → IFL: VBAT OFL: 0V Wheel FL locked

IFL = Inlet valve Front Left

VBAT = Voltage Battery; Voltage at valve

OFL = Outlet valve Front Left

0V = 0 Volt; No voltage at valve

Locked/free = Wheel condition; must be
checked by 2nd mechanic if required

Output Diagnostic Test Mode - → EDL valves/Hyd-P: VBAT Wheel FL/FR locked

Hydr-P = Hydraulic pump

- Connect V.A.G 1551 scan tool.
- Switch on ignition.
- Press key -1- for "Rapid data transfer" operating mode.
- Select brake electronics control module (address word 03); ⇒ [Page 01-165](#) .

Rapid data transfer
03 - Brake electronics

q ↩

Indicated on display:

- Confirm entry with key Q.

Note:

During the next work steps the ABS warning light - K47- flashes.

- Read off control module version in V.A.G 1551 display.
- Press → key.

01-175

Rapid data transfer Select function XX	HELP	←	Indicated on display - Press keys 0 and 3
Rapid data transfer 03 - Output Diagnostic Test Mode	Q	←	Indicated on display - Confirm entry with key Q. ABS hydraulic pump -V64- must run.
Output Diagnostic Test Mode ABS hydraulic pump - V64	. →	←	Indicated on display - Press → key.
Output Diagnostic Test Mode Operate brakes	. →	←	Indicated on display - Operate brake pedal. - Press → key.
Output Diagnostic Test Mode IFL: 0V OFL: 0V Wheel FL locked	. →	←	Indicated on display - Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel does not lock, there is a possibility that there is a malfunction in the mechanical/hydraulic part of the brake system.

Output Diagnostic Test Mode . →

IFL: VBAT OFL: 0V Wheel FL locked

- Press → key.



Indicated on display

- Press → key.

ABS hydraulic pump -V64- must run.

Brake pedal must not give.

If the brake pedal gives, there is a malfunction in the hydraulic unit. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45](#)

Output Diagnostic Test Mode . →

IFL: VBAT OFL: VBAT Wheel FL free



Indicated on display

- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel locks there is a possibility that the brake lines to the wheel calipers/cylinders have been interchanged.

Output Diagnostic Test Mode . →

IFL: VBAT OFL: 0V Wheel FL free

- Press → key.

ABS hydraulic pump -V64 no longer runs.



Indicated on display

- Press → key.

Brake pedal must give perceptibly

If the brake pedal does not give, there is a malfunction in the hydraulic unit. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45](#)

Output Diagnostic Test Mode . →

IFL: 0V OFL: 0V Wheel FL locked



Indicated on display

- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel does not lock, there is a possibility that there is a malfunction in the mechanical/hydraulic part of the brake system.

01-178

Output Diagnostic Test Mode . →	◀	- Press → key.
Release brakes		Indicated on display
		- Remove foot from brake pedal.
		- Press → key.
Output Diagnostic Test Mode . →	◀	Indicated on display
Operate brakes		- Operate brake pedal.
		- Press → key.
Output Diagnostic Test Mode . →	◀	Indicated on display
IFR: 0V OFR: 0V Wheel FR locked		- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel does not lock, there is a possibility that there is a malfunction in the mechanical/hydraulic part of the brake system.

01-179

Output Diagnostic Test Mode . →

IFR: VBAT OFR: 0V Wheel FR locked

- Press → key.



Indicated on display

- Press → key.

ABS hydraulic pump -V64- must run.

Brake pedal must not give

If the brake pedal gives, there is a malfunction in the hydraulic unit. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45](#)

Output Diagnostic Test Mode . →

IFR: VBAT OFR: VBAT Wheel FR free



Indicated on display

- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel locks there is a possibility that the brake lines to the wheel calipers/cylinders have been interchanged.

Output Diagnostic Test Mode . →

IFR: VBAT OFR: 0V Wheel FR free

- Press → key.

ABS hydraulic pump -V64- no longer runs.



Indicated on display

- Press → key.

Brake pedal must give perceptibly

If the brake pedal does not give, there is a malfunction in the hydraulic unit. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45](#)

Output Diagnostic Test Mode . →

IFR: 0V OFR: 0V Wheel FR locked



Indicated on display

- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel does not lock, there is a possibility that there is a malfunction in the mechanical/hydraulic part of the brake system.

01-181

Output Diagnostic Test Mode . →	◀	- Press → key.
Release brakes		Indicated on display
		- Remove foot from brake pedal.
		- Press → key.
Output Diagnostic Test Mode . →	◀	Indicated on display
Operate brakes		- Operate brake pedal.
		- Press → key.
Output Diagnostic Test Mode . →	◀	Indicated on display
IRL: 0V ORL: 0V Wheel RL locked		- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel does not lock, there is a possibility that there is a malfunction in the mechanical/hydraulic part of the brake system.

Output Diagnostic Test Mode . →

IRL: VBAT ORL: 0V Wheel RL locked

- Press → key.



Indicated on display

- Press → key.

ABS hydraulic pump -V64- must run.

Brake pedal must not give

If the brake pedal gives, there is a malfunction in the hydraulic unit. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45](#)

Output Diagnostic Test Mode . →

IRL: VBAT ORL: VBAT Wheel RL free



Indicated on display

- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel locks there is a possibility that the brake lines to the wheel calipers/cylinders have been interchanged.

Output Diagnostic Test Mode . →

IRL: VBAT ORL: 0V Wheel RL free

- Press → key.

ABS hydraulic pump -V64 no longer runs.



Indicated on display

- Press → key.

Brake pedal must give perceptibly

If the brake pedal does not give, there is a malfunction in the hydraulic unit. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45](#)

Output Diagnostic Test Mode . →

IRL: 0V ORL: 0V Wheel RL locked



Indicated on display

- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel does not lock, there is a possibility that there is a malfunction in the mechanical/hydraulic part of the brake system.

01-184

Output Diagnostic Test Mode . →	◀	- Press → key.
Release brakes		Indicated on display
		- Remove foot from brake pedal.
		- Press → key.
Output Diagnostic Test Mode . →	◀	Indicated on display
Operate brakes		- Operate brake pedal.
		- Press → key.
Output Diagnostic Test Mode . →	◀	Indicated on display
IRR: 0V ORR: 0V Wheel RR locked		- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel does not lock, there is a possibility that there is a malfunction in the mechanical/hydraulic part of the brake system.

Output Diagnostic Test Mode . →

IRR: VBAT ORR: 0V Wheel RR locked

- Press → key.



Indicated on display

- Press → key.

ABS hydraulic pump -V64- must run.

Brake pedal must not give

If the brake pedal gives, there is a malfunction in the hydraulic unit. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45](#)

Output Diagnostic Test Mode . →

IRR: VBAT ORR: VBAT Wheel RR free



Indicated on display

- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel locks there is a possibility that the brake lines to the wheel calipers/cylinders have been interchanged.

Output Diagnostic Test Mode . →

IRR: VBAT ORR: 0V Wheel RR free

- Press → key.

ABS hydraulic pump -V64 no longer runs.



Indicated on display

- Press → key.

Brake pedal must give perceptibly

If the brake pedal does not give, there is a malfunction in the hydraulic unit. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45](#)

Output Diagnostic Test Mode . →

IRR: 0V ORR: 0V Wheel RR locked



Indicated on display

- Indicate to 2nd mechanic which wheel requires turning by hand.

Note:

If the wheel does not lock, there is a possibility that there is a malfunction in the mechanical/hydraulic part of the brake system.

Output Diagnostic Test Mode . →

Release brakes

- Press → key.



Indicated on display

- Remove foot from brake pedal.

- Press → key.

Output Diagnostic Test Mode . →

EDL valves/Hyd-P: VBAT Wh FL/FR locked



Indicated on display (vehicles with EDL)

A 2nd mechanic is required to rotate the respective wheel by hand.

If the wheels do not lock, there is a malfunction in the hydraulic part of the ABS system. In this case the hydraulic unit must be replaced.

⇒ [Repair Manual, Brake System, Repair Group 45](#)

Function is unknown or →
cannot be carried out at the moment

- Press → key.

The ABS warning light -K47- goes out.

← Indicated on display

The final control diagnosis is completed

- Press → key.

Rapid data transfer HELP
Select function XX

← Indicated on display

Note:

◆ *There is a malfunction in the system if the ABS warning light -K47- does not go out.*

◆ *Adhere exactly to test sequence: First check DTC memory, then erase.*

- End output (Function 06) ⇒ [Page 01-231](#) .

Diagnostic Trouble Code (DTC) table

Note:

- ◆ *When beginning On Board Diagnostic (OBD) troubleshooting of the vehicle control modules, always start with function "Automatic test sequence" by pressing keys 0 and 0 because the control modules are interconnected with a data bus wire. This checks the DTC memories of the control modules in the vehicle.*
- ◆ *All the possible DTCs which can be recognized by the ABS control module (w/EDL) - J104- and printed-out on V.A.G 1551 or VAS 5051, are listed on the following pages according to the 5 digit DTC code.*
- ◆ *DTC code appears (in the "Rapid data transfer" mode) only on the print-out.*

Example:

DTC code	P code	DTC code
5 digit	5 digit	3 digit
18256	P1848	035

- ◆ *The 5 digit P code which may appear next to the DTC code, is for use with the On Board Diagnosis (OBD) and may be disregarded.*
 - ◆ *The 3 digit DTC type code is a data code and may be disregarded, but the DTC type text is of use.*
 - ◆ *Before replacing components indicated as being faulty, check all the appropriate connectors, wiring and Ground connections using the wiring diagram.*
- ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder.*
- ◆ *On completion of repairs always check the DTC memory with V.A.G 1551 scan tool or the VAS 5051 and erase.*
 - ◆ *Carry out road test exceeding 20 km/h (13 mph).*
 - ◆ *After the road test check DTC memory again.*

V.A.G 1551 print-out	Possible cause	Repair
No DTC recognized	<p>If "No DTC recognized" appears after carrying out repairs, On Board Diagnostic (OBD) is ended.</p> <p>If, despite "No DTC recognized" appearing in the display, the ABS system does not function properly, then proceed as follows:</p> <ol style="list-style-type: none"> 1. Carry out road test exceeding 20 km/h (13 mph), 2. Again check DTC memory, if there is still no DTC stored, 3. Continue troubleshooting without OBD and work through the complete <p>Electrical check ⇒ Page 01-288 .</p>	
00003		
Fault number: 00003 / literature	ABS Control Module (w/EDL) - J104- malfunction	<p>- Replace ABS Control Module (w/EDL) -J104-</p> <p>⇒ Repair Manual, Brake System, Repair Group 45</p>

01-191

V.A.G 1551 print-out	Possible cause	Repair
00283		
Left front ABS wheel speed sensor -G47- ¹⁾ Electrical malfunction in current circuit	◆ Open circuit in wiring between left front ABS wheel speed sensor -G47- and ABS control module (w/EDL) -J104-	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288 - Read measured value block ⇒ Page 01-240 Display group number 001 ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles
		If the malfunction occurs again:
	◆ Left front ABS wheel speed sensor -G47- faulty	- Replace left front ABS wheel speed sensor -G47- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This DTC is recognized when vehicle is stationary.

01-192

V.A.G 1551 print-out	Possible cause	Repair
00283		
Left front ABS wheel speed sensor -G47- ¹⁾ Implausible signal	◆ Open circuit or loose contact in wiring between Left front ABS wheel speed sensor -G47- and ABS control module (w/EDL) -J104-	- Check wiring and connections using wiring diagram
		- Perform electrical check ⇒ Page 01-288
	◆ Electrical interferences from other sources (high frequency radiation e.g. uninsulated ignition cable)	- Read measured value block ⇒ Page 01-240 Display group number 001

¹⁾ Type of DTC, this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-193

V.A.G 1551 print-out	Possible cause	Repair
00283		
Left front ABS wheel speed sensor -G47- Mechanical fault ¹⁾	◆ Excessive air gap between left front ABS wheel speed sensor-G47- and rotor (signal not OK)	- Check installation of left front ABS wheel speed sensor -G47- and rotor ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles - Read measured value block ⇒ Page 01-240 Display group numbers 001 and 002 - Perform test drive
	◆ Short to positive or ground in wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	◆ Left front ABS wheel speed sensor -G47- faulty	- Replace left front ABS wheel speed sensor -G47- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ Type of DTC, this DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-194

V.A.G 1551 print-out	Possible cause	Repair
00285		
Right front ABS wheel speed sensor -G45- ¹⁾ Electrical malfunction in current circuit	◆ Open circuit in wiring between Right front ABS wheel speed sensor -G45- and ABS control module (w/EDL) -J104-	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288 - Read measured value block ⇒ Page 01-240 Display group number 001 ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles
		If the malfunction occurs again:
	◆ Right front ABS wheel speed sensor -G45- faulty	- Replace Right front ABS wheel speed sensor -G45- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This malfunction is recognized when vehicle is stationary.

01-195

V.A.G 1551 print-out	Possible cause	Repair
00285		
Right front ABS wheel speed sensor -G45- ¹⁾ Implausible signal	<ul style="list-style-type: none"> ◆ Open circuit; short to ground or loose contact in wiring between Right front ABS wheel speed sensor -G45- and ABS control module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and Connection using wiring diagram - Perform electrical check ⇒ Page 01-288
	<ul style="list-style-type: none"> ◆ Electrical interferences from other sources (high frequency radiation e.g. uninsulated ignition cable) 	<ul style="list-style-type: none"> - Read measured value block ⇒ Page 01-240 Display Group number 001

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-196

V.A.G 1551 print-out	Possible cause	Repair
00285		
Right front ABS wheel speed sensor -G45- Mechanical malfunction ¹⁾	<ul style="list-style-type: none"> ◆ Excessive air gap between Right front ABS wheel speed sensor-G45- and rotor (signal not OK) 	<ul style="list-style-type: none"> - Check installation of right front ABS wheel speed sensor -G45- and rotor ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles - Read measured value block ⇒ Page 01-240 Display group numbers 001 and 002 - Perform test drive
	<ul style="list-style-type: none"> ◆ Short to positive or ground in wiring 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	<ul style="list-style-type: none"> ◆ Right front ABS wheel speed sensor -G45- faulty 	<ul style="list-style-type: none"> - Replace Right front ABS wheel speed sensor -G45- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-197

V.A.G 1551 print-out	Possible cause	Repair
00287		
Right rear ABS wheel speed sensor -G44- ¹⁾ Electrical malfunction in current circuit	◆ Open circuit in wiring between Right rear ABS wheel speed sensor -G44- and ABS control module (w/EDL) -J104-	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288 - Read measured value block ⇒ Page 01-240 Display group number 001 ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles
	◆ Right rear ABS wheel speed sensor -G44- faulty	- Replace right rear ABS wheel speed sensor -G44-
		⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This malfunction is recognized when vehicle is stationary.

V.A.G 1551 print-out	Possible cause	Repair
00287		
Right rear ABS wheel speed sensor -G44- ¹⁾ Implausible signal	◆ Open circuit; short to ground or loose contact in wiring between Right rear ABS wheel speed sensor -G44- and ABS control module (w/EDL) -J104-	- Check wiring and connections using wiring diagram
		- Perform electrical check ⇒ Page 01-288
	◆ Electrical interferences from other sources (high frequency radiation e.g. uninsulated ignition cable)	- Read measured value block ⇒ Page 01-240 Display group number 001

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-199

V.A.G 1551 print-out	Possible cause	Repair
00287		
Right rear ABS wheel speed sensor -G44- ¹⁾ Mechanical malfunction	◆ Excessive air gap between Right rear ABS wheel speed sensor -G44- and rotor (signal not OK)	- Check installation of speed sensor -G44- and rotor ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles - Read measured value block ⇒ Page 01-240 Display group numbers 001 and 002 - Perform test drive
	◆ Short to positive or ground in wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	◆ Right rear ABS wheel speed sensor -G44- faulty	- Replace speed sensor -G44- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

V.A.G 1551 print-out	Possible cause	Repair
00290		
Left rear ABS wheel speed sensor - G46- ¹⁾	<ul style="list-style-type: none"> ◆ Open circuit; short to positive or ground, or loose contact in connections between Left rear ABS wheel speed sensor -G46- and ABS control module (w/EDL) -J104- 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288 - Read measured value block ⇒ Page 01-240 Display group number 001 ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles
		If the malfunction occurs again:
	<ul style="list-style-type: none"> ◆ Left rear ABS wheel speed sensor - G46- faulty 	<ul style="list-style-type: none"> - Replace Left rear ABS wheel speed sensor -G46- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This DTC is recognized when vehicle is stationary.

01-201

V.A.G 1551 print-out	Possible cause	Repair
00290		
Left rear ABS wheel speed sensor -G46- ¹⁾ Implausible signal	<ul style="list-style-type: none"> ◆ Open circuit; short to ground or loose contact in wiring between Left rear ABS wheel speed sensor -G46- and ABS control module (w/EDL) -J104- 	- Check wiring and connections using wiring diagram
		- Perform electrical check ⇒ Page 01-288
	<ul style="list-style-type: none"> ◆ Electrical interferences from other sources (high frequency radiation e.g. uninsulated ignition cable) 	- Read measured value block ⇒ Page 01-240 Display group number 001

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-202

V.A.G 1551 print-out	Possible cause	Repair
00290		
Left rear ABS wheel speed sensor -G46- ¹⁾ Mechanical malfunction	◆ Excessive air gap between Left rear ABS wheel speed sensor -G46- and rotor (signal not OK)	- Check installation of speed sensor -G46- and rotor ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles - Read measured value block ⇒ Page 01-240 Display group numbers 001 and 002 - Perform test drive
	◆ Short to positive or ground in wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	◆ Left rear ABS wheel speed sensor -G46- faulty	- Replace Left rear ABS wheel speed sensor -G46- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-203

V.A.G 1551 print-out	Possible cause	Repair
00493		
ESP-Sensor Unit, vehicles from 02.02 No Signal/Communication or ESP-Sensor Unit faulty	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or ground in CANbus wiring ◆ ESP-Sensor Unit - G419- faulty 	<ul style="list-style-type: none"> - Check wiring and connectors of data bus wiring using current flow diagram - Perform electrical check ⇒ Page 01-288 - Replace ESP-Sensor Unit - G419- ⇒ Brake systems; Repair group 45; Removing and installing parts of ESP system - Perform a zero compensation: - Initiate basic setting ⇒ Page 01-264 Display group number 063 - Initiate basic setting ⇒ Page 01-264 Display group number 069¹⁾

¹⁾ 4MOTION vehicles only

01-204

V.A.G 1551 print-out	Possible cause	Repair
00495		
ESP-Sensor Unit, vehicles from 02.02 Voltage supply	◆ Open circuit, short to positive or ground in CANbus wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288

01-205

V.A.G 1551 print-out	Possible cause	Repair
00526		
Brake light switch -F- ¹⁾ Implausible signal		
		- Read measured value block ⇒ Page 01-240 Display group number 002
	◆ Open circuit, short to positive or ground in the wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	◆ Brake light switch improperly adjusted ◆ Brake light switch faulty	- Adjust brake light switch ⇒ Repair Manual, Brake System, Repair Group 46; Brake pedal - Assembly overview; Adjusting brake light switch

¹⁾ For ABS/EDL/ASR/ESP and ABS/EDL/ASR/ESP 4MOTION

01-206

V.A.G 1551 print-out	Possible cause	Repair
00538		
Reference voltage Electrical malfunction in current circuit	<ul style="list-style-type: none"> ◆ Short to positive or ground in voltage supply wiring: ◆ Voltage supply less than 5 Volt ◆ Sender for rotation rate - G202- ◆ Sensor for transverse acceleration -G200- ◆ Sender 1 for brake booster -G201- ◆ Longitudinal acceleration sensor -G251⁻¹⁾ 	- Check wiring and connections using wiring diagram
		- Perform electrical check ⇒ Page 01-288

¹⁾ 4MOTION vehicles only

01-207

V.A.G 1551 print-out	Possible cause	Repair
00668		
Vehicle voltage terminal 30 Implausible signal	◆ Open circuit, short to positive or ground in the wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	◆ Alternator voltage > 17 Volt	⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-208

V.A.G 1551 print-out	Possible cause	Repair
00778		
Steering angle sensor - G85- No signal/communication ¹⁾	<ul style="list-style-type: none"> ◆ Open circuit or loose contact in data bus wiring between steering angle sensor -G85- and control module -J104- ◆ Terminals 15 and 30 on steering angle sensor - G85-, ◆ Ground not present 	- Check wiring and connections using wiring diagram
		- Perform electrical check ⇒ Page 01-288
	<ul style="list-style-type: none"> ◆ Steering angle sensor - G85- faulty 	<ul style="list-style-type: none"> - Replace steering angle sensor -G85- ⇒ Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ESP system - Perform a zero compensation: - Initiate basic settings ⇒ Page 01-264 Display group number 060

¹⁾ For ABS/EDL/ASR/ESP and ABS/EDL/ASR/ESP 4MOTION

01-209

V.A.G 1551 print-out	Possible cause	Repair
00778		
Steering angle sensor -G85- ¹⁾ Mechanical malfunction		
	◆ Steering wheel has been removed and no subsequent zero compensation performed	- Perform a zero compensation: - Initiate basic settings ⇒ Page 01-264 Display group number 060
	◆ Check specification from steering angle sensor -G85-	- Read measured value block ⇒ Page 01-240 Display group number 004
	◆ Steering geometry of suspension is not OK.	- Check vehicle alignment ⇒ Repair Manual, Suspension, Wheels, Steering, Repair Group 44; Vehicle alignment
	◆ Installation of steering angle sensor -G85- is not OK	- Check installation of steering angle sensor -G85-
	◆ Steering angle sensor -G85- faulty	- Replace steering angle sensor -G85- ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ESP system

¹⁾ For ABS/EDL/ASR/ESP and ABS/EDL/ASR/ESP 4MOTION

01-210

V.A.G 1551 print-out	Possible cause	Repair
00778		
Steering angle sensor -G85- Implausible signal ¹⁾	◆ Installation of steering angle sensor -G85- is not OK.	- Check installation of steering angle sensor -G85- ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ESP system
	◆ Steering geometry of suspension is not OK.	- Check vehicle alignment ⇒ Repair Manual, Suspension, Wheels, Steering, Repair Group 44; Vehicle alignment
	◆ Unacceptable vibrations in steering due to wear	- Perform a zero compensation: - Initiate basic settings ⇒ Page 01-264 Display group number 060
00778		
Steering angle sensor -G85- ¹⁾ No, or incorrect, basic setting/adaption	◆ Steering angle sensor -G85- sends no, or incorrect, setting values	- Perform a zero compensation: - Initiate basic setting ⇒ Page 01-264 Display group number 060

¹⁾ For ABS/EDL/ASR/ESP and ABS/EDL/ASR/ESP 4MOTION

01-211

V.A.G 1551 print-out	Possible cause	Repair
00778		
Steering angle sensor -G85- Faulty ¹⁾	◆ Steering angle sensor -G85- faulty	- Replace steering angle sensor - G85- ⇒ Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ESP system - Perform a zero compensation: - Initiate basic settings ⇒ Page 01-264 Display group number 060
01044		
Control module incorrectly coded	◆ ABS Control Module (w/EDL) -J104- incorrectly coded	- Re-code for ABS Control Module (w/EDL) -J104- ⇒ Page 01-232
	◆ Coding bridge in multi-pin connector to ABS Control Module (w/EDL) -J104- open or short circuit	- Check wiring and connections using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

¹⁾ For ABS/EDL/ASR/ESP and ABS/EDL/ASR/ESP 4MOTION

01-212

V.A.G 1551 print-out	Possible cause	Repair
01130		
ABS operation Implausible signal ¹⁾	<ul style="list-style-type: none"> ◆ Electrical interferences from other sources (high frequency radiation e.g. non-insulated ignition cable) 	<ul style="list-style-type: none"> - Erase DTC memory - Perform test drive at more than 20 km/h (13 mph) - Check DTC memory again
	<ul style="list-style-type: none"> ◆ Open circuit, short to positive or ground in the wiring 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	<ul style="list-style-type: none"> ◆ ABS Control Module (w/EDL) -J104-faulty 	<ul style="list-style-type: none"> - Replace ABS Control Module (w/EDL) -J104- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-213

V.A.G 1551 print-out	Possible cause	Repair
01164		
ESP operation Implausible signal ¹⁾	◆ Electrical interferences from other sources (high frequency radiation e.g. uninsulated ignition cable)	- Erase DTC memory - Perform test drive at more than 20 km/h (13 mph) - Check DTC memory again
	◆ Open circuit, short to positive or ground in the wiring	- Check wiring and connections using wiring diagram
		- Perform electrical check ⇒ Page 01-288
	◆ Steering angle sensor -G85- sends incorrect setting values	- Perform a zero compensation: - Initiate basic setting ⇒ Page 01-264 Display group number 060
	◆ ABS Control Module (w/EDL) -J104- faulty	- Replace ABS Control Module (w/EDL) -J104- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-214

V.A.G 1551 print-out	Possible cause	Repair
01276		
ABS hydraulic pump -V64- Implausible signal 1)		
	◆ Resistance in ground or positive wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	◆ Hydraulic pump -V64- faulty	- Replace ABS hydraulic unit -N55- ⇒ Repair Manual, Brake System, Repair Group 45
01276		
ABS hydraulic pump -V64- faulty ¹⁾	◆ Short in electronics	- Replace ABS hydraulic unit -N55- with ABS Control Module (w/EDL) - J104- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-215

V.A.G 1551 print-out	Possible cause	Repair
01276		
ABS hydraulic pump - V64- Electrical malfunction in current circuit ¹⁾	◆ Battery positive fuse faulty	- Check fuses
	◆ Open circuit, short to positive or ground in the wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	◆ Hydraulic pump -V64- faulty	◆ Replace ABS hydraulic unit -N55- ⇒ Repair Manual, Brake System, Repair Group 45

¹⁾ This DTC is only recognized above 20 km/h (13 mph) (carry out test drive).

01-216

V.A.G 1551 print-out	Possible cause	Repair
01279		
Longitudinal acceleration sensor - G251- ¹⁾ Electrical malfunction in current circuit	◆ Voltage supply less than 5 Volt	- Read measured value block ⇒ Page 01-240 Display group number 006
	◆ Open circuit, short to positive or ground in the wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	◆ Longitudinal acceleration sensor - G251- faulty	- Replace longitudinal acceleration sensor -G251- ⇒ Repair Manual, Brake System, Repair Group 45 - Perform a zero compensation: - Introduce basic setting ⇒ Page 01-264 Display group number 069

¹⁾ 4MOTION vehicles only

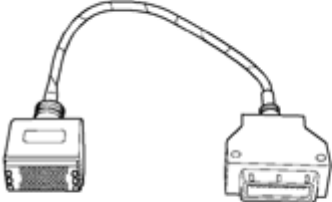
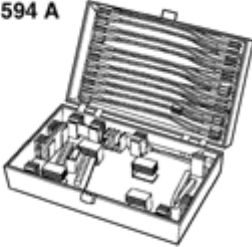



01-217

V.A.G 1551 print-out	Possible cause	Repair
01279		
Longitudinal acceleration sensor -G251- ¹⁾ Implausible signal		- Read measured value block ⇒ Page 01-240 Display group number 006
	◆ The installation position of the longitudinal acceleration sensor -G251- is not OK	- Check installation position of longitudinal acceleration sensor -G251-
	◆ Open circuit, short to positive or ground in the wiring	- Check wiring and connections using wiring diagram - Perform electrical check ⇒ Page 01-288
	◆ Longitudinal acceleration sensor -G251- faulty	- Replace longitudinal acceleration sensor -G251- ⇒ Repair Manual, Brake System, Repair Group 45 - Perform a zero compensation: - Introduce basic setting ⇒ Page 01-264 Display group number 069

¹⁾ 4MOTION vehicles only

01-218

V.A.G 1551 print-out	Possible cause	Repair
01279		
Longitudinal acceleration sensor - G251- ¹⁾ No, or incorrect, basic setting/adaptation	♦ Longitudinal acceleration sensor -G251- sends no, or incorrect, setting values	- Read measured value block ⇒ Page 01-264 Display group number 069
01312		
Drive train data bus faulty ²⁾		

<p>V.A.G 1598/36</p> 	<p>V.A.G 1594 A</p> 
<p>V.A.G 1526 A</p> 	<p>V.A.G 1921</p> 
<p>V.A.G 1598 A</p> 	<p style="text-align: right;">W01-0021</p>

Electrical check of Mark 60

Special tools and equipment

- ◆ V.A.G 1598/36 Adapter
- ◆ V.A.G 1594 A Adapter set
- ◆ V.A.G 1526 A Hand multimeter
- ◆ V.A.G 1921 Pliers
- ◆ V.A.G 1598 A Test box

The test steps ⇒ [Page 01-297](#) apply only to vehicles with ABS/EDL/ASR/ESP

- ◆ For vehicles on which the On Board Diagnostic (OBD) does not give any indication of the source of the malfunction. Work through the complete electrical check.

- ◆ For vehicles on which the OBD provides a direct indication of the source of the malfunction. Only carry out the test steps recommended in the DTC table (directed entry).

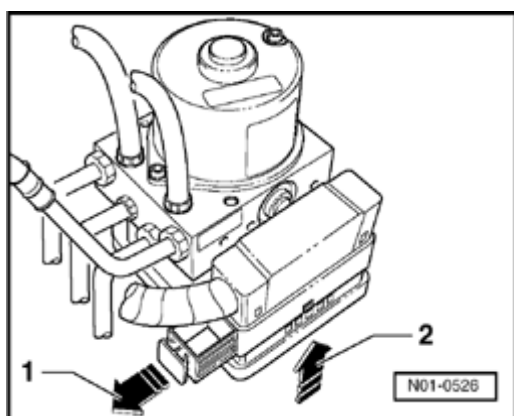
An overview of all the test steps in the electrical check ⇒ [Page 01-297](#) .

Test prerequisites

- Switch ignition and electrical consumers off before commencing the check (headlights, lighting, fans ...).
- Fuses must be OK (remove fuses from fuse holder to check).

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locationsbinder*

- Pull fuse holder out of cable channel.

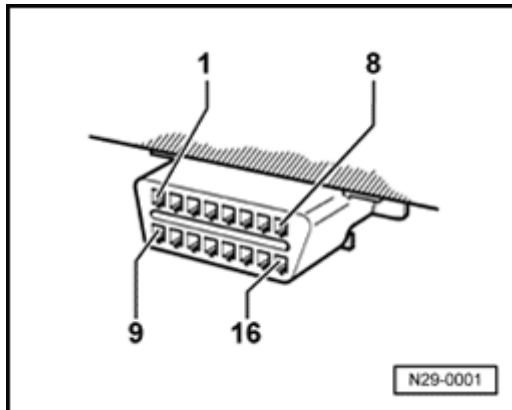


- Release ABS Control Module (w/EDL) -J104- connector -arrow 1- and pull off -arrow 2-.

Multi-pin connector with contact assignments

Note:

All contacts not listed are currently not assigned and must never be connected to other components!

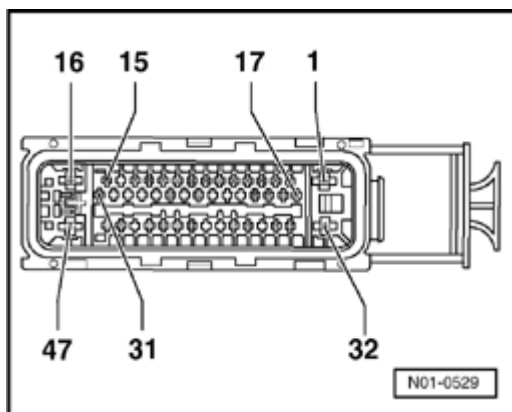


⚡ **Contact assignment of connectors for voltage supply and self-diagnosis with the V.A.G 1551 scan tool**

Contact = Ground (terminal 31)
4

Contact = Positive (terminal 30)
16

Contact = K wire to contact 2 of multi-pin connector T47 of ABS control module (w/EDL) - J104-



⚡ **Contact assignment of connector T47 wiring harness/ABS control module (w/EDL) -J104-**

01-293

Contact	Wiring connection to component ...	
1	⇒	Voltage supply from battery +
2	⇒	Connector T16/7, K wire
3	⇒	Longitudinal acceleration sensor -G251- sensor wire(4MOTION vehicles only)
	⇒	Vacant (4MOTION vehicles with ESP-sensor unit -G419, vehicles from 11.01)
4	⇒	Voltage supply from ignition/starter switch
5	⇒	Longitudinal acceleration sensor -G251- Ground(4MOTION vehicles only)
	⇒	Vacant (4MOTION vehicles with ESP-sensor unit -G419-, vehicles from 11.01)
6	⇒	Sensor for transverse acceleration -G200-
	⇒	Voltage supply for ESP-sensor unit -G419-, vehicles from 02.02
7	⇒	Longitudinal acceleration sensor -G251- voltage supply(4MOTION vehicles only)
	⇒	Vacant (4MOTION vehicles with ESP-sensor unit -G419-, vehicles from 11.01)
8	⇒	Vehicles with navigation system only
9	⇒	Coding bridge to contact 12 (vehicles with ABS/EDL/ASR/ESP 4MOTION only)
10	⇒	Vehicles with navigation system only
11	⇒	Data bus wire ⇒ Wiring diagrams
12	⇒	Coding bridge to contact 9 (vehicles with ABS/EDL/ASR/ESP 4MOTION only)
	⇒	Coding bridge to contact 38 (vehicles with ABS/EDL/ASR/ESP front wheel drive only)

01-294

Contact	Wiring connection to component ...	
13	⇒	ASR/ESP button -E256-
14	⇒	Coding bridge to contact 38 (vehicles with ABS and ABS/EDL/ASR front wheel drive only)
15	⇒	Data bus wire ⇒ Wiring diagrams
16	⇒	Ground point on left-hand longitudinal member
17	⇒	Vacant
18	⇒	Sender 1 for brake booster -G201- voltage supply
19	⇒	Sender 1 for brake booster -G201- signal wire
20	⇒	Sender 1 for brake booster -G201- ground wire
21	⇒	Vacant
22	⇒	Vacant
23	⇒	Vacant
24	⇒	Ground wire for sensor for transverse acceleration -G200- and sender for rotation rate -G202-
	⇒	Ground wire for ESP-sensor unit -G419-, vehicles from 02.02
25	⇒	Vacant
	⇒	Data bus wire for ESP-sensor unit -G419-, vehicles from 02.02
26	⇒	Voltage supply for sensor for transverse acceleration -G200- and sender for rotation rate -G202-

01-295

Contact	Wiring connection to component ...	
27	⇒	Vacant
28	⇒	Vacant
29	⇒	Vacant
	⇒	Data bus wire for ESP-sensor unit -G419-
30	⇒	Vacant
31	⇒	Vacant
32	⇒	Voltage supply from battery +
33	⇒	Right front ABS wheel speed sensor -G45-
34	⇒	Right front ABS wheel speed sensor -G45-
35	⇒	Vacant
36	⇒	Left rear ABS wheel speed sensor -G46-
37	⇒	Left rear ABS wheel speed sensor -G46-
38	⇒	Coding bridge to contact 12 (vehicles with ABS/EDL/ASR/ESP front wheel drive only)
	⇒	Coding bridge to contact 14 (vehicles with ABS and ABS/EDL/ASR front wheel drive only)

Contact	Wiring connection to component ...	
39	⇒	Vacant
40	⇒	Sender for rotation rate -G202- signal wire
41	⇒	Brake light switch -F-
42	⇒	Right rear ABS wheel speed sensor -G44-
43	⇒	Right rear ABS wheel speed sensor -G44-
44	⇒	Vacant
45	⇒	Left front ABS wheel speed sensor -G47-
46	⇒	Left front ABS wheel speed sensor -G47-
47	⇒	Ground point on left-hand longitudinal member

Test step overview

Component to be tested	
Voltage supply for ABS hydraulic pump -V64- to ABS control module (w/EDL) -J104-	- Perform test step 1
Voltage supply for valves in ABS hydraulic unit -N55- to ABS control module (w/EDL) -J104-	- Perform test step 2
Voltage supply (ignition/starter switch) to ABS control module (w/EDL) -J104-	- Perform test step 3
Function of brake light switch -F-	- Perform test step 4
Resistance of right front ABS wheel speed sensor -G45-	- Perform test step 5
Resistance of left front ABS wheel speed sensor -G47-	- Perform test step 6
Resistance of right rear ABS wheel speed sensor -G44-	- Perform test step 7
Resistance of left rear ABS wheel speed sensor -G46-	- Perform test step 8
Voltage signal of right front ABS wheel speed sensor -G45-	- Perform test step 9
Voltage signal of left front ABS wheel speed sensor -G47-	- Perform test step 10
Voltage signal of right rear ABS wheel speed sensor -G44-	- Perform test step 11

01-298

Component to be tested	
Voltage signal of left rear ABS wheel speed sensor -G46-	- Perform test step 12
Warning lamp function for ABS warning light -K47-	- Perform test step 13
Warning lamp function for warning light for brake system - K118-	- Perform test step 14
Warning lamp function for ESP control lamp -K155-	- Perform test step 15
Function of ASR/ESP button -E256-	- Perform test step 16
Activation of steering angle sensor -G85-	- Perform test step 17
Activation of sensor for transverse acceleration -G200- Activation of sender for rotation rate -G202-	- Perform test step 18
Activation of sender 1 for brake booster -G201-	- Perform test step 19
Check of data bus wiring	- Perform test step 20
Voltage supply for V.A.G 1551, connector T16	- Perform test step 21
Resistance of K wire for self-diagnosis, connector T16	- Perform test step 22
Coding bridge	- Perform test step 23

Test table (test steps 1 - 16)

Test steps 17 - 23 ⇒ see ⇒ [Page 01-313](#)

Note on test table

- ◆ *The socket designations of adapter V.A.G 1598/33 are identical to the ABS control module (w/EDL) -J104- contact designations in wiring diagram.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ *If the readings obtained deviate from the specifications, carry out repair measure in the right-hand part of the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ *Continuity checks with adapter set V.A.G 1594 A (bridging).*

- ◆ *If the measured figures only deviate slightly from the specifications, clean sockets and plugs of the testers and adapter cables (with contact spray G 000 700 04) and repeat check. Before replacing components, check wiring and connections and also, particularly for specifications of less than 10 Ω , repeat resistance check on the component.*

01-300

Switch to measuring range:					
Voltage measurement (20 V =)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
1	1 + 47	Voltage supply for ABS hydraulic pump -V64- to ABS Control Module (w/EDL) - J104-	<ul style="list-style-type: none"> • Ignition switched off 	10.0 - 14.5 V	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
2	32 + 16	Voltage supply for the valves in ABS hydraulic unit -N55- to ABS Control Module (w/EDL) - J104-	<ul style="list-style-type: none"> • Ignition switched off 	10.0 - 14.5 V	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-301

Switch to measuring range:					
Voltage measurement (20 V =)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations	Specification	Measures for deviations from specification
3	4 + 47	Voltage supply (ignition/starter switch) to ABS Control Module (w/EDL) -J104-	<ul style="list-style-type: none"> • Ignition switched on 	10.0 - 14.5 V	- Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
4	47 + 41	Function of brake light switch -F-	<ul style="list-style-type: none"> • Ignition switched off • Brake pedal not depressed 	0.0 - 0.5 V	- Check brake light switch -F- and read measured value block ⇒ Page 01-240 , Display group number 003
			- Depress brake pedal	Approx. battery voltage	- Adjusting brake light switch ⇒ Repair Manual, Brake System, Repair Group 46; Brake pedal - Assembly overview; Adjusting brake light switch - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-302

Switch to measuring range:					
Resistance measurement (2 k Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
5	33 + 34	Resistance of right front ABS wheel speed sensor -G45-	<ul style="list-style-type: none"> • Ignition switched off 	1.0 - 1.3 k Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram - Wiggle wiring during test <p>⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i></p> <p>If no malfunction can be located in the wiring:</p> <ul style="list-style-type: none"> - Replace right front ABS wheel speed sensor -G45- <p>⇒ <i>Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles</i></p>

01-303

Switch to measuring range:**Resistance measurement (2 k Ω)**

Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
6	45 + 46	Resistance of left front ABS wheel speed sensor -G47-	<ul style="list-style-type: none"> • Ignition switched off 	1.0 - 1.3 k Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram - Wiggle wiring during test \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> If no malfunction can be located in the wiring: - Replace left front ABS wheel speed sensor -G47- \Rightarrow <i>Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles</i>

01-304

Switch to measuring range:**Resistance measurement (2 k Ω)**

Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
7	42 + 43	Resistance of right rear ABS wheel speed sensor -G44-	<ul style="list-style-type: none"> • Ignition switched off 	1.0 - 1.3 k Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram - Wiggle wiring during test ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> If no malfunction can be located in the wiring: - Replace right rear ABS wheel speed sensor -G44- ⇒ <i>Repair Manual, Brake System, Repair Group 45: Removing and installing parts of ABS system on front and rear axles</i>

01-305

Switch to measuring range:**Resistance measurement (2 k Ω)**

Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
8	37 + 36	Resistance of left rear ABS wheel speed sensor -G46-	<ul style="list-style-type: none"> • Ignition switched off 	1.0 - 1.3 k Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram - Wiggle wiring during test \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> If no malfunction can be located in the wiring: - Replace left rear ABS wheel speed sensor -G46- \Rightarrow <i>Repair Manual, Brake System, Repair Group 45; Removing and installing parts of ABS system on front and rear axles</i>

01-306

Switch to measuring range:					
Voltage measurement (2 V ≈)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations	Specification	Measures for deviations from specification
9	33 + 34	Right front ABS wheel speed sensor - G45- voltage signal	<ul style="list-style-type: none"> • Vehicle raised 		- Check installation of right front ABS wheel speed sensor - G45- and rotor.
			<ul style="list-style-type: none"> • Ignition switched off 		
			- Rotate front right wheel at approx. 1 rev./sec.	Min. 65 mV alternating voltage	- Check whether right front ABS wheel speed sensor -G45- has been interchanged and read measured value block ⇒ Page 01-240 , Display group number 001
10	45 + 46	Left front ABS wheel speed sensor - G47- voltage signal	<ul style="list-style-type: none"> • Vehicle raised 		- Check installation of left front ABS wheel speed sensor - G47- and rotor.
			<ul style="list-style-type: none"> • Ignition switched off 		
			- Rotate front left wheel at approx. 1 rev./sec.	Min. 65 mV alternating voltage	- Check whether left front ABS wheel speed sensor -G47- has been

					interchanged and read measured value block ⇒ Page 01-240 , display group number 001
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01-307

Switch to measuring range:					
Voltage measurement (2 V ≈)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations	Specification	Measures for deviations from specification
11	42 + 43	Right rear ABS wheel speed sensor - G44- voltage signal	<ul style="list-style-type: none"> • Vehicle raised 		- Check installation of right rear ABS wheel speed sensor - G44- and rotor.
			<ul style="list-style-type: none"> • Ignition switched off 		
			- Rotate rear right wheel at approx. 1 rev./sec.	Min. 190 mV alternating voltage	- Check whether right rear ABS wheel speed sensor -G44- has been interchanged and read measured value block ⇒ Page 01-240 , Display group number 001
12	37 + 36	Left rear ABS wheel speed sensor - G46- voltage signal	<ul style="list-style-type: none"> • Vehicle raised 		- Check installation of left rear ABS wheel speed sensor - G46- and rotor.
			<ul style="list-style-type: none"> • Ignition switched off 		
			- Rotate rear left wheel at approx. 1 rev./sec.	Min. 190 mV alternating voltage	- Check whether left rear ABS wheel speed sensor -G46- has been

					interchanged and read measured value block ⇒ Page 01-240 , Display group number 001
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01-308

Functional check: ABS warning light -K47-					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
13	-	Function of ABS warning light -K47-	<ul style="list-style-type: none"> • Ignition switched on - Switch on ignition 	The ABS warning light -K47- lights up for approx. 2 seconds and goes out again	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> - Malfunction in instrument cluster ⇒ Repair Manual, Body Interior, Repair Group 70; instrument panel

01-309

Functional check: Warning light for brake system -K118-					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
14	-	Function of warning light for brake system - K118-	<ul style="list-style-type: none"> • Parking brake not applied • Brake fluid level OK • Ignition switched on 	Warning light for brake system - K118- does not light up	
			- Apply parking brake	Warning light for brake system - K118- lights up	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> - Malfunction in instrument cluster ⇒ Repair Manual, Body Interior, Repair Group 70; instrument panel

01-310

Functional check: ESP Control Lamp -K155-					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
15	-	Function of ESP control lamp - K155-	<ul style="list-style-type: none"> • Ignition switched on - Switch ignition on 	ESP control lamp -K155- lights up for 2 seconds and goes out again	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i> - Malfunction in instrument cluster ⇒ <i>Repair Manual, Body Interior, Repair Group 70; instrument panel</i>

01-311

Functional check: warning lamp for ASR/ESP button -E256-					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
16	-	Function of ASR/ESP button - E256-	<ul style="list-style-type: none"> • Ignition switched on • The function of the ESP Control Lamp -K155- was checked in test step 15. 	ESP control lamp -K155- lights up for 2 seconds and goes out again	
			- Operate ASR/ESP button -E256-	ESP control lamp -K155- lights up	
			- Operate ASR/ESP button -E256- again	ESP control lamp -K155- goes out	
				Test step 16: Continued on next page.	

01-312

Continuation of test step 16					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
					- Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
			ASR/ESP button -E256-faulty		- Replace ASR/ESP button -E256- ⇒ Repair Manual, Body Interior, Repair Group 70; instrument panel

Test table (test steps 17 - 23)

Switch to measuring range:					
Voltage measurement (20 V =) in test step 17, resistance measurement (200 Ω)/ (20 M Ω) in test step 17a					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
17	-	Voltage supply for steering angle sensor - G85-	<ul style="list-style-type: none"> • Ignition switched off - Disconnect connection from steering angle sensor -G85- 		
			- Disconnect multi-pin connection T47 from ABS control module (w/EDL) - J104-		
			- Check wiring between contact T6a/4 and contact T6a/1 of steering angle sensor -G85-	10.0 - 14.5 V	- Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
				Test step 17: Continued on next page.	

01-314

Continuation of test step 17					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
17	-	Voltage supply for steering angle sensor - G85-	<ul style="list-style-type: none"> - Ignition switched on - Check wiring between contact T6a/5 and connector contact T6a/1 of steering angle sensor - G85- 	10.0 - 14.5 V	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
				Test step 17a: On next page.	

01-315

Continuation of test step 17a					
Switch to measuring range:					
Resistance measurement (200 Ω/20 M Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
17a	-	Wiring for steering angle sensor - G85-	<ul style="list-style-type: none"> • Measuring range set to 200 Ω • Ignition switched off - Connect test box V.A.G 1598/36 		
			- Check wiring for open circuit between steering angle sensor -G85- and ABS control module (w/EDL) - J104- multi-pin connector	Max. 1.5 Ω	- Check wiring using wiring diagram <i>⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
				Test step 17a: On next page.	

01-316

Continuation of test step 17a					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
17a		Wiring for steering angle sensor - G85-	<ul style="list-style-type: none"> - Set measuring range to 20 M Ω - Remove fuse S9 		
			<ul style="list-style-type: none"> - Check wiring for short circuit to positive or Ground 	$\infty \Omega$	
					<ul style="list-style-type: none"> - Check wiring using wiring diagram \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-317

Switch to measuring range:					
Resistance measurement (200 Ω/20 M Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
18	-	Wiring for sensor for transverse acceleration - G200- and sender for rotation rate - G202-	<ul style="list-style-type: none"> • Ignition switched off • Measuring range set to 200 Ω 		
			- Connect test box V.A.G1598/36		
			- Check wiring for open circuit between multi-pin connector of sensor for transverse acceleration - G200-, sender for rotation rate - G202- and multi-pin connector of ABS control module (w/EDL) - J104-:	Max. 1.5 Ω	- Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
				Test step 18: Continued on next page.	

01-318

Continuation of test step 18					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
			<ul style="list-style-type: none"> - Set measuring range to 20 M Ω - Remove fuse S9 		
			<ul style="list-style-type: none"> - Check wiring for short circuit to positive or Ground 	$\infty \Omega$	
					<ul style="list-style-type: none"> - Check wiring using wiring diagram \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-319

Switch to measuring range:					
Resistance measurement (200 Ω/20 M Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
19	-	Wiring for sender 1 for brake booster - G201-	<ul style="list-style-type: none"> • Ignition switched off • Measuring range set to 200 Ω - Disconnect connection from sender 1 for brake booster -G201- - Disconnect multi-pin connection T47 from ABS control module (w/EDL) - J104- - Connect test box V.A.G 1598/36 		
			- Check wiring for open circuit between sender 1 for brake booster - G201- multi-pin connector and ABS control module (w/EDL) -J104- multi-pin connector	Max. 1.5 Ω	- Check wiring using wiring diagram <i>⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
				Test step 19: Continued on next page.	

01-320

Continuation of test step 19					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
			<ul style="list-style-type: none"> - Set measuring range to 20 M Ω - Remove fuse S9 		
			<ul style="list-style-type: none"> - Check wiring for short circuit to positive or Ground 	$\infty \Omega$	
					<ul style="list-style-type: none"> - Check wiring using wiring diagram \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-321

Switch to measuring range:					
Resistance measurement (200 Ω/20 M Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
20	11 or 15	Data bus wiring	<ul style="list-style-type: none"> • Ignition switched off • Measuring set range to 200 Ω - Disconnect multi-pin connection from a control module which is connected via data bus wiring: - Connect test box V.A.G 1598/36 		
			- Check data bus wiring for open circuit	Max. 1.5 Ω	- Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
				Test step 20: Continued on next page	

01-322

Continuation of test step 20					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
			<ul style="list-style-type: none"> - Set measuring range to 20 M Ω - Remove fuse S9 		
			<ul style="list-style-type: none"> - Check wiring for short circuit to positive or Ground 	$\infty \Omega$	
					<ul style="list-style-type: none"> - Check wiring using wiring diagram \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

01-323

Switch to measuring range:					
Voltage measurement (20 V =)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations	Specification	Measures for deviations from specification
21	-	Voltage supply for V.A.G 1551, connector T16 ¹⁾	<ul style="list-style-type: none"> • Ignition switched off - Connect hand multimeter V.A.G 1526 to connector T16 ¹⁾ using adapter set V.A.G 1594	10.0 -14.5 V	
					- Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

¹⁾ Diagnosis connector contact assignment ⇒ [Page 01-292](#)

01-324

Switch to measuring range:					
Resistance measurement 200 Ω					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations 	Specification	Measures for deviations from specification
22	-	Resistance of K wire for V.A.G 1551, connector T16 ¹⁾	<ul style="list-style-type: none"> • Ignition switched off - Disconnect multi-pin connector from ABS control module (w/EDL) - J104 - Connect test box V.A.G 1598/36 - Connect hand multimeter V.A.G 1526 to contacts T16/7¹⁾ and T47/2 of multi-pin connector of ABS control module (w/EDL) -J104- using cables from adapter set V.A.G 1594 	Max. 1.5 Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

¹⁾ Diagnosis connector contact assignment ⇒ [Page 01-292](#)

01-325

Switch to measuring range:					
Resistance measurement (200 Ω)					
Test step	V.A.G 1598 sockets	Item tested	<ul style="list-style-type: none"> • Test conditions - Additional operations	Specification	Measures for deviations from specification
23	14 + 38	Coding bridge for ABS and ABS/EDL/ASR front wheel drive	<ul style="list-style-type: none"> • Ignition switched off 	0.0 -1.0 Ω	
	12 + 38	Coding bridge for ABS/EDL/ASR/ESP front wheel drive			
	12 + 9	Coding bridge for ABS/EDL/ASR/ESP 4MOTION			
					- Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

Definitions

These explanations refer only to this assembly group: ABS On Board Diagnostic (OBD). These definitions are not necessarily generally valid.

ABS

Anti-locking brake system. Further information on the ABS can be found in the relevant self-study programs.

Display group number ⇒ Read measured value block

ASR

Traction Control System

Data bus

Transportation of data. To do this the electrical signals are brought into a certain format (BUS). Further information can be found in Self-study programs. Also called CAN Bus.

Data bus low (high)

The voltage used to transport the data is low (high). Further information can be found in Self-study programs.

Speed sensor

Sends speed signals to control module.

EBD

Electronic brake pressure distribution

EDL

Electronic differential lock

On Board Diagnostic (OBD)

The capability of the control module:

- ◆ Recognize Diagnostic Trouble Codes (DTCs)
- ◆ React to DTCs
- ◆ Store DTCs

and make them available in the Measured value block. Further information on this can be found in Self-study programs and test unit instruction manual.

Performing On Board Diagnostic (OBD)

Connecting the Scan Tool to be able to check the DTC memory. Further information on this can be found in Self-study programs and test unit instruction manual.

Performing electrical check

A targeted check of the electronic components by performing certain measurements.

ESP

Electronic Stabilization program

ESP-Sensor unit -G419-, vehicles from 02.02

The sensor for transverse acceleration - G200-, the sender for rotation rate -G202- and the sensor for longitudinal acceleration sensor -G251- (4MOTION vehicles) are assembled together in a housing.

No communication

There is no connection for exchanging information between the control modules.

Sender for rotation rate -G202-

Recognizes the rotational movement of the vehicle along its vertical axis in relation to vehicle speed.

Longitudinal acceleration sensor -G251-

Determines the correct speed for 4MOTION vehicles

Steering angle sensor -G85-

Determines the angle and direction of steering lock (driver's wish). Data is transferred to control module via data bus wiring.

Short to Ground

Current flows incorrectly to Ground without supplying a consumer.

Short to positive

Current flows incorrectly to a live component without supplying a consumer.

Brake pressure release solenoid -F84-

The trip switch is installed in the brake booster and is required by the control module to recognize the braking desired by the driver.

Magnetic coil for brake pressure, in brake booster, -N247-

The brake pressure solenoid is installed in the brake booster and ensures that a pre-pressure of 10 bar is available for the ABS/ESP pump.

Read measured value block

The control module can transfer a considerable amount of test data. This test data delivers information on the operational condition of the system and/or sensors connected to it. In many cases the transferred test data supports troubleshooting and malfunction repair. The test data has been summarized into single display groups because all the information cannot be evaluated at the same time. The information can be selected via display group numbers.

EBC

Engine braking control

Sensor for transverse acceleration - G200-

The lateral acceleration sensor is used to register the speed through curves/bends on the road and decides which side of the vehicle the ESP is to brake.

Sender 1 for brake booster/Sensor -2- for brake pressure -G201-/-G214-

Recognizes the pressure exerted by the driver and is required to control the pressure of the pre-pressure system.

Program card version

Always use the most up-to-date program card. Further information can be found in the test unit operating instructions.

Sporadic

Happens occasionally

Infinity Ω

The resistance is infinite, open circuit.

Ω = Ohm

Infinity Ω

The resistance is infinite, open circuit.

$$\Omega = \text{Ohm}$$

Forget-malfunction counter

When a fault gets in the memory fault counter, after 50 vehicle starts, and this fault is not repeated again, the memory counter erases the fault.

Select a topic

00 - General, Technical data

[Technical data](#)

[Vehicle data sticker](#)

[Technical data, brakes](#)

[Technical data, brakes](#)

45 - Anti-lock brake system

[Anti-lock brake system \(ABS\) and anti-lock brake system with electronic differential lock \(ABS/EDL\) ITT Mark 20 IE](#)

[General](#)

[Distinguishing features of ABS ITT Mark 20 IE and the ABS/EDL ITT Mark 20 IE](#)

[Notes for repair work on ABS, ABS/EDL](#)

[Hydraulic unit, brake booster/master cylinder, overview](#)

[Hydraulic unit/ABS control module, removing and installing](#)

[ABS system components for front axle, removing and installing](#)

[ABS system components on rear axle, removing and installing](#)

[Anti-lock brake system \(ABS\) Mark 60](#)

[General information on this ABS, ABS/EDL](#)

[Distinguishing features of ABS Mark 60](#)

[Notes for repair work on ABS, ABS/EDL](#)

[VAS 5051 Vehicle Diagnostic, Testing and Information System, connecting and selecting functions](#)

[Electrical/electronic components and installing locations \(ABS\) Mark 60](#)

[Hydraulic unit, brake booster/brake master cylinder Mark 60, assembly overview](#)

[Control module and hydraulic unit Mark 60, removing and installing](#)

[DTCs displayed by \(ABS\) Mark 60 warning lights -K32-, -K47-, -K118-, and -K155-](#)

[ABS system components for front and rear axles, removing and installing](#)

[ABS system components on front axle, removing and installing](#)

[ABS system components for rear axle, \(Front wheel drive\) removing and installing](#)

[ABS system components for rear axle \(all-wheel drive\), removing and installing](#)

[ESP system components, removing and installing](#)

[Sender for rotation rate -G202- and sensor for transverse acceleration -G200-, removing and installing](#)

[Longitudinal acceleration sensor -G251-, removing and installing](#)

[ESP sensor unit -G419-, vehicles from my 02.02, removing and installing](#)

[Steering angle sensor -G85-, removing and installing](#)

46 - Brakes - Mechanical components

[Front brakes](#)

[Front brakes, FS III brake caliper, assembly overview](#)

[Front brake pads, removing and installing](#)

[Front brakes, FN 3 brake caliper, servicing](#)

[Brake pads, removing and installing](#)

[Front brakes, 2FN brake caliper, servicing](#)

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[Rear wheel brakes \(disc brakes - front wheel drive\), assembly overview](#)

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[Rear wheel brakes/disc brakes \(all-wheel drive\), servicing](#)

[Brake pads, removing and installing](#)

[Parking brake, adjusting](#)

[Parking brake cables for disc brakes - front wheel drive, removing and installing](#)

[Parking brake cables for disc brakes - all wheel drive, removing and installing](#)

[Parking brake lever, assembly overview](#)

[Brake pedal - assembly overview](#)

[Brake pedal from brake booster, disconnecting and connecting](#)

[Brake pedal, removing and installing](#)

[Brake light switch, removing and installing/adjusting](#)

47 - Brakes - Hydraulic components

[Front brake calipers, servicing](#)

[FS III front brake calipers, servicing](#)

[Front brake caliper piston, removing and installing](#)

[FN 3 front brake calipers, servicing](#)

[Front caliper piston, removing and installing](#)

[Front brakes, 2FN brake caliper, Servicing](#)

[Front caliper piston, removing and installing](#)

[Rear brake caliper, servicing](#)

[Rear brake caliper piston, removing and installing](#)

[Pressure leak test](#)

[Brake pressure regulator, assembly overview](#)

[Brake pressure regulator, checking and adjusting](#)

[Specifications for load dependent brake pressure regulator](#)

Brake system, bleeding

Bleeding brake system with brake filler and bleeder unit VAS 5234, vehicles with ABS Mark 20

Brake system, bleeding without pressure bleeder

Bleeding brake system with brake filler and bleeder unit VAS 5234, vehicles with ABS Mark 60

Bleeding brake system without brake filling and bleeding appliance

Brake booster/brake master cylinder for vehicles with ABS/EDL/ASR/ESP, servicing for vehicles up to my 10.00

Vacuum pump for brake booster (vehicles with Diesel engines), removing and installing

Brake booster/brake master cylinder for vehicles with ABS/EDL/ASR/ESP Mark 60 from m.y. 10.00, assembly overview

Sender 1 for brake booster -G201- and Sensor -2- for brake pressure -G214-, removing and installing

Check function of brake assist in brake booster, vehicles from my 02.02,

Brake system vacuum pump -V192-, removing and installing

Brake system vacuum pump -V192-, checking

Brake booster pressure sensor -G294-, removing and installing

Check function of check valve -A-,

Brake system vacuum pump -V192-, vehicles up to my 05.02, electrical check

Multi-pin connector with contact assignment

Test table (test steps 1 - 6)

Brake system vacuum pump -V192-, vehicles from my 06.02, electrical check

Multi-pin connector with contact assignment

Test table (test steps 1 - 4)

Brake master cylinder, removing and installing**Brake booster, removing and installing****Definitions****Additional Information****System Overviews****Other Topics**

CAN-BUS Operation

ESP Operation

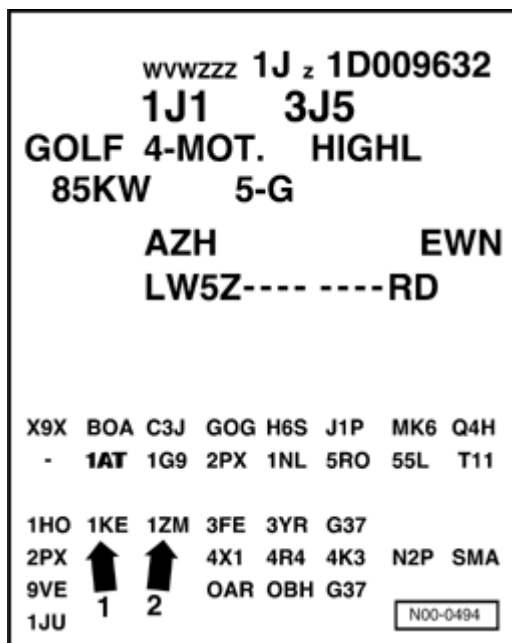
VAS 5234 Setup and Operation

Technical data

Vehicle data sticker

Explanation of the PR. numbers (factory codes) on vehicle data sticker

Various brake systems are installed depending on engine and equipment level. These are identified by the PR. numbers (they are also known as factory codes).



Example of a vehicle data sticker

In this example the vehicle is equipped with the following brakes:

- ◆ Arrow 1 - Rear brakes - 1KE
- ◆ Arrow 2 - Front brakes - 1ZM

The vehicle data sticker is located as follows:

- Vehicles up to 03.00: In spare wheel recess
- Vehicles from 04.00 (Only Jetta vehicles): Next to spare tire wheel well, near left rear wheelhouse
- In service booklet

The following table explains brake numbers. These are important for the combination of brake calipers/brake discs and brake pads.

- ◆ Application see Parts catalog

Front brakes

Engine Type	PR.- No.	Front brake
2.0l - 85/88 kW (Golf, Jetta, Jetta Wagon)	1LR / 1LS / 1ZM / 1ZP / 1ZR	FS III (15 inch.)
1.9l - 66 kW (TDI)		
1.9l - 74 kW (TDI)		
1.8l - 110/132 kW	1LE / 1ZD / 1ZE	FN 3 (15 inch.)
2.8l - 130/150 kW		
1.8l - 110/132 kW (Golf GTI)	1LQ / 1LJ / 1LJ+E54	FN 3 (16")

Rear brakes (Disc brakes)**Front wheel drive, Golf sedan**

Engine type	PR.- No.	Rear brake
2.0l - 85 kW	1KK / 1KS / 1KV / 1KX	C 38 (16")
1.8l - 110 kW		
2.8l - 130 kW ²		
1.9l - 66/74 kW (TDI)		
1.8l - 132 kW (Golf GTI)	1KY+E54	C 38 (16")

²⁾ North American Region

Front wheel drive Jetta, Jetta Wagon

Engine type	PR.- No.	Rear brake
2.0l - 85 kW	1KX	C 41
1.8l - 110/132 kW		
2.8l - 130/150 kW ²		
1.9l - 66/74 kW (TDI)		

²⁾ North American Region

4 Motion

Engine type	PR.- No.	Rear brake
2.8l - 150 kW ²	1KE / 2EG	C 41

²) North American Region

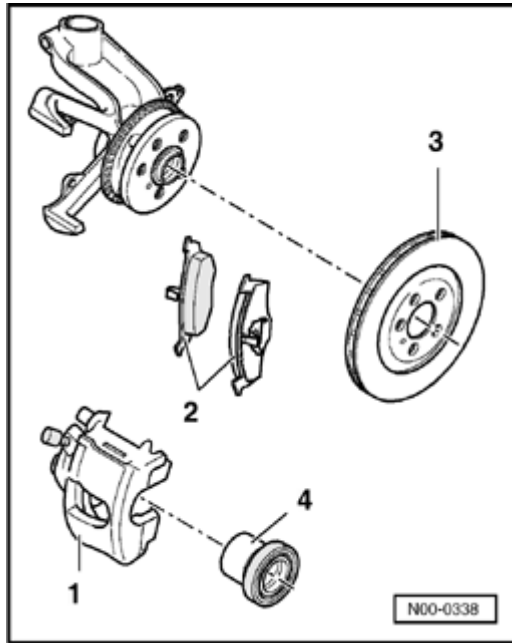
Technical data, brakes

Brake master cylinder	diameter in mm (in.)	23.81 (.94 in.)
Brake servo (Left hand drive)	diameter in	10 inch

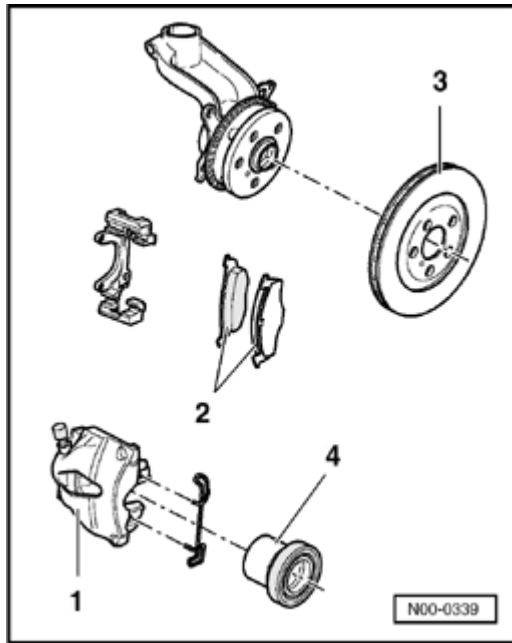
Technical data, brakes



Vehicles with FS III front brake calipers

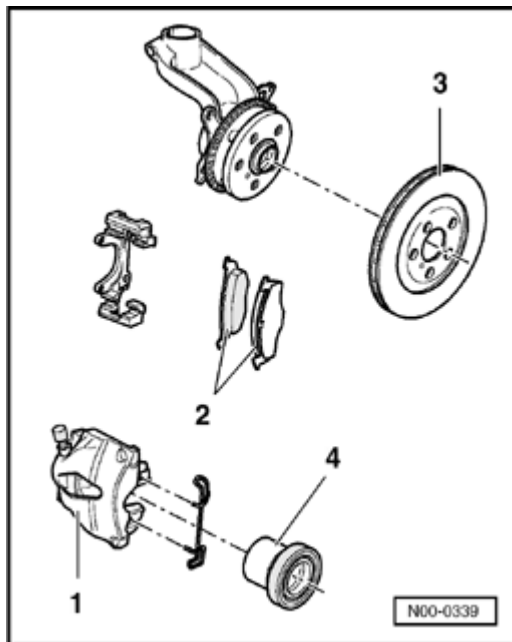


Item	Pr. No.		1LR / 1LS / 1ZM / 1ZP/ 1ZR
1	Brake caliper		FS III (15 inch.)
2	Brake pad, thickness	mm	19.7 (.775) including backing plate
3	Brake disc	diameter in mm	280 (11.02)
	Brake disc, thickness	mm	22 (.866)
4	Brake caliper, piston	diameter in mm	54 (2.13)



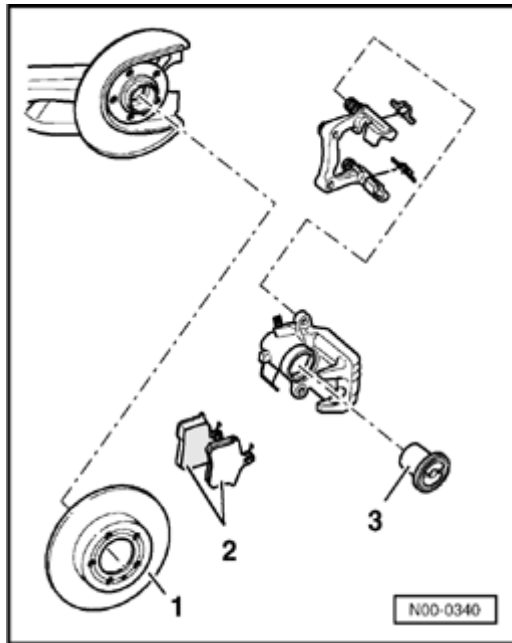
A Vehicles with FN 3 front brake calipers

Item	Pr. No.		1LE / 1ZD / 1ZE
1	Brake caliper		FN 3 (15 inch.)
2	Brake pad, thickness	mm	19.7 (.775) including backing plate
3	Brake disc	diameter in mm	288 (11.02)
	Brake disc, thickness	mm	25 (.984)
4	Brake caliper, piston	diameter in mm	54 (2.13)



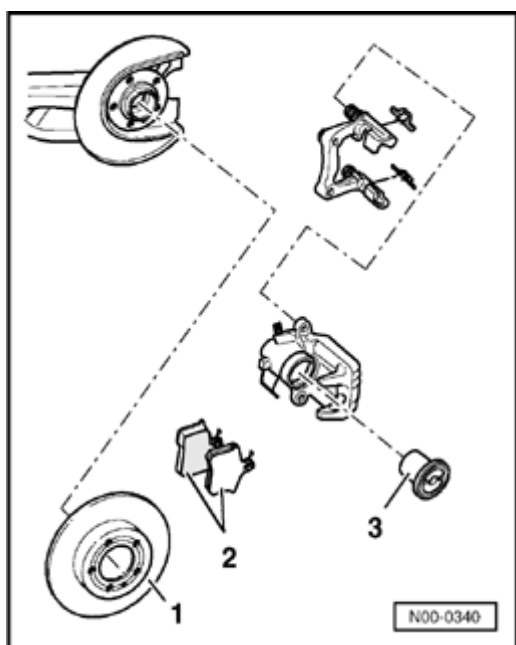
▲ Vehicles with FN 3 front brake calipers

Item	Pr. No.		1LQ / 1LJ / 1LJ+E54
1	Brake caliper		FN3 (16")
2	Brake pad, thickness	mm	19.7 (.775) including backing plate
3	Brake disc	diameter in mm	312 (12.283)
	Brake disc, thickness	mm	25 (.984)
4	Brake caliper, piston	diameter in mm	54 (2.13)



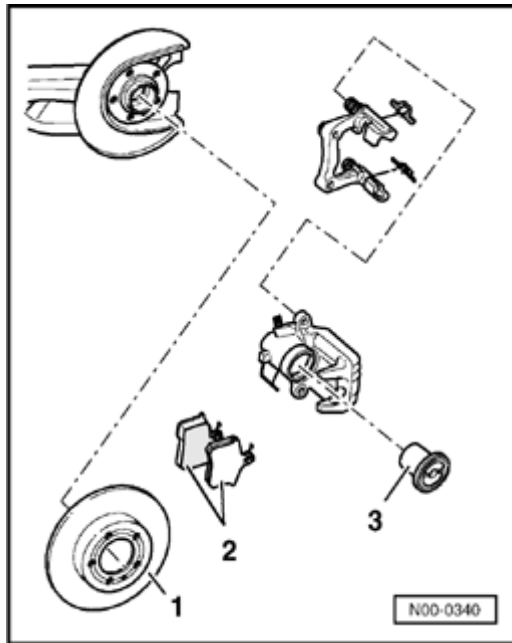
A Vehicles with rear disc brakes

Item	Pr. No.		1KK / 1KS / 1KV
	Brake caliper		C 38
1	Brake disc	diameter in mm	232 (9.134)
	Brake disc, thickness	mm	9 (.354)
2	Brake pad, thickness	mm	16.9 (.665) including backing plate
3	Brake caliper, piston	diameter in mm	38 (1.496)



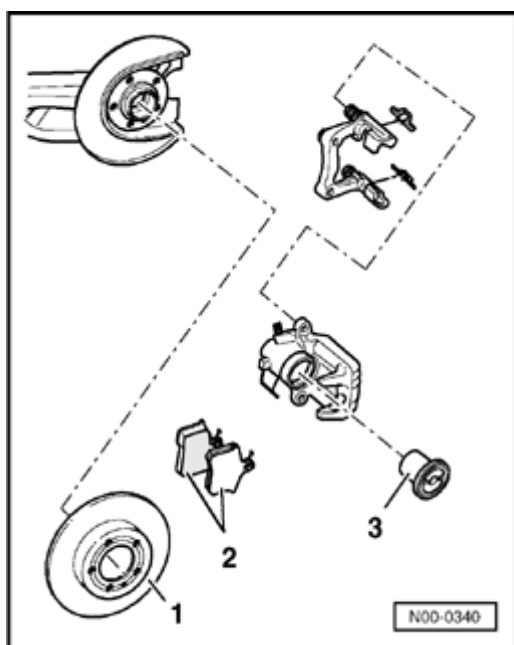
◀ Vehicles with rear disc brakes

Item	Pr. No.		1KX
	Brake caliper		C 41
1	Brake disc	diameter in mm	232 (9.134)
	Brake disc, thickness	mm	9 (.354)
2	Brake pad, thickness	mm	16.9 (.665) including backing plate
3	Brake caliper, piston	diameter in mm	41 (1.614)



↳ Vehicles with rear disc brakes

Item	Pr. No.		1KY / 1KY+E54
	Brake caliper		C 38 (16")
1	Brake disc	diameter in mm	256 (10.08)
	Brake disc, thickness	mm	22 (.87)
2	Brake pad, thickness	mm	16.9 (.665) including backing plate
3	Brake caliper, piston	diameter in mm	38 (1.496)



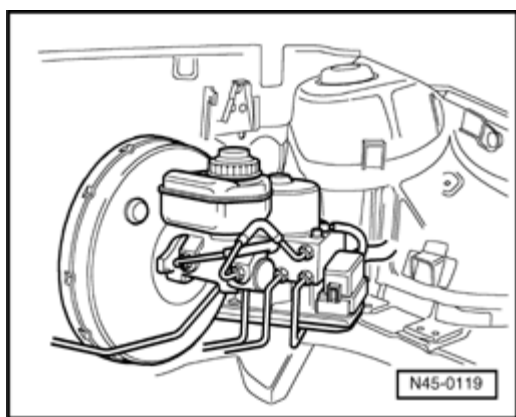
A

Vehicles with rear disc brakes

Item	Pr. No.		1KE / 2EG
	Brake caliper		C 41
1	Brake disc	diameter in mm	239 (9.41)
	Brake disc, thickness	mm	9 (.354)
2	Brake pad, thickness	mm	16.9 (.665) including backing plate
3	Brake caliper, piston	diameter in mm	41 (1.614)

Anti-lock brake system (ABS) and anti-lock brake system with electronic differential lock (ABS/EDL) ITT Mark 20 IE

General

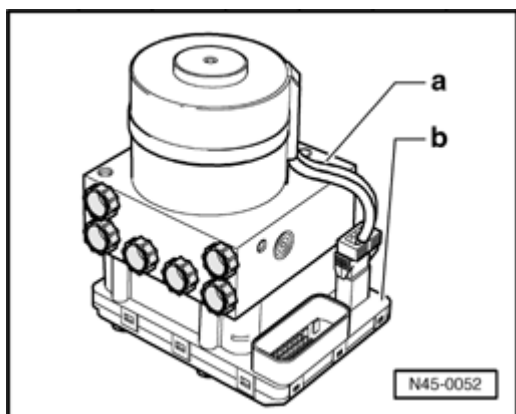


◀ ABS layout

The ABS or ABS/EDL brake system is divided diagonally. Brake pedal pressure is assisted pneumatically by the vacuum brake booster.

Vehicles with ITT Mark 20 IE ABS do not have a mechanical brake pressure regulator. Specially matched software in the control module controls the rear axle brake pressure regulation.

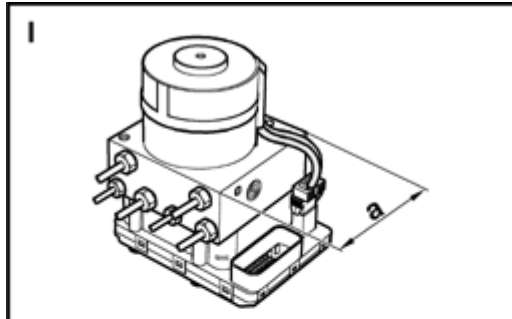
Malfunctions of the ABS or ABS/EDL systems do not influence the brake system or the vacuum assistance. The conventional braking system remains functional even if the ABS is not operating.



◀ The hydraulic unit -a- and the control module part -b- form one component. Separating the two parts is only possible when the complete component has been removed from the vehicle.

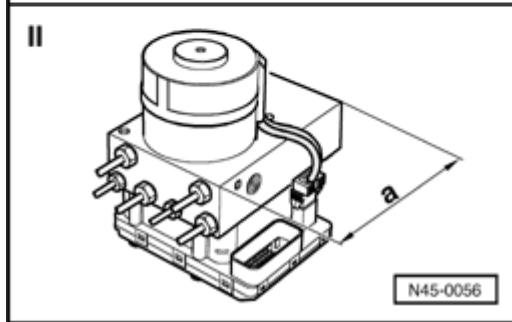
New control modules (replacement parts) are not coded and must be coded after installation.

Distinguishing features of ABS ITT Mark 20 IE and the ABS/EDL ITT Mark 20 IE



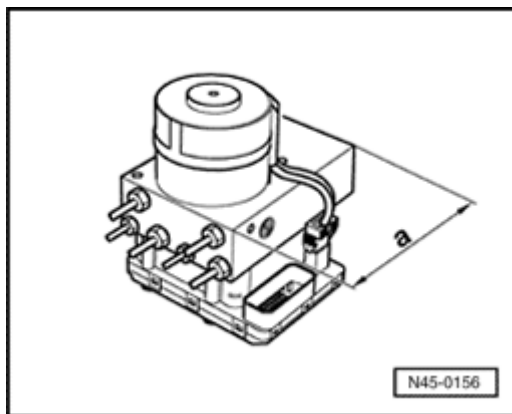
I - ABS - ITT Mark 20 IE

Dimension a = 100 mm (3.9 in.)



II - ABS/EDL - ITT Mark 20 IE

Dimension a = 130 mm (5.1 in.)



Notes for repair work on ABS, ABS/EDL

WARNING!

Brake fluid is poisonous.

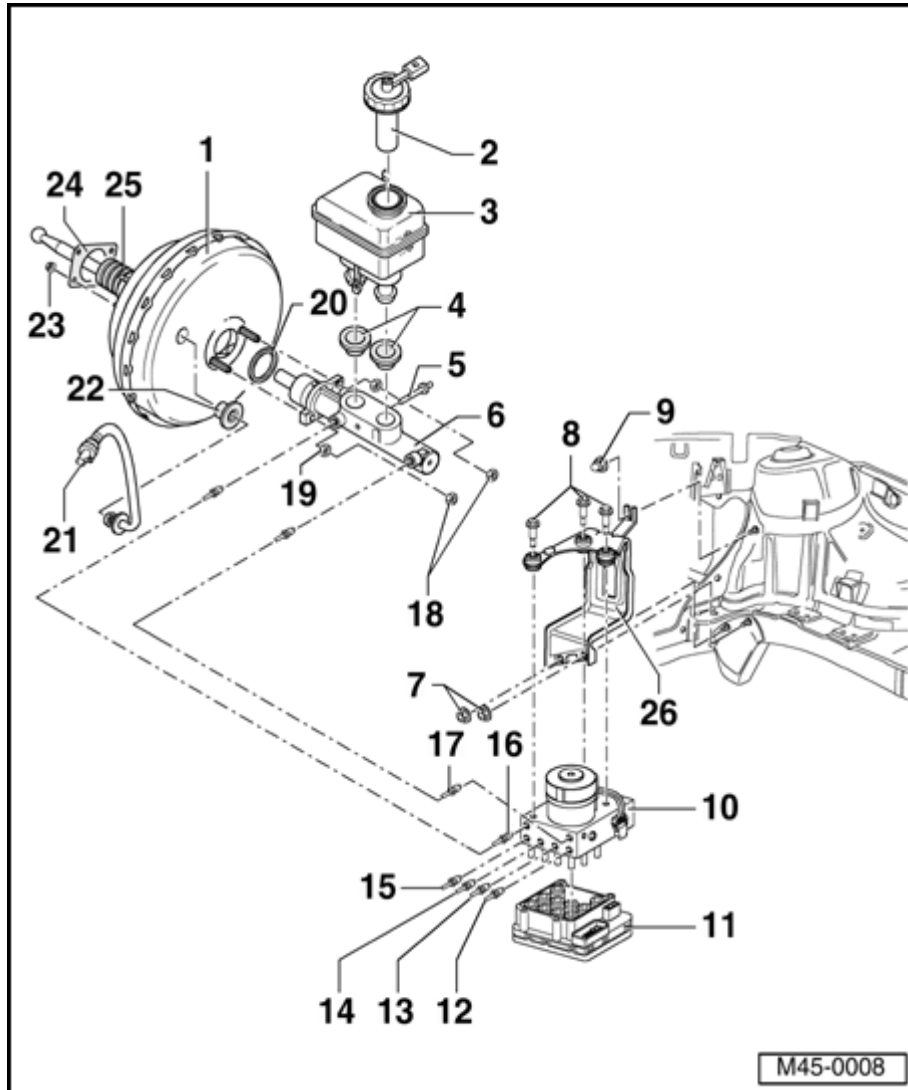
Note:

- ◆ *Before working on the ABS system, determine the cause of the malfunction using On Board Diagnostic (OBD)*

⇒ [Repair Manual, Brake System On Board Diagnostic \(OBD\), Repair Group 01](#)

- ◆ *Before working on the ABS system, disconnect the battery ground (GND) strap. Obtain the radio code for vehicles with a coded radio.*
- ◆ *Before doing any welding work with an electric welding unit, disconnect the ABS control module.*
- ◆ *When working with brake fluid, observe the relevant safety precautions and notes ⇒ [Page 47-33](#).*
- ◆ *If the brake hydraulic system had to be opened during the course of repair, bleed the brake system after completion of the repair ⇒ [Page 47-33](#).*
- ◆ *During the final road test perform at least one controlled brake test where the brake pedal is felt to pulsate (ABS operation).*
- ◆ *Absolute cleanliness is required when working on the ABS system. It is not permitted to use any products which contain mineral oil, greases, etc.*

- ◆ *Thoroughly clean all connections and the adjacent areas before loosening. Do not use aggressive cleaning agents such as brake cleaner, gasoline, thinners or similar.*
- ◆ *Place removed parts on a clean surface and cover them. Only use clean plastic covering or paper. Do not use rags that may contain lint.*
- ◆ *After separating the control module from the hydraulic unit, use the transportation protection for the valve dome.*
- ◆ *Carefully cover or seal open components if repairs cannot be carried out immediately. Use the sealing plugs contained in repair kit, Part No. 1 H0 693 311 A.*
- ◆ *Do not use rags that may contain lint.*
- ◆ *Only remove replacement parts from packaging immediately prior to installation.*
- ◆ *Only use genuine packed parts.*
- ◆ *When the system is open do not work with compressed air and do not move the vehicle.*
- ◆ *Make sure that no brake fluid enters electrical connectors.*



Hydraulic unit brake booster/master cylinder, overview

Note:

Complete brake master cylinders and brake boosters can be replaced separately

1 - Brake Boost

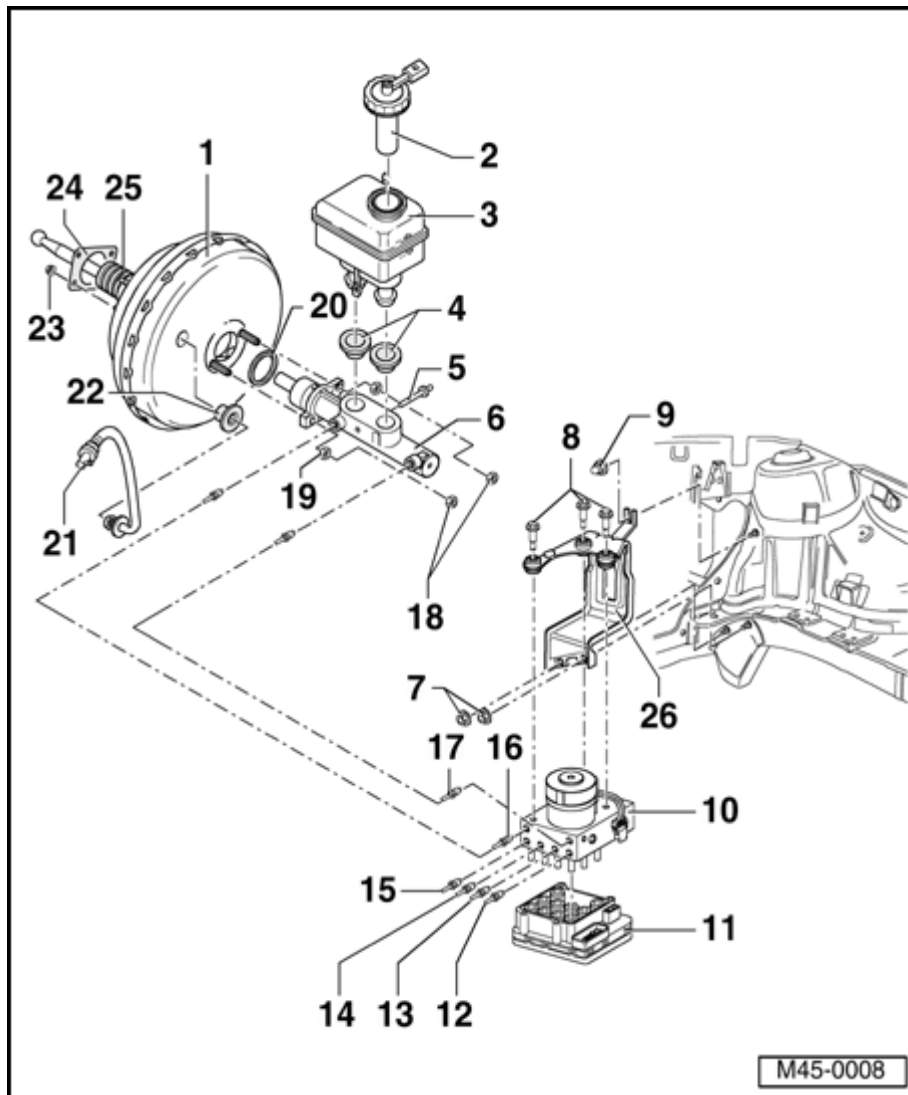
- ◆ For gasoline engines vacuum is taken from intake manifold
- ◆ Diesel engines have a vacuum pump to create the required vacuum
- ◆ Functional check:

- With engine switched depress brake pedal firmly several times (to exhaust vacuum in the unit)

- Hold brake pedal with average force pressure brake position and start engine. If brake booster is functioning

properly,
brake pe
should gi
noticeabl
underfoot

- ◆ If pedal doe
not give,
replace bra
booster



- ◆ Check valve (in vacuum hose ⇒ [Page 47-49](#))

Functional check ⇒ [Page 47-49](#)

- ◆ Separating from brake pedal ⇒ [Page 46-79](#).

- ◆ Removing and installing ⇒ [Page 47-84](#)

2 - Cap

3 - Brake fluid reservoir

4 - Plug

- ◆ Coat with brake fluid and press into reservoir

5 - Retaining pin

- ◆ Insert through brake master cylinder

6 - Brake master cylinder

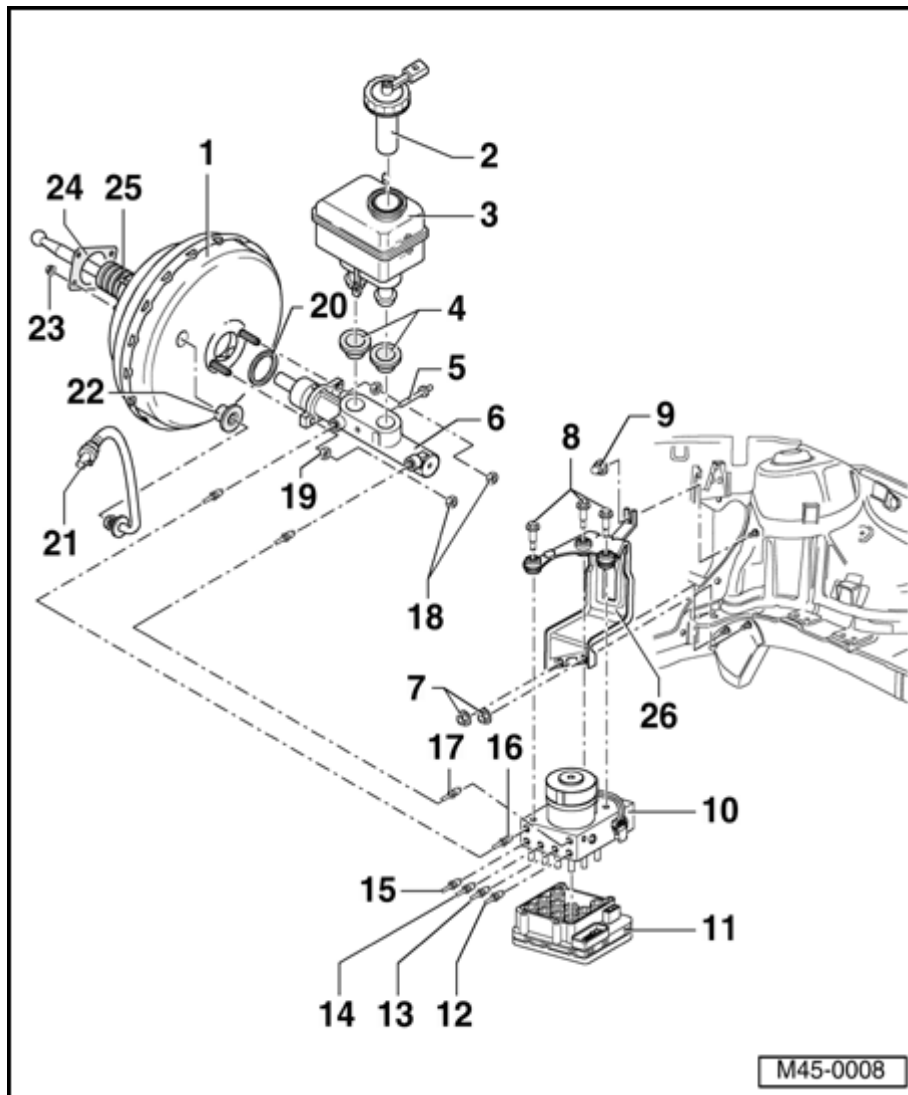
- ◆ Cannot

be
repaired.
If faulty,
replace
as
complete
unit

**7 - Hex
nut,
self-
locking
20 Nm
(15 ft.
lb)**

**8 - Bolt, 8
Nm (70
in. lb)**

45-7



9 - Cap nut, 20 Nm (15 ft. lb)

10 - ABS/EDL hydraulic unit

11 - ABS control module

- ◆ Control module connector is not disconnecte before On Board Diagnostic (OBD)

12 - Connection for brake line

- ◆ Hydraulic unit to left front brake caliper ⇒ [Page 45-9](#)

13 - Connection for brake line

- ◆ Hydraulic unit to right rear wheel cylinder/ brake caliper ⇒ [Page 45-9](#)

14 - Connection for brake line

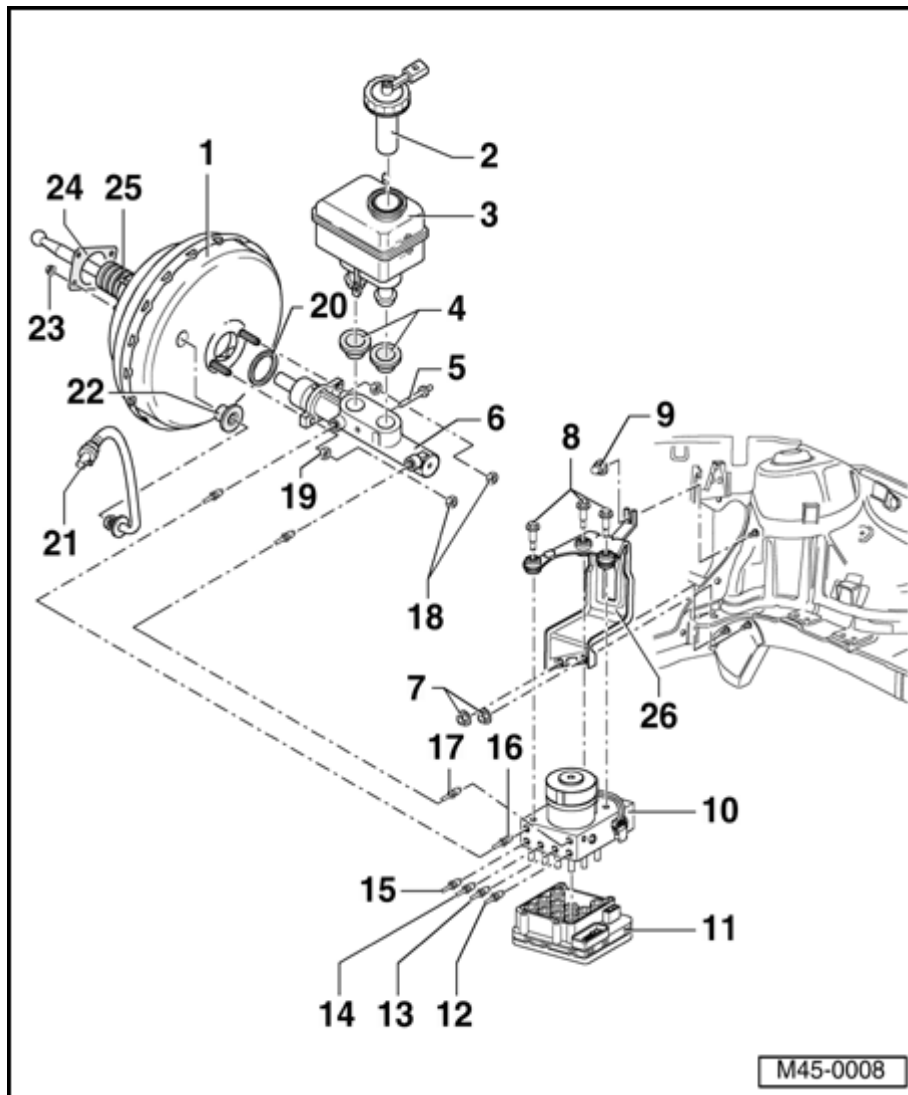
- ◆ Hydraulic unit to left rear wheel cylinder/ brake caliper ⇒ [Page 45-9](#)

15 - Connection for brake line

- ◆ Hydraulic unit to right front brake caliper ⇒ [Page 45-9](#)

16 - Brake line

- ◆ Brake master cylinder/pressure rod piston circuit to hydraulic unit ⇒ [Page 45-9](#)

**17 - Brake line**

- ◆ Brake master cylinder/floating piston circuit to hydraulic unit
⇒ [Page 45-9](#)

18 - Hex nut, self-locking, 20 Nm (15 ft. lb)

19 - Hex nut, self-locking, 20 Nm (15 ft. lb)

20 - Seal

- ◆ Always replace

21 - Vacuum hose

- ◆ Install in brake booster

22 - Sealing plug

23 - Hex nut, self-locking, 20 Nm (15 ft. lb)

24 - Seal

- ◆ For brake booster

25 - Boot

- ◆ Make sure boot is properly seated or suction noises may be

noticed

26 - Bracket

Brake lines from brake master cylinder to hydraulic unit, connecting

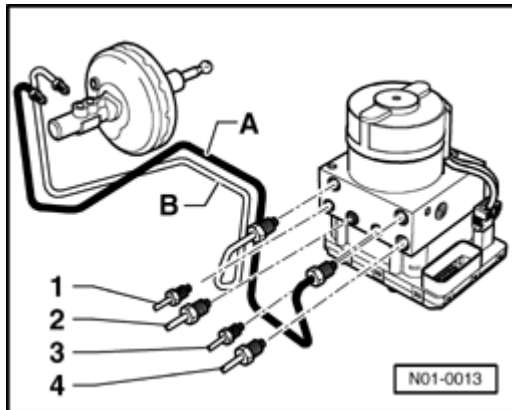


Fig. 1 Vehicles with ABS

A - Secondary piston circuit

B - Primary piston circuit

1 - Hydraulic unit to right front brake caliper

2 - Hydraulic unit to left rear wheel cylinder/brake caliper

3 - Hydraulic unit to right rear wheel cylinder/brake caliper

4 - Hydraulic unit to left front brake caliper

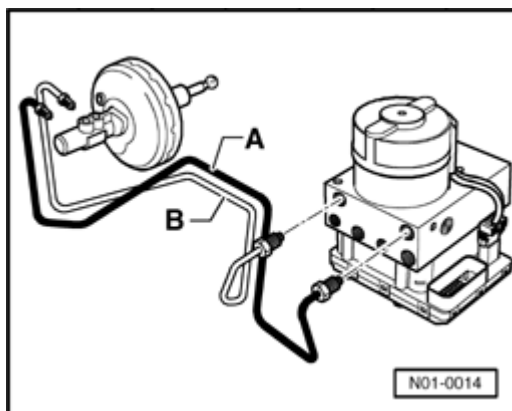


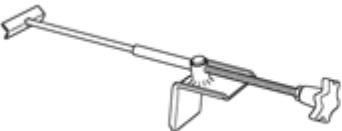


Fig. 2 Vehicles with ABS/EDL

A - Secondary piston circuit

B - Primary piston circuit

<p>V.A.G 1331</p> 	<p>V.A.G 1410</p> 
<p>V.A.G 1869/2</p> 	
	<p style="text-align: right; border: 1px solid black; padding: 2px;">W45-0003</p>

Hydraulic unit/ABS control module, removing and installing

Special tools and equipment

- ◆ VAG 1331 Torque wrench or equivalent
- ◆ VAG 1410 Torque wrench or equivalent
- ◆ VAG 1869/2 Brake pedal depressor or equivalent

Additional required information sources

⇒ [Repair Manual, Brake System On Board Diagnostic \(OBD\), Repair Group 01](#)

Component location:

The ABS control module is bolted together with the hydraulic unit and is located in the engine compartment, left side.

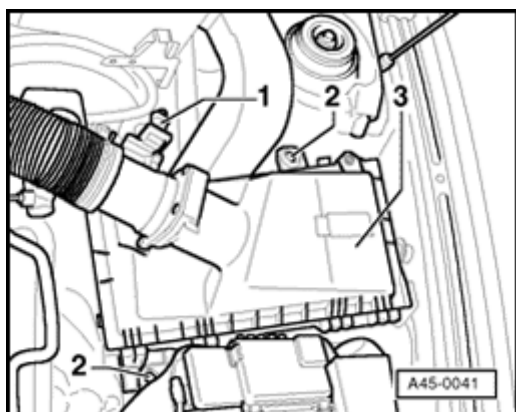
CAUTION!

Brake lines in the area of the hydraulic unit should not be bent!

Removing

- For vehicles with a coded radio, obtain code.
- Disconnect battery

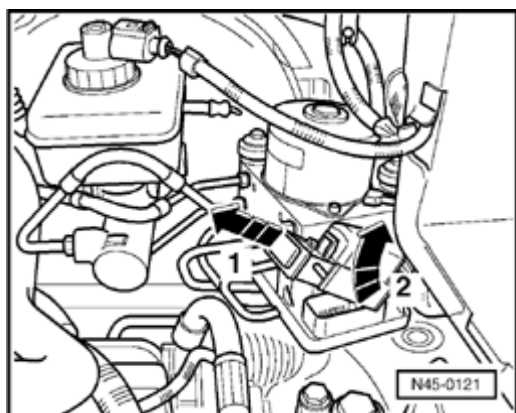
⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#)



- Disconnect electrical connector - 1- of Mass Air Flow MAF sensor from air filter tube.
- Remove bolts -2- at air filter -3- and move filter to left side.
- On vehicles with Diesel engines, remove relay panel above brake booster.

45-12

- Remove as much brake fluid as possible from brake fluid reservoir using a brake bleeder bottle.
- Insert brake pedal depressor VAG 1869/2 equivalent.
- Activate brake pedal booster with brake pedal depressor.
- Connect bleeder bottle hose to bleed screw on left front brake caliper and open bleed screw.
- Close left front bleed screw.

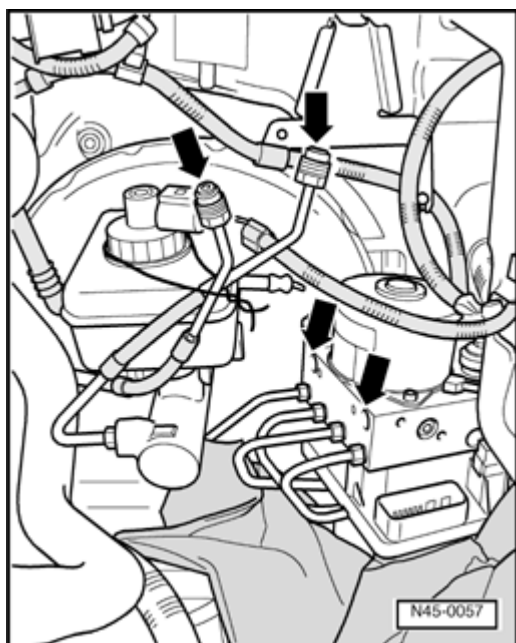


- Release ABS control module connector (1) and remove (arrow 2).
- Place plastic covering under control module and hydraulic unit. Do not use rags.

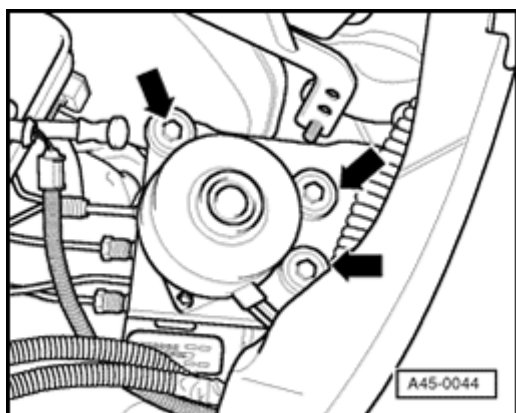
Note:

Do not let brake fluid enter electrical connections.

45-13



- Disconnect brake lines from hydraulic unit to brake master cylinder (arrows) and suspend with wire.
- Disconnect remaining brake lines from hydraulic unit.
- Seal brake lines and threaded holes (arrows) using plugs from repair kit, Part No. 1H0 698 311 A.

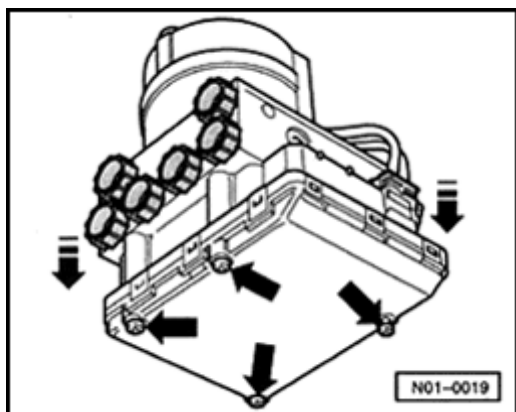


- Remove bolts from bracket for hydraulic unit (arrows).
- Remove hydraulic unit with control module.

45-14

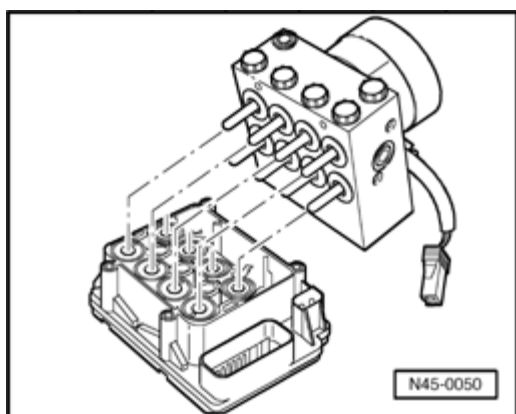
ABS control module, removing from hydraulic unit

- Disconnect electrical connector for hydraulic pump motor from control module.



- Remove bolts (arrows) from control module. Then remove control module.

Note:



- ◆ When removing the control module make sure that the hydraulic unit valve dome does not contact the control module solenoid valve.
- ◆ Cover the control module magnet coils with plastic cover. Do not use rags.
- ◆ After separating the control module and hydraulic unit use transportation protection to protect the valve dome.

Installing

Note:

- ◆ *Only remove the sealing plugs on the new hydraulic unit just before installing the corresponding brake line.*
- ◆ *If the sealing plugs are removed from the hydraulic unit too early, brake fluid can escape. It can then no longer be guaranteed that the unit is sufficiently filled or adequately bled.*
- ◆ *When assembling the control module and hydraulic unit, be sure that the hydraulic unit valve dome does not come in contact with the control module solenoid valves.*

- Using new bolts, install control module to hydraulic unit. Do not tighten more than max. 4 Nm (35 in. lb).
- Re-connect electrical connector for hydraulic pump motor.
- Install ABS unit to bracket.

Note:

Hand-tighten bolts at first to make attaching the individual brake lines easier.

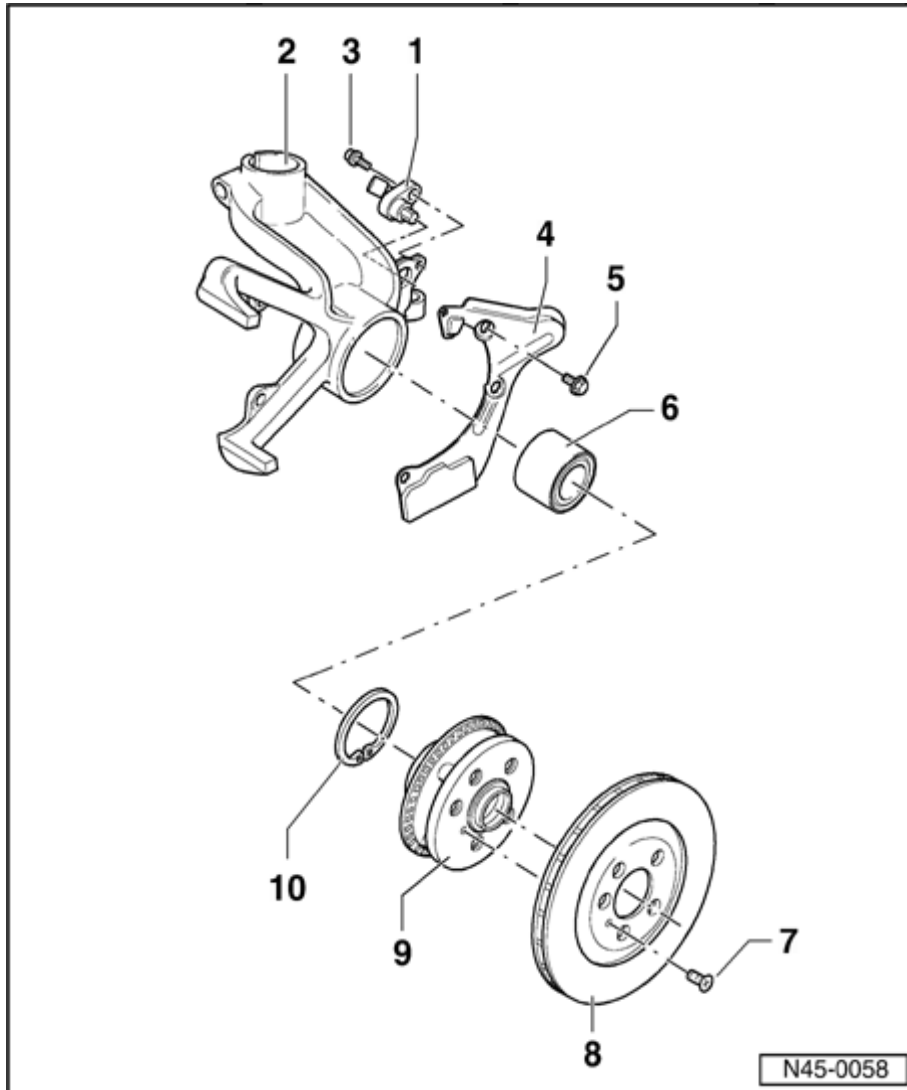
- After tightening brake lines, tighten hydraulic unit.
- Continue installation in reverse order of removal.

- Bleed brake system ⇒ [Page 47-33](#)
- Enter radio code.
- Code control module.

⇒ [Repair Manual, Brake System On Board Diagnostic \(OBD\), Repair Group 01](#)

Tightening Torques:

Control module to hydraulic unit	max.
	4 Nm (35 in. lb)
Hydraulic unit to bracket	8 Nm (70 in. lb)
Nut for brake master cylinder to brake booster	20 Nm (15 ft. lb)
Brake lines at ABS unit:	
Thread M10 x 1	14 Nm (10 ft. lb)
Thread M12 x 1	14 Nm (10 ft. lb)
Nut to body	20 Nm (15 ft. lb)
Cap nut to body	20 Nm (15 ft. lb)



ABS system components for front axle, removing and installing

Note:

Removing and installing ABS system component is identical for FS II and FN 3 brake calipers.

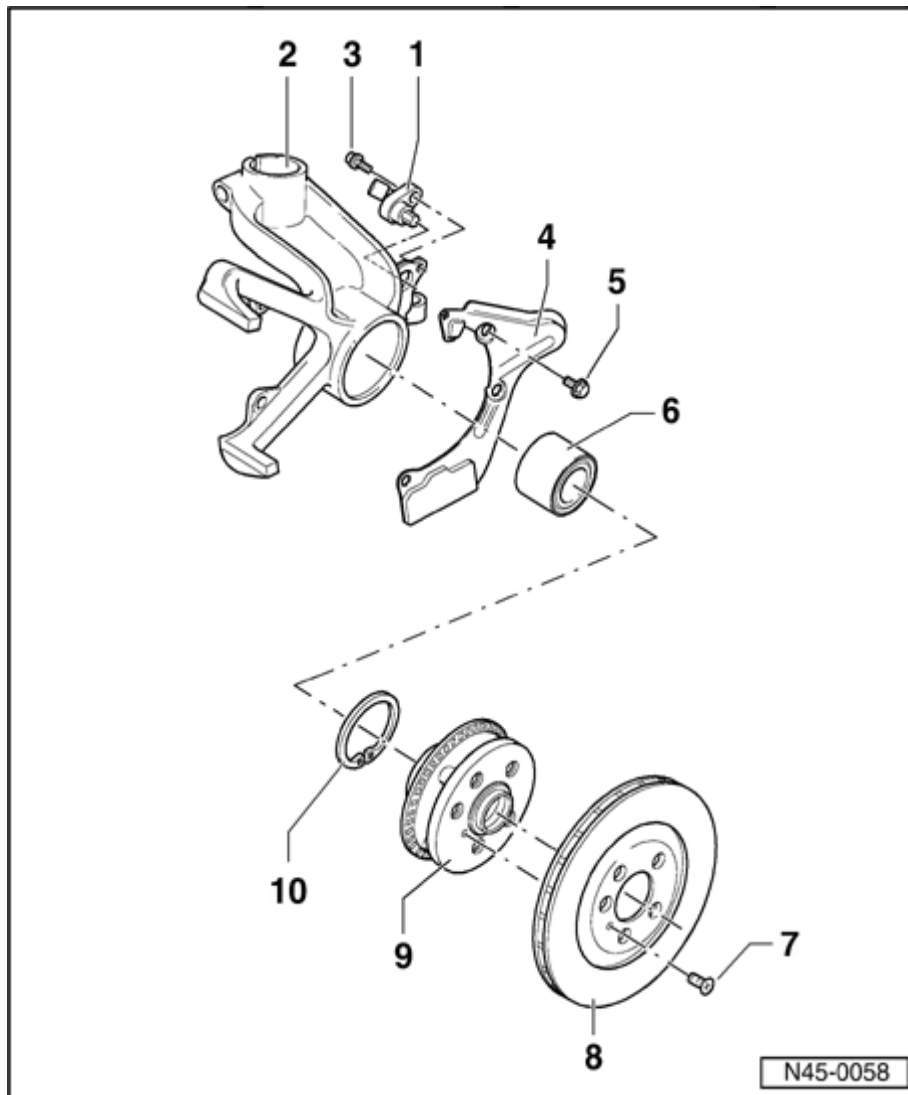
1 - ABS wheel speed sensor

- ◆ Before inserting sensor, clean mounting hole inner surface and coat with lubricant, G 000 650

2 - Wheel bearing housing

3 - Hex socket head bolt, 8 Nm (70 in. lb)

45-18



4 - Splash shield

5 - Hex bolt, 7 Nm (62 in. lb)

6 - Wheel bearing

◆ Replace each time after removing

◆ Removing and installing

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

7 - Screw

8 - Brake disc

9 - Wheel hub with ABS wheel speed sensor rotor

◆ Pressing out and in

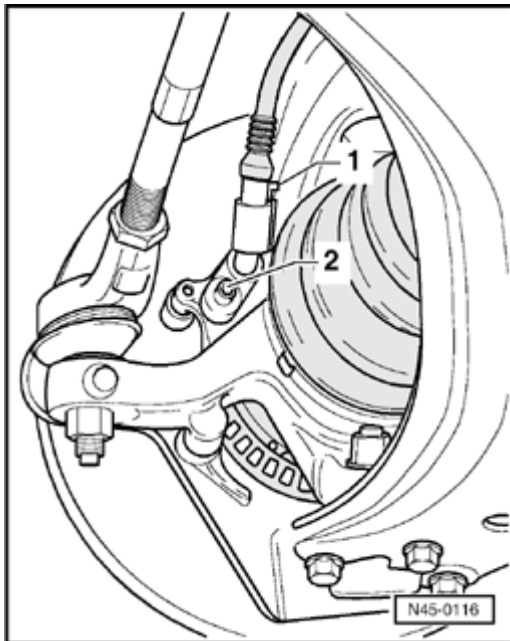
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

10 - Circlip

Wheel speed sensor for front axle, removing and installing

Removing

- Raise vehicle.
- Disconnect wheel speed sensor wiring connector -1-.
- Remove bolt -2- from wheel bearing housing.
- Remove wheel speed sensor from wheel bearing housing.



Installing

- Before inserting speed sensor, clean mounting hole inner surface and coat sensor with lubricant G 000 650.
- Insert speed sensor into mounting hole in wheel bearing housing and tighten bolt to 8 Nm (70 in. lb).
- Connect wheel speed sensor wiring connector.
- Turn wheels fully to left and right lock and check clearance of speed sensor wiring.

ABS wheel speed sensor rotor for front axle, checking

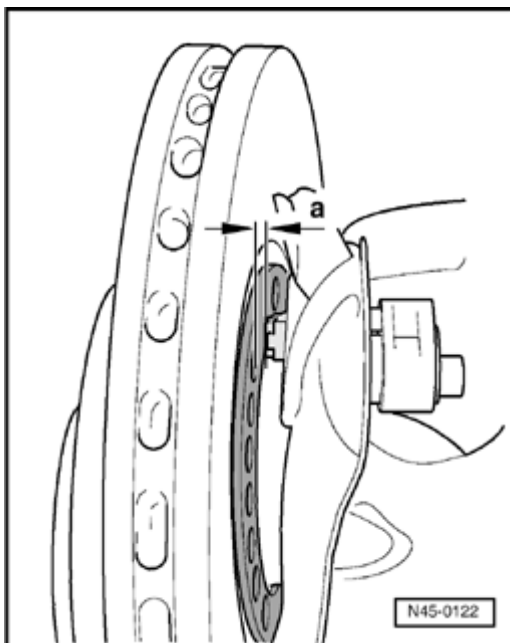
- Raise vehicle.
- Remove wheel.
- Rotate brake disc and check whether wheel speed sensor rotor is damaged or dirty.
- If rotor is damaged, remove wheel hub with rotor and replace.

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

ABS wheel speed sensor gap, checking

- Raise vehicle.
- Remove wheel.
- Turn wheel hub and measure distance between rotor and speed sensor, -dimension a-, all around.
 - Dimension a = 0.3 mm (0.0118 in.)
- If the rotor is not true, remove wheel hub with rotor and replace.

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)



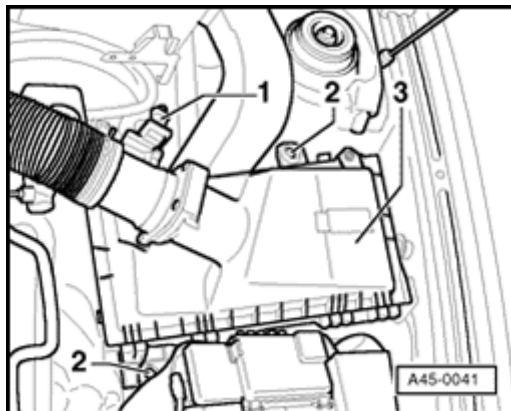
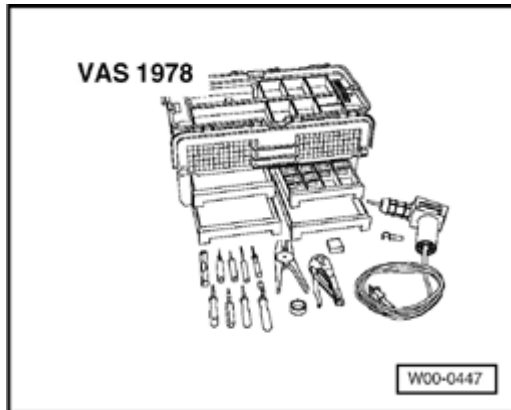
Front wheel speed sensor wiring, removing and installing

Special tools and equipment

- ◆ VAS 1978 wiring repair set

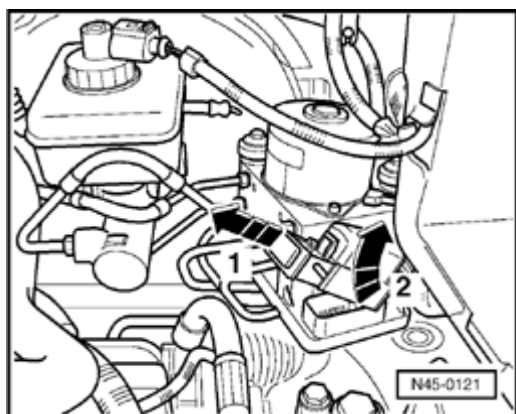
Removing

- Obtain radio code on vehicles with coded radio.
- Disconnect battery.

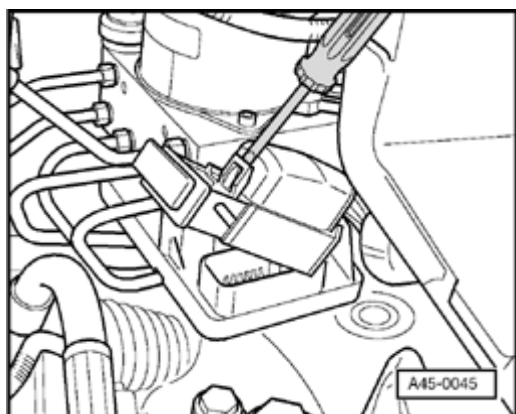


- Remove Mass Air Flow (MAF) sensor connector -1- from air filter duct.
- Remove bolts -2- at air filter -3- and place filter to left side.
- On vehicles with diesel engines, remove relay panel above brake booster.

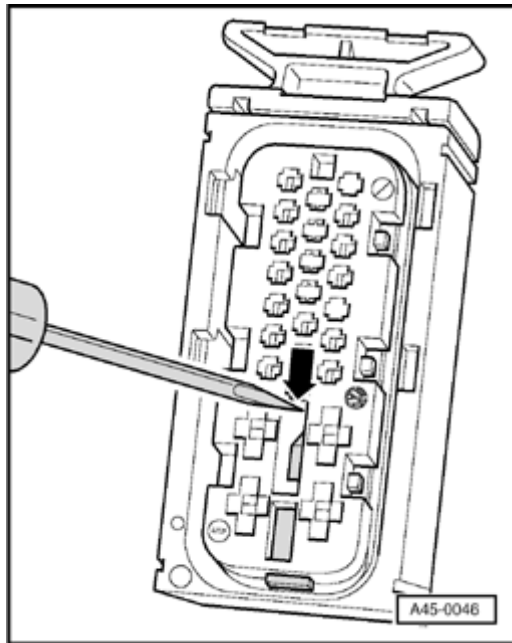
45-22



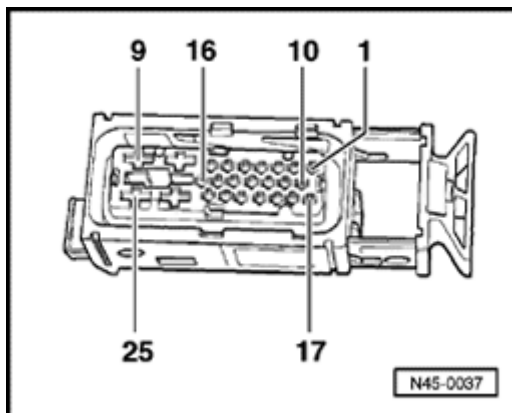
- ✦ - Release connector from control module (arrow -1-) and pull off (arrow -2-)



- ✦ - Using a screwdriver, lift cover of multi-pin connector and remove.

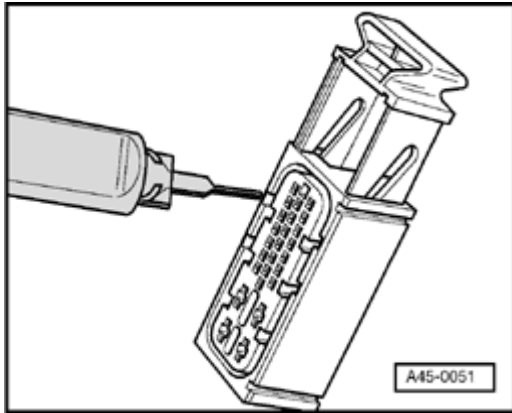


- Using a small screwdriver, push purple latch in direction of arrow.

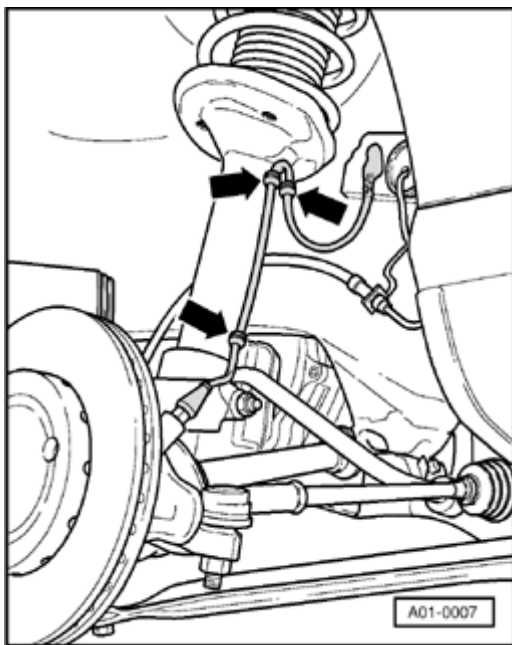


Pin assignment of harness connector T25 and ABS Control Module (w/EDL) -J104-

Pin	Connected to component:
19 +	Right Front ABS Wheel
20	Speed Sensor -G45-
1 + 2	Left Front ABS Wheel
	Speed Sensor -G47-



- Using extractor tool from wiring harness repair set VAS 1978, push out applicable terminals.
- Disconnect wheel speed sensor wiring connector.
- Replace faulty wheel speed sensor wiring.
- Connect speed sensor to speed sensor wiring.

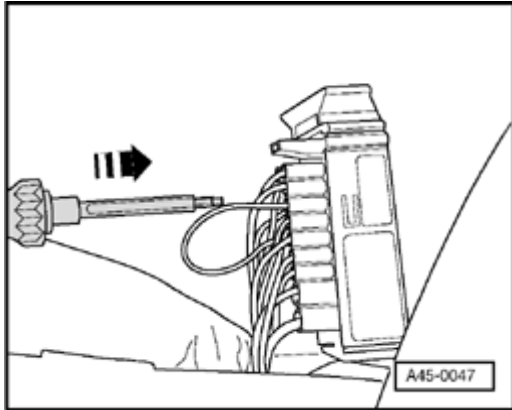


- Secure speed sensor wiring (arrows).

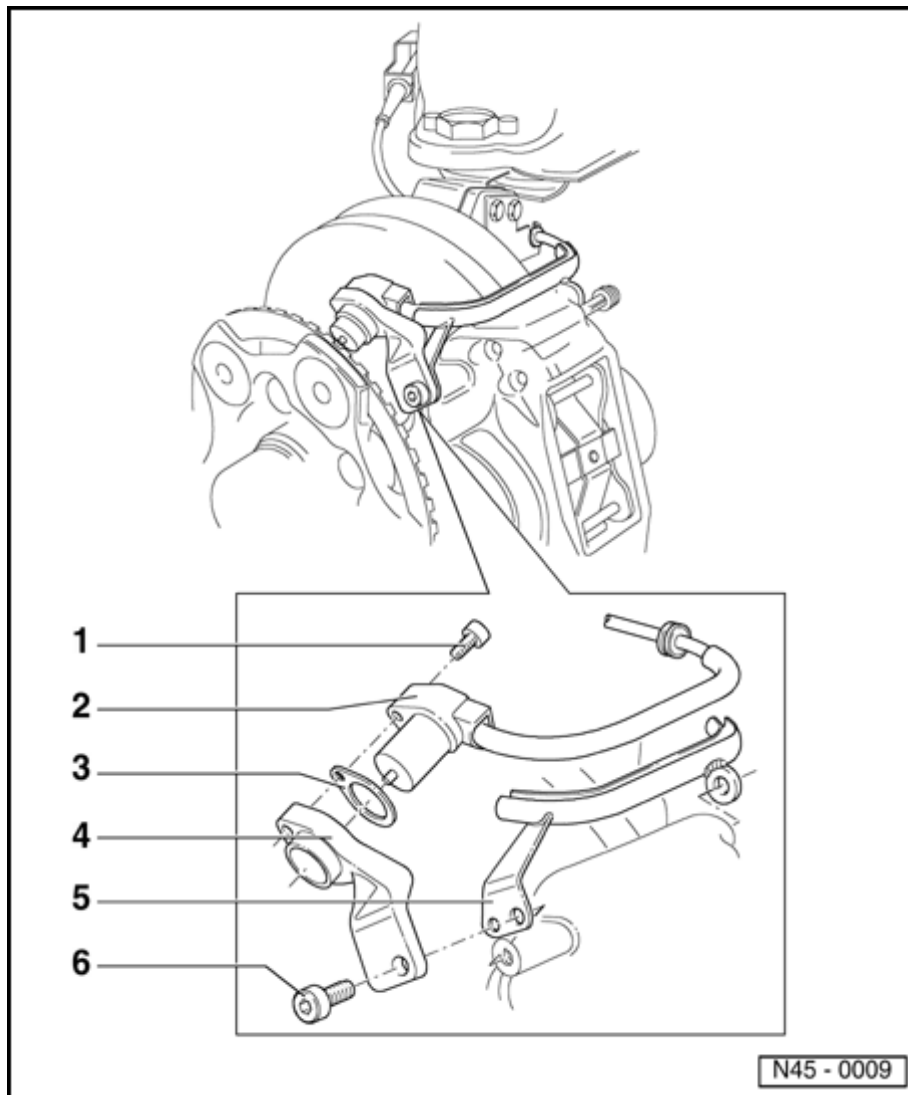
Note:

Make sure the wiring is not twisted in the wheel well.

45-25



- Install pin connectors in connector housing.
- Using installation tool from VAS 1978, push individual wire seals to stop.
- Secure terminals by engaging purple latch and install cover of multi-pin connector.



ABS system components on rear axle, removing and installing

1 - ABS wheel speed sensor

- ◆ Before inserting sensor, clean mounting hole inner surface and coat with lubricant G 000 650

2 - Hex socket head bolt, 8 Nm (70 in lb)

3 - Stub axle

4 - Splash shield

5 - Wheel hub with wheel bearing and speed sensor rotor

- ◆ Replace each time after

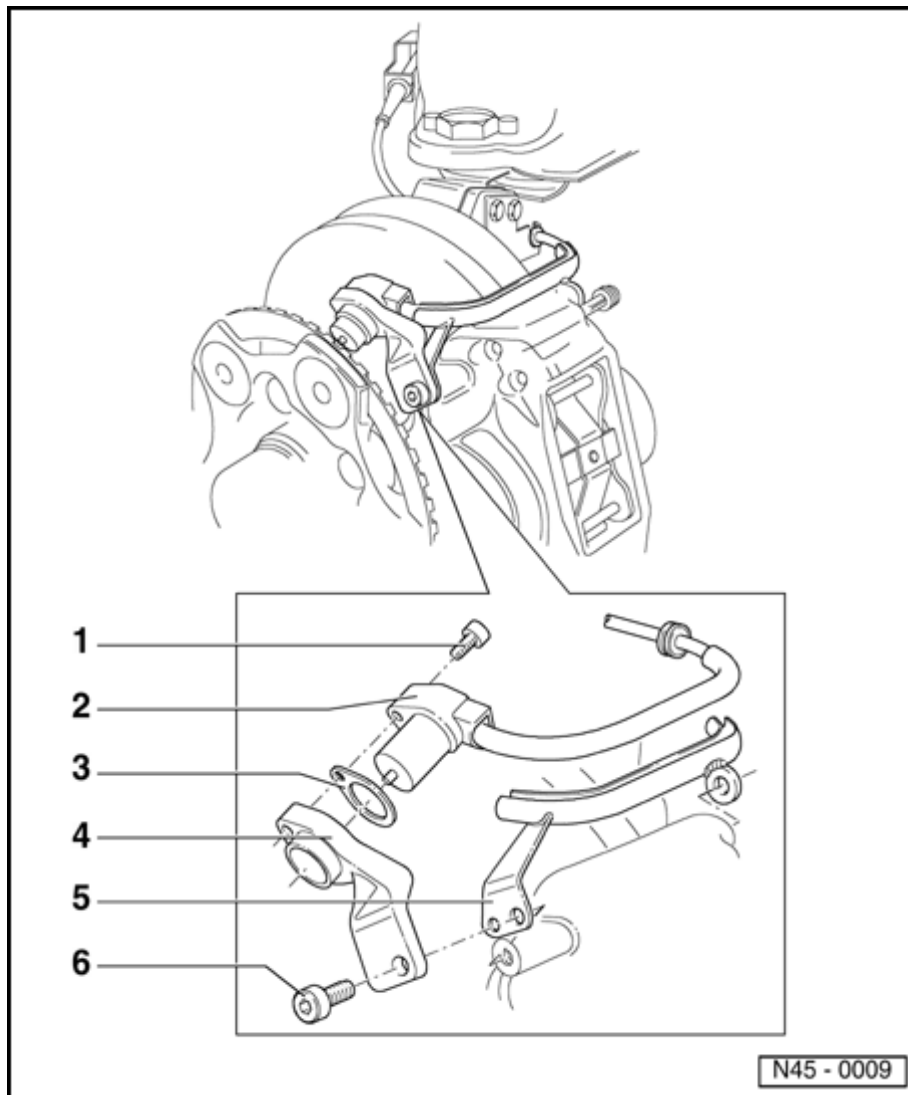
disassembly

◆ Only
replace
complete

◆ Removing
and
installing

⇒ [Repair](#)
[Manual,](#)
[Suspension,](#)
[Wheels,](#)
[Steering,](#)
[Repair Group](#)
[42](#)

45-27



6 - Self-locking 12-point nut, 175 Nm (129 ft. lb)

- ◆ Replace each time after removing

7 - Cap

- ◆ Pressing off and driving in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42](#)

8 - Brake disc

9 - Screw

10 - Hex bolt, 60 Nm (44 ft. lb)

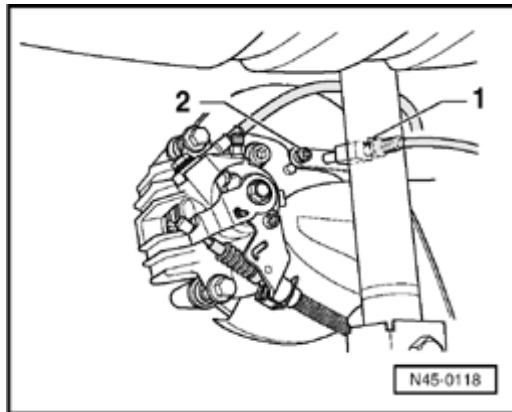
- ◆ With dished spring

11 - Axle beam

Wheel speed sensor on rear axle, removing and installing

Removing

- Raise vehicle.
- Disconnect wheel speed sensor and speed sensor wiring connector -1-.
- Remove bolt -2- from stub axle.
- Pull ABS wheel speed sensor out of stub axle.



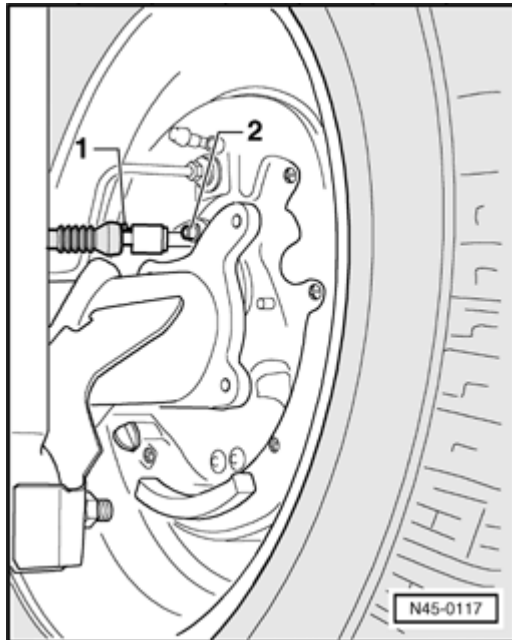
Installing

- Before inserting wheel speed sensor, clean mounting hole inner surface and coat speed sensor with lubricant G 000 650.
- Insert wheel speed sensor into hole in stub axle and tighten bolt to 8 Nm (70 in. lb).
- Connect wheel speed sensor to speed sensor wiring.

Wheel speed sensor on rear axle (drum brakes), removing and installing

Removing

- Raise vehicle.
- Disconnect wheel speed sensor and speed sensor wiring connector -1-.
- Remove bolt -2- from stub axle.
- Pull ABS wheel speed sensor out of stub axle.



Installing

- Before inserting speed sensor, clean mounting hole inner surface and coat speed sensor with lubricant G 000 650.
- Insert speed sensor into hole in stub axle and tighten bolt to 8 Nm (70 in. lb).
- Connect speed sensor to speed sensor wiring.

ABS wheel speed sensor wiring to rear axle, removing and installing

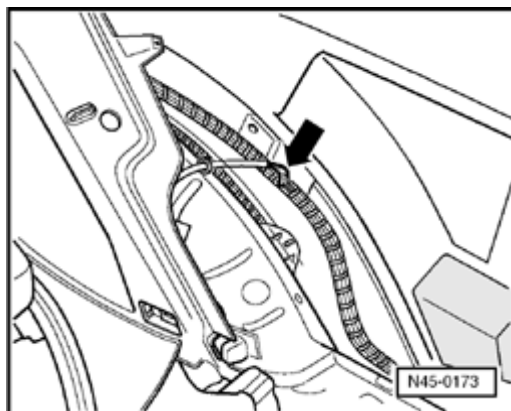
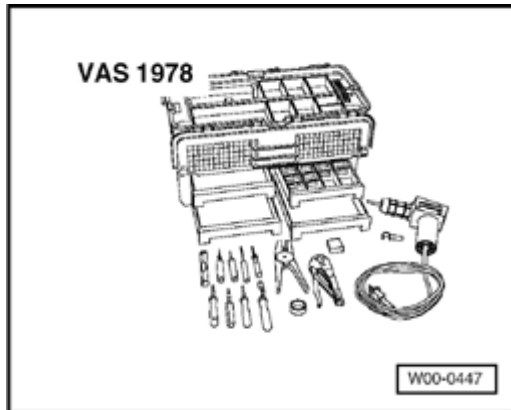
Required special tools

- ◆ VAS 1978 Wirng harness repair set

Removing

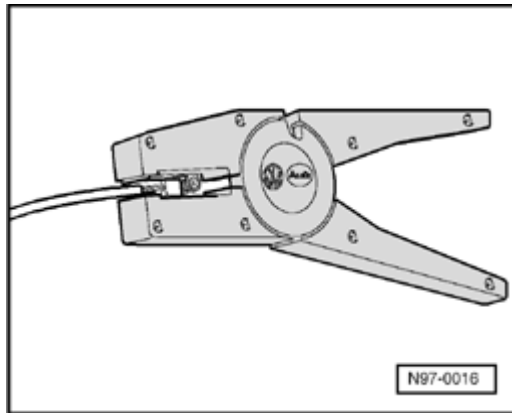
- Obtain radio code on vehicles with coded radio.
- Disconnect battery
- Disconnect wheel speed sensor wiring connector.
- Remove rear interior side panel trim.

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

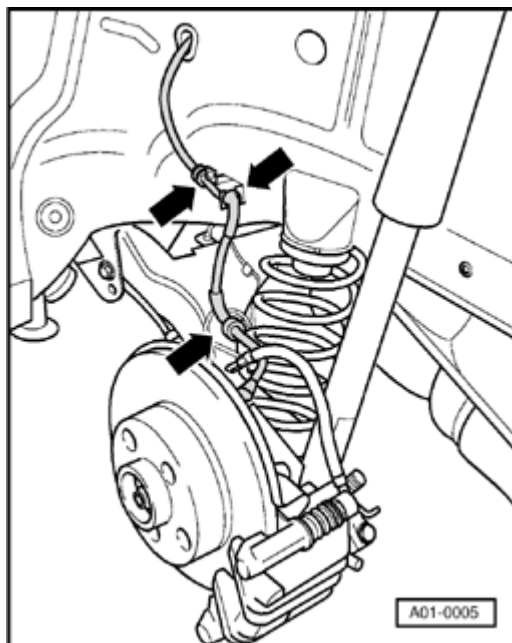


- Strip insulation (arrow) from shrink connection.
- Cut speed sensor wiring in front of spliced connection with stripping pliers from VAS 1978 wiring repair kit and remove faulty wiring.

45-31



- ✦ - Strip insulation at wiring end by 15 mm (5/8 in.) using stripping pliers from repair kit and fold over stripped wire portion.
- Install new speed sensor wiring.
- Connect wheel speed sensor to speed sensor wiring.



- ✦ - Secure wheel speed sensor wire (arrows).

Note:

Do not twist wires in the wheel well.

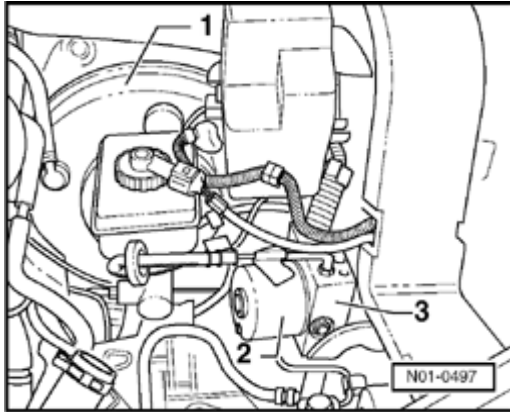
- Cut 2-pin connector at new speed sensor wire (if installed) using stripping pliers from repair kit.
- Strip 15 mm (5/8 in.) insulation off wire end and fold over stripped wire.
- Connect wheel speed sensor wire using correct connector from wiring repair kit VAS 1978.

Anti-lock brake system (ABS) Mark 60

Only the following versions of the ABS Mark 60 are installed in this vehicle:

- ◆ ABS
- ◆ ABS/EDL with electronic differential lock
- ◆ ABS/EDL/ASR with electronic differential lock and traction control system
- ◆ ABS/EDL/ASR/ESP with electronic stabilization program

General information on this ABS, ABS/EDL



Application of ABS in a left-hand drive vehicle.

1 - Brake booster

2 - Hydraulic unit

3 - Control module, 47-pin (screwed to hydraulic unit). Two 4.8 mm wide contacts are located at both ends of the connection.

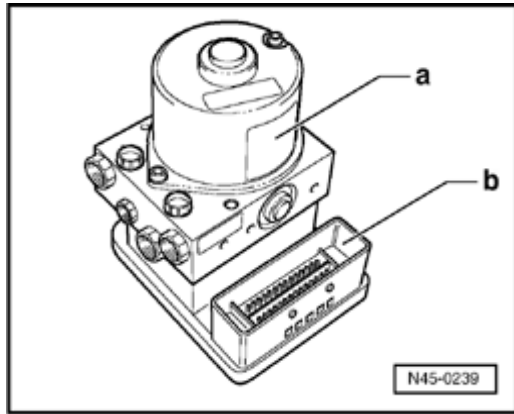
For vehicles from my 02.02 the mechanical brake assist is installed. It's integrated in the brake booster for the use within the system as special equipment. This can be recognized by the replacement part number.

Repairing the mechanical brake assist is not possible. The brake booster must be replaced complete.

Function test of brake assist in brake booster ⇒ [Page 47-57](#)

The ABS brake system is divided diagonally. The brake booster is a pneumatic type and the vacuum is provided by brake booster.

Vehicles with Mark 60 ABS do not have a mechanical brake pressure regulator. A specially matched software in the control module controls the rear axle brake pressure regulation.



Malfunctions in the ABS systems do not influence the brake system and booster. The conventional braking system remains functional even without ABS.

⚡ The hydraulic unit -a- and control unit -b- (47 pin) form one component. Separating the two parts is only possible when the complete component has been removed from the vehicle.

New control modules (replacement parts) are not coded and require coding after installation.

Coding control module with VAS 5051 in operating mode "Guided Fault Finding" ⇒ [Page 45-38](#)

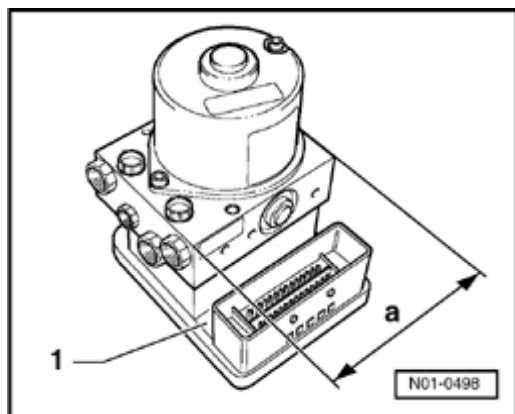
Distinguishing features of ABS Mark 60

◀ ABS/EDL/ASR/ESP - Mark 60

Dimension a = 100 mm

1 - Control module, 47-pin (screwed to hydraulic unit). Two 4.8 mm wide contacts are located at both ends of the connection.

The wiring linking between hydraulic unit and control module is routed internally.



Notes for repair work on ABS, ABS/EDL

- ◆ *Before carrying out repair work on the anti-locking system, determine the cause of the malfunction using On Board Diagnostic (OBD).*

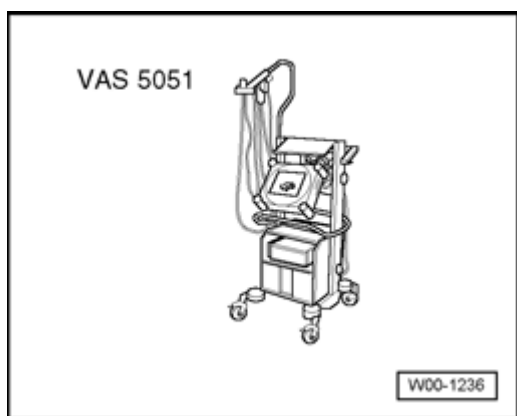
The "Guided Fault Finding" is carried out with the VAS 5051 ⇒ [Page 45-38](#)

- ◆ *Before working on the ABS, ABS/EDL system, disconnect the battery Ground (GND) strap. Obtain the radio code for vehicles with a coded radio.*
- ◆ *Before doing welding work with an electric welding unit, disconnect the ABS control module.*
- ◆ *When working with brake fluid, observe the relevant safety precautions and notes ⇒ [Page 47-38](#) .*
- ◆ *If the brake hydraulic system had to be opened, bleed the brake system with brake filler and bleeding unit VAS 5234 ⇒ [Page 47-38](#) .*
- ◆ *During the final road test, make sure that a controlled brake test is performed at least once (pulsations must be felt at the brake pedal).*

- ◆ *Absolute cleanliness is required when working on the anti-locking brake system. It is not permitted to use any products which contain mineral oil, such as oils, greases etc.*
- ◆ *Thoroughly clean all connections and the adjacent areas before loosening. Do not use cleaning agents such as brake cleaner, gasoline, thinners or similar.*
- ◆ *Place removed parts on a clean surface and cover.*
- ◆ *After separating the control module/hydraulic unit use the transportation protection for the valve dome.*
- ◆ *Carefully cover or seal open components if repairs cannot be carried out immediately. (Use sealing plugs repair kit 1 H0 693 311 A).*
- ◆ *Do not use fluffy cloths.*
- ◆ *Only remove replacement parts from packaging prior to installation.*
- ◆ *Only use genuine packed parts.*
- ◆ *When the system is open do not work with compressed air and do not move the vehicle.*
- ◆ *Make sure that no brake fluid enters plug connectors.*

VAS 5051 Vehicle Diagnostic, Testing and Information System, connecting and selecting functions

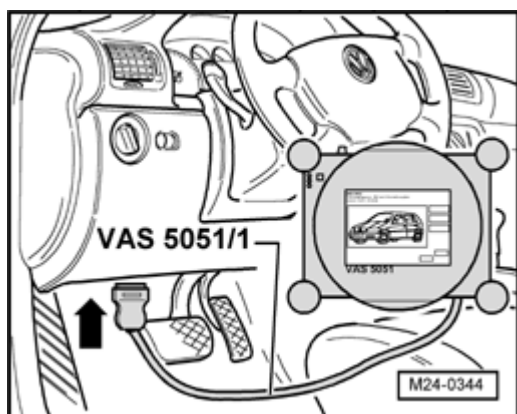
Special Tools and Equipment



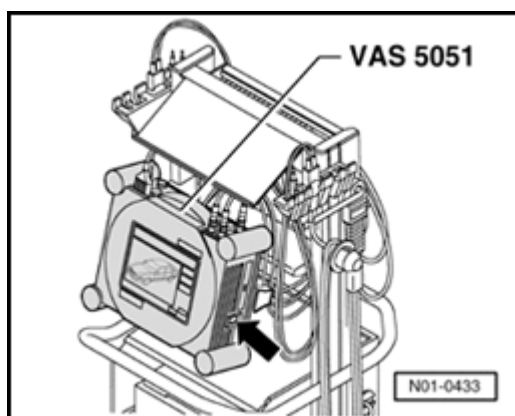
- ◆ VAS 5051 tester
- ◆ VAS 5051/1 or VAS 5051/3 diagnostic cable

WARNING!

- ◆ **Test equipment must always be secured on the rear seat during a road test.**
- ◆ **Drivers must NEVER operate these tools while driving.**



- With ignition switched off, connect VAS 5051 to Data Link Connector (DLC) with VAS 5051/3 diagnostic cable.



- Switch on tester (arrow).

The tester is ready for operation when it displays the image (photo) of a vehicle.

- Switch on ignition.
- Touch the field / the button on the screen: Guided Fault Finding.
- Select one after another:
 - ◆ Brand
 - ◆ Model
 - ◆ Model year
 - ◆ Version
 - ◆ Engine identification
- Confirm the entered data.

Note:

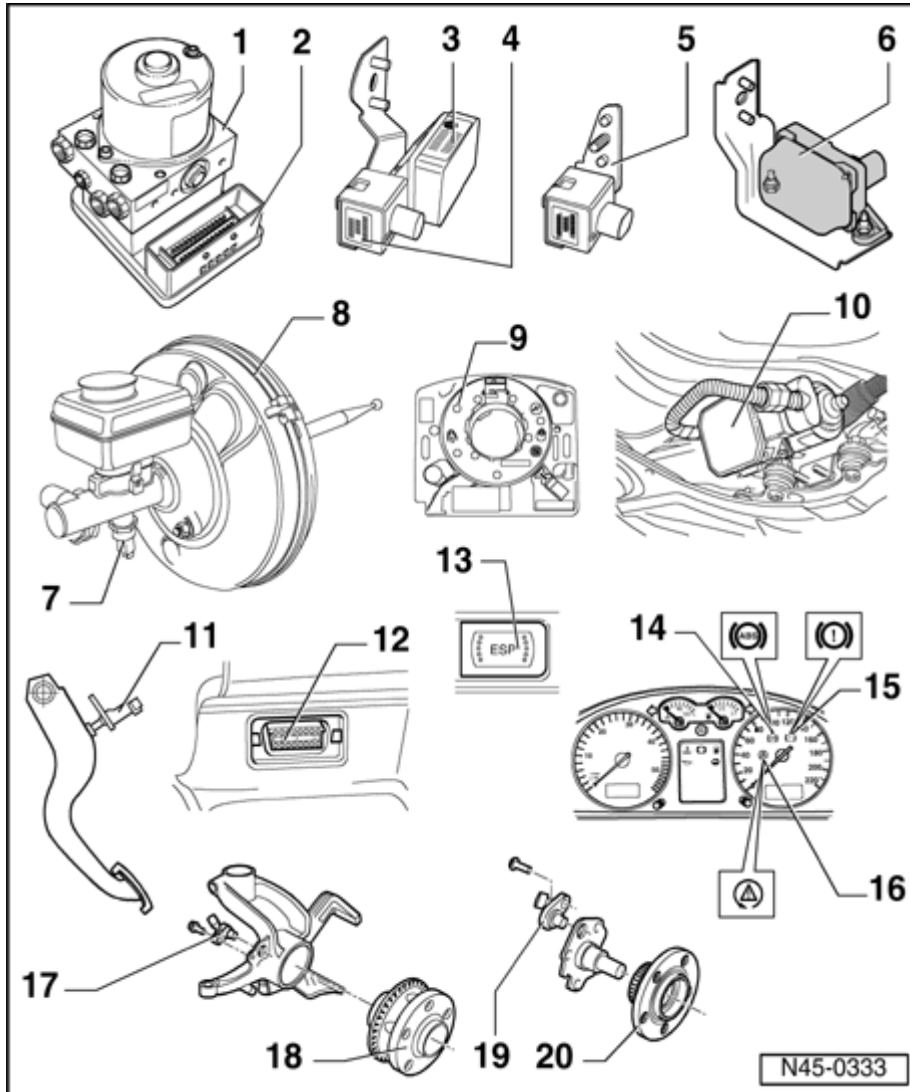
Wait until tester has checked all control modules installed in the vehicle.

- Press the Go To button and select the "Function/component selection" function.
- Select "Suspension" on the display
- Select "Brake system" on the display
- Select the displayed "01-On Board Diagnostic (OBD) capable system..." on the display
- Select the displayed "Anti-lock Brake System (ABS)..." on the display
- Select the displayed "Function" on the display.

Note:

Now, all possible functions of Anti-lock Brake System (ABS) installed in vehicle are displayed.

- Select the desired function on display.



Electrical/electronic components and installing locations (ABS) Mark 60

1 - ABS hydraulic pump N55-

◆ ⇒ [Page 45](#)

◆ Can be checked in the "Guided Fault Finding" section in VAS 5051 : [38-38](#)

2 - ABS Control Unit (w/EDL) -J10

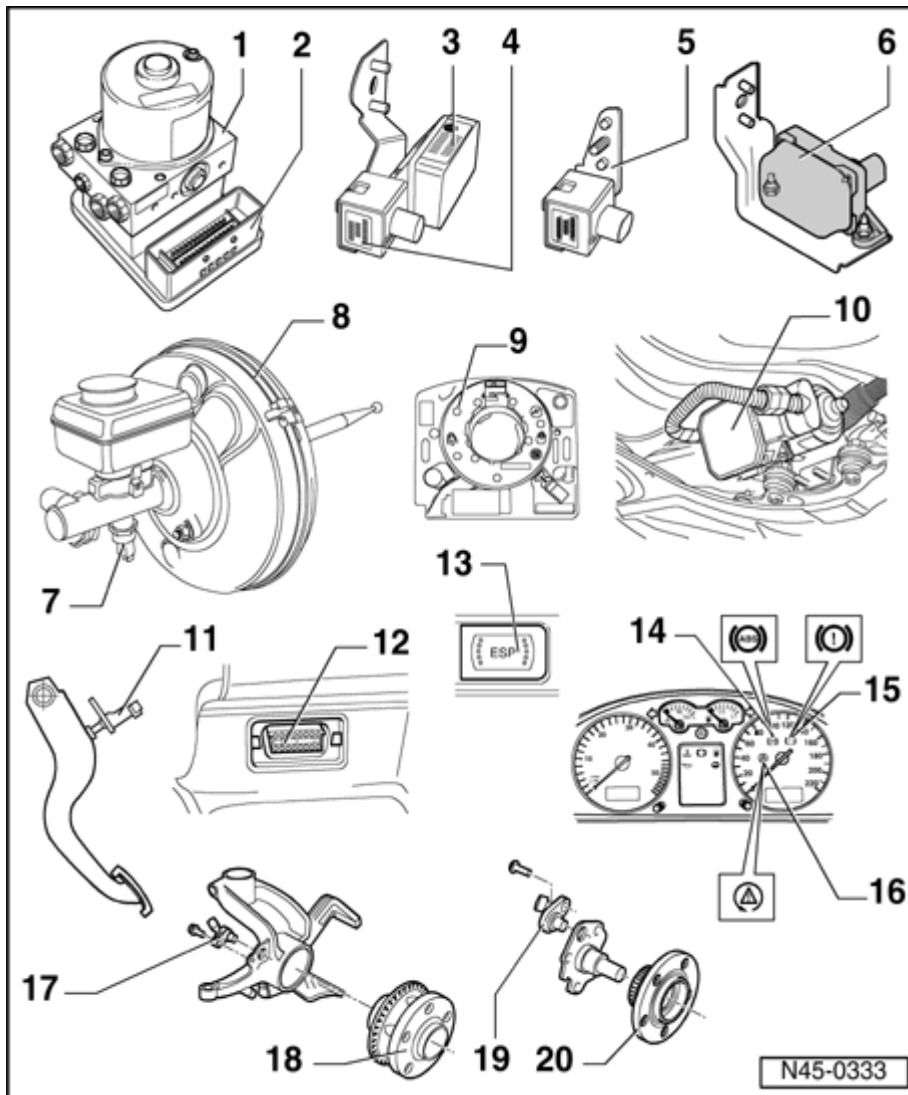
◆ ⇒ [Page 45](#)

◆ Can be checked in the "Guided Fault Finding" section in VAS 5051 : [38-38](#)

3 - Sender for rear wheel -G202-

◆ ⇒ [Page 45](#)

◆ Can be checked in the "Guided Fault Finding" section in VAS 5051 : [38-38](#)



4 Sensor for - transverse acceleration -G200-

◆ ⇒ [Page 45-100](#)

◆ Can be checked using "Guided Fault Finding" in VAS 5051 ⇒ [Page 45-38](#)

5 Longitudinal - acceleration sender - G251-

◆ All-wheel drive vehicles with Haldex coupling only

◆ ⇒ [Page 45-106](#)

◆ Can be checked using "Guided Fault Finding" in VAS 5051 ⇒ [Page 45-38](#)

6 - ESP-Sensor unit -

**G419-,
vehicles
from my
02.02**

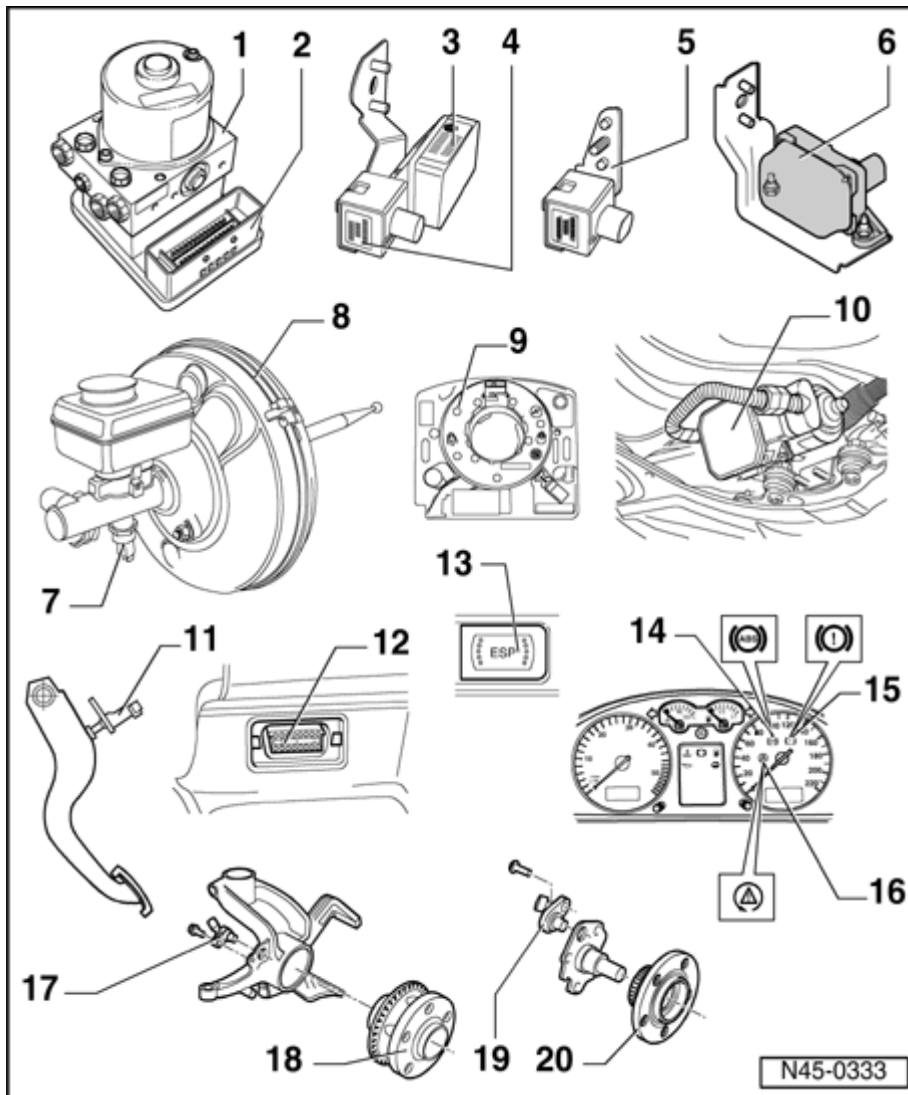
◆ ⇒
[Page
45-109](#)

◆ Combined sensor for transverse acceleration -G200-, sender for rotation rate -G202- and longitudinal acceleration sensor¹⁾ - G251- ⇒
[Page 45-109](#)

◆ Assembled together in one housing

◆ Can be checked using "Guided Fault Finding" with the VAS 5051 ⇒
[Page 45-38](#)

1)
4Motion vehicles with Haldex clutch only



**7 - Sender
1 for
brake
booster
-G201-**



[Page
47-54](#)

◆ Can be checked using "Guided Fault Finding" in VAS 5051 ⇒ [Page 45-38](#)

**8 - Brake
booster**



[Page
47-43](#)

**9 - Steering
angle
sensor -
G85-**



[Page
45-
112](#)

◆ Can be checked using "Guided Fault Finding" in VAS 5051 ⇒ [Page 45-38](#)

**10 - Brake
system
vacuum
pump -**

V192-

◆ ⇒

[Page
47-58](#)

**11 - Brake
Light
Switch -
F-**

- ◆ Integrated with Brake Pedal Switch (cruise control/DFI) -F47- on vehicles with cruise control or Diesel vehicles)

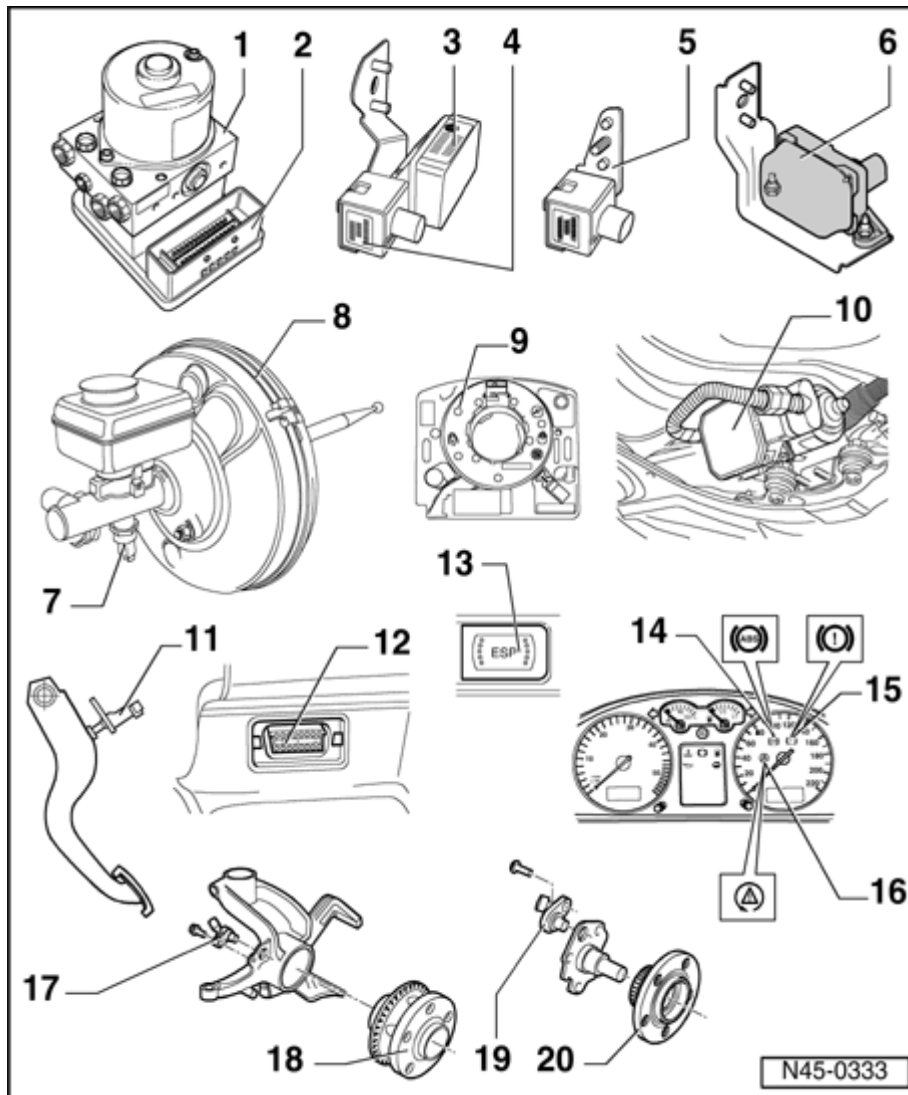
◆ ⇒

[Page
46-84](#)

**12 Data Link
- Connector
(DLC)**

◆ ⇒ [Fig.](#)

[1](#) , ⇒
[Page
45-46](#)

**13 - ESP button**

- ◆ Vehicles with ABS/EDL/ASR/ESP only

14 - ABS warning light -K47-

- ◆ ⇒ [Page 45](#)

15 - Warning light for brake system -K11

- ◆ ⇒ [Page 45](#)

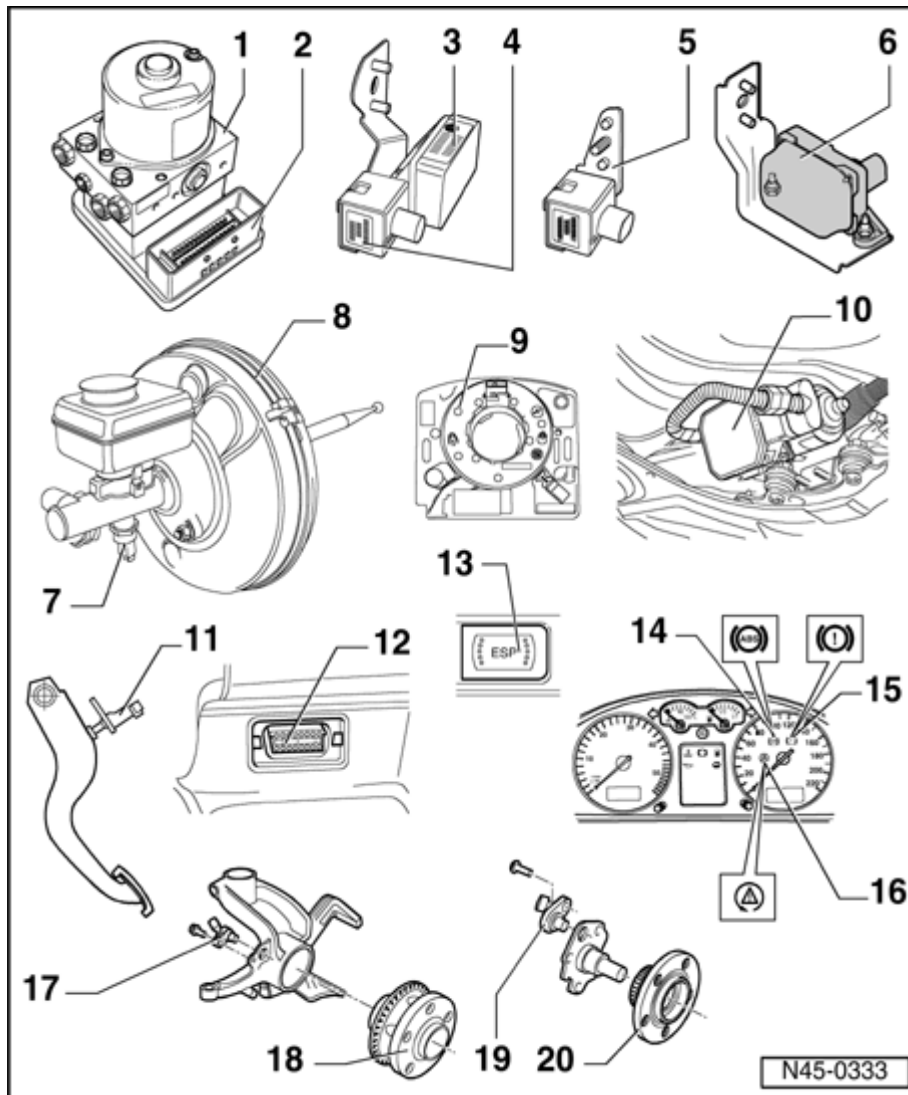
16 - ASR/ESP control lamp K155-

- ◆ ⇒ [Page 45](#)

17 - Right/left front speed sensor G45-/G47-

- ◆ ⇒ [Page 45](#)

- ◆ Can be checked using "Guided Fault Finding" in VAS 5051 : [Page 45-38](#)



18 - Wheel hub with rotor for speed sensors

⇒ [Repair Group, Suspension, Wheels, Steering, Repair Group 40; Servicing front suspension; III - Servicing wheel bearings](#)

19 Right/left - rear speed sensor - G44/- G46-

◆ Front wheel drive
⇒ [Page 45-88](#)

◆ All-wheel drive
⇒ [Page 45-88](#)

◆ Can be checked using "Guided Fault Finding" in VAS 5051 ⇒ [Page 45-38](#)

**20 - Wheel
hub
with
rotor
for
speed
sensors**

- ◆ Front wheel drive:

⇒ [Repair Group, Suspension, Wheels, Steering, Repair Group 42; Servicing wheel bearings](#)

- ◆ All-wheel drive:

⇒ [Repair Group, Suspension, Wheels, Steering, Repair Group 42; Assembly overview for trailing arm and transverse links; Pressing wheel bearing out and in](#)

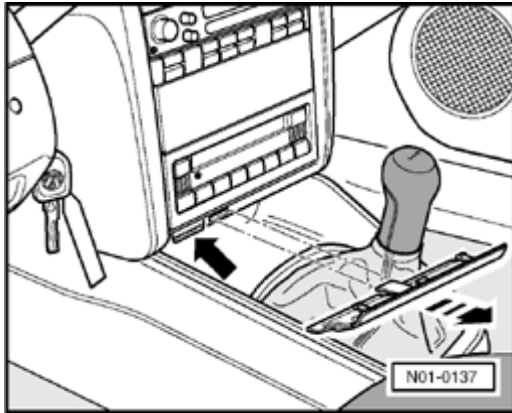
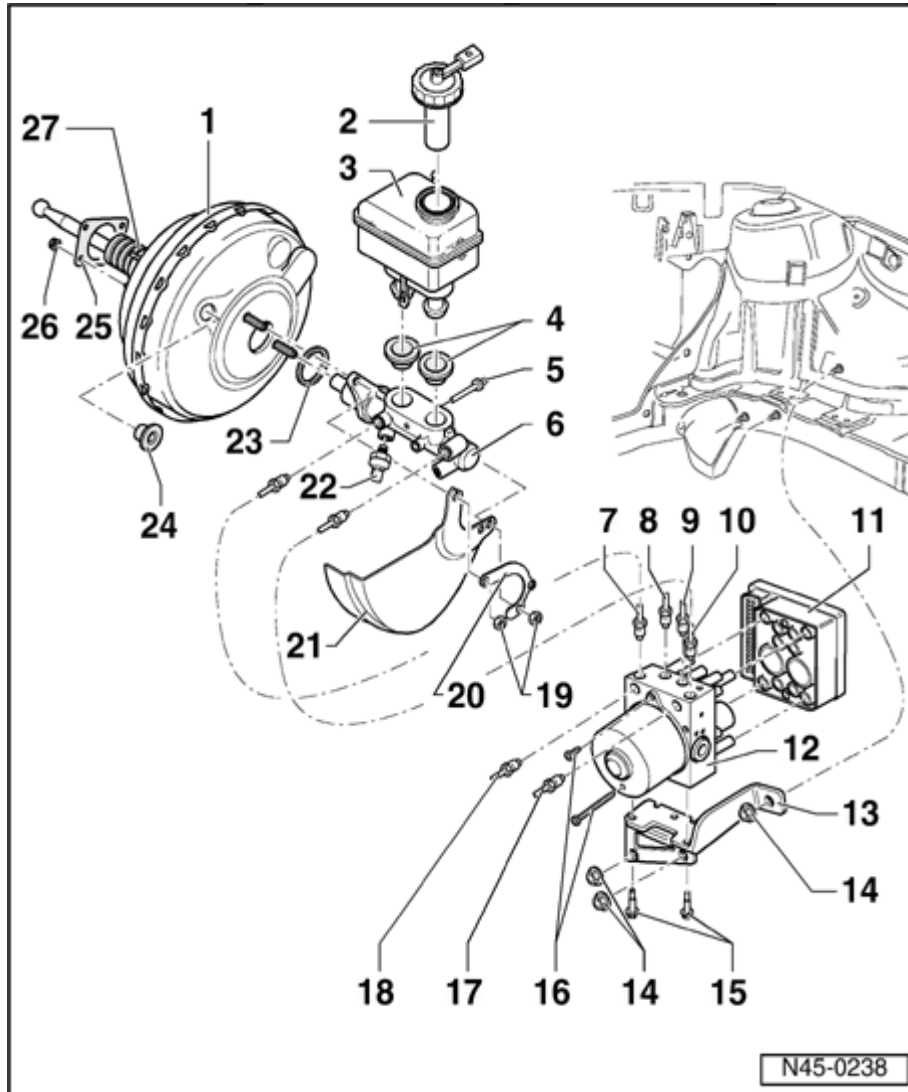


Fig. 1 Data Link Connector (DLC)

Location: Under instrument panel to the left of the steering column (arrow).



Hydraulic unit, brake booster/brake master cylinder Mark 60, assembly overview

Note:

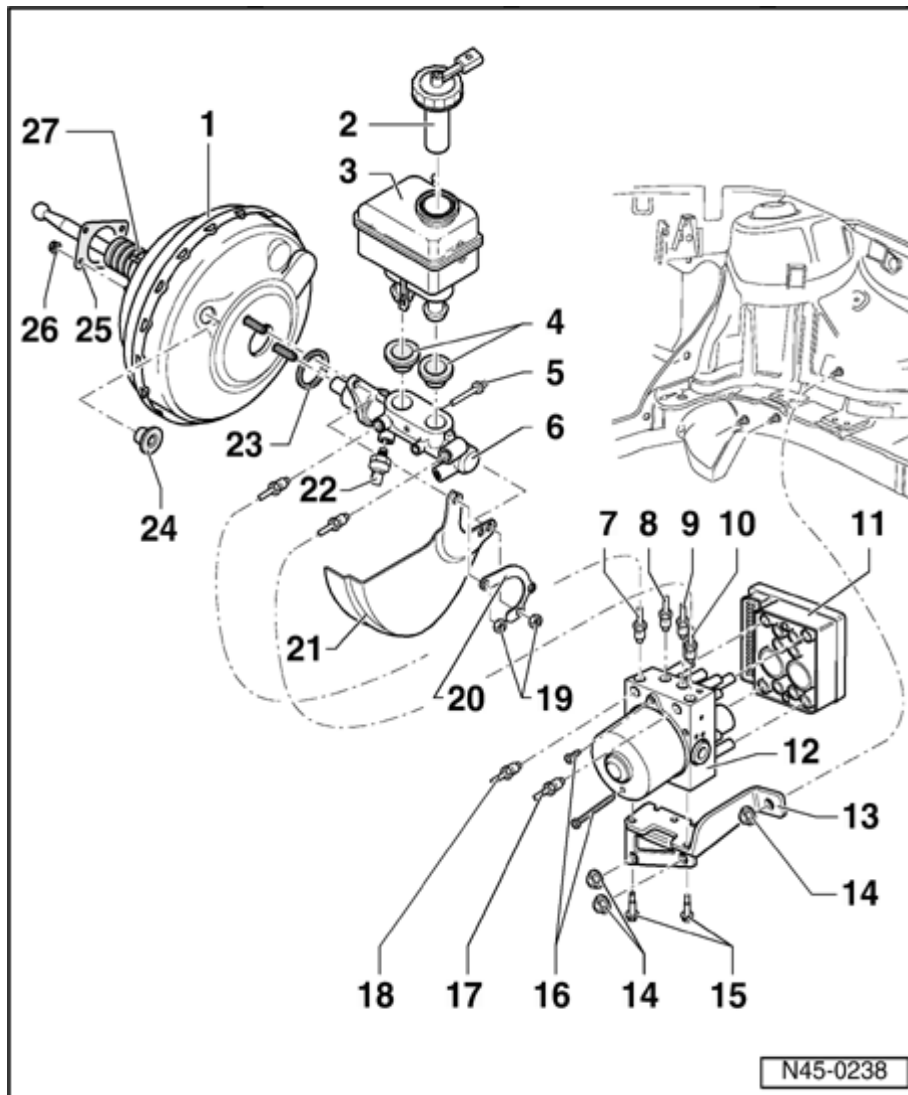
Complete master cylinder and brake booster can be replaced independently of each other

1 - Brake booster

- ◆ For gasoline engines, the vacuum is taken from the intake manifold.
- ◆ Diesel engines, have a vacuum pump to create the required vacuum.
- ◆ With some vehicles, a brake system vacuum pump -V19 is installed.
- ◆ Functional check ⇒ [Page 47-60](#)
- ◆ Removing and installing ⇒ [Page 47](#)

[58](#)

- ◆ Application
- ◆ See parts catalog



◆ Functional check

- With engine switched off, press brake pedal firmly several times (to exhaust the vacuum in the module).

- Now depress brake pedal with average foot pressure, hold and start engine. If the booster module is working properly, the pedal will be felt to give slightly under foot (booster assistance becomes effective).

◆ If faulty, replace complete

◆ Non-return valve

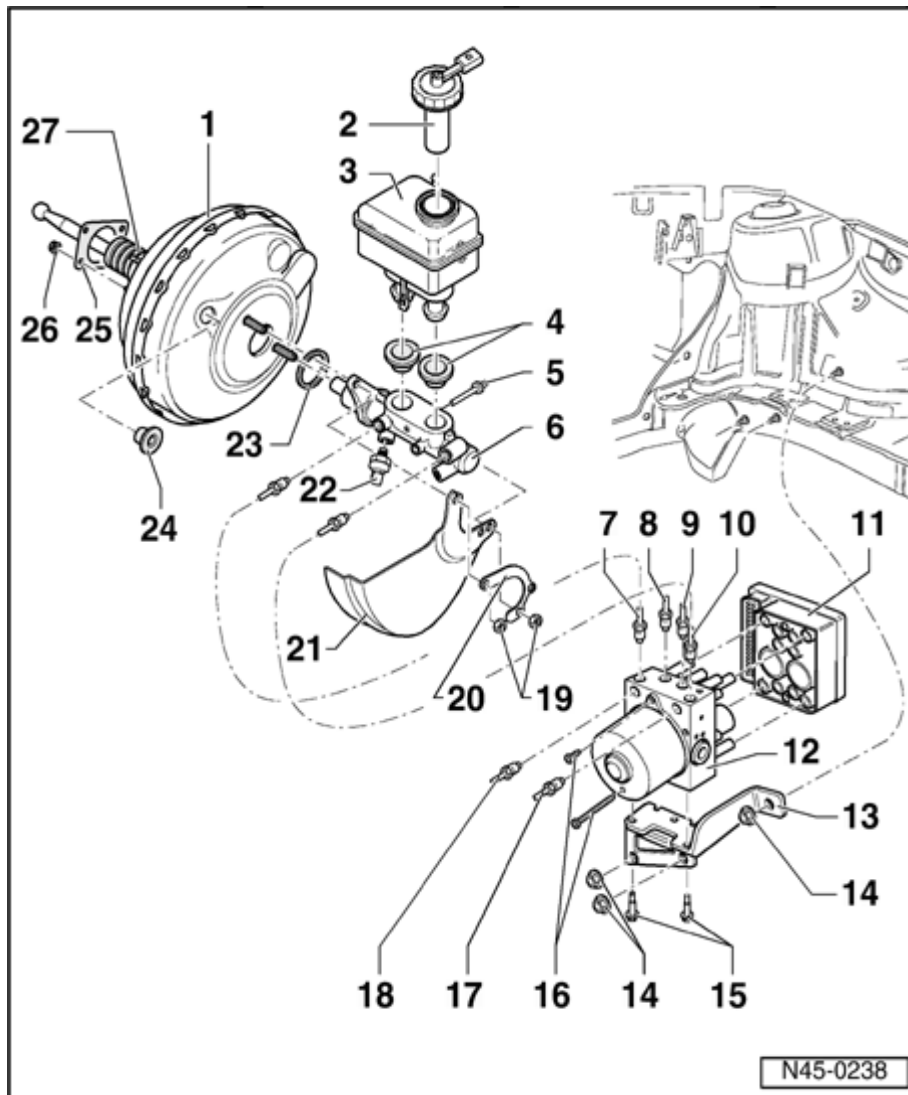
(in
vacuum
hose)

⇒

[Page
47-49](#)

◆ Separating
from brake
pedal ⇒
[Page 46-
79](#)

◆ Removing
and
installing
⇒ [Page
47-84](#)

**2 - Cap****3 - Brake fluid reservoir****4 - Sealing plug**

- ◆ Coat with brake fluid ; press into brake master cylinder

5 - Retainer pin

- ◆ Insert through brake master cylinder

6 - Brake master cylinder

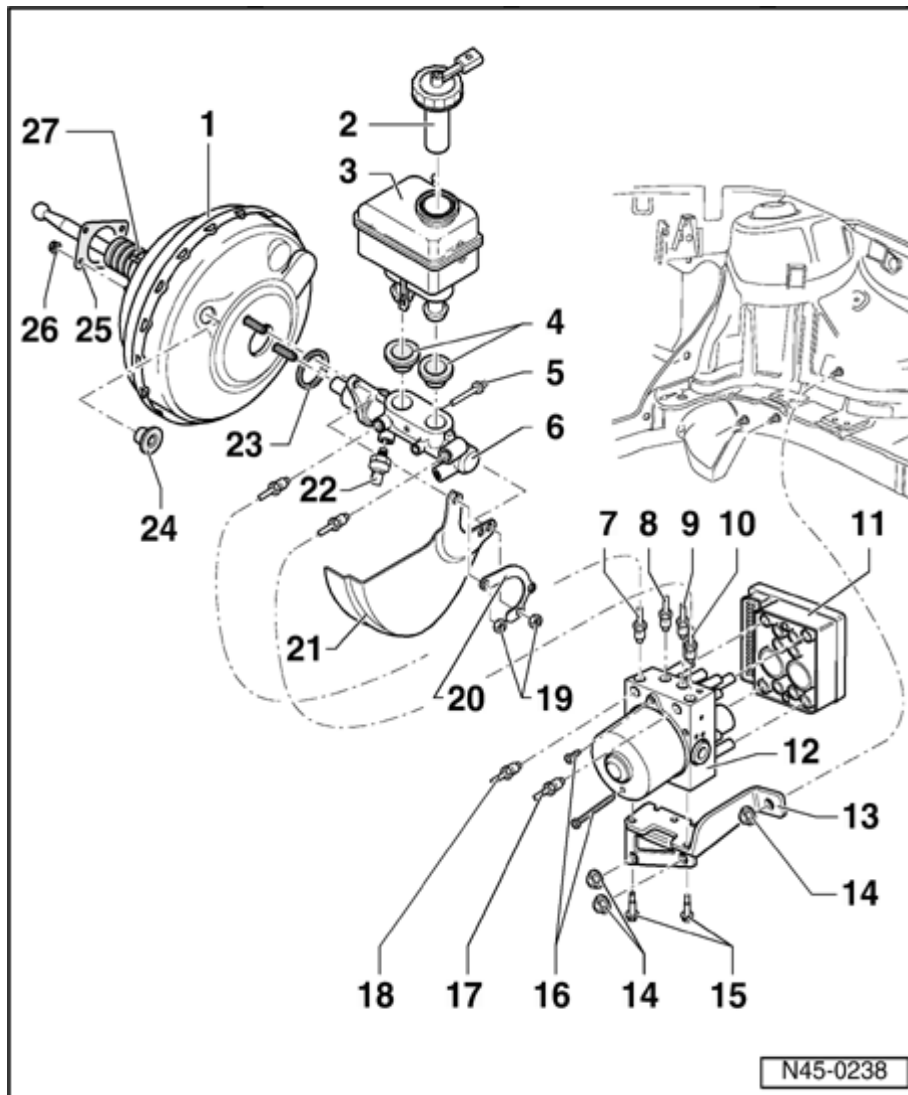
- ◆ Sender 1 for brake booster -G201- installed on vehicles with ABS/EDL/ASR/ESP ⇒ [Page 47-43](#)

- ◆ Cannot be repaired. If faulty, replace complete.

7 - Connection to brake line

- ◆ Brake master cylinder/piston circuit hydraulic unit
- ◆ Tightening torque ⇒ [P 45-62](#)

45-50



8 - Connection 1 brake line

- ◆ Hydraulic u
to left front
brake calipi
- ◆ Tightening
torque ⇒
[Page 45-62](#)

9 - Connection 1 brake line

- ◆ Hydraulic u
to right fron
brake calipi
- ◆ Tightening
torque ⇒
[Page 45-62](#)

10 - Connection 1 brake line

- ◆ Master brake
cylinder/second
piston circuit to
hydraulic unit
- ◆ Tightening
torque ⇒
[Page 45-62](#)

11 - Control module

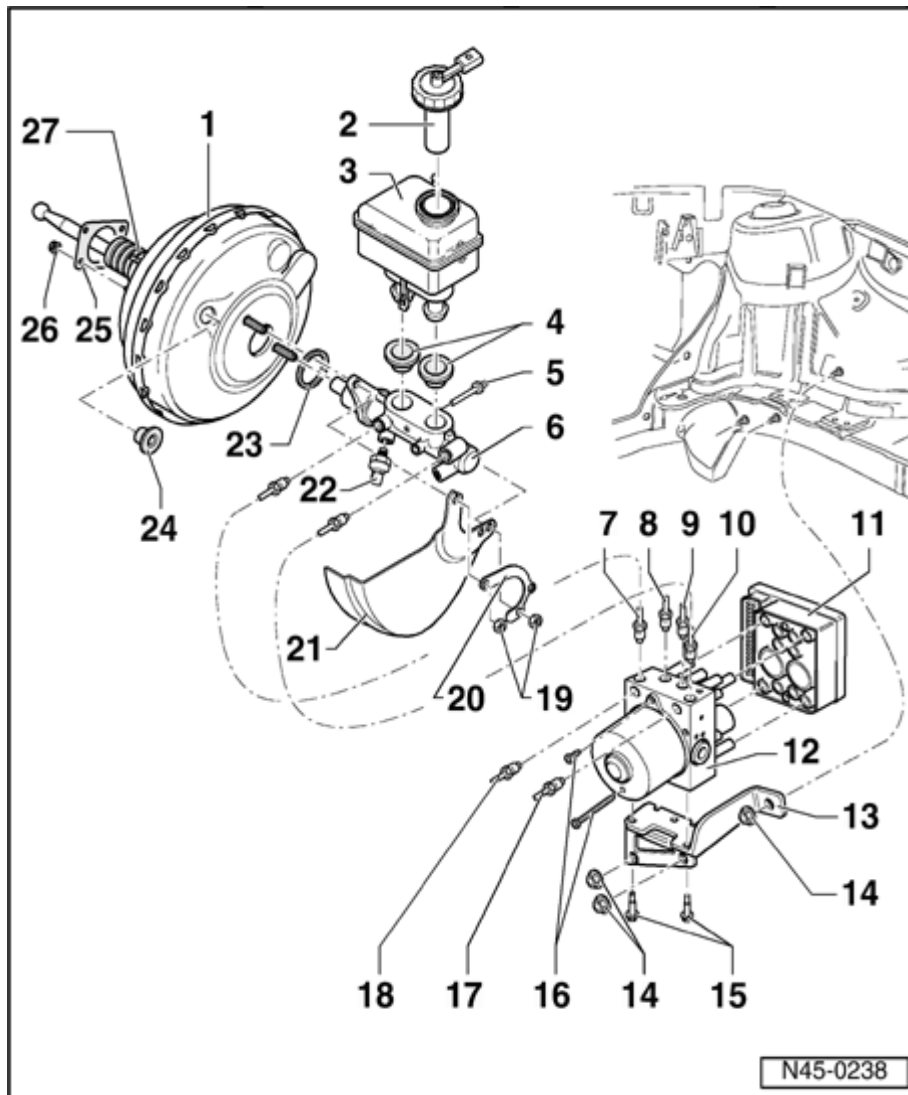
- ◆ Do not
separate
connector
before On
Board
Diagnostic
(OBD)
- ◆ Tightening
torque ⇒
[Page 45-62](#)

12 - ABS hydraul unit

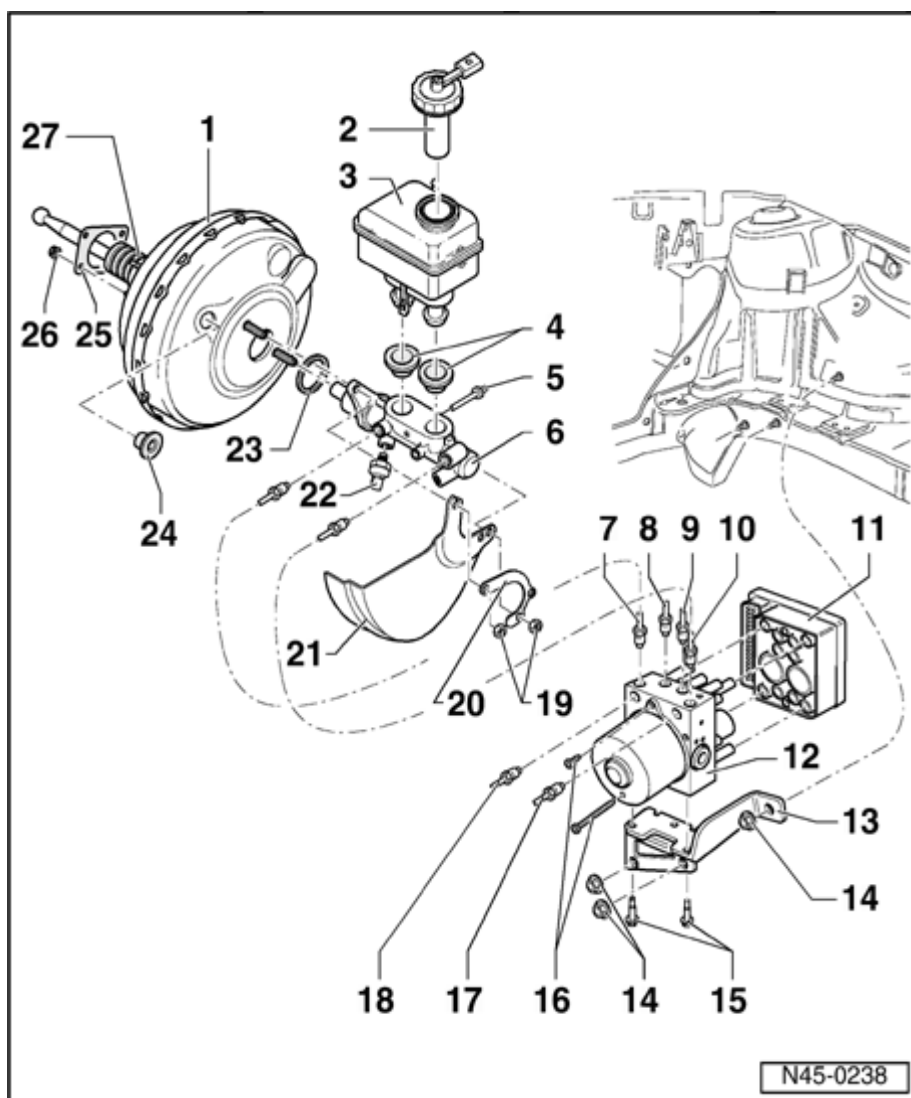
- ◆ The ABS
hydraulic
pump -V64

and the inlet/outlet valves in the hydraulic unit are checked by self diagnosis

- ◆ The ABS hydraulic pump -V64 and valve block must not be separated from one another
- ◆ Removing and installing
- ◆ When changing the hydraulic unit always seal the old part with the plug from the repair kit P: No. 1H0 69 311A



- 13 - Retainer**
- 14 - Cap nut, 20 Nm (15 ft. lb)**
- 15 - Bolts, 8 Nm (70 in lb)**
- 16 - Torx head bolt E 5, 4 Nm (35 in lb)**
- 17 - Connection for brake line**
- ◆ Hydraulic unit to left rear wheel cylinder/caliper
 - ◆ Tightening torque ⇒ [Page 45-62](#)
- 18 - Connection for brake line**
- ◆ Hydraulic unit to right rear wheel cylinder/caliper
 - ◆ Tightening torque ⇒ [Page 45-62](#)
- 19 - Self-locking hex nut, 20 Nm (15 ft. lb)**



20 - Mounting plate

- ◆ Used to secure the wiring harness

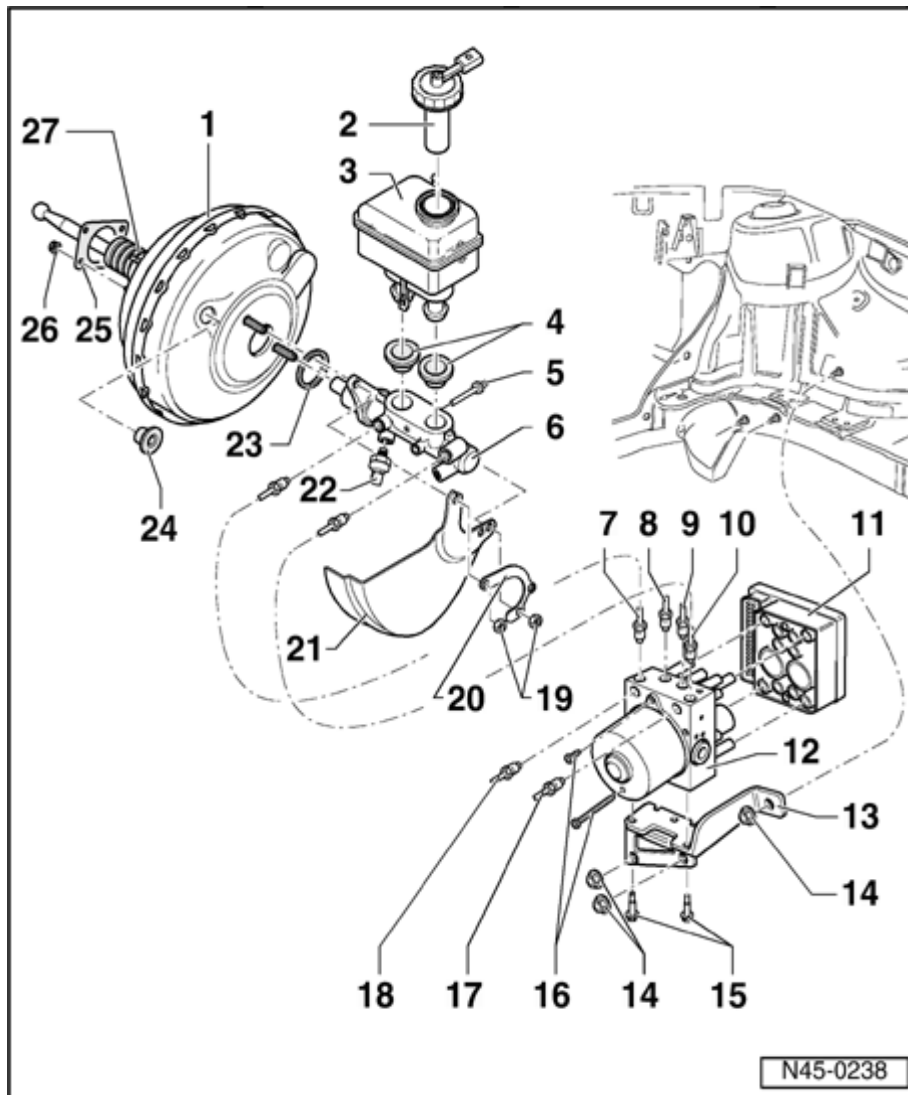
21 - Heat shield

- ◆ Application
- ◆ See parts catalog

22 - Brake pressure sender 1 -G2

- ◆ Installed only on vehicles with ABS/EDL/ASR/ESP ⇒ [Page 47-54](#)

45-53

**23 - Sealing ring**

- ◆ Always replace

24 - Sealing plug

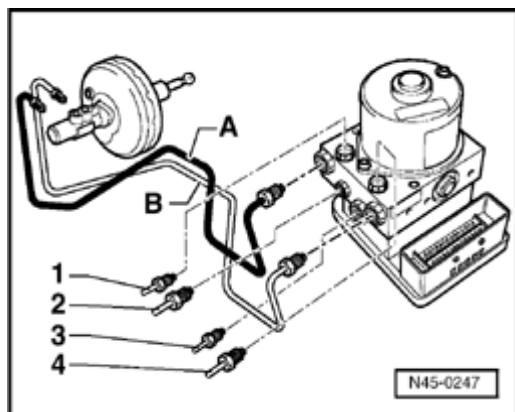
- ◆ Connection for vacuum hose

25 - Gasket

- ◆ For brake booster

26 - Self-locking hex nut, 20 Nm (15 ft. lb)**27 - Boot**

- ◆ Make sure it seats correctly, danger of suction noises



Connecting brake lines from tandem brake master cylinder to hydraulic unit

Fig. 1 Vehicles with ABS, ABS/EDL, ABS/EDL/ASR and ABS/EDL/ASR/ESP

A - Secondary piston circuit

B - Primary piston circuit




1 - Hydraulic unit to left rear wheel cylinder/brake caliper

2 - Hydraulic unit to right front brake caliper

3 - Hydraulic unit to left front brake caliper

4 - Hydraulic unit to right rear wheel cylinder/brake caliper

45-55

<p>V.A.G 1331</p> 	<p>V.A.G 1410</p> 
<p>V.A.G 1869/2</p> 	
	<p>W45-0003</p>

Control module and hydraulic unit Mark 60, removing and installing

Special tools and equipment

- ◆ VAG 1331
Torque wrench
- ◆ VAG 1410
Torque wrench
- ◆ VAG 1869/2
Brake pedal depressor

Location:

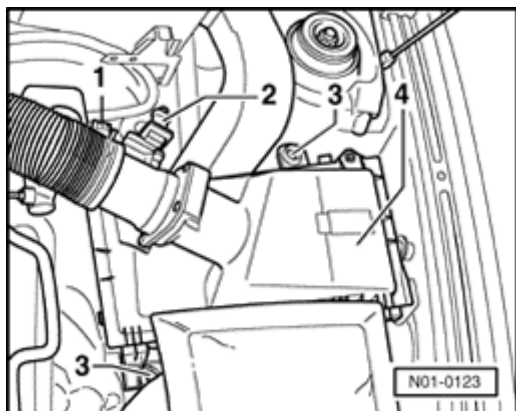
The control module is bolted to the hydraulic unit and is located on left in the engine compartment.

WARNING!

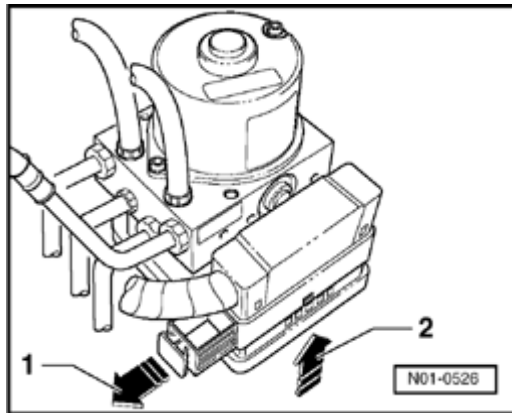
Do not bend the brake lines in the area of hydraulic unit!

Removing:

- Request radio code on vehicles with code if necessary.
- Disconnect battery.

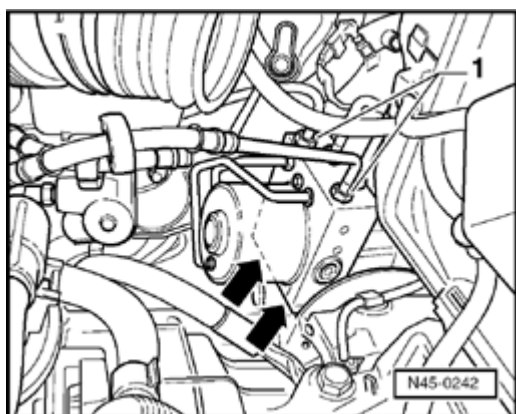
Remove air cleaner

- Pull connector -2- off mass air flow sensor.
- Release spring-type clip -1- on air duct hose with pliers VAG 1921 and pull hose off air cleaner.
- Remove air cleaner bolts -3- and take out cleaner -4-.



- Release control module connector (arrow -1-) and pull off (arrow -2-).
- Install brake pedal loading device VAG 1869/2.
- Connect bleeder bottle hose to left front brake caliper and left rear caliper bleed screw and open bleed screws.
- Depress brake pedal at least 60 mm. (2.36 in.) with brake pedal depressor VAG 1869/2.

- Close left front and left rear caliper bleed screws.
- Do not remove brake pedal depressor VA 1869/2 from brake pedal.
- Place sufficient lint-free cloths under the control module and hydraulic unit.

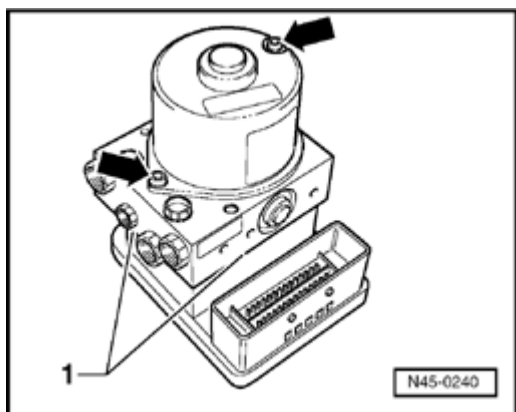
Make sure no brake fluid gets on contact

A

- Disconnect brake lines -1- from hydraulic brake master cylinder and tie up
- Disconnect remaining brake lines on hydraulic unit.
- Seal brake lines and threaded holes with sealant from repair kit Part No. 1H0 698 311 A.
- Remove bolts (arrows) from hydraulic unit/control module bracket.
- Remove hydraulic unit with control module

Removing control module from hydraulic unit.

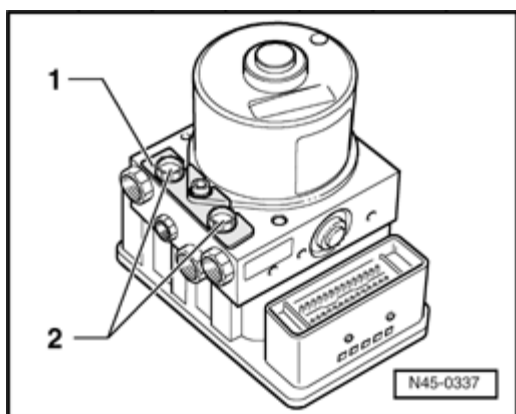
- Place the hydraulic unit with control mod down on a clean flat surface.



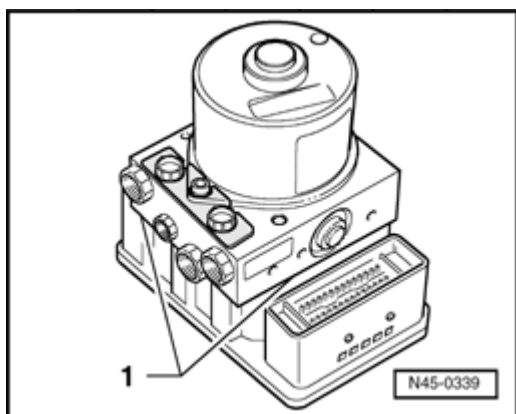
- Remove E 5 hex socket head bolt -arrow hydraulic pump.

CAUTION!

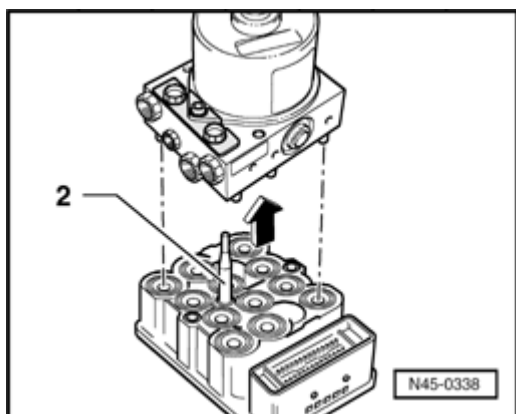
The hydraulic pump must not be separated from the hydraulic unit.



- For this reason, tighten the hydraulic pur the red bracket -1- from the repair kit and sealing plugs -2- on the hydraulic unit.



- ✦ - Separate hydraulic unit with hydraulic pump from control module by carefully lifting off joint -1-.



- ✦ When pulling off control module, make sure that the hydraulic unit valve dome does not contact the control module solenoid valves.

Cover control module magnetic coils with a lint-free cloth.

After separating control module and hydraulic unit use transportation protection for valve dome.

The contact pin -2- which is supplied as a replacement part along with the control module can only be clipped in once and then it cannot be removed.

Installing

Note:

- ◆ *Only remove sealing plugs on new hydraulic unit when the corresponding brake line is going to be installed.*

- ◆ *If the sealing plugs are removed too early, brake fluid can escape, it can no longer be guaranteed that the module is sufficiently filled or adequately bled.*

When assembling the control module and hydraulic unit, be sure that the hydraulic unit valve dome does not come in contact with the control module solenoid valves.

- Using new bolts, install control module to hydraulic unit. Do not tighten more than a max. 4 Nm (35 in. lb).

- Bolt ABS module to bracket.

Do not tighten bolts completely. Attaching the individual brake lines is made easier.

- After tightening brake lines, tighten hydraulic unit.

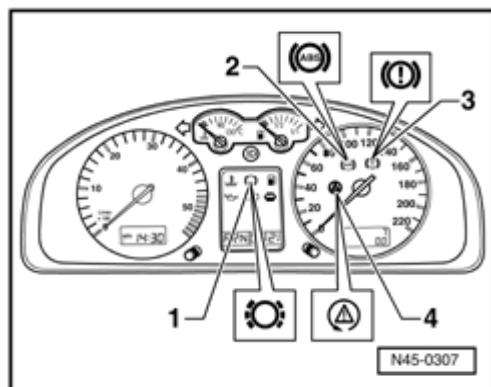
- Further installation is carried out in the reverse sequence.

- Remove brake pedal depressor VAG 1869/2.
- Bleed brake system ⇒ [Page 47-38](#)
- Enter radio code.
- Code ABS control module (w/EDL) -J104-.
- Basic settings must be performed when replacing ABS control module (w/EDL) -J104-.
- Connecting VAS 5051 and selecting functions ⇒ [Page 45-38](#)

Tightening Torques:

Control module to hydraulic unit	max. 4 Nm (35 in. lb)
Hydraulic unit to bracket	8 Nm (70 in. lb)
Nut for brake master cylinder to brake booster	20 Nm (15 ft. lb)
Brake lines at ABS module:	
Thread M 10 x 1	14 Nm (10 ft. lb)
Thread M 12 x 1	14 Nm (10 ft. lb)
Cap nut to body	20 Nm (15 ft. lb)

DTCs displayed by (ABS) Mark 60 warning lights -K32-, -K47-, -K118-, and -K155-

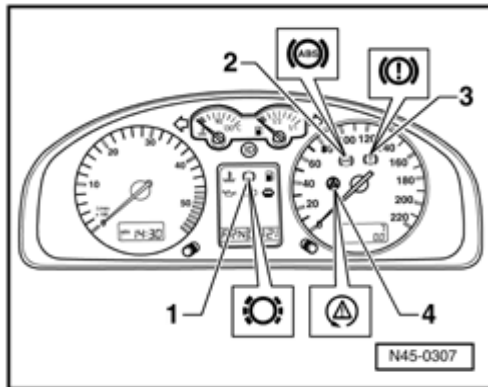


Warning lamps

Pos.	Component
1	Brake pad wear indicator light -K32-
2	ABS warning light -K47-
3	Warning light for brake system -K118-
4	ASR/ESP Control Lamp -K155-

Note:

The ASR/ESP control lamp -K155- for stabilization program ASR/ESP is used by ABS/EDL/ASR and ABS/EDL/ASR/ESP brake systems.



Brake pad wear indicator light - K32-

- ◆ If the Brake pad wear indicator light -K32- -1- does not go out after ignition is switched on and test sequence is completed, or it lights up while driving, then the malfunction may be:

-a- The brake pads may be worn out

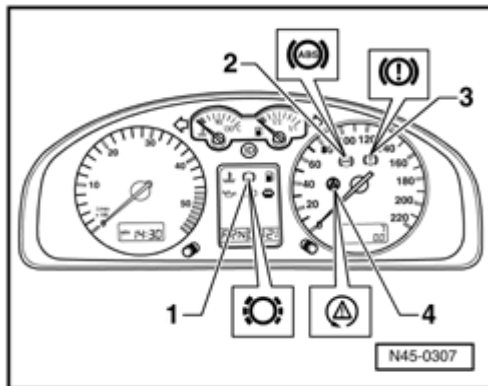
Check the front and rear brake pads.

⇒ [Repair Manual, Brake System, Repair Group 46; repairing front brakes](#) ⇒ [Repair Manual, Brake System, Repair Group 46; repairing rear brakes \(disc brakes\)](#) ⇒ [Repair Manual, Brake System, Repair Group 46; repairing rear brakes \(drum brakes\)](#)

-b- There is a malfunction in the activation of the brake pad wear indicator light -K32-.

⇒ [Electrical Wiring Diagrams, Troubleshooting & Component Locations](#)

For vehicles with display in instrument panel, it is indicated on display: "CHECK BRAKE PADS"



ABS warning light -K47-

- ◆ If the ABS warning light -K47- -2- does not go out after ignition is switched off and test sequence is completed, then the malfunction may be:

-a- Voltage supply is below 10 Volt.

-b- There is a malfunction in the ABS.

The anti-locking brake system remains switched off with an ABS malfunction -b-, but the brake system remains fully operational.

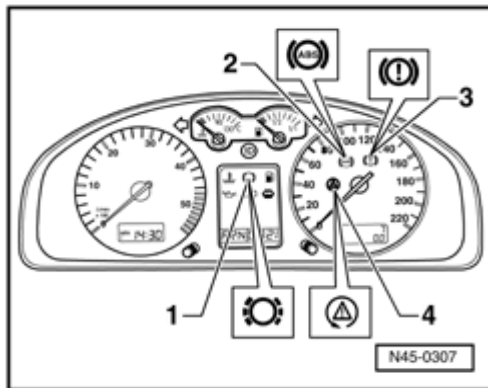
-c- Since the last time the vehicle was started there was a temporary speed sensor malfunction.

In the case of a sensor malfunction -c-, the ABS warning light -K47- will extinguish after restarting the engine and attaining a speed of above 20 km/h (approx. 13 mph).

-d- The connection of instrument cluster to ABS control module (w/EDL) -J104- is interrupted.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

-e- Instrument cluster is faulty.



ABS warning light -K47- and Warning light for brake system - K118-

- ◆ If the ABS warning light -K47-, -2-, goes out, but the brake system Warning light for brake system -K118-, -3-, remains on, then the malfunction may be:

-a- The parking brake is applied.

-b- The brake fluid level is too low.

-c- There is a malfunction in the activation of the brake system warning light for brake system - K118-.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ If the ABS warning light -K47- -2- and the brake system warning light for brake system -K118- -3- light up, the ABS system is faulty and the EBD (Electronic brake pressure distribution) is not functioning.

WARNING!

After the ABS warning light -K47- and warning light for brake system -K118- have lighted up, it is possible that the rear wheels can lock up earlier during braking.

For vehicles with display in instrument panel, it is indicated on display with the parking brake lifted:

"PARKING BRAKE LIFTED"

or

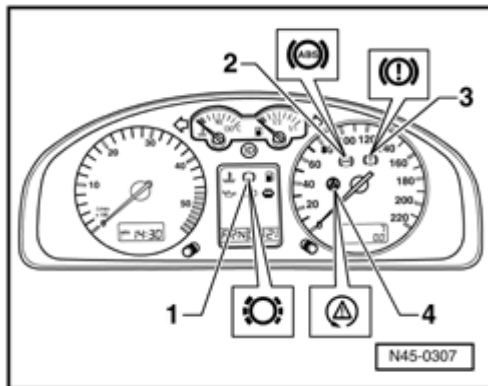
with too low brake fluid level

"STOP! BRAKE FLUID INSTRUCTIONS
MANUAL"

or

with brake system faulty

"STOP! BRAKES FAULTY INSTRUCTIONS
MANUAL"



ASR/ESP control lamp -K155-

- ◆ If the stabilization program ASR/ESP warning lamp -K155- - 4- does not go out after ignition is switched on and test sequence is completed then the malfunction may be:

-a- Short to positive in ASR/ESP button -E256-.

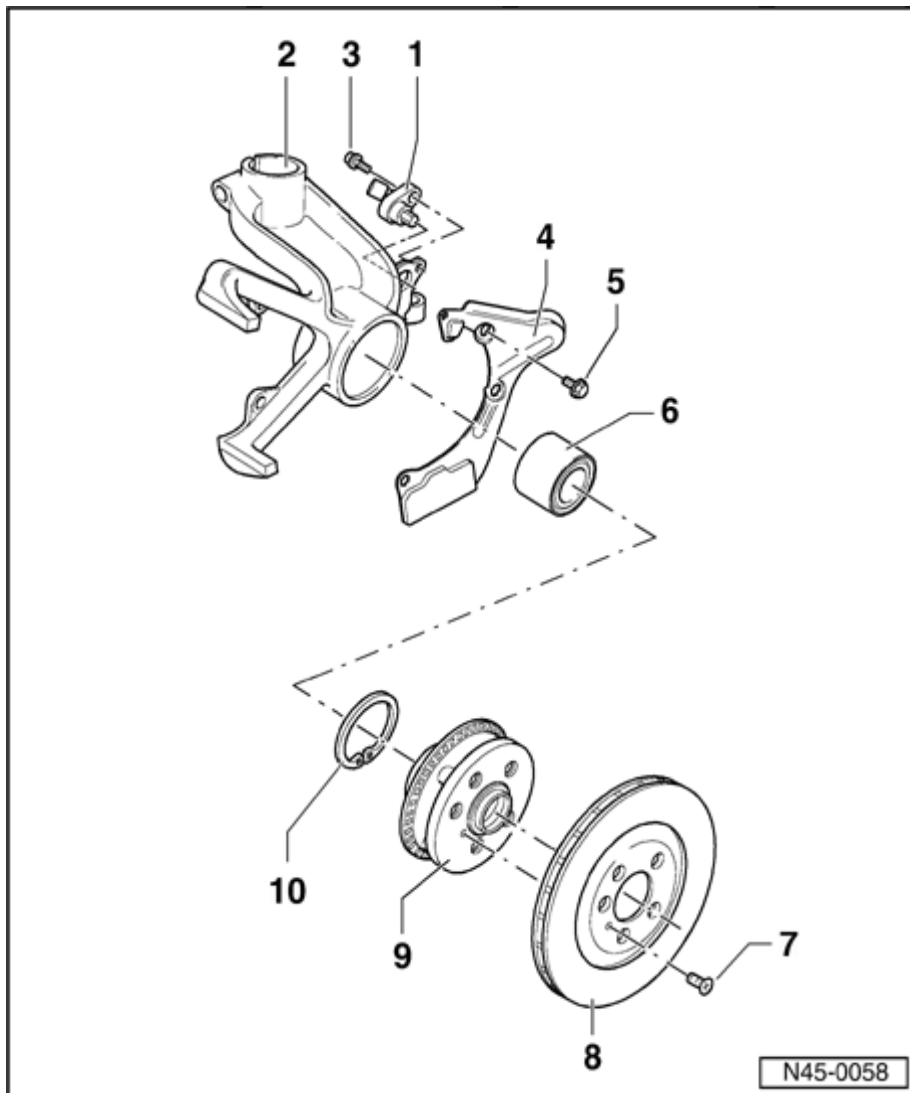
-b- There is a malfunction in the activation of the stabilization program ASR/ESP control lamp -K155-.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

-c- The ASR/ESP has been switched off via ASR/ESP button -E256-.

There is a malfunction present which exclusively affects the safety systems of the ASR/ESP. The ABS/EDL and EBD safety systems of the vehicle remain fully functional.

If stabilization program ASR/ESP Control lamp -K155- flashes while driving, the ASR or ESP system is regulating the system.



ABS system components for front and rear axles, removing and installing

ABS system components on front axle, removing and installing

Note:

Removing and installing ABS system parts is identical for FS III and FN 3 brake calipers.

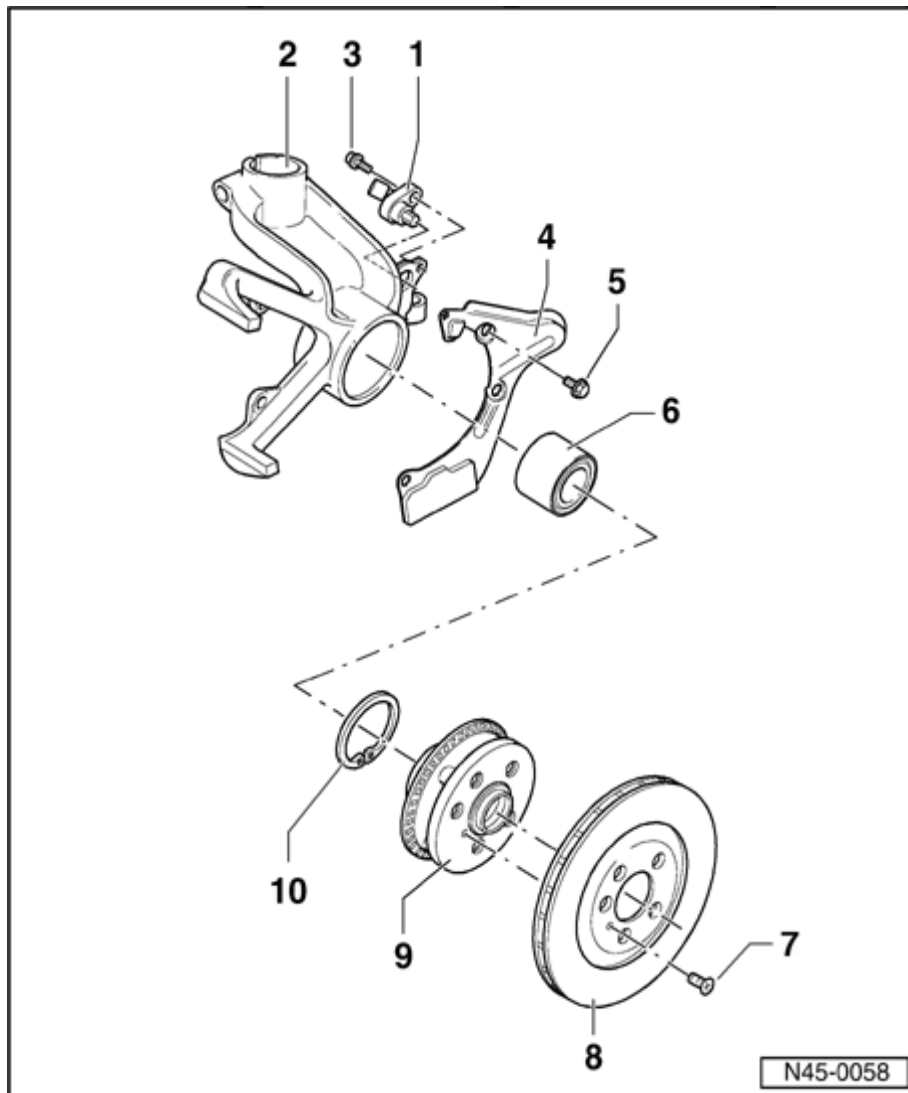
1 - ABS speed sensor

- ◆ Before inserting sensor, clean mounting hole inner surface and coat with lubricating paste G 000 650
- ◆ Checked by On Board Diagnostic (OBD)
- ◆ ⇒ [Page 45-71](#)

**2 - Wheel
bearing
housing**

**3 - Hex socket
head bolt, 8
Nm (70 in lb)**

45-70



4 - Splash plate

5 - Hex bolt, 10 Nm (62 in. lb)

6 - Wheel bearing

◆ Replace each time after removing

◆ Pressing out and in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front wheel suspension; II - Servicing wheel bearing](#)

7 - Phillips-head screw

8 - Brake disc

9 - Wheel hub with rotor

◆ Pressing out and in

⇒ [Repair Manual, Suspension, Wheels, Steering,](#)

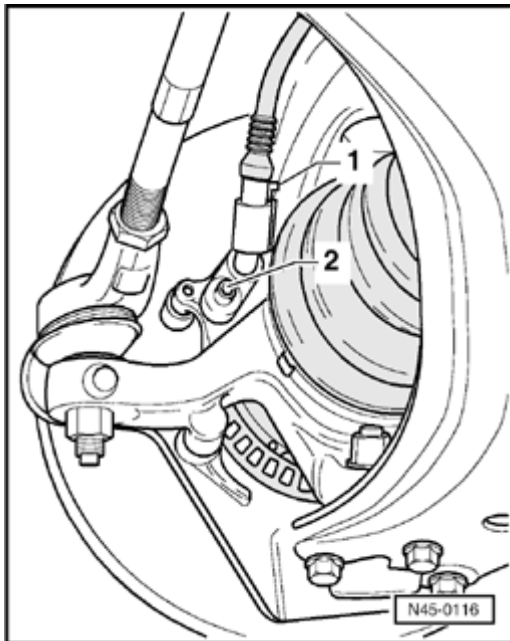
[Repair Group
40; Servicing
front wheel
suspension; II
- Servicing
wheel bearing](#)

10 - Circlip

Removing and installing speed sensor on front axle

Removing

- Raise vehicle.
- Disconnect speed sensor and speed sensor wiring connector -1-
- Remove bolt -2- from wheel bearing housing.
- Pull ABS speed sensor from wheel bearing housing.



Installing

- Before inserting speed sensor, clean mounting hole inner surface and coat speed sensor with solid lubricant paste G 000 650.
- Insert speed sensor into mounting hole in wheel bearing housing and tighten bolt to 8 Nm (71 in. lb).
- Connect speed sensor to speed sensor wiring connector.
- Turn wheels fully left and right lock and check clearance to speed sensor wiring.

Checking or removing and installing rotor front axle

- Raise vehicle.
- Remove wheel.
- Rotate brake disc and check rotor is damaged or dirty.
- If rotor is damaged, remove wheel hub with rotor and replace.

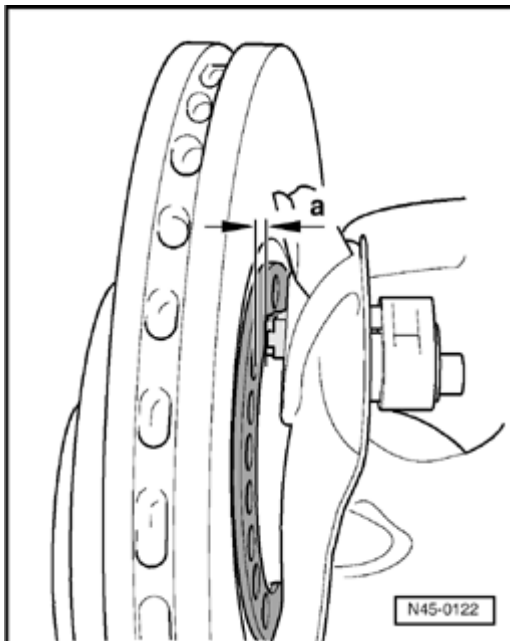
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front wheel suspension; II - Servicing wheel bearing](#)

Checking rotor lateral run-out

- Raise vehicle.
- Remove wheel.
- Turn wheel hub and check gap - dimension *a* between rotor and speed sensor is even.
- If rotor is damaged, remove wheel hub with rotor and replace.

Dimension *a* = 0.3 mm (0.0118 in.)

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front wheel suspension; II - Servicing wheel bearing](#)



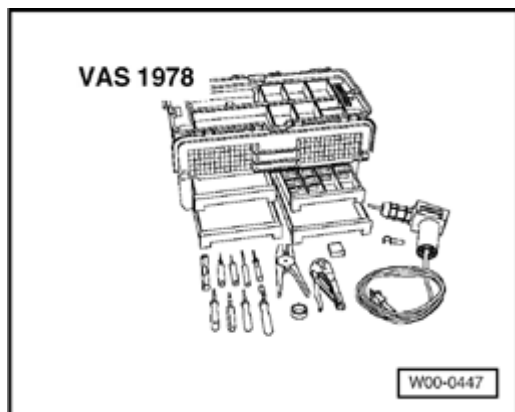
Front speed sensor wiring, removing and installing

Special tools and equipment

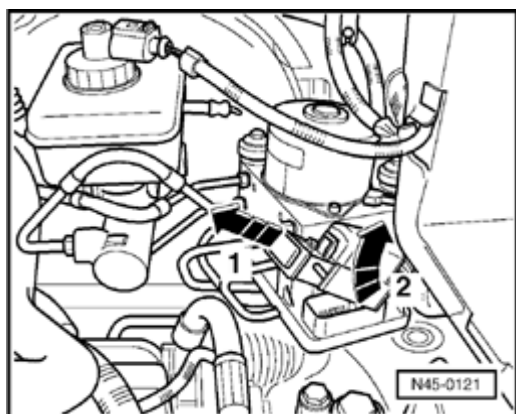
- ◆ VAS 1978 Wiring harness repair set

Removing:

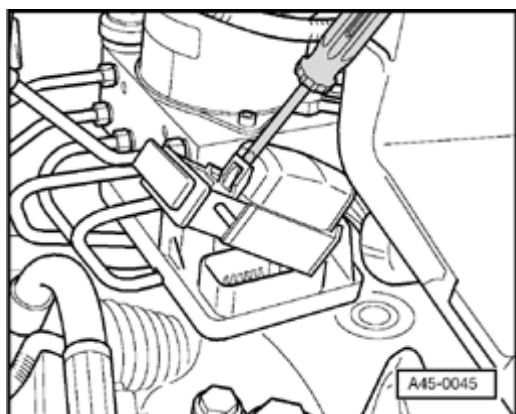
- Obtain radio code on vehicles with coded radio.
- Disconnect battery.



45-74

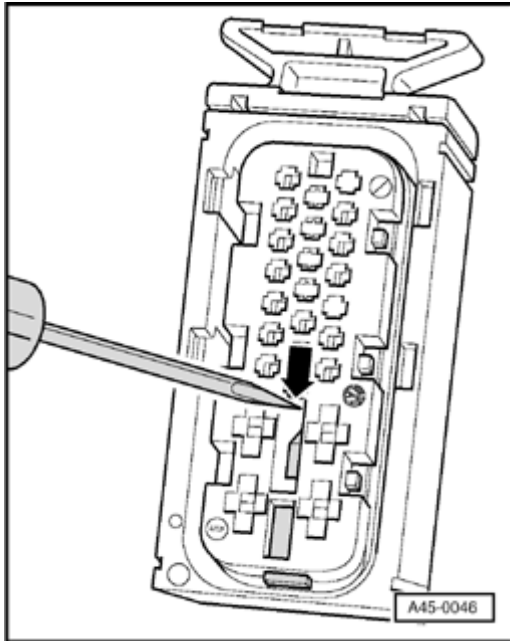


- ✦ - Release control module connector (arrow -1-) and pull off (arrow -2-).

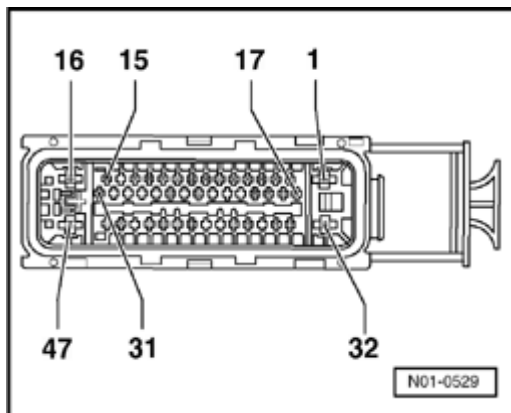


- ✦ - Release multi-pin connector cover cap with a screwdriver and remove.

45-75



- Release secondary locking device (violet) in direction of arrow with a screwdriver.

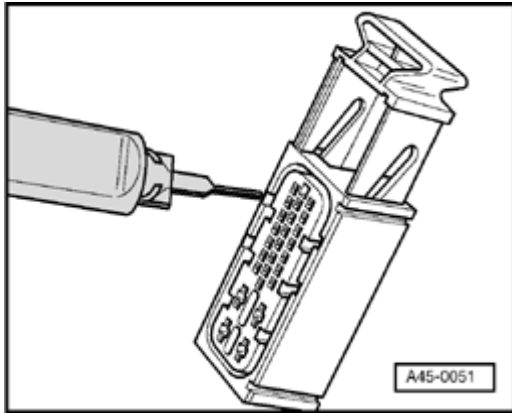


ABS/EDS/ASR/ESP Mark 60 connector T47

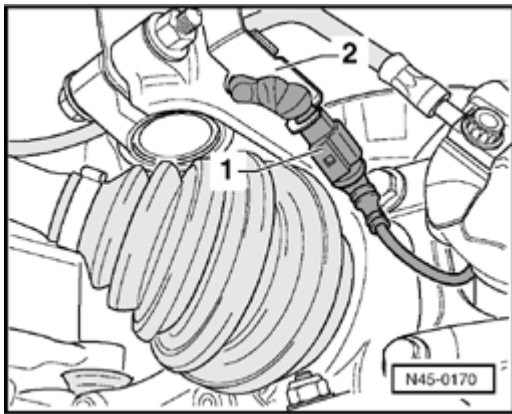
Contact assignment of connector T47 wiring harness/ABS control module (w/EDL) -J104-.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

45-76

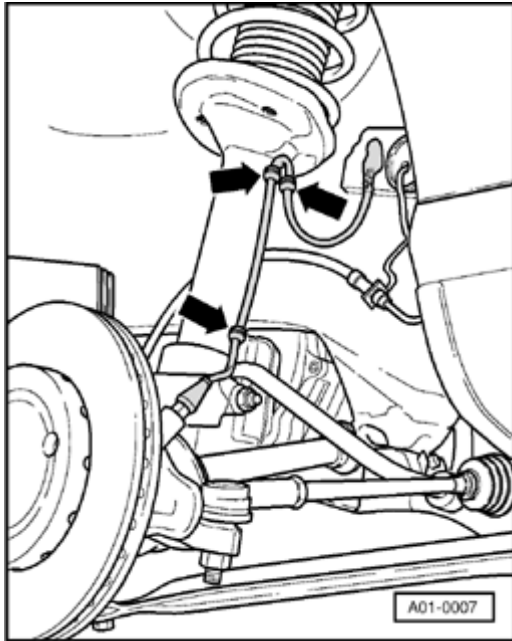


- Push out relevant contacts with an ejection tool from wiring harness repair kit VAS 1978.
- Separate connector from speed sensor wiring and speed sensor.



- For vehicles with brake wear indicator separate connector -1-.
- Unclip the wiring from retainer -2-.
- Remove faulty speed sensor wiring and guide in new speed sensor wiring.
- Connect speed sensor to speed sensor wiring.

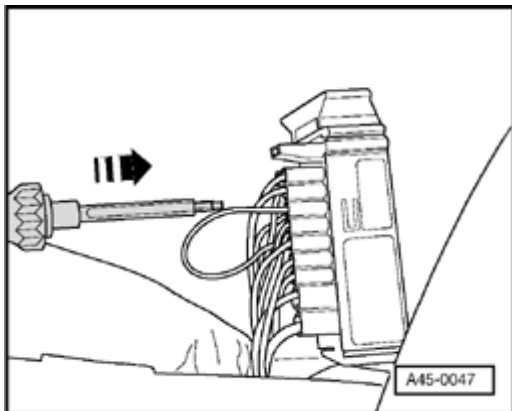
45-77



- Clip in speed sensor wiring (arrows).

Make sure the wiring is not twisted when installing the speed sensor wiring in the wheel housing.

- Insert brake wear indicator connector into bracket on suspension strut.
- Guide contacts into connector housing.

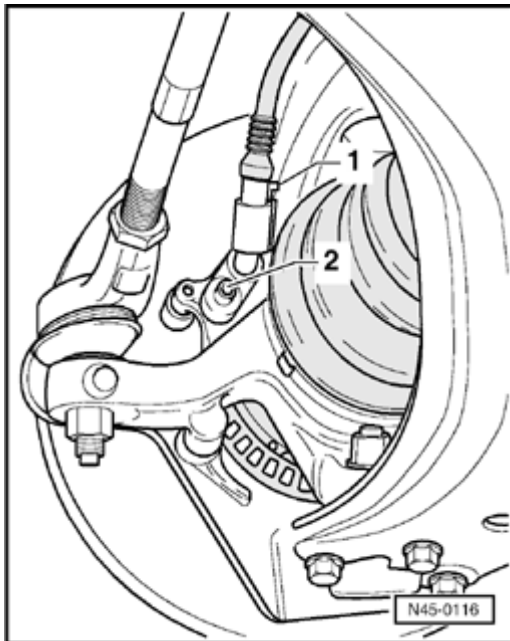


- Push individual wiring seals in onto stop with an insertion tool from VAS 1978.
- Secure contacts with secondary locking device and install multi-pin connector cover cap.

Speed sensor on front axle, removing and installing

Removing

- Raise vehicle.
- Separate speed sensor and speed sensor wiring connector -1-
- Remove bolt -2- from wheel bearing housing.
- Pull ABS speed sensor from wheel bearing housing.



Installing

- Before inserting speed sensor, clean hole inner surface and coat speed sensor all-round with solid lubricant paste G 000 650.
- Insert speed sensor into hole in wheel bearing housing and tighten bolt to 8 Nm (71 in. lb).
- Connect speed sensor to speed sensor wiring.
- Turn wheels fully onto left and right-hand lock and check clearance to speed sensor wiring.

Rotor on front axle, checking or removing

- Raise vehicle.
- Remove wheel.
- Rotate brake disc and check rotor is not damaged or dirty.
- If rotor is damaged, remove wheel hub with bearing and replace.

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front wheel suspension; II - Servicing wheel bearing](#)

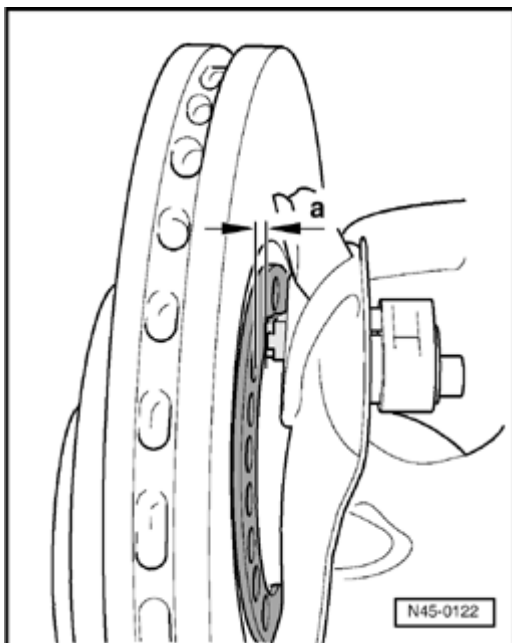
Checking rotor lateral run-out

- Raise vehicle.
- Remove wheel.
- Turn wheel hub and check gap dimension between rotor and speed sensor is even.

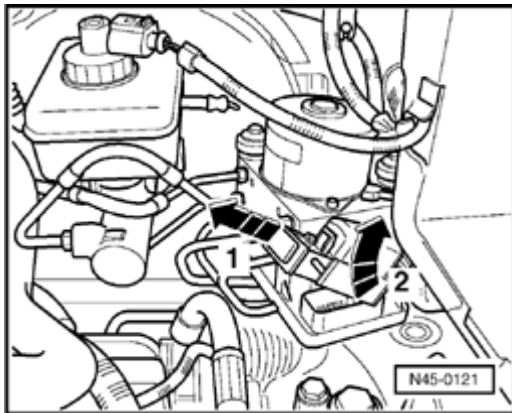
Dimension a = 0.3 mm (0.0118 in.)

- If rotor is damaged, remove wheel hub with bearing and replace.

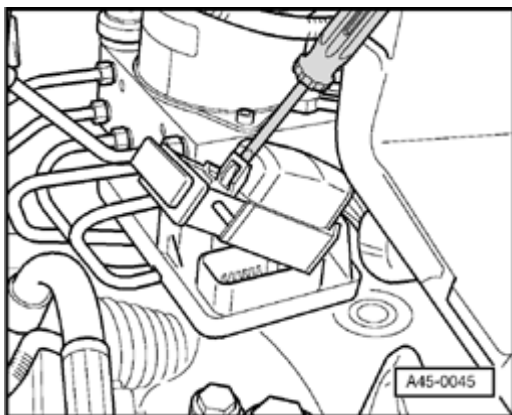
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front wheel suspension; II - Servicing wheel bearing](#)



45-81

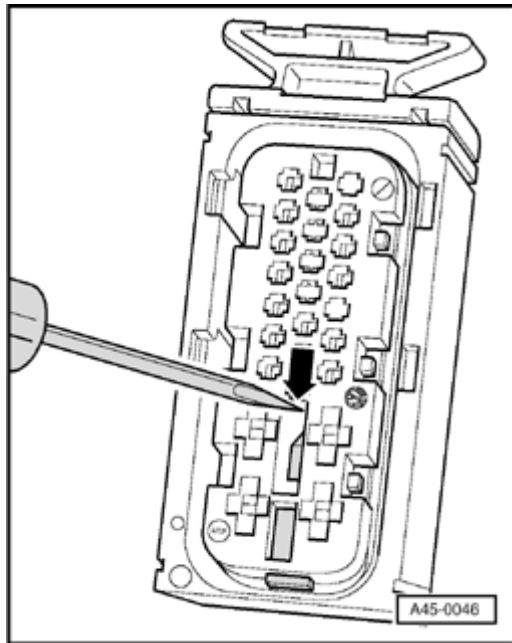


- ✦ - Release control unit connector (arrow -1-) and pull off (arrow -2-).

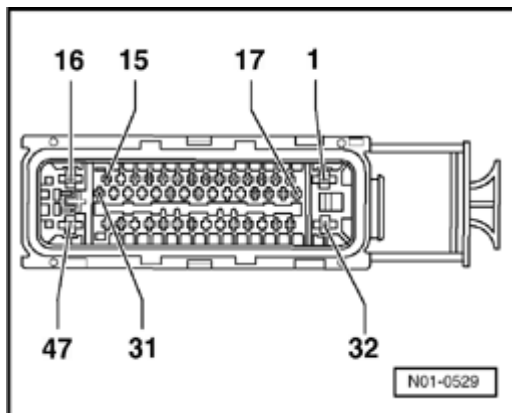


- ✦ - Release multi-pin connector cover cap with a screwdriver and remove.

45-82



- Release secondary locking device (violet) in direction of arrow with a screwdriver.

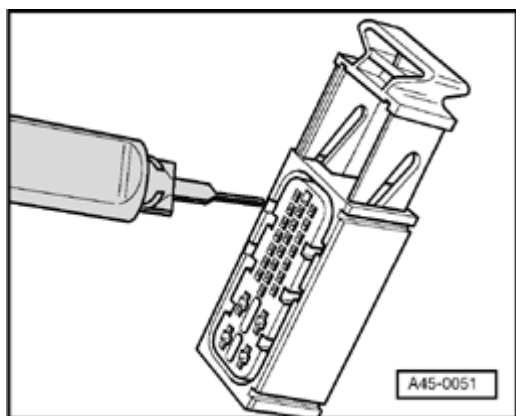


ABS/EDS/ASR/ESP Mark 60 connector T47

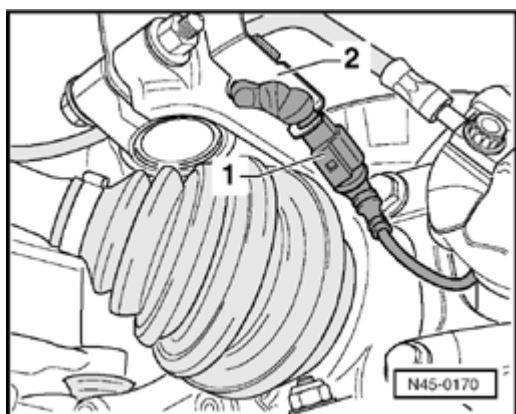
Contact assignment of connector T47 wiring harness/ ABS Control Module (w/EDL) -J104-

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

45-83

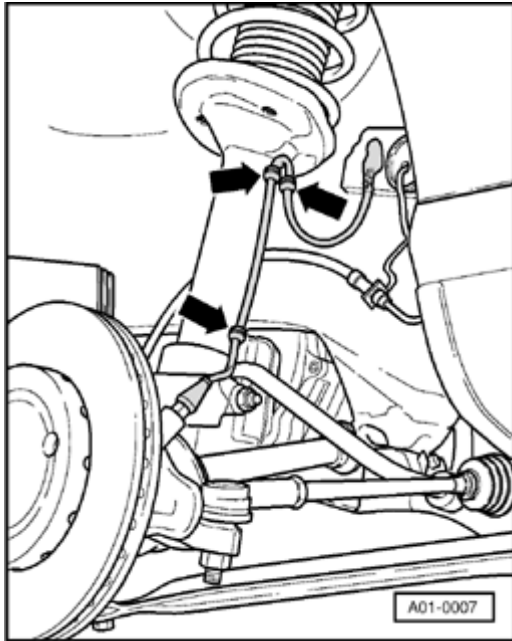


- Push out relevant contacts with an ejection tool from wiring harness repair kit VAS 1978.
- Separate connector from speed sensor wiring and speed sensor.



- For vehicles with brake wear indicator separate connector -1-.
- Unclip the wiring from retainer -2-.
- Remove faulty speed sensor wiring and guide in new speed sensor wiring.
- Connect speed sensor to speed sensor wiring.

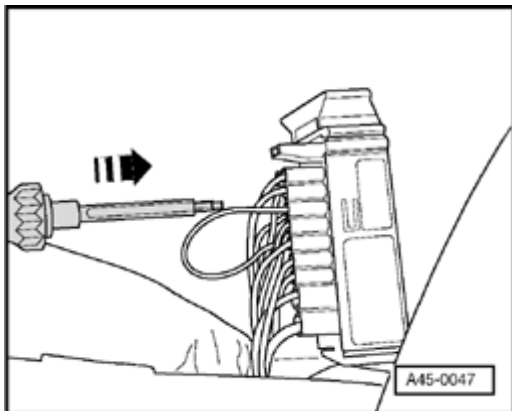
45-84



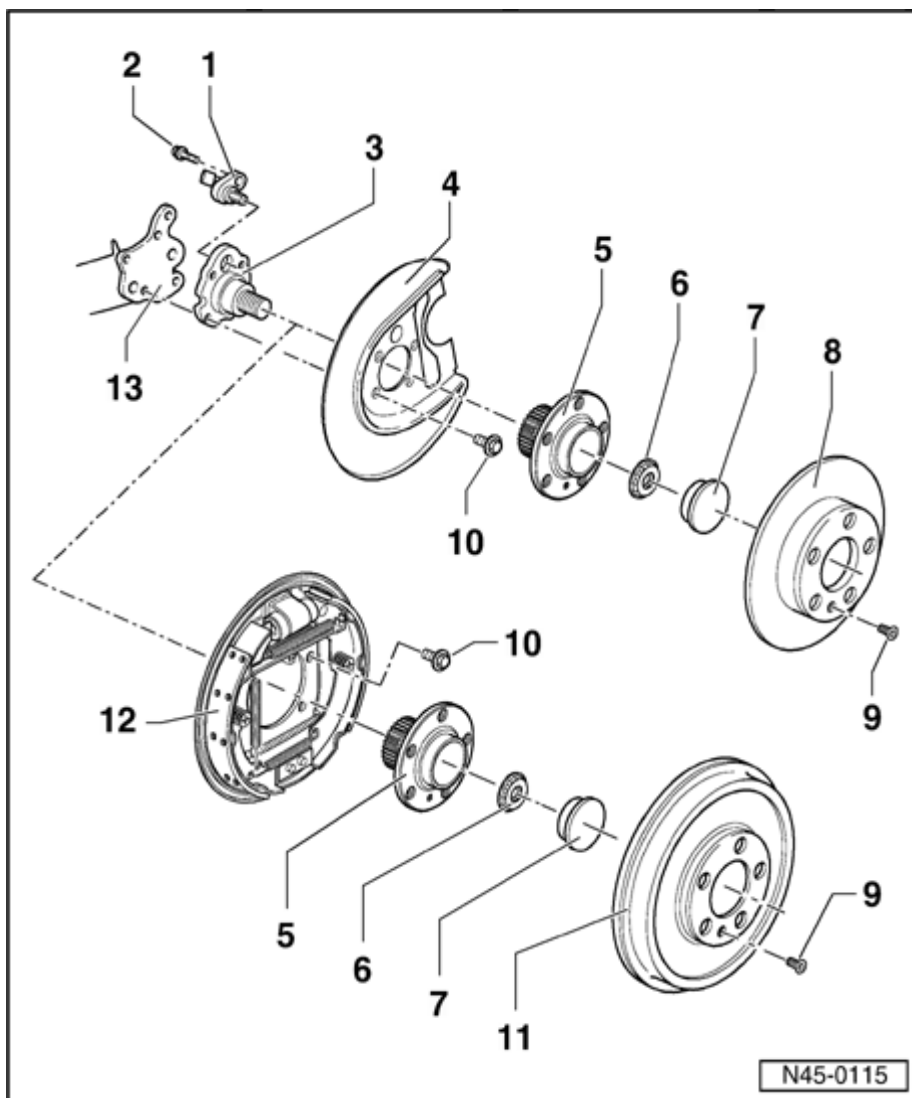
- Clip in speed sensor wiring (arrows).

Make sure the wiring is not twisted when installing the speed sensor wiring in the wheel housing.

- Insert brake wear indicator connector into bracket on suspension strut.
- Guide contacts into connector housing.



- Push individual wiring seals in onto stop with an insertion tool from VAS 1978.
- Secure contacts with secondary locking device and install multi-pin connector cover cap.



ABS system components for rear axle, (Front wheel drive) removing and installing

1 - ABS speed sensor

◆ Checked by On Board Diagnostic (OBD)

◆ Before inserting sensor, clean mounting hole inner surface and coat with lubricating paste G 000 650

◆ Disc brakes
⇒ [Page 45-88](#)

2 - Hex socket head bolt, 8 Nm (71 in lb)

3 - Stub axle

4 - Splash plate

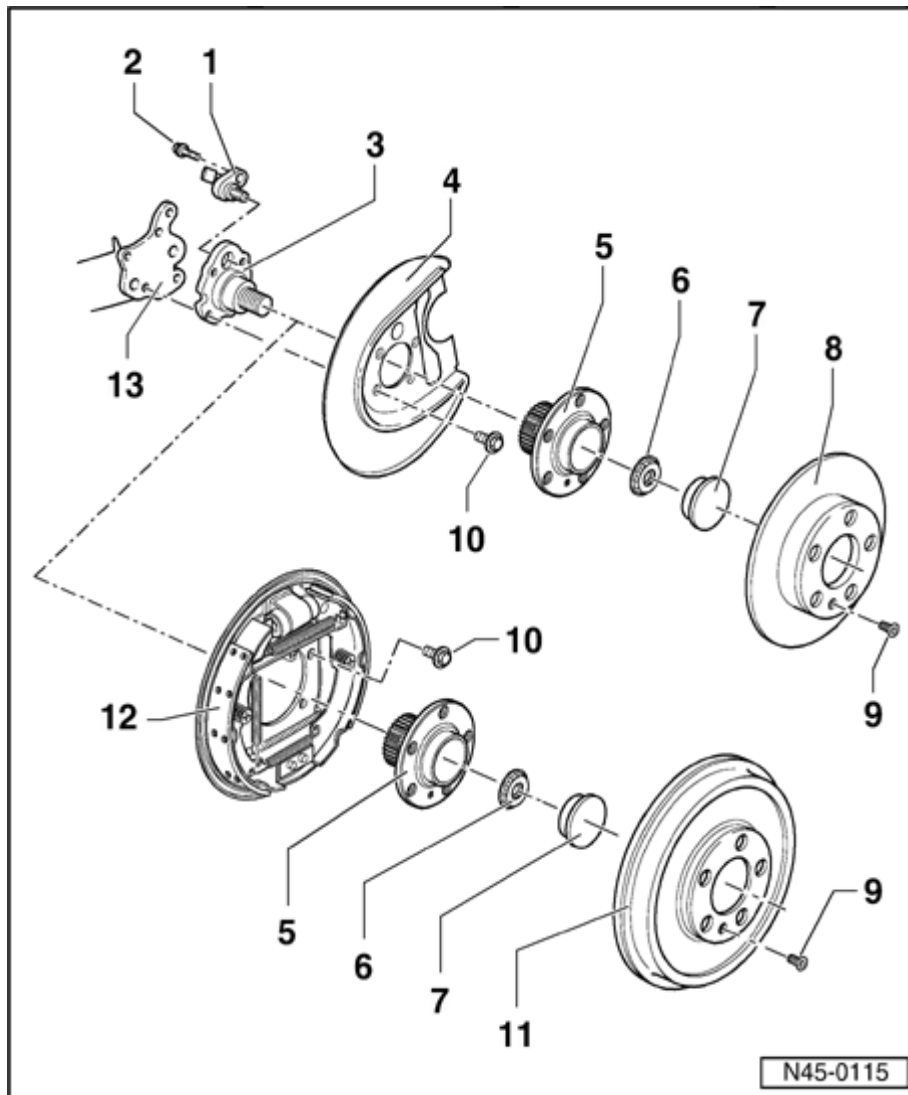
5 - Wheel

**hub
with
wheel
bearing
and
rotor**

- ◆ Replace each time after removing
- ◆ Only replace complete
- ◆ Removing and installing

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Servicing wheel bearings; Removing and installing wheel bearing/wheel hub module, vehicles with disc brakes](#)

45-86



6 - Self-locking 12-point nut, 175 Nm (129 ft. lb)

◆ Always replace

7 - Cap

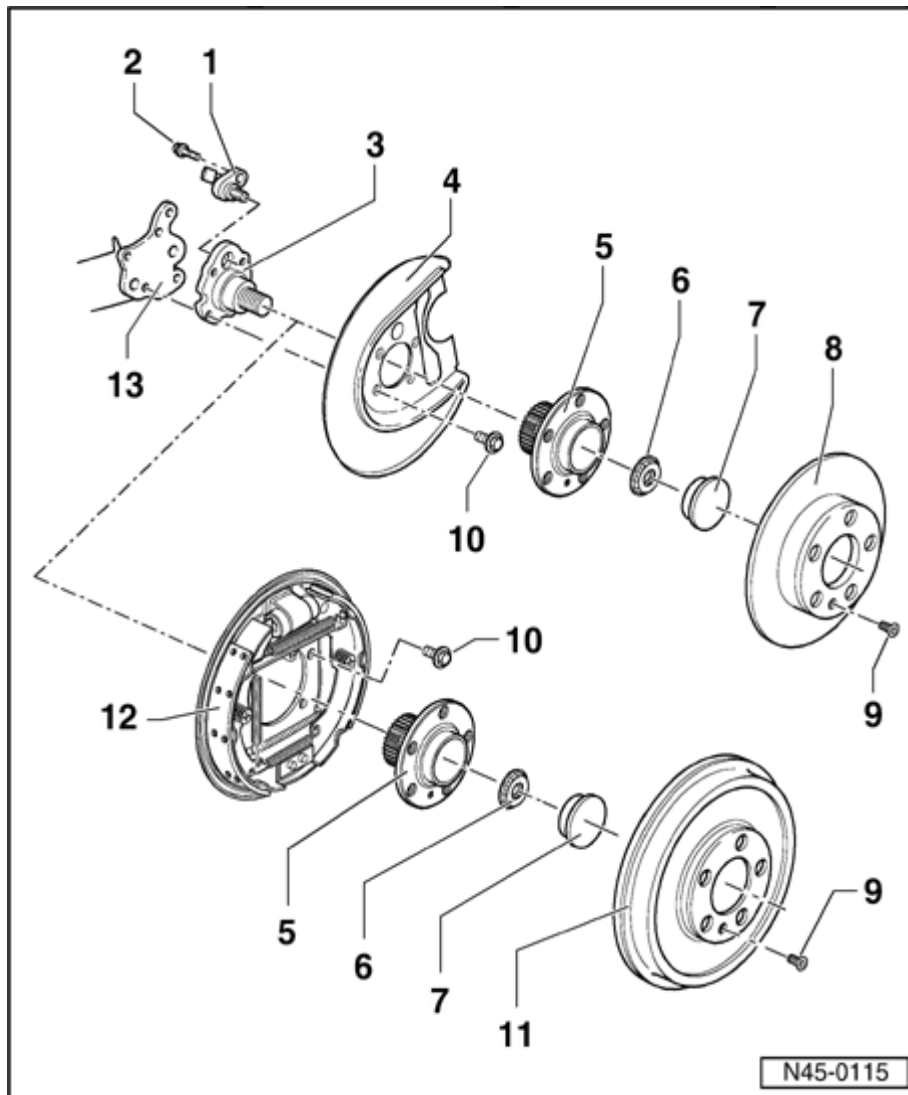
◆ Pressing off and driving in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Servicing wheel bearings; Removing and installing wheel bearing/wheel hub module, vehicles with disc brakes](#)

8 - Brake disc

9 - Phillips-head screw

45-87



10 - Hex bolt 60 Nm (44 ft. lb)

- ◆ With dished spring

11 - Brake drum (not used)

- ◆ Brake drum diameter 230 mm (9.06 in.)

- ◆ Wear limit 231 mm (9.09 in.)

- ◆ Release adjustment before removing brake drum

- ◆ Clean thoroughly, check for wear, damage, tolerances, damaged wheel bolt threads and perfect braking surface

12 - Back plate with

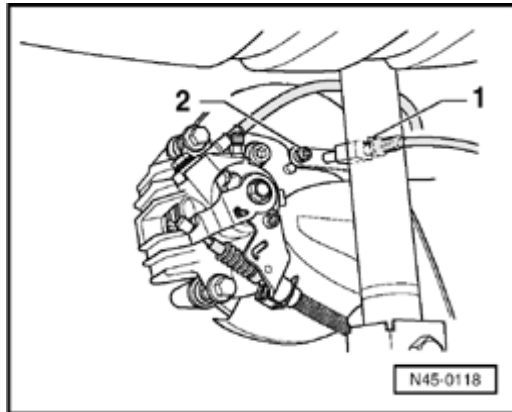
**brake
shoes**

**13 - Axle
beam**

Speed sensor on rear axle(front wheel drive), removing and installing

Removing

- Raise vehicle.
- Disconnect speed sensor and speed sensor wiring connector -1- .
- Remove bolt -2- from stub axle.
- Pull ABS speed sensor out of stub axle.



Installing

- Before inserting speed sensor, clean mounting hole inner surface and coat speed sensor with solid lubricant paste G 000 650.
- Insert speed sensor into hole in stub axle and tighten bolt to 8 Nm (71 in. lb)
- Connect speed sensor to speed sensor wiring.

Rear speed sensor wiring (front wheel drive), removing and installing

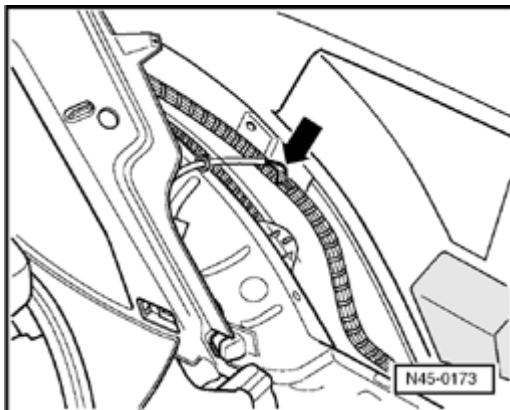
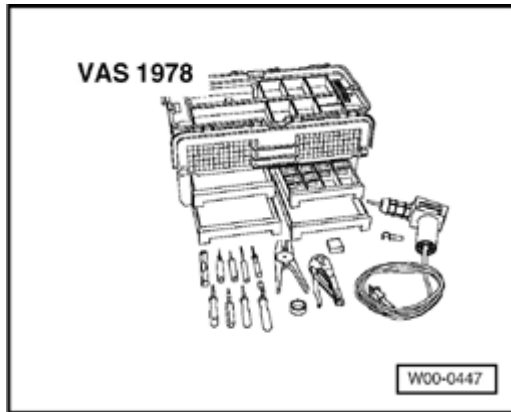
Special tools and equipment

- ◆ VAS 1978 Wiring harness repair kit

Removing:

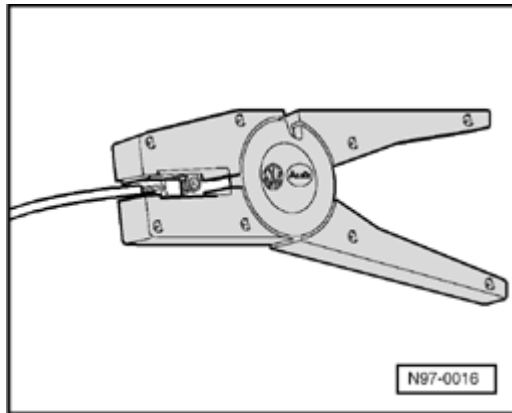
- Obtain radio code on vehicles with coded radio.
- Disconnect battery.
- Disconnect speed sensor wiring/speed sensor connection.
- Remove rear side panel trim.

⇒ [Repair Manual, Body Interior, Repair Group 70; Pillar and side panel trim; Removing wheel housing trim.](#)

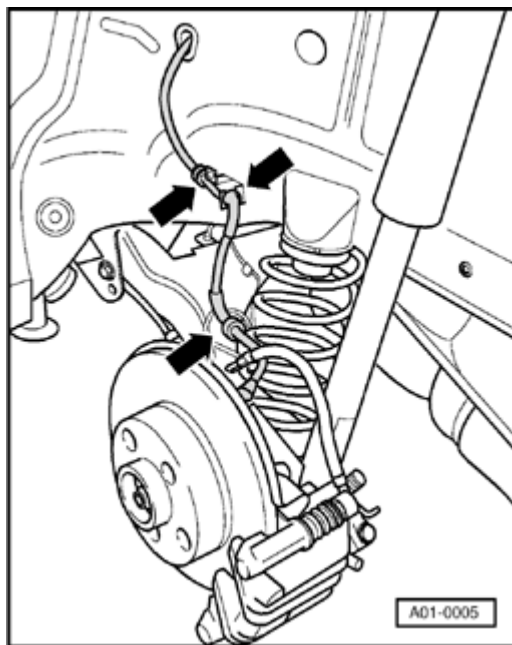


- Disconnect speed sensor wiring (arrow) with wire strippers from VAS 1978 and remove faulty wiring.

45-90



- ✦ - Strip 15 mm (5/8 in.) of insulation from end of wire with wire stripper and fold half of stripped wire back.
- Guide in new speed sensor wiring.
- Connect speed sensor to speed sensor wiring.

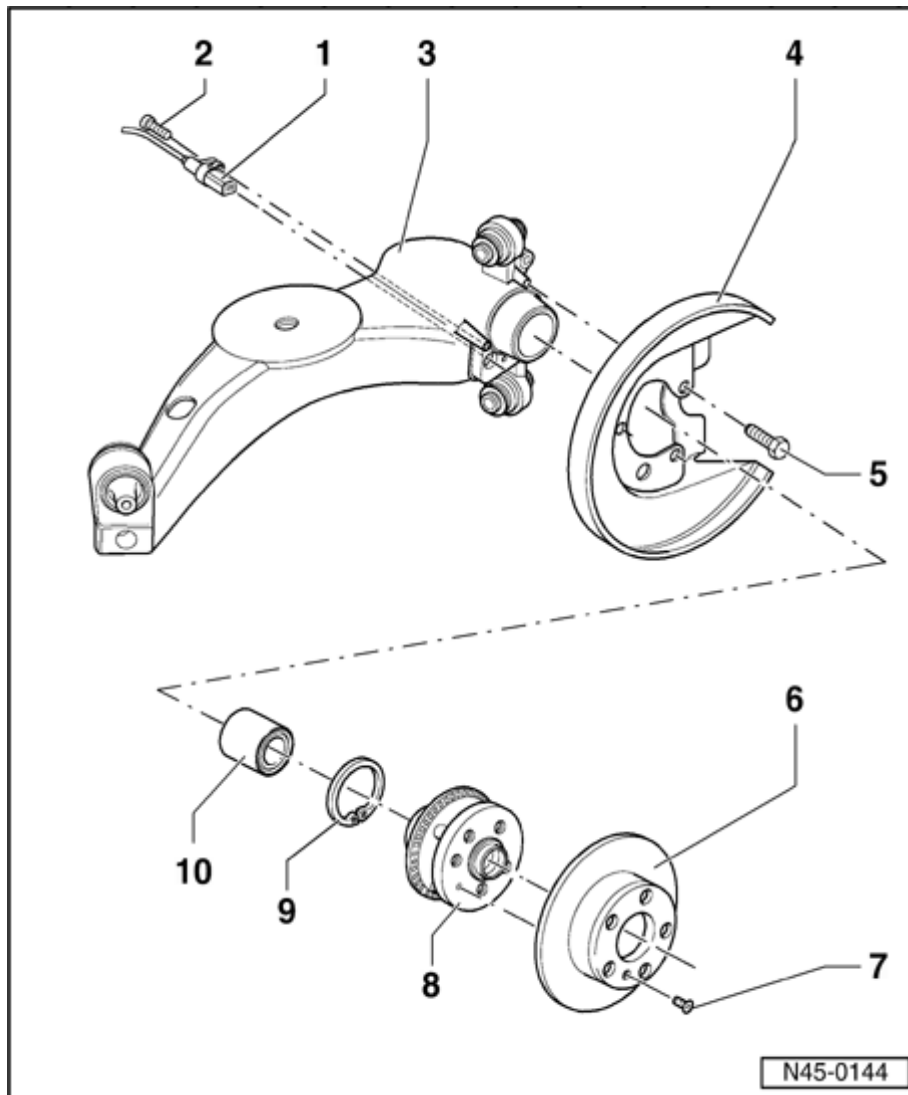


- ✦ - Clip in speed sensor wiring (arrow).

Make sure the wiring is not twisted when installing the speed sensor wiring in the wheel housing.

- Cut 2-pin connector off new speed sensor wiring with wire stripper pliers.
- Strip 15 mm (5/8 in.) of insulation from end of wire with wire strippers and bend back half.
- Connect speed sensor wiring with aid of suitable crimp connector from wiring harness repair set VAS 1978.

45-91



ABS system components for rear axle (all-wheel drive), removing and installing

1 - ABS speed sensor

- ◆ Checked by On Board Diagnostic (OBD)
- ◆ Before inserting sensor, clean fitting hole inner surface and coat with lubricant paste G 000 650
- ◆ All-wheel drive
⇒ [Page 45-93](#)

2 - Hex socket head bolt, 8 Nm (71 in. lb)

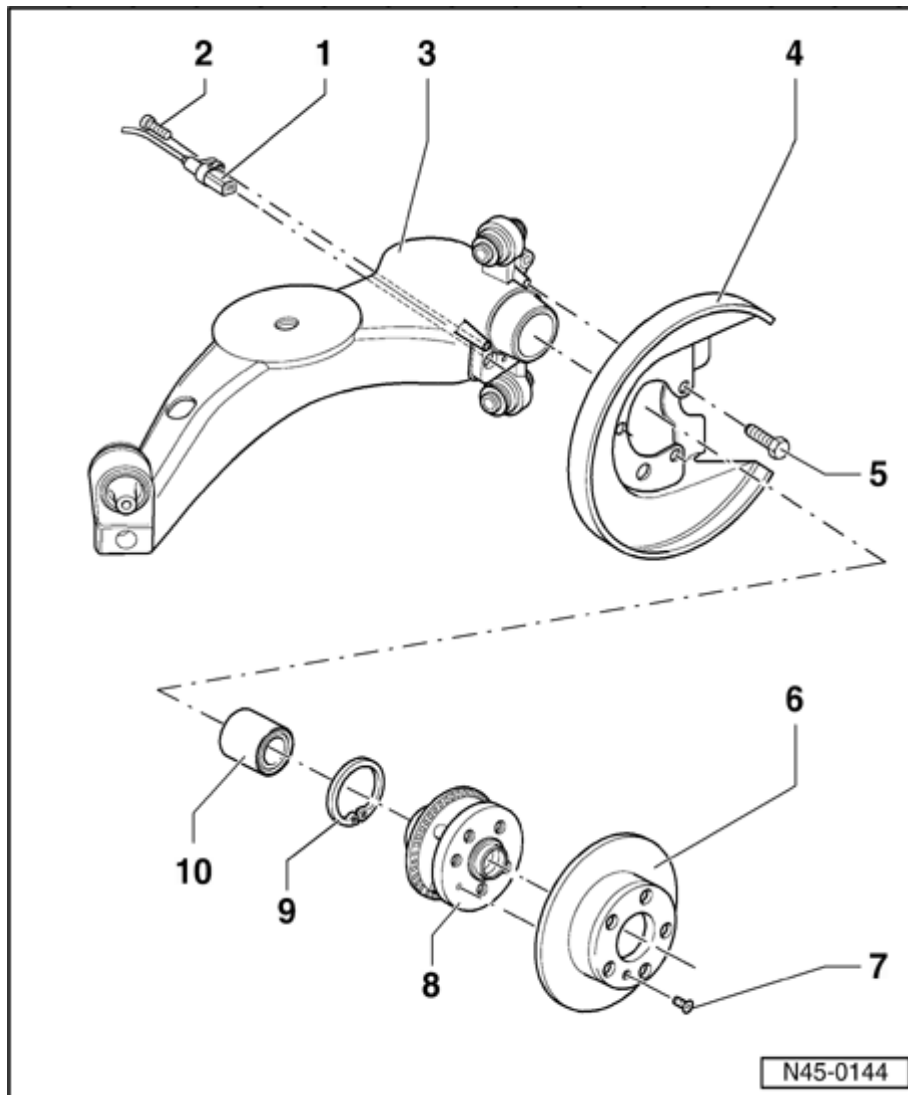
3 - Trailing arm

**4 - Splash
plate**

**5 - Hex
bolt, 10
Nm
(7.37 in.
lb)**

**6 - Brake
disc**

45-92



7 - Phillips-head screw

8 - Wheel hub with rotor

◆ Press out and in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Assembly overview for trailing arm and transverse links; Pressing wheel bearings out and in](#)

9 - Circlip

10 - Wheel bearing

◆ Replace each time after removing

◆ Pressing out and in

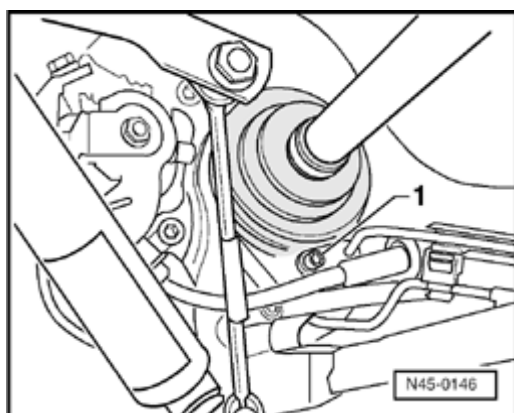
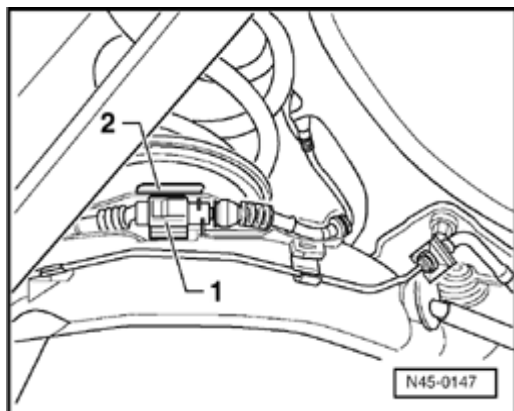
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Assembly overview for trailing arm and transverse links; Pressing wheel bearings](#)

[out and in](#)

Speed sensor on rear axle (disc brakes all-wheel drive), removing and installing

Removing

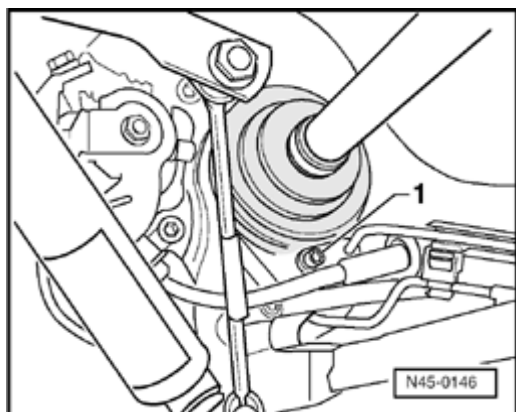
- Raise vehicle.
- ✦ - Open connector -1- cover -2-.
- Separate speed sensor and speed sensor wiring connector -1-.
- ✦ - Remove bolt -1- from trailing arm.
- Remove ABS speed sensor out of trailing arm.



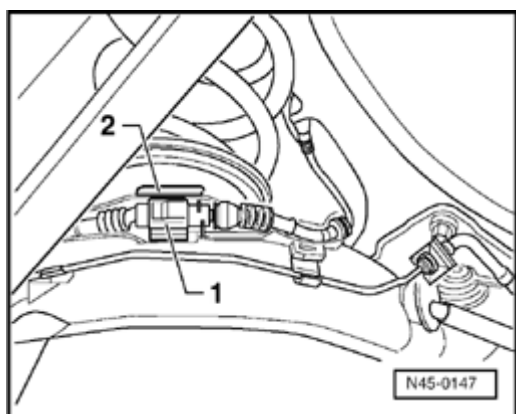
45-94

Installing

- Before inserting speed sensor, clean hole surface and coat speed sensor all-round solid lubricant paste G 000 650.



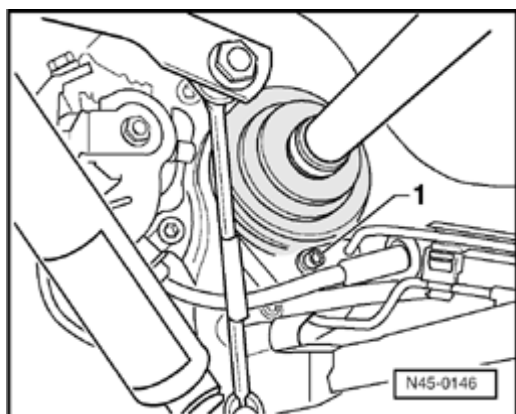
- ◀ - Insert speed sensor into hole in trailing arm and tighten bolt -1- to 8 Nm (71 in. lb).



- ◀ - Connect speed sensor to speed sensor wire and close connector -1- cover -2-.

Rotor on rear axle (all-wheel drive), checking or removing and installing

- Raise vehicle.
- Remove wheel.
- Remove bolt -1- from trailing arm.
- Pull ABS speed sensor out of trailing arm.
- Check rotor is not damaged or dirty.
- If rotor is damaged, remove wheel hub with rotor and replace.



⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Assembly overview for trailing arm and transverse links; Pressing wheel bearings out and in.](#)

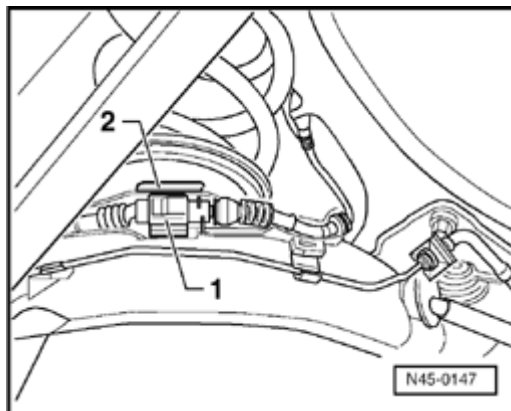
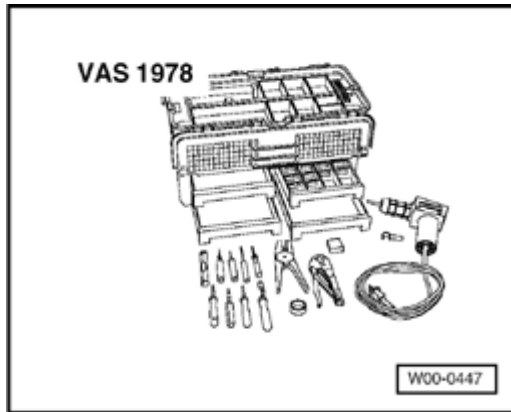
Removing and installing rear speed sensor wiring (all-wheel drive)

Special tools and equipment

- ◆ VAS 1978 Wiring harness repair set

Removing

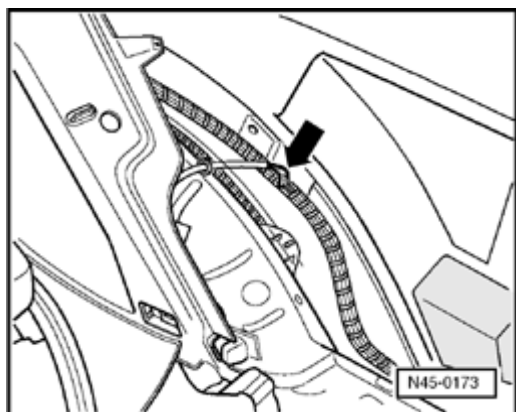
- Obtain radio code on vehicles with coded radio.
 - Disconnect battery.
 - Separate speed sensor wiring/speed sensor connection.
 - Raise vehicle.
-
- Open connector -1- cover -2-
 - Separate speed sensor and speed sensor wiring connector -1-
 - .



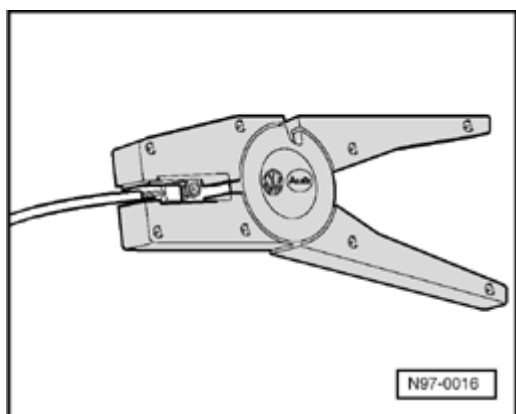
45-97

- Remove rear side panel trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillars and side panel trims](#)

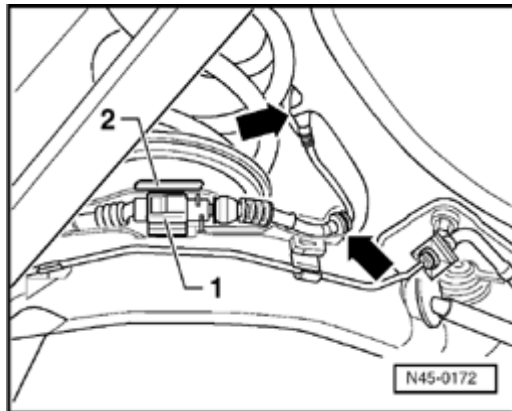


- Separate speed sensor wiring (arrow) with wire strippers from VAS 1978 and remove faulty wiring.



- Strip 15 mm (5/8 in.) of insulation from end of wire with wire strippers and bend half of stripped wire back.
- Guide in new speed sensor wiring.

45-98



- Connect speed sensor to speed sensor wiring -1- and close connector cover -2-.
- Clip in speed sensor wiring (arrows).

Make sure the wiring is not twisted when installing the speed sensor wiring in the wheel housing.

- Cut 2-pin connector off new speed sensor wiring with wire stripper pliers.
- Strip 15 mm (5/8 in.) of insulation from end of wire with wire strippers and bend back half.
- Connect speed sensor wiring with help of suitable crimp connector from wiring harness repair set VAS 1978.

ESP system components, removing and installing

A description of construction and function of ESP system is found in Self Study Program 861103 Volkswagen Handling Controls.

When the individual sensors or senders are changed, a zero compensation must be carried out for the changed component.

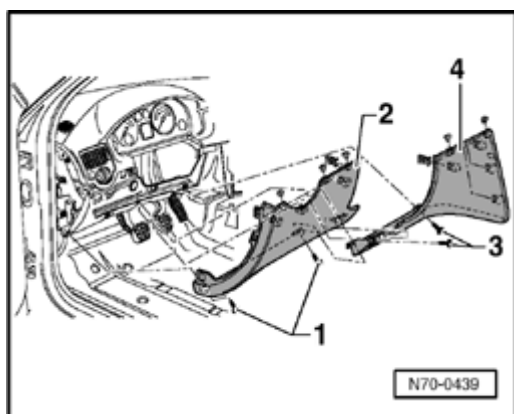
Sender for rotation rate -G202- and sensor for transverse acceleration -G200-, removing and installing

Note:

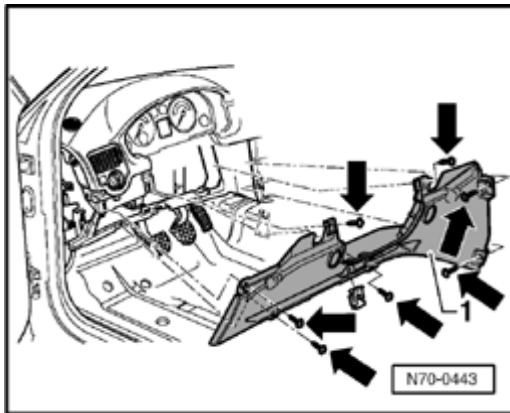
The removal and installation sequence for the sender for rotation rate -G202- and the sensor for transverse acceleration -G200- is identical except for the mounting bracket for each component.

Removing

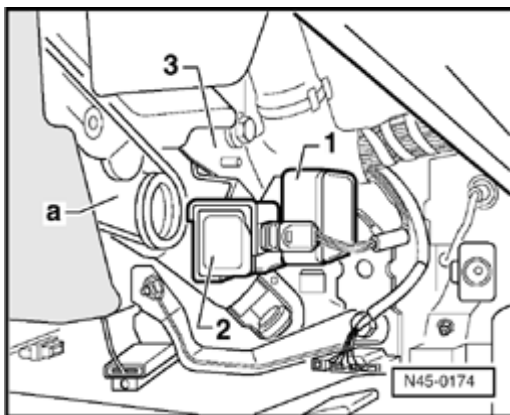
- Request radio code on vehicles with code if necessary.
- Disconnect battery.
- Remove Qty. 2 screws -1-.
- Unclip top of trim -2-
- Remove Qty. 2 screws -3-
- Unclip top of trim -4-.



45-101



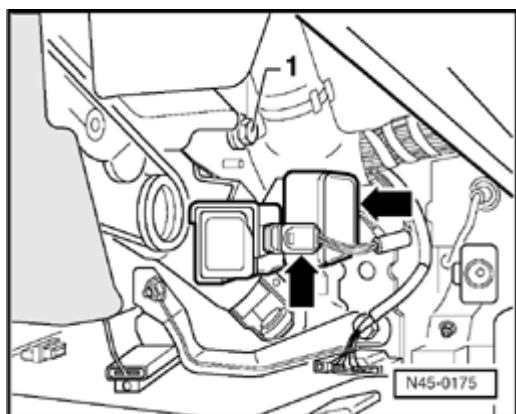
- Remove Qty. 7 screws (arrows).
- Take off reinforcement -1-.



- The sender for rotation rate - G202- -1- and the sensor for transverse acceleration -G200- - 2- are located on the steering column -3- bearing bracket.

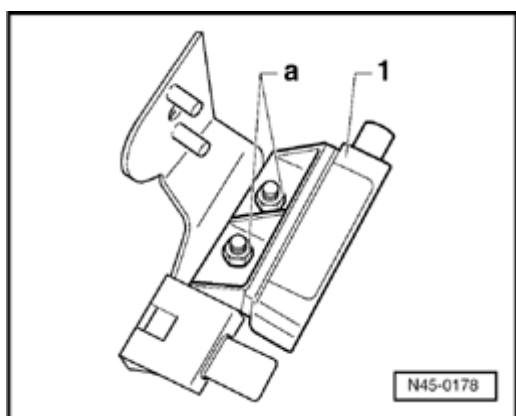
a - Steering column

45-102



- Pull off connectors (arrows) from sender for rotation rate -G202- and sensor for transverse acceleration -G200-.
- Remove bolts -1- and remove sender for rotation rate -G202- and sensor for transverse acceleration -G200-.

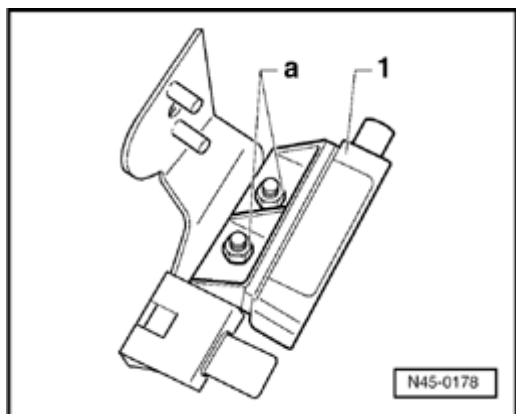
Removing and installing sender for rotation rate -G202-



- Remove nuts -a- on sender for rotation rate -G202- -1-.
- Take out sender for rotation rate -G202-.

Installing sender for rotation rate -G202-

- Insert sender for rotation rate -G202- and straight.

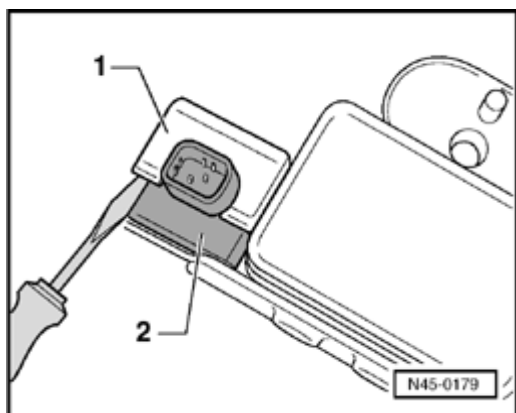


- ⚡ Tighten nuts -a- on sender for rotation rate 1- .

CAUTION!

Strong vibrations can damage Sender fo rotation rate -G202-.

Removing sensor for transverse acceler: G200-

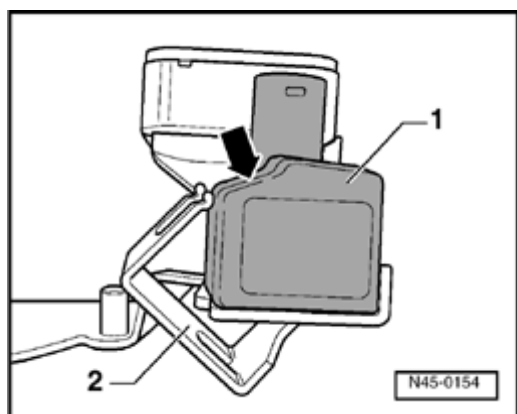


- ⚡ - Using a screwdriver, lift retainer -1- off se transverse acceleration -G200- -2-
- Take out sensor for transverse accelerati G200-.

45-104

Installing lateral acceleration sensor -G2

- Insert lateral acceleration sensor -G200- bracket.



- Installation position: The slanted side (arr the lateral acceleration sensor -G200- -1- face retainer -2-.
- Slide retainer -2- over the lateral acceleration sensor -G200- -1- until it engages.

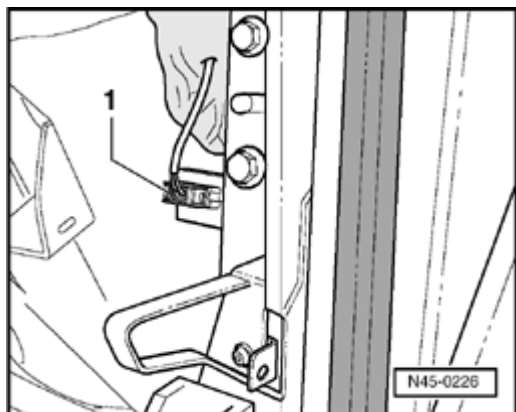
Further installation in reverse order

- Enter radio code.
- Perform basic settings of lateral acceleration sensor -G200- and Sender for rotation rate G202-.
- Connecting VAS 5051 and selecting function [Page 45-38](#)

Tightening torques:

Sender for rotation rate -G202- to bracket	9 Nm	(79 in. lb)
Hex bolt to steering column mounting bracket	20 Nm	(15 ft. lb)

Longitudinal acceleration sensor -G251-, removing and installing



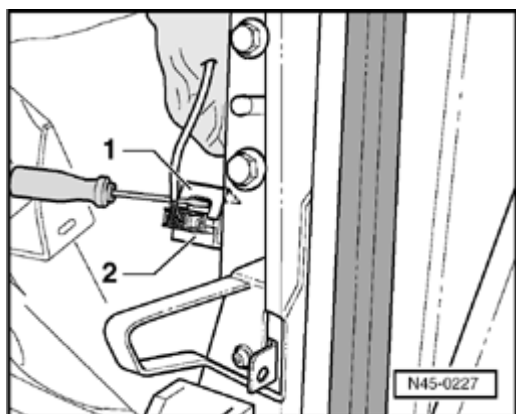
- ✦ The longitudinal acceleration sensor -G251- -1- is located on the right-hand A-pillar

Removing

- Note or request radio code on vehicles with coded radio if necessary.
- Disconnect battery.
- Remove glove box.

⇒ [Repair Manual, Body Interior, Repair Group 68; Compartments, covers and trims.](#)

- Disconnect connector off longitudinal acceleration sensor - G251-.



- ✦ - Lift retainer -1- off longitudinal acceleration sensor -G251- -2- with a screwdriver.

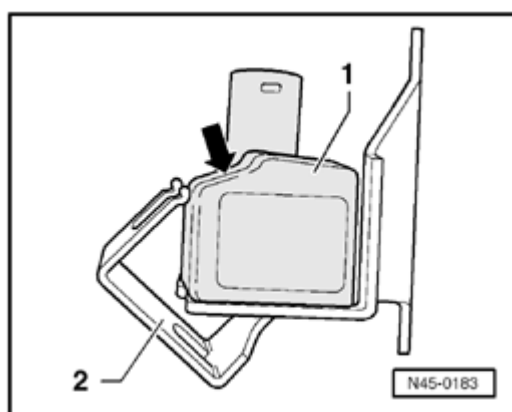
Installing

CAUTION!

Strong vibrations can damage longitudinal acceleration sensor -G251-.

- Insert longitudinal acceleration sensor -G into retainer.
- Installation position: The angled section (of longitudinal acceleration sensor -G251 must face retainer -2-.
- Slide retainer -2- over longitudinal acceleration sensor -G251- -1- until it engages.

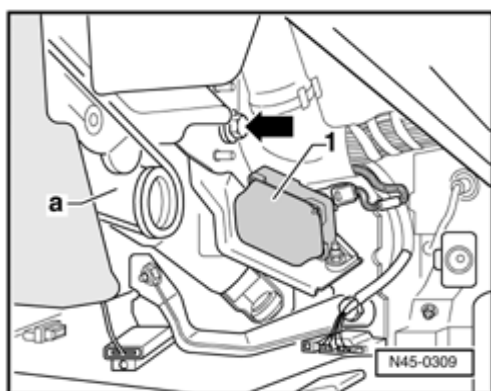
Further installation in reverse order.



ESP sensor unit -G419-, vehicles from my 02.02, removing and installing

The Sensor for transverse acceleration -G200-, the Sender for rotation rate -G202- and the Longitudinal acceleration sensor¹⁾ -G251- are assembled together in one housing on a new bracket, at the same place in the vehicle.

¹⁾ 4Motion vehicles with Haldex clutch only

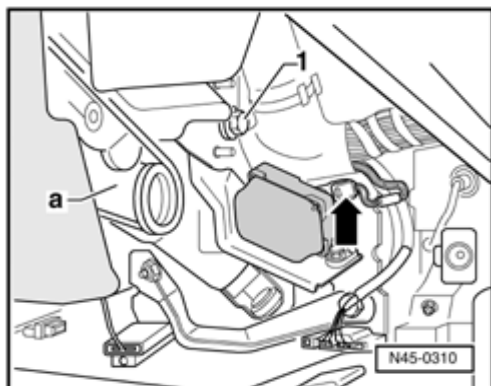


- The ESP-sensor unit -G419- -1- is secured with a bracket on the steering column bearing bracket - a-.

When the ESP-sensor unit -G419- is replaced, a zero compensation of the sensor for transverse acceleration -G200-, the sender for rotation rate -G202-, and the longitudinal acceleration sensor¹⁾ -G251- must be performed.

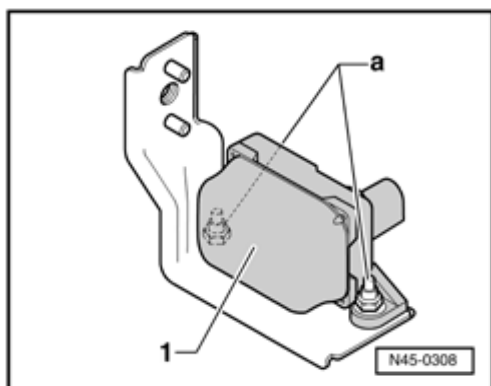
¹⁾ 4Motion vehicles with Haldex clutch only

45-110



Removing

- Disconnect connector (arrow) from ESP-sensor unit -G419-
- Remove bolt -1- and remove ESP-sensor unit -G419-



- Remove nuts -a- from the ESP-sensor unit -G419-
- Remove ESP-sensor unit -G419-

CAUTION!

Sharp shaking motions can destroy the Sensor for transverse acceleration -G200-, Sender for Rotation Rate -G202- and Longitudinal Acceleration Sensor ¹⁾-G251-.

Installing

Installation in reverse order

Tightening torques:

ESP-sensor unit -G419- to bracket	9 Nm	(79.7 in. lb)
Hex bolt to steering column mounting bracket	20 Nm	(15 ft. lb)

- Enter radio code.
- Perform basic settings of sensor for transverse acceleration -G200-, sender for rotation rate -G202- and longitudinal acceleration sensor¹⁾-G251-.
- Connecting VAS 5051 and selecting functions ⇒ [Page 45-38](#)

¹⁾ 4Motion vehicles with Haldex clutch only

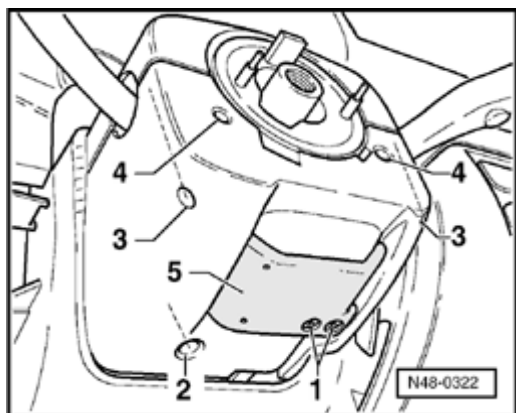
Steering angle sensor -G85-, removing and installing

Removing

- Turn wheels to straight ahead position.
- Removing airbag module and steering wheel.

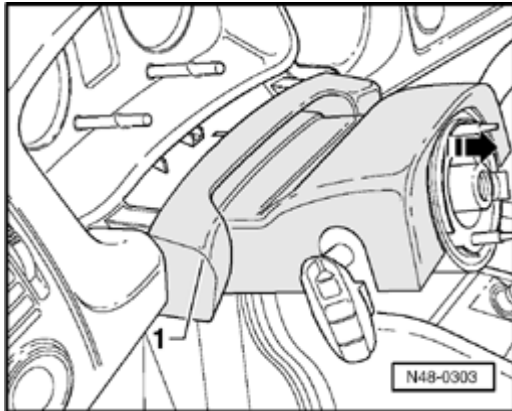
⇒ [Repair Manual, Body Interior, Repair Group 69; Airbag](#)

- Remove lower stowage compartment.
- Take out covering in footwell.

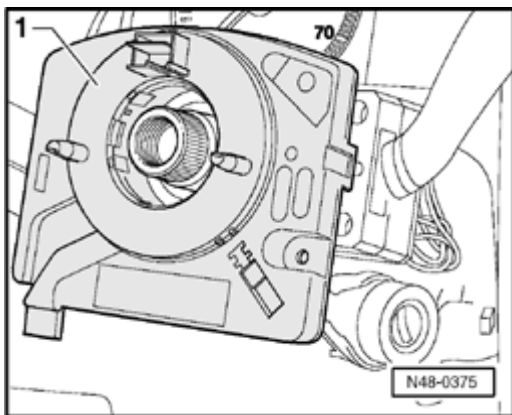


- Remove bolts -1-.
- Take off handle for height and reach adjustment -5-.
- Remove bolts -2-, -3- and -4-.
- Take off lower steering column switch trim.

45-113

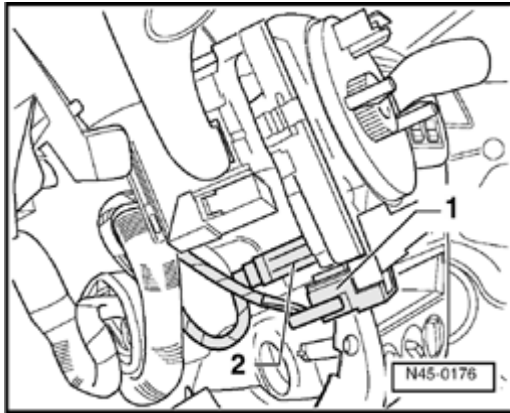


- ✦ - Take off upper steering column switch trim -1-.

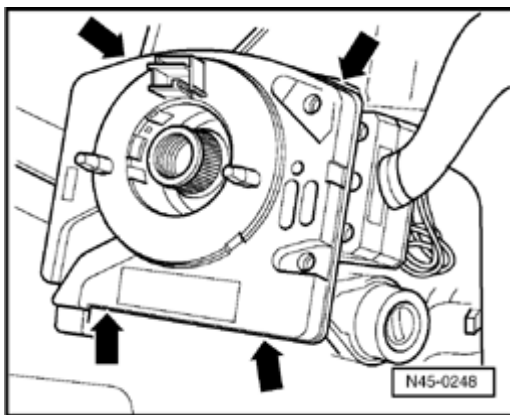


- ✦ The steering angle sensor -G85- is installed in a housing -1- together with the coil connector.

45-114



- ✦ - Disconnect connectors -1- and -2-
.

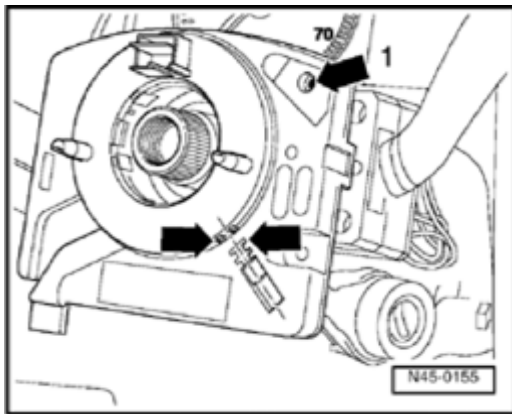


- ✦ - Carefully lift locking lugs (arrows) and pull off steering angle sensor -G85-.

Installing

The steering angle sensor -G85- must be in its centered position before installing.




- Install steering angle sensor -G85- until it engages.
- Remove transportation protection.
- A yellow mark must be visible in hole (arrow)
- The marks (arrows) must also align.



Make sure it does not move from centered position.

Further installation in reverse order

- Installing airbag module and steering column
- ⇒ [Repair Manual, Body Interior, Repair Group Airbag](#)
- Perform steering angle sensor -G85- basic settings.
- Connecting VAS 5051 and selecting function
- ⇒ [Page 45-38](#)

<p>V.A.G 1331</p> 	<p>V.A.G 1410</p> 
<p>V.A.G 1869/2</p> 	
	<p style="text-align: right;">W45-0003</p>

Front brakes

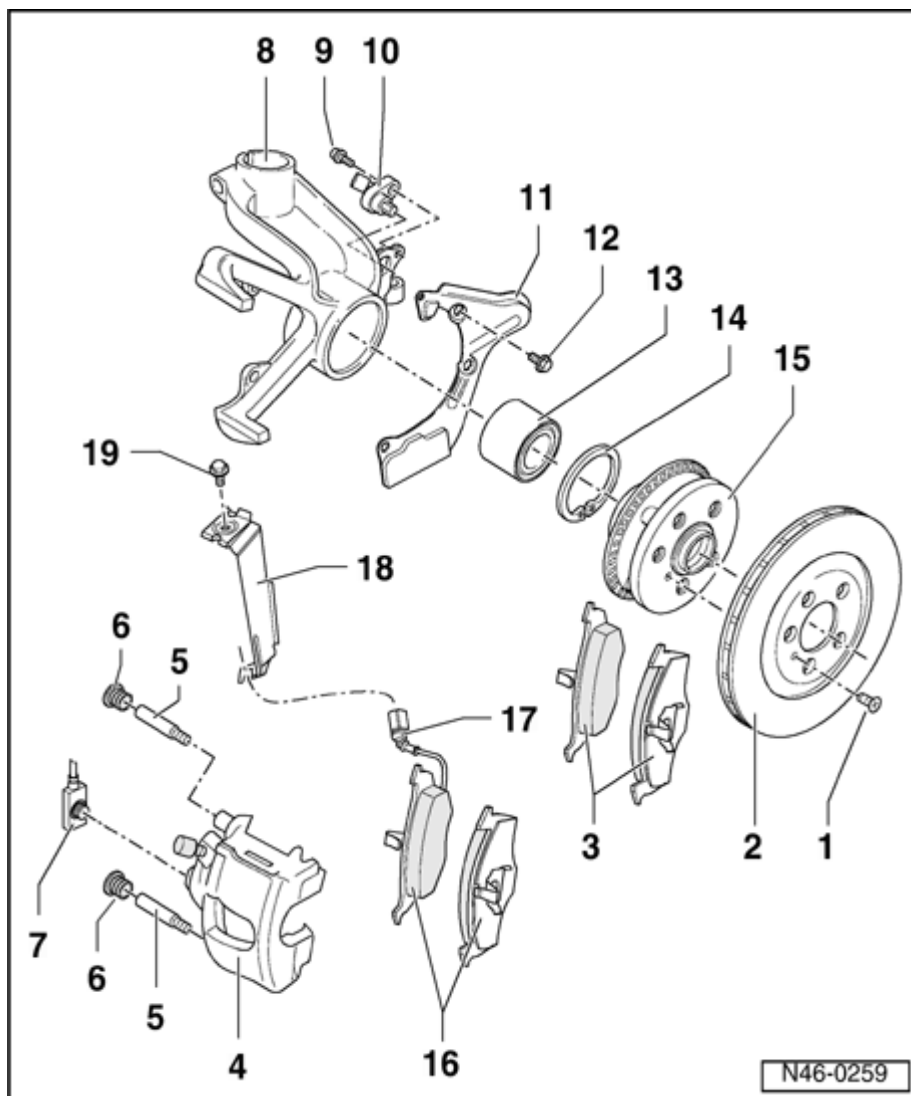
Front brakes, FS III brake caliper, assembly overview

Special tools and equipment

- ◆ VAG 1331 Torque wrench
- ◆ VAG 1410 Torque wrench
- ◆ VAG 1869/2 Brake pedal depressor

Special tools and equipment

- ◆ VAS 5234 Brake filler and bleeder unit

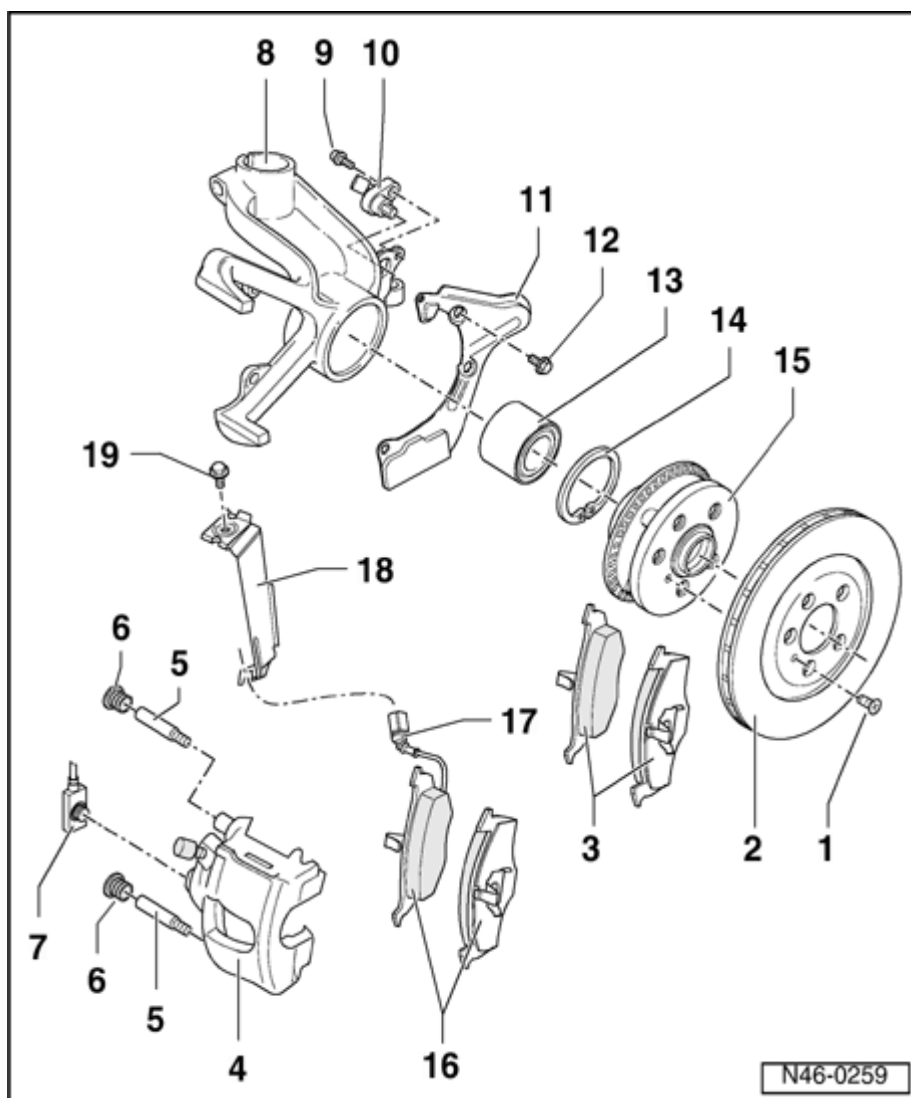
**Note:**

- ◆ After replacing brake pads, depress brake pedal firmly several times with vehicle stationary so that the brake pads are properly seated in their normal operating position.
- ◆ To draw off brake fluid from the reservoir, use brake filler and bleeder unit VAS 5234.
- ◆ Install brake pedal depressor VAG 1869/2 before removing a brake caliper or disconnecting a brake hose.
- ◆ Tightening torques for wheel bolts

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 44; Tightening wheel bolts](#)

1 - Phillips-

**head
screw, 4
Nm (35 in.
lb)**



2 - Brake disc

◆ Thickness
22 mm
(.866 in.)

◆ Wear limit:
19 mm
(.748 in.)

◆ When worn always replace both sides

◆ Remove brake caliper prior to removing

◆ Never remove brake discs from hub by force. If necessary use penetrating fluid, otherwise brake discs can be damaged.

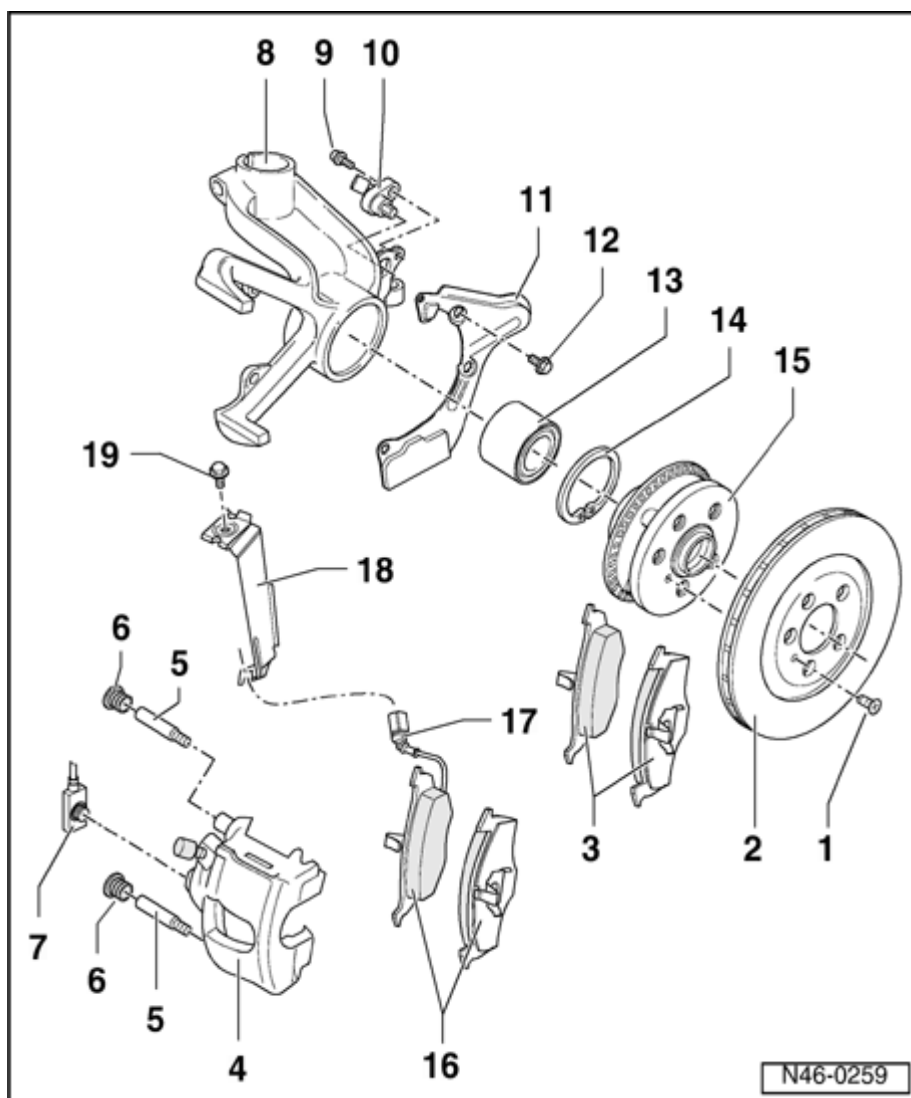
3 - Brake pads

◆ Thickness
19.7 mm
(.775 in.) including backing plate

- ◆ Checking thickness

⇒ *Repair Manual, Maintenance; Work sequences; Front and rear brake pads/linings; Checking thickness*

- ◆ Always replace both sides
- ◆ Removing and installing
⇒ [Page 46-9](#)
- ◆ Wear limit: 7 mm (.276 in.) including back plate



4 - Brake caliper

- ◆ Do not disconnect brake hose when changing brake pads

◆ Removing:

- Remove brake pads - item 3 - ⇒ [Page 46-9](#)

- Install brake pedal depressor VAG 1869/2

- Remove brake hose - item 7 - from brake caliper

◆ Installing:

- Install brake pads - item 3 - ⇒ [Page 46-10](#)

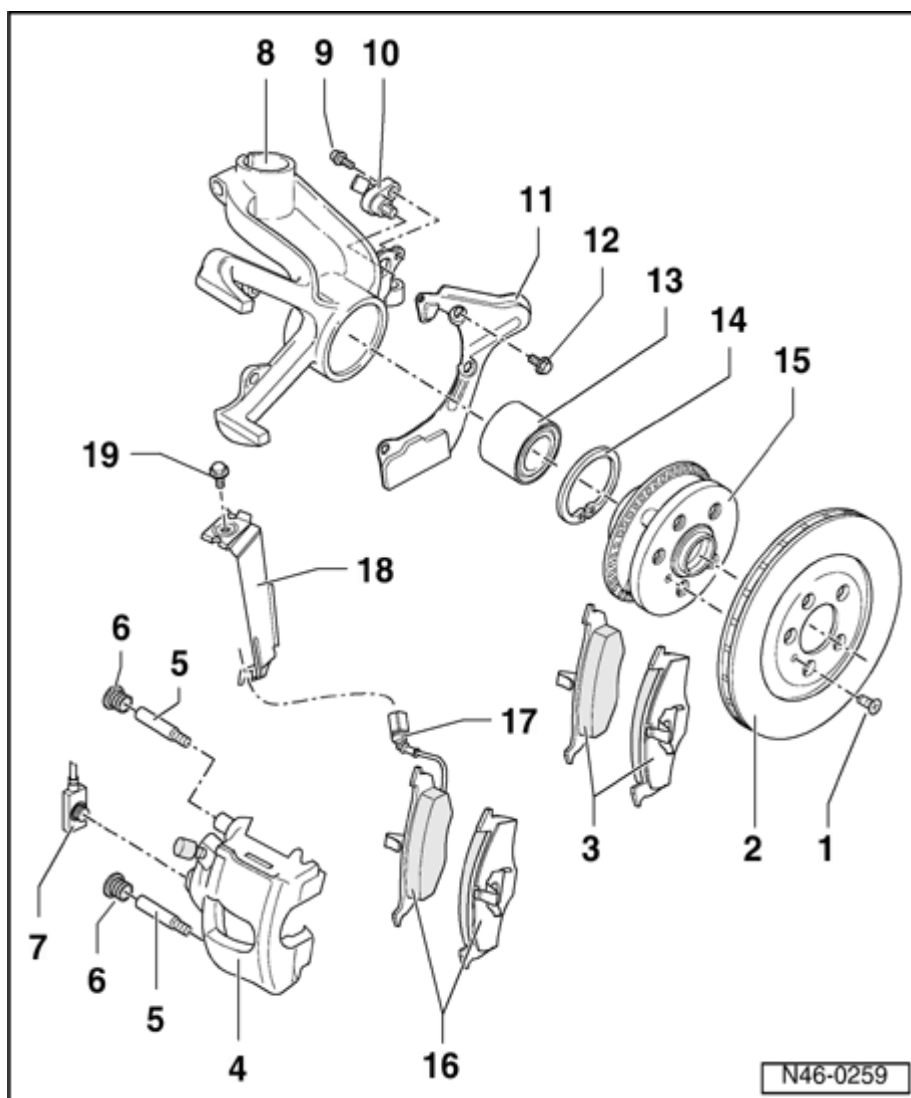
- Install brake hose - item 7 - onto brake caliper

- Remove
brake
pedal
depressor
VAG
1869/2

- Bleed
brake
system
Mark
60 ⇒
[Page
47-38](#)

◆ Servicing
⇒ [Page
47-1](#)

**5 - Guide
pins, 30
Nm
(22.1
ft.. lb)**



6 Protective - cap

◆ Remove

7 - Brake hose with banjo union and banjo bolt, 35 Nm (26 ft. lb)

◆ Always use new sealing washers

8 - Wheel bearing housing

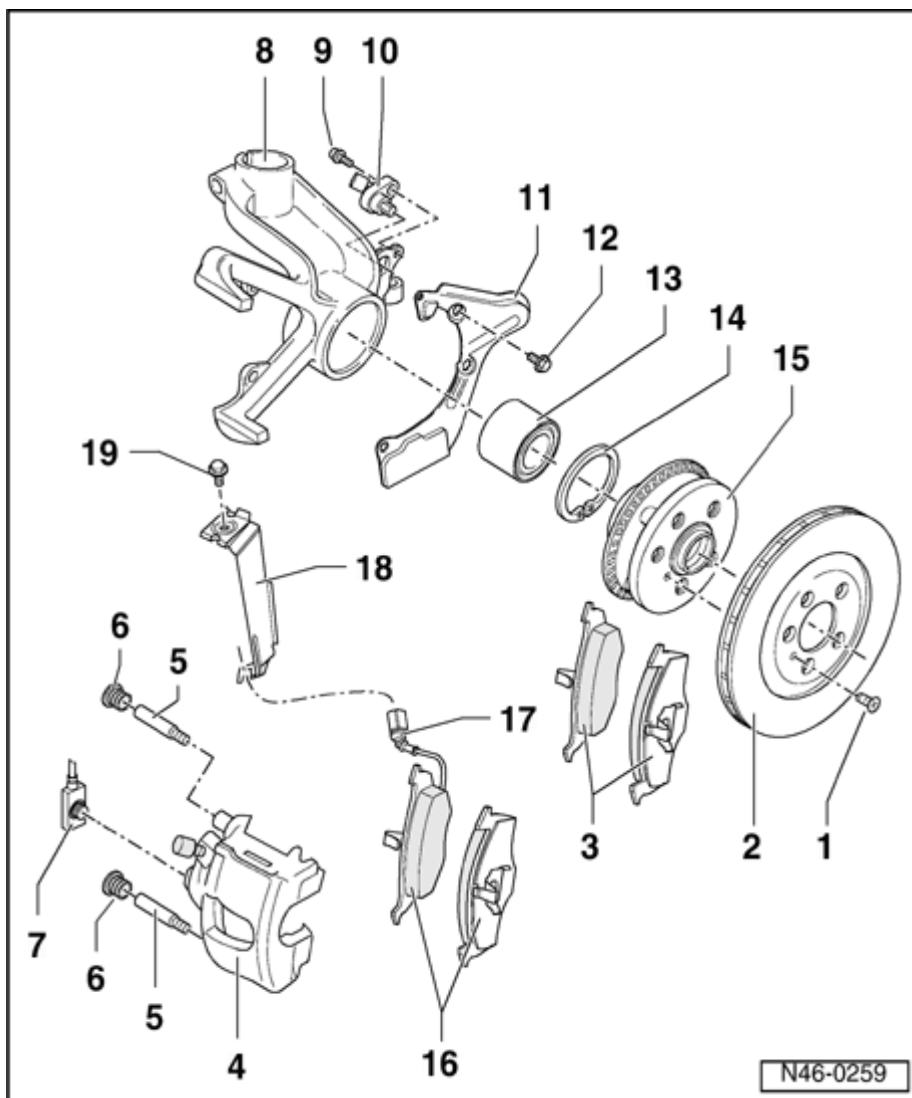
9 - Hex socket head bolt, 8 Nm (71 in. lb)

10 - ABS speed sensor

◆ Before inserting sensor, clean mounting hole inner surface and coat with lubricating paste G 000 650

11 - Splash plate

**12 - Hex
bolt, 10
Nm (89
in. lb)**



13 - Wheel bearing

◆ Replace each time after removing

◆ Pressing out and in

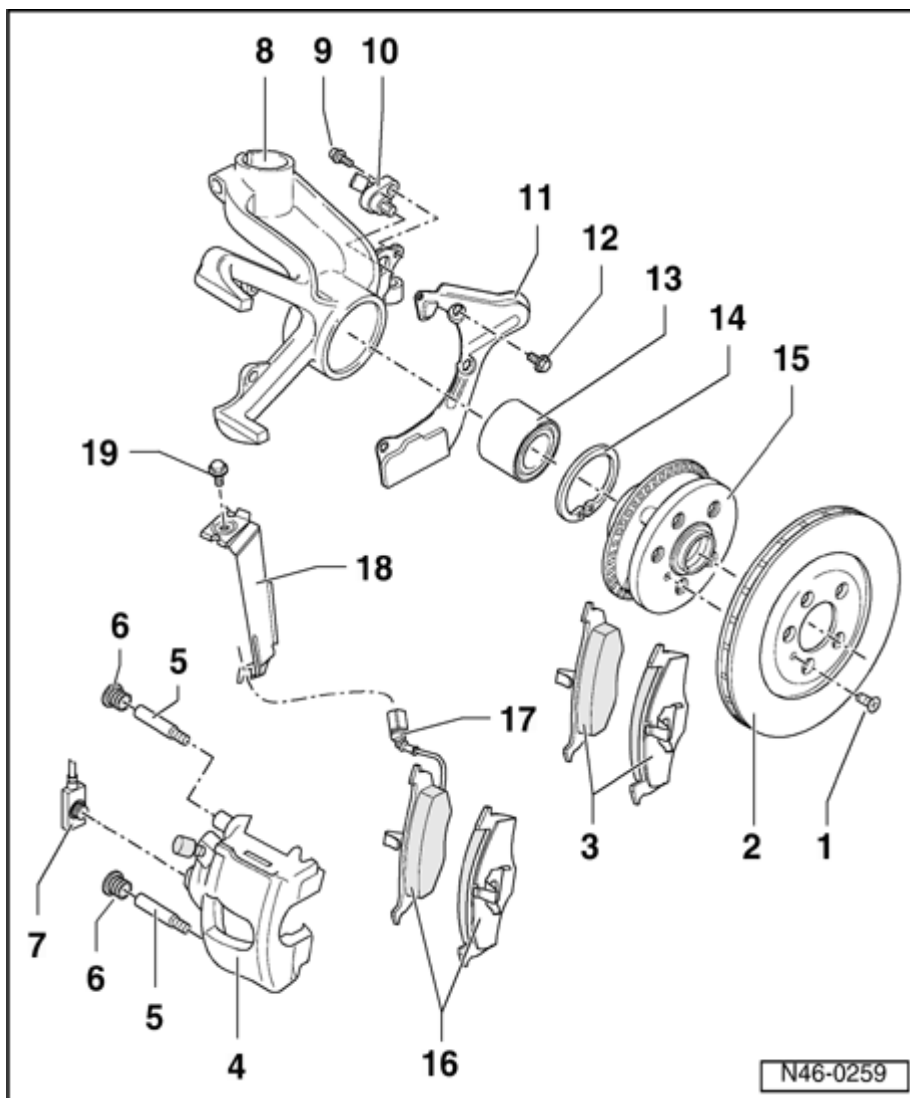
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front wheel suspension; III - Servicing wheel bearing](#)

14 - Circlip

15 - Wheel hub with rotor

◆ Pressing out and in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front wheel suspension; III - Servicing wheel bearing](#)



16 - Brake pads

- ◆ With wear indicator

- Warning lamp lights up on instrument panel when wear limit is reached (limit: 2 to 3 mm; 0.0787 to .118 in.)

- ◆ Thickness 19.7 mm (.775 in.) including backing plate

- ◆ Checking thickness

⇒ *Repair Manual, Maintenance; Work sequences; Front and rear brake pads/linings; Checking thickness*

- ◆ Always Replace both sides

- ◆ Removing and installing
⇒ [Page 46-9](#)

- ◆ Wear limit: 7 mm (.276 in.) including back plate

17 - Connector

- ◆ Remove from bracket - item 18 - when changing pads

18 - Bracket

19 - Bolt

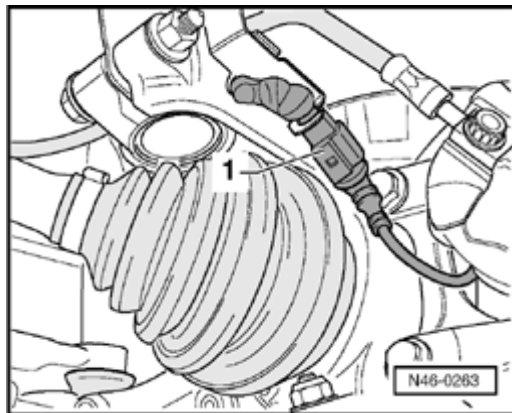
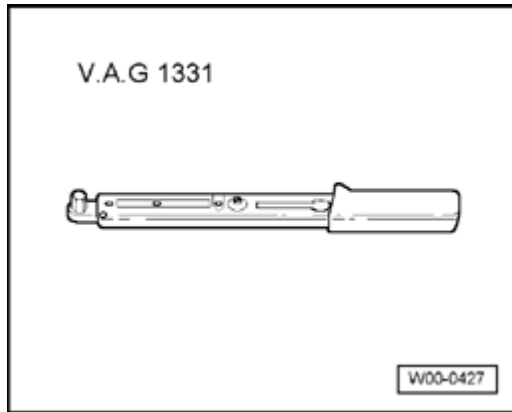
Front brake pads, removing and installing

Special tools and equipment

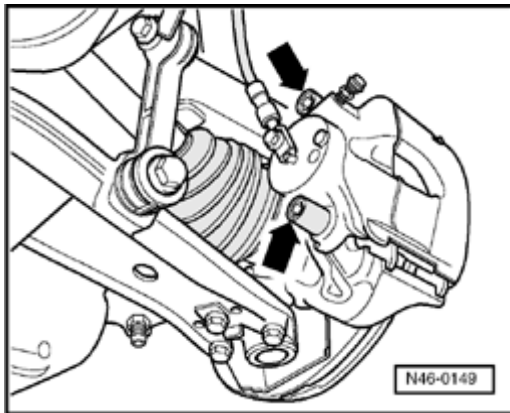
- ◆ VAG 1331 Torque wrench or equivalent
- ◆ Piston resetting tool

Removing

- Remove protective caps from guide pins.
-
- ◆ - Disconnect connector -1- on vehicles with brake pad wear indicator.



46-10



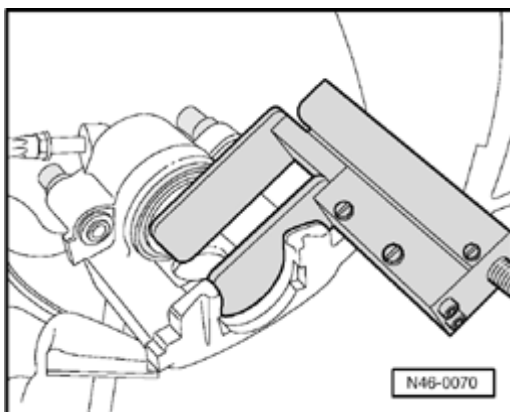
- Remove both guide pins (arrows) from brake caliper.
- Remove brake caliper housing and secure with wire so that the weight of the brake caliper does not stress or damage brake hose.
- Take brake pads out of brake caliper housing.

Use methylated spirit only for cleaning brake caliper housing.

Installing

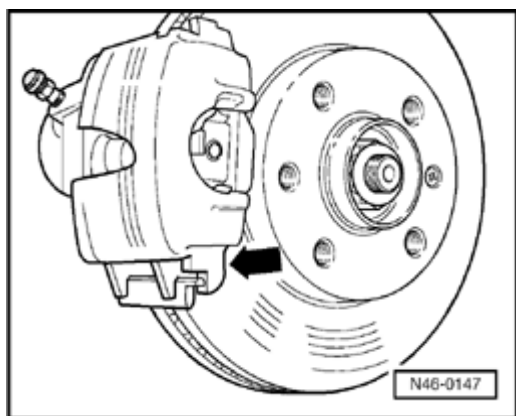
Note:

- ◆ *A new brake pad with a white mark on the back for use on the inner side (piston side) is being introduced gradually.*
- ◆ *Before inserting new brake pads, press piston back into the cylinder with piston resetting tool. Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise if reservoir has been topped off, fluid will overflow and cause damage.*



- Press piston back.
- The brake pad with the black three finger clip is to be used on the outer side of the brake caliper housing.

46-11



- Locate lower part of brake caliper housing (arrow) first.
- Install brake caliper housing with brake pads on wheel bearing housing.




The brake caliper housing lug (arrow) must be behind the wheel bearing housing guide.

- Secure brake caliper housing to brake carrier with both guide pins and tighten to 28 Nm (21 ft. lb)
- Insert brake wear indicator connector into bracket on suspension strut.

Note:

- ◆ *After each brake pad change firmly depress brake pedal several times with vehicle stationary, so that the brake pads are properly seated in their normal operating position.*
- ◆ *After changing brake pads check brake fluid level.*

46-12

<p>V.A.G 1331</p> 	<p>V.A.G 1410</p> 
<p>V.A.G 1869/2</p> 	
	<p>W46-0003</p>

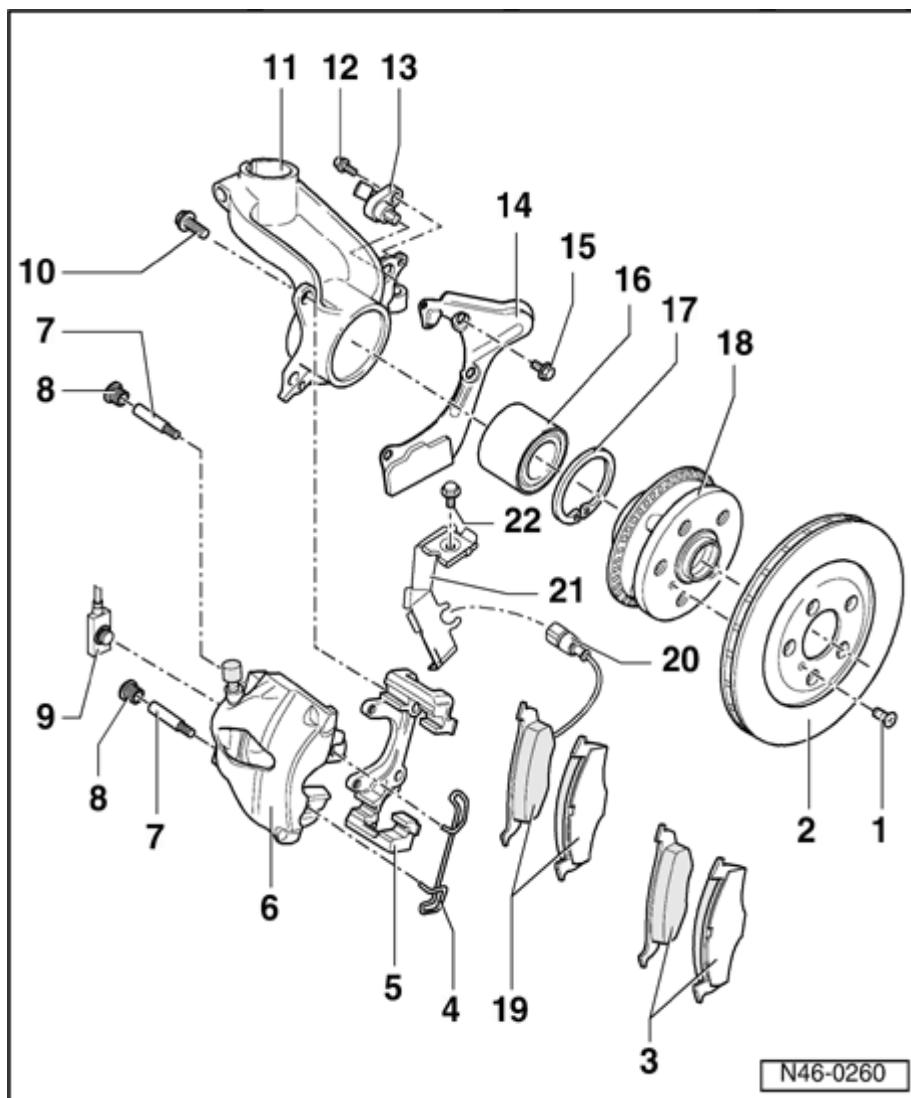
Front brakes, FN 3 brake caliper, servicing

Special tools and equipment

- ◆ VAG 1331
Torque
wrench or
equivalent
- ◆ VAG 1410
Torque
wrench or
equivalent
- ◆ VAG
1869/2
Brake
pedal
depressor
or
equivalent

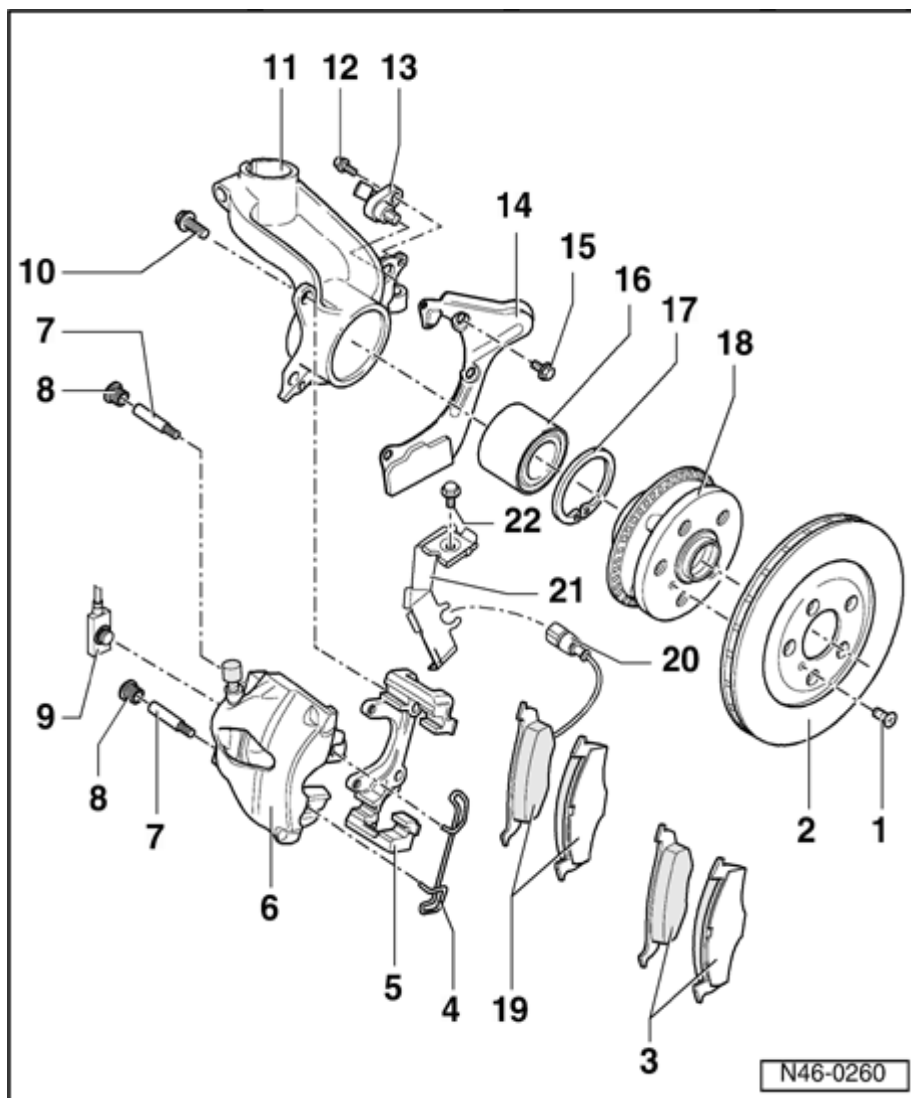
Special tools and equipment

- ◆ VAS 5234 Brake filler and bleeder unit

**Note:**

- ◆ After replacing brake pads, depress brake pedal firmly several times with vehicle stationary so that the brake pads are properly seated in their normal operating position.
- ◆ To draw off brake fluid from the reservoir, use brake filler and bleeder unit VAS 5234 or extraction unit VAG 1869/4.
- ◆ Install brake pedal depressor VAG 1869/2 before removing a brake caliper or disconnecting a brake hose.

1 - Phillips-head screw, 4 Nm (35 in. lb)



2 - Brake disc

- ◆ Thickness 25 mm (.984 in.)
- ◆ Wear limit: 22 mm (.866 in.)
- ◆ When worn always replace both sides

3 - Brake pads

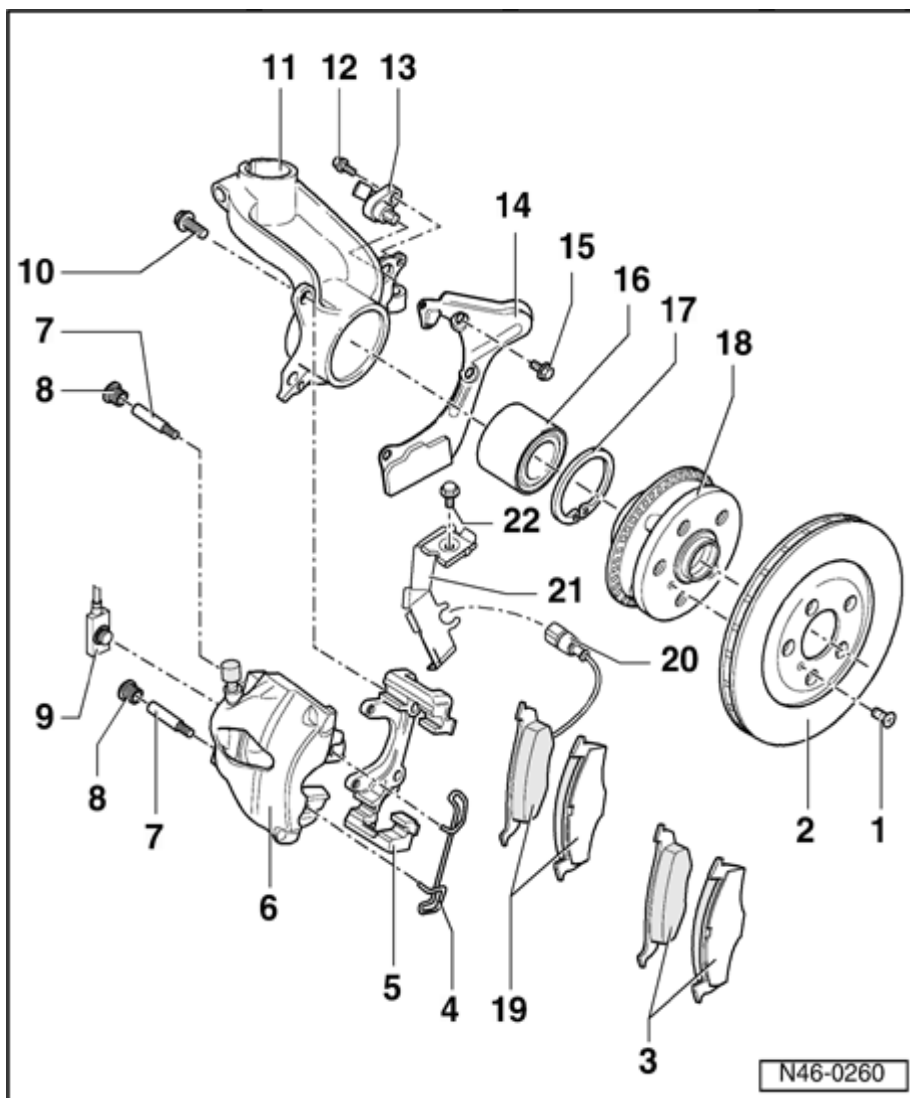
- ◆ Thickness 19.7 mm (.775 in.) including backing plate
- ◆ Checking thickness

⇒ *Repair Manual, Maintenance; Work sequences; Front and rear brake pads/linings; Checking thickness*

- ◆ Always replace both sides
- ◆ Removing and installing ⇒ [Page](#)

[46-20](#)

- ◆ Wear
limit: 7
mm
(.276 in.)
including
back
plate



4 - Retaining spring

- ◆ Insert in both brake caliper housing holes

5 - Brake carrier

6 - Brake caliper housing

- ◆ Do not disconnect brake hose when changing brake pads

◆ Removing:

- Remove brake pads - item 3 - ⇒ [Page 46-20](#)

- Install brake pedal depressor VAG 1869/2

- Unscrew brake hose - item 9 - from brake caliper

◆ Installing:

- Install

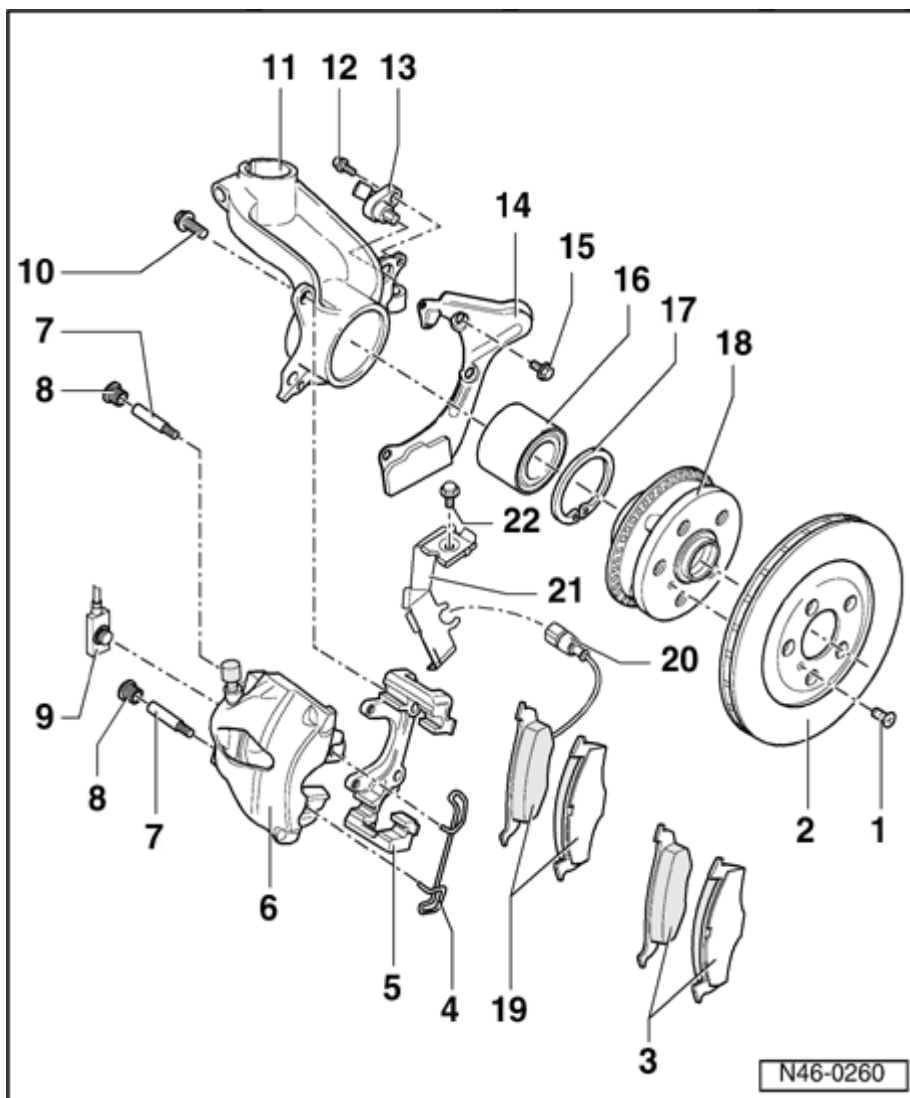
brake
pads
-item
3 - ⇒
[Page
46-22](#)

- Install
brake
hose -
item 9
- on
brake
caliper

- Remove
brake
pedal
depressor
VAG
1869/2

- Bleed
brake
system
Mark
60 ⇒
[Page
47-38](#)

◆ Servicing
⇒ [Page
47-6](#)



7 - Guide pins, 28 Nm (21 ft. lb)

◆ Removing and installing ⇒ [Page 46-20](#)

8 Protective - cap

◆ Remove

9 - Brake hose with banjo union and banjo bolt, 35 Nm (26 ft. lb)

10 - Ribbed combi bolt, 125 Nm (92 ft. lb)

11 - Wheel bearing housing

12 - Hex socket head bolt, 8 Nm (71 ft. lb)

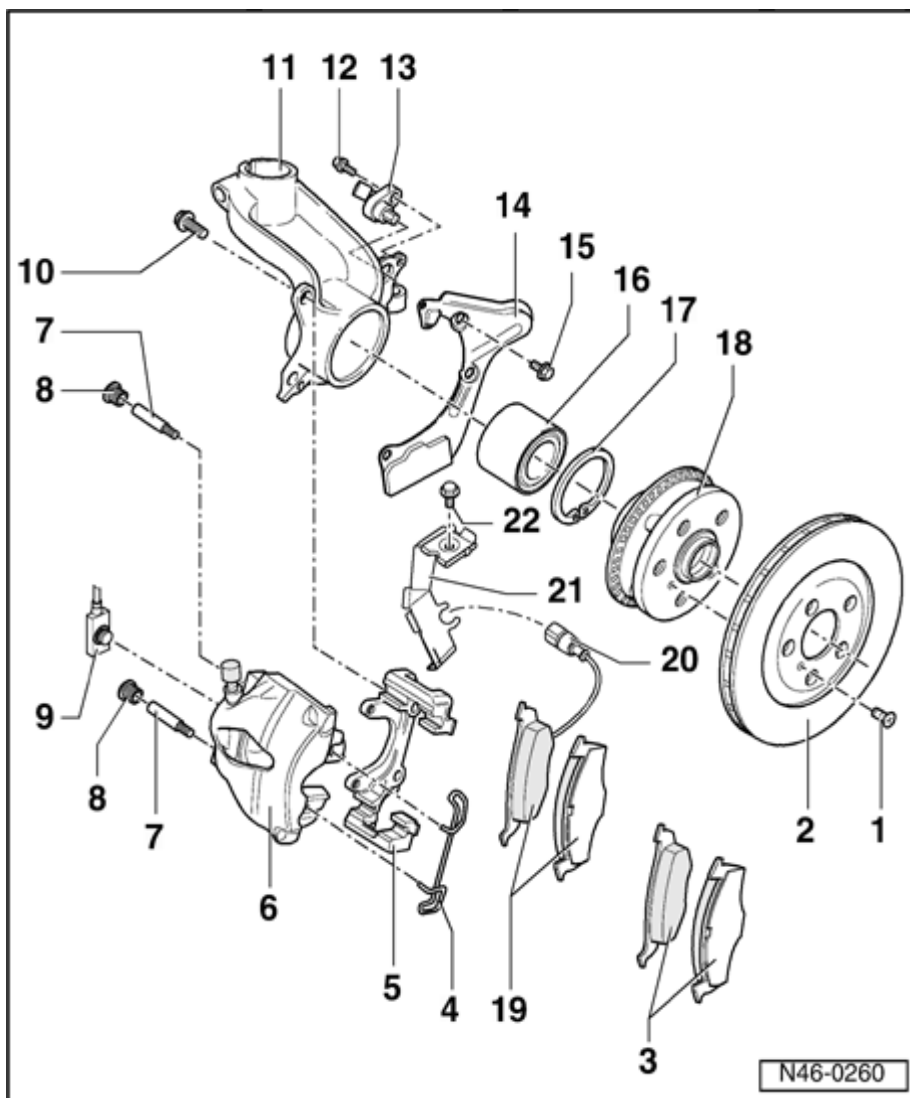
13 - ABS speed sensor

◆ Before inserting sensor, clean

mounting
hole inner
surface
and coat
with
lubricating
paste G
000 650

**14 - Splash
plate**

**15 - Hex
bolt, 10
Nm (7.4
ft. lb)**



16 - Wheel bearing

- ◆ Replace each time after removing

- ◆ Pressing out and in

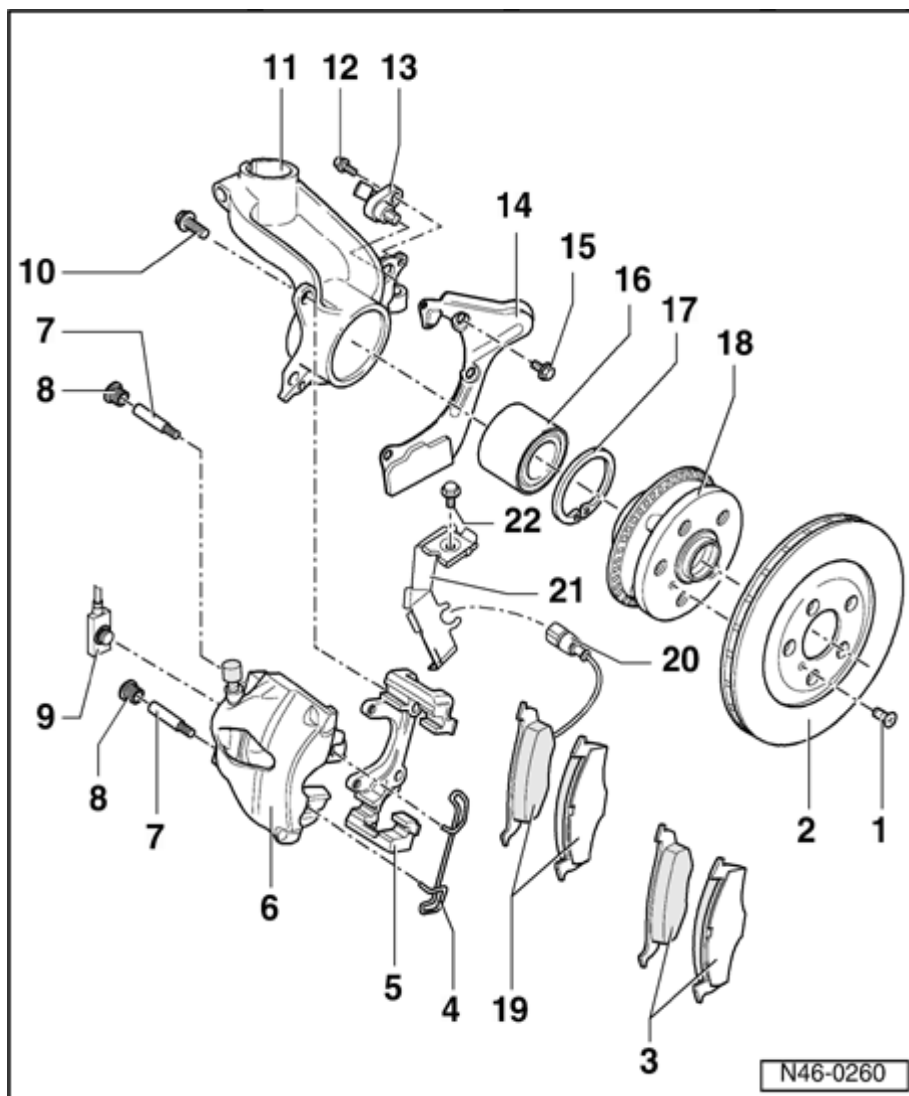
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front wheel suspension; II - Servicing wheel bearing](#)

17 - Circlip

18 - Wheel hub with rotor

- ◆ Pressing out and in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front wheel suspension; II - Servicing wheel bearing](#)



19 - Brake pads

- ◆ With wear indicator

- Warning lamp lights up on instrument panel when wear limit is reached (limit: 2 to 3 mm; 0.0787 to .118 in.).

- ◆ Thickness 19.7 mm (.775 in.) including backing plate

- ◆ Checking thickness

⇒ *Repair Manual, Maintenance; Work sequences; Front and rear brake pads/linings; Checking thickness*

- ◆ Always replace both sides

- ◆ Removing and installing
⇒ [Page 46-20](#)

- ◆ Wear limit: 7 mm (.276 in.) including back plate

20 - Connector

- ◆ Remove from bracket - item 21 - when changing brake pads

21 - Retainer

22 - Bolt

Brake pads, removing and installing

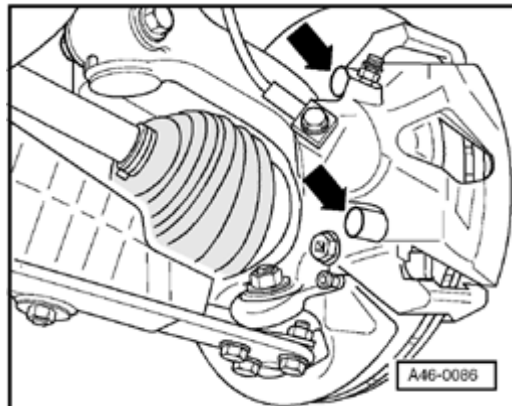
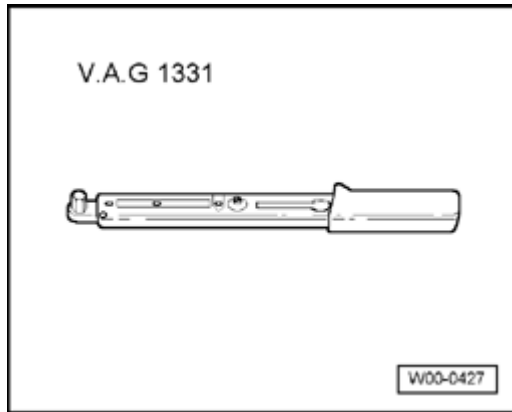
Special tools and equipment

- ◆ VAG 1331 Torque wrench or equivalent
- ◆ Piston resetting tool

Removing

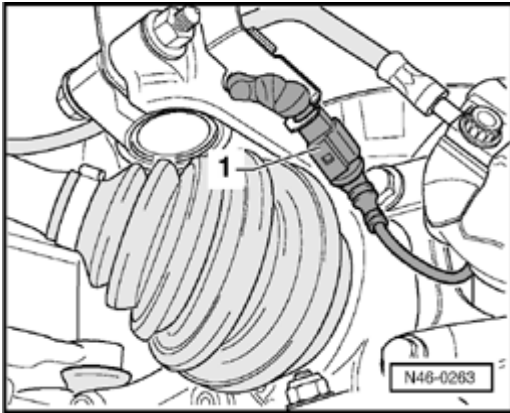
Note:

If reusing brake pads mark location and install in same position when installing otherwise uneven braking may occur!

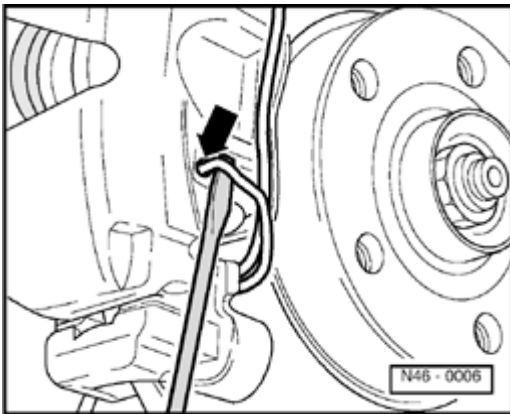


- Remove protective caps (arrows).

46-21

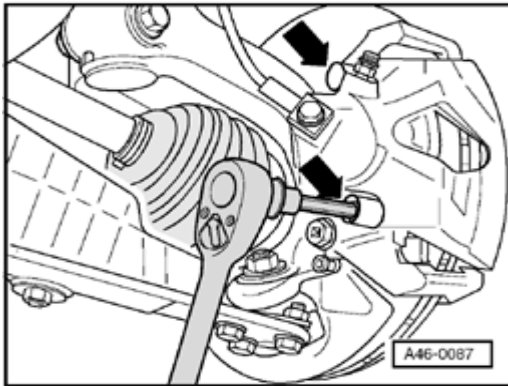


- Disconnect connector -1- on vehicles with a brake pad wear indicator.



- Pry brake pad retaining spring out from brake caliper housing (arrow) with a screwdriver and remove.

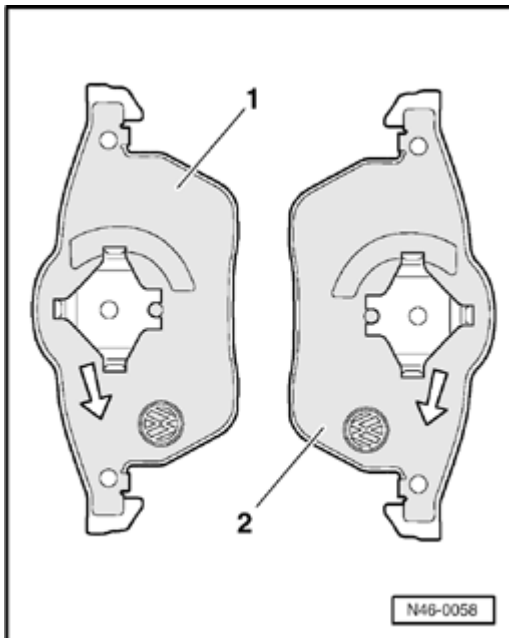
46-22



- Remove both guide pins (arrows) from brake caliper.
- Remove brake caliper housing and secure with wire so that the weight of the brake caliper does not stress or damage brake hose.
- Remove brake pads out of brake caliper housing or from brake carrier.
- Clean brake caliper housing, in particular the bonding surface for the brake pad. It must be free of adhesive and grease residues.

Use methylated spirit only for cleaning the brake caliper housing.

Installing



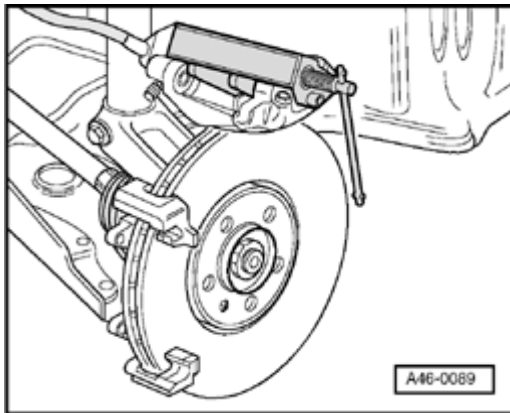
Brake pads with specified direction of rotation

- 1 - Right-hand piston side brake pad
- 2 - Left-hand piston side brake pad

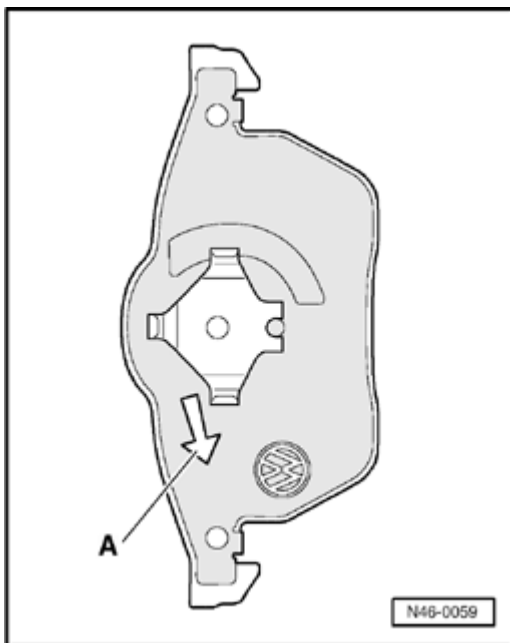
Note:

Before inserting new brake pads, press piston back into the cylinder with resetting tool. Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise if reservoir has been topped off, fluid will overflow and cause damage.

46-23

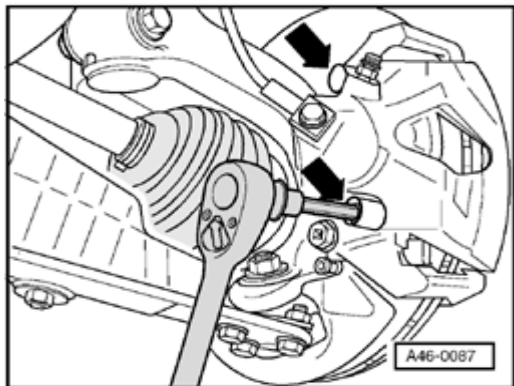


- ✦ - Pressing piston back.
- Insert brake pads.



- ✦ **When installed the arrow on the brake pad backplate -A- must point downward. Make sure this is installed correctly!**
- Install outer brake pad to brake carrier.
- Remove protective foil off outer brake pad backplate.




46-24



- Secure brake caliper housing to brake carrier with both guide pins and tighten to 28 Nm (21 ft. lb).
- Install both protective caps.
- Insert retaining spring into brake caliper housing.
- Insert brake wear indicator connector into bracket on suspension strut.

Note:

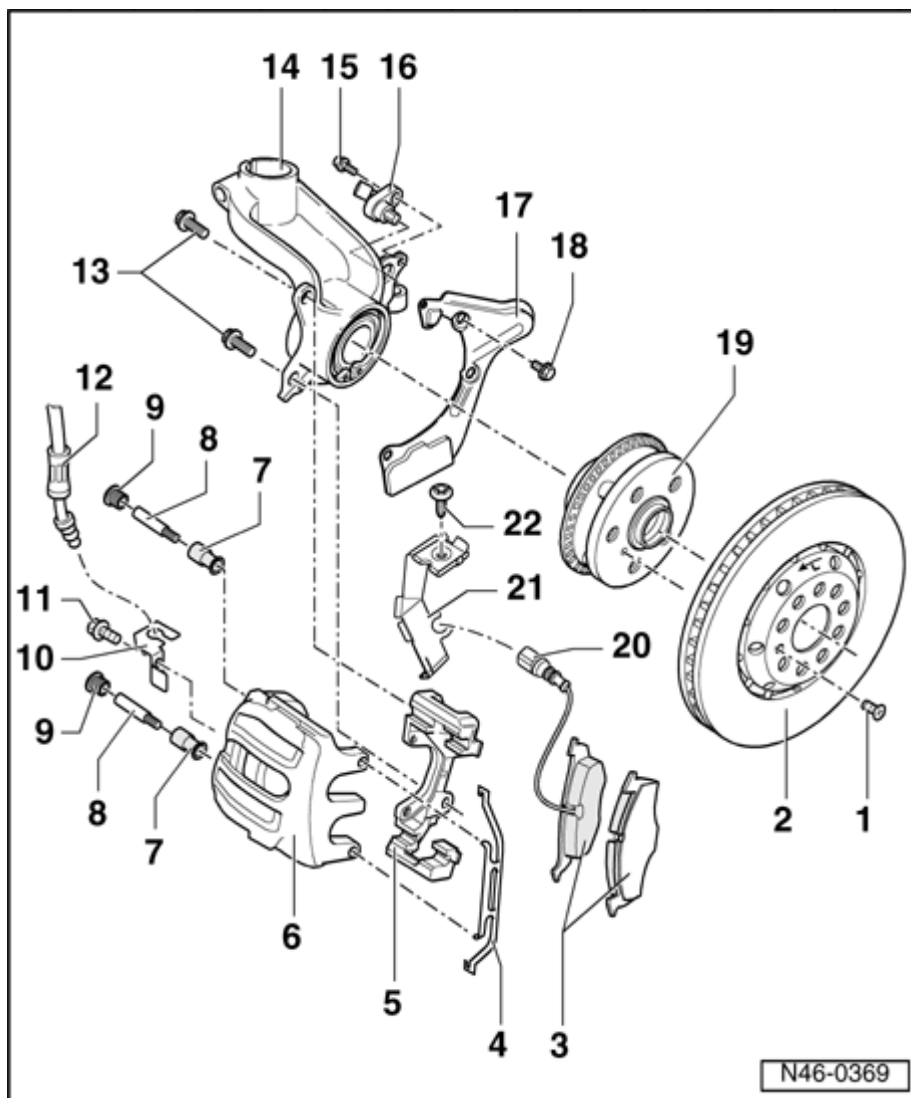
- ◆ *After each brake pad change firmly depress brake pedal several times with vehicle stationary, so that the brake pads are properly seated in their normal operating position.*
- ◆ *After changing brake pads check brake fluid level.*

<p>V.A.G 1331</p> 	<p>V.A.G 1410</p> 
<p>V.A.G 1869/2</p> 	
	<p style="text-align: right;">W45-0003</p>

**Front
brakes, 2FN
brake
caliper,
servicing**

**Special tools
and
equipment
required**

- ◆ V.A.G 1331 Torque wrench
- ◆ V.A.G 1410 Torque wrench
- ◆ V.A.G 1869/2 Brake pedal depressor

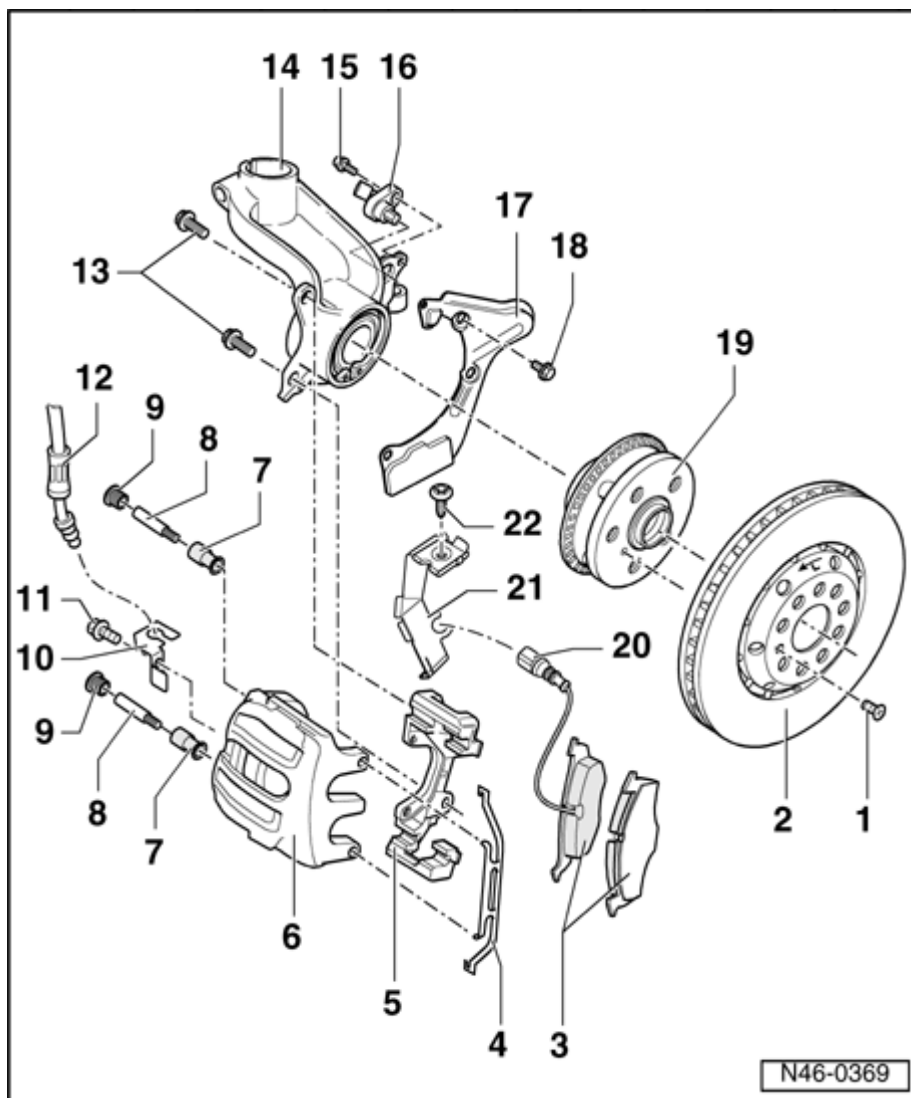
**Note:**

- ◆ After replacing brake pads, depress brake pedal firmly several times with vehicle stationary so that the brake pads are properly seated in their normal operating position.
- ◆ To draw off brake fluid from the reservoir, use brake charge and bleed unit VAS 5234 or extraction unit V.A.G 1869/4.
- ◆ install brake pedal depressor V.A.G 1869/2 before removing a brake caliper or disconnecting a brake hose.
- ◆ Wheel bolt tightening torque

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 44; Torque setting](#)

[for wheel bolts](#)

**1 - Phillips-
head
screw, 4
Nm**



2 - Brake disc

- ◆ Ventilated brake disc: diameter 334 mm
- ◆ Brake disc thickness: 32 mm
 - ◆ Wear limit: 30 mm
- ◆ Always replace both sides

- ◆ Left is different from right. Arrow points in direction of normal travel

- ◆ Remove brake caliper prior to removing

3 - Brake pads

- ◆ With wear indicator

- Warning lamp lights up on instrument

panel
when
wear limit
is reached
(limit: 2 to
3 mm)

◆ Thickness
19.7 mm
(.775 in.)
including
backing
plate

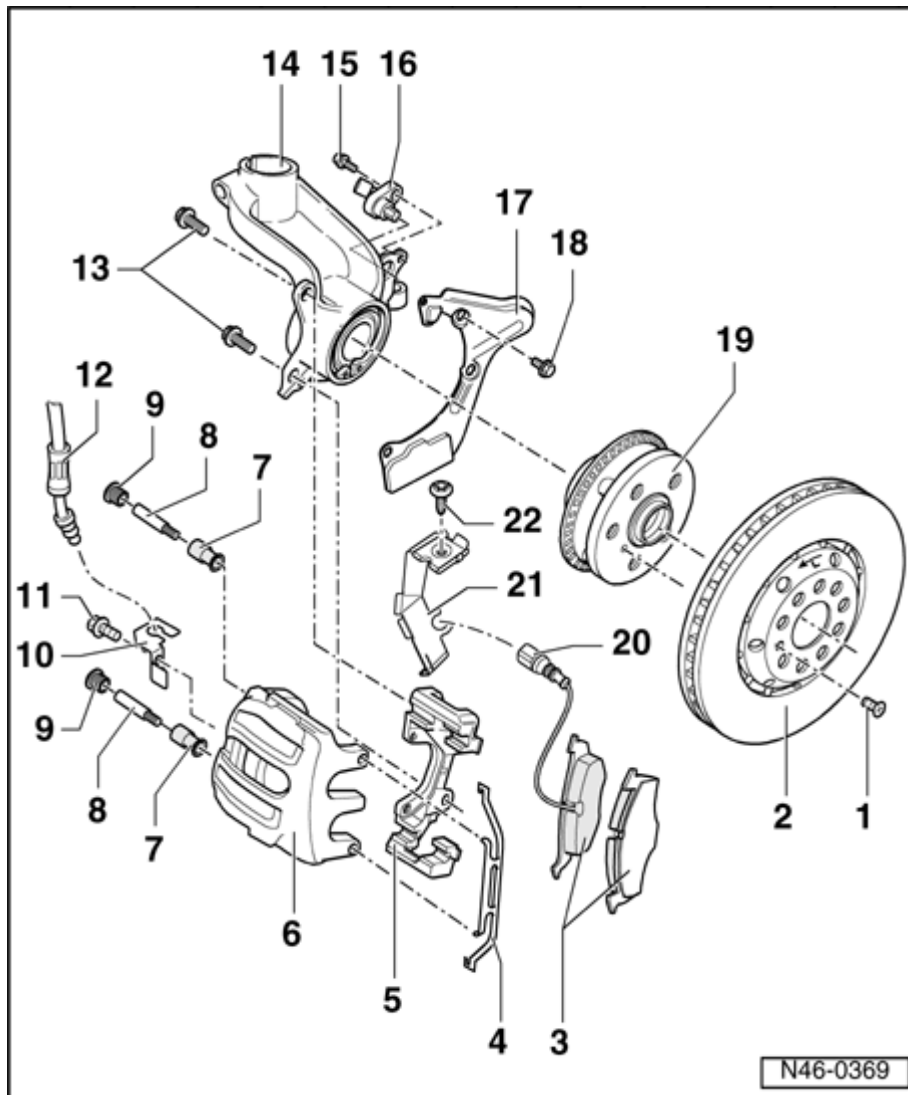
◆ Checking
thickness

⇒ [Repair
Manual,
Maintenance](#)

◆ Always
replace
both
sides

◆ Removing
and
installing
⇒ [Page
46-33](#)

◆ Wear
limit: 7
mm
including
backing
plate



4 - Retaining spring

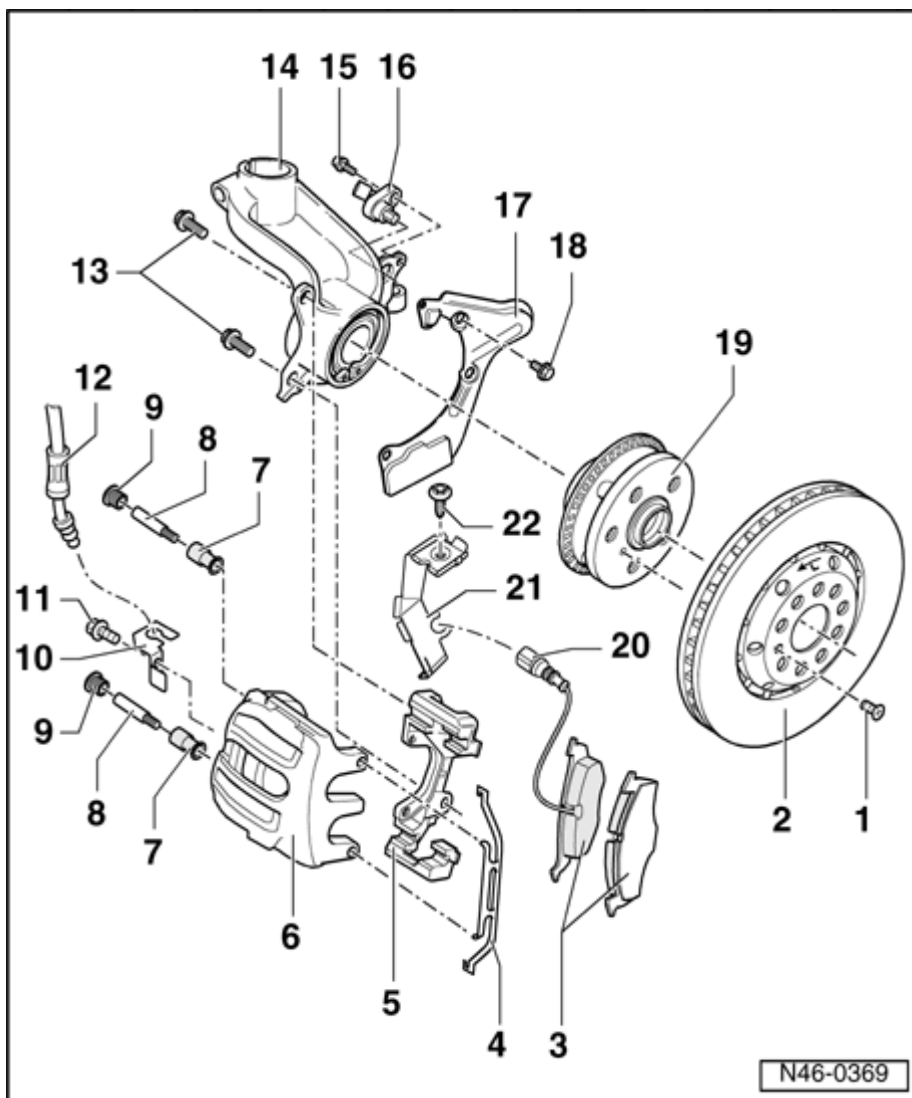
- ◆ Insert in both brake caliper housing holes

Note:

The retaining spring must be pushed under the brake carrier after inserting into both holes. Faulty installation will not allow compensation of outer pad wear and therefore the pedal travel increases.

5 - Brake carrier

- ◆ Bolt to wheel bearing housing



6 - Brake caliper housing

◆ Do not disconnect brake hose when changing brake pads

◆ Removing:

- Remove brake pads - item 3 - ⇒ [Page 46-33](#)

- Install brake pedal depressor V.A.G 1869/2

- Remove brake hose - item 7 - from brake caliper

◆ Installing:

- Install brake pads - item 3 - ⇒ [Page 46-33](#)

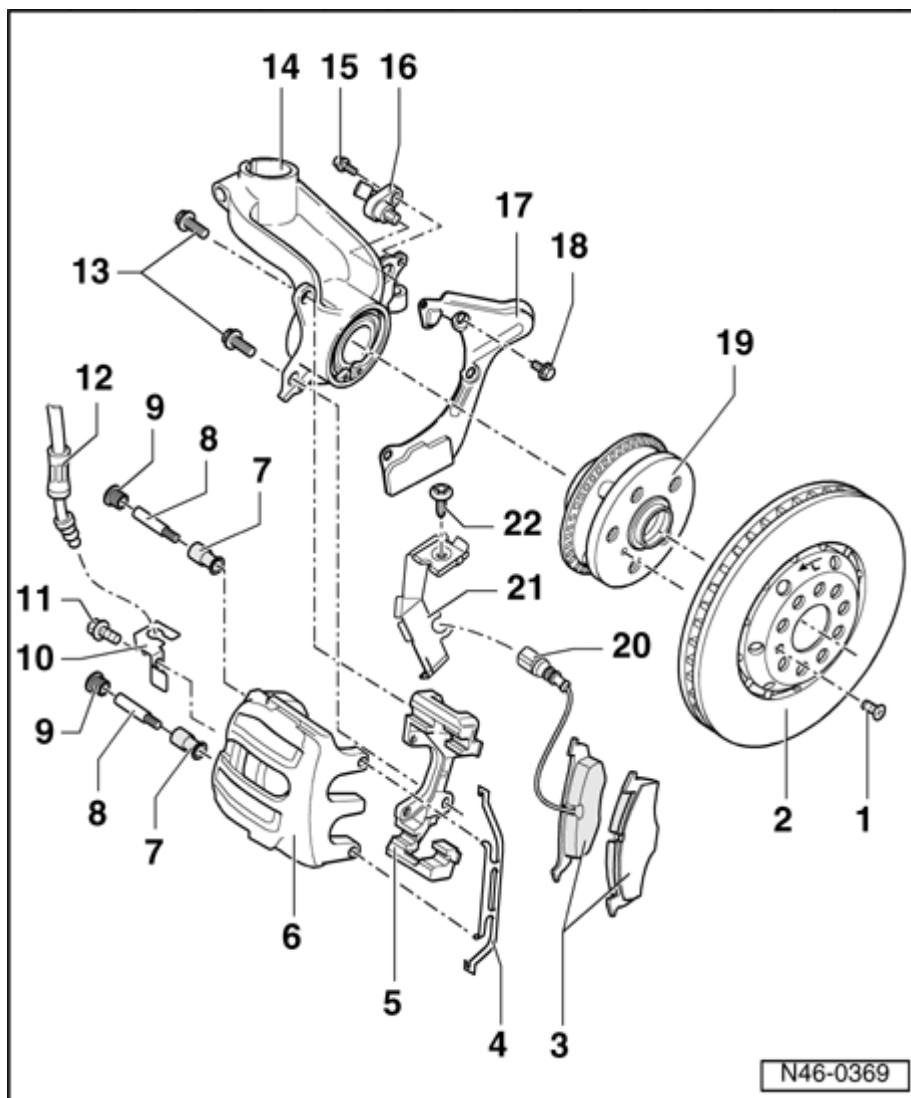
- Install brake hose - item 7 - onto brake

caliper

- Remove
brake
pedal
depressor
V.A.G
1869/2

- Bleeding
brake
system
Mark 60
⇒ [Page
47-38](#)

◆ Servicing
⇒ [Page
47-12](#)



7 - Bearing bushing

8 - Guide pins, 25 Nm

9 Protective - cap

◆ Remove

◆ Upper protective cap with cable holder for brake pad wear indicator

10 - Retainer

◆ Bolt to brake caliper housing

11 - Hex bolt, 8 Nm

12 Brake - hose/line

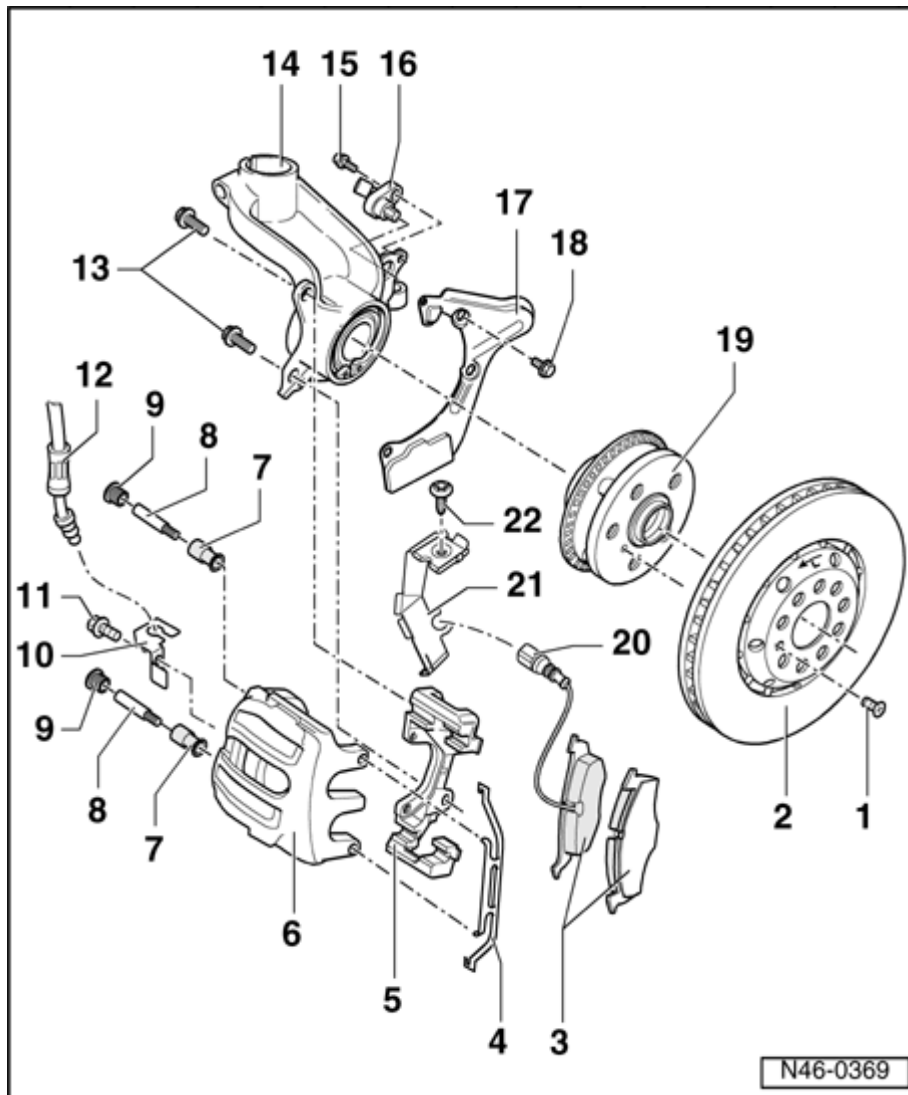
◆ Screw into brake caliper housing

◆ Do not disconnect brake hose when changing brake pads

13 - Ribbed combi bolt, 125 Nm

- ◆ Clean
if
reusing

46-31



14 - Wheel bearing housing

15 - Hex socket head bolt, 8 Nm

16 - ABS speed sensor

◆ Before inserting sensor, clean mounting hole inner surface and coat with lubricating paste G 000 650

17 - Splash plate

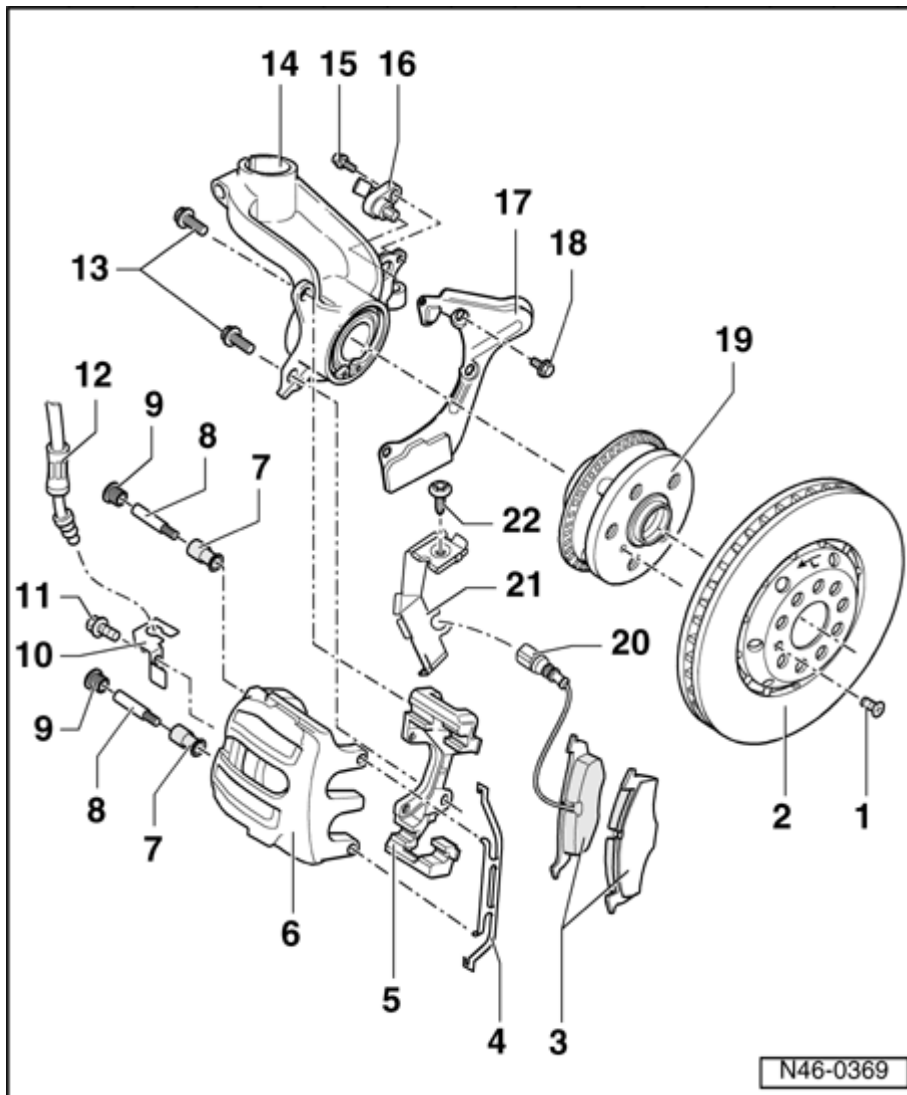
18 - Hex bolt, 10 Nm

19 - Wheel hub with rotor

◆ Pressing out and in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40; Servicing front suspension; III - Servicing](#)

[wheel
bearings](#)



20
_ Connector

21 - Bracket

22 - Bolt

Brake pads, removing and installing

Special tools and equipment required

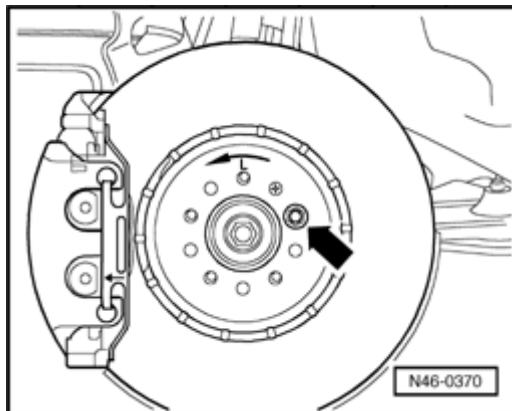
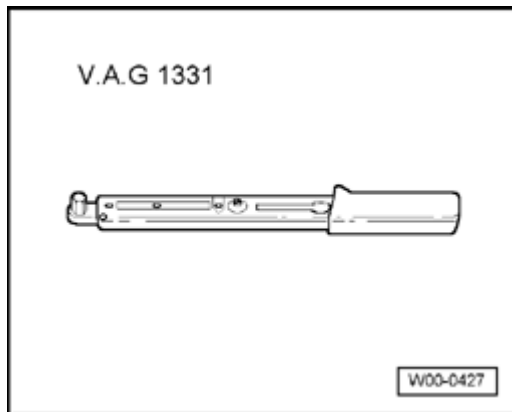
- ◆ V.A.G 1331 Torque wrench
- ◆ Piston resetting tool

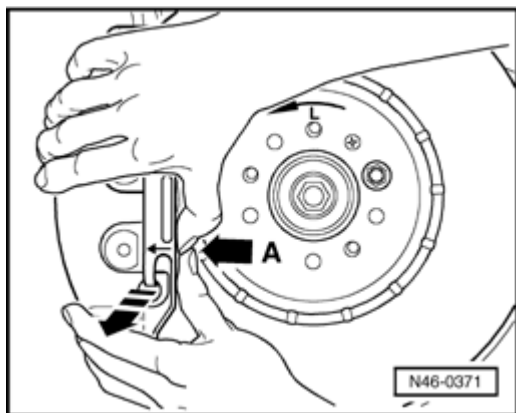
Removing

Note:

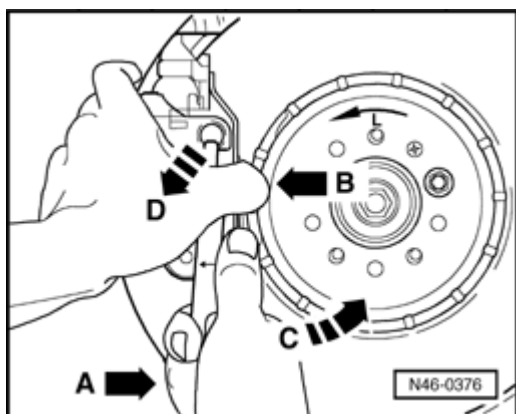
If reusing brake pads mark location and install in same position when installing otherwise uneven braking will occur!

- Remove wheels.
- Secure brake disc using a wheel bolt.



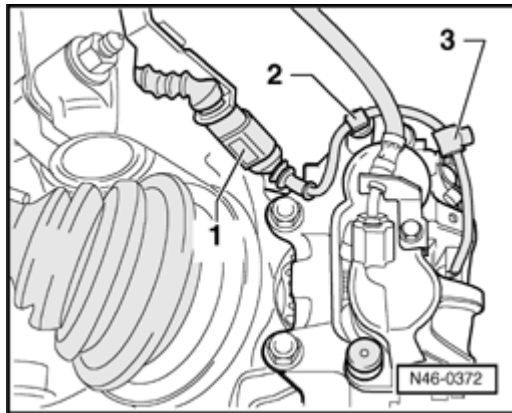


- Press retaining spring so far in direction of (arrow -A-) until it can be pressed out of the bore of the brake caliper.

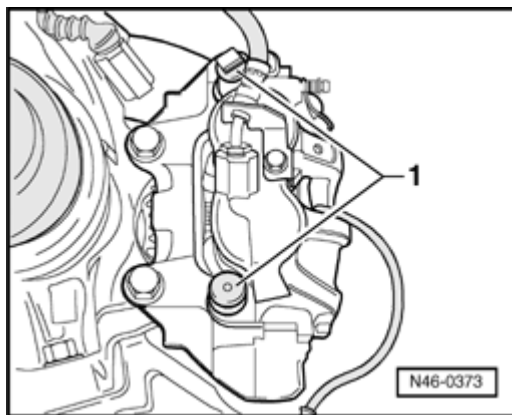


- Then, pull bottom of retaining spring in direction of (arrow -A-) and hold this position. Now press top of retaining spring in direction of (arrow -B-). At the same time, the retaining spring must be turned slightly counter-clockwise and be pulled out of the bore of the brake caliper (arrow -D-).

46-35



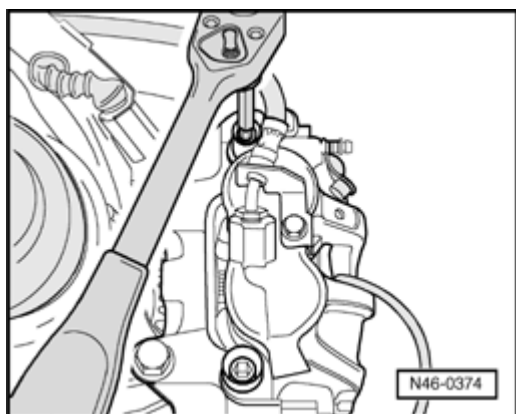
- Separate connector -1- from brake pad wear indicator.
- Remove harness for brake lining wear indicator from retainer -2- of the upper cap and out of retainer -3- of the protective cap.



- Remove protective caps -1-.

Note:

Upper protective cover with cable holder for brake pad wear indicator



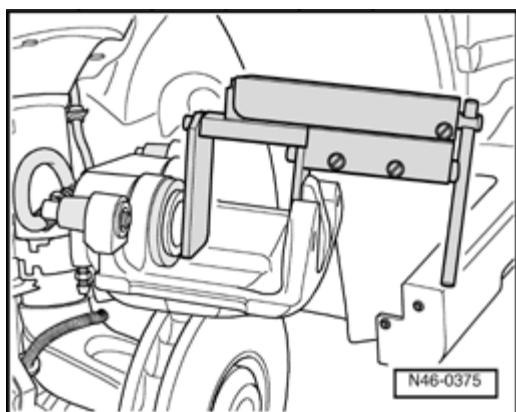
- ✦ - Remove both guide pins from brake caliper.
- Take off brake caliper housing and lay to one side so that the weight of the brake caliper does not stress or damage brake hose.
- Take brake pads out of brake caliper housing or from brake carrier.

Use methylated spirit only for cleaning brake caliper housing.

Installing

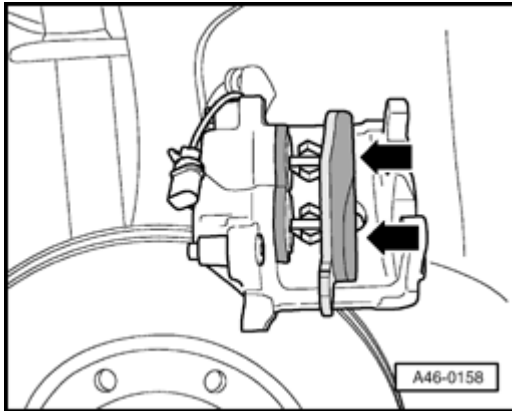
Note:

Before inserting new brake pads, press piston back into the cylinder with resetting tool. Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise particularly if reservoir has been topped off, fluid will overflow and cause damage.

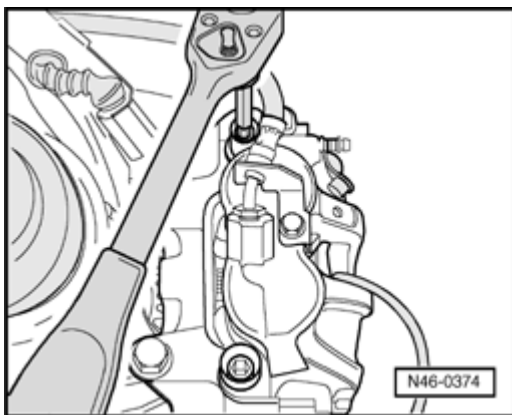


- ✦ - Press piston back.

46-37



- Insert brake pad with retaining spring in brake caliper housing (piston).
- Install outer brake pad to brake carrier.

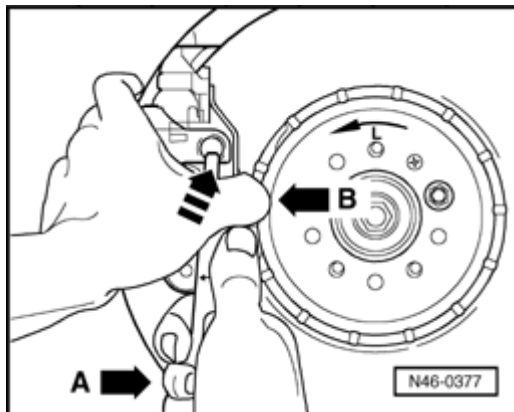


- Bolt brake caliper housing to brake carrier with both guide pins.
- Install both protective caps.

Note:

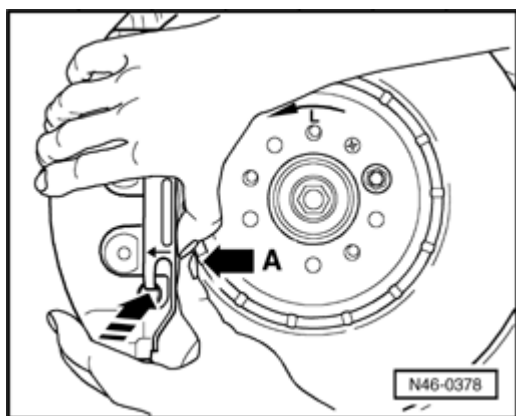
Upper protective cover with cable holder for brake pad wear indicator.

- Insert brake pad wear indicator connector dust cap of bleeder valve, in upper protection cap and in bracket on brake caliper.
- Join connector for brake wear indicator.



- Place top of retaining spring against brake caliper carrier. Then, press the top of retaining spring in direction of (arrow -B-) and simultaneously hold the bottom in opposite direction of (arrow -A-). Now, press the retaining spring into the bore of the brake caliper.

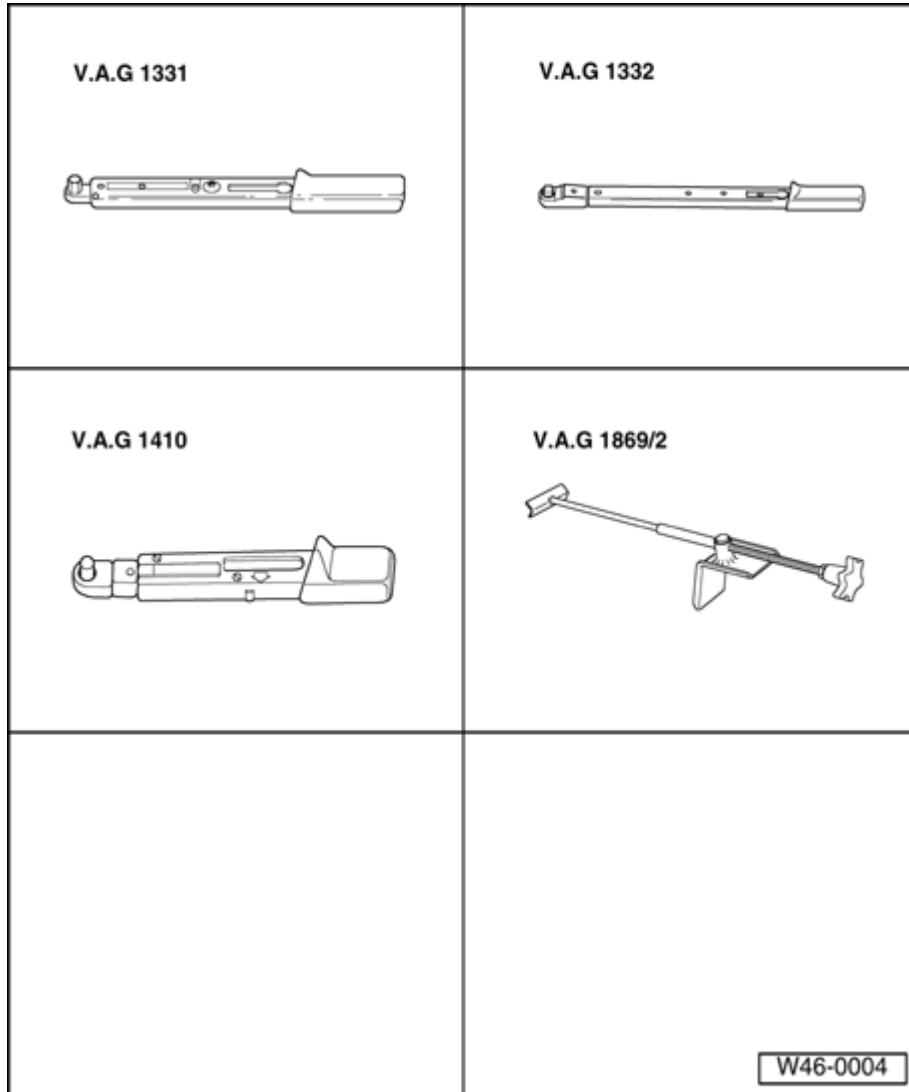
46-39



- Place the bottom of retaining spring against brake caliper carrier. Then, press retaining spring in direction of (arrow -A-) first, and then simultaneously into the bore of the brake caliper.
- Install wheels.

Note:

- ◆ *After each brake pad change firmly depress brake pedal several times with vehicle stationary, so that the brake pads are properly seated in their normal operating position.*
- ◆ *After changing brake pads check brake fluid level.*

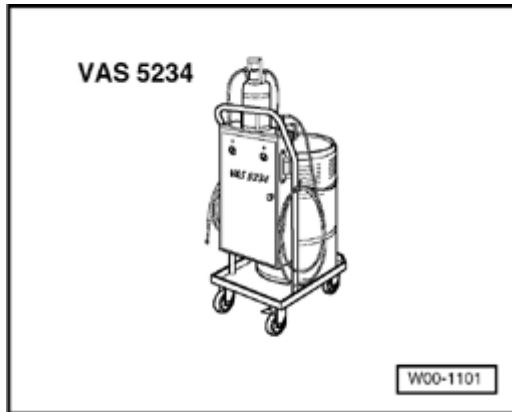


Rear wheel brakes (disc brakes - front wheel drive), assembly overview

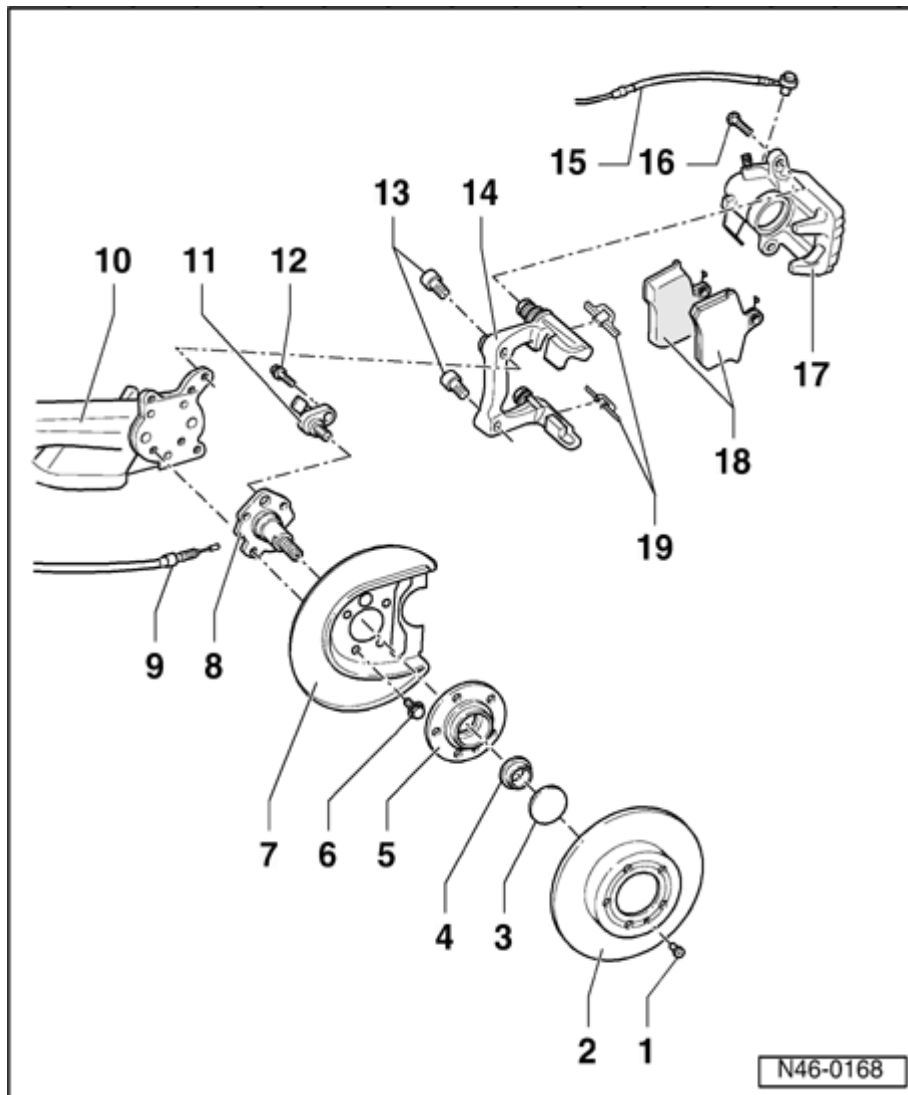
Special tools and equipment

- ◆ VAG 1331
Torque wrench or equivalent
- ◆ VAG 1332
Torque wrench or equivalent
- ◆ VAG 1410
Torque wrench or equivalent
- ◆ VAG 1869/2
Brake pedal depressor or equivalent

Special tools and equipment required

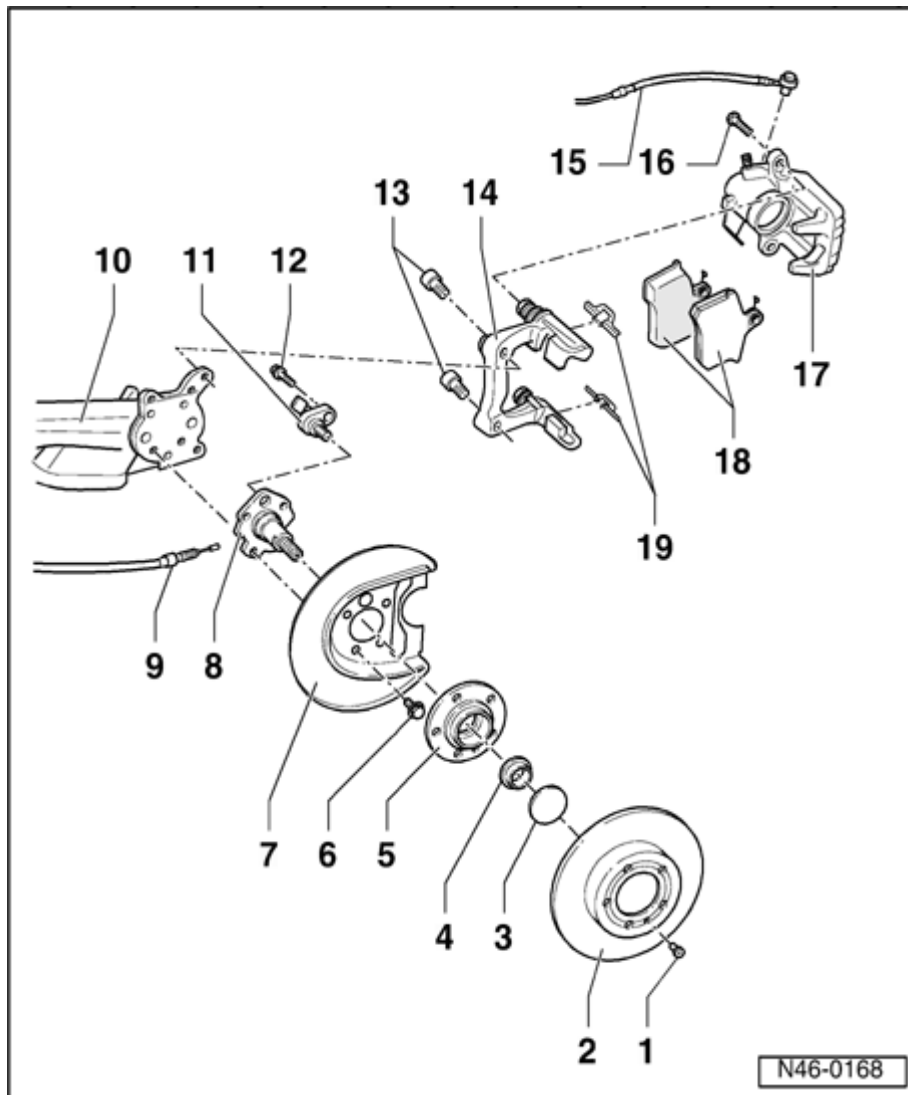


- ◆ VAS 5234 Brake filler and bleeder unit

**Note:**

- ◆ After replacing brake pads, depress brake pedal firmly several times with vehicle stationary so that the brake pads are properly seated in their normal operating position.
- ◆ To draw off brake fluid from the reservoir, use brake filler and bleeder unit VAS 5234.
- ◆ Install brake pedal depressor VAG 1869/2 before removing a brake caliper or disconnecting a brake hose from the brake caliper.

1 - Phillips-head screw, 4 Nm (35 in lb)



2 - Brake disc

- ◆ Thickness 9 mm (.354 in.)
 - ◆ Wear limit, 7 mm (.276 in.)
- ◆ Thickness 22 mm (.866 in.)
 - ◆ Wear limit 20 mm (.787 in.)
- ◆ When worn, always replace both sides on an axle.

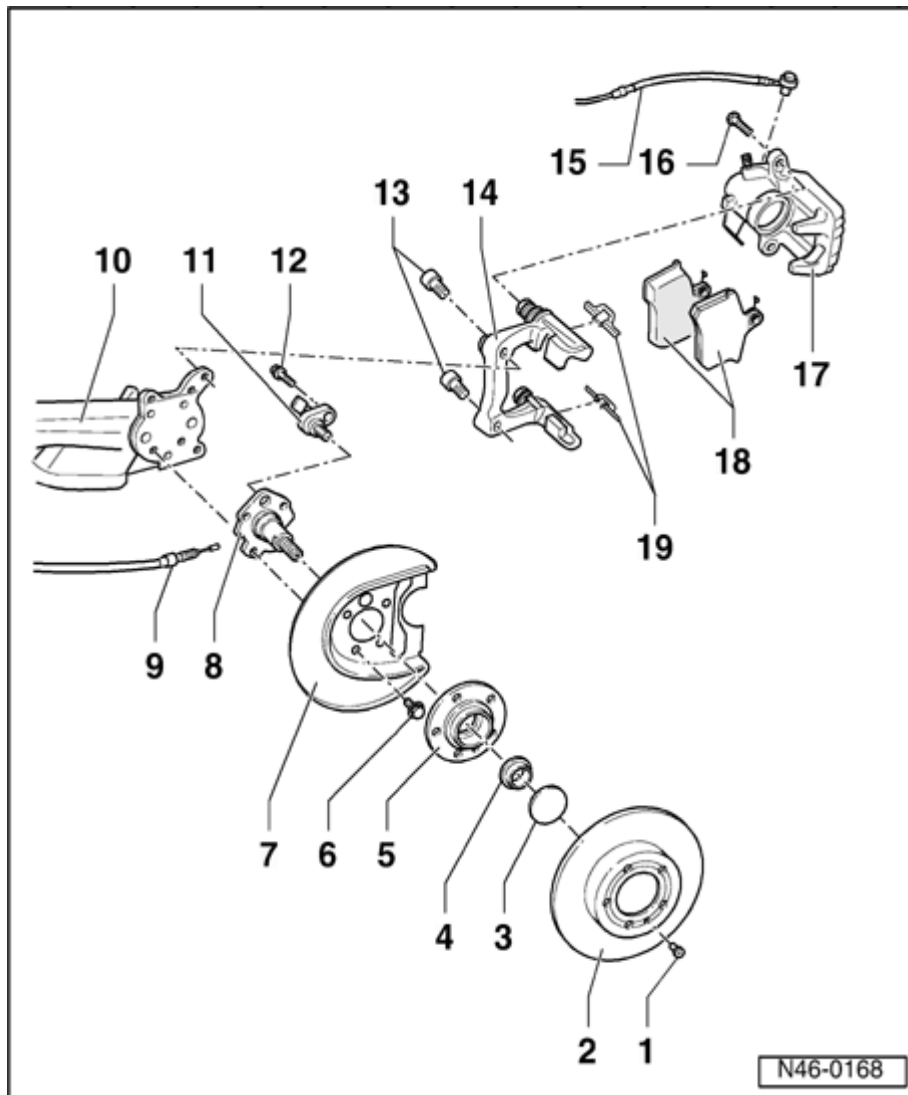
3 - Cap

- ◆ Pressing off and driving in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Servicing wheel bearings; Removing and installing wheel bearing/wheel](#)

[hub unit,
vehicles with
disc brakes](#)

46-44



4 - Self-locking 12-point nut, 175 Nm (129 ft. lb)

◆ Always replace

5 - Wheel hub with wheel bearing and rotor

◆ Replace each time after removing

◆ Only replace complete

◆ Removing and installing

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Servicing wheel bearings; Removing and installing wheel bearing/wheel hub unit, vehicles with disc brakes](#)

6 - Hex bolt, 60

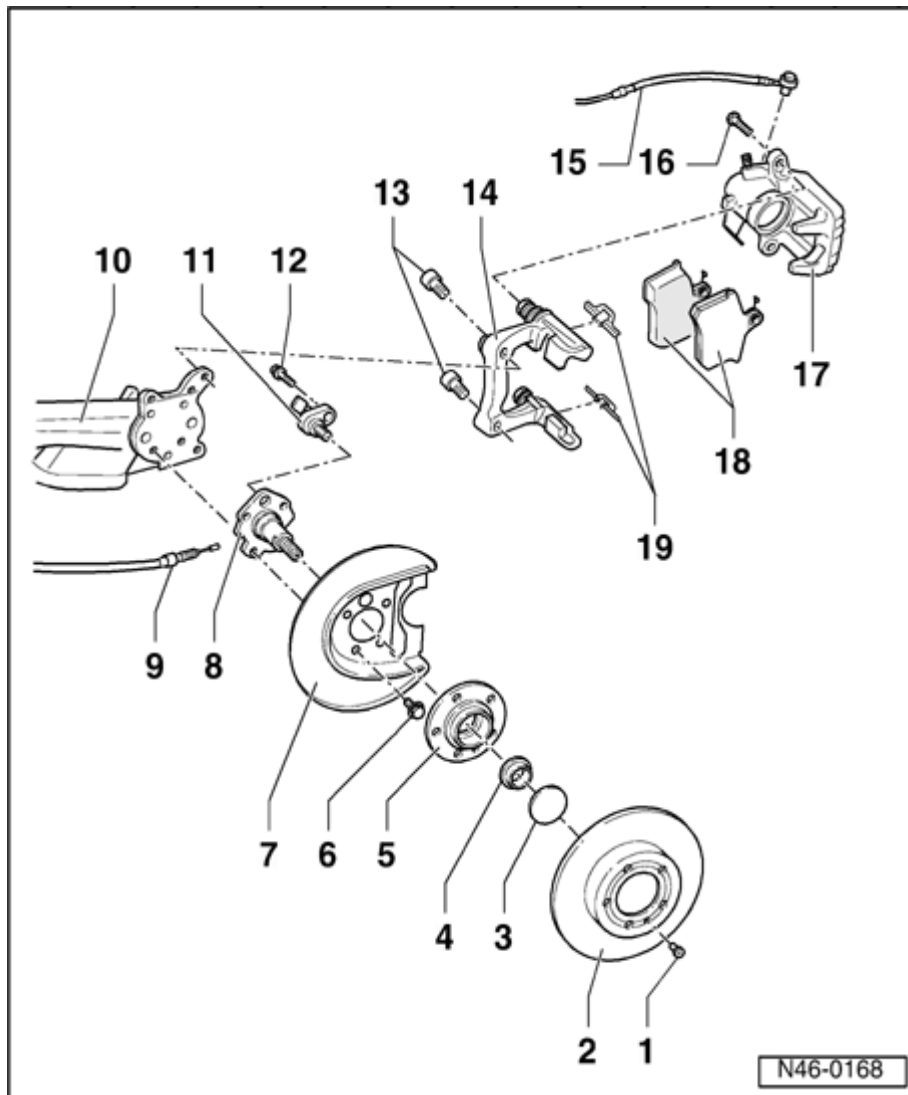
**Nm (44
ft. lb)**

- ◆ With
dished
spring
washer

**7 - Splash
plate**

**8 - Stub
axle**

46-45



**9 - Parking
brake
cable**

◆ Adjusting
parking
brake ⇒
[Page 46-
71](#)

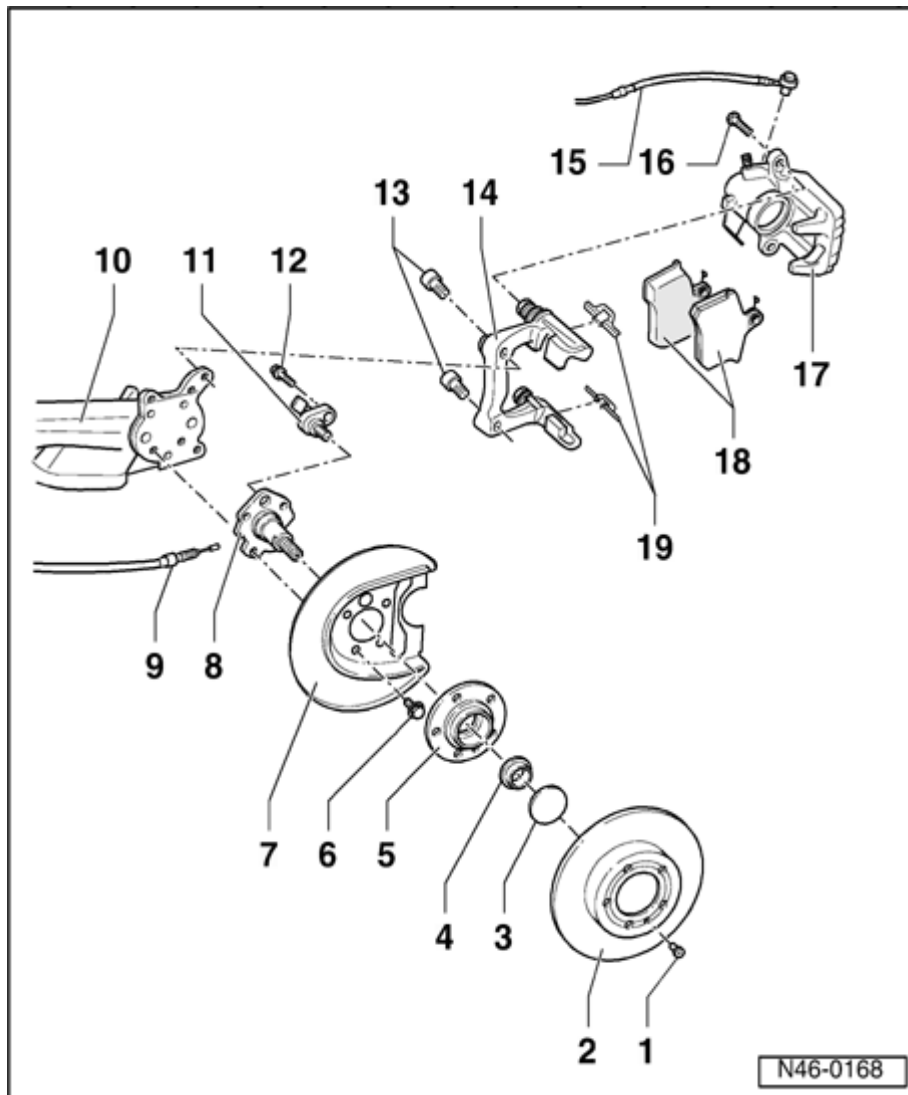
**10 - Axle
beam**

**11 - ABS
speed
sensor**

◆ Before
inserting
sensor,
clean
mounting
hole inner
surface
and coat
with
lubricating
paste G
000 650

**12 - Hex
socket
head
bolt 8
Nm (70
in. lb)**

**13 - Hex
socket
head
bolt, 65
Nm (48
ft. lb)**



14 - Brake carrier with guide pins and protective cap

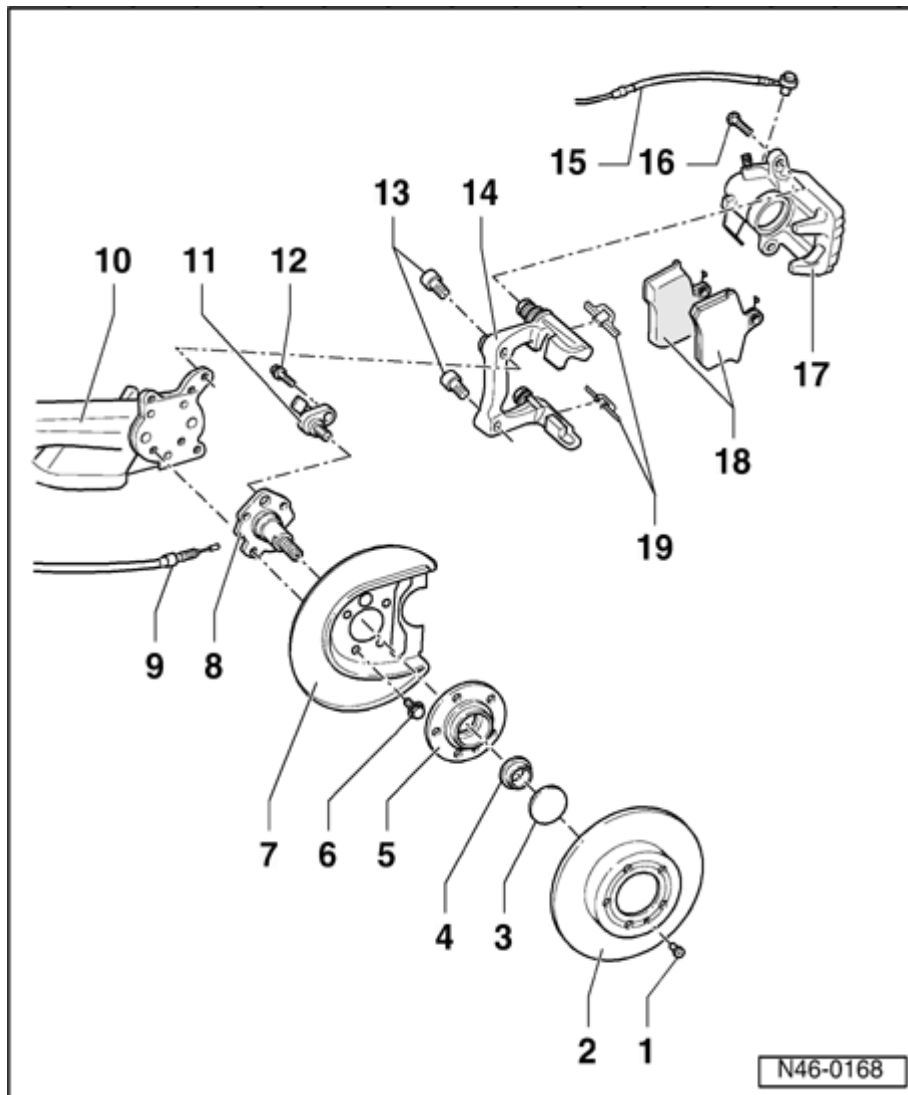
- ◆ Supplied as replacement part, assembled with sufficient grease on guide pins

- ◆ If protective caps or guide pins are damaged use repair kit. Use grease packet supplied to lubricate guide pins.

15 Brake - hose/brake line

- ◆ With banjo bolt and seals
- ◆ Banjo bolt to brake caliper tightening torque 38 Nm (28 ft. lb)

- ◆ Always use new sealing washers
 - ◆ Do not disconnect brake hose when changing brake pads
 - ◆ Always replace sealing washers
- 16 - Self-locking hex bolt, 35 Nm (26 ft. lb)**
- ◆ Always replace



17 - Brake caliper

- ◆ Do not disconnect brake hose when changing brake pads

◆ Removing:

- Remove brake pad - Item 18
- ⇒ [Page 46-49](#)

- Install brake pedal depressor VAG 1869/2

- Remove brake hose - Item 15
- from brake caliper

◆ Installing:

- Install brake pads - Item 18 - ⇒ [Page 46-52](#)

- Connect brake hose - Item 15 - to

brake
caliper

- Remove
brake
pedal
depressor
VAG
1869/2

- Bleed
brake
system

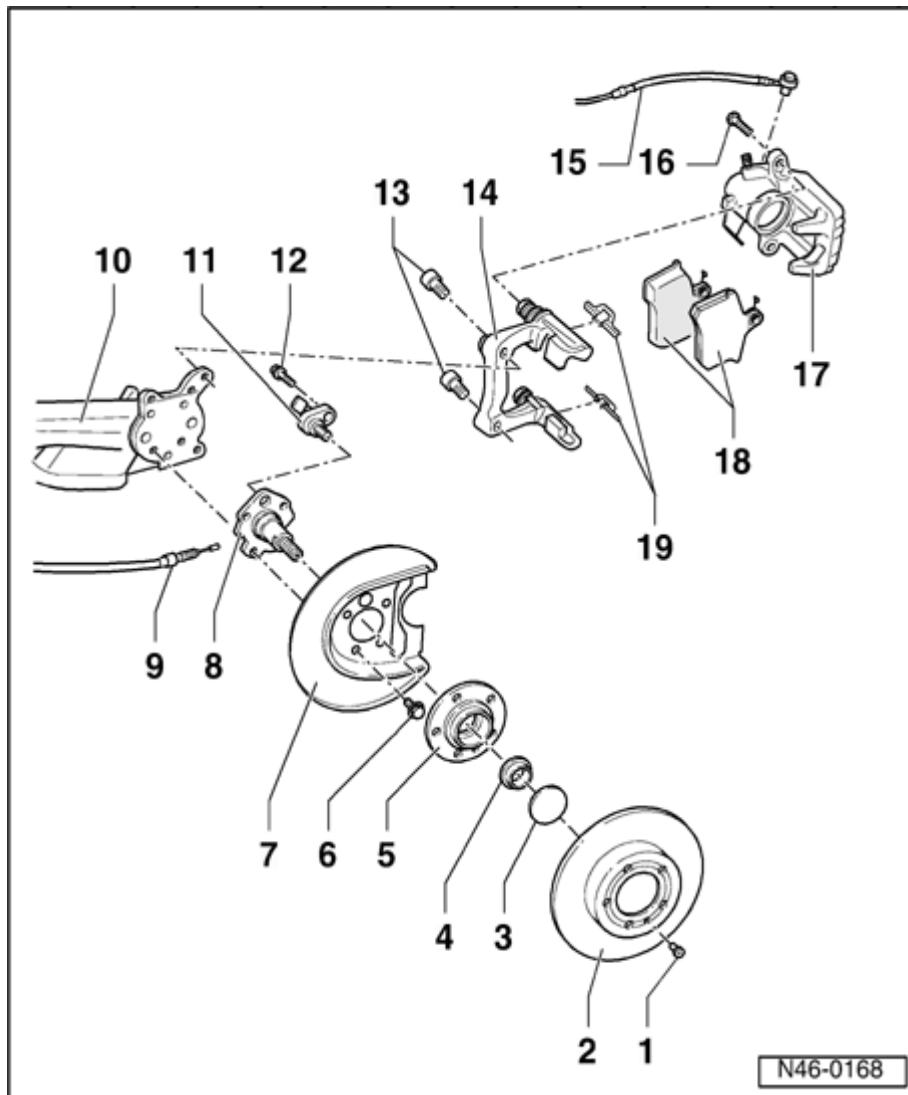
⇒

[Page
47-38](#)

◆ Servicing
⇒ [Page
47-20](#)

◆ Parking
brake cable
must be
adjusted first
after
maintenance
or
replacement.

◆ Adjusting
parking
brake ⇒
[Page 46-
71](#)



18 - Brake pads

- ◆ Thickness: 16.9 mm (.665 in.) including backing plate
- ◆ Wear limit: 7.5 mm (.295 in.) including back plate

- ◆ Checking thickness:

⇒ *Repair Manual, Maintenance; Description of work; Front and rear brake pads: Checking thickness*

- ◆ Always replace both sides on an axle.

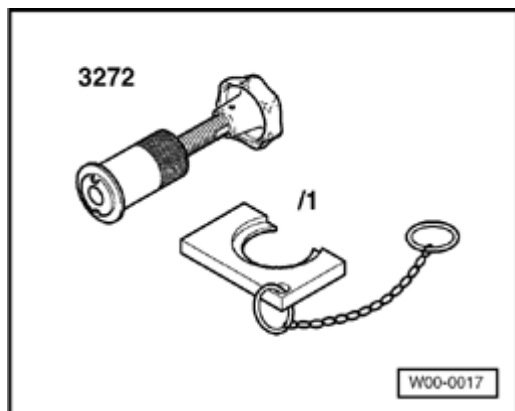
- ◆ Removing and installing
⇒ [Page 46-49](#)

19 Pad - retaining springs

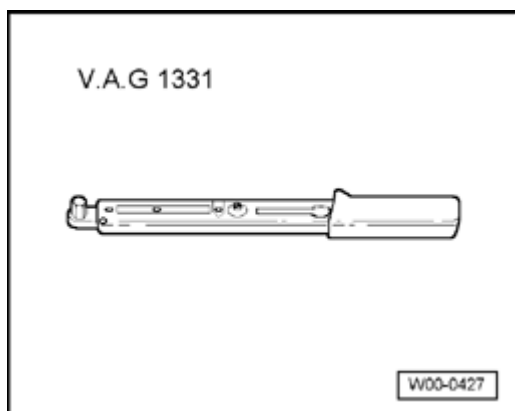
- ◆ Replace always when changing pads

Rear brake pads, removing and installing

Special tools and equipment



- ◆ 3272 Resetting and removal tool



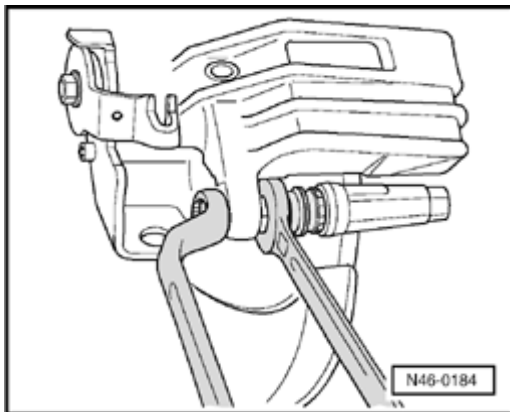
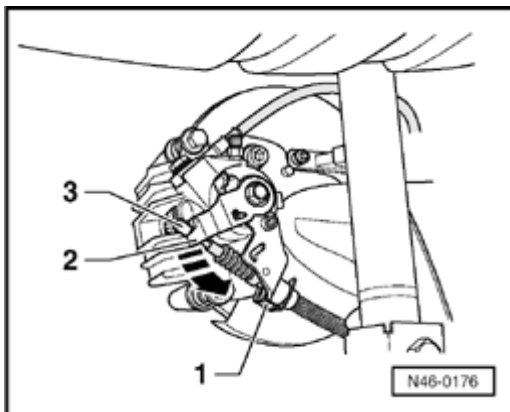
- ◆ VAG 1331 Torque wrench or equivalent

Note:

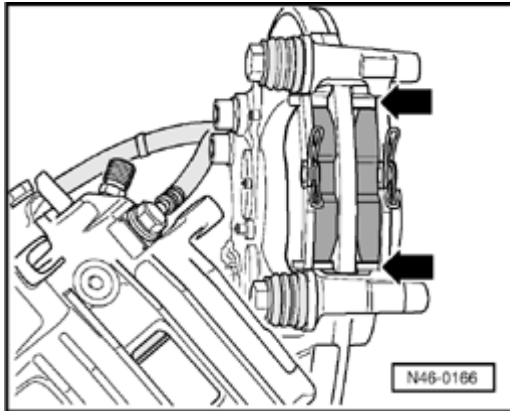
Mark brake pads when removing if they are to be reused. Re-install in their original position to prevent uneven braking!

Removing

- Remove wheels.
- ✦ - Remove clip -1-.
- Press brake lever -2- in direction of arrow and unhook brake cable -3-.
- Take parking brake cable out of brake caliper mounting.
- ✦ - Remove securing bolts from brake caliper housing, to do this counterhold on guide pins.
- Remove brake caliper housing and secure with wire so that the weight of the brake caliper does not stress or damage the brake hose.



46-51



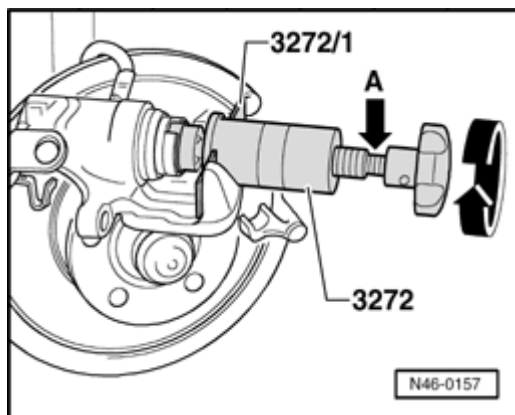
- Remove brake pads and pad retaining springs (arrows).
- Clean brake caliper housing, in particular the bonding surface for the brake pad. It must be free of adhesive and grease residues.

Use methylated spirit only for cleaning the brake caliper housing.

Installing

Note:

Before pressing the piston back, use a bleed bottle to draw off brake fluid from reservoir. Otherwise brake fluid may overflow out of the reservoir if brake fluid has been topped off between changes of brake pads and can cause damage.

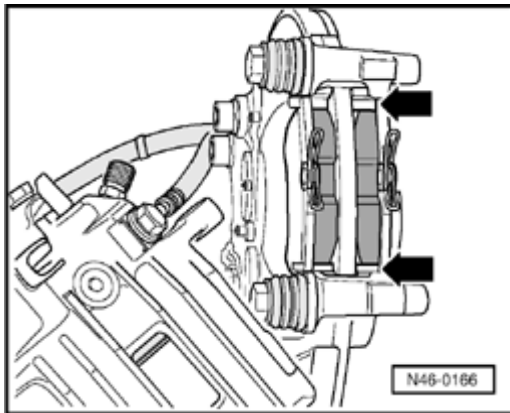


- Screw in piston by turning knurled wheel of special tool 3272 clockwise, do not damage protective cap when doing this.
- To help screwing in, use special tool 3272/1.

Note:

- ◆ Install special tool 3272 so that the collar (arrow) of the tool is seated on connecting piece 3272/1.
- ◆ If the piston is difficult to move, use a 13 mm (.512 in.) AF open end wrench on the flats (arrow - A-) provided for this purpose.

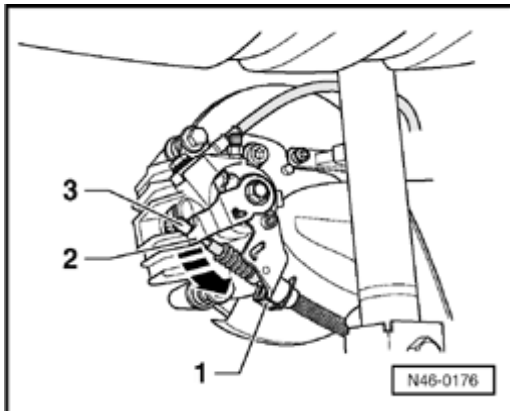
46-53



- Insert brake pads and brake pad retaining springs (arrows) into brake carrier.
- Remove protective foil off outer brake pad backplate.
- Secure brake caliper housing with new self-locking bolts.
Torque: 35 Nm (26 ft lb.)

Note:

- ◆ *The repair kit includes four self-locking hex bolts which must be installed in all cases.*



- Press brake lever -2- in direction of arrow and attach parking brake cable.
- Install clip -1-.
- Adjusting parking brake ⇒ [Page 46-71](#) .
- Install wheels.

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 44: Tightening wheel bolts](#)

Note:

- ◆ *After each brake pad change, firmly depress brake pedal several times with vehicle stationary, so that the brake pads are properly seated in their normal operating position.*
- ◆ *After changing brake pads check brake fluid level.*

Parking brake, adjusting

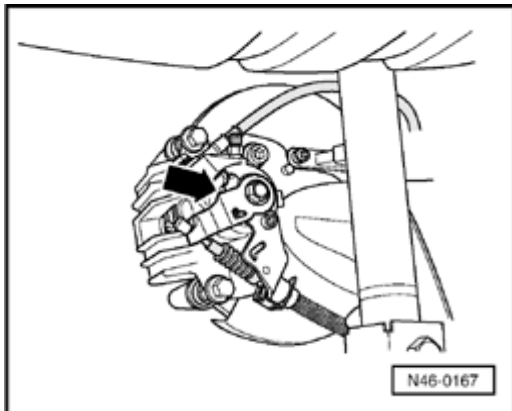
Note:

A new adjustment is only necessary after replacing, parking brake cables, brake caliper and brake discs.

- Remove center console extension,




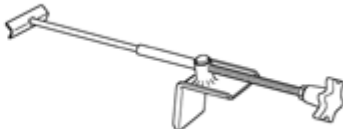
⇒ [Repair Manual, Body Interior, Repair Group 68; Compartments, covers and trims; Remove center console extension](#)

- Firmly depress brake pedal three times.
- Pull parking brake three times and then release again.
- Parking brake lever in "rest/off" position. Turn adjusting nut until lever -arrow- lifts off the caliper stop.
- A gap of min. 1.0 mm (.039 in.) and max. 1.5 mm (.118 in.) from stop (arrow) is permissible on each side.
- Check that both wheels turn freely. Adjust adjustment nut if necessary.



Note:

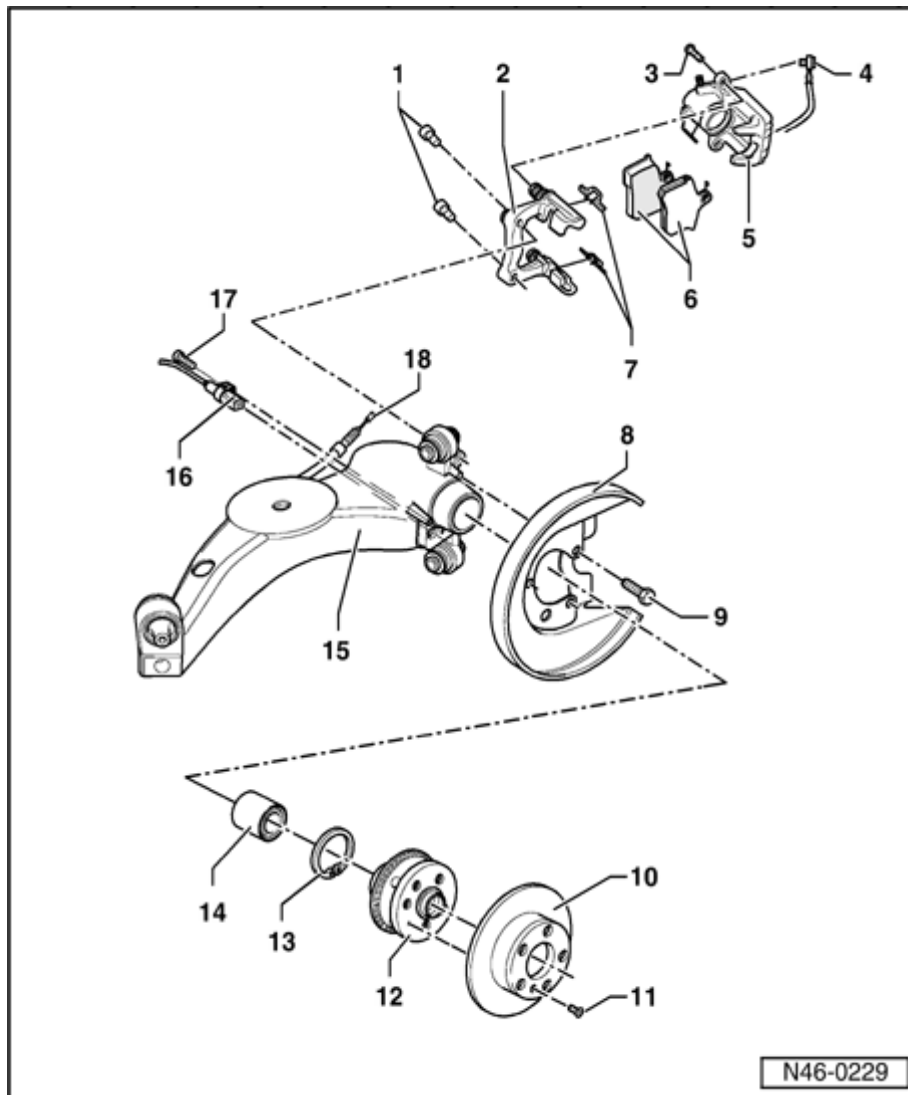
Due to the automatic rear wheel brake adjustment, there is no requirement to adjust the parking brake after making new/initial adjustment.

<p>V.A.G 1331</p> 	<p>V.A.G 1332</p> 
<p>V.A.G 1410</p> 	<p>V.A.G 1869/2</p> 
	<p>W46-0004</p>

Rear wheel brakes/disc brakes (all-wheel drive), servicing

Special tools and equipment

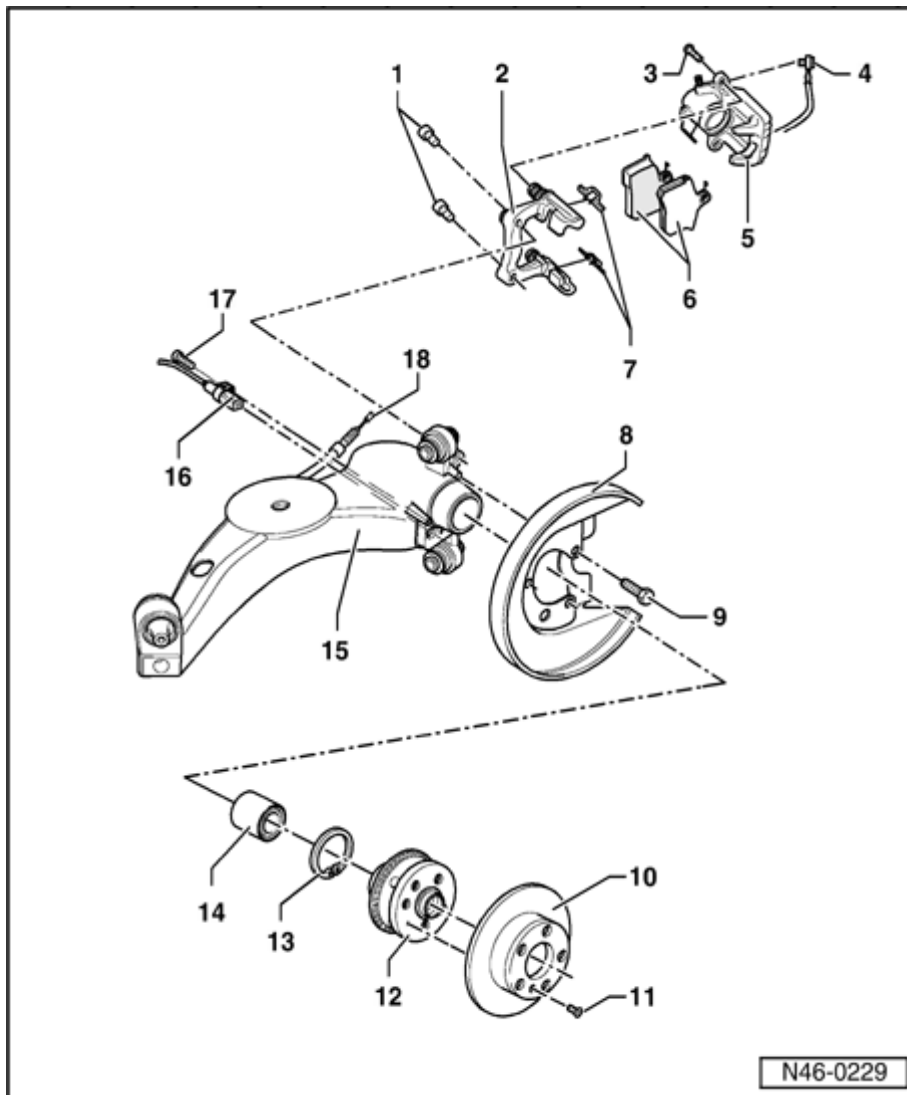
- ◆ VAG 1331
Torque wrench
- ◆ VAG 1332
Torque wrench
- ◆ VAG 1410
Torque wrench
- ◆ VAG 1869/2
Brake pedal depressor

**Note:**

- ◆ After replacing brake pads, depress brake pedal firmly several times with vehicle stationary so that the brake pads are properly seated in their normal operating position.
- ◆ To draw off brake fluid from the reservoir, use brake filler and bleeder unit VAS 5234
- ◆ Install brake pedal depressor VAG 1869/2 before removing a brake caliper or disconnecting a brake hose.

**1 - Hex
socket
head bolt,
80 Nm (59
ft. lb)**

46-57



2 - Brake carrier with guide pins and protective cap

◆ Supplied as replacement part assembled with sufficient grease on guide pins

◆ If protective caps or guide pins are damaged, use repair kit. Use grease packet supplied to lubricate guide pins.

3 - Self-locking hex bolt, 35 Nm (26 ft. lb)

◆ Always replace

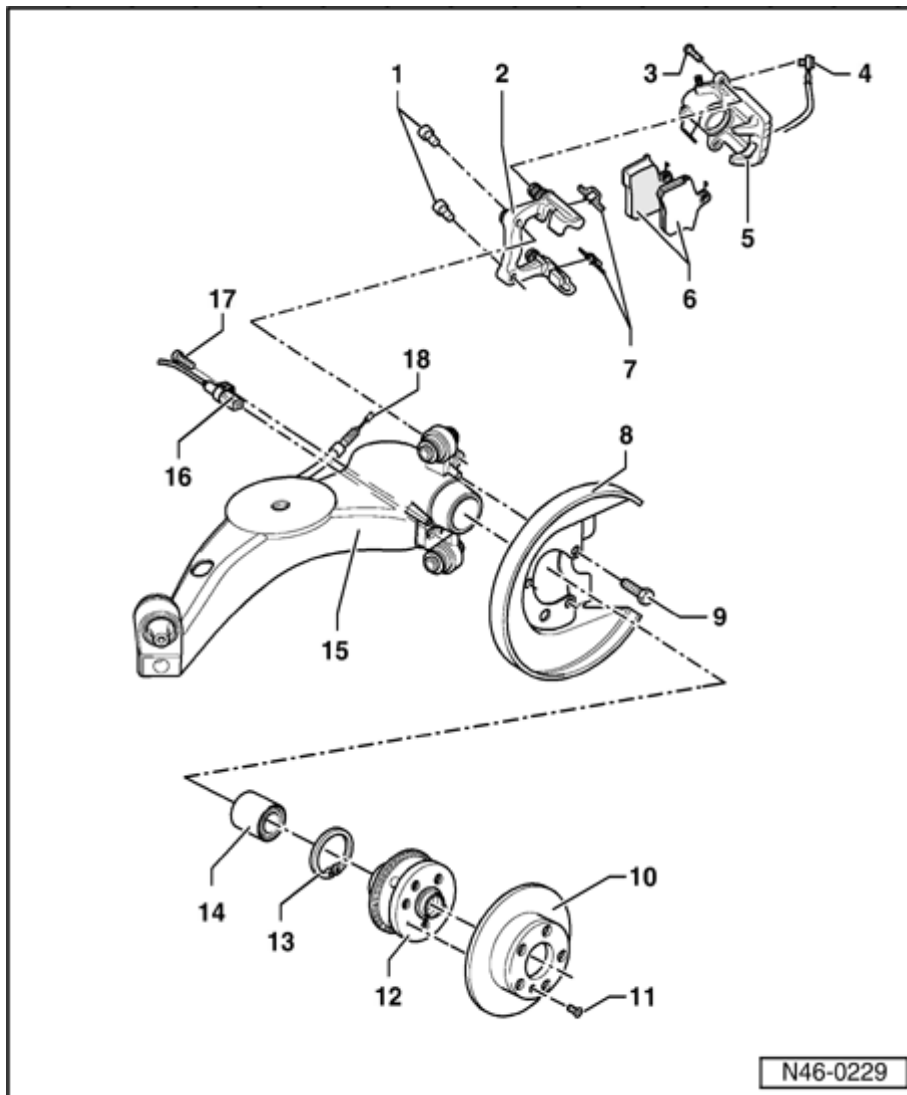
4 - Brake hose/line

◆ With banjo bolt and seals

◆ Banjo

bolt to
brake
caliper
tightening
torque 38
Nm
(28.03 ft.
lb)

- ◆ Do not
disconnect
brake
hose
when
changing
brake
pads



5 - Brake caliper

- ◆ Do not disconnect brake hose when changing brake pads

◆ Removing:

- Remove brake pads - item 6 - ⇒ [Page 46-62](#)
- Install brake pedal depressor VAG 1869/2
- Unscrew brake hose - item 4 , from brake caliper

◆ Installing:

- Install brake pads - item 6 - ⇒ [Page 46-62](#)
- Install brake hose - item 4 - on brake caliper

- Remove
brake
pedal
depressor
VAG
1869/2

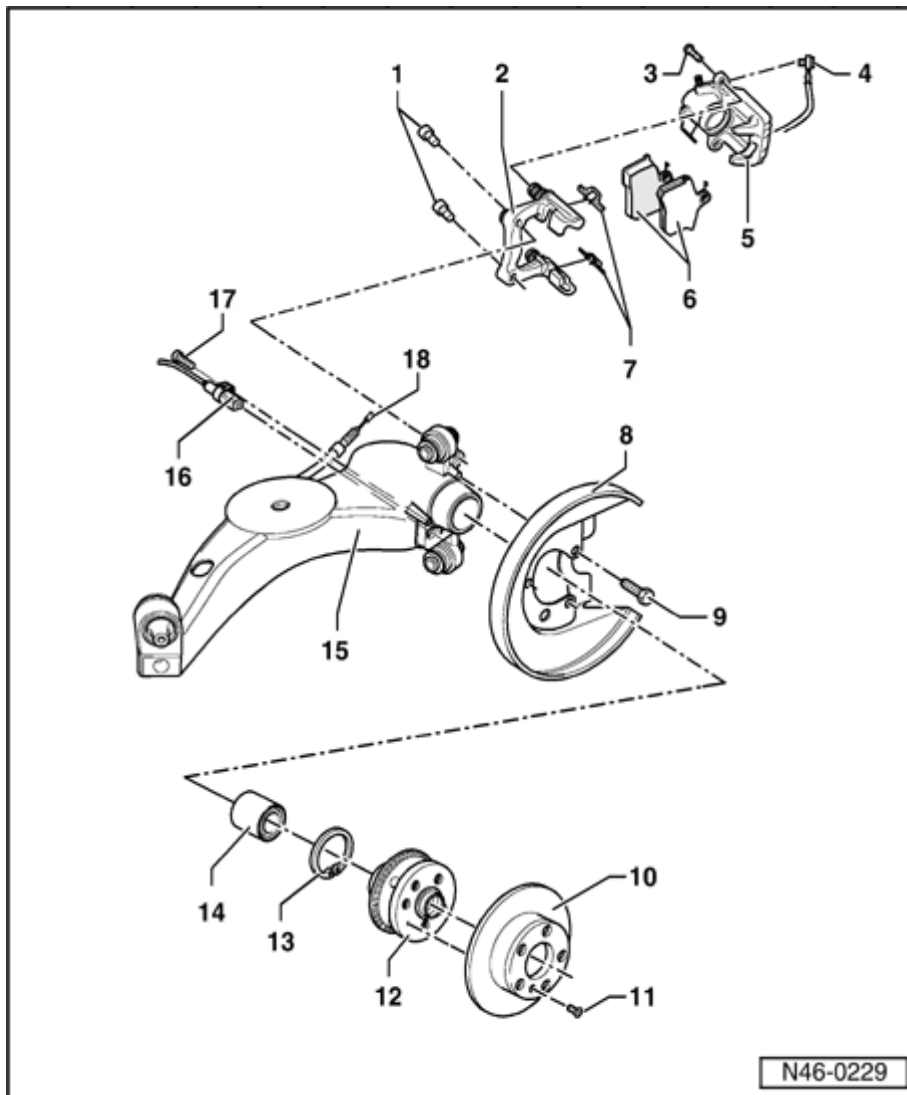
- Bleed
brake
system
Mark
60 ⇒
[Page
46-40](#)

- ◆ Servicing
⇒ [Page
47-20](#)

- ◆ Adjust
parking
brake cable
first after
maintenance
or
replacement.

- ◆ Adjusting
parking
brake ⇒
[Page 46-
66](#)

46-59



6 - Brake pads

- ◆ Thickness 16.9 mm (.665 in.) including backing plate

- ◆ Checking thickness:

⇒ [Repair Manual, Maintenance](#)

- ◆ Always replace on both wheels of axle.

- ◆ Removing and installing ⇒ [Page 46-62](#)

- ◆ Wear limit: 7.5 mm (.295 in.) including back plate

7 - Pad retaining springs

- ◆ Always replace when changing pads

8 - Splash plate

- 9 - Hex bolt, 10 Nm

**(88.5 in.
lb)**

**10 - Brake
disc**

◆ Thickness,
9 mm
(.354 in.)

◆ Wear
limit,
7 mm
(.276
in.)

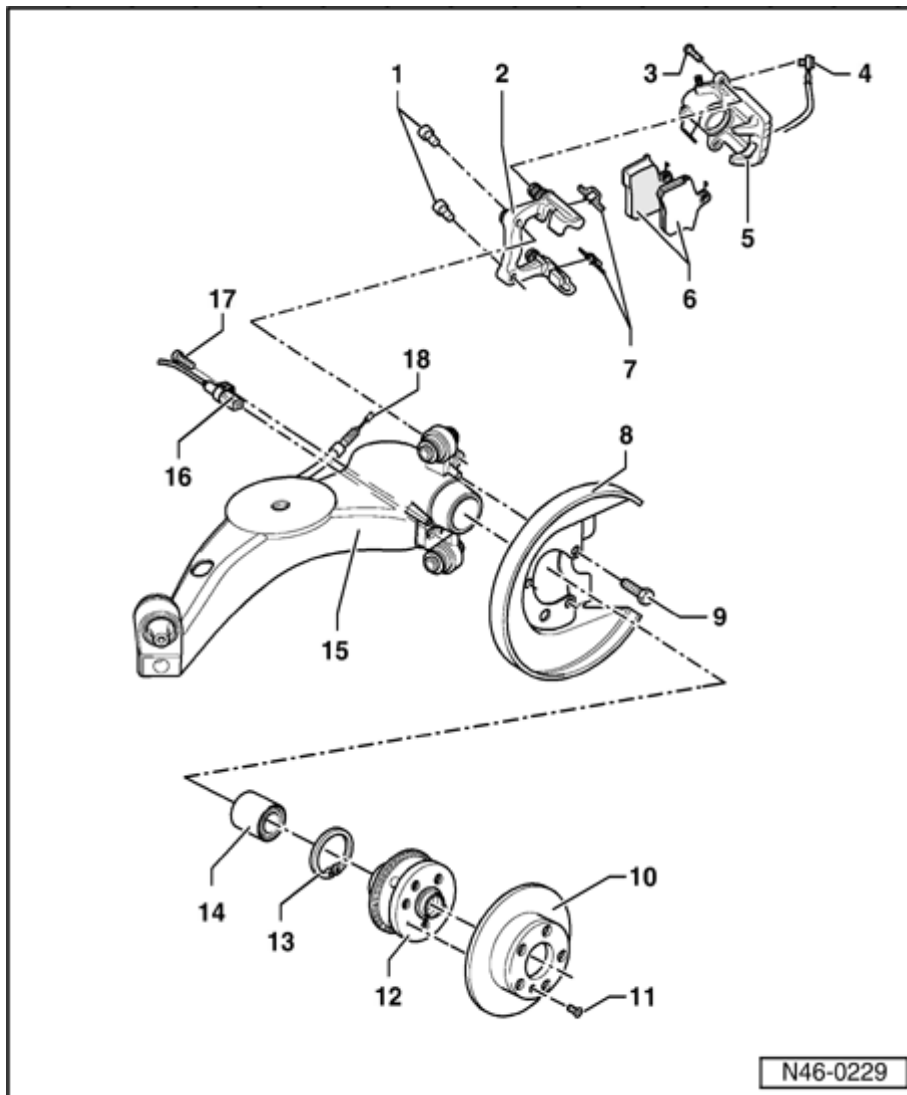
◆ Thickness,
22 mm
(.866 in.)

◆ Wear
limit,
20
mm
(.787
in.)

◆ When
worn,
always
replace
both
sides

◆ Application
see Parts
catalog

46-60



11 - Phillips-head screw, 4 Nm (35.4 ft. lb)

12 - Wheel hub with rotor

◆ Pressing out and in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Assembly overview for trailing arm and transverse links; Pressing wheel bearings out and in](#)

13 - Circlip

14 - Wheel bearing

◆ Replace each time after removing

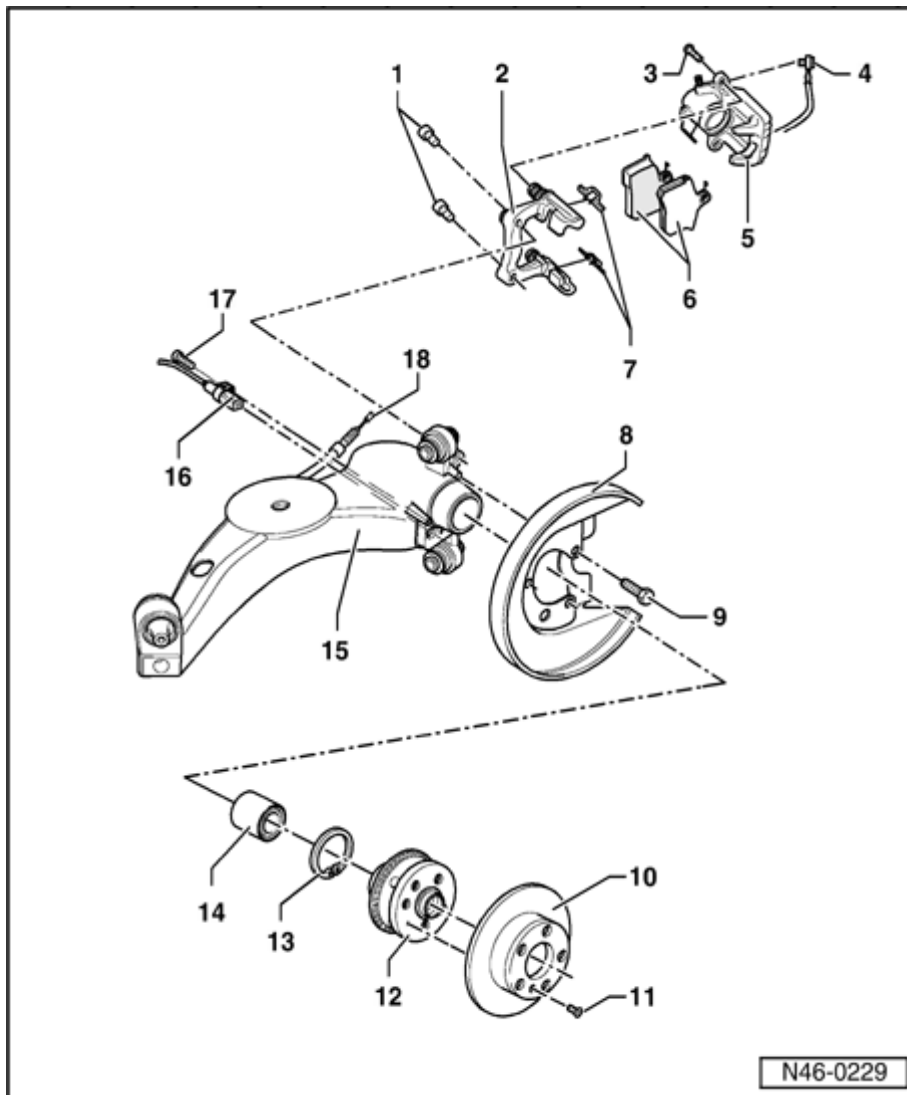
◆ Pressing out and in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42; Assembly](#)

[overview for trailing arm and transverse links; Pressing wheel bearings out and in](#)

15 - Trailing arm

46-61



16 - ABS speed sensor

- ◆ Before inserting sensor, clean mounting hole inner surface and coat with lubricating paste G 000 650

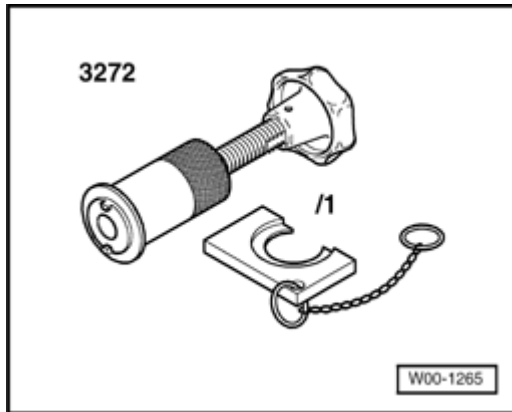
17 - Hex socket head bolt, 8 Nm (71 ft. lb)

18 - Parking brake cable

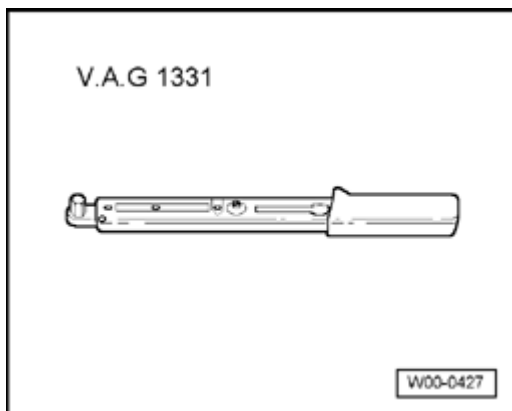
- ◆ Adjusting parking brake cable ⇒ [Page 46-66](#)

Brake pads, removing and installing

Special tools and equipment



- ◆ 3272 Resetting and removal tool



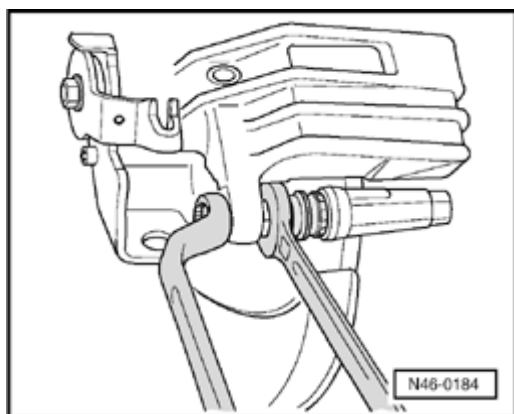
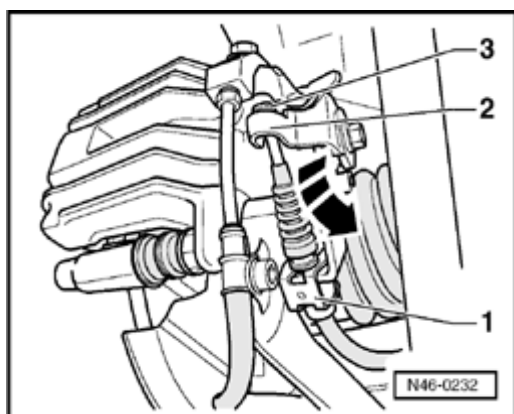
- ◆ VAG 1331 Torque wrench

Note:

Mark brake pads when removing if they are to be reused. Re-install in their original position to prevent uneven braking!

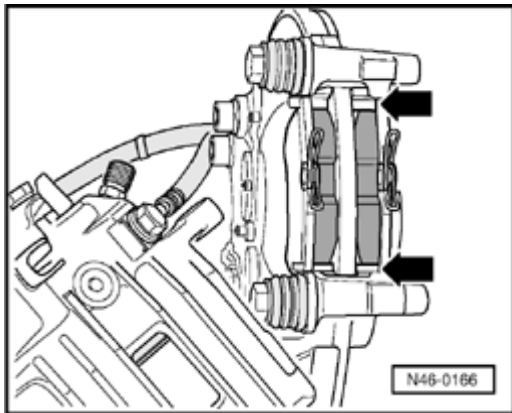
Removing

- Remove wheels
- ✦ - Remove clip -1-.
- Press brake lever -2- in direction of arrow and unhook brake cable -3-.



- ✦ - Remove securing bolts from brake caliper housing, to do this counterhold on guide pins.

46-64



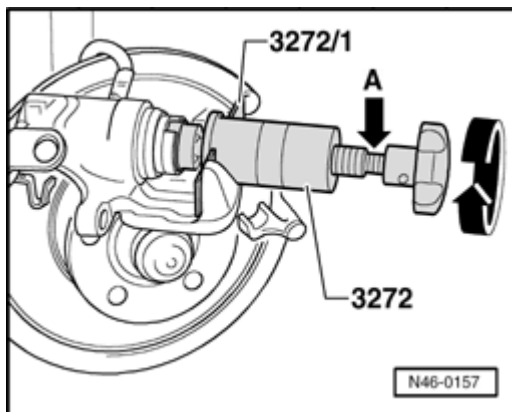
- Remove brake pads and pad retaining springs (arrows).
- Clean brake caliper housing, in particular the bonding surface for the brake pad. It must be free from adhesive and grease residues.

Use methilated spirit only for cleaning the brake caliper housing.

Installing

Note:

Before pressing the piston back, use a bleed bottle to draw off brake fluid from the reservoir. If brake fluid has been topped off between changes of brake pads, brake fluid may overflow out of the reservoir, and cause damage.

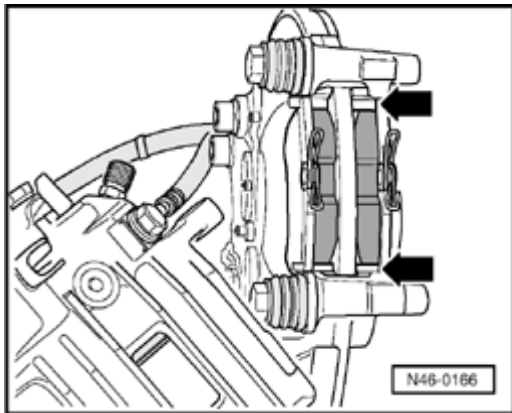


- Screw in piston by turning knurled wheel of special tool 3272 clockwise, do not damage protective cap when doing this.
- To help screwing in, use special tool 3272/1.

Note:

- ◆ *If the piston is difficult to move, use a 13 mm (.512 in.) AF open-end wrench on the flats -arrow A- provided for this purpose.*
- ◆ *If the piston is pushed back with a piston resetting tool, the automatic adjustment in the brake caliper will be destroyed.*

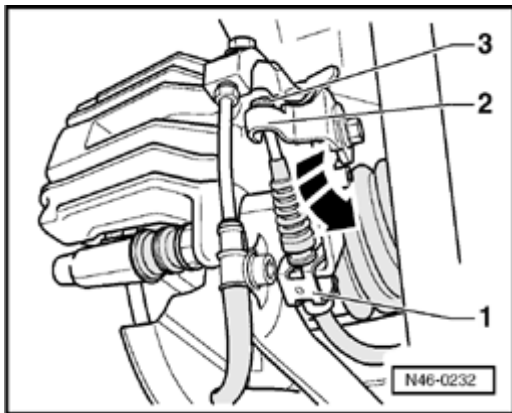
46-65



- Insert brake pads and brake pad retaining springs (arrows) into brake carrier.
- Pull protective foil off outer brake pad backplate.
- Secure brake caliper housing with new self-locking bolts.

Note:

- ◆ *The repair kit includes four self-locking hex bolts which must be installed in all cases.*



- Press brake lever -2- in direction of arrow and attach parking brake cable.
- Install clip -1-.
- Adjusting parking brake ⇒ [Page 46-66](#) .
- Install wheels.

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 44: Tightening wheel bolts](#)

Note:

- ◆ *After each brake pad change depress firmly brake pedal several times with vehicle stationary, so that the brake pads are properly seated in their normal operating position.*
- ◆ *After changing brake pads check brake fluid level.*

Parking brake, adjusting

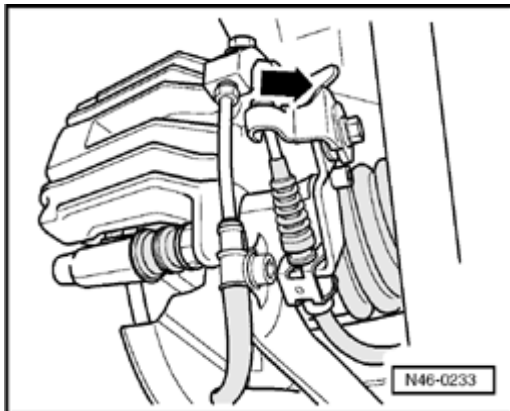
Note:

A new adjustment is only necessary after replacing parking brake cables, brake caliper and brake discs.

- Remove center console extension,

⇒ [Repair Manual, Body Interior, Repair Group 68; Compartments, covers and trims; Removal and installing center console.](#)

- Firmly depress brake pedal three times.
- Pull parking brake on three times and the release again.
- Parking brake lever in "rest/off" position. Adjusting nut until lever (arrow) lifts off the caliper stop.
- A gap of min. 1.0 mm (.039 in.) and max. 1.5 mm (.118 in.) from stop (arrow) is permitted each side.
- Check that both wheels turn freely.



Note:

Due to the automatic rear wheel brake adjustment, there is no requirement to adjust the parking brake after making new/initial adjustment.

46-67

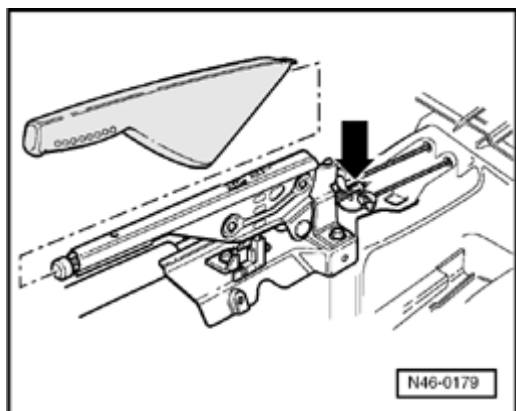
Parking brake cables for disc brakes - front wheel drive, removing and installing

Removing

- Remove center console extension,

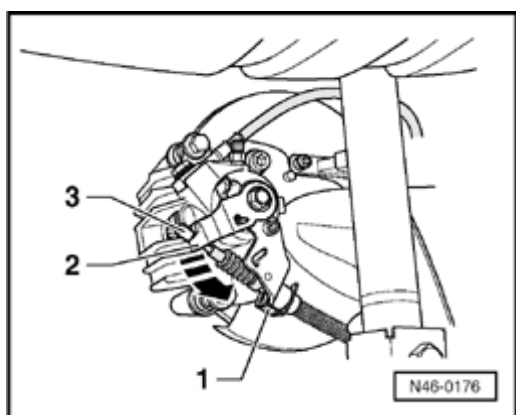
⇒ [Repair Manual, Body Interior, Repair Group 68](#)

- Release parking brake.



- Loosen adjustment nut (arrow) until the parking brake cable can be unhooked from the compensator.

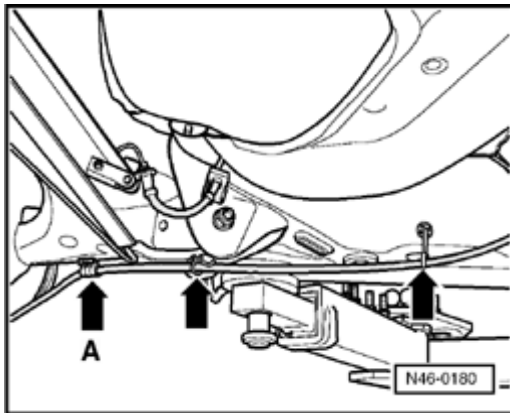
- Raise vehicle.



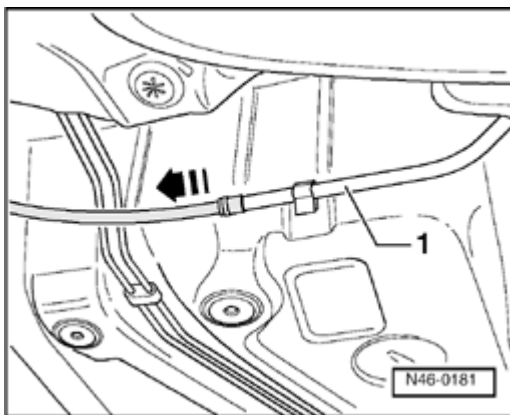
- Remove clip -1-.

- Press brake lever -2- in direction of arrow and unhook brake cable -3-.

46-68



- ✦ - Unclip parking brake cable from retainer on rear axle (arrow -A-) and unhook from retainers (arrows).

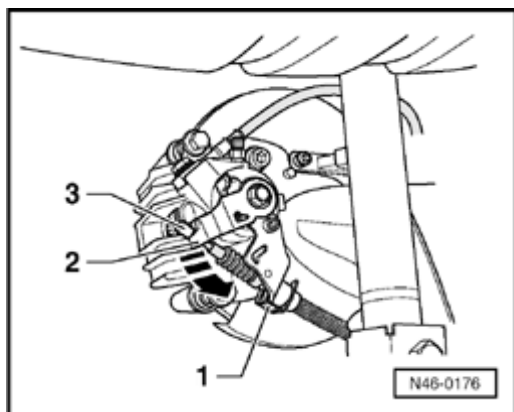


- ✦ - Pull parking brake cable out from guide tube -1- in direction of arrow.

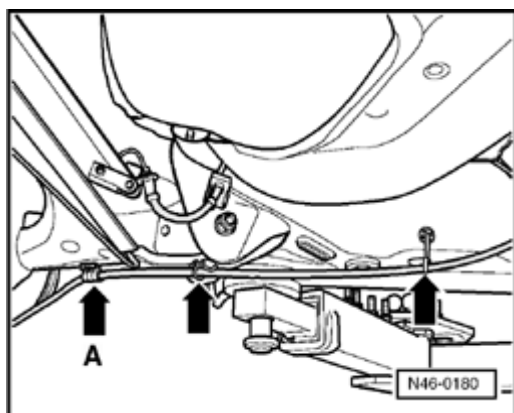
46-69

Installing

- Slide parking brake cable into guide tube.

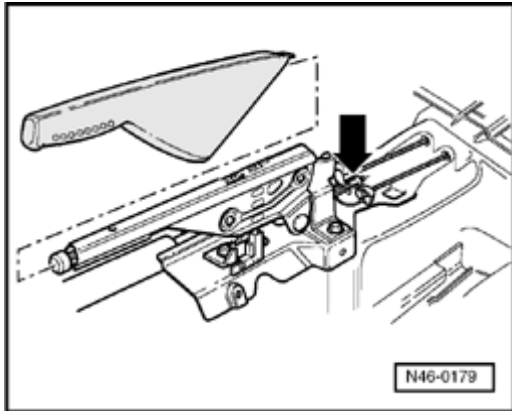


- Press brake lever -2- in direction of arrow and attach parking brake cable.
- Install clip -1-.



- Clip parking brake cable into retainer on rear axle (arrow -A-).
- Parking brake cable clamping ring must lie in the middle of the clip.
- Hook parking brake cable into retainers (arrows).
- Hook parking brake cable into compensator.

46-70



- Pretension parking brake cable with adjustment nut (arrow).
- Adjusting parking brake ⇒ [Page 46-54](#) .
- Install center console extension.
⇒ [Repair Manual, Body Interior; Repair Group 68](#)

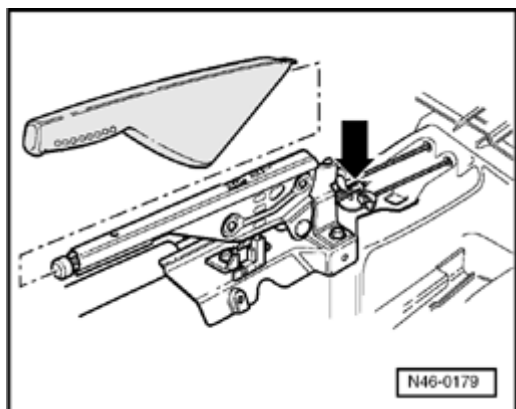
46-71

Parking brake cables for disc brakes - all wheel drive, removing and installing

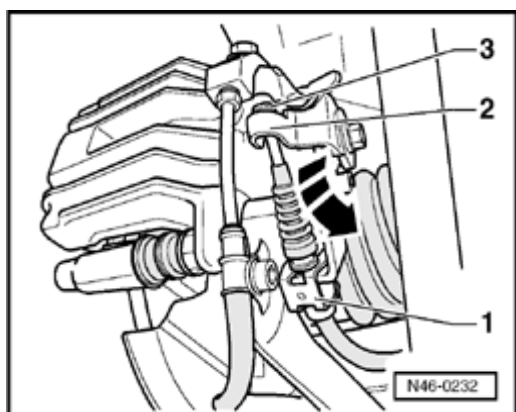
- Remove center console extension,

⇒ [Repair Manual, Body Interior, Repair Group 68; Compartments, covers and trims; Removing center console extension](#)

- Release parking brake.

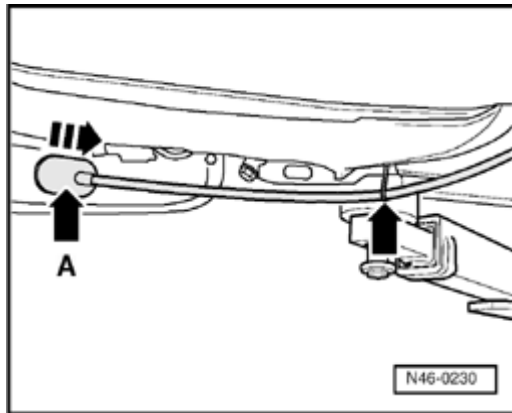


- Loosen adjustment nut (arrow) until the parking brake cable can be unhooked from compensator.
- Raise vehicle.

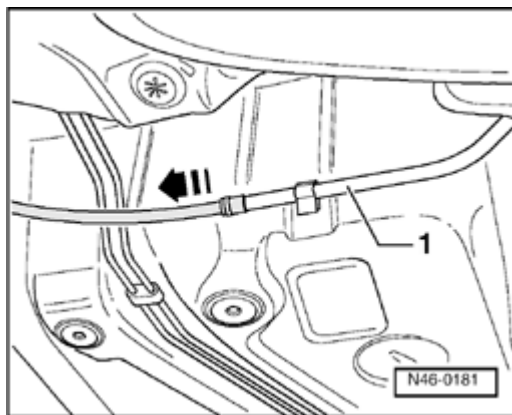


- Remove clip -1-.
- Press brake lever -2- in direction of arrow and unhook brake cable -3-.

46-72



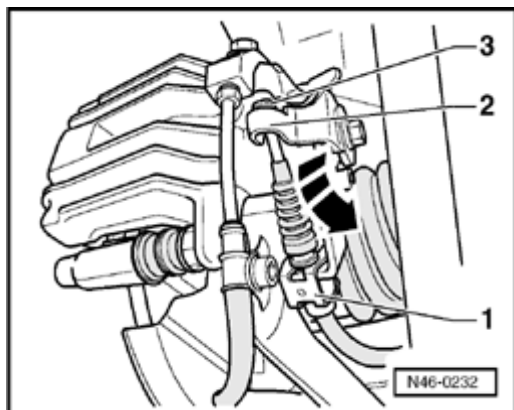
- ✦ - Remove rubber grommet (arrow - A-) in trailing arm.
- Unhook parking brake cable (arrow) from retainer and pull out of trailing arm in direction of arrow.



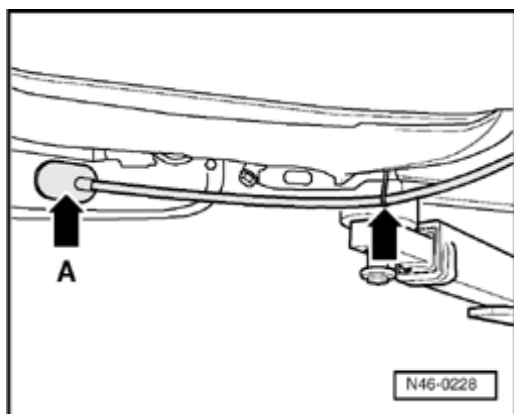
- ✦ - Pull parking brake cable out from guide tube -1- in direction of arrow.

Installing

- Slide parking brake cable into guide tube.
- Slide parking brake cable through trailing arm.

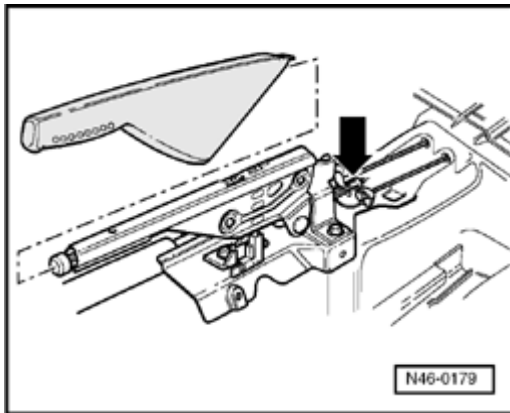


- Press brake lever -2- in direction of -row and attach parking brake cable.
- Install clip -1-.

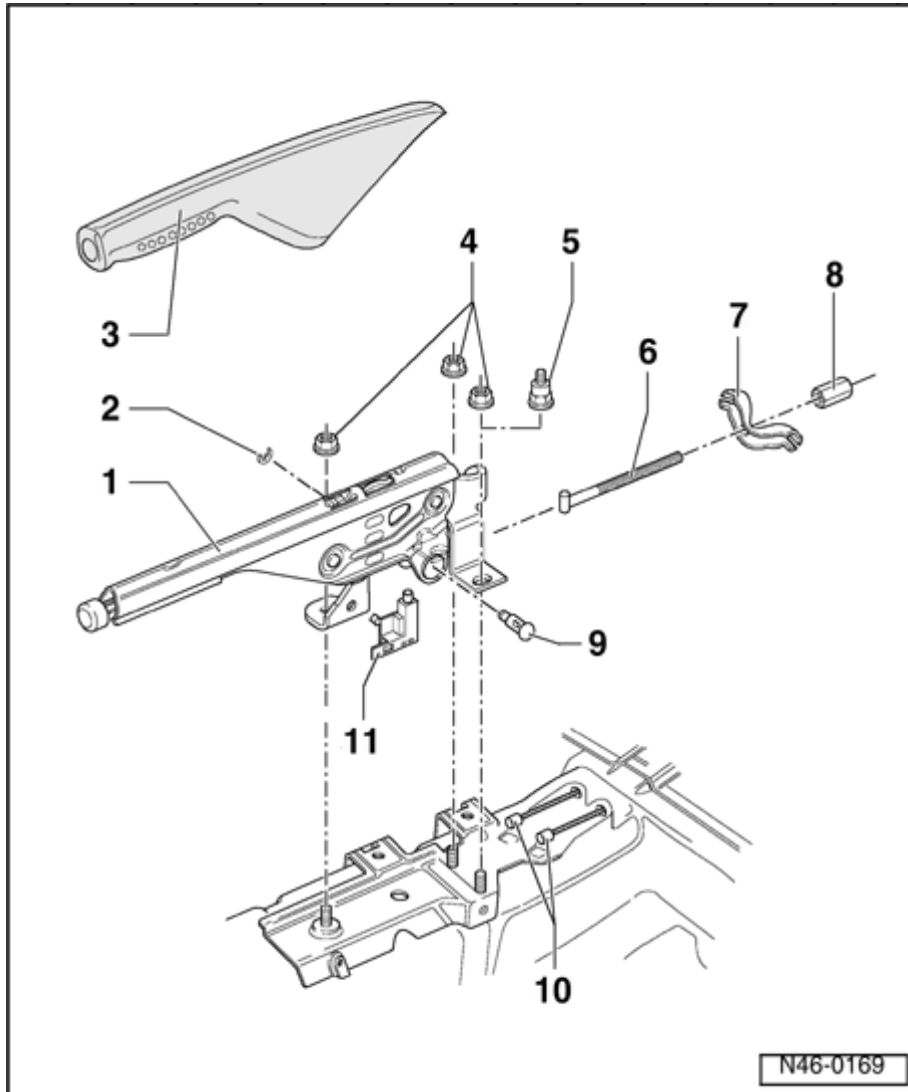


- Install rubber grommet (arrow -A-) in trailing arm.
- Hook parking brake cable in retainer (arrow).
- Hook parking brake cable into compensator.

46-74



- Pretension parking brake cable with adjustment nut (arrow).
- Adjusting parking brake ⇒ [Page 46-66](#) .
- Install center console extension.
⇒ [Repair Manual, Body Interior, Repair Group 68; Compartments, covers and trims; Removing and installing center console.](#)



Parking brake lever, assembly overview

1 - Parking brake lever

- ◆ Before removing take out center console

2 - Circlip

3 - Parking brake lever trim

- ◆ Pull off forward
- ◆ Pry up release tab in rear lower area of trim with a screwdriver

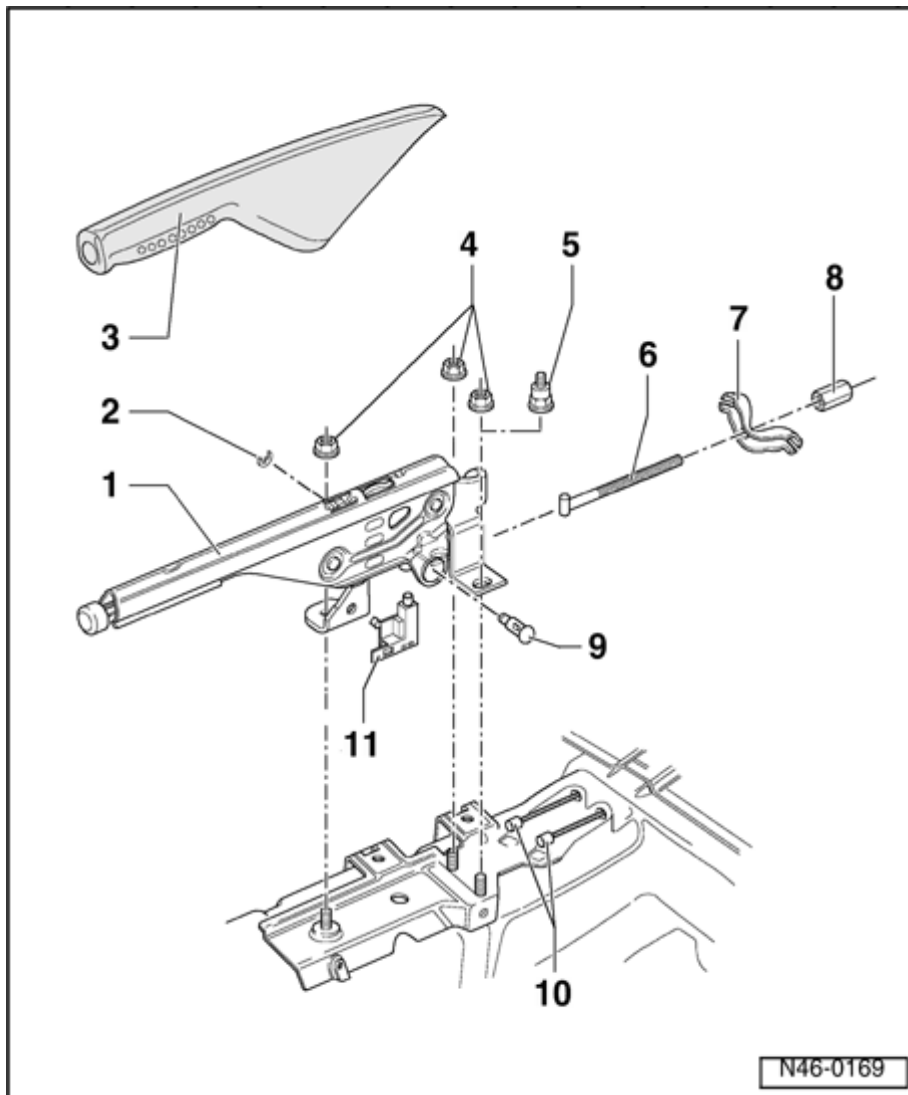
4 - Hex nut, 25 Nm (18 ft. lb)

5 - Adapter

- ◆ For vehicles with center armrest

6 - Pull rod

7 - Compensator



8 - Adjusting nut

- ◆ Adjusting parking brake:

- Vehicles with disc brakes/front wheel drive ⇒ [Page 46-67](#)

- Vehicles with disc brakes/all-wheel drive ⇒ [Page 46-71](#)

9 - Fulcrum pin

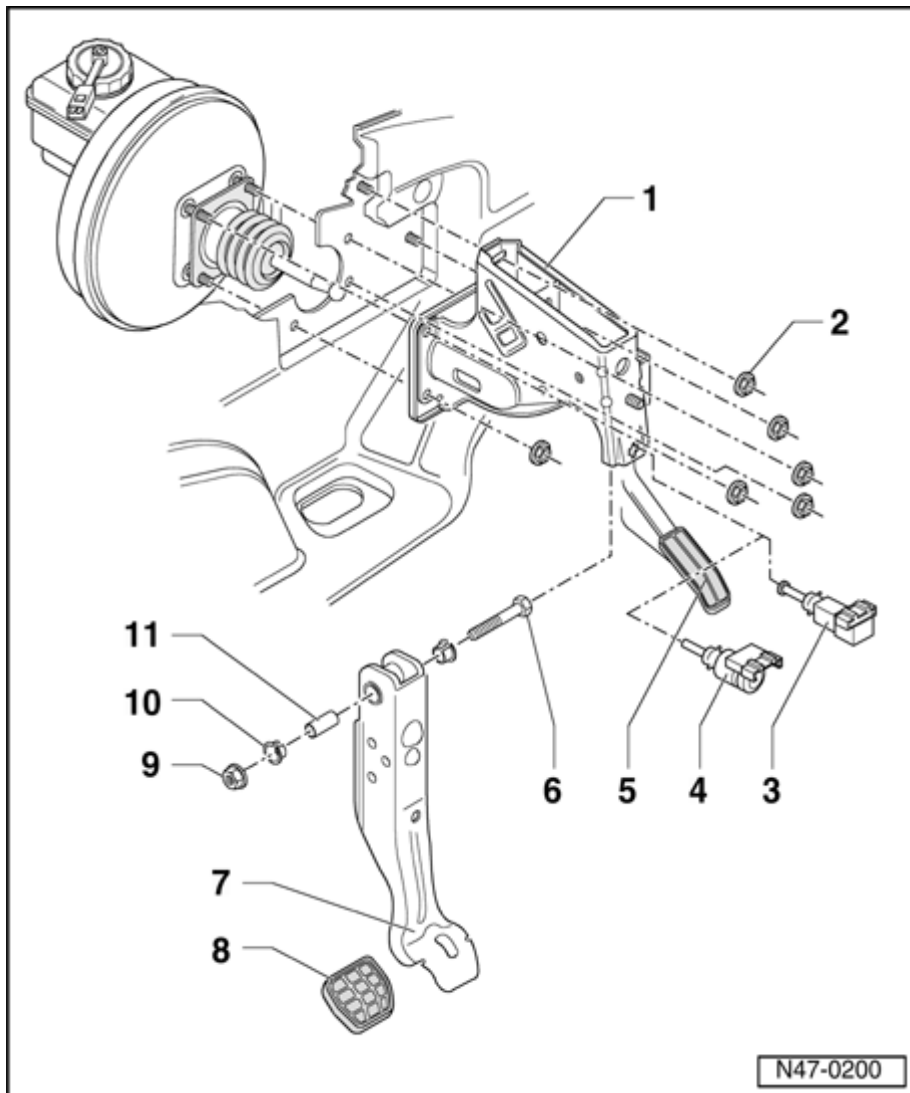
- ◆ Mounts pull rod -item 6 - in parking brake

10 - Parking brake cables

- ◆ Removing and installing (disc brakes/front wheel drive) ⇒ [Page 46-67](#)
- ◆ Removing and installing (disc brakes/all-wheel drive) ⇒ [Page 46-](#)

[71](#)

**11 - Parking
brake
warning
switch**



Brake pedal assembly overview

WARNING!

The brake pedal travel must not be restricted by additional floor mats.

Note:

Grease all mounting points before installing with grease Part No. G 000 602.

1 - Mounting bracket

2 - Self-locking hex nut, 28 Nm (20.7 ft.. lb)

◆ Always replace

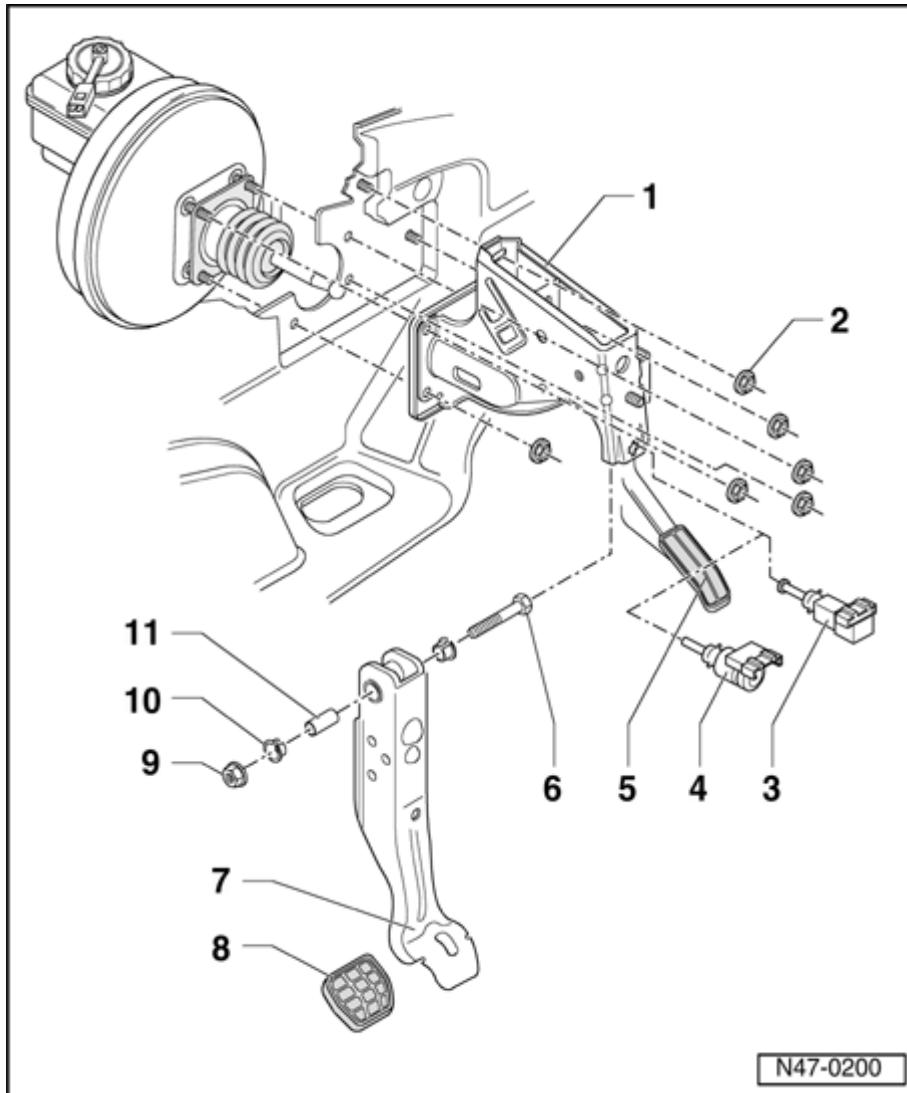
3 - Brake Light Switch -F-

◆ "Old style"

◆ Integrated with Brake Pedal Switch (cruise control/DFI, F47- on Diesel models and models with cruise control.

◆ Removing and installing/adjusting ⇒ [Page 46-84](#) .

46-78



4 - Brake Light Switch -F-

- ◆ "New style"
- ◆ Integrated with Brake Pedal Switch (cruise control/DFI F47- on Diesel models and models with cruise control.
- ◆ Removing and installing/adjusting ⇒ [Page 46-84](#) .

5 - Accelerator pedal

6 - Hex bolt

7 - Brake pedal

8 - Pad

9 - Self-locking hex nut, 20 Nm (15 ft. lb)

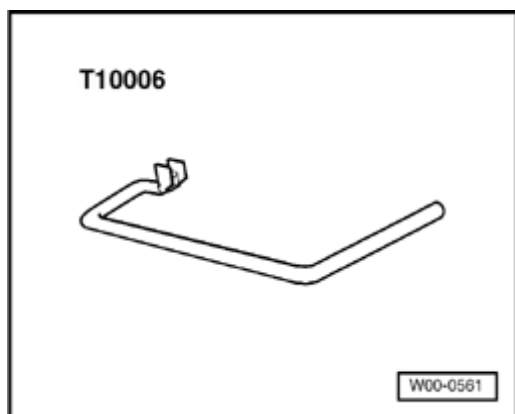
- ◆ Always replace

10 - Mounting bushing

11 - Pivot pin

Brake pedal from brake booster, disconnecting and connecting

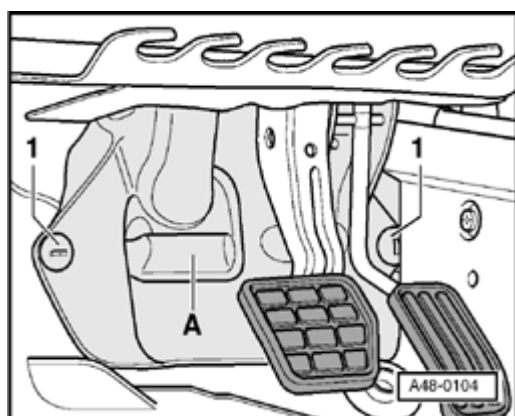
Special tools and equipment



- ◆ T 10006 Release tool

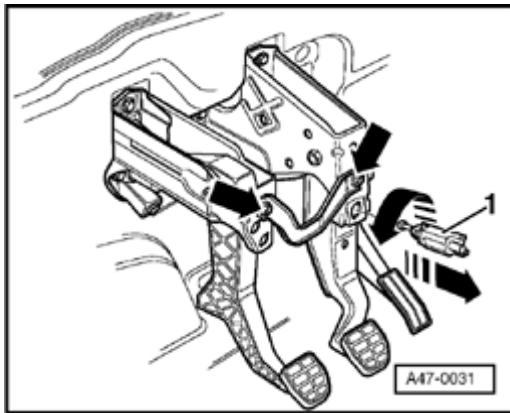
- Remove trim under instrument panel.

⇒ [Repair Manual, Body Interior, Repair Group 68; Trim under steering column, removing and installing](#)

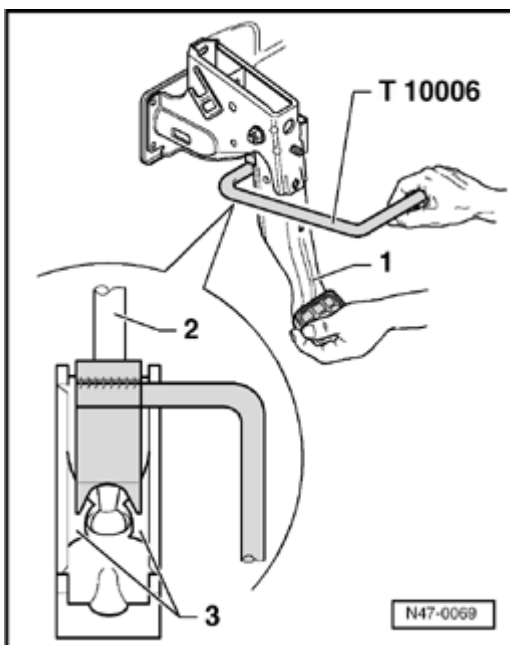


- Remove screws -1-.

- Remove cover -A-.



- ✦ - Remove connecting plate between clutch and brake pedals (arrows) on vehicles with manual transmission.
- Remove brake light switch -1- ⇒ [Page 46-84](#) .



- ✦ - Press brake pedal in direction of brake booster and hold.
- 1 - Brake pedal
- 2 - Push rod
- 3 - Retaining lugs
- Insert special tool T 10006 and pull in direction of driver's seat, when doing this counter-hold on brake pedal. (At this moment the pedal must not be allowed to move backward). Thereby the mounting retaining lugs -3- will be pressed off the ball head of the push rod -2-.

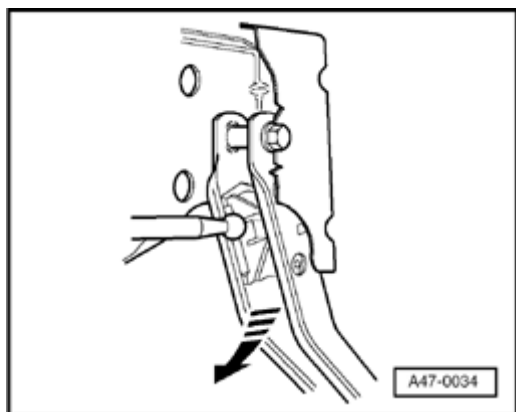
Note:

For ease of illustration separating the brake pedal from the brake booster is shown with the pedal cluster removed.

46-81

- Pull special tool T10006 and brake pedal together toward the driver's seat. (Thereby brake pedal will be pulled off the ball head push rod).

Joining brake pedal to brake booster



- Hold push rod ball head in front of mounting bracket and push brake pedal in direction of brake booster so that the ball head audibly locates.

Installation is performed in reverse order.

- Adjust brake light switch ⇒ [Page 46-84](#) .

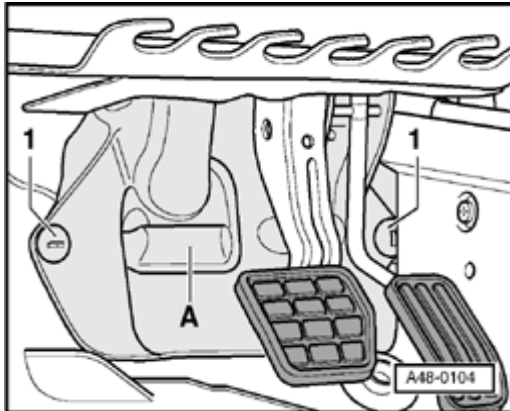
Brake pedal, removing and installing

Additional information

⇒ [Repair Manual, Brake System On Board Diagnostic \(OBD\), Repair Group 01](#)

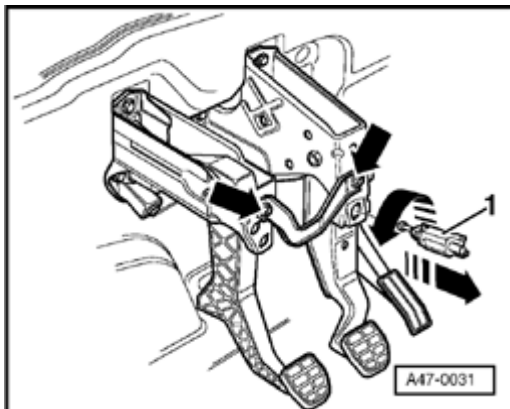
Removing

- Remove trim below instrument panel.
- Remove screws -1-.
- Remove cover -A-.



Vehicles with manual transmission

- Remove connecting plate between clutch and brake pedals on vehicles with a manual transmission.



Continued for all vehicles

- Remove brake light switch -1-.
- Disconnect accelerator cable.
- Vehicles with accelerator pedal position sensor, release connector below instrument panel.

- Disconnect brake pedal from brake booster ⇒ [Page 46-79](#) .
- Remove hex nuts item - 2 -, ⇒ [Page 46-77](#) .
- Take out pedal cluster.
- Remove brake pedal.

Installing

Install in reverse order.

- Adjust brake light switch ⇒ [Page 46-84](#) .

Brake light switch, removing and installing/adjusting

Two different styles of brake light switch were used in production. For servicing purposes they will be referred to here as "old style" and "new style".

It is important to identify which style of switch is installed prior to servicing as each requires specific removal and installation/replacement procedures.

Notes

- ◆ *On Diesel models and gasoline models with cruise control, Brake Switch -F- and Brake Pedal Switch (cruise control/DFI) -F47- are integrated. The following procedures apply to all models regardless of switch.*
- ◆ *Only "old style" switches can be removed and reinstalled/adjusted.*
- ◆ *"New style" switches must NOT be reused after removal. Always replace.*

CAUTION!

Should a brake light switch require replacement, only a specific "new style" switch is available (supercedes all previous part number versions). This switch requires that critical procedures be followed prior to and during installation ⇒ [Page 46-87](#) .

Preparation

- Remove driver's side lower instrument panel cover.
- Disconnect electrical connector from brake switch.
- Identify style of switch installed:
 - ◆ "Old style" switch is identified by large (approx. 10 mm) plunger tip button, and square plunger shaft. Removing and installing/adjusting below.
 - ◆ "New style" switch is identified by small (approx. 4 mm) plunger tip without button and round plunger shaft. Removing and installing/adjusting below. [Page 46-87](#) .

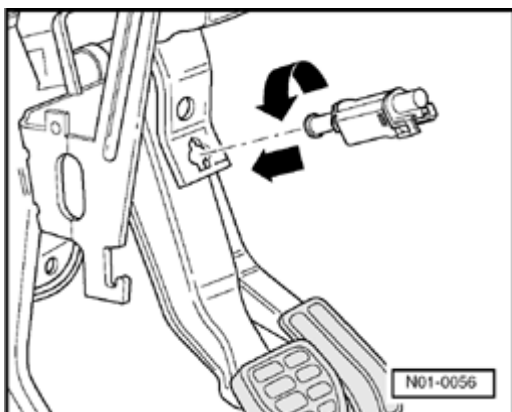
"Old style" brake light switch, removing and installing/adjusting

Note:

The following applies only to an existing, functional "old style" switch that is removed and reinstalled/adjusted.

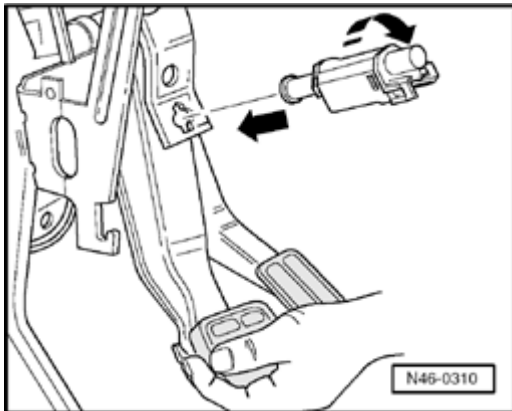
Removing

- Turn switch counter-clockwise 90° .
- Pull switch out from retainer mounting hole.



Installing/adjusting

- Before installing, pull out plunger completely.
- Apply a light coat of lubricant Part No. G 142 A2 to end of plunger.
- Depress and hold brake pedal in down position.
- Note orientation of retainer tabs on switch carefully insert switch into retainer mount hole.



- Secure switch by turning clockwise 90°.
- Slowly release brake pedal to stop.

Note:

The above action automatically adjusts the plunger travel.

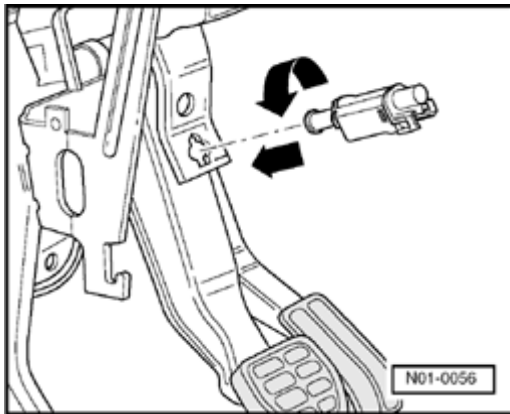
- Reconnect electrical connector to switch.
- Check function of brake light switch.

"New style" brake light switch, removing and installing

Note:

The following applies only to a "new style" switch that is removed and replaced.

Removing



- Turn switch counter-clockwise 45°.
- Pull switch out from retainer mounting hole.
- Dispose of switch accordingly.

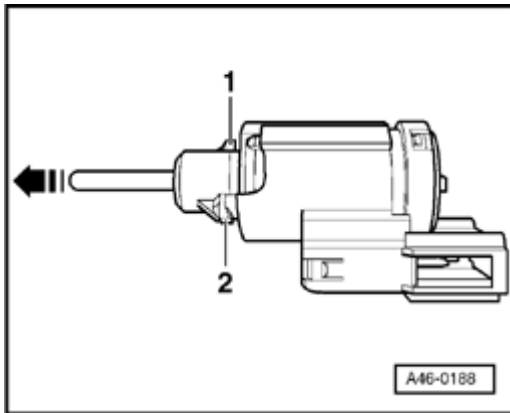
CAUTION!

"New style" switches must NOT be reused after removal. Always replace.

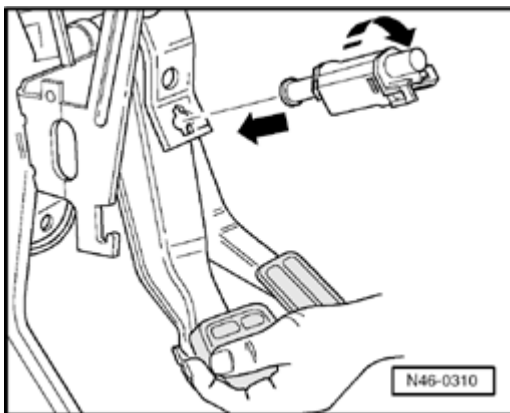
Installing

CAUTION!

- ♦ ***"New style" switches have an internal switch mechanism that will be damaged if not installed and adjusted according to the following procedure.***
- ♦ ***DO NOT depress switch plunger or otherwise rotate the retaining collar of the switch prior to installation.***
- ♦ ***Brake pedal must be held in the up position (not depressed) during switch installation.***



- Before installing, pull out plunger (arrow) completely.
- Apply a light coat of lubricant Part No. G 052 142 A2 to end of plunger.
- Hold brake pedal in up position (against stop).
- Note orientation of retainer tabs - 1- and -2- on switch and carefully insert switch into retainer mounting hole.
- Push switch in and seat fully into opening (pressing plunger against brake pedal to adjust).



- Once seated, secure switch by turning clockwise 45°.

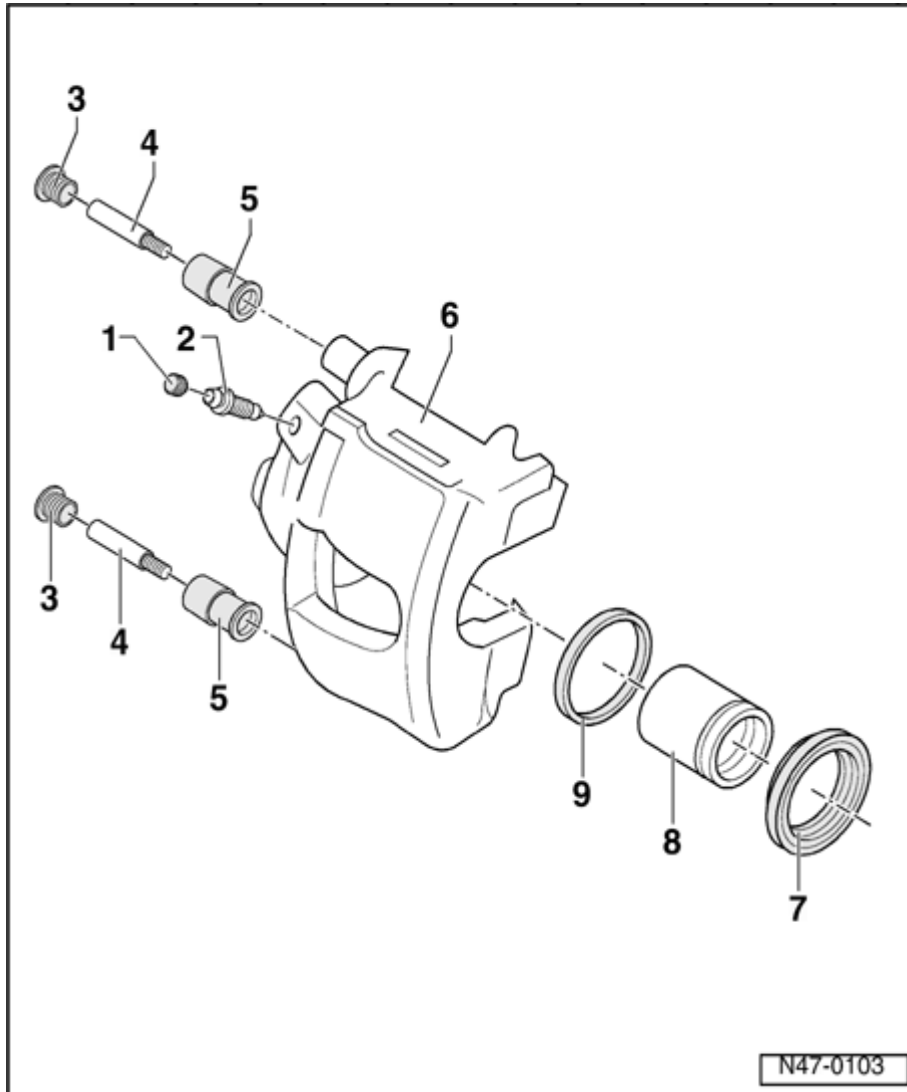
Note:

The above action turns the plunger shoe into the correct orientation to make electrical contacts in switch operate, as well as locks in the plunger adjustment against the brake pedal.

CAUTION!

When installing, switch must be rotated until it is fully locked and the electrical connector is in the horizontal position. Inspect to ensure internal stop pin on retaining collar is fully seated against outer shell.

- Reconnect electrical connector to switch.
- Check function of brake light switch.



Front brake calipers, servicing

FS III front brake calipers, servicing

Note:

- ◆ *When carrying out repairs install all parts supplied in repair kit.*
- ◆ *New brake calipers are filled with brake fluid and are pre-bled.*
- ◆ *Apply thin coat of lubricant G 052 150 A2 to brake cylinders, pistons and seals.*

1 Protective - seal

2 - Bleed valve

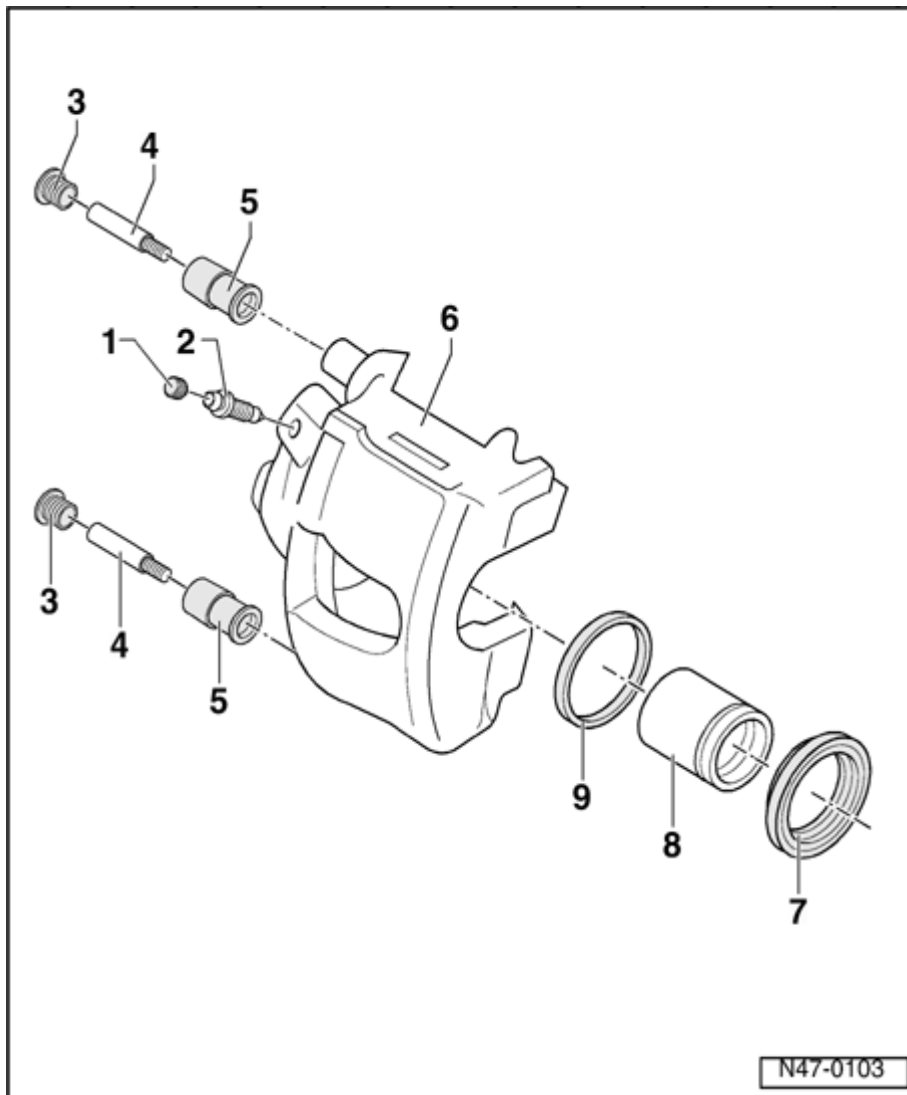
- ◆ *Apply thin coat of assembly lubricant G 052 150 A2*

to
threads
before
screwing
in

3 - Cap

◆ Insert in
mounting
bushing

**4 - Guide
pins, 30
Nm
(22.1 ft.
lb)**



5 - Mounting bushing

- ◆ Insert into brake caliper housing

6 - Brake caliper housing

7 Protective - seal

- ◆ Do not damage when inserting piston

8 - Piston

- ◆ Removing and installing ⇒ [Page 47-3](#)

- ◆ Apply thin coat of assembly lubricant G 052 150 A2 to piston before inserting

9 - Seal

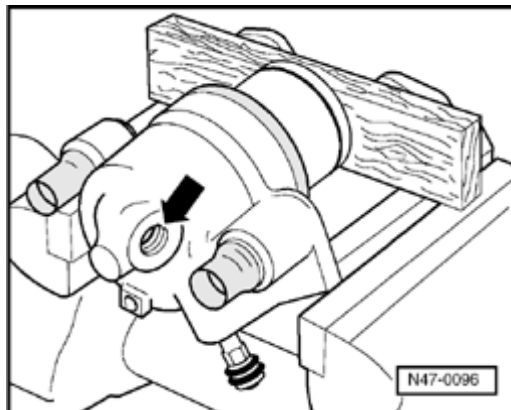
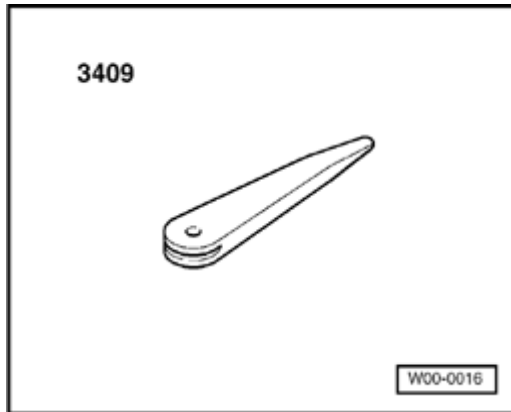
- ◆ Removing and installing ⇒ [Page 47-3](#)

Front brake caliper piston, removing and installing

Special tools and equipment

- ◆ 3409 Wedge
- ◆ Piston resetting tool

Removing

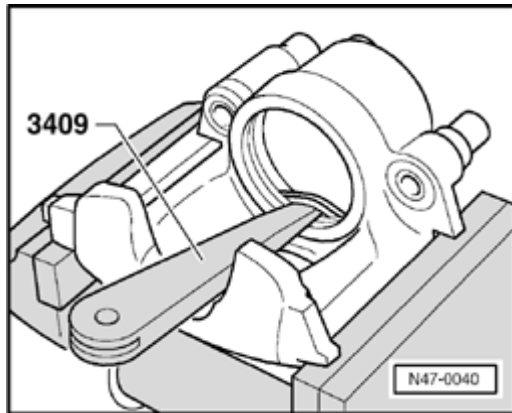


- Force piston out of brake caliper housing using compressed air.

Note:

Place a piece of wood in the recess to prevent damaging the piston.

47-4



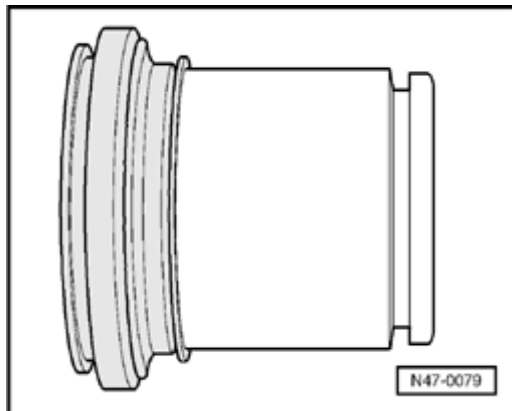
- Remove seal using wedge 3409.

Note:

When removing ensure that the surface of the cylinder is not damaged.

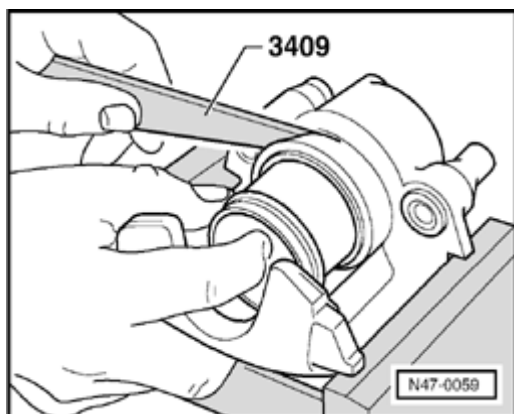
Installing

- The surface of the piston and seal must only be cleaned with methylated spirits and then dried.
- Thinly coat piston and seal with assembly paste G 052 150 A2 before inserting.
- Insert oil seal in brake caliper housing.



- Place protective seal with the outer sealing lip on the piston.

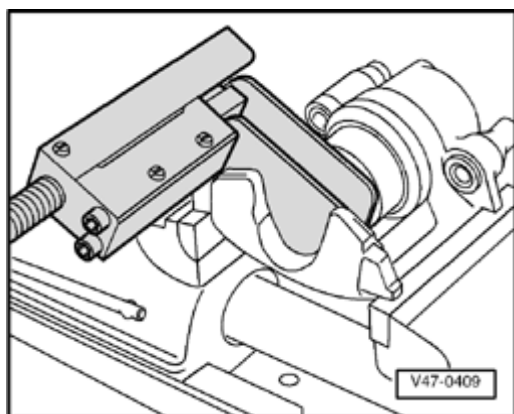
47-5



- Using wedge 3409, insert the inner sealing lip into the groove in the cylinder.

Note:

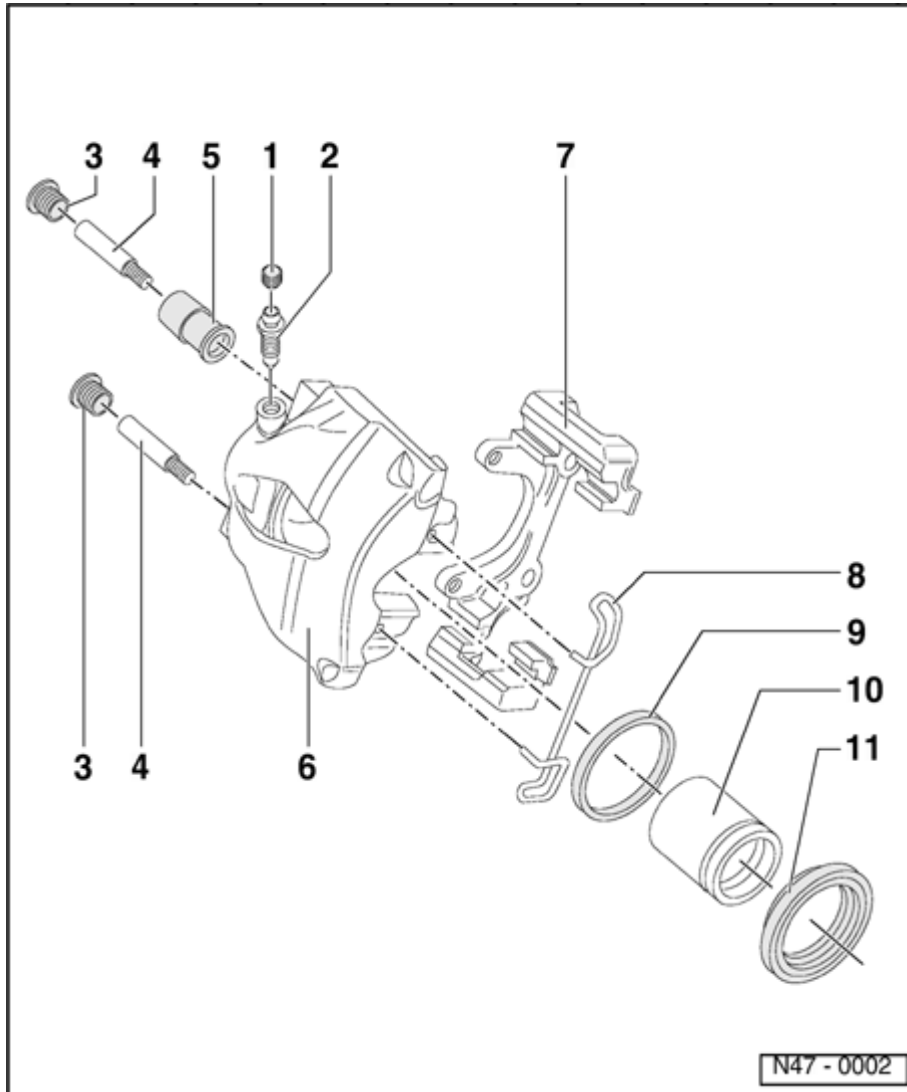
When doing this hold piston in front of caliper housing.



- Press piston into brake caliper housing using piston resetting tool.

Note:

The protective seal outer sealing lip must slip into the piston groove.



FN 3 front brake calipers, servicing

Note:

- ◆ Install all parts supplied in repair kit.
- ◆ New brake calipers are filled with brake fluid and are pre-bled.
- ◆ Apply thin coat of assembly lubricant G 052 150 A2 to brake cylinders, pistons and seals.

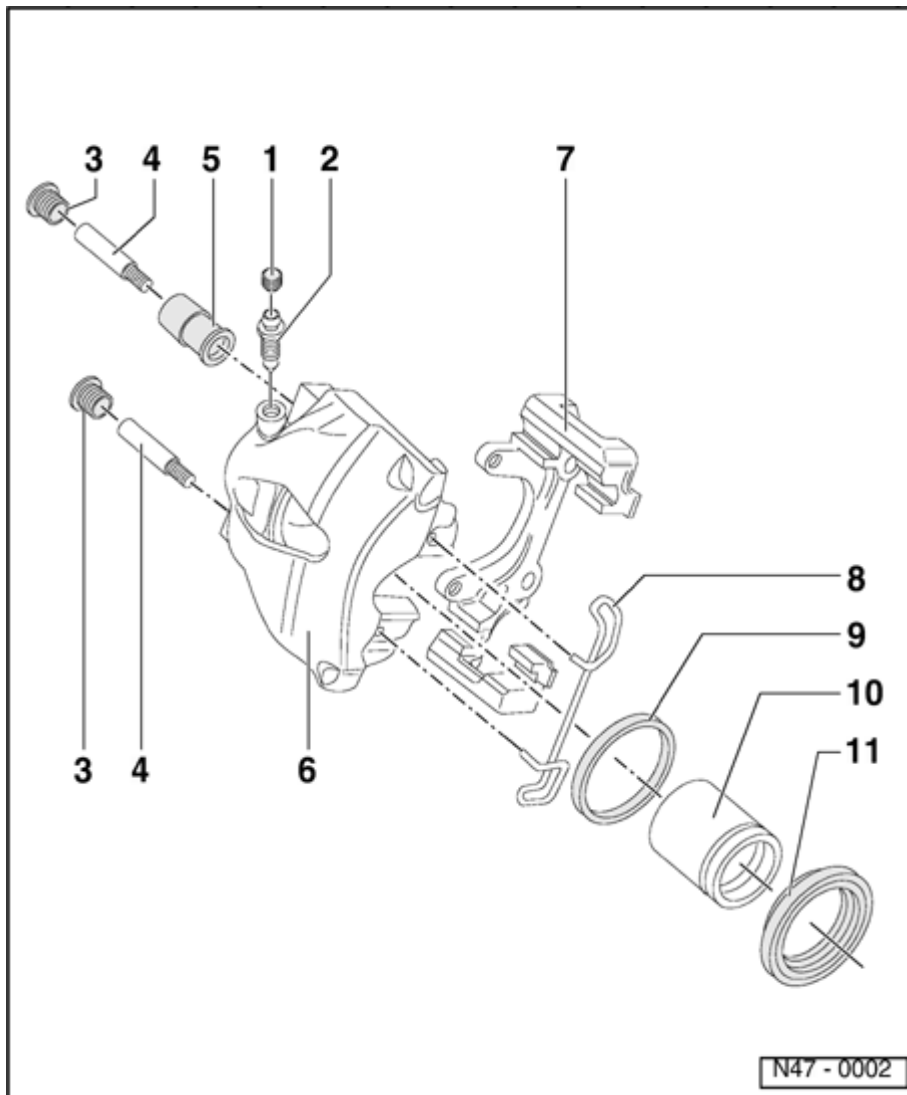
1 Protective - seal

2 - Bleeder valve

- ◆ Apply thin coat of assembly lubricant G 052 150 A2 to threads before screwing in

3 - Cap

- ◆ Insert in mounting bushing



4 - Guide pins, 30 Nm (22.1 ft. lb)

5 - Mounting bushing

◆ Insert into brake caliper housing

6 - Brake caliper housing

7 - Brake carrier

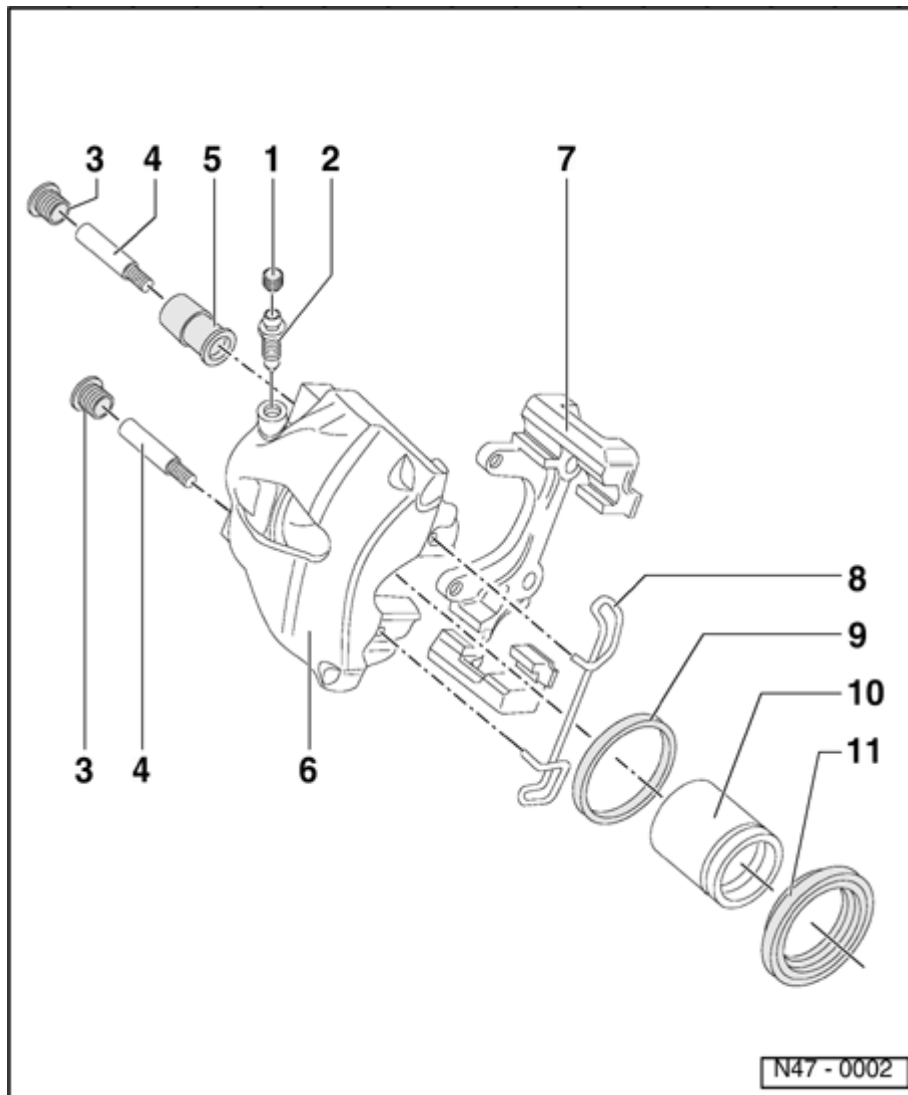
◆ Install on brake caliper housing

8 - Retaining spring

◆ Insert with both ends in the holes in brake caliper housing

9 - Seal

◆ Removing and installing ⇒ [Page 47-9](#)



10 - Piston

- ◆ Removing and installing ⇒ [Page 47-9](#)
- ◆ Apply thin coat of assembly lubricant G 052 150 A2 to piston before inserting

11 Protective - seal

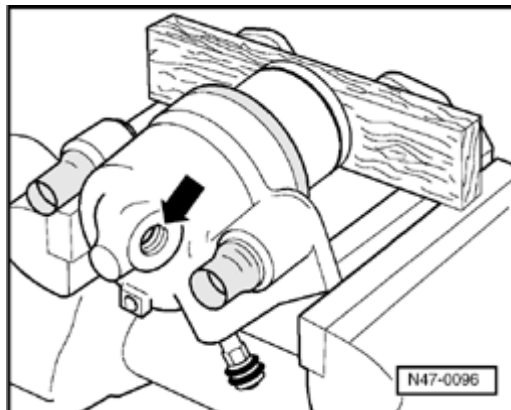
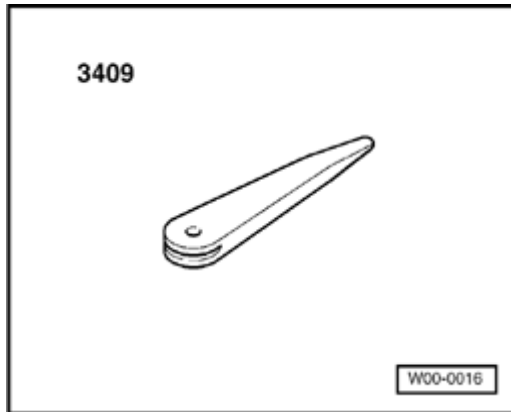
- ◆ Removing and installing ⇒ [Page 47-9](#)
- ◆ Do not damage when inserting piston

Front caliper piston, removing and installing

Special tools and equipment

- ◆ 3409 Wedge
- ◆ Piston resetting tool

Removing

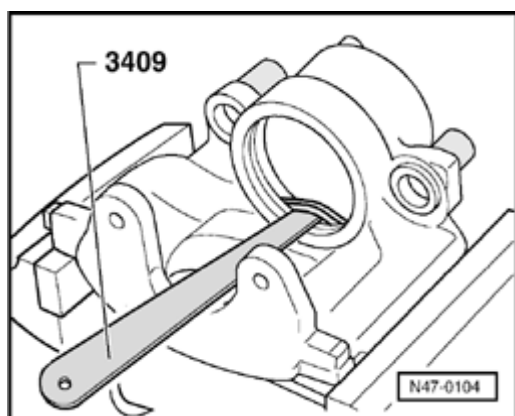


- Force piston out of brake caliper housing using compressed air.

Note:

Place a piece of wood in the recess to prevent damaging the piston.

47-10



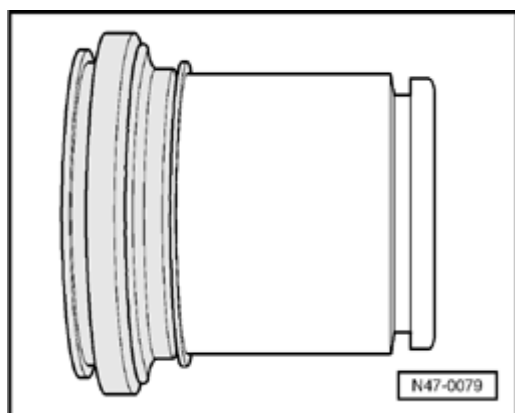
- Remove seal using wedge 3409.

Note:

When removing the piston seal make sure that the cylinder bore is not damaged.

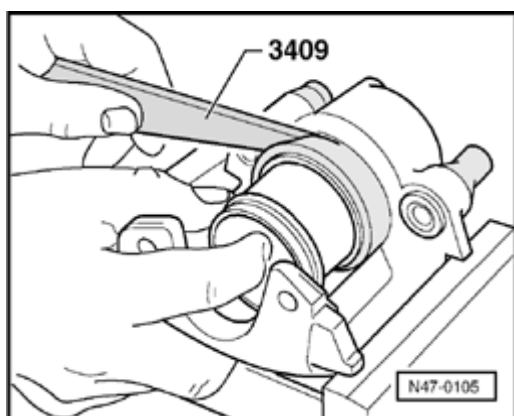
Installing

- The surface of the piston and seal must only be cleaned with methylated spirits and then dried.
- Thinly coat piston and seal with assembly lubricant G 052 150 A2 before inserting.
- Insert oil seal in brake caliper housing.



- Place protective seal with the outer sealing lip on the piston.

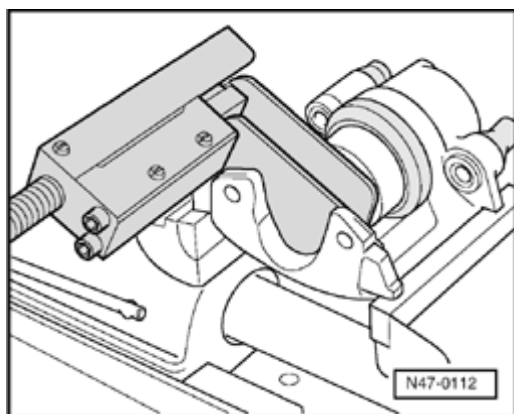
47-11



- Using wedge 3409, insert the inner sealing lip into the groove in the cylinder.

Note:

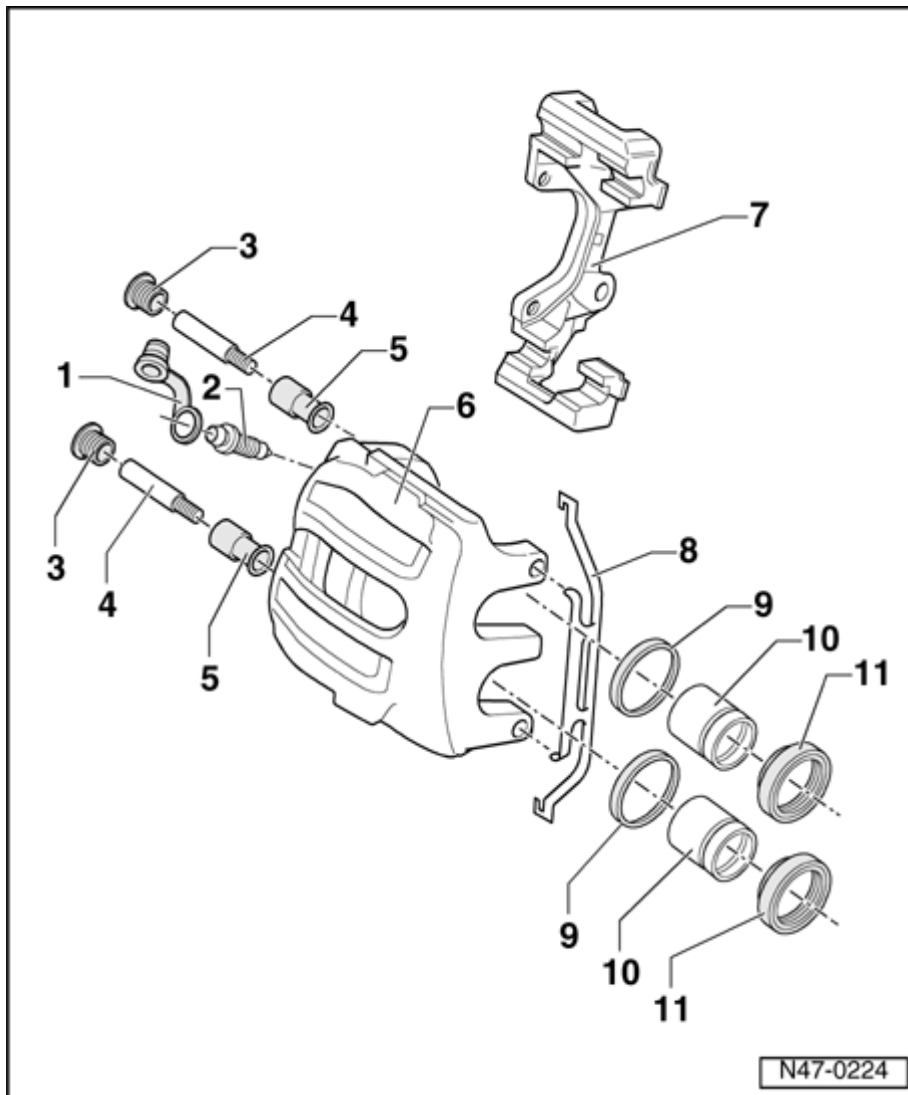
Hold piston in front of caliper housing.



- Press piston into the brake caliper housing using piston resetting tool.

Note:

The protective seal outer sealing lip must slip into the piston groove.



Front brakes, 2FN brake caliper, Servicing

Note:

- ◆ When carrying out repairs install all parts supplied in repair kit.
- ◆ New brake calipers are filled with brake fluid and are pre-bled.
- ◆ Apply thin coat of assembly paste G 052 150 A2 to brake cylinders, pistons and seals.

1 - Dust cap

- ◆ Push onto bleeder valve

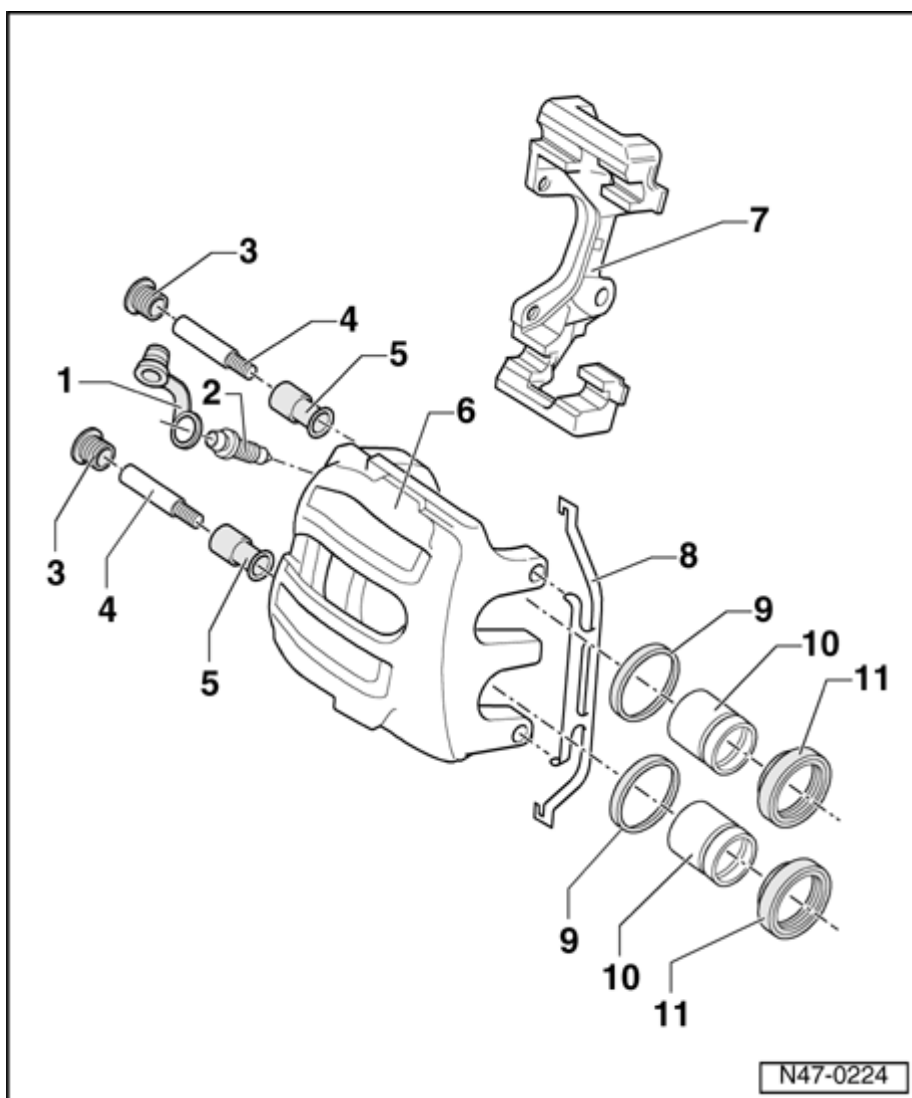
2 - Bleeder valve

- ◆ Apply thin coat of assembly paste G 052 150

A2 to
threads
before
screwing
in

3 - Cap

- ◆ Insert in
mounting
bushing



4 - Guide pin, 25 Nm

5 - Mounting bushing

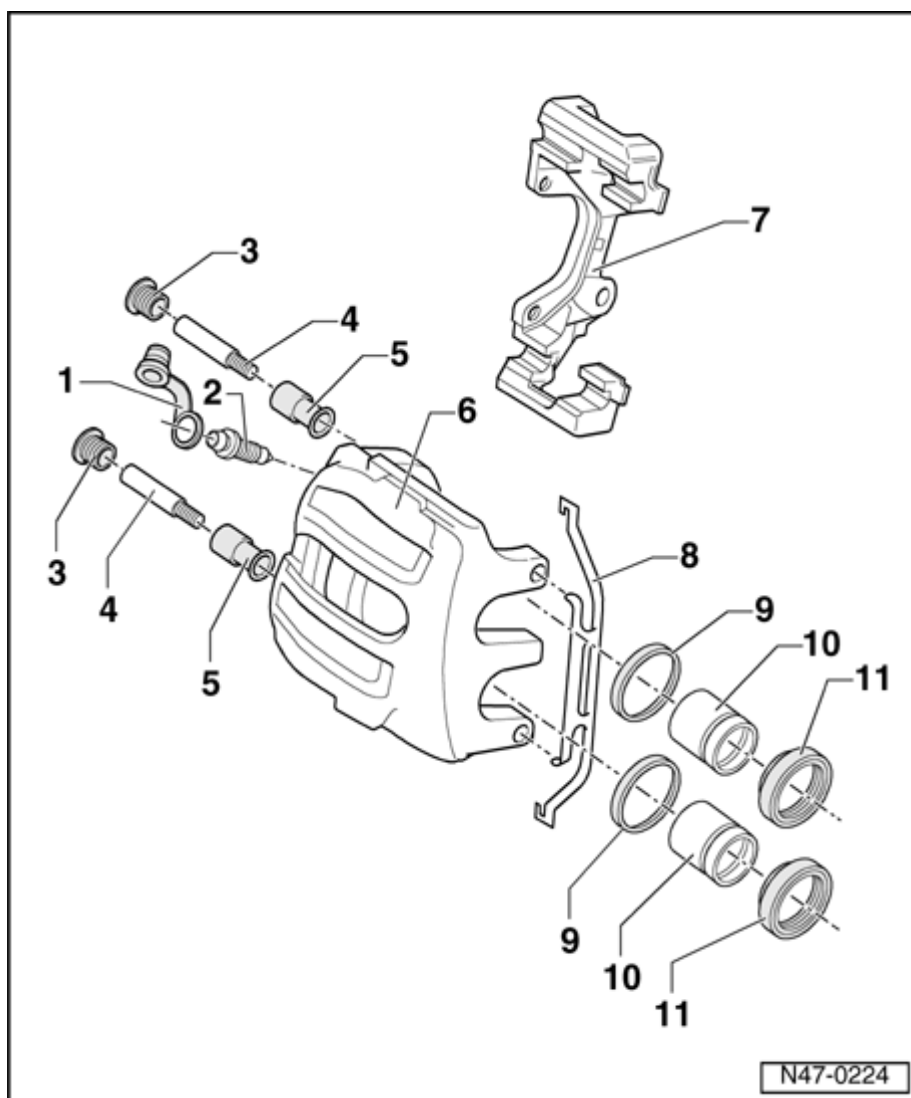
◆ Insert into brake caliper housing

6 - Brake caliper housing

7 - Brake carrier

◆ Install on brake caliper housing

8 - Retaining spring



9 - Seal

- ◆ Removing and installing ⇒ [Page 47-15](#)

10 - Piston

- ◆ Removing and installing ⇒ [Page 47-15](#)

- ◆ Apply thin coat of assembly paste G 052 150 A2 to piston before inserting

11 Protective - seal

- ◆ Removing and installing ⇒ [Page 47-15](#)

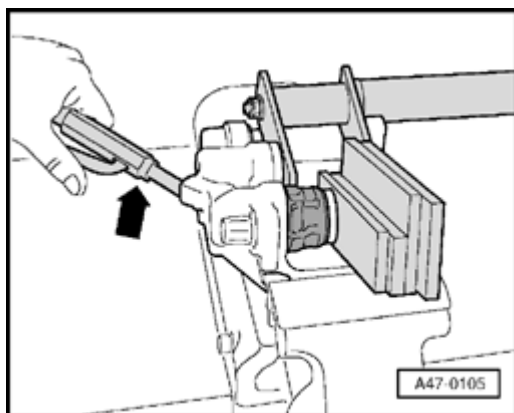
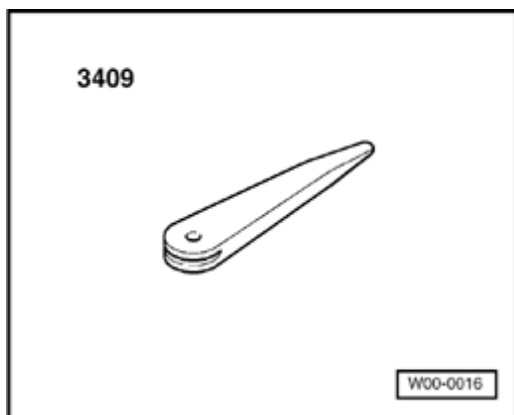
- ◆ Do not damage when inserting piston

Front caliper piston, removing and installing

Special tools and equipment required

- ◆ 3409 Wedge
- ◆ Piston resetting tool

Removing

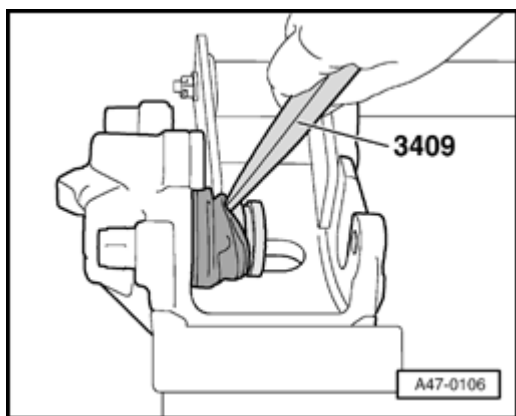


- Force piston out of brake caliper housing using compressed air.

Note:

Place a piece of wood in the recess to prevent damaging the piston.

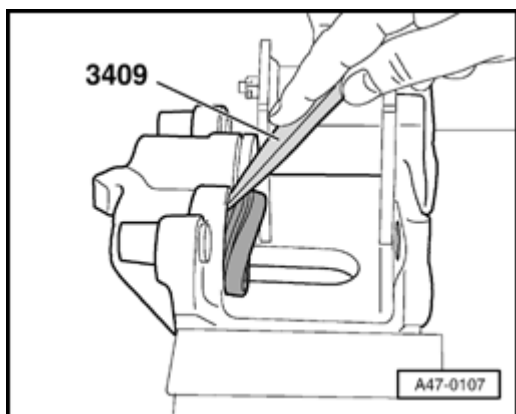
Only one piston at a time can be forced out. When doing this hold the other piston in the caliper using the piston resetting tool.



- ✦ - Remove protective seal out of piston groove using wedge 3409.
- Remove piston.

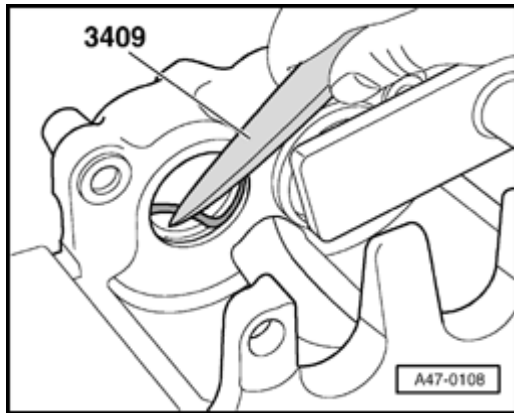
Note:

When removing ensure that the surface of the cylinder is not damaged.



- ✦ - Remove protective seal using wedge 3409.

47-17



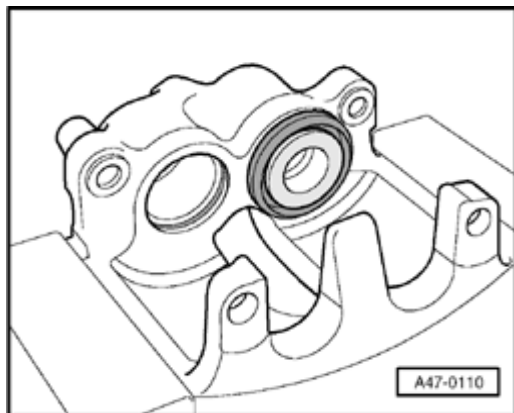
- Remove seal using wedge 3409.

Note:

When removing ensure that the surface of the cylinder is not damaged.

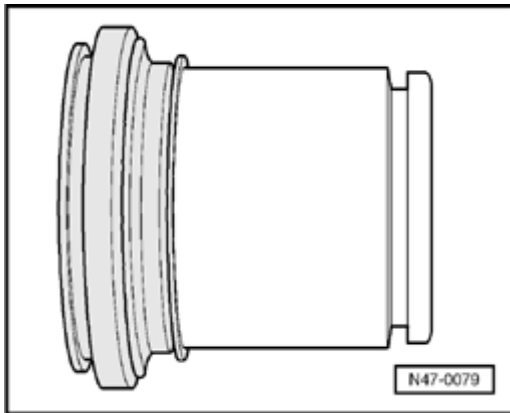
Installing

- The surface of the piston and seal must only be cleaned with methylated spirits and then dried.

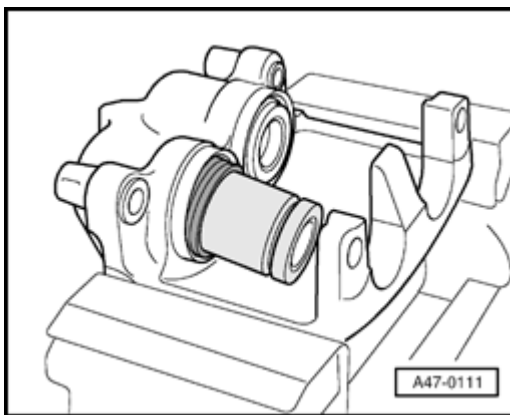


- Thinly coat piston and seal with assembly paste G 052 150 A2 before inserting.
- Insert oil seal in brake caliper housing.

47-18



- Place protective seal with outer sealing lip on the piston.

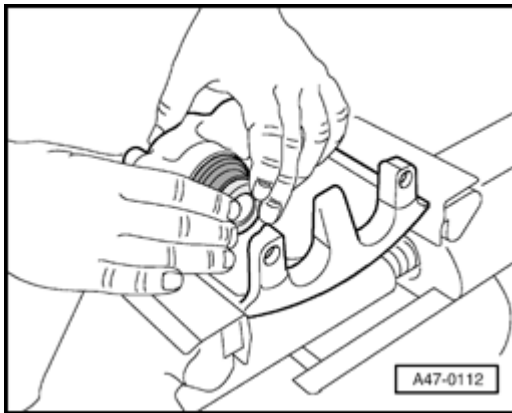


- Using wedge 3409, insert inner sealing lip into groove in cylinder.

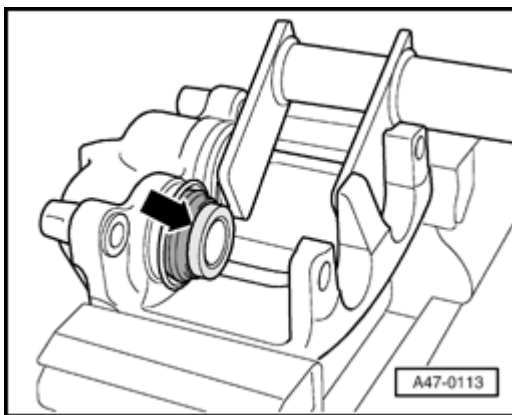
Note:

When doing this hold piston in front of caliper housing.

47-19



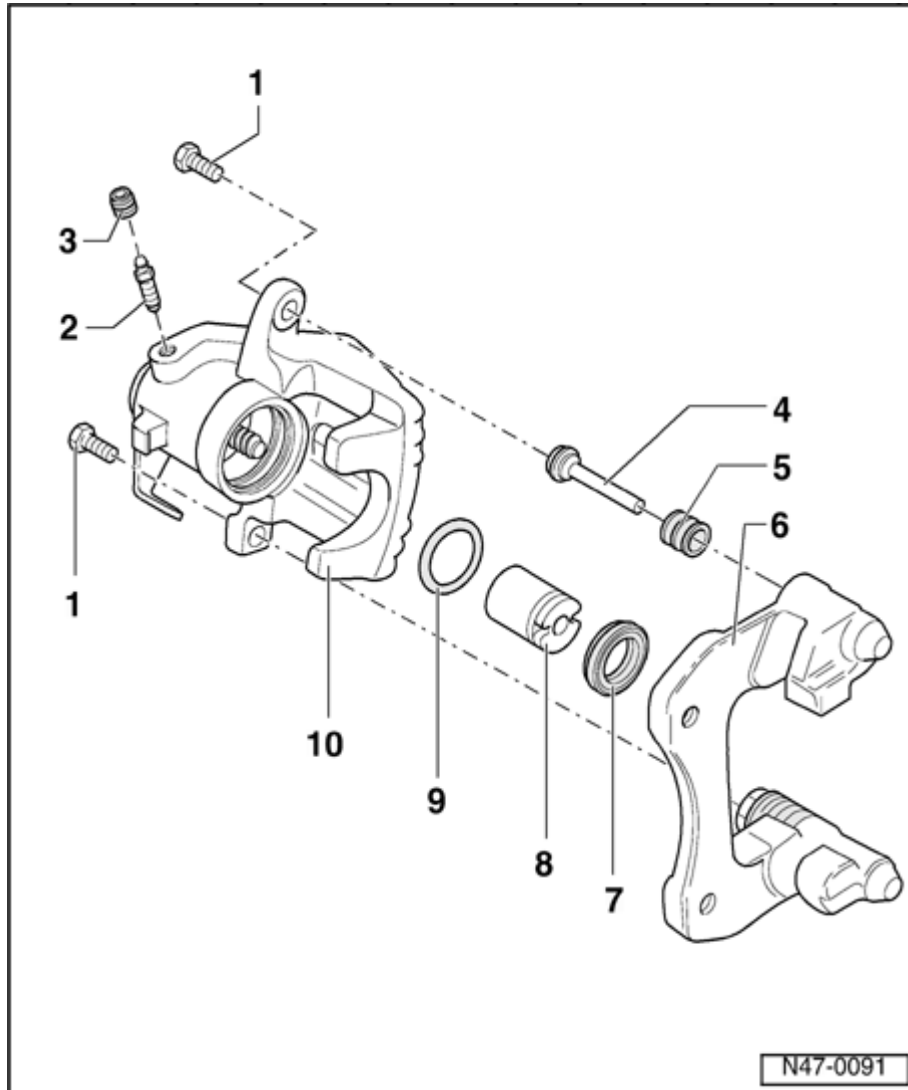
- Press piston into brake caliper housing as far as possible by hand.



- Press piston into brake caliper housing using piston resetting tool.

Note:

The protective seal outer sealing lip will then locate in piston groove.



Rear brake caliper, servicing

Note:

- ◆ When repairing install all parts supplied in repair kit.
- ◆ New brake calipers are filled with brake fluid and pre-bled.
- ◆ Apply thin coat of assembly lubricant G 052 150 A2 to brake cylinders, pistons and seals.
- ◆ When carrying out repairs it is essential to pre-bleed the brake calipers (without brake pads) before installing in the vehicle
⇒ [Page 47-26](#)

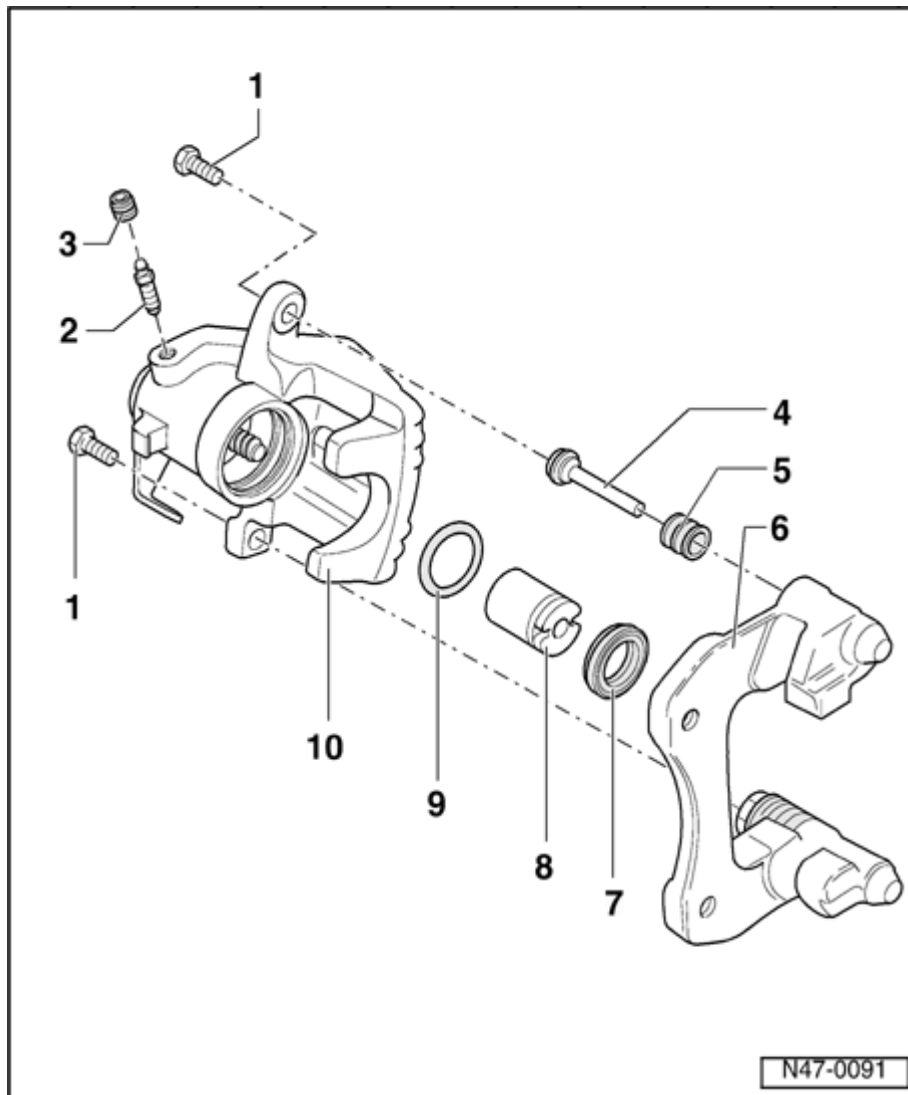
1 - Self-

**locking
hex
bolt, 35
Nm (26
ft. lb)**

- ◆ Always replace
- ◆ When loosening and tightening counter-hold on guide pin

**2 - Bleeder
valve,
11 Nm
(8.1 ft.
lb)**

- ◆ Apply thin coat of assembly lubricant G 052 150 A2 to threads before installing

**3 - Dust cap****4 - Guide pins**

- ◆ Grease before pulling on protective cap

5 - Protective cap

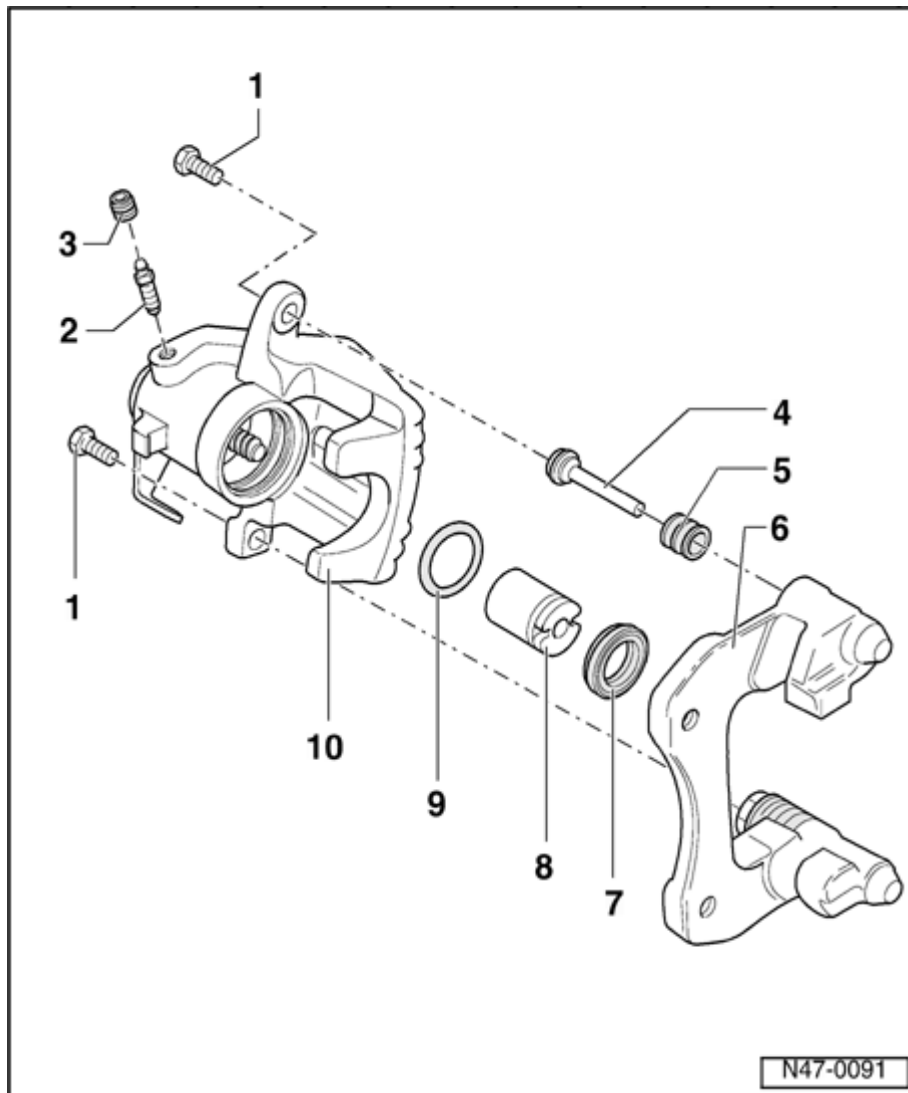
- ◆ Pull onto brake carrier and guide pin

6 - Brake carrier with guide pin and protective cap

- ◆ Replacement part is assembled with sufficient grease on guide pins

- ◆ If protective caps or guide pins are damaged, install repair kit. Use grease packet supplied to lubricate

the guide
pins.



7 Protective - seal

- ◆ Pull outer sealing lip onto piston

8 Piston with - automatic adjustment

- ◆ Removing and installing ⇒ [Page 47-23](#)
- ◆ Apply thin coat of assembly lubricant G 052 150 A2 to piston before inserting

9 - Sealing ring

- ◆ Removing and installing ⇒ [Page 47-23](#)

10 - Brake caliper housing with parking brake cable lever

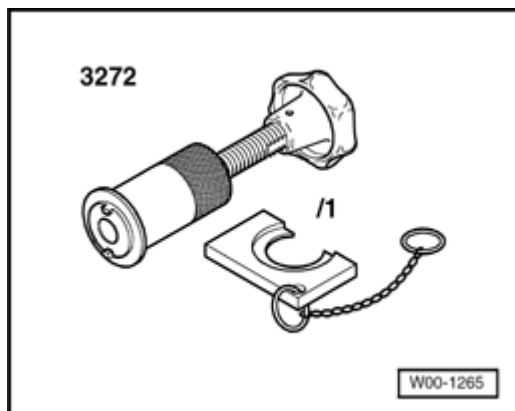
- ◆ If a leak exists at the parking

brake
cable
lever
replace
brake
caliper
housing

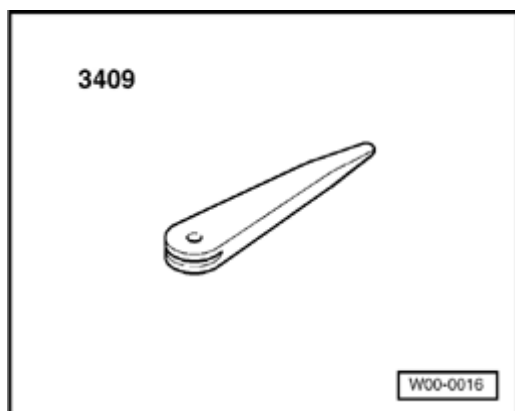
- ◆ After repairing, pre-bleed caliper housing ⇒ [Page 47-26](#)

Rear brake caliper piston, removing and installing

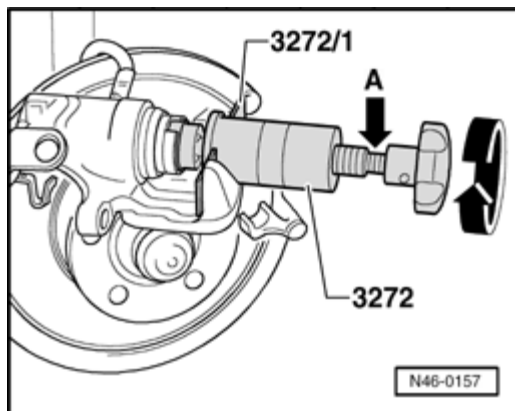
Special tools and equipment



- ◆ 3272 Piston resetting and removal tool



- ◆ 3409 Wedge
- ◆ Bleeder container

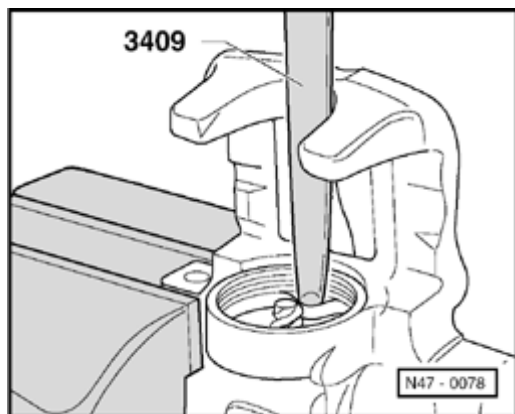


Removing

- Remove piston out of brake caliper housing by turning the knurled wheel counter-clockwise.

Note:

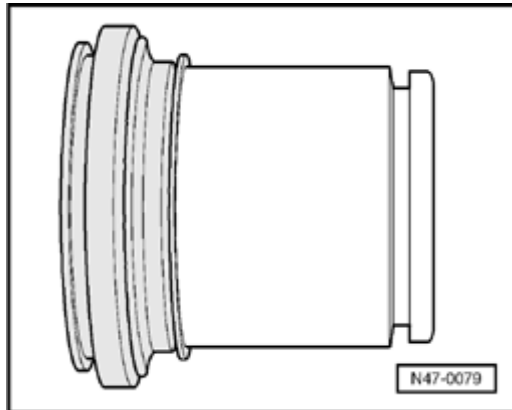
- ◆ Use special tool 3272/1 to help screw in.
- ◆ If piston is difficult to move, use a 13 mm (.512 in.) AF open end wrench on the flats (arrow -A-) provided for this purpose.



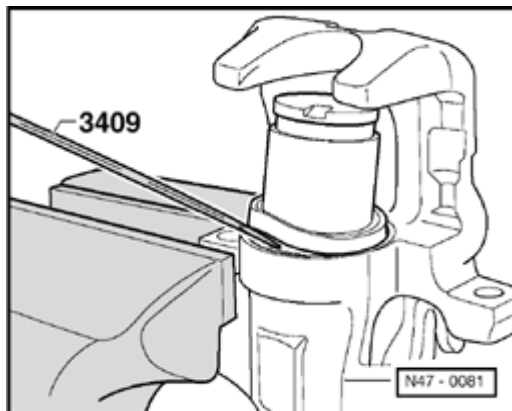
- Remove seal using wedge 3409.

Installing

- The surface of the piston and seal must be cleaned with methylated spirits and then dried.
- Apply a thin coat of assembly lubricant G 150 A2 to piston and seal before inserting it into the cylinder.
- Place protective seal with the outer seal lip on the piston.



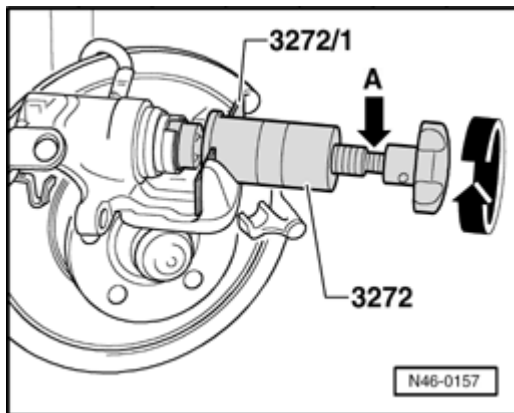
- Place protective seal with the outer seal lip on the piston.



- Using wedge 3409, insert the inner seal into the groove in the cylinder.

Note:

Hold piston in front of caliper housing.

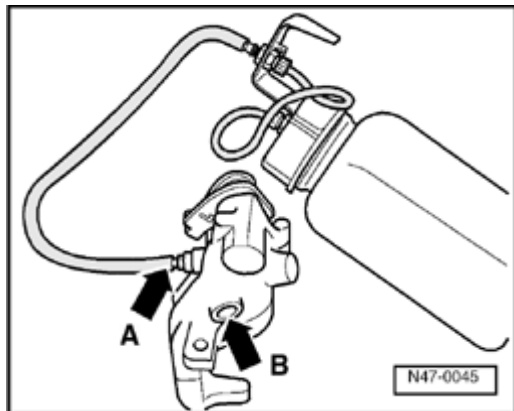


- Screw piston into housing by turning knurled wheel clockwise.

Note:

- ◆ Use special tool 3272/1 to help screw in.
- ◆ If the piston is pushed back with a piston resetting tool or by operating the foot brake the automatic adjustment in the brake caliper is destroyed.

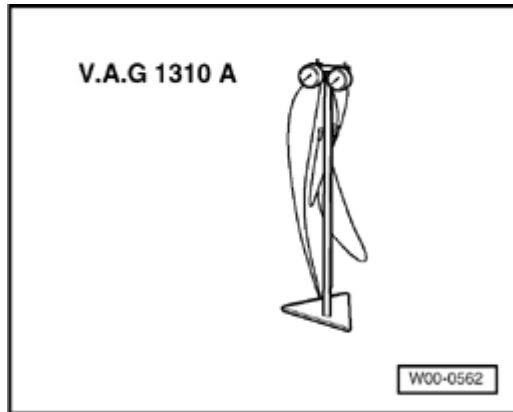
- Install brake pads.

Pre-bleeding brake caliper

- Open bleed valve (arrow -A-) and using a standard bleeder bottle, with brake fluid until bubble-free brake fluid flows from the threaded hole (arrow -B-) (brake hose connection).
- Close bleed valve.

Note:

Position brake caliper as illustrated to pre-bleed.



Pressure leak test

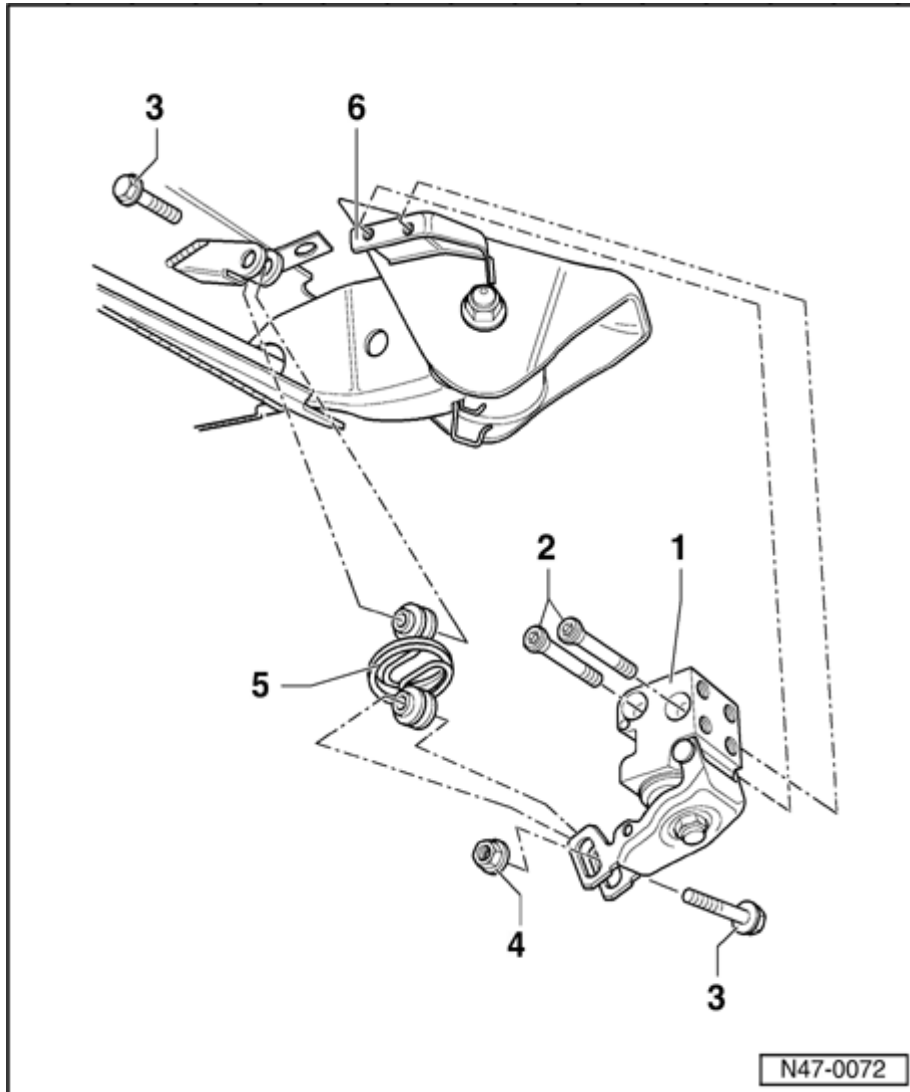
Special tools and equipment

- ◆ VAG 1310 A Brake pressure gauge

Requirements:

Brake system (hydraulic unit, brake hoses, brake lines and brake calipers) operating properly and free of leaks.

- Remove bleed screw at one of the front brake calipers. Connect pressure gauge from VAG 1310A and bleed.
- Apply pressure to brake pedal until the gauge indicates a pressure of 50 bar (725 psi). The pressure must not drop by more than 4 bar (58.01 psi) during the test period of 45 seconds. Replace master cylinder if pressure drops greatly.



Brake pressure regulator, assembly overview

1 - Brake pressure regulator

◆ Checking and adjusting
⇒ [Page 47-29](#)

2 - Hex socket head screw, 21 Nm (15 ft. lb)

3 - Hex bolt, 16 Nm (12 ft. lb)

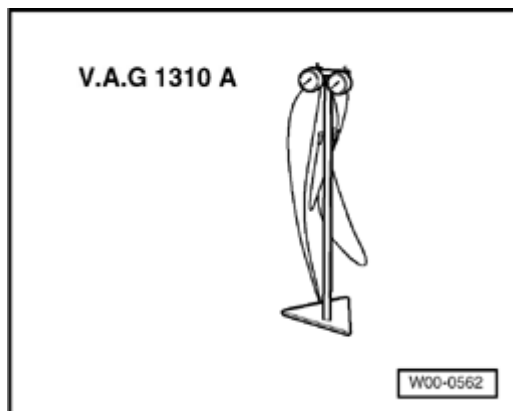
4 - Nut, 21 Nm (15 ft. lb)

5 - Spring

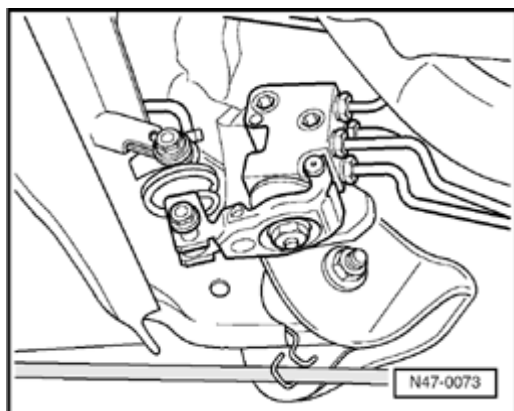
6 - Mounting bracket

Brake pressure regulator, checking and adjusting

Special tools and equipment



- ◆ VAG 1310 A Brake pressure gauge



- ✦ The brake pressure regulator is mounted on a bracket mounted to the rear axle. The regulator is controlled from the rear axle by a spring.

Checking function

- Depress the brake pedal and release quickly (vehicle standing on its wheels).
- Brake pressure regulator must move.

Checking and adjusting pressure

Note:

The brake pressure regulator is set with the vehicle unladen¹⁾.

- Lift vehicle and connect the pressure gauges to left front brake caliper and to right rear wheel cylinder/caliper.
- Bleed both gauges.
- Lower vehicle and bounce rear of vehicle several times.
- Press brake pedal and measure pressures.
- Compare figures attained with specifications, ⇒ [Page 47-31](#) , and if necessary adjust.

1) The term "unladen" means: The weight of the vehicle ready for the road which has a:

Driver's weight of 75 kg (165.34 lb).

Full fuel tank.

Spare wheel, vehicle tool kit and jack installed to relevant stowage points on vehicle.

The fluid reservoir for the windshield/headlight washer system must be full.

Specifications for load dependent brake pressure regulator

Model / Version		Bar (psi)		Bar (psi)
Rear disc brakes	Front axle	70 (1015)	Front axle	100 (1450)
	Rear axle	36 to 42 (522-609)	Rear axle	49 to 55 (710-798)

Adjusting brake pressure regulator

Rear axle test pressure too high:

- Release regulator spring.

Rear axle test pressure too low:

- Increase tension regulator spring.

Note:

Do not adjust with brake pedal depressed. Use the following work sequence:

Read off figures:

- Release pedal.
- Adjust spring.

Press pedal again:

- Read off figures and if necessary, readjust.
- Remove pressure gauge and bleed brake system ⇒ [Page 47-38](#) .

Brake system, bleeding

Vehicles with ABS and ABS/EDL

When at least one chamber in the brake fluid reservoir is completely empty (e.g. leaks in braking system) the hydraulic unit must be bled using the VAG 1551 scan tool in function 04, "basic setting".

Basic setting

⇒ [Repair Manual, Brake System On Board Diagnostic \(OBD\), Repair Group 01](#)

WARNING!

Do not exceed a filling pressure of 1 bar (14.5 psi) when filling with brake fluid using brake filler and bleeder unit VAS 5234. The brake system will not be completely bled if excessive pressure is used.

Note:

- ◆ *Bleeding the brake system on vehicles with ABS is the same as for vehicles with conventional braking systems with the exception of using function 04 to bleed systems that have been completely empty.*
- ◆ *Brake fluid absorbs moisture from the air and must therefore be replaced every two years. Use only new, unused and approved brake fluid that complies with MVSS 116 DOT 4.*

Note:

- ◆ *Brake fluid is poisonous. Also due to its corrosive effect brake fluid must not come into contact with paintwork.*
- ◆ *Brake fluid must always be stored in air tight containers.*
- ◆ *Do not use silicone-based brake fluid (DOT 5). Even the smallest trace can cause severe corrosion in the brake system.*
- ◆ *Rinse off brake fluid spillages using plenty of water.*

Bleeding brake system with brake filler and bleeder unit VAS 5234, vehicles with ABS Mark 20

Special tools and equipment



- ◆ Brake filler and bleeder unit VAS 5234

Note:

- ◆ *Bleeding the brake system on vehicles with ABS is the same as for vehicles with a conventional brake system with the exception of using function 04 to bleed systems that have been completely empty.*
 - ◆ *On vehicles with a brake pressure regulator, move the regulator lever when bleeding rear brakes.*
- Connect brake filling and bleeding unit.
 - Open bleeder valves in specified sequence and bleed brake calipers.

Bleeding sequence

1 - Right rear caliper

2 - Left rear caliper

3 - Right front caliper

4 - Left front caliper

Vehicles with ABS or ABS/EDL

- Test drive vehicle and perform at least one brake application sufficient to engage ABS regulation.

Brake system, bleeding without pressure bleeder

- Build-up brake pressure in brake system by pumping brake pedal.
- Connect hose from bleeder bottle to brake bleeder valve at each wheel in turn (Bleeding sequence ⇒ [Page 47-36](#)).
- Open bleeder valve.
- Hold brake pedal down, close bleeder screw.

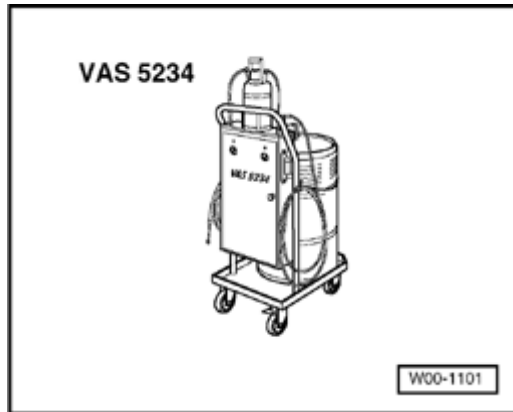
Note:

The brake fluid level in the reservoir must not fall below the MIN mark during bleeding.

- Release brake pedal.
- Repeat operation until brake fluid flows without air bubbles.

Brake fluid, changing

⇒ [Repair Manual, Maintenance](#)



Bleeding brake system with brake filler and bleeder unit VAS 5234, vehicles with ABS Mark 60

⚡ The bleeding of the brake system is described for brake filler and bleeder unit VAS 5234

Special points regarding vehicles with ABS/EDL, ABS/EDL/ASR and ABS/EDL/ASR/ESP

When at least one chamber in the brake fluid reservoir is completely empty (e.g. leaks in braking system) the hydraulic unit must be bled with scan tool VAG 1551 in function "basic setting".

Bleeding sequence ABS Mark 60 ⇒ [Page 47-40](#)

Then the hydraulic unit must be bled with scan tool VAG 1551 in function "basic setting".

Introduction of basic setting

Connecting VAS 5051 and selecting functions ⇒ [Page 45-38](#)

- Then bleed brake system ⇒ [Page 47-40](#)

Special points regarding vehicles with ABS/EDL/ASR/ESP

After bleeding the brake system ⇒ [Page 47-40](#) perform a zero compensation of the brake pressure sender -1- -G201-.

Connecting VAS 5051 and selecting functions ⇒ [Page 45-38](#)

Once the bleeding sequence is completed. Carry out a test drive and perform at least one ABS application when doing this.

WARNING!

Make sure that a filling pressure of 1 bar (14.5 psi) is not exceeded, when filling brake fluid using brake filler and bleeder unit VAS 5234.



The brake fluid pressure must be reduced to 1 bar (14.5 psi) on brake filler and bleeder unit VAS 5234 ⇒ Operating instructions VAS 5234

Note:

- ◆ Use new brake fluid with part No. B 000 700 A. (Enter container size index for decimal point after the A).
- ◆ Brake fluid is poisonous. Brake fluid must not come into contact with paintwork as it is very corrosive.
- ◆ Brake fluid is hygroscopic, which means it absorbs moisture from the ambient air and should always be stored in air tight containers.
- ◆ Rinse off brake fluid spillages, by using plenty of water.



Special tools and equipment

- ◆ VAS 5234 Brake filler and bleeder unit
- Connect brake filler and bleeder unit VAS 5234.
- Open bleeder screws in the prescribed sequence and bleed brake caliper/wheel cylinder.

Bleeding sequence

- 1 - Left front brake caliper
 - 2 - Right front brake caliper
 - 3 - Left rear wheel cylinder/brake caliper
 - 4 - Right rear wheel cylinder/brake caliper
- With hose still connected, leave the respective bleeder screw open until brake fluid is free from air bubbles out of the bleeder screw.

A test drive must be carried out after bleeding brakes. When doing this an ABS application must be performed at least once!

Changing brake fluid

⇒ *Repair Manual, Maintenance; Work descriptions; Changing brake fluid (every 2 years)*

Pre-bleed the brake system when at least one chamber in the brake fluid reservoir is completely empty (e.g. leaks in braking system).

Pre-bleeding sequence

- 1 - Bleed left front and right front brake calipers simultaneously
- 2 - Bleed left rear and right rear brake calipers simultaneously
- With hose still connected, leave the respective bleeder screw open until brake fluid is free from air bubbles flows out of the bleederscrew.

Bleeding brake system without brake filling and bleeding appliance

- Build-up brake pressure in brake system by pumping the brake pedal.
- Attach bleeder bottle hose and open bleeder screw.
- With brake pedal held down, close bleeder screw.
- Repeat operation until no air is present.

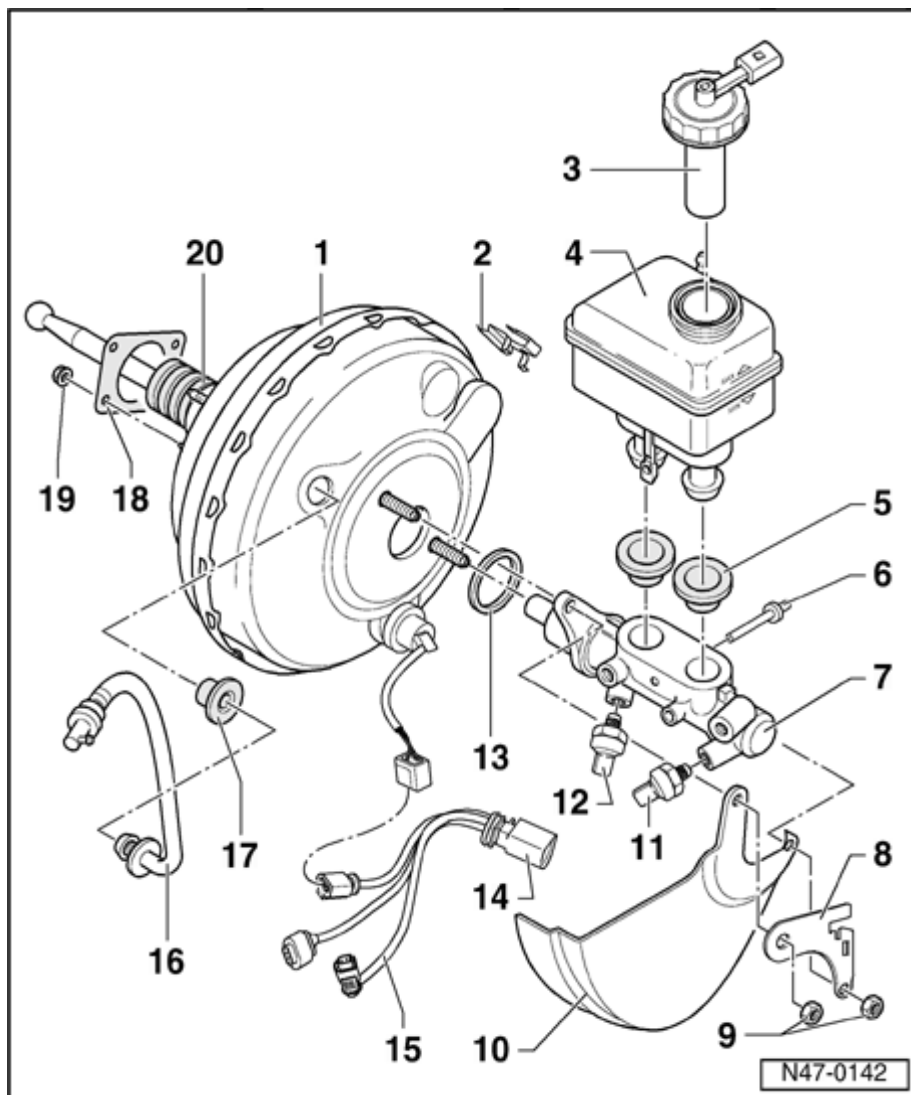
Bleeding sequence ABS Mark 60 ⇒ [Page 47-40](#)

Pre-bleed the brake system when at least one chamber in the brake fluid reservoir is completely empty (e.g. leaks in braking system).

Pre-bleeding sequence ⇒ [Page 47-41](#)

Changing brake fluid

⇒ *Repair Manual, Maintenance; Work descriptions; Changing brake fluid (every 2 years)*



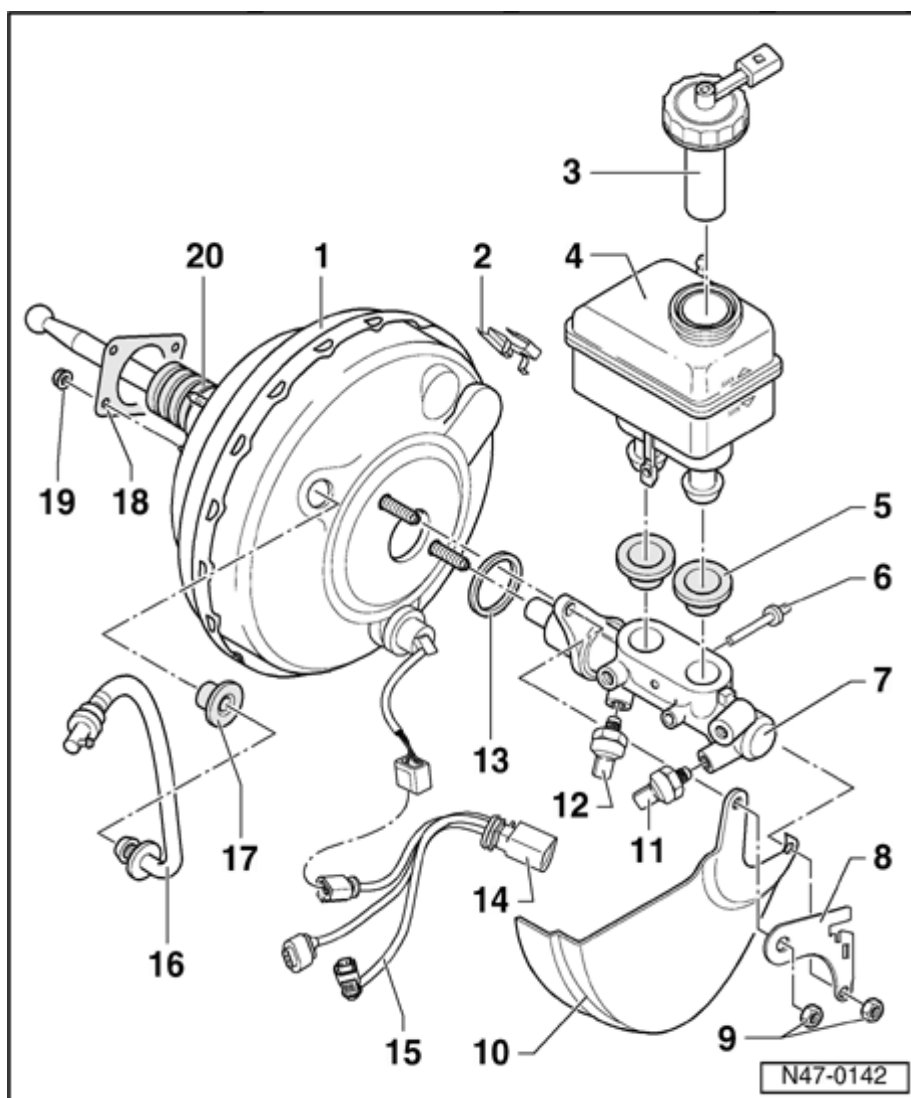
Brake booster/brake master cylinder for vehicles with ABS/EDL/ASR servicing for vehicles up to 10.00

Note:

Complete brake master cylinder and brake booster must be replaced independently of each other.

1 - Brake booster

- ◆ With wiring harness:
 - Sender -1-
 - booster -G2-
 - Sensor -2-
 - Pressure -C-
 - 12
- ◆ On gasoline engines the required vacuum is drawn at the manifold
- ◆ On diesel engines a vacuum pump must be installed to create vacuum
- ◆ Function test:
 - With engine running, push brake pedal down all the way several times (this forces the vacuum into the equipment)



- Now hold brake pedal in braking position with medium foot pressure and start engine. If the brake booster functions properly, the pedal will be felt to give slightly under foot (booster takes effect).

◆ If there are malfunctions, replace completely.

◆ Check valve (in vacuum hose) ⇒ [Page 47-49](#)

Function testing ⇒ [Page 47-49](#)

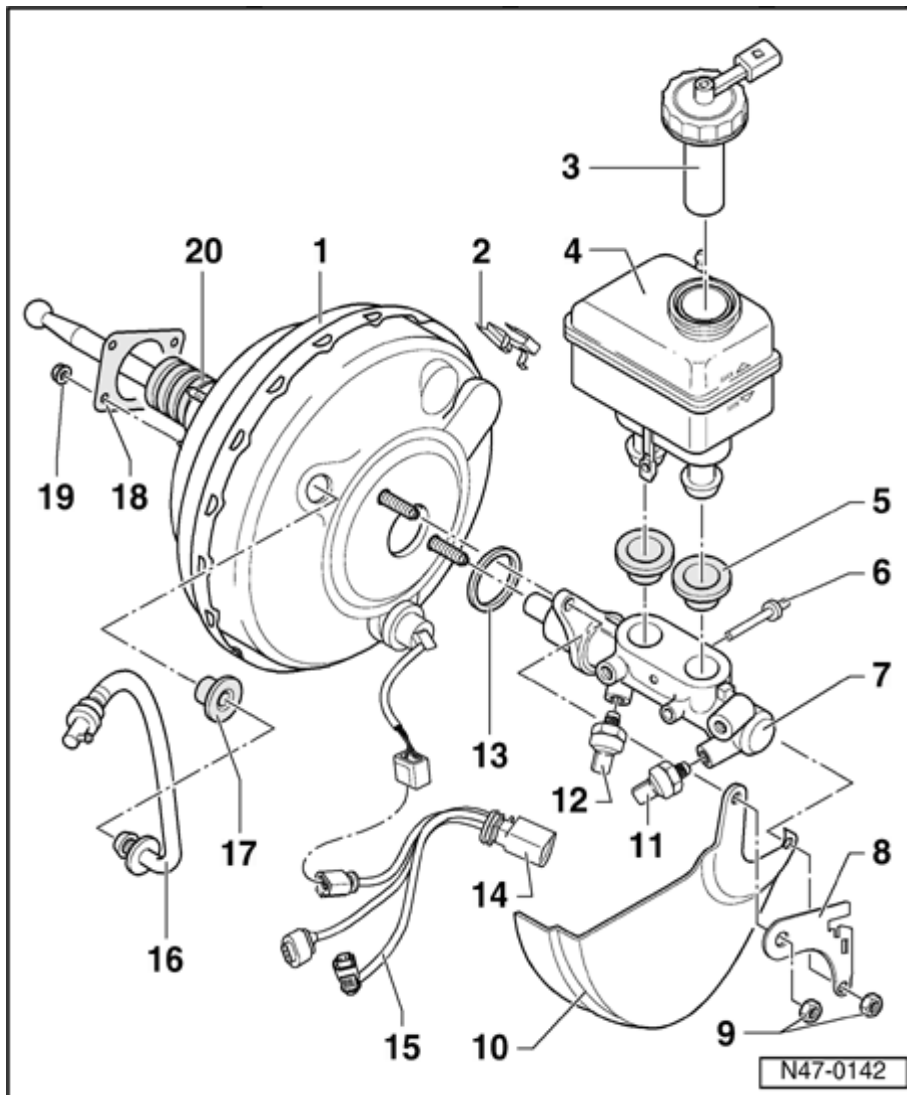
◆ Disconnecting from brake pedal ⇒ [Page 46-79](#)

◆ Removing

and
installing
⇒ [Page
47-84](#)

2 - Bracket

- ◆ Mounted on edge or brake booster
- ◆ Used to hold the connector housing - Item 14-



3 - Cover

4 - Brake fluid reservoir

5 - Sealing stopper

◆ Coat with brake fluid and press into expansion tank

6 - Holding pin

◆ Insert through the brake master cylinder

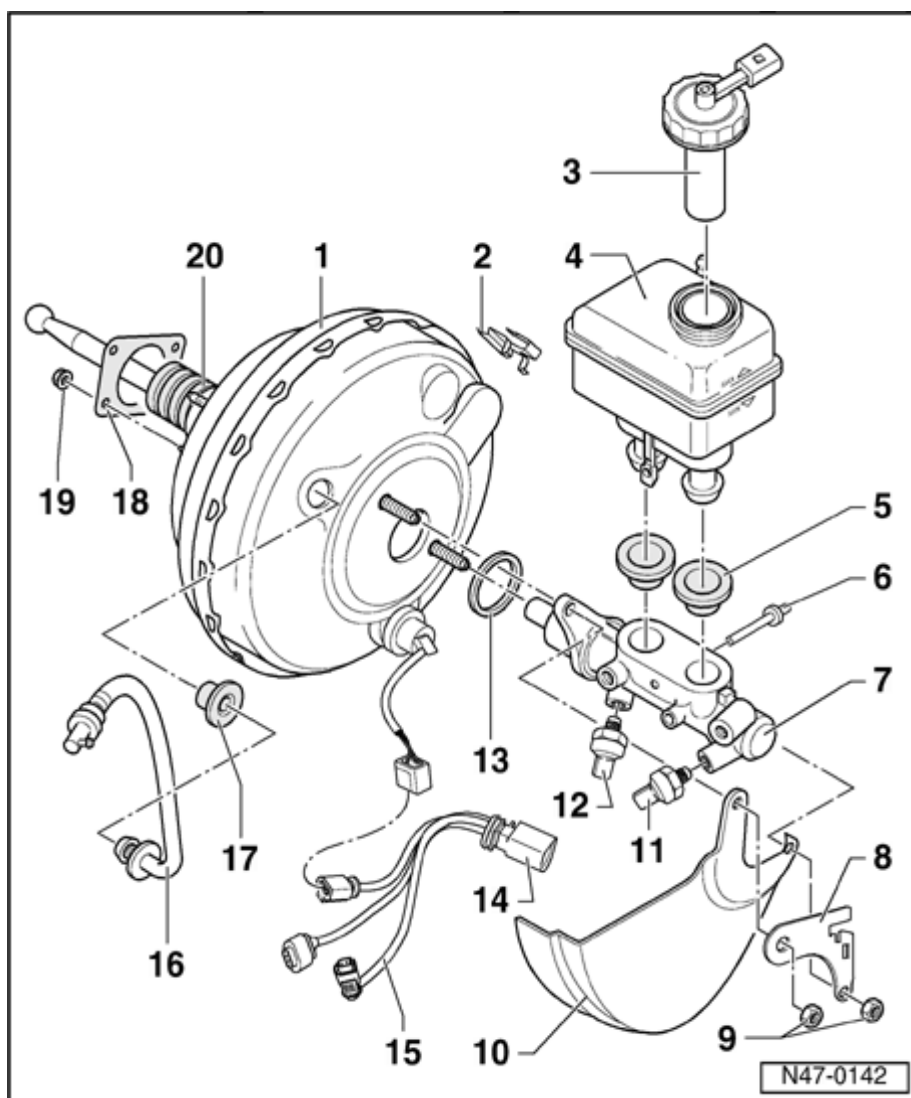
7 - Brake master cylinder

◆ Can not be repaired. Replace complete if there are malfunctions.

8 - Holding plate

◆ Used to fasten the wiring harness

9 - Hex nut, self-locking 20 Nm



10 - Heat shield plate

◆ Only on vehicles with 74 kW, 92 Kw, 110 kW, 150 kW engines

◆ See Parts catalog

11 - Sender - 1- for Brake Booster - G201-

◆ Removing and installing ⇒ [Page 47-54](#)

12 - Sensor - 2- for Brake Pressure -G214-

◆ Removing and installing ⇒ [Page 47-54](#)

13 - Sealing ring

◆ Always replace

14 Connecting - housing

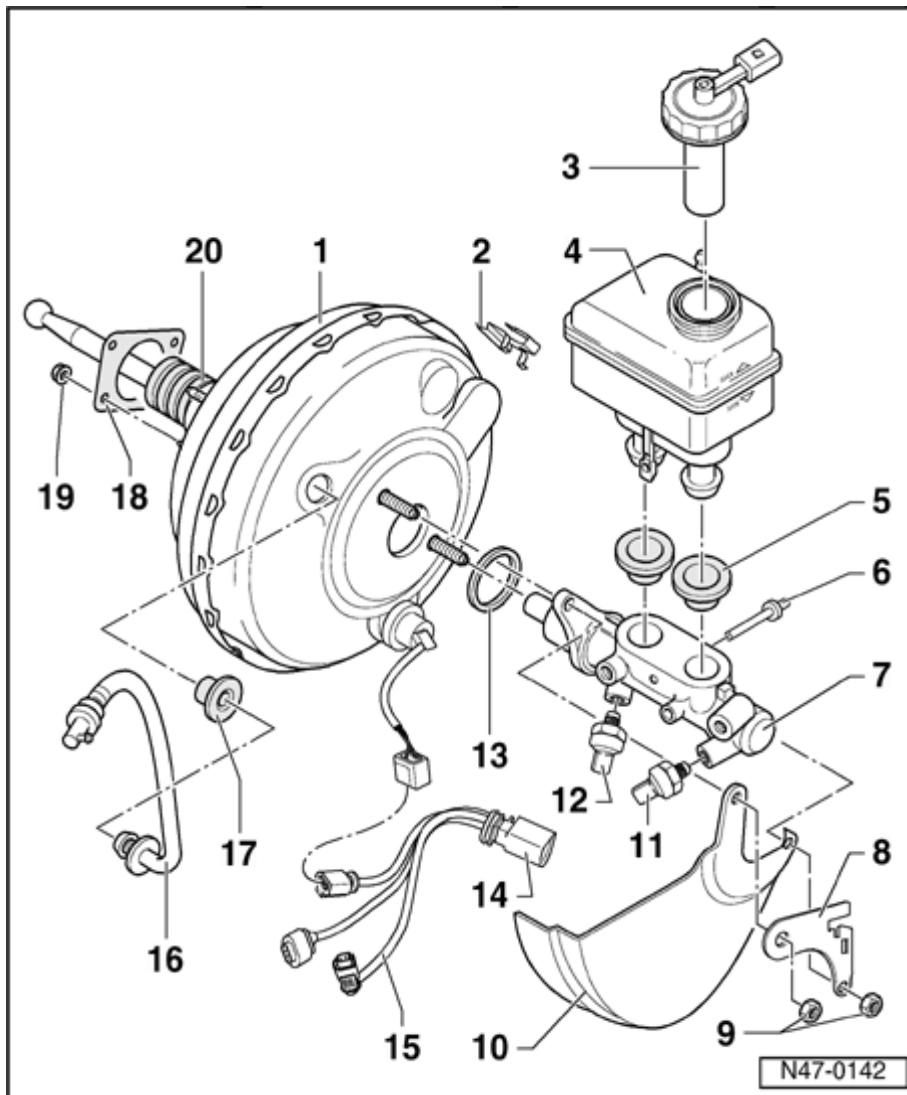
15 - Wiring harness

16 - Vacuum

hose

- Install
in
brake
booster

**17 - Sealing
plug**



18 - Seal

- ◆ For brake booster

19 - Hex nut, self-locking, 20 Nm

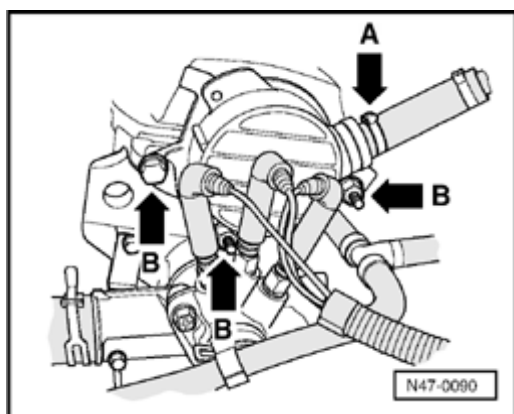
20 - Boot

- ◆ Make sure correct seat, danger of suction noises

Vacuum pump for brake booster (vehicles with Diesel engines), removal and installing

Removing

- Remove retainer for wiring harness from pump.
- Loosen vacuum hose clamp (arrow -A-) and remove hose from pump.
- Remove bolts (arrow -B-) on flange.
- Remove vacuum pump.



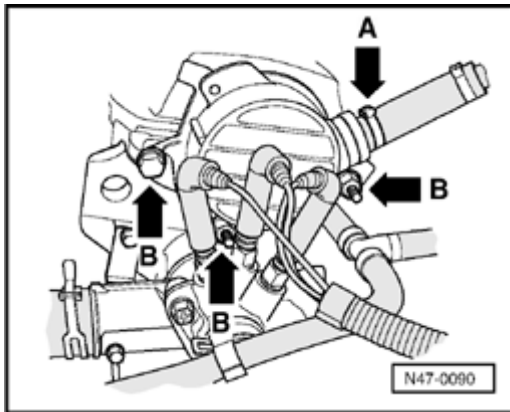
Note:

- ◆ *The vacuum pump cannot be repaired.*

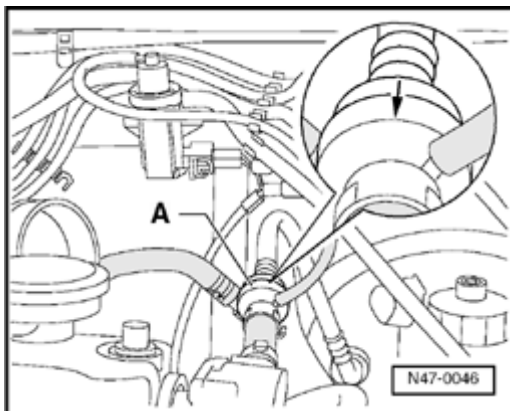
Installing

Note:

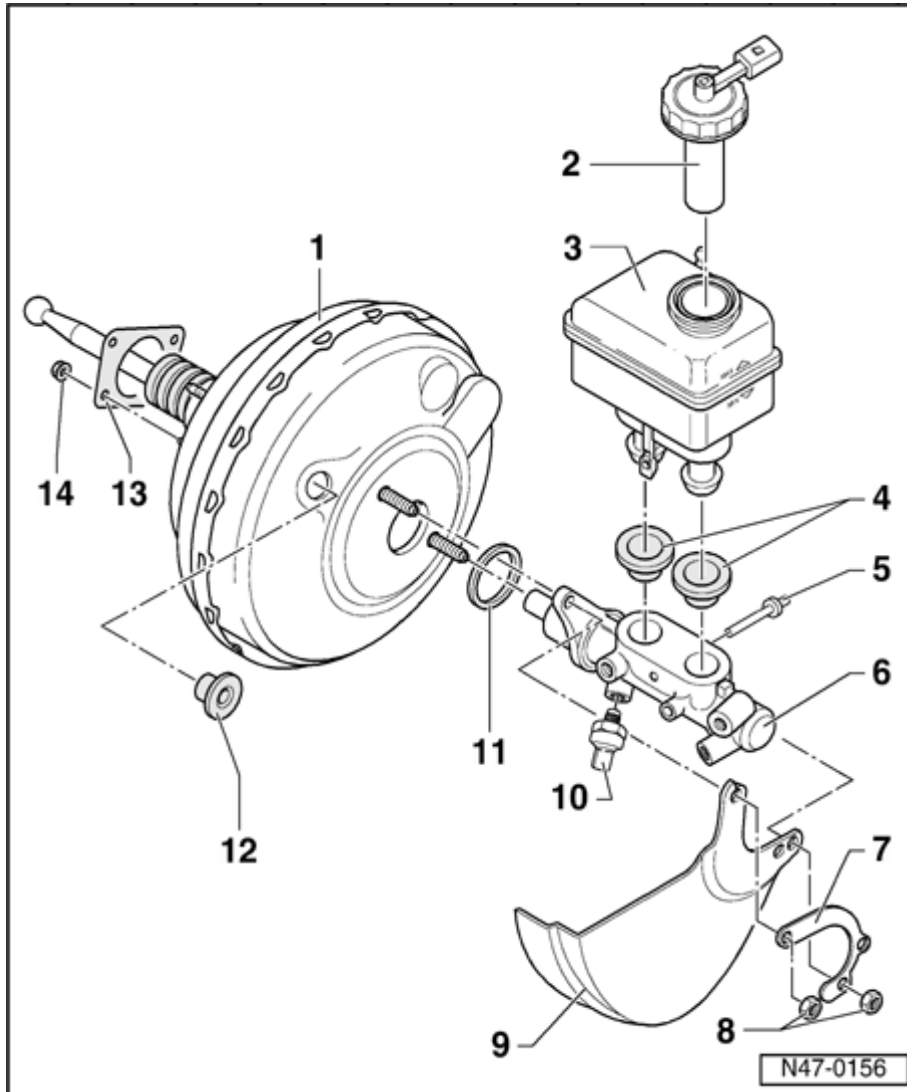
When installing the vacuum pump be sure that the follower engages correctly with the camshaft.



- Install bolts (arrows -B-) on cylinder head flange.
- Secure vacuum hose with clamp (arrow -A-).



- Check function of check valve -A-.
 - Air must pass through in direction of arrow.
 - Valve must remain closed in opposite direction.
- Make sure that the check valve is installed correctly.



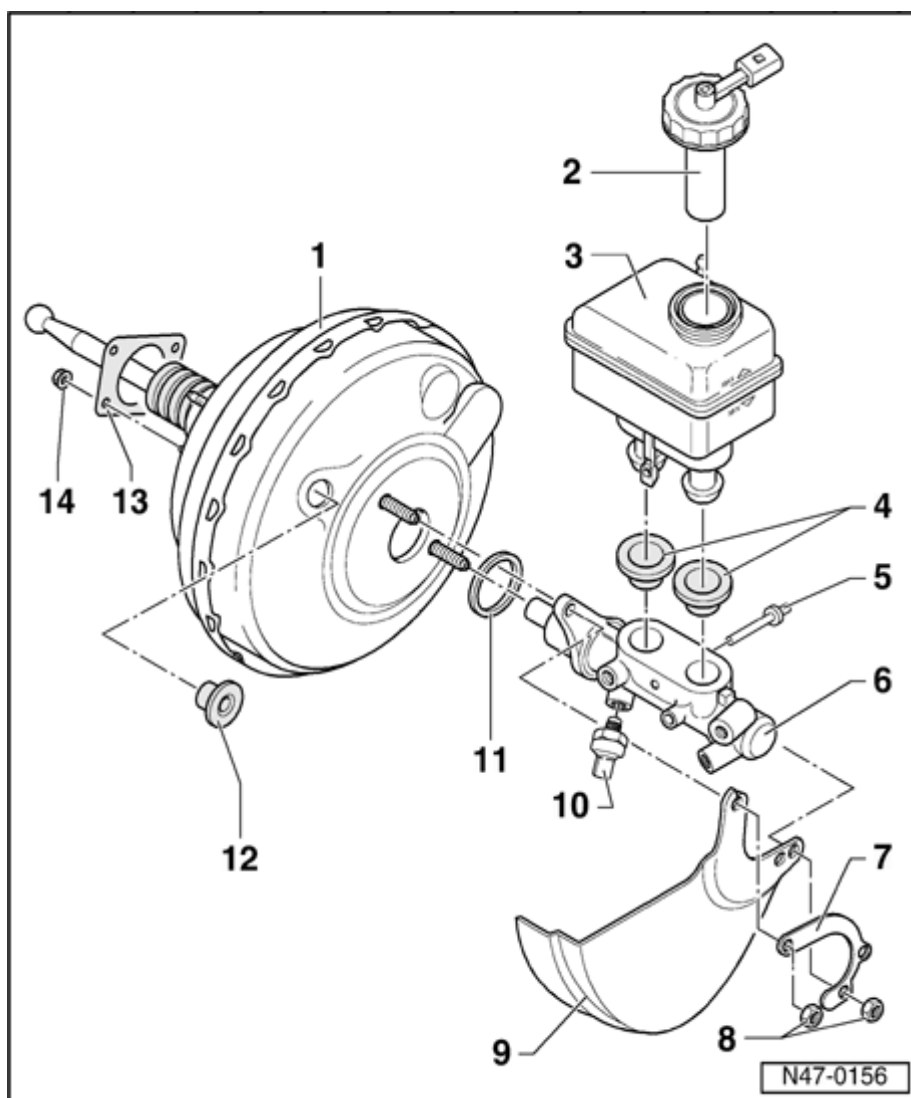
Brake booster/brake master cylinder for vehicles with ABS/EDL/ASR/ESP Mark 60 from 10.00, assembly overview

Note:

Complete master cylinder and brake booster can be replaced independently of each other.

1 - Brake booster

- ◆ On gasoline engines the vacuum is taken from the intake manifold.
- ◆ On Diesel engines a vacuum pump is installed to provide the required vacuum.
- ◆ On some vehicles with an electrical brake system vacuum -V192- is installed.
- ◆ Functional test:
 - With engine running, depress the brake pedal several times to allow exhaust to build up vacuum in the booster.



- Now depress brake pedal with average foot pressure, hold and start engine. If the brake booster is working properly, the pedal will be felt to give slightly under foot (booster assistance becomes effective).

◆ If faulty, replace complete

◆ Non-return valve (in vacuum hose)
⇒ [Page 47-62](#)

Functional check ⇒ [Page 47-60](#)

◆ Separating from brake pedal ⇒ [Page 47-81](#)

◆ Removing and installing

⇒ [Page
47-84](#)

◆ Brake
assistant
in brake
booster

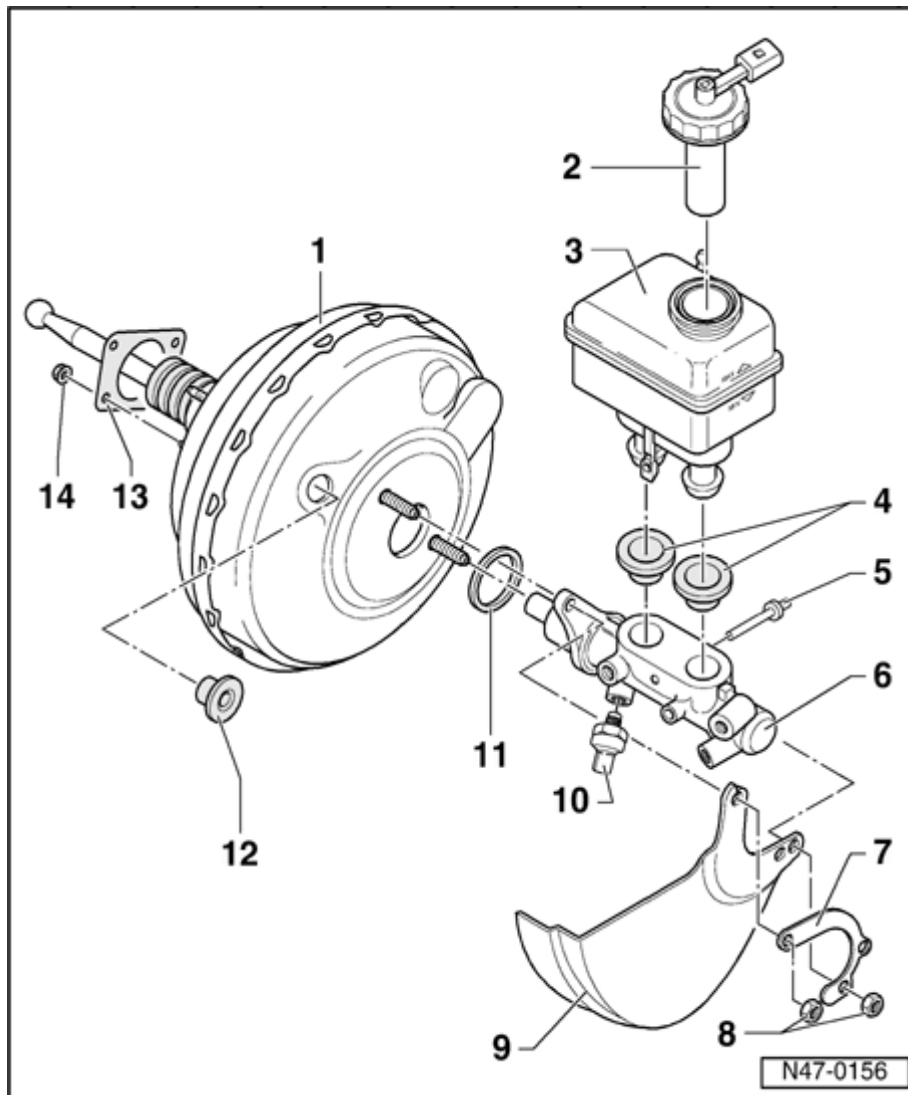
◆ Function
test ⇒
[Page
47-57](#)

**2 - Sealing
cap**

**3 - Brake
fluid
reservoir**

**4 - Sealing
plugs**

◆ Coat
with
brake
fluid and
install
into
brake
fluid
reservoir



5 - Retaining pin

- ◆ Insert through brake master cylinder

6 - Brake master cylinder

- ◆ Must not be repaired. If faulty, replace complete.

7 - Retaining plate

- ◆ Used to secure the wiring harness

8 - Self locking nut, 20 Nm

9 - Heat shield

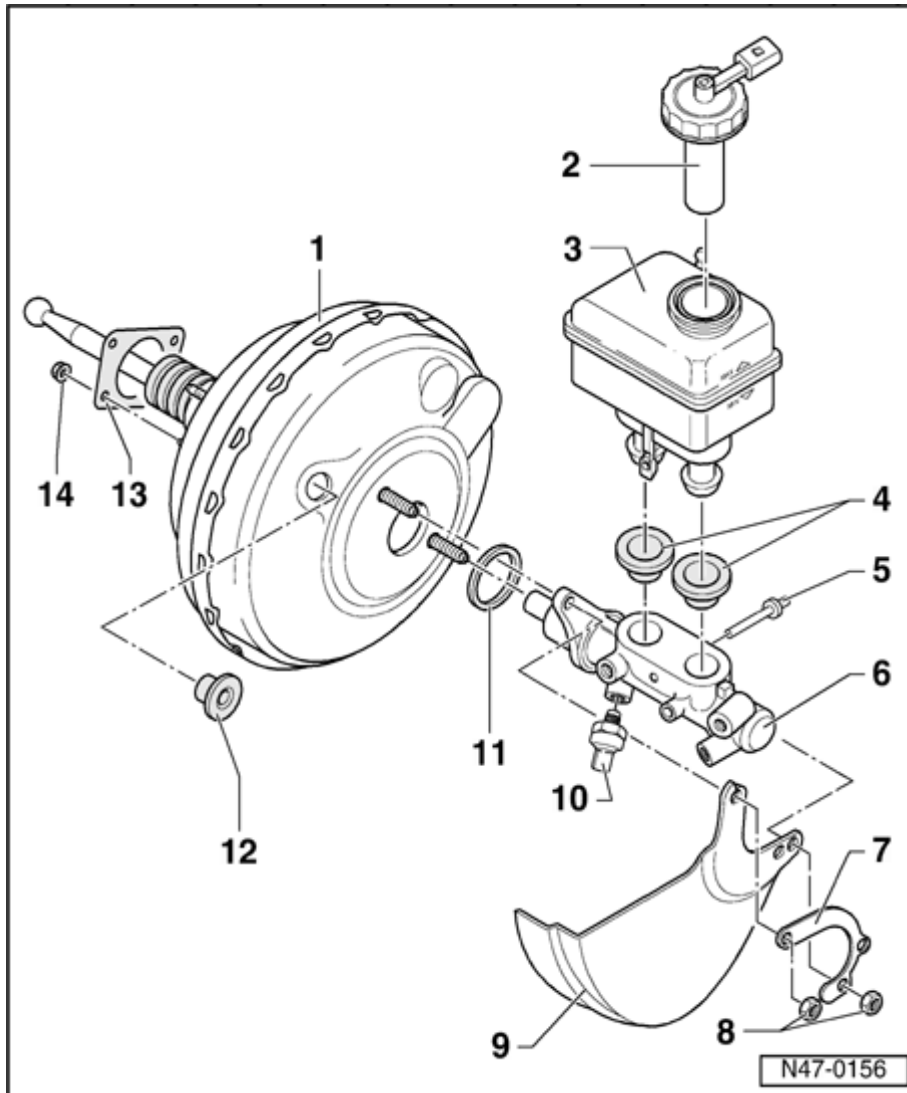
◆ Application

- ◆ See Parts catalog

10 - Sender 1 for brake booster -G201-

- ◆ 25 Nm (18.4 ft. lb)

◆ Removing
and
installing
⇒ [Page
47-54](#)



11 - Sealing ring

- ◆ Always replace

12 - Sealing plug

- ◆ Connection for vacuum hose

- Insert into brake servo unit

13 - Gasket

- ◆ For brake booster

14 - Self-locking hex nut, 20 Nm (14 ft. lb)

Sender 1 for brake booster -G201- a Sensor -2- for brake pressure -G214 removing and installing

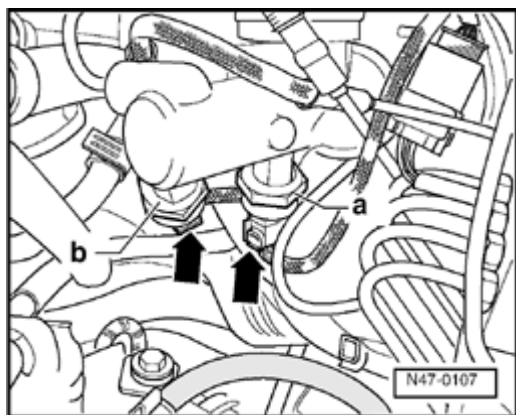
Removing

- Request radio code on vehicles with code radio, if necessary.
- Disconnect battery.
- Lay out sufficient lint free cloths in area of plenum chamber, engine, and transmission.
- Draw off as much brake fluid as possible from brake fluid reservoir using brake filler and bleeder unit VAS 5234.
- Connect bleeder bottle hose to left front brake caliper bleeder screw and open bleeder screw.



- Operate brake pedal at least 15 times so the brake master cylinder empties.

- Close front left bleeder screw.



- Pull connector (arrow) off relevant brake pressure sender (the one to be removed)

- a - Sensor -2- for brake pressure -G214- in primary brake circuit

- b - Sender 1 for brake booster -G201- in secondary brake circuit

- Remove brake pressure sensor.

Installing

- Installation is carried out in the reverse sequence

Tightening torques:

Sender 1 for brake booster - G201-	25 Nm	(18 ft. lb)
------------------------------------	-------	-------------

Sensor -2- for brake pressure - G214-	25 Nm	(18 ft. lb)
---------------------------------------	-------	-------------

- Bleeding brake system Mark 60 IE ⇒ [Page 47-38](#)
- Initiate basic settings
- A zero compensation of sender 1 for brake booster -G201- must be performed in addition to basic settings on vehicles with ABS/EDL/ASR/ESP.

⇒ [Repair Manual, Brake System On Board Diagnostic \(OBD\), Repair Group 01; Function of self-diagnosis ABS/EDL/ASR/ESP Mark 60 IE](#)

**Check function of brake assist in
brake booster, vehicles from my
02.02,**

With engine running, depress brake pedal to ensure full vacuum boost.

When brake pedal is depressed, a "click" must be audible, so that the mechanical brake assist is activated.

The brake pedal can now be partially released and pressed again with less force.

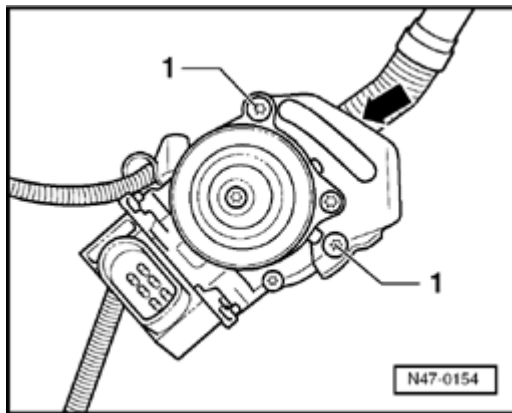
It is not possible to repair the brake assist, the complete brake booster must be replaced.

Brake system vacuum pump - V192-, removing and installing

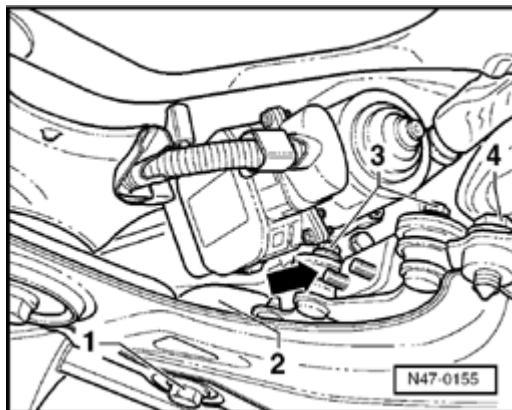
There are no provisions for servicing the brake system vacuum pump - V192-. If a malfunction is detected the brake vacuum pump -V192- must be replaced.

The brake system vacuum pump - V192- is located lower left on the subframe.

Removing



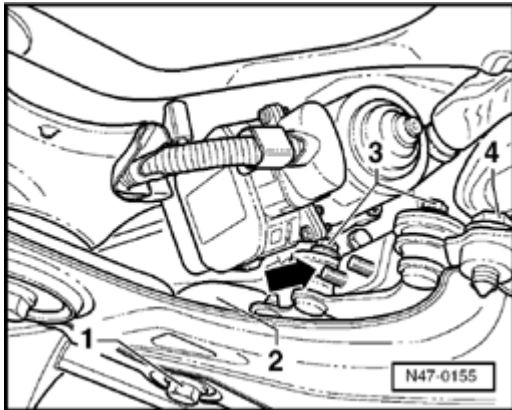
- ✦ - Remove bolts -1- on bracket for brake system vacuum pump - V192-.
- Pull hose (arrow) off brake system vacuum pump -V192-.
- Take out brake system vacuum pump -V192-.



- ✦ Bracket (arrow) for brake system vacuum pump -V192-.
- Remove lock nut -2- from bolt -1-.
- Remove bolt -4- .
- Take bracket out.
- Remove bolts -3- to disassemble the bracket (arrow) further.

Installing

Install in reverse order.



Tightening torques

Nut -2- to bracket	20 Nm	(15 ft. lb)
Bolts -3- to bracket	8 Nm	(71 in. lb)
Bolt -4- to bracket	20 Nm	(15 ft. lb)
Torx socket head bolt for brake vacuum pump -V192- to bracket	8 Nm	(71 in. lb)

Brake system vacuum pump -V192-, checking

During the start-up sequence the brake system vacuum pump -V192- must run briefly.

Work sequence

- Position vehicle on a lifting platform, switch engine off.

- Start engine.

- Check by touch that the brake system vacuum pump -V192- is running with the assistance of a second person.

If the brake system vacuum pump -V192- does not run:

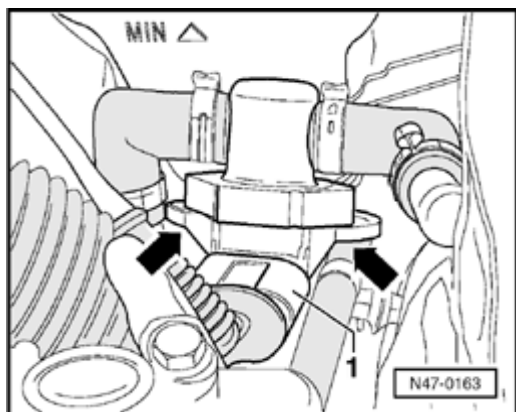
- Read engine control module Diagnostic Trouble Code (DTC) memory.

⇒ [Repair Manual, Brake System On Board Diagnostic \(OBD\), Repair Group 01; Checking and erasing engine control module DTC memory](#)

Brake booster pressure sensor -G294-, removing and installing

Removing

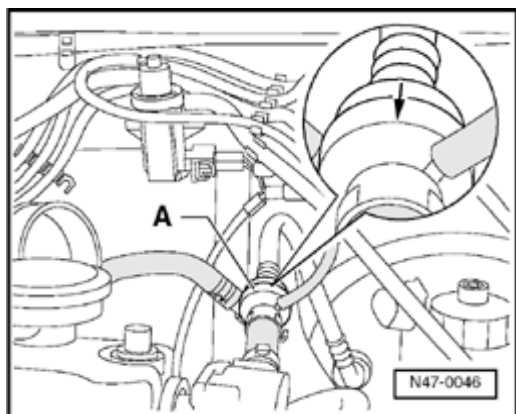
- Remove plenum chamber cover.
- Disconnect connector -1-.
- Remove bolts (arrows).
- Remove brake booster pressure sensor -G294-.



Installing

Install in reverse order.

Check function of check valve - A-



- Checking check valve -A-

Air must pass through in direction of (arrow).

Valve must remain closed in opposite direction.

Make sure that check valve is installed correctly.

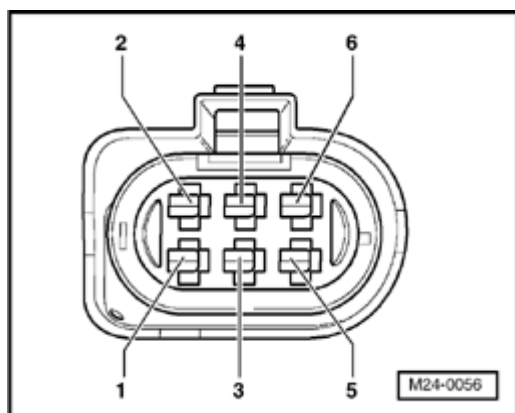
Brake system vacuum pump - V192-, vehicles up to my 05.02, electrical check

Special tools and equipment

- ◆ VAG 1526 B Hand multimeter
- ◆ VAG. 1598/31 Adapter set

Requirements

- Fuses 51 and 31 must be OK (remove fuses from fuse holder to check).

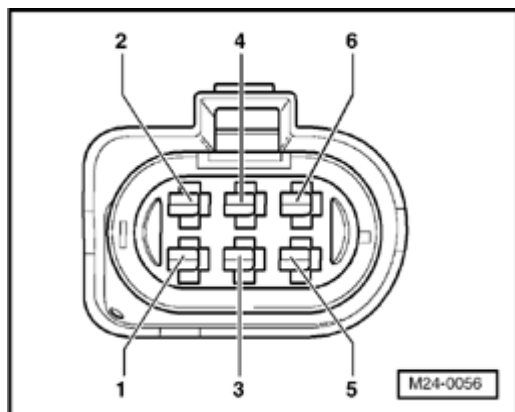


- Remove the 6 - pole contact.

Multi-pin connector with contact assignment

Note:

All contacts not listed are currently not assigned and must never be connected to other components!



Contact assignment of connectors for voltage supply and diagnosis.

Contact 1 = Ground

Contact 2 = Connection with engine control module (pin 22)

Contact 3 = Voltage supply from ignition/starter switch through fuse 31

Contact 4 = Not applicable

Contact 5 = Voltage supply from Battery + through fuse 51

Contact 6 = Not applicable

Contact	Wiring connection to component ...	
1	⇒	Ground point
2	⇒	Connection with engine control module
3	⇒	Voltage supply from ignition/starter switch
4	⇒	Not applicable
5	⇒	Voltage supply from Battery +
6	⇒	Not applicable

Test step overview

To test component	
Resistance of -V192- brake system vacuum pump	- Perform test step 1
Communication signal of engine control unit to -V192- brake system vacuum pump	- Perform test step 2
Voltage supply of ignition/starter switch to -V192- brake system vacuum pump	- Perform test step 3
Resistance of connection of ignition/starter switch to -V192- brake system vacuum pump	- Perform test step 4
Resistance of connection of battery to -V192- brake system vacuum pump	- Perform test step 5
Voltage supply of Battery to -V192- brake system vacuum pump	- Perform test step 6

Test table (test steps 1 - 6)

Notes on test table

- ◆ *The socket designations of adapter VAG 1598/31 (for test step 2) are identical to the engine control module contact designations in wiring diagram.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ *If the readings obtained deviate from the specifications, carry out repair measure in the right-hand part of the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ *If the measured figures only deviate slightly from the specifications, clean sockets and plugs of the testers and adapter cables (with contact spray G 000 700 04) and repeat check. Before replacing components, check wiring and connections and also, particularly for specifications of less than 10 Ω , repeat resistance check on the component.*

Switch to measuring range:					
Resistance measurement (Ω)					
Test step	Contact	Item tested	• Test conditions	Specification	Measures for deviations from specification
1	1 + Ground	Resistance of - V192- brake system vacuum pump	<ul style="list-style-type: none"> • Ignition switched off 	5.0...5.3 Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
2	2 + pin 22	Communication signal of engine control unit to - V192- brake system vacuum pump	<ul style="list-style-type: none"> • Ignition switched off 	0.0...0.1 Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

Switch to measuring range:					
Voltage measurement (20 V =)					
Test step	Contact	Item tested	• Test conditions	Specification	Measures for deviations from specification
3	3 + 1	Voltage supply from ignition/starter switch to -V192-brake system vacuum pump	<ul style="list-style-type: none"> • Ignition switched on 	12.0...12.60 V (approx. battery voltage)	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

Switch to measuring range:					
Resistance measurement (Ω)					
Test step	Contact	Item tested	• Test conditions	Specification	Measures for deviations from specification
4	3 + fuse 31	Resistance of connection of ignition/starter switch to -V192- brake vacuum pump	<ul style="list-style-type: none"> • Ignition switched off 	0.1...0.9 Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

Switch to measuring range:					
Resistance measurement (Ω)					
Test step	Contact	Item tested	• Test conditions	Specification	Measures for deviations from specification
5	5 + fuse 51	Resistance of connection of battery to - V192- brake system vacuum pump	<ul style="list-style-type: none"> • Ignition switched off 	1.7...1.8 Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram <p><i>⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i></p>

Switch to measuring range:**Voltage measurement (20 V =)**

Test step	Contact	Item tested	• Test conditions	Specification	Measures for deviations from specification
6	5 + 1	Voltage supply of Battery to - V192-brake system vacuum pump	<ul style="list-style-type: none"> • Ignition switched on 	12.0...12.81 V (approx. battery voltage)	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

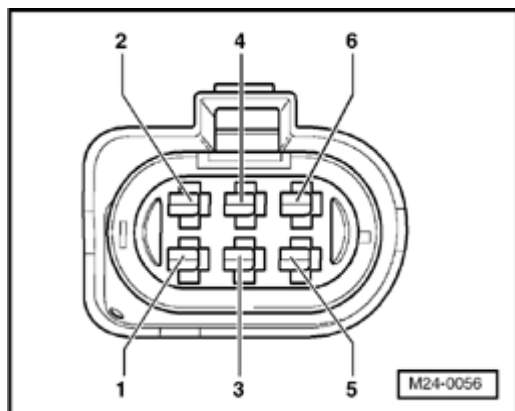
Brake system vacuum pump - V192-, vehicles from my 06.02, electrical check

Special tools and equipment

- ◆ VAG 1526 B Hand multimeter
- ◆ VAG. 1598/31 Adapter set

Requirements

- Fuse 51 must be OK (remove fuse from fuse holder to check).

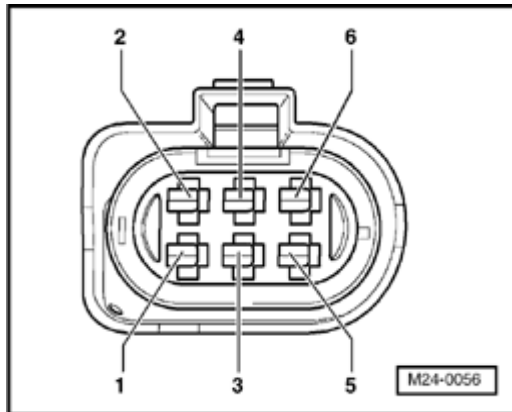


- Remove the 6 - pole contact.

Multi-pin connector with contact assignment

Note:

All contacts not listed are currently not assigned and must never be connected to other components!



Contact assignment of connectors for voltage supply and diagnosis.

Contact 1 = Ground

Contact 2 = Connection with engine control module (pin 22)

Contact 3 = Not applicable

Contact 4 = Not applicable

Contact 5 = Voltage supply from Battery + through fuse 51

Contact 6 = Not applicable

Contact	Wiring connection to component ...	
1	⇒	Ground point
2	⇒	Connection with engine control module
3	⇒	Not applicable
4	⇒	Not applicable
5	⇒	Voltage supply from Battery +
6	⇒	Not applicable

Test step overview

To test component	
Resistance of -V192- brake system vacuum pump	- Perform test step 1
Communication signal of engine control unit to -V192- brake system vacuum pump	- Perform test step 2
Resistance of connection of battery to -V192- brake system vacuum pump	- Perform test step 3
Voltage supply of Battery to -V192- brake system vacuum pump	- Perform test step 4

Test table (test steps 1 - 4)

Notes on test table

- ◆ *The socket designations of adapter VAG 1598/31 (for test step 2) are identical to the engine control module contact designations in wiring diagram.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ *If the readings obtained deviate from the specifications, carry out repair measure in the right-hand part of the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- ◆ *If the measured figures deviate slightly from the specifications, clean sockets and plugs of the testers and adapter cables (with contact spray G 000 700 04) and repeat check. Before replacing components, check wiring and connections and also, particularly for specifications of less than 10 Ω , repeat resistance check on the component.*

Switch to measuring range:					
Resistance measurement (Ω)					
Test step	Contact	Item tested	• Test conditions	Specification	Measures for deviations from specification
1	1 + ground	Resistance of - V192- brake system va-cuum pump	<ul style="list-style-type: none"> • Ignition switched off 	5.0 to 5.3 Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>
2	2 + pin 22	Communication signal of engine control module to -V192- brake system vacuum pump	<ul style="list-style-type: none"> • Ignition switched off 	0.0 to 0.1 Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram \Rightarrow <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

Switch to measuring range:					
Resistance measurement (Ω)					
Test step	Contact	Item tested	• Test conditions	Specification	Measures for deviations from specification
3	5 + fuse 51	Resistance of connection of battery to - V192- brake system vacuum pump	<ul style="list-style-type: none"> • Ignition switched off 	1.7 to 1.8 Ω	<ul style="list-style-type: none"> - Check wiring using wiring diagram <p><i>⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i></p>

Switch to measuring range:**Voltage measurement (20 V =)**

Test step	Contact	Item tested	• Test conditions	Specification	Measures for deviations from specification
4	5 + 1	Voltage supply of Battery to - V192-brake system vacuum pump	<ul style="list-style-type: none"> • Ignition switched off 	12.0 to 12.81 V (approx. battery voltage)	<ul style="list-style-type: none"> - Check wiring using wiring diagram ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations binder</i>

47-81

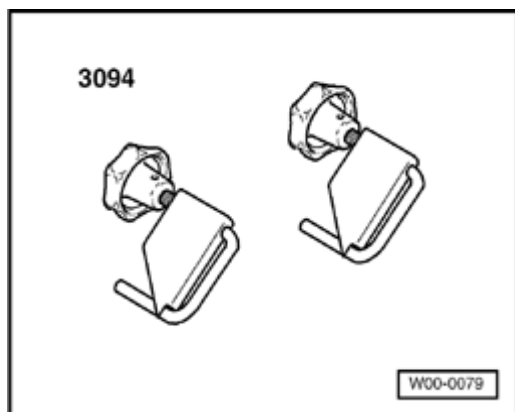
Brake master cylinder, removing and installing

Special tools and equipment

- ◆ 3094 Hose clamps

Removing

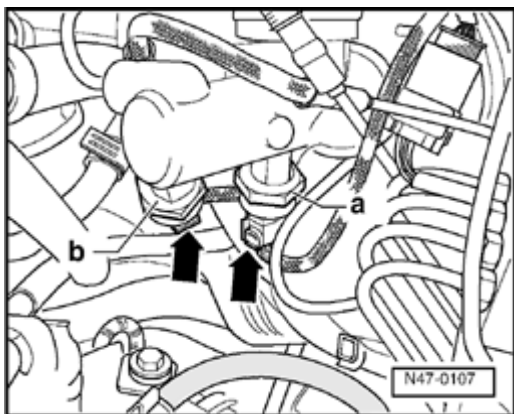
- Obtain radio code on vehicles with coded radio.
- Disconnect battery.
- Lay out sufficient lint free clothes in area of plenum chamber, engine and transmission.
- Draw off as much brake fluid as possible from brake fluid reservoir using brake filler and bleeder unit VAS 5234.



47-82

- Clamp clutch master cylinder supply hose special tool 3094.
- Disconnect clutch master cylinder supply hose.
- Disconnect connector off float warning in sensor.

Vehicles with ABS/EDL/ASR/ESP



- Disconnect connectors (arrows) off brake pressure sensors -a- and -b-.

Continued for all vehicles

- Disconnect brake lines on brake master c and seal brake lines with plugs from repa Part No. 1H0 698 311 A.
- Remove brake master cylinder nuts.
- Remove heat shield, if part of original equipment.
- Carefully remove brake master cylinder o brake booster.

Installing

- Installation is carried out in the reverse sequence

Observe the following points when installing:

- When installing the brake master cylinder and brake booster, make sure that the push rod is correctly located in the brake master cylinder.

- After installing, bleed brakes ⇒ [Page 47-38](#)

- Initiate basic settings

⇒ [Repair Manual, Brake System On Board Diagnostic \(OBD\), Repair Group 01; Performing self-diagnosis; Introducing basic settings](#)

- A zero compensation of brake pressure sender 1 -G201- and brake pressure sender 2 -G214- must be performed in addition to basic settings on vehicles with ABS/EDL/ASR/ESP

- Connecting VAS 5051 and selecting functions ⇒ [Page 45-38](#)

- After installing, bleed brakes ⇒ [Page 47-38](#)

- Initiate basic settings.

Brake booster, removing and installing

Special tools and equipment

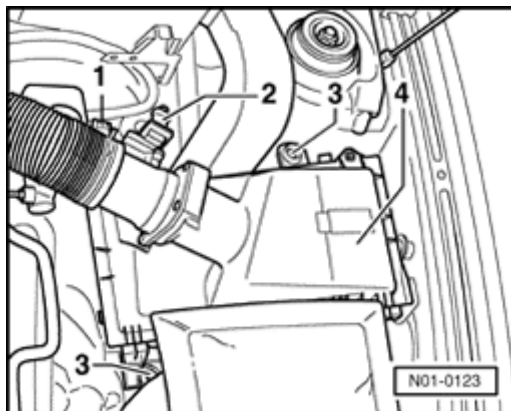
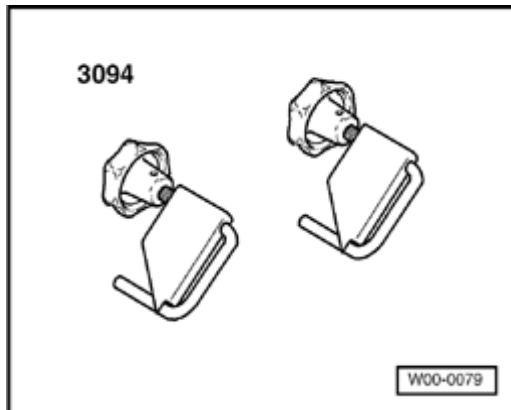
- ◆ 3094 Hose clamps

Removing

- Obtain radio code on vehicles with coded radio.
- Disconnect battery.

Remove air cleaner

- Pull connector -2- off mass air flow sensor.
- Release spring-type clip -1- on air duct hose with pliers VAG 1921 and pull hose off air cleaner.
- Remove air cleaner bolts -3- and take out air cleaner -4-.



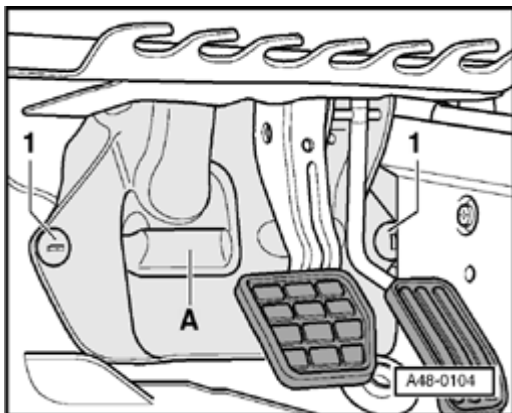
Vehicles with manual transmission

- Clamp clutch master cylinder supply hose special tool 3094.
- Disconnect clutch master cylinder supply hose.

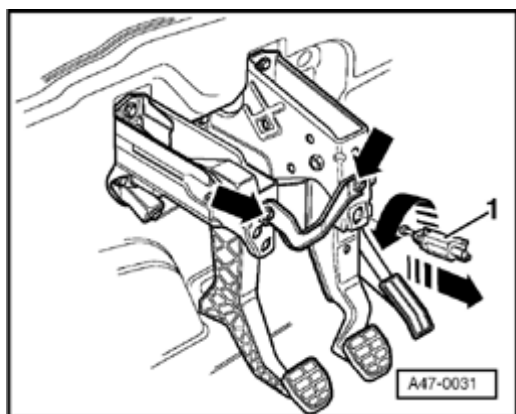
Continued for all vehicles

- Remove control module and hydraulic un [Page 45-55](#)
- Disconnect vacuum hose from brake serv
- Remove trim below steering column.

⇒ [Repair Manual, Body Interior, Repair Gro 68; Trim under steering](#)



- Remove bolts -1-.
- Remove cover -A-.



- Remove connecting plate between clutch and brake pedals on vehicles with manual transmission.
- Remove brake light switch -1- ⇒ [Page 46-84](#)
- Separate brake pedal from brake booster ⇒ [Page 46-79](#) .
- Guide brake booster with brake master cylinder out forward and remove.

Installing

Install in reverse order.

- Adjusting brake light switch ⇒ [Page 46-84](#)
- Bleeding brake system Mark 60 IE ⇒ [Page 47-38](#)

Definitions

These explanations refer only to this assembly group: Brake system. These definitions are not necessarily valid generally.

ABS

The anti-lock brake system (ABS) is a regulating system in the brake system which prevents the wheels from locking-up.

ASR (Anti-Slip Regulations)

Further information on this can be found in the appropriate Self-study program No. 115.

Sender for rotation rate -G202-

The sender for rotation rate recognizes the rotational movement of the vehicle along the vertical axis compared with the speed of the vehicle.

Sender 1 for brake booster/Sensor -2- for brake pressure -G201-/-G214-

Recognizes the pressure exerted by the driver and is required to control the pressure of the pre-pressure system.

Speed sensor

The speed sensor sends the speed signal to the control module.

ESP (Electronic Stabilization Program)

The ESP recognizes critical vehicle conditions and stabilizes the vehicle by braking individual wheels and intervening in the engine management system. This occurs independent of brake or accelerator pedal operations.

A description of the construction and function of the ESP is found in Self-study program No. 204.

ESP-Sensor Unit -G419-, vehicles from my 02.02

The sensor for transverse acceleration - G200-, the sender for rotation rate -G202- and the longitudinal acceleration sensor - G251- (4MOTION vehicles) are assembled together in a housing.

Steering angle sensor -G85-

Determines the angle and direction of steering lock (driver's wish). Data is transferred to control unit via data bus wiring.

Sensor for transverse acceleration - G200-

The lateral acceleration sensor is used to register the speed through curves/bends in the road and decides which side of the vehicle the ESP is to brake.

EDL

Electronic Differential Lock. Further information on this can be found in Self-study program No 171.

Select a topic

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Additional Information

System Overviews

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Technical data

Suspension

Model: Golf		Front wheel drive	All wheel drive	M
Wheelbase:	mm	2500	2513	V
Track width in front unloaded weight	mm	1520, Wheel ET 36 1516, Wheel ET 38 1508, Wheel ET 42	1520, Wheel ET 36 1516, Wheel ET 38 1508, Wheel ET 42	T u.
Track width in rear unloaded weight	mm	1498, Wheel ET 36 1494, Wheel ET 38 1486, Wheel ET 42	1485, Wheel ET 36 1481, Wheel ET 38 1473, Wheel ET 42	T u.

Wheels, tires

General information, information on wheel/tire combinations, winter tires, snow chains, recommended tire makes, can be found in VESIS; Library; Additional Information "Wheel and Tire Guide."

Check list for evaluating the suspension of accident vehicles

When repairing load-bearing or wheel-supporting components on accident vehicles, damages to the chassis could remain undiscovered. These undiscovered damages can sometimes lead to heavy damages, in continued vehicle operation. Therefore, on accident vehicles, the listed components are to be inspected in the described manner and sequence, independent of performing a vehicle alignment. If no deviations from the specified values were determined during a vehicle alignment, then no deformations of the chassis are present.

Visual and function testing of the steering system

- n Visually inspect for deformations and splits
- n Check for play in tie rod joints and steering gear
- n Visually inspect for defects in dust and grease boots
- n Inspect electrical and hydraulic lines/hoses for abrasions, cuts and kinked areas
- n Verify that hydraulic lines, connections and steering gear are not leaking
- n Check steering gear and lines for proper and secure seating
- n Check the problem-free movement of steering wheel from lock to lock, by turning the steering wheel completely in each direction. Thereby, the rotation of the steering wheel must require steady force without catching

Visual and function testing of the suspension

- n The sequence of the following test procedures must be maintained!
 - n Check all components displayed in the assembly overview for deformation, splits and other damages
 - n Replace damaged components
 - n Align vehicle on a VOLKSWAGEN AG approved alignment stand

Visual and function testing of wheels and tires

- n Check for radial run-out and imbalance see General information, information on wheel/tire combinations, winter tires, snow chains, recommended tire makes, can be found in VESIS; Library; Additional Information "Wheel and Tire Guide"; Vibrations from wheels and tires.
- n Check tires for cuts and impact damages in tread and on sides see General information, information on wheel/tire combinations, winter tires, snow chains, recommended tire makes, can be found in VESIS; Library; Additional Information "Wheel and Tire Guide"; Tire damages
- n Check tire pressures; For tire pressure specification, see inside of fuel filler door or

⇒ [Repair Manual, Maintenance](#)

Replace tire if there is damage to the wheel and/or tire. This also applies when the area of impact and damage of the vehicle suggest that unverifiable damage may be possible.

Another determining factor is the age of the tire: Tires should not be older than 6 years.

If not able to be determined:

- n As soon as a safety risk can be verified, the tire(s) must be replaced

Entire vehicle

Check other vehicle systems, for example:

- n Brake system including ABS
- n Exhaust system and occupant protection through visual inspection and function testing

Test values, adjustment values, and notes can be found in the appropriate repair manual.

The examination of accident vehicles described here, refers to the chassis and lays no claim on the completeness of the total vehicle.

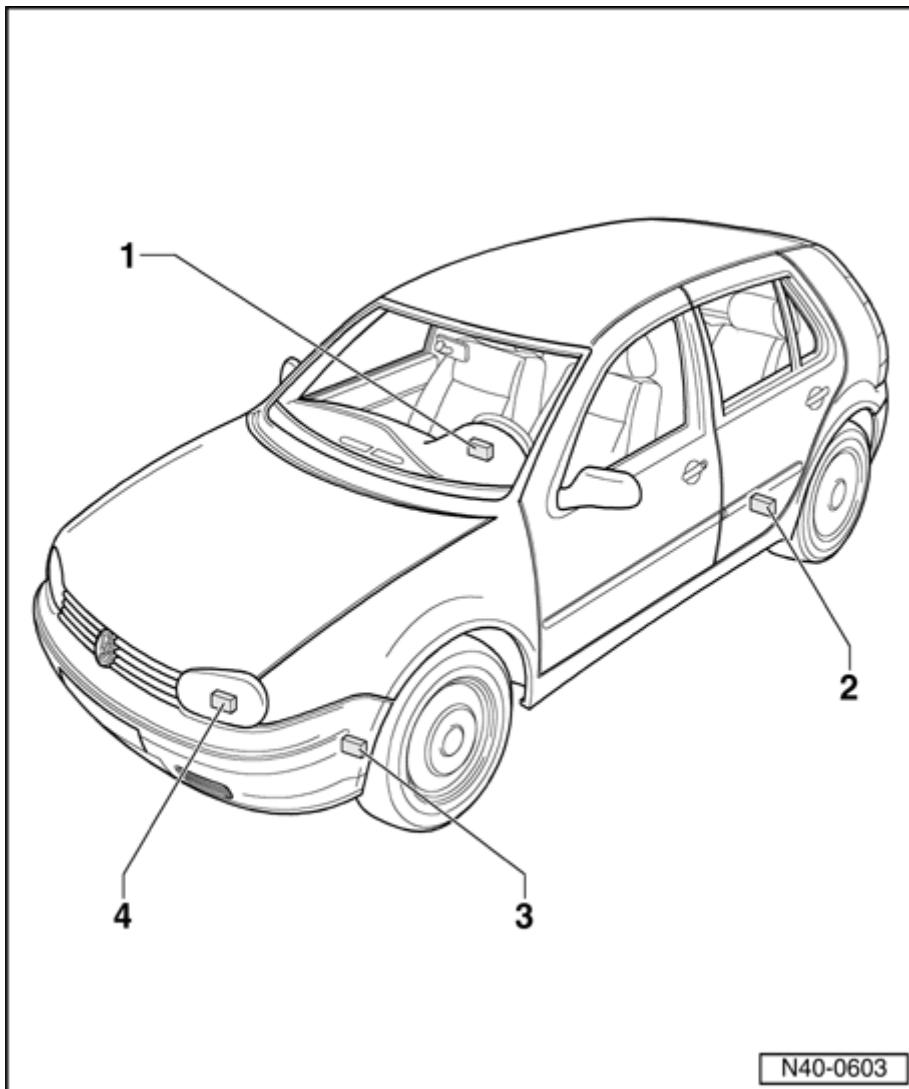
Electronic vehicle systems

Safety-related systems, for example: ABS/EDS; Airbag; Electronically regulated vehicle systems; Electromechanical; Electrohydraulic steering and other driver assist systems must be queried for Diagnostic Trouble Code (DTC) codes that could possibly be stored, using the vehicle diagnostic, test and measuring system VAS 5051 . If a malfunction was stored in the DTC memory of one of these systems, perform the appropriate procedures in the repair manual to repair it. After performing repairs, check the DTC memory of the affected system again, to make sure that proper function can be ensured again.

Evaluation of accident vehicles

A check list for evaluating the suspension of accident vehicles can be found here ⇒ [00-2, Check list for evaluating the suspension of accident vehicles](#) .

Electrical/electronic components and installation locations



1. Steering angle sensor G85

- i Location: On steering column between steering wheel and steering column switch
- i Observe installation instructions ⇒ [48-4.](#)
- i After replacing steering angle sensor G85 a zero compensation must be performed ⇒ [48-4.](#)

2. Left rear level control system sensor G76 on the rear axle

- i General notes ⇒ [40-2, Level control system sensor in vehicles with automatic headlight range control - general information](#)
- i Installation position front wheel drive: ⇒ [40-2, Left rear level control system sensor G76 on rear axle for front wheel drive](#)
- i Installation position all wheel drive: ⇒ [40-2, Left rear level control system sensor G76 on rear axle for all wheel drive](#)

3. Left front level control system sensor G78 on front axle

- i General notes ⇒ [40-2, Level control system sensor in vehicles with automatic headlight range control - general information](#)
- i Location: ⇒ [40-2, Left front level control system sensor G78 on front axle](#)
- i Location R32: ⇒ [40-2, Left front level control system sensor G78 on front axle R32](#)

4. Headlight range control module J431

- i Location: on left headlight

Level control system sensor in vehicles with automatic headlight range control - general information

Vehicles with gas discharge headlights come standard with automatic headlight range control.

The automatic headlight range control requires information about suspension compression and rebound at the front and rear axles.

For this, the position of the left lower control arm in relation to the structure is transferred over a connecting link to the left front level control system sensor G78 . The sensor transmits electrical signals to the headlight range control module.

On the rear axle, signals are transmitted to the control module from the left rear level control system sensor G76 .

These signals are required for determining vehicle height.

The automatic headlight range control reacts automatically to changes in vehicle inclination.

The vehicle height can change in the following situations:

- n Towing a trailer
- n Different load conditions; vehicle empty, vehicle partially or fully loaded
- n Slow or fast driving habits

Caution!

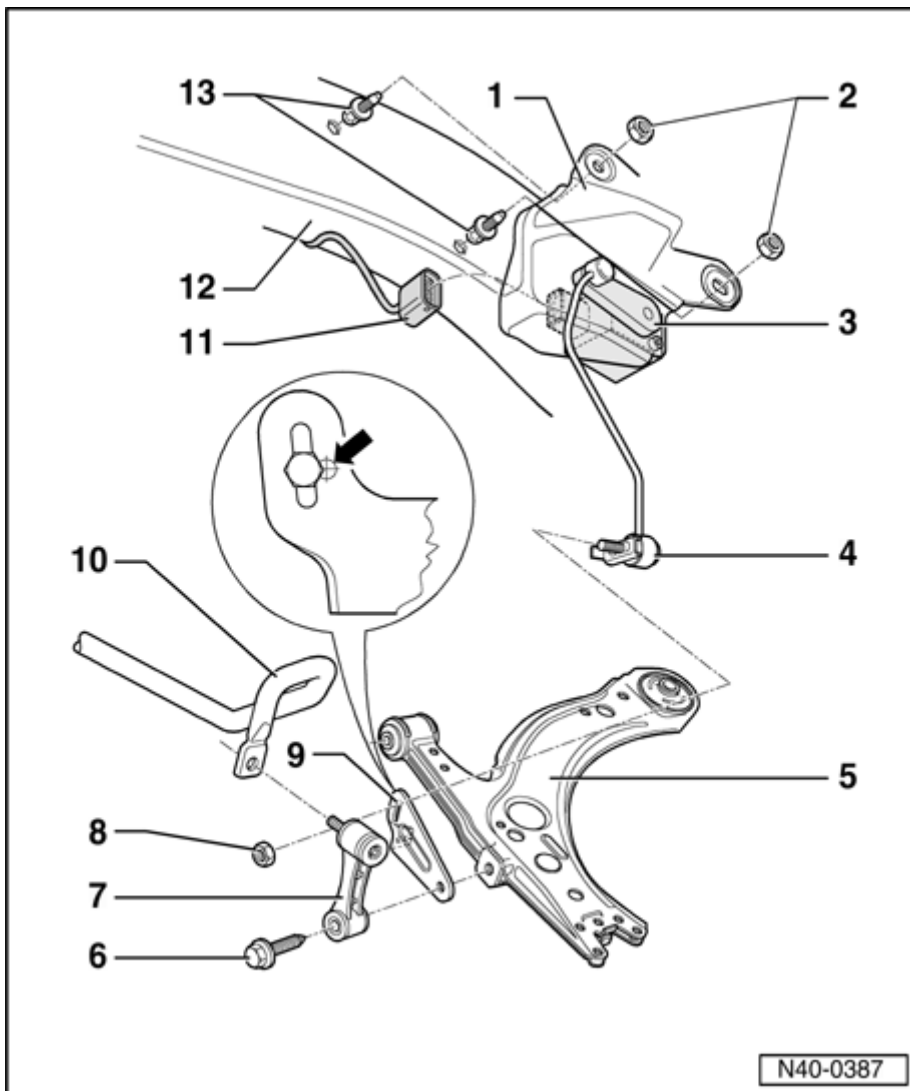
Adjustment of headlights!

Note:

- n *Checking the headlight basic setting is necessary when:*
 - n The retaining clamp for the connecting link on the lower control arm was loosened
 - n The lower link/arm was removed and installed or replaced
 - n Work is performed on level control system sensor
 - n The level control system sensor is replaced

Left front level control system sensor G78 on front axle

General notes ⇒ [40-2, Level control system sensor in vehicles with automatic headlight range control - general information](#)



Headlight basic settings

⇒ [Repair Manual, Electrical Equipment, Repair Group 94, Setting gas discharge lights; Adjusting gas discharge lights](#)

1. Bracket

2. Hex nut, 6 Nm

3. Level control system sensor G78

- ⌚ Check electrically using On Board Diagnostics (OBD)
- ⌚ When complaints are received
⇒ Perform basic setting in "Guided Fault Finding" with the VAS 5051.

For this, use the Goto button in the "Functions/Component selection" .

4. Connecting Left front level control system sensor G78

- i Fasten connecting rod within the range of the mark - **arrow** - to the bracket ⇒ [Item - 9 -](#) .

5. Control arm

6. Hex bolt

- i 15 Nm plus an additional $1/4$ turn 90°
- i Always replace

7. Connecting Link

- i Different versions
- i Application ⇒ *See Parts Catalog*

8. Hex nut, 6 Nm

9. Bracket

10. Stabilizer bar

11. Connector

12. Side rail

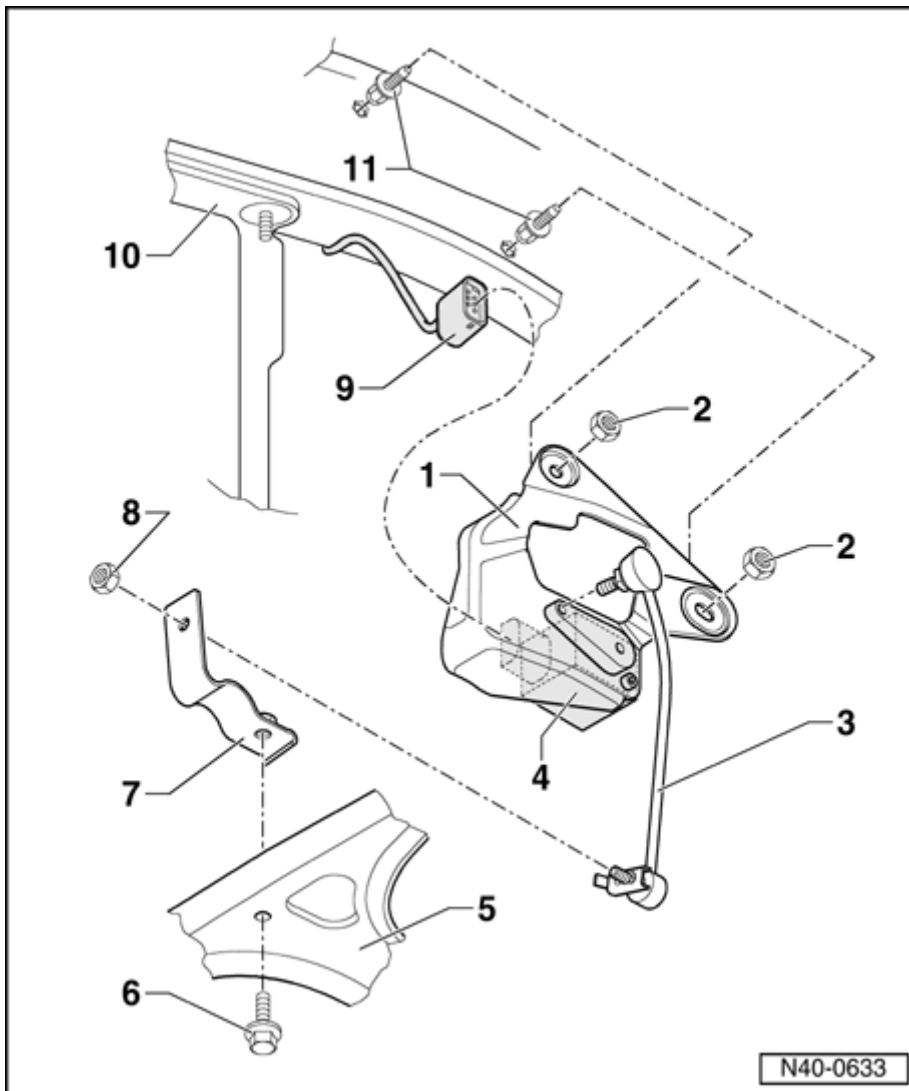
13. Pop rivet screw

Draw in pop rivet using Pop Rivet Tongs V.A.G 1765 B .

Left front level control system sensor G78 on front axle R32

General notes ⇒ [40-2, Level control system sensor in vehicles with automatic headlight range control - general](#)

[information](#)



Headlight basic settings

⇒ [Repair Manual, Electrical Equipment, Repair Group 94, Setting gas discharge lights; Adjusting gas discharge lights](#)

1. **Bracket**
2. **Hex nut, 8 Nm**
3. **Connecting Left front level control system sensor G78**
 - ⓘ Torque Left front level control system sensor G78 to: 4 Nm
4. **Level control system sensor G78**

- i Check electrically through On Board Diagnostics (OBD)
- i When complaints are received
⇒ *Perform basic setting in "Guided Fault Finding" with the VAS 5051.*

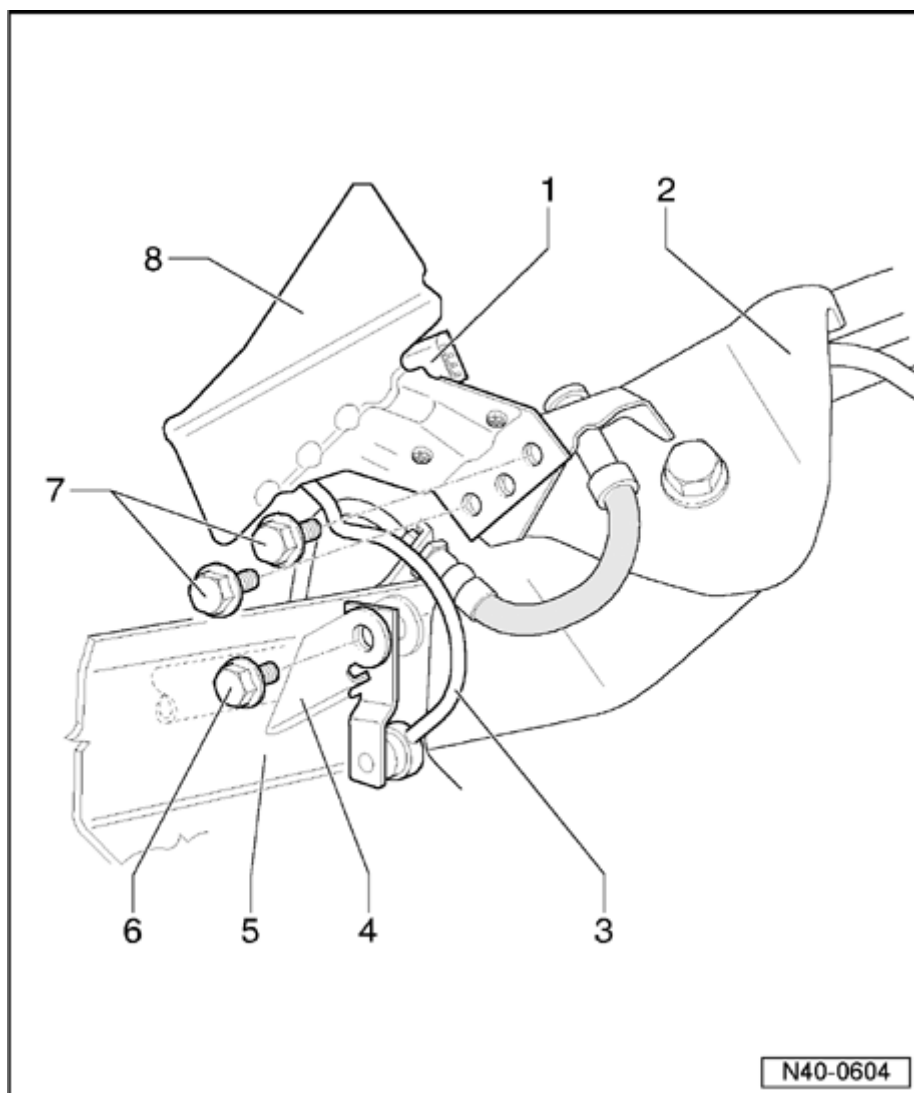
For this, use the Goto button in the "Functions/Component selection" .

5. Control arm
6. Hex bolt, 25 Nm
7. Bracket
8. Hex nut, 5 Nm
9. Connector
10. Side rail
11. Pop rivet screw

Draw in pop rivet using Pop Rivet Tongs V.A.G 1765 B .

Left rear level control system sensor G76 on rear axle for front wheel drive

General notes ⇒ [40-2, Level control system sensor in vehicles with automatic headlight range control - general information](#)



Headlight basic settings

⇒ [Repair Manual, Electrical Equipment, Repair Group 94, Setting gas discharge lights; Adjusting gas discharge lights](#)

1. Level control system sensor G76

- ı Check electrically using On Board Diagnostics (OBD)
- ı When complaints are received
⇒ Perform basic setting in "Guided Fault Finding" with the VAS 5051.

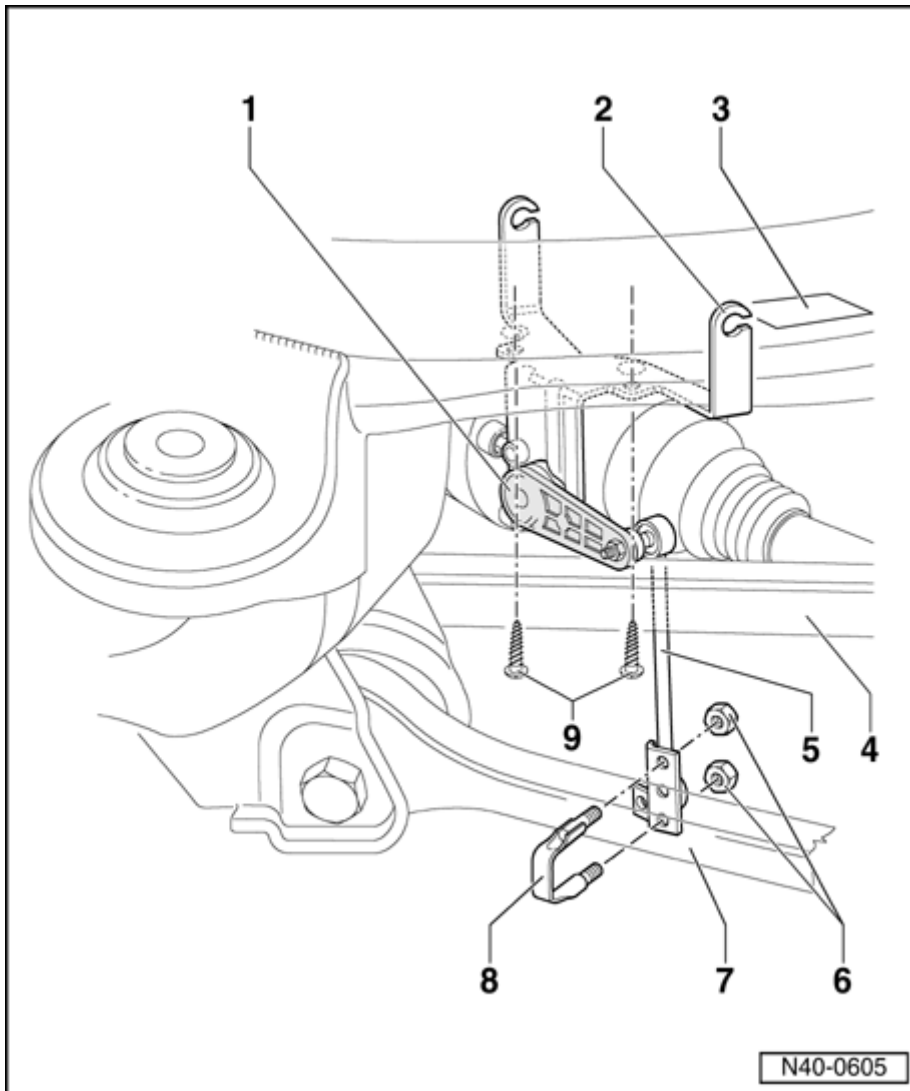
For this, use the Goto button in the "Functions/Component selection" .

2. Clevis mounting for rear axle**3. Connecting Left front level control system sensor G76**

- ⓘ Do not pull connecting link from ball joint!

4. Bracket**5. Axle beam****6. Hex bolt, 16 Nm****7. Hex bolt, 20 Nm****8. Heat shield****Left rear level control system sensor G76 on rear axle for all wheel drive**

General notes ⇒ [40-2, Level control system sensor in vehicles with automatic headlight range control - general information](#)



Headlight basic settings

⇒ [Repair Manual, Electrical Equipment, Repair Group 94, Setting gas discharge lights; Adjusting gas discharge lights](#)

1. Level control system sensor G76

- Check electrically using On Board Diagnostics (OBD)
- When complaints are received
⇒ Perform basic setting in "Guided Fault Finding" with the VAS 5051.

For this, use the Goto button in the "Functions/Component selection" .

2. Bracket

3. Subframe

4. Upper transverse link

5. Connecting Left front level control system sensor G76

- ⓘ Do not pull connecting link from ball joint!

6. Self-locking hex nut, 4 Nm

- ⓘ Always replace

7. Lower transverse link

8. Clamp

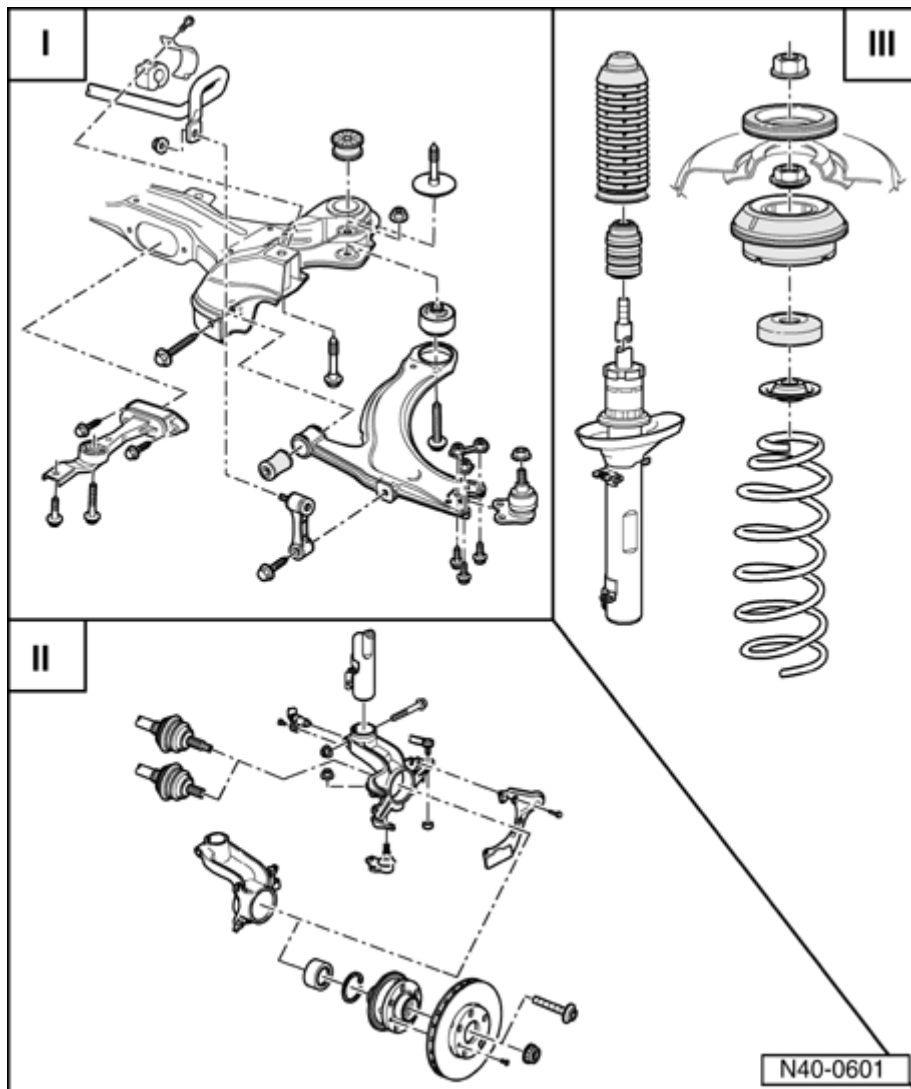
9. Bolt, 9 Nm

Front suspension, servicing

Front axle, overview

Note:

- n The chapter "Servicing axle shafts" can be found on ⇒ [40-5, Front drive axle, servicing](#) .



I - Assembly overview of subframe, stabilizer bar, control arm ⇒ [40-3, I - Subframe, stabilizer bar, control arm, assembly overview](#)

II - Assembly overview of wheel bearing ⇒ [40-3, II - Wheel bearing, assembly overview](#)

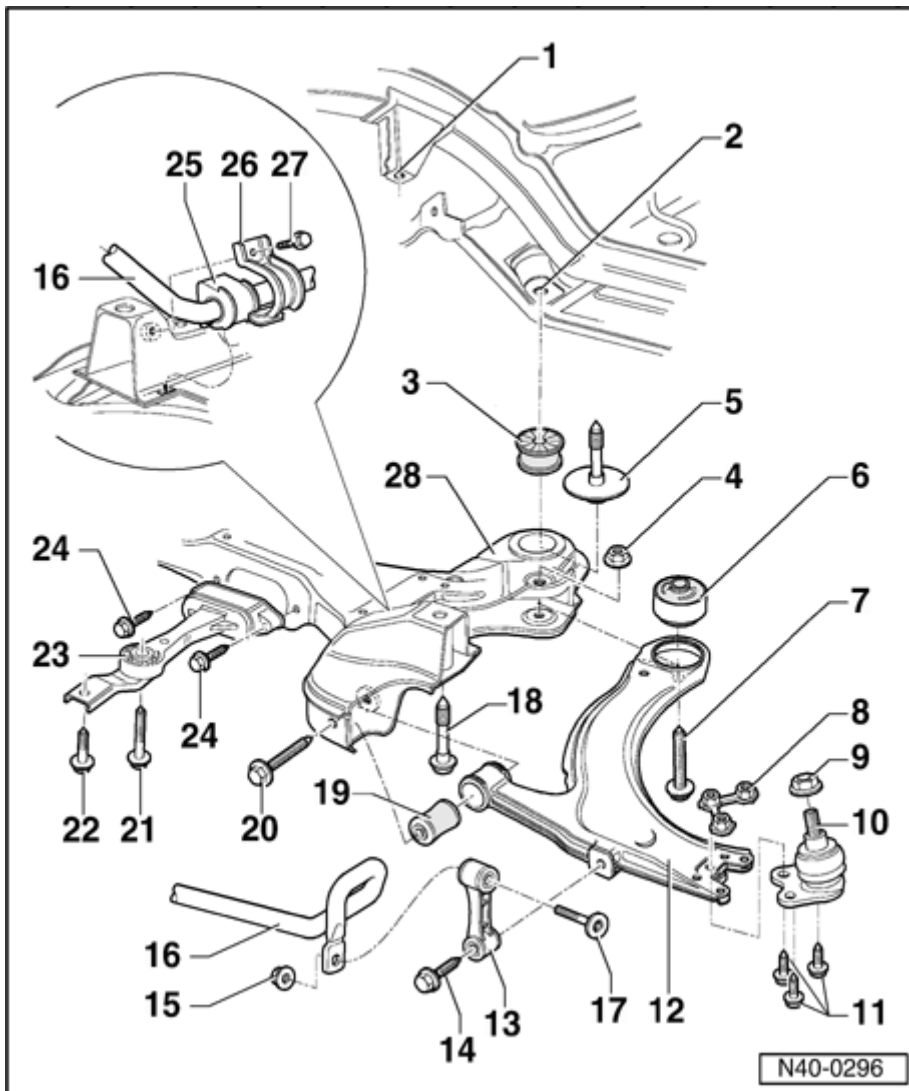
III - Assembly overview of suspension strut ⇒ [40-3, III - Front suspension strut,](#)

[assembly overview](#)

I - Subframe, stabilizer bar, control arm, assembly overview

Note:

- n *If a vehicle has a drive axle removed and is to be moved, an outer CV joint must be installed in place of the drive axle and be tightened to 50 Nm. Otherwise, the wheel bearing will be damaged.*
- n *Welding and straightening operations are not permitted on load-bearing or wheel-controlling components.*
- n *Always replace self-locking nuts.*
- n *Always replaced corroded nuts./bolts.*



1. Subframe retaining bracket

The captive nut cannot be reworked. If nut is damaged, replace complete mounting bracket.

2. Weld nut in body

If weld nut threads are damaged, threads can be repaired using Heli-Coil thread inserts.

Servicing thread in side rail ⇒ [40-3, Threads in longitudinal member, servicing](#)

3. Bonded rubber bushing

- i Removing and installing ⇒ [40-3, Bonded rubber bushings for](#)

[subframe, replacing](#)

4. Self-locking nut

- i Always replace

5. Hex bolt M 14 x 1.5 x 63

- i 100 Nm plus an additional $1/4$ turn 90 °
- i Always replace

6. Rear control arm bushing

- i Installation location ⇒ [40-3, Installation position of rear control arm mount](#)
- i Pressing out and in ⇒ [40-3, Pressing out/in control arm rear bushing](#)

7. Hex bolt M 12 x 1.5 x 70

- i 70 Nm and turn additional 90 °
- i Always replace

8. Plate with nuts

9. Hex nut, self-locking, 45 Nm

- i Always replace

10. Ball joint

- i Checking ⇒ [40-3, Ball joint, checking](#)
- i Removing and installing ⇒ [40-3, Ball joint, removing and installing](#)

11. Hex head bolt

- i 20 Nm an additional $1/4$ turn 90

- ; Always replace

12. Control arm

13. Connecting Link

- ; Different versions
- ; Application ⇒ *See Parts Catalog*

14. Hex bolt

- ; 15 Nm an additional $1/4$ turn
90
- ; Always replace

15. Hex nut

- ; Self-locking
- ; 15 Nm an additional $1/4$ turn
90
- ; Always replace

16. Stabilizer bar

The subframe must be lowered to remove and install.

- ; Different versions
- ; Application ⇒ *See Parts Catalog*
- ; Modified mounting for stabilizer bar with all wheel drive ⇒ [40-3, Modified mounting for stabilizer bar](#)

17. Hex socket head bolt

18. Hex bolt M 14 x 1.5 x 95

- ; 100 Nm plus an additional $1/4$ turn 90 °
- ; Always replace

19. Front control arm bushing

- i Pressing out ⇒ [40-3, Pressing out front control arm bushing](#)
- i Pressing in ⇒ [40-3, Pressing in front control arm bushing](#)

20. Hex bolt M 12 x 1.5 x 82

- i 70 Nm plus an additional $\frac{1}{4}$ turn 90 °
- i Always replace

21. Hex bolt, 50 Nm

- i M10×70

22. Hex bolt, 50 Nm

- i M10×30

23. Pendulum support

- i Different versions
- i Application ⇒ *See Parts Catalog*

24. Hex bolt, 25 Nm

- i M8×45

25. Rubber bushing**26. Clamp****27. Hex bolt, 25 Nm****28. Subframe**

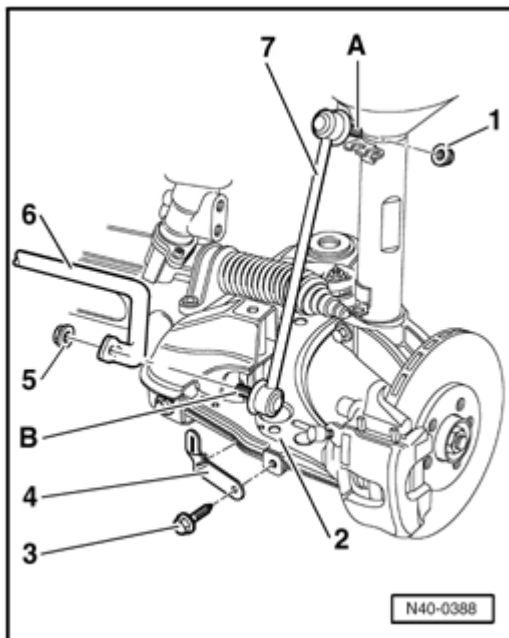
- i If damaged, do not repair threads in subframe for front control arm bolt!

Modified mounting for stabilizer bar

Affected vehicles:

- n Vehicles with all wheel drive

- 1 - Nut, 90 Nm
- 2 - Control arm
- 3 - Hex bolt, 15 Nm plus an additional 1 / 4 turn 90
- 4 - Bracket
- 5 - Nut, 90 Nm
- 6 - Stabilizer bar
- 7 - Connecting Link
- A - Upper threaded pin



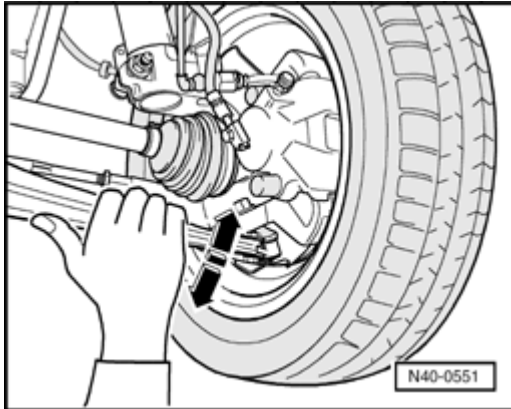
- Install ball joint with long thread - **A** - at top on spring plate.

B - Lower threaded pin

- Install ball joint with short thread - **B** - , at bottom on stabilizer bar.

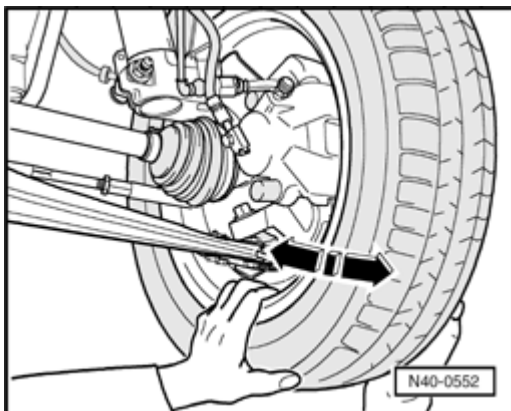
Ball joint, checking

Checking axial play



- Pull control arm down and press up again.

Check radial play

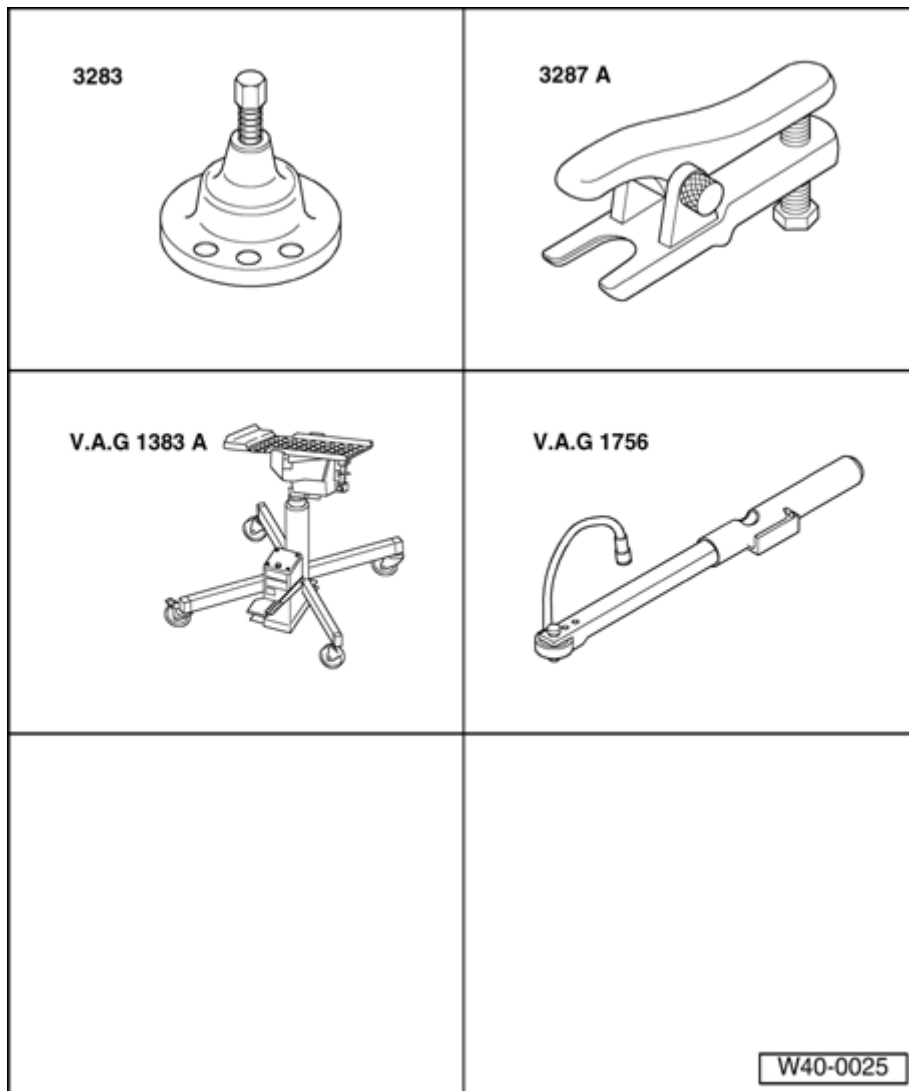


- Press lower part of wheel inward and outward.

Note:

- n *There must be no perceptible or visual "play" when carrying out both tests.*
- n *Observe ball joint during checks.*
- n *Take into account possible existing wheel bearing play or "play" in upper suspension strut mount.*
- n *Check rubber boot for damage, replace ball joint if necessary*

Ball joint, removing and installing



Special tools, testers and auxiliary items required

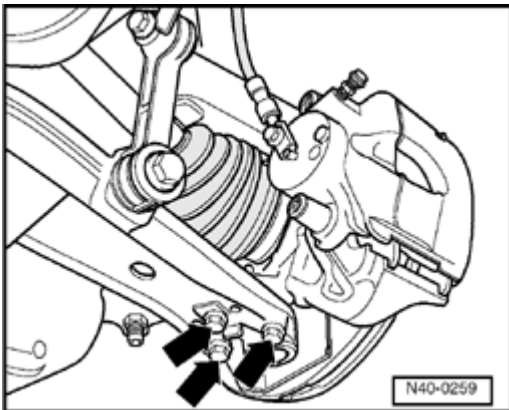
- n Hub puller 3283
- n Ball joint puller 3287 A
- n Engine/transmission jack V.A.G 1383 A
- n Angle wrench V.A.G1756

Removing

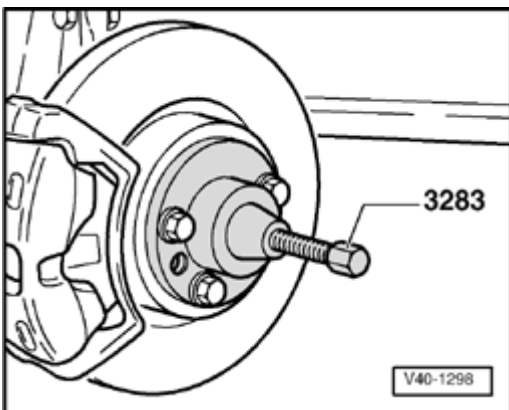
Note:

- n *Vehicle must be standing on its wheels when loosening or tightening 12-point axle nut*

- Lift vehicle until the load on the front axle is relieved.
- Loosen 12-point nut.
- Remove wheel.
- Remove noise insulation.
- Mark installation position of bolts from ball joint to control arm.



- Remove bolts - **Arrows** - .

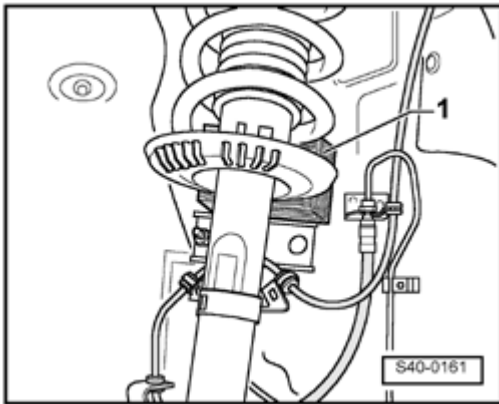


- Press drive axle out. Install hub puller 3283 as shown in illustration.

Note:

- *When pressing drive axle out ensure sufficient clearance is available.*

- Pull wheel bearing housing with ball joint out from control arm.



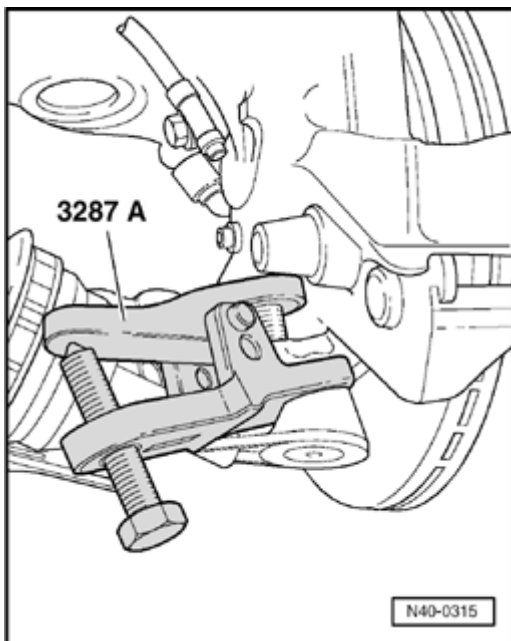
- Swing wheel with suspension strut outward and support e.g. with a piece of wood - **1** -, to do this pull drive axle out from wheel bearing.

- Secure drive axle to structure with wire.

The drive axle must not hang down!

The inner joint will be damaged through overflexing.

- Loosen nut from ball joint.



- Install ball joint puller 3282 A as shown in illustration and press out ball joint.

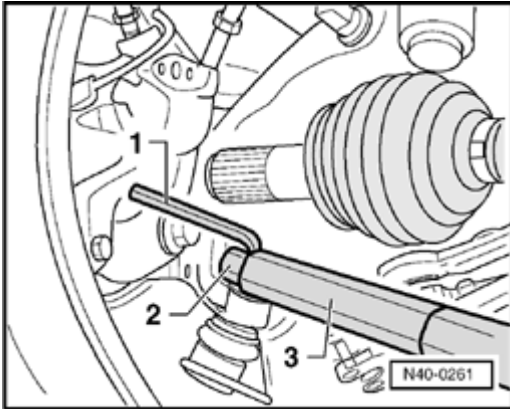
Note:

- n *Place engine/transmission jack V.A.G1383/A , or similar, underneath to ensure safety (danger of accident through falling parts when pressing out the ball joint).*
- n *To protect ball joint threads and for safety reasons*

leave nut on a few turns.

Installing

- Install ball joint in wheel bearing housing.



- Install new self-locking nut, and counter-hold with T40 Torx bit.

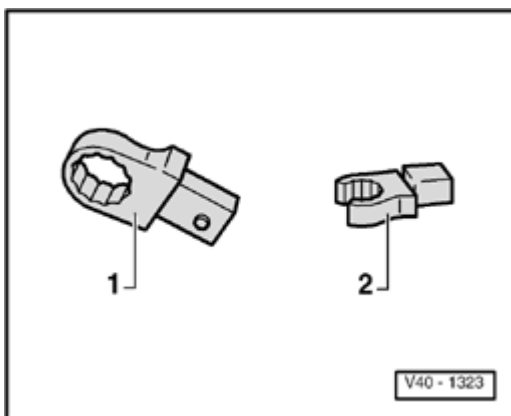
1 - Torx bit T40

2 - Ring wrench insert or slotted ring wrench insert ⇒ Fig. V40-1323

3 - V.A.G1331

- Install drive axle.

- Secure ball joint to control arm (bolts on old marks).



Use new bolts!

1 - Box wrench insert (commercial type, 18 mm)

2 - Open end wrench insert (commercial type, 18 mm)

Note:

- Check boot for damage or twisting.

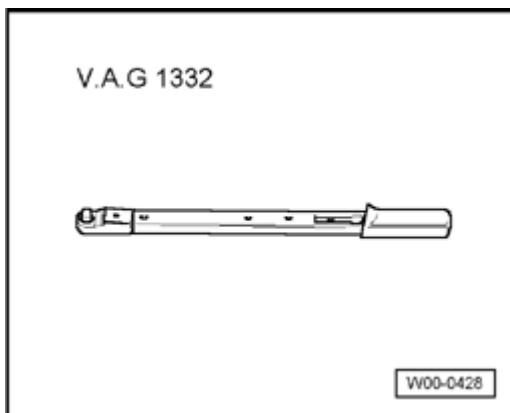
- Install and fasten wheel ⇒ [44-2, Tightening torques for wheel bolts](#) .
- Tighten 12-point nut or hex bolt. ⇒ [40-5, Installing](#) .

Tightening torques

Ball joint to control arm	20 Nm plus an additional $\frac{1}{4}$ turn (90°)
Use new bolts!	
Ball joint to wheel bearing housing	45 Nm

Control arm, removing and installing

Special tools, testers and auxiliary items required

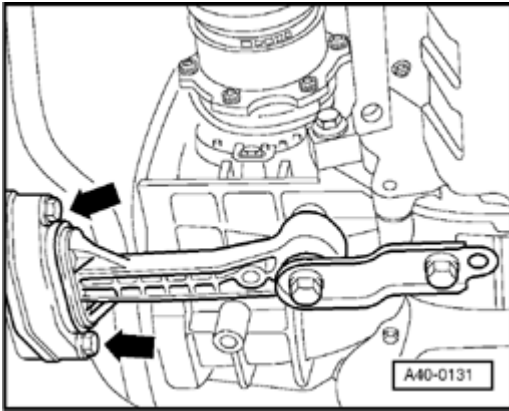


n Torque wrench V.A.G1332

Removing

- Remove wheel.
- Remove noise insulation.
- For all wheel drive vehicles, the coupling link for vehicle Left front level control system sensor G78 on front axle must be disconnected from control arm bracket before removing left control arm ⇒ [40-2, Left front level control system sensor G78 on front axle](#) .

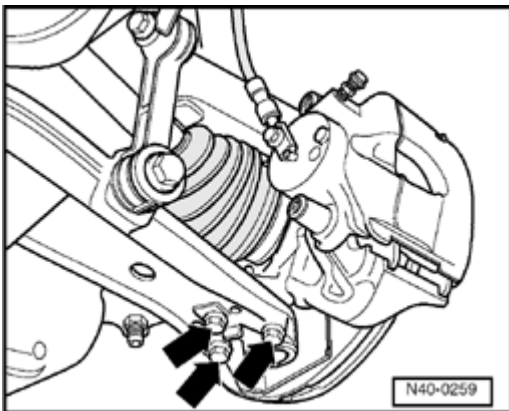
Vehicles with automatic transmission



- Remove bolts - **Arrows** - .

The following steps apply to all vehicles.

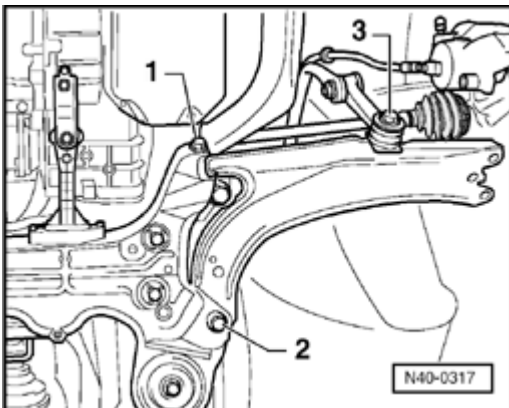
- Mark installation position of bolts from ball joint to control arm.



- Remove bolts - **Arrows** - .

- Disconnect drive axle from transmission axle flange.

- Pull wheel bearing housing with ball joint out from control arm.



- Remove hex bolt - **3** - on control arm.

- Remove hex bolts - **1** - and - **2** - and take out control arm.

Vehicles with automatic transmission

- Push engine/transmission assembly forward with a lever.
- Remove hex bolt - 1 - and take out control arm.

Installing

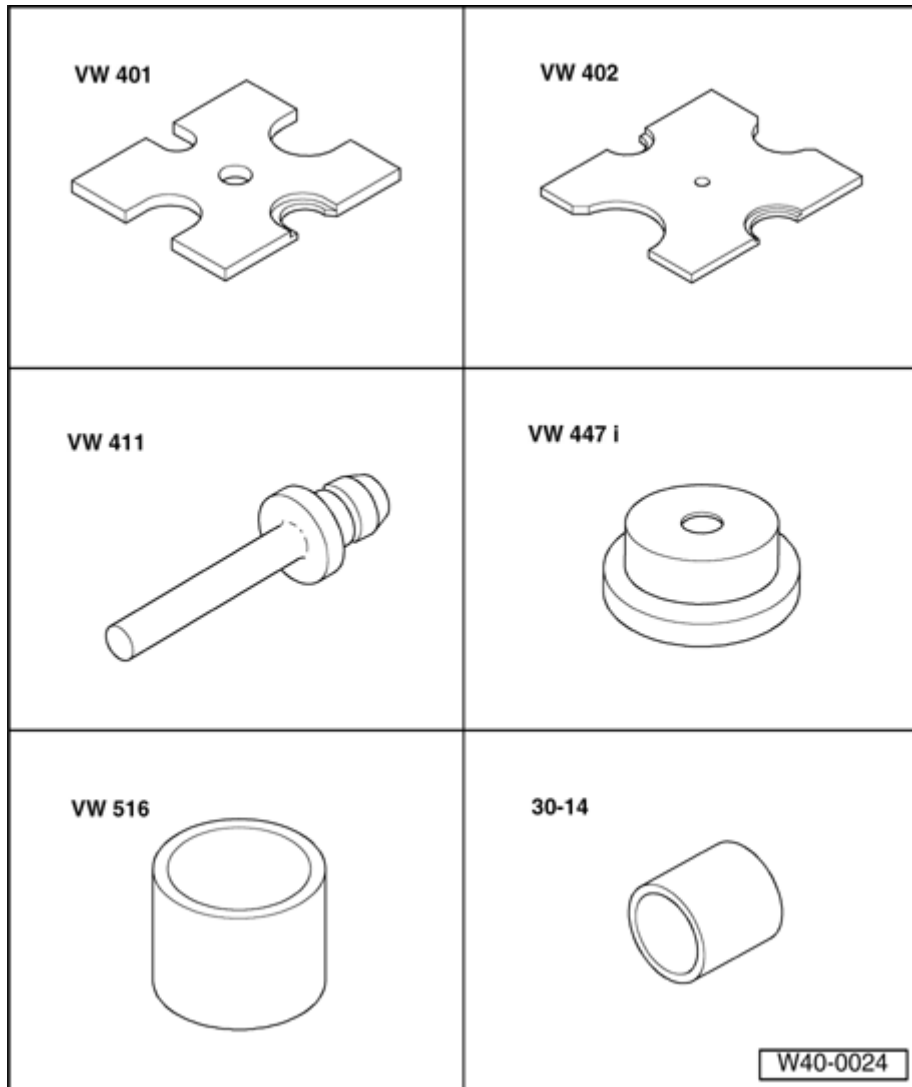
Installation is carried out in reverse sequence.

- Install and fasten wheel ⇒ [44-2, Tightening torques for wheel bolts](#) .

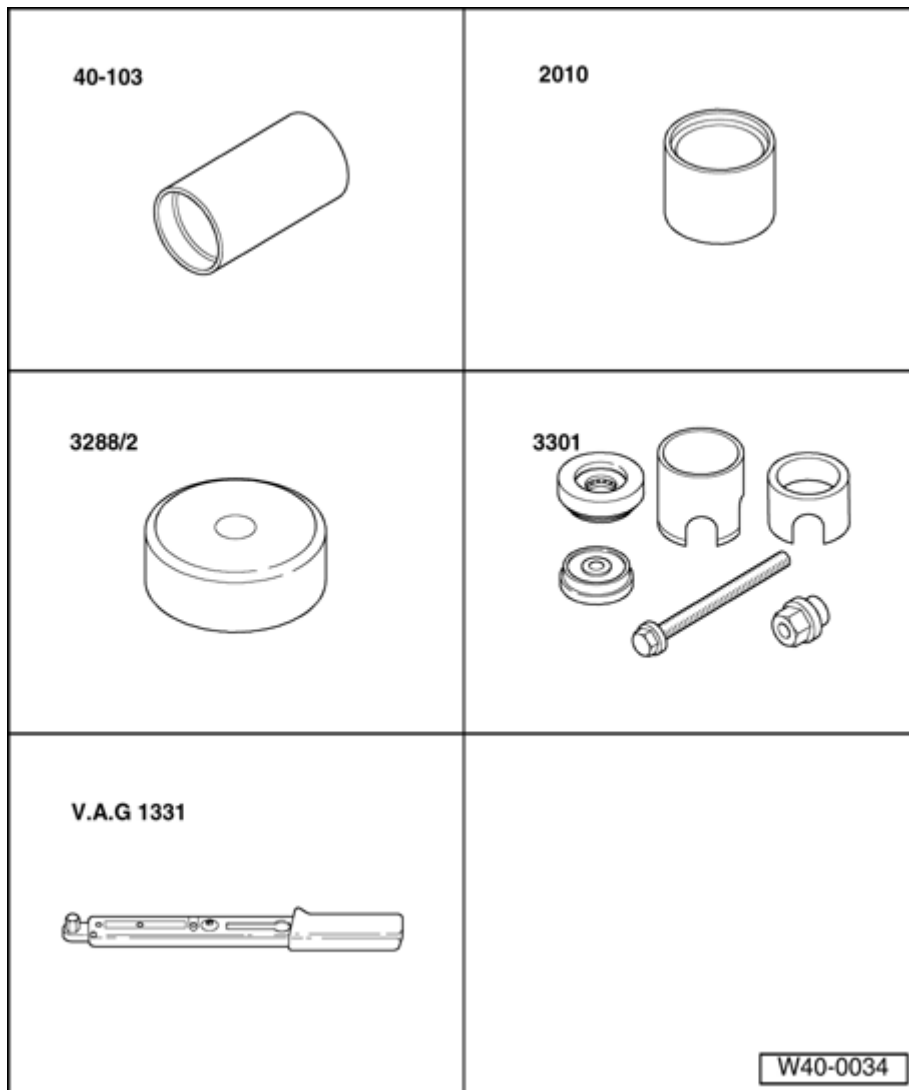
Tightening torques:

Ball joint to control arm Use new bolts!	20 Nm plus an additional $1/4$ turn (90°)
Pendulum support to subframe	25 Nm
Forward bolt for control arm	70 Nm plus an additional $1/4$ turn (90°)
Rearward bolt for control arm Use new bolts!	
Coupling rod to stabilizer bar	30 Nm
Drive shaft to flanged shaft ⇒ 40-5,	

Control arm bonded rubber bushing, replacing

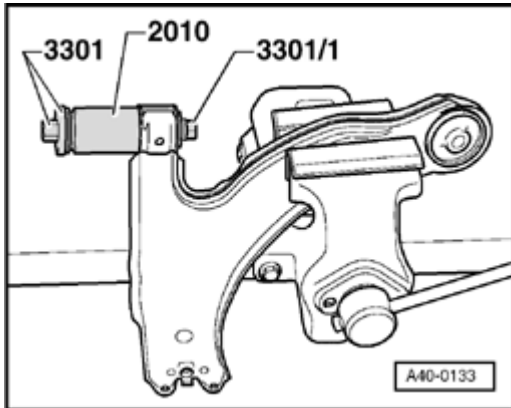
**Special tools, testers and auxiliary items required**

- n Thrust plate VW401
- n Thrust plate VW402
- n Punch VW411
- n Thrust pad VW447 i
- n Sleeve VW516
- n Tube 30 - 14



Special tools, testers and auxiliary items required

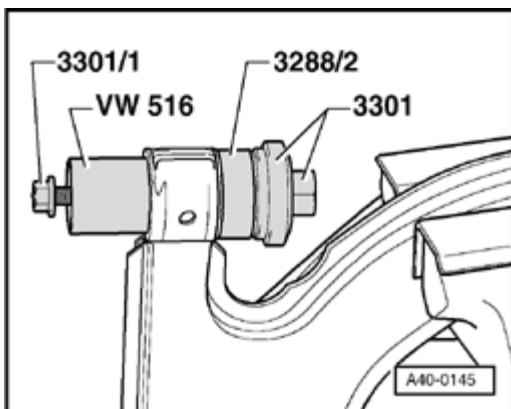
- n Support 40 - 103
- n Sleeve 2010
- n Press piece 3288/2
- n Assembly tool 3301
- n Torque wrench V.A.G1331



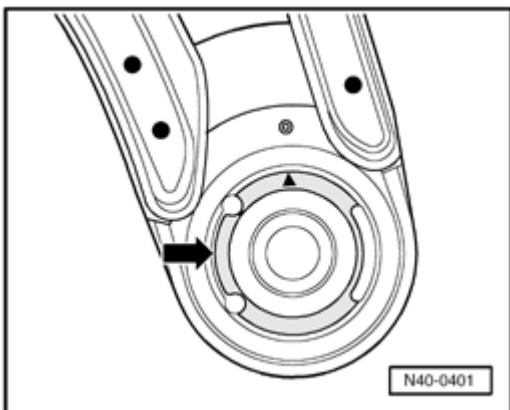
Pressing out front control arm bushing

Note:

- n Use lubricant to press in the bonded rubber mount
e.g. lubricant G 294 421 A1 .



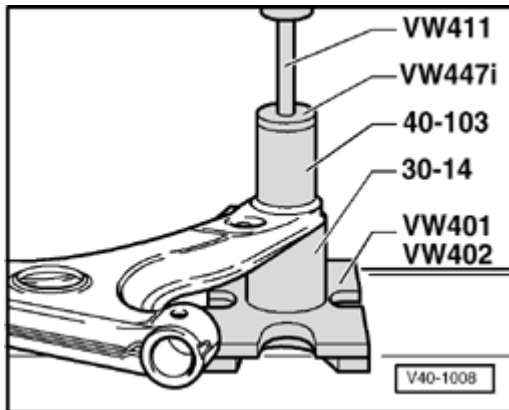
Pressing in front control arm bushing



Installation position of rear control arm mount

One of the embossed arrows points toward the projection - **arrow** - on control arm.

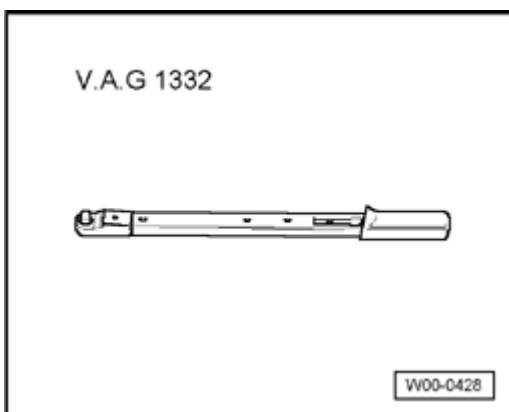
The cam - **arrow** - must always point to outside of vehicle.



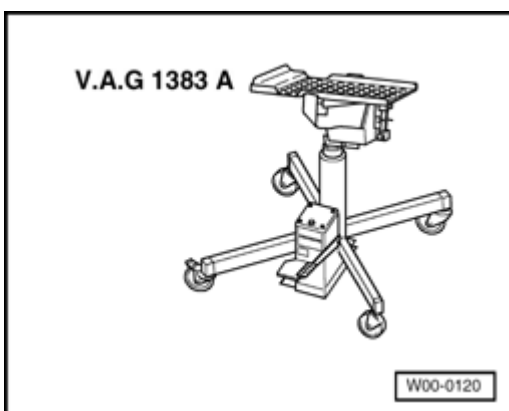
Pressing out/in control arm rear bushing

Subframe, removing and installing

Special tools, testers and auxiliary items required



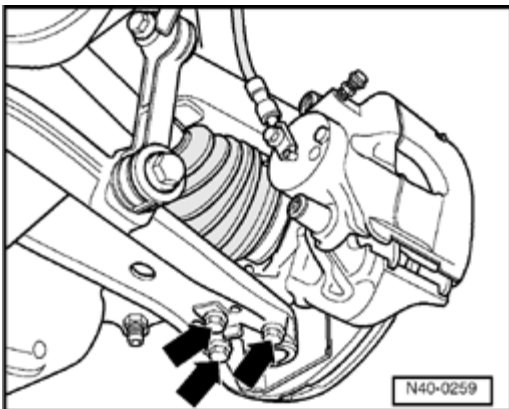
n Torque wrench V.A.G1332



- n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2

Removing

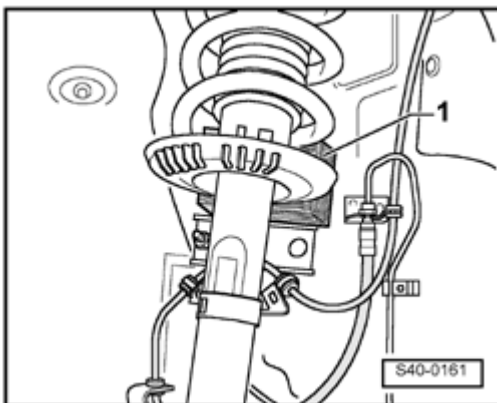
- Remove wheel.
- Remove noise insulation.
- Mark installation position of bolts from ball joint to control arm.



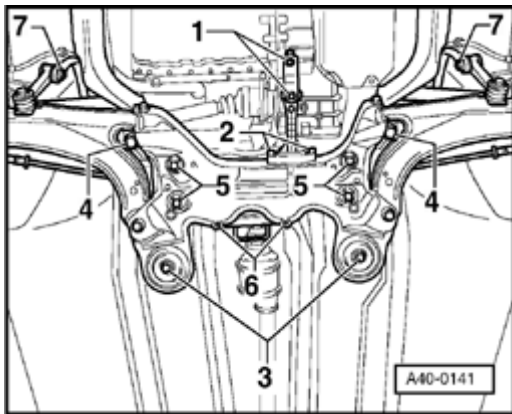
- Remove bolts - **Arrows** - .
- Disconnect drive axle from transmission axle flange.
- Secure drive axle to structure with wire.

The drive axle must not hang down!

- Pull wheel bearing housing with ball joint out from control arm.



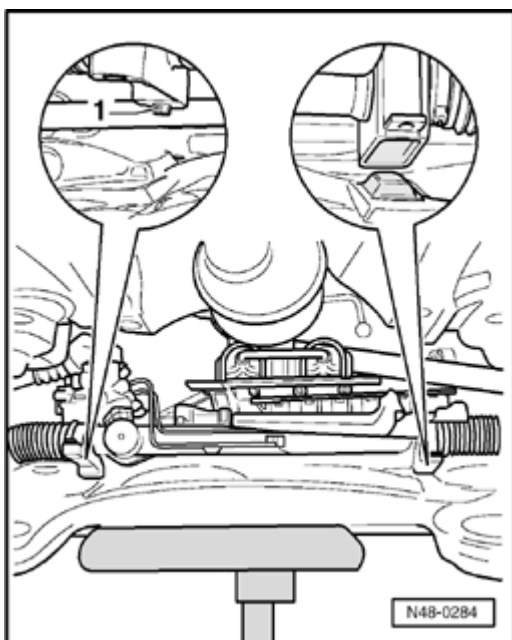
- Swing wheel with suspension strut outward and support e.g. with a piece of wood - **1** - .



- Remove bolts - 1 - and - 2 - and remove pendulum support.
- Remove bolt - 5 - for steering gear.
- Remove stabilizer bar link nut - 7 -
- TDI engines, remove bolts - 6 - for exhaust system.
- Place engine/transmission jack V.A.G1383A with V.A.G1359/2 under subframe.
- Remove bolts - 3 - and - 4 - for subframe.
- Lower subframe using engine/transmission jack V.A.G1383A .

Installing

Before inserting bolts for subframe, position steering gear on subframe and insert bolts for steering gear



The threaded sleeve - 1 - must seat in subframe hole.

Further installation in reverse order

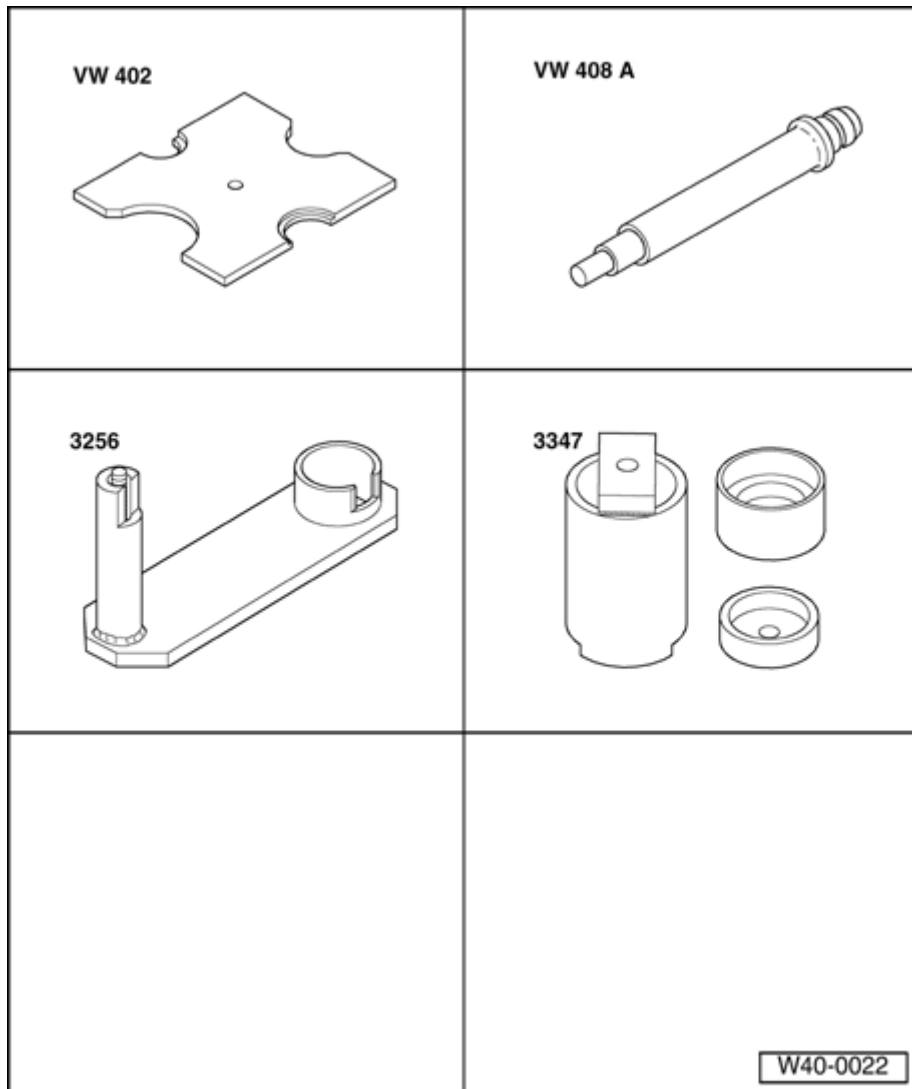
After installing check position of steering wheel during a test drive.

If steering wheel is not in straight ahead position the front axle alignment must be checked!

Tightening torques

Ball joint to control arm Use new bolts!	20 Nm plus an additional $\frac{1}{4}$ turn (90 °)
Pendulum support to subframe	25 Nm
Pendulum support to transmission	
M 10 x 70	50 Nm
M 10 x 30	50 Nm
Pendulum support at transmissions for vehicles with transmission 02T	
M 10 x 70	40 Nm plus an additional $\frac{1}{8}$ turn (45 °)
M 10 x 30	40 Nm plus an additional $\frac{1}{8}$ turn (45 °)
Steering gear to subframe Use new bolts!	20 Nm plus an additional $\frac{1}{4}$ turn (90 °)
Coupling rod to stabilizer bar	30 Nm
Subframe to body Use new bolts!	100 Nm plus an additional $\frac{1}{4}$ turn (90 °)

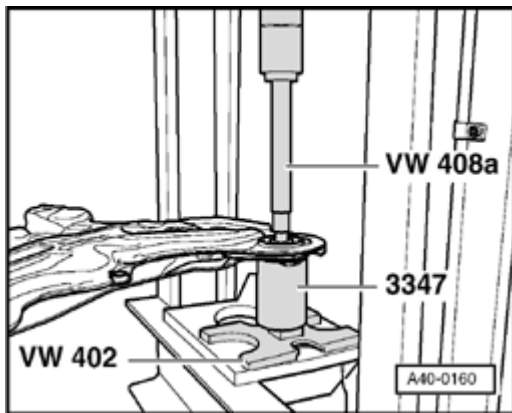
Bonded rubber bushings for subframe, replacing



Special tools, testers and auxiliary items required

- n Thrust plate VW402
- n Punch VW408A
- n Counterhold 3256
- n Assembly tool 3347

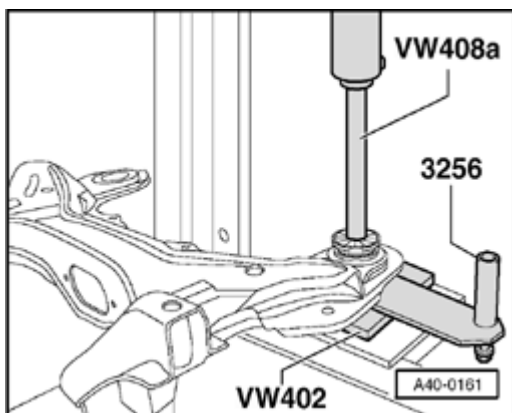
Removing and installing is only possible when subframe is removed, removing subframe ⇒ [40-3, Subframe, removing and installing](#)



Pressing out bonded rubber bushing

Note:

- n Use lubricant to press in the bonded rubber mount e.g. lubricant G 294 421 A1 .



Pressing in bonded rubber bushing

Threads in longitudinal member, servicing

It is possible to service the threads of the weld nuts in the longitudinal member depending on certain conditions.

- n Servicing work may only be carried out once per thread.
- n If servicing is necessary after this, the nuts must be replaced.
- n Observe the operating instructions of the VAS repair kit.

Caution!

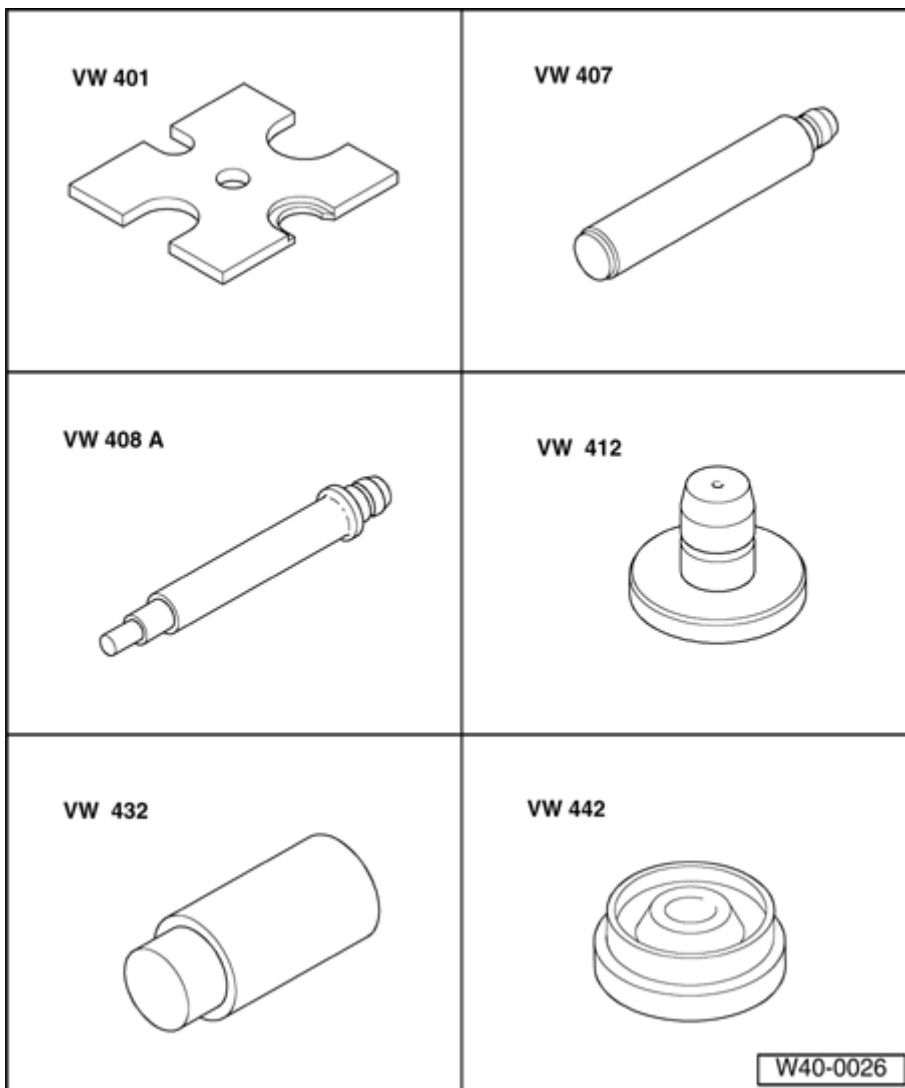
When drilling, it is essential that eye protection be worn!

- n Have the thread repair checked by the responsible foreman or next person in charge.
- n Correct any damage to underbody sealant layer. ⇒ *Body Collision Repair*; Measures for corrosion protection
- n Only use VAS repair kit listed in table for maintenance

VAS thread repair kit

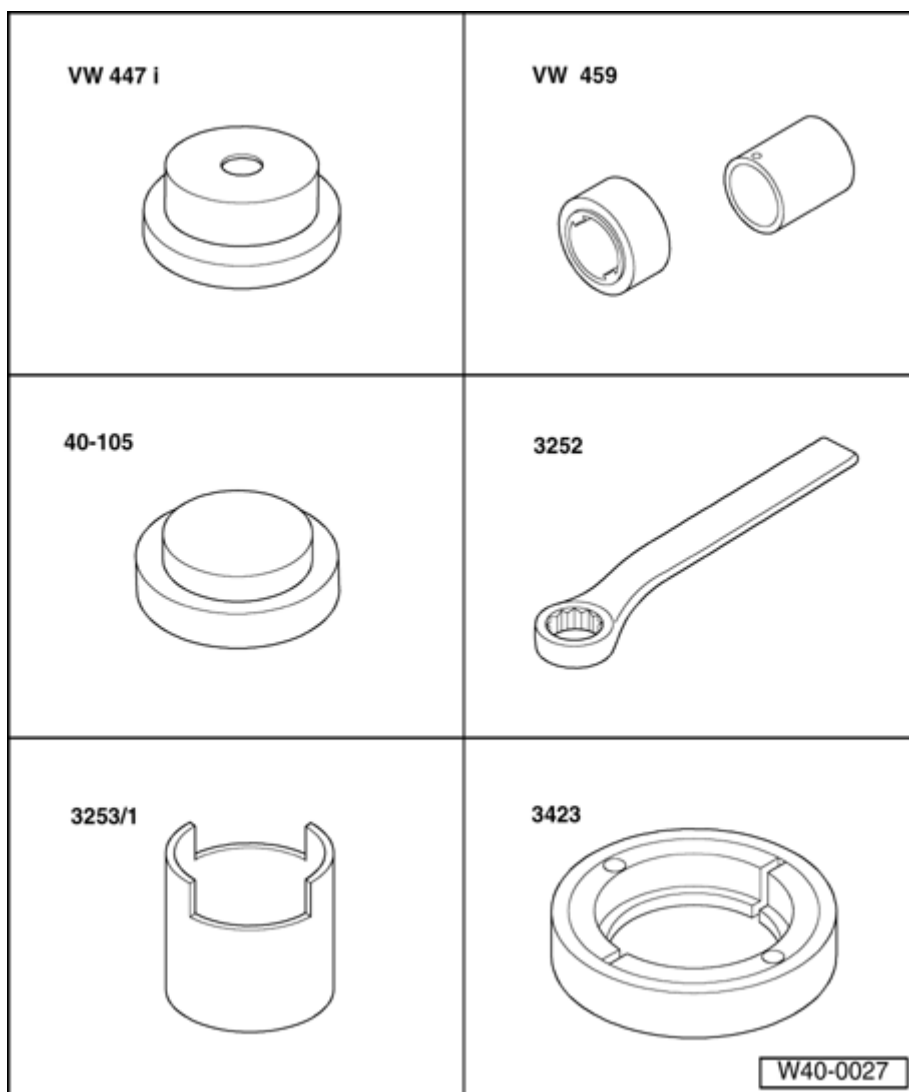
Thread	VAS number
M10	6024
M12×1.5	6058
M14×1.5	6027

II - Wheel bearing, assembly overview



Special tools, testers and auxiliary items required




- n Thrust plate VW401
- n Punch VW407
- n Punch VW408A
- n Thrust disc VW412
- n Arbor 50 mm dia. VW432
- n Thrust pad VW442



Special tools, testers and auxiliary items required

- n Thrust pad VW447 i
- n Pressing appliance VW459/2
- n Thrust pad 40 - 105

- n Box wrench SW 32 3252 A
- n Assembly tool 3253
- n Collar for wheel bearing inner race 3423

<p>V.A.G 1331</p> 	<p>V.A.G 1332</p> 
<p>V.A.G 1410</p> 	
	<p style="text-align: right;">W40-0028</p>

Special tools, testers and auxiliary items required

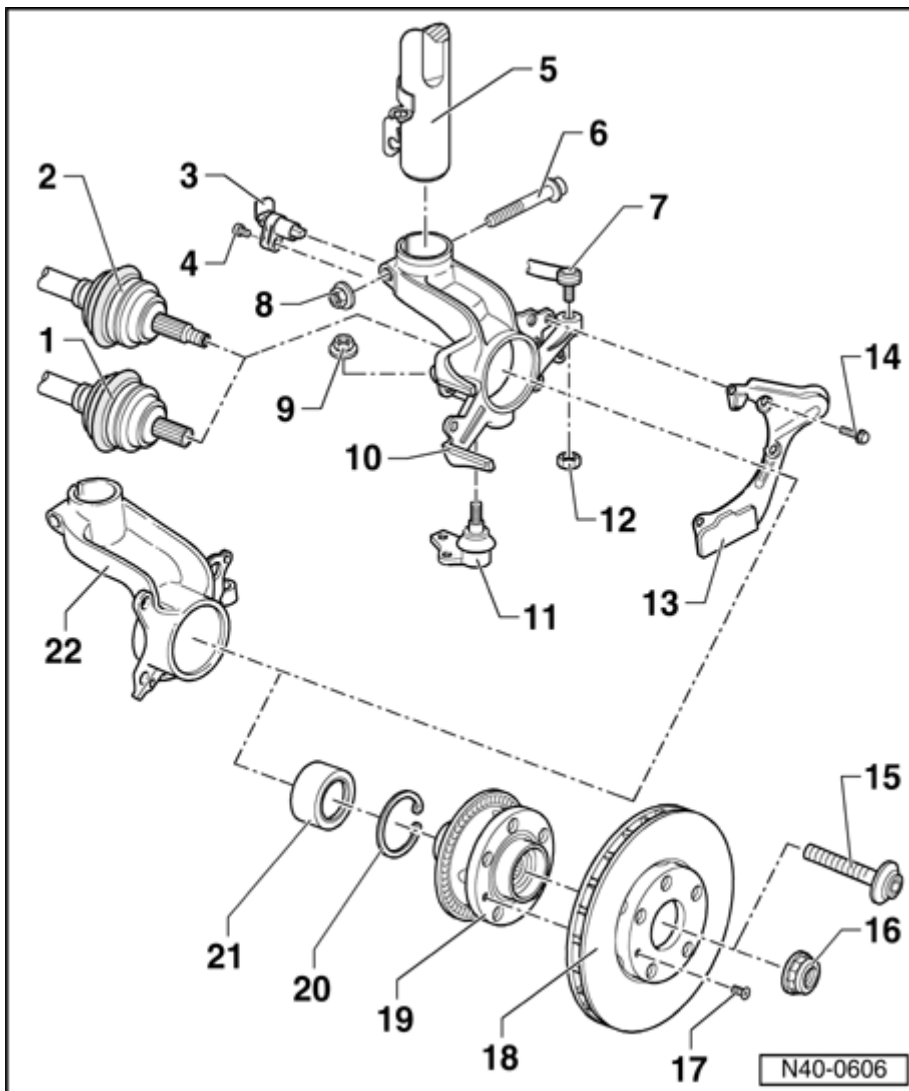
- n Torque wrench V.A.G1331
- n Torque wrench V.A.G1332
- n Torque wrench V.A.G1410

Note:

- n *If a vehicle that has a drive axle*

removed and is to be moved, an outer CV joint must be installed in place of the drive axle and be tightened to 50 Nm. Otherwise, the wheel bearing will be damaged.

- n *Welding and straightening operations are not permitted on load-bearing or wheel-controlling components.*
- n *Always replace self-locking nuts.*
- n *Always replaced corroded nuts/bolts.*



1. Drive axle

- i For special model "Golf GTI 132 kW"
- i Pulling drive axle out from

wheel hub and pressing in ⇒
Removing and installing drive
axles ⇒ [40-5, Drive axle,
removing and installing](#)

2. Drive axle

- i Pulling drive axle out from wheel hub and pressing in ⇒ Removing and installing drive axles ⇒ [40-5, Drive axle, removing and installing](#)

3. Speed sensor

4. Hex socket head bolt, 10 Nm

5. Suspension strut

6. Hex bolt

- i Always replace
- i The point on hex bolt must point in normal direction of travel

7. Tie rod end

8. Self-locking nut

- i 60 Nm plus an additional $\frac{1}{4}$ turn 90°
- i Never less than 90° !
- i Turning angle tolerance 90° to 120°
- i Always replace

9. Self-locking hex nut, 45 Nm

- i Always replace

10. Wheel bearing housing

For vehicles:

- i With gasoline engines up to

and including 92 kW

- ; With SDI/TDI engine

11. Ball joint

- ; Checking ⇒ [40-3, Ball joint, checking](#)
- ; Removing and installing ⇒ [40-3, Ball joint, removing and installing](#)

12. Self-locking hex nut, 45 Nm

- ; Always replace

13. Shield plate

14. Hex bolt, 10 Nm

15. Hex bolt

- ; For special model "Golf GTI 132 kW"
- ; Fastening ⇒ [40-5, Installing](#)
- ; Always replace

16. Self-locking 12-point nut

- ; Fastening
- ; Always replace

17. Phillips-head screw, 4 Nm

18. Ventilated brake disc

19. Wheel hub with speed sensor rotor

- ; Rotor is welded to wheel hub
- ; Removing and installing when the wheel bearing housing is installed ⇒ [40-3, Front wheel bearing, pressing out and in with wheel bearing housing installed](#)

20. Circlip

- i Make sure it is seated properly

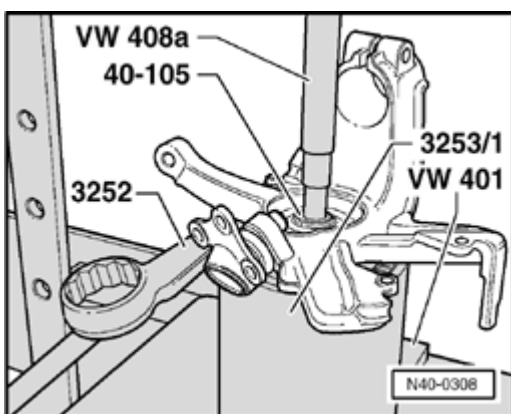
21. Wheel bearing

- i Pressing out ⇒ [40-3, Pressing wheel bearing out of wheel bearing housing](#)
- i Replace, as it is destroyed during pressing out
- i Pressing in ⇒ [40-3, Pressing wheel bearing into wheel bearing housing](#)
- i Removing and installing when the wheel bearing housing is installed ⇒ [40-3, Front wheel bearing, pressing out and in with wheel bearing housing installed](#)

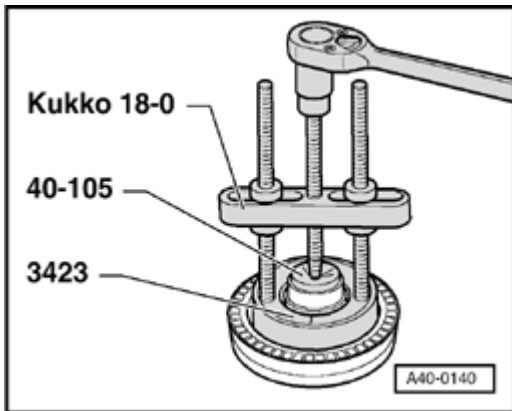
22. Wheel bearing housing

For vehicles:

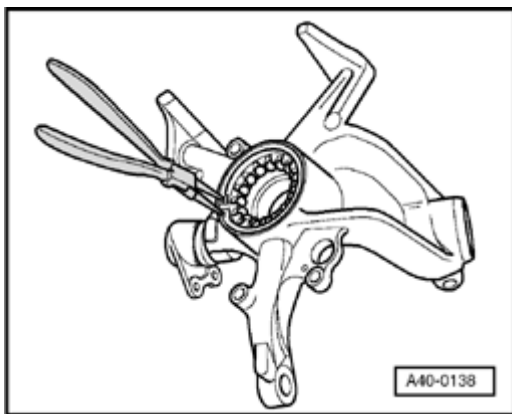
- i With gasoline engines from 110 kW



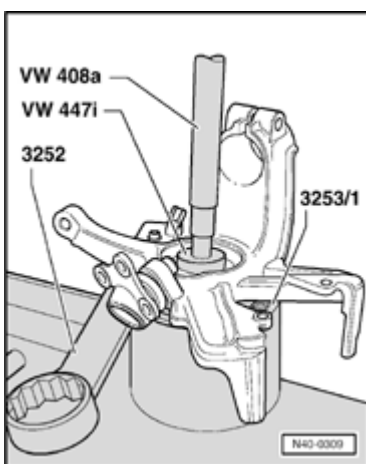
Pressing wheel hub out of wheel bearing housing



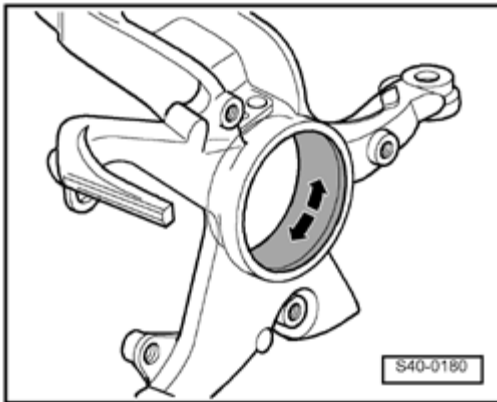
Pulling bearing inner race out of hub



Removing circlip



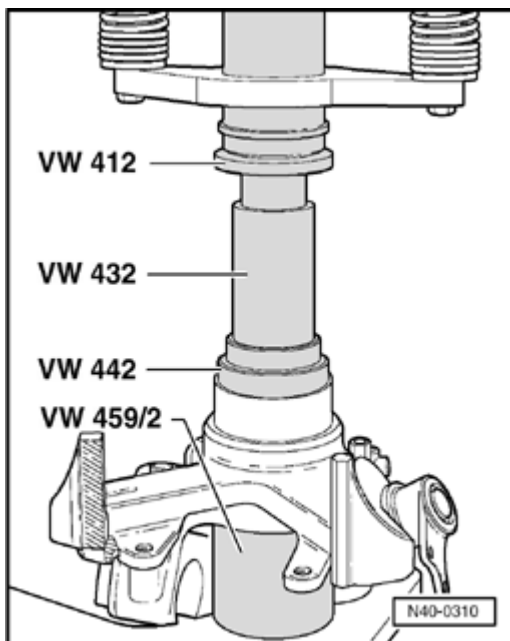
Pressing wheel bearing out of wheel bearing housing



Greasing hole completely with Molikote grease

Molykote grease, G 052 723 A2

Use grease packet from repair kit

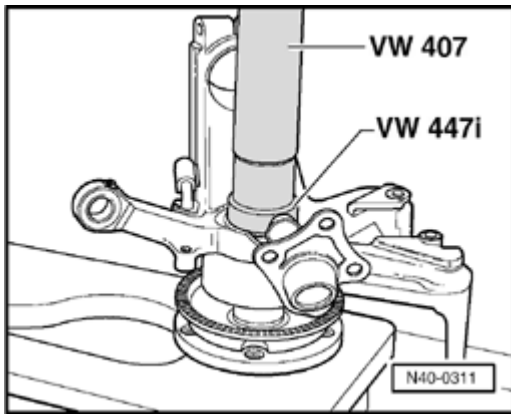


Pressing wheel bearing into wheel bearing housing

- Install circlip.

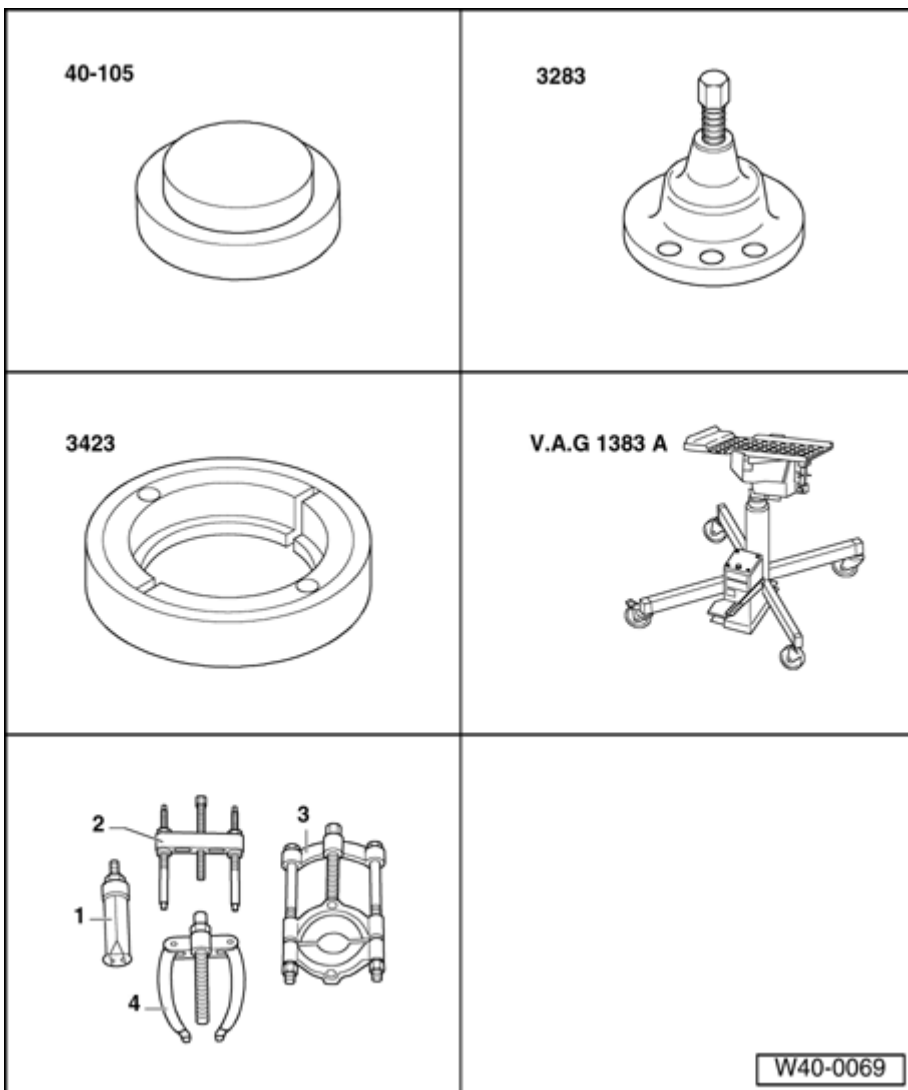
Note:

- n Make sure the circlip is seated correctly. The opening of the circlip must point downward.*



Pressing wheel hub into wheel bearing

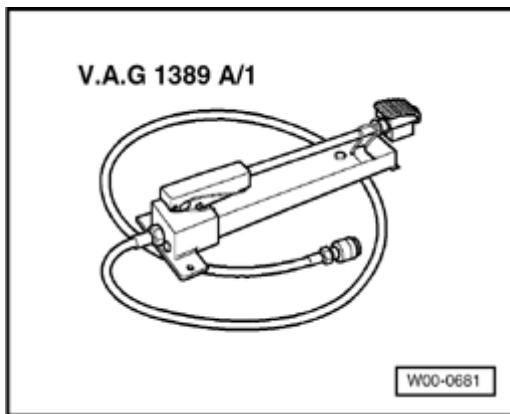
Front wheel bearing, pressing out and in with wheel bearing housing installed



Special tools, testers and auxiliary items required

- n Thrust pad 40 - 105
- n Hub puller 3283
- n Collar for wheel bearing inner race 3423
- n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2
- n - 2 - Puller Kukko 18/0

Special tools, testers and auxiliary items required



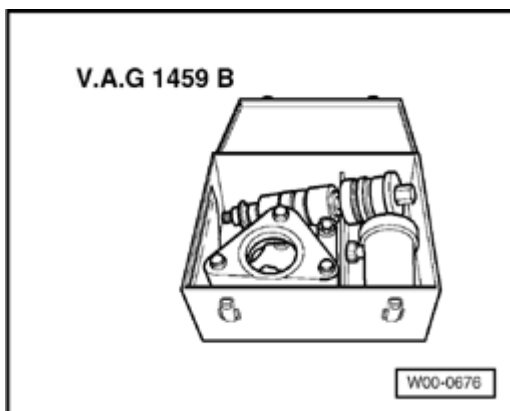
- n Foot pump with high pressure hose V.A.G1389A/1

If there is a hand pump V.A.G 1389/1 available in the dealership it can be converted to a foot pump.

To do this use the conversion set V.A.G 1389/4 .

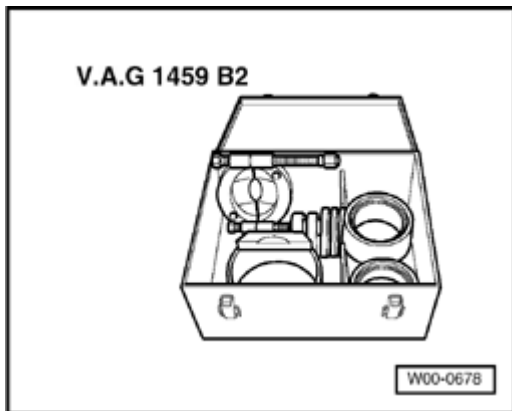
Special tools, testers and auxiliary items required

Special tools, testers and auxiliary items required



- n Hydraulic removal and installing tool for wheel bearing V.A.G 1459 B

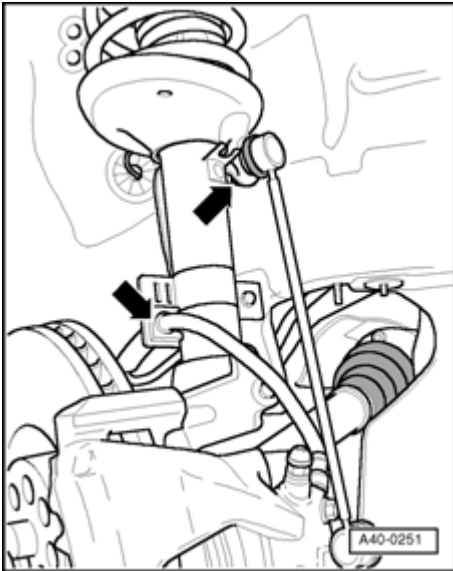
- n Piston cylinder HKZ-15 with hydraulic press piece E-0-204-T
- n Removal rods E-0-217+218
- n Special nut E-8-214
- n Press piece E-5
- n Press piece E-10
- n Press sleeve E-13-1
- n Thrust bolt E-15



- n Supplementary set V.A.G 1459 B/2
- n Bell E-40

- Lift vehicle until the load on front axle is relieved.
- Loosen 12-point nut.
- Lift vehicle to installing height.
- Remove wheel.

The following three steps are necessary only for vehicles with modified stabilizer bar mounting.

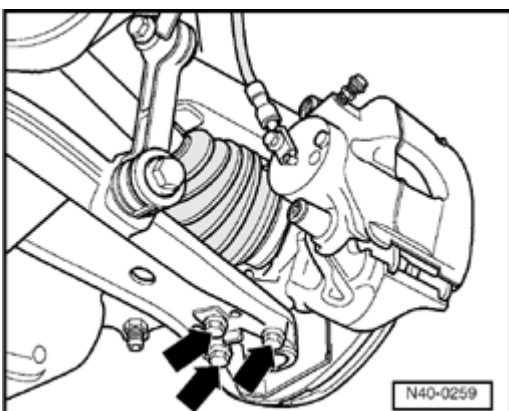


- Loosen upper hex nuts of connecting links from left and right suspension strut.
- Pull out clamp on brake hose bracket and release brake hose.
- Release speed sensor wiring from front suspension strut.
- Remove brake carrier with brake caliper. To do this remove brake caliper and hang from body with wire.

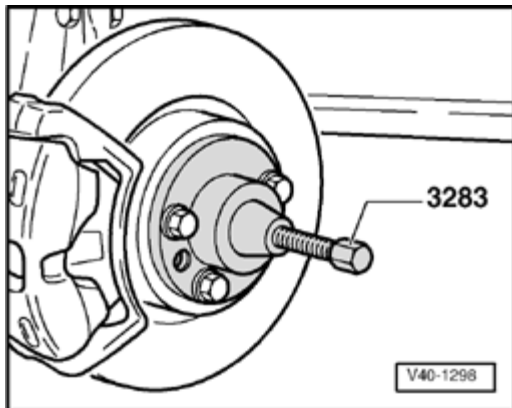
⇒ *Repair Manual, Brake Systems, Repair Group 46, Servicing front brakes*

.

- Mark installation position of bolts from ball joint to control arm.



- Remove bolts - **Arrows** - .



- Press out drive axle.

Note:

- n *When pressing drive axle out ensure sufficient clearance is available.*

- Pull wheel bearing housing with ball joint out from control arm.
- Remove drive axle from wheel bearing housing and tie up.

The axle shaft must not hang down!

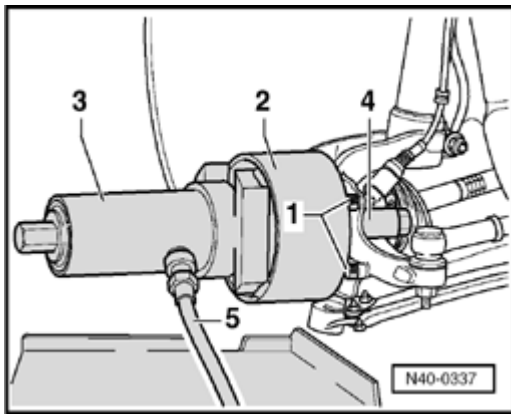
The inner joint will be damaged through overflexing.

- Remove phillips-head screw for brake disc and take out brake disc.
- Remove cover plate.
- Remove connecting link from control arm.
- Release speed sensor wiring from suspension strut.

Note:

- n *Place engine/transmission jack V.A.G1383/A underneath (danger of accident from falling parts when removing the wheel hub and wheel bearing).*

Pulling out wheel hub



- Insert thrust bolts - **1** - in wheel bearing housing.
- Install support - **2** - , piston cylinder - **3** - with pull rod and special nut - **4** - .
- Hold tool securely and pull out wheel hub.

1 - Thrust bolt E-15

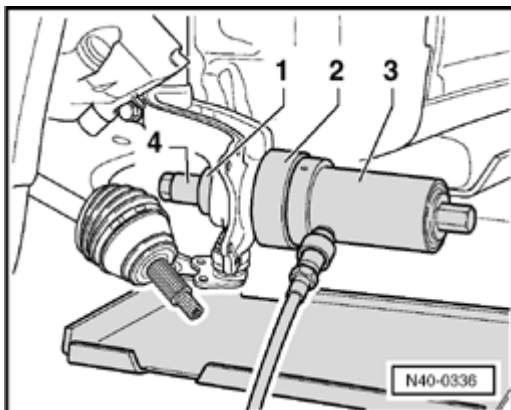
2 - Bell E-40

3 - Piston cylinder HKZ-15

4 - Special nut E-8-214 and pull rod

Pulling out wheel bearing

- Remove circlip.



- Install press piece - **1** - with shoulder to bearing, press sleeve - **2** - with four stepped internal diameters to wheel bearing housing, piston cylinder - **3** - with pull rod and special nut - **4** - .

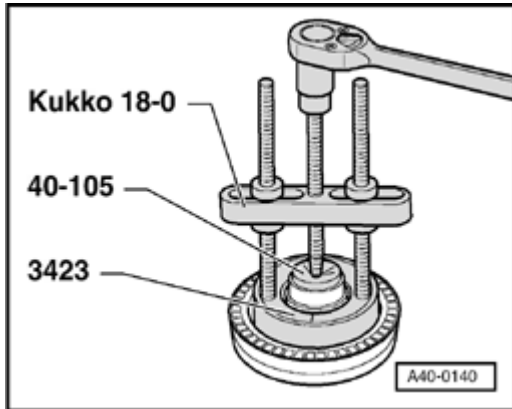
- Operate pump and remove wheel bearing.

1 - Thrust tube E-5

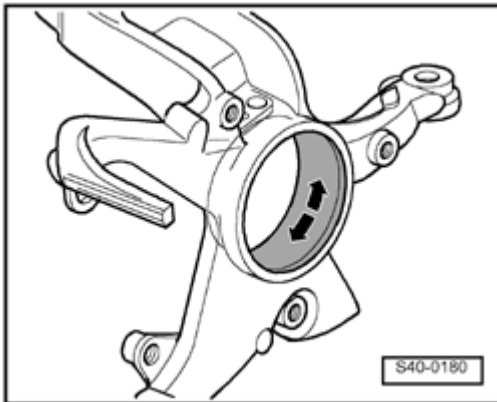
2 - Press sleeve E-65-1

3 - Piston cylinder HKZ-15

4 - Special nut E-8-214 and pull rod

**Pulling off bearing inner race from hub****Pressing in wheel bearing**

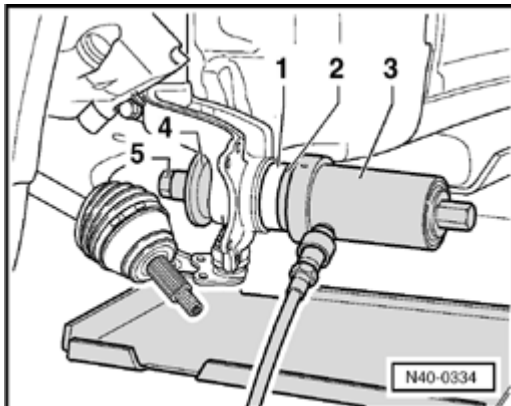
- Clean hole from wheel bearing housing



- Grease hole completely with Molykote grease.

Molykote grease, G 052 723 A2

Use grease packet from repair kit



- Install wheel bearing - **1** - , press piece - **2** - install with collar in bearing) and piston cylinder - **3** - with pull rod on wheel bearing housing.

- Install thrust piece - **4** - with wide collar toward wheel bearing housing and special nut - **5** - on inside.

- Press wheel bearing in by operating pump.

- Insert circlip with needle nose pliers.

1 - Wheel bearing

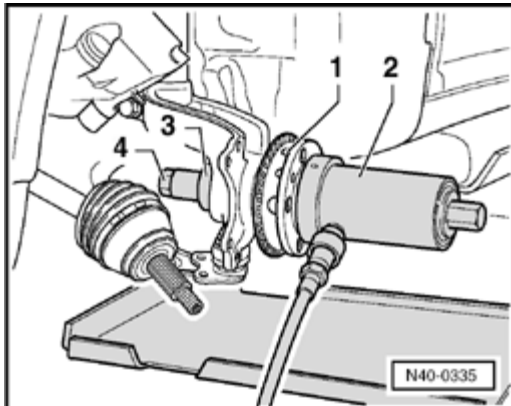
2 - Thrust tube E-13-1

3 - Piston cylinder HKZ-15

4 - Thrust tube E-10

5 - Special nut E-8-214 and pull rod

Pressing in wheel hub



- Install hub - **1** - and piston cylinder - **2** - with pull rod on wheel bearing.

- Install thrust piece - **3** - with collar toward special nut - **4** - on inside.

- Press in hub by operating pump.

1 - Wheel hub

2 - Piston cylinder HKZ-15

3 - Thrust tube E-5

4 - Special nut E-8-214 and pull rod

Further installation is in reverse sequence to removal.

III - Front suspension strut, assembly overview

compartment or service booklet**8. Spring plate****9. Coil spring**

- i Observe color coding
- i Surface of winding must not be damaged
- i Application to vehicle see Vehicle data plate, ⇒ [40-3, Vehicle data sticker](#)

10. Self-locking nut

- i 50 Nm plus an additional $\frac{1}{4}$ turn 90°
- i Always replace

11. Hex bolt, 10 Nm**12. Bracket****13. Heat shield****14. Hex bolt**

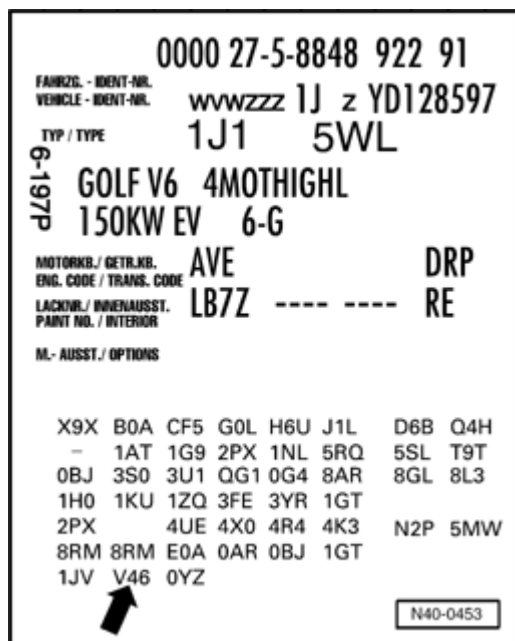
- i Always replace
- i The point on hex bolt must point in normal direction of travel

15. Clip**16. Wheel bearing housing****17. Self-locking nut**

- i 60 Nm plus an additional $\frac{1}{4}$ turn 90°
- i Never less than 90° !
- i Turning angle tolerance 90° to 120°
- i Always replace

18. Clamp**19. Connecting Link****20. Damper**

- i Can be replaced individually
- i Application ⇒ *See Parts Catalog*

21. Bump stop**22. Protective sleeve****Vehicle data sticker****Example of a vehicle data sticker**

Various springs are installed depending on engine and equipment level. Each spring is allocated to a certain weight class.

For example

Weight class V46 - **arrow** - corresponds to coil spring 1J0 411 105 CD

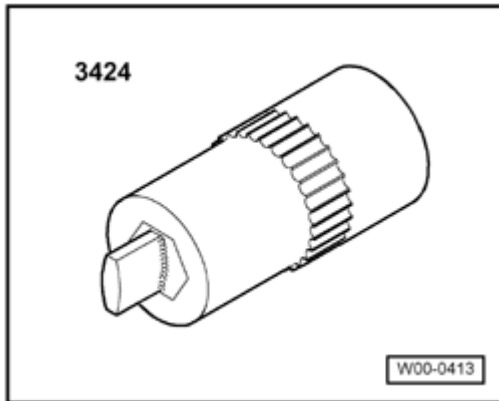
Which springs are installed in the vehicle is documented on the vehicle data label with relevant PR. number of weight class.

With the help of this PR number you can find the appropriate spring for the vehicle in the parts catalog.

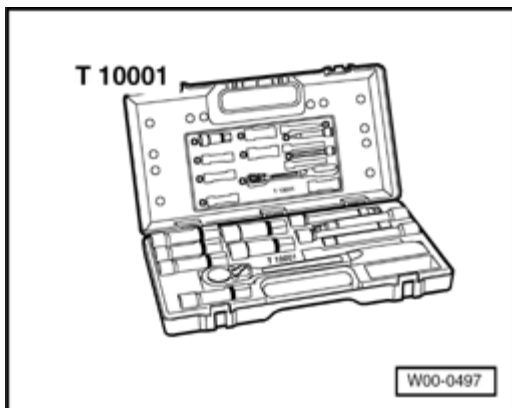
The vehicle data sticker is located in spare wheel well and in Maintenance booklet.

Suspension strut, removing and installing

Special tools, testers and auxiliary items required



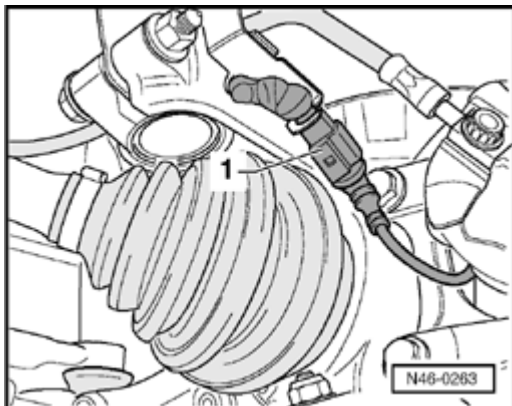
n Spreader 3424



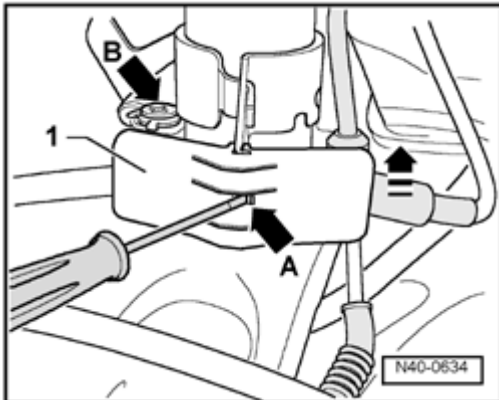
n Shock absorber set T10001

Removing

- Remove wheel.



- For vehicles with brake wear pad indicator, disconnect connector - **1** - .

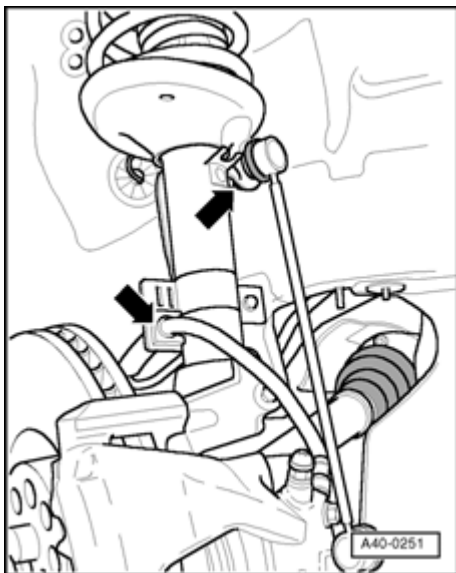


- Remove heat shield - **1** - .

- To do this push lip - **arrow A** - with a screwdriver in and push at the same time the heat shield - **1** - upward in direction of arrow.

- For vehicles with brake wear pad indicator remove bolt - **arrow B** - to remove support for brake wear pad indicator.

The following three steps are necessary only for vehicles with modified stabilizer bar mounting.

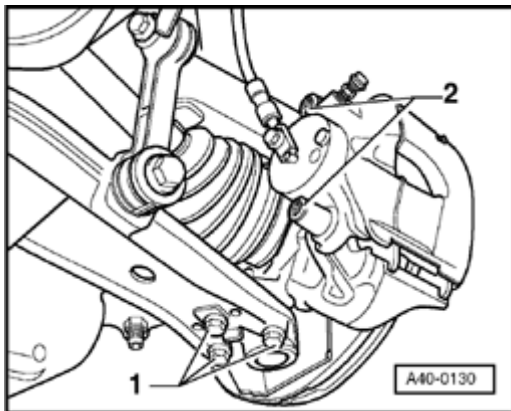


- Remove upper hex nuts of connecting links from left and right suspension strut.

- Pull out clamp on brake hose bracket and release brake hose.

- Release speed sensor wiring from front suspension strut.

Continued for all vehicles



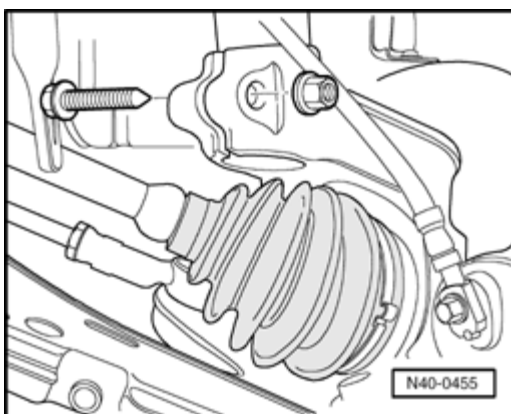
- Remove securing bolts - **2** - from brake caliper.
- Remove brake caliper and hang up on structure.
- Remove connecting link from control arm.
- Release speed sensor wiring from suspension strut.

Right suspension strut

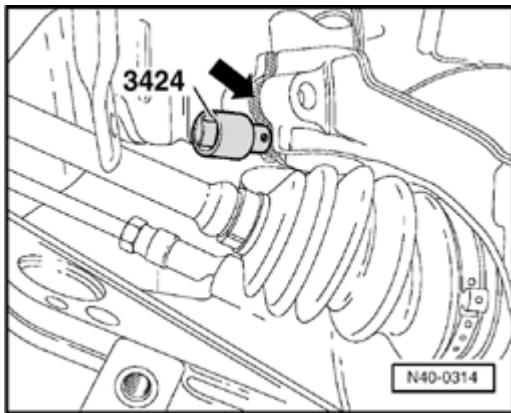
Additional work is required if right suspension strut is to be removed

- Remove noise insulation.
- Disconnect drive axle from transmission axle flange.

The following work sequence is valid for both sides



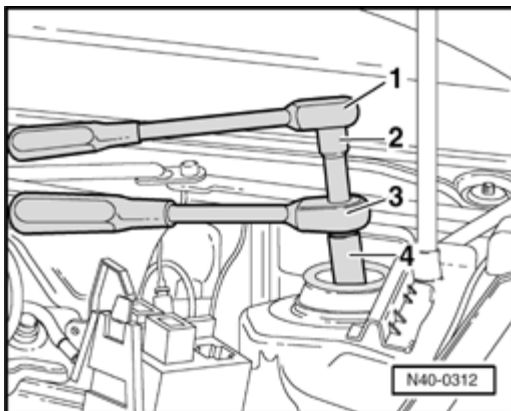
- Separate wheel bearing housing/suspension strut bolted connection.



- Insert Spreader 3424 into slot - **arrow** - .
- Turn ratchet handle through 90 ° and pull off 3424 .
- Press brake disc in direction of suspension strut by hand.

Otherwise the shock absorber tube could catch in wheel bearing housing hole.

- Pull wheel bearing housing off shock absorber downward.



Remove hex nut from upper shock absorber mount

- 1 - Ratchet (commercially available)
- 2 - T10001/8
- 3 - T10001/11
- 4 - T10001/5

- Remove strut.

Installing

- Install suspension strut.
- Remove spreader 3424 .
- Tighten bolted union wheel bearing housing/suspension strut.

Further installation of suspension strut is performed in reverse order

Tightening torques:

12-point nut for upper spring plate

60 Nm

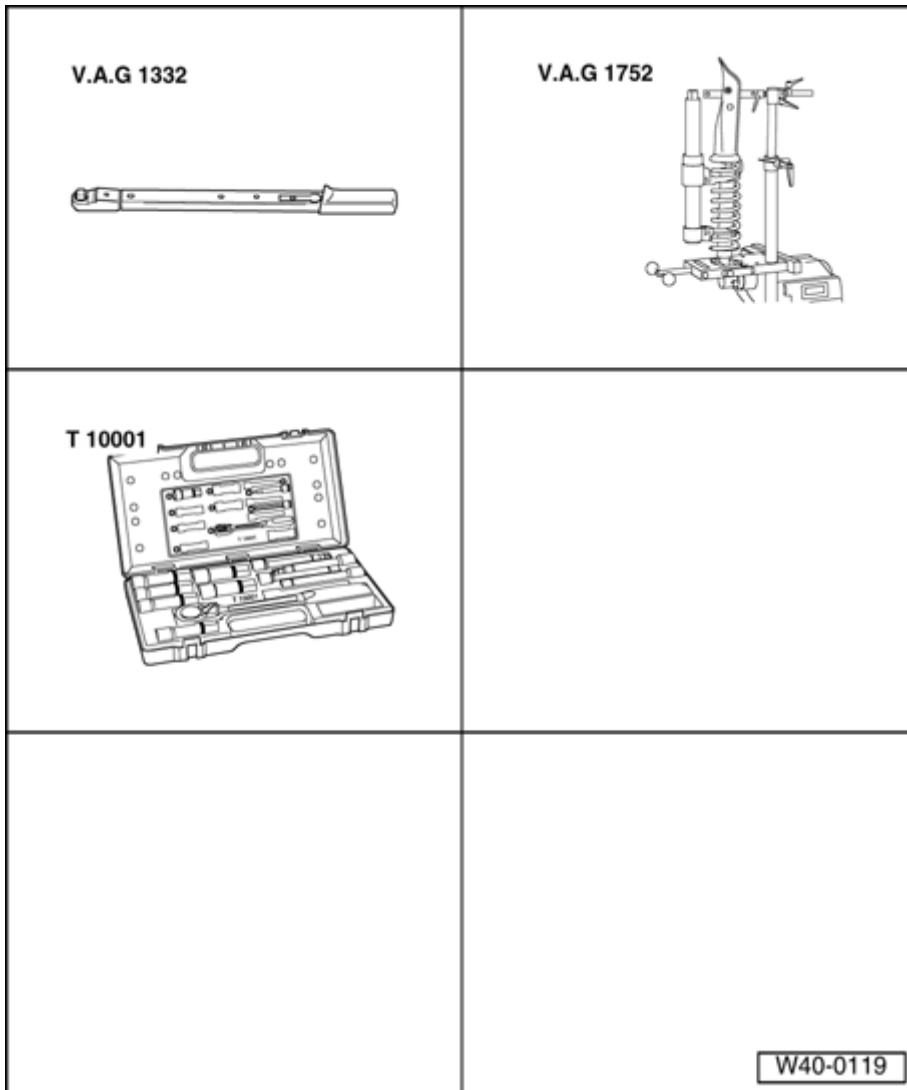
Hex. nut for wheel bearing housing

60 Nm plus an additional $\frac{1}{4}$ turn (90°)

Coupling rod to suspension strut

50 Nm plus an additional $\frac{1}{4}$ turn (90°)

Front suspension strut, servicing

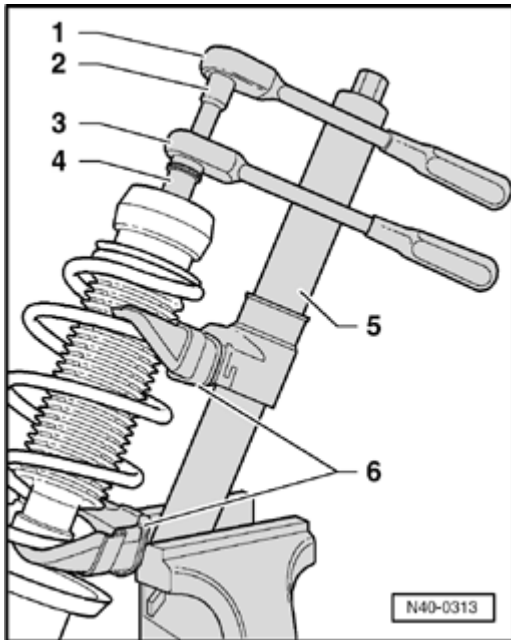


Special tools, testers and auxiliary items required

- n Torque wrench V.A.G1332
- n Spring compressor V.A.G1752/1
- n Spring holder V.A.G1752/4
- n Shock absorber set T10001

- Removing suspension strut ⇒ [40-3, Suspension strut, removing and installing](#) .

Removing coil spring



- Compress coil spring with spring compressor V.A.G1752/1 until upper spring plate is free.
- Remove hex nut from piston rod.
- Remove individual components of the suspension strut and coil spring using spring compressor V.A.G1752/1 .

1 - Ratchet (commercially available)

2 - T10001/8

3 - T10001/11

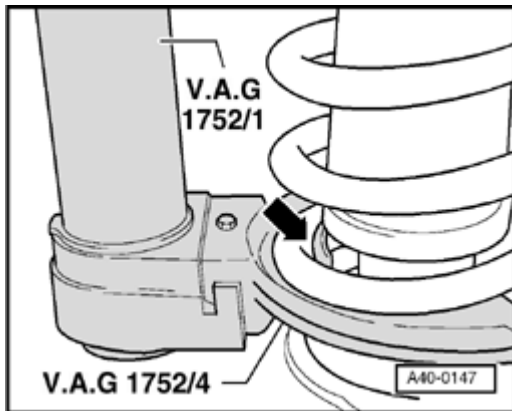
4 - T10001/5

5 - Spring tensioner V.A.G1752/1

6 - Bracket V.A.G1752/4

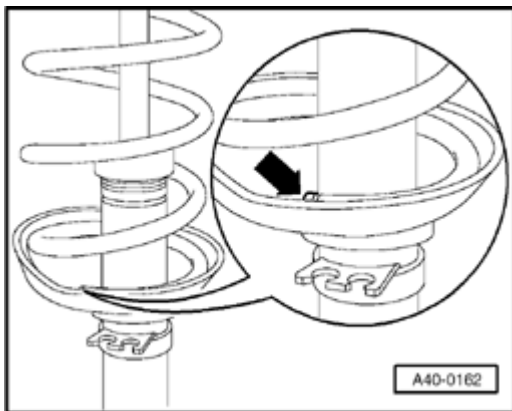
Caution!

First pre-load the spring until the upper spring plate is no longer under load.



- Make sure the coil spring is properly seated in the spring holder V.A.G1752/4 - **arrow** - .

Installing coil spring



- Install coil spring using spring compressor V.A.G1752/1 onto lower spring support.

The end of the coil spring must lie against stop - **arrow** - .

- Tighten new hex nut on the piston rod.

- Release spring compressor V.A.G1752/1 and remove from coil spring.

- Installing suspension strut ⇒ [40-3, Installing](#) .

Tightening torques:

Hex nut for upper shock absorber mounting
Use new nut!

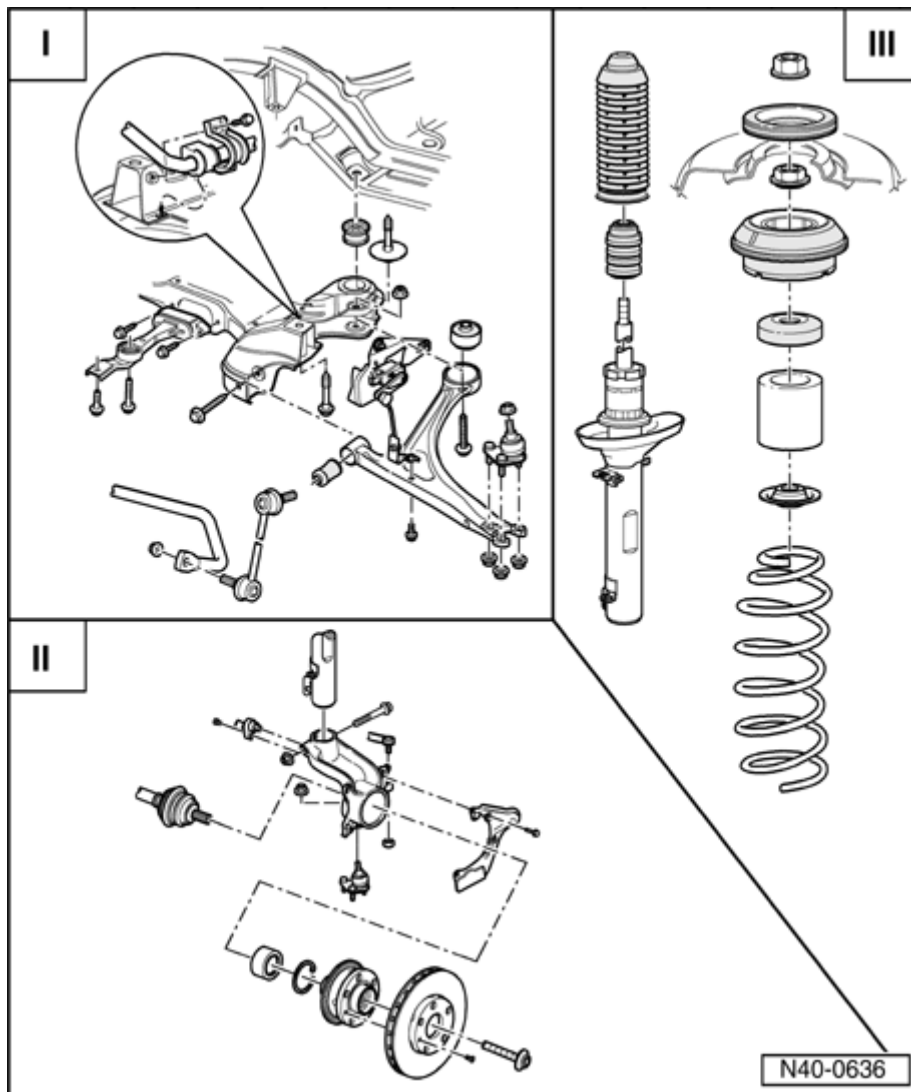
60 Nm

Front suspension R32, servicing

Front axle overview

Note:

- n The chapter "Servicing drive axle " can be found on ⇒ [40-5, Front drive axle, servicing](#) .



I - Assembly overview of subframe, stabilizer bar, control arm ⇒ [40-4, I - Subframe, stabilizer bar, control arm, assembly overview](#)

II - Assembly overview of wheel bearing ⇒ [40-4, II - Wheel bearing, assembly overview](#)

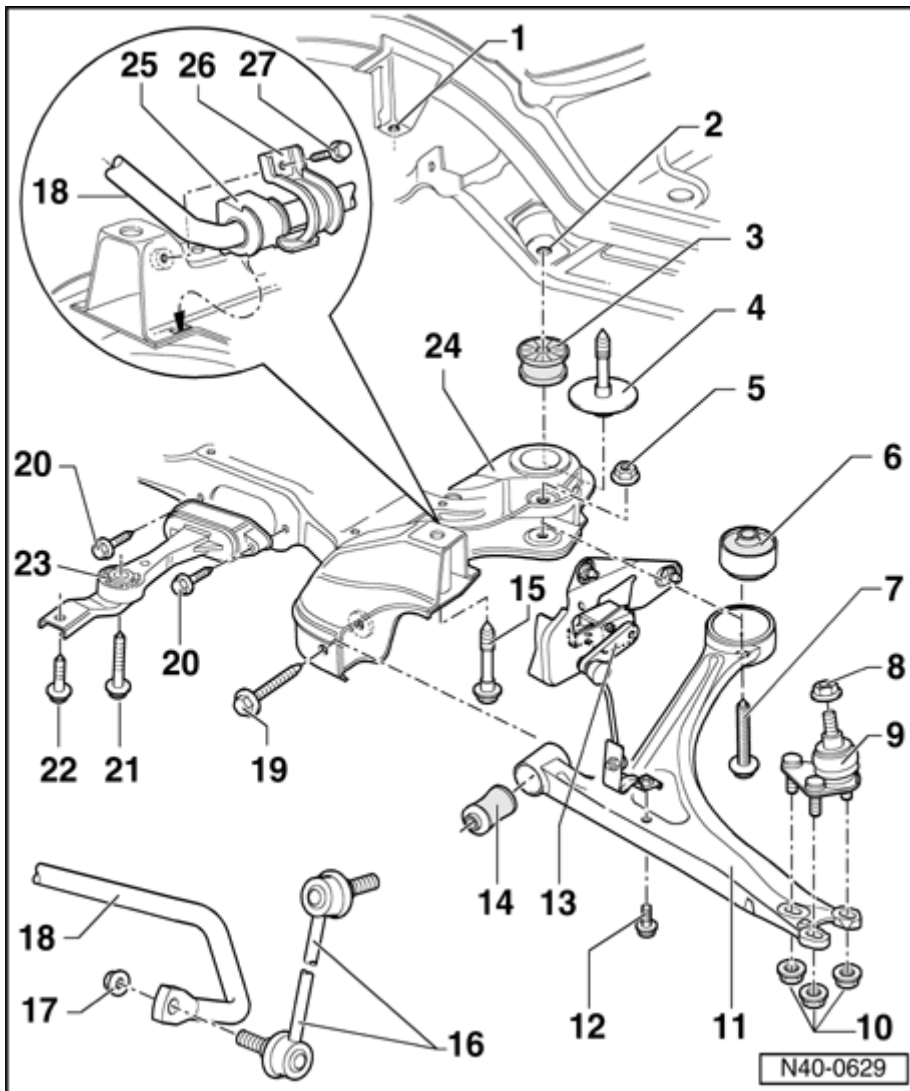
III - Assembly overview of suspension strut ⇒ [40-4, III - Front suspension strut,](#)

[assembly overview](#)

I - Subframe, stabilizer bar, control arm, assembly overview

Note:

- n *If a vehicle that has a drive axle removed and is to be moved, an outer CV joint must be installed in place of the drive axle and be tightened to 50 Nm. Otherwise, the wheel bearing will be damaged.*
- n *Welding and straightening operations are not permitted on load-bearing or wheel-controlling components.*
- n *Always replace self-locking nuts.*
- n *Always replaced corroded nuts/bolts.*



1. Subframe retaining bracket

The captive nut cannot be reworked. If the nut is damaged, replace complete mounting bracket.

2. Weld nut in body

If weld nut threads are damaged, threads can be repaired using Heli-Coil thread inserts.

Servicing thread in side rail ⇒ [40-4, Threads in longitudinal member, servicing](#)

3. Bonded rubber bushing

- i Removing and installing ⇒ [40-4, Bonded rubber bushings for](#)

[subframe, replacing](#)**4. Hex bolt M 14 x 1.5 x 63**

- ı 100 Nm plus an additional $1/4$ turn 90°
- ı Always replace

5. Self-locking nut

- ı Always replace

6. Rear control arm bushing

- ı Pressing out and in \Rightarrow [40-4, Pressing out/in control arm rear bushing](#)

7. Hex bolt M 12 x 1.5 x 70

- ı 70 Nm plus an additional $1/4$ turn 90°
- ı Always replace

8. Self-locking hex nut, 45 Nm

- ı Always replace

9. Ball joint

- ı Checking \Rightarrow [40-4, Ball joint, checking](#)
- ı Removing and installing \Rightarrow [40-4, Ball joint, removing and installing](#)

10. Hex nut, 75 Nm

- ı Always replace

11. Control arm**12. Hex bolt, 25 Nm****13. Left Front Level Control System**

Sensor G78**14. Front control arm bushing**

- i Pressing out ⇒ [40-4, Pressing out front control arm bushing](#)
- i Installation location ⇒ [40-4, Installation position for control arm front bushing](#)
- i Pressing in ⇒ [40-4, Pressing in front control arm bushing](#)

15. Hex bolt M 14 x 1.5 x 95

- i 100 Nm plus an additional $\frac{1}{4}$ turn 90 °
- i Always replace

16. Connecting Link**17. Hex nut, 90 Nm**

- i Always replace

18. Stabilizer bar

The subframe must be lowered to remove and install.

19. Hex bolt M 12 x 1.5 x 78

- i 70 Nm plus an additional $\frac{1}{4}$ turn 90 °
- i Always replace

20. Hex bolt, 25 Nm

- i M8 x 45

21. Hex bolt, 50 Nm

- i M10 x 70

22. Hex bolt, 50 Nm

; M10 × 30

23. Pendulum support

24. Subframe

; If damaged, do not repair threads in subframe for front control arm bolt!

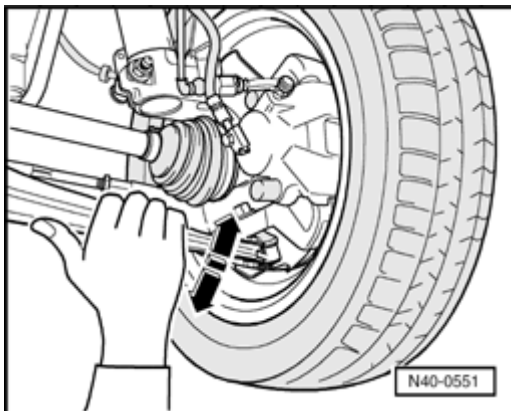
25. Rubber bushing

26. Clamp

27. Hex bolt, 25 Nm

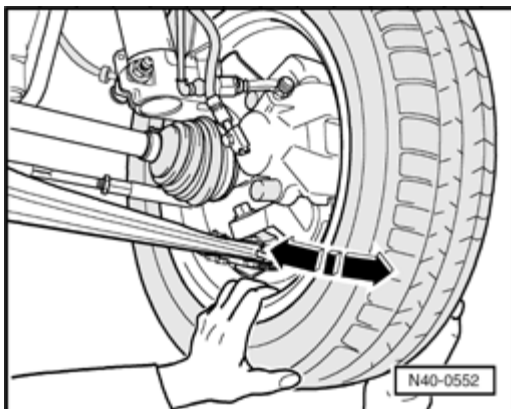
Ball joint, checking

Checking axial play



- Pull control arm down and press up again.

Check radial play



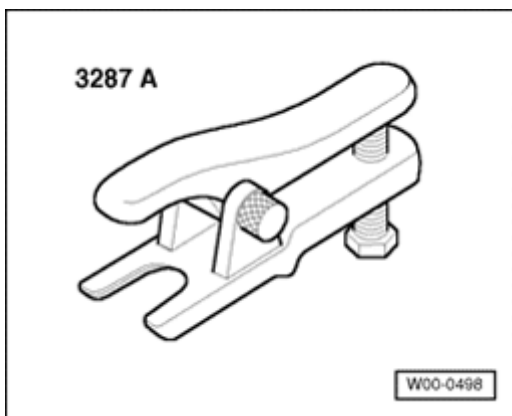
- Press lower part of wheel inward and outward.

Note:

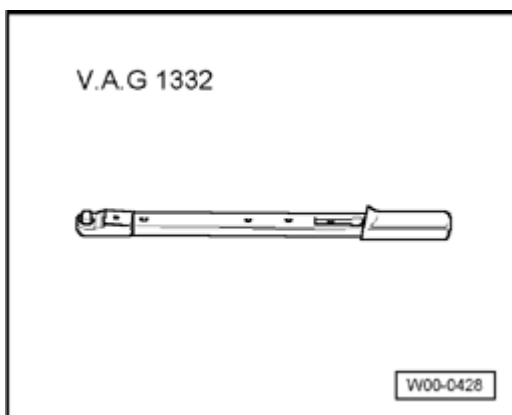
- n *There must be no perceptible or visual "play" when carrying out both tests.*
- n *Observe ball joint during checks.*
- n *Take into account possible existing wheel bearing play or "play" in upper suspension strut mounting.*
- n *Check rubber boot for damage, replace ball joint if necessary*

Ball joint, removing and installing

Special tools, testers and auxiliary items required



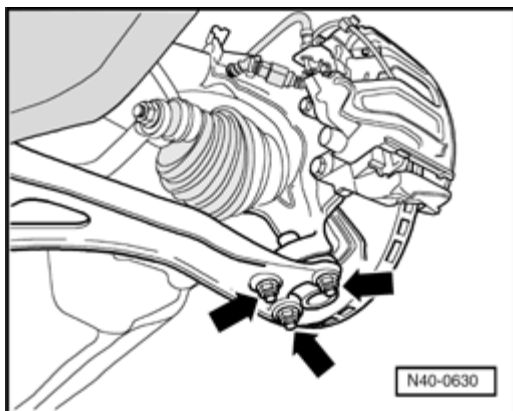
- n Ball joint puller 3287 A



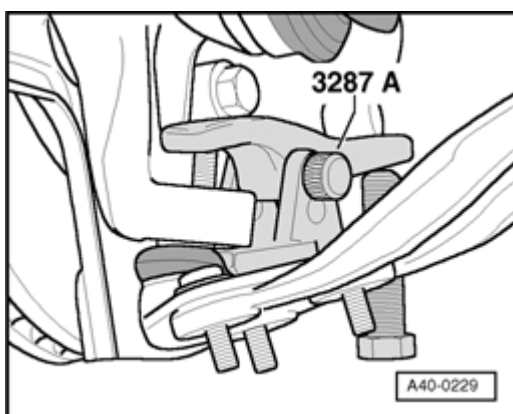
- n Torque wrench V.A.G1332

Removing

- Remove wheel.
- Remove noise insulation.
- Mark installation position of nuts from ball joint to control arm.



- Remove nuts - **Arrow** - .
- Loosen nut from ball joint.

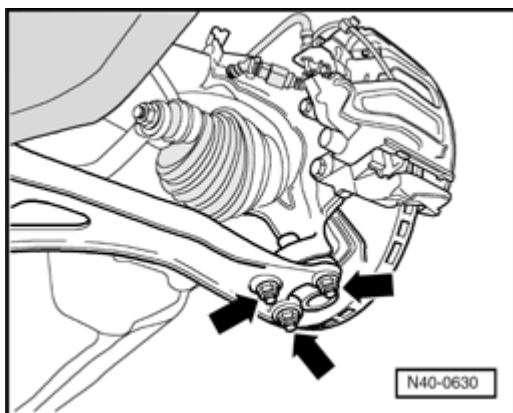


- Install ball joint puller as shown in illustration and press out ball joint.

Note:

- n *To protect ball joint threads and for safety reasons leave nut on a few turns.*

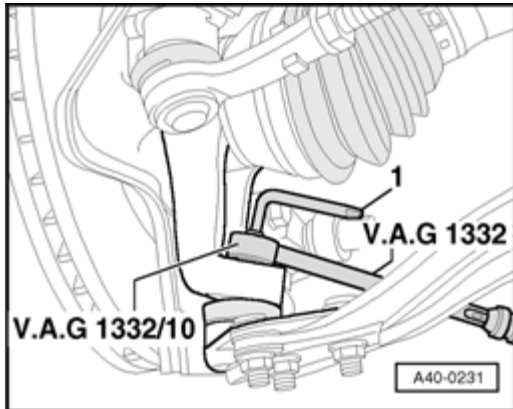
Installing



- Tighten ball joint to control arm - **arrows** - (nuts on

previous marks)

- Install ball joint in wheel bearing housing.



- Install new self-locking nut, and counter-hold with T40 Torx bit.

1 - Torx bit T40

Note:

n Check boot for damage or twisting.

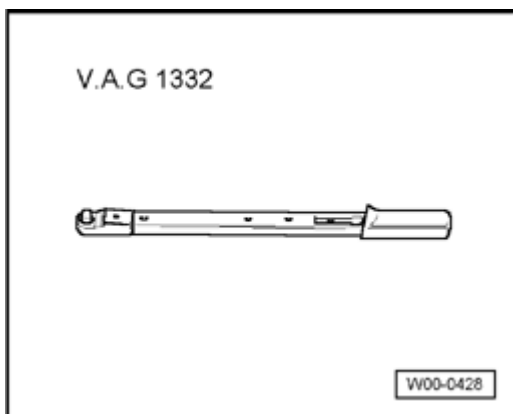
- Install and fasten wheel ⇒ [44-2, Tightening torques for wheel bolts](#) .

Tightening torques:

Ball joint to control arm	75 Nm
Use new nuts!	
Ball joint to wheel bearing housing	45 Nm
Use new nuts!	

Control arm, removing and installing

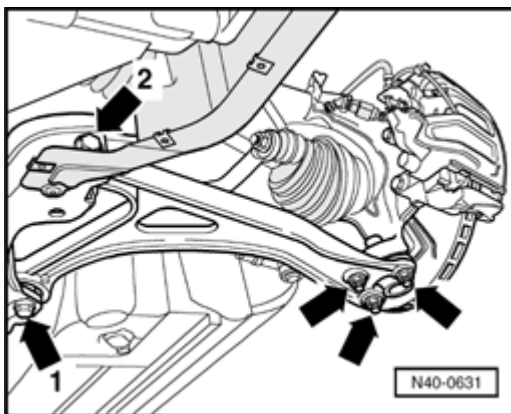
Special tools, testers and auxiliary items required



n Torque wrench V.A.G1332

Removing

- Remove wheel.
- Remove noise insulation.
- For all wheel drive vehicles, the coupling link for vehicle Left front level control system sensor G78 on front axle must be disconnected from control arm bracket before removing left control arm ⇒ [40-2, Left front level control system sensor G78 on front axle R32](#) .
- Mark installation position of nuts from ball joint to control arm.



- Remove nuts - **Arrow** - .
- Remove hex bolts - **1** - and - **2** - and take out control arm.

Installing

Installation is carried out in reverse sequence.

- Install and fasten wheel ⇒ [44-2, Tightening torques for wheel bolts](#) .

Tightening torques:

Ball joint to control arm

75 Nm

Use new nuts!

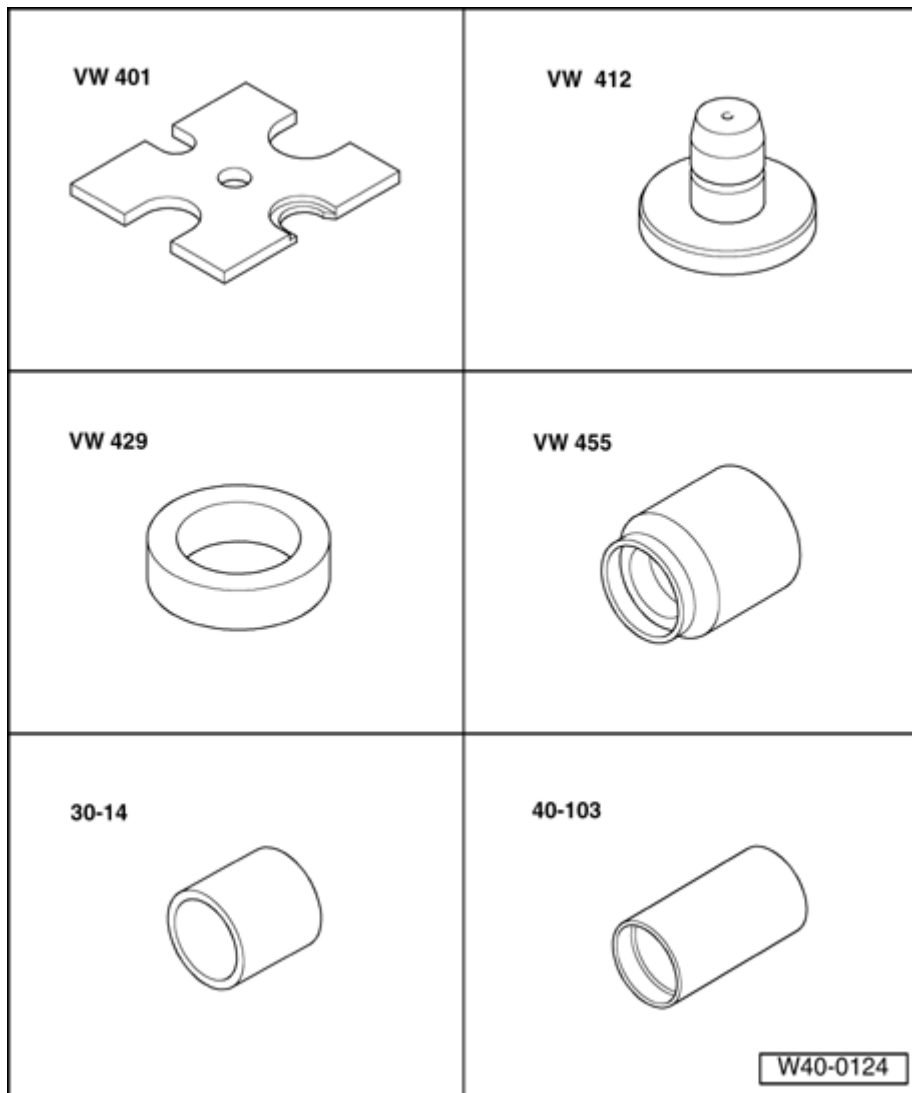
Forward bolt for control arm

70 Nm plus an additional $\frac{1}{4}$ turn 90°

Rearward bolt for control arm

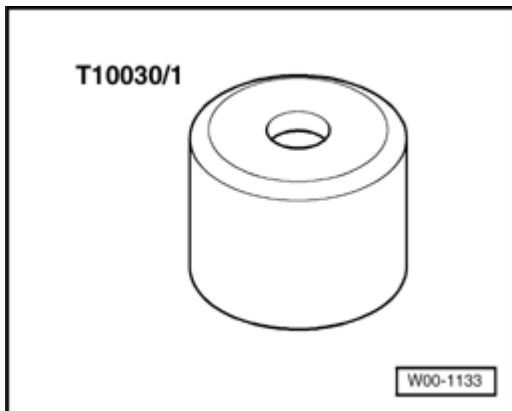
Use new bolts!

Control arm bonded rubber bushing, replacing

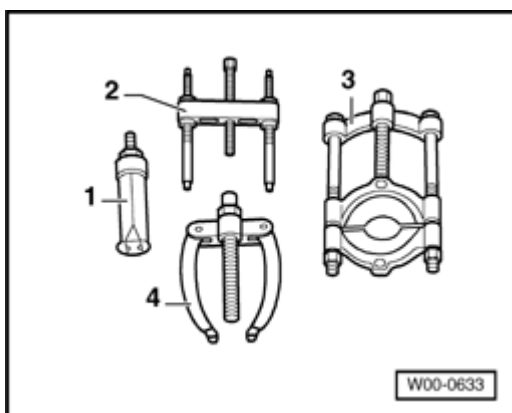
**Special tools, testers and auxiliary items required**

- n Thrust plate VW401
- n Punch VW412
- n Thrust ring VW429
- n Press sleeve VW455
- n Tube 30 - 14
- n Support 40 - 103

Special tools, testers and auxiliary items required

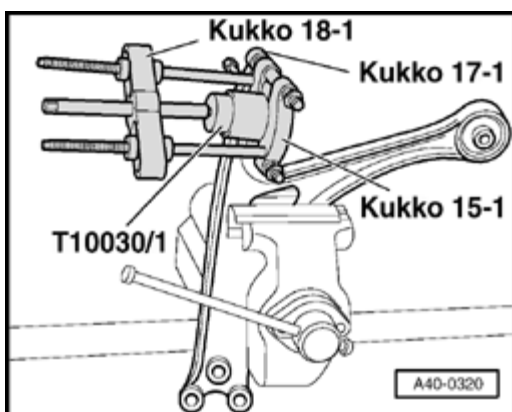


n Thrust piece T10030/1

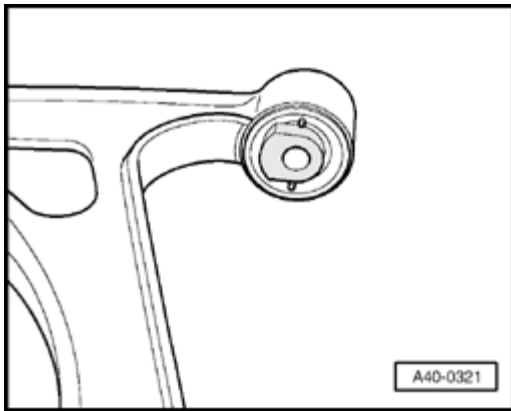


n - 2 - Puller Kukko 18/1

n - 3 - Separating device Kukko 17/1



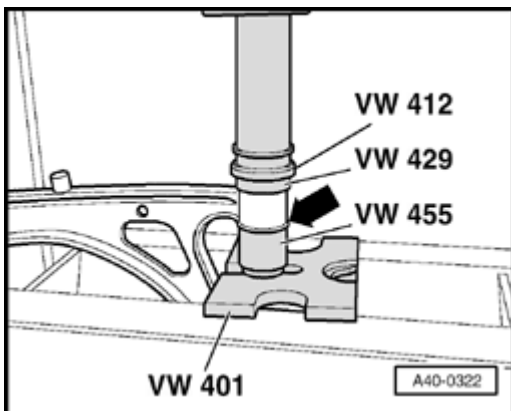
Pressing out front control arm bushing



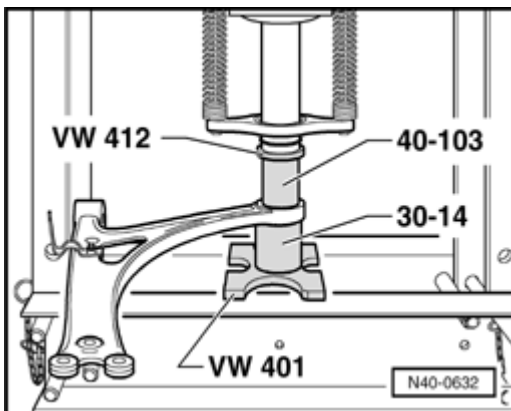
Installation position for control arm front bushing

Note:

n Use lubricant to press in bonded rubber mounting e.g. lubricant G 294 421 A1



Pressing in front control arm bushing

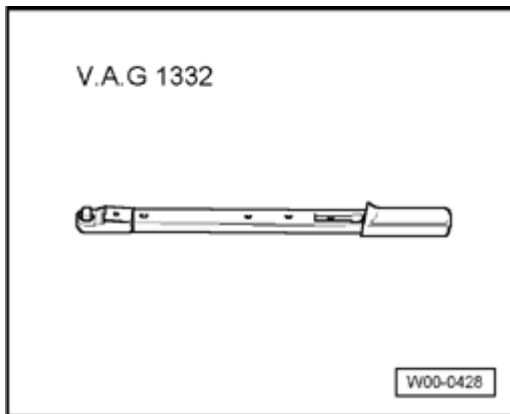


Pressing out/in control arm rear bushing

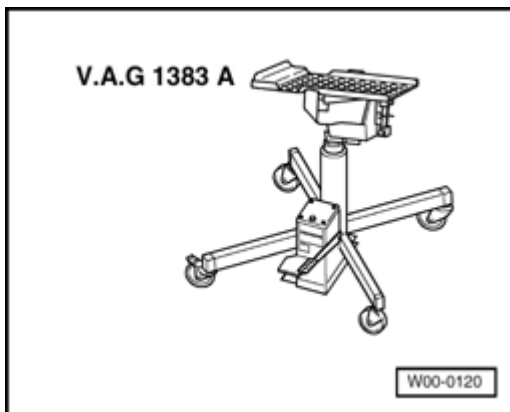
Bushing must be pressed in flush on upper side.

Subframe, removing and installing

Special tools, testers and auxiliary items required



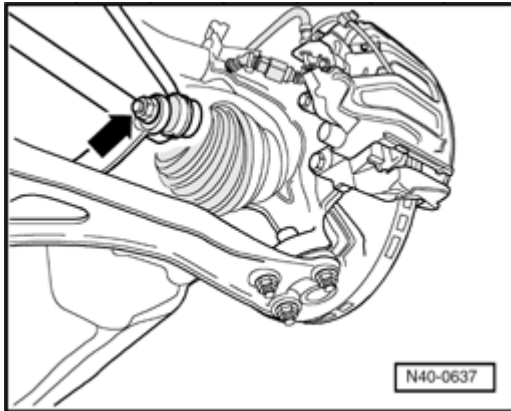
n Torque wrench V.A.G1332



n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2

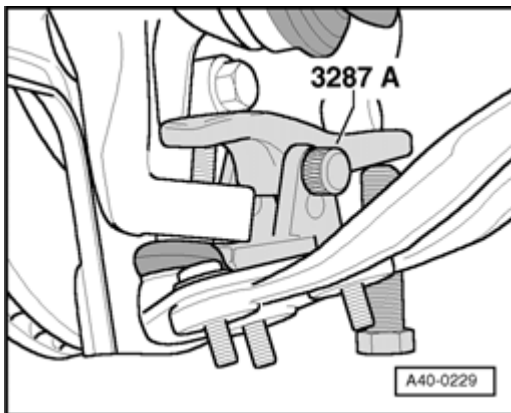
Removing

- Remove wheel.
- Remove noise insulation.



- Remove hex nuts from coupling rod - **arrow** - right and left from stabilizer bar.

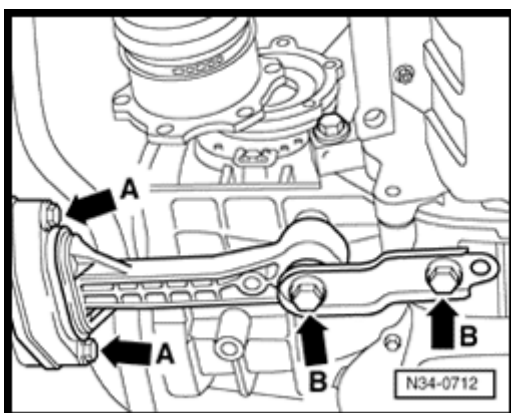
- Loosen nut from ball joint.



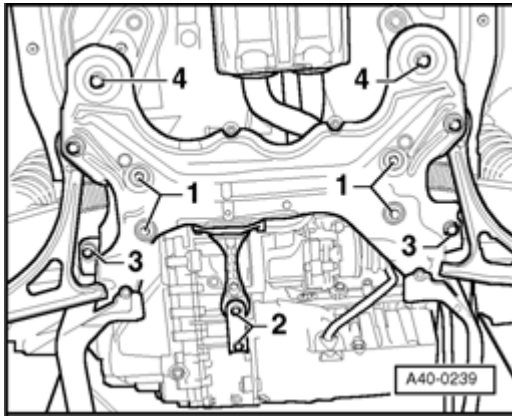
- Install ball joint puller as shown in illustration and press out ball joint.

Note:

- n To protect ball joint threads and for safety reasons leave nut on a few turns.



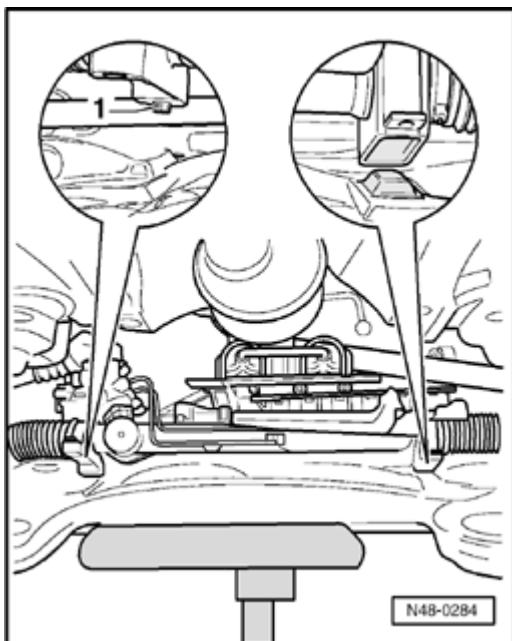
- Remove pendulum support - **arrow A** - and - **B** - .



- Remove bolt - **1** - for steering gear.
- Place engine/transmission jack V.A.G1383A with V.A.G1359/2 under subframe.
- Remove bolts - **3** - and - **4** - for subframe.
- Lower subframe using engine/transmission jack V.A.G1383A .

Installing

Before inserting bolts for subframe, position steering gear on subframe and insert bolts for steering gear



The threaded sleeve - **1** - must seat in subframe hole.

Further installation in reverse order

After installing check position of steering wheel during a test drive.

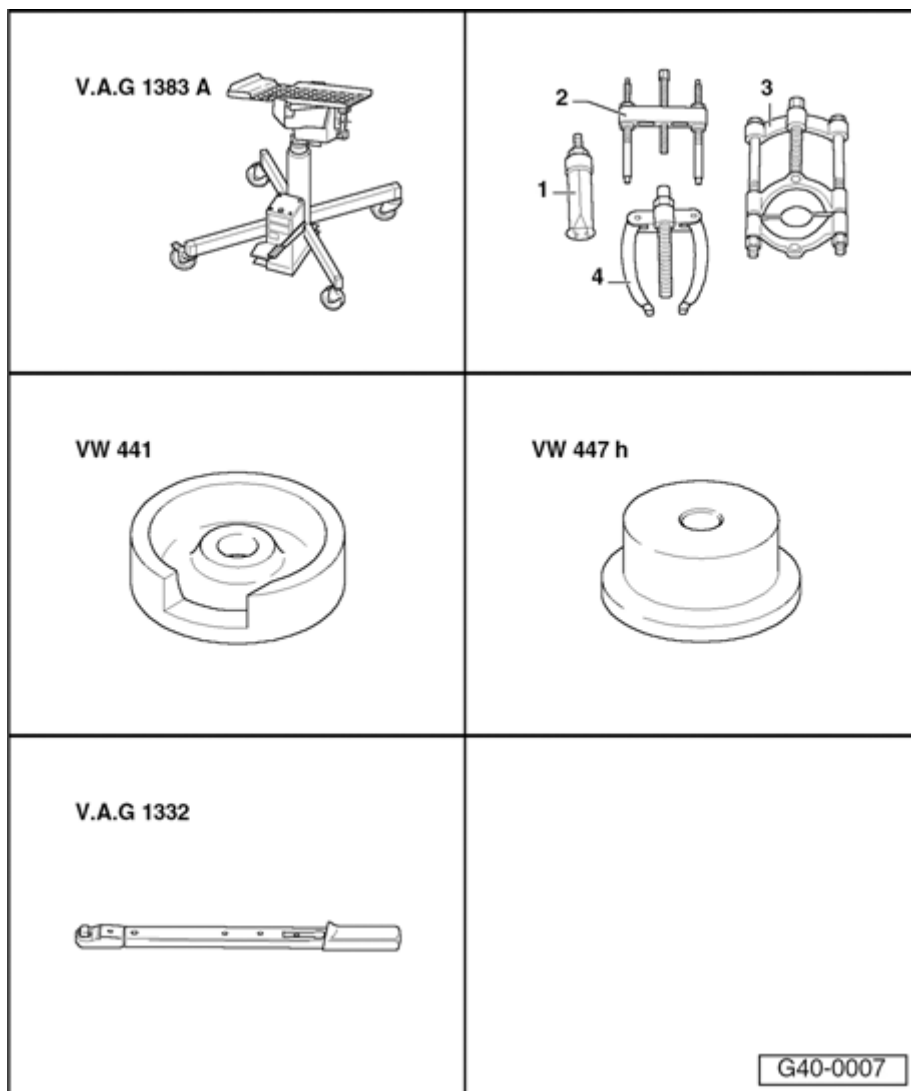
If steering wheel is not in straight ahead position the front

axle alignment must be checked!

Tightening torques:

Ball joint to wheel bearing housing Use new nuts!	45 Nm
Pendulum support to subframe	25 Nm
Pendulum support to transmission	
M 10 x 70	50 Nm
M 10 x 30	50 Nm
Steering gear to subframe Use new bolts!	20 Nm plus an additional $1/4$ turn 90°
Coupling rod to stabilizer bar Use new nuts!	90 Nm
Subframe to body Use new bolts!	100 Nm plus an additional $1/4$ turn 90°

Bonded rubber bushings for subframe, replacing



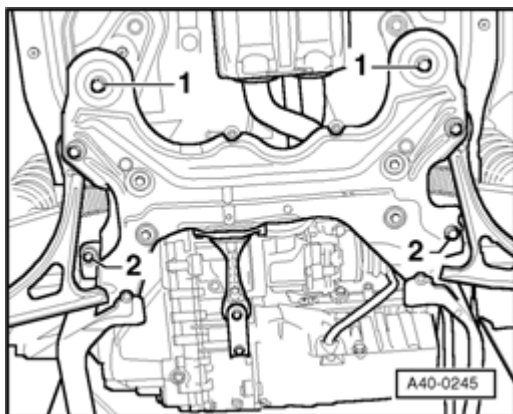
Special tools, testers and auxiliary items

required

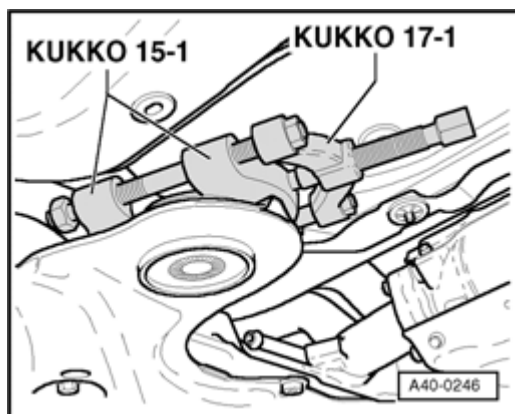
- n Engine/transmission jack V.A.G 1383 A
- n - **3** - Separating device Kukko 17/1
- n Base block VW441
- n Thrust pad VW447H
- n Torque wrench V.A.G1332

Removing

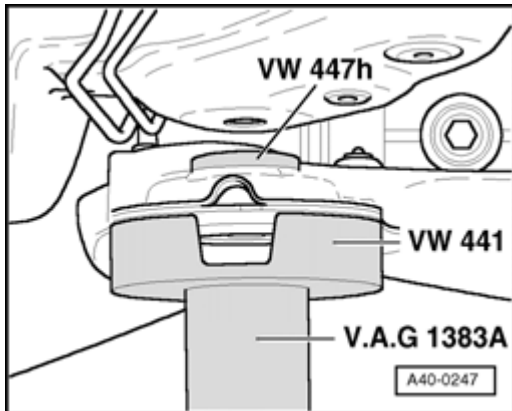
- Remove noise insulation.



- Remove bolts - **1** - for subframe.
- By loosening bolts - **2** - lower subframe as far as possible, until bonded rubber bushings are accessible.

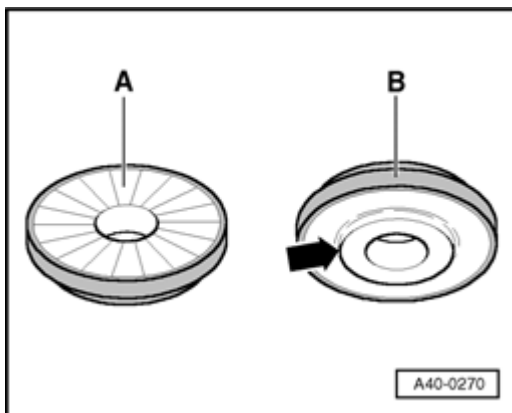


- Install separating device on upper half of bushing.
- Pull upper half out.



- Insert thrust plate VW447H from above.
- Press subframe upward using base block VW441 and engine/transmission jack V.A.G1383A until lower half of bushing falls out.

Installing



Installation position of bushing halves

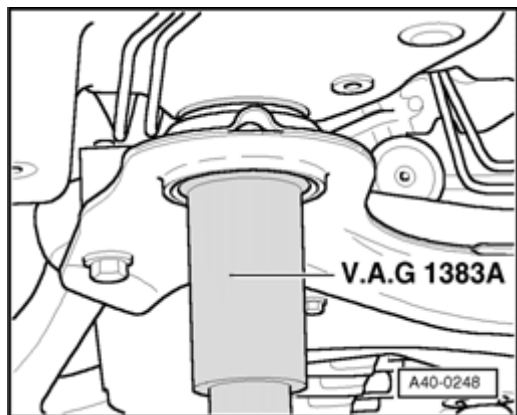
A - Upper bushing half with no shoulder, the ribs face toward body

B - Lower bushing half with a shoulder, the shoulder faces toward bolt heads

Note:

- ⁿ Use lubricant to press in the bonded rubber mounting e.g. lubricant G 294 421 A1 .

- Install mounting halves into subframe.



- Press new mountings in using engine/transmission jack V.A.G1383A .
- Reinstall subframe ⇒ [40-4, Installing](#) .

Threads in longitudinal member, servicing

It is possible to service the threads of the weld nuts in the longitudinal member depending on certain conditions.

- n Servicing work may only be carried out once per thread.
- n If servicing is necessary after this, the nuts must be replaced.
- n Observe the operating instructions of the VAS repair kit.

Caution!

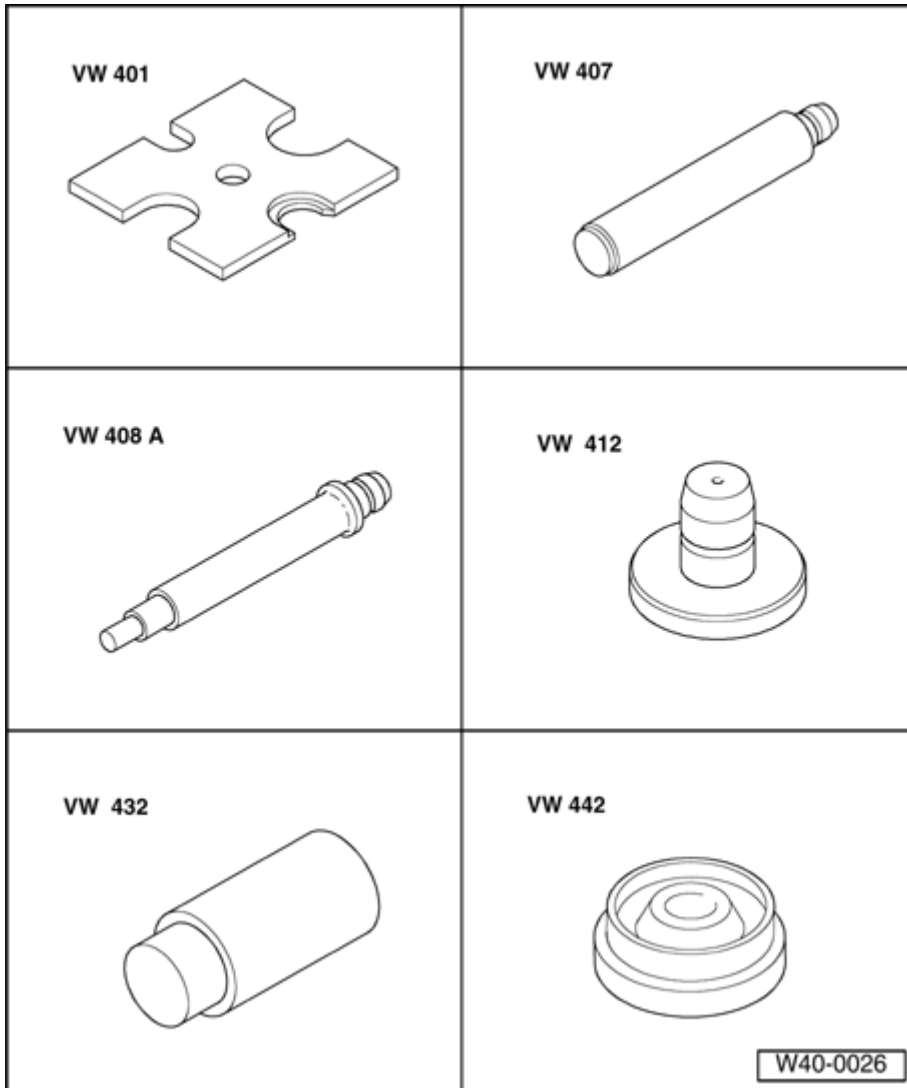
When drilling, it is essential that eye protection be worn!

- n Have the thread repair checked by the responsible foreman or next person in charge.
- n Correct any damage to the underbody sealant layer.
⇒ *General information; Body collision repair; Measures for corrosion protection*
- n Only use VAS repair kit listed in table for maintenance

VAS thread repair kit

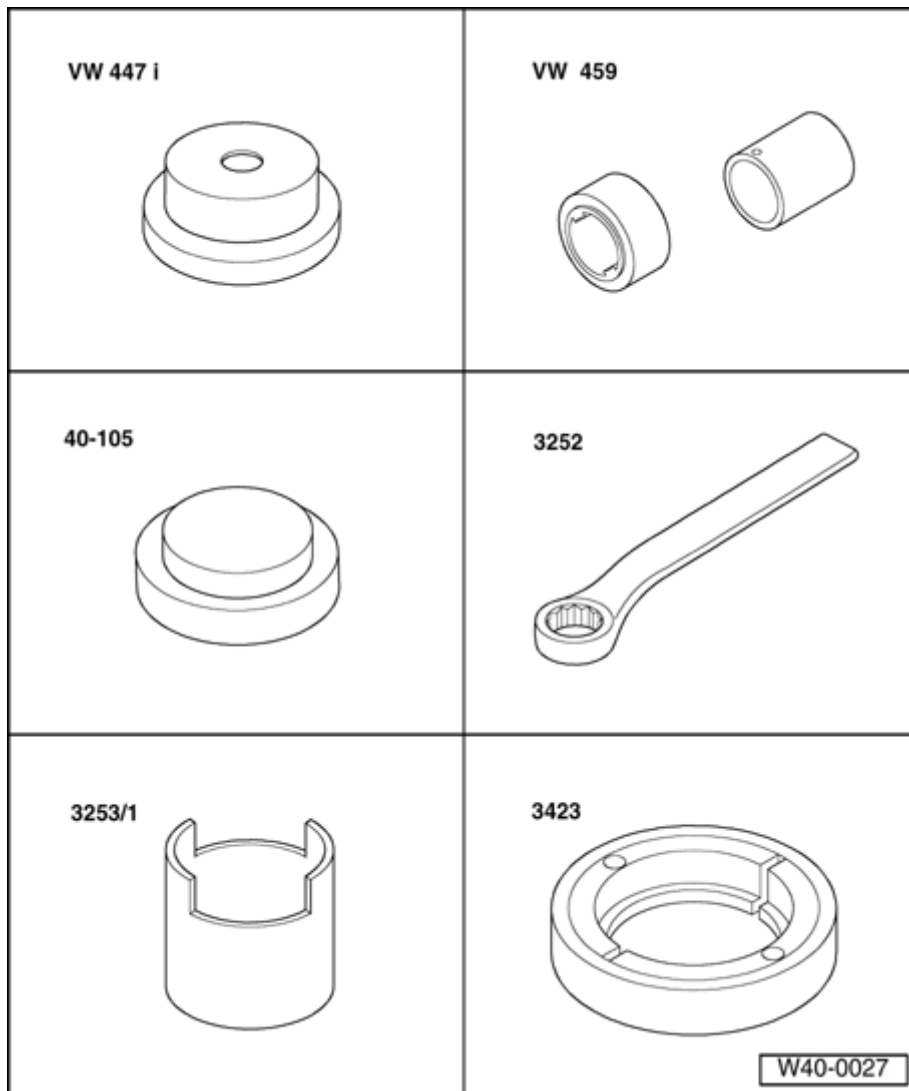
Thread	VAS number
M10	6024
M12×1.5	6058
M14×1.5	6027

II - Wheel bearing, assembly overview






Special tools, testers and auxiliary items required

- n Thrust plate VW401
- n Punch VW407
- n Punch VW408A
- n Thrust disc VW412
- n Arbor 50 mm dia. VW432
- n Press piece VW442



Special tools, testers and auxiliary items required

- n Thrust pad VW447 i
- n Pressing appliance VW459/2
- n Thrust pad 40 - 105
- n Box wrench SW 32 3252 A
- n Assembly tool 3253
- n Collar for wheel bearing inner race 3423

<p>V.A.G 1331</p> 	<p>V.A.G 1332</p> 
<p>V.A.G 1410</p> 	
	<p>W40-0028</p>

Special tools, testers and auxiliary items required

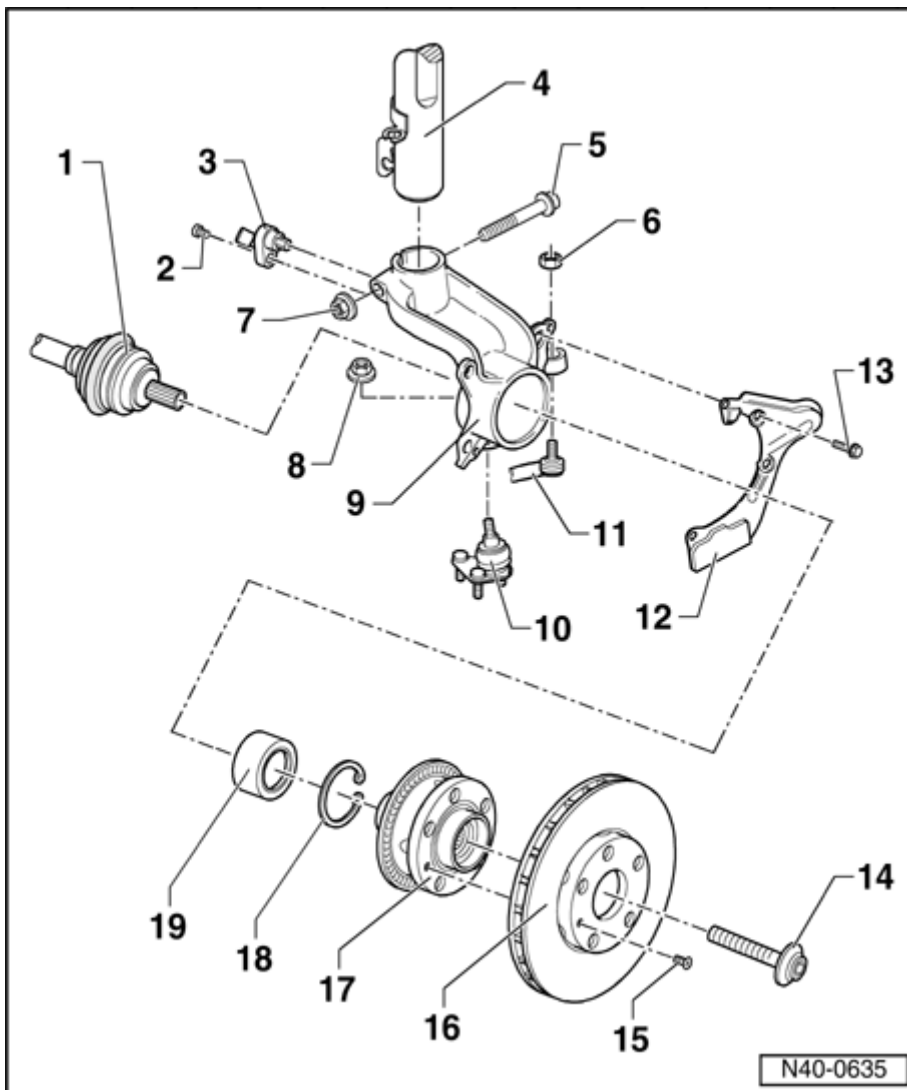
- n Torque wrench V.A.G1331
- n Torque wrench V.A.G1332
- n Torque wrench V.A.G1410

Note:

- n *If a vehicle that has a drive axle removed and is to be moved, an outer CV joint must be installed in place of the drive axle and be tightened to 50 Nm. Otherwise, the wheel bearing will be damaged.*
- n *Welding and straightening operations are not permitted on*

load-bearing or wheel-controlling components.

- n Always replace self-locking nuts.
- n Always replaced corroded bolts/nuts.



1. Drive axle

- i Pulling drive axle out from wheel hub and pressing in ⇒ Removing and installing drive axle ⇒ [40-5, Drive axle, removing and installing](#)

2. Hex socket head bolt, 10 Nm

3. Speed sensor

4. Suspension strut

5. Hex bolt

- i Always replace
- i The point on the hex bolt must point in normal direction of travel

6. Self-locking hex nut, 45 Nm

- i Always replace

7. Self-locking nut

- i 60 Nm plus an additional $\frac{1}{4}$ turn 90°
- i Never less than 90° !
- i Turning angle tolerance 90° to 120°
- i Always replace

8. Self-locking hex nut, 45 Nm

- i Always replace

9. Wheel bearing housing

- i After pressing out the tie rod end, press socket back into tie rod arm

10. Ball joint

- i Checking \Rightarrow [40-4, Ball joint, checking](#)
- i Removing and installing \Rightarrow [40-4, Ball joint, removing and installing](#)

11. Tie rod end**12. Shield plate****13. Hex bolt, 10 Nm**

14. Hex bolt

- ; Fastening ⇒ [40-5, Installing](#)
- ; Always replace

15. Phillips-head screw, 4 Nm**16. Ventilated brake disc****17. Wheel hub with speed sensor rotor**

- ; Rotor is welded to wheel hub
- ; Removing and installing ⇒ [40-4, Front wheel bearing, pressing out and pressing in](#)

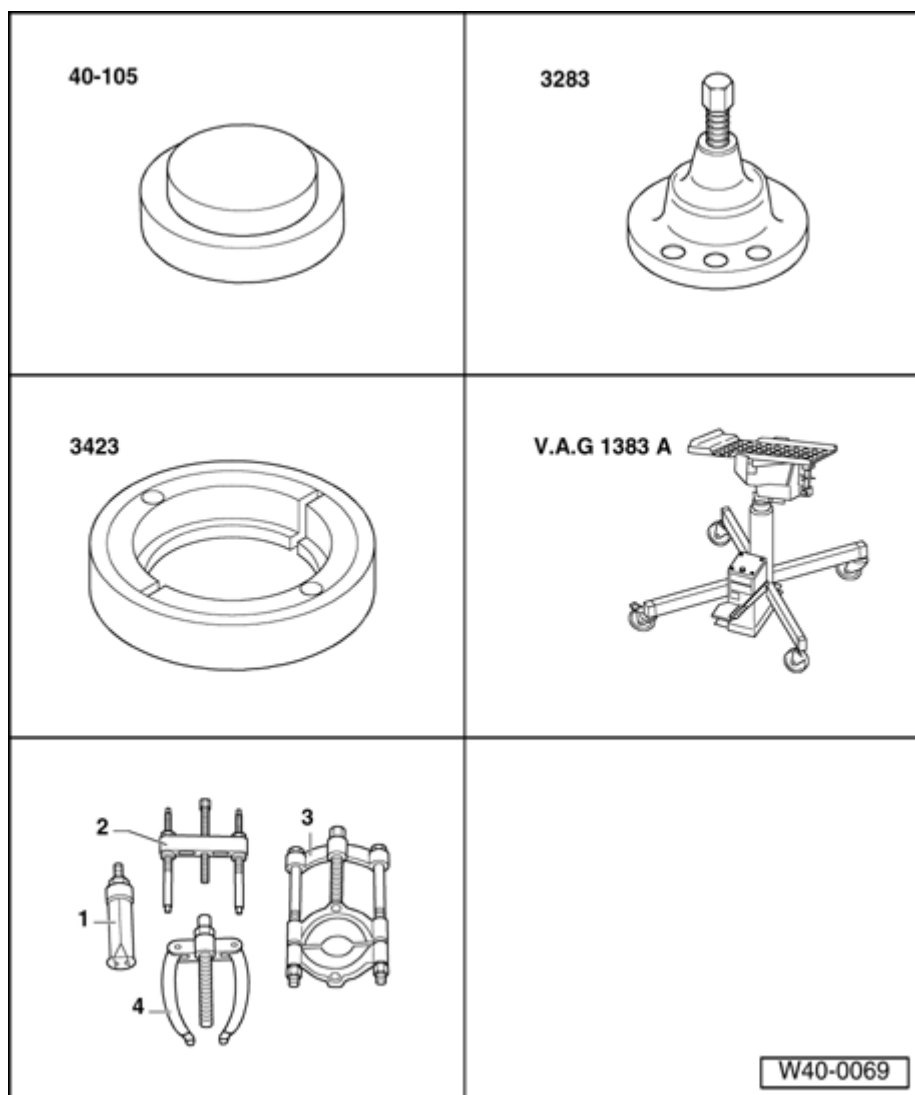
18. Circlip

- ; Make sure it is seated properly

19. Wheel bearing

- ; Removing and installing ⇒ [40-4, Front wheel bearing, pressing out and pressing in](#)

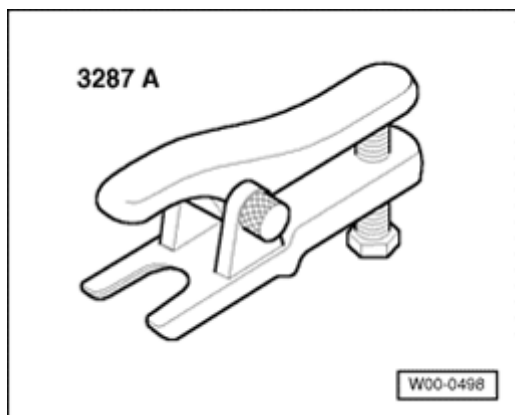
Front wheel bearing, pressing out and pressing in



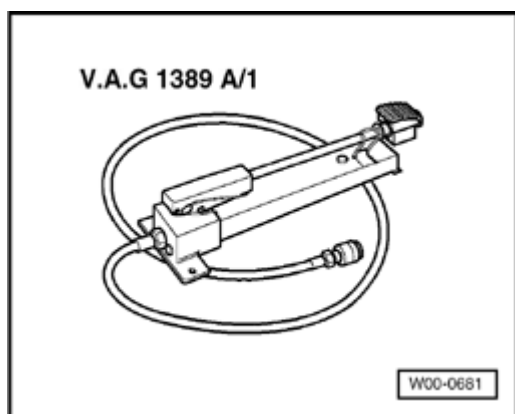
Special tools, testers and auxiliary items required

- n Thrust pad 40 - 105
- n Hub puller 3283
- n Collar for wheel bearing inner race 3423
- n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2
- n - 2 - Puller Kukko 18/0

Special tools, testers and auxiliary items required



n Ball joint puller 3287 A



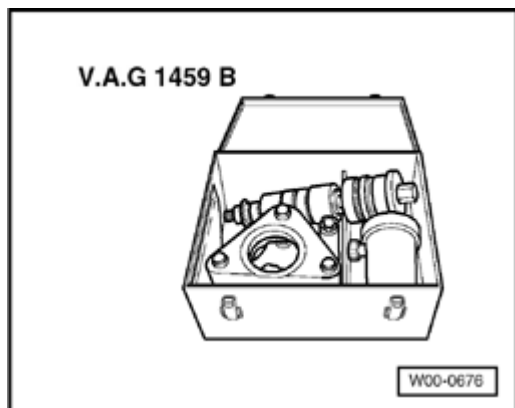
n Foot pump with high pressure hose V.A.G1389A/1

If there is a hand pump V.A.G 1389/1 available in dealership it can be converted to a foot pump.

To do this use conversion set V.A.G 1389/4 .

Special tools, testers and auxiliary items required

Special tools, testers and auxiliary items required

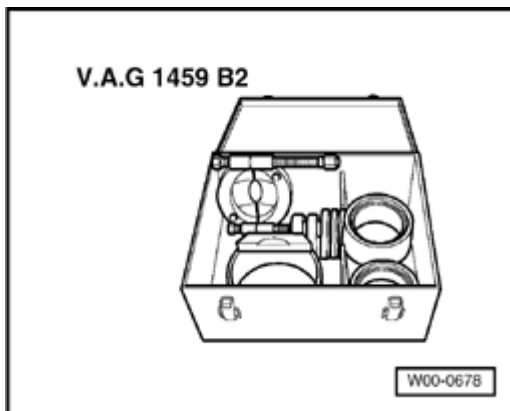


n Hydraulic removal and installing tool for wheel bearing V.A.G 1459 B

n Piston cylinder HKZ-15 with hydraulic press piece E-

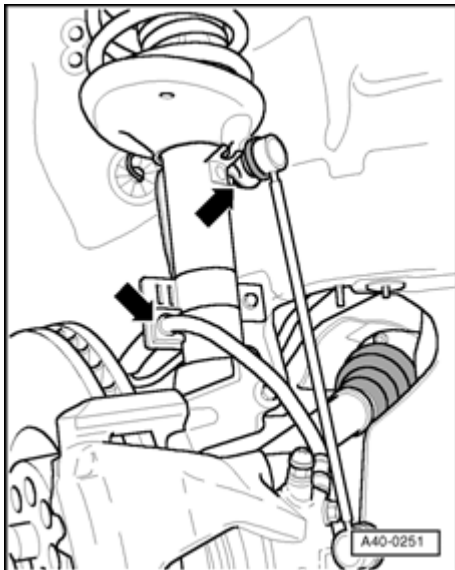
0-204-T

- n Removal rods E-0-217+218
- n Special nut E-8-214
- n Press piece E-5
- n Press piece E-10
- n Press sleeve E-13-1
- n Thrust bolt E-15



- n Supplementary set V.A.G 1459 B/2
- n Bell E-40

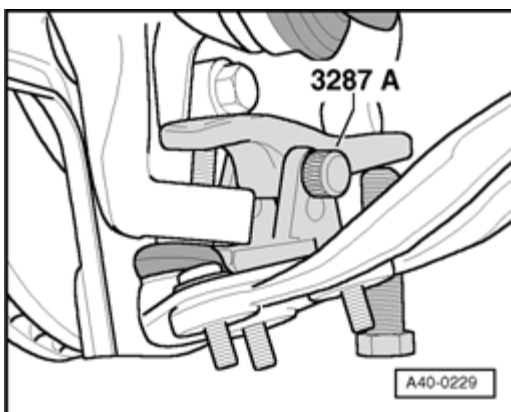
- Lift vehicle until the load on front axle is relieved.
- Loosen hex bolt.
- Lift vehicle to installing height.
- Remove wheel.



- Loosen upper hex nuts of connecting links from left and right suspension strut.
- Pull out clamp on brake hose bracket and release brake hose.
- Release speed sensor wiring from front suspension strut.
- Remove brake carrier with brake caliper and hang from structure with wire

⇒ *Repair Manual, Braking System, Repair Group 46, Servicing front brakes*

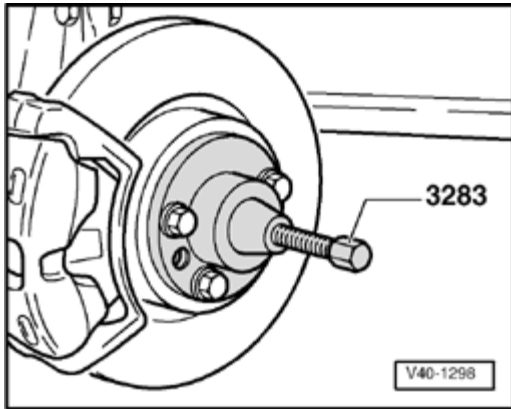
- Loosen nut from ball joint.



- Install ball joint puller 3287 A as shown in illustration and press out ball joint.

Note:

- n *To protect ball joint threads and for safety reasons leave nut on a few turns.*



- Press out drive axle.

Note:

- n *When pressing drive axle out ensure sufficient clearance is available.*

- Remove drive axle from wheel bearing housing and tie up.

The drive axle must not hang down!

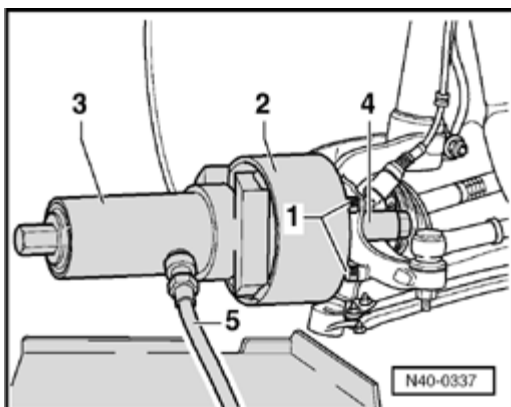
The inner joint will be damaged through overflexing.

- Remove phillips-head screw for brake disc and take out brake disc.
- Remove cover plate.

Note:

- n *Place engine/transmission jack V.A.G1383/A underneath (danger of accident from falling parts when removing the wheel hub and wheel bearing).*

Pulling out wheel hub



- Insert thrust bolts - 1 - in wheel bearing housing.

- Install support - **2** - , piston cylinder - **3** - with pull rod and special nut - **4** - .

- Hold tool securely and pull out wheel hub.

1 - Thrust bolt E-15

2 - Bell E-40

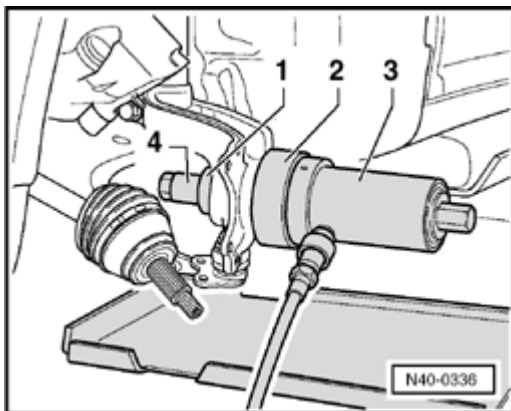
3 - Piston cylinder HKZ-15

4 - Special nut E-8-214 and pull rod

5 - High pressure hose with quick release coupling

Pulling out wheel bearing

- Remove circlip.



- Install press piece - **1** - with shoulder to bearing, press sleeve - **2** - with four stepped internal diameters to wheel bearing housing, piston cylinder - **3** - with pull rod and special nut - **4** - .

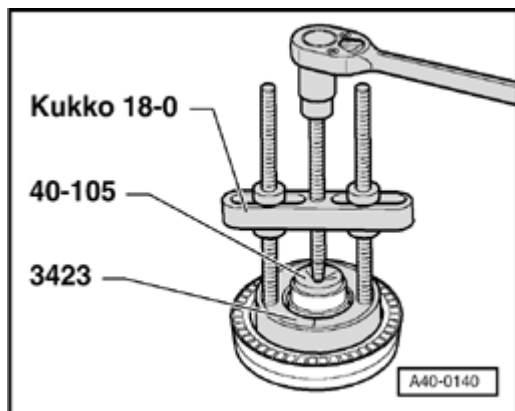
- Operate pump and remove the wheel bearing.

1 - Press piece E-5

2 - Press sleeve E-65-1

3 - Piston cylinder HKZ-15

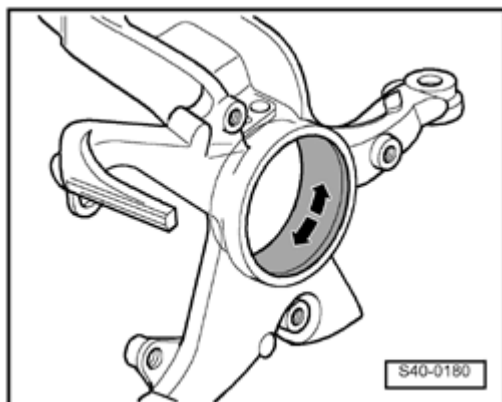
4 - Special nut E-8-214 and pull rod



Pulling bearing inner race from hub

Pressing in wheel bearing

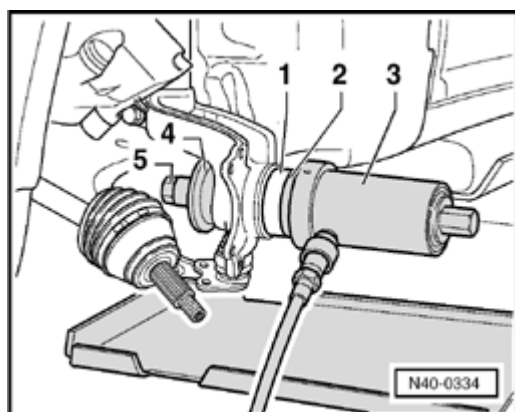
- Clean hole from wheel bearing housing



- Grease hole with Molykote grease completely.

Molykote grease, G 052 723 A2

Use grease packet from repair kit

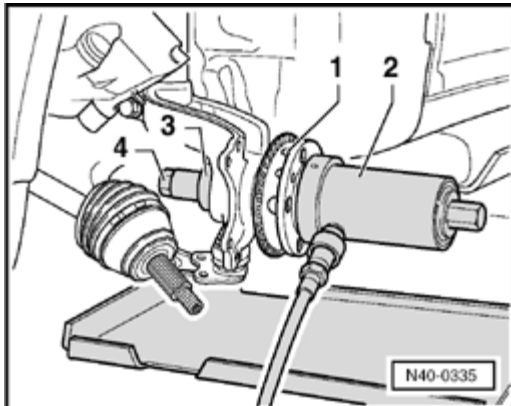


- Install wheel bearing - **1** - , press piece - **2** - install with collar in bearing) and piston cylinder - **3** - with pull rod on wheel bearing housing.

- Install thrust piece - **4** - with wide collar toward wheel bearing housing and special nut - **5** - on inside.
- Press wheel bearing in by operating pump.
- Insert circlip with needle nose pliers.

- 1 - Wheel bearing
- 2 - Press piece E-13-1
- 3 - Piston cylinder HKZ-15
- 4 - Press piece E-10
- 5 - Special nut E-8-214 and pull rod

Pressing in wheel hub

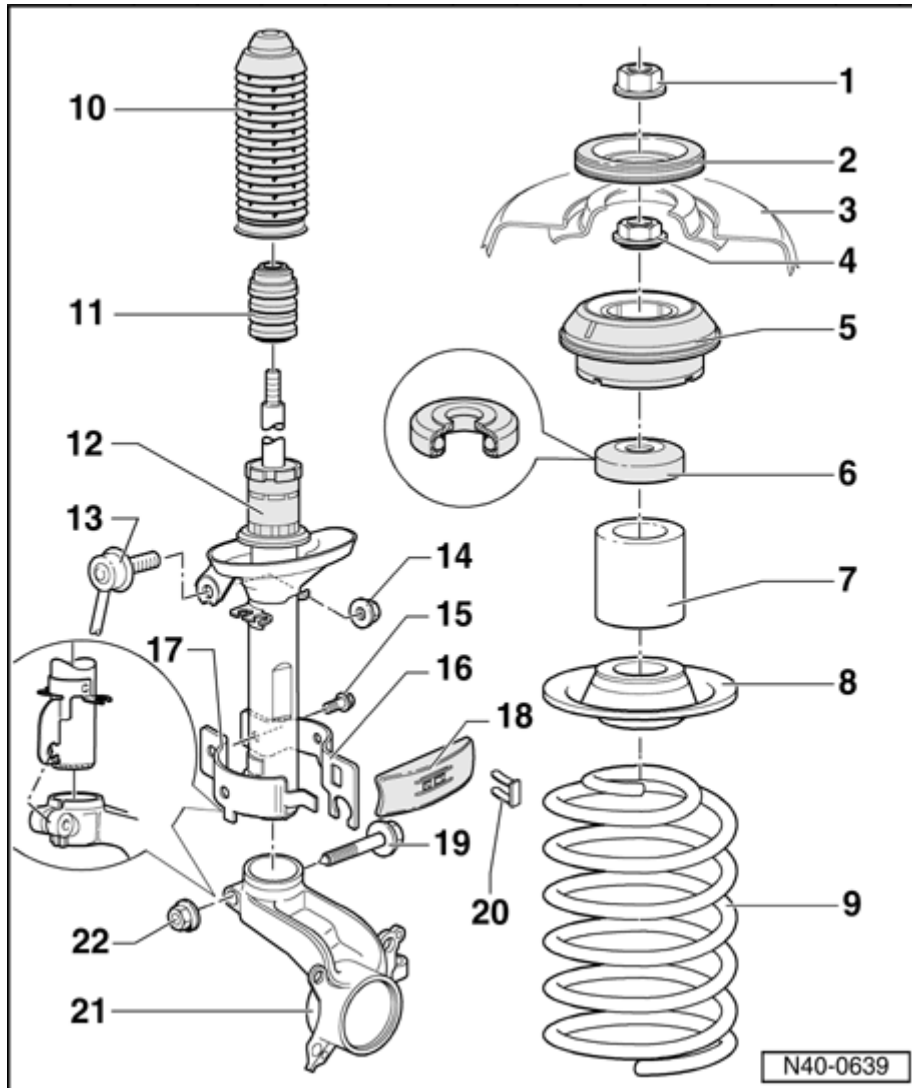


- Install hub - **1** - and piston cylinder - **2** - with pull rod on wheel bearing.
- Install thrust piece - **3** - and special nut - **4** - (with collar toward special nut) on inside.
- Press in hub by operating pump.

- 1 - Wheel hub
- 2 - Piston cylinder HKZ-15
- 3 - Press piece E-5
- 4 - Special nut E-8-214 and pull rod

Further installation is in reverse sequence to removal.

III - Front suspension strut, assembly overview



1. Self-locking hex nut, 60 Nm

ⓘ Always replace

2. Stop

3. Suspension strut turret

4. Hex nut, 60 Nm

5. Strut mount

6. Axial ball bearing

7. Bushing

8. Spring plate

9. Coil spring

ⓘ Observe color coding

- ; Surface of spring must not be damaged

10. Protective sleeve**11. Buffer stop****12. Damper**

- ; Can be replaced individually
- ; Application ⇒ *See Parts Catalog*

13. Connecting Link**14. Hex nut, 90 Nm**

- ; Always replace

15. Hex bolt, 10 Nm**16. Bracket****17. Clamp****18. Heat shield****19. Hex bolt**

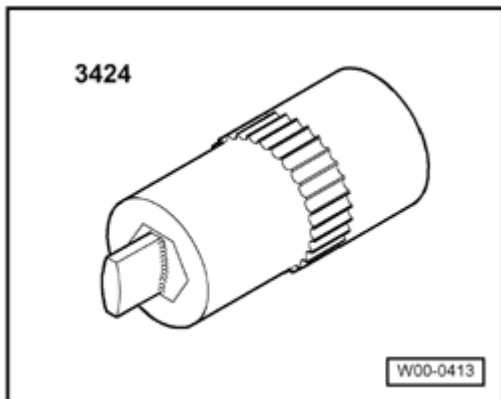
- ; Always replace
- ; The point on the hex bolt must point in normal direction of travel

20. Clip**21. Wheel bearing housing****22. Self-locking nut**

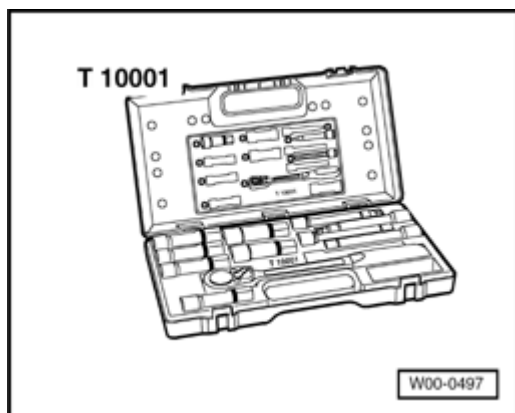
- ; 60 Nm plus an additional $\frac{1}{4}$ turn 90°
- ; Never less than 90° !
- ; Turning angle tolerance 90° to 120°
- ; Always replace

Suspension strut, removing and installing

Special tools, testers and auxiliary items required



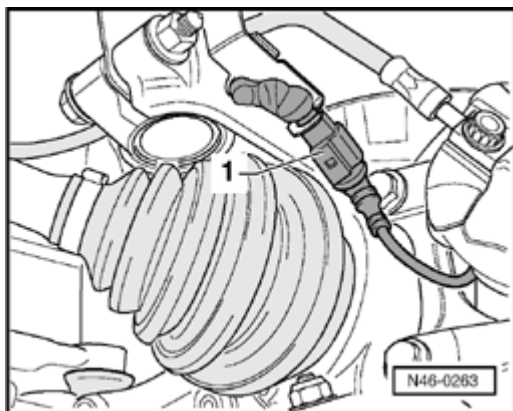
n Spreader 3424



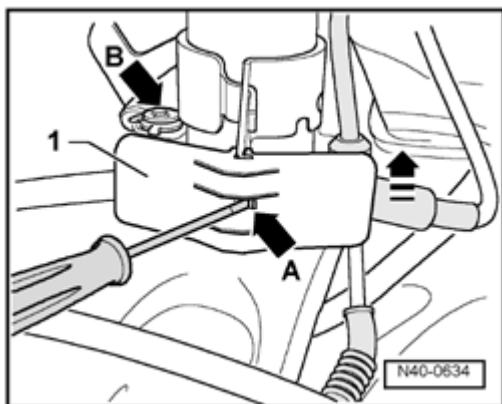
n Shock absorber set T10001

Removing

- Remove wheel.



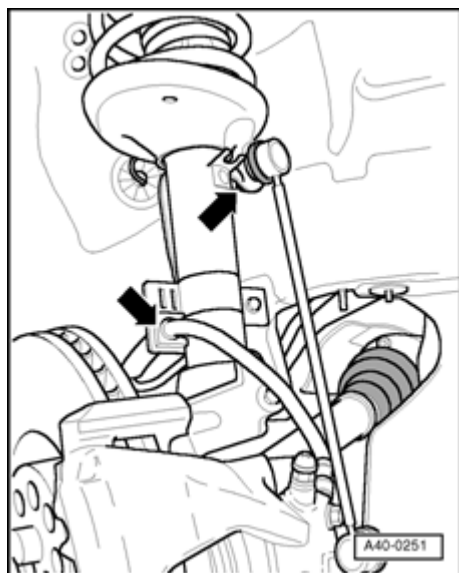
- Disconnect connector - 1 - .



- Remove heat shield - 1 - .

- To do this push lip - **arrow A** - with a screwdriver in and push at the same time the heat shield - 1 - upward in direction of arrow.

- For vehicles with brake wear pad indicator remove bolt - **arrow B** - to remove support for brake wear pad indicator.



- Remove upper hex nuts of connecting links from left and right suspension strut.

- Pull out clamp on brake hose bracket and release brake hose.

- Release speed sensor wiring from front suspension strut.

- Remove brake carrier with brake caliper and hang from body with wire

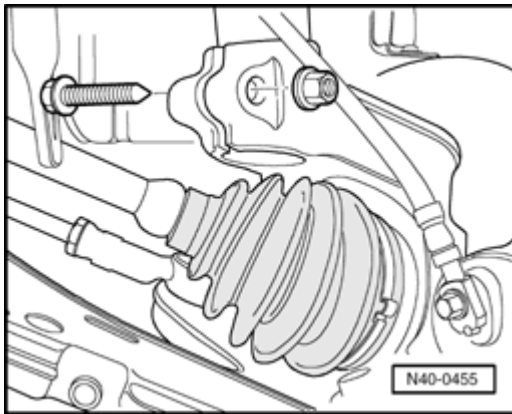
⇒ *Repair Manual, Braking System, Repair Group 46, Servicing front brakes*

Right suspension strut

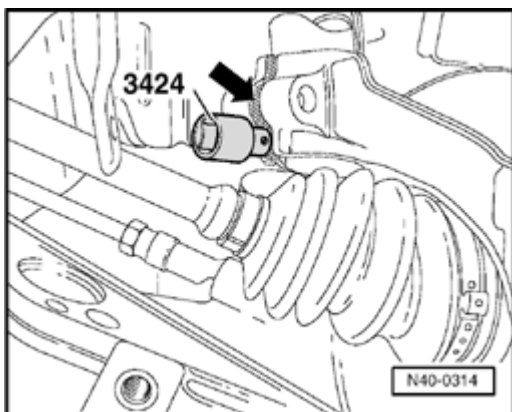
Additional work is required if right suspension strut is to be removed

- Remove noise insulation.
- Disconnect drive axle from transmission axle flange.

The following work sequence is valid for both sides



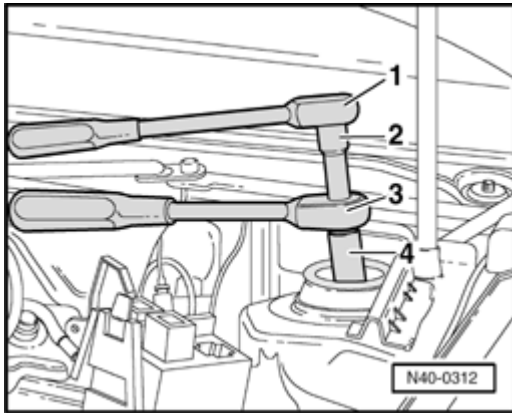
- Separate wheel bearing housing/suspension strut bolted connection.



- Insert Spreader 3424 into slot - **arrow** - .
- Turn ratchet handle through 90 ° and pull off 3424 .
- Press brake disc in direction of suspension strut by hand.

Otherwise the shock absorber tube could catch in the wheel bearing housing hole.

- Pull wheel bearing housing off shock absorber downward.



Remove hex nut for upper shock absorber mount

1 - Ratchet (commercially available)

2 - T10001/8

3 - T10001/11

4 - T10001/5

- Remove strut.

Installing

- Install suspension strut.

- Remove spreader 3424 .

- Tighten bolted union wheel bearing housing/suspension strut.

Further installation of suspension strut is performed in reverse order

Tightening torques:

12-point nut for upper spring plate

60 Nm

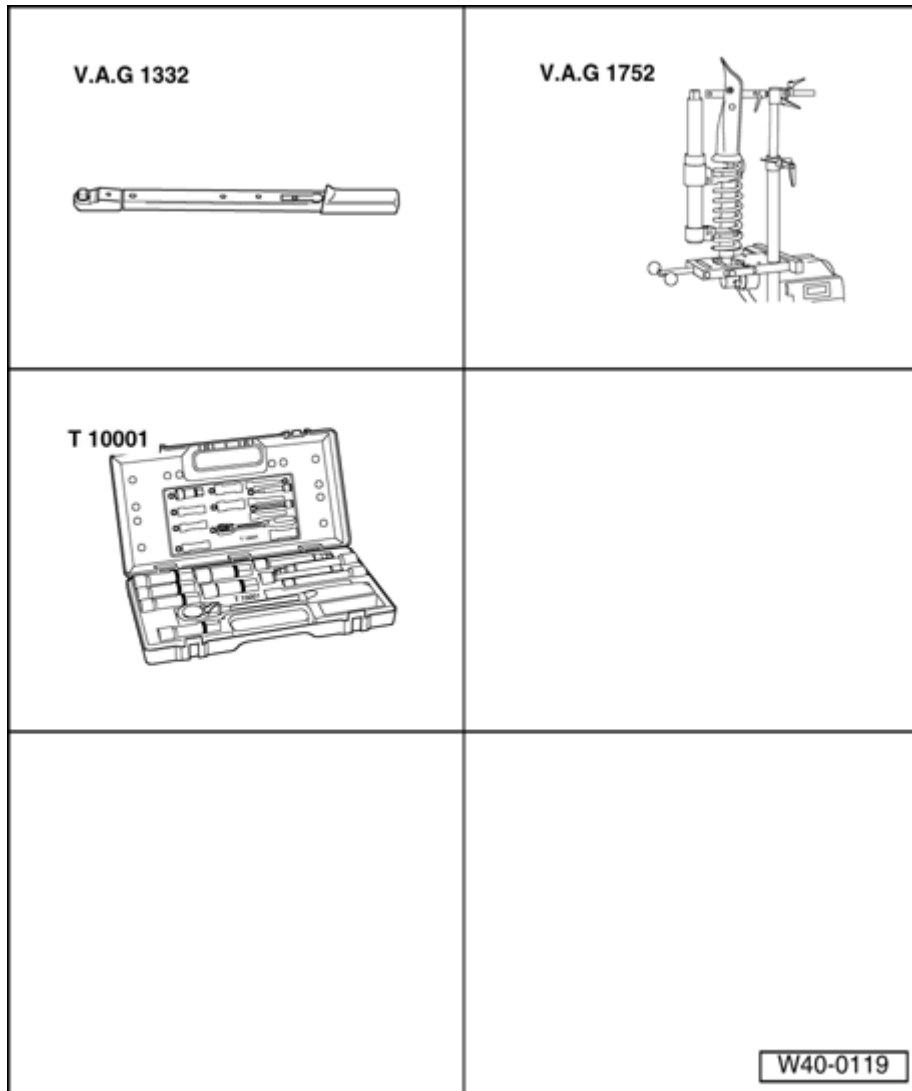
Hex. nut for wheel bearing housing

60 Nm plus an additional $\frac{1}{4}$ turn 90°

Coupling rod to suspension strut. Use new nuts!

90 Nm

Front suspension strut, servicing

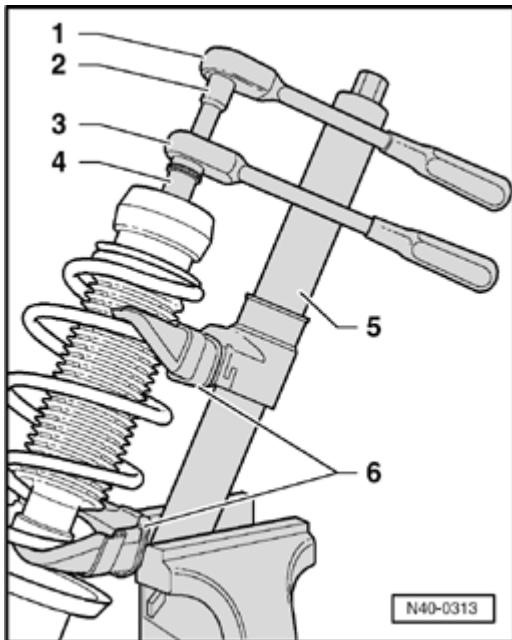


Special tools, testers and auxiliary items required

- n Torque wrench V.A.G1332
- n Spring compressor V.A.G1752/1
- n Spring holder V.A.G1752/4
- n Shock absorber set T10001

- Removing suspension strut ⇒ [40-4, Suspension strut, removing and installing](#) .

Removing coil spring



- Compress coil spring with spring compressor V.A.G1752/1 until the upper spring plate is free.
- Remove hex nut from piston rod.
- Remove individual components of the suspension strut and coil spring using spring compressor V.A.G1752/1 .

1 - Ratchet (commercially available)

2 - T10001/8

3 - T10001/11

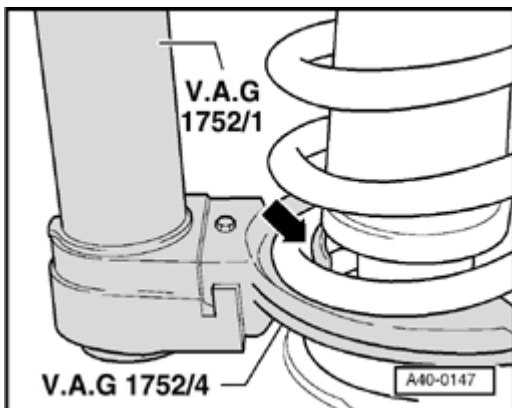
4 - T10001/5

5 - Spring tensioner V.A.G1752/1

6 - Bracket V.A.G1752/4

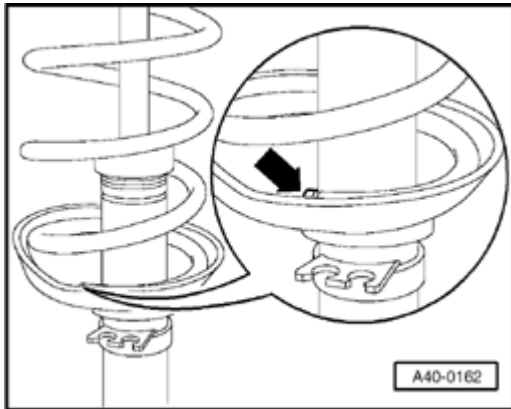
Caution!

First pre-load the spring until the upper spring plate is no longer under load.



- Make sure coil spring is properly seated in spring holder V.A.G1752/4 - **arrow** - .

Installing coil spring



- Install coil spring using spring compressor V.A.G1752/1 onto lower spring support.

The end of the coil spring must lie against stop - **arrow** - .

- Tighten new hex nut on piston rod.
- Release spring compressor V.A.G1752/1 and remove from coil spring.
- Install strut ⇒ [40-3, Installing](#) .

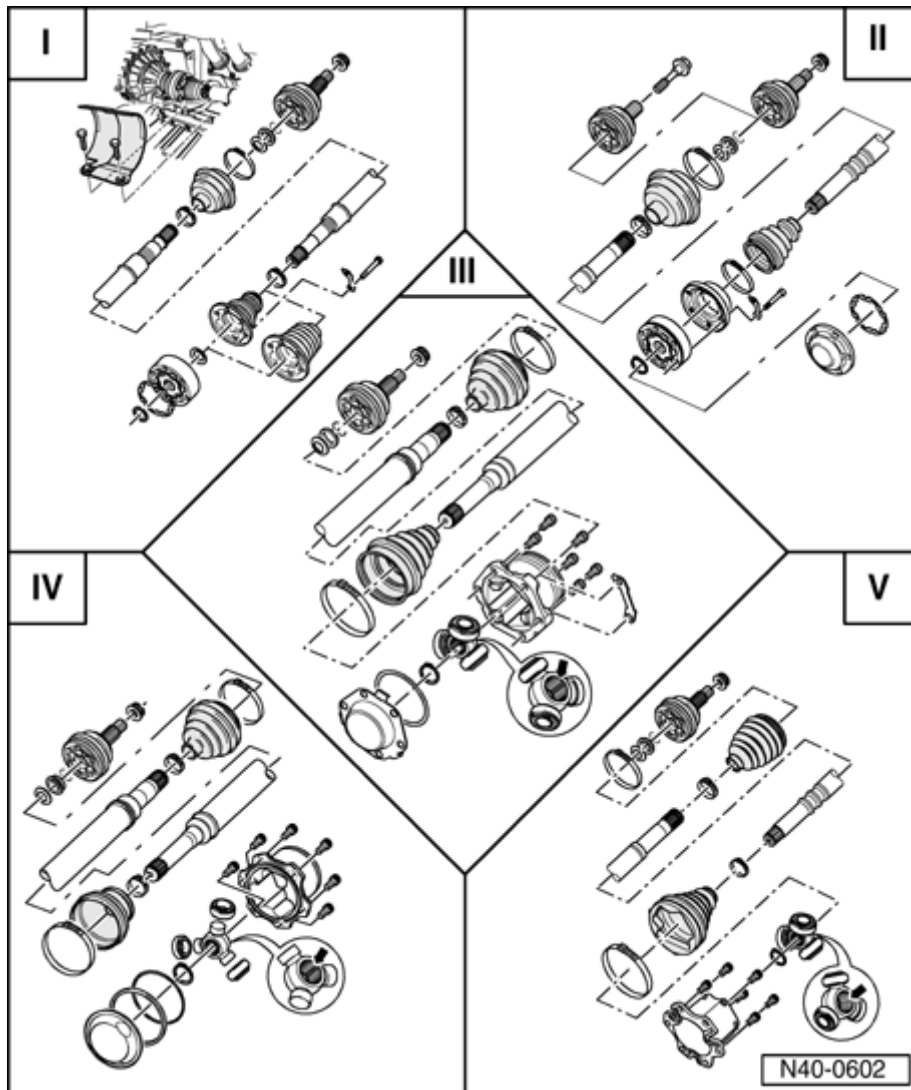
Tightening torques:

Hex nut for upper shock absorber mounting
Use new nut!

60 Nm

Front drive axle, servicing

Drive axle, assembly overview



I - Servicing front drive axle with constant velocity joint ⇒ [40-5, I - Front drive axle with constant velocity joint, servicing](#)

II - Servicing front drive axle with constant velocity joint VL 3700 ⇒ [40-5, II - Front axle shaft with constant velocity joint VL 3700, servicing](#)

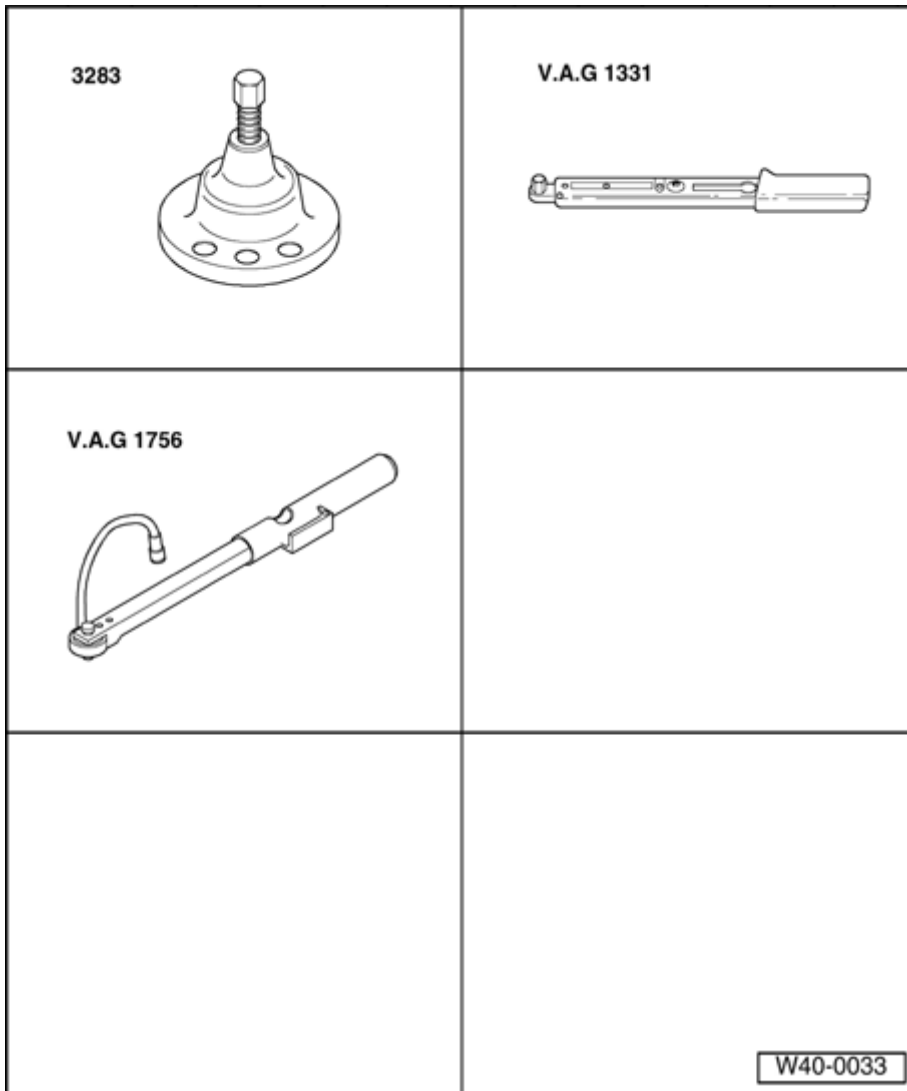
III - Servicing front drive axle with triple roller joint AAR 2000 ⇒ [40-5, III - Axle shaft with triple roller joint AAR 2000, servicing](#)

IV - Servicing drive axle with triple roller joint AAR 2900 ⇒ [40-5, IV - Drive](#)

[axle with triple roller joint AAR 2900, servicing](#)

V - Servicing drive axle with triple roller joint AAR 3300i ⇒ [40-5, V - Drive axle with triple roller joint AAR 3300i, servicing](#)

Drive axle, removing and installing



Special tools, testers and auxiliary items required

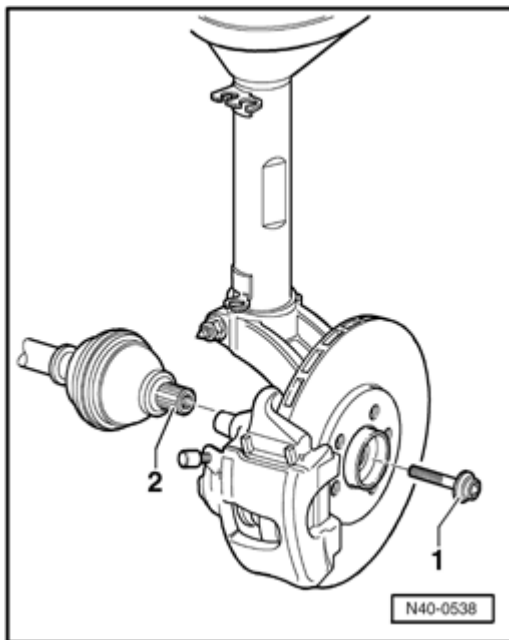
- n Hub puller 3283
- n Torque wrench V.A.G1331
- n Angle wrench V.A.G1756

Removing

The wheel bearings must not be loaded when the 12-point nut/hex bolt is loose.

If the bearings are loaded by the vehicles own weight the will bearing will be damaged. The wheel bearings will be stressed and the life expectancy reduced.

If a vehicle that has a drive axle removed and is to be moved, an outer CV joint must be installed in place of the drive axle and be tightened to 50 Nm. Otherwise, the wheel bearing will be damaged.



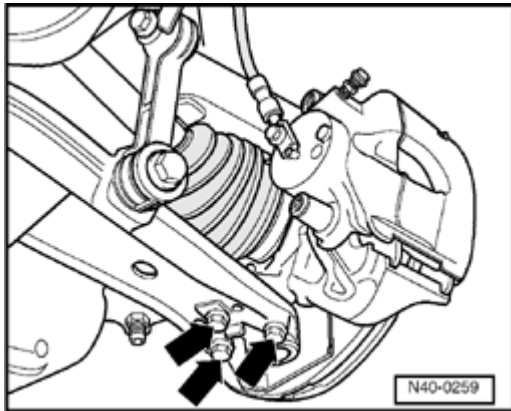
The wheel hub/drive axle on model "Golf GTI 132 kW" and R32 is secured with a hex bolt - **1** - instead of a 12-point nut. The spline of the outer joint - **2** - is slightly shorter than previous splines and has an internal thread.

The revised assembly sequence and revised torque settings are contained in the following work sequence.

- Lift vehicle until the load on front axle is relieved.
- Loosen 12-point nut.
- Disconnect drive axle from transmission axle flange.

Vehicles with 12-point nut

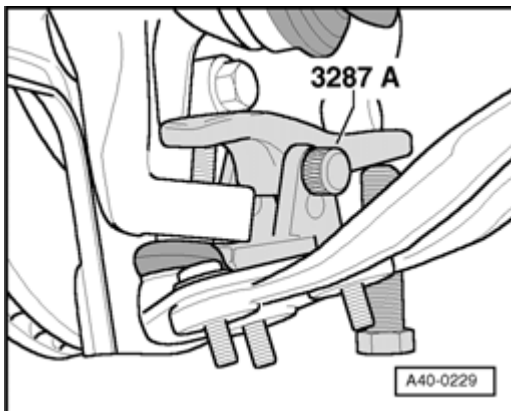
- Mark installation position of bolts from ball joint to control arm.



- Remove bolts - **Arrows** - .

Vehicles with hex. bolt

- Loosen nut from ball joint.

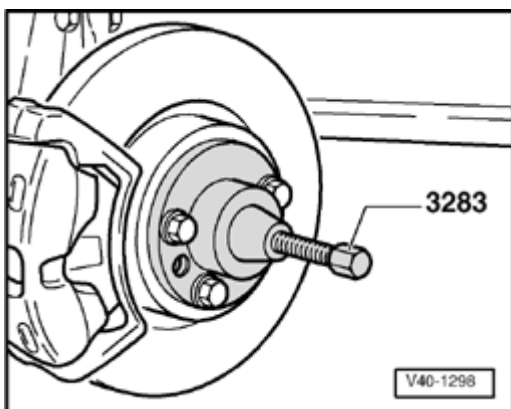


- Install ball joint puller 3287 A as shown in illustration and press out ball joint.

Note:

- n *To protect ball joint threads and for safety reasons leave nut on a few turns.*

Continued for all vehicles



- Press out drive axle.
- Vehicles where the drive axle is secured with a hex bolt, use Thrust piece VW 434 .

Note:

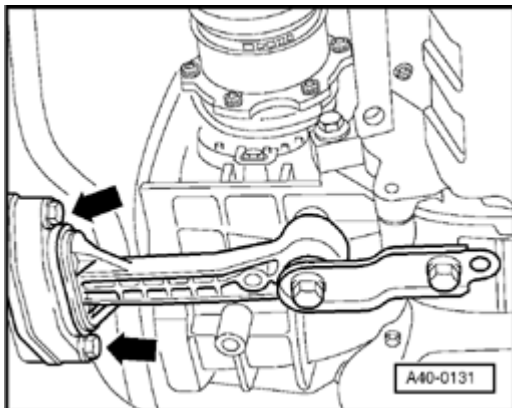
- n *When pressing drive axle out ensure sufficient clearance is available.*

- Remove drive axle.

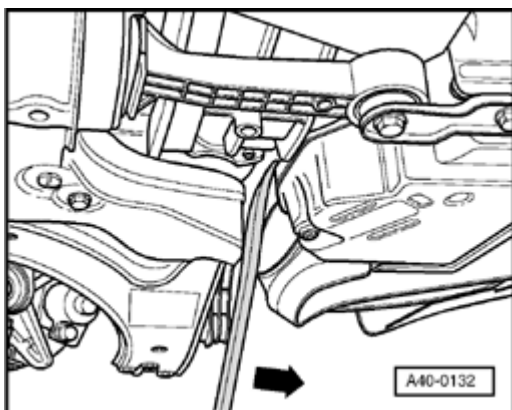
The drive axle must not hang down!

The inner joint will be damaged through over flexing.

The following sequence applies to automatic transmission vehicles only



- Remove bolts - **Arrows** - .
- Remove left side of noise insulation if necessary.



- Push engine/transmission assembly forward with a pry bar.

Now drive axle can be removed.

(- **Arrow** - points forward)

Installing

For vehicles with 12-point nut or hex bolt

Remove any paint residue and/or corrosion on thread/splines of the outer joint.

Coat with oil before installing drive axle;

- n The splines of outer joint,
- n The thread of outer joint
- n Wheel hub splines,
- n The contact surface and thread of 12-point nut

Vehicles with hex. bolt

Note:

- n *Do not oil threads of hex bolt.*

Continued for all vehicles

- Install drive axle.
- Insert outer joint as far as possible into spline in wheel hub.
- Connect ball joint to control arm using new bolts onto old marks.

Torque ball joint to control arm: 20 Nm plus an additional ¹ /₄ turn 90 °

- Install inner joint of drive axle and initially tighten bolts diagonally to 10 Nm.

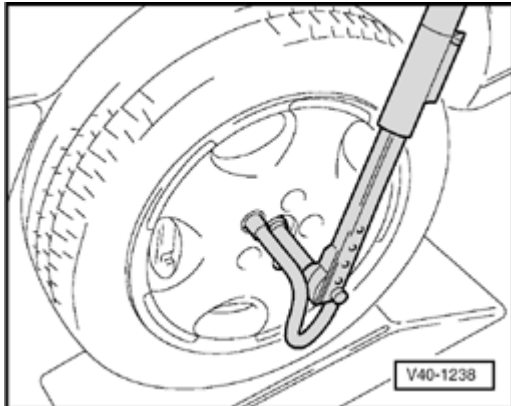
Tightening torques:

- Tighten multi-point socket head bolts diagonally to tightening torque listed.

Multi-point socket head bolt M 8 x 18	40 Nm
Multi-point socket head bolt M 8 x 28	40 Nm
Multi-point socket head bolt M 8 x 48	40 Nm

- Bolt pendulum support to subframe and tighten to 25 Nm
- Pull outer joint into wheel hub until outer joint is in position.

Vehicles with 12-point nut



- Tighten 12-point nut to 200 Nm and loosen 1/2 turn.
- Turn wheel hub 180 ° .

Tighten again with:

50 Nm plus an additional 60 ° turn

Vehicles with hex. bolt

- Tighten hex bolt to 250 Nm plus an additional $1/4$ turn 90 ° and then loosen 1/2 turn.
- Turn wheel hub 180 ° .

Tighten again with:

Tighten 250 Nm plus an additional $1/4$ turn 90

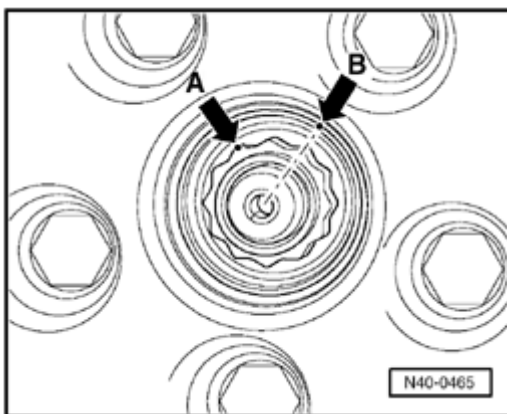
Note:

- n To tighten 12-point nut/hex bolt we recommend the angle measuring wrench V.A.G1756 .*

If an angle measuring wrench is not available, tighten 12-point nut using following method.

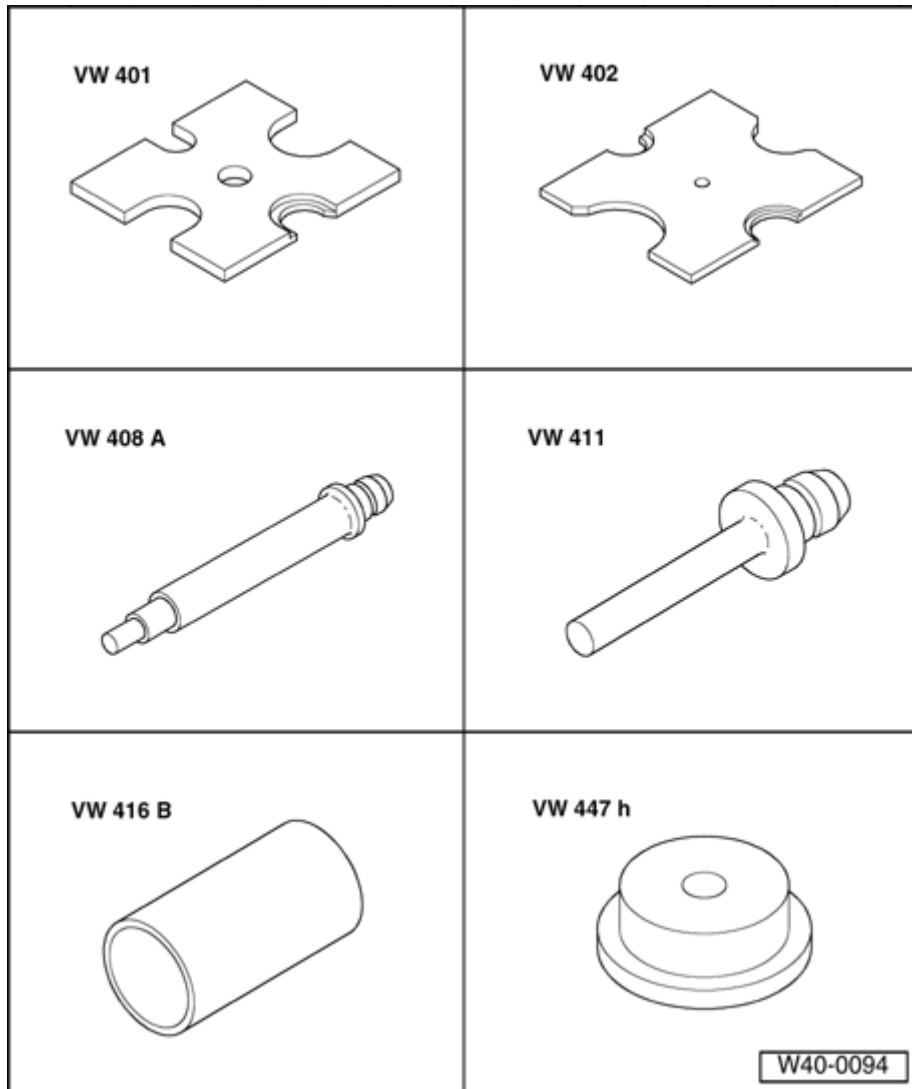
Vehicles with 12-point nut

- Lower vehicle until wheels touch ground.
- Tighten 12-point nut to 200 Nm and loosen 1/2 turn.
- Tighten 12-point nut to 50 Nm.

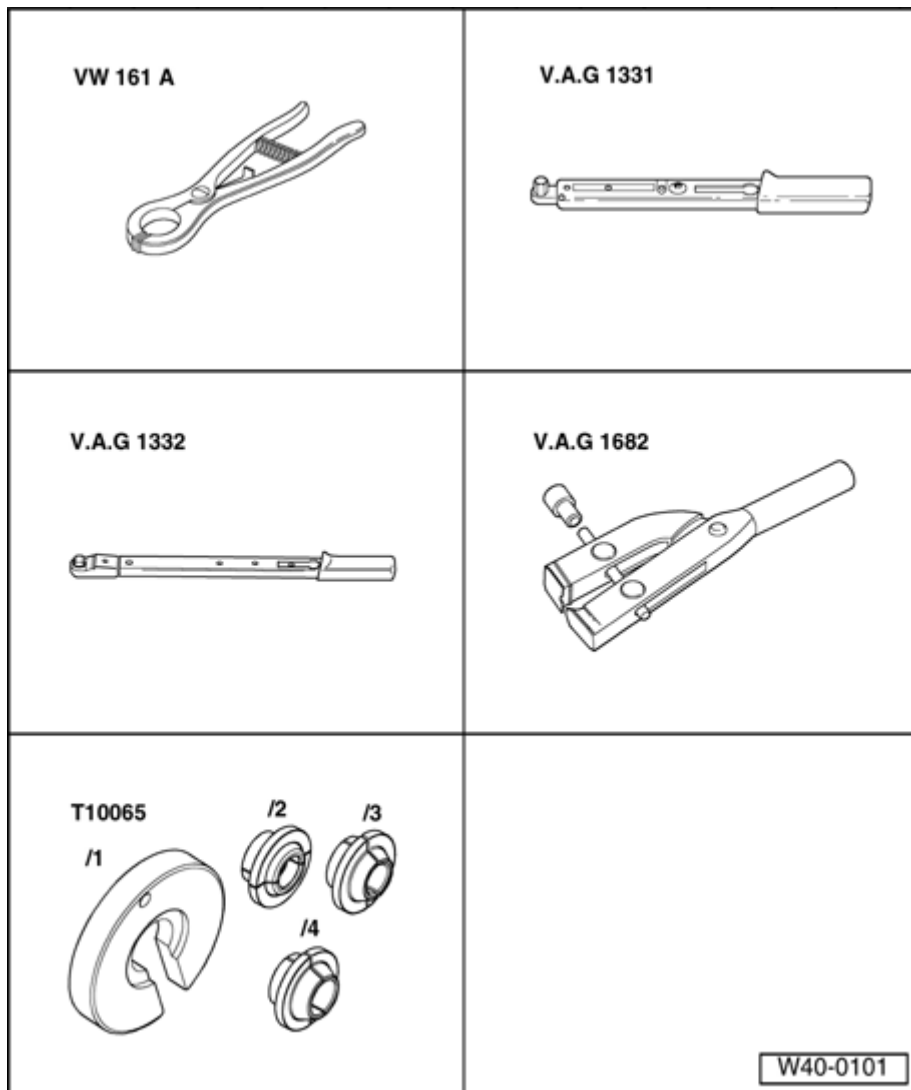


- Mark one of the 12-points on the nut with a line - **arrowA** -
- .
- Mark 2nd line - **arrowB** - on the edge of the wheel hub as shown in illustration.
- Turn 12-point nut until both points align.

I - Front drive axle with constant velocity joint, servicing

**Special tools, testers and auxiliary items required**

- n Thrust plate VW401
- n Thrust plate VW402
- n Punch VW408A
- n Punch VW411
- n Sleeve VW416B
- n Thrust pad VW447H



Special tools, testers and auxiliary items required

- n Circlip pliers VW161A
- n Torque wrench V.A.G1331
- n Torque wrench V.A.G1332
- n CV joint boot clamp tool V.A.G1682
- n Assembly tool T10065

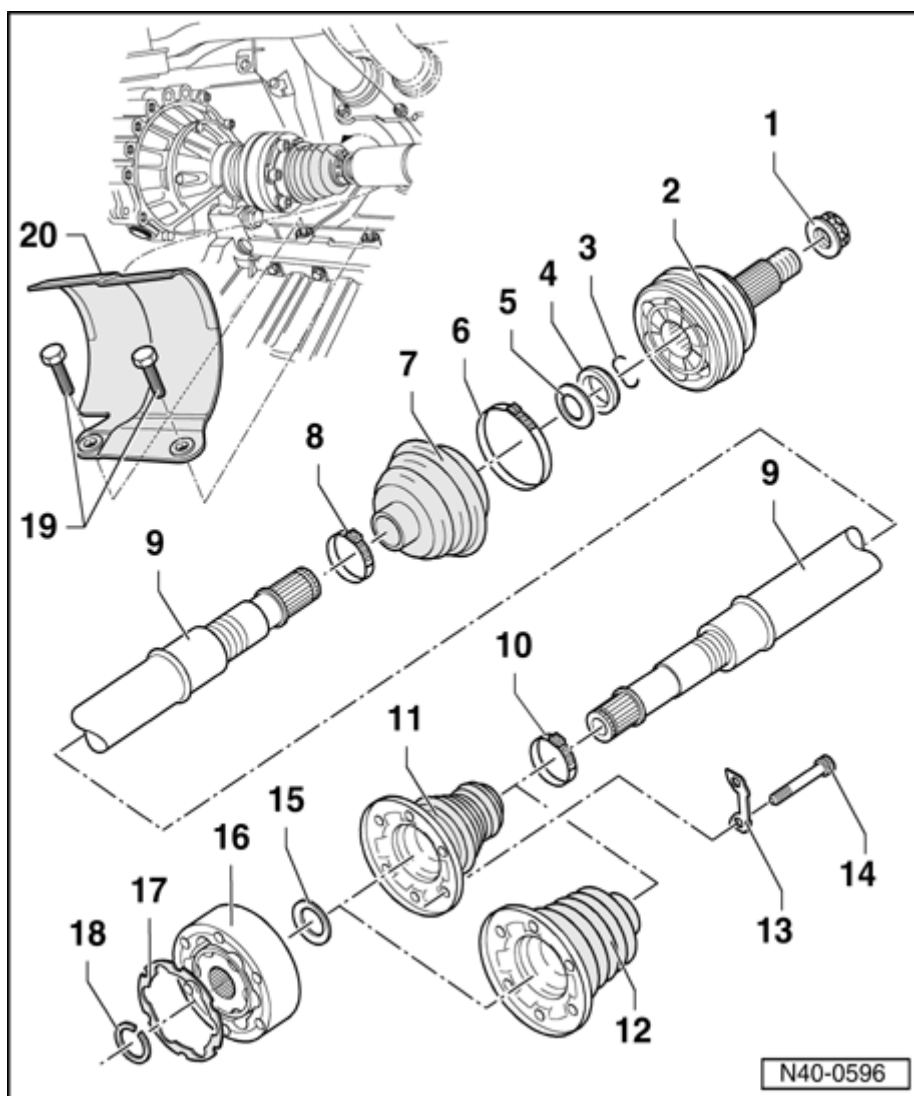
Grease quantity and type

Filling drive axle with high temperature grease. ⇒ See *Parts Catalog*

Outer joint	Grease Total quantity	Joint	Amount in: Protective boot

mm	[g]	[g]	[g]
81	80	40	40
90	120	80	40
Inner joint			
mm			
94	90	40	50
100	120	50	70

Regrease joint, if necessary, when replacing the protective boot.



1. Self-locking 12-point nut

- ; Tightening ⇒ [40-5, Installing](#)
- ; Any paint residue and/or corrosion on thread of the outer joint must be removed before the nut is installed.
- ; Always replace

2. Outer constant velocity joint

- i Replace as a unit
- i Removing ⇒ [40-5, Removing outer constant velocity joint](#)
- i Installing: Using a plastic hammer, drive onto axle as far as the stop
- i Greasing ⇒ [40-5,](#)
- i Checking ⇒ [40-5, Outer constant velocity joint, checking](#)

3. Circlip

- i Always replace
- i Insert in shaft groove

4. Thrust washer

- i Installation location ⇒ [40-5, Installing spring washer and thrust washer on outer joint](#)

5. Spring washer

- i Installation location ⇒ [40-5, Installing spring washer and thrust washer on outer joint](#)

6. Clamp

- i Always replace
- i Tightening with pliers
V.A.G1682 ⇒ [40-5, Tightening clamp on outer CV joint boot](#)

7. Protective boot

- i Check for tears and chafing
- i Material: Hytrel
(Polyelastomer)

8. Clamp

- i Always replace
- i Tightening ⇒ [40-5, Tightening clamp for CV joint boot \(inner, small dia.\)](#)

9. Axle shaft

10. Clamp

- i Always replace
- i Tightening ⇒ [40-5, Tightening clamp for CV joint boot \(inner, small dia.\)](#)

11. Protective boot for inner constant velocity joint

- i Material: Hytrel (Polyelastomer)
- i No vent hole
- i Check for tears and chafing
- i Drive off constant velocity joint with a drift
- i Before installing on constant velocity joint, coat sealing surface with D454300A2

12. Protective boot for inner constant velocity joint

- i Material: Rubber
- i With vent hole
- i Check for tears and chafing
- i Drive off constant velocity joint with a drift
- i Installation position for left drive axle ⇒ [40-5, Installing joint protective boot on left axle shaft](#)
- i Installation position for right

drive axle ⇒ [40-5, Installing boot for constant velocity joint \(right drive axle\)](#)

- ; Before installing on constant velocity joint, coat sealing surface with D454300A2

13. Plate

14. Multi-point socket head bolt

Tightening torques: ⇒ [40-5,](#)

15. Spring washer

- ; Installation location ⇒ [40-5, Installing spring washer on inner joint](#)

16. Inner constant velocity joint

- ; Replace only as a unit
- ; Pressing off ⇒ [40-5, Pressing off inner constant velocity joint](#)
- ; Pressing on ⇒ [40-5, Pressing on inner constant velocity joint](#)
- ; Greasing ⇒ [40-5,](#)
- ; Checking ⇒ [40-5, Inner constant velocity joint, checking](#)

17. Gasket

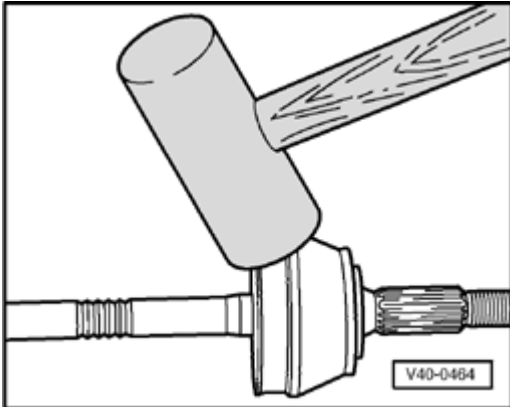
- ; Adhesive surface on constant velocity joint must be free of oil and grease!
- ; Always replace
- ; Pull off protective foil and stick gasket onto joint.

18. Circlip

- ; Remove and install with VW161 a

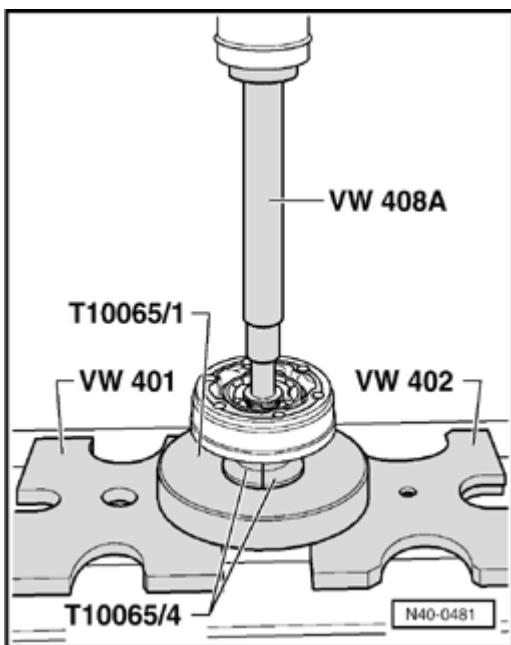
19. Hex bolt, 35 Nm

20. Protective cap



Removing outer constant velocity joint

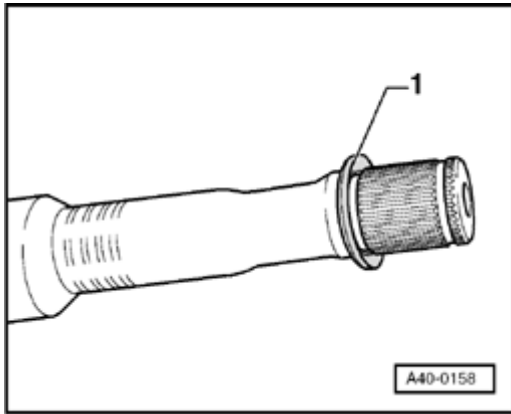
- Drive joint off axle shaft with a firm blow from a plastic hammer.



Pressing off inner constant velocity joint

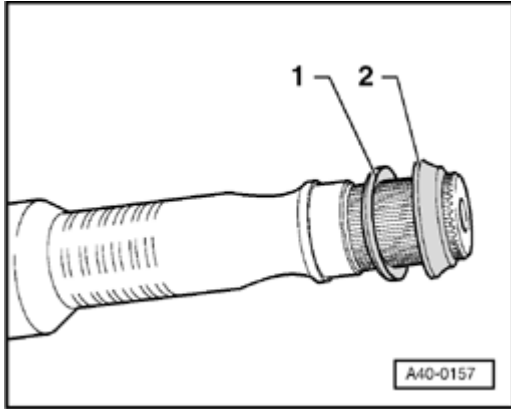
Note:

n First drive boot off with drift



Installing spring washer on inner joint

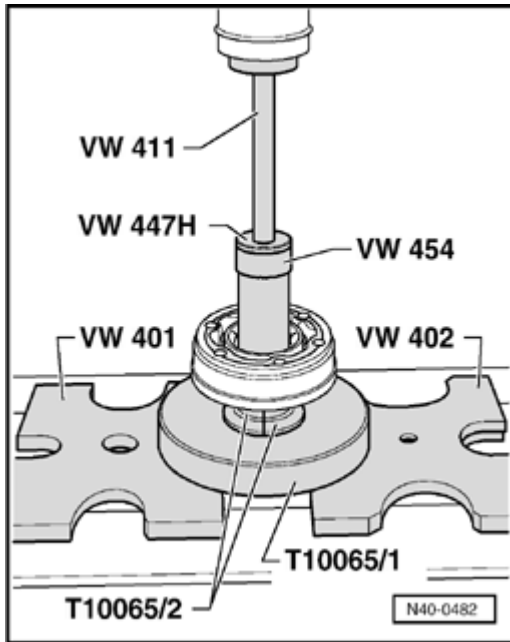
1 - Spring washer



Installing spring washer and thrust washer on outer joint

1 - Spring washer

2 - Thrust washer

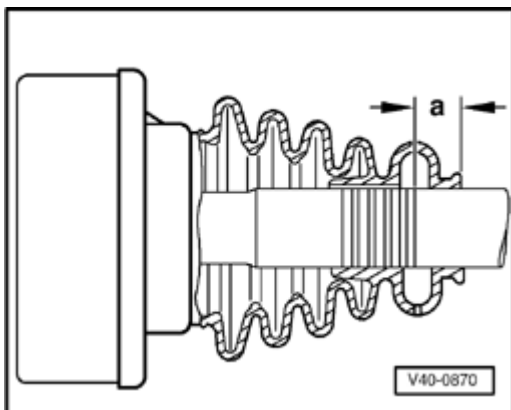


Pressing on inner constant velocity joint

- Press on joint up to stop.
- Insert circlip.

Note:

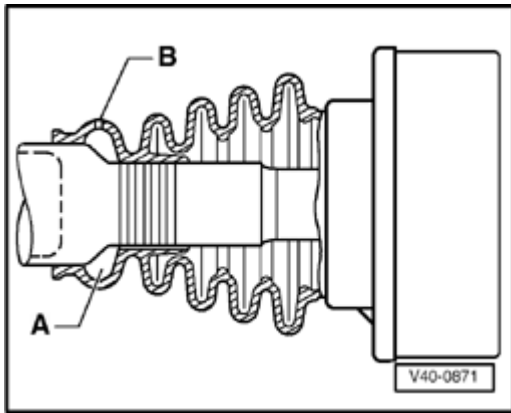
- n Chamfer on inner diameter of ball hub (splines) must face the contact shoulder on the axle shaft.



Installing joint protective boot on left axle shaft

Dimension - **a** - = 17 mm

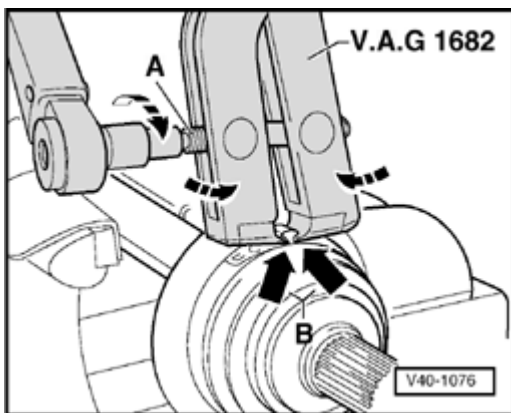
Before installing boot mark position, measure - **a** - (for example paint or adhesive tape). Under no circumstances should paint surface be damaged with a sharp tool.



Installing boot for constant velocity joint (right drive axle)

The vent chamber - **A** - must seat on tube.

B - Vent hole



Tightening clamp on outer CV joint boot

- Install tightening clamp V.A.G 1682 as shown in illustration. Make sure that the jaws of the tension clamp seat in the corners - **arrows B** - of the hose clip.

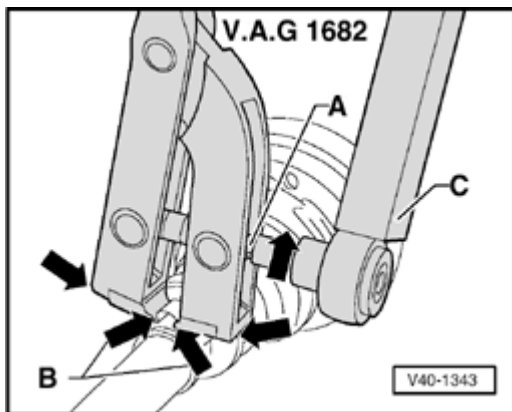
- Tighten hose clamp by turning the spindle with a torque wrench (do not bend tensioning clamp).

Note:

- n Due to the hard material of the joint boot (compared to rubber) makes it necessary to use a stainless steel hose clamp, it is only possible to tighten the hose clamp with clamping device V.A.G1682 .
- n Tightening torque: 25 Nm
- n Use torque wrench - **C** - with a range of 5 to 50 Nm

(e.g. V.A.G1331).

- n *Make sure the spindle thread - A - is not tight. If necessary lubricate with grease MOS 2 .*
- n *If the thread is tight e.g. dirty, the required tensioning force for the clamp will not be achieved in spite of correct tightening torque settings.*

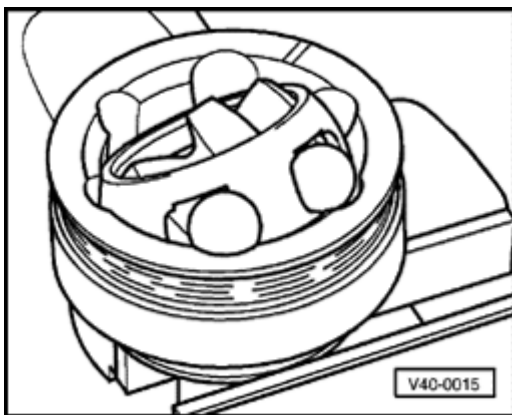


Tightening clamp for CV joint boot (inner, small dia.)

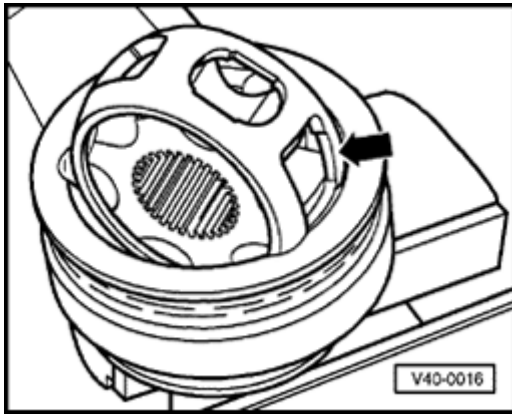
Outer constant velocity joint, checking

Joint must be disassembled to replace dirty grease or for checking the balls and ball tracks for wear and damage.

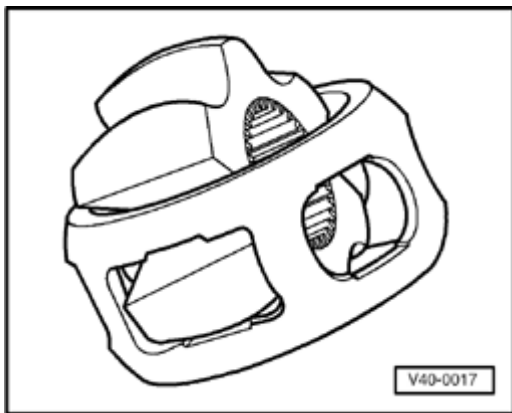
Removing



- Before disassembling mark ball hub position in relation to the ball cage and housing with an electric scriber or oil stone.
- Swivel ball hub and ball cage.
- Remove balls one after another.



- Turn cage until two rectangular windows - **arrow** - are aligned with joint housing.
- Lift out cage together with hub.



- Pivot segment of hub into rectangular cage opening.
- Tilt hub out of cage.

Note:

- n *The 6 balls of each joint belong to one tolerance group. Check stub axle, hub, cage and balls for small indentations (pitting) and signs of seizure. Excessive backlash in joint will be noticed as a knock during load changes, in such cases the joint must be replaced. Polished areas and ball track marks are not a reason for changing joint.*

Installing

- Press half of the total amount of grease 40 grams (1.4 oz.) into the joint body.
- Install cage with hub in the joint housing.
- Press in the balls one after another from opposite sides whereby the original position of the hub to cage and joint

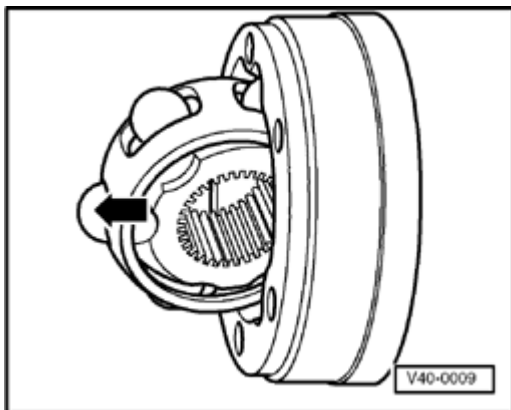
housing must be restored.

- Install new circlip in hub.
- Distribute remaining grease in constant velocity joint boot.

Inner constant velocity joint, checking

When checking the balls and ball tracks for wear and damage the joint should be disassembled to replace dirty grease.

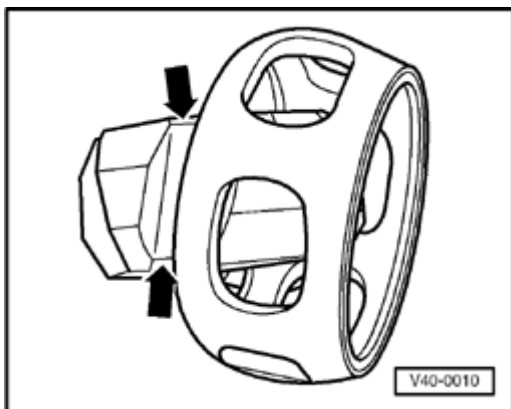
Removing



- Swivel ball hub and ball cage.
- Press out ball joint housing in direction of arrow.
- Press balls out of cage.

Note:

- n The ball hub and joint are paired. Must not be interchanged.



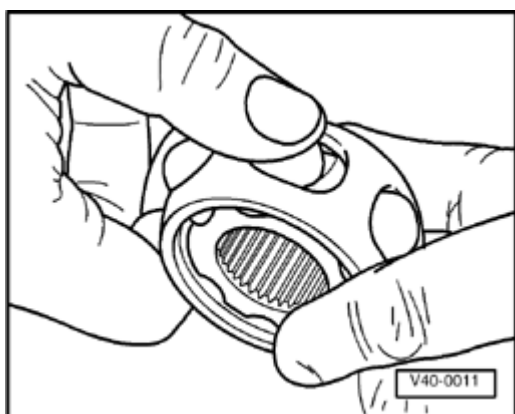
- Tilt ball hub out of ball cage over ball track - **arrow** - .
- Check joint housing, ball hub, ball cage and balls for

indentations (pitting) and signs of seizure.

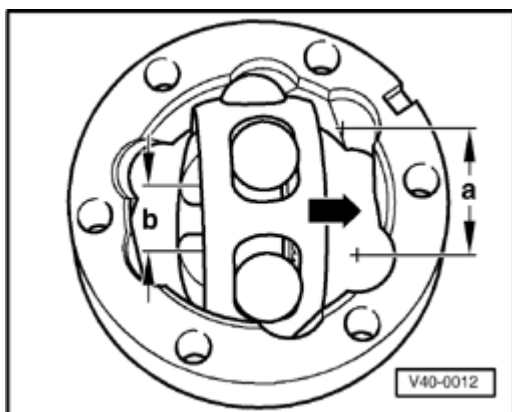
Note:

- n Excessive backlash in joint will be noticed as a knock during load changes. In such cases the joint must be replaced. Polished areas and ball track marks are not a reason for replacing joint.

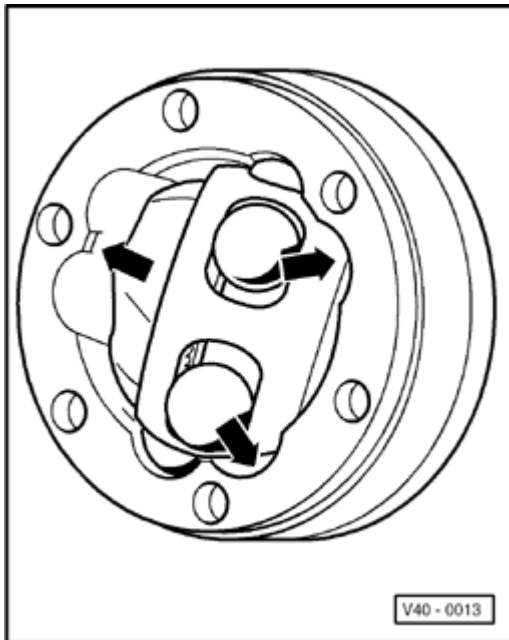
Installing



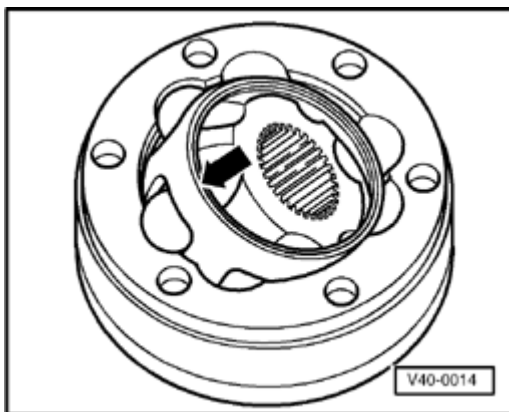
- Insert ball hub over both chamfers into ball cage. The hub can be installed in any position. Press balls into cage.
- Insert hub with cage and balls at right angle to the joint.



- n When inserting make sure that the wide space - **a** - on joint housing is aligned with narrow space - **b** - on hub after swivelling in.
- n Chamfer on inner diameter of ball hub (splines) must face larger diameter of joint housing.



- Install ball hub, whereby the hub must be swivelled out of cage - **arrows** - far enough to allow the balls to fit into ball tracks.

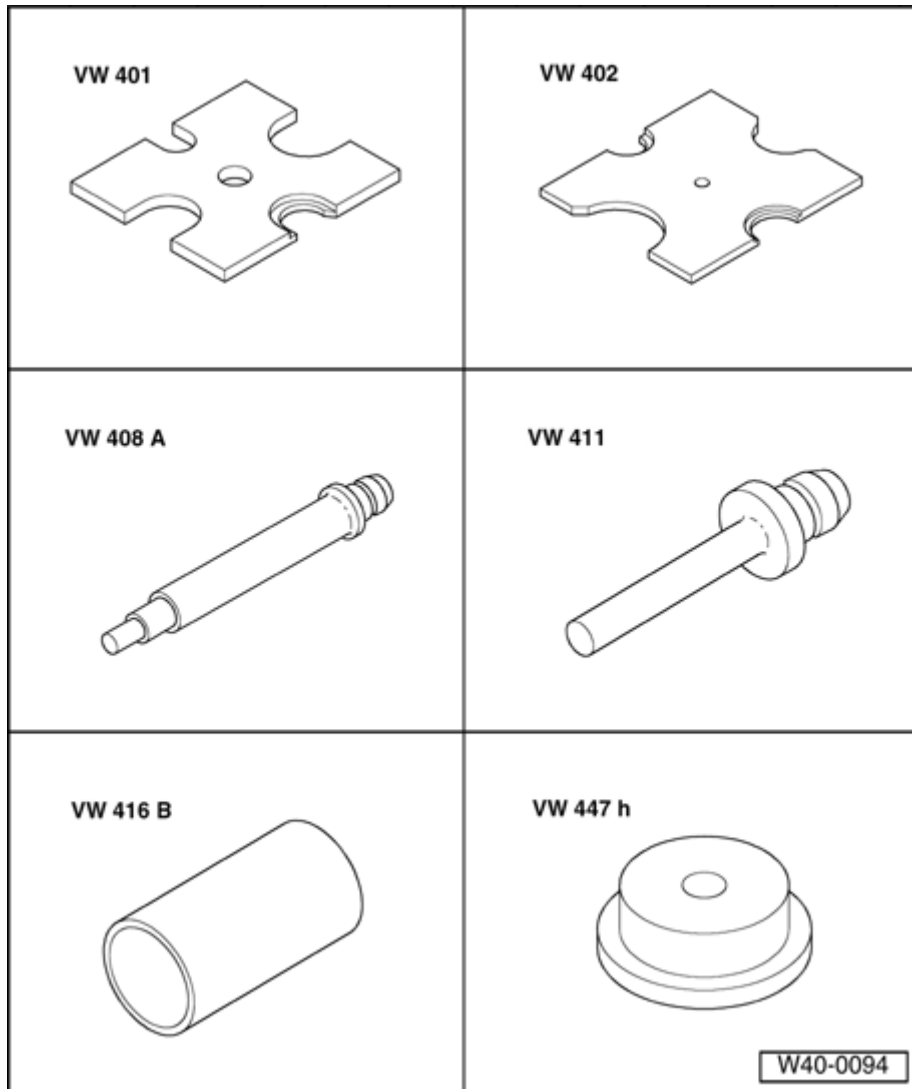


- Press cage firmly - **arrow** - until hub swings fully in position.

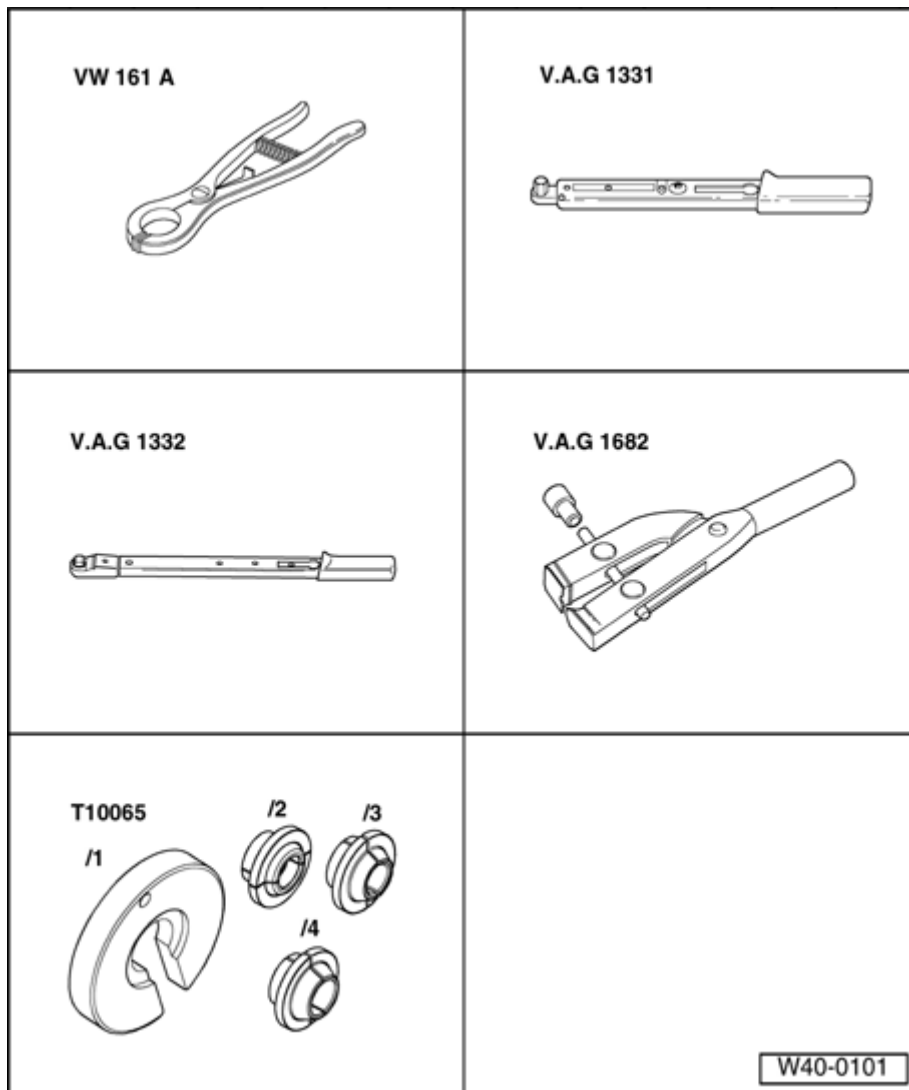
Check operation of constant velocity joint:

The CV joint is correctly assembled when the ball hub can be moved by hand backward and forward over its entire axial movement range.

II - Front axle shaft with constant velocity joint VL 3700, servicing

**Special tools, testers and auxiliary items required**

- n Thrust plate VW401
- n Thrust plate VW402
- n Punch VW408A
- n Punch VW411
- n Tube 37 mm dia. VW416B
- n Thrust pad VW447H



Special tools, testers and auxiliary items required

- n Circlip pliers VW161A
- n Torque wrench V.A.G1331
- n Torque wrench V.A.G1332
- n CV joint boot clamp tool V.A.G1682
- n Assembly tool T10065

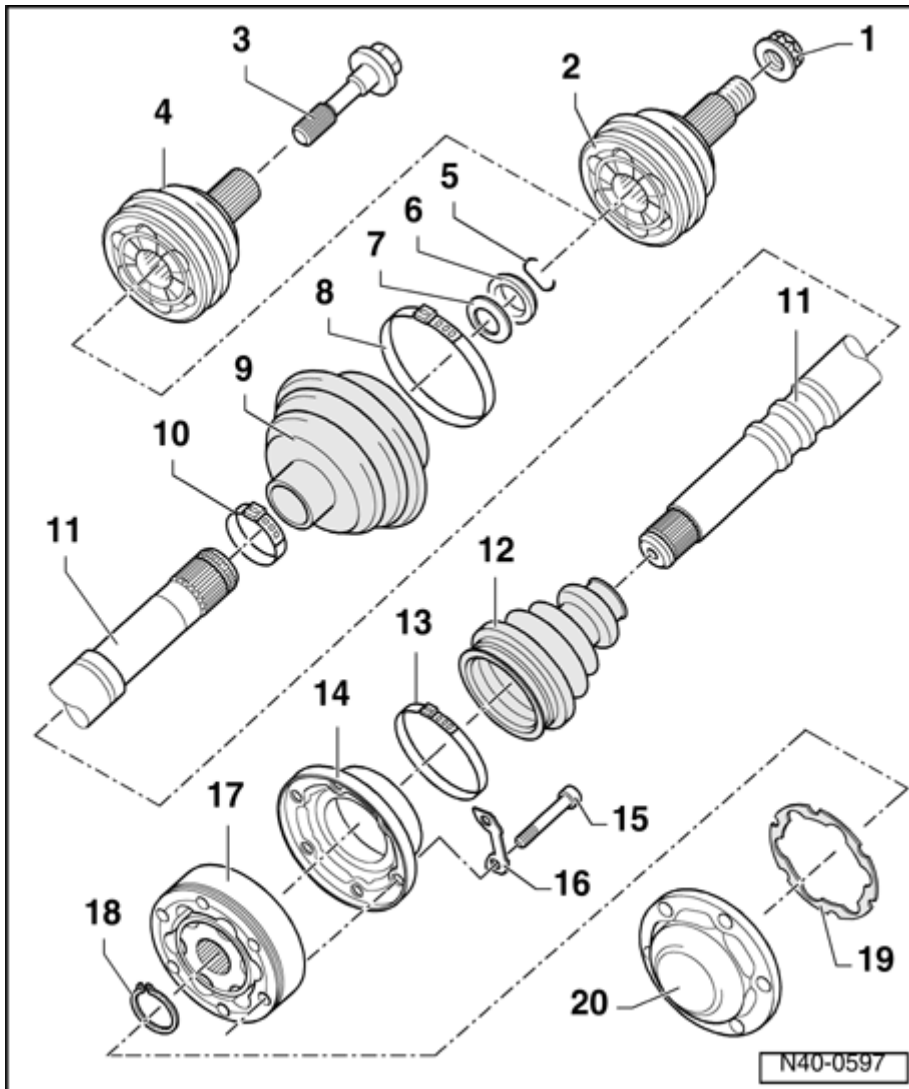
Grease quantity and type

Filling drive axle with high temperature grease. ⇒ See *Parts Catalog*

Grease	Amount in:
---------------	-------------------

Outer joint	Total quantity	Joint	Protective boot
mm	[g]	[g]	[g]
98	120	80	40
Inner joint			
mm			
108	120	60	60

Regrease joint, if necessary, when replacing the protective boot.



1. Self-locking 12-point nut

- ; Tightening ⇒ [40-5, Installing](#)
- ; Any paint residue and/or corrosion on thread of outer joint must be removed before nut is installed.
- ; Always replace

2. Outer constant velocity joint

- i Replace as a unit
- i Removing ⇒ [40-5, Removing outer constant velocity joint](#)
- i Installing: Using a plastic hammer, drive onto shaft as far as the stop
- i Checking ⇒ [40-5, Outer constant velocity joint, checking](#)
- i Greasing ⇒ [40-5,](#)

3. Hex bolt

- i Tightening ⇒ [40-5, Installing](#)
- i Any paint residue and/or corrosion on thread of outer joint must be removed before nut is installed.
- i Always replace

4. Outer constant velocity joint

- i For special models "GolfGT1132kW" and "R32"
- i Replace as a unit
- i Removing ⇒ [40-5, Removing outer constant velocity joint](#)
- i Installing: Using a plastic hammer, drive onto shaft as far as the stop
- i Checking ⇒ [40-5, Outer constant velocity joint, checking](#)
- i Greasing ⇒ [40-5,](#)

5. Circlip

- i Always replace
- i Insert in shaft groove

6. Thrust washer

- i Installation location ⇒ [40-5, Installing spring washer and thrust washer on outer joint](#)

7. Spring washer

- i Installation location ⇒ [40-5, Installing spring washer and thrust washer on outer joint](#)

8. Clamp

- i Always replace
- i Tightening with pliers
V.A.G1682 ⇒ [40-5, Tightening clamp on outer CV joint boot](#)

9. Protective boot

- i Check for tears and chafing
- i Material: Hytrel
(Polyelastomer)

10. Clamp

- i Always replace
- i Tightening ⇒ [40-5, Tightening clamp for CV joint boot \(inner, small dia.\)](#)

11. Axle shaft

12. Protective boot for inner constant velocity joint

- i Material: Rubber
- i With vent hole
- i Check for tears and chafing, replace if necessary

13. Clamp

- i Always replace

14. Cover

- i Carefully drive off with a drift
- i Before installing on constant velocity joint, coat sealing surface with D454300A2
- i Adhesive surface must be free of oil and grease

15. Multi-point socket head bolt

- i Tighten diagonally to 10 Nm
- i Tighten to 70 Nm
- i Always replace

16. Plate**17. Inner constant velocity joint**

- i Replace as a unit
- i Pressing off ⇒ [40-5, Pressing off inner constant velocity joint](#)
- i Pressing on ⇒ [40-5, Pressing on inner constant velocity joint](#)
- i Checking ⇒ [40-5, Inner constant velocity joint, checking](#)
- i Adhesive surface must be free of oil and grease
- i Greasing ⇒ [40-5,](#)

18. Circlip

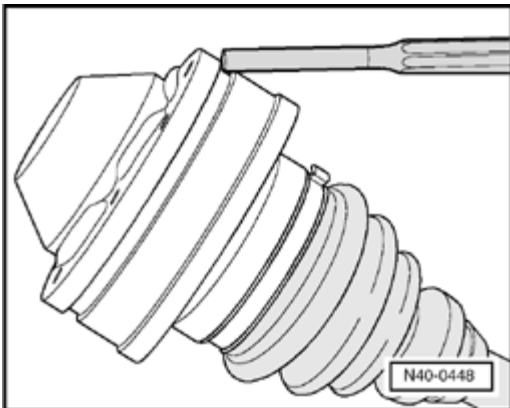
- i Always replace

19. Gasket

- i Replacing. Pull off protective foil and stick into joint.

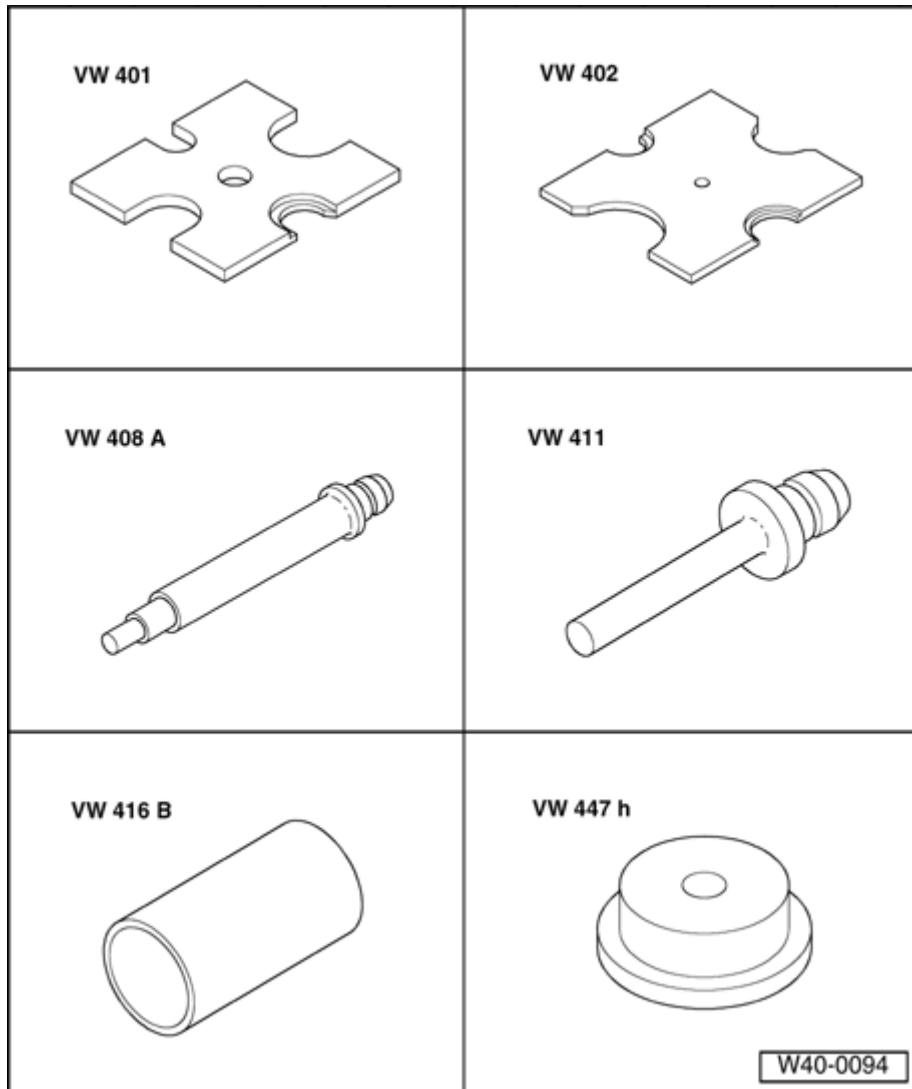
20. Cover

- ; Carefully drive off with a drift
⇒ [40-5, Drive off cover for inner joint](#)
- ; Adhesive surface must be free of oil and grease
- ; Before installing on constant velocity joint, coat sealing surface with D454300A2

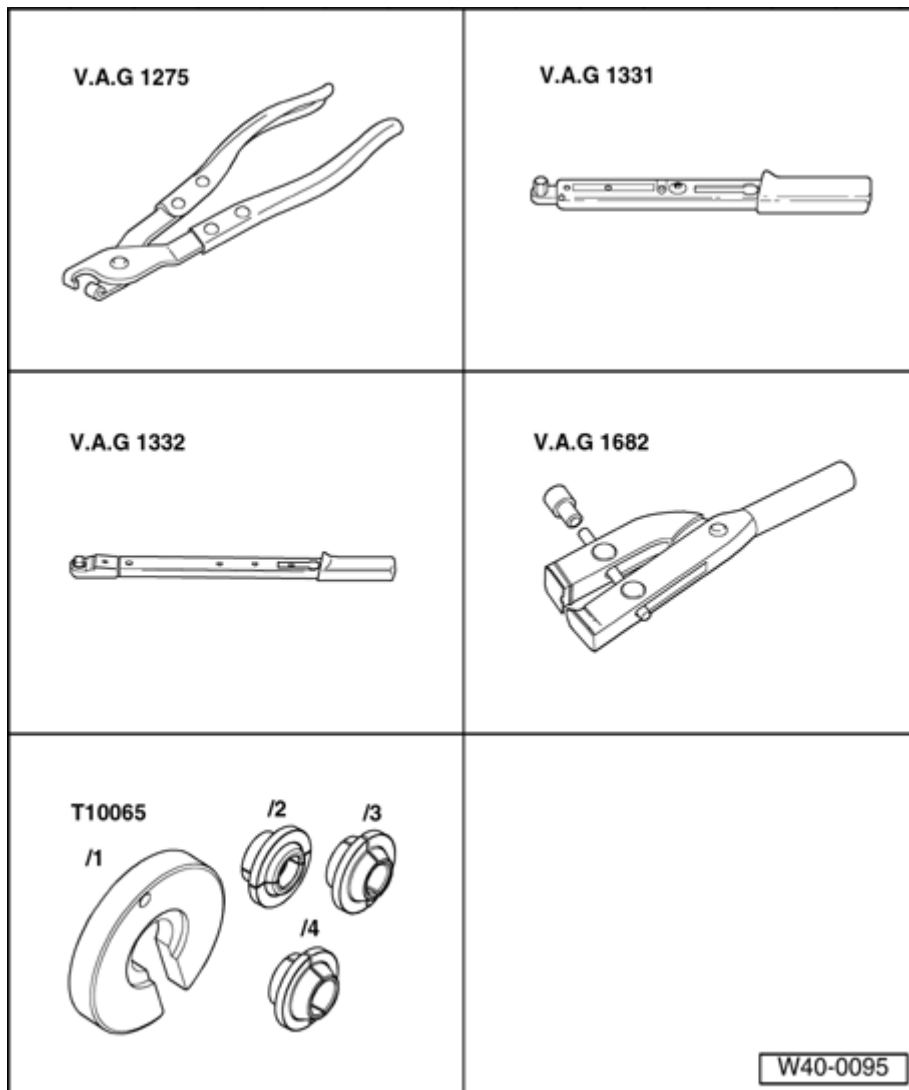


Drive off cover for inner joint

III - Axle shaft with triple roller joint AAR 2000, servicing

**Special tools, testers and auxiliary items required**

- n Thrust plate VW401
- n Thrust plate VW402
- n Punch VW408A
- n Punch VW411
- n Tube 37 mm dia. VW416B
- n Thrust pad VW447H



Special tools, testers and auxiliary items required

- n CV joint boot clamp tool V.A.G1275
- n Torque wrench V.A.G1331
- n Torque wrench V.A.G1332
- n CV joint boot clamp tool V.A.G1682
- n Assembly tool T10065

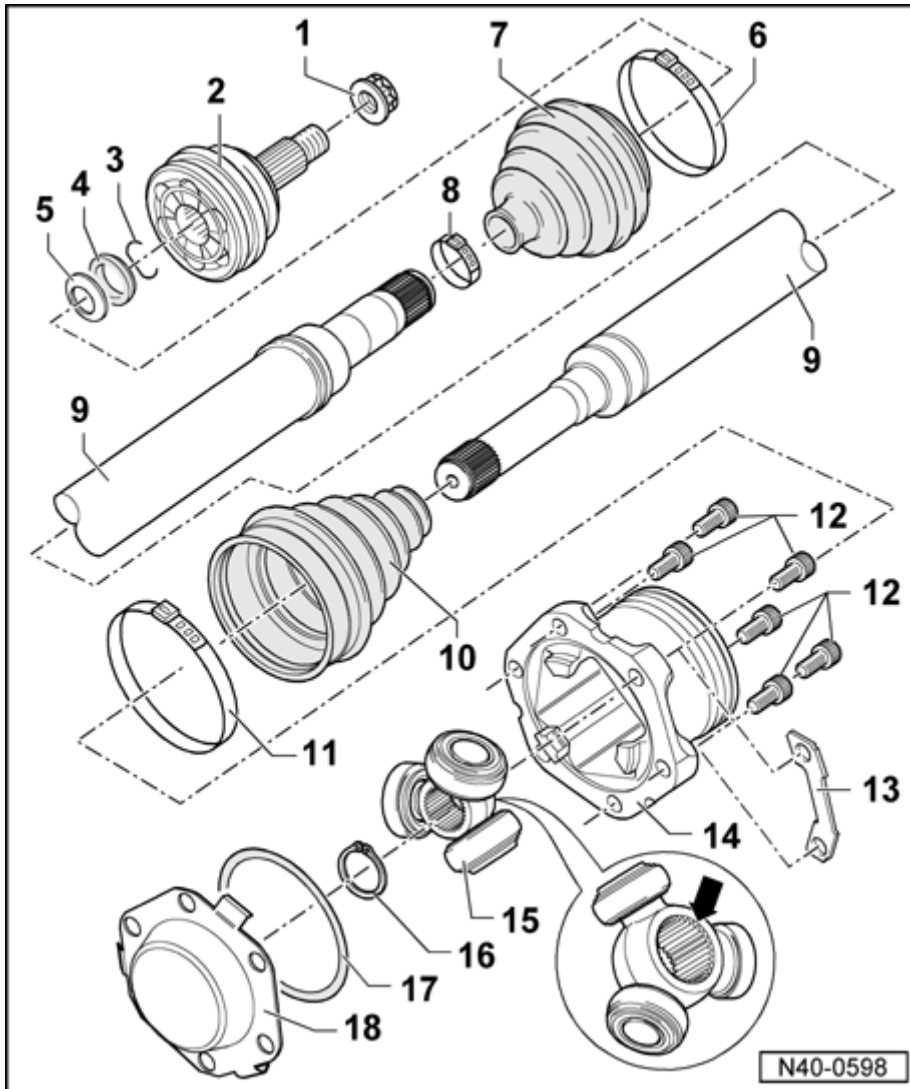
Grease quantity and type

Filling drive axle with high temperature grease. ⇒ See *Parts Catalog*

Outer joint	Grease Total quantity	Joint	Amount in: Protective boot
-------------	--------------------------	-------	-------------------------------

mm	[g]	[g]	[g]
90	100	50	50
Inner joint			
mm			
100	110	55	55
108	110	55	55

Regrease joint, if necessary, when replacing the protective boot.



1. Self-locking 12-point nut

- Tightening ⇒ [40-5, Installing](#)
- Any paint residue and/or corrosion on thread of outer joint must be removed before nut is installed.

2. Outer constant velocity joint

- i Replace as a unit
- i Removing ⇒ [40-5, Removing outer constant velocity joint](#)
- i Installing: Drive onto shaft with plastic hammer until compressed circlip seats.
- i Checking ⇒ [40-5, Outer constant velocity joint, checking](#)
- i Greasing ⇒ [40-5,](#)

3. Circlip

- i Insert in groove in shaft

4. Thrust washer

- i Installation location ⇒ [40-5, Installing spring washer and thrust washer on outer joint](#)

5. Spring washer

- i Outer diameter (concave side) contacts thrust washer

6. Clamp

- i Always replace
- i Tightening with pliers V.A.G1682 ⇒ [40-5, Tightening clamp on outer CV joint boot](#)

7. Constant velocity joint boots

- i Check for tears and chafing

8. Clamp

- i Always replace
- i Tightening ⇒ [40-5, Tightening clamp for CV joint boot \(inner, small dia.\)](#)

9. Axle shaft

10. Triple roller joint boot

- ; Check for tears and chafing

11. Clamp

For triple rotor star

- ; Always replace
- ; Tightening

12. Multi-point socket head bolt

Tightening torques: ⇒ [40-5.](#)

13. Plate

Is only on joints with 108mm dia.

14. Triple roller joint housing

15. Triple rotor star with rollers

The chamfer - arrow - points to axle shaft splines.

16. Circlip

- ; Always replace

17. O-ring

- ; Always replace

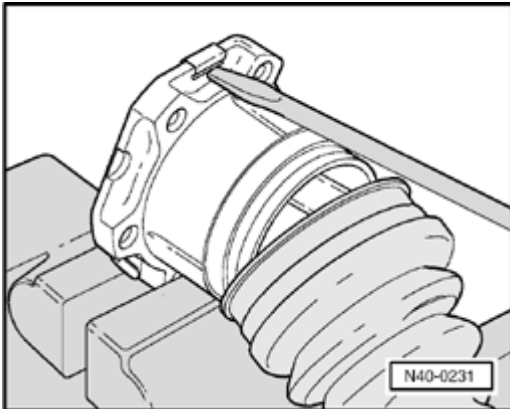
18. Cover

- ; Always replace

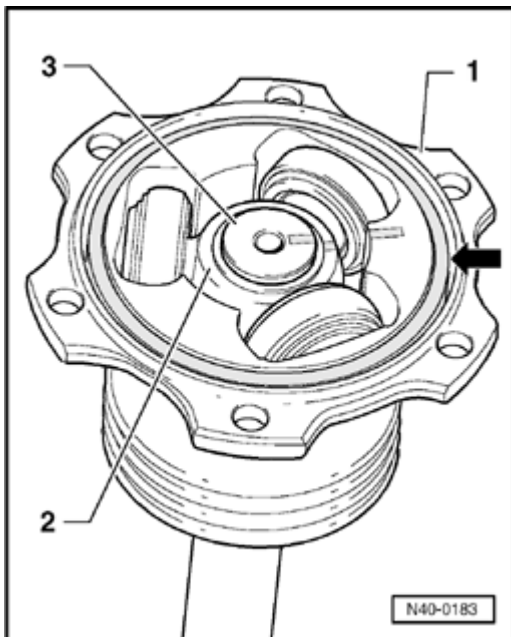
Triple roller joint, disassembling and assembling

Disassembling

- Open clamp on joint and slide back protective boot.



- Open out plate tabs with a flat screwdriver and pry off cover.



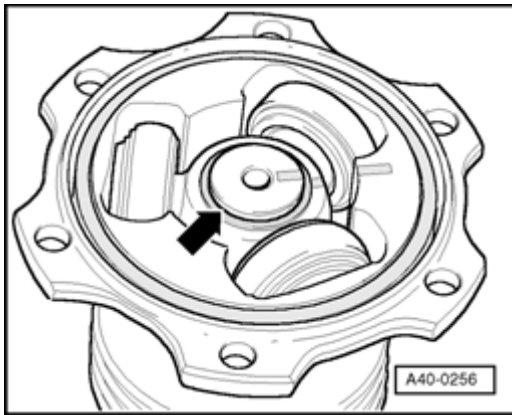
- installation position of parts - **1 to 3** - mark by lines.

If the parts are not marked when assembling, the components are not brought back to their original installation position. It is then possible that it will be noisy when driving.

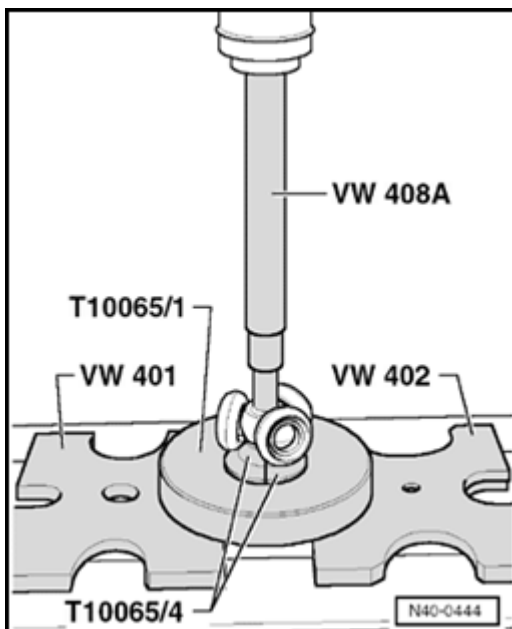
A waterproof felt tipped pen is suitable for marking.

- 1 - Triple roller joint housing
- 2 - Triple roller star
- 3 - Axle shaft

- Take O-ring - **arrow** - out of groove.



- Remove circlip - **arrow** - .
- Hold joint and take axle shaft out of vice.
- Insert axle shaft in press.



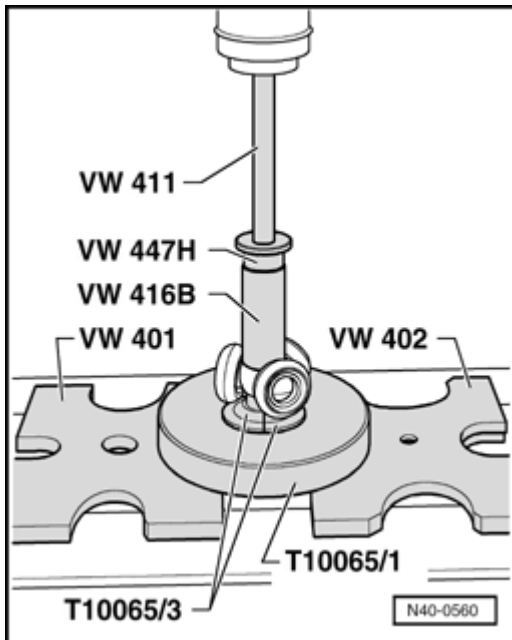
- Hold axle shaft, then press triple roller star off axle shaft.
- Remove triple roller star with rollers and place on a clean surface.
- Pull CV joint off shaft.
- Pull protective boot off shaft.
- Clean shaft, joint and groove for oil seal.

Assembling

- Slide CV joint protective boot onto shaft.
- Slide CV joint onto shaft.

Assembling triple roller star

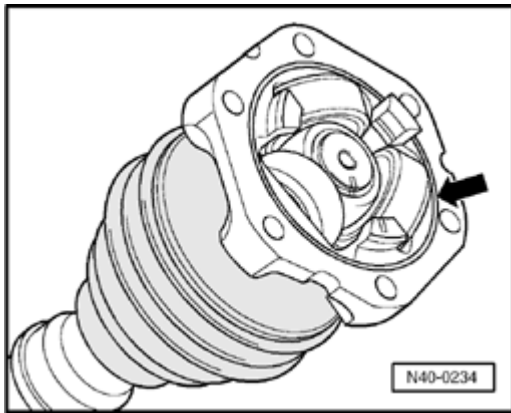
The chamfer on triple roller star faces toward shaft, this is used as an assembly aid.



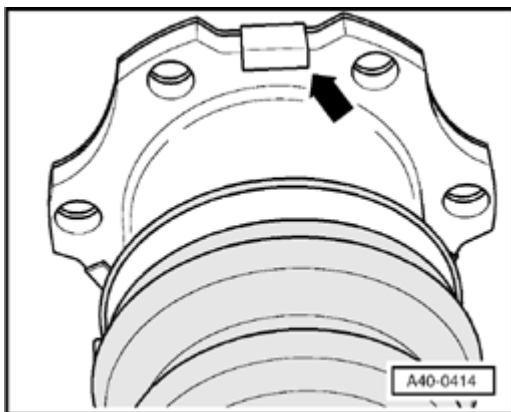
- Install triple roller star onto shaft as per markings and press in to stop.
- Insert circlip, make sure seated correctly.
- Slide joint over rollers and hold.
- Press half of joint grease from repair set into triple roller joint.
- Press the other half of joint grease from repair set into reverse side of triple roller joint.
- Install joint protective boot.

The ridge in CV joint protective boot must seat in joint groove.

- Remove axle shaft from vice and tighten joint in vice.

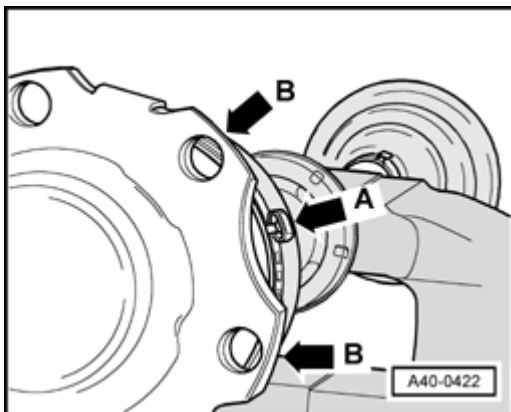


- Insert new seal - **arrow** - from repair kit into groove.



- Install new cover to joint. Position plate tabs on the grooved surfaces from joint - **arrow** - .

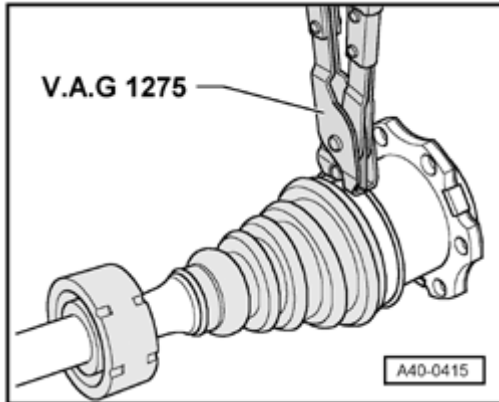
The holes of cover and joint must align.



- Install boot clamp.

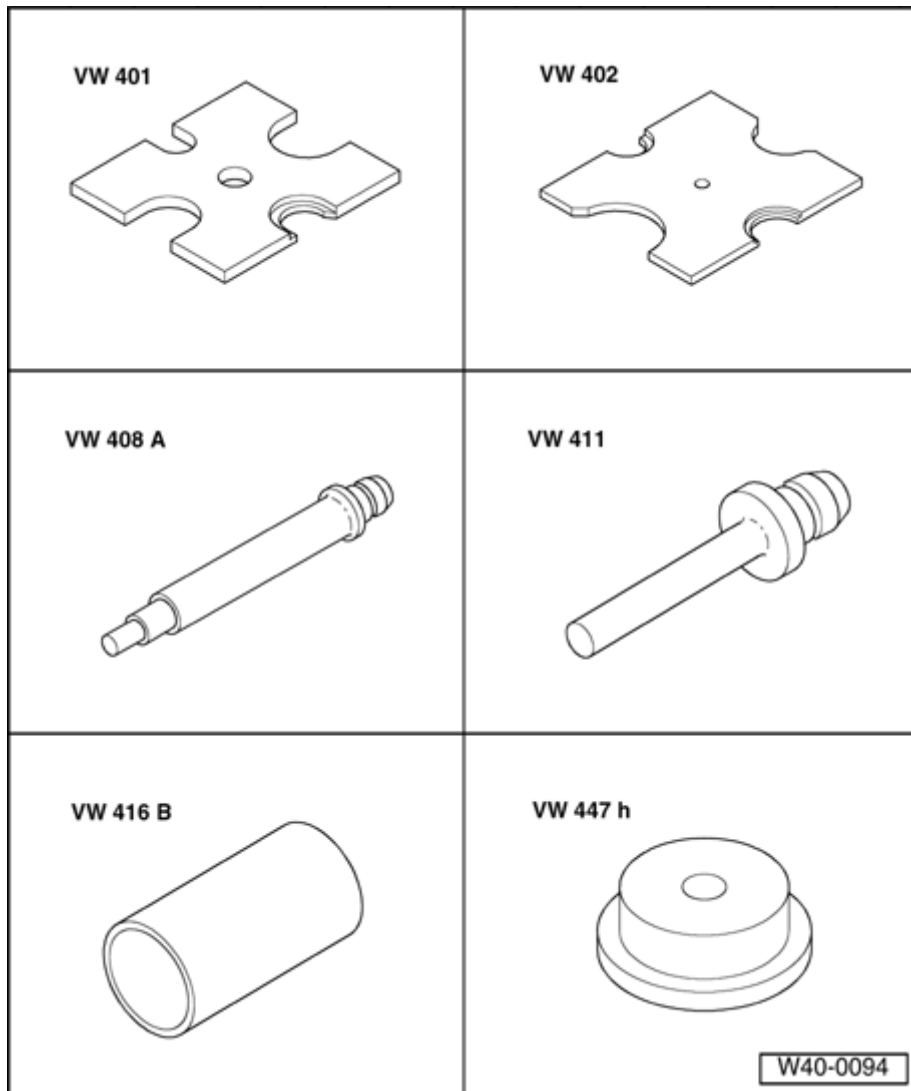
Note:

- n For a better alignment of the multi-point socket head bolts when mounting the axle shaft, it is necessary that the clamping ear of the clamp - **arrow A** - is placed between the fixing flanges from the joint - **arrow B** - .



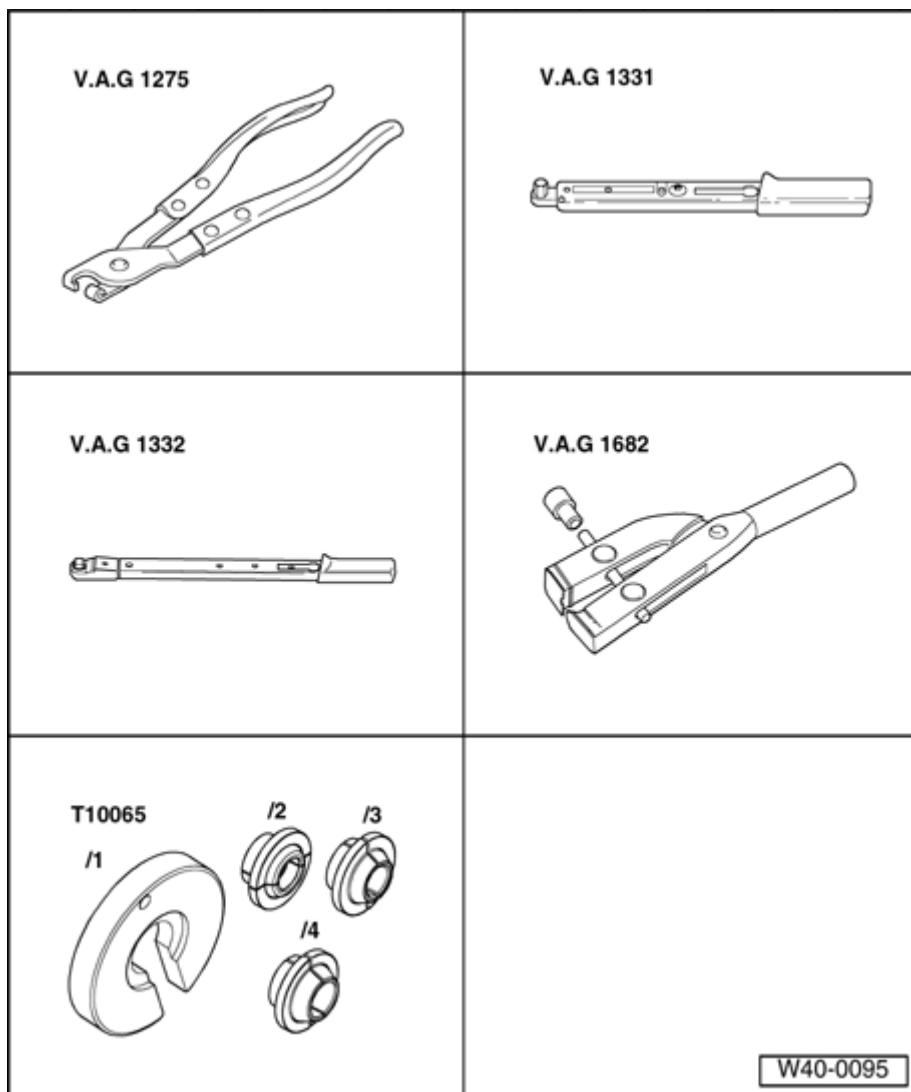
- Tighten clamp with hose clamp pliers V.A.G1275 .

IV - Drive axle with triple roller joint AAR 2900, servicing



Special tools, testers and auxiliary items required

- n Thrust plate VW401
- n Thrust plate VW402
- n Punch VW408A
- n Punch VW411
- n Tube 37 mm dia. VW416B
- n Thrust pad VW447H



Special tools, testers and auxiliary items required

- n CV joint boot clamp tool V.A.G1275
- n Torque wrench V.A.G1331
- n Torque wrench V.A.G1332

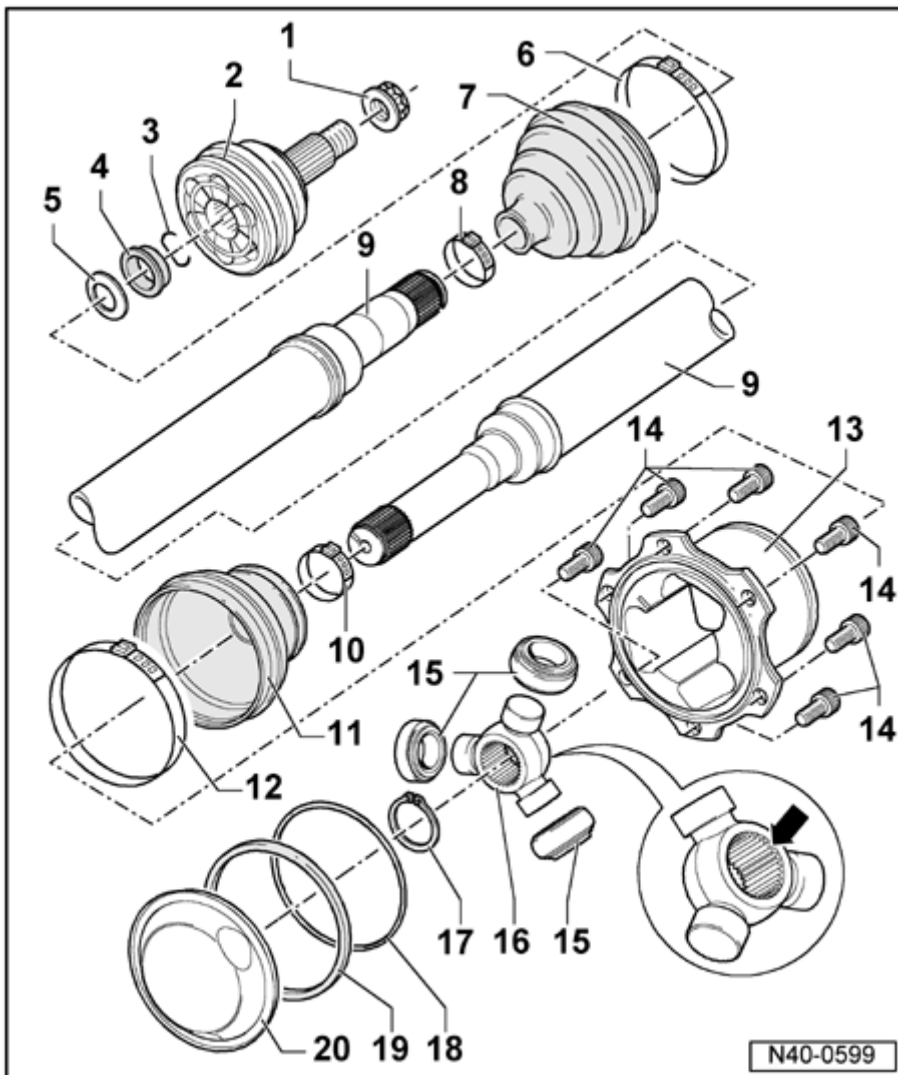
- n CV joint boot clamp tool V.A.G1682
- n Assembly tool T10065

Grease quantity and type

Filling axle shaft with high temperature grease. ⇒ See *Parts Catalog*

Outer joint	Grease		Amount of:
	Total quantity	Joint	
mm	[g]	[g]	[g]
90	100	50	50
Inner joint			
mm			
124	140	70	70

Regrease joint, if necessary, when replacing the protective boot.



1. Self-locking 12-point nut

- i Tightening ⇒ [40-5, Installing](#)
- i Any paint residue and/or corrosion on thread of outer joint must be removed before nut is installed.
- i Always replace

2. Outer constant velocity joint

- i Replace as a unit
- i Removing ⇒ [40-5, Removing outer constant velocity joint](#)
- i Installing: Drive onto shaft with plastic hammer until compressed circlip seats.
- i Checking ⇒ [40-5, Outer constant velocity joint, checking](#)
- i Greasing ⇒ [40-5,](#)

3. Circlip

- i Always replace
- i Insert in shaft groove

4. Thrust washer

- i Installation location ⇒ [40-5, Installing spring washer and thrust washer on outer joint](#)

5. Spring washer

- i Installation location ⇒ [40-5, Installing spring washer and thrust washer on outer joint](#)

6. Clamp

- i Always replace
- i Tightening with pliers

V.A.G1682 ⇒ [40-5, Tightening clamp on outer CV joint boot](#)

7. Constant velocity joint boots

- i Check for tears and chafing
- i Material: Hytrel (Polyelastomer)

8. Clamp

- i Always replace
- i Tightening ⇒ [40-5, Tightening clamp for CV joint boot \(inner, small dia.\)](#)

9. Axle shaft

10. Clamp

- i Always replace
- i Tightening

11. Triple roller joint boot

- i Check for tears and chafing

12. Clamp

- i Always replace
- i Tightening

13. Triple roller joint housing

14. Multi-point socket head bolt

- i M 8 x 18

Tightening torques: ⇒ [40-5,](#)

15. Rollers

16. Triple roller star

The chamfer - arrow - points to axle shaft splines.

17. Circlip

- ; Always replace
- ; Insert in groove in shaft

18. O-ring

Is no longer required for assembly.

19. Rectangular section seal

This oil seal is part of the repair kit. It is not installed during manufacturing.

No longer supplied as a replacement part. In the future a new repair kit will be supplied.

20. Cover

Destroyed when disassembling.

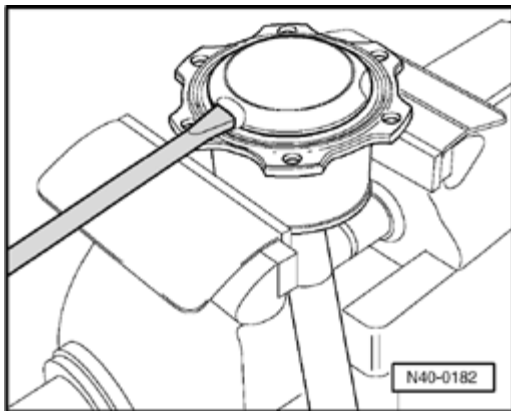
No longer required when assembling and is therefore no longer supplied as a spare part.

A new cover is included in the repair kit.

Triple-rotor joint AAR 2900, disassembling and assembling

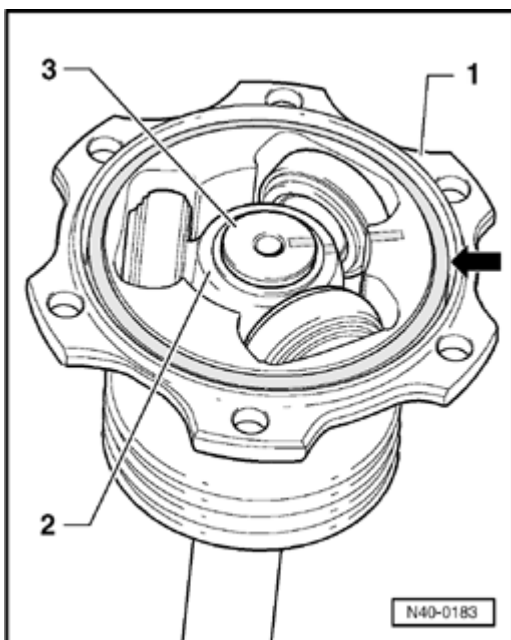
Disassembling

- Open clamp on joint and slide back protective boot.
- Open clamp on shaft and slide back joint protective boot.



- Drive screwdriver or similar into cover and pry off cover.

If the cover cannot be pried off, we recommend that a screwdriver is driven in on the opposite side, then pry off cover.



- Mark installation position of part - **1 to 3** - .

It is only necessary to mark parts when the rollers are pulled off the triple roller star.

If parts are not marked when assembling, the components are not brought back to their original installation position. It is then possible that it will be noisy when driving.

A waterproof felt tipped pen is suitable for marking.

- Take rubber ring - **arrow** - out of groove.

1 - Triple roller joint housing

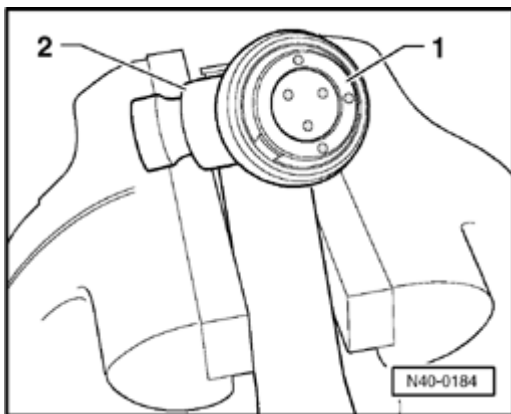
2 - Triple roller star

3 - Axle shaft

- Hold joint and take axle shaft out of vice.

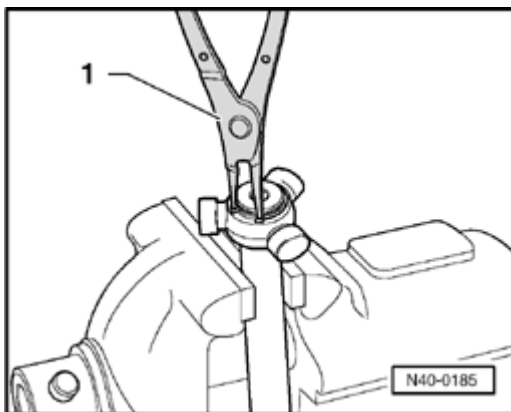
Make sure that the rollers do not slide off triple roller star and fall on ground!

- Hold axle shaft and joint horizontal and using the other hand slowly slide joint back.



- Mark installation position of rollers - 1 - to triple roller star - 2 - using a felt tipped pen.

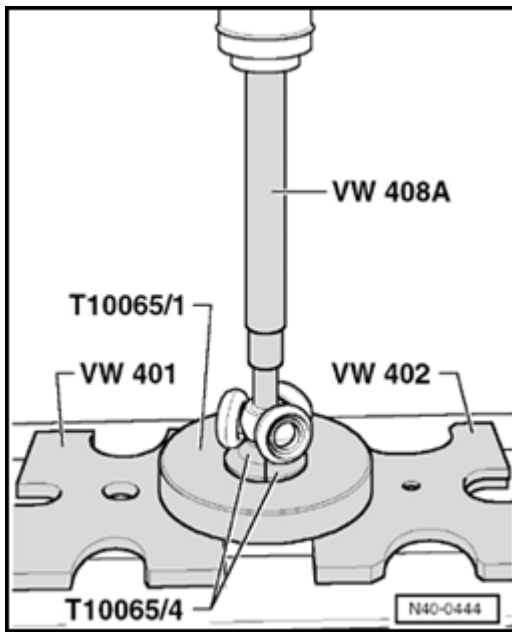
- Remove rollers - 1 - and place on a clean surface.



- Remove circlip.

1 - Pliers (commercially available)

- Insert axle shaft in press.



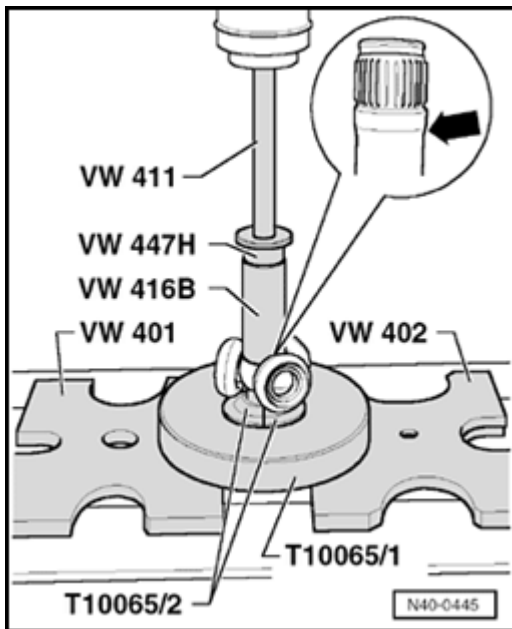
- Hold axle shaft, then press triple roller star off axle shaft.
- Pull joint with protective boot off shaft.
- Clean shaft, joint and groove for oil seal.

Assembling

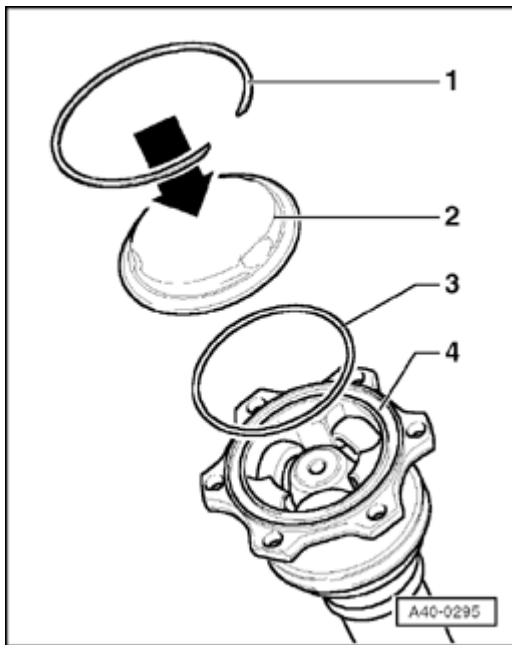
- Slide small clamp for joint protective boot onto shaft.
- Slide joint protective boot onto shaft.
- Slide joint onto shaft.

Assembling triple roller star

The chamfer on triple roller star faces toward shaft, this is used as an assembly aid.



- Install triple roller star onto shaft and press onto stop.
- Make sure that the pressure does not exceed 3.0 t!
- If necessary coat axle shaft splines and triple-roller star with lubricating paste G 052142A2 .
- Insert circlip, make sure seated correctly.
- Install rollers onto triple roller star as per markings.
- Slide joint over rollers and hold.
- Press 70 grams of joint grease, from repair kit, into triple roller joint.
- Press 70 grams of joint grease, from repair kit, into reverse side of triple roller joint and protective boot.



- Place seal - 3 - from repair kit in groove - 4 - of triple roller joint.

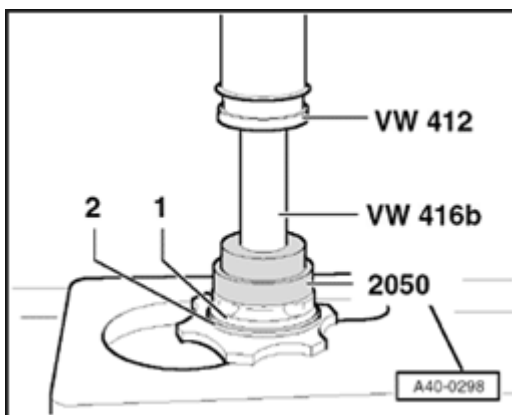
1 - Circlip

2 - Cover from repair kit

3 - O-ring

4 - Triple roller joint housing

- Insert axle shaft in press.

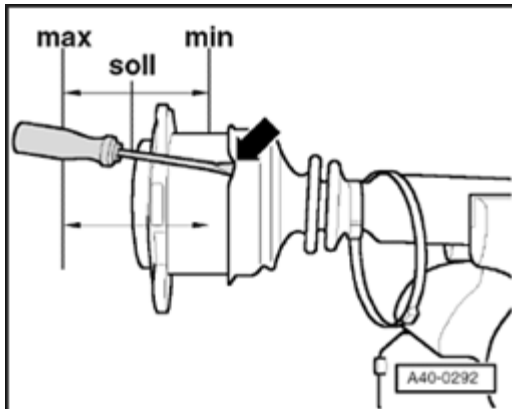


- Press cover - 1 - into triple roller joint until circlip can be installed.

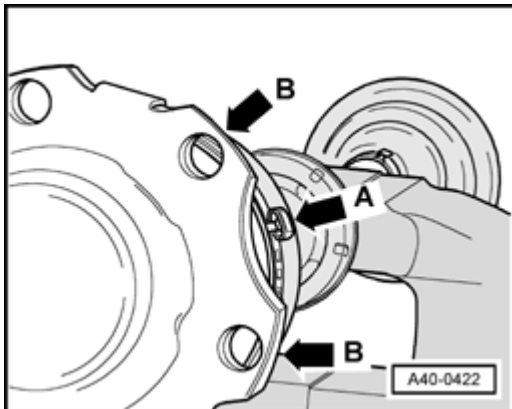
- Insert circlip, make sure seated correctly.

The circlip must be audibly engaged when it seats!

- Install joint protective boot.



- Position triple roller joint approximately in middle of sliding part. See distance between min. and max.
- Hold triple roller joint in this position and lift boot slightly - **arrow** - .

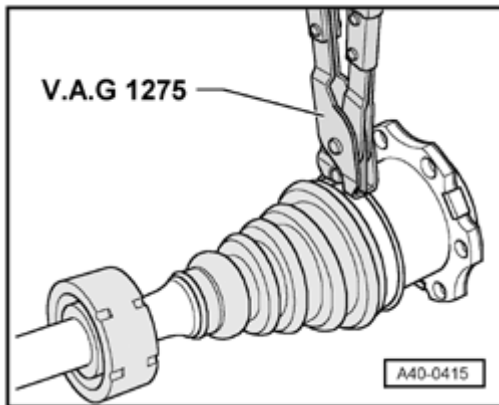


- Install clamp.

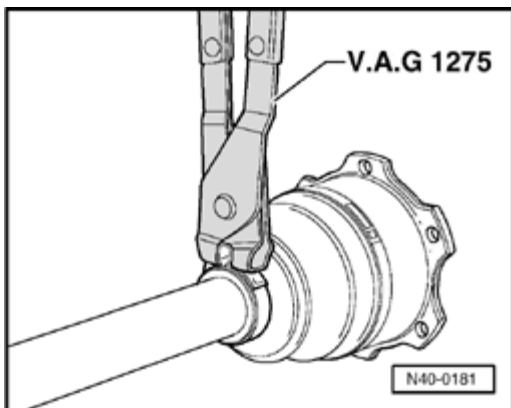
This allows a possible vacuum inside the boot to escape.

Note:

- n For a better alignment of the multi-point socket head bolts when mounting the axle shaft, it is necessary that the clamping ear of the clamp - **arrow A** - is placed between fixing flanges from joint - **arrow B** - .

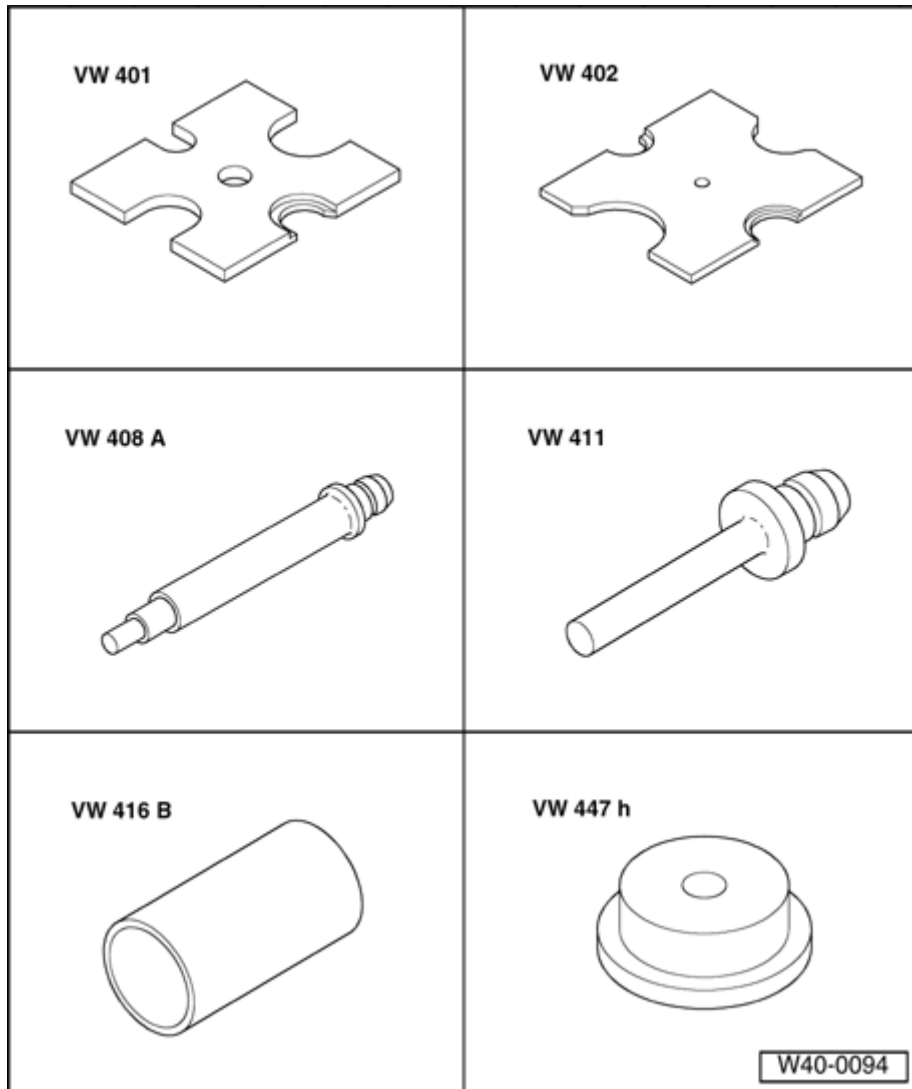


- Tighten clamp with hose clamp pliers V.A.G1275 .



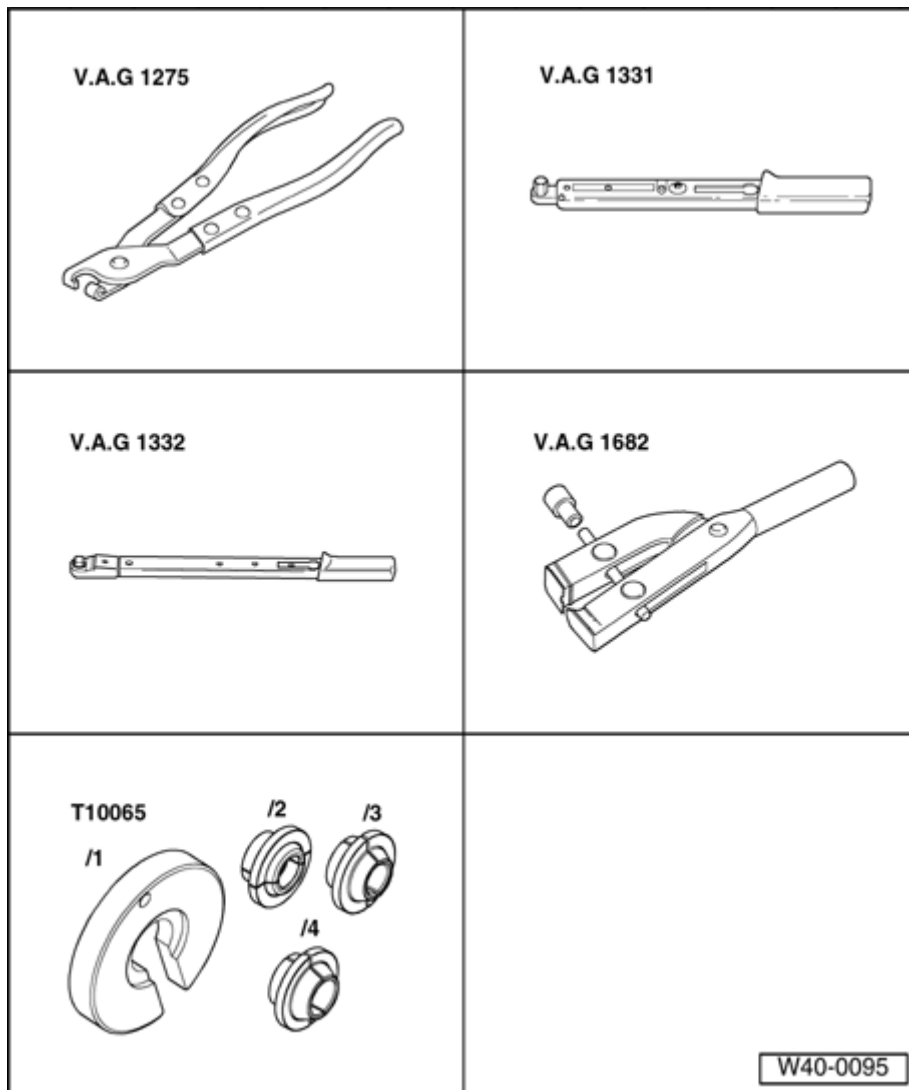
- Tighten clamp with hose clamp pliers V.A.G1275 .

V - Drive axle with triple roller joint AAR 3300i, servicing



Special tools, testers and auxiliary items required

- n Thrust plate VW401
- n Thrust plate VW402
- n Punch VW408A
- n Punch VW411
- n Tube 37 mm dia. VW416B
- n Thrust pad VW447H



Special tools, testers and auxiliary items required

- n CV joint boot clamp tool V.A.G1275
- n Torque wrench V.A.G1331
- n Torque wrench V.A.G1332
- n CV joint boot clamp tool V.A.G1682
- n Assembly tool T10065

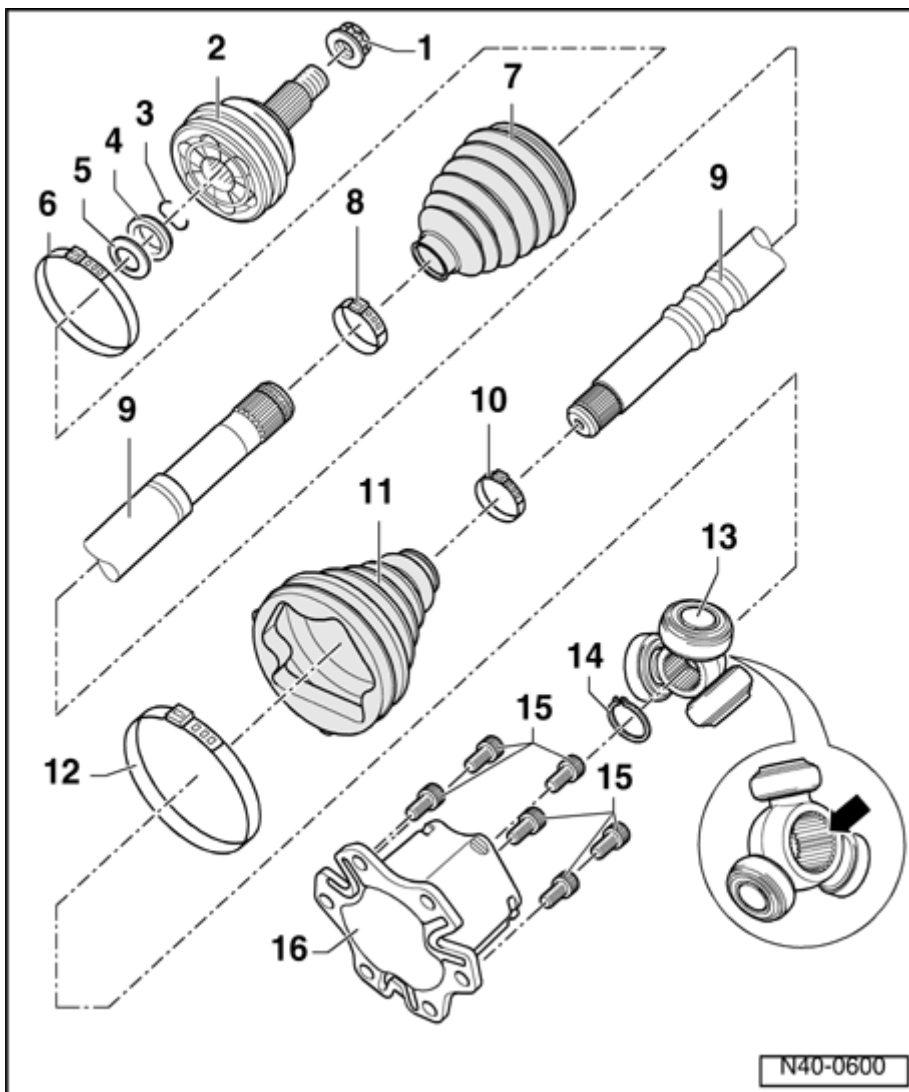
Grease quantity and type

Filling axle shaft with high temperature grease. ⇒ See *Parts Catalog*

Outer joint	Grease Total quantity	Joint	Amount of: Protective boot
-------------	--------------------------	-------	-------------------------------

mm	[g]	[g]	[g]
98	120	80	40
Inner joint			
mm			
123	130	70	60

Regrease joint, if necessary, when replacing the protective boot.



1. Self-locking 12-point nut

- ı Tightening ⇒ [40-5, Installing](#)
- ı Any paint residue and/or corrosion on thread of outer joint must be removed before nut is installed.
- ı Always replace

2. Outer constant velocity joint

- i Replace as a unit
- i Removing ⇒ [40-5, Removing outer constant velocity joint](#)
- i Installing: Drive onto shaft with plastic hammer until securing ring engages.
- i Greasing ⇒ [40-5,](#)
- i Checking ⇒ [40-5, Outer constant velocity joint, checking](#)

3. Circlip

- i Always replace
- i Insert in shaft groove

4. Thrust washer

- i Installation location ⇒ [40-5, Installing spring washer and thrust washer on outer joint](#)

5. Spring washer

- i Installation location ⇒ [40-5, Installing spring washer and thrust washer on outer joint](#)

6. Clamp

- i Always replace
- i Tightening with pliers
V.A.G1682 ⇒ [40-5, Tightening clamp on outer CV joint boot](#)

7. Constant velocity joint boots

- i Check for tears and chafing
- i Material: Hytrel
(Polyelastomer)

8. Clamp

- ; Always replace
- ; Tightening ⇒ [40-5, Tightening clamp for CV joint boot \(inner, small dia.\)](#)

9. Axle shaft

10. Clamp

- ; Always replace
- ; Tightening

11. Triple roller joint boot

- ; Check for tears and chafing

12. Clamp

- ; Always replace
- ; Tightening

13. Triple rotor star with rollers

The chamfer - arrow - points to axle shaft splines.

14. Circlip

- ; Always replace
- ; Insert in groove in shaft

15. Multi-point socket head bolt

Tightening torques: ⇒ [40-5,](#)

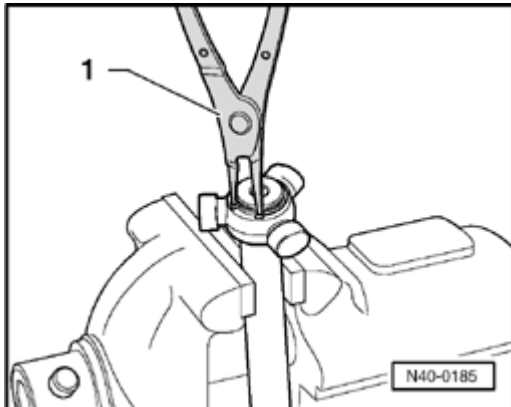
16. Triple roller joint housing

Triple-rotor joint AAR 3300i, disassembling and assembling

Disassembling

- Open clamp on joint and slide back protective boot.

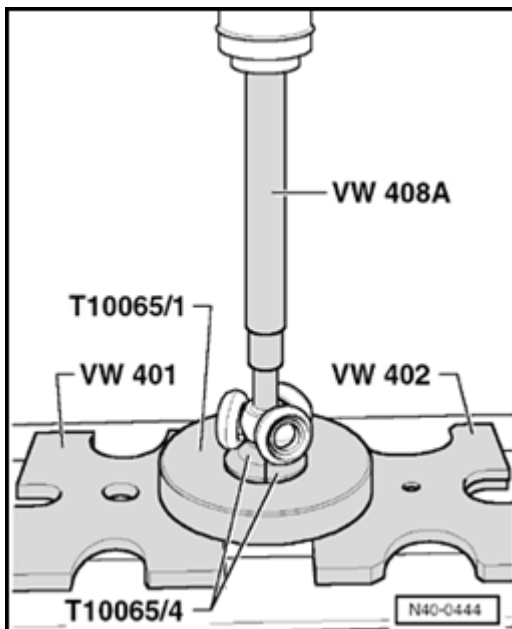
- Open clamp on shaft and slide back joint protective boot.
- Pull joint off axle shaft.



- Remove circlip.

1 - Pliers (commercially available) VW161A

- Insert axle shaft into press.



- Press out star off axle shaft.
- Pull protective boot off shaft.
- Clean shaft, joint and groove for oil seal.

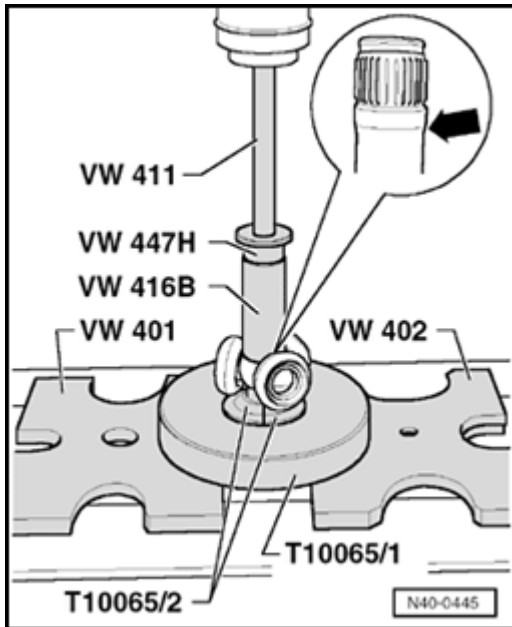
Assembling

- Slide small clamp for joint protective boot onto shaft.
- Slide joint protective boot onto shaft.
- Slide joint onto shaft.

Assembling triple roller star

Conical-type axle shaft

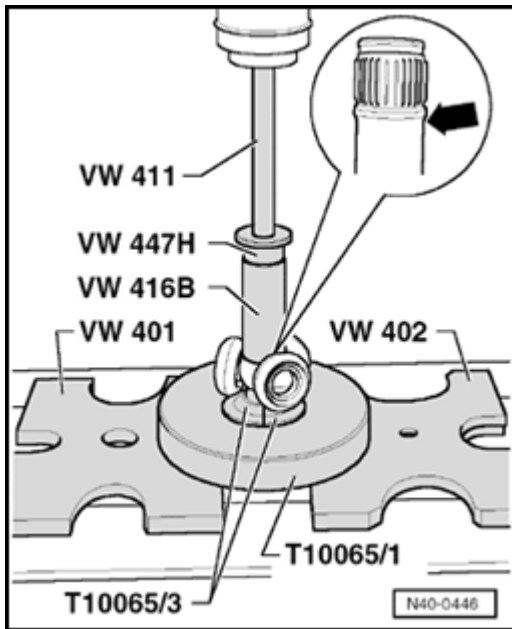
The chamfer on triple roller star faces toward shaft, this is used as an assembly aid.



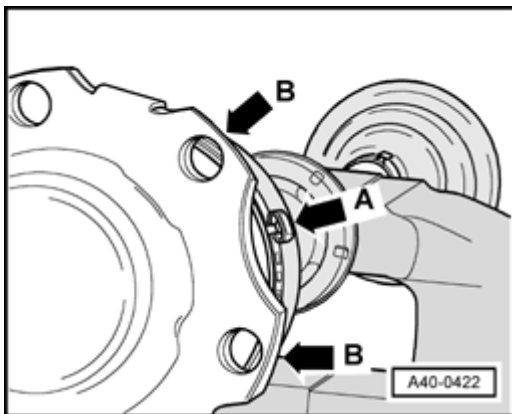
- Install triple roller star onto shaft and press onto stop.
- Make sure that the pressure does not exceed 3.0 t!
- If necessary coat drive shaft splines and triple-roller star with lubricating paste G 052142A2 .
- Insert circlip, make sure seated correctly.
- Press 70 grams of joint grease from repair set, into triple roller joint.
- Slide joint over rollers and hold.
- Press 60 grams of joint grease, from repair set, into the reverse side of the triple roller joint.
- Install joint protective boot.

Assembling triple roller star

Cylindrical-type axle shaft



- Install triple roller star onto shaft and press onto stop.
- Make sure that the pressure does not exceed 3.0 t!
- If necessary coat axle shaft splines and triple-roller star with lubricating paste G 052142A2 .
- Insert circlip, make sure seated correctly.
- Press 70 grams of joint grease from repair kit, into triple roller joint.
- Slide joint over rollers and hold.
- Press 60 grams of joint grease, from repair kit, into reverse side of triple roller joint.
- Install joint protective boot.

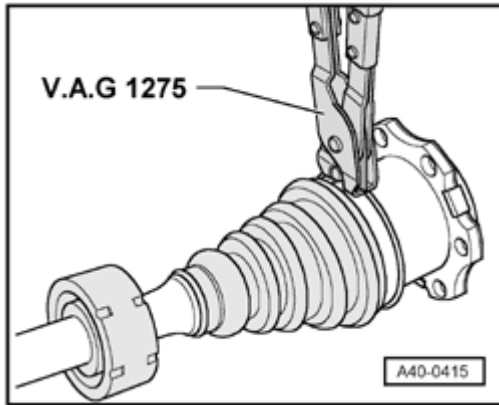


- Install clamp.

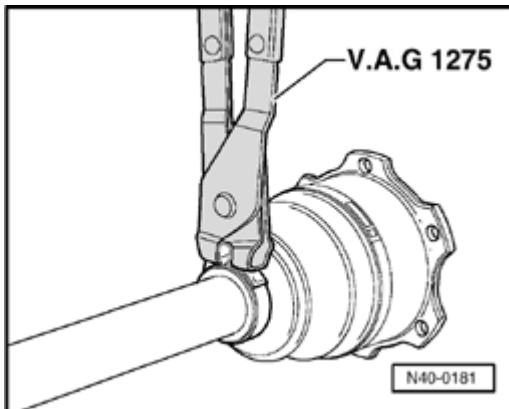
Note:

- n For a better alignment of the multi-point socket head

*bolts when mounting the axle shaft, it is necessary that the clamping ear of the clamp - **arrow A** - is placed between the fixing flanges from the joint - **arrow B** - .*



- Tighten clamp with hose clamp pliers V.A.G1275 .



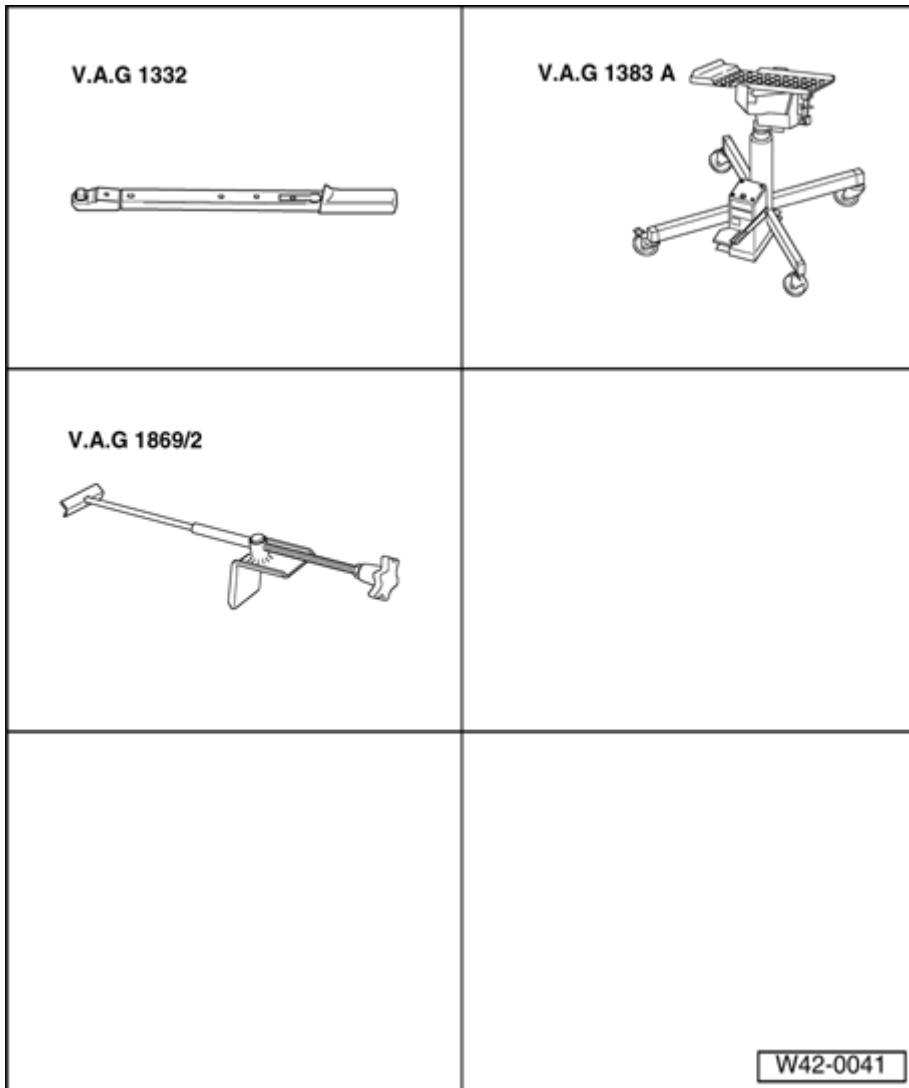
- Tighten clamp with hose clamp pliers V.A.G1275 .

Evaluation of accident vehicles

A check list for evaluating the suspension of accident vehicles can be found here ⇒ [00-2, Check list for evaluating the suspension of accident vehicles](#) .

Rear axle, servicing

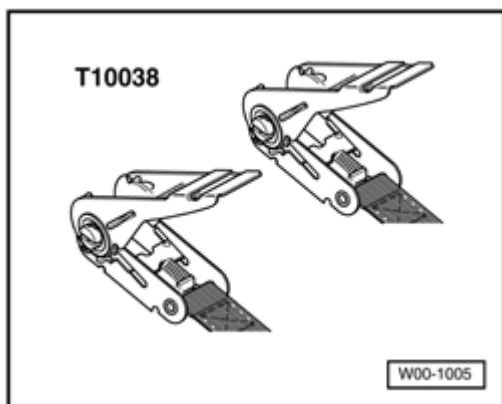
Rear axle, removing and installing



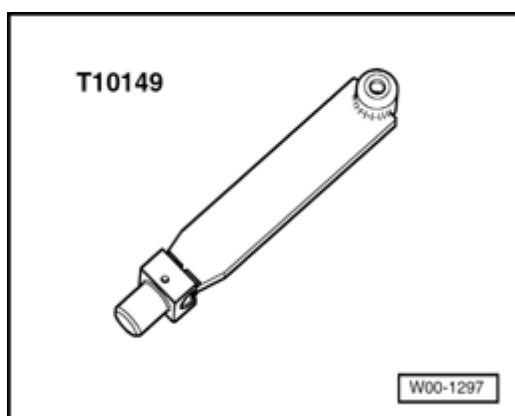
Special tools, testers and auxiliary items required

- n Torque wrench V.A.G1332
- n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2
- n Brake pedal depressor V.A.G1869/2

Special tools, testers and auxiliary items required

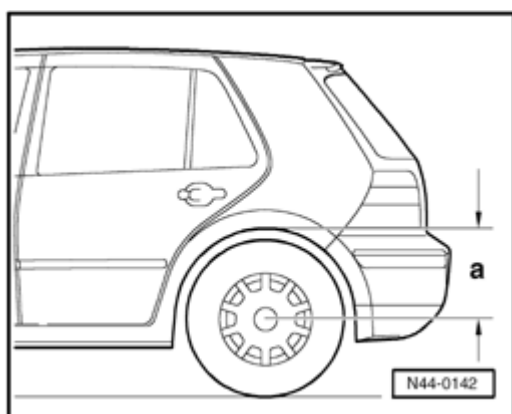


n Tightening strap T10038



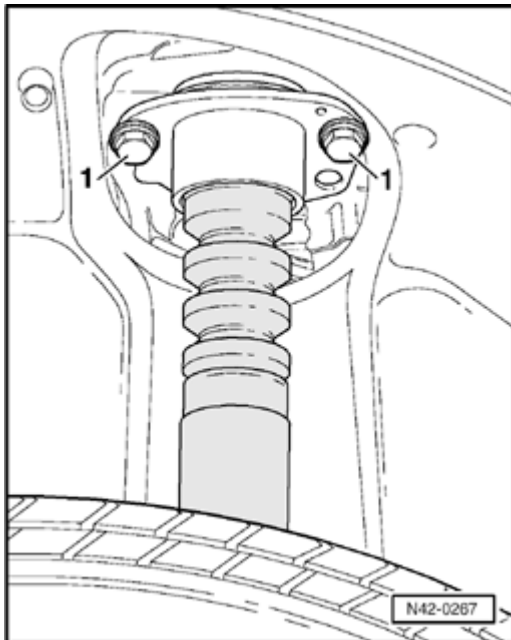
n Wheel hub support T10149

Removing



- Measure dimension - **a** - from center of wheel to lower edge of the wheel housing.
- Make a note of measurement. This is necessary to tighten bolts for rear axle to bearing bracket.
- Install brake pedal loading device V.A.G1869/2 .
- Actuate brake pedal with brake pedal loading device.

The bearing bracket should not be removed to remove rear axle!



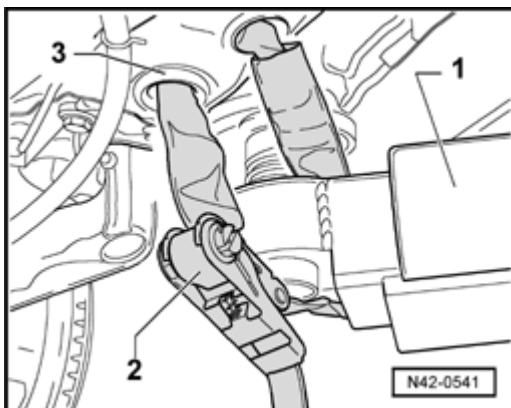
- Remove bolts - **1** - with vehicle standing on its wheels. Raise vehicle until the bolts are accessible.
- Loosen wheel bolts.
- Raise vehicle to assembly height to relieve the pressure on the coil spring.
- Remove wheels.

Tighten vehicle to lifting platform

Before removing rear axle, the vehicle must be fixed to the support arms of lifting platform.

Caution!

If the vehicle is not secured, there is a risk that it may slip off the hoist.



- Remove plugs from trailing arm - **3** - and tighten tensioning strap .

1 - Support arm of lifting platform

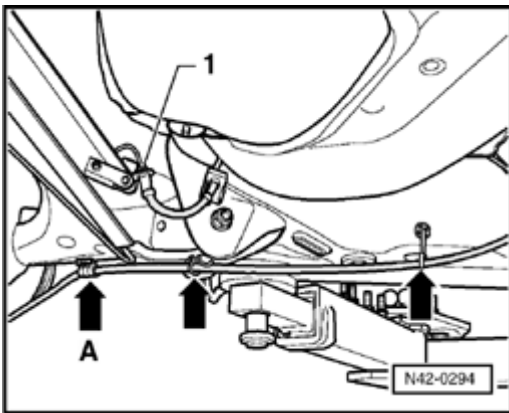
2 - Tightening strap T10038

- The vehicle must be tightened with the tensioning straps on left and right side.

Vehicles with automatic headlight range control

- Removing coupling rod from Left Rear Level Control System Sensor G76 from rear axle ⇒ [40-2, Left rear level control system sensor G76 on rear axle for front wheel drive](#) .

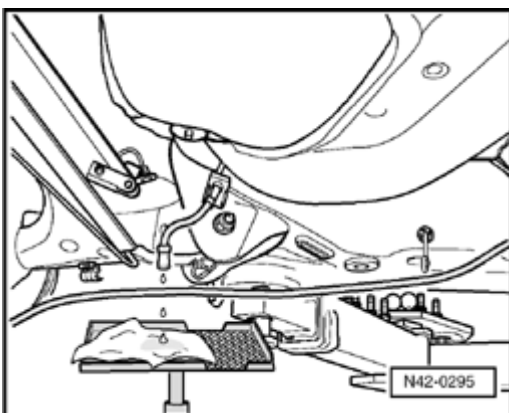
Continue for all vehicles



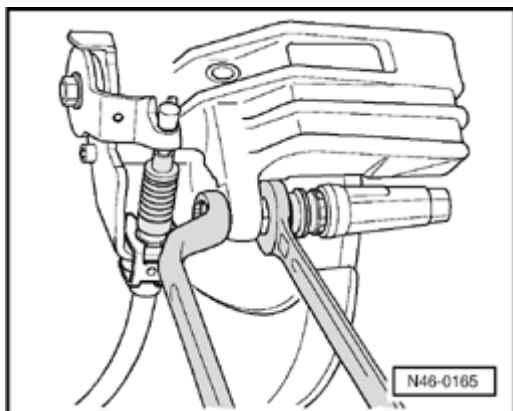
- Unclip brake cable from support on rear axle body - **arrow A** - and remove from supports - **arrow** - .

- Pull off clip - **1** - .

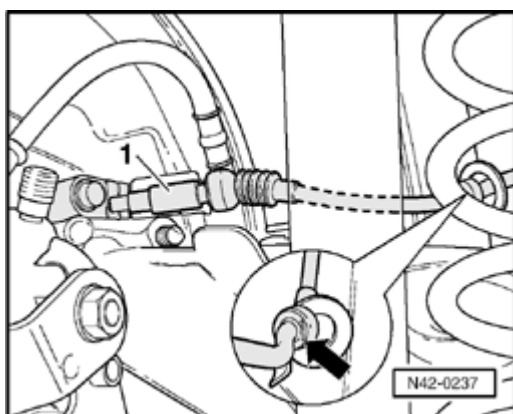
- Place engine/transmission jack V.A.G1383A with cloth under brake line.



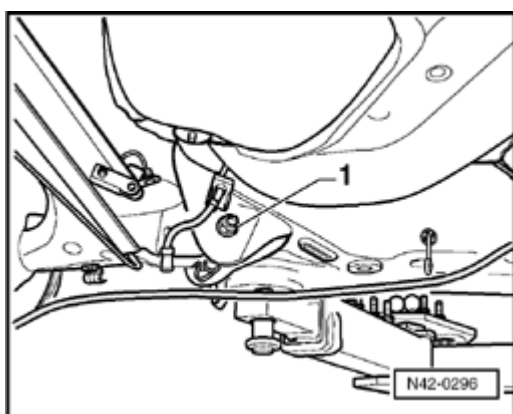
- Disconnect brake lines.



- Remove securing bolts from brake caliper housing, while counter-holding on guide pins.
- Remove brake caliper and secure to body.



- Disconnect connector - 1 - from speed sensor.
- Unclip wheel speed sensor wiring from retainer.
- Support rear axle with engine/transmission jack V.A.G1383A .



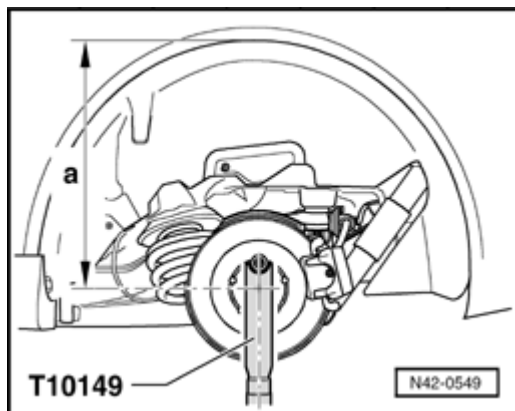
- Remove bearing bracket bolts - 1 - on rear axle on both sides and lower rear axle.

Installing

Greasing bonded rubber bushing

- Grease bonded rubber bushing kidney shaped cavity with assembly paste G 052 150 A2 before installing rear axle.

If rear axle is not "lubricated" when installed, it will be noisy when driving.



Tightening bearing bracket is only possible, when the measured value - a - from middle of wheel hub to lower edge bordering wheel housing is reached.

Otherwise the bonded rubber bushing will be distorted, resulting in reduced service life.

- Turn wheel hub until one of the holes for wheel bolts is at 12 o'clock position.
- Install wheel hub support T10149 with a wheel bolt.
- Raise wheel bearing housing using the engine/transmission jack until dimension - a - is reached.

Caution!

- n Do not raise or lower vehicle while engine/transmission jack is under vehicle.**
- n Do not leave engine and transmission lift under the vehicle longer than necessary.**

- Tighten bolts from bearing bracket to rear axle with tightening torque.

Installation is continued in reverse sequence

After installing check position of steering wheel during a test drive.

If steering wheel is not in straight ahead position the front axle alignment must be checked!

Fastener/location

Shock absorber to body
 Use new bolts!
 Bearing bracket to rear axle
 Use new nuts and bolts!

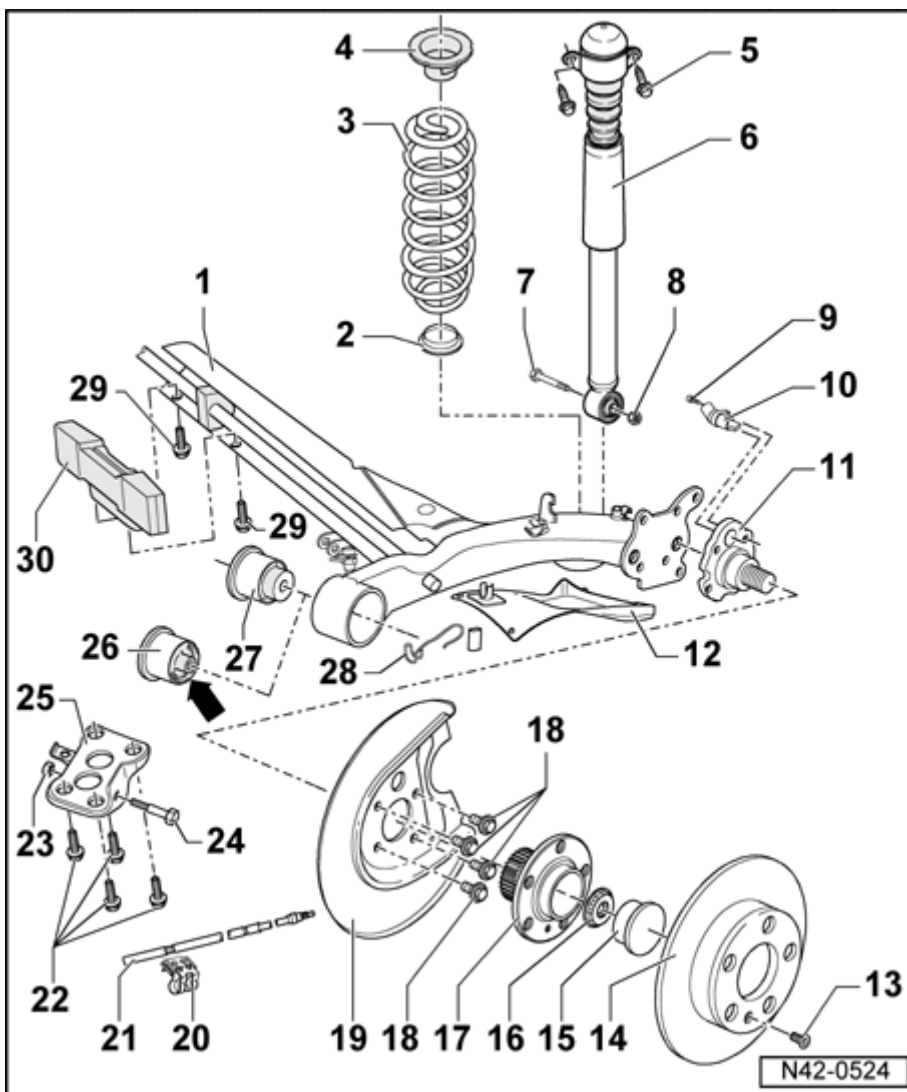
Tightening torques:

75 Nm

80 Nm

Rear axle, assembly overview**Note:**

- n *Welding and straightening on axle beam and stub axle is not permitted.*

**1. Axle beam**

- i Stub axle contact surfaces and threaded holes are to be free of paint and dirt

2. Spacer bushing

Material: Zinc

- ; Check bushing for damage

3. Coil spring

- ; Application ⇒ *See Parts Catalog*

4. Spring support**5. Hex bolt**

- ; 30 Nm plus an additional $\frac{1}{4}$ turn 90 °
- ; Always replace

If weld nut threads are damaged, threads can be repaired using Heli-Coil thread inserts.

Servicing thread in side rail ⇒
[40-3, Threads in longitudinal member, servicing](#)

6. Shock absorber

Functional check ⇒ [Item - 1 -](#)

7. Hex bolt

- ; 40 Nm plus an additional $\frac{1}{4}$ turn 90 °
- ; Always replace

8. Hex nut

- ; Always replace
- ; The axle beam must be in the middle position when tightening nut

We recommend that the rear of the vehicle be loaded with the weight of one person when tightening

9. Hex socket head bolt, 8 Nm**10. Speed sensor****11. Stub axle**

- ı Straightening operations are not allowed!
- ı Recutting thread is not allowed!

12. Stone protection plate**13. Phillips-head screw, 4 Nm****14. Brake disc****15. Dust cap**

- ı Always replace
- ı Pressing out and driving in ⇒ [42-3, Wheel bearing/wheel hub on vehicles with disc brakes, removing and installing](#)

A perfect seal is only achieved using a new dust cap.

16. Self-locking 12-point nut, 175 Nm

- ı Always replace

17. Wheel hub with wheel bearing

- ı Always replace

The wheel bearing and wheel hub are installed together in a housing.

This wheel bearing/hub unit is maintenance and adjustment free. Adjusting and servicing is not possible!

18. Hex bolt, 60 Nm

- ı Always replace

19. Shield plate**20. Retainer for parking brake cable****21. Parking brake cable****22. Hex bolt, 75 Nm**

- ı Always replace
- ı For removal of rear axle, do not loosen if possible

If weld nut threads are damaged, threads can be repaired using Heli-Coil thread inserts.

Servicing thread in side rail ⇒
[40-3, Threads in longitudinal member, servicing](#)

23. Self-locking hex nut, 80 Nm

- ı Always replace
- ı When tightening nut, the axle beam must be in the horizontal position (unladen vehicle state)

24. Hex bolt, 80 Nm

- ı Always replace

25. Rear axle bearing bracket

- ı Check and if necessary adjust rear axle total track after installation
- ı If possible do not loosen when removing the rear axle

26. Hydraulic bonded rubber bushing

**Distinguish between bonded rubber bushing ⇒ [Item - 27 -](#) .
The hydraulic bonded rubber bushing has a bulge - arrow - , to the exterior of vehicle.**

Bushing must be replaced if

leaking

- ; Removing and installing ⇒ [42-2, Hydraulic bonded rubber bushing, removing and installing](#)

27. Bonded rubber bushing

- ; Removing and installing ⇒ [42-2, Bonded rubber bushing, removing and installing](#)

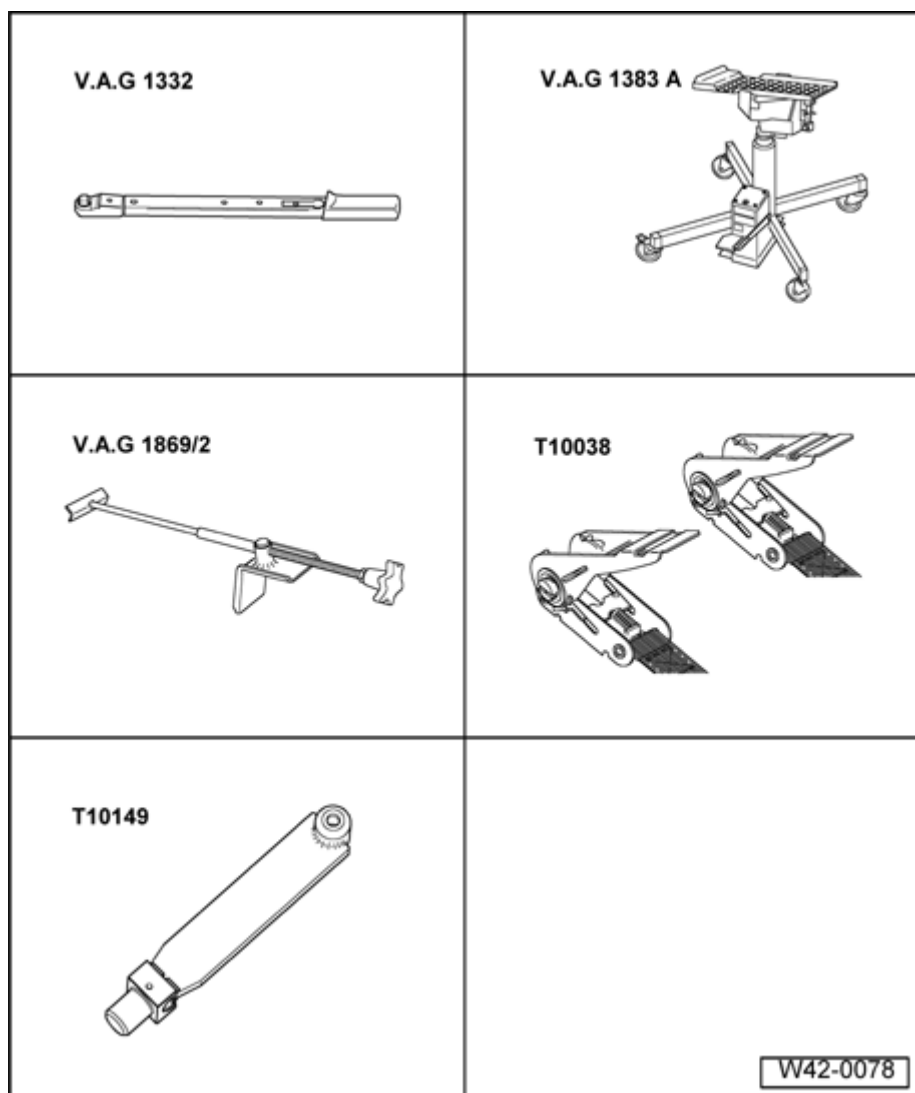
28. Parking brake cable clip**29. Bolt, 20 Nm plus an additional 1/8 turn 45 °**

- ; Always replace

30. Vibration damper

- ; Always replace

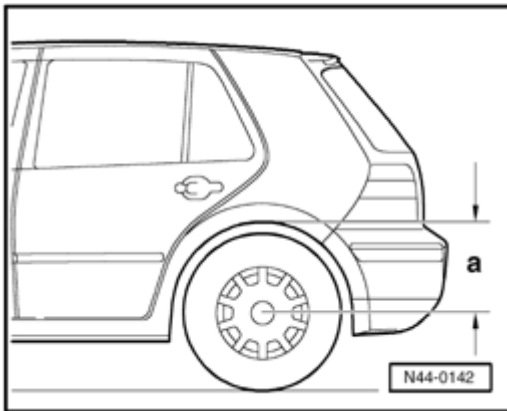
Bonded rubber bushing, removing and installing



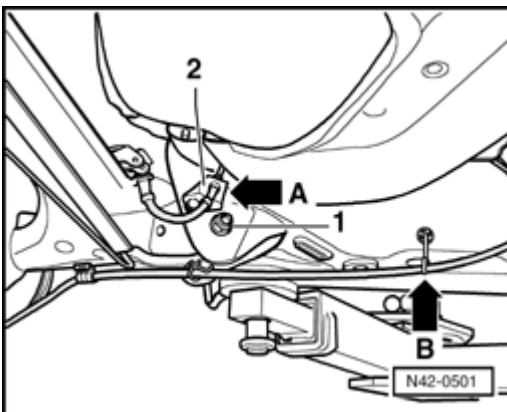
Special tools, testers and auxiliary items required

- n Torque wrench V.A.G1332
- n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2
- n Brake pedal depressor V.A.G1869/2
- n Tensioning strap T10038
- n Wheel hub support T10149
- n Hydraulic press VAS 6178
- n Hollow piston cylinder VAS 6179
- n Assembly tool VAS 6180

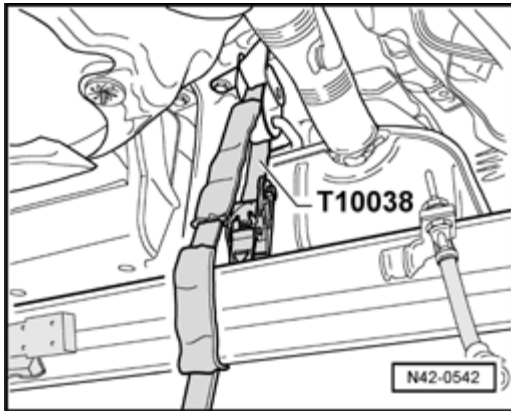
Removing



- Measure dimension - **a** - from the center of the wheel to lower edge of wheel housing.
- Make a note of the measurement. This is necessary to tighten bolts for rear axle to bearing bracket.
- Install brake pedal loading device V.A.G1869/2 .
- Lift vehicle on lifting platform.
- Remove wheels.



- Separate brake lines - **arrow A** - and remove clip.
- Remove left brake hose from bracket - **2** - .
- Remove right brake hose from rear axle.
- Remove parking brake cable from brackets - **arrow B** - .
- Support rear axle with engine/transmission jack V.A.G1383A .
- Remove bolt - **1** - for bearing bracket on rear axle on both sides.
- Lower rear axle using engine/transmission jack V.A.G1383A .



- Tighten rear axle with tensioning strap T10038 over mounting from muffler system.

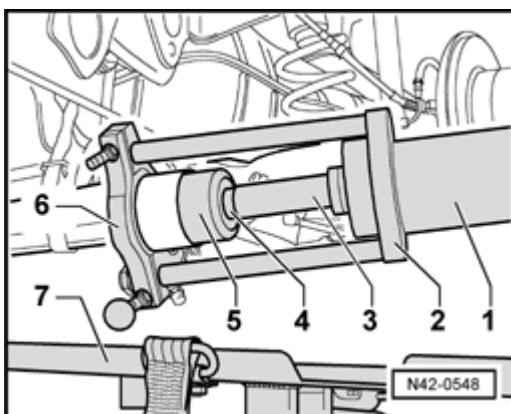
Vehicles with automatic headlight range control

- Removing coupling rod from Left Rear Level Control System Sensor G76 from rear axle ⇒ [40-2, Left rear level control system sensor G76 on rear axle for front wheel drive](#) .

Continue for all vehicles

Note:

- n Place engine/transmission jack V.A.G1383A with universal transmission support V.A.G1359/2 under the control arm (danger of accident from falling parts when pulling out the wheel hub and the wheel bearing).



- Pulling out bonded rubber bushing

- 1 - VAS6178
- 2 - VAS6180/1
- 3 - VAS6180/4 long
- 4 - VAS6180/3

5 - Thrust tube 3416/2

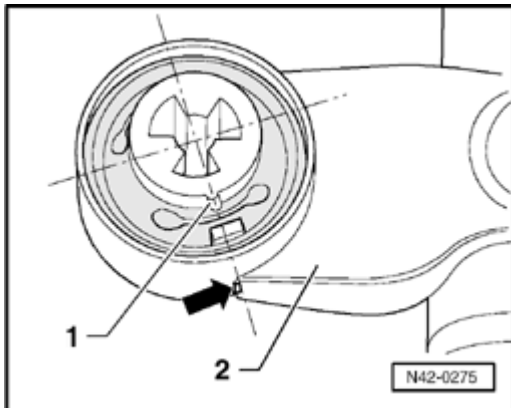
6 - VAS6180/2

7 - V.A.G1383A with V.A.G1359/2

Note:

- n *The edges of separating device VAS6180/2 must come in position between the collar of the bonded rubber bushing and the connection of the control arm.*
- n *The note "Top" on the separating device VAS6180/2 must point to the control arm.*

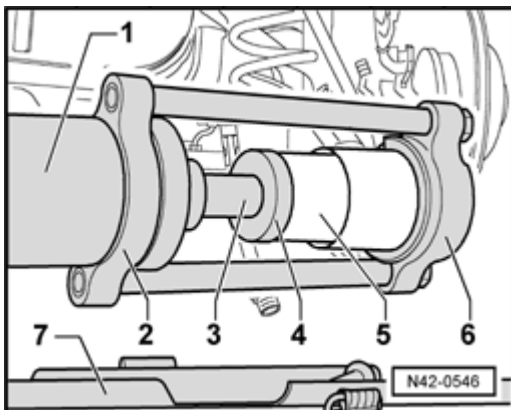
Installing



Bonded rubber bushing is marked on face with marks - 1 - .

They must align with edge - **arrow** - on trailing arm - 2 - .

- Mark position of marks - 1 - on long side of bonded rubber bushing.



- Install bonded rubber bushing and special tools on rear axle.

1 - VAS6178

2 - VAS6180/1

3 - VAS6180/6

4 - VAS6180/7

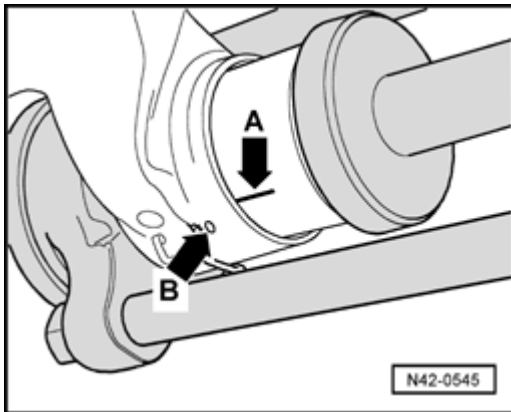
5 - Bonded rubber bushing

6 - VAS6180/8

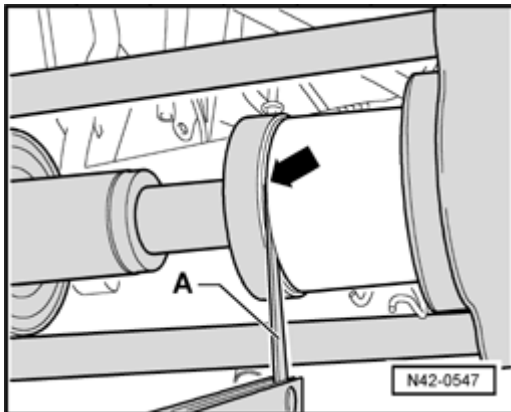
7 - V.A.G1383A with V.A.G1359/2

Note:

- n The note "Top" on the device VAS6180/8 points to the control arm.



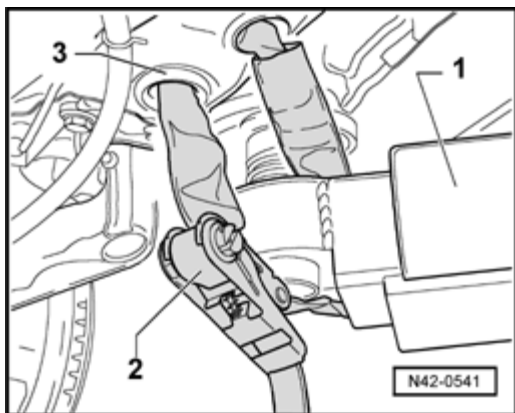
- Before installing bonded rubber bushing, make sure that the mark - **arrow A** - align with edge - **arrow B** - of trailing arm.



- Press in bonded rubber bushing until a gap of 0.2 mm - **arrow** - is available.
- Measure this gap - **arrow** - with a measure gauge - **A** - .
- Check position of bonded rubber bushing after installing.

Tighten vehicle to the lifting platform

If the vehicle is not secured, there is a risk that it may slip off the hoist.



- Remove plugs from trailing arm - **3** - and tighten tensioning strap .

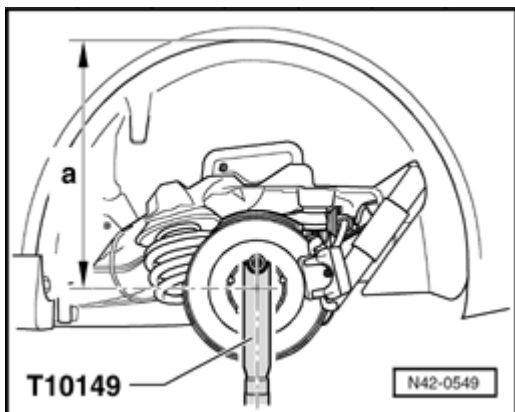
1 - Support arm of lifting platform

2 - Tightening strap T10038

- The vehicle must be tightened with tensioning straps on left and right side.

- Grease bonded rubber bushing kidney shaped cavity with assembly paste G052150A2 before installing rear axle.

If the rear axle is not "lubricated" when installed, it will be noisy when driving.



Tightening bearing bracket is only possible, when the measured value - a - from the middle of wheel hub to lower edge bordering wheel housing is reached.

Otherwise the bonded rubber bushing will be distorted, resulting in reduced service life.

- Turn wheel hub until one of the holes for wheel bolts is at the 12 o'clock position.

- Install wheel hub support T10149 with a wheel bolt.

- Lift wheel bearing housing using engine/transmission jack until dimension - **a** - is reached.

Caution!

- n **Do not raise or lower vehicle while engine/transmission jack is under vehicle.**
- n **Do not leave engine and transmission lift under the vehicle longer than necessary.**

- Tighten bolts from bearing bracket to rear axle with tightening torque.

Further installation in reverse order

- Bleed brake system

⇒ [Repair Manual, Brake System, Repair Group 47, Brake bleeding](#)

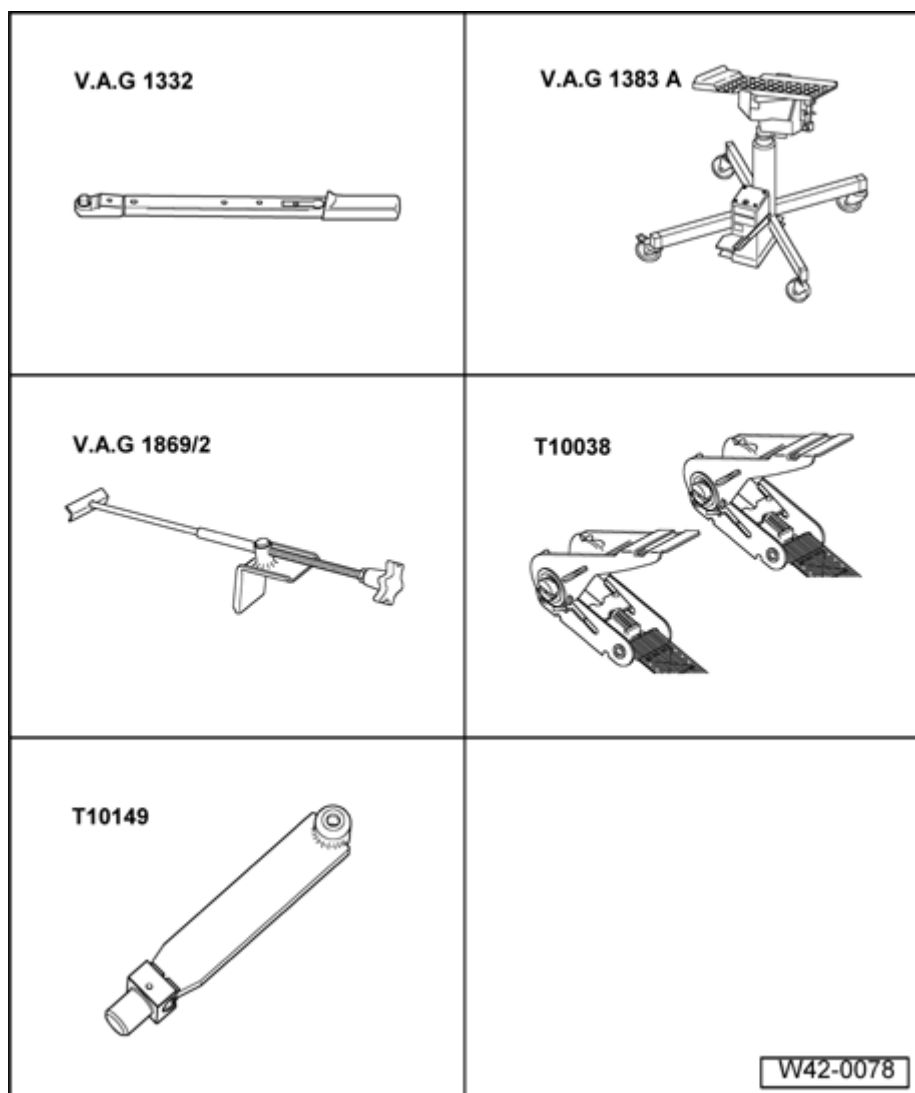
Fastener/location

Bearing bracket to rear axle
Use new nuts and bolts!

Tightening torque

80 Nm

Hydraulic bonded rubber bushing, removing and installing

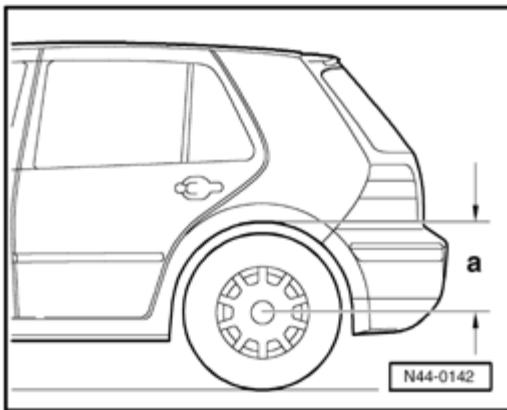


Special tools, testers and auxiliary items required

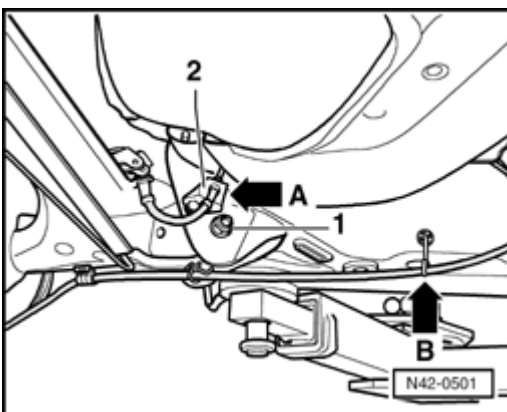
- n Torque wrench V.A.G1332
- n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2
- n Brake pedal depressor V.A.G1869/2
- n Tensioning strap T10038
- n Wheel hub support T10149
- n Hydraulic press VAS 6178
- n Hollow piston cylinder VAS 6179
- n Assembly tool VAS 6180

Note:

- n After removing the hydraulic bonded rubber bushings, only "conventional" bonded rubber bushings must be installed.
- n The hydraulic bonded rubber bushings must be replaced on both sides of rear axle. A mixed installation is not allowed.

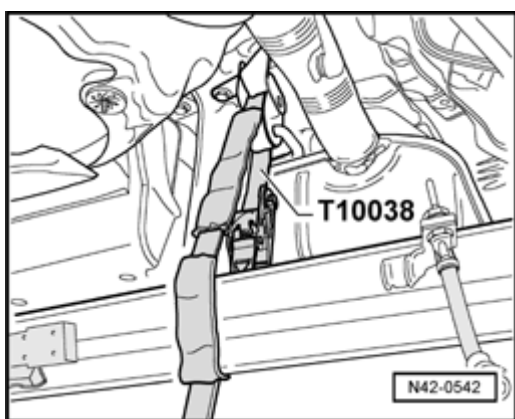
Removing

- Measure dimension - **a** - from the center of the wheel to the lower edge of the wheel housing.
- Make a note of the measurement. This is necessary to tighten the bolts for the rear axle to the bearing bracket.
- Install brake pedal loading device V.A.G1869/2 .
- Lift vehicle on lifting platform.
- Remove wheels.



- Separate brake lines - **arrow A** - and remove clip.
- Remove left brake hose from bracket - **2** - .

- Remove right brake hose from rear axle.
- Remove parking brake cable from brackets - **arrow B** - .
- Support rear axle with engine/transmission jack V.A.G1383A .
- Remove bolt - **1** - for bearing bracket on rear axle on both sides.
- Lower rear axle using engine and transmission jack V.A.G1383A .



- Tighten rear axle with tensioning strap T10038 over mounting from muffler system.

Vehicles with automatic headlight range control

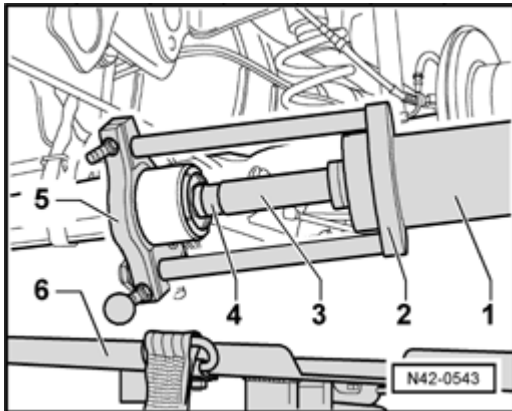
- Removing coupling rod from Left Rear Level Control System Sensor G76 from rear axle ⇒ [40-2, Left rear level control system sensor G76 on rear axle for front wheel drive](#) .

Continue for all vehicles

Note:

- n *Place engine/transmission jack V.A.G1383A with universal transmission support V.A.G1359/2 under the control arm (danger of accident from falling parts when pulling out the wheel hub and the wheel bearing).*

Pressing out center of hydraulic bonded rubber bushing



- Install special tools on rear axle as shown on illustration.
- Pull a plastic bag over the special tools and control arm to pick up escaping oil when pressing out center of bonded rubber bushing.
- Press out center of bonded rubber bushing.

1 - VAS6178

2 - VAS6180/1

3 - VAS6180/4 long

4 - VAS6180/3

5 - VAS6180/2

6 - V.A.G1383A with V.A.G1359/2

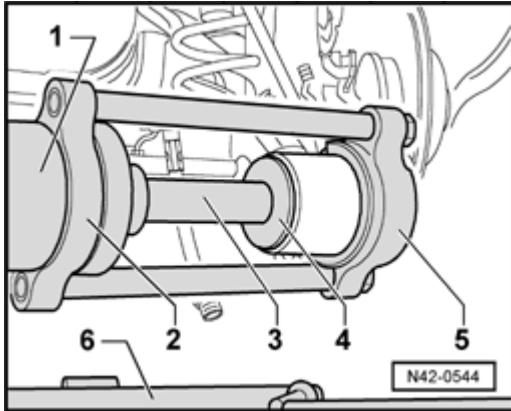
Note:

- n *The edges of separating device VAS6180/2 must come in position between the collar of the bonded rubber bushing and the connection of the control arm.*
- n *The note "Top" on the separating device VAS6180/2 must point to the control arm.*

Pressing out sleeve of hydraulic bonded rubber bushing

Caution!

Replace the separating device VAS 6180/2 with the counter-holder VAS 6180/8 , otherwise the separating device will be damaged by the sleeve.



- Press out sleeve

1 - VAS6178

2 - VAS6180/1

3 - VAS6180/4 long

4 - VAS6180/5

5 - VAS6180/8

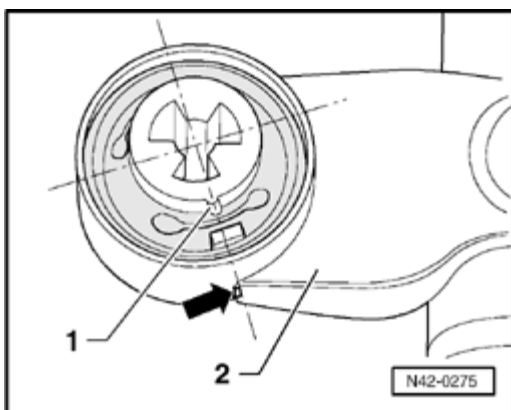
6 - V.A.G1383A with V.A.G1359/2

Note:

n The note "Top" on the device VAS6180/8 points to the control arm.

Installing

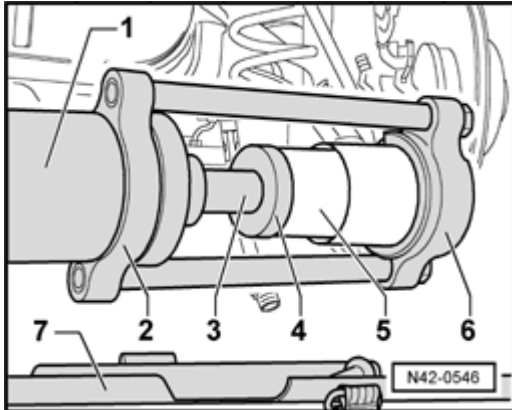
Install only "conventional" bonded rubber bushings.



Bonded rubber bushing is marked on face with marks - 1 - .

They must align with edge - **arrow** - on trailing arm - 2 - .

- Mark position of marks - 1 - on the long side of bonded rubber bushing.



- Install bonded rubber bushing and special tools on rear axle.

1 - VAS6178

2 - VAS6180/1

3 - VAS6180/6

4 - VAS6180/7

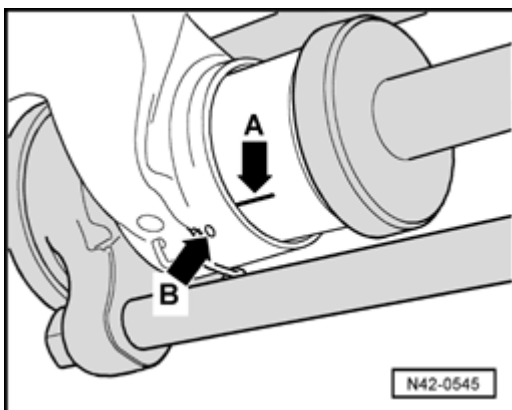
5 - Bonded rubber bushing

6 - VAS6180/8

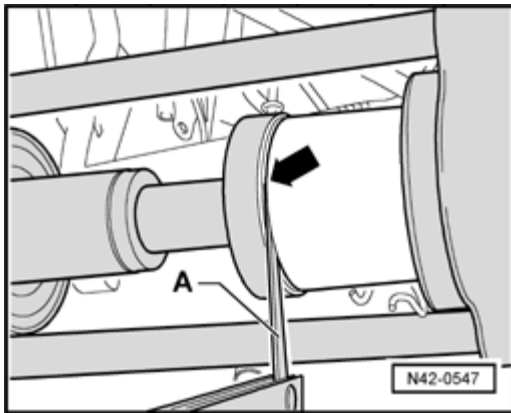
7 - V.A.G1383A with V.A.G1359/2

Note:

- n The note "Top" on the device VAS6180/8 points to the control arm.



- Before installing bonded rubber bushing, make sure that the mark - **arrow A** - align with the edge - **arrow B** - of trailing arm.

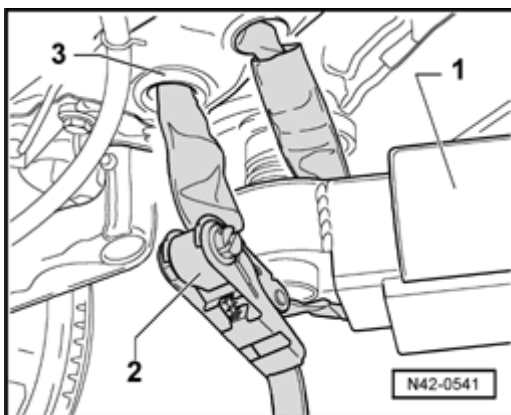


- Press in bonded rubber bushing until a gap of 0.2 mm - **arrow** - is available.
- Measure this gap - **arrow** - with a measure gauge - **A** - .
- Check position of bonded rubber bushing after installing.

Tighten vehicle to lifting platform

Caution!

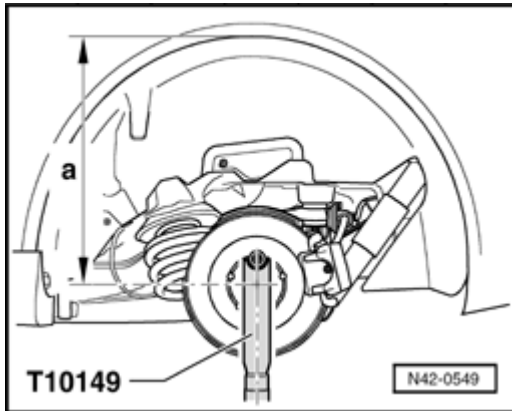
If the vehicle is not secured, there is a risk that it may slip off the hoist.



- Remove plugs from trailing arm - **3** - and tighten tensioning strap .
- 1 - Support arm of lifting platform
- 2 - Tightening strap T10038
- The vehicle must be tightened with the tensioning straps on left and right side.
- Grease bonded rubber bushing kidney shaped cavity with assembly paste G052150A2 before installing rear axle.

Note:

- n *If the rear axle is not "lubricated" when installed, it will be noisy when driving.*



Tightening bearing bracket is only possible, when measured value - a - from the middle of wheel hub to lower edge bordering wheel housing is reached.

Otherwise the bonded rubber bushing will be distorted, resulting in reduced service life.

- Turn wheel hub until one of the holes for wheel bolts is at 12 o'clock position.
- Install wheel hub support T10149 with a wheel bolt.
- Lift wheel bearing housing using engine/transmission jack until dimension - **a** - is reached.

Caution!

- n **Do not raise or lower vehicle while engine/transmission jack is under vehicle.**
- n **Do not leave engine and transmission lift under the vehicle longer than necessary.**

- Tighten bolts from bearing bracket to rear axle with tightening torque.

Further installation in reverse order

- Bleed brake system

⇒ [Repair Manual, Brake System, Repair Group 47, Brake bleeding](#)

Fastener/location

Bearing bracket to rear axle

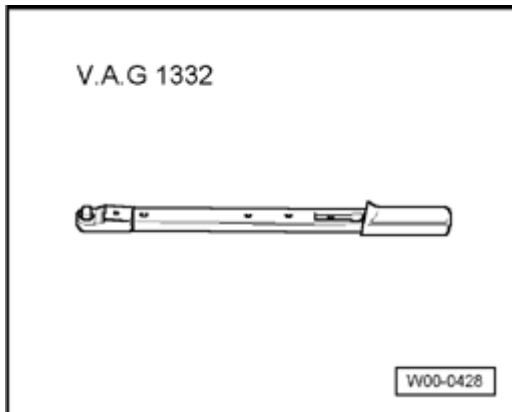
Use new nuts and bolts!

Tightening torque

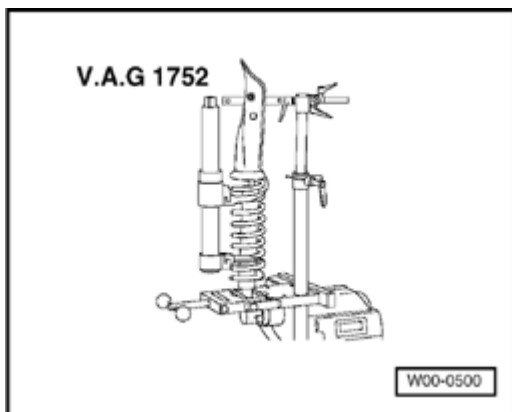
80 Nm

Spring, removing and installing

Special tools, testers and auxiliary items required

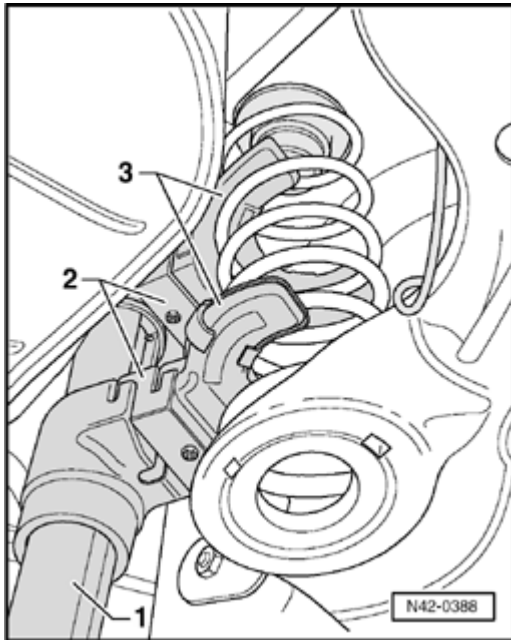


- n Torque wrench V.A.G1332



- n Spring compressor V.A.G 1752
- n Spring holder V.A.G1752/3
- n Adapter V.A.G1752/9

Removing spring



- Insert spring holder - 1 - .
- Compress coil spring until it can be removed.
- Remove spring.

1 - Spring tensioner V.A.G1752/1

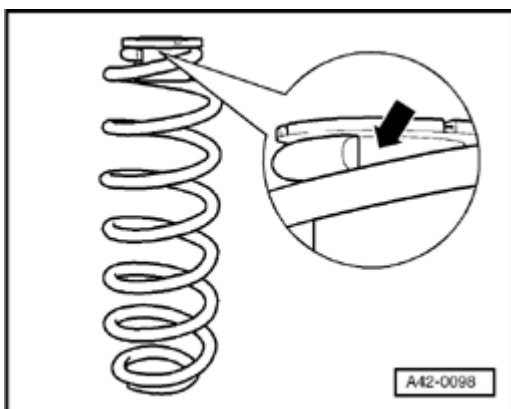
2 - Adapter V.A.G1752/9

3 - Bracket V.A.G1752/3

Installing spring

- Make sure space bushing (zinc) is not damaged.
- Replace if necessary.
- Install spring together with spring seat.
- Loosen spring and remove spring compressor.

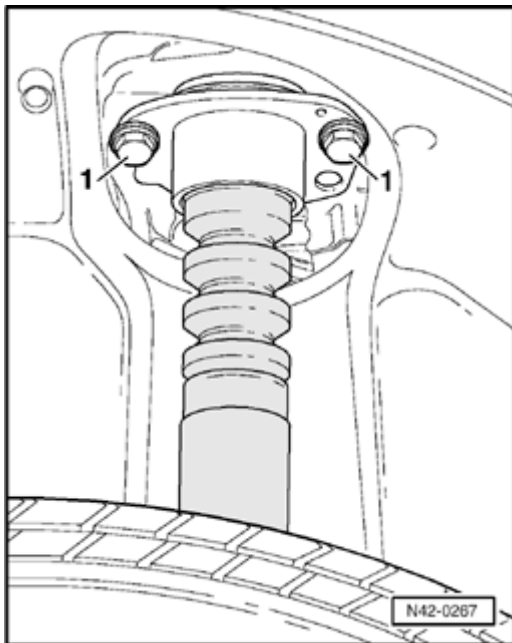
Observe installation position!



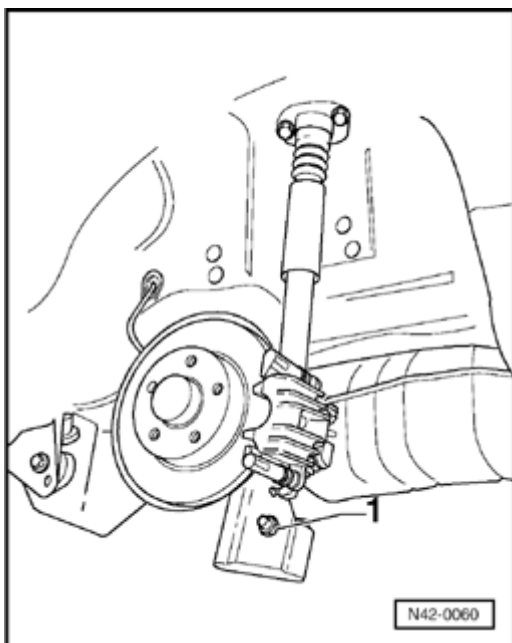
End of spring - **arrow** - must lie against stop on spring seat.

Removing shock absorber

The coil spring must be removed beforehand, ⇒ [42-2, Spring, removing and installing](#)



- Remove bolts - **1** - with vehicle standing on its wheels.
Raise vehicle until bolts are accessible.



- Remove shock absorber hex bolt - **1** - on rear axle.

For ease of illustration the work sequence is shown without wheel.

- Take out shock absorber.

Installation is carried out in reverse sequence.

Fastener/location

Shock absorber to rear axle

Use new nuts!

Load rear of vehicle by the weight of one person when tightening

Shock absorber to structure

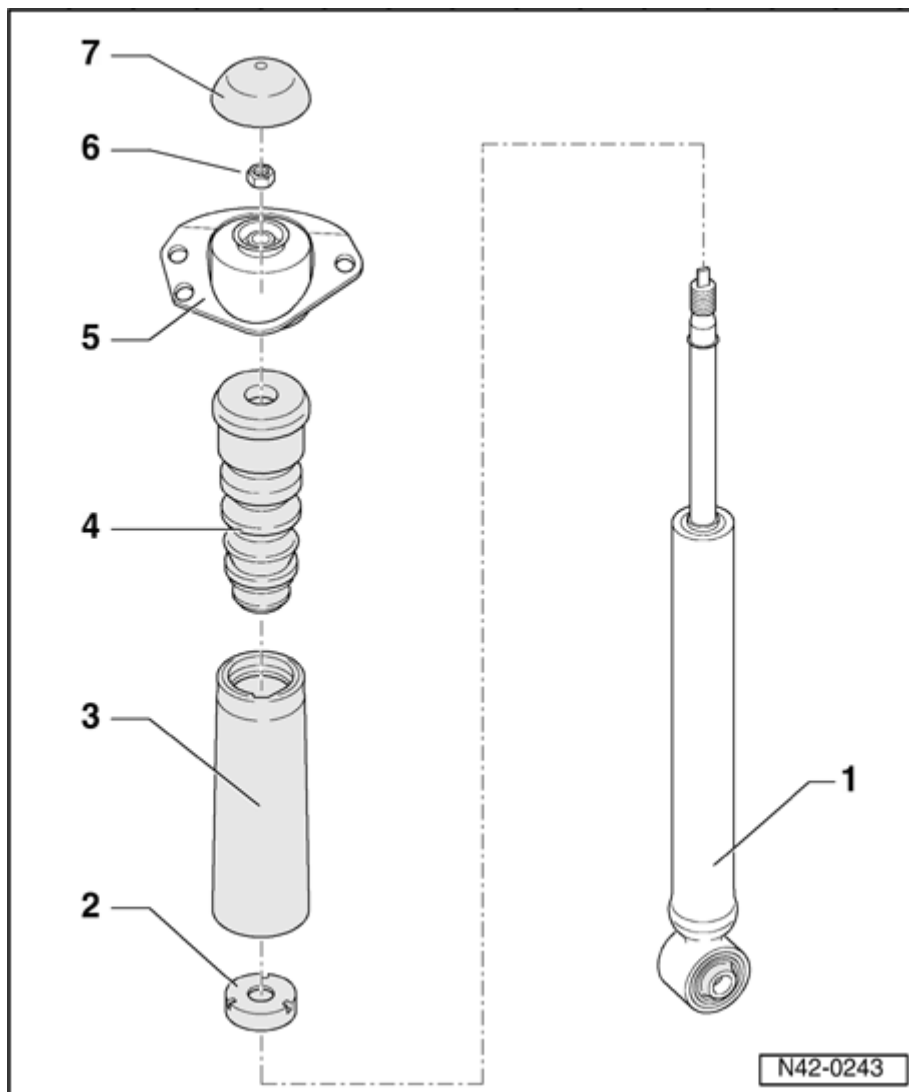
Use new bolts!

Tightening torques:

40 Nm plus an additional $1/4$ turn
90 °

30 Nm plus an additional $1/4$ turn
90 °

Shock absorbers on vehicles with front wheel drive, assembly overview



1. Gas-filled shock absorber

- ı Can be replaced individually
- ı Application ⇒ *See Parts Catalog*

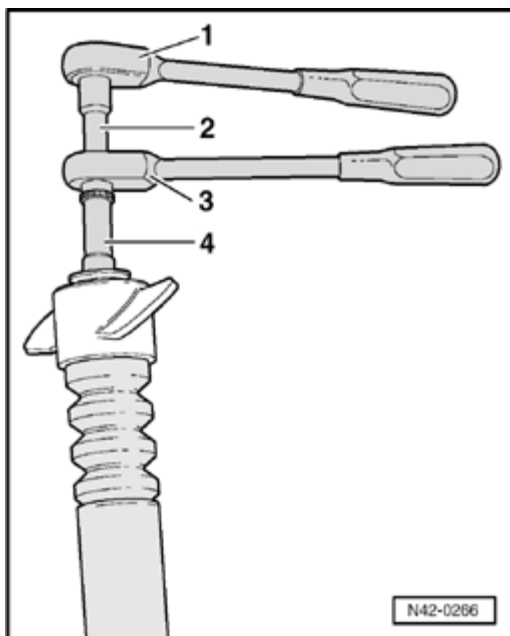
Functional check

Press shock absorber together by hand. When doing this the piston rod must move over its complete length smoothly and with even force.

When the shock absorber has sufficient gas pressure the piston rod returns to its original starting position.

If the piston rod does not return to its starting position and there is no loss of oil then the shock absorber is still OK.

2. Protective cap
3. Protective tube
4. Bump stop
5. Shock absorber mount
6. Self-locking hex nut, 25 Nm
 - ; Always replace
 - ; Remove ⇒ [42-2, Removing hex nut from shock absorber](#)
7. Cover



Removing hex nut from shock absorber

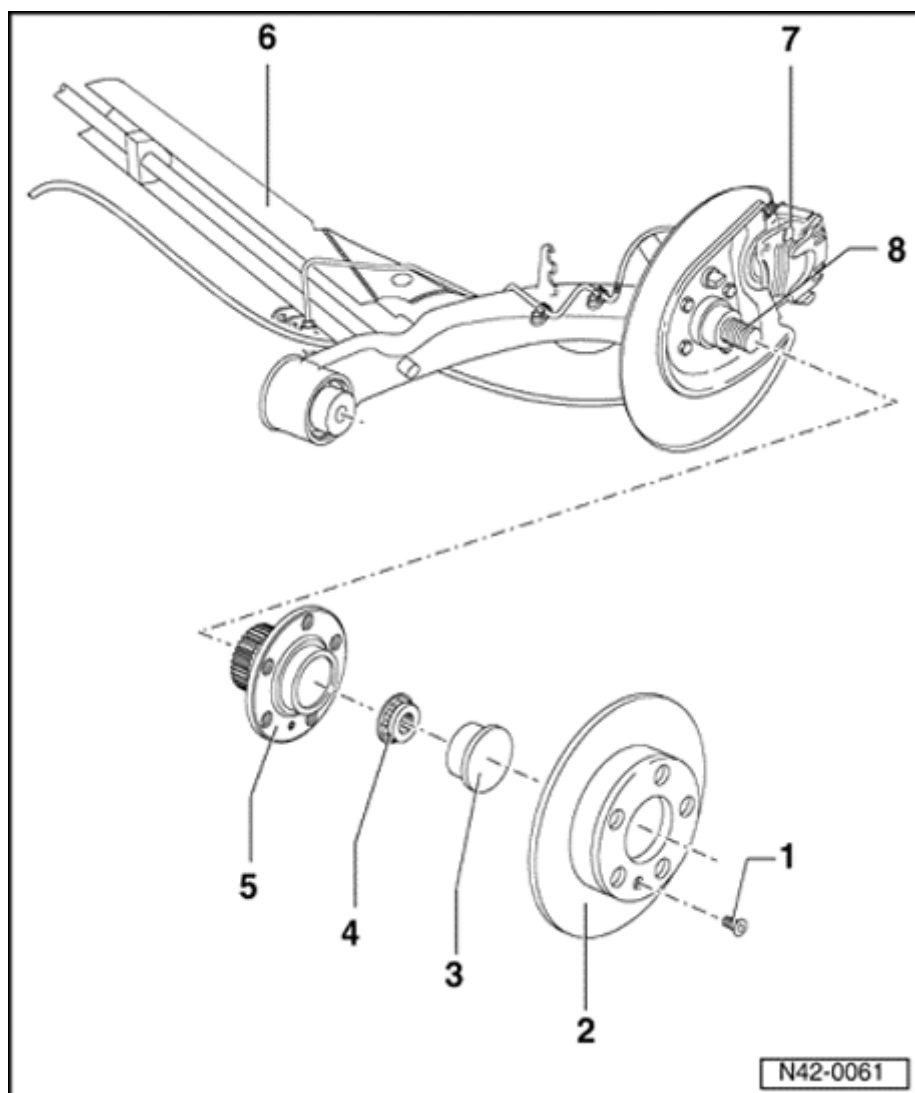
- 1 - Ratchet (commercially available)
- 2 - Socket T10001/9
- 3 - T10001/11
- 4 - Socket T10001/1

Wheel bearing, servicing

Wheel bearings, front wheel drive vehicles, servicing

Note:

- n *The descriptions and illustrations are for vehicles with disc brakes.*
- n *Wheel installation for vehicles with drum brakes is the same.*
- n *All tightening torques and notes are valid for vehicles with drum brakes.*



1. Phillips-head screw

2. Brake disc

3. Dust cap

- i Pressing out and pressing in for vehicles with disc brake ⇒ [42-3, Wheel bearing/wheel hub on vehicles with disc brakes, removing and installing](#)
- i Pressing out and pressing in for vehicles with drum brake ⇒ [42-3, Wheel bearing/wheel hub on vehicles with drum brakes, removing and installing](#)
- i Always replace

A perfect seal is only achieved using a new dust cap.

Only then is an optimum function and long service life guaranteed.

4. Self-locking 12-point nut, 175 Nm

- i Always replace

5. Wheel hub with wheel bearing

The wheel bearing and wheel hub are installed together in a housing.

This wheel bearing/hub unit is maintenance and adjustment free. Adjusting and servicing is not possible!

6. Axle beam

7. Brake caliper

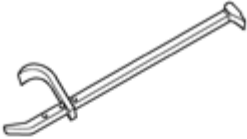
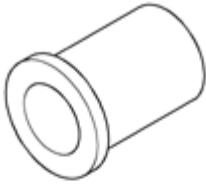
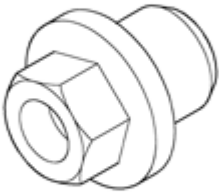

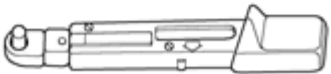
- i Servicing

⇒ [Repair Manual, Brake System, Repair Group 47, Servicing rear brake calipers](#)

8. Stub axle

- i Straightening operations are not allowed
- i Recutting thread is not allowed!

Wheel bearing/wheel hub on vehicles with disc brakes, removing and installing

<p>VW 637/2</p> 	<p>3241/4</p> 
<p>3420</p> 	<p>V.A.G 1332</p> 
<p>V.A.G 1410</p> 	<p style="text-align: right;">W42-0015</p>

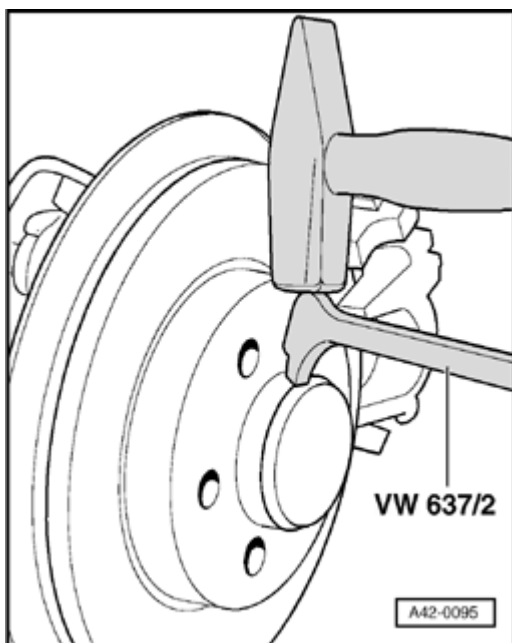
Special tools, testers and auxiliary items required

- n Hub cap puller VW637/2
- n Seal installer 3241
- n Installation sleeve wheel brg. 3420

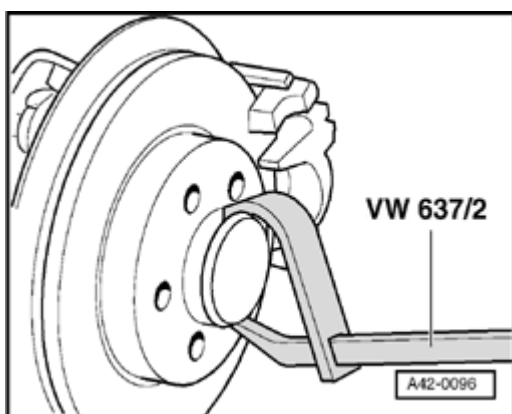
- n Torque wrench V.A.G1332
- n Torque wrench V.A.G1410

Removing

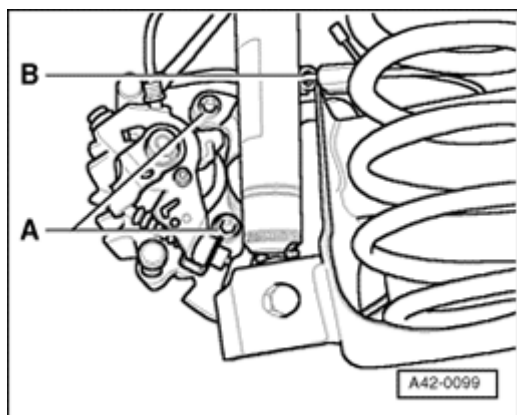
- Lift vehicle.
- Remove wheel.



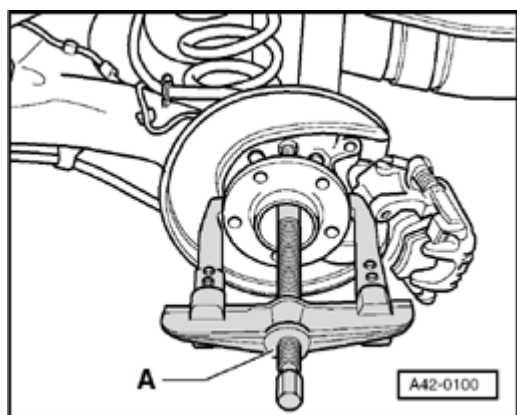
Loosen dust cap from seat by tapping lightly on claw with hub cap puller VW637/2 .



- Pull off dust cap.

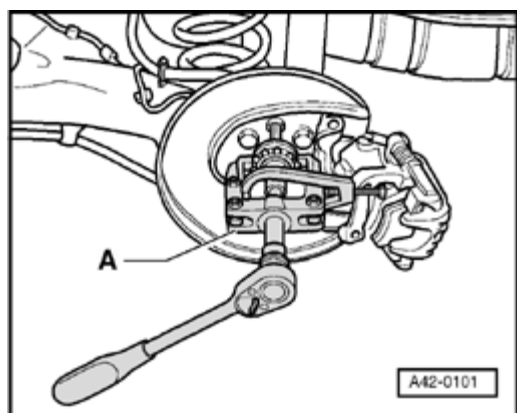


- Remove securing bolts - **A** - from brake caliper.
- Remove brake caliper and hang up on body.
- Remove phillips-head screw for brake disc and take out brake disc.
- Remove 12-point nut.



- Pull off wheel bearing/wheel hub unit from stub axle.

A - Puller with leg clamp, e.g. Kukko 20/2

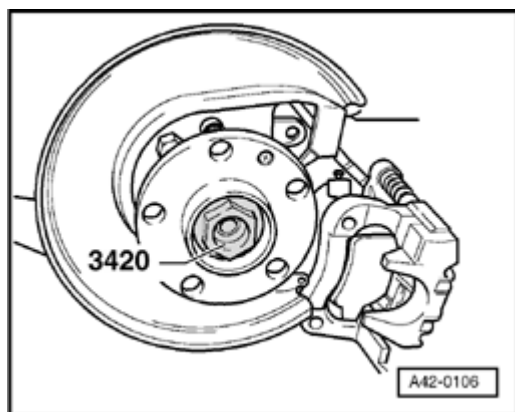


- Pull off bearing inner race from stub axle.

Only use puller - **A** - with leg clamp e.g. Kukko 204-2 (commercial type).

Installing

- Install wheel bearing/wheel hub unit as far as possible on stub axle.

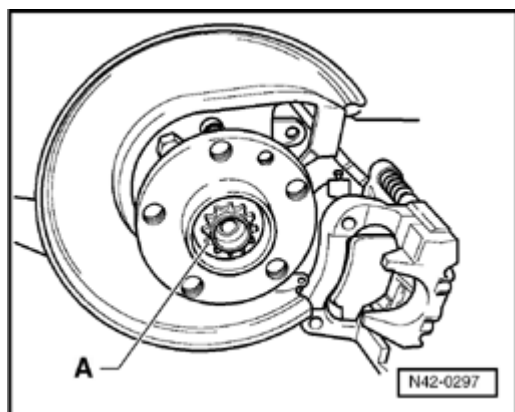


- Attach special tool 3420 and pull wheel bearing/wheel hub unit on to stop.

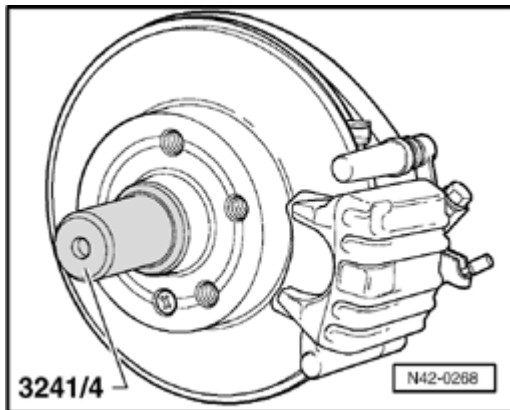
Caution!

Make sure that the hubs/wheel bearing unit does not tilt!

- Remove assembly tool 3420 ab.



- Use a new 12-point nut - A - and tighten to 175 Nm.
- Install brake disc.



- Drive in dust cap.

Note:

- n *Always replace dust caps.*
- n *Damaged (dented) dust caps allow ingress of moisture, always use the tool illustrated. Always use tool illustrated to reduce chance of damage to dust cap.*

Further installation in reverse order

- Install and fasten wheel ⇒ [44-2, Tightening torques for wheel bolts](#) .

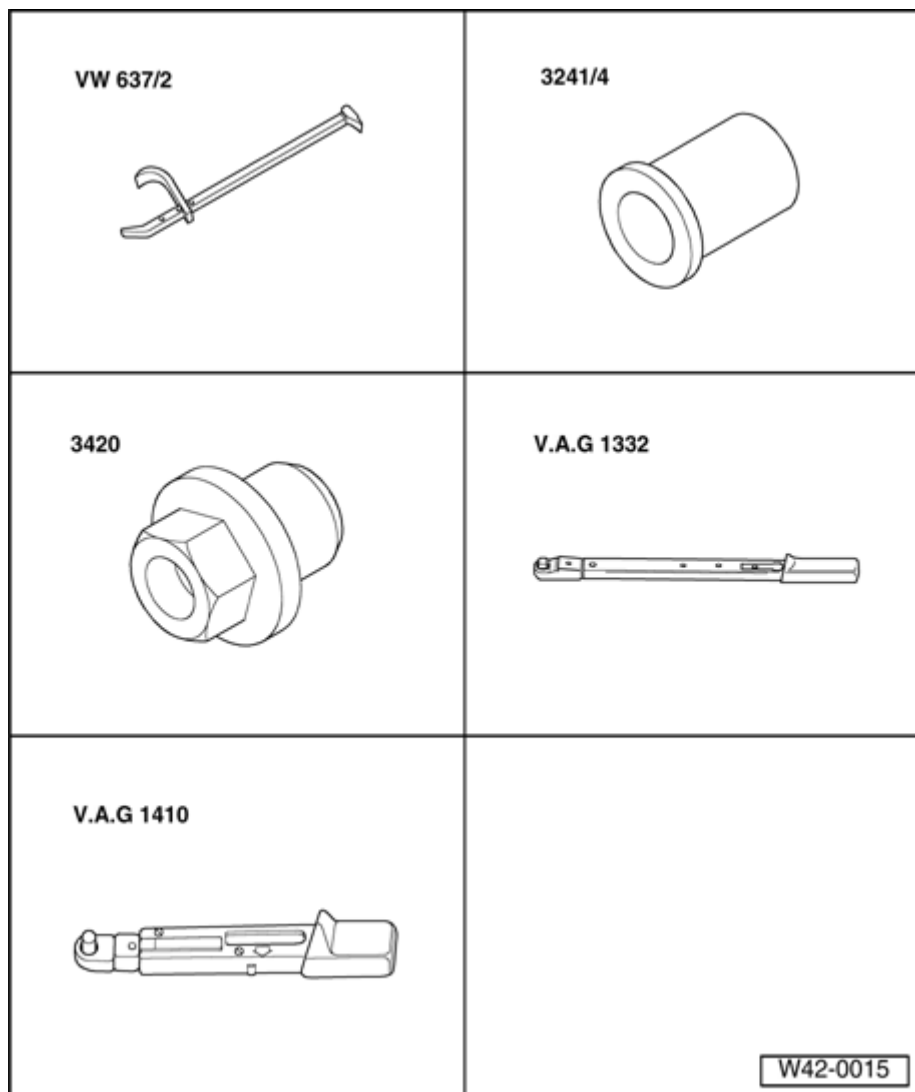
Fastener/location

Brake caliper to rear axle

Tightening torque:

65 Nm

Wheel bearing/wheel hub on vehicles with drum brakes, removing and installing

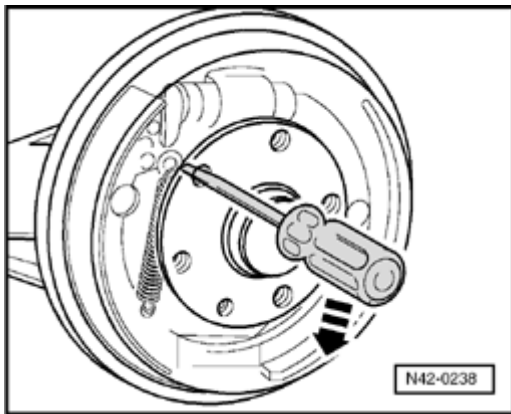


Special tools, testers and auxiliary items required

- n Hub cap puller VW637/2
- n Seal installer 3241
- n Assembly tool 3420
- n Torque wrench V.A.G1332
- n Torque wrench V.A.G1410

Removing

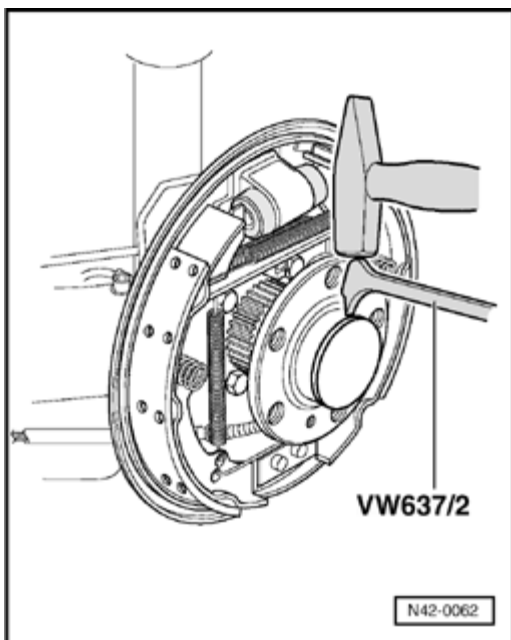
- Lift vehicle.
- Remove wheel.



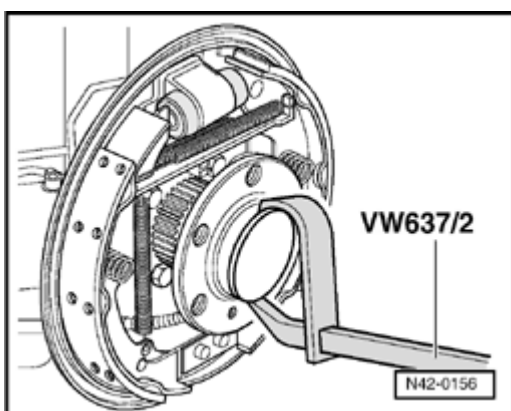
- Reset brake

- To do this use a screwdriver through the opening in the brake drum and push adjuster upward.

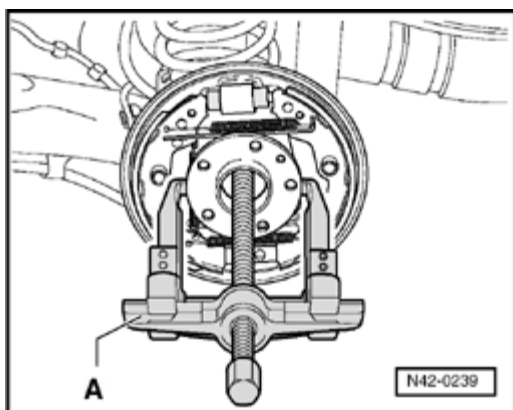
- Remove phillips-head screw for brake drum and take out brake drum.



Loosen dust cap from seat by tapping lightly on claw with hub cap puller VW637/2 .

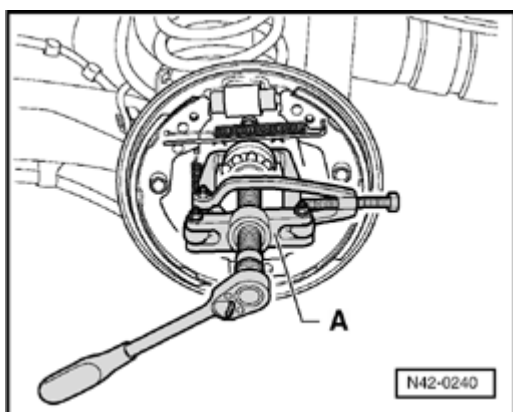


- Pull off dust cap.
- Remove 12-point nut.



- Pull off wheel bearing/wheel hub unit from stub axle.

A - Puller with leg clamp, e.g. Kukko 20/2

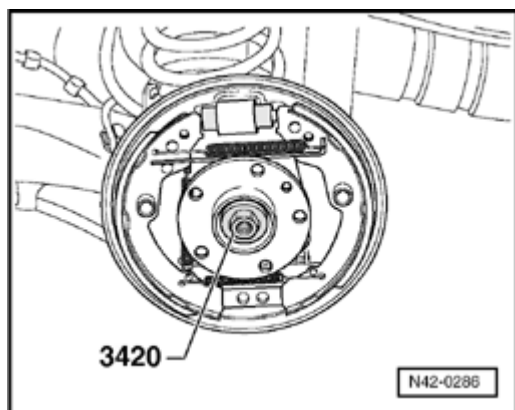


- Pull off bearing inner race from stub axle.

Only use puller - **A** - with leg clamp e.g. Kukko 204-2 (commercial type).

Installing

- Install wheel bearing/wheel hub unit as far as possible on stub axle.

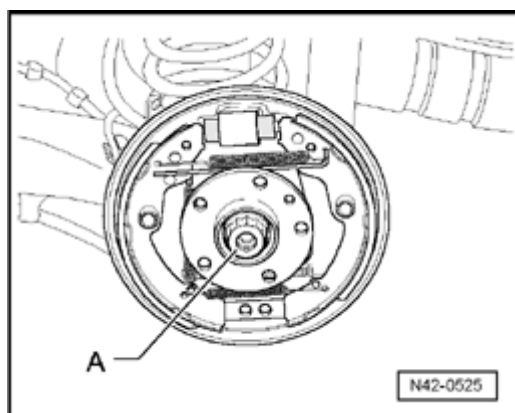


- Attach installation sleeve wheel brg. 3420 and pull wheel bearing/wheel hub unit on to stop.

Note:

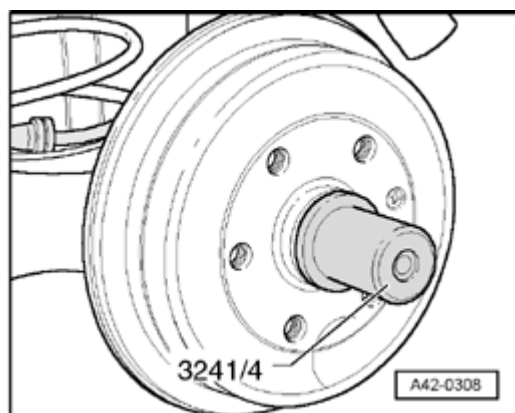
n Make sure that the hubs/wheel bearing unit does not tilt!

- Remove installation sleeve wheel brg. 3420 ab.



- Use a new 12-point nut - **A** - and tighten to 175 Nm.

- Install brake drum.



- Drive in dust cap.

Note:

- n *Always replace dust caps.*
- n *Damaged (dented) dust caps allow ingress of moisture, always use the tool illustrated. Always use tool illustrated to reduce chance of damage to dust cap.*

Further installation in reverse order

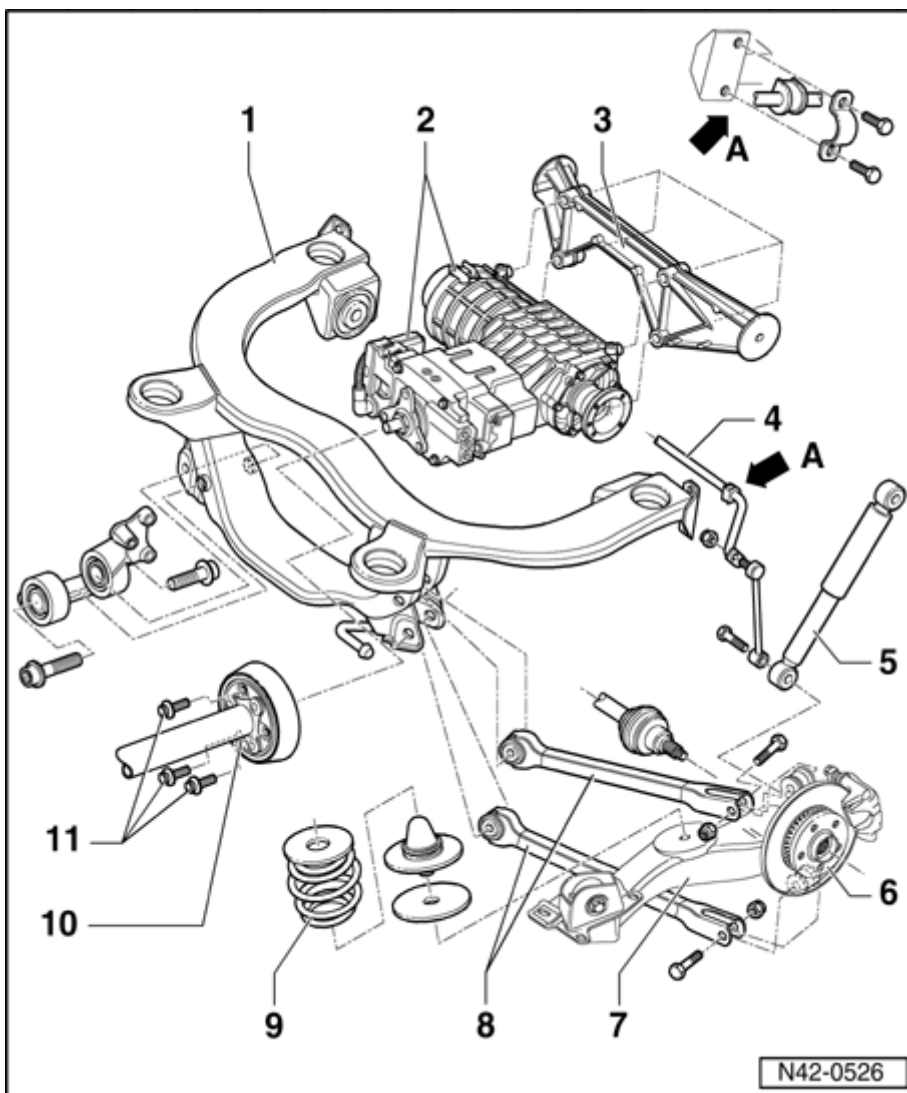
- Install and fasten wheel ⇒ [44-2, Tightening torques for wheel bolts](#) .

Rear axle, servicing (all wheel drive vehicles)

Rear axle with all wheel drive, overview

Note:

- n Always replace self-locking nuts and bolts.
- n Always replace corroded nuts and bolts.



1. Subframe

- i Assembly overview ⇒ [42-5, Trailing arm and transverse links \(all-wheel drive vehicles\), assembly overview](#)

2. Final drive

- i Servicing

⇒ *Repair Manual, Transmission, Repair Group 39, disassembling and assembling final drive*

3. Cross member

4. Stabilizer bar

- i Repair damaged paint and protect against corrosion

5. Gas filled shock absorber

- i Assembly overview ⇒ [42-4, Spring and shock absorbers on vehicles with all-wheel drive, assembly overview](#)
- i Removing and installing ⇒ [42-4, Shock absorber, removing and installing](#)

6. Wheel bearing

- i Removing and installing ⇒ [42-5, Rear wheel bearing, pressing out and in with trailing arm installed](#)

7. Trailing arm

- i Assembly overview ⇒ [42-5, Trailing arm and transverse links \(all-wheel drive vehicles\), assembly overview](#)

8. Transverse link

- i Assembly overview ⇒ [42-5, Trailing arm and transverse links \(all-wheel drive vehicles\), assembly overview](#)

9. Coil spring

- i Assembly overview ⇒ [42-4, Spring and shock absorbers on vehicles with all-wheel drive, assembly overview](#)

10. Drive shaft

- i Repair instructions

⇒ *Repair Manual, Transmission, Repair Group 39, Repairing final drive*

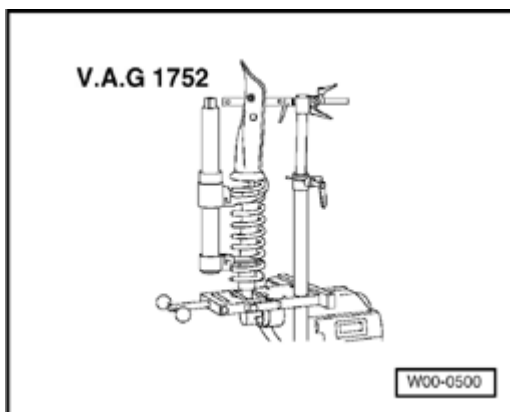
11. Twelve point bolt

i

⇒ *Repair Manual, Transmission, Repair Group 39, Drive shaft, removing and installing*

Spring, removing and installing

Special tools, testers and auxiliary items required



- n Spring compressor V.A.G1752/1
- n Spring holder V.A.G 1752/15

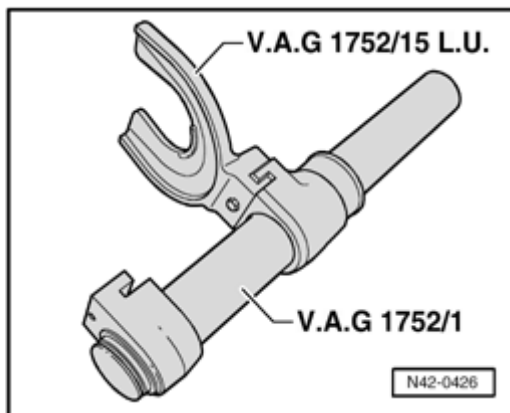
The Spring holder V.A.G1752/15 developed for 4 Motion vehicles. Thus the safe removing and installing of springs are possible

When compressing the spring high tension exists. Note the following safety rules.

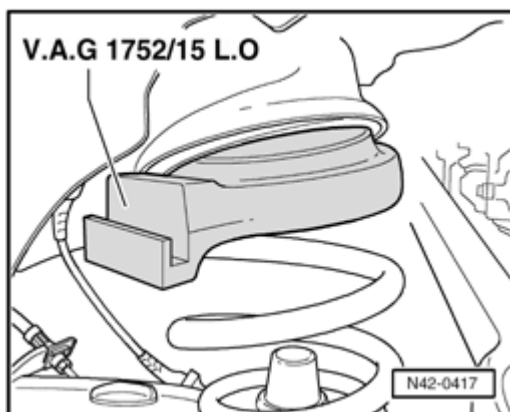
Caution!

- n **Make sure that the spring holders rest as near as possible against the spring coils.**
- n **Check the spring holders at the spring coils during the clamping action for correct seating.**
- n **Do not use an impact wrench.**

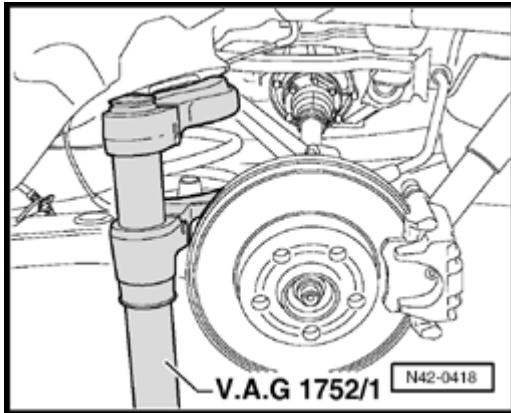
Removing left spring



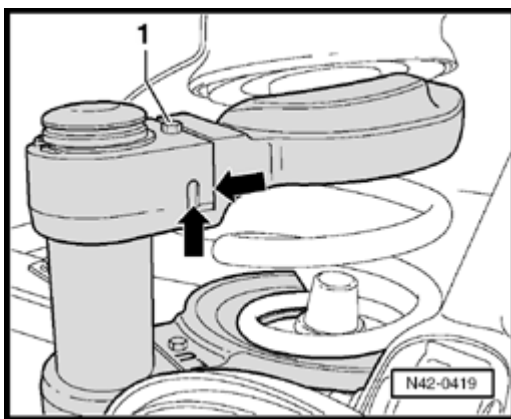
- Install spring holder V.A.G1752/15L. U. to spring compressor V.A.G1752/1



- Set spring holder V.A.G1752/15L. O. on highest attainable spring coil.



- Install spring compressor V.A.G1752/1 .



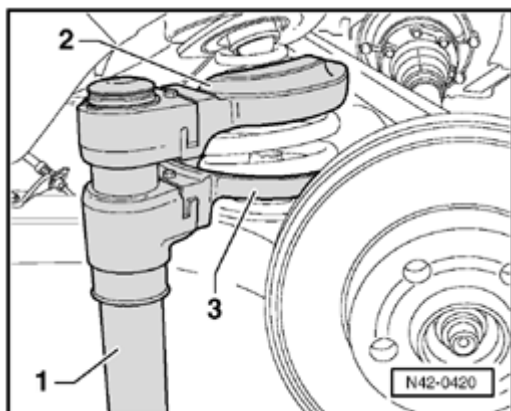
- Turn spindle of the spring compressor in a clockwise direction so far, until the claws - **arrows** - of spring compressor and spring holder interlock.

- Install bolt - **1** - at the top of spring holder.

The bolt - **1** - must be put in from the bottom.

- Turn spindle of the spring compressor until spring is slightly tightened.

Check whether the spring holders rest correctly against spring coils.



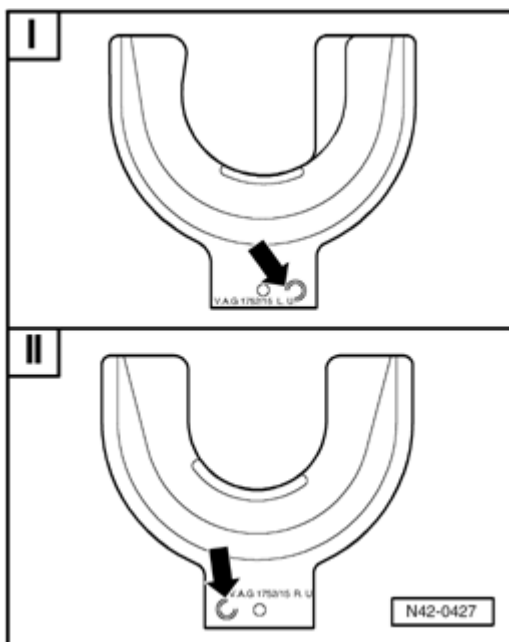
- Compress coil spring until it can be removed.
- Stop clamping action, if spring coils touch themselves!
- Take spring with the spring compressor from vehicle.

If a shim is under stop buffer, you must take this out together with spring.

- Place spring with spring compressor.

- 1 - Spring tensioner V.A.G1752/1
- 2 - Spring holder V.A.G1752/15L. O.
- 3 - Spring holder V.A.G1752/15L. U.

Installing left spring



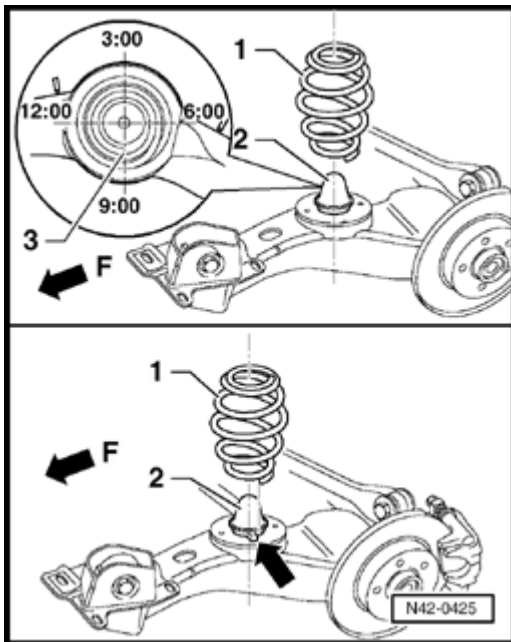
- Install spring into spring holder.

The beginning of the spring coil must be positioned in spring holder - **arrow** - , as represented.

- I - Spring holder left bottom (L.U.)
- II - Spring holder right bottom (L.U.)

- Turn spindle of the spring compressor until spring is slightly tightened.
- Check whether spring holders rest correctly against spring coils.
- Compress coil spring until it can be install into the vehicle.
- Stop clamping action, if spring coils touch themselves!

Installation position of spring



For vehicles without stop buffer - **2** - .

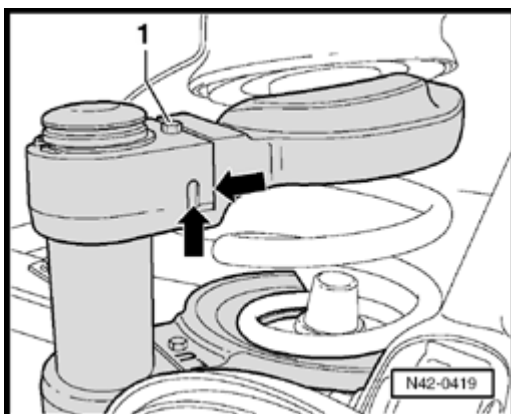
The beginning of spring coil - **3** - must be located in 9:00 o'clock position.

1 - Spring

2 - Bump stop

F - Driving direction

Installation position of spring

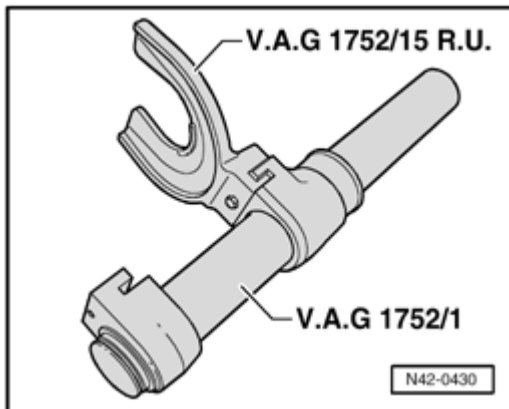


For vehicles with stop buffer - **2** - .

The end of coil spring must lie against stop - **arrow** - .

- Release tension of the spring by turning spindle clockwise.
- After releasing spring tension, check installation position
- Do not use an impact wrench or similar!

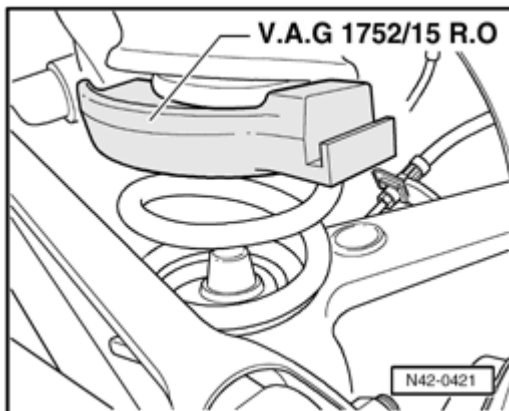
If you turn spindle too far, the spring holders block themselves!



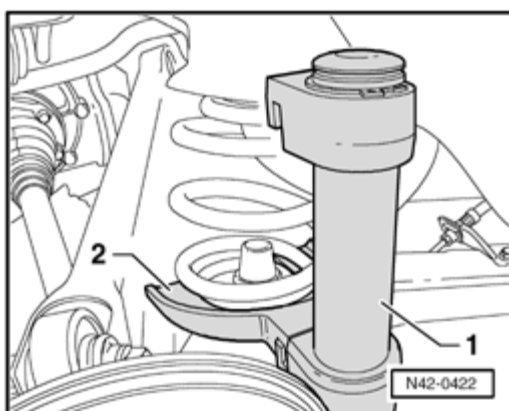
- Remove nut - 1 - off and remove screw with the spring holder.

- Take spring compressor off spring.

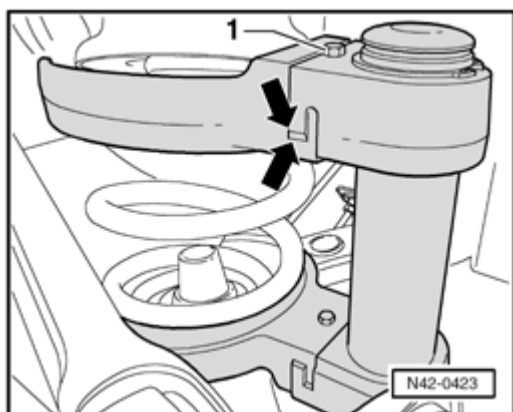
Removing right spring



- Install the spring holder V.A.G1752/15R. U. to spring compressor V.A.G1752/1



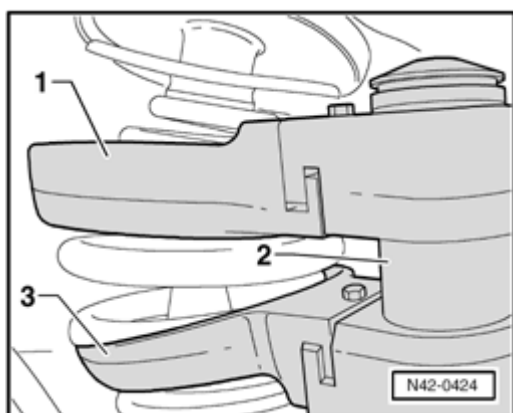
- Set spring holder V.A.G1752/15R. O. on highest spring coil.



- Install spring compressor V.A.G1752/1 .

1 - Spring tensioner V.A.G1752/1

2 - Spring holder V.A.G1752/15R. U.



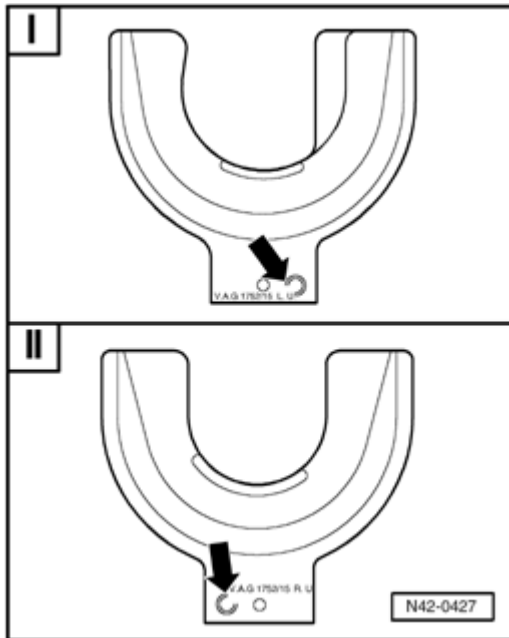
- Turn spindle of the spring compressor in a clockwise direction so far, until the claws - **arrows** - of spring compressor and spring holder interlock.

- Install bolt - **1** - at top of spring holder.

The bolt - **1** - must be put in from the bottom.

- Turn spindle of the spring compressor until spring is slightly tightened.

- Check whether spring holders rest correctly against spring coils.



- Compress coil spring until it can be removed.

1 - Spring holder V.A.G1752/15R. O.

2 - Spring tensioner V.A.G1752/1

3 - Spring holder V.A.G1752/15R. U.

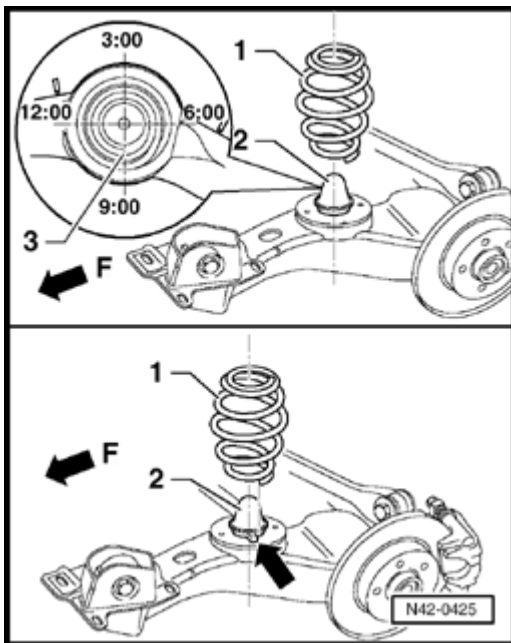
- Stop clamping action, if spring coils touch themselves!

- Take spring with spring compressor from vehicle.

If a shim is under stop buffer, you must take this out together with spring.

- Placing spring with spring compressor.

Installing right spring



- Install spring into spring holder.

The beginning of the spring coil must be positioned in spring holder - **arrow** - , as represented.

I - Spring holder left bottom (L.U.)

II - Spring holder right bottom (L.U.)

- Turn spindle of spring compressor until spring is slightly tightened.
- Check whether spring holders rest correctly against spring coils.
- Compress coil spring until it can be install into vehicle.
- Stop clamping action, if spring coils touch themselves!

Installation position of spring

For vehicles without stop buffer - **2** - .

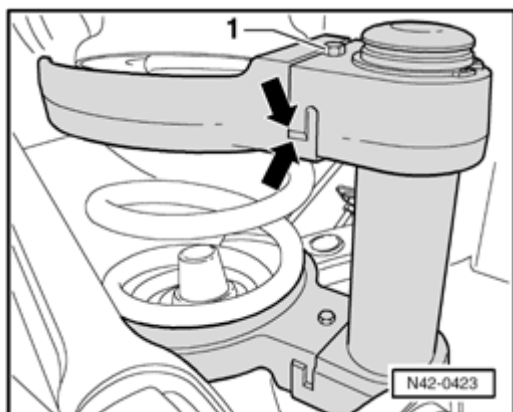
The beginning of spring coil - **3** - must be located in 9:00 o'clock position.

1 - Spring

2 - Bump stop

F - Driving direction

Installation position of spring

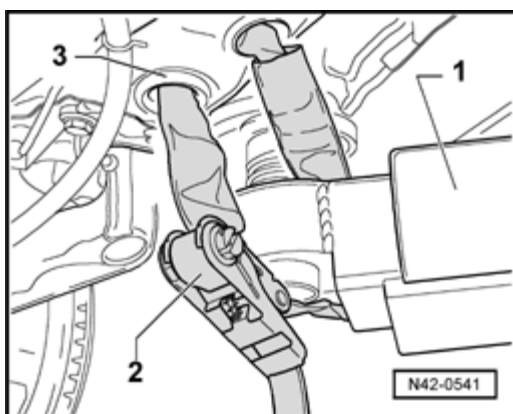


For vehicles with stop buffer - **2** - .

The end of coil spring must lie against stop - **arrow** - .

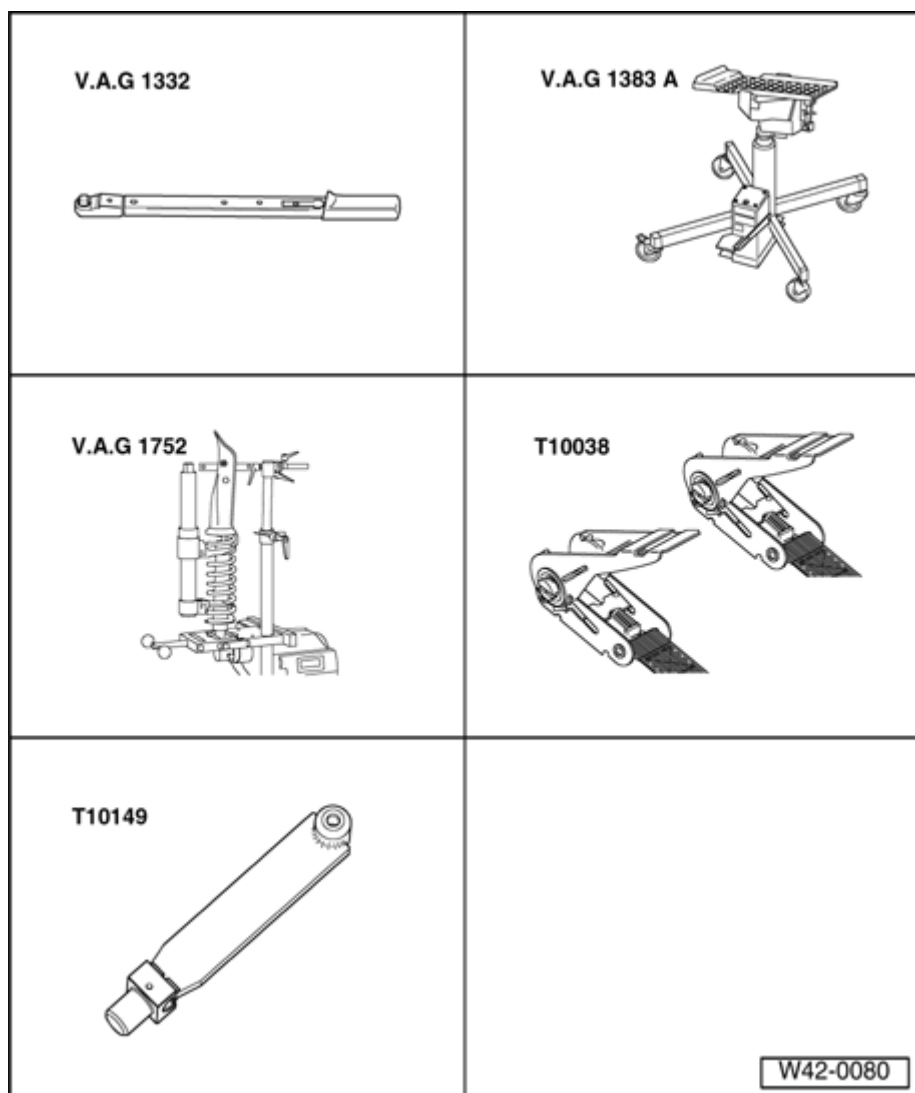
- Release tension of spring by turning spindle clockwise.
- Do not use an impact wrench or similar!

If spindle is turned too far, the spring holders block themselves!



- Remove nut - **1** - off and remove screw with spring holder.
- Take spring compressor off spring.

Spring R32, removing and installing



Special tools, testers and auxiliary items required

- n Torque wrench V.A.G1332
- n Engine/transmission jack V.A.G1383A
- n Spring compressor V.A.G1752/1
- n Spring holder V.A.G1752/7
- n Spring holder V.A.G1752/15
- n Tensioning strap T10038
- n Wheel hub support T10149

The Spring holder V.A.G1752/15 developed for 4 Motion vehicles. Thus the safe removing and installing of springs

are possible

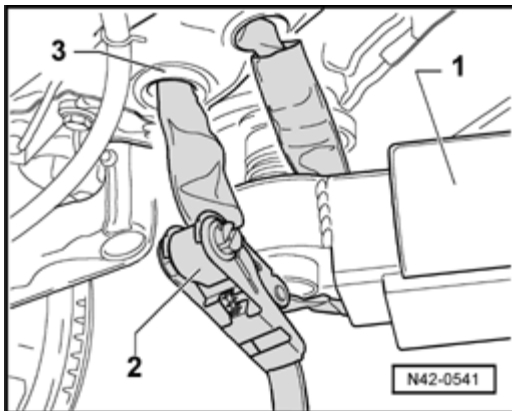
When compressing the spring, high tension exists. Note the following safety rules.

Caution!

- n **Make sure that the spring holders rest as near as possible against the spring coils.**
- n **Check the spring holders at the spring coils during the clamping action for correct seating.**
- n **Do not use an impact wrench.**

Caution!

- n **Tighten vehicle to the lifting platform**
- n **If the vehicle is not secured, there is a risk that it may slip off the hoist.**



- Remove plugs from trailing arm - 3 - and tighten tensioning strap - 2 - .

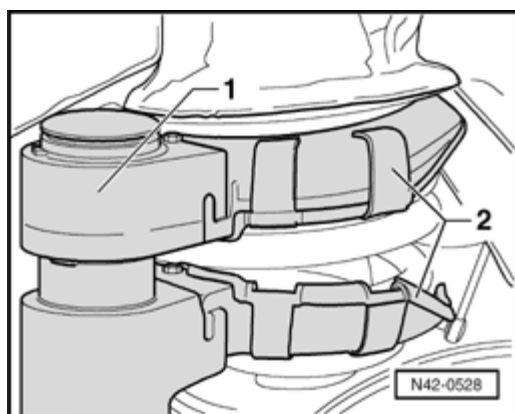
1 - Support lifting platform arm

2 - Tensioning strap T10038

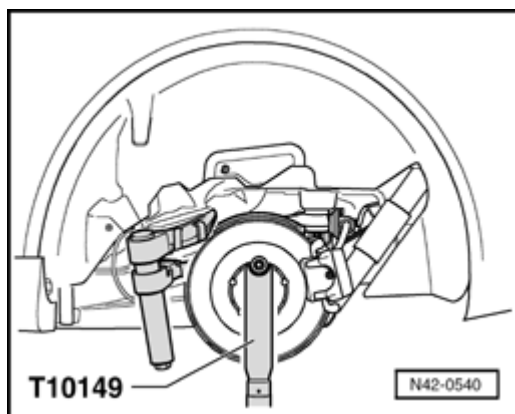
- The vehicle must be tightened with tensioning strap on left and right side.

Removing left spring

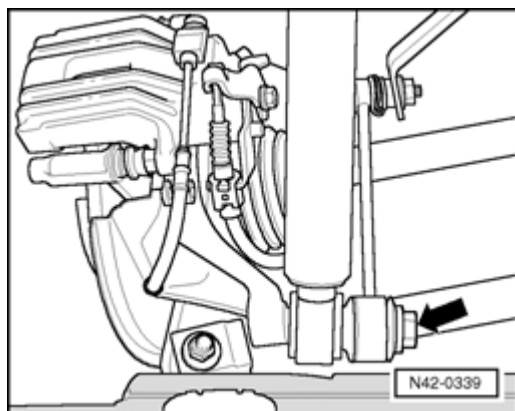
- Removing coupling rod from Left Rear Level Control System Sensor G76 from rear axle ⇒ [40-2, Left rear level control system sensor G76 on rear axle for all wheel drive](#) .



- Insert spring compressor V.A.G1752/1 - 1 - with spring retainer V.A.G1752/7 - 2 - .
- Turn spring compressor spindle until spring is slightly tightened.
- Check whether spring holders rest correctly against spring coils.
- Compress coil spring until spring coils touch each other.
- Turn wheel hub until one of the holes for wheel bolts is at the 12 o'clock position.



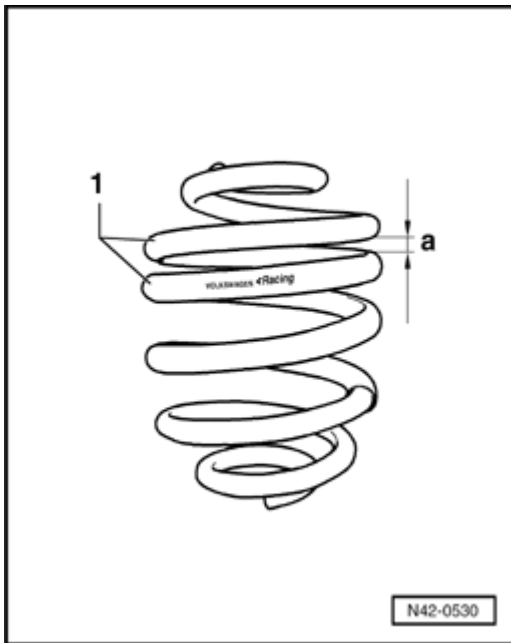
- Install wheel hub support T10149 with a wheel bolt.



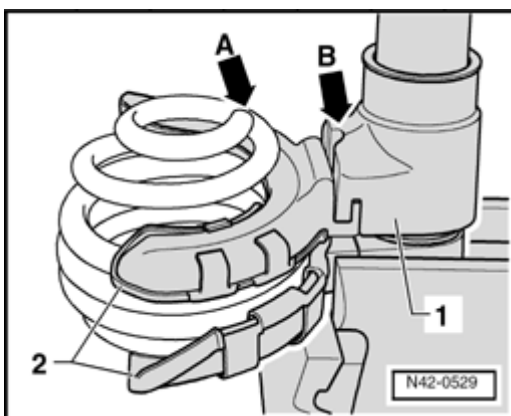
- Remove lower bolt - **arrow** - from shock absorbers.
- Lower wheel bearing housing approx. 5 cm.
- Take spring with spring compressor from the vehicle.
- Placing spring with spring compressor.

Installing left spring

- When changing spring an exact position must be observed.



- The spring coils - **1** - with the lowest distance - **a** - in vehicle must point upward.



- Compress spring compressor V.A.G1752/1 - **1** - with spring retainer V.A.G1752/7 - **2** - into a vice.
- Compress spring with spring compressor so that lower end of spring - **arrow A** - points to notch in spring compressor - **arrow B** - .

Both narrow coil springs that point to one another, point downward.

- Turn spring compressor spindle until the spring is slightly tightened.
- Check whether spring holders rest correctly against spring coils.
- Compress coil spring until spring coils touch each other.

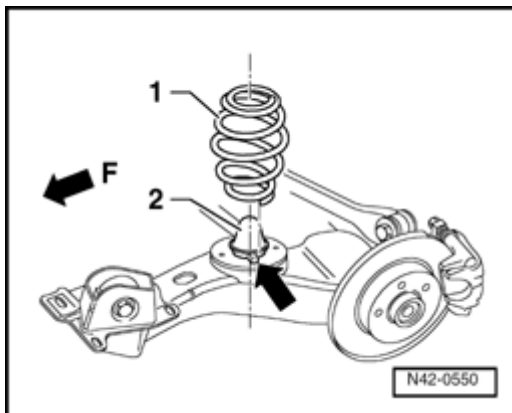
Installation position of spring

1 - Spring

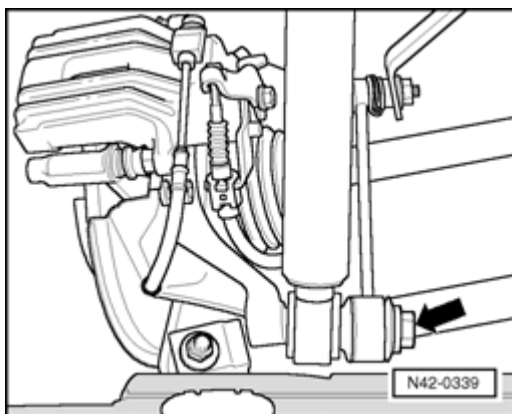
2 - Bump stop

F - Driving direction

The end of coil spring must lie against stop - **arrow** - .



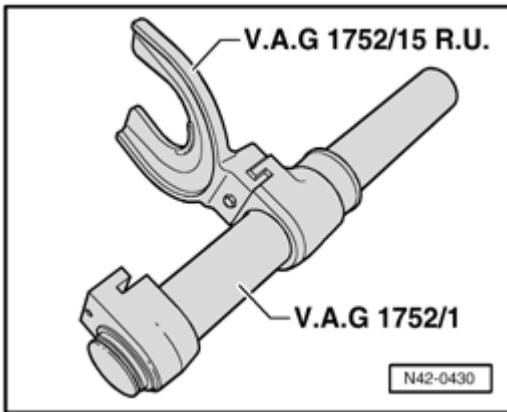
- Set spring with spring compressor V.A.G1752/1 .



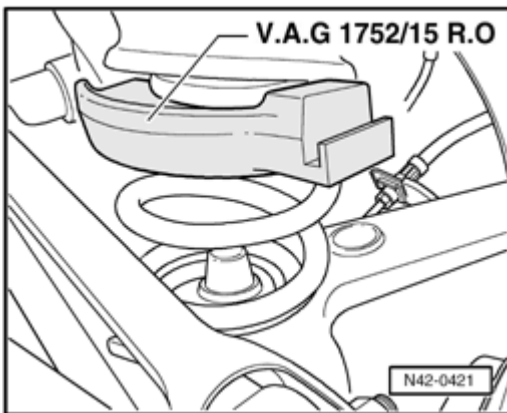
- Screw lower bolt - **arrow** - to shock absorbers.
- Release spring tension by turning spindle clockwise.
- After releasing spring tension, check installation position
- Do not use an impact wrench or similar!

- Take spring compressor off spring.

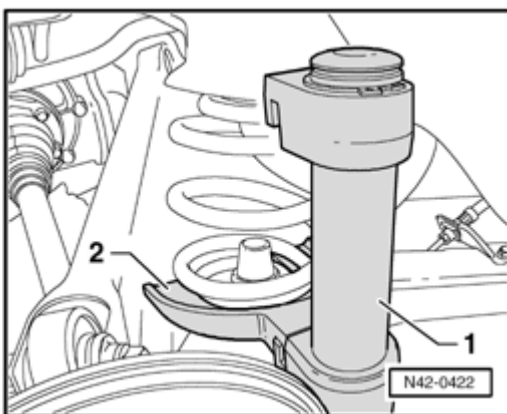
Removing right spring



- Install the spring holder V.A.G1752/15R. U. to spring compressor V.A.G1752/1



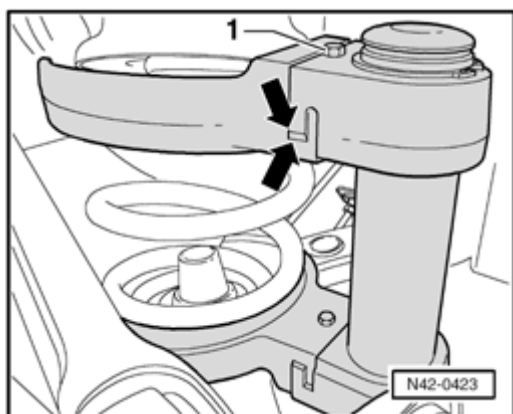
- Set spring holder V.A.G1752/15R. O. on highest spring coil.



- Install spring compressor V.A.G1752/1- .

1 - Spring tensioner V.A.G1752/1

2 - Spring holder V.A.G1752/15R. U.



- Turn spring compressor spindle in a clockwise direction so far, until the claws - **arrows** - of spring compressor and spring holder interlock.

- Install bolt - **1** - at top of spring holder.

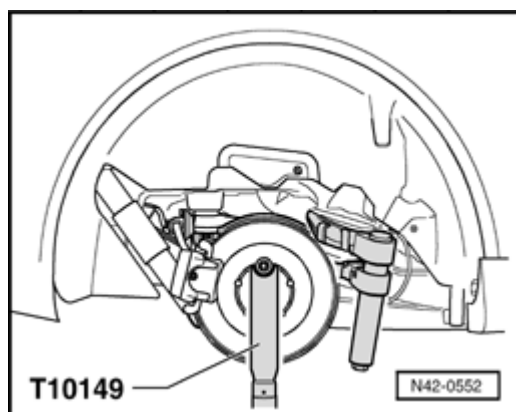
Bolt - **1** - must be put in from the bottom.

- Turn spring compressor spindle until spring is slightly tightened.

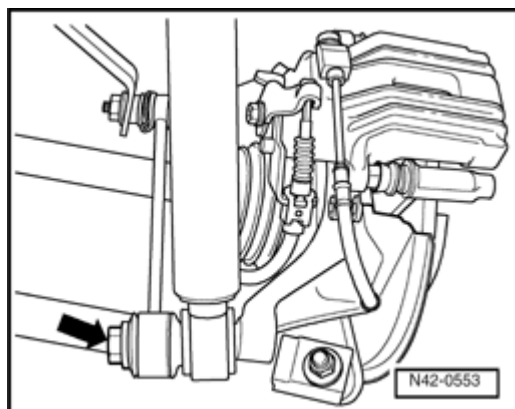
Check whether spring holders rest correctly against spring coils.

- Compress coil spring until spring coils touch each other.

- Turn wheel hub until one of the holes for the wheel bolts is at 12 o'clock position.

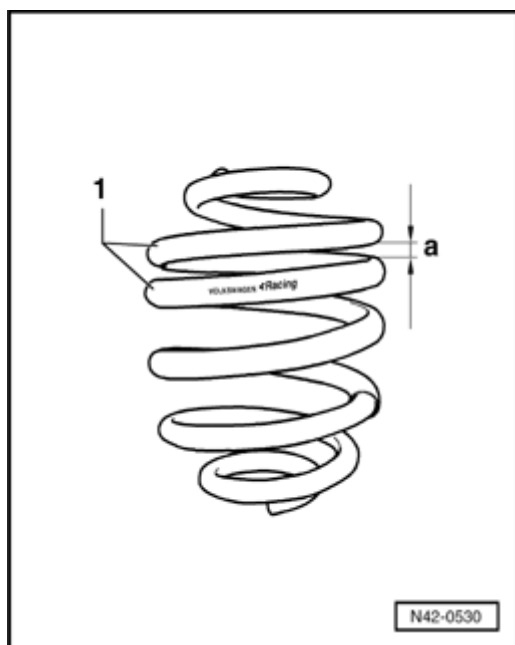


- Install wheel hub support T10149 with a wheel bolt.

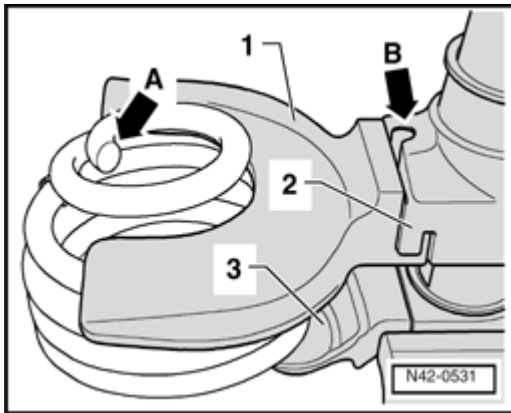


- Remove lower bolt - **arrow** - from shock absorbers.
- Lower wheel bearing housing approx. 5 cm.
- Take spring with spring compressor from vehicle.
- Placing spring with spring compressor.

Installing right spring



- When changing spring an exact position must be observed.
- The spring coils - **1** - with lowest distance - **a** - in vehicle must point upward.



- Compress spring compressor V.A.G1752/1 - **2** - with spring retainer V.A.G1752/15 into a vice.

1 - Spring holder V.A.G1752/15R. U.

2 - Spring tensioner V.A.G1752/1

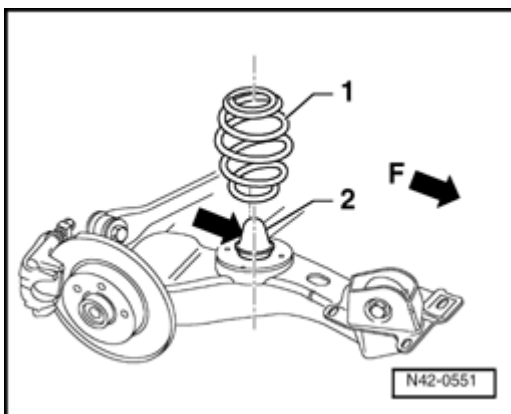
3 - Spring holder V.A.G1752/15R. O.

- Compress spring with spring compressor so that lower end of spring - **arrow A** - is across from notch in spring compressor - **arrow B** - stand.

Both narrow coil springs that point to one another, point downward.

- Turn spring compressor spindle until spring is slightly tightened.

Check whether spring holders rest correctly against spring coils.



- Compress coil spring until spring coils touch each other.

Installation position of spring

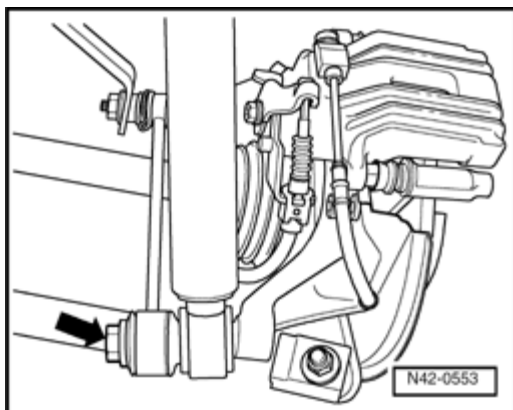
1 - Spring

2 - Bump stop

F - Driving direction

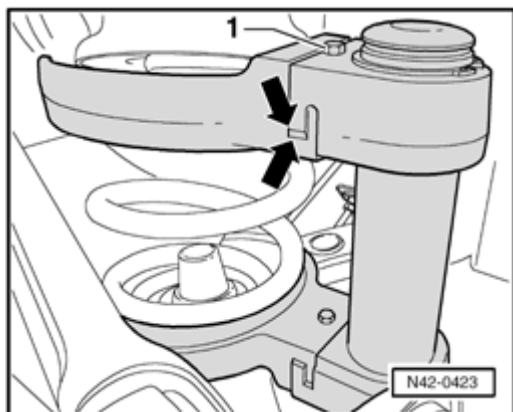
The coil spring end must lie against stop - **arrow** - .

- Set spring with spring compressor V.A.G1752/1 .



- Screw lower bolt - **arrow** - to shock absorbers.
- Release spring tension by turning spindle clockwise.
- After releasing spring tension, check installation position
- Do not use an impact wrench or similar!

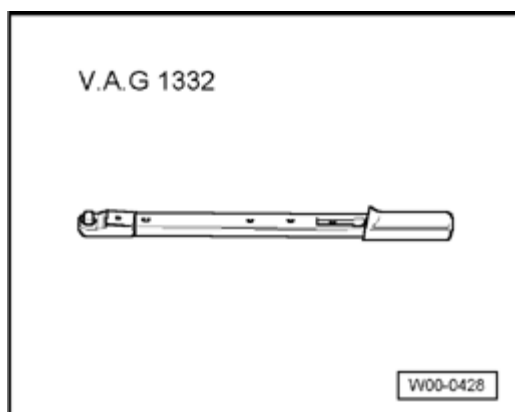
If you turn spindle too far, the spring holders block themselves!



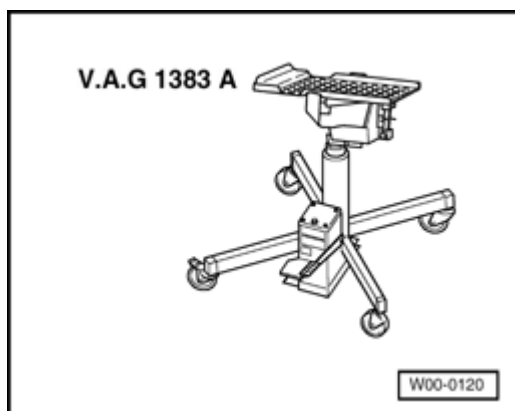
- Remove nut - **1** - off and remove screw with spring holder.
- Take spring compressor off spring.

Shock absorber, removing and installing

Special tools, testers and auxiliary items required



n Torque wrench V.A.G1332



n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2

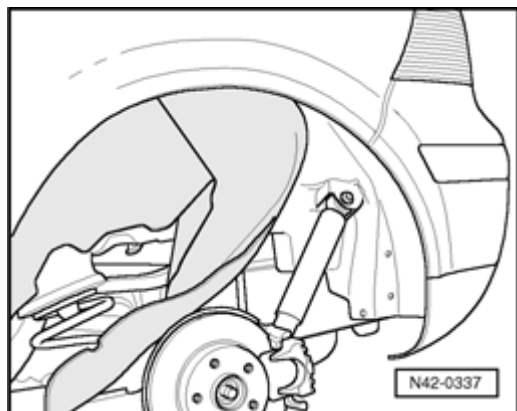
Removing

- First remove spring

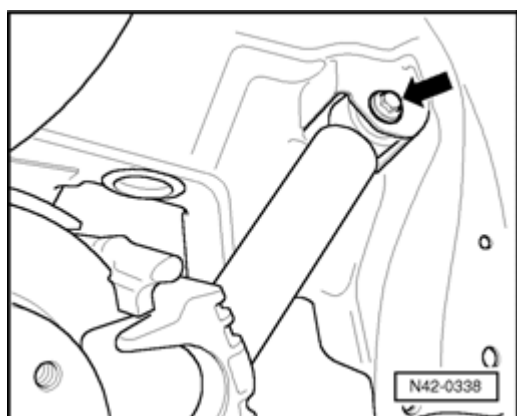
Spring, removing and installing ⇒ [42-4, Spring, removing and installing](#) .

Removing and installing spring R32, ⇒ [42-4, Spring R32, removing and installing](#)

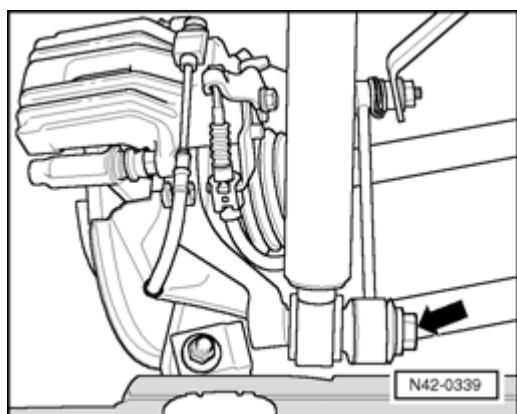
- Remove wheel.
- Unclip wire for wheel speed sensor from retainer.



- Partially loosen wheel housing liner.
- Support rear axle with engine/transmission jack V.A.G1383A .

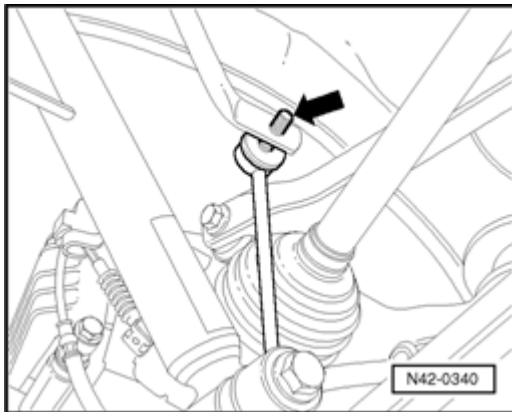


- Remove shock absorber upper bolt - **arrow** - .
- Lower trailing arm slowly using engine/transmission jack V.A.G1383A .



- Remove lower bolt - **arrow** - from shock absorbers.
- Remove absorber out of vehicle.

Installing



- Disconnect coupling rod from stabilizer bar - **arrow** - if necessary.

This eases installation of the shock absorber lower bolt.

Further installation in reverse order

Fastener/location

Shock absorber to body

Use new bolts!

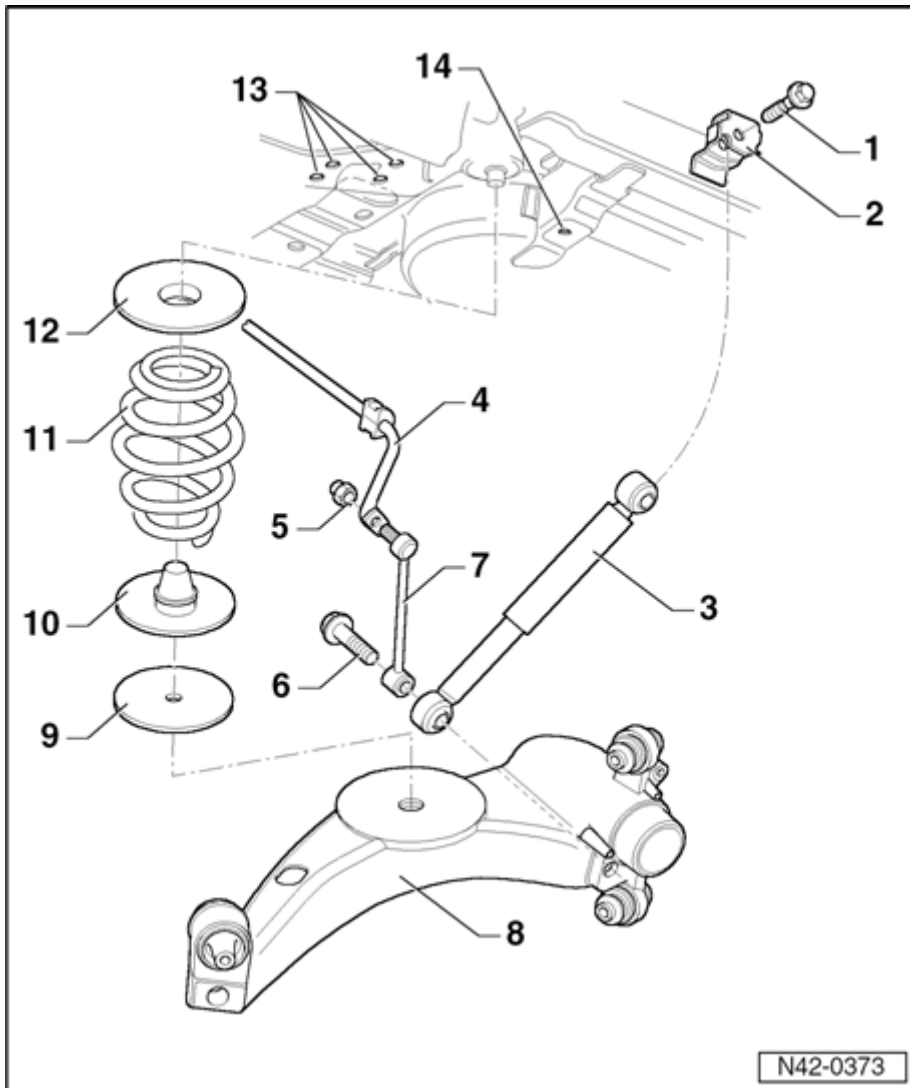
Shock absorber to trailing arm

Tightening torques

60 Nm

110 Nm

Spring and shock absorbers on vehicles with all-wheel drive, assembly overview



1. Hex bolt, 60 Nm

- ⓘ Always replace

2. Shock absorber mounting bracket

3. Gas filled shock absorber

- ⓘ Removing and installing ⇒ [42-4, Shock absorber, removing and installing](#)

Function check

⇒ [Item - 1 -](#)

- ⓘ Can be replaced individually
- ⓘ Application ⇒ *See Parts Catalog*

4. Stabilizer bar**5. Self-locking nut, 25 Nm**

- ; Always replace

6. Hex bolt, 110 Nm

- ; M 14 x 1.5 x 90
- ; Always replace

7. Connecting Link**8. Trailing arm****9. Spacer**

- ; Installed to vehicles with heavy-duty suspension only

10. Bump stop

- ; 10 Nm

11. Coil spring

- ; Examine for paint damage and repair paint damage if necessary
- ; Observe color coding
- ; Different versions
- ; Application ⇒ *See Parts Catalog*
- ; Removing and installing ⇒ [42-4, Spring, removing and installing](#)

12. Washer**13. Threads in longitudinal member**

If weld nut threads are damaged, threads can be repaired using Heli-Coil thread inserts.

Servicing thread in longitudinal

member ⇒ [40-3, Threads in longitudinal member, servicing](#)

14. Thread in cross-member

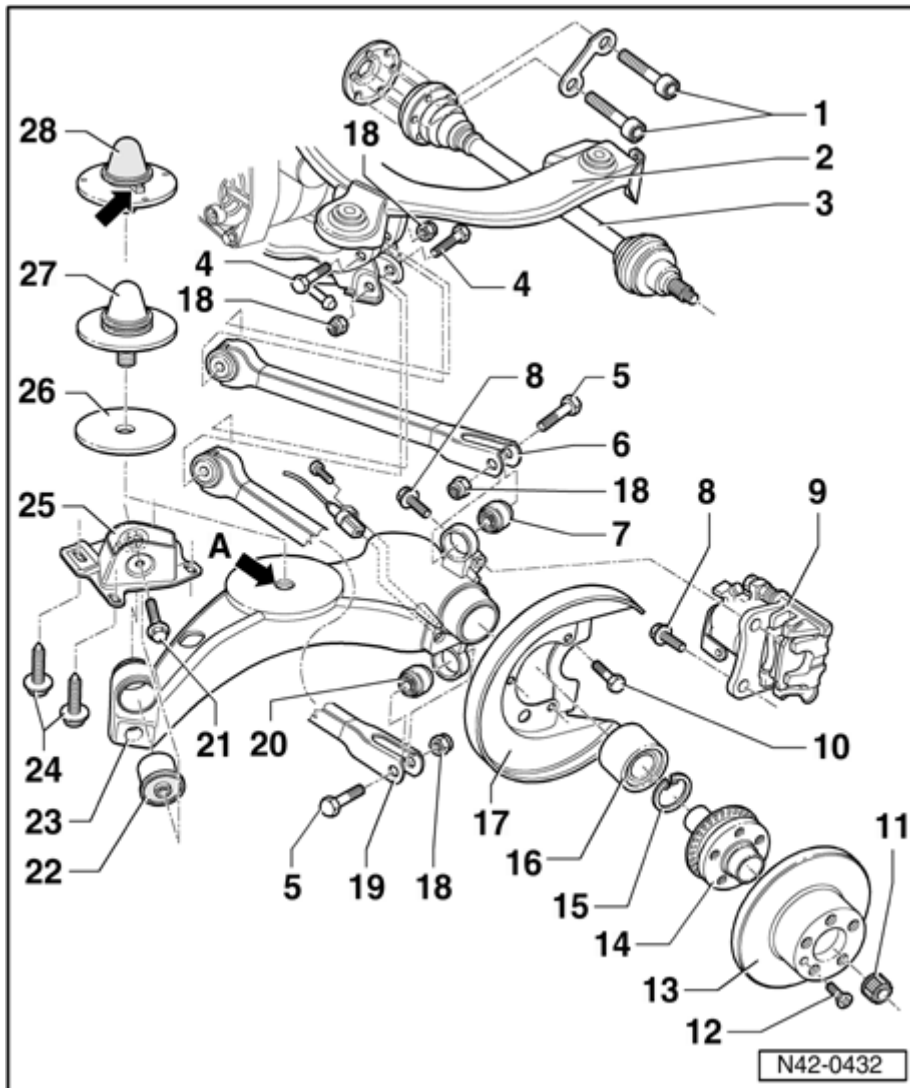
If welded nut threads in the cross member are damaged, threads can be repaired using Heli-Coil thread inserts.

Servicing thread in cross member ⇒ [40-3, Threads in longitudinal member, servicing](#)

Trailing arm and transverse links (all-wheel drive vehicles), assembly overview

Note:

- n *Never load the wheel bearing when the drive axle is removed.*
- n *When the vehicle is on its wheels and to be moved, an outer joint from a drive axle must be installed.*
- n *Welding and straightening operations are not permitted on load-bearing or wheel-controlling components.*
- n *Always replace self-locking nuts.*
- n *Always replaced corroded bolts/nuts.*



1. Multiple point socket head bolt,
40 Nm

2. Subframe

- ; Removing and installing ⇒ [42-6, Subframe, removing and installing](#)

3. Drive axle

- ; Pulling drive axle out from wheel hub and pressing in ⇒ Removing and installing drive axle ⇒ [42-7, Rear drive axle, removing and installing](#)

4. Hex bolt M 12 x 1.5 x 80

- ; Always replace

- i Installation position was modified: bolt head points opposite direction of travel

5. Hex bolt M 12 x 1.5 x 75

- i Always replace

6. Upper transverse link

- i Removing and installing ⇒ [42-5, Transverse link, removing and installing](#)
- i Different versions
- i From model year 2003 is installed a trailing arm with an adjusting hole to adjust camber
- i Application ⇒ *See Parts Catalog*

7. Ball joint

- i Check rubber boots for damage and cracks
- i Removing and installing ⇒ [42-5, Upper ball joint/bonded rubber bushing, removing and installing](#)

Starting from model year 2004 a bonded rubber bushing is inserted in place of the ball joint.

If the ball joint must be replaced, then a new bonded rubber bushing and a new upper transverse link ⇒ [Item - 6](#) - must be inserted above.

At the same time the ball joint ⇒ [Item - 20](#) - and lower transverse link ⇒ [Item - 19](#) - must be replaced.

The replacement of the ball joints by the bonded rubber bushing must be done on both

side of the vehicle!

A mixed installation is not allowed

8. Internal hex head bolt, 65 Nm

9. Brake caliper

- ; Servicing

⇒ [Repair Manual, Brake System, Repair Group 47, Servicing rear brake calipers](#)

10. Hex bolt, 10 Nm

11. Self-locking 12-point nut

- ; Tightening ⇒ [42-7, Installing](#)
- ; Always replace

12. Phillips-head screw, 4 Nm

13. Brake disc

14. Wheel hub with speed sensor rotor

- ; Rotor is welded to wheel hub
- ; Removing and installing ⇒ [42-5, Rear wheel bearing, pressing out and in with trailing arm installed](#)

15. Circlip

- ; Make sure it is seated properly

16. Wheel bearing

- ; Replace, as it is destroyed during pressing out
- ; Removing and installing ⇒ [42-5, Rear wheel bearing, pressing out and in with trailing arm installed](#)

17. Shield plate

18. Self-locking nut

- i 70 Nm plus an additional $\frac{1}{4}$ turn 90 °
- i Always replace

19. Lower transverse link

- i Removing and installing ⇒ [42-5, Transverse link, removing and installing](#)
- i Different versions
- i From model year 2003 is installed a trailing arm with an adjusting hole to adjust camber
- i Application ⇒ *See Parts Catalog*

20. Ball joint

- i Check rubber boots for damage and cracks
- i Removing and installing ⇒ [42-5, Lower ball joint/bonded rubber bushing, removing and installing](#)

Starting from model year 2004 a bonded rubber bushing is inserted in place of the ball joint.

If the ball joint must be replaced, then a new bonded rubber bushing and a new lower transverse link ⇒ [Item - 19 -](#) must be inserted above.

At the same time the ball joint ⇒ [Item - 7 -](#) and upper transverse link ⇒ [Item - 6 -](#) must be replaced.

The replacement of the ball joints by the bonded rubber bushing must be done on both

side of the vehicle!

A mixed installation is not allowed

21. Hex bolt, 90 Nm

- ; Always replace

22. Bonded rubber mounting

- ; Removing and installing ⇒ [42-5, Trailing arm mountings, removing and installing](#)

23. Trailing arm

- ; Removing and installing ⇒ [42-5, Trailing arm, removing and installing](#)
- ; From 06.99 the thread - **arrow A** - to mounting of buffer stop ⇒ [Item - 27](#) - no longer installed
- ; If the buffer stop ⇒ [Item - 28](#) - in trailing arm must be installed before build date 06.99, the thread - **arrow A** - must be extended to 10.5mm diameter

24. Hex bolt, 75 Nm

- ; Always replace

25. Clevis mounting for rear axle

- ; Check and if necessary adjust rear axle total track after installation
- ; Alignment can be adjusted by moving bearing bracket

26. Spacer

- ; Installed to vehicles with heavy-duty suspension only

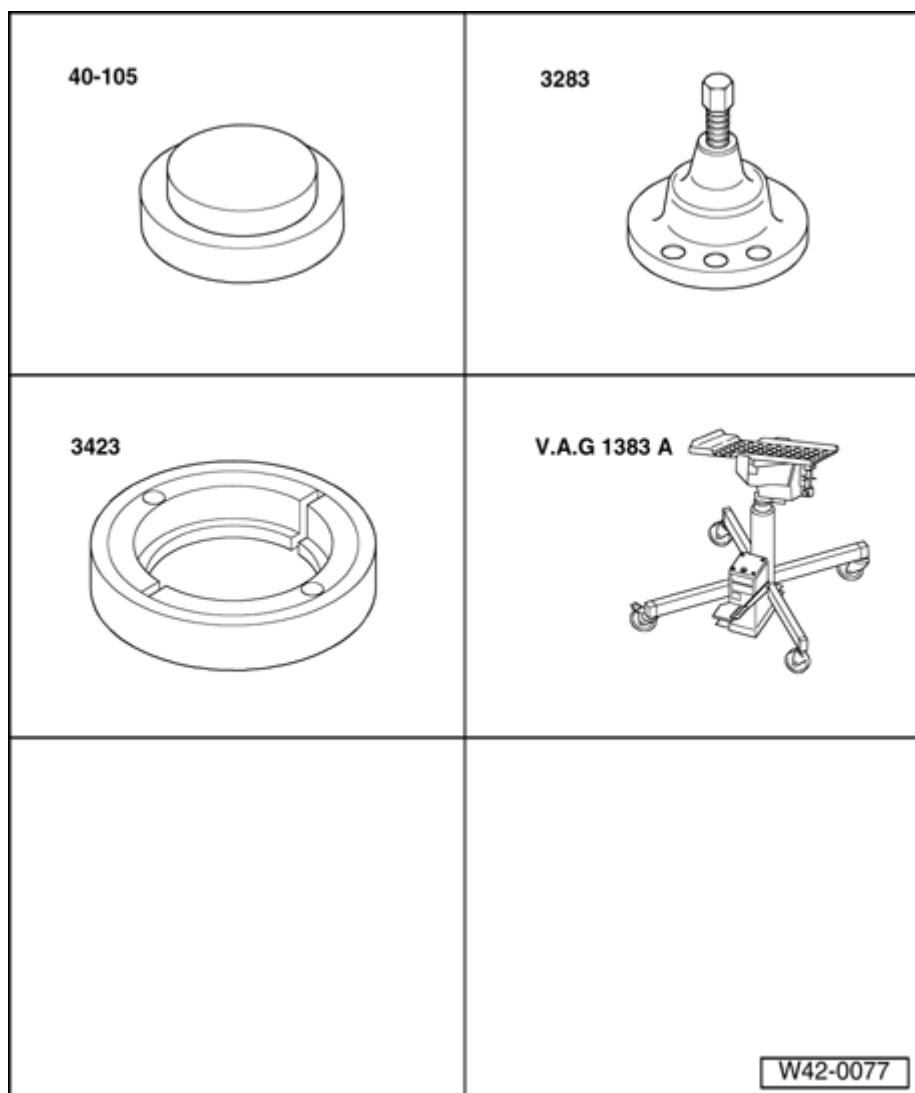
27. Buffer stop with threaded pin

- i Tighten to 10 Nm
- i No longer used after 06.99
- i Buffer stop ⇒ [Item - 28 -](#) supplied as a spare part

28. Buffer stop with locating pin

- i Introduced from 06.99
- i Correct installation position is determined by locating pin
- i Locating pin on underside must be removed if buffer stop is used on vehicles up to 06.99
- i End of spring coil must lie against the web - **arrow** - .
- i Installation position of the spring ⇒ [42-4.](#)

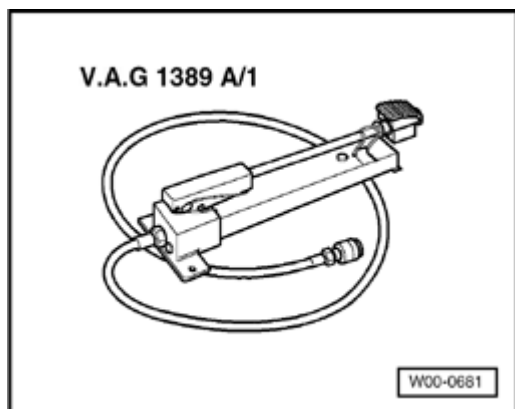
Rear wheel bearing, pressing out and in with trailing arm installed



Special tools, testers and auxiliary items required

- n Thrust piece 40 - 105
- n Hub puller 3283
- n Collar for wheel bearing inner race 3423
- n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2

Special tools, testers and auxiliary items required

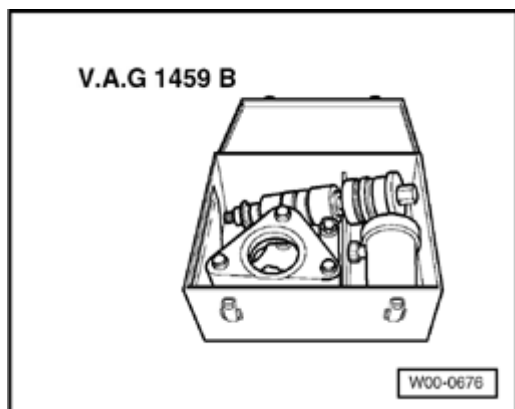


- n Foot pump with high pressure hose V.A.G1389A/1

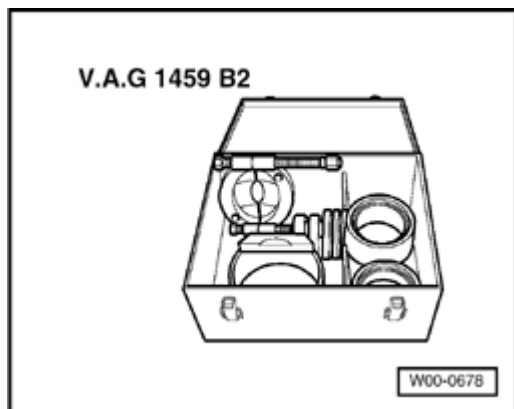
If there is a hand pump V.A.G 1389/1 available in the dealership it can be converted to a foot pump.

To do this use the conversion set V.A.G 1389/4 .

Special tools, testers and auxiliary items required



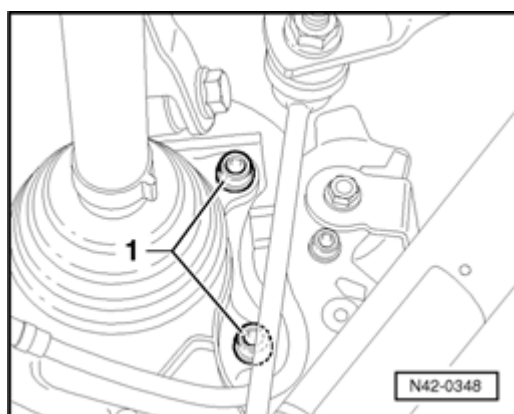
- n Hydraulic removing and installing tool for wheel bearing V.A.G 1459 B
- n Piston cylinder HKZ-15 with hydraulic press piece E-0-204-T
- n Removal rods E-0-217+218
- n Special nut E-8-214
- n Press piece E-5
- n Centering with clip E-76-2



- n Supplementary set V.A.G 1459 B/2
- n Bell E-40
- n Press piece E-6-1
- n Press piece E-13-1
- n Thrust pad E-39

- Remove wheel.

- First remove drive axle ⇒ [42-7, Rear drive axle, removing and installing](#) .



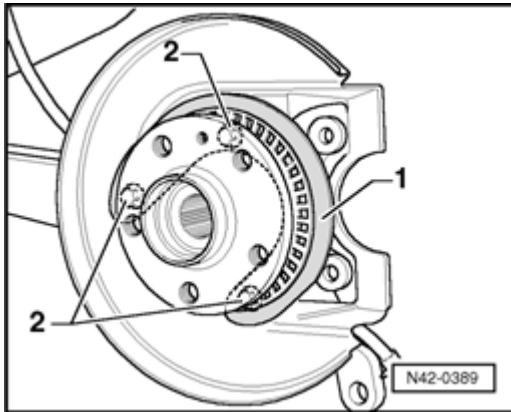
- Remove bolts - 1 - from brake caliper and take off brake caliper.

- Secure brake caliper to body.

- Remove phillips-head screw for brake disc and take out brake disc.

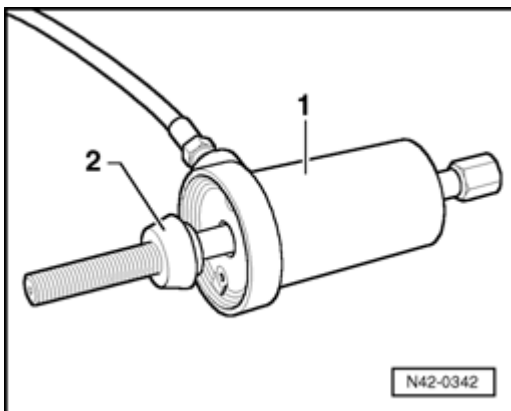
- Disconnect ABS vehicle speed sensor from trail arm housing.

Pressing out hub



- Install thrust disc - 1 - as shown in illustration.

1 - Thrust disc E-39 ; Position thrust disc so that it lies completely on bolt heads 2 .



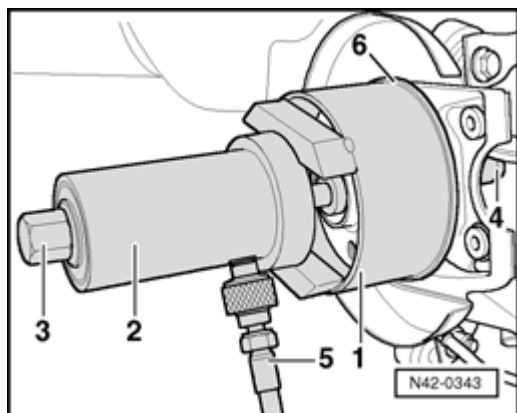
- Center assembly with clip E-76-2 .

1 - Piston cylinder HKZ-15 with hydraulic press piece E-0-204-T

2 - Centering with clip E-76-2

Note:

- n Place engine/transmission jack V.A.G1383/A , or similar, underneath to ensure safety (danger of accident through falling parts when pressing out the wheel hub).



- Install support - 1 - , piston cylinder - 2 - with pull rod - 3 - and special nut - 4 - .

1 - Bell E-40

2 - Piston cylinder HKZ-15

3 - Removal rods E-0-217

4 - Special nut E-8-214

5 - High pressure hose with quick release coupling

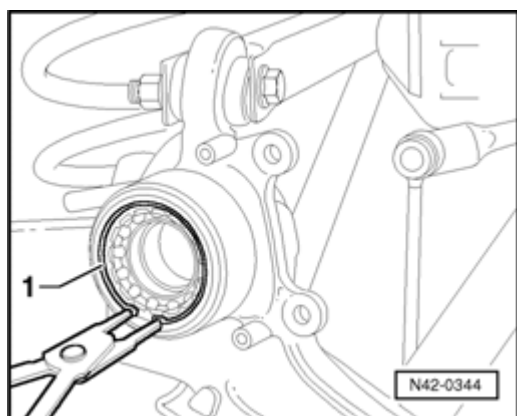
6 - Thrust pad E-39

- Build-up pressure with foot pump.

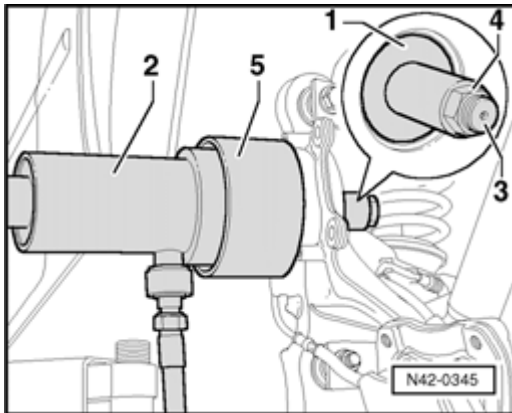
- Check that all tools are correctly centered.

- Press wheel hub out through wheel bearing by operating pump.

Pressing out wheel bearing



- Remove circlip - 1 - .



- Position thrust piece - 1 - on back of wheel bearing.
- Install piston cylinder - 2 - with pull rod - 3 - and special tool - 4 - .

1 - Press piece E-5

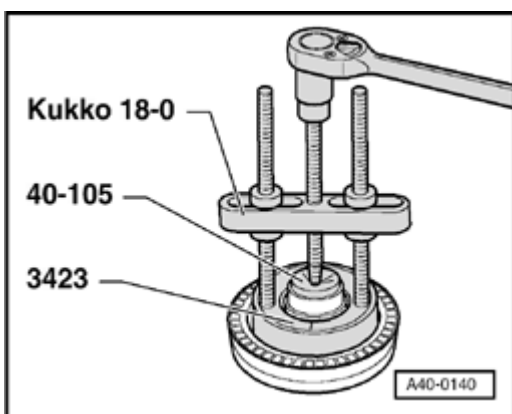
2 - Piston cylinder HKZ-15

3 - Removal rods E-0-217

4 - Special nut E-8-214

5 - Bell E-44

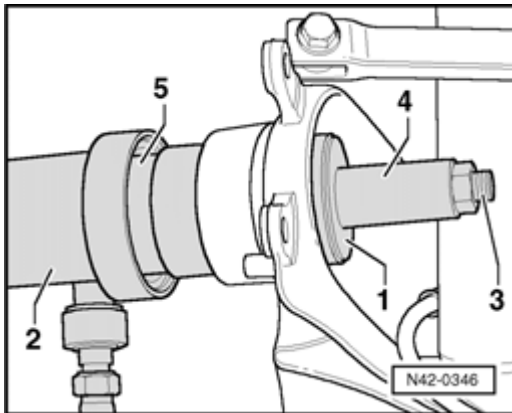
- Build-up pressure with foot pump.
- Check that all tools are correctly centered.
- Press out wheel bearing by operating pump.



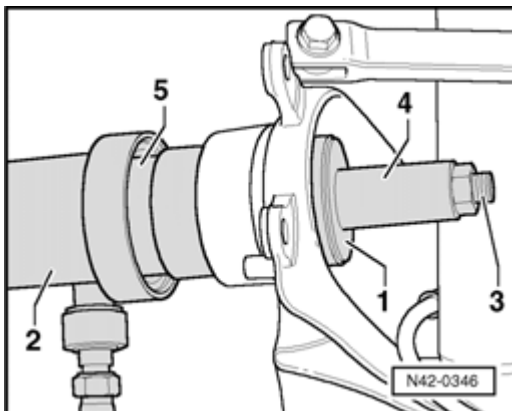
- Pull bearing inner race off from wheel hub.

Pressing in wheel bearing

- Position wheel bearing on wheel bearing housing.



- Position thrust piece - 1 - on back of wheel bearing housing.
- Install piston cylinder - 2 - with bolt - 3 - , special tool - 4 - and thrust piece - 5 - .
- Build-up pressure with foot pump.
- Check that all tools are correctly centered.

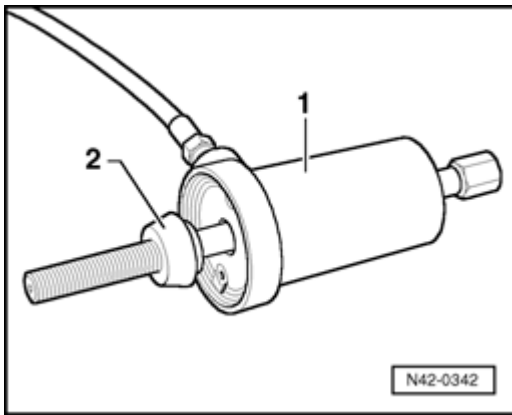


- Then press in wheel bearing by operating pump.

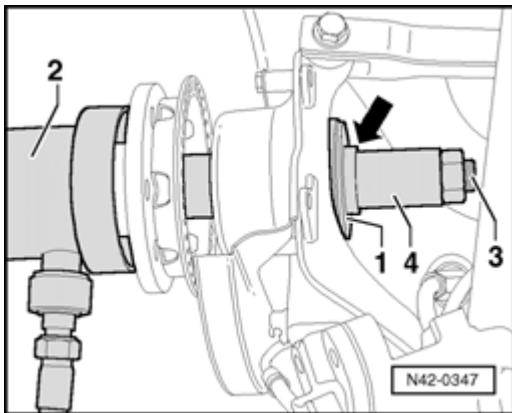
- 1 - Press piece E-6-1
- 2 - Piston cylinder HKZ-15
- 3 - Removal rods E-0-217
- 4 - Special nut E-8-214
- 5 - Press piece E-13-1

Install securing ring!

Pressing in wheel hub



- Center assembly with clip E-76-2 .
- Position wheel hub on wheel bearing.



- Position thrust piece - 1 - on back of wheel bearing housing.
- Install piston cylinder - 2 - with bolt - 3 - , special tool - 4 - and thrust piece - 5 - .

1 - Press piece E-5

2 - Piston cylinder HKZ-15

3 - Removal rods E-0-217

4 - Special nut E-8-214

- Build-up pressure with foot pump.
- Check that all tools are correctly centered.
- Press wheel hub on by pumping foot pump.

The shoulder - **arrow** - of the thrust piece E-5 must face toward special nut - 4 - .

Installing

Installation is carried out in reverse sequence.

Fastener/location

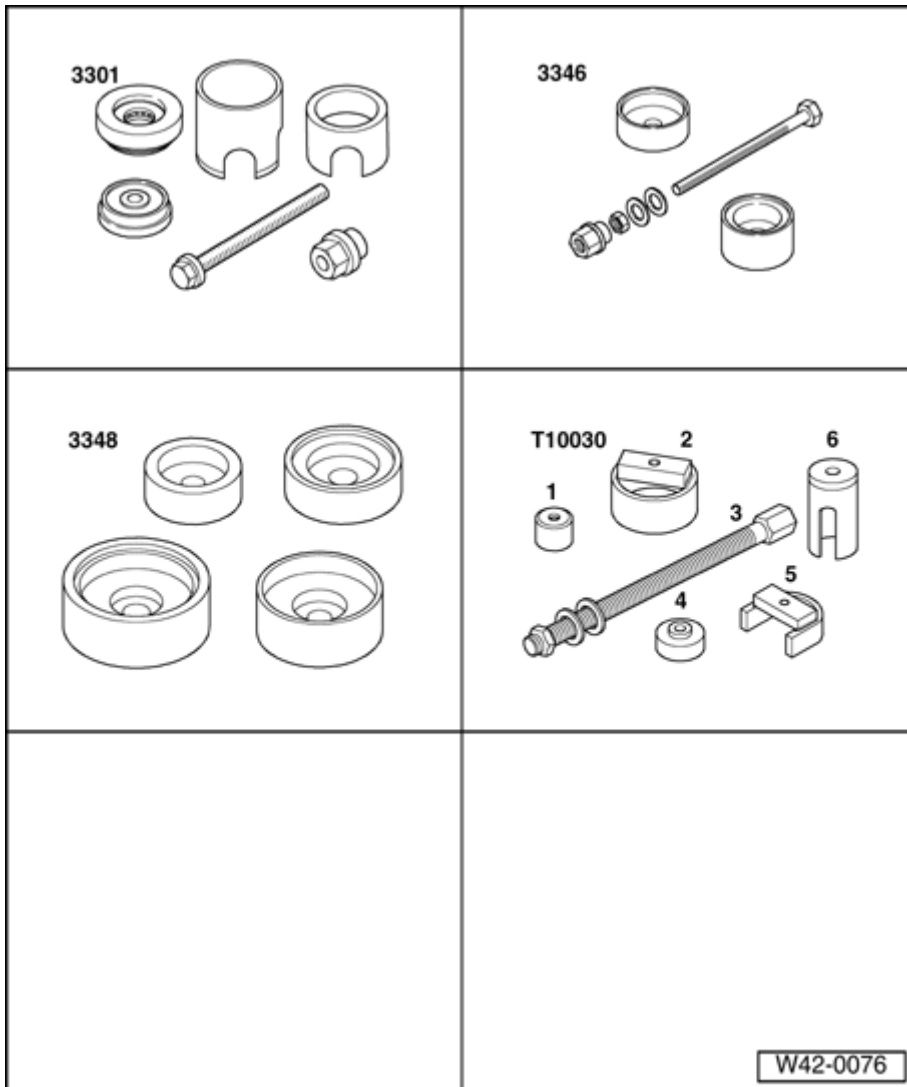
Drive axle inner joint to final drive flange

Brake caliper to trailing arm

12-point nut to wheel hub ⇒ [42-7, Installing](#)**Tightening torques**

40 Nm

65 Nm

Trailing arm mountings, removing and installing**Special tools, testers and auxiliary items required**

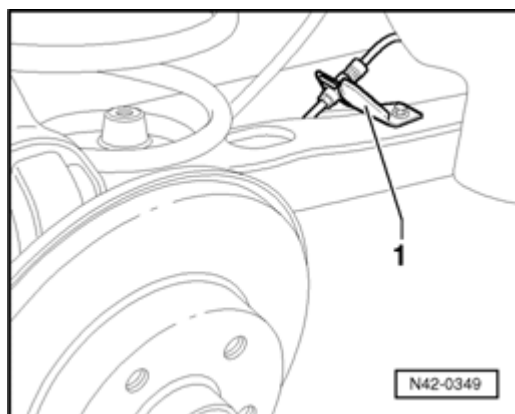
- n Assembly tool 3301
- n Assembly tool 3346
- n Assembly tool 3348
- n Assembly tool T10030

Removing

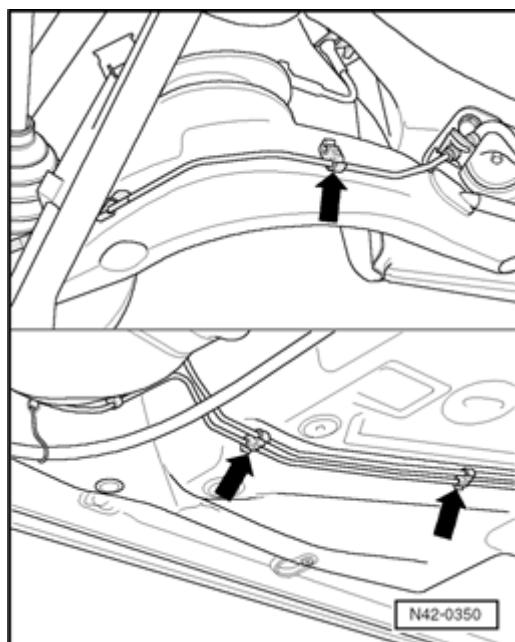
- Remove wheel.
- First remove the spring

Removing and installing spring ⇒ [42-4, Spring, removing and installing](#) .

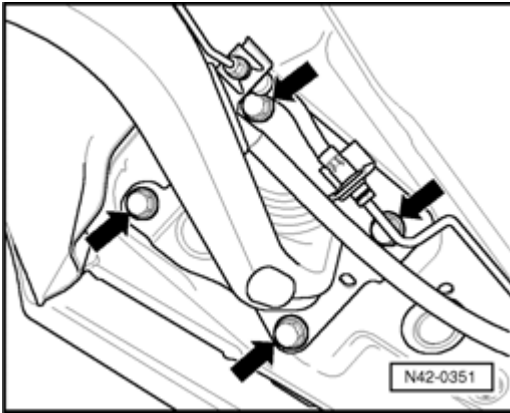
Removing and installing spring R32 ⇒ [42-4, Spring R32, removing and installing](#)



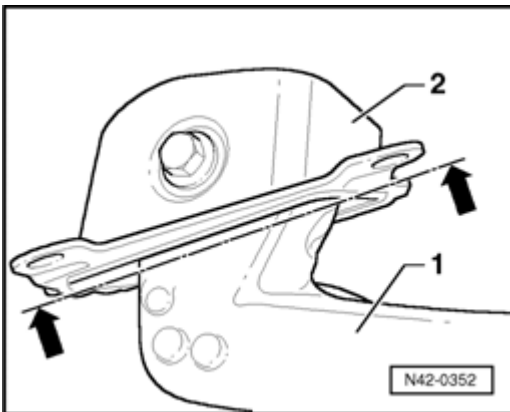
- Remove brake line bracket - 1 - from trailing arm.



- Unclip brake line - **arrows** - from retainer.
- Mark installation position of bearing bracket on structure.



- Remove bearing bracket bolts - **arrows** - from structure.



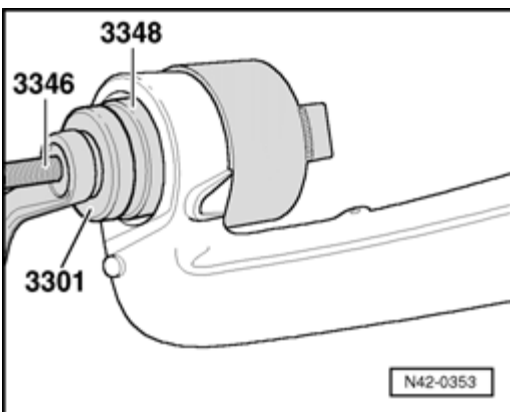
- Mark installation position of bearing bracket to trailing arm with e.g. a felt tip pen.

See - **arrows** - and dashed line

1 - Trailing arm

2 - Mounting bracket

Pulling bonded rubber mounting out from trailing arm

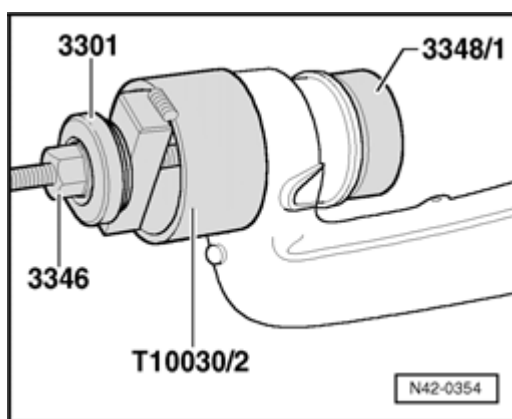


- Install tools as shown in illustration.

- Pull out bonded rubber mounting by tightening spindle.

Pulling in bonded rubber mounting

- Install tools as shown in illustration.



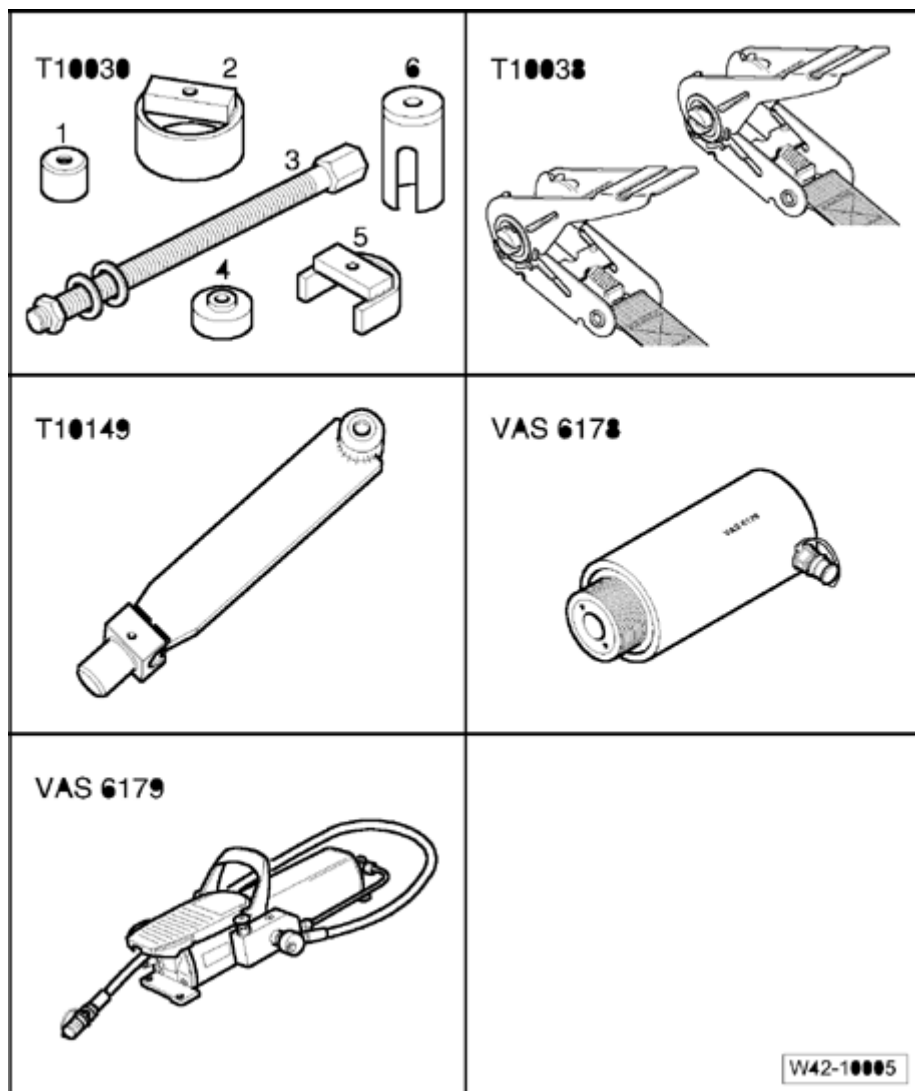
- Pull out bonded rubber mounting by tightening spindle.

Installing trailing arm

Installation is carried out in reverse sequence.

Determine installation position, if installation position of bearing bracket to trailing arm has not been marked; ⇒ [42-5.](#)

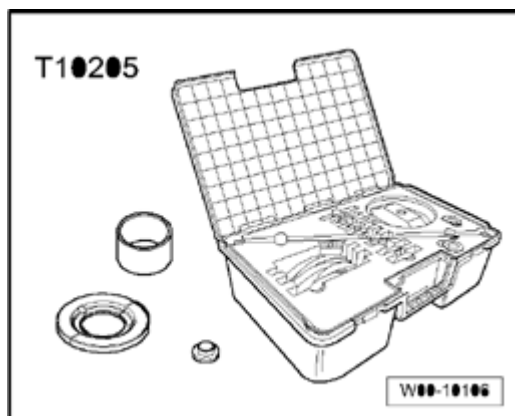
Upper ball joint/bonded rubber bushing, removing and installing



Special tools, testers and auxiliary items required

- n Thrust piece T10030/1A
- n Tightening strap T10038
- n Wheel hub support T10149
- n Hydraulic press VAS 6178
- n Hollow piston cylinder VAS 6179

Special tools, testers and auxiliary items required



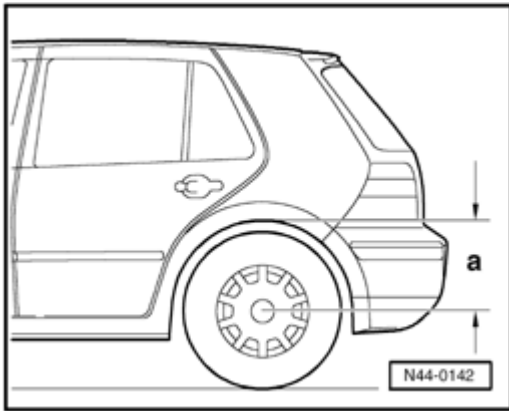
- n Insert tool T10205/13
- n Assembly tool T10254

Caution!

- n **Starting from model year 2004 a bonded rubber bushing is inserted in place of the ball joint.**
- n **If the ball joint must be replaced, then a new bonded rubber bushing and a new upper transverse link ⇒ [Item - 6](#) - must be inserted above.**
- n **At the same time the ball joint ⇒ [Item - 20](#) - and the lower transverse link ⇒ [Item - 19](#) - must be replaced.**
- n **The replacement of the ball joints by the bonded rubber bushing must be done on both side of the vehicle!**
- n **A mixed installation is not allowed.**

If a bonded rubber bushing is already inserted, then the points before specified do not apply. The bonded rubber bushing must only be exchanged.

Remove upper ball joint/bonded rubber bushing



- Measure dimension - **a** - from the center of wheel to lower edge of wheel housing.

- Make a note of the measurement. This is necessary to tighten bolts for rear axle to bearing bracket.

- Lift vehicle until the load on rear axle is relieved.

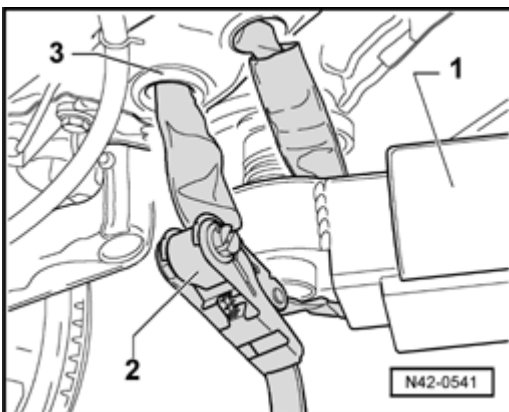
The wheel should still be touching the floor.

- Loose twelve point nut from drive axle.

Tighten vehicle to lifting platform

Caution!

If the vehicle is not secured, there is a risk that it may slip off the hoist.



- Remove plugs from trailing arm - **3** - and tighten tensioning strap .

1 - Support arm of lifting platform

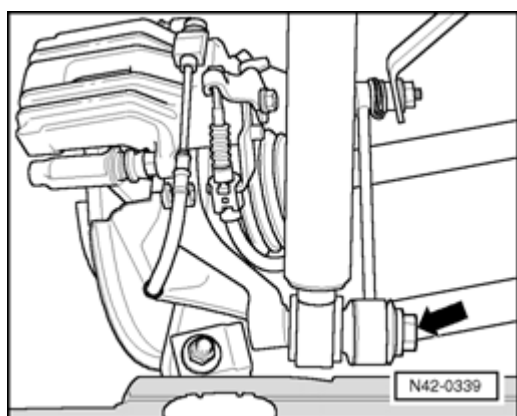
2 - Tensioning strap T10038 ; The vehicle must be fastened with the tensioning straps on left and right side.

- Remove wheel.

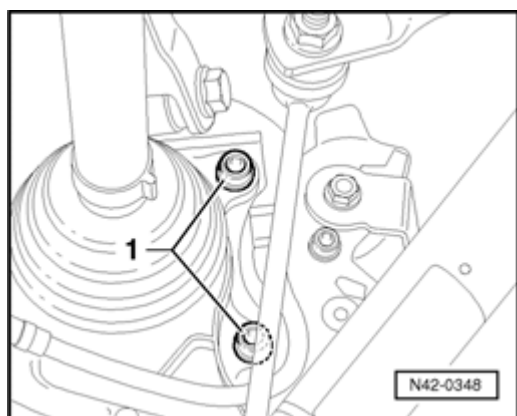
- Remove spring

Removing and installing spring ⇒ [42-4, Spring, removing and installing](#) .

Removing and installing spring R32 ⇒ [42-4, Spring R32, removing and installing](#)

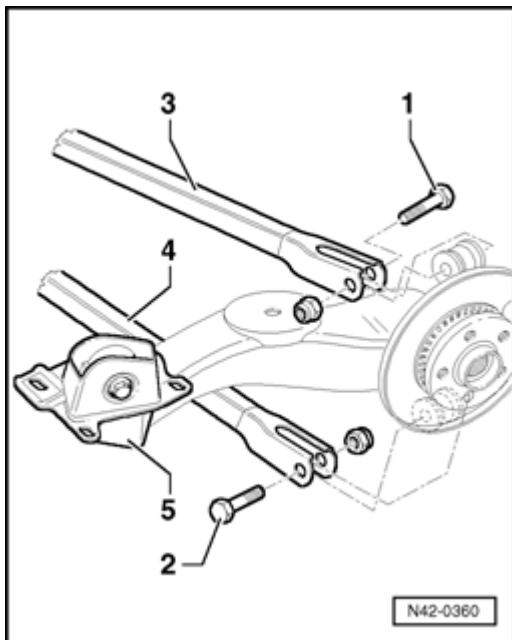


- Remove lower bolt - **arrow** - from shock absorbers.

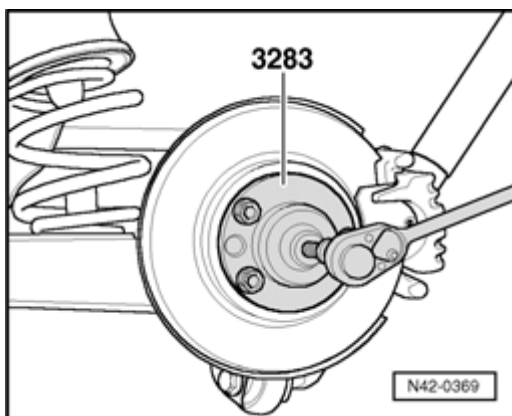


- Remove bolts - **1** - from brake caliper and remove brake caliper.

- Secure brake caliper to body.



- Remove bolt - 1 - for transverse link.
- Loosen transverse link connection bolt on subframe.

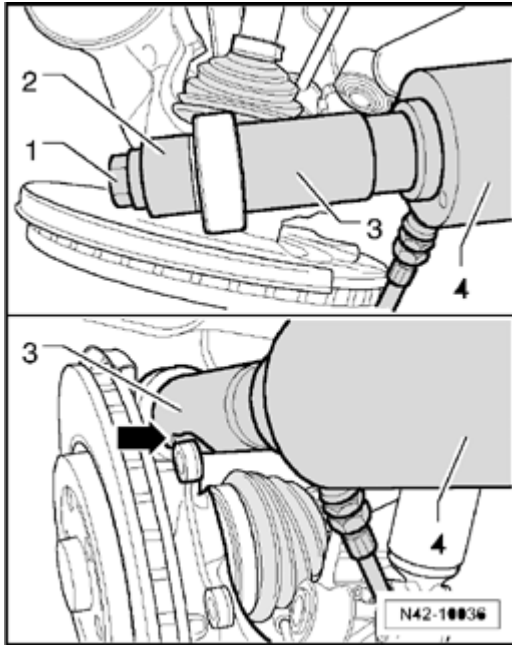


- Press out drive axle.

Note:

- n *When pressing drive axle out make sure there is sufficient clearance.*

- Pull down trailing arm from control arm.



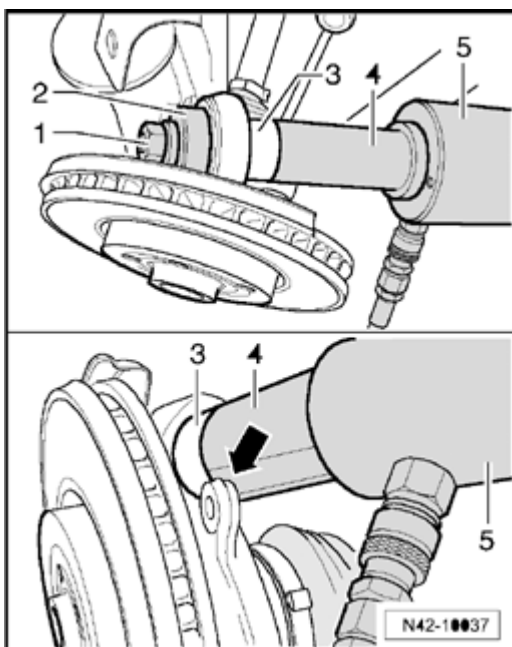
- Install tools as shown in illustration.

Make sure when setting the tools that the recess - **arrow** - of the press piece T10254/2 - **3** - is correctly positioned.

1. Nut T10254/4 with Spindle T10254/5
2. Press piece T10030/1A
3. Press piece T10254/2
4. Hydraulic press VAS 6178

- Pull ball joint out

Upper bonded rubber bushing, installing



- Install tools as shown in illustration.

Make sure when setting the tools that the recess is on the milled side T10254/3 - **arrow** - of press piece T10254/2 - **4** - is correctly positioned.

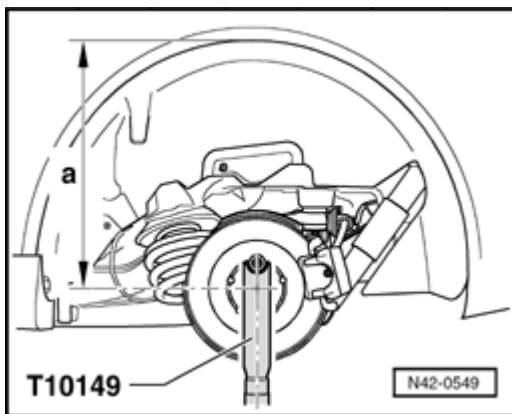
1. Nut T10254/4 with Spindle T10254/5
2. Press piece T10254/1
3. Bonded rubber mounting
4. Press piece T10254/3
5. Hydraulic press VAS 6178

Make sure there is sufficient clearance when tightening.

- Draw in rubber mounted bushing.
- Secure upper control arm at trailing arm with new nut and bolt.
- Install shock absorber to trailing arm
- Installing spring:

Removing and installing spring ⇒ [42-4, Spring, removing and installing](#) .

Removing and installing spring R32 ⇒ [42-4, Spring R32, removing and installing](#)



Tightening bearing bracket is only possible from below, when measured value - a - from the middle of wheel hub to lower edge bordering wheel housing is reached.

- Turn wheel hub until one of the holes for the wheel bolts is at the 12 o'clock position.
- Install wheel hub support T10149 with a wheel bolt.
- Raise steering knuckle using engine/transmission jack until dimension - a - is reached.

Caution!

- n **Do not raise or lower the vehicle if the engine/transmission jack is under the vehicle.**

- Do not leave engine/transmission jack under the vehicle longer than necessary.**

- Tighten bolts from bearing bracket to rear axle with tightening torque.

Fastener/location

Transverse link to trailing arm

Use new nuts and bolts!

Shock absorber to trailing arm

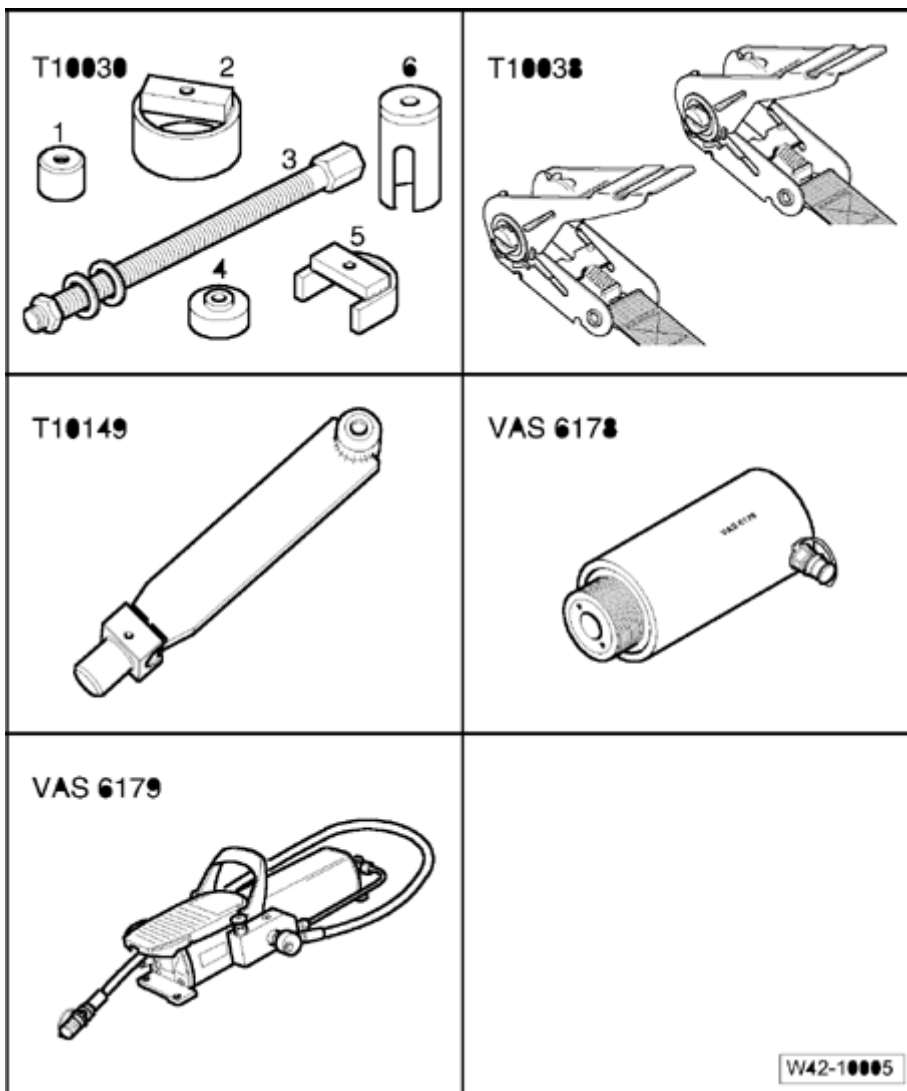
12-point nut to wheel hub ⇒ [42-7, Installing](#)

Tightening torques

70 Nm plus an additional $\frac{1}{4}$ turn 90°

110 Nm

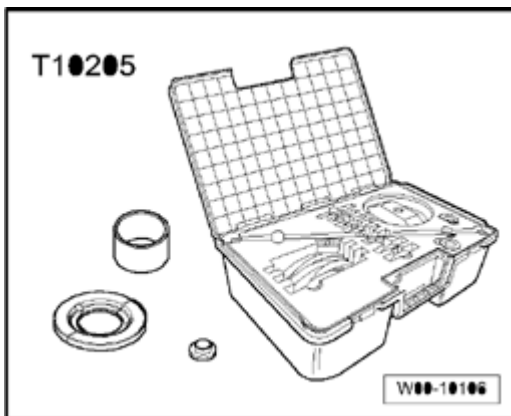
Lower ball joint/bonded rubber bushing, removing and installing



Special tools, testers and auxiliary items required

- n Thrust piece T10030/1A
- n Tightening strap T10038
- n Wheel hub support T10149
- n Hydraulic press VAS 6178
- n Hollow piston cylinder VAS 6179

Special tools, testers and auxiliary items required



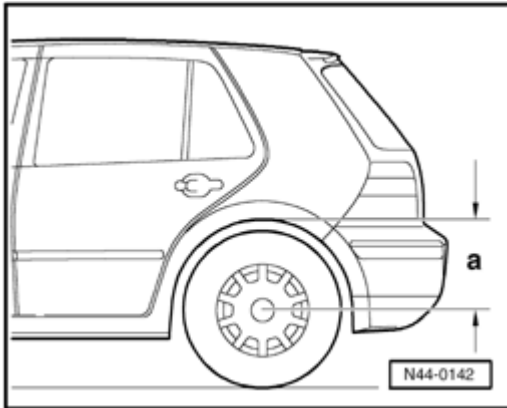
- n Insert tool T10205/13
- n Assembly tool T10254

Caution!

- n **Starting from model year 2004 a bonded rubber bushing is inserted in place of the ball joint.**
- n **If the ball joint must be replaced, then a new bonded rubber bushing and a new lower transverse link ⇒ [Item - 19](#) - must be inserted.**
- n **At the same time the ball joint ⇒ [Item - 7](#) - and upper transverse link ⇒ [Item - 6](#) - must be replaced.**
- n **The replacement of the ball joints by the bonded rubber bushing must be done on both side of the vehicle!**
- n **A mixed installation is not allowed.**

If a bonded rubber bushing is already inserted, then the points before specified do not apply. The bonded rubber bushing must only be exchanged.

Remove lower ball joint/bonded rubber bushing



- Measure dimension - a - from the center of wheel to lower edge of wheelhousing..
- Make a note of the measurement. This is necessary to tighten bolts for rear axle to bearing bracket.
- Lift vehicle until the load on rear axle is relieved.

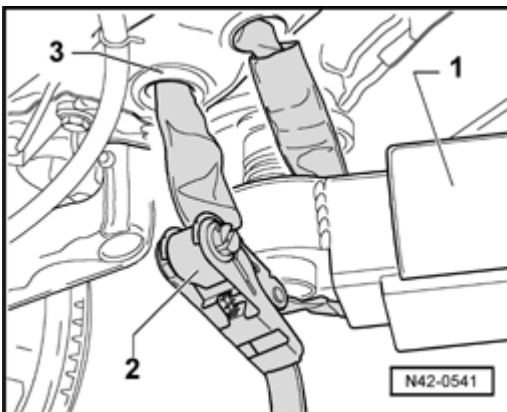
The wheel should still be touching the floor.

- Loose twelve point nut from the drive axle.

Tighten vehicle to lifting platform

Caution!

If the vehicle is not secured, there is a risk that it may slip off the hoist.

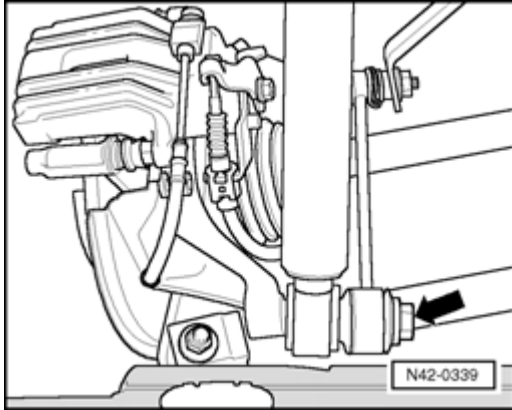


- Remove plugs from trailing arm - 3 - and tighten tensioning strap .
- 1 - Support arm of lifting platform
- 2 - Tensioning strap T10038 ; The vehicle must be fastened with tensioning straps on left and right side.
- Remove wheel.

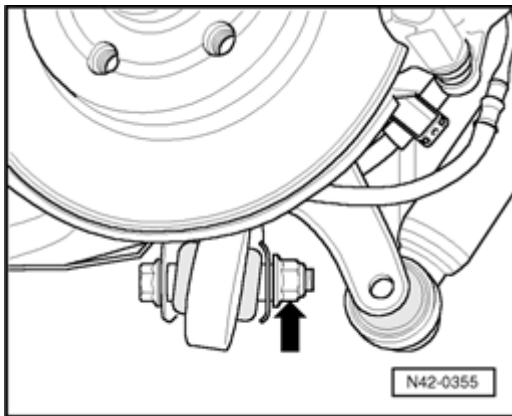
- Remove spring

Removing spring ⇒ [42-4, Spring, removing and installing](#) .

Removing spring R32 ⇒ [42-4, Spring R32, removing and installing](#) .

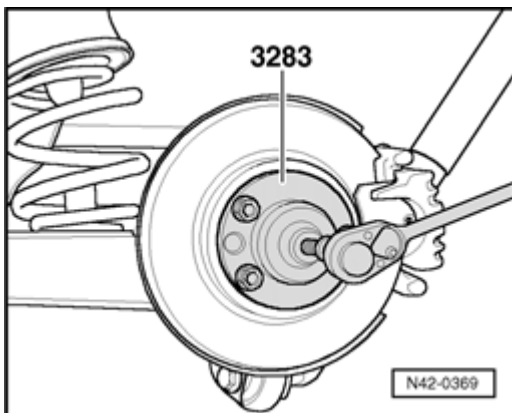


- Remove lower bolt - **arrow** - from shock absorbers.



- Disconnect transverse link at trailing arm - **arrow** - .

- Loosen transverse link connection bolt on subframe.

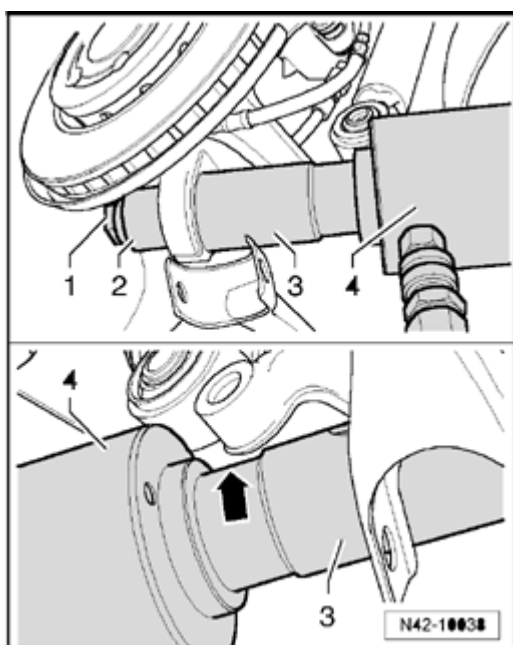


- Press out drive axle.

Note:

- n *When pressing drive axle out ensure there is sufficient clearance.*

- Pull down trailing arm from control arm.



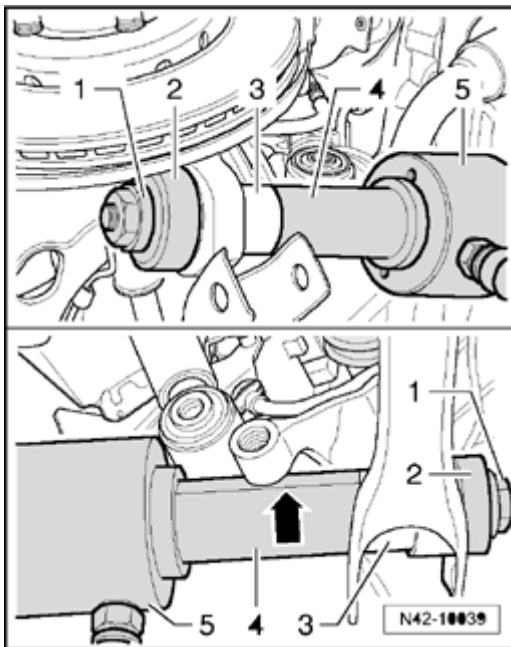
- Install tools as shown in illustration.

Make sure when setting the tools that the recess - **arrow** - of the press piece T10254/2 - **3** - is correctly positioned.

1. Nut T10254/4 with Spindle T10254/5
2. Thrust piece T10030/1A
3. Press piece T10254/2
4. Hydraulic press VAS 6178

- Pull ball joint out

Install lower bonded rubber bushing



- Install tools as shown in illustration.

Make sure when setting the tools that the recess is on the milled side T10254/3 - **arrow** - of the press piece T10254/2 - **4** - is correctly positioned.

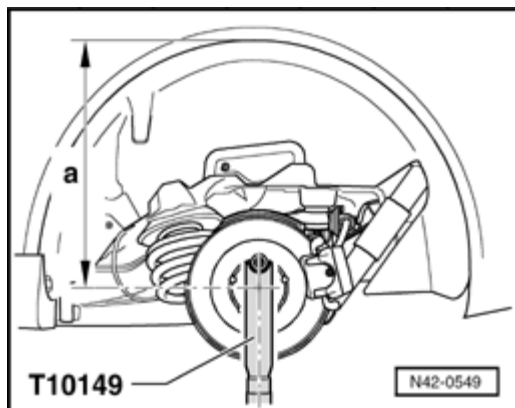
1. Nut T10254/4 with Spindle T10254/5
2. Press piece T10254/1
3. Bonded rubber bushing
4. Press piece T10254/3
5. Hydraulic press VAS 6178

Make sure there is sufficient space when tightening.

- Draw in rubber mounted bushing.
- Secure lower control arm at trailing arm with new nut and bolt.
- Install shock absorber to trailing arm
- Installing spring:

Installing spring ⇒ [42-4, Spring, removing and installing](#) .

Installing spring R32 ⇒ [42-4, Spring R32, removing and installing](#) .



Tightening bearing bracket is only possible from below, when the measured value - a - from the middle of wheel hub to lower edge bordering wheel housing is reached.

- Turn wheel hub until one of the holes for the wheel bolts is at the 12 o'clock position.
- Install wheel hub support T10149 with a wheel bolt.
- Raise wheel bearing housing using engine/transmission jack until dimension - a - is reached.

Caution!

- n **Do not raise or lower the vehicle if the engine/transmission jack is under the vehicle.**
- n **Do not leave engine/transmission jack under the vehicle longer than necessary.**

- Tighten bolts from bearing bracket to rear axle with tightening torque.

Fastener/location

Transverse link to trailing arm

Use new nuts and bolts!

Shock absorber to trailing arm

12-point nut to wheel hub ⇒ [42-7, Installing](#)

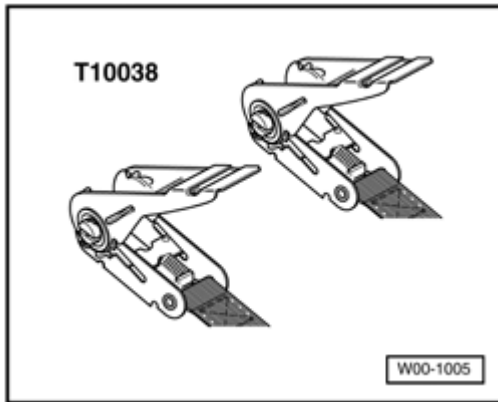
Tightening torques

70 Nm plus an additional $\frac{1}{4}$ turn 90°

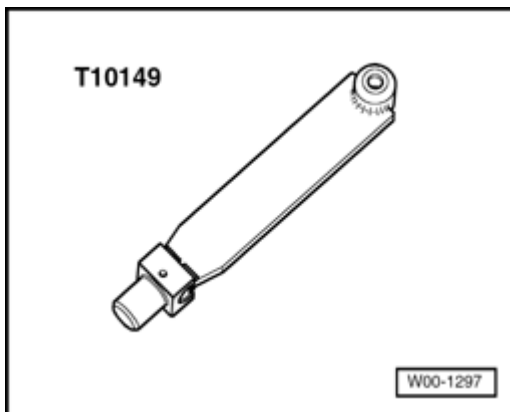
110 Nm

Trailing arm, removing and installing

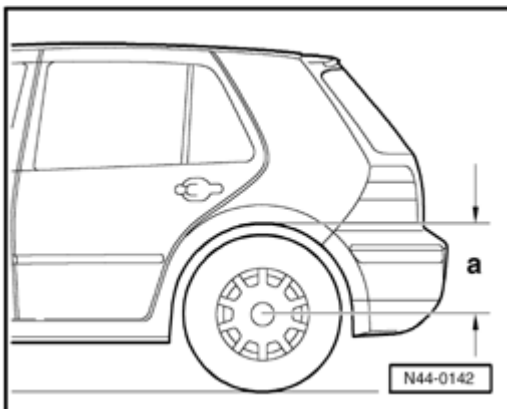
Special tools, testers and auxiliary items required



n Tensioning strap T10038



n Wheel hub support T10149



- Measure dimension - **a** - from center of wheel to lower edge of wheelhouse.

- Make a note of the measurement. This is necessary to tighten bolts for rear axle to bearing bracket.

Removing

Vehicles with automatic headlight range control

- Removing coupling rod from Left Rear Level Control System Sensor G76 from rear axle ⇒ [40-2, Left rear level](#)

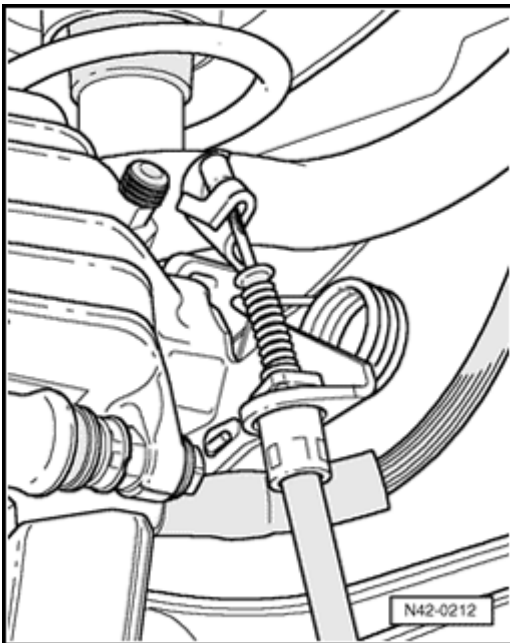
[control system sensor G76 on rear axle for all wheel drive](#) .

Continue for all vehicles

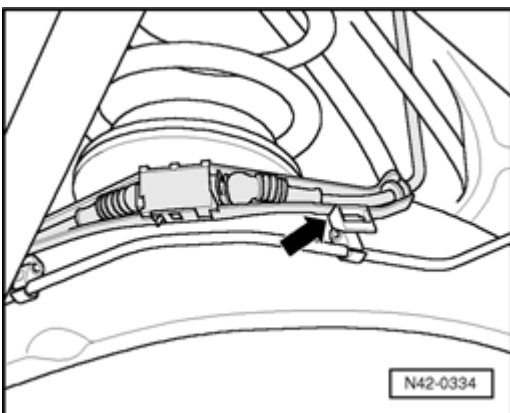
- Remove wheel.
- Remove spring

Removing and installing spring ⇒ [42-4, Spring, removing and installing](#) .

Removing and installing spring R32 ⇒ [42-4, Spring R32, removing and installing](#)

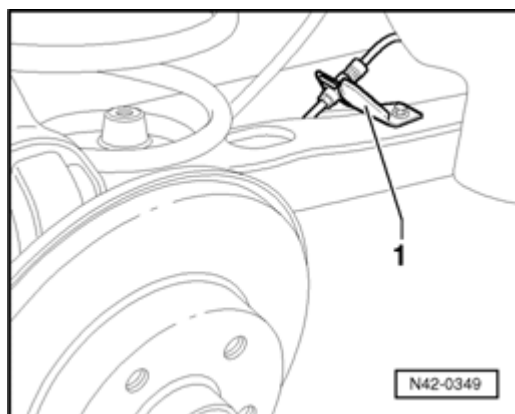


- Unhook parking brake cable from brake calipers.
- Pull parking brake cable out of trailing arm.
- Remove drive axle ⇒ [42-7, Rear drive axle, removing and installing](#) .

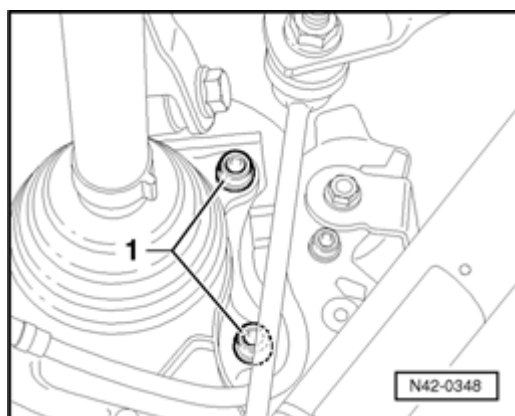


- Unclip wire for wheel speed sensor from retainer - **arrow** -

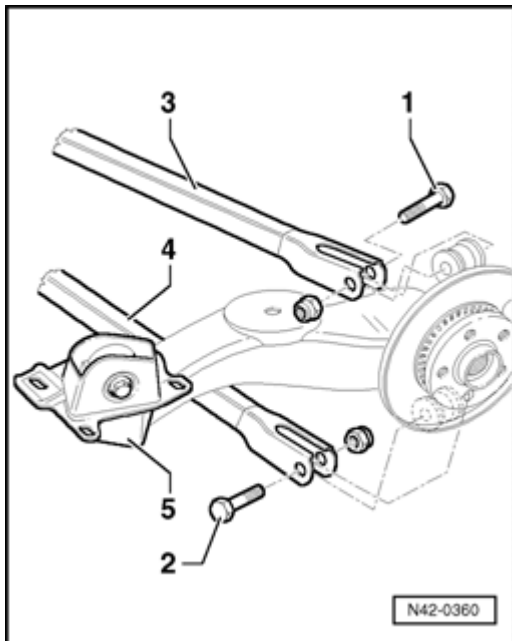
- Disconnect ABS vehicle speed sensor from trail arm housing.



- Remove brake line bracket from trailing arm.
- Unclip brake line from retainer - **1** - .



- Remove bolts - **1** - from brake caliper and remove brake caliper.
- Secure brake caliper to body.
- Remove phillips-head screw for brake disc and remove brake disc.

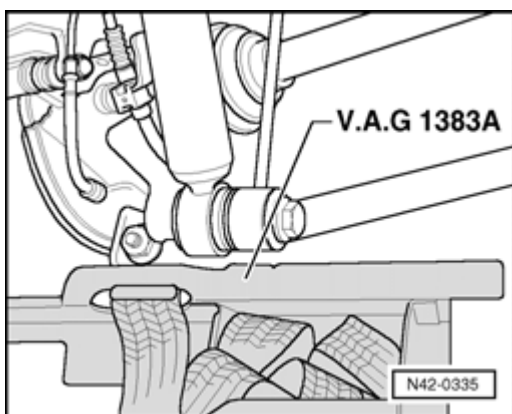


- Remove bolt - **2** - for transverse link.

3 - Upper transverse link

4 - Lower transverse link

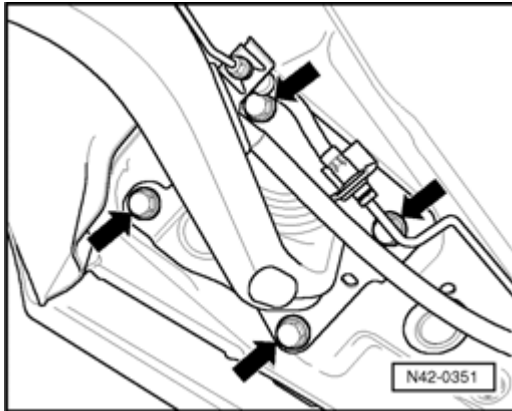
5 - Trailing arm



- Position engine/transmission jack under trailing arm

- Remove shock absorber bolt.

- Mark installation position of bearing bracket on body.

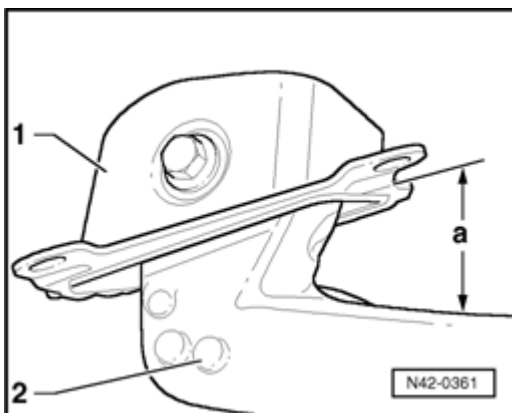


- Loosen bearing bracket on body - **arrows** - .
- Disconnect brake line if necessary.

If trailing arm is to be replaced, the bearing bracket must be transferred.

Bearing bracket installation position must be set as described on ⇒ [42-5](#), .

Determine bearing bracket installation position to trailing arm



Dimension - **a** - is 53.5 ± 2 mm

- 1 - Bearing bracket
- 2 - Trailing arm

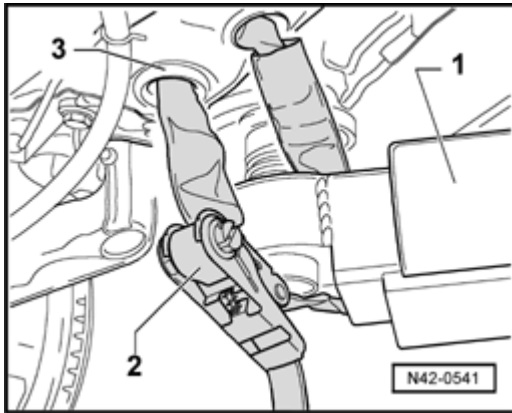
Installing

Installation is carried out in reverse sequence.

Tighten vehicle to lifting platform

Caution!

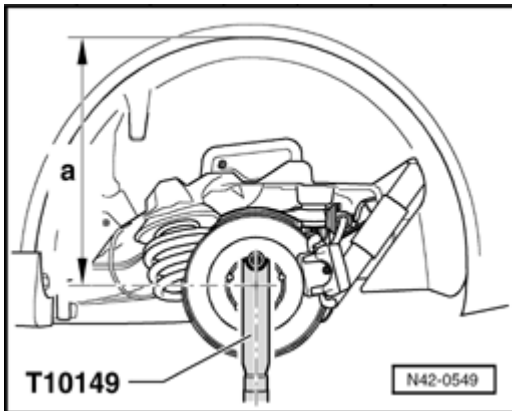
If the vehicle is not secured, there is a risk that it may slip off the hoist.



- Remove plugs from trailing arm - **3** - and tighten tensioning strap .

1 - Support arm of lifting platform

2 - Tensioning strap T10038 ; The vehicle must be fastened with the tensioning straps on left and right side.



Tightening bearing bracket is only possible, when the measured value - a - from the middle of wheel hub to lower edge bordering wheel housing is reached.

- Turn wheel hub until one of the holes for the wheel bolts is at the 12 o'clock position.

- Install wheel hub support T10149 with a wheel bolt.

- Raise wheel bearing housing using engine/transmission jack until dimension - **a** - is reached.

Caution!

- n Do not raise or lower the vehicle if the engine/transmission jack is under the vehicle.**
- n Do not leave engine/transmission jack under the vehicle longer than necessary.**

- Tighten bolts from bearing bracket to rear axle with

tightening torque.

Check camber and toe adjustment on alignment machine after installing.

Fastener/location

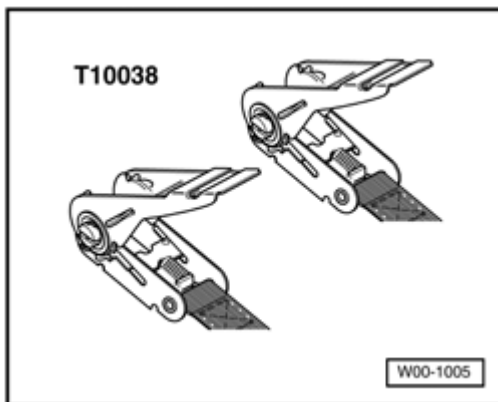
Brake caliper to trailing arm
 Bearing bracket to trailing arm
 Mounting bracket to body
 Transverse link to trailing arm
 Use new nuts and bolts!
 Shock absorber to trailing arm
 Drive axle inner joint to final drive flange
 12-point nut to wheel hub ⇒ [42-7, Installing](#)

Tightening torques

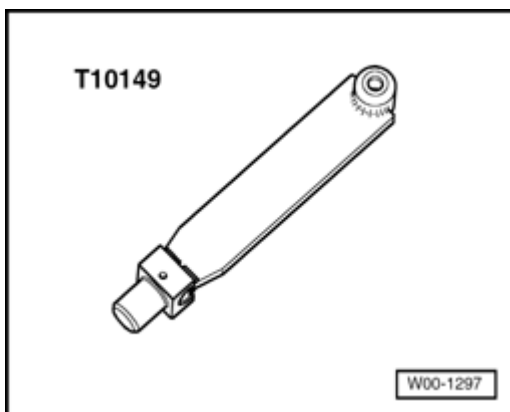
65 Nm
 90 Nm
 75 Nm
 70 Nm plus an additional $\frac{1}{4}$ turn 90°
 110 Nm
 40 Nm

Transverse link, removing and installing

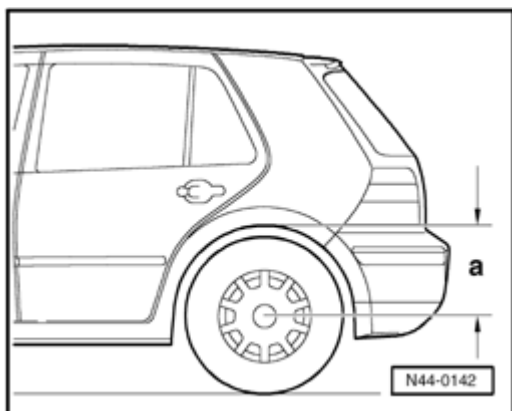
Special tools, testers and auxiliary items required



n Tensioning strap T10038



n Wheel hub support T10149



- Measure dimension - **a** - from center of wheel to lower edge of wheelhouse.
- Make a note of the measurement. This is necessary to tighten the bolts for the rear axle to the bearing bracket.

Removing

Vehicles with automatic headlight range control

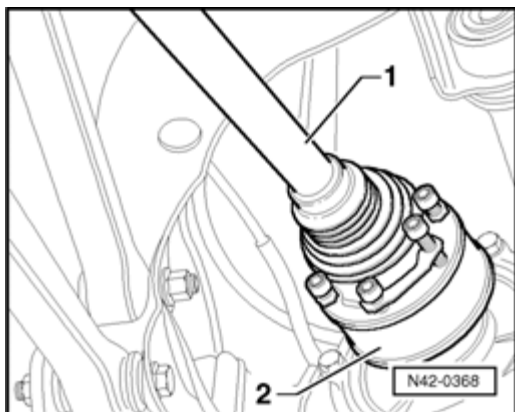
- Removing coupling rod from Left Rear Level Control System Sensor G76 from rear axle ⇒ [40-2, Left rear level control system sensor G76 on rear axle for all wheel drive](#) .

Continue for all vehicles

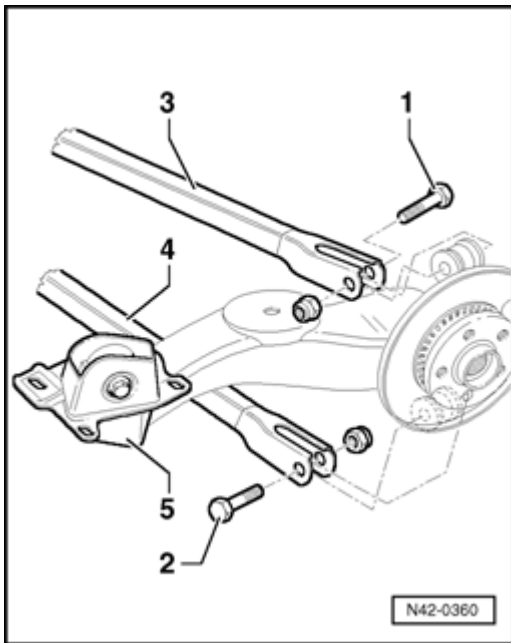
- Remove spring

Removing and installing spring ⇒ [42-4, Spring, removing and installing](#) .

Removing and installing spring R32 ⇒ [42-4, Spring R32, removing and installing](#)



- Disconnect drive axle - **1** - from final drive flange shaft - **2** -

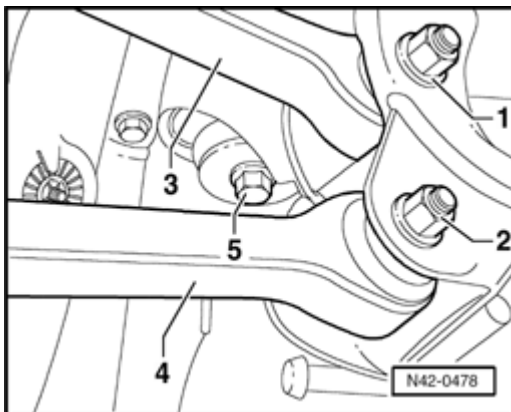


- Remove bolt - 1 - and/or - 2 - .

3 - Upper transverse link

4 - Lower transverse link

5 - Trailing arm



- Remove bolt - 1 - and/or - 2 - .

To make easier disassembly/assembly remove bolt - 5 - if necessary.

3 - Upper transverse link

4 - Lower transverse link

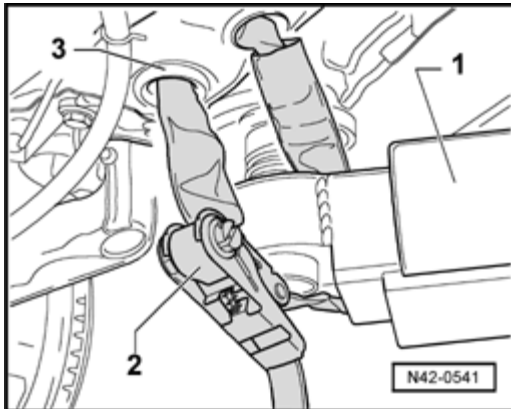
Installing

Installation is carried out in reverse sequence.

Tighten vehicle to lifting platform

Caution!

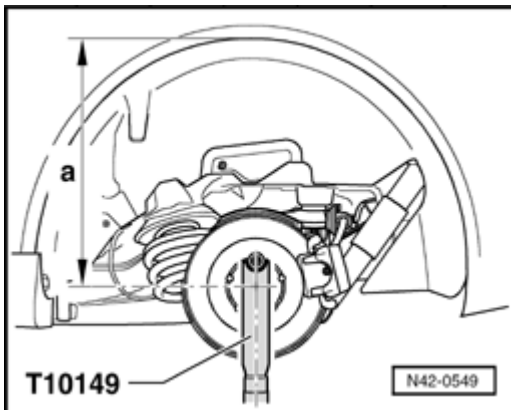
If the vehicle is not secured, there is a risk that it may slip off the hoist.



- Remove plugs from trailing arm - **3** - and tighten tensioning strap .

1 - Support arm of lifting platform

2 - Tensioning strap T10038 ; The vehicle must be fastened with the tensioning straps on left and right side.



Tightening bearing bracket is only possible, when the measured value - a - from middle of wheel hub to lower edge bordering wheel housing is reached.

- Turn wheel hub until one of the holes for the wheel bolts is at the 12 o'clock position.

- Install wheel hub support T10149 with a wheel bolt.

- Raise wheel bearing housing using engine/transmission jack until dimension - **a** - is reached.

Caution!

n Do not raise or lower the vehicle if the engine/transmission jack is under the vehicle.

n Do not leave engine/transmission jack under the

vehicle longer than necessary.

- Tighten bolts from bearing bracket to rear axle with tightening torque.

Check camber and toe adjustment on alignment machine after installing.

Fastener/location

Transverse link to trailing arm
Use new nuts and bolts!

Transverse link to subframe
Use new nuts and bolts!

Drive axle to final drive flange shaft

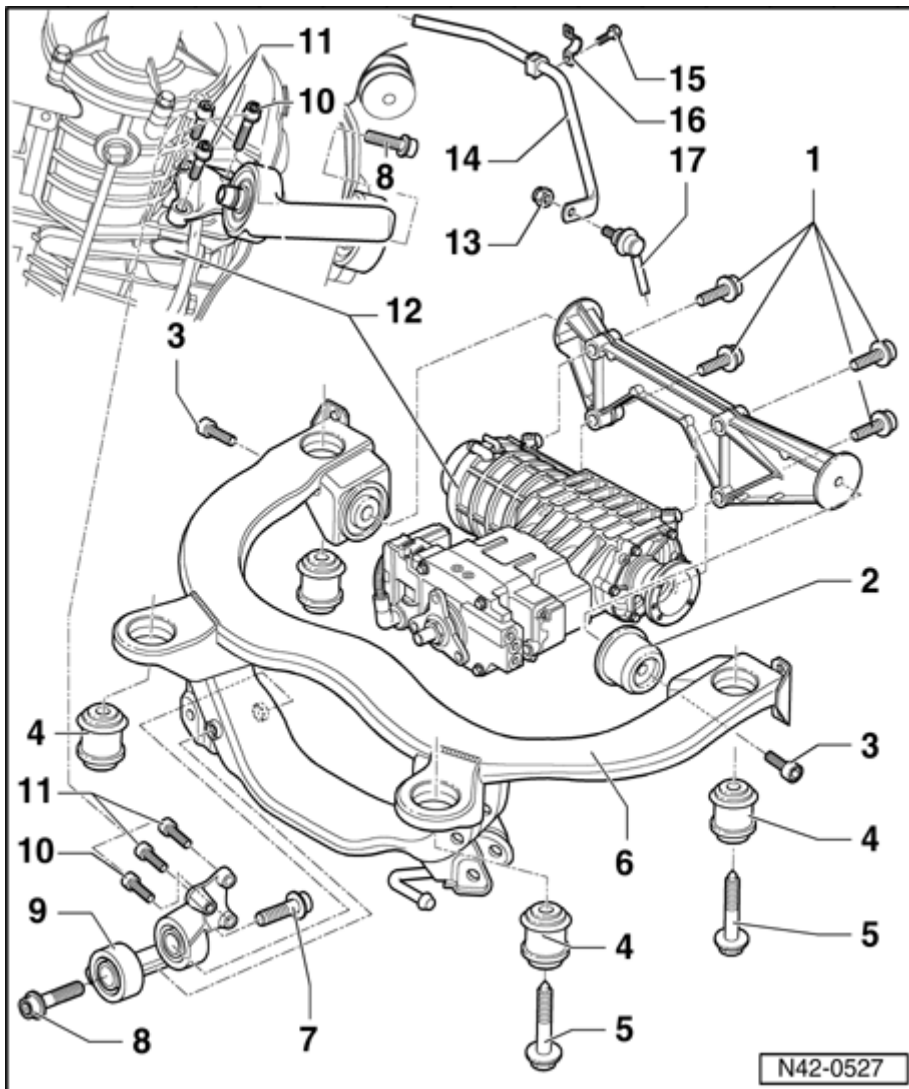
Tightening torques:

70 Nm plus an additional $1/4$ turn 90°

70 Nm plus an additional $1/4$ turn 90°

40 Nm

Subframe with final drive, assembly overview



1. Multiple point socket head bolt, 60 Nm

2. Bonded rubber bushing for final drive

- i Removing and installing ⇒ [42-6, Bonded rubber bushings for final drive, removing and installing](#)

3. Multiple point socket head bolt, 60 Nm

4. Bonded rubber bushing for subframe

- i Supplied as a spare part in a sealed plastic bag.
- i Do not use a bonded rubber bushing which has been stored unsealed.
- i Removing and installing ⇒ [42-6, Bonded rubber bushing for subframe, removing and installing](#)

5. Hex bolt M 12 x 1.5 x 85

- i 110 Nm plus an additional $1/4$ turn 90°
- i Always replace

6. Subframe

- i Removing and installing ⇒ [42-6, Subframe, removing and installing](#)

7. Multiple point socket head bolt, 60 Nm

8. Multiple point socket head bolt, 60 Nm

9. Final drive support

10. Hex socket boll, 40Nm plus an additional $1/8$ turn 45°

- i M10 x 55

11. Hex socket head bolt, plus an additional $1/8$ turn 45°

- i M10 x 40

12. Final drive

- i Servicing

⇒ *Repair Manual, Transmission, Repair Group 39, disassembling and assembling final drive*

13. Self-locking hex nut, 25 Nm

ⓘ Always replace

14. Stabilizer bar

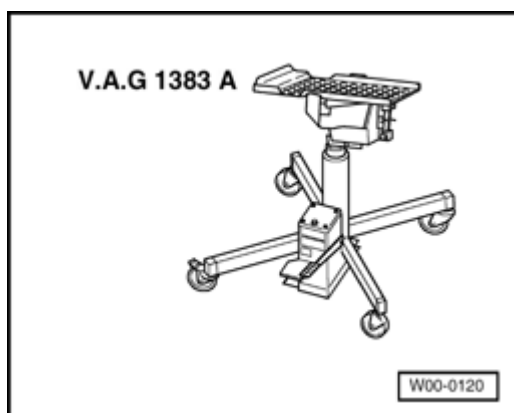
15. Hex bolt, 20 Nm

16. Clamp

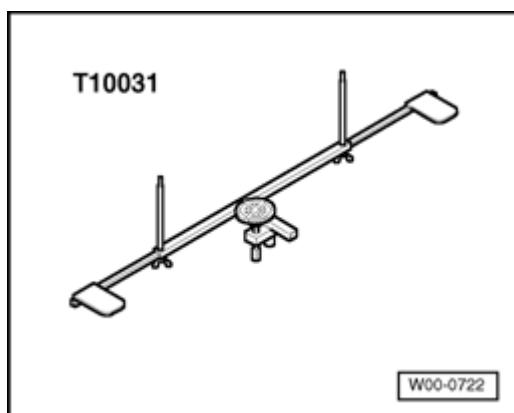
17. Connecting Link

Subframe, removing and installing

Special tools, testers and auxiliary items required



ⓘ Engine and transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2



ⓘ Support T10031

Removing

- Remove wheels.
- Remove spring

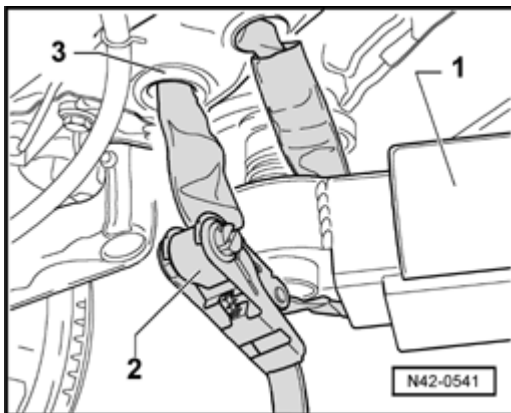
Removing and installing spring ⇒ [42-4, Spring, removing and installing](#)

Removing and installing spring R32, ⇒ [42-4, Spring R32, removing and installing](#)

Tighten vehicle to lifting platform

Caution!

If the vehicle is not secured, there is a risk that it may slip off the hoist.

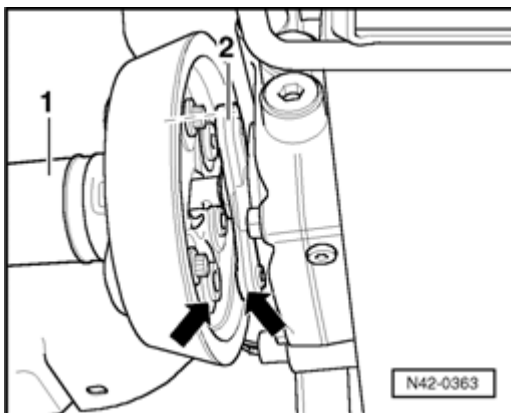


- Remove plugs from trailing arm - 3 - and tighten tensioning strap .

1 - Support lifting platform arm

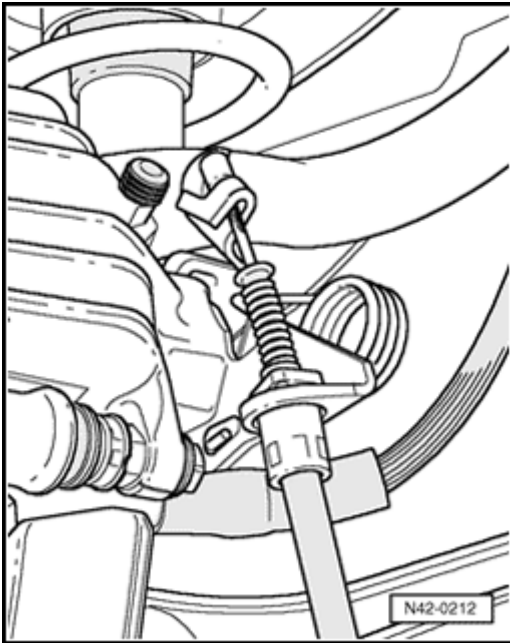
2 - Tensioning strap T10038

- The vehicle must be tightened with tensioning straps on left and right side.



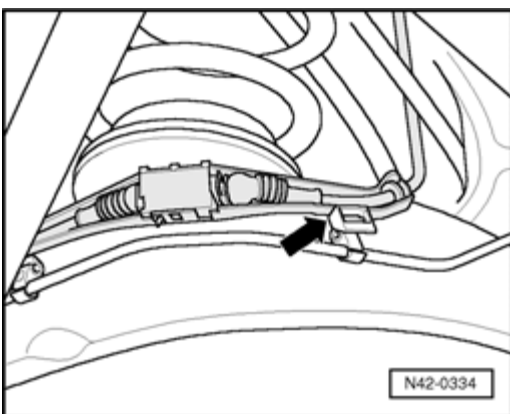
It is essential that the installation position is marked - **arrows** - before the drive shaft is removed. Offset installation will cause excessive imbalance.

- 1 - Drive shaft with balance weight
 - 2 - Drive shaft flange
- Open double clamp behind Three Way Catalytic Converter (TWC) and remove rear part of exhaust system.
 - Disconnect drive shaft at final drive.
 - Remove heat shield from muffler.

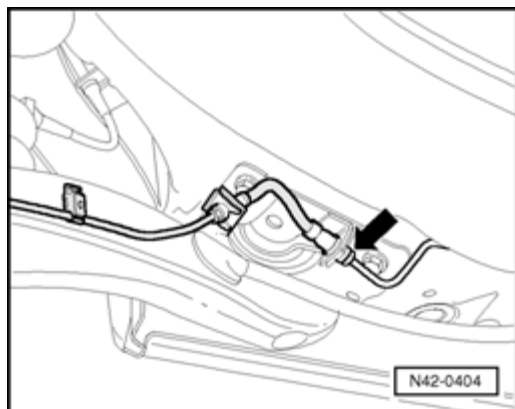


- Unhook parking brake cable from brake calipers.
- Pull parking brake cable out of trailing arm.

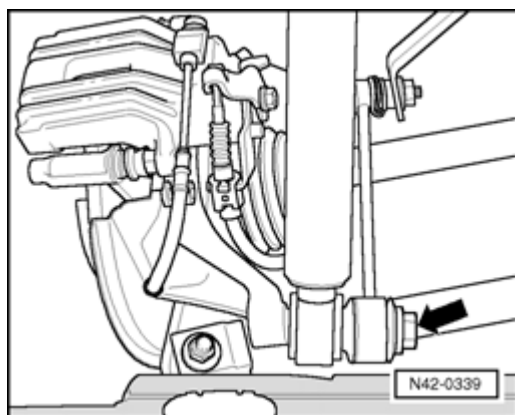
If subframe is only to be lowered, the parking brake cable doesn't need to be pulled out of trailing arm. Example: when replacing bonded rubber bushing.



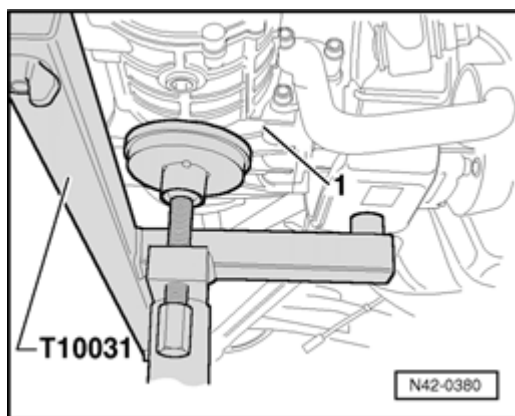
- Unclip wire for wheel speed sensor from retainer - **arrow** -
- .
- Disconnect ABS vehicle speed sensor from trail arm housing.



- Separate brake lines - **arrow** - .

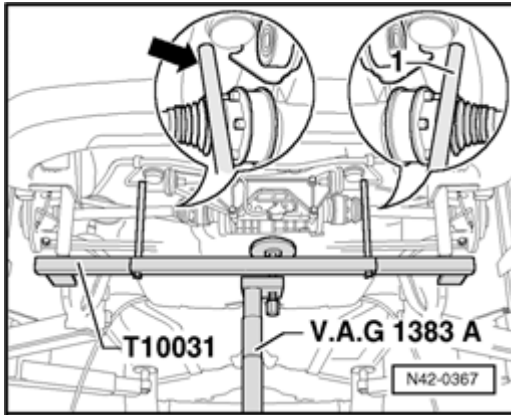


- Remove lower bolt - **arrow** - from shock absorbers.

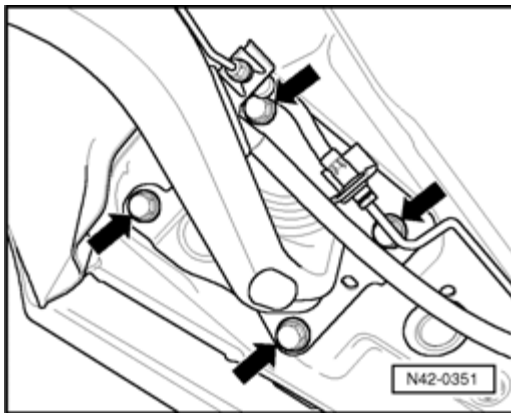


- Place engine/transmission jack V.A.G1383A under rear axle - **1** - .

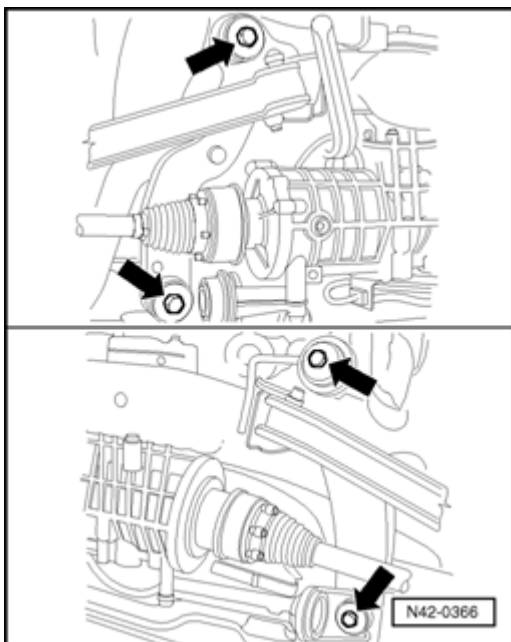
- Use support T10031



- Guide pin - **arrow** - / - **1** - into hole in subframe.
- Separate vacuum and electrical wiring connections.
- Mark installation position of bearing bracket on body.



- Loosen bearing bracket on structure - **arrows** - .



- Remove bearing bracket bolts on body - **arrow** - .

- Lower rear axle slowly using engine/transmission jack V.A.G1383A .

Installing

Installation is carried out in reverse sequence.

- Tighten bolts for subframe and bearing bracket on installation position as marked.

Check camber and toe adjustment on alignment machine after installing.

Fastener/location

Bearing bracket to body
Use new bolts!

Subframe to body
Use new bolts!

Drives haft to final drive

Shock absorber to trailing arm

Tightening torques:

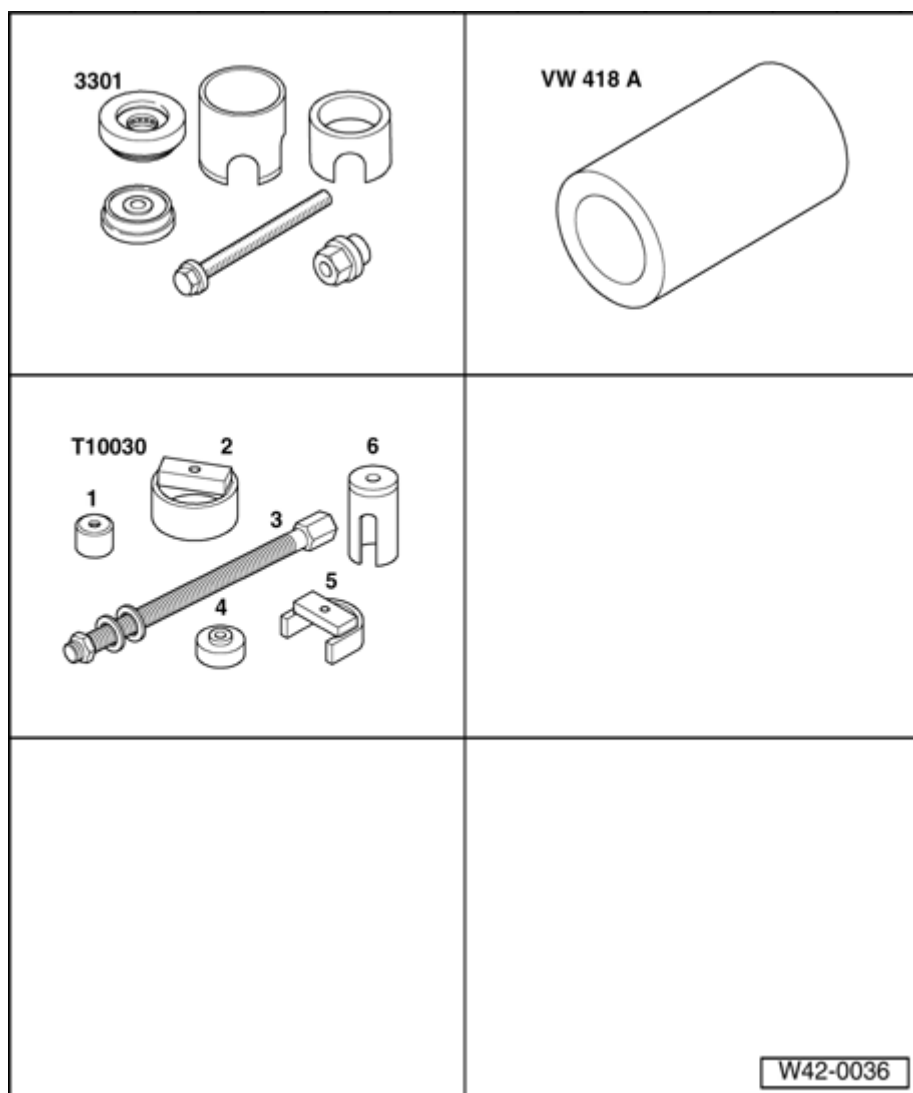
75 Nm

110 Nm plus an additional $\frac{1}{4}$ turn 90°

60 Nm

110 Nm

Bonded rubber bushing for subframe, removing and installing



Special tools, testers and auxiliary items required

- n Assembly tool 3301
- n Tube 31.5 mm dia. VW418A
- n Screw T10030/3
- n Thrust piece T10030/4
- n Tube T10030/6

Removing

- Remove wheels.
- Remove spring

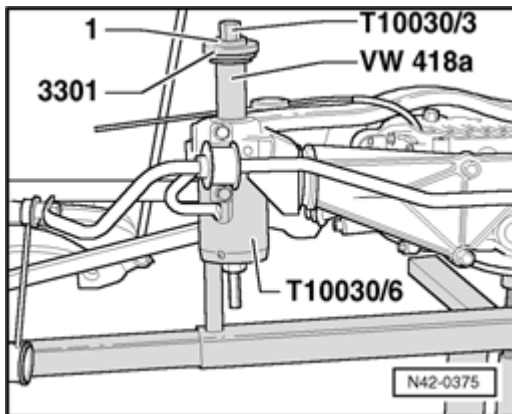
Removing and installing spring ⇒ [42-4, Spring, removing](#)

and installing

Removing and installing spring R32, ⇒ [42-4, Spring R32, removing and installing](#)

- Remove subframe complete with final drive.

Subframe, removing and installing ⇒ [42-6, Subframe, removing and installing](#)



- Position special tool.

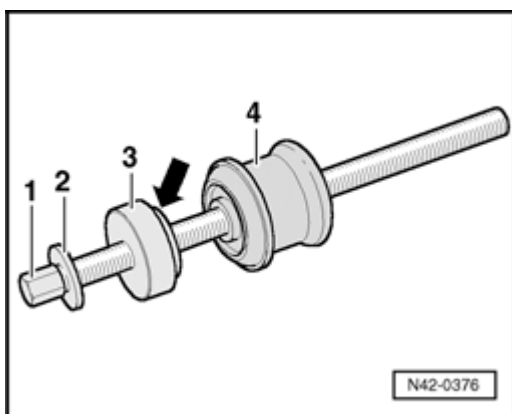
1 - Washer

- Pull out bonded rubber bushing by tightening spindle.

Installing

The bonded rubber bushing is supplied as a spare part in a sealed plastic bag.

Do not use a bonded rubber bushing which has been stored unsealed!



- Assemble special tool with bonded rubber bushing.

1 - Spindle T10030/3

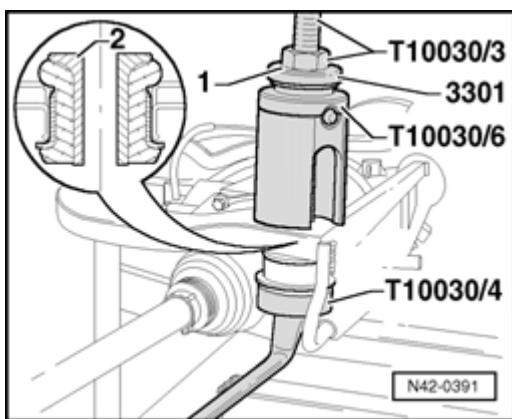
2 - Washer with chamfer

3 - Thrust tube 10030/4

- Shoulder arrow faces toward bonded rubber bushing

4 - Bonded rubber bushing

- Coat bonded rubber bushing with, for example, liquid soap.



- Install bonded rubber bushing and special tools on subframe.

- Pull out bonded rubber bushing by turning spindle.

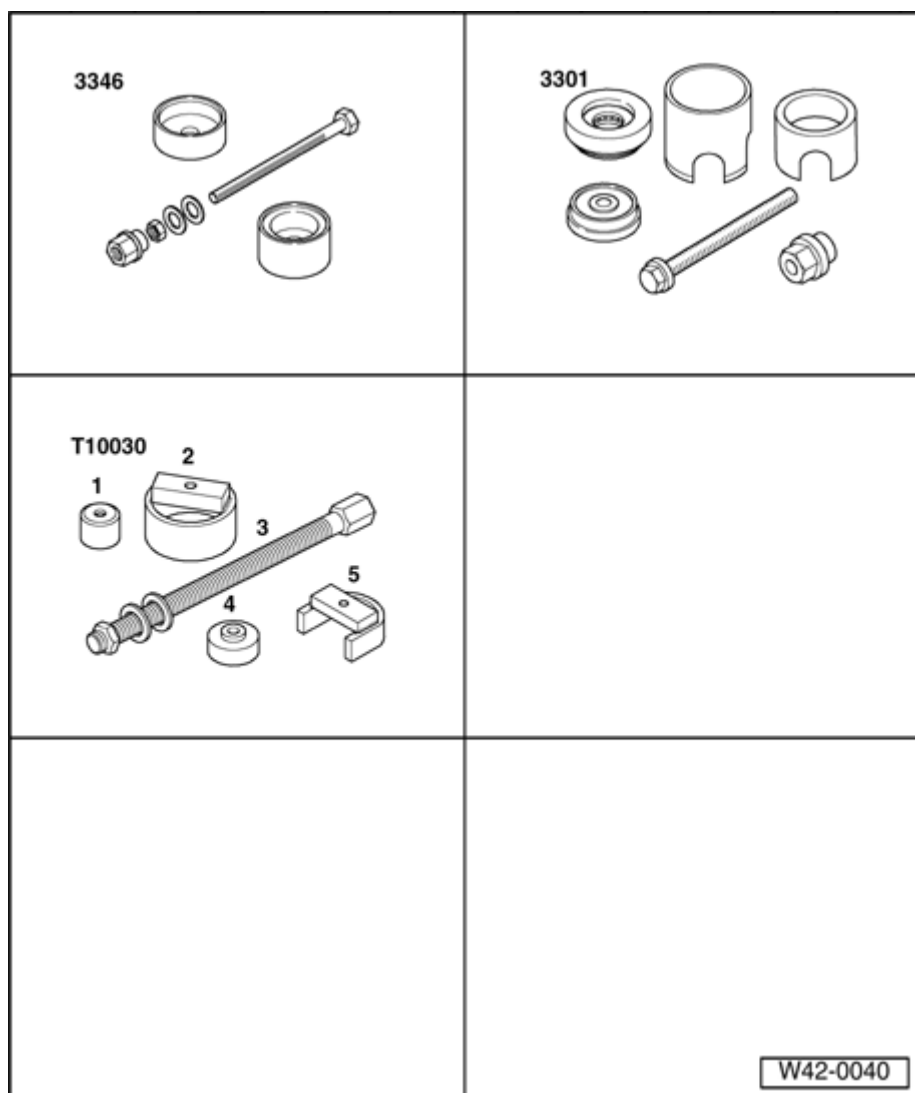
1 - Washer

2 - Installation position of bonded rubber bushing in subframe

Spindle must be inserted from below to remove and pull in subframe front bonded rubber mounting.

Further installation of subframe is performed in reverse order

Bonded rubber bushings for final drive, removing and installing



Special tools, testers and auxiliary items required

- n Assembly tool 3346
- n Assembly tool 3301
- n Tube T10030/2
- n Traverse T10030/5
- n Assembly tool 3348

Removing

- Remove wheels.
- Remove spring

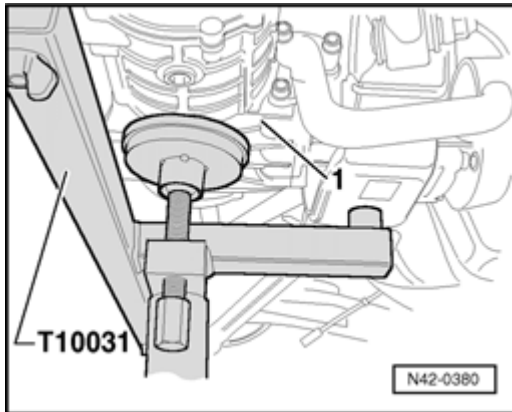
Removing and installing spring ⇒ [42-4, Spring, removing](#)

[and installing](#)

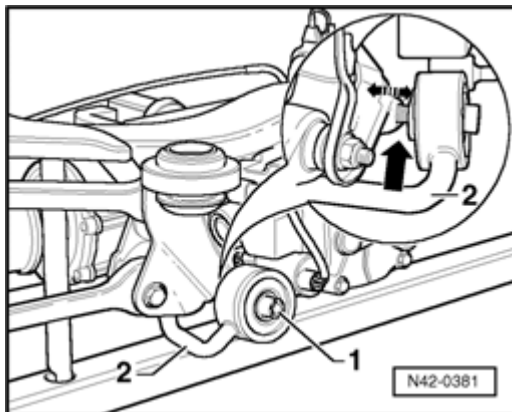
Removing and installing spring R32, ⇒ [42-4, Spring R32, removing and installing](#)

- Remove subframe completely with final drive.

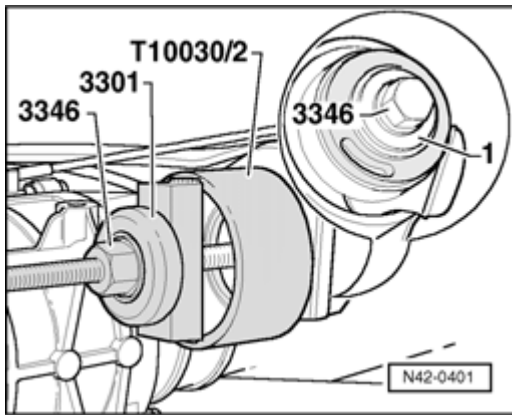
Removing and installing subframe ⇒ [42-6, Subframe, removing and installing](#)



- Support final drive - **1** - .
- Remove multi-point socket head bolt for aluminium cross member.
- Remove aluminium cross member from final drive.



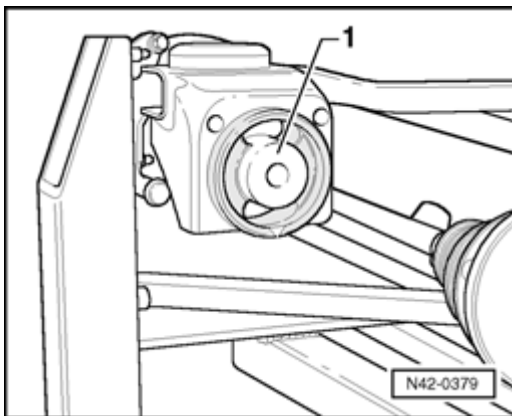
- Loosen multi-point socket head bolt - **1** - .
- Move final drive approx. 15 to 20mm - **arrow** - .
- 2 - Final drive support



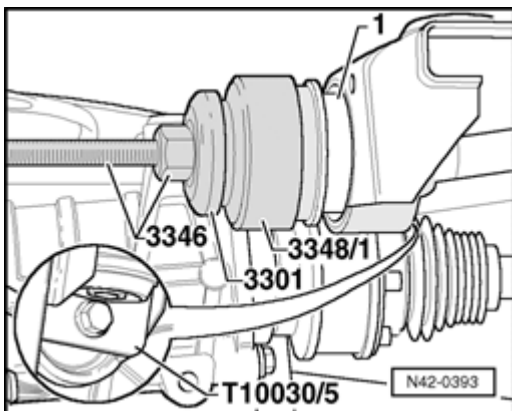
- Position special tool.
- 1 - Washer
- Pull out bonded rubber bushing by tightening spindle.

Installing

Installation position of bonded rubber bushing



Arrow on bonded rubber bushing - 1 - must point up or down.



- Position special tool.
- Pull out bonded rubber bushing by turning spindle.

1 - Bonded rubber bushing

Installation of subframe and spring is performed in reverse order

Fastener/location

Mounting bracket to body

Stabilizer bar to subframe

Drive shaft to final drive

Mounting bracket to structure

Shock absorber to trailing arm

Cross member for final drive to subframe

Support for final drive to subframe

Tightening torques:

75 Nm

20 Nm

60 Nm

75 Nm

110 Nm

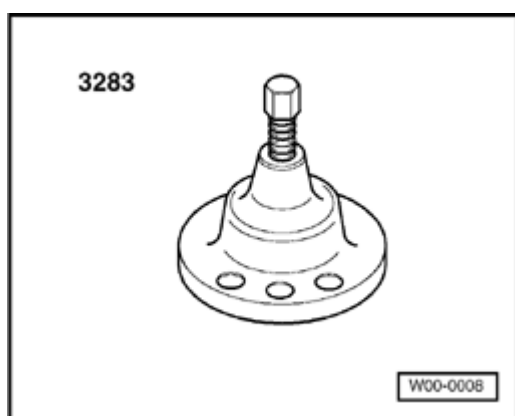
60 Nm

60 Nm

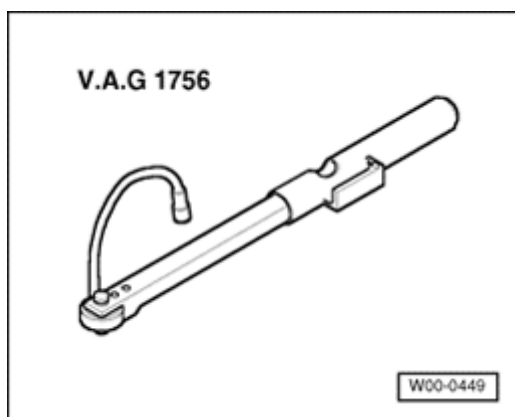
Rear drive axle, servicing

Rear drive axle, removing and installing

Special tools, testers and auxiliary items required



n Hub puller 3283



n Angle wrench V.A.G1756

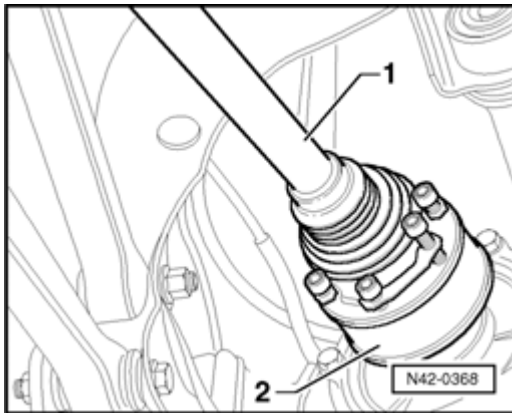
Removing

Left and right drive axle

- Lift vehicle until load on rear axle is relieved.

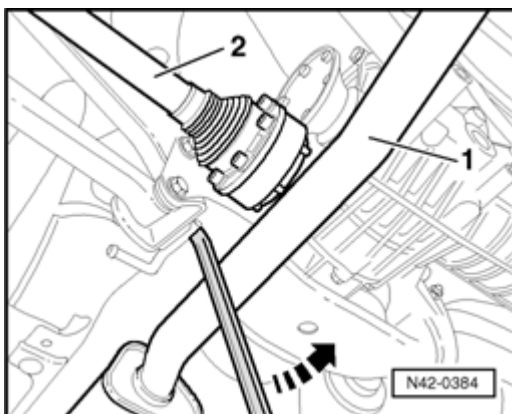
The wheel should still be touching the floor.

- Loosen 12-point nut.



- Disconnect drive axle - 1 - from final drive flange shaft - 2 -

Left drive axle

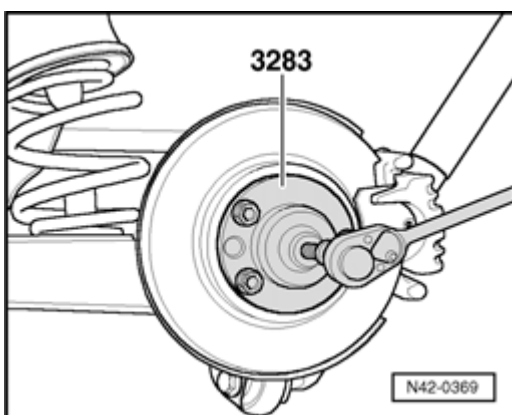


- Push exhaust system to side with a lever
- Remove drive axle inner joint from final drive.

1 - Exhaust system

2 - Drive shaft

The work sequence is valid for both sides



- Press out drive axle.

Note:

- n *When pressing drive axle out make sure there is sufficient clearance.*

- Remove drive axle.

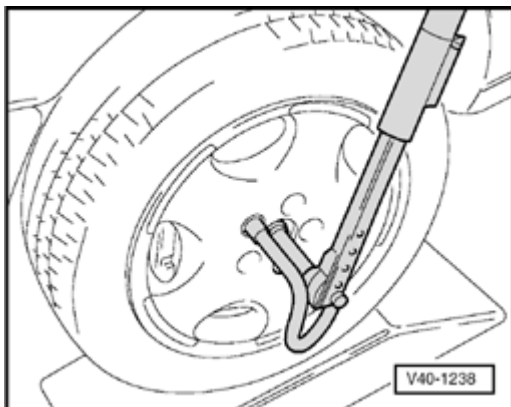
Installing

Remove any paint residue and/or corrosion on thread/splines of outer joint.

- Coat with oil before installing axle shaft;
 - n The splines of outer joint,
 - n The thread of outer joint
 - n Wheel hub splines,
 - n The contact surface and thread of 12-point nut

with oil.

- Install drive axle.
- Insert outer joint as far as possible into spline in wheel hub.
- Pull outer joint into wheel hub until outer joint is in position.
- Install drive axle inner joint and initially tighten bolts diagonally to 10 Nm.
- Tighten multi-point socket head bolts diagonally to 40 Nm
- Lower vehicle until wheels touch ground.
- Tighten 12-point nut to 200 Nm and loosen 1/2 turn.



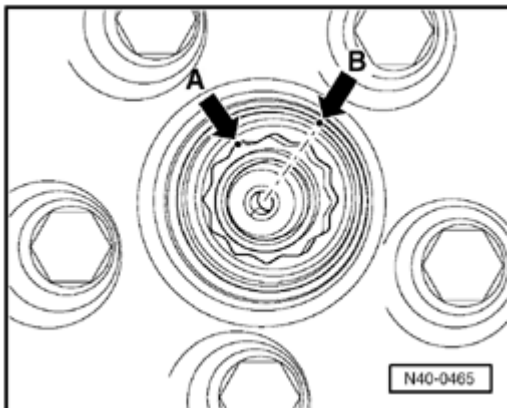
- Tightening 12-point nut.

Tightening torque:**50 Nm plus an additional $1/6$ turn 60°**

- n To tighten 12-point nut we recommend the angle measuring wrench V.A.G1756 .

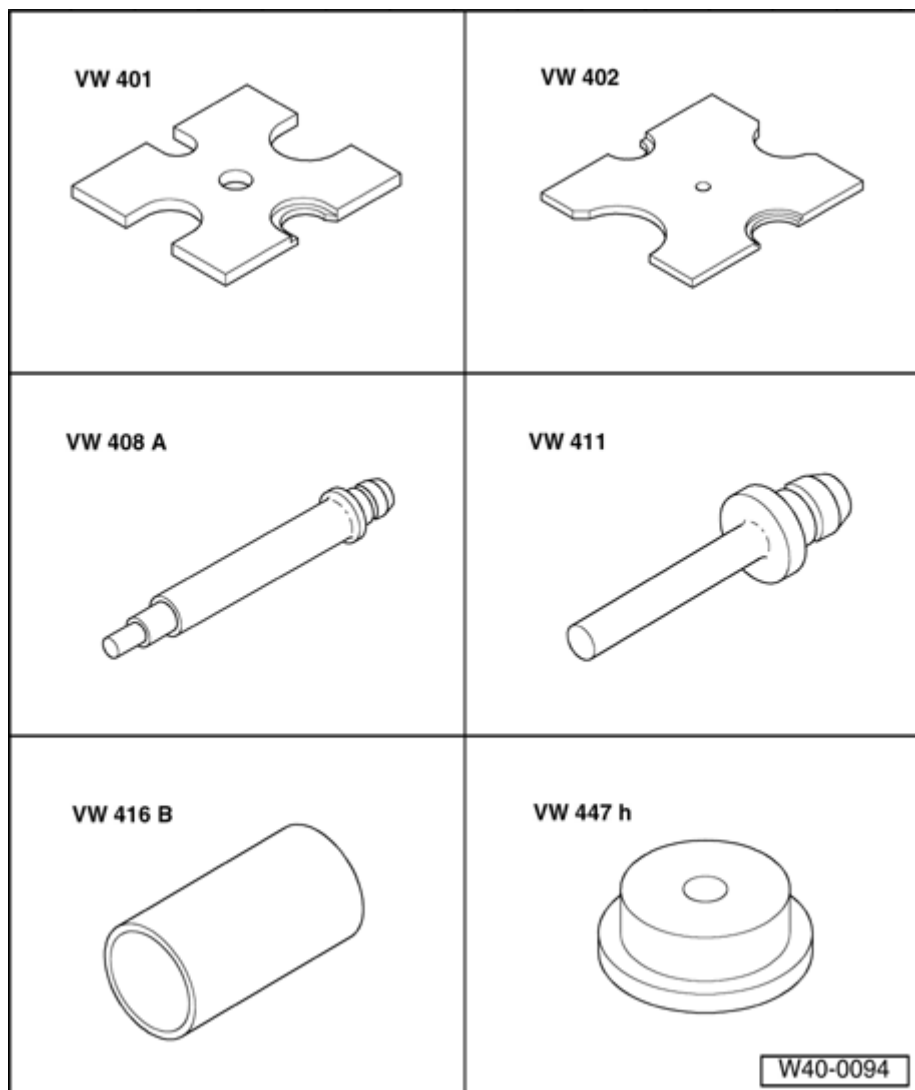
If an angle measuring wrench is not available, then tighten 12-point nut using the following method.

- Lower vehicle until wheels touch ground.
- Tighten 12-point nut to 200 Nm and loosen $1/2$ turn.
- Pretighten 12-point nut to 50 Nm.

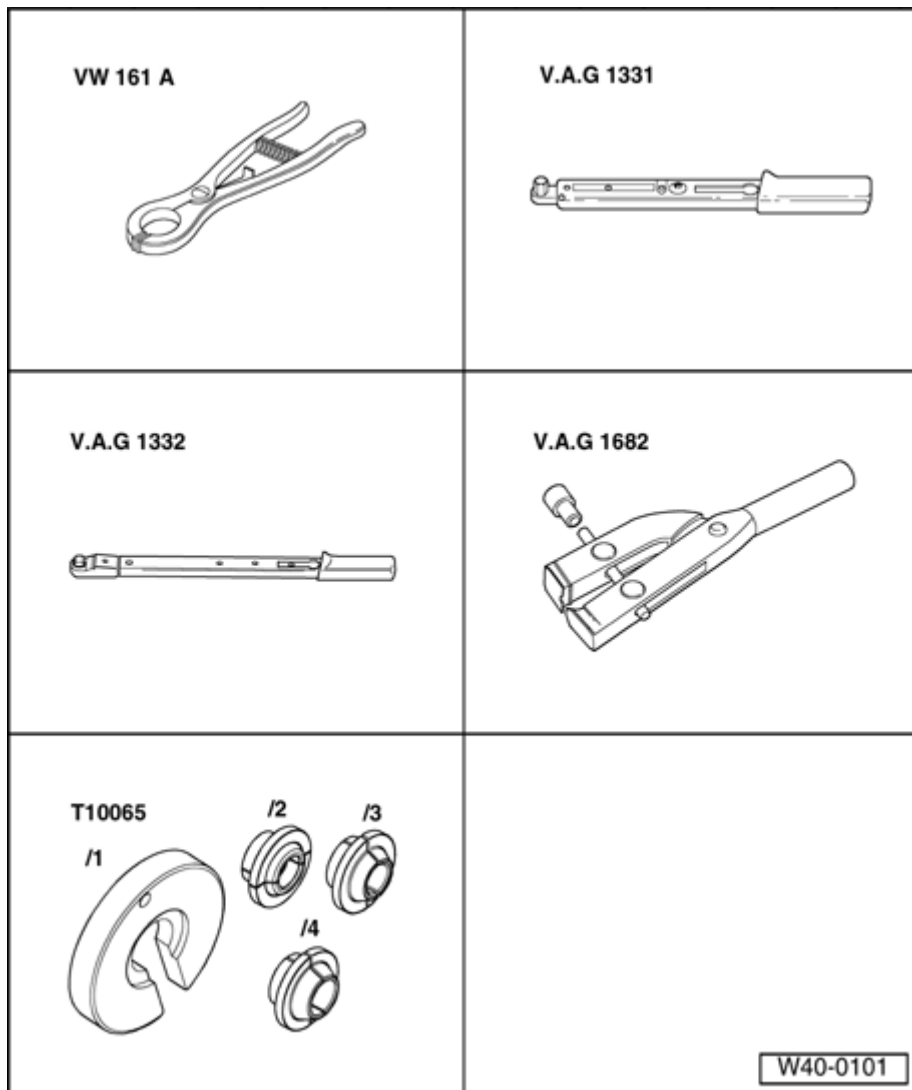


- Mark one of the 12-points on the nut with a line - **arrowA** -
- Mark 2nd line - **arrowB** - on edge of wheel hub as shown in illustration.
- Turn 12-point nut until both points align.

Rear drive axle with constant velocity joint, servicing

**Special tools, testers and auxiliary items required**

- n Thrust plate VW401
- n Thrust plate VW402
- n Punch VW408A
- n Punch VW411
- n Sleeve VW416B
- n Thrust pad VW447H



Special tools, testers and auxiliary items required

- n Circlip pliers VW161A
- n Torque wrench V.A.G1331
- n Torque wrench V.A.G1332
- n CV joint boot clamp tool V.A.G1682
- n Assembly tool T10065

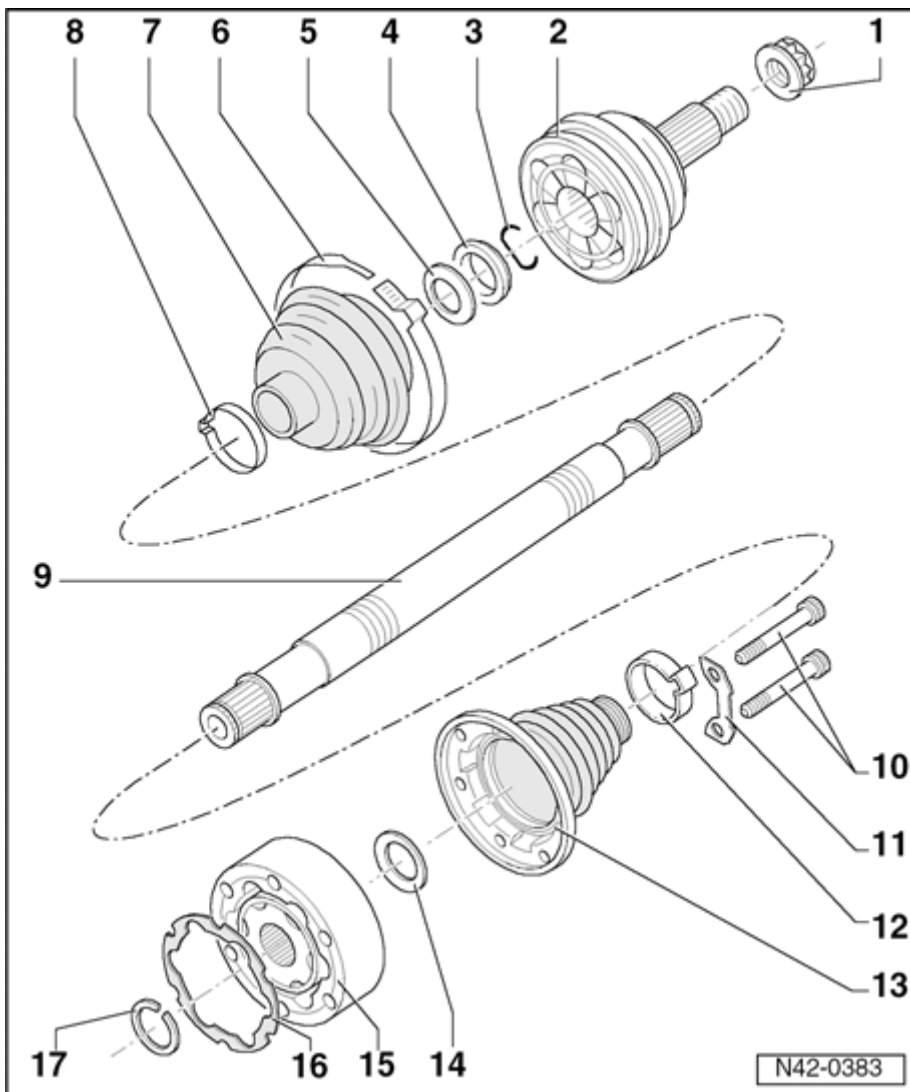
Grease quantity and type

Filling drive axle with high temperature grease. ⇒ See *Parts Catalog*

Outer joint	Grease Total quantity	Joint	Amount of: Protective boot

mm	[g]	[g]	[g]
81	80	40	40
Inner joint			
mm			
100	120	50	70

Regrease joint, if necessary, when replacing protective boot.



1. Self-locking 12-point nut

- ı Tightening
- ı Any paint residue and/or corrosion on thread of the outer joint must be removed before the nut is installed.

2. Outer constant velocity joint

- ı Replace as a unit

- ı Removing ⇒ [40-5, Removing outer constant velocity joint](#)
- ı Installing: Using a plastic hammer, drive onto shaft as far as stop

3. Circlip

- ı Always replace
- ı Insert in shaft groove

4. Thrust washer

- ı Installation location ⇒ [42-7, Installing dish washer and thrust washer on outer joint](#)

5. Spring washer

- ı Installation location ⇒ [42-7, Installing dished washer on inner joint](#)

6. Clamp

- ı Always replace
- ı Tightening ⇒ [42-7, Tightening hose clamp on outer joint](#)

7. Protective boot

- ı Check for tears and chafing
- ı Material: Hytrel (Polyelastomer)

8. Clamp

- ı Always replace
- ı Tightening ⇒ [42-7, Tightening small clamp](#)

9. Axle shaft (solid shaft)

10. Multiple point socket head bolt,

40 Nm

11. Plate

12. Clamp

- ; Always replace
- ; Tightening ⇒ [42-7, Tightening small clamp](#)

13. Protective boot for inner constant velocity joint

- ; Check for tears and chafing
- ; Drive off with drift

14. Dished washer

- ; Installation location ⇒ [42-7, Installing dished washer on inner joint](#)

15. Inner constant velocity joint

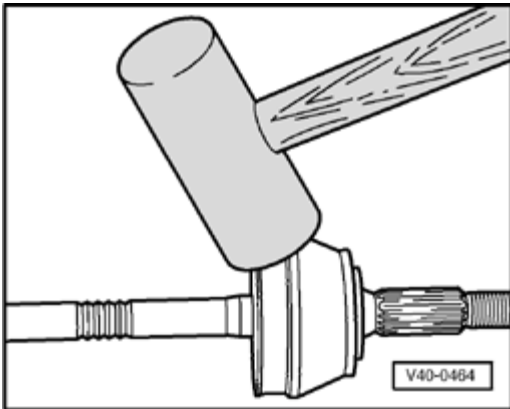
- ; Replace as a unit
- ; pressing off ⇒ [42-7, Pressing off inner constant velocity joint](#)
- ; pressing on ⇒ [42-7, Pressing on inner constant velocity joint](#)
- ; Greasing ⇒ [42-7,](#)
- ; Checking ⇒ [40-5, Inner constant velocity joint, checking](#)

16. Gasket

- ; Replacing. Pull off protective foil and stick into joint.

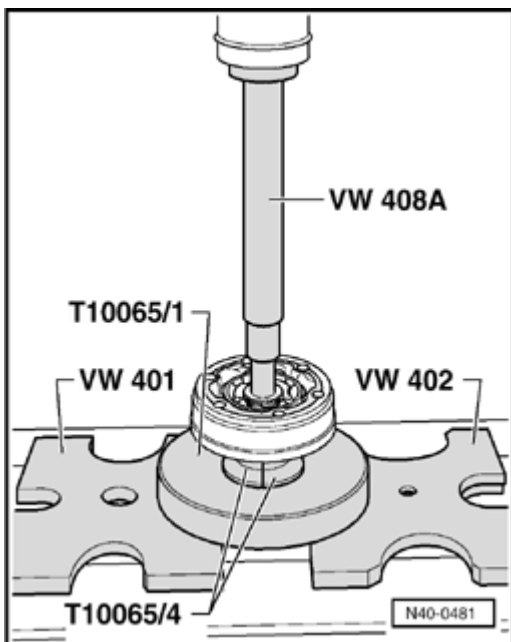
17. Circlip

- ; Removing and installing with VW161 A



Removing outer constant velocity joint

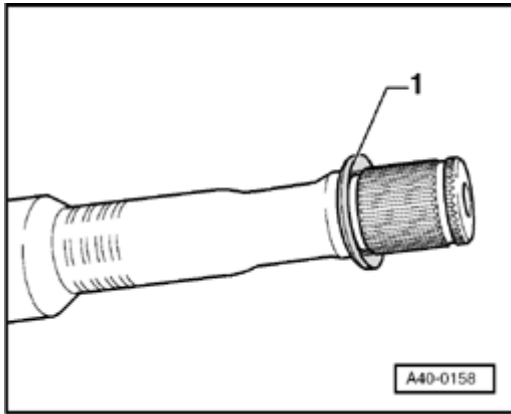
- Drive joint off axle shaft with a firm blow from a plastic hammer.



Pressing off inner constant velocity joint

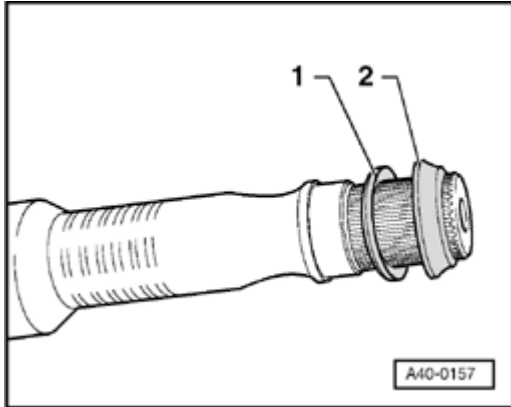
Note:

n Use drift to remove previous boot



Installing dished washer on inner joint

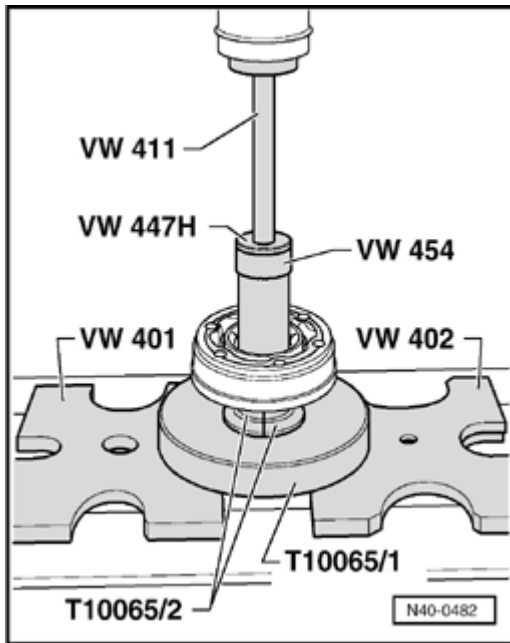
1 - Dish washer



Installing dish washer and thrust washer on outer joint

1 - Dished washer

2 - Thrust washer

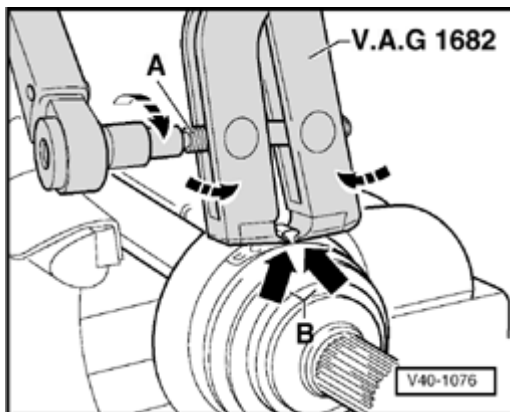


Pressing on inner constant velocity joint

- Press on joint up to stop.
- Insert circlip.

Note:

- n Chamfer on inner diameter of ball hub (splines) must face the contact shoulder on the drive axle.



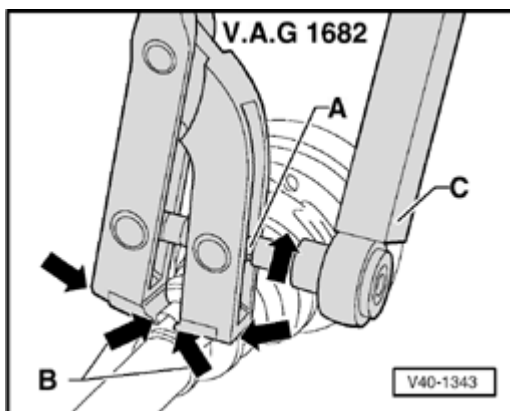
Tightening hose clamp on outer joint

- Install tensioning clamp V.A.G1682 as shown in illustration. Make sure that the jaws of the tension clamp seat in the corners - **arrows B** - of hose clip.
- Tighten hose clamp by turning spindle with a torque

wrench (do not bend tensioning clamp).

Note:

- n *The hard material of the joint boot (compared to rubber) makes it necessary to use a stainless steel hose clamp, it is only possible to tighten the hose clamp with tensioning clamp V.A.G 1682 .*
- n *Tightening torque: 25 Nm*
- n *Use torque wrench - **C** - with a range of 5 to 50 Nm (e.g. V.A.G 1331).*
- n *Make sure the spindle thread - **A** - is not tight. If necessary lubricate with grease MOS 2 .*
- n *If the thread is tight e.g. dirty, the required tensioning force for the hose clamp will not be achieved in spite of correct tightening torque settings.*



Tightening small clamp

Evaluation of accident vehicles

A check list for evaluating the suspension of accident vehicles can be found here ⇒ [00-2, Check list for evaluating the suspension of accident vehicles](#) .

Tightening torques for wheel bolts

Fastener/location

Wheel bolts to wheel hub for all vehicles

Tightening torque

120 Nm

Protecting wheel centering seat against corrosion

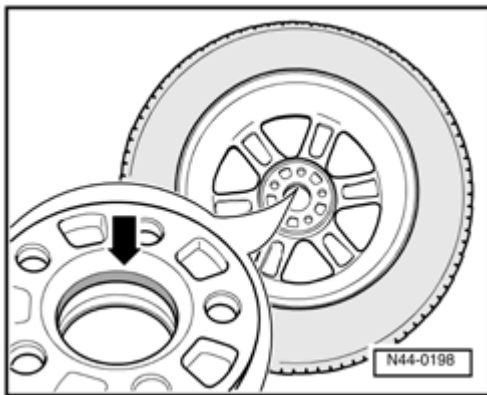
Valid for light alloy and steel wheels

When replacing wheel, the wheel centering seat should be waxed with

Spray wax D322000A2

To prevent corrosion between wheel centering seat and wheel.

- Remove wheel.
- Always clean wheel centering seat at wheel hub and center of rim.



- Apply wax to the area of the centering seat with a brush - **arrow** - .

Make sure that wax is applied only to the centering seat - arrow - and not the contact surface of the wheel. The brakes could be contaminated which would result in poor braking.

Caution!

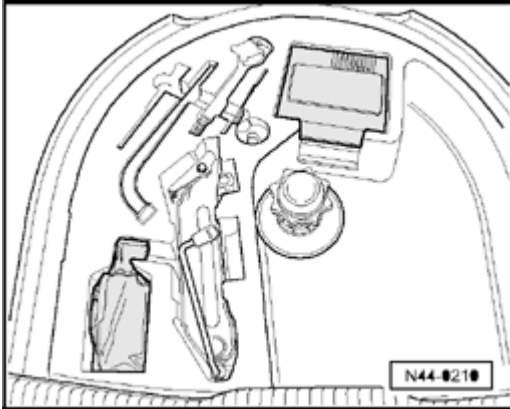
Wheel bolts, contact surfaces of wheel/wheel hub and threads in wheel hub must not be waxed. Threads of wheel bolts must never be handled with grease or corrosion protection agents!

- Install and fasten wheel ⇒ [44-2, Tightening torques for wheel bolts](#) .

Wheels, tires

Vehicles with wheel repair kit

Golf vehicles have either a spare wheel or a wheel repair kit, depending on equipment.

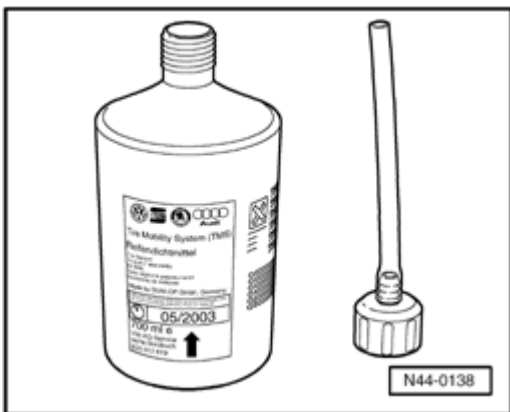


The wheel repair kit is located in the trunk compartment where the spare wheel is normally located. The kit consists of a compressor and a bottle of tire sealant.

Tire sealant

The tire sealant in the plastic bottle has a limited storage life.

On the plastic bottle there are details about the expiration date - **arrow** - .



In this example the expiration date is 05/2003, the plastic bottle must be replaced.

If the plastic bottle has been opened (e.g. a punctured tire) then the bottle must also be replaced.

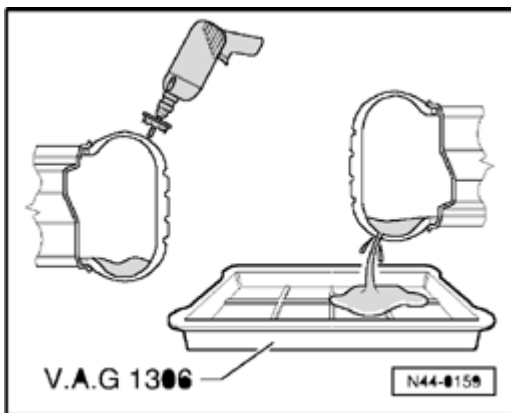
Removing tire

Tires which have been installed or sealed with tire sealant, must be drained before removing from wheel.

Caution!

- n **Avoid eye or skin contact with tire sealant.**
- n **It is hazardous to health and can irritate the eyes and cause allergies.**
- n **Wear protective gloves and eye protection when removing tires.**

- Place wheel down on a flat surface.
- Remove valve from tire valve housing.



- Drill or cut a suitable hole in shoulder of the tire.
- Hold tire over a drip tray and allow sealant to flow out.
- Remove tire from wheel rim.
- Clean wheel rim for example with a damp cloth.

Disposing of tire sealant

The remainder of the tire sealant from the tire and bottle (date expired) must be disposed of properly.

Old tire sealant (date expired) or remainder of sealant from tires must not be mixed with other fluids. Dispose of old tire sealant properly.

Install new tire

- n Make sure the wheel rim is clean.
- Install new tire valve.

- Remove valve insert.
- Inflate tire to approx. 3 to 4 bar, the tire bead must be audibly slid over the hump of the wheel rim.
- Install valve insert.
- Correct inflation pressure to prescribed specification.
- Balance wheel.

Wheel alignment

General

The vehicle alignment should be measured using VW approved wheel alignment equipment!

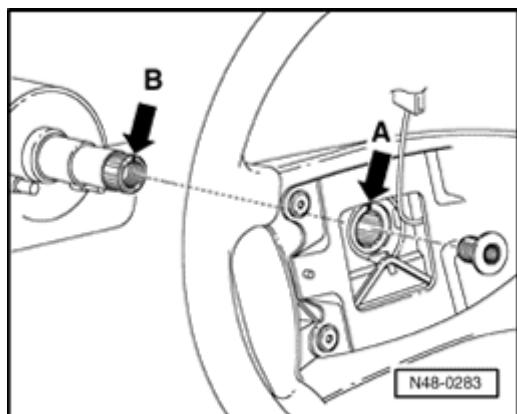
We recommend that the front and rear axles are measured when performing alignment measurements.

Otherwise correct vehicle performance is not guaranteed and an off center steering wheel may exist.

Note:

- n *Perform vehicle alignment only after 1000-2000 km (600-1200 miles) to allow suspension time to settled.*
- n *The individual specifications should be followed as exactly as possible when making adjustments.*

If the installation position of rear axle and the direction of travel of vehicle is not taken into account an off-center steering wheel may occur.



Steering wheel and steering column are marked.

These positions must not be changed!

A - Marked line on steering wheel

B - Punch mark on steering column

Otherwise the center position of the steering rack cannot be guaranteed.

Vehicles with Electronic Stabilization Program (ESP)

If the steering wheel is off-center, the basic setting for the steering angle sensor must be checked. ⇒ Perform basic setting in "Guided Fault Finding" with the VAS

5051. ⇒ [48-4.](#)

Steering columns supplied as a spare part do not have a center punch mark.

After wheel alignment and following test drive the steering column must be marked.

Wheel alignment is necessary when:

- n The vehicle handles poorly.
- n Components were damaged and have been replaced.
- n Axle components were removed.
- n Tire wear patterns are uneven.

Front axle component changed	Wheel alignment check required		Rear axle component changed	Wheel alignment check required	
	Yes	No		Yes	No
Lower control arm	X		Shock absorber		X
Wheel bearing housing	X		Coil spring		X
Tie rod/tie rod end	X		Torsion beam axle, complete	X	
Steering gear	X		Subframe	X	
Subframe	X		Lower control arm/ Upper control arm/	X	
Shock absorber	X		Trailing arm	X	

Requirements:

- n Check suspension, wheel bearing, steering and steering linkage for excessive play and damage.
- n Tire tread depth difference of no more than 2 mm on an axle.
- n Tires inflated to correct pressure
- n Vehicle unladen

Fuel tank must be full

Spare wheel and vehicle tools are stowed at correct installation locations.

The fluid reservoir for the windshield/headlight washer system must be full.

- n Make sure that the sliding plates and turn tables

(alignment equipment) are not touching the end stop when checking wheel alignment.

Caution!

The test equipment must be properly adjusted and attached to the vehicle; observe manufacturers operating instructions.

Adhere to manufacturer of your vehicle alignment equipment for training as required.

Vehicle alignment platforms and vehicle alignment units/vehicle alignment computers can lose their calibration over a period of time.

Vehicle alignment platforms and vehicle alignment units/vehicle alignment computers should be checked and if necessary adjusted within the framework of an inspection/maintenance at least once a year!

- Treat these highly sensitive units carefully and conscientiously!

Measurement preparations

Special tools, testers and auxiliary items required

- n Brake pedal depressor V.A.G1869/2

The lateral run-out of the wheel must be compensated for. Otherwise the result of the measurement will be incorrect.

If the lateral run-out compensation is not performed it is not possible to adjust the toe correctly!

When doing this observe the information from the manufacturer of the wheel alignment unit.

- Carry out wheel run-out compensation.
- Lower vehicle and bounce springs.
- Install brake pedal loading device V.A.G1869/2 .
- Actuate brake pedal with brake pedal loading device.

Vehicle trim height "Zero position"

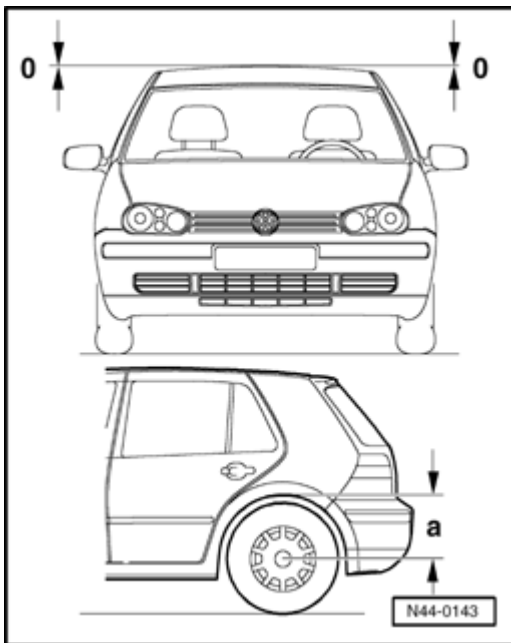
Applies in principle!

If a value lies outside the tolerance, the vehicles trim height must be checked first.

If the measured values are outside the allowed tolerances, the cause may be an incorrect vehicle attitude.

Right-hand drive vehicles or vehicles with automatic transmission can lean to one side slightly.

This is due to the installation position of components and weight distribution



- It is absolutely necessary to measure dimension - a - on left and right sides.

The 0 line on the roof means the horizontal position (zero position) of the vehicle.

- Correct differences if necessary.

It is possible to correct trim height imbalance for front axle by adding weight to top of strut tower through the engine compartment.

To correct trim height imbalance for rear axle add weight to top of strut tower through the trunk compartment.

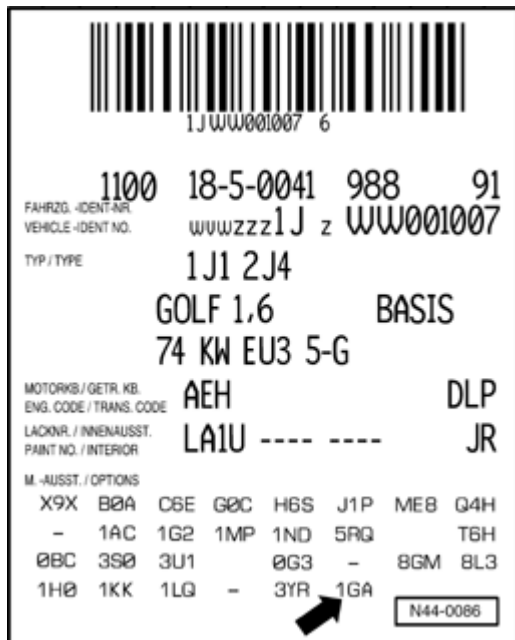
For weight sand bags are suitable for example, approx. 10 kg

Vehicle data sticker

Explanation of the PR No. on the vehicle data sticker

Various suspension components are installed depending on engine and equipment level. They are indicated by the PR numbers (they are also known as factory codes).

The suspension components installed on the front axle in the vehicle is documented on the vehicle data sticker with the relevant PR. number.



Example of a vehicle data sticker

In this example the vehicle is equipped with the standard suspension 1GA - **arrow** - .

The PR No. can also be e.g. G08, G29, G46 G76 etc.

The vehicle data sticker is located in spare wheel well and in Maintenance booklet.

Vehicles up to 03.00 the data sticker is located in spare wheel well and in Maintenance booklet.

Vehicles from 04.00 (Jetta vehicle only) the data sticker is located next to spare tire wheel well, near left rear wheel house and in Maintenance booklet.

The PR numbers determine the specified value allocation for the vehicle.

Wheel alignment specifications

Specifications for front axle with front and all-wheel drive

Front axle/ Model	Suspension strut axle front and all-wheel drive Golf, Jetta, and Jetta Wagon			
	Basic suspension	Sport suspension	Sport suspension	Heavy duty suspension
			Golf GTI 132	

	kW			
Suspension	1GA, 1GE, 1GJ, 1GU, 1GC, 1GG, G08, G09, G11, G27, G28, G29, G34, G36, G37, G38, G41, G44, G45, G46, G47, G49, G76, G77, G80, G81, G82, G83	1GD, 1GV, 1GT, G70 G16, G72, G73, G75, G84, G86, G87, G88		1GB, 1GW, G10, G39, G48, G93, G95
	Explanation of PR. numbers can be found on page ⇒ 44-5.			
Camber (wheels not pressed)		$0^\circ \pm 10'$		
Camber ¹⁾ (wheels in straight ahead position)	$-30' \pm 30'$	$-33' \pm 30'$	$-35' \pm 30'$	$-16' \pm 30'$
Maximum permissible difference between both sides		max. 30'		
Toe out on turns 20° steering lock to left and right	$-1^\circ 30' \pm 20'$	$-1^\circ 31' \pm 20'$	$-1^\circ 32' \pm 20'$	$-1^\circ 27' \pm 20'$
Caster (not adjustable)	$+7^\circ 40' \pm 30'$	$+7^\circ 50' \pm 30'$	$+8^\circ \pm 30'$	$+7^\circ 15' \pm 30'$
Maximum permissible difference between both sides	max. 30'	max. 30'	max. 30'	max. 30'

1) Camber corrections are not possible. Corrections are possible by moving the subframe slightly. Adjustment approx. 10' to 15'.

Front axle/ Model	Suspension strut axle all-wheel drive R32 Sport suspension G90, G67
Suspension versions	Explanation of PR. numbers can be found on page ⇒ 44-5.
Camber (wheels not pressed)	$0^\circ \pm 10'$
Camber ¹⁾ (wheels in straight ahead position)	$-45' \pm 30'$
Maximum allowable difference between two sides	max. 30'
Toe out on turns at 20° steering lock to left and right	$-1^\circ 20' \pm 20'$
Caster (not adjustable)	$+8^\circ \pm 30'$
Maximum permissible difference between both sides	max. 30'

1) Camber corrections are not possible. Corrections are possible by moving the subframe slightly. Adjustment approx. 10' to 15'.

Specifications for rear axle, front wheel drive vehicles

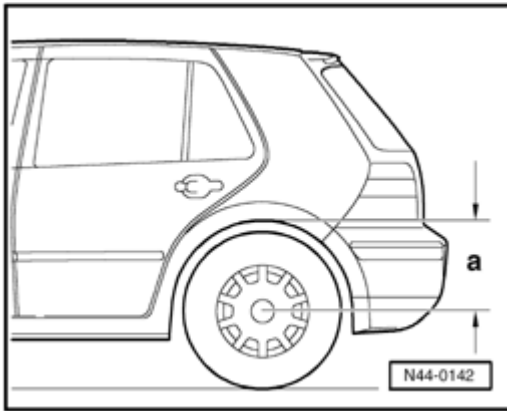
Rear axle/ Model	Torsion beam axle Golf and Jetta			
	Basic suspension	Sport suspension	Sport suspension Golf GTI 132 kW	Heavy duty suspension
Suspension versions	1JA, 1JY, 1JD	1JC	1JC	1JB, 1JG
These PR. Nos. are not shown on the vehicle data sticker. The application, the adjustments for the relevant suspension are taken from the PR. No. for the front axle shock absorbers.				
Camber	-1 ° 27' ± 10' ⇒ 44-5, Vehicle trim height Zero position			
Maximum allowable difference between two sides	max. 30'			
Total toe (at specified camber)	+ 20' ± 10'	+ 25' ± 10'	+ 29' ± 10'	+ 10' +10' / -7'
Max. allowable deviation from direction of travel (thrust angle)	max. 20'			

Specifications for rear axle, vehicles with all-wheel drive

Rear axle/ Model	Trailing arm/double transverse link axle Golf and Jetta		
	Basic suspension	Sport suspension	Heavy duty suspension
Suspension versions	1JD	1JC	1JB
These PR. Nos. are not shown on the vehicle data sticker. The application, the adjustments for the relevant suspension are taken from the PR. No. for the front axle shock absorbers.			
Total toe (at specified camber)	+ 15' ± 10'	+ 15' +15' / -10'	+ 15' ± 10'
Max. allowable deviation from direction of travel (thrust angle)	max. 20'		
Specifications for camber ⇒ 44-5, Specifications for camber .			

On vehicles with all-wheel drive the camber is modified, depending on ride height.

Before measuring camber, calculate ride height.



- Measure dimension - **a** - from center of wheel to lower edge of wheelhousing.

Specifications for camber

Golf, Jetta, Jetta Wagon with basic or sport suspension		Golf, Jetta, Jetta Wagon with heavy duty suspension	
Ride height dimension "a"	Camber	Ride height dimension "a"	Camber
370 mm	-1 ° 10' ± 20'	400 mm	-50' ± 20'
375 mm	-1 ° ± 20'	405 mm	-40' ± 20'
380 mm	-50' ± 20'	410 mm	-30' ± 20'
385 mm	-40' ± 20'	415 mm	-20' ± 20'
390 mm	-30' ± 20'	420 mm	-10' ± 20'
395 mm	-20' ± 20'	425 mm	0 ± 20'
400 mm	-10' ± 20'		
405 mm	0 ± 20'		

Max. allowable difference between left and right max. 20 '

Overview of work procedure for measuring vehicle

The following work sequence must be adhered to!

- 1 - Check front axle camber and adjust if necessary
- 2 - Check rear axle camber.
 - n Vehicles with front wheel drive: Camber is not adjustable, Notes ⇒ [44-5, Camber on rear axle \(front wheel drive vehicles\), adjusting](#)
 - n Vehicles with all-wheel drive: Notes ⇒ [44-5, Camber on rear axle \(vehicles with all-wheel drive\), adjusting](#)
- 3 - Check rear axle toe and adjust if necessary.

Vehicles with front wheel drive

The rear axle toe is not adjustable. ⇒ [44-5, Toe on rear](#)

[axle \(front wheel drive vehicles\), adjusting](#)

Vehicles with all-wheel drive

Toe is adjustable. Adjusting toe, ⇒ [44-5, Toe on rear axle \(vehicles with all-wheel drive\), adjusting](#)

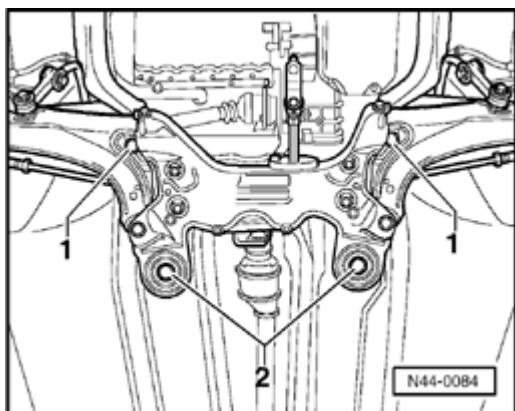
4 - Check front axle toe angle and adjust if necessary;

5 - Check which suspension is installed in vehicle. This information is found on the vehicle data sticker,

Front axle camber, adjusting

If a value lies outside the tolerances, check trim height and balance if necessary ⇒ [44-5, Vehicle trim height Zero position](#) .

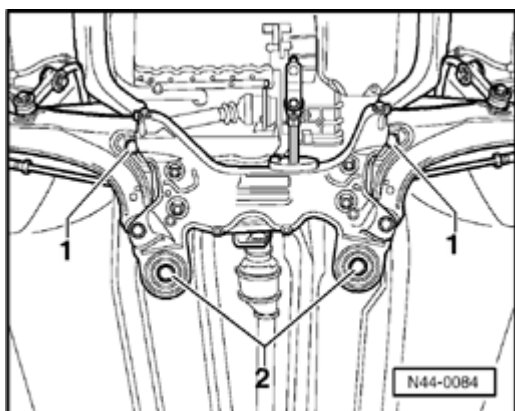
By moving the subframe is it possible to change the camber slightly.



- Loosen bolts - 1 - and - 2 - .
- Move subframe to equalize camber on both sides.

Check caster; caster can also change when moving subframe.

Check caster angle afterward.



- Secure subframe with new bolts.

Fastener/location	Tightening torques
Subframe to body Bolt position - 1 - Use new bolts!	100 Nm plus an additional $1/4$ turn 90°
Subframe to body Bolt position - 2 - Use new bolts!	100 Nm plus an additional $1/4$ turn 90°

Camber on rear axle (front wheel drive vehicles), adjusting

Camber cannot be adjusted.

If a value lies outside the tolerances, check trim height and balance if necessary \Rightarrow [44-5, Vehicle trim height Zero position](#) .

If the measured values are outside the permitted tolerances the axle beam must be checked for damage and replaced if necessary.

Camber on rear axle (vehicles with all-wheel drive), adjusting

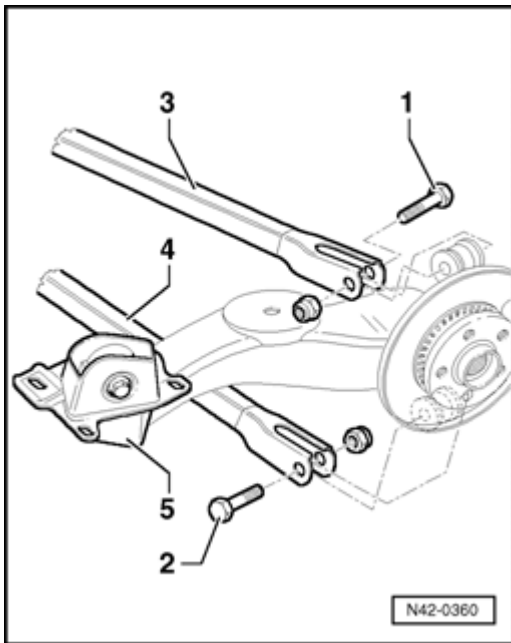
For vehicles before model year 2003 the camber cannot be adjusted.

If a value lies outside the tolerances, check trim height and balance if necessary \Rightarrow [44-5, Vehicle trim height Zero position](#) .

If measured values are outside permitted tolerances the axle beam must be checked for damage and replaced if necessary.

From model year 2003 the camber is adjustable. The transverse link has only one hole. Here the camber can be adjusted too.

If a vehicle before model year 2003 has a transverse link with a hole, then the camber can be adjusted here too.



- Loosen bolts - 1 - and - 2 - for transverse link.
- 3 - Upper transverse link
- 4 - Lower transverse link
- 5 - Trailing arm
- Press wheel in and out to adjust to prescribed value.
- Tighten bolted connection transverse link/trailing arm with 70 Nm.
- Check camber adjustment. If necessary, repeat adjustment.
- If adjustment is o.k., tighten bolted connection transverse link/trailing arm with an additional 1/4 turn 90 ° .

Toe on rear axle (front wheel drive vehicles), adjusting

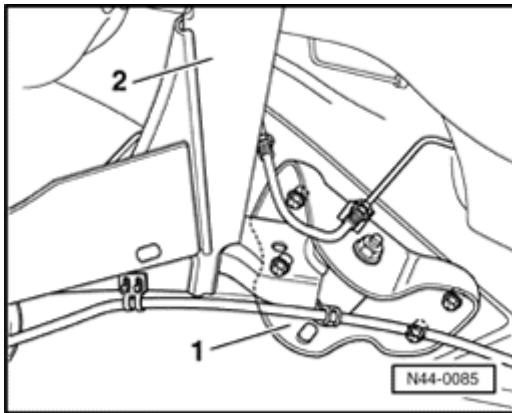
If a value lies outside the tolerances, check trim height and balance if necessary ⇒ [44-5, Vehicle trim height Zero position](#) .

The total toe for the rear axle is not adjustable.

Only by moving the mounting bracket is it possible to adjust the individual toe evenly.

If measured values are outside the allowable tolerances the axle beam must be checked for damage and replaced if necessary.

- Loosen all bolts on mounting brackets - 1 - .

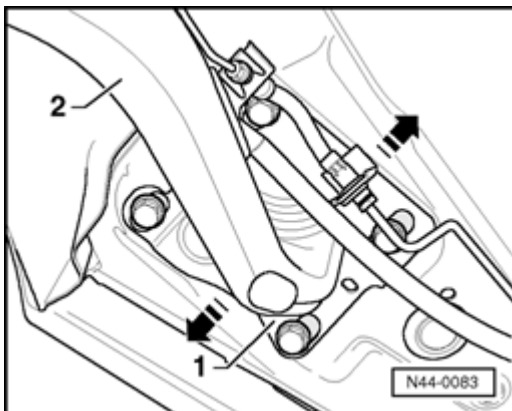


- Slide mounting bracket - 1 - laterally.
- 2 - Rear axle beam
- Tighten bolts to 75 Nm.
- Always use new bolts!

Toe on rear axle (vehicles with all-wheel drive), adjusting

If a value lies outside the tolerances, check trim height and balance if necessary ⇒ [44-5, Vehicle trim height Zero position](#) .

- Loosen all bolts on mounting brackets - 1 - .



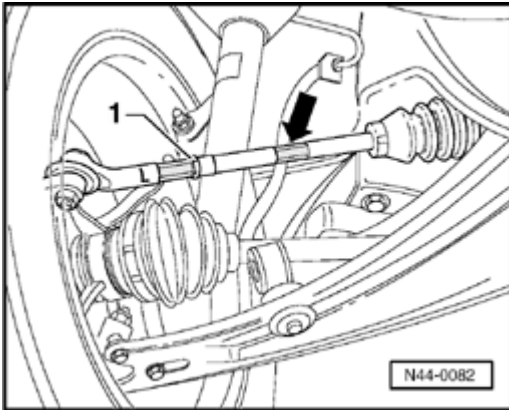
- Slide mounting bracket - 1 - laterally - **arrows** - .
- 2 - Trailing arm
- Tighten bolts to 75 Nm.
- Always use new bolts!

Front axle toe, adjusting

If vehicle is out of specification, check trim height and

balance if necessary ⇒ [44-5, Vehicle trim height Zero position](#) .

- Loosen lock nut - **1** - .



- Adjust toe by turning tie rod to left and/or right.

To do this position wrench at nut - **arrow** - on tie rod.

Note:

- n After turning tie rods, make sure that the boots are not twisted.

Twisted boots wear out quickly.

- Tighten lock nut - **1** - 50 Nm and check toe again to ensure adjustment has not changed.

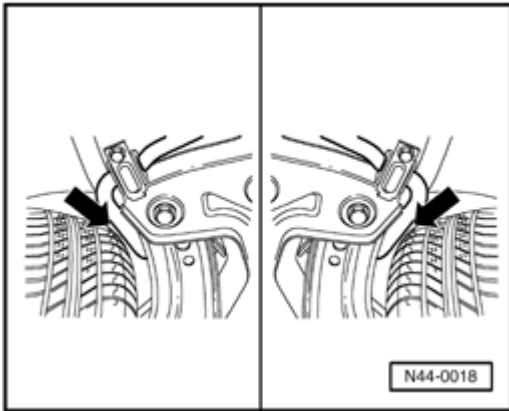
After tightening lock nut - **1** - it is possible that the value will change slightly.

If toe adjustment has not moved more than 2' from specification, adjustment is ok.

Left and right-hand wheel lock, checking

This test is only necessary if:

- n The steering locks differ by more than 2° from one another from the steering center point
- n One side has contact between tire and a front axle component or body at full lock
- n Turning circles left/right different



The distance between front axle components and tires - **arrow** - must be the same at full lock (full turn left/right).

If the distances are unequal then this can be corrected by turning left/right tie rod.

Example:

Right steering lock smaller than left;

- Loosen tie rod lock nuts.
- Turn left tie rod counter-clockwise (unscrew tie rod end).
- Turn tie rod, right side equal amount to left but in opposite direction (turns tie rod end in).
- Check total toe.

Note:

- n *Check total toe is still set to prescribed specifications after completing adjustments!*

- Tighten lock nuts.

After tightening lock nut - **1** - it is possible that the value will change slightly.

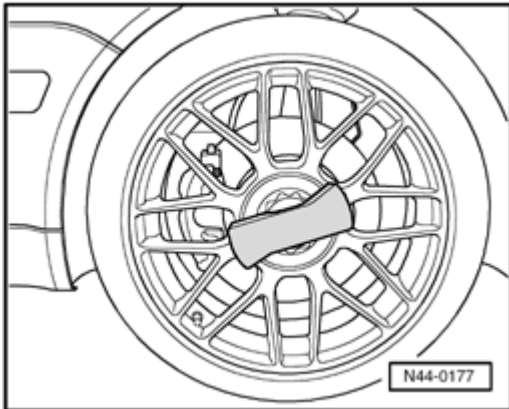
If toe adjustment has not moved more than 2' from specification, adjustment is ok.

Note:

- n *After turning tie rods, make sure that the boots are not twisted.*

Wheels, tires

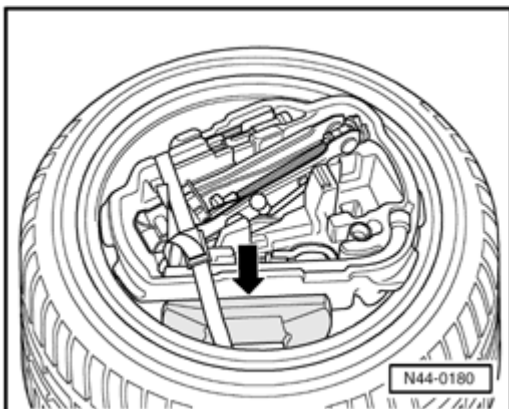
Wheel trim, removing and installing



The alloy wheel of the Golf GTI 132 kW has a bolted wheel trim. You can screw and unscrew the wheel with the assembly tool in the vehicle.

Note:

- n Do not use other assembly tools! Otherwise the wheel trim or alloy wheel can be damaged.*



The assembly tool - **arrow** - for the wheel trim can be found in the tool kit.

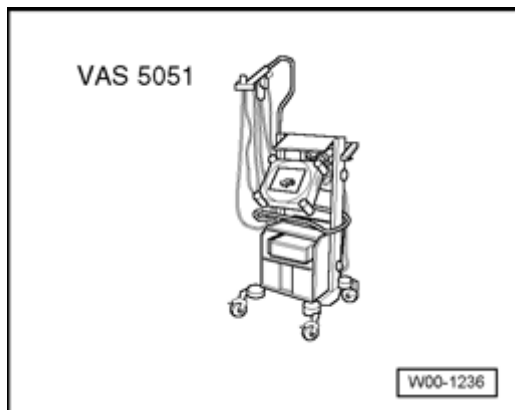
It is available as a replacement part with part No. 4B0012 219 B .

Evaluation of accident vehicles

A check list for evaluating the suspension of accident vehicles can be found here ⇒ [00-2, Check list for evaluating the suspension of accident vehicles](#) .

Connecting VAS 5051 and selecting functions

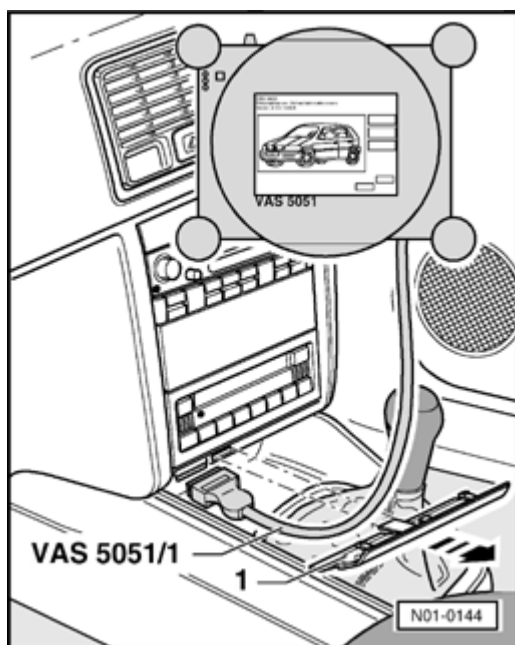
Special tools, testers and auxiliary items required



- n Vehicle Diagnosis, Testing and Information System VAS 5051
- n Diagnostic cable VAS 5051/1 or VAS 5051/3

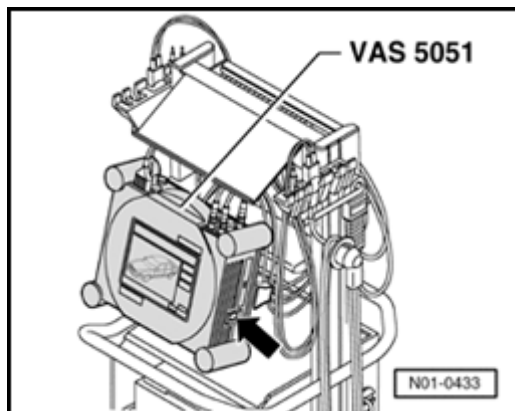
Caution!

- n **During a test drive, the testing and measuring equipment must be secured on the rear seat.**
- n **When vehicle is being driven, a second technician must operate this equipment.**



- Pull cover -1- off in direction of - **arrow** - .

- With ignition switched off, connect tester VAS 5051 to Data Link Connector using diagnosis cable VAS 5051/1 or VAS 5051/3.



- Connect VAS 5051 Vehicle Diagnosis, Testing and Information System - **arrow** - .

The testing and information system is ready to be used when it shows a vehicle on the screen.

- Switch on ignition.
- Press button/field on display for "Guided Fault Finding".
- Select one after another:
 - n Brand
 - n Type
 - n Model year
 - n Version
 - n Engine code
- Confirm data entered.

Note:

- n *Wait until the vehicle diagnosis, testing and information system has checked all the available control modules in vehicle.*

- Press Goto button and select "Function/component selection" function"

Note:

- n *Now follow the instructions given on screen to start*

the desired functions.

Airbag

⇒ [Repair Manual, Body Interior, Repair Group 69, Airbag](#)

Steering column

Steering column, removing and installing

Removing

Replacement steering columns is supplied complete, less steering lock housing

Servicing steering column is not possible.

Steering lock housing can be transferred.

Steering lock housing, removing and installing ⇒ [48-4, Steering lock housing, removing and installing](#)

Caution!

Before working on the electrical system and removing the steering wheel, the following conditions must be met:

- n ***Disconnect Ground strap (GND) from battery.***
- n ***The wheels must be in the straight ahead position.***

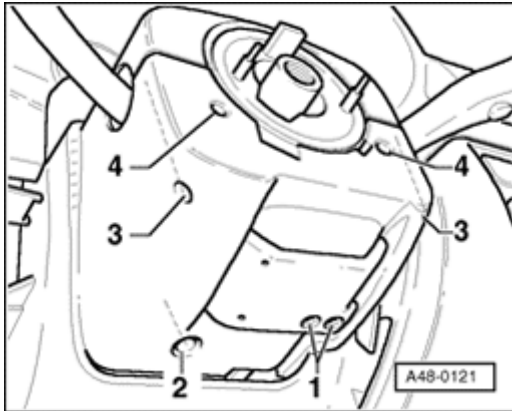
If you do not follow these instructions, the airbag system may fail during subsequent vehicle operation.

- Set wheels to straight ahead position.
- Pull lever below steering column downward.
- Pull steering column down and out as far as possible.
- Remove steering wheel

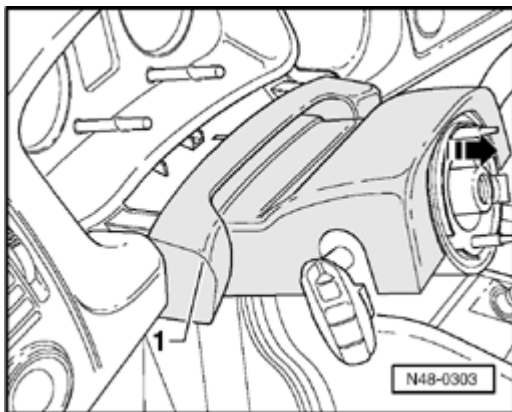
⇒ [Repair Manual, Body Interior, Repair Group 69, Airbag; Steering Wheel, Removing and installing](#)

- .
- Remove lower stowage compartment.
- Remove carpeting.

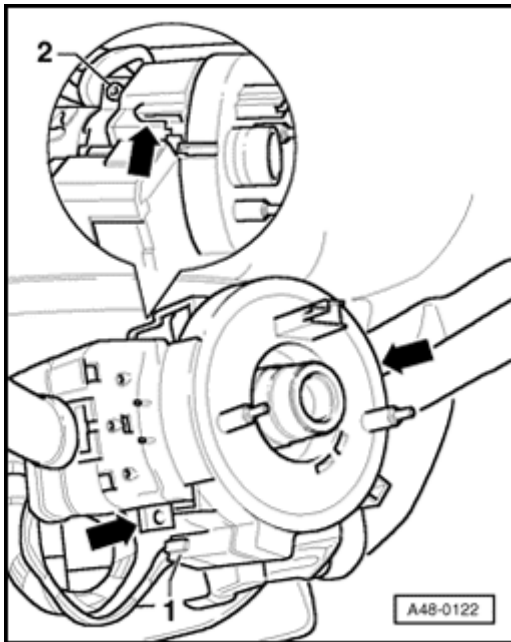
Remove trim for steering column switch



- Remove bolts - 1 - .
- Take off handle for height and reach adjustment.
- Remove bolts - 2 - , - 3 - and - 4 - .
- Remove lower steering column switch trim.



- Remove upper steering column switch trim - 1 - .
- Disconnect connector - 1 - .



- Release locking tabs - **arrow** - and pull coil connector with slip ring off steering column switch.

This illustration shows a coil connector in a vehicle without Electronic Stabilization Program (ESP)

Vehicles with Electronic Stabilization Program "ESP"

Vehicles with ESP are equipped with steering angle sensor G85 . It is installed in housing together with slip ring and coil connector.

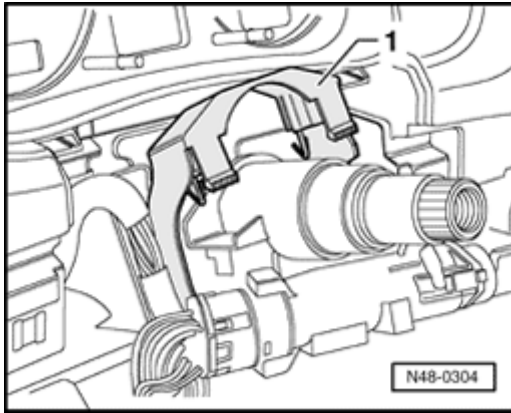
A description of the design and function of the ESP is found in Self-Study Program No. 204.

After work on steering column switch, the basic setting of the steering angle sensor G85 must be checked. ⇒ [48-4](#).

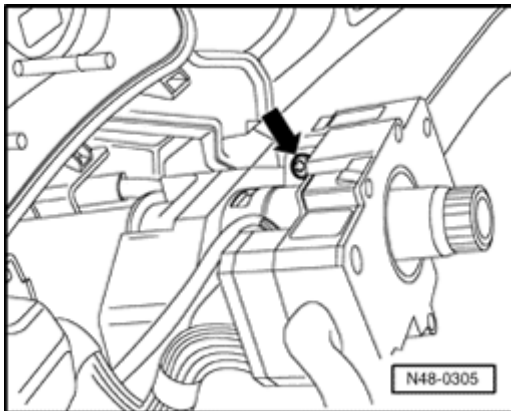
- Removing steering angle sensor G85

⇒ [Repair Manual, Brake System, Repair Group 45, ESP system components removing and installing; steering angle sensor -G85- removing and installing](#)

Continue for all vehicles



- Remove plastic cover - 1 - over shear head bolts.
- Release tie wrap.

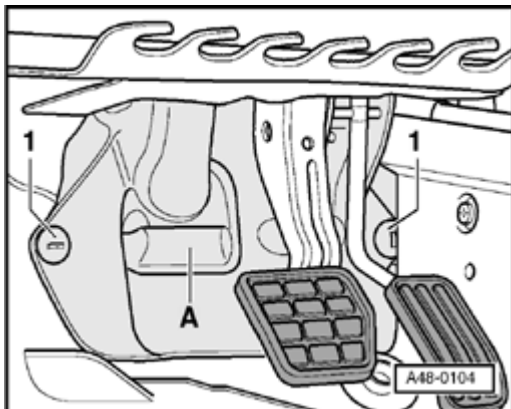


- Remove bolt for steering column switch and remove steering column switch.

Vehicles with automatic transmission

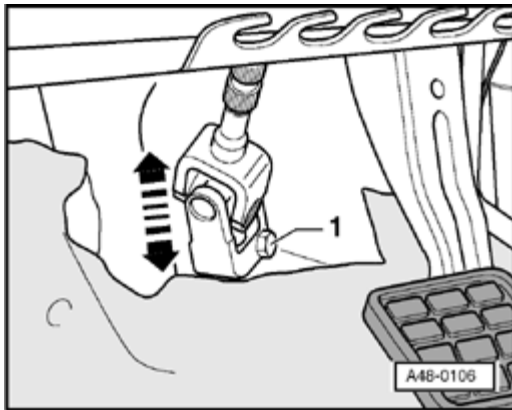
Disconnect ignition lock cable ⇒ [48-4, Locking cable for ignition with key withdrawal lock, removing and installing](#)

Continue for all vehicles



- Remove plastic screws - 1 - .
- Remove cover - A - .

- Remove joint bolt - **1** - from steering shaft joint.



- Remove universal joint steering gear in direction of - **arrow** -

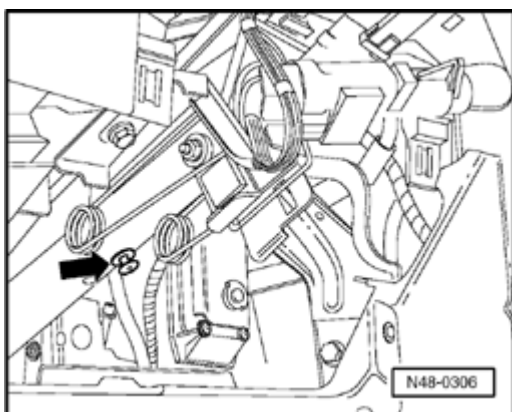
Securing steering column before removal

An assembly aid is required so that the upper and lower parts of the steering column do not pull apart when pulling off steering gear.

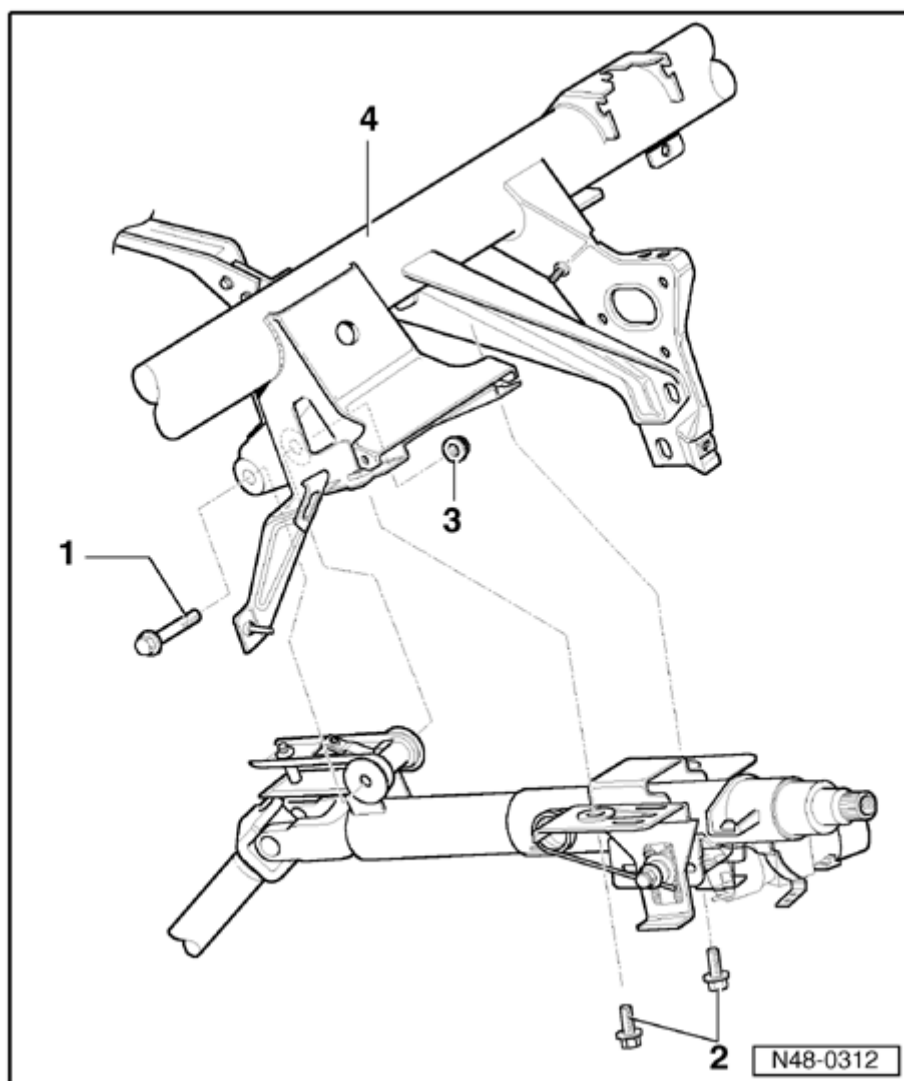
If the upper and lower parts of the steering column are pulled too far apart or pushed too close together the splines separate.

It is possible that rattling noises are created later if the splines are not in their original installation position.

- Push or pull steering column together or apart until the hole is visible.



- For example, insert a clip in hole - **arrow** - .



1. Hex bolt

2. Hex bolt

↳ 22 Nm

3. Hex nut

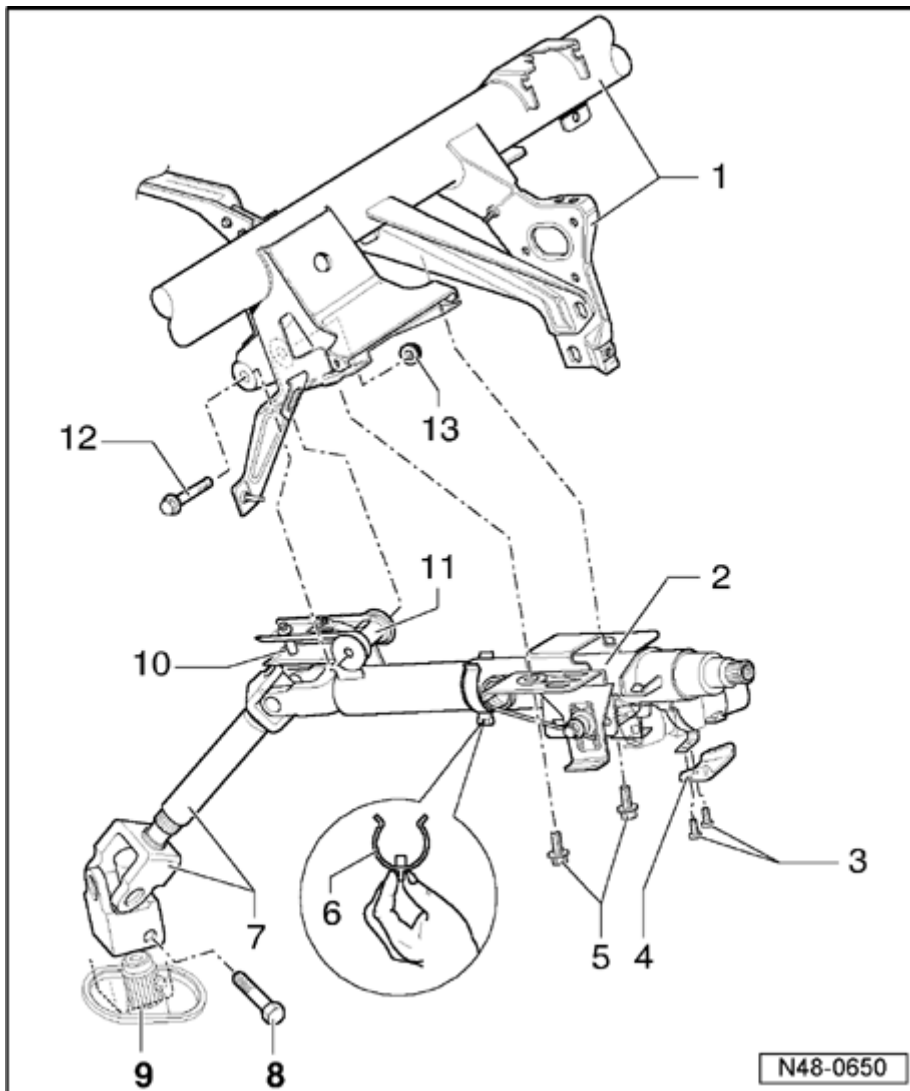
4. Steering column cross member

- Remove nut ⇒ [Item - 3 -](#).

- Remove bolt ⇒ [Item - 1 -](#).

- Remove bolts ⇒ [Item - 2 -](#) and remove steering column.

Install steering column



New replacement steering columns are secured with transportation protection - 6 -

This transport protection - 6 - must be removed after installing steering column in the vehicle.

The shear head bolt - 10 - and Pin - 11 - must be installed on new steering columns, which have been supplied as a replacement part.

- Tighten shear head bolt - 10 - until head shears off.

- Install steering column with preassembled steering lock housing to cross member.

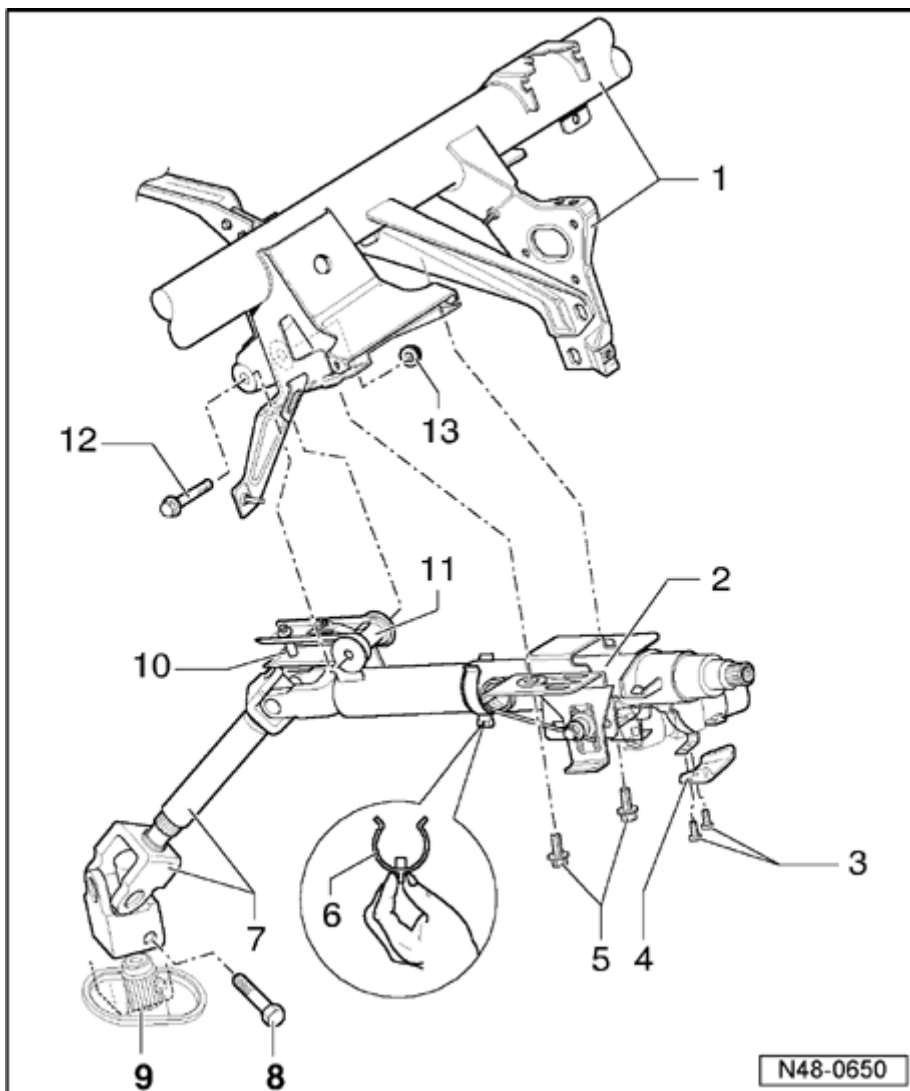
- Install hex bolts - 5 - .

When a steering column from

manufacturer Presta is installed, the bolts must be secured with locking fluid D 000 600 .

Identifying steering column ⇒ [48-4](#),
[Identifying steering column](#)

- Install hex bolt - **12** - .
- Install nut - **13** - and tighten to 10 Nm.
- Tighten bolts - **5** - to 25 Nm
- Remove transportation securing device - **6** - .
- Install universal joint/shaft on steering pinion
- Tighten bolt - **8** - to 30 Nm.



1. Steering column cross member

2. **Steering column**
3. **Bolt**
4. **Handle**
5. **Hex bolt, 22 Nm**
6. **Transportation securing device**
7. **Steering column universal joint/shaft**
8. **Hex bolt, 30 Nm**
9. **Steering gear pinion**
10. **Shear head bolt**
11. **Pin**
12. **Hex bolt**
13. **Hex nut, 10 Nm**

The ignition key removal lock cable must be connected on vehicles with automatic transmission ⇒ [48-4, Installing](#)

- Install steering column switch

⇒ *Repair Manual, Electrical System, Repair Group 94, Steering column switch, Steering column switch, removing and installing*

.

Following work sequence affects only vehicle with ESP

- Installing steering angle sensor G85

⇒ [Repair Manual, Brake System, Repair Group 45, ESP system components removing and installing; steering angle sensor -G85- removing and installing](#)

.

The basic setting for steering angle sender G85 must be checked after the following assembly work:

- n When steering angle sensor G85 has been removed or replaced,

- n After removing or replacing steering column;
- n After removing or replacing steering column switch;
- n After removing or replacing steering lock housing;
- n When steering wheel is repositioned.

Perform steering angle sensor G85 basic setting

- Vehicle diagnosis, testing and information system VAS5051 .
- Select on display "Suspension, Wheels, Brakes, Steering (Repair Group 01; 40...48)" 49) "" .
- Select on display "Brake system" .
- Select on display. "01 On Board Diagnostics Systems"
- Select on display "Anti-lock brake system" .
- Select on display "Functions" .
- Select on display "Basic setting for steering angle sensor - G85-" .

Continue for all vehicles

- Installing trim for steering column switch

⇒ *Repair Manual, Body Interior, Repair Group 70, Instrument panel; Removing and installing instrument panel*

- .
- Install steering wheel

⇒ *Repair Manual, Repair Manual Body Interior, Repair Group 69, Airbag; Steering Wheel, removing and installing*

- .
- Install airbag unit

⇒ [Repair Manual, Body Interior, Repair Group 69, Airbag; Airbag unit; Drivers Side Airbag, removing and installing](#)

Caution!

When connecting battery make sure that no one is in the vehicle!

Steering column, checking for damage**Visual check**

- Check all steering column parts for damage.

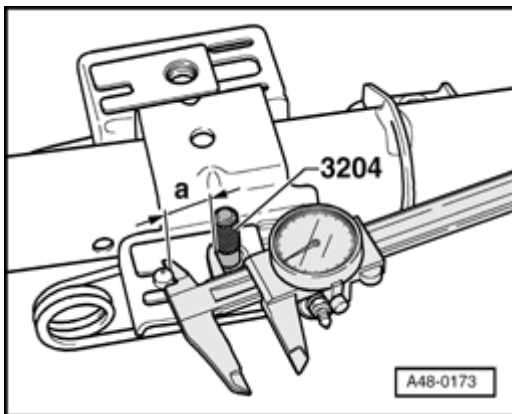
Replace complete steering column if damaged.

Functional check**Requirements:**

- n Steering column universal joint pulled off steering gear.

- Check that steering column turns easily without catching.

- Check that steering column can be adjusted for height and reach.



- Check gap dimension - a - .

- Dimension a ; Maximum 23 mm

If during one of these checks the specifications are not attained the steering column is damaged.

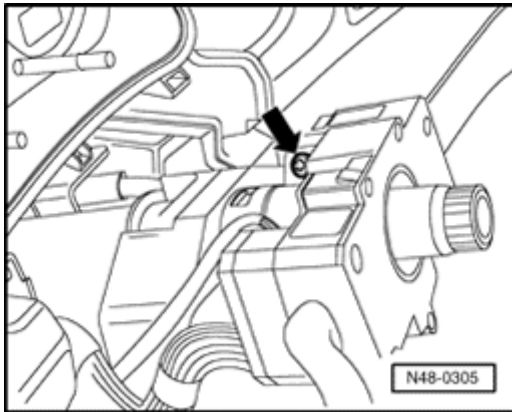
- Replace steering column in this case.

Steering lock housing, removing and installing**Removing**

- Remove steering wheel

⇒ [Repair Manual, Body Interior, Repair Group 69, Airbag: Steering wheel, removing and installing](#)

Remove trim for steering column switch and slip ring or steering angle sensor G85 if installed ⇒ [48-4](#).

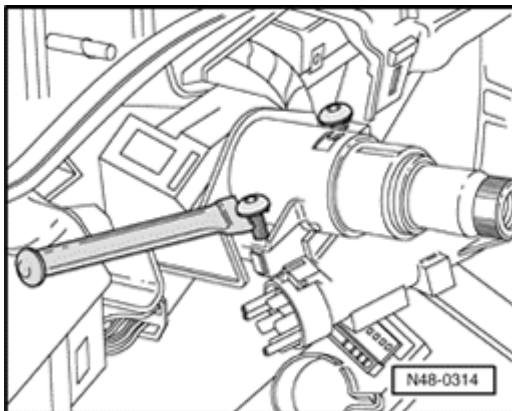


- Remove bolt for steering column switch and remove steering column switch.
- Remove plastic cover over shear bolts.

For vehicles with automatic transmission

Disconnect ignition key removal lock cable ⇒ [48-4, Locking cable for ignition with key withdrawal lock, removing and installing](#)

Continue for all vehicles



- Chisel off shear head bolts with a suitable chisel.

Removing ignition switch / lock cylinder

⇒ *Repair Manual, Electrical Equipment, Repair Group 94, Ignition Switch and lock cylinder; Lock cylinder removing and installing*

/

⇒ [Repair Manual, Electrical Equipment, Repair Group 94, Ignition Switch and lock cylinder; Ignition switch removing and installing](#)

Installing

Installing ignition switch / lock cylinder

⇒ *Repair Manual, Electrical Equipment, Repair Group 94, Ignition Switch and lock cylinder; Lock cylinder removing and installing*

/

⇒ [Repair Manual, Electrical Equipment, Repair Group 94, Ignition Switch and lock cylinder; Ignition switch removing and installing](#)

- Reconnect connector for ignition switch.

For vehicles with automatic transmission

- Connect ignition key removal lock cable ⇒ [48-4, Installing](#) .

Continue for all vehicles

- Install new shear bolts.
- Tighten shear bolts until head shears off.

Following work sequence affects only vehicle with ESP

- Installing steering angle sensor G85

⇒ [Repair Manual, Brake System, Repair Group 45, ESP system components removing and installing; steering angle sensor -G85- removing and installing](#)

.

Continue for all vehicles

- Installing trim for steering column switch

⇒ *Repair Manual, Body Interior, Repair Group 70, Instrument panel; Removing and installing instrument panel*

.

- Install steering wheel

⇒ *Repair Manual, Repair Manual Body Interior, Repair Group 69, Airbag; Steering Wheel, removing and installing*

.

- Install airbag unit

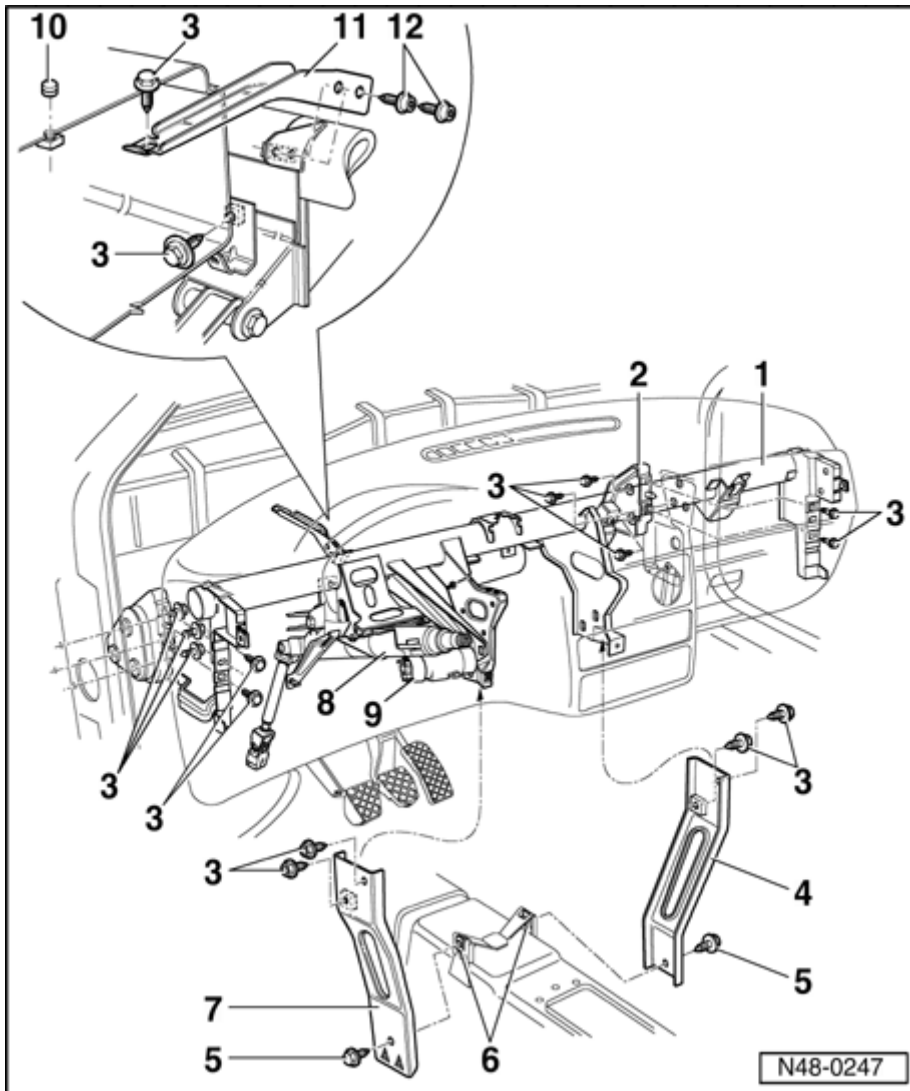
⇒ [Repair Manual, Body Interior, Repair Group 69, Airbag; Airbag unit; Drivers Side Airbag, removing and installing](#)

.

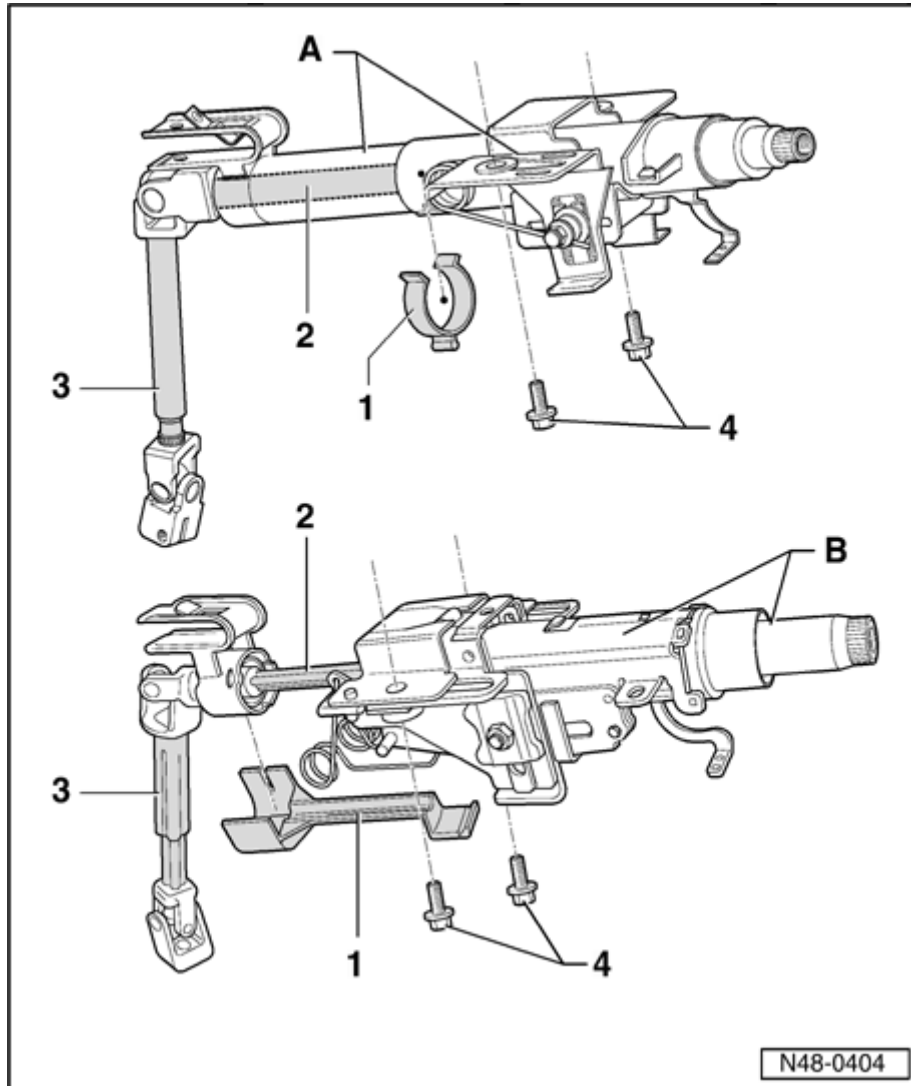
Caution!

When connecting battery make sure that no one is in the vehicle!

Cross member for steering column, assembly overview



1. Steering column cross member
2. Adjustment bracket
3. Hex bolt, 25 Nm
4. Right strut
5. Hex bolt
6. Speed nut
7. Left strut
8. Steering column
9. Steering lock housing
10. Plug
11. Bulkhead reinforcement
12. Multiple point socket head bolt,

10 Nm**Steering column, identification**

From vehicle identity No. 1J-XB 095 035 a steering column from Presta was introduced.

The previous steering column from Nacam is also used.

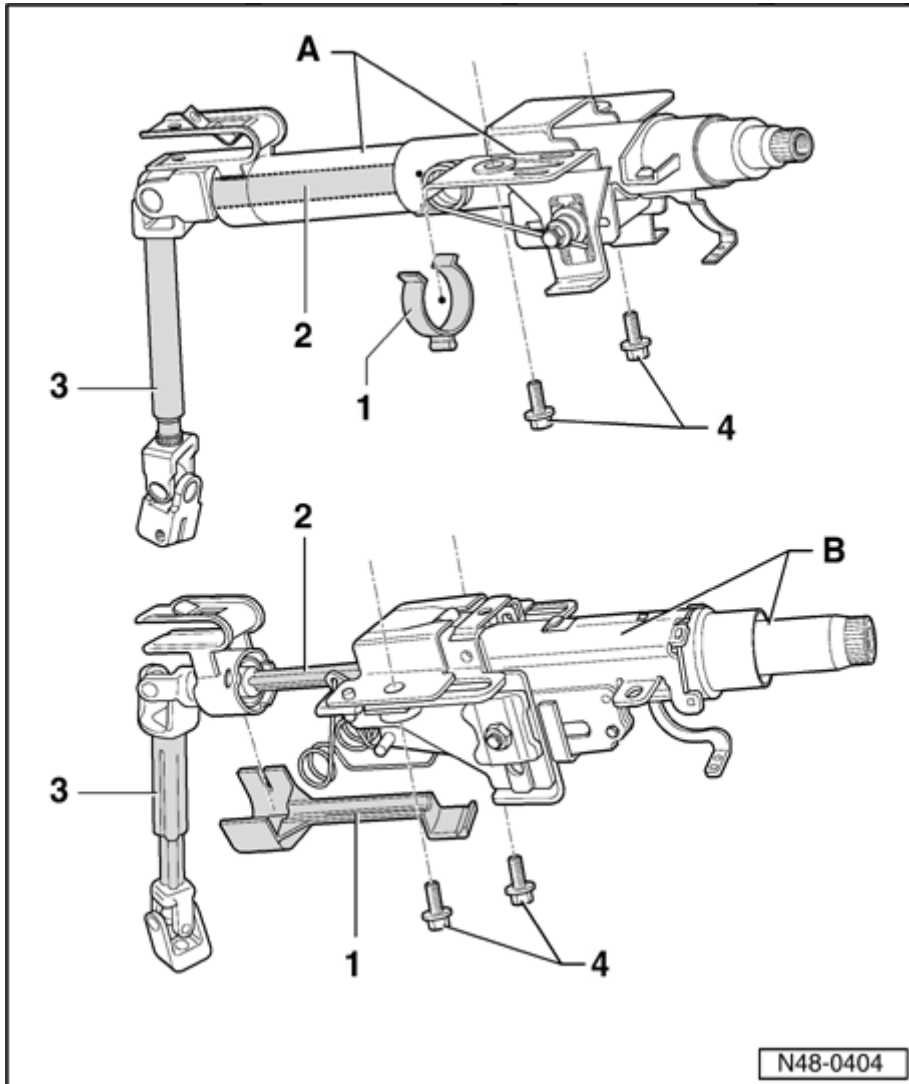
The function of the height and reach adjustment is identical in both steering columns.

Both versions are supplied as replacement parts.

When replacing a steering column, use a steering column from the same manufacturer.

Before removing steering column, check which version is installed in vehicle.

Identifying steering column



A - Steering column

Manufacturer; Nacam

1 - Transportation securing device

- ┆ Remove first after steering column is installed

2 - Steering column

The steering column is not visible in area

3 - Steering column universal joint/shaft

4 - Hex bolt, 22 Nm

- ┆ Installed without locking fluid

B - Steering column**Manufacturer; Presta****1 - Transportation securing device**

- ┆ Remove first after steering column is installed

2 - Steering column

The lower part of the steering column is visible

3 - Steering column universal joint/shaft**4 - Hex bolt, 22 Nm**

- ┆ Inserted with locking fluid
- ┆ Use locking fluid D 000 600

Locking cable for ignition with key withdrawal lock, removing and installing**Only vehicles with automatic transmission**

Adjust locking cable

⇒ *Repair Manual, Automatic Transmission, Repair Group 37, Locking cable removing and installing*

.

Removing

- Remove steering wheel

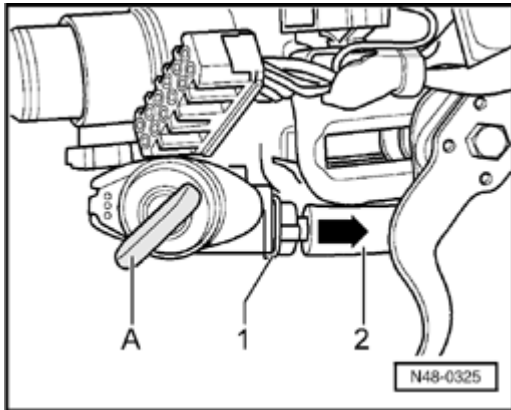
⇒ [*Repair Manual, Body Interior, Repair Group 69, Airbag: Steering Wheel, Removing and installing*](#)

.

- Remove trim for steering column switch

⇒ [Repair Manual, Body Interior, Repair Group 70, Instrument panel; Removing and installing instrument panel](#)

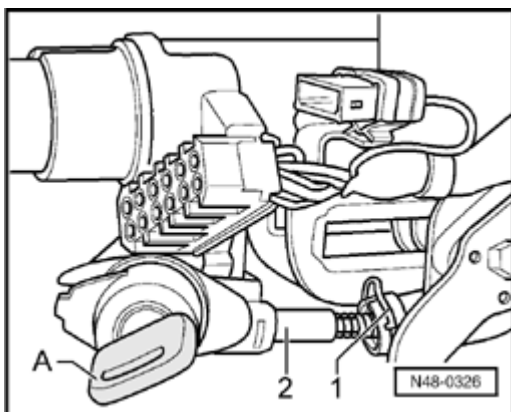
- Shift selector lever into position "P" if necessary.



- Turn ignition key - **A** - to "ignition on" position.
- Press wire clip - **1** - up or down according to installation position and pull at the same ignition lock cable - **2** - out at the same time.

Installing

- Shift selector level into "P" position.



- Turn ignition key - **A** - to "ignition on" position.
- Push lock cable - **2** - into steering lock housing until wire clip - **1** - engages.

Ignition key removal lock, checking

- Turn ignition key to "ignition on" position.
- Press brake pedal.

It must be possible to move selector lever out of P position.

If this is not possible, the ignition key removal lock cable must be adjusted.

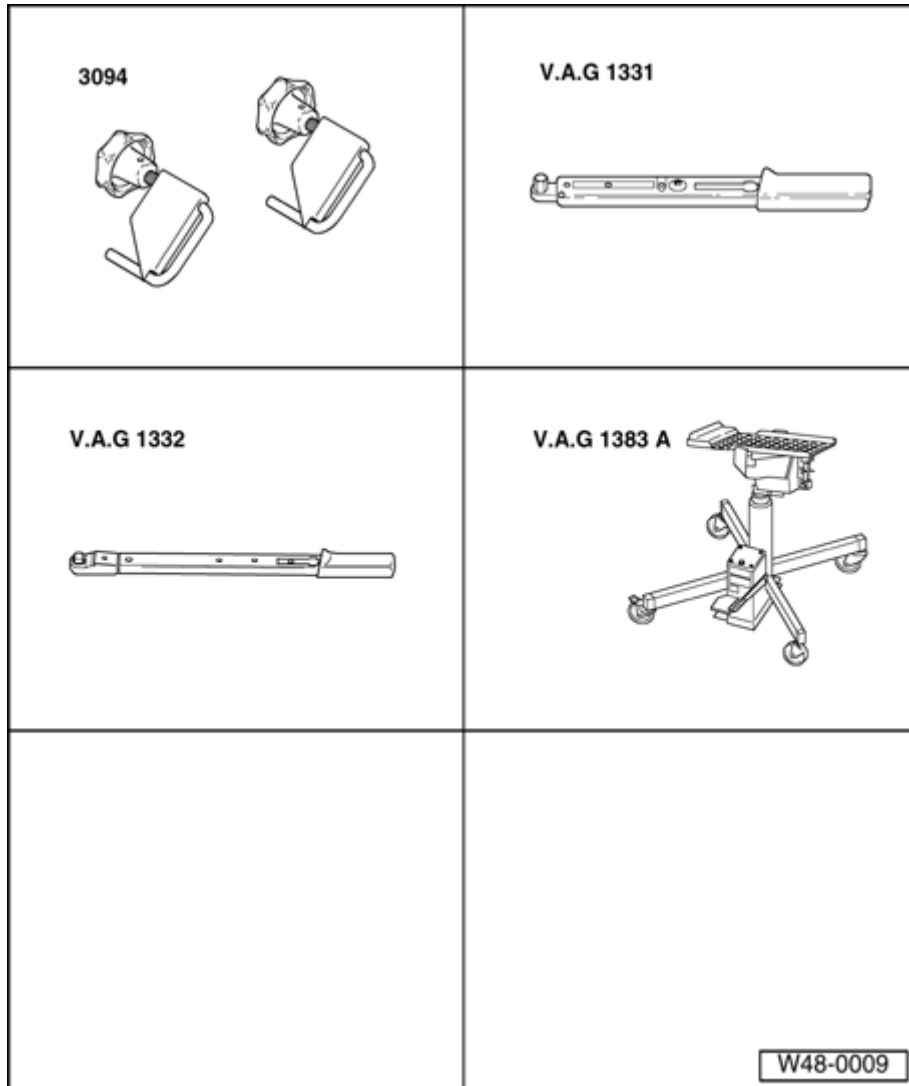
⇒ *Repair Manual, Automatic Transmission, Repair Group 37, Locking cable, removing and installing*

It must only be possible to remove the ignition key when selector lever is in P position!

When ignition key is in position "Ignition off" it must not be possible to move selector lever out of P position!

Power steering, servicing

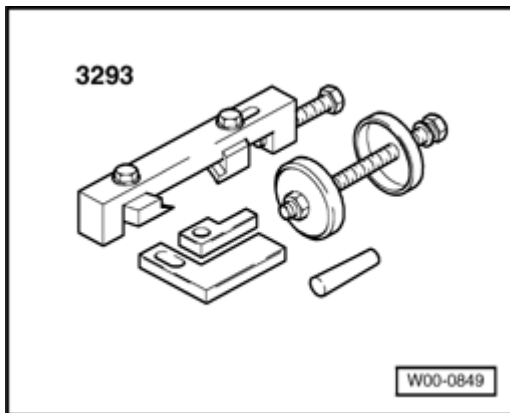
Power steering gear, removing and installing



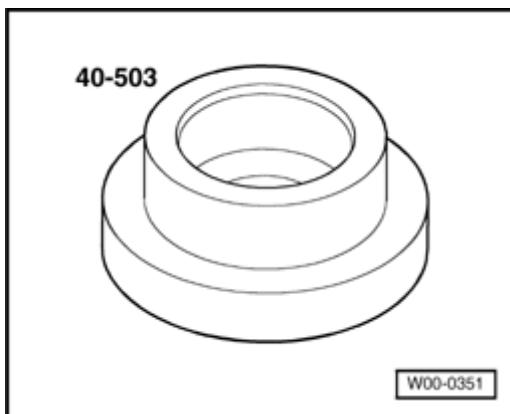
Special tools, testers and auxiliary items required

- n Hose clamps 3094
- n Torque wrench V.A.G1331
- n Torque wrench V.A.G1332
- n Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G1359/2

The following special tools are necessary for R32

Special tools, testers and auxiliary items required

n Assembly tool 3293



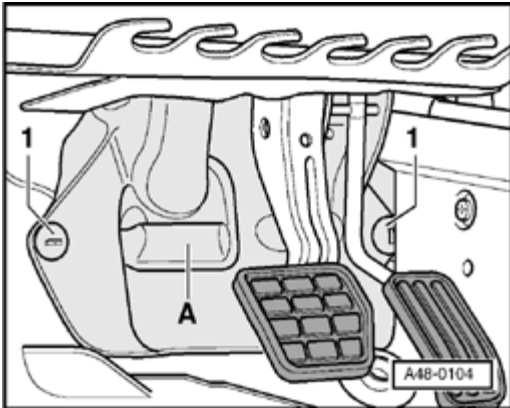
n Installing tool 40 - 503

n Ball joint puller T10239

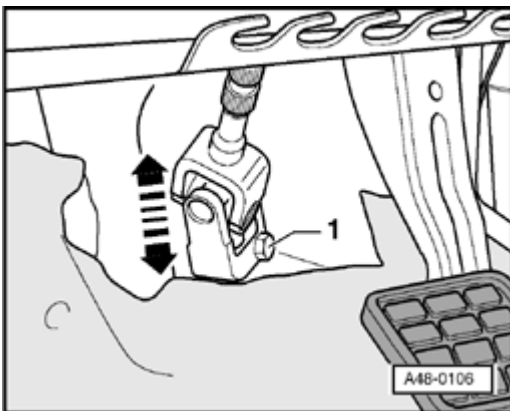
Instructions when working on the power steering gear

- n Absolute cleanliness is required when working on the power steering system.
- n Thoroughly clean connections and immediate vicinity before loosening.
- n Place parts on a clean surface and cover if not re-installing immediately.
- n Do not use fluffy cloths.
- n Remove replacement parts from packaging immediately prior to installation.
- n Only use genuine packed parts.

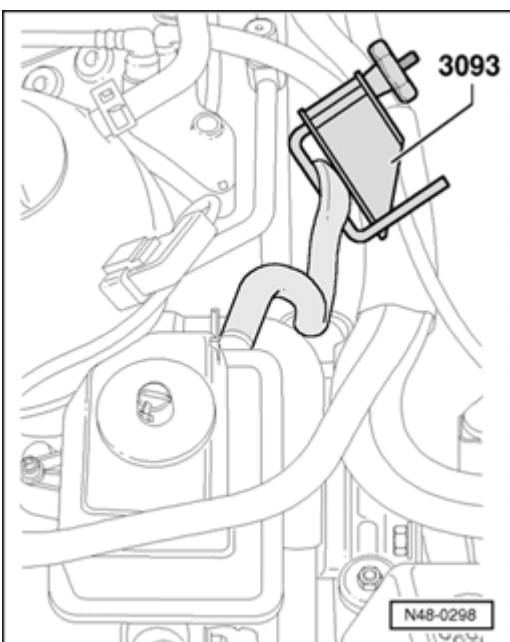
Removing



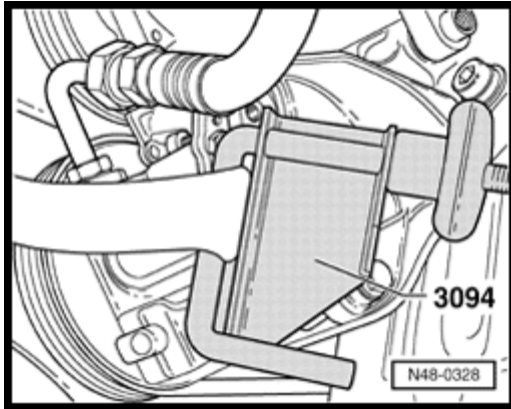
- Remove plastic screws - 1 - .
- Remove cover - A - .



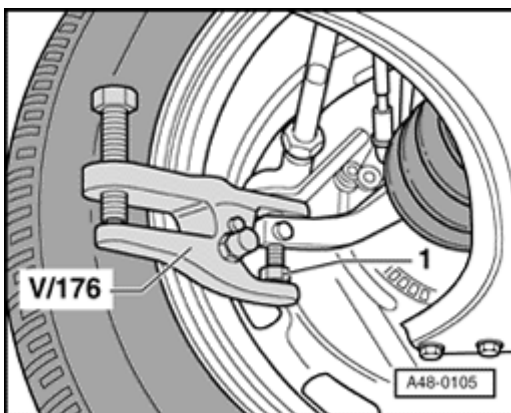
- Remove joint bolt - 1 - from steering shaft joint and remove universal joint steering gear in direction of - **arrow** - .



- Clamp hose from reservoir using hose clamp 3094 .

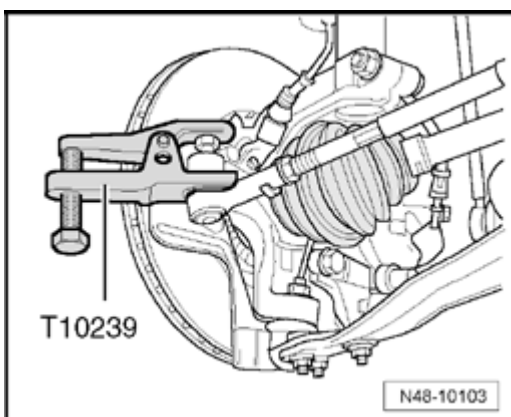


- Clamp power steering pump hose using hose clamp 3094 .
- Remove noise insulation tray.
- Place oil pan under vehicle.

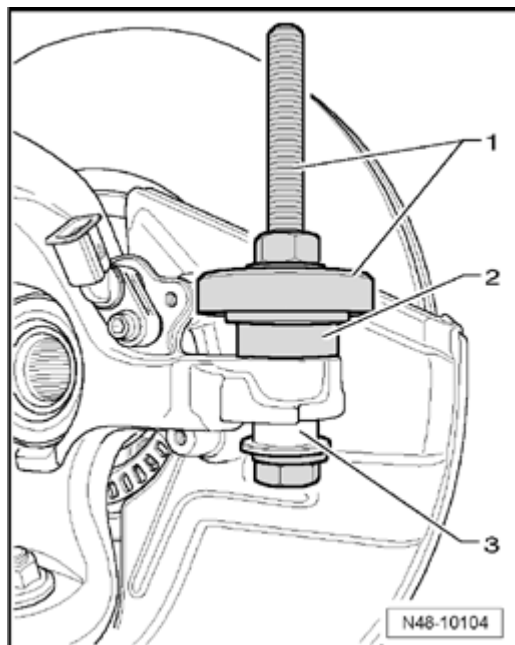


- Press tie rod end off steering arm. .
- 1 - Ball joint puller (commercial type) e.g. Matra V 176

For R32



- Press tie rod end off steering arm.



- If the bushing - **3** - is pressed out while pressing out tie rod, it must be pressed in again.

- Attach special tools as shown in illustration, and tighten spindle to 50 Nm.

The bushing is correctly positioned in steering arm again.

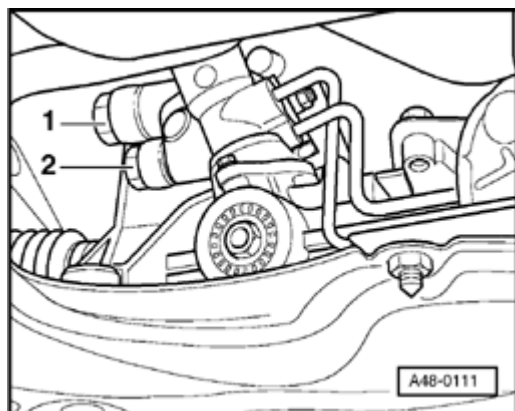
1 - Assembly tool 3293

2 - Installing tool 40 - 503

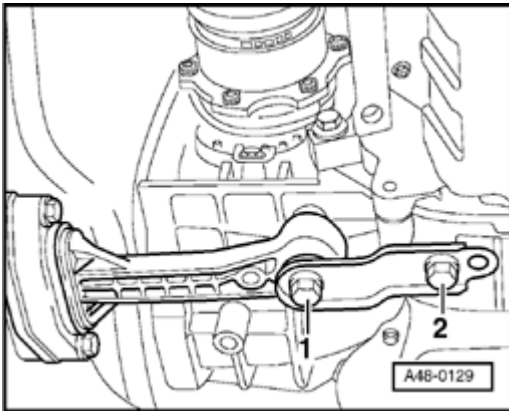
Continue for all vehicles

- Disconnect hoses from steering gear and seal with plastic bag and adhesive tape.

The return line - **1** - can only be removed after first lowering subframe.

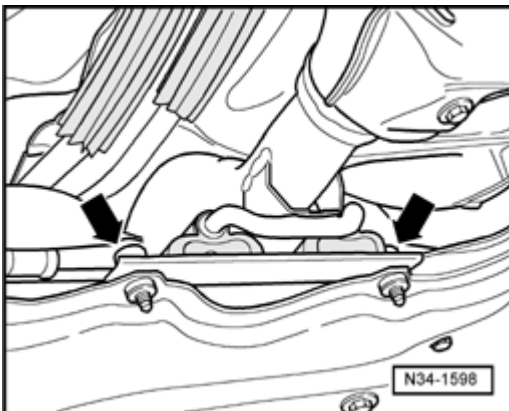


- Seal power steering gear threaded holes with plastic sealing plugs.



- Remove hex bolts - 1 - and - 2 - .

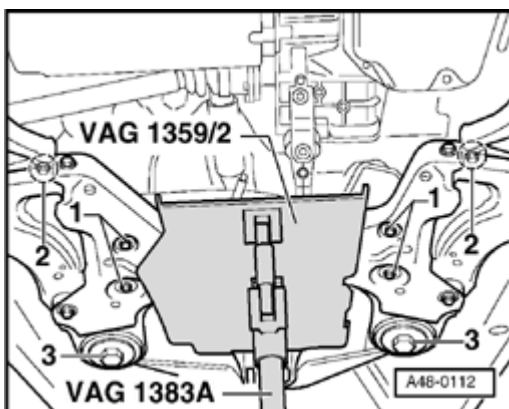
Vehicles with TDI engine



- Unbolt bracket for front exhaust pipe on subframe - **arrow** - and separate.

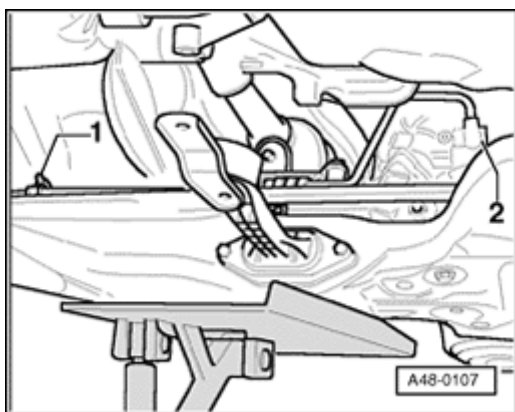
Continue for all vehicles

- Support subframe with engine/transmission jack V.A.G1383A .
- Loosen hex bolt - 1 - .



- Remove hex bolts - 2 - and - 3 - .
- Lower subframe using engine/transmission jack

V.A.G1383A .

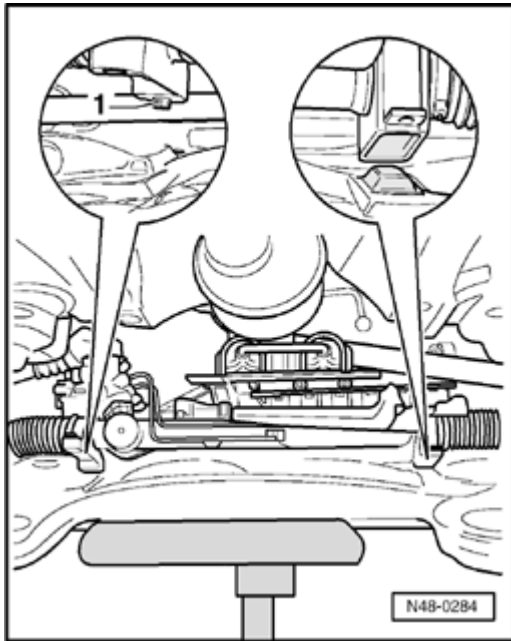


- Remove return line clamp - 1 - and line at steering gear - 2 - .
- Remove power steering gear bolts.
- Take power steering gear out towards rear.

Installing

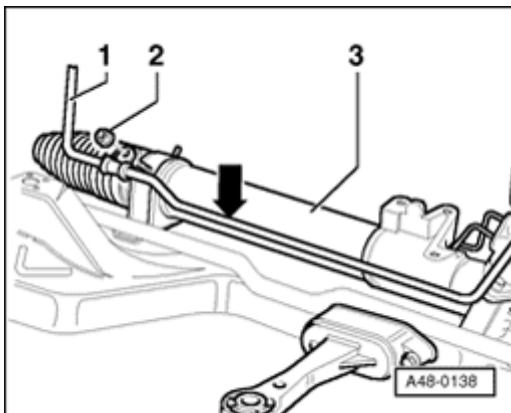
Note:

- n *Use new sealing O-rings for hose/line connections.*
- n *Coat steering gear O-ring seals with lubricant, e.g. liquid soap, before installing steering gear.*
- n *After installation of steering gear to the universal joint shaft, make sure that the seal lies against the assembly plate without kinking and opening to the footwell is correctly sealed. Water ingress and/or noises may be the result.*
- n *Make sure sealing surfaces are clean.*



- Install power steering gear on subframe.

The threaded sleeve - 1 - must seat on subframe hole.



- Install return line.

A gap of approx. 10 mm must exist between return line and power steering gear.

1 - Return line

2 - Hex nut, 22 Nm

3 - Power steering gear

Installation is continued in reverse sequence

Fastener/location

Power steering gear to subframe

Use new bolts!

Subframe to body

Use new bolts!

Universal joint to steering gear

Tightening torques:

20 Nm plus an additional $\frac{1}{4}$ turn 90°

100 Nm plus an additional $\frac{1}{4}$ turn 90°

30 Nm

Use new bolts!

Banjo bolt to steering gear M14 x 1.5 38 Nm

Banjo bolt to steering gear M16 x 1.5 45 Nm

Pendulum support to transmission 50 Nm

Tie rod to steering arm 45 Nm

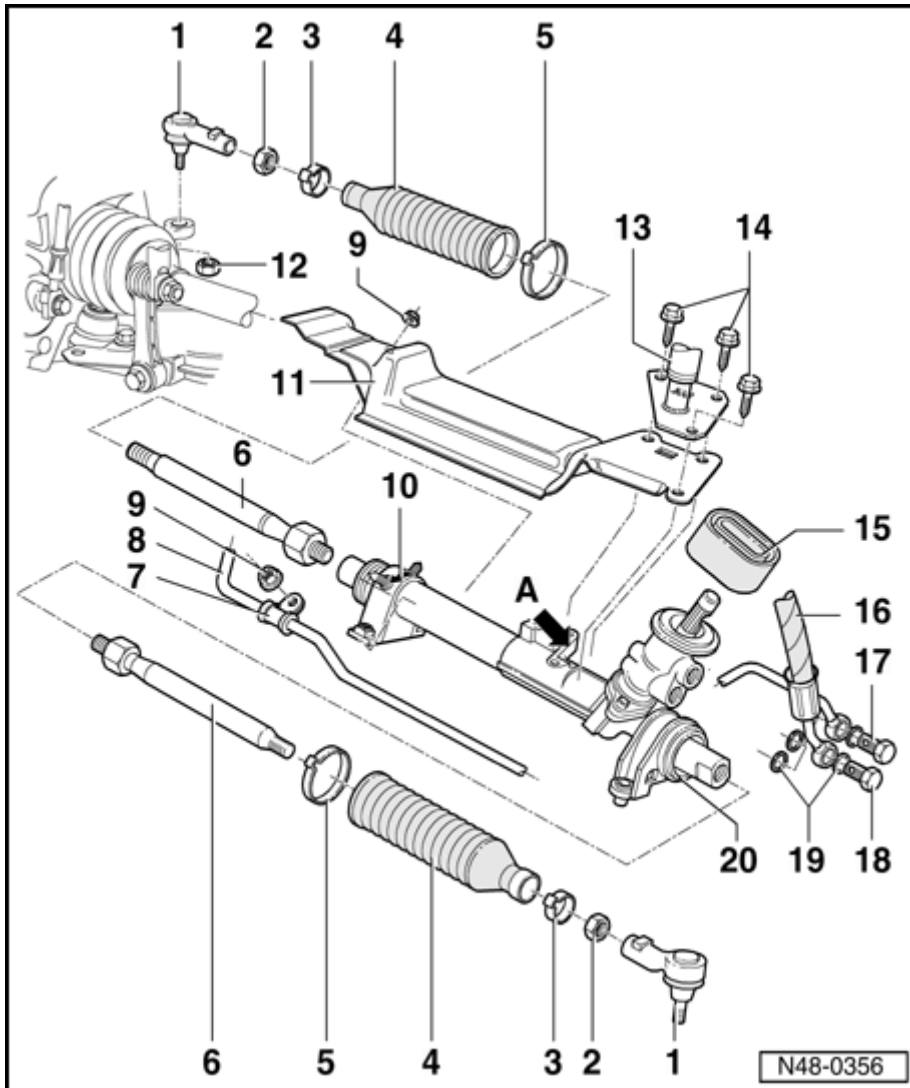
Use new nuts!

Power steering gear, assembly overview

Power steering gear is not serviceable. If complaints are received, determine cause with the help of pressure tests, leak test and Guided Fault Finding. If a malfunction exists replace power steering gear.

Note:

- n *Replace self-locking nuts and bolts. Welding and straightening work on steering components is not permitted.*
- n *To grease the rack only use steering gear grease AOF 063 000 04 .*
- n *Replace self-locking nuts and bolts.*
- n *Type of fluid: Hydraulic fluid G 002 000*
- n *System oil capacity: 0.7 to 0.9 l*



1. Tie rod end

- Checking: ⇒ [48-5, Security and boots on tie rod ends, checking play](#)

Modification:

Modified tie rod ball joints ⇒ [48-5, Tie rod ball joints, modified](#)

- Is installed from below on R32
- Application see ⇒ *Parts catalog*
- With the R32, after pressing out the tie rod end, press socket back into tie rod arm

2. Hex nut, 50 Nm

3. Clamp

- i Always replace
- i Tightening ⇒ [48-5, Installing boot](#)

4. Boot

- i Must not be twisted when adjusting rod
- i Remove steering gear to replace

5. Clamp

- i Always replace
- i Tightening ⇒ [48-5, Installing boot](#)

6. Tie rod

- i 75 Nm

Modification:

Modified tie rods ⇒ [48-5, Tie rods, modified](#)

- i Removing and installing ⇒ [48-5, Tie rod, removing and installing](#)
- i Replacement parts are supplied preset
- i Vehicle alignment ⇒ [44-5, Wheel alignment](#)
- i Different versions
- i Application ⇒ *See Parts Catalog*

7. Clamp with rubber sleeve

8. Return line

9. Hex nut, 22 Nm

10. Clamp with rubber mounting**Installation location**

- ; Arrow on clamp points forward
- ; Replace if threads in welded nut are damaged

11. Heat shield**12. Self-locking hex nut, 45 Nm****13. Selector mechanism bearing bracket**

- ; Must be centered on support - **arrow A** - with heat shield ⇒ [Item - 11 -](#).

14. Hex bolt, 24 Nm**15. Gasket**

- ; Observe installation instructions ⇒ [48-5, Installing](#) !

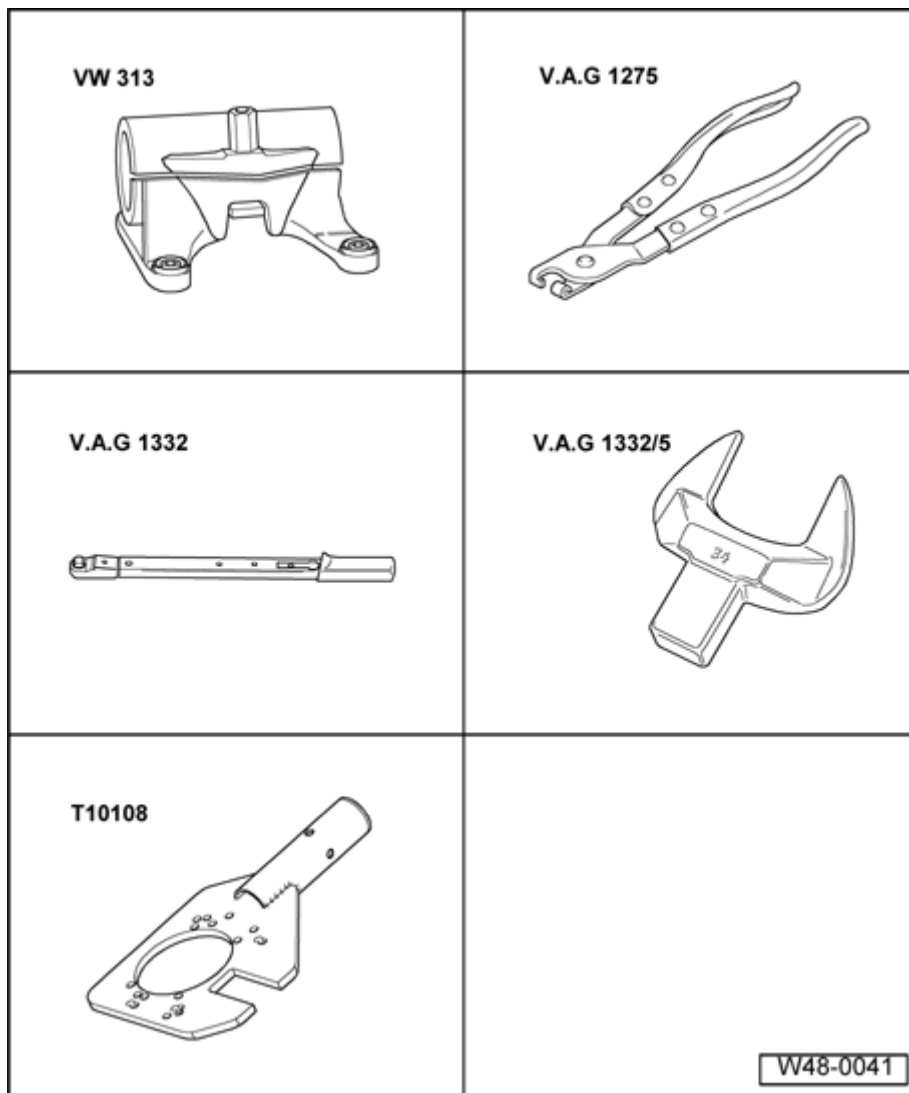
16. Hydraulic line**17. Banjo bolt, 45 Nm****M 16 x 1.5****18. Banjo bolt, 38 Nm****M 14 x 1.5****19. Sealing rings**

- ; Always replace

20. Steering gear

- ; Removing and installing ⇒ [48-5, Power steering gear, removing and installing](#)

Tie rod, removing and installing



Special tools, testers and auxiliary items required

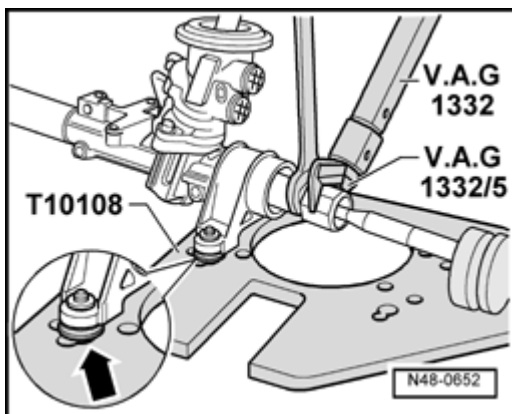
- n Holding fixture VW313
- n CV joint boot clamp tool V.A.G1275
- n Torque wrench V.A.G1332
- n Open jaw insert, 34 mm
V.A.G1332/5
- n Transmission support T10108

Removing

The tie rods can only be removed/installed with steering gear removed.

Removing and installing power steering gear ⇒ [48-5, Power steering gear, removing and installing](#)

- Seal line connections on power steering gear if not already done.
- Clean outside of power steering gear in the area of the boot.
- Open clamp and slide boot back.



- Tighten power steering gear on transmission support T10108 and remove tie rod from connecting rod.

Note:

- n Use only hole "5" and the allocated upper hole from transmission support to tighten power steering gear.*

Installing

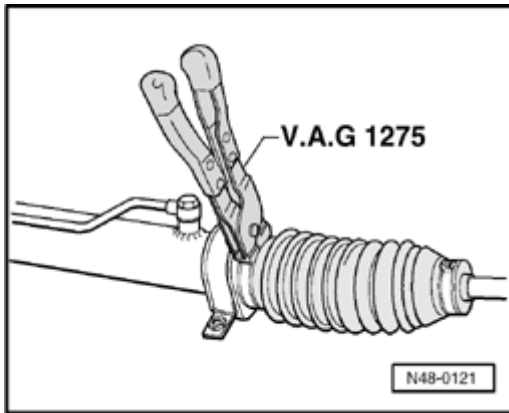
Installation is in reverse sequence to removal.

Tightening torque

Tie rod to power steering gear 75 Nm

Installing boot

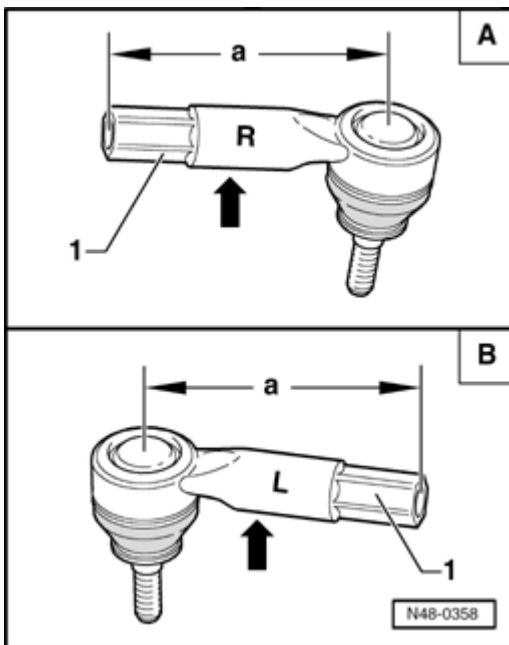
- Inspect boot for wear (cuts, tears) and check that sealing surfaces for boot are clean.



- Installing boot, but first turn tie rod so that the tie rod ball joint shank is in the installation position.

Note:

- n Use only genuine clamp-type clips.



- Tighten clamp with hose clamp pliers V.A.G1275 .
- Install power steering gear

Removing and installing power steering gear ⇒ [48-5. Power steering gear, removing and installing](#)

Tie rod ball joints, modified

The manufacturing process for tie rod ball joints has been optimized. This has resulted in changes to the external shape and length of the internally threaded shaft.

It was necessary to modify the tie rods to match tie rod ball

joints, ⇒ [48-5, Tie rods, modified](#) .

Was introduced in the Wolfsburg factory from;

Vehicle identification No. 1J WW 085 662;

in the Mosel plant from;

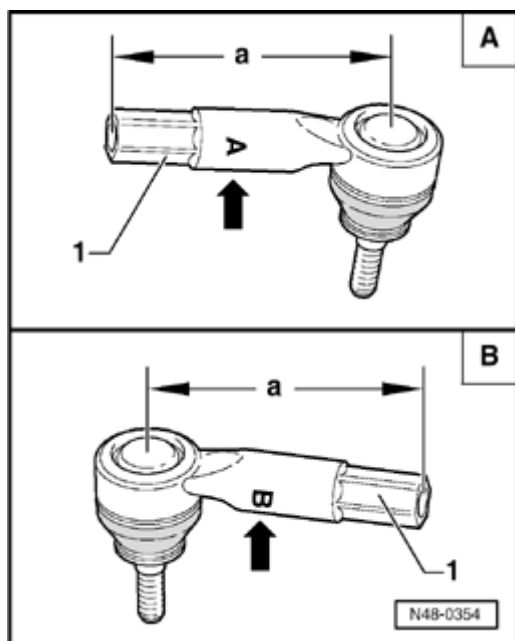
Vehicle identification No. 1J WP 050 833;

in the Bratislava plant from;

Vehicle identification No. 1JWD039151;

in the Brussels plant from; 1J WB 062 360

The modified tie rod ball joints can be recognized by the following features.



A - Right-hand tie rod ball joint

1 - Hex on internally threaded shaft, wrench size 19 mm

Dimension - **a** - ; 94 ± 0.5 mm

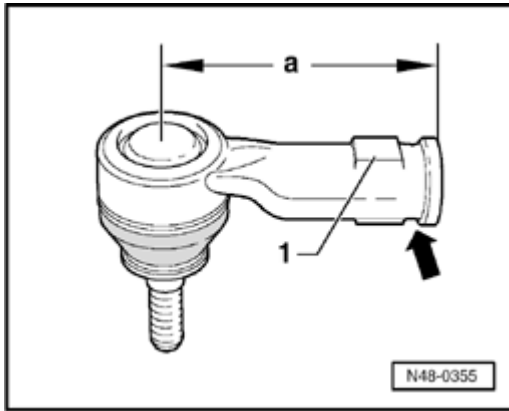
Identification - **A** - for right

B - Left-hand tie rod ball joint

1 - Hex on internally threaded shaft, wrench size 19 mm

Dimension - **a** - ; 94 ± 0.5 mm

Identification - **B** - for left



Identifying features for the previous tie rod ball joint

1 - Flats for wrench on shaft, marked with R or L

Wrench size 22 mm

Dimension - **a** - ; 74 ± -1 mm

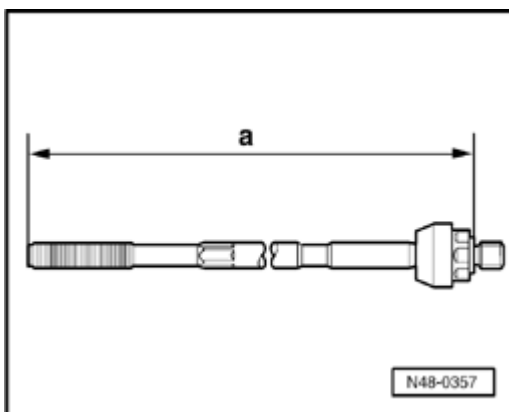
The shaft - **arrow** - is round

Caution!

This tie rod ball joint must not be installed to a tie rod which has a length of - a - = 318.9 mm!

Tie rods, modified

The tie rod rods have been shortened.



Vehicle identification number, introduction \Rightarrow [48-5, Tie rod ball joints, modified](#)

Tie rod dimensions

- n Previous tie rod; dimension - **a** - 343.1 mm
- n New tie rod; dimension - **a** - 318.9 mm

Note:

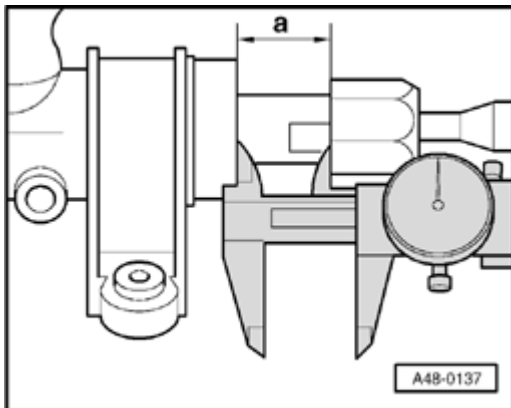
- n *A mixed installation of previous and new tie rods are not permitted!*

Security and boots on tie rod ends, checking play

- With vehicle raised (wheels hanging free), check play by moving tie rods and wheels. Play: Zero play
- Check mountings.
- Check boots are not damaged and are seated correctly.

Center position on rack, determining

Rack should be positioned in center position before installing power steering gear.



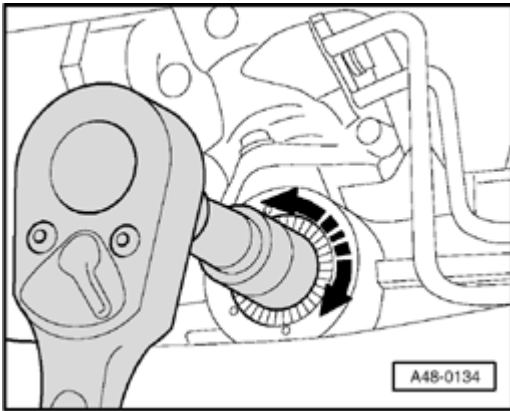
- Slide rack until dimension - **a** - is achieved.

Measure - **a** - = 30.5 mm

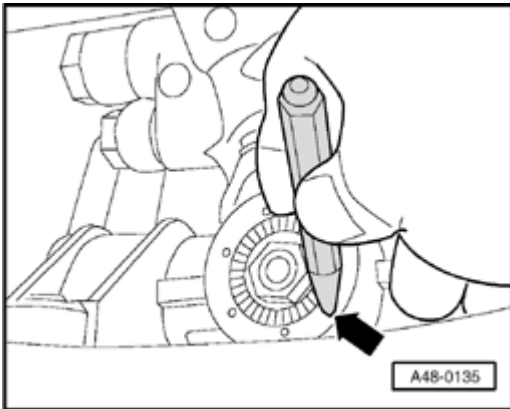
Steering gear, adjusting**Note:**

- n *Two mechanics are required when adjusting. Adjust with engine switched off.*

- Raise vehicle on hoist.
- Wheels in straight-ahead position.
- By turning the steering wheel back and forth (about 30 ° from center axis) a knocking noise will be heard if there is excessive play.



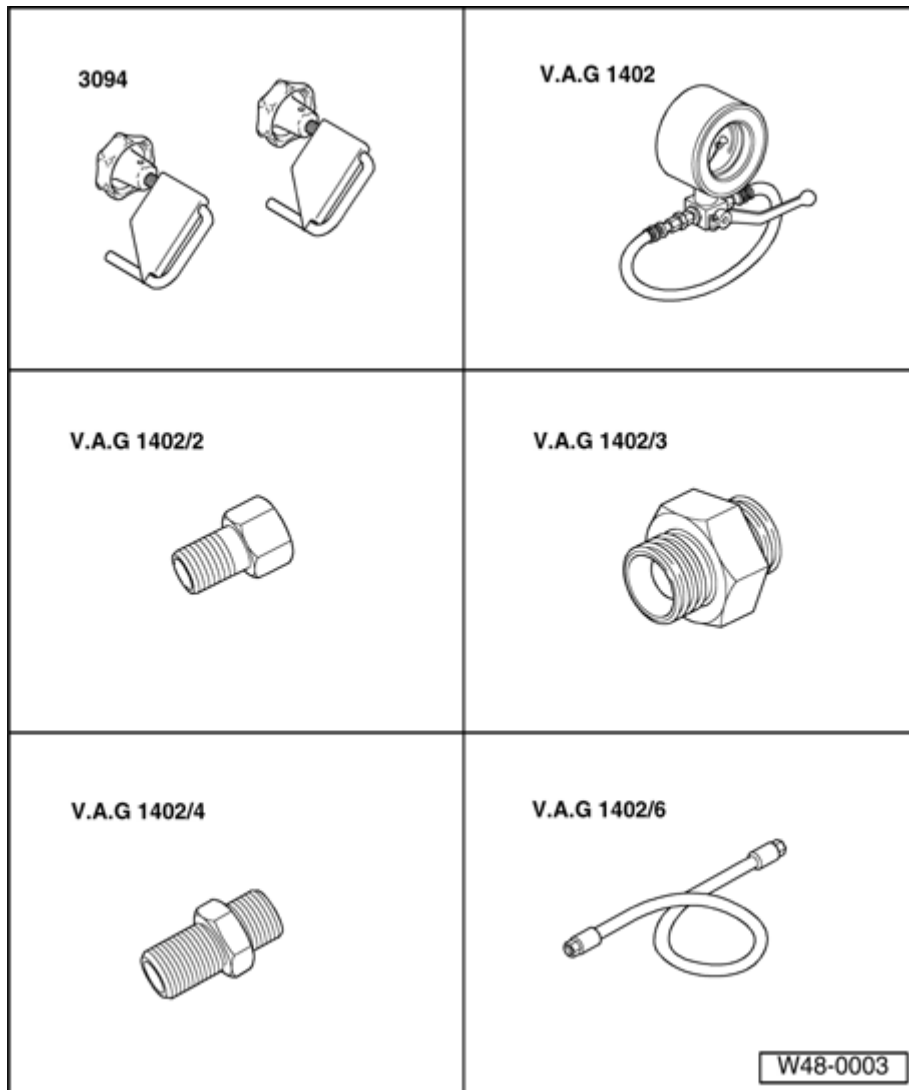
- The second mechanic must carefully screw the adjustment screw into the cover until the knocking noise can no longer be heard inside the vehicle.
- Perform road test to ensure steering returns to center without sticking.



- Secure lock nut with a punch mark

Power steering pump, reservoir and hydraulic lines

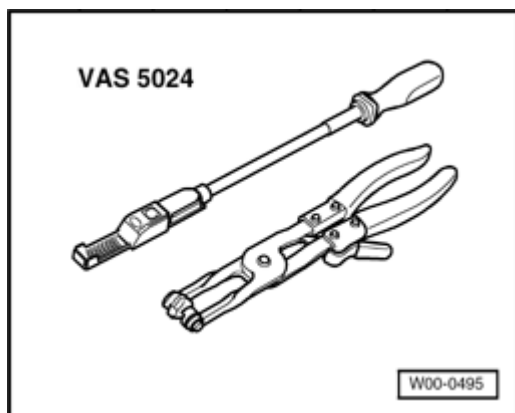
Power steering pump delivery pressure, checking



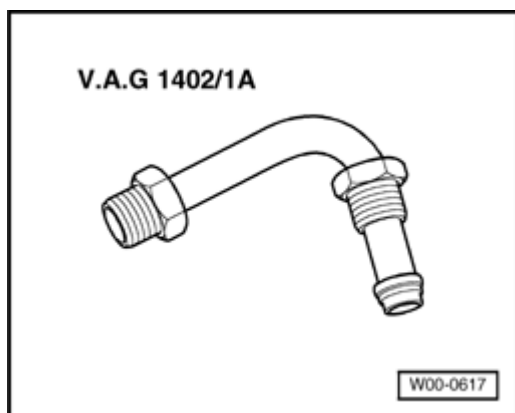
Special tools, testers and auxiliary items required

- n Hose clamps 3094
- n Power steering test unit V.A.G1402
- n Adapter V.A.G1402/2
- n Adapter V.A.G1402/3
- n Adapter V.A.G1402/4
- n Hose from adapter set V.A.G1402/6

Special tools, testers and auxiliary items required

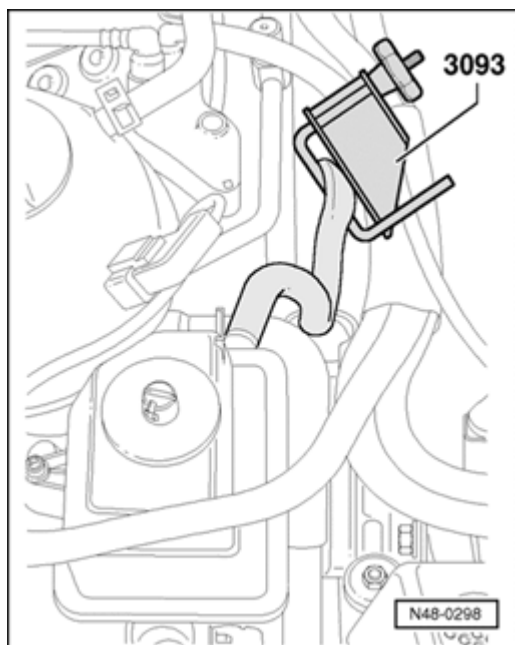


n Spring type clip pliers VAS 5024 A



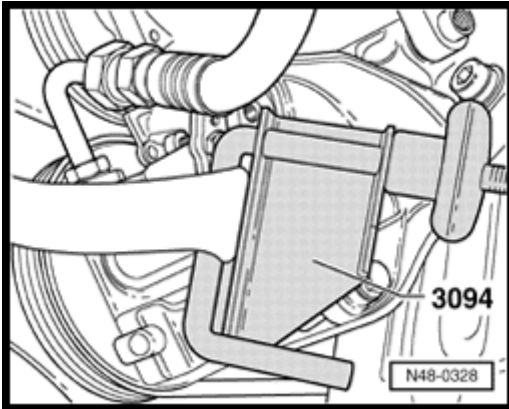
n Adapter V.A.G 1402/1A

Vehicles with low mounted power steering pump

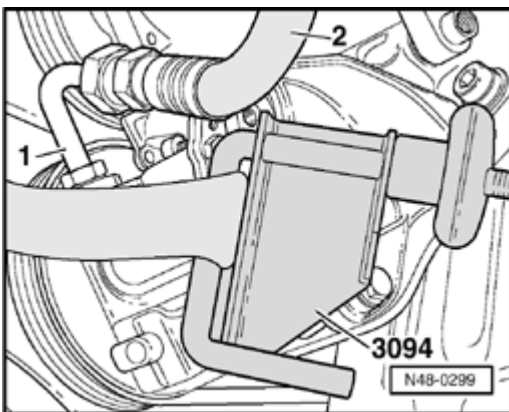


- Clamp return hose with hose clamp 3093 .

- Remove noise insulation cover.



- Clamp intake hose with hose clamp 3094 .
- Place oil pan under vehicle.
- Remove pressure line at the pump.
- Disconnect connector from pressure switch if necessary.

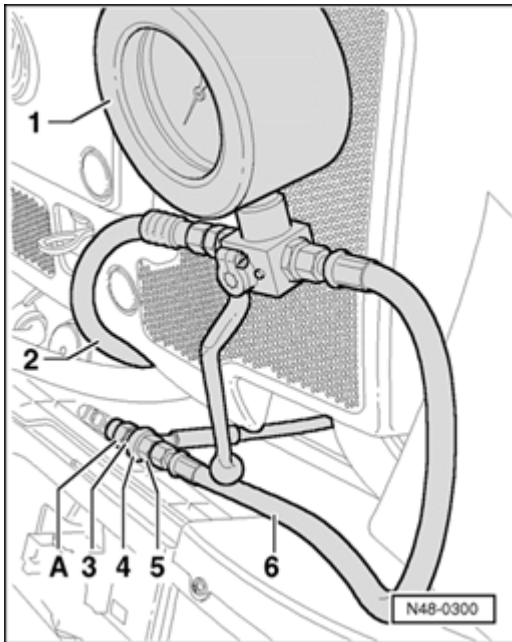


- Install adapter - 1 - .

Use a sealing ring.

1 - V.A.G1402/1

2 - Hose from adapter set V.A.G1402/6



- Connect Power Steering Test Unit V.A.G1402

A - Pressure switch, 1.8 ltr. gasoline engines only

1 - Pressure gauge V.A.G1402

2 - Hose from adapter set V.A.G1402/6

3 - Banjo bolt

4 - Pressure hose banjo union

5 - V.A.G1402/2

6 - Hose from pressure gauge V.A.G1402

- Remove hose clamp 3094 from intake and return hoses.

- Start engine and if necessary add fluid to reservoir.

- Turn steering wheel from lock to lock about 10 times.

- Check delivery pressure.

Test requirements:

- n V-belt/V-belt tension OK
- n System has no leaks
- n Hoses/lines not kinked or restricted

- With engine running at idling speed. Close shut-off valve (not longer than 5 seconds) and read off pressure.

Specifications

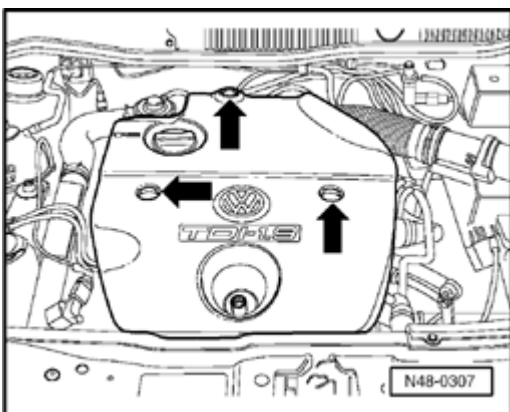
Gasoline engines: 85 to 95 bar

Diesel engines: 96 to 105 bar

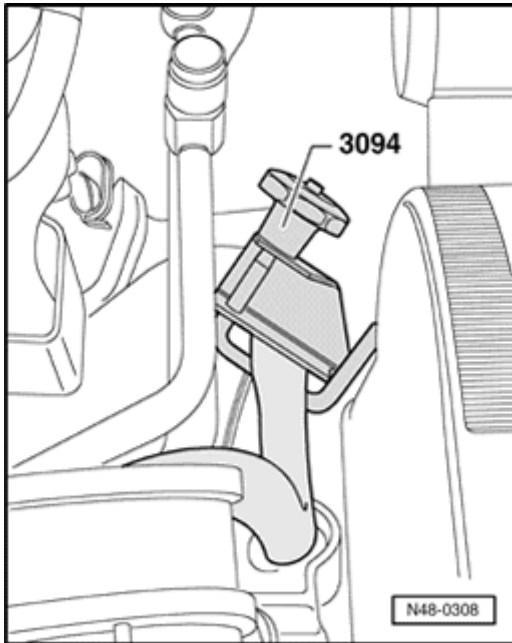
Note:

- n *If the reading is higher or lower than specified replace pump:*
- n *Removing and installing P.A.S. power steering pump, vehicles with low mounted power steering pump ⇒ [48-6, P.A.S. power steering pump, vehicles with low mounted power steering pump, removing and installing](#) and ⇒ [48-6, P.A.S. power steering pump, vehicles with high mounted power steering pump, removing and installing](#) .*
- n *If the fluid level in the reservoir is low, the steering system must be inspected for leaks.*
- n *For leaks at the pinion, first check the lines/line connections for leaks and if necessary tighten and wipe dry.*
- n *If the pinion seal or the rack seals in steering transmission housing are leaking then replace steering transmission.*
- n *To check the rack seals loosen the hose clip on the boot and push boot to one side.*

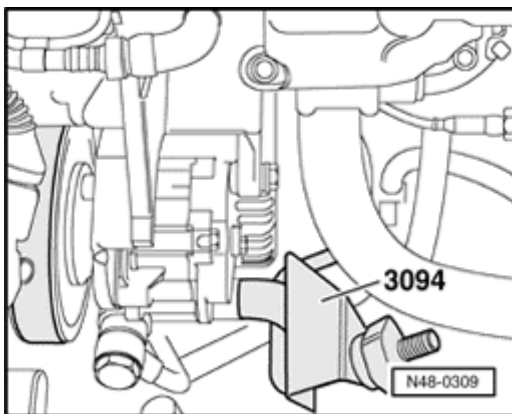
Vehicles with high mounted power steering pump



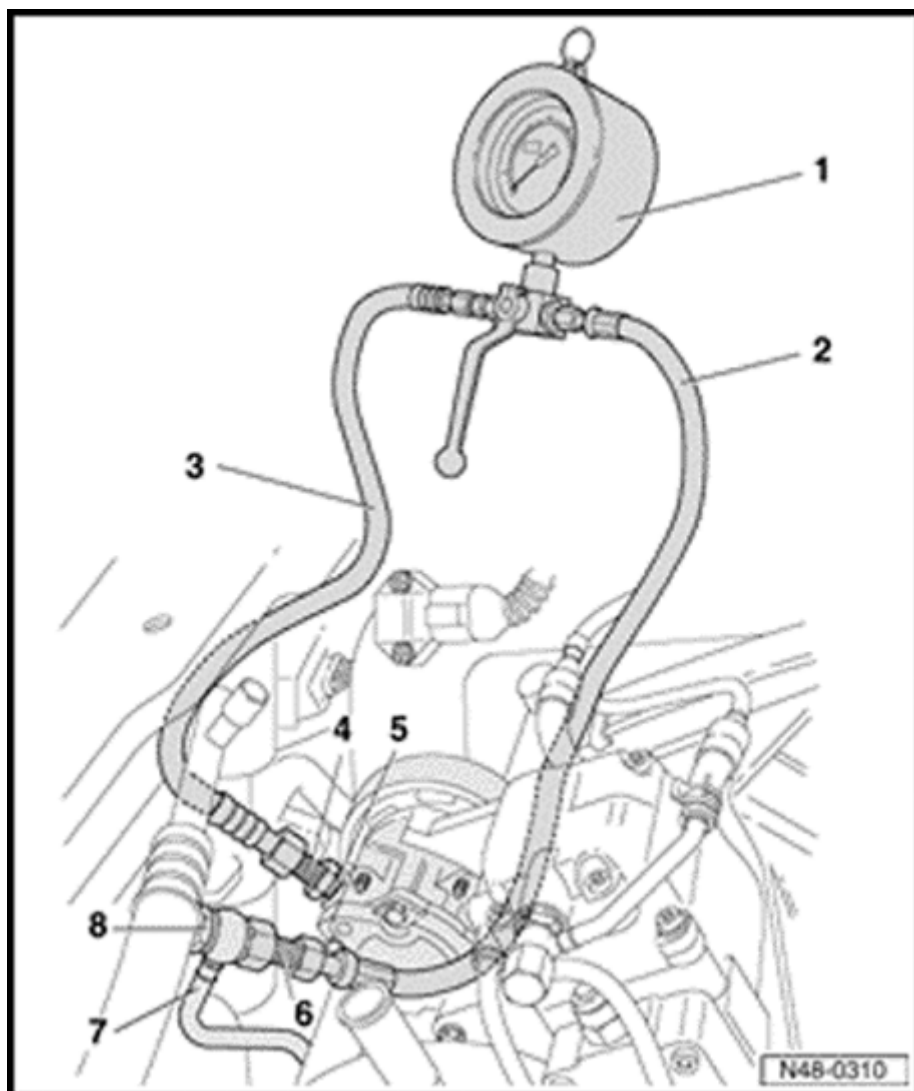
- Remove engine cover.



- Clamp return hose with hose clamp 3094 .



- Clamp intake hose with hose clamp 3094 .
- Place oil pan under vehicle.
- Remove pressure line at the pump.



Connect pressure gauge V.A.G1402

1. Pressure gauge V.A.G1402
2. Hose from pressure gauge V.A.G1402
3. Hose from adapter set V.A.G1402/6
4. Adapter V.A.G1402/4
5. Sealing rings
i Qty. 2
6. Adapter V.A.G1402/2
7. Pressure line with banjo union
8. Banjo bolt

- Remove hose clamp 3094 from intake and return hoses.
- Start engine and if necessary add fluid to reservoir.
- Turn steering wheel from lock to lock about 10 times.
- Check delivery pressure.

Requirements:

- n V-belt/V-belt tension OK
- n System has no leaks
- n Hoses/lines not kinked or restricted

- With engine running at idling speed. Close shut-off valve (not longer than 5 seconds) and read off pressure.

Specifications

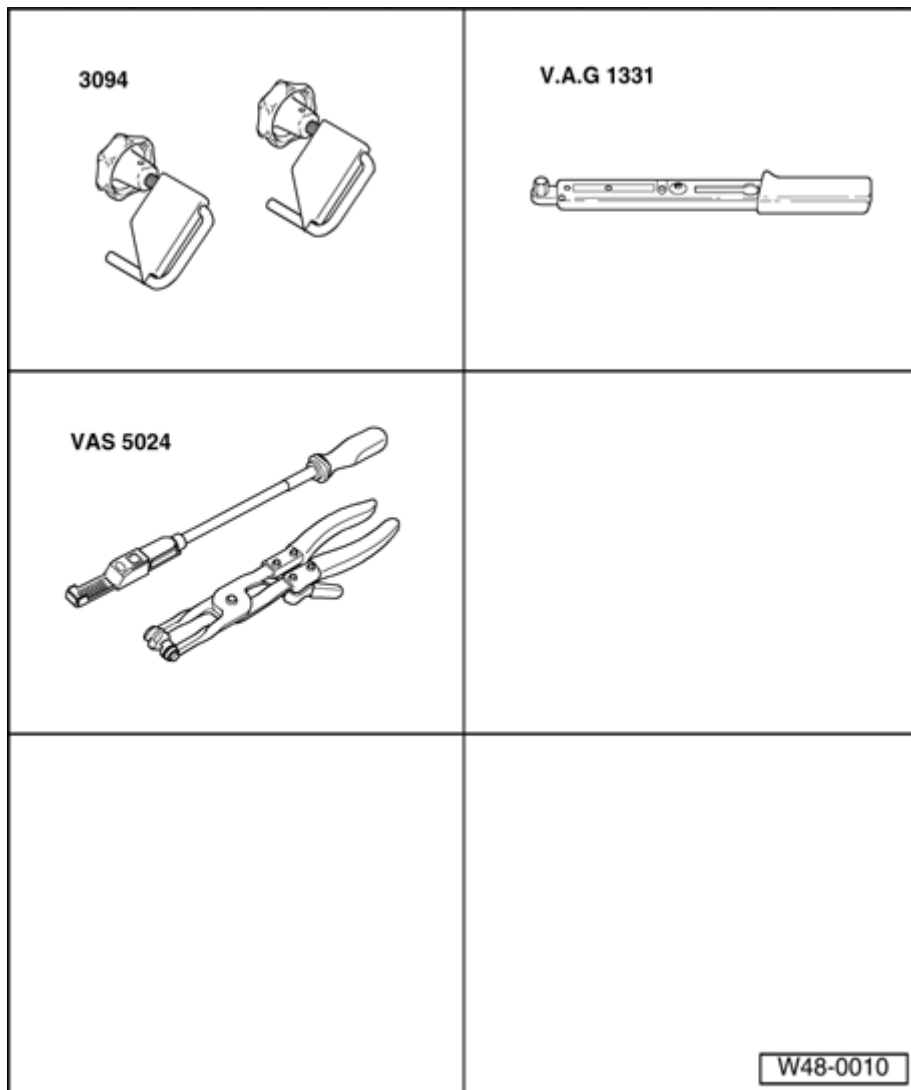
Gasoline engines: 85 to 95 bar

Diesel engines: 96 to 105 bar

Note:

- n *If the reading is higher or lower than specified replace pump:*
- n *Removing and installing P.A.S. power steering pump, vehicles with high mounted power steering pump ⇒ [48-6, P.A.S. power steering pump, vehicles with high mounted power steering pump, removing and installing](#) and ⇒ [48-6, P.A.S. power steering pump, vehicles with high mounted power steering pump, removing and installing](#) .*
- n *If reservoir fluid level is low then check steering system for leaks.*
- n *For leaks at the pinion first check the lines/line connections for leaks and if necessary tighten and wipe dry.*
- n *If the pinion seal or the rack seals in steering transmission housing are leaking then replace steering transmission.*
- n *To check the rack seals loosen the hose clip on the boot and push boot to one side.*

P.A.S. power steering pump, vehicles with low mounted power steering pump, removing and installing



Special tools, testers and auxiliary items required

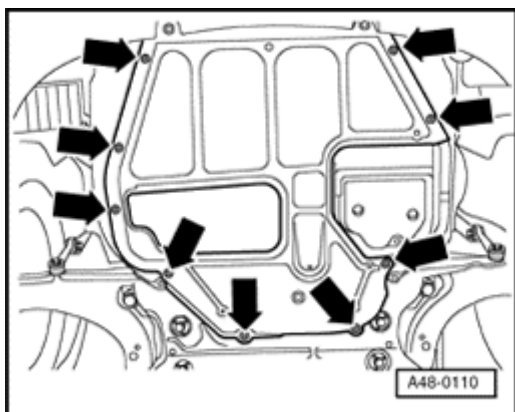
- n Hose clamps 3094
- n Torque wrench V.A.G1331
- n Assembly tool for spring-type clip pliers VAS5024

Power steering pump is not serviceable. If complaints are received, determine cause with the help of pressure tests, leak test and Guided Fault Finding. If a malfunction is present, the pump must be replaced.

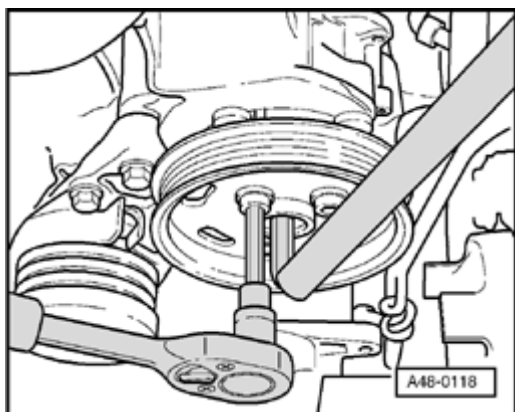
Note:

- n *Pumps supplied as replacement parts are not filled with oil. They must be filled with hydraulic fluid G002 000 and turned by hand before installation, otherwise pump noise or damage can result in operation.*
- n *Type of fluid: Hydraulic fluid G 002 000*
- n *System oil capacity: 0.7 to 0.9 l*

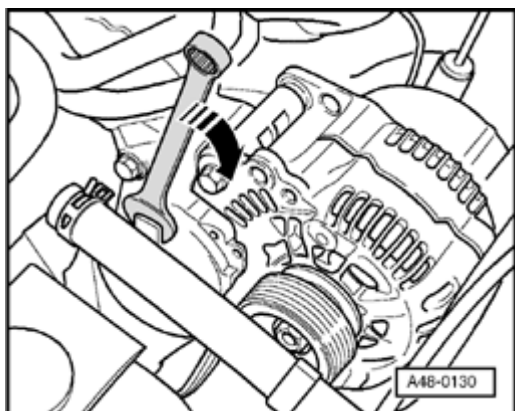
Removing



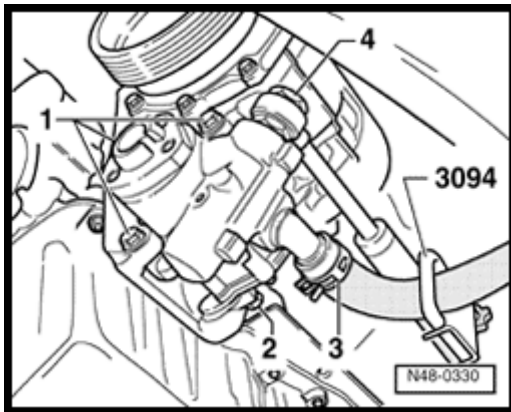
- Remove noise insulation.



- Loosen belt pulley hex socket head bolt.
Counter-hold with a hex key if necessary.



- Turn belt tensioner in direction of - **arrow** - to loosen ribbed belt.
- Identify direction of rotation of ribbed belt
- Remove ribbed belt.
- Remove belt pulley hex. socket head bolt.



- Clamp off intake hose with hose clamps 3094 .
- Open spring clamp - **3** - and pull off intake hose

Use assembly tool for spring-type clip pliers VAS5024 for this.

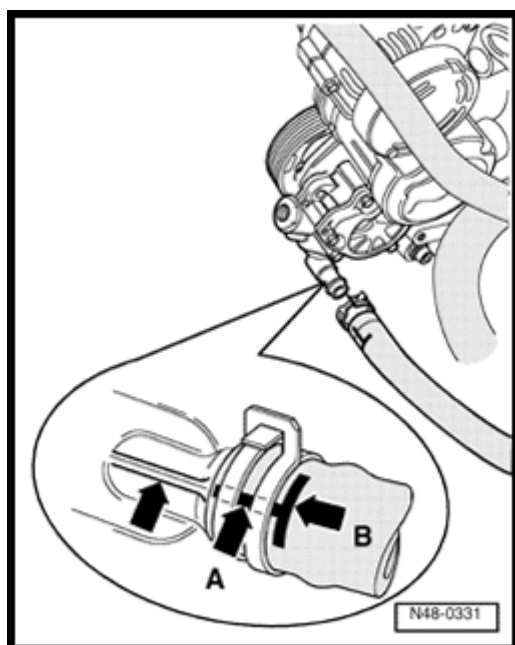
- Remove banjo bolt - **4** - .
- Close off pressure line with a plastic bag or similar.
- Remove hex bolts - **1** - and - **2** - .
- Remove pump.

Installing

- Fill power steering pump with hydraulic fluid.

Fill pump with fluid through intake line.

- Turn hub by hand until oil runs out of pressure side.
- Install power steering pump on bracket and tighten bolts to 25Nm.



- Install intake hose and install spring-type clamp.

The mark - **arrow A** - must align with casting seam - **arrow** -

.

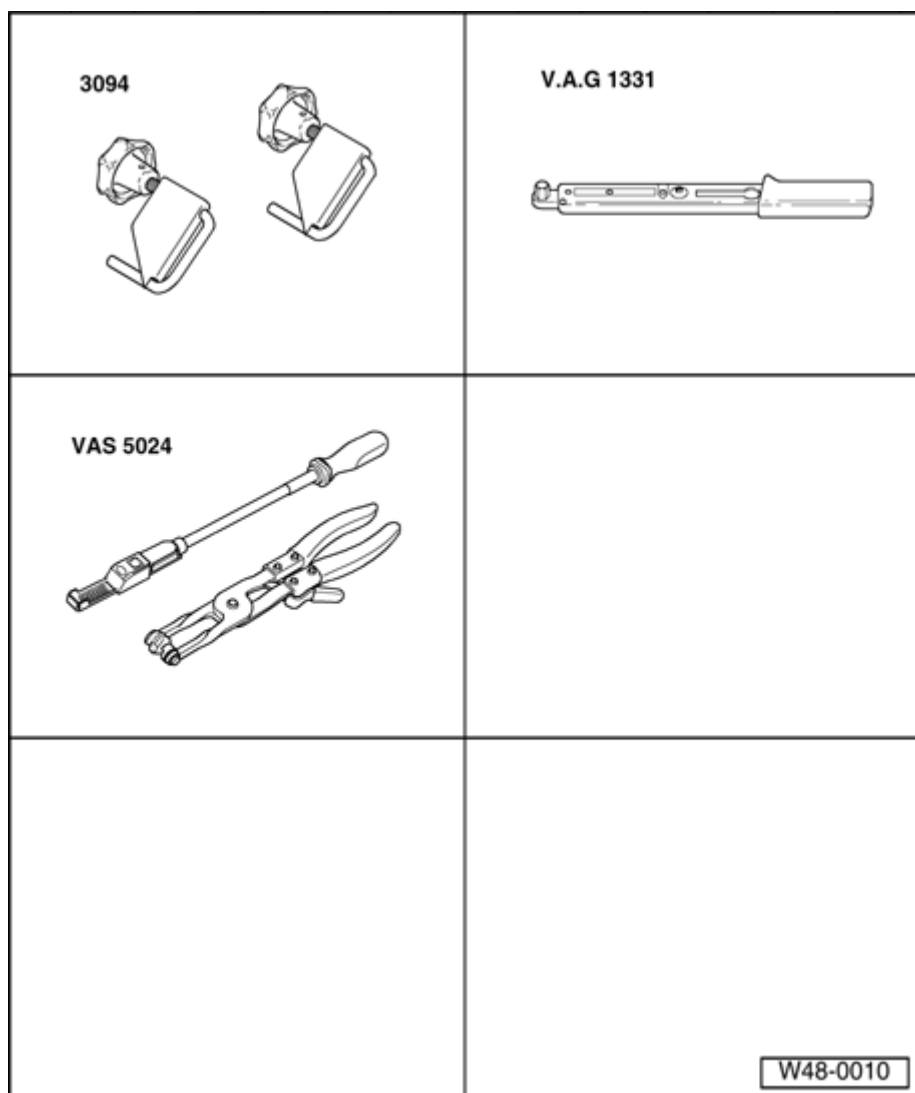
The spring-type clip must close off mark - **arrow B** - .

- Install new sealing rings onto banjo bolt.

- Tighten banjo bolt to 38 Nm

Installation is in reverse sequence

P.A.S. power steering pump, vehicles with high mounted power steering pump, removing and installing



Special tools, testers and auxiliary items required

- n Hose clamps 3094
- n Torque wrench V.A.G1331
- n Assembly tool for spring-type clip pliers VAS5024

Power steering pump is not serviceable. If complaints are received, determine cause with the help of pressure tests, leak test and Guided Fault Finding. If a malfunction is present, the pump must be replaced.

Note:

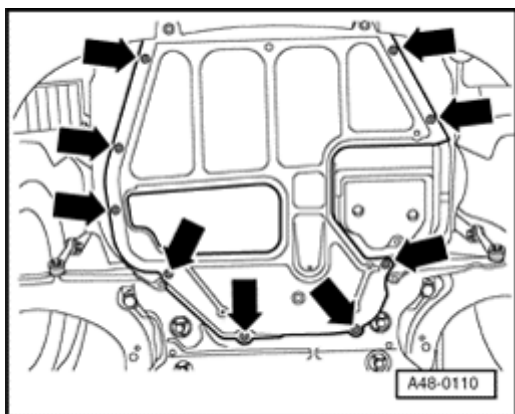
- n *Pumps supplied as replacement parts are not filled with oil. They must be filled with hydraulic fluid G002 000 and turned by hand before installation, otherwise*

pump noise or damage can result in operation.

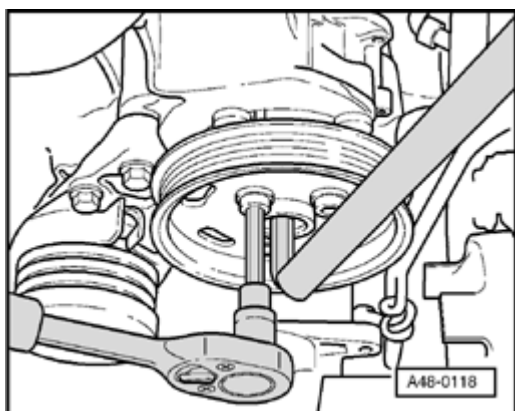
n *Type of fluid: Hydraulic fluid G 002 000*

n *System oil capacity: 0.7 to 0.9 l*

Removing

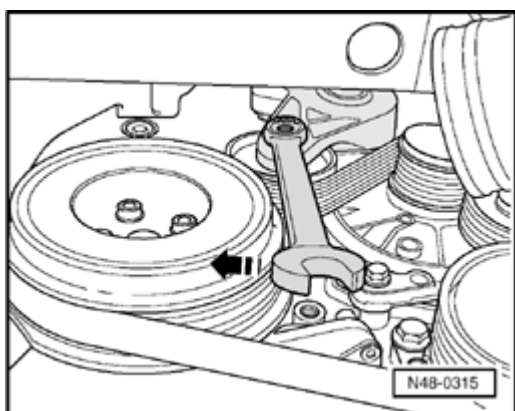


- Remove noise insulation.



- Loosen belt pulley hex socket head bolt.

Counter-hold with a hex key if necessary.



- Turn tightening device in direction of - **arrow** - to relieve tension on ribbed belt.

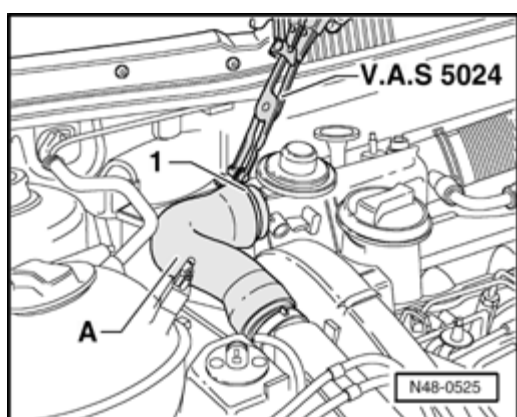
For ease of illustration, relieving belt pulley tension is shown without charge air line.

- Identify direction of rotation of ribbed belt
- Remove ribbed belt.
- Remove belt pulley hex. socket head bolt.

Removing intake line and intake hose

Removing intake hose

- Open spring-type clamps - 1 - , - 2 - and - 3 - .

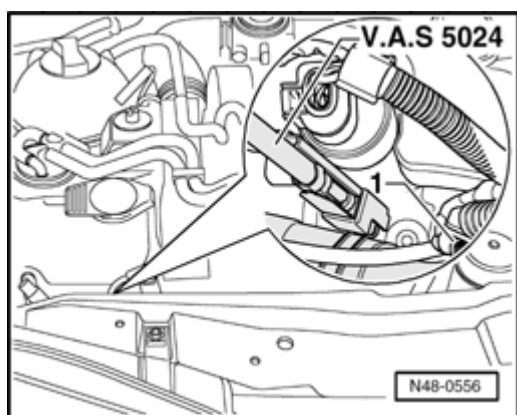


- Remove intake hose - A - .

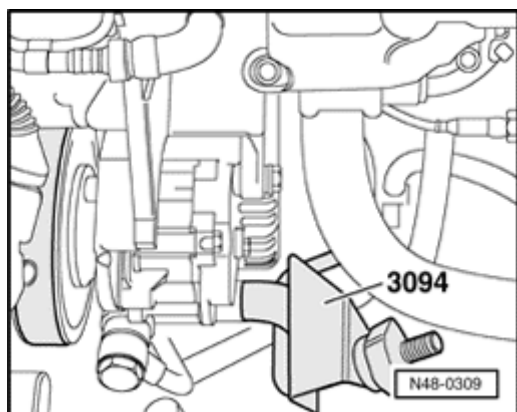
Removing intake line

We recommend that the flexible pliers from tool set VAS5024 be used to remove the intake line lower spring-type clip.

- Disconnect all electrical cables and hoses.
- Open spring-type clamps - 1 - with flexible pliers.

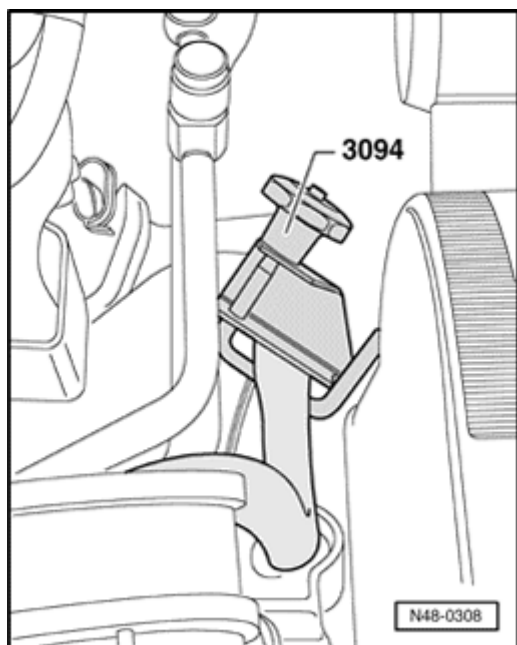


- Remove intake line - B - .

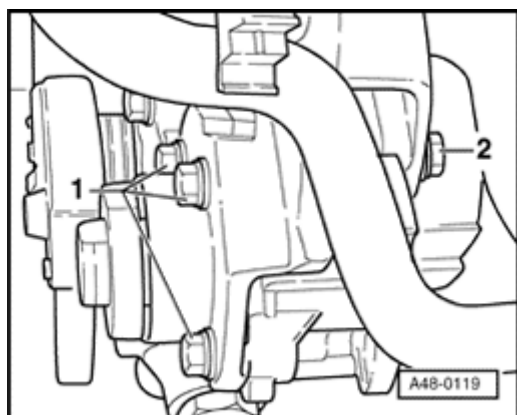


- Clamp off intake hose with hose clamps 3094 .
- Open spring clamp - **3** - and remove intake hose

Use assembly tool for spring-type clip pliers VAS5024 for this.



- Clamp return hose with hose clamp 3094 .
- Remove banjo bolt - **2** - .
- Close off the pressure line with a plastic bag or similar.



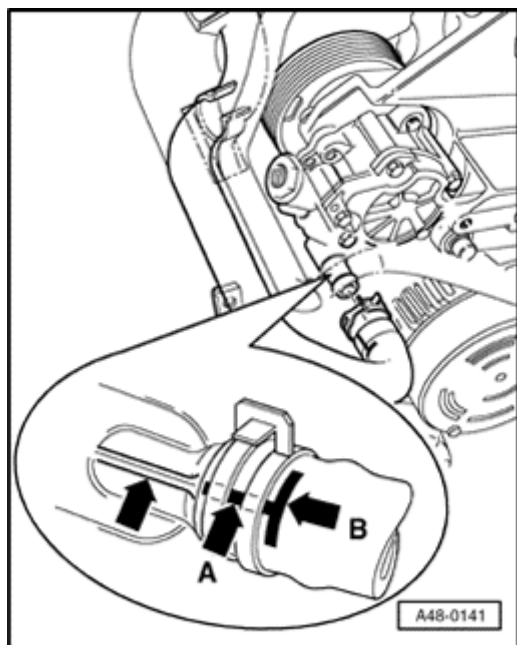
- Remove hex bolts - 1 - and - 2 - .
- Remove pump.

Installing

- Fill power steering pump with hydraulic fluid.

Fill pump with fluid through intake line.

- Turn hub by hand until oil runs out of pressure side.
- Install power steering pump on bracket and tighten bolts to 25Nm.



- Install intake hose and spring-type clip.

The mark - **arrow A** - must align with casting seam - **arrow** - .

The spring-type clip must close off mark - **arrow B** - .

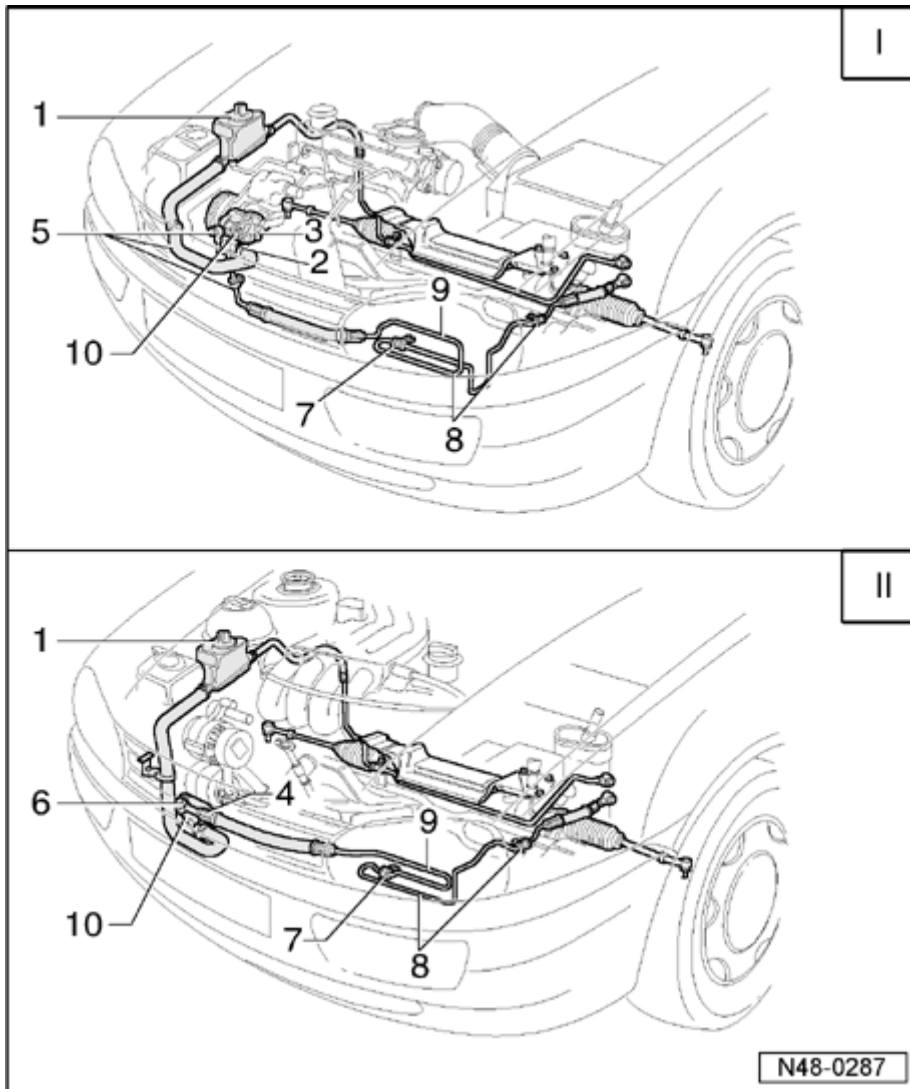
- Install new sealing rings onto banjo bolt.

- Tighten banjo bolt to 38 Nm

Installation is in reverse sequence

Power steering pump with hydraulic lines/hoses, assembly overview

I - Vehicles with high mounted power steering pump



II - Vehicles with low mounted power steering pump

1. Reservoir

Removing and installing instructions ⇒ [48-6, Reservoir, disassembling and assembling](#)

2. Pressure hose/line mounting

Vehicles with TDI engine and air conditioner. Not applicable.

3. Pressure hose/line mounting

Vehicles with 1.4 ltr., 1.6 ltr. engine and air conditioner. Not applicable.

4. Pressure hose/line mounting

Vehicles with 1.4 ltr., 1.6 ltr., 1.9 ltr. SDI/TDI engine and no air conditioner. Not applicable.

Vehicles with VR5 and VR6 engine with/without air conditioner

Removing and installing instructions ⇒ [48-6](#).

5. Pressure hose/line mounting

Vehicles with TDI engine and air conditioner

Removing and installing instructions ⇒ [48-6](#), [Securing pressure line and intake hose on vehicles with TDI engine and A/C](#)

6. Pressure hose/line mounting

Vehicles with TDI engine without air conditioner

Removing and installing instructions ⇒ [48-6](#), [Securing pressure line and intake hose on vehicles with TDI engine without A/C](#)

7. Pressure hose/line mounting

On 5-speed manual transmission 02J

Removing and installing instructions ⇒ [48-6](#), [Securing](#)

[pressure line on 5-speed manual transmission 02J and 5-speed](#)

On 6-speed manual transmission 02M

Removing and installing instructions ⇒ [48-6, Securing pressure line on 6-speed manual transmission 02M](#)

8. Pressure hose/line mounting

On automatic transmission 01M

Removing and installing instructions ⇒ [48-6, Securing pressure line on automatic transmission 01M](#)

On automatic transmission 09A

Removing and installing instructions ⇒ [48-6, Securing pressure line on automatic transmission 09A](#)

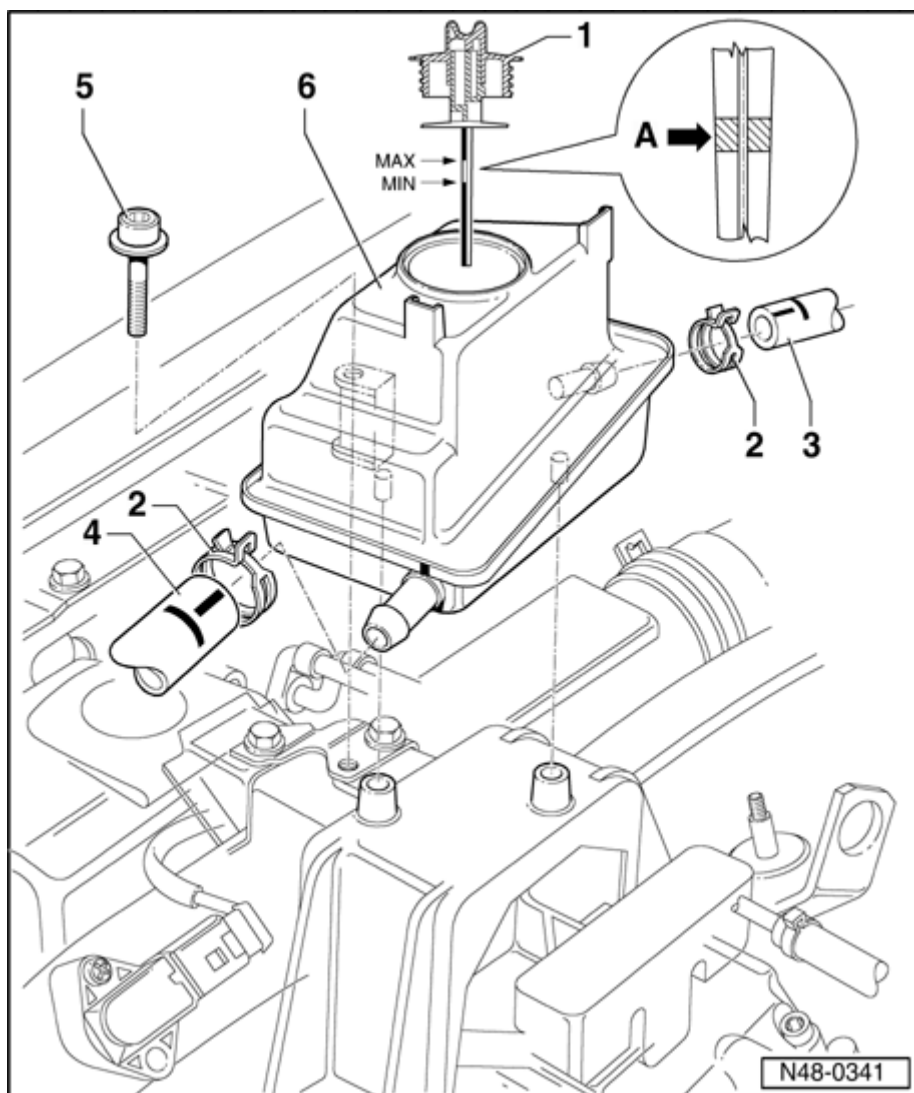
9. Pressure hose/line mounting

On 5-speed manual transmission 02K. Not applicable.

10. Power steering pump

- i Check delivery pressure ⇒ [48-6, Power steering pump delivery pressure, checking](#)
- i Fill with fluid before installing ⇒ Note page ⇒ [48-6, Power steering pump, reservoir and hydraulic lines](#)

Reservoir, disassembling and assembling



1. Cap with dip stick

- ; Oil level: between min. and max. marks; Engine temperature approx. 50 C
- ; Arrow A: oil level with engine cold
- ; With engine cold, oil level must not rise above Min. marking
- ; Check oil level with cap screw on
- ; Open cap with e.g. a bar

2. Hose clamp

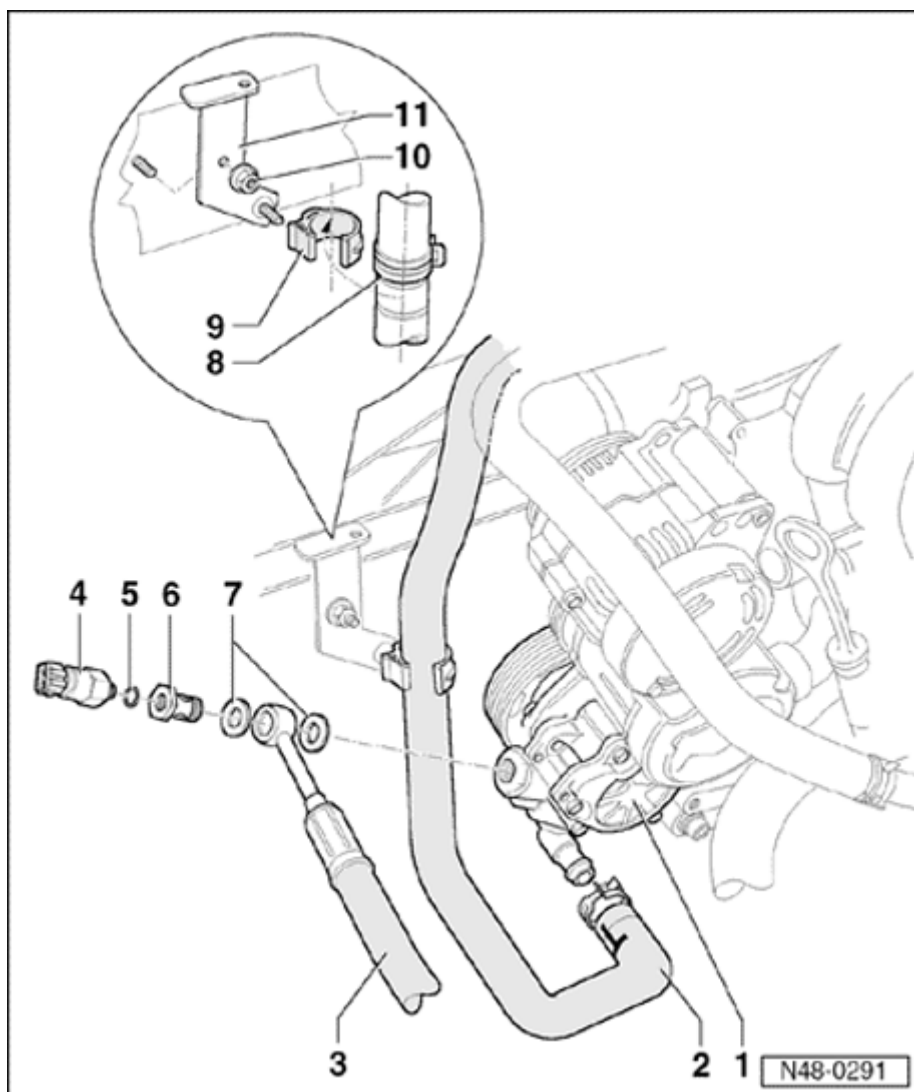
3. Return hose

4. Intake hose

5. Internal hex head bolt, 10 Nm

6. Reservoir

Securing pressure line and intake hose on vehicles with 1.4 ltr., 1.6 ltr., 1.9 ltr. SDI/TDI engines without an air conditioner



VR5 and VR6 with/without air conditioner

1. Power steering pump

- i Check delivery pressure ⇒ [48-6, Power steering pump delivery pressure, checking](#)
- i Fill with fluid before installing ⇒ Note page ⇒ [48-6, Power steering pump, reservoir and](#)

[hydraulic lines](#)

2. Intake hose

3. Pressure line

4. Pressure switch

- ; Switches at 40 bar
- ; Tighten to 15 Nm

5. Seal ring

- ; Replace

6. Banjo bolt, 38 Nm

7. Seal ring

- ; Replace

8. Colored marks on intake hose

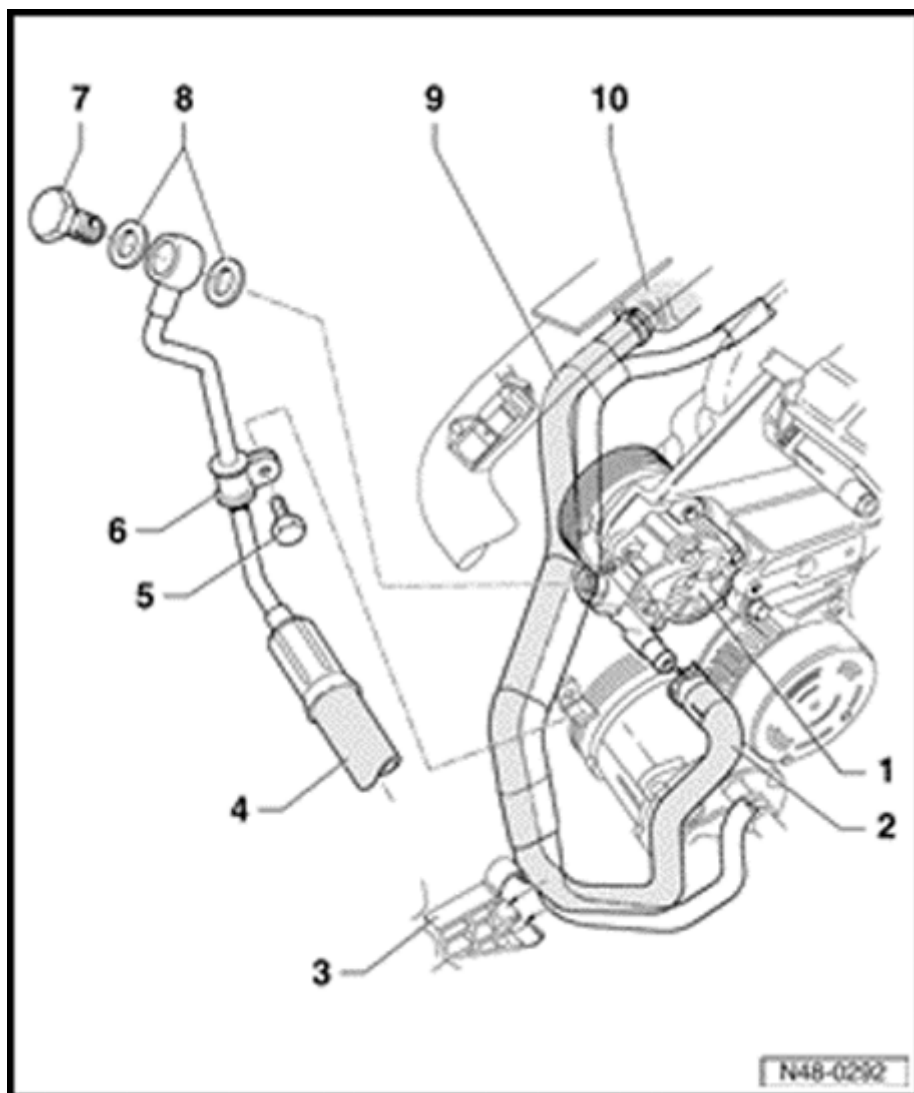
White or yellow ring must seat within retainer ⇒ [Item - 9 -](#) .

9. Bracket

10. Hex nut

11. Bracket

Securing pressure line and intake hose on vehicles with TDI engine and A/C



1. Power steering pump

- ; Check delivery pressure ⇒ [48-6, Power steering pump delivery pressure, checking](#)
- ; Fill with fluid before installing ⇒
Note page ⇒ [48-6, Power steering pump, reservoir and hydraulic lines](#)

2. Intake hose

3. Bracket

4. Pressure line

5. Hex bolt, 22 Nm

6. Clamp

7. Banjo bolt, 38 Nm

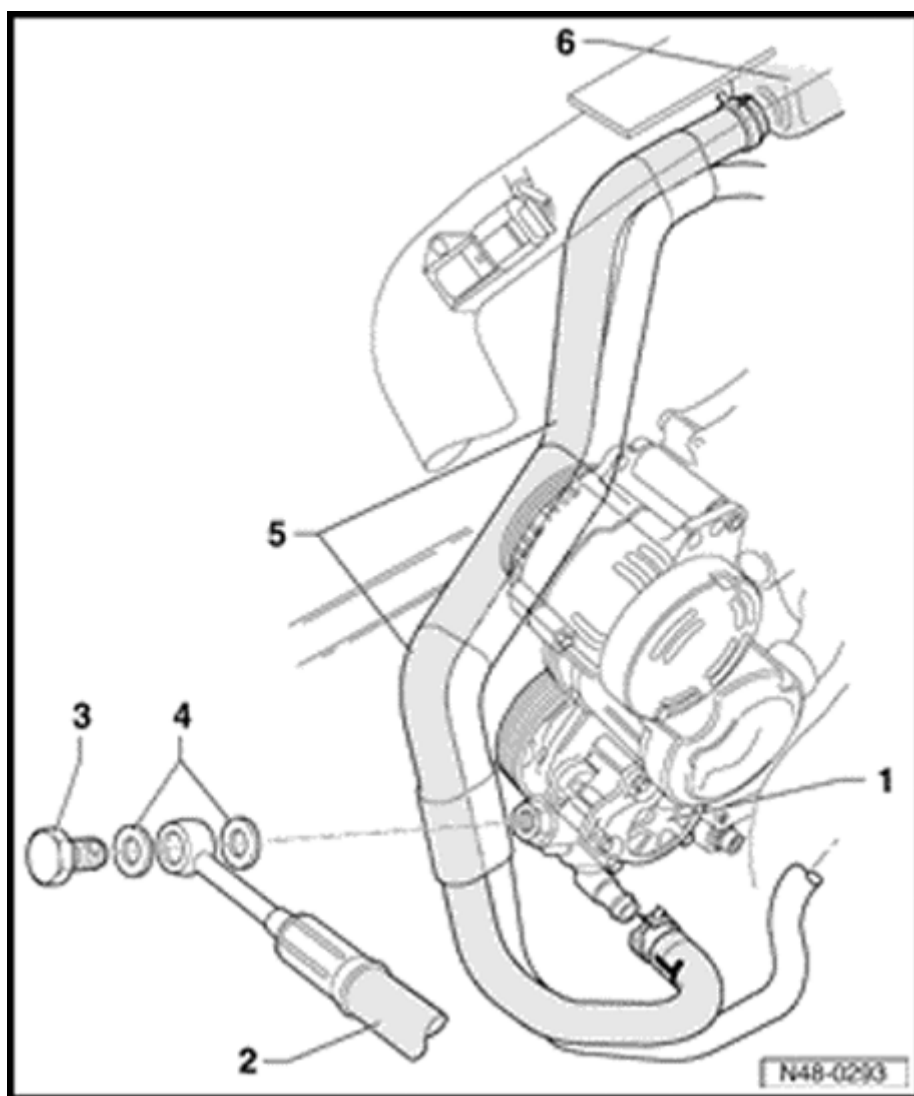
8. Seal ring

- Always replace

9. Intake hose

10. Reservoir

Securing pressure line and intake hose on vehicles with TDI engine without A/C

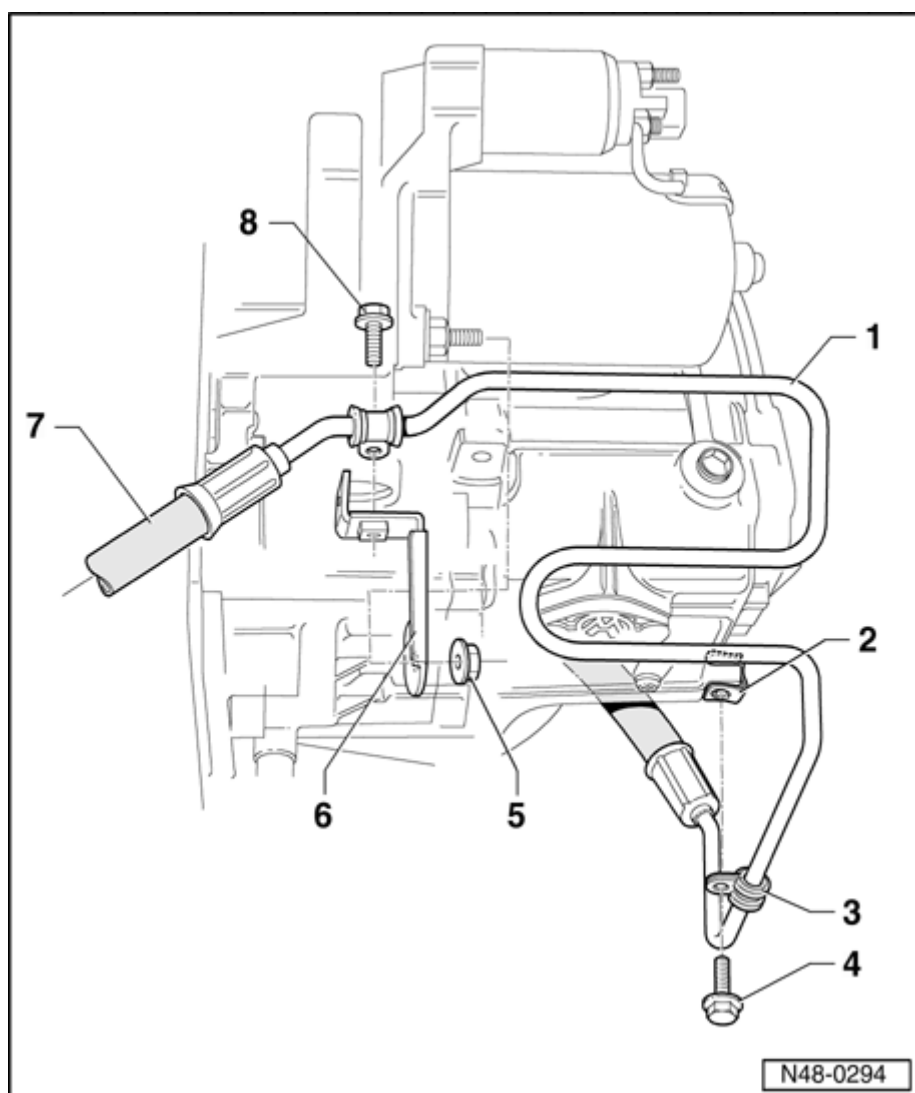


1. Power steering pump

- Check delivery pressure ⇒ [48-6, Power steering pump delivery pressure, checking](#)
- Fill with fluid before installing ⇒ Note page ⇒ [48-6, Power steering pump, reservoir and](#)

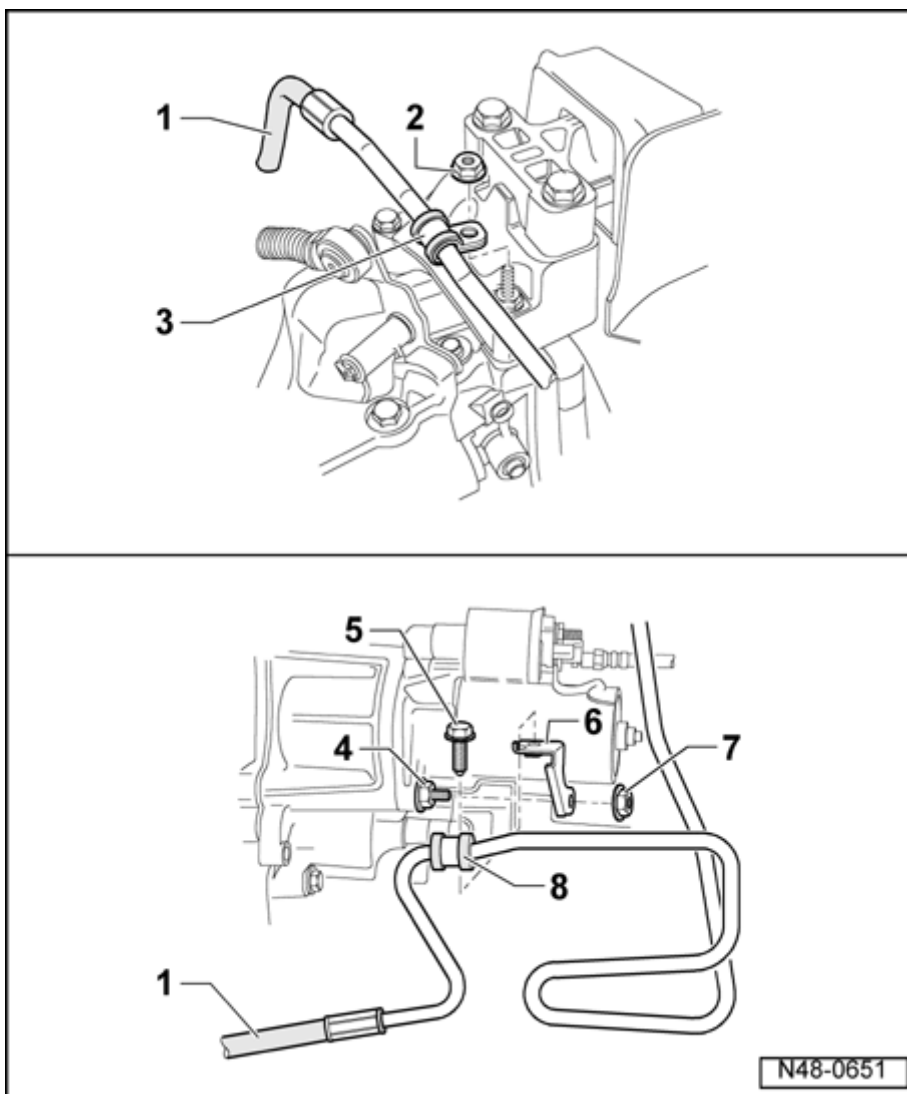
hydraulic lines**2. Pressure line****3. Banjo bolt, 38 Nm****4. Seal ring**

; Replace

5. Intake hose with coolant hose**6. Reservoir****Securing pressure line on 5-speed manual transmission 02J and 5-speed****1. Pressure line****2. Speed nut**

3. Clamp
4. Hex bolt, 22 Nm
5. Hex nut, 22 Nm
6. Bracket
7. Pressure hose
8. Hex bolt, 22 Nm

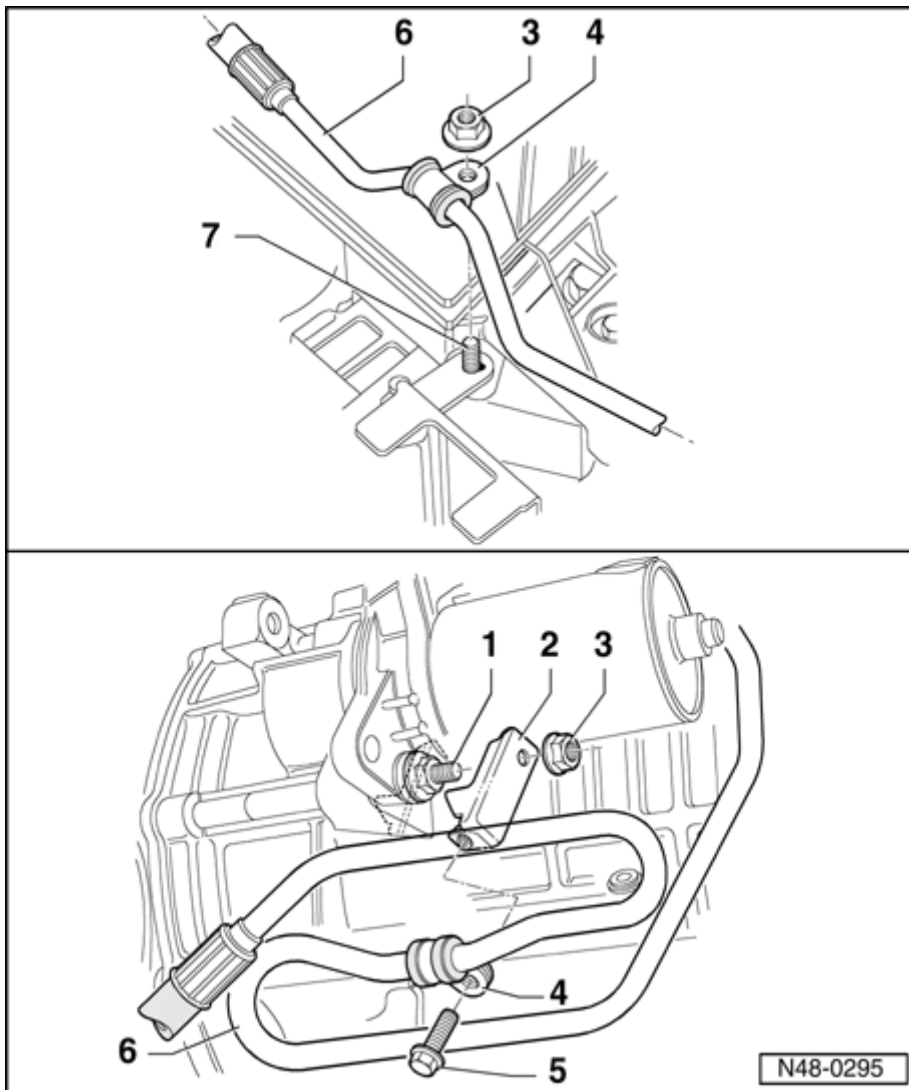
Securing pressure line on 6-speed manual transmission 02M



1. Pressure line
2. Hex nut, 22 Nm
3. Clamp
4. Securing starter bolt

5. Hex bolt, 22 Nm
6. Bracket
7. Hex nut, 22 Nm
8. Clamp

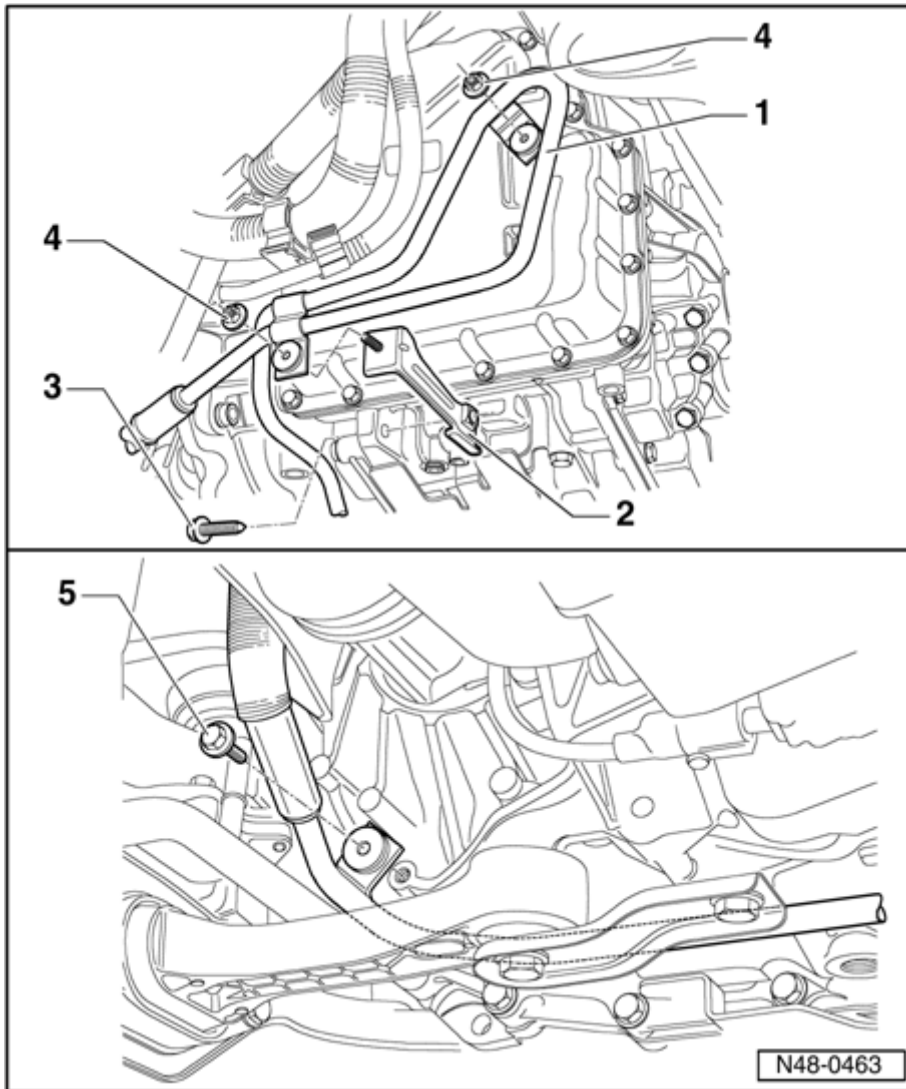
Securing pressure line on automatic transmission 01M



1. Securing starter bolt
2. Bracket
3. Hex nut, 22 Nm
4. Clamp
5. Hex bolt, 22 Nm
6. Pressure line

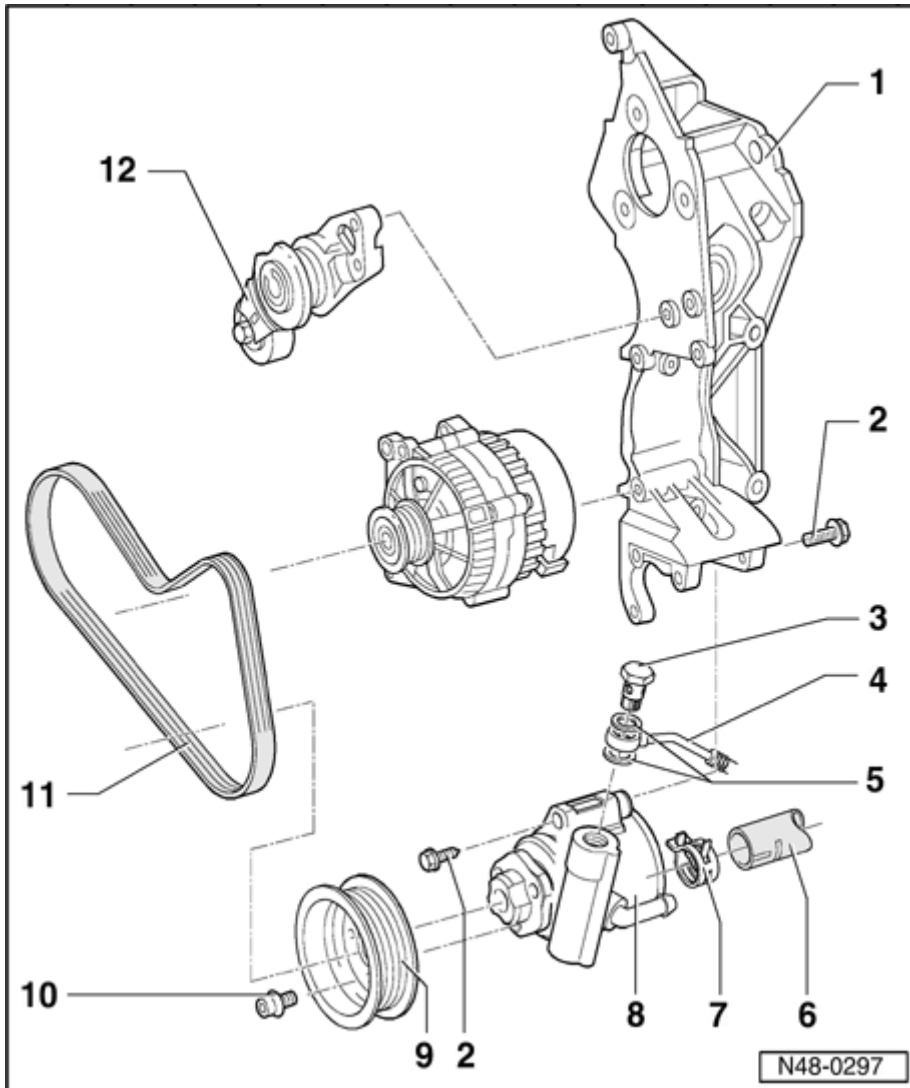
7. Securing bolt on transmission

Securing pressure line on automatic transmission 09A



1. Pressure line
2. Bracket
3. Hex bolt, 22 Nm
4. Hex nut, 9 Nm
5. Hex bolt, 22 Nm

Low-mounted power steering pump, assembly overview



Vehicles with low mounted power steering pump

1. Bracket
2. Hex bolt, 25 Nm
3. Banjo bolt, 38 Nm
4. Pressure line
5. O-ring
 - ⓘ Always replace
6. Intake hose
7. Clamp
8. Power steering pump

- i Check delivery pressure ⇒ [48-6, Power steering pump delivery pressure, checking](#)
- i Fill with fluid before installing ⇒ Note page ⇒ [48-6, Power steering pump, reservoir and hydraulic lines](#)

9. Belt drive pulley

10. Hex socket head bolt

- i 25 Nm

11. Ribbed V-belt

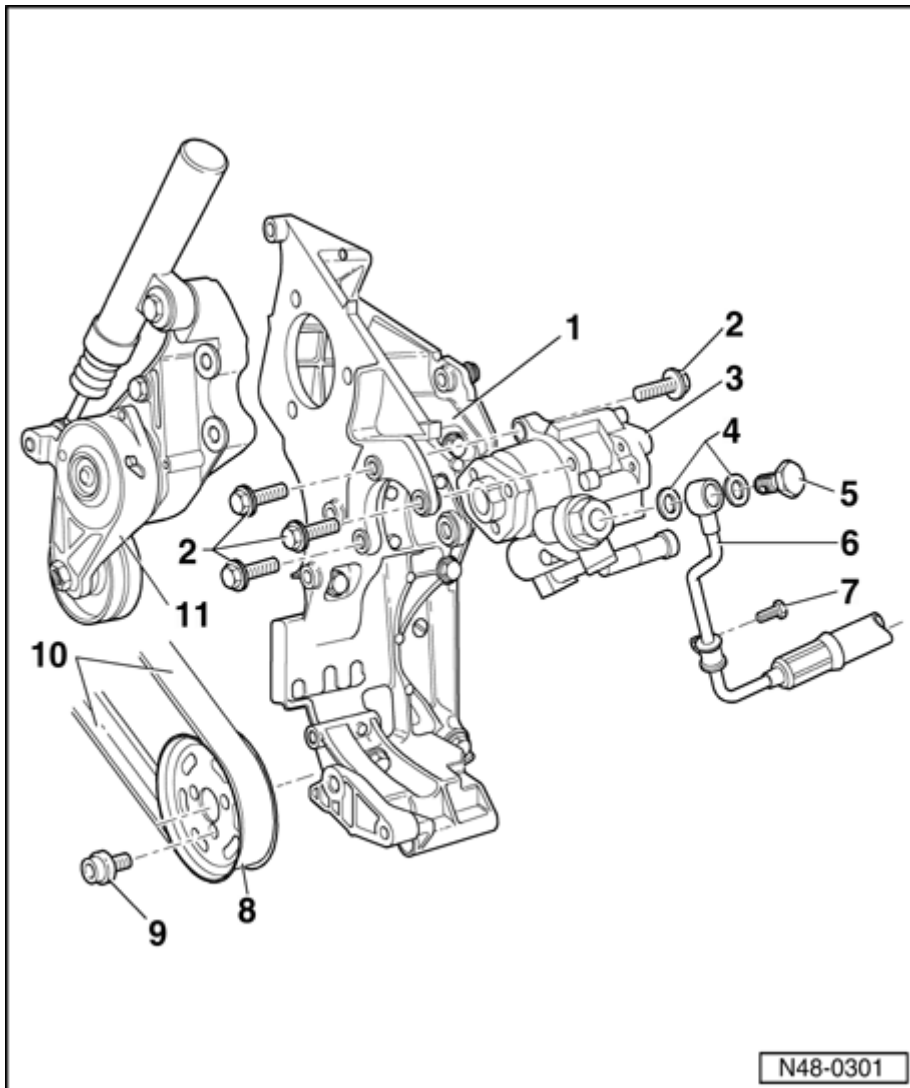
- i Mark direction of travel before removing
- i Application ⇒ *See Parts Catalog*
- i Removing and belt routing

⇒ *Repair Manual, Engine Mechanical, Repair Group 13, Removing and installing ribbed belts*

- i Checking condition
⇒ ⇒ [Repair Manual, Maintenance](#)

12. Ribbed belt tensioner

High-mounted power steering pump, assembly overview



Vehicles with high mounted power steering pump

1. Bracket

2. Hex bolt, 25 Nm

3. Power steering pump

- ; Check delivery pressure ⇒ [48-6](#).
- ; Fill with fluid before installing ⇒ Note page ⇒ [48-6, Power steering pump, reservoir and hydraulic lines](#)

4. O-ring

- ; Always replace

5. Banjo bolt, 38 Nm**6. Pressure line****7. Hex bolt, 22 Nm****8. Belt pulley****9. Hex socket head bolt**

- i 25 Nm

10. Ribbed V-belt

- i Mark direction of travel before removing
- i Application ⇒ *See Parts Catalog*
- i Removing and belt routing

⇒ *Repair Manual, Engine Mechanical, Repair Group 13, Removing and installing ribbed belts*

- i Checking condition

⇒ ⇒ [Repair Manual, Maintenance](#)

11. Ribbed belt tensioner

Definitions

These explanations refer only to this component group: Suspension, Wheels, Steering. They are not intended to be universally applicable.

Pr.-Nr.

Abbreviation for part number.

Steering angle sensor - G85 -

The steering angle sensor recognizes the direction in which the steering has been turned, left or right, and how far.

The data communication to the controller is made by the data bus lines

Heli-Coil

A spiral of spring steel which can be screwed into a threaded hole and serves as the inner thread to receive a bolt.

Hytrell (Polyelastomer)

Substance which remains elastic especially at room temperature right up to break-up temperature.

PR No.

Abbreviation for production control number. They mark, among other things, options, country-specific deviations, and chassis data.

Rep.-Gr.

Abbreviation for Repair Group

Settling

Plastic (irreversible) forming of car springs through weight of vehicle.

Toe

Offset adjustment of wheel plane to direction of travel.

Toe-in difference

Difference between steering angle of inner and outer wheels during a turn.

Camber

Angle between wheel plane and a vertical to plane of road

surface. It is positive when the top of the wheel leans outward and negative when it leans inward.

AF

Abbreviation for width across flats.

Triple roller joint (tripod joint)

Widely used version of constant velocity joint with three rollers in the form of a star.

Select a topic

00 - General, Technical data

Technical data

[Vehicle identification number](#)

[Vehicle information label](#)

[Vehicle data sticker](#)

[Vehicle data sticker from 04.00\(only Jetta vehicles\)](#)

Body foam insulation

Reinforced body sheet metal

Laser welding

Galvanized body panels

Body panel gaps/mating lines

[Body, front \(Golf\)](#)

[Body, rear \(Golf\)](#)

[Body, rear \(Golf\)](#)

[Body, rear \(Jetta\)](#)

[Body, rear \(Jetta wagon\)](#)

Body dimensions

[Body, front](#)

[Body, center](#)

[Body, rear \(Golf\)](#)

[Body, rear \(Jetta\)](#)

[Body, rear \(Jetta wagon\)](#)

Straightening fixture

[Front alignment brackets \(right\), overview](#)

[Front alignment brackets, overview](#)

[Front alignment brackets, overview](#)

[Front alignment brackets, overview](#)

[Front alignment brackets, overview](#)

[Front alignment brackets center of door \(door opening gauge\), overview](#)

[Alignment brackets center of door \(door opening gauge\), overview](#)

[Center alignment brackets, overview](#)

[Center alignment brackets, overview](#)

[Rear alignment brackets, overview](#)

[Rear alignment brackets, overview](#)

50 - Body - Front

50 40 55 50 Engine mount bracket, replacing

[Right engine mount bracket](#)

50 52 55 50 Intermediate piece, replacing

50 53 55 50 fender connecting plate, replacing

[50 72 55 50 long member for upper wheel house, replacing](#)

[50 74 55 00 Front wheel house, partial replacing](#)

[50 75 55 50 Front inner fender, replacing](#)

[50 79 55 00 Front long member, replacing](#)

[50 79 55 02 Front long member, partial replacing](#)

[50 80 55 00 Long member front section, replacing](#)

51 - Body - Center, Chassis, Roof

[51 03 55 00 Roof, replacing \(Golf\)](#)

[51 03 55 00 Roof, replacing \(Jetta\)](#)

[51 03 55 20 Roof, replacing \(Jetta wagon\)](#)

[Tools](#)

[Roof rail dimensions](#)

[51 07 55 50 Front roof cross member, replacing](#)

[51 08 55 50 Roof reinforcement, replacing](#)

[51 09 55 50 Rear roof cross member, replacing \(Golf\)](#)

[51 09 55 50 Rear cross member, replacing \(Jetta\)](#)

[51 09 55 70 Rear roof crossmember, replacing \(Jetta wagon\)](#)

[51 37 55 00 A-pillar, inner, replacing](#)

[51 38 55 50 A-pillar, inner, replacing](#)

[51 41 55 62 B-pillar, replacing \(4 door\), 51 41 55 52 B-pillar, replacing \(Jetta\)](#)

[51 42 55 50 Inner B-pillar, replacing \(2-door\)](#)

[51 42 55 60 Inner B-pillar, replacing \(4-door\), 51 42 55 50 inner B-pillar, replacing \(Jetta\)](#)

[51 45 55 00 Outer side member, replacing \(2-door\)](#)

[51 45 55 10 Outer side member, replacing \(4-door\), 51 45 55 00 outer side member, replacing \(Jetta\)](#)

[51 49 55 50 Side member reinforcement, replacing](#)

[Includes: Web plate part section](#)

[51 73 55 50 Floor plate, partial replacement](#)

53 - Body - Rear

[53 05 55 50 Rear cross panel, replacing](#)

[53 05 55 20 Rear cross panel, exterior, replacing \(Jetta wagon\)](#)

[Tools](#)

[53 05 55 23 Rear cross panel, complete, replacing \(Jetta wagon\)](#)

[Tools](#)

[53 09 55 70 Lock carrier, welding in](#)

[53 61 55 70 Side panel, interior, welding in](#)

[53 13 55 70 Reinforcement for D-pillar, lower, welding in](#)

[53 30 55 70 Reinforcement for D-pillar](#)

[53 17 55 70 Reinforcement for D-pillar, inner, welding in](#)

[53 10 55 70 Mount for SBBR-lamp, welding in](#)

[Weld crossmember to rear cross panel from inside](#)

[53 10 55 50 Tail light mount, replacing \(Golf\)](#)

[53 05 55 50 Rear center cross panel carrier, replacing \(Jetta\)](#)

[53 05 55 50 Rear cross panel, replacing \(Jetta\)](#)

[53 16 55 00 End cross panel, replacing \(Golf\)](#)

[53 16 55 00 Outer wheel house, replacing \(Jetta\)](#)

[53 29 55 70 Reinforcement for C-pillar, replacing \(Jetta wagon\)](#)

[53 47 55 52 Rear long member, partial replacement \(Golf\)](#)

[53 48 55 50 Rear long member, replacing \(Jetta\)](#)

[53 47 55 52 Long member, partial replacement \(Jetta\)](#)

[53 55 55 00 Quarter panel, partial replacement \(2-door\)](#)

[53 55 55 10 Quarter panel, partial replacement \(Golf 4-door\)](#)

[53 55 55 00 Quarter panel, partial replacement \(Jetta\)](#)

[53 55 55 20 Side panel, partial replacement \(Jetta wagon\)](#)

[53 69 55 50 Quarter panel, partial replacement \(Golf\)](#)

[53 69 55 50 Wheel house connecting panel, partial replacement \(Jetta\)](#)

[53 36 55 50 Connecting panel, replacing \(Jetta\)](#)

[53 69 55 70 Rear wheelhousing, outer, replacing -partial section- \(Jetta wagon\)](#)

[53 80 55 50 Spare wheel well, replacing \(Golf\)](#)

[53 80 55 52 Spare wheel well, partial replacement \(Golf\)](#)

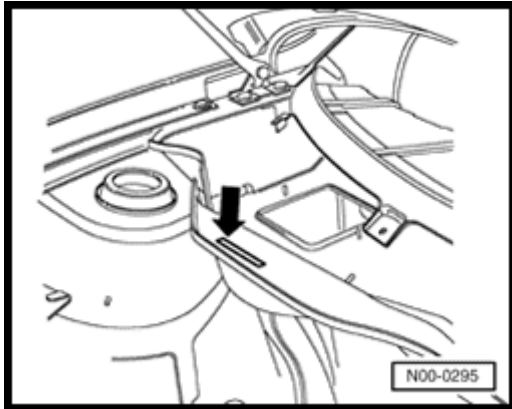
[53 80 55 50 Spare wheel well, replacing \(Jetta\)](#)

Technical data

Vehicle identification number



The vehicle identification number (chassis number) is stamped on the right side of the engine compartment rear bulk head. View it through a window in the plenum chamber cover.

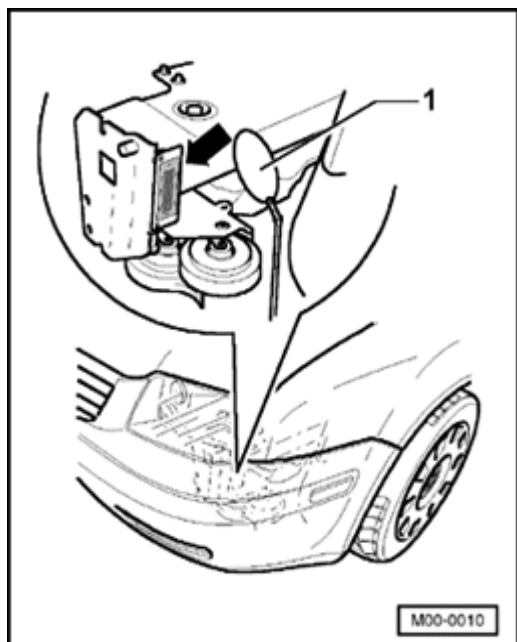


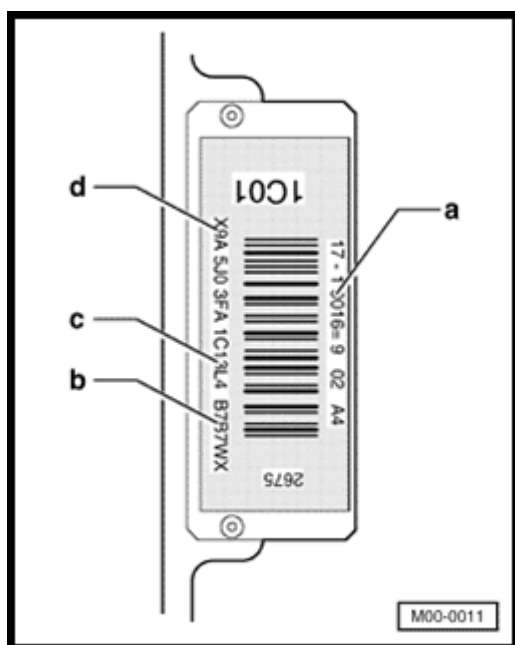
Vehicle information label

- Information label is located on the front long member (arrow), above the horns.

Note:

Lift the vehicle and use a mirror -1- to see the label (arrow).





Vehicle information label contains:

a .- PKN (7 Digits), example:
1719016

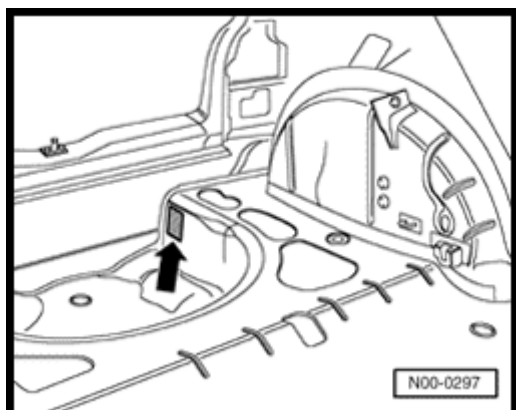
b .- Color, example: B7B7

c .- Commercial code: 1C13L4

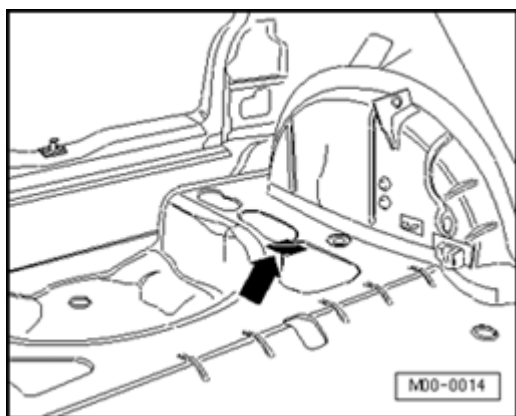
d .- Destination: X9A

Vehicle data sticker

- Vehicle data sticker is located in spare tire wheel well.



00-5



✦ **Vehicle data sticker from
04.00(only Jetta vehicles)**

Vehicle data sticker is located next to spare tire wheel well, near rear left wheelhouse.

Body foam insulation

The 1999 Jetta has various body cavities that are foam treated.

Foam treated locations are described in individual repair instructions.

Foam treating reduces noise transfer to the interior.

Foam insulation is a pre-formed synthetic material.

The parts catalog shows insulation on illustration 863-20.

The pre-formed foam parts are installed during body assembly, they expand during drying time in the paint shop oven at approx. 180 ° C (388 ° F) after priming.

As these temperatures cannot be achieved under normal workshop conditions, proceed as follows:

Requirements

Before continuing with this procedure, ensure that the part for replacement is correctly prepared.

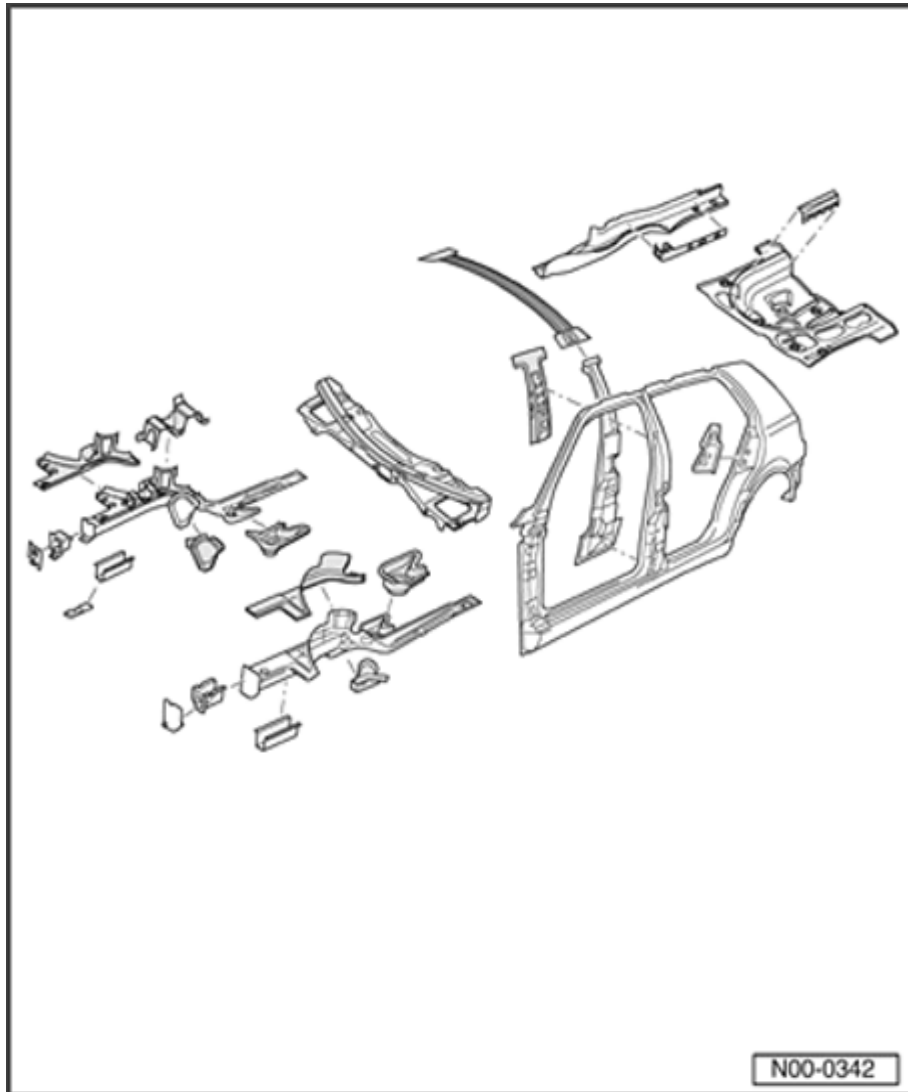
- Remove excess foam material.

- Repaint, apply two coats (wet on wet) glass/paint primer D009 200 02 if necessary, flash-off time - approx.10 min.

Replacing insulation

- Apply sealing cord AKD 497 010 04 R10 around circumference of insulation.
- Install insulation on vehicle.
- Attach new part (e.g. A-pillar) and locate new part by pressing gently in area of insulation and weld in place.
- Do not SG weld 15 mm (0.59 in.) either side of insulation.

Re-under coat repaired area after painting vehicle, as required.



Reinforced body sheet metal

The following areas use reinforced body sheet metal:

- ◆ Various front frame parts (highlighted area)
- ◆ Plenum panel (shaded area)
- ◆ B-pillar (shaded area)
- ◆ Rear reinforcements (shaded area)

Laser welding

The area below the drip rail is laser welded.

With laser welding a light beam of high energy is guided over the weld via optical lenses or fibre optics.

During the welding process the upper panel is melted onto the partially molten lower panel creating a weld joint without the need of additional material.

During collision repair the laser weld seam is replaced by an SG-plug weld seam.

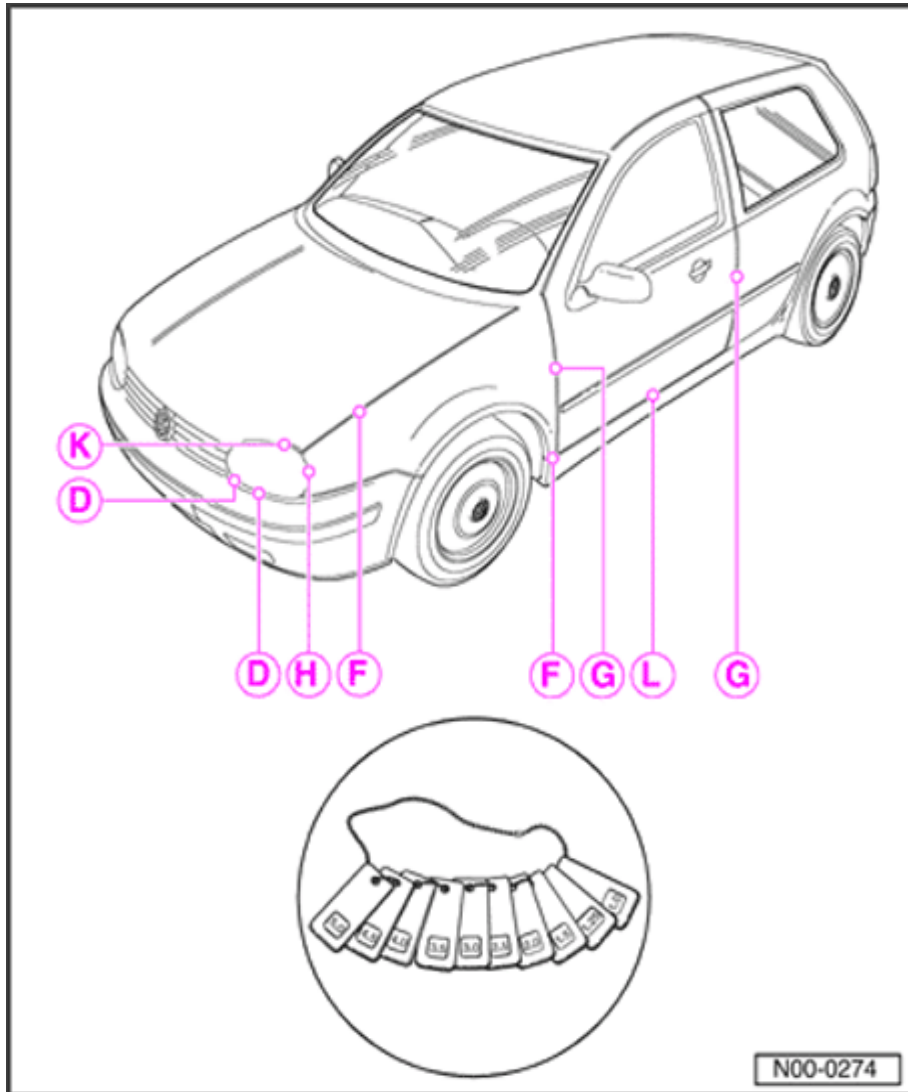
Galvanized body panels

The 1999 Golf/Jetta consist completely of body panels galvanized on both sides!

Before performing body repairs observe the following information:

⇒ *General notes; Body repairs, General body repairs; Work sequences; Galvanized body parts.*

00-11



Body panel gaps/mating lines

Use special tool 3371 for checking or adjusting.

Body, front (Golf)

D - 2.0 mm (0.078 in.)

F - 3.0 mm (0.118 in.)

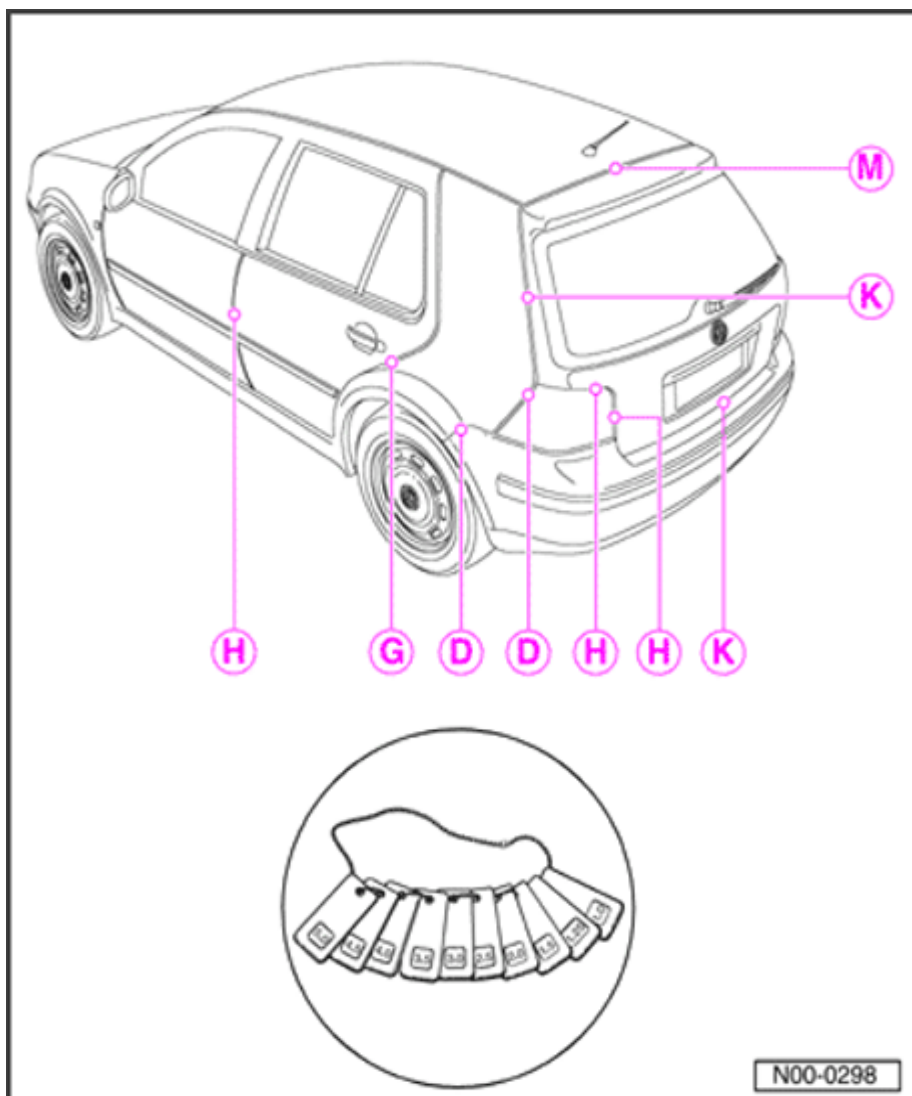
G - 3.5 mm (0.137 in.)

H - 4.0 mm (0.157 in.)

K - 5.0 mm (0.196 in.)

L - 5.5 mm (0.216 in.)

00-12



**Body, rear
(Golf)**

**D - 2.0 mm
(0.078 in.)**

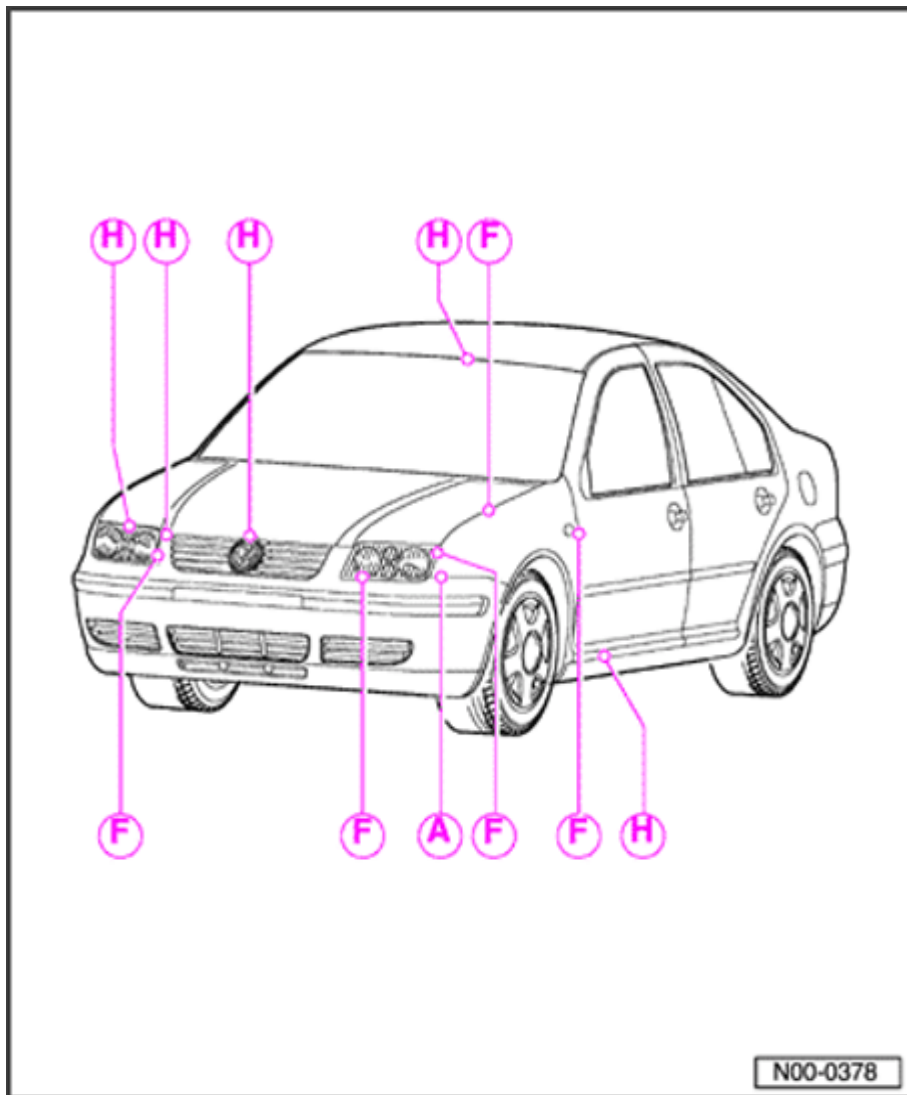
**G - 3.5 mm
(0.137 in.)**

**H - 4.0 mm
(0.157 in.)**

**K - 5.0 mm
(0.196 in.)**

**M - 6.0 mm
(0.236 in.)**

00-13



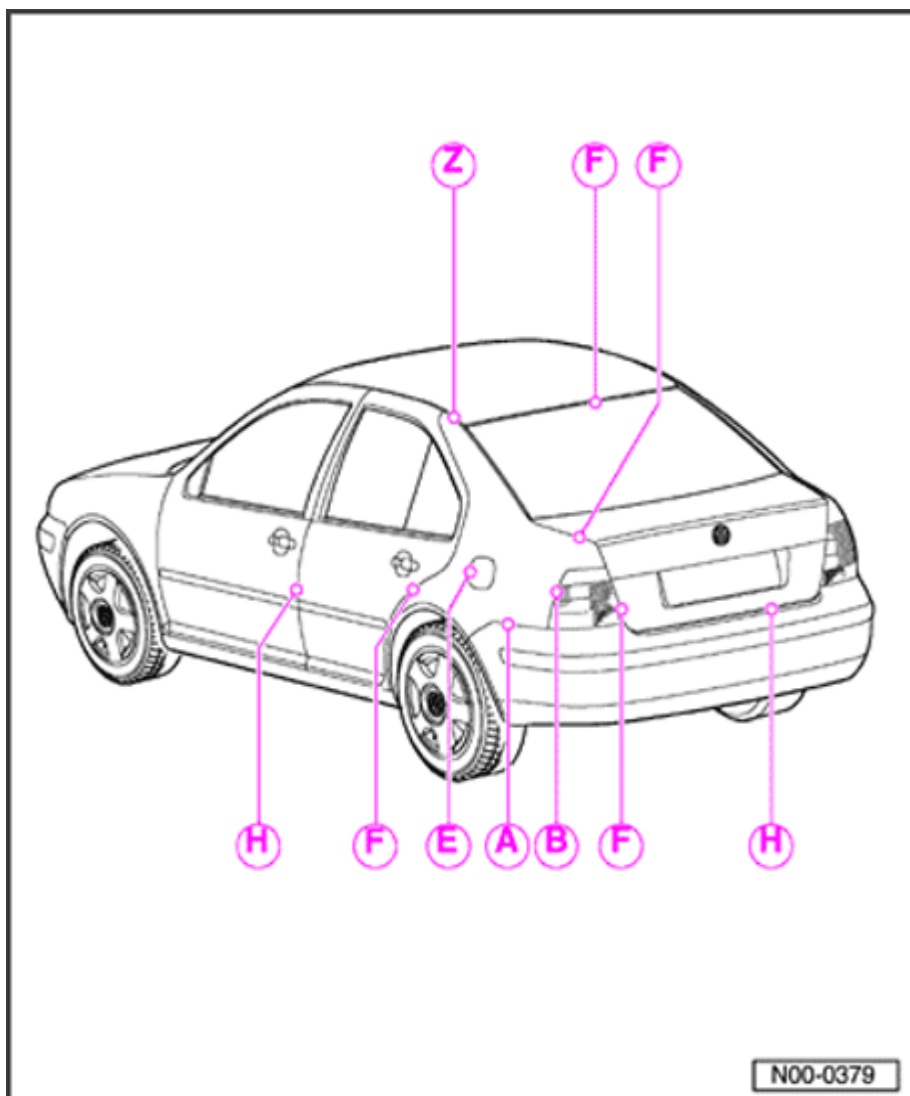
**Body, rear
(Golf)**

**A - 2.0 mm
(0.078 in.)**

**F - 3.5 mm
(0.137 in.)**

**H - 4.0 mm
(0.157 in.)**

00-14



**Body, rear
(Jetta)**

**A - 0.5 mm
(0.019 in.)**

**B - 1.0 mm
(0.038 in.)**

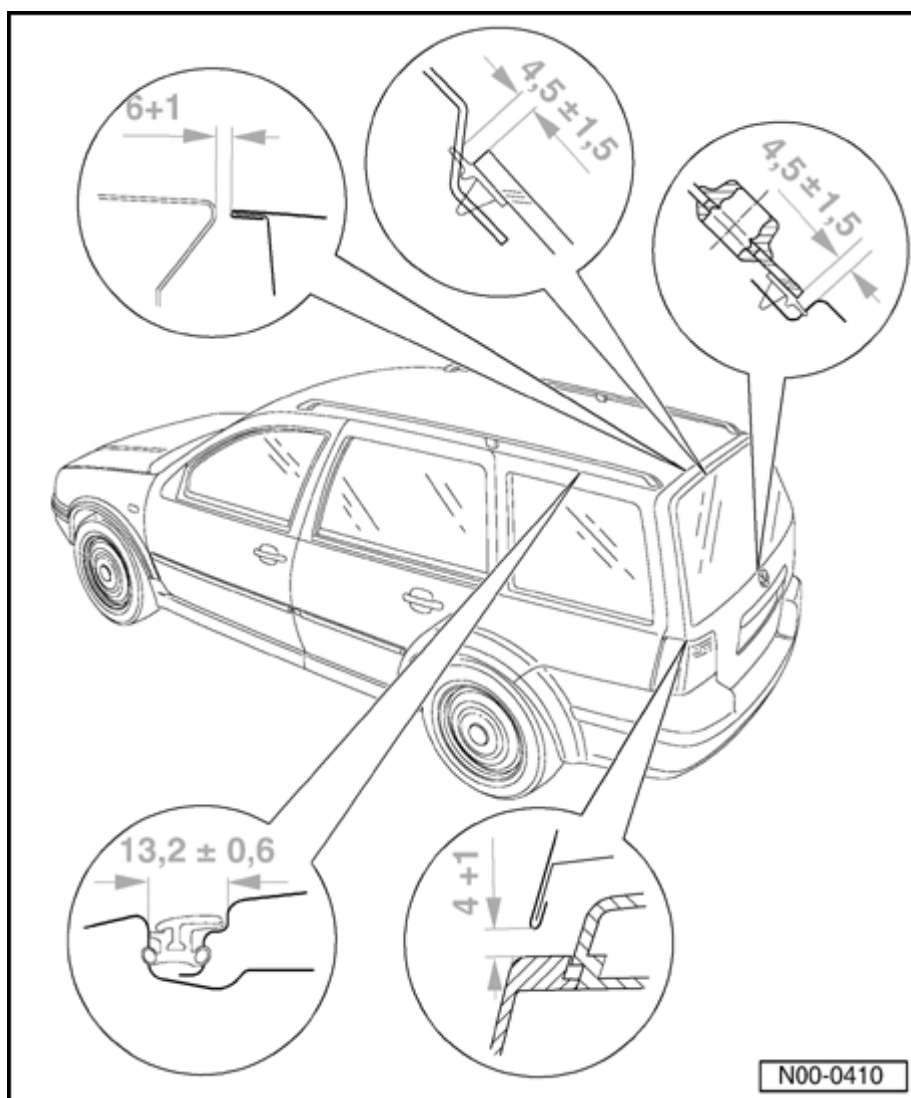
**E - 2.5 mm
(0.098 in.)**

**F - 3.0 mm
(0.118 in.)**

**H - 4.0 mm
(0.157 in.)**

**Z - 13.2 mm
(0.519 in.)**

00-15

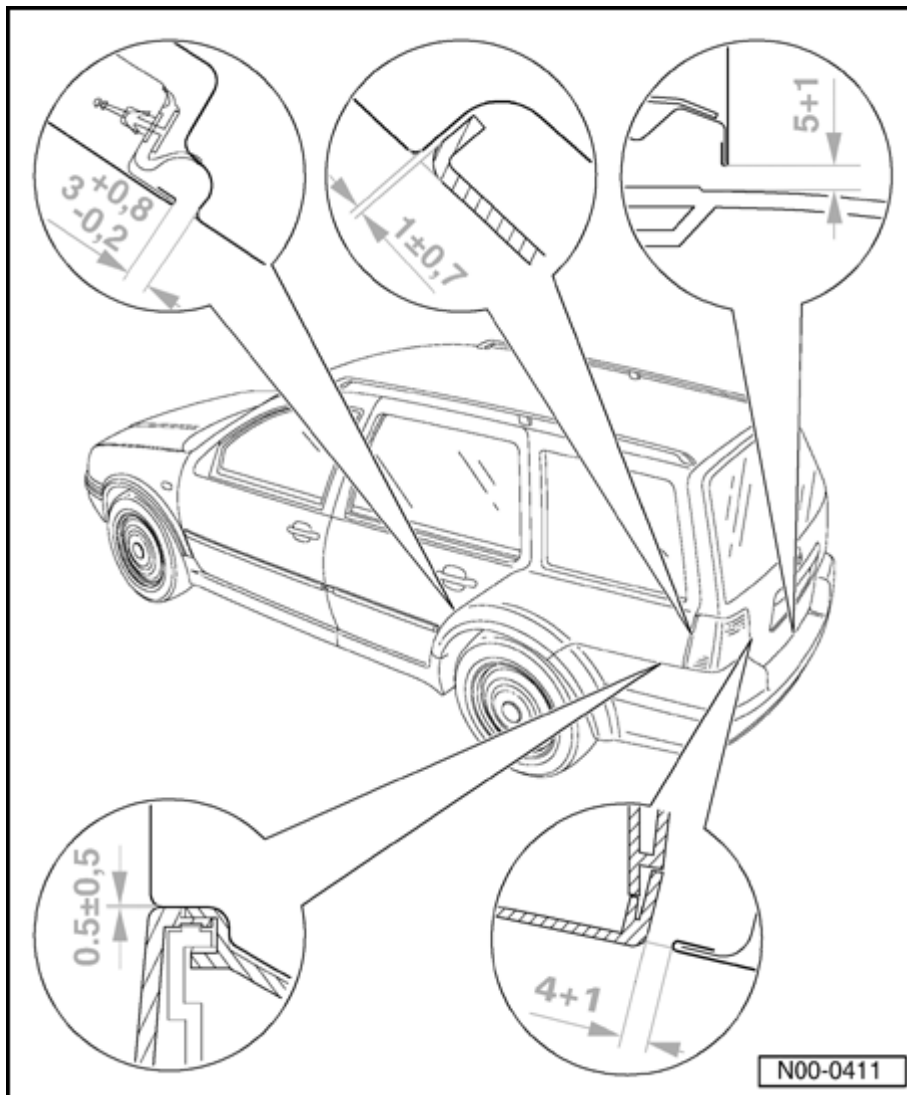


Body, rear (Jetta wagon)

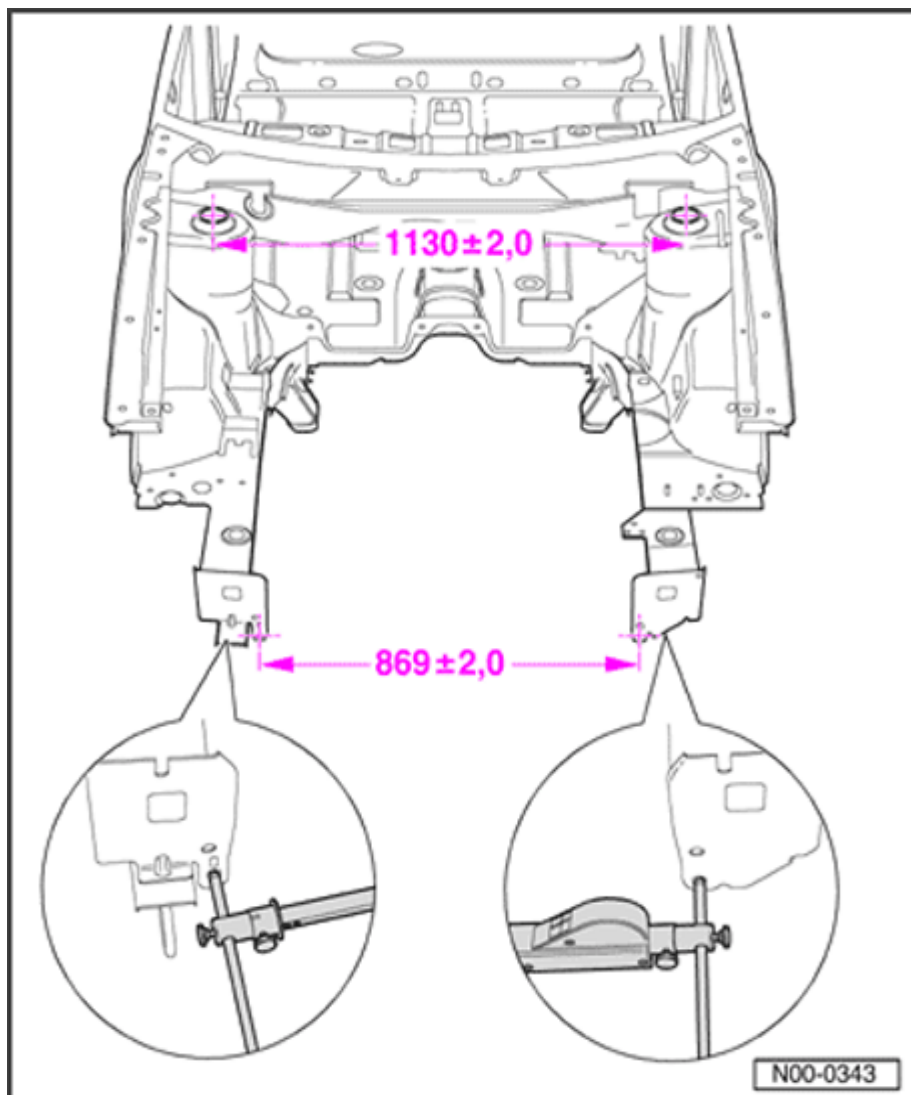
Notes:

- ◆ Please use 3371 special tool for adjusting or checking gap dimensions
- ◆ Gap dimensions are always indicated in mm.

00-16



**Body, rear
(Jetta
wagon)**



Body dimensions

Body, front

Note:

Front and middle areas of body are the same for Jetta and Golf.

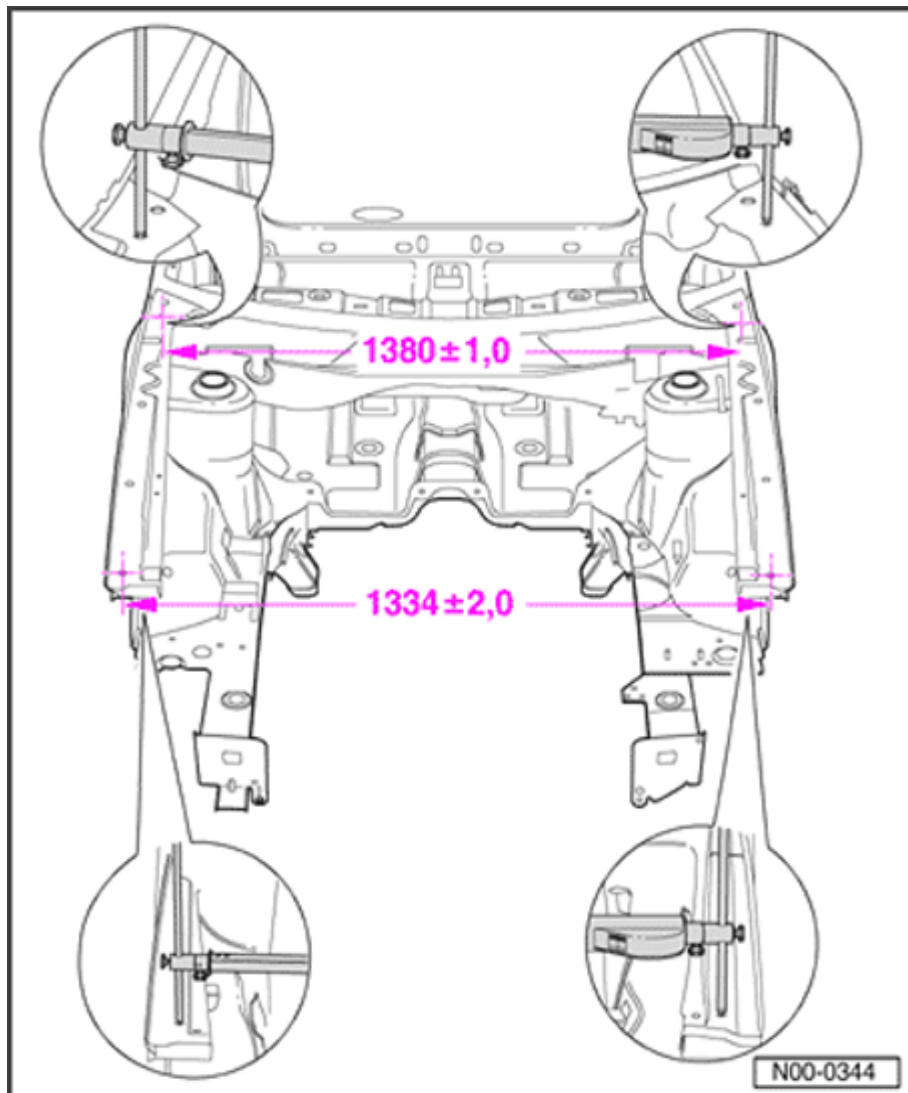
Dimension between front strut towers

Dimension between front long members

CAUTION!

Dimensions only given for checking purposes. The straightening fixture dictates final figures.

00-18



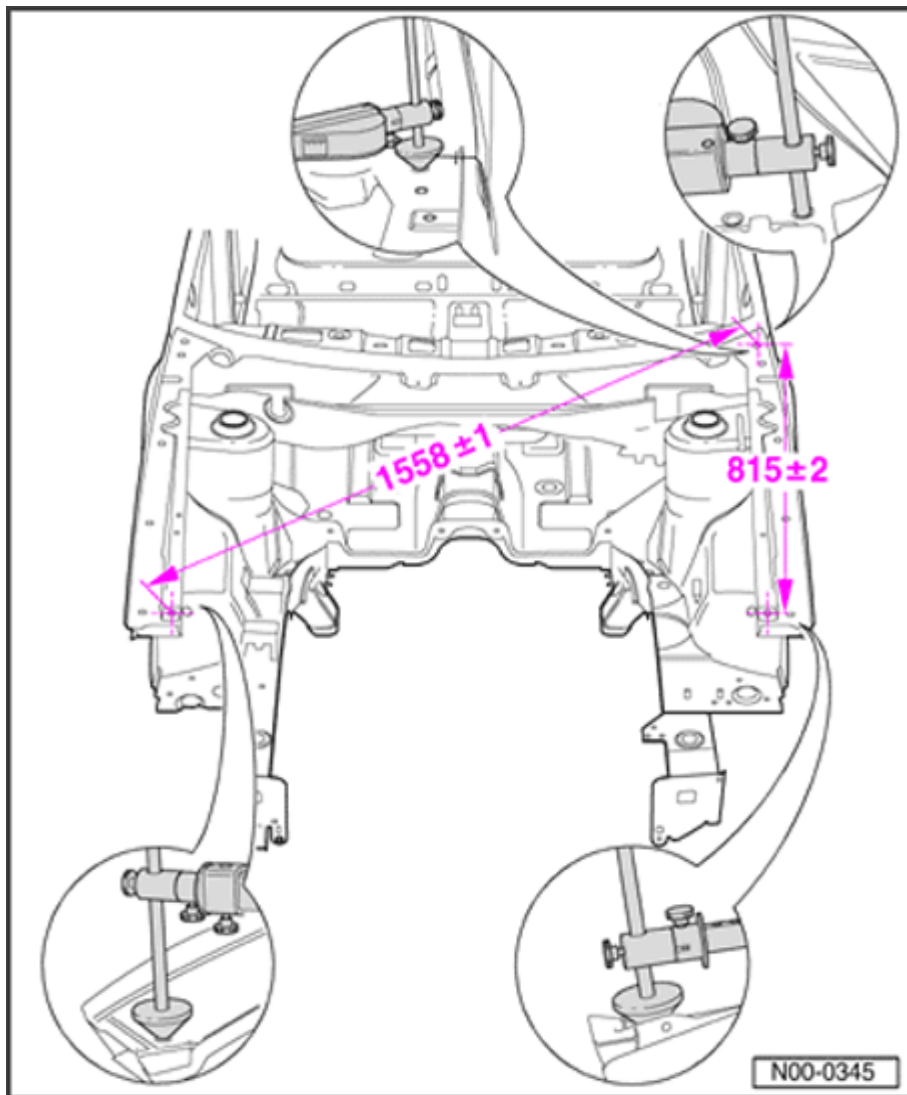
Dimension
between hood
hinge mounts
(cover hinge
attachment)

Dimension
between
wheel house
points

CAUTION!

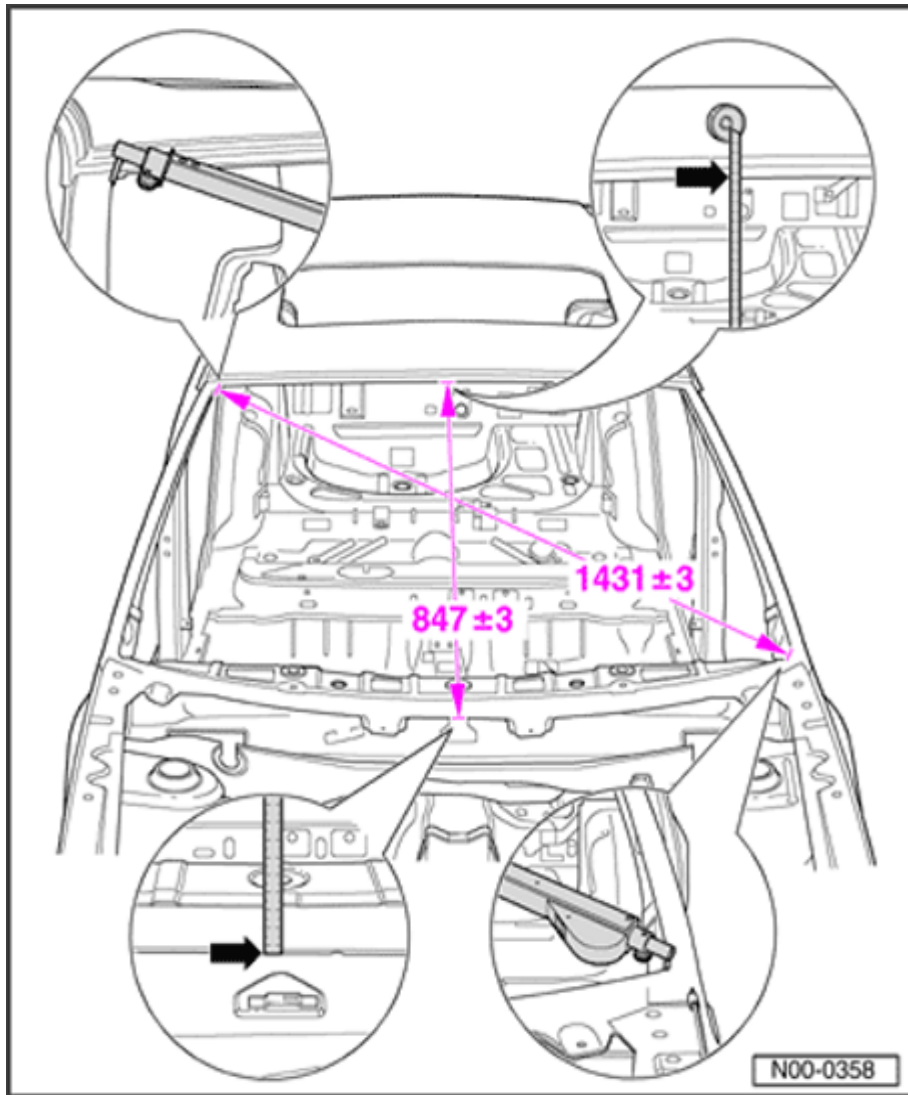
*Dimensions
only given for
checking
purposes.
The
straightening
fixture
dictates final
figures.*

00-19



Diagonal dimension between hood hinge mount to wheel house front upper corner

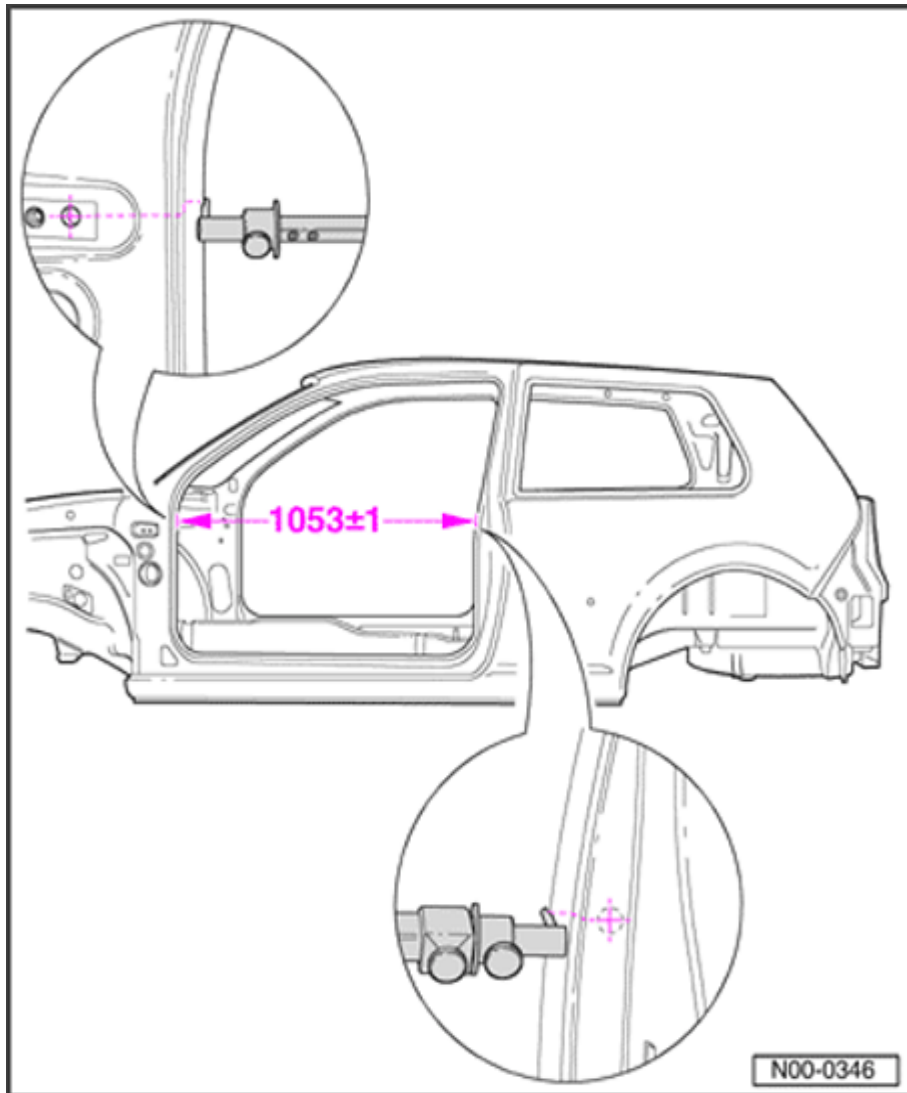
Dimension between wheel house front upper corners



Windshield opening diagonal dimension

Dimension from cowl to roof flange

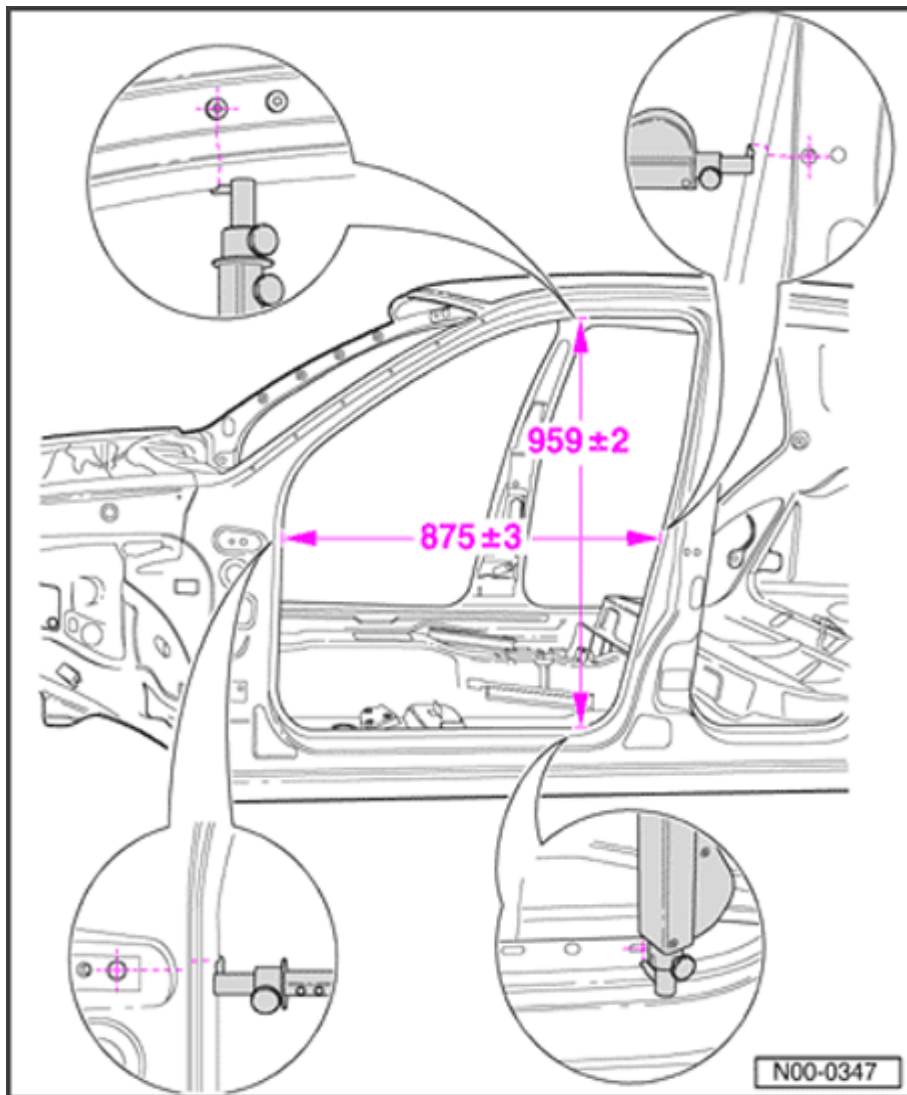
00-21

**Body,
center****Note:**

Front and middle areas of body are the same for Jetta and Golf.

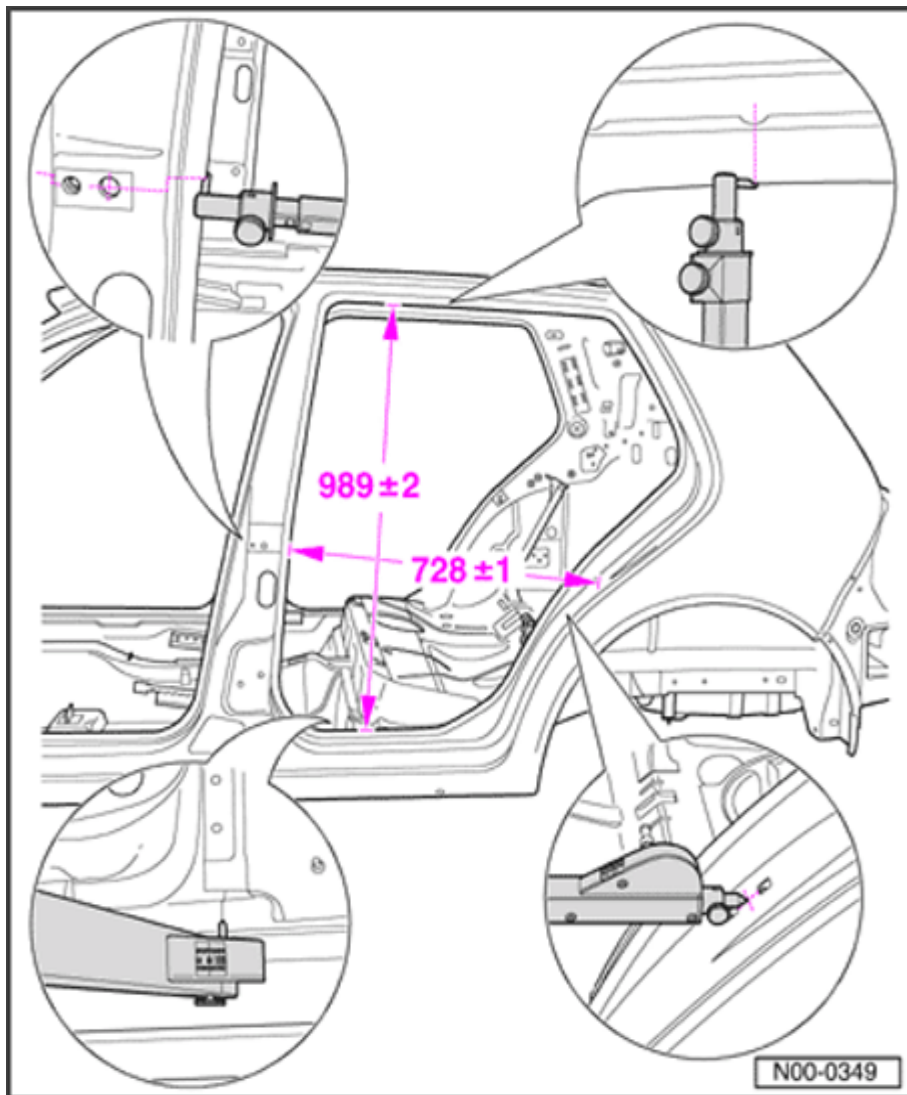
Front door opening (Two door)

00-22

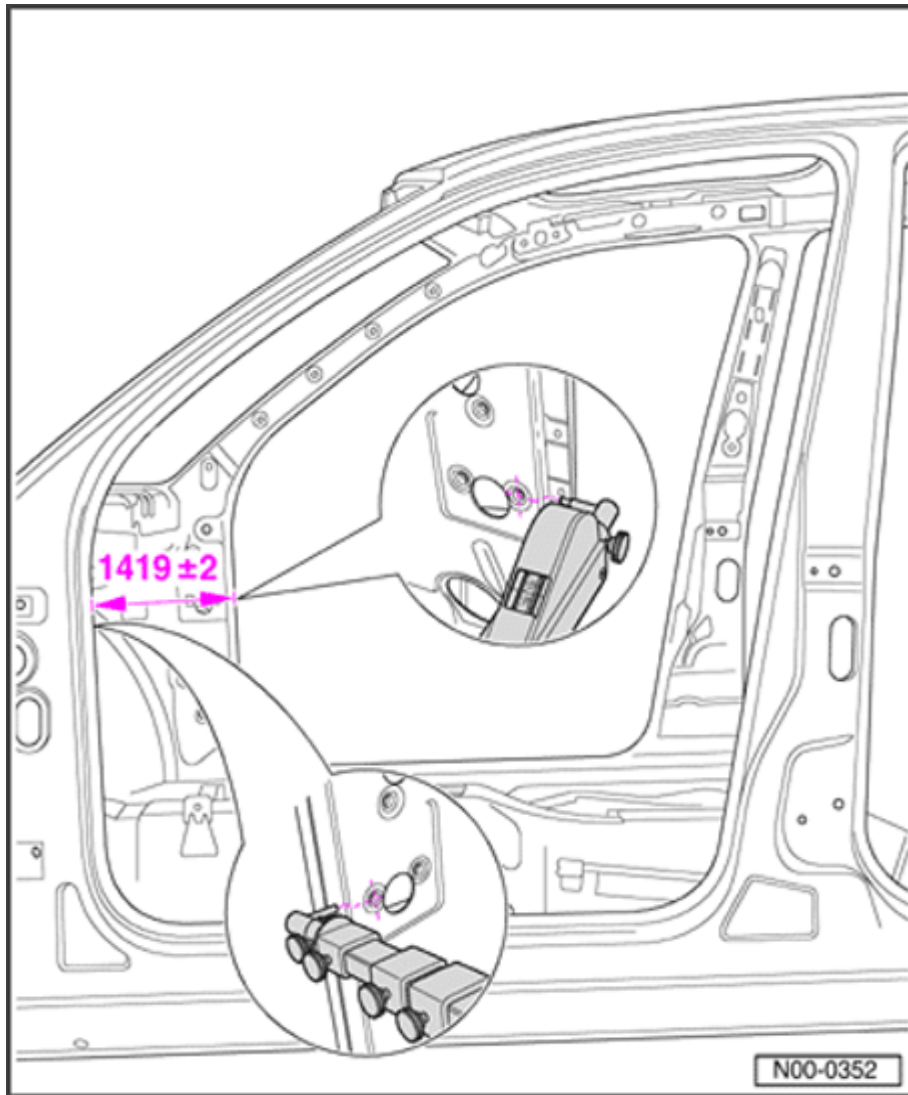
**Front door opening (four door)****Note:**

Front door opening height, for two and four door vehicles is the same.

Rear door opening

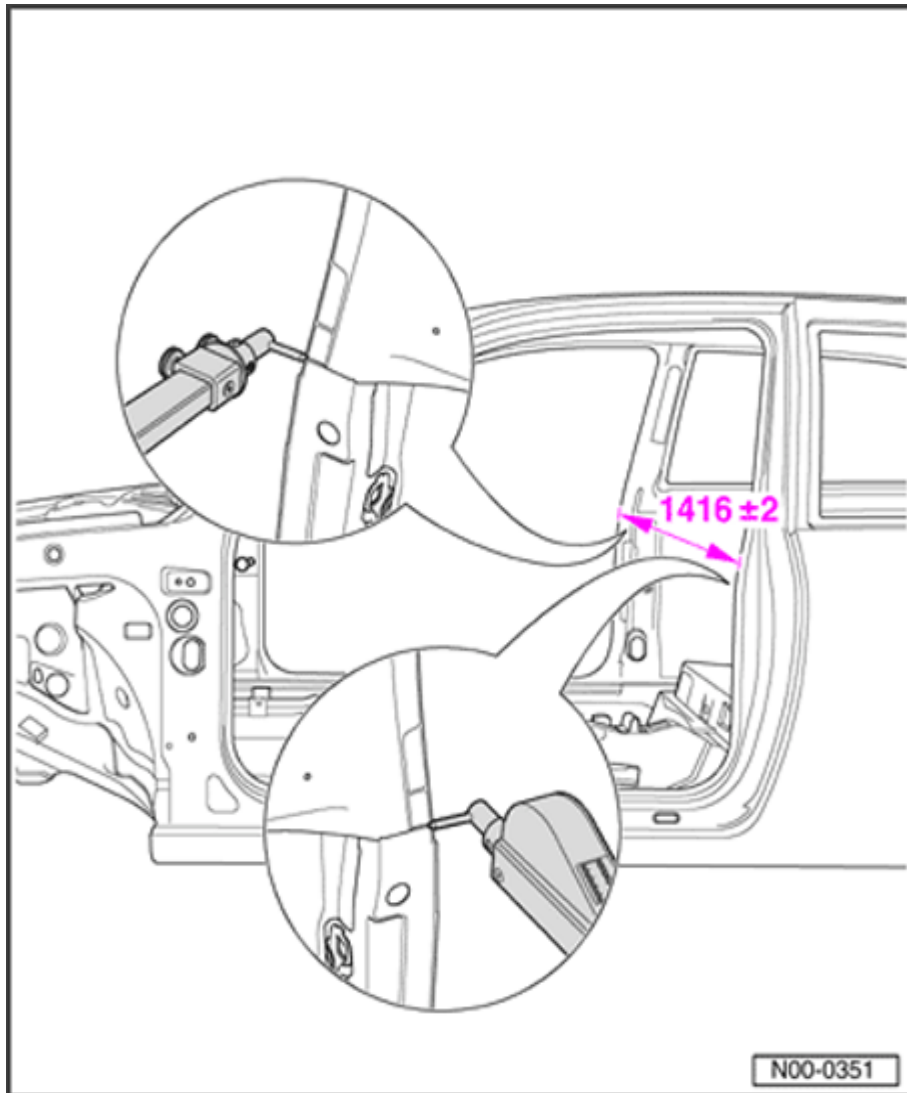


00-24



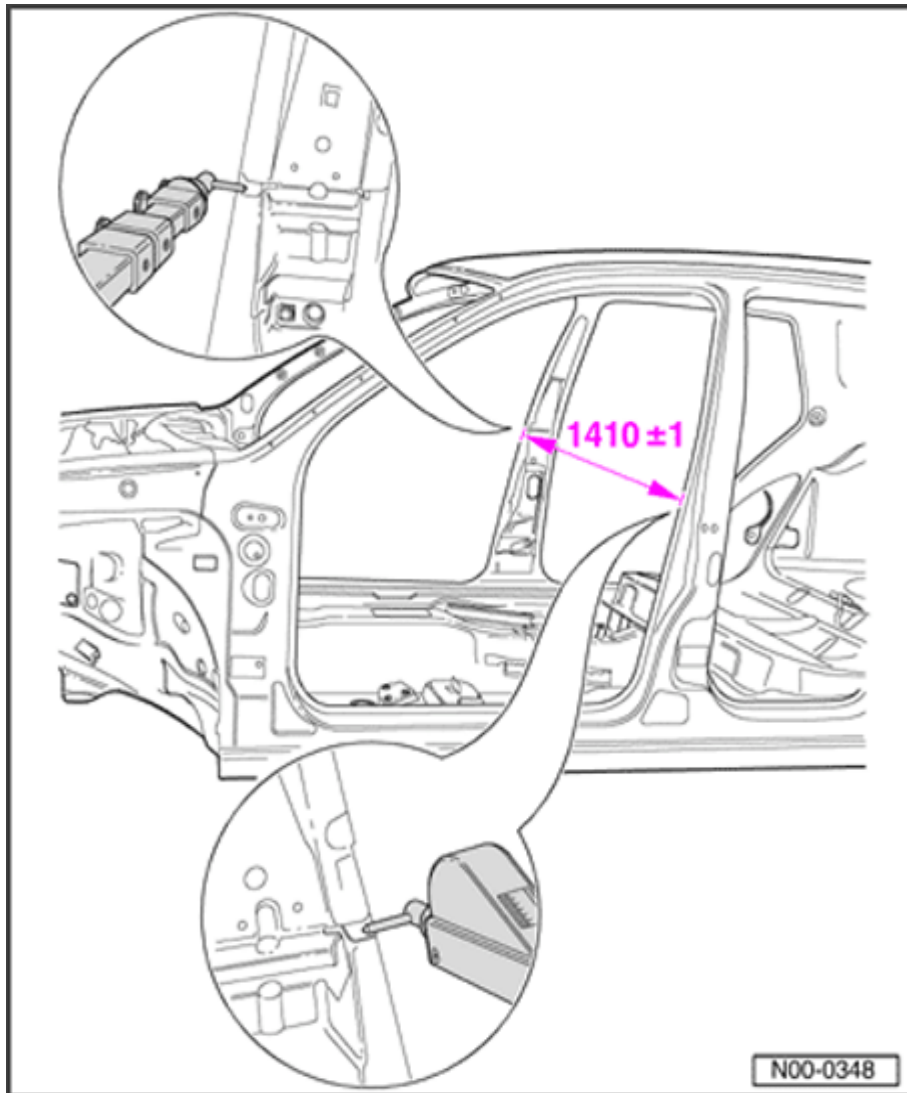
**Dimension
between A-
pillars**

00-25



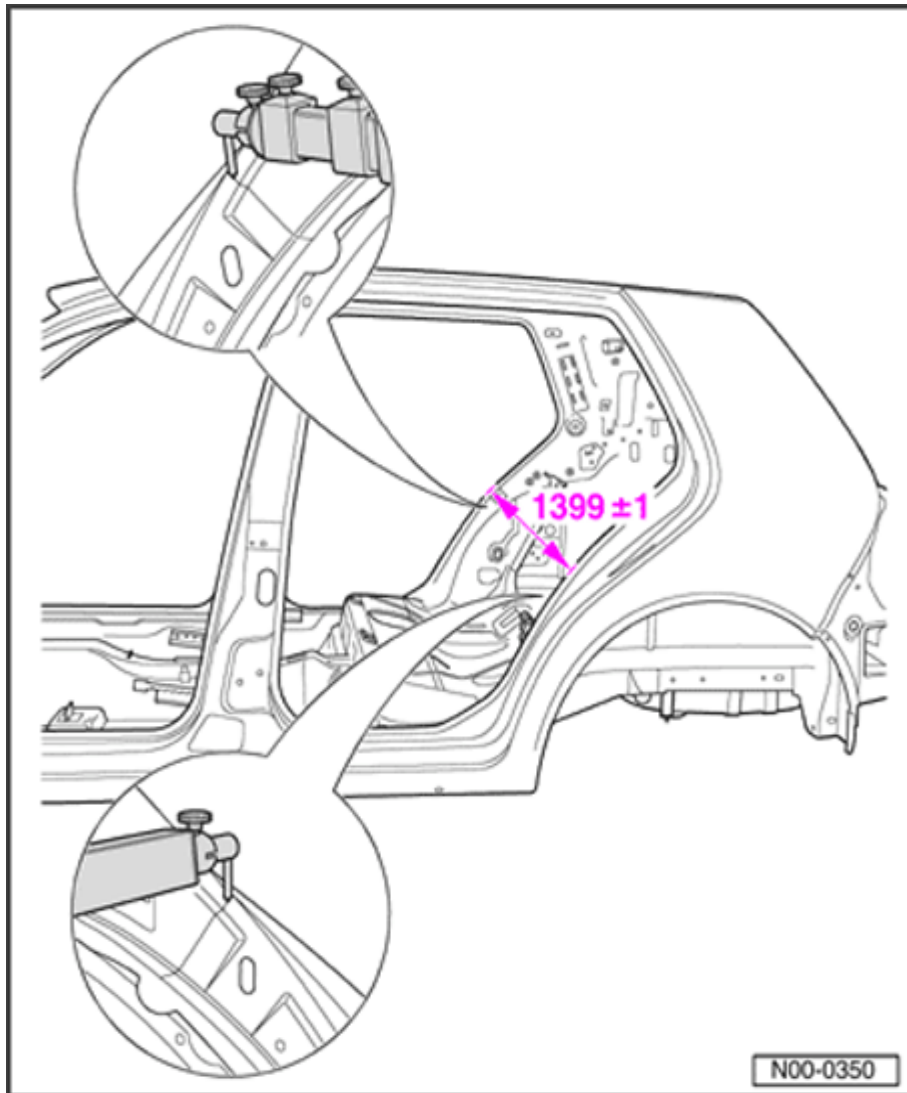
**Dimension
between B-
pillars (2
door)**

00-26



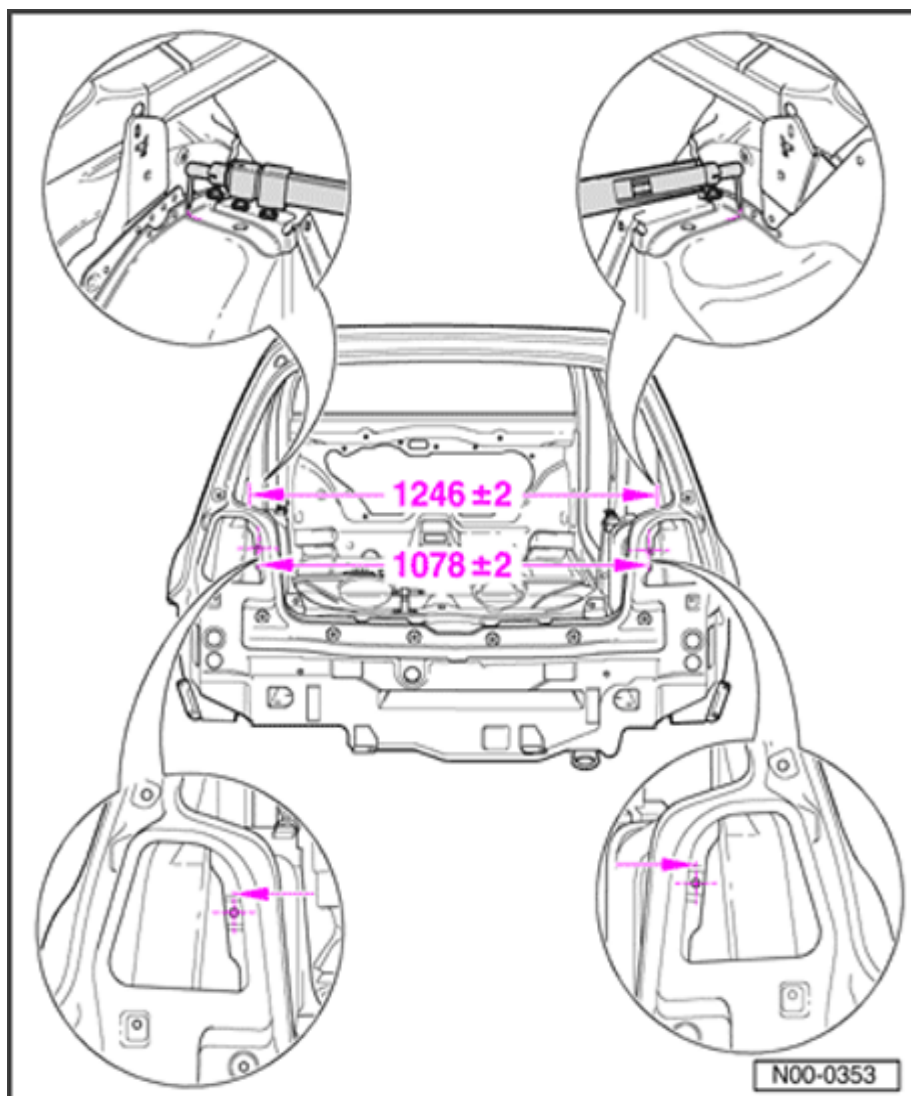
**Dimension
between B-
pillars (4
door)**

00-27

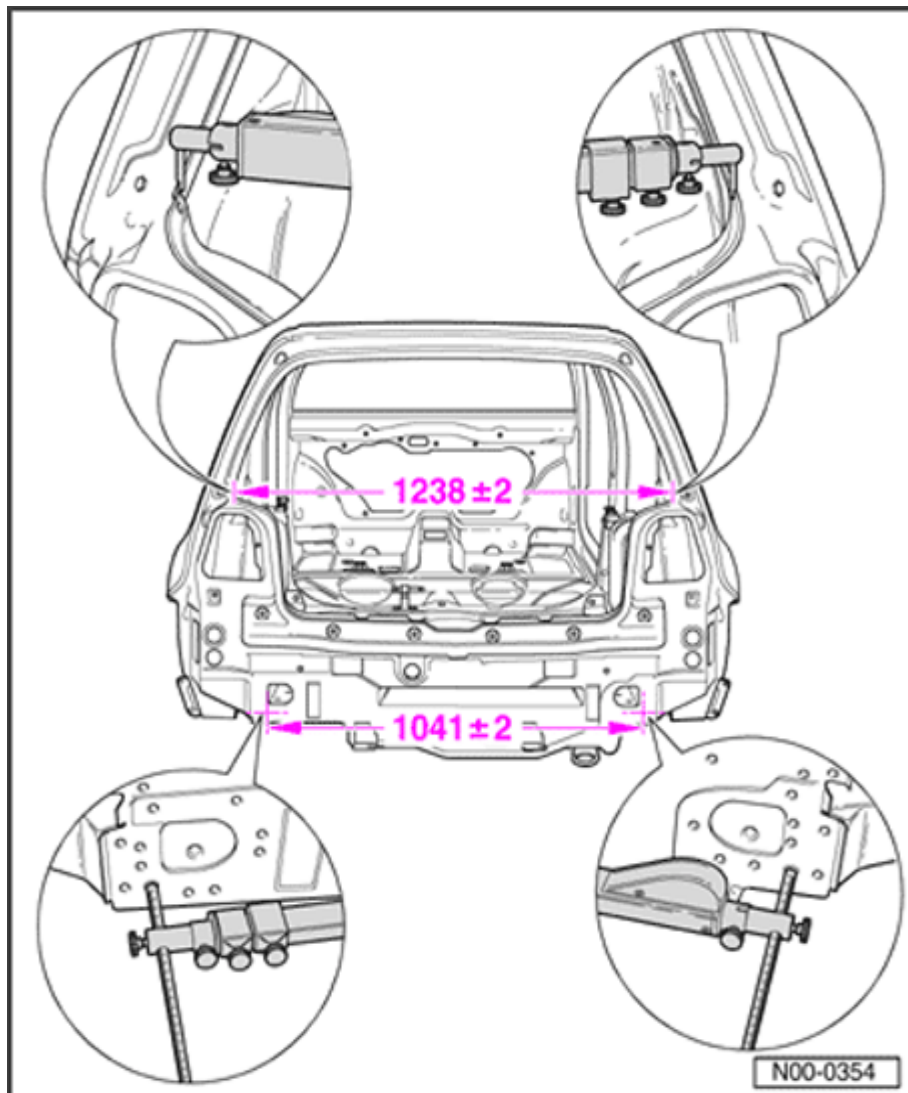


**Dimension
between C-
pillars (4
door)**

00-28

**Body, rear
(Golf)****Dimension
between rear
wheel house****Dimension
between tail
light mounts**

00-29

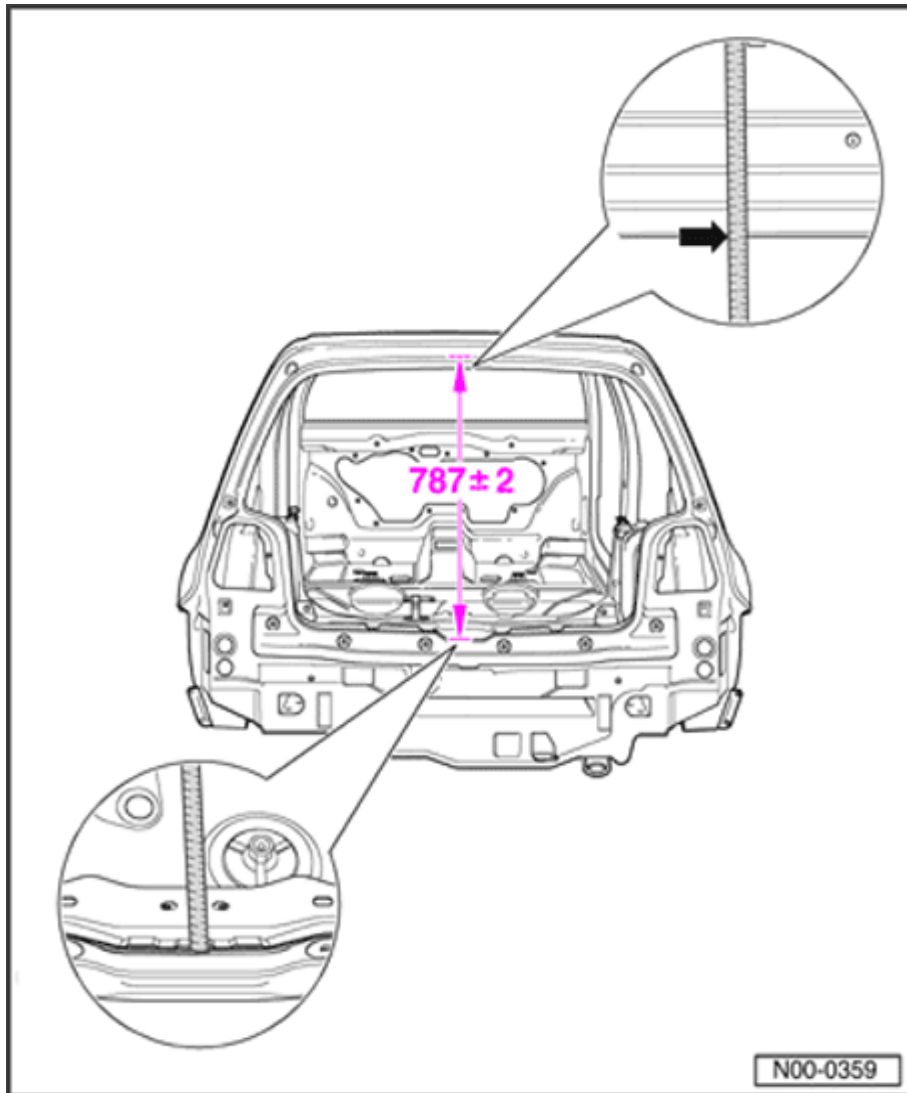


**Trunk width
at opening**

**Dimension
between
bumper
bracket
mounts**

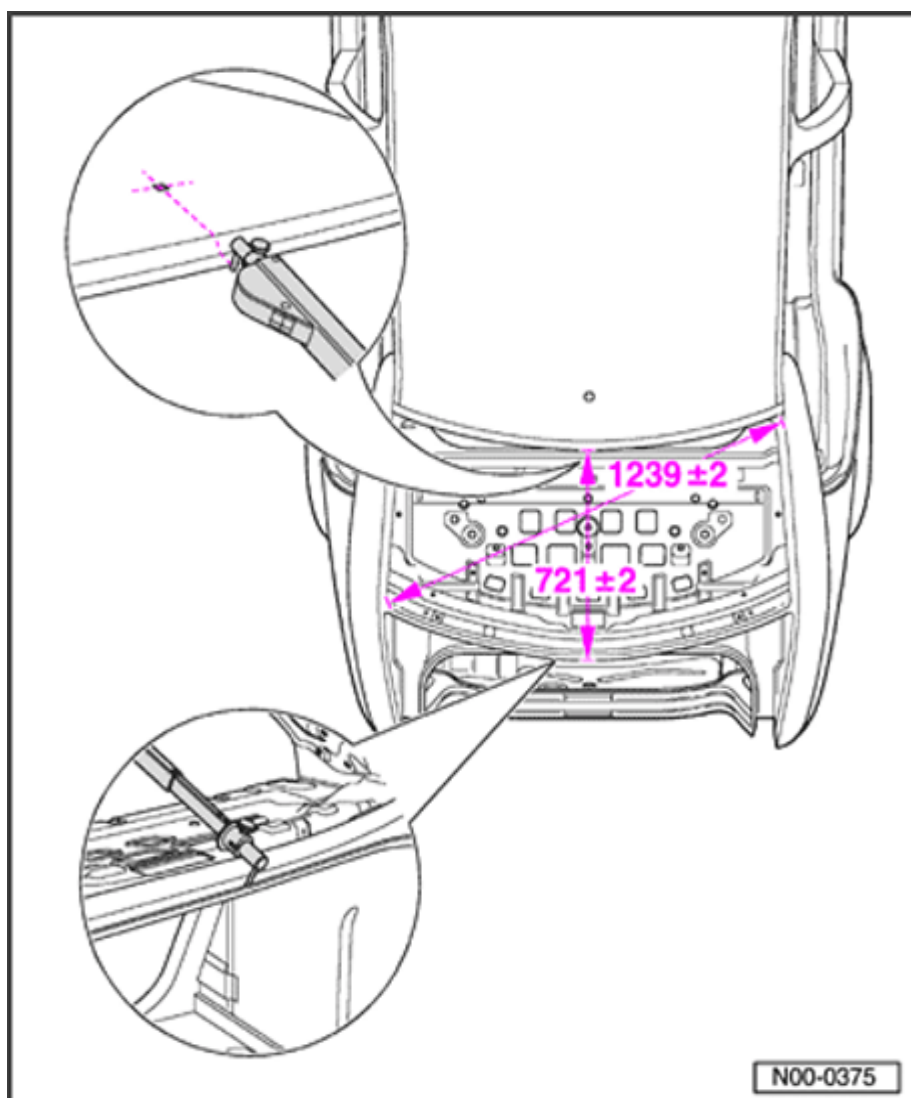
CAUTION!

***Dimensions
only given for
checking
purposes.
The
straightening
fixture
dictates final
figures.***



**Dimension
between
panel
flanges, at
center**

00-31



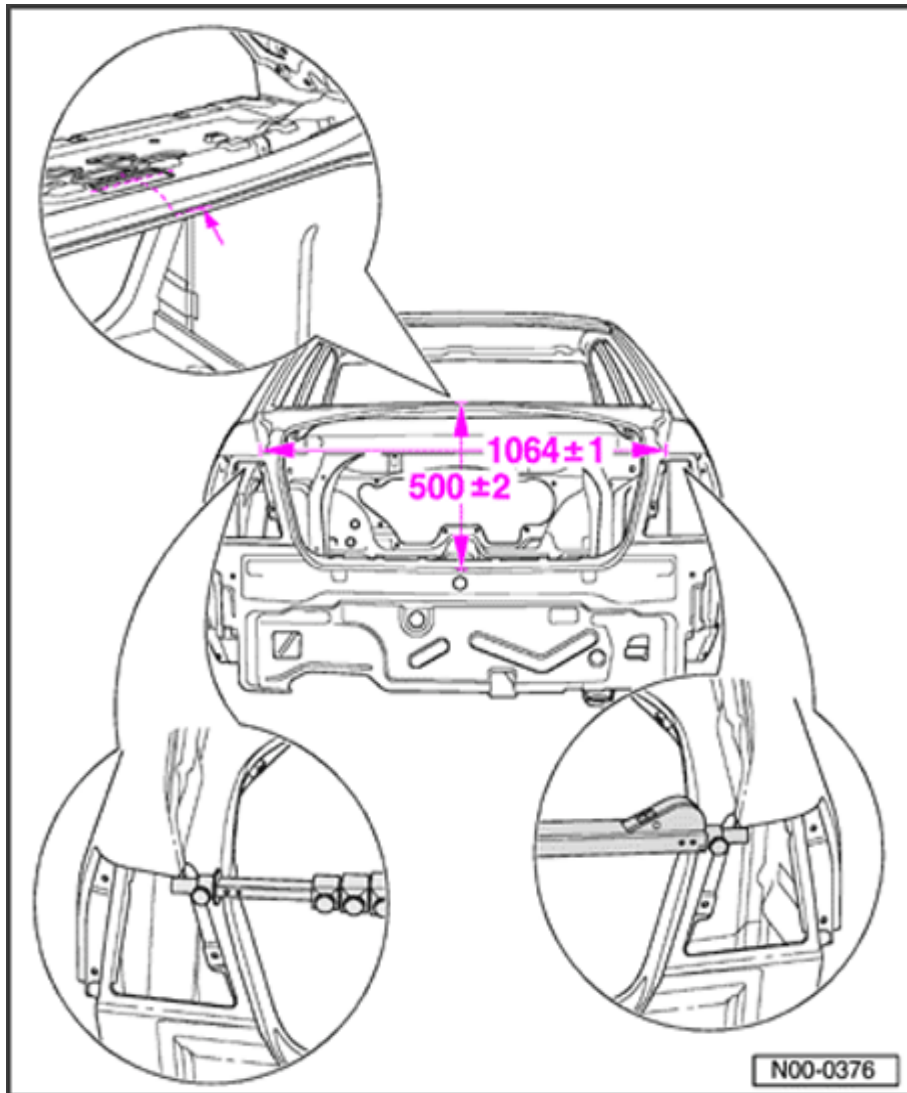
Body, rear (Jetta)

Note:

Front and middle areas of body are the same for Jetta and Golf.

Dimension between window flanges, at center

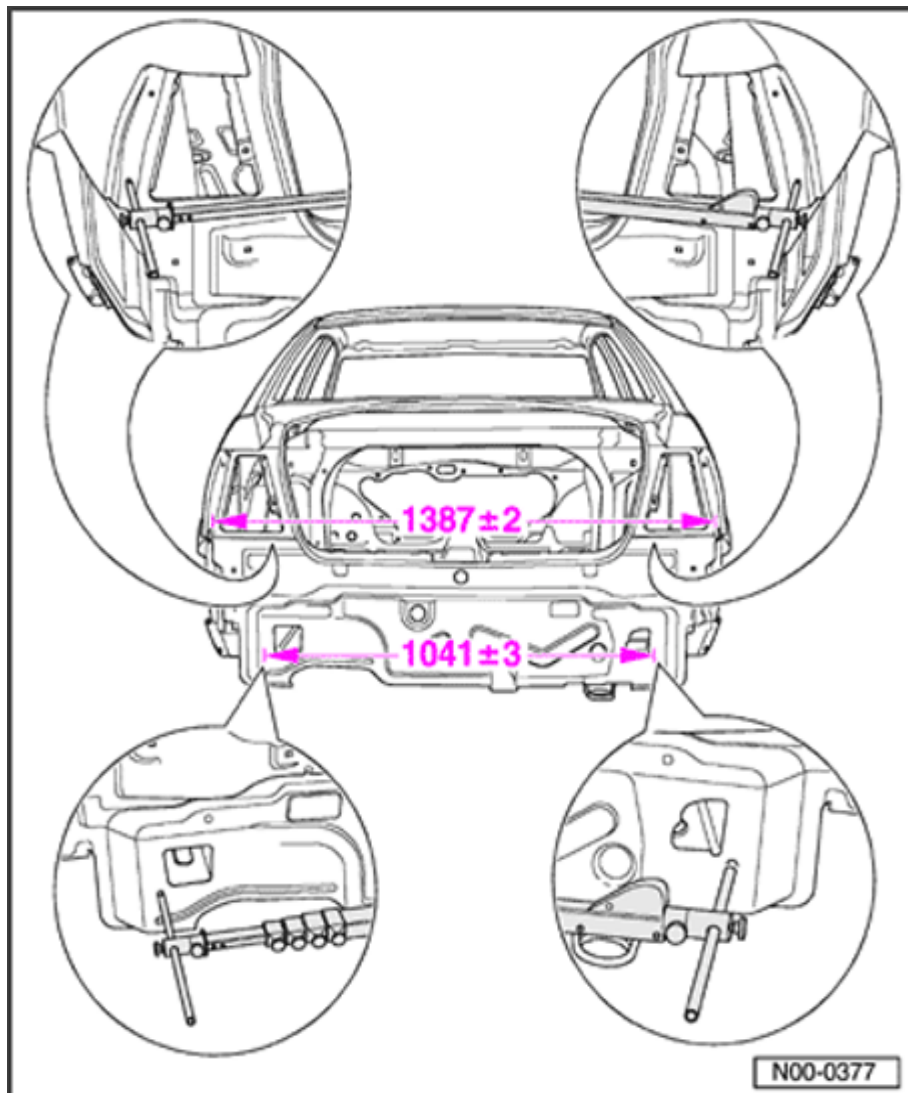
Rear window opening diagonal dimension



**Trunk width
at opening**

**Dimension
between
trunk flanges,
at center**

00-33

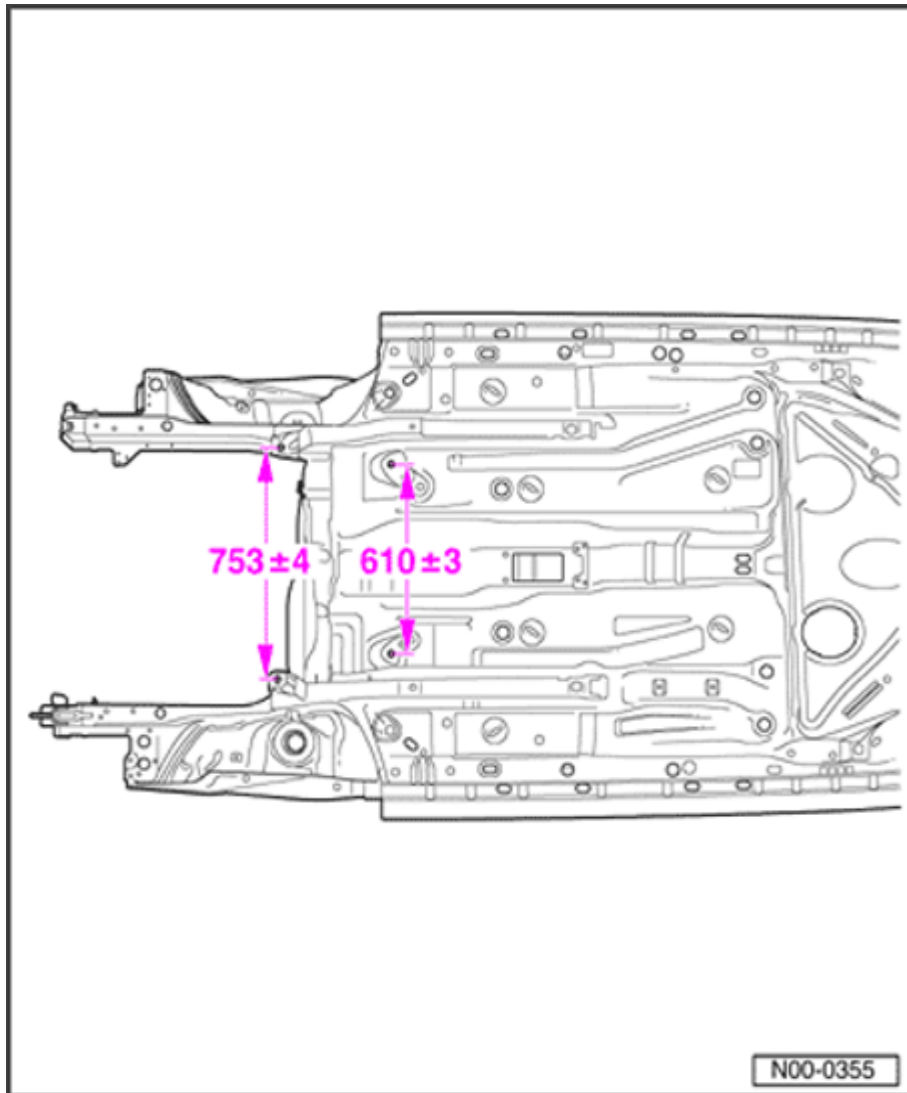
**CAUTION!**

Dimensions only given for checking purposes. The straightening fixture dictates final figures.

Dimension between tail light mounts

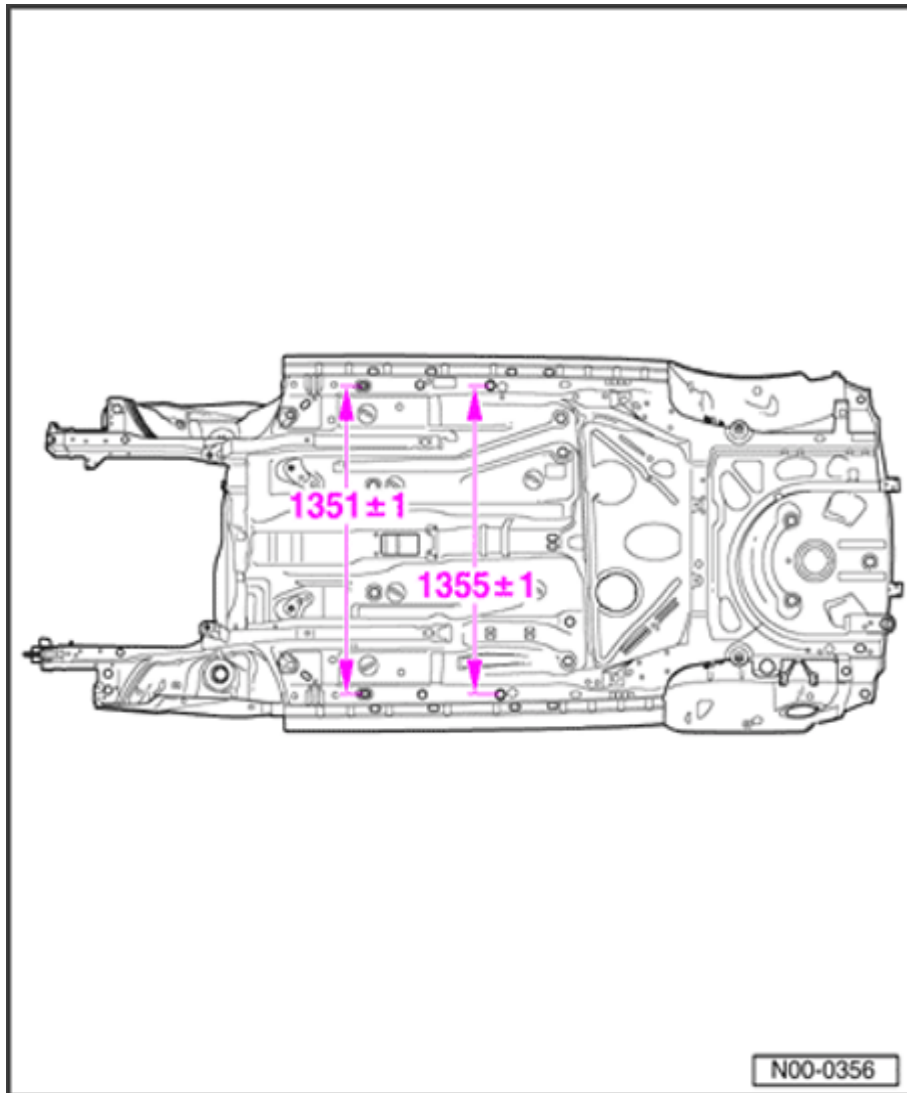
Dimension between bumper bracket mounts

00-34

**Body dimensions****Floor, front*****CAUTION!***

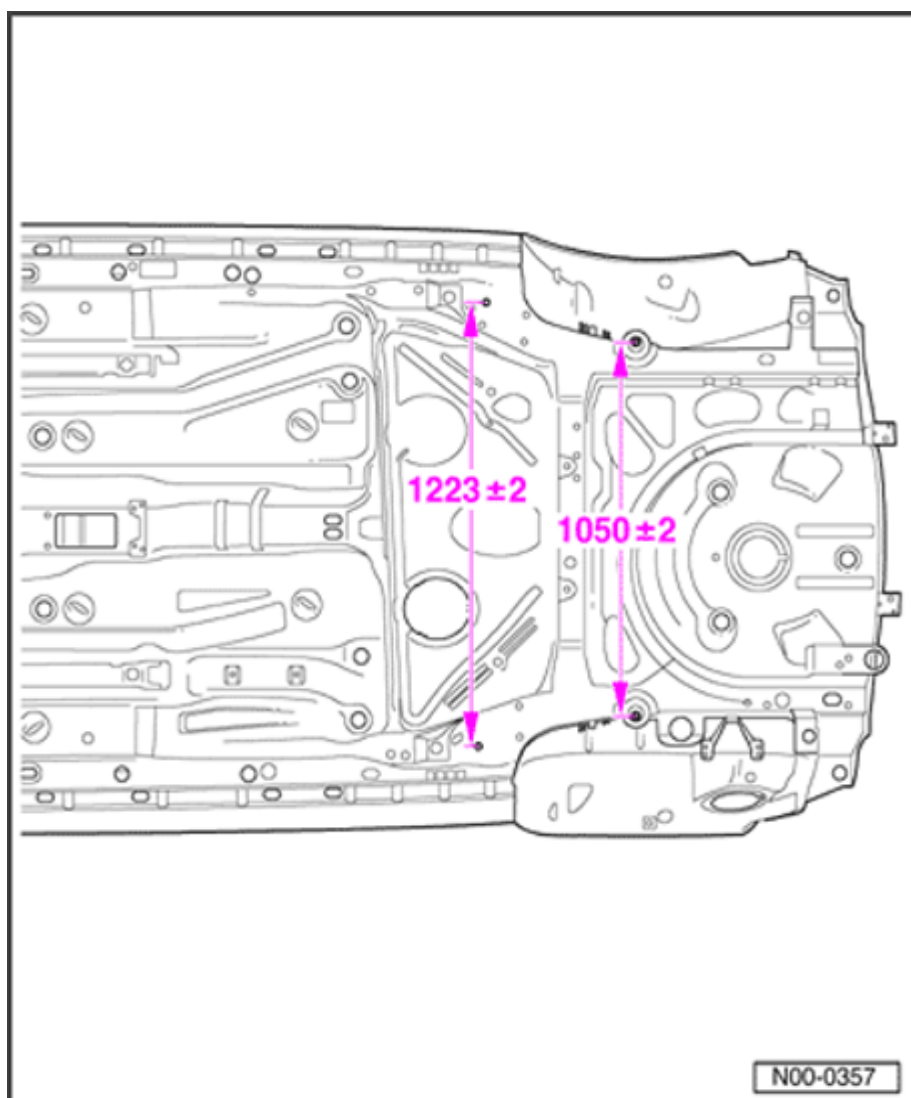
Dimensions only given for checking purposes. The straightening fixture dictates final figures.

00-35

**Floor, center*****CAUTION!***

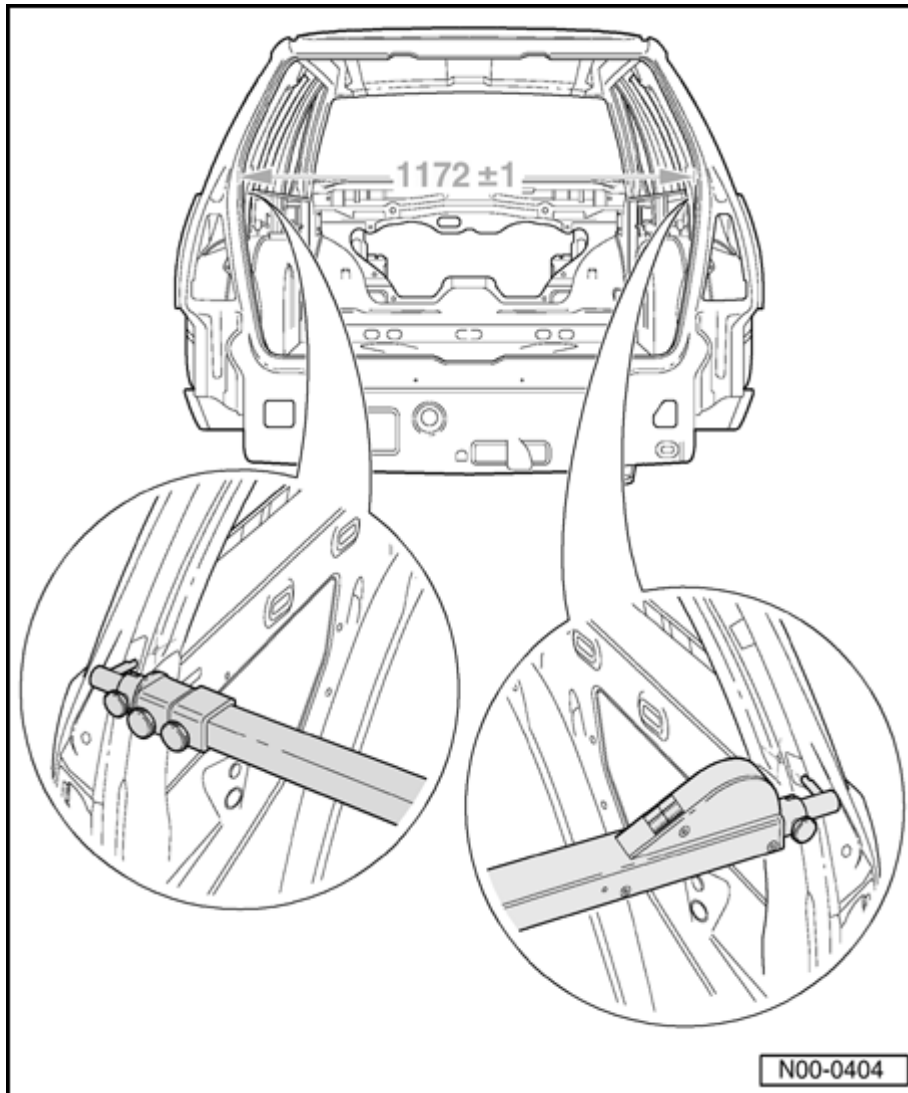
Dimensions only given for checking purposes. The straightening fixture dictates final figures.

00-36

**Floor, rear****CAUTION!**

Dimensions only given for checking purposes. The straightening fixture dictates final figures.

00-37

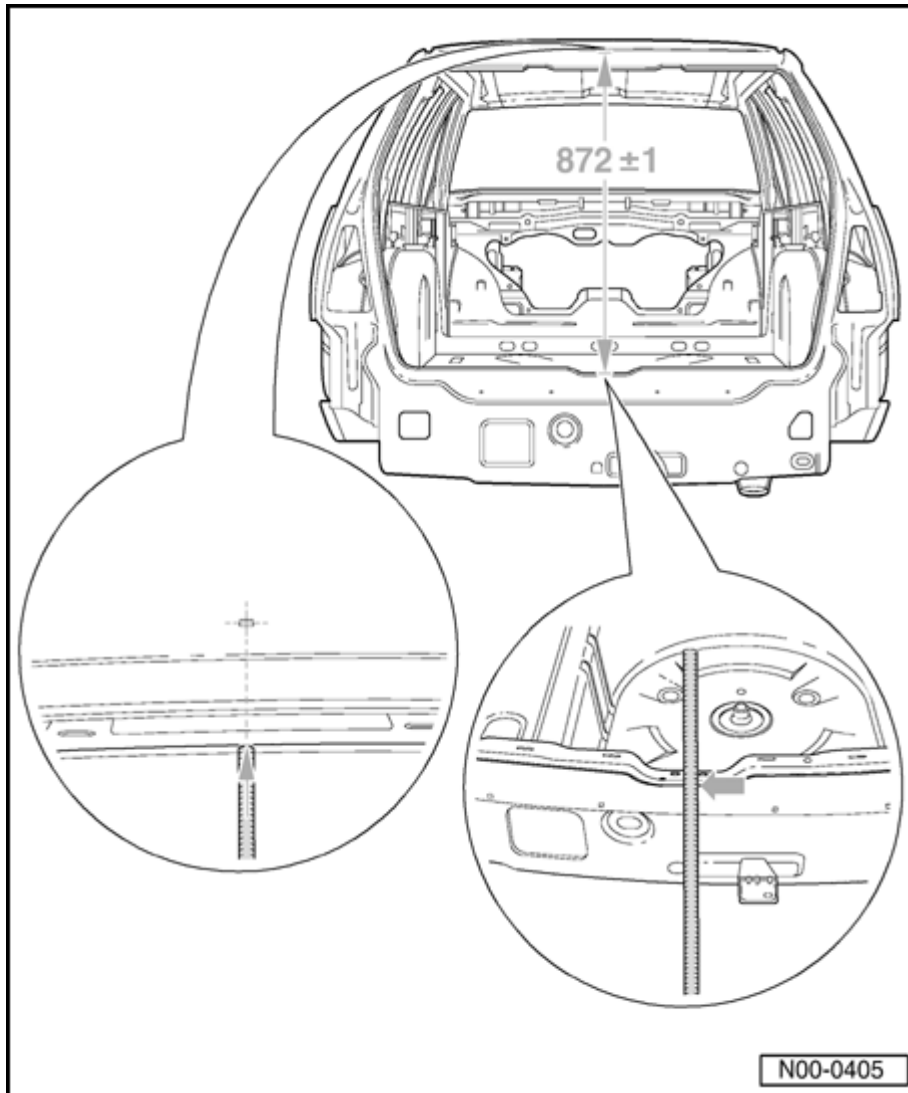


**Body, rear
(Jetta
wagon)**

**Width of rear
lid cutout**

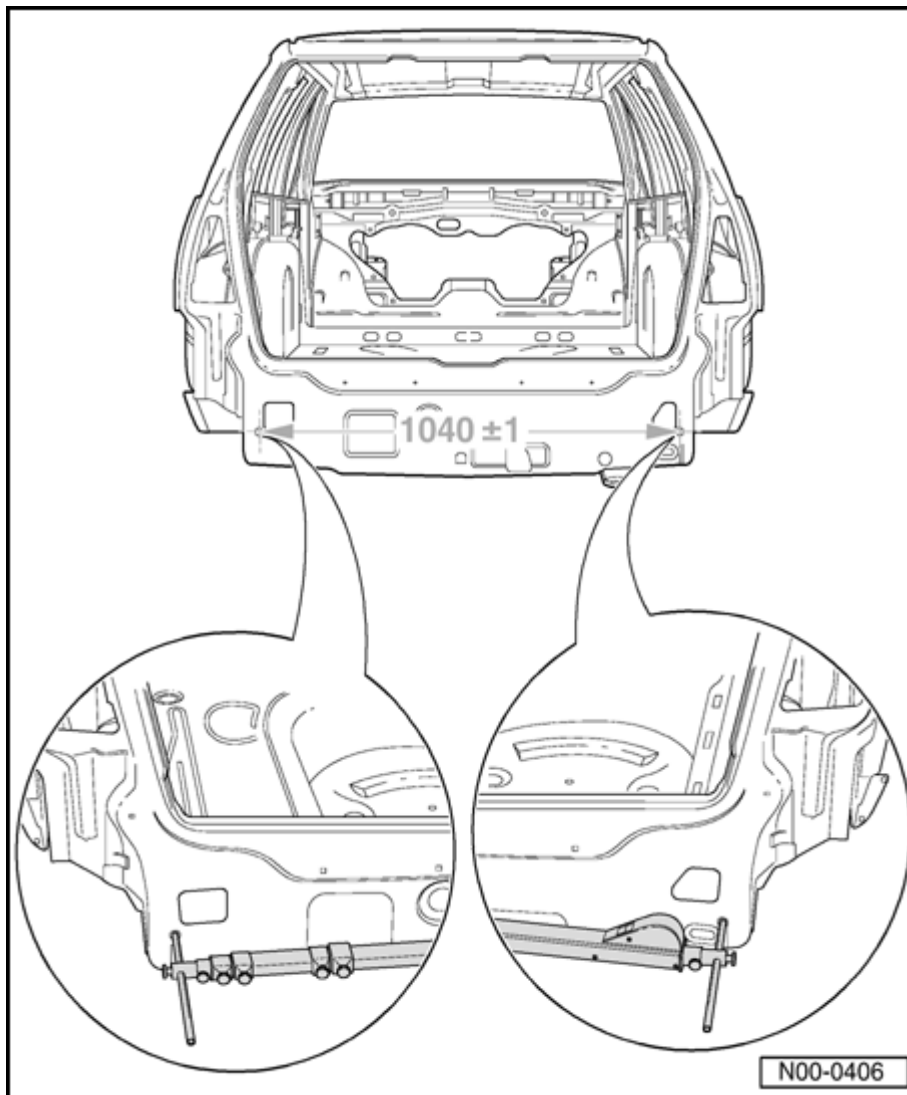
00-38

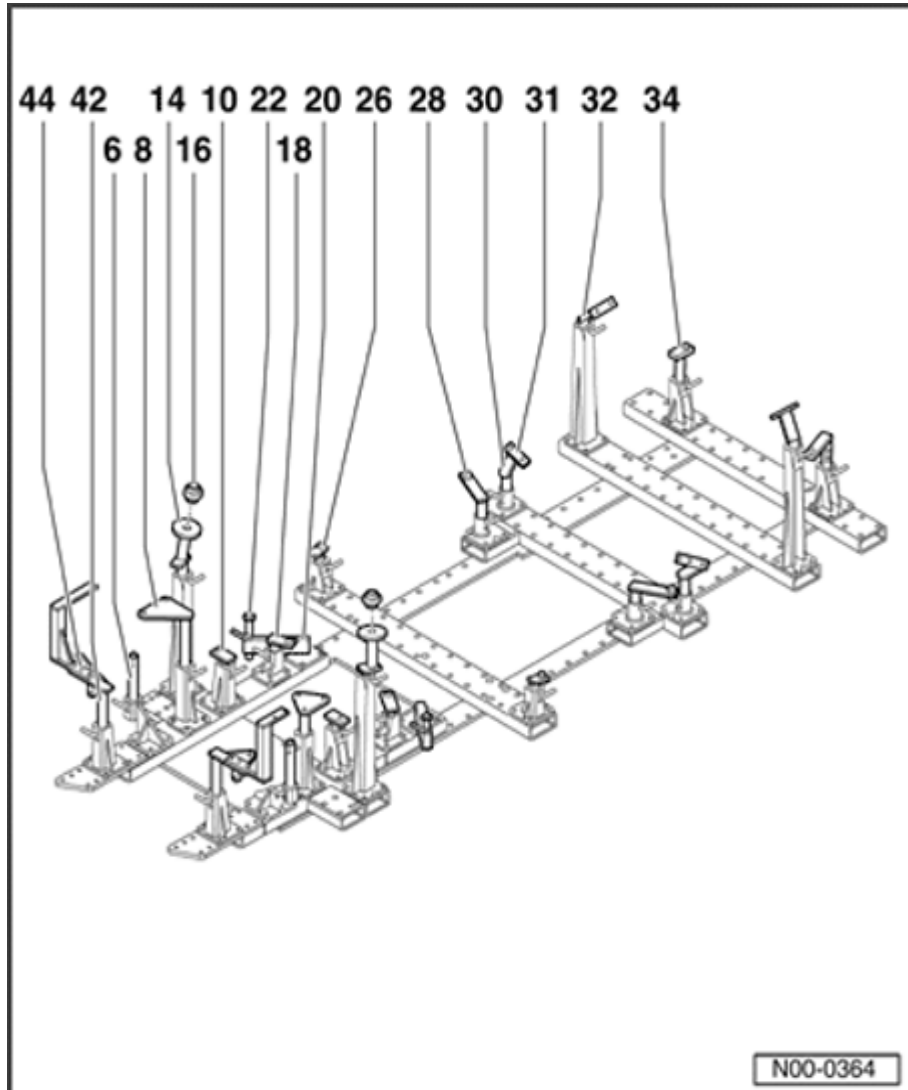
Height of rear lid cutout



00-39

**Distance
between rear
longmembers**



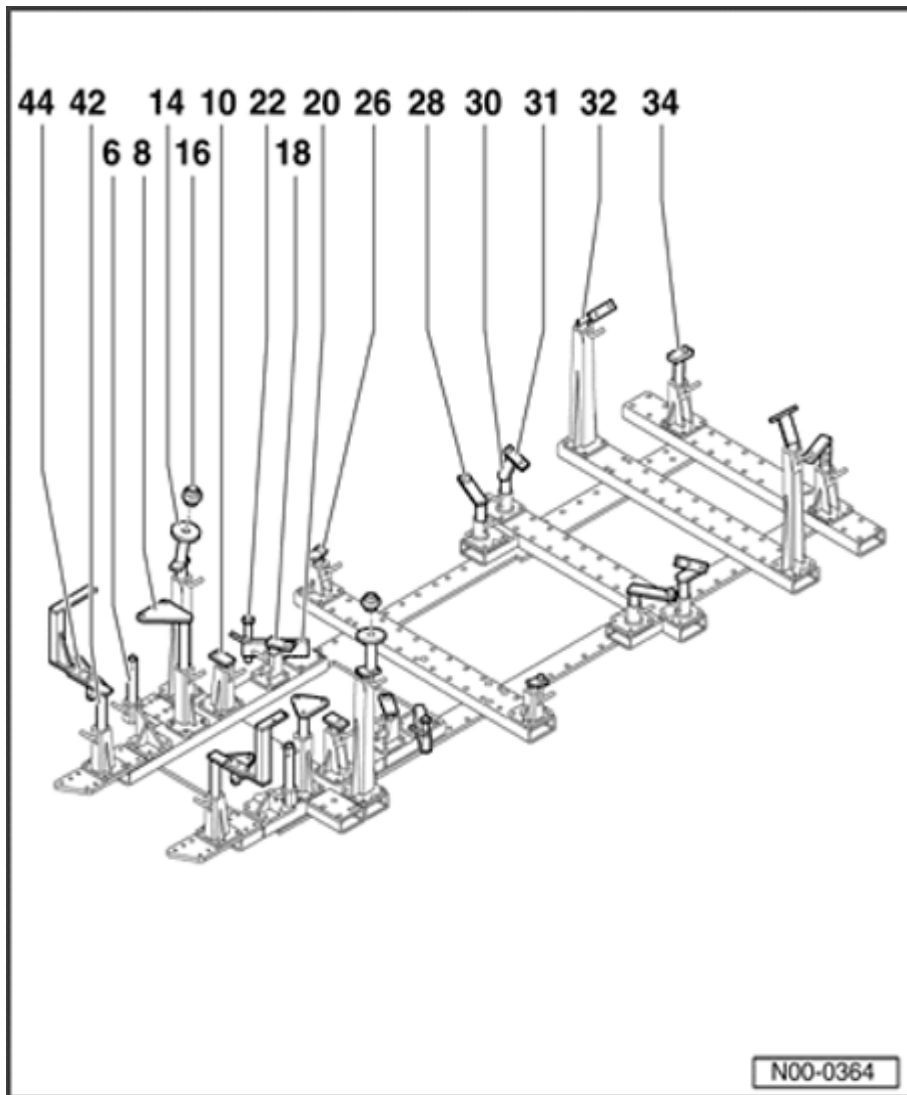


Straightenin fixture

Note:

- ◆ *RW = Angle*
- ◆ *Item numbers in illustration are identical with en numbers on straightening bracket inserts*
- ◆ *For angle required basic size is specified*
- ◆ *VAS 5090 or*
- ◆ *VAS 5020 plus VAS 5020/2 (for Golf/Jetta 1999 ►)*
- ◆ *The following instructions sho right side of vehicle*

00-41



6 - MZ 142

8 - MZ 260

10 - MZ 200

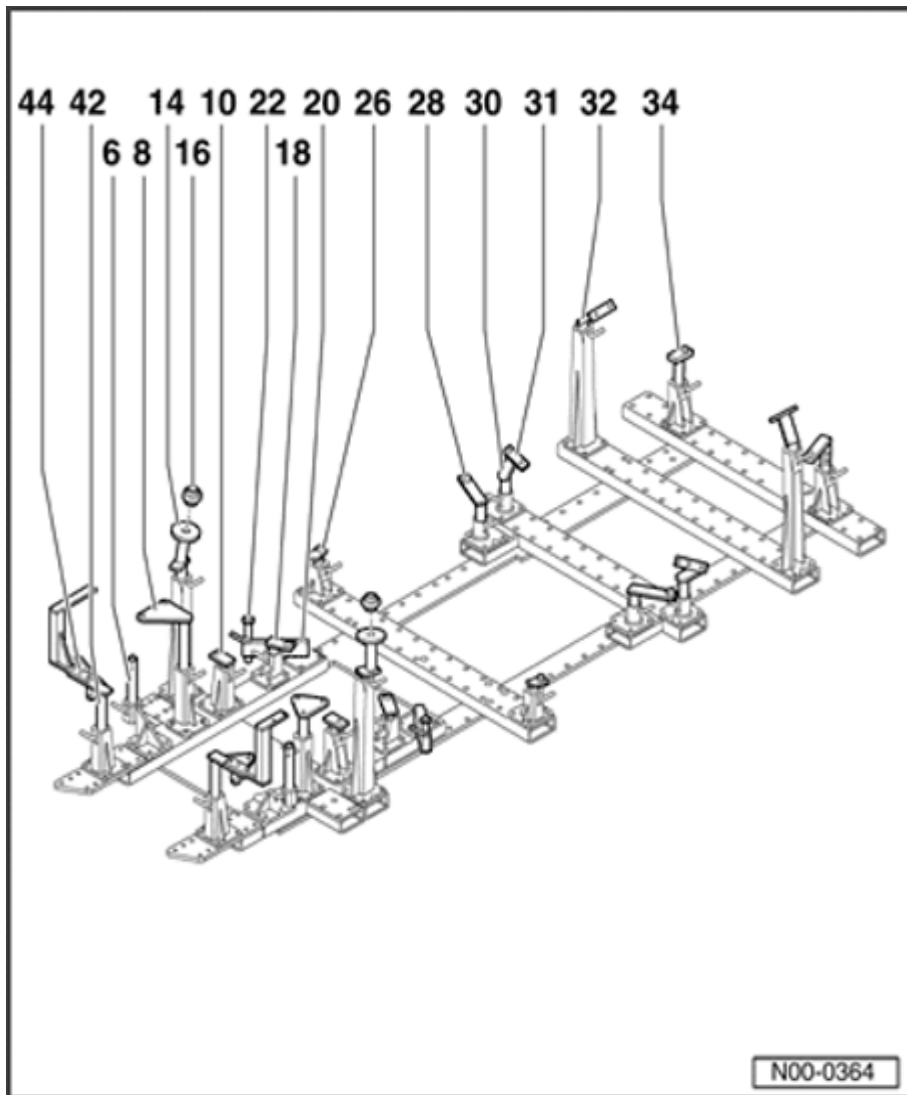
14 - MZ 601

16 - Locating
(centering)
pin, left and
right

42 - MZ 200
and TV 400

44 - On RW -
42-

00-42



18 - MZ 140

20 - Without locating bracket MZ

22 - No locating bracket -20-

26 - MZ 140

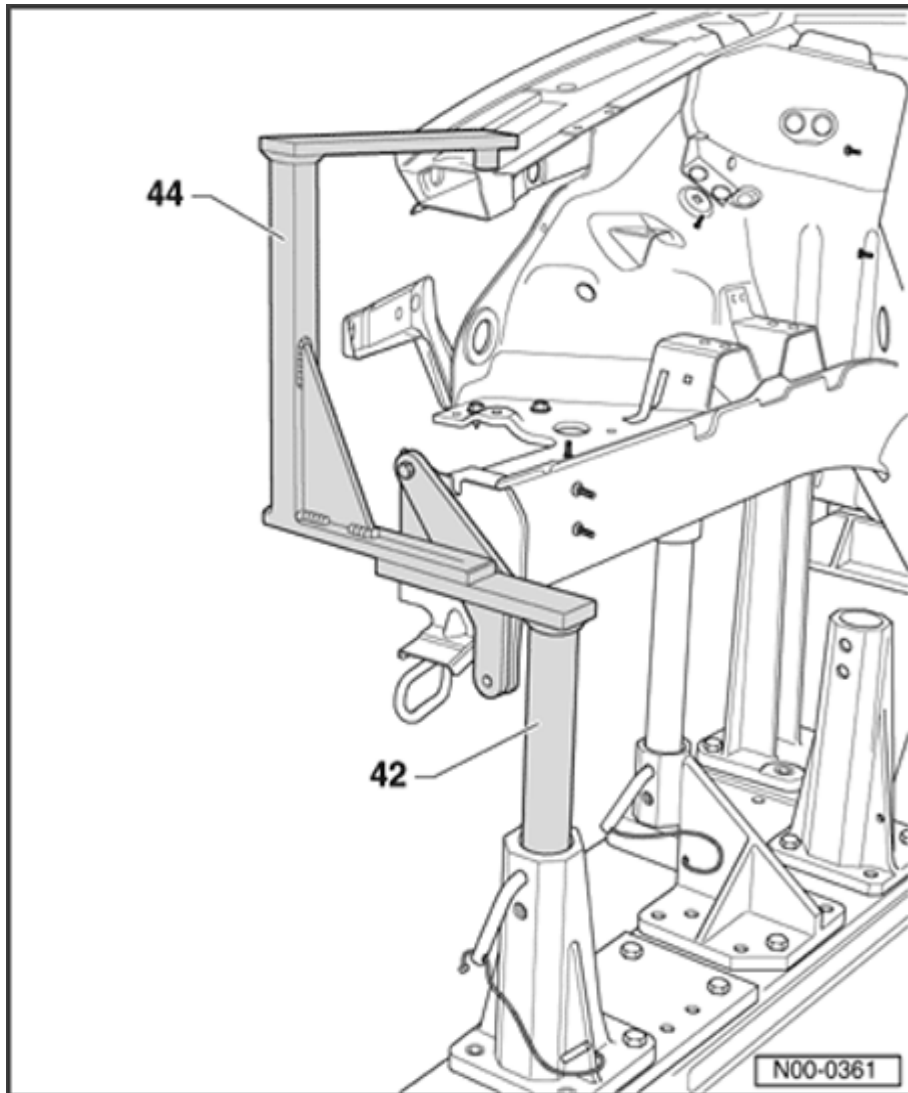
28 - MZ 080

30 - MZ 080

31 - Locating bracket RW - 30-

32 - MZ 602

34 - MZ 200

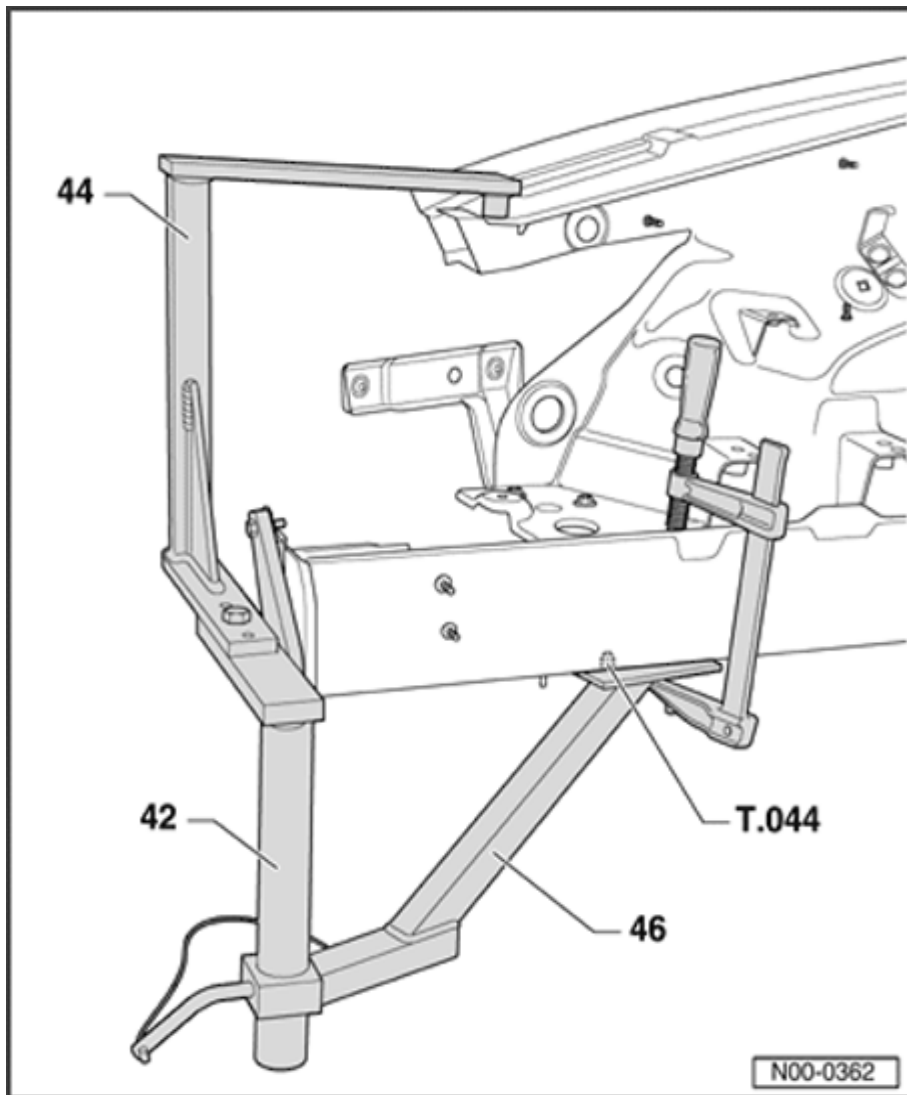


Front alignment brackets (right), overview

42 - RW Front long member

44 - RW Front long member/wheel house upper corner

00-44



42 - RW for Front long member

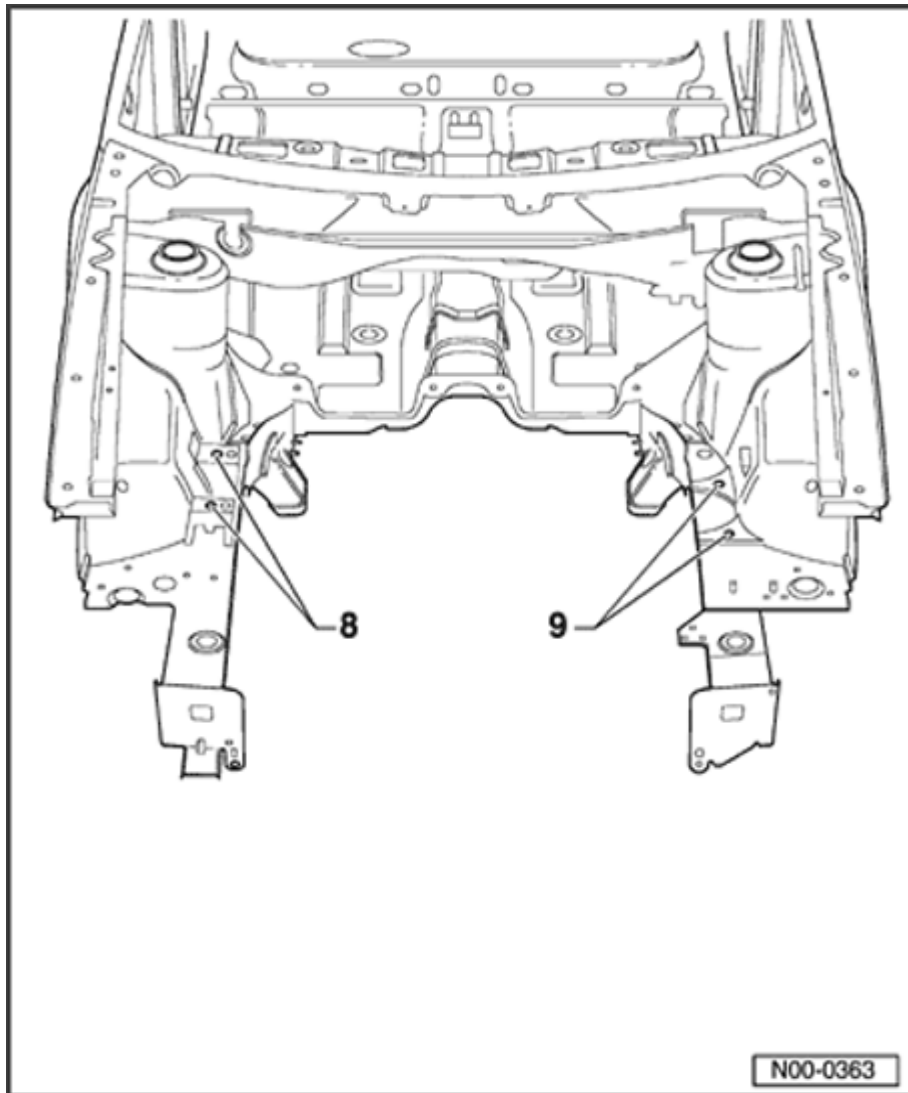
44 - RW for wheel house point

46 - Locating bracket for - 42- and -44-

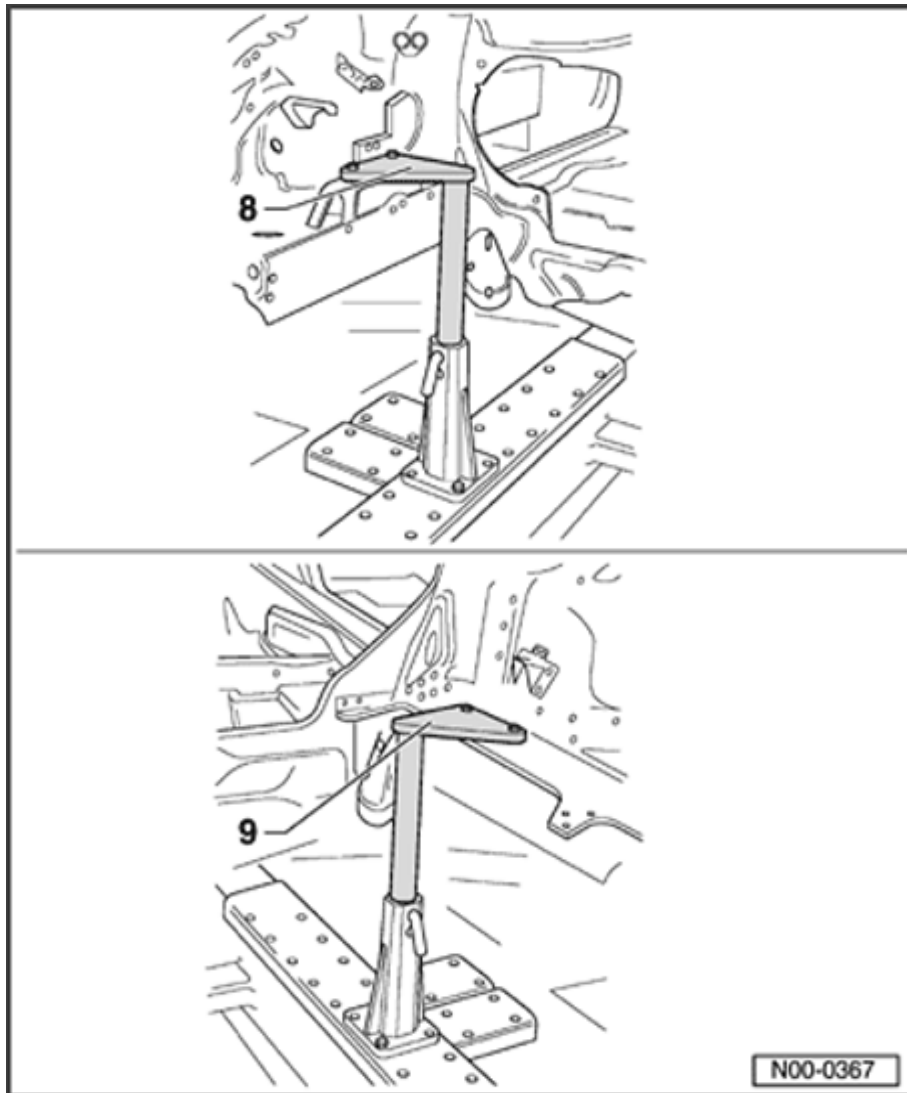
Note:

- ◆ *This combination of angles is used to position wheelhouse point.*
- ◆ *Bracket - 46- is adjusted with thumb screw and bolts -T.044 to long member.*

00-45



**Front
alignment
brackets,
overview**

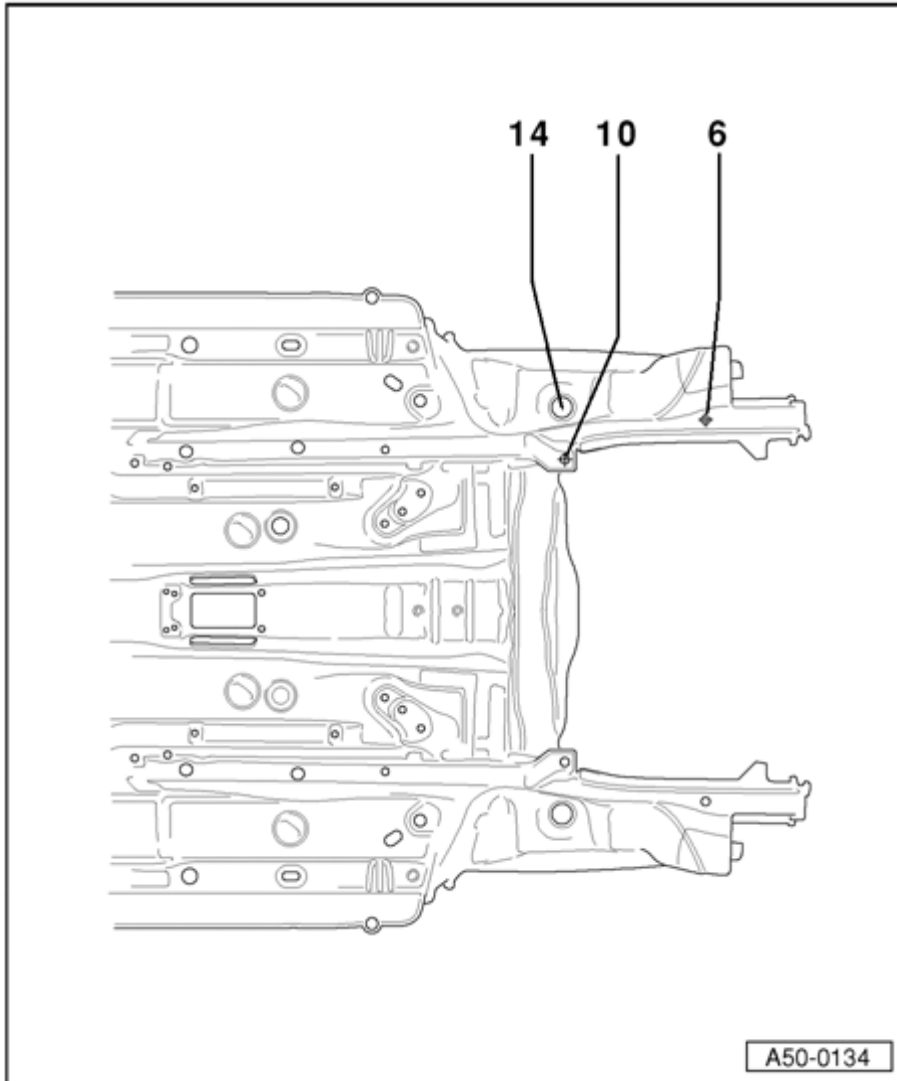


**Front
alignment
brackets,
overview**

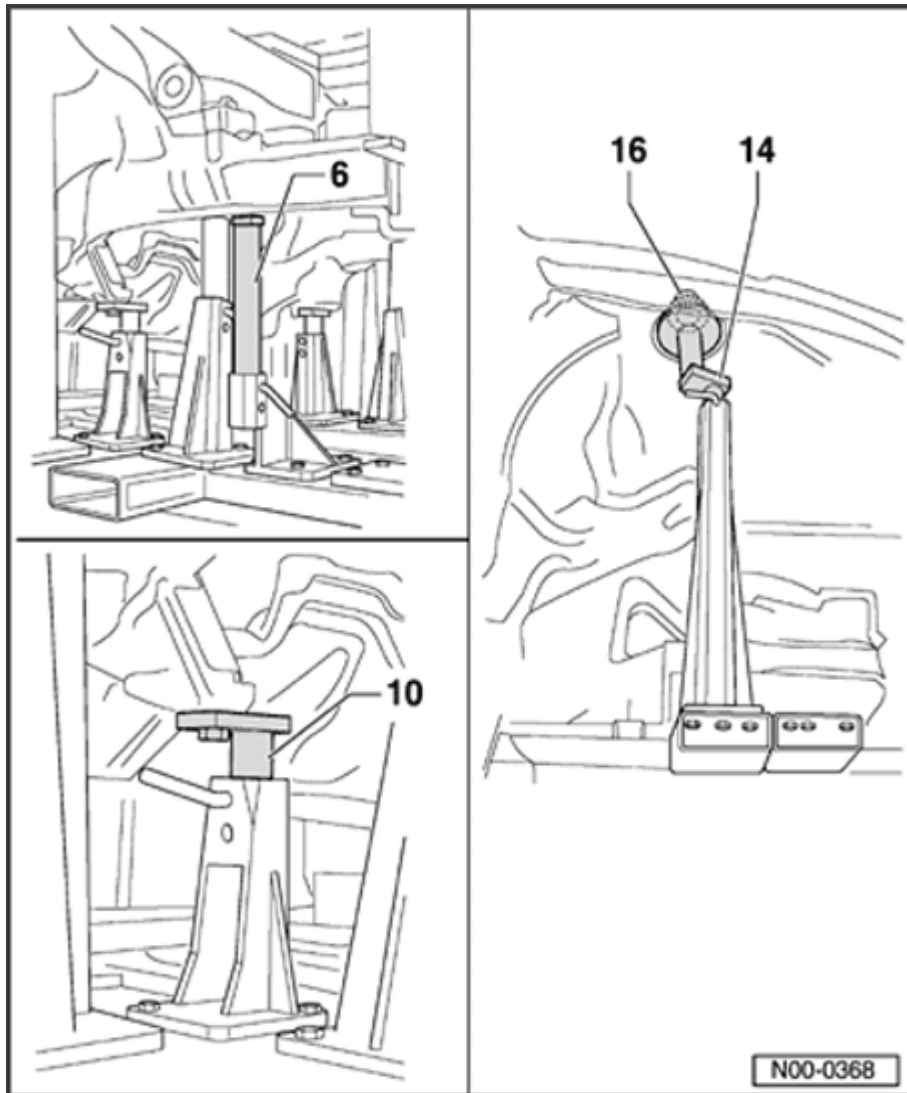
**8 - RW for
engine mount
carrier**

**9 - RW for
transmission
mount carrier**

00-47



**Front
alignment
brackets,
overview**



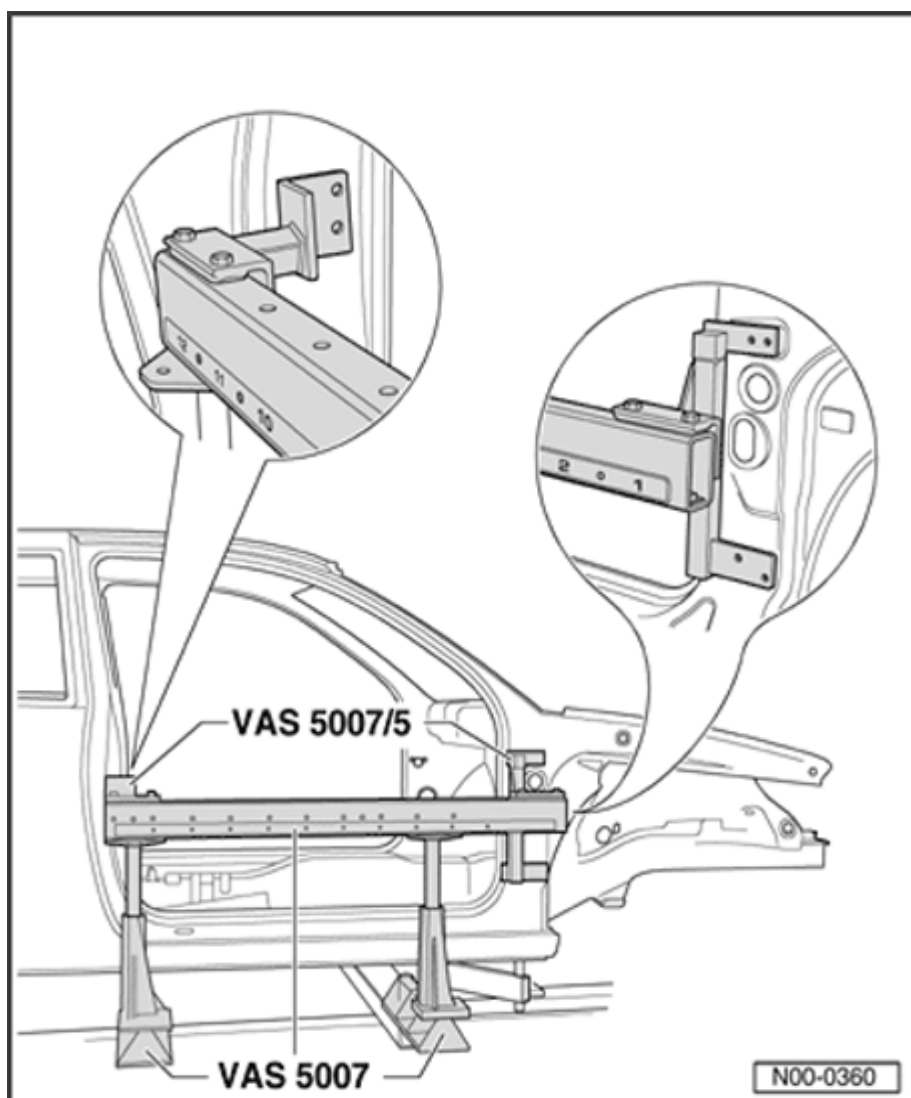
Front alignment brackets, overview

6 - Angle for front long member

10 - Carrier assembly mount

14 - Strut mounting plate

16 - Strut mount

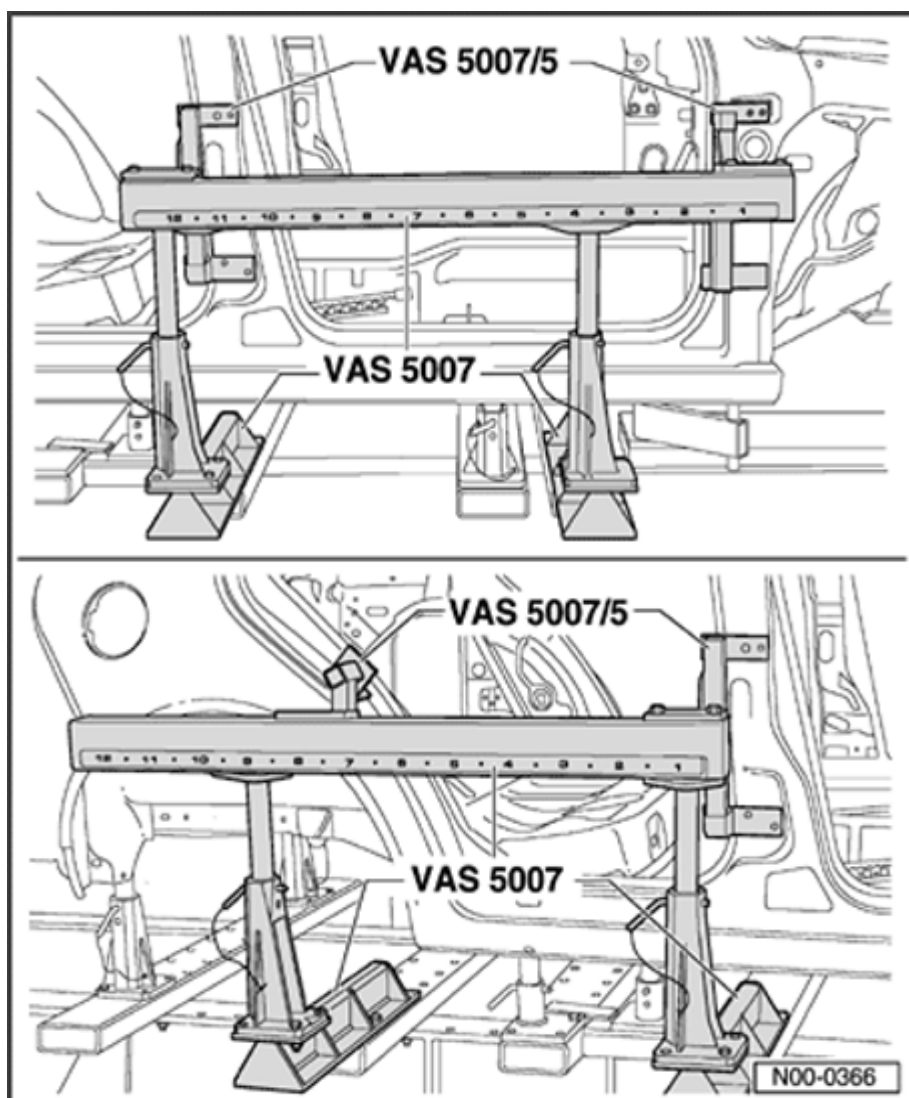


Front alignment brackets center of door (door opening gauge), overview

Note:

The door opening square (or angle) is checked with this tool. Also, the hinges to striker (latch) are checked for alignment to A and B-pillars

00-50

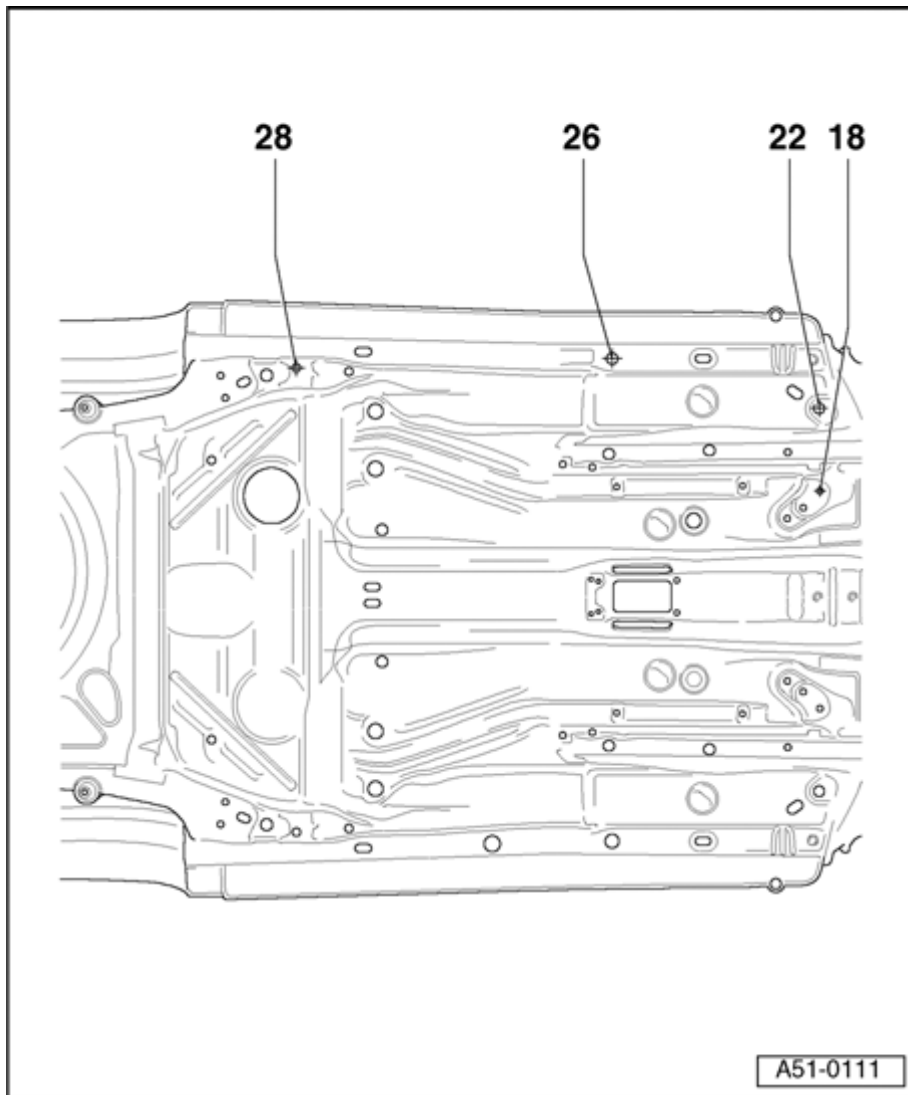


Alignment brackets center of door (door opening gauge), overview

Note:

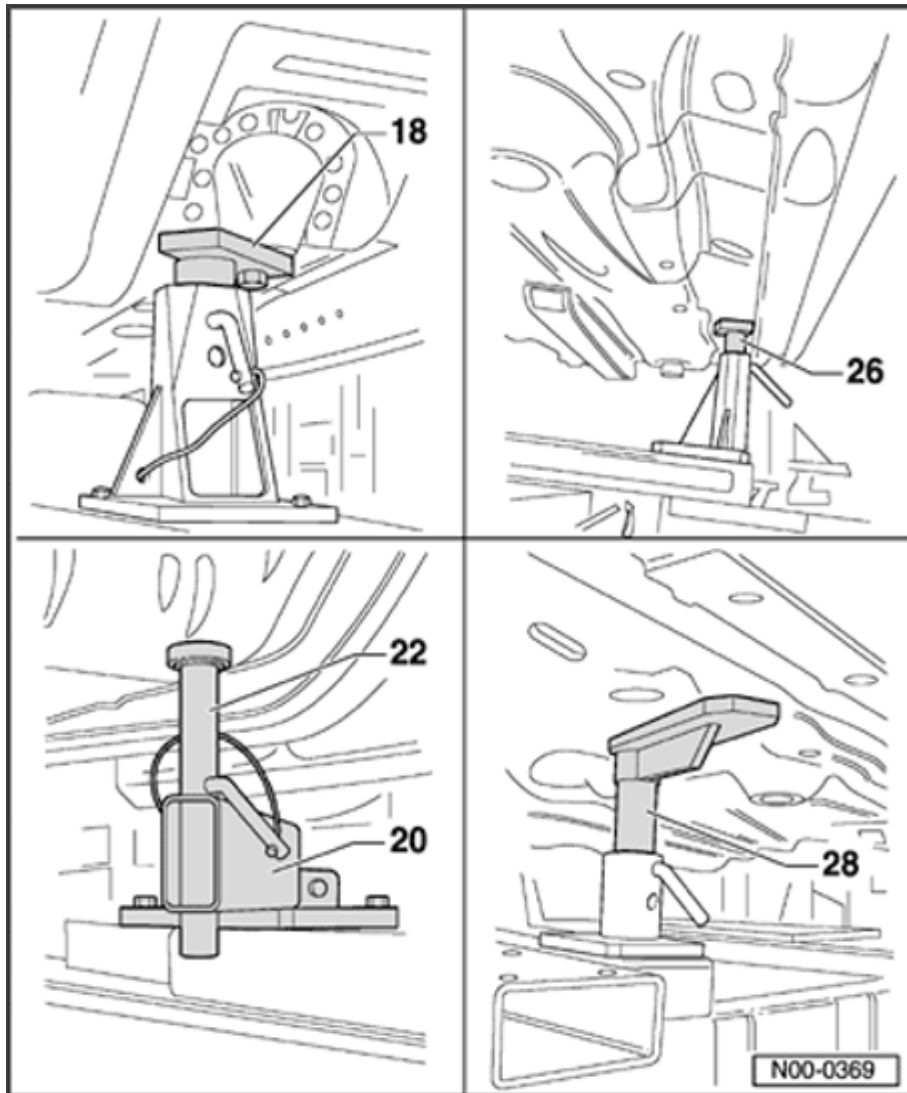
The door opening square is checked with this tool. Also, the hinges to striker (latch) are checked for alignment to A, B and C-pillars

00-51



**Center
alignment
brackets,
overview**

00-52



Center alignment brackets, overview

18 - Locating bracket in long member

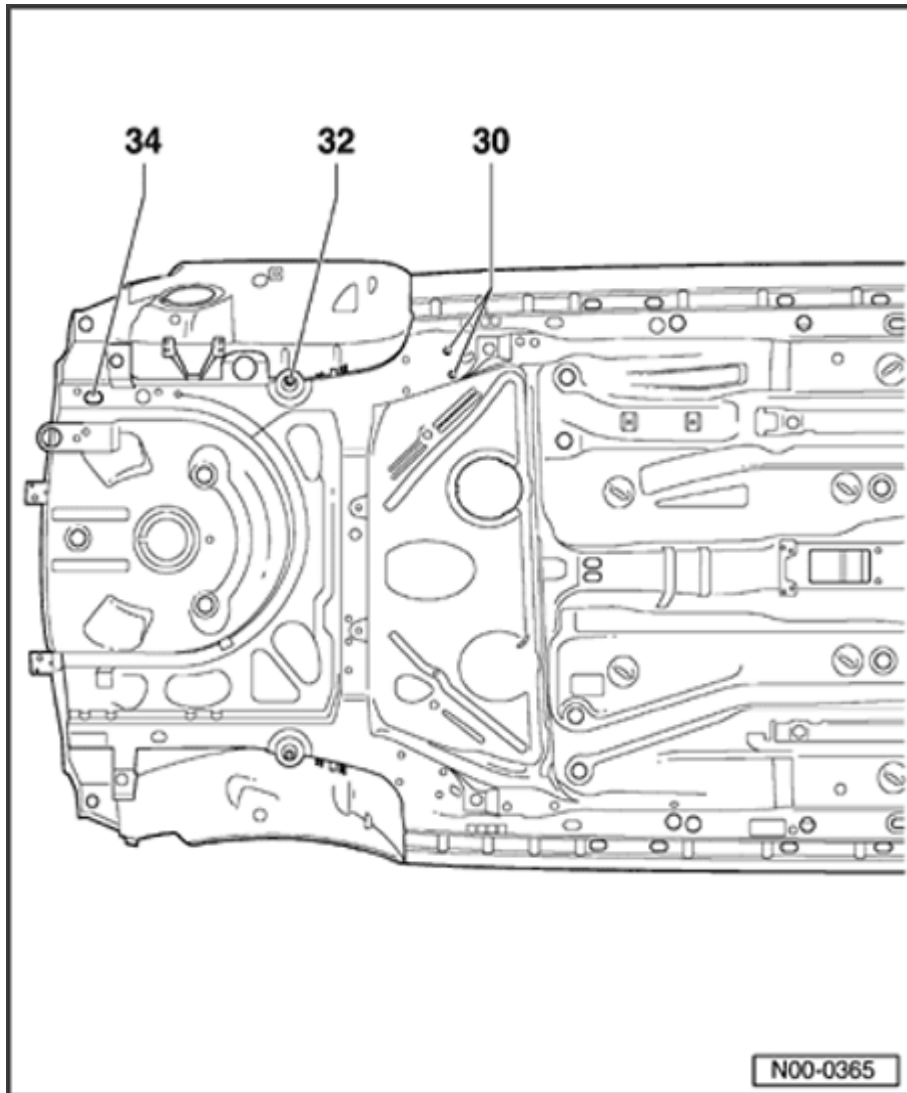
20 - Base for 22

22 - Front production mount, left and right identical

Can be pushed up, use packing up to 4mm (0.15 in.) when measuring if necessary.

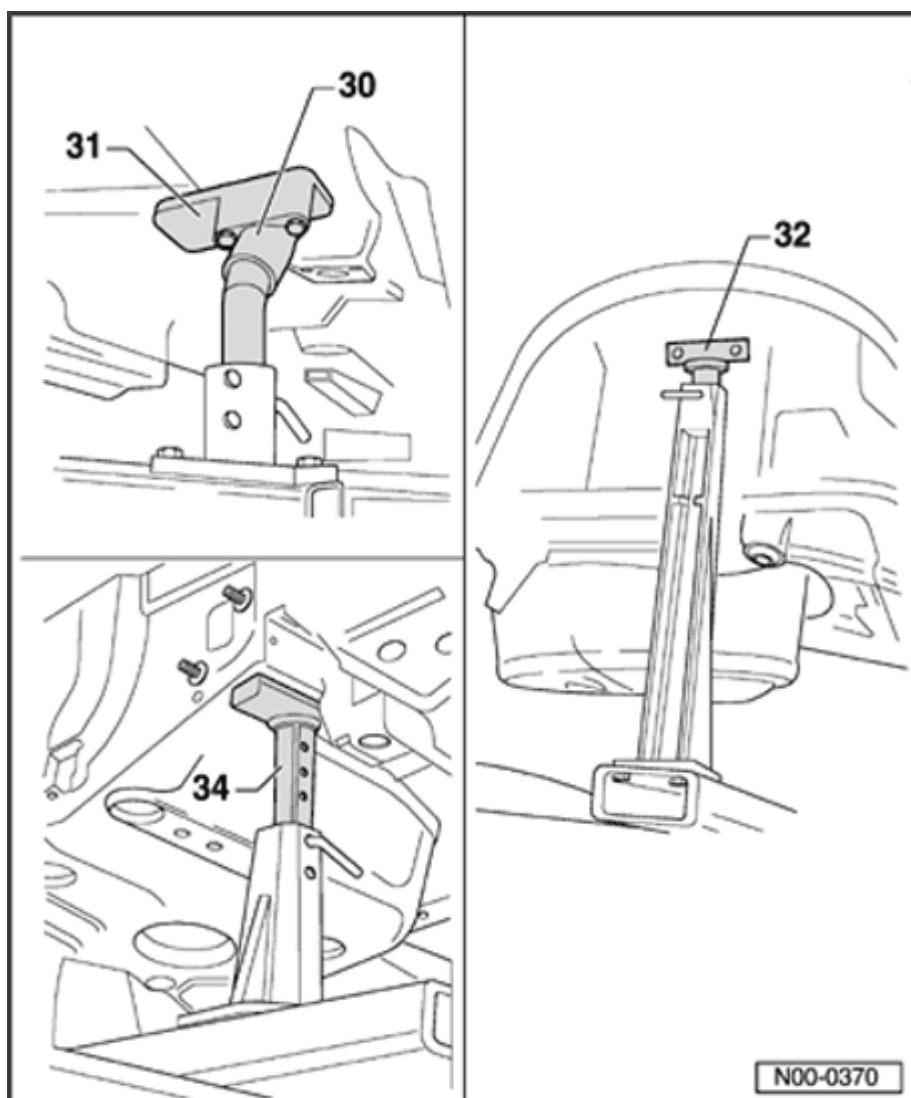
26 - Dimensional check, floor pan locating hole

28 - Locating hole in long member



**Rear
alignment
brackets,
overview**

00-54



Rear alignment brackets, overview

30 - Rear axle mount

- ◆ Stake it after positioning

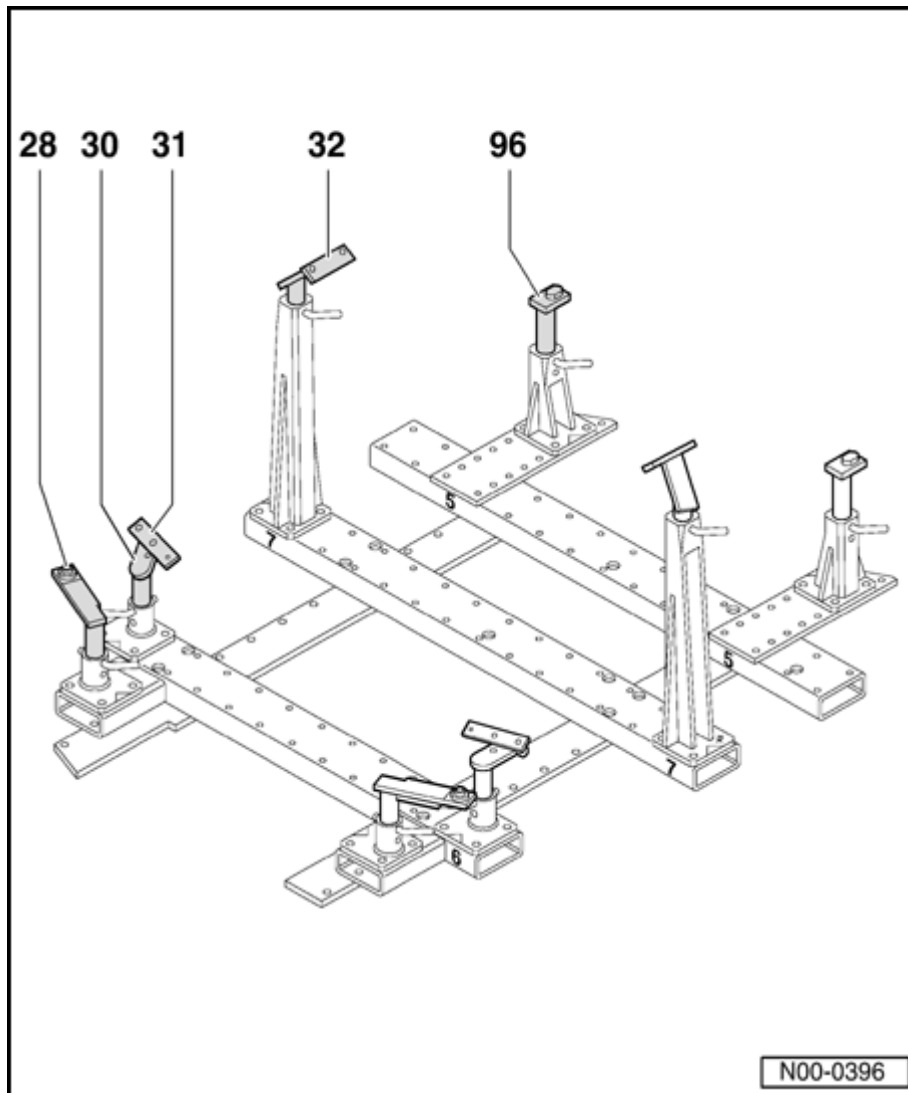
31 - Spacer, left and right

- ◆ Use only with rear axle removed

32 - Suspension strut mount

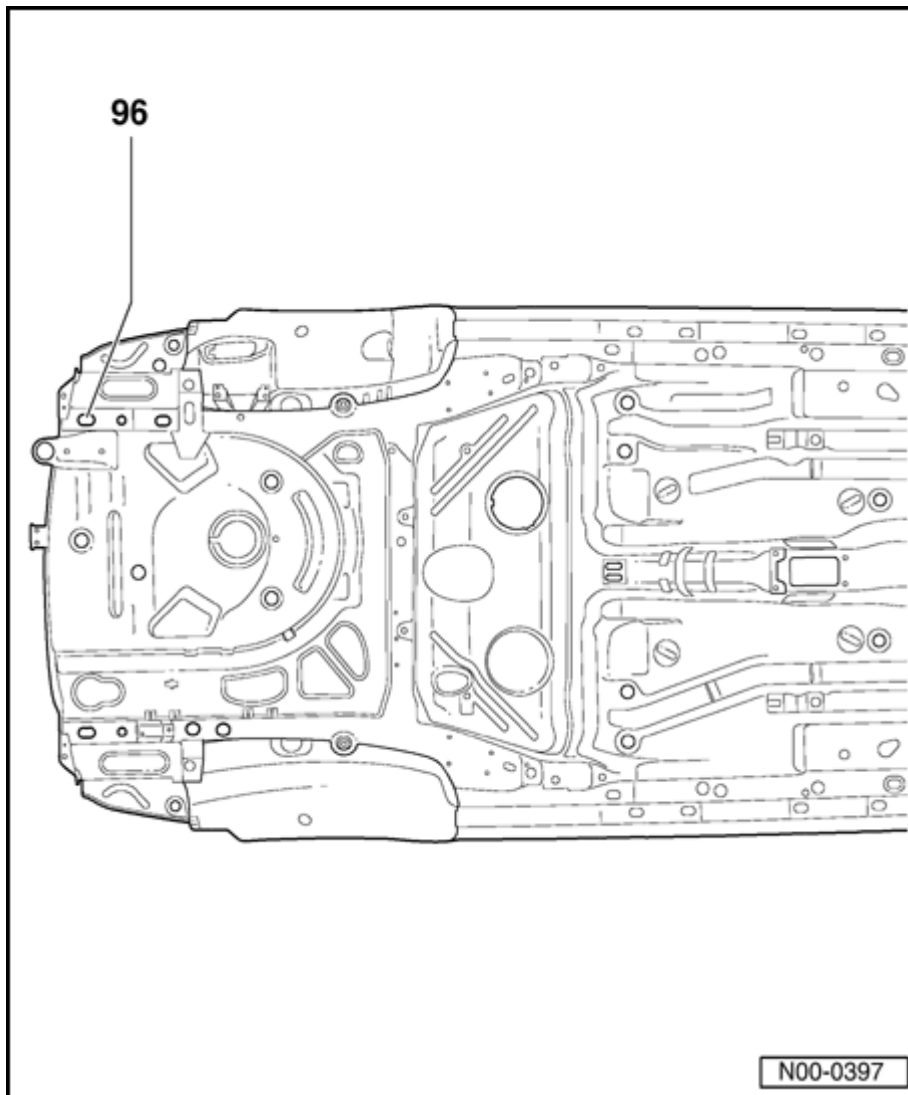
34 - To locate hole in long member

00-55

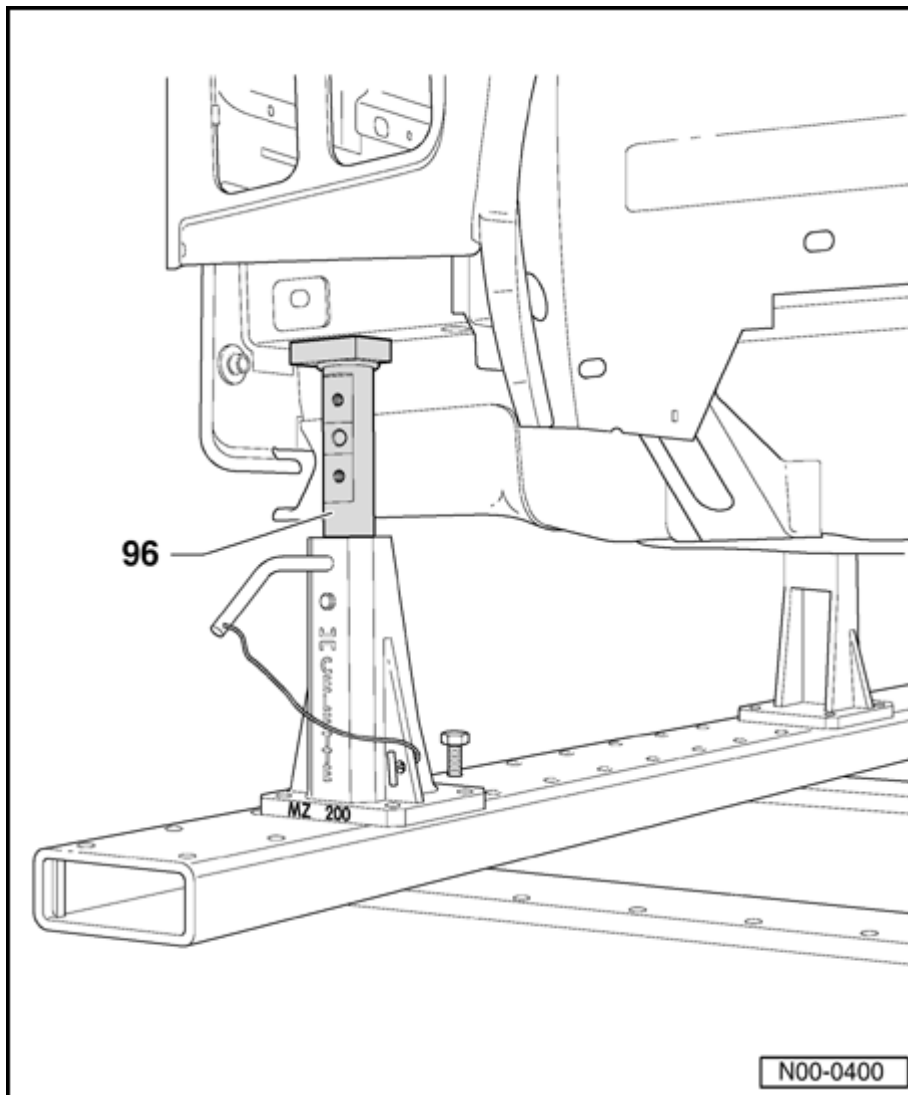
**Jetta wagon****Note:**

- ◆ *Body options:*
 - ◆ *VAS 5020/3, additional Jetta/Jetta Wagon*
- 96 - MZ 200 and TV 400**

00-56

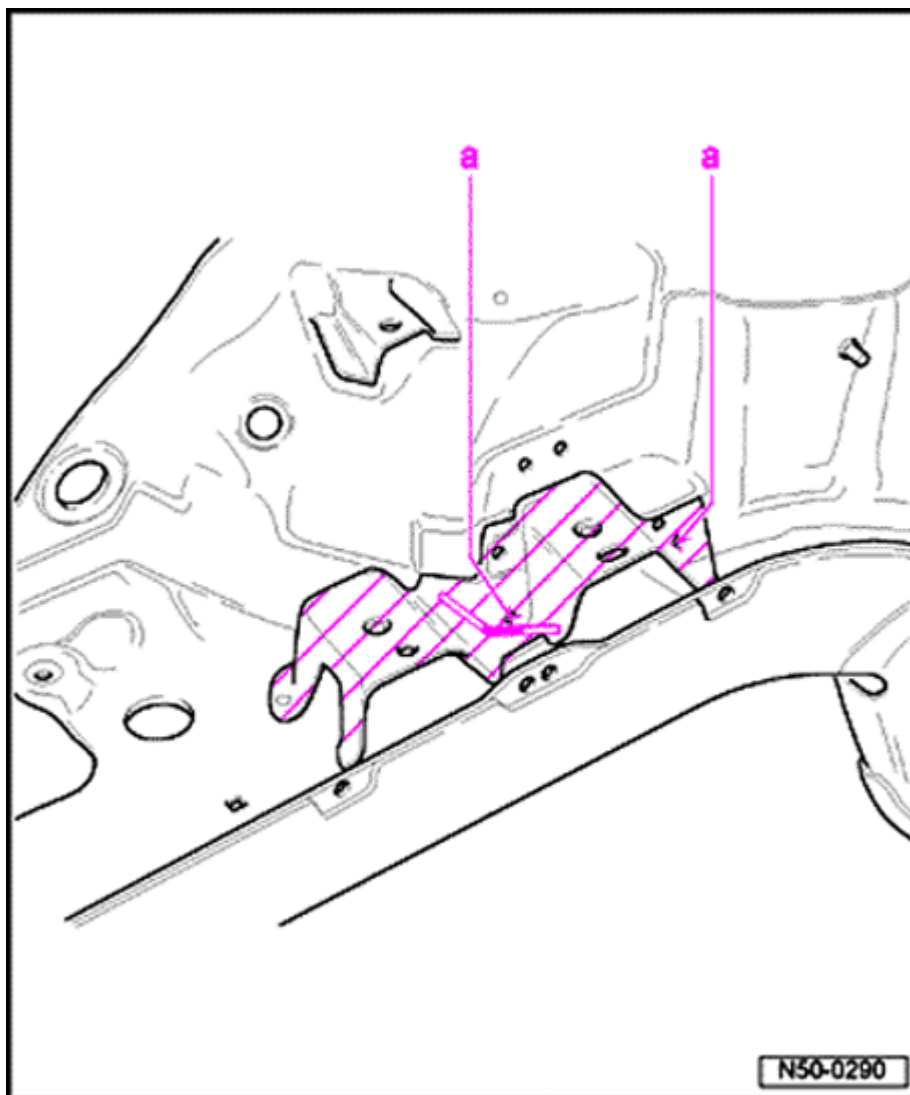


**Overview of
alignment
bracket
positions,
rear**



**Overview of
alignment
bracket
positions, rear**

**96 Mount for
- hole in
longmember,
rear**



50 40 55 50 Engine mount bracket, replacing

Right engine mount bracket

Cutting location

- Separate engine mount bracket.
- Separate original joint.
- Remove front section.
- Drill out welding points -a-, 7 mm dia. (0.275 in.).
- Remove excess material

Replacement part

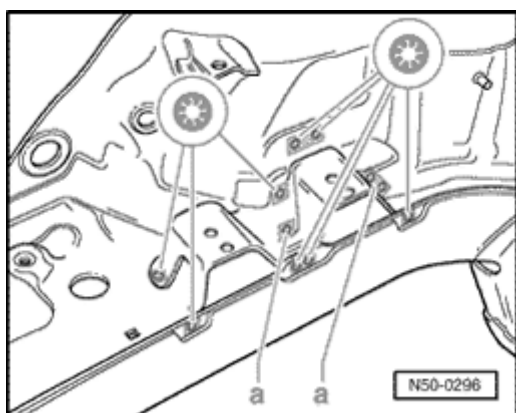
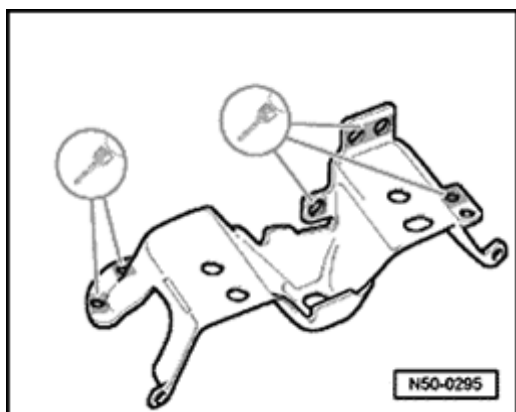
- ◆ Engine mount bracket

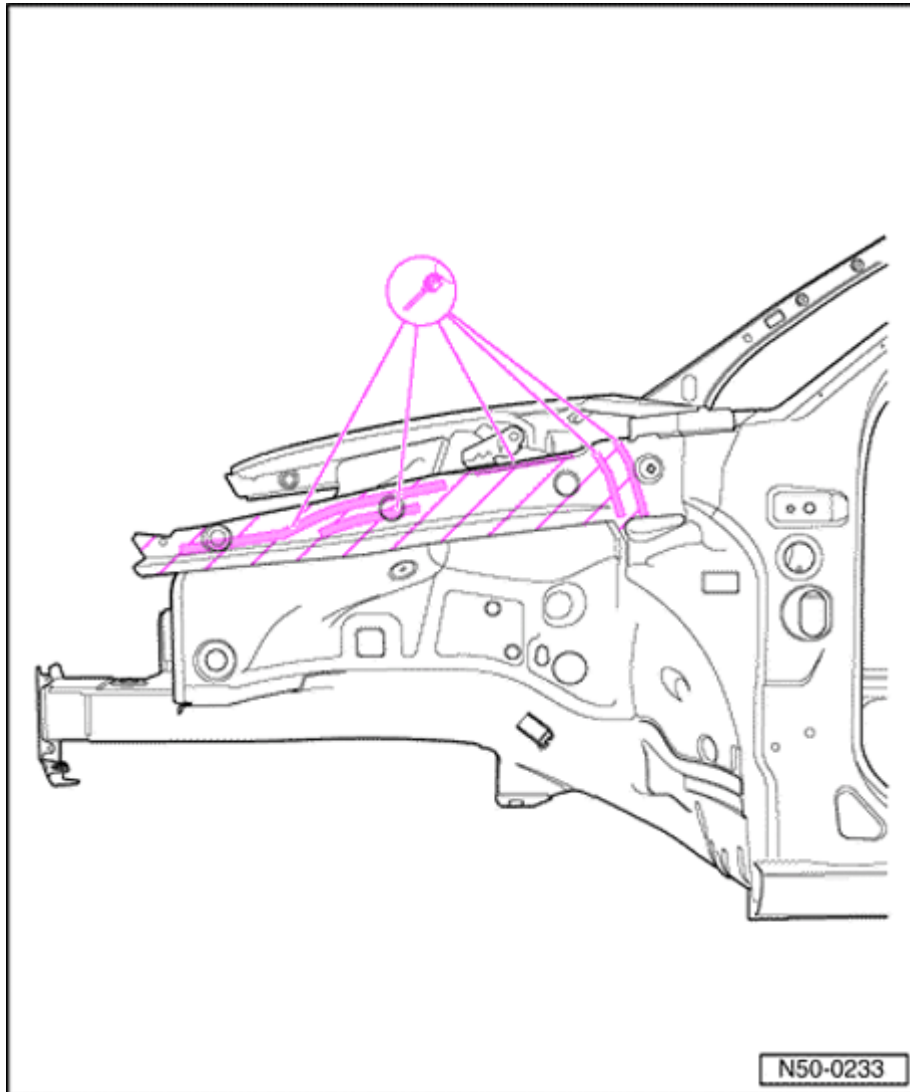
Preparing new part

- ✦ - Drill 7 mm (0.275 in.) dia. holes for SG-plug weld seam.

Welding in place

- Install new part using straightening bracket.
- ✦ - Weld mount bracket in place, SG-plug weld seam.
- Weld in weld points -a- from outside, SG-plug weld seam.





50 52 55 50 Intermediate piece, replacing

Cutting location

- Separate original joint.

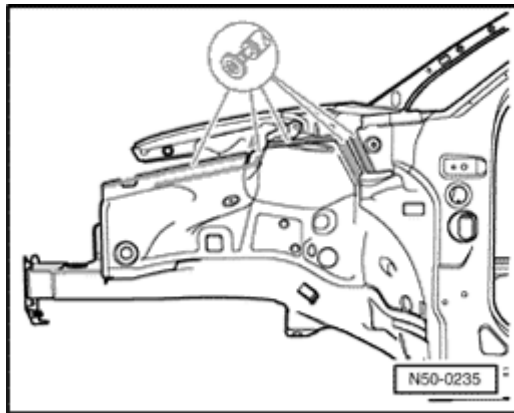
Note:

*Offset parting cut
50 mm (1.96 in.) to
fender connecting
plate and
intermediate piece.*

Partial repair:

If extent of damage permits, parting cuts can be vertical.

Butt weld parting cut, SG-continuous weld seam.



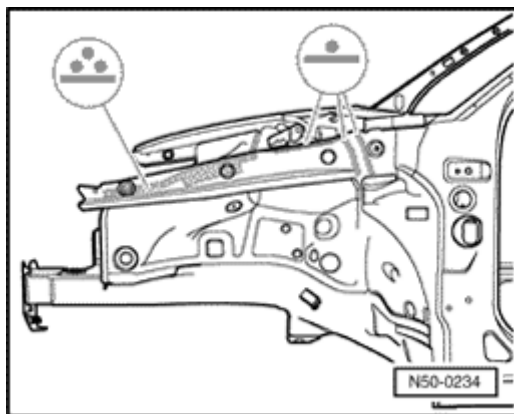
- Remove excess material.

Replacement part

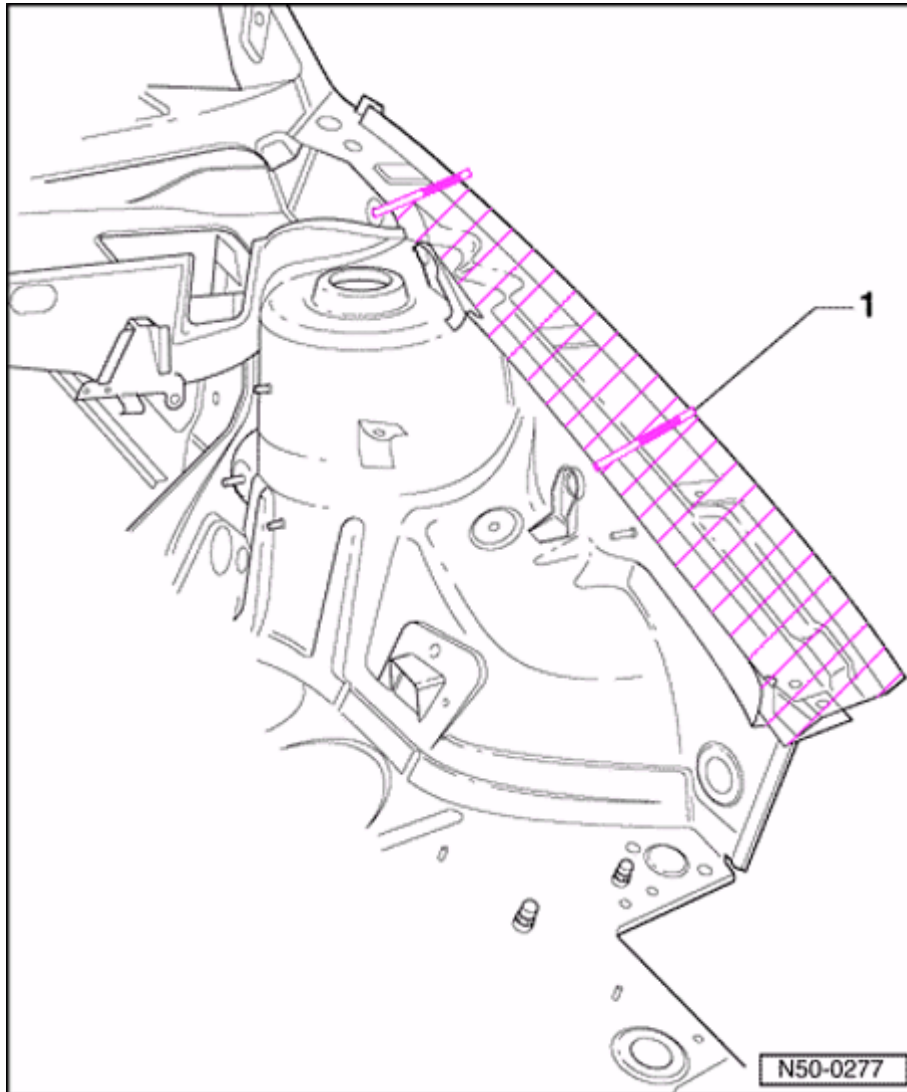
- ◆ Connecting plate

Welding in place

- Secure new part and check gaps/mating lines with attaching parts.



- Spot weld intermediate piece, RP-spot weld seam.
- Weld in fender connecting plate
⇒ [Page 50-7](#) .



50 53 55 50 fender connecting plate, replacing

Cutting location

- Cut out connecting plate.
- Separate original joint.

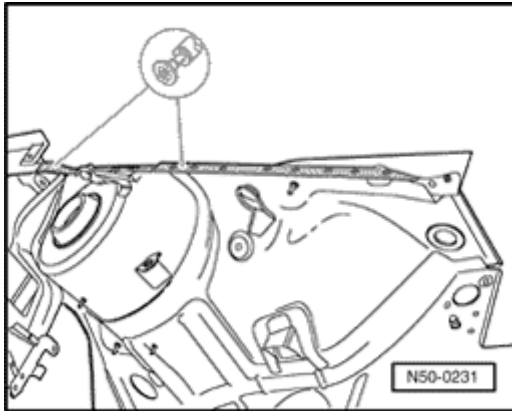
Note:

Offset parting cut 50 mm (1.96 in.) to fender connecting plate and wheel house upper long member.

Partial repair:

A partial repair is possible using parting cut -1- shown.

50-6

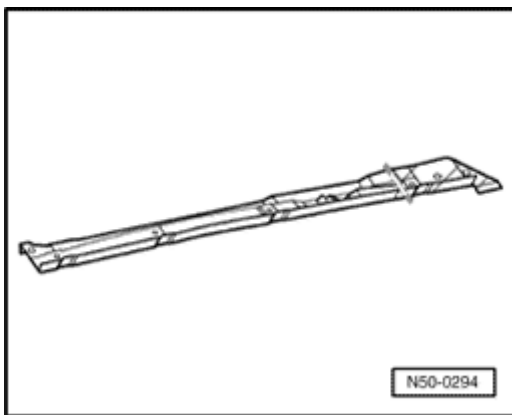


- Remove excess material.

Replacement part

◆ Connecting plate

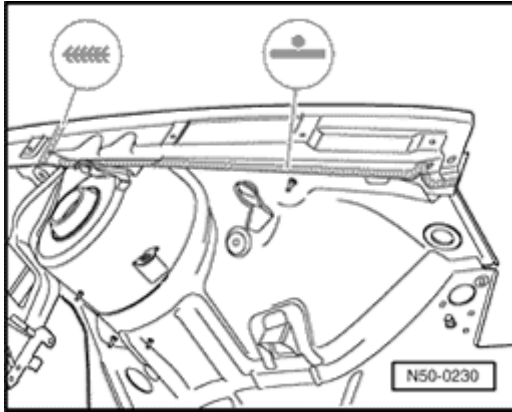
Preparing new part



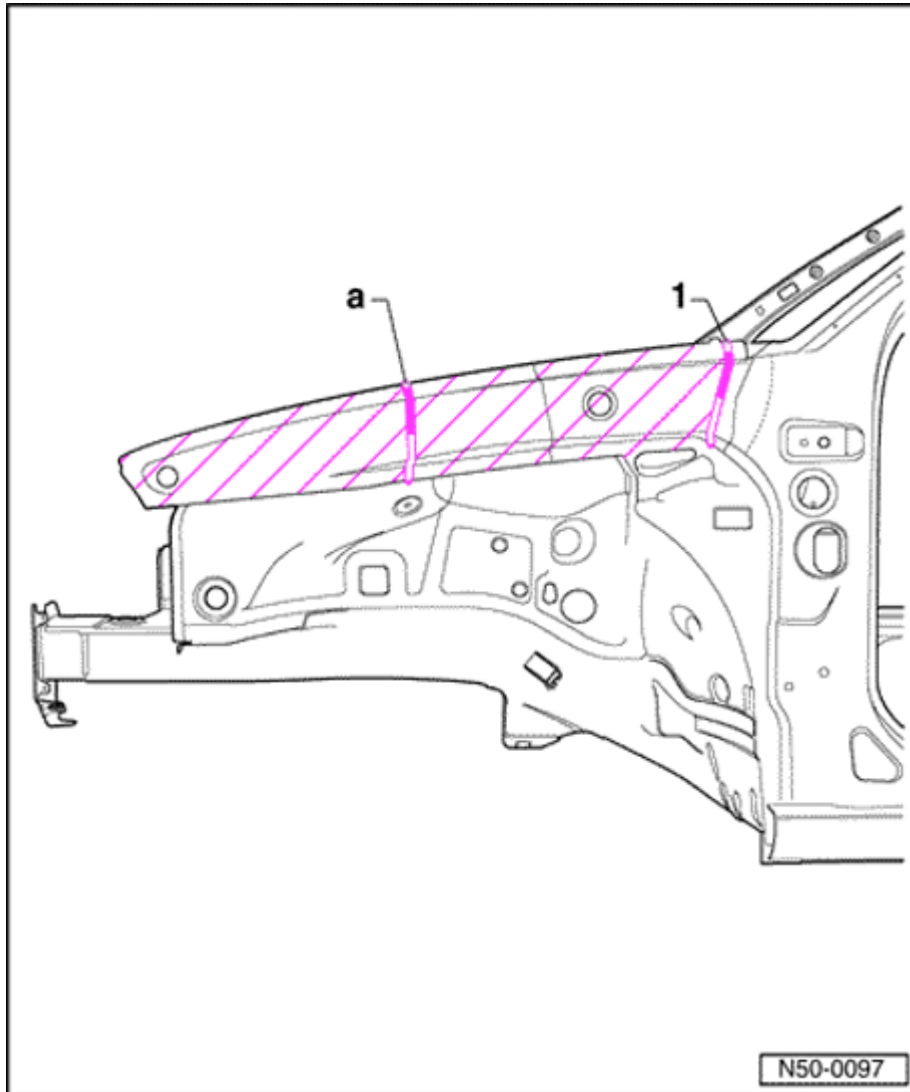
- Transfer separating lines to new part and cut-out.

Welding in place

- Secure new part and check gaps/mating with attaching parts.



- Weld new part in place, RP-spot weld se:
- Butt weld parting cut, SG-continuous wel
- Weld in long member for wheel house ⇒ [50-9](#) .



50 72 55 50 long member for upper wheel house, replacing

Cutting location

- Cut out upper wheel house long member according to degree of damage.

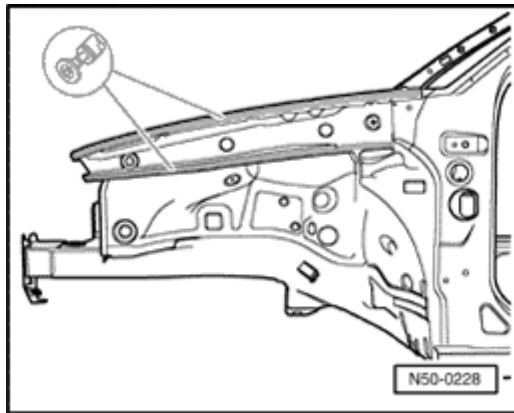
Note:

If damage is beyond prescribed separating lines -1-, inner A pillar must be replaced as well.

- Separate original joint.
- Remove excess material

Partial repair:

A partial repair, depending on damage, is possible using parting cuts -a- shown.



- Remove excess material.

Replacement part

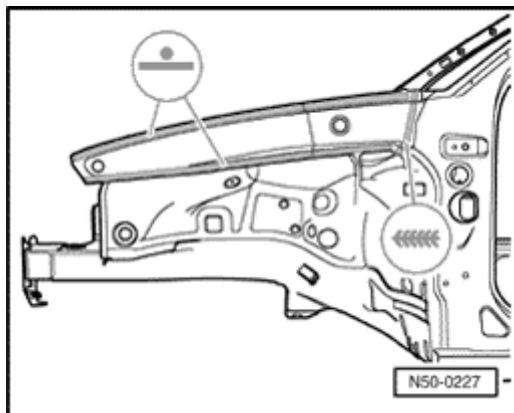
- ◆ Upper wheel house long member

Preparing new part

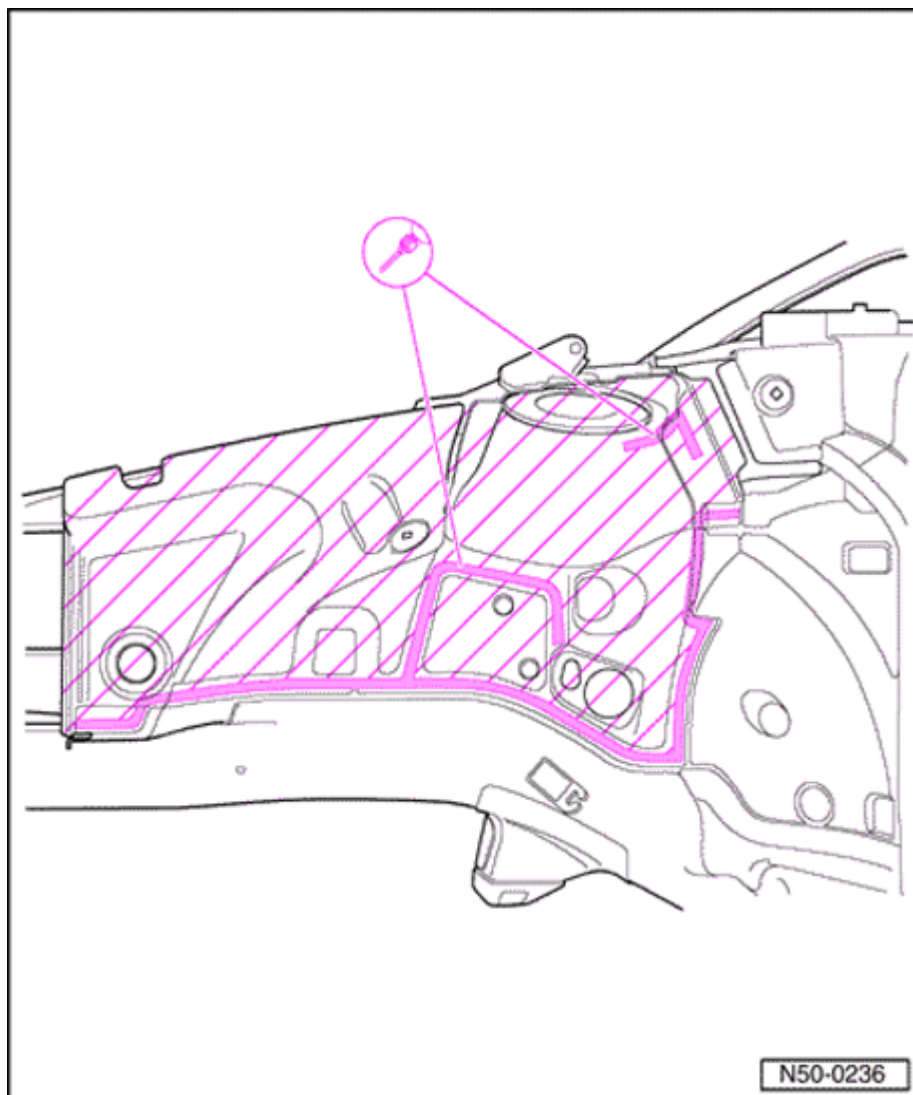
- Transfer separating lines to new part and cut.

Welding in place

- Install and secure new part in position.



- Spot weld upper wheel house long member, RP-spot weld seam.
- Butt weld parting cut, SG-continuous weld seam.



50 74 55 00 Front wheel house, partial replacing

- Long member for upper wheel house already cut out.
- Fender connecting plate already cut out.
- Intermediate piece already cut out.

Cutting location

- Separate original joint.
- Remove excess material

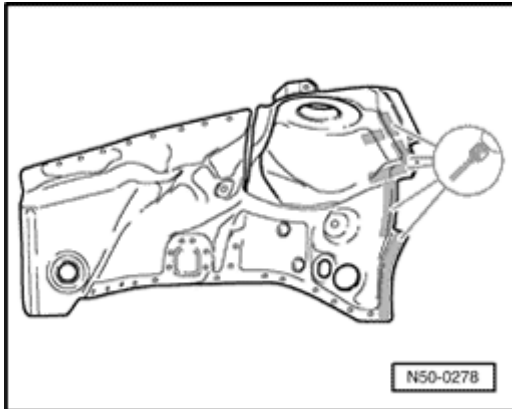
50-11

Replacement part

- ◆ Inner front wheel house

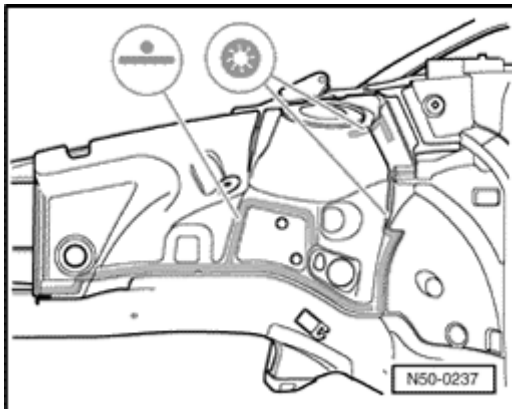
Preparing new part

- ✦ - Drill 7mm (0.27 in.) holes for SG-plug weld seam

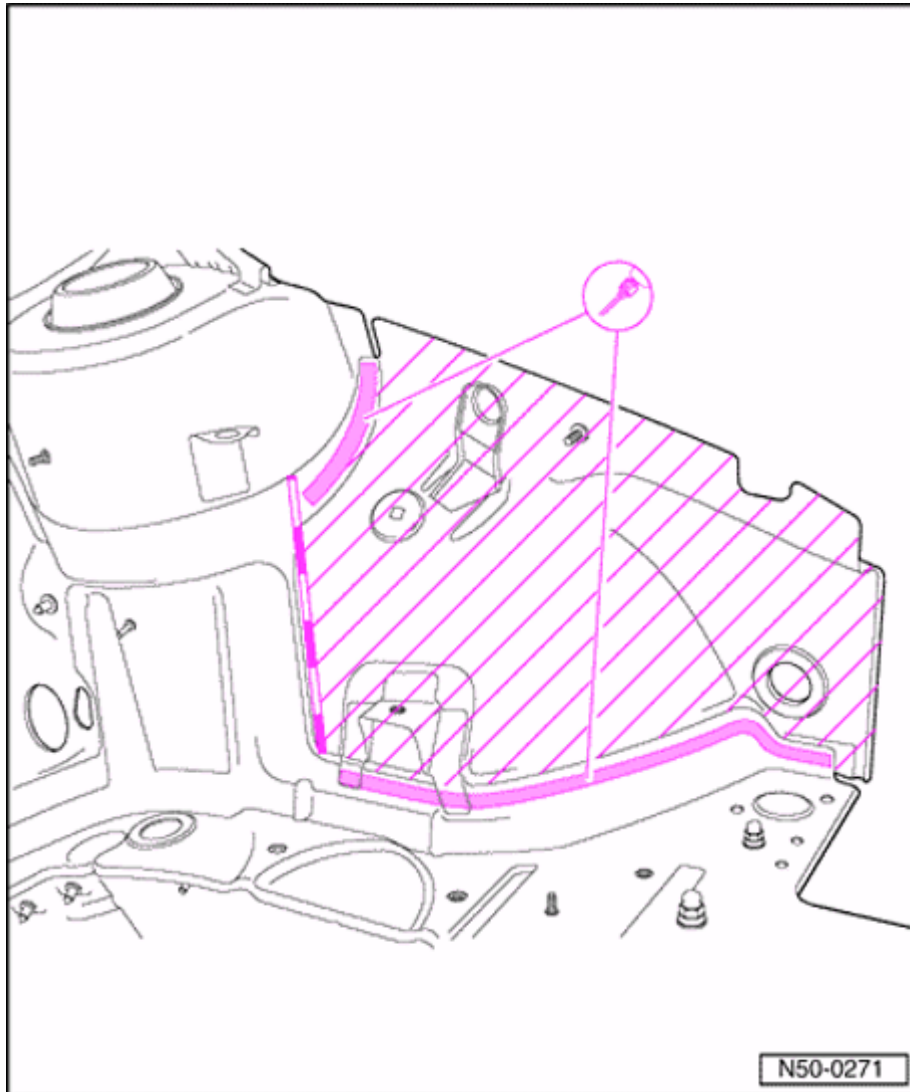


Welding in place

- Secure new part and check gaps/mating lines with attaching parts.



- ✦ - Spot weld wheel house, RP-spot weld seam.
- Apply overlapping weld to both sides of lower parting cut, SG-continuous weld seam (staggered).
- Weld intermediate piece in place ⇒ [Page 50-3](#)



50 75 55 50 Front inner fender, replacing

- ◆ Front fender removed
- ◆ Fender connecting piece removed
- ◆ Intermediate piece removed

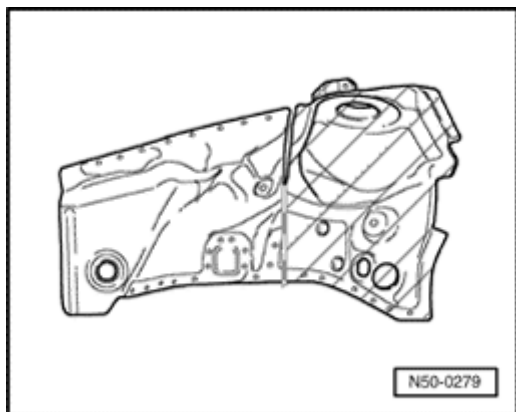
Cutting location

- Separate original joint.
- Remove inner fender.
- Remove excess material

Replacement part

- ◆ Wheel house

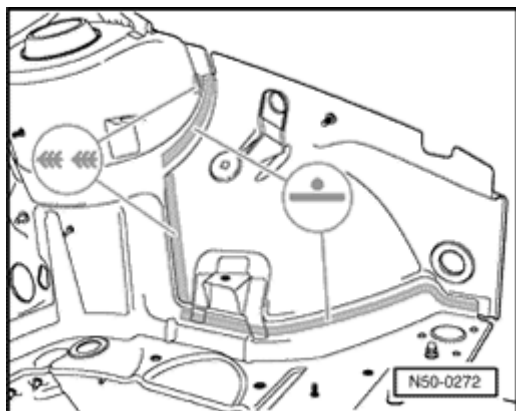
Preparing new part



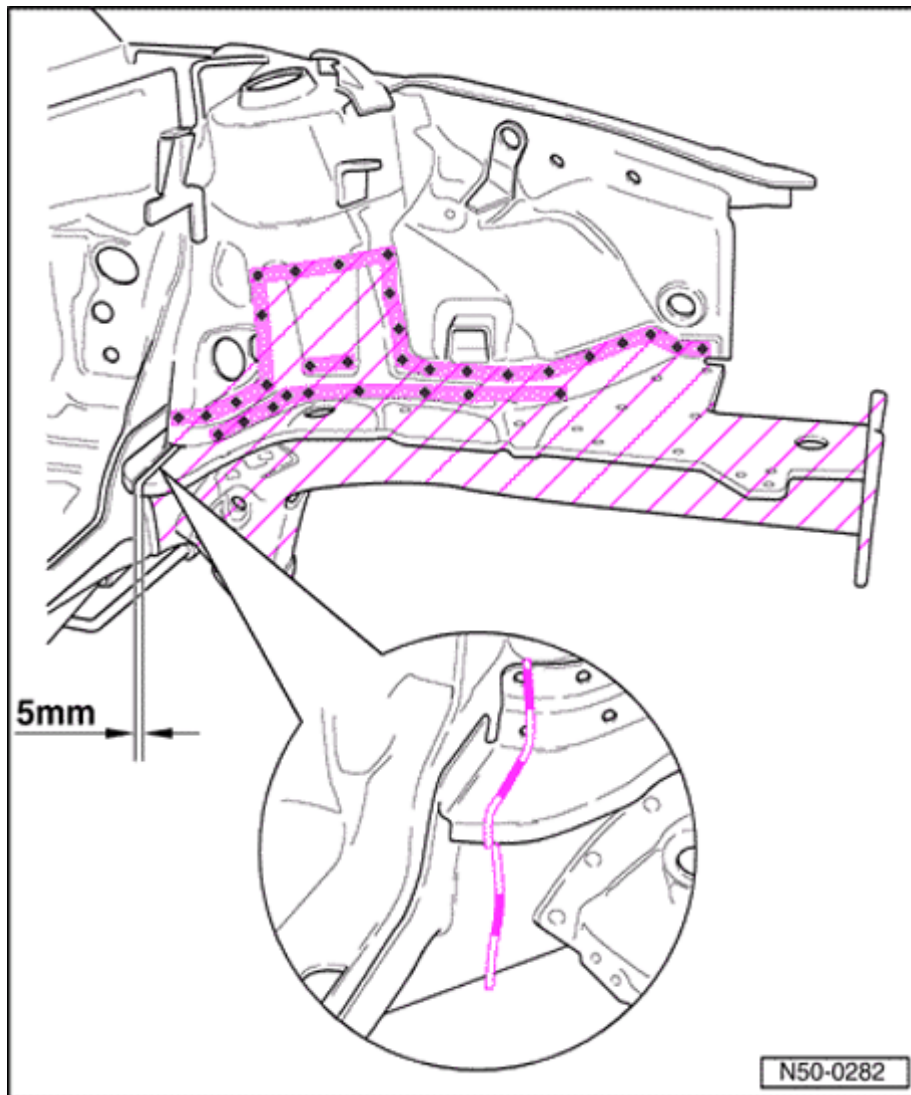
- ✦ - Transfer separating lines to new part plus 10 mm (0.393 in.) for overlap and cut-out highlighted area.
- Offset body side.

Welding in place

- Install new part and secure on fixture.



- ✦ - Weld separating cut, SG-continuous weld seam.
- Spot weld remainder of joint, RP-spot weld seam.
- Weld connecting piece ⇒ [Page 50-4](#)

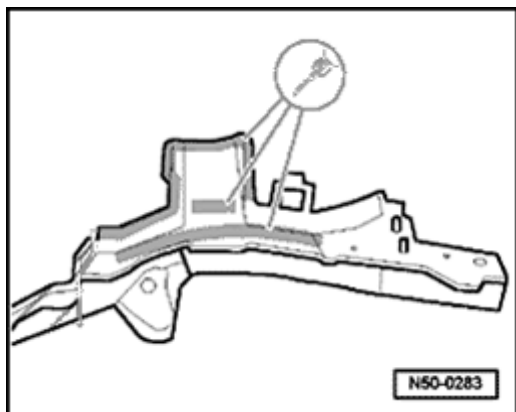


50 79 55 00 Front long member, replacing

Cutting location

- Remove long member
- Separate original joint
- Remove excess material

50-15



Replacement part

- ◆ Long member

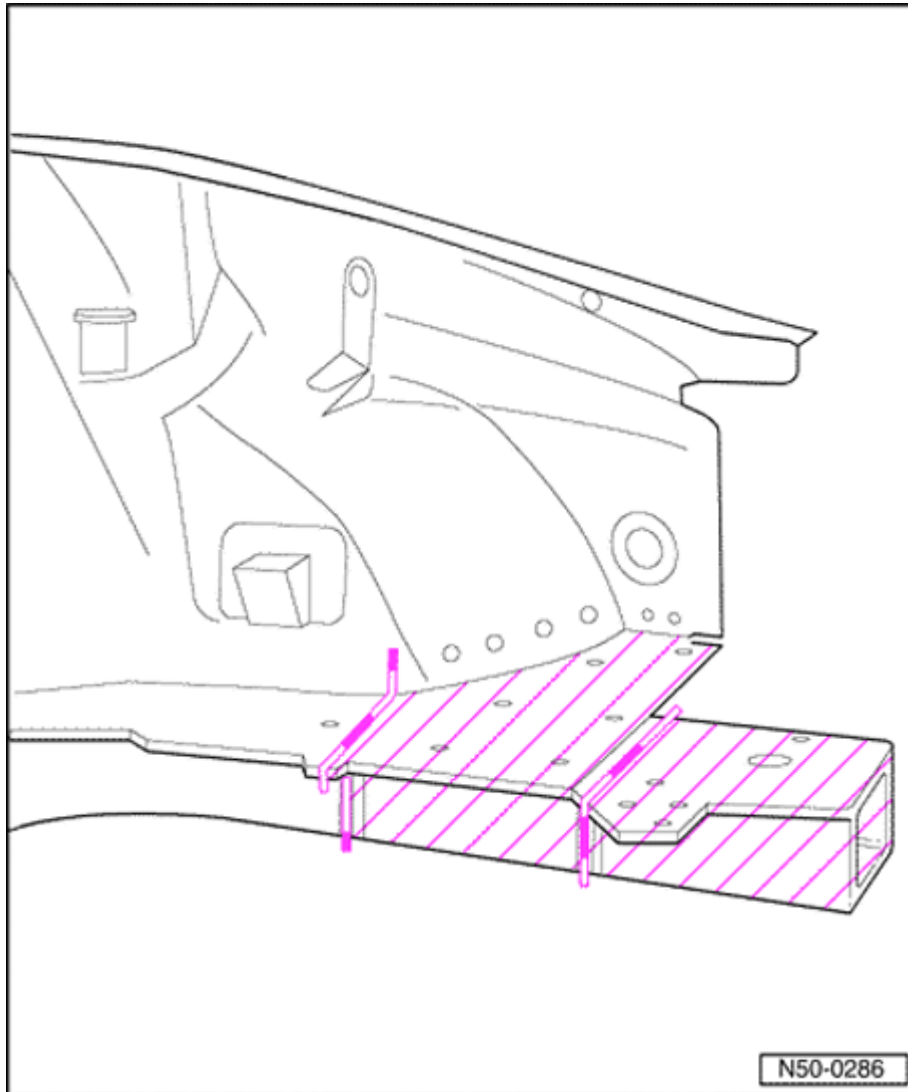
Preparing new part

- Transfer separating lines to new part and remove highlighted area.
- Drill 7 mm dia. (0.27 in.) holes for SG-plug weld seam.

Welding in place

- Install new part on straightening fixture.
- Butt weld parting cut, SG-continuous weld seam.
- Spot weld remainder of joint, RP-spot weld seam.

- Weld long member, SG-plug weld seam.
- Front long member, welding in place ⇒ [Page 50-22](#)



50 79 55 02 Front long member, partial replacing

Cutting location

- Make parting cuts according to degree of damage.

Note:

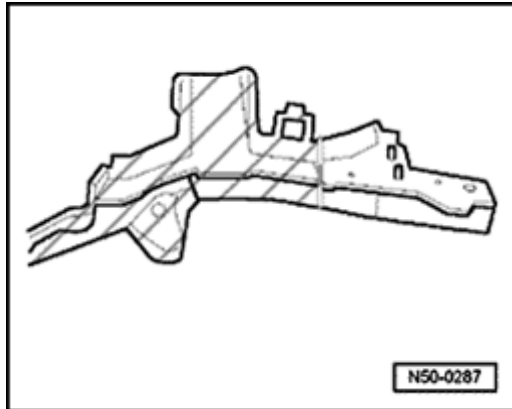
Parting cut must be straight.

Replacement part

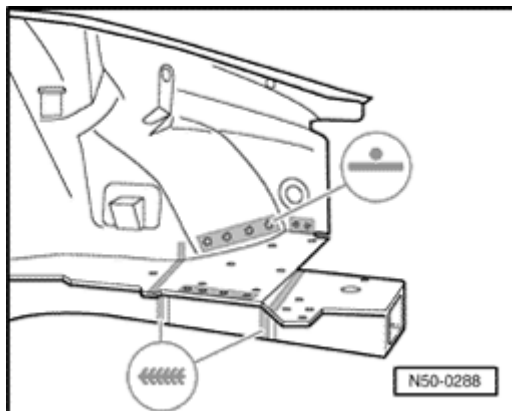
- ◆ long member

Preparing new part

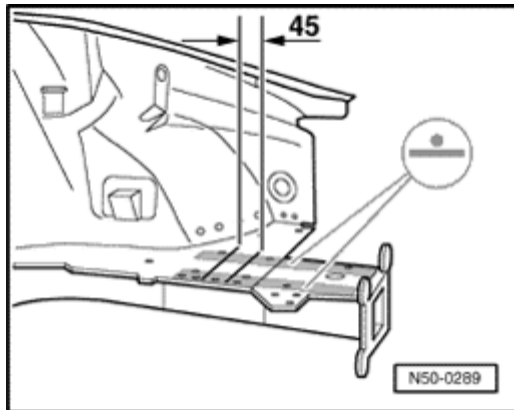
- ✦ - Transfer separating lines to new part and remove highlighted area.

**Welding in place**

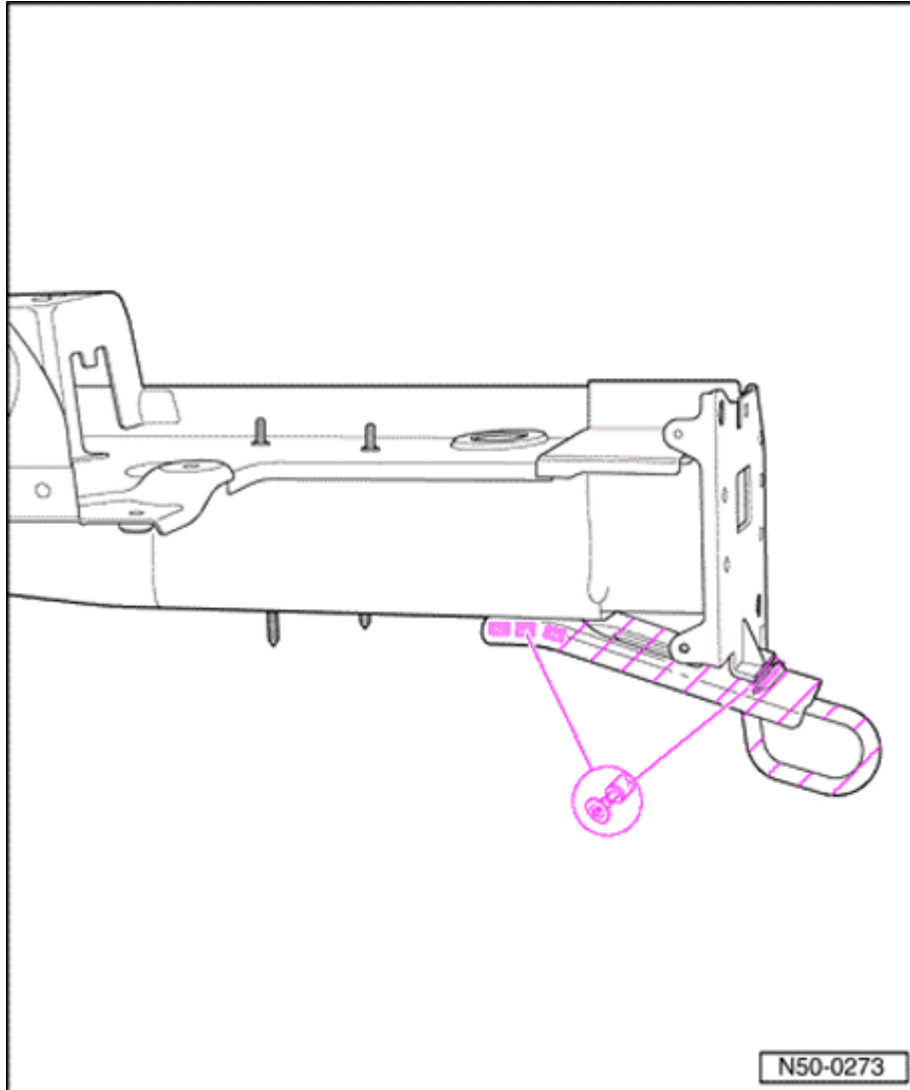
- Position long member on fixture.



- ✦ - Depending on degree damage, butt weld parting cut, SG-continuous weld seam.
- Spot weld remainder of joint, RP-spot weld seam.
- Front long member, welding in place ⇒ [Page 50-22](#) .

**Note:**

- ◀ *Weld points must run parallel with one another if repairs to long member and covering plate are performed as individual parts. Dimension must be adhered to.*



50 80 55 00 Long member front section, replacing

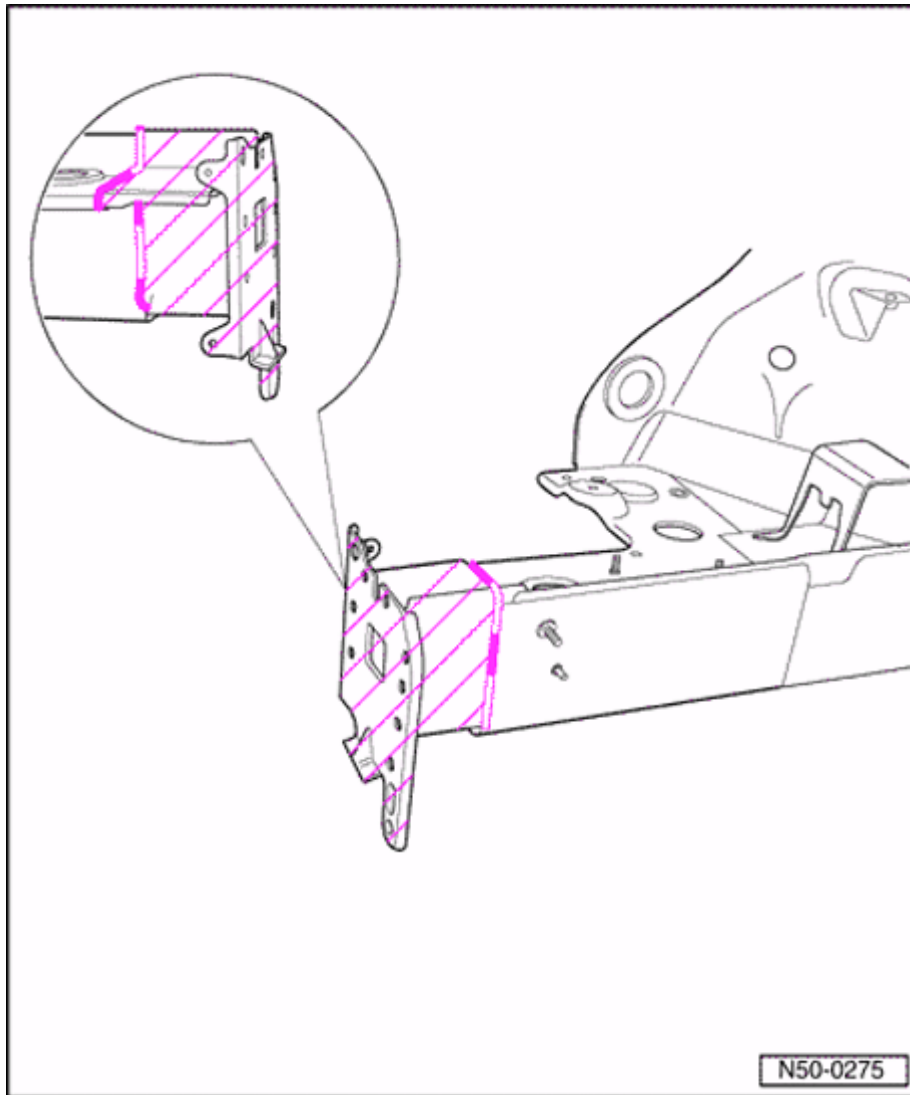
Note:

*Remove
towing eye
first to replace
right long
member front
section.*

**Cutting
location**

- Separate original joint.

50-21



- Make parting cut in front of weld seam.
- Remove excess material

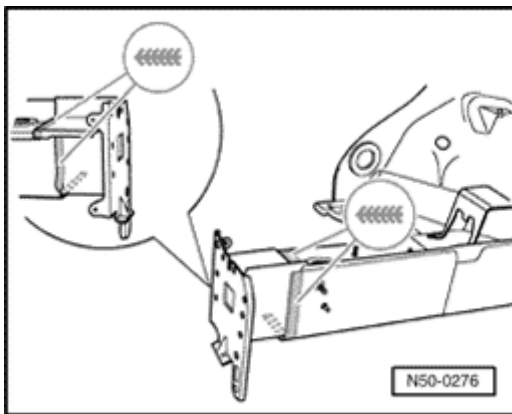
50-22

Replacement parts

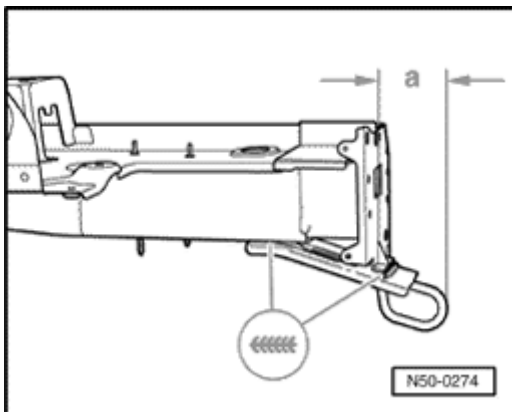
- ◆ Towing eye (right side only)
- ◆ Impact damper mount

Welding in place

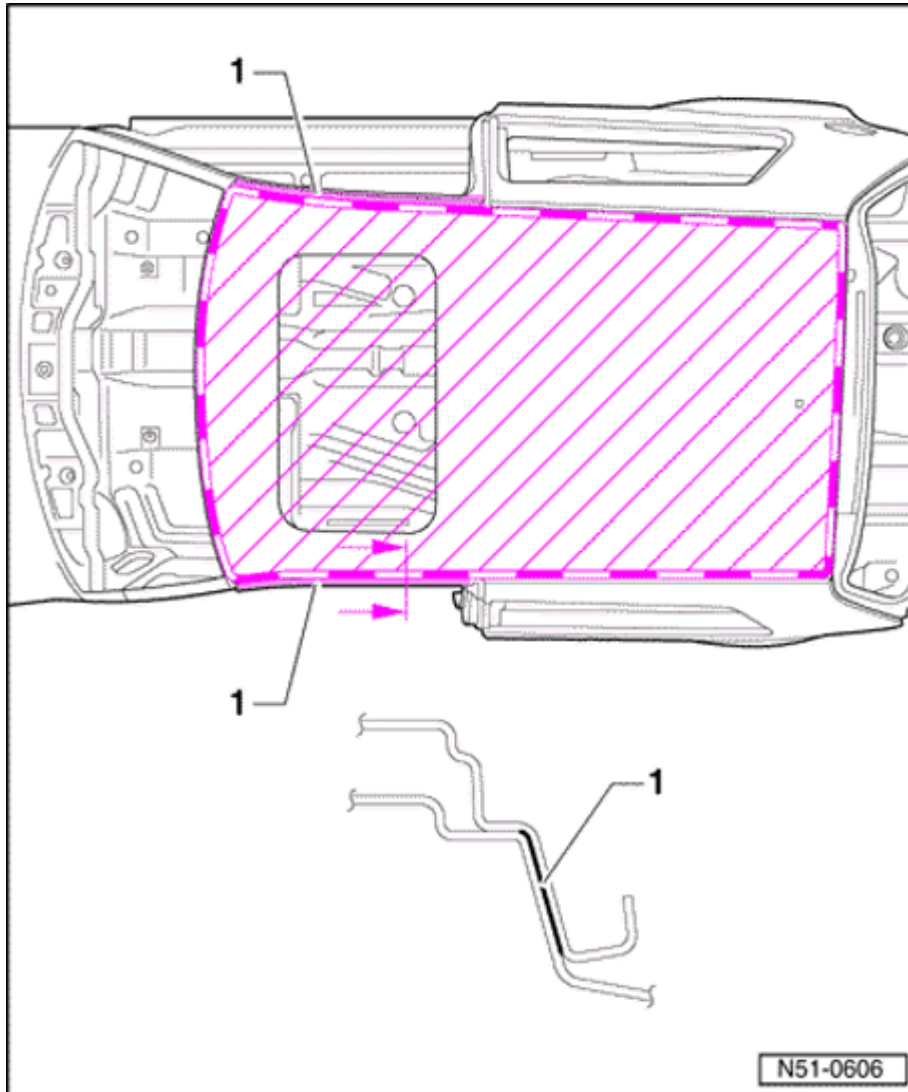
- Install new part and secure on fixture.



- Weld in impact damper mount, SG-continuous weld seam.



- Weld in towing eye, SG-continuous weld seam.
- Dimension -a- = 70 mm (2.75 in.)



51 03 55 00 Roof, replacing (Golf)

1 - Bonded
area

**Cutting
location**

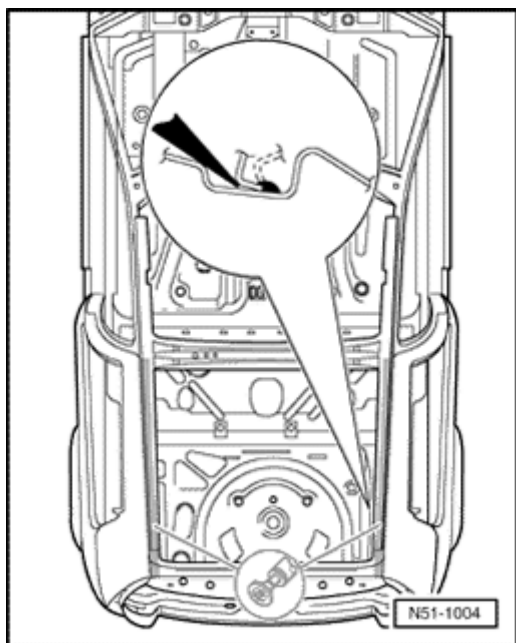
- Rough
cut
roof
out.

Note:

*Special hose
with reduced
nozzle
diameter is
required for
shielding gas
welding unit to
repair roof.*

◆ VAS5023
Hoses

◆ VAS5023/2
- Nozzle
set



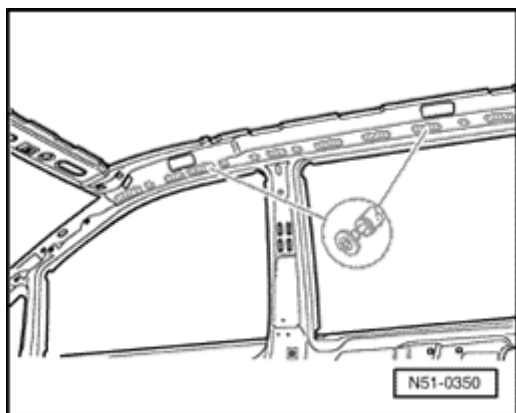
- Remove sealant from sealing channel.

- Grind laser weld seam down, bend excess material up with a chisel and remove.

Note:

Only grind laser weld seam down. Do not grind through roof. Roof frame must be replaced as well if it is damaged.

- Remove excess material.
- Remove adhesive residue completely and grind adhesive surface back to bare metal.

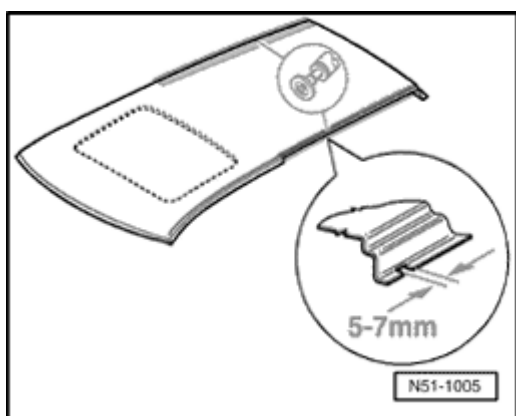


- Clean spot weld flange, from inside, to bright surface with a die grinder and appropriate tool.

Replacement part

- ◆ Roof
- ◆ Butyl adhesive sealing cord AKL 450 005 05
- ◆ Adhesive: DA 001 730 A1

Preparing new part



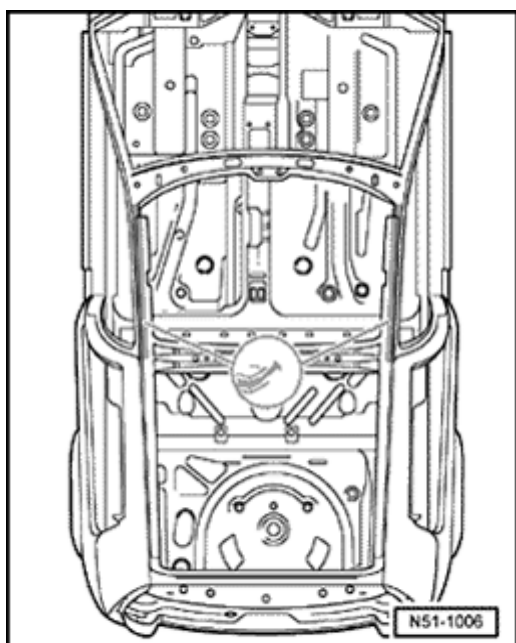
- Slot enlargement must be cut in horizontal roof flange with bench grinder or angled grinder for later SG-plug weld seam.
- Spacing approx. 45 - 50 mm (1.77 - 1.97 in.).

Welding in place

- Before welding in roof, apply Butyl adhesive sealing cord to roof reinforcement.
- Apply adhesive before welding in place.

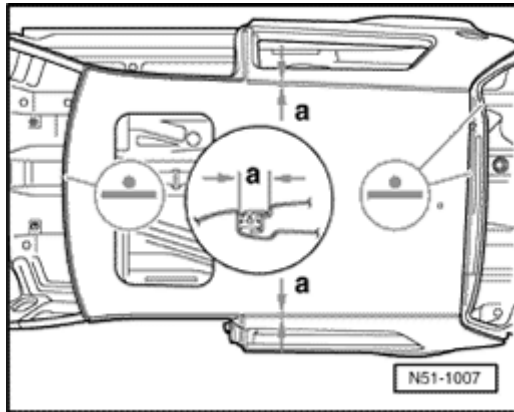
CAUTION!

New part must be installed within 30 minutes, otherwise adhesive properties will be impaired.

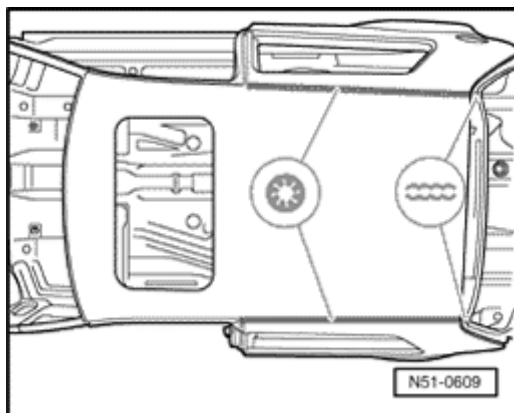


CAUTION!

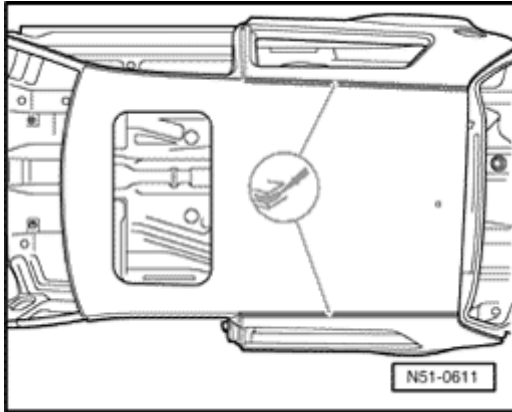
Check fit with windshield and rear window. It is essential that dimension -a- = 13.2 ± 0.6 mm (0.519 ± 0.023 in.) for roof moulding to be maintained.



- Weld in roof, RP-spot weld seam.



- Weld roof, SG-plug weld seam.
- Braze remaining joint.



- Grind SG-weld points down flush.

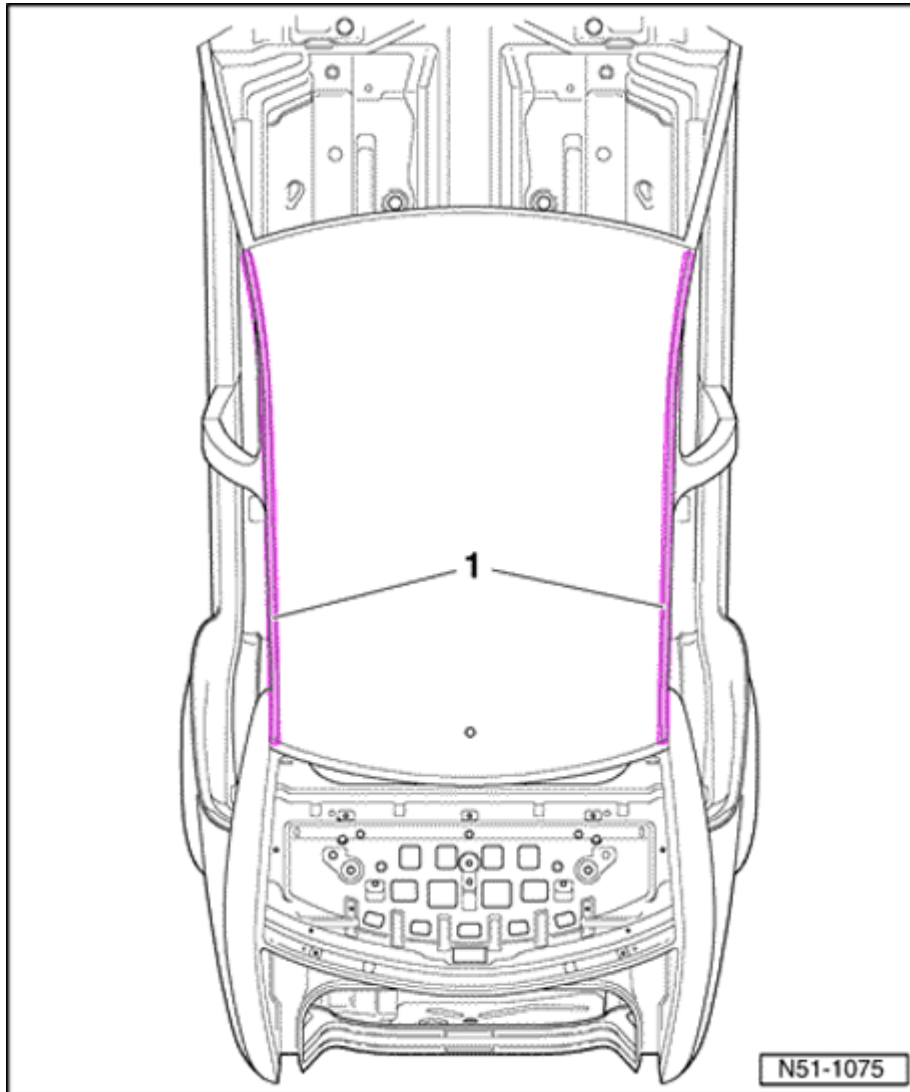
- Seal roof channel (thin layer).

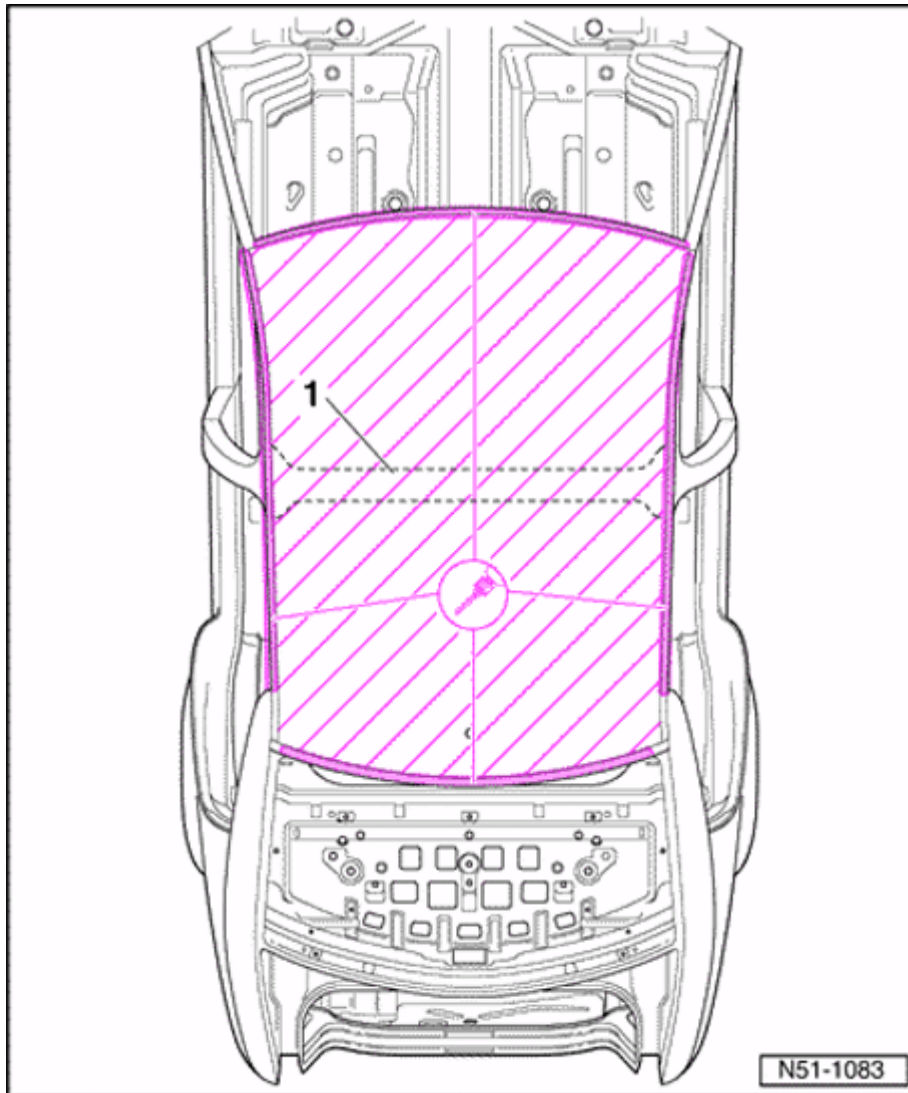
Note:

*Seal must be even and thin.
Irregularities will be visible on roof
trim strip (wavy).*

51 03 55 00 Roof, replacing (Jetta)

1 - Bonded
area.





Cutting location

1 - Roof cross member

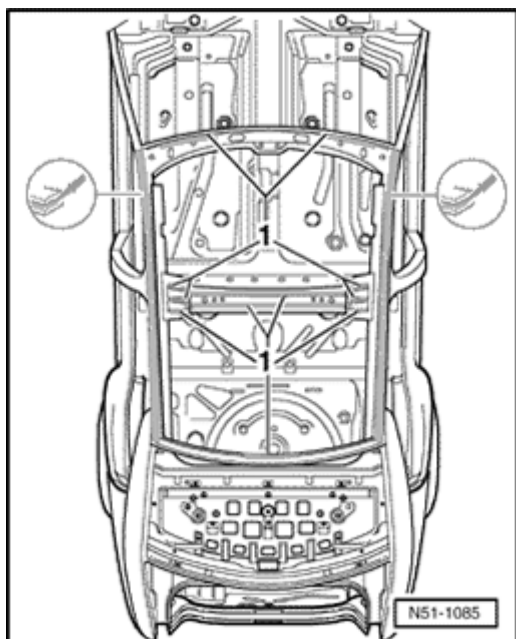
- Cut out roof
- Clean out original bond
- Remove excess material

Replacement part

- ◆ Roof
- ◆ Butyl adhesive sealing cord AKL 450 00.
- ◆ Adhesive: DA 001 730 A1

Welding in place

- Before welding in roof, apply Butyl adhes sealing cord to roof reinforcement.
- Apply adhesive before welding in place.

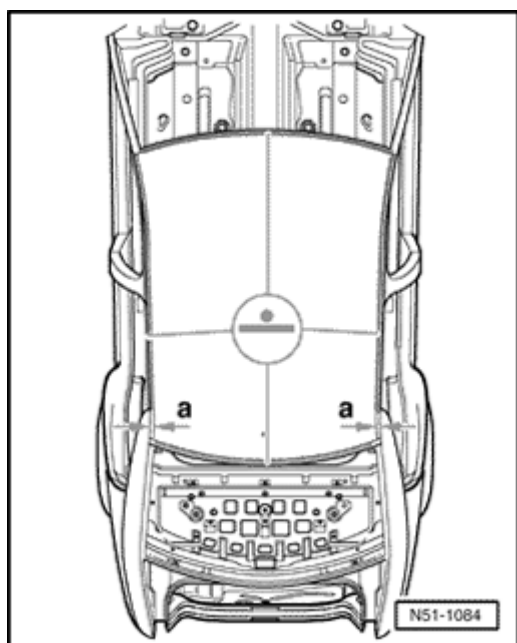


CAUTION!

New part must be installed within 30 min otherwise adhesive properties will be im

CAUTION!

Check fit with windshield and rear window. It is essential that dimension -a- = 13.2 ± 0.6 mm (0.519 ± 0.023 in.) for roof moulding to be maintained.



- Weld in roof, RP-spot weld seam.

Note:

*Seal must be even and thin.
Irregularities will be visible on roof trim strip (wavy).*

51 03 55 20 Roof, replacing (Jetta wagon)

Tools

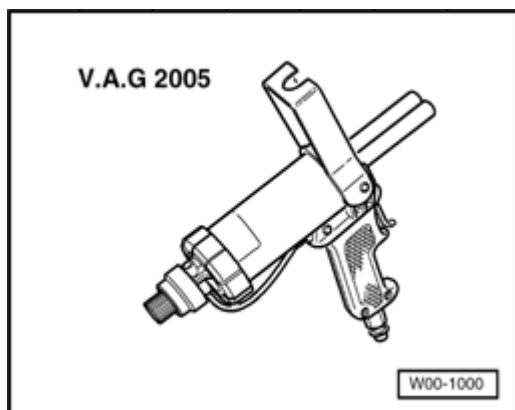
Special tools and equipment



- ◆ VAS5182 wire brush

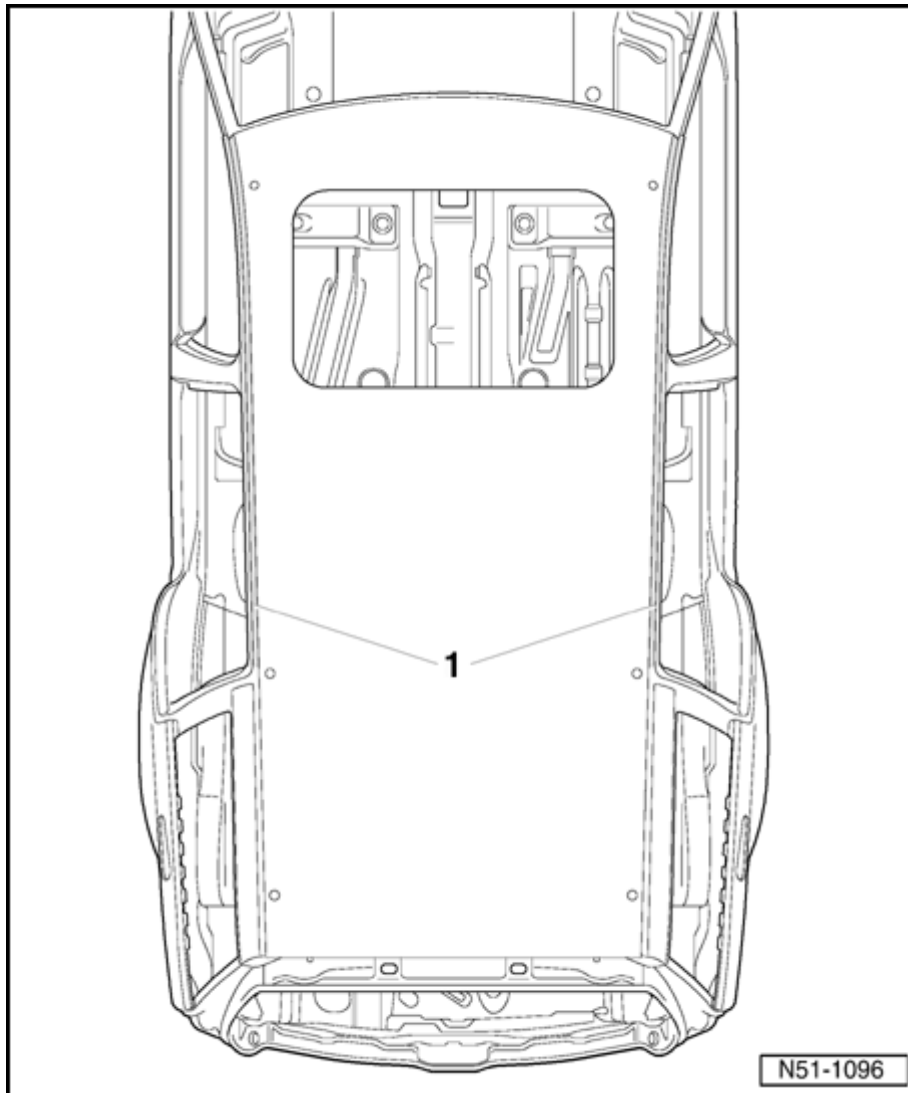
Note:

- ◆ *A special hose package with reduced nozzle diameter is required for the shielded gas welder in order to repair the roof: VAS5023 hose package VAS5023/2 - injector set*



- ◆ VAG2005 compressed air - glue gun

51-11



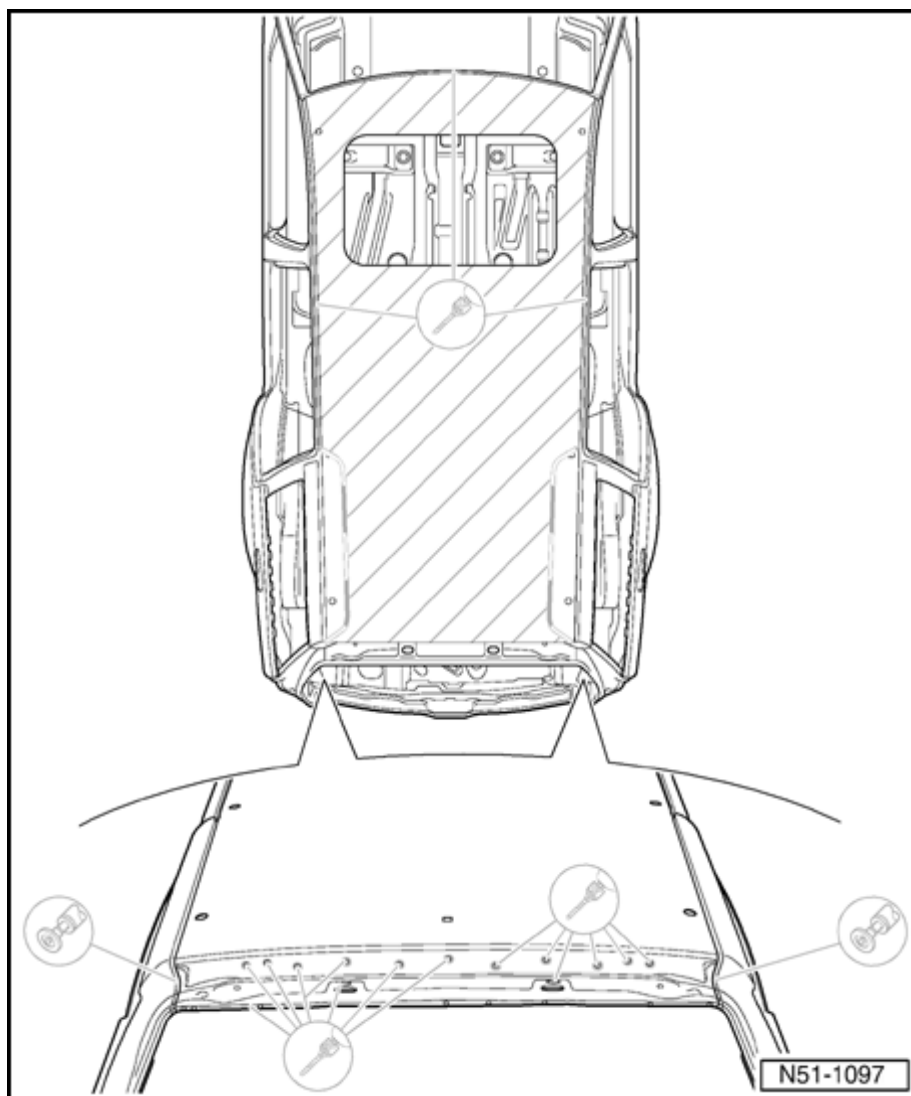
WARNING!

**Observe
safety
precautions!**

⇒ Repair
Manual;
General notes,
Chapter 1,
Safety
precautions

**1 - Glued
area**

51-12



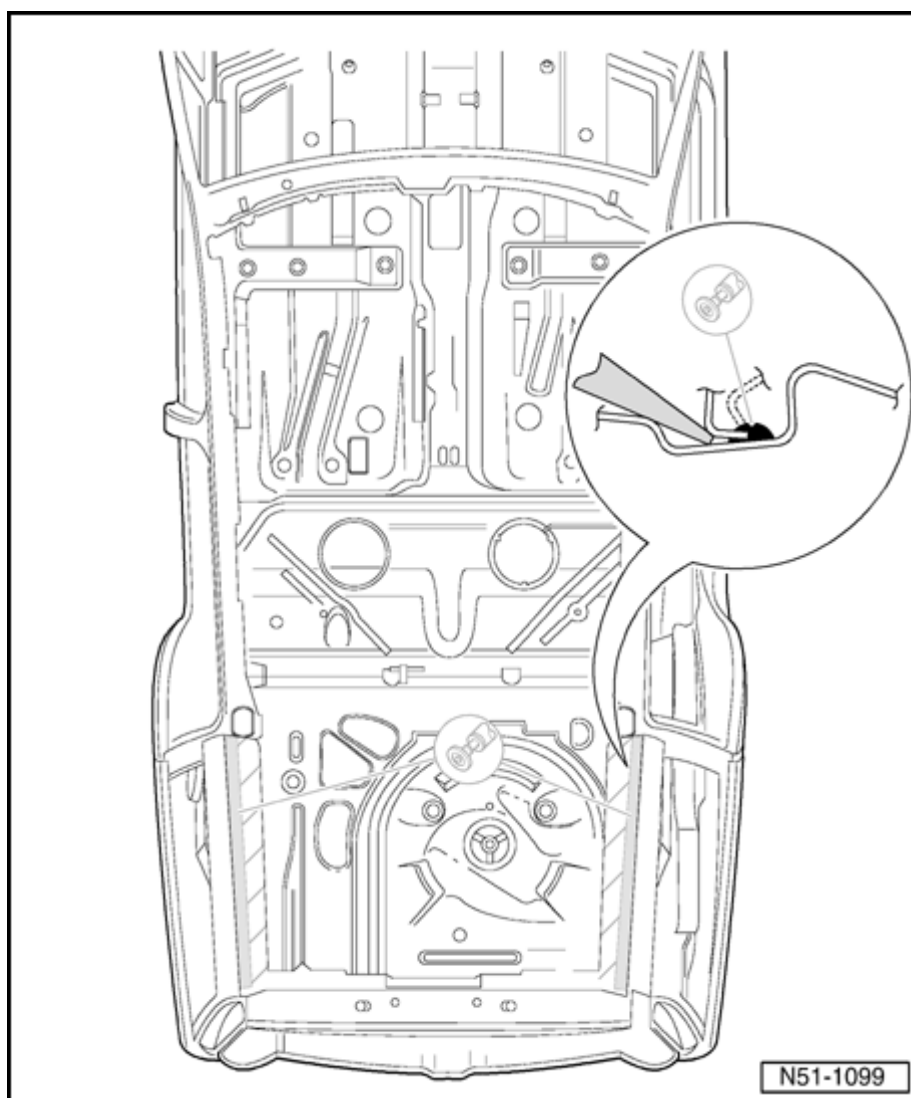
Separating locations

- Drill out original bond to roof frame
- Grind through rear soldering points.

Note:

- ◆ *Brazing solder at vehicle must be completely ground off.*
- Roughly cut out roof in area between C- and D-pillar.
- Remove roof.

51-13



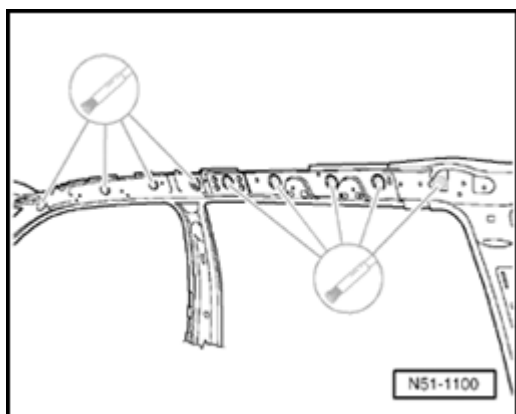
- Remove sealing compound from sealing channel.
- Grind surface of laser weld seam and use chisel to bend up remaining pieces and lever off.

Note:

◆ *Only grind surface of laser weld seam. Do not grind through roof. If the roof frame is damaged, it must also be replaced.*

- Completely remove adhesive remains and grind bonding surface down to bare metal.

51-14

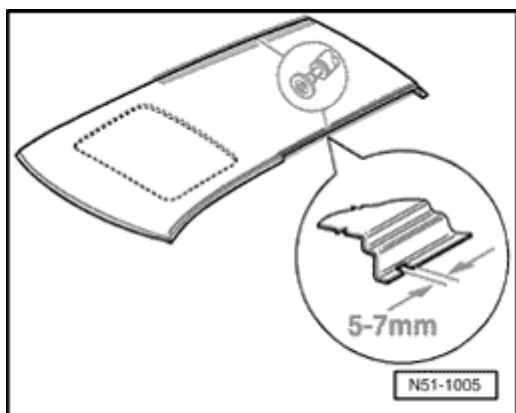


- ✦ - Grind spot flanges down to bare metal from inside using a wire brush.

Replacement parts

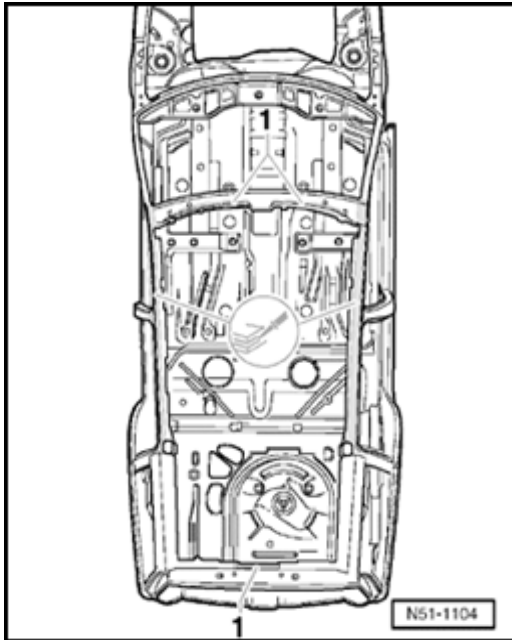
- ◆ Roof
- ◆ Butyl adhesive sealing cord AKL 450 005 05
- ◆ Adhesive: DA 001 730 A1

Preparing new part



- ✦ - For later SG plug weld seam, notches -magnifying glass- must be ground into the horizontal roof flange using an angle grinder or cutting grinder (distance approx. 45 - 50 mm).
- If necessary, drill holes for roof rail ⇒ [Page 51-17](#) .

51-15

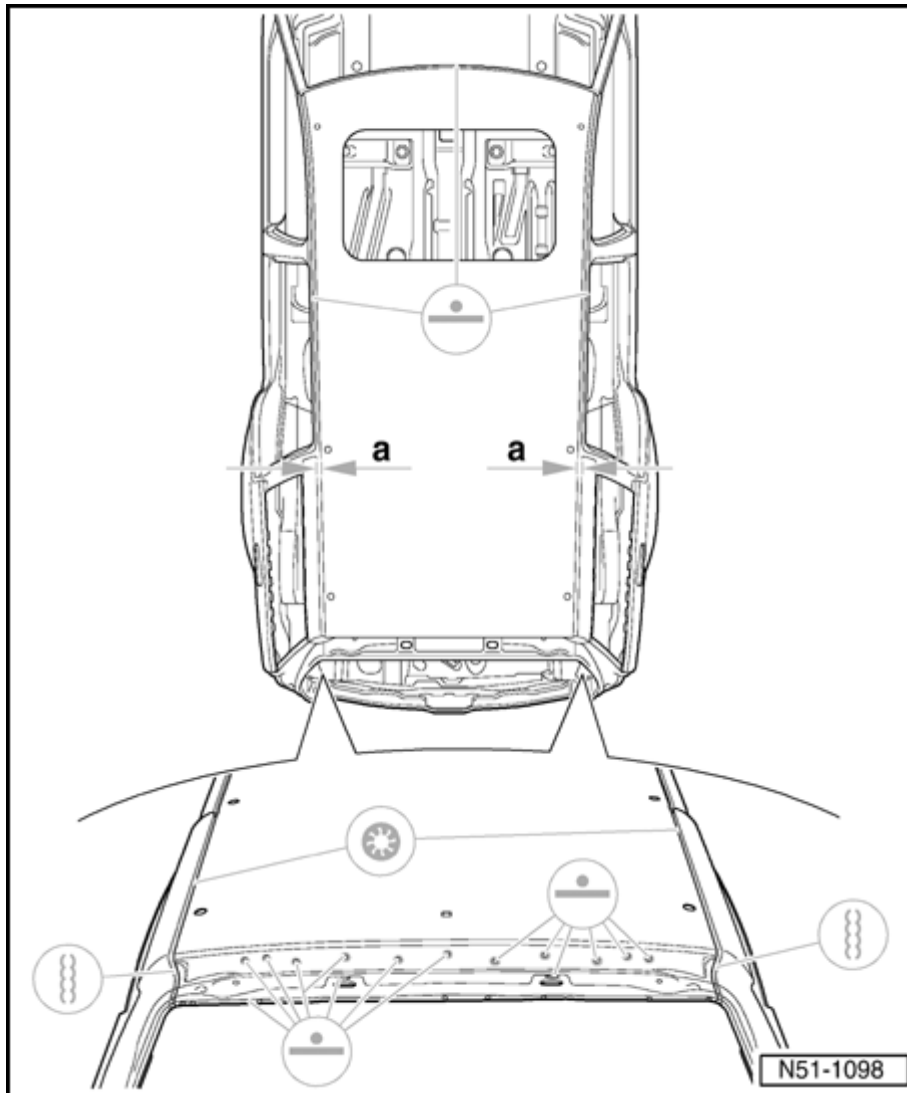
Welding in

- Apply butyl adhesive sealing cord
-1- to front and rear of roof reinforcement
- Apply adhesive to roof frame before welding in.

WARNING!

New part must be installed within 30 minutes, otherwise bonding properties of adhesive will be impaired.

51-16

**Note:**

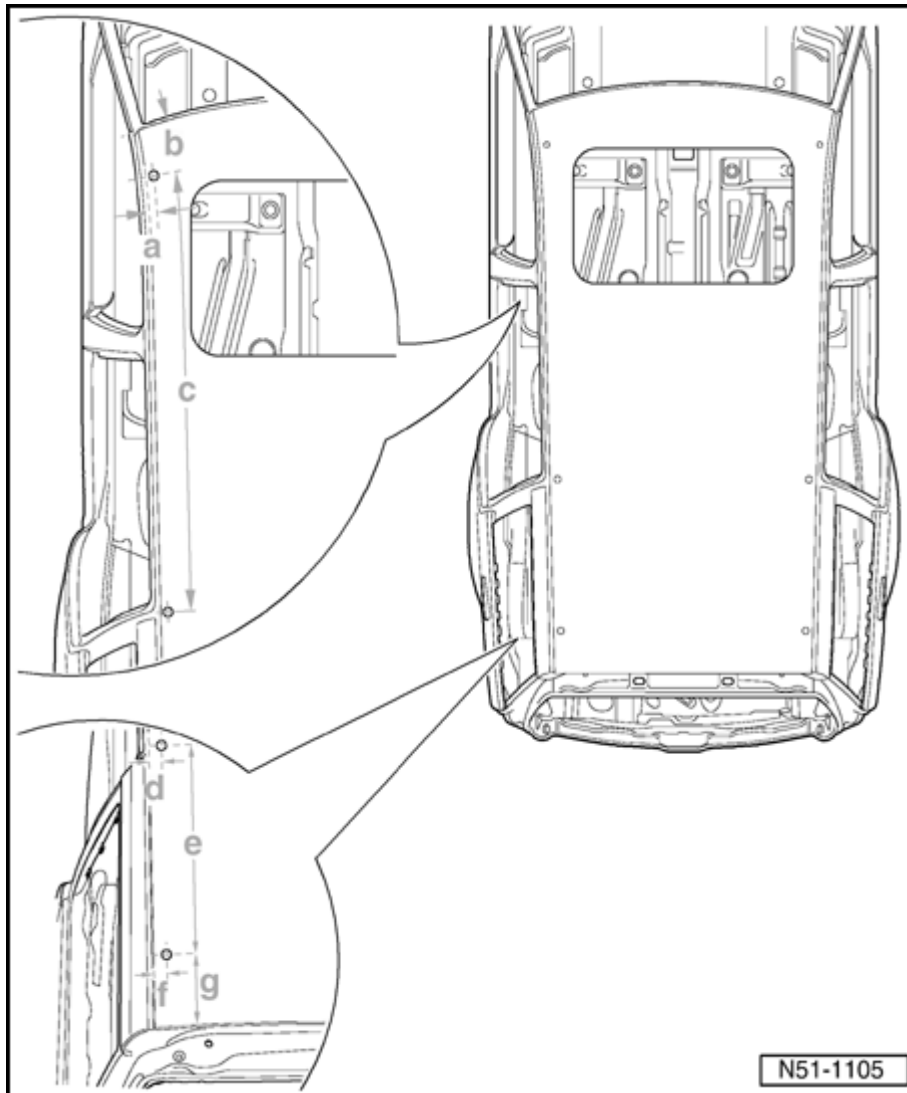
◆ *Check fit with windshield. It is essential to maintain dimension - a- of 13.2 mm for roof trim molding.*

- Weld in roof, RP spot weld seam, SG plug weld seam.
- Braze remainder to rear joint of roof frame, optional SG stepped seam.
- Grind SG spot welds flush.

Note:

◆ *The seal must be even and thin. Irregularities will be visible on the roof trim strip (wavy).*

51-17

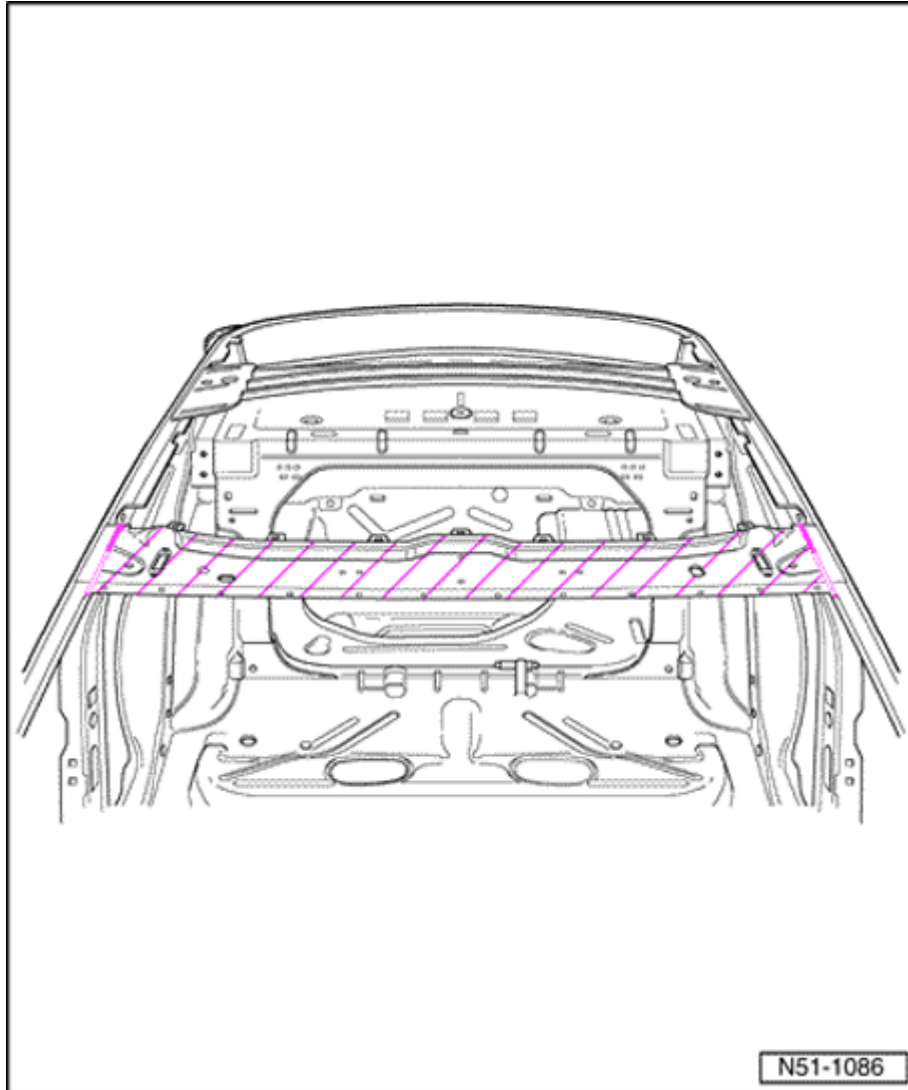


Roof rail dimensions

- a - 34 mm
- b - 153 mm
- c - 1155 mm
- d - 29 mm
- e - 523 mm
- f - 26 mm
- g - 146 mm

Notes:

- ◆ Marks must be checked by placing roof rail on before drilling holes.
- ◆ Taking dimensions for the right side should be performed in mirror image.
- ◆ Reworking cavity sealing.



51 07 55 50 Front roof cross member, replacing

◆ Roof removed

Cutting location

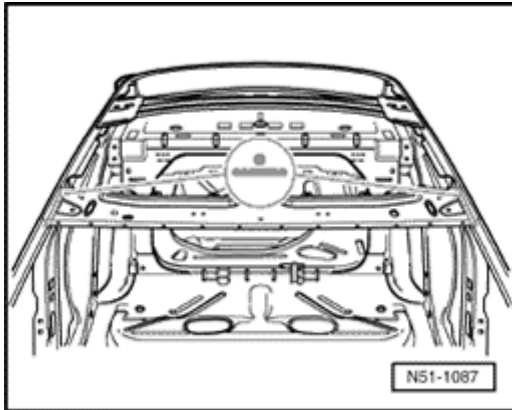
- Cut out cross member.
- Remove excess material

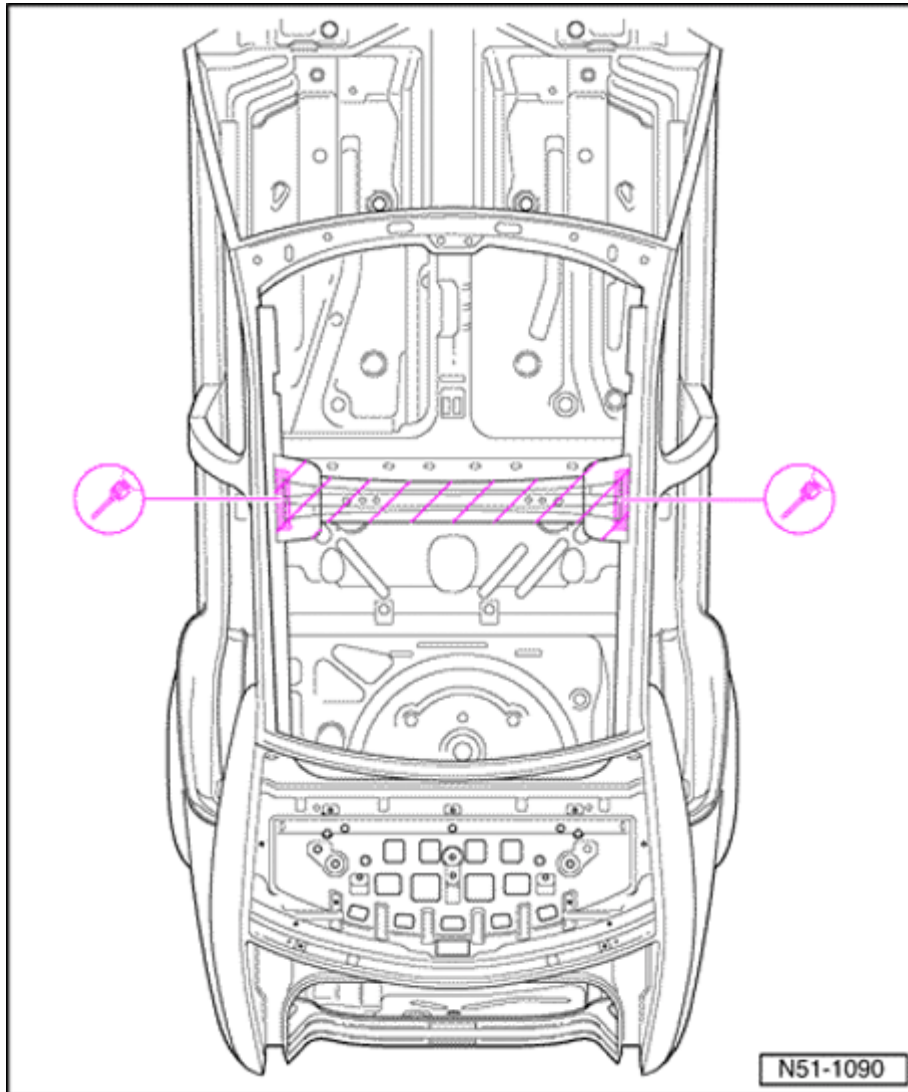
Replacement part

- ◆ Roof cross member

Welding in place

- Position and secure cross member.
- ▲ - Weld in cross member, RP-spot weld seam.





51 08 55 50 Roof reinforceme replacing

◆ Roof removed.

Cutting location

- Cut out roof reinforcement.
- Remove excess material

Note:

*Work process for G
and Jetta is the same.*

51-21

Replacement part

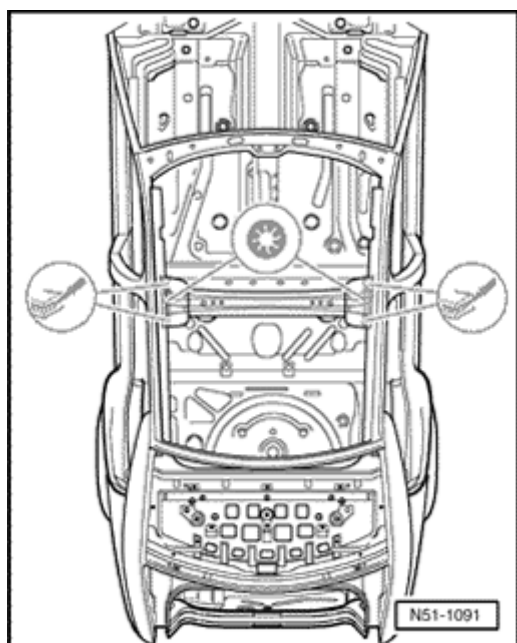
- ◆ Roof cross member
- ◆ Adhesive: DA 001 730 A1

Welding in place

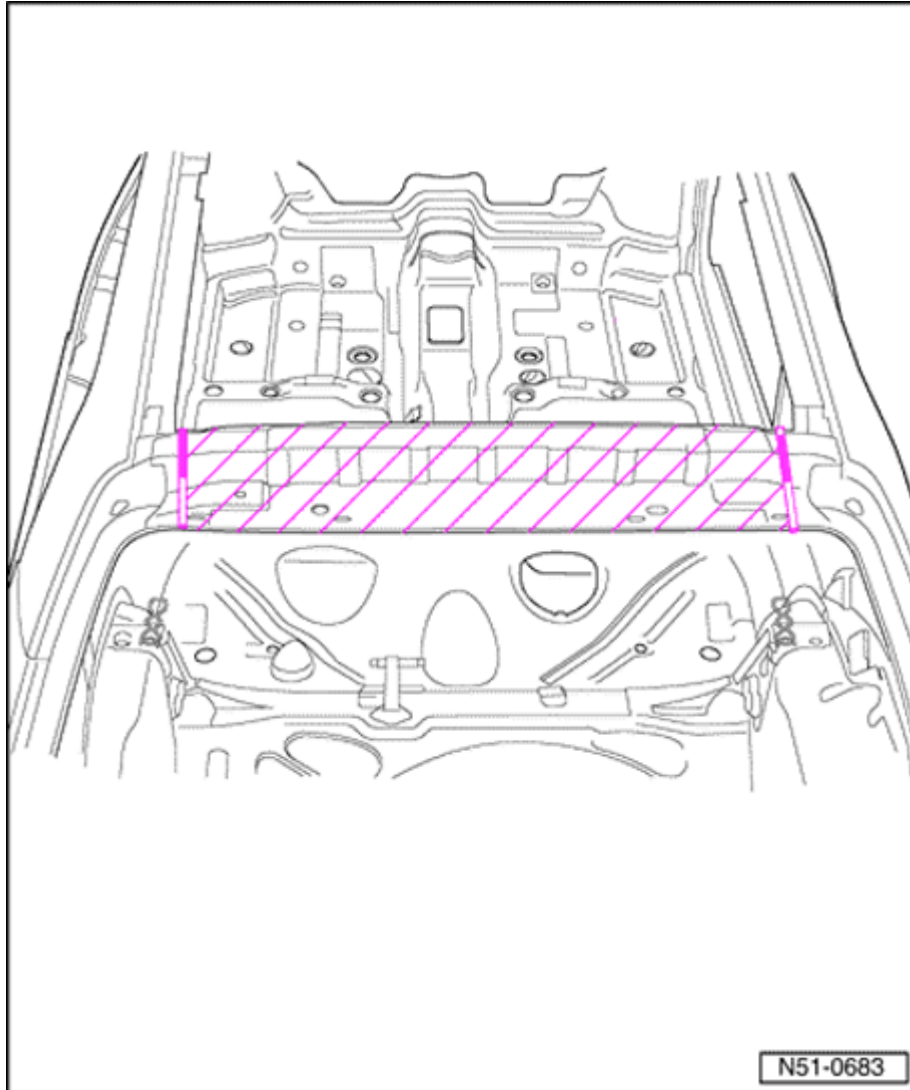
- Position and secure cross member.
- Apply adhesive before welding in place.

CAUTION!

New part must be installed within 30 minutes, otherwise adhesive properties will be impaired.



- Weld cross member, RP-spot weld seam.



51 09 55 50 Rear roof cross member, replacing (Golf)

- ◆ Roof already removed.

Cutting location

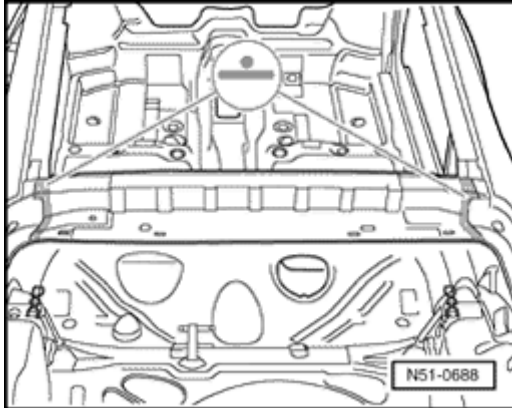
- Cut out cross member.
- Remove excess material

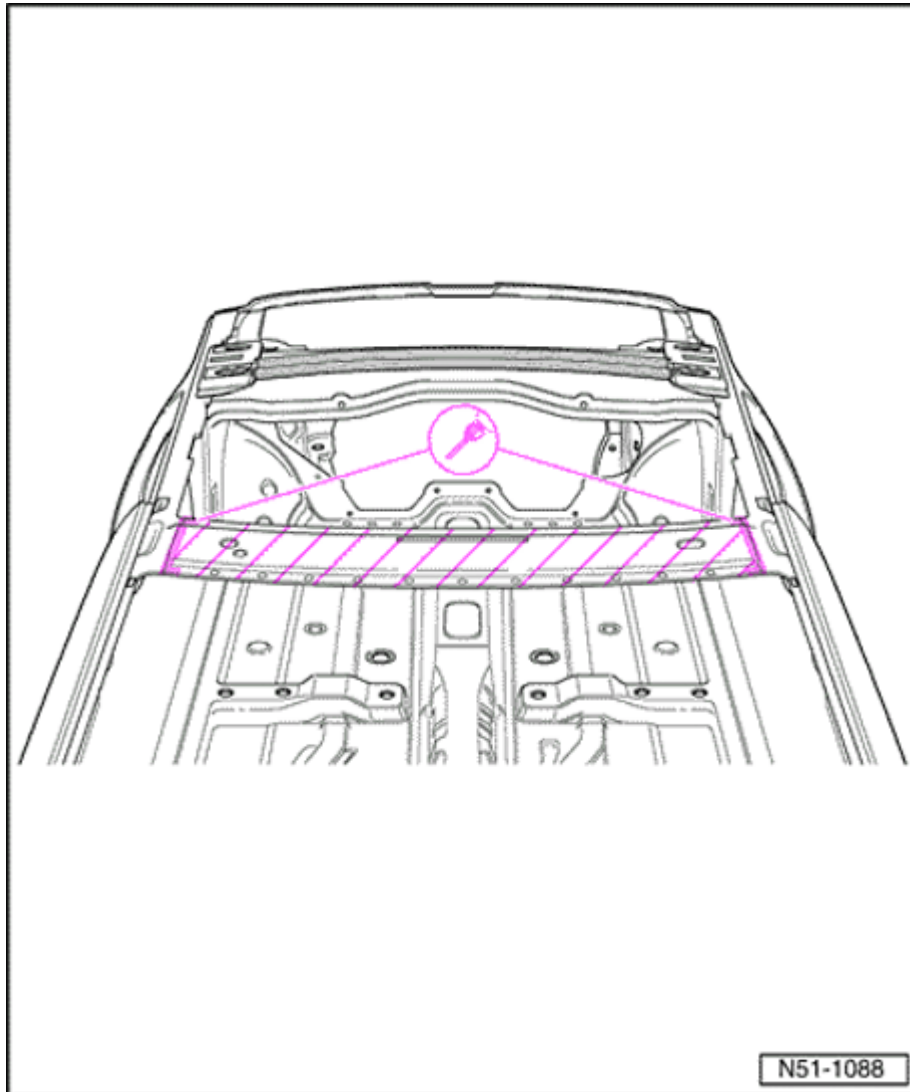
Replacement part

- ◆ Roof cross member

Welding in place

- Position and secure new part.
- ◀ - Weld new part, RP-spot weld seam.





51 09 55 50 Rear cross member, replacing (Jetta)

- ◆ Roof removed

Cutting location

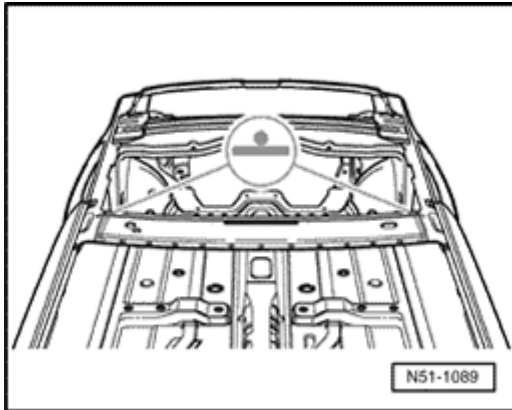
- Cut out cross member.
- Remove excess material.

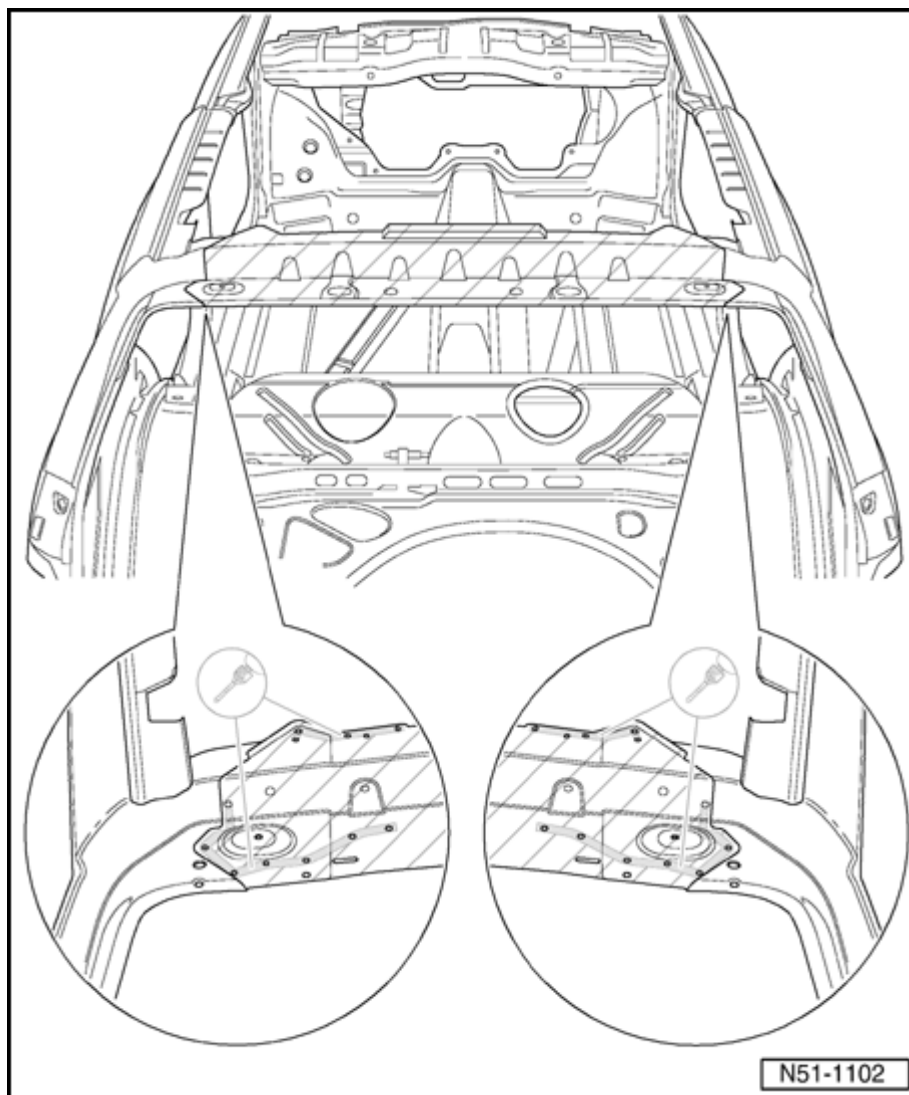
Replacement part

- ◆ Roof cross member

Welding in place

- Position and secure cross member.
- ◀ - Weld in cross member, RP-spot weld seam.





51 09 55 70 Rear roof crossmemb replacing (Jetta wago

WARNING!

Observe safety precautions!

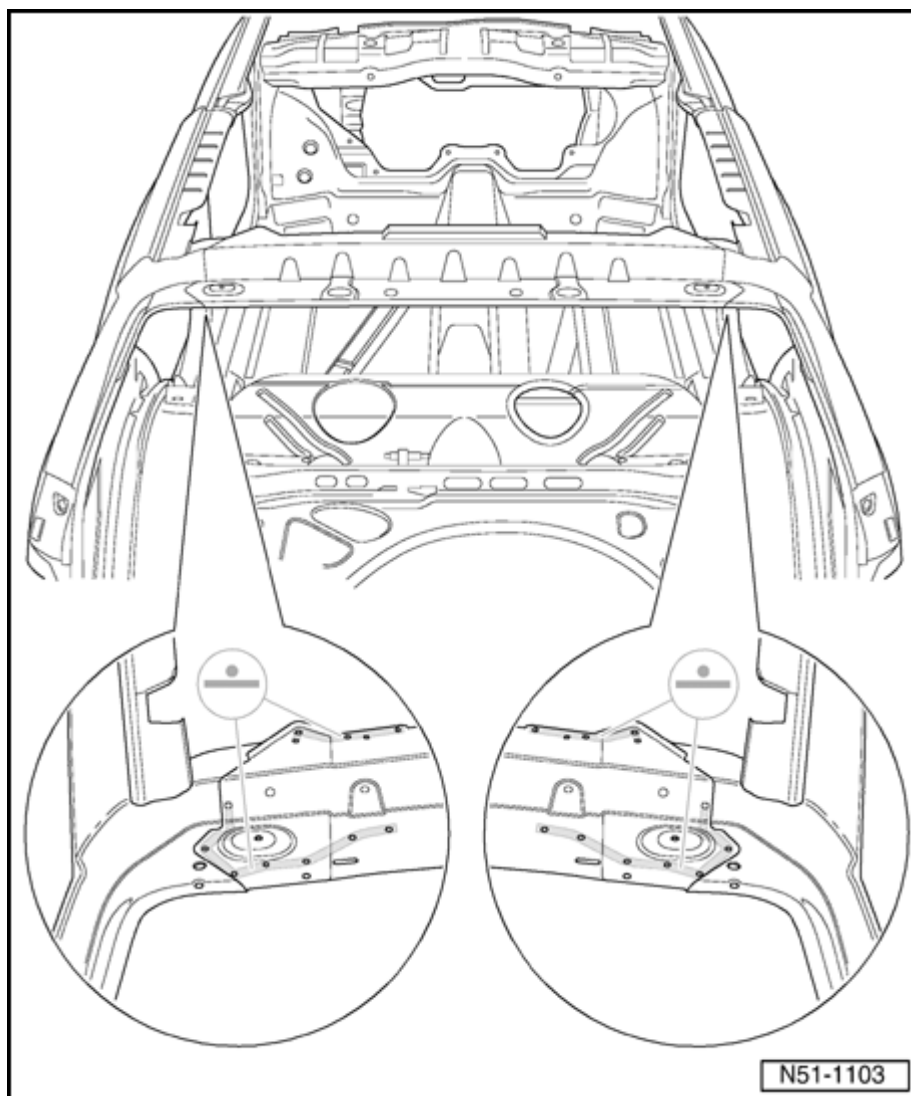
⇒ Repair Manual;
General Notes,
Chapter 1, Safety
precautions

- Roof already cu
out

Separating locatio

- Roof crossmemb
drilling out.
- Remove remainin
material.

51-27

**Replacement part**

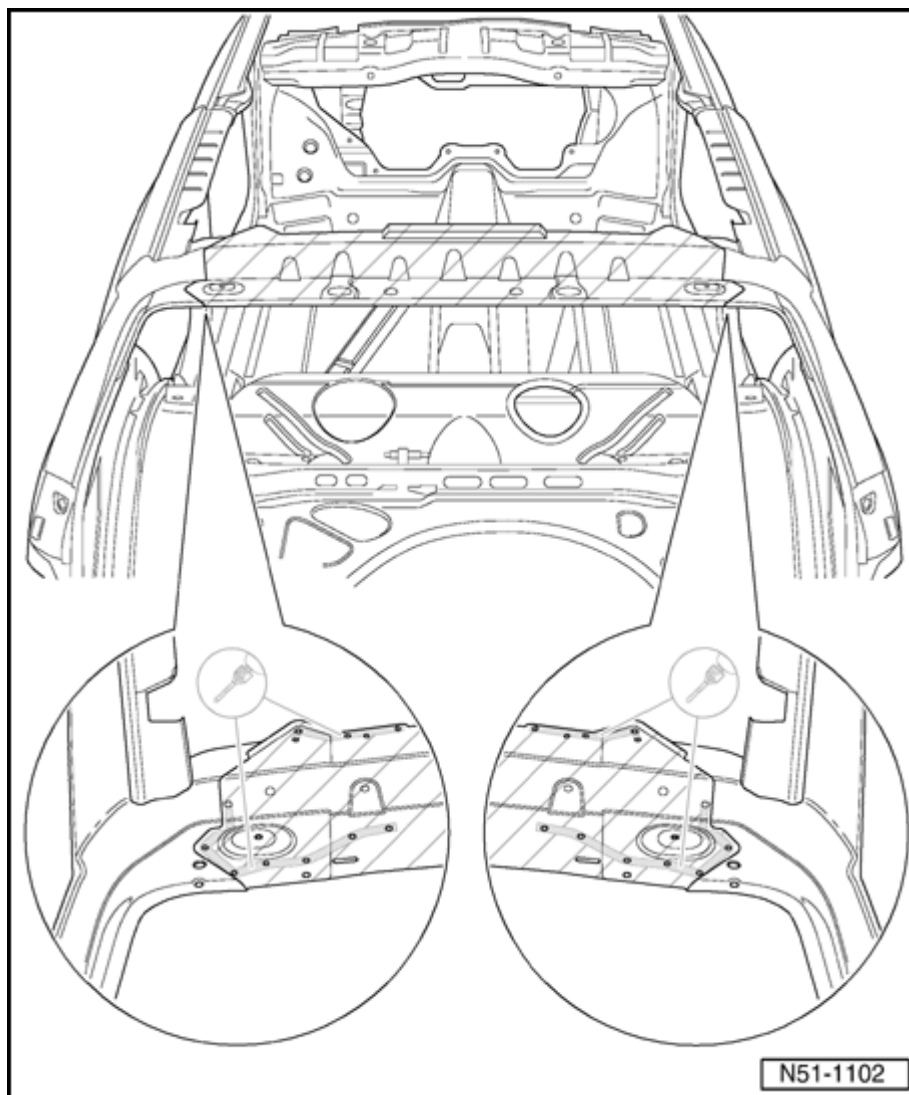
- ◆ Rear roof crossmember

Welding in

- Spot weld roof crossmember, RP spot weld seam.

Notes:

- ◆ *To spot-weld roof crossmember, only VAG1713 special tool may be used due to strength related issues (3 panels of different thicknesses in welding area).*
- ◆ *When using other welding units, the roof crossmember must be welded in using SG plug welding.*



51 09 55 70 Rear roof crossmemb replacing (Jetta wago

WARNING!

Observe safety precautions!

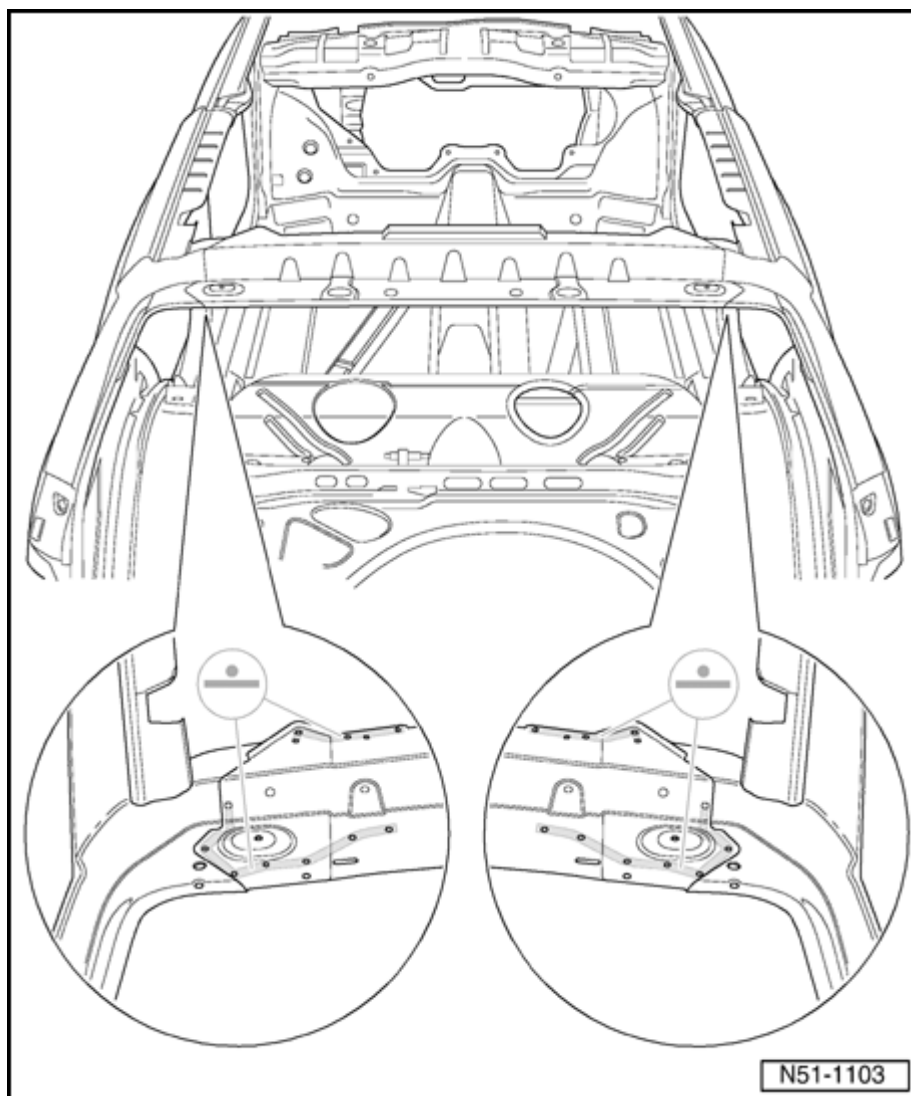
⇒ Repair Manual;
General Notes,
Chapter 1, Safety
precautions

- Roof already cu
out

Separating locatio

- Roof crossmemb
drilling out.
- Remove remainin
material.

51-27

**Replacement part**

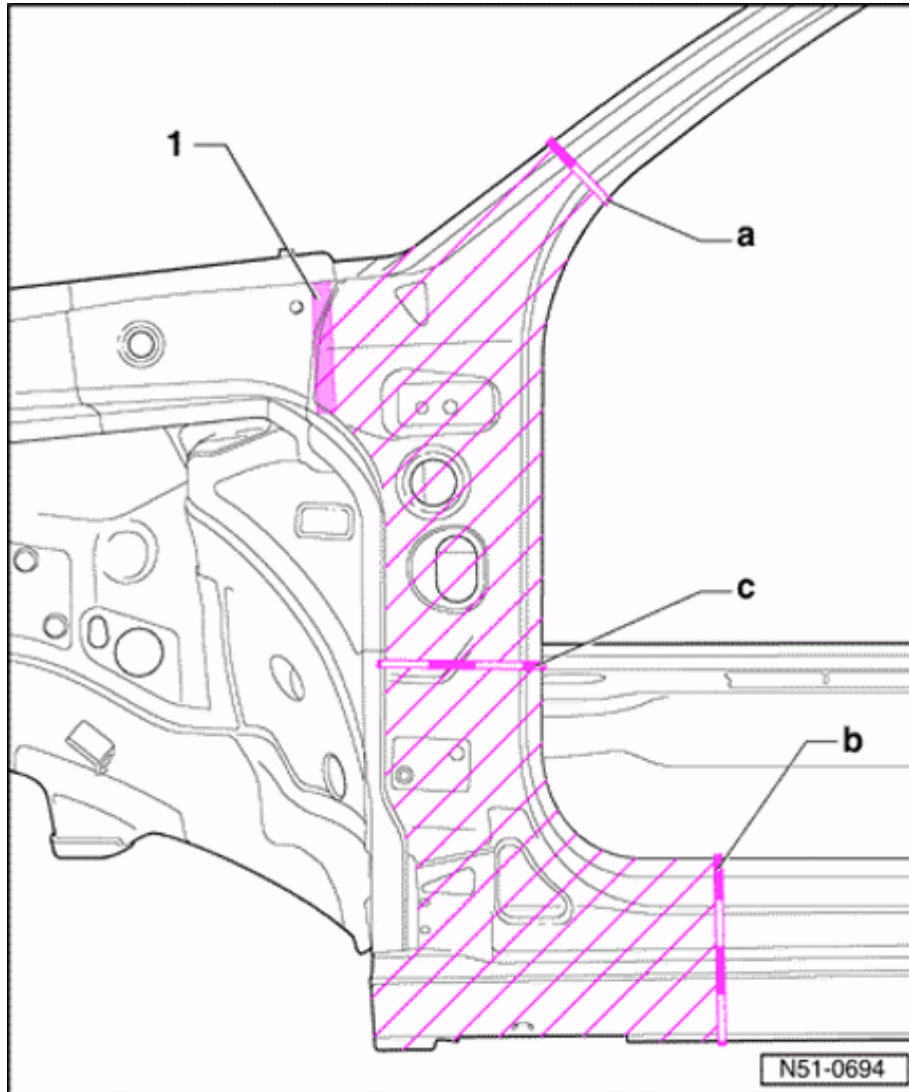
- ◆ Rear roof crossmember

Welding in

- Spot weld roof crossmember, RP spot weld seam.

Notes:

- ◆ *To spot-weld roof crossmember, only VAG1713 special tool may be used due to strength related issues (3 panels of different thicknesses in welding area).*
- ◆ *When using other welding units, the roof crossmember must be welded in using SG plug welding.*



51 37 55 00 A- pillar, inner, replacing

1 - Foam
treated
area

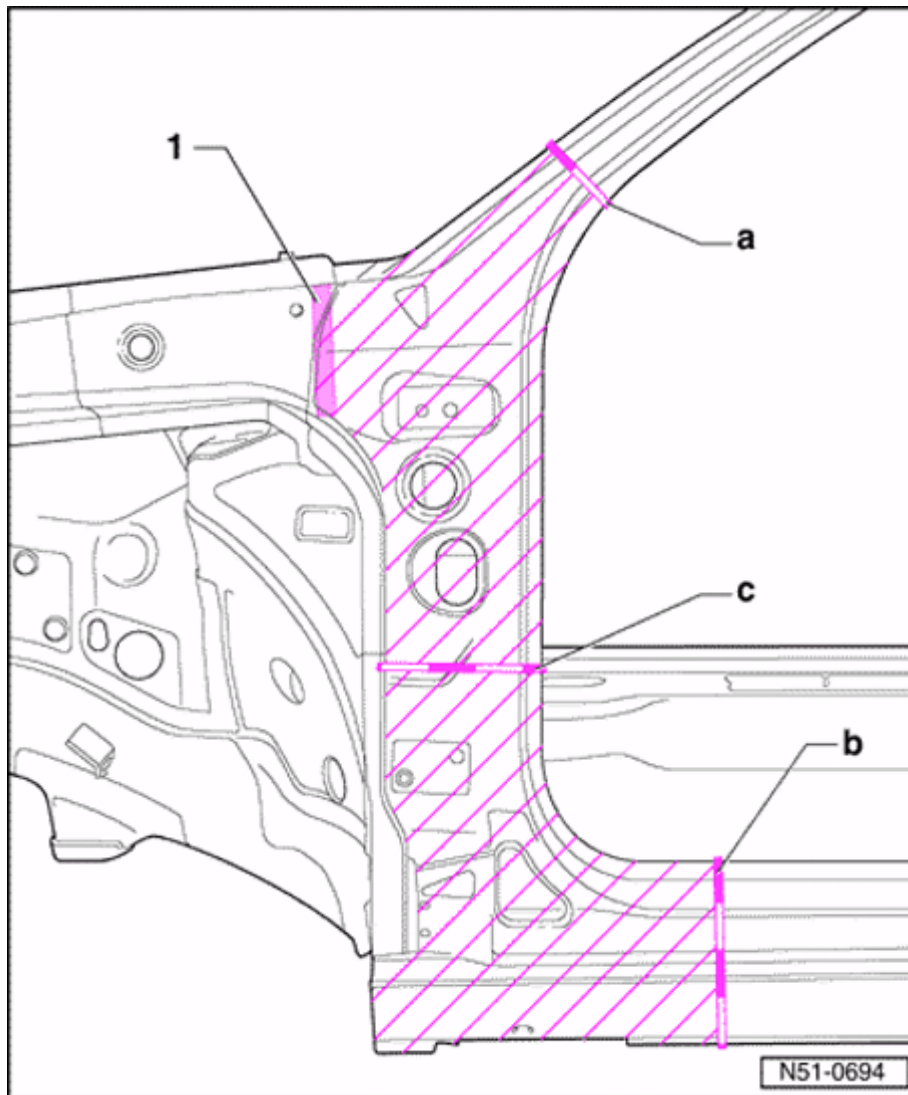
WARNING!

♦ **Welding, separating, using spark generating tools in foam treated areas creates gases, therefore, do not use these processes.**

♦ **Use 2K-filler material to smooth out irregularities.**

- Scrape out as much excess foam as possible before starting grinding work.

51-29



Cutting location

- Make parting cut -a- according to degree of damage.
- Make parting cut -b- as shown, do not damage internal reinforcement.
- Separate original joint.

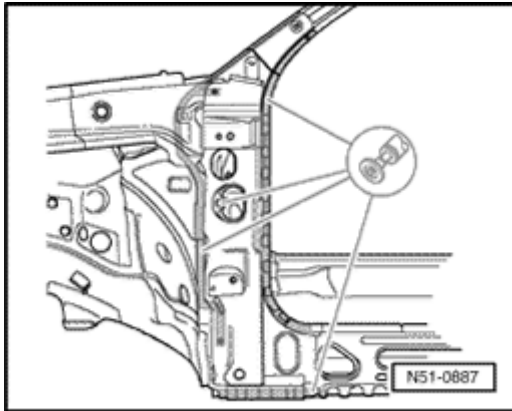
Partial replacement

Due to an internal reinforcement parting cut -c- is only permissible at this position.

Reinforcement can be felt through round opening.

- Butt weld parting cut, SG-continuous weld seam.

51-30

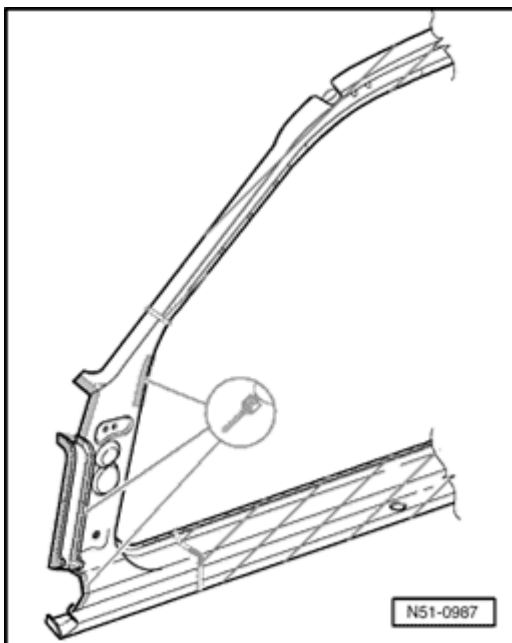


- Remove excess material.

Replacement part

- ◆ A-pillar lower section with sill

Preparing new part

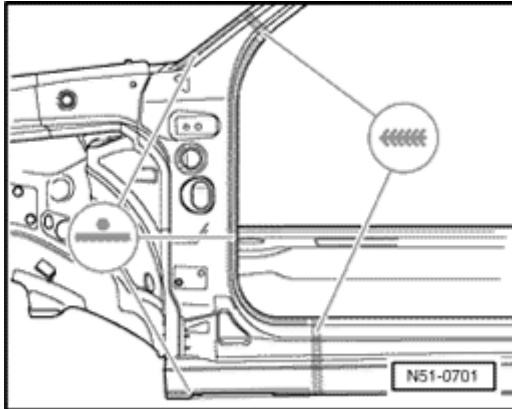


- Transfer separating lines to new part and cut out.
- Drill 7 mm dia. (0.27 in.) holes for SG-plug weld seam.

51-31

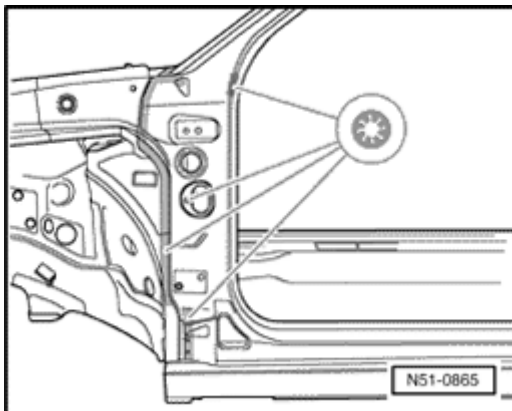
Welding in place

- Adapt new part with vehicle standing on i
wheels or on alignment fixture and tack w

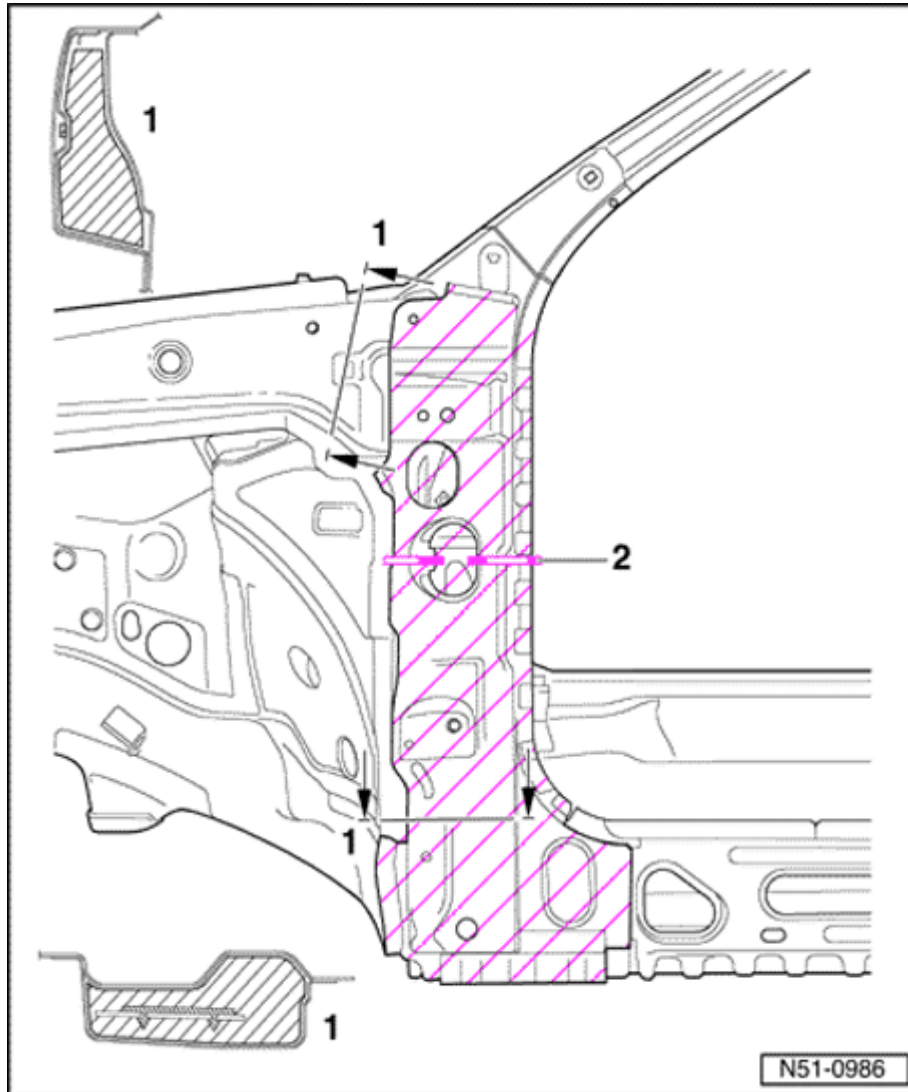


- Weld in A-pillar, RP-spot weld seam.

- Butt weld parting cut, SG-continuous wel



- Weld in A-pillar, SG-plug weld seam.



51 38 55 50 A- pillar, inner, replacing

- 1 - Foam treated area
- 2 - Cutting line part section

WARNING!

- ♦ **Welding, separating, using spark generating tools in foam treated areas creates gases, therefore, do not use these processes.**
- ♦ **Use 2K-filler material to smooth out irregularities.**

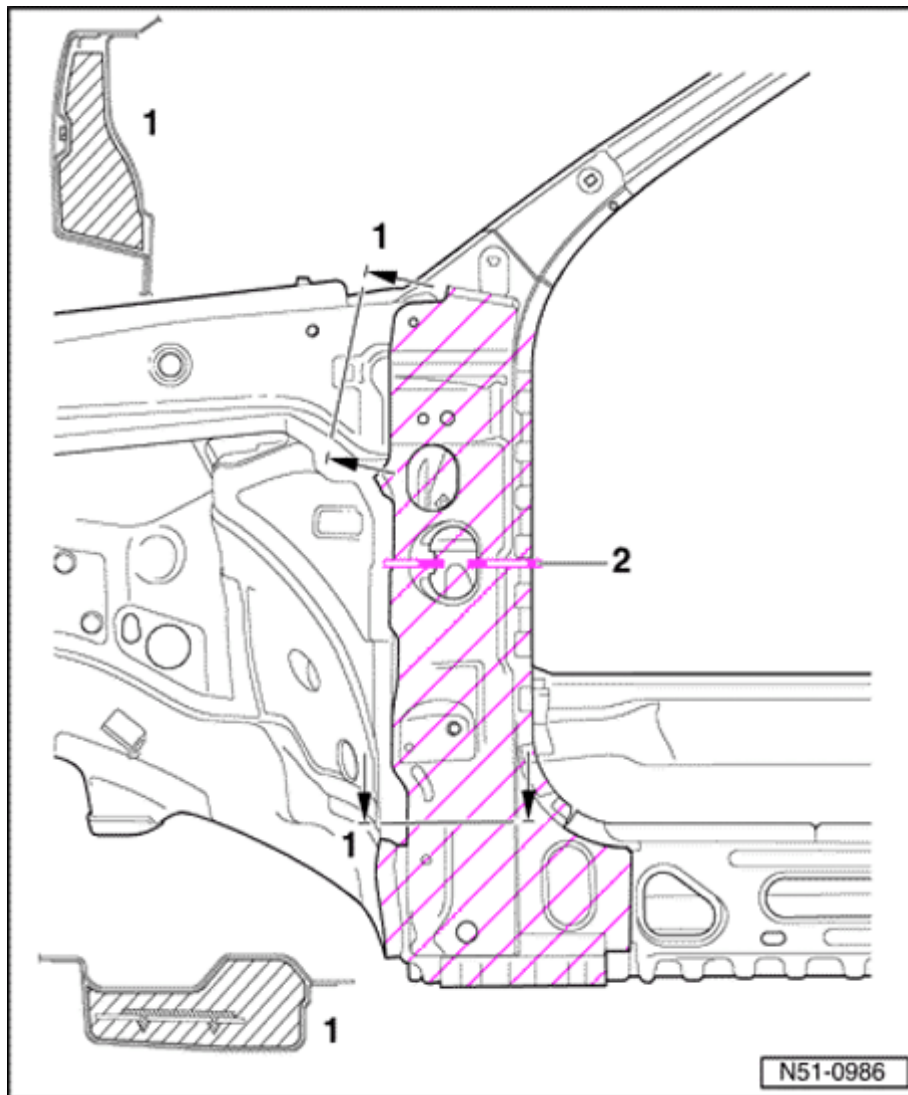
Note:

Only use body saw VAG1523 or air hammer VAG1577 for parting cut!

- Scrape out as much foam as possible before

starting
grinding
work.

51-33

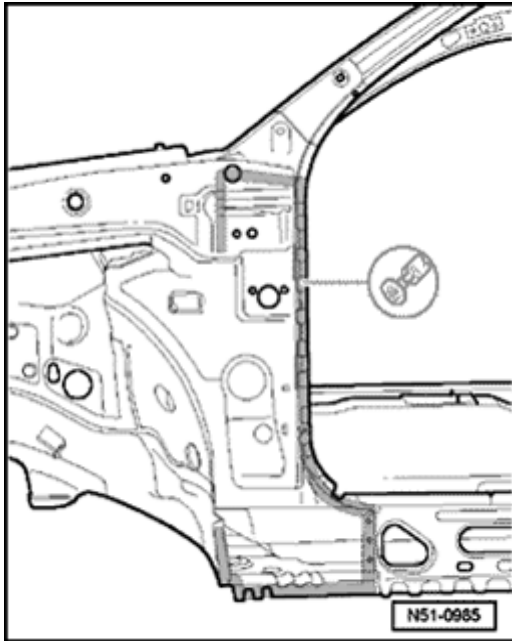
**Cutting location**

- Separate original joint.

Partial repair

A partial repair is possible using parting cuts -2- shown.

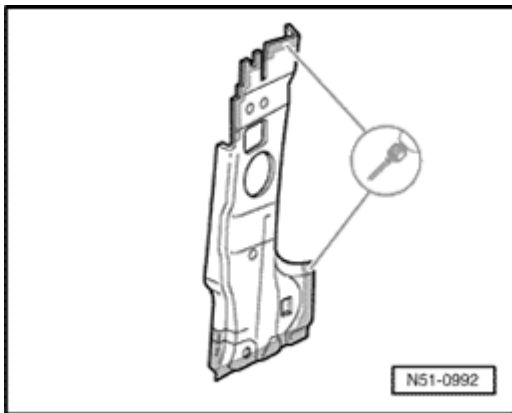
51-34



- ✦ - Remove excess material.

Replacement parts

- ◆ Inner A-pillar
- ◆ Insulation

Preparing new part

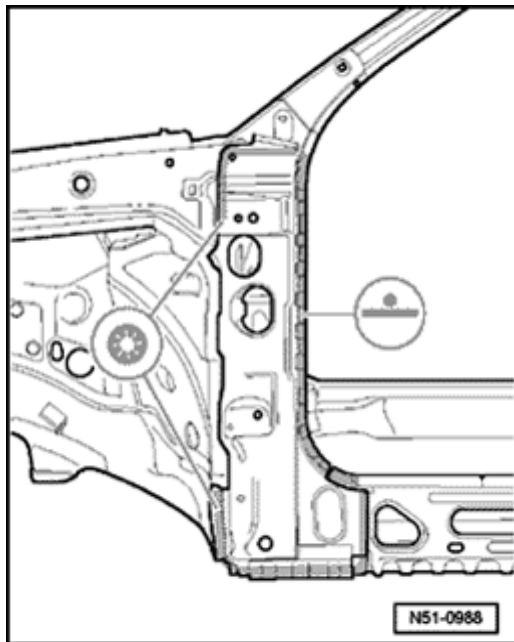
- ✦ - Drill 7 mm dia. (0.27 in.) holes for SG-plug weld seam.

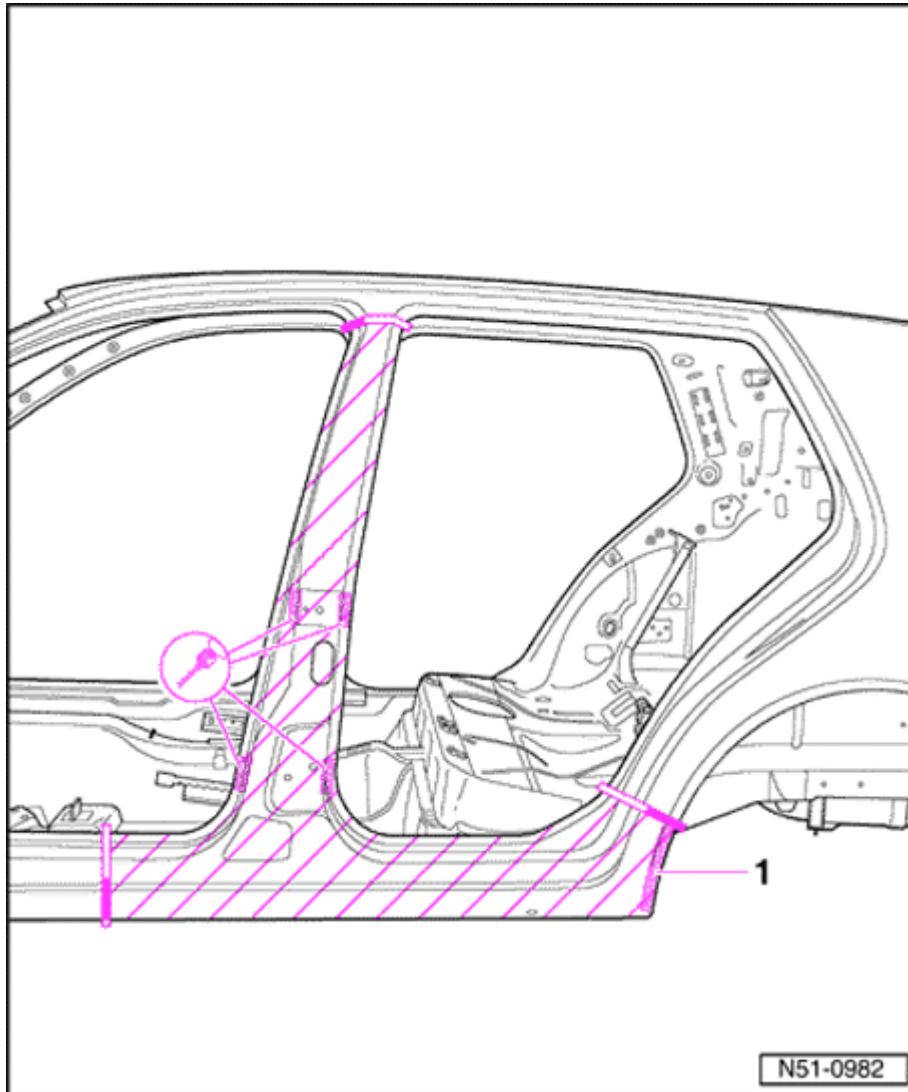
Foam insulation

Note repair instructions ⇒ [Page 00-6](#) .

Welding in place

- Install new part with vehicle standing on i wheels or on alignment fixture and tack w
- Check gaps/mating lines to adjacent part:
- Weld in inner A-pillar, RP-spot weld sear
- Weld remaining joint, SG-plug weld sear





51 41 55 62 B-pillar, replacing (4 door), 51 41 55 52 B-pillar, replacing (Jetta)

1 - Bonded
area

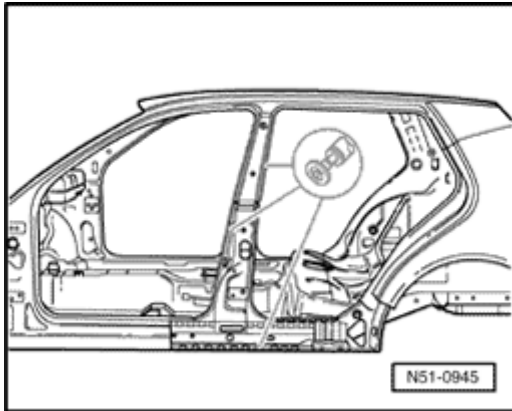
Cutting location

- Position parting cut according to degree of damage and cut out.
- Cut through outer edge of wheel arch.
- Separate original joint.

Note:

- ◆ Record size of replacement part!
- ◆ Do not damage reinforcement in area of parting cut.

51-37



- Remove excess material.
- Remove excess adhesive completely and grind adhesive surface back to bare metal.

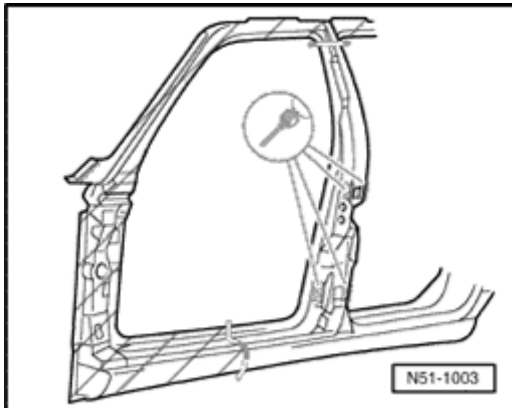
Replacement part

- ◆ Side panel frame lower section
- ◆ Adhesive: DA 001 730 A1

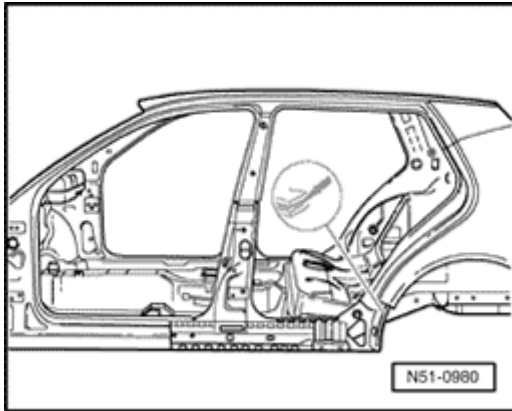
Preparing new part



- Transfer separating lines to new part and cut out shaded area.
- Drill 7 mm dia. (0.27 in.) holes for SG-plug weld seam.
- Ensure flange area is free of dust and grease.



51-38



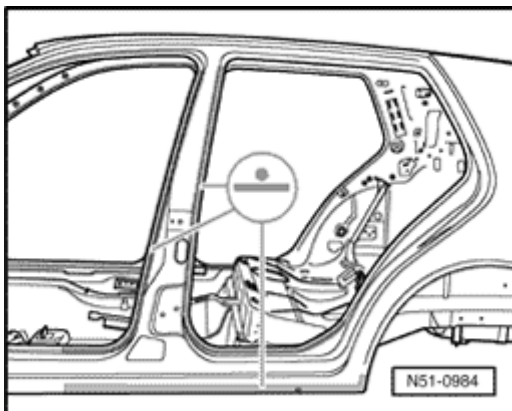
- Apply adhesive to flange 2 beads each of 3.5 mm dia. (0.27 in.).

CAUTION!

New part must be installed within 30 minutes, otherwise adhesive properties will be impaired.

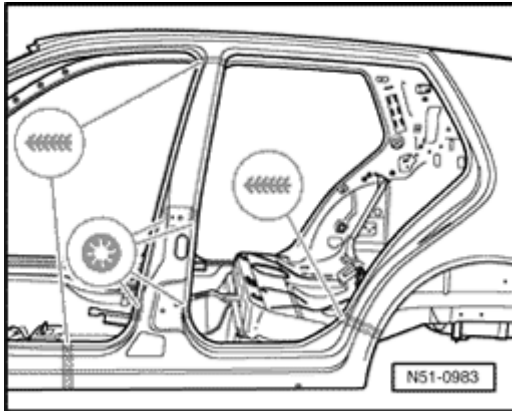
Welding in place

- Place backing plate behind weld seam and tack weld in position.
- Install and secure new part with vehicle on wheels or fixture.
- Check gap to mating part.

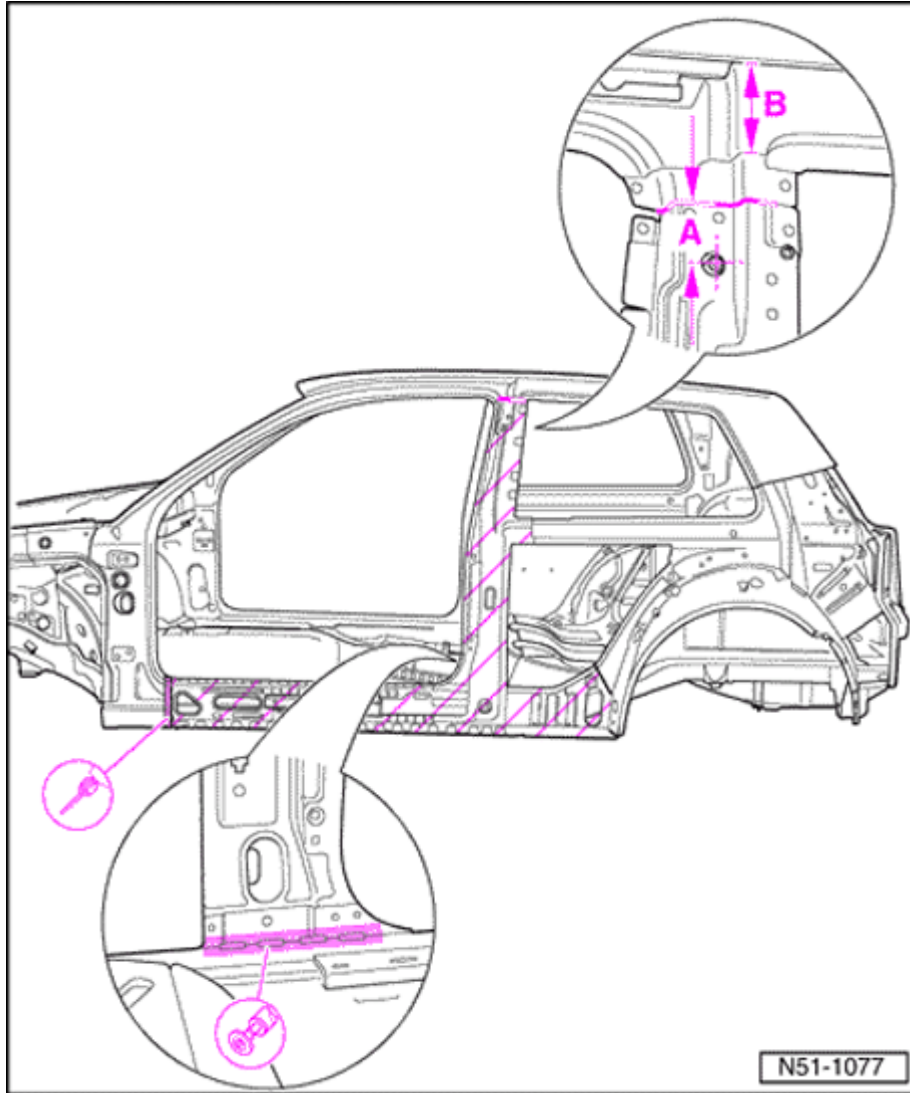


- Weld inner A-pillar, RP-spot weld.

51-39



- Butt weld parting cut, SG-continuous weld seam.
- Weld remaining joint, SG-plug weld seam.
- Reform/compress wheel house flange.
- Remove excess adhesive and seal.



51 42 55 50 Inner B-pillar, replacing (2-door)

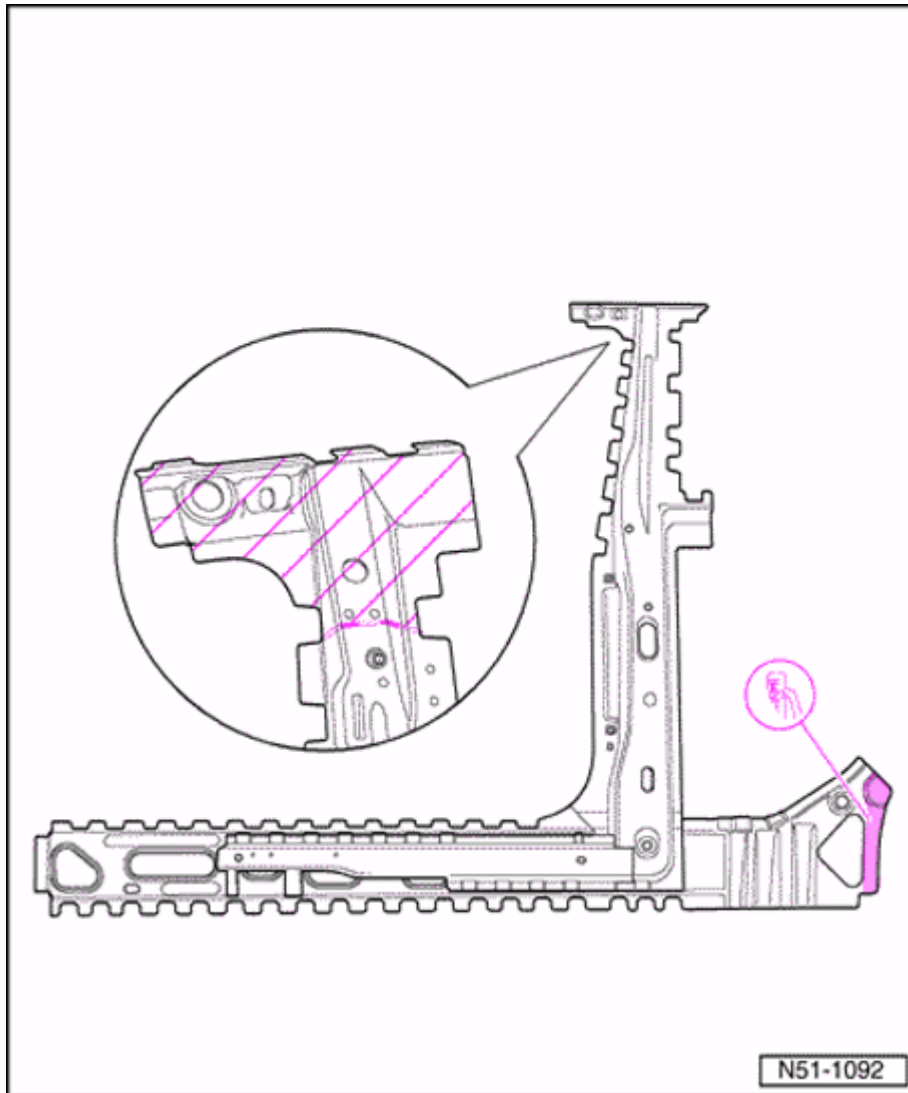
- Side panel removed.

Cutting location

Note:

- ◆ Make parting cut -b- for side panel 100 mm (3.93 in.) under roof edge.
 - ◆ Make parting cut -a- for B-pillar 47 mm (1.85 in.) over mounting point for seat belt, upper.
- Remove excess material.

51-41

**Replacement part**

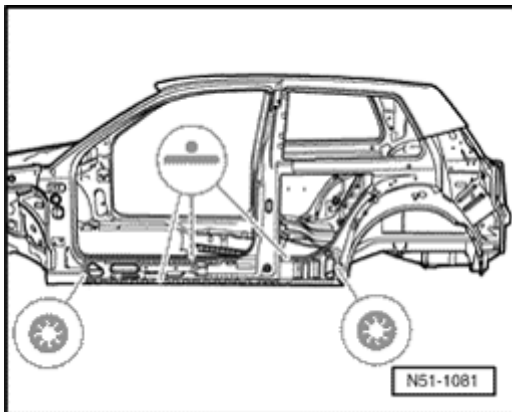
- ◆ Inner B-pillar

Preparing new part

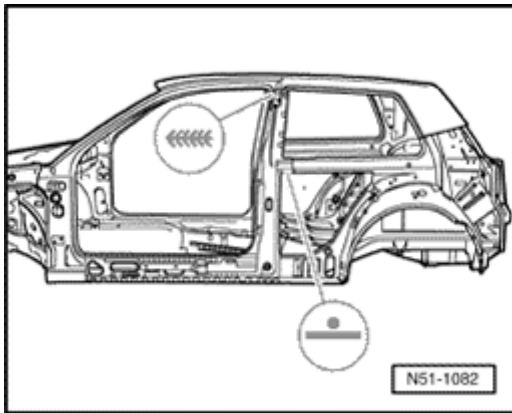
- Transfer separating lines to new part and cut out.
- Make holes in reinforcement for new welds.

Welding in place

- Install B-pillar with side panel and alignm fixture ⇒ [Page 00-49](#)
- Secure B-pillar to body
- Remove door hinge alignment fixture and panel.
- Weld B-pillar, RP-spot weld, SG-plug weld



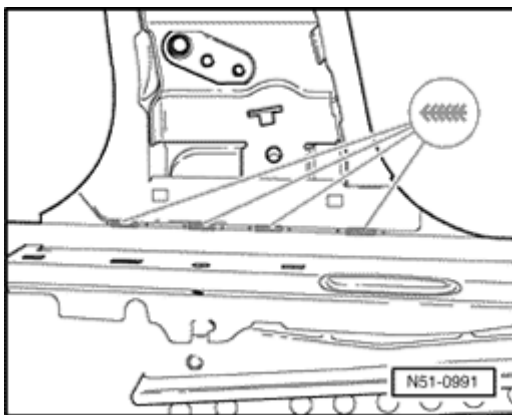
51-43



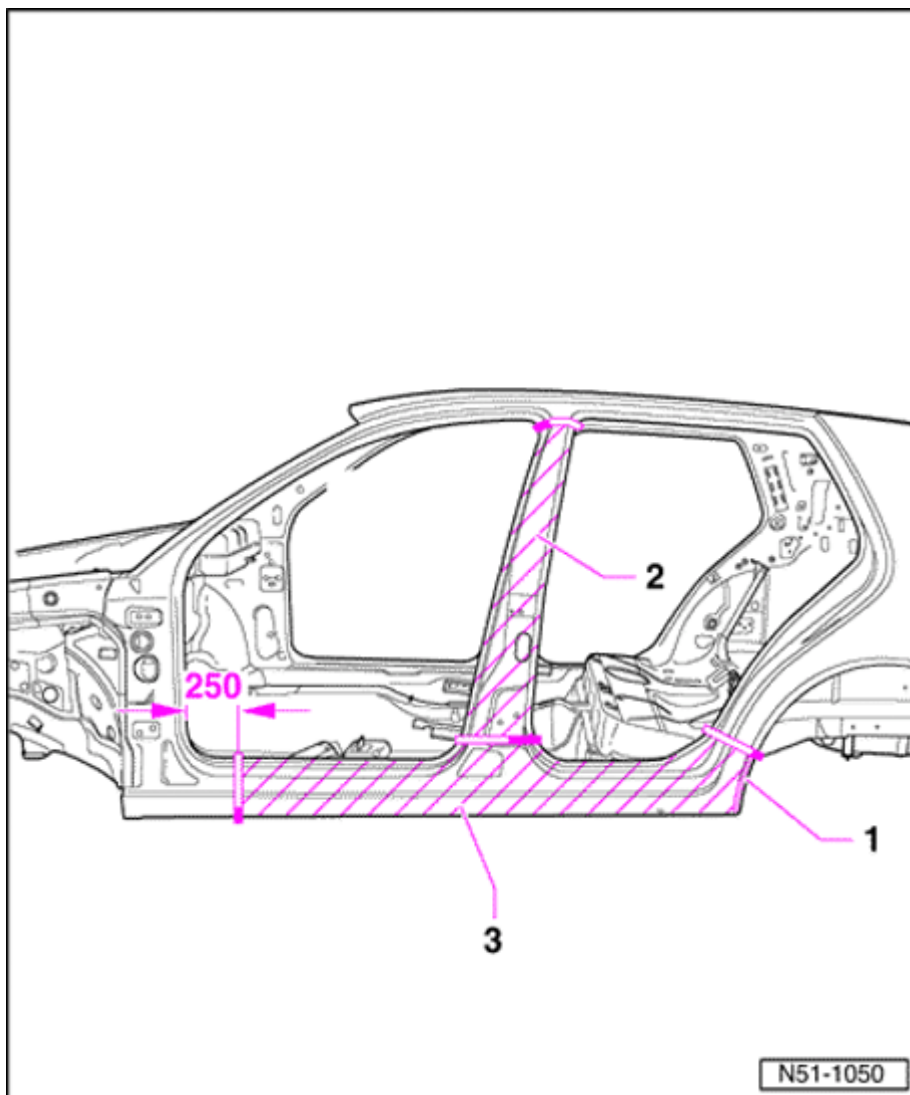
- Weld B-pillar RP-spot weld seam, weld SG-continuous weld seam.

Note:

Missing spot welds in upper area are welded when quarter panel is welded.



- Weld inner B-pillar, SG - continuous weld seam 4x25 mm (0.157 x 0.98 in.)
- Weld in 2 door side members (quarter panel) ⇒ [Page 53-47](#) .
- Weld in side member (quarter panel) ⇒ [Page 51-56](#) .



51 42 55 60 Inner B-pillar, replacing (4-door), 51 42 55 50 inner B-pillar, replacing (Jetta)

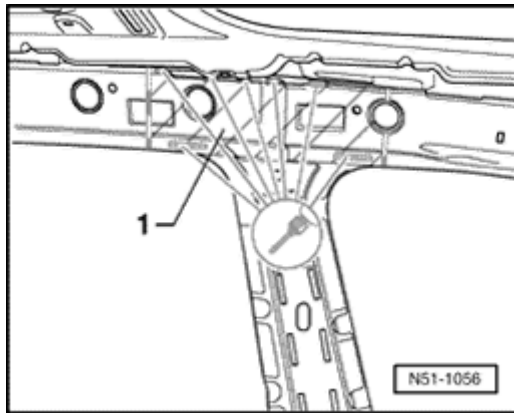
Cutting location

Note:

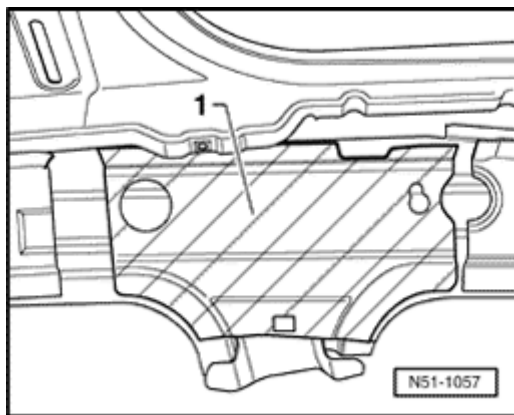
- ◆ Only complete replacement is possible
- ◆ Work procedure for Golf and Jetta is the same

1 - Bonded area

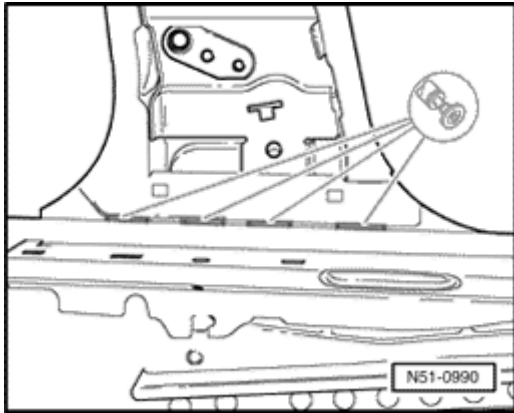
- Remove B-pillar - 2-.
- Grind through outer edge - 1- at wheel arch
- Cut out rocker panel -3-.



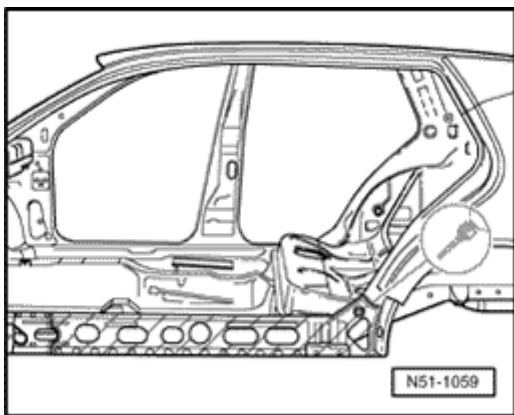
- ✦ - Drill out inner roof frame -1- without damage.



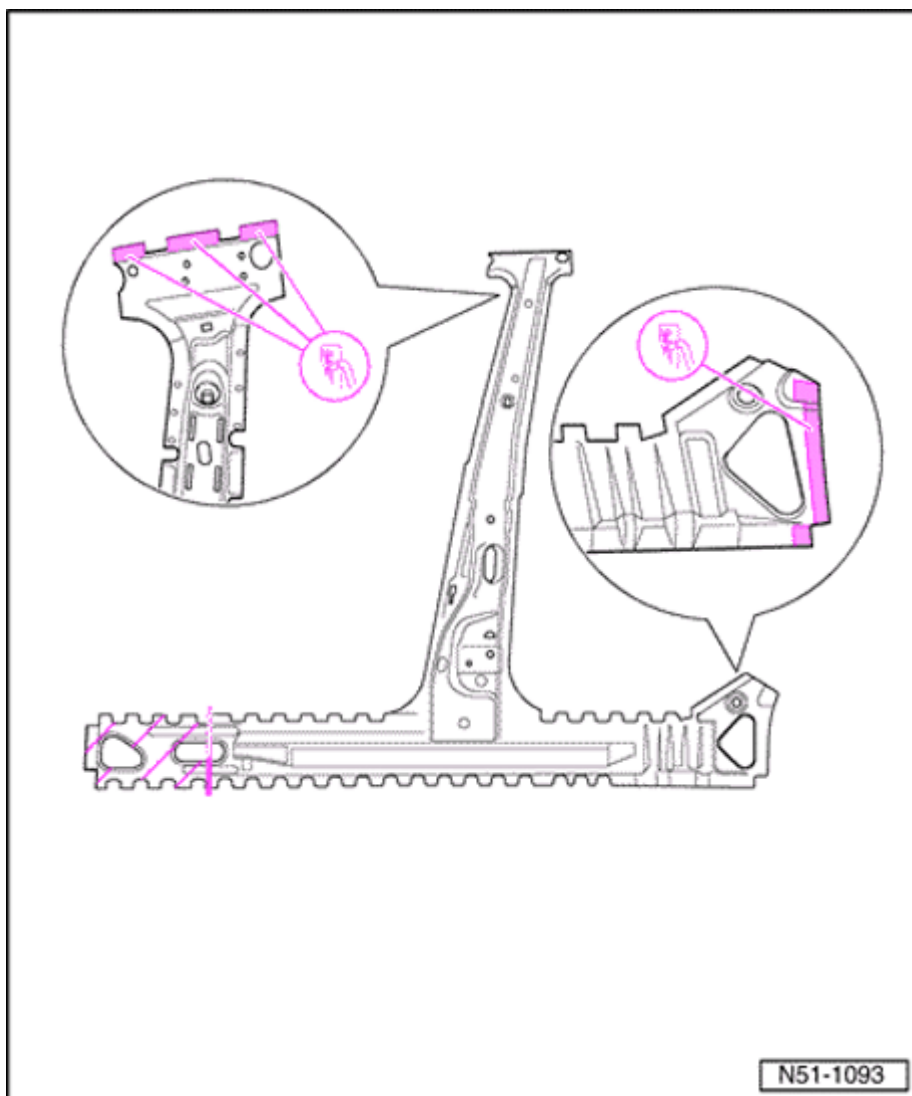
- ✦ - Cut out excess material -1-.



- ✦ - Grind out arc weld seam.



- ✦ - Drill out remaining pieces.



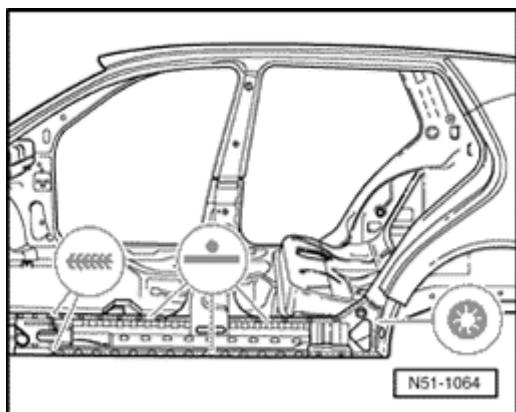
Replacement part

- ◆ Inner B-pillar
- ◆ Outer B-pillar

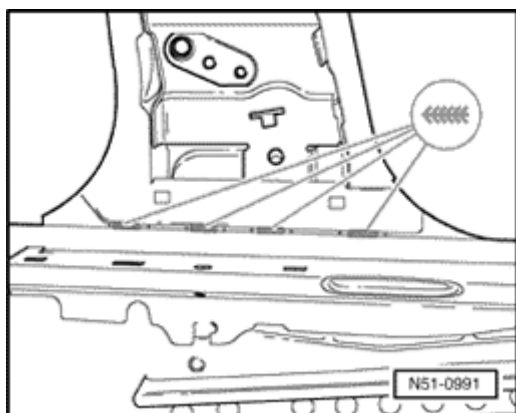
Preparing new parts

- Transfer separating lines to web plate and cut out.
- Make holes in reinforcement for new welds.

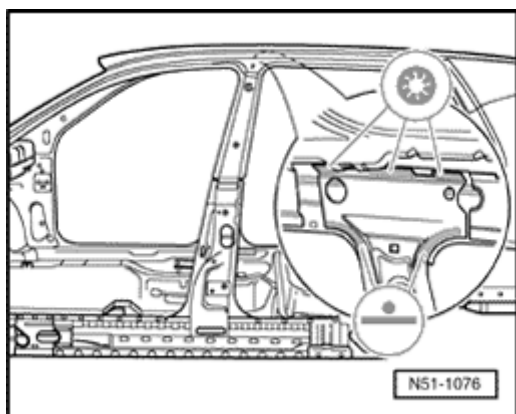
- Install and secure inner and outer B-pillar door alignment fixture ⇒ [Page 00-50](#)



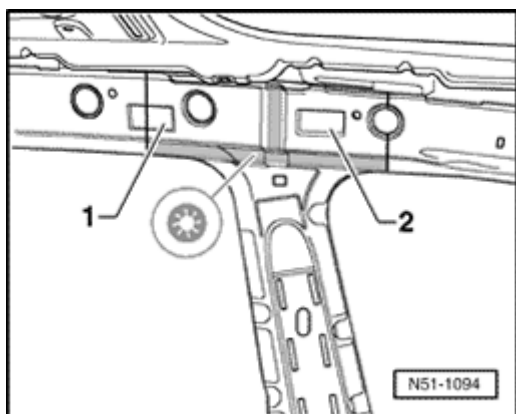
- Remove outer B-pillar.
- Weld inner B-pillar, RP-spot weld seam, SG-continuous weld seam, SG-plug weld seam



- Weld inner B-pillar, SG-continuous weld seam, 4x25 mm (0.157 x 0.98 in.)



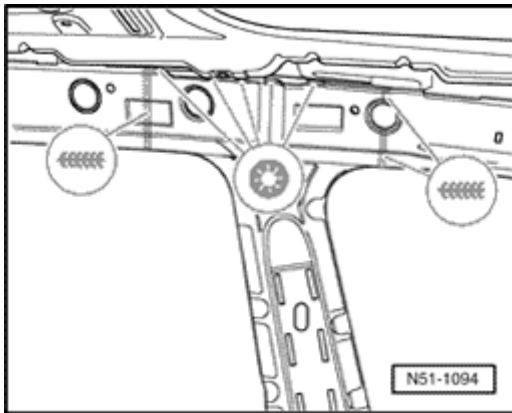
- ✦ - Weld B-pillar in roof area, RP-spot weld, SG-plug weld



- ✦ - Install panels -1- and -2- and secure.
- Weld panels, SG-plug weld seam.

Note:

SG-plug welding should only be 15 mm (0.59 in.)

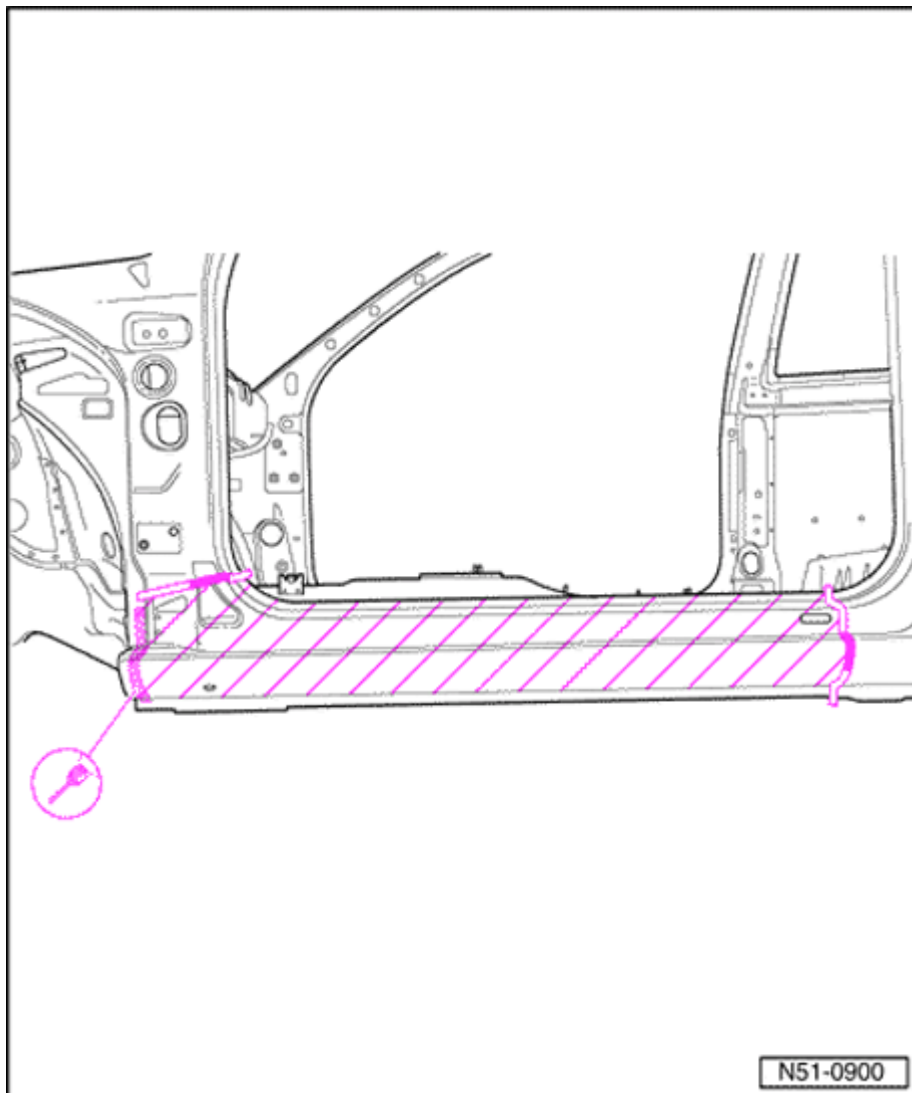


- Weld in web plate, SG-continuous weld seam, SG-plug weld.

Note:

Remaining spot welds will be welded when welding B-pillar.

- Welding B-pillar in ⇒ [Page 51-36](#) .



51 45 55 00 Outer side member, replacing (2-door)

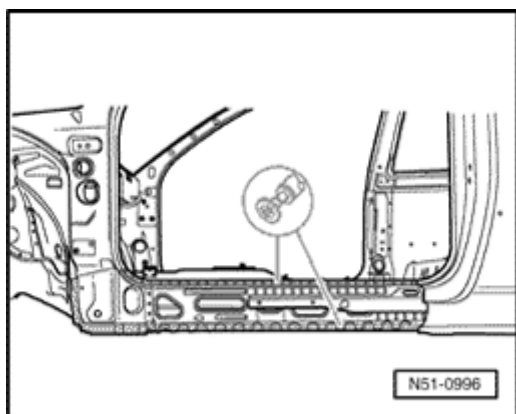
Cutting location

- Make sill parting cut according to degree of damage.
- Drill out original joint to A-pillar.

Note:

Record size of replacement part!

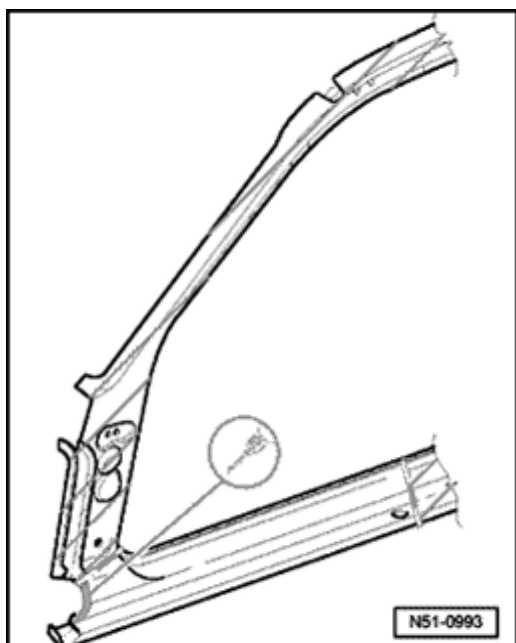
51-52



- ✦ - Remove excess material.

Replacement part

- ◆ Side member (lower section)

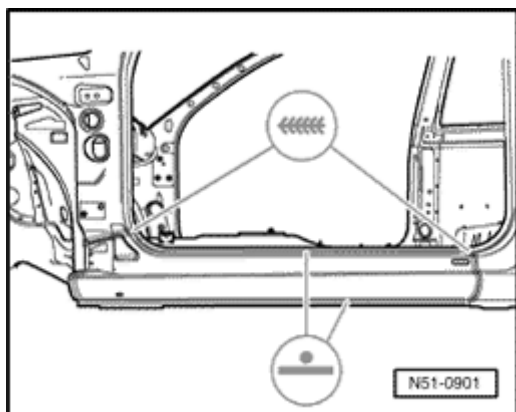
Preparing new part

- ✦ - Transfer separating lines to new part and cut out.
- Drill 7 mm dia. (0.27 in.) holes for SG-plug weld seam.

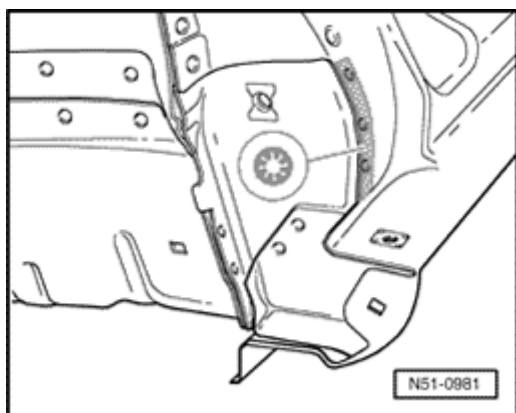
51-53

Welding in place

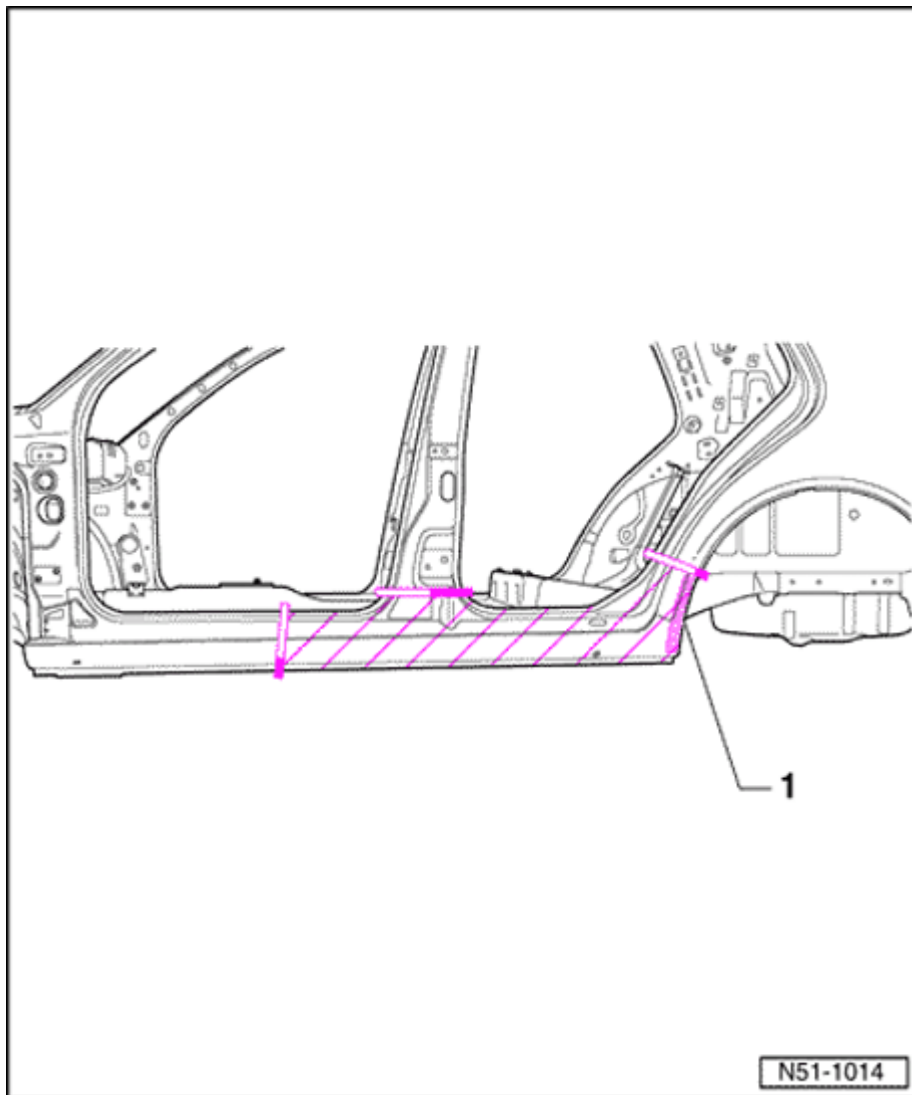
- Install new part with vehicle standing on i wheels or on alignment fixture and tack w



- Weld in side member, RP-spot weld sear
- Butt weld parting cuts, SG continuous sear



- Weld in sill panel, SG-plug weld seam.



**51 45 55
10 Outer
side
member,
replacing
(4-door),
51 45 55
00 outer
side
member,
replacing
(Jetta)**

**1 - Bonded
area**

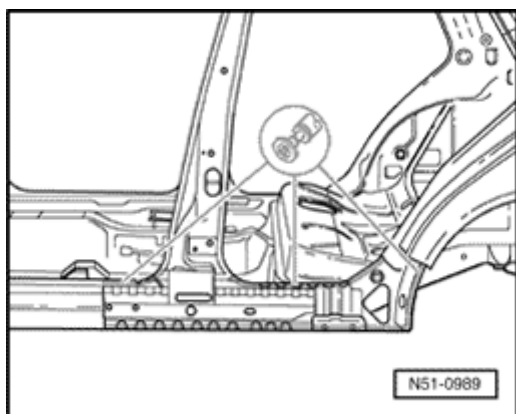
**Cutting
location**

- Make sill
parting
cut
according
to degree
of
damage.

Note:

*Record size of
replacement
part!*

- Cut
through
outer
edge of
wheel
arch.

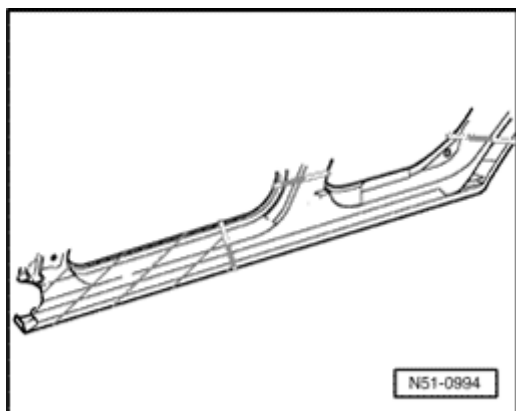


- Remove excess material.
- Remove adhesive completely and grind adhesive surface back to bare metal.

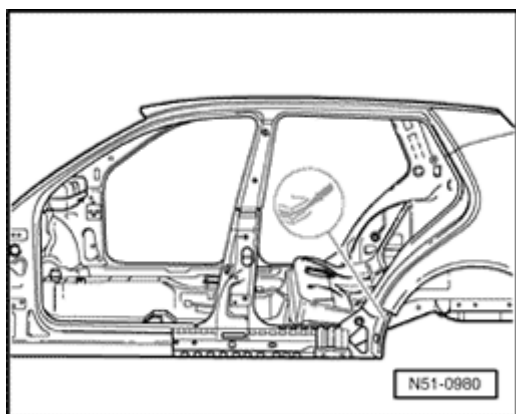
Replacement parts

- ◆ Side member (lower section)
- ◆ Adhesive: DA 001 730 A1

Preparing new part



- Transfer separating lines to new part and cut out.
- Ensure flange area is free of dust and grease.



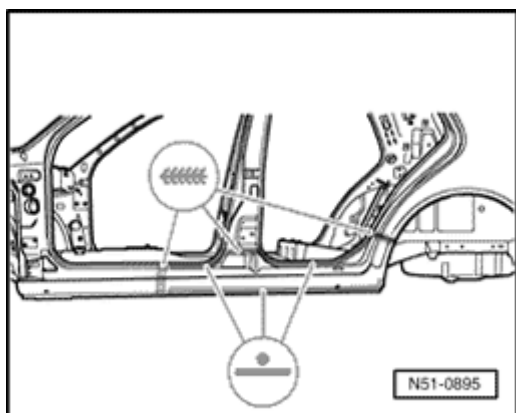
- Apply adhesive to flange. 2 beads each 3.5 mm (0.137 in.) diameter.

CAUTION!

New part must be installed within 30 minutes, otherwise adhesive properties will be impaired.

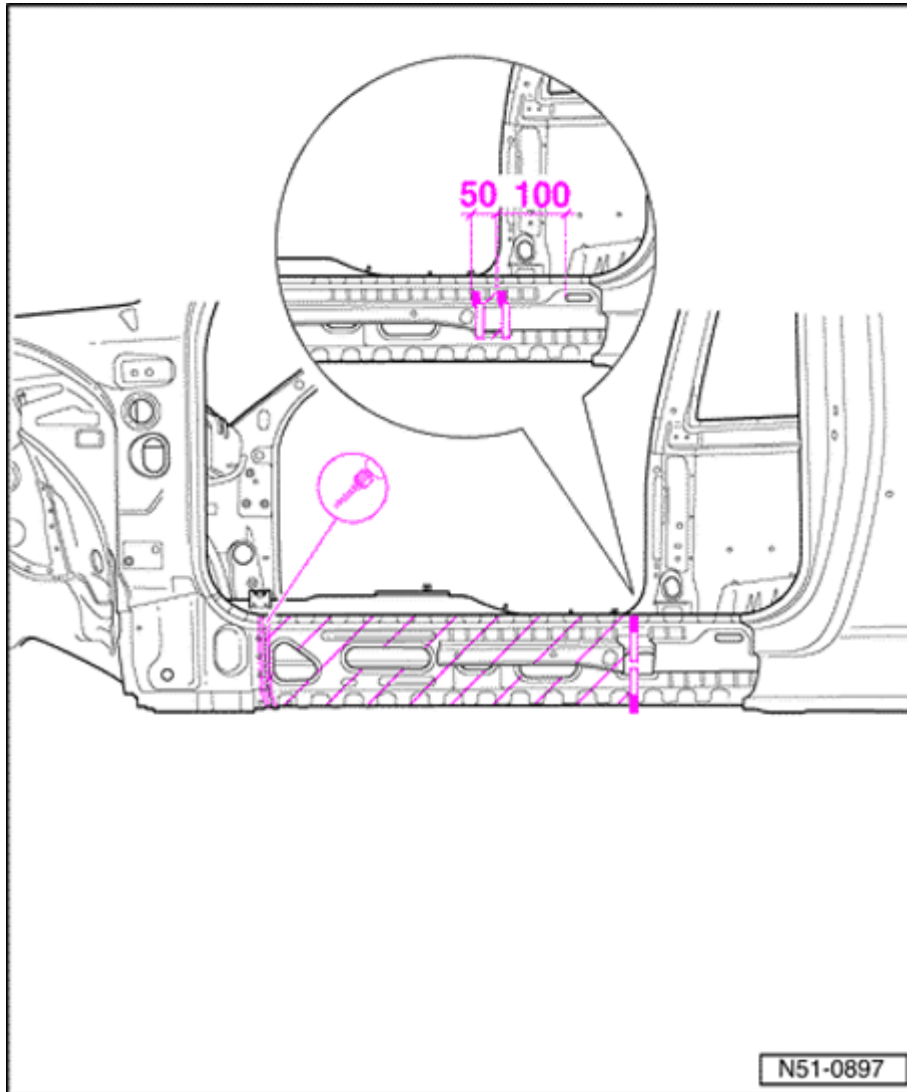
Welding in place

- Install new part with vehicle standing on its wheels or on alignment fixture and tack weld.



- Weld in side member, RP-spot weld seam.
- Butt weld parting cuts, SG-continuous weld seam.
- Reform/compress wheel house flange.
- Remove excessive adhesive and seal.

51-57



51 49 55 50 Side member reinforce replacing

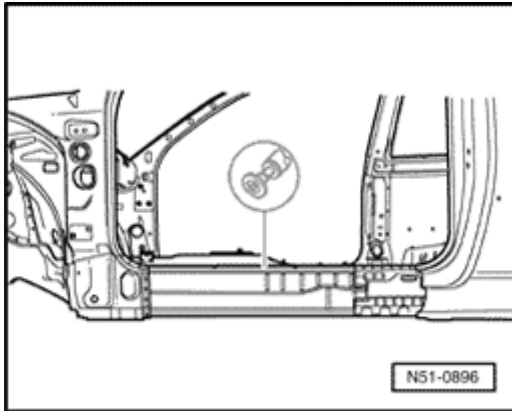
**Includes: Web
plate part sectio**

- ◆ Outer side mem
already remove

Cutting location

- With rear parting
cut, cut strip out
side member
reinforcement, th
separate web pla
- Separate original
joint.

51-58

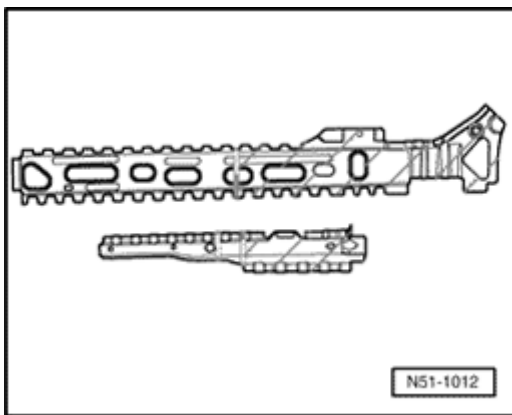


- Remove excess material.

Replacement parts

- ◆ Side member reinforcement
- ◆ Web plate for side member

Preparing new part

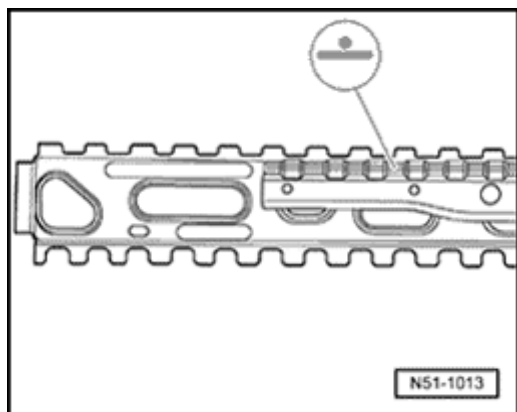


- Transfer separating lines to new part and cut out.

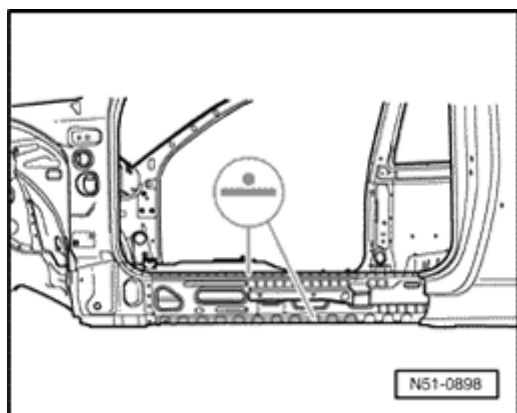
51-59

Welding in place

- Install new part with vehicle standing on i wheels or on alignment fixture and tack w
- Weld side member reinforcement to side member web plate, RP-spot weld seam.

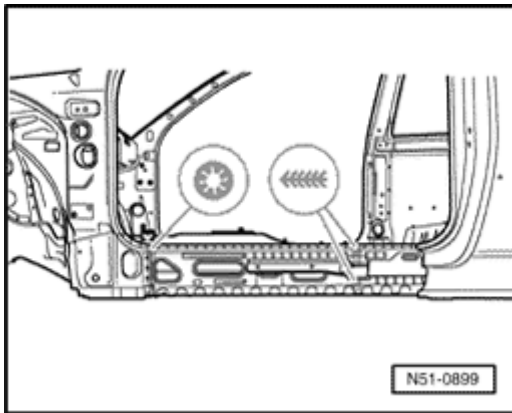


- Weld side member reinforcement to side member web plate, RP-spot weld seam.

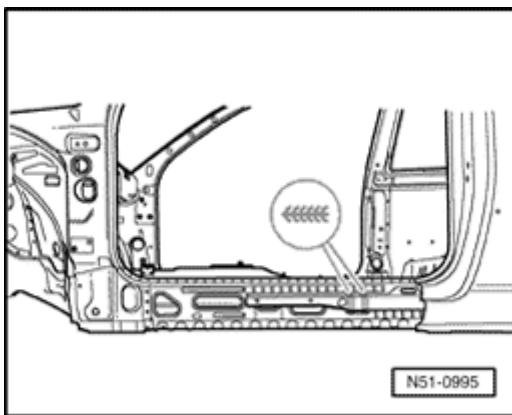


- Spot weld web plate, RP-spot weld.

51-60

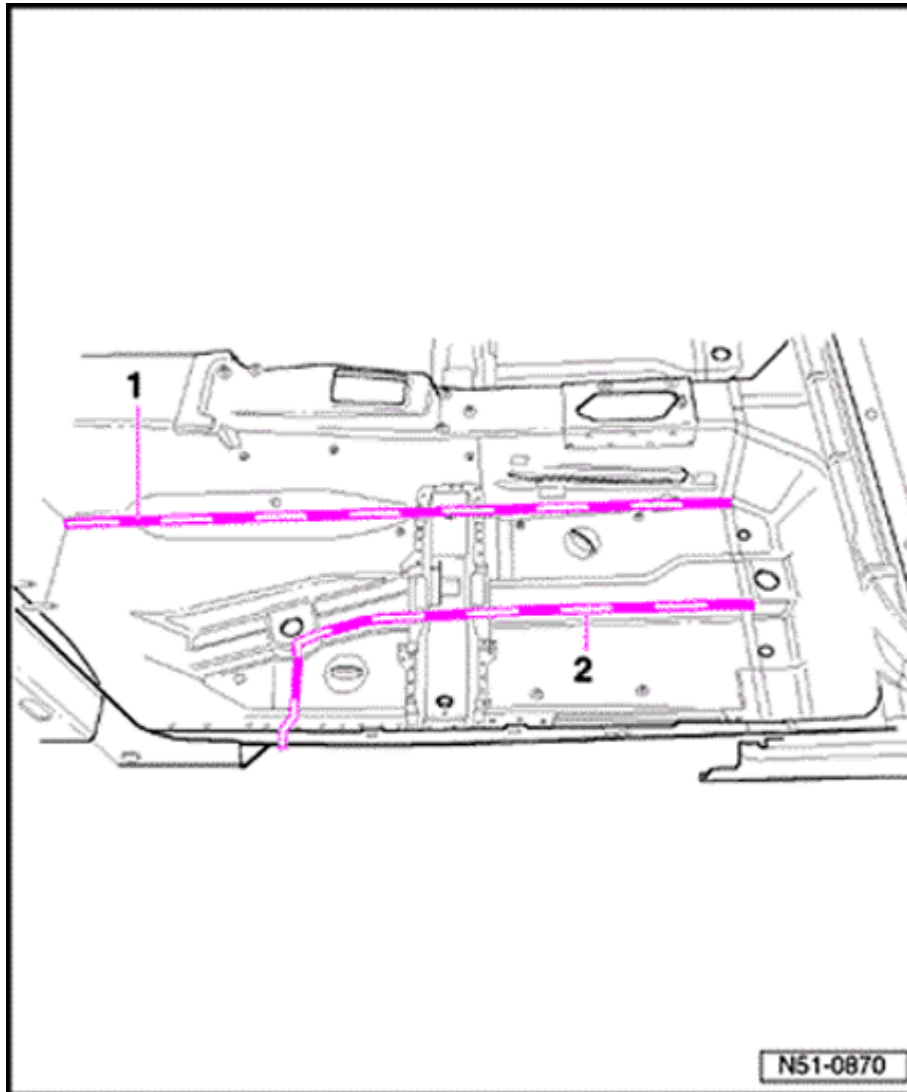


- Weld separating cut, SG-continuous weld seam.
- Weld remaining joint, SG-plug weld seam.



- Secure strip and weld in, SG-continuous weld seam.
- Weld in side member ⇒ [Page 51-57](#).

51-61



51 73 55 50 Floor plate, partial replacement

Cutting location

- 1 - Cutting line full section
- 2 - Cutting line part section

- Cut out according to degree of damage.
- Cut out floor panel.
- Remove excess material

Note:

- ◆ Do not make parting cuts in center tunnel area.
- ◆ Replace seat cross member and guide rail only as complete unit.

Part section

- At parting cut -2-, weld offset overlap

both sides,
SG-
continuous
weld seam
staggered.

Replacement parts

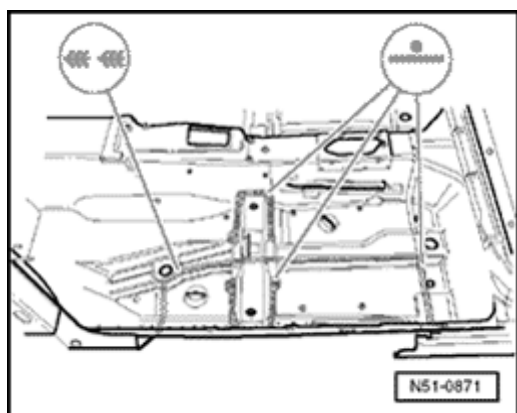
- ◆ Floor plate
- ◆ Seat cross member
- ◆ Guide rails

Preparing new part

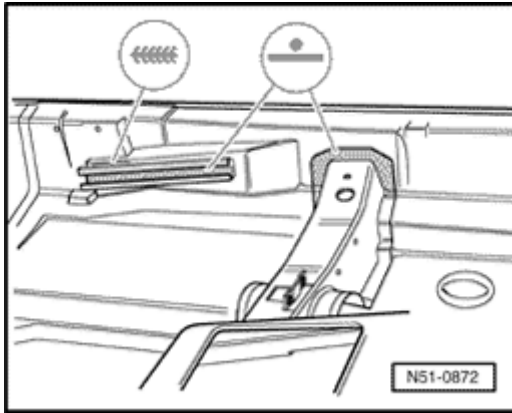
- Transfer parting lines to new part and cut.
- Add approx. 10 mm (0.393 in.) for overlap.

Welding in place

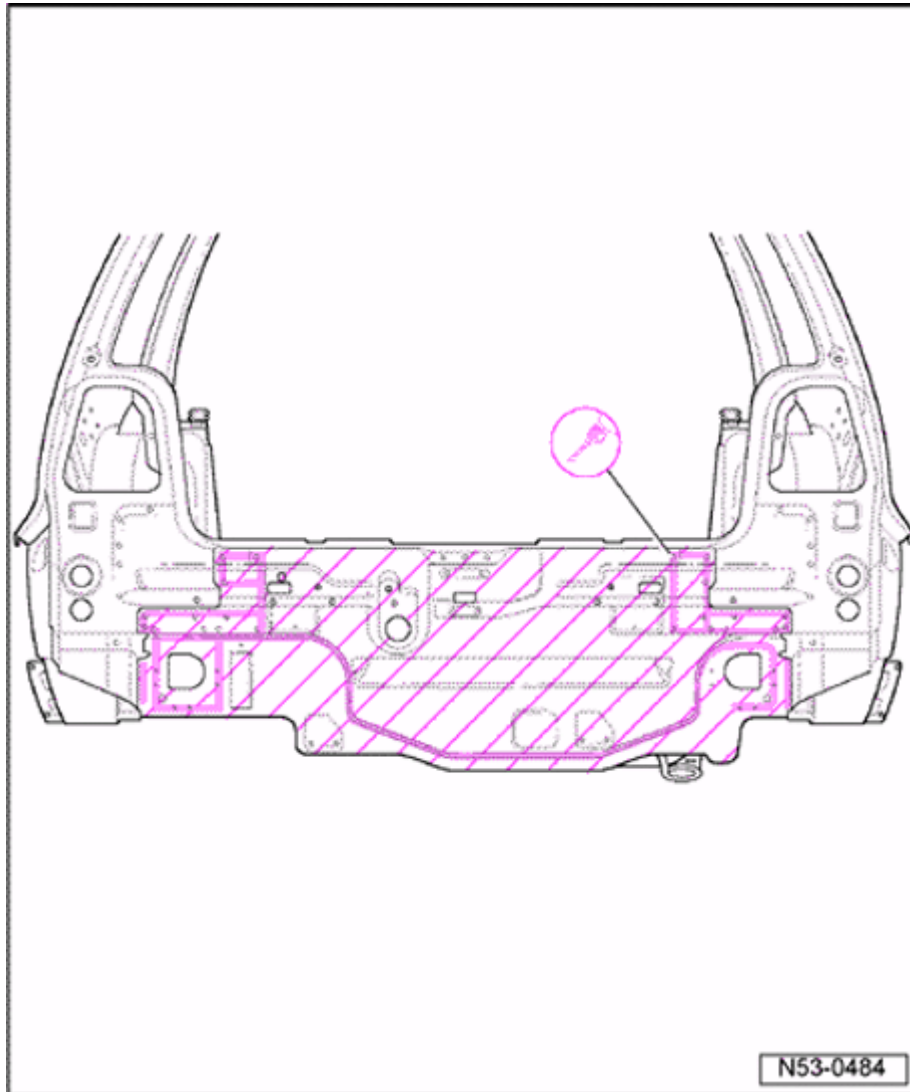
- At parting line, offset overlap weld both sides, SG-continuous weld seam (staggered).
- Align seat cross member, secure and weld in, RP-spot weld seam.
- Weld in floor panel, RP-spot weld.



51-63



- Weld in seat cross member, RP-spot weld seam.
- Weld in seat guide rail, SG-continuous weld seam.
- Weld in seat guide rail, RP-spot weld seam.



53 05 55 50 Rear cross panel, replacing

- ◆ Rear cross panel carrier removed

Cutting location

- Separate rear cross panel original joint.
- Separate original joint.

53 05 55 20 Rear cross panel, exterior, replacing (Jetta wagon)

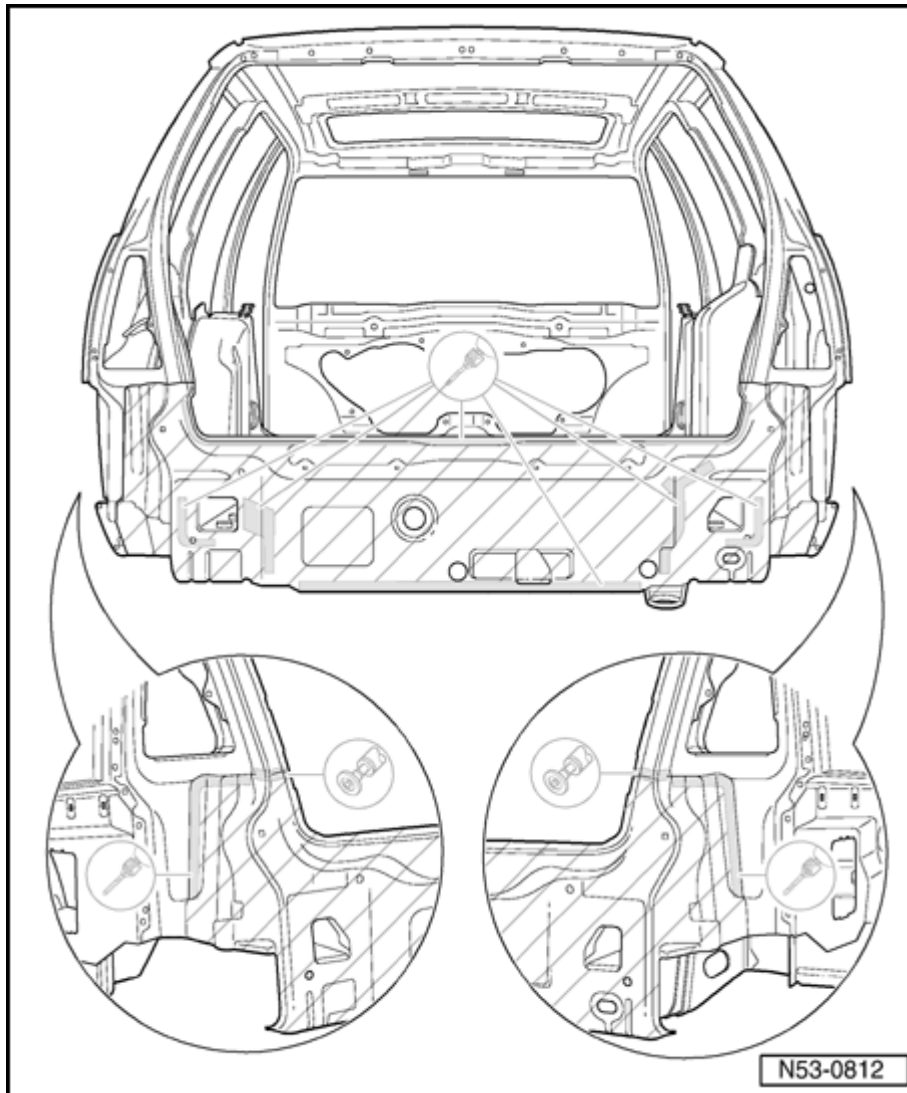
Tools

Special tools and equipment



- ◆ VAS5182 wire brush

53-3

**WARNING!**

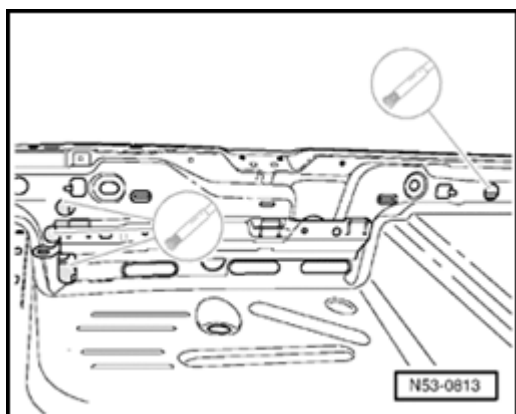
**Observe
safety
precautions!**

⇒ Repair
Manual;
General notes,
chapter 1,
Safety
precautions

**Separating
locations**

- Separate original joint.
- Cut out rear cross panel.

53-4

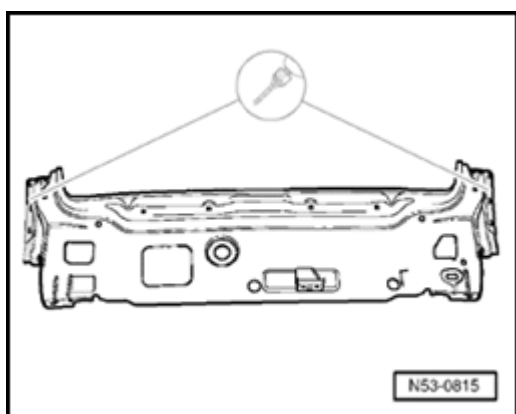


- ✦ - Grind welding area to bare metal from inside using VAS5182 wire brush.

Replacement parts

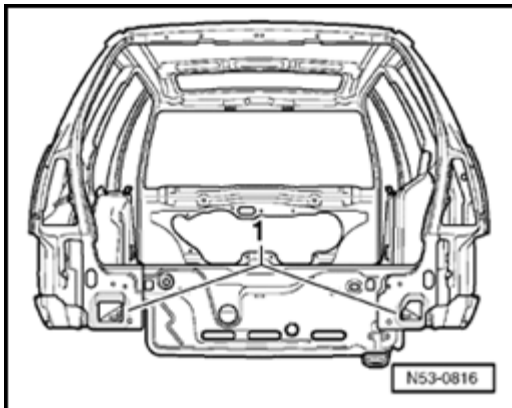
- ◆ Rear cross panel, outside
- ◆ Butyl adhesive sealing cord AKL 450 005 05

Preparing new part



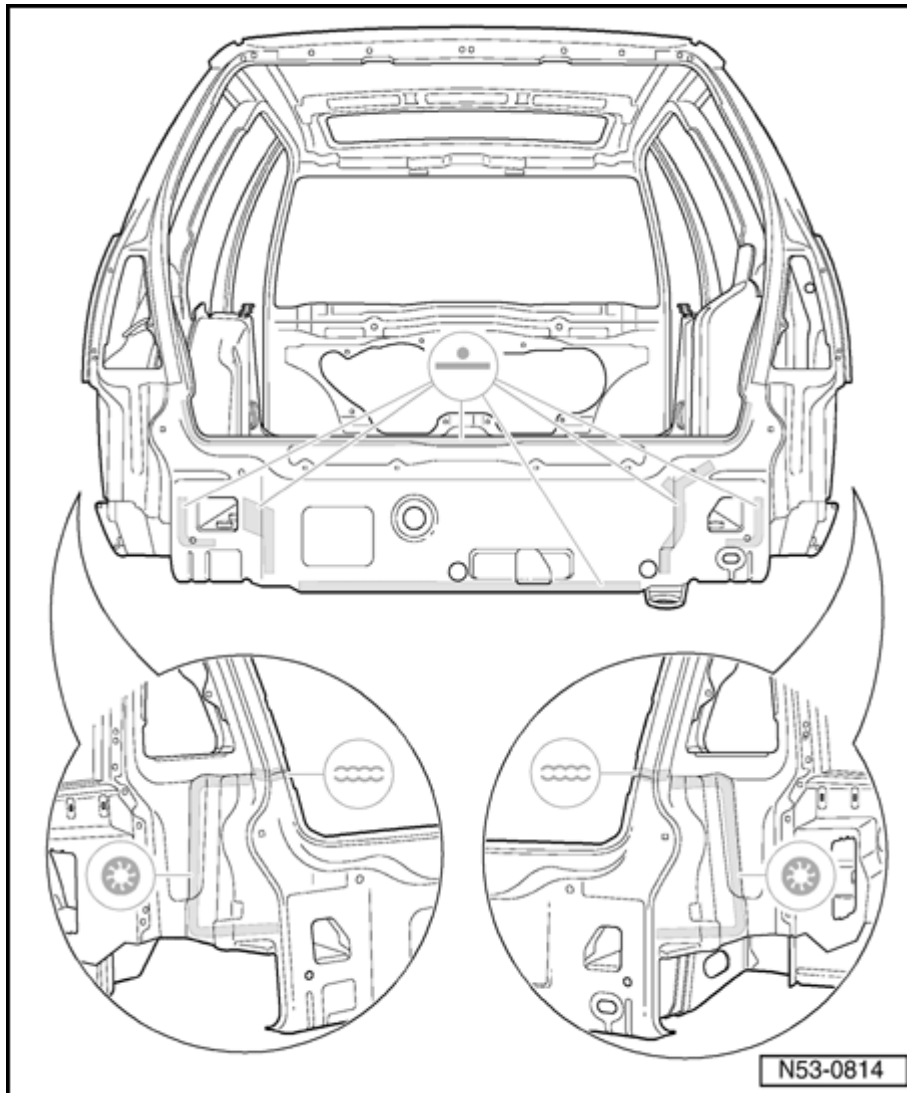
- ✦ - Drill 8 mm holes for SG plug weld seam.

Welding in



- Apply butyl adhesive sealing cord
- 1- to longmembers.

53-6



- Weld in rear cross panel, RP spot weld seam, SG plug weld seam.
- Braze remaining bond to mount for SBBR-lamp.

53 05 55 23 Rear cross panel, complete, replacing (Jetta wagon)

Tools

Special tools and equipment

- ◆ VAS5182 wire brush

WARNING!

Observe safety precautions!

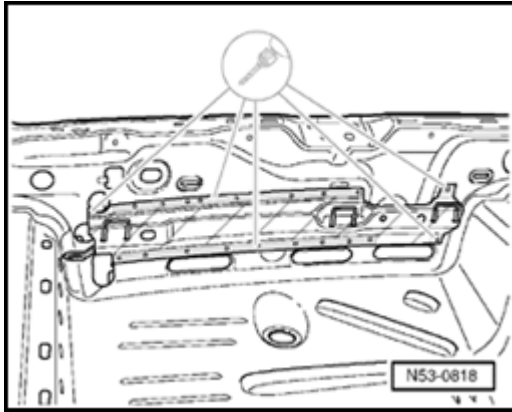
⇒Repair Manual; General notes, chapter 1, Safety precautions



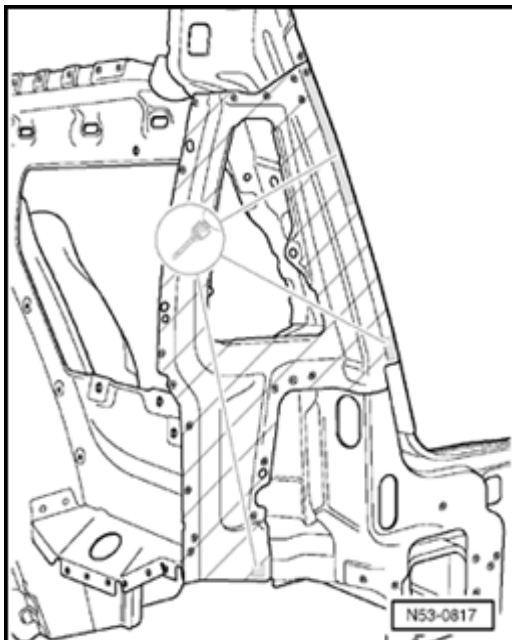
53-8

Separating locations

- Rear cross panel, exterior and side panel already removed.

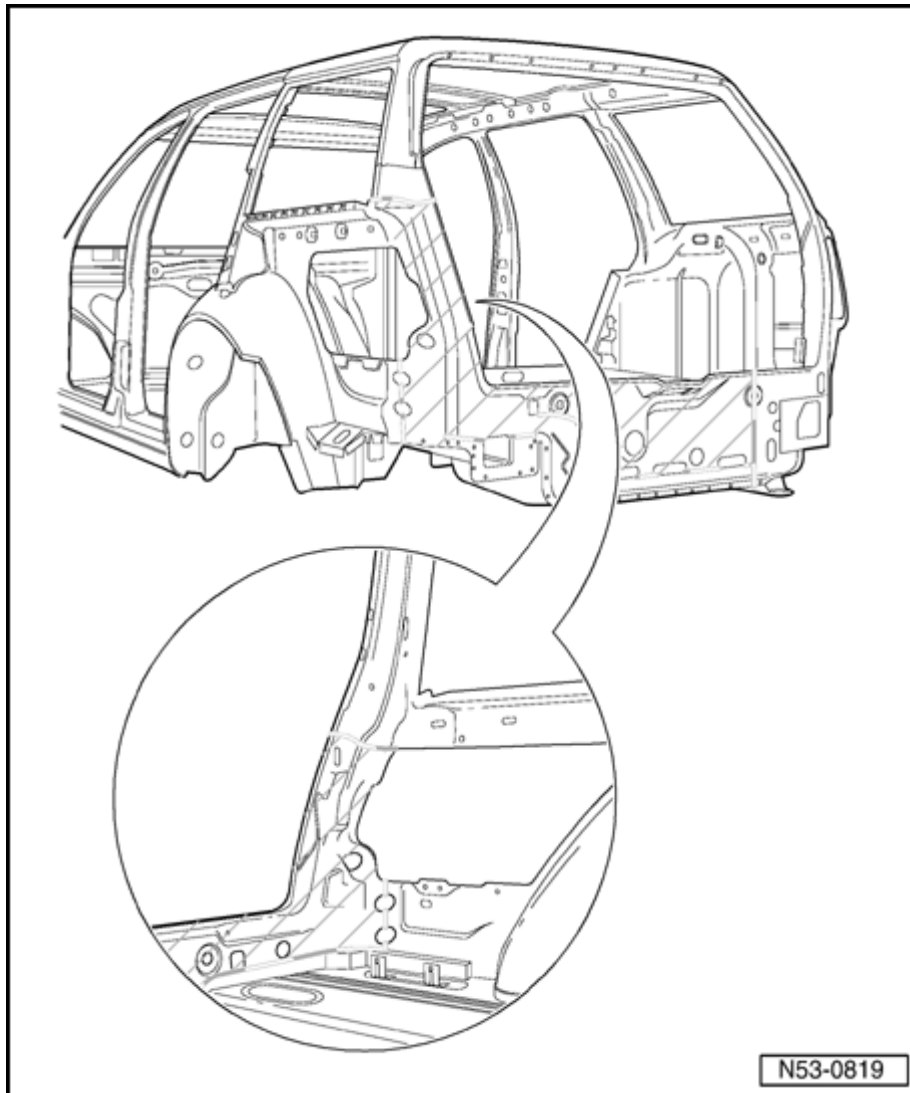


- Drill out transverse beam at rear cross panel from inside.



- Drill out mount for SBBR-lamp.

53-9

**Separating locations**

- Separate original joint.
- Separate rear cross panel and parts of D-pillar.

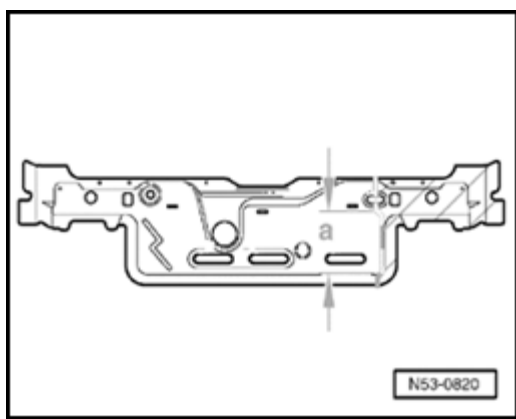
53-10

53 09 55 70 Lock carrier, welding in

Replacement parts

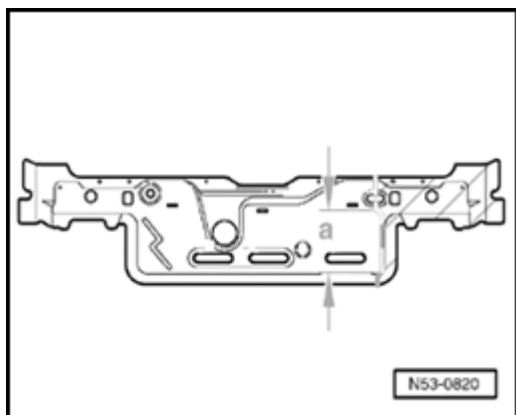
- ◆ Lock carrier
- ◆ Adhesive: DA 001 730 A1

Preparing new part



- Transfer separating cut plus 20 mm to new part for overlap in spot weld area -a-, and separate hatched area.
- Step new part in spot weld area - a-.

53-11



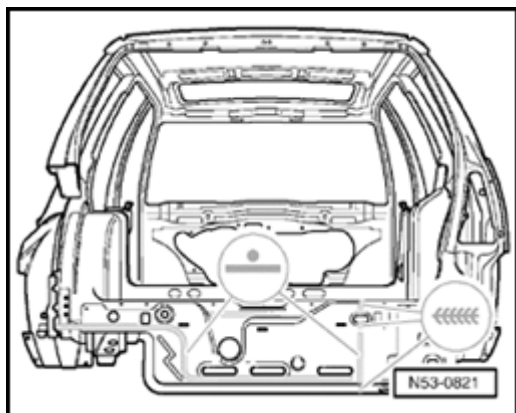
- Align and secure new part.



- Apply adhesive in spot weld area
-a-.

WARNING!

New part must be installed within 30 minutes, otherwise bonding properties of adhesive will be impaired.



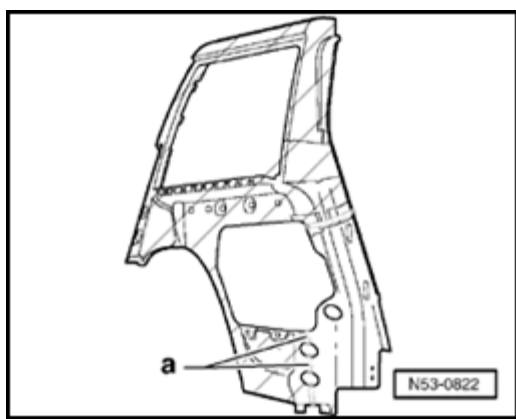
- Weld in new part, RP spot weld seam, SG plug weld seam.

53 61 55 70 Side panel, interior, welding in

Replacement parts

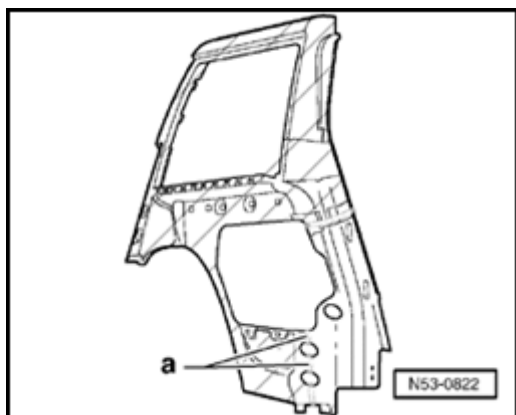
- ◆ Inner side panel
- ◆ Adhesive: DA 001 730 A1

Preparing new part



- Transfer separating cuts plus 20 mm to new part for overlap in spot weld areas -a- and separate hatched area.
- Step new part in spot weld area - a-.

53-13



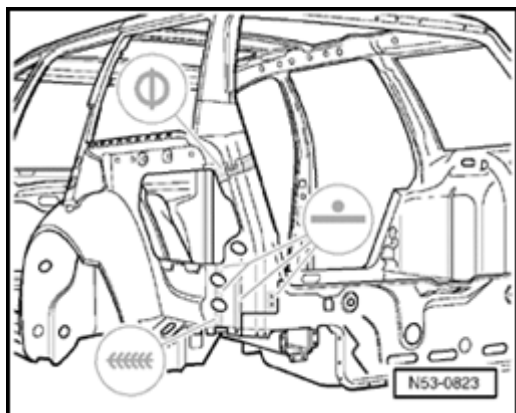
- Align and secure new part.



- Apply adhesive in spot weld area -a-.

WARNING!

New part must be installed within 30 minutes, otherwise bonding properties of adhesive will be impaired.



- Weld in side panel from inside, RP spot weld seam, SG plug weld seam.

- Weld in remainder of joint, SG continuous seam.

53-14

53 13 55 70 Reinforcement for D-pillar, lower, welding in

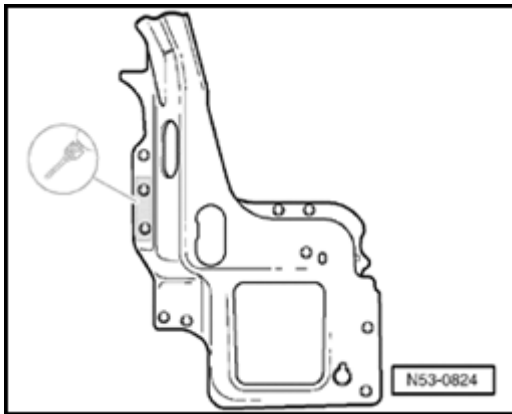
Replacement part

- ◆ Reinforcement for D-pillar, lower

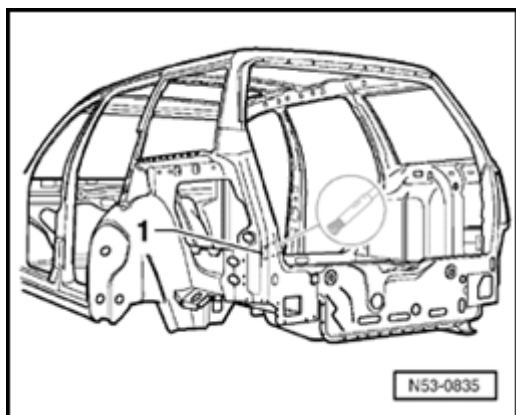
Preparing new part

A

- Drill holes for SG plug weld seam.

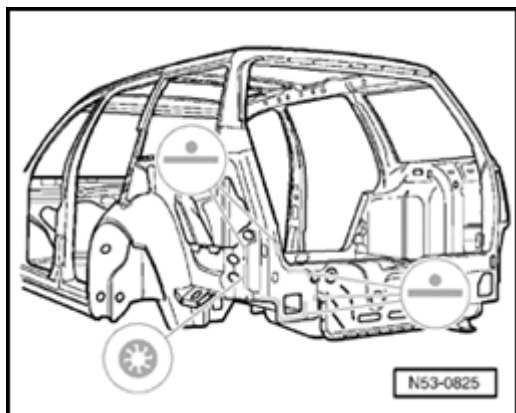


53-15



- Align and secure new part.

- Clean spot weld area through oval hole -1- using wire brush.



- Weld in reinforcement for lower D-pillar, RP-spot weld seam, SG-plug weld seam

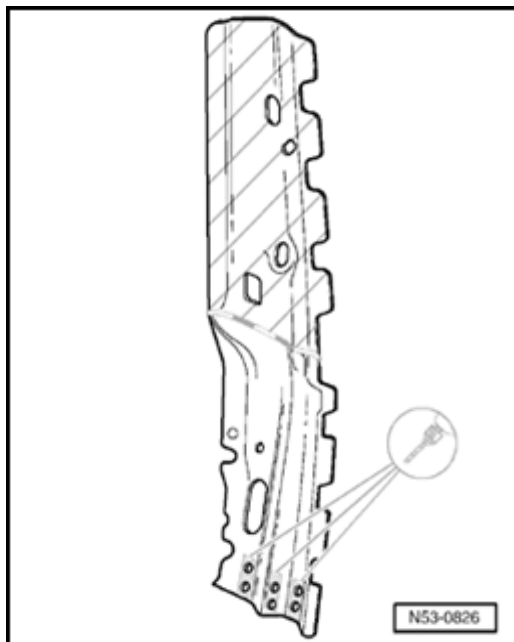
53 30 55 70 Reinforcement for D-pillar

Replacement part

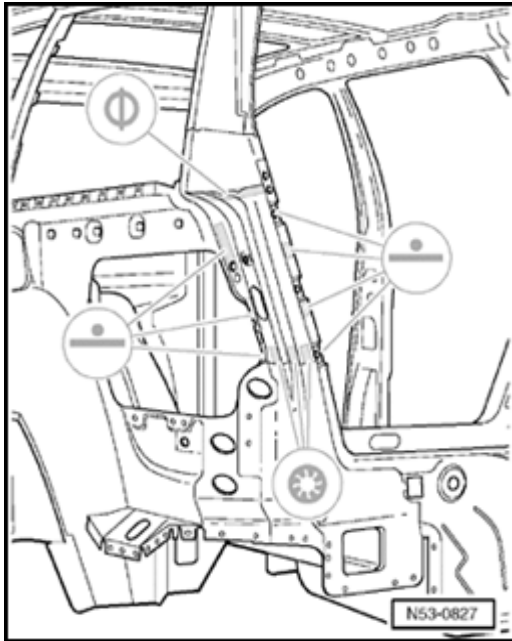
- ◆ Reinforcement for D-pillar

Preparing new part

- Transfer separating cut to new part and cut off hatched area.
- Drill 8 mm holes for SG plug weld seam.



53-17



- Weld in new part, RP spot weld seam, SG stepped seam.
- Weld remaining joint, SG plug weld seam.

53 17 55 70 Reinforcement for D-pillar, inner, welding in

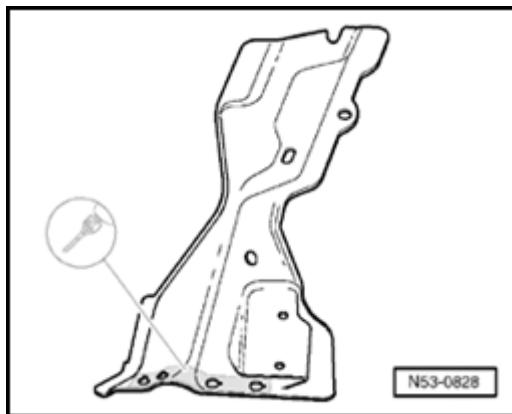
Replacement part

- ◆ Reinforcement for D-pillar, inner

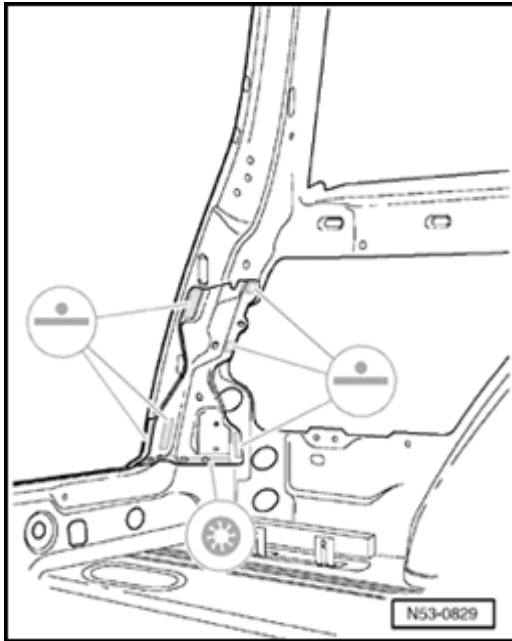
Preparing new part

A

- Drill 8 mm holes for SG plug weld seam.



53-19



- Weld in reinforcement, RP spot weld seam.

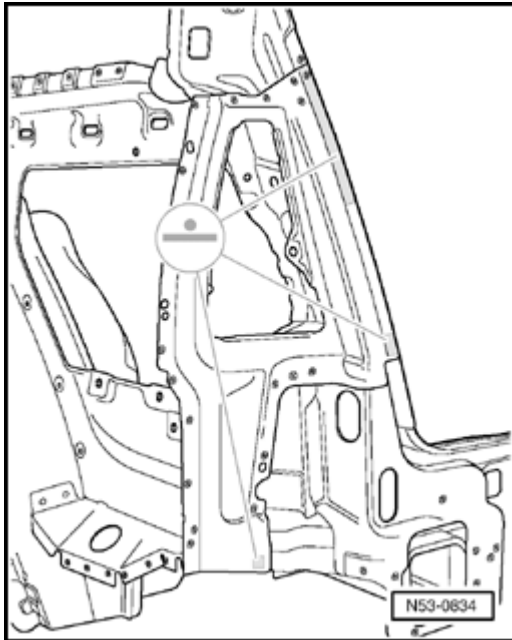
53 10 55 70 Mount for SBBR-lamp, welding in

Replacement part

◆ Mount for SBBR-lamp.



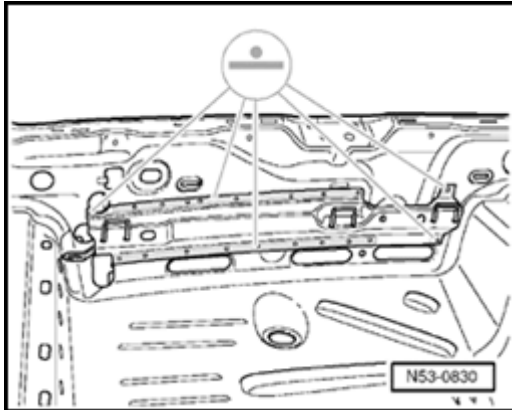
- Weld in new part, RP spot weld seam.



Weld crossmember to rear cross panel from inside

Replacement part

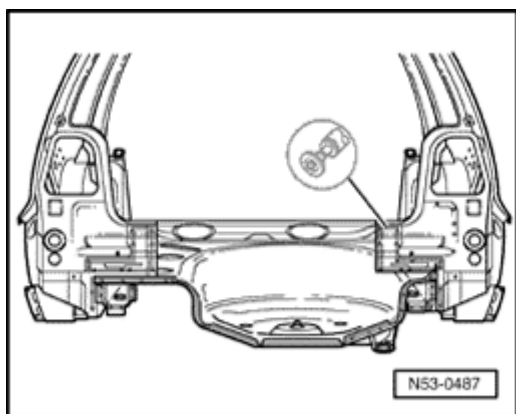
- ◆ Crossmember to rear cross member, inside



A

- Weld in new part, RP spot weld seam.
- Weld in rear cross panel, outer ⇒ [Page 53-5](#) .
- Weld in side panel ⇒ [Page 53-66](#) .

53-22



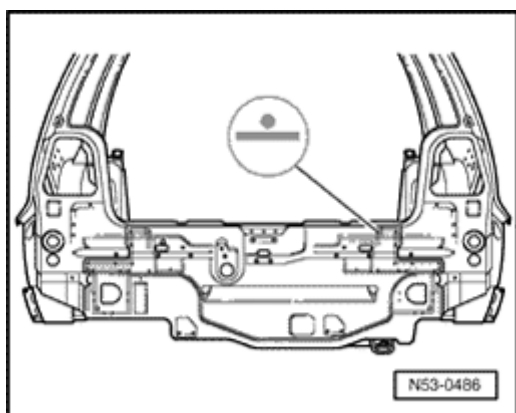
- ✦ - Remove excess material.

Replacement part

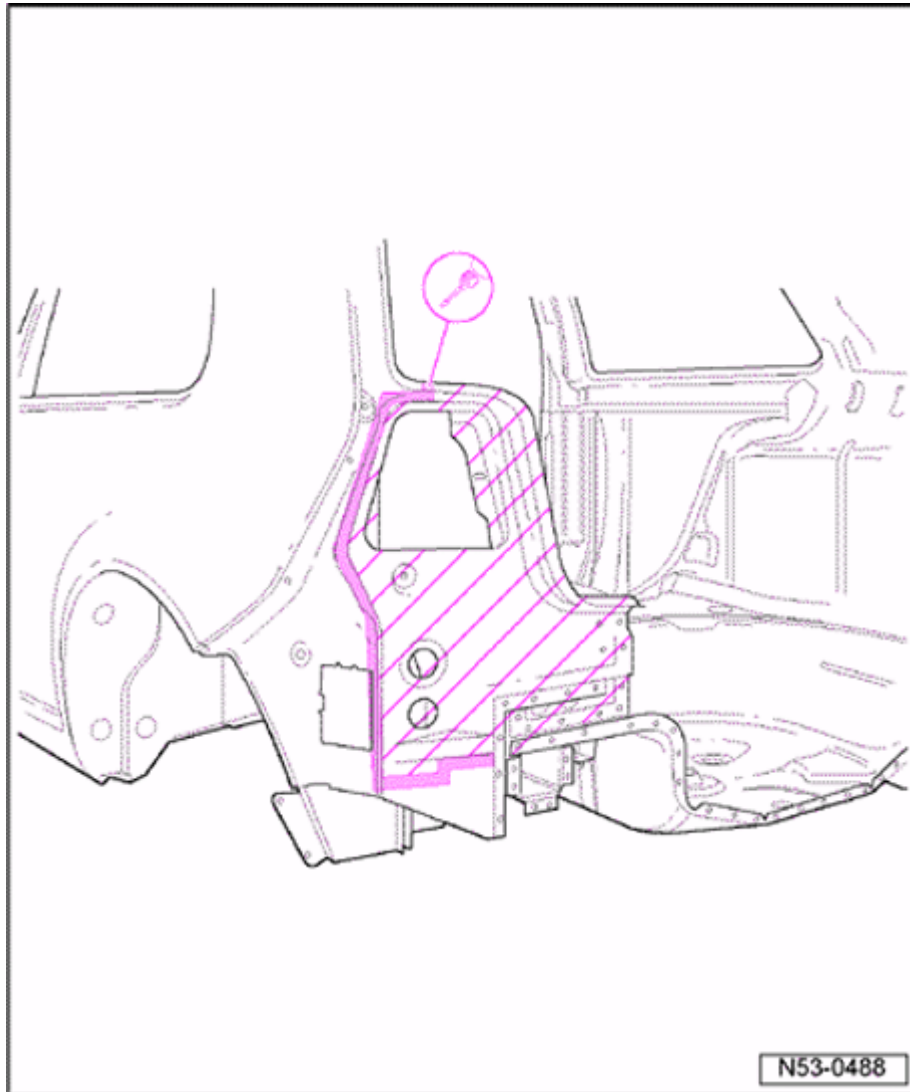
- ◆ Rear cross panel

Welding in place

- Install and secure new part in position.
- Check tailgate lock function.



- ✦ - Spot weld rear cross panel, RP spot weld seam.
- Weld in cross panel ⇒ [Page 53-36](#).



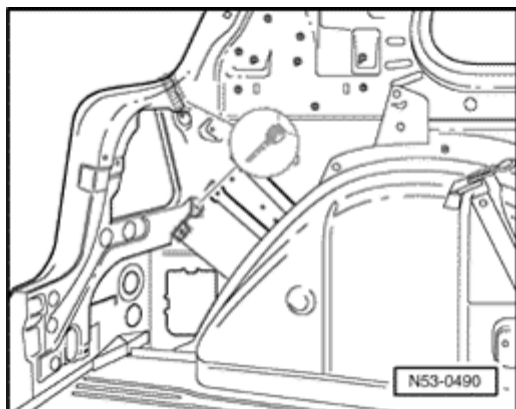
53 10 55 50 Tail light mount, replacing (Golf)

- Rear cross panel removed

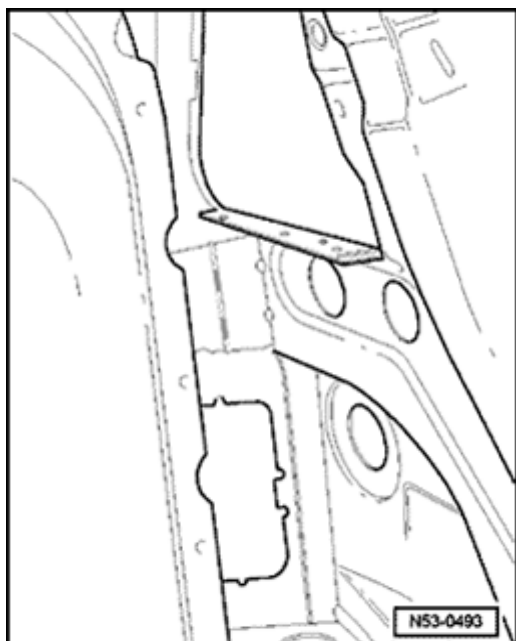
Cutting location

- Separate original joint.

53-24

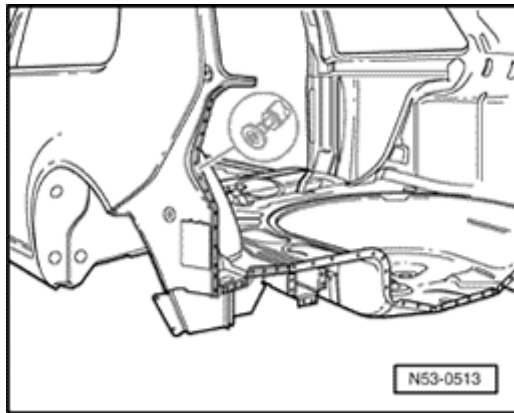
Left inner

- Drill out original joint with spot weld drill bit.

Right inner

- Separate joint to wheel house.
- Make separating cut with body saw VAG1523.
- Offset body side.

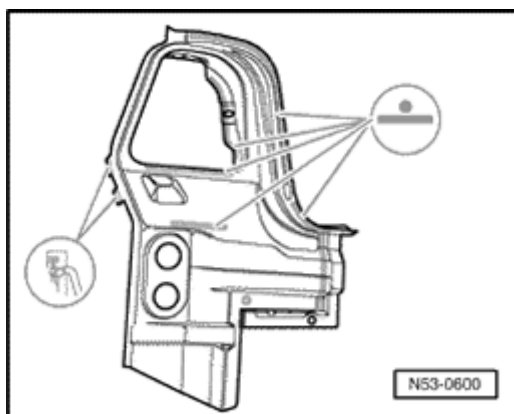
53-25



- ✦ - Remove excess material.

Replacement part

- ◆ Tail light mount

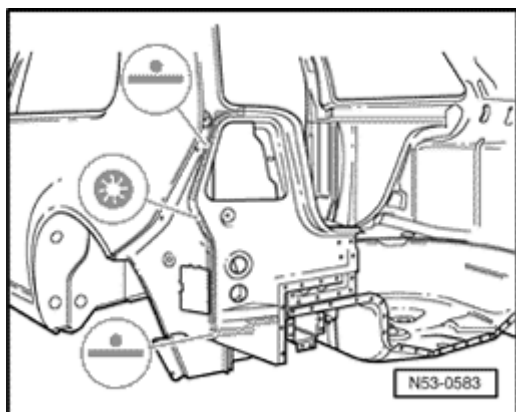
Preparing new part

- ✦ - Make holes in flange of new part.
- Weld new part in, RP-spot weld seam.

53-26

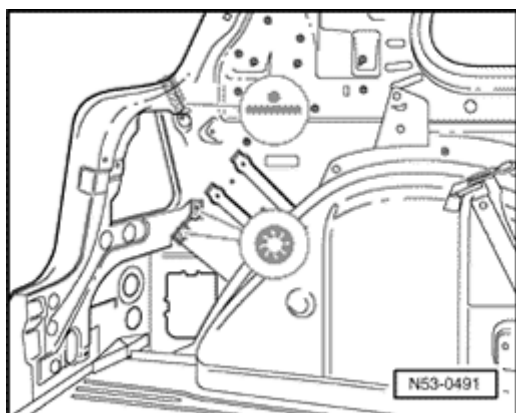
Welding in place

- Install and secure new part in position.



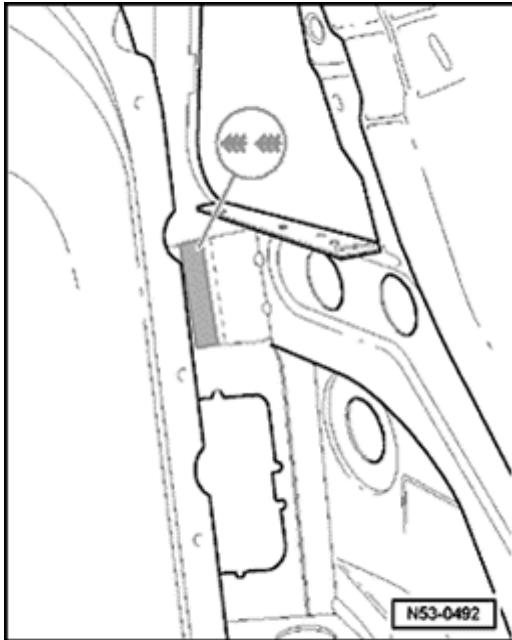
- ▲ - Weld in cross panel, RP-spot weld seam.
- Weld remaining joint, SG-plug weld seam.

Left inner



- ▲ - Weld in cross panel, RP-spot weld seam.
- Weld remaining joint, SG-plug weld seam.

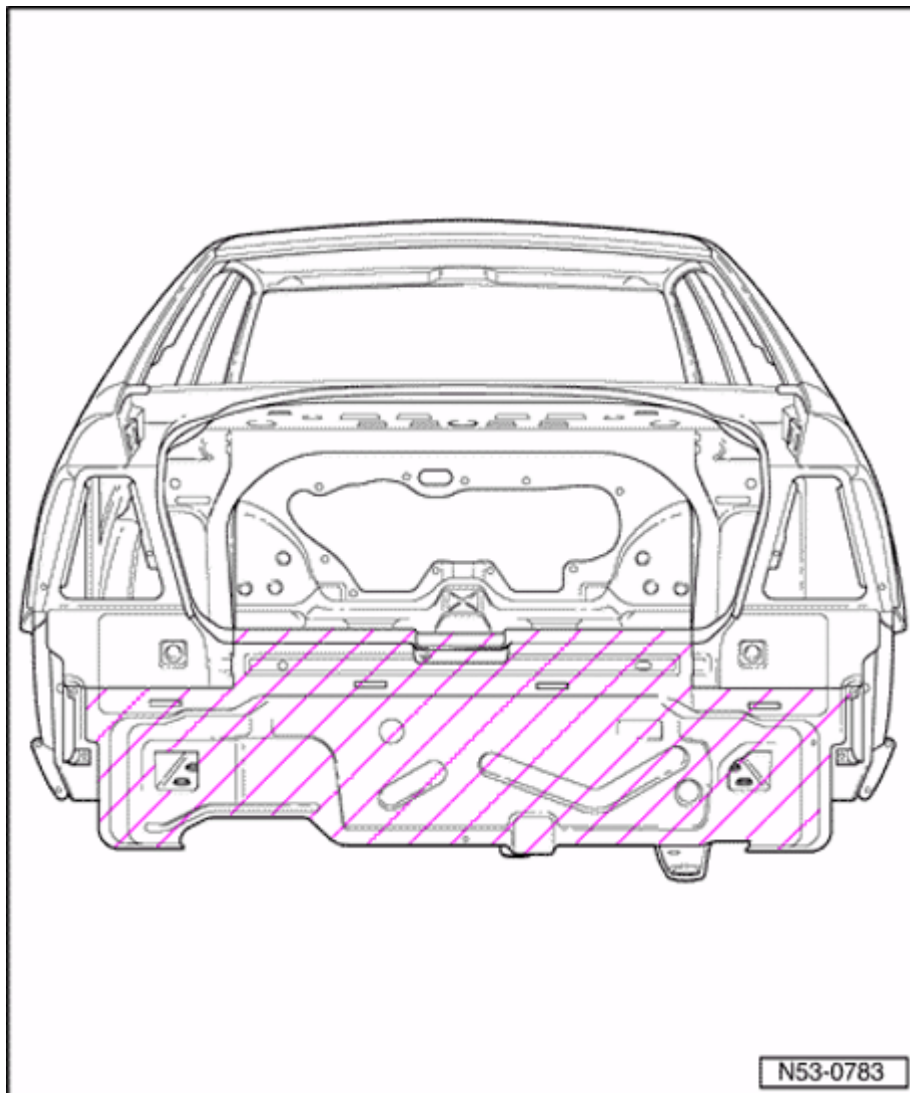
53-27



Right inner



- At parting cut, make overlap weld, SG continuous seam (staggered).
- Weld in sealing plate ⇒ [Page 53-22](#).



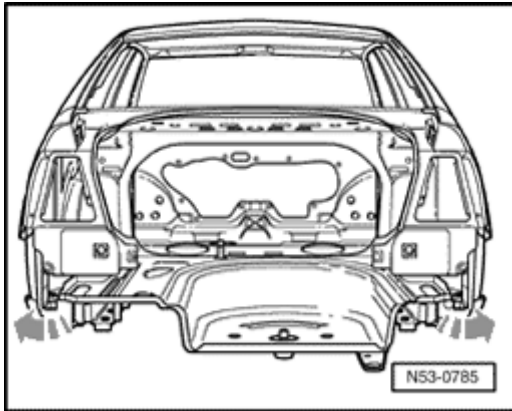
53 05 55 50 Rear center cross panel carrier, replacing (Jetta)

- ◆ Rear cross panel carrier removed

Cutting location

- Separate rear cross panel original joint.
- Separate original joint.

53-29

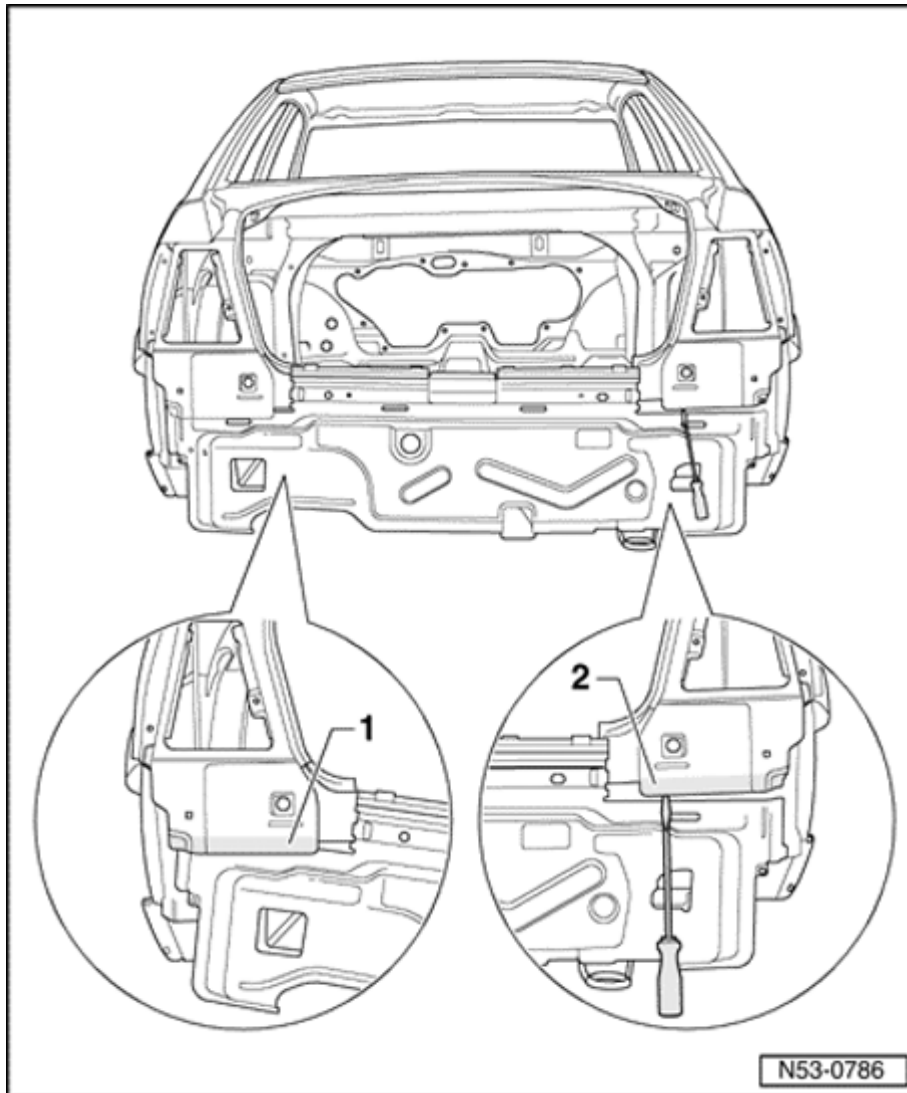


- ✦ - Bend quarter panel out and away from end points (highlighted) (arrows).
- Remove excess material.

Replacement part

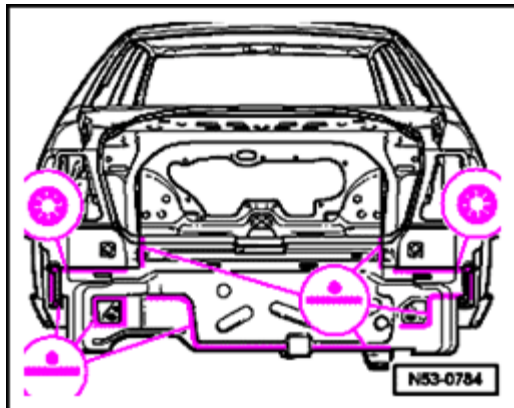
- ◆ Lower rear panel
- ◆ End cross member

53-30



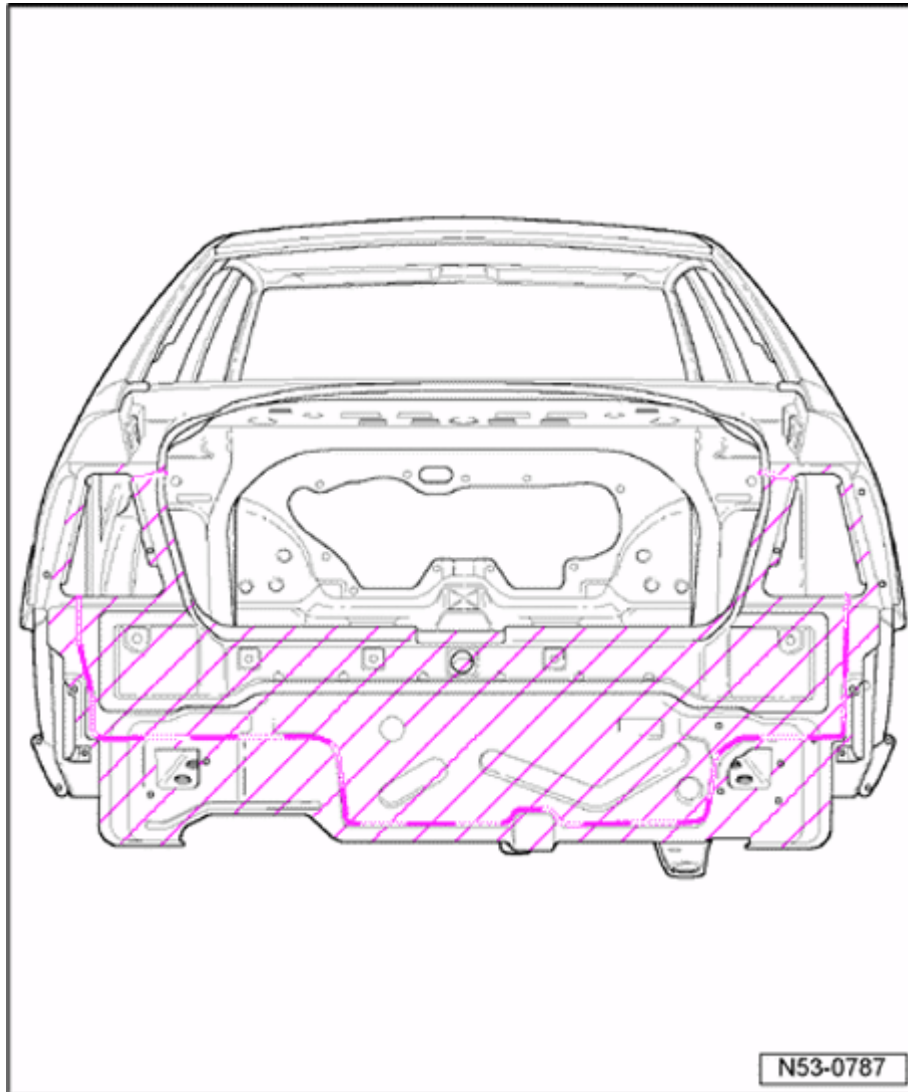
Installing

- Guide close out panel behind areas -1- and -2- mount for tail light asm.
- Install and secure rear closeout panel aligning it with trunk lid.



Welding in place

- Spot weld close out panel, RP spot weld.
- Align quarter panel end points to closeout panel and weld, SG-plug weld seam.
- Weld end cross member ⇒ [Page 53-38](#)

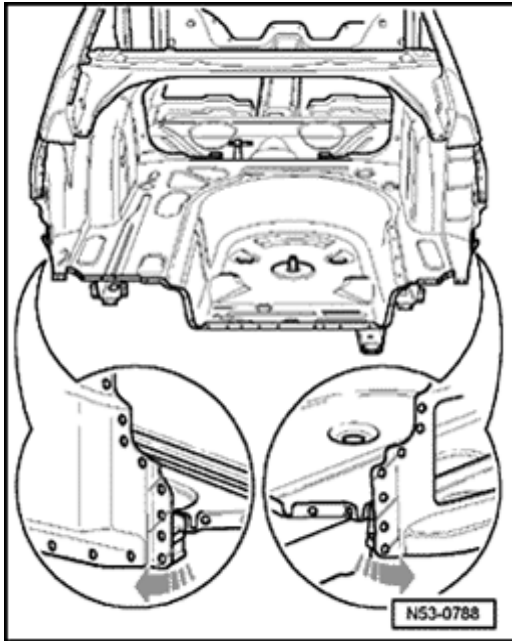


53 05 55 50 Rear cross panel, replacing (Jetta)

Cutting location

- Separate rear cross panel original joint.
- Separate original joint.

53-33



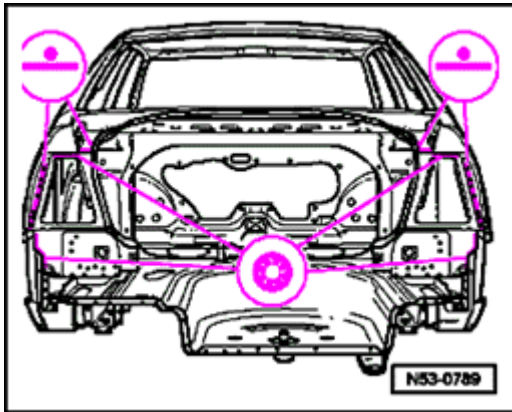
- Bend quarter panel out and away from end points (highlighted) (arrows)
- Remove excess material.

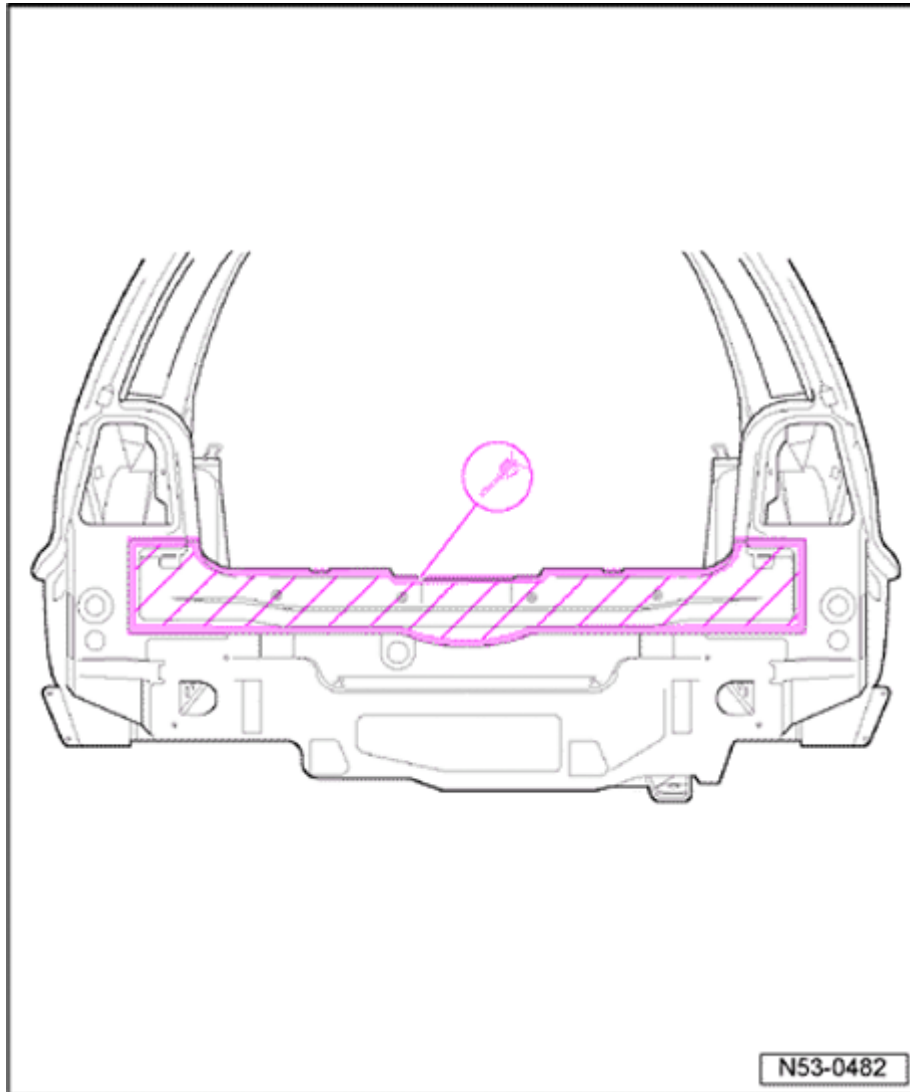
Replacement part

- ◆ Tail light assembly mount
- ◆ Lower back panel
- ◆ End cross member

Welding in place

- Install and align new parts.
- Spot weld close out panel, RP-spot weld seam
- Remaining bond, SG-plug weld.
- Weld close out panel ⇒ [Page 53-31](#)
- Weld end cross member ⇒ [Page 53-38](#)



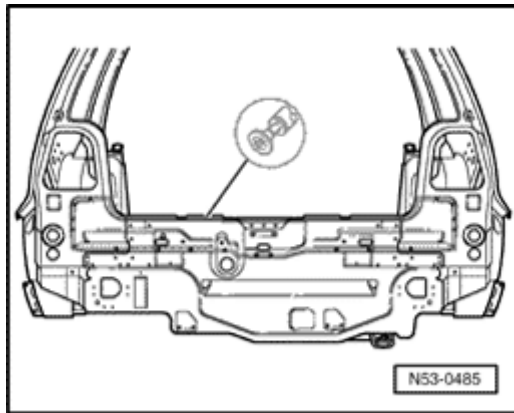


53 16 55 00 End cross panel, replacing (Golf)

Cutting locations

- Separate original joint

53-36



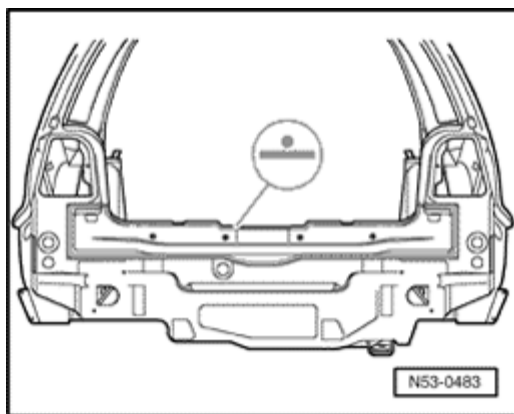
- Remove excess material

Replacement part

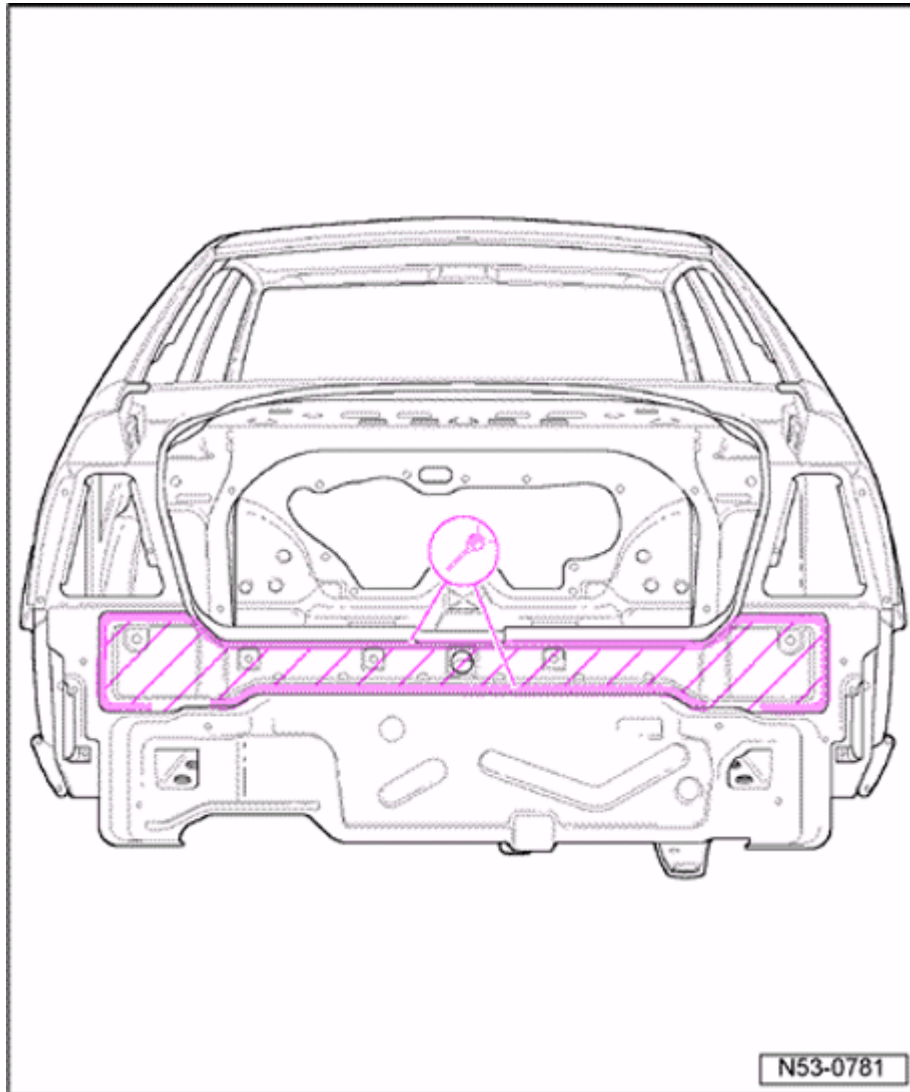
- ◆ End cross member

Welding in place

- Install and secure new part.
- Check trunk lid lock function.



- Weld new part, RP-spot weld seam.



53 16 55 00 Outer wheel house, replacing (Jetta)

Cutting location

- Separate original joint
- Remove excess material.

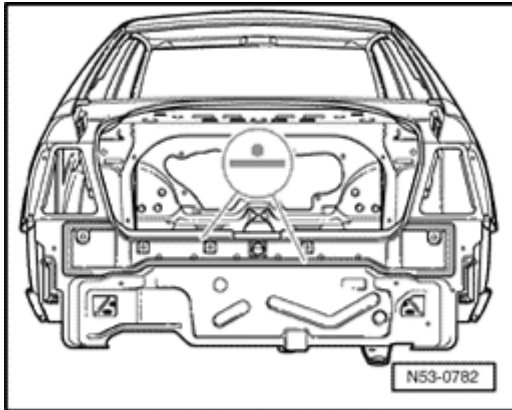
53-38

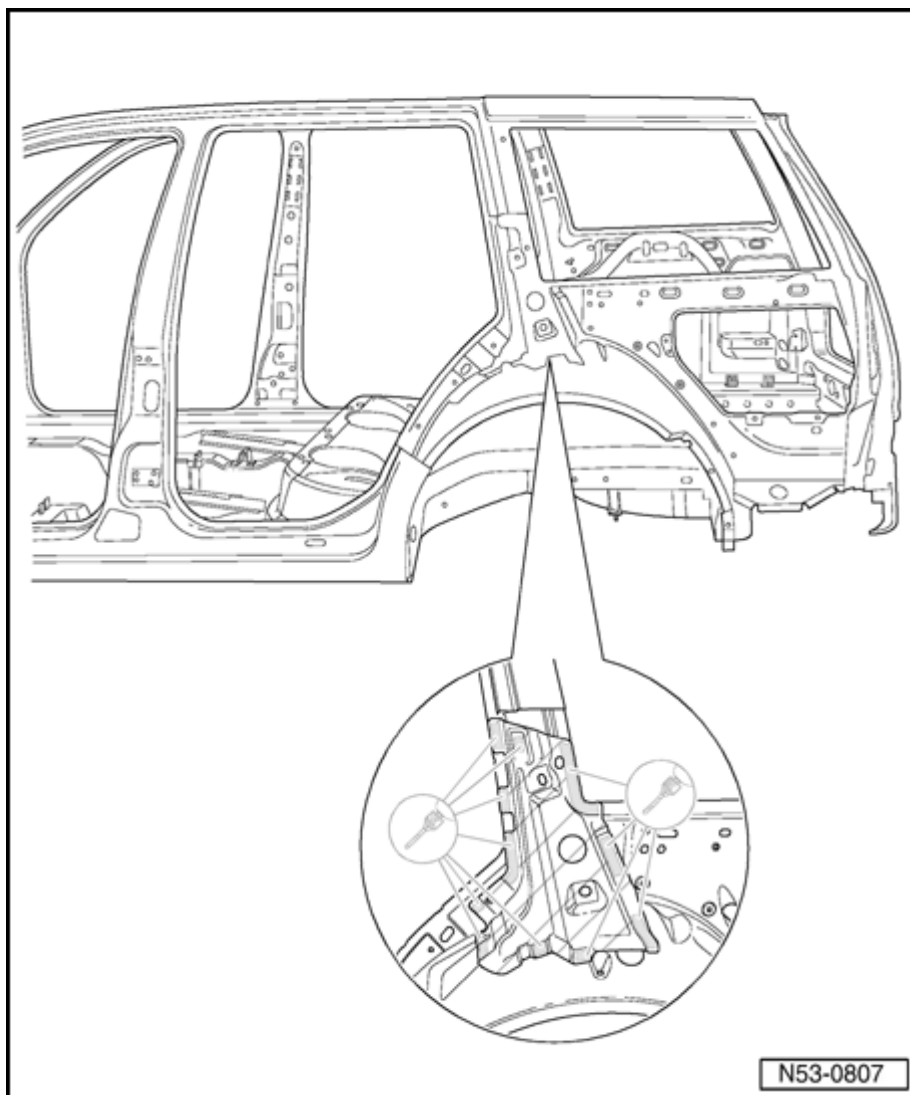
Replacement part

- ◆ End cross member

Welding in place

- Install and secure new part.
- ◀ - Weld new part, RP-spot weld seam.





53 29 55 70 Reinforcement for C-pillar, replacing (Jetta wagon)

WARNING!

**Observe safety
precautions!**

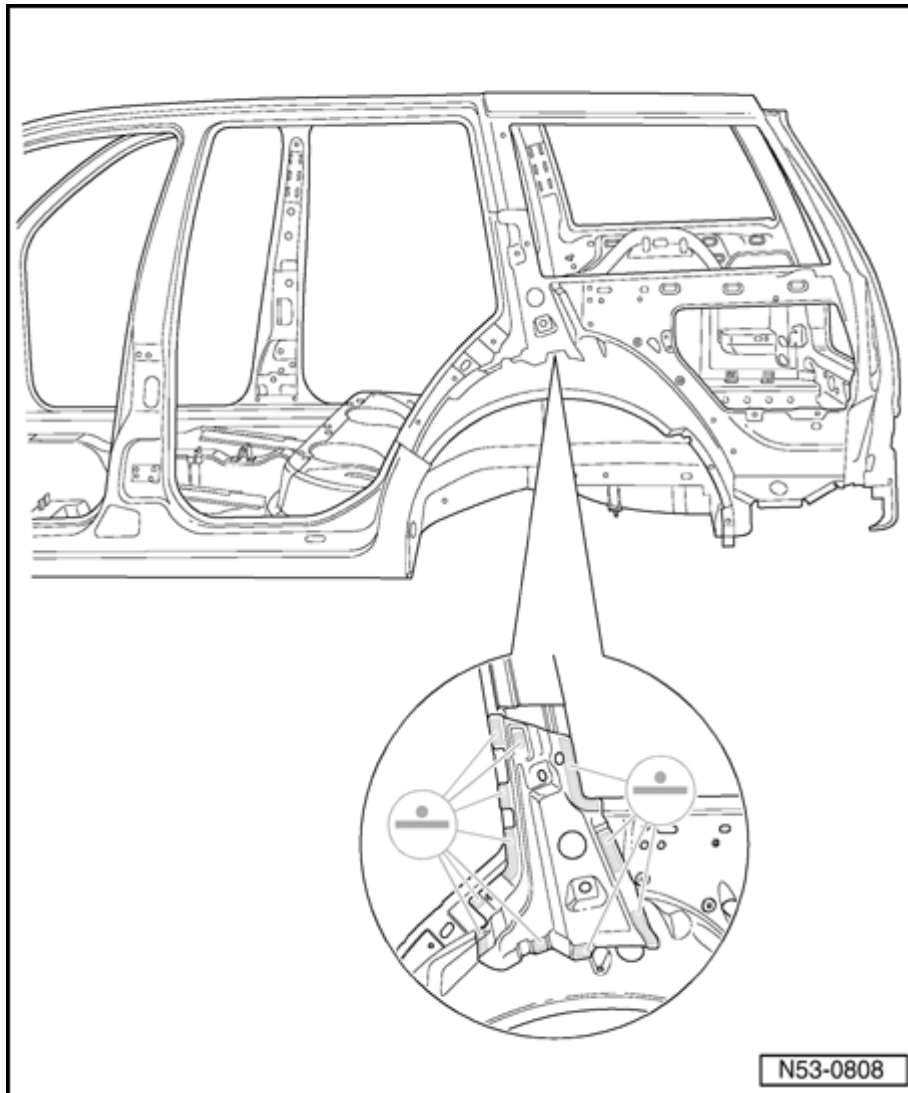
⇒ Repair Manual;
General notes, chap
1, Safety precaution

- Side panel already
cut out

Separating location

- Drill out
reinforcement for
pillar.

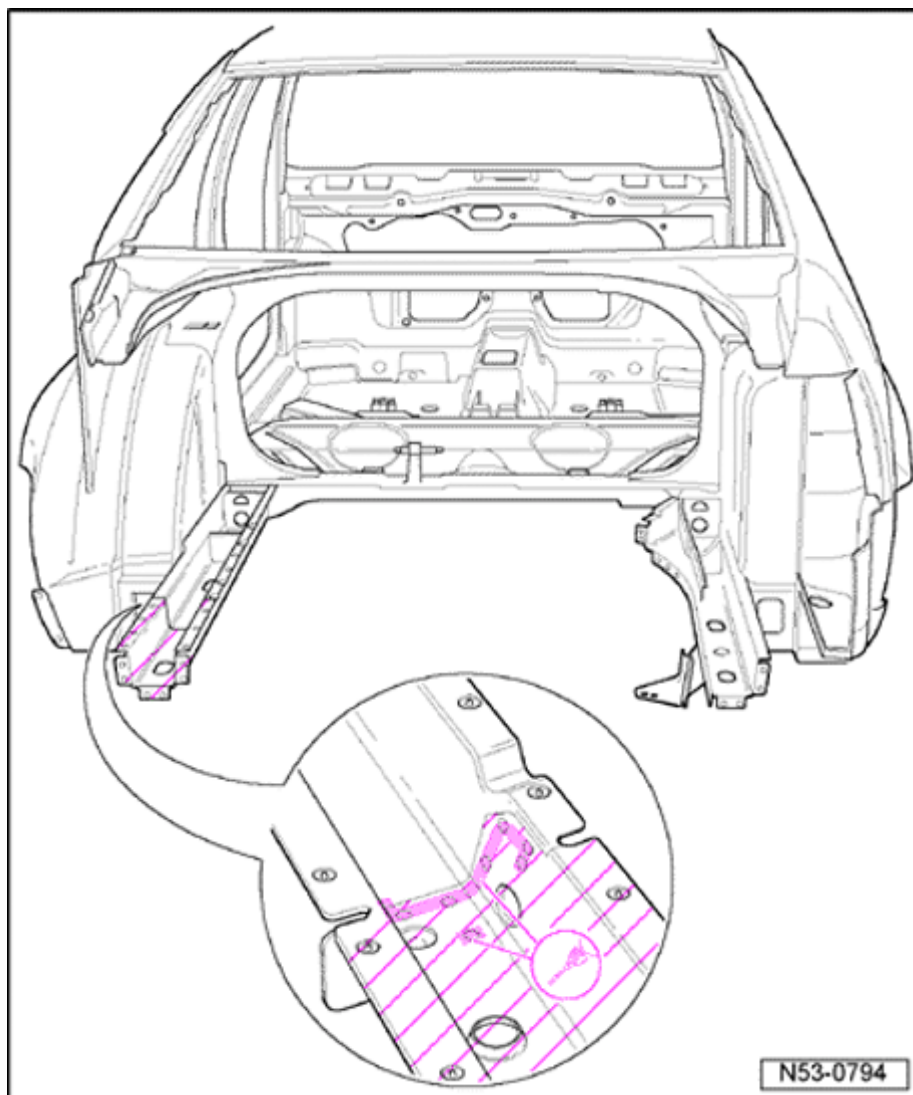
53-40

**Replacement part**

- ◆ Reinforcement for C-pillar

Welding in

- Weld in new part, RP spot weld seam.
- Weld in side panel (Wagon) ⇒ [Page 53-66](#).



53 48 55 50 Rear long member, replacing (Jetta)

- ◆ Close out panel and taillight assembly mount removed

Cutting location

WARNING!

Take care working near fuel tank when removing right long member reinforcement

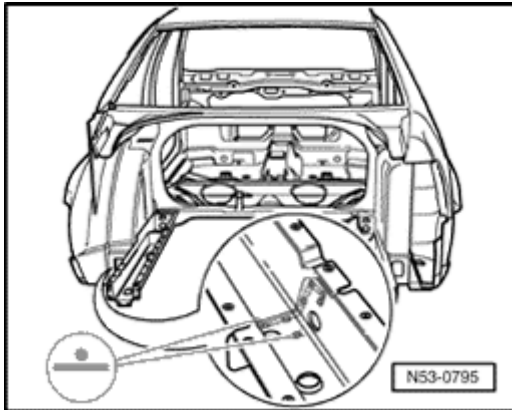
- Drill out long member
- Separate original joint
- Remove excess material

Replacement part

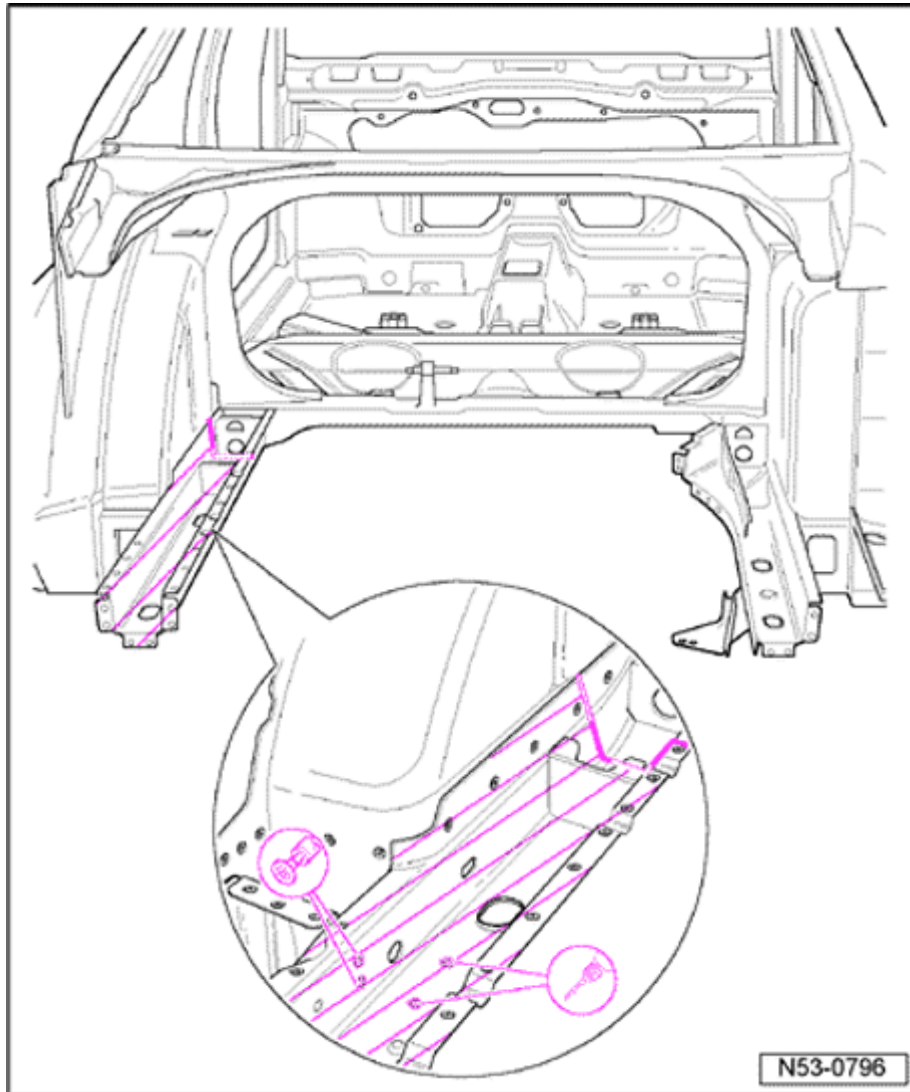
- ◆ Rear long member

Welding in place

- Position long member on fixture.
- ◀ - Weld long member, RP-spot weld.



53-45



53 47 55 52 Long member, partial replacement (Jetta)

- ◆ Cross panel and tail light mount already cut out

Cutting location

WARNING!

Take care working near fuel tank when removing right long member reinforcement

- Drill out forward original joint to floor plate.
- Separate original joint.
- Remove remaining material

Replacement part

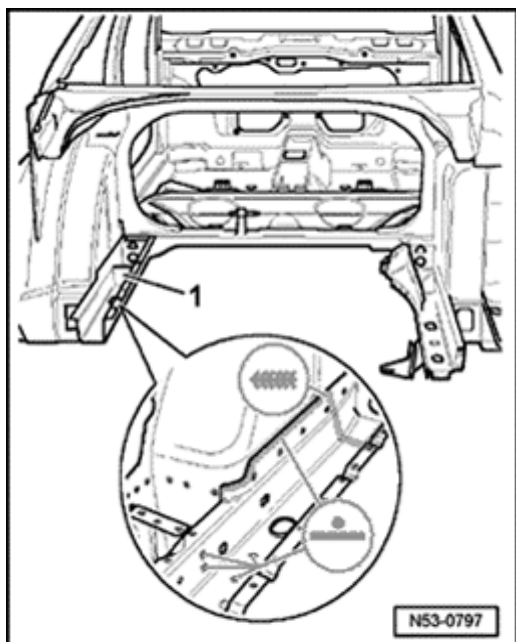
- ◆ Long member
- ◆ Rear long member
- ◆ Adhesive butyl ADL 450 005 05
- ◆ Dampener/insulation

Preparing new part

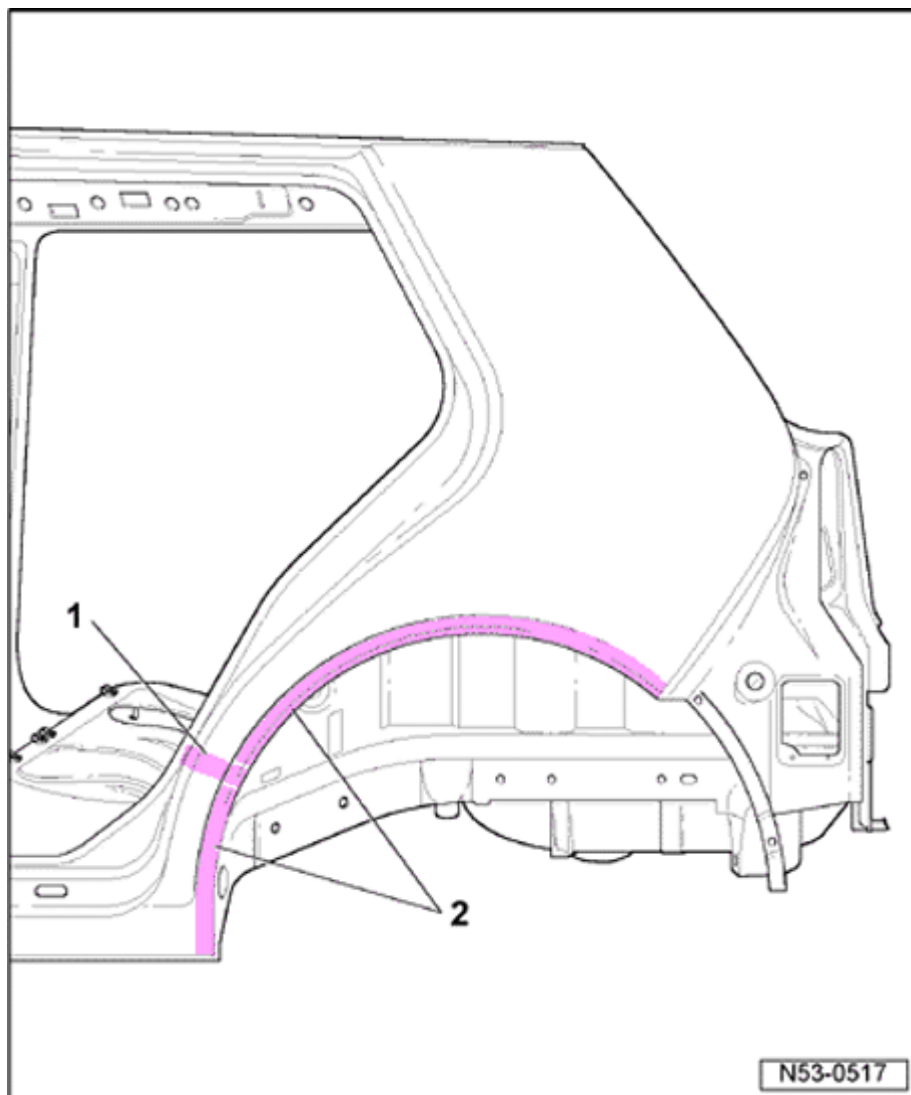
- Transfer separating lines to new part and out.

Welding in place

- Position long member relative to adjoining and secure.
- Butt weld long member, SG-plug weld se
- Spot weld rear long member, RP-spot we
- Apply butyl adhesive to dampener/insulat press onto long member.
- Spot weld rear long member, ⇒ [Page 53](#)



53-51



53 55 55 10 Quarter panel, partial replacement (Golf 4- door)

1 - Foamed
area

2 - Bonded
area

WARNING!

◆ **Welding, separating using spark generating tools in the foam area creates gases, therefore, do not use these processes.**

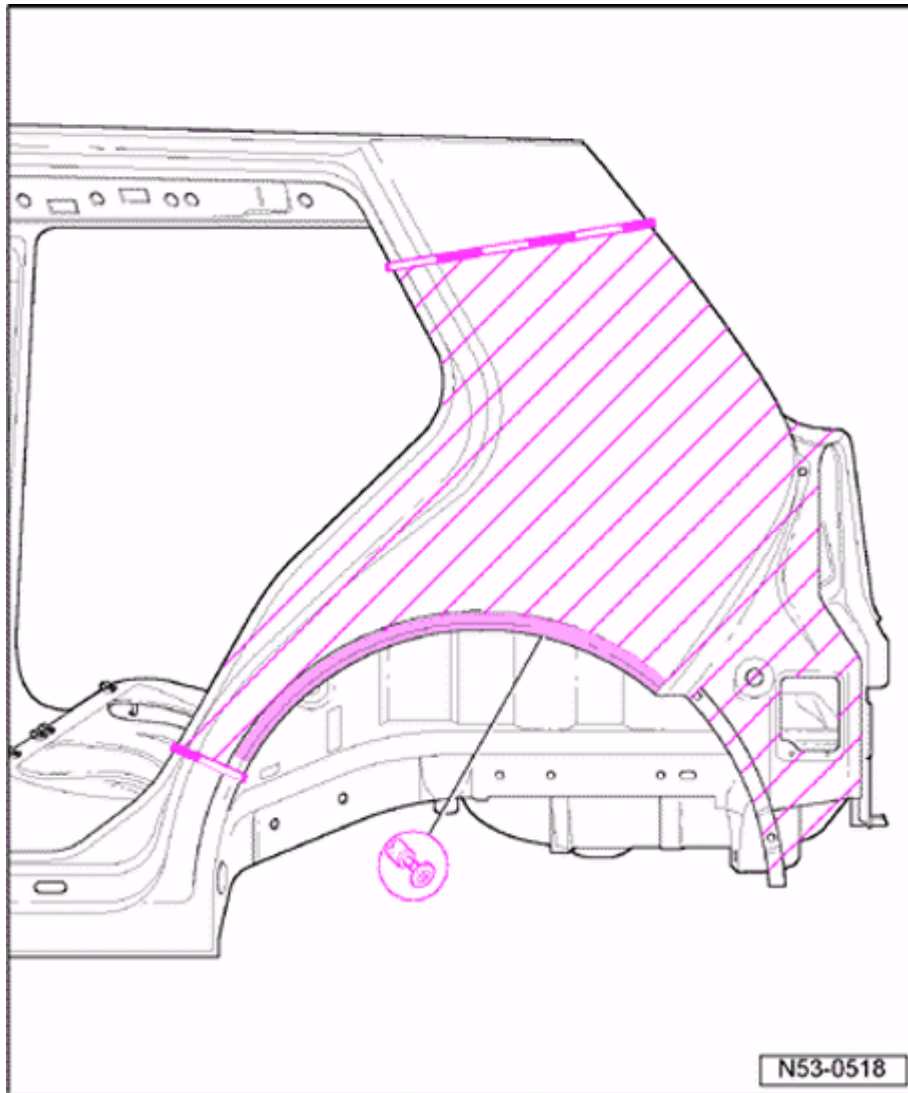
◆ **Use 2-K filler material to smooth out irregularities.**

Note:

Make separation cuts only with body saw VAG1523 or with air hammer VAG1577.

- Before performing grinding work scrape out as much foam residue as possible.

53-52

**Cutting location**

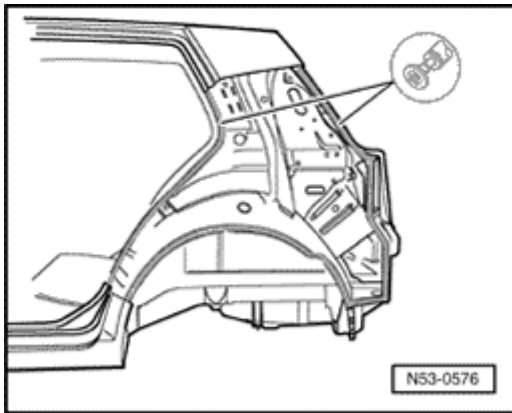
- Make cut to C-pillar according to degree of damage.
- Make lower cut above rocker panel.

Note:

Record replacement part cut.

- Roughly cut out quarter panel.
- Grind outer edge of wheel house.
- Separate original joint.

53-53

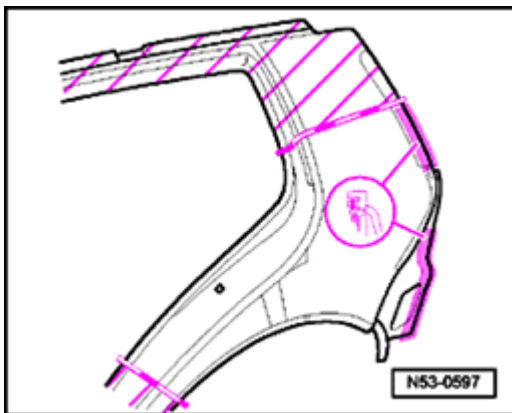


- Remove residue
- Completely remove adhesive residue and grind surface smooth.

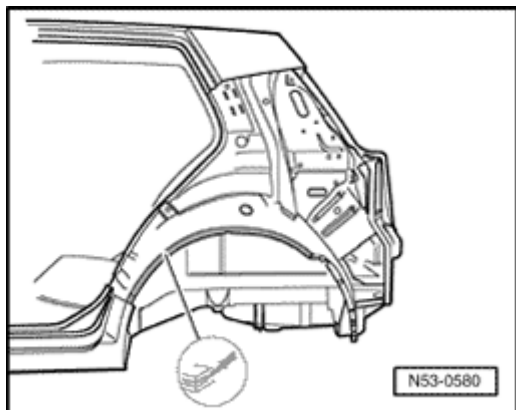
Replacement part

- ◆ Partial quarter panel
- ◆ Adhesive DA 001 730 A1
- ◆ Dampener/insulation

Preparing new part



- Transfer separation lines to new part and cut out high lighted area.
- Drill holes in flange area of new part.
- Clean/degrease flange.

Foamed areaRepair notes ⇒ [Page 00-6](#)

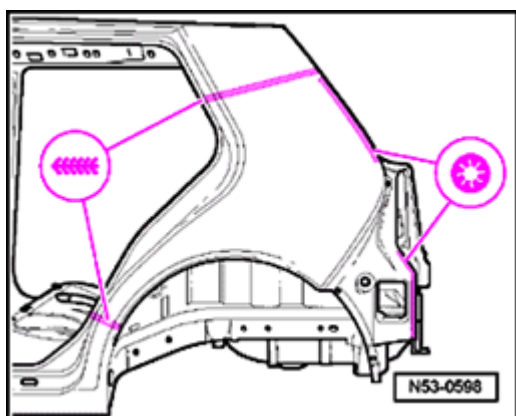
- ✦ - Apply 2 - 3.5 mm dia. (0.14 in.) beads adhesive to flange.

CAUTION!

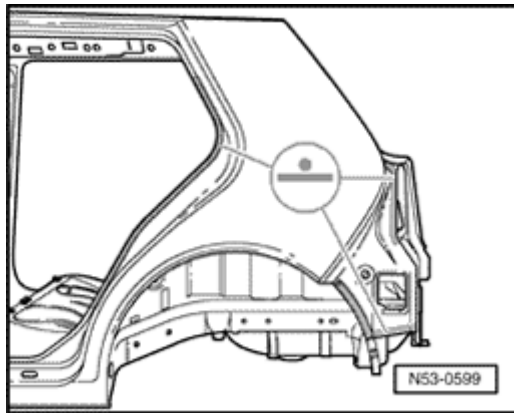
New part must be welded with in 30 min., otherwise adhesion properties are affected.

Welding in place

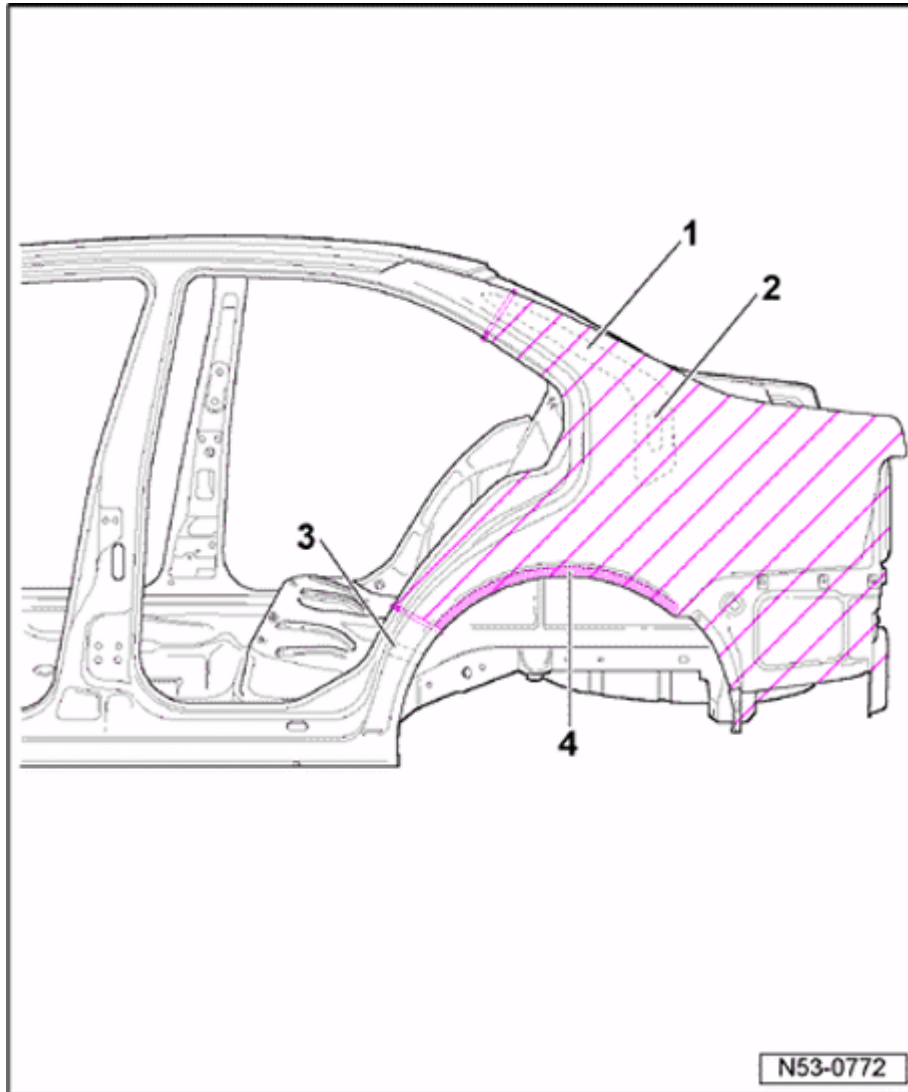
- Place support material behind weld joints.
- Install and secure new part with vehicle on wheels or fixture.
- Check gaps/mating lines dimensions with adjacent parts.



- ✦ - Butt weld cut, SG-weld seam continuous.
- Weld remainder, SG-plug weld seam.



- Weld quarter panel, RP-spot weld.
- Reform/compress wheel house flange.
- Wipe off excess adhesive and seal.



53 55 55 00 Quarter pan partial replacement (Jetta)

Cutting location

1 - Reinforceme

- ◆ Sits directly behind high lighted area

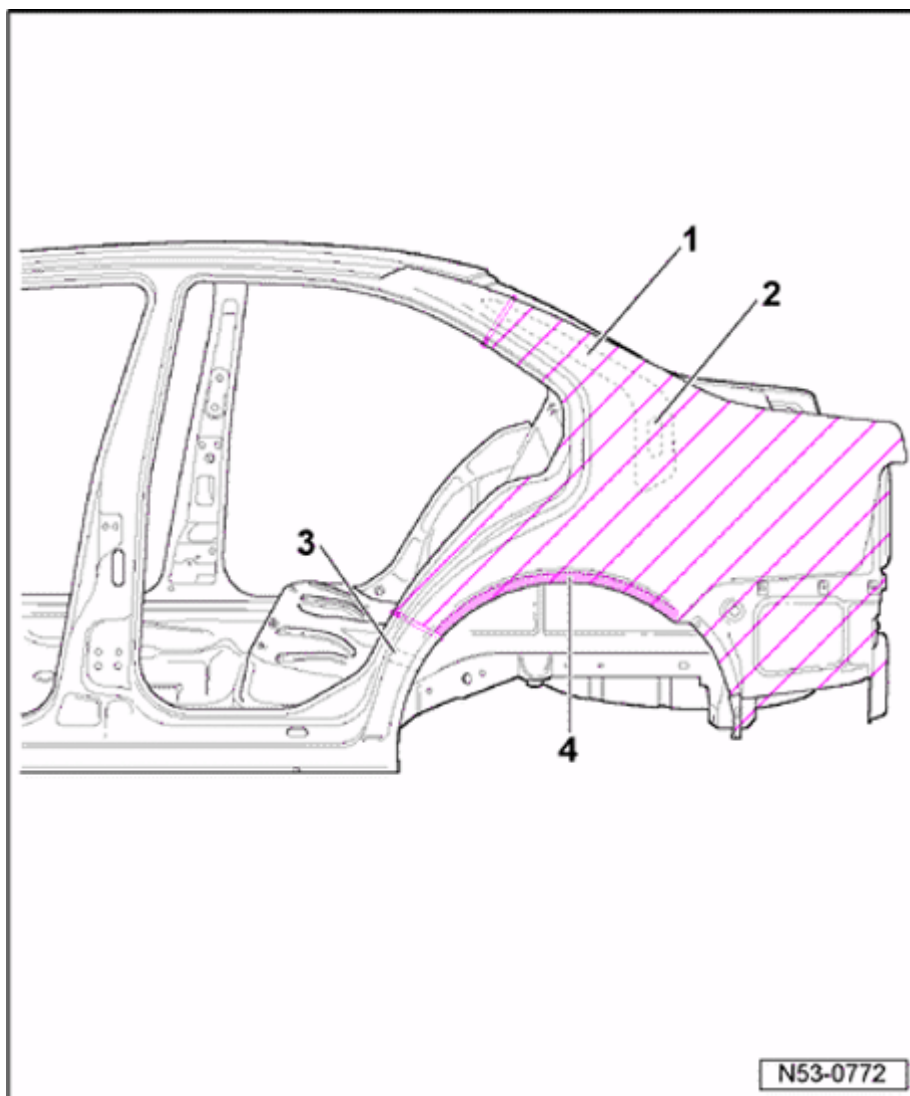
2 - Dampener/insul

- ◆ Combined reinforcement 1- and quarter panel, partial replacement cutting line

3 - Foamed area

4 - Bonded area

53-57

**Notes:**

- ◆ Study replacement part blank
- ◆ Separation cuts made only with body saw VAG1523 or with air hammer VAG1577.

CAUTION!

- ◆ **Welding, separating using spark generating tools in the foam area creates gases, therefore, do not use these processes.**
- ◆ **Use 2-K filler material to smooth out irregularities.**
- Place lower separating cut above rocker panel.
- Grind wheel house outer edge.
- Roughly cut out quarter panel.
- Remove excess material.

53-58

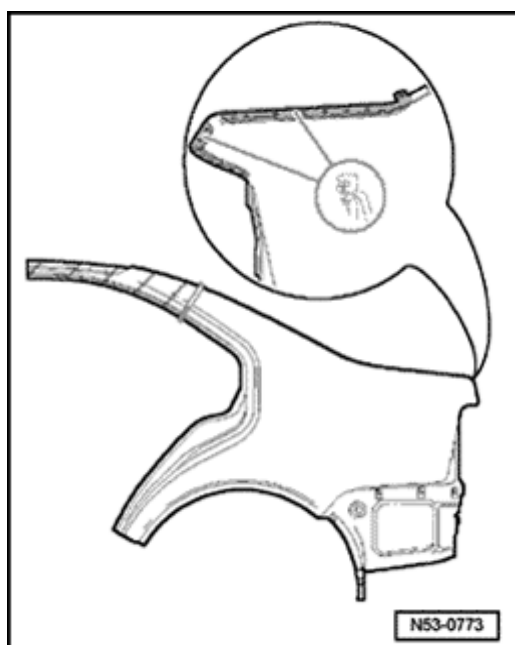
- Remove adhesive residue completely and flange smooth and clean

Replacement part

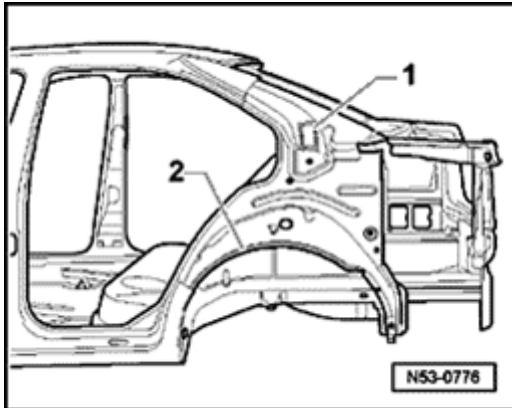
- ◆ Partial quarter panel
- ◆ Adhesive DA 001 730 A1
- ◆ Dampener/insulation
- ◆ Adhesive butyl AKL 450 005 05
- ◆ AKD 476 KD5 05

Preparing new part

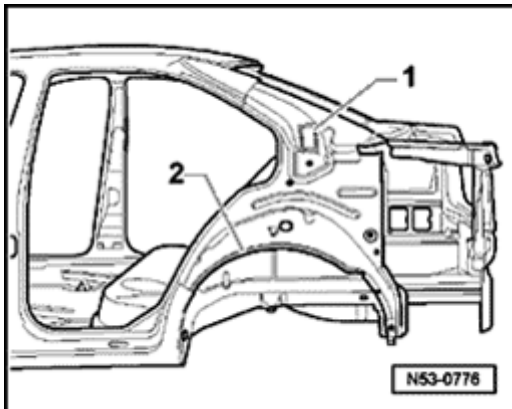
- Transfer separating lines to new part and high lighted area.
- Drill new part in flange/contact area.
- Clean/degrease flange area.



53-59

Foamed area

- Bond dampener/insulation -1- both sides with butyl bead and press securely to C-pillar reinforcement.
- Apply AKD 476 KD5 05 on lower edge for striker reinforcement (on quarter panel).



- Apply 2 - 3.5 mm dia. (0.14 in.) beads of adhesive on flange -2-.

Note:

Study repair notes ⇒ [Page 00-6](#) .

CAUTION!

New part must be welded with in 30 min., otherwise adhesion properties are affected.

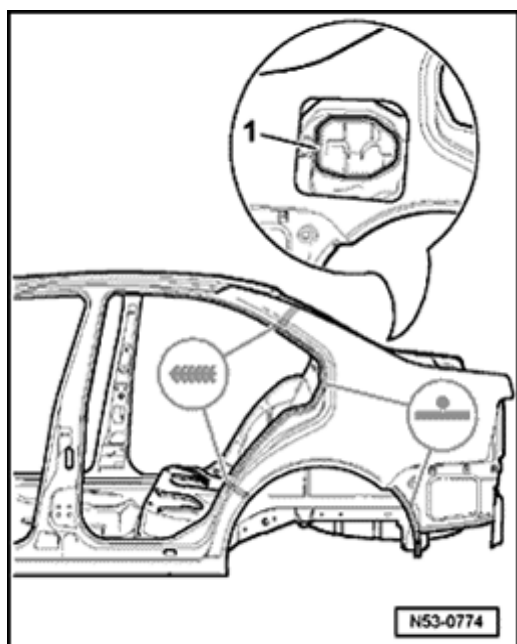
53-60

Welding in place

- Install and secure new part with vehicle wheels or fixture.
- Check gaps/mating lines dimensions with adjacent parts.

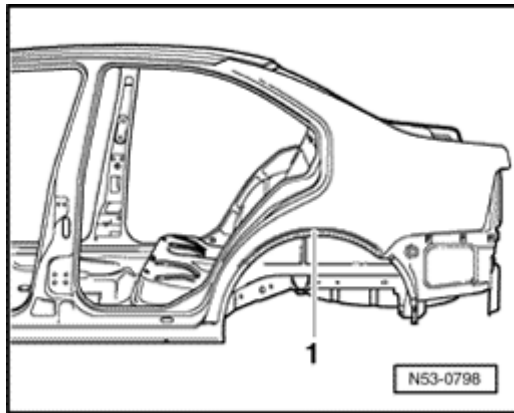
Note:

Before welding right quarter panel, apply butyl -1- at fuel filler neck area.

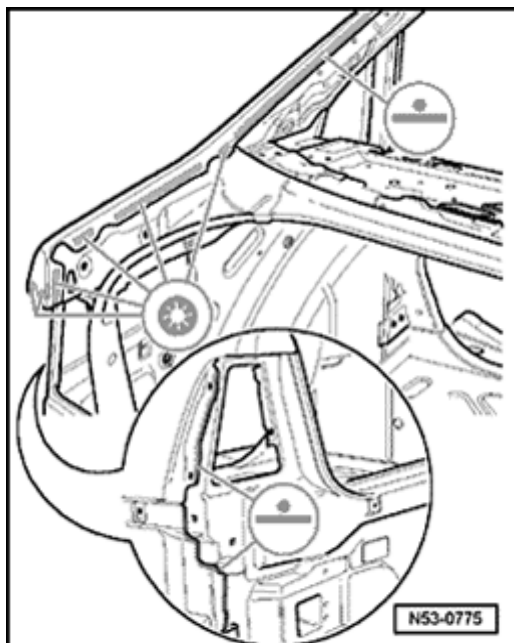


- Butt weld seam, SG-weld continuous sea
- Weld remaining seam, SG-plug weld sea

53-61



- Reform/compress wheel house flange.
- Wipe off excess adhesive and seal.

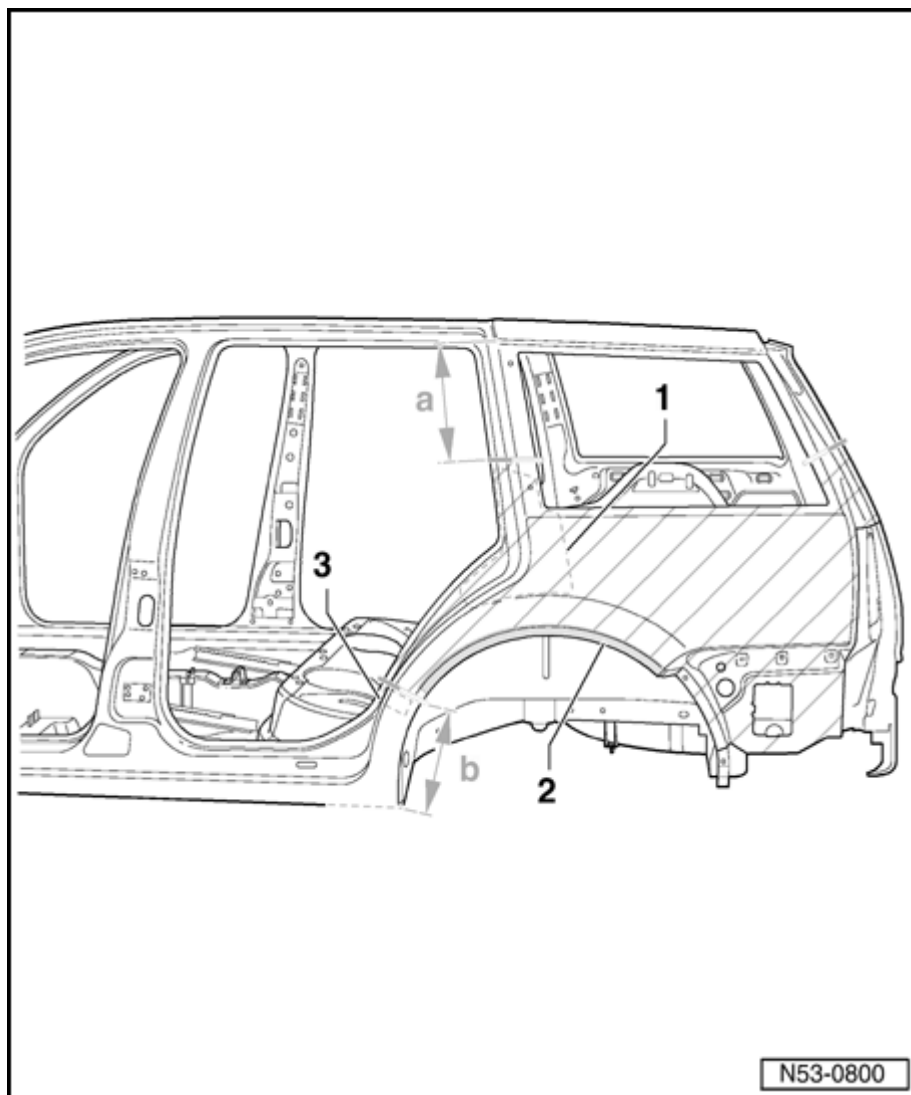


- Weld quarter panel, RP-spot weld, SG-plug weld.

Note:

Fuel filler neck area must be sealed additionally with AKD 476 KD5 05

53-62



53 55 55 20 Side panel, partial replacement (Jetta wagon)

WARNING!

**Observe safety
precautions!**

⇒Repair Manual;
General notes,
chapter 1, Safety
precautions.

Separating locations

1 - Reinforcement

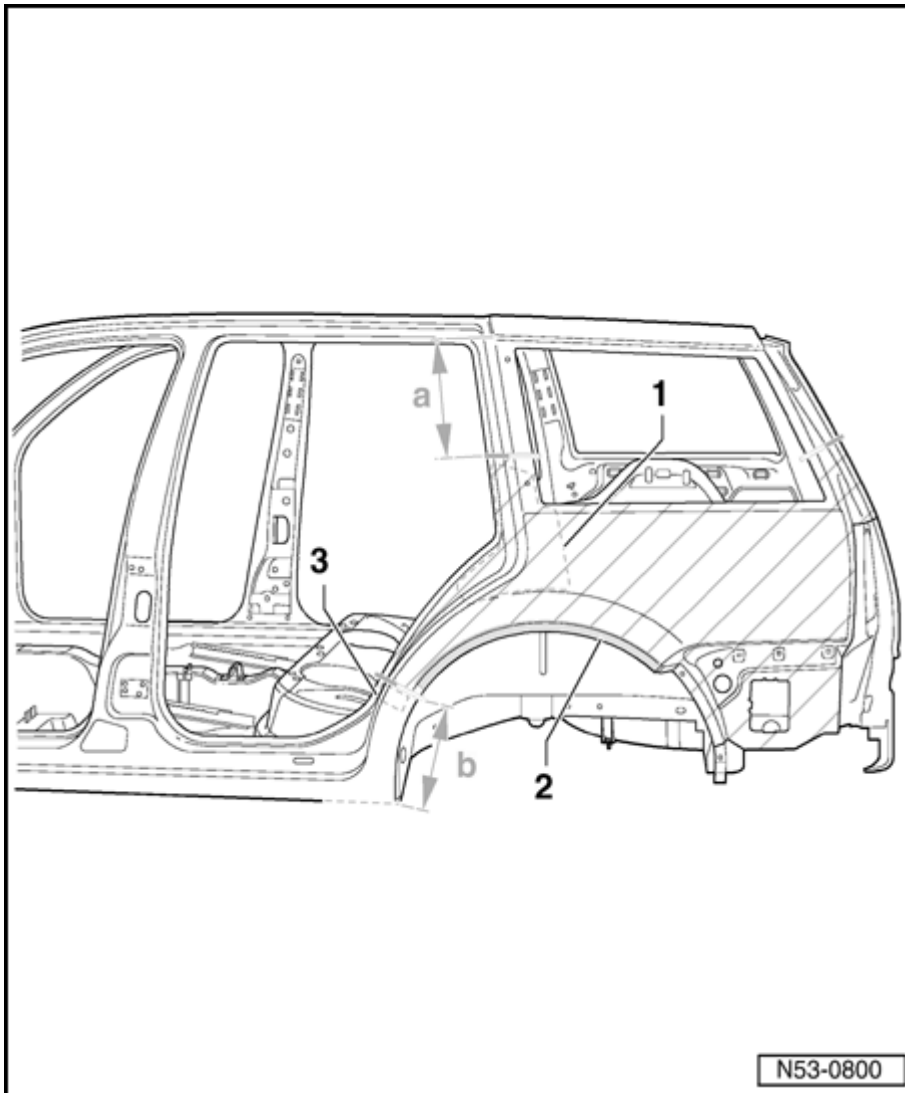
- ◆ is located directly below the indicated upper separating cut -a- = max. 270 mm

2 - Glued area

3 - Foam filled area

- ◆ is located directly behind the indicated upper separating cut

53-63

**Notes:**

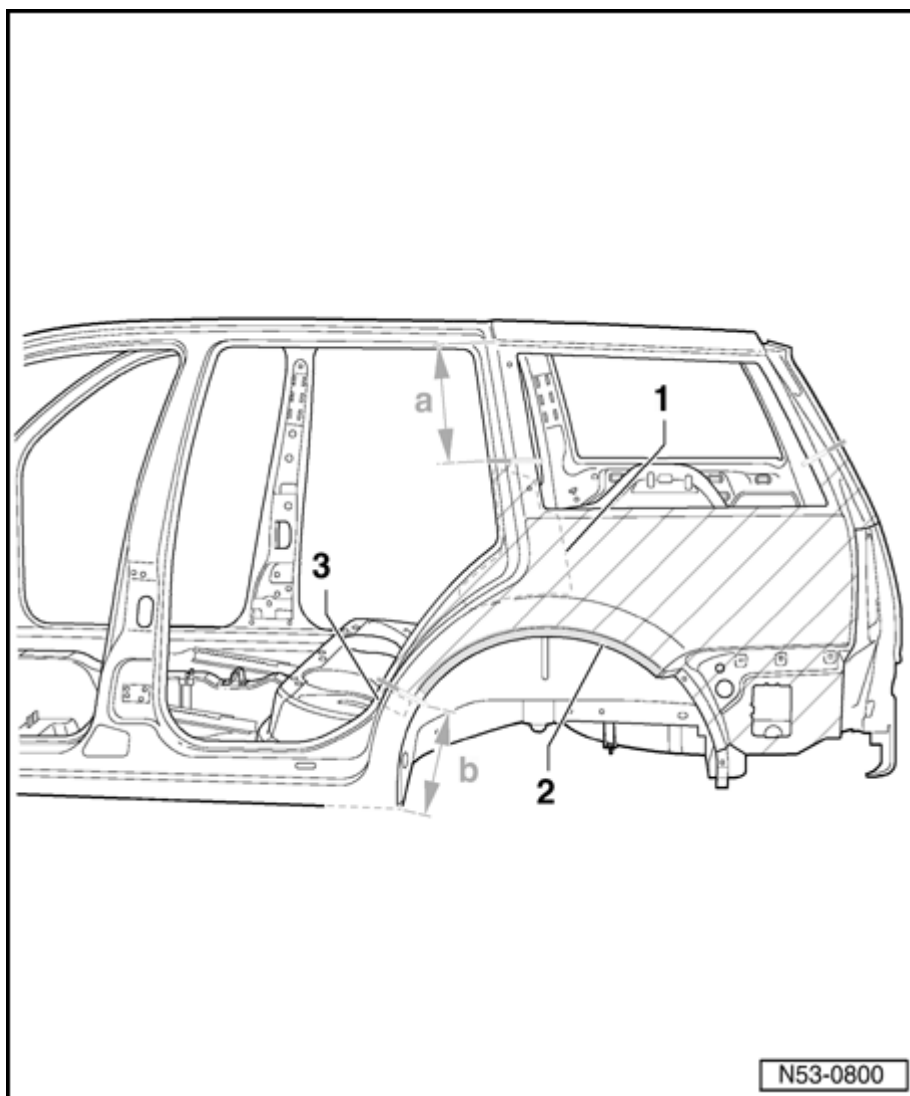
- ◆ *Observe replacement panel separating cut!*
- ◆ *Only perform separating cuts using VAG1523 body saw or VAG1577 pressure hammer!*

WARNING!

Avoid these procedures, since gases which are health-hazardous for humans and environment originate during welding, separating with spark generating appliances/tools or galvanizing in foamed areas.

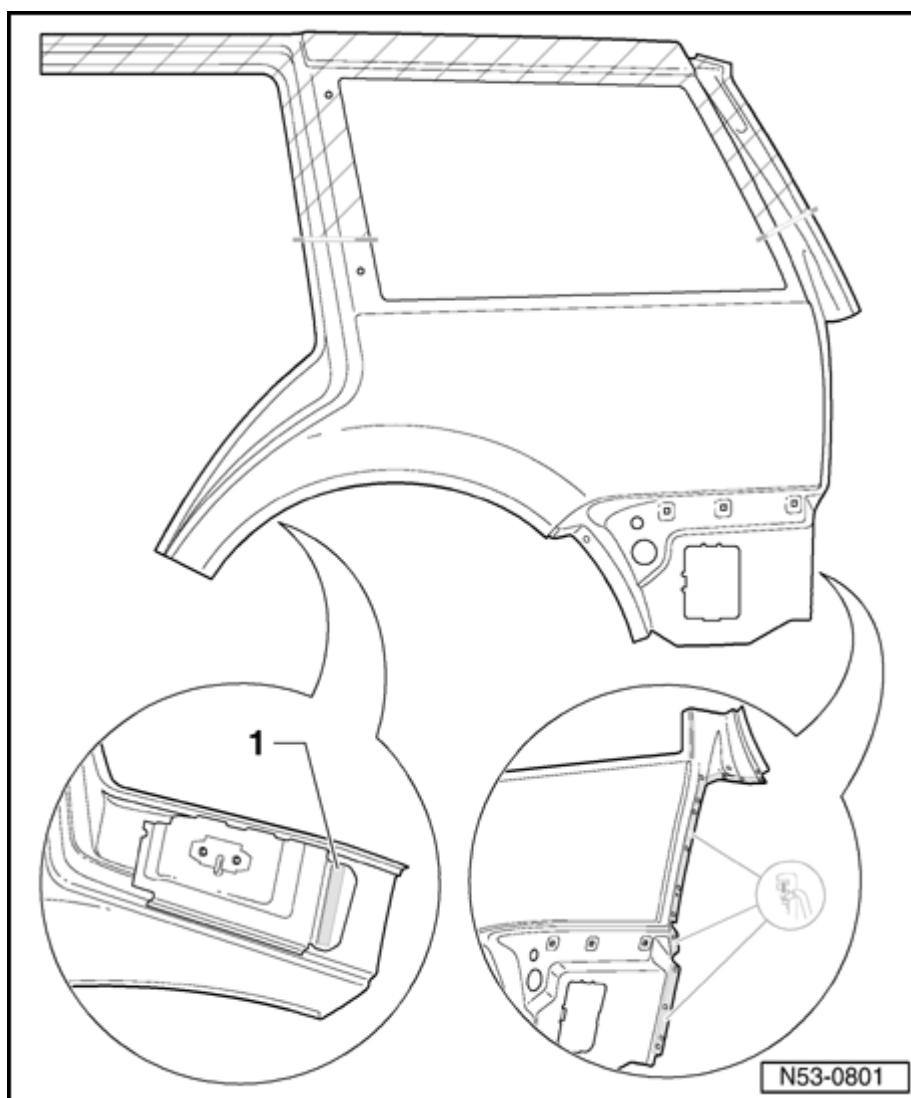
Use a 2-K spackling compound to even out dents.

53-64



- Perform bottom separating cut above sidemember.
- Grind through outer edge of wheelhousing.
- Roughly cut side panel.
- Remove remaining material.
- Completely remove adhesive remains and grind bonding surface down to bare metal.

53-65



Replacement parts

- ◆ Side panel sub-part
- ◆ Adhesive: DA 001 730 A1
- ◆ Butyl adhesive sealing cord AKL 450 005 05
- ◆ Polyurethane-adhesive sealing compound AKD 476 KD5 05

Preparing new part

- Transfer separating cut to new part and cut off hatched area.
- Make holes in outer joint surface of new part.
- Clean flanged area (it must be free of dust and grease).
- Apply butyl adhesive sealing cord - 1- on reinforcement for striker

Welding in

Note:

◆ For the right side panel, butyl adhesive cord -1- must be applied to the wheelho outer around the opening of the tank filler flange.

- Install and fasten new part with vehicle st on wheels or alignment bracket set.

- Check gap dimensions with accessories.

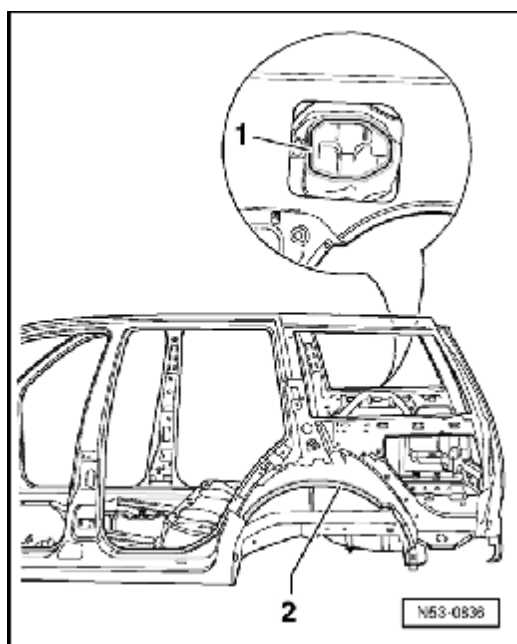
◀ - Apply adhesive to flanged area -2-. 2 beads each 3.5 mm diameter.

Note:

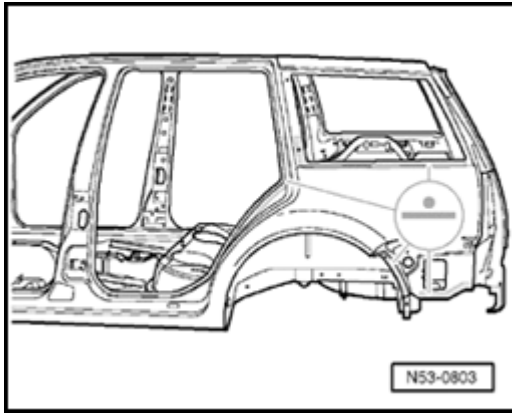
◆ Observe repair notes ⇒ [Page 00-6](#).

WARNING!

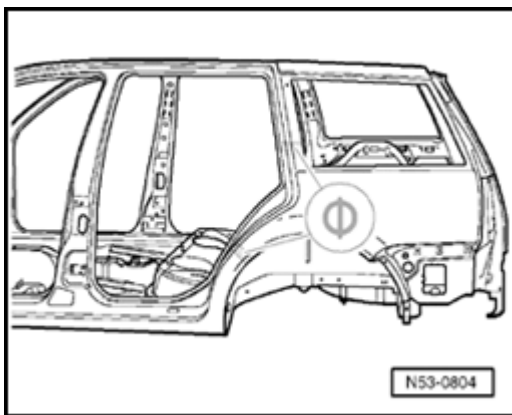
New part must be installed within 30 min otherwise bonding properties of adhesive be impaired.



53-67

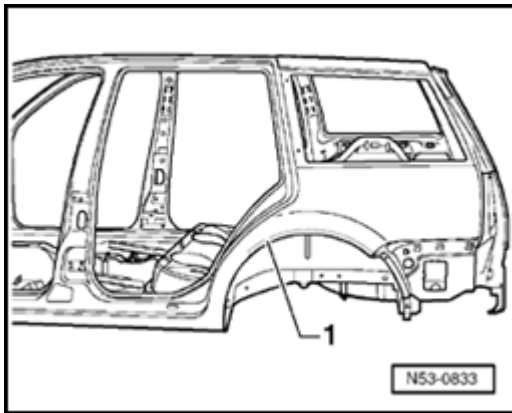


- ✦ - Weld in new part, RP spot weld seam.

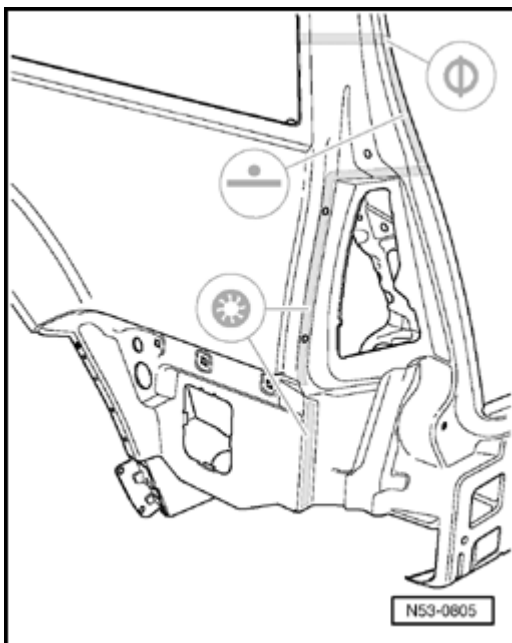


- ✦ - Butt weld separating cuts, SG stepped seam.

53-68

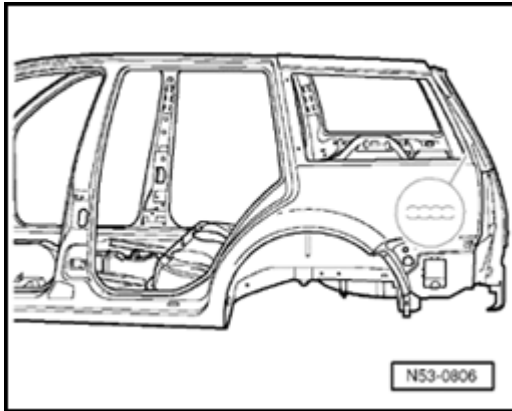


- Flange wheel flange -1-.
- Wipe off escaping adhesive and seal.



- Weld in side panel, RP spot weld seam, SG plug weld seam.
- Weld separating cut, SG stepped seam.

53-69

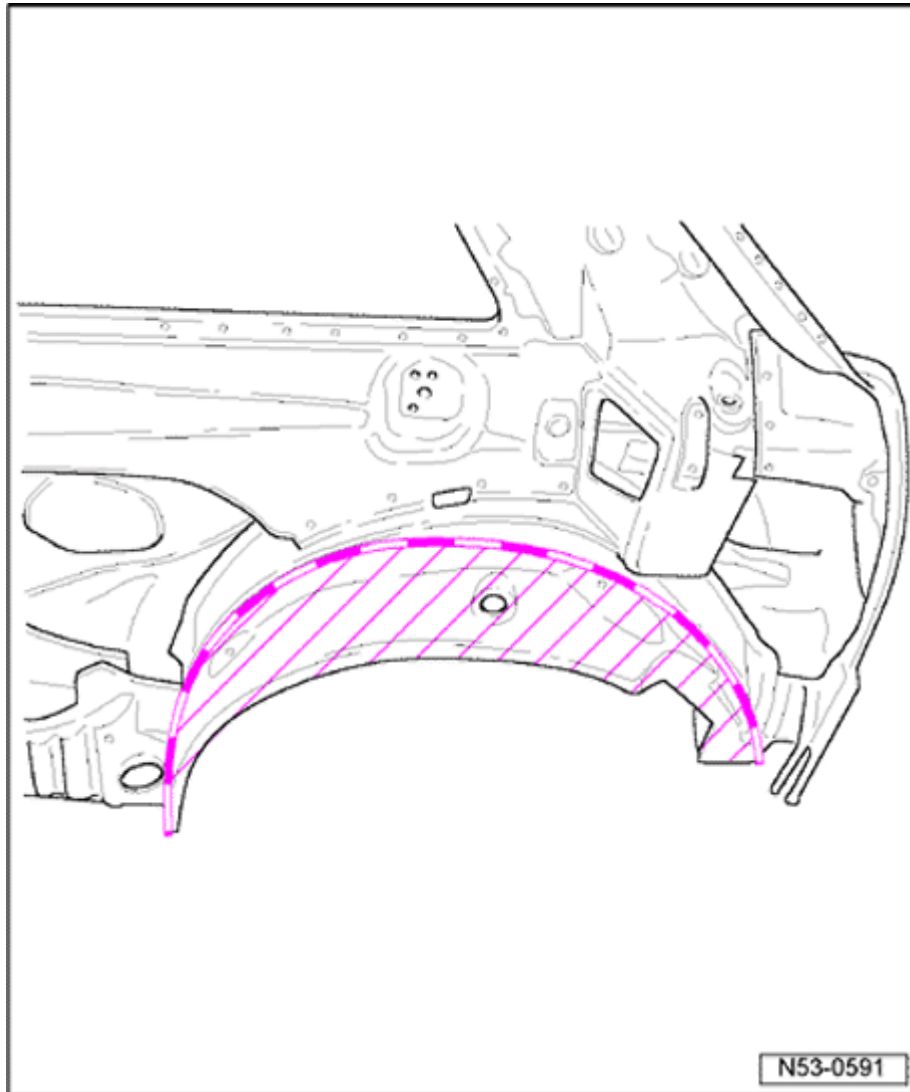


- Braze connection to D-pillar.

Note:

- ◆ After welding in the right side panel, the area of the tank filler flange must also be sealed using AKD 476 KD5 05.

53-70



53 69 55 50 Quarter panel, partial replacement (Golf)

- ◆ Quarter panel removed

Cutting location

- Make parting cut so body side can be offset.

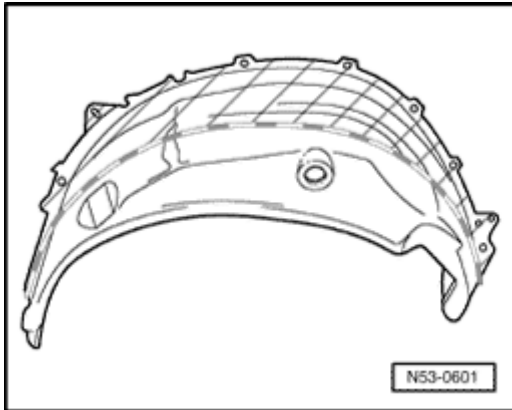
53-71

Replacement part

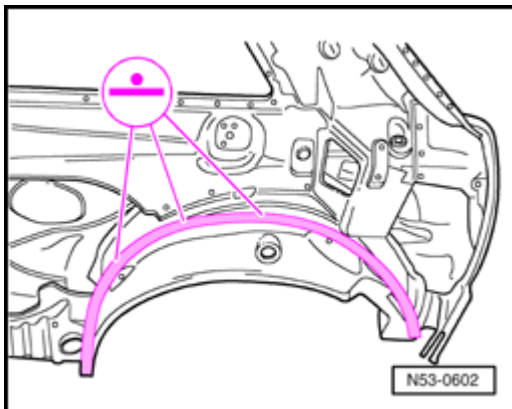
- ◆ Wheel house

Preparing new part

- Offset body side
- ▲ - Transfer separating lines to new part and remove highlighted area.
- Add approx. 10 mm (0.393 in.) for overlap.

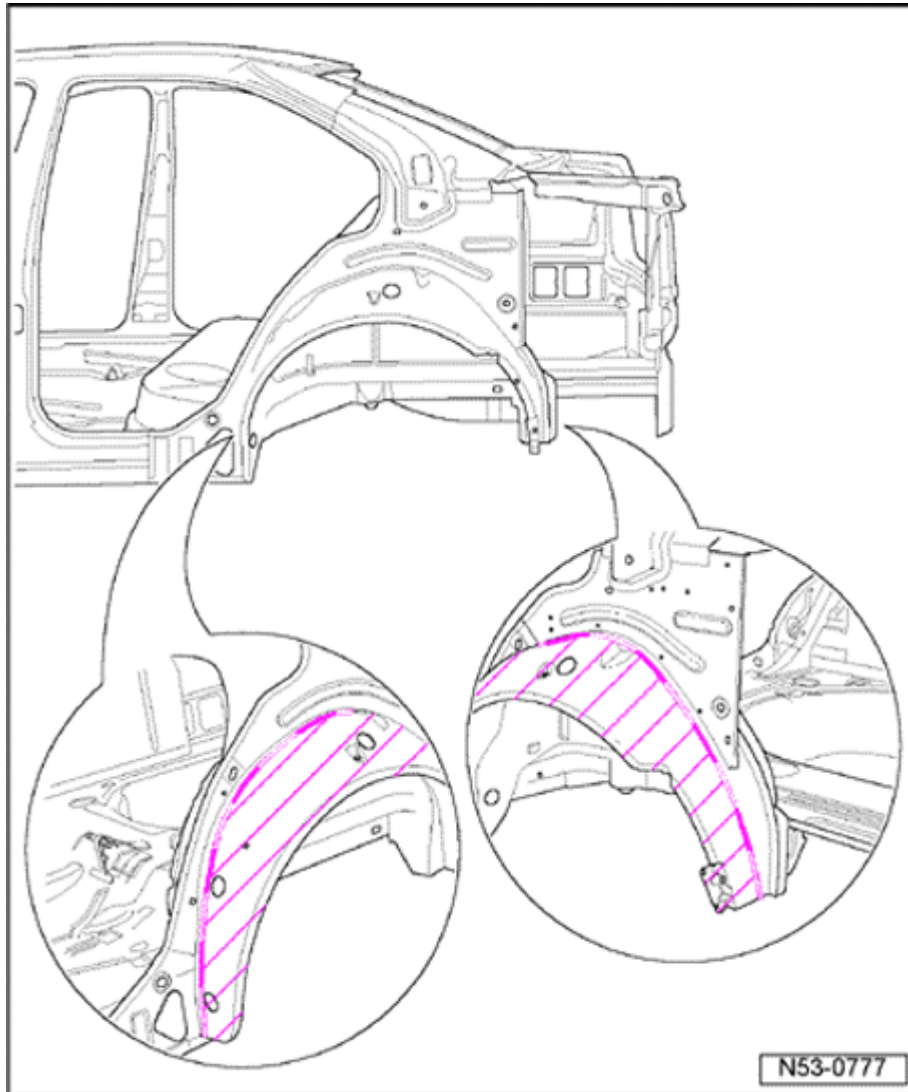
**Welding in place**

- Check gaps/mating lines at wheel house, with quarter panel installed and vehicle stress free.



- ▲ - Spot weld remainder of joint, RP-spot weld seam.
- Weld quarter panel (2-door) ⇒ [Page 53-49](#)
- Weld quarter panel (4-door) ⇒ [Page 53-54](#)

53-72



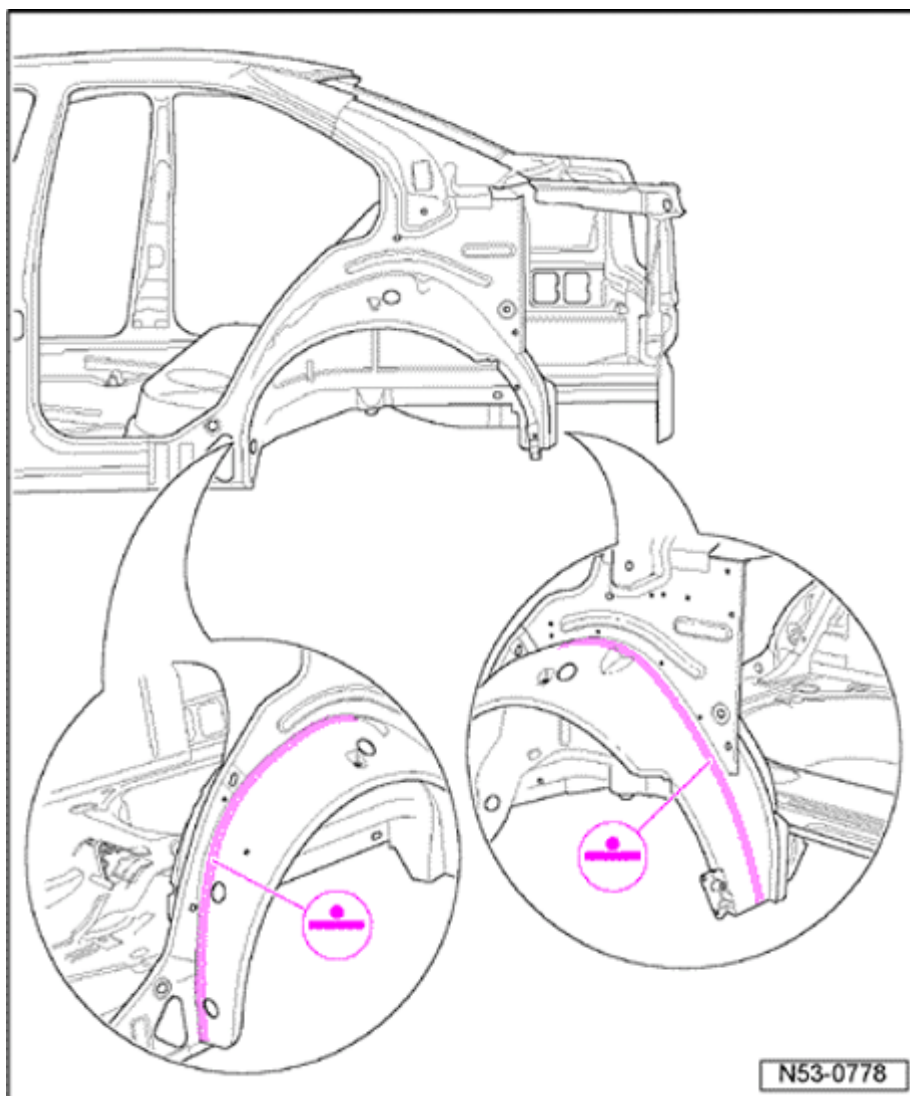
53 69 55 50 Wheel house connecting panel, partial replacement (Jetta)

- ◆ Quarter panel removed

Cutting location

- Make parting cut so body side can be offset.

53-73



Replacement part

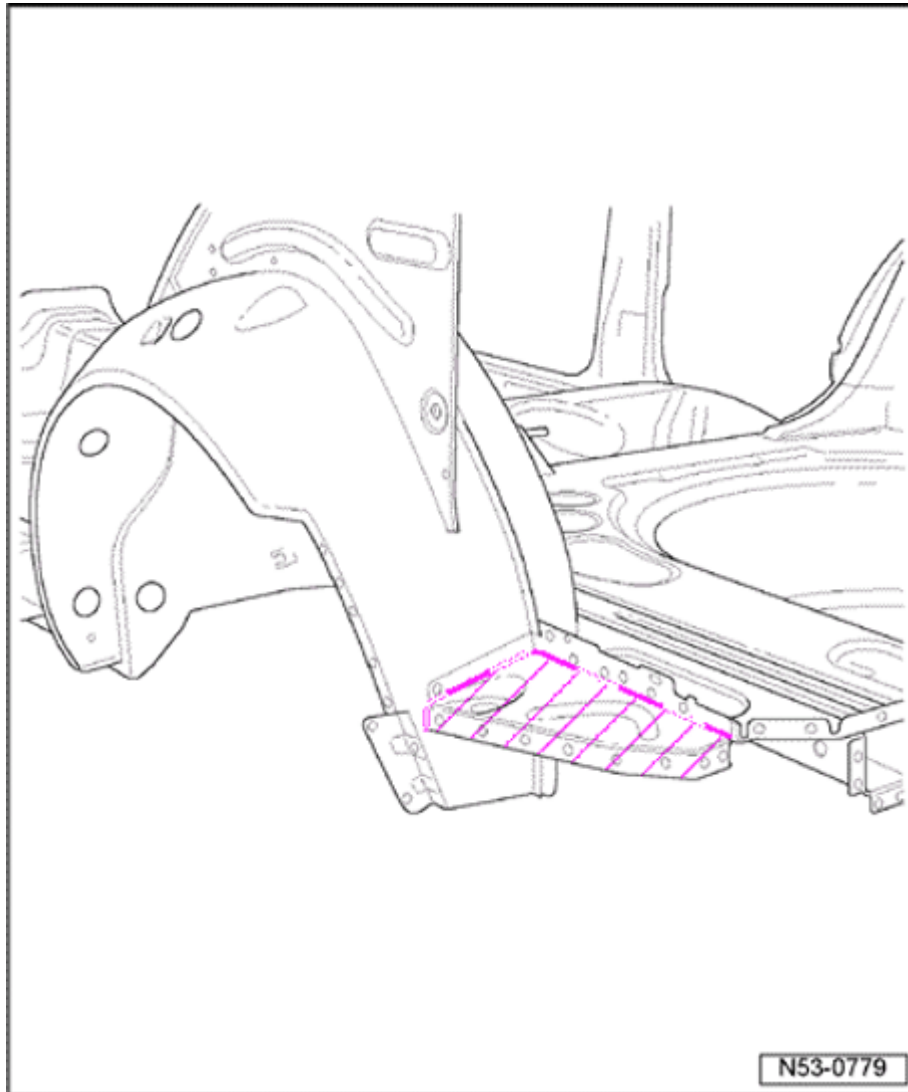
- ◆ Wheel house

Preparing new part

- Offset body side
- Add approx. 10 mm (0.393 in.) for overlap.

Welding in place

- Check gaps/mating lines at wheel house, with quarter panel installed and vehicle stress free.
- Weld new part, RP-spot weld seam.
- Weld wheel house (Jetta) ⇒ [Page 53-60](#)



53 36 55 50 Connecting panel, replacing (Jetta)

- ◆ Quarter panel removed

Cutting location

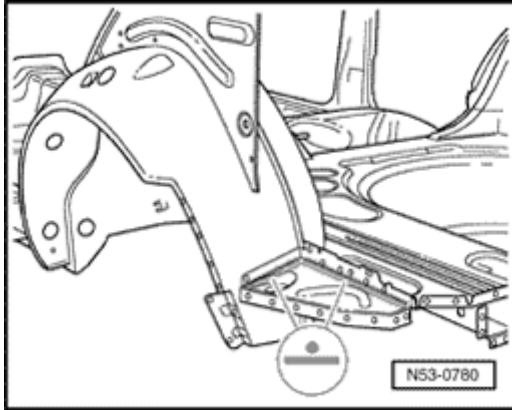
- Remove connecting panel.

Replacement part

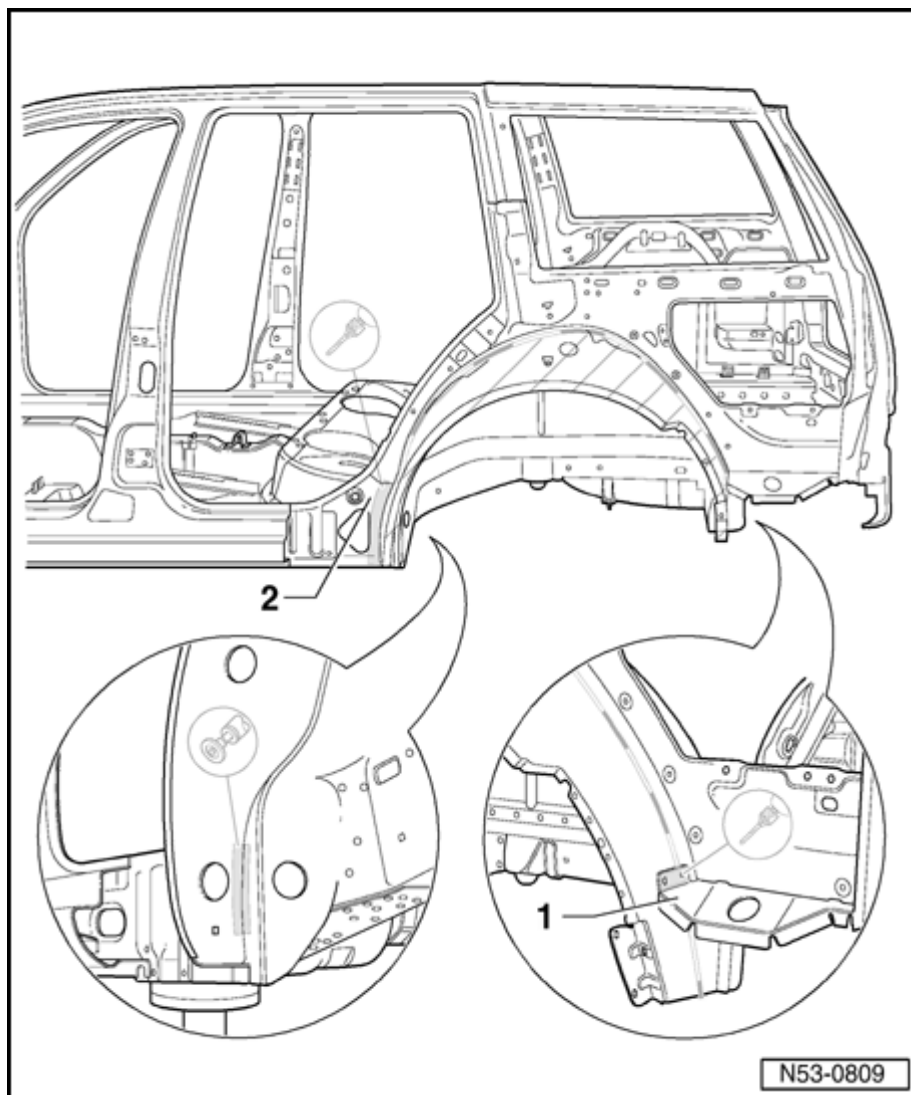
- ◆ Connecting panel

Welding in place

- Weld connecting panel, RP-spot weld



53-76



53 69 55 70 Rear wheelhousing outer, replacing - partial section- (Jetta wagon)

WARNING!

**Observe safety
precautions!**

⇒ Repair Manual;
General notes, chap
1, Safety precaution

- Side panel and reinforcement for C-pillar already removed

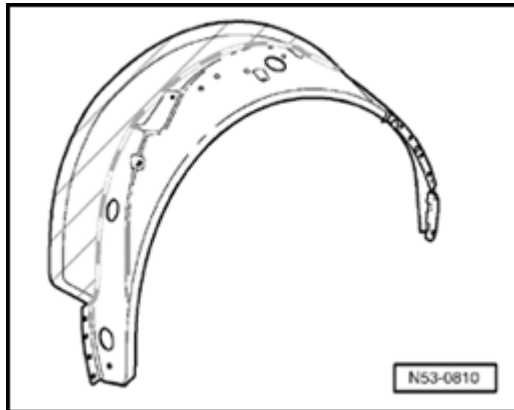
Separating location

- Drill out corner panel for luggage compartment floor 1- from wheelhousing line
- Drill through fillet plate -2- and remove from wheelhousing line
- Grind off brazed seam.
- Make separating so that edges can be stepped on both side.

53-77

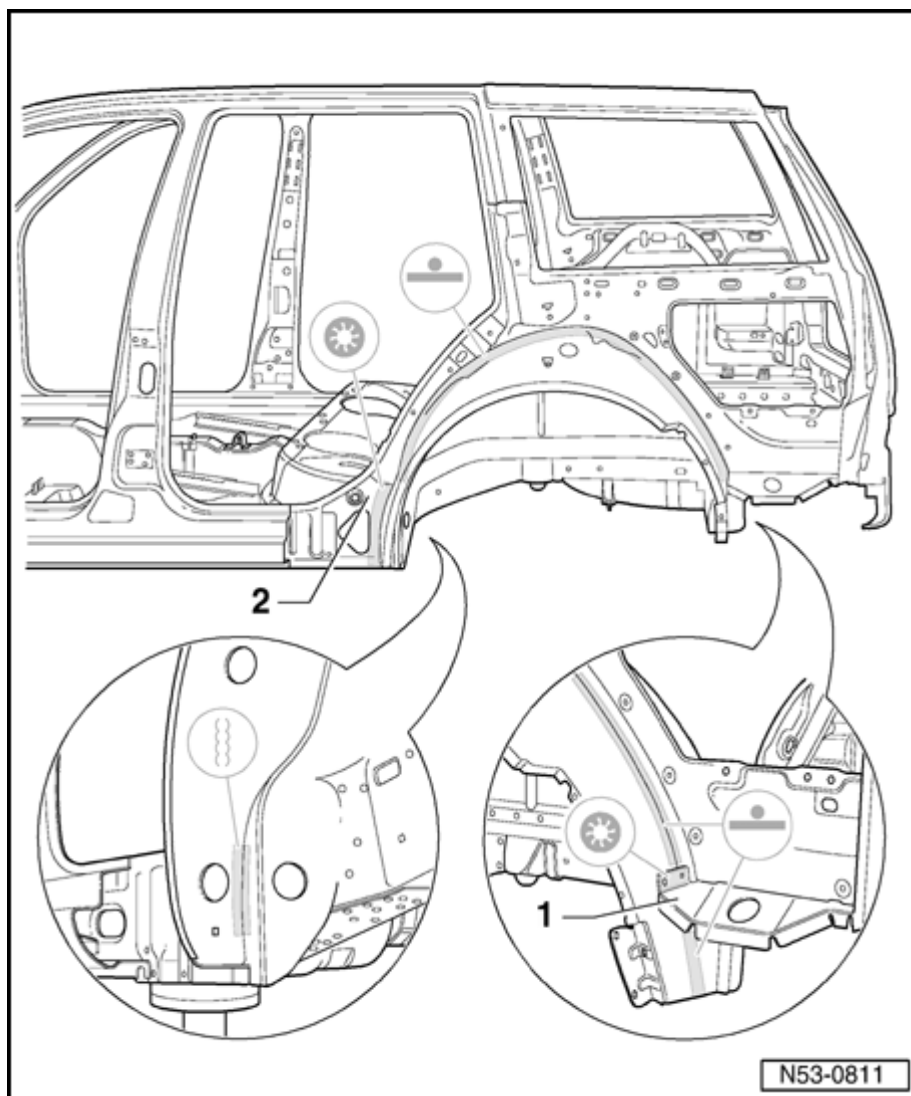
Replacement parts

- ◆ Outer wheelhousing liner
- ◆ Adhesive: DA 001 730 A1

Preparing new part

- ✦ - Transfer separating cut plus 20 mm for overlap for spot weld area to new part and separate hatched area.

53-78



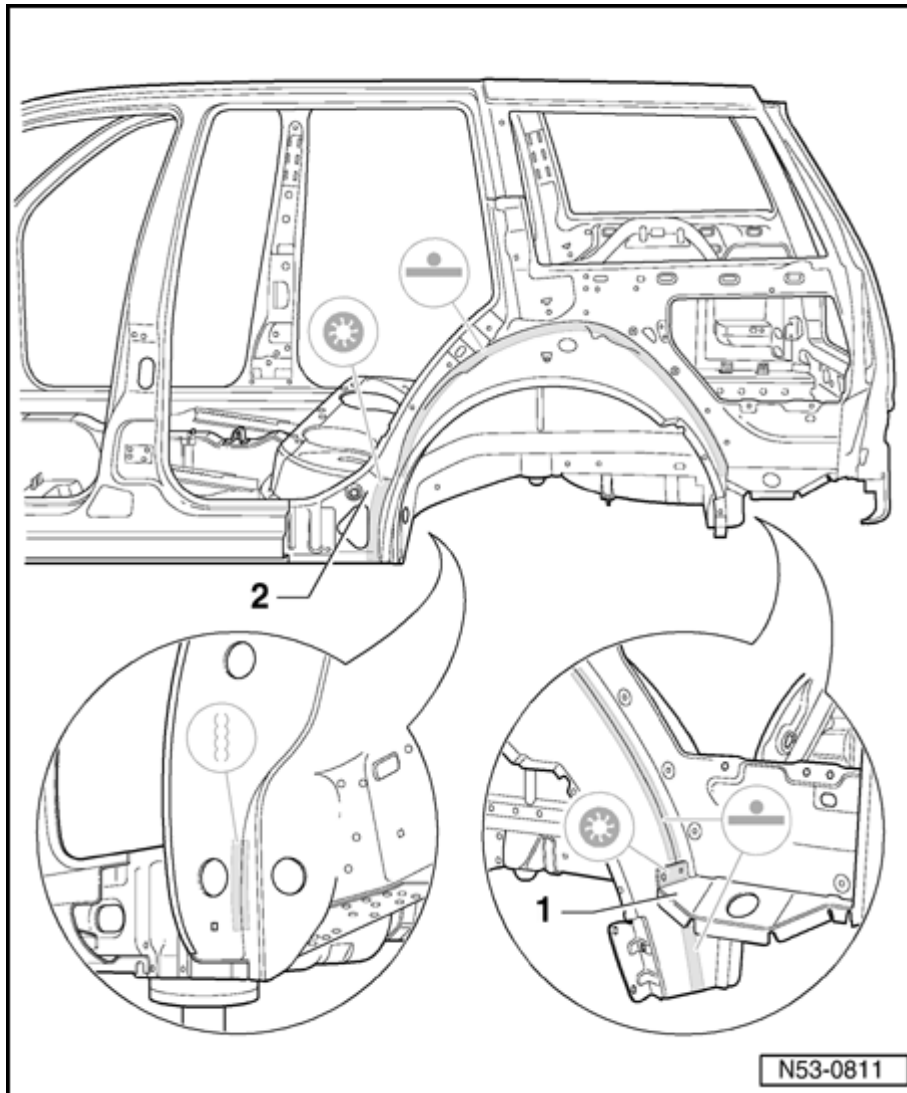
Welding in

- Fit wheelhousing liner and check gap dimensions with side panel installed and with vehicle free of stress.
- Step on body side.

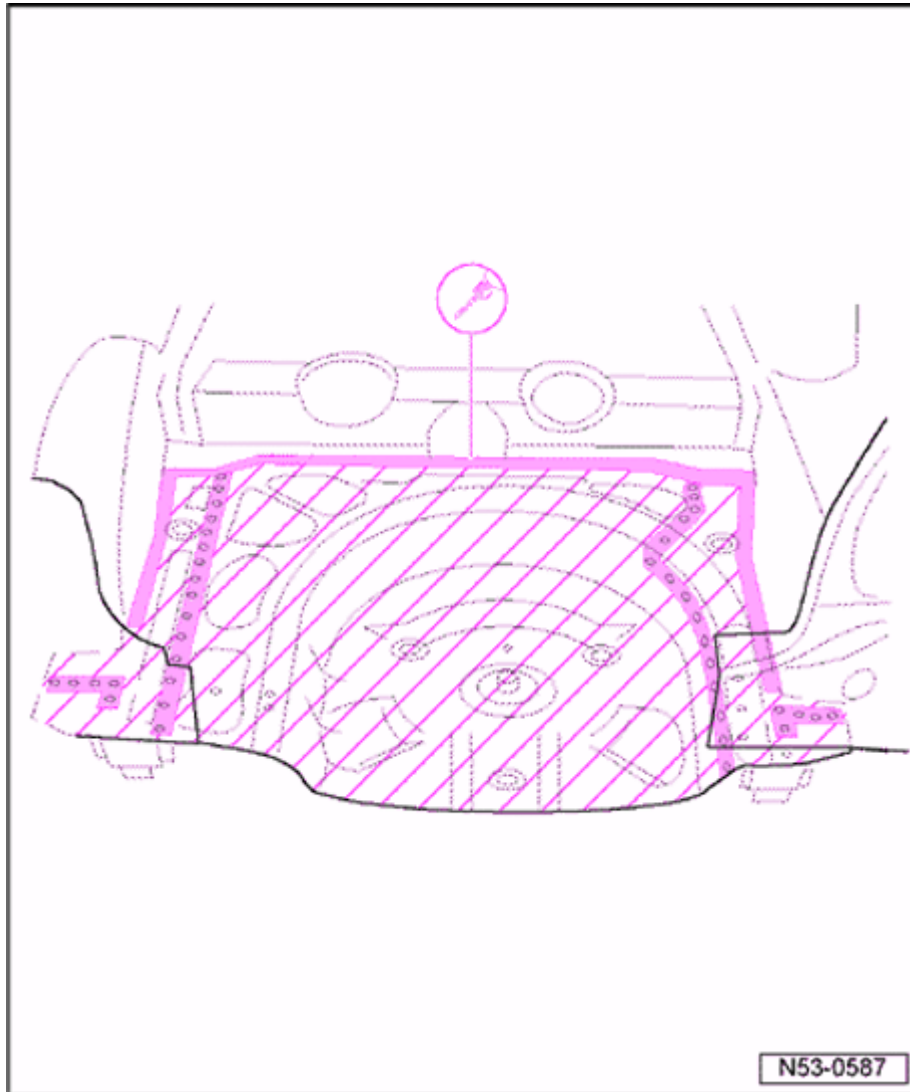
Note:

- New part must be installed within 30 minutes, otherwise bonding properties of adhesive will be impaired.
- Weld in new part, RP spot weld seam.

53-79



- Align corner panel -1- for luggage compartment floor and weld to wheelhousing liner, SG plug weld seam.
- Install fillet plate -2- to wheelhousing liner and weld in, SG plug weld seam.
- Braze inner seam to wheelhousing
- Weld in reinforcement for C-pillar ⇒ [Page 53-40](#) .
- Weld in side panel (Wagon) ⇒ [Page 53-66](#) .



53 80 55 50 Spare wheel well, replacing (Golf)

- ◆ Cross panel and tail light mount removed

Cutting location

- Drill out forward original joint to floor panel.
- Cut out spare tire wheel well.
- Remove excess material.

53-81

Replacement part

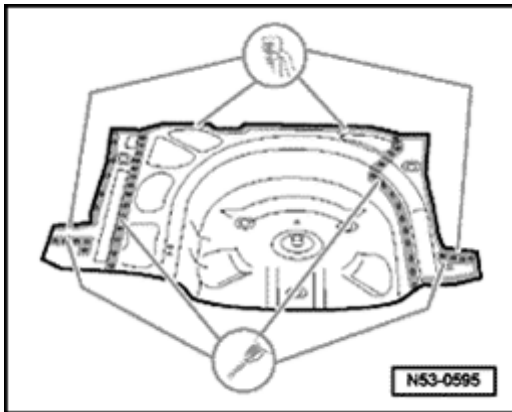
- ◆ Spare tire wheel well -
Designation: Floor plate

Preparing new part

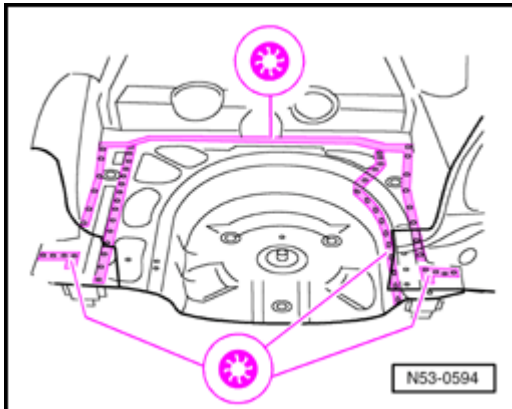
- ✦ - Drill new part in outer flange area.
- Drill holes for welding, SG-plug weld 7 mm dia. (0.27 in.)

Welding in place

- Install and secure new part with vehicle on wheels or fixture.
- Check gaps/mating lines.



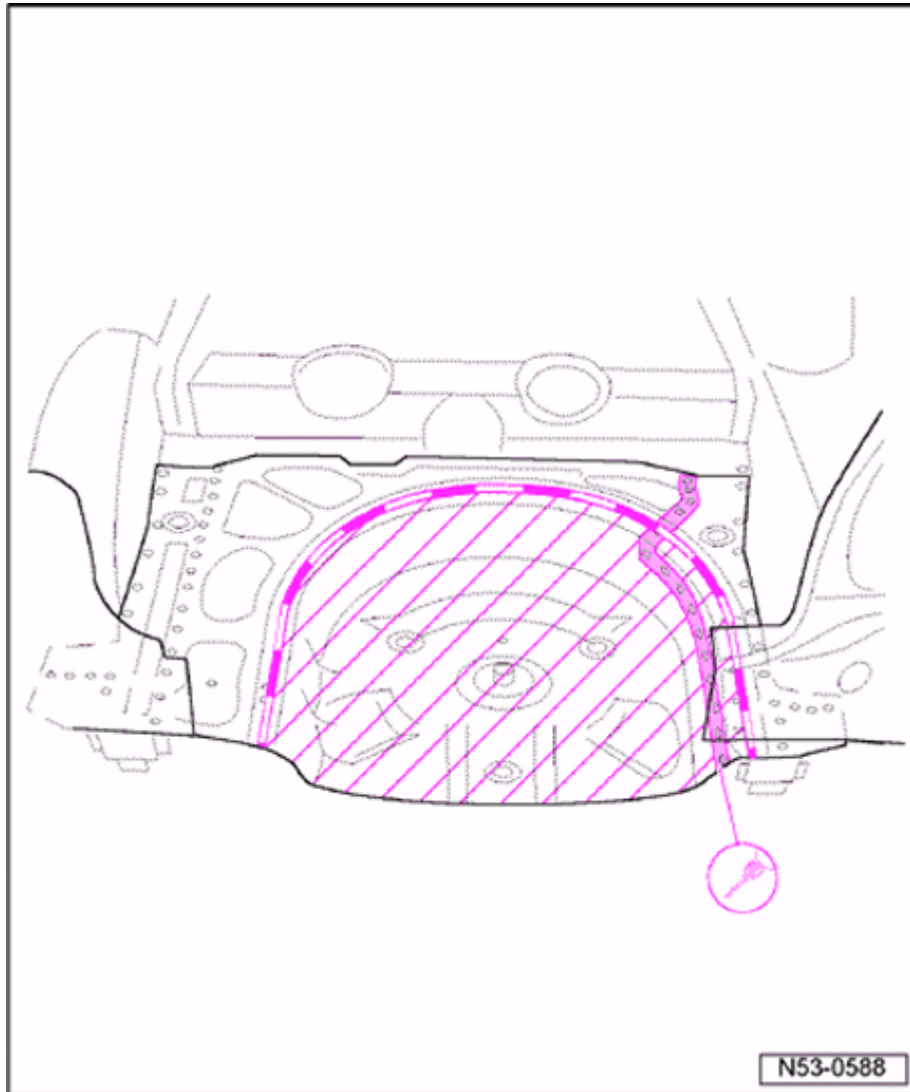
- ✦ - Weld remainder, SG-plug weld seam.
- Weld at connection to floor, SG-continuous seam staggered
- Weld mount for tail light assembly
⇒ [Page 53-26](#) .



Note:

Secure new vehicle information label in spare tire wheel well after paint work is completed.

53-82



53 80 55 52 Spare wheel well, partial replacement (Golf)

- ◆ Rear cross panel carrier removed

Cutting location

- Drill out forward original joint to floor panel.

Note:

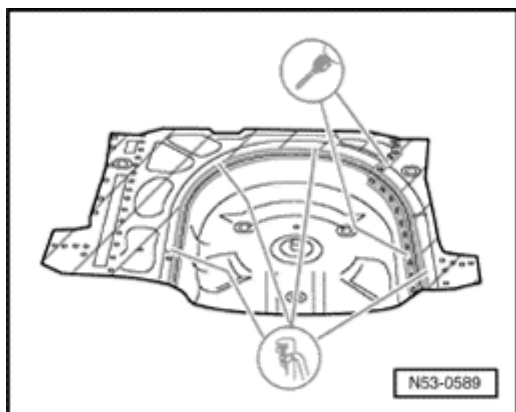
Make separating cut so body side can be offset

- Separate original joint.

Replacement part

- ◆ Spare tire wheel well -
Designation: Floor plate

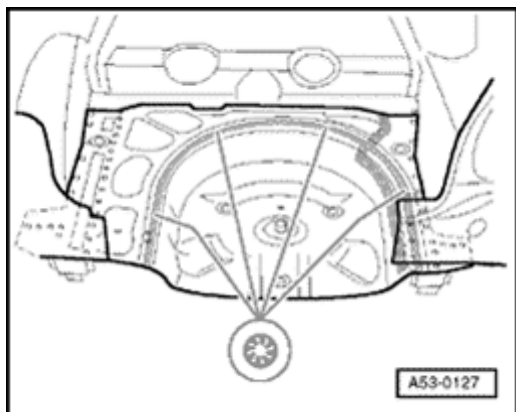
Preparing new part



- ✦ - Transfer separation lines to new part and cut out high lighted area.
- Drill holes for welding, SG-plug weld 7 mm dia. (0.27 in.)
- Hole spacing approx. 20 mm (0.78 in.)
- Offset body side

Welding in place

- Install and secure new part with vehicle on wheels or fixture.
- Check gaps/mating lines.

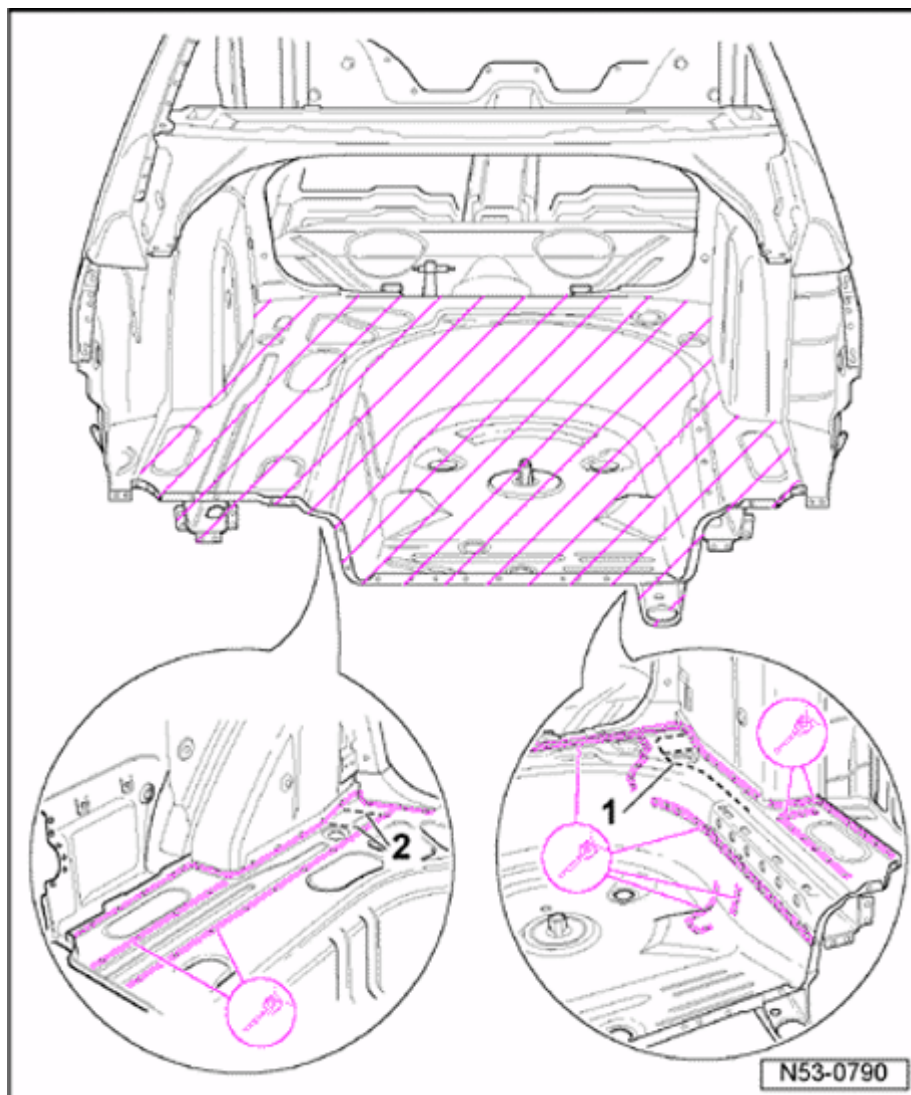


- ✦ - Weld new part, SG-plug weld seam.
- Weld cross panel, ⇒ [Page 53-22](#)

Note:

Secure new vehicle information label in spare tire wheel well after paint work is completed.

53-84



53 80 55 50 Spare wheel well, replacing (Jetta)

- ◆ Rear cross panel carrier removed

Cutting location

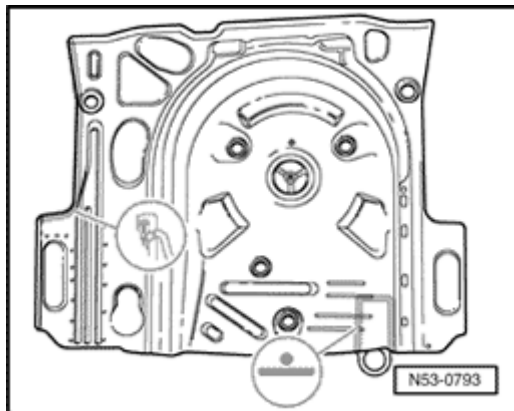
Note:

- ◆ Take care when cutting out spare wheel well that reinforcements -1- and -2- are not damaged since they are located directly underneath.
 - ◆ Carefully drill out welds with spot weld cutter VAG1731 as far as possible.
- Drill out spare wheel well.
 - Remove residue.
 - Remove adhesive residue completely and grind surface smooth.

53-85

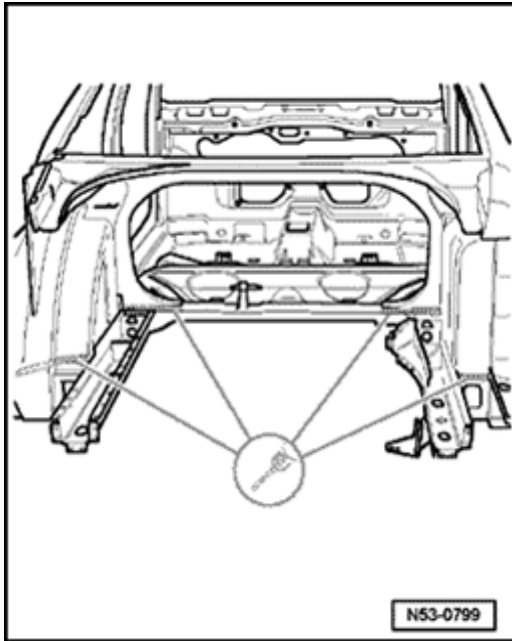
Replacement part

- ◆ Spare tire wheel well -
Designation: Floor plate
- ◆ Tow hooks
- ◆ Dampener/insulation
- ◆ Adhesive bead AKL 450 005 05
- ◆ Adhesive DA 001 730 A1

Preparing new part

- Drill new holes in flange.
- Spot weld tow hooks at spare wheel well, RP-spot weld.

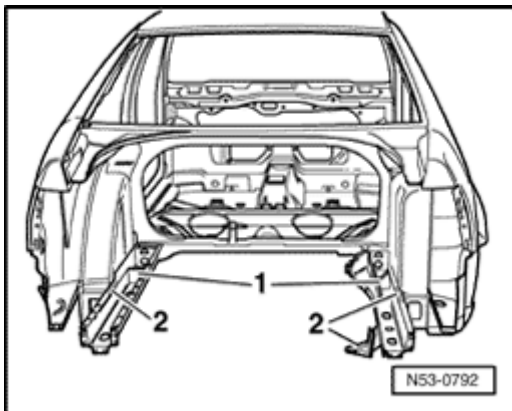
53-86



- Make additional holes for SG-plug weld 7 mm dia. (0.27 in.)

Note:

- ◆ *SG-spot weld should be placed 15mm (0.59 in.) apart to maintain factory produced integrity.*
- ◆ *SG-spot welds should be made from the outside for optical reasons.*

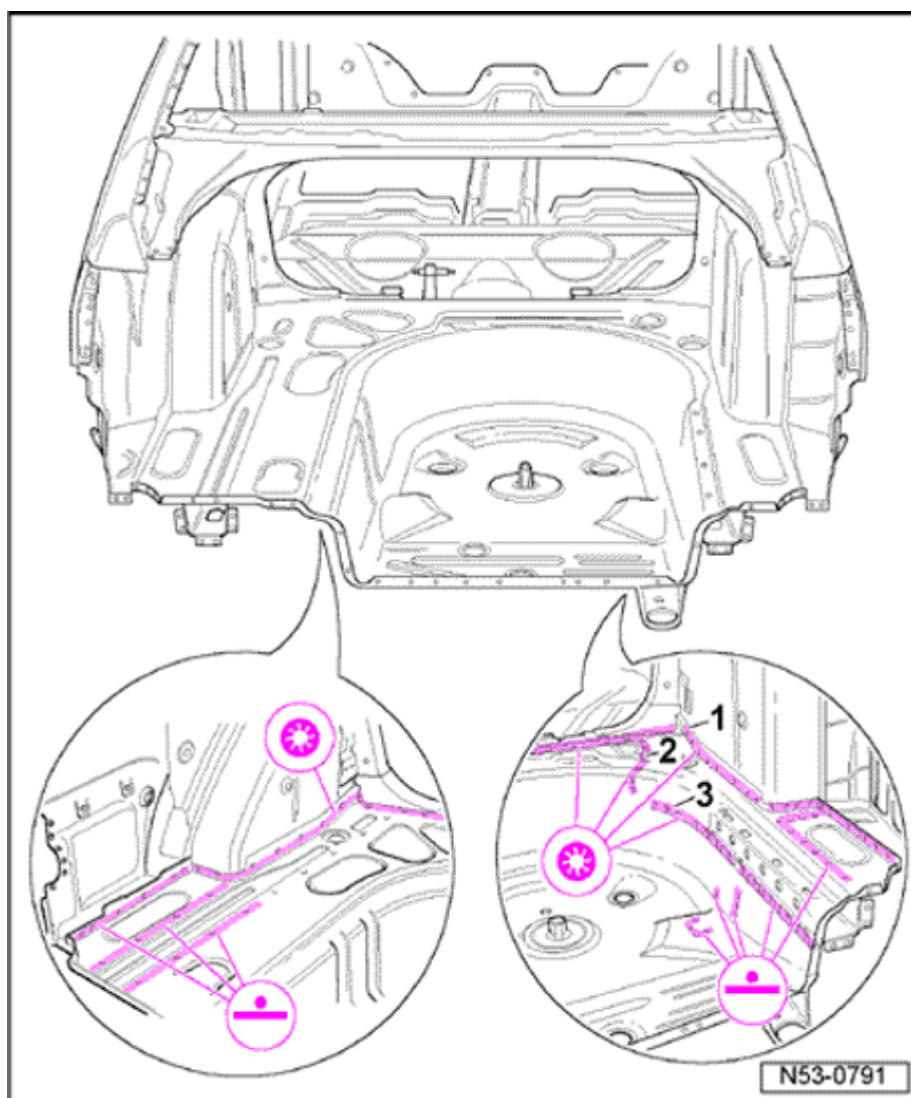


- Bond deadener -1- with Butyl bead all around and press in long member.
- Apply adhesive -2-.

CAUTION!

New part must be welded with in 30 min., otherwise adhesion properties are affected.

53-87

**Welding in place**

- Install and secure new part with vehicle on wheels or fixture.
- Check gaps/mating lines.
- Weld quarter panel, RP-spot weld seam.

Note:

Begin SG-spot welding -1-, -2-, and -3- from the outside

Select a topic

50 - Body, front

[Body, front](#)

[Tools](#)

[Lock carrier with attachments, removing and installing](#)

[Lock carrier service position](#)

[Front fender, assembly overview](#)

[Fender gaps](#)

[Noise insulation \(gasoline engines\), assembly overview](#)

[Noise insulation \(Diesel engines\), assembly overview](#)

55 - Hood, lids

[Hood](#)

[Assembly overview](#)

[Hood, adjusting](#)

[Gas-filled strut, removing](#)

[Bowden cable, removing and installing](#)

[Release lever, removing and installing](#)

[Hood lock, assembly overview](#)

[Hood lock, removing and installing](#)

[Rear lid \(Golf\)](#)

[Tools](#)

[Rear lid \(Golf\), assembly overview](#)

[Gas-filled strut, removing](#)

[Releasing gas from gas-filled strut](#)

[Rear lid, adjusting](#)

[Rear lid lock, removing and installing](#)

[Lock cylinder housing, removing and installing](#)

[Rear lid \(Jetta\)](#)

[Tools](#)

[Rear lid \(Jetta\), assembly overview](#)

[Rear lid lock, removing and installing \(Jetta\)](#)

[Lock cylinder housing, removing and installing](#)

[Micro-switch, removing and installing](#)

[Rear lid, \(Jetta Wagon\)](#)

[Rear lid \(Jetta Wagon\), assembly overview](#)

[Rear lid lock, removing and installing](#)

[Lock cylinder housing, removing and installing](#)

[Micro-switch, removing and installing](#)

[Tank flap unit](#)

[Fuel flap unit, removing and installing \(Golf\)](#)

[Fuel flap unit, removing and installing \(Jetta\)](#)

57 - Front doors, Central locking system

[Front door](#)

[Tools](#)

[Front door, assembly overview](#)
[Door, removing and installing](#)
[Door, adjusting](#)
[Door handle and lock, assembly overview](#)
[Lock cylinder housing, removing and installing](#)
[Door handle, removing and installing](#)
[Door lock, removing and installing](#)
[Locking knob for locking rod, removing and installing](#)
[Door seals](#)
[Auxiliary seal, removing and installing](#)

Central locking system

[Comfort system and central locking system, assembly overview](#)
[Batteries for key with radio remote control \(not foldable\), removing and installing 04.01](#)
[Batteries for key with radio remote control \(foldable\), removing and installing 04.01](#)
[Batteries for key with radio remote control \(foldable\) removing and installing 05.01](#)
[Adaptation of keys with radio remote control](#)

58 - Rear doors

Rear doors

[Tools](#)
[Rear door, assembly overview](#)
[Door, removing and installing](#)
[Door, adjusting](#)
[Door handle and door lock, assembly overview](#)
[Door handle, removing and installing](#)
[Door lock, removing and installing](#)
[Door window, assembling to window regulator](#)
[Door seals](#)

60 - Sunroof

Sunroof

[Tools](#)
[General Information](#)
[Function](#)
[Distinguishing features of Webasto and Rockwell \(Meritor\) sunroofs](#)

Sunroof with glass panel (Webasto)

[Sunroof with glass panel, assembly overview](#)
[Removing glass panel for sunroof](#)
[Glass panel for sunroof, installing](#)
[Glass panel for sunroof \(height adjustment\), adjusting](#)
[Panel seal, replacing](#)
[Wind deflector, removing](#)
[Sliding headliner, removing](#)
[Drive motor for sunroof, removing](#)
[Drive motor for sunroof, adjusting \(zero position\)](#)
[Automatic rotary switch for sunroof, removing](#)
[Parallel movement, checking](#)

[Parallel movement, adjusting](#)
[Installation unit, removing and installing](#)
[Slotted guide rail, removing](#)
[Water drain hoses, cleaning](#)

Sunroof with glass panel (Meritor)

[Sunroof with glass panel, assembly overview](#)
[Glass panel for sunroof, removing](#)
[Glass panel for sunroof, installing](#)
[Glass panel for sunroof \(height adjustment\), adjusting](#)
[Panel seal, adjusting](#)
[Panel seal, replacing](#)
[Wind deflector, removing](#)
[Sliding headliner, removing](#)
[Drive motor for sunroof, removing](#)
[Drive motor for sunroof, adjusting \(zero position\)](#)
[Automatic rotary switch for sunroof, removing](#)
[Parallel movement, checking](#)
[Parallel movement, adjusting](#)
[Installation unit, removing and installing](#)
[Slotted guide rail, removing](#)
[Water drain hoses, cleaning](#)

63 - Bumper

Front bumper

[Bumper cover, assembly overview](#)
[Bumper cover, removing and installing](#)
[Release lever, removing](#)
[Bumper carrier, assembly overview](#)
[Bumper cover \(Golf R32\), assembly overview](#)
[Bumper cover \(Golf R32\), removing and installing](#)
[Adapter part \(Golf R32\), removing and installing](#)
[Center ventilation grid and air guide \(Golf R32\), assembly overview](#)
[Bumper carrier \(Golf R32\), assembly overview](#)

Rear bumper

[Rear bumper cover, assembly overview](#)
[Rear bumper cover, removing and installing](#)
[Rear bumper carrier, assembly overview](#)
[Trailer hitch, assembly overview](#)
[Trailer hitch, removing and installing](#)
[Rear bumper cover \(Golf R32\), assembly overview](#)
[Rear bumper cover \(Golf R32\), removing and installing](#)
[Adapter part \(Golf R32\), removing and installing](#)
[Rear bumper carrier \(Golf R32\), assembly overview](#)

64 - Glass, Window regulators

Flush-bonded windows

[Tools](#)
[Materials](#)
[Windshield, assembly overview](#)
[Plenum chamber cover, removing and installing](#)

[Windshield, removing](#)
[Windshield, installing](#)
[Side window \(Golf\), assembly overview](#)
[Undamaged side window, removing](#)
[Damaged side window, removing](#)
[Side window, installing](#)
[Side window \(Wagon\), assembly overview](#)
[Undamaged side window, removing](#)
[Damaged side window, removing](#)
[Side window, installing](#)
[Rear window \(Golf\), assembly overview](#)
[Undamaged rear window, removing](#)
[Damaged rear window, removing](#)
[Rear window, installing](#)
[Rear window \(Jetta\), assembly overview](#)
[Undamaged rear window, removing](#)
[Damaged rear window, removing](#)
[Rear window, installing](#)
[Preparing undamaged window for glazing](#)
[Preparing new window for glazing](#)
[Preparing new window without pre-coating for glazing](#)
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[Installation notes](#)
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Door windows

[Tools](#)
[Front door window, assembly overview](#)
[Front door window, removing](#)
[Door window, adjusting](#)
[Carrier assembly, removing and installing](#)
[Rear door window, assembly overview](#)
[Carrier assembly, rear door window and quarter window, removing and installing](#)
[Door window at window regulator, installing](#)
[Power window regulator for comfort system \(automatic opening and closing\) with excess force limitation \(pinch protection\)](#)
[Overcoming resistance with excess force limitation \(Pinch protection\)](#)

[Window regulator motor or carrier assembly with window regulator, removing and installing](#)
[Carrier assembly with window regulator, assembly overview](#)
[Window regulator, removing and installing](#)

66 - Exterior equipment

Wheelhousing liner, removing and installing

[Front wheelhousing liner](#)
[Rear wheelhousing liner](#)

Outside rear view mirror

[Tools](#)

[Outside rear view mirror, assembly overview](#)
[Mirror housing, removing](#)
[Outside rear view mirror \(manual\), removing](#)

Roof moldings

[Roof molding](#)

Roof rail

[Roof rail, assembly overview](#)
[Angle bracket, installing](#)

Trim

[Radiator grill, removing and installing](#)

Protective side moldings

[Protective side moldings, replacing](#)

Rear spoiler with integrated stoplight

[Tools](#)

[Stoplight, removing and installing](#)

[Rear spoiler, general notes](#)

[Rear spoiler with rear lid change, removing and installing](#)

[Rear spoiler without rear lid change, removing and installing](#)

Special components of Golf "GTI 337 Edition"/Jetta GLI Sport and Golf R32

[Safety precautions](#)

[Tools](#)

[Materials](#)

[Assembly overview](#)

[Front and rear valance spoilers](#)

[Additional bolts at front valance spoiler, installing](#)

[Sill panel extension \(Golf GTI, Golf R32\)](#)

[Sill panel extension \(Jetta GLI Sport\)](#)

[Roof edge spoiler \(Golf GTI, Golf R32\)](#)

[Preparing bodywork for adhesive](#)

[Installation notes](#)

[Minimum curing time](#)

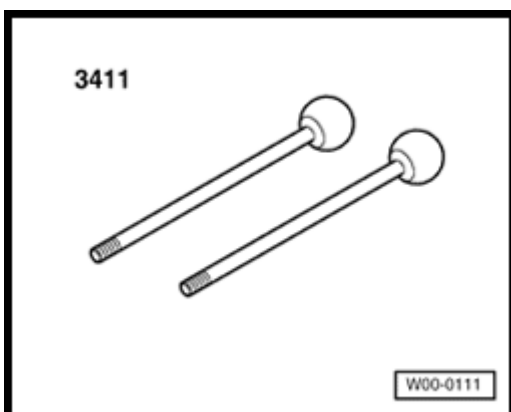
[Repairing paint damage](#)

[Cleaning when soiled by adhesive sealing material](#)

Body, front

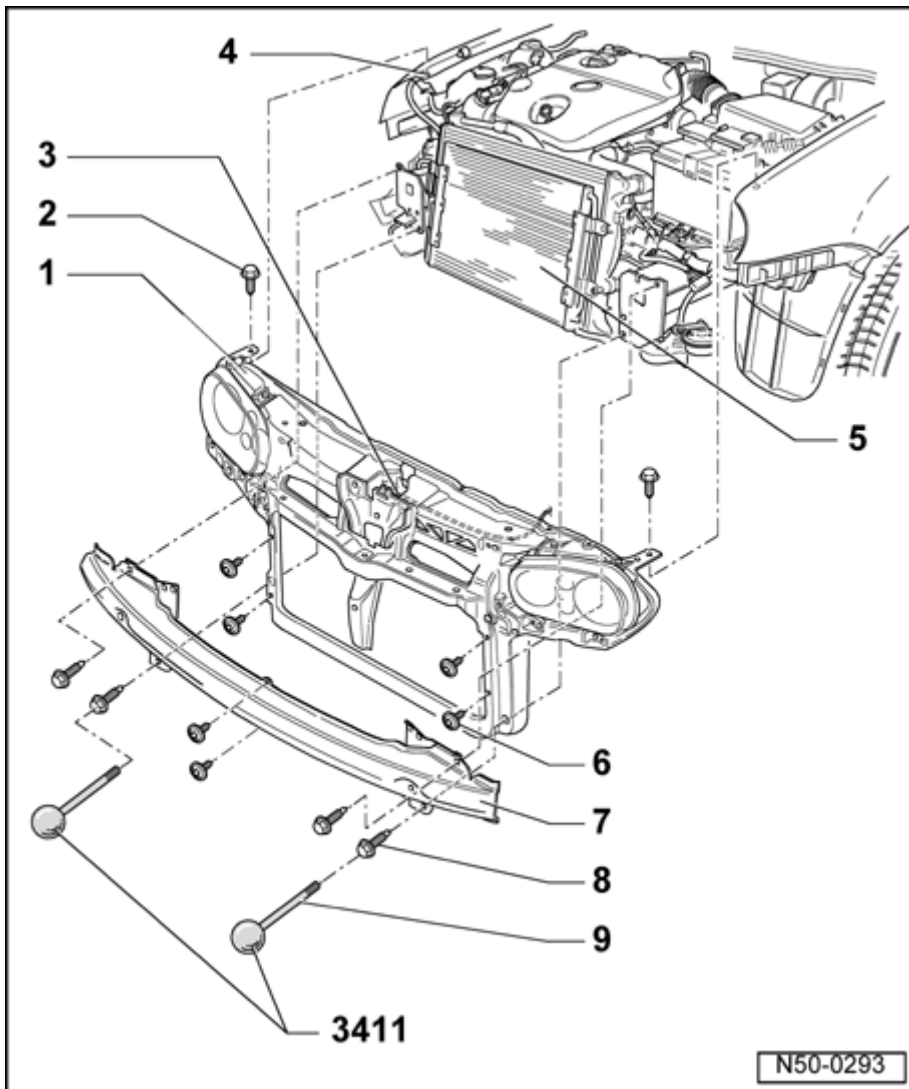
Tools

Special tools, testers and auxiliary items required



Guide Rods 3411

Lock carrier with attachments, removing and installing



1. Lock carrier with attachments

Removing

- Unhook Bowden cable ⇒ [Item - 3](#) - at lock and disconnect electrical connectors.
- Disconnect connectors at headlight housings.
- Removing front bumper and bumper carrier ⇒ [63-1, Front bumper](#) .
- Disconnect hose for headlight cleaning system at T-piece.
- Unbolt radiator and condenser from lock

carrier.

- Secure radiator and condenser in engine compartment

⇒ *Repair Manual, Heating Air Conditioning system, Repair Group 87,*

Note :

Do not unhook condenser at lines.

Condenser lines must not be kinked.

Installing

- Align lock carrier at longmembers and between fenders.

Gaps dimensions. Body panel gaps; Body, front

- Adjust headlights.

2. Bolt

i Qty. 2

i 8 Nm

3. Bowden cable

4. Hole in side panel

5. Radiator and condenser

6. Bolt

i Qty. 4

i 8 Nm

7. Bumper carrier

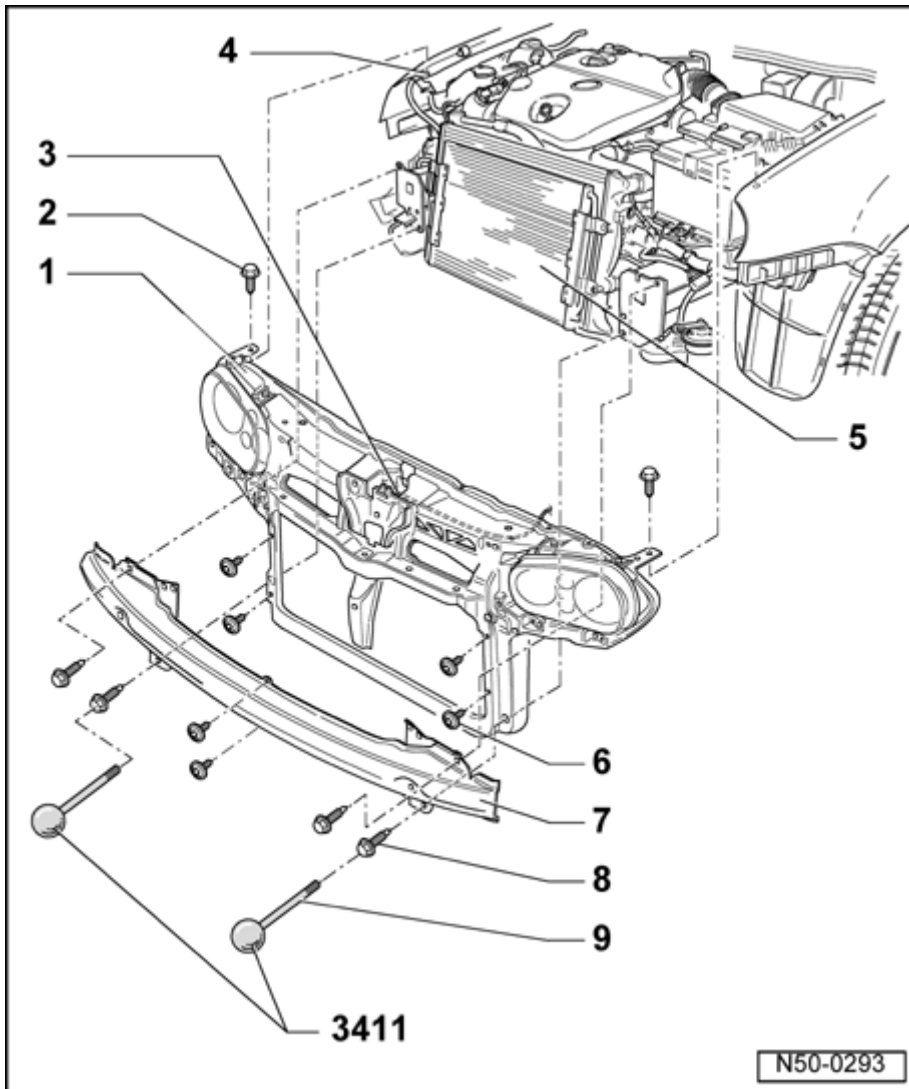
8. Bolt

i Qty. 4

i 20 Nm

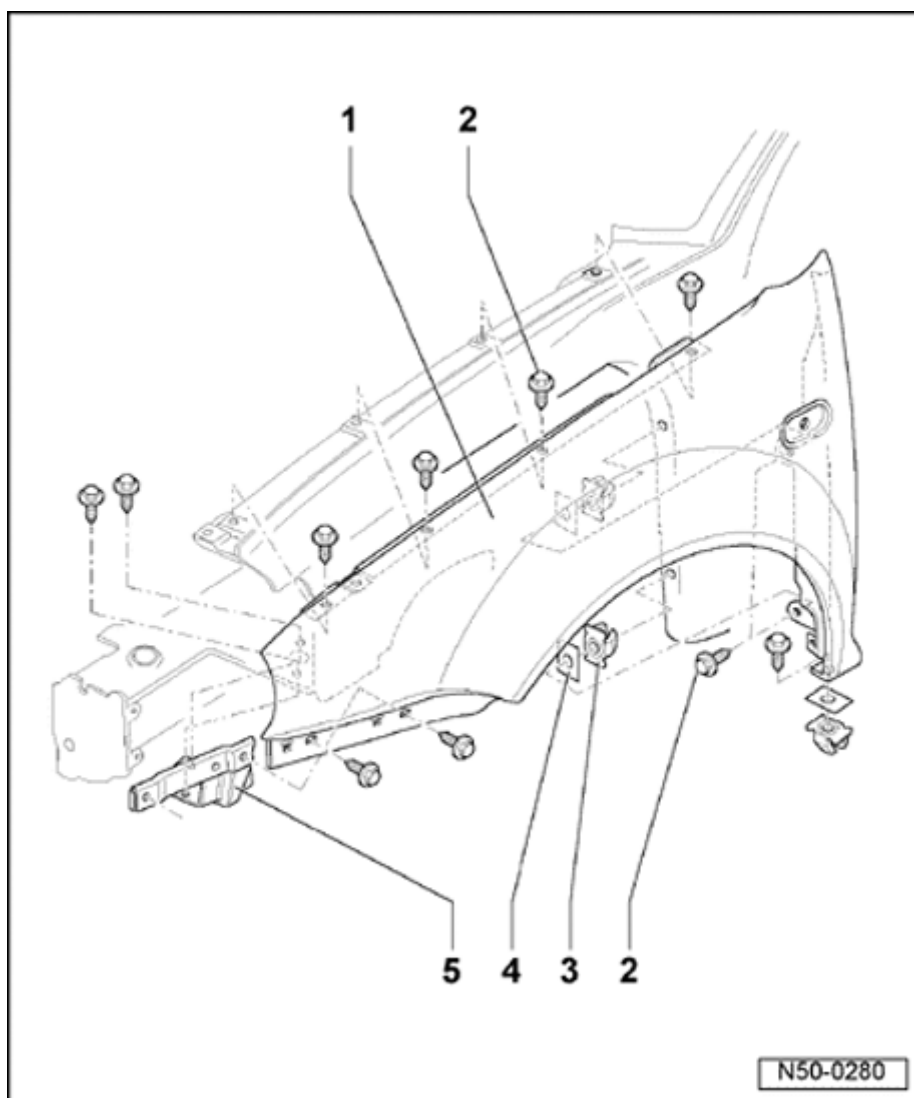
9. Guide rods 3411

Lock carrier service position



- Remove front bumper cover. ⇒ [63-1, Front bumper](#)
- Disconnect Bowden cable at lock.
- Remove one bolt each ⇒ [Item - 8 -](#) at longmembers and screw in Guide rods 3411 at right and left longmembers for this.
- Remove bolts ⇒ [Item - 8 -](#) and ⇒ [Item - 2 -](#) and pull lock carrier toward front in area of Guide rods 3411 .

Front fender, assembly overview



1. Fender

; Removing

- Remove front bumper ⇒ [63-1, Front bumper](#) .

- Remove wheelhousing liner ⇒ [66-1, Front wheelhousing liner](#) .

- Heat fender in area of A-pillar using a heat gun and remove.

; Installing:

- Before bolting on fender, insert one intermediate piece each for bolt points in

contact area.

2. Bolt

i Qty. 9

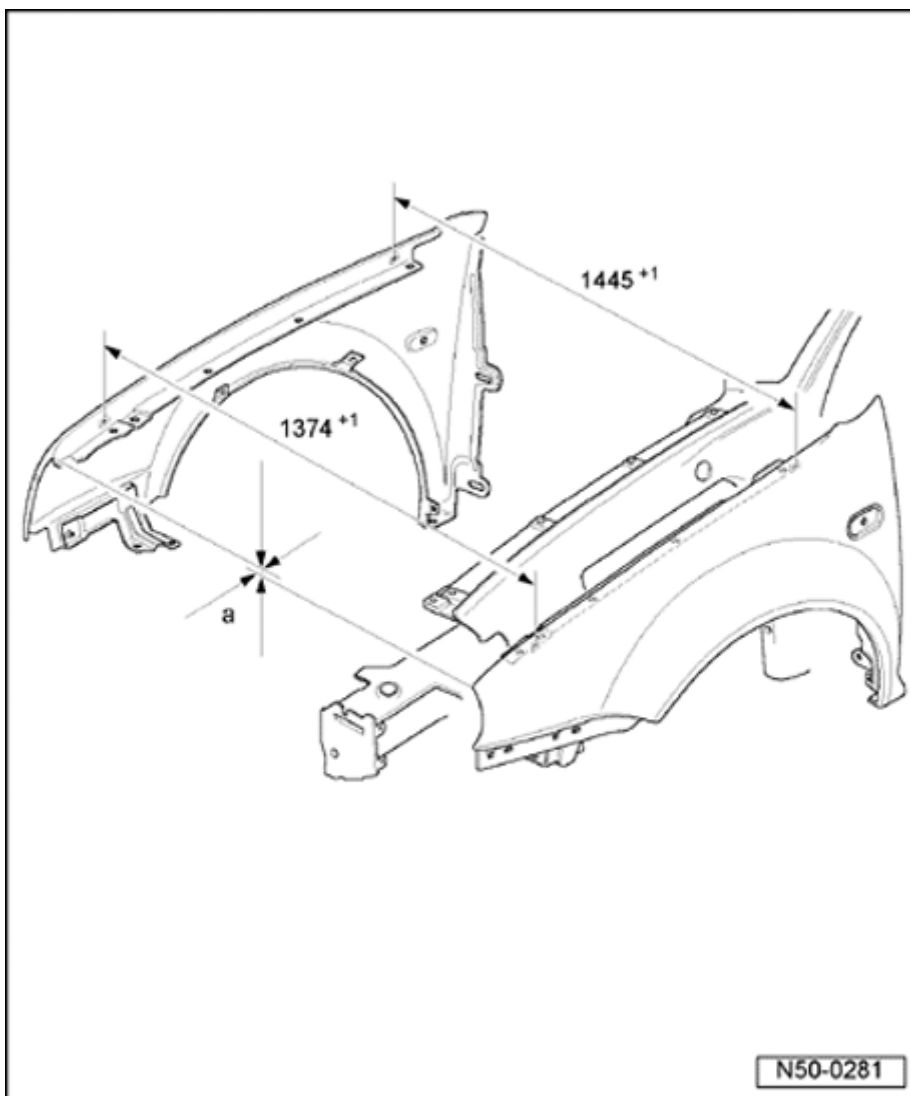
3. Spring nut

4. Gasket

5. Bracket

i Bolted on with front longmember

Fender gaps

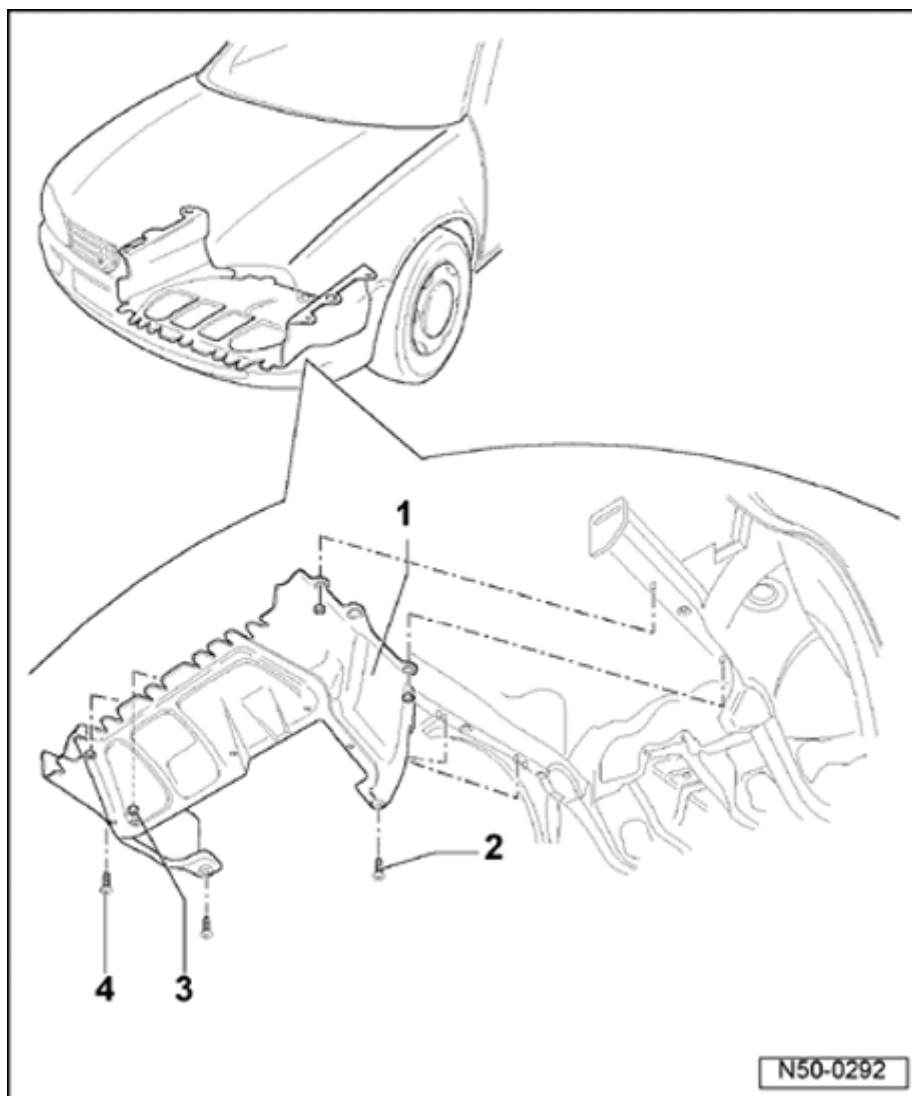


Distance between fenders

Offset between horizontal and vertical fender points:

- a - = 0-2 mm

Noise insulation (gasoline engines), assembly overview



1. Noise insulation

- ı For gasoline engines
- ı Bolted and connected in front area of lock carrier

2. Bolt

- ı Qty. 2

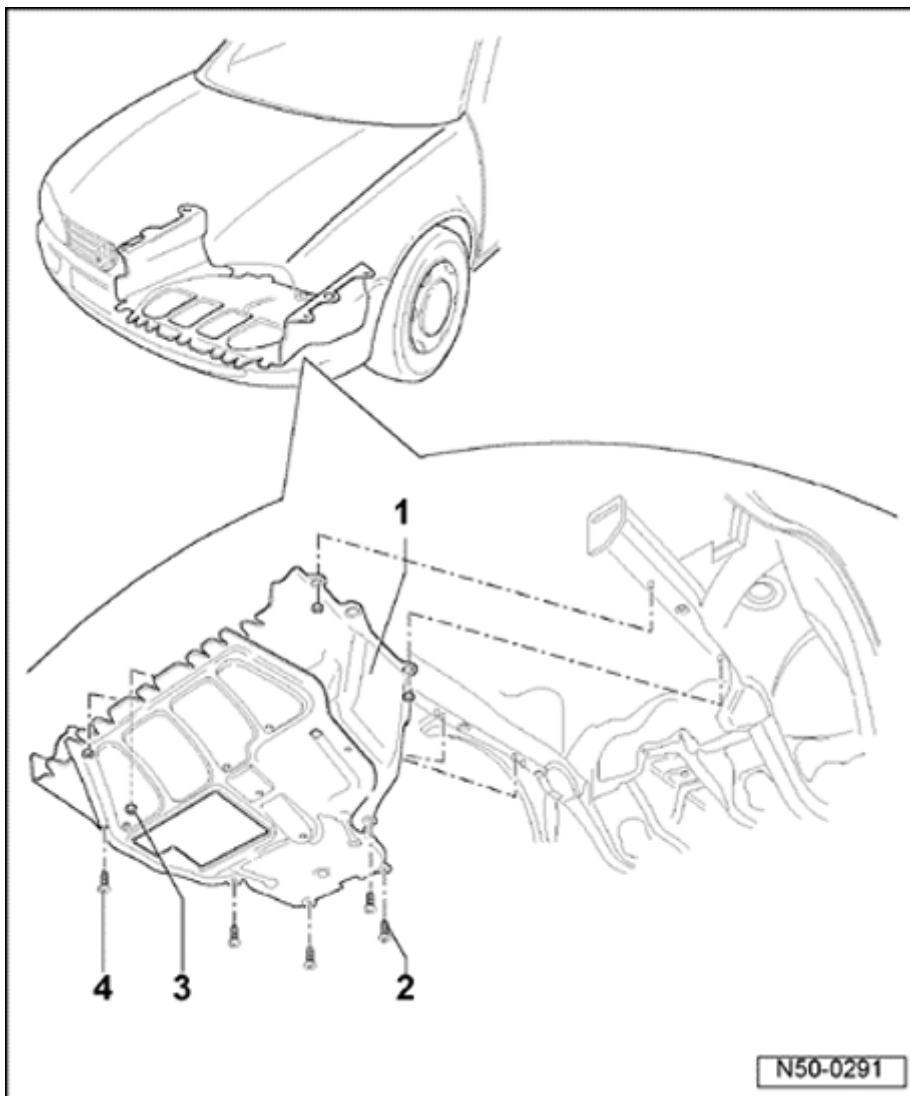
3. Clamping washer

• Qty. 4

4. Bolt

• Qty. 4

Noise insulation (Diesel engines), assembly overview



1. Noise insulation

- For Diesel engines
- Bolted and connected in front area of lock carrier

2. Bolt

i Qty. 2

3. Clamping washer

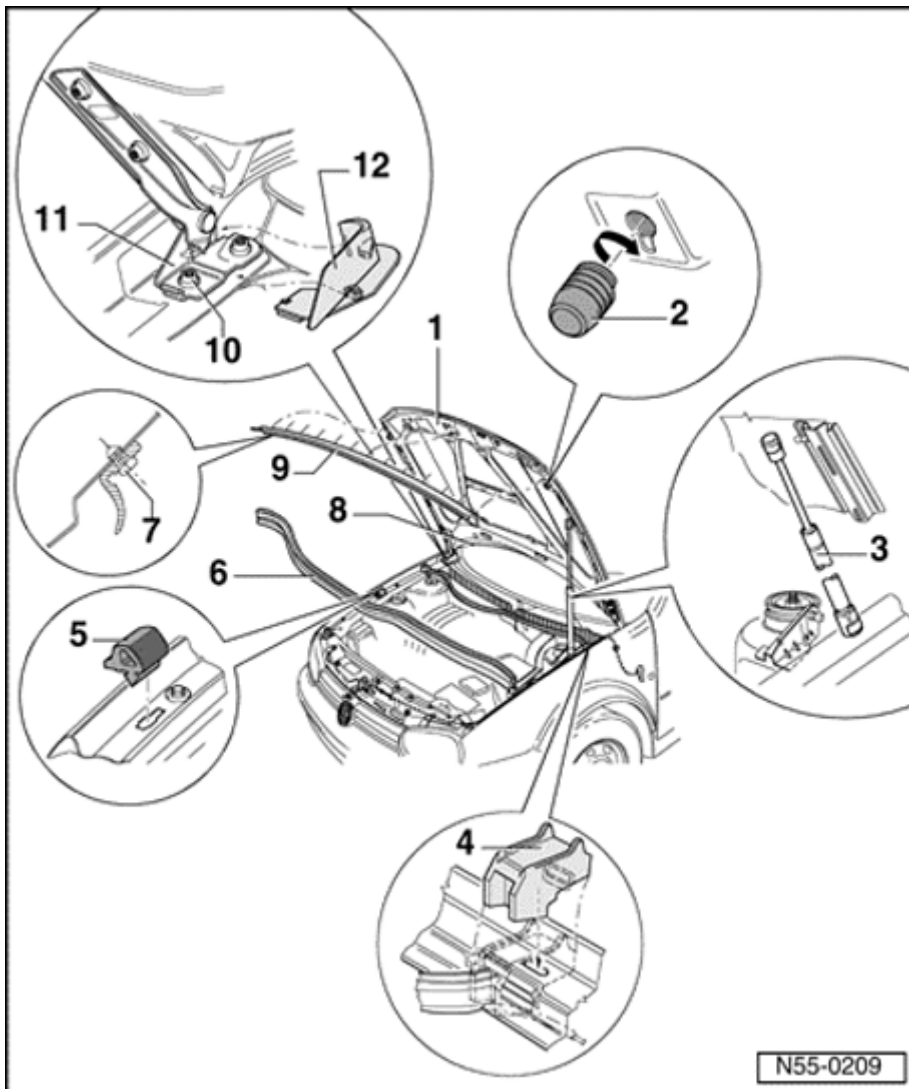
i Qty. 4

4. Bolt

i Qty. 4

Hood

Assembly overview



1. Hood

Removing

- Disconnect hoses for windshield washer system and remove washer nozzles.
- Remove gas-filled strut ⇒ [Item - 3](#) - at lid.
- Unclip hinge cover ⇒ [Item - 12](#) - and remove from hinge.
- Remove bolts ⇒ [Item - 10](#)

- and remove lid.

- Adjusting ⇒ [55-1, Hood, adjusting](#)

2. Stopper

- i By threading out and in, lid can be adjusted in height to fenders.

3. Gas-filled strut

- i Removing and installing ⇒ [55-1, Gas-filled strut, removing](#)
- i Venting gas ⇒ [55-2, Releasing gas from gas-filled strut](#)

4. Spacing device

5. Guide piece

6. Plenum chamber seal

- i Inserted on flange

7. Clip

8. Hose/spray jet

- i Removing

⇒ [Repair Manual, Electrical Equipment, Repair Group 92, Servicing windshield washer system](#)

9. CW sealing piece

10. Bolt

- i 23 Nm

11. Hinge

12. Hinge cover

- i Clipped

- ; Pull off at right angle

Hood, adjusting

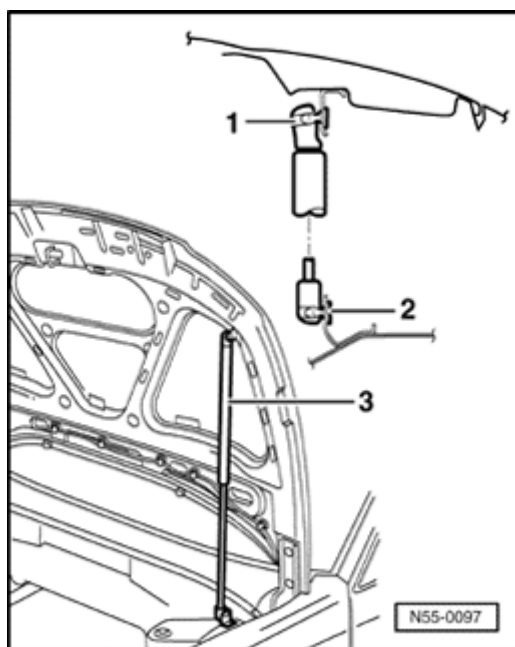
- Hood can be aligned between fenders by sliding flap hinge in elongated holes.
- With stop ⇒ [Item - 2 -](#), hood can be adjusted in height to fenders.

Gap dimension Body panel gaps; Body, front

- After installation or adjustment work, corrosion protection measure must be performed on hinge and bolts.

Gas-filled strut, removing

- Support hood.



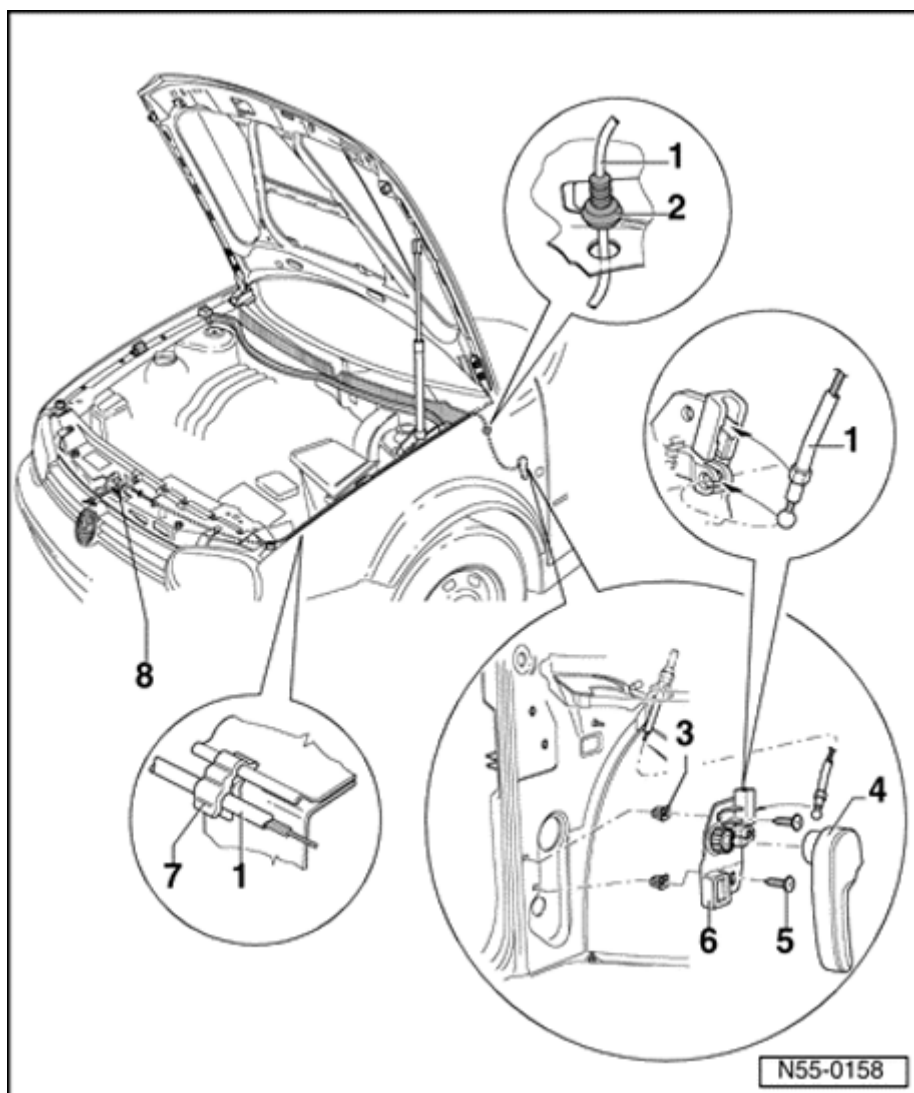
- Lift securing clip - 1 - using a screwdriver and remove gas-filled strut from ball studs - 2 - .

Note:

When re-using gas-filled strut, do not pry securing clip - 1 - completely out of ball socket, otherwise securing clip may be damaged.

1. Securing clip
2. Mounting bracket with ball studs
3. Gas-filled strut

Bowden cable, removing and installing



1. Bowden cable

- Replace - remove operating lever ⇒ [55-1, Release lever, removing and installing](#)

2. Sealing grommet

3. Expanding nut

4. Actuating lever

- Removing and installing ⇒ [55-1, Release lever, removing and installing](#)

5. Bolt

6. Mounting bracket

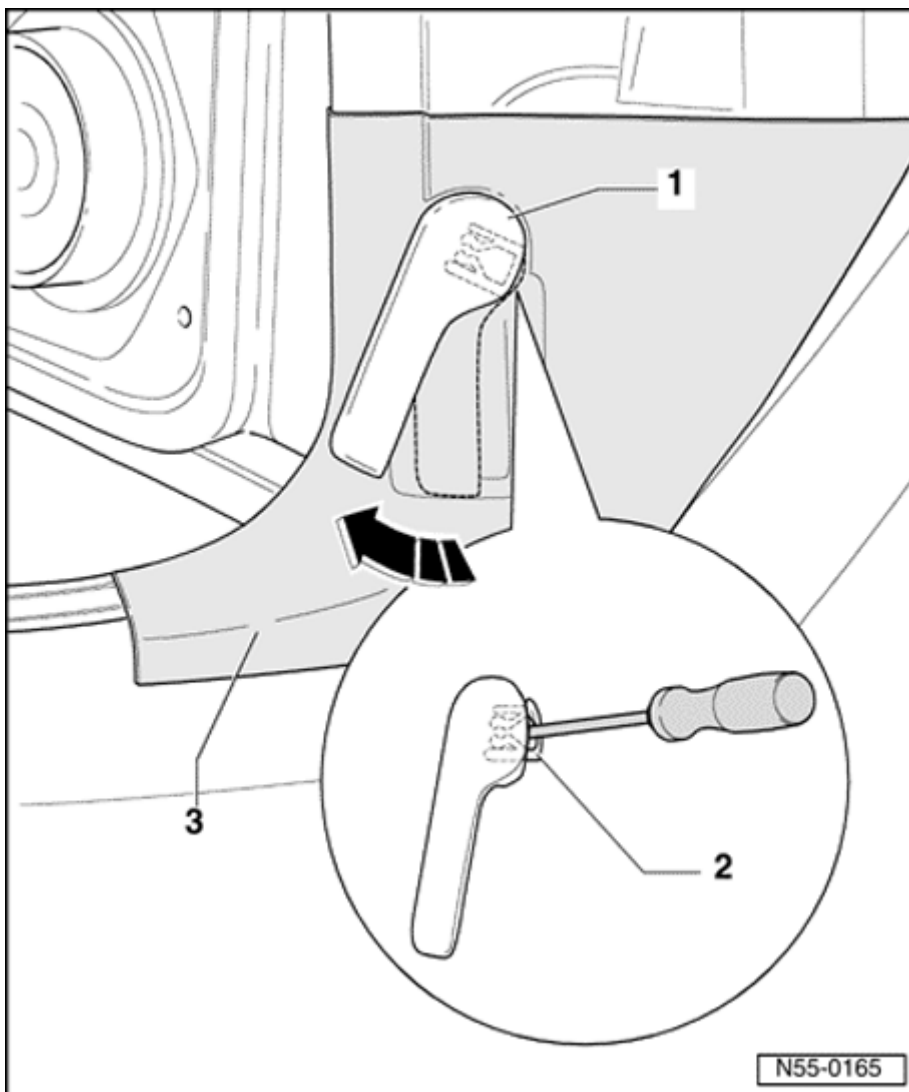
- ; Cable engaged

7. Bracket for Bowden cable

8. Hood lock

- ; Removing and installing ⇒ [55-1, Hood lock, assembly overview](#)

Release lever, removing and installing



Removing

- Pull release lever - 1 - approx. 2 cm.
- Insert a small screwdriver into gap between operating lever - 1 - and clip - 2 -
- .

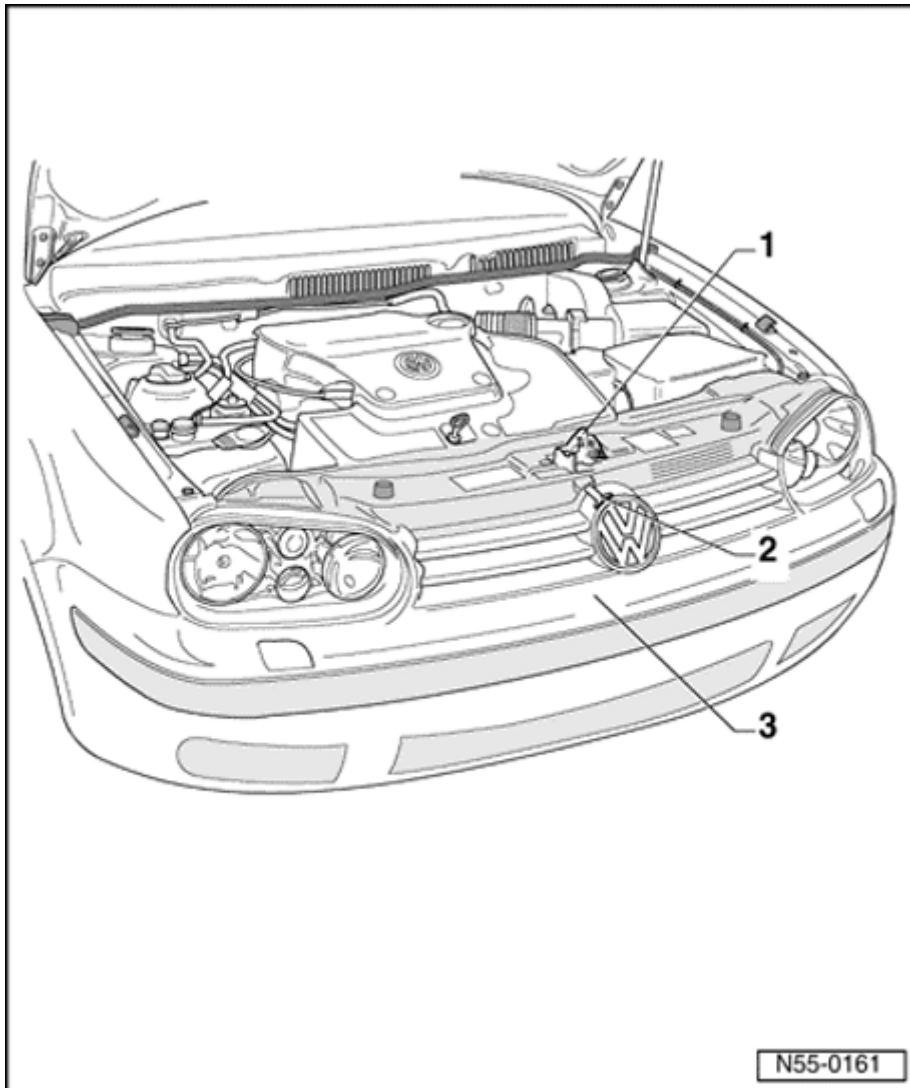
- Release operating lever and unclip clip from release lever (clip falls behind trim).
- Unclip trim - **3** - at center at right angle from mounting bracket and below from door sill molding.

Installing

- First clip in trim - **3** - below in door sill molding. Then press in upper clip into mounting bracket.
- Now, clip - **2** - is locked completely into release lever.
- Then, press release lever onto mount in mounting bracket.

Before hood is closed, a function test of release lever and Bowden cable must be performed.

Hood lock, assembly overview



1. Hood lock

- ; Adjusting: within elongated holes
- ; Gap dimension Body panel gaps;
Body, front
- ; To remove hood lock, radiator grille,
bumper and lock support must be
removed ⇒ [55-1, Hood lock,
removing and installing](#)
- ; Removing and installing

2. Release lever

- ; To remove, radiator grille must be
removed
- ; Removing and installing ⇒ [63-1,
Release lever, removing](#)

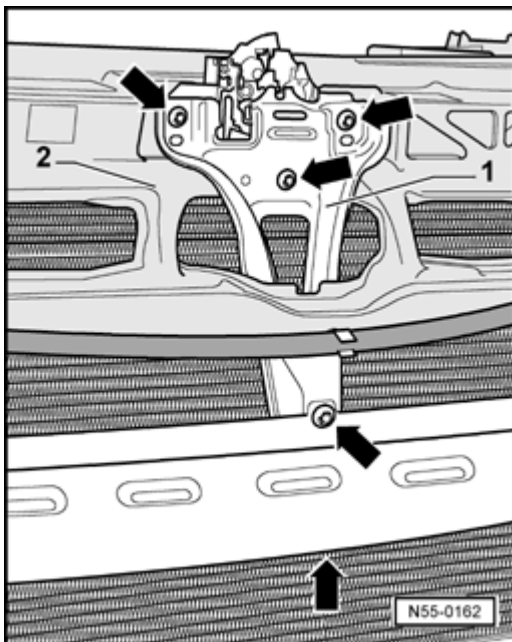
3. Bumper

- ; Removing and installing ⇒ [63-1, Front bumper](#)

Hood lock, removing and installing

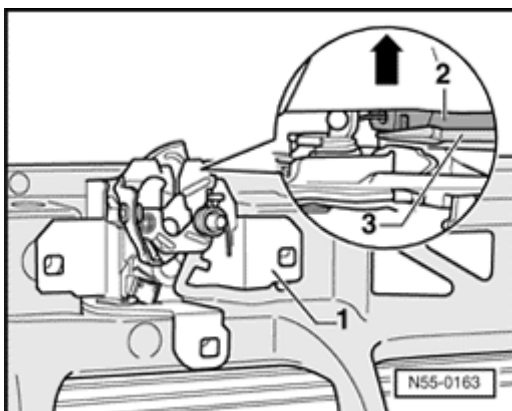
- Remove radiator grille ⇒ [66-5, Radiator grill, removing and installing](#) .
- Remove bumper ⇒ [63-1, Front bumper](#) .

Lock support, removing



- Remove 5 bolts - **arrows** - .
- Remove lock support - **1** - from lock carrier - **2** - .

Hood lock, removing



- Pull hood lock - **1** - slightly toward front. Using a screwdriver - **3** - , unclip Bowden cable - **2** - from lock in direction of - **arrow** - .

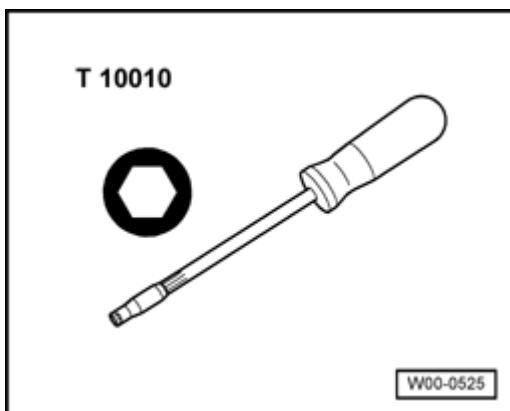
- Disconnect connector from micro-switch.

Installation is performed in reverse order of removal.

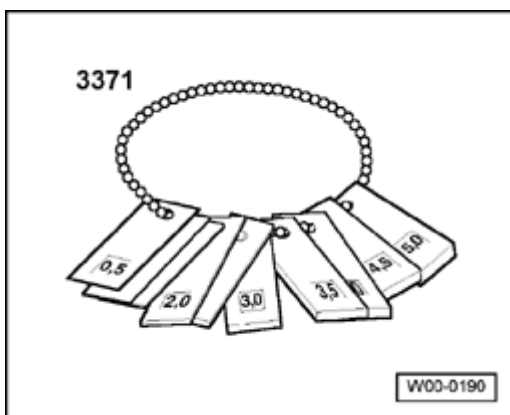
Rear lid (Golf)

Tools

Special tools, testers and auxiliary items required

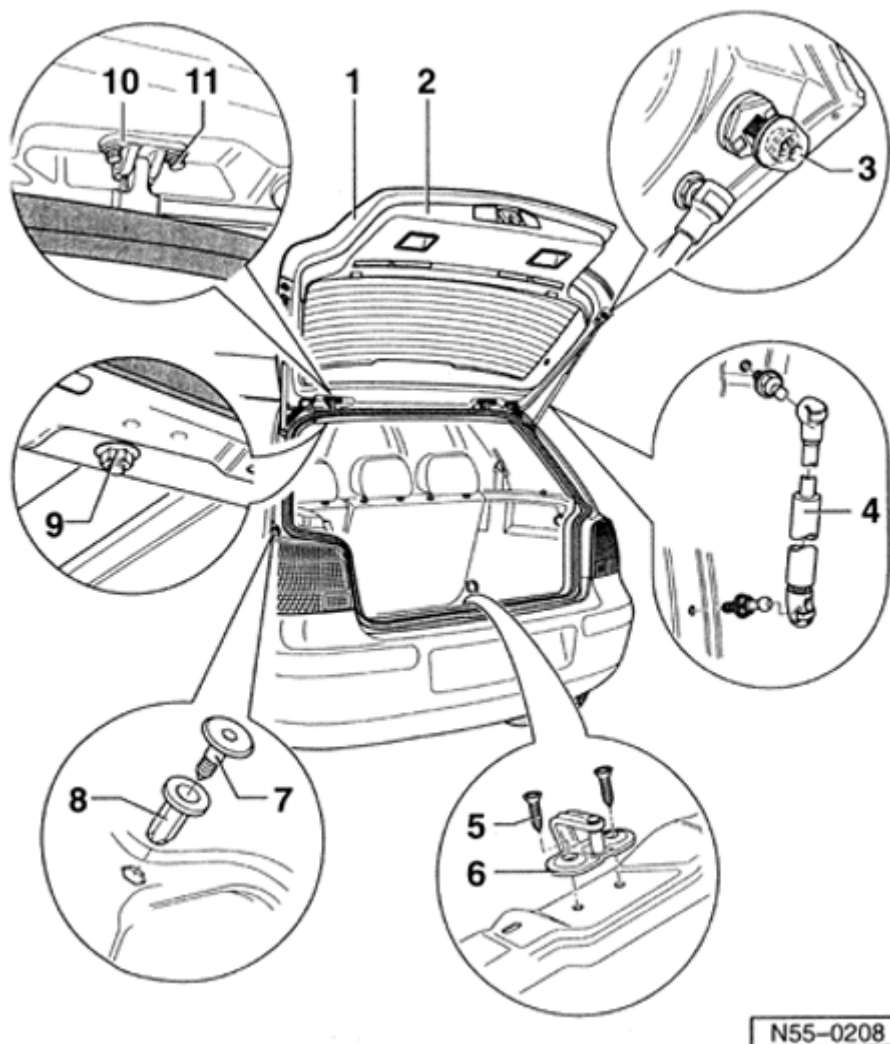


Socket wrench T10010



Adjusting gauge 3371

Rear lid (Golf), assembly overview



N55-0208

1. Rear lid

- ı Adjusting ⇒ [55-2, Rear lid, adjusting](#)
- ı Gap dimension Body panel gaps;
Body, rear

2. Trim

- ı Removing and installing

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim; removing and installing lower trim of rear lid](#)

3. Rubber stop

- ı Adjusting ⇒ [55-2, Rear lid,](#)

[adjusting](#)

4. Gas-filled strut

- i Removing and installing ⇒ [55-2, Gas-filled strut, removing](#)
- i Venting gas ⇒ [55-2, Releasing gas from gas-filled strut](#)

5. Bolt

- i 22 Nm

6. Lock plate

- i Adjusting - within elongated holes
- i Gap dimension Body panel gaps;
Body, rear

7. Cap

8. Blind nut

9. Hex nut

- i 24 Nm

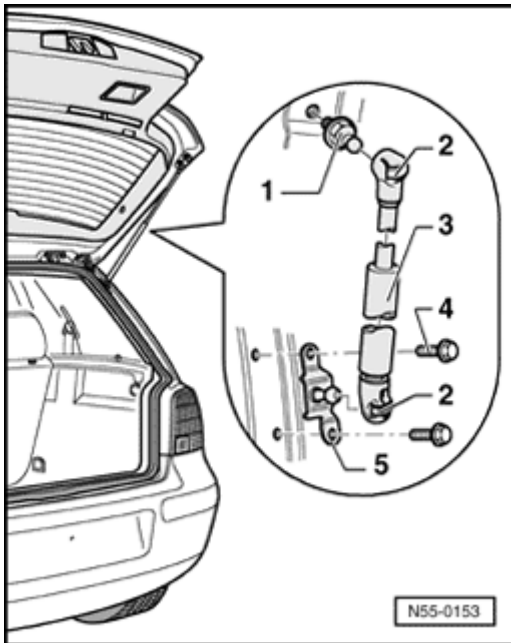
10. Hinge

11. Bolt

- i 10 Nm

Gas-filled strut, removing

- Support rear lid.



- Lift securing clip - 2 - using a screwdriver and remove gas-filled strut from ball stud - 1 - .

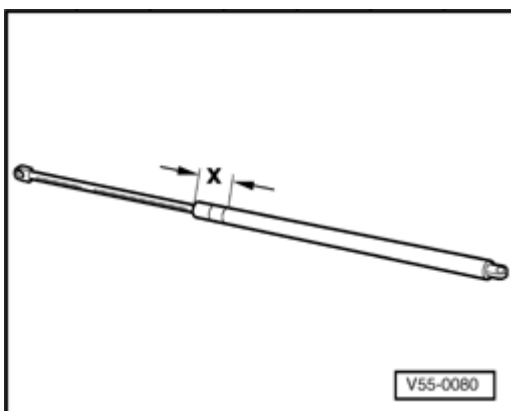
1. Combi ball stud, 15 Nm
2. Securing clip
3. Gas-filled strut
4. Bolt
5. Ball stud

Note:

When re-using gas-filled strut, securing clip - 2 - must not be removed completely out of ball socket, otherwise securing clip may be damaged.

For a smaller lid opening angle, there is option to install shorter gas-filled struts (about 20 mm). This results in an opening height of approx. 175 cm.

Releasing gas from gas-filled strut



- Clamp gas-filled strut in vice area - x - = 50 mm (2 in.).

Warning!

Clamping must only be done in this area, otherwise there is a risk of an accident.

- Using saw, cut into cylindrical part of strut at point within first third of cylinders length (measured from cover edge at piston rod end of cylinder).

Note:

Always wear eye protection when performing this procedure.

Cover area of sawn-off portion with a clean rag.

Dispose of fluid and cleaning rag in a proper manner.

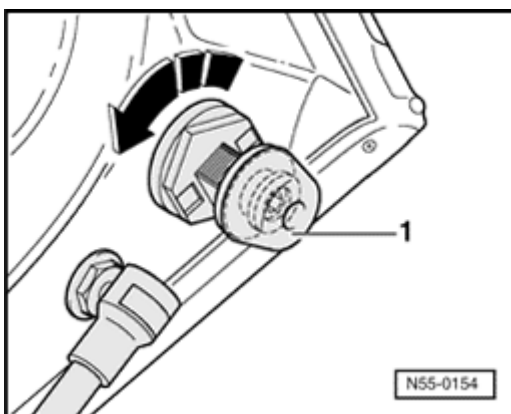
Rear lid, adjusting

Note:

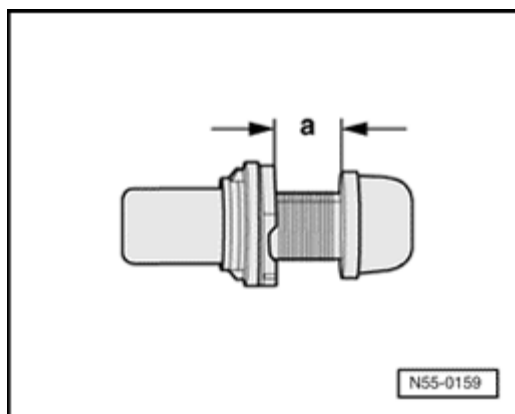
Rear lid is properly adjusted when there is an overall even gap dimension when closed, it is not too far inward or outward and contours align.

Vehicle must stand on its wheels in order to be able to perform adjustment.

- Turn stopper approx. 90 ° using a ring wrench 24 mm and remove from shaped hole.



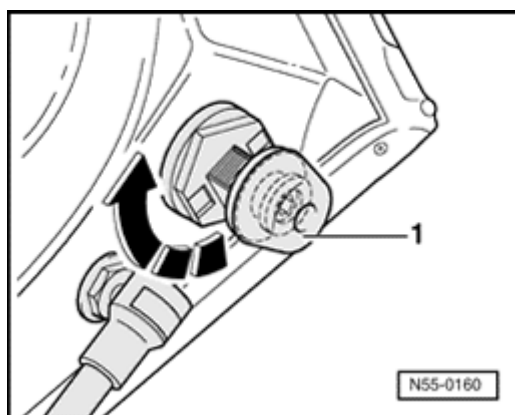
- Remove rubber buffers - **1** - from stopper and loosen clamp screw (socket-head 3mm) only as much until notched slider can be removed.



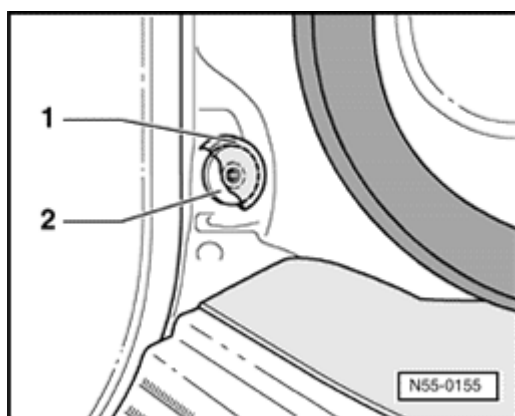
- Remove notched slider from housing and adjust to dimension - **a** - = 12.5 mm.

Note:

In new condition, stopper is already adjusted to a distance of 12.5 mm.



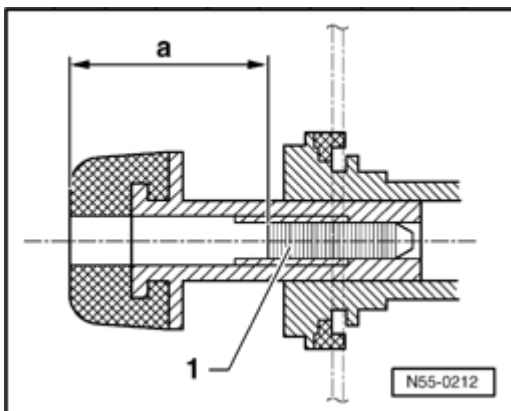
- Insert stopper and install by turning 90 ° in shaped hole.



- Unscrew cap - **1** - from rivet - **2** - (left and right).

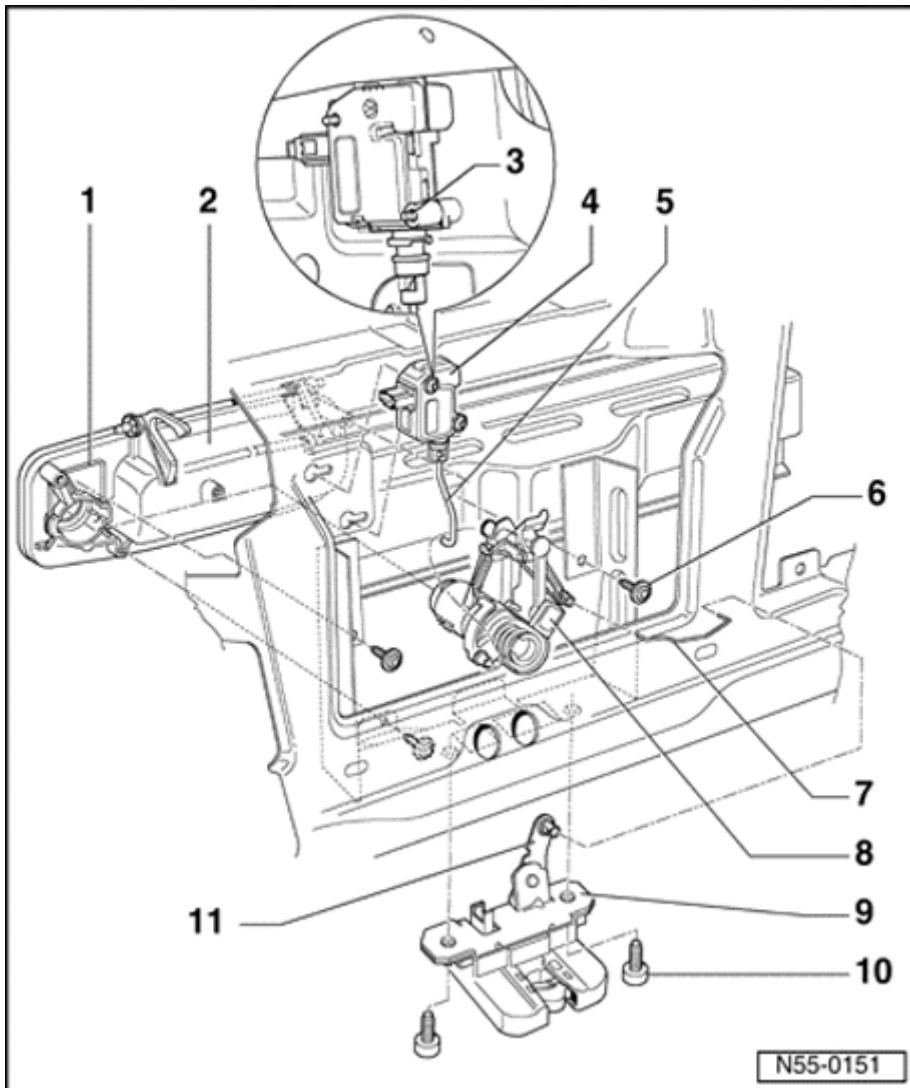
- Close rear lid using light pressure over center, pull handle while doing so.

- Using Adjusting gauge 3371 , set a gap dimension of 5 mm between lid and side panel.
- Open rear lid again.
- Rear lid is now set to a pre-tension of approx. 3 mm.
- Screw in plug into blind rivet (left and right).



- Screw in clamp screw - 1 - until dimension - a - = 25 mm.
- Check setting.

Rear lid lock, removing and installing



1. Locking clamp

2. Handle

i Removing

- Unclip lid trim (handle is secured with a bolt).

- Unclip pull lever ⇒ [Item - 5 -](#), pry out locking clamp ⇒ [Item - 1 -](#) and remove lock cylinder housing from handle.

- Disconnect connector for luggage compartment light and unclip operating rod for central locking system if necessary.

- Remove Torx bolts ⇒

[Item - 6 -](#) and remove handle from lid.

3. Actuator securing bolt

- ı Loosen and tighten using Socket wrench T10010

4. Central locking actuator

- ı Removing
 - Disconnect connector from actuator.
 - Remove actuator using Socket wrench T10010 and remove from lid.

5. Pull lever

6. Torx screw

7. Operating rod

- ı Press actuator lever ⇒ [Item - 11 -](#) against stop and engage operating rod free of tension

8. Lock cylinder housing

- ı Removing
 - Unclip lid trim (handle is secured with a bolt).
 - Unclip pull lever ⇒ [Item - 5 -](#), pry out locking clamp ⇒ [Item - 1 -](#) and remove lock cylinder housing from handle.

9. Lock

- ı Removing
 - Remove lid trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim; removing and installing lower trim for rear lid](#)

.

- Disconnect connector from lock.

- Unclip operating rod ⇒ [Item - 7 -](#), remove bolt ⇒ [Item - 10 -](#) and remove lock from lid.

- i install - only with striker catch in detent

10. Oval-head machine screw

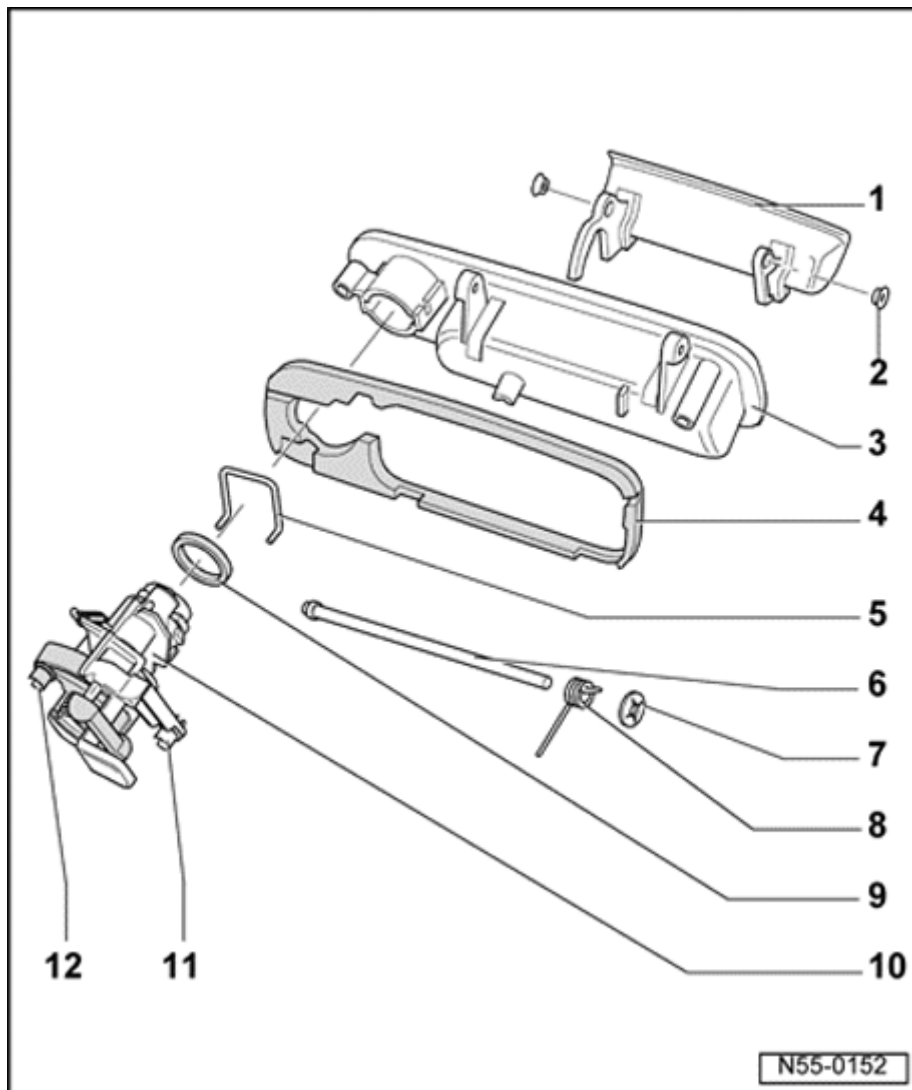
- i 20 Nm

11. Actuator lever

Installing

- Engage locking clamp again.
- Position lock cylinder housing on to grip piece and lock in handle with an audible click.
- Then proceed in reverse order of removal.

Lock cylinder housing, removing and installing



1. Handle
2. Guide sleeves
3. Handle recess
4. Seal
5. Retaining clip
6. Pin
7. Circlip
8. Spring
9. Seal
10. Lock cylinder housing

; Removing

- Unclip lid trim (handle is

secured with a bolt).

- Unclip pull lever for lid lock (operating rod for central locking system if necessary), pry out locking clamp ⇒ [Item - 5 -](#) and remove lock cylinder housing from grip plate ⇒ [Item - 3 -](#).

11. Rod clip

- ; For lid lock

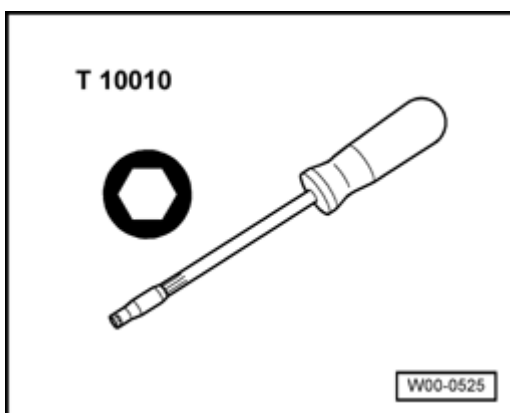
12. Rod clip

- ; For actuator

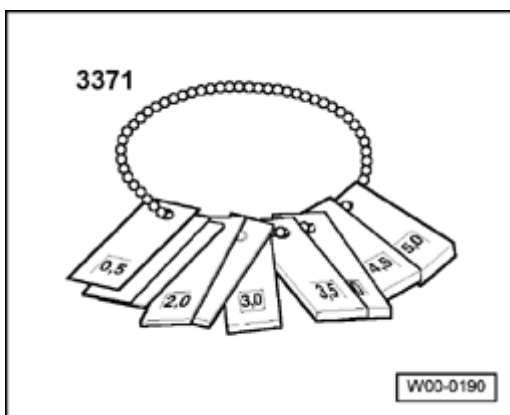
Rear lid (Jetta)

Tools

Special tools, testers and auxiliary items required

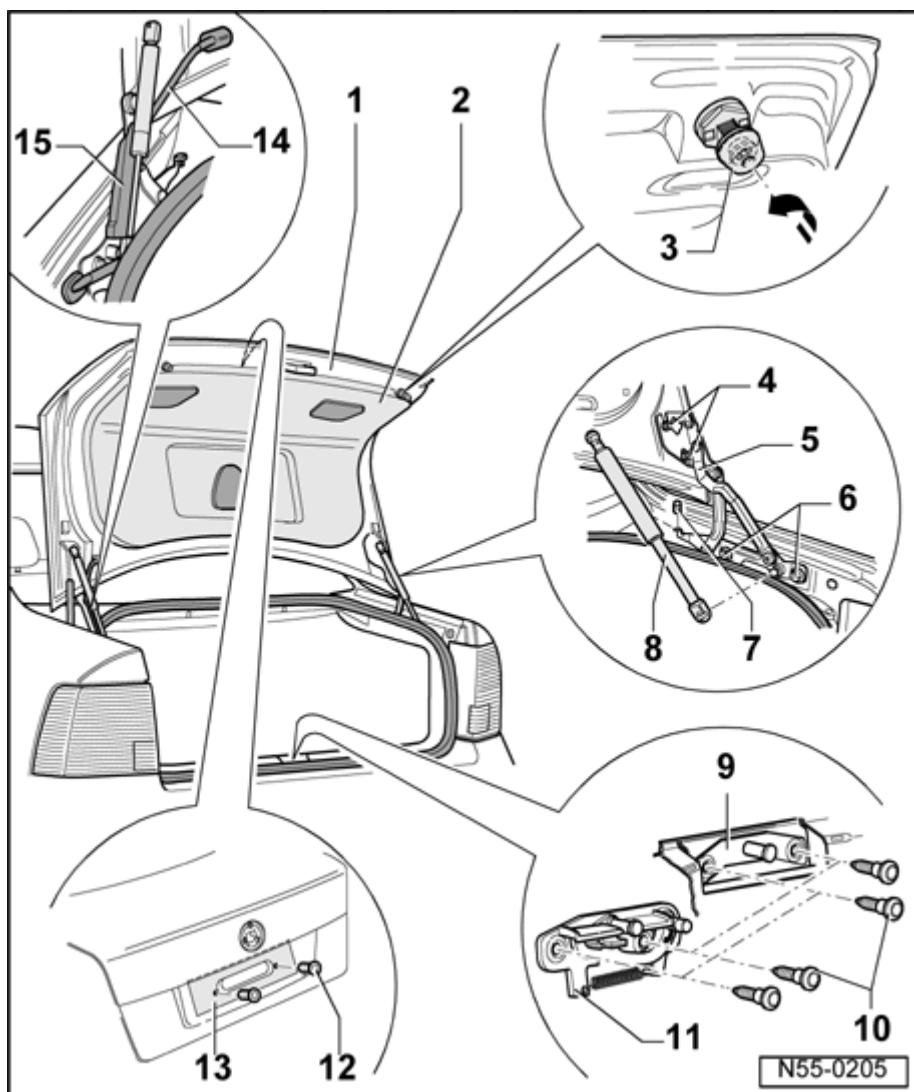


Socket wrench T10010



Adjusting gauge 3371

Rear lid (Jetta), assembly overview



1. Rear lid

- ı Adjusting ⇒ [55-2, Rear lid, adjusting](#)

Lid adjustment if performed as for Golf

- ı Gap dimension Body panel gaps;
Body, rear

2. Trim

- ı Removing and installing

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim removing and installing](#)

3. Rubber stop

- i Adjusting ⇒ [55-2, Rear lid, adjusting](#)

4. Hex nuts

- i 22 Nm

5. Hinge**6. Bolt**

- i 22 Nm

7. Rubber buffer**8. Gas-filled strut**

- i Removing and installing ⇒ [55-2, Gas-filled strut, removing](#)
- i Venting gas ⇒ [55-2, Releasing gas from gas-filled strut](#)

9. Lock plate

- i adjusting - within elongated holes
- i Gap dimension Body panel gaps; Body, rear

10. Bolt

- i 22 Nm

11. Lock plate

- i Only for USA

12. Pop rivet

- i Tighten using Pop rivet tongs V.A.G1765A

13. Identification plate

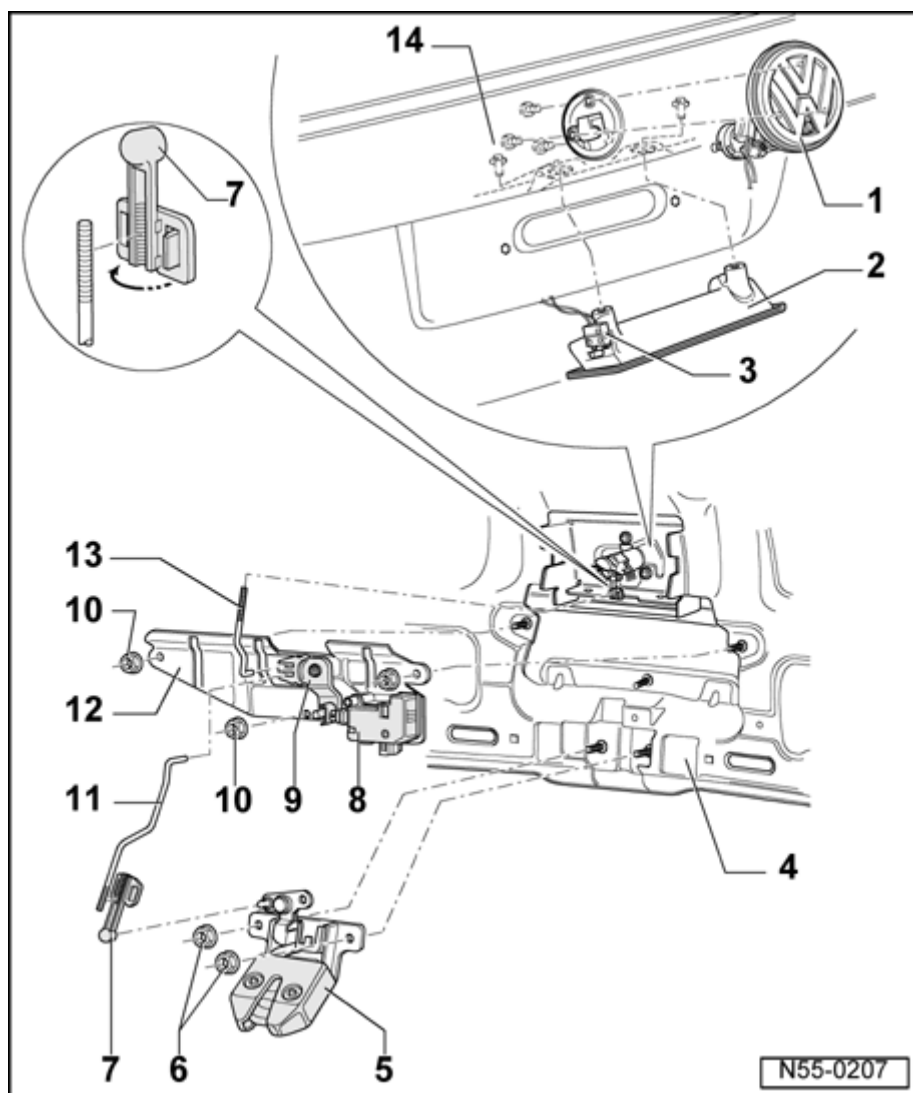
- i Press on only on hatched area

- i Replacement part has two foils.
First foil covers adhesive surface,
second must be removed after
installing.

14. Wire

15. Hinge cover

Rear lid lock, removing and installing (Jetta)



1. Lock cylinder housing

- i Removing and installing ⇒ [55-3, Lock cylinder housing, removing and installing](#)

2. Handle

- i Removing

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim](#)

- Remove bolt ⇒ [Item - 14 -](#), disconnect connector for switch ⇒ [Item - 3 -](#) and remove handle from lid.

3. Switch for rear lid release E165

4. Rear Lid

5. Lock

- i Removing

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim](#)

- Disconnect connector from lock.

- i Unclip operating rod ⇒ [Item - 11 -](#), remove nuts ⇒ [Item - 6 -](#) and remove lock.

6. Hex nut

- i 7 Nm

7. Actuator lever with linkage clip

8. Motor for rear lid release V139

- i Removing

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim, removing and installing](#)

- Disconnect connector from motor.

- i Unclip operating rods ⇒ [Item - 11 -](#)
and ⇒ [Item - 13 -](#).
 - Remove nuts ⇒ [Item - 10](#)
- and remove carrier plate
⇒ [Item - 12 -](#).
 - Remove motor for rear lid
release ⇒ [Item - 8 -](#) from
carrier plate.

9. Actuator lever

10. Hex nut

- i 7 Nm

11. Actuator rod

- i Press actuator lever ⇒ [Item - 7 -](#)
against stop and engage operating
rod free of tension

12. Support bracket

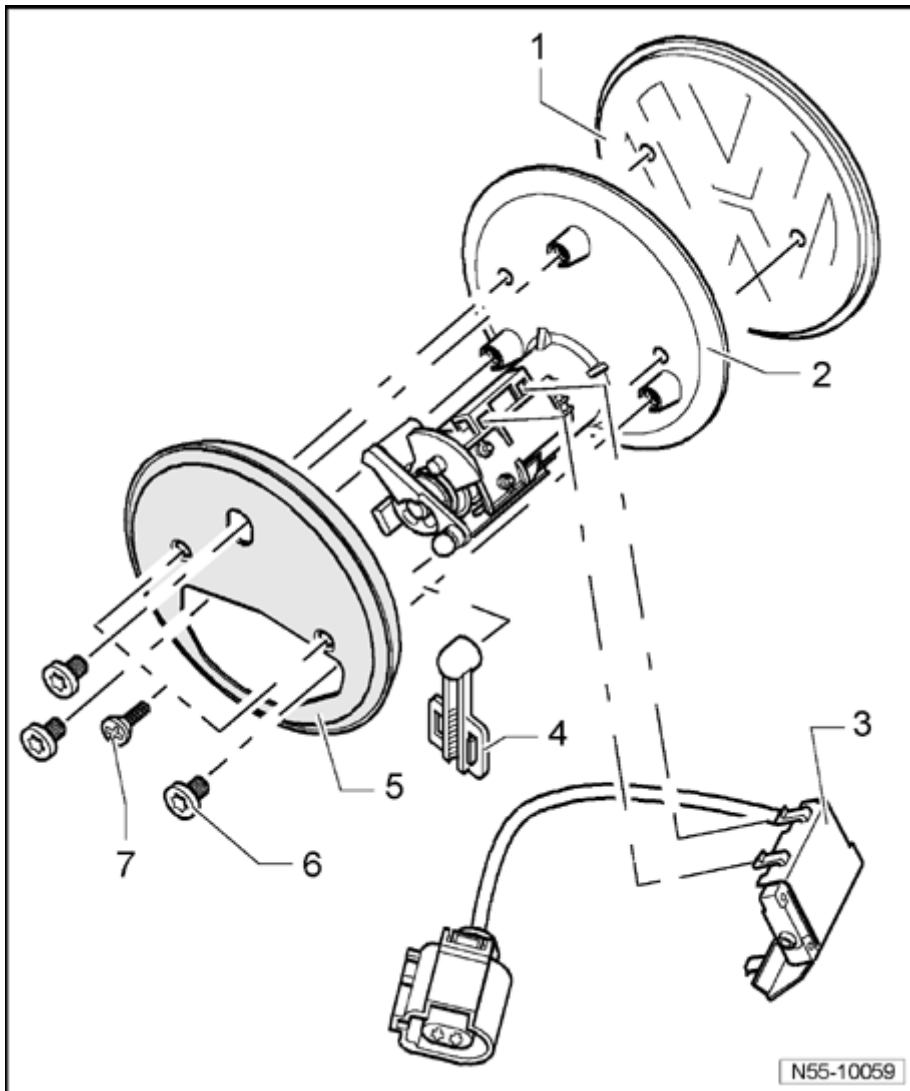
13. Actuator rod

- i Press actuator lever with linkage
clip ⇒ [Item - 7 -](#) against stop and
engage operating rod free of
tension

14. Bolt

- i 7 Nm

Lock cylinder housing, removing and installing



1. VW-symbol

- ı consisting of emblem carrier and message
- ı To install VW symbol, remove protective foil and adhere to lock cylinder housing using two-sided adhesive tape
- ı also bolted to lock cylinder housing
⇒ [Item - 7 -](#)

2. Lock cylinder housing

- ı Removing
 - Remove rear lid trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim](#)

- Disconnect connector for micro-switch / wiring harness.

- Remove operating rod at actuator lever.

- Remove screws ⇒ [Item - 6](#) - (3x).

- Remove lock cylinder housing with VW symbol from rear lid.

i Installing:

Installation is performed in reverse order of removal.

3. Micro-switch

i For vehicles with central locking system

i For vehicles without central locking system

i Allocation ⇒ *Original parts distributor*

i Removing and installing ⇒ [55-3, Micro-switch, removing and installing](#)

4. Linkage clip

i To remove operating rod, disconnect linkage clip and pull open

5. Seal

i Attached in area of lock cylinder housing

6. Bolt

i Qty. 3

• 4 Nm

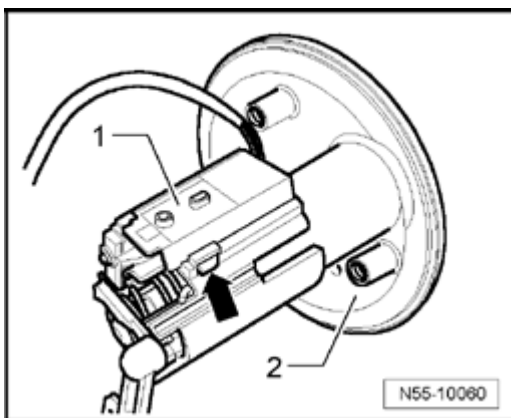
7. Bolt

• Qty. 2

• 0.3 Nm

Micro-switch, removing and installing

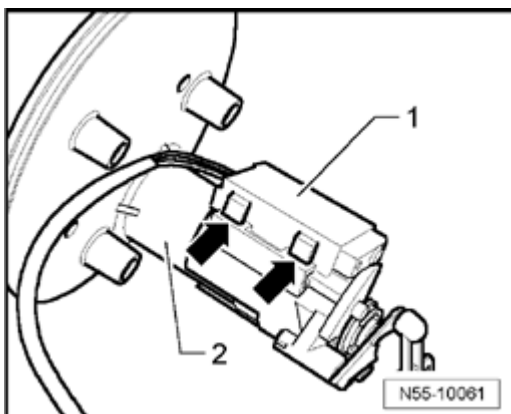
Removing



- Removing and installing lock cylinder housing - **2** - ⇒ [55-3, Lock cylinder housing, removing and installing](#) .

- Release catches at micro-switch - **1** - .

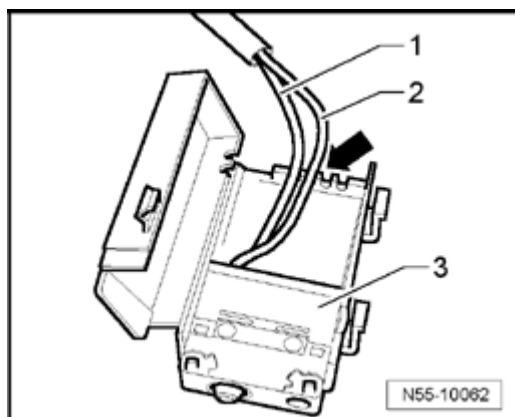
To do so, press catches downward - **arrow** - .



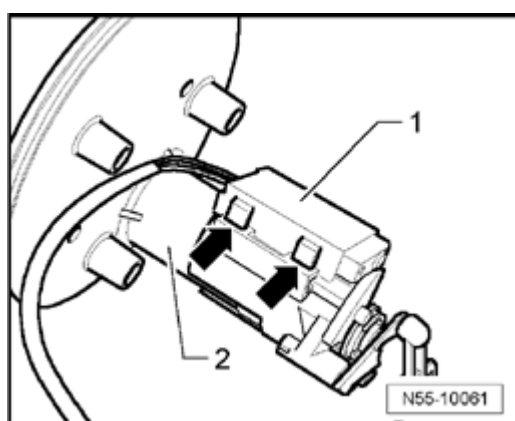
- Disengage catches - **arrows** - of micro-switch - **1** - from lock cylinder housing - **2** - .

- Remove micro-switch - **1** - from lock cylinder - **2** - .

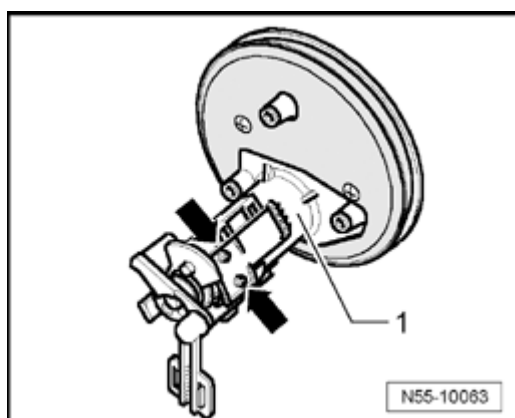
Installing



- Secure wires - 1 - and - 2 - in retaining profile - **arrow** - of micro-switch - 3 - .

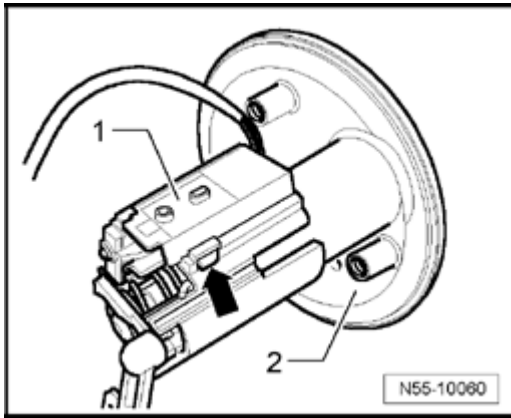


- Lock catches - **arrows** - of micro-switch - 1 - into lock cylinder housing - 2 - .



- Make sure that micro-switch is positioned with securing tabs - **arrows** - on lock cylinder housing - 1 - .

- Before locking micro-switch, it must be checked that wires are lying correctly in retaining profile of micro-switch and lock cylinder. If this is not the case and micro-switch is locked, wires/micro-switch may be damaged.

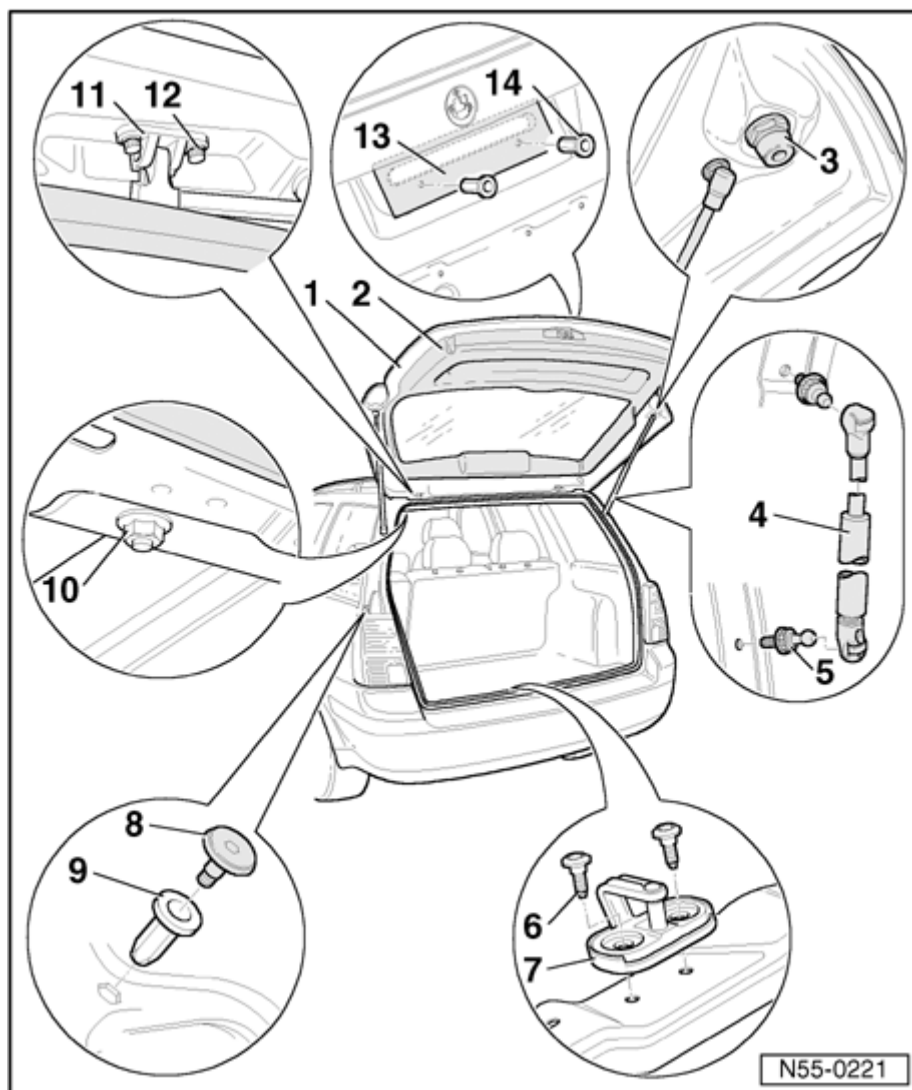


- Lock micro-switch - 1 - with lock cylinder housing - 2 - .
Make sure that catch - **arrow** - is locks correctly.

- Install lock cylinder housing ⇒ [55-3, Lock cylinder housing, removing and installing](#)

Rear lid, (Jetta Wagon)

Rear lid (Jetta Wagon), assembly overview



1. Rear lid

- i Adjusting ⇒ [55-2, Rear lid, adjusting](#)
- i Gap dimension Body panel gaps;
Body, rear

2. Trim

- i Removing and installing

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim removing and](#)

[*installing*](#)**3. Rubber stop**

- i Adjusting ⇒ [55-2, Rear lid, adjusting](#)

4. Gas-filled strut

- i Removing and installing ⇒ [55-2, Gas-filled strut, removing](#)
- i Venting gas ⇒ [55-2, Releasing gas from gas-filled strut](#)

5. Ball stud

- i 10 Nm

6. Bolt

- i 22 Nm

7. Closure plate

- i Adjusting - within elongated holes
- i Gap dimension Body panel gaps; Body, rear

8. Cap**9. Pop rivet****10. Hex nuts**

- i 22 Nm

11. Hinge**12. Bolt**

- i 10 Nm

13. Identification plate

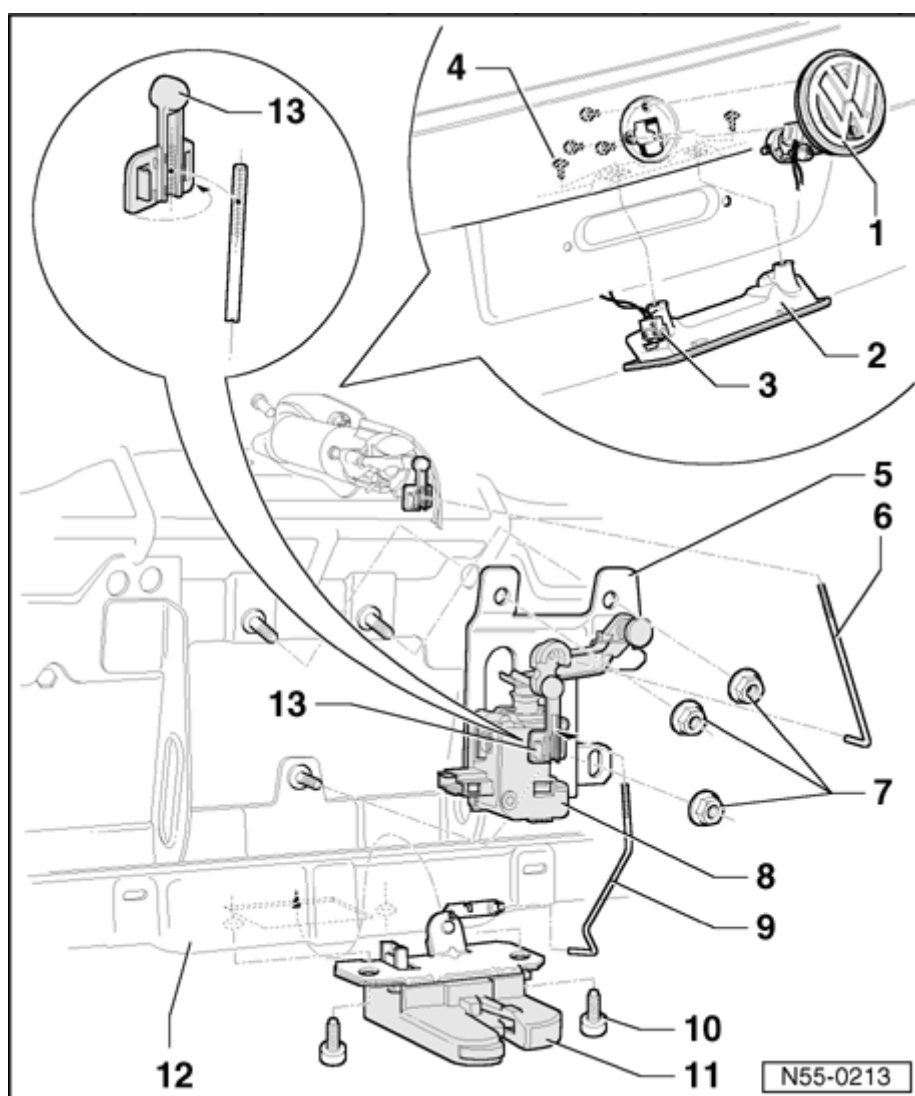
- i Press on only on hatched area
- i Replacement part has two foils.

First foil covers adhesive surface,
second must be removed after
installing.

14. Internally threaded pop rivet

- i Tighten using Pop rivet tongs
V.A.G1765A

Rear lid lock, removing and installing



1. Lock cylinder housing

- i Removing and installing ⇒ [55-4, Lock cylinder housing, removing and installing](#)

2. Handle

- i Removing

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim](#)

- Remove bolt ⇒ [Item - 4 -](#), disconnect connector for switch ⇒ [Item - 3 -](#) and remove handle from lid.

3. Tailgate/trunk lid release switch E165

4. Bolt

- i 7 Nm

5. Carrier plate

6. Operating rod

- i Press actuator lever with linkage clip ⇒ [Item - 13 -](#) against stop and engage operating rod free of tension

7. Nut

- i 7 Nm

8. Tailgate/trunk lid release motor V139

- i Removing

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim](#)

- Disconnect connector from motor.
- Unclip operating rod ⇒ [Item - 6 -](#) from lock cylinder housing.
- Unclip operating rod ⇒

[Item - 9 -](#) from motor for rear lid release.

- Remove hex nuts ⇒ [Item - 7 -](#) and remove carrier plate ⇒ [Item - 5 -](#).

- Remove motor for rear lid release ⇒ [Item - 8 -](#) from carrier plate.

9. Operating rod

- i Press actuator lever with operating rod ⇒ [Item - 13 -](#) against stop and engage operating rod free of tension

10. Bolt

- i 22 Nm

11. Lock

- i Removing

- Remove lid trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim](#)

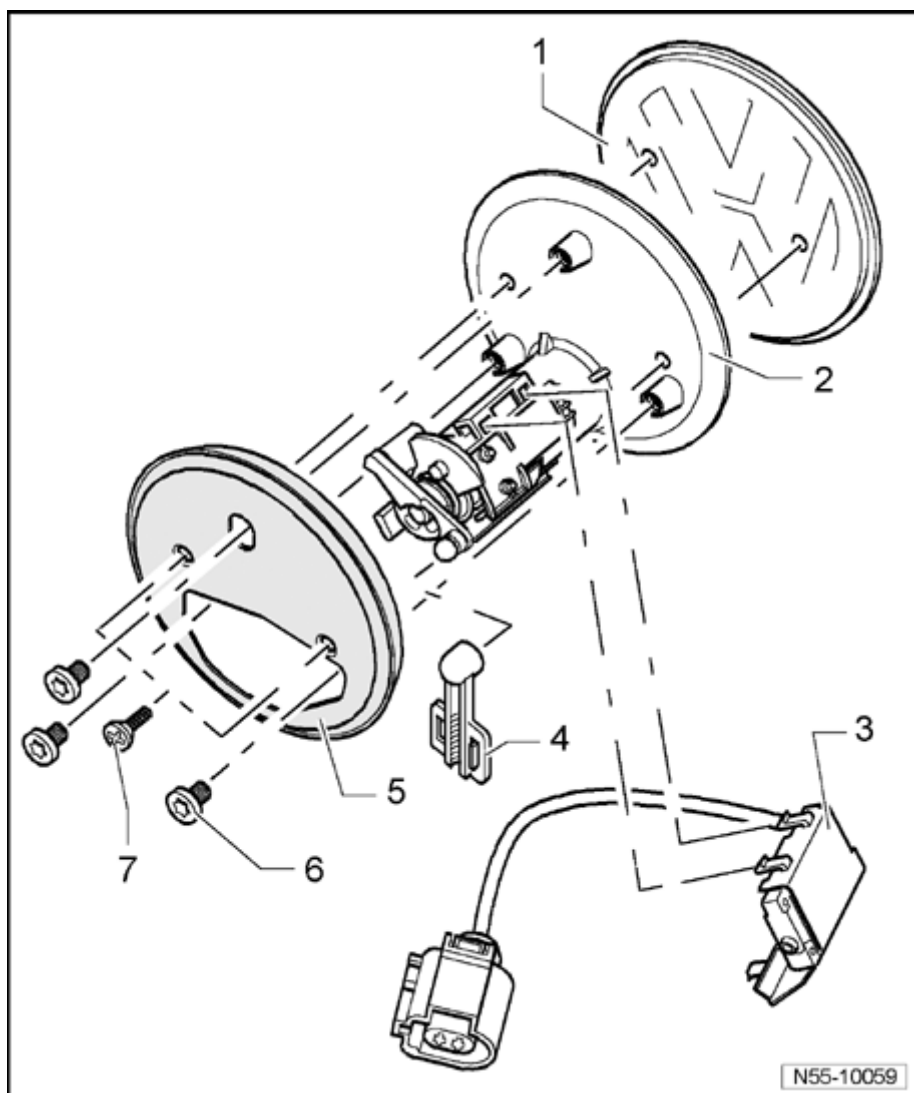
- Disconnect connector from lock.

- i Unclip operating rod ⇒ [Item - 9 -](#), remove bolt ⇒ [Item - 10 -](#) (2 pieces) and remove lock.

12. Rear lid

13. Actuator lever with linkage clip

Lock cylinder housing, removing and installing



1. VW-symbol

- ı consisting of emblem carrier and message
- ı To install VW symbol, remove protective foil and adhere to lock cylinder housing using two-sided adhesive tape
- ı also bolted to lock cylinder housing
⇒ [Item - 7 -](#)

2. Lock cylinder housing

- ı Removing
 - Remove rear lid trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim](#)

- Disconnect connector for micro-switch / wiring harness.

- Remove operating rod at actuator lever

- Remove screws ⇒ [Item - 6](#) - (3x).

- Remove lock cylinder housing with VW symbol from rear lid.

i Installing:

Installation is performed in reverse order of removal.

3. Micro-switch

i for vehicles with central locking system

i for vehicles without central locking system

i Allocation ⇒ *Original parts distributor*

i Removing and installing ⇒ [55-4, Micro-switch, removing and installing](#)

4. Linkage clip

i To remove operating rod, disconnect linkage clip and pull open

5. Seal

i Applied in area of lock cylinder housing

6. Bolt

i Qty. 3

i 4 Nm

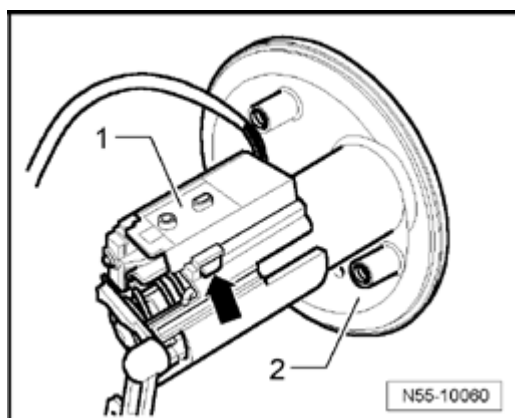
7. Bolt

i Qty. 2

i 0.3 Nm

Micro-switch, removing and installing

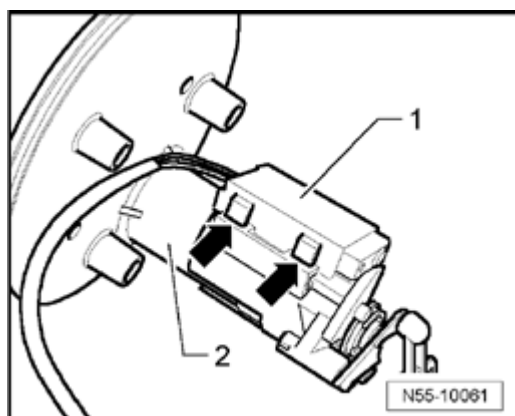
Removing



- Removing and installing lock cylinder housing - 2 - ⇒ [55-4, Lock cylinder housing, removing and installing](#) .

- Release catches - **arrow** - at micro-switch - 1 - .

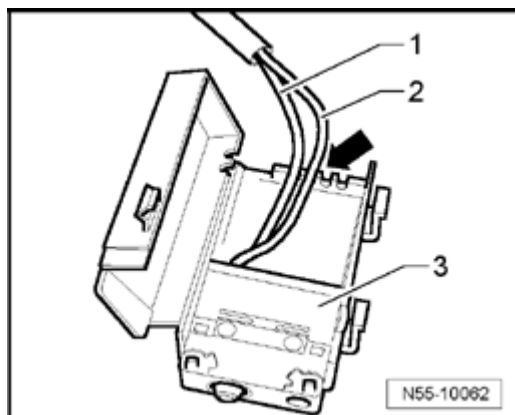
To do so, press catches downward.



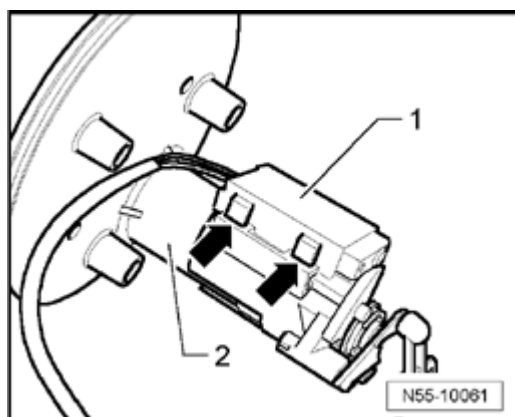
- Disengage catches - **arrows** - of micro-switch - 1 - from lock cylinder housing - 2 - .

- Remove micro-switch - 1 - from lock cylinder - 2 - .

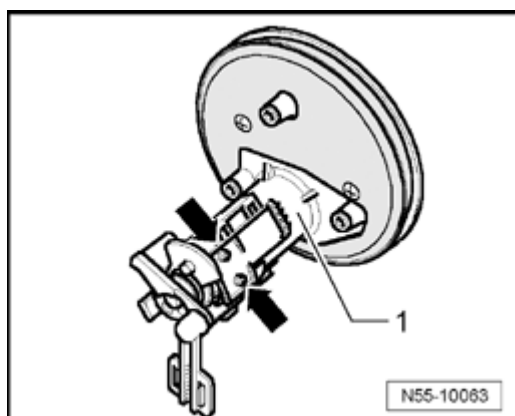
Installing



- Secure wires - 1 - and - 2 - in retaining profile - **arrow** - of micro-switch - 3 - .

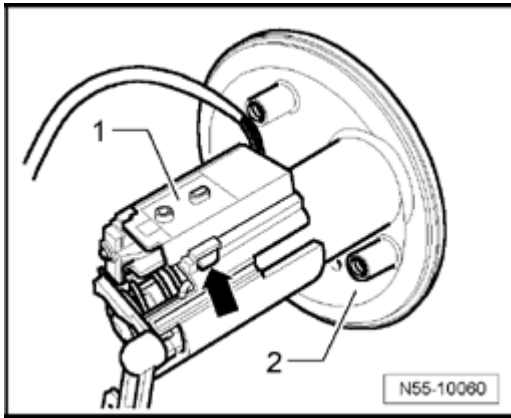


- Lock catches - **arrows** - of micro-switch - 1 - into lock cylinder housing - 2 - .



- Make sure that micro-switch is positioned with securing tabs - **arrows** - on lock cylinder housing - 1 - .

- Before locking micro-switch, it must be checked that wires are lying correctly in retaining profile of micro-switch and lock cylinder. If this is not the case and micro-switch is locked, wires/micro-switch may be damaged.

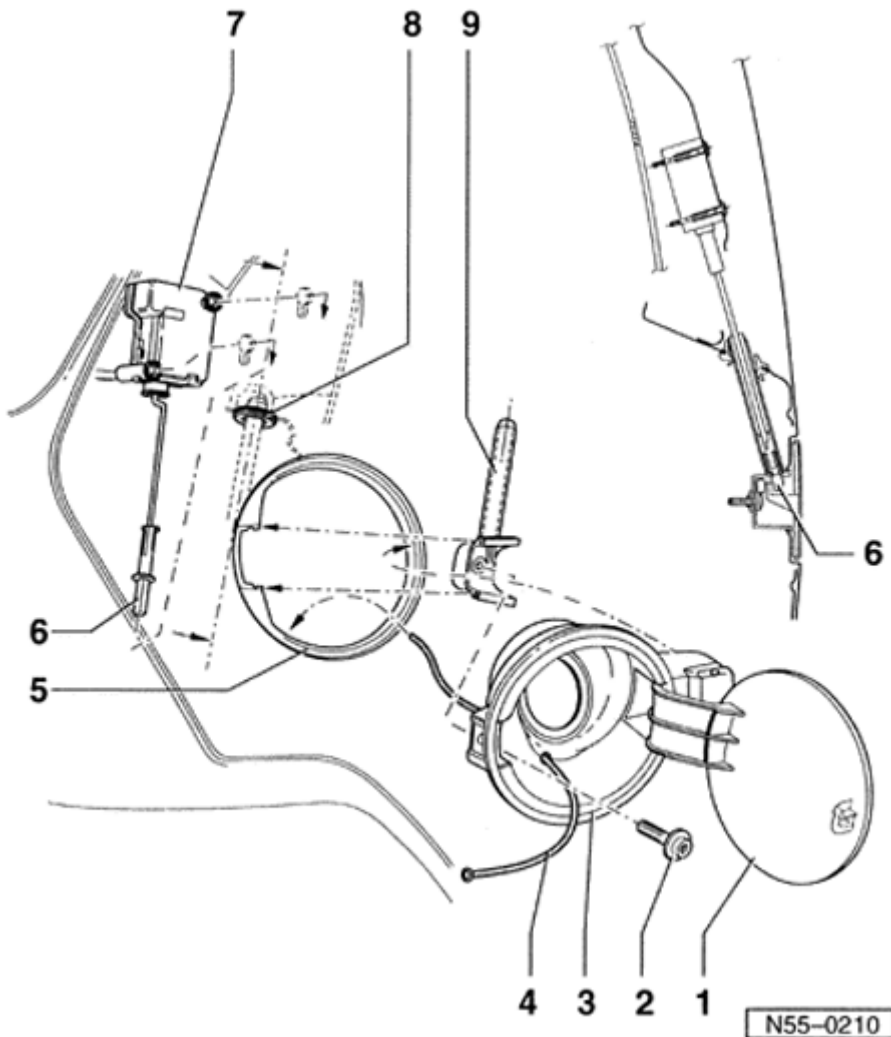


- Lock micro-switch - 1 - with lock cylinder housing - 2 - .
Make sure that catch - **arrow** - is engage correctly.

- Install lock cylinder housing ⇒ [55-4, Lock cylinder housing, removing and installing](#) .

Tank flap unit

Fuel flap unit, removing and installing (Golf)



1. Tank flap unit

; Removing

- Remove fuel tank cap.
- Press back release rod by operating remote unlocking.
- Remove bolt ⇒ [Item - 2 -](#) .
- Remove rubber part of tank filler flange and swivel out fuel flap unit from side panel.

- ; Installing:

Assembly piece and actuator element are installed.

- Install fuel flap unit (rubber part rolled up) with hinge side first.
- Bolt in fuel flap unit and assembly piece.

2. Screw

3. Tank flap cup

- ; Removing and installing (can only be removed as part of fuel flap unit)
- ; To remove fuel filler cap, press out securing pin in fuel flap unit

4. Drain hose

5. Side panel

6. Release rod

7. Actuator for fuel filler flap

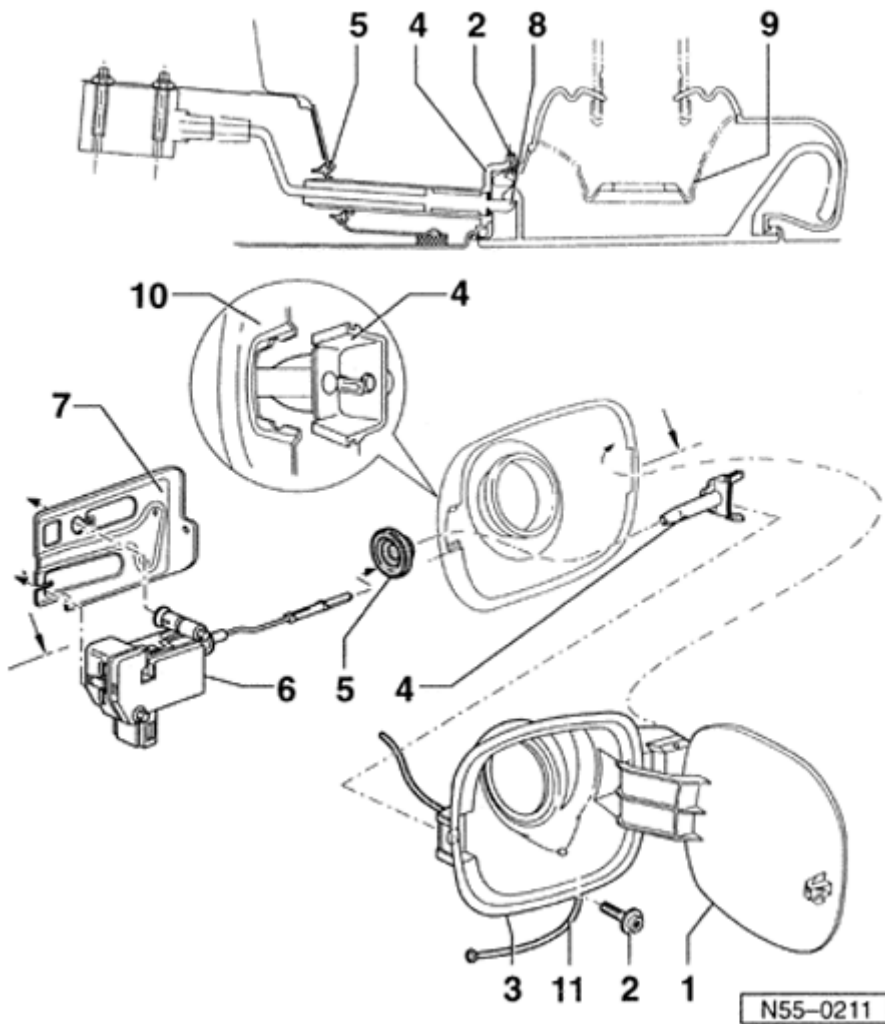
8. Seal

9. Assembly piece

- ; Inserted into side panel

10. Rubber piece

Fuel flap unit, removing and installing (Jetta)



1. Tank flap unit

; Removing

- Unscrew fuel tank cap.
- Press back release rod by operating remote unlocking.
- Remove bolt ⇒ [Item - 2 -](#).
- Remove rubber part of tank filler flange and swivel out fuel flap unit from side panel.

; Installing:

Assembly piece and actuator element are installed.

- Install fuel flap unit (rubber part rolled up) with hinge side first.

- Bolt in fuel flap unit and assembly piece.

2. Screw

3. Tank flap cup

- ı Removing and installing (can only be removed as part of fuel flap unit)
- ı To remove fuel filler cap, press out securing pin in fuel flap unit

4. Assembly piece

- ı Inserted into side panel

5. Seal

6. Actuator for fuel filler flap

7. Angle bracket

8. Release rod

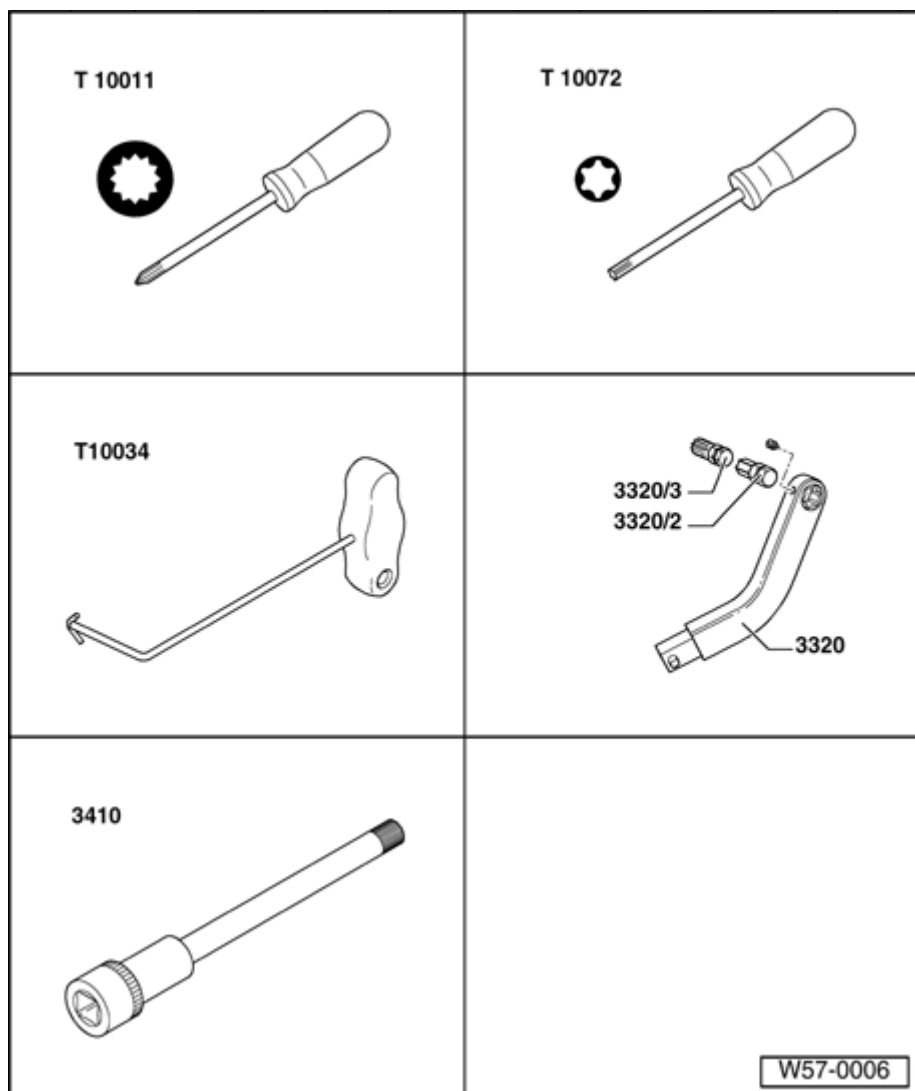
9. Rubber piece

- ı Must be rolled for installation

10. Side panel

Front door

Tools



Special tools, testers and auxiliary items required

Socket wrench T10011

Socket wrench T10072

Assembly tool T10034

Box spanner 3320/2 for 3320

Box spanner 3320/3 for 3320

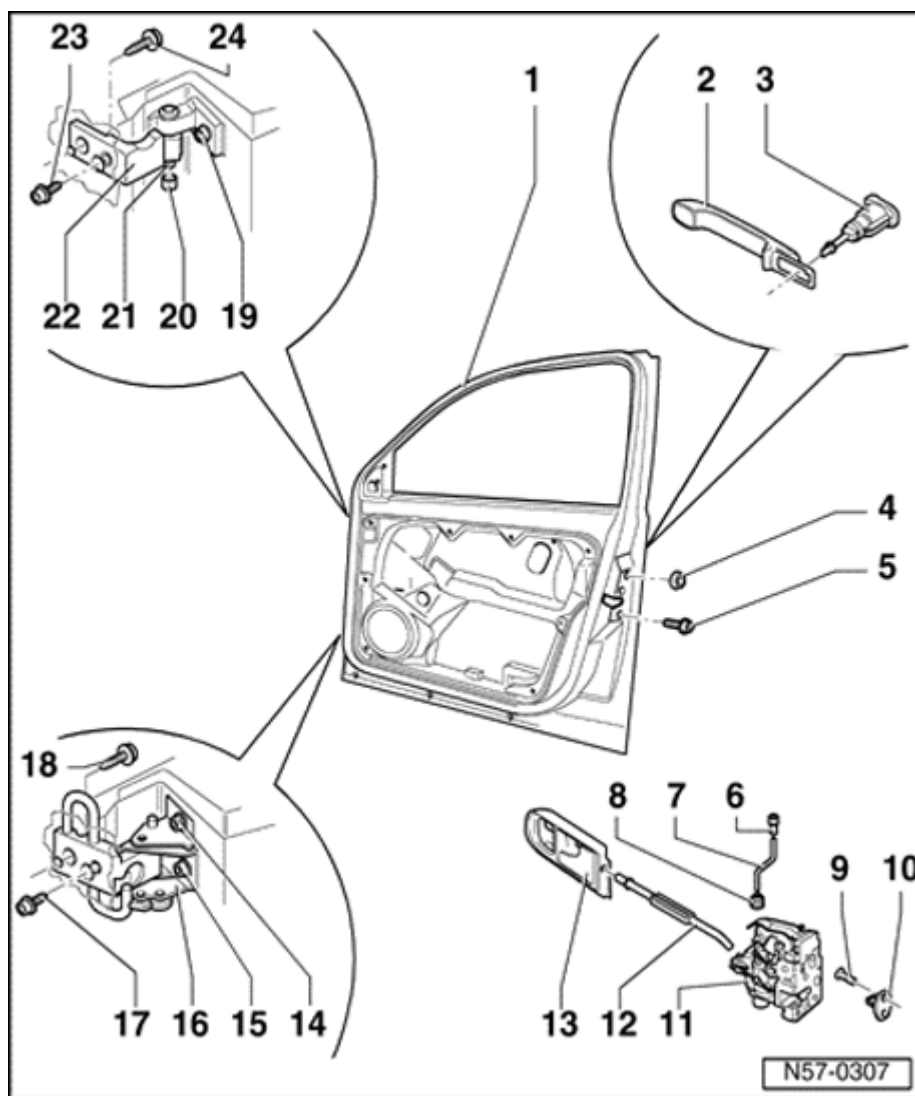
Socket 3410

Front door, assembly overview

Note :

Bolts for door hinges must always be replaced after loosening.

To remove and adjust upper door hinges, instrument cluster must be removed.



1. Door

- i Removing and installing ⇒ [57-1, Door, removing and installing](#)

2. Door handle with backing plate

- i Removing and installing ⇒ [57-1, Door handle, removing and installing](#)

3. Lock cylinder housing

- i Removing ⇒ [57-1, Lock cylinder housing, removing and installing](#)

4. Cover cap

5. Bolt

- i 18 Nm

6. Locking knob

- i Removing and installing ⇒ [57-1, Locking knob for locking rod, removing and installing](#)

7. Locking rod

8. Boot

9. Bolt

- i 20 Nm

10. Lock plate

11. Door lock

- i Removing and installing ⇒ [57-1, Door lock, removing and installing](#)

12. Bowden cable

13. Interior release handle

14. Bolt

- i M8x28
- i 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- i Always replace bolts after loosening

15. Bolt

- i M8x28
- i Only this bolt must be removed to remove door from hinge

- ; 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- ; Always replace bolts after loosening

16. Door hinge with door arrester

- ; Hinge is divided

17. Bolt

- ; M8x28
- ; Installed from vehicle interior side
- ; Remove lower A-pillar trim

⇒ [*Repair Manual, Body Interior, Repair Group 70, Pillar and side trim*](#)

- ; 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- ; Always replace bolts after loosening

18. Bolt

- ; M8x28
- ; 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- ; Always replace bolts after loosening

19. Bolt

- ; M8x28
- ; 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- ; Always replace bolts after loosening

20. Cover cap

21. Bolt

- ; 13 Nm

22. Door hinge

- i Hinge is divided

23. Bolt

- i M8x22
- i Installed from vehicle interior side
- i To loosen or tighten bolt, removing and installing instrument cluster

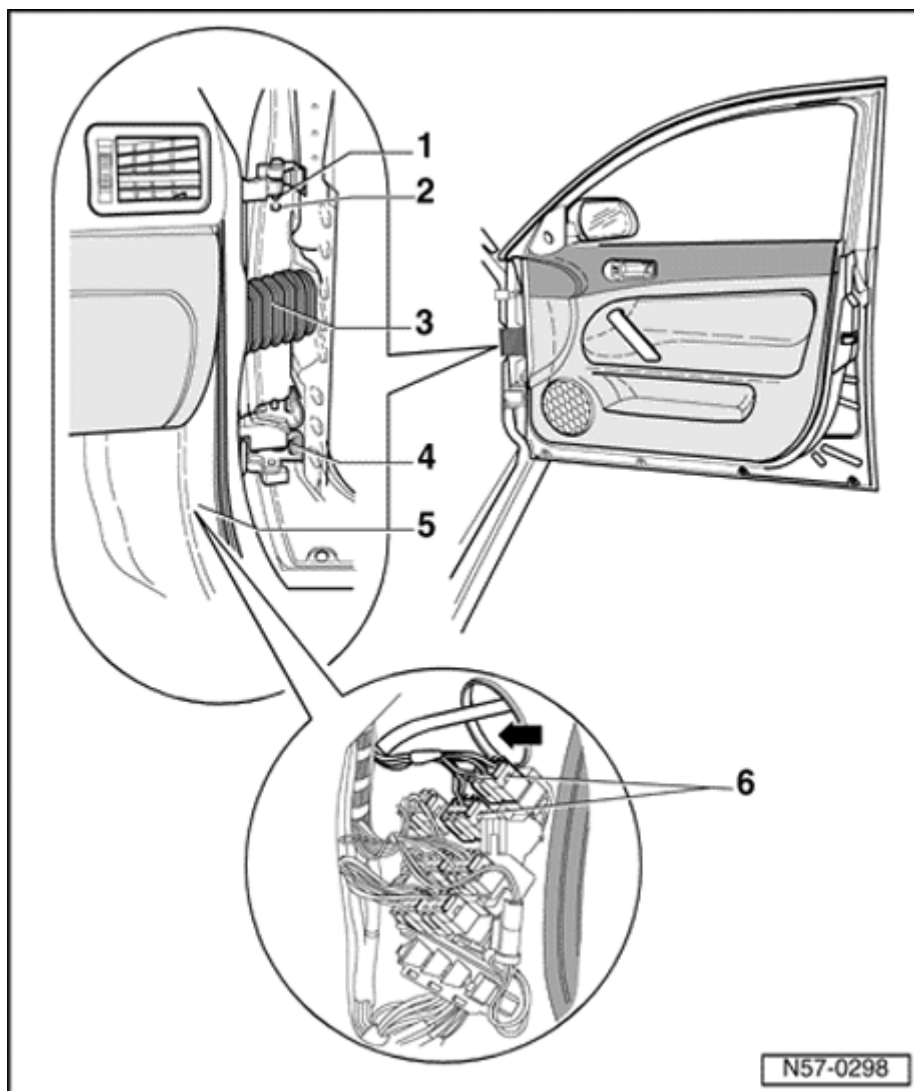
⇒ [*Repair Manual, Body Interior, Repair Group 70, Instrument cluster*](#)

- i 20 Nm + $1/4$ turns (90 °) turn
- i Always replace bolts after loosening

24. Bolt

- i M8x28
- i 20 Nm + $1/4$ turns (90 °) turn
- i Always replace bolts after loosening

Door, removing and installing



- Remove lower A-pillar trim - **5** -

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim; Removing lower A-pillar trim](#)

- Disconnect connectors - **6** - at A-pillar.
- Remove boot - **3** - from A-pillar. Thread electrical wires out through opening - **arrow** - from pillar.
- Pry off cover cap - **2** - and remove bolt - **1** - from upper hinge pins. Tightening torque: 13 Nm
- Remove bolt - **4** - using Door adjusting wrench 3320 and Box spanner 3320/2

from hinge. Tightening torque: 20 Nm +
 $\frac{1}{4}$ turn (90 °) turn

Note :

This bolt must always be replaced.

- Lift out door upward from angle hinge.

Door, adjusting

For proper door adjustment, door hinge must be loosened at pillar. Other measures, such as aligning door upward, are not effective. Excess pressure thereafter will again cause door to sag.

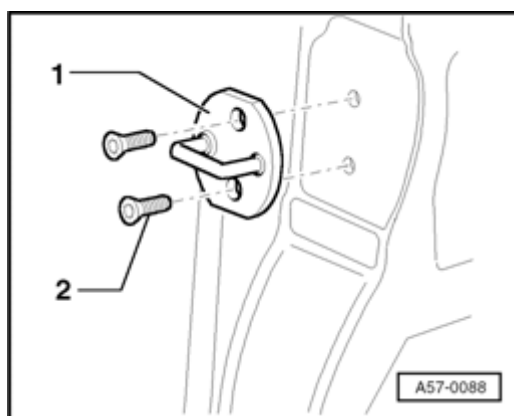
For this, Door adjusting wrench 3320 with Box spanner 3320/2 must be used.

If it should be necessary that door hinge must be loosened at upper A-pillar from inside, Socket insert 3410 can be used. To do so, instrument cluster must be removed

⇒ *Repair Manual, Body Interior, Repair Group 70, Instrument Cluster; removing and installing instrument cluster*

.

Adjusting door at striker plate



- Loosen bolts - 2 - .

- Move striker plate - 1 - until door shell is flush with contour of body.

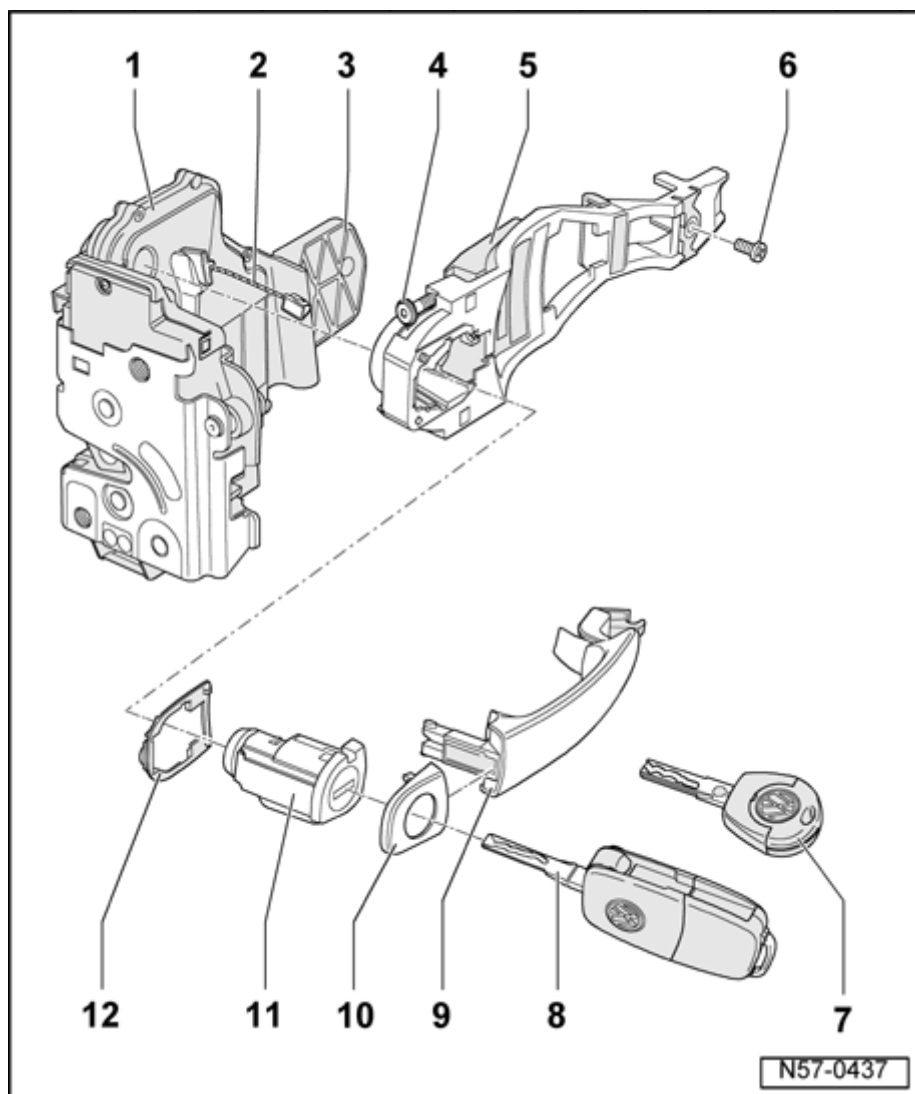
- Tighten bolts.

Tightening torque: 20 Nm

Warning!

Use this adjustment only to align the door inward or outward, not vertically. Door should not move up or down when closed or opened. If this occurs, vertical alignment of striker is incorrect

Door handle and lock, assembly overview



1. Door lock

- Door lock can only be removed in conjunction with carrier assembly.
- Removing and installing ⇒ [57-1, Door lock, removing and installing](#)

2. Cable

- ; Lock release

3. Angle bracket

- ; Bolted and riveted to door lock
- ; Does not belong to door lock delivery casing

4. Bolt

- ; This bolt was replaced by a Torx bolt, and a new tool must be used for it
- ; Socket wrench T10011
- ; Socket wrench T10072
- ; By loosening this bolt, locking mechanism for lock cylinder housing ⇒ [Item - 11 -](#) is disengaged and may be removed from mounting bracket ⇒ [Item - 5 -](#).
- ; Bolt ⇒ [Item - 4 -](#) must not be threaded in without lock cylinder housing installed. Lock mechanism ring may fall into door.

5. Mounting bracket

- ; Removing

Door handle, lock cylinder housing and carrier assembly have been removed

- Remove bolt ⇒ [Item - 6 -](#), slide mounting bracket slightly to rear and remove from door.

6. Screw

7. Key

- ; With radio-frequency remote control (non-foldable)
- ; Changing battery ➤ 04.01 ⇒ [57-2](#).

[Batteries for key with radio remote control \(not foldable\), removing and installing 04.01](#)

8. Key

- ı With radio-frequency remote control (foldable)
- ı Changing battery ➤ 04.01 ⇒ [57-2, Batteries for key with radio remote control \(foldable\), removing and installing 04.01](#)
- ı Changing battery 05.01 ➤ ⇒ [57-2, Batteries for key with radio remote control \(foldable\) removing and installing 05.01](#)
- ı Adapting new/additional keys to remote control ⇒ [57-2, Adaptation of keys with radio remote control](#)

9. Door handle with backing plate

- ı Removing and installing ⇒ [57-1, Door handle, removing and installing](#)

10. Cover cap

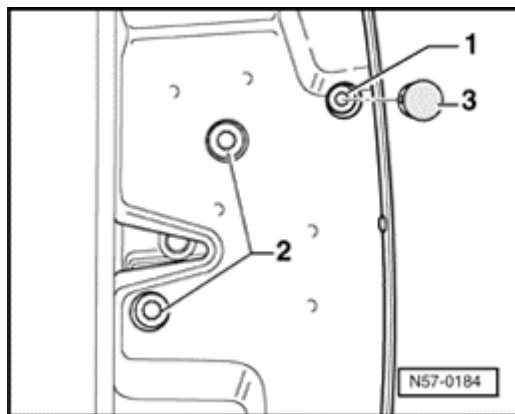
11. Lock cylinder housing

- ı Removing ⇒ [57-1, Lock cylinder housing, removing and installing](#)
- ı Lock cylinder is not available as an individual replacement part

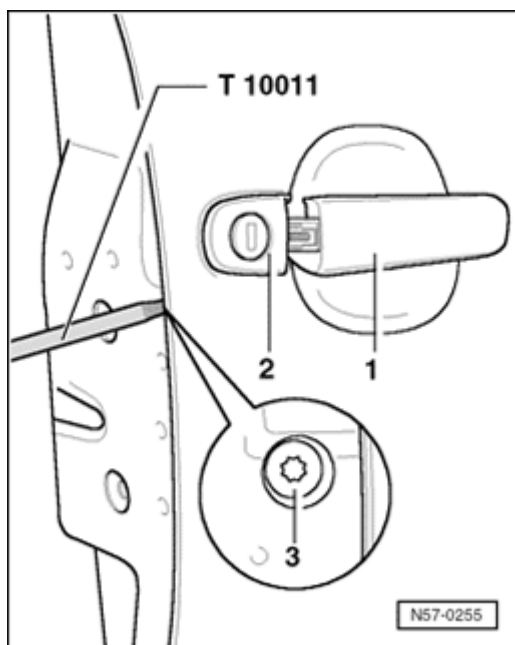
12. Base plate

Lock cylinder housing, removing and installing

Removing



- Pry out cap - 3 - .



- Pull door handle - 1 - and hold in this position. Remove bolt - 3 - using torque wrench T10011 (socket wrench T10072 introduced as running change) until stop. Lock cylinder housing is loosened by doing so.

Note:

If bolt has been loosened too far, this may cause lock mechanism ring to loosen from mounting bracket and fall into door.

- Remove lock cylinder housing - 2 - at right angle to door from door handle mounting bracket.

Installing

- Insert lock cylinder housing at right angle into door handle mounting bracket.

- Now screw in bolt into mounting bracket using torque wrench.

Door handle engages again into lock cylinder housing with a very audible click.

Note:

During installation, door handle and lock cylinder housing must be pressed onto door plate.

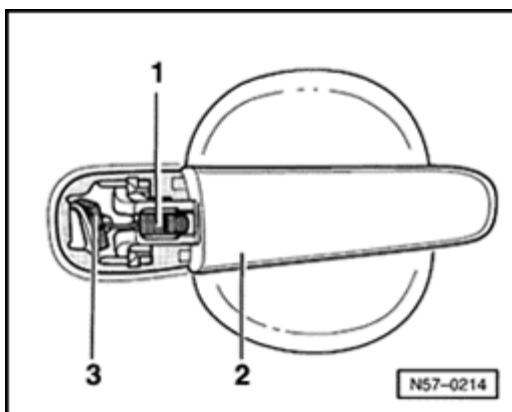
- Then, perform in reverse order of removal.

Then a function test must be performed, since door cannot be opened if adjustment and clips of Bowden cable are not correct.

Door handle, removing and installing

Removing and installing lock cylinder housing ⇒ [57-1, Lock cylinder housing, removing and installing](#) .

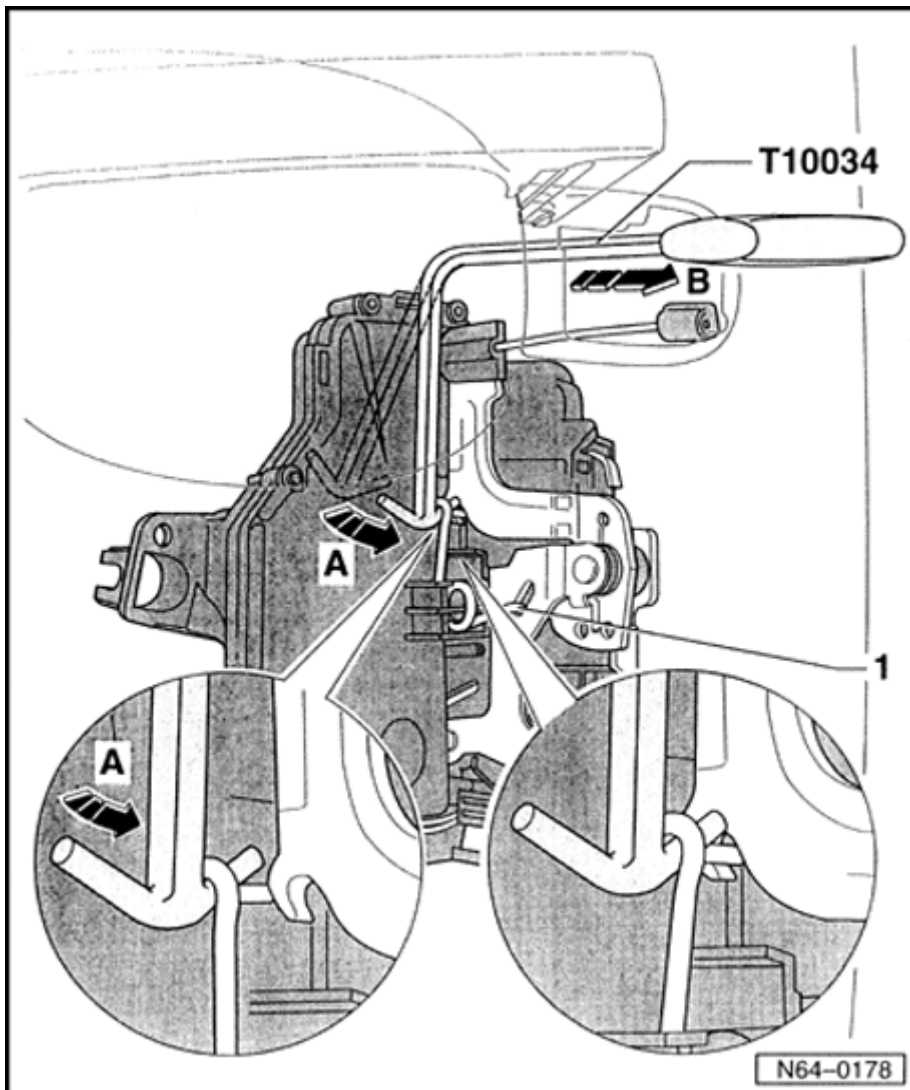
Removing



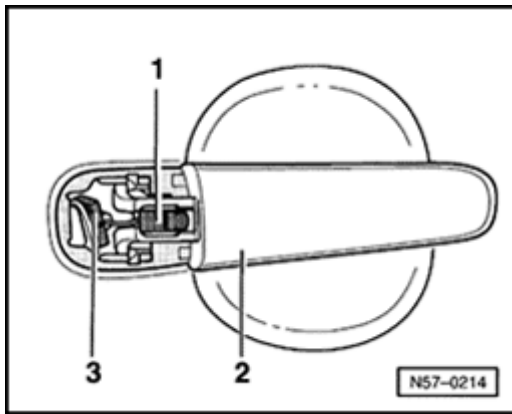
- Unclip clip - 1 - from door handle.

- Remove door handle from door.

Installing



- Guide assembly tool T10034 into door through opening in inner door plate.
- Light inner part of door using a flashlight for better view.
- Hook assembly tool into spring - **1** - - **arrow A** - .
- Engage spring into door lock by pulling assembly tool - **arrow B** - .
- Insert door handle into door.



- Insert clip - 1 - into metal cut out and engage into door handle - 2 - .

Note:

During installation, door handle - 2 - must be pressed onto door plate.

Install lock cylinder housing ⇒ [57-1, Installing](#) .

Then a function test must be performed with door opened, since door cannot be opened if adjustment and clips of Bowden cable are not correct.

Door lock, removing and installing

Window regulator, door lock and loudspeaker are secured to carrier assembly.

Door lock can only be removed in conjunction with carrier assembly.

Carrier assembly can only be removed when door window has been removed at clamping brackets of window regulator. For this purpose, door window must be driven down to height of installation holes in carrier assembly and clamping brackets loosened.

If it is not possible to drive down door window by electrical window regulator, first exact cause of malfunction must be determined.

To do so, using Scan Tool (ST) V.A.G1551 , check DTC Memory of comfort system (address word 46)

⇒ [Repair Manual, Body On Board Diagnostic \(OBD\), Repair Group 01, Comfort system; check DTC Memory](#)

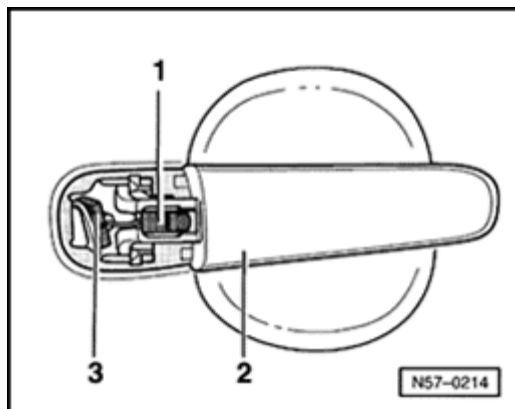
If there is an electrical malfunction via window regulator motor, this can be removed from carrier assembly.

Removing

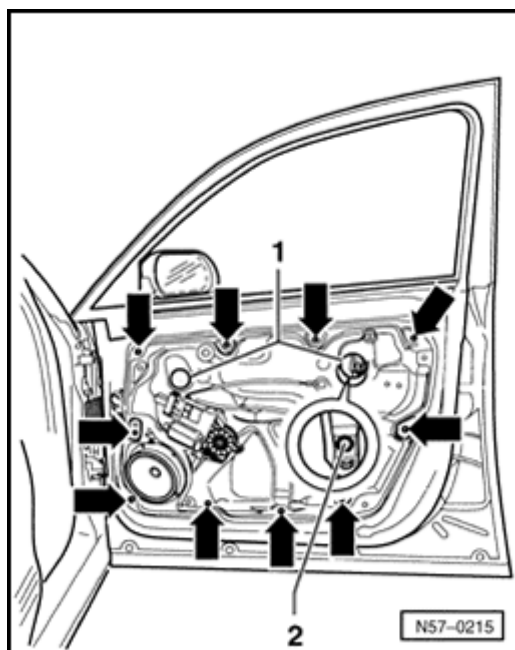
- Removing front door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Door trim, removing and installing](#)

- Removing and installing lock cylinder housing ⇒ [57-1, Lock cylinder housing, removing and installing](#) .



- Unclip clip - 1 - from door handle.



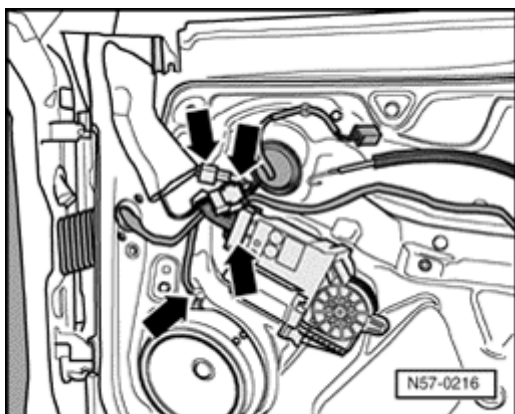
- Pry off caps - 1 - .

- Lower door window until securing bolts of door window are accessible.

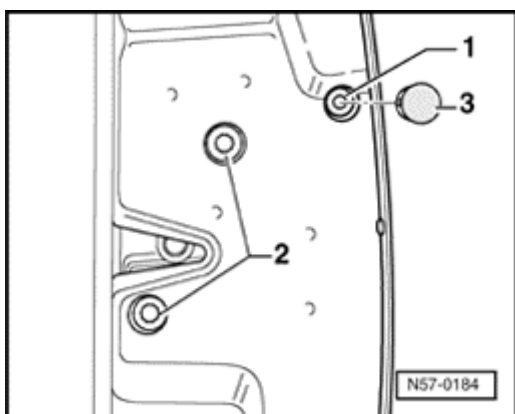
Note:

If work step is not possible due to a malfunction via electrical window regulator, window regulator motor can be removed to be able to slide window down.

- Loosen bolts - **2** - and press clamping brackets apart.
- Slide door windows upward and secure (e.g. using adhesive tape).

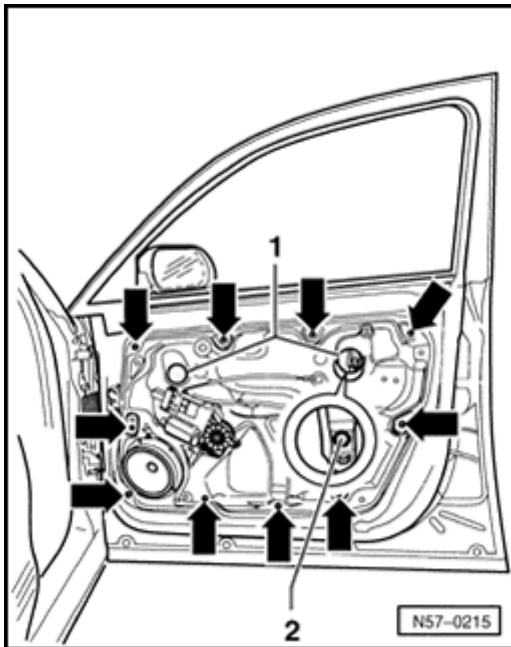


- Disconnect all connectors - **arrows** - .

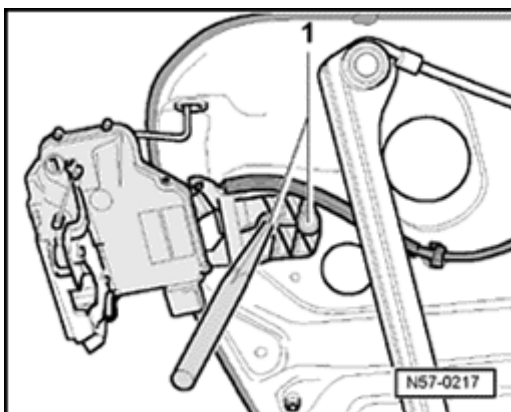


- Remove bolts - **2** - .

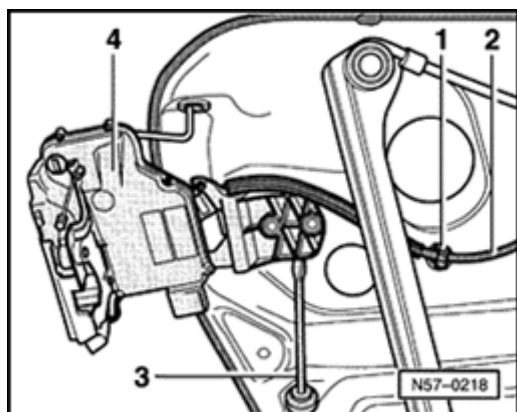
Tightening torque: 20 Nm



- Remove bolts - **arrows** - . Remove upper carrier assembly from door, lift and lift out from door toward door hinges.
- Rotate carrier assembly and disconnect connector from door lock.
- Then, unclip clips for electrical wires from rear side of carrier assembly.



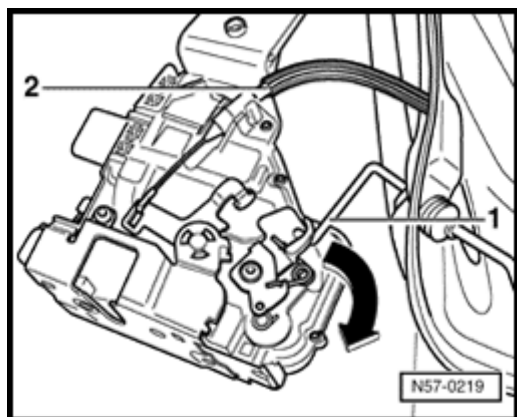
- Drive out clips - **1** - using a drift.



- Unclip cable - 2 - from clip - 1 - .
- Using a screwdriver - 3 - , pry off door lock with assembly aid from carrier assembly.

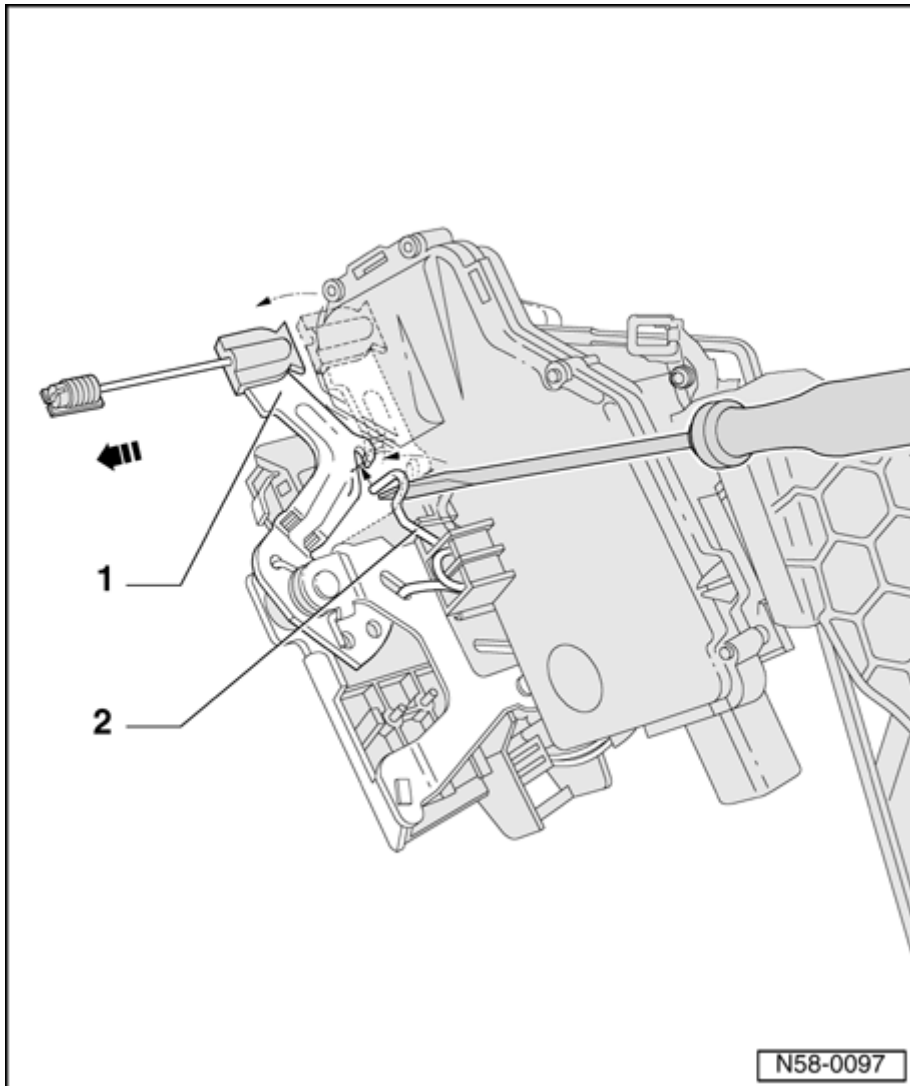
Note:

Angle bracket is not part of parts supplied with door lock. It is secured to door lock with a bolt and a blind rivet.



- Unclip locking rod - 1 - . To do so, turn door lock in direction of - **arrow** - .
- Unclip cable - 2 - .
- Turn end of cable 90 ° and remove from eyelet.

Installing



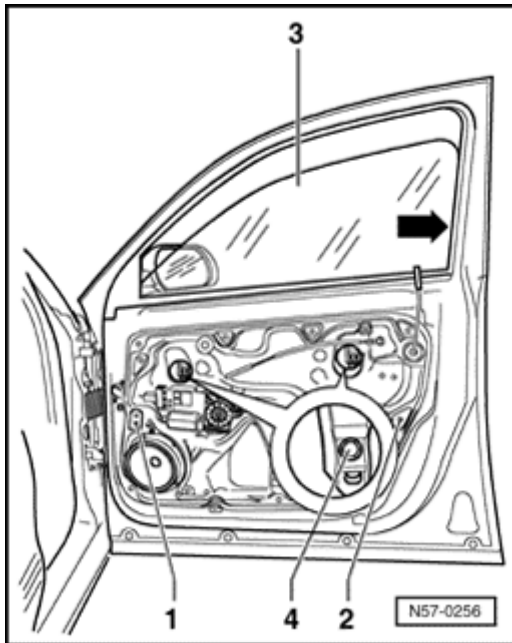
- Pull operating lever - 1 - in direction of - **arrow** - .

- Using a screwdriver, tension spring - 2 - secured to door lock in direction of - **arrow** - and engage lock lever into spring.

Note :

Lock is secured by engaging operating lever. Thereby later "incorrect" clipping-in of Bowden cable is prevented.

- Insert carrier assembly into door.



- Tighten all bolts. Tighten bolts marked - 1 - and - 2 - in reverse order of removal.

Tightening torque: 8 Nm

- Remaining bolts can be tightened in any sequence.

- Press door window - 3 - into window guide - **arrow** - and tighten clamping brackets with bolts - 4 - .

Tightening torque: Plastic clamping brackets 9 Nm, aluminum clamping brackets 11 Nm.

- Then, perform in reverse order of removal.

Then, perform a function load test.

Locking knob for locking rod, removing and installing

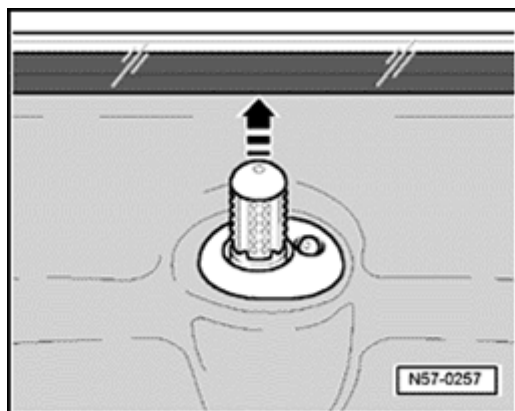
Following descriptions of removing and installing locking knob must always be observed.

If disregarded, locking rods may rotate out of front door locks and relays may rotate into rear doors/damage mounts.

Removing

Right front and left rear door

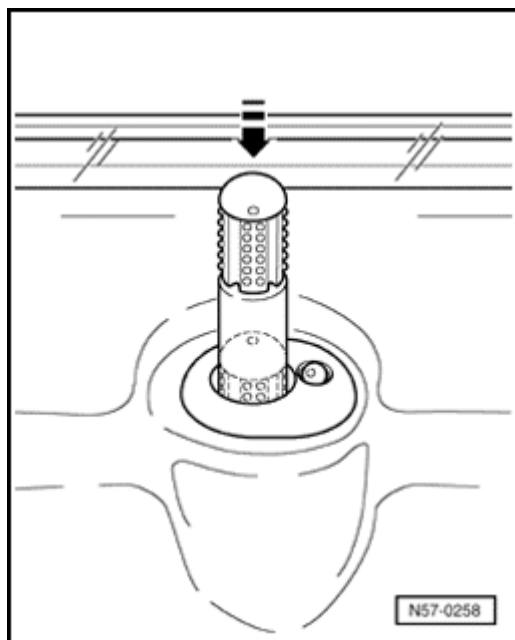
- Unscrew locking knob 180 ° to left.



- Remove locking knob upward - **arrow** - .

Installing

Right front and left rear door



- Attach locking knob onto locking rod with marking -small point on top side- toward vehicle interior side.

- Press locking knob onto locking rod only as far until corrugation is at height of door trim.

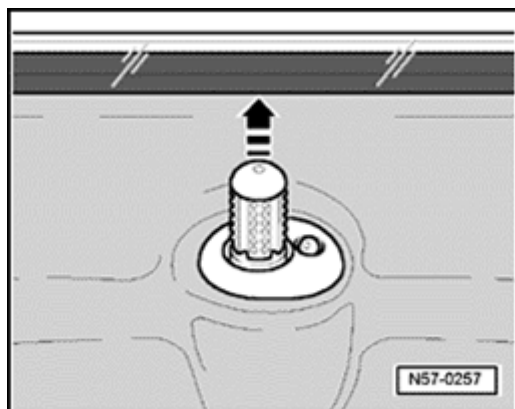
- Then screw locking knob 180 ° to left.

When locked, locking knob can be approx. 02 mm over door trim.

Removing

Left front and right rear door

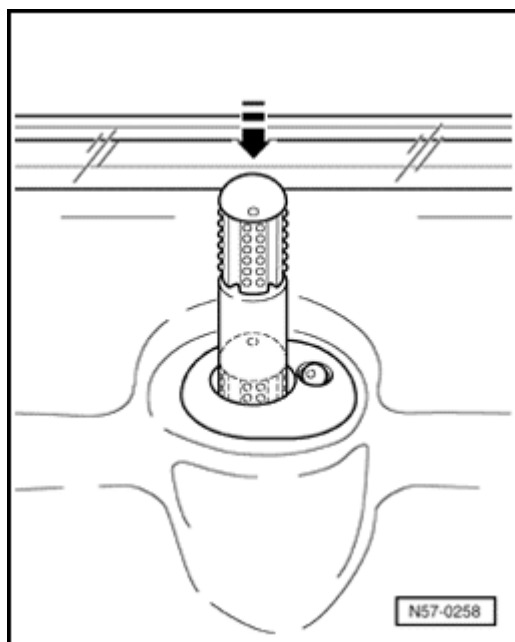
- Unscrew locking knob 180 ° to right.



- Remove locking knob upward - **arrow** - .

Installing

Left front and right rear door



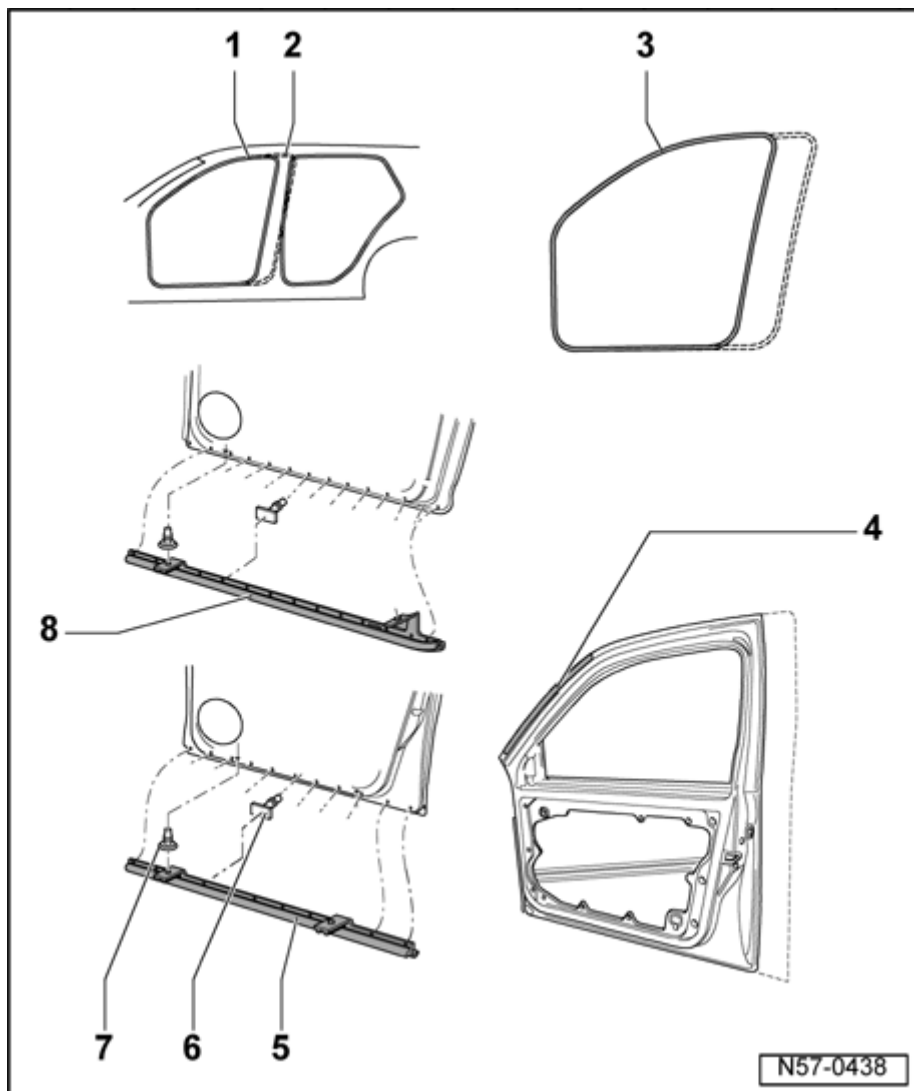
- Attach locking knob onto locking rod with marking -small point on top side- toward vehicle interior side.

- Press locking knob onto locking rod only as far until corrugation is at height of door trim.

- Then screw locking knob 180 ° to right.

When locked, locking knob can be approx. 02 mm over door trim.

Door seals



Door seals are equipped at factory with sealant, applied to door flange and then rolled on.

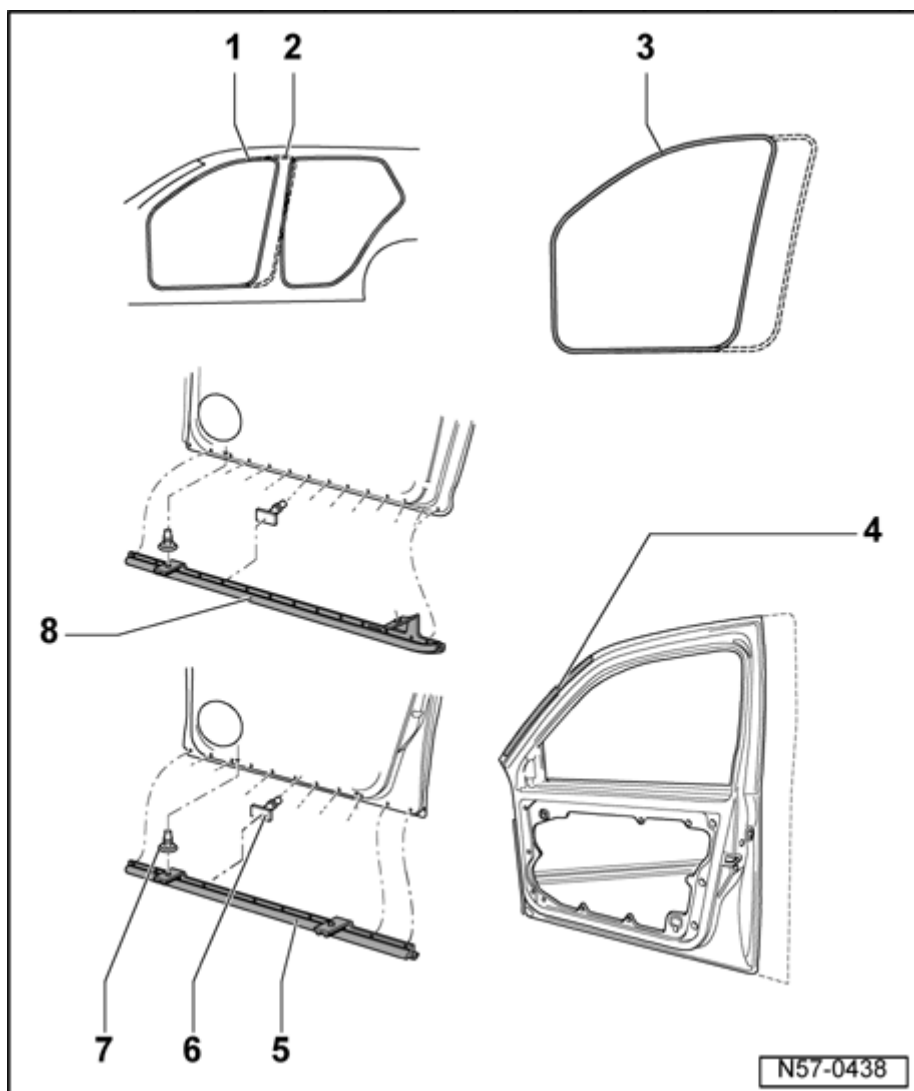
Note :

During removal of seal, sealant is distributed on interior side of seal and flanks are bent up easily. If seal is re-installed, sealing performance and proper seating are no longer guaranteed.

For this reason, every completely removed seal must be replaced with a so-called "Hammer-stroke seal" .

For partially removed seals, seal flanks must be pressed together before installation.

Door seals, assembly overview



1. Door inner seal, 4-door

- ı To install seal, begin in upper radius of door cut out.

2. Door inner seal, 2-door

- ı To install seal, begin at B-pillar trim

3. Internal door seal

4. Auxiliary seal

- ı Material - TPE
- ı Auxiliary seal cannot be removed without destroying it
- ı Removing and installing ⇒ [57-1, Auxiliary seal, removing and installing](#)

5. Outer door seal, 4-door**6. Clip**

- i Inserted into door seal

7. Clip

- i Inserted into door seal

8. Outer door seal, 2-door**Note :**

Trim must be removed in order to remove door seals.

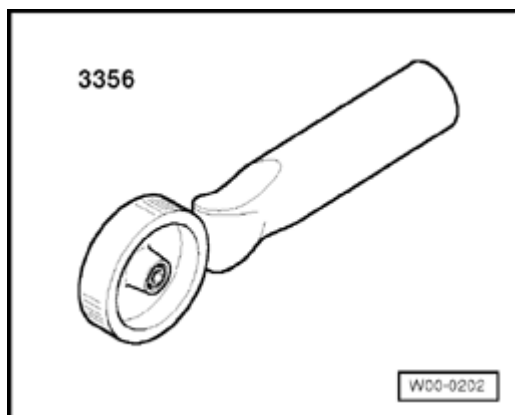
Depending on space arrangement, it may be necessary to remove instrument cluster as well.

Auxiliary seal, removing and installing**Materials**

Sprayable sealant	D 476 KD9 A3
Bonding agent	ALO 822 000 04 ¹⁾
Cleaning solution	D 009 401 04
Adhesive remover	D 002 000 10

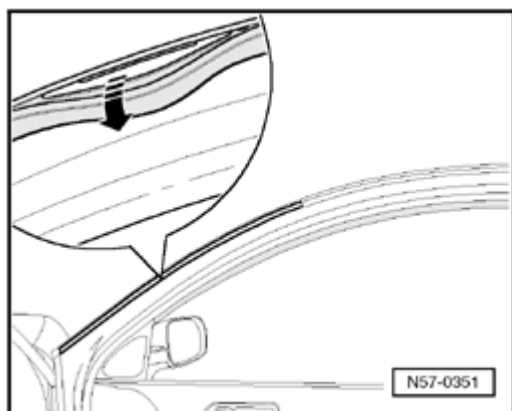
¹⁾ As an option, bonding agent D 822 150 A1 can also be used

Tools**Special tools, testers and auxiliary items required**

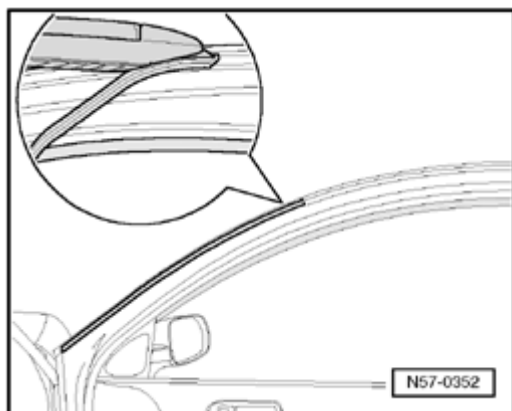


Application roller for door insulation foil 3356

Removing



- Remove auxiliary seal outward from center in direction of **- arrow -** .
- Cut through sealant (adhesive) at ends of auxiliary seal (only top position is shown in illustration) using a cutting knife.
- Remove adhesive tape residue from door.



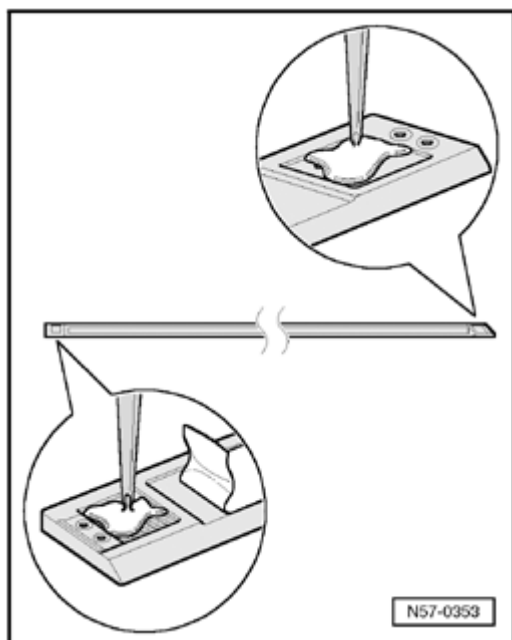
- So that new auxiliary seal is not installed too strongly at ends, sealant must be cut back (do not remove down to paint).

Installing

- Clean ends of auxiliary seal using cleaning solution D 009 401 04 . Air drying time is 5 minutes.

- Now spray bonding agent ALO 822 000 04 on thinly and observe air drying time of 10 minutes.

Before applying auxiliary seal, seal should be held once on door to check length and fit.

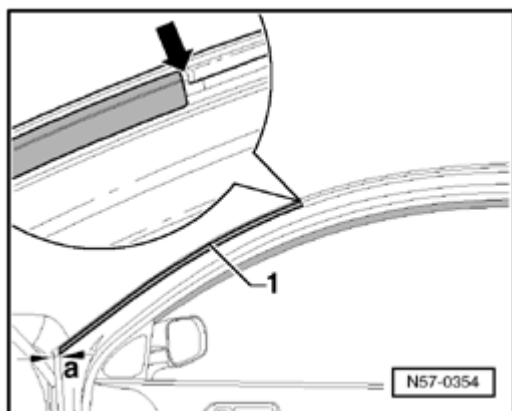


- Apply a small point of sealant D 476 KD9 A3 on ends.

Note:

Do not apply too much sealant. Remove excessive material.

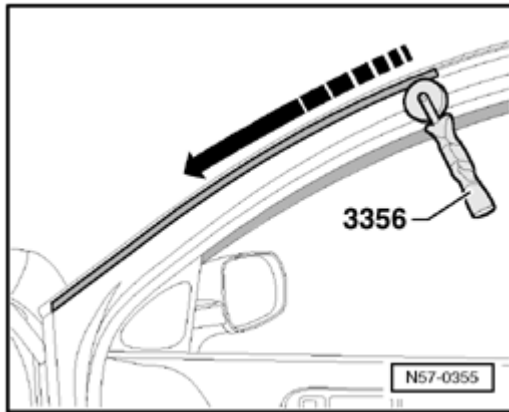
- Now remove foil from auxiliary seal.



- Attach auxiliary seal - **1** - at top at sealing seam - **arrow** -
 . Press on auxiliary seal to door from top to bottom. A

dimension - **a** - of approx. 21 mm results at end of additional seal to door flange.

- Roll auxiliary seal on well using application roller for door insulation foil 3356 .



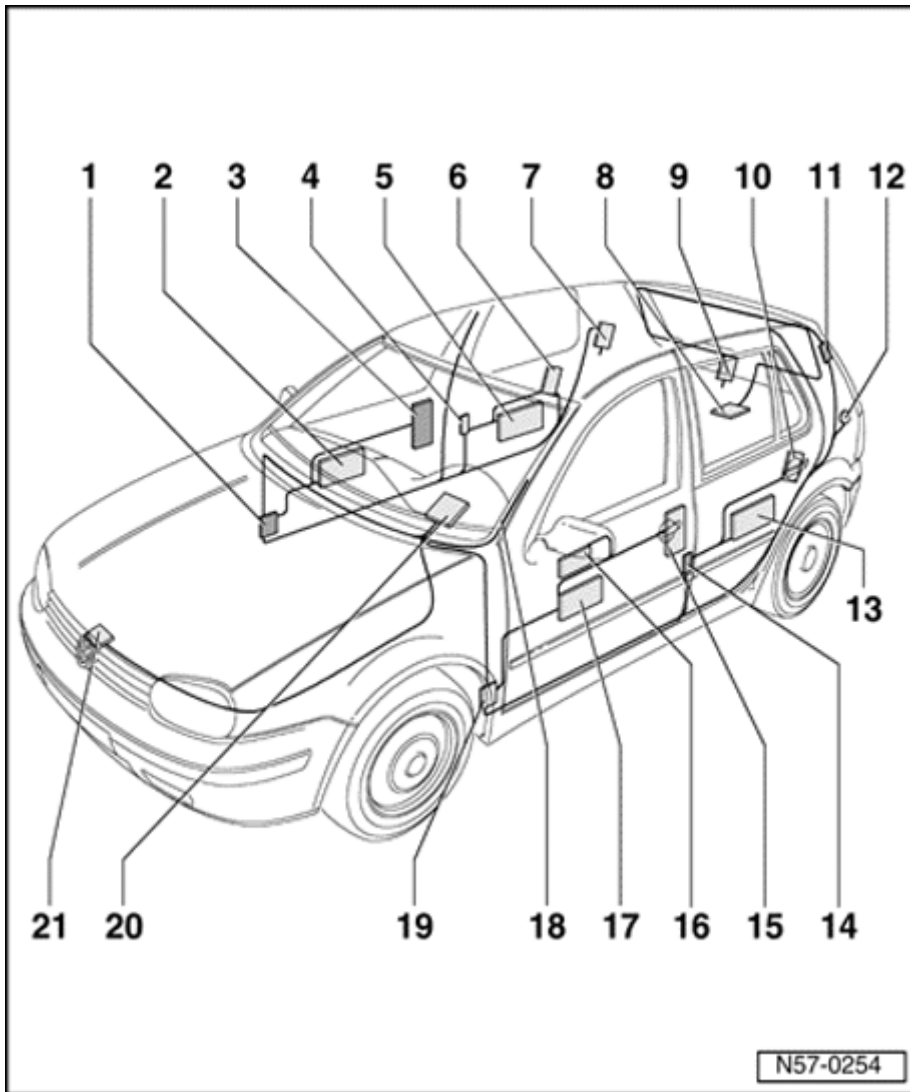
- Remove any excessive, pressed-out sealing material from door.

Note:

It may take a few days for sealing material to dry completely.

Central locking system

Comfort system and central locking system, assembly overview



1. Coupling station

- Component location: Lower A-pillar, covered by footwell trim.

- Remove lower A-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim; Removing lower A-pillar trim](#)

2. Door control module, RF

- i Only for comfort system
- i Integrated in window regulator motor
- i Removing
 - Removing door trim

⇒ [*Repair Manual, Body Interior, Repair Group 70, door trim*](#)

.

- Removing front carrier assembly ⇒ [*64-2, Carrier assembly, removing and installing*](#) .

- Remove window regulator motor ⇒ [*64-2, Window regulator motor or carrier assembly with window regulator, removing and installing*](#) .

3. Door lock, RF

- i Door lock is secured to carrier assembly
- i Electrical central locking system is integrated in door lock module
- i Removing
 - Removing door trim

⇒ [*Repair Manual, Body Interior, Repair Group 70, door trim*](#)

.

- Removing front carrier assembly ⇒ [*64-2, Carrier assembly, removing and installing*](#) .

- Remove door lock ⇒ [57-1, Door lock, removing and installing](#) .

4. Coupling station

; Component location: B-pillar

- Remove lower B-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

.

5. Door control module, RR

; Only for comfort system

; Integrated in window regulator motor

; Removing

- Removing door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, door trim](#)

.

- Remove window regulator motor ⇒ [64-2, Window regulator motor or carrier assembly with window regulator, removing and installing](#) .

6. Door lock, RR

; Door lock is secured to carrier assembly

; Electrical central locking system is integrated in door lock module

; Removing

- Removing door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, door trim](#)

.

- Remove door lock ⇒ [58-1, Door lock, removing and installing](#)

7. Motor for fuel tank lid unlock V155

- i Component location: under C-pillar trim
- i To remove, luggage compartment trim up to wheelhousing must be removed

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillars- and side trim](#)

.

- i Can be removed using Socket wrench T10010

8. Rear lid lock

- i Screwed onto lid
- i Removing
 - Remove rear lid trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim](#)

- Remove lid lock.

9. Rear lid actuator

- i Installed onto lid

- ; Can be removed using Socket wrench T10010

10. Door lock, LR

- ; Door lock is secured to carrier assembly
- ; Electrical central locking system is integrated in door lock module
- ; Removing
 - Removing door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, door trim](#)

.

- Remove door lock ⇒ [57-1, Door lock, removing and installing](#) .

11. Coupling station

- ; Component location: in area of rear roof crossmember, covered by roof trim
 - Removing roof trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Roof trim; molded headliner, removing and installing](#)

.

12. Anti-theft alarm horn

- ; Component location: in area of C-pillar, covered by C-pillar trim

13. Door control module, LR

- ; Only for comfort system

- i Integrated in window regulator motor

- i Removing

- Removing door trim

- ⇒ [*Repair Manual, Body Interior, Repair Group 70, door trim*](#)

- .

- Removing rear carrier assembly ⇒ [*64-2, Carrier assembly, rear door window and quarter window, removing and installing*](#) .

- Remove window regulator motor ⇒ [*64-2, Window regulator motor or carrier assembly with window regulator, removing and installing*](#) .

14. Coupling station

- i Component location: B-pillar

- Remove lower B-pillar trim

- ⇒ [*Repair Manual, Body Interior, Repair Group 70, Pillar and side trim*](#)

- .

15. Door lock, LF

- i Door lock is secured to carrier assembly

- i Electrical central locking system is integrated in door lock module

- i Removing

- Removing door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, door trim](#)

.

- Removing front carrier assembly ⇒ [64-2, Carrier assembly, removing and installing](#) .

- Remove door lock ⇒ [57-1, Door lock, removing and installing](#) .

16. Operating unit

- ; Installed in door trim
- ; Removing
 - Removing door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, door trim](#)

.

17. Door control module, LF

- ; Only for comfort system
- ; Integrated in window regulator motor
- ; Removing
 - Removing door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, door trim](#)

.

- Removing front carrier assembly ⇒ [64-2, Carrier](#)

[assembly, removing and installing](#) .

- Remove window regulator motor ⇒ [64-2, Window regulator motor or carrier assembly with window regulator, removing and installing](#) .

18. Antenna for remote control

- ; Under left, A-pillar trim
- ; Removing

- Remove A-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

19. Coupling station

- ; Component location: Lower A-pillar, covered by footwell trim.
- Remove lower left A-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

20. Central module

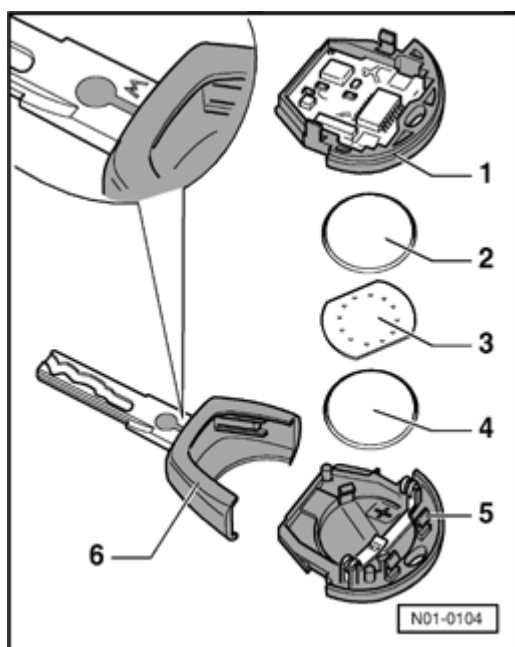
- ; Bolted on under instrument cluster with bracket at steering column
- ; To remove, lower steering column trim must be removed beforehand

⇒ [Repair Manual, Body Interior, Repair Group 68, Storage compartments, covers and panels; removing lower steering](#)

[column trim](#)

21. Hood lock

- ı Contact switch for ATWS
 - ı Component location: in lock carrier
- Removing hood lid lock ⇒
[55-1, Hood lock, removing and installing](#)

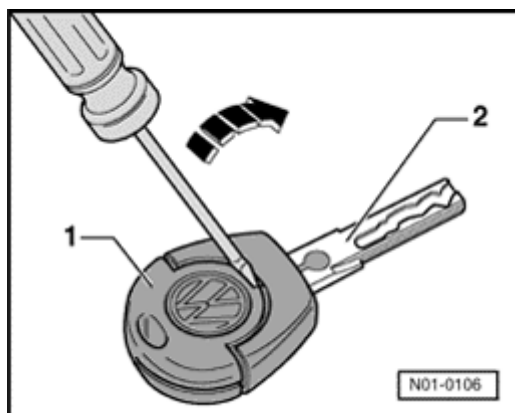


Batteries for key with radio remote control (not foldable), removing and installing ➤ 04.01

1. Radio-frequency unit - upper part (folded up)
2. Transponder battery
3. Contact plate
4. Transponder battery
5. Radio-frequency unit - lower part
6. Main key with variable code transponder

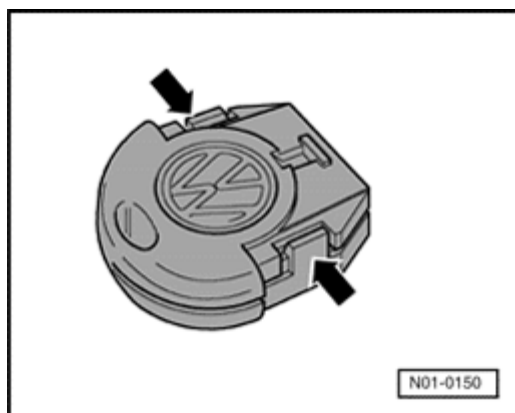
In order to distinguish keys with transponder and variable code transponder, main key is identified by an engraved "W" .

Removing

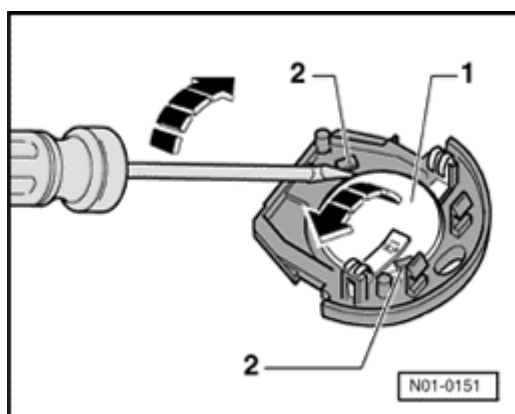


- Insert screwdriver in slot between radio-frequency unit - **1** - and key - **2** - .

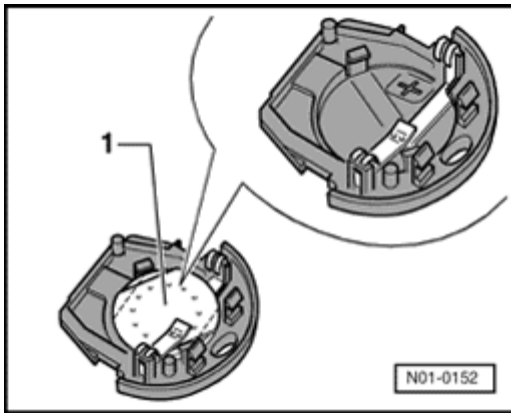
- Rotate screwdriver in direction of - **arrow** - and detach radio frequency unit from key.



- Pry apart radio frequency unit at both catches - **arrows** - .



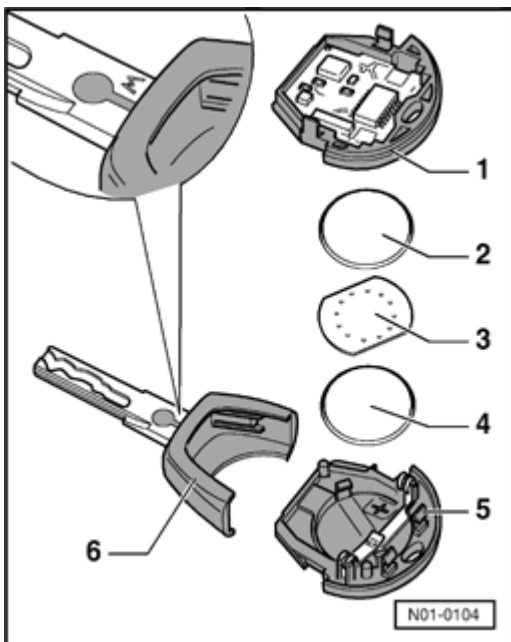
- Use a screwdriver to unclip upper battery - **1** - out of holders - **2** - in direction of - **arrow** - .



- Contact plate - 1 - has two straight edges. Contact plate can be taken out when these edges are turned in direction of catches.
- Contact plate can also be unclipped using a screwdriver.
- Now unclip lower battery from holder using a screwdriver.

Installing

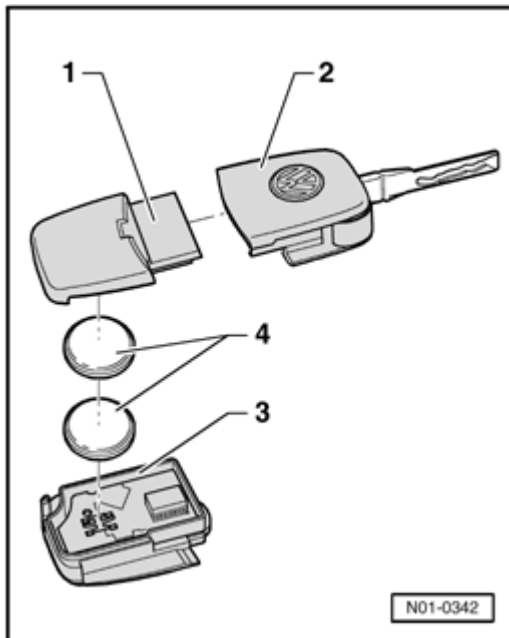
Note polarity and installation position of batteries when installing.



- Place battery - 4 - in transmitter with positive terminal downward (positive terminal is marked in housing).
- Now set contact plate - 3 - onto battery - 4 - .
- Now position battery - 2 - onto contact plate with positive terminal downward and lock.
- Connect upper part of radio-frequency unit - 1 - with lower

part of radio-frequency unit - **5** - and clip.

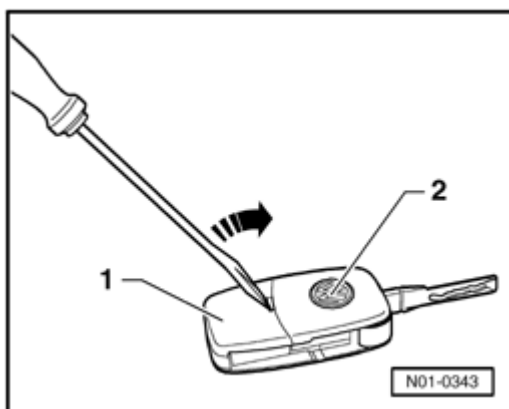
- Then engage radio-frequency unit on key.



Batteries for key with radio remote control (foldable), removing and installing ➤ 04.01

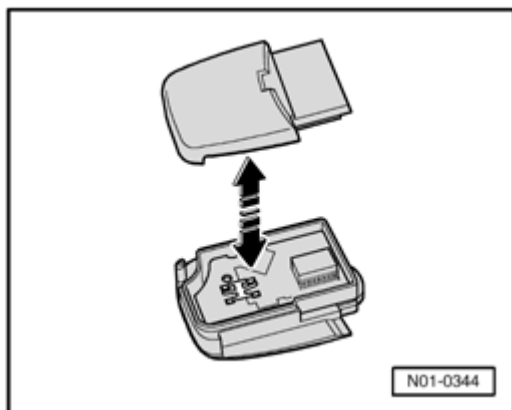
1. Radio-frequency unit - upper part
2. Key with variable code transponder
3. Radio-frequency unit - lower part
4. Battery

Removing

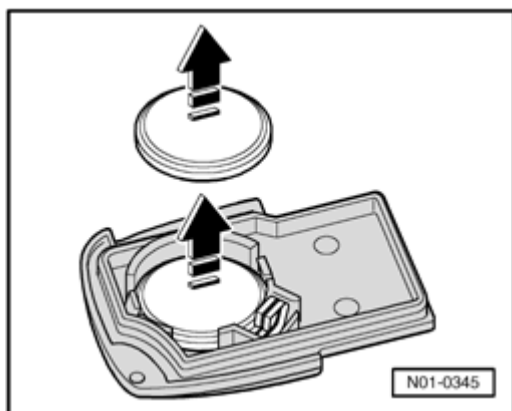


- Insert screwdriver in slot between radio-frequency unit - **1** - and key - **2** - .

- Rotate screwdriver in direction of - **arrow** - and detach radio frequency unit from key.



- Press radio-frequency apart unit in direction of - **arrow** - .

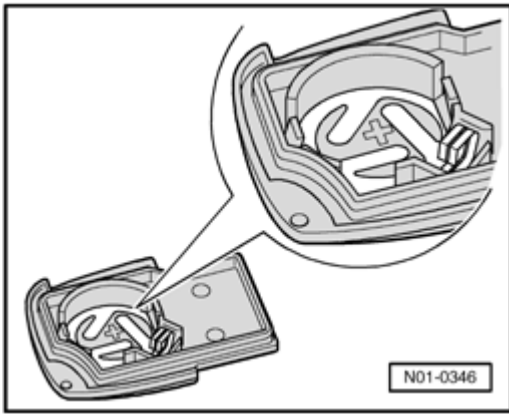


- Use a screwdriver to pry batteries out of holders in direction of - **arrow** - .

Installing

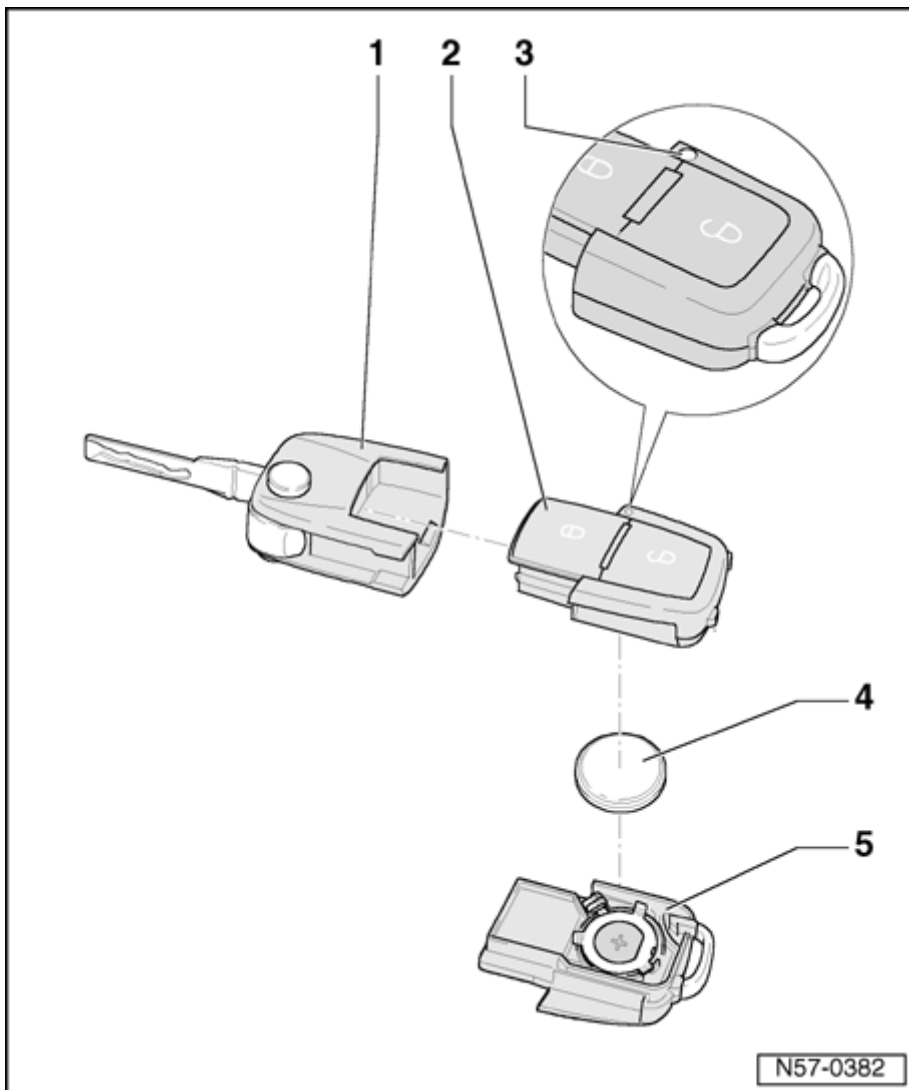
Note polarity and installation position of batteries when installing.

- Place batteries in radio-frequency unit with positive terminal downward (positive terminal is marked in housing).
- Press on battery with light pressure to engage it in radio-frequency unit.
- Reattach cover to radio-frequency unit (do not damage seal).



- Then engage radio-frequency unit on key.

Batteries for key with radio remote control (foldable) removing and installing ➤ 05.01



1. Key with alternating code transponder
2. Radio remote container - upper

3. Light Emitting Diode (LED)

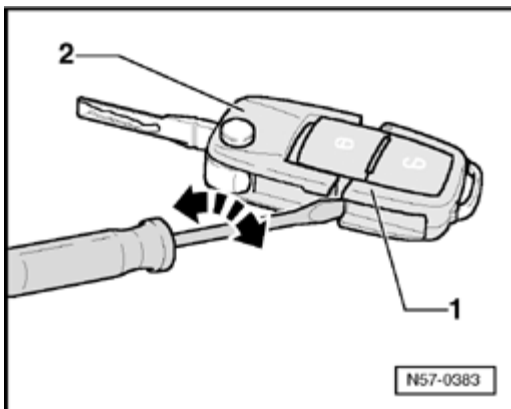
- i This Light Emitting Diode (LED) must light up when remote control is operated.
- i If Light Emitting Diode (LED) does not light up when remote control is operated, battery is completely discharged and must be replaced.

4. Battery

- i Remove battery ⇒ [57-2, Removing](#)
- i Install battery ⇒ [57-2, Installing](#)

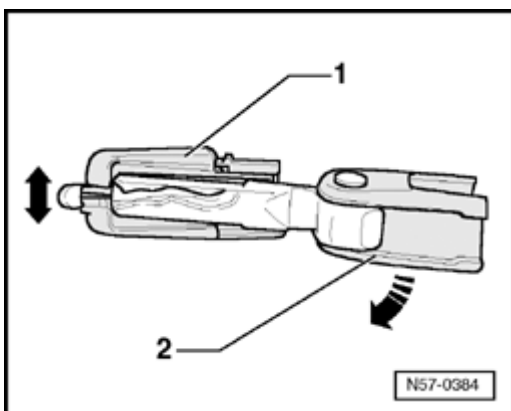
5. Radio-frequency unit - lower part

Removing

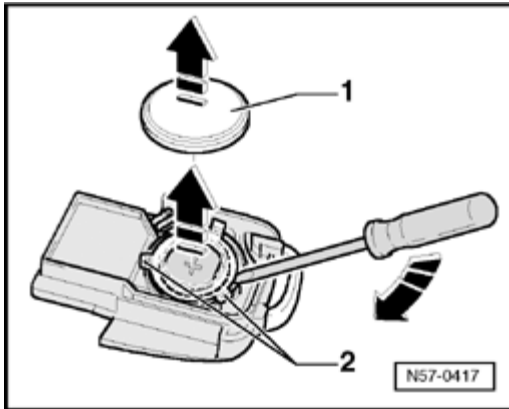


- Insert screwdriver in slot between radio-frequency unit - 1 - and key - 2 - .

- Rotate screwdriver in direction of - **arrow** - and detach radio frequency unit from key.



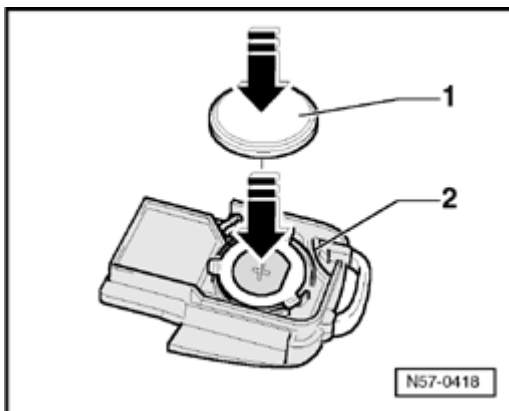
- Press apart radio-frequency unit - 1 - using key bit of key - 2 - .



- Use a screwdriver to unclip battery - 1 - out of holders - 2 - in direction of - **arrow** - .

Installing

Note polarity and installation position of battery when installing.



- Place battery - 1 - in radio-frequency unit - 2 - with positive terminal downward (positive terminal is marked in housing).
- Press on battery with light pressure to engage it in radio-frequency unit.
- Reattach cover to radio-frequency unit (do not damage seal).
- Then engage radio-frequency unit on key.

Adaptation of keys with radio remote control

Adaptation of keys with remote control is performed using Vehicle Diagnostic, Testing and Information System

VAS5051 .

- Select "Guided Fault-Finding" on diagnostic tester VAS5051 .

- Via Go To button, select "Function-/Component selection" and following menu points in sequence:

Chassis

Body-Interior; Repair

01 - On Board Diagnostic (OBD) capable systems

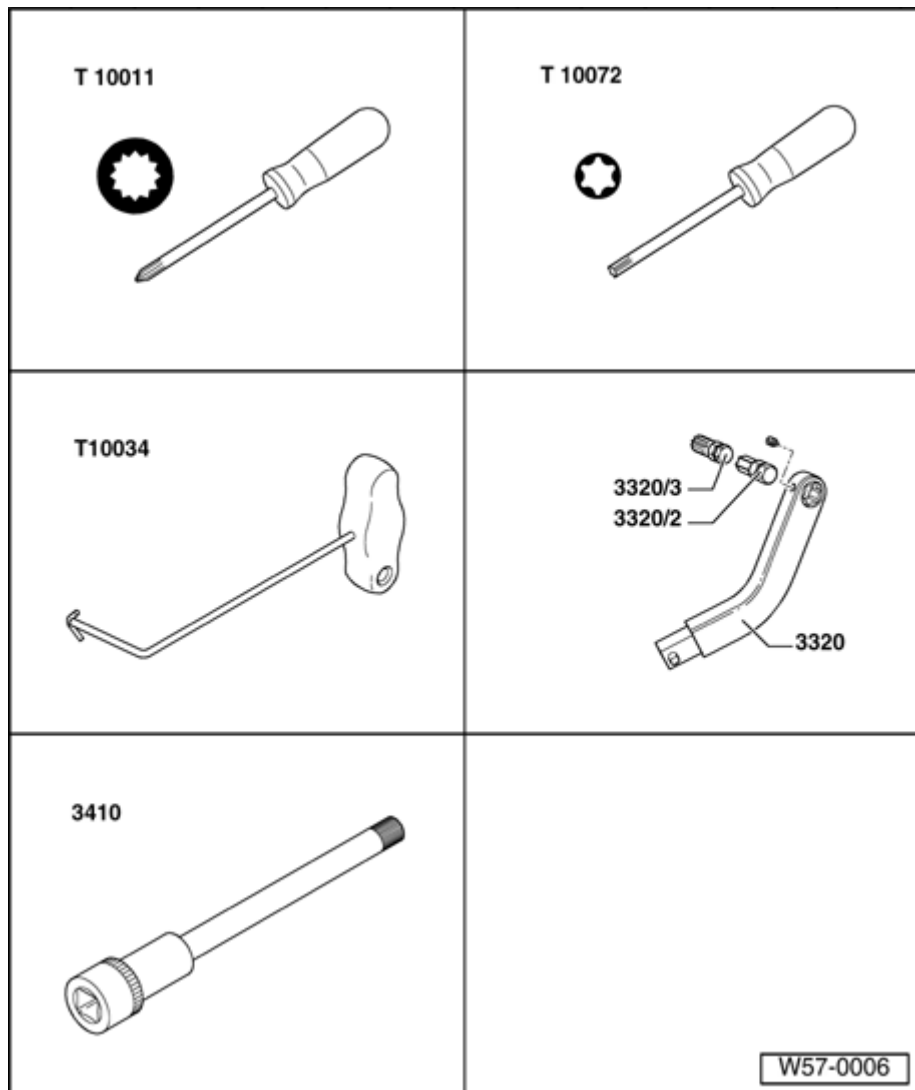
Comfort system

Functions - Comfort system

Adaptation of keys with radio-frequency remote control

Rear doors

Tools



Special tools, testers and auxiliary items required

Socket wrench T10011

Socket wrench T10072

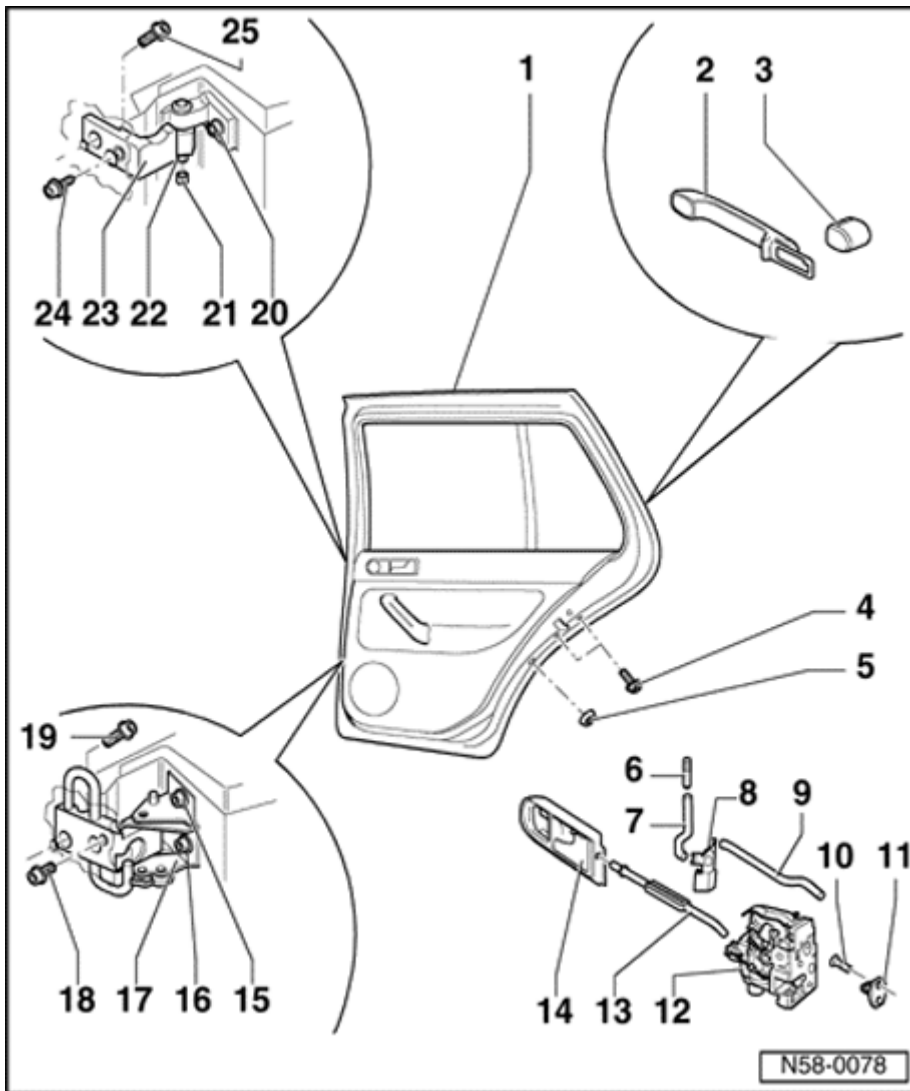
Assembly tool T10034

Box spanner 3320/2 for 3320

Box spanner 3320/3 for 3320

Socket 3410

Rear door, assembly overview



Bolts for door hinges must always be replaced after loosening.

1. Door

- Removing and installing ⇒ [58-1, Door, removing and installing](#)

2. Door handle with backing plate

- Removing and installing ⇒ [58-1, Door handle, removing and installing](#)

3. Housing

- Removing ⇒ [57-1, Lock cylinder housing, removing and installing](#)

4. Bolt

- i 20 Nm

5. Cover cap**6. Locking knob**

- i Removing and installing ⇒ [57-1, Locking knob for locking rod, removing and installing](#)

7. Locking rod**8. Bell crank****9. Locking rod****10. Bolt**

- i 20 Nm

11. Closure plate**12. Door lock**

- i Removing and installing ⇒ [58-1, Door lock, removing and installing](#)

13. Bowden cable**14. Interior door mechanism****15. Bolt**

- i M8x28
- i Only this bolt must be removed to remove door from hinge
- i 20 Nm + $1/4$ turns (90 °) turn
- i Always replace bolt after loosening

16. Bolt

- i M8x28
- i Only this bolt must be removed to remove door from hinge

- i 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- i Always replace bolt after loosening

17. Door hinge with door arrester

- i Hinge is divided

18. Bolt

- i M8x28
- i Installed from vehicle interior side
- i Remove lower B-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

- i 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- i Always replace bolts after loosening

19. Bolt

20. Bolt

- i M8x28
- i 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- i Always replace bolts after loosening

21. Cover cap

22. Bolt

- i 13 Nm

23. Door hinge

- i Hinge is divided

24. Bolt

- i M8x22

- i Installed from vehicle interior side
- i Remove lower B-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

- i 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- i Always replace bolts after loosening

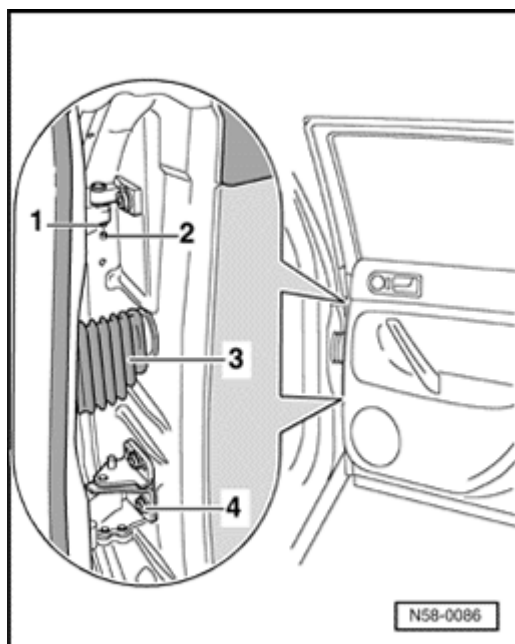
25. Bolt

- i M8x28
- i 20 Nm + $\frac{1}{4}$ turns (90 °) turn
- i Always replace bolts after loosening

Door, removing and installing

- Remove upper and lower B-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)



- Disconnect multi-pin connector below rubber boot - **3** - of B-pillar.
- Pry off cap - **2** - using screwdriver.
- Remove bolt - **1** - from upper hinge.

Tightening torque: 13 Nm

- remove lower bolt - **4** - from hinge.

Tightening torque: 20 Nm + $\frac{1}{4}$ turns (90 °) turn

Note:

This bolt must always be replaced.

- Lift out door upward from angle hinge.

Door, adjusting

For proper door adjustment, door hinge must be loosened at pillar. Other measures, such as aligning door upward, are not effective. Excess pressure thereafter will again cause door to sag.

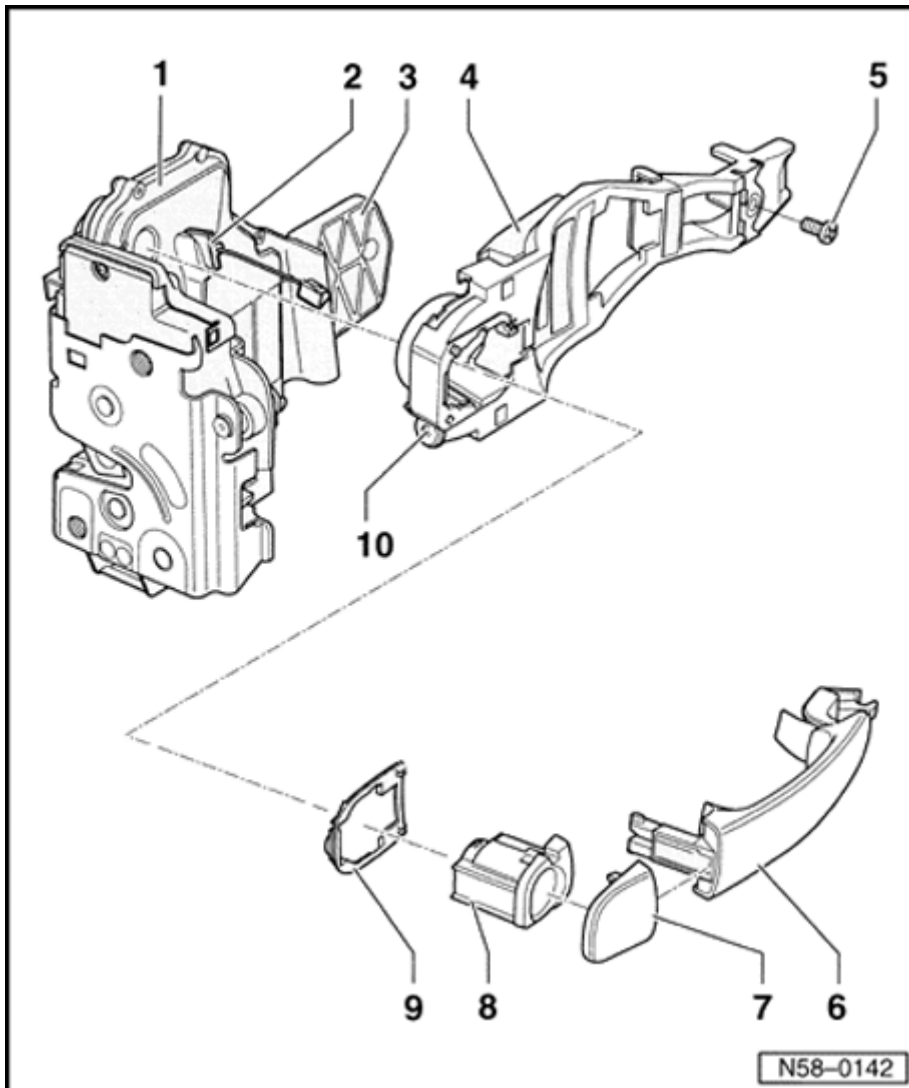
For this, Door adjusting wrench 3320 with Box spanner 3320/2 must be used.

If it should be necessary that door hinge must be loosened at B-pillar from inside, Socket insert 3410 can be used. To do so, lower B-pillar trim must be removed

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

.

Door handle and door lock, assembly overview



1. Door lock

- ı Door lock can only be removed in conjunction with carrier assembly.
- ı Removing and installing ⇒ [58-1, Door lock, removing and installing](#)

2. Cable

- ı Lock release

3. Angle bracket

- ı Bolted and riveted to door lock
- ı Does not belong to door lock delivery casing

4. Mounting bracket

- i Removing

Door handle, lock cylinder housing and carrier assembly have been removed

- Remove bolt ⇒ [Item - 5 -](#), slide mounting bracket slightly to rear and remove from door.

5. Screw

6. Door handle with backing plate

- i Removing and installing ⇒ [58-1, Door handle, removing and installing](#)

7. Cover cap

8. Housing

- i Removing ⇒ [57-1, Lock cylinder housing, removing and installing](#)

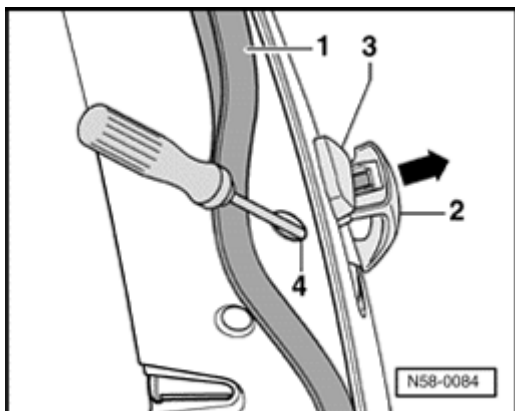
9. Base plate

10. Bolt

- i This bolt was replaced by a Torx bolt, and a new tool must be used for it
- i Socket wrench T10011
- i Socket wrench T10072
- i By loosening this bolt, locking mechanism for housing ⇒ [Item - 8 -](#) is disengaged and may be removed from mounting bracket ⇒ [Item - 4 -](#)
- i Bolt ⇒ [Item - 10 -](#) must not be threaded in without lock cylinder housing installed. Lock mechanism ring may fall into door.

Door handle, removing and installing

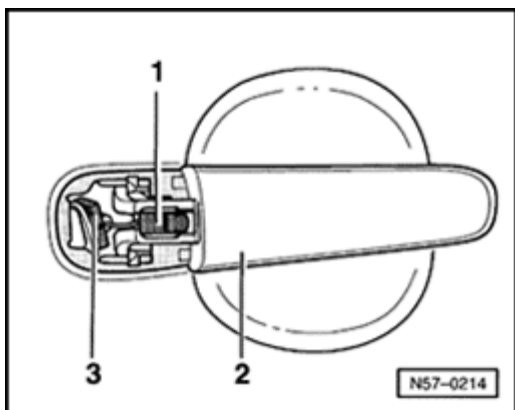
Removing



- Pull off door seal - **1** - in area of door handle.
- Pull door handle - **2** - in direction of - **arrow** - and hold in this position. Remove bolt - **4** - up to stop using Socket wrench T10011 (T10072). Housing is loosened by doing so.

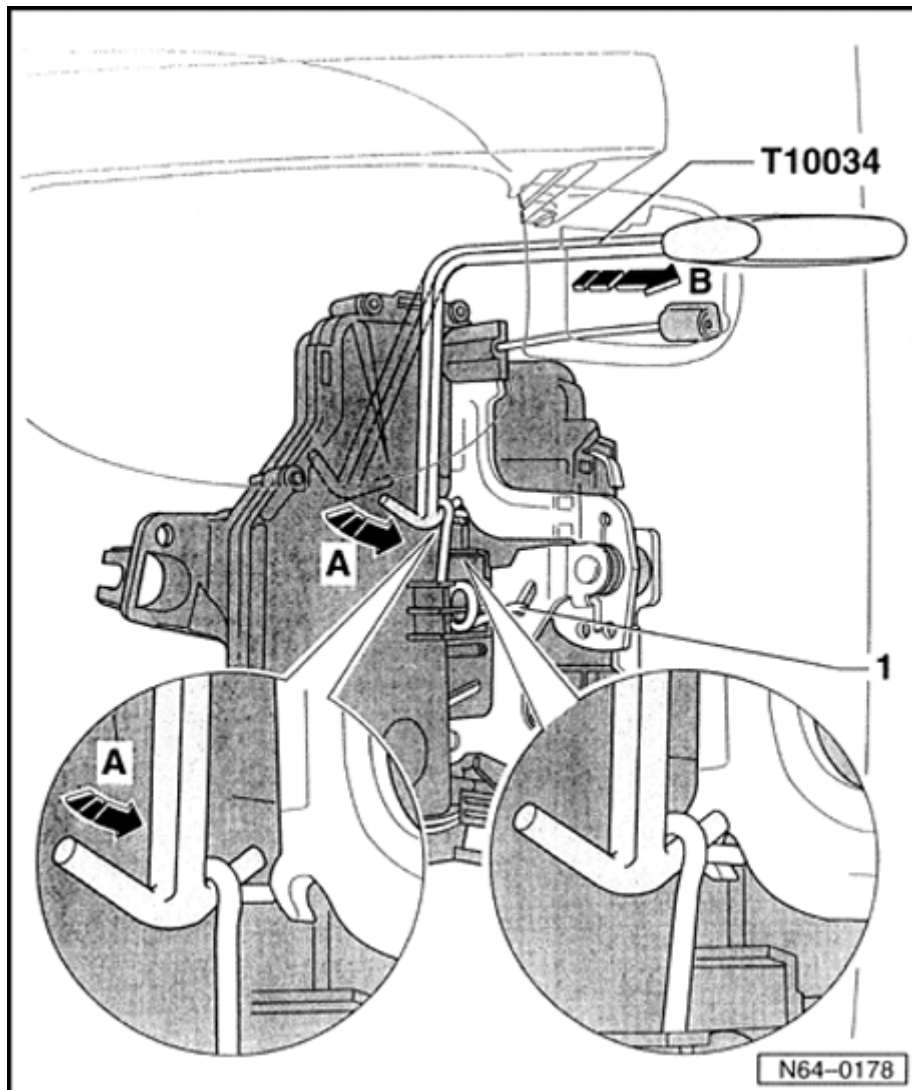
Note:

If bolt has been loosened too far, this may cause lock mechanism ring to loosen from mounting bracket and fall into door.

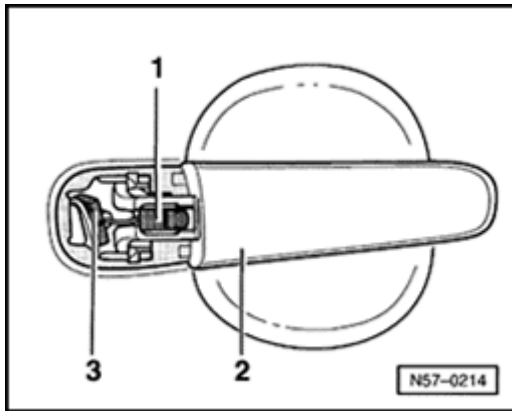


- Remove housing - **3** - at right angle to door from door handle mounting bracket.
- Unclip clip - **1** - from door handle.
- Swivel out door handle from door.

Installing



- Guide Assembly tool T10034 into door through opening in inner door plate.
- Light inner part of door using a flashlight for better view.
- Hook assembly tool into spring - **1** - - **arrow A** - .
- Engage spring into door lock by pulling installation tool - **arrow B** - .
- Install door handle into door.



- Insert clip - 1 - into metal cut out and engage into door handle - 2 - .

- Insert lock cylinder housing at right angle into door handle mounting bracket.

- Now screw in bolt into mounting bracket using torque wrench.

Door handle engages again into lock cylinder housing with a very audible click.

Note:

During installation, door handle - 2 - must be pressed onto door plate.

- Then, perform in reverse order of removal.

Then a function test must be performed, since door cannot be opened if adjustment and clips of Bowden cable are not correct.

Door lock, removing and installing

Window regulator, door lock and loudspeaker are secured to carrier assembly.

Door lock can only be removed in conjunction with carrier assembly.

Carrier assembly can only be removed when door window is removed from window regulator. For this purpose, door window must be driven down to height of installation hole in carrier assembly and spreader pins must be removed.

If it is not possible to drive down door window by electrical window regulator, first exact cause of malfunction must be determined.

To do so, using Scan Tool (ST) V.A.G1551 , check DTC Memory of comfort system (address word 46)

⇒ [Repair Manual, Body On Board Diagnostic \(OBD\), Repair Group 01, Comfort system; check DTC Memory](#)

.

If there is an electrical fault via window regulator motor, this can be removed from carrier assembly.

Removing

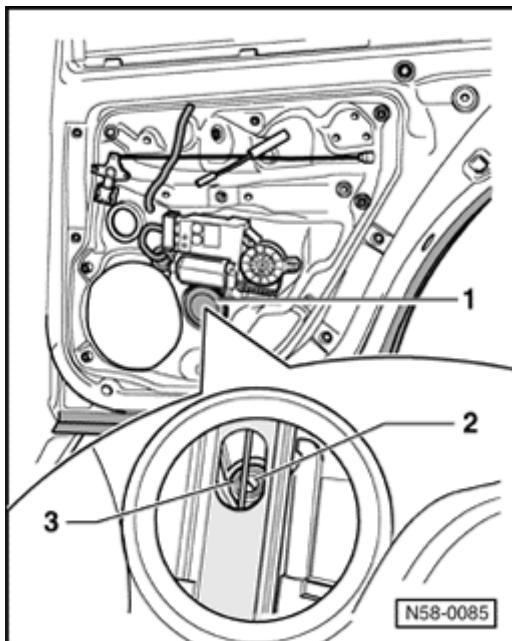
- Removing rear door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Door trim, removing and installing](#)

.

- Remove housing.

- Removing and installing lock cylinder housing ⇒ [57-1, Lock cylinder housing, removing and installing](#) .



- Pry off cap - 1 - .

- Lower door window until spreader pin - 2 - and spreader plug - 3 - are accessible in window cut-out.

Note:

If work step is not possible due to a malfunction via electrical window regulator, window regulator motor can be removed to be able to slide window down.

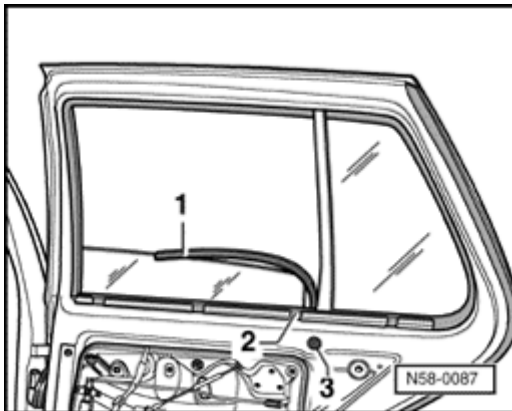
- Screw in a 5 mm bolt (approx. 70 mm long) into spreader pin - **2** - and pull out from spreader plug - **3** - .

- Now screw in a 8 mm bolt (approx. 80 mm long) into spreader plug - **3** - .

Note:

When screwing bolt into spreader plug, do not use excessive force on anchor otherwise it may fall backward into door.

- Pull out spreader plug from window regulator guide and thereby from door window.



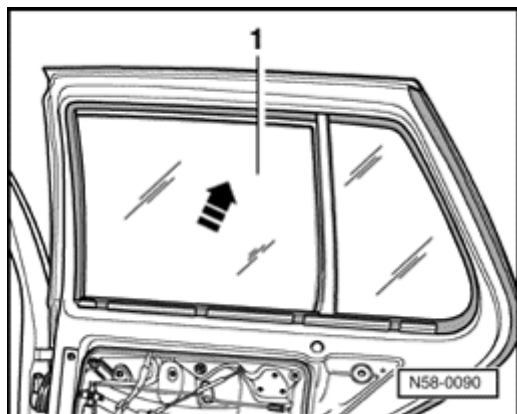
- During this, cable - **2** - must be pressed to side from window using a screwdriver.

- Pull off seal - **1** - from center bar up to window recess seal - **2** - .

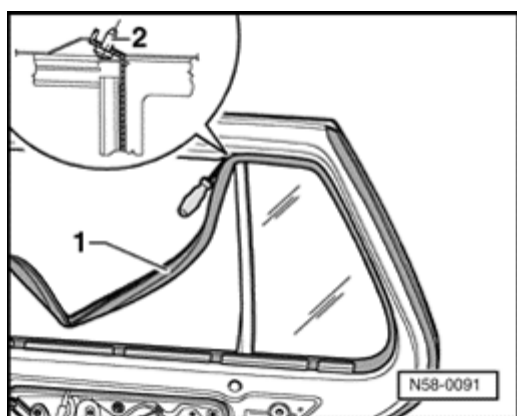
- Pry off cap - **3** - .

- Remove then-visible bolt.

- Using a screwdriver - **1** - , lift catch - **2** - and remove filler piece - **3** - upward out of window frame - **4** - .



- Slide door window - **1** - upward and remove inward - **arrow** - from door.

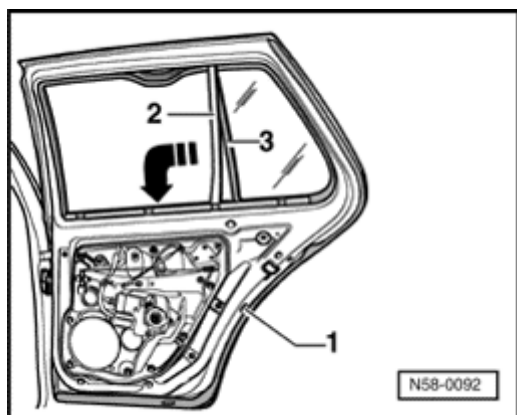


- Remove window guide - **1** - in upper area and remove bolt - **2** - at center bar.

Note:

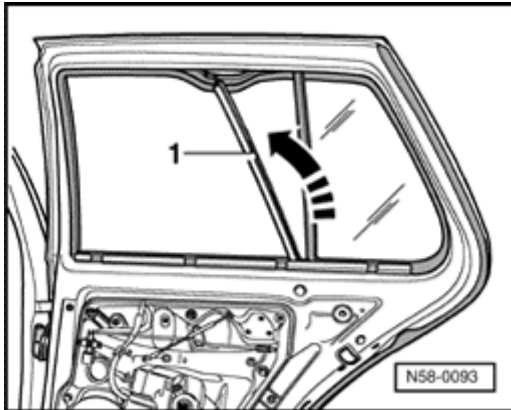
*Bolt - **2** - is gradually being discontinued. Therefore, center bar is then clipped into door at top.*

Rest of work procedure remains identical.

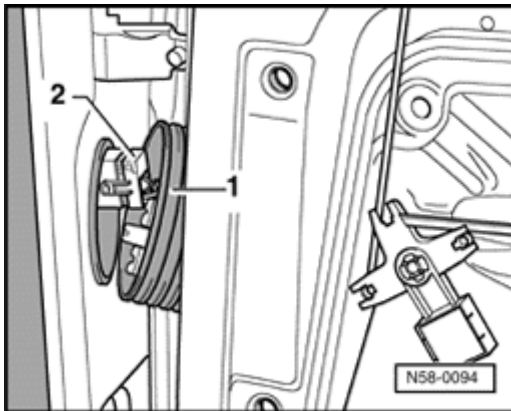


- Remove bolt - **1** - .

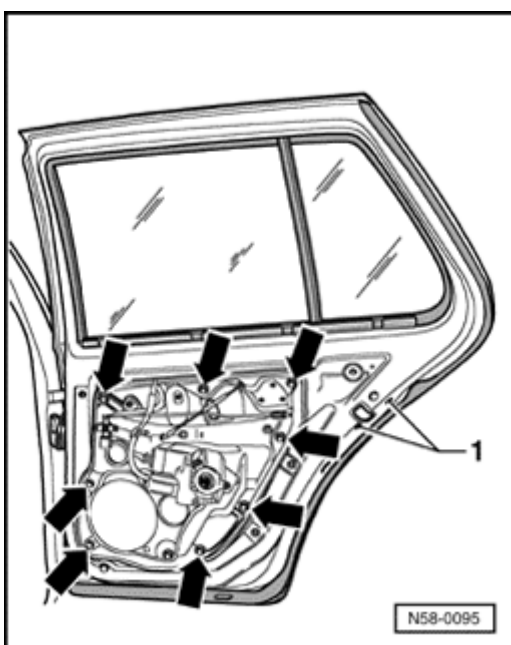
- Remove center bar - **2** - from quarter window seal - **3** - and remove downward from top of window guide.



- Remove center bar - **1** - upward - **arrow** - from door.

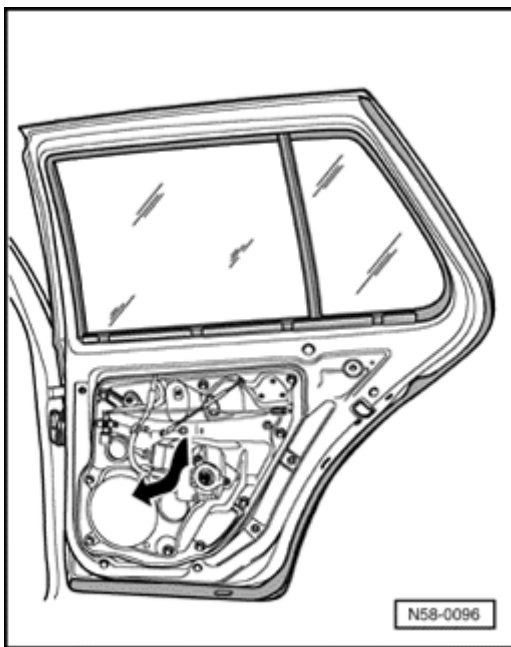


- Remove boot - **1** - from B-pillar.
- Disconnect connector - **2** - .



- Remove bolts - **arrows** - .

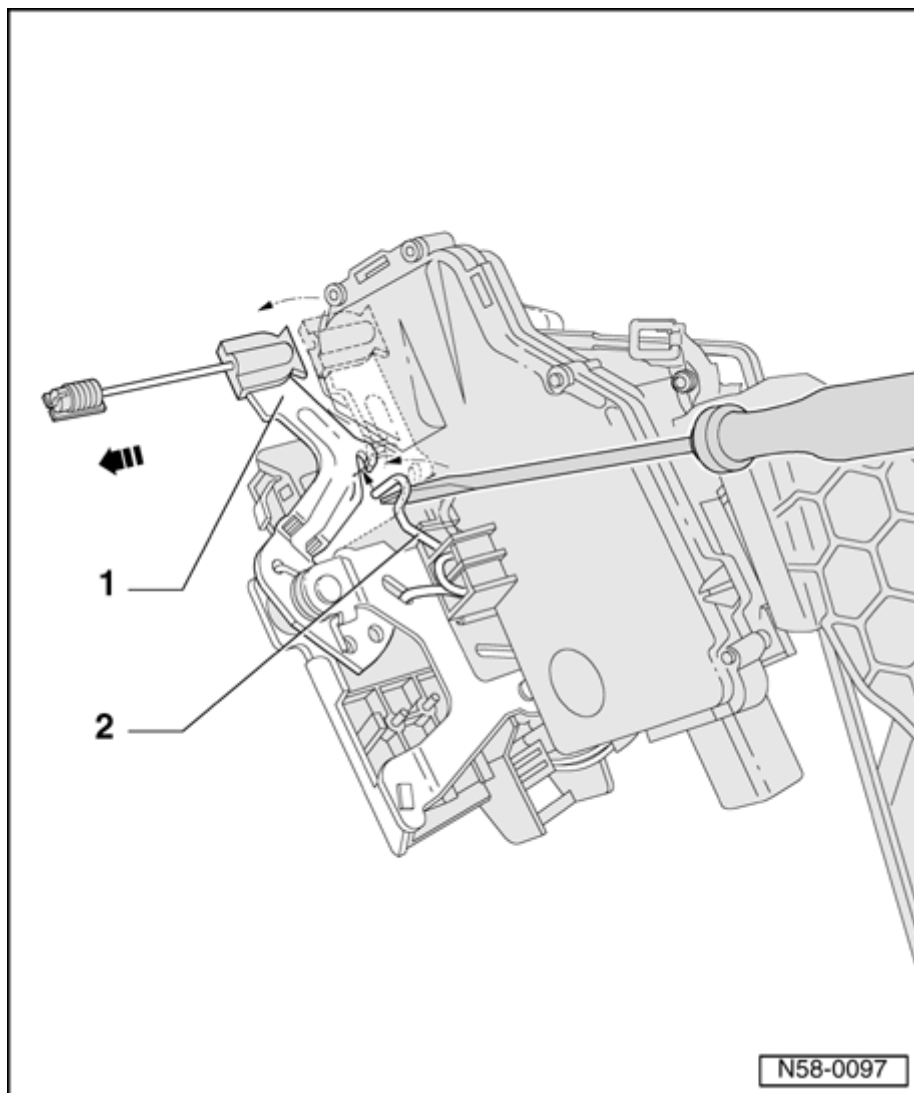
- Remove bolt - **1** - (for lock).



- Remove upper carrier assembly from door, lift and lift out of door toward hinge side - **arrow** - of door.

- Next, loosen two clips for electrical wire from reinforcement plate in door and disconnect wire from boot.

Installing



- Pull operating lever - **1** - in direction of - **arrow** - .

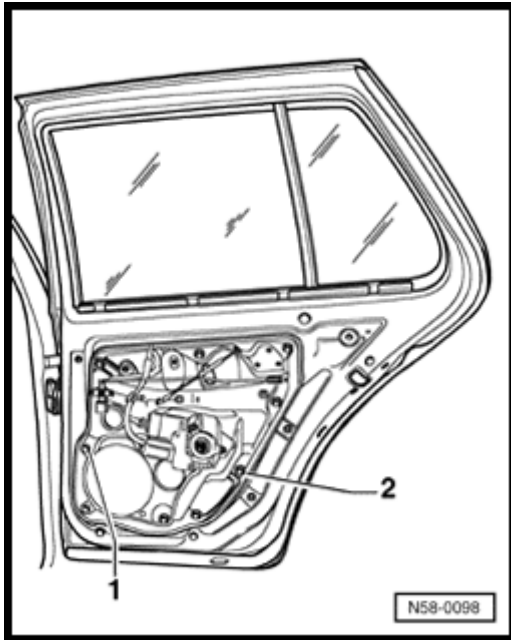
- Using a screwdriver, tension spring - **2** - secured to door lock in direction of - **arrow** - and engage lock lever into spring.

Note :

Lock is secured by engaging operating lever. Thereby later "incorrect" clipping-in of Bowden cable is prevented.

- Thread in electrical wire through boot into door and secure clips in door plate.

- Insert carrier assembly into door.



- Tighten all bolts. Tighten bolts marked - 1 - and - 2 - in specified sequence.

Tightening torque: 8 Nm

- Remaining bolts can be tightened in any sequence.
- Installing door window, see installing door window to window regulator ⇒ [58-1, Door window, assembling to window regulator](#) .
- Then proceed in reverse order of removal.

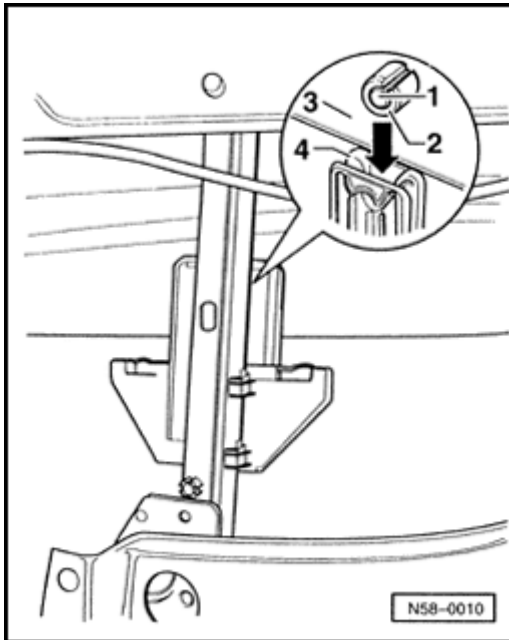
Then, perform a function load test.

Door window, assembling to window regulator

Note:

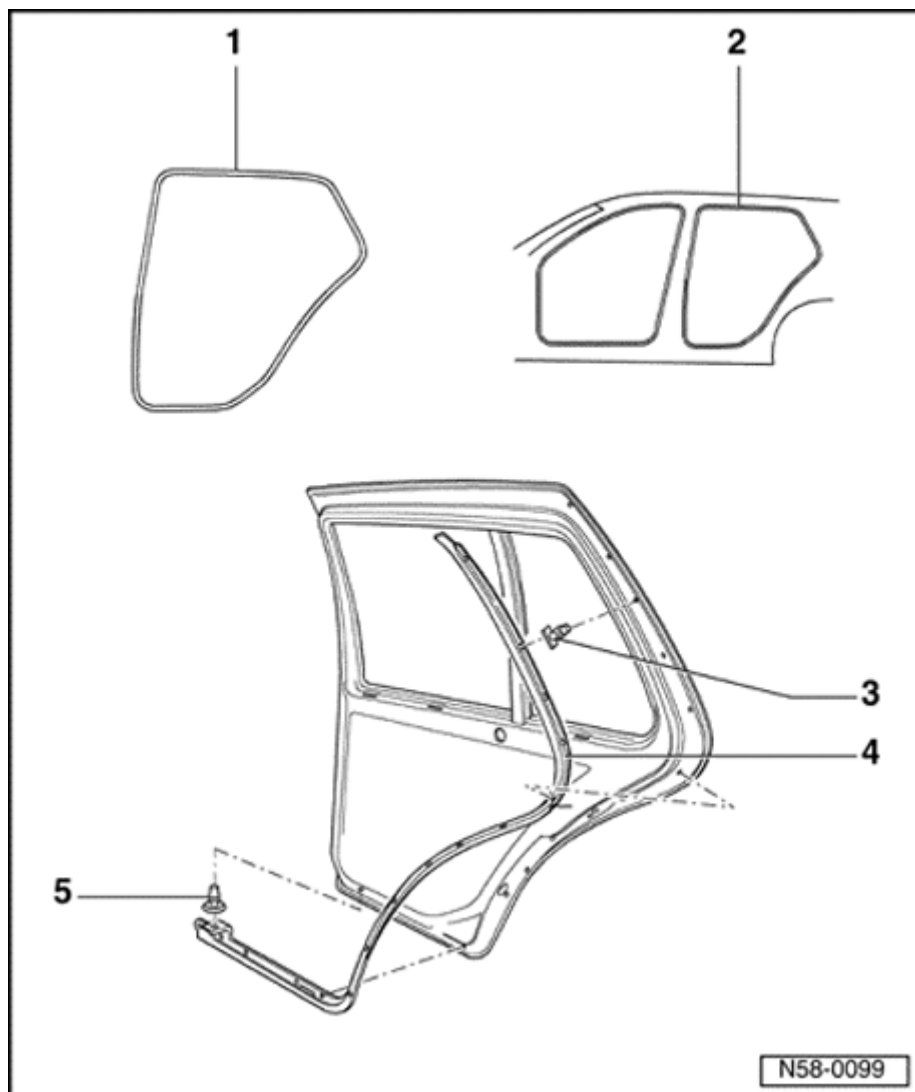
Spreader plug and spreader pin must always be replaced when performing installation work at door window.

- Window must be checked for damage before inserting spreader plug and spreader pin.



- With window removed, insert spreader plug - 2 - centered.
- Press in spreader pin - 1 - flush into spreader plug - 2 - .
- Guide door window into door.
- Insert door window - 3 - into slit of window regulator guide - 4 - .
- Using light pressure from above, lock window into window regulator - **arrow** - .

Door seals



Door seals are equipped at factory with sealant, applied to door flange and then rolled on.

Note :

During removal of seal, sealant is distributed on interior side of seal and flanks are bent up easily. If seal is re-installed, sealing performance and proper seating are no longer guaranteed.

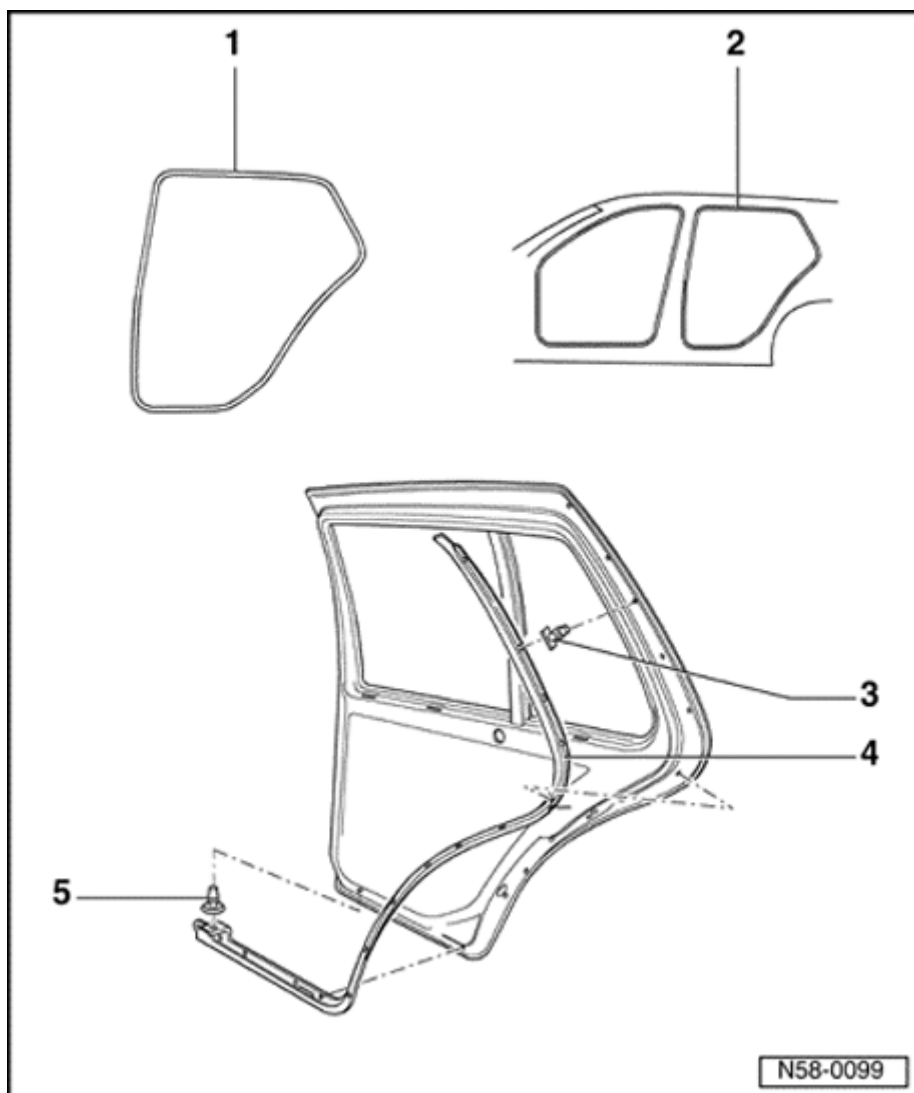
For this reason, every completely removed seal must be replaced with a so-called "hammer-stroke seal" .

For partially removed seals, seal flanks must be pressed together before installation.

Door seals, assembly overview

Note :

Trim must be removed in order to remove door seals.

**1. Internal door seal**

- ı To install seal, begin in upper radius of door cut out.

2. Door inner seal, 4-door**3. Clip**

- ı Inserted into door seal

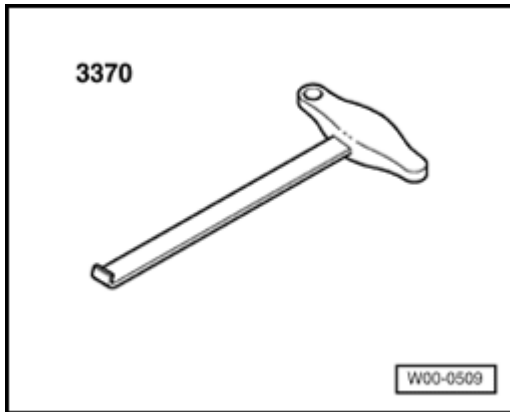
4. Outer door seal, 4-door**5. Clip**

- ı Inserted into door seal

Sunroof

Tools

Special tools, testers and auxiliary items required



Hook for front end 3370

General Information

Sunroofs manufactured by "Webasto" and "Rockwell (Meritor)" are installed.

Sunroofs of both manufacturers cannot be distinguished regarding function/operation and when installed on vehicle have barely any outwardly visible characteristics to distinguish them.

Function ⇒ [60-1, Function](#) .

However, there is a fundamentally strong difference of both sunroofs regarding construction and design, that there is a difference for most repair procedures between both sunroofs.

During replacement of a complete slide/tile sunroof, slide/tile sunroof can be replaced without noting manufacturer.

Always differentiate between both manufacturers of slide/tile sunroofs when performing repairs or servicing work and ordering replacement parts.

Distinguishing characteristics ⇒ [60-1, Distinguishing features of Webasto and Rockwell \(Meritor\) sunroofs](#) .

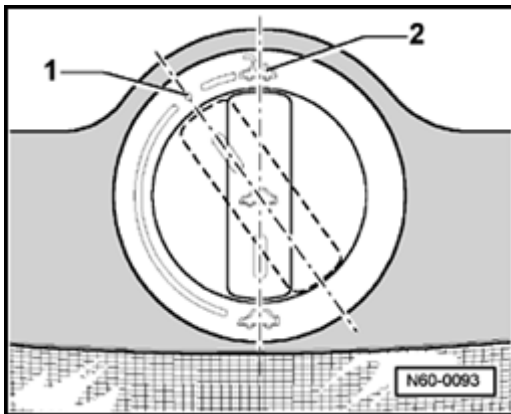
Function

Sunroof is opened and closed via rotary switch when

ignition is switched on/tilted out and closed by pressing and pulling.

After switching off ignition, slide/tile sunroof can still be opened and closed as long until drivers or passengers door is opened.

On rotary switch, there are markings for preset tilt positions of glass panel. However, any other intermediate tilt position can be selected by turning switch in clockwise direction.



In switch position - 1 - , opening of slide/tile sunroof in so-called comfort position decreases driving wind noise which can occur at complete opening in switch position - 2 - .

Tilt-up/closing of sunroof is performed as long as switch is pressed/pulled or until respective end position of glass panel is reached.

Sunroof is equipped with a closing force limit in area of window. When an obstruction is met during closing sequence, roof opens again by itself.

As of calendar week 32. 1998, a new motor and rotary switch was introduced. For this change, glass panel is also tilted up and closed using rotary switch.

In addition, glass panel is closed by pressing rotary switch, as long as rotary switch remains pressed.

Note:

Motor and switch can only be recognized on new replacement part numbers and must not be installed with older versions.

In addition, there is an emergency close function. If there are problems closing, sunroof can be forced closed by pressing preselector, which must be located in "Sunroof closed" position.

For emergency close function, closing force limit is deactivated.

Sunroof drive motor is protected against overheating via a running time limit. Protective mechanism activates after an uninterrupted operation of approx. two minutes. It can only be operated again after a cool-off phase.

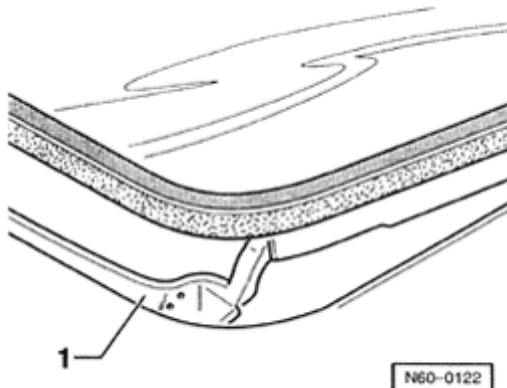
Distinguishing features of Webasto and Rockwell (Meritor) sunroofs

Following distinguishing characteristics make it possible to determine respective manufacturer of sunroof while installed and to allocate repair procedures for sunroofs manufactured by Webasto or Rockwell (Meritor).

Water channel connection

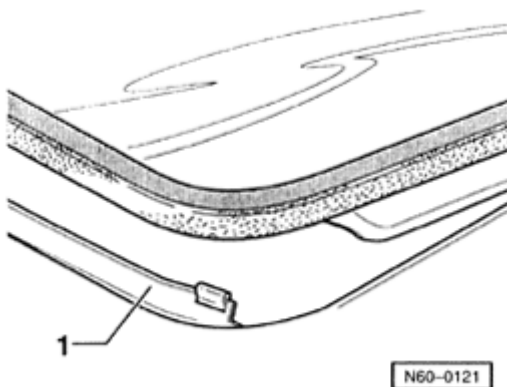
- Open sunroof and check connection of water channel.

Webasto:



Water channel - 1 - is connected to glass panel in rear corner areas.

Rockwell (Meritor):

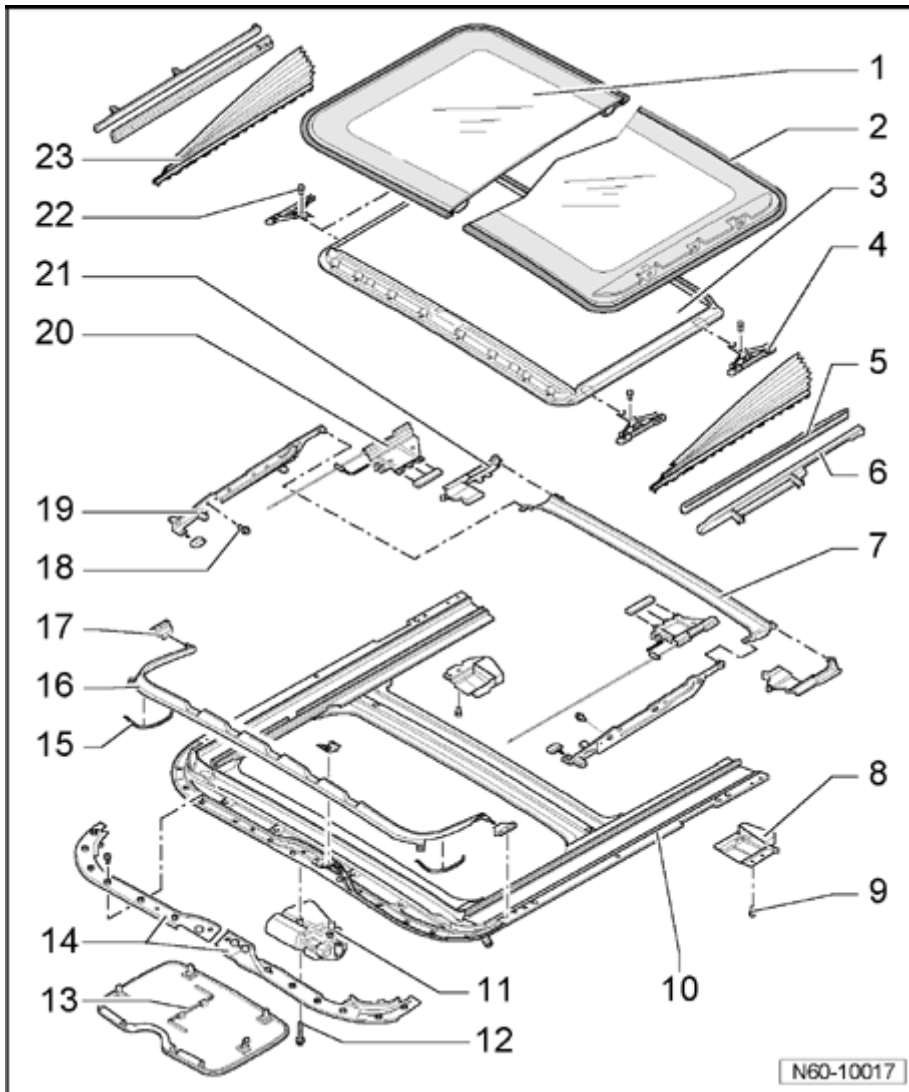


Water channel - 1 - has no connection to glass panel in

rear corner areas.

Sunroof with glass panel (Webasto)

Sunroof with glass panel, assembly overview



1. Glass panel for sunroof (single pane safety glass)

- ; Removing glass panel for sunroof ⇒ [60-2, Removing glass panel for sunroof](#)
- ; Installing glass panel for sunroof ⇒ [60-2, Glass panel for sunroof, installing](#)
- ; Adjusting glass panel for sunroof ⇒ [60-2, Glass panel for sunroof \(height adjustment\), adjusting](#)

2. Panel seal

- i Panel seal, replacing ⇒ [60-2, Panel seal, replacing](#)

3. Sliding headliner

- i Removing and installing Sliding headliner ⇒ [60-2, Sliding headliner, removing](#)

4. Slider

5. Lower trim

- i Vehicles up to calander week 35 2002 (CW 35/02)
- i Removing ⇒ [60-2, Removing glass panel for sunroof](#)

6. Upper trim

- i Vehicles up to calander week 35 2002 (CW 35/02)
- i Removing ⇒ [60-2, Removing glass panel for sunroof](#)

7. Water channel

- i Removed together with slotted guide rail

8. End piece

- i Use Butyl adhesive sealing cord AKL 450 005 05 for sealing

9. Bolt

- i 3.5 Nm

10. Installation unit

- i Removing installation unit ⇒ [60-2, Installation unit, removing and installing](#)

- ı U-frame (with guide channels), if necessary use special grease G 000 450 02 exclusively to grease guide channels, otherwise functions cannot be guaranteed.

11. Drive motor

- ı Removing ⇒ [60-2, Drive motor for sunroof, removing](#)
- ı Adjusting drive motor (zero position) ⇒ [60-2, Drive motor for sunroof, adjusting \(zero position\)](#)

12. Bolt

- ı 3.5 Nm

13. Hex wrench for emergency operation

- ı Clipped in on drive motor cover

14. Cover

15. Spring

16. Wind deflector

- ı Removing ⇒ [60-2, Wind deflector, removing](#)

17. Wind deflector mounting

18. Torx screw

- ı Torx T25
- ı 4.5 Nm

19. Slotted guide rail

- ı Removing ⇒ [60-2, Slotted guide rail, removing](#)

20. Guide with cable

21. Carriage for water channel

22. Countersunk screws (microencapsulated)

- i Always use new countersunk screws
- i 3.5 Nm

23. Trim pieces

- i Vehicles from calander week 36 2002 (CW 36/02) on
- i Removing ⇒ [60-2, Removing glass panel for sunroof](#)
- i Installing ⇒ [60-2, Glass panel for sunroof \(height adjustment\), adjusting](#)

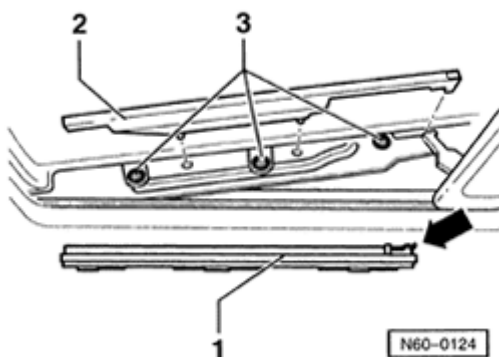
Note :

Trim pieces and trim must not be swapped with each other during replacement. Clearance for mechanical components is otherwise not guaranteed.

Removing glass panel for sunroof

- Slide sliding headliner toward rear.
- Tilt sunroof open.

Vehicles up to calander week 35 2002 (CW 35/02)

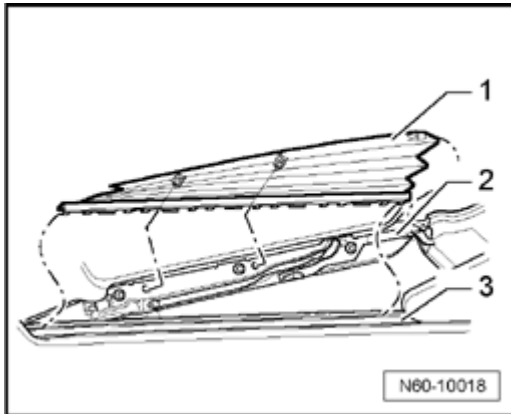


- Unclip lower trim - 1 - in rear area - **arrow** - , slide toward front and remove from roof frame.

- Unclip upper trim - **2** - at front and in center and remove at rear.

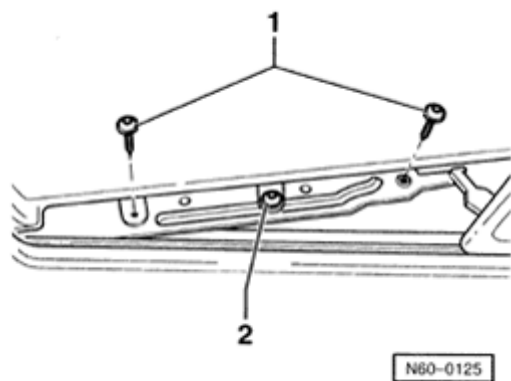
Vehicles from calander week 36 2002 (CW 36/02) on

In vehicles from calander week 36 2002 (CW 36/02) on, a trim piece is installed in place of a lower trim and an upper trim.



- Unclip lower trim - **1** - from securing rails - **3** - .
- Unhook lower trim - **1** - at top, rear, from glass panel for sunroof - **2** - .
- Unhook lower trim - **1** - at top, rear, from glass panel for sunroof - **2** - .
- Unclip lower trim - **1** - from glass panel for sunroof - **2** - .
- Remove lower trim - **1** - .

Continued for all vehicles



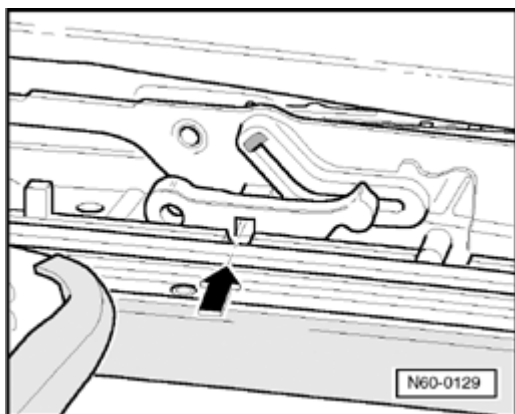
- Remove securing bolts - **1** - (Torx T25; 4.5 Nm). Loosen center bolt - **2** - only - do not remove.
- Lift sunroof out.

Glass panel for sunroof, installing

Panel must be installed in zero position (panel closed).

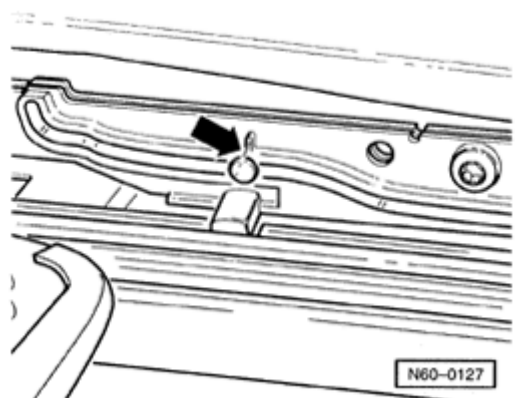
Zero position:

Vehicles up to calender week 31 1998 (CW 31/98)



Square holes in tilt levers must align with grooves in guide rails - **arrow** - .

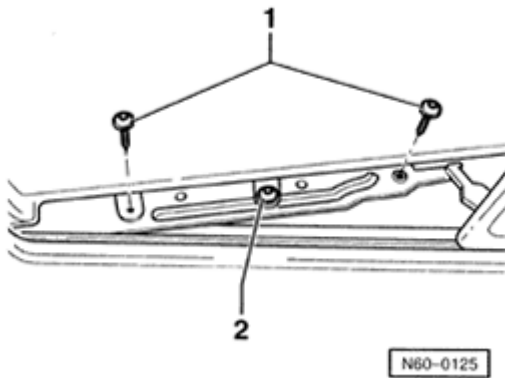
Vehicles from calender week 32 1998 (CW 32/98) on



Guide rail pin must align with marking (pin) on guide rail - **arrow** - .

If this is not case, adjust parallel movement ⇒ [60-2, Parallel movement, adjusting](#) .

- Insert sunroof panel from above and screw in securing bolts (guide rail/panel).



- Slightly tighten securing bolts - 1 - and - 2 - (Torx T25).
- Adjusting glass panel for sunroof (height adjustment) ⇒ [60-2, Glass panel for sunroof \(height adjustment\), adjusting](#)

Note:

Tighten securing bolts after panel height adjustment (4.5 Nm).

Vehicles up to calender week 35 2002 (CW 35/02)

- Install lower trim and upper trim after panel height adjustment.

Vehicles from calender week 36 2002 (CW 36/02) on

In vehicles from calender week 36 2002 (CW 36/02) on, a trim piece is installed in place of a lower trim and an upper trim.

Note:

Trim piece and trim must not be replaced against each other. Clearance for mechanical components is otherwise not guaranteed.

Install trim piece after panel height adjustment.

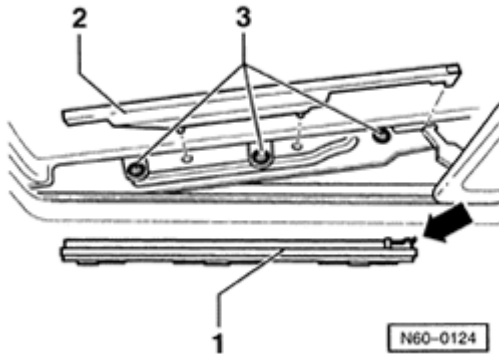
Glass panel for sunroof (height adjustment), adjusting**Note:**

Glass panel height adjustment is to be performed after glass panel has been closed out of sliding position.

Zero position of sunroof OK.

- Tilt sunroof open.
- Slide sliding headliner toward rear.

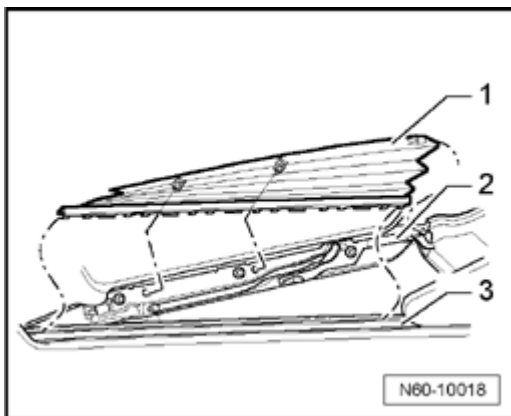
Vehicles up to calender week 35 2002 (CW 35/02)



- Unclip lower trim - **1** - in rear area - **arrow** - , slide toward front and remove from roof frame.
- Unclip upper trim - **2** - at front and in center and unhook at rear.

Vehicles from calender week 36 2002 (CW 36/02) on

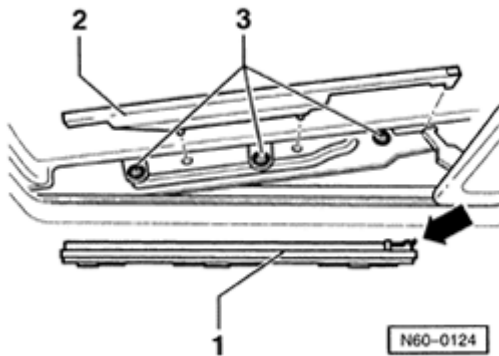
In vehicles from calender week 36 2002 (CW 36/02) on, a trim piece is installed in place of a lower trim and an upper trim.



- Unclip lower trim - **1** - from securing rails - **3** - .
- Unclip lower trim - **1** - at top, rear, from glass panel for sunroof - **2** - .
- Unhook lower trim - **1** - at top, rear, from glass panel for sunroof - **2** - .
- Unclip lower trim - **1** - from glass panel for sunroof - **2** - .
- Remove lower trim - **1** - .

Continued for all vehicles

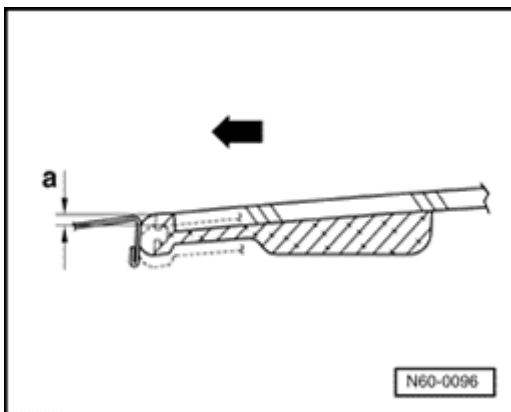
- Loosen securing bolts - **3** - (Torx T25; 4.5 Nm).



- Close glass panel, open and close again (sequence must be observed for a proper adjustment).

- Perform glass panel height adjustment at front and rear on both sides as follows:

Panel adjustment at front:

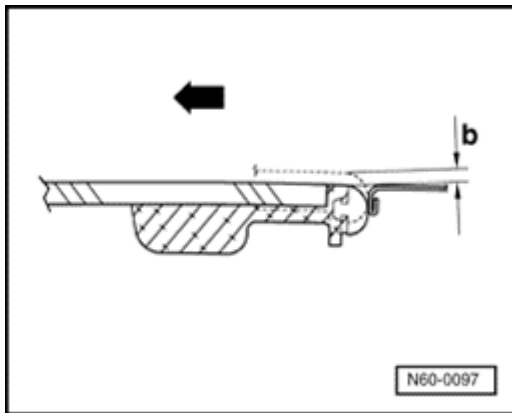


- **a** - = 0 - 1 mm lower than roof

- **arrow** - = direction of travel

Panel adjustment at rear:

- **b** - = 0 - 1 mm higher than roof

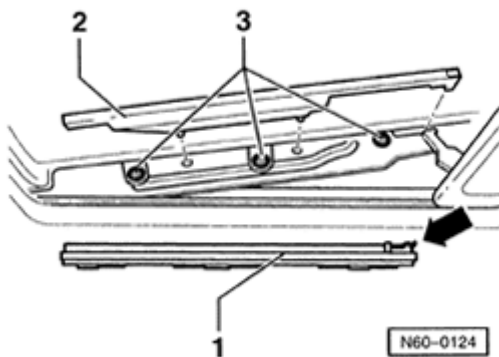


- **arrow** - = direction of travel
- Tighten glass panel bolts (4.5 Nm).

Always adjust left and right-hand glass panel sides symmetrically.

- Tilt sunroof open.

Vehicles up to calendar week 35 2002 (CW 35/02)



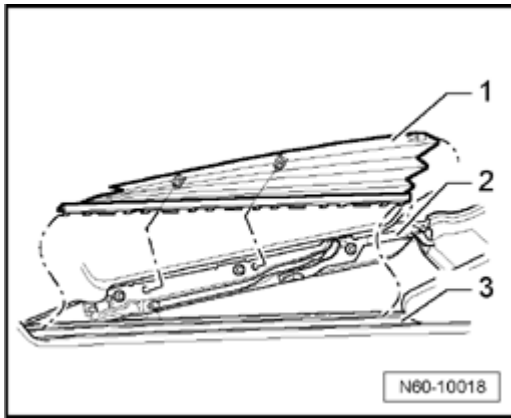
- Hook upper trim - **2** - at rear and in center and clip in at front.
- Slide lower trim - **1** - in direction of - **arrow** - into rear elongated hole and clip in at front area.

Vehicles from calendar week 36 2002 (CW 36/02) on

Note:

In vehicles from calendar week 36 2002 (CW 36/02) on, a trim piece is installed in place of a lower trim and an upper trim.

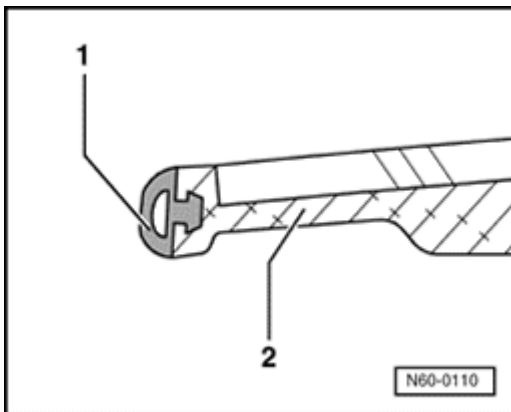
Trim piece and trim must not be replaced against each other. Clearance for mechanical components is otherwise not guaranteed.



- Clip in trim piece - 1 - into glass panel for sunroof - 2 - .
- Hook in trim piece - 1 - at top, rear, into glass panel for sunroof - 2 - .
- Engage trim piece - 1 - at top, rear, with glass panel for sunroof - 2 - .
- Engage trim piece - 1 - with securing rails - 3 - .

Panel seal, replacing

- Removing glass panel for sunroof ⇒ [60-2, Removing glass panel for sunroof](#) .



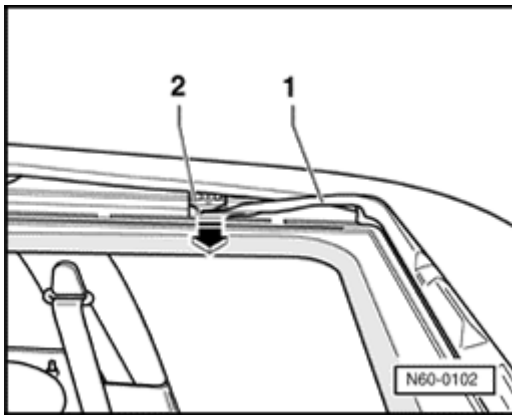
- Pull off seal - 1 - from glass panel.
- Press in new seal at center into glass panel - 2 - .

Note:

Coat edge of panel with soapy water to facilitate installation of seal.

Wind deflector, removing

- Open sunroof completely.



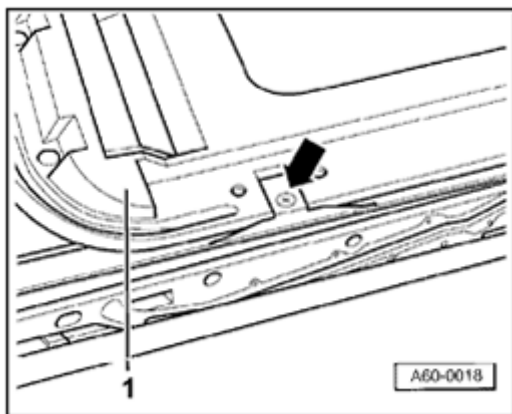
- Press out wind deflector - **1** - downward and simultaneously toward vehicle center - **arrow** - on both sides out of guide - **2** - .

- Remove wind deflector.

Sliding headliner, removing

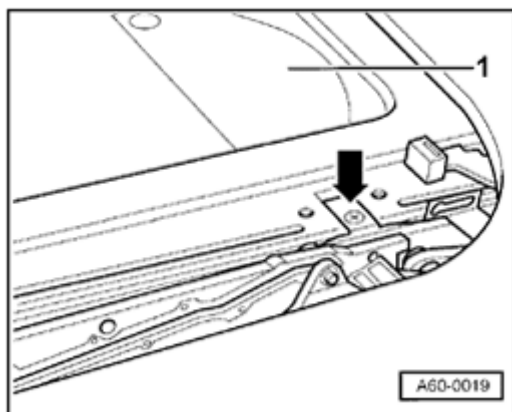
- Removing glass panel for sunroof ⇒ [60-2, Removing glass panel for sunroof](#) .

- Slide back sliding headliner slightly to facilitate installation.



- Remove front bolts - **arrow** - at left and right. Slide out slider toward front over stop - **1** - .

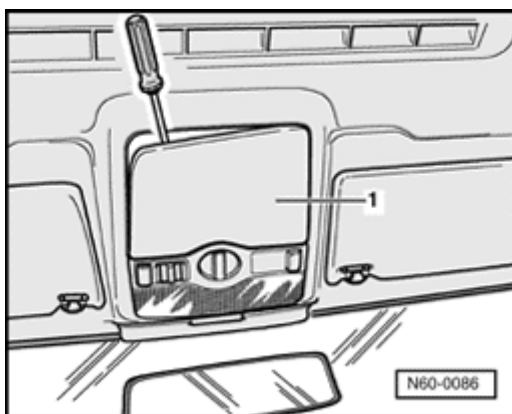
- Slide sliding headliner toward front.



- Remove rear bolts - **arrow** - at left and right. Slide slider toward rear and remove sliding headliner - **1** - upward.

Drive motor for sunroof, removing

- Disconnect Ground (GND) strap from battery.

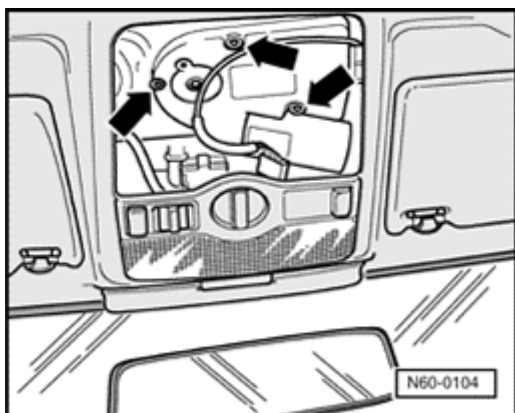


- Unclip cover - **1** - for drive motor.

Note:

Only remove and install drive motor for sunroof when roof is closed (zero position ⇒ [60-2, Drive motor for sunroof, adjusting \(zero position\)](#)).

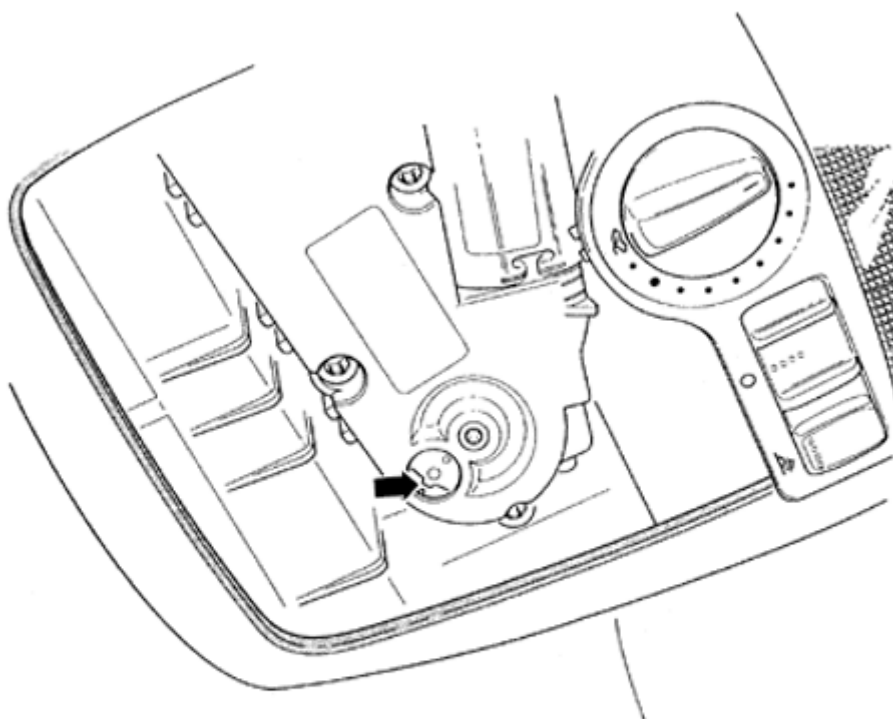
- Unclip and disconnect connector.



- Remove bolts - **arrows** - and remove drive motor for sunroof.

Bolts for drive motor are microencapsulated and must always be replaced (3.5 Nm).

Drive motor for sunroof, adjusting (zero position)



N60-0128

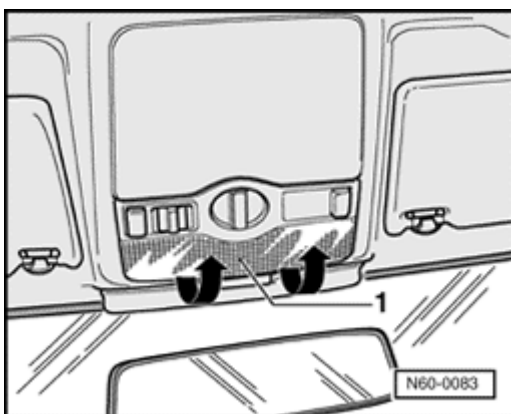
Adjustment of zero position may be necessary if drive motor was removed while not in zero position or sunroof was closed or opened via emergency operation.

Drive motor removed, but electrical wires connected.

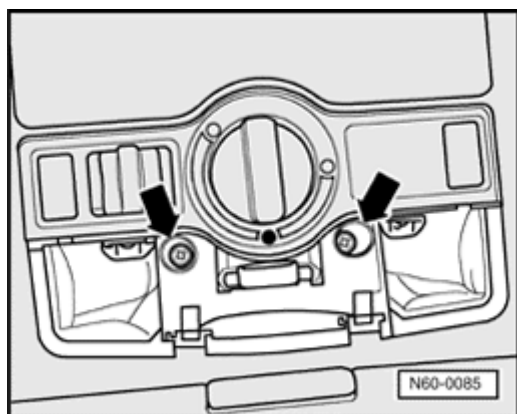
- Move automatic rotary switch to "roof opened" position.
- Move automatic rotary switch to "roof closed" position.
- Move automatic rotary switch to "roof tilted" position.
- Move automatic rotary switch to "roof closed" position.
- Install drive motor in this position (zero position) with sunroof closed.

As of calendar week 32/98, "zero position" can be recognized by a viewing window on motor (markings must align - **arrow** -).

Automatic rotary switch for sunroof, removing



- Unclip trim - **1** - in direction of - **arrow** - and remove.

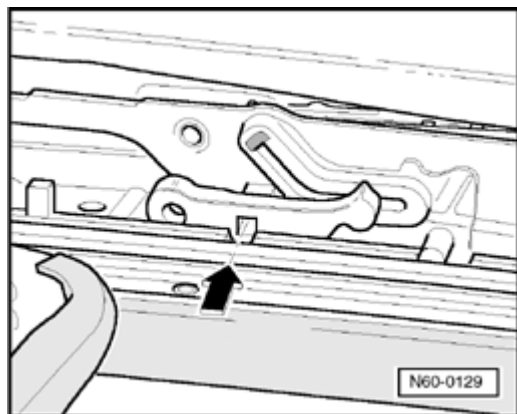


- Remove bolts - **arrows** - and remove automatic rotary switch.
- Unclip and disconnect connector.

Parallel movement, checking

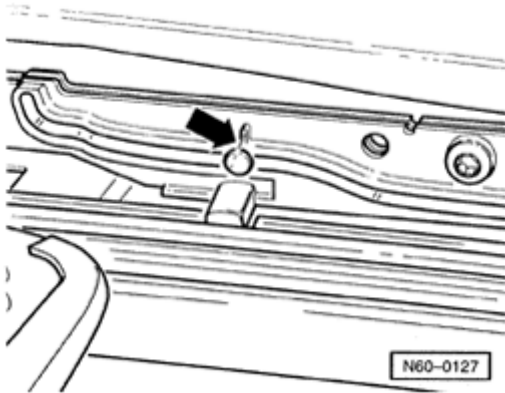
- Removing glass panel for sunroof ⇒ [60-2, Removing glass panel for sunroof](#) .

Vehicles up to calender week 31 1998 (CW 31/98)



Square holes in tilt levers must align with grooves in guide rails - **arrow** - .

Vehicles from calender week 32 1998 (CW 32/98) on



Guide rail pin must align with marking (pin) on guide rail - **arrow** - .

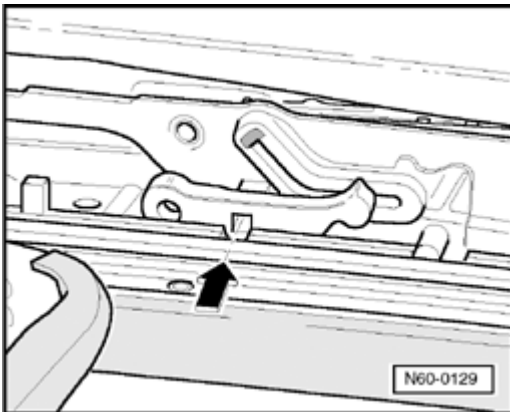
Parallel movement, adjusting

Note:

Parallel movement adjustment can only be performed with drive motor removed and glass panel (in zero position).

- Removing drive motor for sunroof ⇒ [60-2, Drive motor for sunroof, removing](#) .

Vehicles up to calender week 31 1998 (CW 31/98)

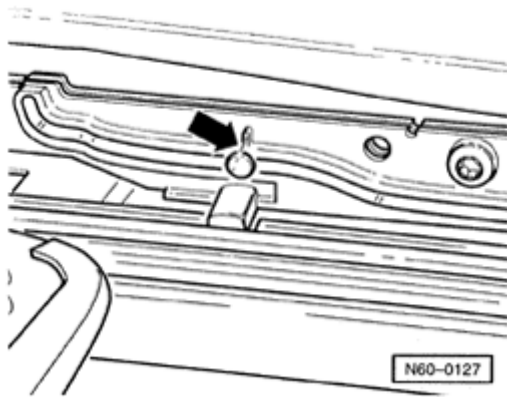


Square holes in tilt levers must align with cut-outs in guide rails - **arrow** - .

- Install drive motor in "zero position" (markings in viewing window must align).

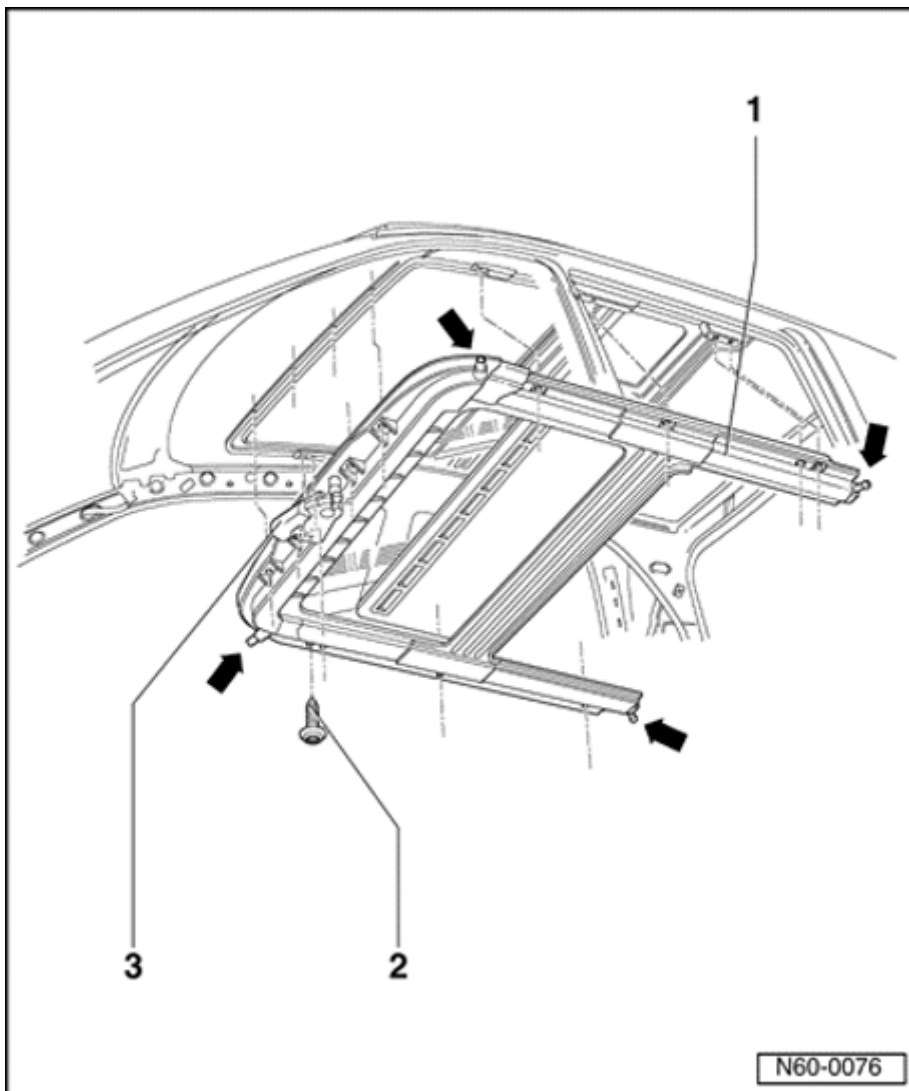
- Then check zero position.

Vehicles from calender week 32 1998 (CW 32/98) on



Guide rail pin must align with marking (pin) on guide rail - **arrow** - .

Installation unit, removing and installing



Removing

- Removing automatic rotary switch for sunroof ⇒ [60-2, Automatic rotary switch](#)

[for sunroof, removing](#) .

- Removing molded headliner

⇒ [Repair Manual, Body Interior, Repair Group 70, roof trim](#)

.

- Disconnect water drain hoses from installation unit - **1** - - **arrows** - .

- Remove bolts - **2** - and remove installation unit from vehicle with a second mechanic.

Installing

- Insert installation unit - **1** - into roof cut out with a second mechanic.

- Align installation unit in roof frame with cylindrical pins (reversed drill) 12 mm at front right and 10 mm at rear left. Installation unit must not make contact with roof frame.

- Check and establish if necessary correct routing of wires and connectors for electrical consumers at roof.

- Secure (8 Nm) installation unit - **1** - of drive motor for sunroof - **3** - beginning at left and right toward rear.

- Install water drain hoses - **arrows** - .

- Connect connector for drive motor - **3** - .

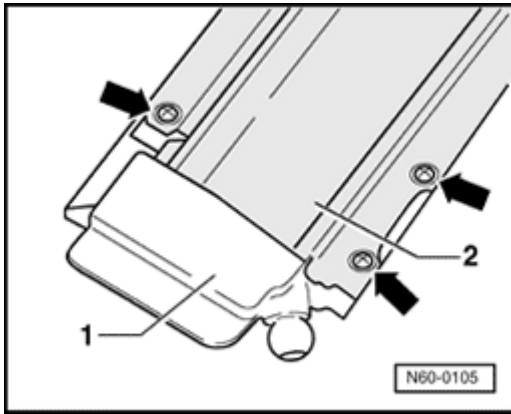
Slotted guide rail, removing

- Removing glass panel for sunroof ⇒ [60-2, Removing glass panel for sunroof](#) .

- Move automatic rotary switch to "roof closed" position.

- Removing installation unit ⇒ [60-2, Installation unit, removing and installing](#) .

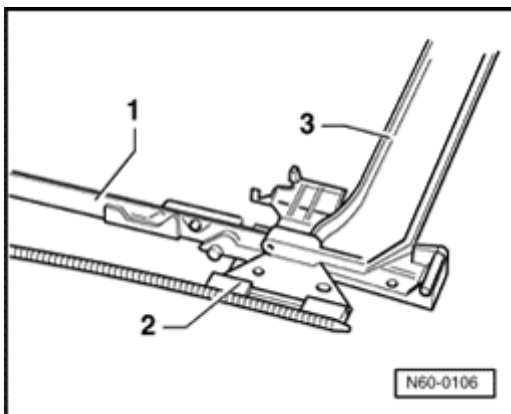
- Removing drive motor for sunroof ⇒ [60-2, Drive motor for sunroof, removing](#) .



- Remove end piece - 1 - from guide rail - 2 - - **arrows** - and then remove.

Note:

When installing end piece - 1 - , seal against guide rail with butyl adhesive sealing cord AKL 450 005 05 .



- Slide slotted guide rail - 1 - , guide with cable - 2 - and water channel - 3 - together at left and right simultaneously out of guide rails of installation unit and then remove.

Note:

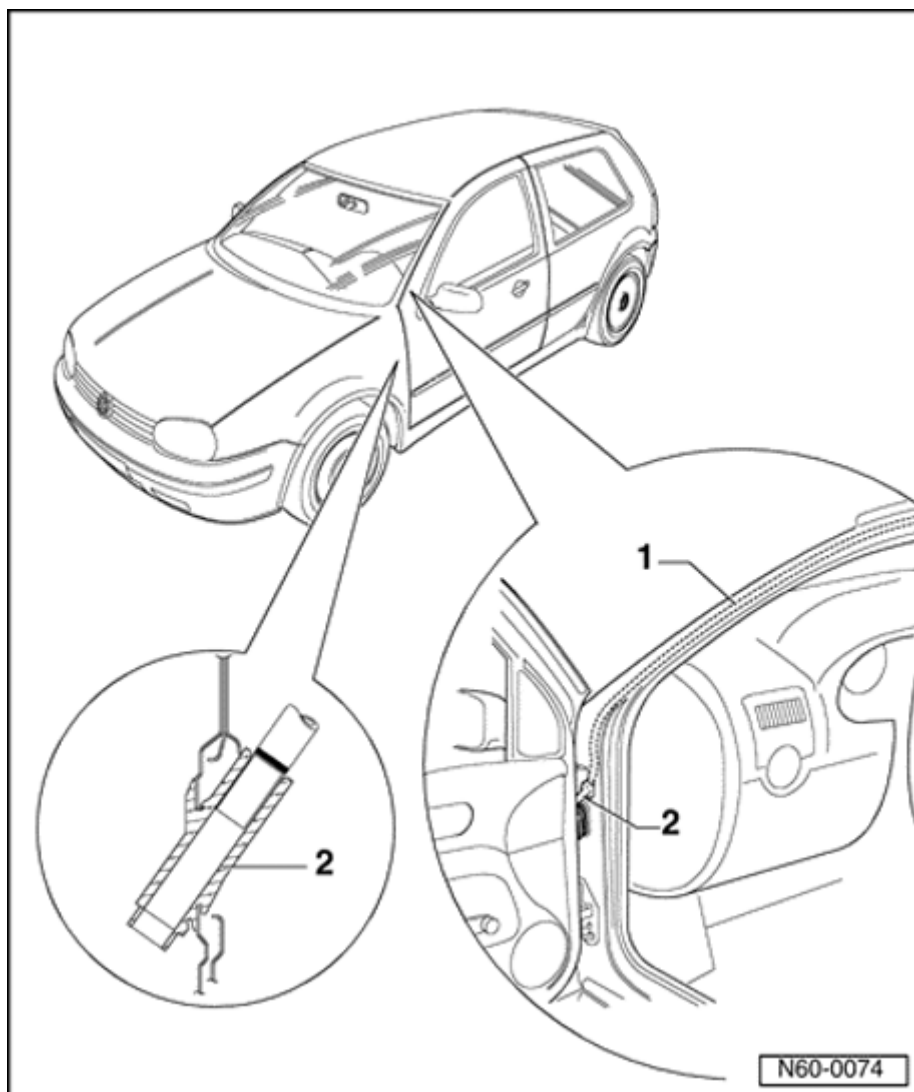
Always replace guides and cable as a set.

Water drain hoses, cleaning

Front water drain hoses:

Note :

For cleaning, it is recommended that you create your own assisting tool out of a speedometer inner cable, approx. 2300 mm (90.5 in.) long.



1. Front water drain hoses

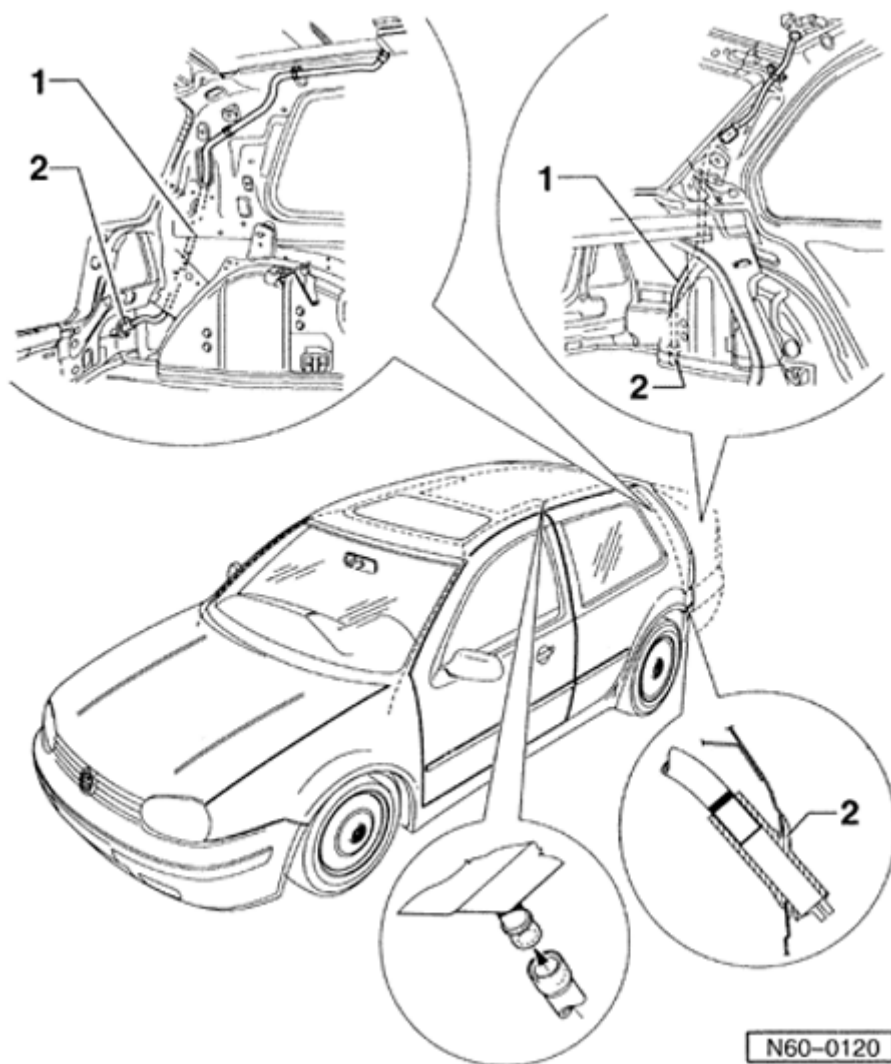
Front water drain hoses are routed in A-pillar and end between door and A-pillar. Cleaning is performed at cut out for sunroof.

2. Hose grommet

Rear water drain hoses:

Note :

For cleaning, it is recommended that you create your own assisting tool out of a speedometer inner cable, approx. 2300 mm (90.5 in.) long.



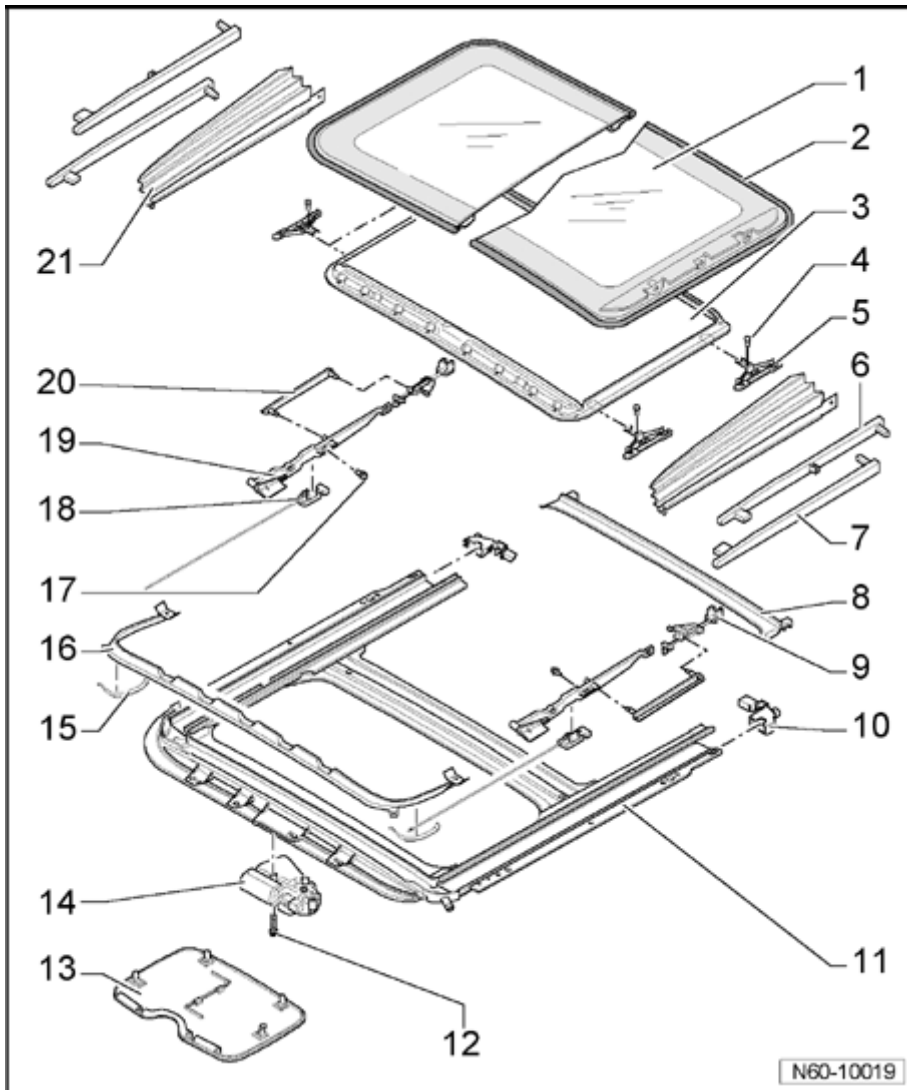
1. Water drain hose

Rear water drain hoses are routed in C-pillar and end behind bumper cover under tail light cluster. Cleaning is performed at lower end of hose. To do so, rear bumper must be removed.

2. Hose grommet

Sunroof with glass panel (Meritor)

Sunroof with glass panel, assembly overview



1. Glass panel for sunroof (single pane safety glass)

- ; Removing glass panel for sunroof ⇒ [60-3, Glass panel for sunroof, removing](#)
- ; Installing glass panel for sunroof ⇒ [60-3, Glass panel for sunroof, installing](#)
- ; Adjusting glass panel for sunroof ⇒ [60-3, Glass panel for sunroof \(height adjustment\), adjusting](#)

2. Panel seal

- i Adjusting panel seal ⇒ [60-3, Panel seal, adjusting](#)
- i Seal join at center in rear area
- i Panel seal, replacing ⇒ [60-3, Panel seal, replacing](#)

3. Sliding headliner

- i Removing and installing sliding headliner ⇒ [60-3, Sliding headliner, removing](#)

4. Countersunk screws (microencapsulated)

- i Always use new countersunk screws
- i 3.5 Nm

5. Slider

6. Upper trim

- i Up to calendar week 35 2002 (CW 35/02)
- i Removing ⇒ [60-3, Glass panel for sunroof, removing](#)

7. Lower trim

- i Up to calendar week 35 2002 (CW 35/02)
- i Removing ⇒ [60-3, Glass panel for sunroof, removing](#)

8. Water channel

- i Removed together with slotted guide rail

9. Guide locking hook

10. End piece

- i Use Butyl adhesive sealing cord AKL 450 005 05 for sealing

11. Installation unit

- i Removing and installing installation unit ⇒ [60-3, Installation unit, removing and installing](#)
- i if necessary use special grease G 000 450 02 exclusively to grease guide channels, otherwise functions cannot be guaranteed.

12. Bolt

- i 3.5 Nm

13. Hex wrench for emergency operation

- i Clipped in on drive motor cover

14. Drive motor

- i Removing ⇒ [60-3, Drive motor for sunroof, removing](#)
- i Adjusting drive motor (zero position) ⇒ [60-3, Drive motor for sunroof, adjusting \(zero position\)](#)

15. Spring

16. Wind deflector

- i Removing ⇒ [60-3, Wind deflector, removing](#)

17. Torx screw

- i Torx T25
- i 4.5 Nm

18. Rear guide

- i Removed together with slotted guide rail

19. slotted guide rail

- ; Removing ⇒ [60-3, Slotted guide rail, removing](#)

20. Gap bracket

- ; Removed together with slotted guide rail

21. Trim piece

- ; From calender week 36 2002 (CW 36/02) on
- ; Removing ⇒ [60-3, Glass panel for sunroof, removing](#)
- ; Installing ⇒ [60-3, Glass panel for sunroof \(height adjustment\), adjusting](#)

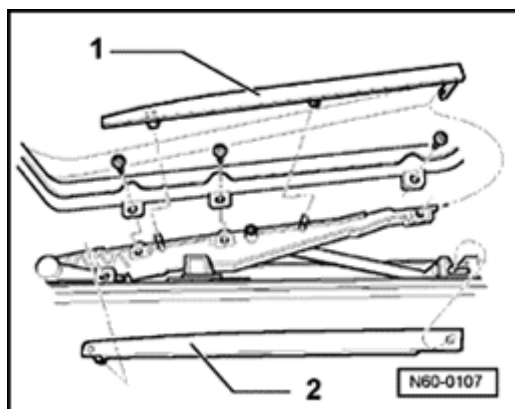
Note :

**Trim piece and trim must not be replaced against each other.
Clearance for mechanical components is otherwise not guaranteed.**

Glass panel for sunroof, removing

- Slide sliding headliner toward rear.
- Tilt sunroof open.

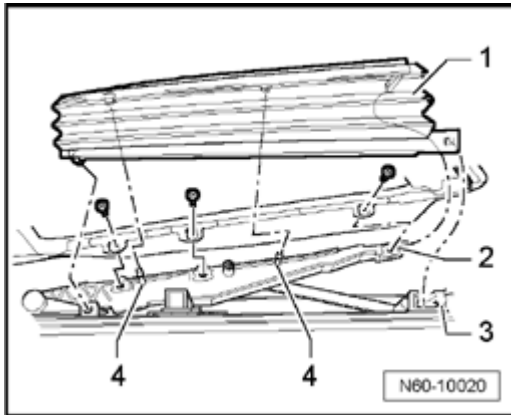
Vehicles up to calender week 35 2002 (CW 35/02)



- Unclip lower trim - 2 - in front area to vehicle center and unhook at rear.
- Unclip upper trim - 1 - at front and in center and remove at rear.

Vehicles from calender week 36 2002 (CW 36/02) on

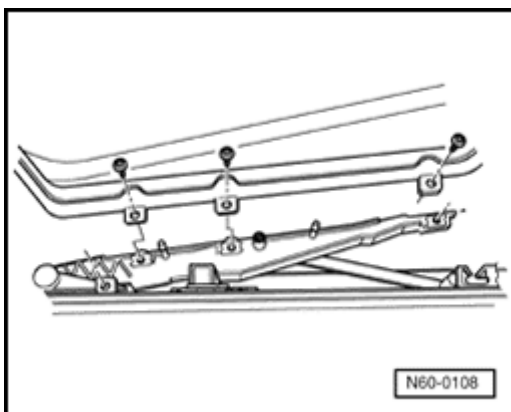
In vehicles from calender week 36 2002 (CW 36/02) on, a trim piece is installed in place of a lower trim and an upper trim.



- Unhook lower trim - 1 - from lower part of slotted guide rail - 3 - .
- Remove lower trim from securing pins - 4 - .
- Unhook lower trim - 1 - at top, rear - 2 - .
- Remove lower trim - 1 - .

Continued for all vehicles

- Remove securing bolts 1 (Torx T25; 4.5 Nm).



- Lift sunroof out.

Note:

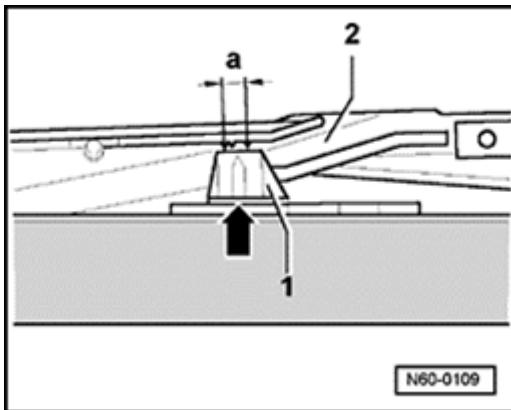
Sunroof must not be driven into "opened" position with

glass panel removed because water channel is no longer pressed down by glass panel and may be wedged in roof.

Glass panel for sunroof, installing

Panel must be installed in zero position (panel closed).

Zero position:



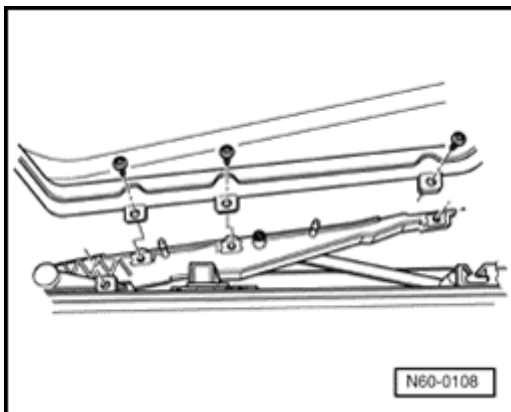
Marking - **arrow** - on upper part of rear guide - **1** - must be located on both sides between markings dimension - **a** - at slotted guide rail - **2** - .

Slotted guide rail - **2** - must be engaged in guide rail (cannot be moved by hand).

If this is not case, adjust parallel movement ⇒ [60-3, Parallel movement, adjusting](#) .

- Insert sunroof panel from above and screw in securing bolts (guide rail/panel).

- Slightly tighten securing bolts (Torx T25).



- Adjusting glass panel for sunroof (height adjustment) ⇒ [60-3, Glass panel for sunroof \(height adjustment\), adjusting](#)

Note:

Tighten securing bolts after panel height adjustment (4.5 Nm).

For vehicles up to calender week 35 2002 (CW 35/02), install lower trim and upper trim after adjusting panel height.

Vehicles from calender week 36 2002 (CW 36/02) on

In vehicles from calender week 36 2002 (CW 36/02) on, a trim piece is installed in place of a lower trim and an upper trim.

Note:

Trim piece and trim must not be replaced against each other. Clearance for mechanical components is otherwise not guaranteed.

Install trim piece after panel height adjustment.

Glass panel for sunroof (height adjustment), adjusting

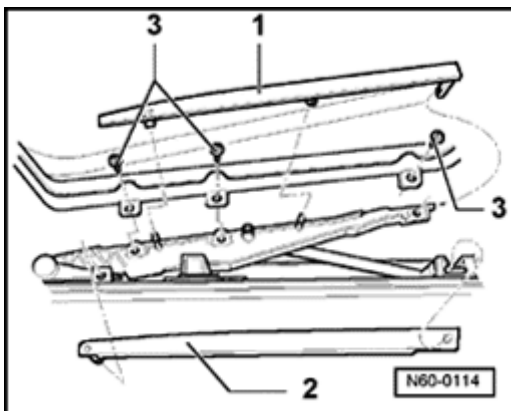
Note:

Glass panel height adjustment is to be performed after glass panel has been closed out of sliding position.

Zero position of sunroof OK.

- Tilt sunroof open.
- Slide sliding headliner toward rear.

Vehicles up to calender week 35 2002 (CW 35/02)

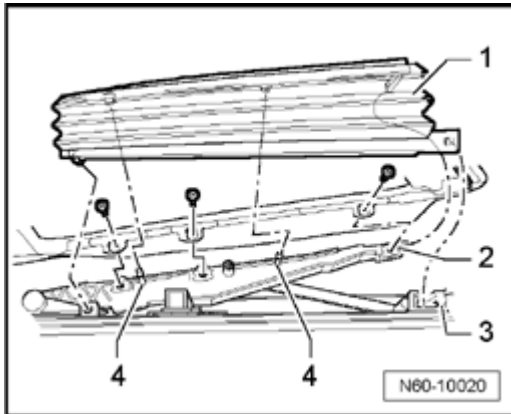


- Unclip lower trim - 2 - in front area to vehicle center and unhook at rear.

- Unclip upper trim - 1 - at front and in center and remove at rear.

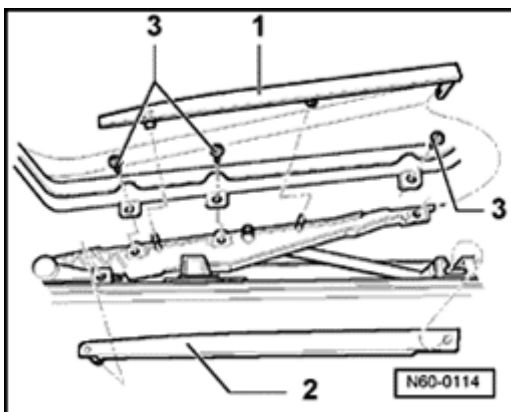
Vehicles from calender week 36 2002 (CW 36/02) on

In vehicles from calender week 36 2002 (CW 36/02) on, a trim piece is installed in place of a lower trim and an upper trim.



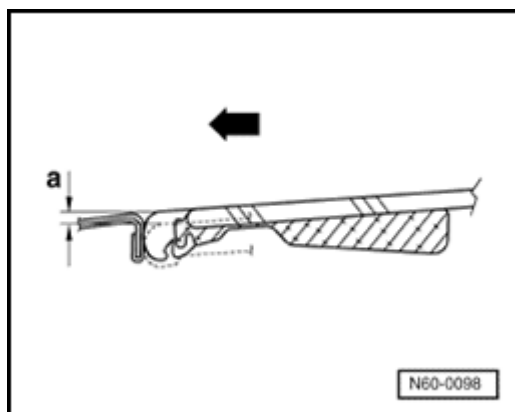
- Unhook lower trim - 1 - from lower part of slotted guide rail - 3 - .
- Remove lower trim from securing pins - 4 - .
- Unhook lower trim - 1 - at top, rear - 2 - .
- Remove lower trim - 1 - .

Continued for all vehicles



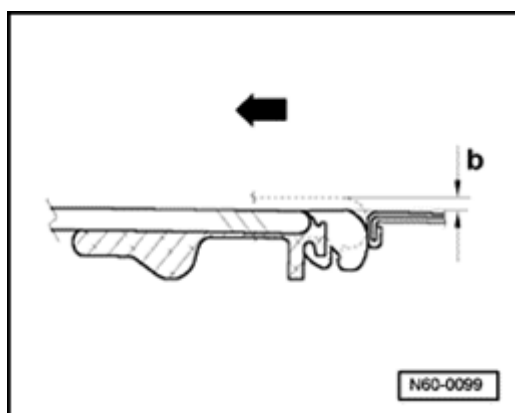
- Loosen securing bolts - 3 - (Torx T25; 4.5 Nm).
- Drive glass panel into "open" position.
- Drive glass panel into "closed" position.
- Perform glass panel height adjustment at front and rear on both sides as follows:

Panel adjustment at front:



- **a** - = 0 - 1 mm lower than roof
- **arrow** - = direction of travel

Panel adjustment at rear:

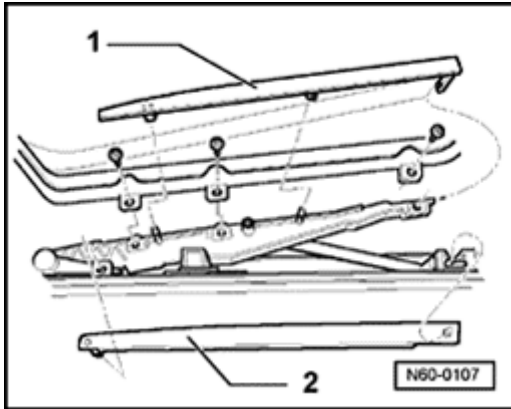


- **b** - = 0 - 1 mm higher than roof
- **arrow** - = direction of travel
- Tighten glass panel bolts (4.5 Nm).

Always adjust left and right-hand glass panel sides symmetrically.

- Tilt sunroof open.

Vehicles up to calender week 35 2002 (CW 35/02)



- Hook upper trim - 1 - at rear and clip on in center and at front.

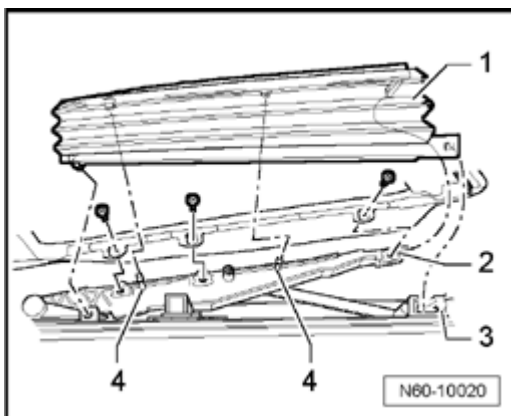
- Hook in lower trim - 2 - at rear and clip in at front.

Vehicles from calender week 36 2002 (CW 36/02) on

Note:

In vehicles from calender week 36 2002 (CW 36/02) on, a trim piece is installed in place of a lower trim and an upper trim.

Trim piece and trim must not be replaced against each other. Clearance for mechanical components is otherwise not guaranteed.

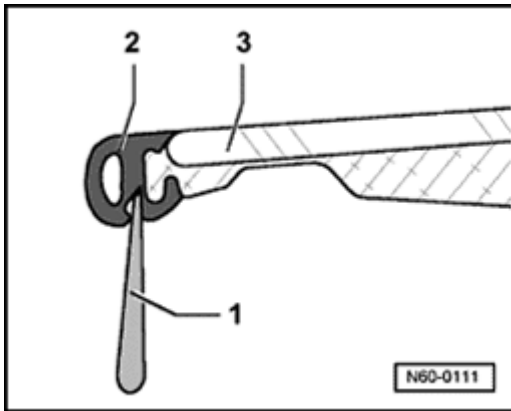


- First hook in trim piece - 1 - at top, rear - 2 - .

- Engage trim piece - 1 - with securing pins - - 4 - .

- Engage trim piece - 1 - in lower part of slotted guide rail - 3 - .

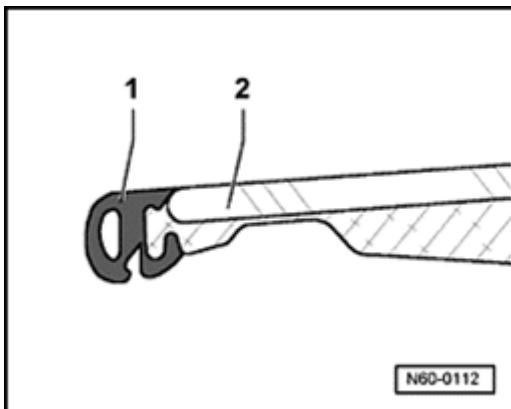
Panel seal, adjusting



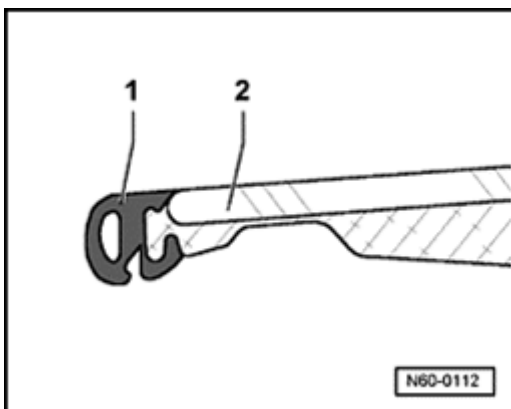
- Using a strip of cardboard about 0.3 mm thick (e.g. business card), check if pretension between panel seal - 2 - and body is even all around. Cardboard should slide through gap with firm resistance.
- If pre-tension is insufficient, press seal reinforcement (inside rubber) open with a wedge - 1 - or, if pre-tension is excessive, close seal reinforcement slightly. Glass panel - 3 - must be removed before adjusting seal.

Panel seal, replacing

- Removing glass panel for sunroof ⇒ [60-3, Glass panel for sunroof, removing](#) .



- Pull off seal - 1 - from glass panel.



- Apply new seal on lower panel edge, begin in center and move from bottom to top of glass panel - 2 - .

Note:

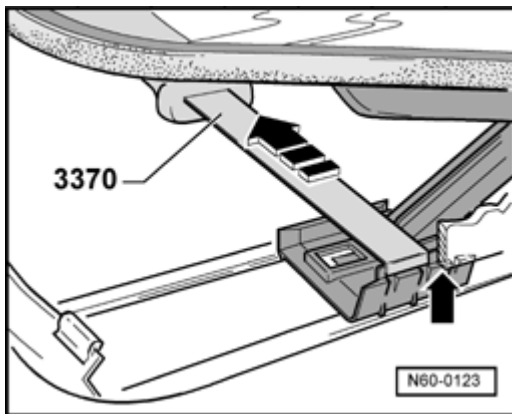
Coat edge of panel with soapy water to facilitate installation of seal.

If seal is not correctly installed, seal surface is wavy.

Panel seal must be shortened corresponding to panel circumference.

Wind deflector, removing

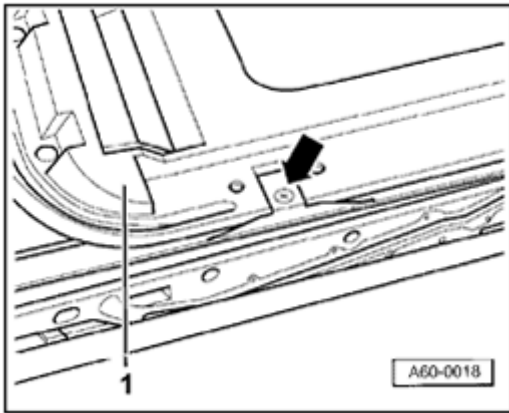
- Open sunroof completely.
- Insert special tool 3370 between roof edge and wind deflector bearing and release wind deflector bearing from side locking tab (left and right sides) by pulling on special tool 3370.
- Using a screwdriver, pry out wind deflector from guide rail (left and right sides).



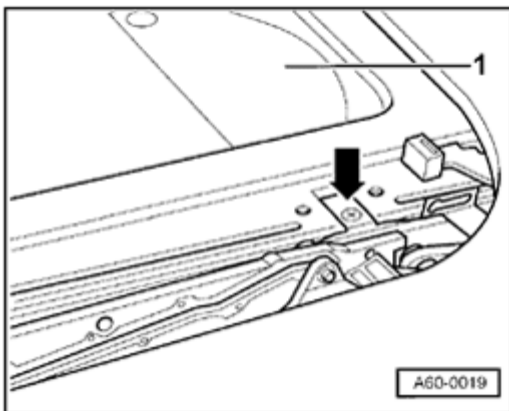
- Remove wind deflector.

Sliding headliner, removing

- Removing glass panel for sunroof ⇒ [60-3, Glass panel for sunroof, removing](#) .
- Slide sliding headliner toward rear.



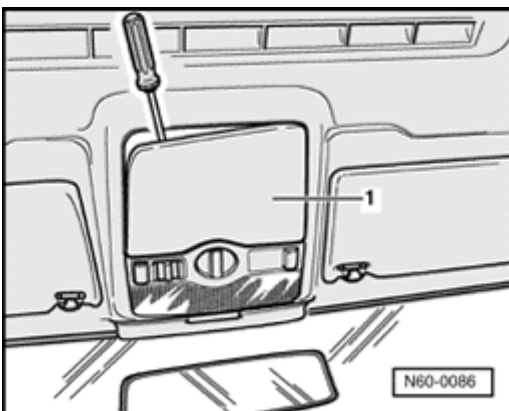
- Remove front bolts - **arrow** - at left and right. Slide out slider toward front over stop - **1** - .
- Slide sliding headliner toward front.



- Remove rear bolts - **arrow** - at left and right. Slide slider toward rear and remove sliding headliner - **1** - upward.

Drive motor for sunroof, removing

- Disconnect Ground (GND) strap from battery.

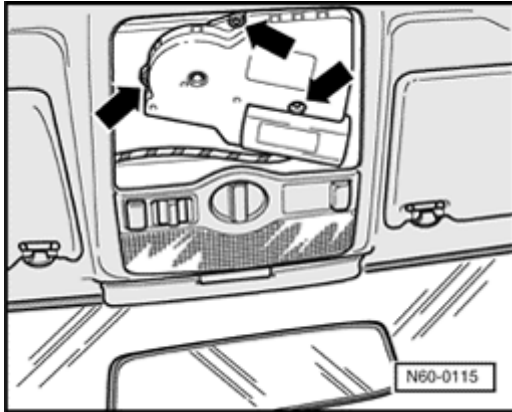


- Unclip cover - **1** - for drive motor.

Note:

Only remove and install drive motor for sunroof when roof is closed (zero position).

- Unclip and disconnect connector.



- Remove bolts - **arrows** - and remove drive motor for sunroof.

Bolts for drive motor are micro-encapsulated and must always be replaced (3.5 Nm).

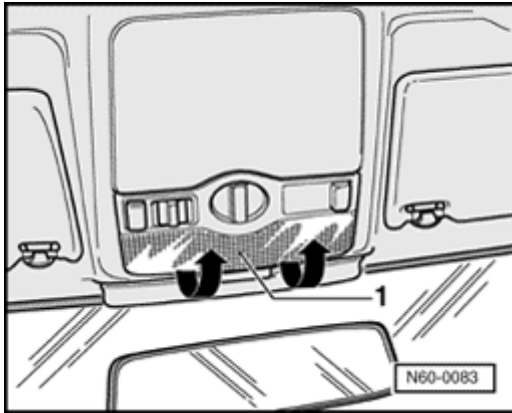
Drive motor for sunroof, adjusting (zero position)

Adjustment of zero position may be necessary if drive motor was removed while not in zero position or sunroof was closed or opened via emergency operation.

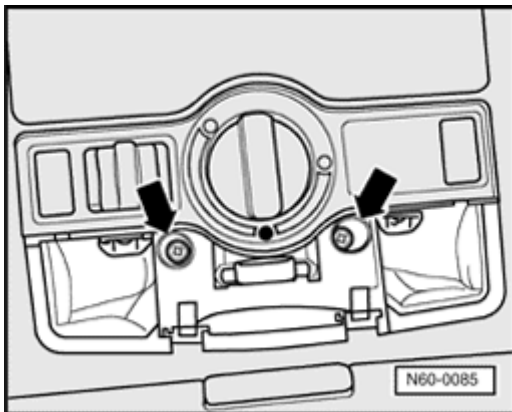
Drive motor removed, but electrical wires connected.

- Move automatic rotary switch to "roof opened" position.
- Move automatic rotary switch to "roof closed" position.
- Move automatic rotary switch to "roof tilted" position.
- Move automatic rotary switch to "roof closed" position.
- Install drive motor in this position (zero position) with sunroof closed.

Automatic rotary switch for sunroof, removing



- Unclip trim - **1** - in direction of - **arrow** - and remove.

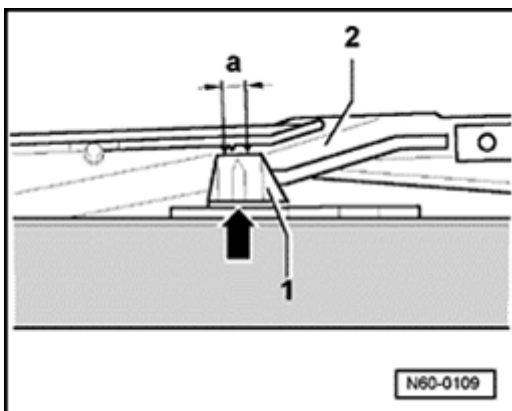


- Remove bolts - **arrows** - and remove automatic rotary switch.

- Unclip and disconnect connector.

Parallel movement, checking

- Removing glass panel for sunroof ⇒ [60-3, Glass panel for sunroof, removing](#) .



Marking - **arrow** - on upper part of rear guide - **1** - must be located on both sides between markings dimension - **a** - at slotted guide rail - **2** - .

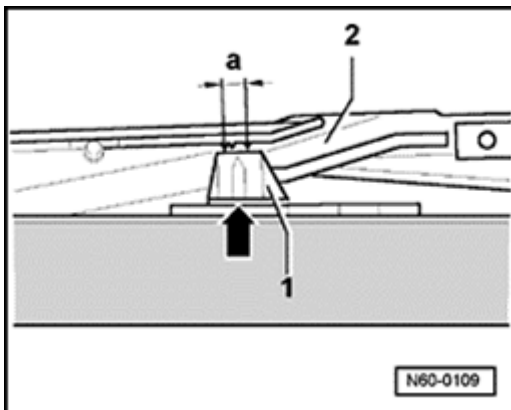
Slotted guide rail - **2** - must be engaged in guide rail (cannot be moved by hand).

Parallel movement, adjusting

Note:

Parallel movement adjustment can only be performed with drive motor removed and glass panel (in zero position).

- Removing drive motor for sunroof ⇒ [60-3, Drive motor for sunroof, removing](#) .



Marking - **arrow** - on upper part of rear guide - **1** - must be located on both sides between markings dimension - **a** - at slotted guide rail - **2** - .

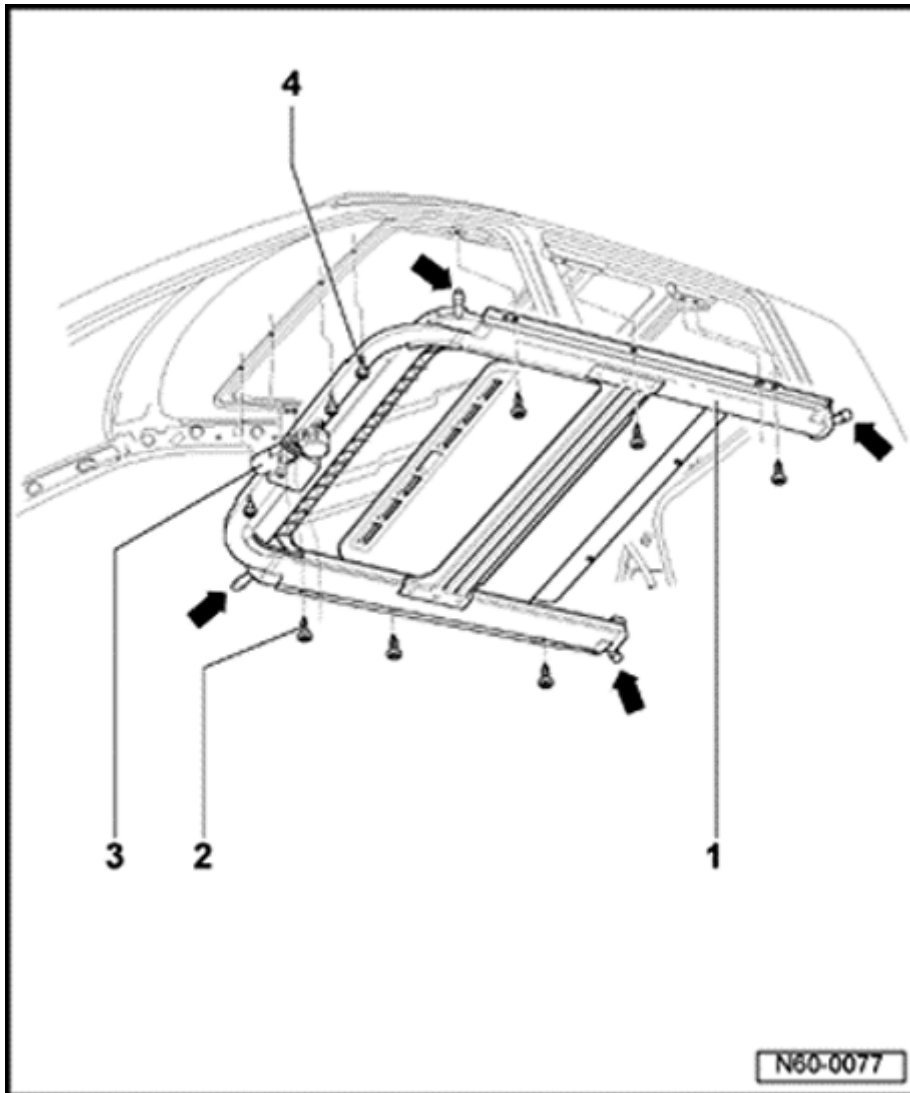
Slotted guide rail - **2** - must be engaged in guide rail (cannot be moved by hand).

- Slide upper part of guide - **1** - only from front toward rear center, between markings.

- Install drive motor (zero position) in this position.

Then check zero position.

Installation unit, removing and installing



Removing

- Removing automatic rotary switch for sunroof ⇒ [60-3, Automatic rotary switch for sunroof, removing](#) .

- Removing molded headliner

⇒ [Repair Manual, Body Interior, Repair Group 70, roof trim](#)

- Disconnect water drain hoses from installation unit - **1** - - **arrows** - .

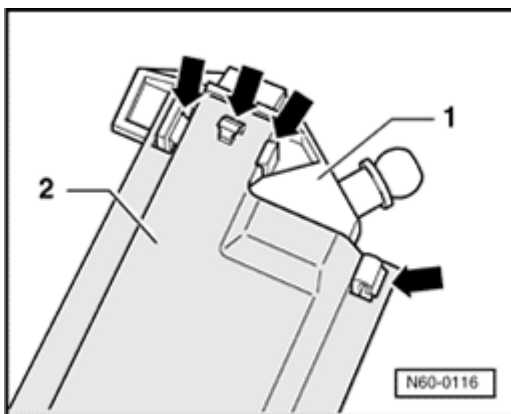
- Remove bolts - **2** - and - **4** - (with sleeves) and remove installation unit from vehicle with a second mechanic.

Installing

- Insert installation unit - **1** - , align according to bolt bores and insert bolts - **2** - and - **4** - (with sleeves).
- Check and establish if necessary correct routing of wires and connectors for electrical consumers at roof.
- Secure (8 Nm) installation unit - **1** - of drive motor for sunroof - **3** - beginning at left and right toward rear.
- Install water drain hoses - **arrows** - .
- Connect connector for drive motor - **3** - .

Slotted guide rail, removing

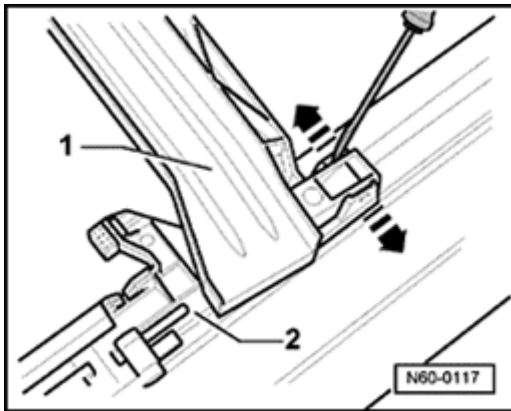
- Removing glass panel for sunroof ⇒ [60-3, Glass panel for sunroof, removing](#) .
- Removing installation unit ⇒ [60-3, Installation unit, removing and installing](#) .
- Removing drive motor for sunroof ⇒ [60-3, Drive motor for sunroof, removing](#) .



- Unclip end piece - **1** - from guide rail - **2** - - **arrows** - and then remove.

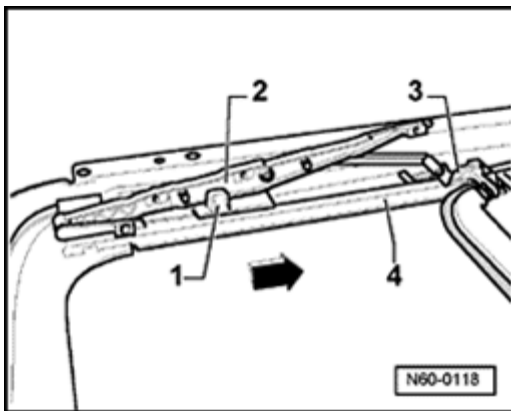
Note:

*When installing end piece - **1** - , seal against guide rail with Butyl adhesive sealing cord AKL 450 005 05 .*



- Using a screw driver, unhook water channel - 1 - carefully on both sides at bearing on guide catch - 2 - and remove.

- Slide rear guide - 1 - in direction of - arrow - in guide rail - 4 - until lock mechanism of guide catch - 3 - is released.



- Remove rear guide - 1 - , guide catch - 3 - and slotted guide rail - 2 - together out of guide rail - 4 - .

Note:

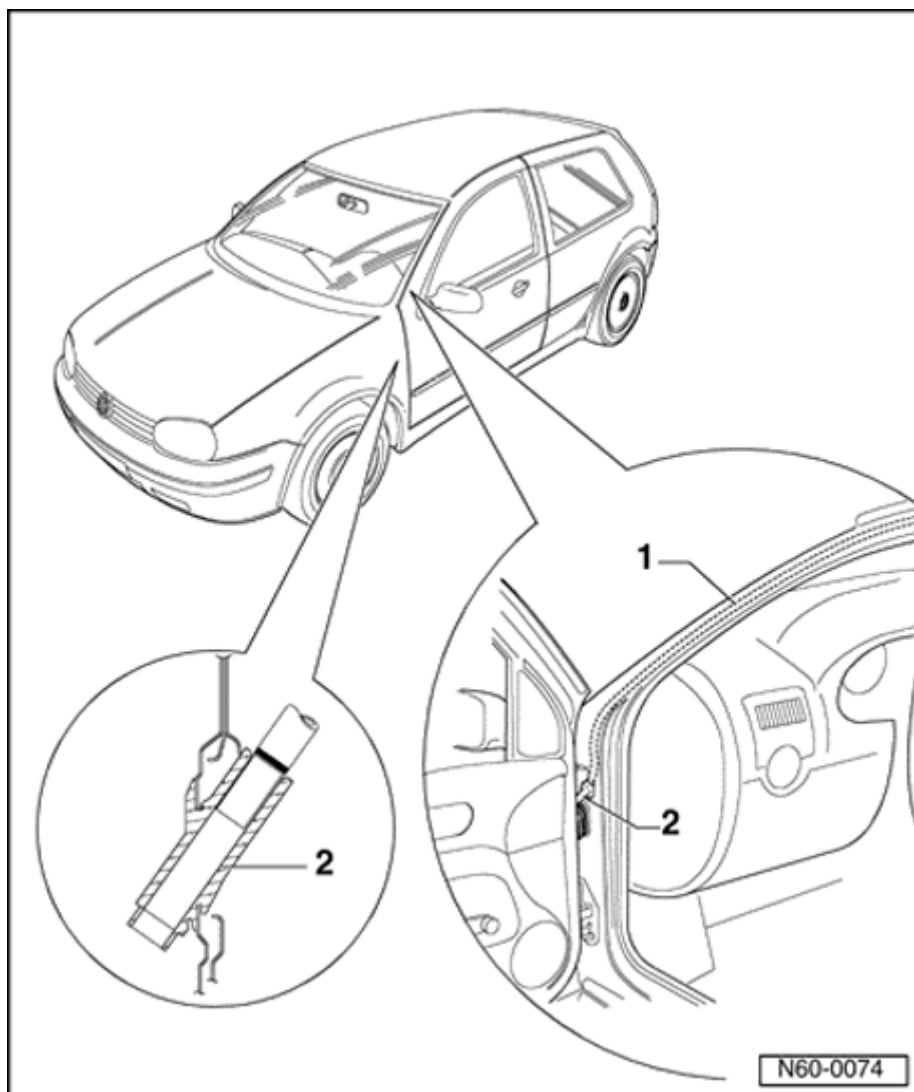
Always replace guides and cable as a set.

Water drain hoses, cleaning

Front water drain hoses:

Note :

For cleaning, it is recommended that you create your own assisting tool out of a speedometer inner cable, approx. 2300 mm (90.5 in.) long.



1. Front water drain hoses

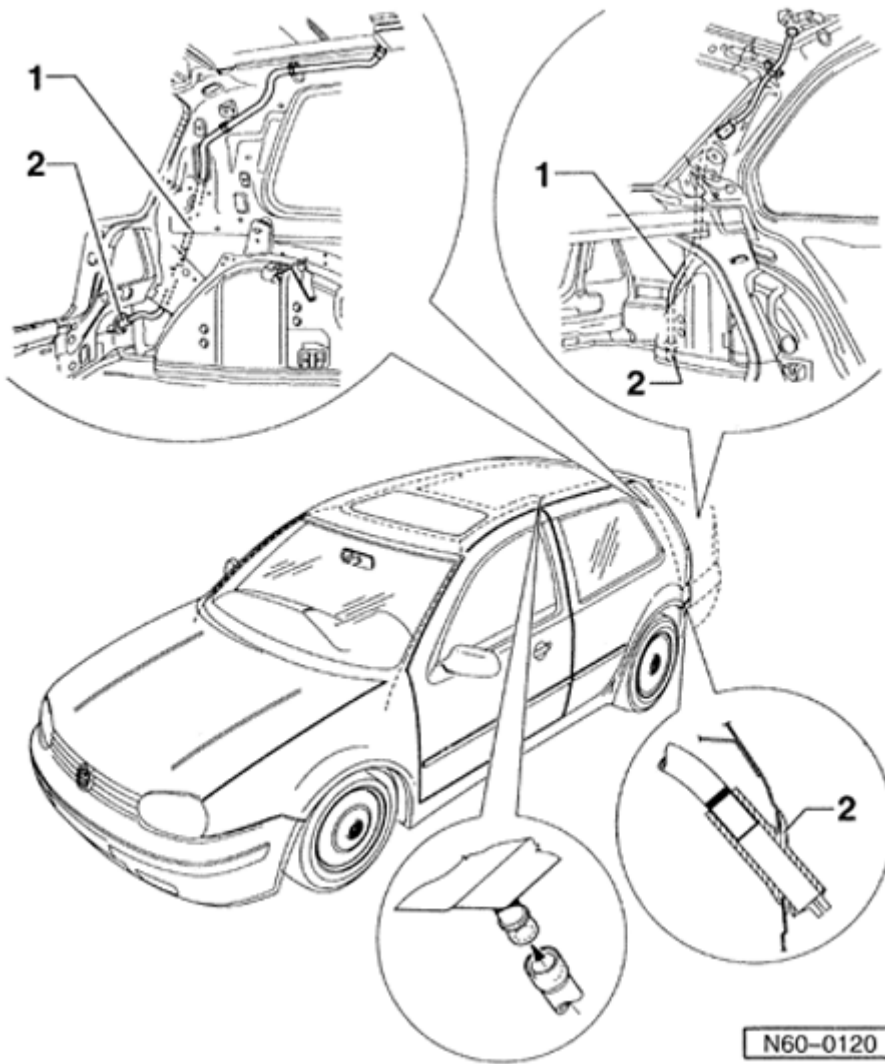
Front water drain hoses are routed in A-pillar and end between door and A-pillar. Cleaning is performed at cut out for sunroof.

2. Hose grommet

Rear water drain hoses:

Note :

For cleaning, it is recommended that you create your own assisting tool out of a speedometer inner cable, approx. 2300 mm (90.5 in.) long.



1. Water drain hose

Rear water drain hoses are routed in C-pillar and end behind bumper cover under tail light cluster. Cleaning is performed at lower end of hose. To do so, rear bumper must be removed

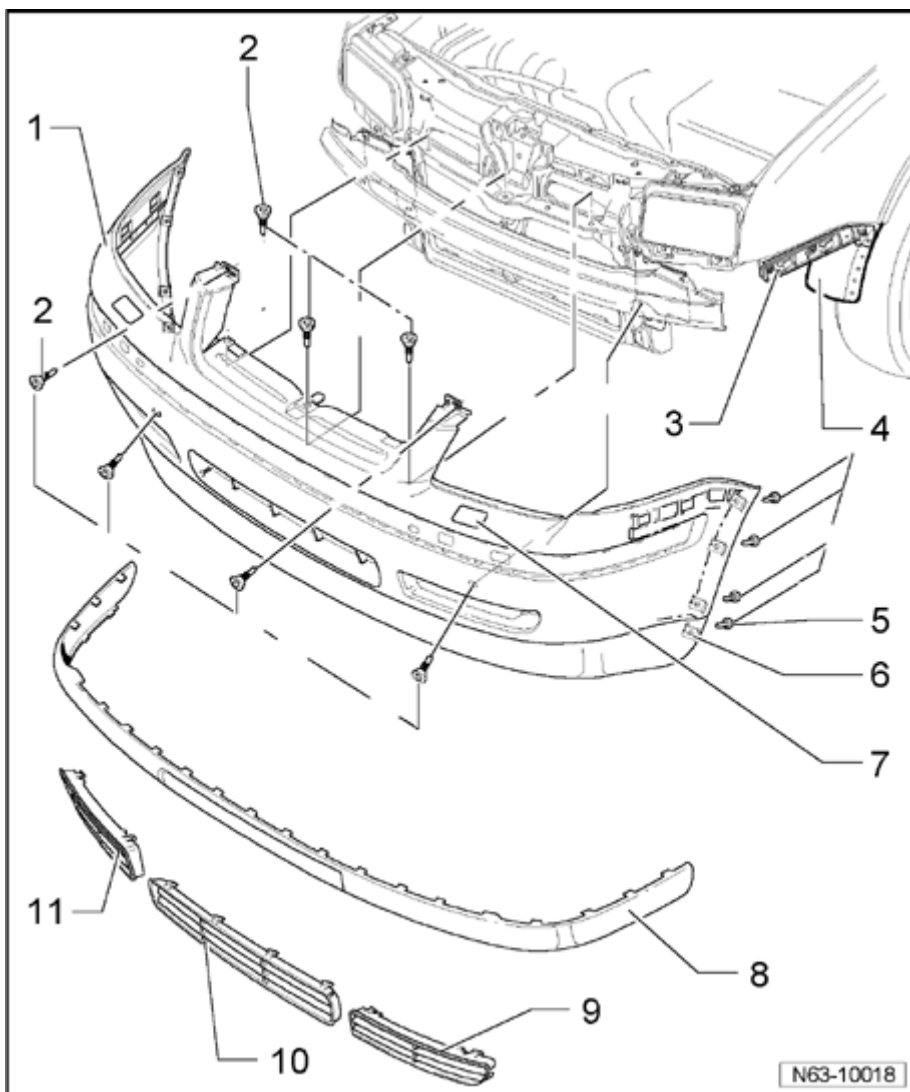
2. Hose grommet

Front bumper

Bumper cover, assembly overview

Note :

Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.

**1. Bumper cover**

- ı Material - PP/EPDM
- ı Removing ⇒ [63-1, Bumper cover, removing and installing](#)

2. Bolt

- i Qty. 7
- i 6.6 Nm

3. Guide piece

- i To remove and install, pull out/slide in bumper cover parallel out of guide pieces (left and right sides).

4. Wheelhousing liner

5. Screw

- i Qty. 8 for common models
Golf/Jetta
- i 1.5 Nm
- i Qty. 10 for Jetta GLI Sport

6. Speed nut

- i Qty. 8 for common models
Golf/Jetta
- i Qty. 10 for Jetta GLI Sport

7. Cover for headlight cleaning system

- i Cover is part of headlight cleaning system
- i For special models

8. Spoiler

- i For common models Golf/Jetta:
clipped in on bumper cover
- i For Jetta GLI Sport: delivered as
by-pack
- i It is not necessary to remove when
removing cover ⇒ [Item - 1 -](#)

9. Air guide grille, left

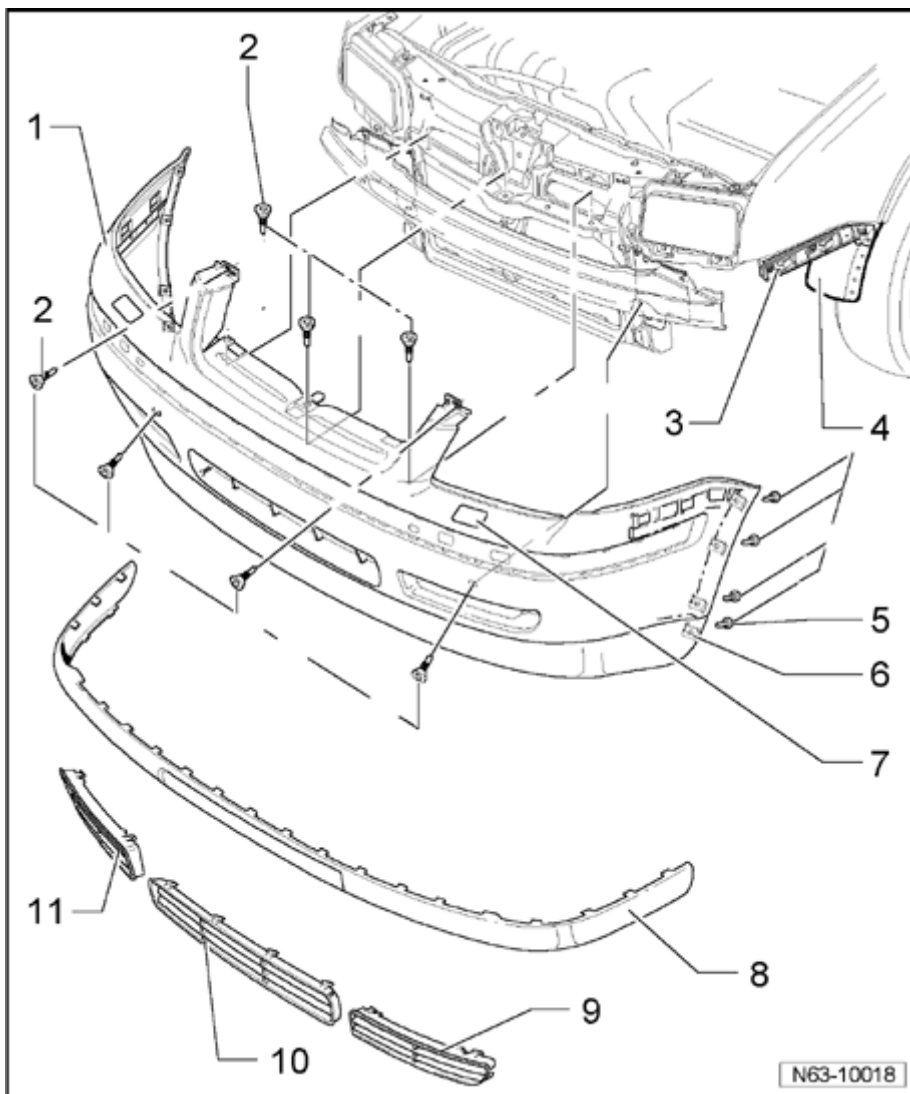
- i Clipped in on bumper cover

10. Air guide grille, center

- ; Clipped in on bumper cover

11. Air guide grille, right

- ; Clipped in on bumper cover

Bumper cover, removing and installing**Removing**

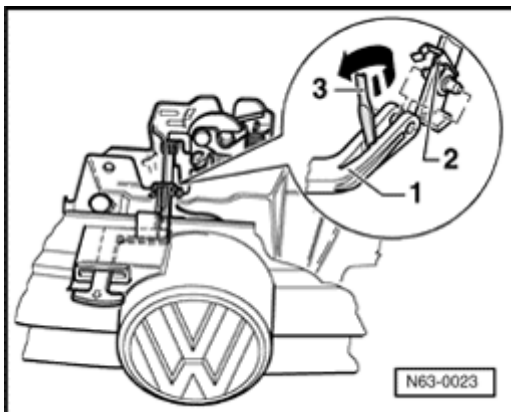
- Disconnect release lever from lid lock ⇒ [63-1, Release lever, removing](#) .
- Remove radiator grille ⇒ [66-5, Radiator grill, removing and installing](#) .

- If equipped, remove covers - **7** - for headlight cleaning system from bumper cover and unclip.
- Remove bolts - **5** - securing bumper cover - **1** - to wheelhousing - **4** - .
- Unclip left air guide grille - **9** - and right air guide grille - **11** - .
- Remove bolts connecting bumper cover - **1** - to sound insulation on left and front underbody.
- Remove bolts - **2** - .
- Remove bumper cover - **1** - from guide pieces - **3** - (left and right).
- Disconnect connector from temperature sensor.
- Remove spoiler - **8** - if necessary

Installing

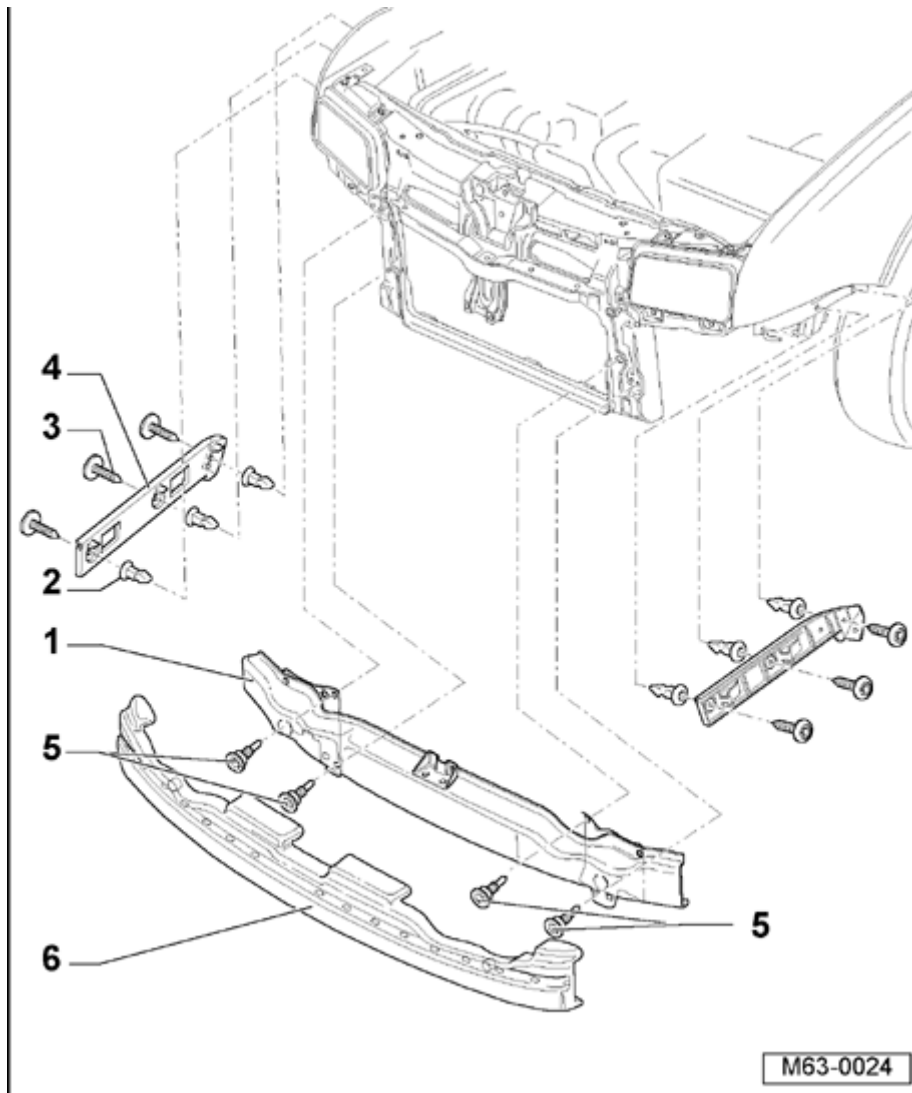
Installation is performed in reverse order of removal.

Release lever, removing



- Remove locking clamp - **2** - upward.
- Spread release lever - **1** - using a screwdriver - **3** - and remove from lid lock.
- Remove release lever - **1** - with guide out of lock carrier.

Bumper carrier, assembly overview



1. Bumper carrier

2. Expanding nut

i Qty. 6

3. Screw

i Qty. 6

i 1.5 Nm

4. Guide piece

i To remove and install, pull out/slide in bumper cover parallel out of guide pieces (left and right sides)

5. Bolt

- i Qty. 4
- i 8.5 Nm

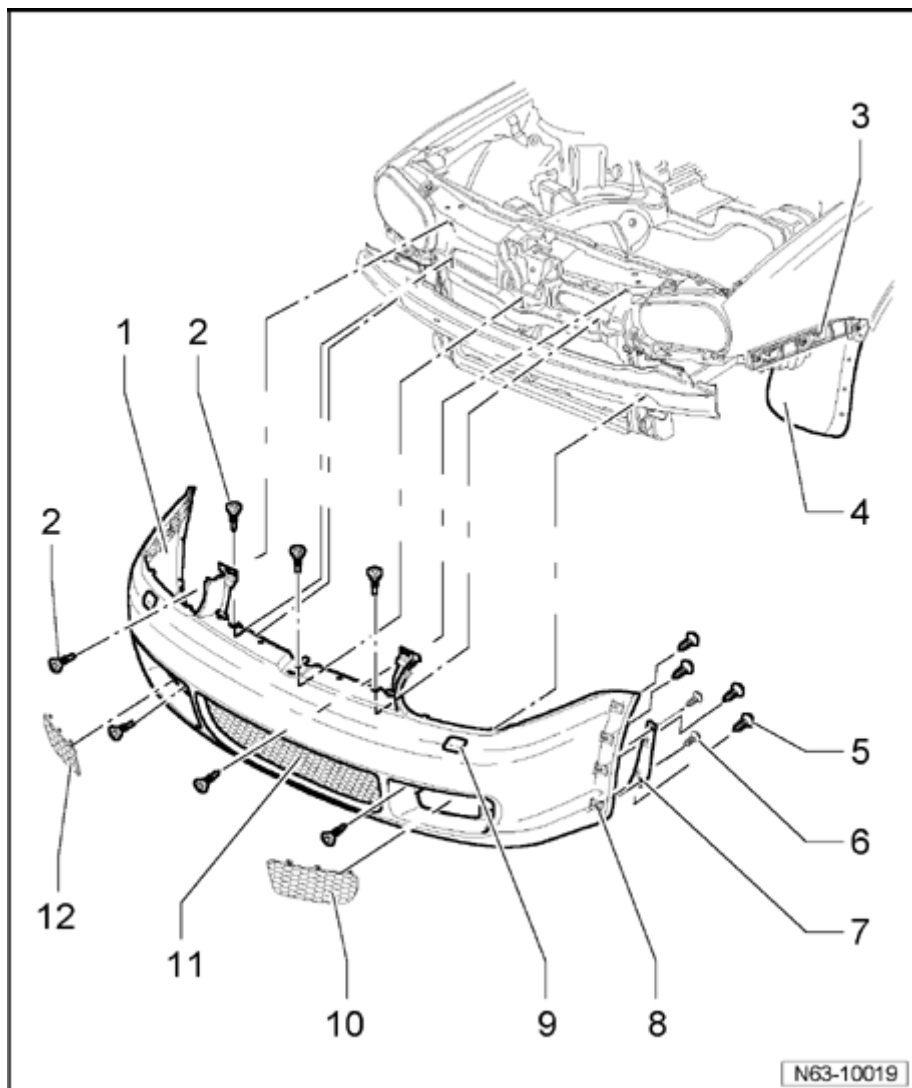
6. Damping

- i Connected to bumper carrier - 1 -

Bumper cover (Golf R32), assembly overview

Note :

Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.



1. Bumper cover

- i Material - PP/EPDM
- i Removing ⇒ [63-1, Bumper cover \(Golf R32\), removing and installing](#)

2. Bolt

- i Qty. 7
- i 6.6 Nm

3. Guide piece

- i To remove and install, pull out/slide in bumper cover parallel out of guide pieces (left and right sides).

4. Wheelhousing liner**5. Bolt**

- i Qty. 8
- i 1.5 Nm

6. Bolt

- i Qty. 2
- i 1.5 Nm

7. Adapter part

- i With 2 speed nuts
- i Remove wheelhousing liner before removing adapter part
- i Removing and installing ⇒ [63-1, Adapter part \(Golf R32\), removing and installing](#)

8. Speed nut

- i Qty. 8

9. Cover for headlight cleaning

system

- ; Cover is clipped in at nozzle holder of headlight cleaning system

10. Left ventilation grid

- ; Clipped in on bumper cover

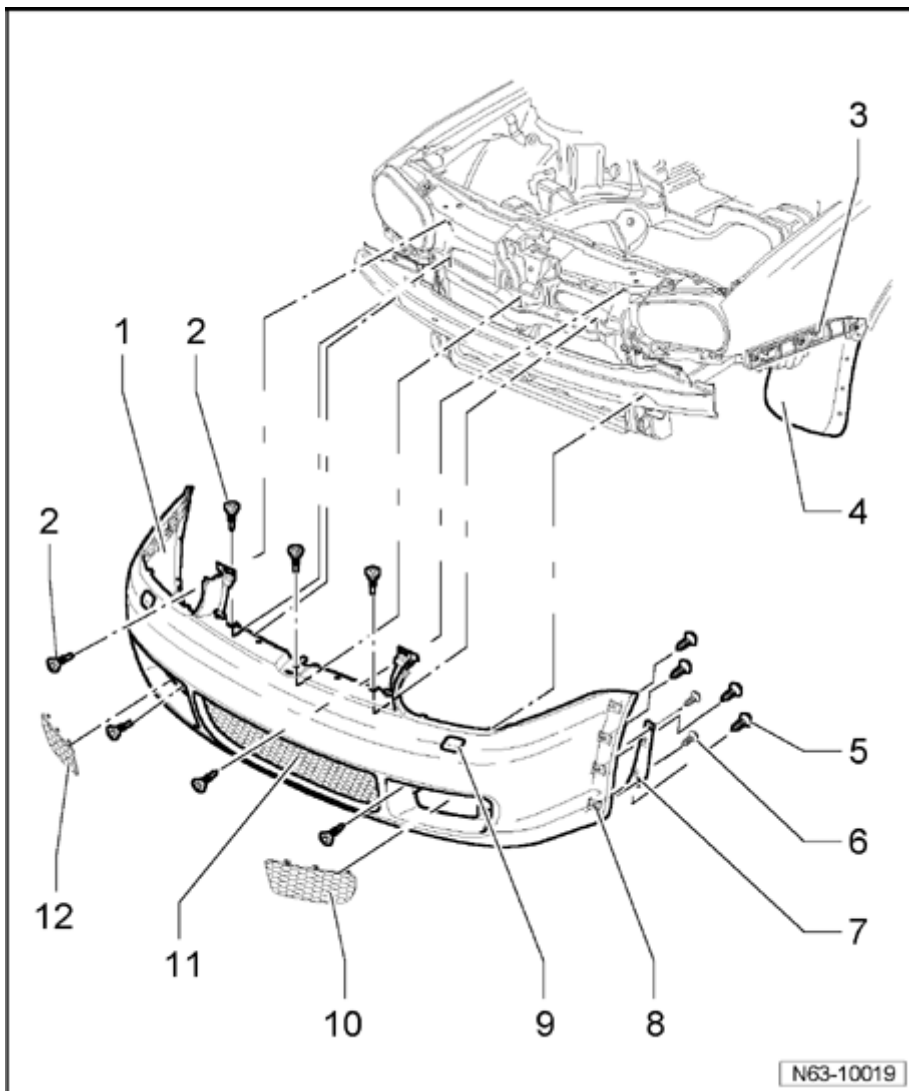
11. Center ventilation grid

- ; Secured to bumper cover with clamps
- ; Assembly overview ⇒ [63-1, Center ventilation grid and air guide \(Golf R32\), assembly overview](#)
- ; Removal of center ventilation grid only possible with bumper cover removed

12. Right ventilation grid

- ; Clipped in on bumper cover

Bumper cover (Golf R32), removing and installing



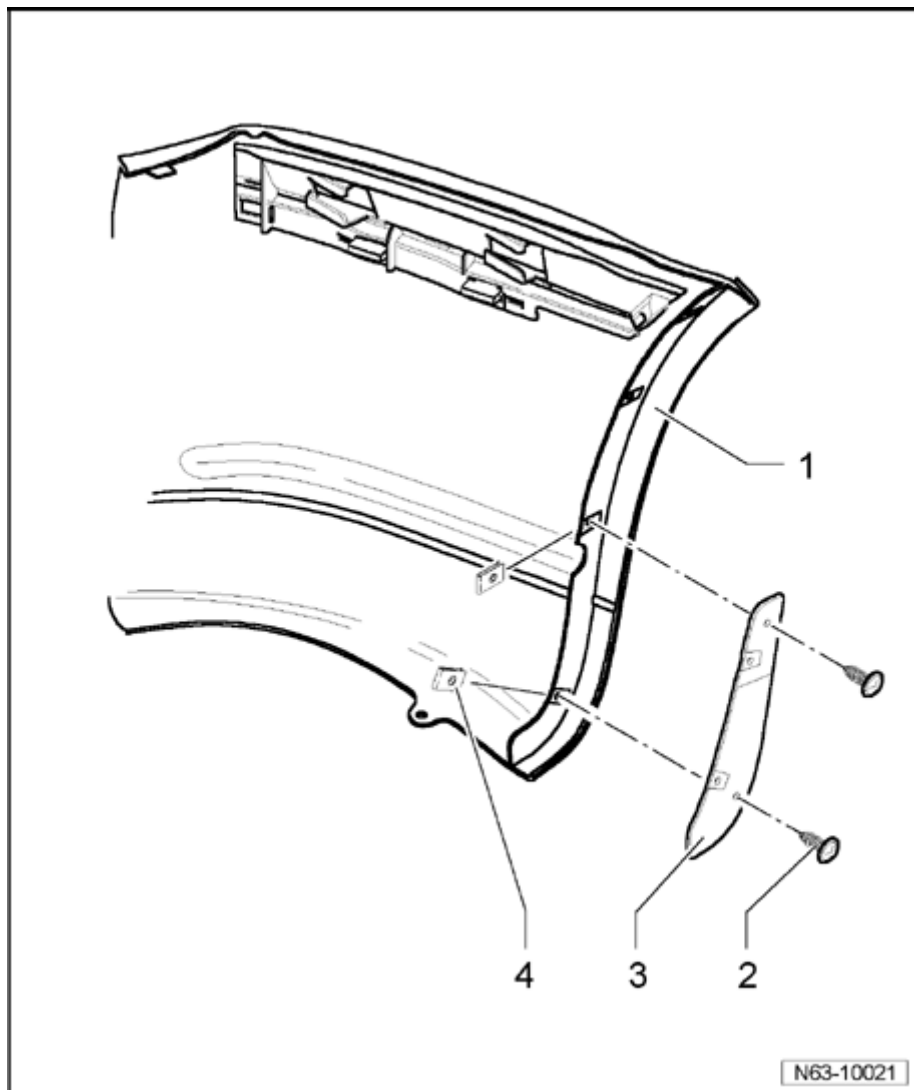
Removing

- Disconnect release lever from lid lock ⇒ [63-1, Release lever, removing](#) .
- Remove radiator grille ⇒ [66-5, Radiator grill, removing and installing](#) .
- Pull off covers - **9** - for headlight cleaning system from bumper cover and unclip.
- Loosen bumper cover - **1** - in area of wheelhousing - **4** - .
- Unclip left ventilation grid - **10** - and right ventilation grid - **12** - .
- Remove bolts - **2** - . Remove bumper cover - **1** - from guide pieces - **3** - (left and right sides).
- Disconnect harness connector from temperature sensor.

Installing

Installation is performed in the reverse order of removal.

Adapter part (Golf R32), removing and installing



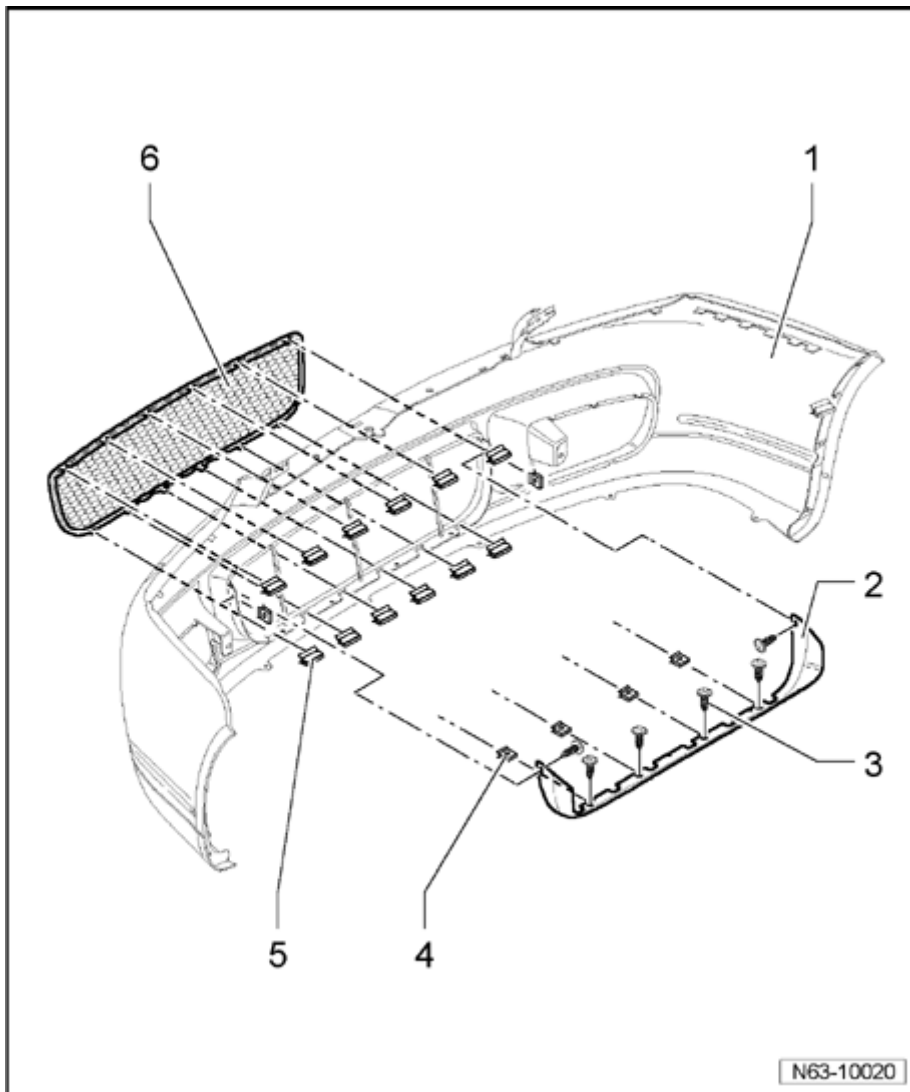
Removing

- Remove front wheelhousing liner ⇒ [66-1, Wheelhousing liner, removing and installing](#) .
- Removing bumper cover (Golf R32) ⇒ [63-1, Bumper cover \(Golf R32\), removing and installing - 1 -](#) .
- Remove bolts - **2** - .
- Remove adapter part - **3** - .
- **4** - Speed nut

Installing

Installation is performed in the reverse order of removal.

Center ventilation grid and air guide (Golf R32), assembly overview



1. Bumper cover

- ; Material - PP/EPDM
- ; Removing ⇒ [63-1, Bumper cover \(Golf R32\), removing and installing](#)

2. Air duct

- ; Removal of air guide only possible with bumper cover removed ⇒ [Item - 1 -](#).

3. Bolt

- i Qty. 6
- i 1.5 Nm

4. Speed nut

- i Qty. 6

5. Clip

- i Qty. 12

6. Center ventilation grid

- i Removal of ventilation grid only possible with bumper cover removed ⇒ [Item - 1 -](#)

- i Removing

- Remove bumper cover ⇒ [Item - 1 -](#).

- Remove clamps ⇒ [Item - 5 -](#).

- Remove center ventilation grid.

- i Installing:

Installation is performed in the reverse order of removal. Note the following:

- Damaged clamps ⇒ [Item - 5 -](#) must be replaced.

Bumper carrier (Golf R32), assembly overview

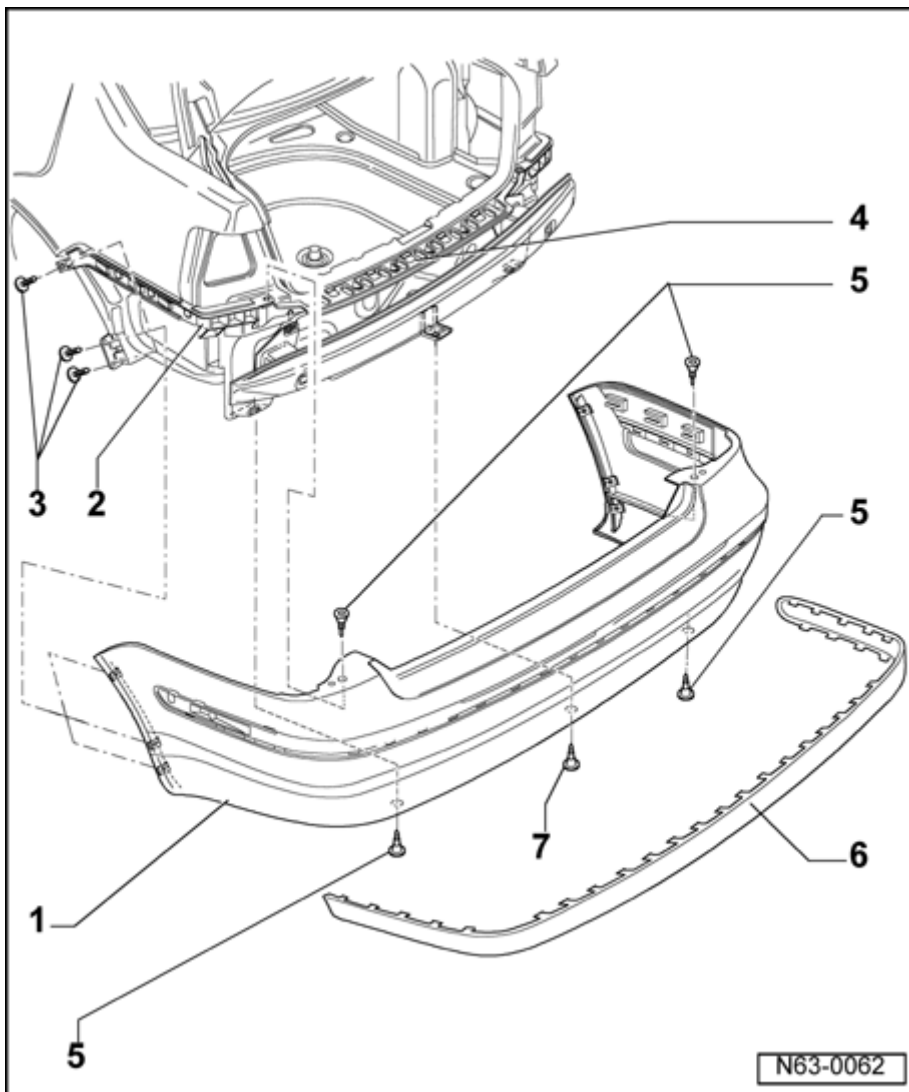
⇒ [63-1, Bumper carrier, assembly overview](#)

Rear bumper

Rear bumper cover, assembly overview

Note :

Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.



1. Rear bumper cover

- ı Material - PP/EPDM
- ı Removing ⇒ [63-2, Rear bumper cover, removing and installing](#)

2. Guide piece

- i To remove and install, pull out/slide in bumper cover parallel out of guide pieces (left and right sides)

3. Bolt

- i Qty. 8 (for common models Golf/Jetta)
- i Qty. 10 (for Jetta GLI Sport)
- i 1.5 Nm

4. Mounting strip

5. Bolt

- i Qty. 4
- i 6.6 Nm

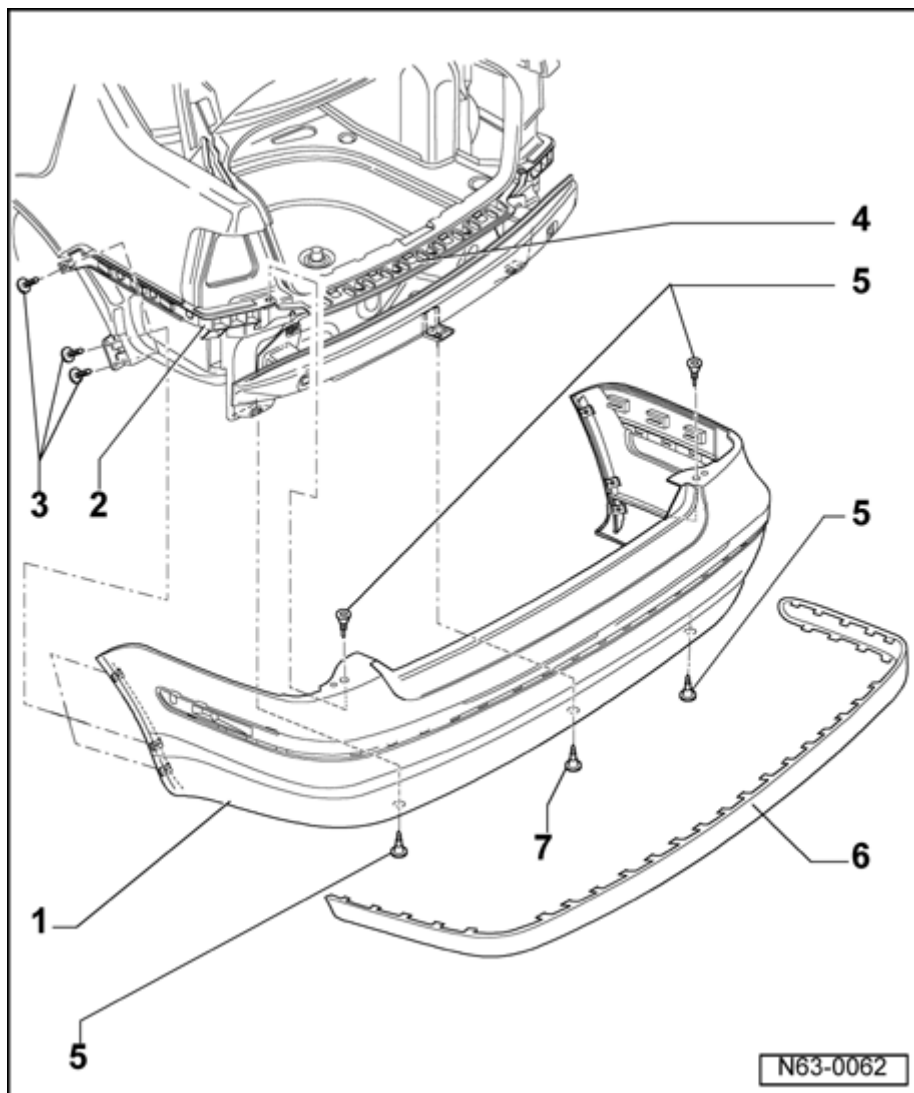
6. Impact strip

- i For common models Golf/Jetta: clipped in cover
- i For Jetta GLI Sport: delivered as by-pack
- i It is not necessary to remove when removing cover ⇒ [63-2, Rear bumper cover, removing and installing](#) .

7. Bolt

- i 6.6 Nm
- i Only on Jetta models

Rear bumper cover, removing and installing



Removing

- Loosen bumper cover - 1 - in area of wheelhousing (bolts - 3 -).

- Removing tail light assembly

⇒ [Repair Manual, Electrical Equipment, Repair Group 94, Tail light assembly](#)

- Disconnect connector (below left tail light assembly) for license plate light (Golf only).

- Remove bolts - 5 - . For Jetta, remove additional bolt - 7 - .

- Remove bumper cover - 1 - from guide pieces - 2 - (left and right sides) and

mounting strip - 4 - .

- Remove impact strip - 6 - if necessary

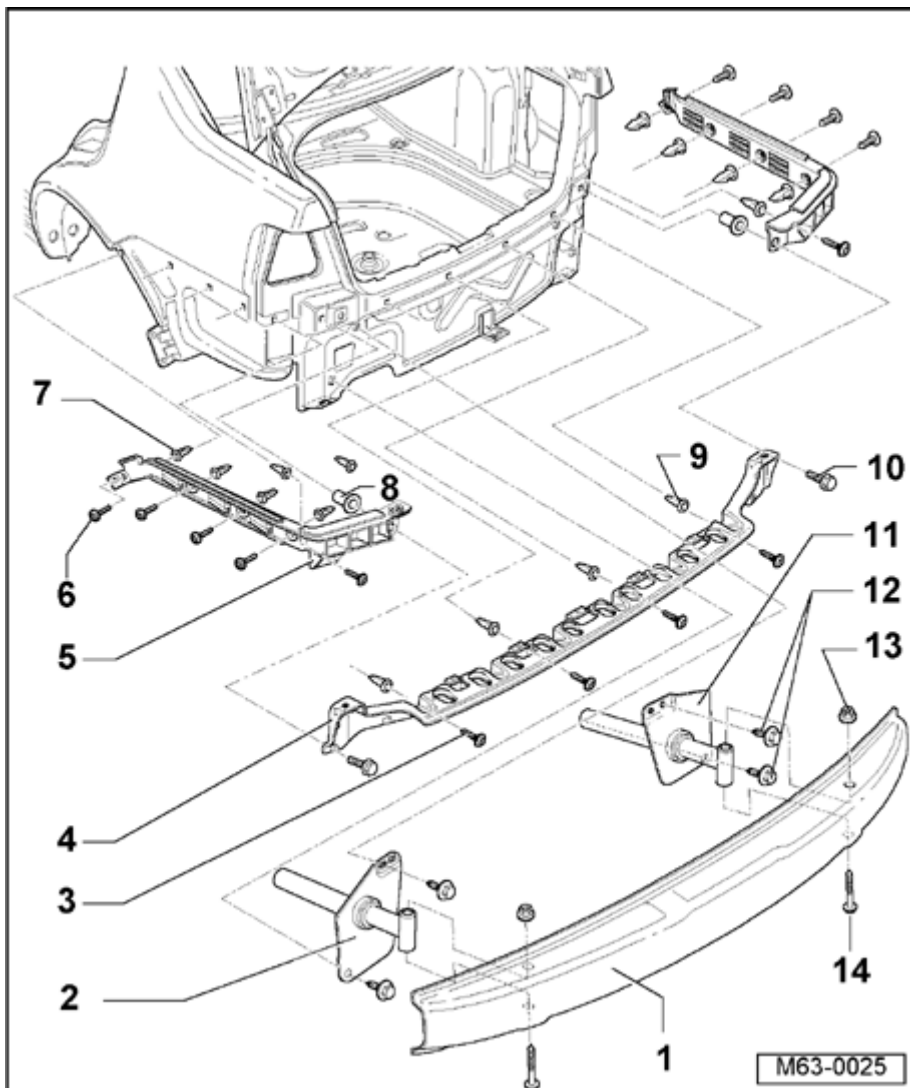
Installing

Installation is performed in reverse order of removal.

Rear bumper carrier, assembly overview

Note:

Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.



1. Bumper carrier

2. Impact absorber, left

3. Screw

- i Qty. 4
- i 1.5 Nm

4. Mounting strip**5. Guide piece**

- i To remove and install, pull out/slide in bumper cover parallel out of guide pieces (left and right sides)

6. Screw

- i Qty. 10
- i 1.5 Nm

7. Expanding nut

- i Qty.10

8. Internally threaded pop rivet

- i Qty. 2

9. Expanding nut

- i Qty. 4

10. Bolt

- i Qty. 2
- i 6.6 Nm

11. Impact absorber, right**12. Bolt**

- i Qty. 4
- i 20 Nm

13. Nut

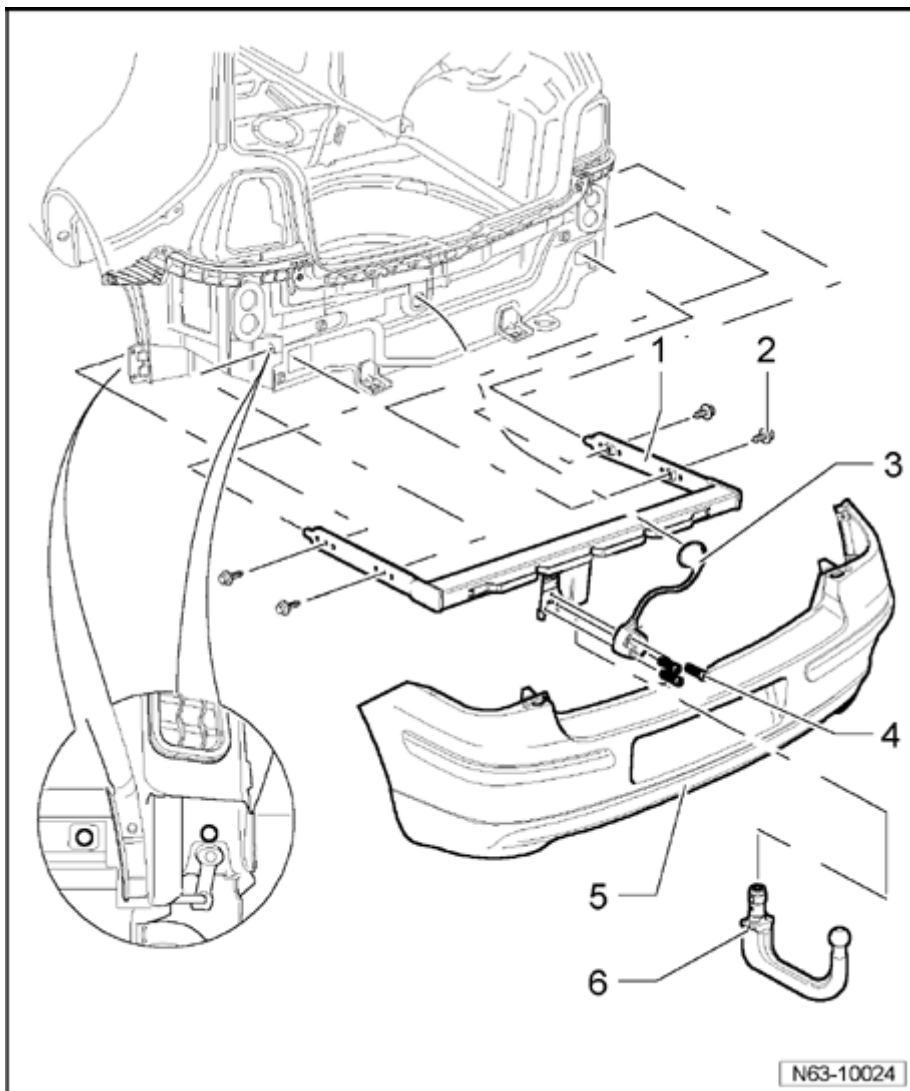
- i Qty. 2

- ; 50 Nm

14. Bolt

- ; Qty. 2
- ; Only tighten

Trailer hitch, assembly overview



1. Trailer hitch

- ; for Front Wheel Drive (FWD) vehicles
- ; for 4Motion vehicles
- ; Allocation ⇒ *Original parts distributor*

- i Removing and installing ⇒ [63-2, Trailer hitch, removing and installing](#)

2. Bolt

- i Qty. 4
- i 60 Nm + $1/4$ turns (90 °) turn
- i Always replace bolts after loosening

3. Power outlet

4. Bolt

- i Qty. 3
- i 2.5 Nm

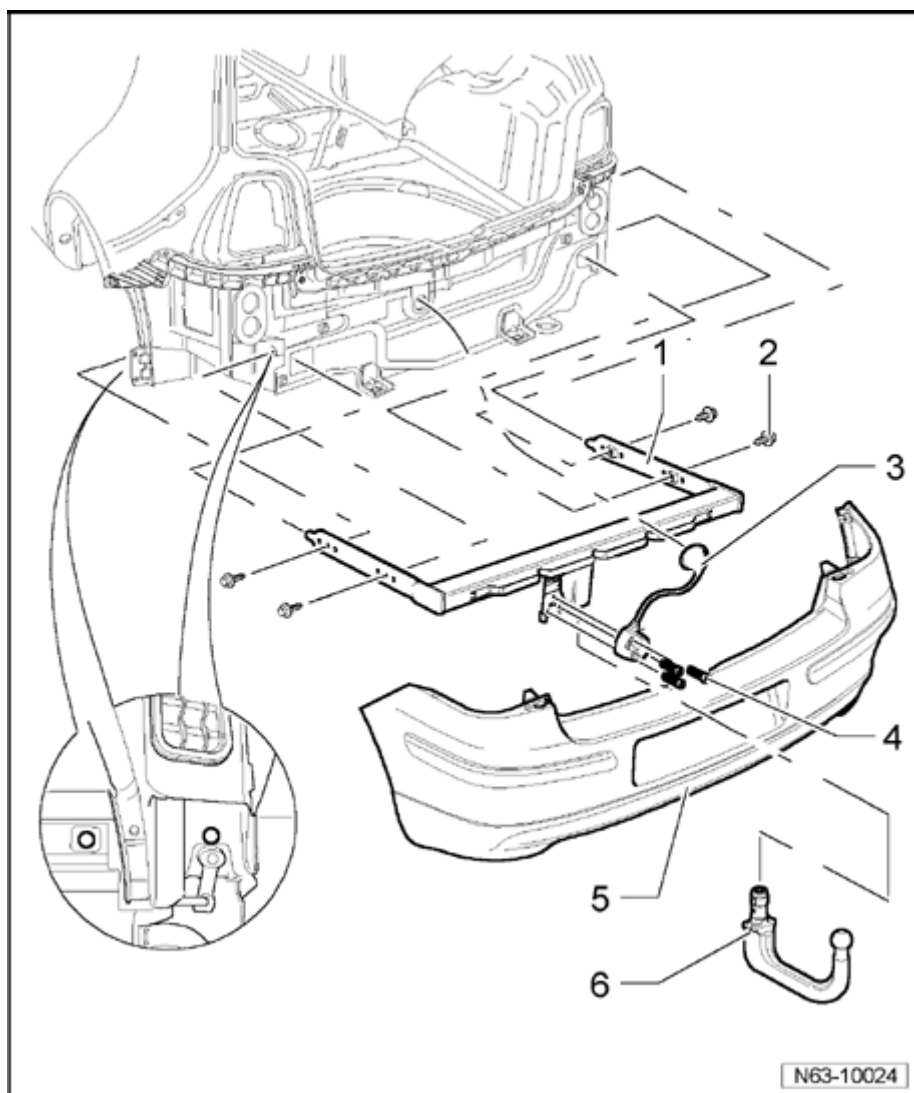
5. Bumper cover

- i Material - PP/EPDM
- i Removing and installing ⇒ [63-2, Rear bumper cover, removing and installing](#)

6. Ball head stud

- i Removable
 - Removing and installing
⇒ *operating instructions*

Trailer hitch, removing and installing



Removing

- Removing ball head stud - **6** - ⇒ *operating instructions* .
- Remove rear wheelhousing liner ⇒ [66-1, Rear wheelhousing liner](#) .
- Remove bumper cover - **5** - ⇒ [63-2, Rear bumper cover, removing and installing](#) .
- Remove power outlet - **3** - from trailer hitch - **1** - .
- Remove bolts - **2** - .
- Remove trailer hitch - **1** - out of mounting profile in body.

Installing

Installation is performed in reverse order

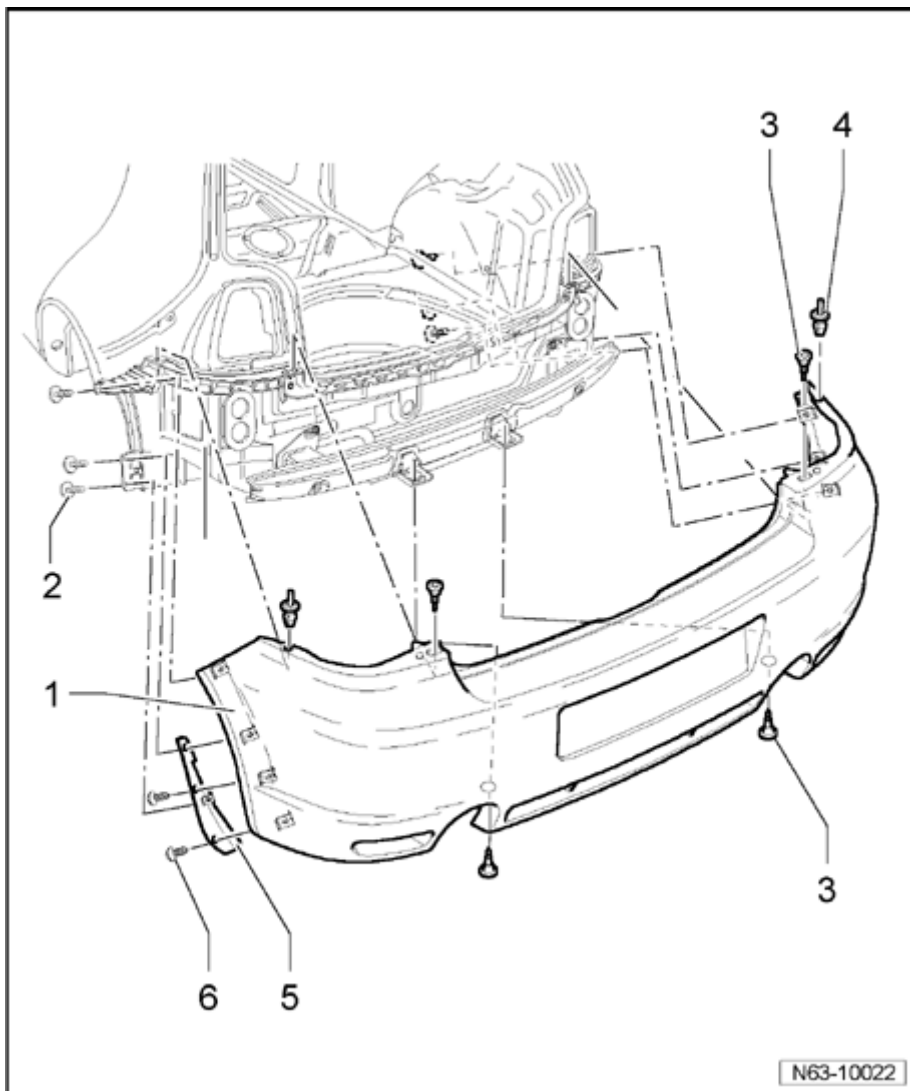
of removal. Note following:

- Only use new bolts - **2** - to secure trailer hitch - **1** - .

Rear bumper cover (Golf R32), assembly overview

Note :

Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.



1. Bumper cover

- ; Material - PP/EPDM
- ; Removing ⇒ [63-2, Rear bumper cover, removing and installing](#)

2. Bolt

- i Qty. 6
- i 1.5 Nm

3. Bolt

- i Qty. 4
- i 6.6 Nm

4. Expanding rivet

- i Qty. 2

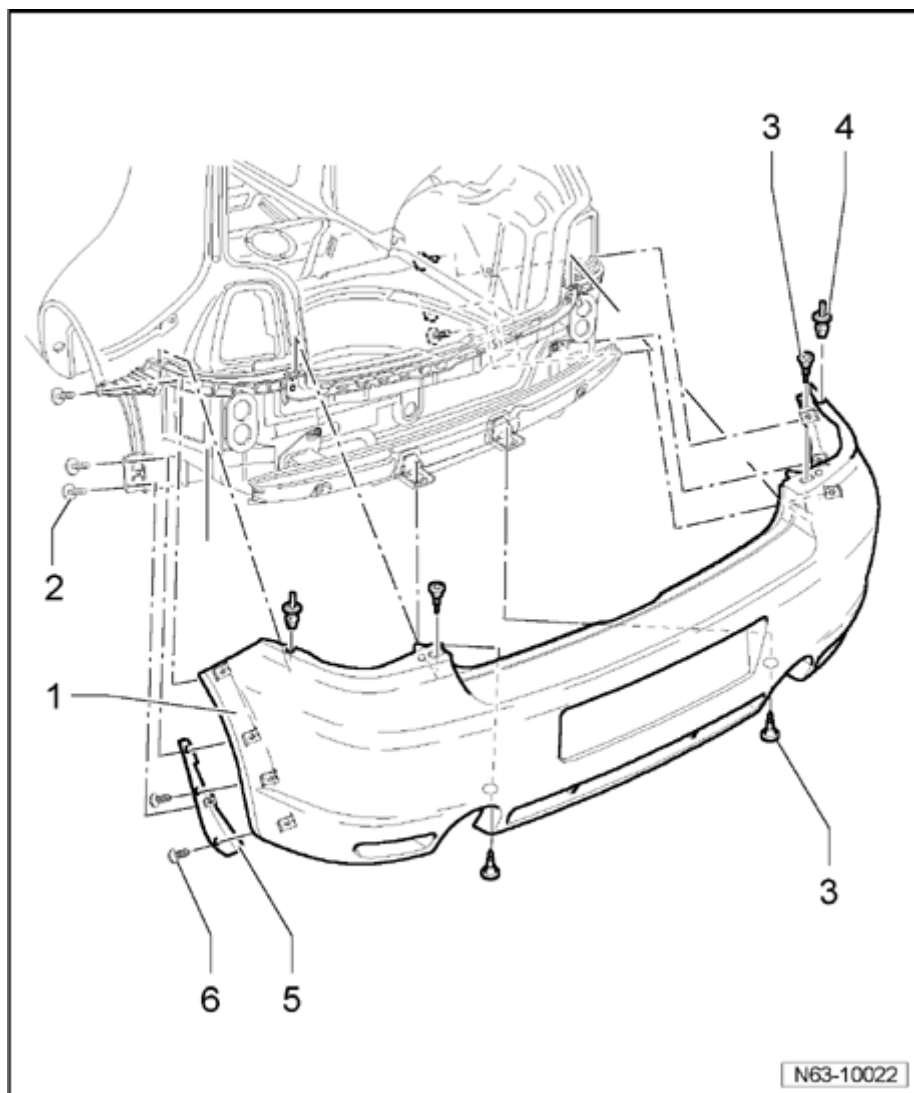
5. Adapter part

- i Removal of adapter part only possible with bumper cover removed ⇒ [63-2, Rear bumper cover \(Golf R32\), removing and installing](#)
- i Removing and installing ⇒ [63-2, Adapter part \(Golf R32\), removing and installing](#)

6. Bolt

- i Qty.2
- i 1.5 Nm

Rear bumper cover (Golf R32), removing and installing



Removing

- Loosen bumper cover - 1 - in area of wheelhousing (bolts - 2 - and - 6 -).

- Removing tail light assembly

⇒ [Repair Manual, Electrical Equipment, Repair Group 94, Tail light assembly](#)

- Disconnect harness connector (below left tail light assembly) for license plate light - only Golf.

- Remove bolts - 3 - .

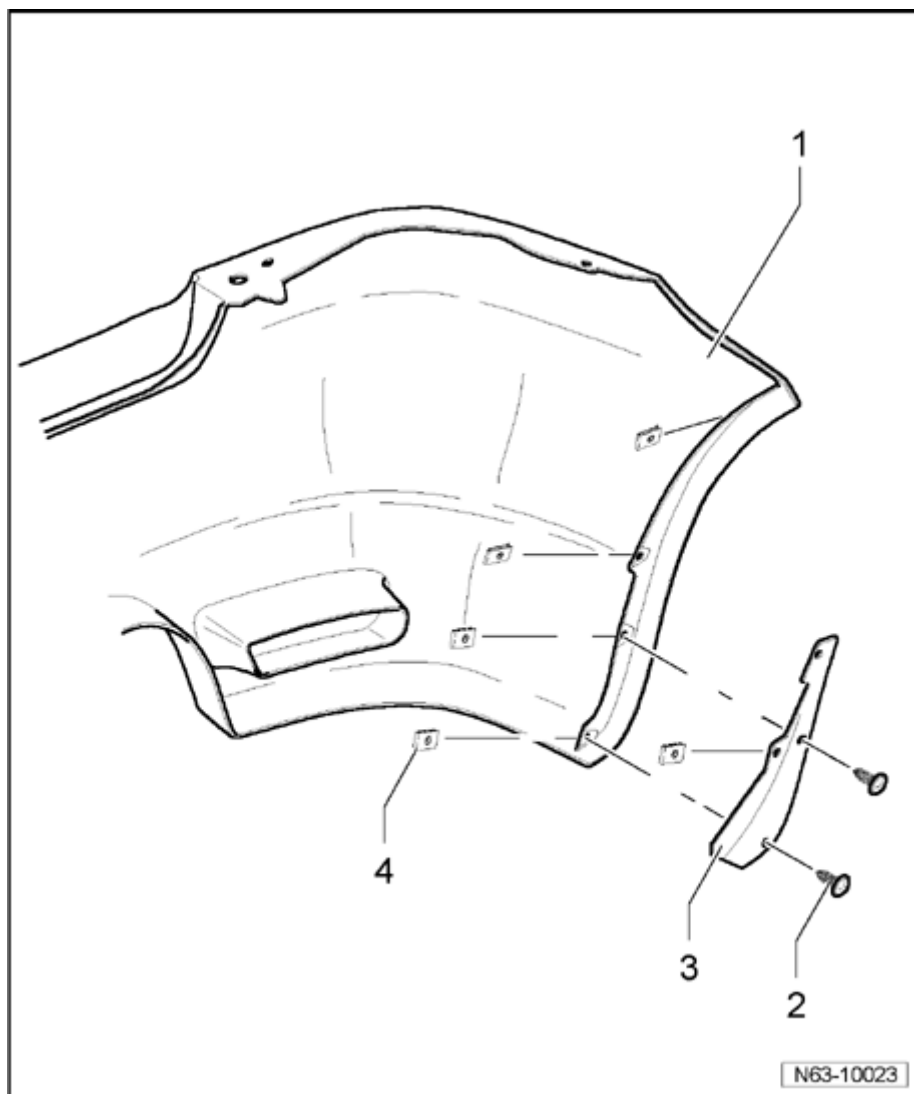
- Remove expanding rivet - 4 - .

- Remove bumper cover - 1 - .

Installing

Installation is performed in the reverse order of removal.

Adapter part (Golf R32), removing and installing



Removing

- Removing bumper cover (Golf R32) ⇒ [63-2, Rear bumper cover \(Golf R32\), removing and installing](#) .
- Remove bolts - **2** - .
- Remove adapter part - **3** - .

Installing

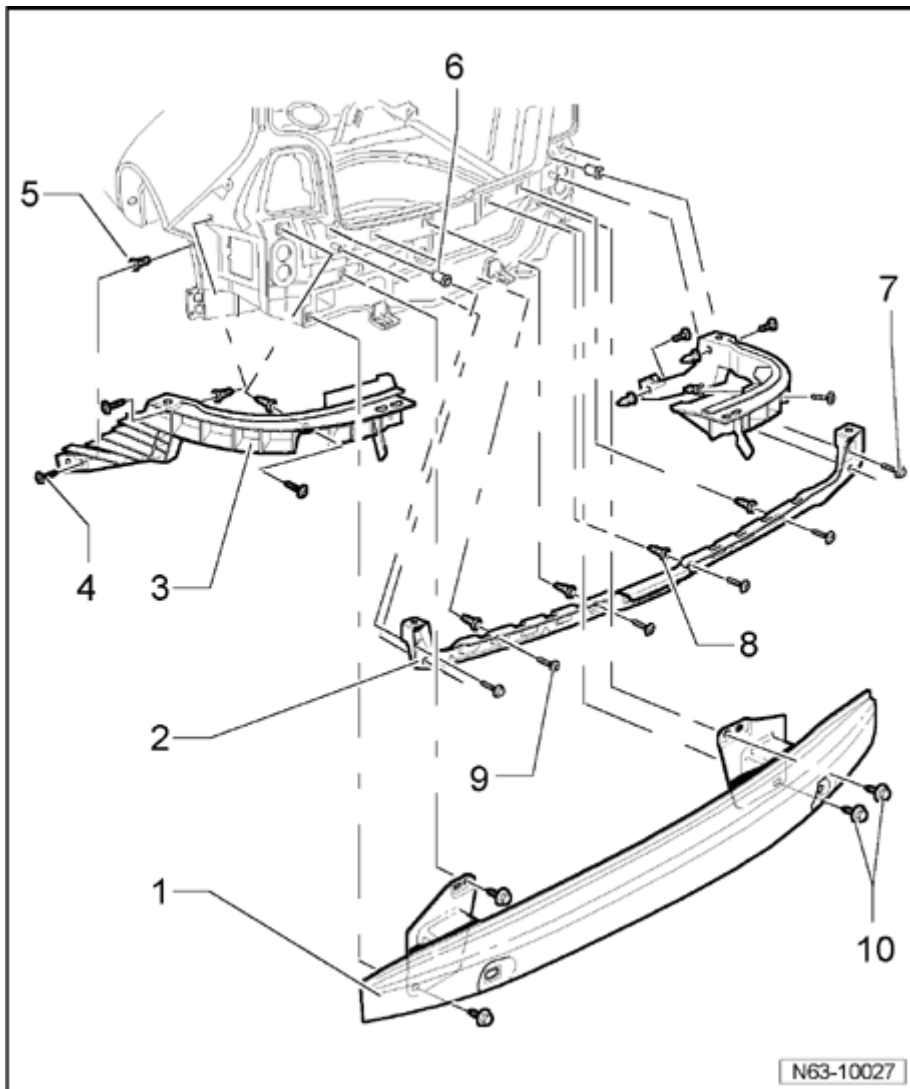
Installation is performed in the reverse

order of removal.

Rear bumper carrier (Golf R32), assembly overview

Note :

Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.



1. Bumper carrier

2. Attachment rail

3. Guide piece

- i To remove and install, pull out/slide in bumper cover parallel out of guide pieces (left and right sides)

4. Bolt

- i Qty. 3
- i 1.5 Nm

5. Expanding nut

- i Qty. 3

6. Internally threaded pop rivet

- i Qty. 2

7. Bolt

- i Qty. 2
- i 6.6 Nm

8. Expanding nut

- i Qty. 4

9. Bolt

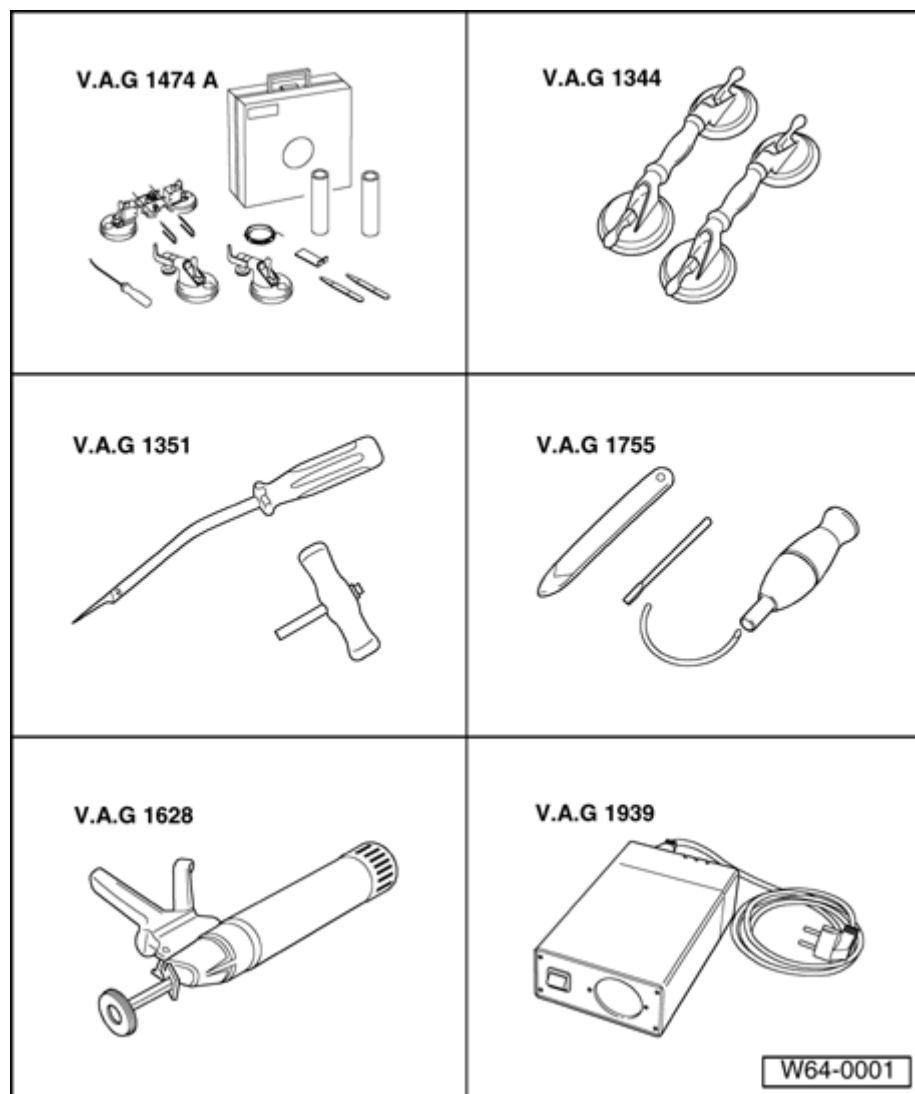
- i Qty. 4
- i 1.5 Nm

10. Bolt

- i Qty. 4
- i 20 Nm

Flush-bonded windows

Tools



Special tools, testers and auxiliary items required

Cutting tool kit V.A.G1474A

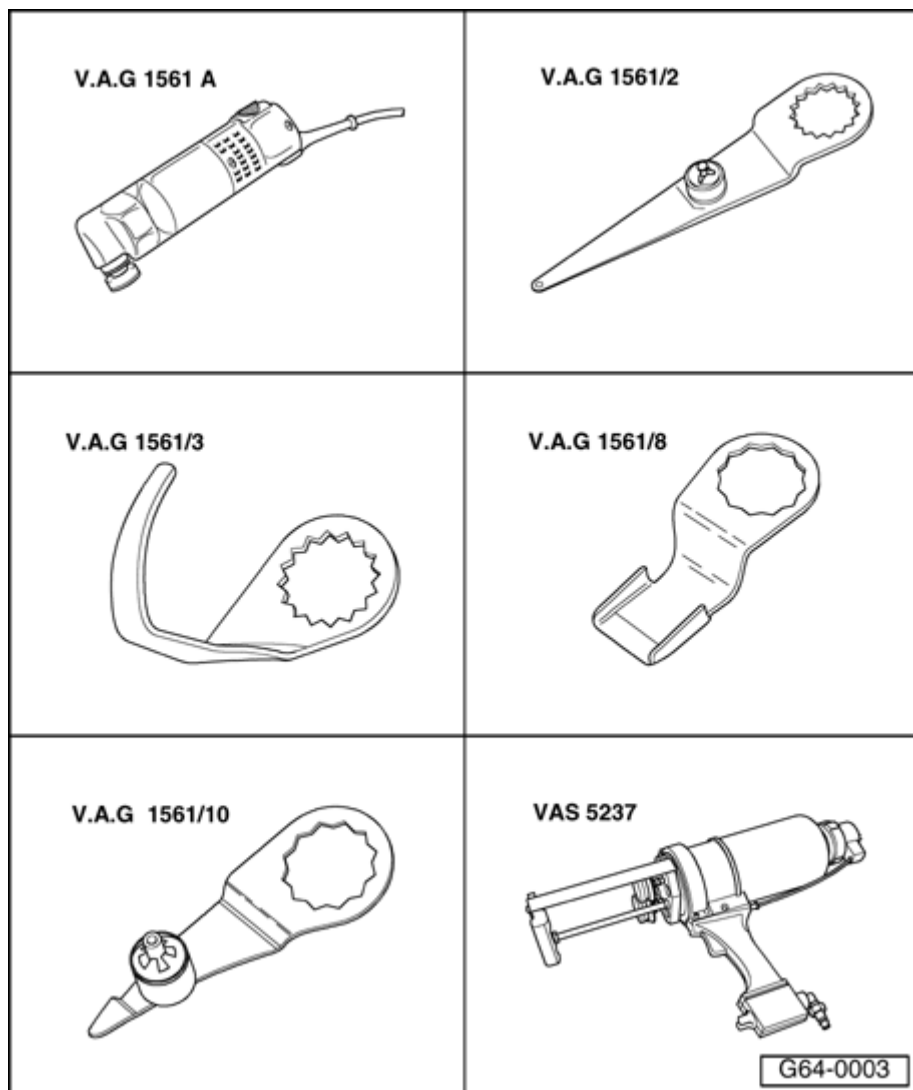
Suction lifter V.A.G1344

Cutting tools for glass V.A.G1351

Window removing kit V.A.G1755

Cartridge gun V.A.G 1628

Cartridge heater V.A.G1939



Special tools, testers and auxiliary items required

Electric cutter V.A.G1561A

Cutting blade (58 mm) V.A.G 1561/2

Cutting blade (U-shaped) V.A.G 1561/3

Scraper (25 mm) V.A.G 1561/8

Cutting blade, bent at right angle V.A.G 1561/10

Double cartridge gun VAS5237

Materials

2C- window adhesive

DA 004 600 A2 ¹⁾, ²⁾

1K- window adhesive	DH 009 100 03 ³⁾ , ⁴⁾
Activator	D 181 801 A1 ⁵⁾
Glass primer/paint primer	D 009 200 02 ⁵⁾
Cleaning solution	D 009 401 04 ⁵⁾
Primer applicator	D 009 500 25 ⁵⁾
Adhesive remover	D 002 000 10 ⁵⁾
Cutting cord	357 853 999 A

⁵⁾Materials are stored in box D 004 700

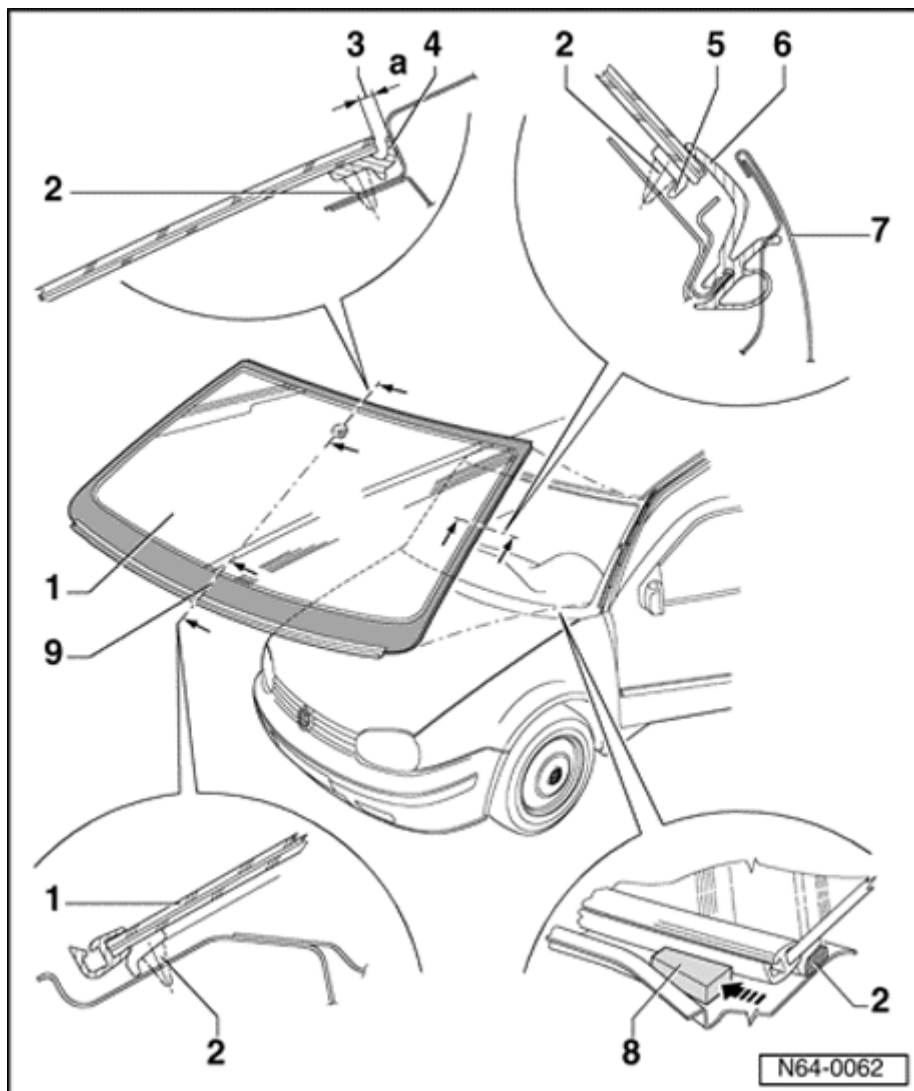
1) Observe minimum curing time ⇒ [64-1, Minimum curing time](#) .

2) Double cartridge pistol VAS5237 must be used to process this material.

3) Heat according to manufacturers instructions using Cartridge heater V.A.G1939 .

4)Small cartridge (110 ml) for sealing and/or when a 400 ml double cartridge is not sufficient.

Windshield, assembly overview



1. Windshield

- ; Removing windshield ⇒ [64-1, Windshield, removing](#)
- ; Installing windshield ⇒ [64-1, Windshield, installing](#)

2. PUR adhesive sealant

- ; Bead cross section:

Width = 7 mm

Height = 11 mm (including pre-coating, residual material on window glass and window flange)

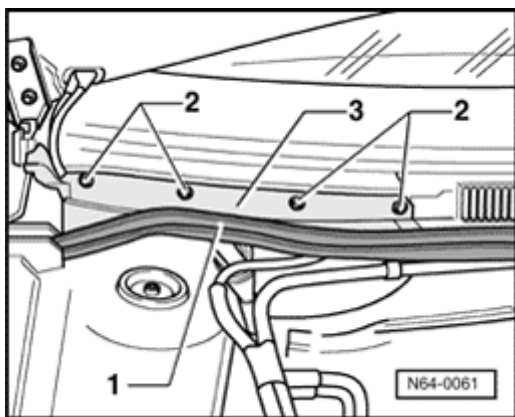
- ; Minimum curing time ⇒ [64-1, Minimum curing time](#)

3. Gap dimension - a - = 4 mm
4. Sealing lip (component part of pre-coating)
5. Spacer (component part of pre-coating)
6. Roof molding
7. Door
8. Window adjuster
i 443,845,631 A
9. PUR adhesive sealant joint

Plenum chamber cover, removing and installing

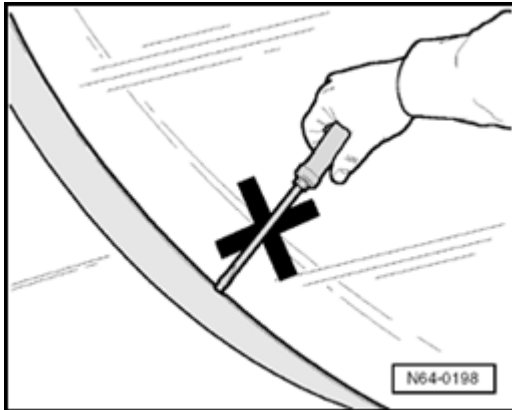
Removing

- Remove wiper arms (nuts M8 = 20 Nm).
- Remove roof molding in area of A-pillar.

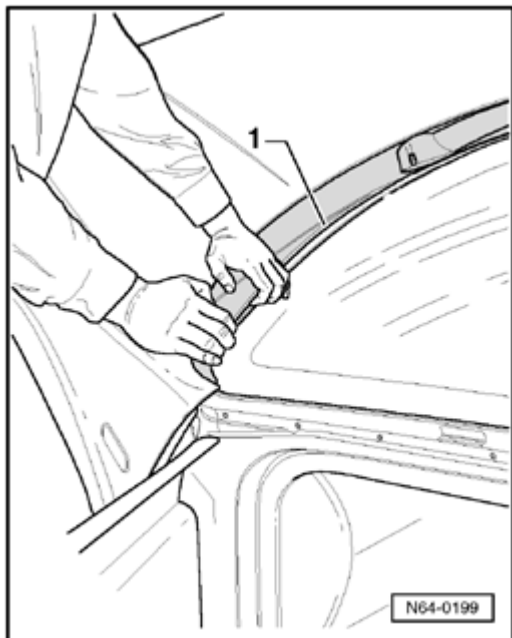


- Remove plenum chamber seal - 1 - along entire length and Remove bolts - 2 - .
- Remove cover - 3 - of pollen filter forward at top.

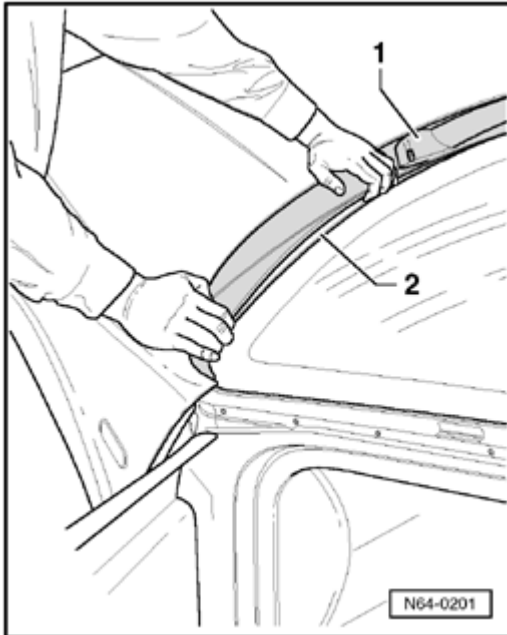
Note:



Plenum chamber cover must not be pried off using a tool (screwdriver, wedge). Window will be damaged and may crack later.



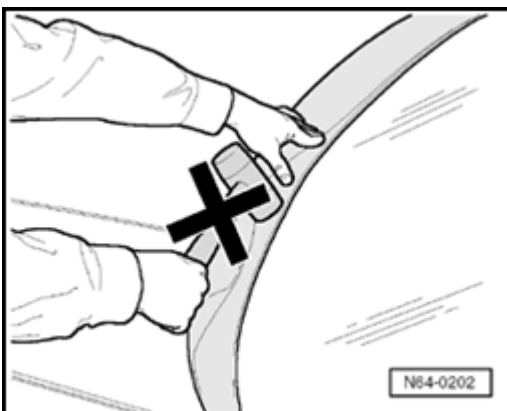
- Lift plenum chamber cover - 1 - at windshield edge.



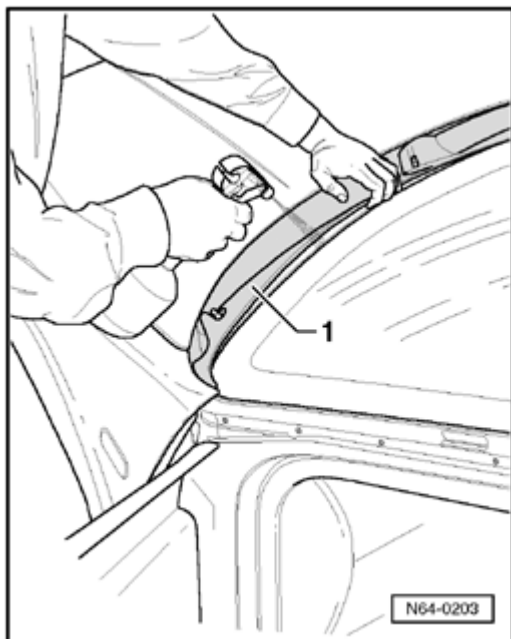
- Now pull out plenum chamber cover - **1** - starting from windshield edge at right angle out of mounting slit at lower edge of windshield - **2** - .

Installing

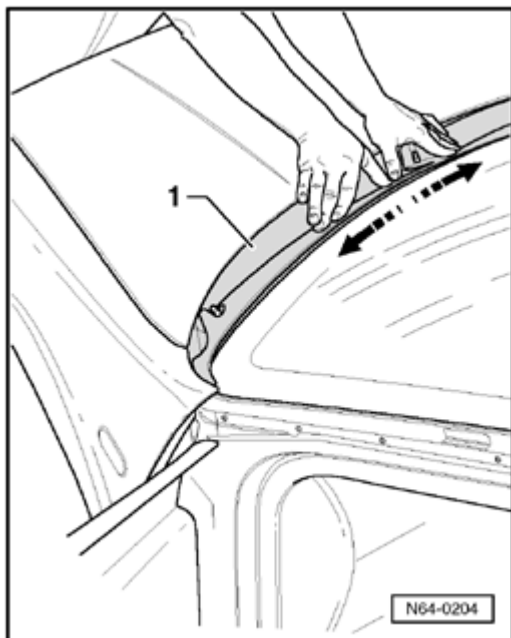
Note:



Striking plenum chamber cover can cause cracks in windshield.



- To ease installation of plenum chamber cover in mounting slots - 1 - , area should be sprayed with a soapy solution.

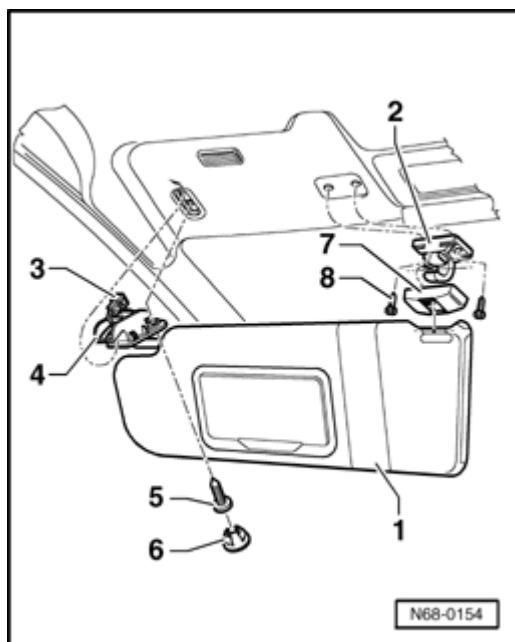


- Press plenum chamber cover - 1 - in mounting slots, starting from center in direction of - **arrow** - .

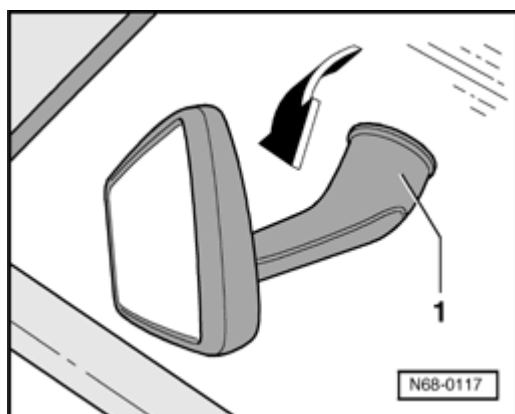
Windshield, removing

- Remove A-pillar trim

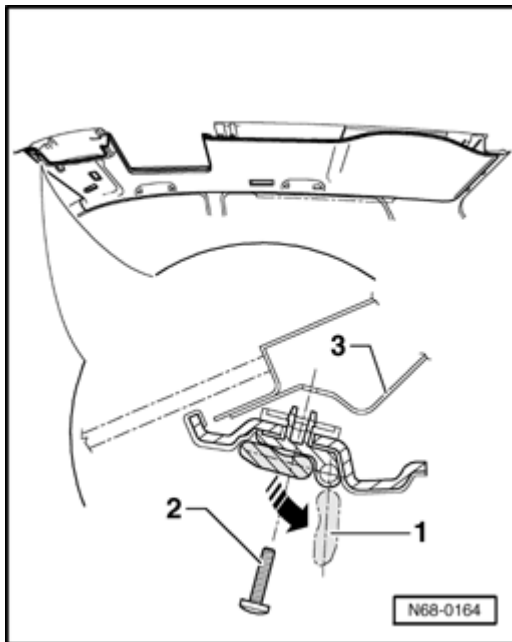
⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)



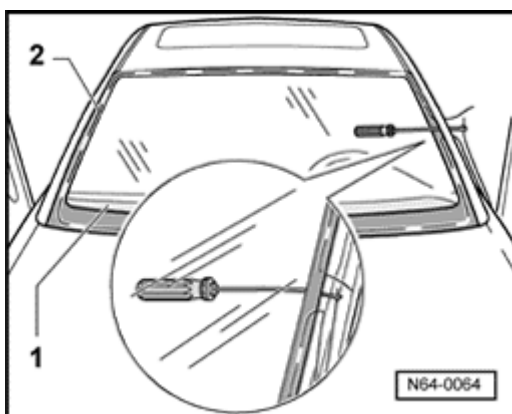
- Unhook sun visor - 1 - out of mount - 2 - .
- Pry off cap - 6 - .
- Remove bolt - 5 - .
- Remove sun visor mount - 4 - from mounting and disconnect connector - 3 - .
- Pry off cap - 7 - .
- Remove bolts - 8 - and remove mounts - 2 - .



- Pull rearview mirror - 1 - down at an angle - **arrow** - to release from retaining plate (retaining springs in base of mirror).



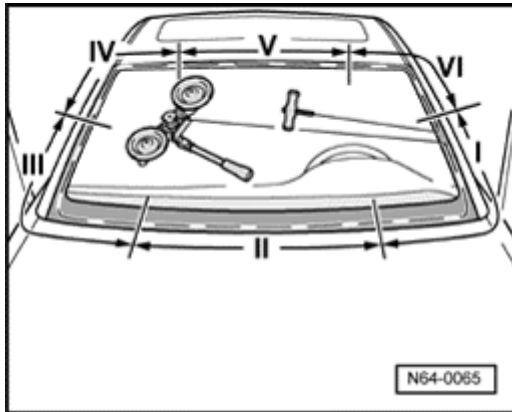
- Fold down - **arrow** - center sun visor - **1** - .
- Remove screw - **2** - out of roof sidemember - **3** - and remove sun visor.
- Insert protective foil - **1** - V.A.G1474/8 between windshield and instrument panel.
- Loosen sealing lip in upper area of windshield using a plastic wedge and spray in Cleaning solution D 009 401 04 (as a substitute for lubricant).



- Insert cutting cord - **2** - into window flange using small tube.
- For very narrow gap dimensions, guide cutting cord from outside and press under lip using plastic wedge.
- Push cutting cord end through adhesive sealant into vehicle interior using awl (from V.A.G1474A).

Note:

In side area of window, guide awl through adhesive sealant as close as possible to window flange on body, so as not to damage sealing lip.



- Secure one cord end to Spooling tool V.A.G 1654 A .
- Pull through second cord inward and attach grip from V.A.G1351 to counterhold.
- Set Spooling tool V.A.G1654 into "Position I" .
- Move spooling tool according to position required and cut windshield free.
- While cutting free, press cutting cord against window using plastic wedge in order to have clearance from window flange and instrument cluster.

Windshield, installing

Preparing undamaged window for glazing ⇒ [64-1, Preparing undamaged window for glazing](#) .

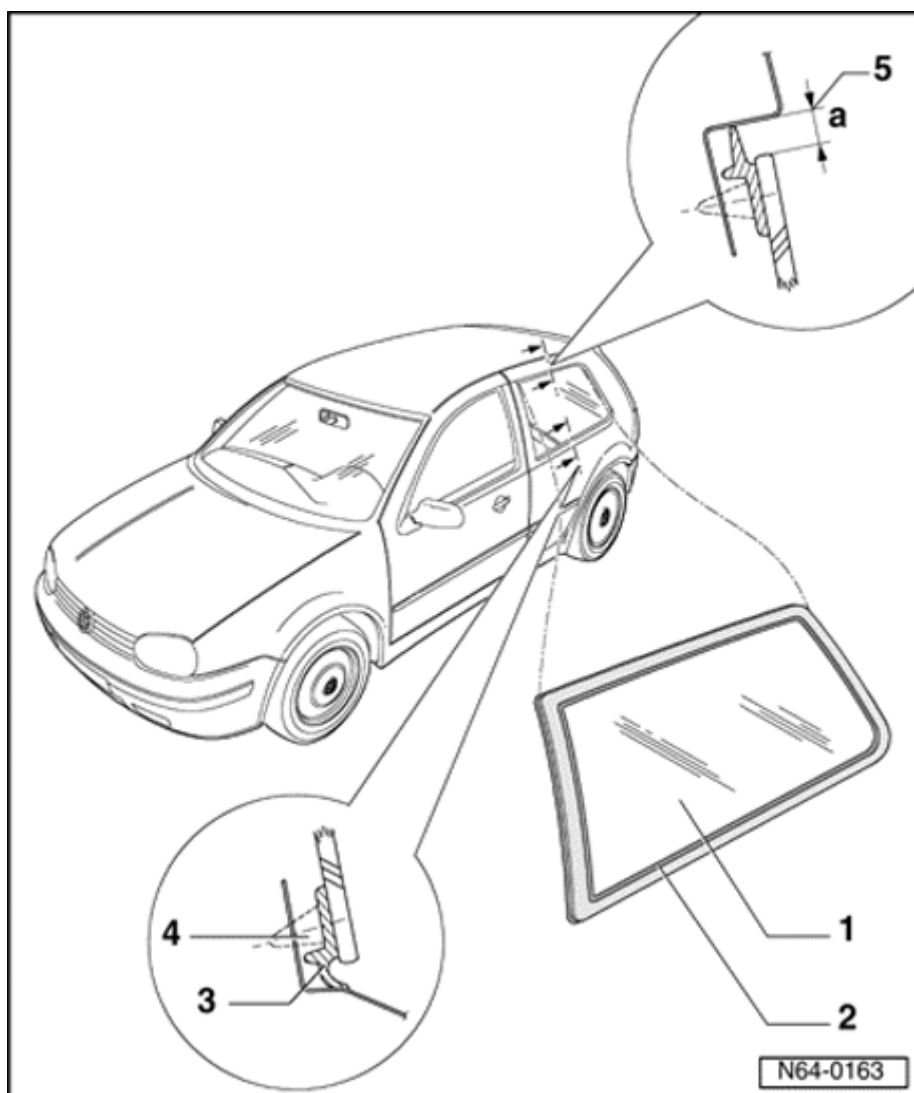
Preparing new window for glazing ⇒ [64-1, Preparing new window for glazing](#) .

Preparing window flange for glazing ⇒ [64-1, Preparing window flange for glazing](#) .

Installation notes ⇒ [64-1, Installation notes](#) .

Minimum curing time ⇒ [64-1, Minimum curing time](#) .

Side window (Golf), assembly overview



1. Side window

- ı Remove side window ⇒ [64-1, Undamaged side window, removing](#)
- ı Installing side window ⇒ [64-1, Side window, installing](#)

2. Ceramic coating

3. Sealing lip (component part of pre-coating)

4. PUR adhesive sealant

- ı Bead cross section:

Width = 7 mm

Height = 11 mm (including pre-coating, residual material on window glass and window flange)

- ; Minimum curing time ⇒ [64-1, Minimum curing time](#)

5. Gap dimension - a - = 56 mm

- ; Gap dimension must be maintained since distance is necessary for securing roof base carrier

Undamaged side window, removing

- Remove side trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

.

- Remove B-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

.

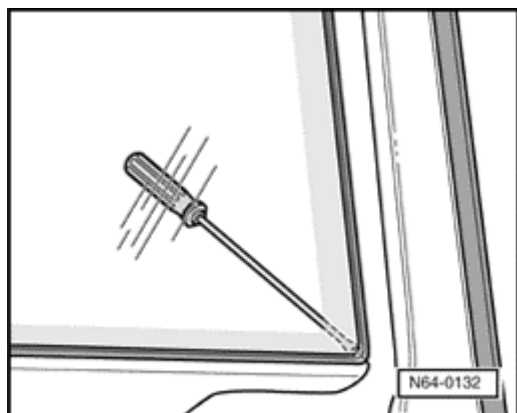
- Removing side support for luggage compartment cover and removing C-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

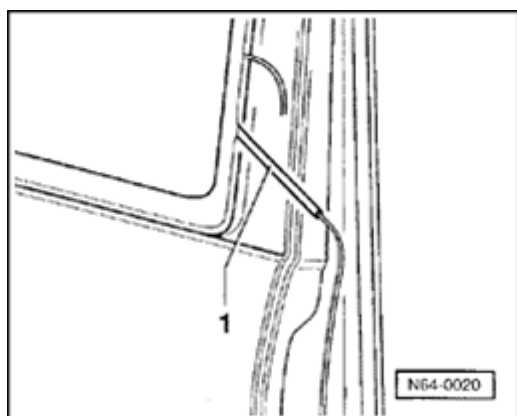
.

- Insert plastic wedge between sealing lip and window flange.

- Loosen sealing lip from window flange all around and spray in Cleaning solution D 009 401 04 (as a substitute for lubricant).



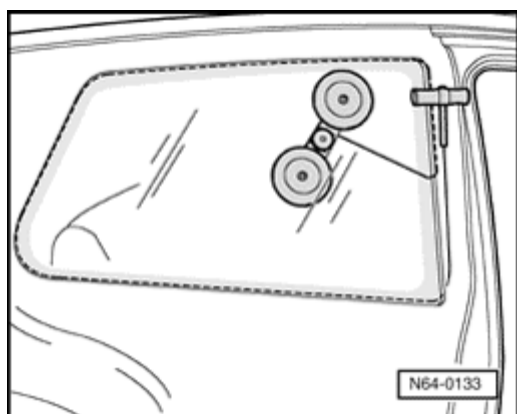
- Push cutting cord through adhesive sealant into vehicle interior using awl (from V.A.G1474).



- Using small tube - 1 - , guide in cutting cord between lip and window flange.

- For very narrow gap dimensions, guide cutting cord from outside and press under lip using plastic wedge.

- Place cutting cord around side window.



- At outer cord end, attach pulling grip from V.A.G1351 to counterhold.

- Secure inner cord end to Spooling tool V.A.G 1654 A and cut window free by positioning spooling tool.

- While cutting free, press cutting cord against window using plastic wedge in order to have clearance from window flange.

Damaged side window, removing

Removing a damaged side window is performed same as for removing a damaged rear window ⇒ [64-1, Damaged rear window, removing](#) .

Side window, installing

Note:

Pre-coating material has been changed for side window (two door). For this purpose, note page ⇒ [64-1, Preparing new window for glazing](#) .

Preparing undamaged window for glazing ⇒ [64-1, Preparing undamaged window for glazing](#) .

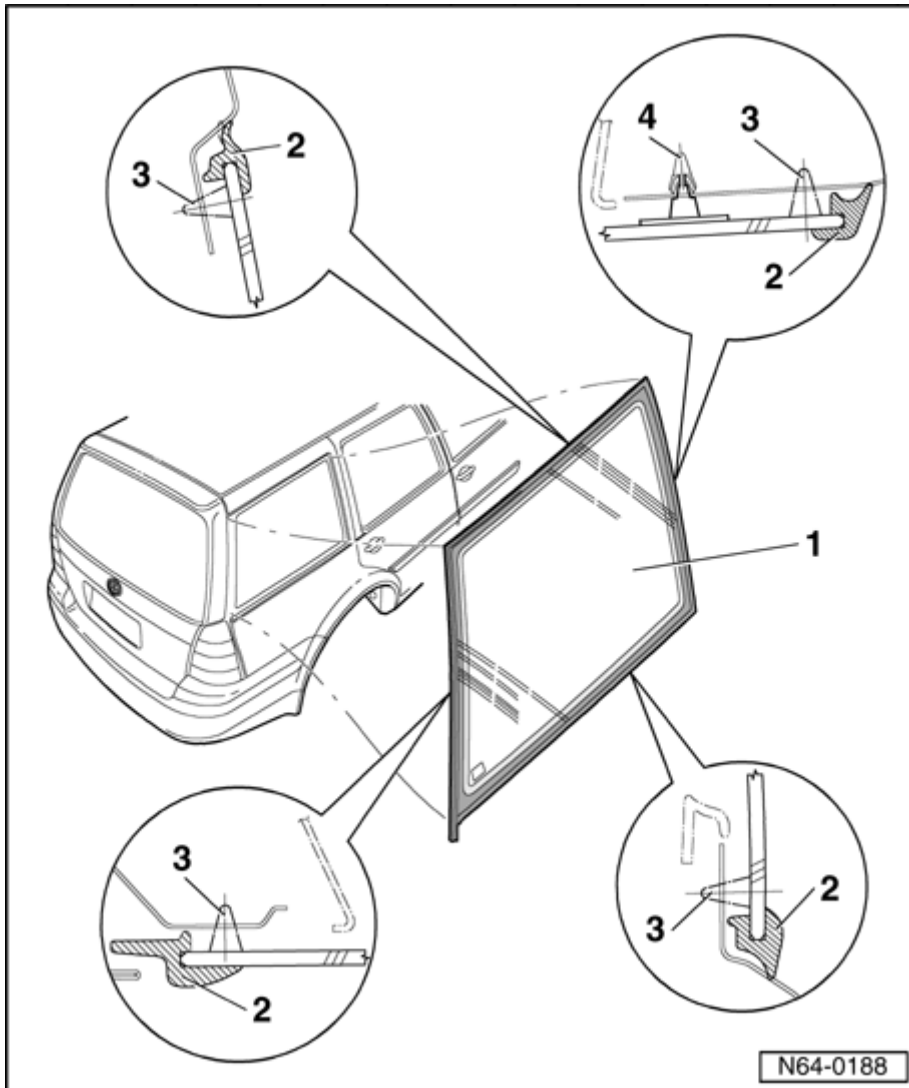
Preparing new window for glazing ⇒ [64-1, Preparing new window for glazing](#) .

Preparing window flange for glazing ⇒ [64-1, Preparing window flange for glazing](#) .

Installation notes ⇒ [64-1, Installation notes](#) .

Minimum curing time ⇒ [64-1, Minimum curing time](#) .

Side window (Wagon), assembly overview



1. Side window

- ; Remove side window ⇒ [64-1, Undamaged side window, removing](#)
- ; Installing side window ⇒ [64-1, Side window, installing](#)
- ; Side window has no pre-coating

2. Seal with spacer (component of window)

3. PUR adhesive sealant

- ; Bead cross section:

Width = 8 mm

Height = 12 mm (including residual material on window glass and window flange)

- ; Minimum curing time ⇒ [64-1, Minimum curing time](#)

4. Securing pin

- ; Two pieces
- ; They secure side window between rear door and rear lid
- ; When using old window, it is installed without securing pins

Undamaged side window, removing

- Remove luggage compartment trim in upper area

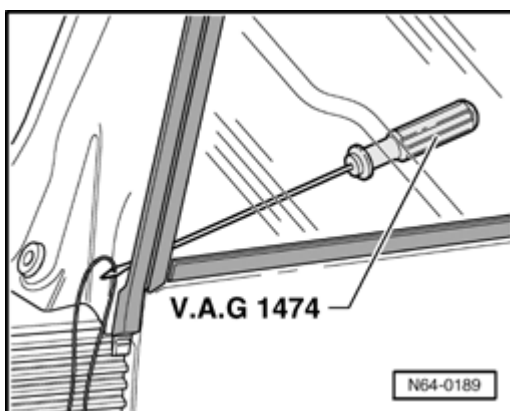
⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

- Removing C- and D-pillar trim

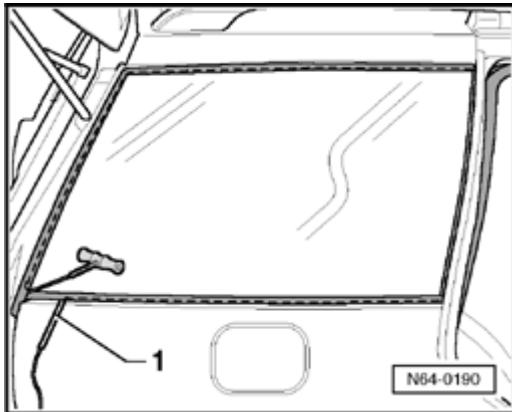
⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim](#)

- Insert plastic wedge between sealing lip and window flange.

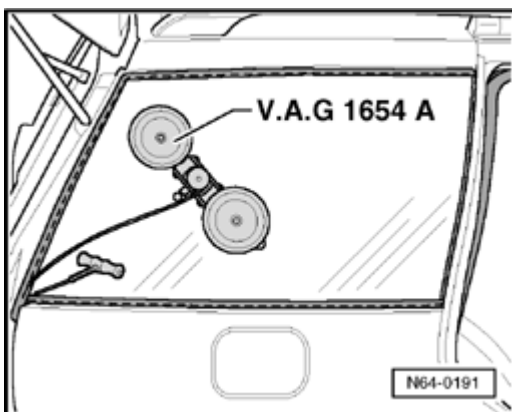
- Loosen seal from window flange all around and spray in cleaning solution D 009 401 04 (as a substitute for lubricant).



- Push cutting cord through adhesive sealant into vehicle interior using awl (from V.A.G1474).

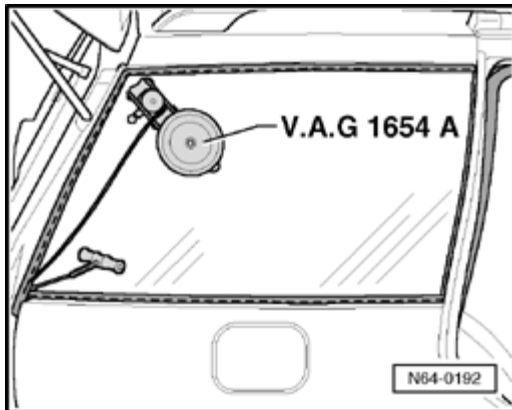


- Using small tube - 1 - , guide in cutting cord between seal and window flange.
- Pull through outer cord end inward and counterhold using Pulling grip V.A.G 1351/1 .
- Secure one cord end to Spooling tool V.A.G1654A and cut window free by positioning spooling tool.



- While cutting free, press cutting cord against window using plastic wedge in order to have clearance from window flange.
- In area of C-pillar, two securing pins are installed on window. Securing pins are cut through when cutting through adhesive bead.

Window is re-installed without securing pins since they are not available as replacement parts.



- As shown in illustration, one suction cup can be removed from spooling tool. By doing this, roller of spooling tool can be placed closer to window flange.

Damaged side window, removing

Removing a damaged side window is performed same as for removing a damaged rear window ⇒ [64-1, Damaged rear window, removing](#) .

Side window, installing

Preparing undamaged window for glazing ⇒ [64-1, Preparing undamaged window for glazing](#) .

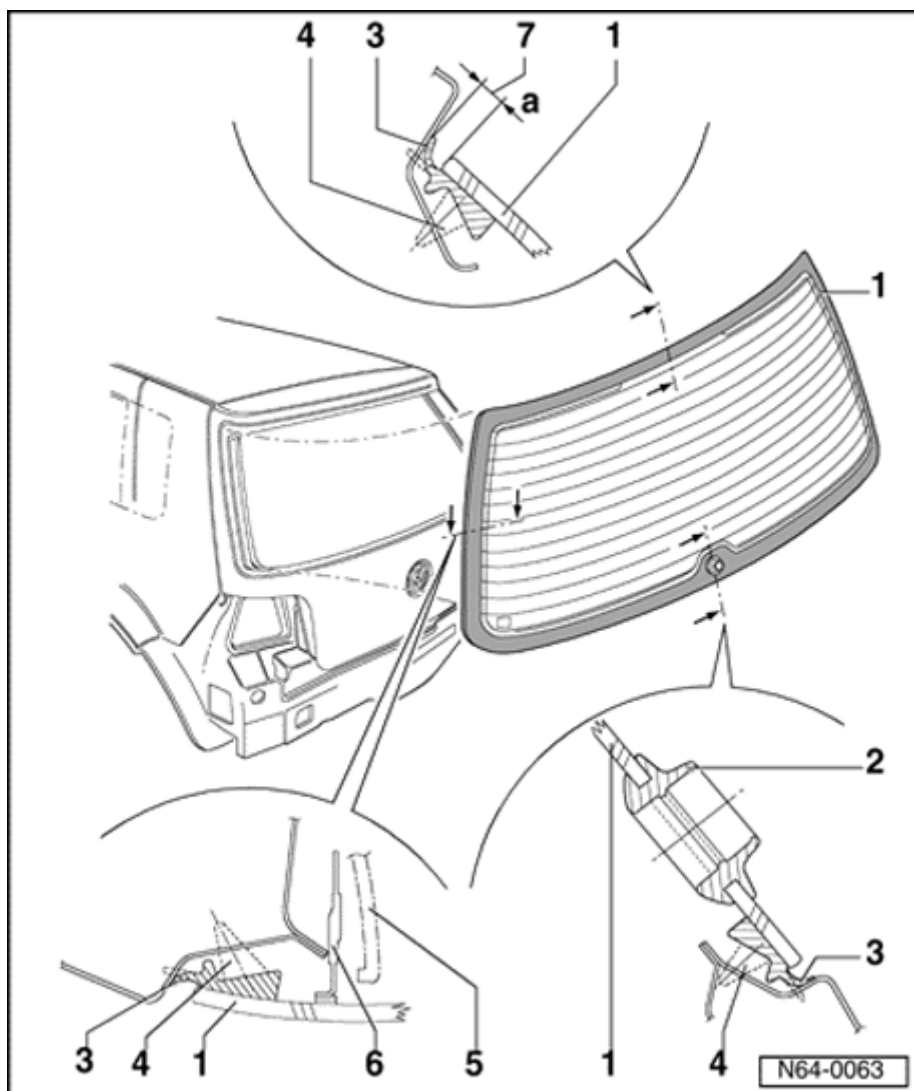
Preparing new window without pre-coating for glazing ⇒ [64-1, Preparing new window without pre-coating for glazing](#) .

Preparing window flange for glazing ⇒ [64-1, Preparing window flange for glazing](#) .

Installation notes ⇒ [64-1, Installation notes](#) .

Minimum curing time ⇒ [64-1, Minimum curing time](#) .

Rear window (Golf), assembly overview



1. Rear window

- ı Removing rear window ⇒ [64-1, Undamaged rear window, removing](#)
- ı Installing rear window ⇒ [64-1, Rear window, installing](#)

2. Gasket

- ı for rear window wiper

3. Sealing lip (component part of pre-coating)

4. PUR adhesive sealant

- ı Bead cross section:

Width = 7 mm

Height = 11 mm (including pre-coating, residual material on window glass and window flange)

- ; Minimum curing time ⇒ [64-1, Minimum curing time](#)

5. Trim

6. Contact for window heater

7. Gap dimension - a - = 4.5 mm

Undamaged rear window, removing

- Remove rear lid trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim](#)

- Disconnect connectors for heated rear window and press connector tabs onto window.

- Removing rear window wiper motor

⇒ [Repair Manual, Electrical Equipment, Repair Group 92, Rear window wiper and washer system, servicing](#)

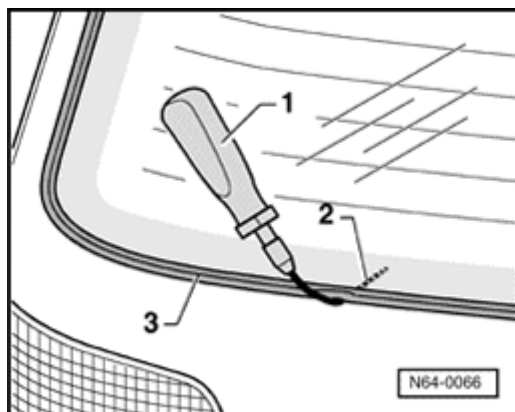
.

- Removing auxiliary brake light

⇒ [Repair Manual, Electrical Equipment, Repair Group 94,](#)

.

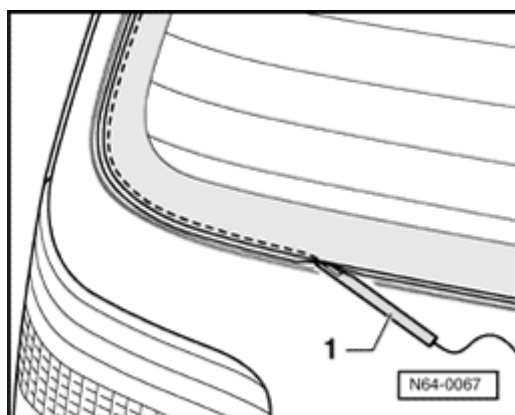
- Loosen sealing lip from window flange using plastic wedge and spray in Cleaning solution D 009 401 04 (as a substitute for lubricant).



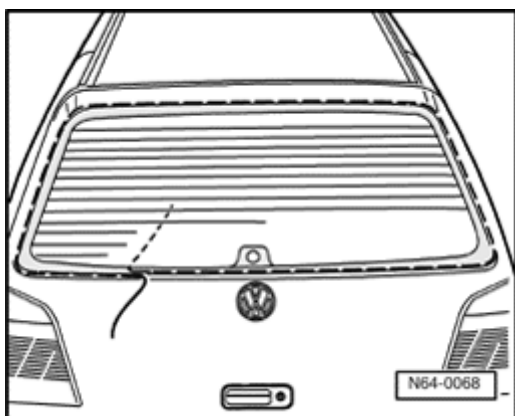
- Insert guide needle - **2** - under sealing lip - **3** - using handle - **1** - and knock through adhesive bead (use side area on lower edge of rear window).

Hold guide needle as close to glass as possible.

- Remove handle and thread cutting cord through eye of needle.
- Using pliers and wearing gloves, pull one end of cutting cord into vehicle interior.



- Using small tube - **1** - , guide in cutting cord between lip and window flange.
- For very narrow gap dimensions, guide cutting cord from outside and press under lip using plastic wedge.

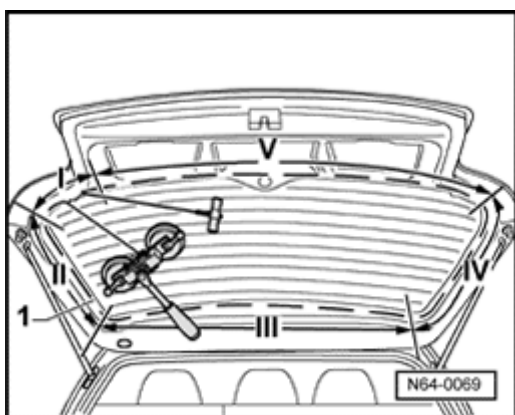


- Place cutting cord around window as shown.

Note:

Press in cutting cord far enough to prevent damage to lip/spacer.

- Pull through outer cord end inward and secure to Pulling grip V.A.G1351/1 to counterhold.

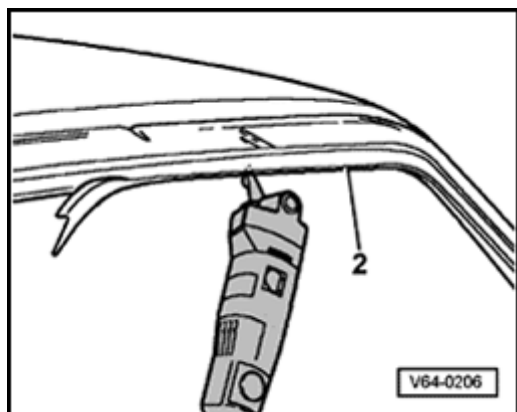


- Apply cloth-reinforced adhesive tape to window flange on inside - **1** - .
- Secure cord end to spooling tool.
- Set Spooling tool V.A.G1654 into "Position I" .
- Move spooling tool according to position required and cut windshield free.
- While cutting free, press cutting cord against window using plastic wedge in order to have clearance from window flange.

Damaged rear window, removing

- Protect body and interior from glass splinters.

- Remove glass pieces up to adhesive material.
- Remove connectors for glass defroster and antenna.



- Bond flange - 2 - all around with fabric reinforced adhesive tape.
- Remove adhesive material (with glass residue) from window opening using electric cutter and Knife V.A.G1561/10 (with stopper roll).

Warning!

Always wear protective goggles and leather gloves.

Rear window, installing

Preparing undamaged window for glazing ⇒ [64-1, Preparing undamaged window for glazing](#) .

Preparing new window for glazing ⇒ [64-1, Preparing new window for glazing](#) .

Preparing window flange for glazing ⇒ [64-1, Preparing window flange for glazing](#) .

Installation notes ⇒ [64-1, Installation notes](#) .

Minimum curing time ⇒ [64-1, Minimum curing time](#) .

Rear window (Jetta), assembly overview

- i Minimum curing time ⇒ [64-1, Minimum curing time](#)

5. Gap dimension - b - = 6.5 mm

- i Check gap dimension using Adjustment gauge 3371

6. Window adjuster

- i 443,845,631 A

7. Gap dimension - c - = 3 mm

Undamaged rear window, removing

- Disconnect connectors for heated rear window and press connector tabs onto window.
- Remove parcel shelf

⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim; removing and installing parcel shelf](#)

.

- Removing upper C-pillar trim

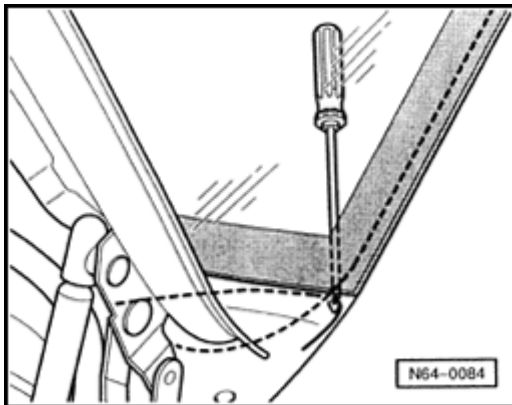
⇒ [Repair Manual, Body Interior, Repair Group 70, Pillar and side trim; removing and installing upper C-pillar trim \(Jetta\)](#)

.

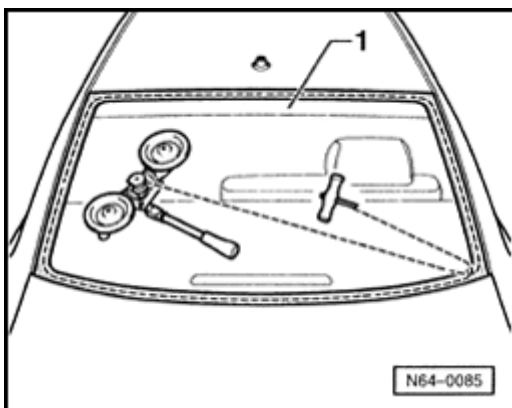
- Loosen sealing lip from window flange using plastic wedge and spray in Cleaning solution D 009 401 04 (as a substitute for lubricant).
- Insert cutting cord into window flange using small tube.

Note:

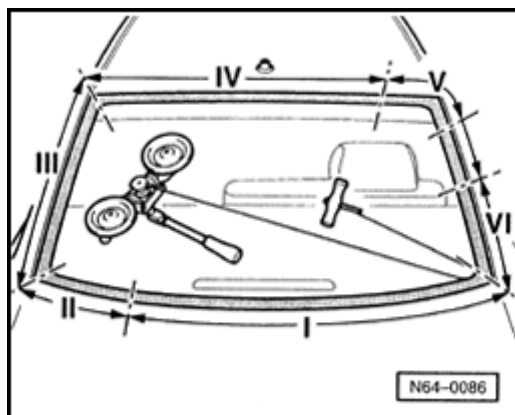
Press in cutting cord far enough to prevent damage to lip/spacer.



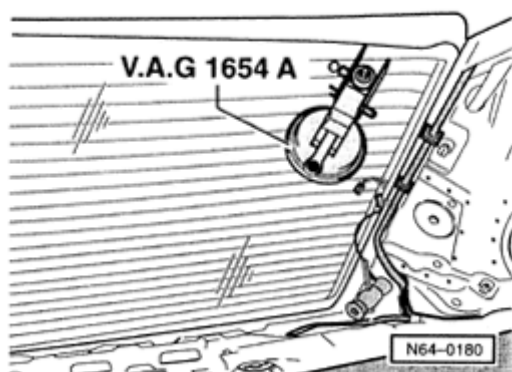
- Push cutting cord through adhesive sealant into vehicle interior using awl (from V.A.G1474A).
- Pull through outer cord end inward and counterhold using Pulling grip V.A.G1351/1 .
- Secure inner cord end to spooling tool.
- Position Spooling tool V.A.G1654 .



- Insert protective foil - 1 - (V.A.G 1474/14) between rear window and headliner.
- Move spooling tool according to position required and cut windshield free.
- While cutting free, press cutting cord against window using plastic wedge in order to have clearance from window flange.



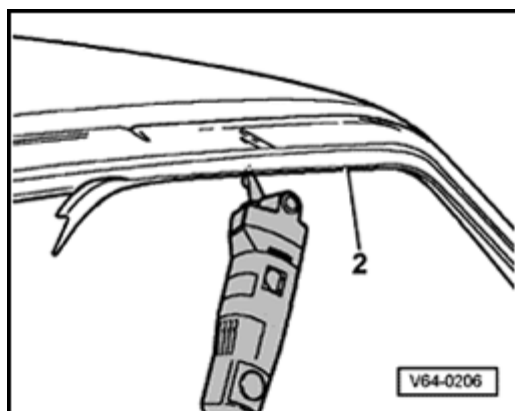
- In place of Spooling tool V.A.G1654 , spooling tool V.A.G1654A can also be used.



- As shown in illustration, one suction cup can be removed from spooling tool. By doing this, roller of spooling tool can be placed closer to window flange.

Damaged rear window, removing

- Protect body and interior from glass splinters.
- Remove glass pieces up to adhesive material.
- Remove connectors for glass defroster and antenna.



- Bond flange - 2 - all around with fabric reinforced

adhesive tape.

- Remove adhesive material (with glass residue) from window opening using electric cutter and Knife V.A.G1561/10 (with stopper roll).

Warning!

Always wear protective goggles and leather gloves.

Rear window, installing

Preparing undamaged window for glazing ⇒ [64-1, Preparing undamaged window for glazing](#) .

Preparing new window for glazing ⇒ [64-1, Preparing new window for glazing](#) .

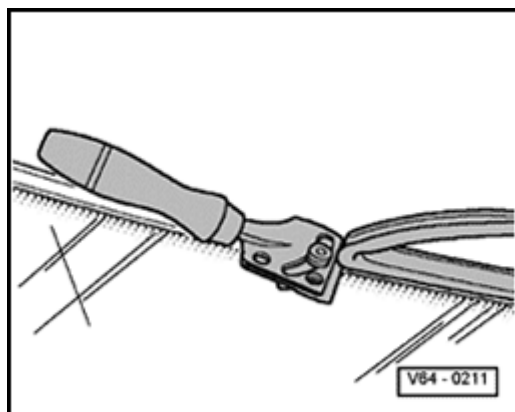
Preparing window flange for glazing ⇒ [64-1, Preparing window flange for glazing](#) .

Installation notes ⇒ [64-1, Installation notes](#) .

Minimum curing time ⇒ [64-1, Minimum curing time](#) .

Preparing undamaged window for glazing

Note:



When re-using an undamaged window, cut back remaining adhesive sealant to 1 - 2 mm shortly before re-adhering, do not damage primer and ceramic coating.

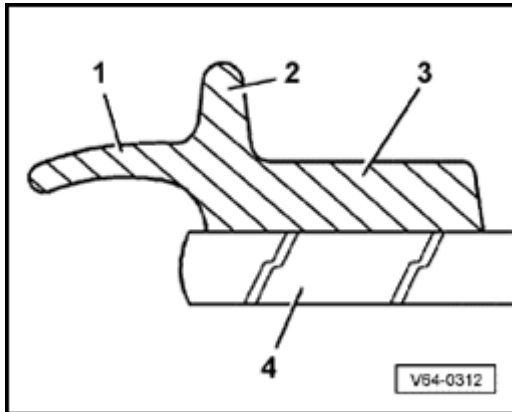
Residual material acts as a base for new adhesive sealing material.

Warning!

Do not prime or use a cleaning solution on adhesive surface. Keep adhesive surface free of dirt and grease.

Exception: If bonding is not performed immediately after cutting back, remaining material must be activated using Activator D 181 801 A1 .

Preparing new window for glazing



New windows are shipped pre-coated with -PUR-. Pre-coating consists of positions - 1 - , - 2 - and - 3 - .

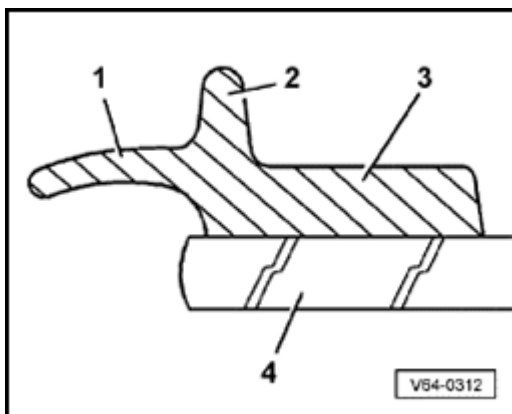
1. Sealing lip
2. Spacer
3. Application area for adhesive bead
4. Washer

Side window

Note:

Due to production change of pre-coating material for side windows, handle pre-coating as follows:

- Saturate cloth with silicone remover.



- Always wipe application area for adhesive bead - 3 - twice using saturated cloth.
- Normally, after an air drying time of at least five minutes,

Activator D 181 801 A1 must be used for pre-coated windows.

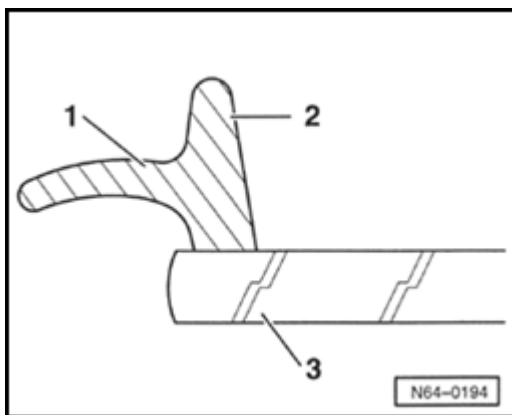
Gap dimensions for side windows

When inserting side window, a gap dimension of 56 mm must be maintained between upper edge of window and window flange at side panel.

Reason: Distance is necessary for securing roof base carrier.

Rest of bonding procedure remains unchanged.

Preparing new window without pre-coating for glazing



For 2-door Golf and Golf/Jetta Wagon, a new, non-pre-coated side window has been introduced. On new side windows, only PUR-sealing lip - 1 - and spacer - 2 - has still been sprayed.

1. Sealing lip
2. Spacer
3. Washer

Note:

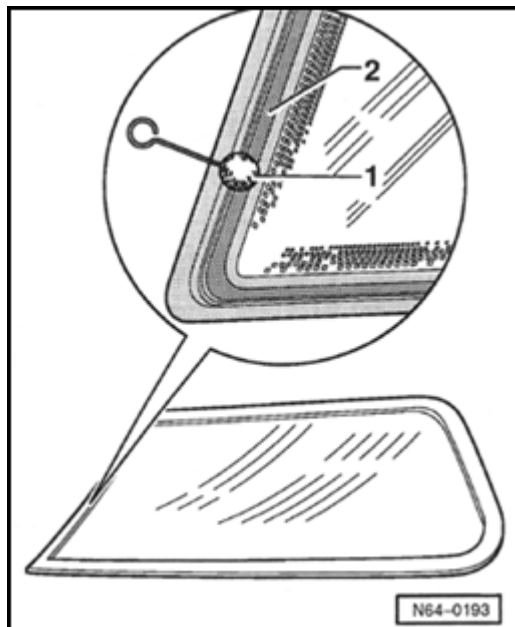
Application area for adhesive bead - 3 - is not pre-coated and not primed.

- Clean window circumference to width of 20 mm all around using Cleaning solution D 009 401 04 .
- Then rub window circumference dry using a lint-free rag.

Warning!

Ceramic application on window is not primer! It must be primed before application of adhesive sealing

material! Only use primer D 009 200 02 !



- Now apply primer - 2 - uniformly in one stroke using Applicator D 009 500 25 - 1 - .

Dry time approx. 10 minutes

Note:

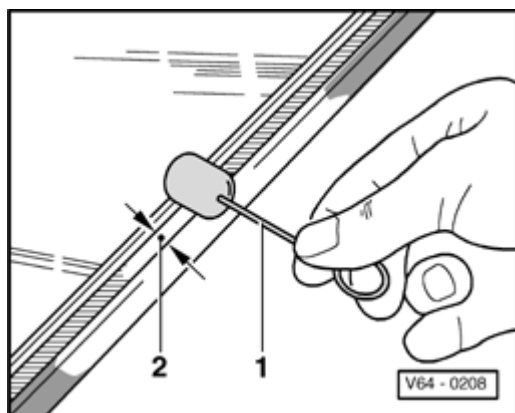
For adhesive bead application, a nozzle must be cut exactly so that adhesive bead can be applied to a width of 8 mm and a height of 12 mm.

All other windows

- Rub pre-coating with a dry, lint-free rag.

Warning!

Do not prime or use a cleaning solution on pre-coating.



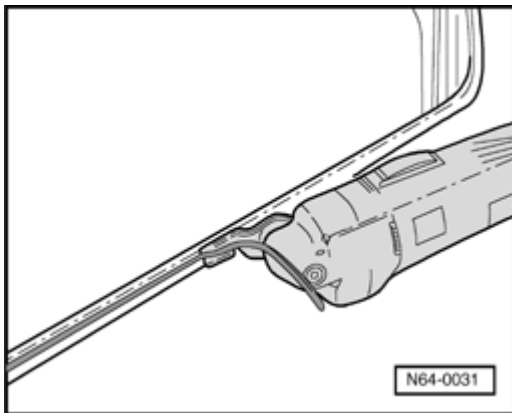
- Using Applicator D 009 500 25 - 1 - (felt ball with wire), apply Activator D 181 801 A1 thinly onto pre-coating - 2 - only.
- Allow activator to air dry for at least 10 minutes.

Note:

Activator must not come into contact with paint - otherwise paint will be damaged.

Activator must not be applied onto distributing wire for window heater.

Preparing window flange for glazing



- Cut back remaining material using Scraper V.A.G1561/8 , do not remove all residue under any circumstance.

Note:

Residual material acts as a base for new adhesive sealing material. Keep adhesive surface free of dirt and grease.

Warning!

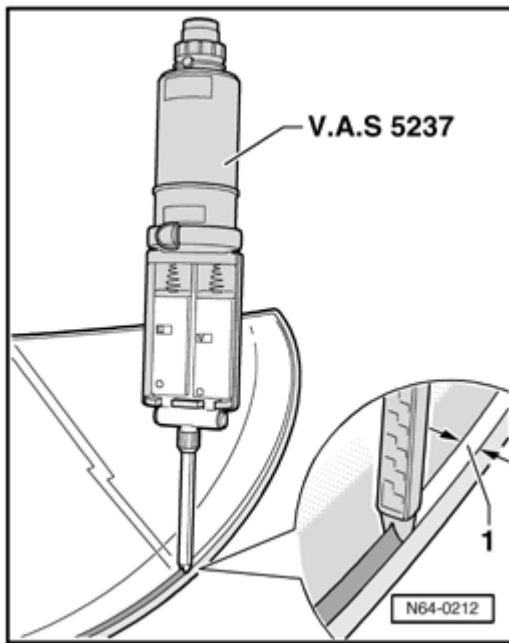
Activator must not come into contact with paint - otherwise paint will be damaged.

Exception: If bonding is not performed immediately after cutting back, remaining material must be activated using Activator D 181 801 A1 .

Note:

If body flange is being worked on or is partially replaced, it must be cleaned and primed again after painting corresponding area.

Installation notes



- Apply adhesive material all around onto pre-coating - 1 - at right angle to window.

Warning!

Window must be installed within 10 minutes, otherwise bonding properties of window adhesive will be impaired.

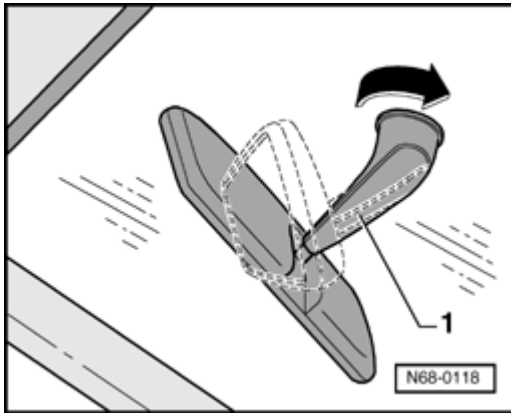
Insert window into window cut out using two double suction lifters Suction lifters VAG 1344), center and press in up to spacer.

Gap dimension of windshield ⇒ [64-1, Windshield, assembly overview](#) .

Secure windshield using window adjuster (443 845 631 A) during curing time.

Plenum chamber cover must always be installed as described on page ⇒ [64-1, Plenum chamber cover, removing and installing](#) .

Re-affix any stickers (e.g. for airbag).



- When installing mirror - 1 - , attach at 6090 ° offset to installation position and turn - **arrow** - until retaining spring engages.

Insert rubber seal for axle of rear windshield wiper motor into rear window.

For Jetta, check gap dimension between rear lid and rear window using Adjusting gauge 3371 ; rear window gap dimension ⇒ [64-1, Rear window \(Jetta\), assembly overview](#) .

Rear window gap dimension ⇒ [64-1, Rear window \(Golf\), assembly overview](#) .

Activator must not be applied onto distributing wire for window heater.

Secure rear window using adhesive tape during curing time.

For Jetta, secure rear window using window adjusters (443 845 631 A) during curing time.

If adhesive bead has been applied too thick and adhesive expands onto area of window heating, then excess adhesive must be removed.

Minimum curing time

Warning!

Special requirements must be fulfilled for replacing bonded windows. This includes that e.g. a newly bonded windshield is safe for vehicle operation also in case of an accident after a specified minimum curing time.

Using new 2K adhesive DA 004 600 A2 , a shorter

minimum curing time may be achieved.

Window	Vehicle	Window adhesive	Minimum curing time
Windshields	with and without airbag	DA 004 600 A2	3 hours
Side windows and rear windows			

Minimum curing time is time from applying components up to vehicle use. During this time, vehicle must stand on an even surface at room temperature (at least 15 ° C).

Warning!

Vehicle is operationally ready only after this waiting time has elapsed.

Repairing paint damage

Paint construction must be re-established according to specifications of Repair Manual "Paint" .

Following repair method applies to paint damage in an area which is not visible:

- Paint twice (wet on wet) using Glass/paint primer D 009 200 02 - minimum air drying time 10 minutes.

Adhesive sealing material, cleaning off surplus

- Adhesive removal solution D 002 000 10 is recommended cleaning solution. Observe safety precautions when processing.

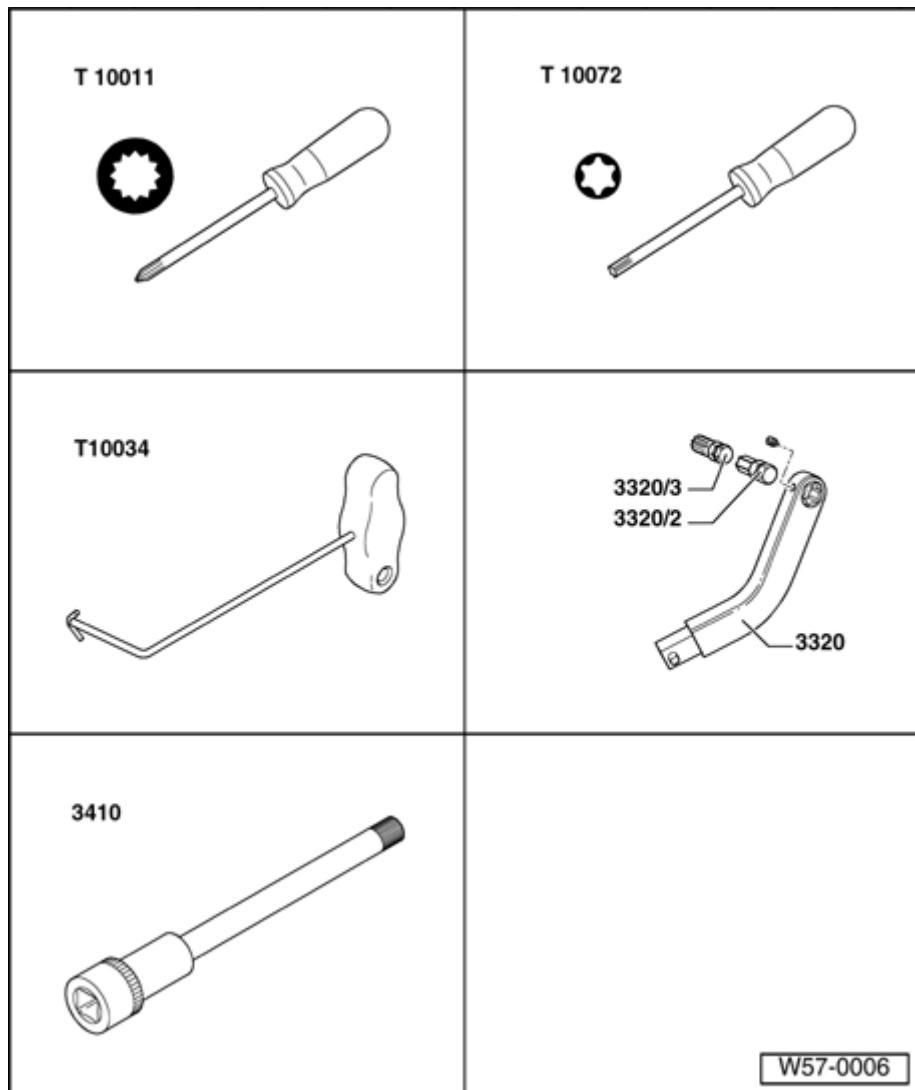
Warning!

When cleaning from vehicle interior out, window just installed must not be pressed outward.

- First, clean coarse paint surfaces with a dry cloth. Remove further material using Adhesive removal solution D 002 000 10 .
- Clean plastic trim: Allow adhesive sealing material to harden (about 1 hour) and then peel off.

Door windows

Tools



Special tools, testers and auxiliary items required

Socket wrench T10011

Socket wrench T10072

Assembly tool T10034

Box spanner 3320/2 for 3320

Box spanner 3320/3 for 3320

Socket 3410

[installing](#)

- ; Window regulator is a component of carrier assembly

6. Motor for window regulator

- ; Bolted on to carrier assembly from front
- ; Tightening torque for bolts of window regulator motor: 3.5 Nm

7. Bolt

- ; Plastic clamping brackets 9 Nm
- ; Aluminum clamping brackets 11 Nm

8. Cover cap**9. Bolt**

- ; 8 Nm

10. Crank mechanism for mechanical window regulator

- ; Bolted on to carrier assembly from front

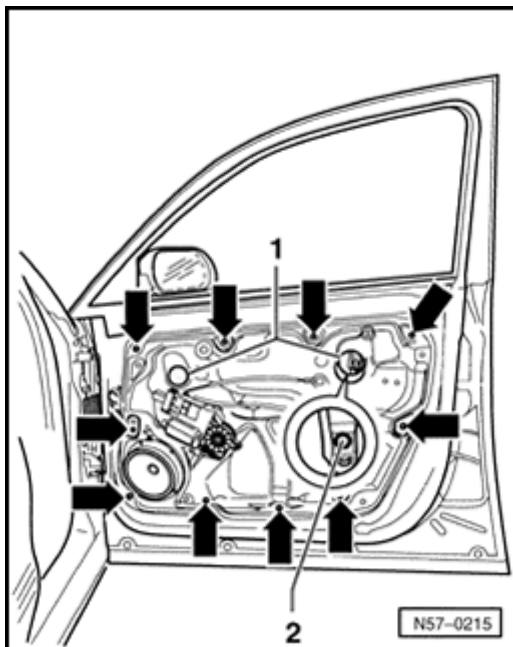
11. Door window

- ; Removing ⇒ [64-2, Front door window, removing](#)
- ; Adjusting ⇒ [64-2, Door window, adjusting](#)

Front door window, removing

- Removing front door trim

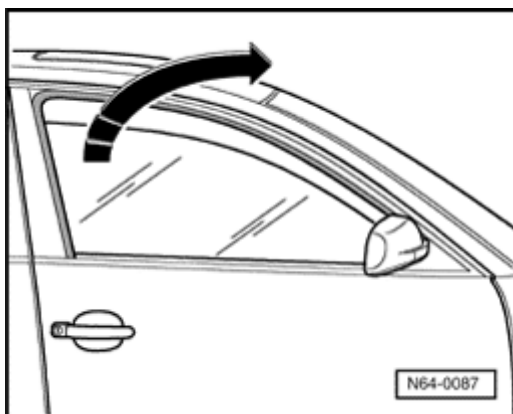
⇒ [Repair Manual, Body Interior, Repair Group 70, Door trim](#)



- Pry off caps - **1** - .
- Lower door window until securing bolts at clamping brackets are accessible.

Note:

If work step is not possible due to a malfunction via electrical window regulator, window regulator motor can be removed to be able to slide window down.

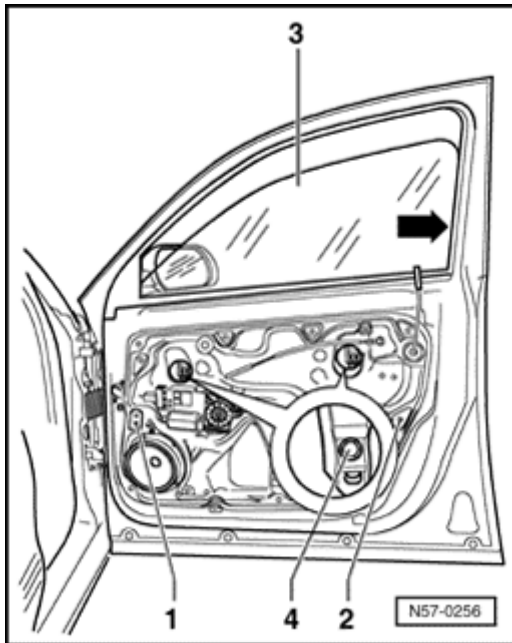


- Loosen bolts - **2** - and press clamping brackets apart.
- Raise rear door window and remove out of door toward front in direction of - **arrow** - .

Door window, adjusting

- Clamping brackets for door window must be in assembly

holes.



- Slide door window - **3** - without additional force into clamping brackets and align at rear window guide - **arrow** -

- While doing this, make sure that window sits parallel to window guide.

- Tighten clamping brackets with bolts - **4** - .

Tightening torque: (Plastic clamping brackets - 9 Nm, Aluminum clamping brackets - 11 Nm)

Then, perform a function load test.

Disregard items - **1** - and - **2** - in illustration.

Carrier assembly, removing and installing

Window regulator, door lock and loudspeaker are secured to carrier assembly.

Window regulator is part of carrier assembly delivery casing.

Carrier assembly can only be removed when door window has been removed at clamping brackets of window regulator. For this purpose, door window must be driven down to height of installation holes in carrier assembly and clamping brackets loosened.

If it is not possible to drive down door window by electrical window regulator, first exact cause of malfunction must be

determined.

To do so, using Scan Tool (ST) V.A.G1551 , check DTC Memory of comfort system (address word 46)

⇒ [Repair Manual, Body On Board Diagnostic \(OBD\), Repair Group 01, Check DTC Memory](#)

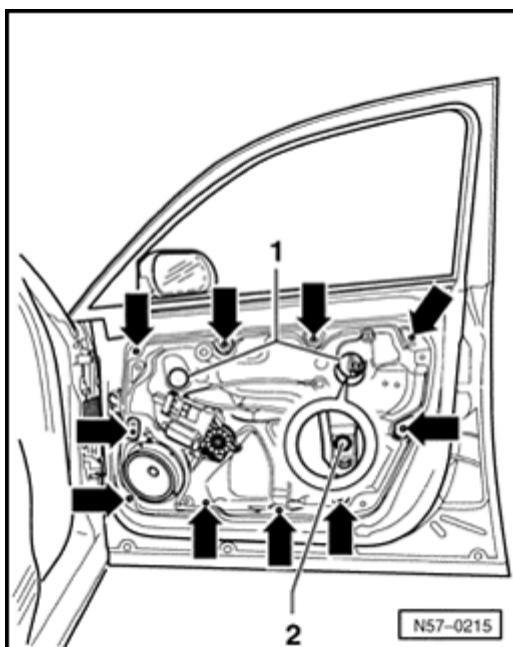
If there is an electrical fault via window regulator motor, this can be removed from carrier assembly.

Removing

- Removing front door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Door trim](#)

- Removing and installing lock cylinder housing ⇒ [57-1, Lock cylinder housing, removing and installing](#) .



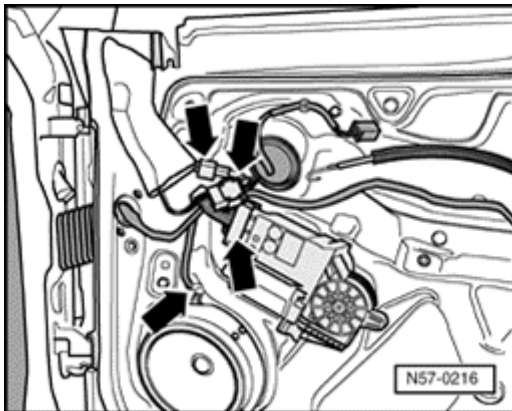
- Pry off caps - 1 - .

- Lower door window until securing bolts of door window are accessible.

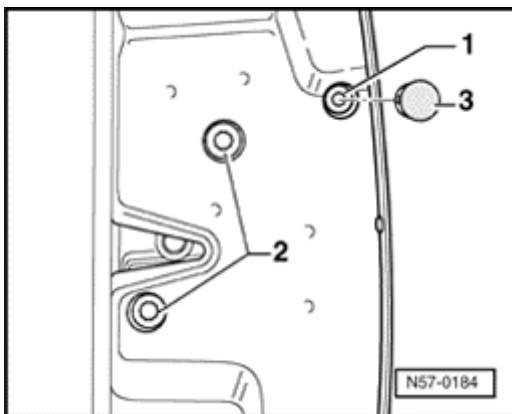
Note:

If work step is not possible due to a malfunction via electrical window regulator, window regulator motor can be removed to be able to slide window down.

- Loosen bolts - **2** - and press clamping brackets apart.
- Slide door windows upward and secure (e.g. using adhesive tape).

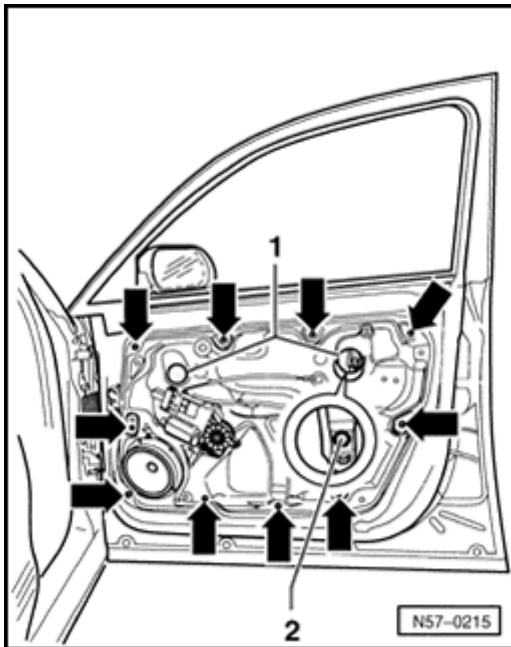


- Disconnect all connectors - **arrows** - .



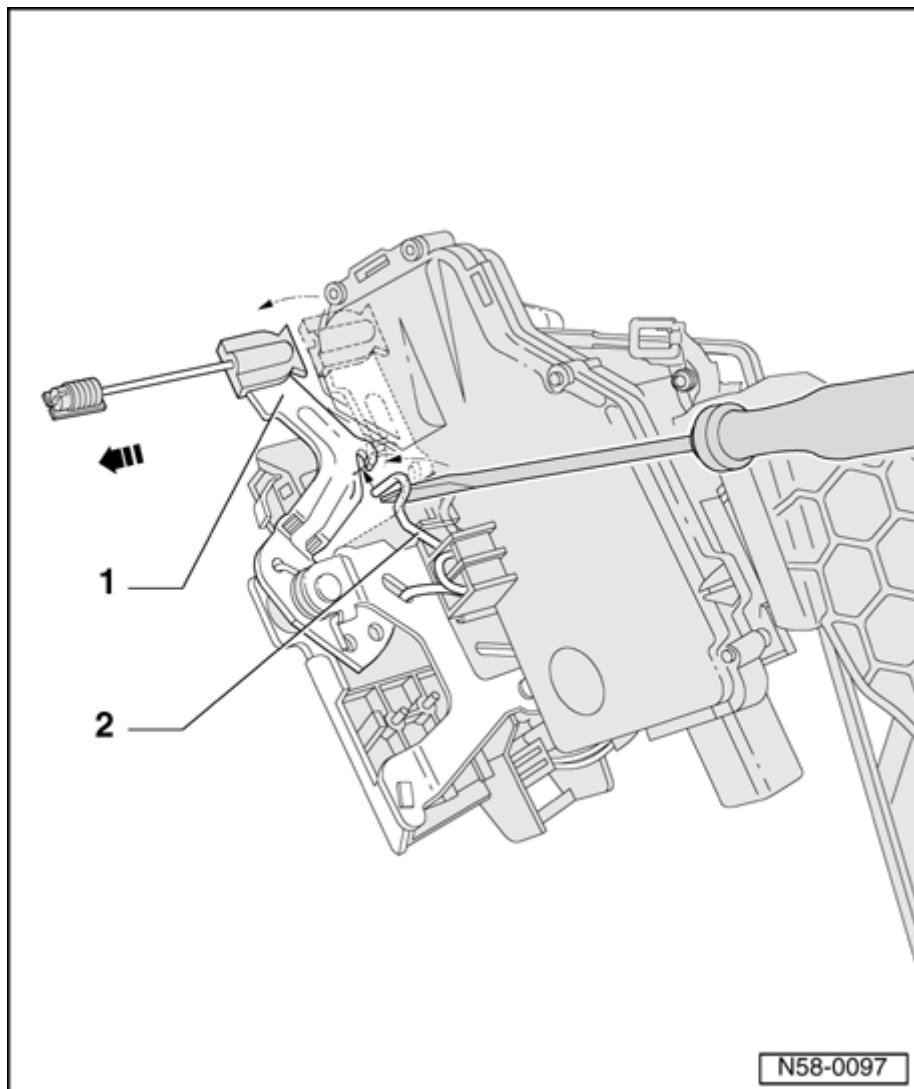
- Remove bolts - **2** - .

Tightening torque: 20 Nm



- Remove bolts - **arrows** - . Remove upper carrier assembly from door, lift and lift out from door toward hinge side of door.
- Rotate carrier assembly and disconnect connector from door lock.
- Then, unclip clips for electrical wires from rear side of carrier assembly.

Installing



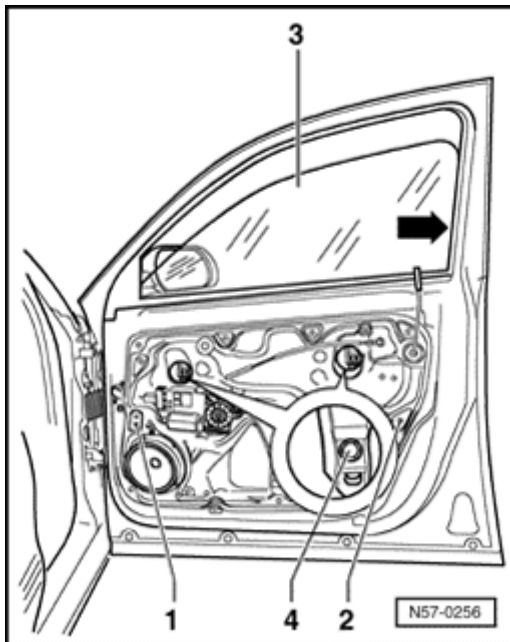
- Pull operating lever - 1 - in direction of - **arrow** - .

- Using a screwdriver, tension spring - 2 - secured to door lock in direction of - **arrow** - and engage lock lever into spring.

Note :

Lock is secured by engaging operating lever. Thereby later "incorrect" clipping-in of Bowden cable is prevented.

- Insert carrier assembly into door.



- Tighten all bolts. Tighten bolts marked - **1** - and - **2** - in specified sequence.

Tightening torque: 8 Nm

- Remaining bolts can be tightened in any sequence.

- Insert door window - **3** - through window recess without additional force into clamping brackets and align at rear window guide - **arrow** - .

- While doing this, make sure that window stands parallel to window guide.

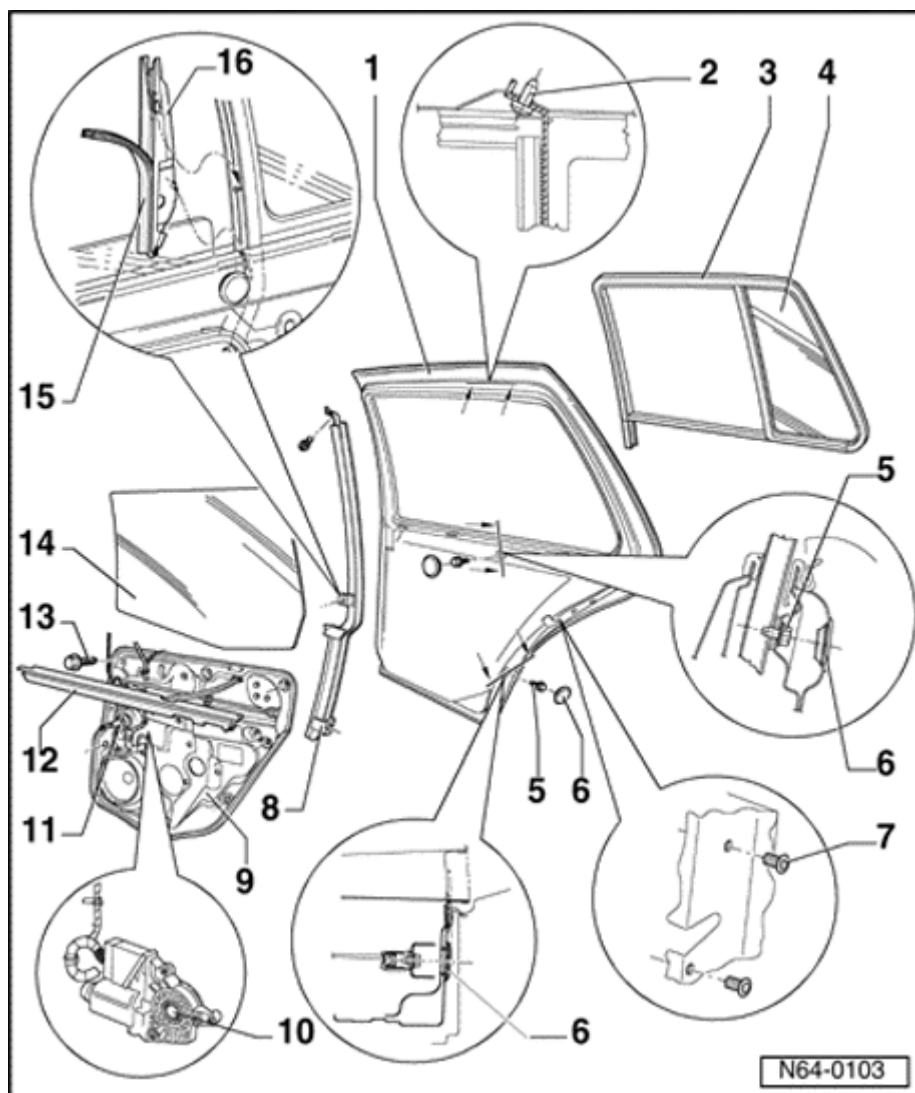
- Tighten clamping brackets with bolts - **4** - .

Tightening torque: Plastic clamping brackets 9 Nm, aluminum clamping brackets 11 Nm.

- Then, perform in reverse order of removal.

Then, perform a function load test.

Rear door window, assembly overview



1. Door

2. Bolt

3. Outer window guide

; Inserted on flange

4. Quarter window

; Removing and installing ⇒ [64-2, Carrier assembly, rear door window and quarter window, removing and installing](#)

5. Bolt

; 10 Nm

6. Cover cap

7. Bolt**8. Center bar****9. Carrier assembly**

- i Removing and installing ⇒ [64-2, Carrier assembly, rear door window and quarter window, removing and installing](#)
- i Window regulator is a component of carrier assembly

10. Motor for window regulator

- i Bolted on to carrier assembly from front
- i Tightening torque for bolts of window regulator motor: 3.5 Nm

11. Crank mechanism for mechanical window regulator

- i Bolted on to carrier assembly from front

12. Inner window recess seal

- i Inserted on flange

13. Bolt

- i 8 Nm

14. Door window

- i Removing ⇒ [64-2, Carrier assembly, rear door window and quarter window, removing and installing](#)

15. Window guide

- i Fastened to filler piece

16. Spacing device

Carrier assembly, rear door window and quarter window, removing and installing

Door window and quarter window are contained in following description "Removing carrier assembly" .

Window regulator, door lock and loudspeaker are secured to carrier assembly.

Window regulator is part of carrier assembly delivery casing and cannot be replaced individually.

Carrier assembly can only be removed when door window is removed from window regulator. For this purpose, door window must be driven down to height of installation hole in carrier assembly and spreader pins must be removed.

If it is not possible to drive down door window by electrical window regulator, first exact cause of malfunction must be determined.

To do so, using Scan Tool (ST) V.A.G1551 , check DTC Memory of comfort system (address word 46)

⇒ [Repair Manual, Body On Board Diagnostic \(OBD\), Repair Group 01, Check DTC Memory](#)

.

If there is an electrical fault via window regulator motor, this can be removed from carrier assembly.

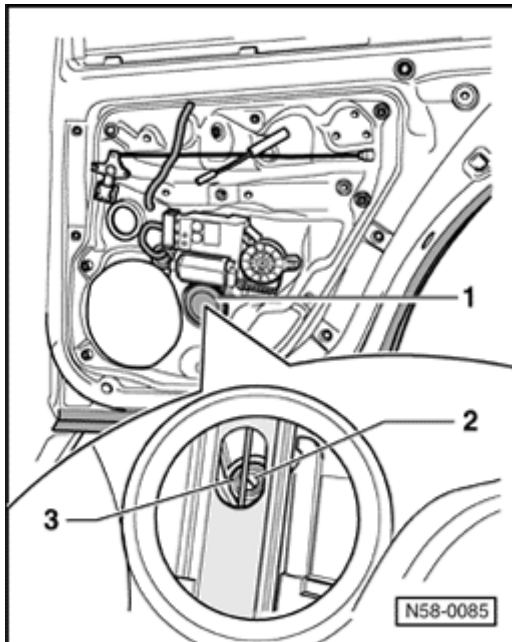
Removing

- Removing rear door trim

⇒ [Repair Manual, Body Interior, Repair Group 70, Door trim](#)

.

- Removing and installing lock cylinder housing ⇒ [57-1, Lock cylinder housing, removing and installing](#) .



- Pry off cap - **1** - .
- Lower door window until spreader pin - **2** - and spreader plug - **3** - are accessible in window cut-out.

Note:

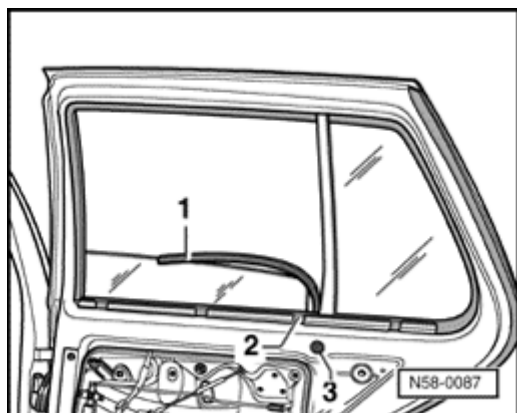
If work step is not possible due to a malfunction via electrical window regulator, window regulator motor can be removed to be able to slide window down.

- Screw in a 5 mm bolt (approx. 70 mm long) into spreader pin - **2** - and pull out from spreader plug - **3** - .
- Now screw in a 8 mm bolt (approx. 80 mm long) into spreader plug - **3** - .

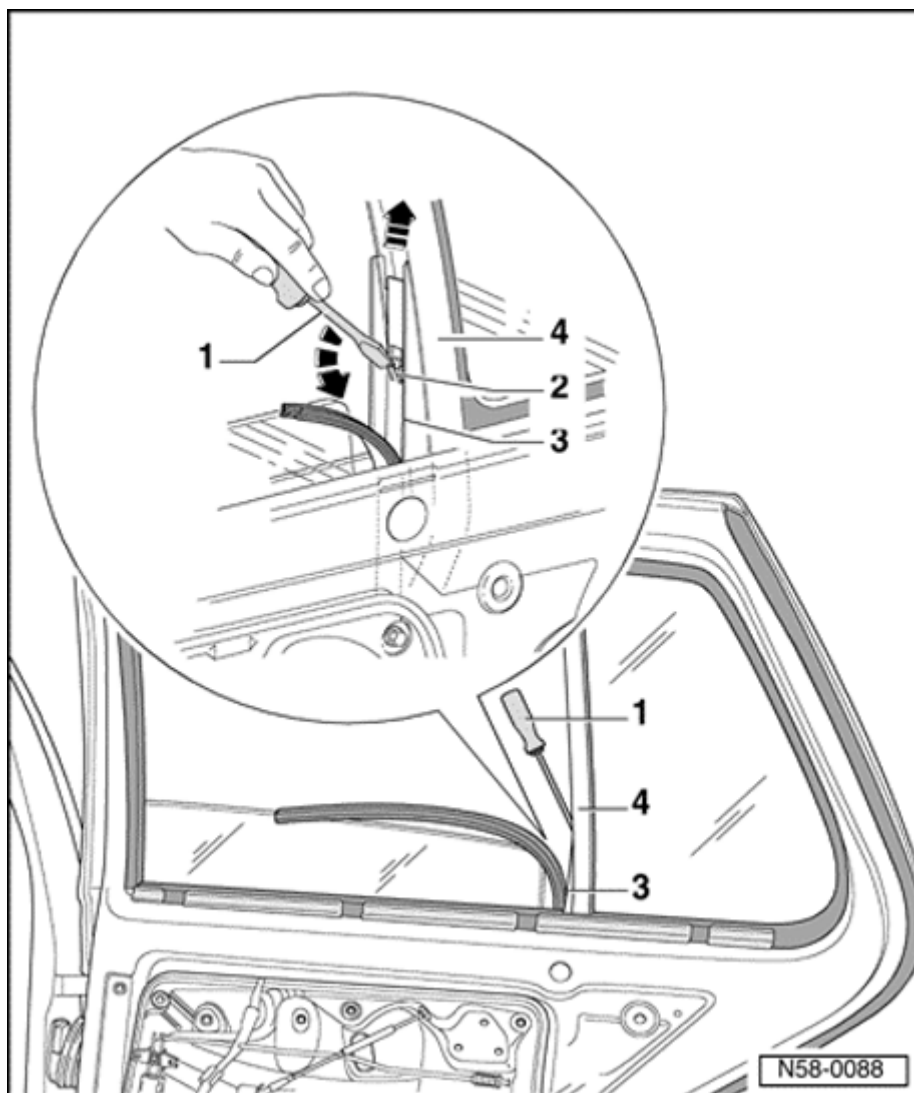
Note:

When screwing bolt into spreader plug, do not use excessive force on anchor otherwise it may fall backward into door.

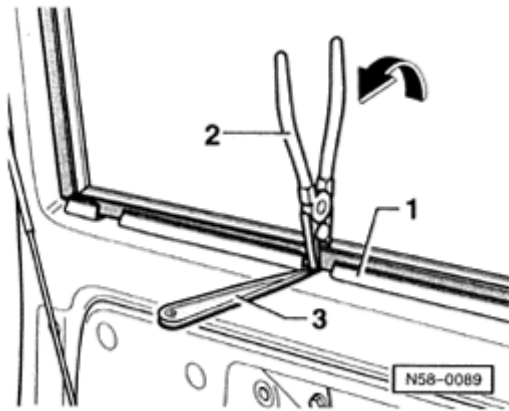
- Pull out spreader plug from window regulator guide and thereby from door window.
- During this, Bowden cable must be pressed to side from window using a screwdriver.



- Pull off seal - 1 - from center bar up to window recess seal
- 2 - .
- Pry off cap - 3 - .
- Remove visible bolt.

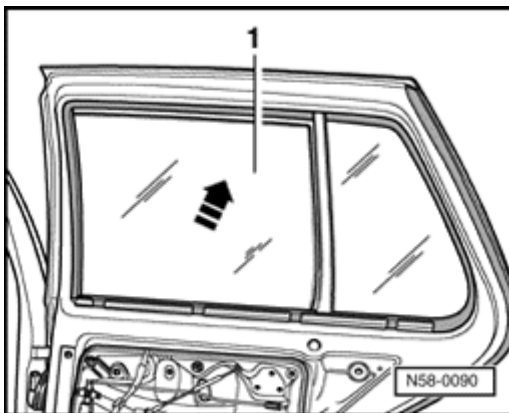


- Using a screwdriver - 1 - , lift catch - 2 - and remove filler piece - 3 - upward out of window frame.

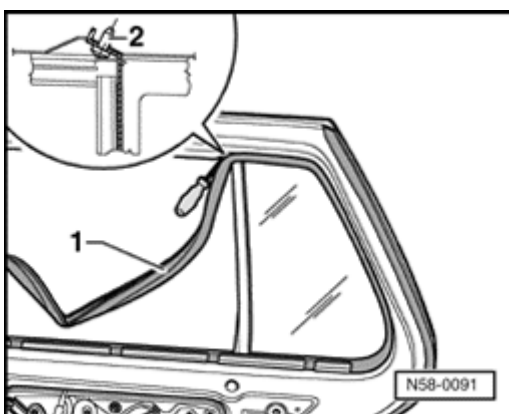


- Grip inner window recess seal - 1 - using pliers - 2 - .
Then, move pliers in direction of - **arrow** - and simultaneously lift off window recess seal - 1 - from door flange using a light turning motion upward.

- For easier removal of window recess seal, pliers may be supported using a wedge - 3 - .



- Slide door window - 1 - upward and remove inward - **arrow** - from door.

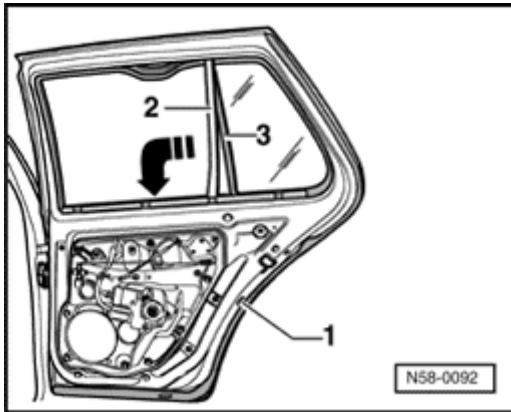


- Remove window guide - 1 - in upper area and remove bolt - 2 - at center bar.

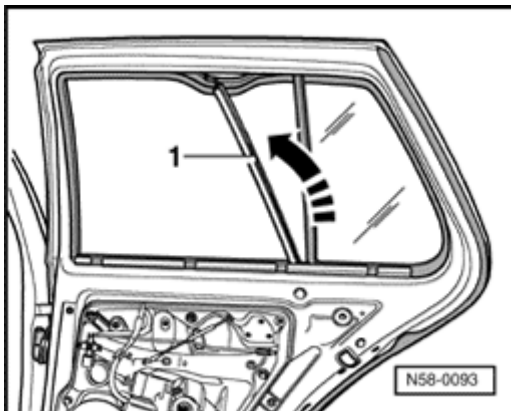
Note:

Bolt - 2 - is gradually being discontinued. Therefore, center bar is then clipped into door at top.

Rest of work procedure remains identical.

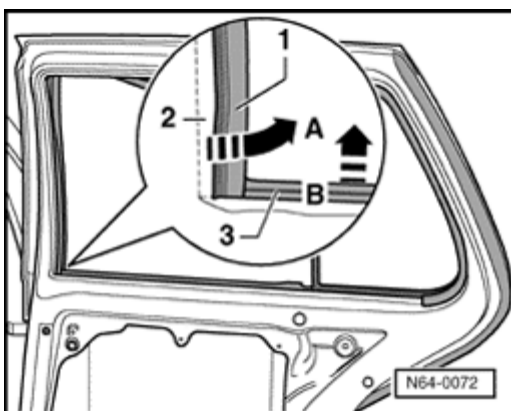


- Remove bolt - 1 - .
- Remove center bar - 2 - from quarter window seal - 3 - and remove downward from top of window guide.



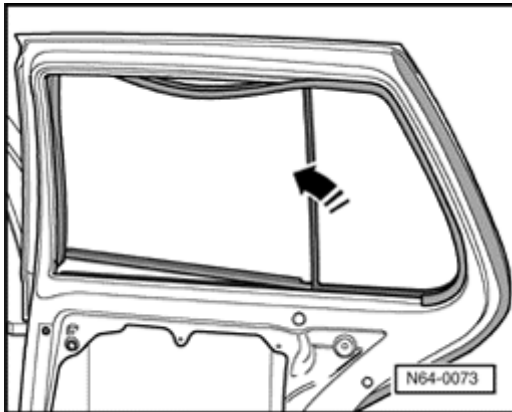
- Remove center bar - 1 - upward from door.

Quarter window, removing (continued)



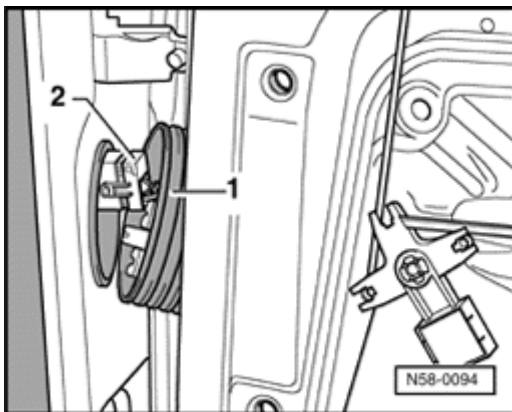
- Remove window guide - 1 - from door flange - 2 - . Rotate lower area of window guide outward 90 ° - **arrowA** - and

then remove window recess seal - **3** - upward - **arrowB** - .



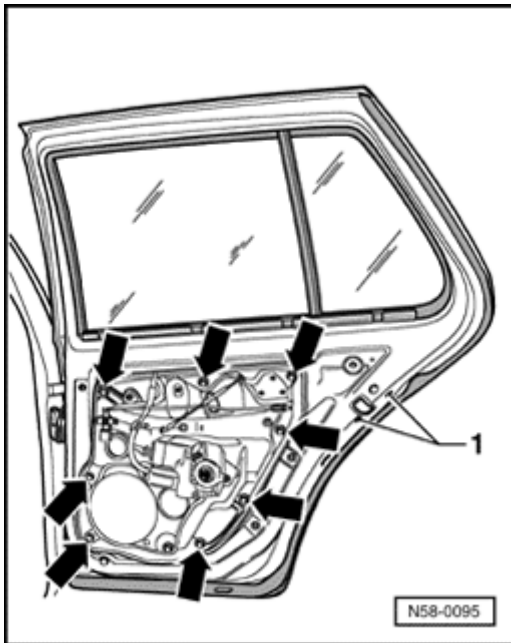
- Now quarter window can be removed from door at corner - **arrow** - .

Carrier assembly, removing (continued)

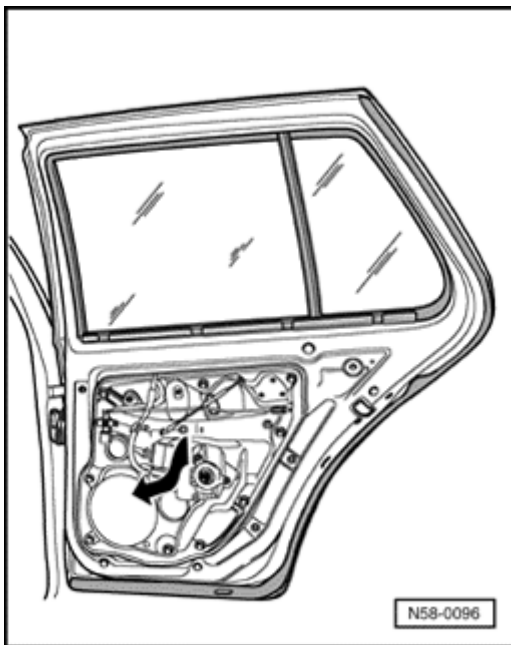


- Remove boot - **1** - from B-pillar.

- Disconnect connector - **2** - .

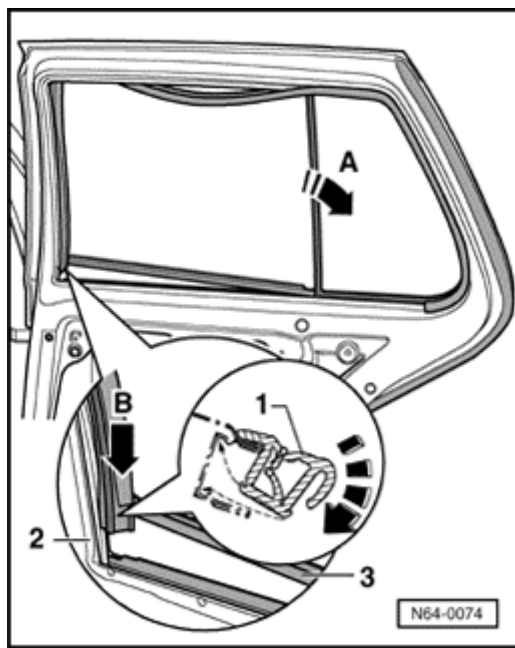


- Remove bolts - **arrows** - .
- Remove bolt - **1** - (for lock).



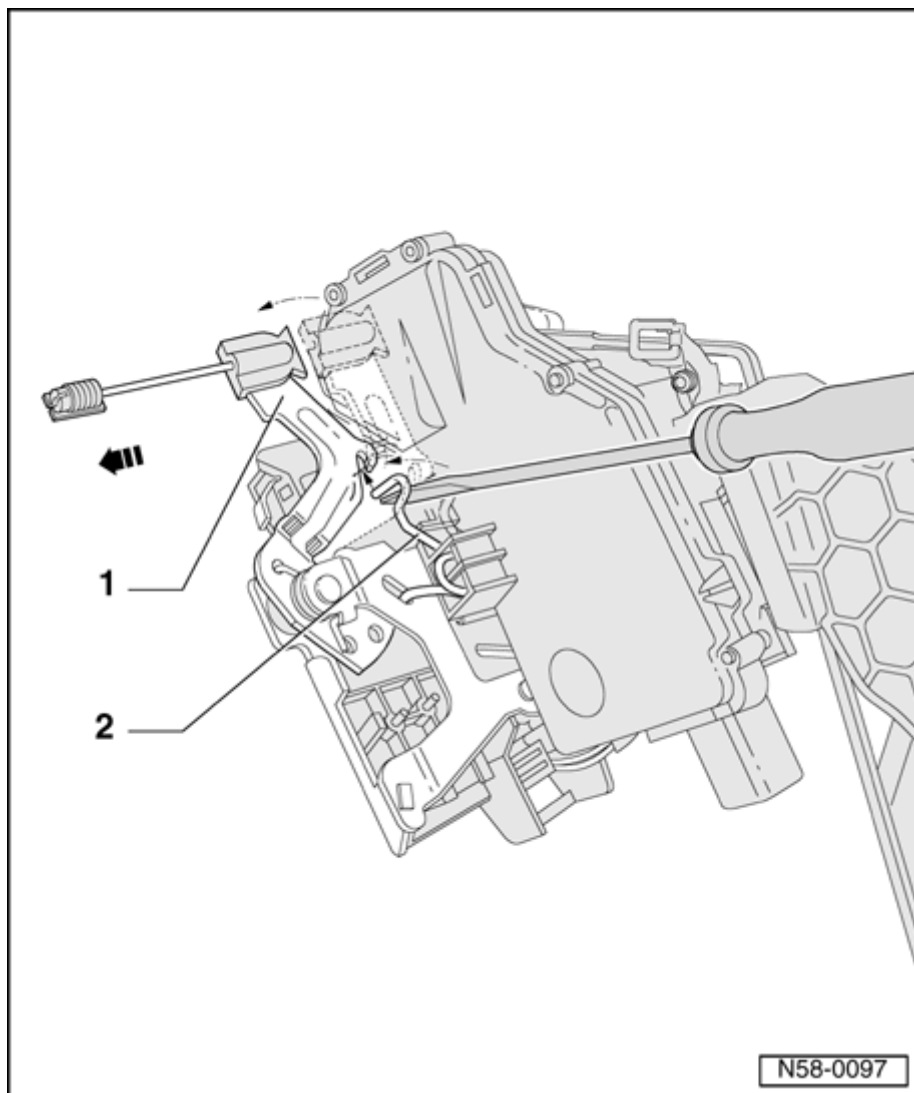
- Remove upper carrier assembly from door, lift and lift out of door toward hinge side - **arrow** - of door.
- Next, loosen two clips for electrical wire from reinforcement plate in door and disconnect wire from boot.

Quarter window, installing



- Insert quarter window into door - **arrow A** - (soapy solution as a lubricant facilitates inserting).
- Attach window guide - **1** - onto door flange - **2** - from outside and rotate outward 90 ° .
- Then insert window guide into window recess as depicted in illustration.
- Now window recess seal - **3** - can be pressed onto door flange downward - **arrow B** - .
- Position window guide - **1** - in door flange - **2** - and install completely.
- Then, perform in reverse order of removal.

Carrier assembly, installing



- Pull operating lever - **1** - in direction of - **arrow** - .

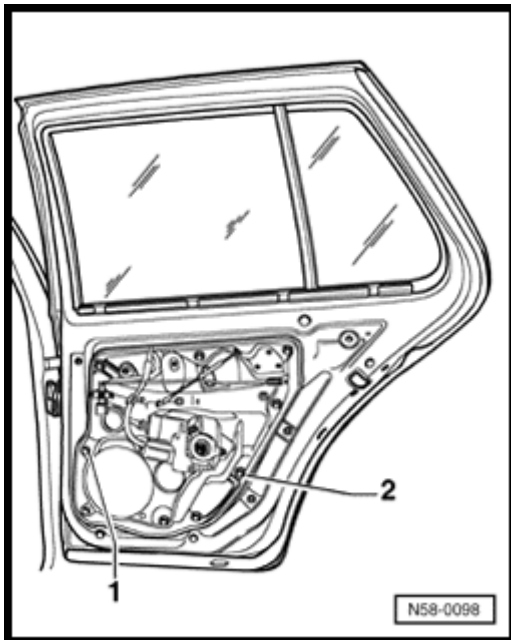
- Using a screwdriver, tension spring - **2** - secured to door lock in direction of - **arrow** - and engage lock lever into spring.

Note :

Lock is secured by engaging operating lever. Thereby later "incorrect" clipping-in of Bowden cable is prevented.

- Insert electrical wire through boot into door and secure clips in door plate.

- Insert carrier assembly into door.



- Tighten all bolts. Tighten bolts marked - 1 - and - 2 - in specified sequence.

Tightening torque: 8 Nm

- Remaining bolts can be tightened in any sequence.
- Installing door window, see installing door window at window regulator page ⇒ [64-2, Door window at window regulator, installing](#) .
- Then, perform in reverse order of removal.

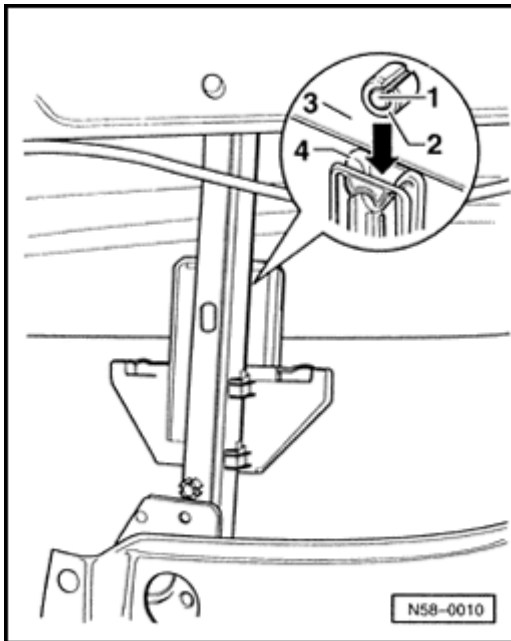
Then, perform a function load test.

Door window at window regulator, installing

- Window must be checked for damage before inserting spreader plug and spreader pin.

Note:

Spreader plug and spreader pin must always be replaced when performing installation work at door window.



- With window removed, insert spreader plug - 2 - centered.
- Press in spreader pin - 1 - flush into spreader plug - 2 - .
- Guide door window into door.
- Insert door window - 3 - into slit of window regulator guide - 4 - .
- Using light pressure from above, lock window into window regulator - arrow - .

Power window regulator for comfort system (automatic opening and closing) with excess force limitation (pinch protection)

With introduction of comfort window regulator, front window regulators are equipped in addition with automatic opening and closing functions.

Switch for automatic opening and closing for front windows are located in drivers door operating unit. Switches for driver and passenger door are equipped with a two-step function.

When respective switch is pressed or pulled to first step, front window manually opens or closes.

When switch is pressed or pulled completely to second step, front window automatically opens or closes.

Also, additional switches for individual windows are installed in passenger door and rear doors.

All electrical window regulators are equipped with excess

force limitation (pinch protection). Window closing is automatically interrupted if obstructions block closing route.

However, this does not apply when closing windows from outside using ignition key - in this case there is no force limit.

Function of window regulator with ignition switched on

Open

Switch in drivers door

Front window:

- Press switch forward to first step. Window is opened manually.
- Press switch forward briefly to second step. Window is opened automatically (automatic run-down).
- When switch is operated anew, window immediately stands.

Rear window:

- Press switch forward. Window is opened manually.

Switch in passenger door and rear doors

- Press on lower surface of switch. Window is opened manually.

Close

Switch in drivers door

Front window:

- Pull switch forward to first step. Window is closed manually.
- Pull switch forward briefly to second step. Window is closed automatically (automatic run-up).
- When switch is operated anew, window immediately stands.

Rear window:

- Press switch forward. Window is closed manually.

Switch in passenger door and rear doors

- Press on upper surface of switch. Window is closed manually.

Function of window regulator with ignition switched off

Window regulators can still be operated approx. 10 minutes after switching ignition off, as long as drivers or passengers door is not opened.

When closing front windows, there is no automatic closing function.

If window in drivers or passengers door is hindered by difficulty of movement or by an obstruction during closing sequence (force limitation), window opens again immediately.

In this case window can only be closed again when ignition is switched on.

For vehicles with central locking system, windows can be closed and opened also from outside. To do so, key must only be held in closing/opening position.

Setting automatic opening and closing

Note:

After disconnecting and connecting vehicle battery, automatic opening and closing of drivers and passengers door is without function.

In order to restore this function after connecting battery, proceed as follows:

- Lock vehicle from outside using drivers or front passengers door.

When doing this, make sure that all doors and windows are completely closed.

- Unlock vehicle and lock again via drivers or passengers door. While doing this, hold key in lock position for at least one second.

Automatic opening and closing of drivers and passengers window is re-activated.

If there is a malfunction of electrical window regulator, this is indicated by blinking of switch lights in drivers and passengers door as well as rear doors.

All lights in door trim will flash for approx. 15 seconds after switching on ignition.

Overcoming resistance with excess force limitation (Pinch protection)

Requirement: Automatic opening and closing is OK.

Ignition switched on.

- Close door window with window regulator switch (automatic opening).

If a window is hindered by resistance or by an obstacle during closing sequence, window opens again immediately (PP has been activated).

- After window has opened, lift/press and hold switch of corresponding window again within 5 seconds.

If window still cannot be closed by resistance or by an obstacle, window immediately remains standing (PP has been activated).

- After window remains standing, switch must be operated again within 5 seconds in order to close window.

Window now closes over obstruction without force limitation.

Ignition switched off.

If a window is hindered by resistance or by an obstacle during closing sequence, window opens again immediately (PP) has been activated).

Operating window regulator switch from inside has now been locked.

If ignition is switched on within 1 minute after opening window and then switch is pressed (close window), window is closed without automatic run-up.

Window regulator motor or carrier assembly with window regulator, removing and installing

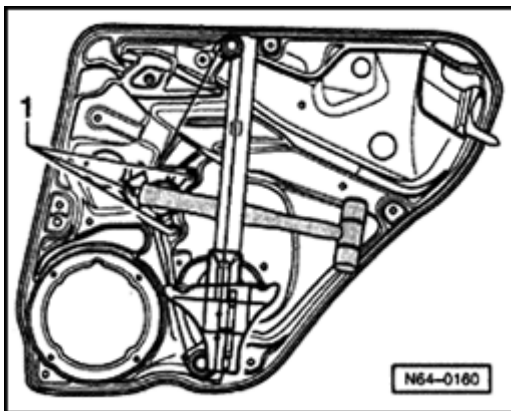
Removing

Illustration shows removal and installation of window regulator motor/carrier assembly with window regulator for

rear doors. Removing and installing for front doors is performed in same way.

Removing front or rear carrier assembly ⇒ [64-2, Carrier assembly, removing and installing](#) or ⇒ [64-2, Carrier assembly, rear door window and quarter window, removing and installing](#) .

- Slide a hammer handle between window guide and carrier assembly so far until hammer handle end presses on gears of carrier assembly.



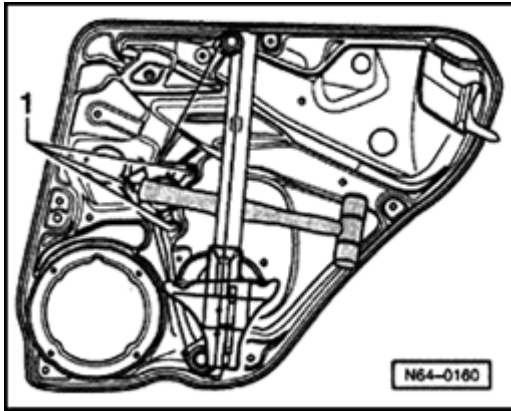
- Remove bolts - 1 - and remove window regulator.

Window regulator motor, installing



- By removing window regulator motor, gearing shifts, it is not centered.

- When installing window regulator motor, gears must be aligned until window regulator motor is centered again.

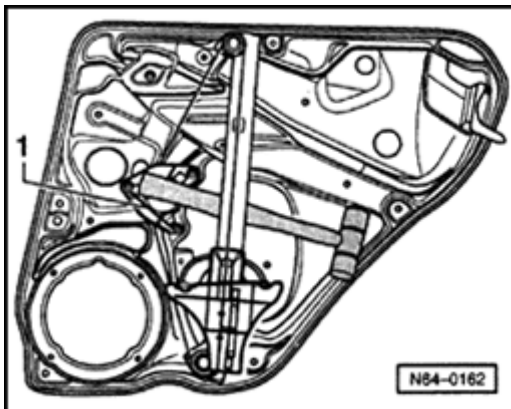


- Attach and tighten bolts - 1 - .

Tightening torque: 3.5 Nm

Tightening torque must always be observed since otherwise damage to plastic sleeve on window regulator motor can result.

Carrier assembly with window regulator, installing

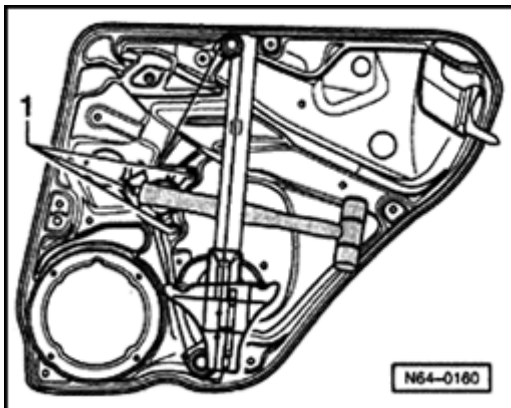


For replacement part carrier assemblies, gearing is secured against slipping and falling by a cable tie - 1 - .

- Slide a hammer handle between window guide and SF so far until hammer handle end presses on gears of SF.



- Remove cable tie - 1 - .
- By removing window regulator motor, gearing shifts, it is not centered.
- When installing window regulator motor, gears must be aligned until window regulator motor is centered again.

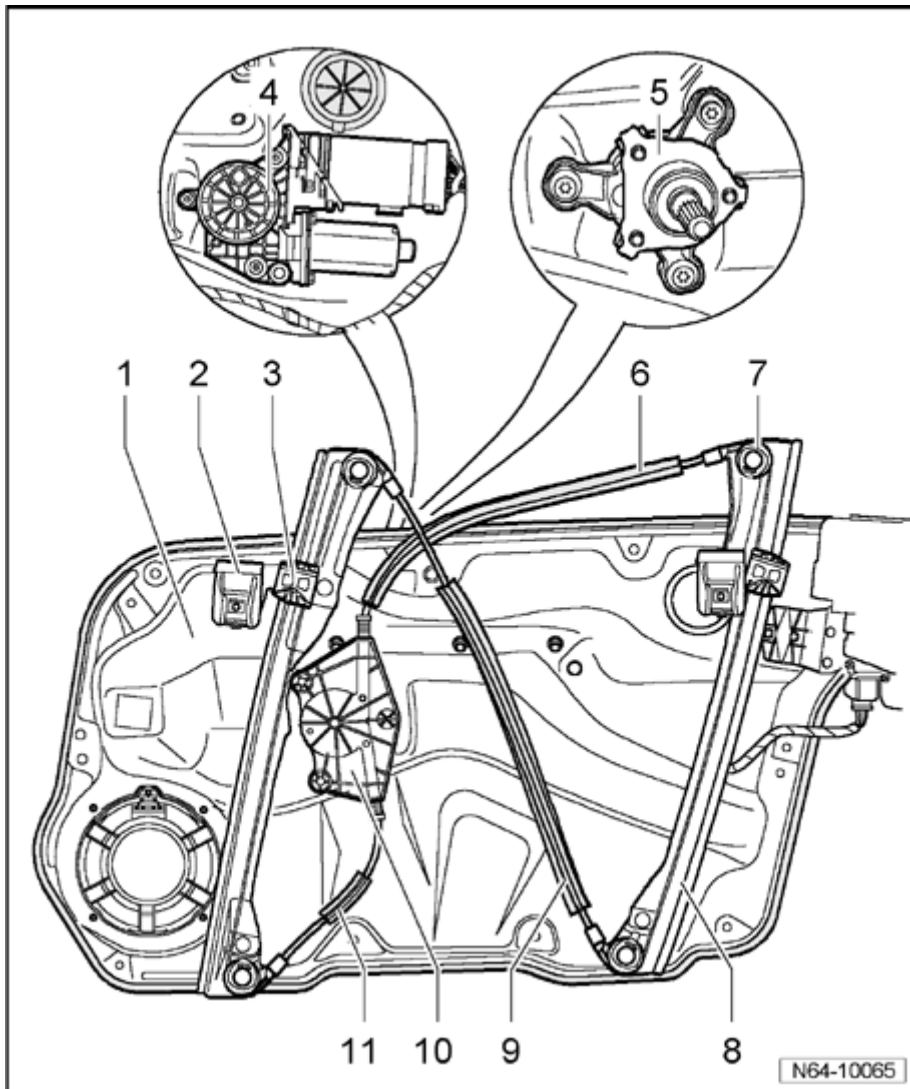


- Attach and tighten bolts - 1 - .

Tightening torque: 3.5 Nm

Tightening torque must always be observed since otherwise damage to plastic sleeve on window regulator motor can result.

Carrier assembly with window regulator, assembly overview



1. **Carrier assembly**
2. **Clamping brackets**
3. **Coupling plate**
4. **Motor for window regulator**
 - ı For electrical window regulator
5. **Crank mechanism**
 - ı For mechanical window regulator
6. **Long Bowden cable**
 - ı Cable reel - coupling plate, rear
7. **Relay pulley**

- i With eccentric
- i Without eccentric

8. Guide rail

9. Diagonal Bowden cable

10. Cable reel

11. Short Bowden cable

- i Cable reel - coupling plate, front

Window regulator, removing and installing

When servicing window regulator, following components can be replaced:

Coupling plate with clamping brackets

Cable reel with Bowden cable

Window regulator motor (for electrical window regulators)

Window crank (for mechanical window regulators)

Removing

- Removing carrier assembly with window regulator ⇒ [64-2, Carrier assembly, removing and installing](#) .

Vehicles with electrical window regulators

- Removing motor for window regulator ⇒ [64-2, Window regulator motor or carrier assembly with window regulator, removing and installing](#) .

Vehicles with mechanical window regulators

- Removing crank mechanism and transfer element for cable reel ⇒ [Topic 64-2](#) .

Continued for all vehicles

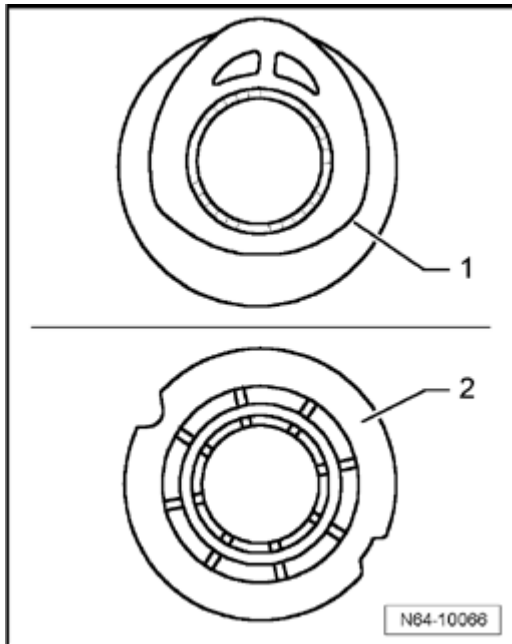
Note:

Repair using repair kit is only possible with window regulator that are equipped with eccentric relay pulley - 1 - .

For window regulators with relay pulleys without eccentric - 2 - , complete carrier assembly must be replaced.

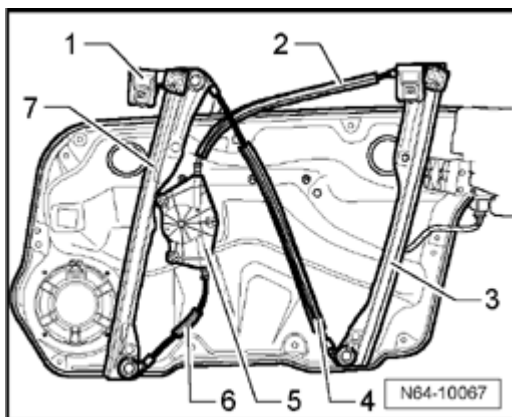
Color of relay pulleys is not important.

Protect loudspeakers against damage during entire repair.



Place carrier assembly on a level surface, support if necessary.

- Checking relay pulleys, guide rails and seal for damage.
Replace carrier assembly if damaged.

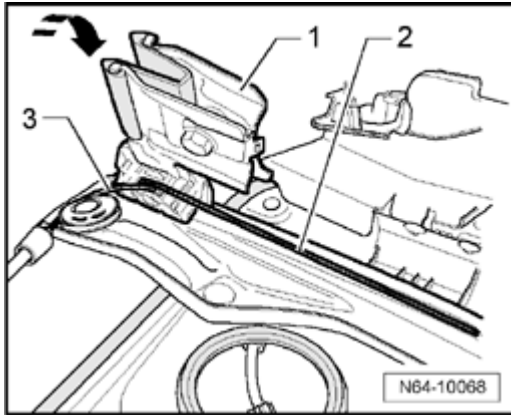


- Locate start and end of diagonal Bowden cable - 4 - . Do not damage diagonal Bowden cable - 4 - , this is not replaced.

- Bowden cables - 2 - and - 6 - , which come from cable reel - 5 - , must be cut through in guide rails - 3 - and - 7 - .

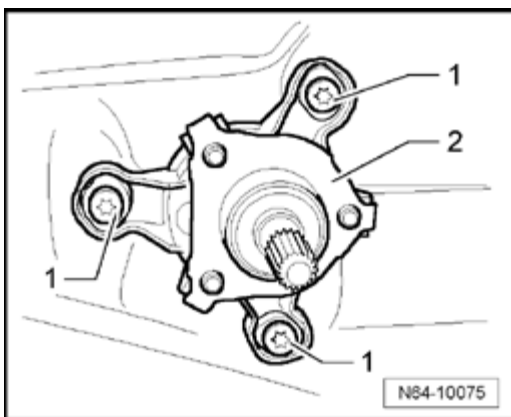
- Slide coupling plate and clamping brackets - 1 - on guide rails into topmost position. It is only possible to remove

coupling plate with clamping brackets here.

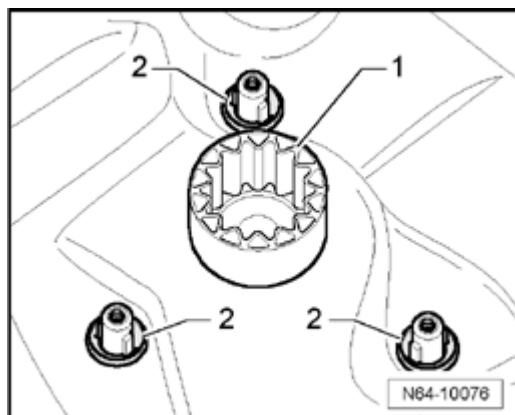


- Fold coupling plate and clamping brackets - **1** - in direction of - **arrow** - . When doing this, note position of Bowden cables - **2** - and - **3** - in coupling plate.
- Remove cut-off ends of Bowden cables from coupling plates.
- Diagonal Bowden cable must not be changed in its installation position.

Removing crank mechanism (vehicles with mechanical window regulators)

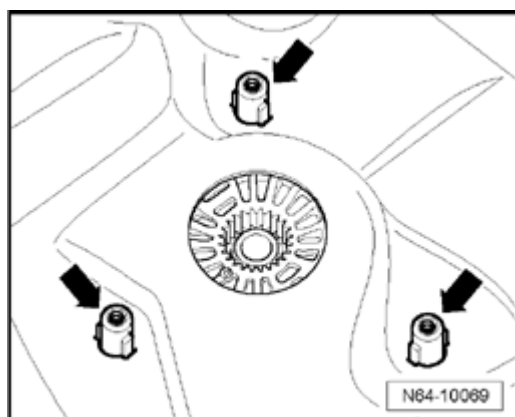


- Remove bolts - **1** - .
- Remove crank mechanism - **2** - .
- Remove seals - **2** - .



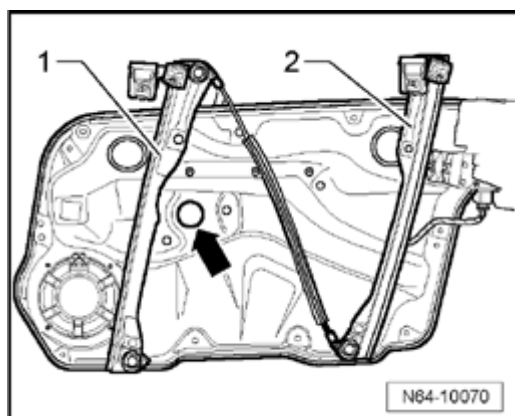
- Remove transfer element for cable reel - **1** - .

Continued for all vehicles



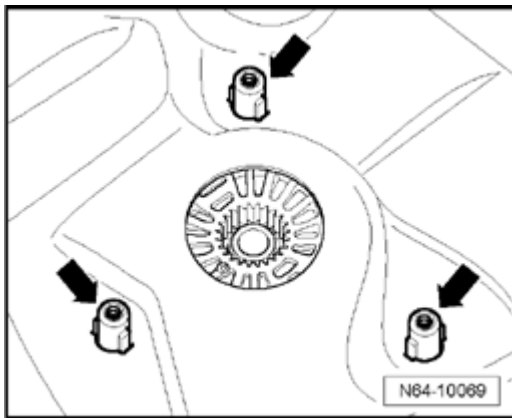
- Press together retaining clamps of threaded sleeves - **arrows** - .

- Remove cable reel from carrier assembly.



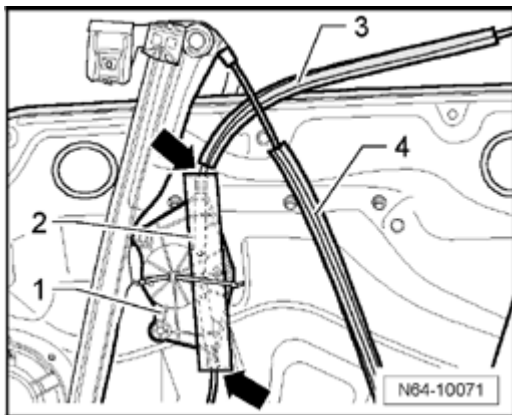
- Clean guide rails - **1** - and - **2** - as well as insertion opening - **arrow** - of grease and dirt.

Installing



- Insert threaded sleeves - **arrows** - of new cable reel through openings in carrier assembly.

- Cut and remove both cable ties on cable reel.



- Press cable reel - **1** - into carrier assembly using light pressure.

Note:

*Do not remove securing plate - **2** - from cable reel.*

- Route Bowden cable with long sheathing - **3** - under diagonal Bowden cable - **4** - .

- Guide sheathing of Bowden cables into cable reel - **1** - - **arrows** - .

- Guide Bowden cable with short sheathing into Bowden cable mount of front guide rail.

Do not thread Bowden cable onto relay pulley yet.

- Guide Bowden cable with long sheathing into Bowden cable mount of rear guide rail.

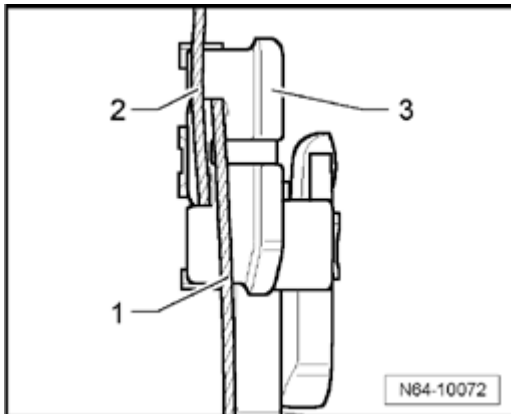
Do not insert Bowden cable onto relay pulley yet.

Note:

Ends of Bowden cable must be located in vicinity of upper side of window regulator because clamping brackets can only be installed on guide rails in topmost position. If necessary, pull Bowden cable slightly out of cable reel.

Installation of coupling plate with clamping brackets

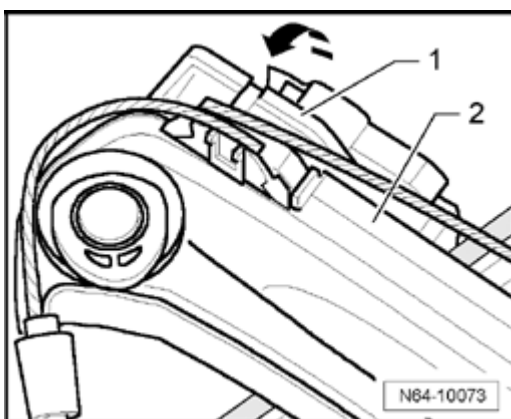
- Connect coupling plate with clamping brackets sideways onto guide rail. Clamping brackets must face toward upper side of window regulator.



- Insert crimped Bowden cable ends into coupling plate - **3** - .
- First insert Bowden cable - **1** - coming from below into upper, deep groove.
- Next, insert Bowden cable - **2** - coming from above into lower, shallow groove.

Note:

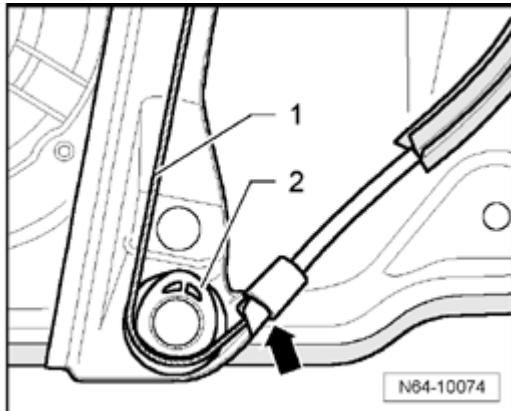
Bowden cables must not cross.



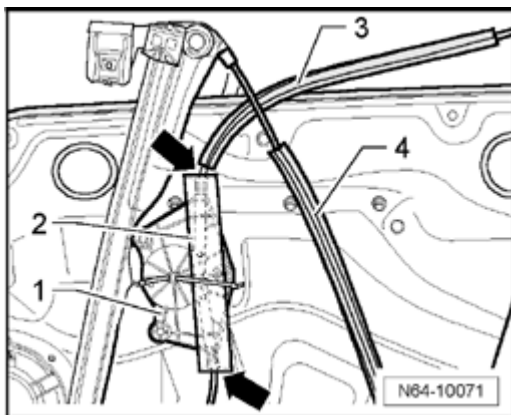
- Fold up coupling plate with clamping brackets - **1** - in direction of - **arrow** - toward guide rail - **2** - .
- Install second coupling plate with clamping brackets - **1** -

as described.

Thread in Bowden cable onto relay pulley



- Check 4 ends of Bowden cable sheathings for correct seating in mounts - **arrow** - .
- Route Bowden cable - **1** - onto eccentric washer of relay pulleys - **2** - as depicted in illustration.
- All eccentric washers must be rotate to lowest height, otherwise it is very difficult to install Bowden cable onto last relay pulley.



- Remove securing plate - **2** - from cable reel - **1** - .
- Pull both coupling plates with clamping brackets up to lower end of guide rails. When doing this, Bowden cable slide automatically into relay pulley grooves.
- Check position of Bowden cable.

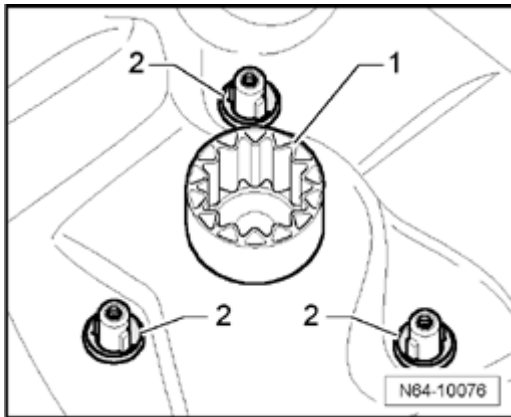
Bowden cable must be located correctly in groove at all 4 relay pulleys.

- Slide coupling plates with clamping brackets back and forth several times on guide rails to check them for proper function.

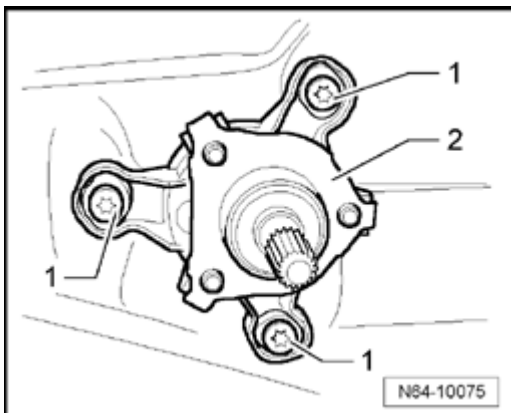
Vehicles with electrical window regulators

- Place foam shims contained in repair set between window regulator motor and carrier assembly.
- Install motor for window regulator.
- Tighten bolts to 3.5 Nm.

Vehicles with mechanical window regulators



- Connect transfer element for cable reel - **1** - .
- Insert new seals - **2** - .



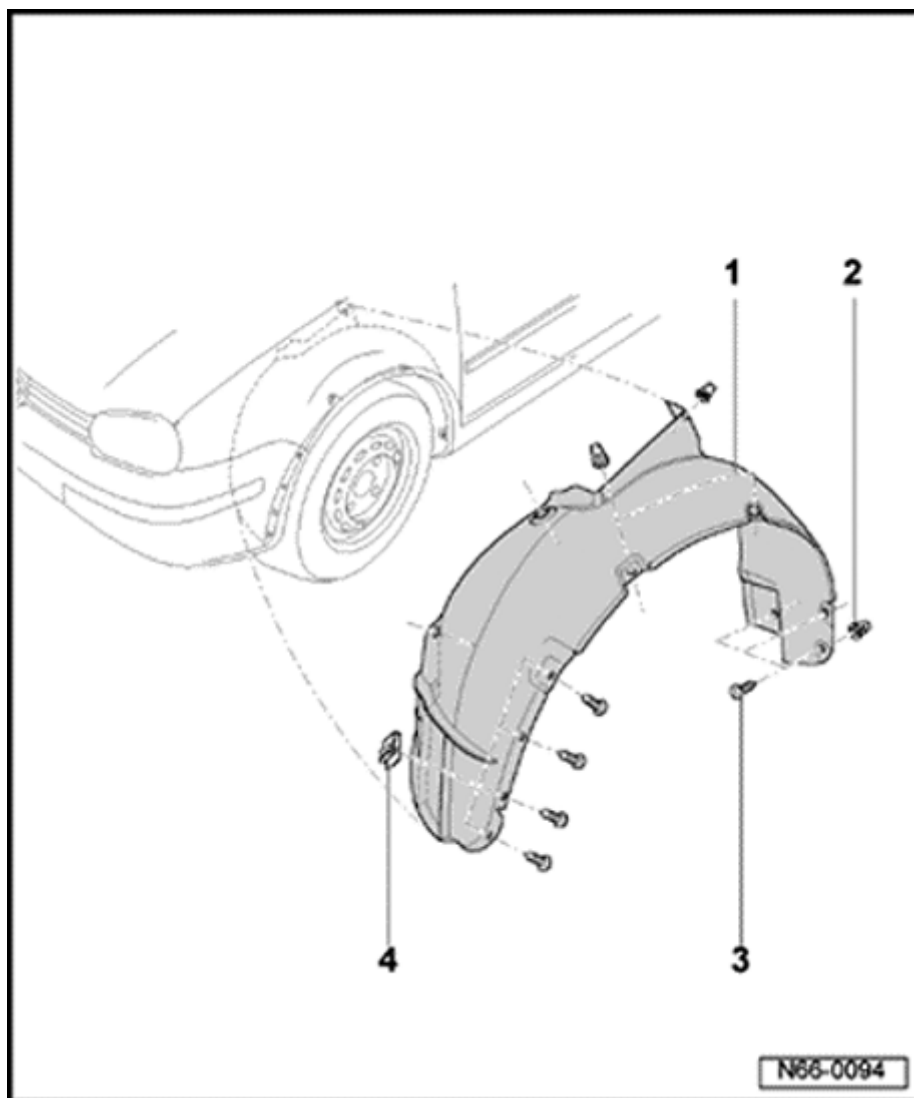
- Connect crank mechanism - **2** - . If necessary, align transfer element for cable reel and crank mechanism. To do so, rotate transfer element as far until transfer element and crank mechanism have correct position to each other.
- Tighten bolts to - **1** - to 3.5 Nm.

Continued for all vehicles

- Installing carrier assembly with window regulator ⇒ [64-2, Carrier assembly, removing and installing](#) .
- Slide door window into clamping brackets without excessive force and align to rear window guide.
- Tighten bolts for clamping brackets to 10 Nm.

Wheelhousing liner, removing and installing

Front wheelhousing liner



1. Wheelhousing liner

• Material - PP/EPDM

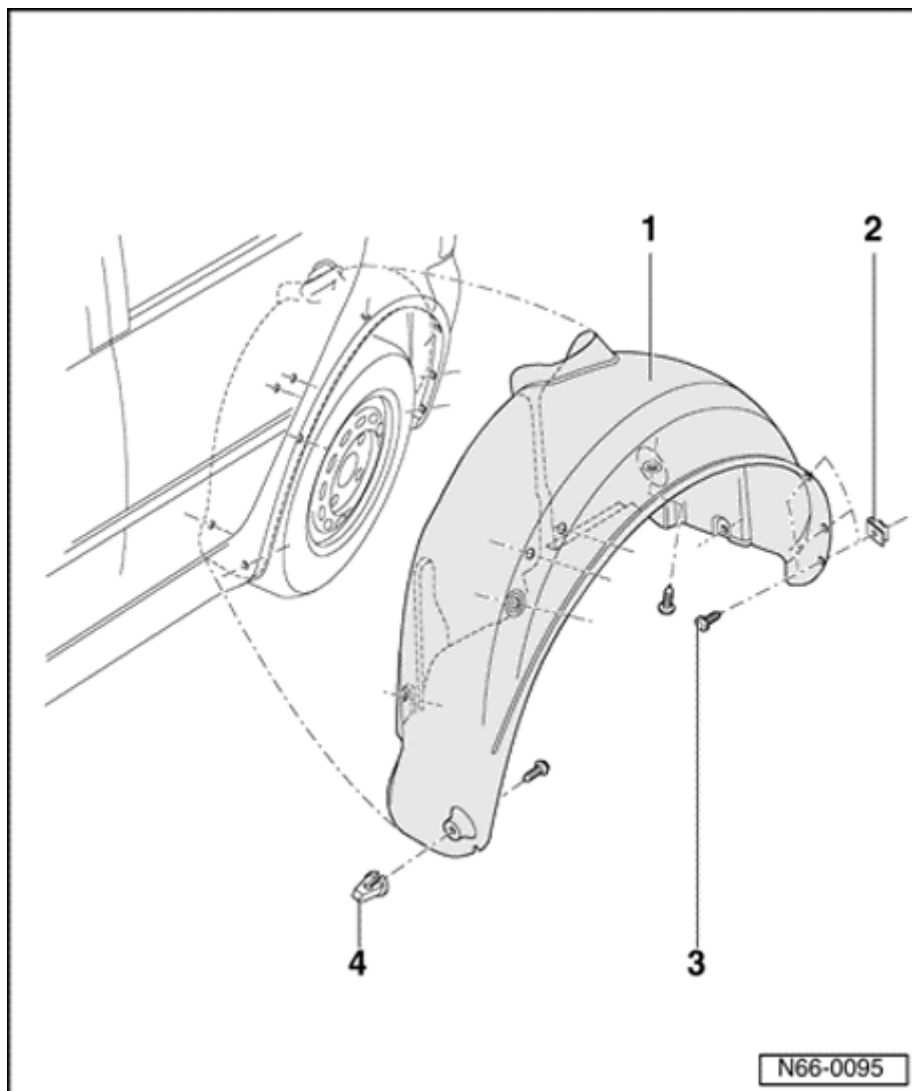
• Removing

- Remove wheel.
Tightening torque of wheel bolts = 120 Nm.

- Remove bolts ⇒ [Item - 3 -](#)
(Qty. 12) and remove wheelhousing liner.

2. Expanding nut**3. Screw****4. Speed nut**

- ; Connected to bumper cover

Rear wheelhousing liner**1. Wheelhousing liner**

- ; Material - PP/EPDM

- ; Removing

- Remove wheel.

Tightening torque of wheel bolts = 120 Nm.

- Remove bolts ⇒ [Item - 3 -](#)
(Qty. 7) and remove
wheelhousing liner.

2. Speed nut

- Connected to bumper cover

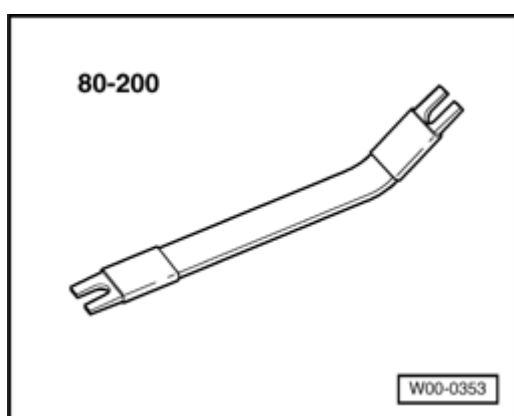
3. Screw

4. Expanding nut

Outside rear view mirror

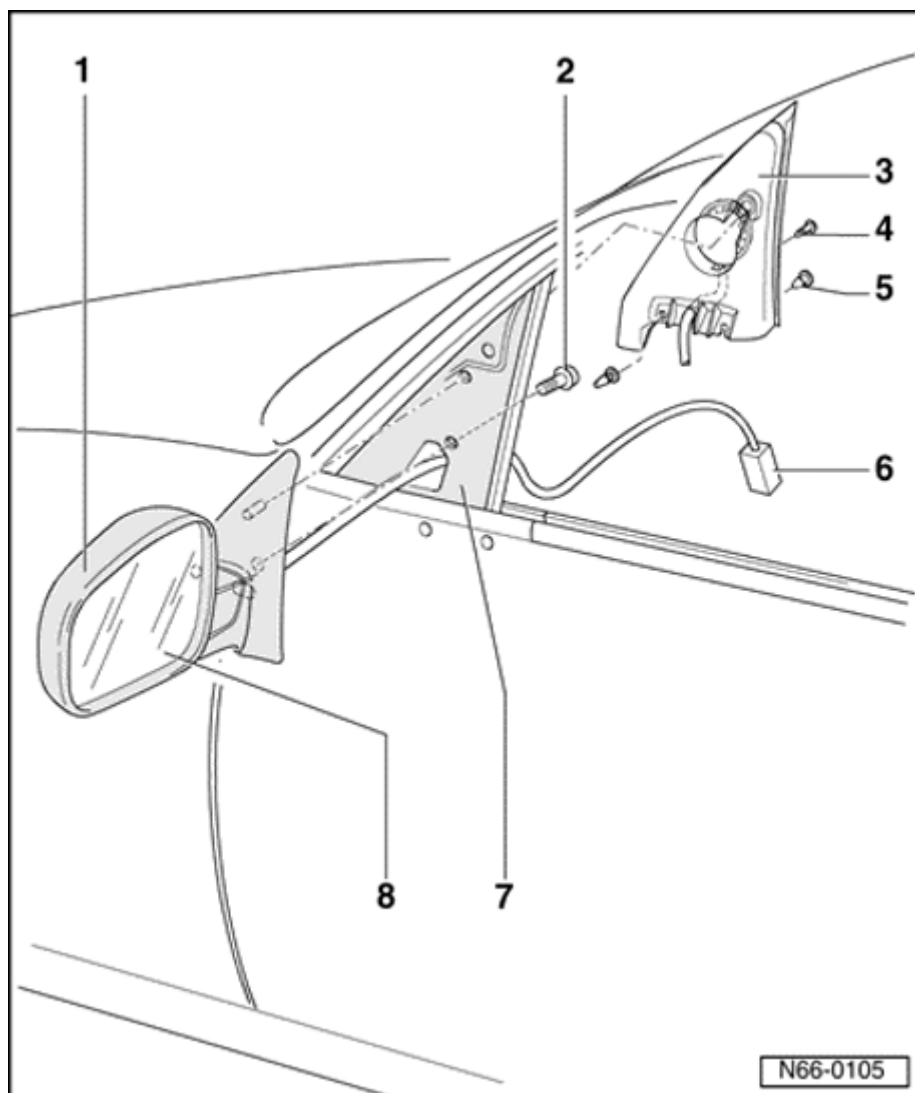
Tools

Special tools, testers and auxiliary items required



Pry lever 80-200

Outside rear view mirror, assembly overview



1. Mirror housing

• Removing ⇒ [66-2, Mirror housing, removing](#) .

• Material - ABS

2. Bolt

• 10 Nm

3. Cover for outside rearview mirror

4. Bolt

5. Clip

6. Connector

7. Insulation

8. Mirror lens

i Removing

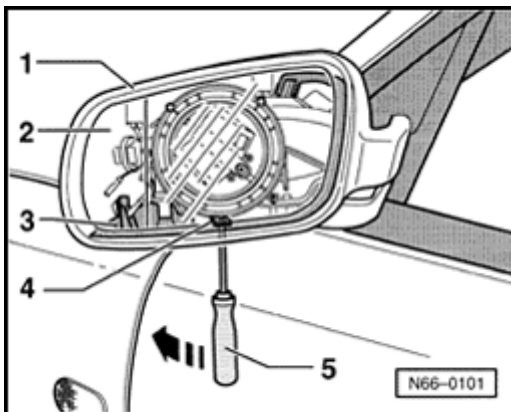
- Press off mirror lens first at bottom, then at top special tool Pry lever 80-200 protect mirror housing from damage.

i Installing:

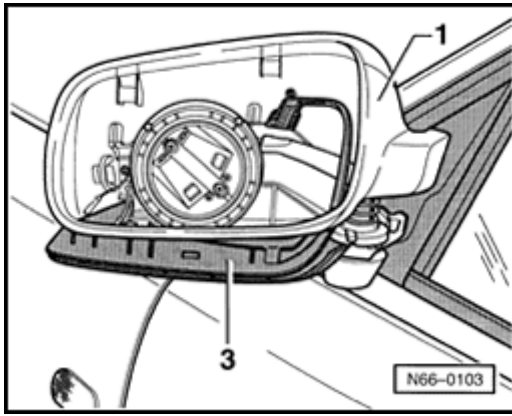
- Insert mirror lens into mount with guide pins and press on.
- i Only press on center of glass - always use protective gloves

Mirror housing, removing

- Fold rearview mirror toward front for easier installation.

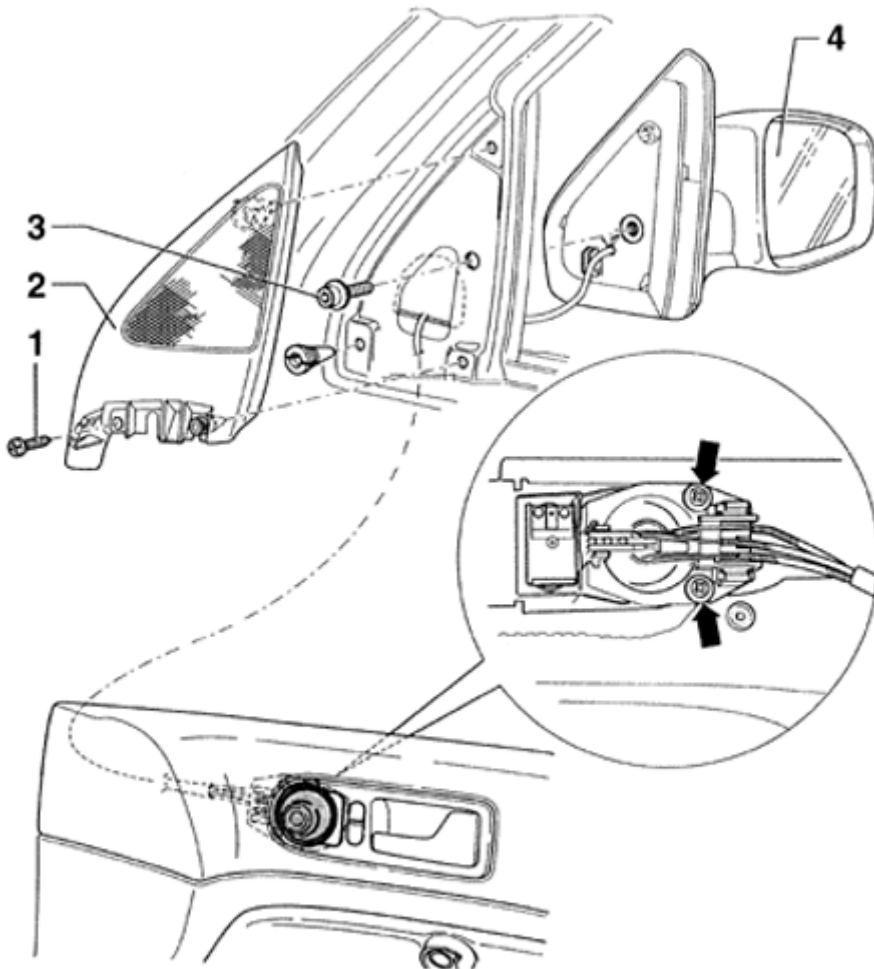


- Set mirror lens - **2** - vertically (otherwise mirror housing may remain hanging on mirror lens when tightening).
- Insert screwdriver - **5** - through assembly hole of mirror carrier up to clamp - **4** - .
- Press screwdriver - **5** - in direction of - **arrow** - (clamp - **4** - releases mirror housing by doing this).



- Remove mirror housing - 1 - upward from mirror carrier - 3
- .

Outside rear view mirror (manual), removing



- Removing front door trim

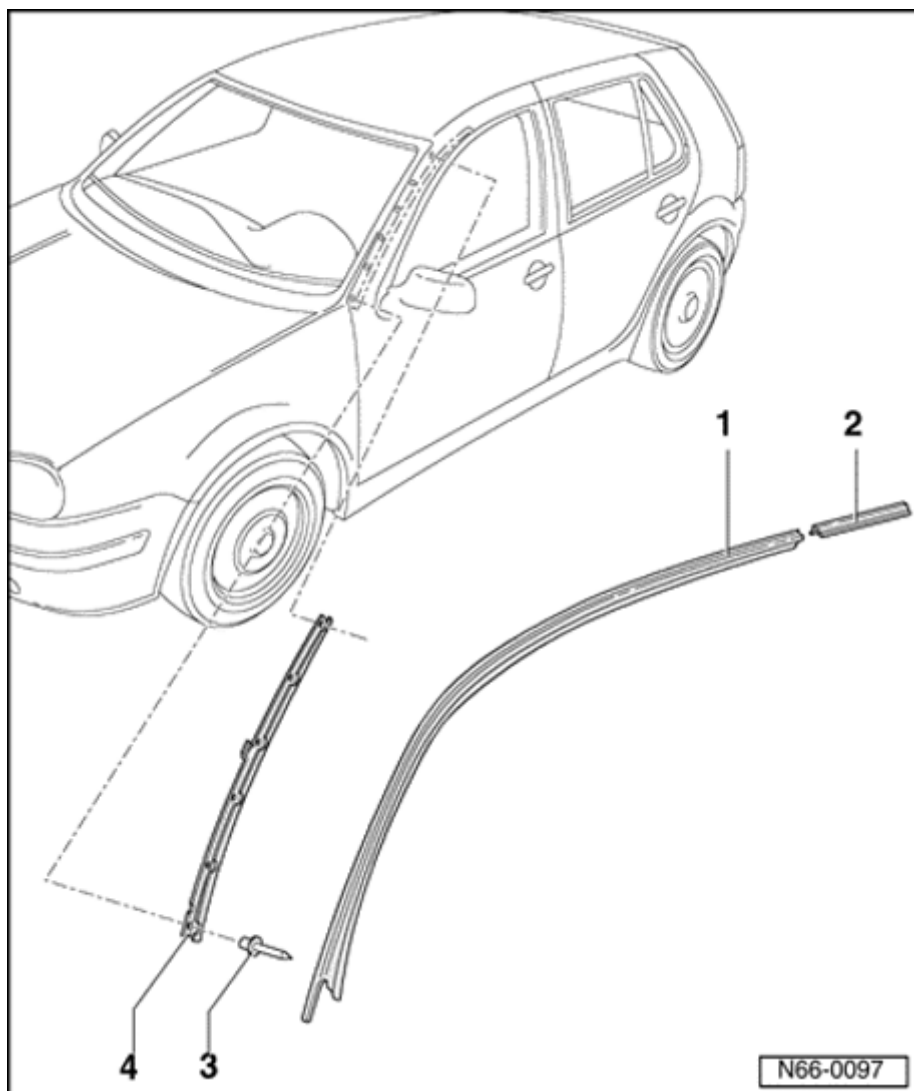
⇒ [Repair Manual, Body Interior, Repair Group 70, Door trim](#)

.

- Remove mirror adjuster from inside of door trim - **arrows** - .
- Remove bolt - **1** - and unclip cover - **2** - .
- Remove insulating foam from mirror triangle.
- Remove bolt - **3** - and remove rearview mirror - **4** - from front door.

Roof moldings

Roof molding



1. Roof molding

- ; Do not bend roof molding
- ; Installing:
 - Align roof molding at B-pillar (two-door) or C-pillar (four-door) and continue installing toward front.

2. Cover strip

- ; Installing:
 - Insert cover strip into

pocket of roof molding up to stop, then press into roof channel.

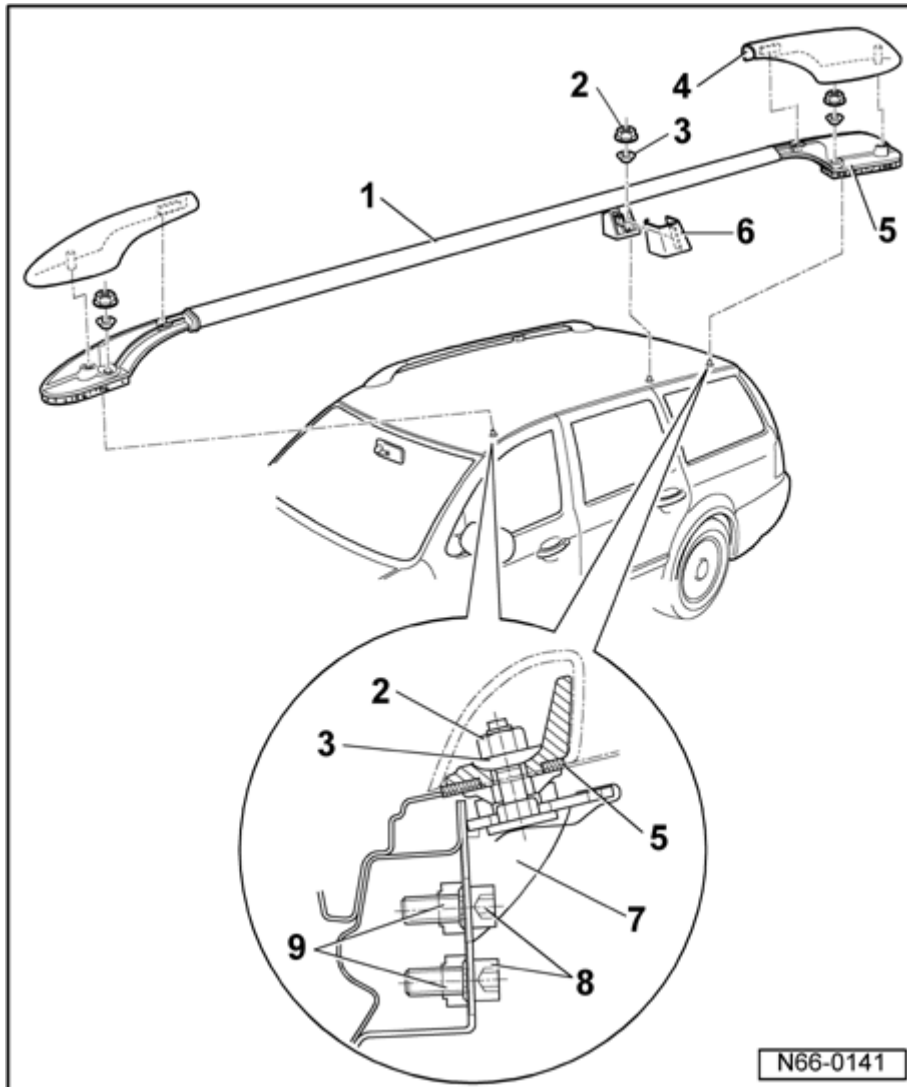
A lubricant may be used for installation.

3. Hollow rivet

4. Angle strip

Roof rail

Roof rail, assembly overview



1. Roof rail

- i Installation sequence: A-pillar, C-pillar and D-pillar

2. Nut

- i Qty. 6
- i 23 Nm

3. Taper washer

4. Cover cap

- i First insert cap into round clip and then press into double clip

5. Base plate

6. Cover cap

- i Center
- i Press cap onto roof railing base

7. Angle bracket

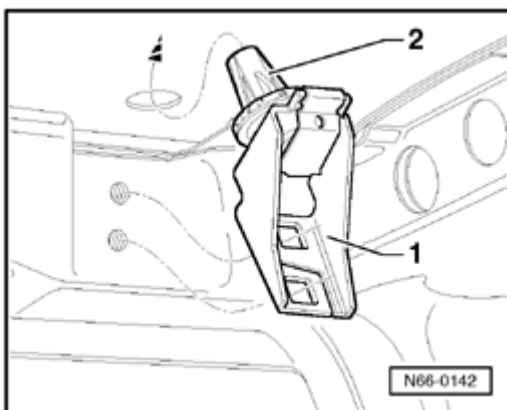
- i Installing ⇒ [66-4, Angle bracket, installing](#)
- i with securing pins, taper washer, sealing ring and securing cap (securing cap is component of replacement part kit)

8. Bolt

- i Qty. 12
- i 20 Nm

9. Weld nut

Angle bracket, installing



- Guide angle bracket - 1 - into roof hole and press into roof hole until securing cap - 2 - engages. All catches must engage.

Note:

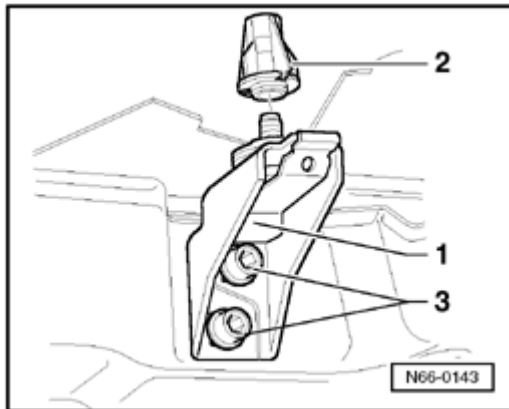
Securing cap must not be turned on angle bracket before it

locks in.

- Press angle bracket - **1** - on inner side panel, secure with bolts - **3** - (20 Nm).

Note:

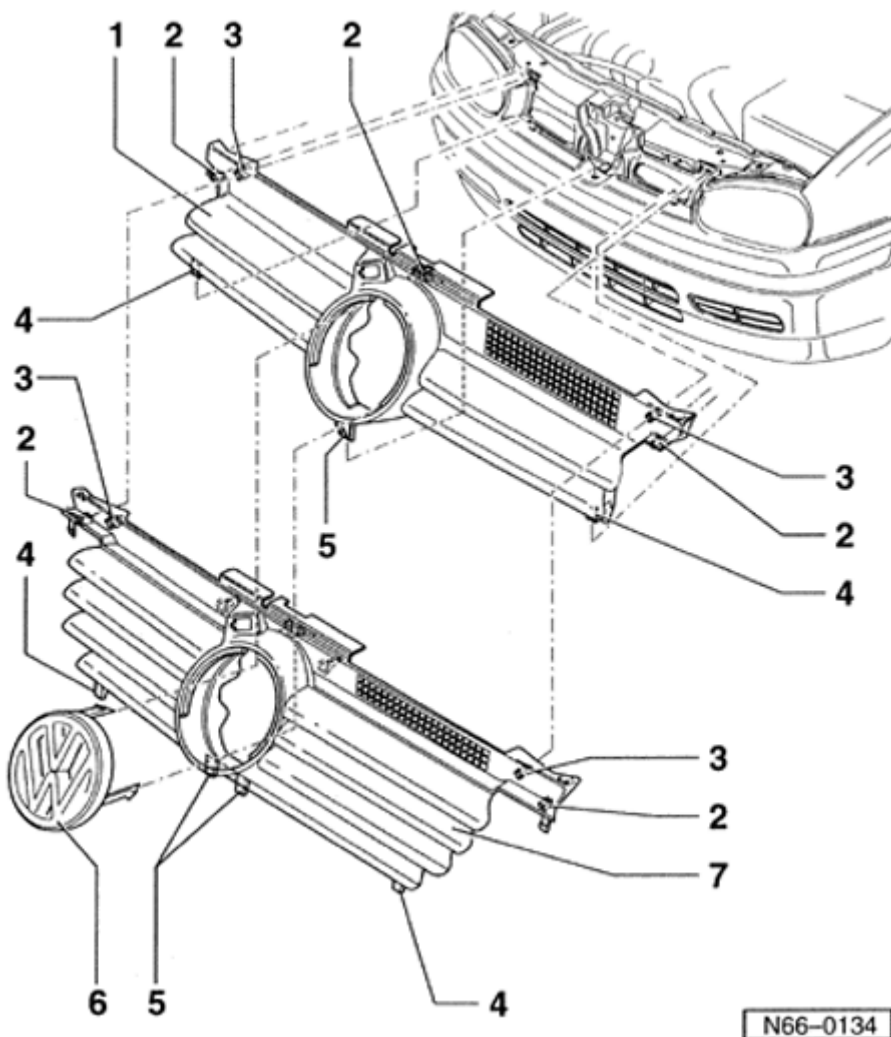
At center angle bracket, bolt points are situated next to one another.



- Unscrew securing cap - **2** - from outside, use a tool if necessary.

Trim

Radiator grille, removing and installing



Assembly overview

1. Radiator grille

- Golf
- Material-ASA

2. Catches

3. Cross pins

4. Retaining pins

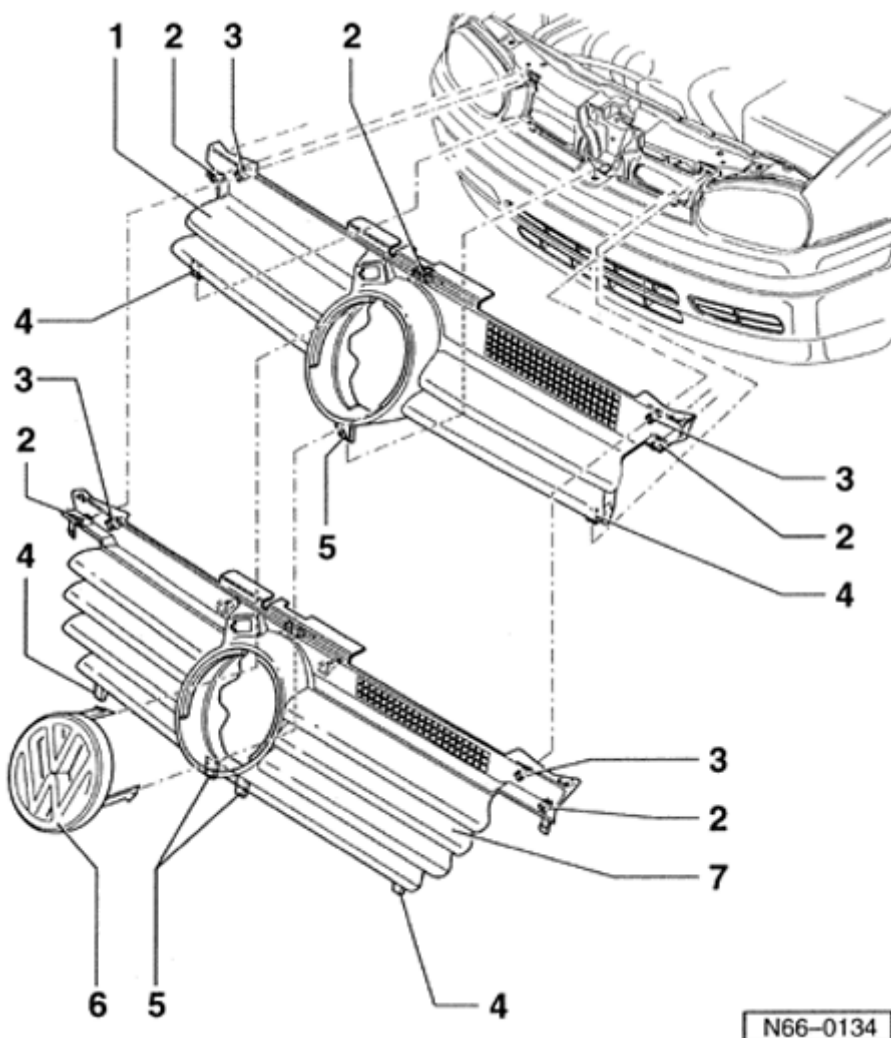
5. Center locating point

6. VW emblem

- ; Clipped in to radiator grille

7. Radiator grille

- ; Jetta
- ; Material-ASA



Removing

- Disconnect release lever from hood lock
⇒ [63-1, Release lever, removing](#) .
- Release retaining clips ⇒ [Item - 2 -](#)
using a screwdriver.
- Remove cross pins ⇒ [Item - 3 -](#) from

lock carrier and remove radiator grille upward.

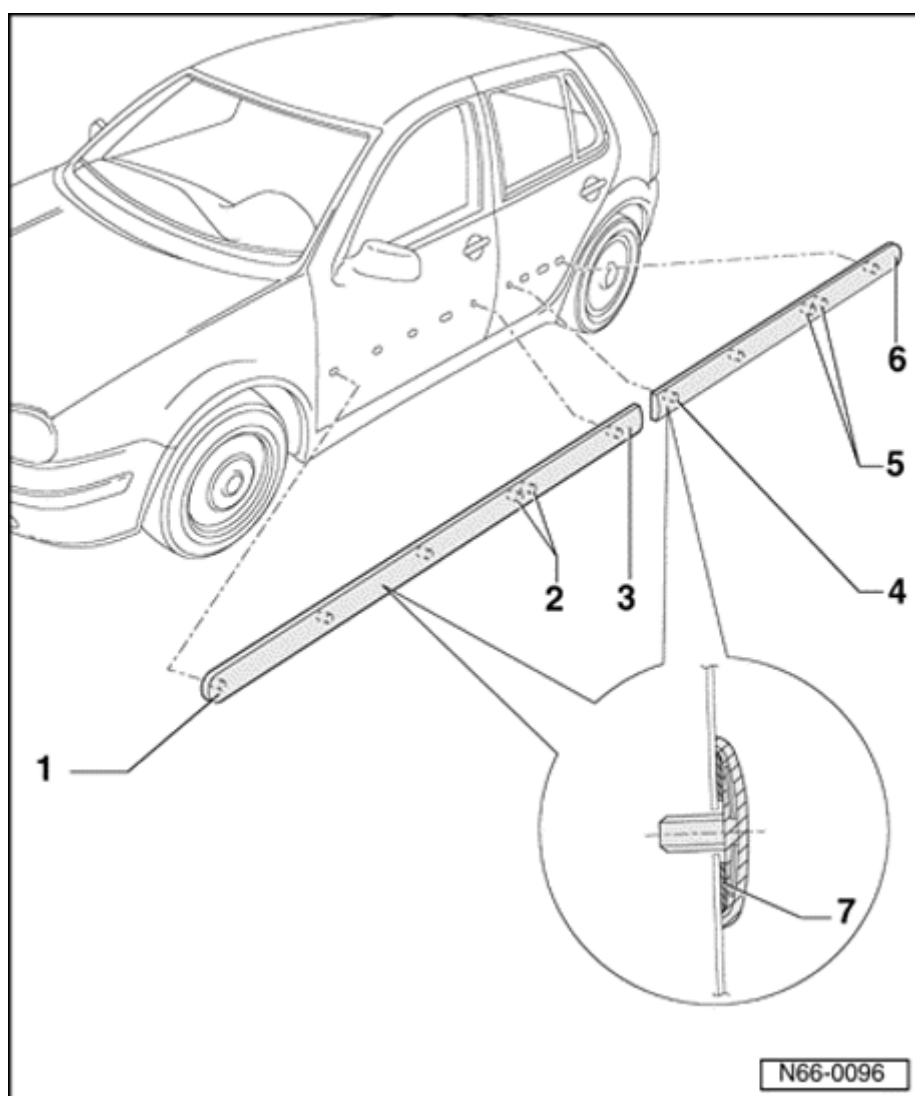
Installing

- Align radiator grille according to center locating point ⇒ [Item - 5 -](#), insert lower pins ⇒ [Item - 4 -](#) into bumper cover and clip in upper area.

Protective side moldings

Protective side moldings, replacing

- Heat side protective molding using hot air gun before removing.
- Clean outer panel with mineral spirits, treat with silicone remover and rub dry.
- Remove protective foil, attach side protective molding and press on forcefully. Processing temperature approx. 68 ° F (20 ° C).



1. Front door protective molding

- ; Left and right protective molding have a different hole pattern
- ; Self adhering

- i Material PP/EPDM
- i Centering pins ⇒ [Item - 3](#) - and ⇒ [Item - 4](#) - specify location of protective moldings.

2. Pins

- i Stop twisting of molding

3. Centering pins

4. Centering pins

5. Pins

- i Stop twisting of molding

6. Rear door protective molding

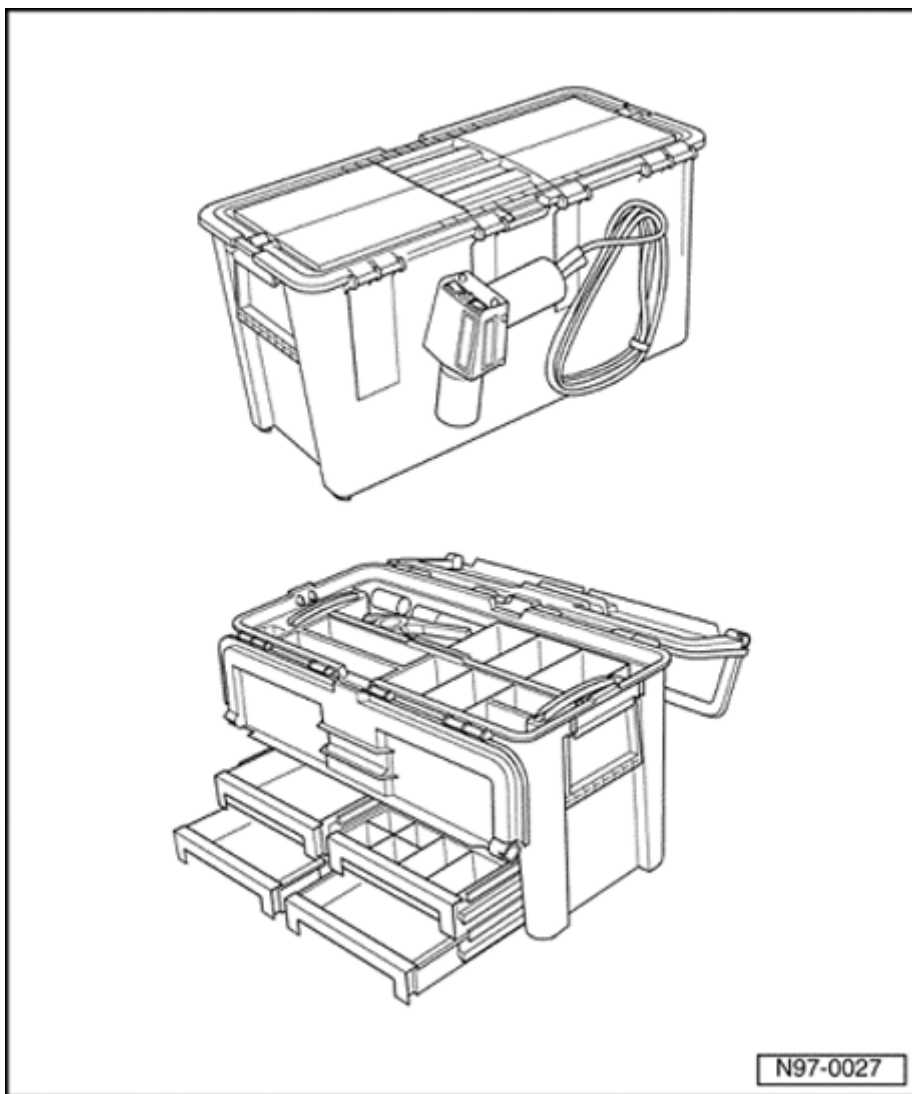
- i Left and right protective molding have a different hole pattern
- i Self adhering
- i Material PP/EPDM
- i Centering pins ⇒ [Item - 3](#) - and ⇒ [Item - 4](#) - specify location of protective moldings.

7. Protective foil

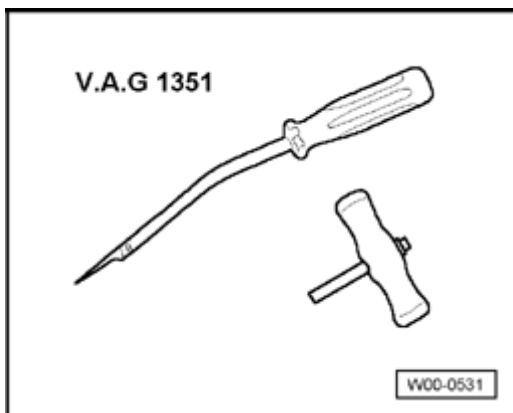
Rear spoiler with integrated stoplight

Tools

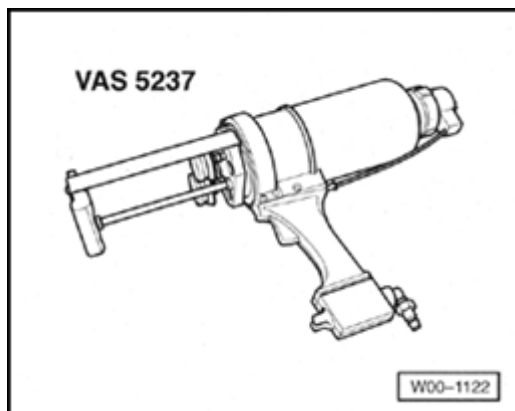
Special tools, testers and auxiliary items required



Wiring harness repair kit VAS 1978



Cutting tool V.A.G1351



Double cartridge gun VAS5237

Application nozzle

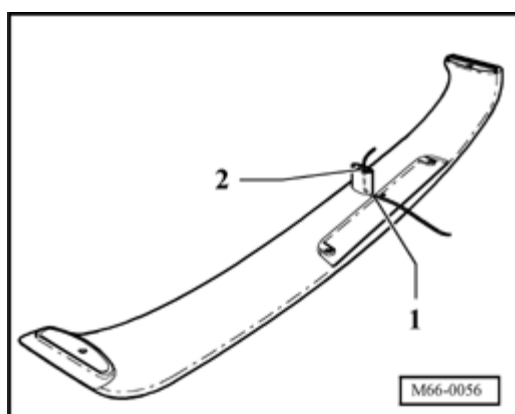
Stoplight, removing and installing

Installing

Warning!

Primer dries very fast and permanently stains painted surfaces.

If any visible part of the vehicle gets stained with primer, clean it thoroughly before primer dries.

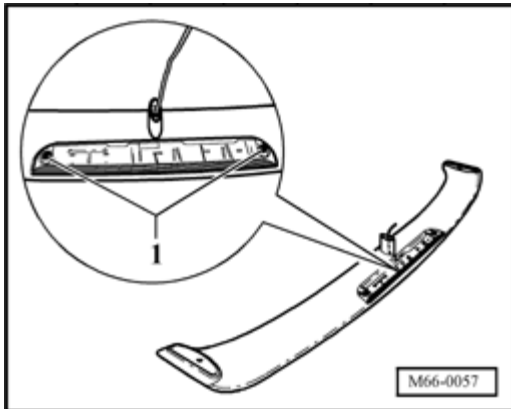


- Slide stoplight wiring harness through hole in stoplight support - **1** -

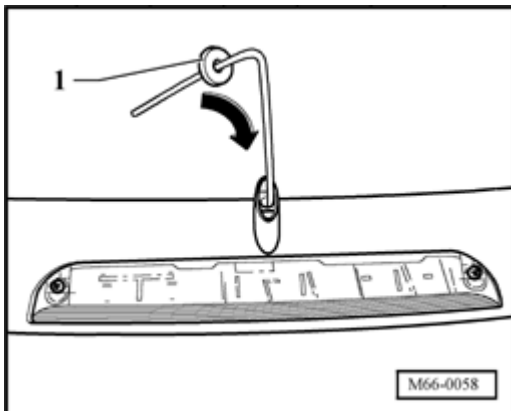
- Route wiring harness through drill hole in spoiler and pull wiring harness from support base - **2** - .

Note:

Make sure that stoplight is pulled tight to support, and if needed adjust slack in wiring harness.



- Attach stoplight to spoiler by screwing stoplight - **1** - into spoiler support base.



- Insert wiring harness into grommet - **1** - .
- Pull grommet toward spoiler support base - **arrow** - .

Removing

- Removal of stoplight once spoiler has been installed to vehicle is impossible, in that case, whole spoiler kit has to be replaced
- If spoiler has not yet been installed remove in reverse order of installing

Rear spoiler, general notes

Note:

If rear lid is damaged and needs to be replaced, rear spoiler also has to be changed and rear lid preparation has to be done before proceeding with installation procedure of rear spoiler/rear lid

Two different procedures are listed below, a procedure that applies when rear lid is damaged and therefore shall be

changed and a procedure that applies when either spoiler or stoplight malfunction.

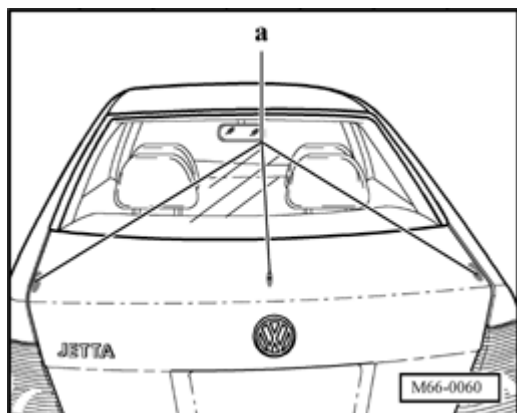
Rear spoiler with rear lid change, removing and installing

Rear lid preparation

- Cut installation template as indicated and paste it to vehicle rear lid following illustrated dimensions.

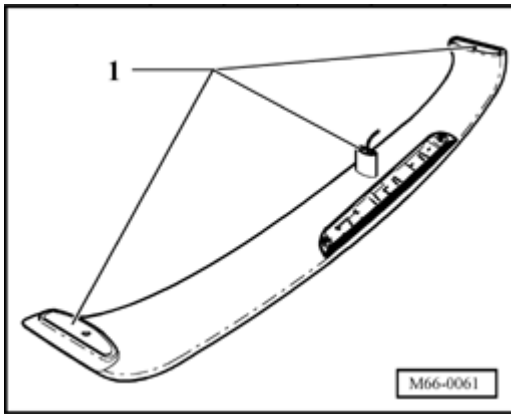
Note:

Jetta 2004 Rear Spoiler Installation Template can be found and printed in: ⇒ Library/Additional Information; Other Topics, Jetta 2004 Rear Spoiler Installation Template



- With a soft pencil or crayon, draw outline of gray shapes - **a** - directly on vehicle surface
- Drill holes to rear lid as indicated on Installing Template
- Remove Installing Template
- Apply scotch tape to outer borders of outlined surfaces to mask them before primer application
- Clean thoroughly with alcoholic cleaner and then apply primer to outlined surfaces (three surfaces) on top of rear lid - **a** - and allow to dry

Installing



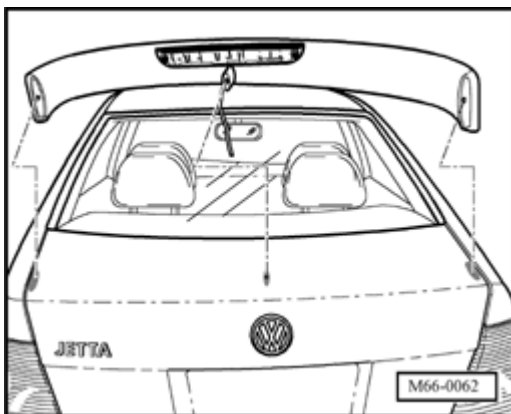
- Apply primer to base of spoiler (three surfaces) - 1 - and allow to dry

- Apply adhesive material to the base of spoiler (three surfaces) - 1 - using VAS 5237

Note:

Spoiler has to be attached to rear lid of vehicle within 5 minutes after adhesive has been applied, otherwise adhesive will loose effectiveness

- Attach spoiler to rear lid of vehicle making sure that the drilled holes match with the attaching holes on spoiler



- Route stoplight wiring harness through the center hole drilled pulling it firmly to make grommet fit

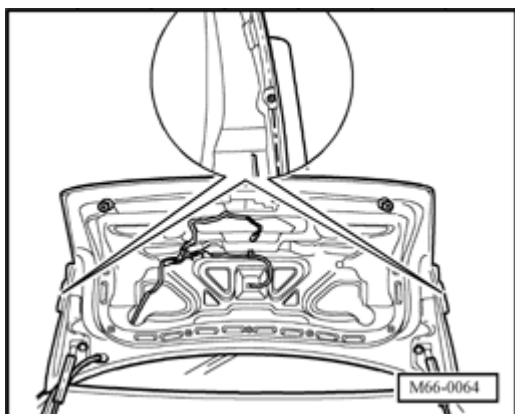
Warning!

Make sure that the stoplights cable passes through the central hole drilled

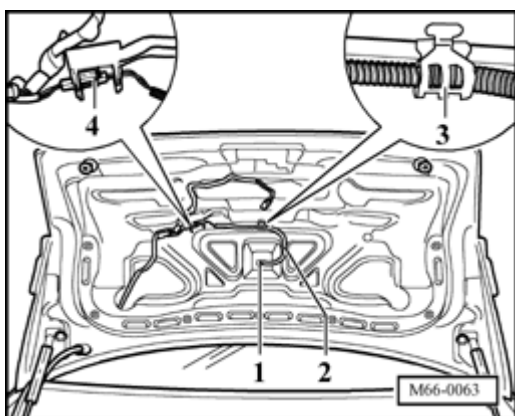
Make sure that the grommet attached to the stoplights cable fits in central hole

Avoid squeezing stoplights cable with spoilers central base

- Fasten spoiler using a screw on each of outer holes drilled.



Tightening torque (1.5 Nm)



- Pass cable through center rectangular hole inside rear lid
- 1 -

- Apply electrical terminals and connectors following Wiring harness repair kit VAS 1978 instructions

- Insert wiring into hose - 2 -

- Attach cable into clip - 3 -

- Connect terminal into harness connector and attach into connector holder - 4 -

Note:

To complete rear lid installation observe following information:

⇒ [Repair Manual, Body Interior, Repair Group 70, Rear lid trim, Rear lid trim, removing and installing](#)

⇒ [Repair Manual, Body Exterior, Repair Group 55, Hood, Lids; Rear lid \(Jetta\)](#)

Removing

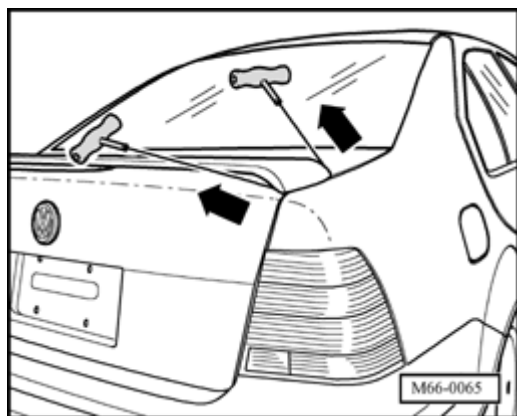
Note:

To remove observe instructions on ⇒ [66-7, Removing](#)

Rear spoiler without rear lid change, removing and installing

Removing

- Pull cutting wire sideways underneath spoiler as well as into two pulling handles from Cutting tool V.A.G1351



- Cut spoiler free following direction of - **arrows** - , until cutter reaches screws on external drilled holes
- On center of spoiler base, cut without restraints
- Remove attaching screws

Installing

Note:

When reusing an undamaged rear lid, avoid removing all adhesive residual material on lid

Residual material acts as an adhesive base for newly applied adhesive sealant

- Install stoplight into spoiler ⇒ [66-7, Stoplight, removing and installing](#)
- Install spoiler ⇒ [66-7, Installing](#)

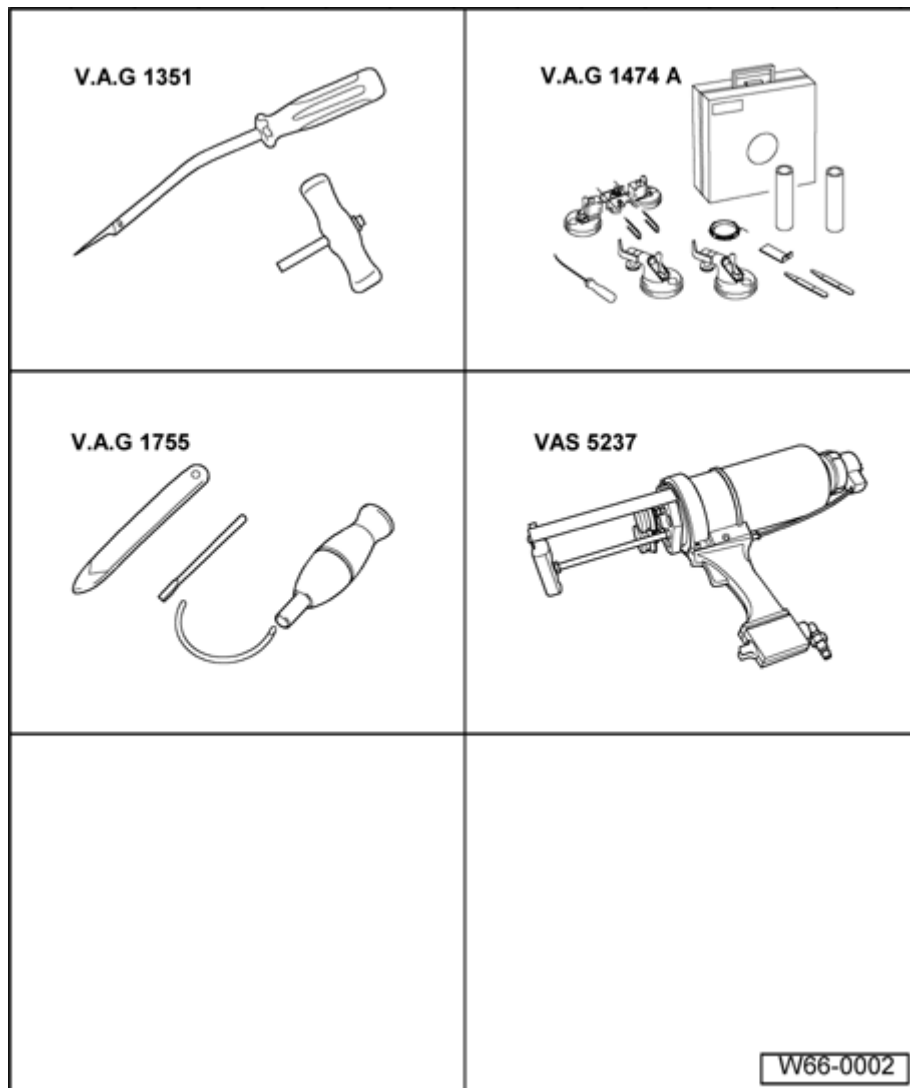
Special components of Golf "GTI 337 Edition"/Jetta GLI Sport and Golf R32

Safety precautions

These components have been developed specifically for technical requirements of Golf "GTI 337 Edition" and Jetta GLI Sport and R32. Each of these components must be replaced in any case with corresponding original part.

Without these components, vehicle may not be driven in open traffic.

Tools



Special tools, testers and auxiliary items required

Cutting tools for glass V.A.G1351

Cutting tool kit V.A.G1474A

Window removing kit V.A.G1755

Double cartridge gun VAS5237

Materials

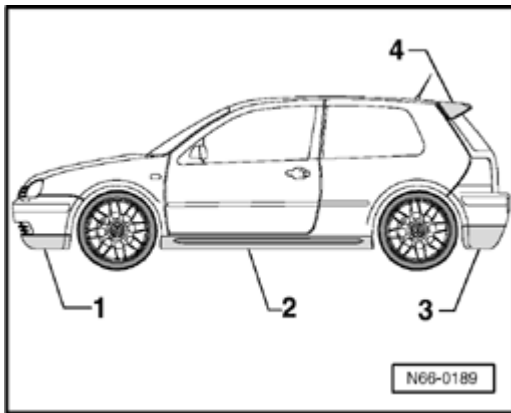
2K- window adhesive	DA 004 600 A2 ¹⁾ , ²⁾
Mixer with cone shaped nozzle	D 002 001
Activator	D 181 801 A1 ³⁾
Primer	D 181 711 A1
Cleaning solution	D 009 401 04 ³⁾
Primer applicator	D 009 500 25 ³⁾
Adhesive remover	D 002 000 10 ³⁾
Cutting cord	357 853 999 A

³⁾Materials are stored in box D 004 700

¹⁾ Observe minimum curing time ⇒ [66-8, Minimum curing time](#) .

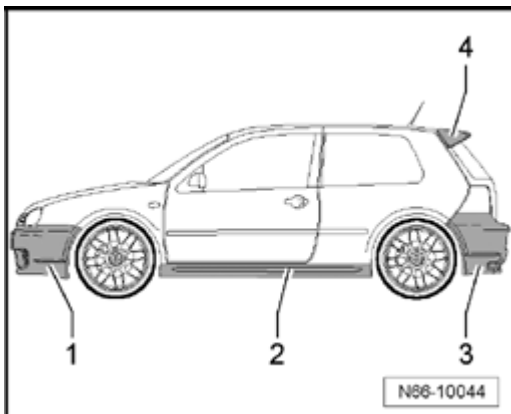
²⁾ Double cartridge pistol VAS5237 must be used to process this material.

Assembly overview



Golf GTI

1. Front spoiler ⇒ [66-8, Front and rear valance spoilers](#)
2. Sill panel extension ⇒ [66-8, Sill panel extension \(Golf GTI, Golf R32\)](#)
3. Rear valance spoiler ⇒ [66-8, Front and rear valance spoilers](#)
4. Rear spoiler ⇒ [66-8, Roof edge spoiler \(Golf GTI, Golf R32\)](#)

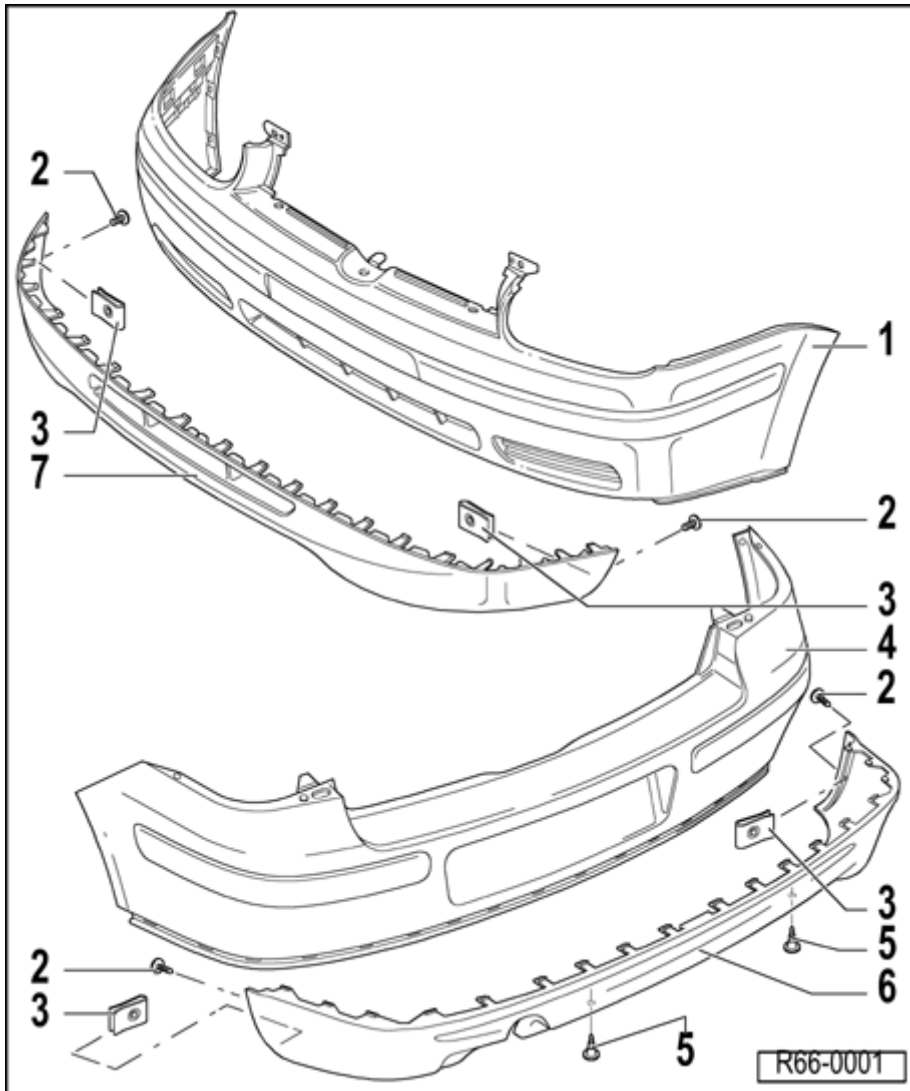


Golf R32

1. Front bumper ⇒ [63-1, Bumper cover \(Golf R32\), removing and installing](#)
2. Extended sill panel ⇒ [66-8, Sill panel extension \(Golf GTI, Golf R32\)](#)
3. Rear bumper ⇒ [63-2, Rear bumper cover \(Golf R32\), assembly overview](#)
4. Roof edge spoiler ⇒ [66-8, Roof edge spoiler \(Golf GTI, Golf R32\)](#)

Front and rear valance spoilers

Assembly overview



1. Front bumper cover

- Removing and installing ⇒ [63-1, Bumper cover, removing and installing](#)

2. Screw

- Qty. 4
- 2 Nm

3. Speed nut

- Page
- Qty. 4

4. Rear bumper cover

- ; Removing and installing ⇒ [63-2, Rear bumper cover, removing and installing](#)

5. Bolt

- ; Qty. 2
- ; 15 Nm

6. Rear valance spoiler

- ; Material PUR-RIM
- ; Clipped to cover and 4 screws

7. Front valance spoiler

- ; Material PUR-RIM
- ; Clipped to cover and 4 screws

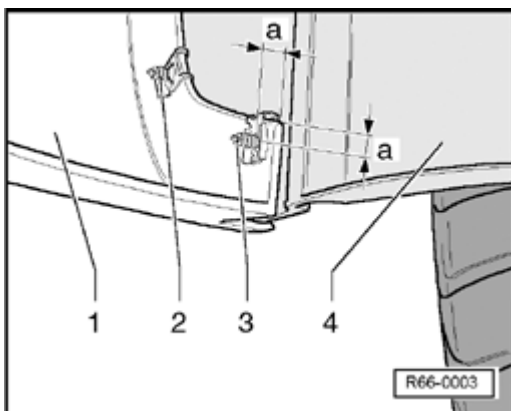
Additional bolts at front valance spoiler, installing

Warning!

When installing front valance spoiler, additional bolts must be installed on both sides.

Additional bolts (Rear view)

- Drill with 4 mm drill the front valance spoiler and wheel housing liner. Hole must be approx. 10 mm away from both outer edges, dimension - **a** - = 10 mm



1. Front valance spoiler

2. Bolts

- i 2 Nm

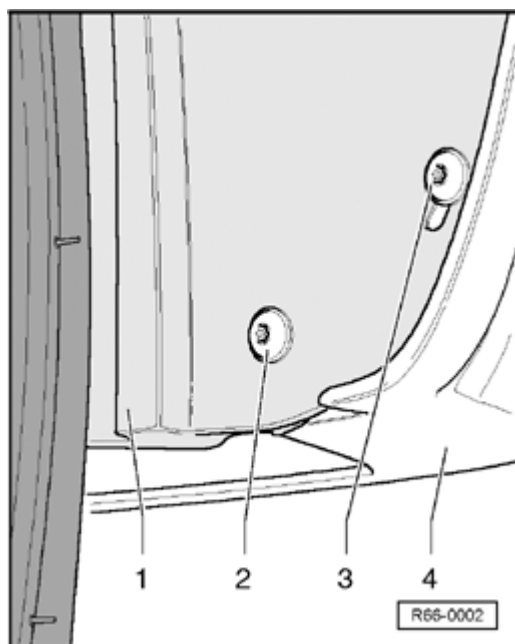
3. Additional bolts

- i 2 Nm

4. Front wheel housing liner

- Install speed nut on front valance spoiler and then bolt front wheel housing liner and front valance spoiler, item - 3

-

Additional bolts (Front view)**1. Front wheel housing liner****2. Additional bolts**

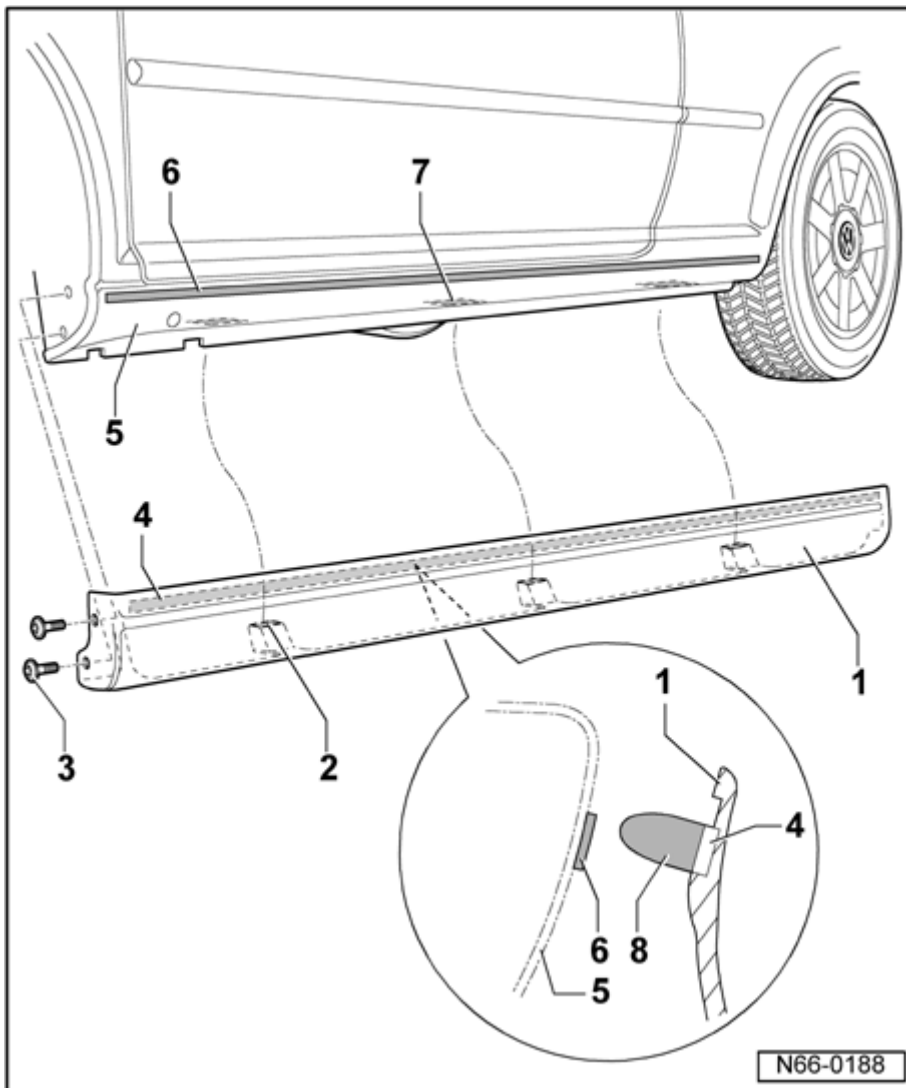
- i 2 Nm

3. Bolts

- i 2 Nm

4. Front valance spoiler**Sill panel extension (Golf GTI, Golf R32)**

Assembly overview



1. Sill panel extension

- ; Removing ⇒ [66-8, Sill panel extension, removing](#)
- ; Installing ⇒ [66-8, Sill panel extension, installing](#)
- ; Installation notes ⇒ [66-8, Installation notes](#)
- ; Material PUR-RIM

2. Lower adhesive surface on sill panel extension

3. Bolt

- ; Qty. 4

- i 2 Nm

4. Upper adhesive surface on sill panel extension

5. Sill panel

- i Preparation ⇒ [66-8, Preparing bodywork for adhesive](#)

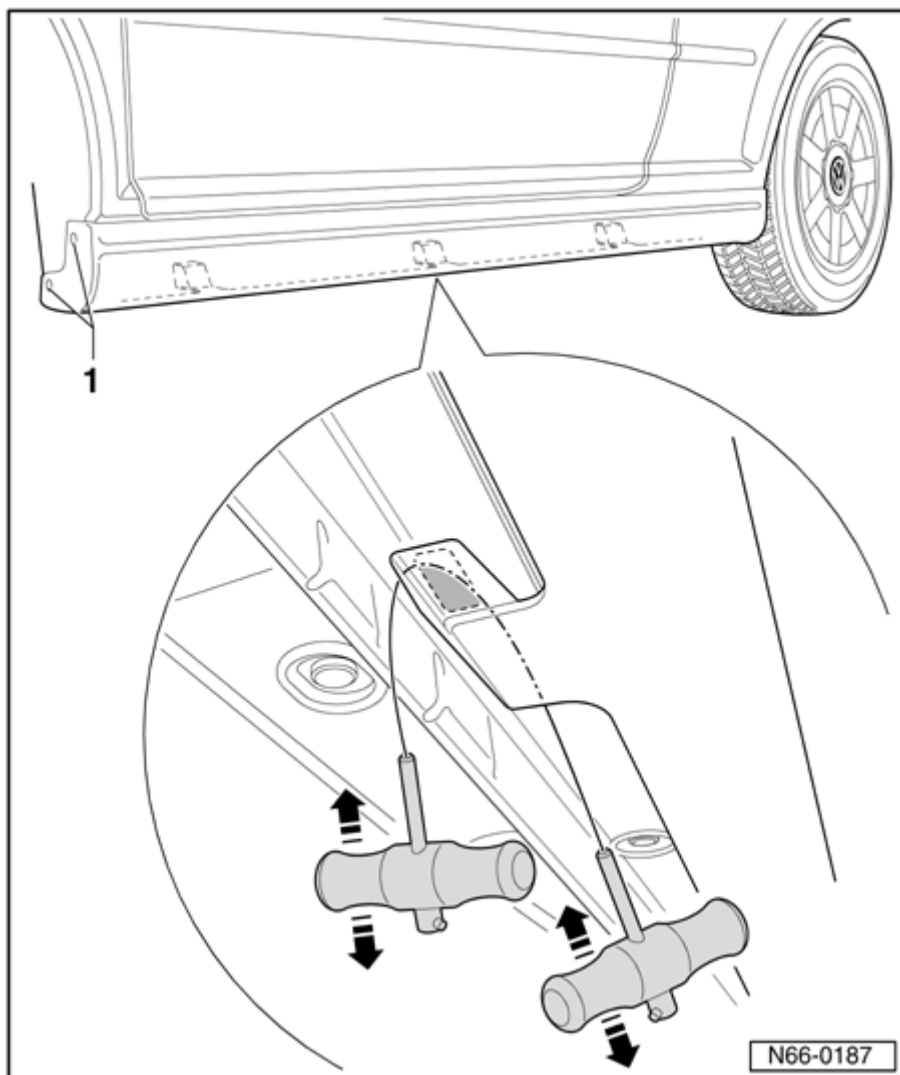
6. Upper primer surface on sill panel extension

7. Lower primer surfaces on sill panel

8. PUR adhesive sealant

- i Minimum curing time ⇒ [66-8, Minimum curing time](#)

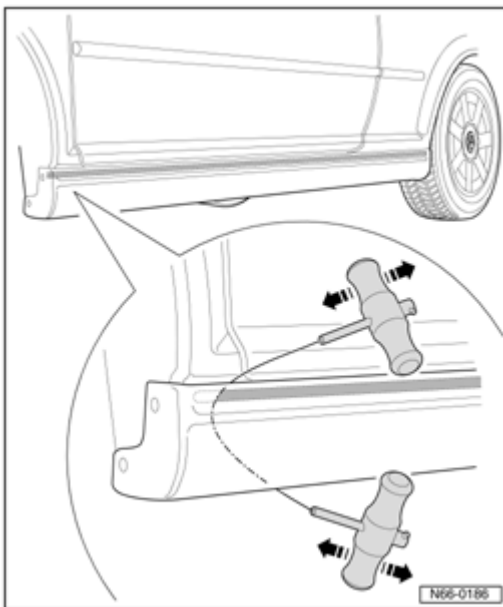
Sill panel extension, removing



Caution!

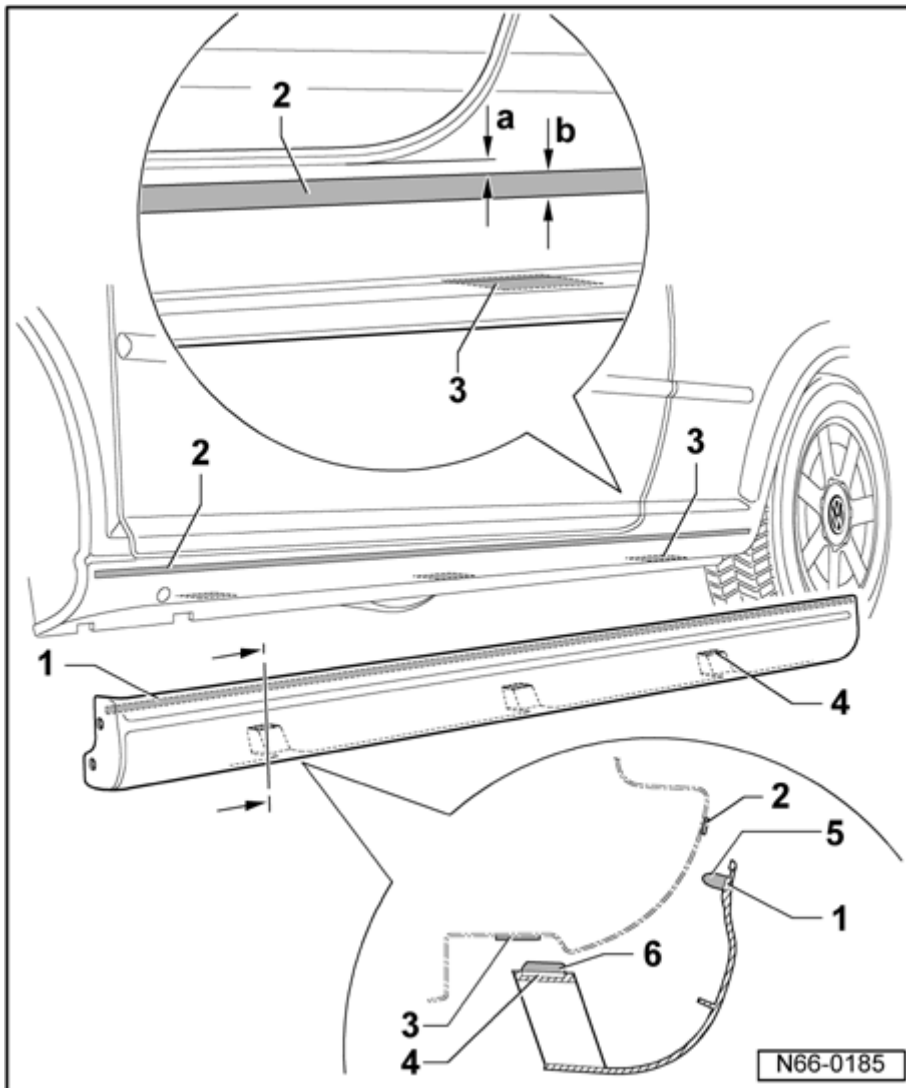
When disassembling special components, a cutting cable must not be used because of danger of damaging painted surfaces.

- Clean dirt from all seams so that no damage to paint will occur when removing components.
- Cover sidemember with tape at top part of extended sill panel in order to prevent damage to paint by cutting cord.
- Remove two bolts - 1 - in front wheelhousing.
- Cut through three lower adhesive surfaces of sill panel extension using pulling handles and cutting cord.



- Also cut through upper adhesive bead using pulling handles and cutting cord.
- Remove sill panel extension.

Sill panel extension, installing



1. Primer/ adhesive surface on sill panel extension

2. Upper primer surface on sill panel extension

- ı Dimension - **a** - = 12 mm
- ı Dimension - **b** - = 10 mm
- ı Edge of stone chip protection can be used as upper edge of primer surface if dimensions are correct.

3. Lower primer surfaces on sill panel extension

- ı Three surfaces (areas) are determined by positioning lower sill panel extension.

4. Lower primer surfaces on sill panel extension

- i 3 areas

5. Upper adhesive bead

- i Bead cross section:

Width = 5 mm

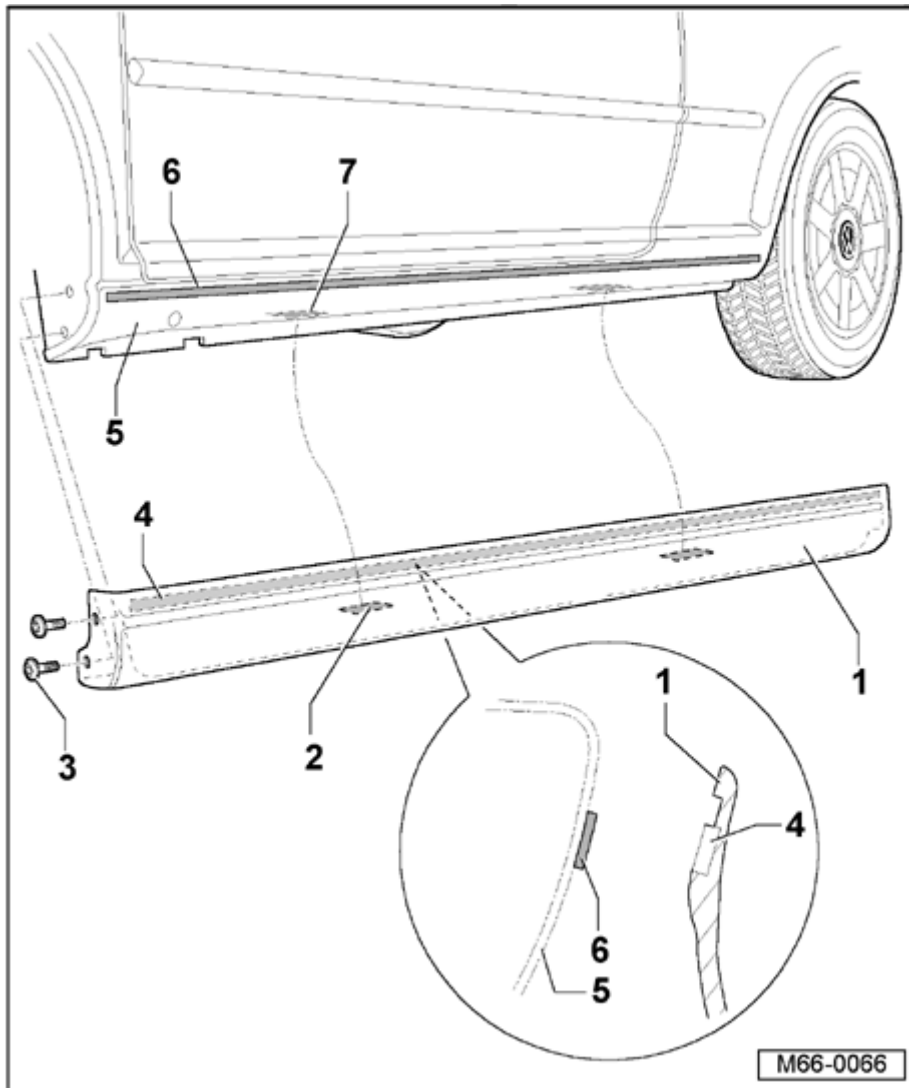
Height = 7 mm (including residue on sill panel)

6. Lower adhesive bead

- i Apply adhesive in two beads of 19 mm x 30 mm and to a height of 7 mm to one surface.
- i 3 areas

Sill panel extension (Jetta GLI Sport)

Assembly overview



1. Sill panel extension

- i Removing ⇒ [66-8, Sill panel extension, removing](#)
- i Installing ⇒ [66-8, Sill panel extension, installing](#)
- i Installation notes ⇒ [66-8, Installation notes](#)
- i Material PUR-RIM

2. Lower primer surface on sill panel extension

3. Bolt

- i Qty. 4
- i 2 Nm

4. Upper adhesive surface on sill panel extension

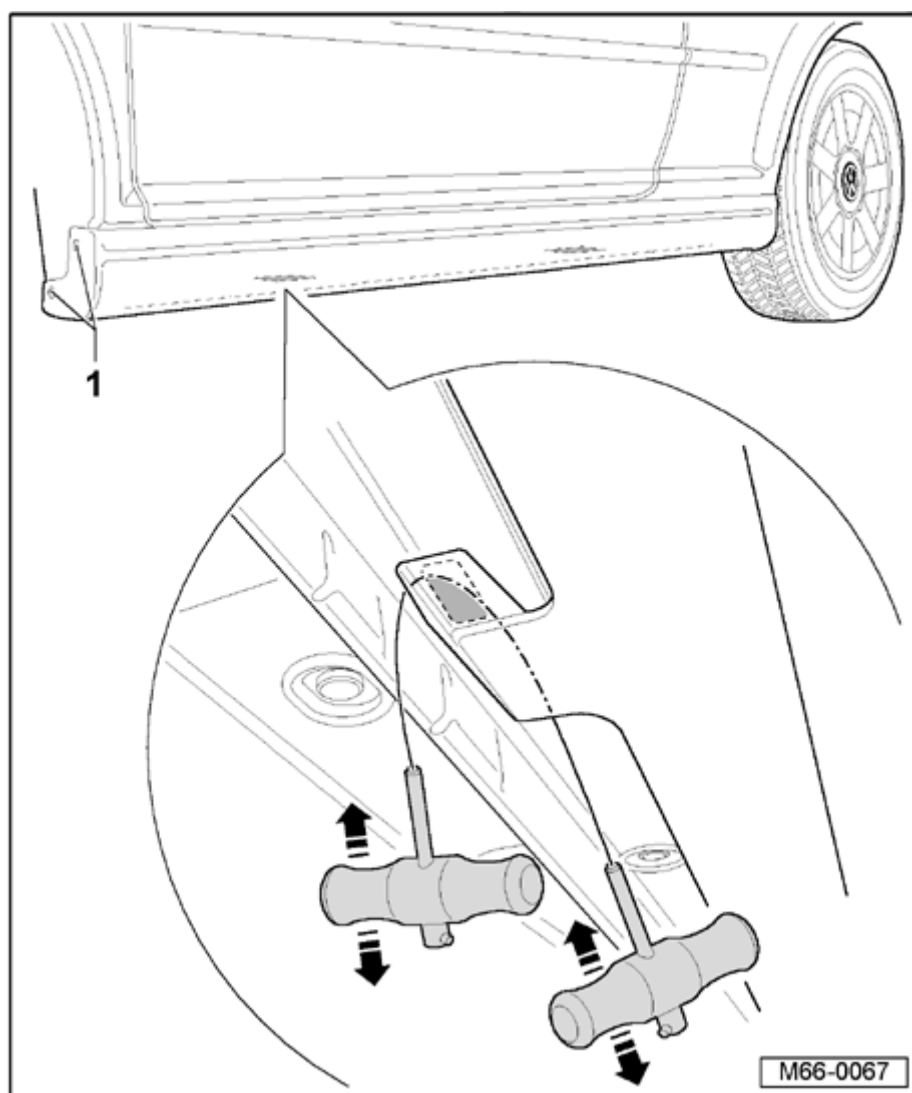
5. Sill panel

i Preparation ⇒ [66-8, Preparing bodywork for adhesive](#)

6. Upper primer surface on sill panel extension

7. Lower primer surfaces on sill panel extension

Sill panel extension, removing

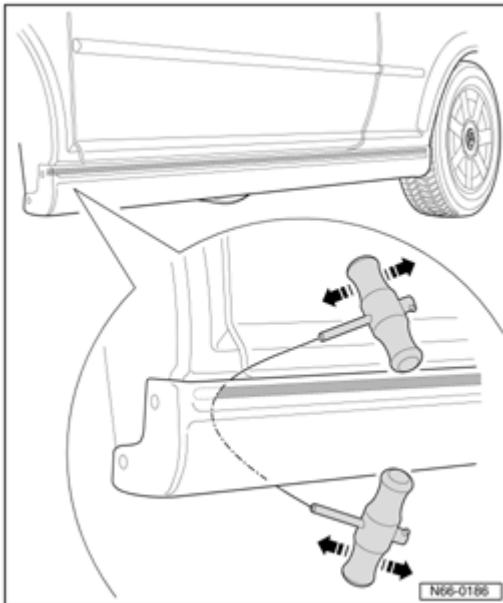


Caution!

When disassembling special components, a cutting cable must not

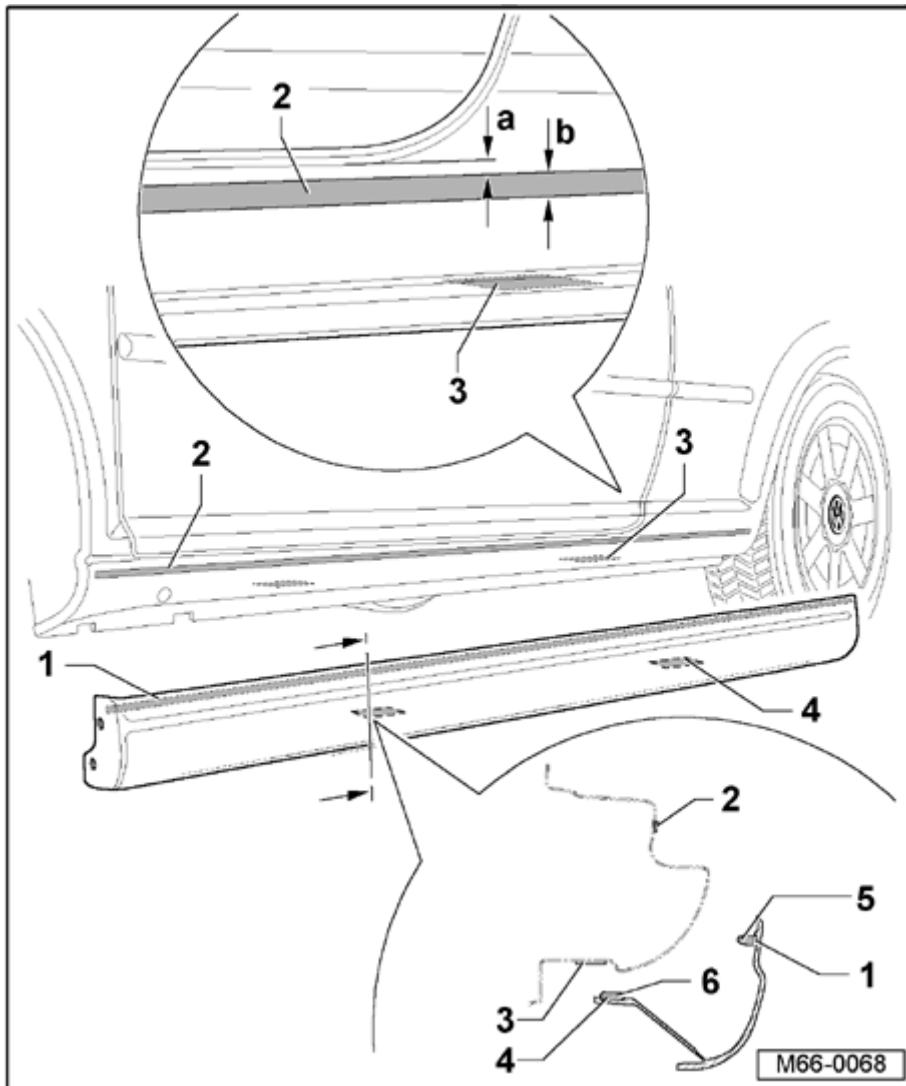
be used because of danger of damaging painted surfaces.

- Clean dirt from all seams so that no damage to paint will occur when removing components.
- Cover sidemember with tape at top part of extended sill panel in order to prevent damage to paint by cutting cord.
- Remove two bolts - **1** - in front wheelhousing.
- Cut through three lower adhesive surfaces of sill panel extension using pulling handles and cutting cord.



- Also cut through upper adhesive bead using pulling handles and cutting cord in direction of - **arrows** - .
- Remove sill panel extension.

Sill panel extension, installing



1. Primer/ adhesive surface on sill panel extension

2. Upper primer surface on sill panel extension

- ı Dimension - **a** - = 5.5 mm
- ı Dimension - **b** - = 6.4 mm
- ı Edge of stone chip protection can be used as upper edge of primer surface if dimensions are correct.

3. Lower primer surfaces on sill panel

- ı Two surfaces (areas) are determined by positioning lower sill panel extension.

4. Lower primer surfaces on sill panel extension

- i 2 areas

5. Upper adhesive bead

- i Bead cross section:

Width = 2mm

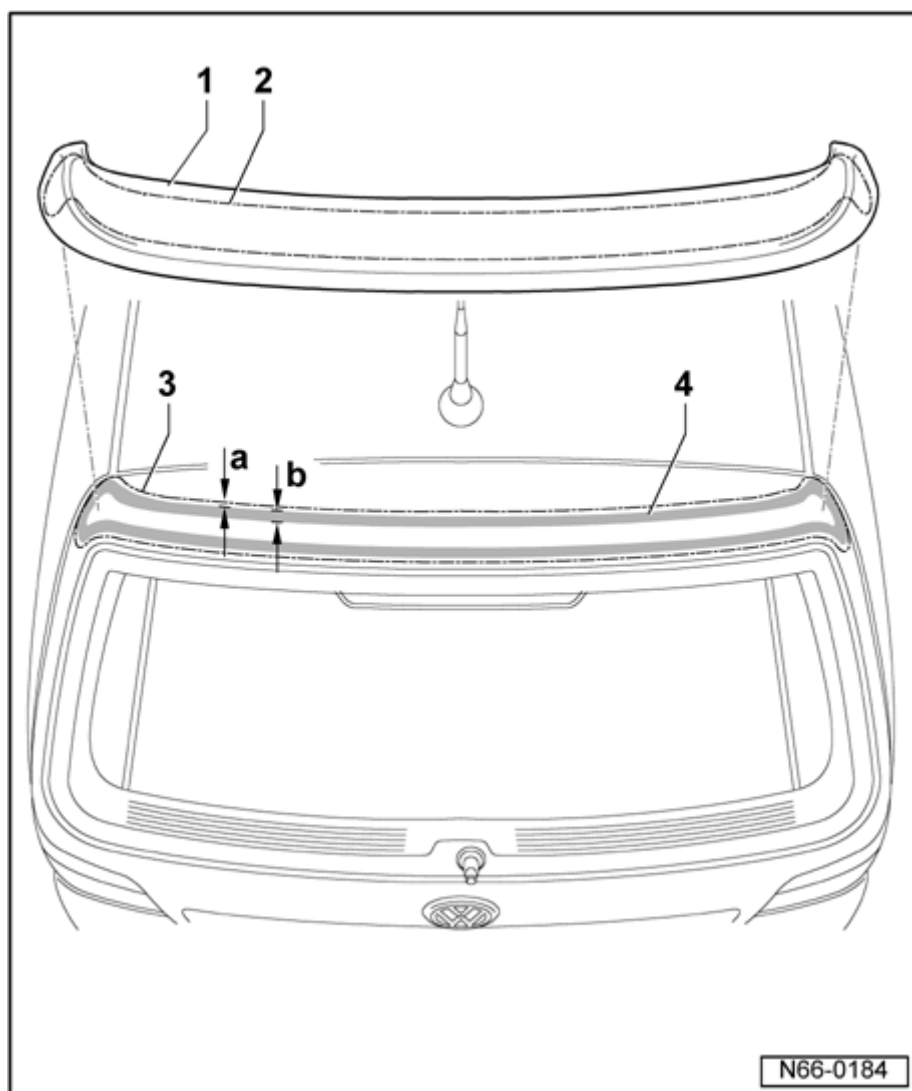
Height = 6.4mm (including residue on sill panel)

6. Lower adhesive bead

- i Apply adhesive in two beads of 17 mm x 72mm (front) /40 mm (rear) and to a height of 1.9 mm.
- i 2 areas

Roof edge spoiler (Golf GTI, Golf R32)

Assembly overview



1. Roof edge spoiler

- ; Removing ⇒ [66-8, Roof edge spoiler, removing](#)
- ; Installing ⇒ [66-8, Installing roof edge spoiler](#)
- ; Installation notes ⇒ [66-8, Installation notes](#)
- ; Material PU-R-RIM

2. Primer surface on spoiler

3. Circumference of installed roof edge spoiler

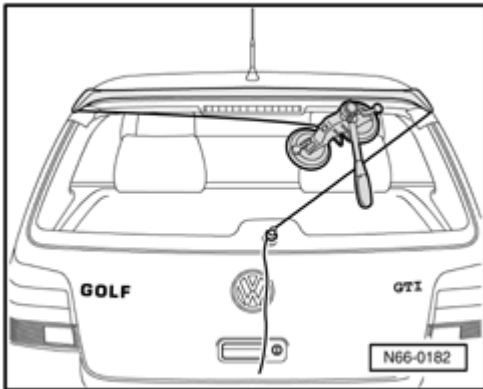
4. Primer surface/residue on rear lid

- ; Preparation ⇒ [66-8, Preparing bodywork for adhesive](#)

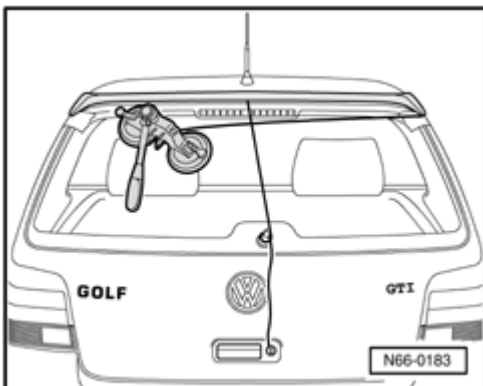
Roof edge spoiler, removing

Warning!

When disassembling special components, a cutting cable must not be used because of danger of damaging painted surfaces.



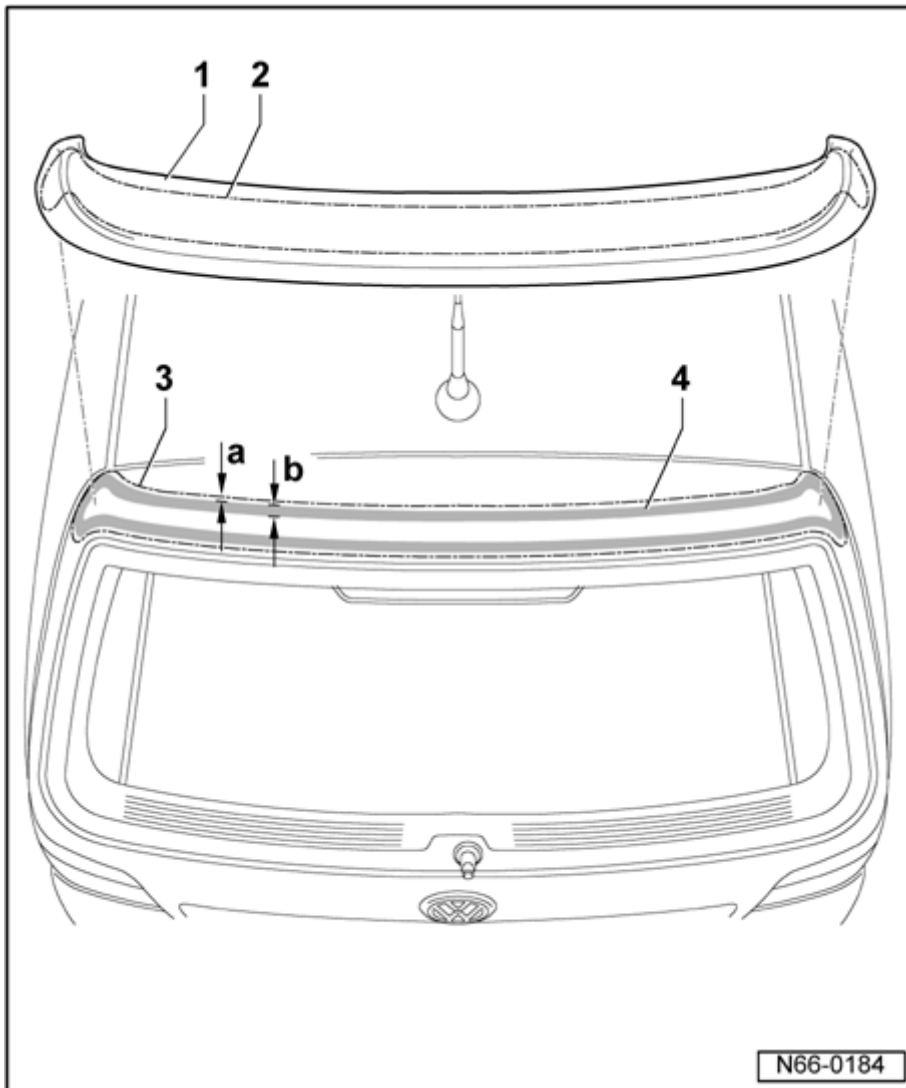
- Clean dirt from all seams so that no damage to paint will occur when removing components.
- Cover all adjacent paint surfaces and gap between roof and rear lid with tape.
- Spooling tool must be applied in depicted position and one cord end must be secured.
- Insert cutting cord around spoiler so that cord passes along outside in seam between spoiler and rear lid and secure second cord end to wiper axle.
- While cutting free, guide cutting cord into seam using a plastic wedge.



- In position illustrated, spoiler can be cut free to slightly past vehicle center.

- Then, position spooling tool corresponding to illustration and swap cord ends. Then cut free spoiler from other outer side toward center.
- Remove spoiler.

Installing roof edge spoiler



1. Roof edge spoiler

- i Material PUR-RIM
- i Installation notes ⇒ [66-8, Installation notes](#)

2. Route of primer surface on spoiler

- i Adhesive bead with a width of 3 mm and a height of 5 mm

3. Circumference of installed roof edge spoiler

- ; Spoiler must be placed on rear lid and circumference covered in tape

4. Primer surface/reside on rear lid

- ; Preparation ⇒ [66-8, Preparing bodywork for adhesive](#)
- ; Dimension - **a** - = 7 mm
- ; Dimension - **b** - = 10 mm

Preparing bodywork for adhesive

Note:

Residual material acts as a base for new adhesive sealing material. Keep adhesive surface free of dirt and grease.

Exception: If bonding is not performed immediately after cutting back, remaining material must be activated using Activator D 181 801 A1 .

Warning!

Activator must not come into contact with paint - otherwise paint will be damaged.

Note:

If bodywork is being worked on or is partially replaced, it must be cleaned and primed again after painting corresponding area.

Installation notes

Surfaces of components to be primed must be free of dirt.

- Remove adhesive residue using Adhesive removal solution D 002 000 10 .
- Saturate a cloth with Silicone remover LSE 020 100 A3 .
- Always wipe application area for adhesive bead twice using saturated cloth and allow to air dry.

- Now apply primer uniformly in one stroke using Applicator D 009 500 25 .

Air dry time approx. 10 minutes

- Adhesive material must be applied to primed surfaces of component.

Warning!

Components must be installed within 10 minutes, otherwise bonding properties of adhesive will be impaired.

Keep gap dimensions as narrow as possible, up to approx. 1 mm.

Secure components using adhesive tape during curing time.

Minimum curing time

Minimum curing time for newly bonded special components is 3 hours.

Minimum curing time is time from applying components up to vehicle use. During this time, vehicle must stand on an even surface at room temperature (at least 60 ° F (15 ° C)).

Warning!

Vehicle is operationally ready only after minimum curing time has elapsed.

Repairing paint damage

Paint construction must be re-established according to specifications of Repair Manual "Paint" .

Following repair method applies to paint damage in an area which is not visible:

- Paint twice (wet on wet) using glass/paint primer D 009 200 02 - minimum air drying time 10 minutes.

Cleaning when soiled by adhesive sealing material

- Adhesive removal solution D 002 000 10 is recommended cleaning solution. Observe safety precautions when

processing.

- First, clean coarse paint surfaces with a dry cloth.
Remove further material using Adhesive removal solution D
002 000 10 .

Select a topic

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[Retaining plate for interior mirror, installing](#)

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[Glove compartment lock cylinder, removing and installing](#)

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Seatbelts

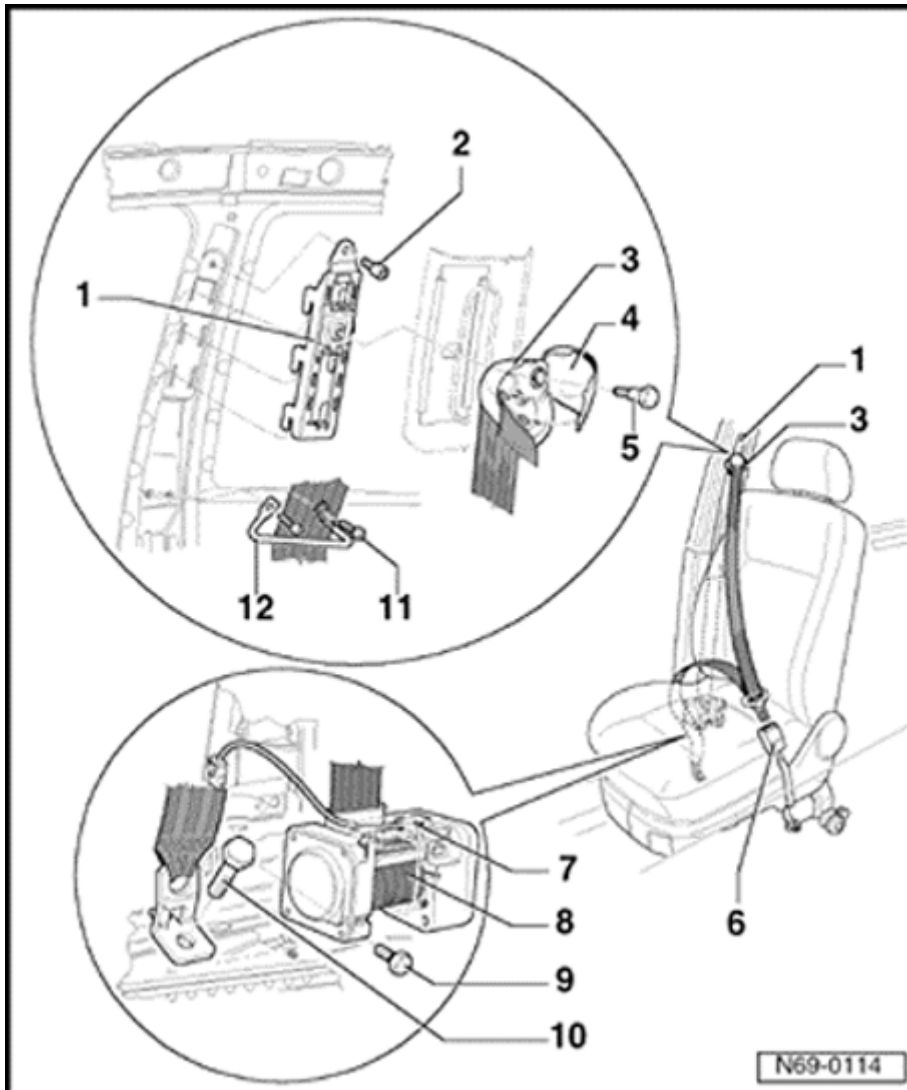
Safety precautions for seatbelt tensioners

- n Testing, removing, installing and servicing may ONLY be performed by qualified personnel.
- n NEVER open or attempt to repair belt tensioner components; always use new parts (danger of injury).
- n Seatbelt tensioner units that have been hit with any force or have fallen to floor, must not be installed in a vehicle.
- n Always replace belt tensioner units which have experienced mechanical damage (dents, cracks).
- n Storage and transportation of belt tensioners must comply with Explosives Act. .
- n distributor or importer is responsible for disposal of non-ignited units.
- n ALWAYS install belt tensioner units in vehicle, as soon as y are removed from packaging.
- n NEVER use impact wrenches to remove belt tensioners.
- n If installation work is interrupted, IMMEDIATELY return belt tensioner unit to its original packaging.
- n NEVER leave a belt tensioner unattended.
- n NEVER treat a belt tensioner unit with grease, cleaning products or anything similar. Do NOT expose belt tensioner unit to temperatures above 212 ° F (100 ° C) even for a few seconds.
- n pyrotechnic ignition charge does not have an expiration date, i.e. it has an infinite shelf life and is maintenance free.
- n Belt tensioners that have ignited can be disposed of as normal scrap. It is recommended, however, that deployed seat belt tensioners be recycled.

Front seatbelt, assembly overview (with belt tensioner)

Caution!

Before beginning disassembly, straightening or or body repair work, belt tensioning units must be removed.

**1. Seatbelt height adjuster**

- ⌋ To remove height adjustment mechanism, upper B-pillar trim must be removed first

2. Cylinder bolt

- ⌋ 23 Nm

3. Belt relay**4. Concealment cap****5. Hex bolt**

- i 40 Nm

6. Belt latch

7. Connector

- i Only with electrical belt tensioners

8. Seatbelt with belt tensioner

- i Removing ⇒ [69-1, Front seatbelts, removing and installing](#)

9. Hex bolt

- i 40 Nm

10. Hex bolt

- i 40 Nm

11. Screws

- i Qty. 2, 1.5 Nm

12. Belt guide

Front seatbelts, removing and installing

Note:

- n *Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*
- n *Two different belt tensioners are installed: Belt tensioners with electrical igniters in vehicles with side airbag and belt tensioners with mechanical igniters in vehicles without side airbag.*

Removing

- Disconnect vehicle battery

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

- Remove lower B-pillar trim ⇒ [70-3, Lower B-pillar trim, removing and installing](#) .

- Remove sill panel trim:

n 2door ⇒ [68-3, Sill panel trim, removing and installing \(2-door\)](#) .

n 4door ⇒ [68-3, Sill panel trim, removing and installing \(4-door\)](#) .

Caution!

Observe safety precautions for belt tensioners ⇒ [69-1, Safety precautions for seatbelt tensioners](#) .

- Remove bolt - **10** - (40 Nm) and remove belt mount from body.

- Remove screw - **9** - (40 Nm) and remove automatic belt retractor - **8** - off B-pillar.

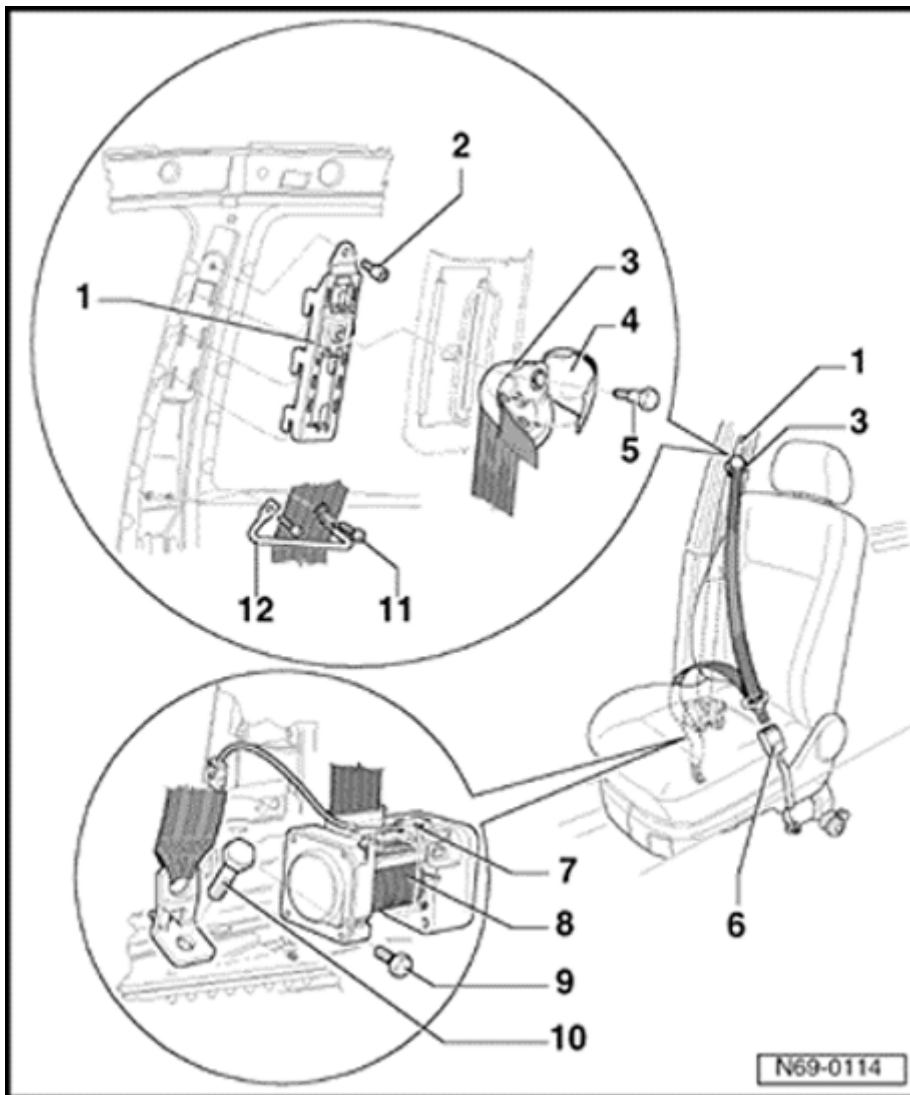
Caution!

Electrostatic charges may result in involuntary deployment of belt tensioner. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.

- Disconnect harness connector - **7** - .

- Remove two bolts - **11** - (1.5 Nm) and remove belt guide - **12** - .

- Clip on cover cap - **4** - for belt relay - **3** - .



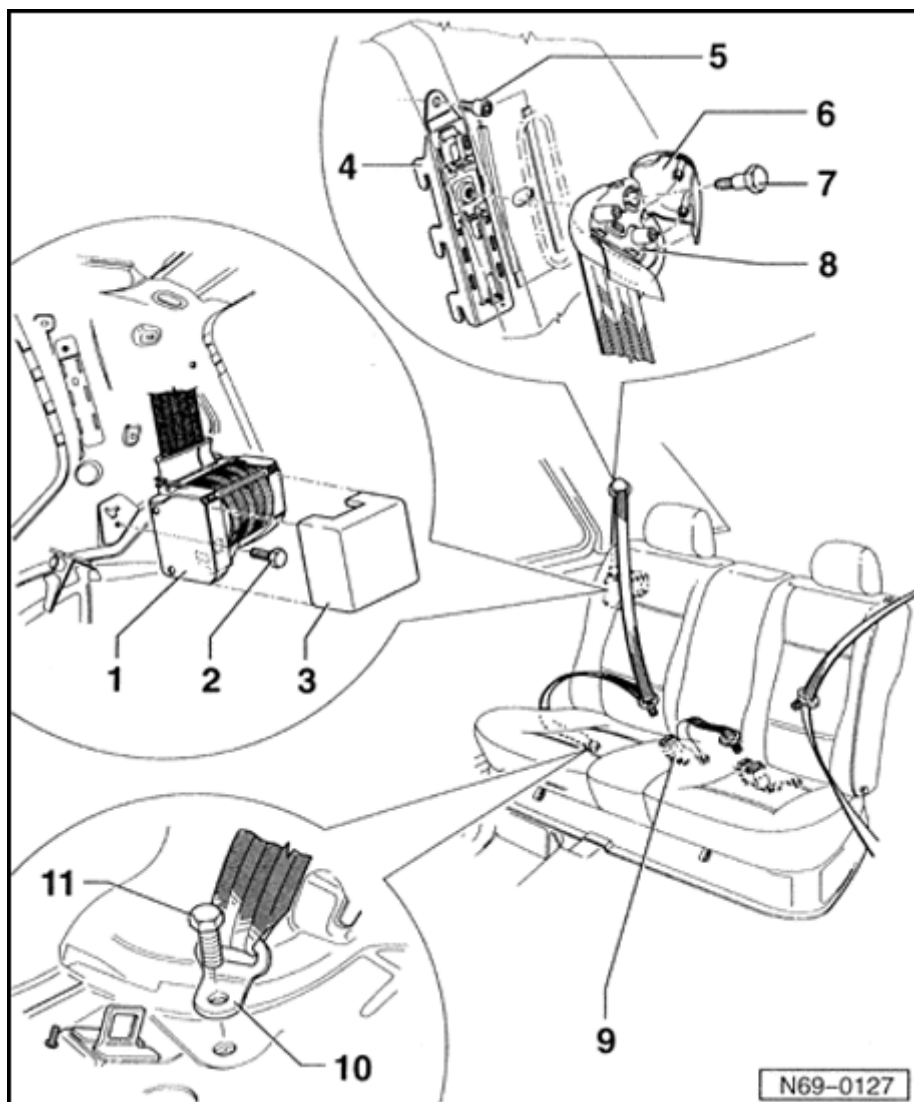
- Remove screw - 5 - (40 Nm) and remove belt relay - 3 - off belt height adjuster - 1 -

Installing

- Installation is reverse of removal.
- Connect vehicle battery

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

Rear outer seatbelts, assembly overview



1. Automatic belt retractor

2. Hex bolt

⌋ 40 Nm

3. Noise insulator

⌋ Connected to automatic belt retractor

4. Seatbelt height adjuster

⌋ To remove height adjustment mechanism, upper C-pillar trim must be removed first

5. Cylinder bolt

⌋ 23 Nm

6. Cover cap for belt relay**7. Hex bolt**

i 40 Nm

8. Belt relay**9. Belt latch****10. Lower belt mount****11. Hex bolt**

i 40 Nm

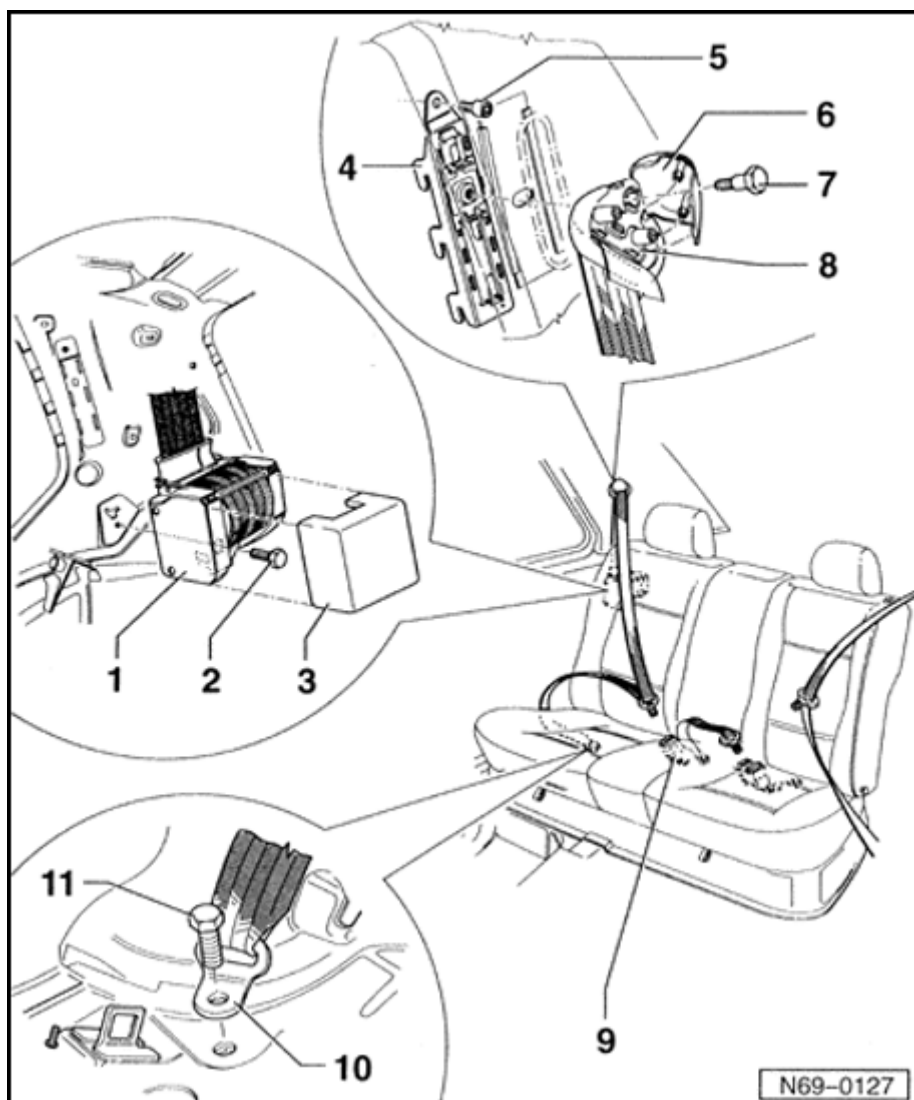
Rear outer seatbelts, removing and installing

Note:

n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.

Removing

- Pull seat cushions upward and fold m toward front.
- Release seat cushion backrest and fold it toward front.
- Remove support, luggage compartment cover ⇒ [70-4, Luggage compartment cover support, removing and installing \(Golf\)](#) .
- Remove luggage compartment trim in area of automatic belt retractors ⇒ [70-4, Right luggage compartment side trim, removing and installing \(Golf\)](#) .
- Remove bolt - **11** - (40 Nm) and remove lower belt end fitting - **10** - .
- Remove noise insulator - **3** - from automatic belt retractor - **1** - .
- Remove screw - **2** - (40 Nm) and remove automatic belt retractor - **1** - from chassis.
- Clip on cover cap - **6** - for belt relay - **8** - .

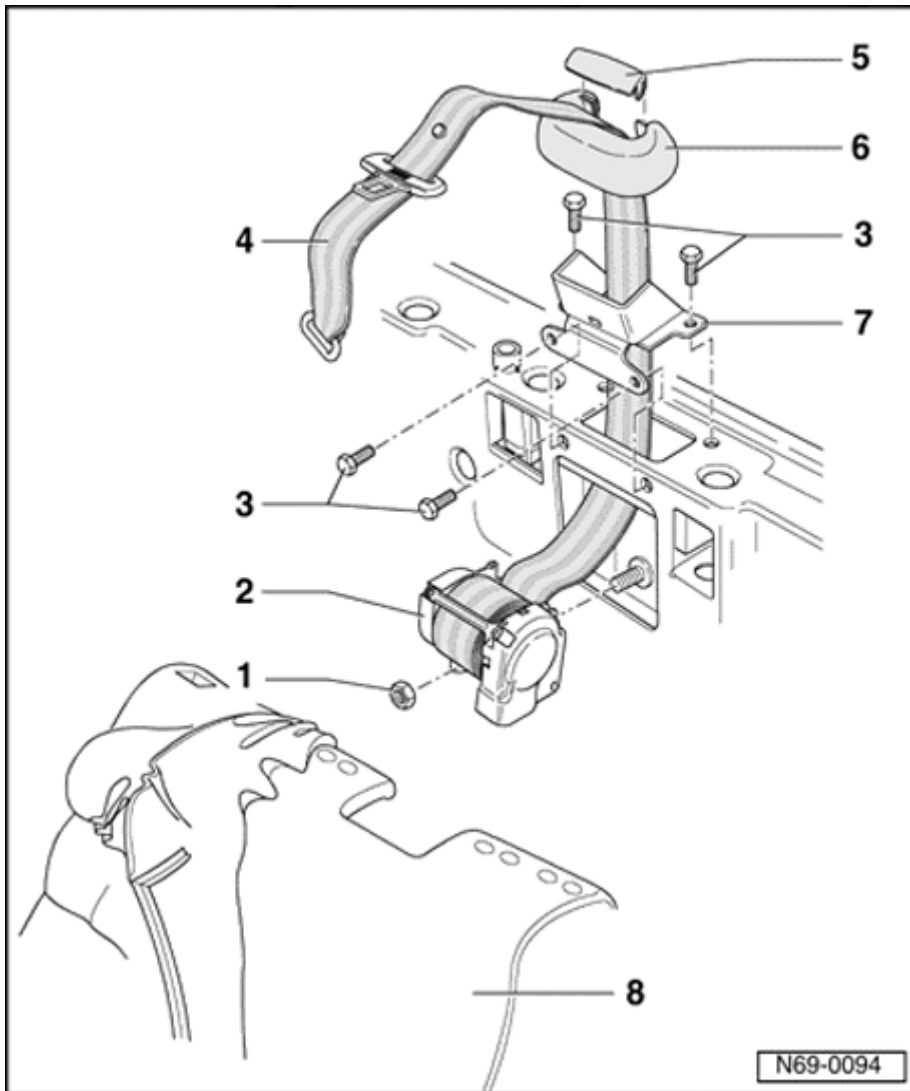


- Remove screw - 7 - (40 Nm) and remove belt relay - 8 - off belt height adjuster - 4 -

Installing

- Installation is reverse of removal.

Rear center seatbelt, assembly overview



1. Hex nut

• 40 Nm

2. Automatic belt retractor

• Removing ⇒ [69-1, Rear center seatbelt, removing and installing](#)

3. Bolts

• Qty. 4, 23 Nm

4. Belt

5. Concealment cap

6. Seatbelt guide

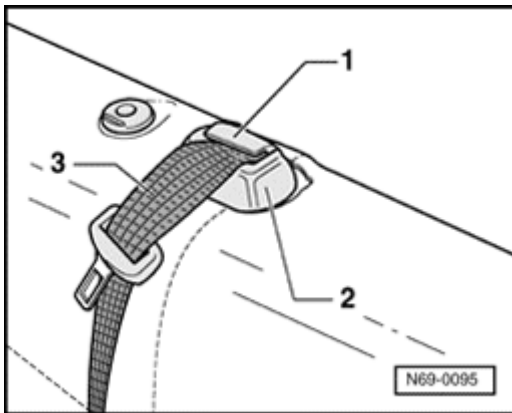
7. Belt mounting

8. Cushion

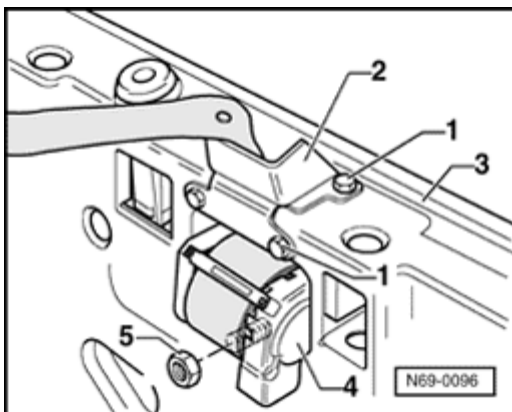
Rear center seatbelt, removing and installing

Removing

- Remove seat cushion backrest ⇒ [72-2, Backrest, removing and installing](#) .
- Remove headrest guides ⇒ [72-1, Headrest guides, removing and installing](#) .



- Remove cover cap - 1 - and seatbelt guide - 2 - .
- Remove belt webbing - 3 - from lower fitting.
- Remove cover and cushion, seat cushion backrest ⇒ [74-3, Cover and cushion for backrest, removing and installing](#) .



- Remove bolts - 1 - (qty. 4, 23 Nm) and remove belt mounting - 2 - from backrest frame - 3 - .
- Remove hex nut - 5 - (40 Nm) and unhook automatic belt retractor - 4 - from backrest frame - 3 - .

- Thread seatbelt with seatbelt strap downward out of backrest frame - **3** - .

Note:

- n *To unreel seatbelt, automatic belt retractor must be held in installation position.*

Installing

- Installation is reverse of removal.

LATCH System "Lower Anchors and TERS for Children", installing and retrofitting

LATCH, definition

LATCH system for "Lower Anchors and TERS for Children" consists of combination of rear upper tERS and rear lower anchors used to secure a child restraint.

Vehicles with production date 09.00 (09/00) and later (see certification label on driver side B-pillar - **arrow** -) are provided with guidance fixtures and must be checked for installation during Pre-Delivery Inspection (PDI).



Refer to LATCH system description and usage instructions.
⇒ Owners Manual.

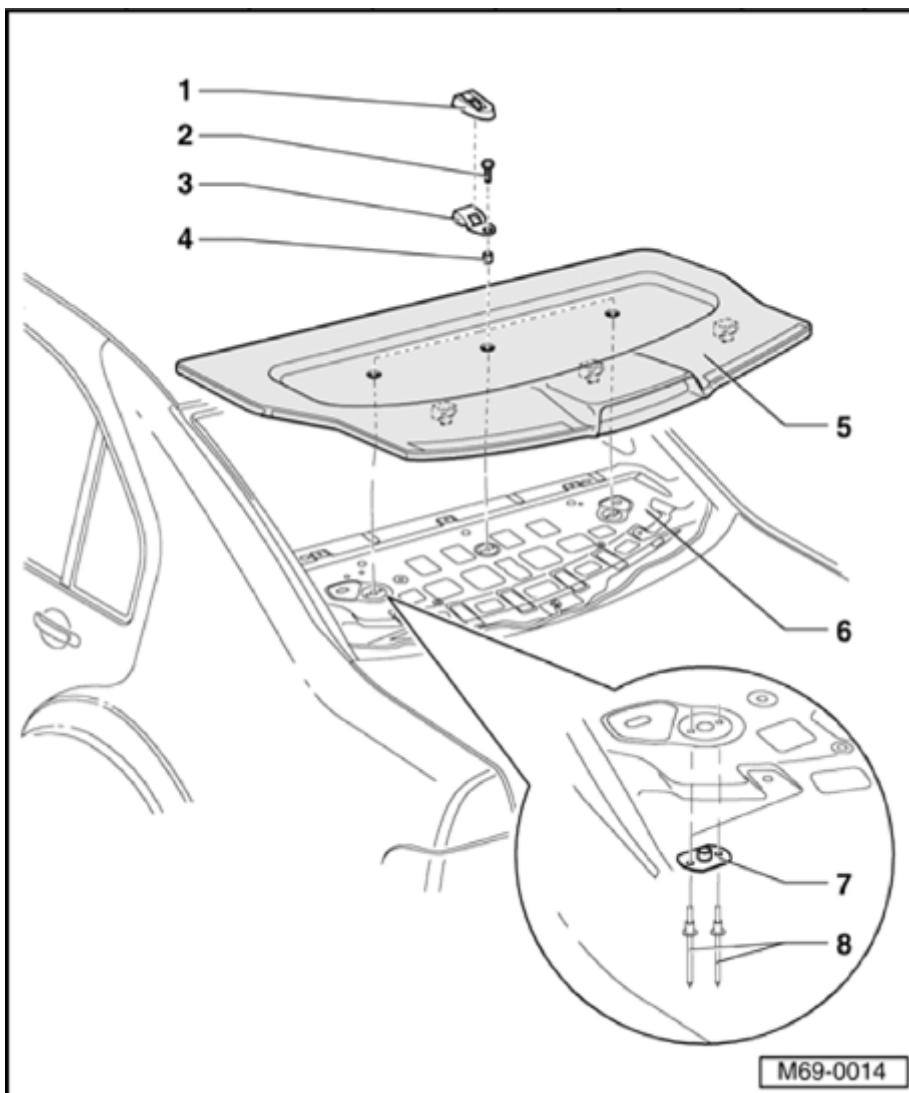
Vehicles manufactured as of January 2001 are equipped with buttons (at arrows) to identify rear lower anchor points.

Note:

- n *LATCH Guidance Fixtures announced in Technical Bulletins Group 00 Number 00-06 and 00-07) are no longer required or supplied on vehicles equipped with buttons.*

Rear top ter (Jetta)

Installation:

**1. Cap**

n Qty. 1

2. Hex bolt

n Qty. 1

n 23 Nm.

3. Bracket

n Qty. 1

4. Spacer

- n Qty. 1

5. Rear shelf

- n Removing and installing
- n Holes for anchorage points are pre-drilled (3 locations) and covered by rear shelf.
- n Locate predrilled holes and cut material off in circular shape to allow installation of anchorage components.

6. Rear shelf sheet metal

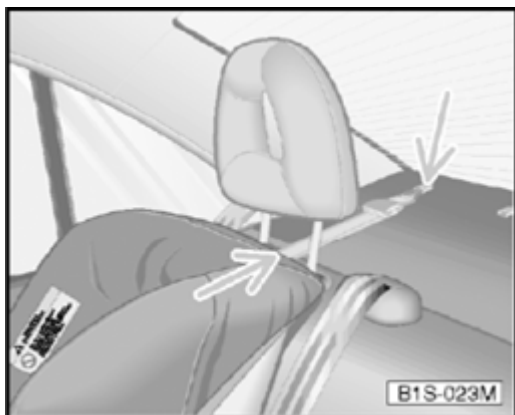
- n With pre-drilled holes for anchorage points.

7. Washer nut

- n Qty. 1
- n Install from below.

8. Rivet

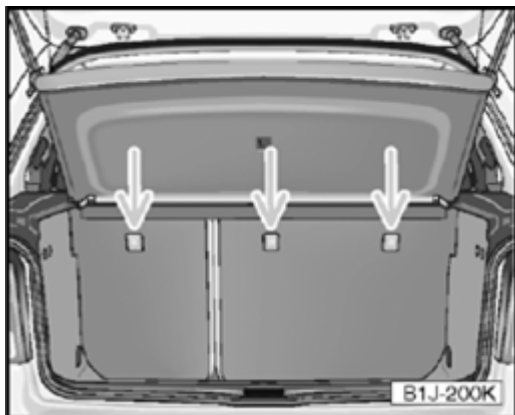
- n Two for washer nut - 7 - .
- n Install from below.



A

Illustration shows rear top ter strap attached to anchor in a sedan model.

Rear top ter (Jetta Wagon)



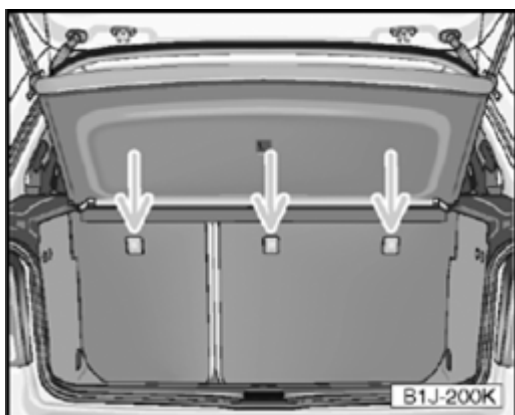
A

Illustration shows approximate locations for rear top ter anchorage points for Jetta Wagon.

Note:

- n *Inside anchors are not recommended for attaching rear lower anchors of a LATCH seat in middle position. three-point lap/shoulder belt should be used.*

Rear top ter (Golf)



A

Illustration shows approximate locations for rear top ter anchorage points for Golf.

Note:

- n *For MY 1999 vehicles only, rear top ters are not installed in seatback. Vehicles for this model year may require a seatback change for rear top ter installation.*

Rear lower anchors (Golf)

Note:

- n *Inside anchors are not recommended for attaching rear lower anchors of a LATCH seat in middle position. three-point lap/shoulder belt should be used.*

Front belt tensioning unit, deploying (disposal)

Caution!

- n ***It is dangerous to scrap an unignited gas generator.***
- n ***Belt tensioner unit gas generator must be made unusable before scrapping. This is important because gas generator is a pyrotechnic device that can cause injury if activated improperly (for instance when using a cutting torch).***

- Remove seat belt with belt tensioning unit NO PAGE

Use Deployment Fixture J-44210 and refer to Airbag Pyrotechnic Deployment Device Instruction Booklet for proper deployment procedure.

Seatbelts, inspecting

Caution!

seatbelt system is to be systematically checked after every accident! If damage has been found according to check points, customer is to be notified of necessity of a seatbelt replacement.

Check points

- n Check belt webbing
- n Check automatic retraction (locking effect)
- n Visual check of belt latch
- n Function check of belt latch
- n Checking guide stops and seatbelt lock tongue
- n Check anchoring components and anchoring points
- n Checking lap belt automatic retractor.

Note:

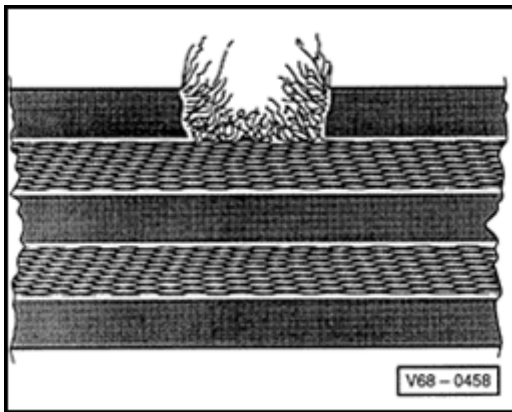
- n *Make a note if customer refuses to allow replacement of damaged seatbelt.*

Belt webbing, checking

- Check belt webbing for soiling, wash with mild soap solution if necessary. ⇒ Also refer to Owners Manual.

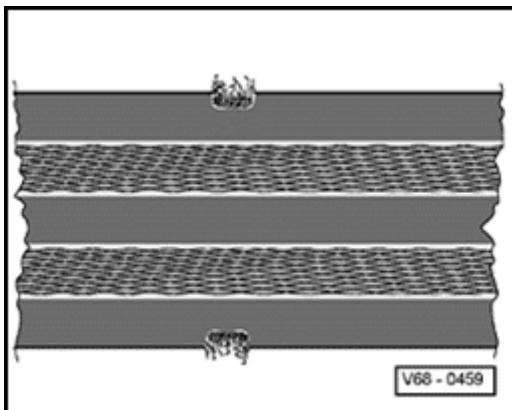
- n If one kind of damage (belt webbing cut, torn or chafed) or (webbing loops on belt edge torn) shown in following is detected on a vehicle which has been in an accident, replace seatbelt complete with belt lock.
- n If one kind of damage described in following is detected on a vehicle which has not been in an accident, only damaged seatbelt needs to be replaced.

Possible damage



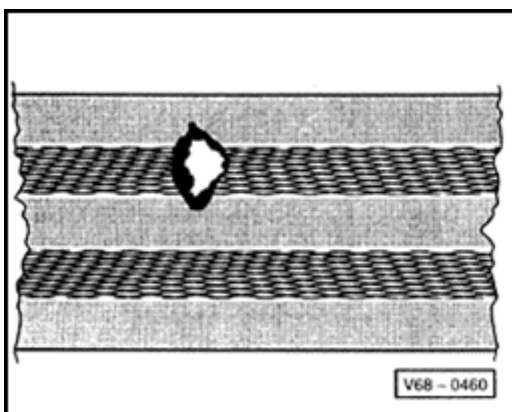
A

Belt webbing cut, torn or chafed



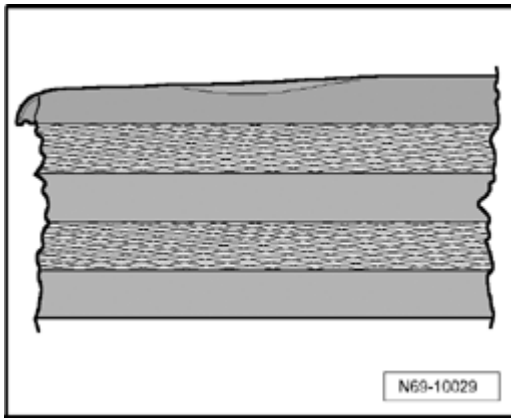
A

Webbing loops on belt edge torn.



A

Burned spots from cigarettes or similar.



One side of belt edge deformed or area of belt edge is wavy

Check automatic retraction (locking effect)

Automatic belt retractor has two locking functions.

- n first locking function is triggered by quick unrolling of belt from automatic belt retractor (belt extraction acceleration).

Test

- Pull belt out of automatic belt retractor with firm jerk.
 - n No locking effect - replace seatbelt complete with belt latch.
 - n If there are malfunctions when belt is extracted or retracted, next check where position of automatic retractor has changed.
 - n Second locking function is initiated by change in vehicle movement sequence (vehicle-dependent locking function).

Checking

- Fasten seatbelt.
- Accelerate vehicle to 12 mph (20 km/h) and perform full braking using foot brake.
 - n Replace seat belt complete with belt latch if seat belt is not locked by locking mechanism during braking procedure.

Caution!

For safety reasons, road test should be performed in

traffic-free area to ensure that or motorists/pedestrians etc. are not endangered.

Visual check of belt latch

- Inspect belt latch for cracks and fracturing.
 - n If damaged, replace seatbelt complete with belt latch.

Function check of belt latch

Check belt latch:

- Insert belt tongue into belt latch until it engages audibly. Check when lock mechanism is engaged by pulling forcefully on belt webbing.
 - n Replace seat belt complete with belt latch if belt tongue fails even only once to engage properly in belt latch during at least 5 tests.

Check release:

- Release seatbelt by pressing button on belt lock with finger.
 - n With seatbelt relaxed, lock tongue must spring out of belt lock without assistance.
 - n Test at least 5 times. Replace seatbelt completely with belt lock if lock tongue fails to spring out even once.

Caution!

Under no circumstances may lubricant be used to eliminate noise or stiffness at belt latch buttons.

Checking guide stops and seatbelt lock tongue

Plastic coated guide stops face load (seatbelt on during accident) of belt system parallel to small grooves. (Chafing created by significant usage, in contrast, is recognizable in relation to smooth, stripe-free abrasion)

- Check plastic for deformation, rupture and tearing.
 - n For groove build-up and/or damage, replace seatbelt completely with lock.

Check anchoring components and anchoring points

- n Lock strap deformed (stretched)
 - n Height adjuster not functioning
 - n Anchoring points (seat, pillar, vehicle floor) warped or threading damaged
-
- n If damage is found at components, replace seatbelt completely with lock.
 - n Replace anchoring points.

Note:

- n *For damaging not resulting from accident, e.g. general wear, replace only damaged component.*

Inspecting child seat anchors after accident (ISOFIX)

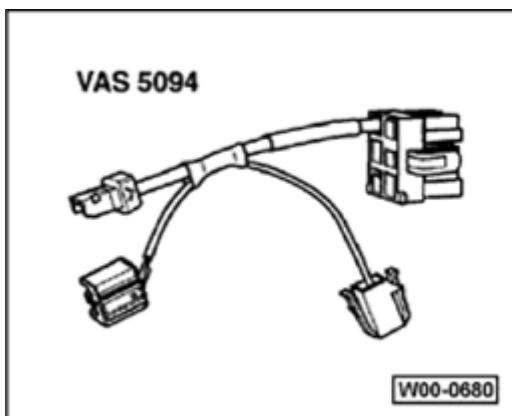
Check points

- n Child seat anchors must be checked for damage or deformations after an accident.
- n Child seat anchors welded into chassis must not be repair or adjusted.
- n Child seat anchors bolted to chassis must be replaced if damaged or deformed.

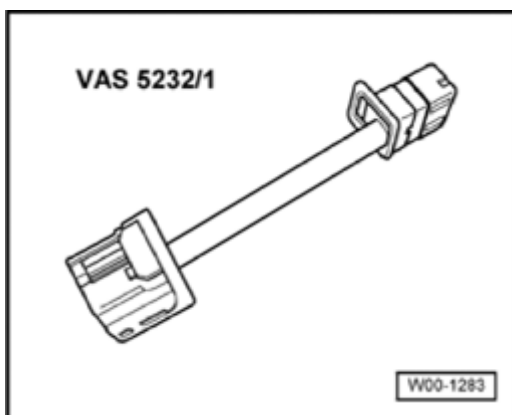
Airbag

Tools

Special tools, testers and auxiliary items required



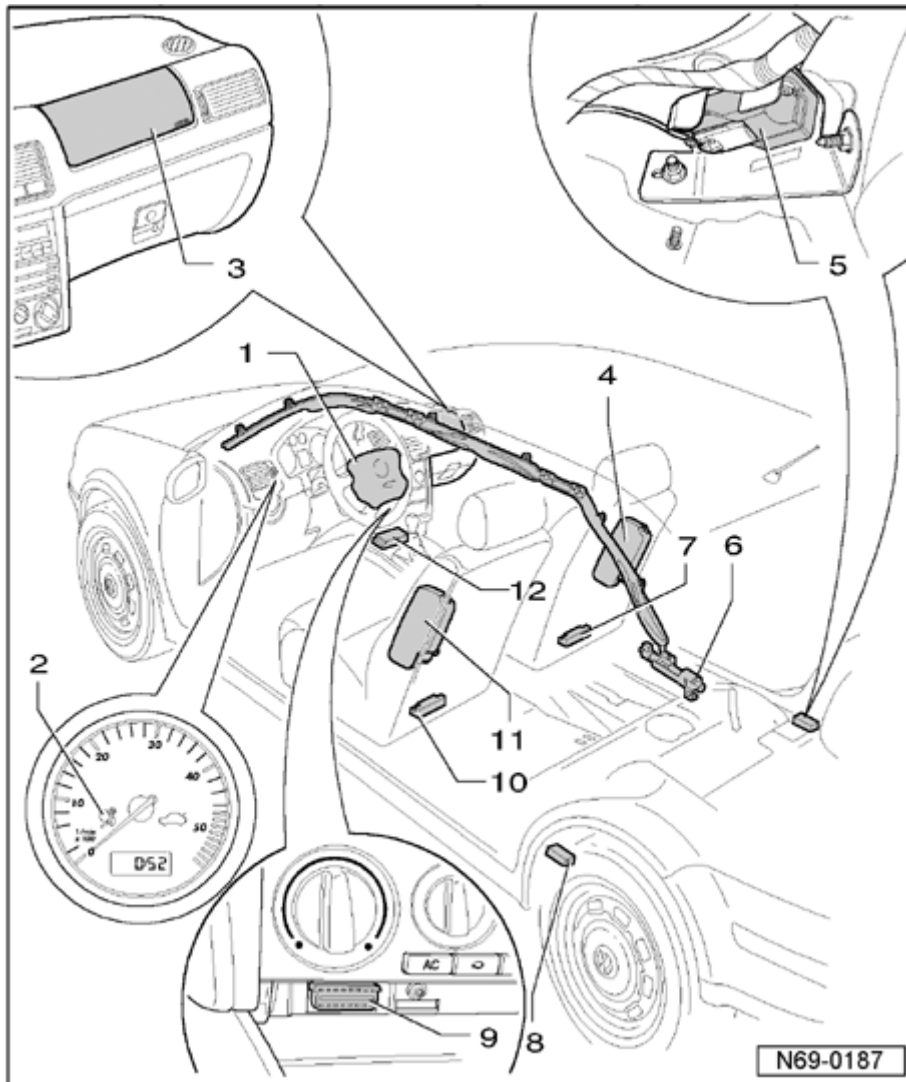
n Airbag adapter VAS 5094



n Airbag adapter VAS 5232/1



Airbag system component locations (Jetta)



1. Airbag unit - driver side (with Airbag igniter, driver side -N95-)

- i Removing, three-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Three-spoke steering wheel\)](#)
- i Removing, four-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Four-spoke steering wheel\)](#)

2. Airbag Malfunction Indicator Lamp (MIL) -K75-

3. Passenger-side airbag unit (with Airbag igniter 1, Passengers side -N131-)

- i Removing, instrument panel with airbag seam ⇒ [69-4, Front Passengers airbag unit \(Instrument panel with airbag seam\), removing and installing](#)
- i Removing, instrument panel without airbag seam ⇒ [69-4, Front Passengers airbag unit \(Instrument panel without airbag seam\), assembly overview](#)
- i Adapting components (locking and activating) ⇒ [69-4, Components, adapting](#)

4. Side airbag, front passenger side (with Side airbag igniter, Passengers side -N200-)

- i Removing ⇒ [69-4, Driver and front passenger seat side airbags, removing and installing](#)
- i Adapting components (locking and activating) ⇒ [69-4, Components, adapting](#)

5. Rear side airbag crash sensor, Passengers side

- i Removing ⇒ [69-5, Crash sensor for driver side/Passengers side rear side curtain protection, removing and installing](#)

6. Side curtain protection, driver and passenger sides

- i Removing, Jetta ⇒ [69-4, Side curtain protection, driver and passenger sides, removing and installing \(Jetta\)](#)
- i Removing, Jetta wagon ⇒ [69-4, Side curtain protection, driver and passenger sides, removing and installing \(Golf wagon/Jetta wagon\)](#)

7. Side airbag crash sensor, Passengers side -G180-

- i Removing ⇒ [69-5, Crash sensor for driver side/passenger side curtain protection, removing and installing](#)

8. Side airbag crash sensor, driver side -G179-

- i Removing ⇒ [69-5, Crash sensor for driver side/Passengers side rear side curtain protection, removing and installing](#)

9. Data Link Connector (DLC)**10. Rear side airbag crash sensor, driver side**

- i Removing ⇒ [69-5, Crash sensor for driver side/passenger side curtain protection, removing and installing](#)

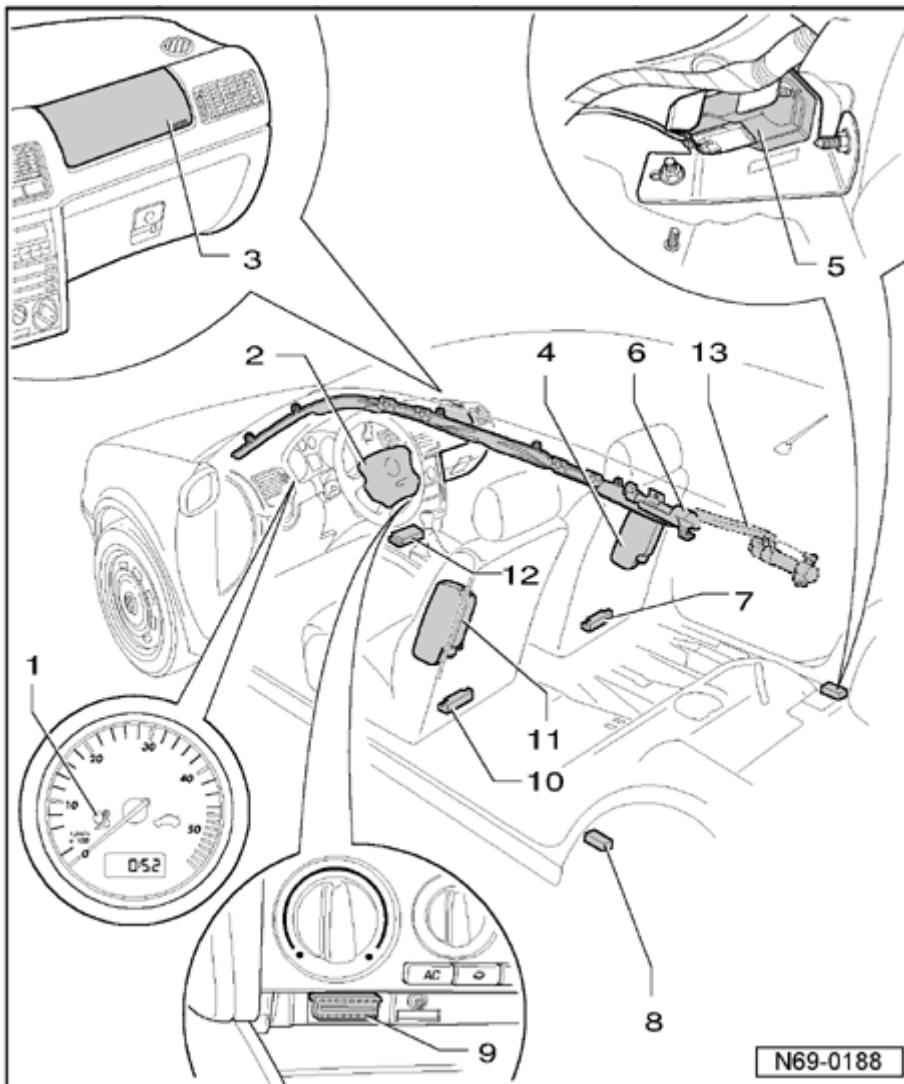
11. Side airbag, front driver side (with Side airbag igniter, driver side - N199-)

- i Removing ⇒ [69-4, Driver and front passenger seat side airbags, removing and installing](#)
- i Adapting components (locking and activating) ⇒ [69-4, Components, adapting](#)

12. Airbag Control Module -J234-

- i Removing ⇒ [69-4, Airbag control module -J234-, removing and installing](#)
- i Adapting (coding) components ⇒ [69-4, Components, adapting](#)

Airbag system component locations (Golf)



1. **Airbag Malfunction Indicator Lamp (MIL) -K75-**
2. **Airbag unit driver side (with Airbag igniter, driver side -N95-)**
 - ı Removing, three-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Three-spoke steering wheel\)](#)
 - ı Removing, four-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Four-spoke steering wheel\)](#)

3. Airbag unit Passengers side (with Airbag igniter 1, Passengers side -N131-)

- i Removing, instrument panel with airbag seam ⇒ [69-4, Front Passengers airbag unit \(Instrument panel with airbag seam\), removing and installing](#)
- i Removing, instrument panel without airbag seam ⇒ [69-4, Front Passengers airbag unit \(Instrument panel without airbag seam\), assembly overview](#)
- i Adapting components (locking and activating) ⇒ [69-4, Components, adapting](#)

4. Side airbag, front passenger side (with Side airbag igniter, Passengers side -N200-)

- i Removing ⇒ [69-4, Driver and front passenger seat side airbags, removing and installing](#)
- i Adapting components (locking and activating) ⇒ [69-4, Components, adapting](#)

5. Crash sensor for rear side-airbag, Passengers side

- i ⇒ [69-5, Crash sensor for driver side/Passengers side rear side curtain protection, removing and installing](#)

6. Side curtain protection, driver and passenger sides

- i Removing, Golf ⇒ [69-4, Side curtain protection, driver and passenger sides, removing and installing \(Golf\)](#)
- i Removing, Golf wagon ⇒ [69-4, Side curtain protection,](#)

[driver and passenger sides, removing and installing \(Golf wagon/Jetta wagon\)](#)

7. Side airbag crash sensor, Passengers side -G180-

- i Removing ⇒ [69-5, Crash sensor for driver side/passenger side curtain protection, removing and installing](#)

8. Rear side airbag crash sensor, passenger side

- i Removing ⇒ [69-5, Crash sensor for driver side/Passengers side rear side curtain protection, removing and installing](#)

9. Data Link Connector (DLC)

10. Side airbag crash sensor, driver side -G179-

- i Removing ⇒ [69-5, Crash sensor for driver side/passenger side curtain protection, removing and installing](#)

11. Side airbag, front driver side (with Side airbag igniter, driver side - N199-)

- i Removing ⇒ [69-4, Driver and front passenger seat side airbags, removing and installing](#)
- i Adapting components (locking and activating) ⇒ [69-4, Components, adapting](#)

12. Airbag Control Module -J234-

- i Removing ⇒ [69-4, Airbag control module -J234-, removing and installing](#)

- i Adapting (coding) components
⇒ [69-4, Components, adapting](#)

13. Side curtain protection, driver and passenger sides (Golf/Jetta wagon)

- i Removing ⇒ [69-4, Side curtain protection, driver and passenger sides, removing and installing \(Golf wagon/Jetta wagon\)](#)

Safety precautions when working on airbags

- n Testing, removing, installing and servicing may ONLY be performed by qualified personnel.
- n When connecting airbag system to battery positive voltage (B+), there must be no person inside vehicle.
- n Battery Ground (GND) strap must be disconnected before performing any work on airbag system. No waiting time is required after disconnecting battery. When connecting airbag system to a voltage source, no one should be in vehicle interior.
- n Before handling (touching) airbag unit, technician must be electrostatically discharged. This is accomplished by touching grounded metal like, for example, water pipes, heating pipes or metal carriers.
- n Always install airbag units in vehicle, as soon as they are removed from packaging.
- n If installation work is interrupted, immediately return airbag unit to its original packaging.
- n NEVER leave an airbag unit unattended.
- n In removed condition, ALWAYS lay airbag down with impact absorbing pad facing up.
- n DO NOT install airbag units that have fallen onto a hard surface, or which have signs of damage.
- n Airbag units that have not deployed must be marked and returned to manufacturer for disposal (Use

- special airbag transporting container).
- n Belt tensioner storage and transportation are covered under Explosive Substance Act.
- n Only use original equipment seat covers that are approved for use with side airbags (identified by AIRBAG label).
- n use of commercially available extra seat covers is not permitted (extra seat covers must be approved for use with airbags).
- n Always replace any airbag system component that has been mechanically damaged (example: dented or cracked).
- n When installing backrest cover, cover seam must run straight in area of side-airbag.
- n All cover clips must be replaced.
- n Only use original equipment cover clips.
- n If cover is damaged (rips or burn holes, etc.) in area of side-airbag, always replace cover for safety reasons.

Additional safety precautions for side curtain protection

- n Always replace damaged pillar trim, never repair.
- n Side curtain protection must not be kinked or twisted.
- n After servicing body in area of side curtain protection, check body for welding beads, deformations and chafe marks (compare with opposite side of vehicle if necessary).
- n If ignited side curtain protection is replaced, molded headliner, door seals with piping, head-level airbag guides, bracket for grab handle and A-, B-, C- and, if installed, D-pillar trim must be replaced in general. If damaged, interior (rear) reading lights, roof grab handle and roof end strip must also be replaced.

Replacing airbag unit after an accident

Accident where airbag deployed

Always replace following:

- n All deployed airbag units with control modules and sensors
- n Support for front passenger module
- n Return spring with slip ring
- n Seat cover and cover clips, if side airbag is deployed.
- n All airbag wiring harnesses for side airbag in seat, if unit is deployed.
- n All seatbelts with belt tensioners that have been triggered

As necessary (visual inspection):

- n all damaged components

In case of side curtain airbag deployment exchange following additional components:

- n Pillar Trims (A, B and C Pillar Trims).
- n Door seal.
- n Guide piece for head airbag.
- n Bracket for grab handle
- n Headliner.
- n Reading light rear.*
- n Grab handle.*
- n Connecting strip (for headliner).*

*) Components could be used up to 6 times.

Accident not involving activation of airbag

- n If airbag Malfunction Indicator Lamp (MIL) K75 does not indicate a DTC, airbag components do not need to be replaced.

Caution!

seat belts should be checked separately.

When replacing an airbag unit or airbag control module, affix stickers (only tear-off strips) to registration card and return registration card to relevant dealer or to Importer for registration. .

See your Parts Department for proper registration procedure.

registration card must be ordered separately.

Airbag units, deploying (disposal)

Caution!

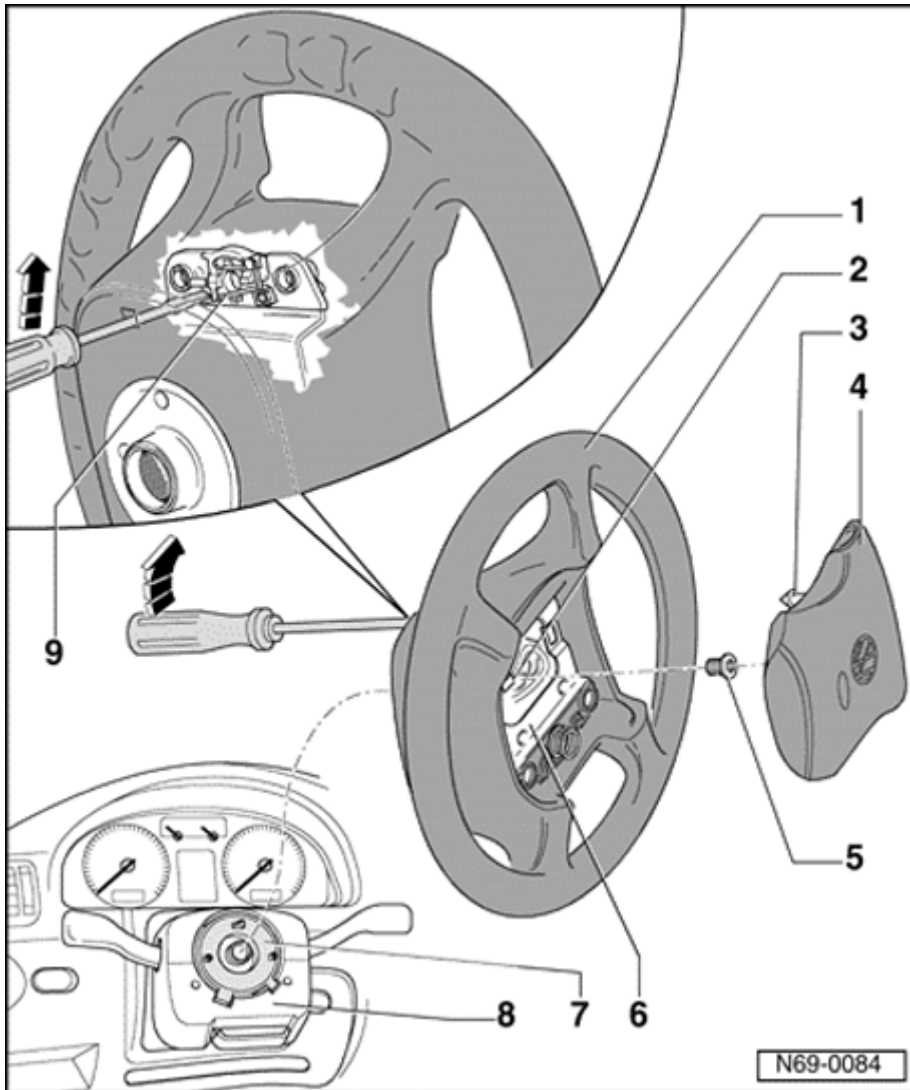
DO NOT ignite airbag units in vehicles.

According to regulations, airbag units must be rendered unusable by igniting m electrically before scrapping vehicle. This is necessary because airbag unit is a pyrotechnic device that may cause injuries if activated in an improper manner (e.g. using a cutting torch).

- Remove airbag unit ⇒ [69-4, Driver side airbag unit , removing and installing \(Four-spoke steering wheel\)](#)

Use Deployment Fixture J-44210 and refer to Airbag Pyrotechnic Deployment Device Instruction Booklet for proper deployment procedure.

Drivers side airbag unit, assembly overview (Four-spoke steering wheel)



1. Steering wheel

- ; Removing ⇒ [69-4, Steering wheel, removing and installing](#)

2. Connector

3. Catches

- ; Are disengaged from back side of steering wheel

4. Airbag unit (with Airbag igniter, driver side -N95-)

- ; Because of differing engaging mechanisms, only steering wheels and airbag units from same supplier can be installed.
- ; Removing and installing ⇒ [69-](#)

[4, Driver side airbag unit , removing and installing \(Four-spoke steering wheel\)](#)

5. Socket-head bolt

- ; 55 Nm
- ; Coated with locking compound
- ; May be used up to five times
- ; Press in a punch indentation after each installation

6. Securing plate

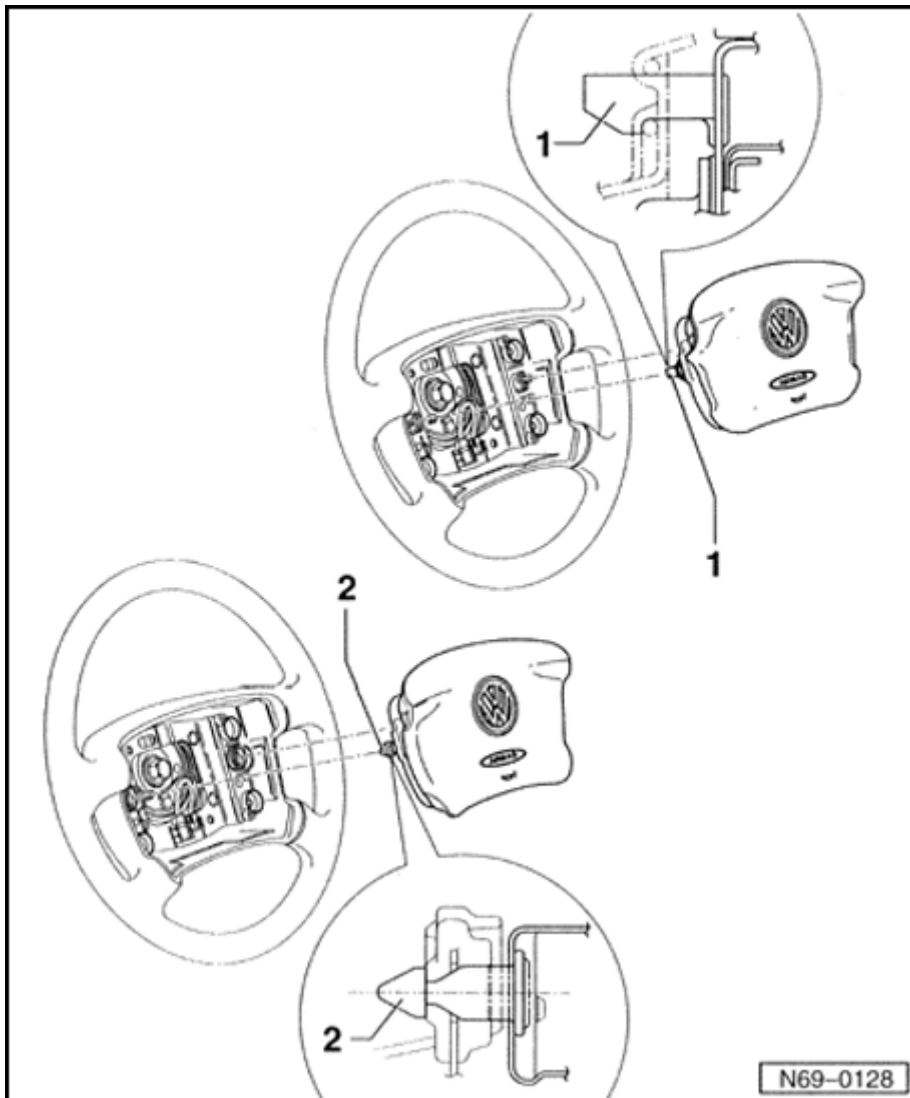
7. Coil spring for airbag/return spring with slip ring -F138-

- ; Removing ⇒ [69-4, Airbag spiral spring/return spring with slip ring -F138-, removing and installing](#)

8. Trim

9. Clip

Driver side airbag unit , removing and installing (Four-spoke steering wheel)

**Note:**

- n *There are two suppliers for four-spoke steering wheel with airbag unit. Petri secures airbag unit in steering wheel with a rectangular stud - 1 - . TRW secures airbag unit in steering wheel with a stepped pin - 2 - .*
- n *Because of differing engaging mechanisms, only steering wheels and airbag units from same supplier can be installed.*
- n *Always note component supplier when ordering replacement parts.*

Removing

- Disconnect battery Ground (GND) strap

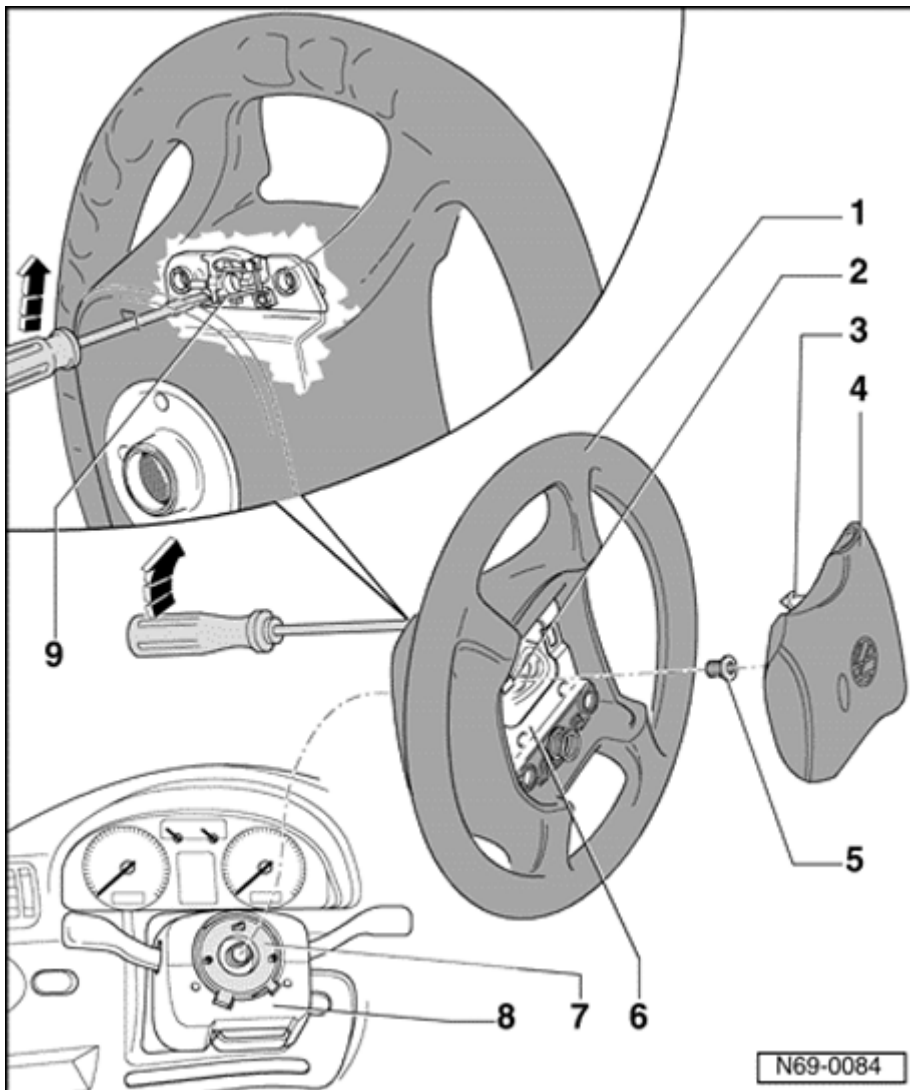
⇒ *Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery*

.

Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

- Release steering column adjustment.
- Turn steering wheel - 1 - until steering wheel spoke is in a vertical position. Pull out steering column entirely and push into lower position.
- Secure steering column adjustment.



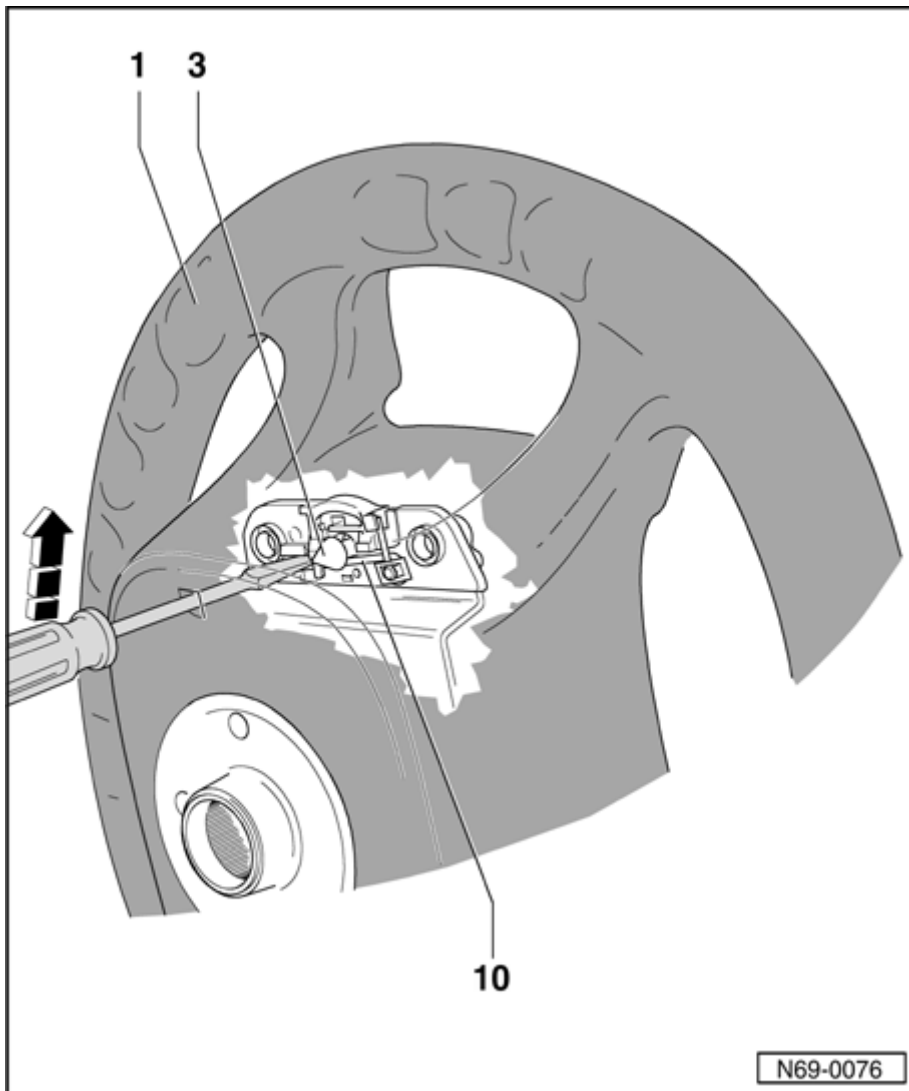
- Insert a screwdriver of approx. 175 mm

length into bore of steering wheel pan from rear (insert screwdriver approx. 45 mm).

- Press screwdriver in direction of - **arrow**
- . In this case, clamp - **10** - will be pressed back and catch - **3** - of airbag unit will reby release.
- Turn steering wheel back 180 ° and disengage second catch on opposite side.
- Turn steering wheel - **1** - to center position (wheels in straight-ahead position).

Caution!

Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.



- Disconnect harness connector from airbag unit.

Installing

- Connect harness connector for airbag module to steering wheel pan and press airbag unit into steering wheel.

Note:

- n Only steering wheels and airbag units of same manufacturer can be installed.
- n Check wher all catches for airbag unit are locked in steering wheel.

- Switch ignition on.

Caution!

Make sure no one is in vehicle.

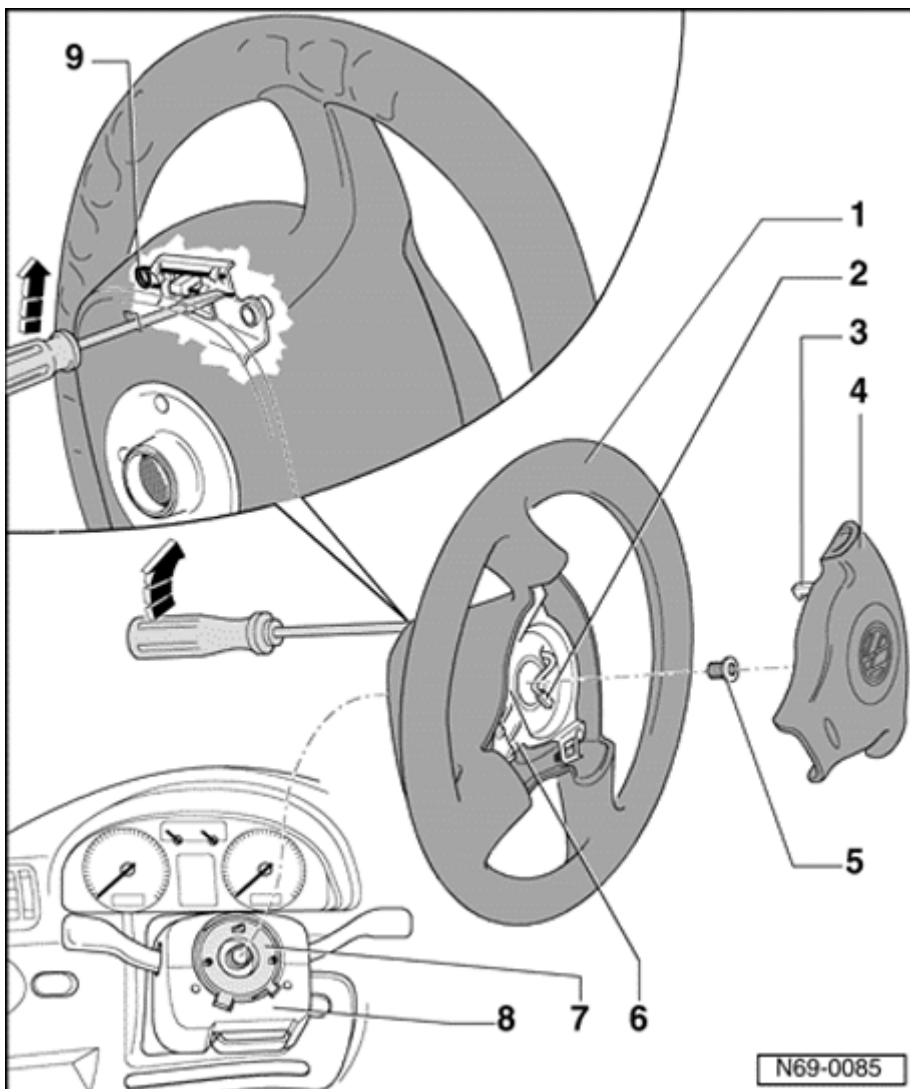
- Connect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

Note:

- n If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked ⇒ [Repair Manual, On Board Diagnostic Fuel Injection Ignition, Repair Group 01](#).

Drivers side airbag unit, assembly overview (Three-spoke steering wheel)



1. Steering wheel

- ; Removing ⇒ [69-4, Steering wheel, removing and installing](#)

2. Connector

3. Catches

- ; are disengaged from back side of steering wheel

4. Airbag unit (with Airbag igniter, driver side -N95-)

- ; Removing ⇒ [69-4, Driver side airbag unit , removing and installing \(Three-spoke steering wheel\)](#)

5. Socket-head bolt

- ; 55 Nm
- ; coated with locking compound
- ; may be used up to five times
- ; press in a punch indentation after each installation

6. Securing plate

7. Airbag spiral spring/return spring with slip ring -F138-

- ; Removing ⇒ [69-4, Airbag spiral spring/return spring with slip ring -F138-, removing and installing](#)

8. Trim

9. Clip

Driver side airbag unit , removing and installing (Three-spoke steering wheel)

Removing

- Disconnect battery Ground (GND) strap

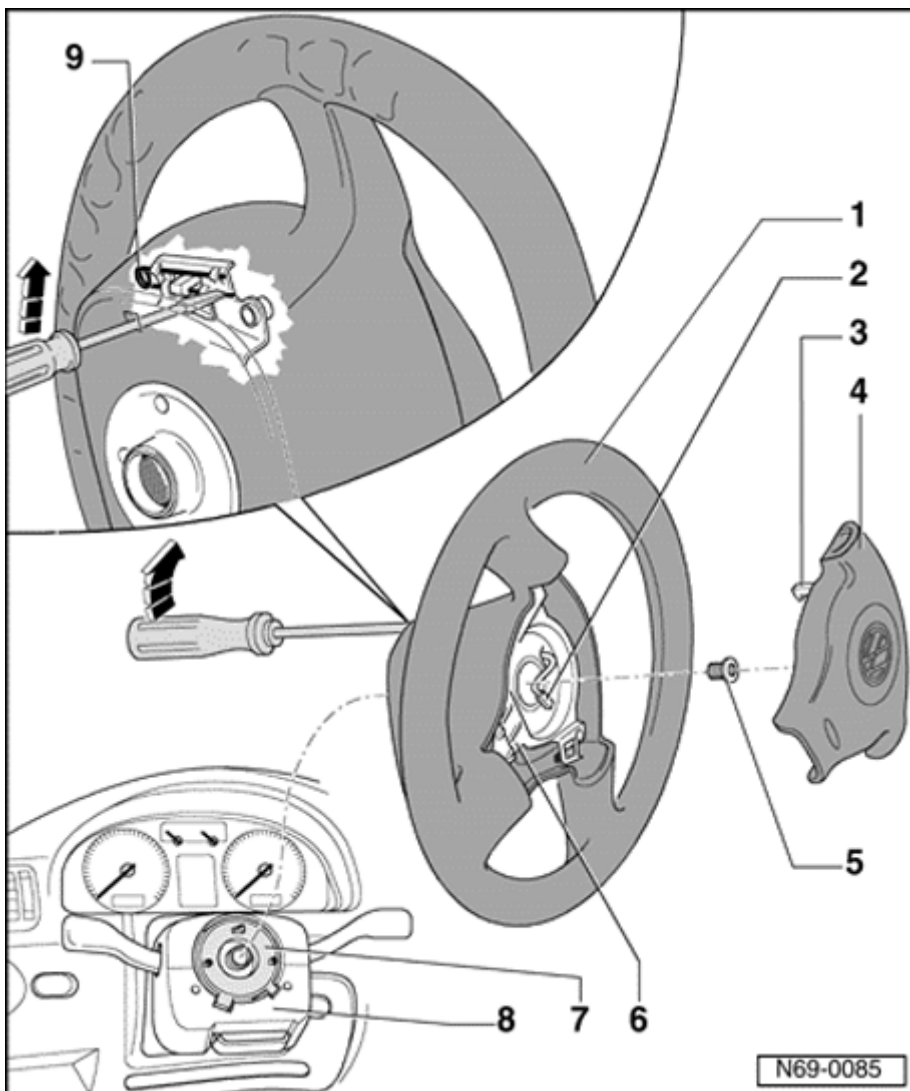
⇒ *Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery*

.

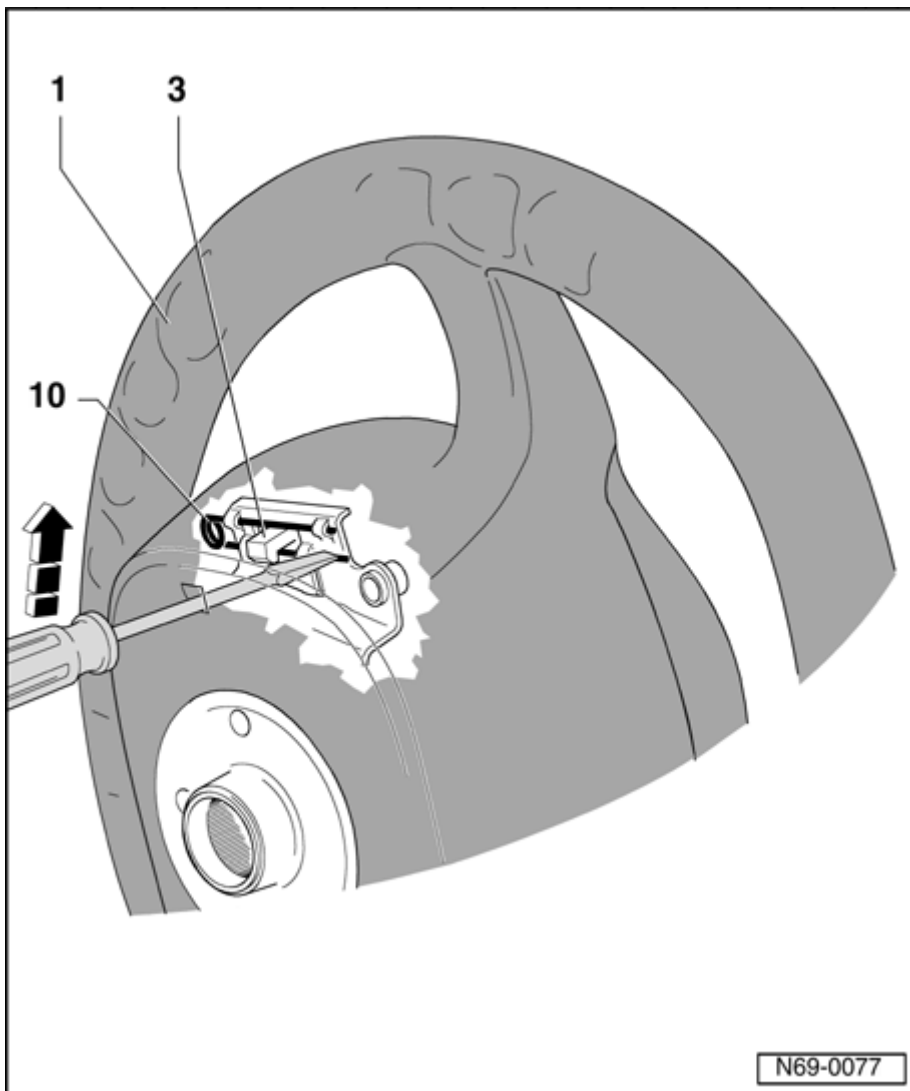
Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

- Release steering column adjustment, pull out completely and push into upper position.
- Secure steering column adjustment.
- Turn steering wheel - 1 - until steering wheel spoke is in a vertical position.



- Insert a screwdriver of approx. 175 mm length into bore of steering wheel pan from rear (insert screwdriver approx. 45 mm).
- Press screwdriver upward - **arrow** - . In this case, clamp - **10** - will be pressed back and catch - **3** - of airbag unit will reby disengage.
- Turn steering wheel back 180 ° and disengage second catch on opposite side.
- Turn steering wheel - **1** - to center position (wheels in straight-ahead position).



- Disconnect harness connector from airbag unit.

Installing

- Connect harness connector for airbag module to steering wheel pan and press airbag unit into steering wheel.

Note:

- n *Check wher all catches for airbag unit are locked in steering wheel.*

- Switch ignition on.

Caution!

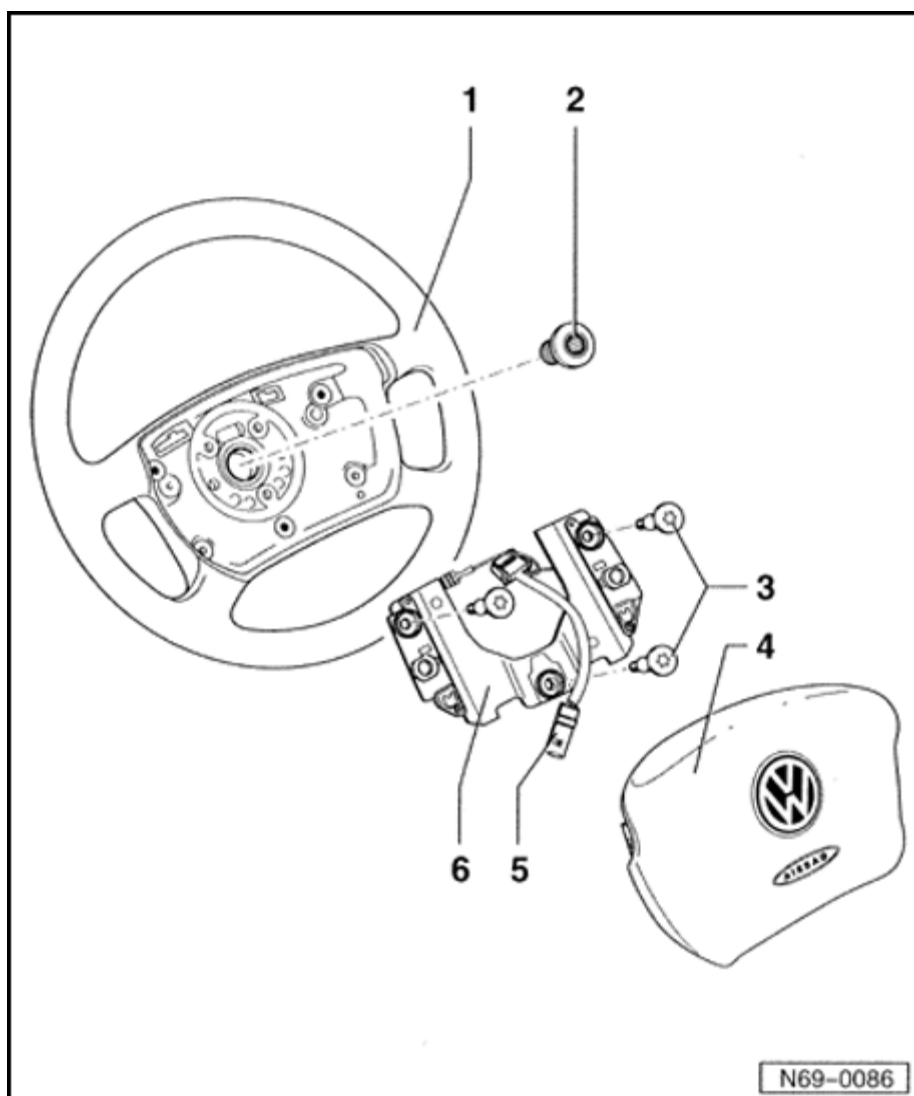
Make sure no one is in vehicle.

- Connect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

.

Steering wheel - assembly overview



1. Steering wheel

- i Removing ⇒ [69-4, Steering wheel, removing and installing](#)

2. Socket-head bolt

- i 55 Nm
- i coated with locking compound
- i may be used up to five times
- i press in a punch indentation after each installation

3. Torx bolts

- i 5 Nm

4. Airbag unit with driver side airbag igniter -N95-

- i Because of differing engaging mechanisms, only steering wheels and airbag units from same supplier can be installed.
- i Removing, three-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Three-spoke steering wheel\)](#)
- i Removing, four-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Four-spoke steering wheel\)](#)

5. Connector

6. Securing plate

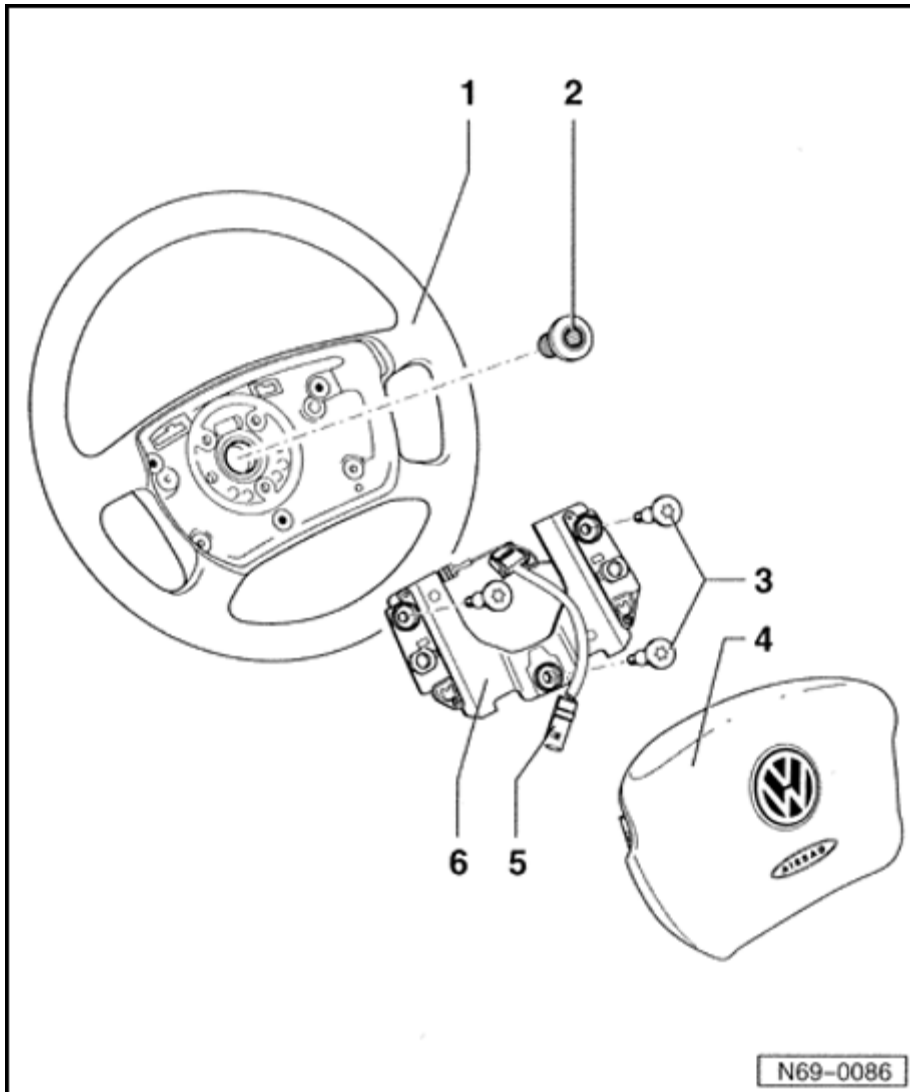
Steering wheel, removing and installing

Removing

- Remove driver side airbag unit.

- n Three-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Three-spoke steering wheel\)](#) .
- n Four-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Four-spoke steering wheel\)](#) .

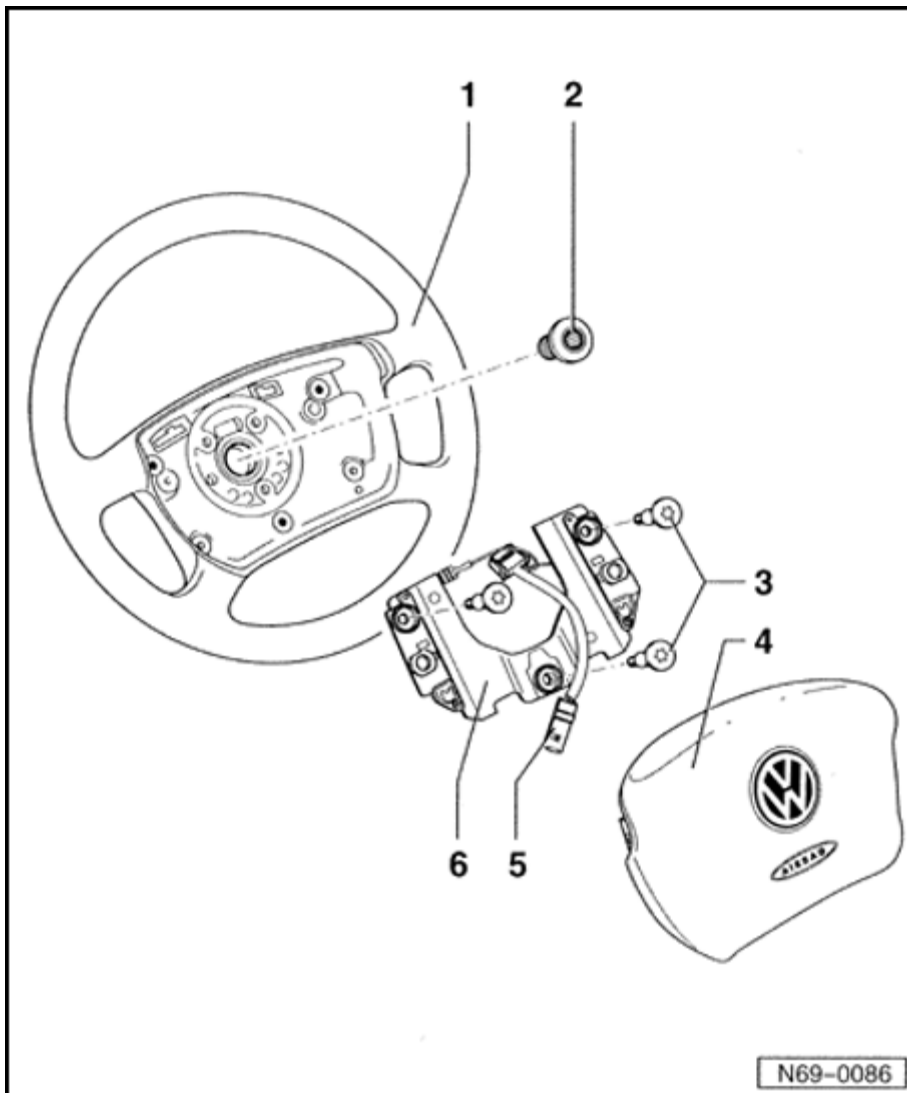
- Turn steering wheel - 1 - to center position (wheels in straight-ahead position).



- Remove bolt - 2 - and pull steering wheel off steering column.

Installing

- Set steering wheel - 1 - on steering column.
- Center markings for steering wheel and steering column must align.
- Spiral spring connecting socket and studs must be positioned into designated holes in steering wheel base.
- Secure steering wheel with bolt - 2 - , tightening torque is 55 Nm.
- Mark bolt with punch indentation after each loosening procedure.



- If five punch indentations are on bolt, it must be replaced with a new one.

Airbag spiral spring/return spring with slip ring -F138-, removing and installing

Note:

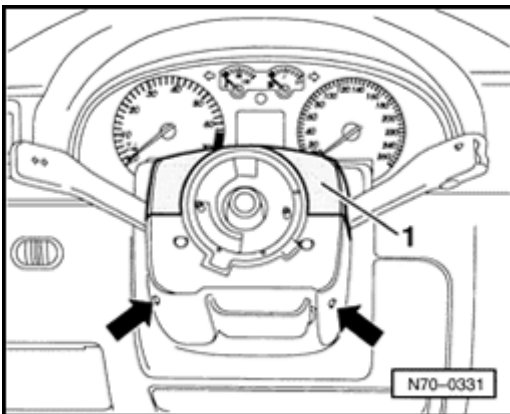
- n When removing and installing Airbag spiral spring/return spring with slip ring -F138-, make sure that Airbag spiral spring/return spring is set in center position.
- n A new return ring with slip ring is secured in centered position with a tie wrap.

Removing

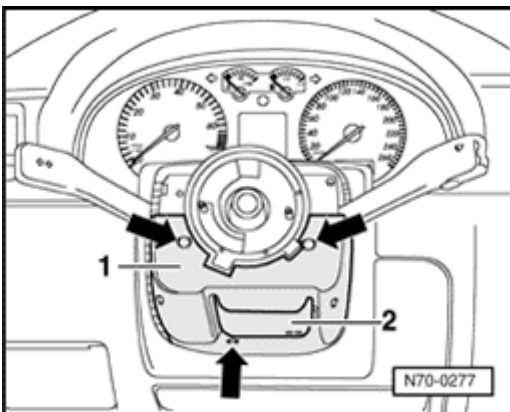
- Remove driver side airbag unit.

- n Three-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Three-spoke steering wheel\)](#) .
- n Four-spoke steering wheel ⇒ [69-4, Driver side airbag unit , removing and installing \(Four-spoke steering wheel\)](#) .

- Put wheels in straight-ahead position.
- Remove steering wheel ⇒ [69-4, Steering wheel, removing and installing](#) .



- Remove bolts (Qty. 2) - **arrows** - .
- Remove upper trim - **1** - for steering column switches.



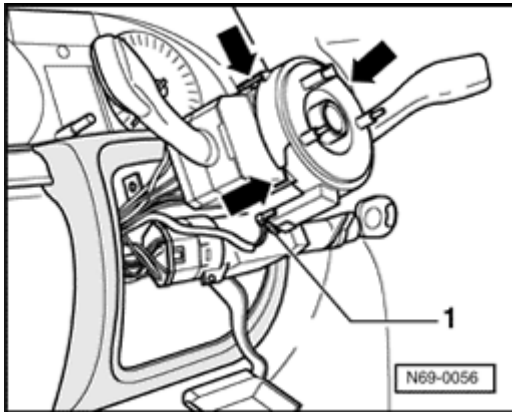
- Remove bolts (Qty. 3) - **arrows** - .
- Loosen height adjustment - **2** - for steering wheel.
- Remove lower trim for steering wheel switch - **1** - .

Vehicles with Electronic Stability Program (ESP):

In vehicles with ESP, return spring is a component of "Steering Angle Sensor -G85-"

⇒ *Repair Manual, , Repair Group 45,*

Vehicles without ESP:



- Disconnect harness connector - **1** - .
- Release catch - **arrows** - and pull return spring with slip ring from steering column switches.

Installing

- Installation is reverse of removal.

Electronic Stability Program (ESP)

Following steps are valid only for vehicles with Electronic Stability Program (ESP).

Vehicles with ESP are additionally equipped with a Steering angle sensor -G85-. sensor is installed in conjunction with coil connector and slip ring in a housing.

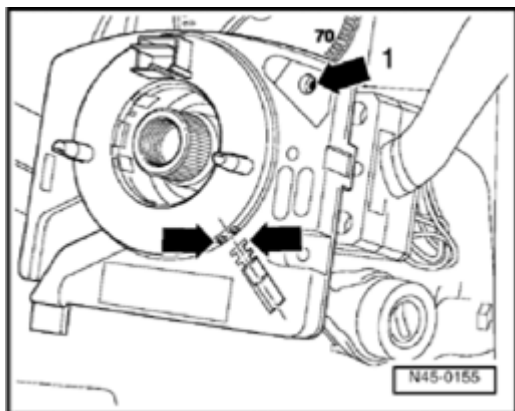
Removing

- Front wheels and steering wheel must be in straight-ahead position.

Note:

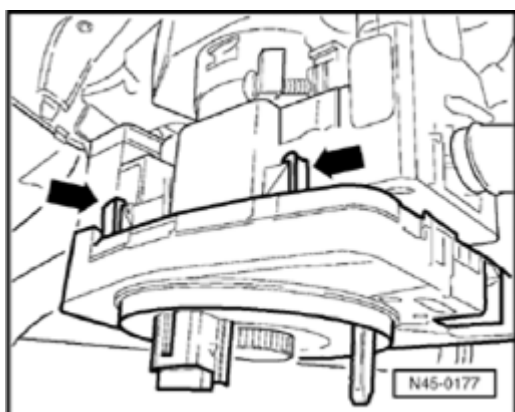
- n *Replacement slip ring is secured as a new part in center position with cable tie*

Position steering wheels in central position; A yellow spot must be visible in hole - **1** - . marking - **arrow** - must align.



A

- Disconnect steering angle sensor connection.



A

- Lift hooks - **arrows** - carefully and remove steering angle sensor.

Installing

- Install in reverse order of removal.

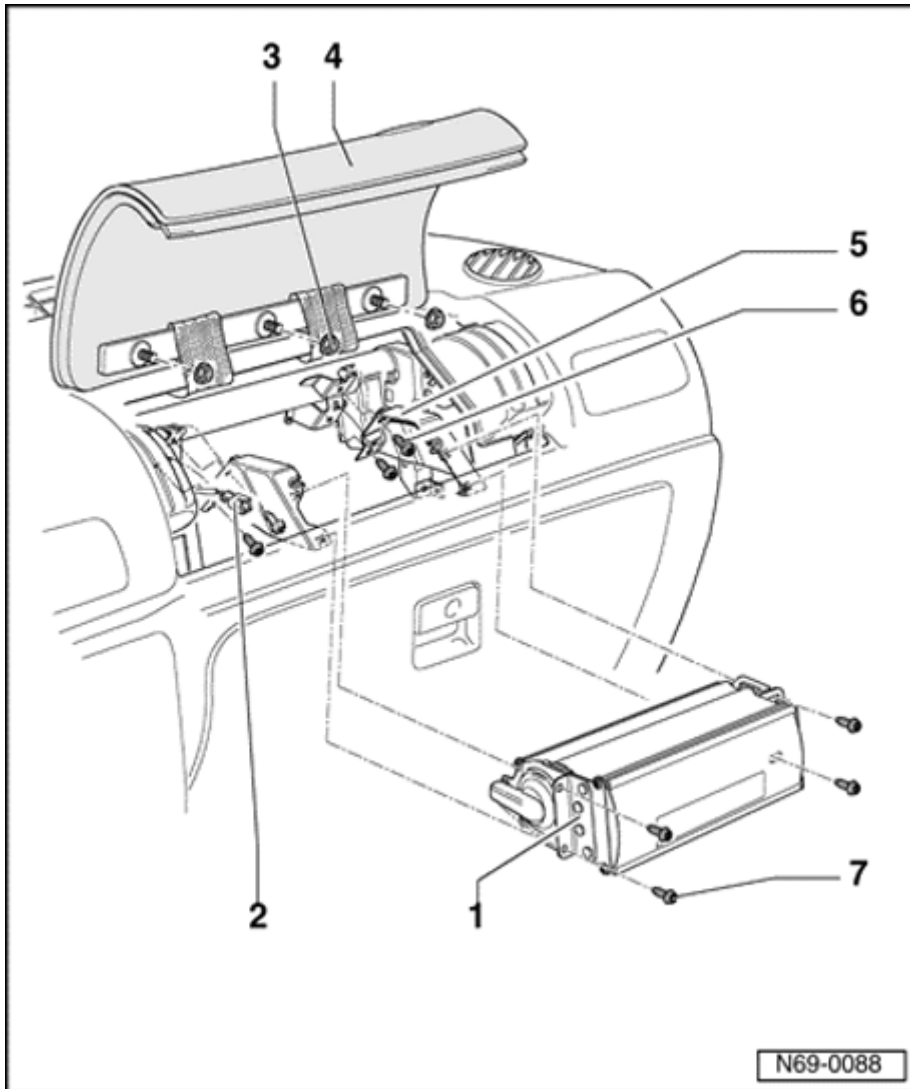
For vehicles with ESP observe following:

When installing, ensure steering angle sensor is correctly seated and is free of stress.

- Front wheels and steering wheel must be in straight ahead position.
- Remove transportation protection (cable tie) on markings before installing a new steering angle sensor.
- Install steering angle sensor, until lugs engage.
- Position steering wheels in central position; A yellow spot must be visible in hole - **1** - . marking - **arrow** - must align.
- A zero compensation must n be performed.

⇒ *Repair Manual, Brake System On Board Diagnostic (OBD), Repair Group 01, On Board Diagnostic (OBD) Performing, Basic setting, initiating*

Front Passengers airbag unit (Instrument panel with airbag seam), assembly overview



1. Passengers airbag unit with airbag igniter 1, Passengers side - N131-

- Removing ⇒ [69-4, Front Passengers airbag unit \(Instrument panel with airbag seam\), removing and installing](#)

2. Connector

3. Hex nut

i 4 Nm

4. Cover

5. Brace

i Always replace after airbag has deployed.

6. Hex bolt

i 2.5 Nm

7. Hex bolt

i 2.5 Nm

Front Passengers airbag unit (Instrument panel with airbag seam), removing and installing

Removing

- Disconnect battery Ground (GND) strap

⇒ *Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery*

.

Caution!

airbag harness is very short. To keep from damaging connector remove glove box .

Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags .](#)

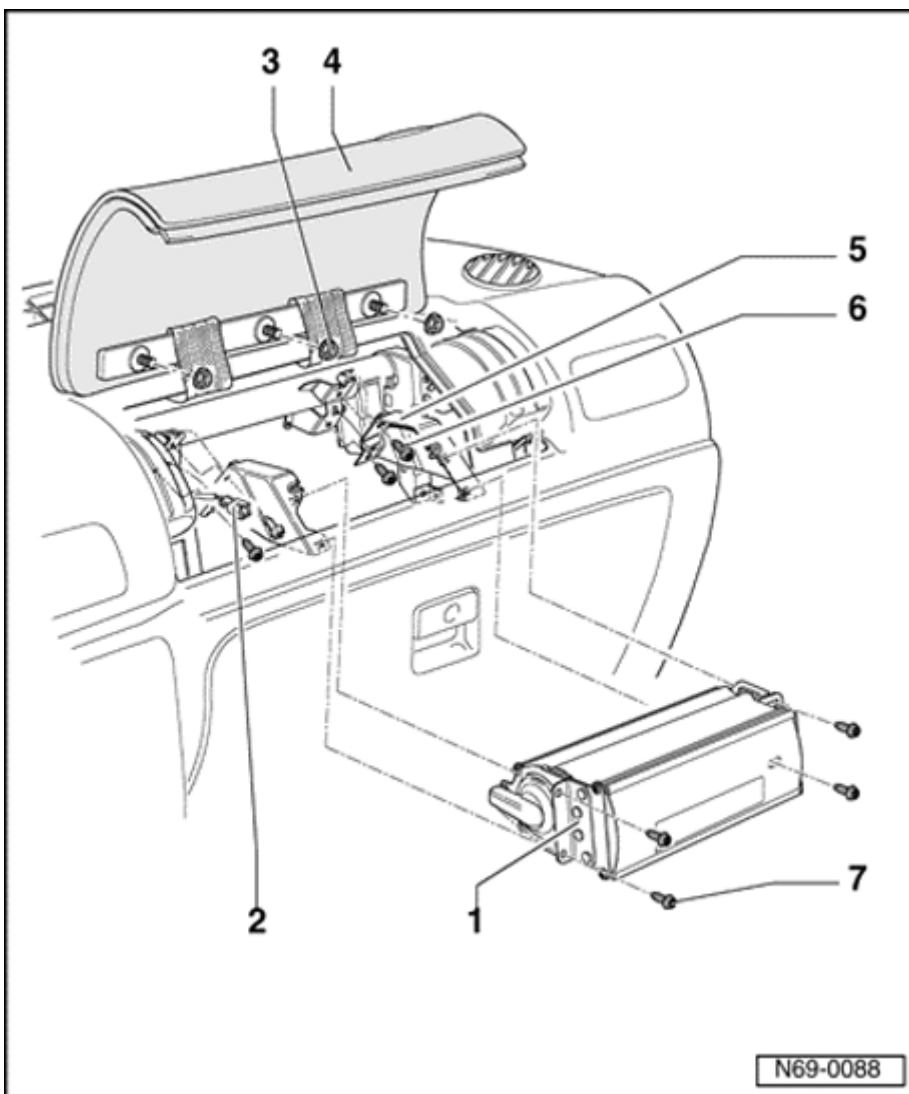
- Pull cover - **4** - for Passengers side airbag from instrument panel in opposite of direction of travel (cover is pushed flush into instrument panel).

- Fold cover upward and unscrew three hex nuts - **3** - (4 Nm).

- Remove hex bolts - 7 - (qty. 4, 2.5 Nm),
loosen airbag unit - 1 - from supports - 5 -

Caution!

Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.



- Disconnect harness connector - 2 - and
remove airbag unit - 1 - from instrument
panel.

Installing

- Installation is reverse of removal.
- Switch ignition on.

Caution!

Make sure no one is in vehicle.

- Connect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

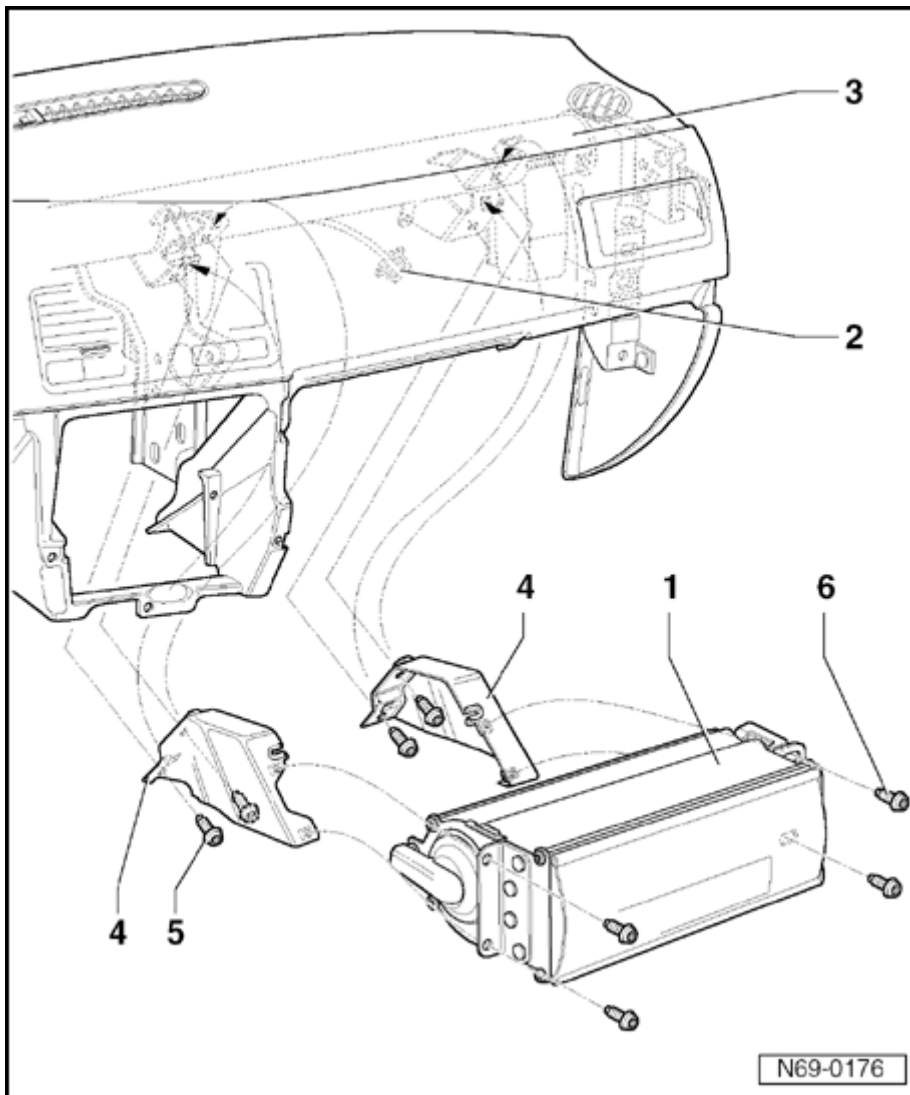
.

Note:

- n If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked.*

⇒ [Repair Manual, OBD II Fuel Injection Ignition, Repair Group 01,](#)

Front Passengers airbag unit (Instrument panel without airbag seam), assembly overview



**1. Passengers airbag unit with
airbag igniter 1, Passengers side -
N131-**

- ; Removing ⇒ [69-4, Front Passengers airbag unit \(Instrument panel without airbag seam\), removing and installing](#)

2. Connector

3. Central tube

4. Brace

- ; Always replace after airbag has deployed.

5. Bolt

i Qty. 4, 2.5 Nm

6. Bolt

i Qty. 4, 2.5 Nm

Front Passengers airbag unit (Instrument panel without airbag seam), removing and installing

Removing

Caution!

Before working on electronic components, disconnect battery ground (GND) strap.

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

- Disconnect battery Ground (GND) strap .
- Remove center console ⇒ [68-2, Center console, removing and installing](#) .
- Remove glove compartment ⇒ [68-2, Glove compartment, removing and installing](#) .

Caution!

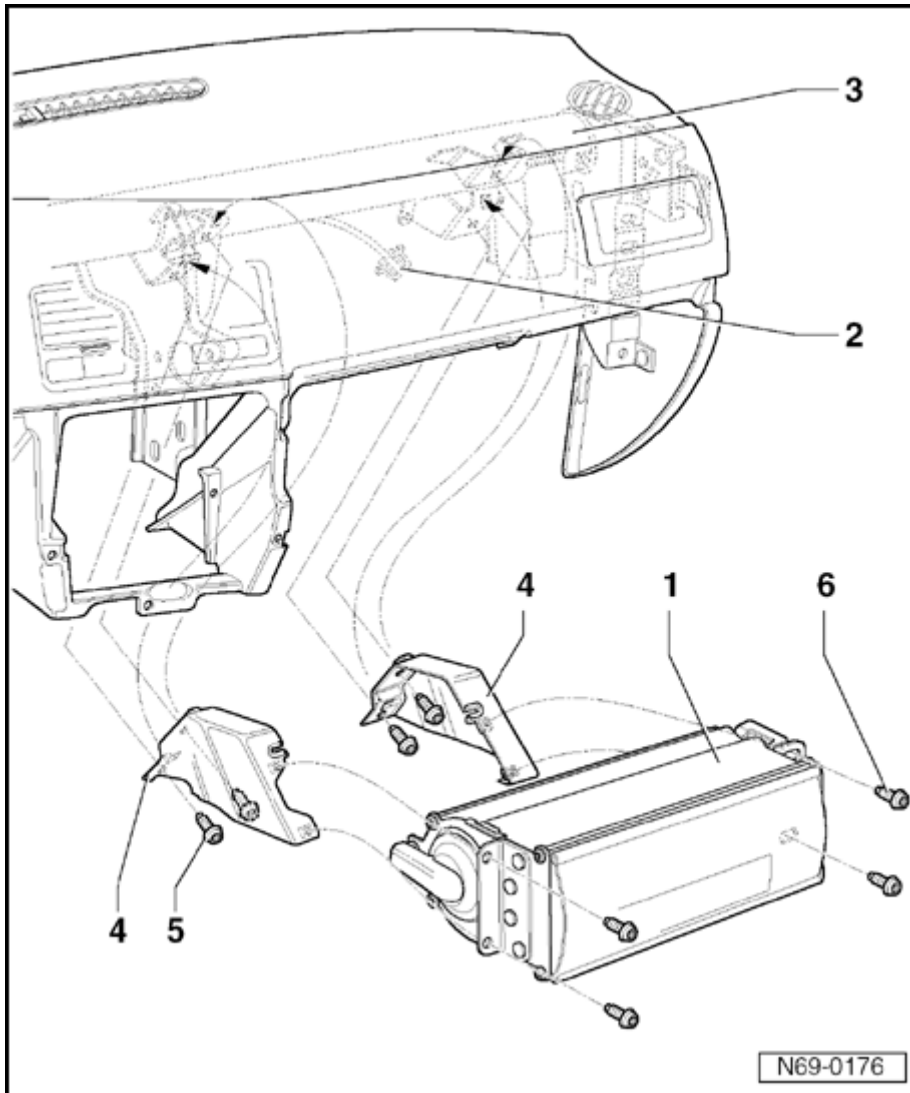
Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

- Remove four bolts - **5** - (2.5 Nm).
- Push out airbag unit - **1** - with two supports - **4** - upward out of angle brackets on central tube - **3** - .
- Press airbag unit - **1** - aside and lower until harness connector - **2** - is accessible.

Caution!

Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before

disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.



- Disconnect harness connector - 2 - and remove airbag unit - 1 - downward.

Installing

- Installation is reverse of removal.
- Switch ignition on.
- Close doors.

Caution!

Make sure no one is in vehicle.

- Connect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

Note:

- n If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked.

⇒ [Repair Manual, OBD II Fuel Injection Ignition, Repair Group 01,](#)

Airbag control module -J234-, removing and installing

Removing

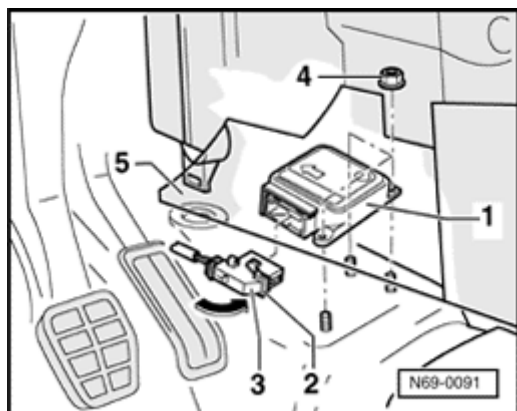
- Disconnect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

- Remove trim/footwell - 5 - .

Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .



- Fold bracket - **2** - opposite direction of - **arrow** - and disconnect connector - **3** - from control module - **1** - .
- Remove nuts - **4** - (qty. 3, 6 Nm) and remove control module from studs.

Installing

- Installation is reverse of removal.
- Switch ignition on.

Caution!

Make sure no one is in vehicle.

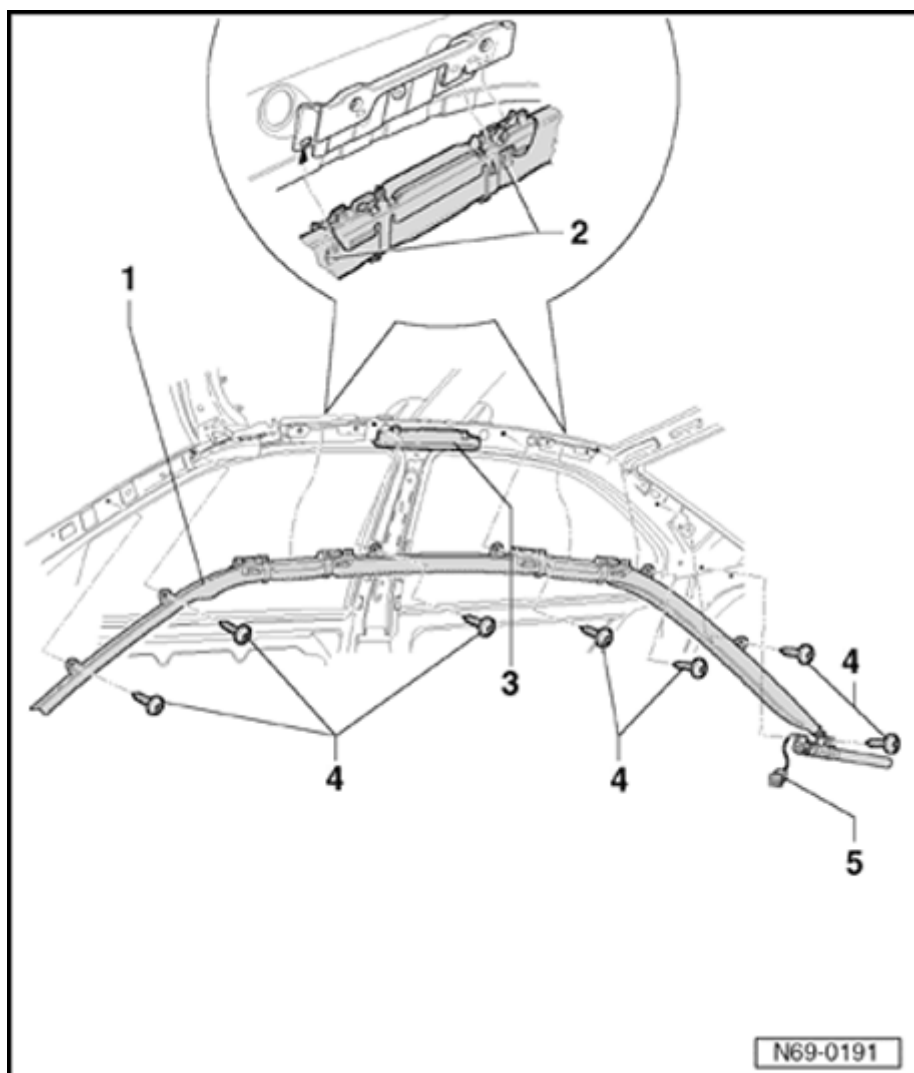
- Connect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

.

- If control module was replaced, it must be coded, adapt (code) components ⇒ [69-4, Components, adapting](#) .

Side curtain protection, driver and passenger sides, assembly overview (Jetta)



1. Side curtain protection

- Removing ⇒ [69-4, Side curtain protection, driver and passenger sides, removing and installing \(Jetta\)](#)

2. Catches

3. Side curtain guide

- Clipped in

4. Bolt

- Qty. 7
- 5 Nm

5. Connector

Side curtain protection, driver and passenger sides, removing and installing (Jetta)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.
- n Observe notes regarding coding in radio operators manual before disconnecting battery.
- n After connecting battery, vehicle options (radio, clock, electric window regulator) must be checked according to repair manual and/or user manual.
- n Technicians must electrostatically discharge mselves by touching door lock or vehicle body briefly before separating igniter and ground (GND) wires.

Removing

- Disconnect battery Ground (GND) strap

⇒ Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery

.

- Remove upper A pillar trim ⇒ [70-3, Upper A-pillar trim, removing and installing \(Vehicles with side curtain protection \)](#) .
- Remove upper B-pillar trim
 - n ➤ 04.01. ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 04.01\)](#) .
 - n 05.01. ➤ ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 05.01 \)](#) .
- Remove upper C-pillar trim ⇒ [70-3, Upper C-pillar trim, removing and installing \(Jetta with side curtain protection \)](#) .
- Molded headliner, removing
 - n Vehicles with sunroof ⇒ [70-6, Molded headliner,](#)

[removing and installing \(Vehicles with sunroof\)](#) .

- n [Vehicles without sunroof](#) ⇒ [70-6, Molded headliner, removing and installing \(Vehicles without sunroof\)](#) .

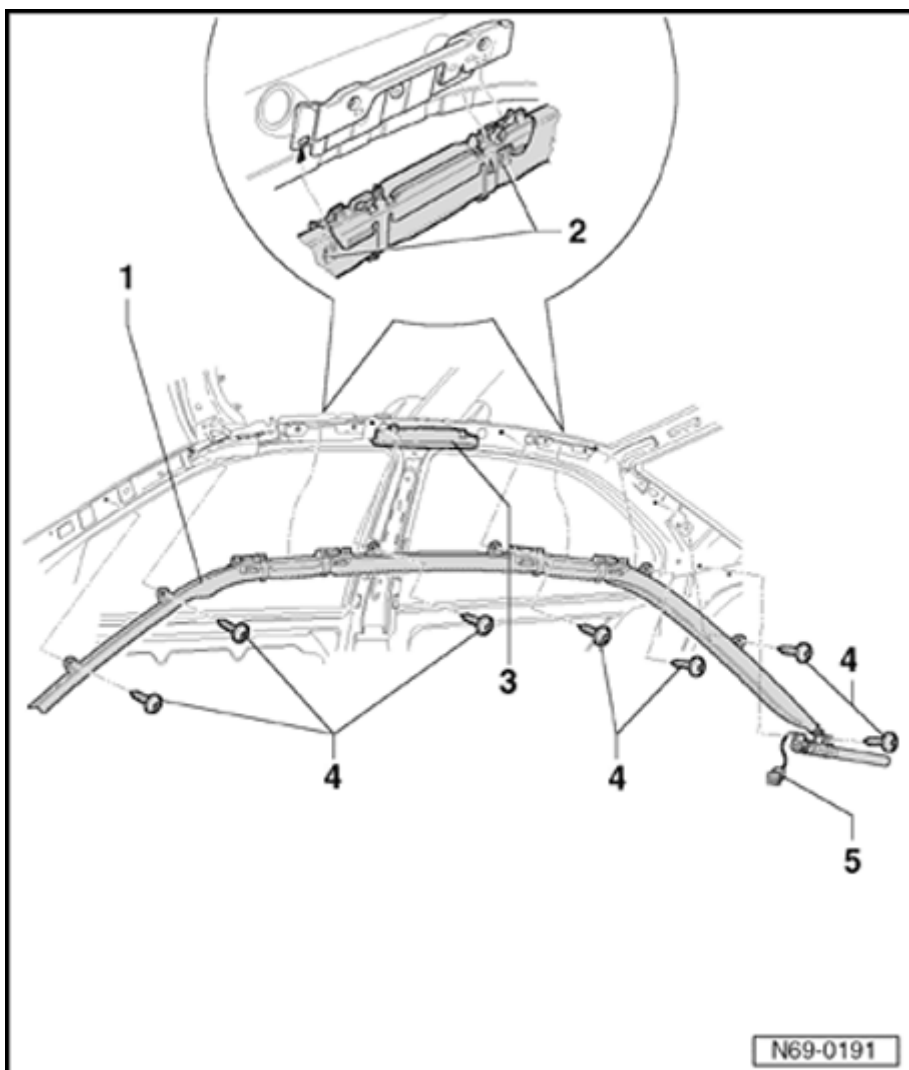
Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

Caution!

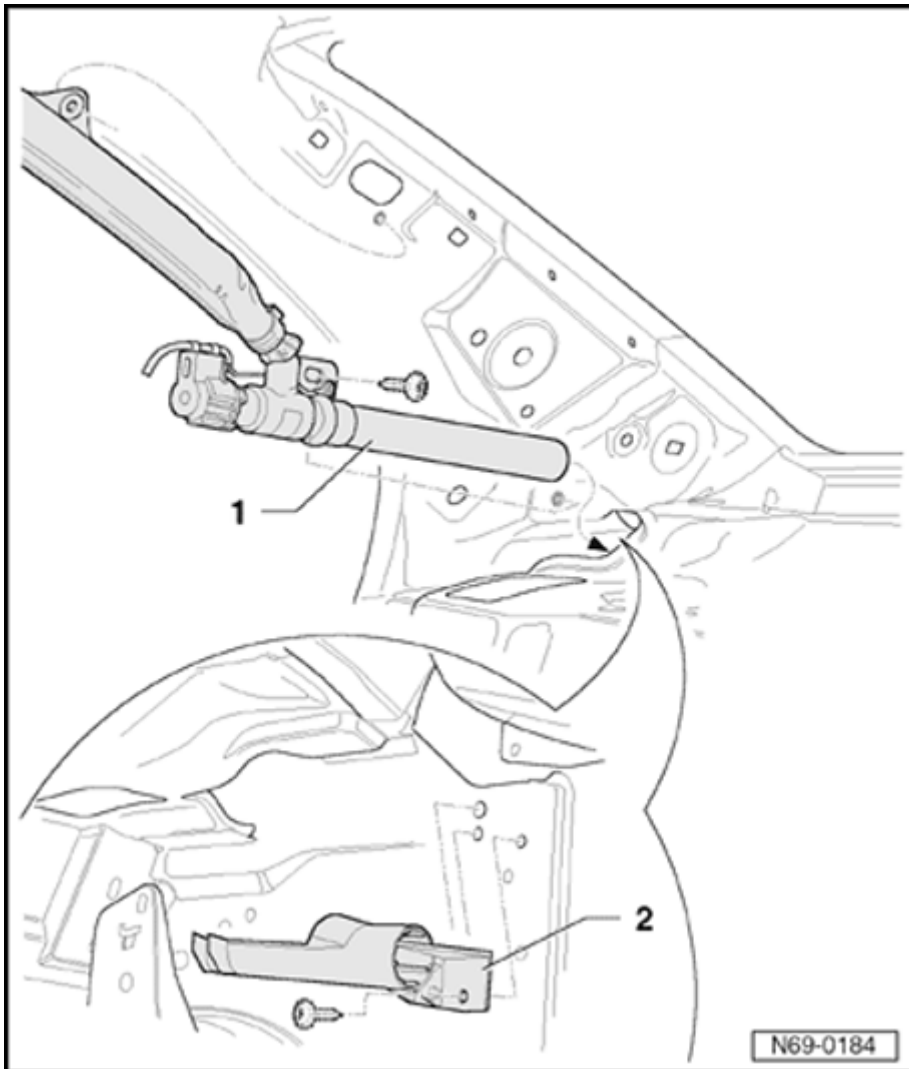
Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.

- Disconnect harness connector - 5 - .



- Unscrew bolts - **4** - (qty. 7, 5 Nm) and pull out head-level airbag - **1** - downward out of angle brackets (hold catch - **2** - and secure head-level airbag in angle brackets).

- Pull gas generator - **1** - from bracket - **2** -



- Remove head-level airbag without bending from vehicle.

Installing

- Installation is reverse of removal.
- Switch on ignition.
- Close doors.

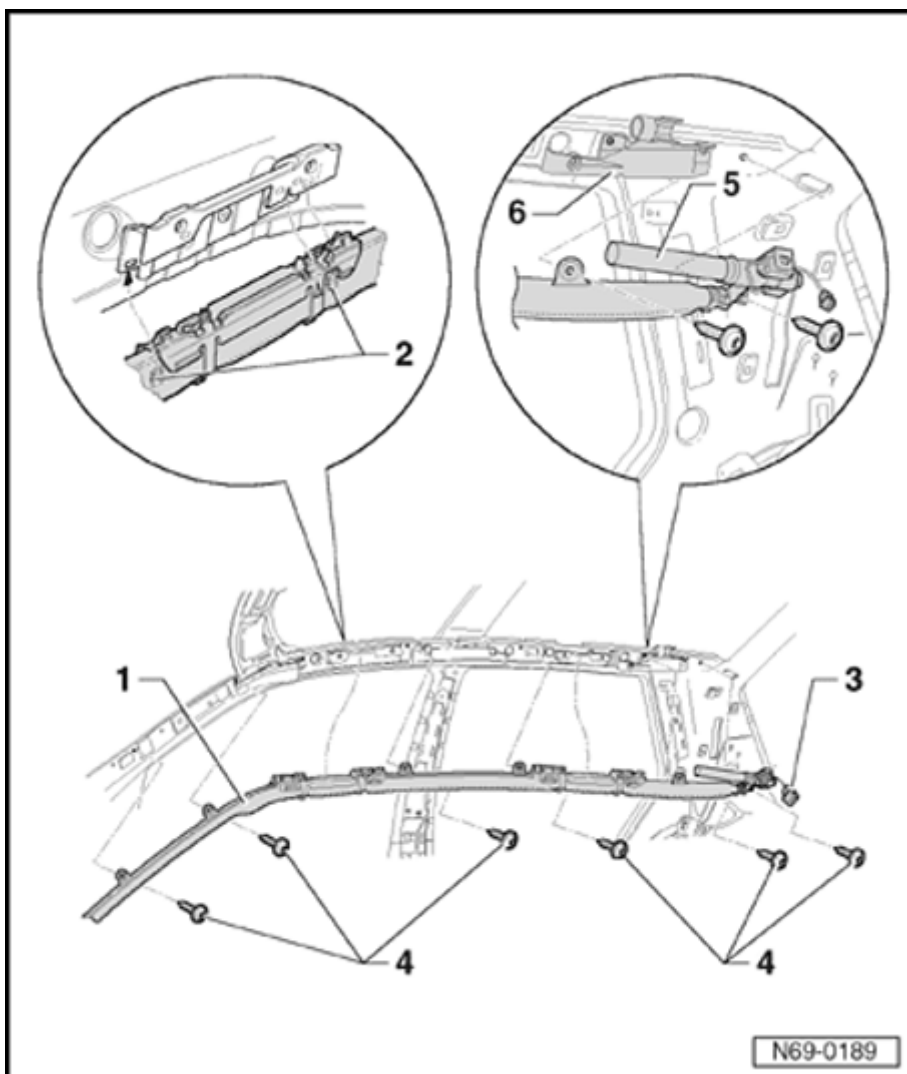
Caution!

Make sure no one is in vehicle.

- Connect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

Side curtain protection, driver and passenger sides, assembly overview (Golf)



1. Head-level airbag

- i Removing ⇒ [69-4, Side curtain protection, driver and passenger sides, removing and installing \(Golf\)](#)

2. Catches**3. Connector****4. Bolt**

- six pieces

- 5 Nm

5. Igniter**6. Bracket**

Side curtain protection, driver and passenger sides, removing and installing (Golf)

Note:

- n *Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*
- n *Observe notes regarding coding in radio operators manual before disconnecting battery.*
- n *After connecting battery, vehicle options (radio, clock, electric window regulator) must be checked according to repair manual and/or user manual.*
- n *Removal of head-level airbag is identical for 2- and 4-door.*

Removing

- Disconnect battery Ground (GND) strap

⇒ *Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery*

.

- Remove upper A pillar trim ⇒ [70-3, Upper A-pillar trim, removing and installing \(Vehicles with side curtain protection\)](#) .

- Remove upper B-pillar trim

- n ➤ 04.01. ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 04.01\)](#) .
- n 05.01. ➤ ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 05.01\)](#) .

- Remove upper C-pillar trim ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf with side curtain protection\)](#) .

- Molded headliner, removing

- n Vehicles without sunroof ⇒ [70-6, Molded headliner, removing and installing \(Vehicles without sunroof\)](#) .
- n Vehicles with sunroof ⇒ [70-6, Molded headliner, removing and installing \(Vehicles with sunroof\)](#) .

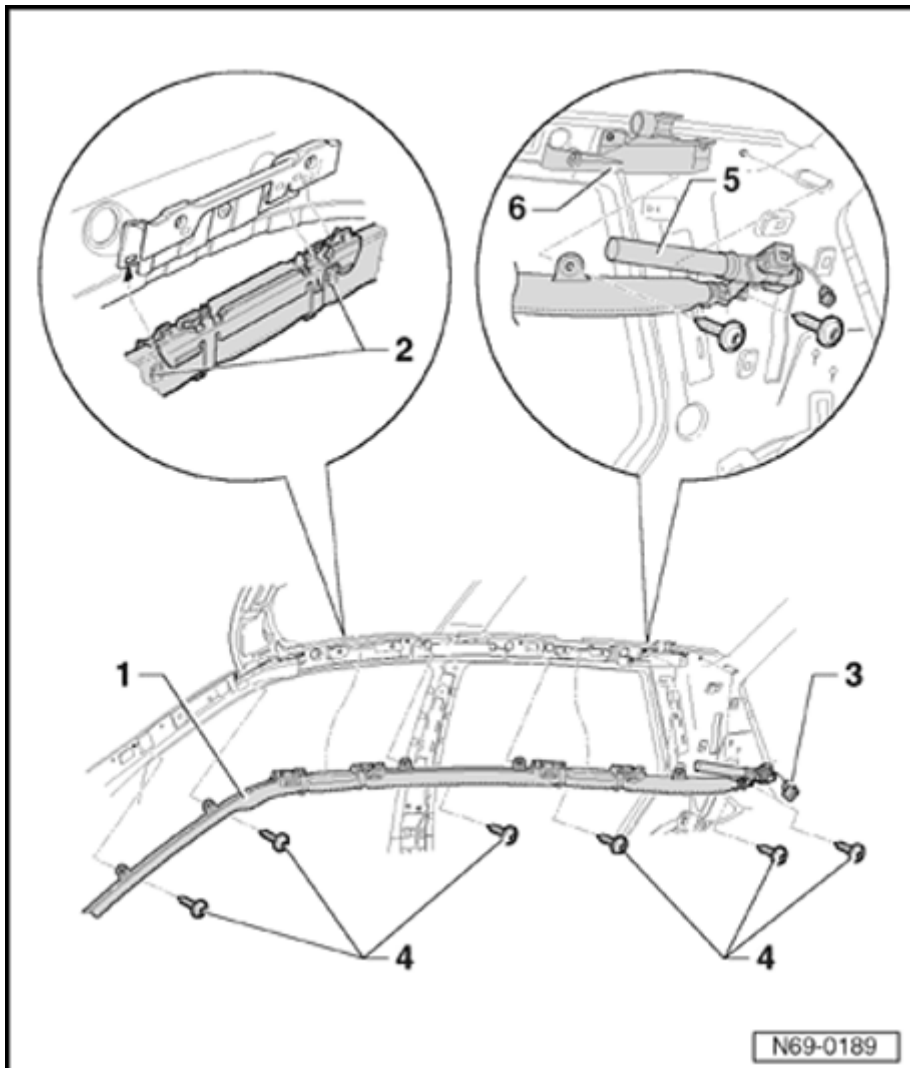
Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

Caution!

Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.

- Disconnect harness connector - **3** - .
- Unscrew bolts - **4** - (qty. 6, 5 Nm) and pull out head-level airbag downward out of angle brackets (hold catch - **2** - and secure head-level airbag in angle brackets).
- Pull gas generator - **5** - from bracket - **6** - .



- Remove head-level airbag without bending from vehicle.

Installing

- Installation is reverse of removal.
- Switch on ignition.
- Close doors.

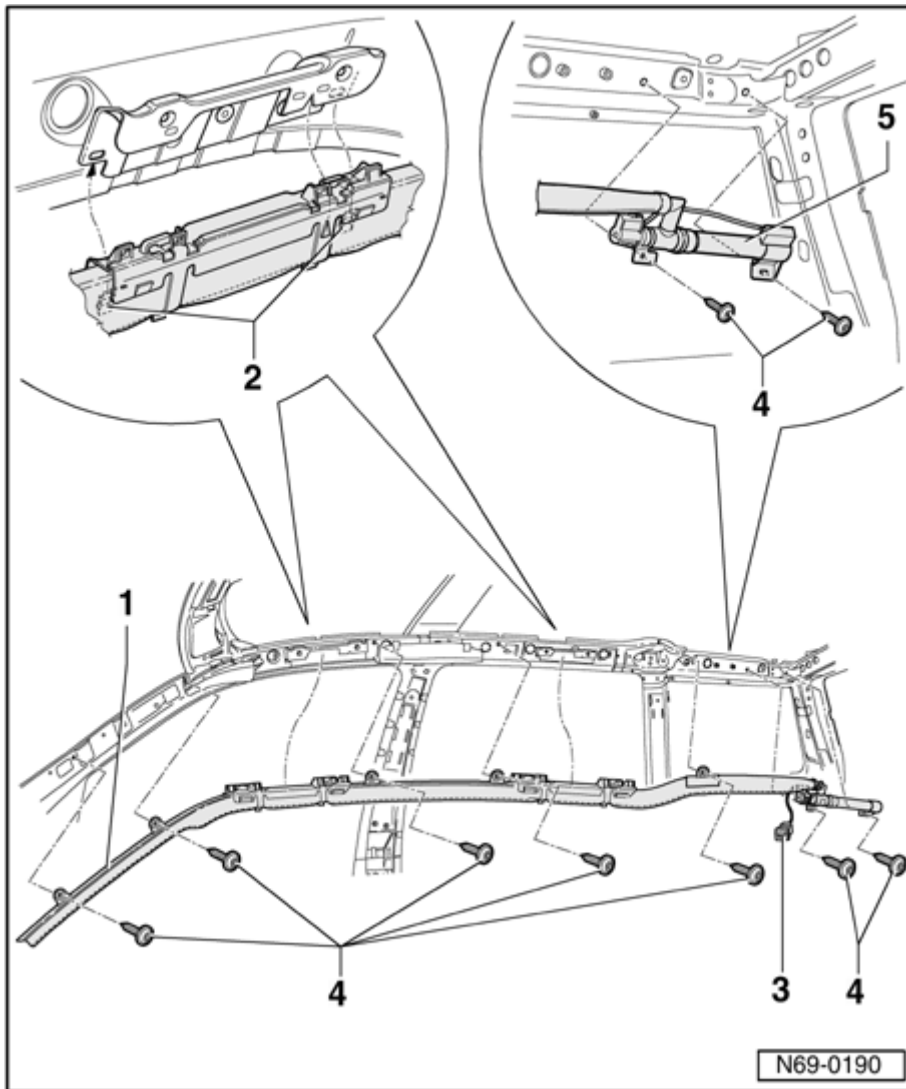
Caution!

Make sure no one is in vehicle.

- Connect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

Side curtain protection, driver and passenger sides, assembly overview (Golf wagon/Jetta wagon)



1. Side curtain protection

- Removing ⇒ [69-4, Side curtain protection, driver and passenger sides, removing and installing \(Golf wagon/Jetta wagon\)](#)

2. Catches

3. Connector

4. Screw

- Qty. 7

i 5 Nm

5. Igniter

Side curtain protection, driver and passenger sides, removing and installing (Golf wagon/Jetta wagon)

Note:

- n *Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*
- n *Observe notes regarding coding in radio operators manual before disconnecting battery.*
- n *After connecting battery, vehicle options (radio, clock, electric window regulator) must be checked according to repair manual and/or user manual.*
- n *Technicians must electrostatically discharge mselves by touching door lock or vehicle body briefly before separating igniter and ground (GND) wires.*

Removing

- Disconnect battery Ground (GND) strap

⇒ *Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery*

.

- Remove upper A pillar trim ⇒ [70-3, Upper A-pillar trim, removing and installing \(Vehicles with side curtain protection\)](#) .
- Remove upper B-pillar trim ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 04.01\)](#) .
- Remove upper C-pillar trim ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon with side curtain protection 04.01\)](#) .
- Removing D-pillar trim ⇒ [70-3, Upper D-pillar trim, removing and installing \(Golf wagon/Jetta wagon\)](#) .

- Molded headliner, removing
 - n With sunroof ⇒ [70-6, Molded headliner, removing and installing \(Vehicles with sunroof\)](#) .
 - n without sunroof ⇒ [70-6, Molded headliner, removing and installing \(Vehicles without sunroof\)](#) .

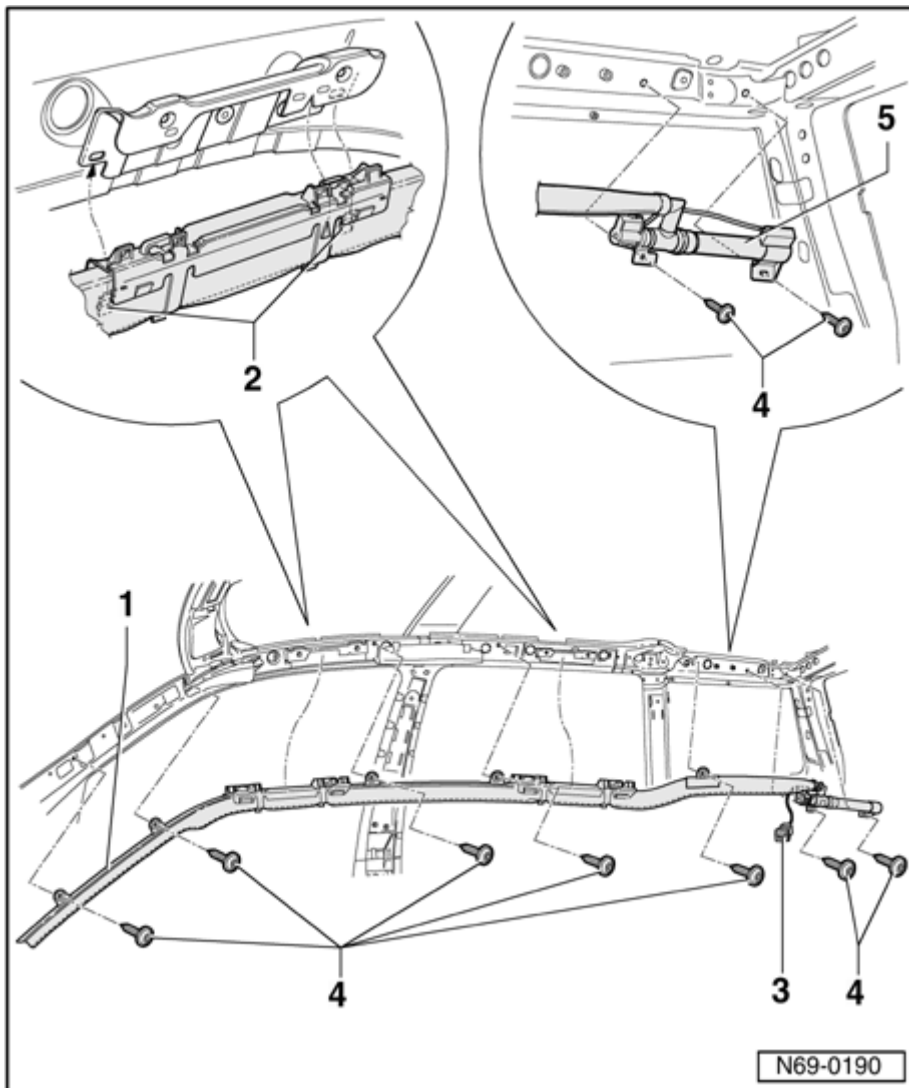
Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

Caution!

Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.

- Disconnect harness connector - **3** - .
- Remove screws - **4** - (qty. 7, 5 Nm) and pull out side curtain protection downward out of angle brackets (hold catch - **2** - and secure head-level airbag in angle brackets).



- Remove side curtain protection without bending from vehicle.

Installing

- Installation is reverse of removal.
- Switch on ignition.
- Close doors.

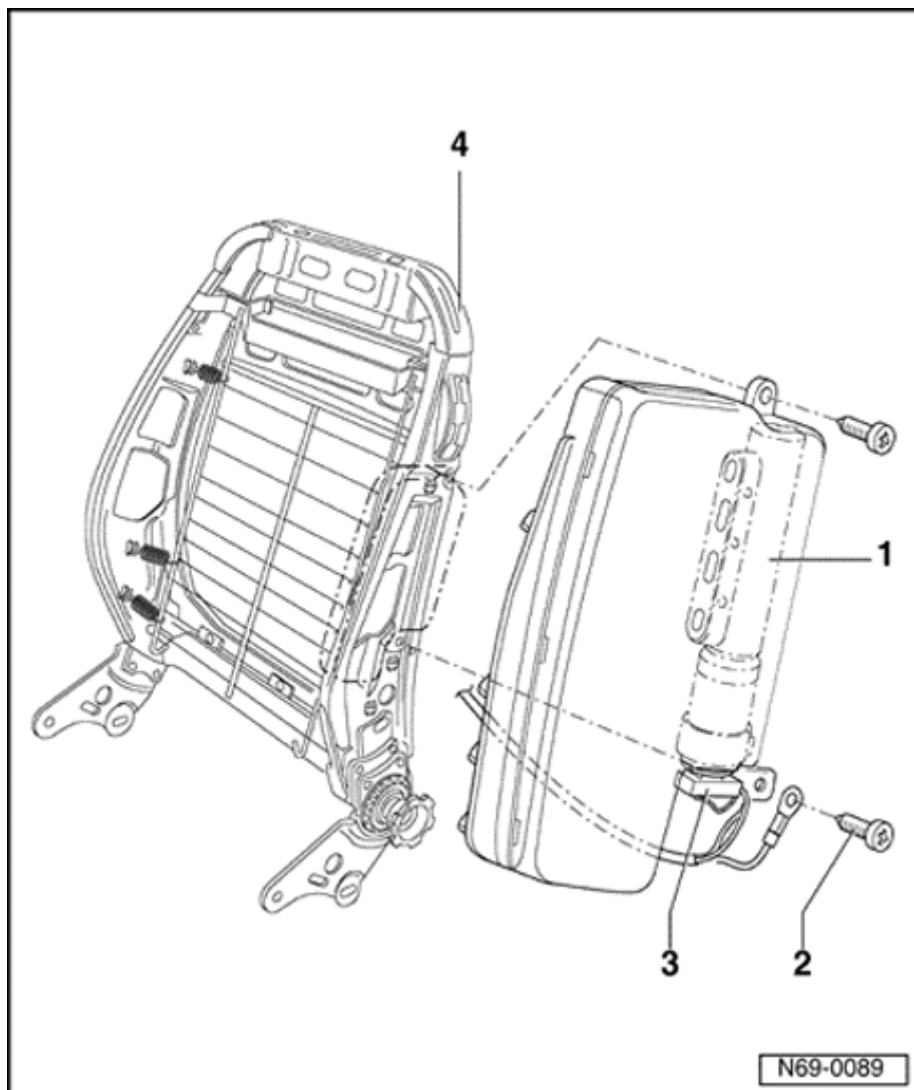
Caution!

Make sure no one is in vehicle.

- Connect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

Driver and front passenger seat side airbags, assembly overview



1. Side airbag, driver with igniter for side airbag -N199- or front passenger with igniter for side airbag -N200-

- i Removing ⇒ [69-4, Driver and front passenger seat side airbags, removing and installing](#)

2. Bolt

- i Qty. 2
- i 7 Nm

3. Connector

4. Backrest frame

Driver and front passenger seat side airbags, removing and installing

Note:

- n *Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*
- n *Observe notes regarding coding in radio operators manual before disconnecting battery.*
- n *After connecting battery, vehicle options (radio, clock, electric window regulator) must be checked according to repair manual and/or user manual.*

Removing

- Disconnect battery Ground (GND) strap

⇒ *Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery*

.

- Remove driver /passenger seat ⇒ [72-1, Front seats, removing and installing](#) .
- Remove backrest frame ⇒ [72-1, Front backrest, removing and installing](#) .

Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

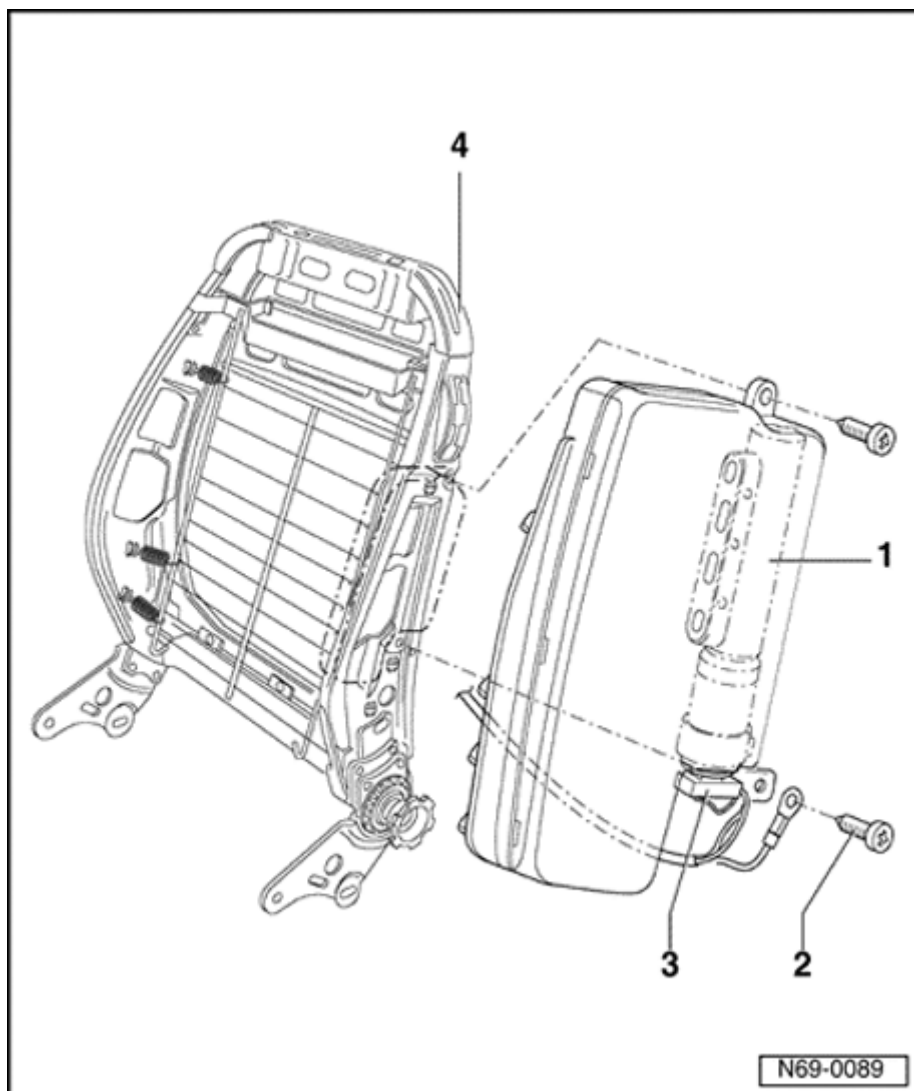
- Loosen backrest cover in area of airbag
- **1** - ⇒ [74-1, Front backrest cover and upholstery, removing and installing](#) .
- Remove screws - **2** - (qty. 2, 7 Nm).

Caution!

Electrostatic charges may result in involuntary deployment of airbag.

Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.

- Disconnect connector - 3 - from airbag unit - 1 - .



- Remove airbag unit - 1 - from backrest frame - 4 - .

Installing

- Installation is reverse of removal.
- Switch on ignition.
- Close doors.

Caution!

Make sure no one is in vehicle.

- Connect battery Ground (GND) strap

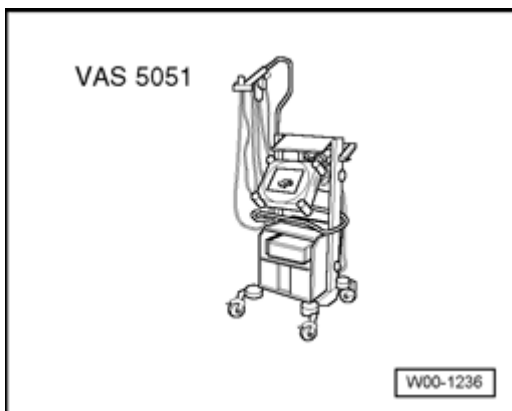
⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

.

Note:

- n If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked

⇒ [Repair Manual, Fuel Injection Ignition, Repair Group 01,](#)

**Components, adapting****Special tools, testers and auxiliary items required**

- n Vehicle Diagnosis, Testing and Information System VAS5051
- n Diagnostic cable VAS5051/1 or VAS5051/3

Work procedure

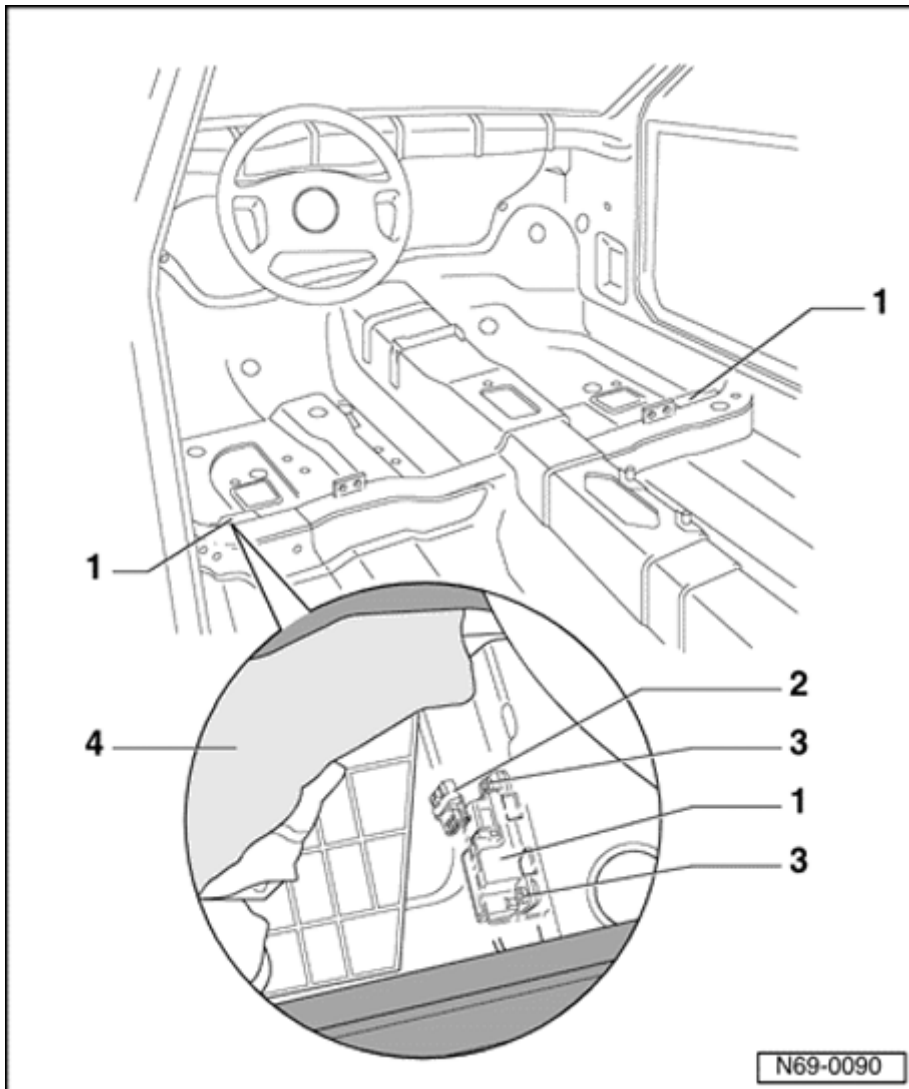
- Select "Guided Fault-Finding" on Vehicle Diagnosis, Testing and Information System VAS5051 .

After all control modules have been checked:

- Press "Go to" button
- Select "Function/component selection"
- Select "Body"
- "Body-Interior; Repair "
- Select "01 - On Board Diagnostic (OBD) capable systems"
- Select "airbag"
- Select "Functions" :
- Select "action"

Crash sensors

Crash sensor for driver-side and passenger side - side airbag, assembly overview



1. Driver-side and passenger-side sensor

- i Removing ⇒ [69-5, Crash sensor for driver side/passenger side curtain protection, removing and installing](#)

2. Connector

3. Bolt

- i Qty. 2, 6 Nm

4. Carpet

Crash sensor for driver side/passenger side curtain protection, removing and installing

Note:

- n *Removal and installation is described for left side of vehicle. same instructions apply for removal and installation for right-hand side.*
- n *Observe notes regarding coding in radio operators manual before disconnecting battery.*
- n *After connecting battery, vehicle options (radio, clock, electric window regulator) must be checked according to repair manual and/or user manual.*

Removing

- Switch ignition off.
- Disconnect battery Ground (GND) strap

⇒ *Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery*

- Remove driver /passenger seat ⇒ [72-1, Front seats, removing and installing](#) .

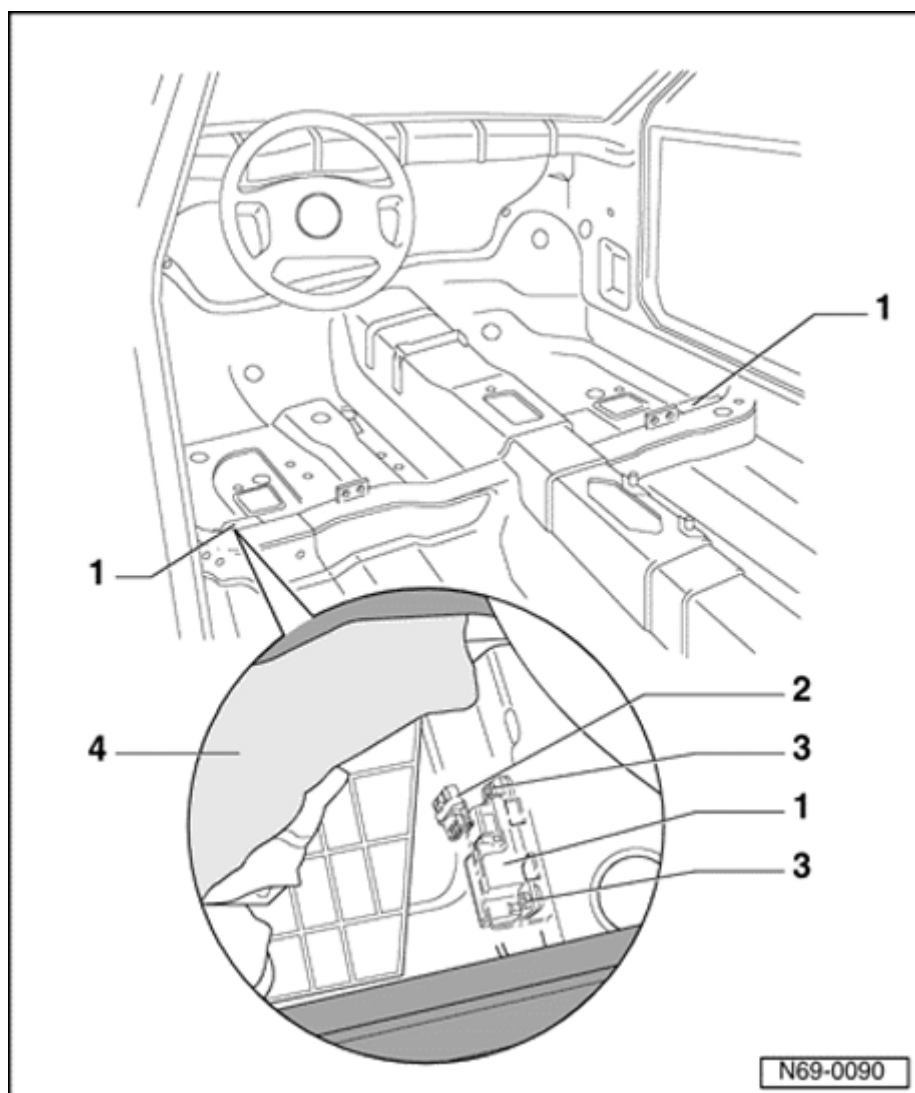
Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

- Remove floor carpet - 4 - and insulation mat in sensor area.

Caution!

Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.



- Disconnect harness connector - **2** - and unscrew two bolts - **3** - (6 Nm).

Installing

- Installation is reverse of removal.
- Switch on ignition.
- Close doors.

Caution!

Make sure no one is in vehicle.

- Connect battery Ground (GND) strap

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

Crash sensor for driver side/Passengers side rear side curtain protection, removing and installing

Note:

- n *Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*
- n *illustration shows chassis version of notchback, removal of crash sensor side rear level airbag is identical for sedan and wagon.*
- n *Observe notes regarding coding in radio operators manual before disconnecting battery.*
- n *After connecting battery, vehicle options (radio, clock, electric window regulator) must be checked according to repair manual and/or user manual.*
- n *"crash sensor for rear side-airbag" sends signal to deploy head-level and side-airbags in certain accident situations.*
- n *"crash sensor for rear side-airbag on driver /Passengers side" is listed as a replacement part under "control module for side curtain protection" .*

Removing

- Switch ignition off.
- Disconnect battery Ground (GND) strap

⇒ *Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery*

- Remove wheel housing trim.
 - n Golf ⇒ [70-3, Wheel housing trim, removing and installing \(Golf\)](#) .
 - n Jetta ⇒ [70-3, Wheel housing trim, removing and installing \(Jetta\)](#) .

- n Golf wagon/Jetta wagon ⇒ [70-3, Wheel housing trim, removing and installing \(Golf wagon/Jetta wagon\)](#) .

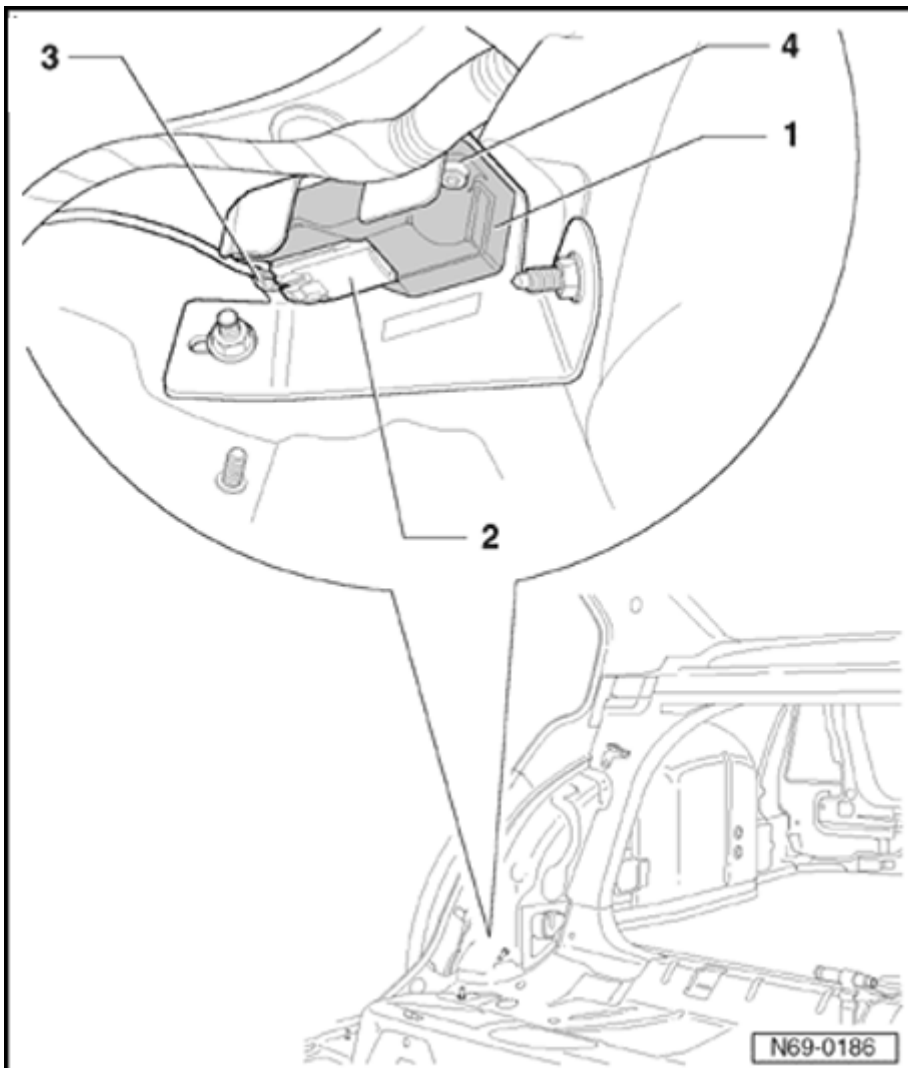
Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

Caution!

Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.

- Disconnect harness connector - 2 - .



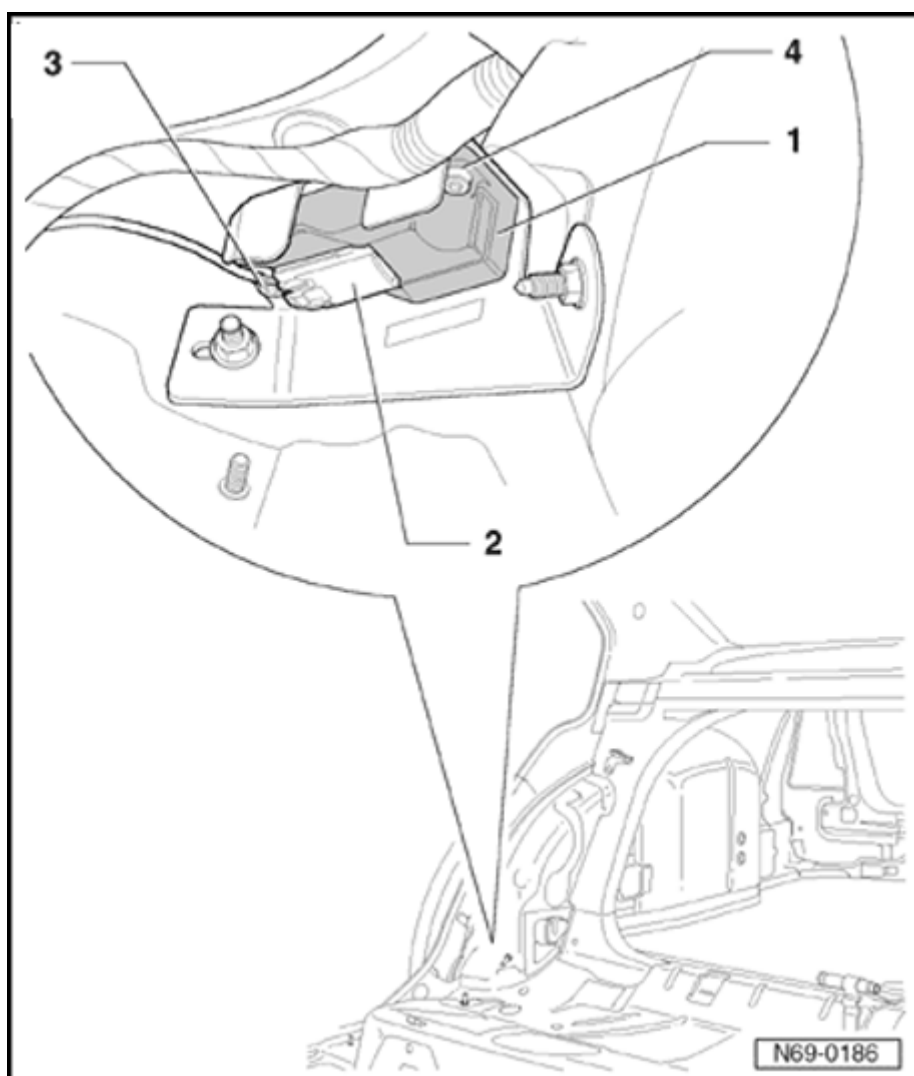
- Remove bolts - 3 - and - 4 - .

Installing

- Install crash sensor - 1 - with bolts - 3 - (6 Nm) and - 4 - (6 Nm).
- Connect connector - 2 - into connector housing for crash sensor - 1 - .
- Switch on ignition.
- Close doors.

Caution!

Make sure no one is in vehicle.



- Connect battery Ground (GND) strap

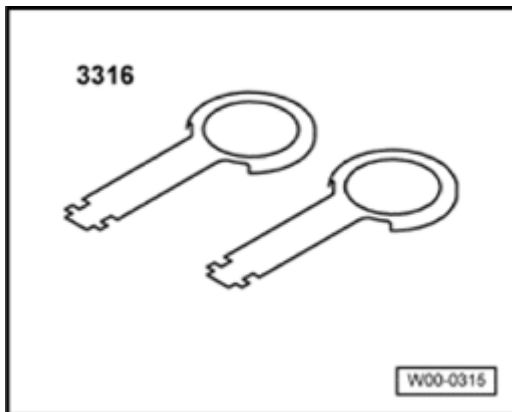
⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

.

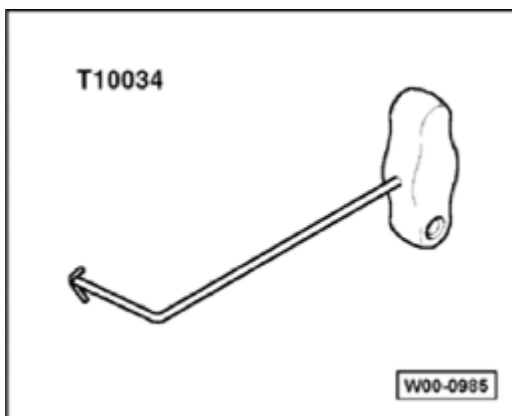
Instrument panel

Instrument panel, removing and installing

Special tools, testers and auxiliary items required



n Radio release tool 3316



n Assembly tool T10034

Caution!

Disconnect battery ground (GND) strap before working on electrical system.

Note:

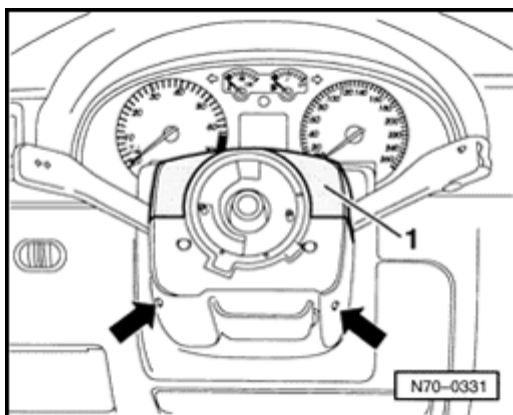
- n *Observe notes regarding coding in radio operators manual before disconnecting battery.*
- n *removal and installation procedures may have to be modified slightly depending on equipment variants*
- n *After connecting battery, vehicle options (radio, clock, electric window regulator) must be checked according to repair manual and/or user manual.*

Removing

- Switch ignition off.
- Disconnect battery Ground (GND) strap

⇒ *Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery*

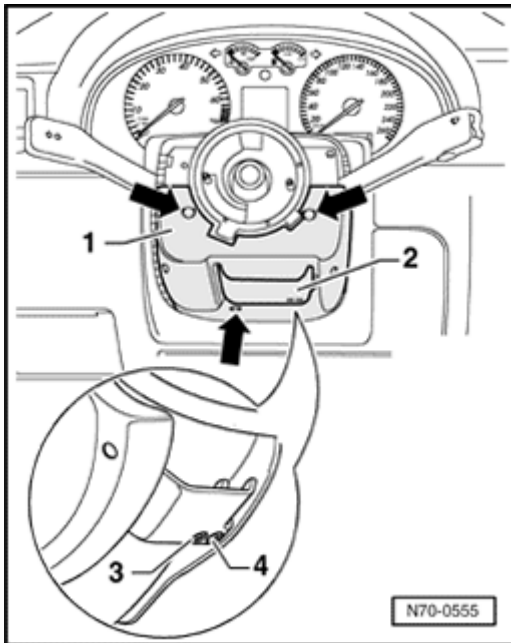
- Remove steering wheel ⇒ [69-4, Steering wheel, removing and installing](#) .
- Remove center console ⇒ [68-2, Center console, removing and installing](#) .



- Remove screws - **arrows** - .
- Remove upper trim - **1** - for steering column switches.

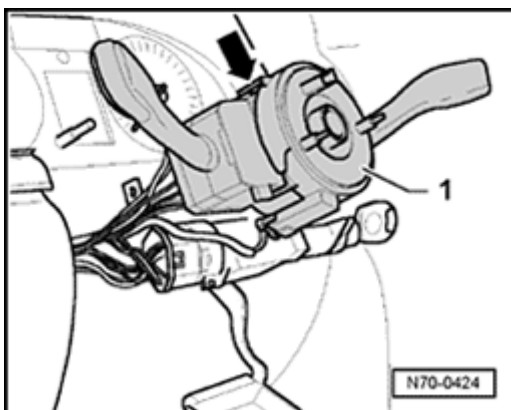
Note:

- n *Unclip front section of trim - 1 - horizontally from instrument cluster.*



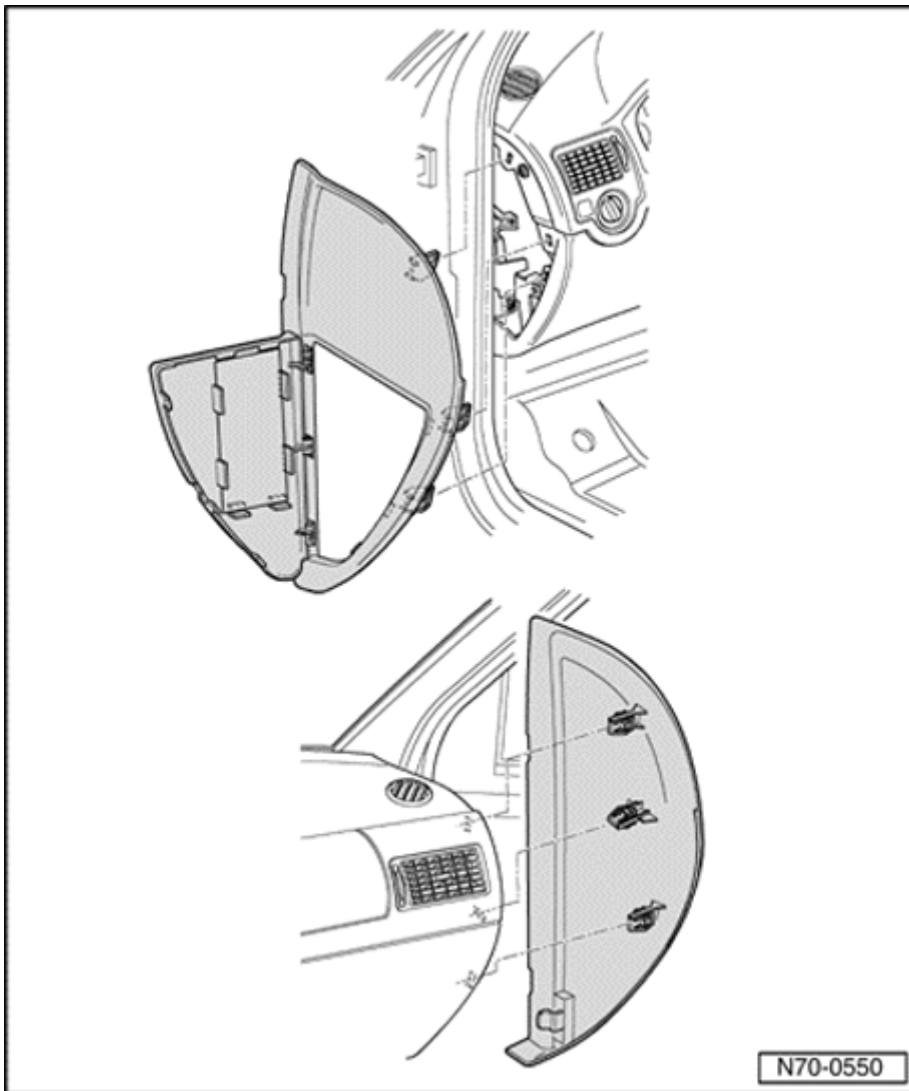
A

- Remove screws - **arrows** - .
- Remove screws - **3** - and - **4** - .
- Remove handle from steering wheel height adjustment - **2** - .
- Remove steering wheel height adjustment.
- Remove lower trim - **1** - for steering wheel switch.

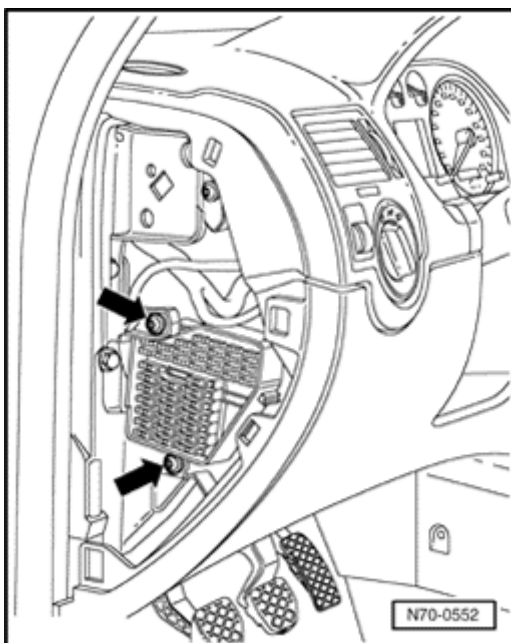


A

- Remove bolt - **arrow** - .
- Disconnect harness connectors from steering column switches - **1** - .
- Remove steering column switches - **1** - .

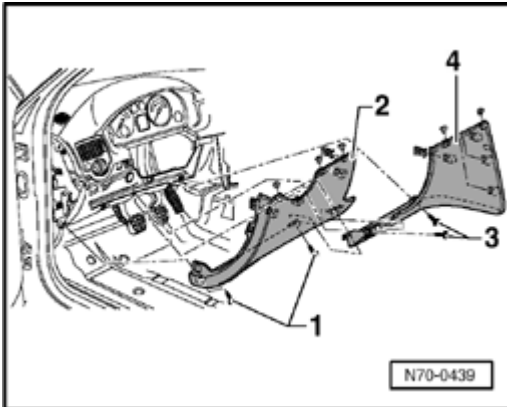


- Unclip left and right end plates using a flat screwdriver.



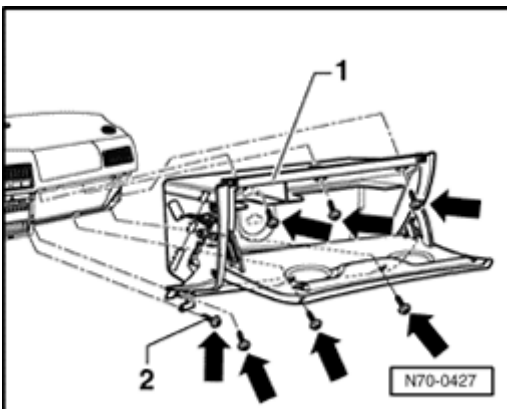
A

- Remove screws - **arrows** - .



A

- Remove screws - **1** - .
- Unclip trim - **2** - at top.
- Remove screws - **3** - .
- Unclip trim - **4** - at top.

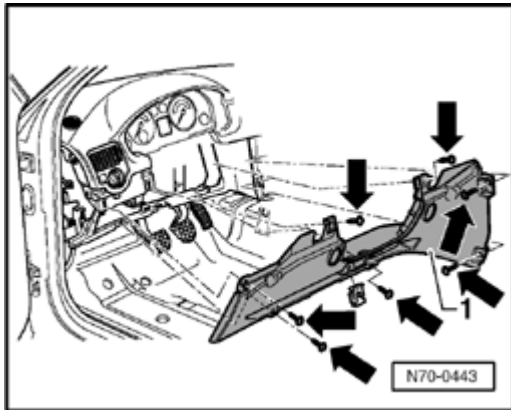


A

- Remove bolts - **arrows** - .
- Remove glove compartment - **1** - .
- Disconnect harness connector for glove compartment light.

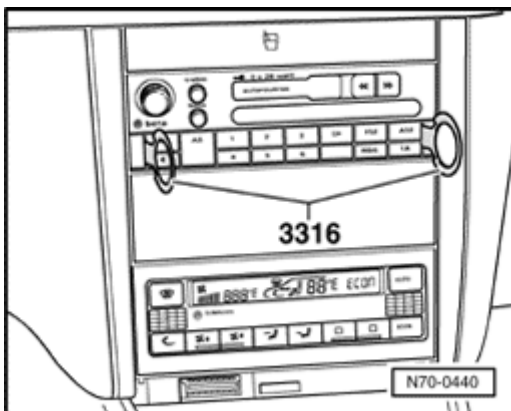
Note:

- n *If only glove compartment is to be removed, center console must be removed first because bolt - **2** - is otherwise not accessible.*



A

- Remove screws - **arrows** - .
- Remove reinforcement - **1** - .

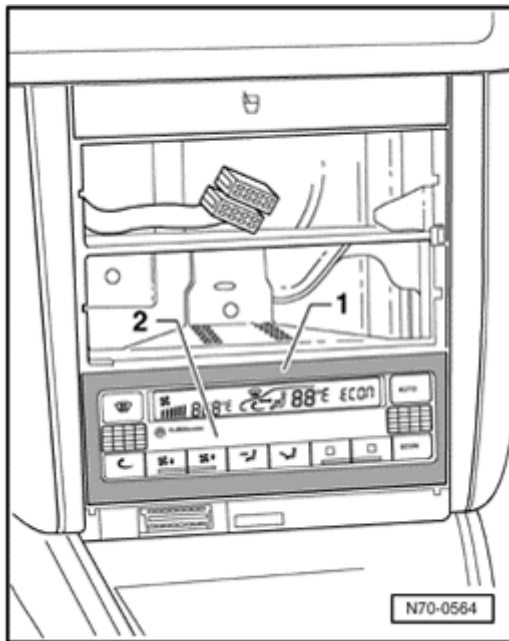


A

- Slide Radio release tool 3316 into release slots until y engage.
- Remove radio from instrument panel using grip rings on release tool and disconnect harness connectors.

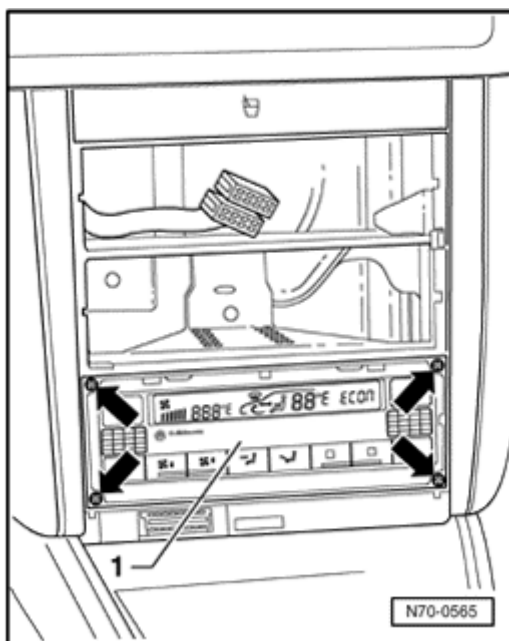
Note:

- n *Radio release tool 3316 must not be pushed to side or tilted during procedure.*
- n *To remove release tool from radio, press in locking lugs on side of radio.*



A

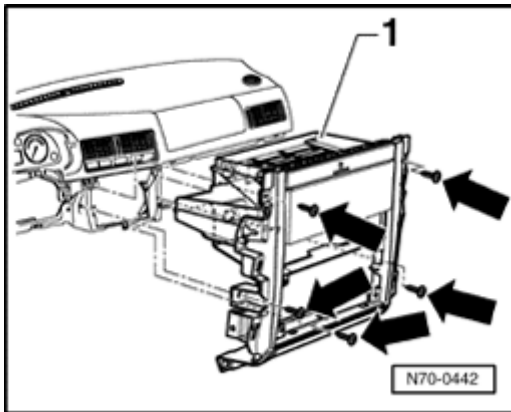
- Unclip trim - 1 - for Climatronic - 2 - .



A

- Remove screws - **arrows** - for Climatronic - 1 - .

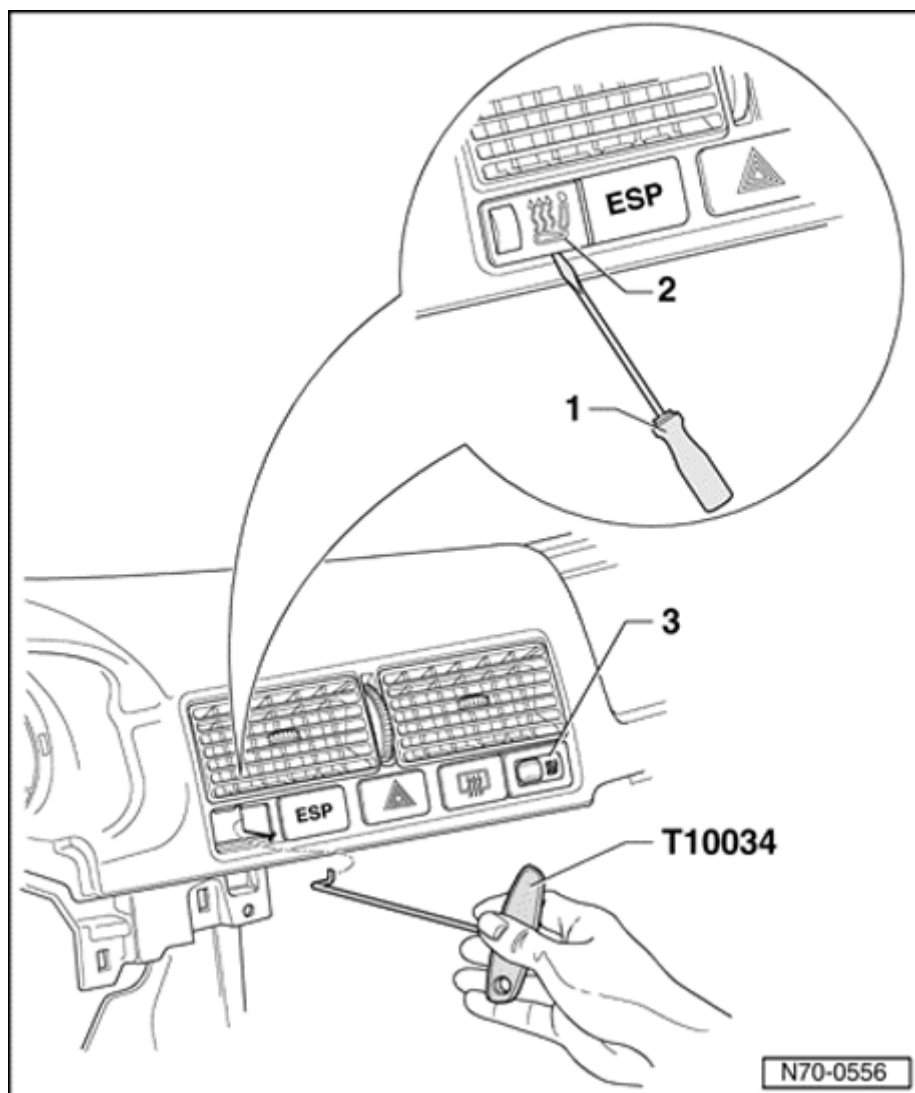
- Remove Climatronic - 1 - and unclip connector.



- Remove bolts - **arrows** - .
- Remove carrier plate - **1** - .
- Unclip Data Link Connector (DLC).
- Using a flat screwdriver - **1** - , unclip seat heater switches - **2** - and - **3** - .
- Disconnect harness connectors.

Note:

- n *Due to high spring forces, do not use screwdriver to remove control switches for ESP, indicator light and rear window defroster.*

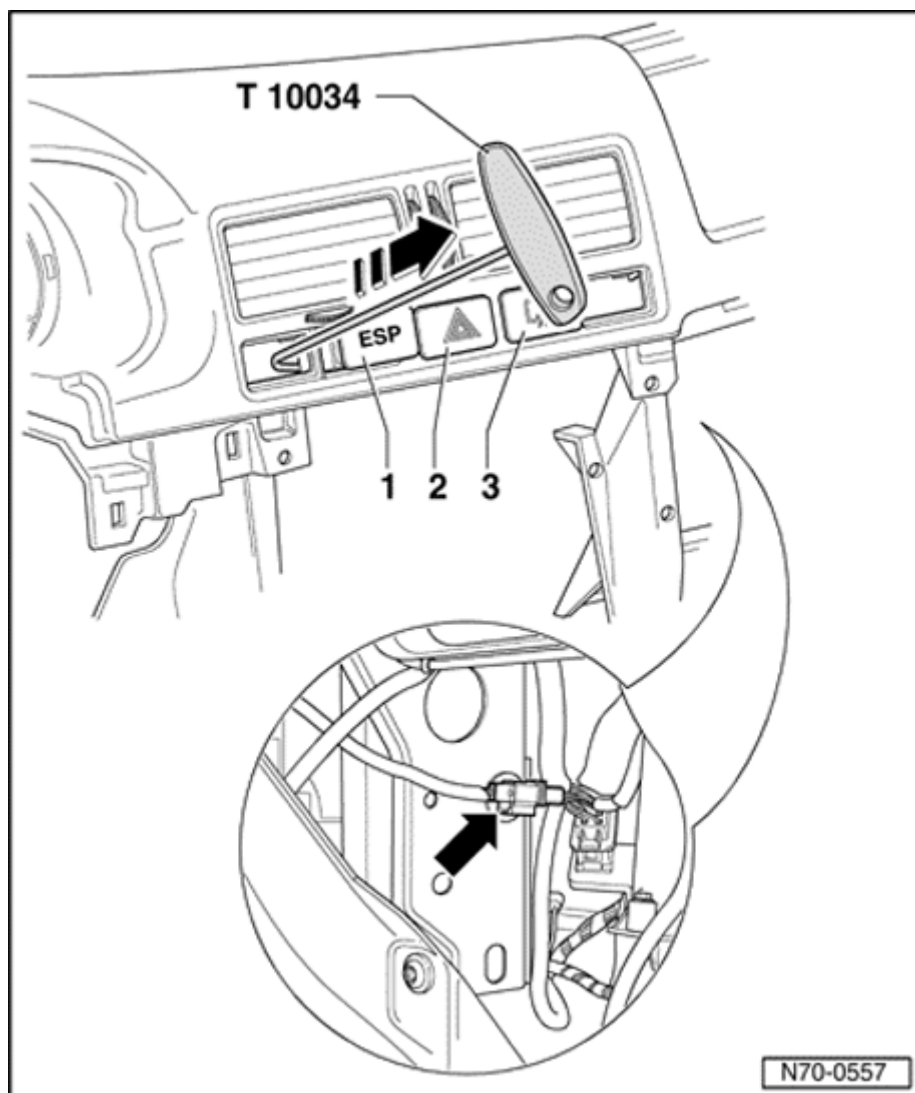


- Reach behind ESP switch using tip of Assembly tool T10034 .

- Using Assembly tool T10034 unclip ESP switch - 1 - , indicator light - 2 - and rear window defroster - 3 - out of center vent in direction of - **arrow** - .

- Disconnect harness connectors.

Only Jetta/Jetta wagon:



- Disconnect harness connector for air outlet indicator - **arrow** - .

All models:

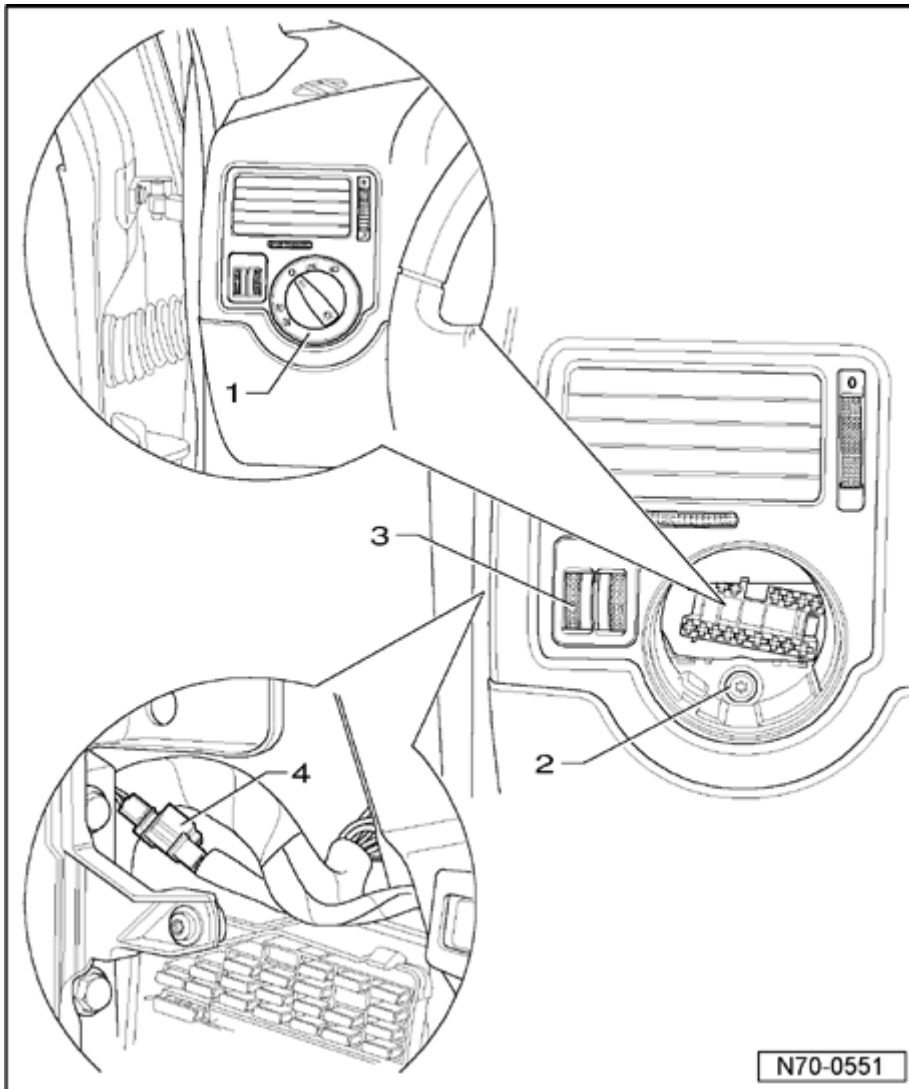
- Press in headlight switch - **1** - , turn toward right and remove.

- Disconnect harness connector.

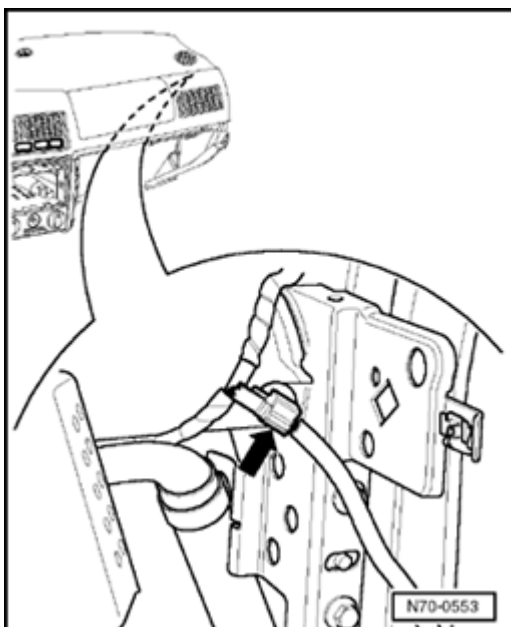
- Remove screw - **2** - and remove air outlet from instrument panel.

- Disconnect harness connector for headlight aim control - **3** - .

Only Jetta/Jetta wagon:



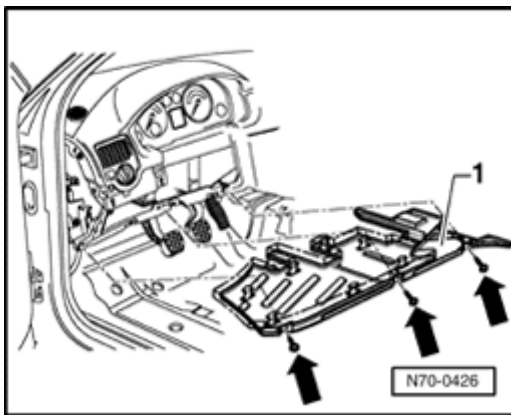
- Disconnect harness connector for air outlet indicator - 4 - .



A

- Disconnect harness connector for air outlet indicator - **arrow** - .

All models:



- Remove screws - **arrows** - .
- Remove footwell cover - **1** - .

Note:

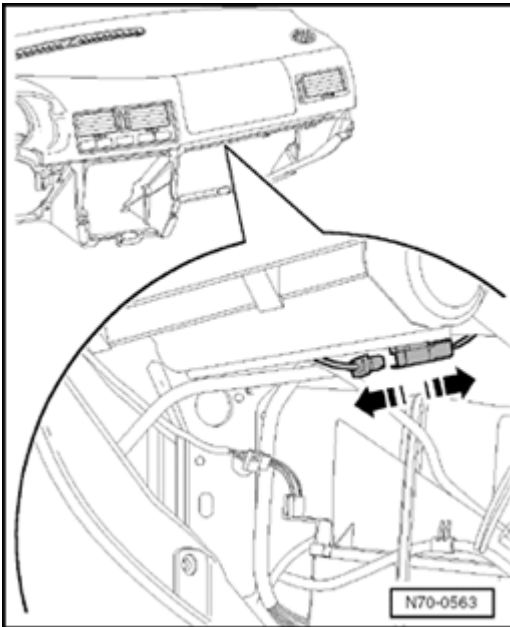
n Cover - **1** - can also be secured by clips.

Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

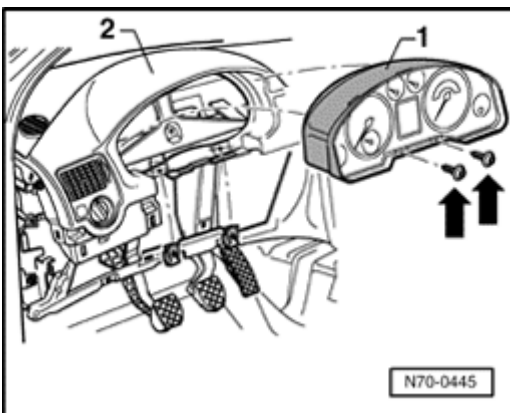
Caution!

Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.



A

- Disconnect harness connector for Passengers airbag.

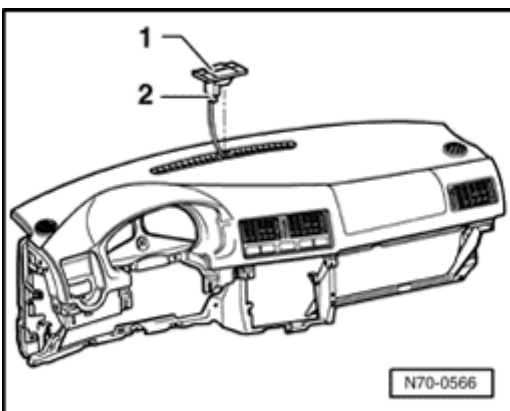


A

- Remove screws - **arrows** - .

- Lower instrument cluster - **1** - slightly and remove from instrument panel - **2** - .

- Disconnect harness connector.

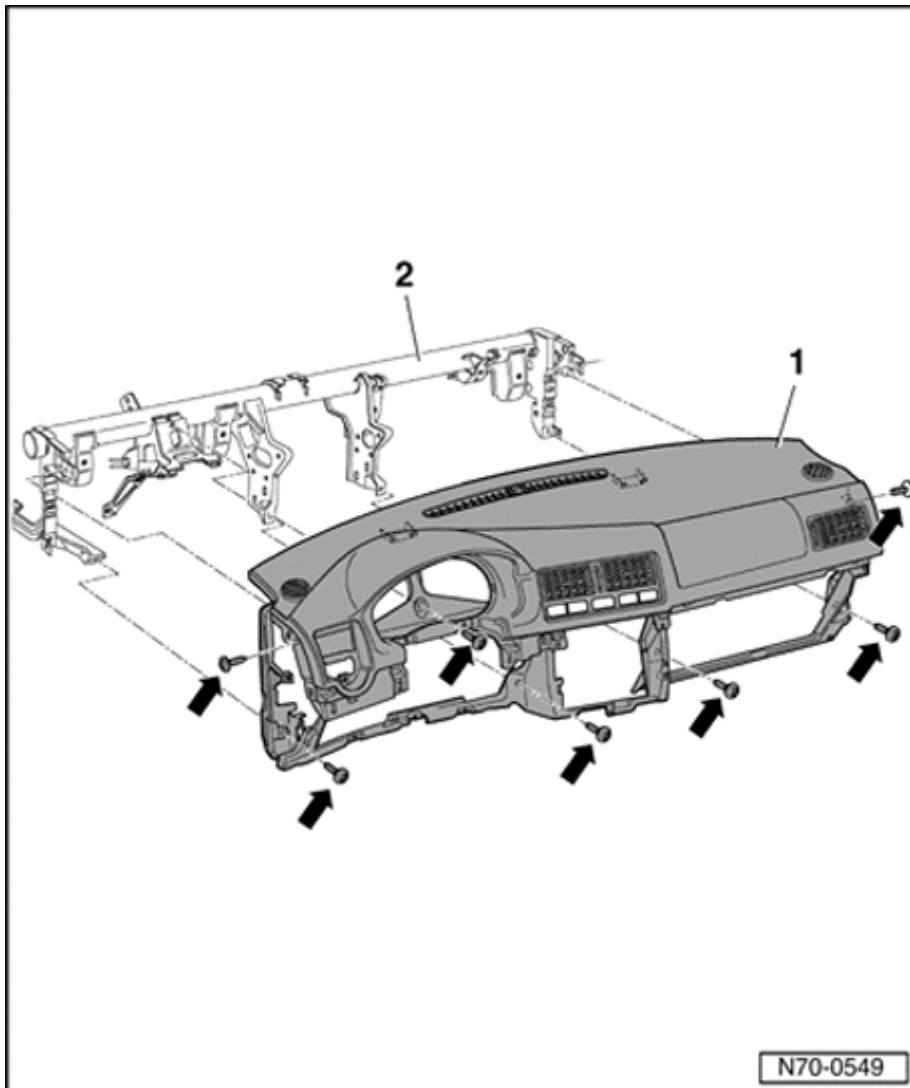


A

- Unclip temperature sensor - **1** - and disconnect connector

- 2 - .

- Remove bolts - **arrows** - (tightening torque 3 Nm).



- Remove instrument panel - **1** - from crossmember - **2** - .

Installing

Installation is reverse of removal.

Note:

- n If Airbag Malfunction Indicator Lamp (MIL) -K75- signals a DTC after assembling n DTC memory must be erased and checked again using VAG 1551 tester (or VAS 5051).

⇒ [Repair Manual, Body On Board Diagnostic \(OBD\),
Repair Group 01,](#)

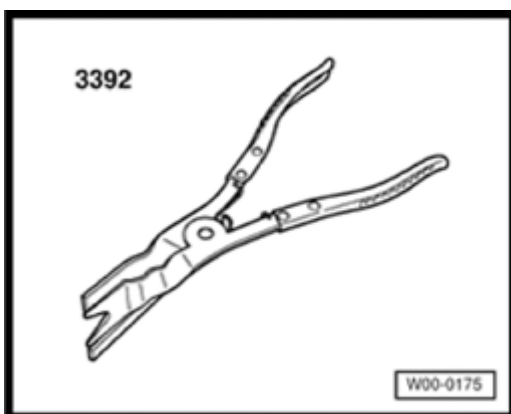
n *If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked*

⇒ *Repair Manual, Fuel Injection Ignition, Repair Group 01,*

Door trim

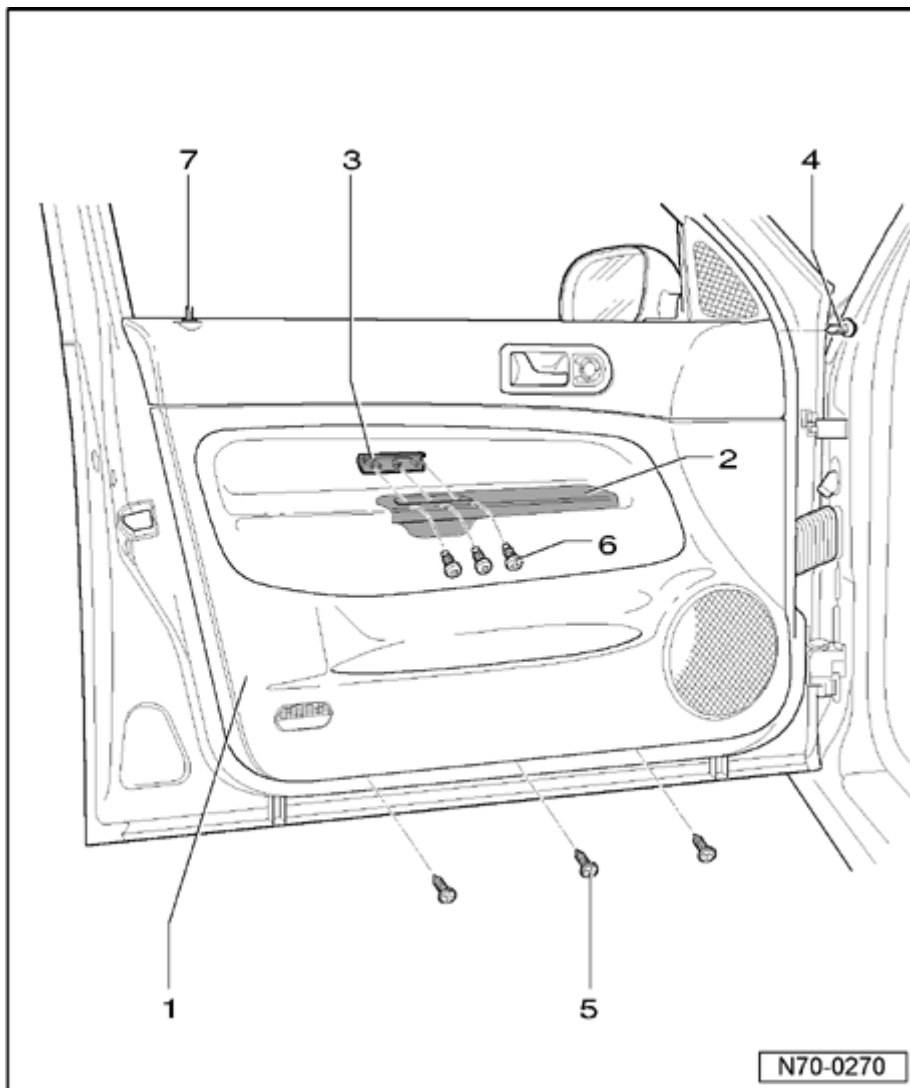
Tools

Special tools, testers and auxiliary items required



n Disassembly pliers 3392

Drivers side front door trim, assembly overview



1. Trim

- i Removing ⇒ [70-2, Drivers side front door trim, removing and installing](#)

2. Grip recess

3. Face plate

4. Front screw

5. Three lower bolts

6. Three screws behind grip recess

7. Locking knob

Drivers side front door trim, removing and installing

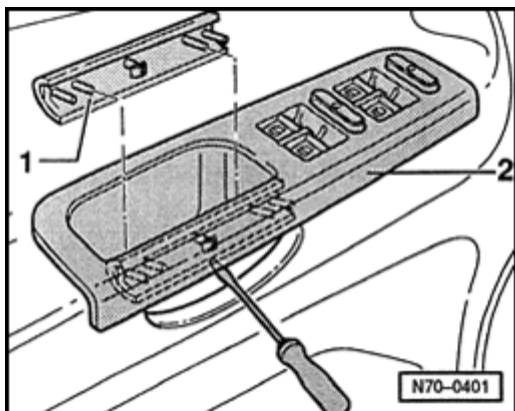
Note:

- n *Since partition is very narrow, use a sharp screwdriver to prevent damage to panel and grip recess.*
- n *Obtain radio unit code before disconnecting battery.*
- n *Do not grasp in grip depression when pulling off grip recess as a strut secured to door trim is underneath.*
- n *Removing and installing driver side front door trim for vehicles with manual window regulators is same as removing and installing Passengers side front door trim*

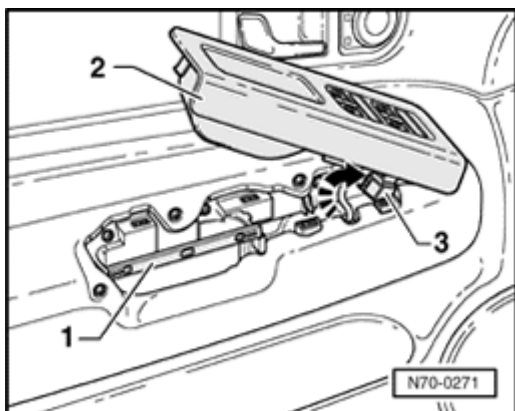
Removing**Caution!**

Disconnect battery ground (GND) strap before working on electrical system.

- Switch ignition off.



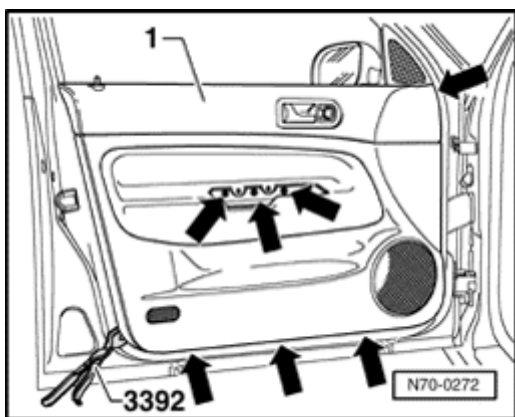
- Insert flat screwdriver in lower partition between panel - 1 - and grip recess - 2 -



- Unclip grip recess - 2 - upward out of door trim, do not

reach into grip depression while doing so, to prevent damage to brace - 1 - .

- Press locking lug against connector - 3 - - **arrow** - and remove.

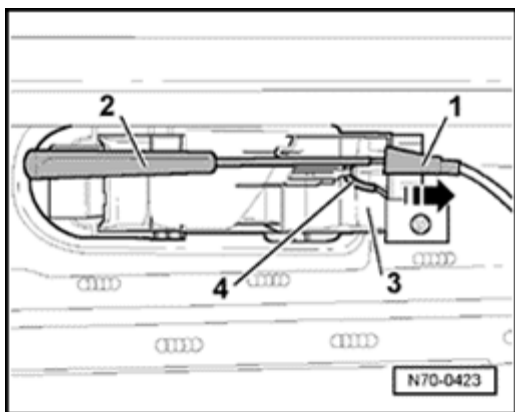


A

- Remove screws - **arrows** - .

- Unclip door trim - 1 - at sides using Disassembly pliers 3392 .

- Lift door trim upward out of window recess.

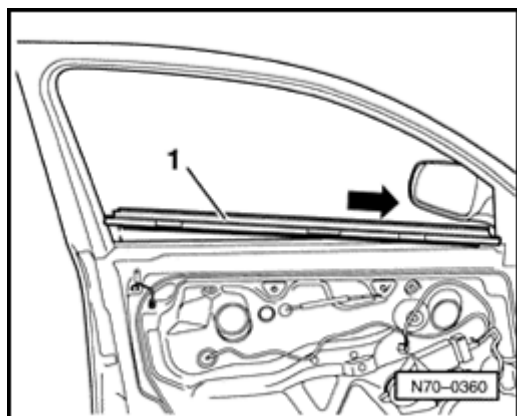


A

- Unclip cable guide - 1 - using a flat screwdriver - 2 - , remove bracket - 3 - in direction of - **arrow** - and unhook cable hook - 4 - .

- Disconnect harness connectors.

Installing



- Remove window recess seal - 1 - from door trim and insert in window recess.

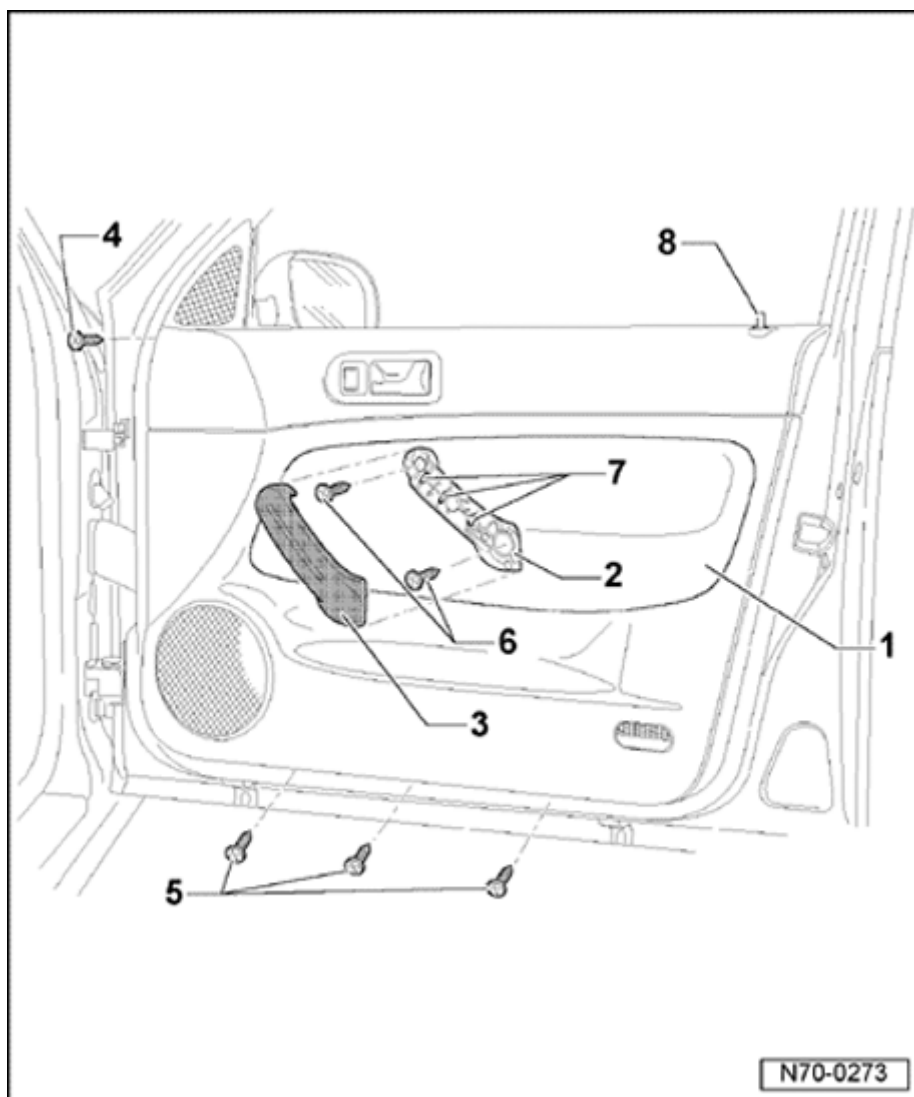
- Remainder of installing is reverse of removing.

Note:

- n *Before installing door trim, check clips and replace if necessary, and insert into mounts of door trim.*
- n *After connecting battery, check vehicle equipment (radio, clock, electric windows) as per Repair Manual and/or Owners Manual.*
- n *If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked*

⇒ *Repair Manual, Fuel Injection Ignition, Repair Group 01,*

Passengers side front door trim, assembly overview



1. Trim

- i Removing ⇒ [70-2, Passengers side front door trim, removing and installing](#)

2. Handle

3. Face plate

4. Front screw

5. Three lower bolts

6. Two screws behind trim

7. Three clips

8. Locking knob

Passengers side front door trim, removing

and installing

Removing

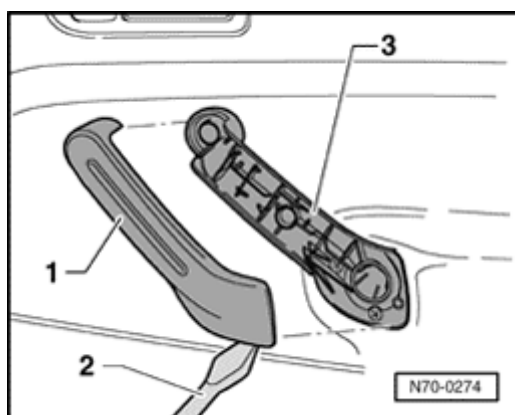
Caution!

Disconnect battery ground (GND) strap before working on electrical system.

Note:

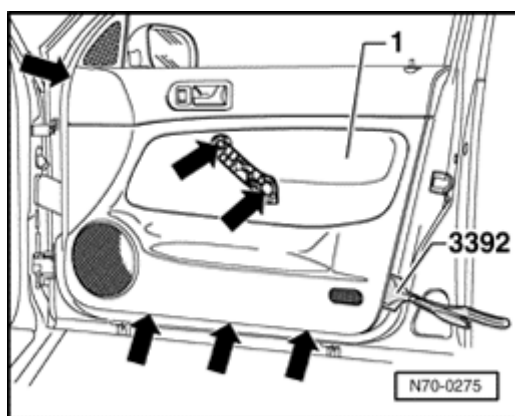
- n Obtain radio code before disconnecting battery.

- Switch ignition off.



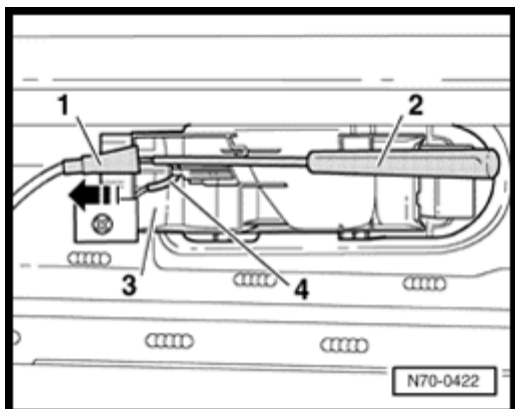
A

- Using a flat screwdriver - 2 - , pry out trim - 1 - from handle - 3 - .



A

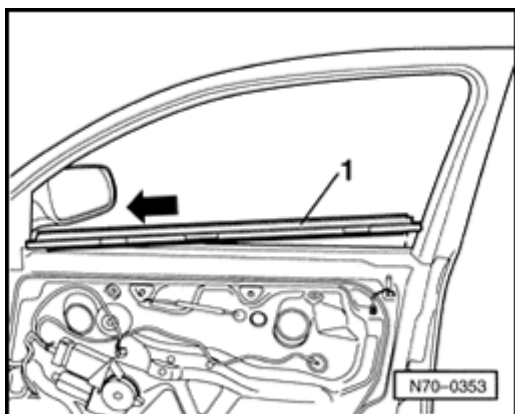
- Remove screws - **arrows** - .
- Unclip door trim - 1 - at sides using Disassembly pliers 3392 .
- Lift door trim upward out of window recess.



- Unclip cable guide - 1 - using a flat screwdriver - 2 - , pull out bracket - 3 - in direction of - **arrow** - and unhook cable hook - 4 - .

- Disconnect harness connectors.

Installing



- Remove window recess seal - 1 - from door trim and insert in window recess.

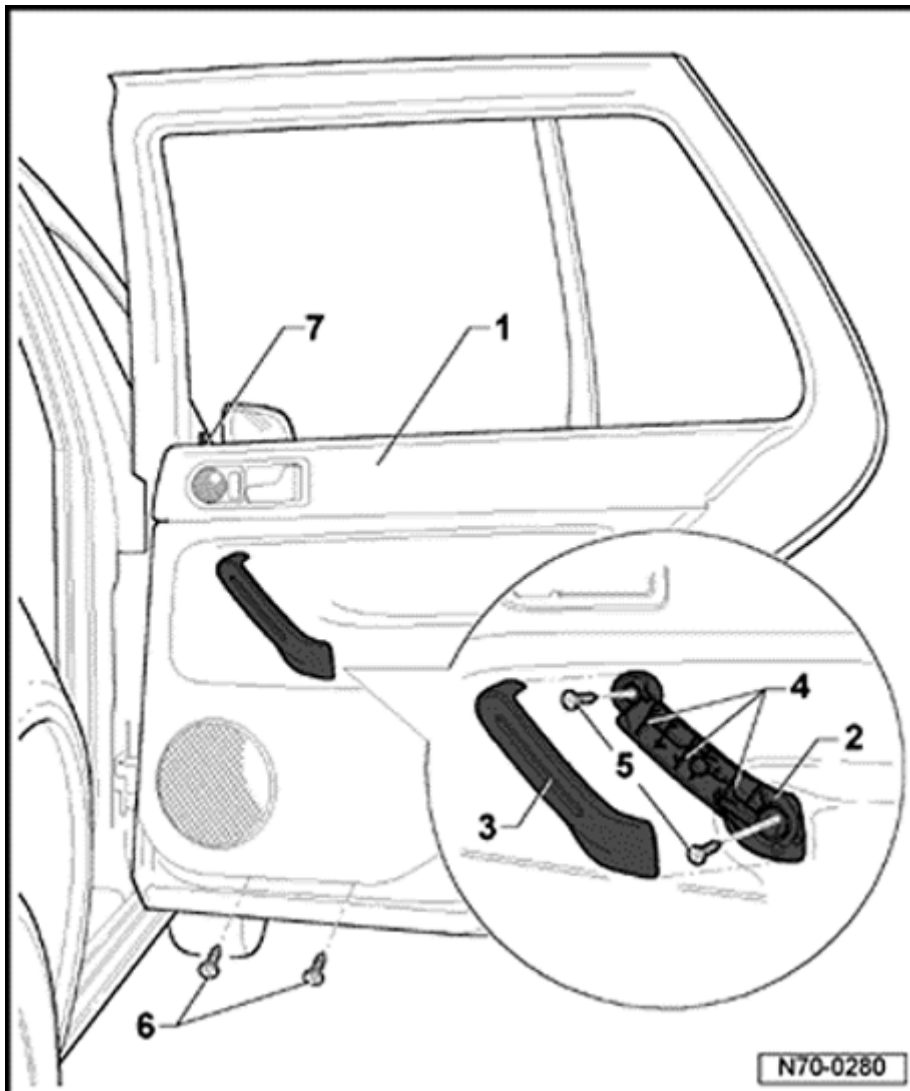
- Remainder of installing is reverse of removing.

Note:

- n *Replace clips before installing door trim.*
- n *Check plate nut for front upper screw is seated correctly.*
- n *After connecting battery, check vehicle equipment (radio, clock, electric windows) as per Workshop manual and/or Owners manual*
- n *If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked*

⇒ *Repair Manual, Fuel Injection Ignition, Repair Group 01,*

Rear door trim, assembly overview



1. Trim

- Removing ⇒ [70-2, Rear door trim, removing and installing](#)

2. Handle

3. Face plate

4. Three clips

5. Two screws behind trim

6. Two lower screws

7. locking knob

Rear door trim, removing and installing

Caution!

Disconnect battery ground (GND) strap before working on electrical system.

Note:

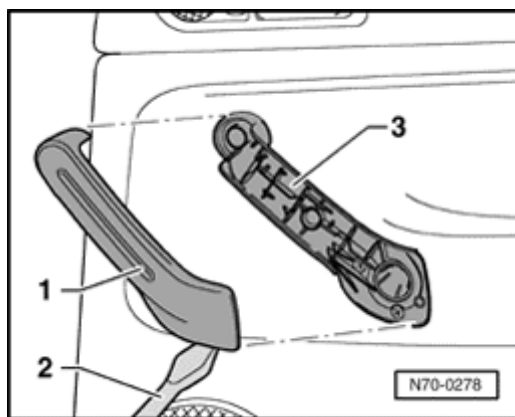
- n Removal and installation of trim is described for right side of vehicle. same instructions apply for removal and installation of trim for left-hand side.
- n Obtain radio code before disconnecting battery.

Removing

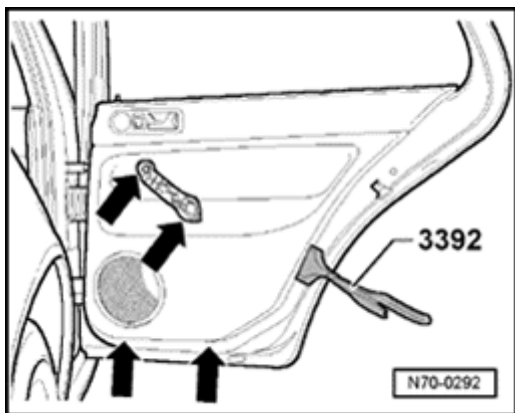
Note:

- n Obtain radio code before disconnecting battery.

- Switch ignition off.

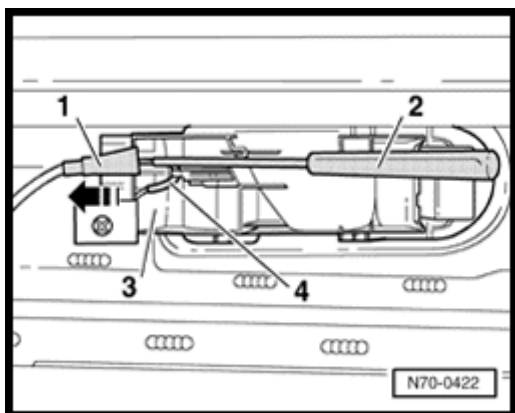


- Using a flat screwdriver - 2 - , pry out trim - 1 - from handle
- 3 - .



A

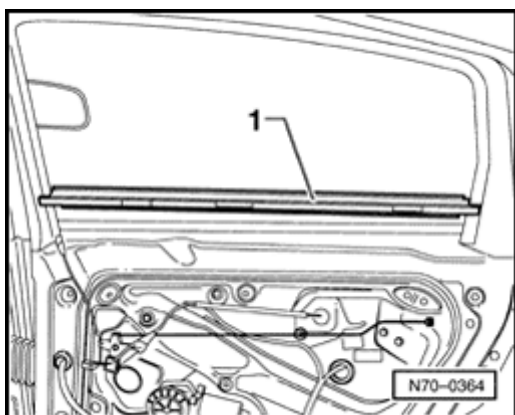
- Remove screws - **arrows** - .
- Unclip door trim at sides using Disassembly pliers 3392 .
- Lift door trim upward out of window recess.



A

- Unclip cable guide - **1** - using a flat screwdriver - **2** - , pull out bracket - **3** - in direction of - **arrow** - and unhook cable hook - **4** - .
- Disconnect harness connector - **3** - .

Installing



A

- Remove window recess seal - **1** - from door trim and insert in window recess.

- Remainder of installing is reverse of removing. .

Note:

- n *Replace clips before installing door trim.*
- n *After connecting battery, check vehicle equipment (radio, clock, electric windows) as per Repair Manual and/or Owners Manual.*
- n *If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked*

⇒ *Repair Manual, Fuel Injection Ignition, Repair Group 01,*

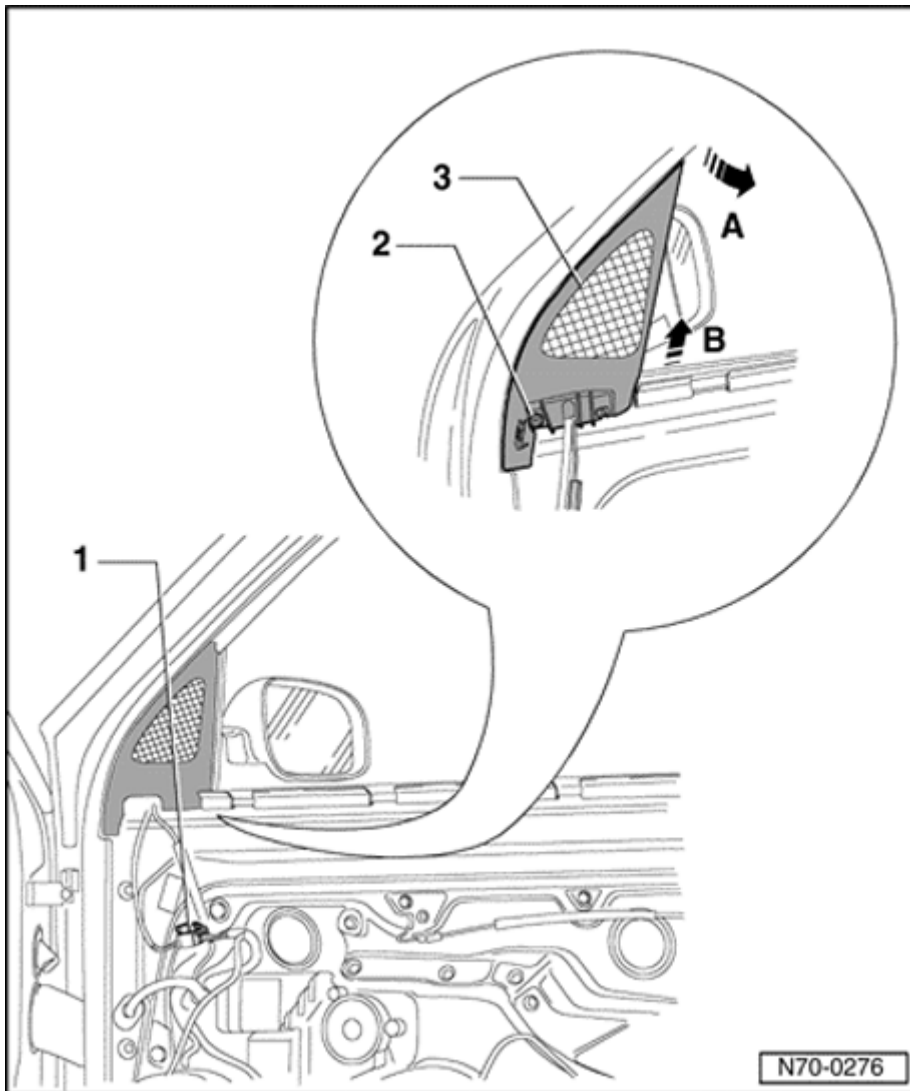
Front door window triangular trim (with speaker), removing and installing

Note:

- n *Removal and installation is described for right side of vehicle. same instructions apply for removal and installation on left-hand side.*

Removing

- Switch ignition off.
- Remove front door trim:
 - n Drivers side ⇒ [70-2, Drivers side front door trim, removing and installing](#) .
 - n Passengers side ⇒ [70-2, Passengers side front door trim, removing and installing](#) .
- Disconnect harness connector - **1** - for speaker.
- Remove screw - **2** - .



- Remove speaker - **3** - at top - **arrow A** -
and remove from door - **arrow B** - .

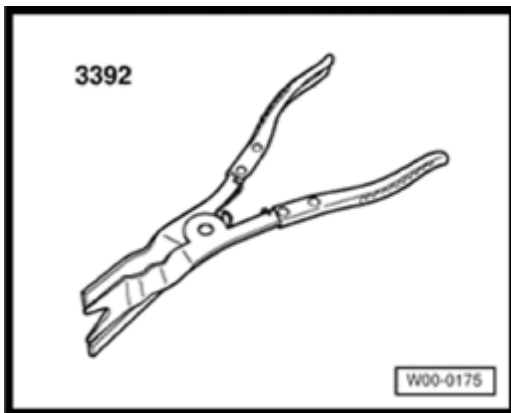
Installing

- Installation is reverse of removal.

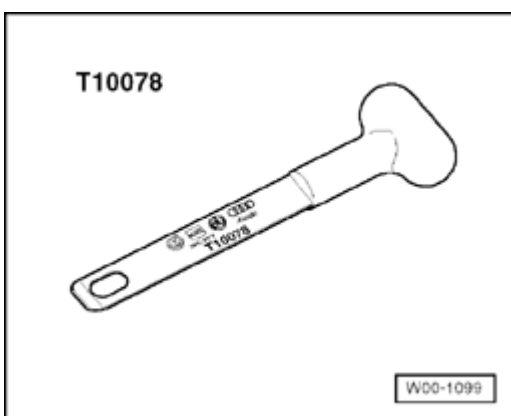
Pillar and side trim

Tools

Special tools, testers and auxiliary items required

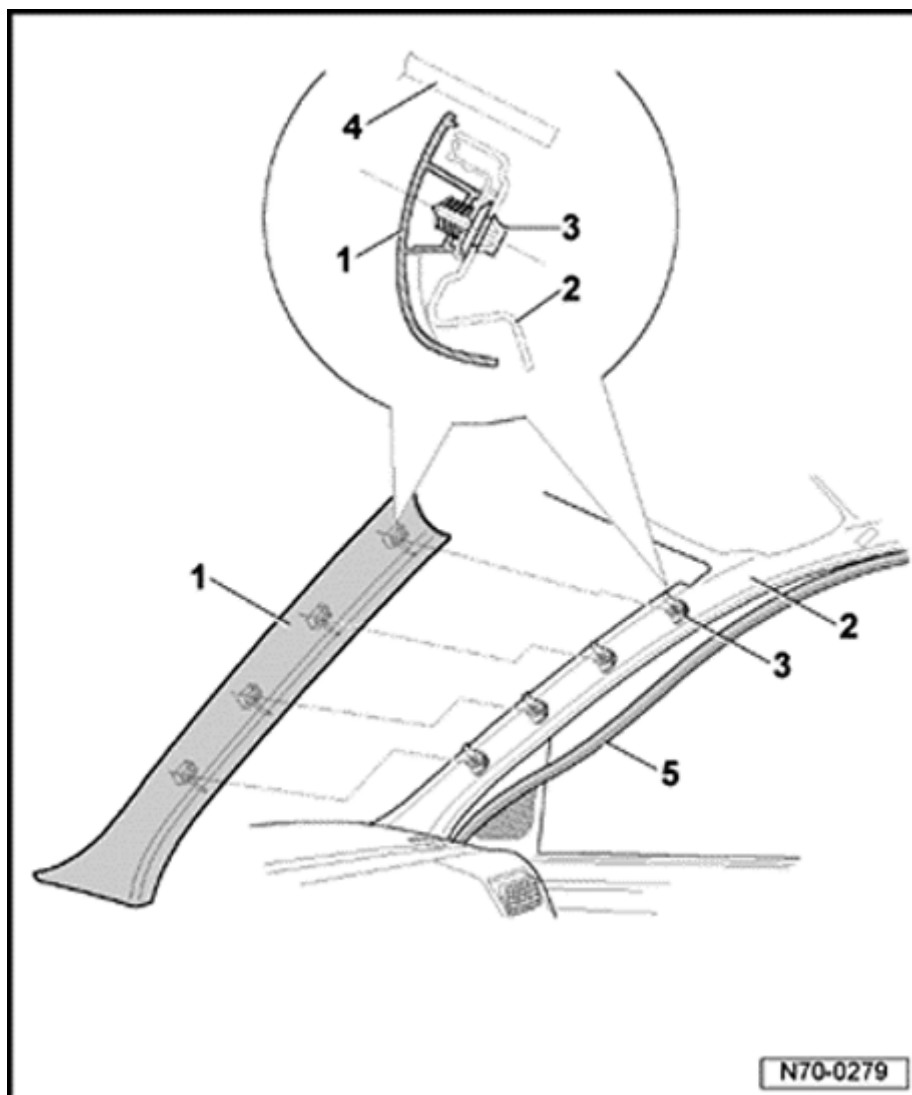


n Disassembly pliers 3392



n Releasing tool T10078

Upper A-pillar trim, assembly overview (Vehicles without side curtain protection)



1. Trim

- i Removing ⇒ [70-3, Upper A-pillar trim, removing and installing \(Vehicles without side curtain protection \)](#)

2. A-pillar

3. Clip

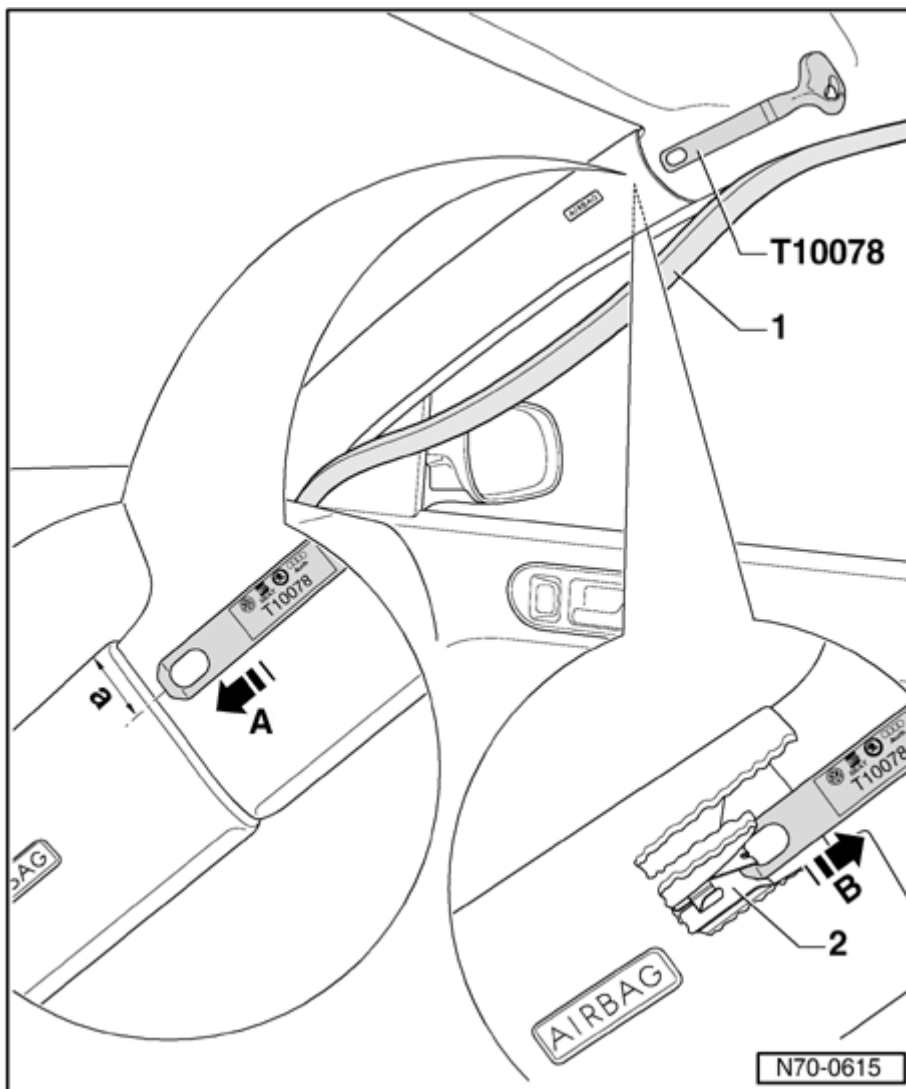
4. Windshield

5. Door inner seal

Upper A-pillar trim, removing and installing (Vehicles with side curtain protection)

Removing

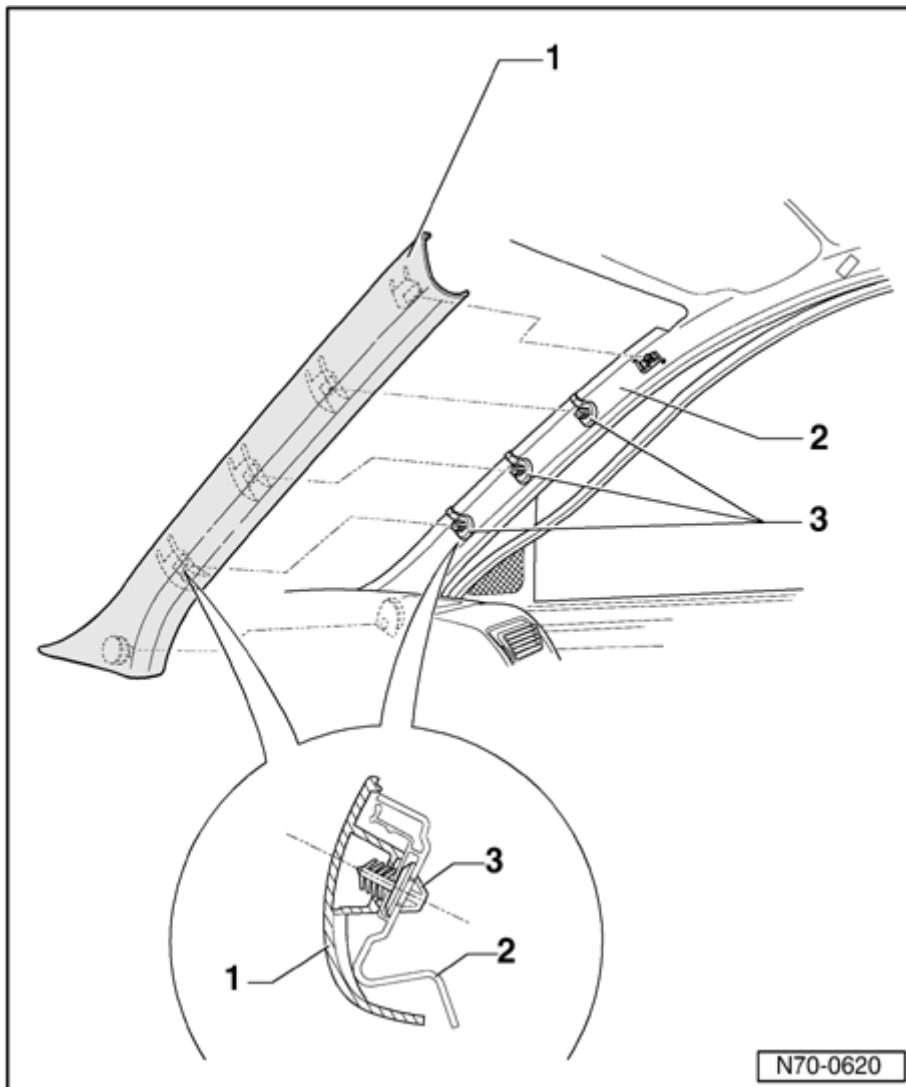
- Remove inner door seal - **1** - in area of A-pillar trim.
- Position Release tool T10078 at transition from molded headliner to A-pillar trim.
- Distance from windshield to center of tool must be approx. 22 mm (dimension - **a** -).
- Slide Release tool T10078 between molded headliner and A-pillar trim until it engages audibly - **arrowA** - .



- Pull tool back - **arrowB** - , reby removing lower part of steel clip - **2** - .
- Unclip trim - **1** - , starting at top, from A-pillar - **2** - and remove.

Note:

- n For safety, steel clips - 3 - and upper C-pillar trim must be replaced every time trim panel of C-pillar is removed on a vehicle with side curtain airbags.
- n Steel clips and upper C-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection → parts catalog.



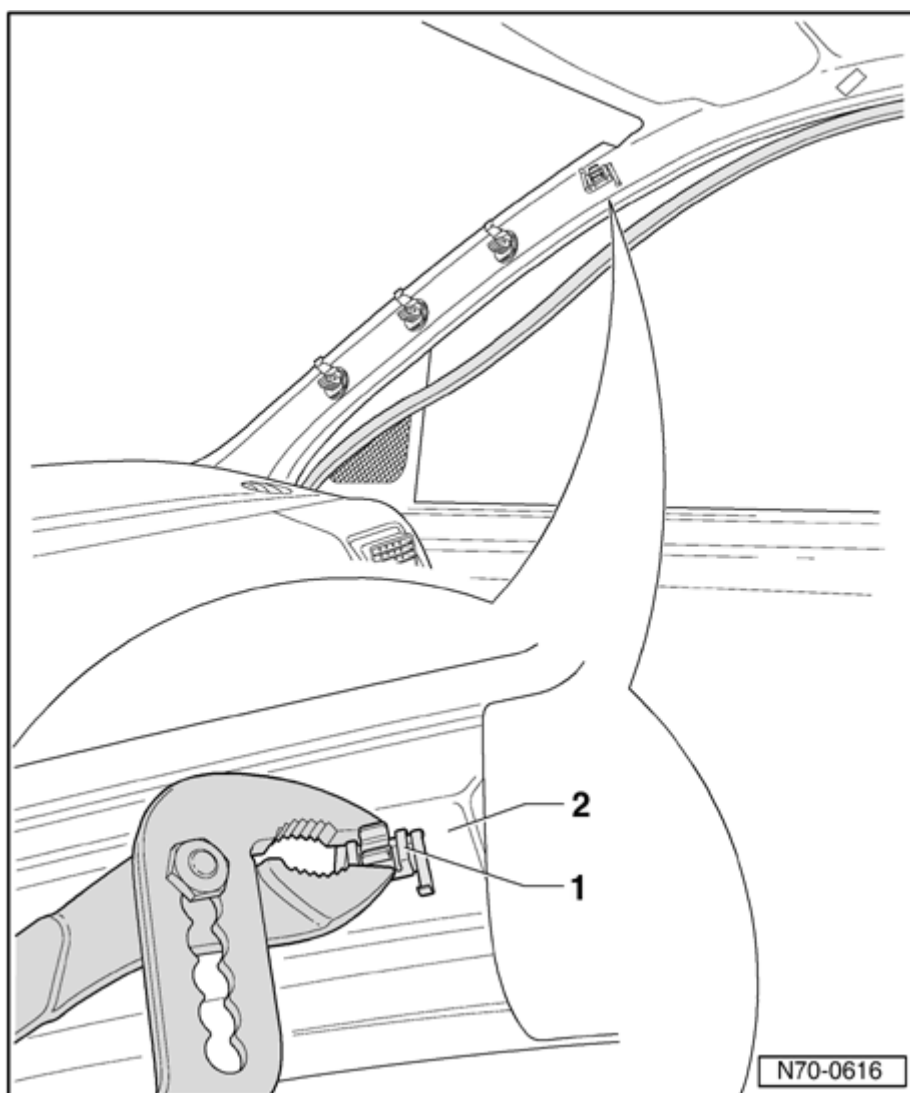
- Disengage locking mechanism of steel clip - 1 - by forcefully pushing toger using standard pliers.

- Remove steel clip - 1 - from A-pillar - 2 -

Note:

- n It is not possible to remove steel clip

- 1 - without destroying it.



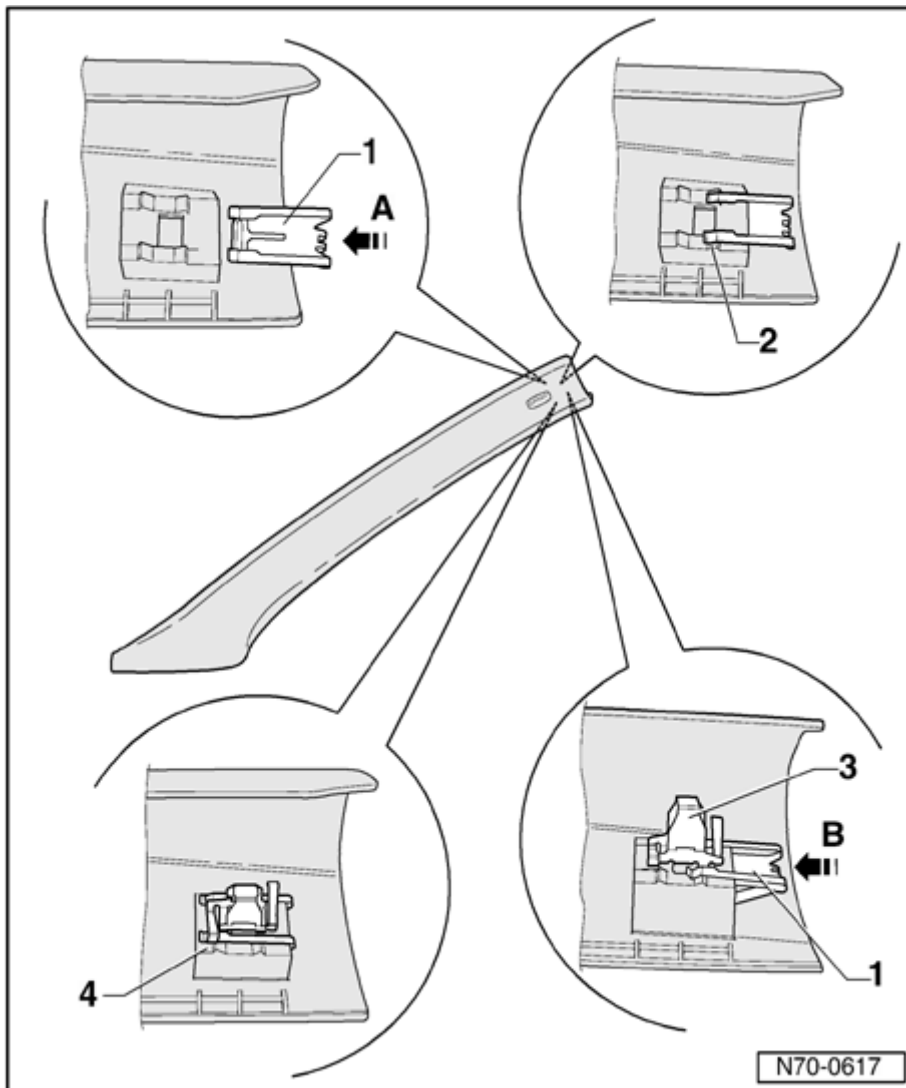
Installing

Note:

- n For safety reasons, steel clips - 1 - and - 3 - must be replaced after each removal and installation of A-pillar trim.
- n Steel clips and upper A-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection ⇒ see parts catalog.

- Slide steel clip - 1 - in direction of - **arrow A** - into first detent - 2 - of A-pillar trim.

- Insert steel clip - 3 - into mount.

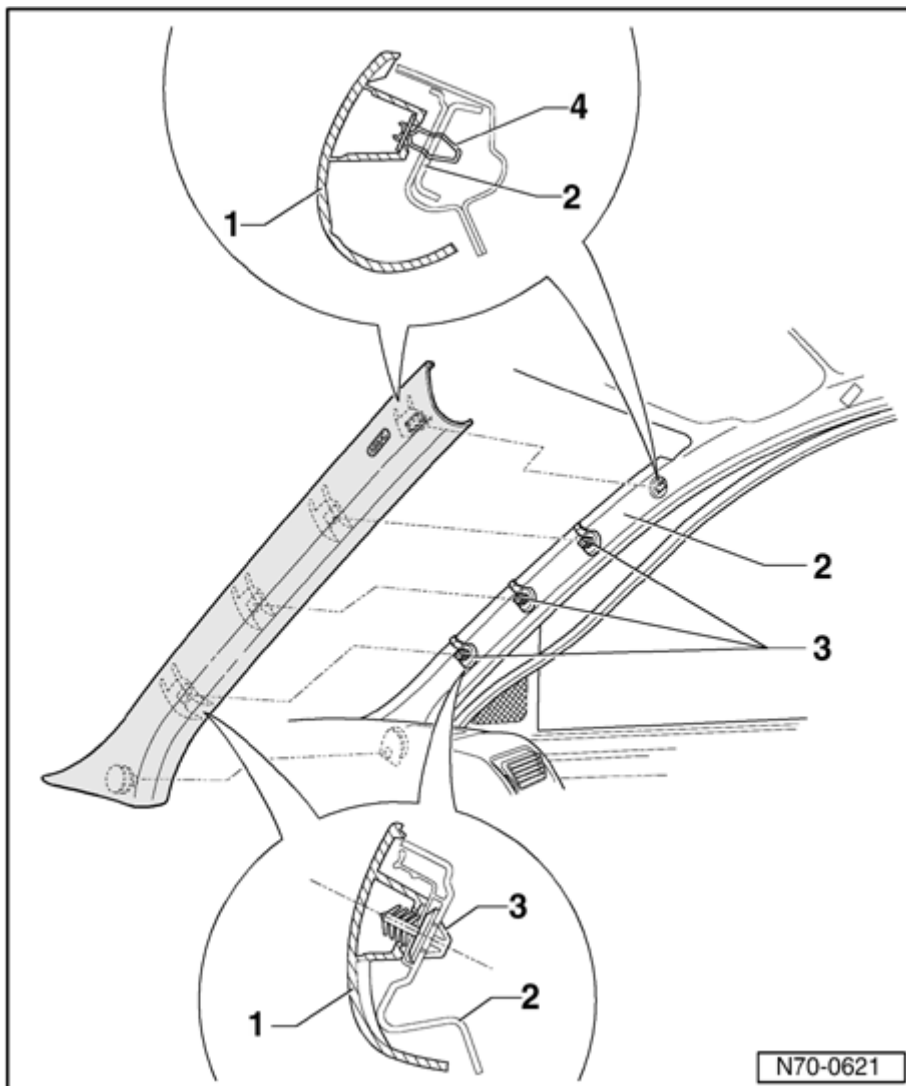


- Slide steel clip - 1 - in direction of - **arrow B** - up to second detent - 4 - .

Note:

- n upper section of trim panel must be fixed with steel clip - 4 - , until it engages audibly.
- n Before installing trim, check clips - 3 - for damage and replace if necessary.

- Clip trim - 1 - to A-pillar - 2 - .

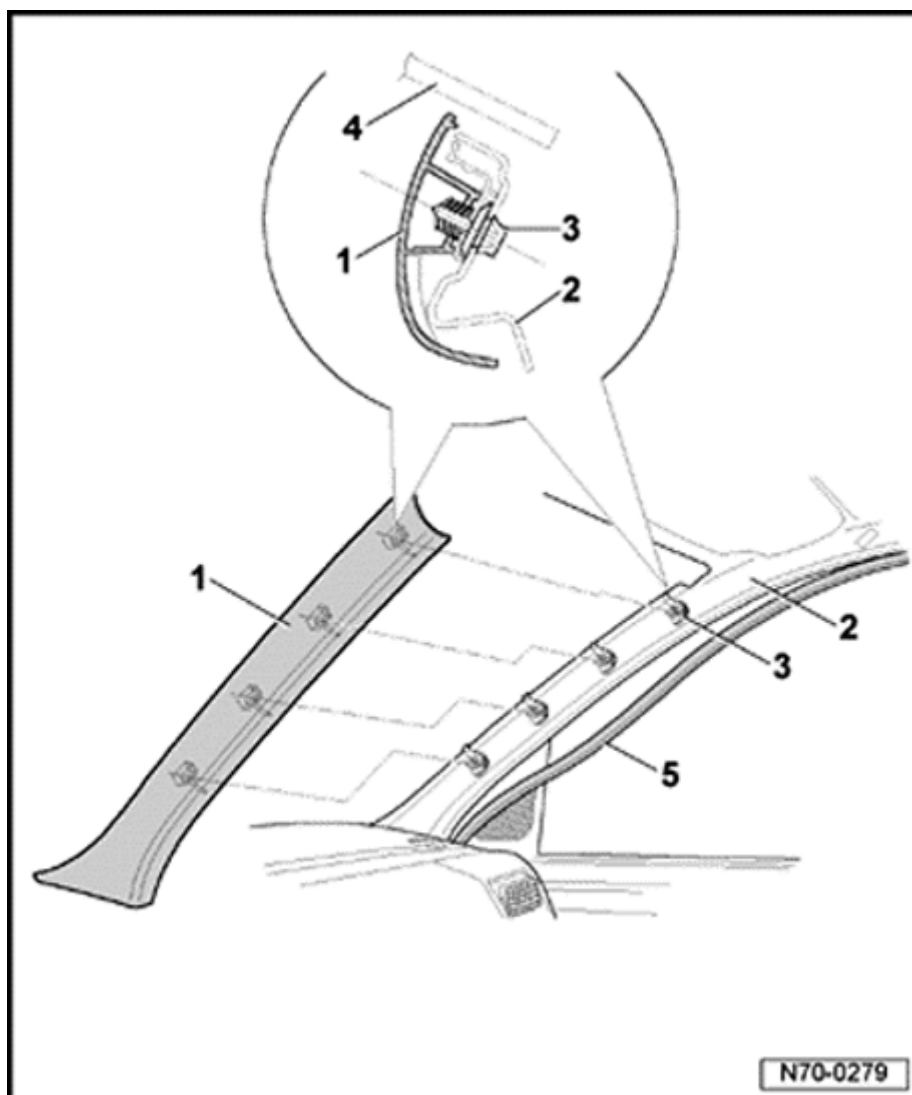


- Install door inner seal. .

Upper A-pillar trim, removing and installing (Vehicles without side curtain protection)

Removing

- Remove inner door seal - 5 - from A-pillar - 2 - .



- Unclip trim - 1 - , starting at top, from A-pillar - 2 - and remove.

Installing

- Installation is reverse of removal.

Note:

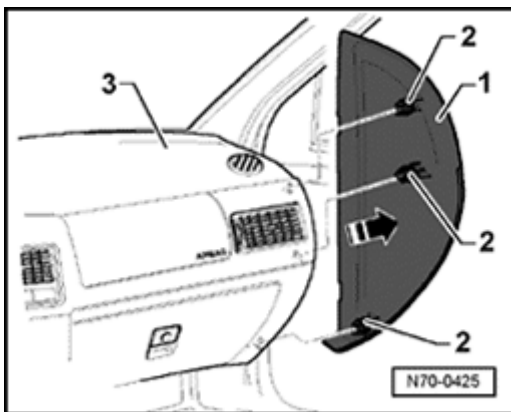
- n *For safety, steel clips - 3 - and upper C-pillar trim must be replaced every time trim panel of C-pillar is removed on a vehicle with side curtain airbags.*
- n *Steel clips and upper C-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection ⇒ parts catalog*

Lower A-pillar trim, removing and installing

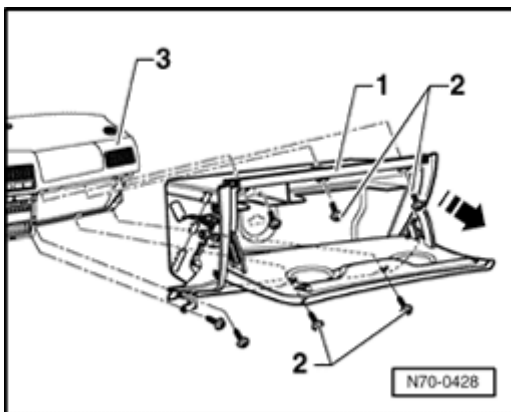
Removing

- Remove hood release lever

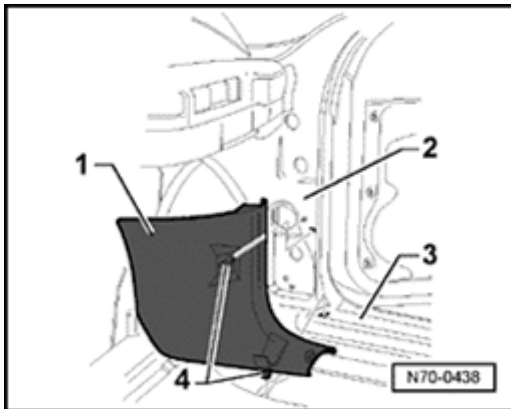
⇒ [Repair Manual, Body Exterior, Repair Group 55, Front hood](#)



- Release cover - 1 - with clips - 2 - from instrument panel - 3 - .
- Remove cover - 1 - - **arrow** - .



- Remove bolts - 2 - .
- Carefully remove glove compartment - 1 - from instrument panel - 3 - - **arrow** - .



- Unclip trim - 1 - at top from A-pillar - 2 - and loosen from sill panel trim - 3 - at bottom.

Note:

n Trim - 1 - is secured with two metal clips - 4 - .

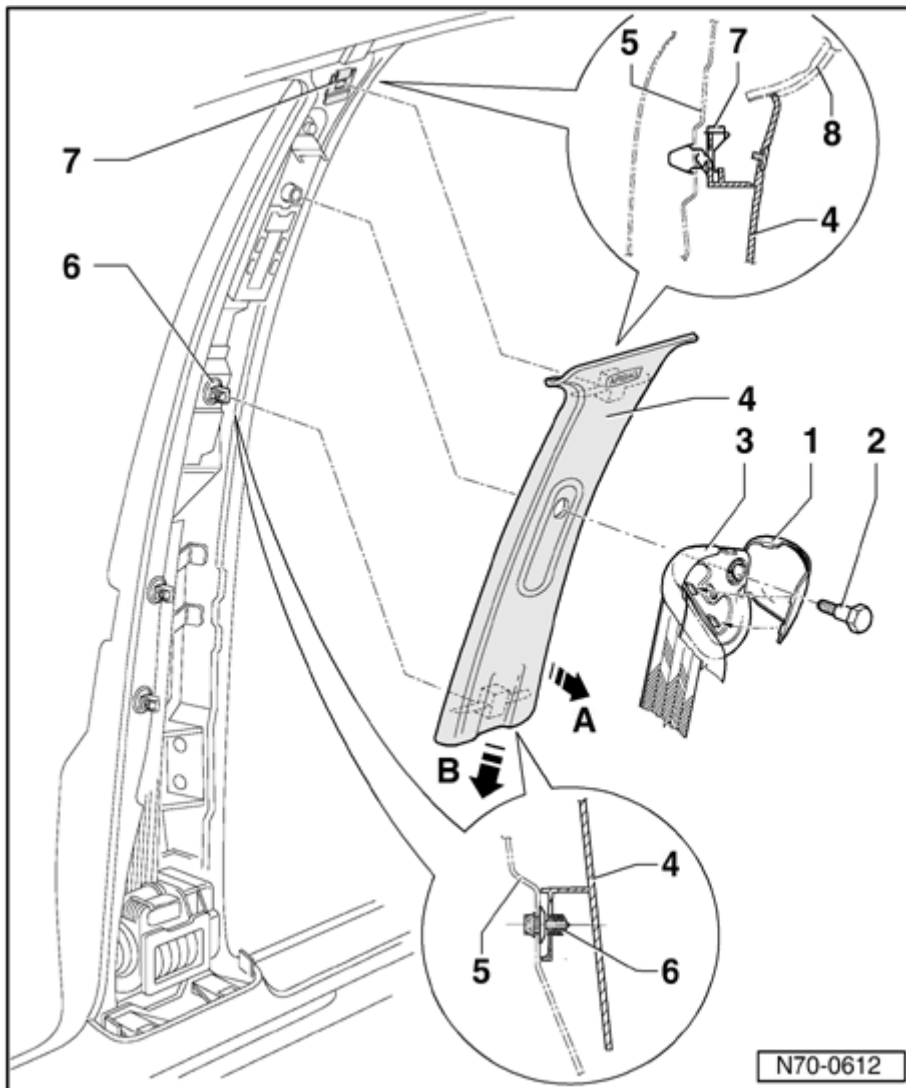
Installing

- Installation is reverse of removal.

Note:

n Before installation, securing clips and retaining clips must be checked for damage and replaced if necessary.

Upper B-pillar trim, assembly overview (Vehicles with side curtain protection ➤ 04.01)



1. Cover cap

2. Bolt

ⓘ 40 Nm

3. Belt relay

4. B-pillar trim

ⓘ Removing ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 04.01\)](#)

5. B-pillar

6. Mounting clip

7. Steel clip

8. Molded headliner

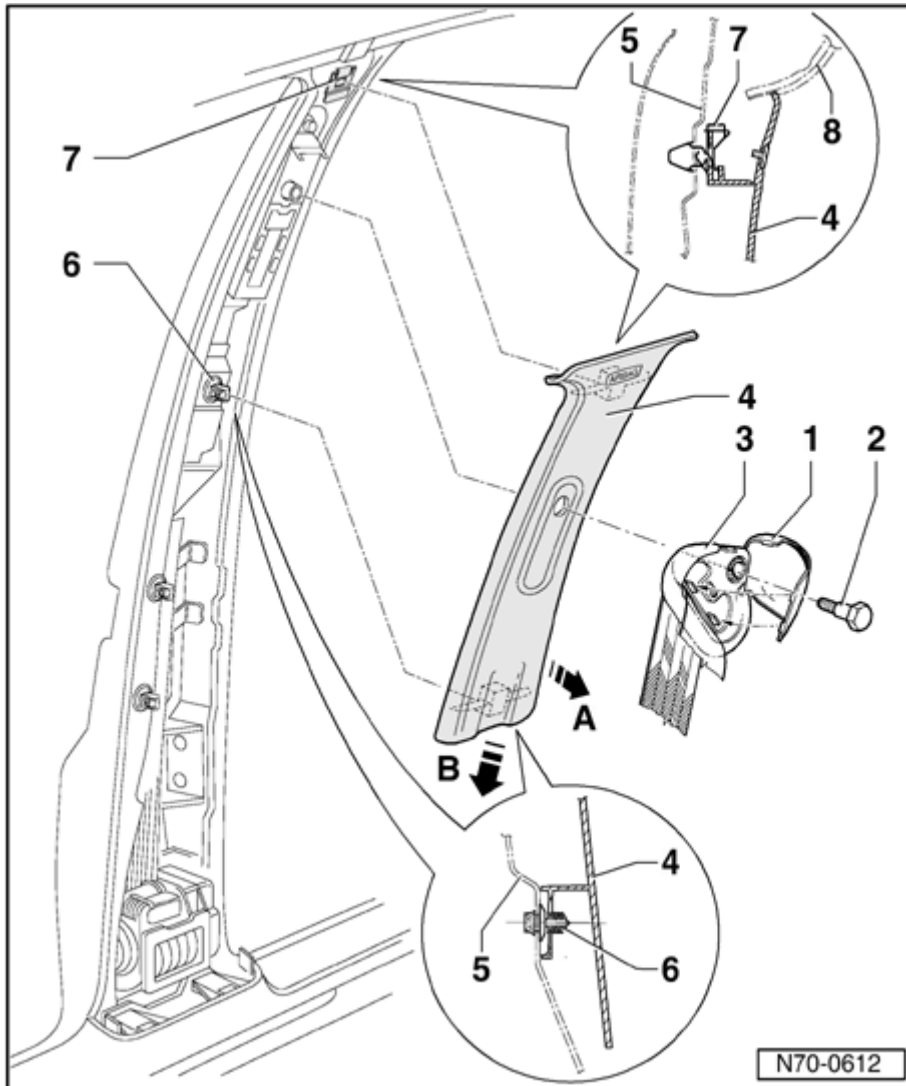
Upper B-pillar trim, removing and installing (Vehicles with side curtain protection ➤ 04.01)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Remove lower B-pillar trim ⇒ [70-3, Lower B-pillar trim, removing and installing](#) .
- Remove cap - **1** - .
- Remove screw - **2** - (40 Nm) and remove belt relay - **3** - .
- Loosen B-pillar trim - **4** - in lower area - **arrowA** - .



- Pull B-pillar trim - 4 - downward - **arrow B** - .

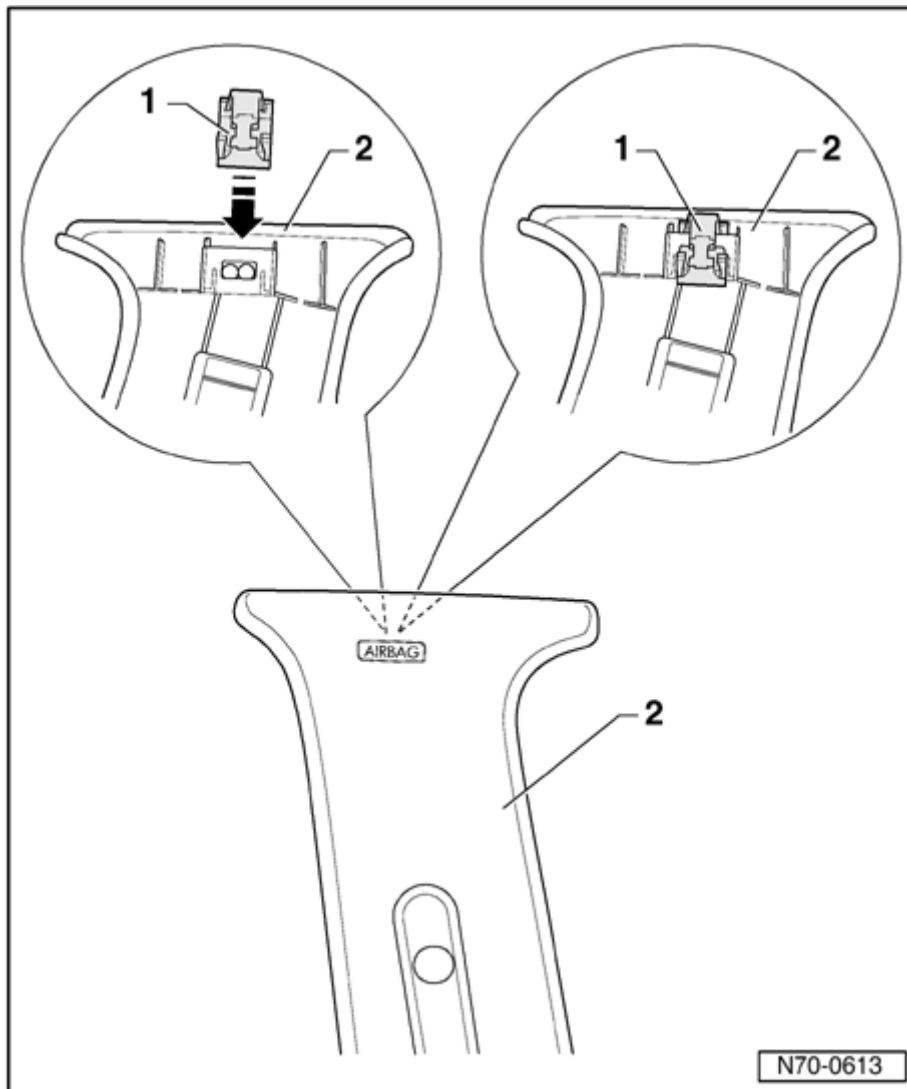
- Position standard needle-nose pliers at side between B-pillar - 1 - and steel clip - 2 - .

- Disengage locking mechanism of steel clip - 2 - by forcefully pushing toger using needle-nose pliers - **arrows** - .

- Remove steel clip - 2 - from B-pillar - 1 - .

Note:

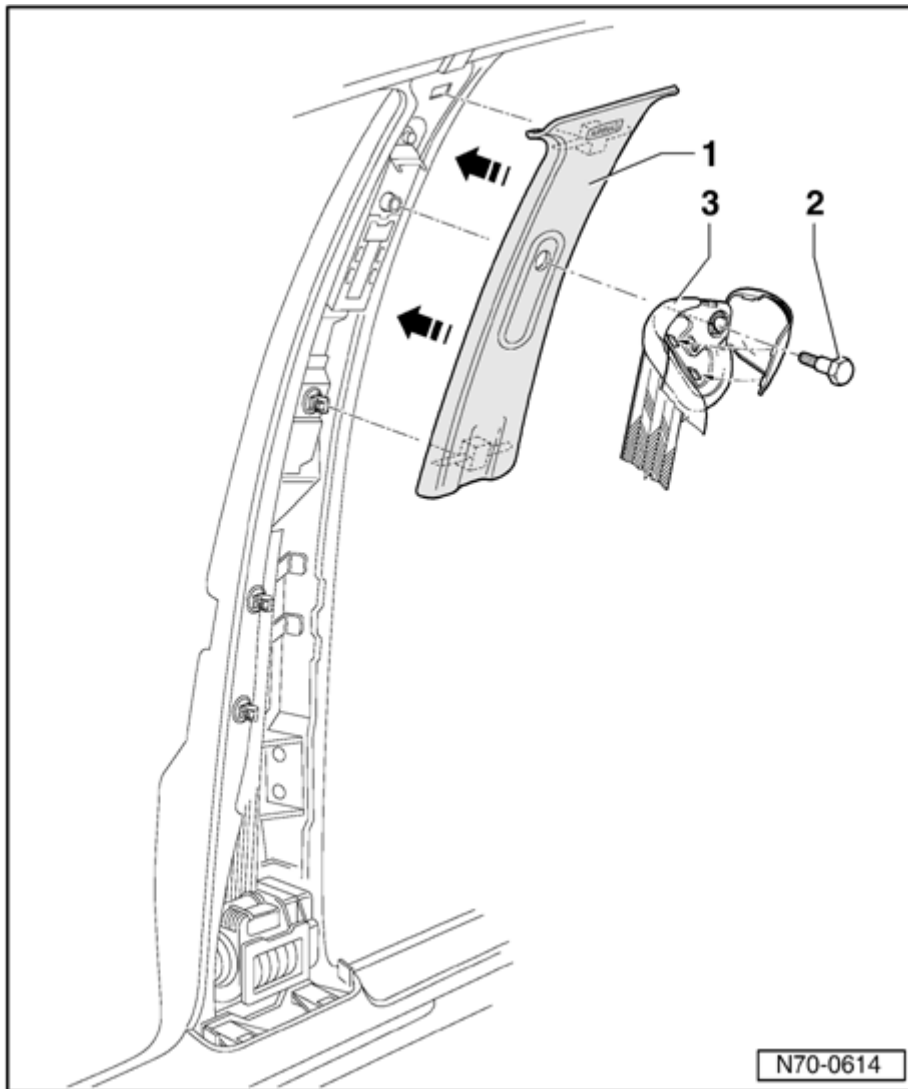
- n *It is not possible to remove steel clip - 2 - without destroying it, it must be replaced*



- Insert steel clip - 1 - in B-pillar trim - 2 - -
arrow - .

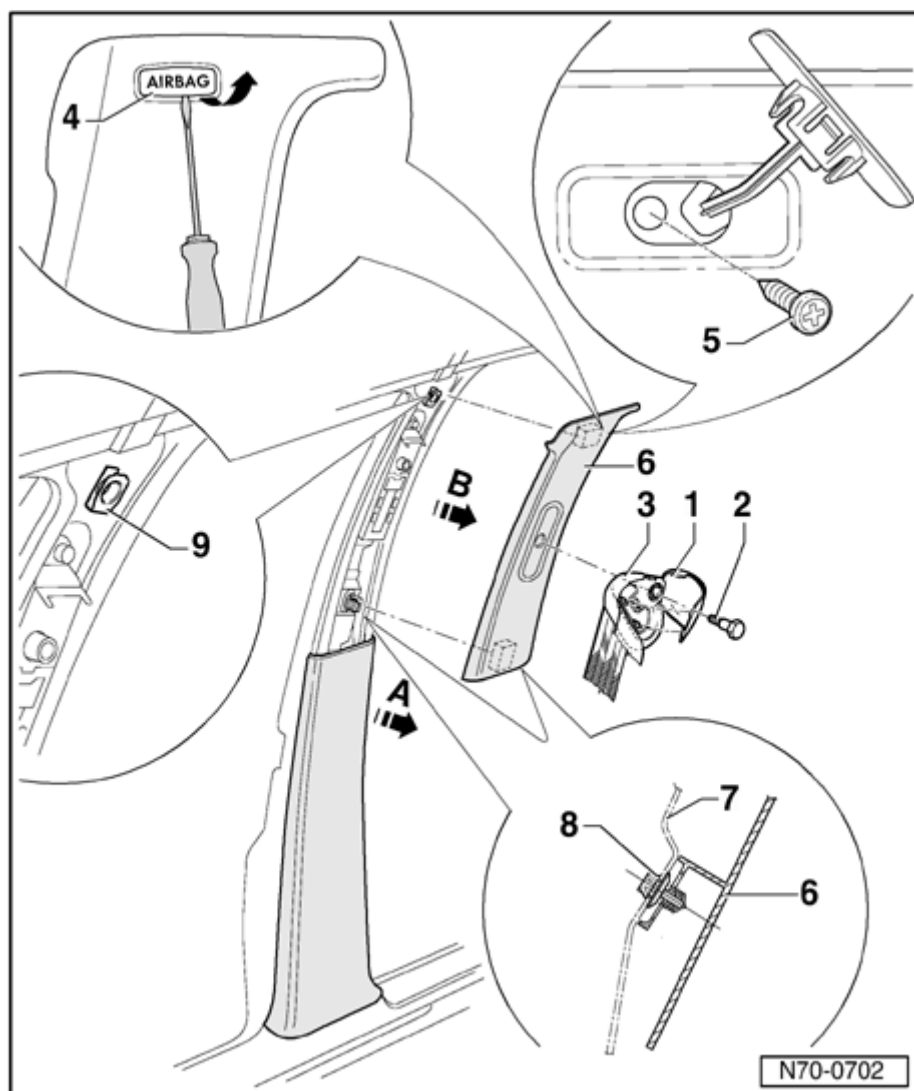
- Clip trim - 1 - to B-pillar - **arrows** - .

- Bolt belt relay - 3 - with bolt - 2 - (40 Nm)
to B-pillar.



- Install lower B-pillar trim ⇒ [70-3, Lower B-pillar trim, removing and installing](#) .

Upper B-pillar trim, assembly overview
(Vehicles with side curtain protection 05.01
▼)



1. Cover cap

2. Bolt

ⓘ 40 Nm

3. Belt relay

4. Emblem, airbag

5. screw

ⓘ 2 Nm

6. B-pillar trim

ⓘ Removing ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 05.01 \)](#)

7. B-pillar
8. Mounting clip
9. Steel Clip

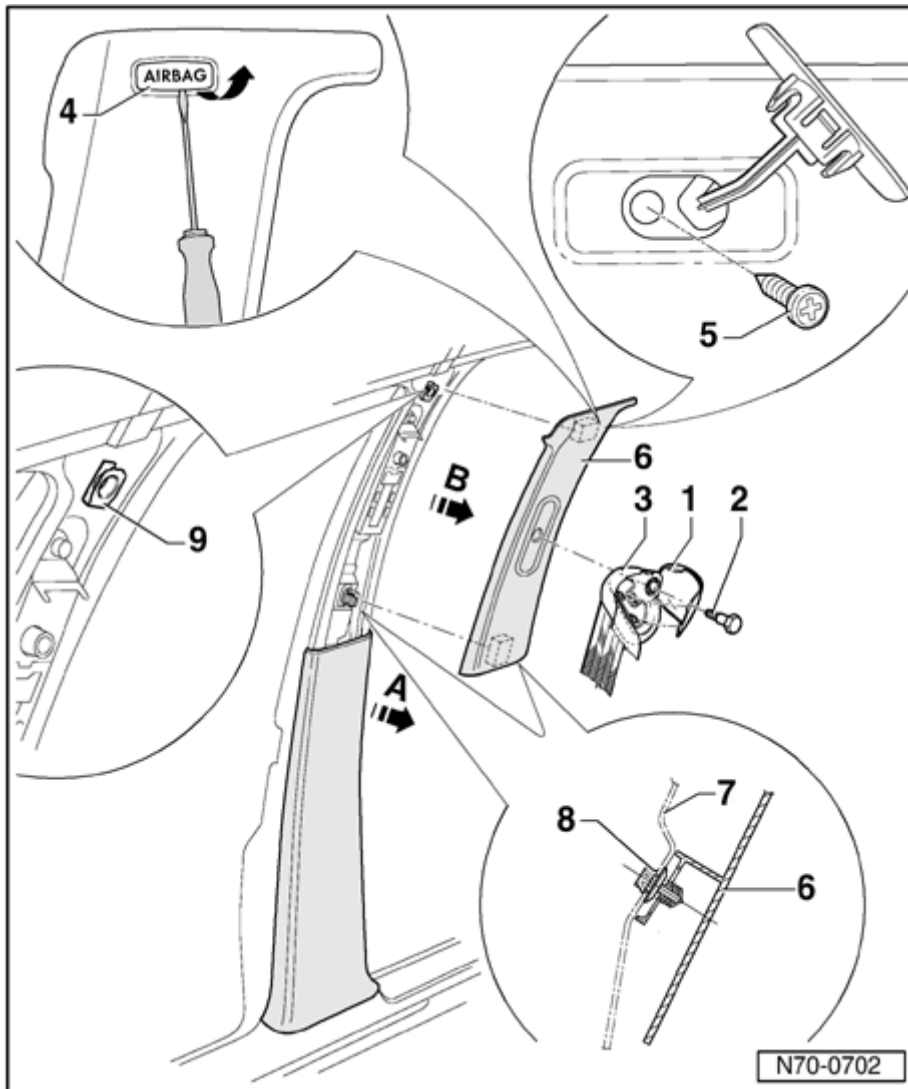
Upper B-pillar trim, removing and installing (Vehicles with side curtain protection 05.01 >)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

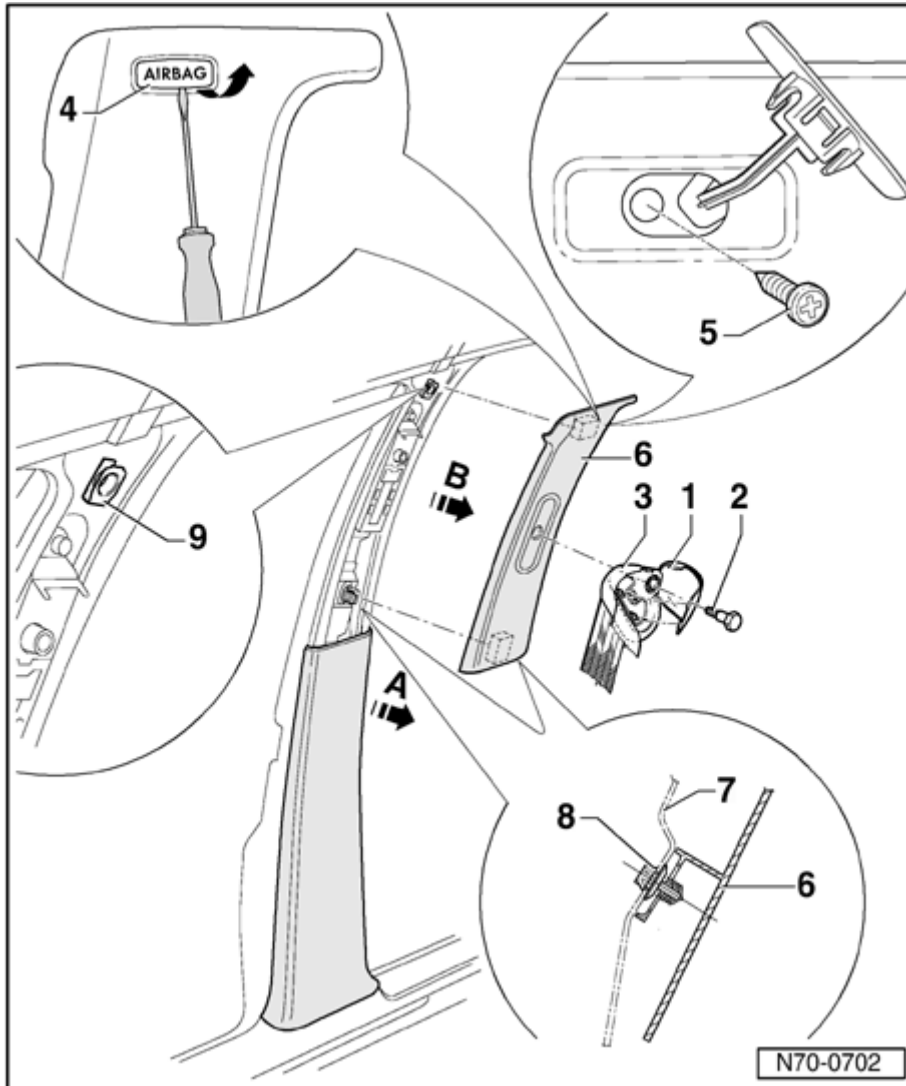
Removing

- Remove cap - **1** - .
- Remove bolt - **2** - (40 Nm) and remove belt relay - **3** - .
- Unclip emblem, airbag - **4** - using a small screwdriver.
- Remove bolt - **5** - (2 Nm).
- Loosen lower B-pillar trim in upper area - **arrow A** - .



- Loosen B-pillar trim - 6 - first at sides, n
in center of B-pillar - 7 - - arrow B - .

Installing

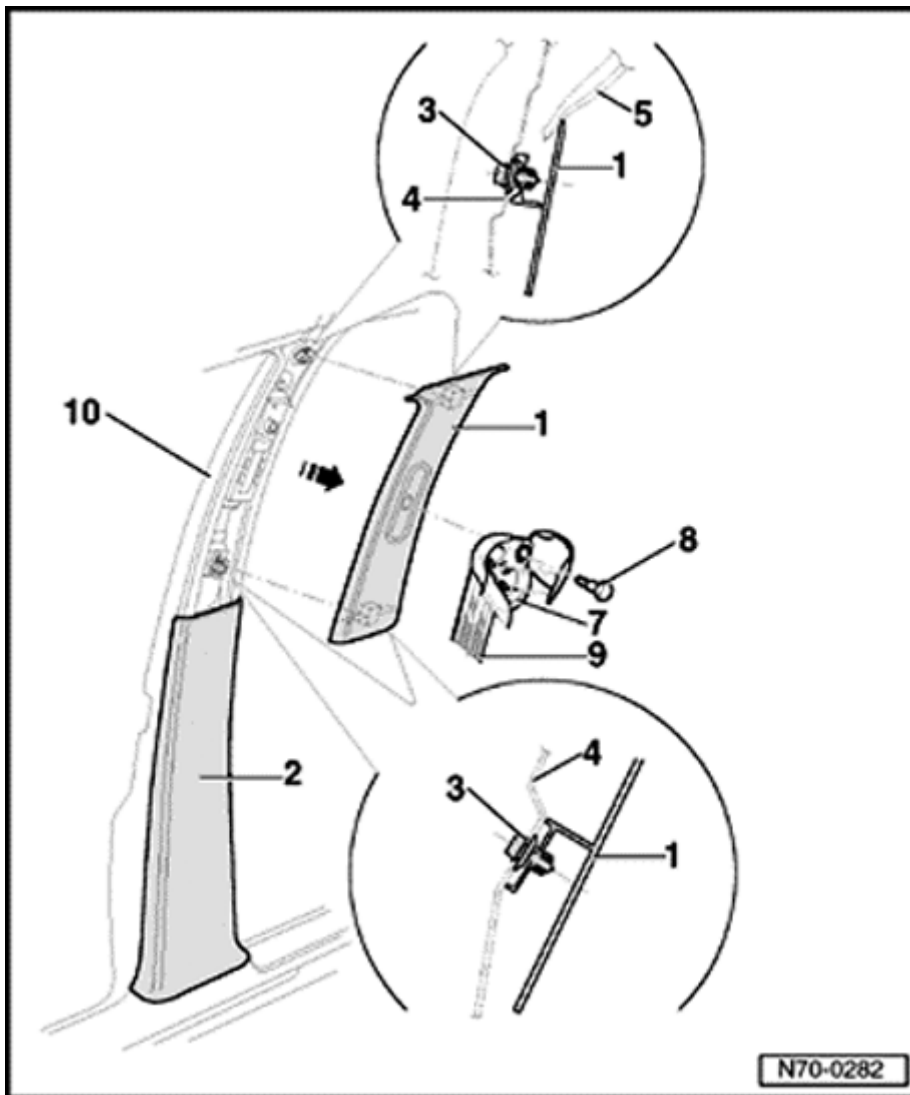


Installation is reverse of removal.

Note:

- n For safety, steel clips and upper B-pillar trim must be replaced every time trim panel of B-pillar is removed on a vehicle with side curtain airbags.
- n Steel clips and upper B-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection ⇒ parts catalog.

**Upper B-pillar trim, assembly overview
(Vehicles without side curtain protection)**



1. Upper B-pillar trim

- i Removing ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles without side curtain protection\)](#)

2. Lower B-pillar trim

3. Securing clip

4. B-pillar

5. Molded headliner

6. Cover cap

7. Belt relay

8. Bolt

- i 40 Nm

9. Belt webbing

10. B-pillar

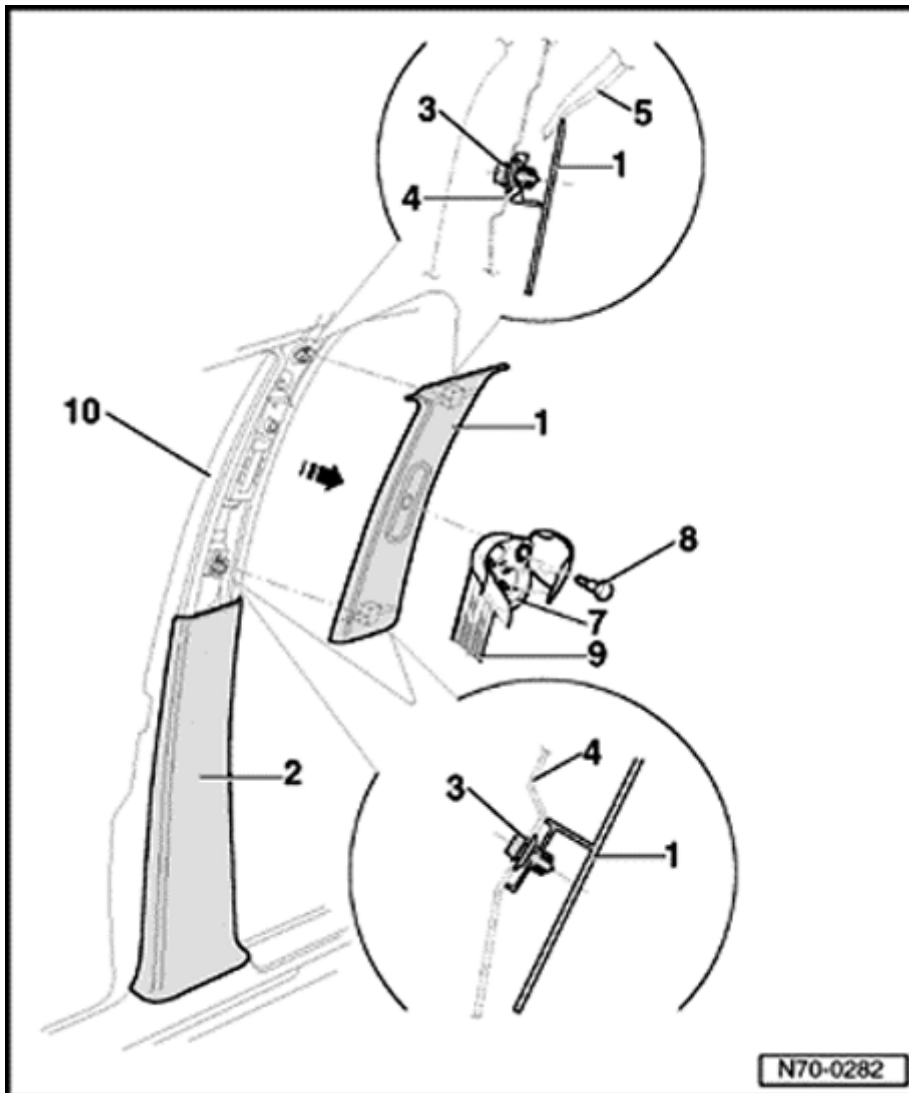
Upper B-pillar trim, removing and installing (Vehicles without side curtain protection)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Remove cap - **6** - .
- Remove bolt - **8** - and remove belt relay
- **7** - .
- Loosen lower B-pillar trim - **2** - in upper
area - **arrow** - .



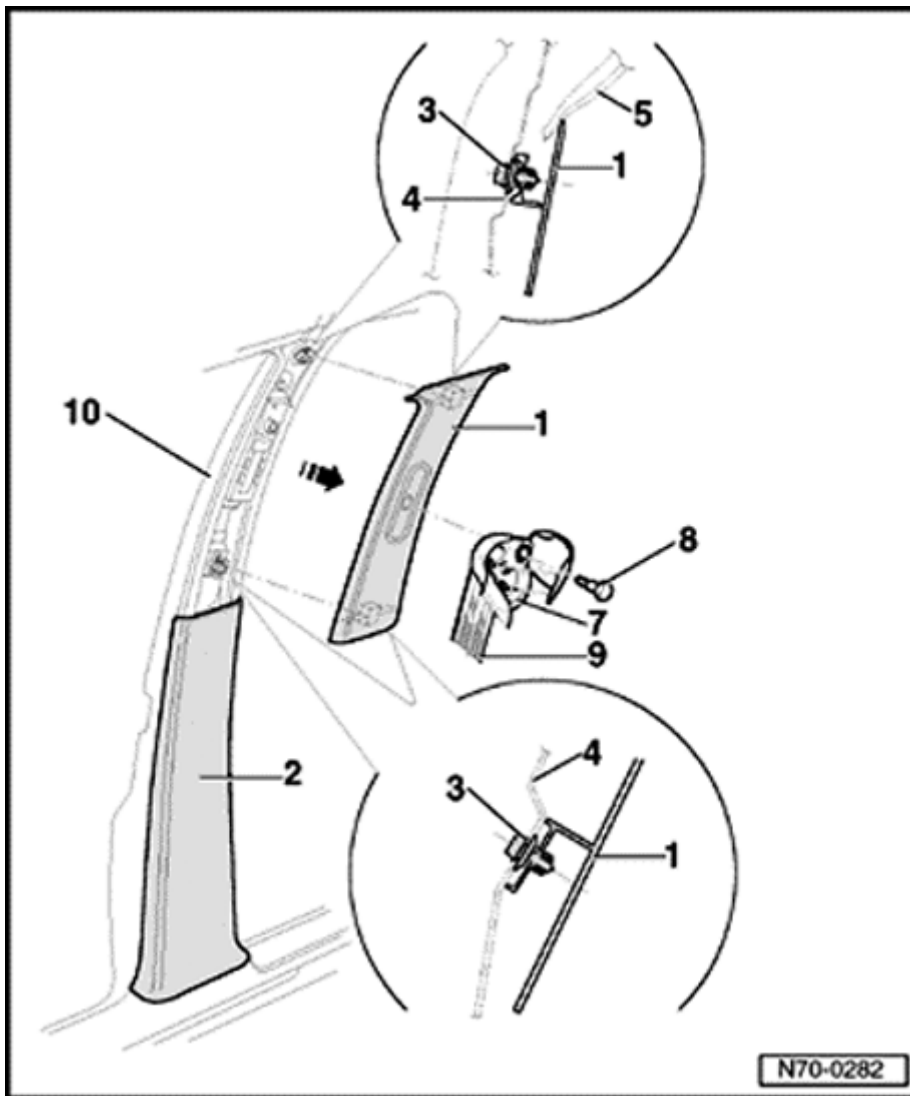
- Loosen upper B-pillar trim - 1 - first at sides, n in center of B-pillar - 4 - - arrow -

Installing

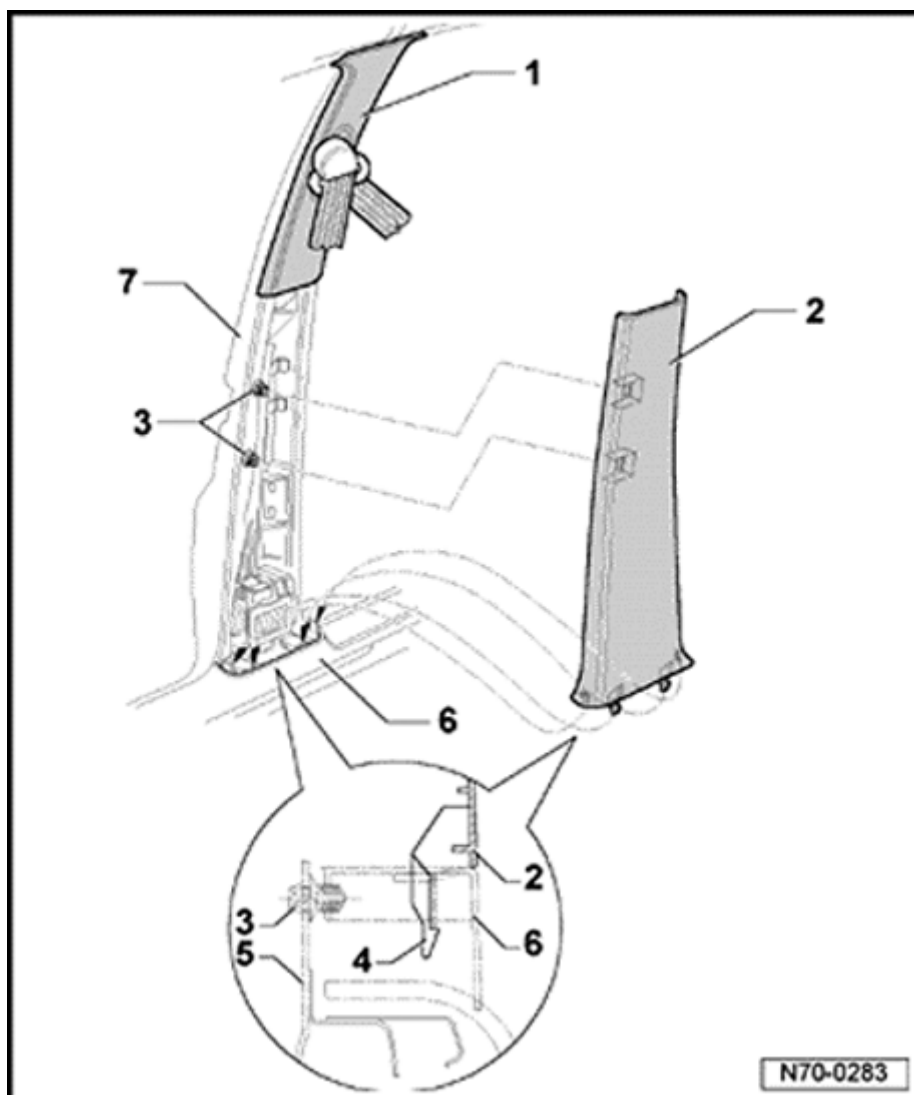
- Installation is reverse of removal.

Note:

- n For safety, steel clips - 3 - and upper C-pillar trim must be replaced every time trim panel of C-pillar is removed on a vehicle with side curtain airbags.
- n Steel clips and upper C-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection ⇒ parts catalog



Lower B-pillar trim, assembly overview



1. Upper B-pillar trim

2. Lower B-pillar trim

↳ Removing ⇒ [70-3, Lower B-pillar trim, removing and installing](#)

3. Securing clips

4. Catches

5. Sill

6. Sill panel trim

7. B-pillar

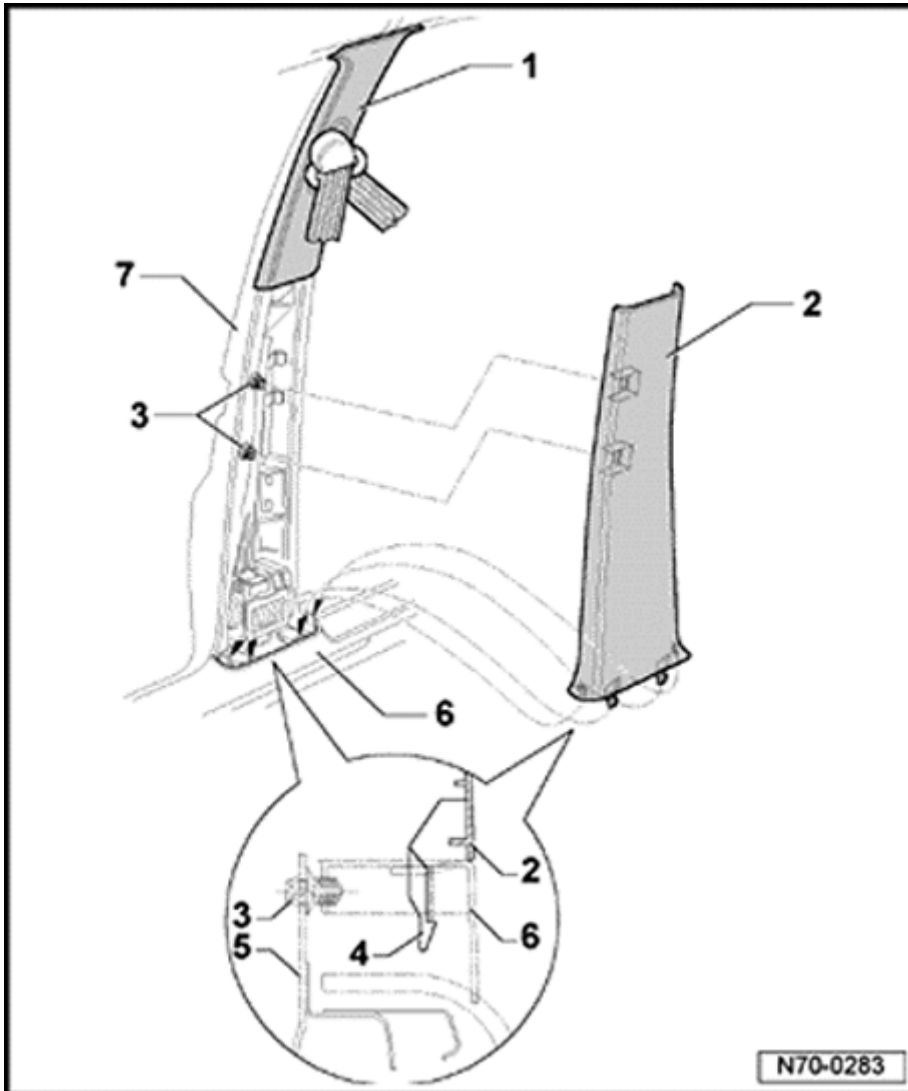
Lower B-pillar trim, removing and installing

Note:

- n *Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Loosen lower B-pillar trim - 2 - first at sides, n in center of B-pillar - 7 - .



- Remove lower B-pillar trim - 2 - upward out of sill panel trim - 6 - with hooks - 4 - .

Installing

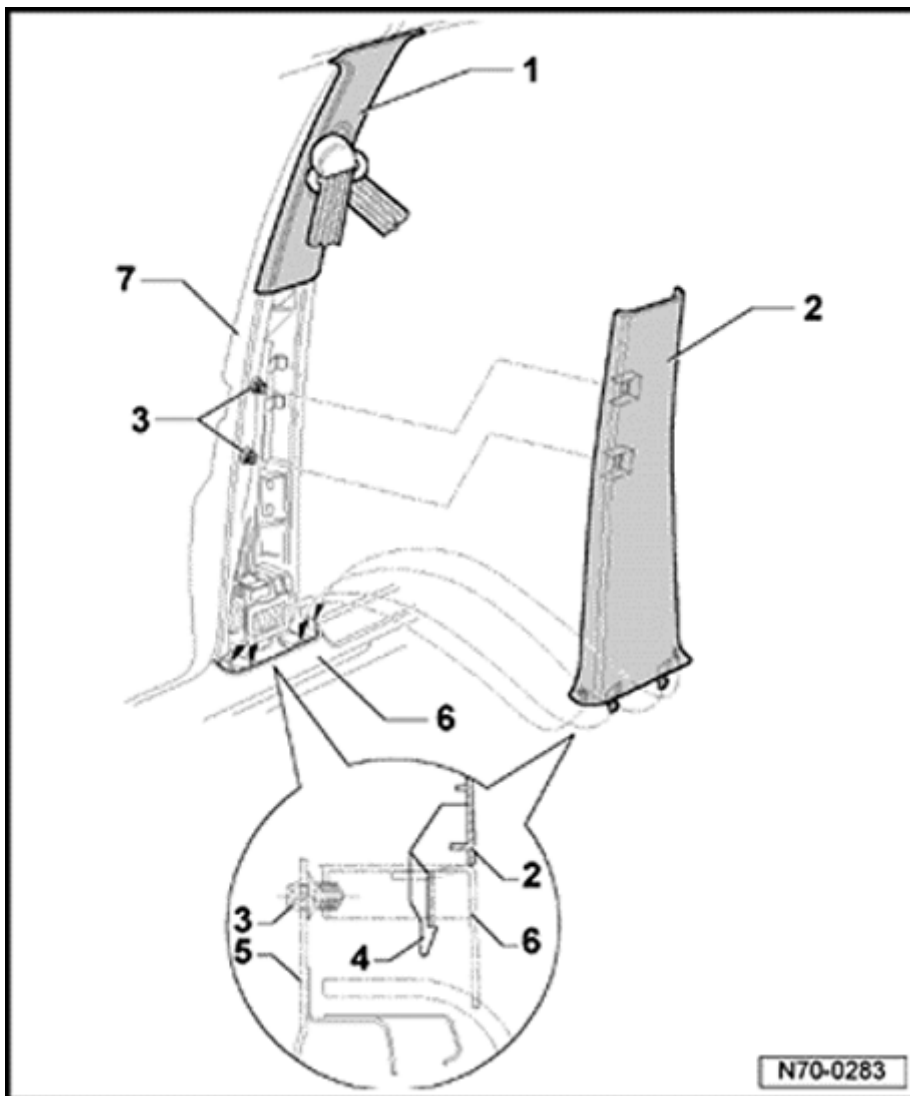
- Installation is reverse of removal.

Note:

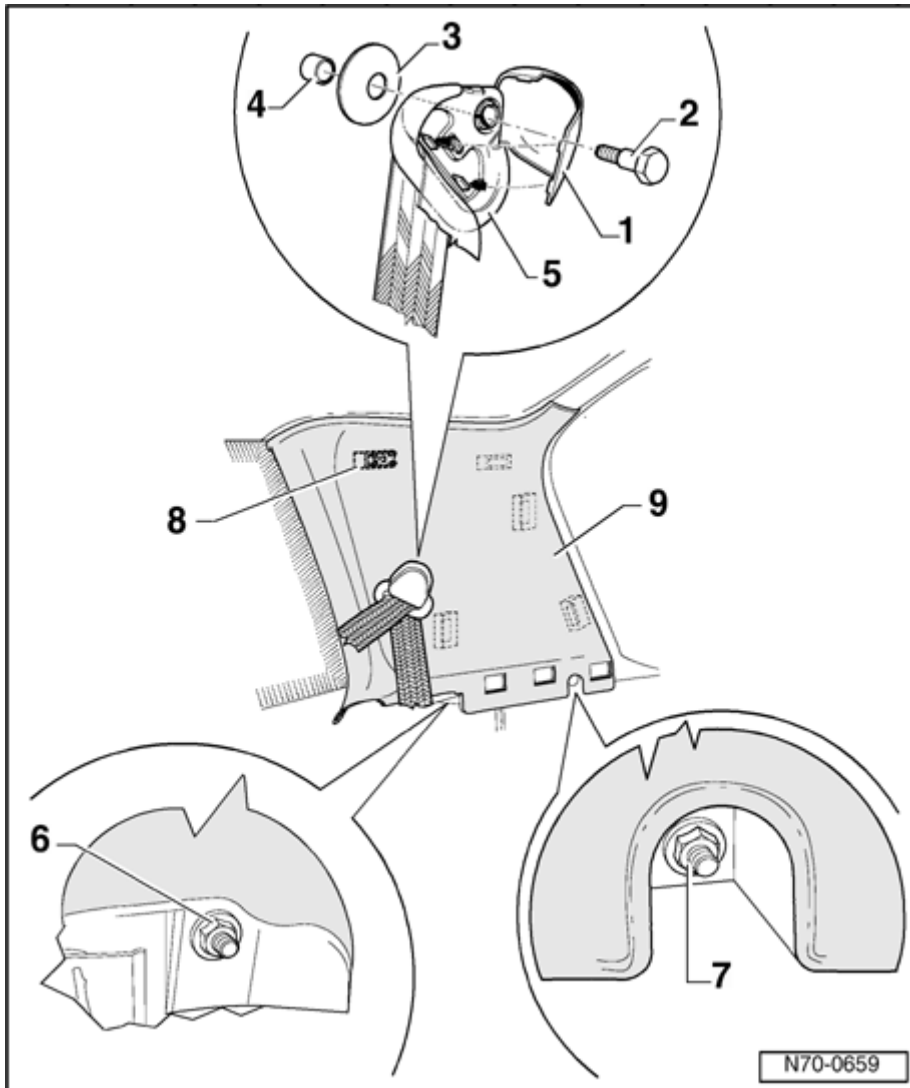
- n *For safety, steel clips - 3 - and upper C-pillar trim must be replaced every time trim panel of C-pillar is*

removed on a vehicle with side curtain airbags.

- n Steel clips and upper C-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection ⇒ parts catalog.*



Upper C-pillar trim, assembly overview (Golf with side curtain protection)



1. Cover cap for belt relay

2. Hex bolt

ⓘ 40 Nm

3. Tension disc

4. Spacer sleeve

5. Belt relay

6. Spring nut

7. Spring nut

8. Steel clip

9. Upper C-pillar trim

ⓘ Removing ⇒ [70-3, Upper C-pillar trim, removing and](#)

[installing \(Golf with side curtain protection\)](#)

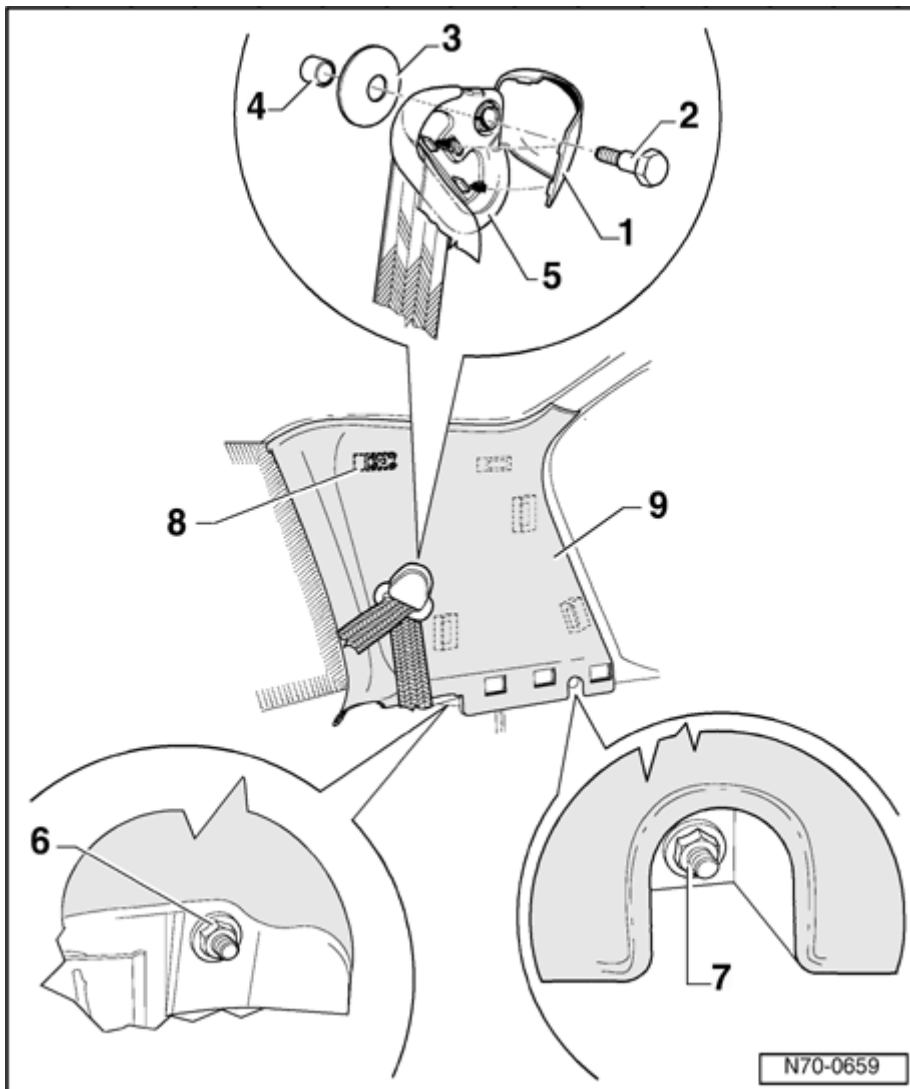
Upper C-pillar trim, removing and installing (Golf with side curtain protection)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Remove support, luggage compartment cover ⇒ [70-4, Luggage compartment cover support, removing and installing \(Golf\)](#) .
- Remove roof end strip ⇒ [70-6, Roof end strip, removing and installing \(Golf\)](#) .
- Unclip cover cap - **1** - and unscrew hex bolt - **2** - (40 Nm).
- Remove belt relay - **5** - , tension disc - **3**
- and spacer sleeve - **4** - .
- Remove spring nuts - **6** - and - **7** - .

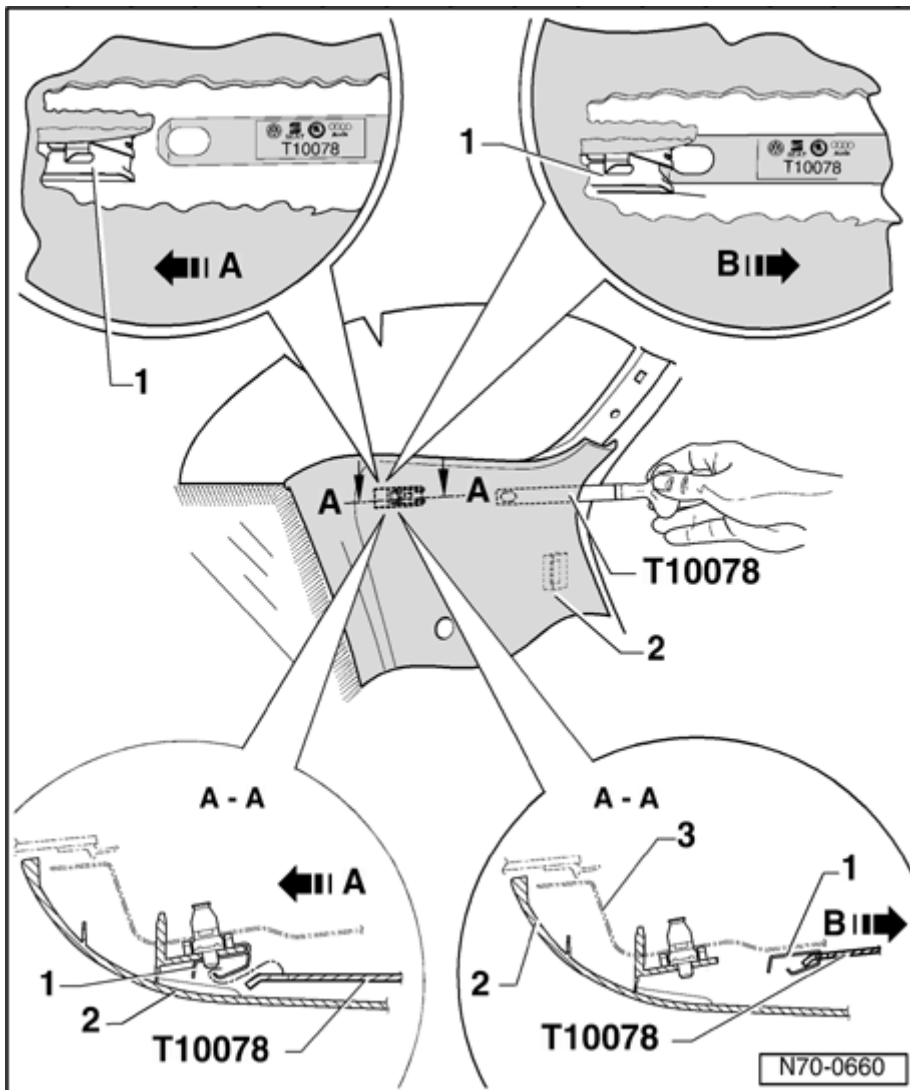


- Remove trim - **9** - in area of rear lid.

- Position Release tool T10078 between trim - **2** - and C-pillar - **3** - .

- Slide Release tool T10078 until it engages into clip - **1** - - **arrowA** - .

- Pull Release tool T10078 back - **arrowB** - , reby removing lower part of steel clip - **1** - .



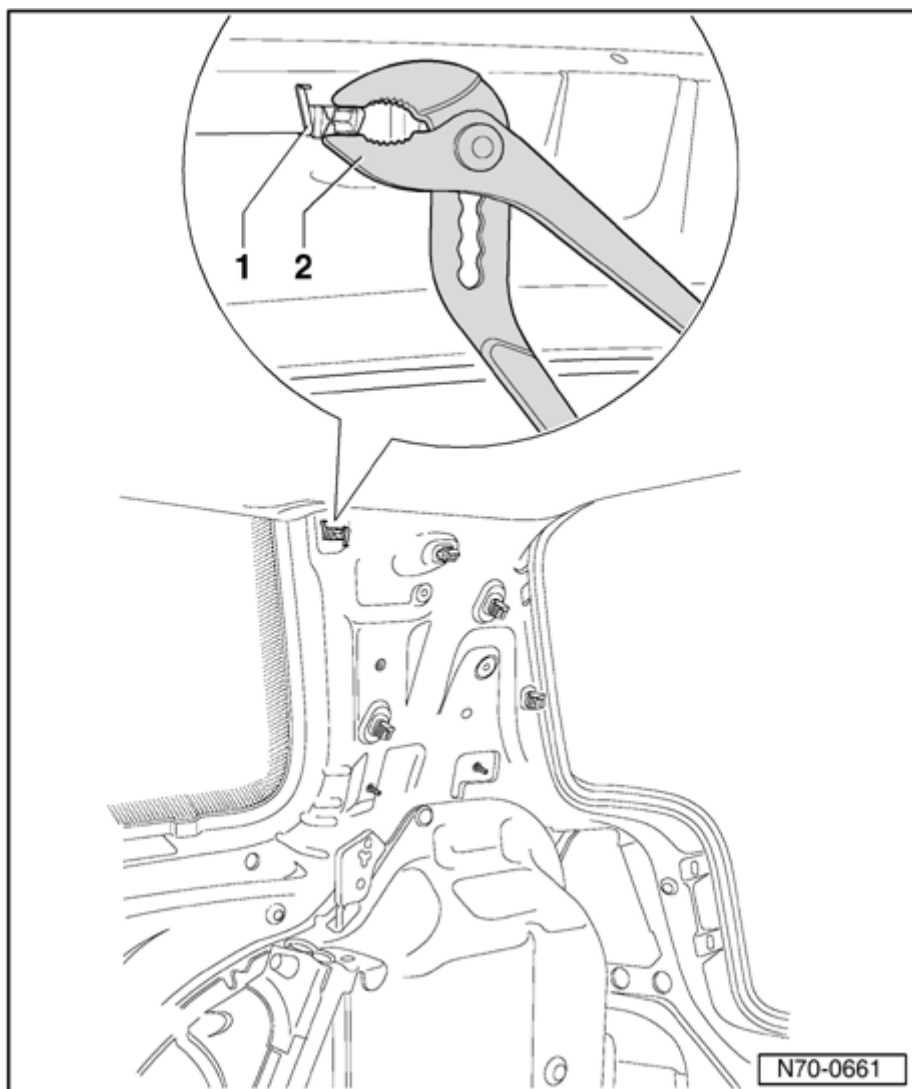
- Unclip trim - 2 - from C-pillar - 3 - .

- Disengage locking mechanism of steel clip - 1 - by forcefully pushing toger using standard pliers - 2 - .

- Remove steel clip - 1 - from C-pillar.

Note:

- n It is not possible to remove steel clip - 1 - without destroying it.



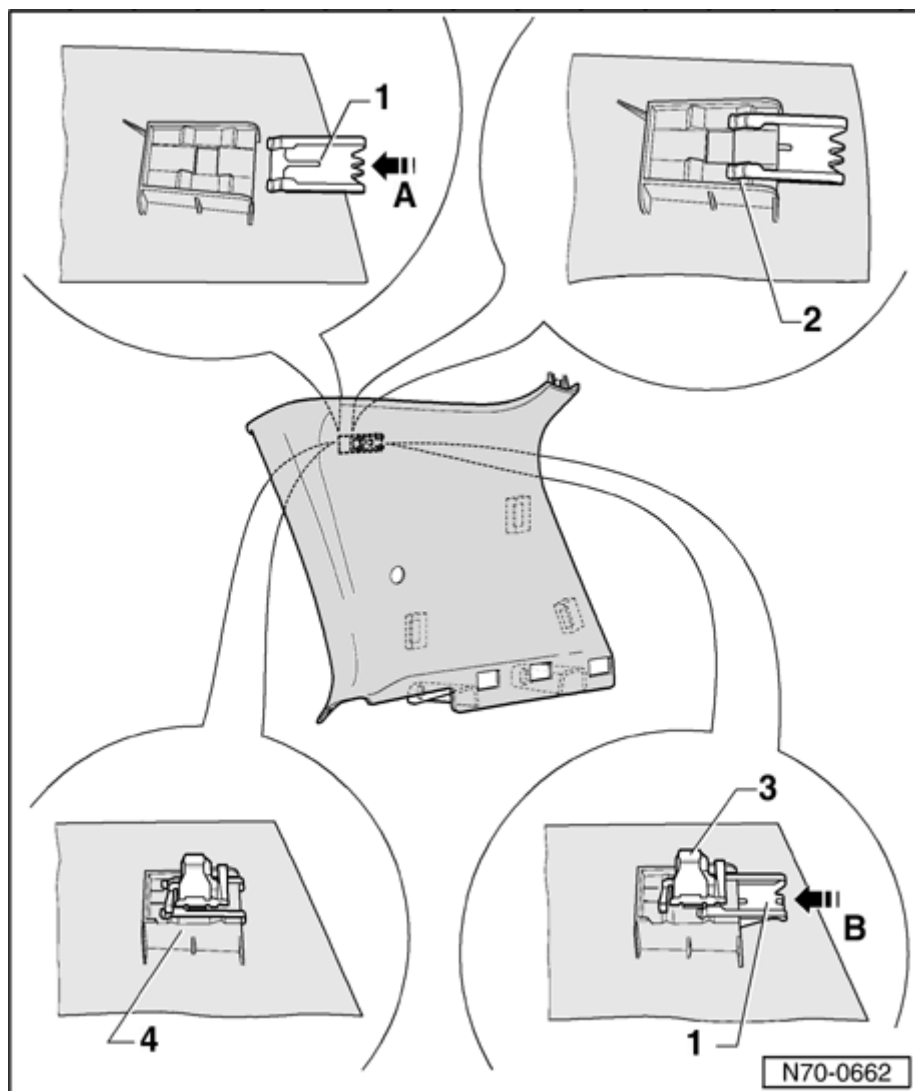
Installing

Note:

- n *For safety reasons, steel clips - 1 - and - 3 - must be replaced after each removal and installation of C-pillar trim.*
- n *Steel clips and upper C-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection ⇒ parts catalog.*

- Slide steel clip - 1 - in direction of arrow - **arrowA** - into first detent - 2 - of C-pillar trim.

- Insert steel clip - 3 - into mount.



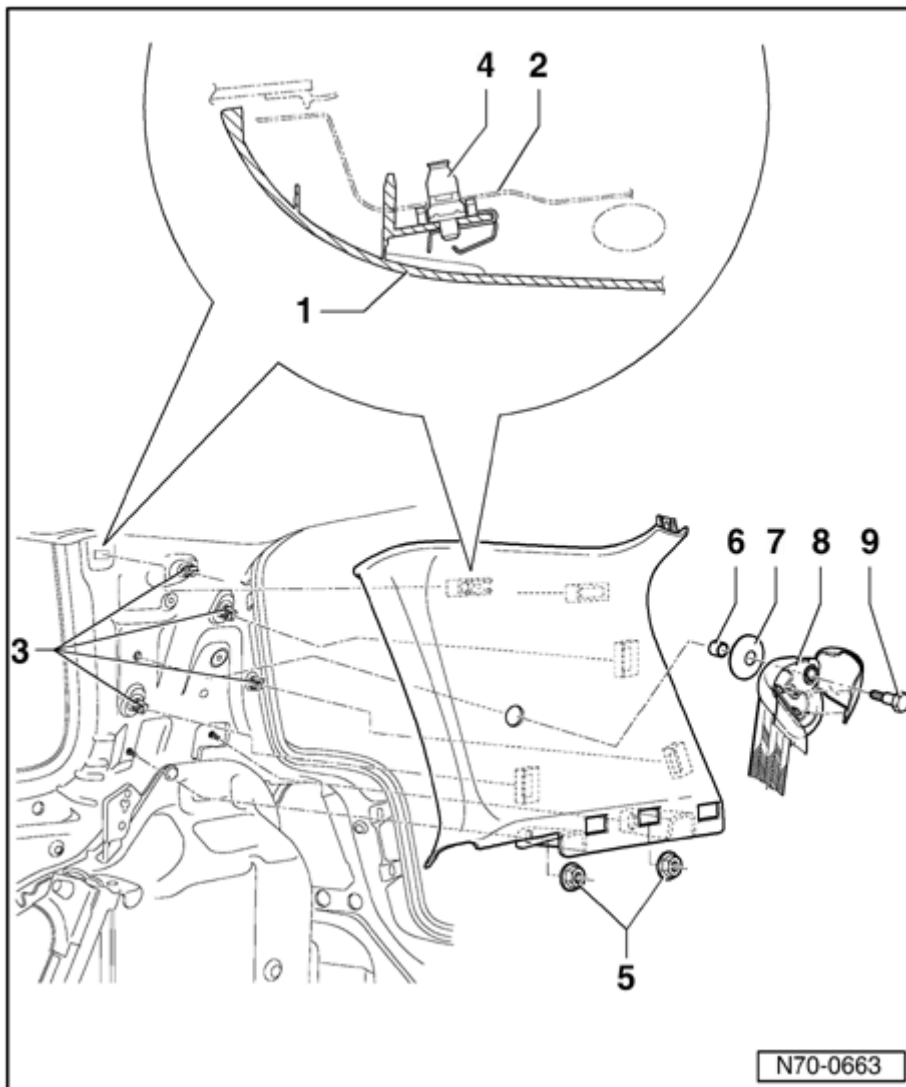
- Slide steel clip - 1 - in direction of arrow - **arrow B** - up to second detent - 4 - .

Note:

- n upper section of trim panel must be fixed with steel clip - 4 - , until it engages audibly.
- n Before installing trim, check clips - 3 - for damage and replace if necessary.
- n Avoid damage due to striking!

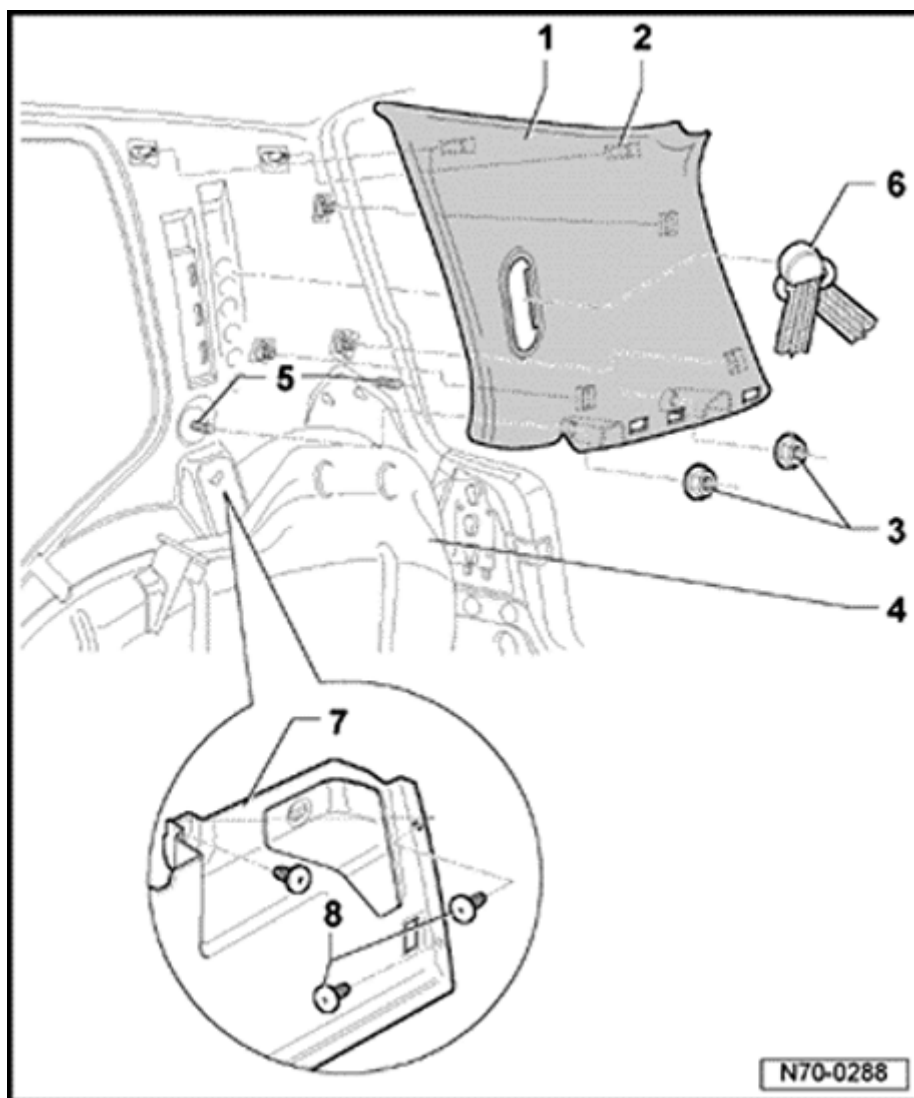
- Clip trim - 1 - to C-pillar - 2 - .

- Secure trim with two spring nuts - 5 - to C-pillar.



- Bolt spacer sleeve - **6** - , tension disc - **7**
- and belt relay - **8** - with hex bolt - **9** - (40 Nm) to C-pillar.

Upper C-pillar trim, assembly overview (Golf without side curtain protection)



1. Upper C-pillar trim

- i Removing ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf without side curtain protection\)](#)

2. Securing clips

- i Qty. 5

3. Speed nuts

4. Wheelhousing

5. Studs

- i Qty. 2

6. Belt relay

7. Lower trim

8. Plugs

Upper C-pillar trim, removing and installing (Golf without side curtain protection)

Note:

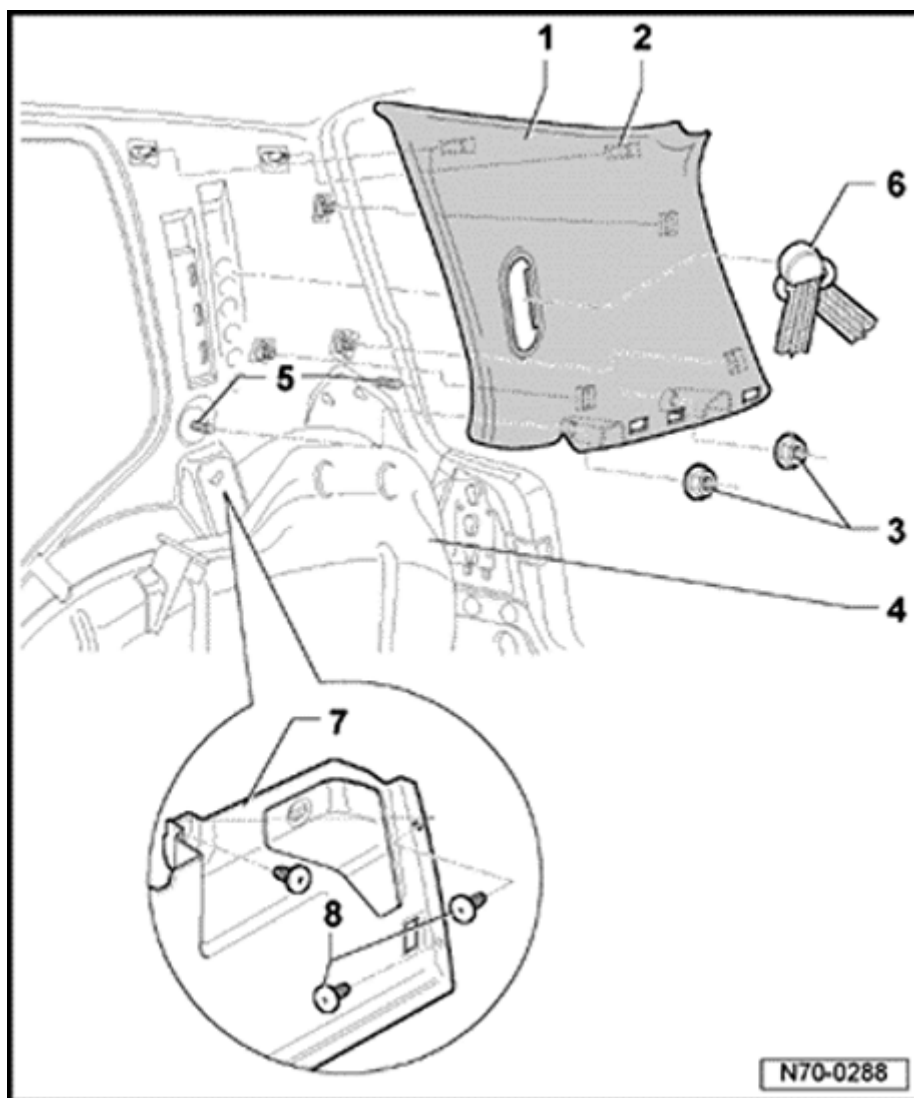
- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Remove support, luggage compartment cover ⇒ [70-4, Luggage compartment cover support, removing and installing \(Golf\)](#) .
- Remove roof end strip ⇒ [70-6, Roof end strip, removing and installing \(Golf\)](#) .
- Unclip plugs - **8** - from C-pillar.
- Remove trim - **1** - from C-pillar at top.
- Remove speed nuts - **3** - from both studs
- **5** - .

Note:

- n two speed nuts - **3** - are hidden between body flange of wheel housing - **4** - and C-pillar trim - **1** - .*



- Unclip trim - 1 - from C-pillar.

Installing

- Installation is reverse of removal.

Upper C-pillar trim, removing and installing (Jetta with side curtain protection)

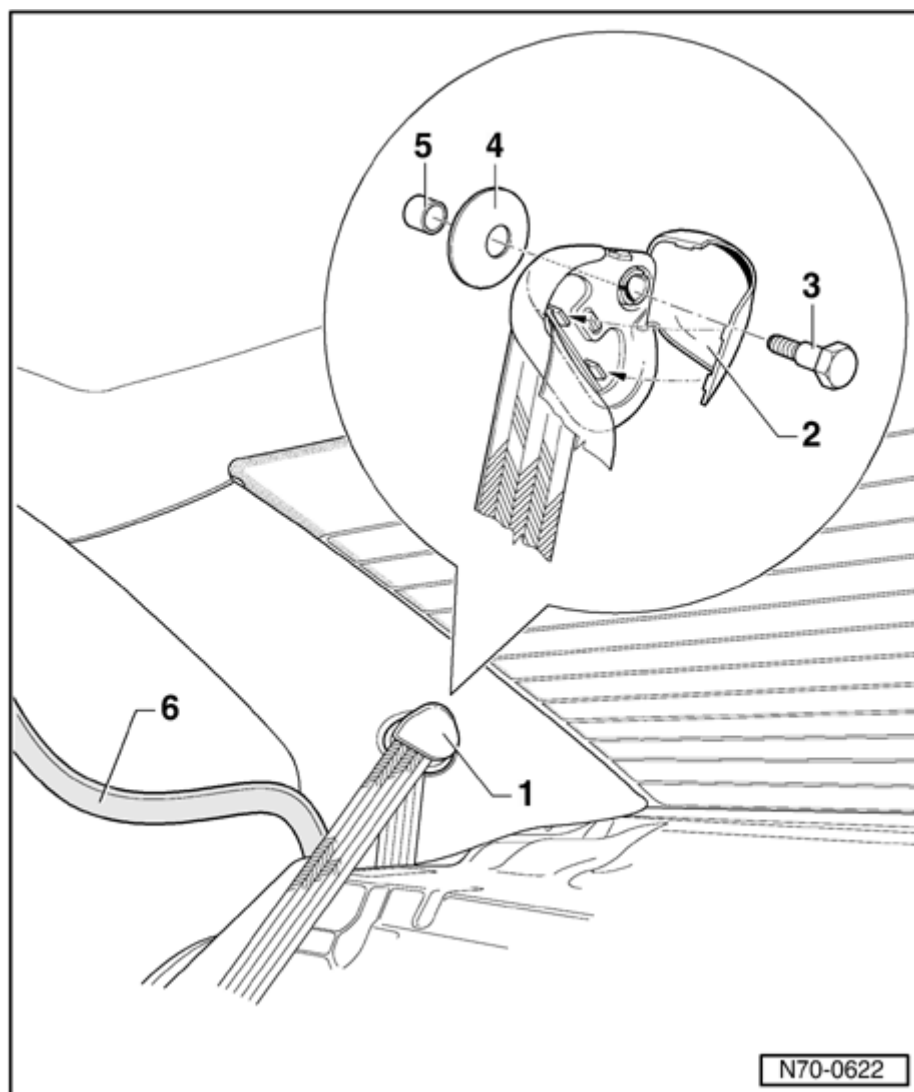
Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.

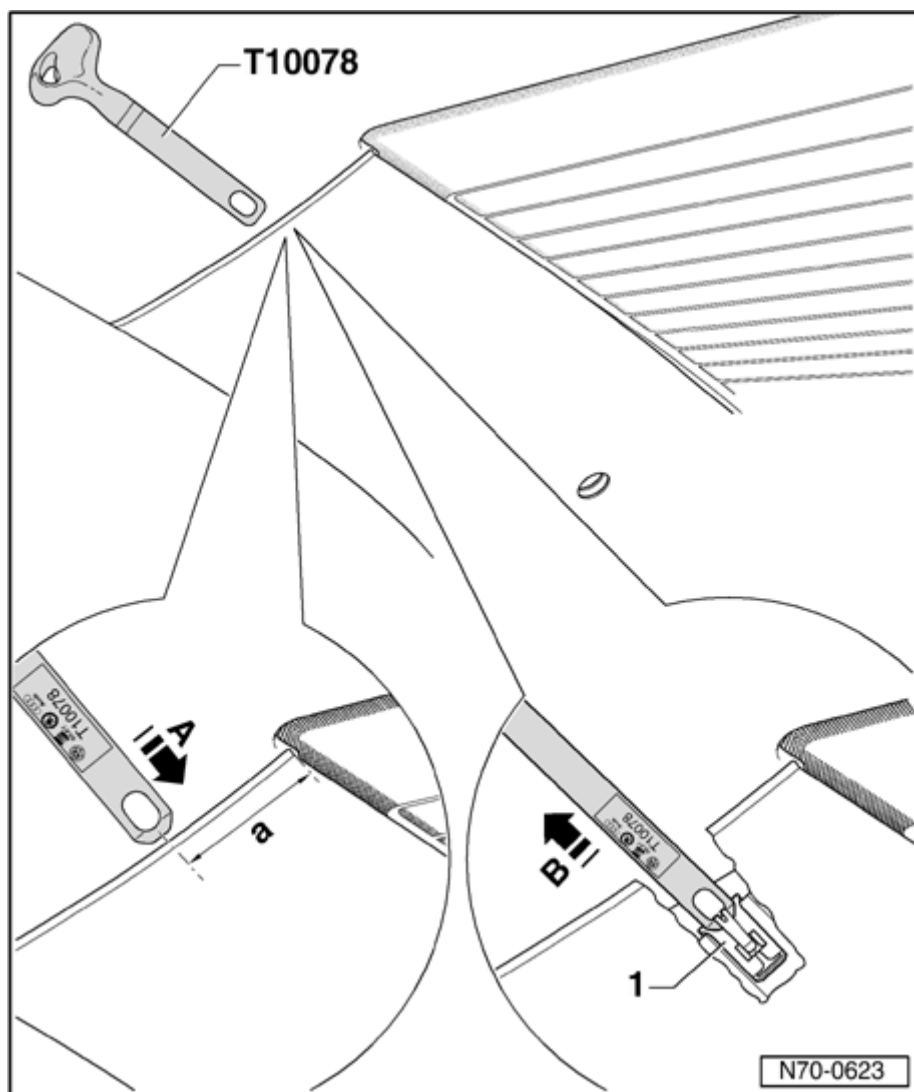
Removing

- Remove rear shelf ⇒ [70-3, Rear shelf, removing and installing](#) .

- Unclip cover cap - **2** - and remove bolt - **3** - (40 Nm).
- Remove belt relay - **1** - , tension disc - **4** - and spacer sleeve - **5** - .



- Remove seal - **6** - in area of trim.
- Position Release tool T10078 at transition from molded headliner to C-pillar trim.
- Distance from rear windshield to center of tool must be approx. 66 mm (dimension - **a** -).
- Slide Release tool T10078 between molded headliner and C-pillar trim until it engages audibly - **arrowA** - .

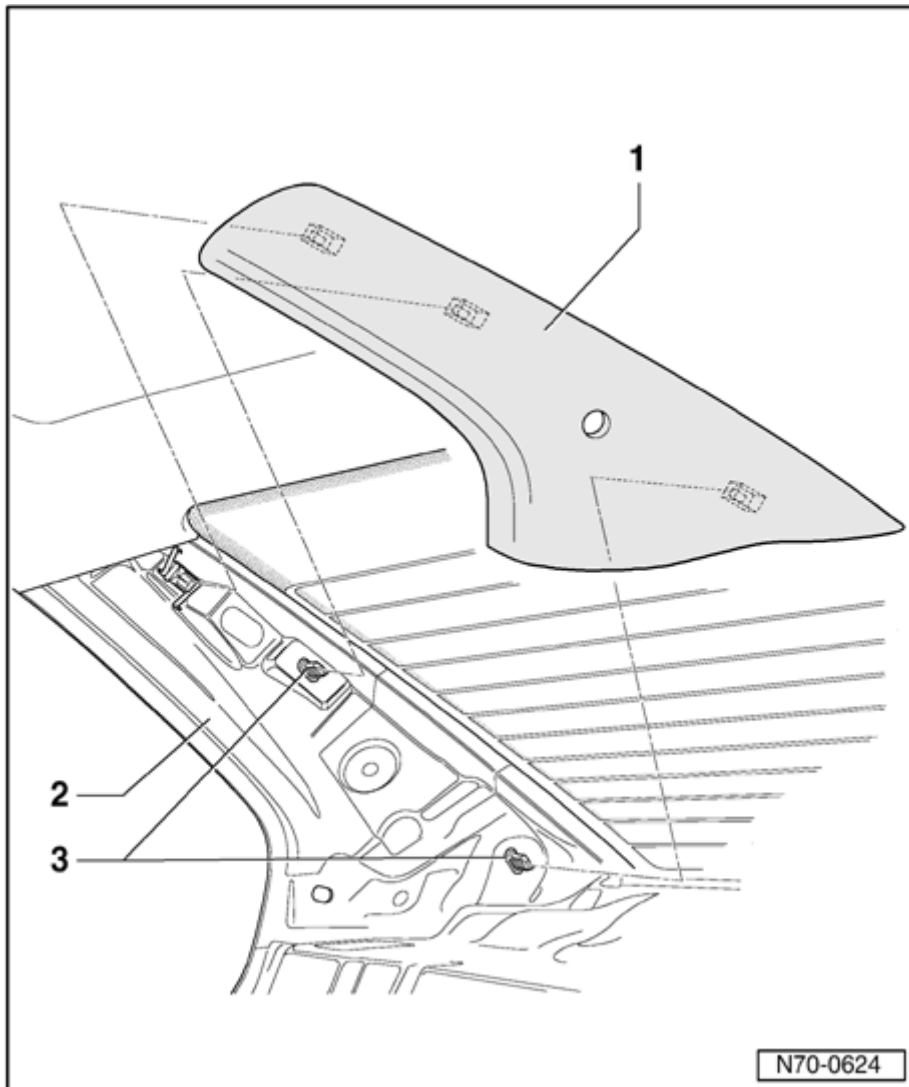


- Pull tool back - **arrow B** - , reby removing lower part of steel clip - **1** - .

- Unclip trim - **1** - from C-pillar - **2** - .

Note:

- n Check clips - **3** - and replace if necessary.

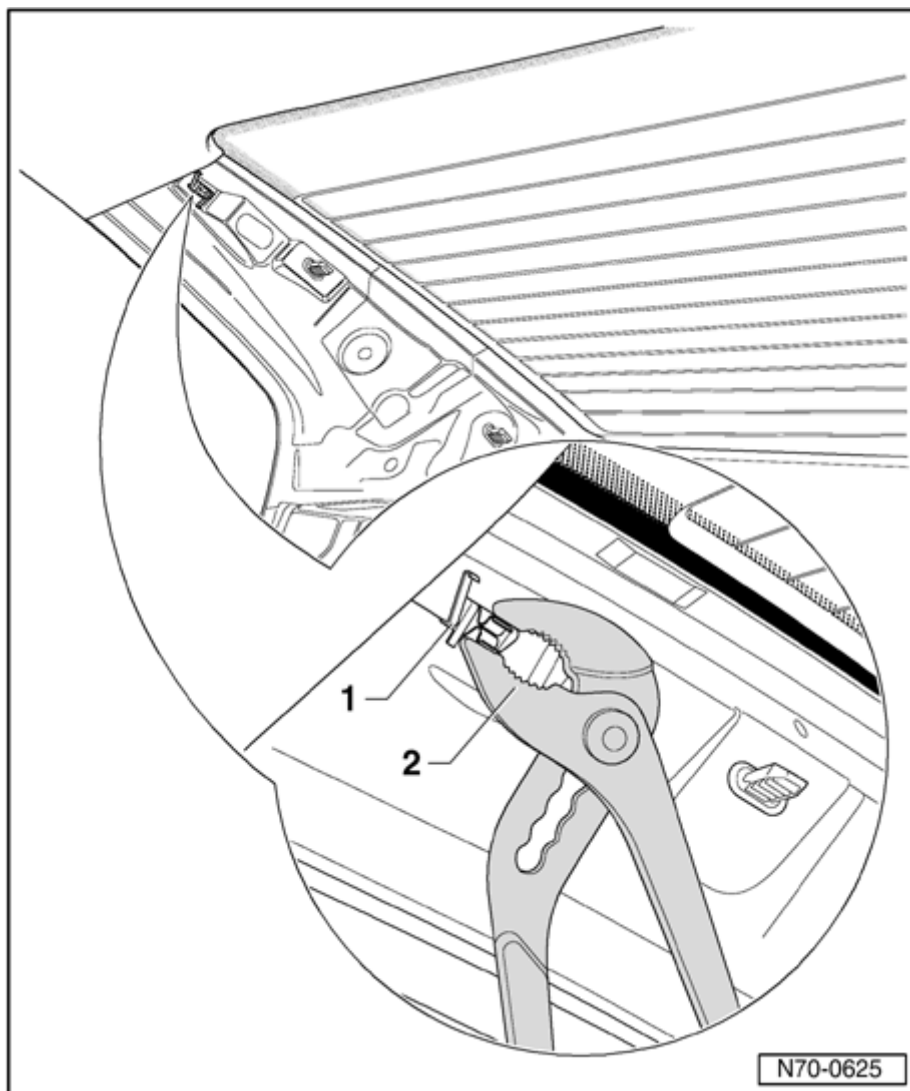


- Disengage locking mechanism of steel clip - 1 - by forcefully pushing toger using standard pliers - 2 - .

- Remove steel clip - 1 - from C-pillar.

Note:

- n *It is not possible to remove steel clip - 1 - without destroying it.*



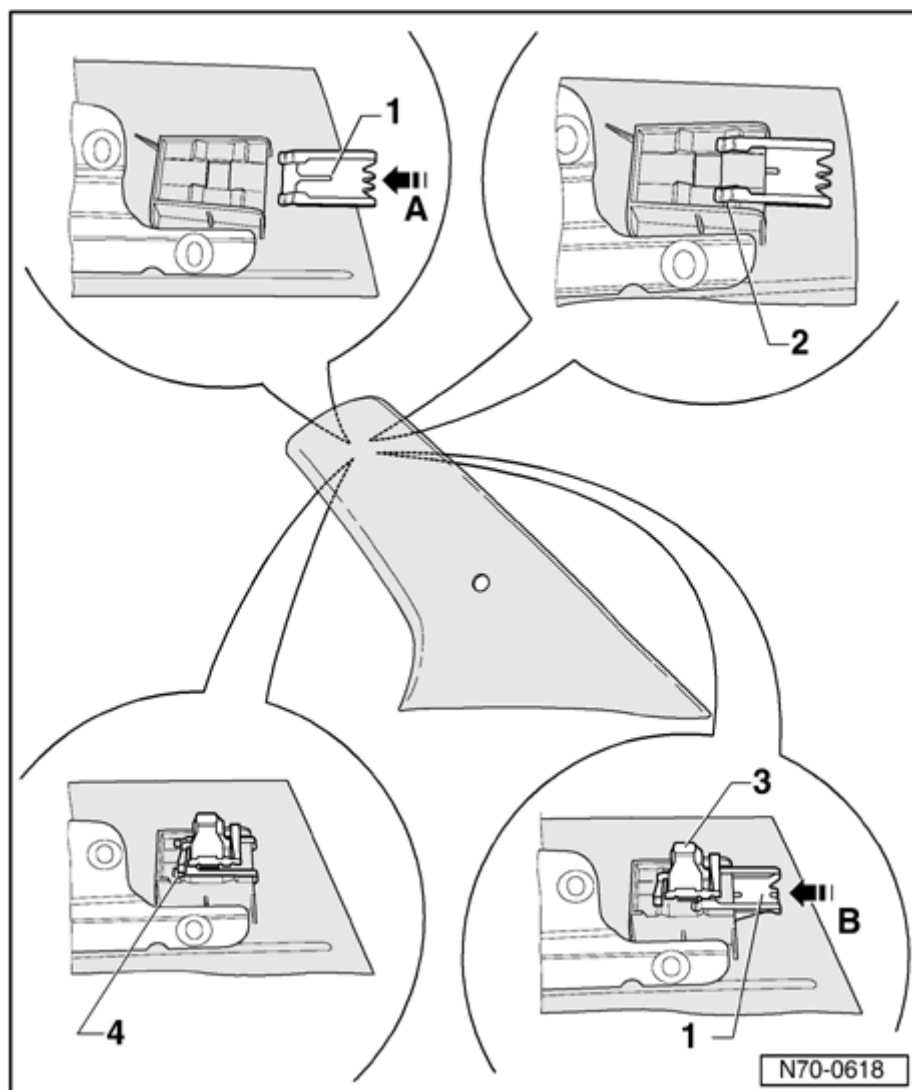
Installing

Note:

- n For safety reasons, steel clips - **1** - and - **3** - must be replaced after each removal and installation of C-pillar trim.
- n Steel clips and upper C-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection ⇒ parts catalog.

- Slide steel clip - **1** - into first detent - **2** - of C-pillar trim - **arrowA** - .

- Insert steel clip - **3** - into mount.



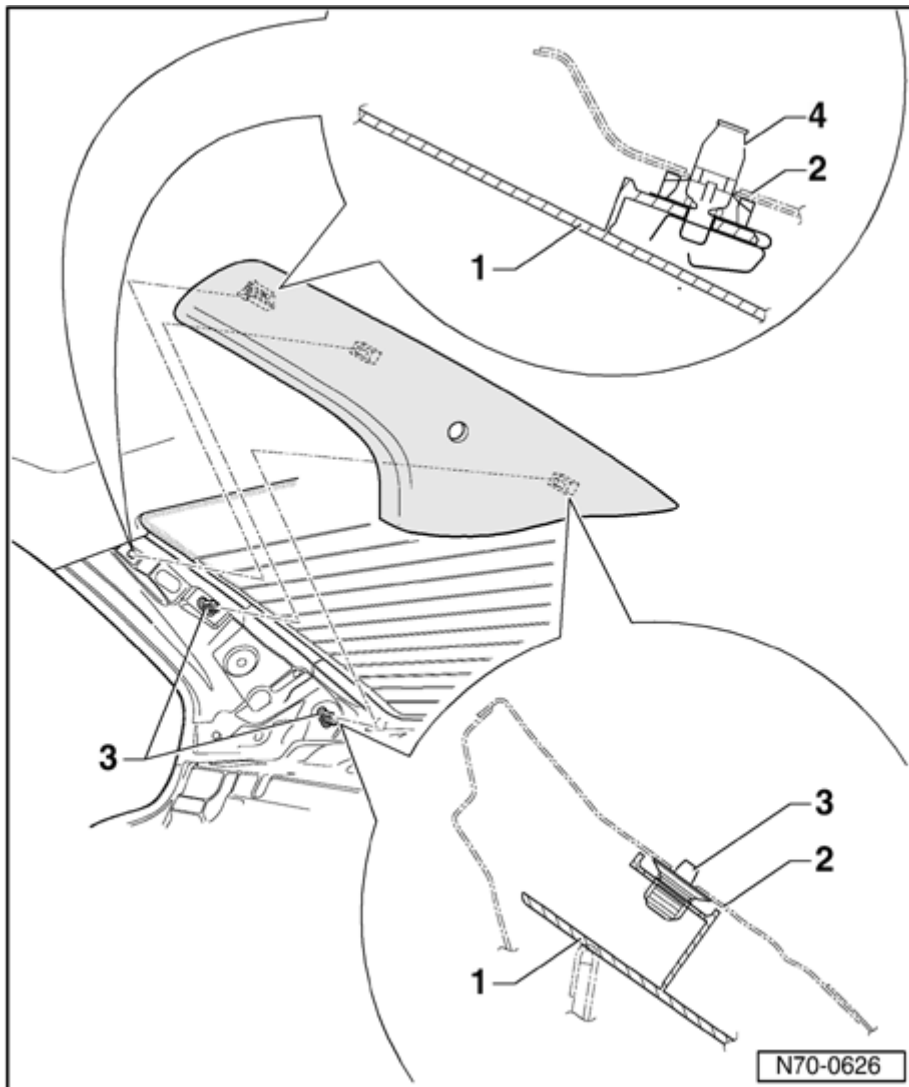
- Slide steel clip - 1 - up to second detent - 4 - - arrow B - .

Note:

- n upper section of trim panel must be fixed with steel clip - 4 - , until it engages audibly.
- n Before installing trim, check both clips - 3 - for damage and replace if necessary.

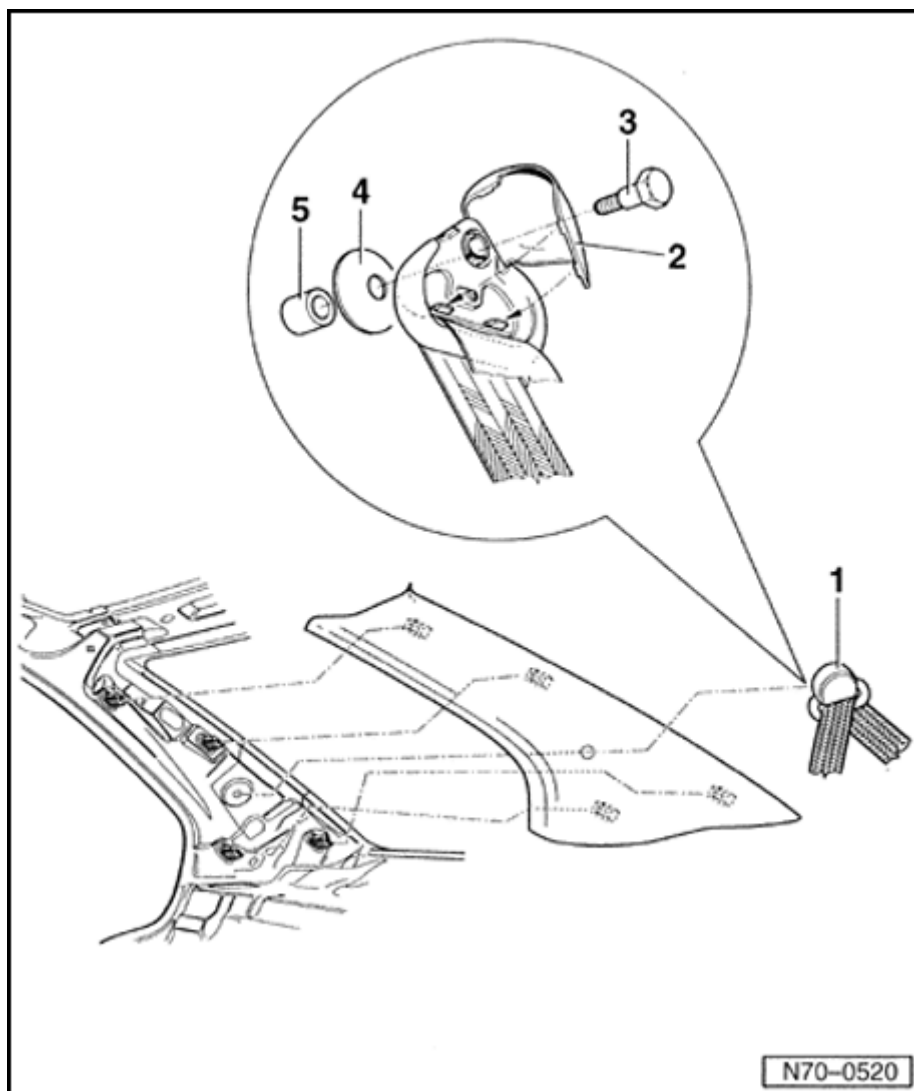
- Clip trim - 1 - to C-pillar - 2 - .

- Insert door seal.



- Install rear shelf ⇒ [70-3, Rear shelf, removing and installing](#) .

Upper C-pillar trim, assembly overview (Jetta without side curtain protection)



1. Belt relay
2. Belt relay cover cap
3. Bolt

⌋ 40 Nm

4. Washer
5. Spacer

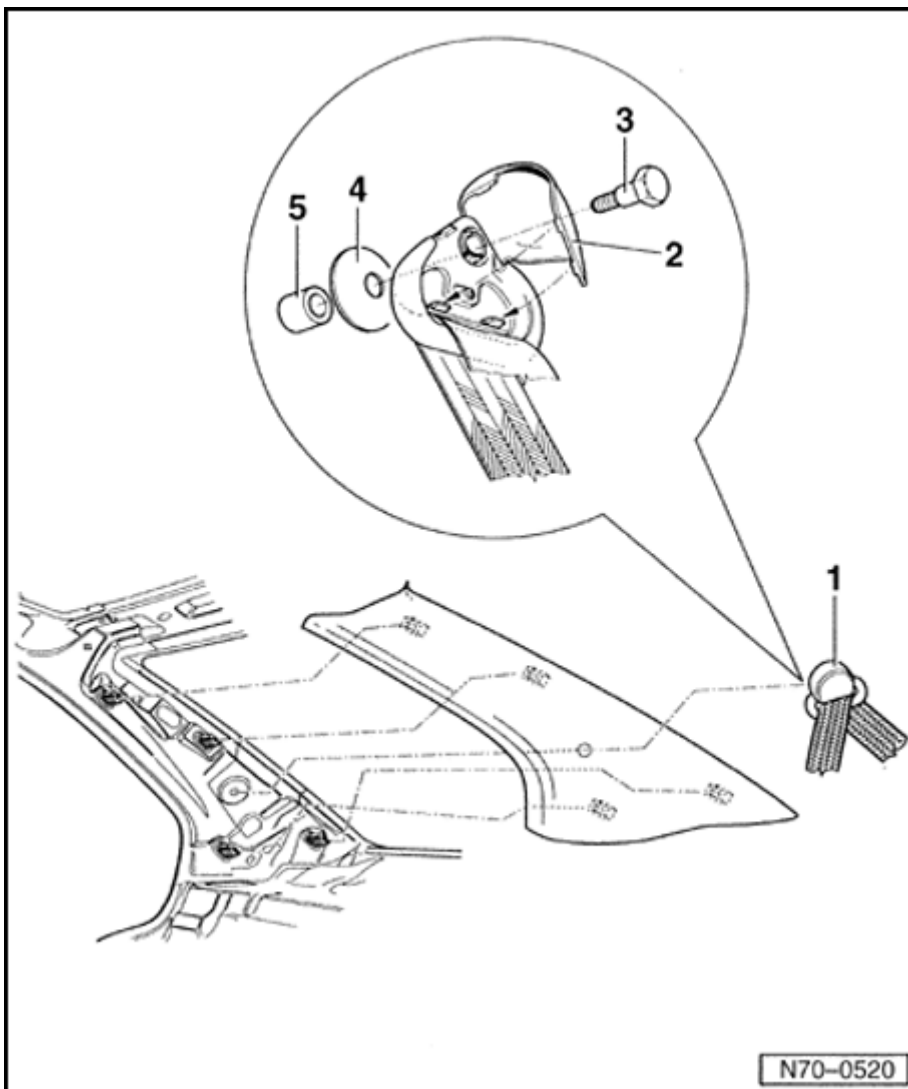
Upper C-pillar trim, removing and installing (Jetta without side curtain protection)

Note:

- ⌋ Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.

Removing

- Remove rear shelf ⇒ [70-3, Rear shelf, removing and installing](#) .
- Remove seal in area of trim.
- Remove cover cap - **2** - and remove bolt - **3** - (40 Nm).
- Remove belt relay - **1** - , washer - **4** - and spacer - **5** - .



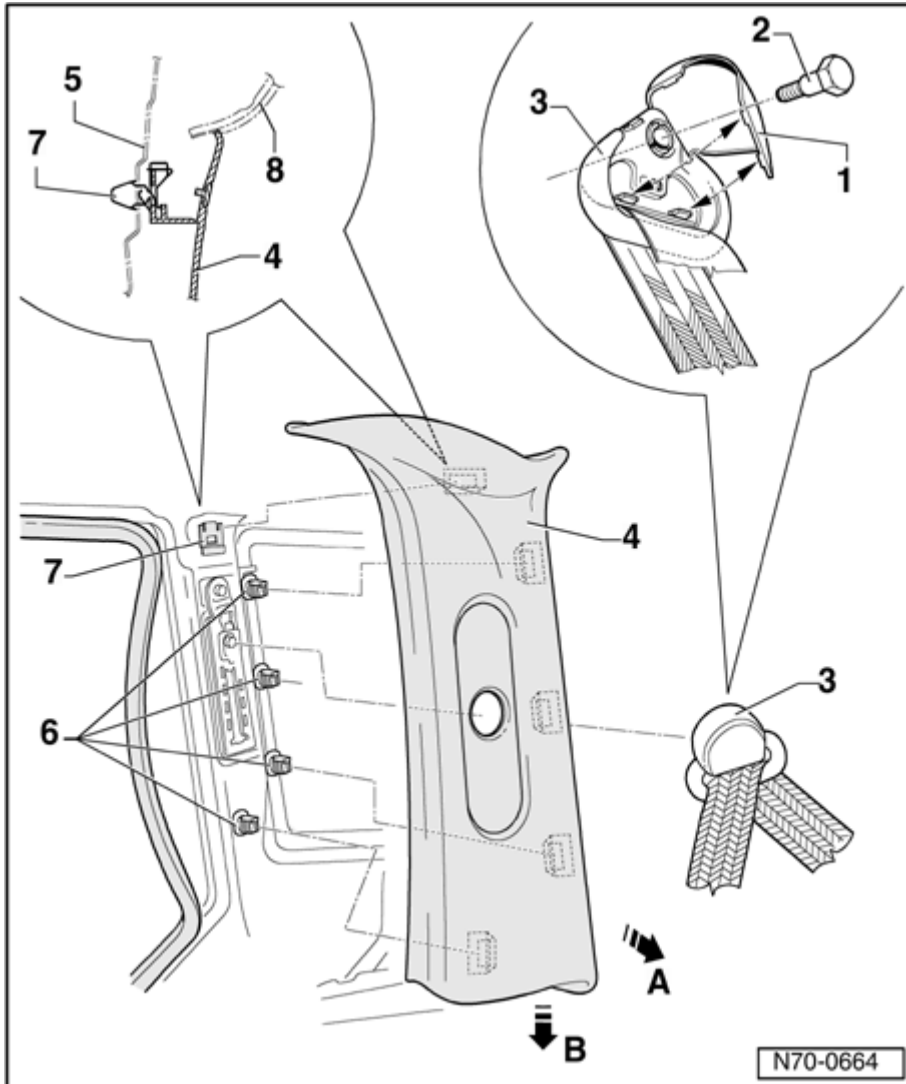
- Remove trim from C-pillar.

Installing

- Installation is reverse of removal.

Upper C-pillar trim, assembly overview (Golf)

wagon/Jetta wagon with side curtain protection ➤ 04.01)



1. Cover cap

2. Bolt

ⓘ 40 Nm

3. Belt relay

4. Upper C-pillar trim

ⓘ Removing ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon with side curtain protection 04.01\)](#)

5. C-pillar

6. Securing clip
7. Steel clip
8. Molded headliner

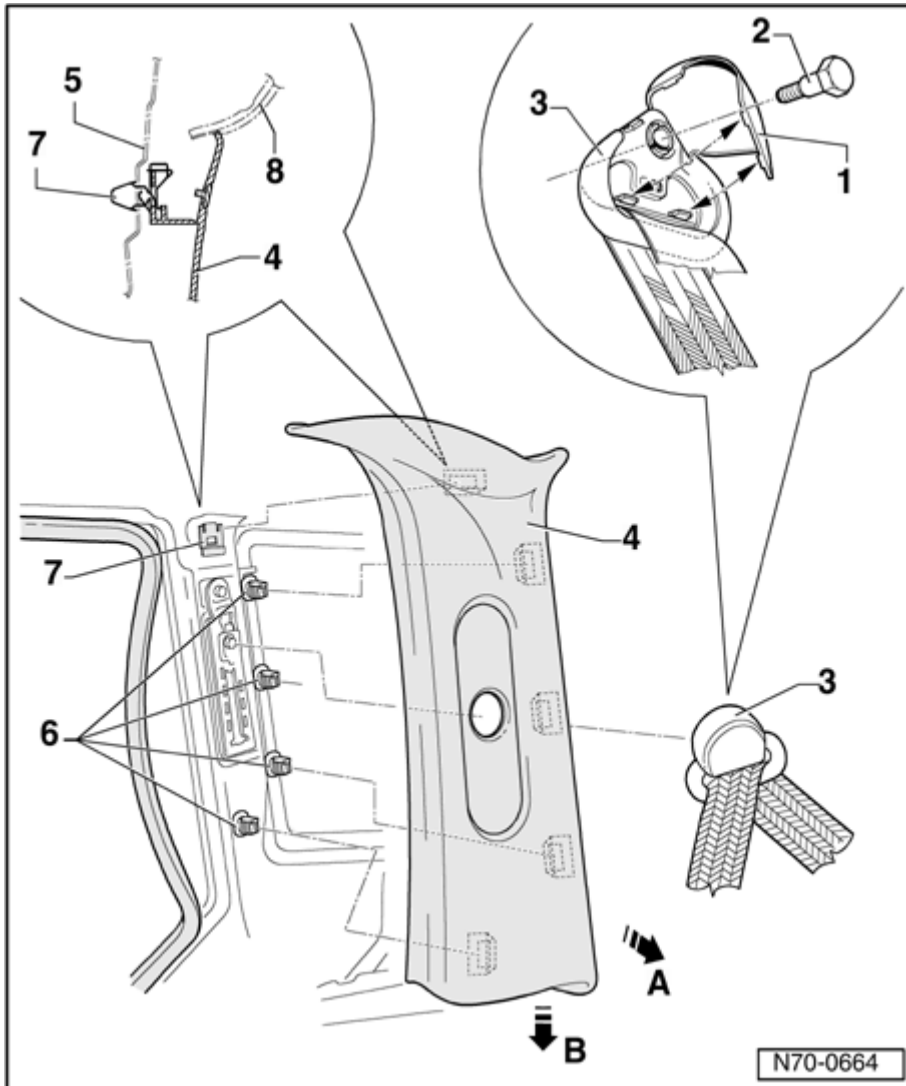
Upper C-pillar trim, removing and installing (Golf wagon/Jetta wagon with side curtain protection ➤ 04.01)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Remove cap - **1** - .
- Remove bolt - **2** - (40 Nm) and remove belt relay - **3** - .
- Loosen C-pillar trim - **4** - in lower area - **arrowA** - .



- Pull C-pillar trim - 4 - downward - **arrow B** - .

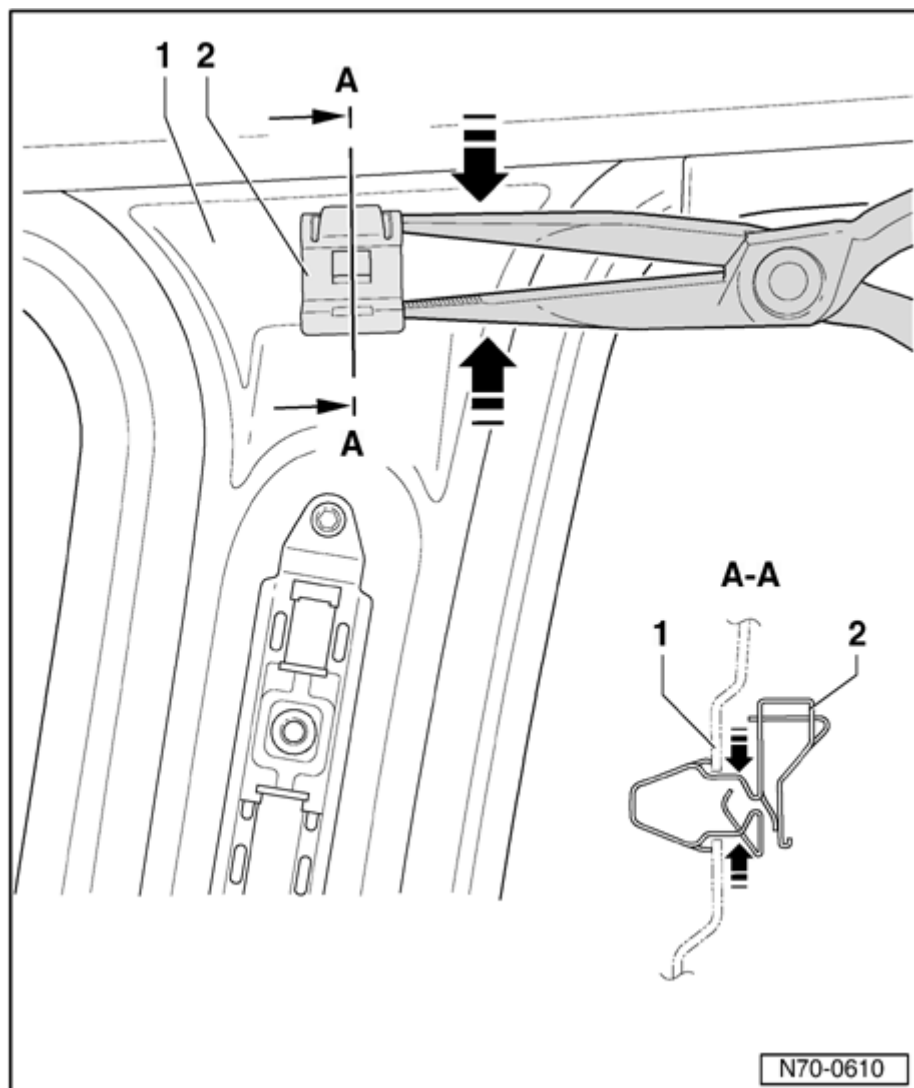
- Position standard needle-nose pliers at side between C-pillar - 1 - and steel clip - 2 - .

- Disengage locking mechanism of steel clip - 2 - by pushing toger using needle-nose pliers - **arrows** - .

- Remove steel clip - 2 - from C-pillar - 1 - .

Note:

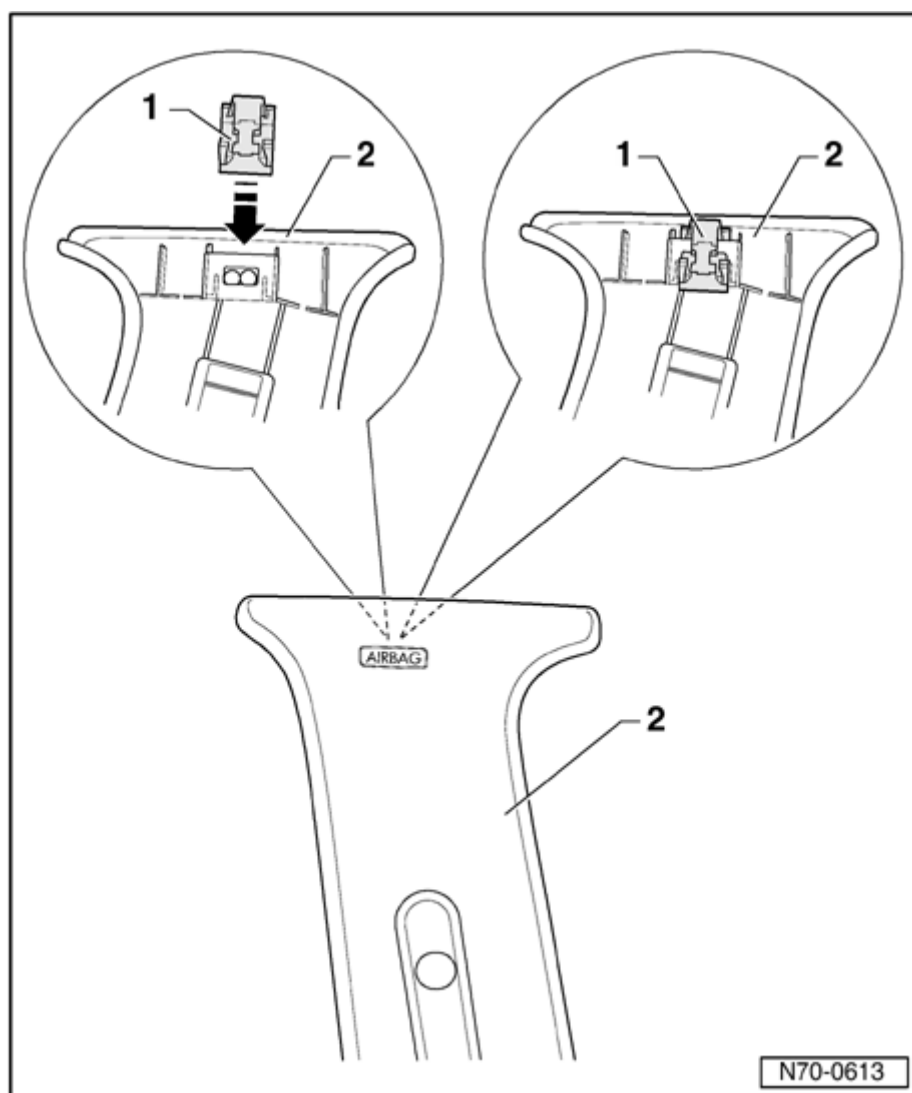
- n *It is not possible to remove steel clip - 2 - without destroying it.*



Installing

Note:

- n For safety reasons, steel clip - 1 - must be replaced after each removal and installation of C-pillar trim - 2 - .
- n Steel clips and upper C-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection → parts catalog.

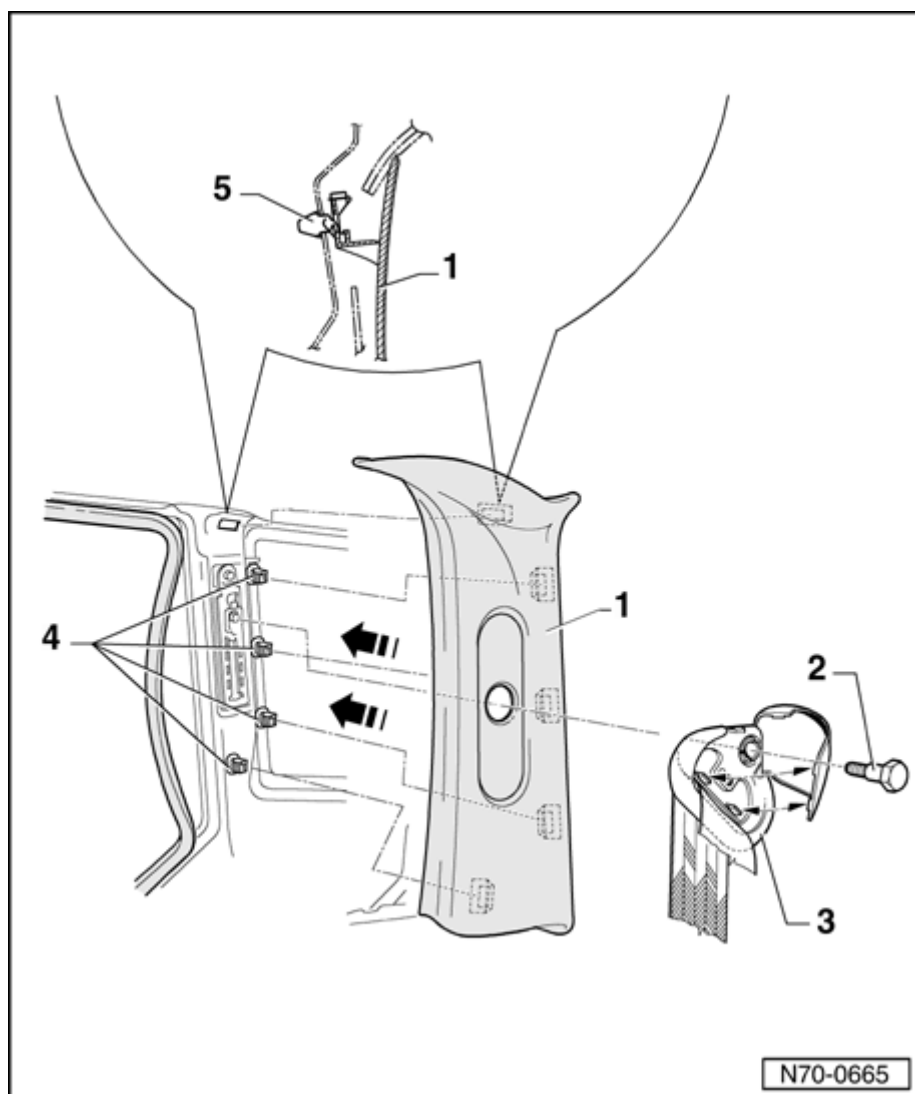


- Insert steel clip - 1 - in C-pillar trim - 2 - in direction of - arrow - .

Note:

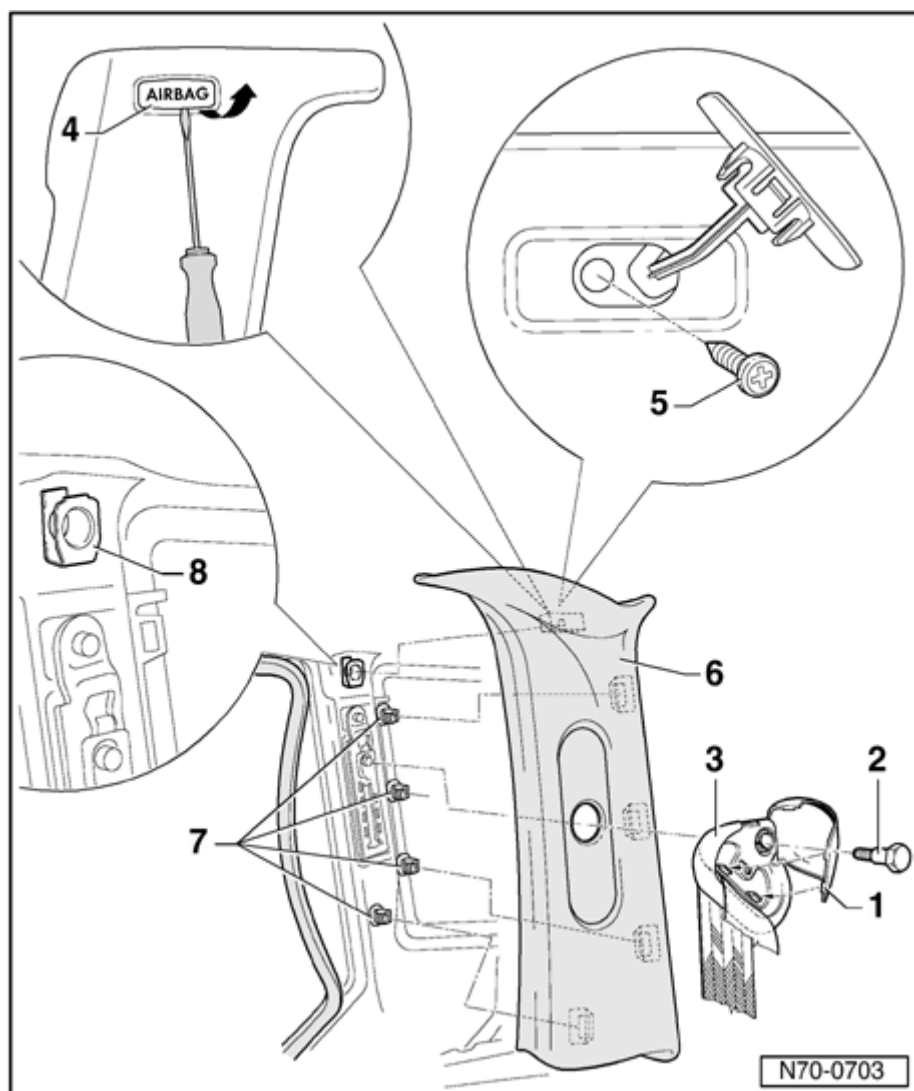
- n upper section of trim panel must be fixed with steel clip - 5 - , until it engages audibly.
- n Before installing trim, check clips - 4 - for damage and replace if necessary.
- n Avoid damage due to striking!

- Clip trim - 1 - to C-pillar.



- Bolt belt relay - 3 - with bolt - 2 - (40 Nm)
to C-pillar.

**Upper C-pillar trim, assembly overview (Golf
wagon/Jetta wagon with side curtain
protection 05.01 ➤)**



1. Cover cap

2. Bolt

i 40 Nm

3. Belt relay

4. Emblem, airbag

5. Bolt

i 2 Nm

6. Upper C-pillar trim

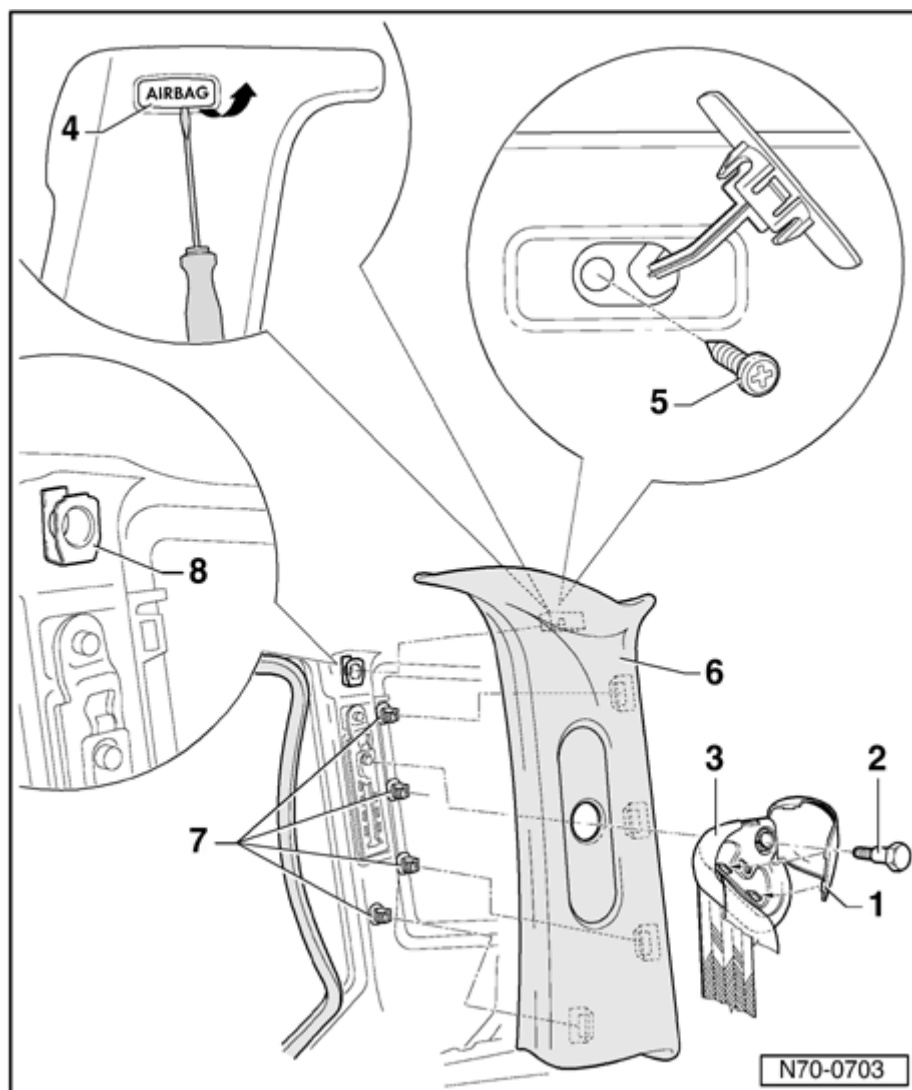
i Removing ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon with side curtain protection 05.01 \)](#)

7. Clips**8. Clip****Upper C-pillar trim, removing and installing
(Golf wagon/Jetta wagon with side curtain
protection 05.01 ➤)****Note:**

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Pry off cap - **1** - .
- Remove bolt - **2** - (40 Nm) and remove belt relay - **3** - .
- Unclip emblem, airbag - **4** - using a small screwdriver.
- Remove bolt - **5** - (2 Nm).



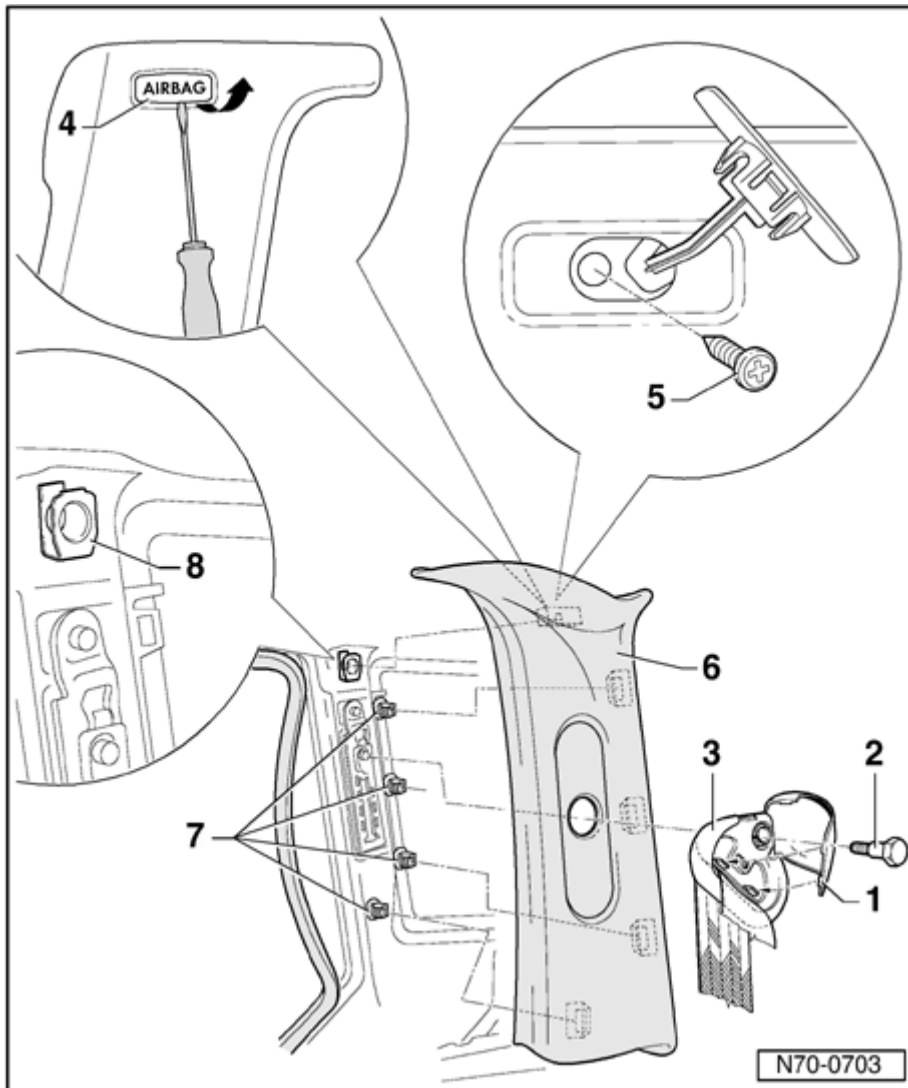
- Unclip trim - **6** - from C-pillar.

Installing

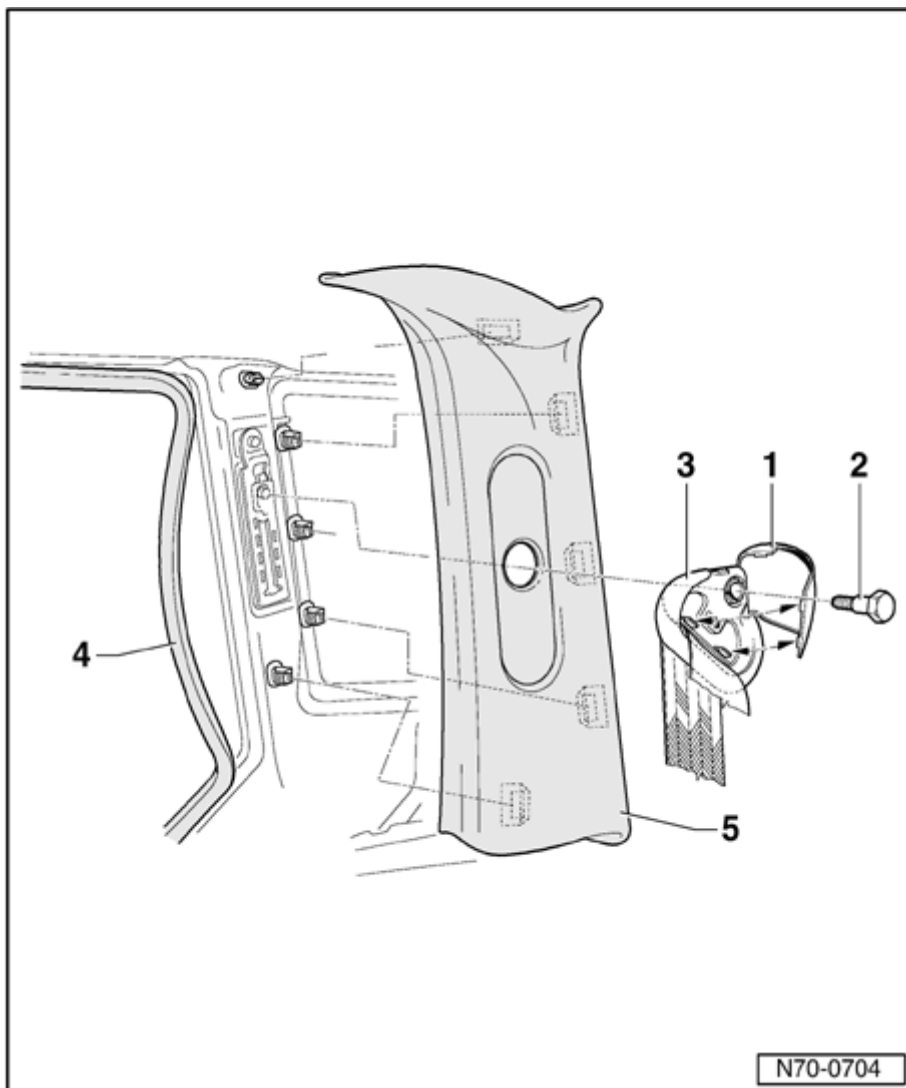
Installation is reverse of removal.

Note:

- n Before installing trim, check clips - **7** - and clip - **8** - for damage and replace if necessary.
- n Steel clips and C-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection ⇒ parts catalog.



Upper C-pillar trim, assembly overview (Golf wagon/Jetta wagon without side curtain protection)



1. Cover cap

2. Bolt

ⓘ 40 Nm

3. Belt relay

4. Seal

5. Upper C-pillar trim

ⓘ Removing ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon without side curtain protection\)](#)

Upper C-pillar trim, removing and installing

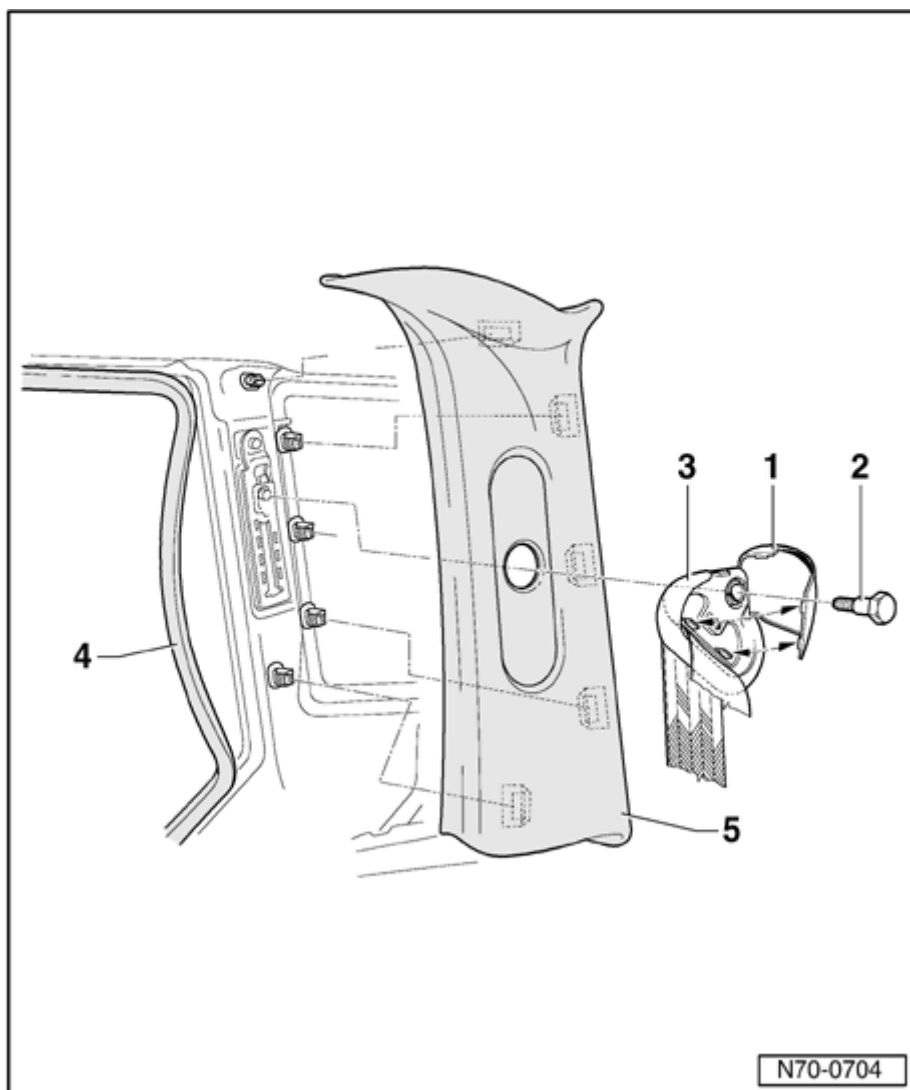
(Golf wagon/Jetta wagon without side curtain protection)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.

Removing

- Remove cap - 1 - .
- Remove bolt - 2 - and remove belt relay - 3 - .
- Remove seal - 4 - in area of trim.

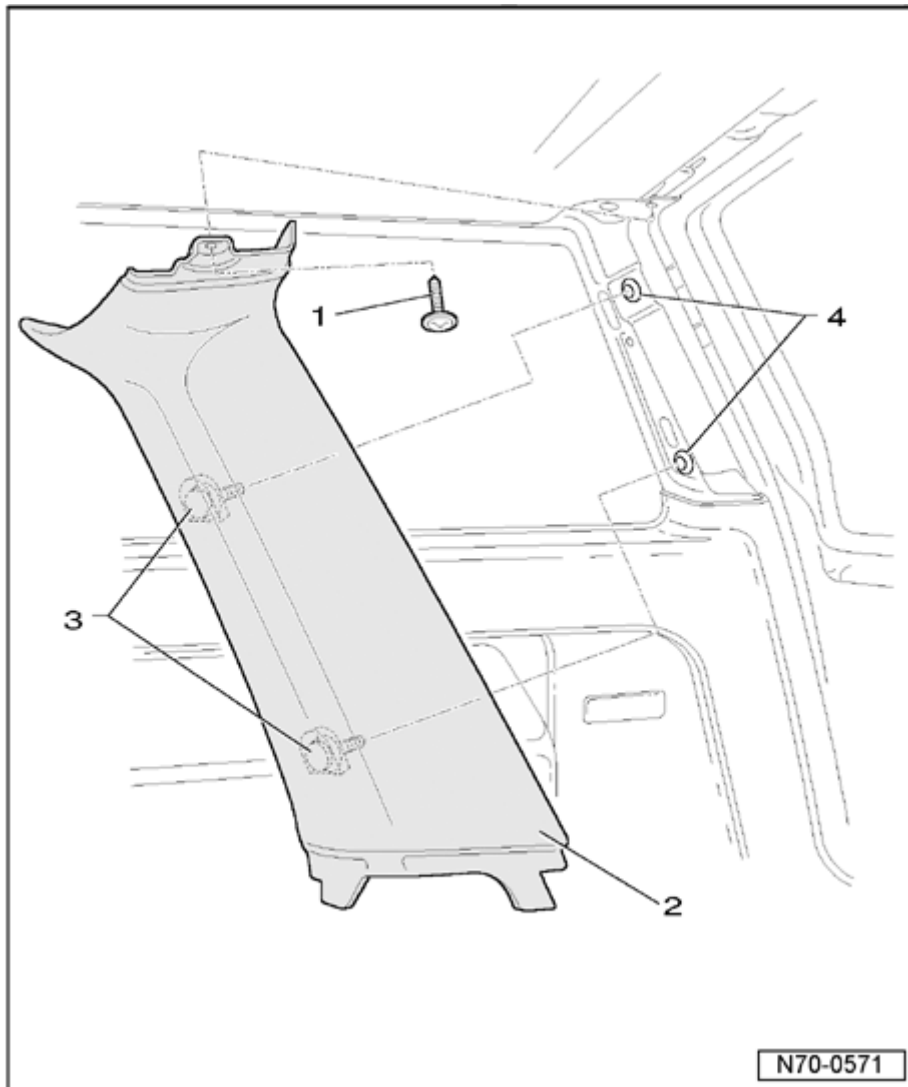


- Remove trim - 5 - from C-pillar.

Installing

- Installation is reverse of removal.

Upper D-pillar trim, assembly overview (Golf wagon/Jetta wagon)



1. Bolt

2. Upper D-pillar trim panel

- i Removing ⇒ [70-3, Upper D-pillar trim, removing and installing \(Golf wagon/Jetta wagon\)](#)

3. Clips

- i Qty. 2

4. Mounting sleeves

i Qty. 2

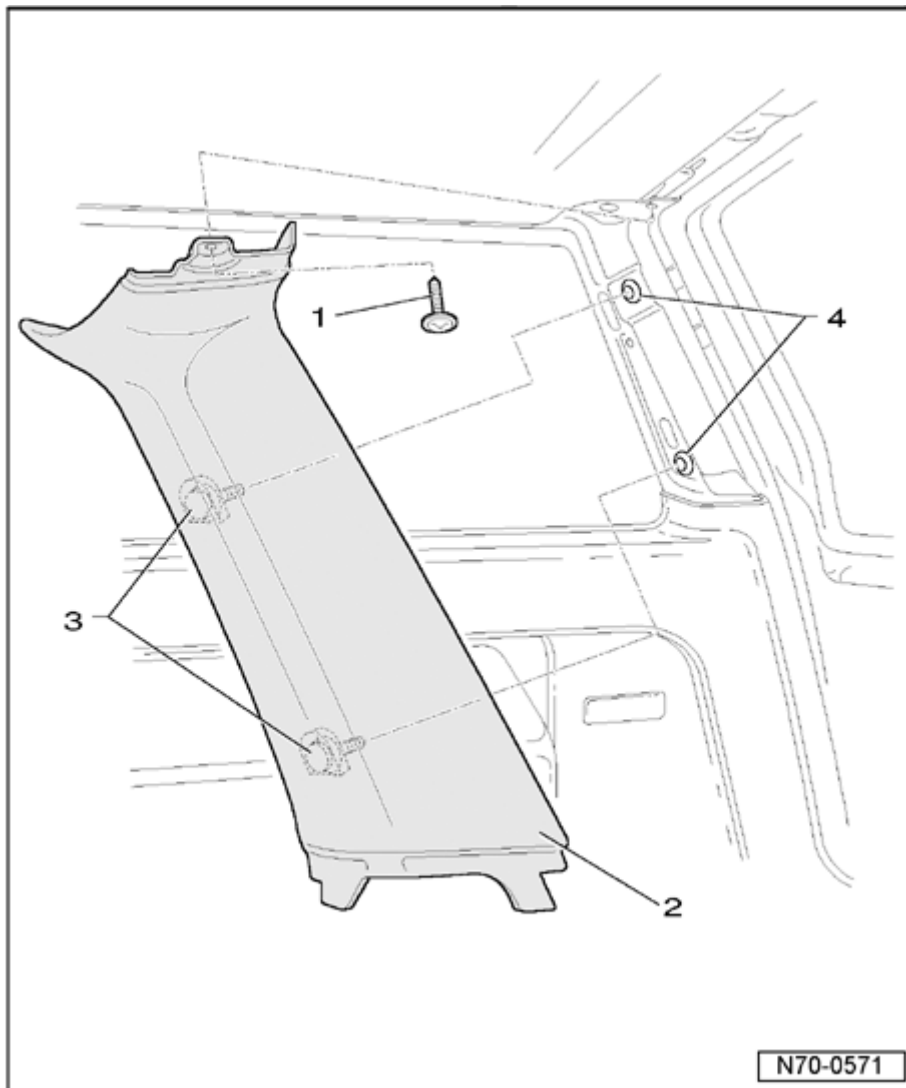
Upper D-pillar trim, removing and installing (Golf wagon/Jetta wagon)

Note:

- n *Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Remove roof end strip ⇒ [70-6, Roof end strip, removing and installing \(Golf wagon/Jetta wagon\)](#) .
- Remove bolt - 1 - .



- Remove trim - **2** - and pull out upward.

Installing

Note:

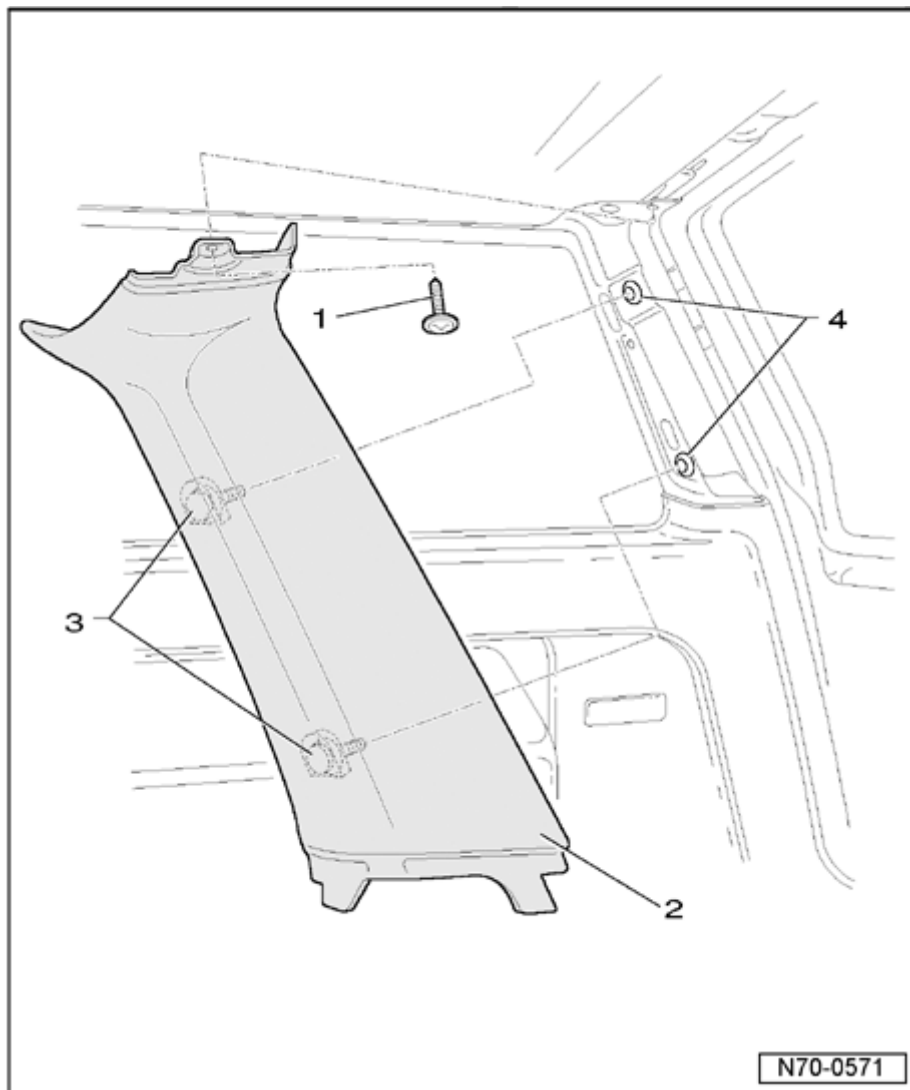
- n Before installing trim - **2** -, check clips - **3** - and mounting sleeves - **4** - for damage, replace if necessary.
- n Steel clips and D-pillar trim parts can no longer be ordered separately for vehicles with side curtain protection ⇒ parts catalog.

- Insert clips - **3** - into mounts for trim - **2** - and press mounting sleeves - **4** - into C-pillar holes.

- Insert lower edge of D-pillar trim panel -

2 - behind luggage compartment side trim and clip into D-pillar.

- Secure trim - **2** - in roof area with bolt - **1**
- .



- Install roof end strip ⇒ [70-6, Roof end strip, removing and installing \(Golf wagon/Jetta wagon\)](#) .

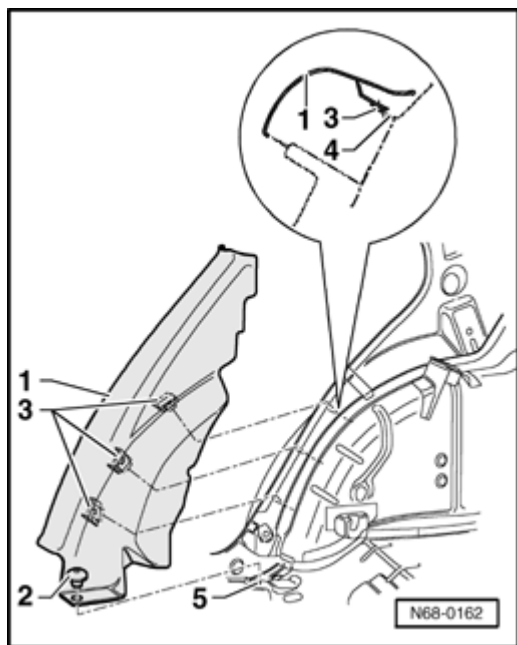
Wheel housing trim, removing and installing (Golf)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.

Removing

- Fold seat cushion and backrest forward.



- Remove press button - 2 - from stud - 5 - .
- Remove trim - 1 - from body flange - 4 - with clips - 3 - .

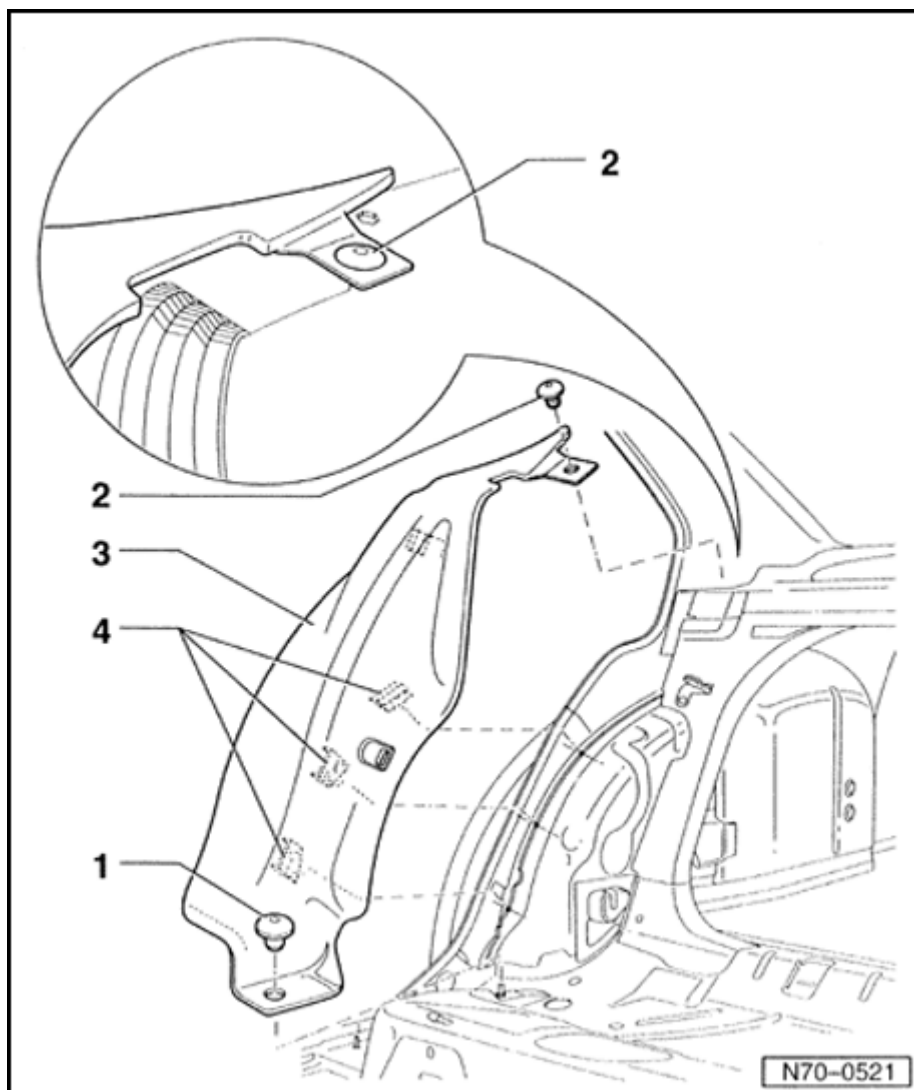
Installing

- Installation is reverse of removal.

Wheel housing trim, removing and installing (Jetta)

Removing

- Remove rear shelf ⇒ [70-3, Rear shelf, removing and installing](#) .
- Fold seat cushion and backrest forward.
- Remove press button - 1 - .
- Remove plugs - 2 - using Disassembly pliers 3392 .



- Loosen trim - 3 - in area of clips - 4 - and remove.

Installing

- Installation is reverse of removal.

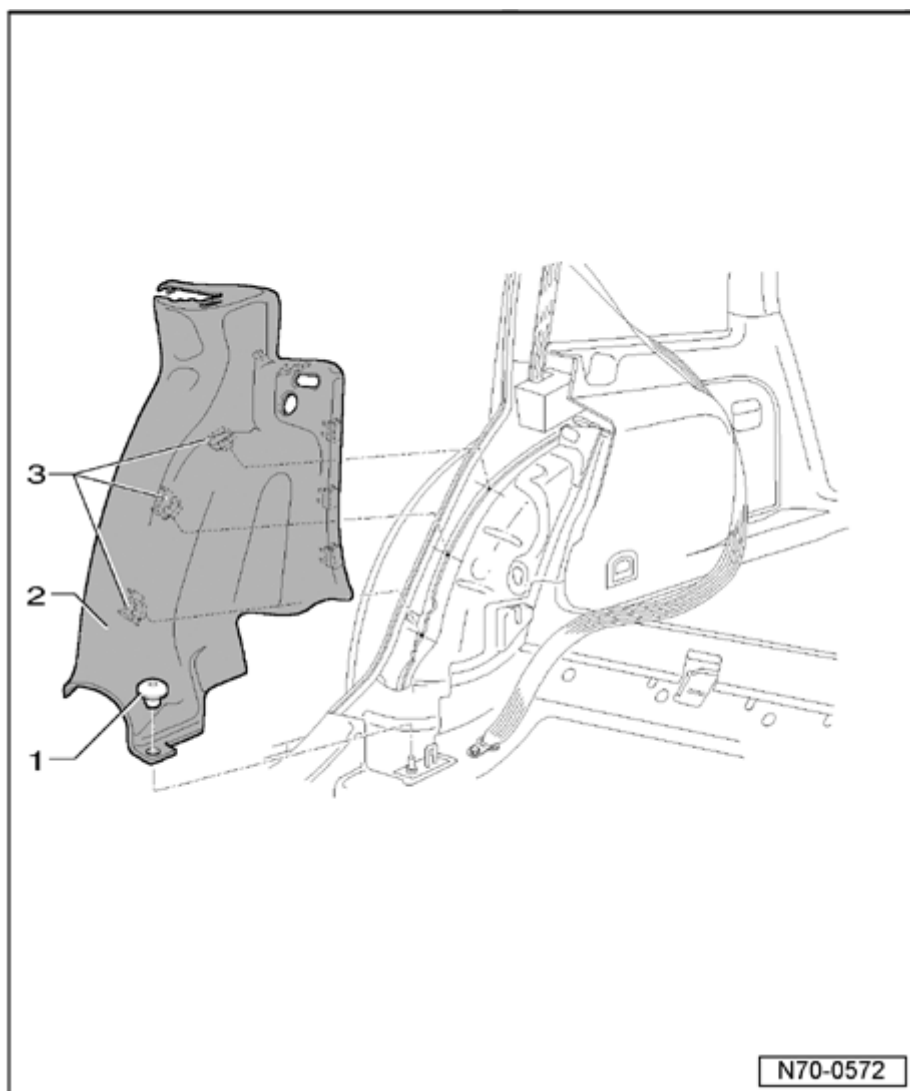
Wheel housing trim, removing and installing (Golf wagon/Jetta wagon)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.
- n For better depiction of trim, backrests are not shown in illustration.

Removing

- Fold seat cushion forward.
- Remove press button - 1 - .



- Loosen trim - 2 - in area of clips - 3 - and remove.

Installing

- Installation is reverse of removal.

Rear shelf, removing and installing

Removing

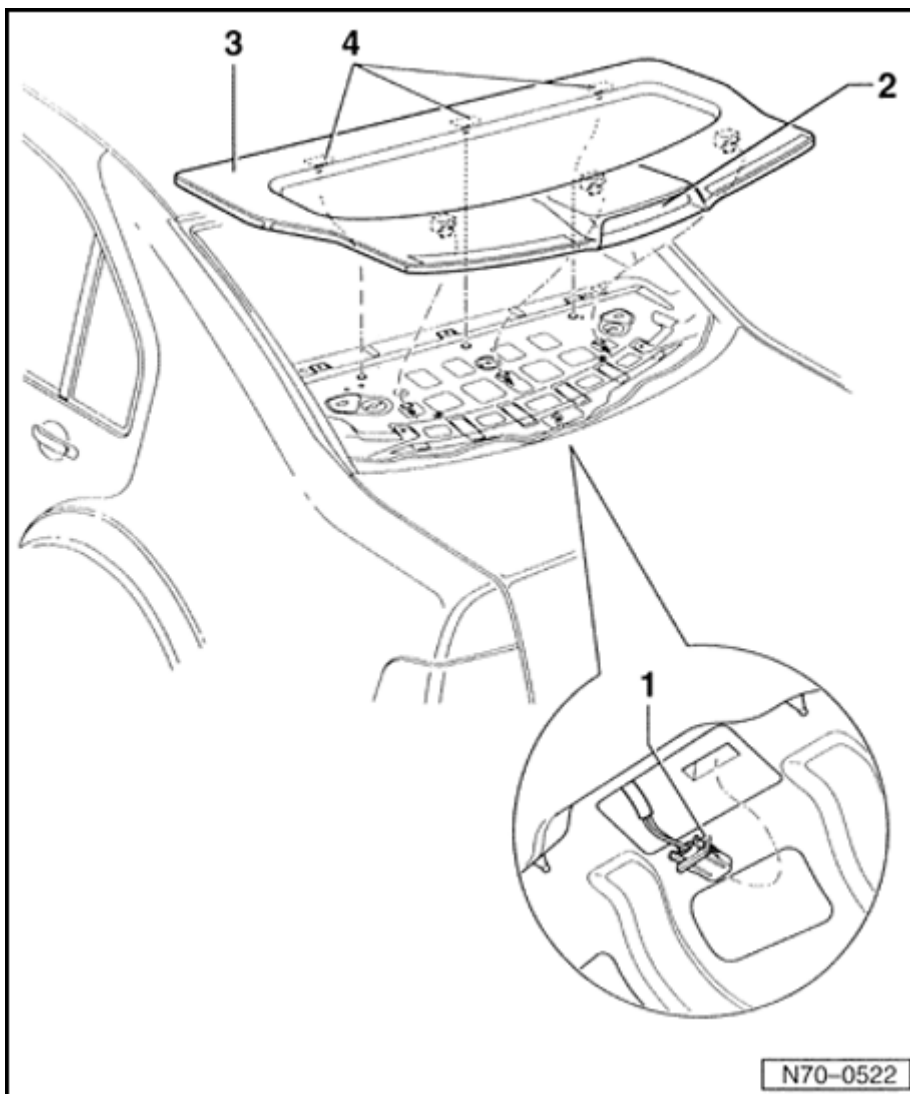
Caution!

Disconnect battery ground (GND) strap before working

on electrical system.**Note:**

n Before disconnecting battery, see note concerning radio anti-ft coding in Owners Manual.

- Switch ignition off.
- Push backrests forward.
- Disconnect connector - 1 - from auxiliary brake lights - 2 - .



- Unclip rear shelf - 3 - and remove.

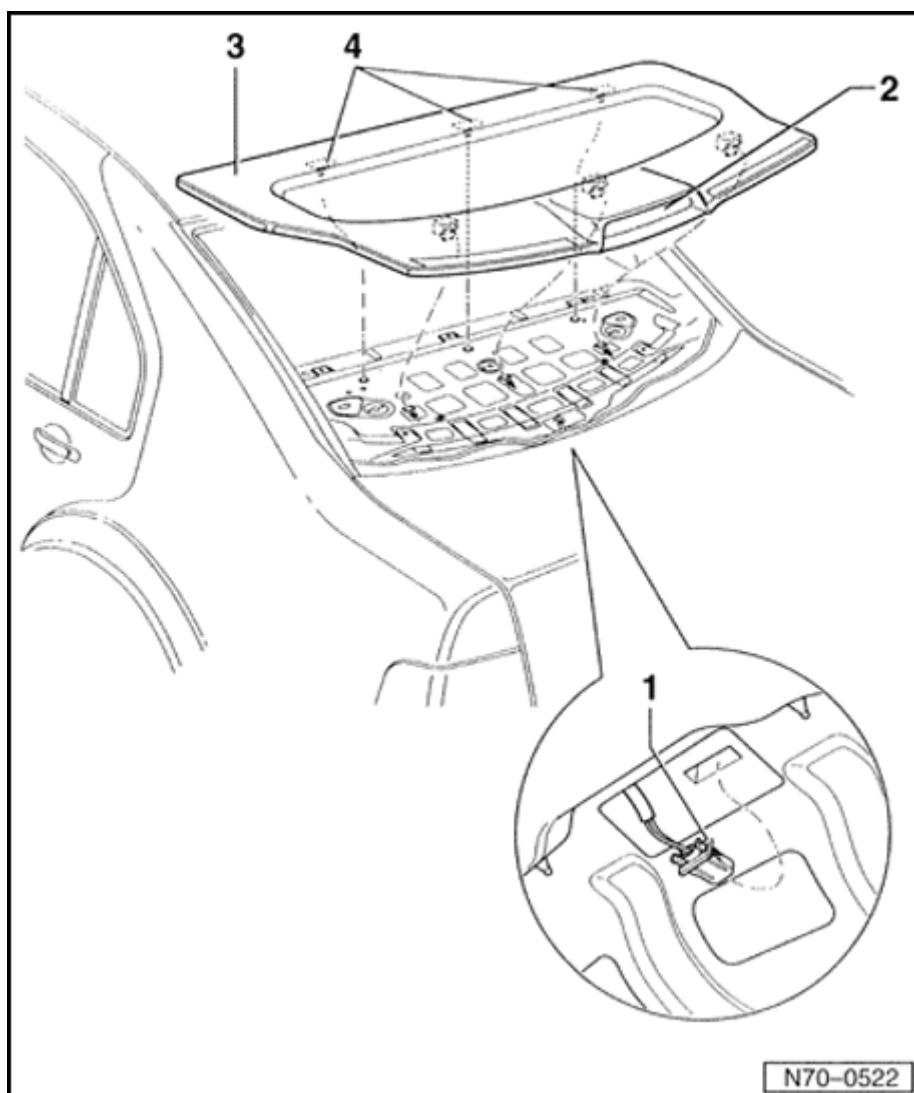
Installing

- Installation is reverse of removal.

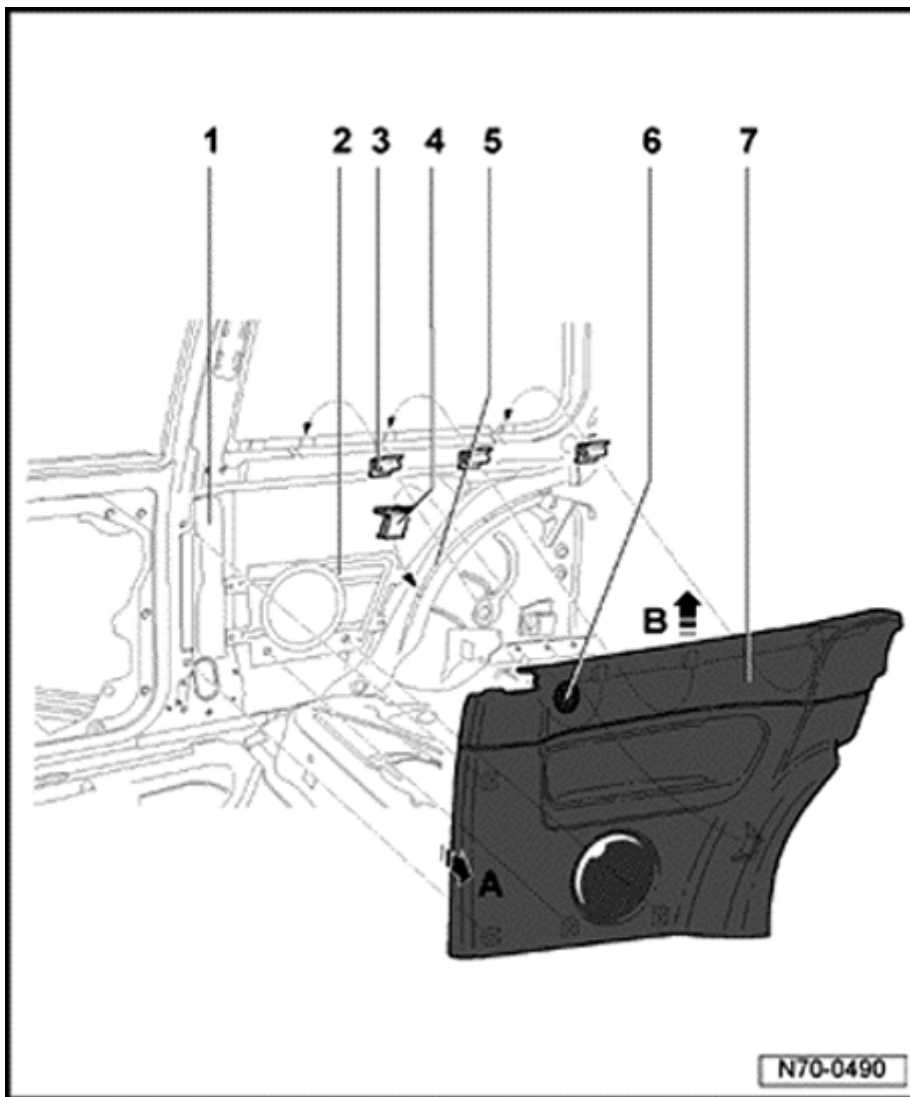
Note:

- n Before installing, check clips - 4 - for damage and replace if necessary.
- n After connecting battery, check vehicle equipment (radio, clock, electric windows) as per Repair Manual and/or Owners Manual.
- n If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked.

⇒ Repair Manual, Fuel Injection Ignition, Repair Group 01,



Side trim, assembly overview (Golf 2- door)



1. **B-pillar**

2. **Speaker bracket**

3. **Clip**

; 3 pieces

4. **Clip**

; for body flange

5. **Body flange**

6. **Speaker**

7. **Side trim**

; Removing ⇒ [70-3, Side trim,](#)

[removing and installing \(Golf 2-door\)](#)

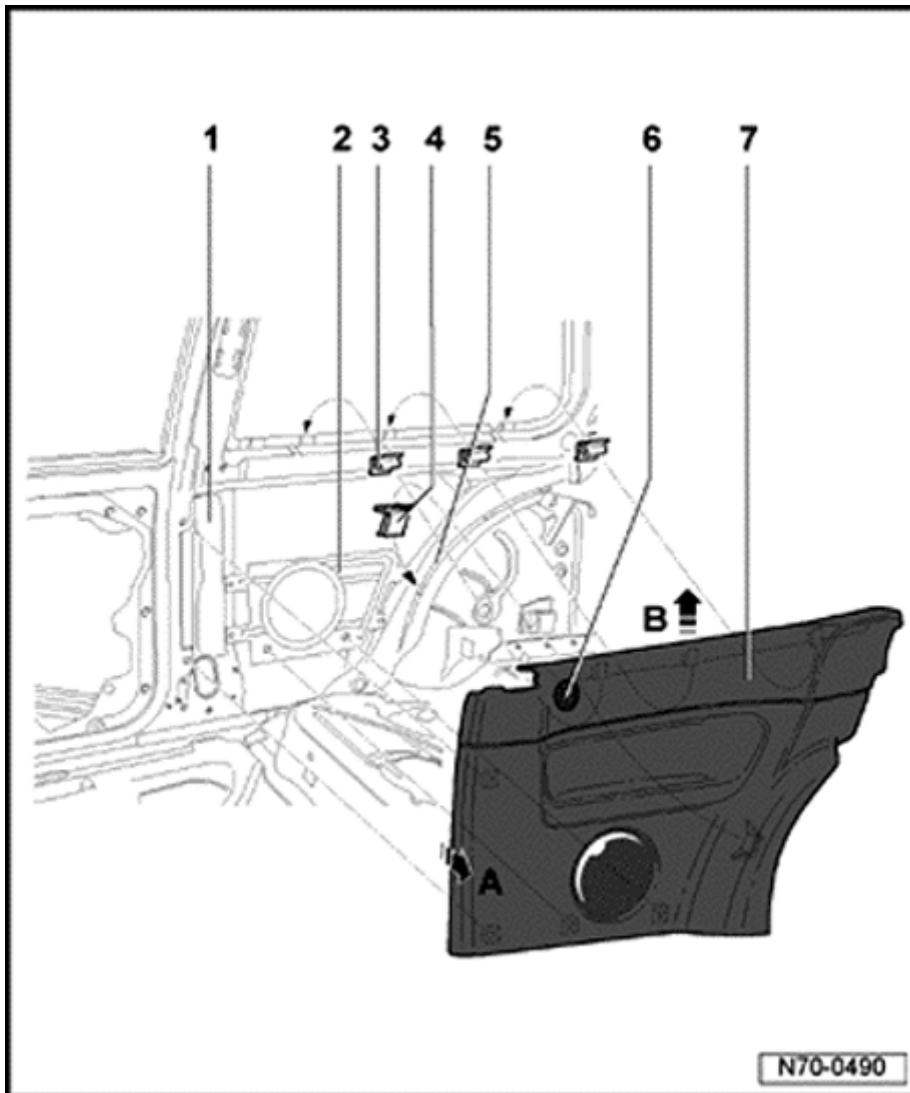
Side trim, removing and installing (Golf 2-door)

Note:

- Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Remove seat ⇒ [72-2, Seat cushion, removing and installing](#) .
- Remove backrest ⇒ [72-2, Backrest, removing and installing](#) .
- Unclip side trim - **7** - from B-pillar - **1** - and from bracket - **2** - for speaker - **arrowA** - .



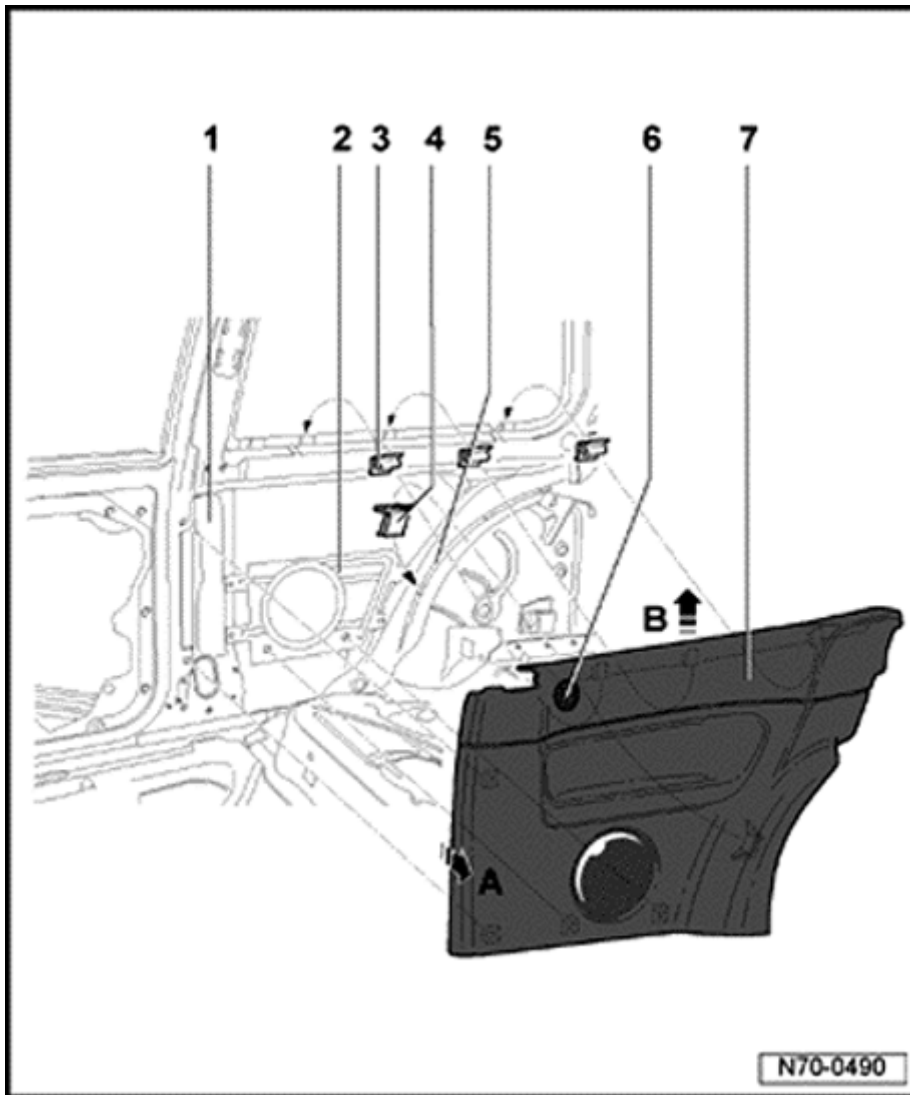
- Pull side trim - 7 - slightly upward - **arrow B** - and disconnect any harness connectors for speaker - 6 - .

Installing

Installation is reverse of removal.

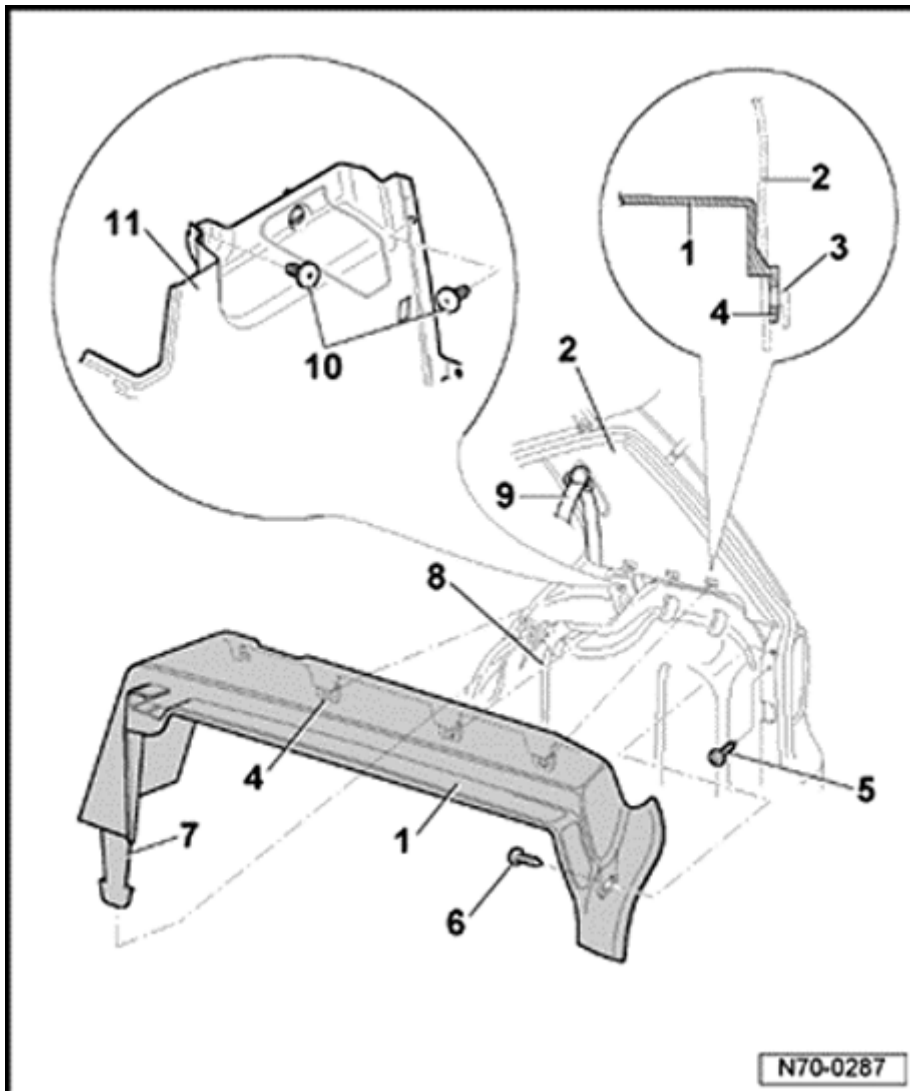
Note:

- n Before installing side trim, check clips - 3 - and - 4 - for damage and replace if necessary.
- n Clip - 4 - connects side trim - 7 - to body flange - 5 - for wheel housing.



Luggage compartment trim

Luggage compartment cover support , assembly overview (Golf)



1. Luggage compartment cover support

- Removing ⇒ [70-4, Luggage compartment cover support, removing and installing \(Golf\)](#)

2. C-pillar trim

3. Locking lug on C-pillar

4. Hook on support

5. Bolt

6. Bolt

7. Locking pin

8. Wheelhousing

9. Seatbelt

10. Clips

i Qty. 2

11. Luggage compartment trim

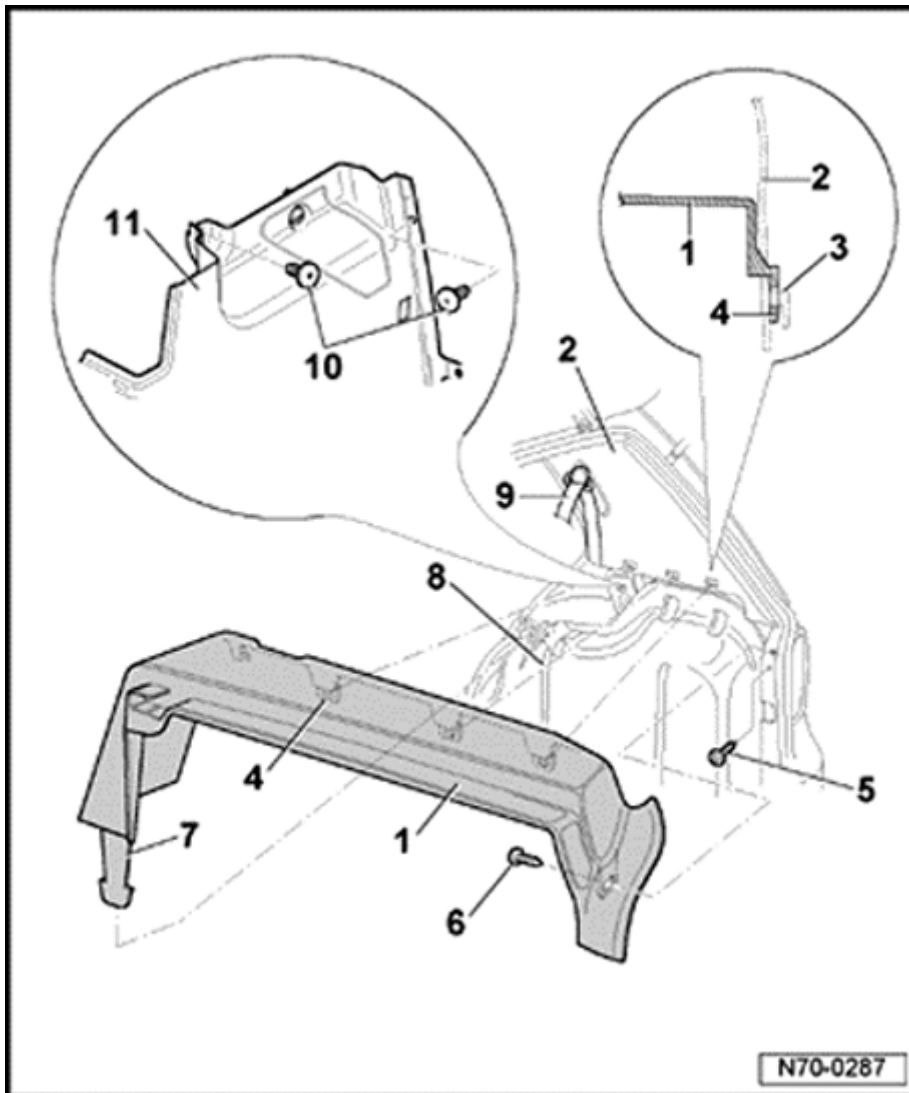
Luggage compartment cover support, removing and installing (Golf)

Note:

- n Removal and installation is described for right side of vehicle. same instructions apply for removal and installation for left-hand side.*

Removing

- Remove luggage compartment cover.
- Remove bolt - **5** - .
- Unclip lock carrier trim from C-pillar and remove clips - **10** - .
- Remove bolt - **6** - .
- Remove support - **1** - upward, starting at rear.



- Remove support - 1 - with locking pin - 7
- from out of wheel housing - 8 - .

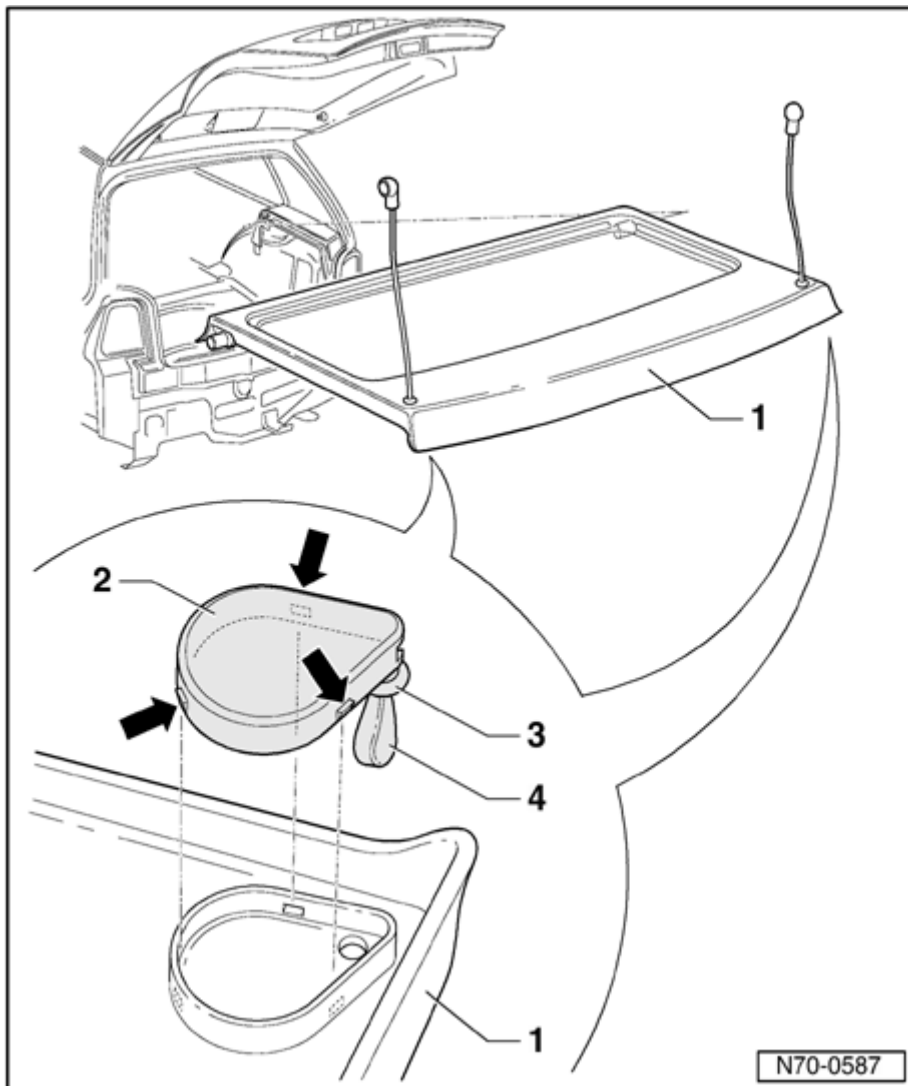
Installing

Installation is reverse of removal.

Luggage compartment cover retraction spool, removing and installing

Removing

- Remove luggage compartment cover - 1 - .
- Remove three locking lugs - **arrows** - using a small screwdriver.
- Remove retraction spool - 2 - out of mount using a small screwdriver.

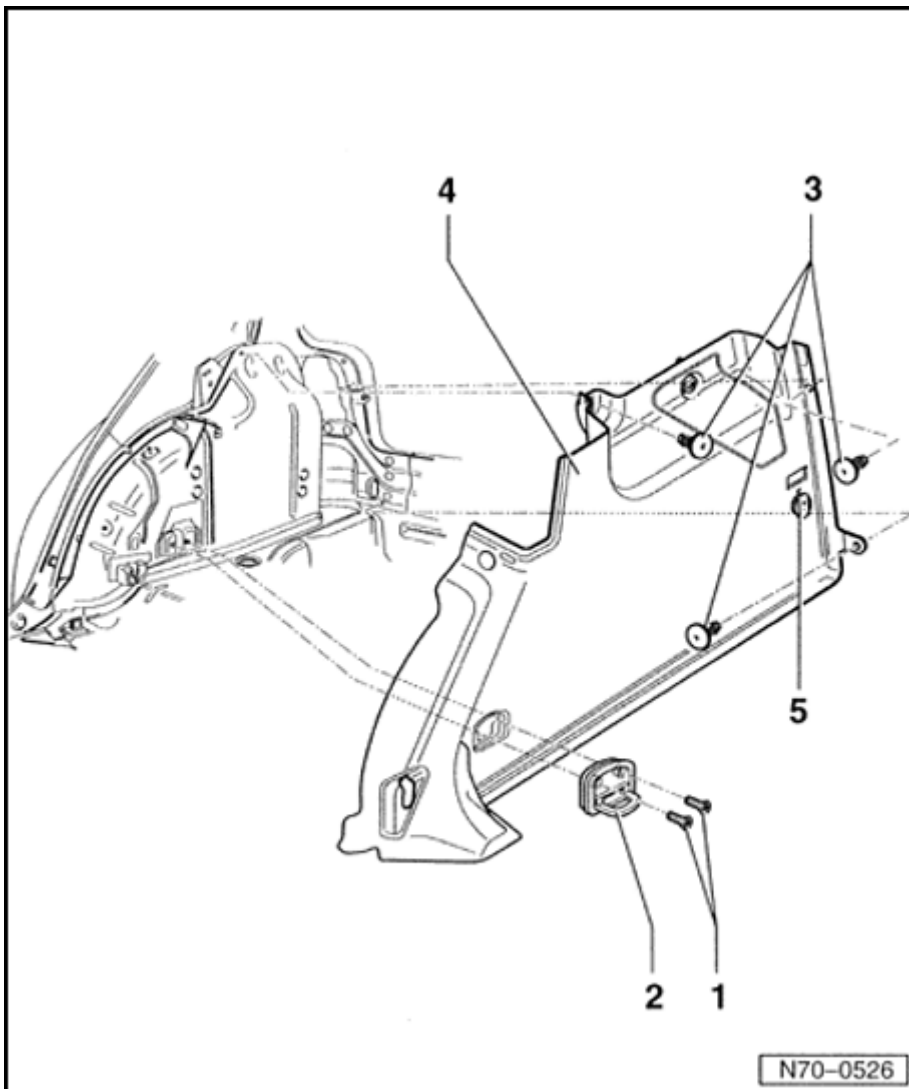


- Guide collar - **3** - and lifting eyelet - **4** - through hole in luggage compartment cover.

Installing

Installation is reverse of removal.

Right luggage compartment side trim, assembly overview (Golf)

**1. Bolts****2. Tie-down hook****3. Plugs**

i Qty. 3

4. Luggage compartment trim

i Removing ⇒ [70-4, Right luggage compartment side trim, removing and installing \(Golf\)](#)

5. 12 V socket -U5-**Right luggage compartment side trim,
removing and installing (Golf)**

Removing

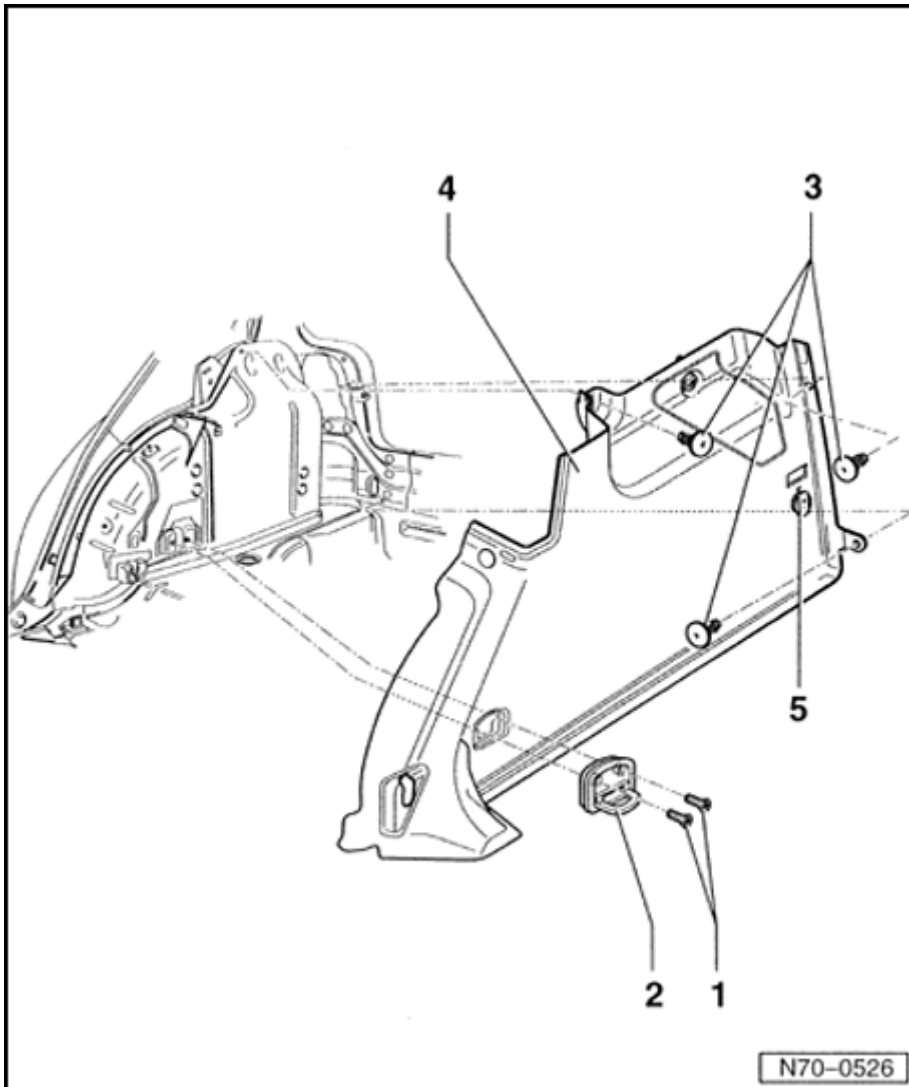
Caution!

Disconnect battery ground (GND) strap before working on electrical system.

Note:

ⁿ Before disconnecting battery see note concerning radio anti-ft coding in Owners Manual.

- Switch ignition off.
- Remove right seat backrest ⇒ [72-2, Backrest, removing and installing](#) .
- Remove wheel housing trim ⇒ [70-3, Wheel housing trim, removing and installing \(Golf\)](#) .
- Remove rear lock carrier cover ⇒ [70-4, Rear lock carrier cover, removing and installing \(Golf\)](#) .
- Remove bolts - **1** - and remove tie-down
- **2** - .
- Remove three plugs - **3** - .



- Loosen luggage compartment trim - **4** - and disconnect harness connectors.

Installing

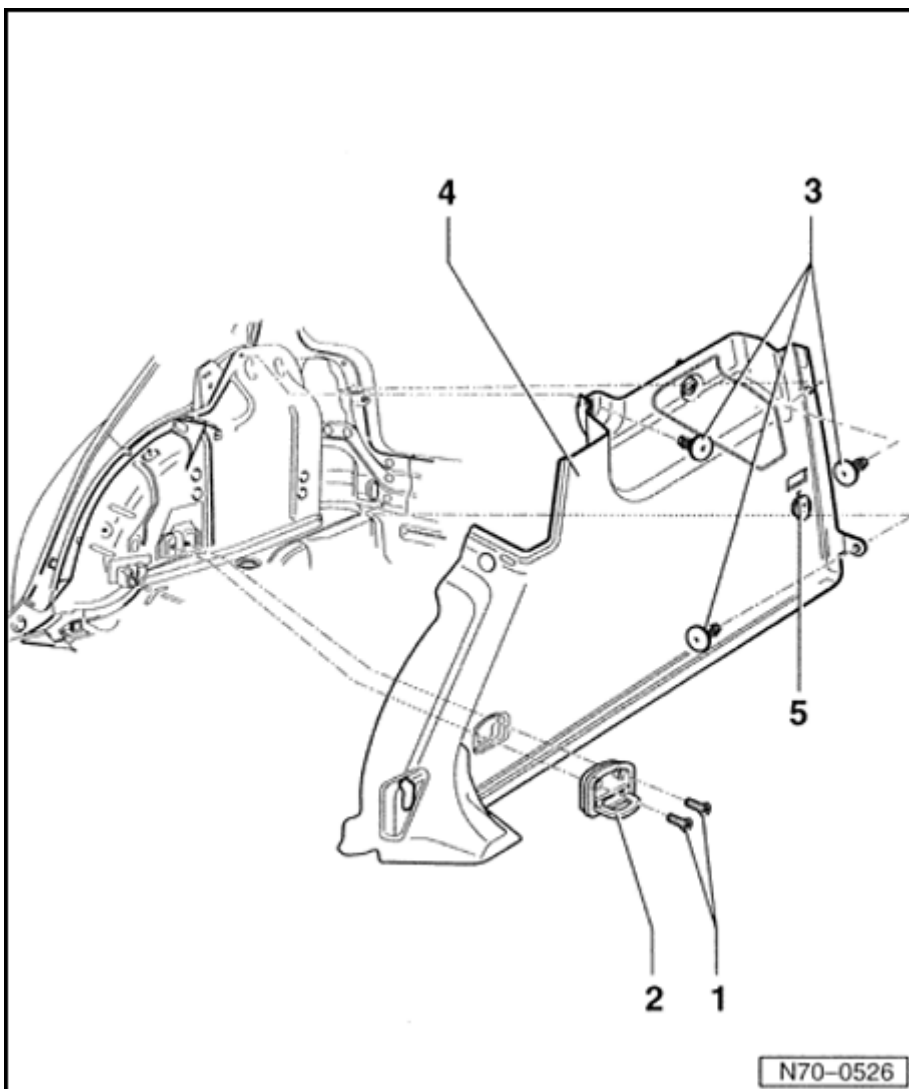
- Installation is reverse of removal.

Note:

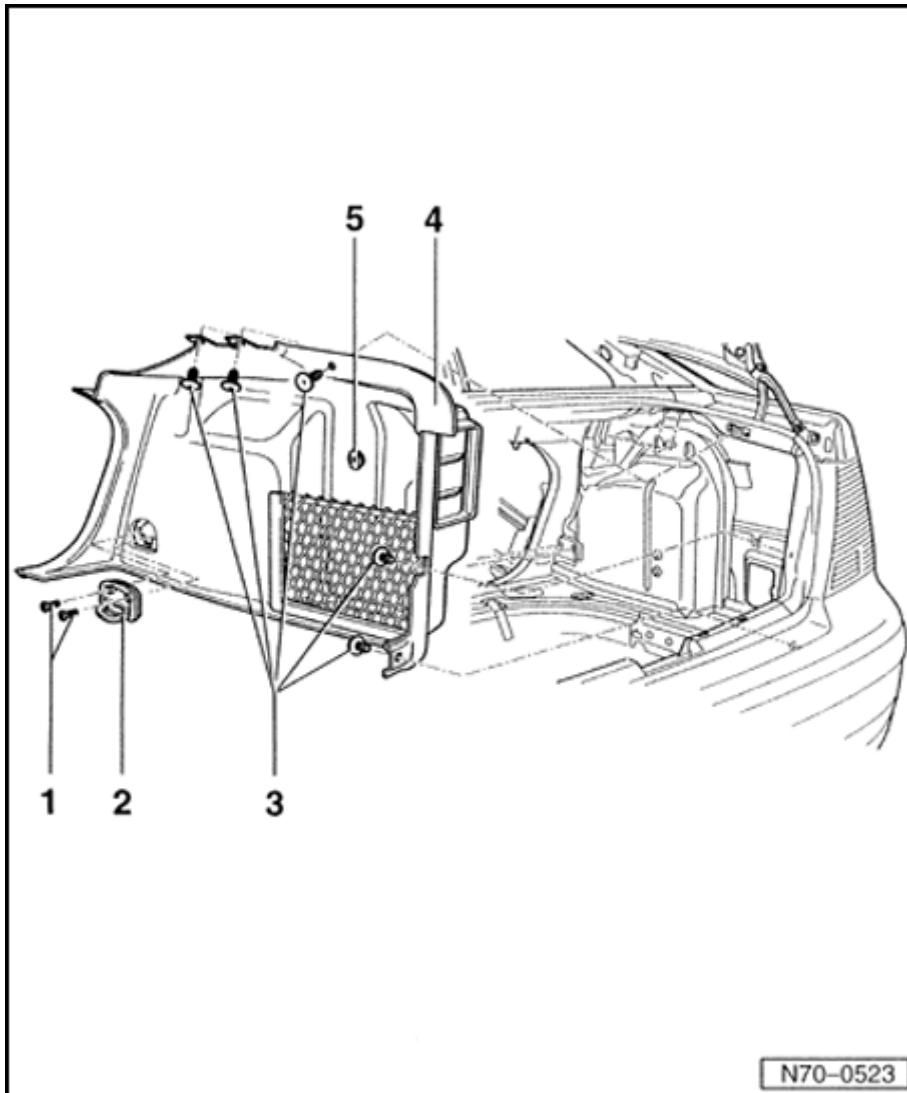
- n Before installing trim, check plugs - **3** - for damage and replace if necessary.
- n After connecting battery, check vehicle equipment (radio, clock, electric windows) as per Repair Manual and/or Owners Manual.
- n If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and

Readiness code must be checked.

⇒ *Repair Manual, Fuel Injection Ignition,
Repair Group 01,*



**Right luggage compartment side trim,
assembly overview (Jetta)**



1. Bolts
2. Tie-down hook
3. Buffer plugs
4. Luggage compartment trim
 - i Removing ⇒ [70-4, Right luggage compartment side trim, removing and installing \(Jetta\)](#)
5. 12 V socket -U5-

Right luggage compartment side trim, removing and installing (Jetta)

Removing

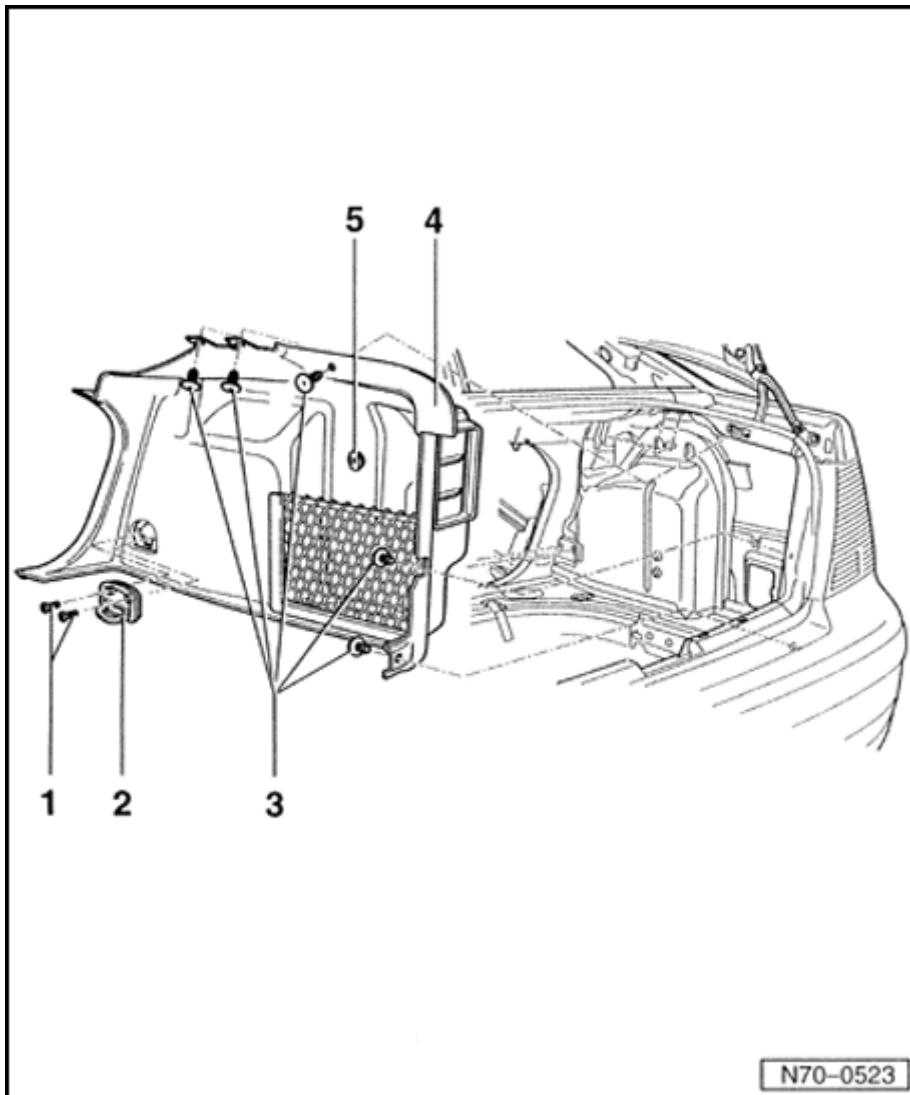
Caution!

Disconnect battery ground (GND) strap before working on electrical system.

Note:

- n Before disconnecting battery see note concerning radio anti-ft coding in Owners Manual.*

- Switch ignition off.
- Remove right seat backrest ⇒ [72-2, Backrest, removing and installing](#) .
- Remove wheel housing trim ⇒ [70-3, Wheel housing trim, removing and installing \(Jetta\)](#) .
- Remove rear lock carrier cover ⇒ [70-4, Rear lock carrier cover, removing and installing \(Jetta\)](#) .
- Remove bolts - **1** - and remove tie-down
- **2** - .
- Remove plugs - **3** - (Qty. 5).



- Loosen luggage compartment trim - **4** - and disconnect harness connector for 12 V socket -U5-. - **5** - .

Installing

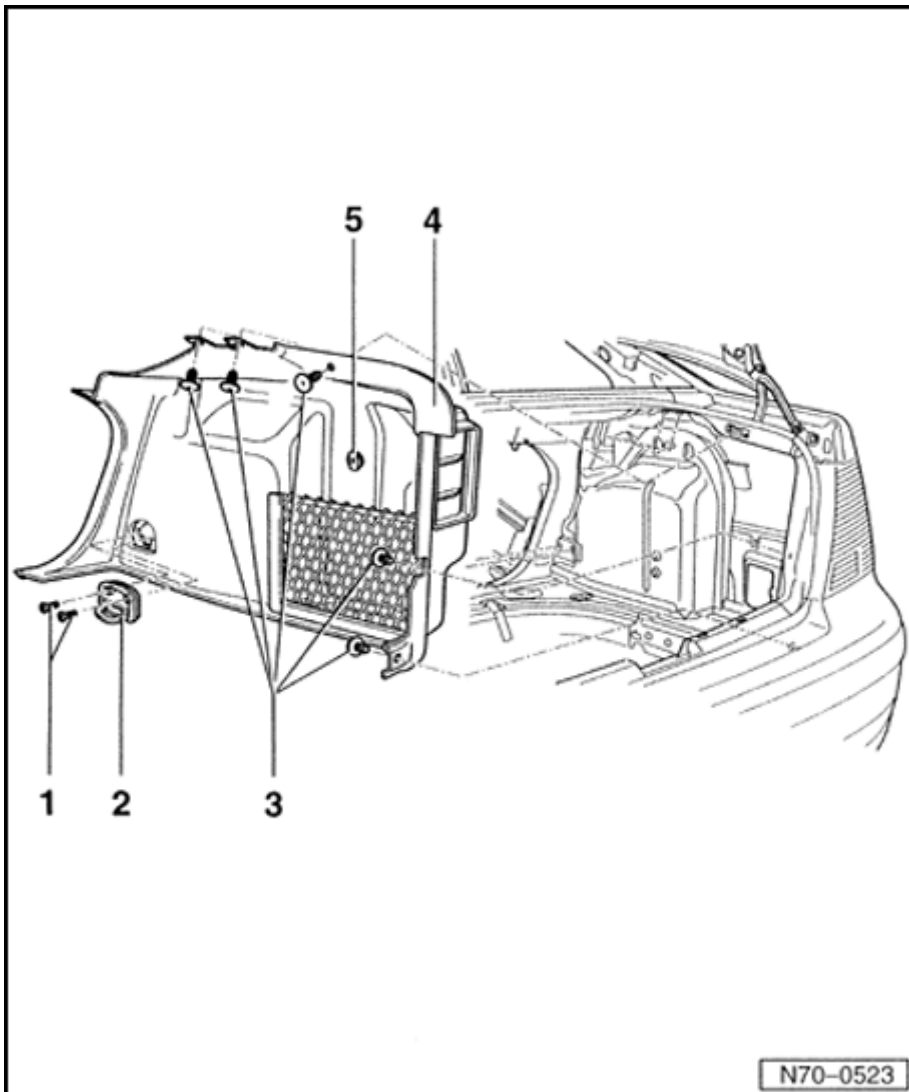
- Installation is reverse of removal.

Note:

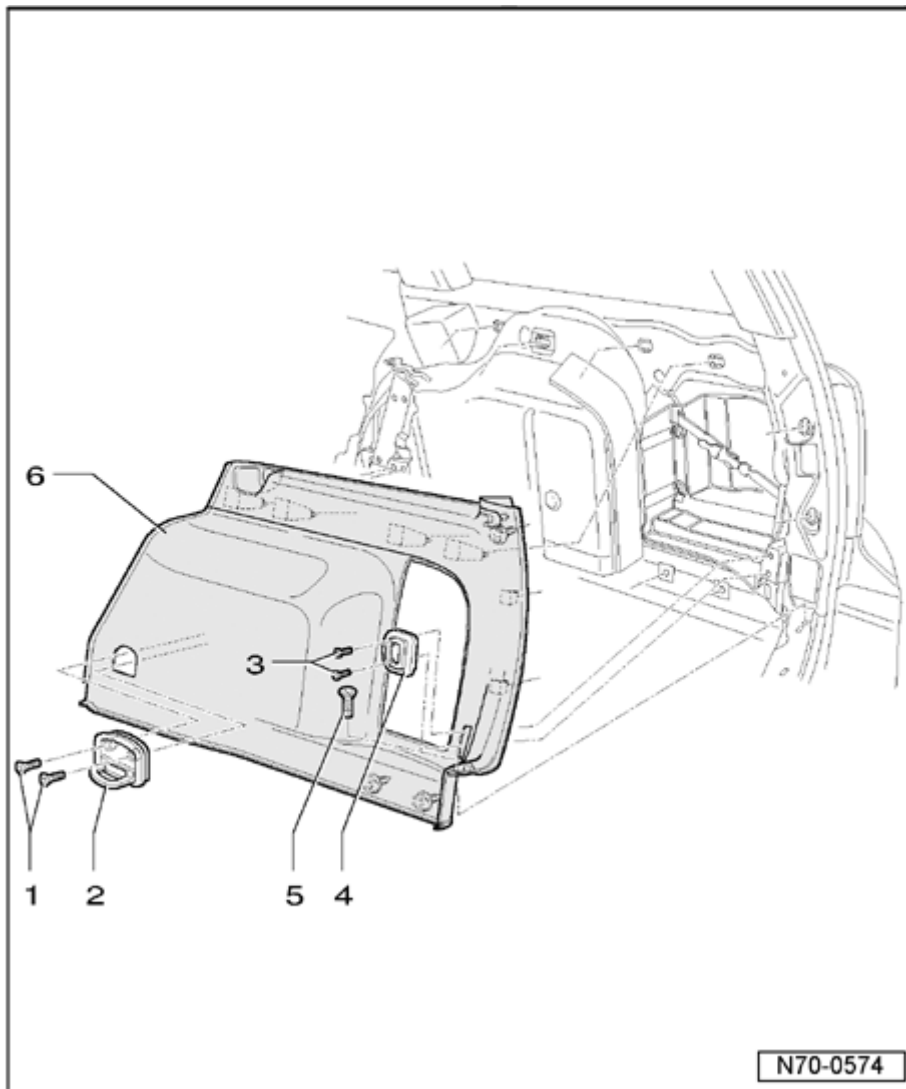
- n *Before installing trim, check plugs - **3** - for damage and replace if necessary.*
- n *After connecting battery, check vehicle equipment (radio, clock, electric windows) as per Repair Manual and/or Owners Manual.*
- n *If engine Electronic Control Module (ECM) is subject to low voltage with*

*ignition on, DTC memory and
Readiness code must be checked.*

*⇒ Repair Manual, Fuel Injection Ignition,
Repair Group 01,*



**Right luggage compartment side trim,
assembly overview (Golf wagon/Jetta
wagon)**



1. Bolts
2. Tie-down
3. Bolts
4. Tie-down
5. Bolt
6. Luggage compartment trim panel, right

i Removing ⇒ [70-4, Right luggage compartment side trim, removing and installing \(Golf wagon/Jetta wagon\)](#)

Right luggage compartment side trim,

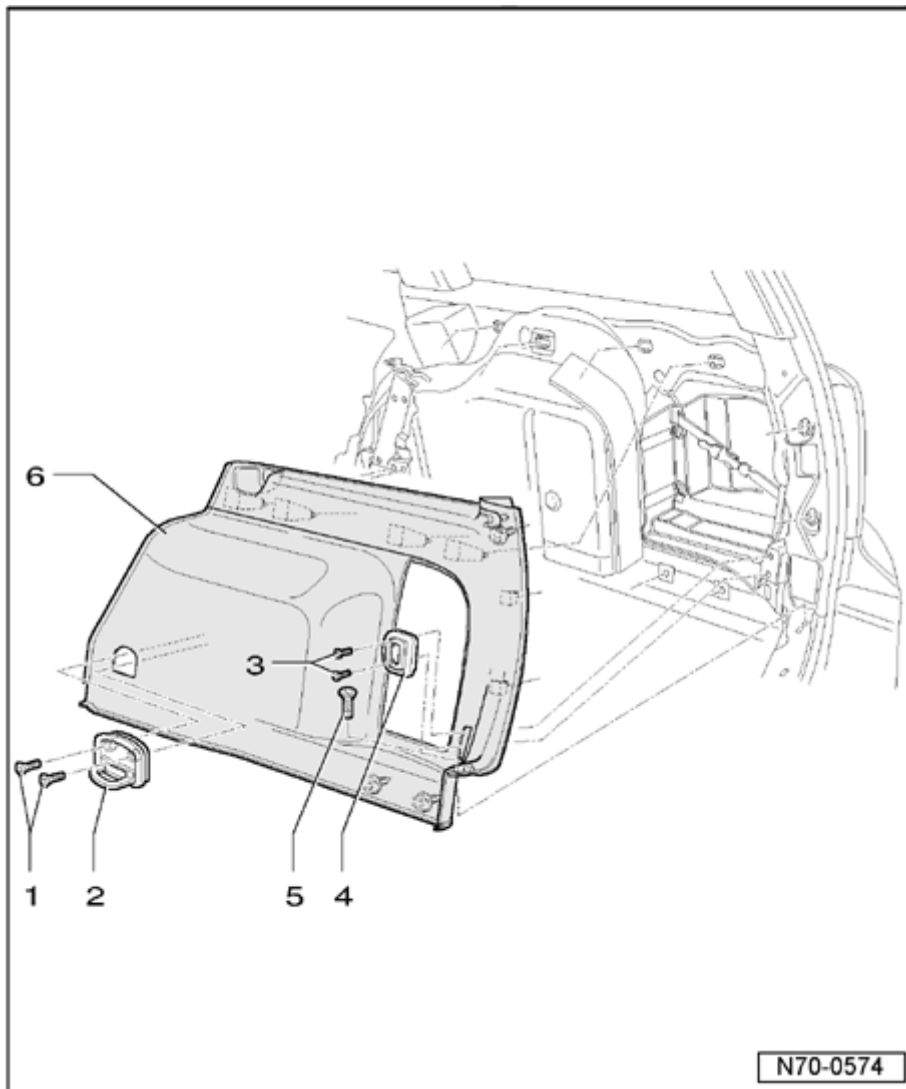
removing and installing (Golf wagon/Jetta wagon)

Note:

- n Luggage compartment side trim at left contains a 12 V socket and a luggage compartment light. corresponding wiring harnesses must be disconnected before removing trim.*

Removing

- Fold right seat cushion forward.
- Remove right seat backrest ⇒ [72-2, Backrest, removing and installing](#) .
- Remove wheel housing trim ⇒ [70-3, Wheel housing trim, removing and installing \(Golf wagon/Jetta wagon\)](#) .
- Remove lock carrier cover at rear ⇒ [70-4, Rear lock carrier cover, removing and installing \(Golf wagon/Jetta wagon\)](#) .
- Remove bolts - **1** - and remove tie-down
- **2** - .
- Remove bolts - **3** - and remove tie-down
- **4** - .
- Remove bolt - **5** - .



- Loosen luggage compartment trim - **6** - and disconnect any harness connectors for light and 12 V socket .

Installing

Installation is reverse of removal.

Note:

- n Before installing, check clips and clamps for damage and replace if necessary.

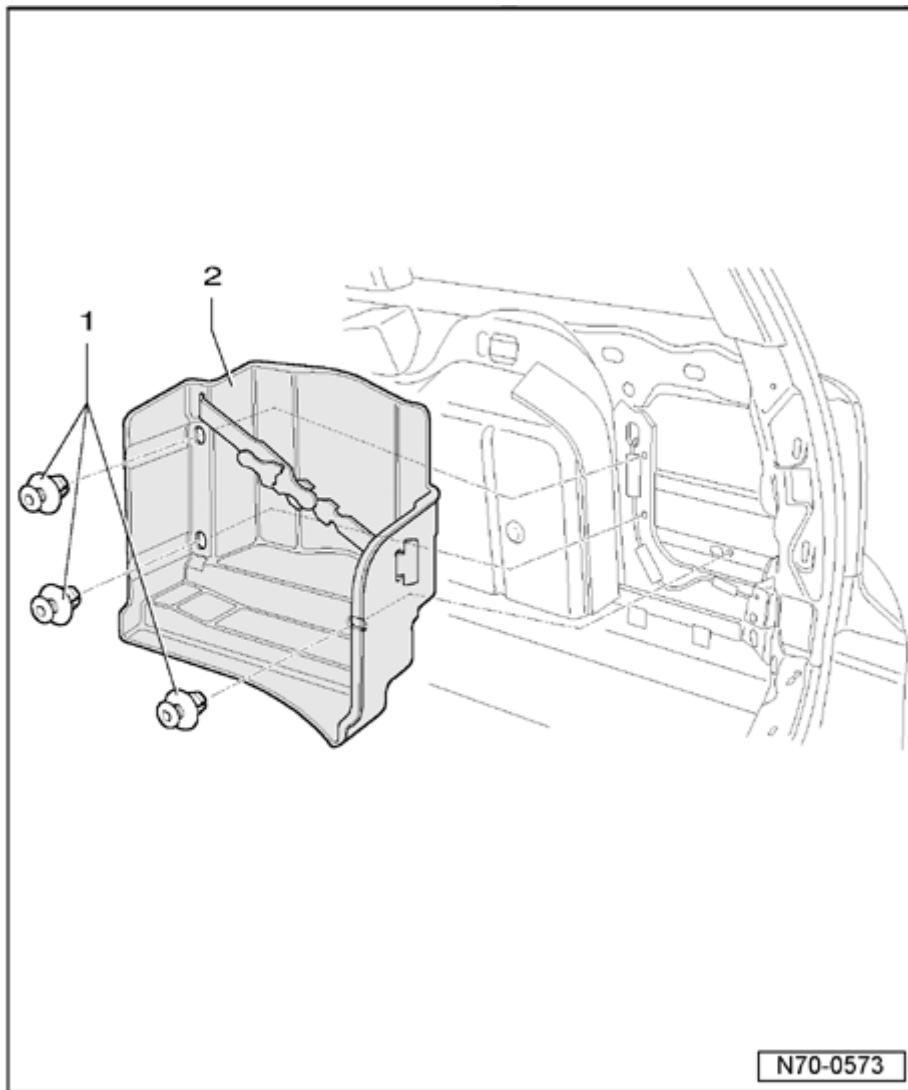
Right storage compartment, removing and installing (Golf wagon/Jetta wagon)

Removing

- Remove right luggage compartment side trim ⇒ [70-4](#).

Right luggage compartment side trim, removing and installing (Golf wagon/Jetta wagon) .

- Remove securing clips - 1 - .



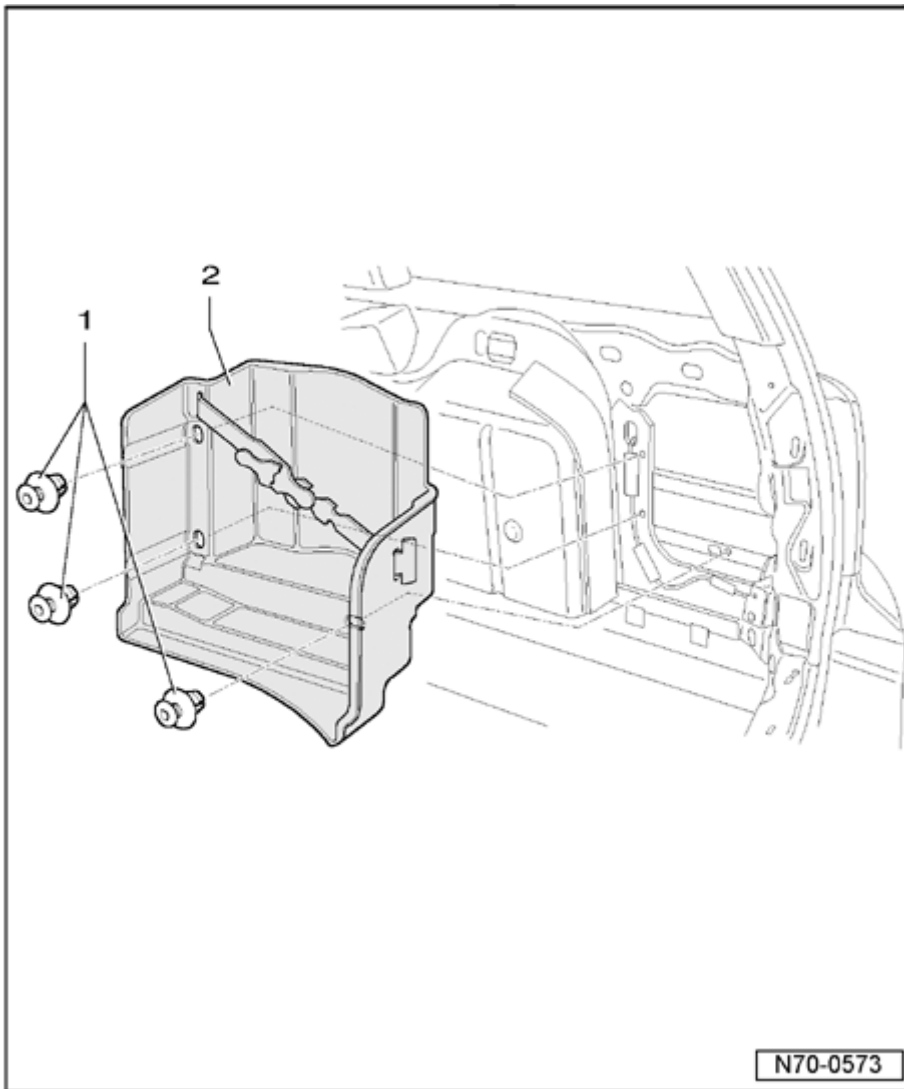
- Remove storage compartment - 2 - .

Installing

- Installation is reverse of removal.

Note:

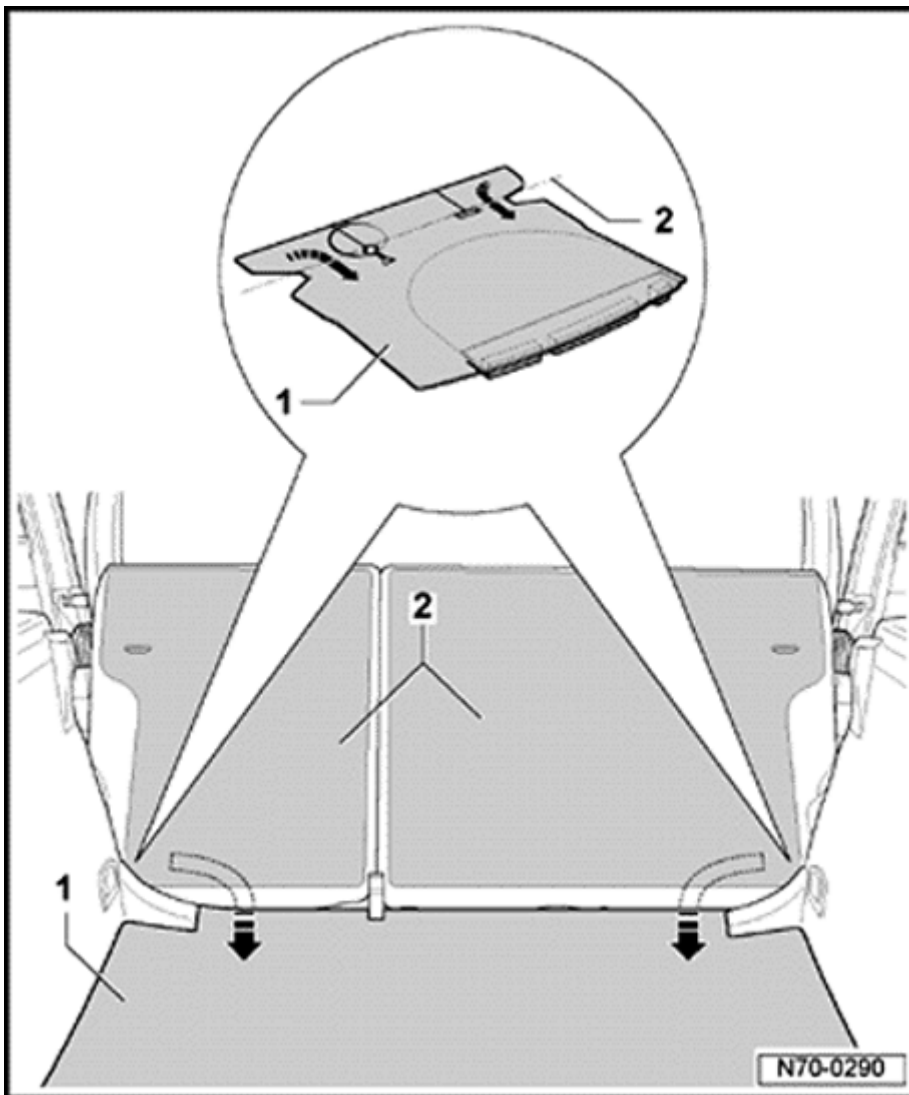
- n Check securing clips - 1 - and replace if necessary before installing storage compartment.



Luggage compartment floor carpet, removing (Golf)

Removing

- Fold seat cushions and backrests forward.



- Remove luggage compartment floor carpet - 1 - toward rear under backrests - 2 - .

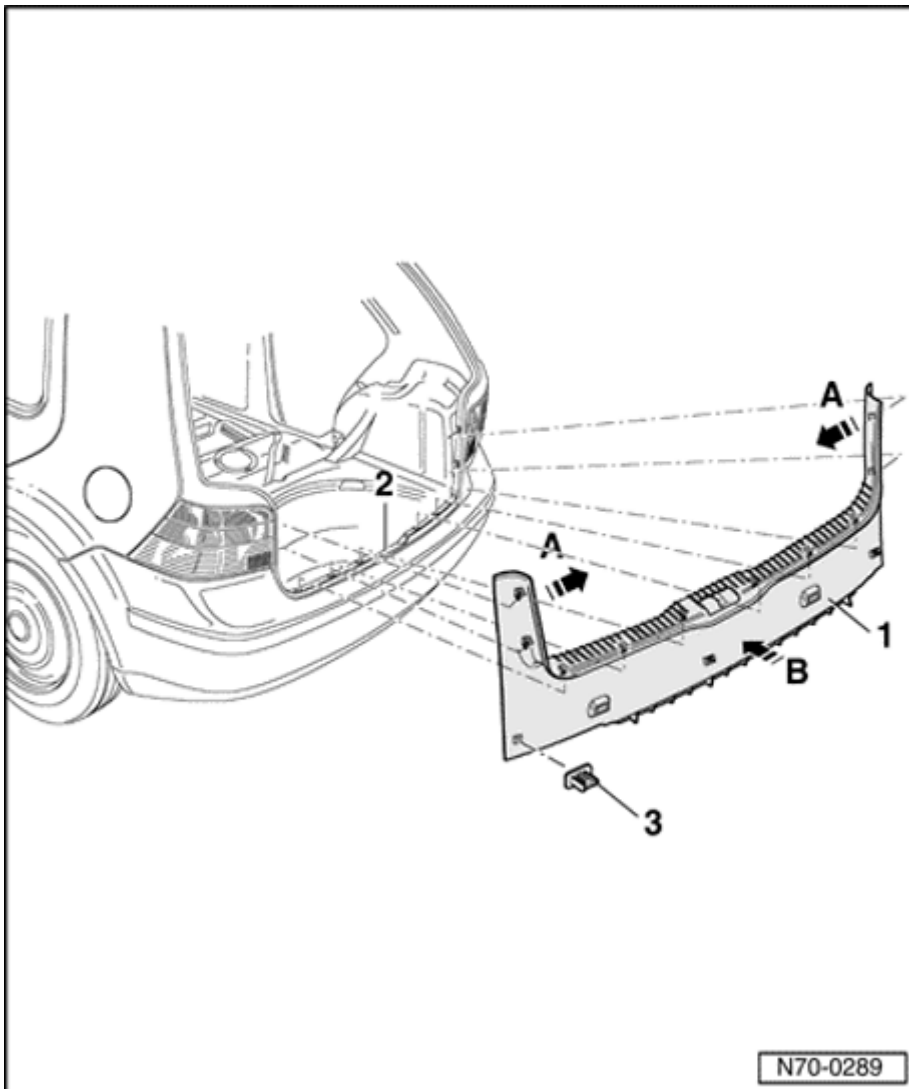
Installing

- Installation is reverse of removal.

Rear lock carrier cover, removing and installing (Golf)

Removing

- Release lock carrier cover - 1 - first at top - **arrow A** - and then at bottom - **arrow B**
- from trim panel - 2 - .



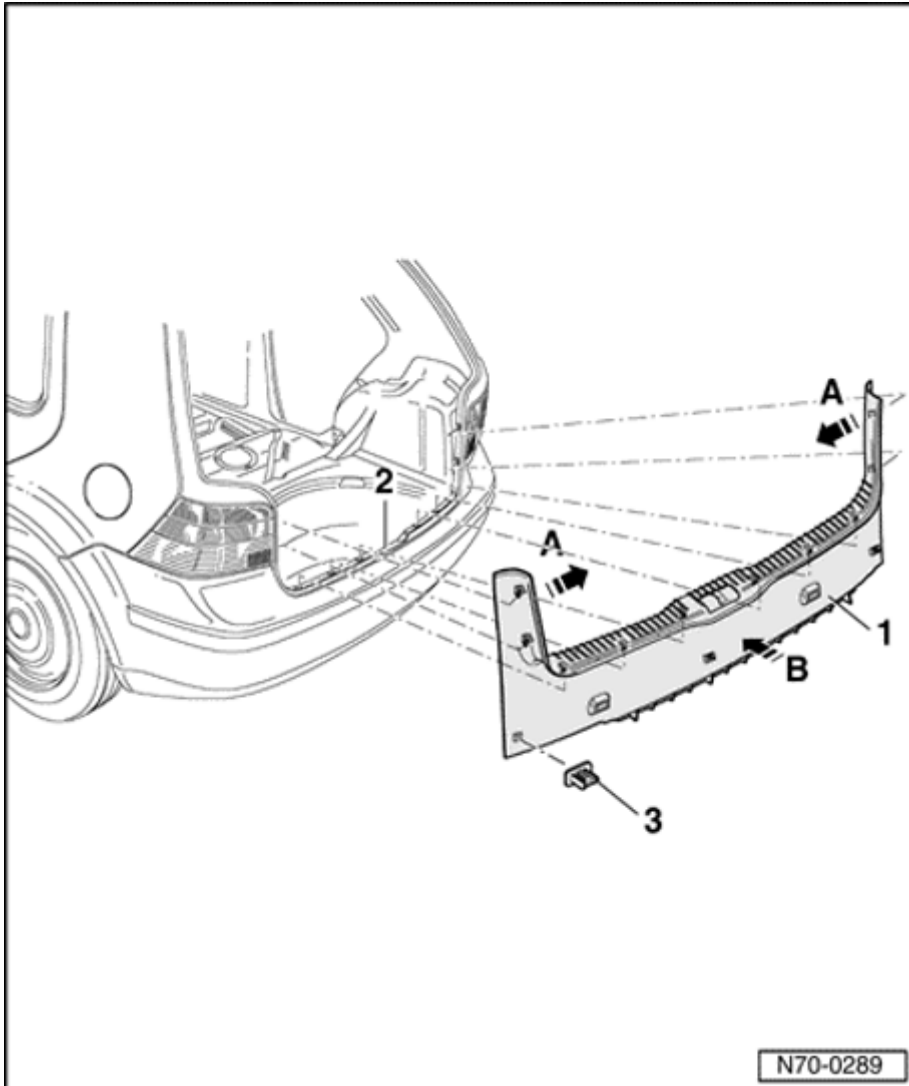
- Remove lock carrier cover - **1** - upward from trim panel.

Installing

- Installation is reverse of removal.

Note:

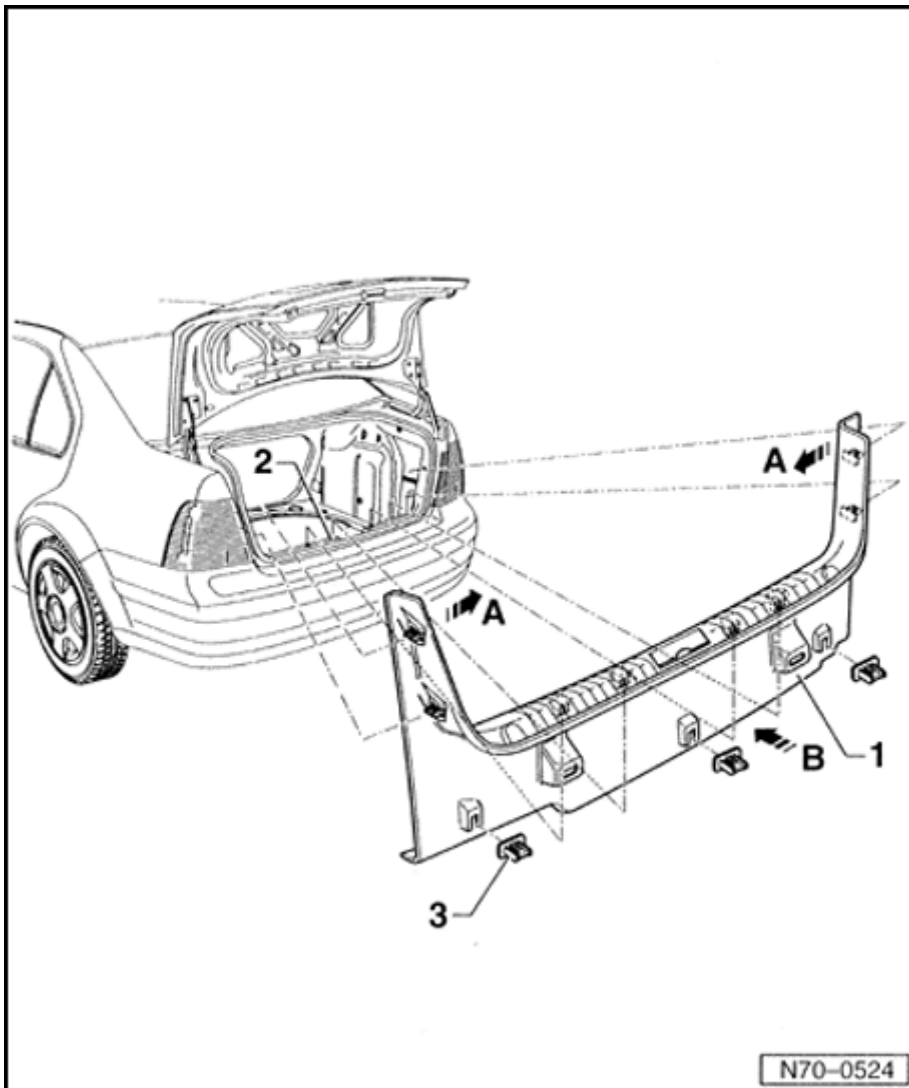
- n Before installing, check clips - **3** - for damage and replace if necessary.



Rear lock carrier cover, removing and installing (Jetta)

Removing

- Release lock carrier cover - 1 - first at top - **arrow A** - and then at bottom - **arrow B**
- from trim panel - 2 - .



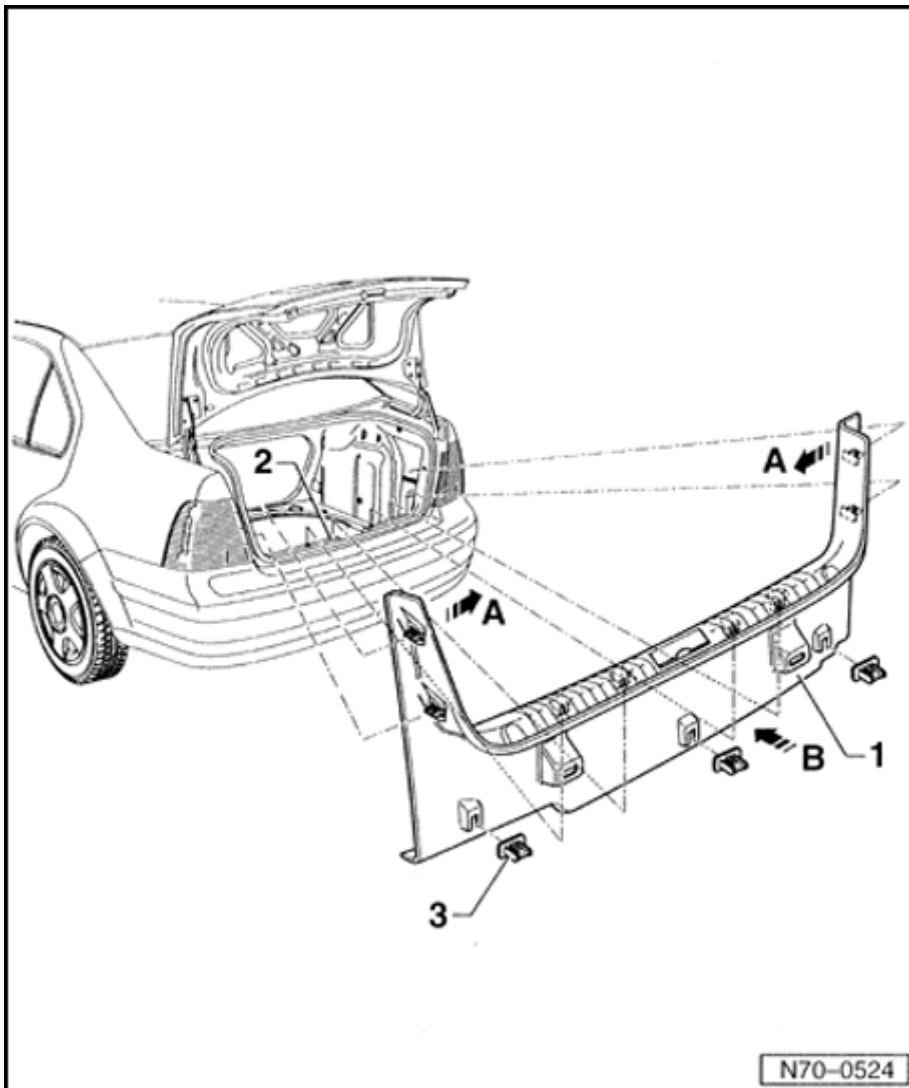
- Remove lock carrier cover - **1** - upward from trim panel.

Installing

- Installation is reverse of removal.

Note:

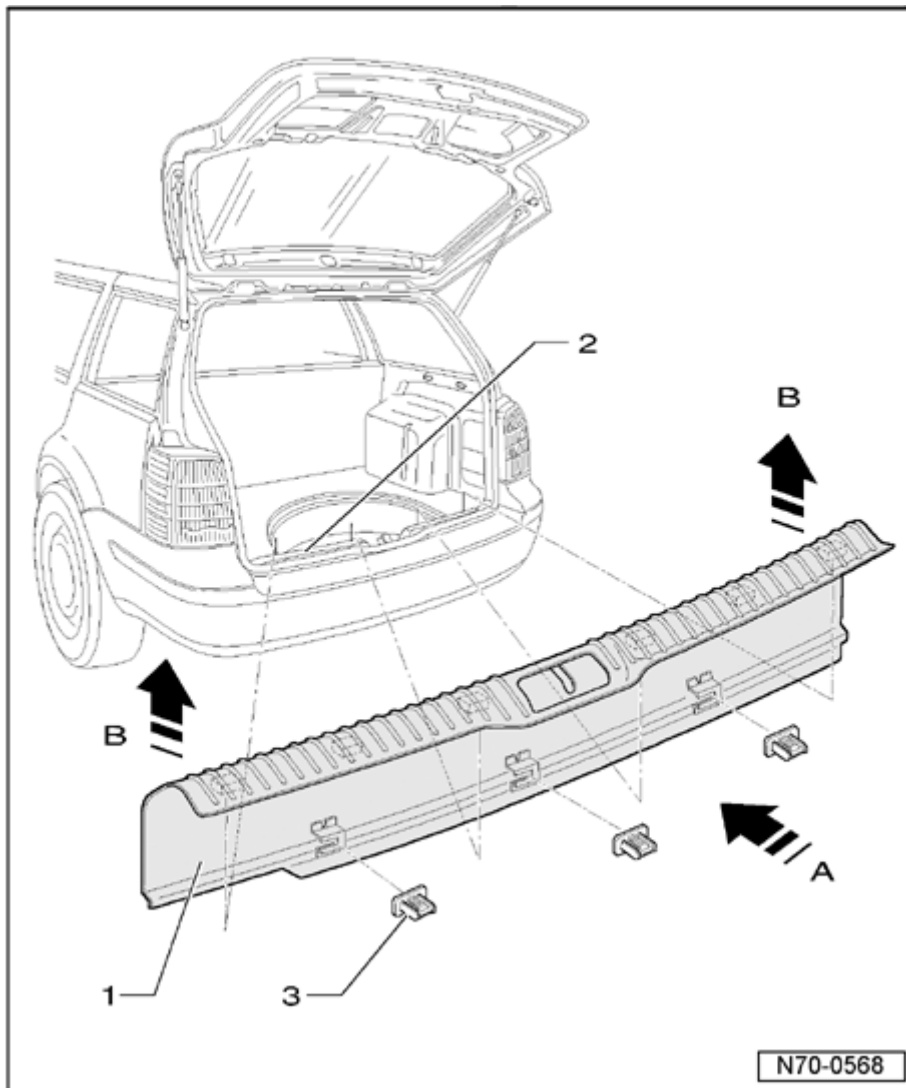
- n Before installing, check clips - **3** - for damage and replace if necessary.



Rear lock carrier cover, removing and installing (Golf wagon/Jetta wagon)

Removing

- Release lock carrier cover - 1 - at bottom from trim panel - 2 - - arrow A - .



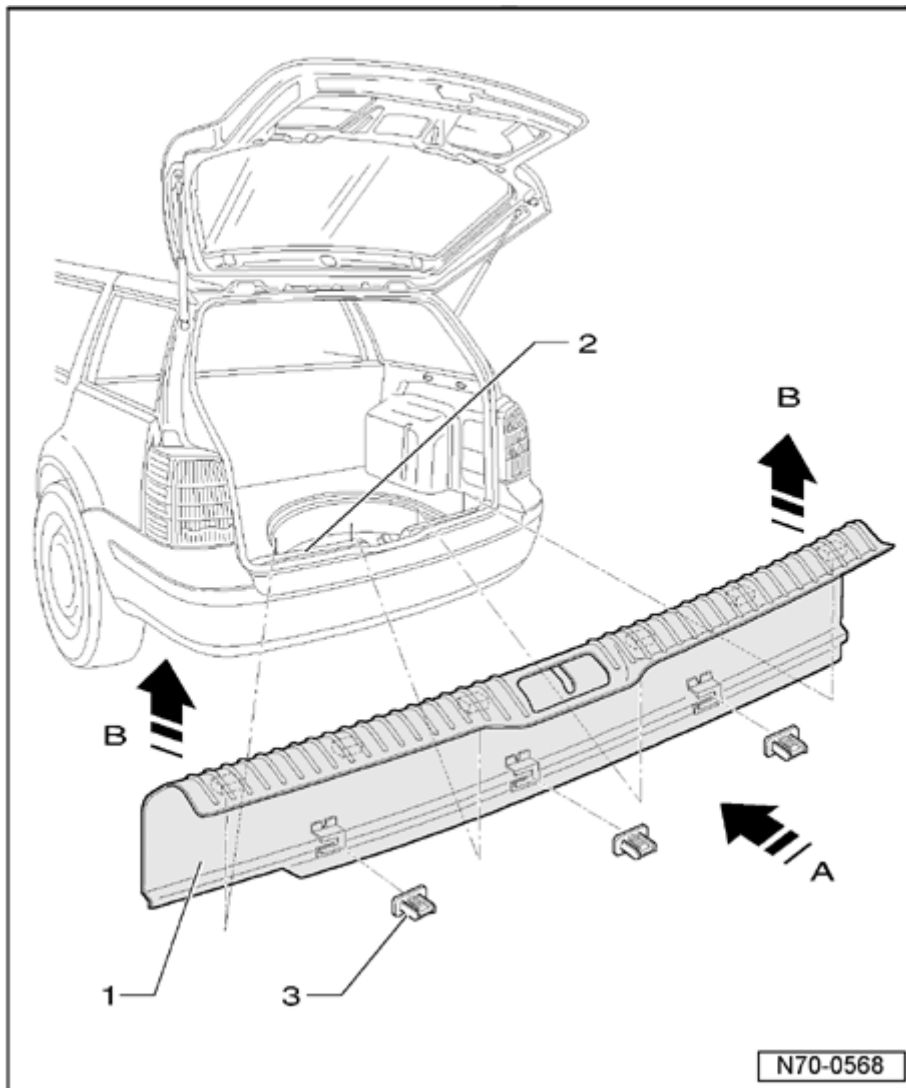
- Remove lock carrier cover - **1** - from trim panel - **2** - - **arrow B** - .

Installing

Installation is reverse of removal.

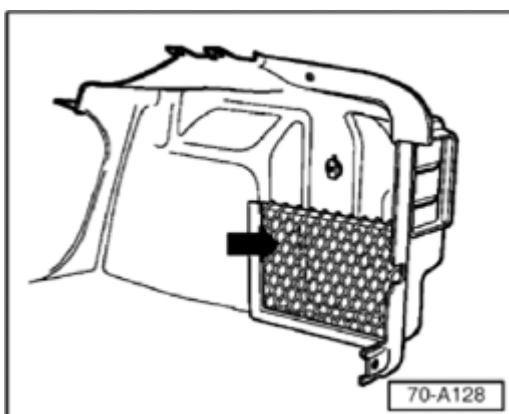
Note:

- n Before installing, check clips - **3** - for damage and replace if necessary.



Cargo net repair kit, installing

Installing



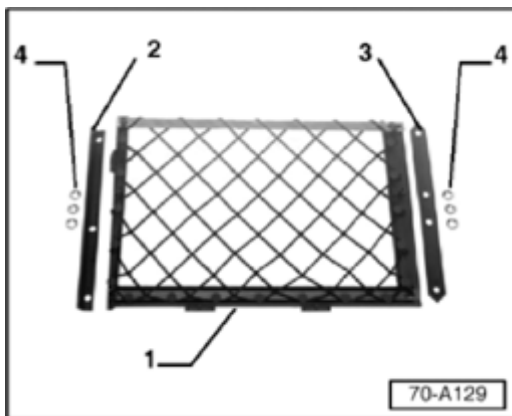
Right side luggage compartment trim panel cargo net - **arrow** - requires replacement.

Install cargo net repair kit as follows:

Note:

n Always check with your Parts Dept. for latest part information

- Remove right side luggage compartment trim panel.
- Remove net fasteners on reverse side of luggage compartment trim
- Install replacement cargo net - **1** - into holes on luggage compartment trim.
- Install retainers - **2** - and - **3** - onto net studs on reverse side of luggage compartment trim.
- Install retainer push-nuts - **4** - firmly over studs.

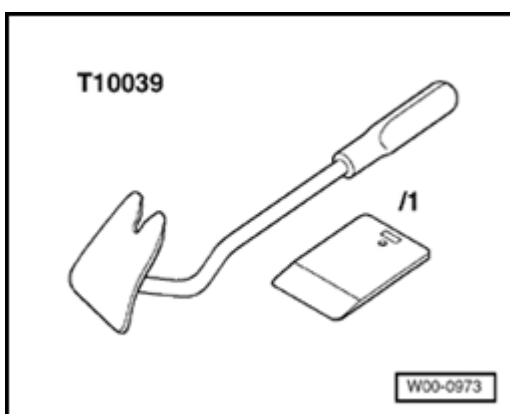


- Install side luggage compartment trim panel.

Rear lid trim

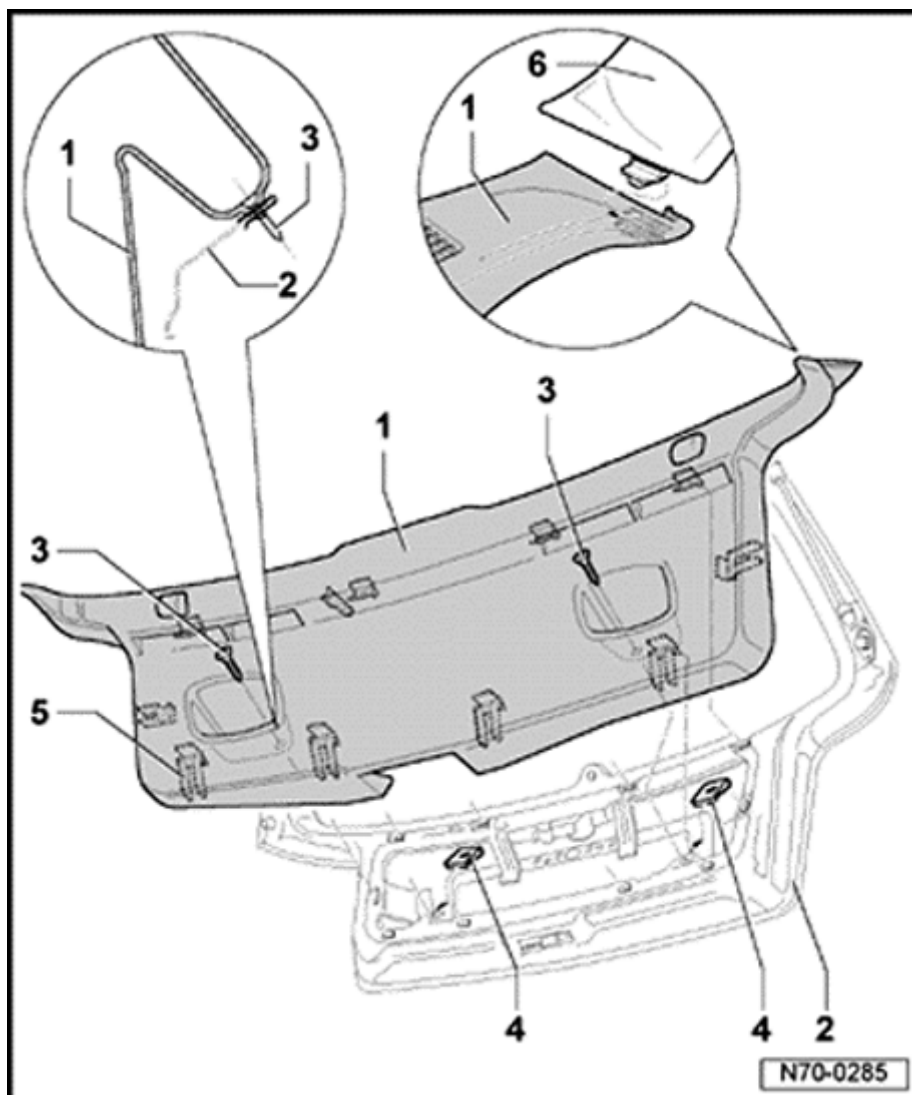
Tools

Special tools, testers and auxiliary items required



n Lever T10039

Lower rear lid trim, assembly overview (Golf)



1. Lower trim panel

- i Removing ⇒ [70-5, Lower rear lid trim, removing and installing \(Golf\)](#)

2. Rear lid

3. Screws

- i Qty. 2

4. Nuts

- i Qty. 2

5. Clips

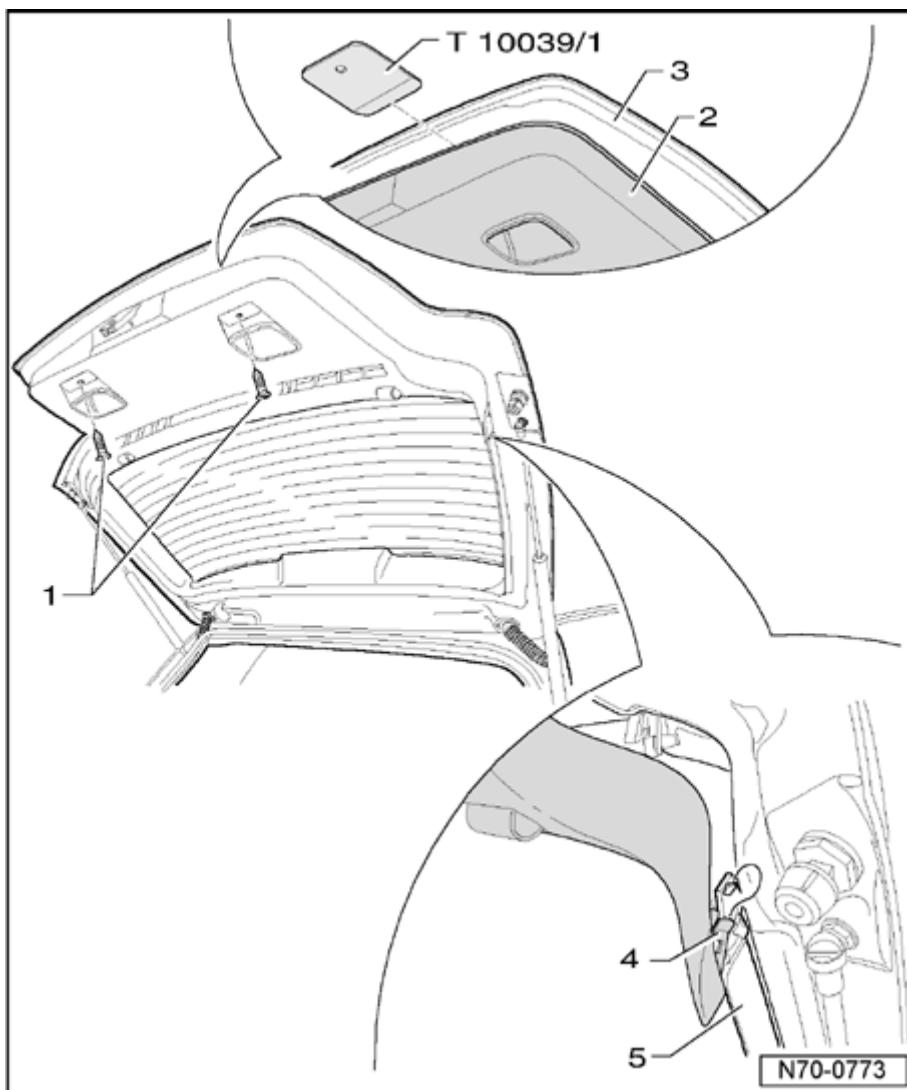
- i Qty. 10

6. Upper trim

Lower rear lid trim, removing and installing (Golf)

Removing

- Remove screws - 1 - in grip depressions.
- Slide Wedge T10039/1 between trim - 2 - and lid - 3 - .
- Remove trim out of mounts in lid. Start at lower edge of lid.



- Remove side straps - 4 - from upper trim
- 5 - .

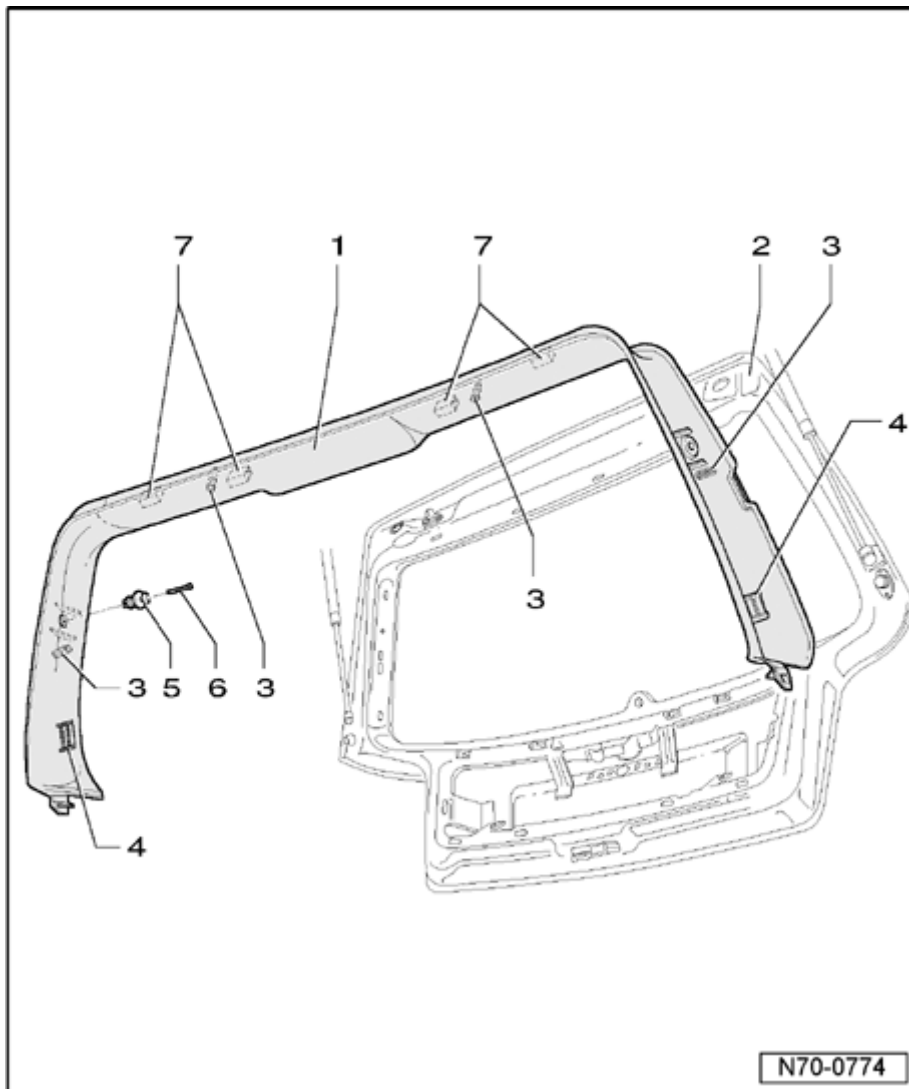
Installing

- Installation is reverse of removal.

Note:

- n Before installation, securing clips must be checked for damage and replaced if necessary.

Upper rear lid trim, assembly overview (Golf)



1. Upper trim panel

- i Removing ⇒ [70-5, Upper rear lid trim, removing and installing \(Golf\)](#)

2. Rear lid

3. Guide pins

- i Qty. 4

4. Securing clips

- i Qty. 2

5. Bracket for rear shelf

- i Qty. 2

- i left and right

6. Spreader pins for bracket

- i Qty. 2

- i left and right

7. Clips

- i Qty. 4

Upper rear lid trim, removing and installing (Golf)

Removing

- Remove lower rear lid trim ⇒ [70-5, Lower rear lid trim, removing and installing \(Golf\)](#) .

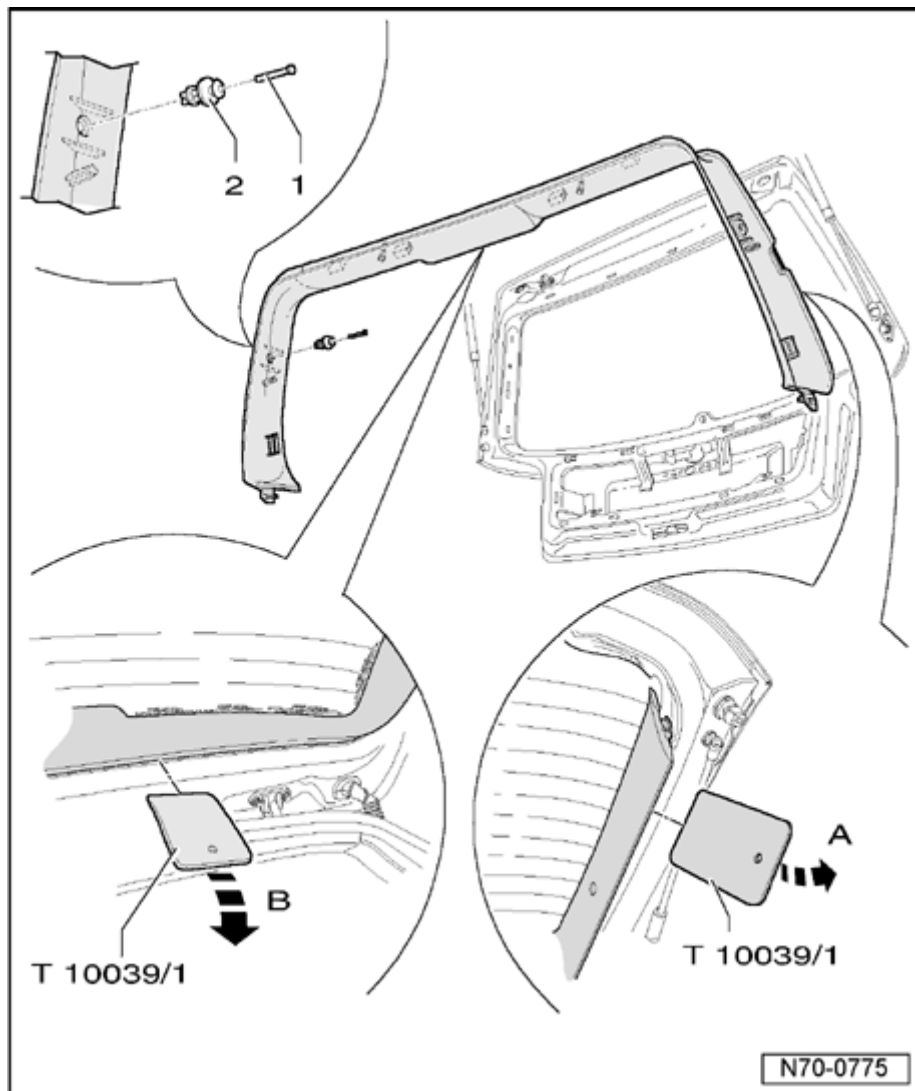
- At right and left sides, remove spreader pin - **1** - from rear shelf bracket - **2** - .

- Using Wedge T10039/1 , lift trim at sides out of mounts in lid - **arrow A** - .

- Using Lever T10039 , lift trim at upper edge out of mounts - **arrow B** - .

Note:

- n *Before installation, securing clips must be checked for damage and replaced if necessary.*

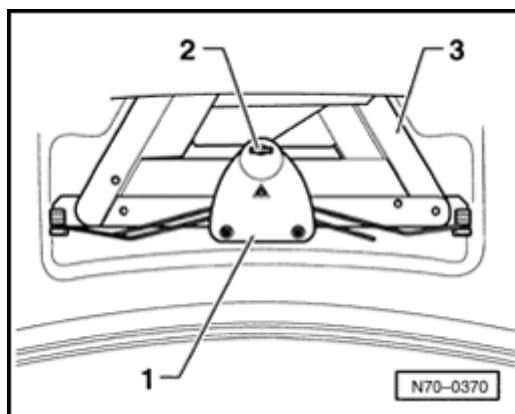


Installing

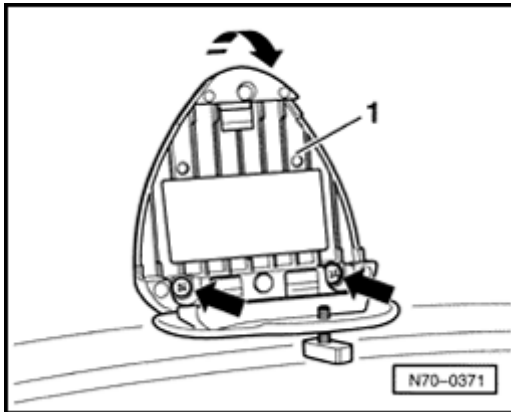
- Installation is reverse of removal.

Rear lid trim, removing and installing (Jetta)

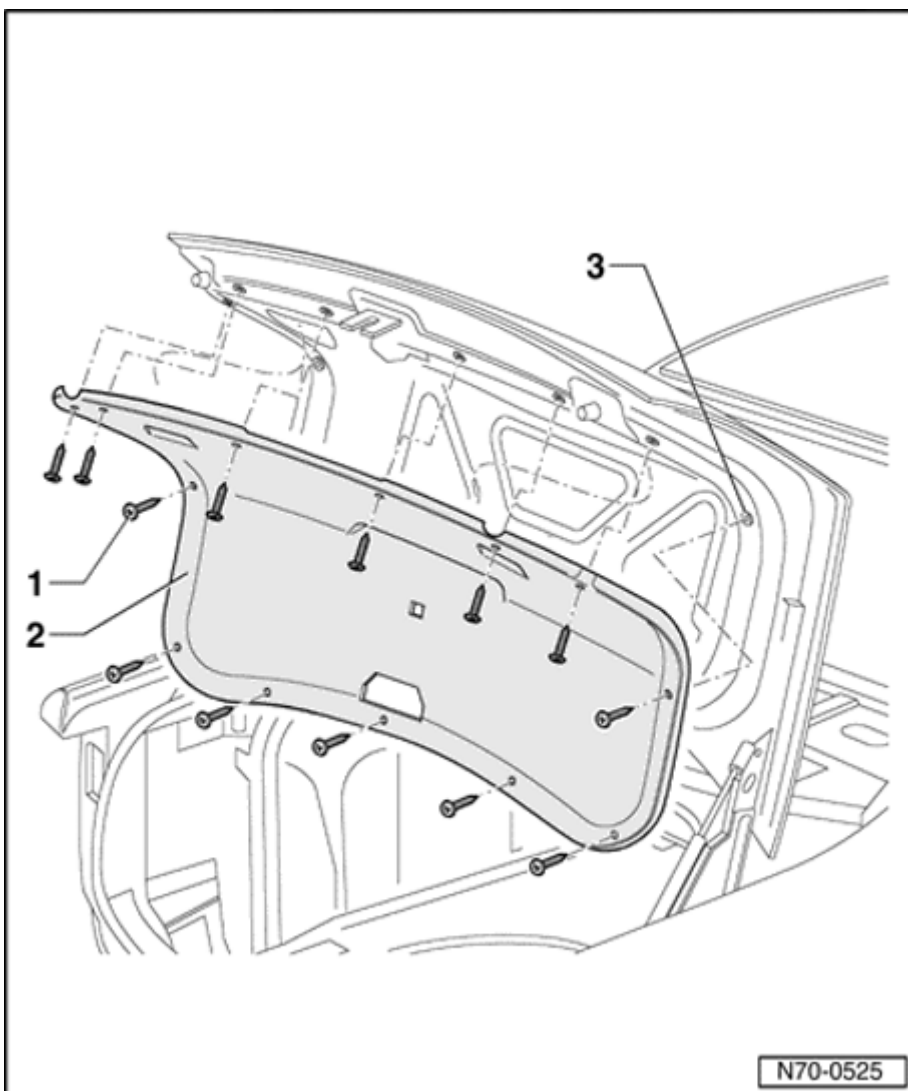
Removing



- Open locking mechanism - **2** - .
- Fold bracket - **1** - upward and remove warning triangle - **3**
- .



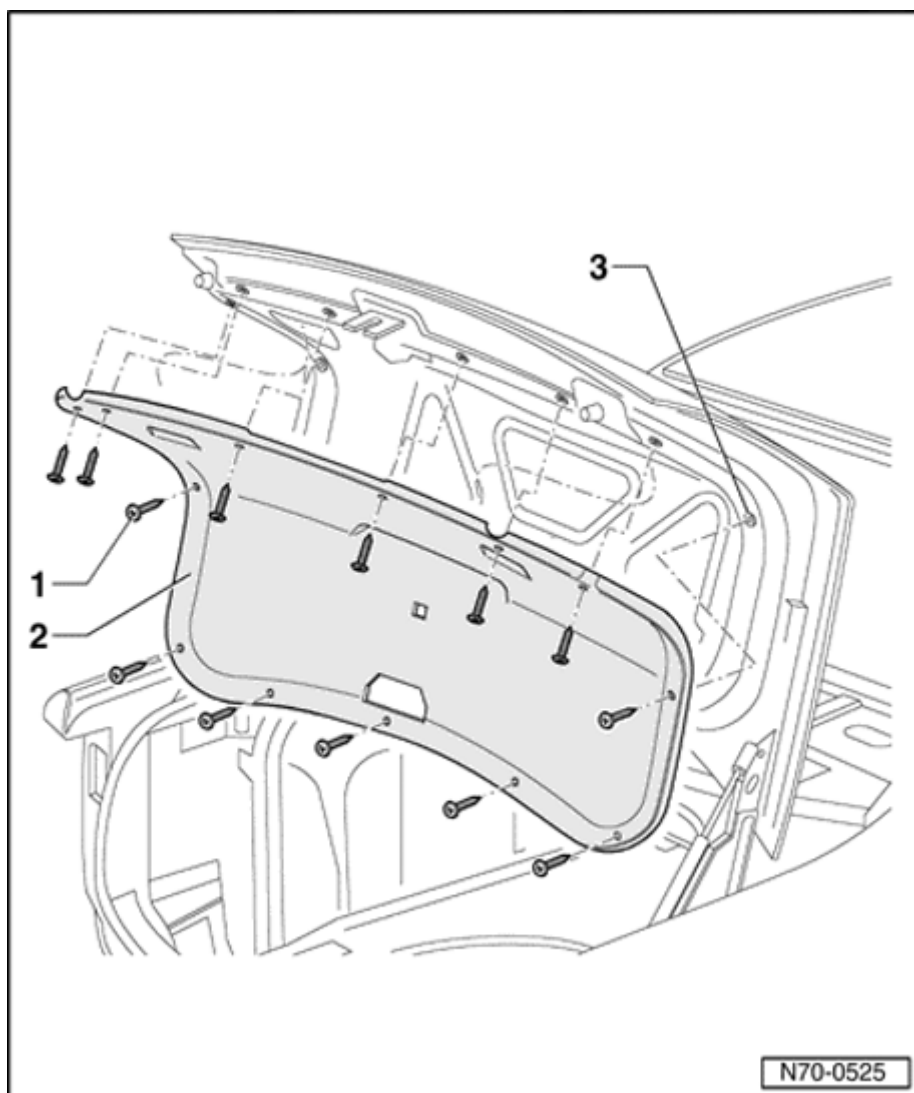
- Remove bolts - **arrows** - .
- Slide bracket - **1** - upward and remove.
- Remove bolts - **1** - (Qty. 13).



- Loosen trim - **2** - in area of grip recess out of lid and remove.

Installing

- Check nuts - **3** - , replace if necessary and insert into holes of lid.
- Place trim - **2** - in installation position and bolt firmly.
- Insert bracket for warning triangle and bolt firmly.
- Insert warning triangle into bracket.



- Fold bracket closed and bolt down locking mechanism.

Trunk escape handle, removing and

installing

Removing

- Unclip up clip - **6** - and release cable Bowden - **arrow** -

- Clamping washer - **1** -

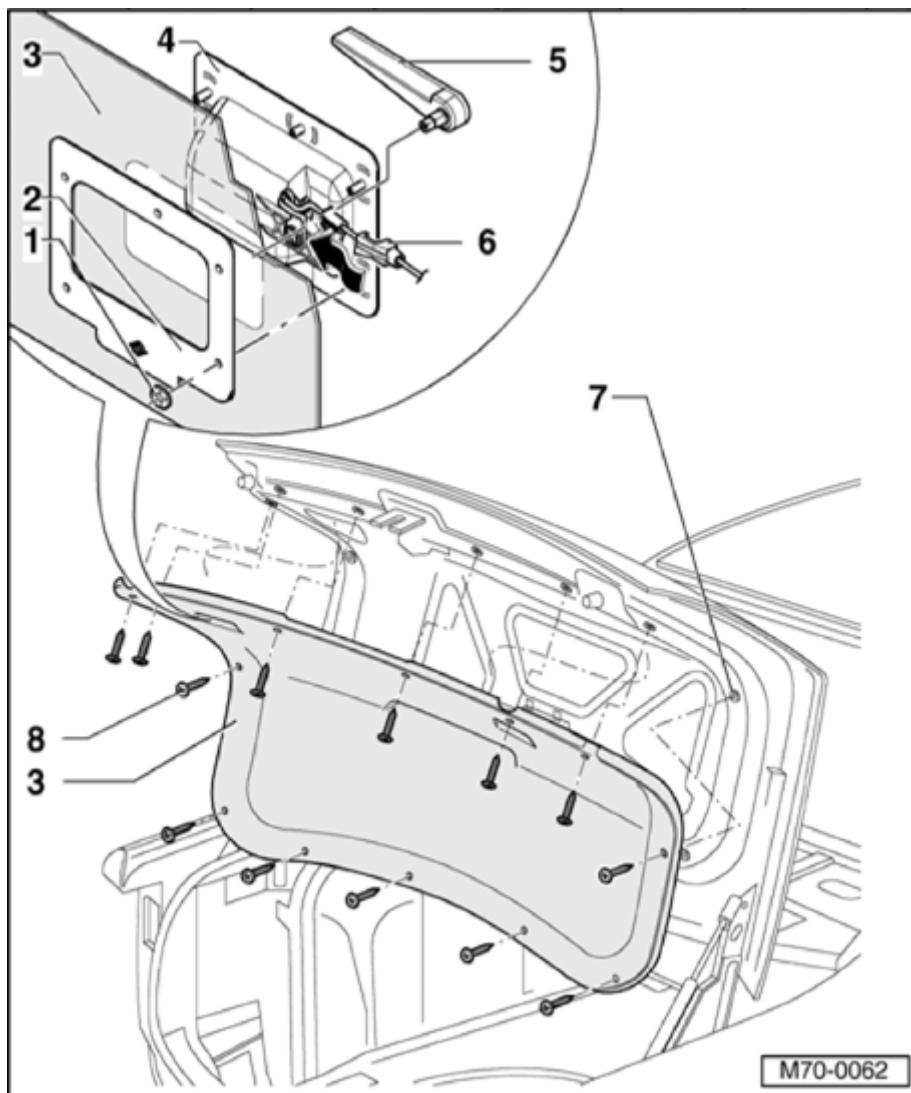
n Qty. 6

- Remove frame - **2** -

- Remove handle support - **4** - from rear lid trim.

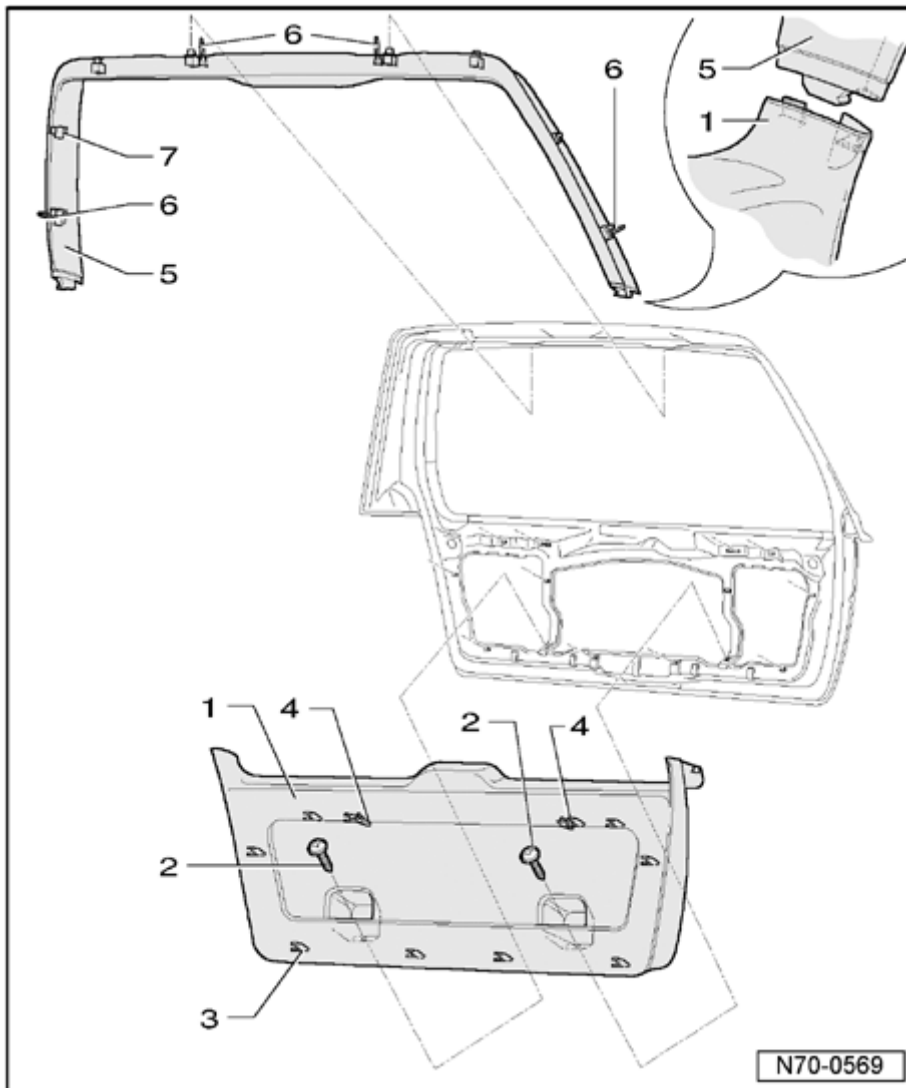
- Release escape handle - **5** - from handle support - **4** - .

Installing



Install in reverse order of removal.

Tailgate trim, assembly overview (Golf

wagon/Jetta wagon)**1. Lower trim panel**

- i Removing ⇒ [70-5, Tailgate trim, removing and installing \(Golf wagon/Jetta wagon\)](#)

2. Screws

- i Qty. 2

3. Clips

- i Qty. 10

4. Guide pin

- i Qty. 2

5. Upper trim

- i Removing ⇒ [70-5, Tailgate trim, removing and installing \(Golf wagon/Jetta wagon\)](#)

6. Guide pins

- i Qty. 4

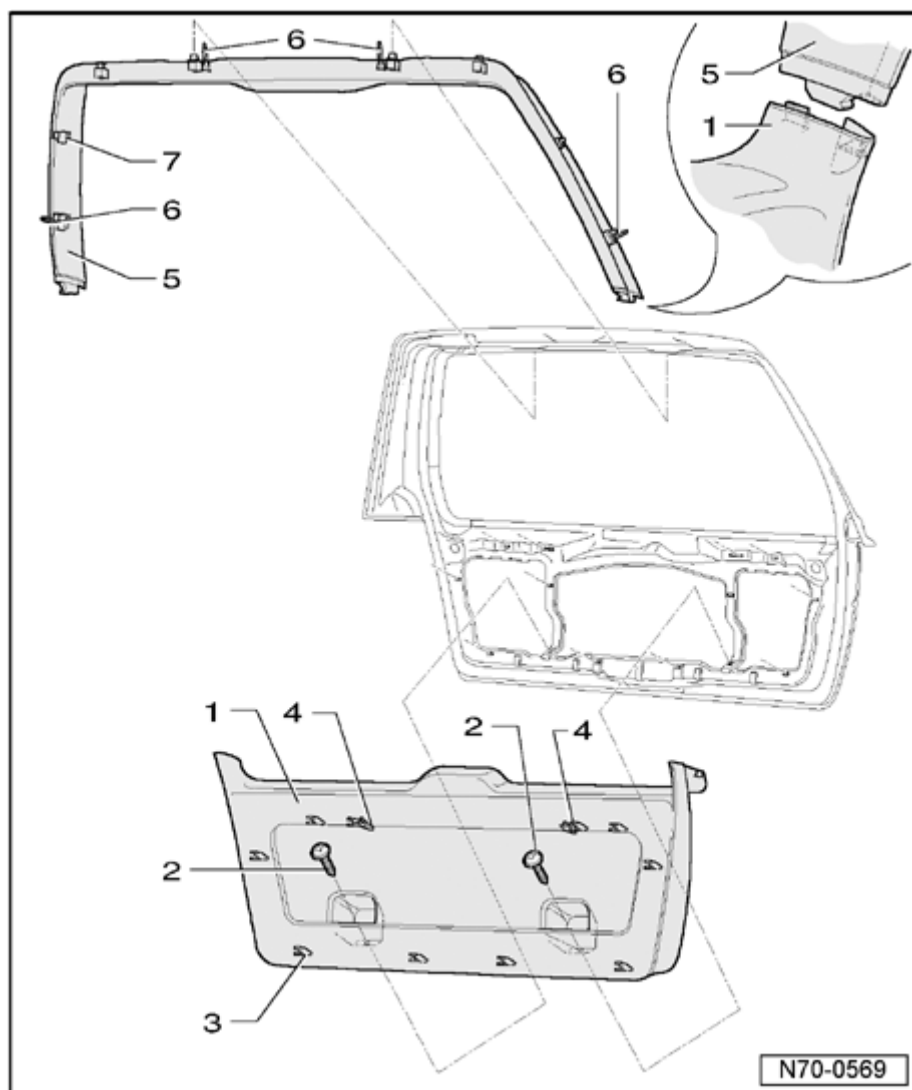
7. Clips

- i Qty. 8

Tailgate trim, removing and installing (Golf wagon/Jetta wagon)

Removing

- Remove bolts - **2** - from lid.
- Unclip lower trim - **1** - from lid at bottom.
- Unclip lower trim - **1** - at sides from upper trim - **5** - (harness connector).



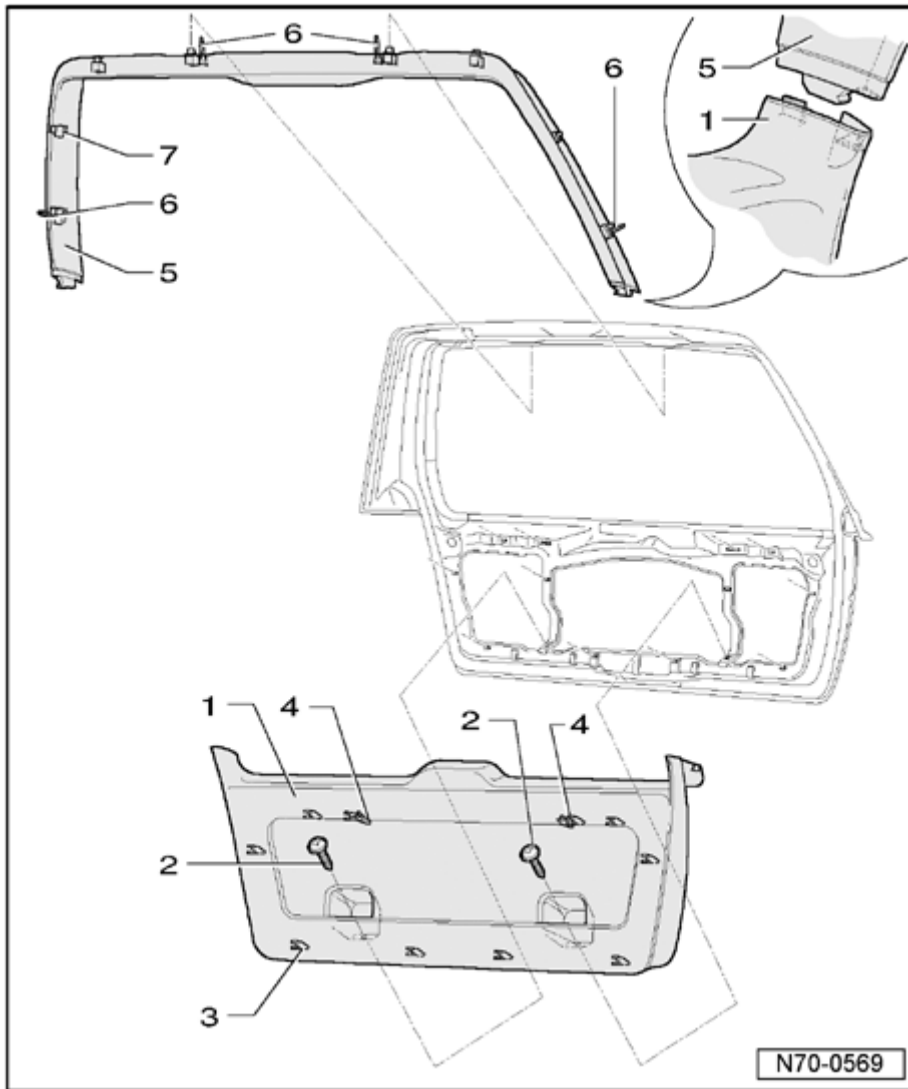
- Unclip upper trim - **5** - first at sides out of clips - **7** - , n unclip at upper area.

Installing

- Installation is reverse of removal.

Note:

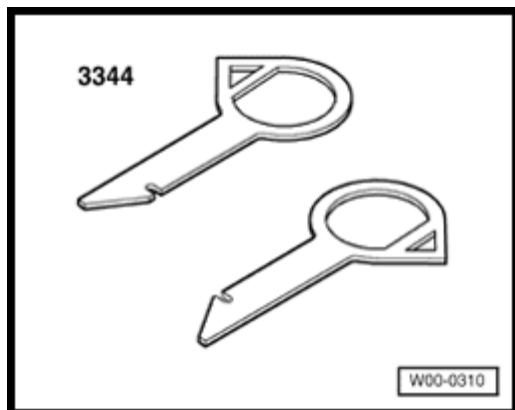
- n Before installing, check clips - **3** - and - **7** - for damage and replace if necessary.



Headliner

Tools

Special tools, testers and auxiliary items required

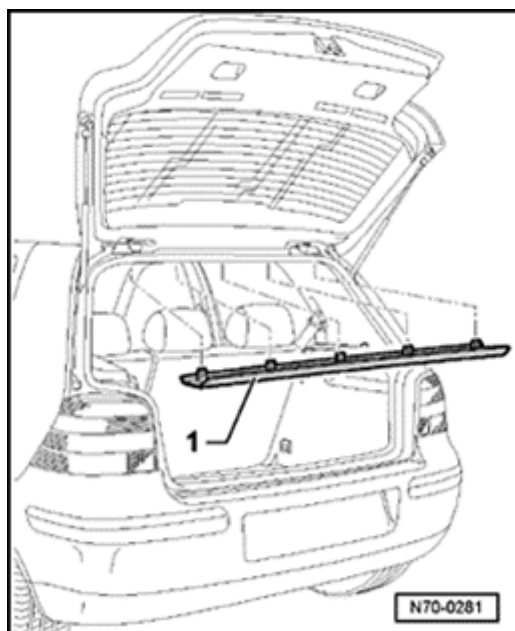


n Release tool 3344 A

A

Roof end strip, removing and installing (Golf)

Removing



A

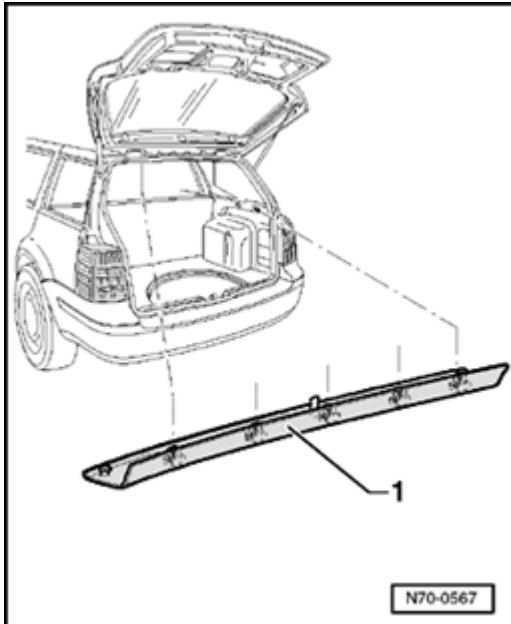
- Open tailgate.
- Unclip roof end strip - 1 - downward out of mounts in roof crossmember.

Installing

- Installation is reverse of removal.

Roof end strip, removing and installing (Golf wagon/Jetta wagon)

Removing



- Open tailgate.
- Remove roof end strip - 1 - downward out of mounts in roof crossmember.

Installing

- Installation is reverse of removal.

Molded headliner, removing and installing (Vehicles with sunroof)

Note:

- n Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.
- n Before disconnecting battery, see note in Owners Manual concerning radio.
- n Obtain radio anti-ft code before disconnecting battery.

Removing

Caution!

Disconnect battery ground (GND) strap before working on electrical system.

- Switch ignition off.
- Remove upper A pillar trim:
 - n with side curtain protection ⇒ [70-3, Upper A-pillar trim, removing and installing \(Vehicles with side curtain protection\)](#) .
 - n without side curtain protection ⇒ [70-3, Upper A-pillar trim, removing and installing \(Vehicles without side curtain protection\)](#) .
- Remove upper B-pillar trim:
 - n with Side curtain protection ➤ 04.01 ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 04.01\)](#) .
 - n with Side curtain protection 05.01 ➤ ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 05.01\)](#) .
 - n without Side curtain protection ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles without side curtain protection\)](#) .
- Remove roof end strip:
 - n Golf ⇒ [70-6, Roof end strip, removing and installing \(Golf\)](#) .
 - n Golf wagon/Jetta wagon ⇒ [70-6, Roof end strip, removing and installing \(Golf wagon/Jetta wagon\)](#) .
- Loosen upper C-pillar trim:
 - n Golf with Side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf with side curtain protection\)](#) .
 - n Golf without Side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf without side curtain protection\)](#) .
 - n Jetta with Side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Jetta with side](#)

[curtain protection](#)) .

- n Jetta without Side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Jetta without side curtain protection\)](#) .
- n Golf wagon/Jetta wagon with Side curtain protection
 ➤ 04.01 ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon with side curtain protection 04.01\)](#) .
- n Golf wagon/Jetta wagon with Side curtain protection
 05.01 ➤ ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon with side curtain protection 05.01\)](#) .
- n Golf wagon/Jetta wagon without Side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon without side curtain protection\)](#) .

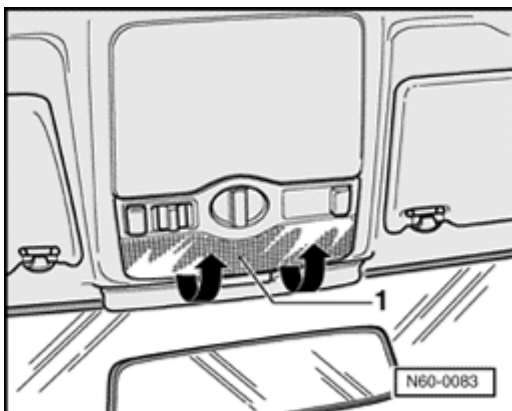
- Remove upper D-pillar trim (Golf wagon/Jetta Wagon): ⇒ [70-3, Upper D-pillar trim, removing and installing \(Golf wagon/Jetta wagon\)](#) .

- Remove sun visor ⇒ [68-2, Sun visor, removing and installing](#) .

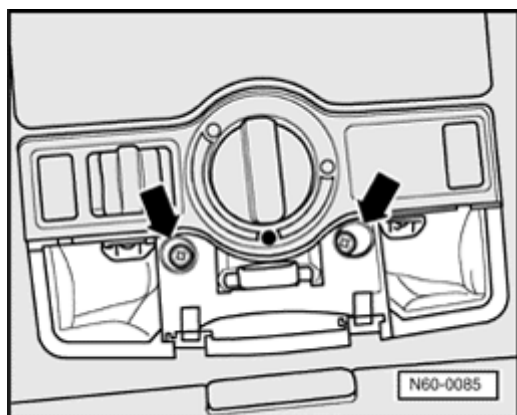
- Remove center sun visor ⇒ [68-2, Center sun visor, removing and installing](#) .

- Remove grab handle (roof) ⇒ [68-2, Grab handle, removing and installing \(Roof\)](#) .

- Remove door inner seals at top.

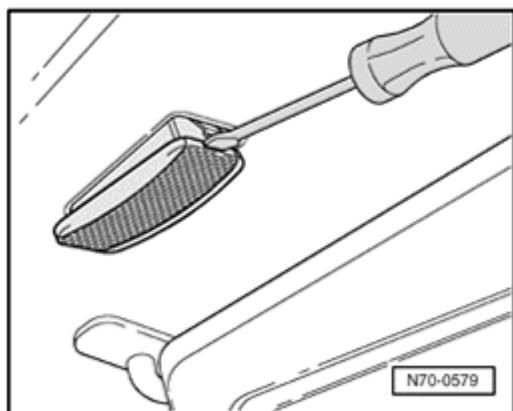


- Unclip trim - **1** - in direction of - **arrow** - and remove.



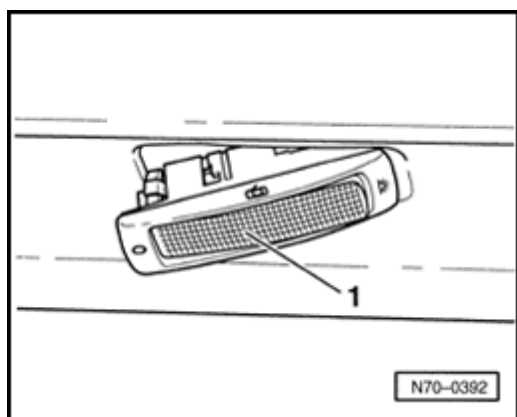
A

- Remove bolts - **arrows** - and remove automatic rotary switch.
- Unclip and disconnect harness connector.



A

- Remove light for make-up mirror using a small screwdriver.
- Disconnect harness connector.



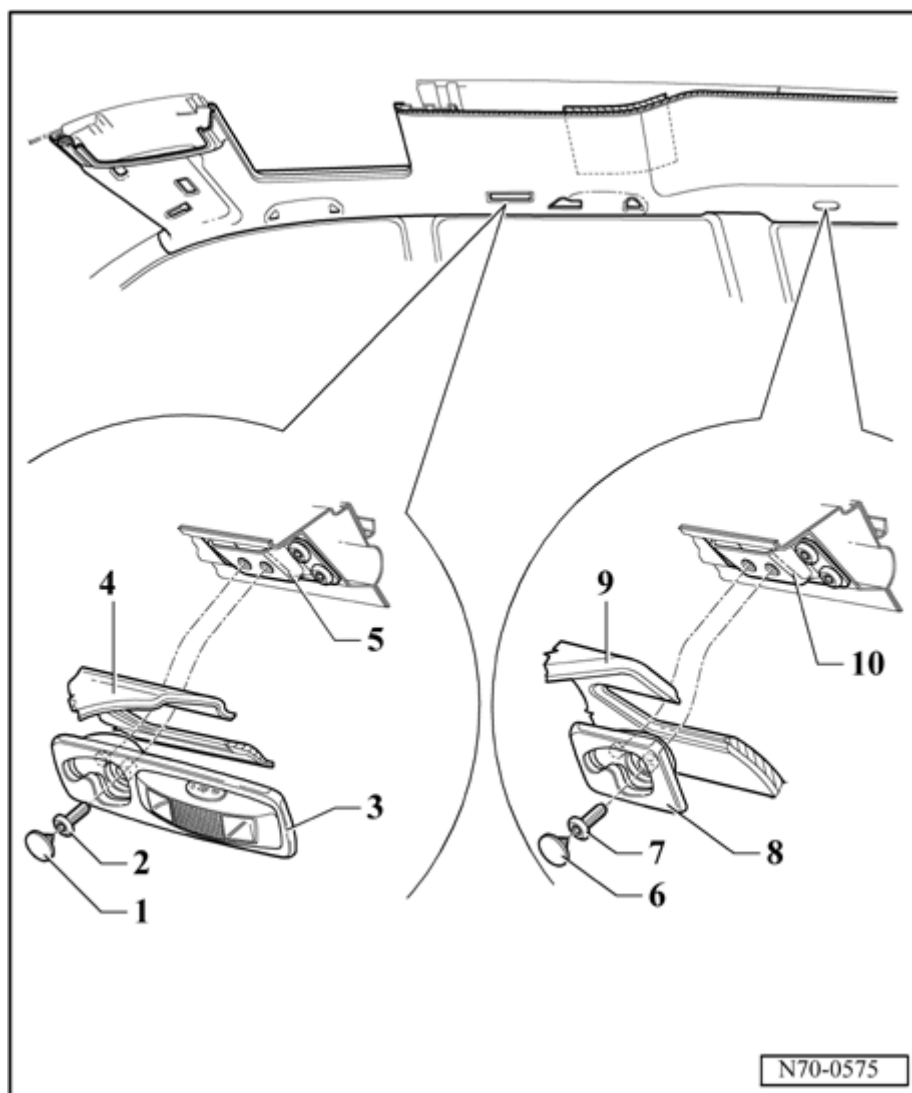
A

- Remove interior light - **1** - and disconnect harness connector.

Only Golf wagon/Jetta wagon

- Unclip caps - **1** - and - **6** - .

- Remove bolts - 2 - and - 7 - .



- Remove front lifting eyelet - 3 - and rear lifting eyelet - 8 - .

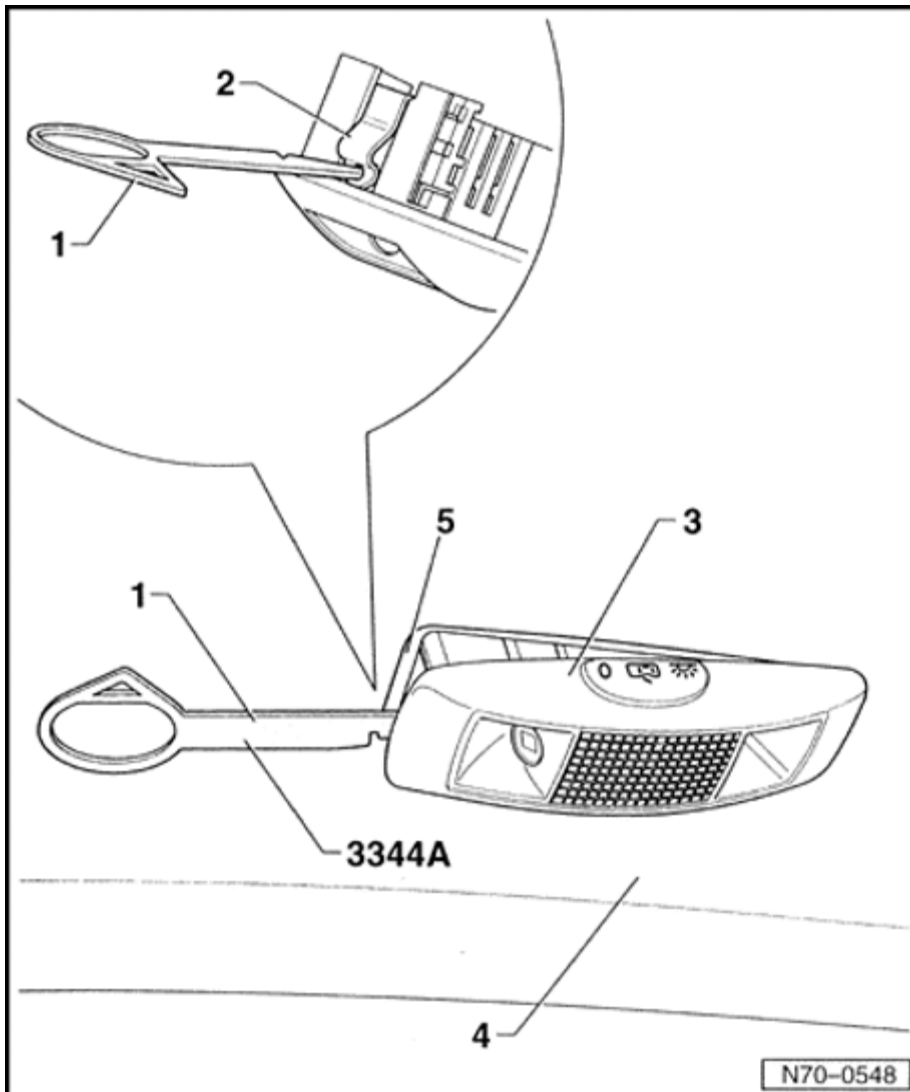
All models

- Using Release tool 3344A - 1 - , press spring - 2 - for reading light with interior monitoring - 3 - toward rear.

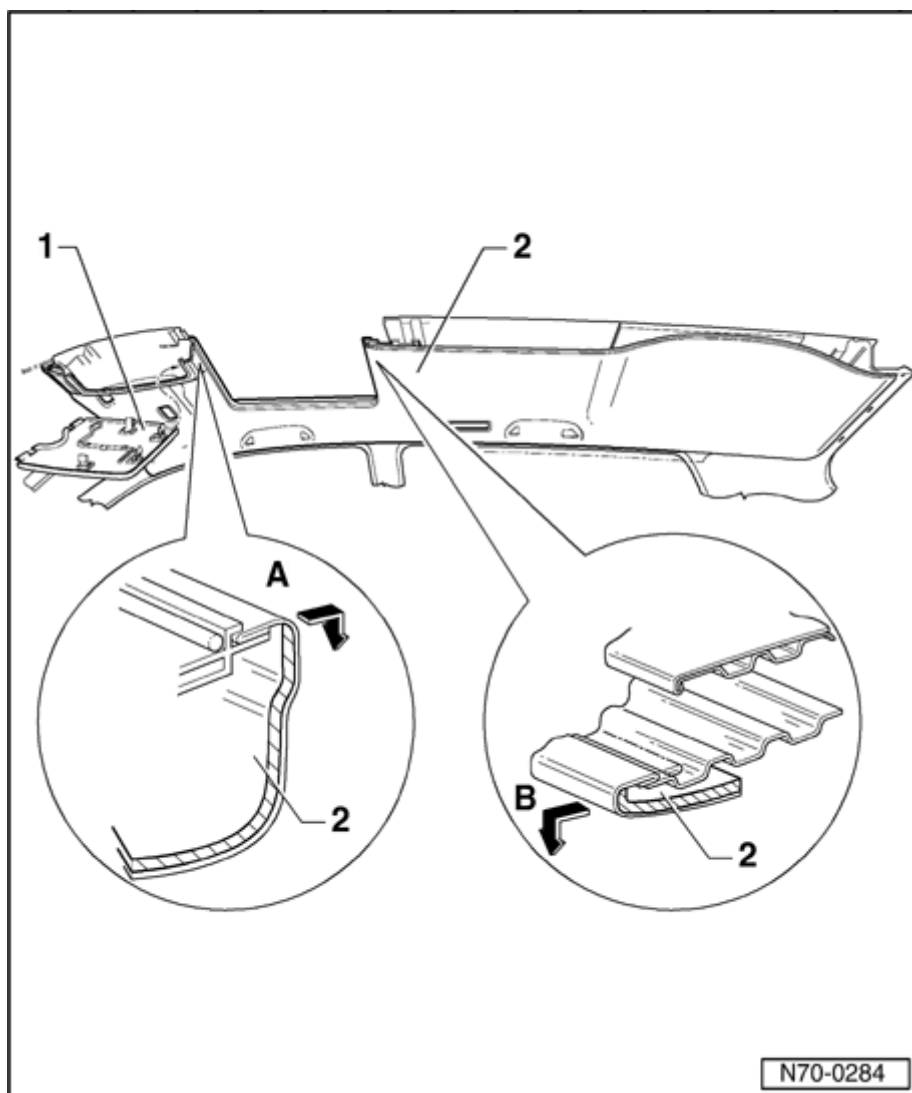
- Remove reading light - 3 - and disconnect harness connector.

Note:

- n *When operating spring - 2 - , make sure that Release tool 3344A - 1 - does not stick between molded headliner - 4 - and metal frame - 5 - in molded headliner.*



- Unclip cover cap for sunroof drive - 1 - .
- Slide molded headliner - 2 - toward rear and pull down at front - **arrow A** - .



- Slide molded headliner - **2** - toward front and lower - **arrow B** - .

Only Golf

- Remove molded headliner through rear lid out of vehicle.

Only Jetta

- Fold passenger seat backrest down and remove molded headliner through rear door.

Only Golf wagon/Jetta wagon

- Remove molded headliner through rear lid out of vehicle.

Installing

- Installation is reverse of removal.

Molded headliner, removing and installing

(Vehicles without sunroof)

Caution!

Disconnect battery ground strap before working on electrical system.

Note:

- n Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.
- n Before disconnecting battery see note concerning coding in Owners Manual for radio.
- n Obtain radio anti-ft code before disconnecting battery.

Removing

- Switch ignition off.
- Remove upper A pillar trim:
 - n with side curtain protection ⇒ [70-3, Upper A-pillar trim, removing and installing \(Vehicles with side curtain protection\)](#) .
 - n without side curtain protection ⇒ [70-3, Upper A-pillar trim, removing and installing \(Vehicles without side curtain protection\)](#) .
- Remove upper B-pillar trim:
 - n with side curtain protection ➤ 04.01 ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 04.01\)](#) .
 - n with side curtain protection 05.01 ➤ ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles with side curtain protection 05.01\)](#) .
 - n without side curtain protection ⇒ [70-3, Upper B-pillar trim, removing and installing \(Vehicles without side curtain protection\)](#) .
- Remove roof end strip:
 - n Golf ⇒ [70-6, Roof end strip, removing and installing \(Golf\)](#) .

- n Golf wagon/Jetta wagon ⇒ [70-6, Roof end strip, removing and installing \(Golf wagon/Jetta wagon\)](#) .

- Loosen upper C-pillar trim:

- n Golf with side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf with side curtain protection\)](#) .
- n Golf without side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf without side curtain protection\)](#) .
- n Jetta with side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Jetta with side curtain protection\)](#) .
- n Jetta without side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Jetta without side curtain protection\)](#) .
- n Golf wagon/Jetta wagon with side curtain protection ➤
04.01 ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon with side curtain protection 04.01\)](#) .
- n Golf wagon/Jetta wagon with side curtain protection
05.01 ➤ ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon with side curtain protection 05.01\)](#) .
- n Golf wagon/Jetta wagon without side curtain protection ⇒ [70-3, Upper C-pillar trim, removing and installing \(Golf wagon/Jetta wagon without side curtain protection\)](#) .

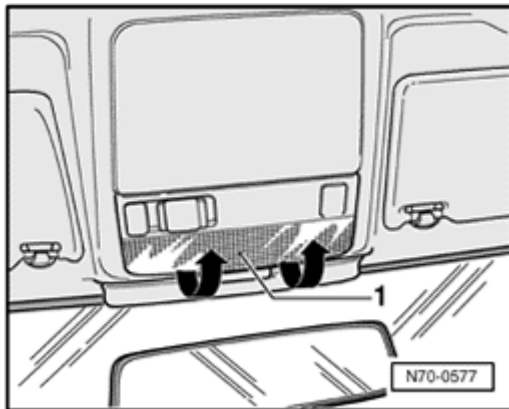
- Remove upper D-pillar trim (Golf wagon/Jetta Wagon) ⇒ [70-3, Upper D-pillar trim, removing and installing \(Golf wagon/Jetta wagon\)](#) .

- Remove sun visor ⇒ [68-2, Sun visor, removing and installing](#) .

- Remove center sun visor ⇒ [68-2, Center sun visor, removing and installing](#) .

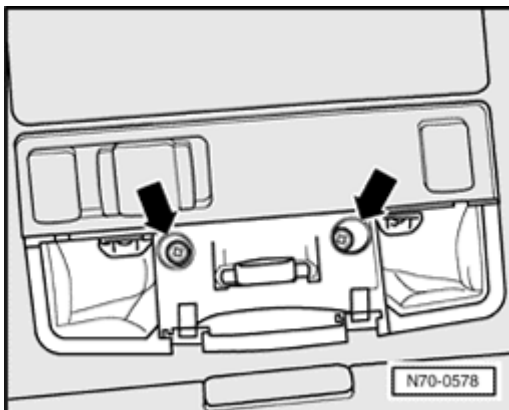
- Remove grab handle (roof) ⇒ [68-2, Grab handle, removing and installing \(Roof\)](#)

- Remove door inner seals at top.



A

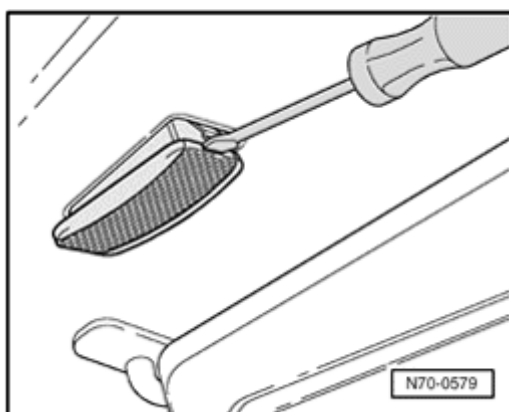
- Unclip trim - **1** - in direction of - **arrow** - and remove.



A

- Remove bolts - **arrows** - and unclip light unit from molded headliner.

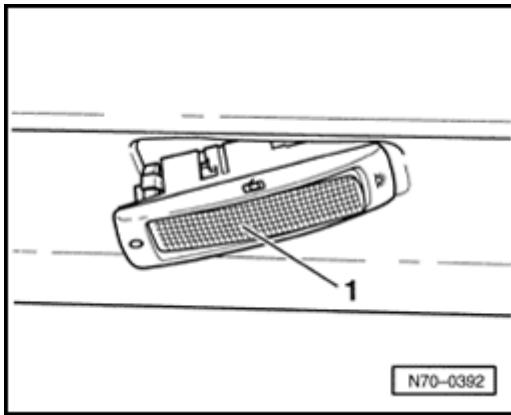
- Disconnect harness connector.



A

- Remove light for make-up mirror using a small screwdriver.

- Disconnect harness connector.

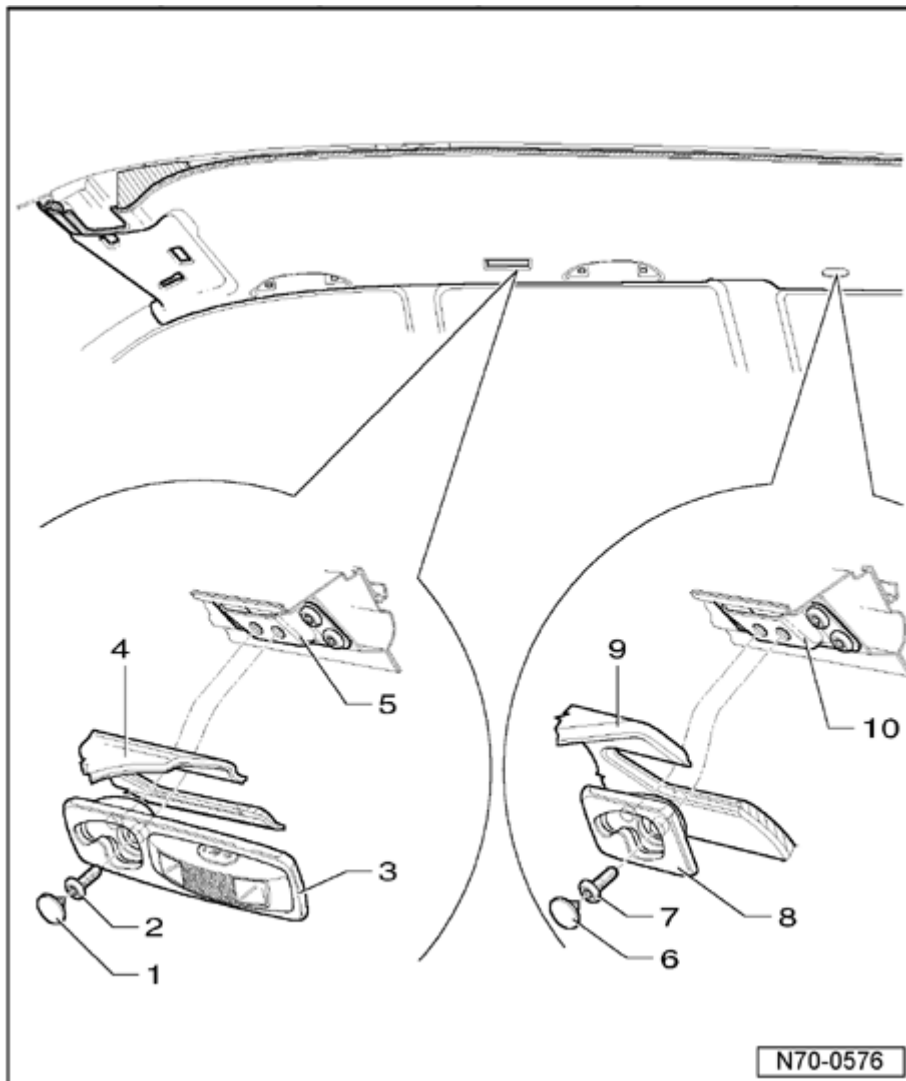


A

- Remove interior light - 1 - and disconnect harness connector.

Only Golf wagon/Jetta wagon

- Unclip caps - 1 - and - 6 - .
- Remove bolts - 2 - and - 7 - .



- Remove front lifting eyelet - 3 - and rear

lifting eyelet - 8 - .

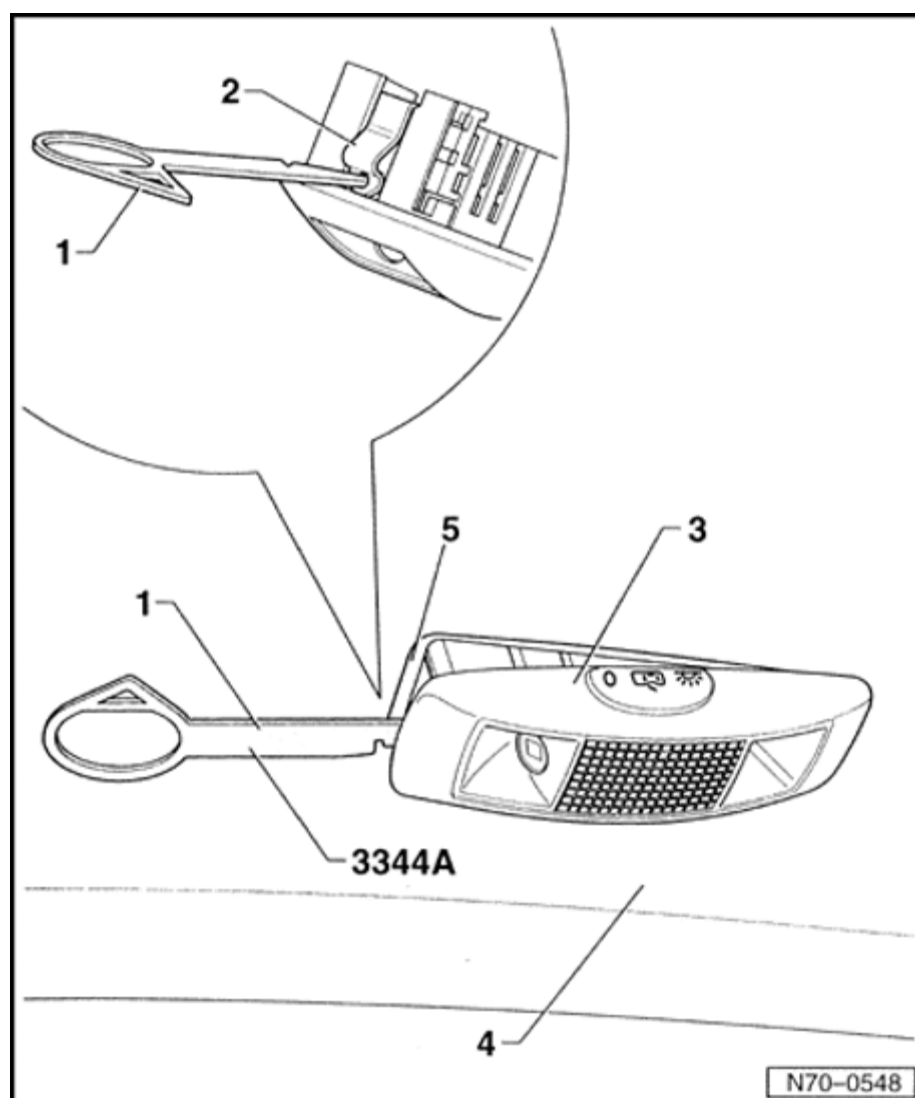
All models

- Using Release tool 3344A - 1 - , press spring - 2 - for reading light with interior monitoring - 3 - toward rear.

- Remove reading light with interior monitoring - 3 - and disconnect harness connector.

Note:

- n When operating spring - 2 - , make sure that Release tool 3344A - 1 - does not stick between molded headliner - 4 - and metal frame - 5 - in molded headliner.



Only Golf

- Remove molded headliner through rear lid out of vehicle.

Only Jetta

- Fold passenger seat backrest down and remove molded headliner through rear door.

Only Golf wagon/Jetta wagon

- Remove molded headliner through rear lid out of vehicle.

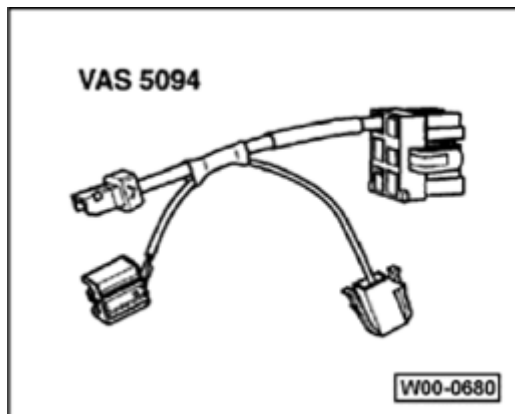
Installing

- Installation is reverse of removal.

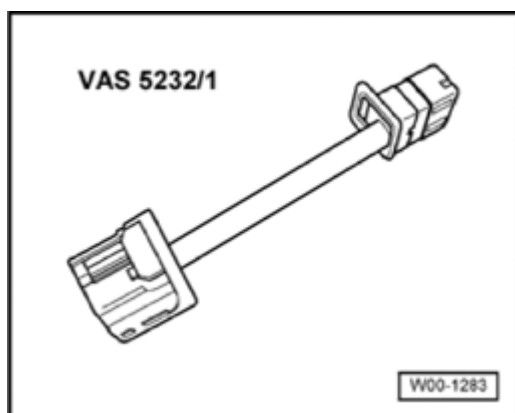
Front seats

Tools

Special tools, testers and auxiliary items required



n Airbag adapter VAS 5094



n Airbag adapter VAS 5232/1

Front seats, removing and installing

Caution!

Disconnect battery ground (GND) strap before working on electrical system.

Note:

- n Removal and installation is described for left side of vehicle. same instructions apply for removal and installation for right-hand side.
- n Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.

- n *Observe notes regarding coding in radio operators manual before disconnecting battery.*
- n *After connecting battery, vehicle options (radio, clock, electric window regulator) must be checked according to repair manual and/or user manual.*

Removing

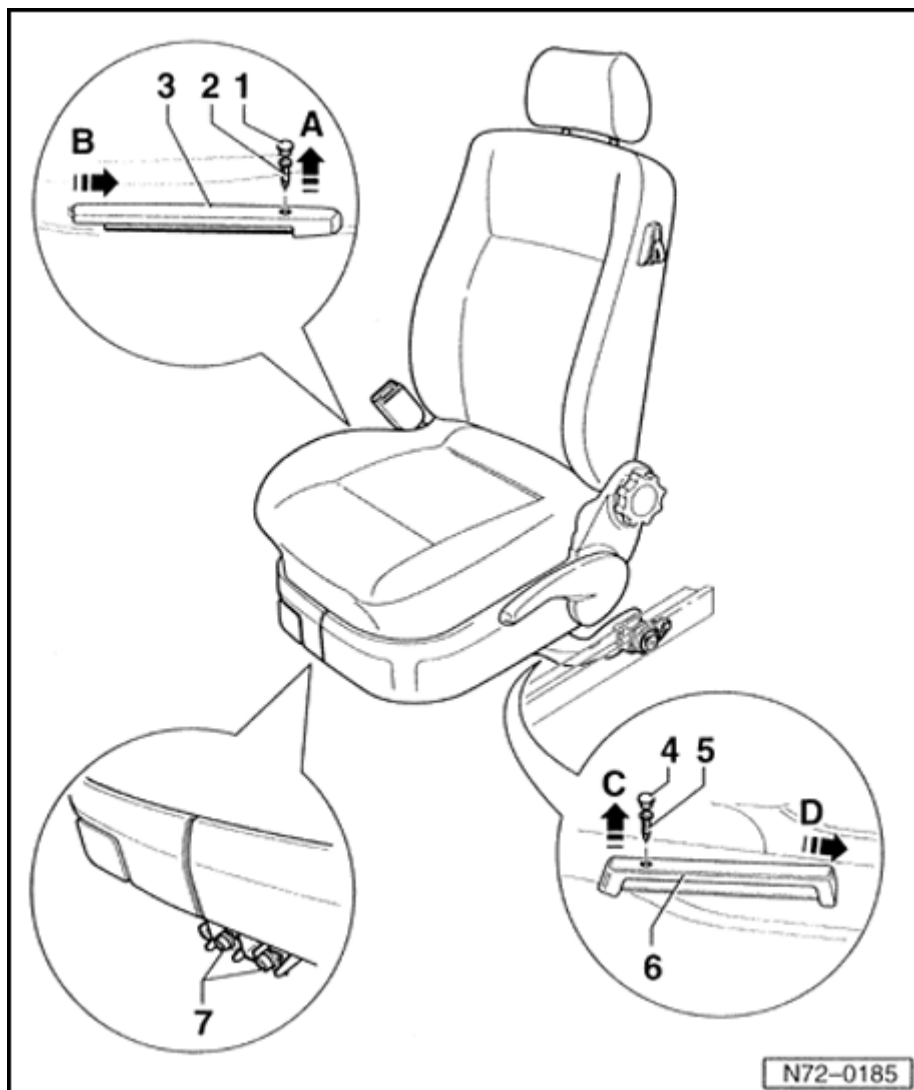
- Switch ignition off.
- Disconnect vehicle battery

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

Caution!

Observe safety precautions for working on airbags ⇒ [69-4, Safety precautions when working on airbags](#) .

- Push seat forward.
- Unclip cover cap - **1** - from tunnel-side cover strip - **3** - , unscrew bolt - **2** - , unclip cover strip for seat rail - **arrow A** - and remove - **arrow B** - .
- Unclip cover cap - **4** - from door sill-side cover strip - **6** - , unscrew bolt - **5** - , unclip cover strip for seat rail - **arrow C** - and remove - **arrow D** - .
- Slide seat toward rear.
- Remove bolts - **7** - (23 Nm).



- Push seat back out of guide rail.

Caution!

Electrostatic charges may result in involuntary deployment of airbag. Therefore, mechanic must be electrostatically discharged before disconnecting ignition- and Ground (GND) wires. This is done e.g. by briefly grasping chassis or door striker.

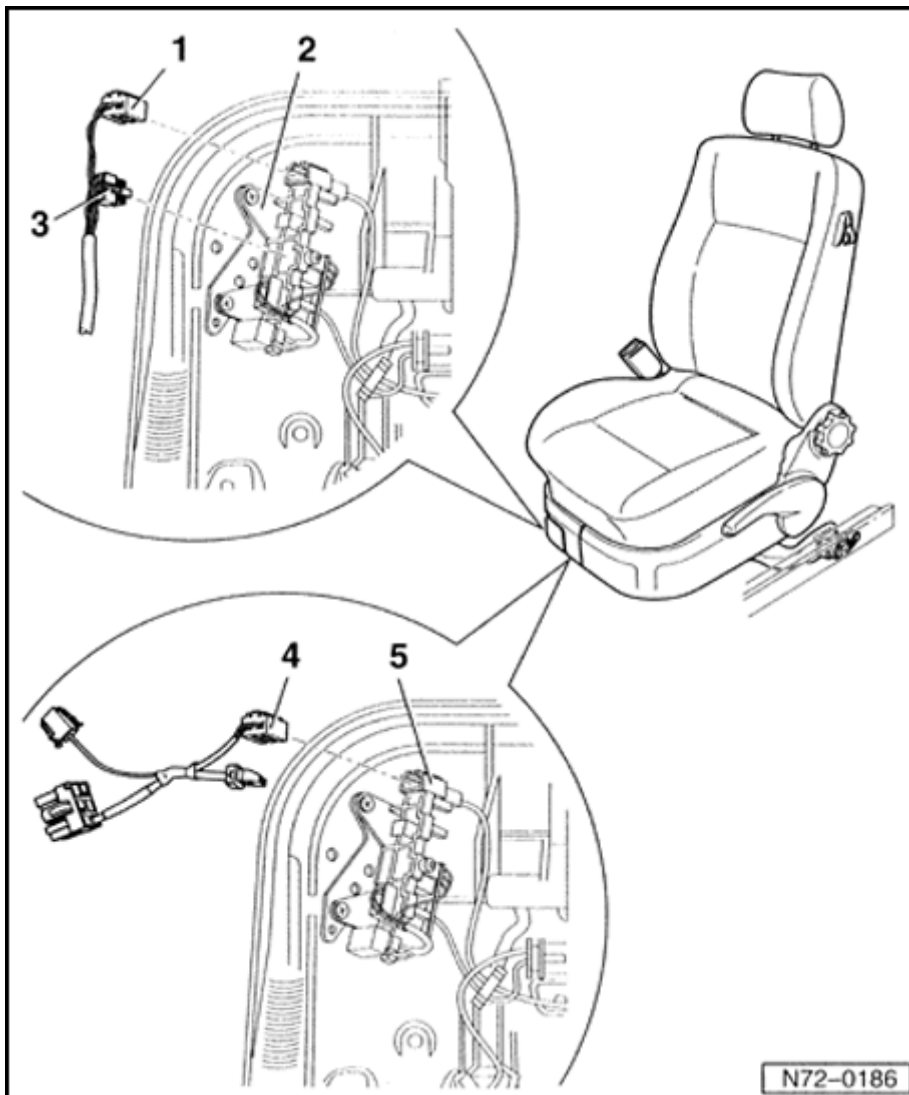
- Disconnect connector for side airbag - 1
- from connector station - 2 - .
- If installed, disconnect connector for seat heater - 3 - from connector station.

Vehicles ▶ 07.00

- Connect connector - 4 - (Airbag adapter

VAS 5094) into connector housing - 5 - .

Vehicles 08.00 ➤



- Insert Airbag adapter VAS 5232/1 into connector housing - 5 - .

Installing

- Installation is reverse of removal.
- Switch ignition on.

Caution!

Make sure no one is in vehicle.

- Connect batteries

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

Note:

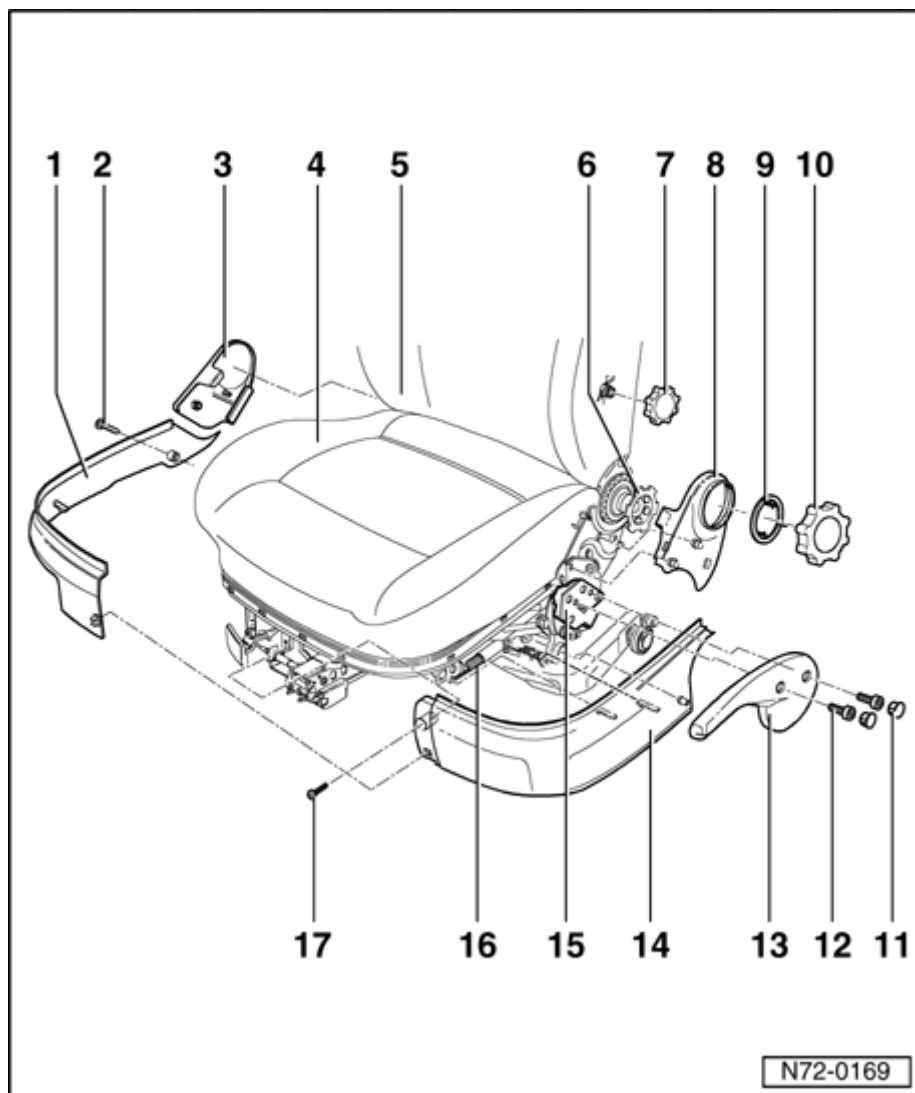
- n *If Airbag Malfunction Indicator Lamp (MIL) -K75- signals a malfunction, DTC memory must be erased and n checked again using VAG 5051 tester.*
- n *In place of "On Board Diagnostic (OBD)" , only Vehicle Diagnosis, Testing and Information System VAS5051 in "Guided Fault Finding" function must be used for troubleshooting.*
- n *After connecting battery, check vehicle equipment (radio, clock, electric windows) as per Repair Manual and/or Owners Manual.*
- n *If engine Electronic Control Module (ECM) is subject to low voltage with ignition on, DTC memory and Readiness code must be checked*

⇒ [Repair Manual, On Board Diagnostic \(OBD\) Fuel Injection Ignition,, Repair Group 01,](#)

Front seat, assembly overview (2-door)

Note:

- n *When replacing backrest in vehicles without "Easy Entry" equipment, hook for "Easy Entry" mechanism must be drilled off.*



1. Seat trim

; Right front

2. Bolt

3. Seat trim

; Right rear

4. Seat

5. Backrest

6. Transfer rod

; for backrest adjustment

7. Adjustment knob

- ; for lumbar support

8. Seat trim

- ; Left rear

9. Spacer ring

10. Adjustment knob

- ; For backrest

11. Cover cap

- ; Qty. 2

12. Bolt

- ; Qty. 2

13. Adjusting lever

- ; For seat height

14. Seat trim

- ; Left front

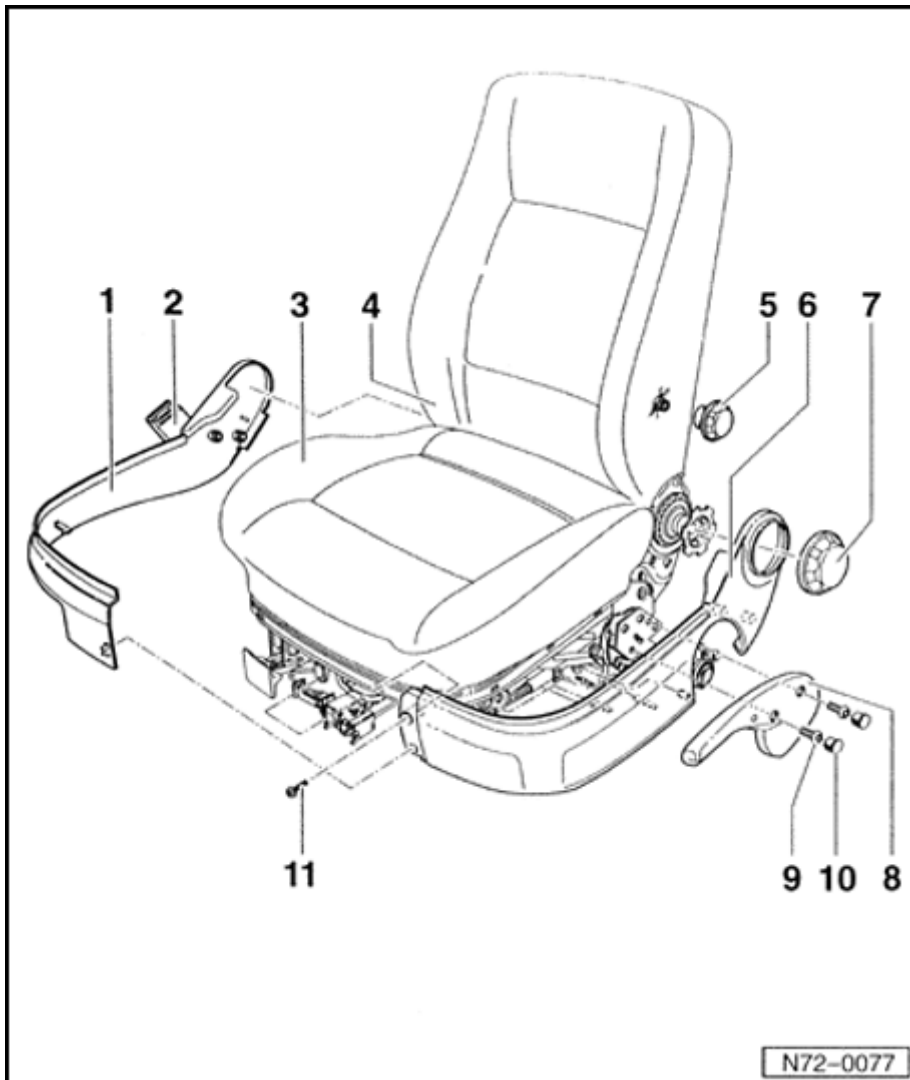
15. Seat height adjusting element

16. Tensioning spring

- ; Qty. 2

17. Bolt

Front seat, assembly overview (4-door)

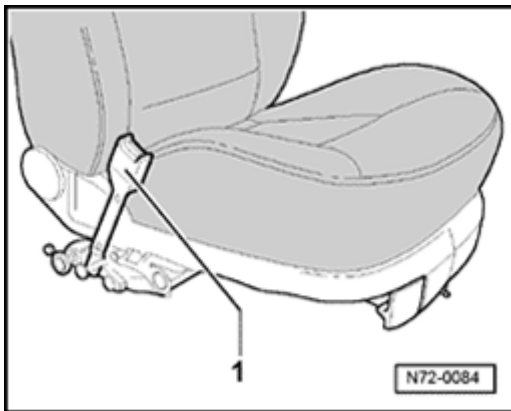


1. Right seat trim
2. Belt latch
3. Seat
4. Backrest
5. Adjusting knob (lumbar support)
6. Left seat trim
7. Adjusting knob (backrest)
8. Adjusting lever (seat height)
9. Bolts
10. Caps
11. Bolt for left trim

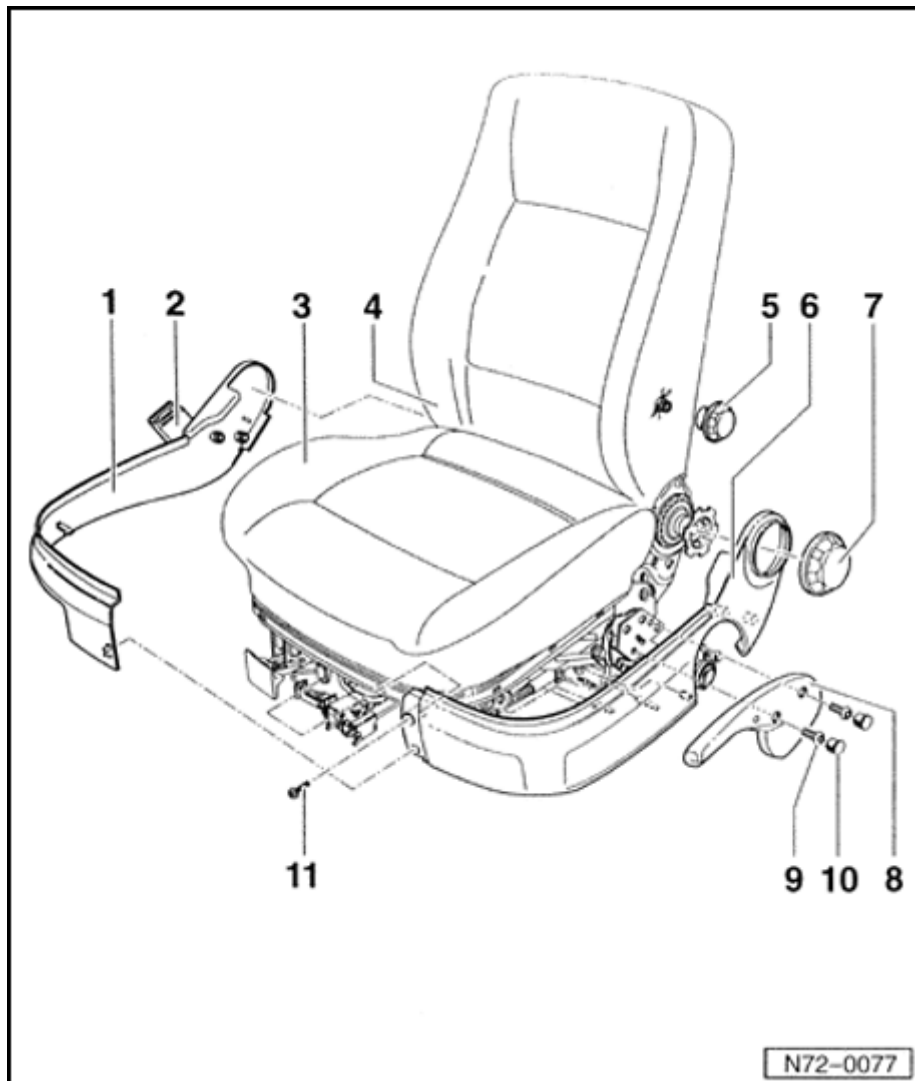
Front backrest, removing and installing

Removing

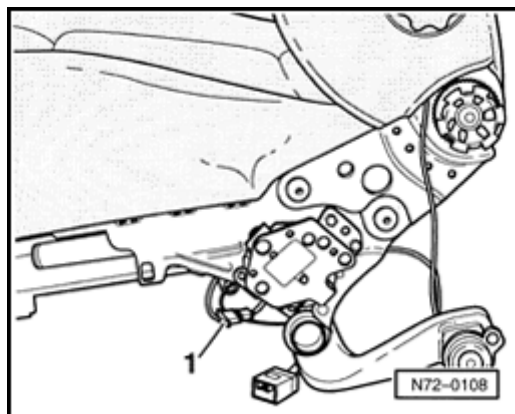
- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .



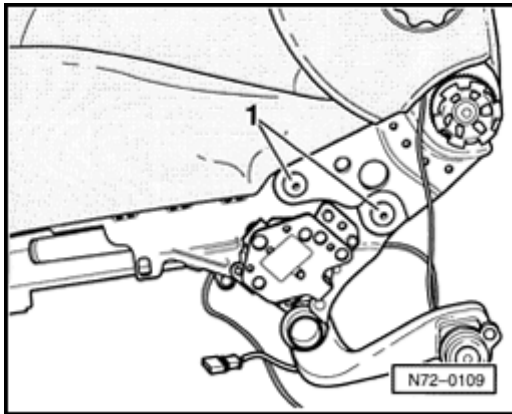
- Remove belt latch - **1** - .
- Remove adjusting knob - **7** - .
- Unclip two cover caps - **10** - , unscrew two bolts - **9** - and remove adjusting lever - **8** - .
- Remove trim - **1** - .
- Remove bolt - **11** - .



- Remove trim - 6 - .



- Disconnect harness connector - 1 - for backrest heater, and if necessary, remove wiring harness for backrest heater by removing seat height adjusting element from seat frame ⇒ [72-1, Seat height adjuster, removing and installing](#) .



- Remove bolts - 1 - on both sides of seat and remove backrest.

Note:

- n In 2-door vehicles, backrest is secured to seat pan with only two bolts (24 Nm).

Installing

Installation is reverse of removal.

Note:

- n Bolts - 1 - must be secured with fluid locking compound D 000 600 A2 (tightening torque 20 Nm).

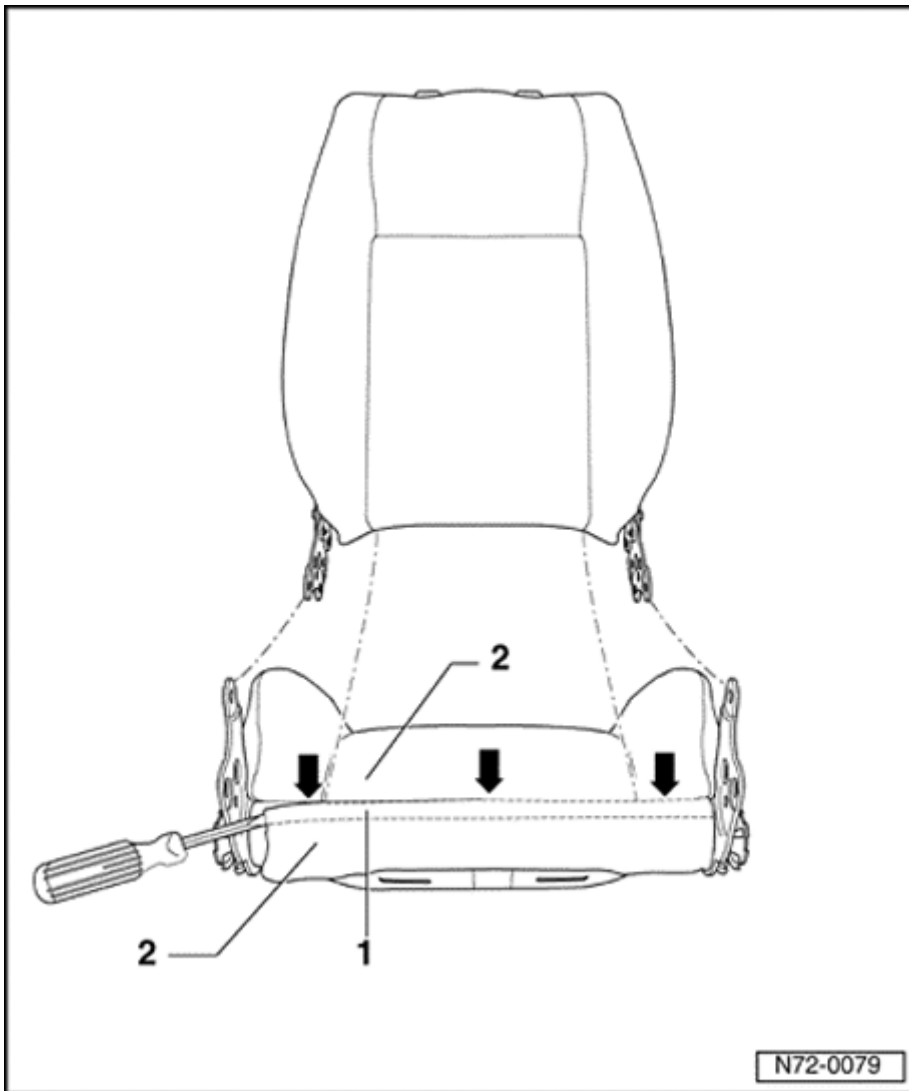
Lumbar support, removing and installing

Note:

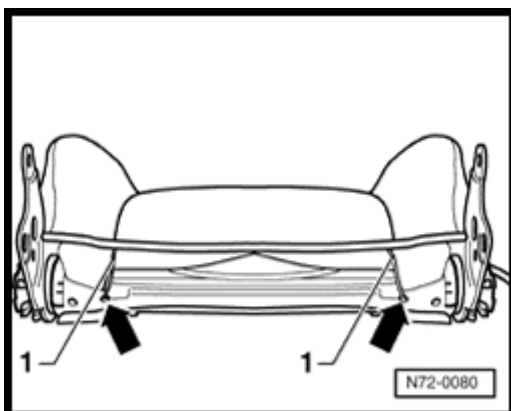
- n lumbar support allows backrest adjustment in area of lumbar vertebra.

Removing

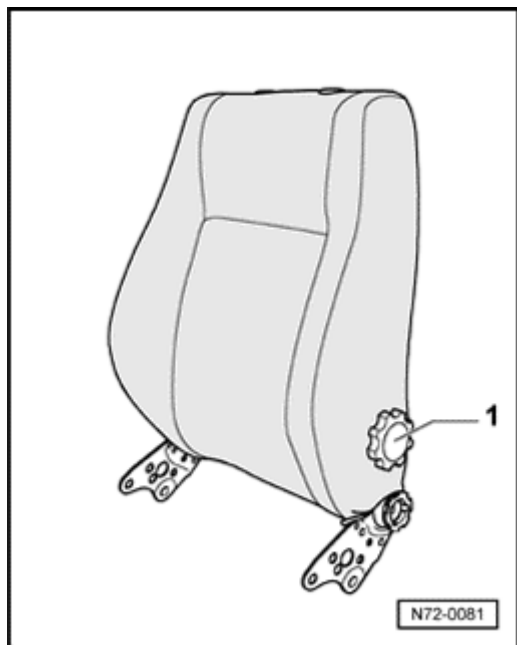
- Remove headrest guides ⇒ [72-1, Headrest guides, removing and installing](#) .
- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .
- Remove backrest ⇒ [72-1, Front backrest, removing and installing](#) .
- Unclip trim on rear side at bottom and unhook upward.



- Separate beading strip - 1 - for cover - 2
- using a screwdriver - **arrows** - .

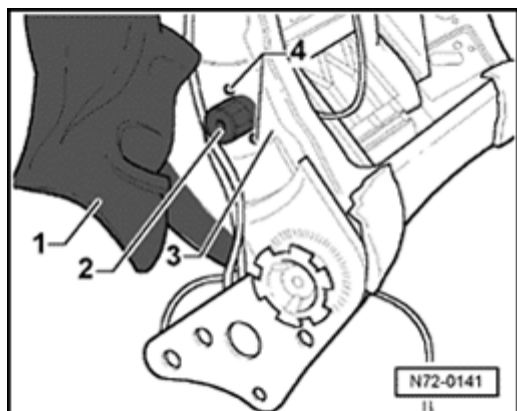


- Unhook tension wire - 1 - - **arrows** - .



A

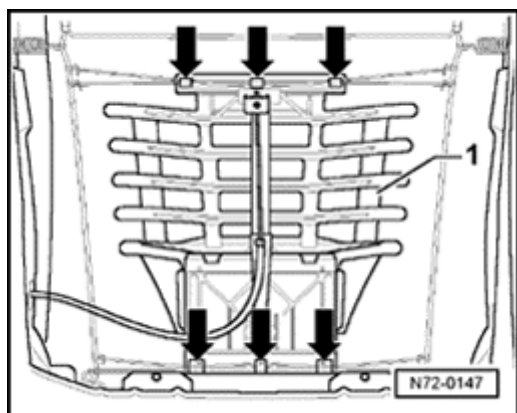
- Remove adjusting knob - 1 - .



A

- Slide cover - 1 - up and remove bolts - 4 - for lumbar adjustment - 2 - .

- Remove lumbar adjustment - 2 - from backrest frame - 3 - .



A

- Unclip lumbar support - 1 - - **arrows** - and remove from backrest frame.

Installing

Installation is reverse of removal.

Seat height adjuster, removing and installing

Note:

- n Removal and installation is described for left seat. same instructions apply for removal and installation for right seat.*

Removing

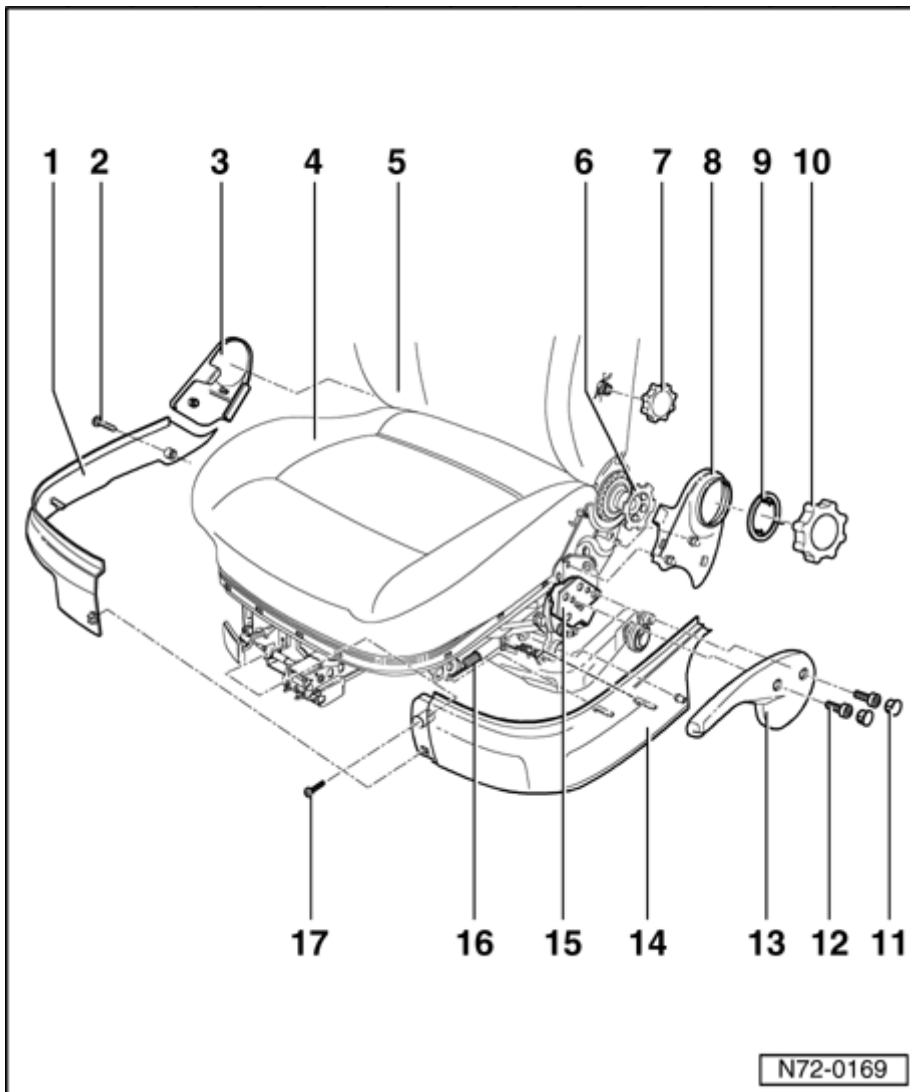
- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .

Note:

- n Before removing, seat must be brought to highest position in order to release tension on tension springs for height adjustment to greatest extent.*

- Remove bolt - **2** - and unclip trim - **1** - .

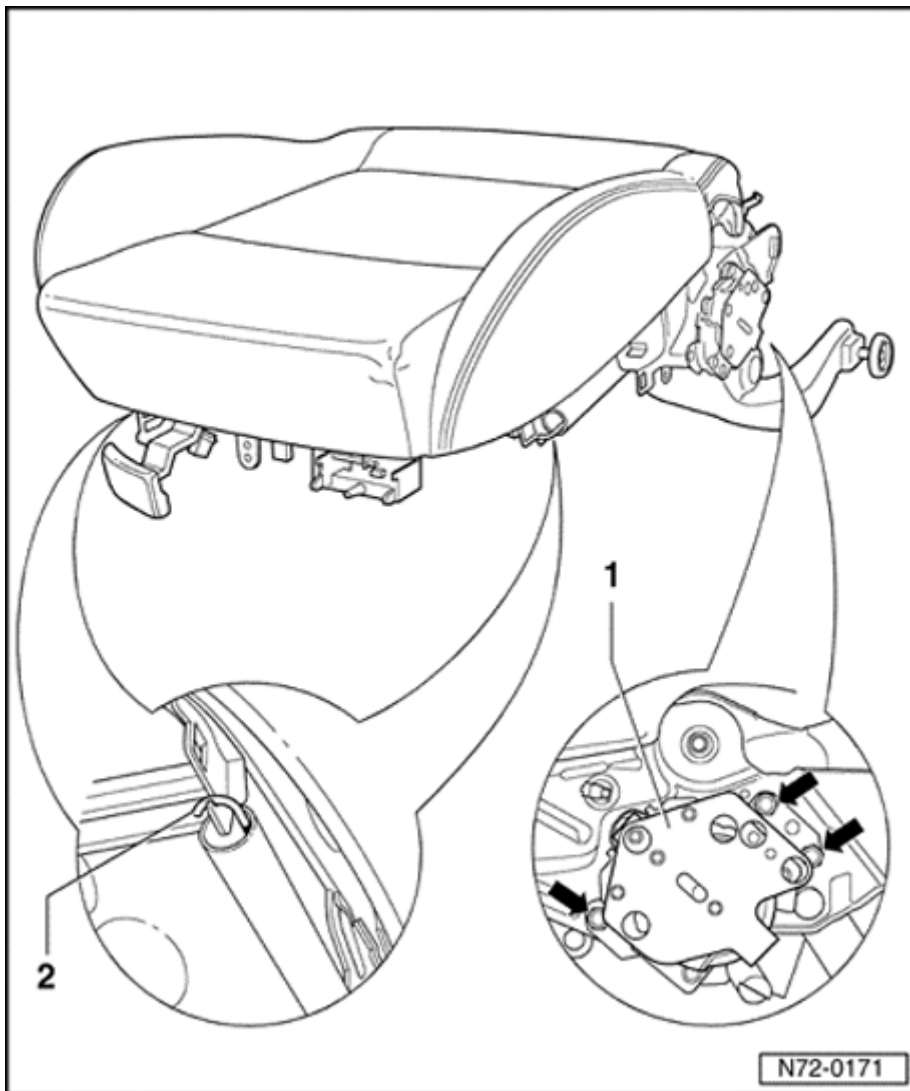
- Unclip two cover caps - **11** - , remove two bolts - **12** - and remove adjusting lever - **13** - .



- Remove bolt - 17 - and unclip trim - 14 -

.

- Carefully unhook tension spring - 2 - .



- Remove bolts - **arrows** - (10 Nm) and pull seat height adjuster - **1** - out of seat frame.

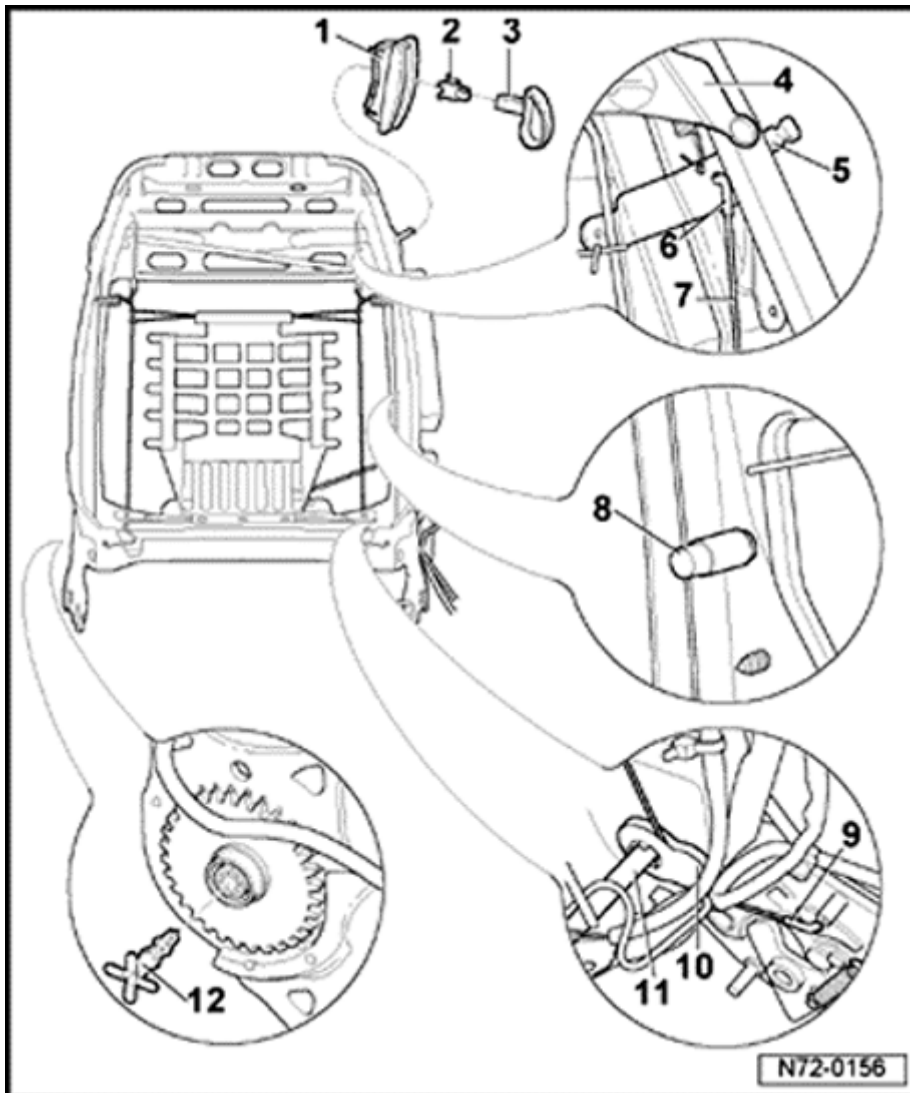
Installing

Installation is reverse of removal.

Note:

- n Tightening torque for bolts - **arrows** - is 10 Nm (7 ft lb).

Cable for locking backrest, assembly overview (2-door)



1. Cover
2. Clip
3. Handle
4. Backrest frame
5. Locking lever
6. Upper cable hook
7. Cable
 - i Removing ⇒ [72-1, Cable for locking backrest, removing and installing \(2-door\)](#)
8. Center cable guide
9. Lower cable hook

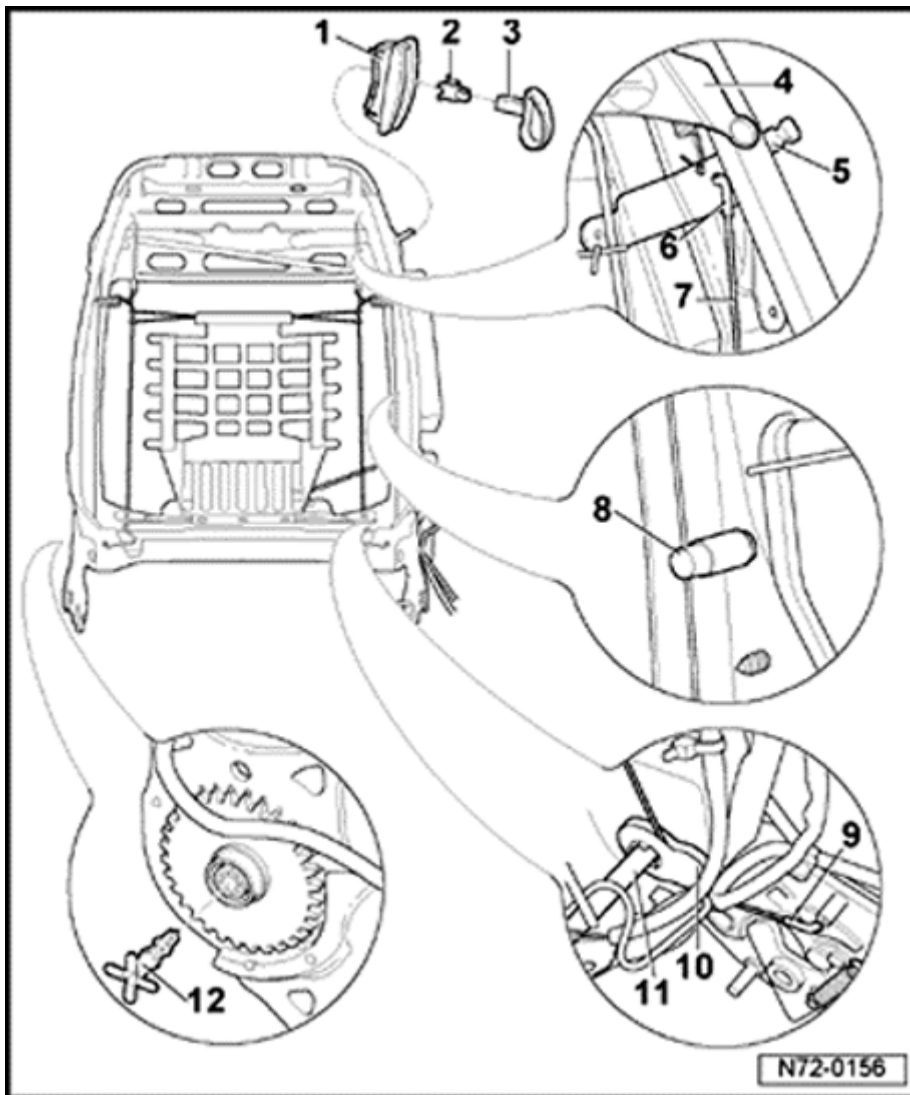
10. Lower cable guide**11. Transfer rod****12. Locking sleeve****Cable for locking backrest, removing and installing (2-door)****Removing**

- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .
- Remove headrest guides ⇒ [72-1, Headrest guides, removing and installing](#) .
- Remove backrest ⇒ [72-1, Front backrest, removing and installing](#) .
- Remove handle - **3** - and unclip cover - **1** - .
- Remove cover and cushion ⇒ [74-1, Front backrest cover and upholstery, removing and installing](#) .
- Break off four small metal tabs for locking sleeve - **12** - and drive rest of locking sleeve - **12** - into transfer rod - **11** - using a drift.

Note:

- n Clip - **2** - and locking sleeve - **12** - must always be replaced after each disassembly.*

- Press locking lever - **5** - downward and pull out cable hook - **6** - .
- Unclip center cable guide - **8** - from backrest frame - **4** - .
- Pull transfer rod - **11** - far enough out of backrest frame so that lower cable guide - **10** - can be unclipped.



- Unhook cable hook - 9 - and pull cable - 7 - out of backrest frame - 4 - .

Installing

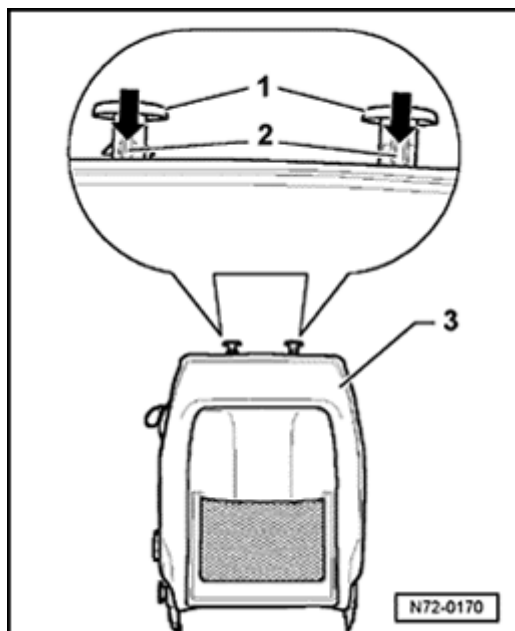
- Installation is reverse of removal.

Headrest guides, removing and installing

Note:

- n No or parts need to be removed to remove headrest guides.

Removing



- Push in locking lugs - 2 - and remove headrest guides - 1 - from backrest - 3 - .

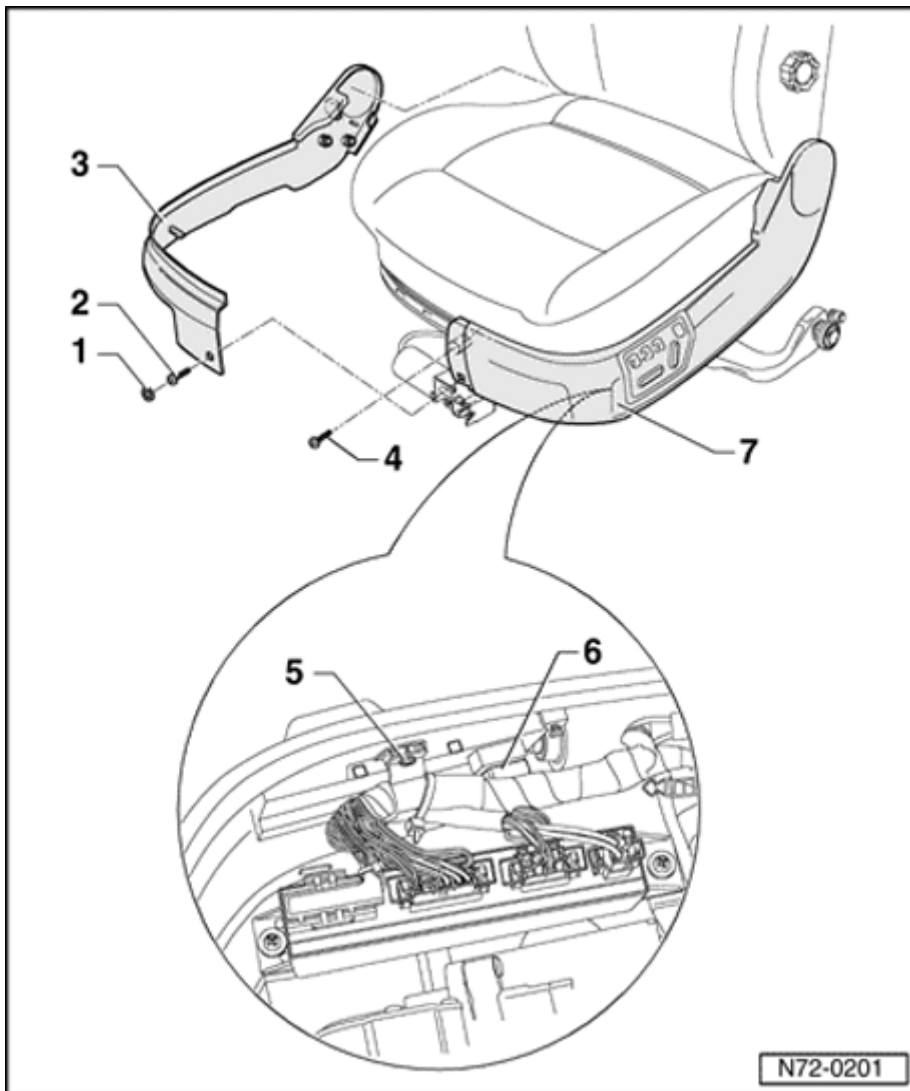
Installing

- Installation is reverse of removal.

8-way seat trim, removing and installing

Removing

- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .
- Remove belt latch ⇒ [72-1, Front backrest, removing and installing](#) .
- Unclip cover cap - 1 - and remove screw - 2 - .
- Unclip right seat trim - 3 - .
- Remove bolts - 4 - and - 5 - .
- Disconnect harness connector - 6 - .



- Unclip left seat trim - 7 - .

Installing

- Installation is reverse of removal.

8-way seat control module, removing and installing

Note:

n Control module is installed under drivers seat.

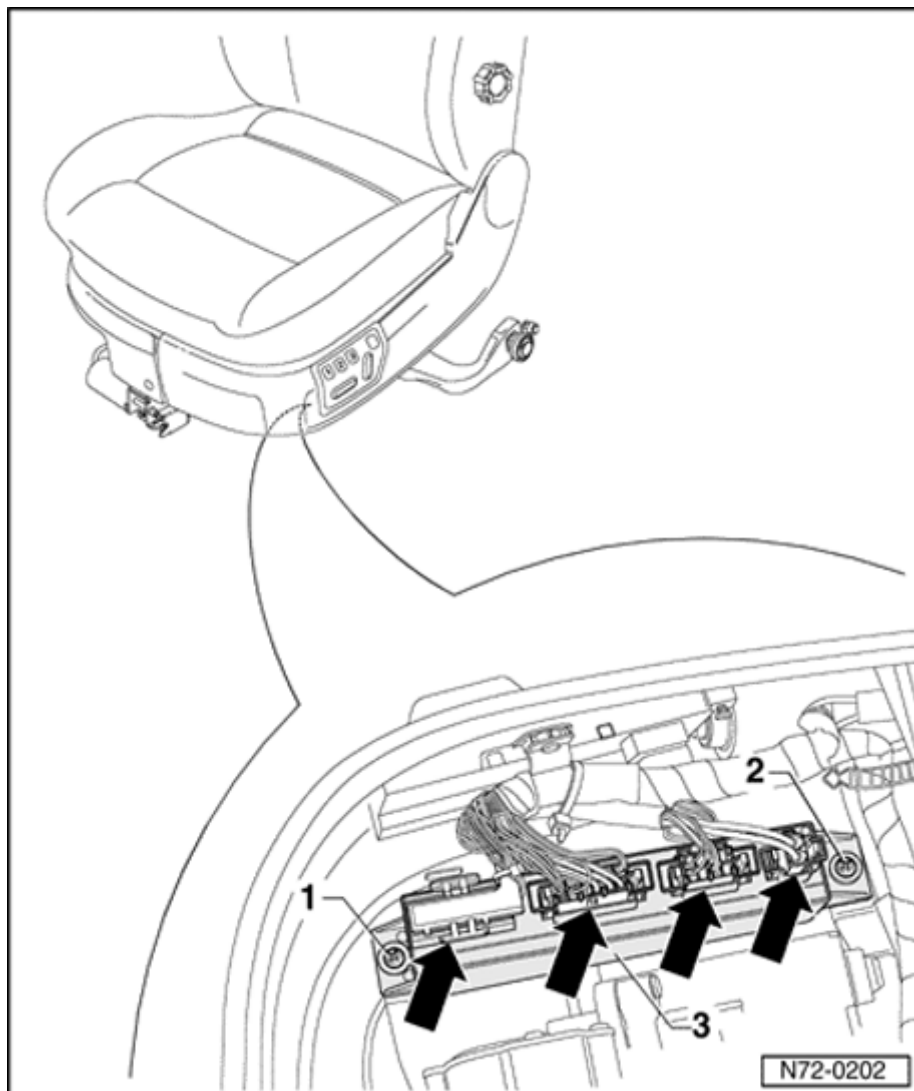
Removing

- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .

- Disconnect four harness connectors -

arrows - .

- Remove bolts - 1 - and - 2 - .



- Remove control module - 3 - .

Installing

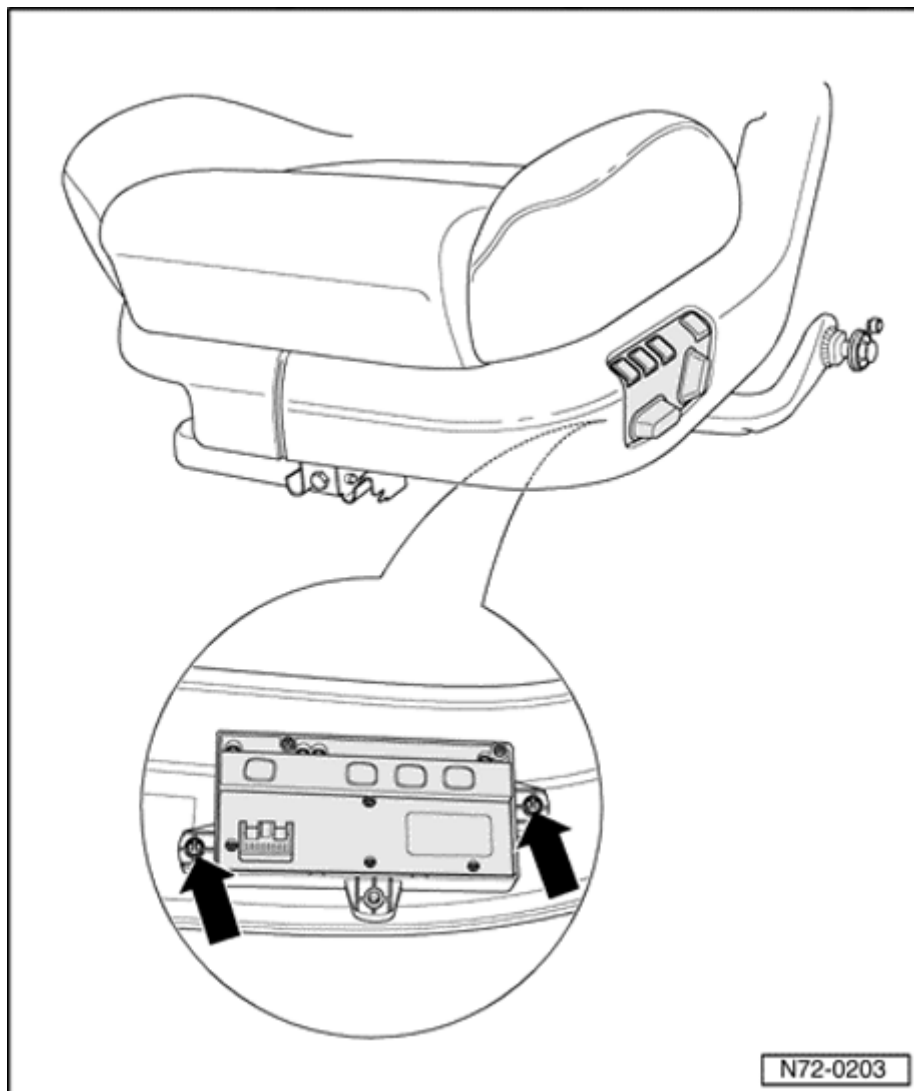
- Installation is reverse of removal.

8-way seat adjusting unit, removing and installing

Removing

- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .

- Remove 8-way seat trim ⇒ [72-1, 8-way seat trim, removing and installing](#) .



- Remove two bolts - **arrows** - at interior of left seat trim and remove switch unit.

Installing

- Installation is reverse of removal.

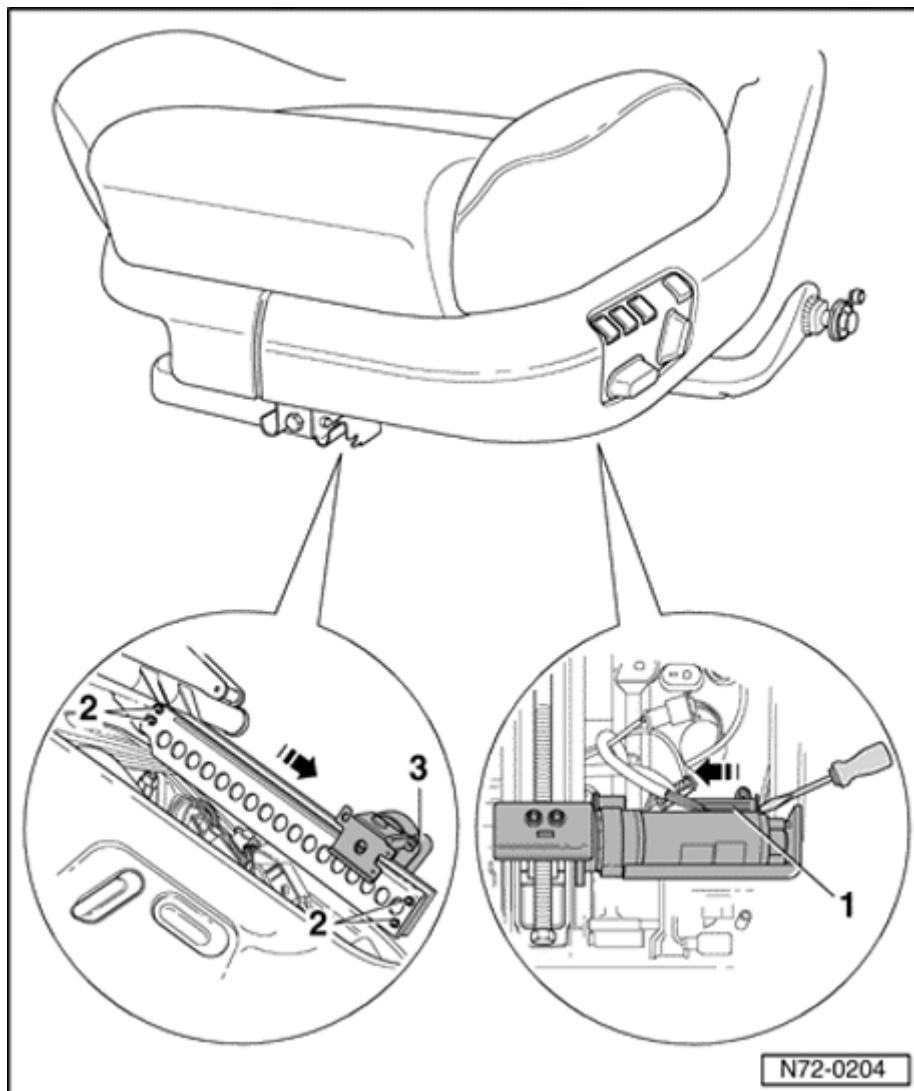
8-way seat fore and aft adjustment, removing and installing

Removing

- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .

- Using a screwdriver, disconnect harness connector - **1** - in direction of - **arrow** - .

- Remove bolts - **2** - (four on each side).



- Remove seat fore and aft adjustment - **3**
- in direction of - **arrow** - .

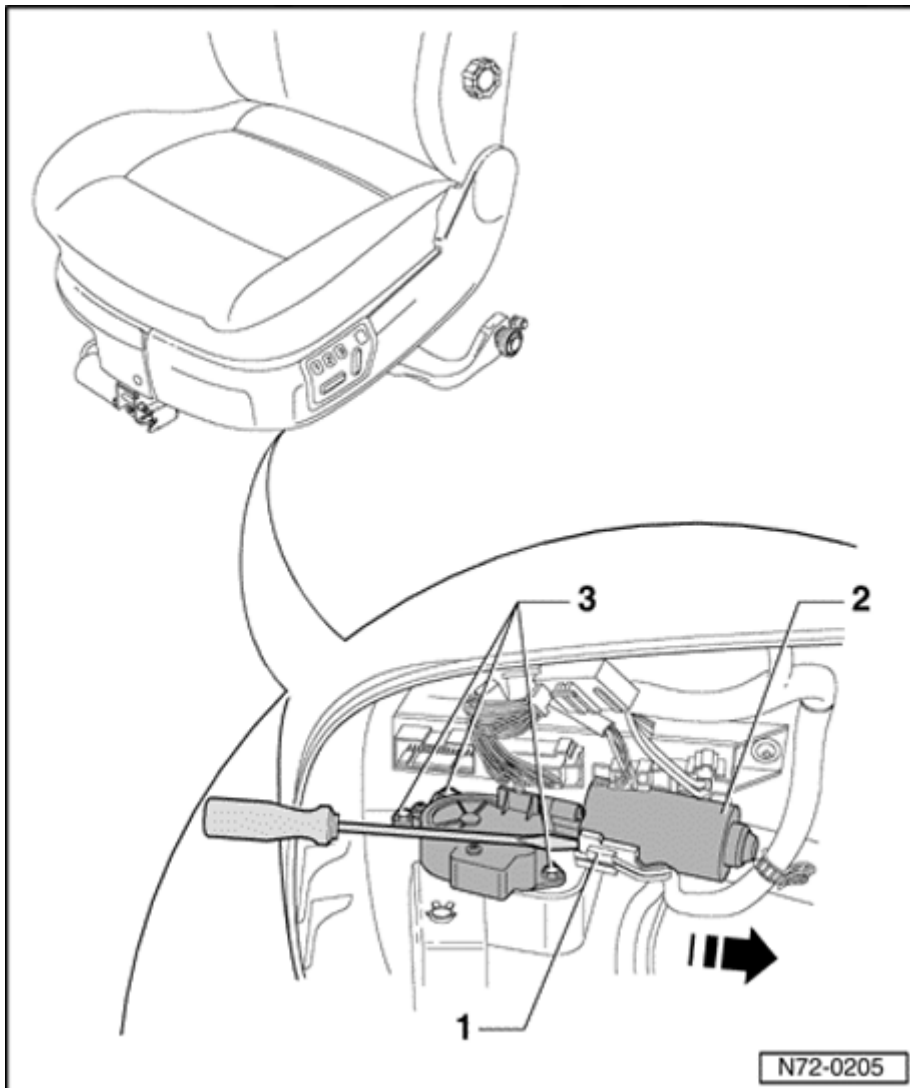
Installing

- Installation is reverse of removal.

8-way seat front height adjustment drive, removing and installing

Removing

- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .
- Using a screwdriver, disconnect harness connector - **1** - in direction of - **arrow** - .
- Remove bolts - **3** - .



- Remove front drive - 2 - .

Installing

- Installation is reverse of removal.

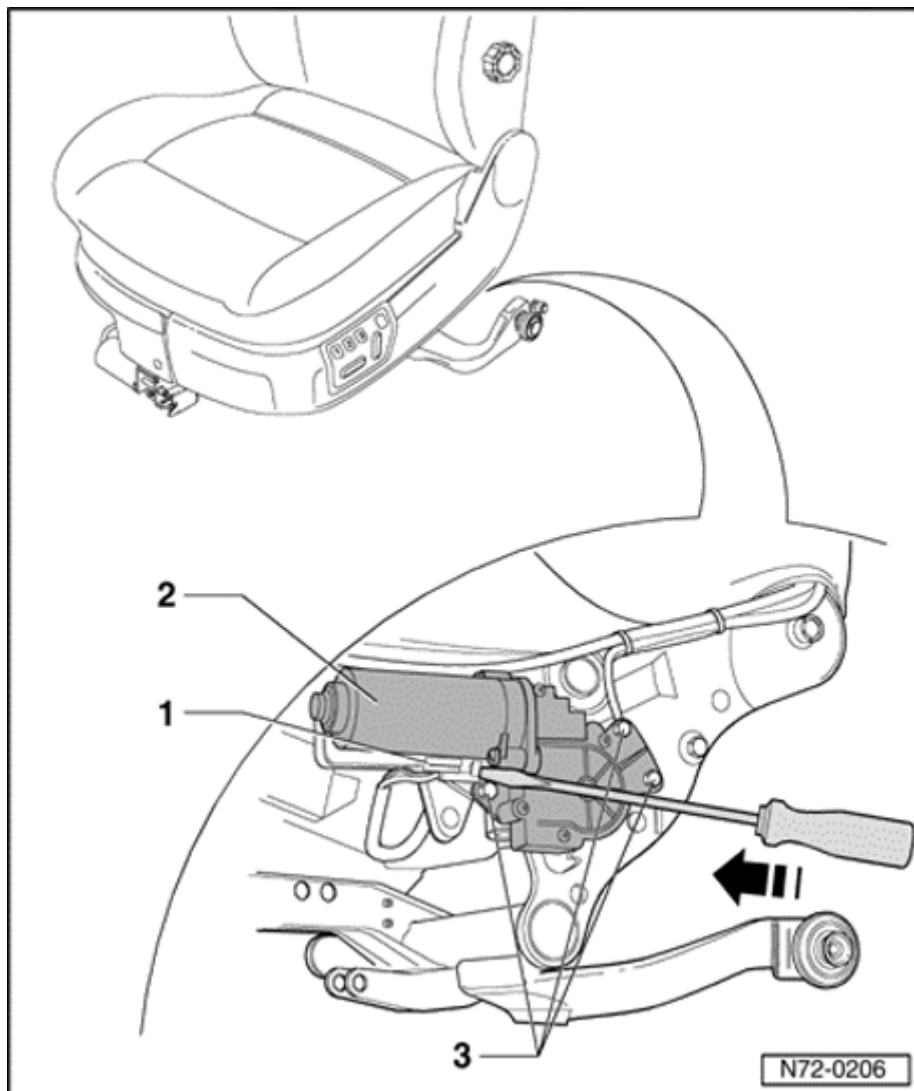
8-way seat rear height adjustment drive, removing and installing

Removing

- Bring seat to uppermost position.
- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .
- Remove 8-way seat trim ⇒ [72-1, 8-way seat trim, removing and installing](#) .
- Using a screwdriver, disconnect harness

connector - **1** - in direction of - **arrow** - .

- Remove bolts - **3** - .



- Remove rear drive - **2** - .

Installing

- Installation is reverse of removal.

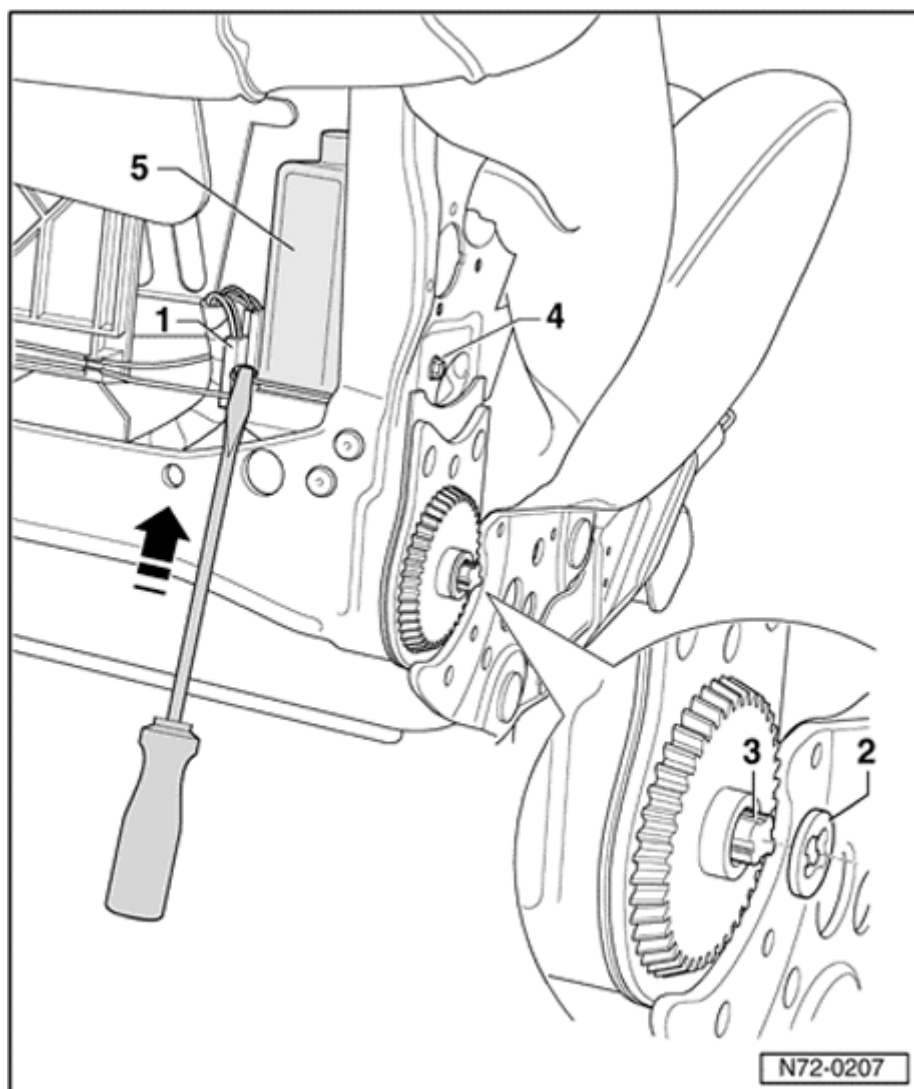
8-way seat backrest adjustment drive, removing and installing

Removing

- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .

- Remove 8-way seat trim ⇒ [72-1, 8-way seat trim, removing and installing](#) .

- Remove cover in lower area of backrest and roll up ⇒ [74-1, Front backrest cover and upholstery, removing and installing](#) .
- Using a screwdriver, disconnect harness connector - **1** - in direction of arrow.
- Pry out locking washer - **2** - from shaft - **3** - using a screwdriver.
- Drive shaft - **3** - approx. 15 cm into backrest frame using hammer and drift.
- Unscrew nut - **4** - .



- Remove drive - **5** - .

Installing

- Installation is reverse of removal.

Rear seats

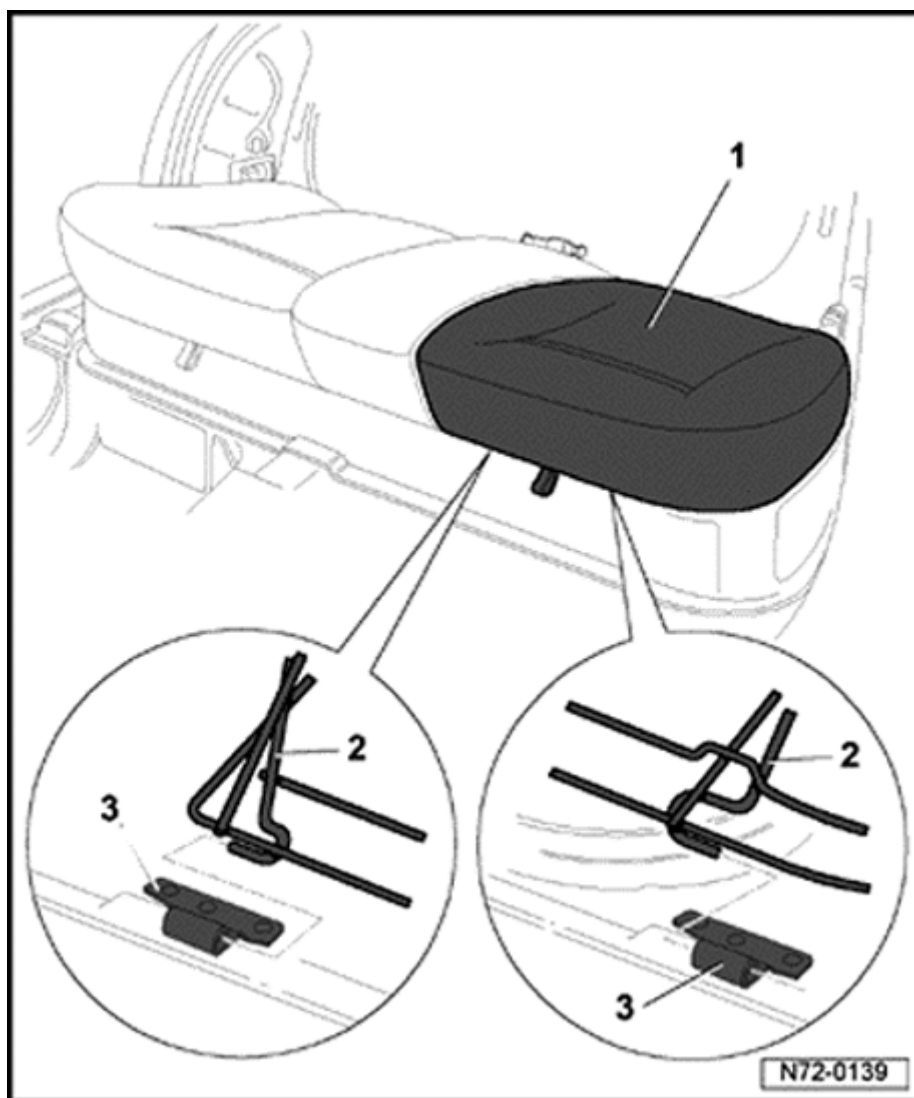
Seat cushion, removing and installing

Note:

n Illustration shows only left seat cushion. Removal of right seat cushion is identical.

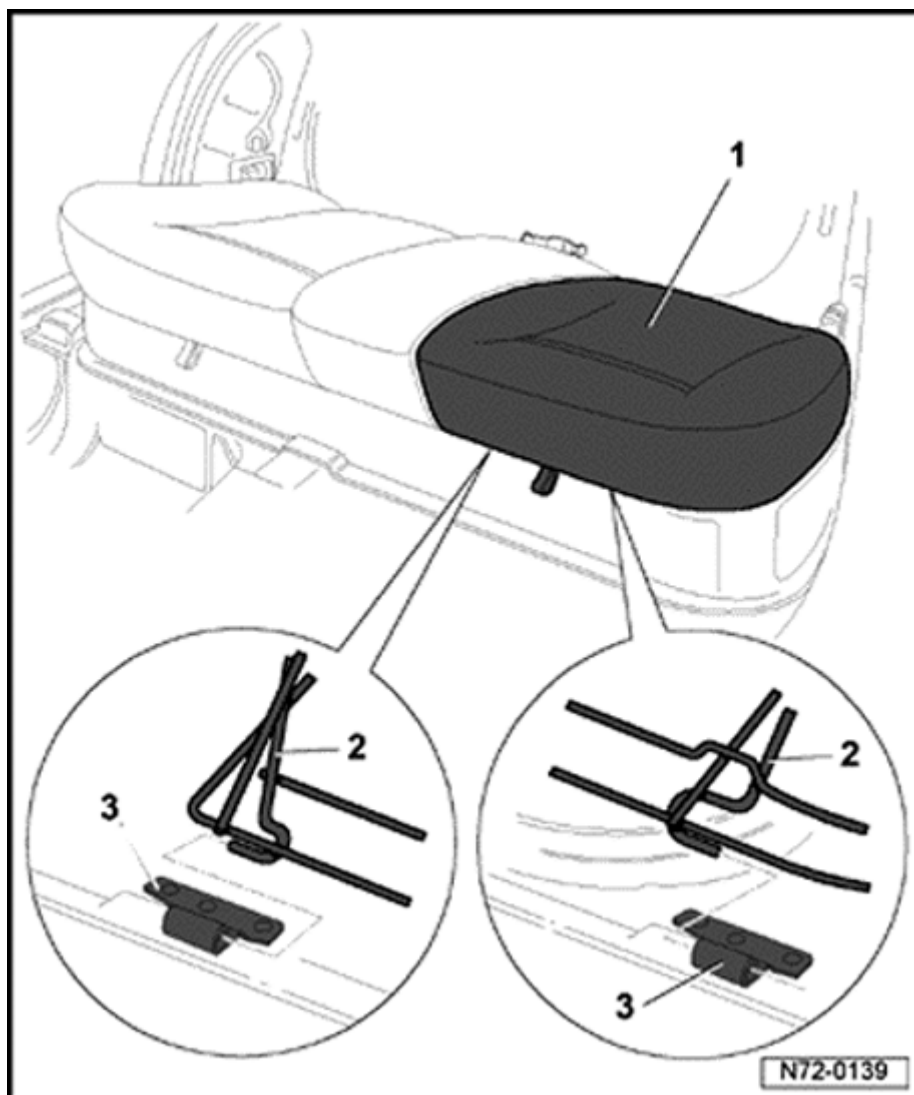
Removing

- Raise seat cushion - 1 - and pull forward.



- Push rod - 2 - out of bracket - 3 - .

Installing



- Guide rods - 2 - into bracket - 3 - , fold seat cushion - 1 - toward rear and press down at front.

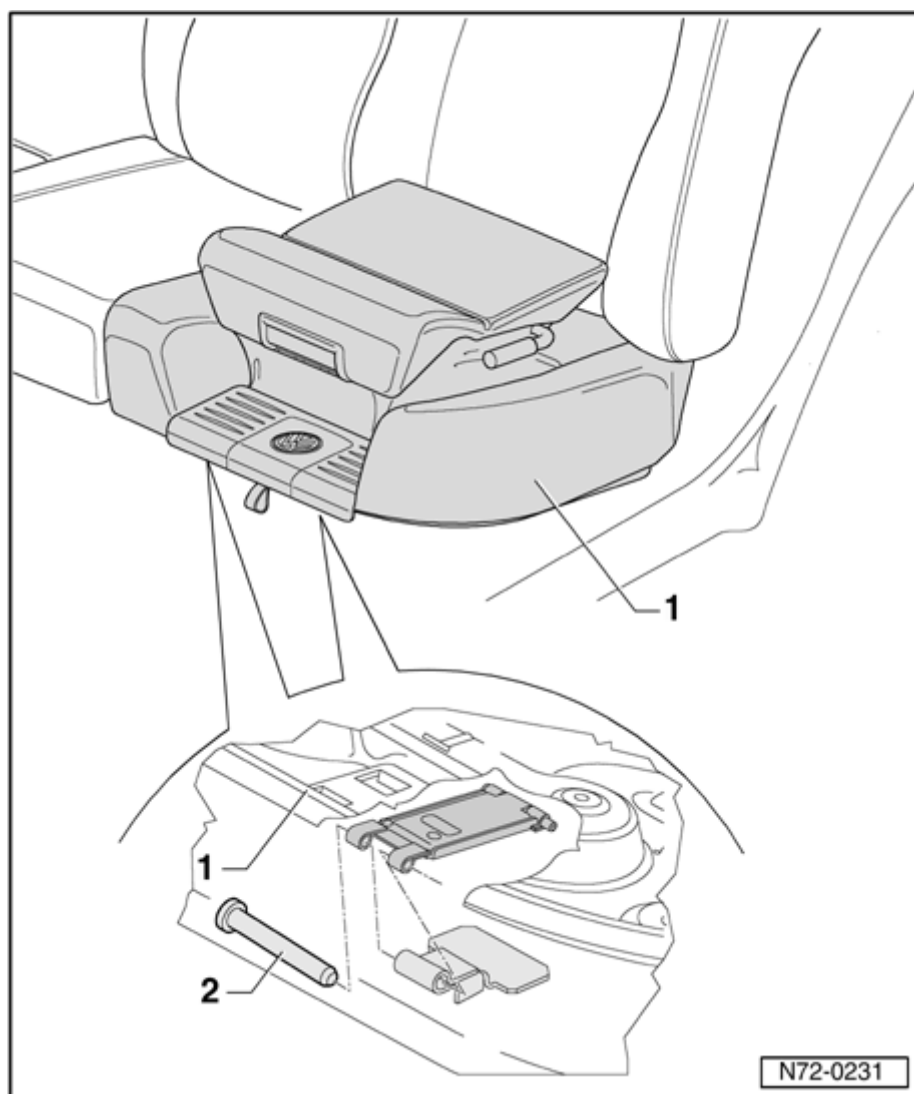
Seat cushion with integrated child seat, removing and installing

Note:

n Illustration shows only left seat cushion. Removal of right seat cushion is identical.

Removing

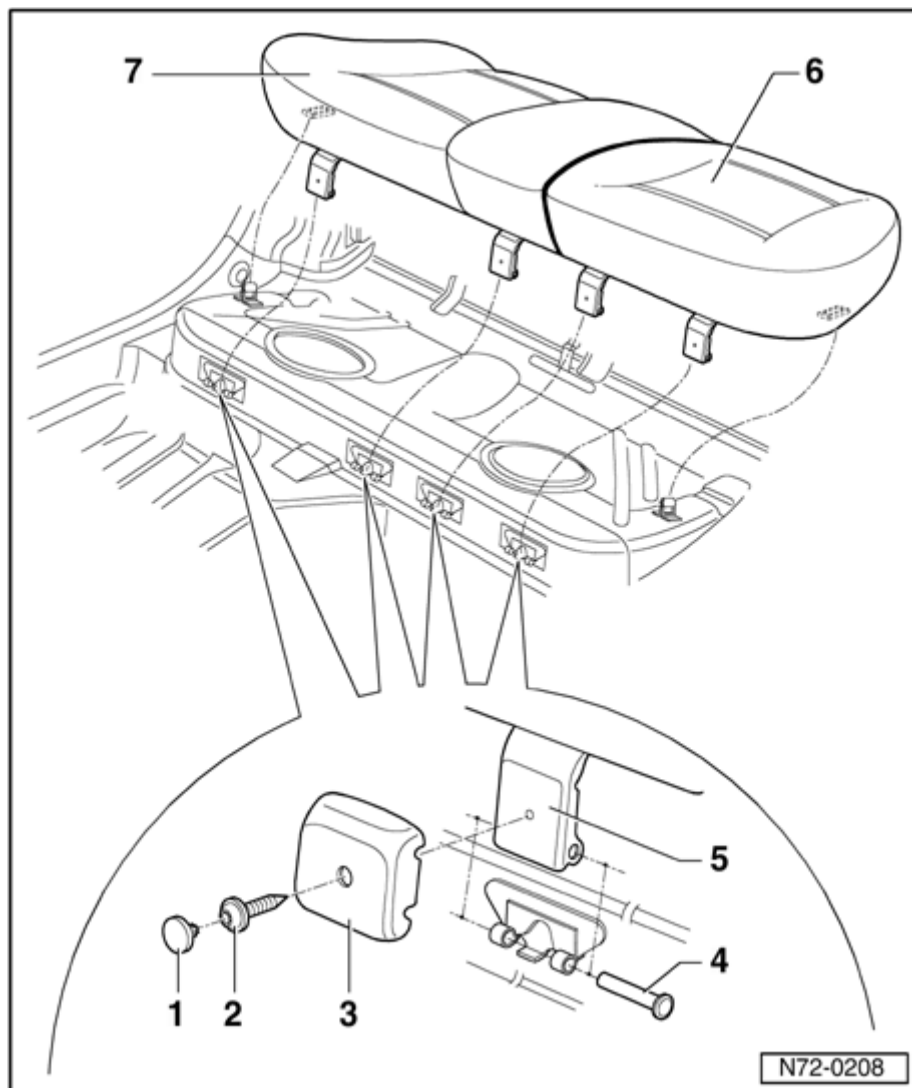
- Raise seat cushion - 1 - and pull forward.
- Remove pins - 2 - from seat hinges.
- Remove left seat cushion - 1 - .



Installing

Installation is reverse of removal.

Seat cushion, assembly overview (Golf wagon/Jetta wagon)



1. Cover cap

2. Bolt

3. Seat hinge cover cap

4. Pin

5. Seat hinge

6. Left seat cushion

- ; Removing ⇒ [72-2, Seat cushion, removing and installing \(Golf wagon/Jetta wagon\)](#)

7. Right seat cushion

- ; Removing ⇒ [72-2, Seat cushion, removing and installing \(Golf wagon/Jetta wagon\)](#)

wagon)

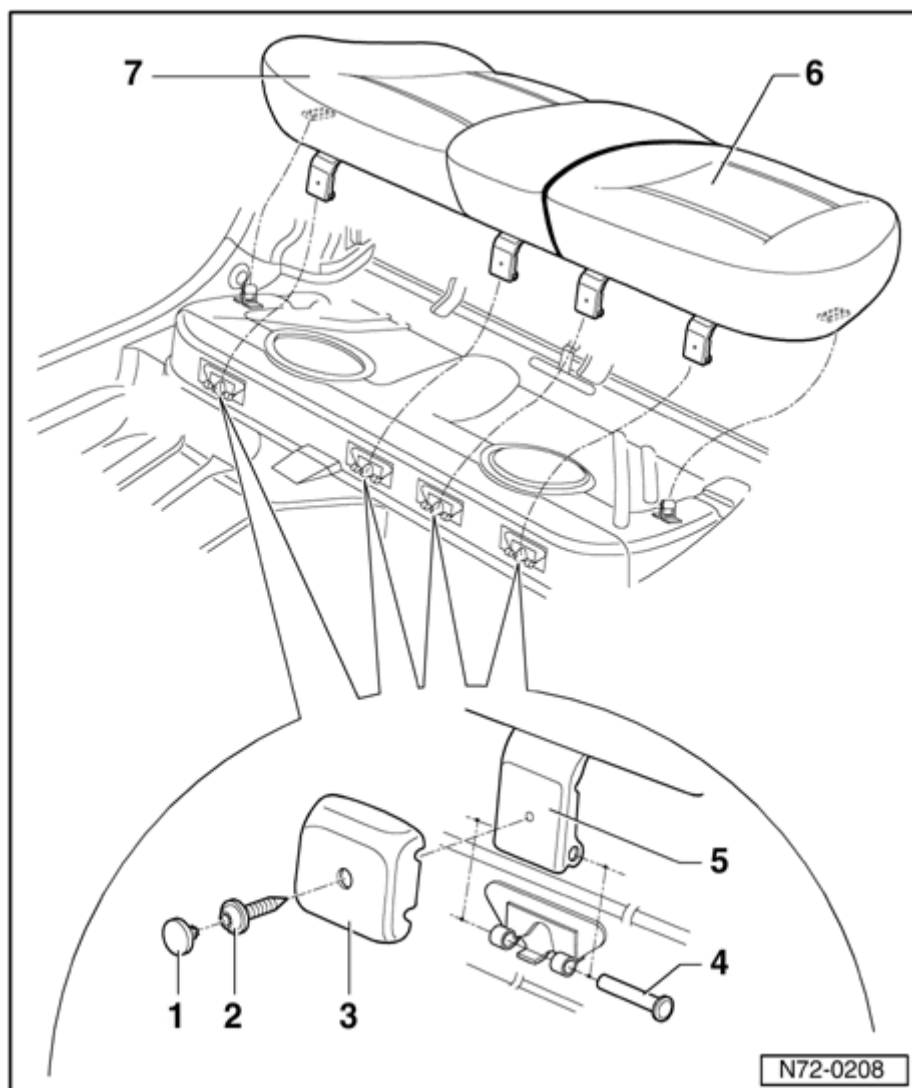
Seat cushion, removing and installing (Golf wagon/Jetta wagon)

Note:

- n removal and installation procedures may have to be modified slightly for a seat with integrated child seat.

Removing

- Unclip cover caps - 1 - , Remove bolts - 2 - and remove seat hinge cover caps - 3 -
- .
- Remove pins - 4 - from seat hinges - 5 -
- .



- Remove left seat cushion - **6** - and right seat cushion - **7** - .

Installing

Installation is reverse of removal.

Backrest, removing and installing

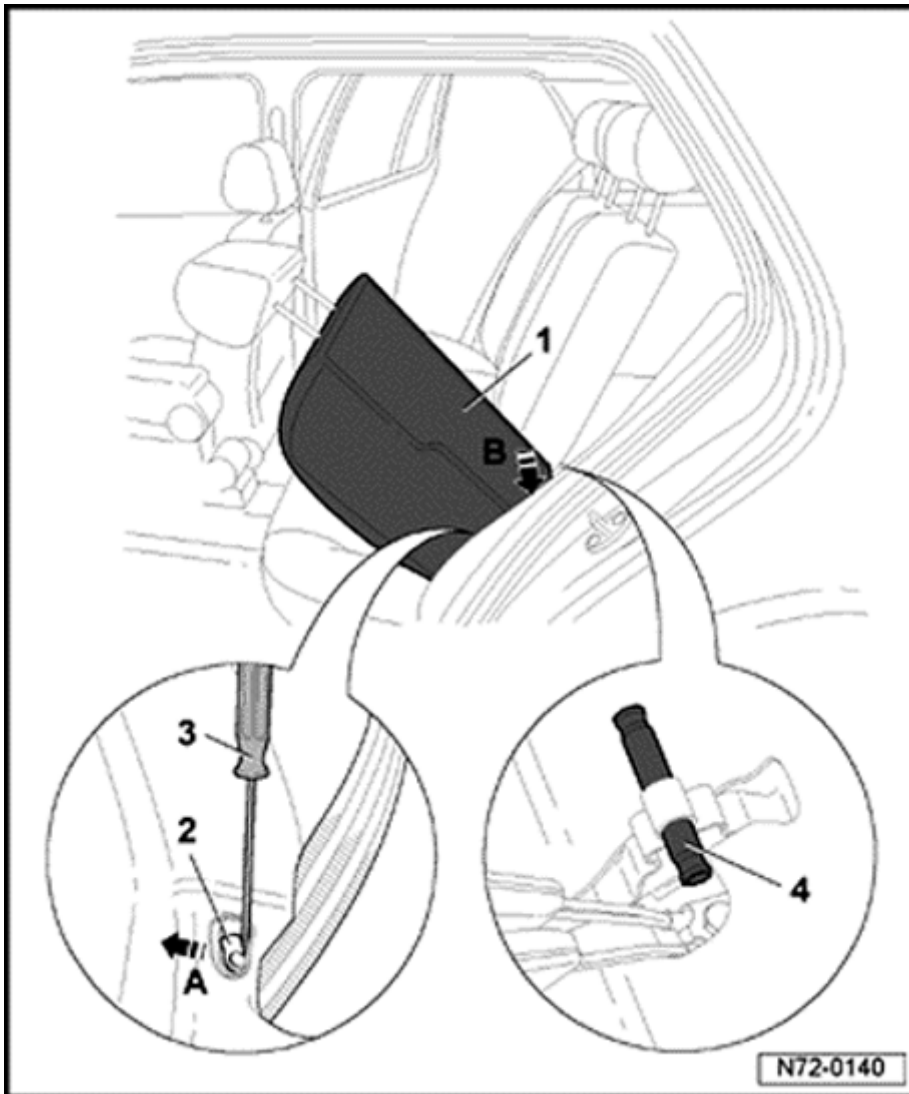
Note:

n Illustration shows only left backrest. Removal of right backrest is identical.

Removing

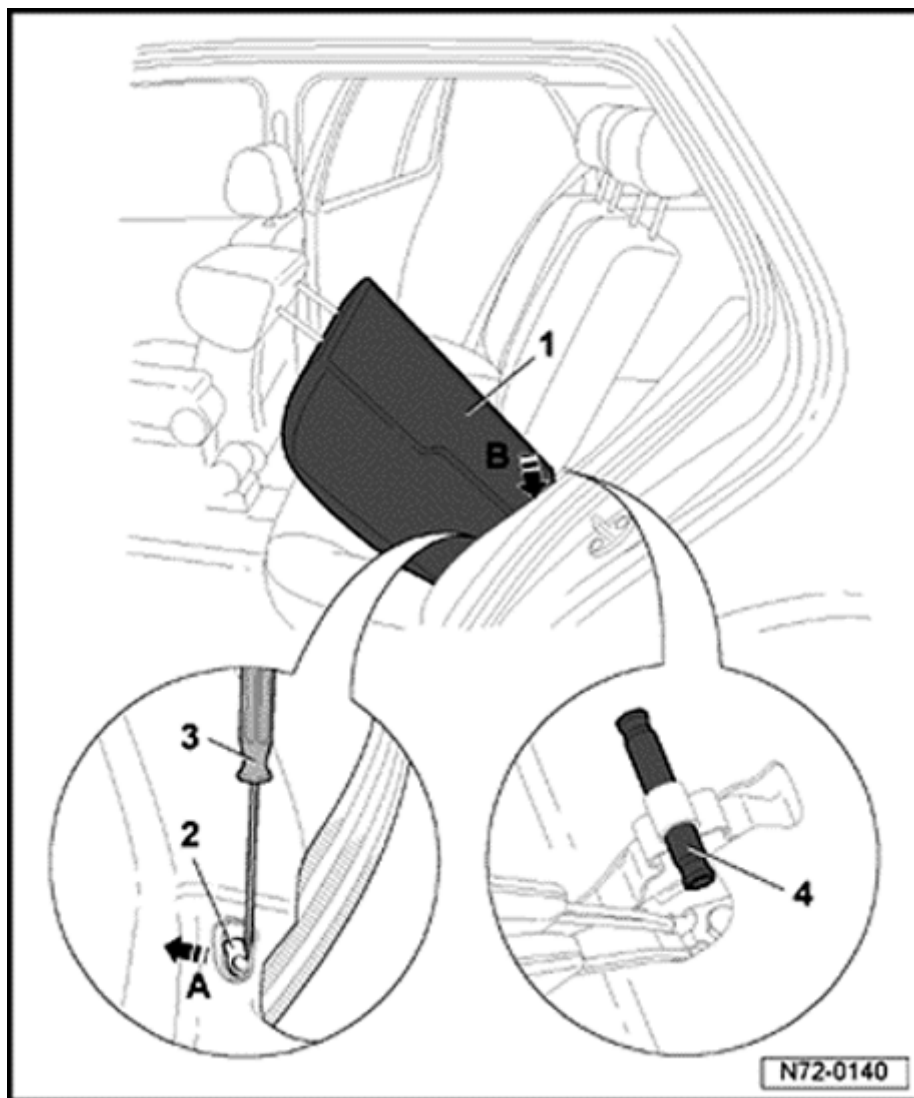
- Fold backrest - **1** - forward.

- Using a screwdriver - **3** - , press locking hook - **2** - toward rear - **arrowA** - .



- Pull backrest - 1 - up slightly and remove from center anchor - 4 - - **arrow B** - .

Installing

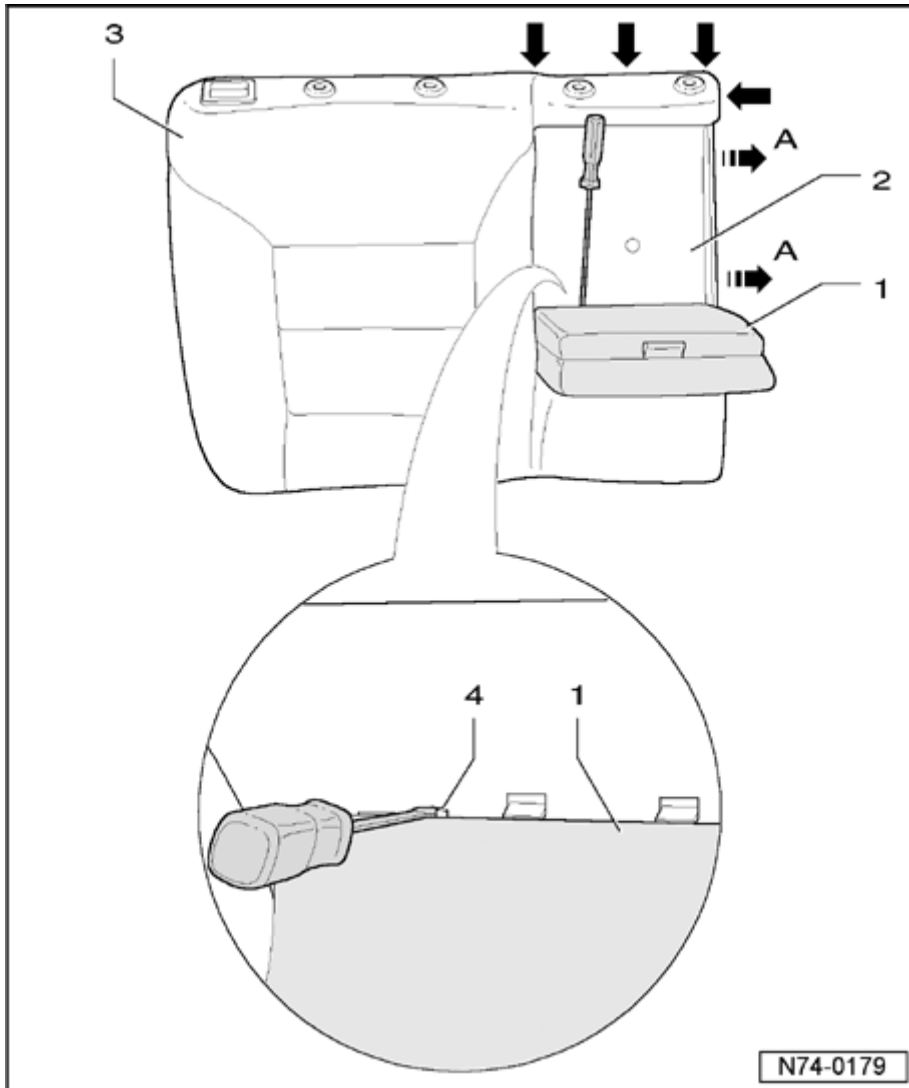


- Guide backrest - 1 - onto anchor - 4 - and press down at outside.

Center arm rest, removing and installing

Removing

- Remove right backrest ⇒ [72-2, Backrest, removing and installing](#) .
- Fold down center armrest - 1 - .
- Remove trim - 2 - - **arrow A** - .
- Loosen trim - 2 - from cover - 3 - at top.
- Loosen trim - 2 - from catch - 4 - using a screwdriver and pull out upward.



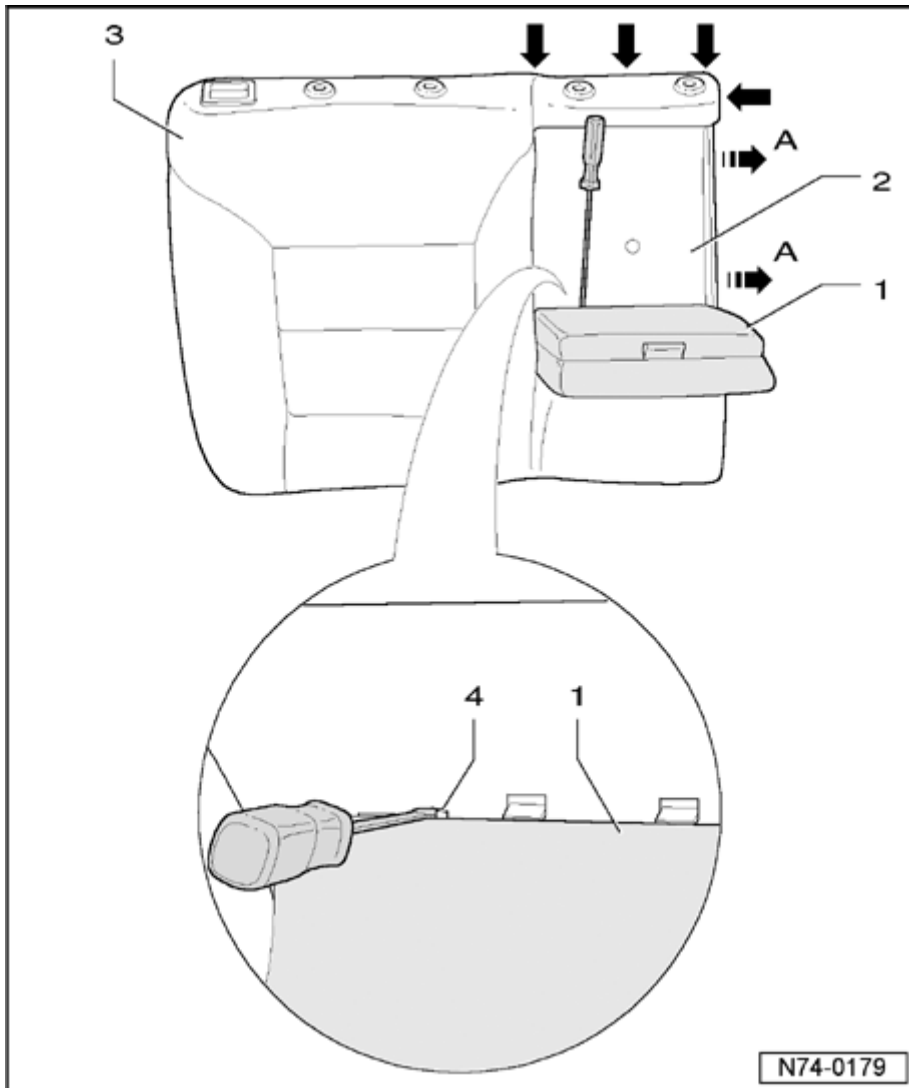
- Remove center armrest - 1 - from backrest.

Installing

- Installation is reverse of removal.

Note:

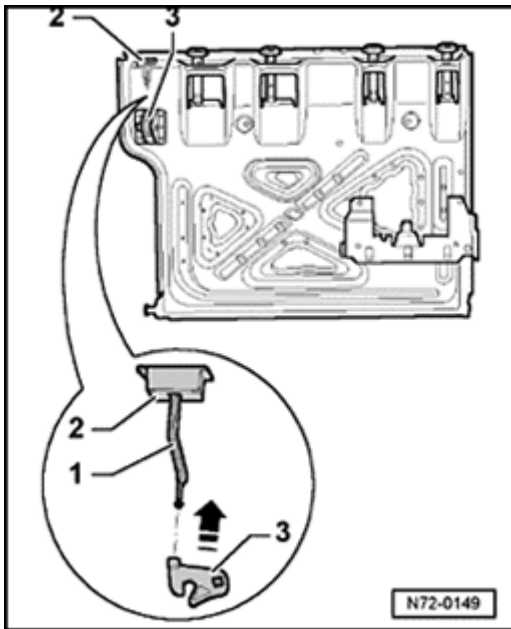
- n To install trim - 2 - , cover - 3 - must be loosened in upper area - **arrows** - from backrest so that piping on trim - 2 - can be clipped.



Right backrest lock, removing and installing

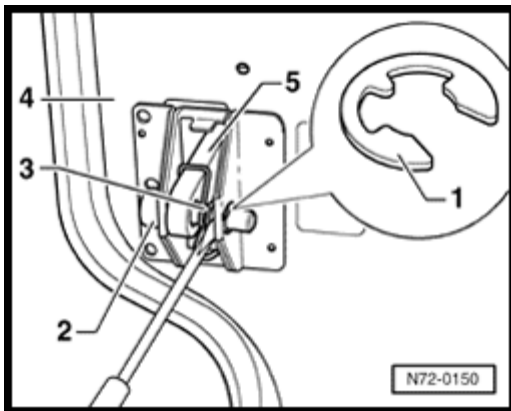
Removing

- Remove right backrest ⇒ [72-2, Backrest, removing and installing](#) .
- Remove right cushion ⇒ [74-3, Cover and cushion for backrest, removing and installing](#) .



A

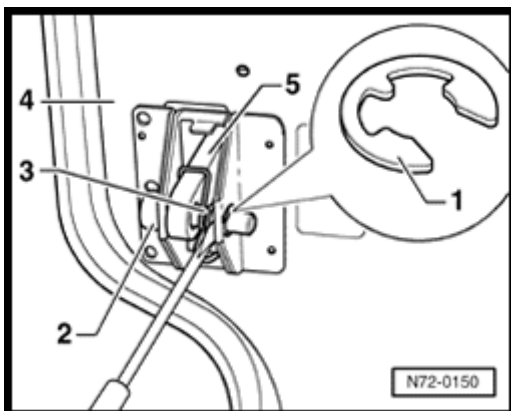
- Press rod - 1 - for handle - 2 - out of locking hook - 3 - - arrow - .



A

- Remove circlip - 1 - from pin - 2 - .

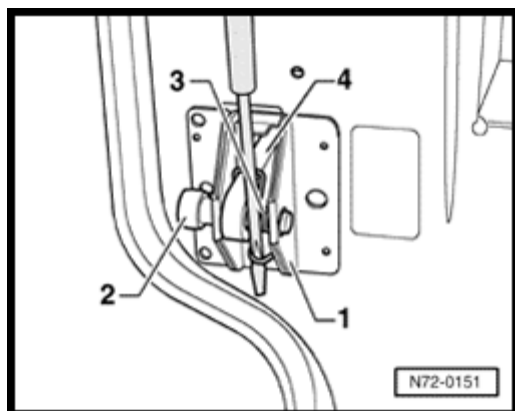
- Remove spring - 3 - from backrest - 4 - using a screwdriver.



A

- Remove pin - 2 - from backrest - 4 - , hold spring - 3 - in place using pliers and remove while doing this.

Installing

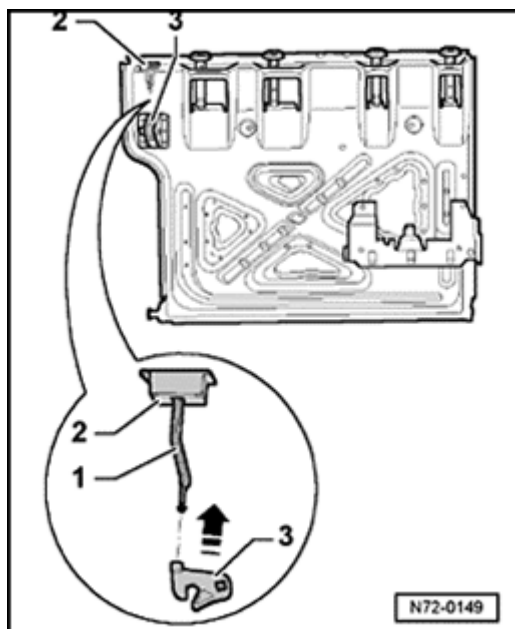


A

- Pin - 2 - , spring - 3 - and locking hook - 4 - must be inserted together.

- Engage circlip - 1 - on pin - 2 - .

- Tension spring - 3 - .



A

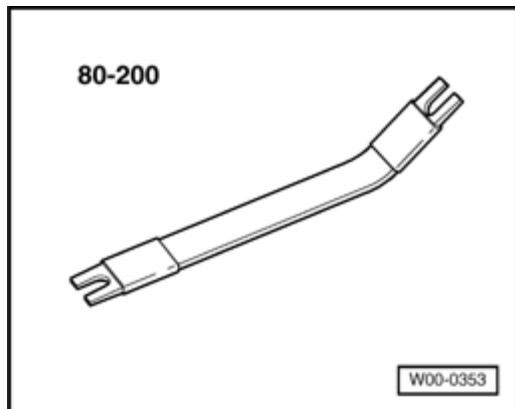
- Press locking hook - 3 - upward - **arrow** - .

- Engage rod - 1 - in locking hook - 3 - .

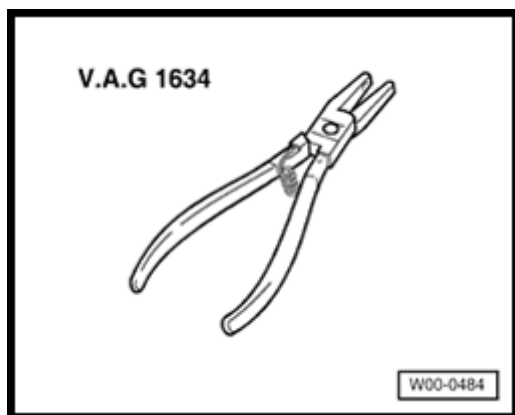
Front seat cushion and cover

Tools

Special tools, testers and auxiliary items required



n Pry bar 80 - 200



n Upholstery pliers V.A.G 1634

Front seat cover and upholstery, removing and installing

Note:

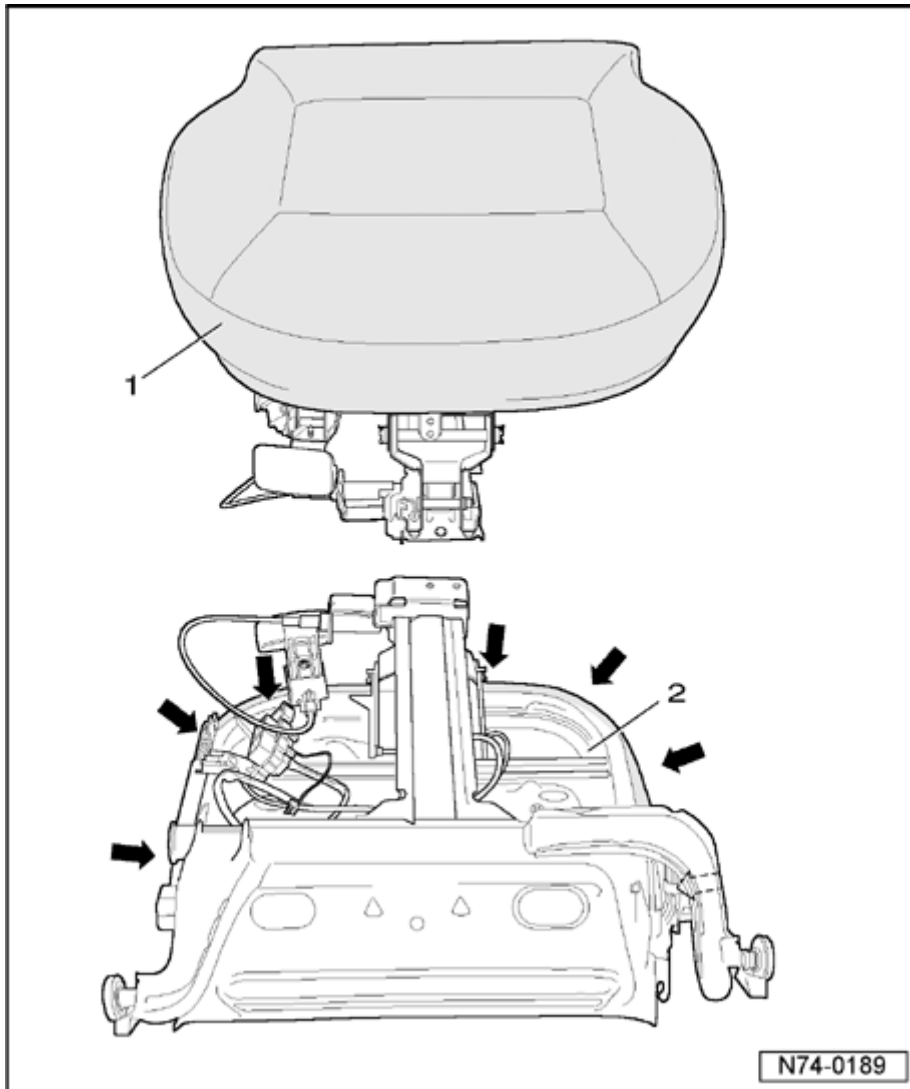
- n *Removal and installation is described for left front seat. same instructions apply for removal and installation for right front seat.*
- n *Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.*

Removing

- Remove seat ⇒ [72-1, Front seats, removing and](#)

[installing](#) .

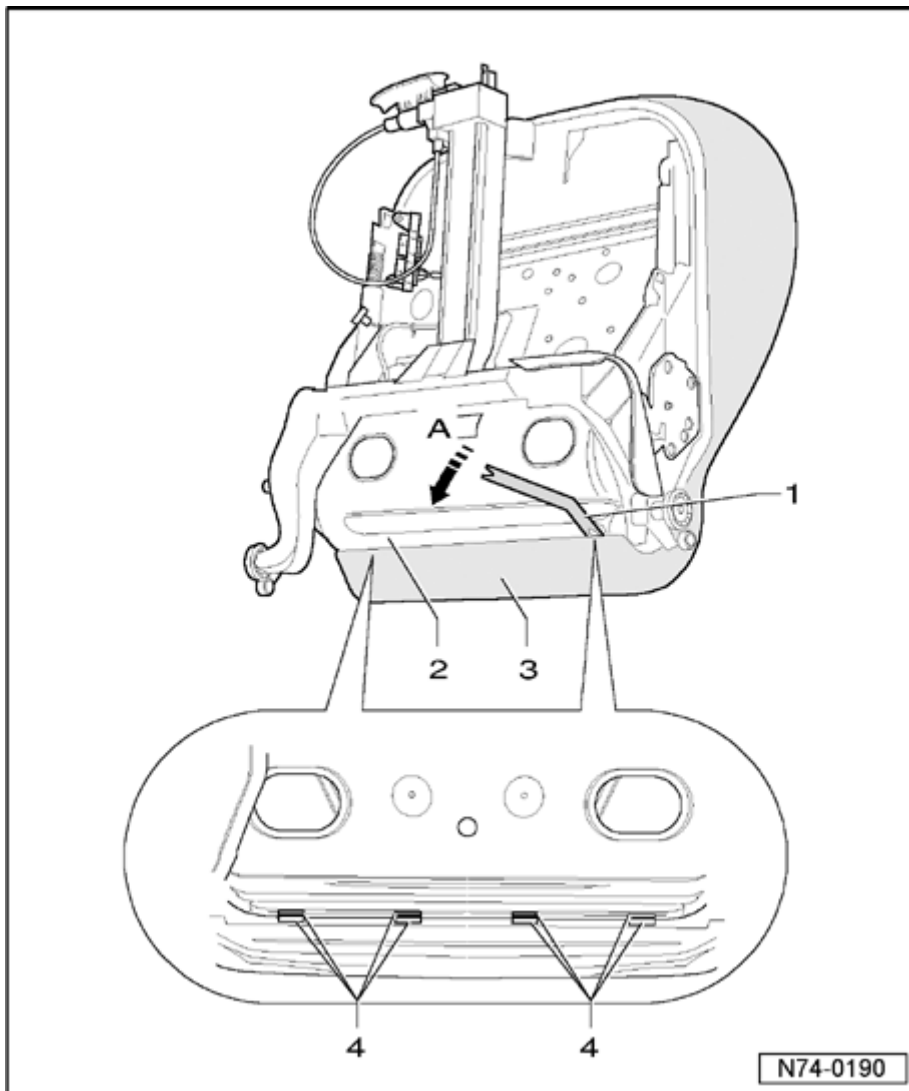
- Remove backrest ⇒ [72-1, Front backrest, removing and installing](#) .



- Pull off cover - 1 - from seat frame - 2 - - **arrows** - .

- Guide Pry lever 80 - 200 - 1 - between seat frame - 2 - and cover - 3 - and press apart locking lugs - 4 - - **arrow A** - .

- Remove cover - 3 - and cushion from seat frame - 2 - .



- Remove cover.

Installing

Installation is reverse of removal.

Front seat cover and upholstery, removing and installing (Golf R32)

Note:

- n Removal and installation is described for left front seat. same instructions apply for removal and installation for right front seat.

Removing

- Switch ignition off.

- Disconnect vehicle battery

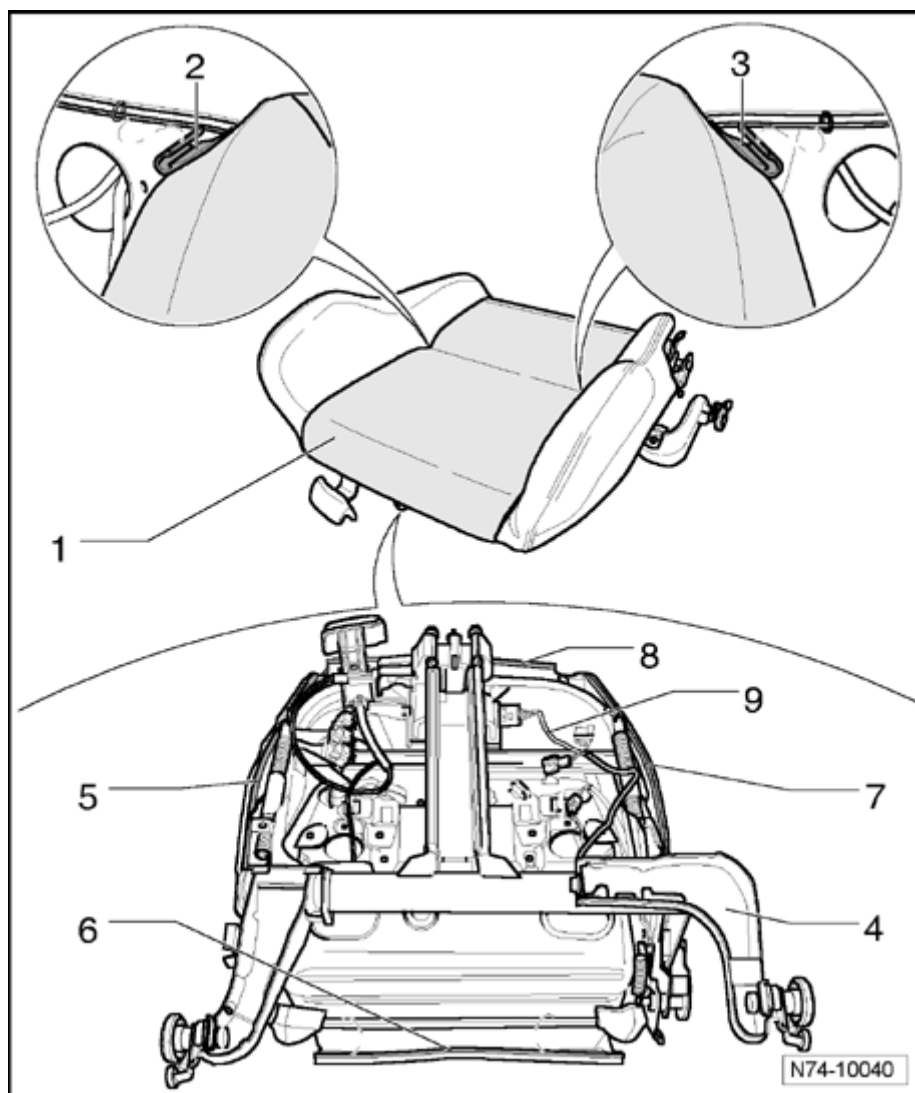
⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

- Remove front seat ⇒ [72-1, Front seats, removing and installing](#) .

- Remove front backrest ⇒ [72-1, Front backrest, removing and installing](#) .

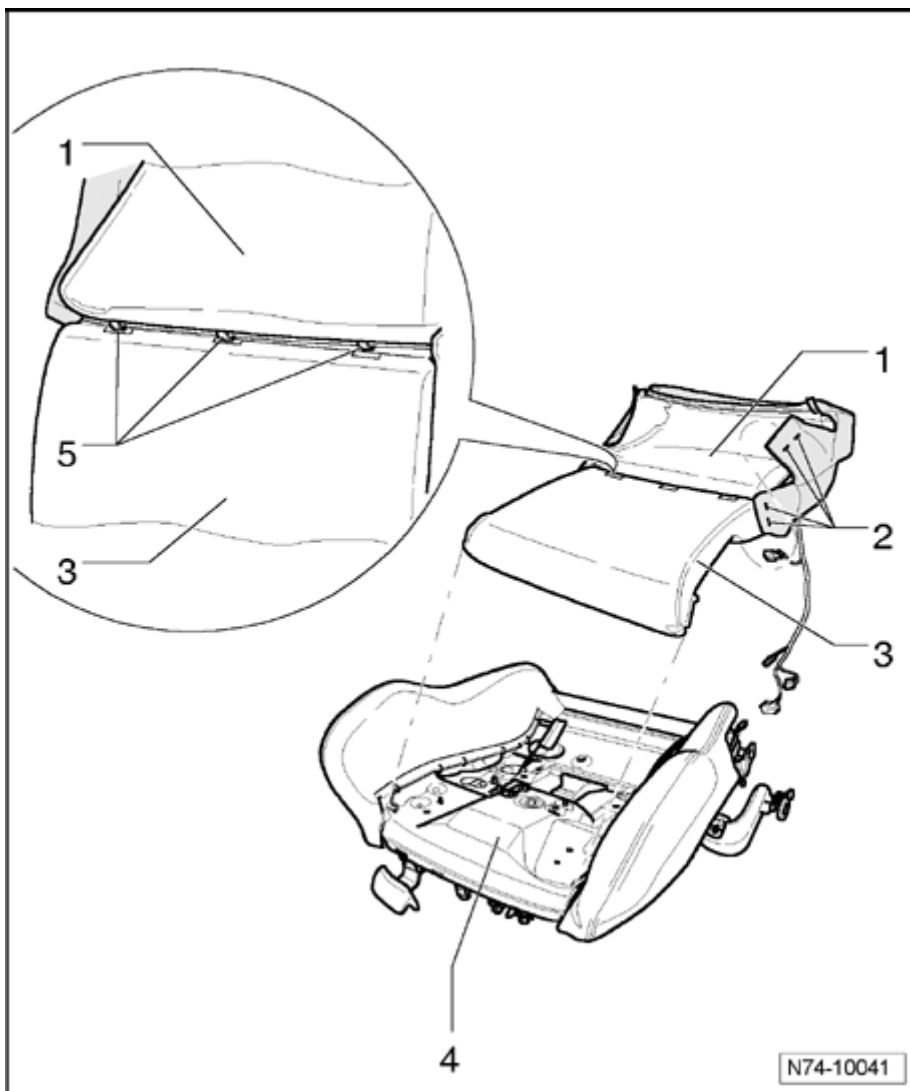
- Loosen beading strip - **5** - , - **6** - , - **7** - and - **8** - from seat frame - **4** - .

- Disconnect wiring harnesses for seat heater - **9** - from seat frame.



- Loosen both beading strips - **2** - and - **3** - located at center portion of seat - **1** - from seat frame.

- Remove cover - 1 - with cushion - 3 - from seat frame - 4 - .
- On underside of cushion, remove staples - 2 - .
- Roll up cover until cushion wire can be reached.
- Using a small screwdriver, unclip cushion wire for cover out of frame - 5 - in cushion.



- Remove cover from cushion.
- On inner side of left seat bolster, remove staples - 6 - .
- Cut through all cushion clips - 5 - .

Note:

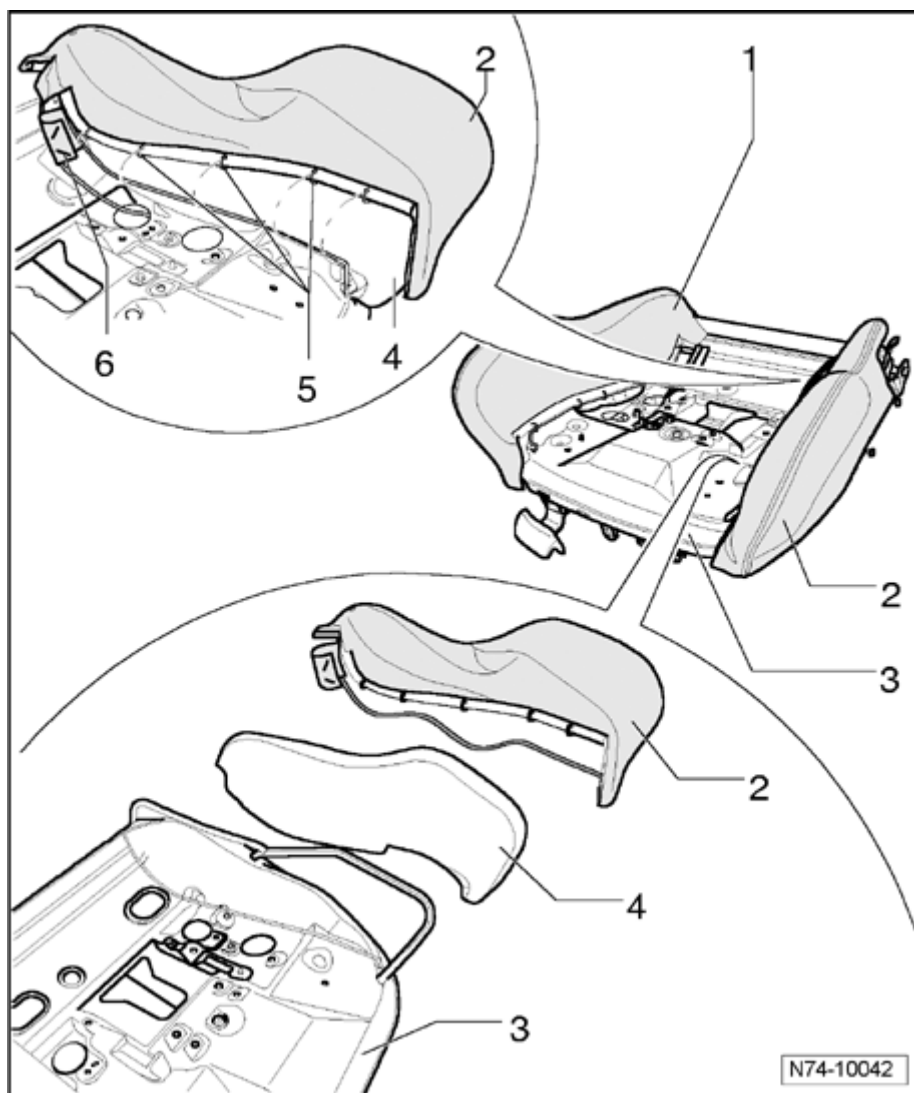
- n *Cushion clips - 5 - are destroyed upon removing, y must be replaced during installation.*

- Carefully remove seat bolster cover - 2 - from cushion - 4 - .

- Carefully pull seat bolster cushion - 4 - out of seat frame - 3 - .

Note:

- n *same instructions apply to right seat bolster cover - 1 - and corresponding cushion.*



Installing

- Installation is reverse of removal.

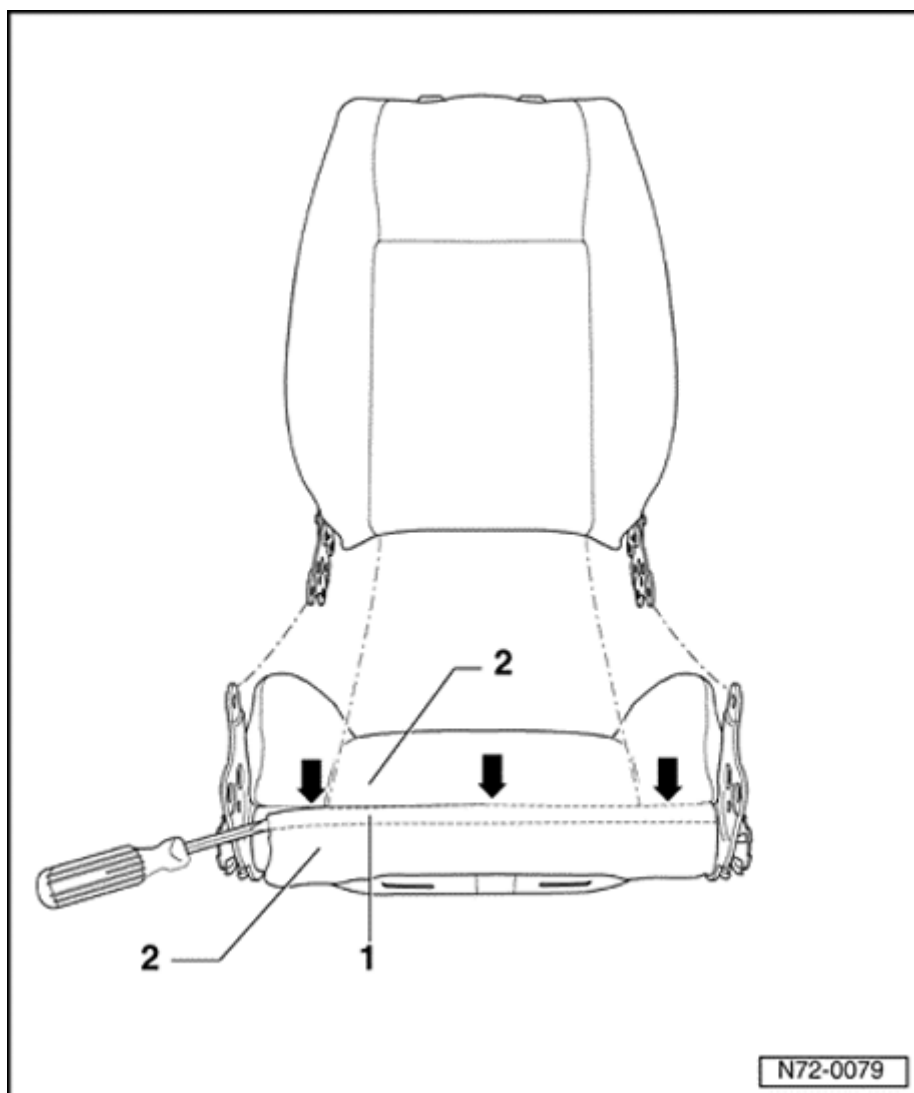
Front backrest cover and upholstery, removing and installing

Note:

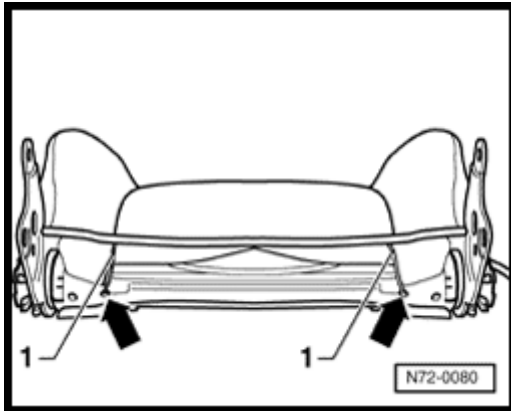
- n Slight changes may have to be made to removal and installation procedures, depending upon equipment installed in vehicle.

Removing

- Remove headrest.
- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .
- Remove backrest ⇒ [72-1, Front backrest, removing and installing](#) .
- Unclip trim on rear side at bottom and unhook upward.

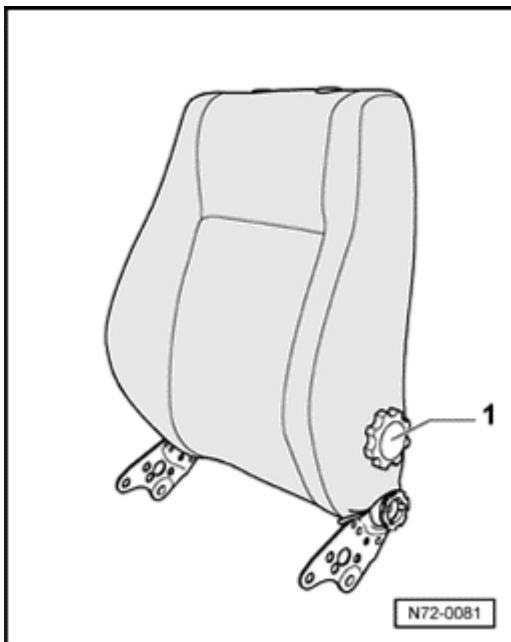


- Separate beading strip - 1 - for cover - 2
- using a screwdriver - **arrows** - .



A

- Unhook tension wire - 1 - - **arrows** - .



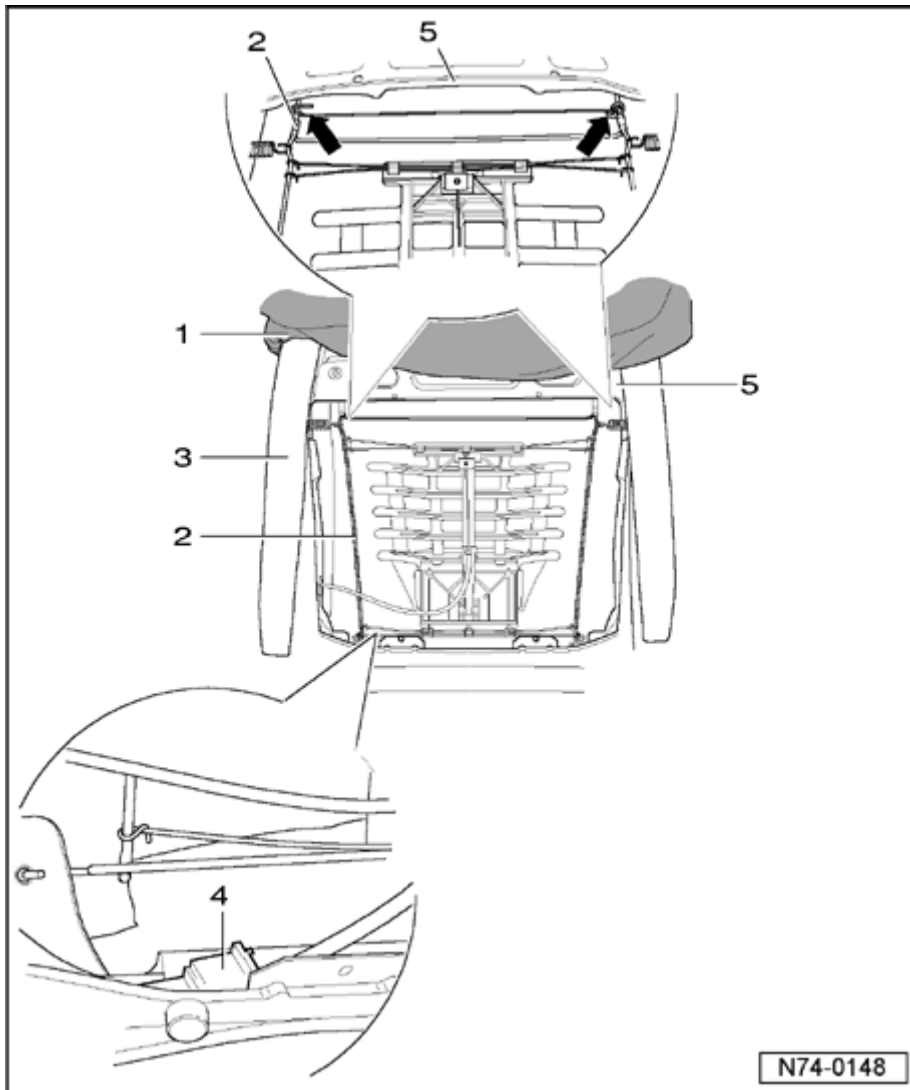
A

- Remove adjusting knob - 1 - .
- Pull up cover - 1 - and remove from tensioning frame - 2 - - **arrows** - .
- Pull cover - 1 - upward over cushion - 3 - and headrest guides.
- Disconnect harness connector - 4 - for backrest heater.
- Remove cushion - 3 - from backrest frame - 5 - .

Note:

n Upholstery - 3 - is secured to lumbar

support - 4 - with Velcro straps.



Installing

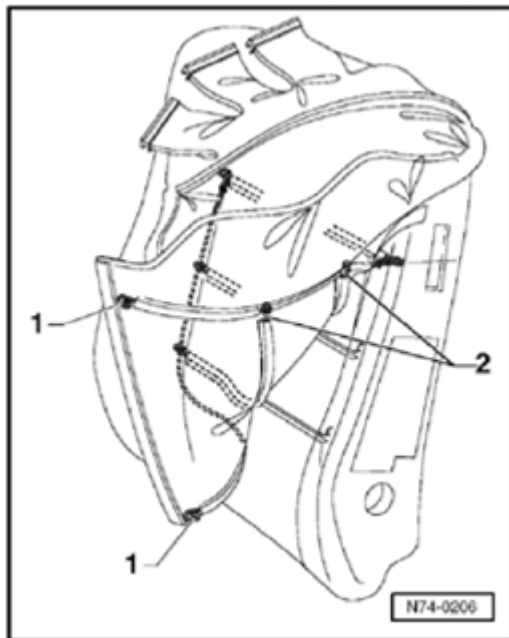
- Installation is reverse of removal.

Note:

- n If new backrest cover is not supplied with two tension wires, se must be determined and replaced.

Caution!

tensioning wires in seat must be replaced on all vehicles installed with side airbags!



- Determine backrest version.
- Determine corresponding tension wire - **1** - according to following table.

Note:

- n If new backrest cover is supplied without upholstery wires - **2** - , use upholstery wires from old backrest cover.*

Overview of tension wires

Backrest version	Part number	Tensioning wire color code
Basis/Comfort without lumbar support	1J0 881 883 A	-
Comfort with lumbar support	1J0 881 883 B	red
Sport without lumbar support	1J0 881 883 C	blue
Sport with lumbar support	1J0 881 883 D	green

Front backrest cover and upholstery, removing and installing (Golf R32)

Note:

- n Removal and installation is described for left front seat. same instructions apply for removal and installation for right front seat.*

Removing

- Switch ignition off.

- Disconnect vehicle battery

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, disconnecting and connecting battery](#)

- Remove front seat ⇒ [72-1, Front seats, removing and installing](#) .

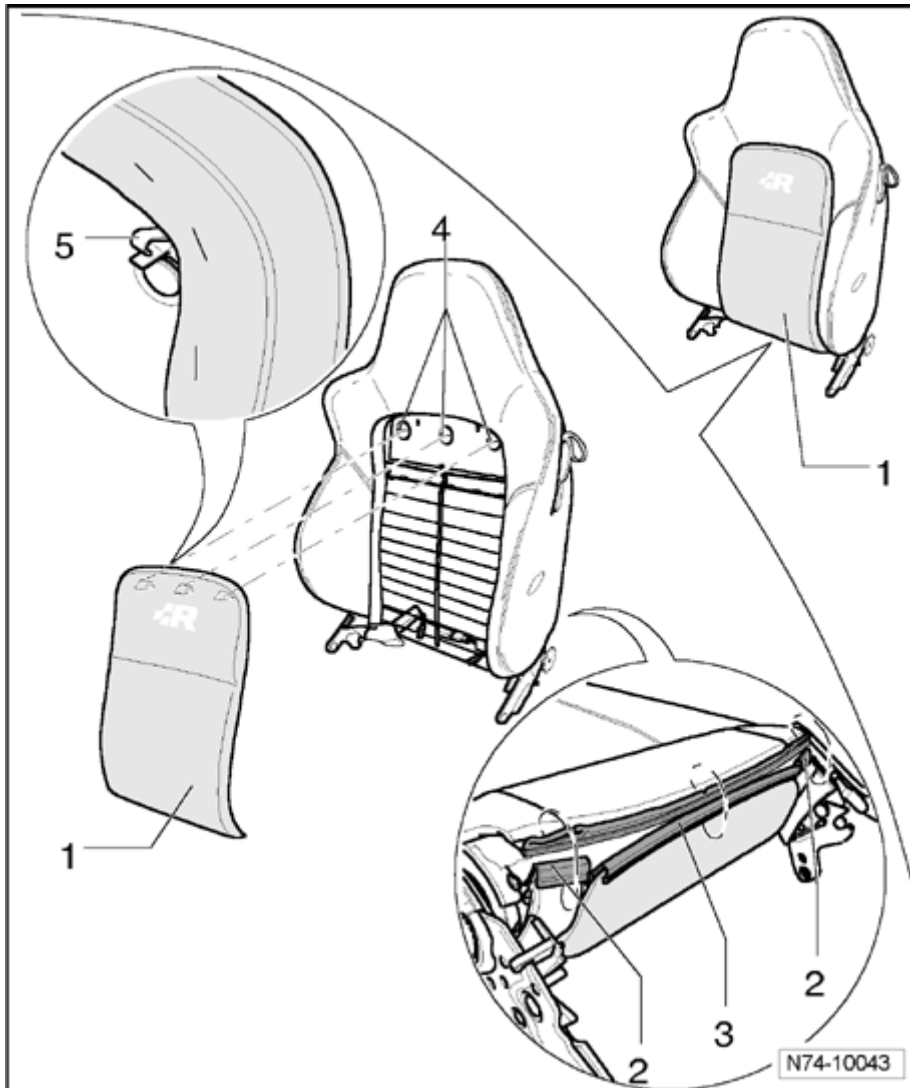
- Remove front backrest ⇒ [72-1, Front backrest, removing and installing](#) .

- Open beading strip - **2** - and - **3** - .

- Pull center part of backrest - **1** - out of three mounts in backrest frame - **4** - and disconnect harness connectors for seat heater.

Note:

- n *After installation, check wher securing clips - **5** - are engaged correctly into mounts - **4** - .*



- Remove operating lever - **3** - .
- Unclip panel - **2** - from backrest.

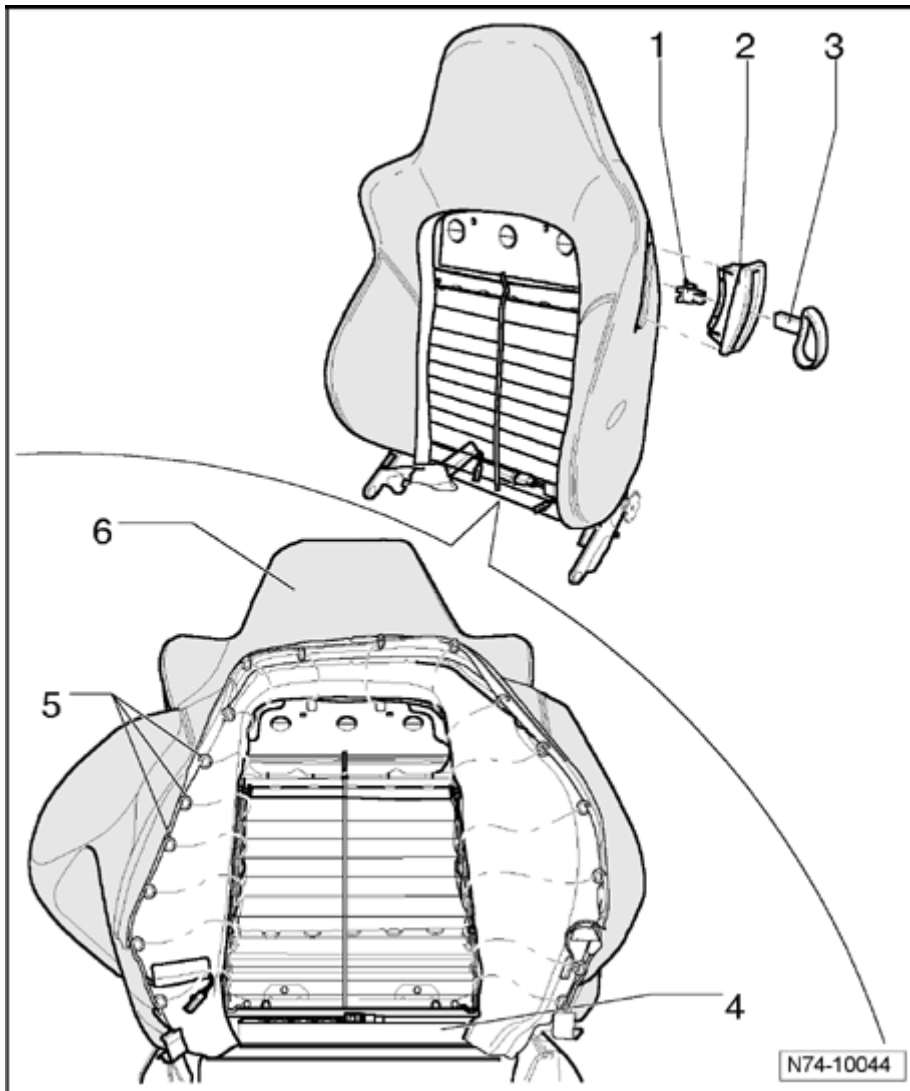
Note:

- n Before installing retaining clips - **1** - and operating lever - **3** - , check for damage and replace if necessary.

- Cut through all cushion clips - **5** - .

Note:

- n Cushion clips are destroyed upon removing, y must be replaced during installation.

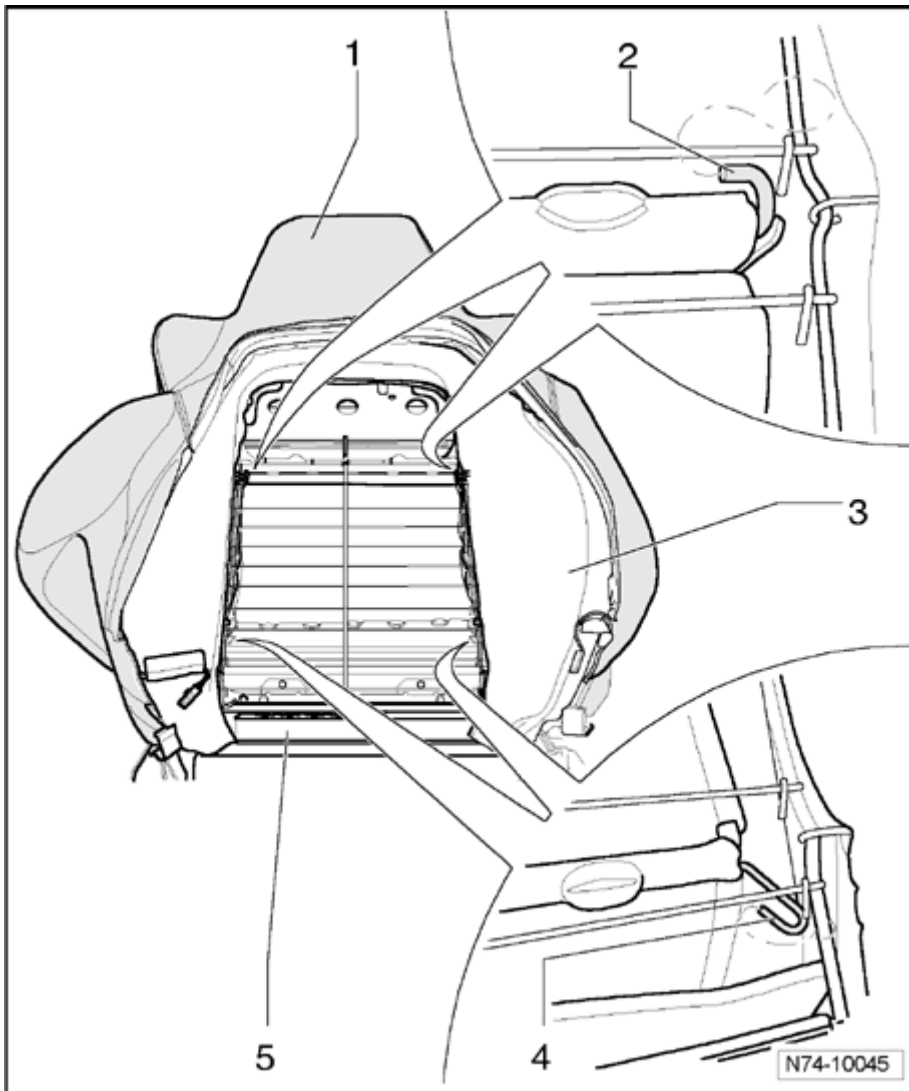


- Roll backrest cover - **6** - all around over backrest cushion until backrest frame - **4** - is accessible.

- Unhook upper tension wire - **2** - at sides.

- Unhook lower tension wire - **4** - at sides.

- Remove backrest cover - **1** - upward from backrest cushion - **3** - .



- Carefully remove backrest cushion upward from backrest frame - **5** - .

Installing

- Installation is reverse of removal.

Seat heating elements

Front seat heating element, removing and installing

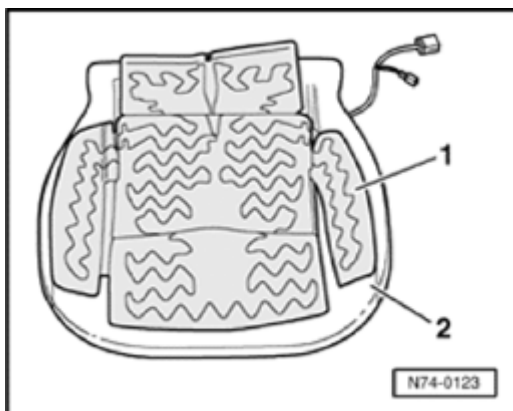
Caution!

Do not install normal seat heater elements (for fabric seat covers) in vehicles with lear seat covers.

re is a danger seat heater may overheat.

Removing

- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .
- Remove backrest ⇒ [72-1, Front backrest, removing and installing](#) .
- Remove seat cover ⇒ [74-1, Front seat cover and upholstery, removing and installing](#) .



- Pull off heating element - 1 - from cushion - 2 - .

Installing

- Installation is reverse of removal.

Front seat backrest heating element, removing and installing

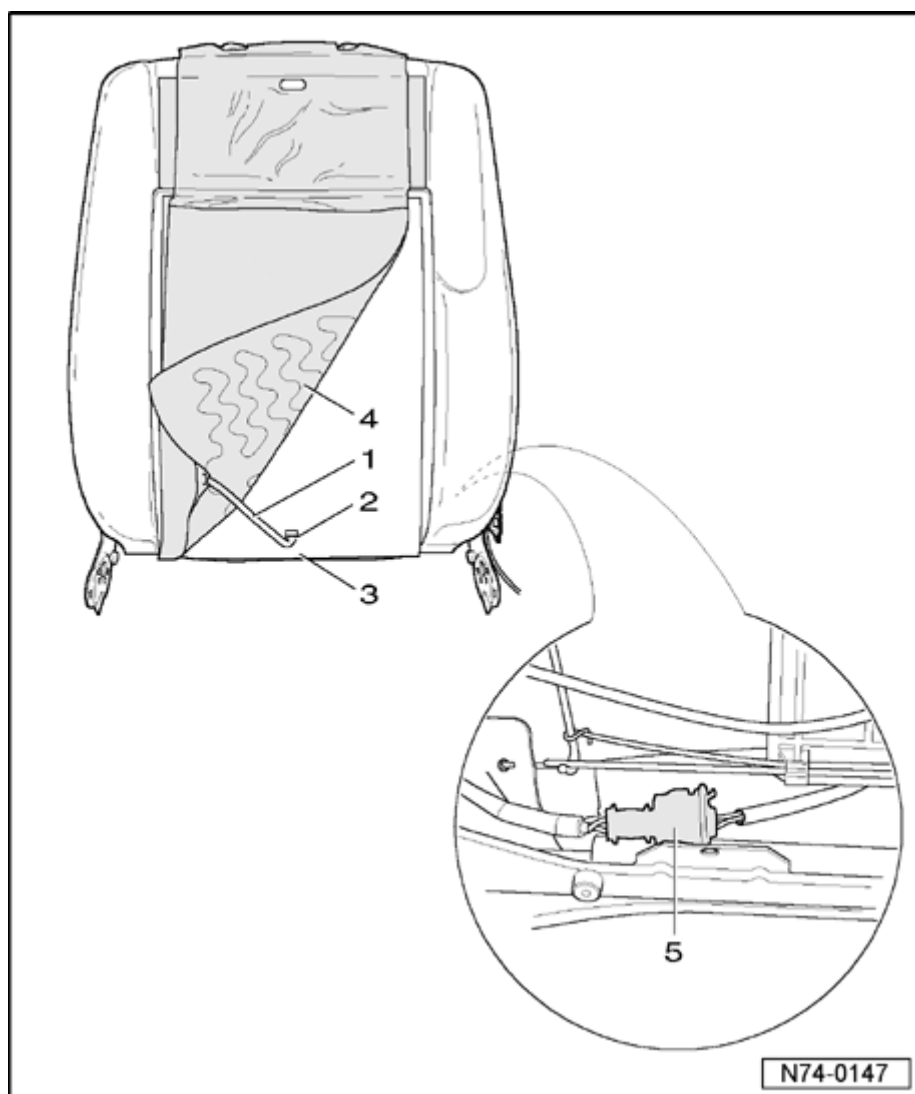
Caution!

Do not install normal seat heater elements (for fabric seat covers) in vehicles with lear seat covers.

re is a danger seat heater may overheat.

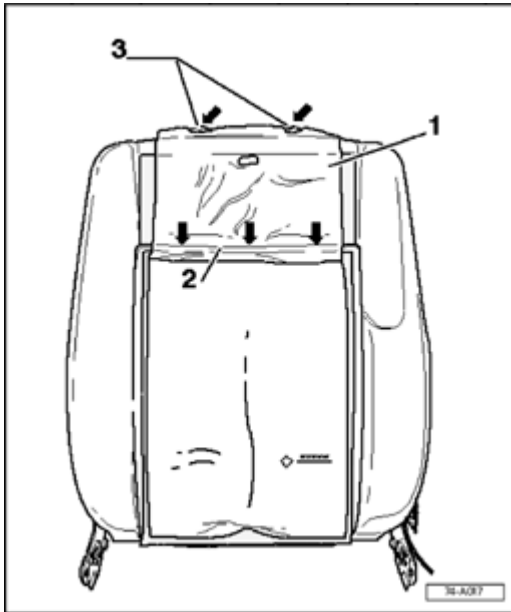
Removing

- Remove seat ⇒ [72-1, Front seats, removing and installing](#) .
- Remove backrest ⇒ [72-1, Front backrest, removing and installing](#) .
- Remove backrest cover ⇒ [74-1, Front backrest cover and upholstery, removing and installing](#) .
- Disconnect harness connector - **5** - .



- Guide cable - **1** - through opening - **2** - in center part of cushion - **3** - and remove heating element - **4** - .

Installing



- Installation is reverse of removal.

Note:

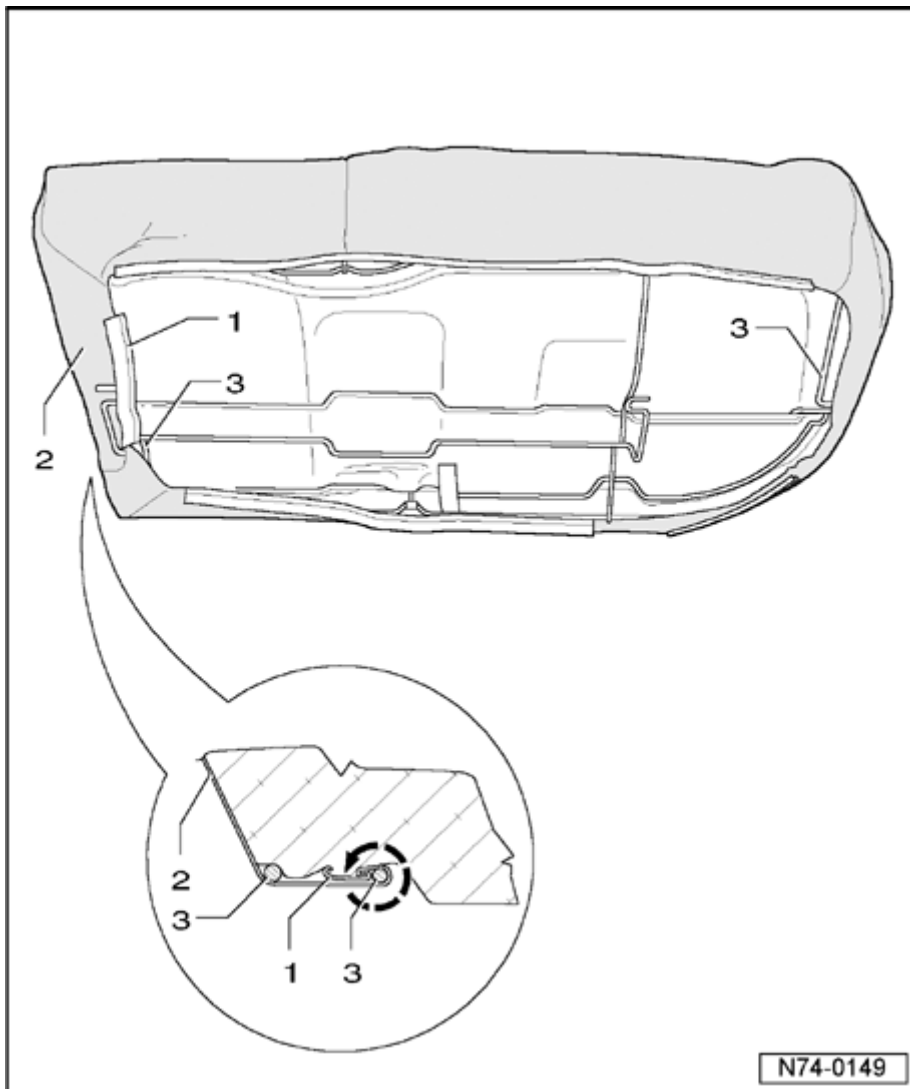
- n *When installing material - 1 - of heater element, it must be connected with backrest cover and backrest frame - 2 - in groove (depression) utilizing two sided tape. heater element must be installed over head rest adjuster guide holes - 3 - and secured with head rest guide.*

Rear seat upholstery and cover

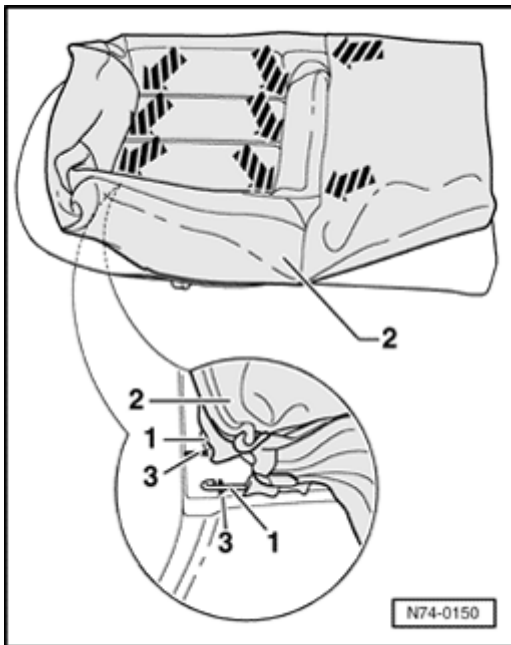
Cover and cushion for seat cushion, removing and installing

Removing

- Remove seat cushion ⇒ [72-2, Seat cushion, removing and installing \(Golf wagon/Jetta wagon\)](#) .



- Release beading - 1 - for cover - 2 - from seat cushion frame - 3 - .



- Release tension wire - 1 - for cover - 2 - from upholstery wire - 3 - .
- Remove cover - 2 - .

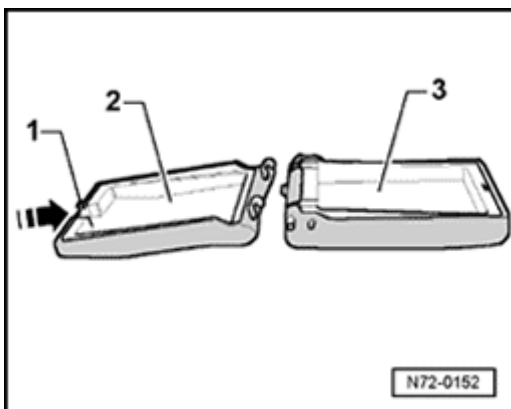
Installing

- Installation is reverse of removal.

Cover, center arm rest, removing and installing

Removing

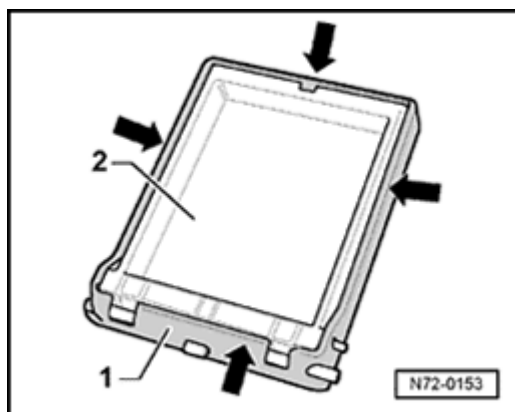
- Remove right backrest ⇒ [72-2, Backrest, removing and installing](#) .
- Remove center arm rest ⇒ [72-2, Center arm rest, removing and installing](#) .



- Press in locking lug - 1 - - **arrow** - and open center

armrest.

- Separate upper part - 2 - from lower part - 3 - .



- Remove cover - 1 - from plastic tray - 2 - .

Installing

- Installation is reverse of removal.

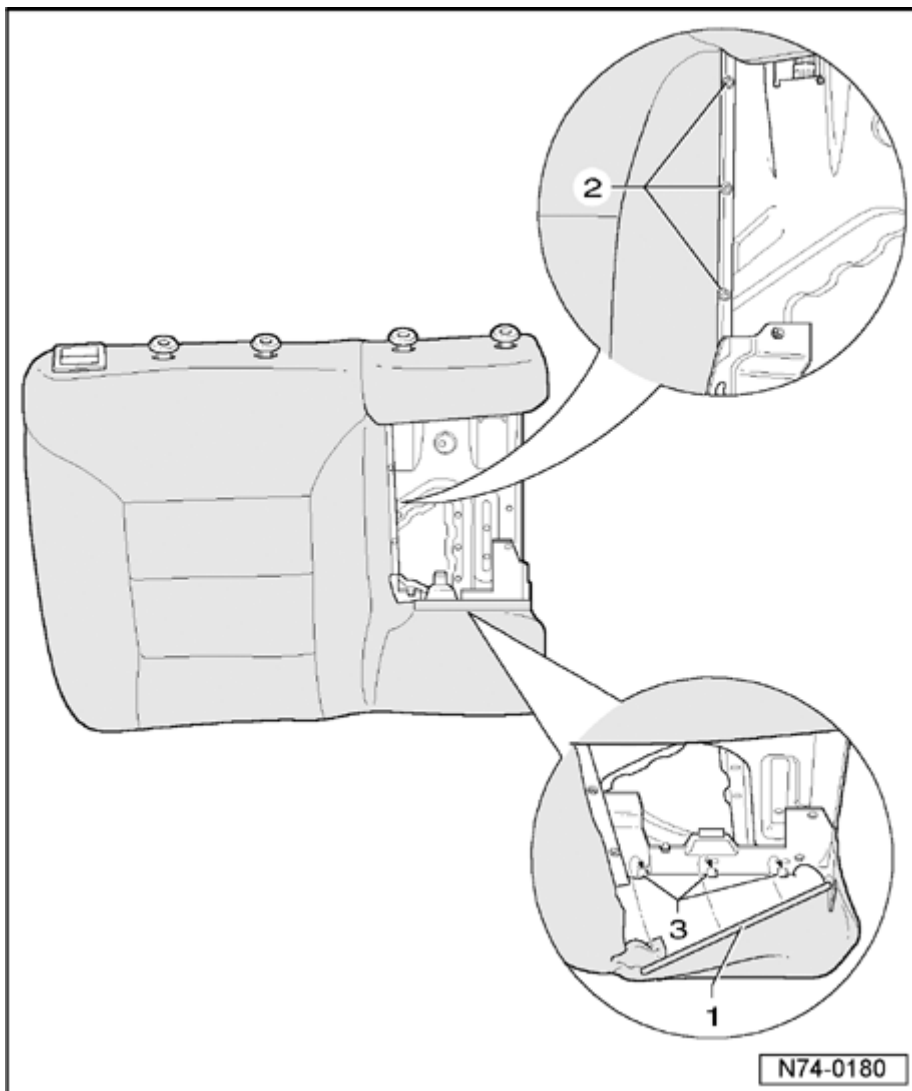
Cover and cushion for backrest, removing and installing

Note:

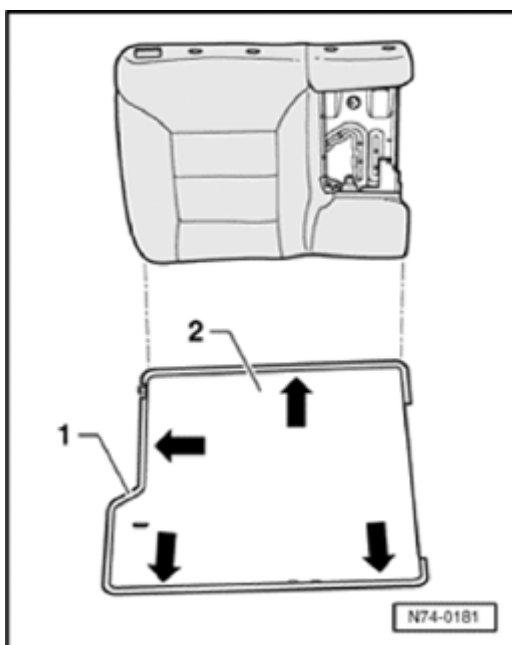
- n *Illustration shows right-hand backrest, left-hand backrest can be removed by modifying se procedures slightly.*

Removing

- Remove headrests.
- Remove right backrest ⇒ [72-2, Backrest, removing and installing](#) .
- Remove center arm rest ⇒ [72-2, Center arm rest, removing and installing](#) .
- Pull out three clips - 2 - .



- Remove beading - 1 - from locking hooks - 3 - .

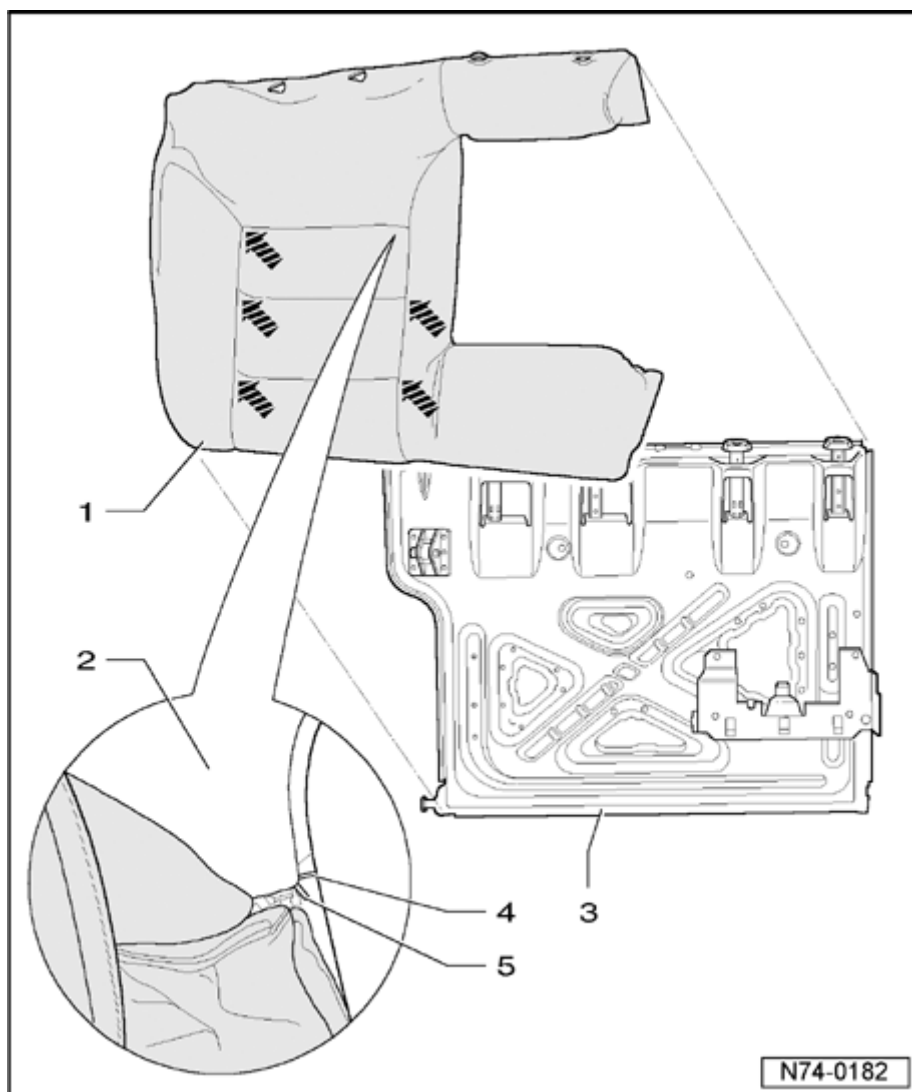


A

- Pull up cover - **1** - all around and remove from backrest frame - **2** - - **arrows** - .

- Remove cover - **1** - and cushion - **2** - from backrest frame - **3** - .

- Separate tension wire - **4** - and upholstery wire - **5** - - **arrows** - .



- Remove cover - **1** - from cushion - **2** - .

Installing

- Installation is reverse of removal.

Select a topic

01 - On Board Diagnostic (OBD)

[On Board Diagnostic \(OBD\)](#)

[Tools](#)

[Scan tool, connecting](#)

[Airbag system, On Board Diagnostic \(OBD\)](#)

[Function](#)

[Control Module Version, checking](#)

[Airbag Control Module, coding using V.A.G 1551 scan tool](#)

[Check DTC Memory](#)

[Erase DTC memory](#)

[End output](#)

[Diagnostic Trouble Code \(DTC\) table](#)

[Read Measuring Value Block](#)

[VAS 5056B test box](#)

[Output Diagnostic Test Mode \(DTM\)](#)

[Convenience system \(vehicles with power windows\), On Board Diagnostic \(OBD\)](#)

[Functional description](#)

[Determining which source has possibly triggered the anti-theft alarm](#)

[Interior monitoring system, description](#)

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[Convenience system, initiating On Board Diagnostic \(OBD\)](#)

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[Convenience System Control Module, coding](#)

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[End Output](#)

[DTC tables, vehicles through 05.01](#)

[Output Diagnostic Test Mode \(DTM\), vehicles through 05.01](#)

[Read measuring value block, vehicles through 05.01](#)

[Display group overview, vehicles through 05.01](#)

[DTC tables, vehicles from 06.01 on](#)

[Output Diagnostic Test Mode \(DTM\), vehicles from 06.01 on](#)

[Read measuring value block, vehicles from 06.01 on](#)

[Display group overview, vehicles from 06.01 on](#)

[Adaptation](#)

[New additional key, matching](#)

[Radio wave remote control function variations, vehicles through 05.98](#)

[Radio wave remote control functional variations, vehicles from 06.98 on](#)

[Batteries for the main key with radio wave remote control, removing and installing](#)

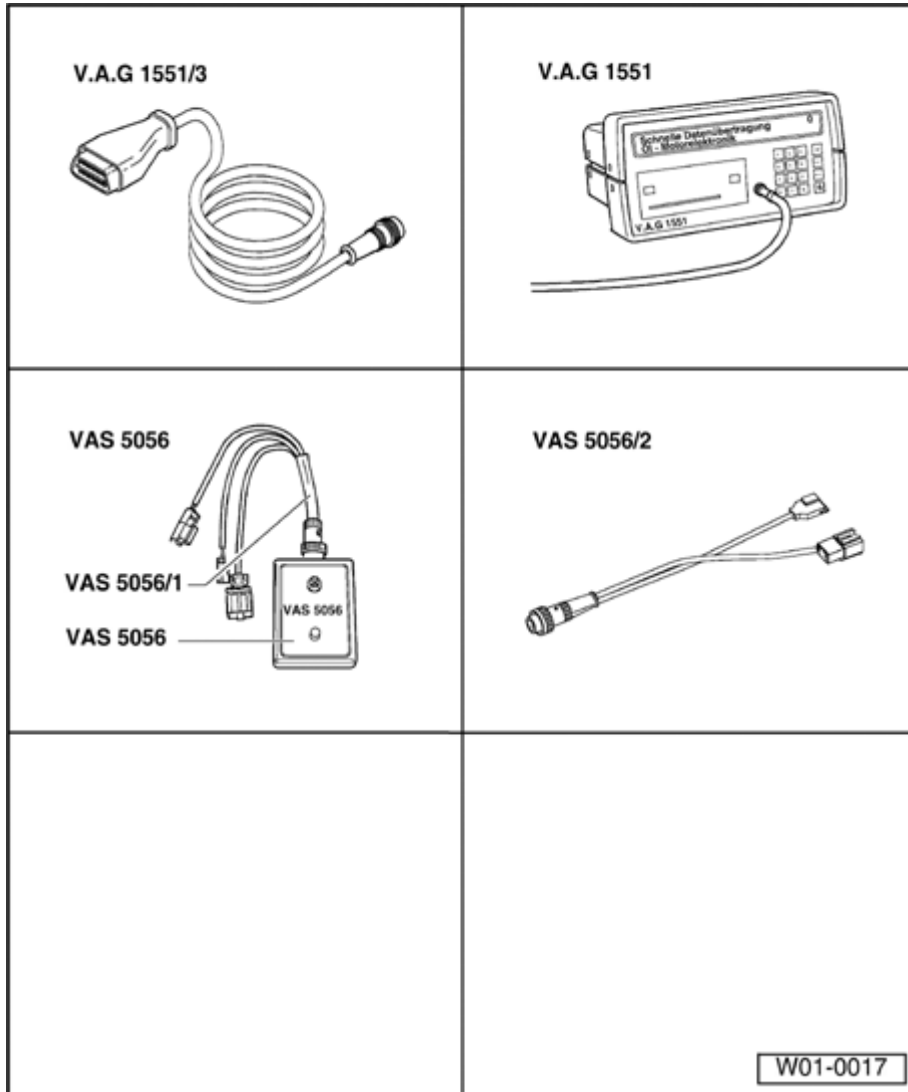
[Batteries for the main key \(folding\) with radio wave remote control, removing and installing](#)

[Central locking system \(vehicles without power windows\), On Board Diagnostic \(OBD\)](#)

[Functional description](#)
[System active indicator](#)
[Convenience system, initiating On Board Diagnostic \(OBD\)](#)
[Selectable functions, overview](#)
[Check Control Module Version](#)
[Central locking control module, coding](#)
[Check DTC Memory](#)
[Erase DTC memory](#)
[End Output](#)
[DTC table](#)
[Output Diagnostic Test Mode \(DTM\)](#)
[Read Measuring Value Block](#)
[Display group overview](#)
[Adaptation - function 10](#)
[Radio wave remote control functional variants](#)
[Batteries for the main key with radio wave remote control, removing and installing](#)

[Driver's side seat adjustment, On Board Diagnostic \(OBD\)](#)

[Seat adjustment, functional description](#)
[On Board Diagnostic \(OBD\), functional description](#)
[Memory system, initializing](#)
[Seat and mirror settings for normal driving, storing](#)
[Mirror setting for reversing, storing](#)
[Allocating radio wave remote control key to memory buttons](#)
[Seat and mirror settings for normal driving, activating](#)
[Mirror setting for reversing, activating](#)
[Seat adjustment, initiating On Board Diagnostic \(OBD\)](#)
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[DTC table](#)
[Read Measuring Value Block](#)
[Display group overview](#)

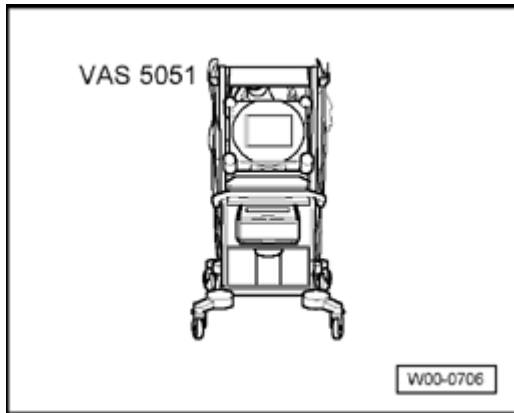


On Board Diagnostic (OBD)

Tools

Special tools, workshop equipment, test and measuring appliances and aux. items required

- ◆ V.A.G 1551/3 Cable
- ◆ V.A.G 1551 Scan tool
- ◆ VAS 5056B Test box (not VAS 5056 as shown)
- ◆ VAS 5056/3 Adapter cable (not VAS 5056/2 as shown)



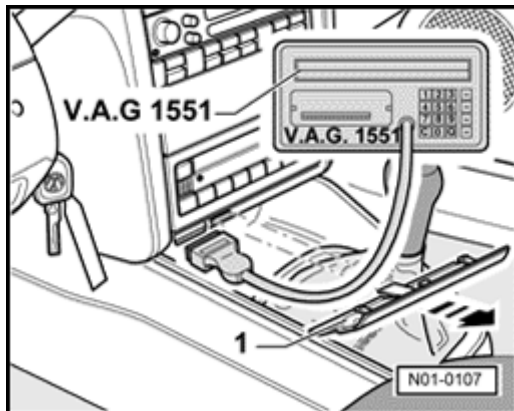
◆ Scan Tool VAS 5051

Scan tool, connecting

All functions, which were previously performed with the V.A.G 1551 or V.A.G 1552, can also be performed with the new Scan Tool VAS 5051 in the operating mode -vehicle On Board Diagnostic (OBD).

Check prerequisites:

- ◆ All fuses according to wiring diagram OK.
- ◆ Battery voltage at least 9 V.



- ✦ - Connect V.A.G 1551 Scan tool with V.A.G 1551/3 cable.

Indicated on display:

- ◆ Display will show the actual software version installed (will be shown briefly in display)

V.A.G 1551 -GB/7.0-

1.01.1997

Note:

- ◆ *If the display remains blank, check V.A.G 1551 voltage supply*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- ◆ *Additional operating instructions can be obtained by pressing the V.A.G 1551 Scan Tool (ST) HELP button.*
- ◆ *The → button is used to advance through the program sequence.*
- ◆ *The PRINT button is used for switching on the printer (warning lamp in button lights up).*

and then the following appears in the display:

Rapid data transfer
Enter address word XX

HELP



Indicated on display:

Note:

With the address word 00 the automatic test sequence is carried out, i.e. the DTC memories of all systems in the vehicle capable of On Board Diagnostic (OBD) are checked via the rapid data transfer.

Airbag system, On Board Diagnostic (OBD)

Function

The Airbag Control Module -J234- is located behind the console on the tunnel. It is equipped with a DTC memory. The On Board Diagnostic (OBD) connection is located under the driver's knee bar to left of the steering wheel.

The control module detects malfunctions in the airbag system and stores them in a permanent memory.

Malfunctions which can be attributed to a temporary open circuit in the wiring or a loose contact, will also be stored. These malfunctions will be displayed as sporadic DTCs "SP".

After the ignition is switched on, the Airbag Malfunction Indicator Lamp (MIL) -K75- comes on for about 4 seconds and then goes out again. If the lamp then flashes for a further 15 seconds this signals that the airbags or the belt tensioners are electronically blocked.

- ◆ If the warning lamp -K75- does not go out again after about 4 seconds, then the voltage supply to the Airbag Control Module -J234- is malfunctioning. Check DTC memory ⇒ [Page 01-30](#) .
- ◆ A malfunction is present if the warning lamp -K75- lights up again. Check DTC memory ⇒ [Page 01-30](#) .
- ◆ If the warning lamp -K75- flashes continuously then the control module -J234- must be replaced.

To commence troubleshooting, initiate self-diagnosis and retrieve the stored information with the V.A.G 1551 scan tool.

The malfunction information displayed is used to refer to a DTC table with notes on the possible causes for directed repair measures.

WARNING!

- ◆ **Only visual check of wiring!**
- ◆ **Do not carry out electrical continuity tests or measurements to igniter circuits!**
- ◆ **Only check wiring with ignition switched off!**

Introducing On Board Diagnostic (OBD) for airbag

- Connecting scan tool ⇒ [Page 01-3](#) .
- Switch on printer with Print button (warning lamp in button lights up).
- Switch on ignition.

Rapid data transfer
Enter address word XX

HELP ↩

Indicated on display:

- Press buttons -1- and -5- (the address word of the vehicle system to be tested "Airbag" is entered with 15).

Rapid data transfer
15 Airbag

Q ↩

Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer
Select function XX

HELP ↩

Indicated on display:

Note:

Rapid data transfer
control module does not answer!

HELP ↩

- ◆ *If one of the malfunction messages opposite appears in the display, the possible causes of the malfunction can be printed out with the HELP button.*

Rapid data transfer
K wire not switching to B+!

HELP ↩

- ◆ *Ignition must be switched on.*

Rapid data transfer
No signal from control module!

→ ↩

- ◆ *Malfunctions have occurred at the start of or during the program (external interference?).*

Rapid data transfer →
Fault in communication build up

Note:

◆ Check diagnosis wires as well as voltage supply and Ground connection.

- After repairing the possible causes of the fault, once again enter the address word 15 for "Airbag" by pressing -1- and -5- buttons and confirm with the -Q- button.

Rapid data transfer
Tester sends the address word 15

Indicated in display after entering the address word 15:

and then the following appears in the display:

1J0 909 608 D AIRBAG VW 3-S V03 →
Coding 00068 WSC12345

Indicated on display (see parts catalog for latest control module version).

- Press → button.

Rapid data transfer HELP
Select function XX

Indicated on display:

List of selectable functions

	page
01 - Check Control Module Version	⇒ Page 01-10
02 - Check DTC Memory	⇒ Page 01-30
03 - Output Diagnostic Test Mode	⇒ Page 01-87
05 - Erase DTC memory	⇒ Page 01-32
06 - End Output	⇒ Page 01-33
07 - Code Control Module	⇒ Page 01-13
08 - Read Measuring Value Block	⇒ Page 01-69

Note:

- ◆ *A list of possible functions is printed out after pressing the HELP button.*
- ◆ *Do not select further functions, which can be printed out after pressing the HELP button.*
- ◆ *After the function is completed the V.A.G 1551 returns to the following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display:

Control Module Version, checking

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-7](#) .
- Switch on printer with Print button (warning lamp in button lights up).
- Press buttons -0- and -1-.

Rapid data transfer

Q



Indicated on display:

01-Check Control Module Version

- Confirm entry with the -Q- button.

01-11

1J0 909 609 A AIRBAG VW 3 SG V03 →
Coding 00068 WSC12345

Control module VW3 (example)

← Indicated on display (see parts catalog for latest control module version).

Top line

- ◆ 1J0 909 609 A = Control module Part No.
- ◆ Airbag VW3 = System designation
- ◆ S = Side airbag, G = Elect. belt tensioner
- ◆ V03 = software version number

Lower line

- ◆ Coding XXXXX = Coding variants
- ◆ WSC XXXXX = Dealership number (Will be automatically stored in the control module when entering the system)

- Press → button.

Rapid data transfer HELP
Enter address word XX

← Indicated on display:

6Q0909605 A 0F AIRBAG VW5 02 0004 →
Coding 12358 WSC12345

Control module VW5 (example)

← Indicated on display (see parts catalog for latest control module version).

Top line

- ◆ 6Q0909605 A = Control module Part No.
- ◆ 0F = Index
- ◆ Airbag VW5 = System designation
- ◆ 02 = version number crash sensor
- ◆ 0004 = software version number

Lower line

- ◆ Coding XXXXX = Coding variants
- ◆ WSC XXXXX = Dealership number (Will be automatically stored in the control module when entering the system)

- Press → button.

Rapid data transfer HELP
Enter address word XX

← Indicated on display:

Airbag Control Module, coding using V.A.G 1551 scan tool

Coding is only possible when a new control module is used.

- Connecting scan tool ⇒ [Page 01-3](#) , initiating O Board Diagnostic (OBD) ⇒ [Page 01-7](#) .
- Switch on printer with Print button (warning lamp in button lights up).

The Airbag Malfunction Indicator Lamp (MIL) - K75- lights up continuously.

- Press buttons -1- and -5- (the address word of the vehicle system to be tested "Airbag" is entered with 15).

Rapid data transfer
15 Airbag

Q



Indicated on display:

- Confirm entry with the -Q- button.

6Q0 909 605 A AIRBAG VW 3-OM V03 →
Coding 00000 WSC 00066



Indicated on display (see parts catalog for latest control module version):

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -7- (with 07 the function "Code control module" is selected).

Rapid data transfer
07 Code control module

Q



Indicated on display:

- Confirm entry with the -Q- button.

01-14

Code control module

Enter code number XXXXX (0-32000)



Indicated on display:

- Enter code number according to table:

Vehicle equipment	Part No.	Index	Code number
Only driver's airbag	1J0 909 603	AP	16720
Only driver's airbag	6Q0 909 601	0B	12354
Driver's/passenger's airbag	1J0 909 603	AN	16718
Driver's/passenger's airbag	6Q0 909 601	0C	12355
Driver's/passenger's airbag	6Q0 909 601	12	12594
Driver's/passenger's airbag USA	6Q0 909 601	0D	12356
Driver's/passenger's airbag USA	1J0 909 603	J	00074
Driver's/passenger's airbag USA (Mexico production)	6Q0 909 601	0M	12365
Driver's/passenger's airbag	6Q0 909 601	1F	12614
Driver's/passenger's airbag USA	6Q0 909 601	1G	12615
Driver's/passenger's airbag USA (Brazil production)	6Q0 909 601	1H	12616
Driver's/passenger's airbag with seat belt detection for switch-over activation limit	6Q0 909 601	1J	12618

01-15

Vehicle equipment	Part No.	Index	Code number
Driver's/passenger's airbag USA	6Q0 909 601	1K	12619
Driver's/passenger's airbag with seat belt detection for switch-over activation limit USA (Brazil production)	6Q0 909 601	1L	12620
Driver's/passenger's airbag	6Q0 909 601	21	12849
Driver's/passenger's airbag USA	6Q0 909 601	22	12850
Driver's/passenger's airbag USA	6Q0 909 601	23	12851
Driver's/passenger's airbag USA (Brazil production)	6Q0 909 601	13	12595
Driver's/ and side airbags	1J0 909 608	AS	16723
Driver's/passenger's and side airbags	1J0 909 608	AR	16722
Driver's/ and side airbags + electr. belt tensioner	1J0 909 609	B	00066
Driver's/ and side airbags + electr. belt tensioner USA	1J0 909 609	C	00067
Driver's/ and side airbags + electr. belt tensioner	6Q0 909 605 A	01	12337

01-16

Vehicle equipment	Part No.	Index	Code number
Driver's/passenger's and side airbags + electr. belt tensioner	6Q0 909 605 A	2B	12866
Driver's/ and side airbags + electr. belt tensioner	6Q0 909 605 A	0E	12357
Driver's/ and side airbags + electr. belt tensioner (Brazil production)	6Q0 909 605 A	2D	12868
Driver's/ passenger's/ and side airbags + electr. belt tensioner	6Q0 909 605 A	2E	12869
Driver's/ passenger's/ and side airbags + electr. belt tensioner	1J0 909 609	A	00065
Driver's/ passenger's/ and side airbags + electr. belt tensioner	6Q0 909 605 A	02	12338
Driver's/ passenger's/ and side airbags + electr. belt tensioner	6Q0 909 605 A	0F	12358
Driver's/ passenger's airbag, side airbags + electr. belt tensioner with seat belt detection for switch-over activation limit	6Q0 909 605 A	0G	12359

01-17

Vehicle equipment	Part No.	Index	Code number
Driver's/ passenger's/ and side airbags + electr. belt tensioner	6Q0 909 605 A	0T	12372
Driver's/ passenger's/ and side airbags + electr. belt tensioner (Brazil production)	6Q0 909 605 A	13	12595
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA	6Q0 909 605 A	03	12339
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA (Mexico production)	6Q0 909 605 A	09	12345
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA (Brazil production)	6Q0 909 605 A	11	12593
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA	6Q0 909 605 A	12	12594

01-18

Vehicle equipment	Part No.	Index	Code number
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA (Brazil production)	6Q0 909 605 A	14	12596
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA	6Q0 909 605 A	21	12849
Driver's/ passenger's airbag, side airbags + electr. belt tensioner (Brazil production)	6Q0 909 605 A	22	12850
Driver's/ passenger's airbag, side airbags + electr. belt tensioner	6Q0 909 605 A	23	12851
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA (Mexico production)	6Q0 909 605 A	15	12597
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA (Brazil production) with seat belt detection for switch-over activation limit	6Q0 909 605 A	UM	21837

01-19

Vehicle equipment	Part No.	Index	Code number
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA (Mexico production) with seat belt detection for switch-over activation limit	6Q0 909 605 A	UN	21838
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA (Mexico production) with seat belt detection for switch-over activation limit	6Q0 909 605 A	1N	12622
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA	6Q0 909 605 A	0M	12345
Driver's/ passenger's airbag, side airbags + electr. belt tensioner USA (Brazil production) with seat belt detection for switch-over activation limit	6Q0 909 605 A	1M	12621
Driver's/ side / side curtain airbags + electr. belt tensioner	6Q0 909 605 F	01	12337

01-20

Vehicle equipment	Part No.	Index	Code number
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner	6Q0 909 605 F	02	12338
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner	6Q0 909 605 F	X1	12337
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner USA	6Q0 909 605 F	X4	22580
Driver's/ passenger's airbag, side and side curtain airbags + electr. belt tensioner USA with seat belt detection for switch-over activation limit	6Q0 909 605 F	Y3	22835
Driver's/ passenger's airbag, side and side curtain airbags + electr. belt tensioner USA with seat belt detection for switch-over activation limit	6Q0 909 605 F	Y4	22836

01-21

Vehicle equipment	Part No.	Index	Code number
Driver's/passenger's airbag, side and side curtain airbags	6Q0 909 608	AT	16724
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner	6Q0 909 605 F	02	12338
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner USA	6Q0 909 605 F	03	12339
Driver's/passenger's airbag, side and side curtain airbags + electr. belt tensioner USA with seat belt detection for switch-over activation limit (Mexico production)	6Q0 909 605 F	04	12340
Driver's/passenger's airbag, side and side curtain airbags + electr. belt tensioner USA (Mexico production)	6Q0 909 605 F	05	12341
Driver's/passenger's airbag, side and side curtain airbags + electr. belt tensioner USA	6Q0 909 605 F	06	12342

01-22

Vehicle equipment	Part No.	Index	Code number
Driver's/passenger's airbag, side and side curtain airbags + electr. belt tensioner USA (Brazil production)	6Q0 909 605 F	07	12343
Driver's/ passenger's airbag, side and side curtain airbags + electr. belt tensioner with seat belt detection for switch-over activation limit USA (Brazil production)	6Q0 909 605 F	08	12344
Driver's/ passenger's airbag, side and side curtain airbags + electr. belt tensioner USA (Mexico production)	6Q0 909 605 F	09	12345
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner	6Q0 909 605 F	0A	12353
Driver's/passenger's airbag, side and side curtain airbags + electr. belt tensioner USA (Brazil production)	6Q0 909 605 F	0B	12354
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner	6Q0 909 605 F	21	12849

01-23

Vehicle equipment	Part No.	Index	Code number
Driver's/ passenger's airbag, side airbags + electr. belt tensioner (Brazil production)	6Q0 909 605 A	22	12850
Driver's/ passenger's airbag, side airbags + electr. belt tensioner	6Q0 909 605 A	23	12851
Driver's/passenger's airbag	1C0 909 601	1F	12614
Driver's/passenger's airbag (Mexico production)	1C0 909 601	1G	12615
Driver's/passenger's airbag (Brazil production)	1C0 909 601	1H	12616
Driver's/passenger's airbag	1C0 909 601	1J	12618
Driver's/passenger's airbag with seat belt detection for switch-over activation limit USA (Mexico production)	1C0 909 601	1K	12619
Driver's/passenger's airbag with seat belt detection for switch-over activation limit USA (Brazil production)	1C0 909 601	1L	12620
Driver's/passenger's airbag	1C0 909 601	21	12849

01-24

Vehicle equipment	Part No.	Index	Code number
Driver's/passenger's airbag (Brazil production)	1C0 909 601	22	12850
Driver's/passenger's airbag	1C0 909 601	23	12851
Driver's/ passenger's/ side airbags + electr. belt tensioner	1C0 909 605 A	12	12549
Driver's/ passenger's/ side airbags + electr. belt tensioner (Brazil production)	1C0 909 605 A	14	12596
Driver's/ passenger's/ side airbags + electr. belt tensioner (Mexico production)	1C0 909 605 A	15	12597
Driver's/ passenger's/ side airbags + electr. belt tensioner with seat belt detection for switch-over activation limit USA (Brazil production)	1C0 909 605 A	1M	12621

01-25

Vehicle equipment	Part No.	Index	Code number
Driver's/ passenger's/ side airbags + electr. belt tensioner with seat belt detection for switch-over activation limit USA (Mexico production)	1C0 909 605 A	1N	12622
Driver's/ passenger's/ side airbags + electr. belt tensioner with seat belt detection for switch-over activation limit	1C0 909 605 A	0G	12359
Driver's/ passenger's/ side airbags + electr. belt tensioner	1C0 909 605 A	21	12849
Driver's/ passenger's/ side airbags + electr. belt tensioner (Brazil production)	1C0 909 605 A	22	12850
Driver's/ passenger's/ side airbags + electr. belt tensioner (Mexico production)	1C0 909 605 A	23	12851

01-26

Vehicle equipment	Part No.	Index	Code number
Driver's/ passenger's/ side airbags + electr. belt tensioner	1C0 909 605 A	2B	12866
Driver's/ passenger's/ side airbags + electr. belt tensioner (Brazil production)	1C0 909 605 A	2D	12868
Driver's/ passenger's/ side airbags + electr. belt tensioner (Mexico production)	1C0 909 605 A	2E	12869
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner	1C0 909 605 F	0A	12353
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner (Brazil production)	1C0 909 605 F	0B	12354
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner with seat belt detection for switch- over activation limit	1C0 909 605 F	03	12339

01-27

Vehicle equipment	Part No.	Index	Code number
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner with seat belt detection for switch- over activation limit (Mexico production)	1C0 909 605 F	04	12340
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner (Mexico production)	1C0 909 605 F	05	12341
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner	1C0 909 605 F	06	12342
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner (Brazil production)	1C0 909 605 F	07	12343

01-28

Vehicle equipment	Part No.	Index	Code number
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner with seat belt detection for switch-over activation limit (Brazil production)	1C0 909 605 F	08	12344
Driver's/ passenger's/ side and side curtain airbags + electr. belt tensioner (Mexico production)	1C0 909 605 F	09	12345

- Confirm entry with the -Q- button.

6Q0 909 605 A AIRBAG VW 3-OM V03 →
Coding 12345 WSC 00066



The control module identification number with the relevant letter index, code number and workshop code is displayed.

If the contents of the display are as shown then the coding is successful.

01-29

FAULT**Coding 00200 not accepted**

If the control module code number entered is not accepted, then the "FAULT" and the "code xxxxx not accepted" will be displayed, e.g. 00200:

Indicated on display:

In this case the control module has not been programmed with the relevant data for the vehicle. Coding is then not possible. The Airbag Malfunction Indicator Lamp (MIL) -K75- will not extinguish and lights up continuously. A check must then be completed to see if the correct control module for the vehicle has been installed (compare Part No. and letter index), or whether an incorrect code number has been entered.

End output:

- Press → button.

Rapid data transfer**HELP****Select function XX**

Indicated on display:

- Press buttons -0- and -6- to end the output.

- Confirm entry with the -Q- button.

Rapid data transfer**Q****06 End output**

Indicated on display:

Airbag Malfunction Indicator Lamp (MIL) -K75- must go out after approx. 4 seconds.

Check DTC Memory

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-7](#) .
- Switch on printer with Print button (warning lamp in button lights up).
- Press buttons -0- and -2- (the function "Check DTC memory" is entered with 02).

Rapid data transfer
02 - Check DTC memory

q ◀

Indicated on display:

- Press "Print" button.
- Confirm entry with the -Q- button.

X DTCs recognized!

◀

The number of stored malfunctions appears in the display.

The stored malfunctions are displayed and printed out one after the other.

- Enter DTC table at malfunction printed out and repair.

No DTC recognized!

→ ◀

If "No DTC recognized" is displayed, the program will return to the initial position after pressing the → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

If something else is displayed:

⇒ *Scan tool operating instructions*

- End output (function 06) ⇒ [Page 01-33](#) .
- Switch off ignition and separate diagnostic connections.

Note:

If a DTC is recognized:

- ◆ **1 . Repair malfunction**
- ◆ *2. Erase DTC memory (function 05).*
- ◆ *3. Check DTC memory again (function 02).*

Erase DTC memory

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-7](#) .
- Switch on printer with Print button (warning lamp in button lights up).

Prerequisites:

- ◆ DTCs are repaired
- ◆ DTC memory checked again
- Press buttons -0- and -5- (the function "Erase DTC memory" is entered with 05).

Rapid data transfer
05 Erase DTC memory

Q ←

Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer
DTC memory is erased!

→ ←

Indicated on display:

- Press → button.

Rapid data transfer
Select function XX

HELP ←

Indicated on display:

Note:

WARNING!
DTC memory was checked not

←

- ◆ *If this appears in the display, the test sequence is faulty.*
- ◆ *Adhere strictly to test sequence; first of all check DTC memory, then erase memory.*

End output

- Press buttons -0- and -6- to end the output.

Rapid data transfer

Q



Indicated on display:

06 End output

- Confirm entry with the -Q- button.

Rapid data transfer

HELP



Indicated on display:

Enter address word XX

- Switch off ignition.
- Disconnect connector to V.A.G 1551 scan tool.

Diagnostic Trouble Code (DTC) table

Note:

- ◆ *The following table lists all the malfunctions, with the corresponding 5-digit code numbers, that can be recognized by the Airbag Control Module -J234- and printed out by the V.A.G 1551.*
- ◆ *The most current coding for airbags can only be found using the VAS 5051. To get the control module coding list through Guided Fault Finding press the "Go to" button, and select "Function/Component selection". Follow the prompts through to Functions - Code Airbag Control Module..*
- ◆ *DTC's appear only on print-out.*
- ◆ *Some of the mentioned DTC texts are only displayed on the VAS 5051. On the V.A.G 1551, only the DTC will be printed in this case.*
- ◆ *The possible malfunctions are dependant on the respective vehicle equipment.*
- ◆ *Before replacing a component shown as malfunctioning, check wiring and connections to the component as well as Ground connections according to wiring diagram.*
- ◆ *Check all relay plate connections are seated securely.*
- ◆ *After completing repairs, the DTC memory must always be re-checked and erased using the V.A.G 1551 scan tool.*
- ◆ *In addition, the malfunction type may also appear in the DTC table.*

V.A.G 1551 display	Possible cause	Corrective action
00000 No DTC recognized	If "No DTC recognized" appears after performing repairs, the On Board Diagnostic (OBD) is ended.	

01-35

V.A.G 1551 display	Possible cause	Corrective action
00532 Supply voltage Signal too large Signal too small	Alternator malfunctioning Wiring or connections to Airbag Control Module -J234- Battery discharged or malfunctioning	- Test alternator ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations</i> - Test wiring and connections to control module using wiring diagram - Charge or replace battery

01-36

V.A.G 1551 display	Possible cause	Corrective action
00588 Airbag igniter - driver's side -N95- Resistance too high Resistance too low Short to B+ Short to Ground	Faulty wiring or connections Driver's airbag -N95- malfunctioning Coil connector with slip ring - F138- malfunctioning	- Replace faulty wiring or connections - Replace driver's airbag - N95- - Replace coil connector with slip ring - Read Measuring Value Block ⇒ Page 01-69

01-37

V.A.G 1551 display	Possible cause	Corrective action
00589 Airbag igniter 1 - passenger's side -N131- Resistance too high Resistance too low Short to B+ Short to Ground	Faulty wiring or connections Front passenger's airbag igniter -N131- malfunctioning	- Replace faulty wiring or connections - Replace front passenger's airbag unit - N131- - Read Measuring Value Block ⇒ Page 01-69

01-38

V.A.G 1551 display	Possible cause	Corrective action
00591 Left Seat Belt Switch -E24- undefined switch condition Short circuit to Ground (GND) Open circuit/short circuit to B+	Faulty wiring or connections Left Front Seatbelt Microswitch -F140- malfunctioning	- Replace faulty wiring or connections - Replace Left Front Seatbelt Microswitch -F140- - Read Measuring Value Block ⇒ Page 01-69 Display Group 003

V.A.G 1551 display	Possible cause	Corrective action
00592 Right Seat Belt Switch -E25- Undefined switch condition Short circuit to Ground (GND) Open circuit/short circuit to B+	Faulty wiring or connections Right Front Seatbelt Microswitch -F141- malfunctioning	- Replace faulty wiring or connections - Replace Right Front Seatbelt Microswitch -F141- - Read Measuring Value Block ⇒ Page 01-69 Display Group 003

01-40

V.A.G 1551 display	Possible cause	Corrective action
00594 Airbag igniter circuit Short circuit	Faulty wiring or connections to airbag units	- Read Measuring Value Block ⇒ Page 01-69
00595 Crash data stored		- Replace control module - Replace activated airbag units as well as all damaged components

01-41

V.A.G 1551 display	Possible cause	Corrective action
00654 Belt tensioner igniter - driver's side -N153- ¹⁾ Resistance too high Resistance too low Short to B+ Short to Ground	Faulty wiring or connectors Driver's side belt tensioner igniter -N153- malfunctioning	- Read Measuring Value Block ⇒ Page 01-69 - Replace driver's side belt tensioner -N153-

¹⁾ Only valid for vehicles with electric belt tensioners, the display is not relevant for vehicles with mechanical belt tensioners.

V.A.G 1551 display	Possible cause	Corrective action
00655 Belt tensioner igniter - passenger's side - N154- ¹⁾ Resistance too high Resistance too low Short to B+ Short to Ground	Faulty wiring or connectors Passenger's side belt tensioner igniter -N154- malfunctioning	- Read Measuring Value Block ⇒ Page 01-69 - Replace passenger's side belt tensioner -N154-
00945 Crash sensor for front airbag -G190- ²⁾ Short to Ground	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Faulty airbag control module 	- Check wiring and connectors using wiring diagram - Output can also be checked using Output Diagnostic Test Mode (DTM) ⇒ Page 01-87 - Replace airbag control module

¹⁾ Only valid for vehicles with electric belt tensioners, the display is not relevant for vehicles with mechanical belt tensioners.

²⁾ Note: -G190- is internal to airbag control module and cannot be checked separately.

01-43

V.A.G 1551 display	Possible cause	Corrective action
01025 Malfunction warning lamp activation malfunctioning	Malfunction warning lamp malfunctioning Faulty wiring or connections control module malfunctioning	- Replace instrument cluster - Replace faulty wiring or connections control module malfunctioning
01044 Control module incorrectly coded	Control module is not designed for this vehicle	- Install a control module appropriate for the vehicle equipment according to parts catalog

01-44

V.A.G 1551 display	Possible cause	Corrective action
01211 Igniter for belt tensioner rear, drivers side - N196- Resistance too high Resistance too low Short to B+ Short to Ground	Faulty wiring or connections Igniter for belt tensioner rear, drivers side -N196- malfunctioning	- Replace faulty wiring or connections - Replace Igniter for belt tensioner rear, drivers side -N196- - Read Measuring Value Block ⇒ Page 01-69

01-45

V.A.G 1551 display	Possible cause	Corrective action
<p>01212</p> <p>Igniter for belt tensioner rear, passenger side - N197-</p> <p>Resistance too high</p> <p>Resistance too low</p> <p>Short to B+</p> <p>Short to Ground</p>	<p>Faulty wiring or connections</p> <p>Igniter for belt tensioner rear, passenger side -N197- malfunctioning</p>	<p>- Replace faulty wiring or connections</p> <p>- Replace Igniter for belt tensioner rear, passenger side -N197-</p> <p>- Read Measuring Value Block ⇒ Page 01-69</p>

01-46

V.A.G 1551 display	Possible cause	Corrective action
01214 Crash data seat belt tensioner stored		<ul style="list-style-type: none">- Erase DTC, if DTC will not erase, replace Airbag Control Module (Side impact data can be cleared up to 2 times, once after each occurrence of crash data stored. In the event of a 3rd occurrence of side impact crash data, the Airbag Control Module must be replaced.)- Replace deployed seat belt tensioners and all damaged components, as applicable.

01-47

V.A.G 1551 display	Possible cause	Corrective action
01217 Driver's, side airbag igniter -N199- Resistance too high Resistance too low Short to B+ Short to Ground	Faulty wiring or connections Driver's side, side airbag igniter - N199- malfunctioning	- Replace faulty wiring or connections - Replace driver's side, side airbag -N199- - Read Measuring Value Block ⇒ Page 01-69

01-48

V.A.G 1551 display	Possible cause	Corrective action
<p>01218</p> <p>Front passenger's, side airbag igniter -N200-</p> <p>Resistance too high</p> <p>Resistance too low</p> <p>Short to B+</p> <p>Short to Ground</p>	<p>Faulty wiring or connections</p> <p>Passenger's side, side airbag igniter -N200- malfunctioning</p>	<p>- Replace faulty wiring or connections</p> <p>- Replace passenger's side, side airbag -N200-</p> <p>- Read Measuring Value Block ⇒ Page 01-69</p>

01-49

V.A.G 1551 display	Possible cause	Corrective action
<p>01219</p> <p>Igniter for side airbag rear, drivers side - N201-</p> <p>Resistance too high</p> <p>Resistance too low</p> <p>Short to B+</p> <p>Short to Ground</p>	<p>Faulty wiring or connections</p> <p>Igniter for side airbag rear, drivers side -N201- malfunctioning</p>	<p>- Replace faulty wiring or connections</p> <p>- Replace Igniter for side airbag rear, drivers side - N201-</p> <p>- Read Measuring Value Block ⇒ Page 01-69</p>

01-50

V.A.G 1551 display	Possible cause	Corrective action
01220 Igniter for side airbag rear, passenger side - N202- Resistance too high Resistance too low Short to B+ Short to Ground	Faulty wiring or connections Igniter for side airbag rear, passenger side -N202- malfunctioning	- Replace faulty wiring or connections - Replace Igniter for side airbag rear, passenger side -N202- - Read Measuring Value Block ⇒ Page 01-69

01-52

V.A.G 1551 display	Possible cause	Corrective action
<p>01222</p> <p>Passenger's side, side airbag crash sensor -G180-</p> <p>Short to B+</p> <p>Short to Ground</p> <p>malfunctioning</p> <p>No adjustment or incorrect adjustment</p>	<p>Faulty wiring or connections</p> <p>Crash sensor malfunctioning</p> <p>control module malfunctioning</p> <p>Crash sensor not programmed or incorrectly programmed</p>	<p>- Replace faulty wiring or connections</p> <p>- Replace damaged component</p> <p>- Replace crash sensor</p> <p>- Read Measuring Value Block ⇒ Page 01-69</p>

01-53

V.A.G 1551 display	Possible cause	Corrective action
01224 Equipment incorrectly adjusted	Control module does not correspond to the equipment of the vehicle (number of airbags in vehicle)	- Install a control module corresponding to the vehicle equipment according to parts catalog
01226 Crash data side airbag, driver's side stored		<ul style="list-style-type: none"> - Erase DTC memory or replace control module - In case of side airbag activation, the signal "Crash data side airbag driver's side stored" can be reset twice via erasing DTC memory after the 3. side airbag activation the malfunction "control module malfunctioning" will be set and the control module must be replaced - Replace airbag unit and all damaged components

01-54

V.A.G 1551 display	Possible cause	Corrective action
01227 Crash data side airbag, passenger side stored		<ul style="list-style-type: none">- Erase DTC memory or replace control module- In case of side airbag activation, the signal "Crash data side airbag passenger side stored" can be reset twice via erasing DTC memory after the 3. side airbag activation the malfunction "control module malfunctioning" will be set and the control module must be replaced- Replace airbag unit and all damaged components

01-55

V.A.G 1551 display	Possible cause	Corrective action
<p>01228</p> <p>Key switch for switching off passenger side airbag -E224-</p> <p>Undefined switch condition</p> <p>Short circuit</p> <p>Open circuit</p>	<p>Faulty wiring or connections</p> <p>Key switch for switching off passenger side airbag -E224- malfunctioning</p> <p>Passenger side airbag malfunctioning</p>	<p>- Replace faulty wiring or connections</p> <p>- Replace Key switch for switching off passenger side airbag -E224-</p> <p>- Replace passenger side airbag</p> <p>- Read Measuring Value Block ⇒ Page 01-69</p>

01-56

V.A.G 1551 display	Possible cause	Corrective action
01280¹⁾ Front passenger's airbag is deactivated	Front passenger's airbag not functional	- Control module was matched
01281¹⁾ Driver's airbag is deactivated	Driver's airbag not functional	- Control module was matched
01284¹⁾ Driver's side airbag is deactivated	Driver's side airbag not functional	- Control module was matched
01285¹⁾ Front passenger's side airbag is deactivated	Passenger's side airbag not functional	- Control module was matched
01286¹⁾ Driver's belt tensioner is deactivated	Driver's belt tensioner not functional	- Control module was matched
01287¹⁾ Front passenger's belt tensioner is deactivated	Front passenger's belt tensioner not functional	- Control module was matched

¹⁾ The DTC message will only be stored in the DTC memory when the matching is activated.

01-58

V.A.G 1551 display	Possible cause	Corrective action
<p>01312 Data bus drive malfunctioning</p>	<p>Faulty wires or harness connectors</p> <p>Coding for control modules is not OK</p> <p>Data Bus On Board Diagnostic Interface - J533- malfunctioning</p>	<p>- Repair or replace faulty wires or harness connectors</p> <p>⇒ <i>Electrical Wiring Diagrams Troubleshooting & Component Locations</i></p> <p>- Check coding of the control modules, check DTC memory of all control modules.</p> <p>- Check Data Bus On Board Diagnostic Interface -J533- and replace if necessary (replace instrument cluster)</p> <p>⇒ <i>Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01; Diagnostic interface for databus</i></p>

01-59

V.A.G 1551 display	Possible cause	Corrective action
<p>01317</p> <p>Control module in dash panel insert - J285-</p> <p>No communication</p>	<p>Faulty wiring or connections</p> <p>Coding for control modules is not OK</p> <p>Data Bus On Board Diagnostic Interface - J533- malfunctioning</p>	<p>- Replace or repair faulty wiring or connections</p> <p>- Check coding of the control modules, check DTC memory of all control modules</p> <p>- Check Data Bus On Board Diagnostic Interface -J533- and replace if necessary (replace instrument cluster)</p> <p>⇒ Repair Manual, Electrical Equipment On Board Diagnostic (OBD), Repair Group 01; Diagnostic interface for databus</p>

01-60

V.A.G 1551 display	Possible cause	Corrective action
<p>01578</p> <p>Warning light for airbag off, passenger side - K145-</p> <p>Short circuit to B+</p> <p>Open circuit</p>	<p>Faulty wiring or connections</p> <p>Warning light for airbag off, passenger side -K145- malfunctioning</p>	<p>- Replace faulty wiring or connections</p> <p>- Replace Warning light for airbag off, passenger side - K145-</p> <p>- Read Measuring Value Block ⇒ Page 01-69</p>

01-61

V.A.G 1551 display	Possible cause	Corrective action
01588 Igniter for driver's side, side curtain protection -N251- Resistance too high Resistance too low Short to B+ Short to Ground	Faulty wiring or connections Side curtain protection igniter -N251- malfunctioning	- Replace faulty wiring or connections - Replace side curtain protection -N251- - Read Measuring Value Block ⇒ Page 01-69

01-62

V.A.G 1551 display	Possible cause	Corrective action
<p>01589</p> <p>Igniter for front passenger's airbag - N252-</p> <p>Resistance too high</p> <p>Resistance too low</p> <p>Short to B+</p> <p>Short to Ground</p>	<p>Faulty wiring or connections</p> <p>Side curtain protection igniter - N252- malfunctioning</p>	<p>- Replace faulty wiring or connections</p> <p>- Replace side curtain protection -N252-</p> <p>- Read Measuring Value Block ⇒ Page 01-69</p>

01-63

V.A.G 1551 display	Possible cause	Corrective action
01634¹⁾ Igniter for battery interruption switched off	Igniter for battery interruption not functioning	Control module was adapted
01635 Crash data for igniter for battery interruption stored		<ul style="list-style-type: none"> - Erase DTC memory or replace control module - In case of battery interruption, the signal "Crash data for igniter for battery interruption" can be reset twice via erasing DTC memory after the 3. battery interruption activation the malfunction "control module malfunctioning" will be set and the control module must be replaced - Replace battery interruption and all damaged components

¹⁾ DTC is only stored in DTC memory during activated adaptation.

01-64

V.A.G 1551 display	Possible cause	Corrective action
<p>01638</p> <p>Rear side airbag crash sensor -G256-, driver's side</p> <p>Short to B+</p> <p>Short to Ground</p> <p>malfunctioning</p> <p>No adjustment or incorrect adjustment</p>	<p>Faulty wiring or connections</p> <p>Crash sensor malfunctioning</p> <p>control module malfunctioning</p> <p>Crash sensor not programmed or incorrectly programmed</p>	<p>- Replace faulty wiring or connections</p> <p>- Replace damaged component</p> <p>- Replace crash sensor</p> <p>- Read Measuring Value Block ⇒ Page 01-69</p>

01-66

V.A.G 1551 display	Possible cause	Corrective action
01644¹⁾ Driver-side rear airbag is deactivated	Driver-side rear airbag not functioning	Control module was adapted
01645¹⁾ Passenger-side rear airbag is deactivated	Passenger-side rear airbag not functioning	Control module was adapted
01646¹⁾ Driver-side side curtain airbag is deactivated	Driver-side side curtain airbag not functioning	Control module was adapted
01647¹⁾ Passenger-side side curtain airbag is deactivated	Passenger-side side curtain airbag not functioning	Control module was adapted
01648¹⁾ Driver-side rear seatbelt tensioner is deactivated	Driver-side rear seatbelt tensioner not functioning	Control module was adapted
01649¹⁾ Passenger-side rear seatbelt tensioner is deactivated	Passenger-side rear seatbelt tensioner not functioning	Control module was adapted

¹⁾ DTC is only stored in DTC memory during activated adaptation.

01-67

V.A.G 1551 display	Possible cause	Corrective action
01650 Crash data side airbag, rear, driver-side stored		<ul style="list-style-type: none"> - Erase DTC memory or replace control module - In case of side airbag activation, the signal "Crash data side airbag, rear driver's side" can be reset twice via erasing DTC memory - after the 3rd. side airbag activation the malfunction "control module malfunctioning" will be set and the control module must be replaced
01651 Crash data side airbag, rear, passenger-side stored		<ul style="list-style-type: none"> - Erase DTC memory or replace control module - In case of side airbag activation, the signal "Crash data side airbag, rear passenger side" can be reset twice via erasing DTC memory after the 3rd. side airbag activation the malfunction "control module malfunctioning" will be set and the control module must be replaced - Replace airbag unit and all damaged components

01-68

V.A.G 1551 display	Possible cause	Corrective action
65535 Control module malfunctioning	Control module malfunctioning	- Replace control module

Read Measuring Value Block

WARNING!

- ♦ **Only visual check of wiring!**
- ♦ **Do not carry out electrical continuity tests or measurements to ignition circuits!**
- ♦ **Only check wiring with ignition switched off!**

<p>Rapid data transfer Select function XX</p>	<p>HELP</p>	<p>◀</p>	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Press buttons -0- and -8- (08 initiates the "Read Measuring Value Block" function).
<p>Rapid data transfer 08 Read Measuring Value Block</p>	<p>Q</p>	<p>◀</p>	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Confirm entry with the -Q- button.
<p>Read Measuring Value Block Input display group number XXX</p>	<p>HELP</p>	<p>◀</p>	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Select relevant display group number and confirm entry with -Q- button.
<p>Read Measuring Value Block 1 1 2 3 4</p>	<p>→</p>	<p>◀</p>	<p>Indicated on display: (1 to 4 = Display zones)</p>

The explanation of the individual display zones on the display is found in the evaluation of display group numbers ⇒ [Page 01-72](#) .

Note:

Some of the indicated display groups are only meaningful for respective vehicle equipment (e.g. side airbag).

If the displayed values in all display zones are "correct":

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

Note:

Check DTC memory after completing the function "Read Measuring Value Block" ⇒ [Page 01-30](#) .

Display group 001

Display group 001						
Read Measuring Value Block 1 xxx xxx xxx xxx				→ ◀ Indicated on display		
1	2	3	4	◀ Display zones	Specification	Evaluation
				Igniter, front passenger belt tensioner -N154- ¹⁾	Correct or not installed	⇒ Page 01-72
				Igniter, driver's belt tensioner - N153- ¹⁾	Correct or not installed	
				Igniter, front passenger's airbag	Correct or not installed	
				Igniter, driver's airbag	Correct	

¹⁾ Only valid for vehicles with electrical seat belt tensioners, for vehicles with mechanical seat belt tensioners the display indication has no meaning i.e. "not installed" will be displayed.

Evaluation for display group number 001

Display zone	Designation	Display contents	Corrective action
1	Igniter for airbag (driver's side) - N95-	<p>Correct</p> <p>Trig. Ground</p> <p>Trig. positive</p> <p>Too low</p>	<p>- No DTC's present</p> <p>- Visual check of wiring</p> <p>- Watch display and check connectors of appropriate current circuit for correct engagement and tight fit. If display changes to "correct", erase DTC memory</p> <p>- Pull igniter connector off airbag unit</p> <p>Display changes to "too high"</p> <p>- Replace airbag unit</p> <p>Display remains on "too low"</p> <p>- Separate connector on coil connector with slip ring</p> <p>Display changes to "too high"</p> <p>- Replace coil connector with slip ring</p> <p>Display remains on "too low"</p> <p>- Replace wiring harness</p>
			Continued on next page

01-73

Display zone	Designation	Display contents	Corrective action
1		Too high	<ul style="list-style-type: none"> - Pull igniter connector off airbag unit - Fit igniter connector onto inert igniter on VAS 5056B ⇒ Page 01-85 . Display changes to "correct" - Replace airbag unit Display remains on "too high" - Pull off connector between wiring harness and coil connector with slip ring - Connect test box VAS 5056B to driver's circuit wiring harness instead of coil connector with slip ring ⇒ Page 01-85 . Display changes to "correct" - Replace coil connector with slip ring Display remains on "too high" - Press button on VAS 5056B Display changes to "too high" - Replace wiring harness
			Continued on next page

01-75

Display zone	Designation	Display contents	Corrective action
3	Igniter driver's belt tensioner -N153- ¹⁾	Correct Too high Too low Trig. Ground Trig. positive not installed	- Visual check of wiring - Watch display and check connectors of appropriate current circuit for correct engagement and tight fit. If the display changes to "correct", erase DTC memory - Replace driver's/front passenger's belt tensioner
4	Igniter front passenger's belt tensioner -N154- ¹⁾	Correct Too high Too low Trig. Ground Trig. positive not installed	

¹⁾ Only valid for vehicles with electrical seat belt tensioners, for vehicles with mechanical seat belt tensioners the display indication has no meaning i.e. "not installed" will be displayed.

01-76

Display group 003

Display group 003			
Read Measuring Value →			
Block 3			
xxx	xxx	xxx	xxx
1	2	3	4
◀ Indicated on display			
◀ Display zones			
Specification			
Evaluation			
Right Front Seatbelt Microswitch -F141			
not installed			
or			
belt: yes			
belt: no			
Left Front Seatbelt Microswitch -F140			
not installed			
or			
belt: yes			
belt: no			
Front passenger's seat occupied recognition			
not installed			
Voltage supply			
correct			
⇒ Page 01-77			

Evaluating display group number 003

Display zone	Designation	Display contents	Corrective action
1	Voltage supply	correct too low too high	- Battery voltage min. 9 Volt - Check alternator ⇒ <i>Electrical Wiring Diagrams, Troubleshooting & Component Locations</i> - Check voltage regulator ⇒ <i>Electrical wiring diagrams & Component locations</i> - Visual check of wiring
2	Passenger side seat occupant detection	not installed	no malfunction present
			Continued on next page

01-78

Display zone	Designation	Display contents	Corrective action
3	Left Front Seatbelt Microswitch - F140-	not installed belt: yes belt: no too high too low to Ground (GND) to B+ not defined	<ul style="list-style-type: none"> • If the switch is not installed or if "belt yes" is displayed with belt tongue inserted or "belt no" with the belt tongue not inserted, no malfunction is present - Visual check of wiring - Check harness connectors of the respective electrical circuit for proper and secure seating and observe the display at the same time If the display content changes to "correct", erase DTC memory
4	Right Front Seatbelt Microswitch - F141-	not installed belt: yes belt: no too high too low to Ground (GND) to B+ not defined	- Replace faulty wires or harness connectors - Replace driver- or passenger-side belt buckle switch

Display group 005

Display group 005			
Read Measuring Value →			◀ Indicated on display
Block 5			
xxx	xxx	xxx	xxx
1	2	3	4
			◀ Display zones
			Specification
			Evaluation
			Rear near side, side airbag igniter -N202-
			not installed
			Rear off side, side airbag igniter -N201-
			not installed
			Front passenger's, side airbag igniter - N200-
			correct
			⇒ Page 01-80
			Driver's, side airbag igniter -N199-
			correct

Evaluating display group number 005

Display zone	Designation	Display contents	Corrective action
1	Driver's side, side airbag igniter -N199-	correct too high too low Trig. Ground Trig. positive	- Visual check of wiring - Watch display and check connectors of appropriate current circuit for correct engagement and tight fit. If display changes to "correct", erase DTC memory. - Replace faulty wiring or connections
2	Front passenger's side, side airbag igniter -N200-	correct too high too low Trig. Ground Trig. positive	- Replace driver's or front passenger's side, side airbag
3	Igniter for side airbag rear, drivers side -N201-	not installed	no malfunction present
4	Igniter for side airbag rear, passenger side - N202-	not installed	

Display group 007

Display group 007						
Read Measuring Value Block 7			→	◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				empty ¹⁾		
				empty ¹⁾		
				Front passenger's side, side curtain protection igniter -N252-	correct or not installed	⇒ Page 01-82
				Driver's side, side curtain protection igniter - N251-	correct or not installed	

¹⁾ Empty means: empty display field

01-82

Evaluating display group number 007

Display zone	Designation	Display contents	Corrective action
1	Driver's side, side curtain protection igniter -N251-	correct too high too low Trig. Ground Trig. positive	- Visual check of wiring - Watch display and check connectors of appropriate current circuit for correct engagement and tight fit. If display changes to "correct", erase DTC memory. - Replace faulty wiring or connections
2	Front passenger's side, side curtain protection igniter - N252-	correct too high too low Trig. Ground Trig. positive	- Replace driver's or front passenger's side, side curtain protection

Display group 009

Display group 009											
Read Measuring Value Block 9			→	◀ Indicated on display							
xxx	xxx	xxx	xxx								
1	2	3	4	◀ Display zones							
				<table border="1"> <thead> <tr> <th>Specification</th> <th>Evaluation</th> </tr> </thead> <tbody> <tr> <td> Identification Right Rear Side Airbag Crash Sensor - G257- e.g. 02 or not installed </td> <td rowspan="4">⇒ Page 01-84</td> </tr> <tr> <td> Identification Left Rear Side Airbag Crash Sensor -G256- e.g 02 or not installed </td> </tr> <tr> <td> Identification Crash sensor for side airbag, passenger side -G180- e.g 02 or not installed </td> </tr> <tr> <td> Identification Crash sensor for side airbag, drivers side -G179- e.g 02 or not installed </td> </tr> </tbody> </table>	Specification	Evaluation	Identification Right Rear Side Airbag Crash Sensor - G257- e.g. 02 or not installed	⇒ Page 01-84	Identification Left Rear Side Airbag Crash Sensor -G256- e.g 02 or not installed	Identification Crash sensor for side airbag, passenger side -G180- e.g 02 or not installed	Identification Crash sensor for side airbag, drivers side -G179- e.g 02 or not installed
Specification	Evaluation										
Identification Right Rear Side Airbag Crash Sensor - G257- e.g. 02 or not installed	⇒ Page 01-84										
Identification Left Rear Side Airbag Crash Sensor -G256- e.g 02 or not installed											
Identification Crash sensor for side airbag, passenger side -G180- e.g 02 or not installed											
Identification Crash sensor for side airbag, drivers side -G179- e.g 02 or not installed											

Evaluating display group number 009

Display zone	Designation	Display contents	Corrective action
1	Identification Crash sensor for side airbag, drivers side - G179-	e.g. 02 or not installed	<ul style="list-style-type: none"> Displayed identification number of crash sensor (for side crash) must match the displayed version number of the crash sensor when control module version is displayed ⇒ Page 01-10 - If the identification numbers of the crash sensors and the displayed version number for control module identification do not match, the crash sensors or the control module must be replaced
2	Identification Crash sensor for side airbag, passenger side -G180-	e.g. 02 or not installed	
3	Identification Left Rear Side Airbag Crash Sensor - G256-	e.g. 02 or not installed	
4	Identification Right Rear Side Airbag Crash Sensor - G257-	e.g. 02 or not installed	

VAS 5056B test box

It is possible to check the individual components of the airbag system with test box VAS 5056B and to check which components are actually malfunctioning.

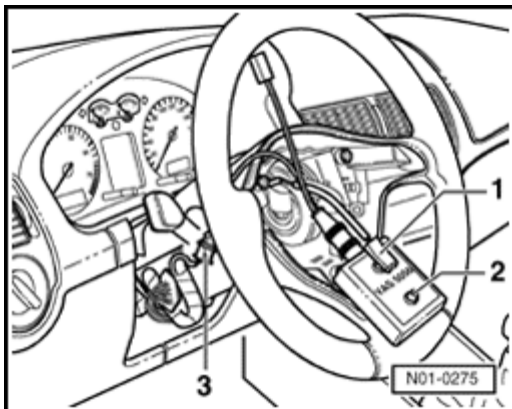
Note:

- ◆ *Observe safety measures when working on airbag.*

⇒ [Repair Manual, Body Interior, Repair Group 69; Airbag; Safety measures when working on airbag](#)

Connecting test box to driver's airbag components

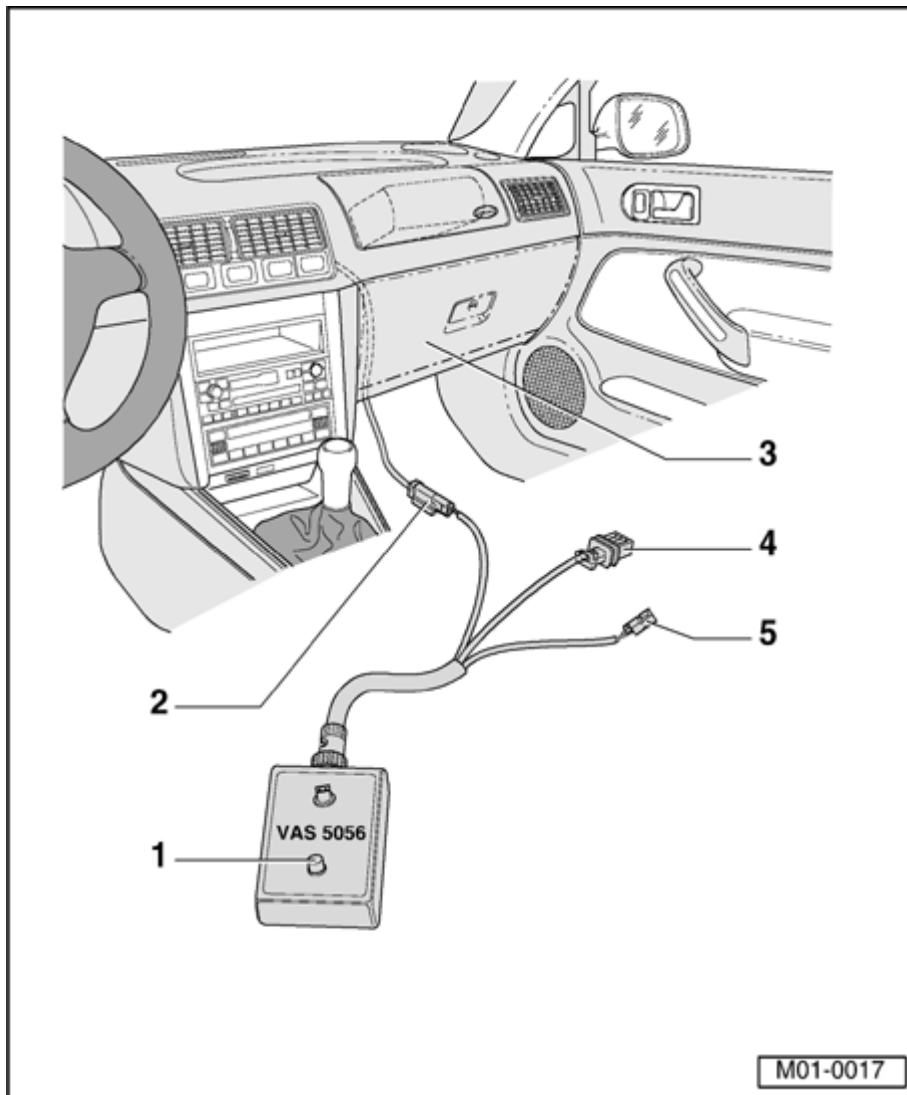
Driver's airbag and steering column switch trim removed.



- Connect igniter connector to inert igniter separate wiring harness to coil connector slip ring. Connect connector -3- from VAS 5056/3 with airbag wiring harness.

- 1 - Igniter connector on inert igniter
- 2 - Key
- 3 - Coil connector with slip ring connector

01-86



Connecting test b to passenger airba components

- Remove glove compartment - 10

⇒ [Repair Manual, I Interior, Repair Gro 68; Compartments, covers and trims; removing glove compartment](#)

- Disconnect wiring harness to airbag unit and connect yellow 2-pin connector of VAS 5056/3 with the wiring harness/passenger side airbag.

1 - Switch

**2 Connector for
- wiring
harness/passenger side airbag**

3 - Glove compartment

**4 - Connector
(without meaning)**

**5 - Connector
(without meaning)**

Output Diagnostic Test Mode (DTM)

The function "Crash output" is checked with Output Diagnostic Test Mode (DTM).

When airbags are ignited the central locking is switched to "unlock", the interior lights are switched "on" and the engine switched off.

Note:

- ◆ *Before performing the Output Diagnostic Test Mode (DTM), switch central locking to "lock" (operate interior lock switch).*
- ◆ *Switch interior light switch to position "door contact".*
- ◆ *Start engine.*
- ◆ *After completing the Output Diagnostic Test Mode (DTM) the central locking controls are not active until the ignition has been switched off and on again.*

- Connecting scan tool ⇒ [Page 01-3](#) .

Perform function "03 Output Diagnostic Test Mode (DTM)"

Rapid data transfer HELP
Select function XX



Indicated on display:

- Press buttons -0- and -3-

Rapid data transfer Q
03 Output Diagnostic Test Mode (DTM)



Indicated on display:

- Confirm entry with the -Q- button.

Output Diagnostic Test Mode (DTM) _ →
Crash signal



Indicated on display:

The engine stops, the central locking must switch to "unlock" and the interior lights must switch "on".

Output Diagnostic Test Mode (DTM) _ →
END



Indicated on display:

- Press → button.

During test and assembly work malfunctions can be recognized from other control modules like e.g. plug disconnected. Therefore on completion the DTC memories of all control modules must be checked and erased. To do this:

- Press button -0- twice for address word "Automatic test sequence" and confirm entry with -Q- button. The V.A.G 1551 transmits all known address words one after the other.

When a control module answers with its identification the number of stored malfunctions appears on the display or "No DTC recognized".

Any system malfunctions that are stored will be displayed one after the other and printed out. The V.A.G 1551 will then transmit the next address word.

V.A.G - ON BOARD DIAGNOSTIC HELP

1 - Rapid data transfer

2 - Blink code output



Indicated on display ¹⁾

¹⁾ Operating modes 1 and 2 are displayed alternately

Note:

If a DTC is recognized:

- ◆ 1 . **Repair malfunction**
- ◆ 2. *Erase DTC memory (function 05).*
- ◆ 3. *Check DTC memory again (function 02).*

Convenience system (vehicles with power windows), On Board Diagnostic (OBD)

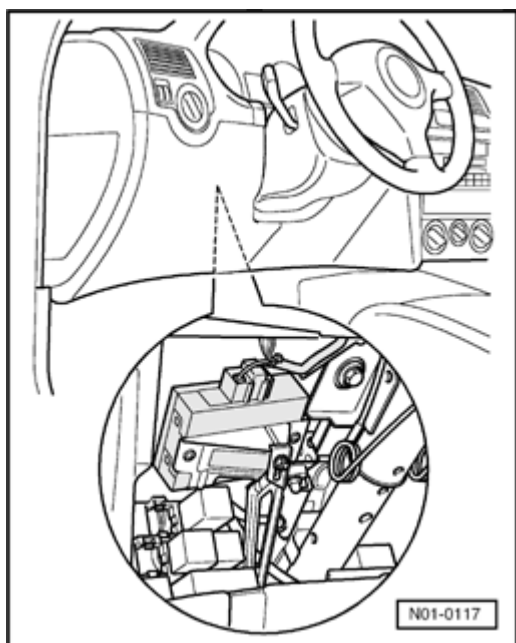
Functional description

The locking units located in the doors (door lock) have an electric motor.

The motor locks the door and also takes care of the "Safe" condition, i.e. after locking at an external lock (door lock, tailgate, radio remote control) the vehicle is protected against theft and can no longer be unlocked from the interior. The feedback on the respective condition in control module occurs via the contact switch in the locking unit.

All the known convenience functions can be performed with the electric convenience system, interior lights control, ATA with interior monitoring (see description of system on ⇒ [Page 01-94](#)), electric windows, mirror and the radio remote control.

If the Airbag Control Module is triggered, a signal is sent to the convenience control module to unlock the doors.



✦ The Convenience System Control Module -J393- is located under the instrument panel and is secured with a bracket to the steering column. It is equipped with a DTC memory. The On Board Diagnostic (OBD) connection is located under the driver's knee bar to left of the steering wheel.

The control module recognizes DTC's and malfunctions in the central locking convenience system (convenience system includes central locking, anti-theft alarm, electric windows, radio wave remote control, mirror) and stores them in a non-volatile memory.

Testers V.A.G 1551 and 1552 can be used to check the DTC memories and code the control modules as well as the function On Board Diagnostic (OBD) of the VAS 5051.

The function "Guided Troubleshooting" of the VAS 5051 should be used for troubleshooting in diagnostic capable systems. Using this system a systematic malfunction check is guaranteed, from the fuses via wiring, connections in the current path.:

⇒ *Operating instructions for VAS 5051 Vehicle Diagnosis, Testing and Information System.*

The malfunction information displayed is used to refer to a DTC table with notes on the possible causes for directed repair measures.

Malfunctions which can be attributed to a temporary open circuit in the wiring or a loose contact, will also be stored. These malfunctions will be displayed as sporadic DTCs "SP".

Only statistical malfunctions are considered:

- ◆ Central locking inoperative
- ◆ Mirror positioning motor inoperative
- ◆ Electric window positioning motor inoperative
- ◆ CAN-bus communication inoperative

Note:

Before changing a component erase DTC memory, perform functional checks and check DTC memory again.

Determining which source has possibly triggered the anti-theft alarm

The breakdown of the display content illustrated on ⇒ [Page 01-197](#) for display group number 15 for vehicles through 05.01, and ⇒ [Page 01-283](#) display group number 16 for vehicles from 06.01 on gives information as to which component triggered the alarm system last, and can therefore help the troubleshooting/repair.

This "DTC memory" cannot be erased.

Interior monitoring system, description

The interior monitoring system is an integral part of the anti-theft alarm system. The system consists of two sensors into which the function of the rear reading lights are integrated. Setting the operating mode of the reading lights is performed on each of the sensors separately.

The interior sensors work on the ultrasonic wave principle. The alarm of the anti-theft alarm system will be triggered if movement is detected in the interior when the system is active.

The interior sensors can be switched off via a switch in the B pillar/door sill and via the adaptation (function 10, channel number 05). To do this the ignition key must be withdrawn from the ignition switch, then operate switch and lock the vehicle.

The sensors will be switched on again the next time the vehicle is unlocked.

A waiting time of at least 30 seconds must be observed before commencing tests when the vehicle is locked.

System active indicator

The optical central locking system active indicator is via an additional LED in the upper part of the driver's door inner trim. The LED flashes for a period of time and then goes out.

When the LED is activated it will differentiate between the following functions:

- Central locking using SAFE system (lock once) LED activation then 50ms on and 950ms off, when the safe condition is obtained
- Central locking not using SAFE system (lock twice) LED goes out.

The anti-theft alarm system (ATA) is not always displayed.

Convenience system, initiating On Board Diagnostic (OBD)

Test prerequisites:

- ◆ Voltage supply and fuses S111 and S144 for the respective system OK.
- ◆ To initiate the On Board Diagnostic (OBD) the ignition must be switched on "Terminal 15 on".

Note:

- ◆ *If the display remains blank, check V.A.G 1551 voltage supply according to wiring diagram.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- ◆ *Additional operating information can be printed out depending on the program by pressing the HELP button of V.A.G 1551.*

- ◆ *The → button is used for advancing the program sequence.*

- ◆ *The PRINT button is used for switching on the printer (warning lamp in button lights up).*

- Connect scan tool ⇒ [Page 01-3](#) .
- Switch on ignition.
- Switch on printer with Print button (warning lamp in button lights up).

			- Press button -1- for "Rapid data transfer" mode.
Rapid data transfer	HELP	⏪	Indicated on display:
Enter address word XX			Address word for the convenience system: 46
Rapid data transfer	HELP	⏪	Indicated on display:
Enter address word XX			- Press buttons -4- and -6-.
Rapid data transfer	Q	⏪	Indicated on display after entering the address word 46:
46 Convenience system			- Confirm entry with the Q button.
			and then the following appears in the display:
Rapid data transfer		⏪	Indicated on display:
Tester sends the address word 46			
1J0959799J 03 Conv. cent. CU 0001 →		⏪	The control module identification of the Central control module for comfort system -J393- (Conv. cent. CU) will be shown on the V.A.G 1551 scan tool display, e.g.:
Coding XXXXX	WSC XXXXX		

At this point the program can be advanced with the -C- button to the option "Rapid data transfer, select function".

- Press → button.

Please wait



Will appear briefly in display:

and then the following appears in the display:

1J0959801A 03 Door CU DS0022 →



The control module identification of the driver's door control module will be shown on the V.A.G 1551 scan tool display, e.g.:

- Press → button.

Please wait



Will appear briefly in display:

and then the following appears in the display:

1J0959802B 03 Door CU PS0022 →



The control module identification of the passenger's door control module will be shown on the V.A.G 1551 scan tool display, e.g.:

Selectable functions, overview

	page
01 - Check Control Module Version	⇒ Page 01-101
02 - Check DTC Memory	⇒ Page 01-110
03 - Output Diagnostic Test Mode	⇒ Page 01-247
05 - Erase DTC memory	⇒ Page 01-113
06 - End Output	⇒ Page 01-115
07 - Code Control Module	⇒ Page 01-105
08 - Read Measuring Value Block	⇒ Page 01-250
10 - Adaptation	⇒ Page 01-285

Note:

- ◆ *A list of possible functions is printed out after pressing the HELP button.*
- ◆ *Do not select further functions, which can be printed out after pressing the HELP button.*
- ◆ *After the function is completed the V.A.G 1551 returns to the following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display:

Check Control Module Version

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .
- Switch on ignition.
- Press button -1- for "Rapid data transfer" mode.
- Switch on printer with Print button (warning lamp in button lights up).
- Press buttons -0- and -1-.

Rapid data transfer

Q



Indicated on display:

01-Check Control Module Version

- Confirm entry with the -Q- button.

1J0959799J 03 Conv. cent. CU 0001 →



The control module identification of the Central control module for comfort system -J393- (Conv. cent. CU) will be shown on the V.A.G 1551 scan tool display, e.g.:

Coding XXXXX

WSC XXXXX

Breakdown of the display:

- ◆ Upper line ◆ Part No. of control module system designation (03²Comf. cent. CU 0001)
- ◆ Lower line ◆ Code number dealer code number¹⁾

1) Automatically stored in the control module when checking the system.

2) A number or number/letter combination (03 or 6Q, or others) indicate a correct programming of the control module.

- Press → button.

Please wait



Will appear briefly in display:

and then the following appears in the display:

1J0959801A 03 Door CU DS0022 →



The control module identification of the driver's door control module will be shown on the V.A.G 1551 scan tool display, e.g.:

- Press → button.

Please wait



Will appear briefly in display:

and then the following appears in the display:

1J0959802B 03 Door CU PS0022 →



The control module identification of the passenger's door control module will be shown on the V.A.G 1551 scan tool display, e.g.:

- Press → button.
- Please wait ← Will appear briefly in display:

and then the following appears in the display:
- 1J0959811A 03 Door CU RL0022 → ← The control module identification of the rear left door control module will be shown on the V.A.G 1551 scan tool display, e.g.:

- Press → button.
- Please wait ← Will appear briefly in display:

and then the following appears in the display:
- 1J0959812A 03 Door CU RR0022 → ← The control module identification of the rear right door control module will be shown on the V.A.G 1551 scan tool display, e.g.:

- Press → button.
- Rapid data transfer HELP ← Indicated on display:

Select function XX

Note:

Rapid data transfer HELP
control module does not answer!



◆ *If one of the malfunction messages opposite appears in the display, the possible causes of the malfunction can be printed out with the HELP button.*

Rapid data transfer HELP
K wire not switching to B+!



◆ *Ignition must be switched on.*

Rapid data transfer →
No signal from control module!



◆ *Malfunctions have occurred at the start of or during the program (external interference?).*

Rapid data transfer →
Fault in communication build up



◆ *Check diagnosis wires as well as voltage supply and Ground connection.*

- Press buttons -0- and -6- to end the output.

Rapid data transfer Q
06 End output



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer HELP
Enter address word XX



Indicated on display:

- Switch off ignition.

- Disconnect connector to V.A.G 1551 scan tool.

Convenience System Control Module, coding

Note:

- ◆ *When supplied the control module is precoded according to the vehicle equipment.*
- ◆ *The coding is performed with the V.A.G 1551 scan tool ⇒ [Page 01-106](#) or ⇒ [Page 01-107](#) .*
- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -7- (with 07 the function "Code control module" is selected).

Rapid data transfer
07 Code control module

Q



Indicated on display:

- Confirm entry with the -Q- button.

Code control module
Enter code number XXXXX (0-32000)

Q



Indicated on display:

- Enter code number according to table:

Coding table, vehicles with convenience system ➤ 05.01

Address word	Code number	
	2 doors	4 doors
46 Comfort Convenience		
Electric windows, one door	00256	04096
46 Comfort Convenience		
Electric windows, all doors	00257	04097
46 Comfort Convenience		
Electric windows with seat memory, one door	00258	04098
46 Comfort Convenience		
Electric windows with seat memory, all doors	00259	04099

Coding table, vehicles with convenience system 06.01 ➤

Address word	Code number	
	2 doors	4 doors
46 Comfort Convenience		
Electric windows, one door	00064	00258
46 Comfort Convenience		
Electric windows, all doors	00065	00259
46 Comfort Convenience		
Electric windows with seat memory, one door	N/A	00258
46 Comfort Convenience		
Electric windows with seat memory, all doors	N/A	00259

1J0959799J 03 Conv. cent. CU 0001 →
 Coding XXXXX WSC XXXXX

- Confirm entry with the -Q- button.



The control module identification number will be displayed with the appropriate index letter, the code number and the workshop code.

If the contents of the display are as shown then the coding is successful.

If the code number entered is not accepted by the control module, the previous coding will appear in the display:

1J0959799J 03 Conv. cent. CU 0001 →
 Coding XXXXX WSC XXXXX



Indicated on display:

In this case the control module has not been programmed with the relevant data for the vehicle. A check must then be completed to see if the correct control module for the vehicle has been installed (compare Part No. and letter index), or whether an incorrect code number has been entered.

- Repeat coding.

If the control module cannot be coded (correct control module, correct code number), the control module is malfunctioning.

Furthermore, at this point the door control module is called-up and checked.

End output:

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -6- to end the output.

Rapid data transfer
06 End output

Q



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer
Enter address word XX

HELP



Indicated on display:

- Switch off ignition.
- Disconnect connector to V.A.G 1551 scan tool.

Check DTC Memory

Note:

The vehicle V.A.G 1552 System tester can be used instead of the V.A.G 1551 scan tool, however a print-out is not possible.

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .
- Switch on printer with Print button (warning lamp in button lights up).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -2- (the function "Check DTC memory" is entered with 02).

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Press "Print" button
- Confirm entry with the -Q- button.

X DTCs recognized!



The number of stored DTC's appears in the display.

The stored DTC's are displayed and printed out one after the other.

Note:

If a DTC is recognized:

- ◆ 1. Repair malfunction
- ◆ 2. Erase DTC memory (function 05).
- ◆ 3. Check DTC memory again (function 02).

- The DTCs printed out can be repaired with aid of DTC table ⇒ [Page 01-201](#) .
- The function "Read Measuring Value Block" ⇒ [Page 01-250](#) and Display group overview ⇒ [Page 01-252](#) are additional aids.

The measured value block is divided into 15 display group numbers. The assignment of the individual display zones can be taken from the display group overview ⇒ [Page 01-252](#) .

No DTC recognized!



If "No DTC recognized" is displayed the program will return to the initial position after pressing the → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

If something else is displayed:

⇒ *Scan tool operating instructions*

Erase DTC memory

Note:

The vehicle V.A.G 1552 System tester can be used instead of the V.A.G 1551 scan tool, however a print-out is not possible.

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .

Prerequisites:

- ◆ DTCs are corrected
- ◆ Functional check has been carried out
- ◆ DTC memory checked again

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -5- (the function "Erase DTC memory" is entered with 05).

Rapid data transfer
05 Erase DTC memory

Q



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer
DTC memory is erased!

→



Indicated on display:

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

WARNING!

DTC memory was not checked



Note:

- ◆ *If this appears in the display, the test sequence is faulty.*
- ◆ *Adhere strictly to test sequence; first of all check DTC memory, then erase memory.*
- Press buttons -0- and -6- to end the output.

Rapid data transfer

Q

06 End output



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer

HELP

Enter address word XX



Indicated on display:

- Switch off ignition.
- Disconnect connector to V.A.G 1551 scan tool.

End Output

- Press buttons -0- and -6- to end the output.

Rapid data transfer Q
06 End output



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer HELP
Enter address word XX



Indicated on display:

- Switch off ignition.
- Disconnect connector to V.A.G 1551 scan tool.

DTC tables, vehicles through 05.01

Note:

- ◆ *The DTC table is listed according to the 5 digit code on the left.*
- ◆ *Some of the mentioned DTC texts are only displayed on the VAS 5051. On the V.A.G 1551, only the DTC will be printed in this case.*
- ◆ *The possible malfunctions are dependant on the respective vehicle equipment.*
- ◆ *Explanation of the malfunction types (e.g. "open circuit/short circuit to Ground"):*

⇒ *Scan tool operating instructions*

- ◆ *Before replacing components indicated as being malfunctioning, check the wiring and connectors to these components as well as the Ground connections using wiring diagram. This is particularly relevant if DTC's are output as "occurring sporadically" (SP).*
- ◆ *The DTC's displayed can be localized using the test table.*

Note:

- ◆ *This malfunction "no communication" can also appear with the door control modules. This has no influence on the function of the convenience system and is therefore of no consequence. Erase DTC memory.*

01333 049

Door CU -J388

no communication



Scan tool print-out: The number shown here in bold 049 (e.g.) has no relevance.

V.A.G 1551 display	Possible cause	Corrective action
00000 No DTC recognized	If "No DTC recognized" appears after carrying out repairs On Board Diagnostic (OBD) is ended	
00849 S-terminal on ignition/starter switch -D- Undefined switch condition	<ul style="list-style-type: none">◆ Terminal 15 OK. but S-terminal malfunctioning ◆ Faulty wiring or connectors	- Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , Display zone 3

V.A.G 1551 display	Possible cause	Corrective action
00893 Button for tailgate/trunk lid release - -E234- Implausible signal ¹⁾	◆ Faulty wiring or connectors	- Read Measuring Value Block; Display group number 014 ⇒ Page 01-279 , display zone 2

¹⁾ DTC recorded if button pressed for longer than 5 minutes.

V.A.G 1551 display	Possible cause	Corrective action
<p>00912 Electric window switch FL - E40-</p> <p>Implausible signal</p> <p>Short to Ground</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Electric window switch, FL -E40-malfunctioning 	<p>- Read Measuring Value Block; Display group number 002 ⇒ Page 01-254 , display zone 1</p> <p>- Check button</p>
<p>00913 Electric window switch FR, driver's door -E81-</p> <p>Implausible signal</p> <p>Short to Ground</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Electric window switch, FR -E81-malfunctioning 	<p>- Read Measuring Value Block; Display group number 002 ⇒ Page 01-254 , display zone 2</p> <p>- Check button</p>

V.A.G 1551 display	Possible cause	Corrective action
<p>00914</p> <p>Electric window switch RL, driver's door -E53-</p> <p>Implausible signal</p> <p>Short to Ground</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Electric window switch, RL -E53- malfunctioning 	<p>- Read Measuring Value Block; Display group number 002 ⇒ Page 01-254 , display zone 3</p> <p>- Check button</p>
<p>00915</p> <p>Electric window switch RR, driver's door -E55-</p> <p>Implausible signal</p> <p>Short to Ground</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Electric window switch, RR -E55- malfunctioning 	<p>- Read Measuring Value Block; Display group number 002 ⇒ Page 01-254 , display zone 4</p> <p>- Check button</p>

V.A.G 1551 display	Possible cause	Corrective action
00928 Locking unit for driver's side CL -F220- Implausible signal Wrong equipment	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on driver's door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for driver's side central locking - F220- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to driver's door control module or to door main connector (lower left footwell) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for driver's door central locking -F220- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
00929 Locking unit for front passenger's side CL -F221- Implausible signal Wrong equipment	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on front passengers door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for front passenger's central locking -F221- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to front passenger's door control module or to door main connector (lower right footwell) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for front passenger's door central locking -F221- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
00930 Locking unit for rear left CL -F222- Implausible signal Wrong equipment	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on left rear door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for rear left central locking -F222- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to left rear door control module or to door main connector (in B pillar left) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for rear left central locking - F222- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
<p>00931</p> <p>Locking unit for rear right CL -F223-</p> <p>Implausible signal</p> <p>Wrong equipment</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on right rear door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for rear right central locking - F223- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to right rear door control module or to door main connector (in B pillar right) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for rear right central locking - F223- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
<p>00932</p> <p>Electric window motor, driver's side -V147-</p> <p>No or incorrect adjustment</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on driver's door ◆ Window lifter mechanical components are stiff/partially seized¹⁾ ◆ Driver's side window motor -V147- malfunctioning ◆ No setting for automatic opening and closing 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to driver's door control module or to door main connector (footwell lower left) (LHD) - Check window lifter mechanical components and make serviceable¹⁾ - Replace driver's side window motor -V147- - Perform setting for automatic opening and closing <p>⇒ Repair Manual, Body Exterior, Repair Group 64</p>

¹⁾ It is also possible that the door window runs tight in window guides

V.A.G 1551 display	Possible cause	Corrective action
<p>00934 Electric window motor, rear left -V26-</p> <p>No or incorrect adjustment</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on left rear door ◆ Window lifter mechanical components are stiff/partially seized¹⁾ ◆ Rear left window motor -V26- malfunctioning ◆ No setting for automatic opening and closing 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to left rear door control module or to door main connector (in left B pillar) (LHD) - Check window lifter mechanical components and make serviceable¹⁾ - Replace rear left window motor -V26- - Perform setting for automatic opening and closing <p>⇒ Repair Manual, Body Exterior, Repair Group 64</p>

¹⁾ It is also possible that the door window runs tight in window guides

V.A.G 1551 display	Possible cause	Corrective action
00936 Window lifter switch, front passenger's side -E107- ¹⁾ Implausible signal ¹⁾ Short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Front passenger's window lifter switch - E107- malfunctioning 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 005 ⇒ Page 01-260 , display zone 1 - Check button

¹⁾ DTC recorded if button pressed in a direction for longer than 5 minutes, or both signals (open, close) occur simultaneously.

V.A.G 1551 display	Possible cause	Corrective action
00937 Window lifter switch, rear left -E52- ¹⁾ implausible signal Short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Window lifter switch, rear left -E52- malfunctioning 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 008 ⇒ Page 01-266 , display zone 1 - Check button

¹⁾ DTC recorded if button pressed in a direction for longer than 5 minutes, or both signals (open, close) occur simultaneously.

V.A.G 1551 display	Possible cause	Corrective action
00938 Window lifter switch, right rear -E54- ¹⁾ implausible signal Short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Window lifter switch rear right -E54- malfunctioning 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 007 ⇒ Page 01-264 , display zone 1 - Check button

¹⁾ DTC recorded if button pressed in a direction for longer than 5 minutes, or both signals (open, close) occur simultaneously.

V.A.G 1551 display	Possible cause	Corrective action
00939 Mirror adjustment motor, driver's side - V149-	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ No voltage supply to driver's door◆ Driver's side mirror adjustment motor -V49- malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram- Check voltage supply to driver's door control module or to door main connector (lower left footwell) (LHD)- Replace mirror adjustment motor, driver's side -V149-

V.A.G 1551 display	Possible cause	Corrective action
00940 Mirror adjustment motor, front passenger's side - V150-	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ No voltage supply for central locking on front passenger's door◆ Front passenger's side mirror adjustment motor - V150- malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram- Check voltage supply to front passenger's door control module or to door main connector (lower right footwell)- Replace mirror adjustment motor, front passenger's side - V150-

V.A.G 1551 display	Possible cause	Corrective action
00941 Exterior mirror retraction motor, driver's side -V121-	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply to driver's door ◆ Exterior mirror retraction motor, driver's side - V121- malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to driver's door control module or to door main connector (lower left footwell) (LHD) - Replace exterior mirror retraction motor, driver's side - V121- - Check exterior mirror retraction function¹⁾

¹⁾ To do this the vehicle must be driven at ≥ 15 km/h either on a rolling road or during a test drive. The mirrors must not be retracted again. Retracting mirrors must though return to their normal position.

V.A.G 1551 display	Possible cause	Corrective action
00942 Exterior mirror retraction motor, passenger's side - V122-	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply to passenger's door ◆ Exterior mirror retraction motor, passenger's side - V122- malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to passenger's door control module or to door main connector (lower right footwell) (LHD) - Replace exterior mirror retraction motor, passenger's side -V122- - Check exterior mirror retraction function¹⁾

¹⁾ To do this the vehicle must be driven at ≥ 15 km/h (9 mph) either on a rolling road or during a test drive. The mirrors must not be retracted again. Retracting mirrors must though return to their normal position.

V.A.G 1551 display	Possible cause	Corrective action
00943 Heated exterior mirror, driver's side - Z4-	<ul style="list-style-type: none"> ◆ Mirror heater not installed ◆ Faulty wiring or connectors ◆ No voltage supply to driver's/front passenger's doors 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 010 ⇒ Page 01-270 , display zone 2. Measured value block shows if rear window button is being read correctly - Check wiring and connectors using wiring diagram - Check voltage supply to door control modules or to door main connectors (lower left and right foot wells)
00944 Heated exterior mirror, front passenger's side - Z5-		

V.A.G 1551 display	Possible cause	Corrective action
00946 Interior light -W- Short to B+	<ul style="list-style-type: none">◆ Faulty wiring or connectors ◆ Interior light or one of the reading lights are malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram - Replace interior light or malfunctioning reading light

V.A.G 1551 display	Possible cause	Corrective action
00947 Tailgate/trunk lid remote control switch -E188- Short to Ground	<ul style="list-style-type: none">◆ Faulty wiring or connectors ◆ Tailgate/trunk lid remote control switch -E188- malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram - Replace tailgate/trunk lid remote control switch -E188-
00948 Signal, close sliding roof Short to B+	<ul style="list-style-type: none">◆ Faulty wiring or connectors	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram

V.A.G 1551 display	Possible cause	Corrective action
<p>00949</p> <p>Motor for tailgate/trunk lid CL - V53- lock</p> <p>Undefined switch position</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock mechanical components are stiff/partially seized ◆ Tailgate/trunk lid lock/unlock motor malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check lock mechanical components and make serviceable - Replace tailgate/trunk lid lock/unlock motor
<p>00950</p> <p>Motor for tailgate/trunk lid CL - V53- unlock</p> <p>Undefined switch position</p>		

V.A.G 1551 display	Possible cause	Corrective action
00951 Release for tailgate/trunk lid remote release -J398- (Only USA) Short to B+	◆ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram
00952 Signal driver's door open Short to B+	◆ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram

V.A.G 1551 display	Possible cause	Corrective action
00953 Time limit interior light Undefined switch position	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Interior light, reading lights and luggage compartment connections malfunctioning ◆ Interior light malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check wiring and connectors using wiring diagram - Replace interior light
00954 Starter inhibitor relay - J433- ^{1),2)} Short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Starter inhibitor relay -J433- malfunctioning (USA) 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Replace starter inhibitor relay -J433-(USA)

1) Not displayed on scan tool display at present

2) Only vehicles for USA or vehicles without immobilizer

V.A.G 1551 display	Possible cause	Corrective action
00955 Key 1 Adaptation limit exceeded	<ul style="list-style-type: none"> ◆ Key not matched ◆ Key operated more than 200 times beyond range of system 	- Read Measuring Value Block; display group number 013 ⇒ Page 01-277 , display zone 1 to 4
00956 Key 2 Adaptation limit exceeded		
00957 Key 3 Adaptation limit exceeded		
00958 Key 4 Adaptation limit exceeded		

V.A.G 1551 display	Possible cause	Corrective action
01030 Key button CL driver's side, locking Implausible signal Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock cylinder sticks ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 003 ⇒ Page 01-256 , display zone 1 - Check lock cylinder installation
01031 Key button CL driver's side, unlocking Implausible signal Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock cylinder sticks ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 003 ⇒ Page 01-256 , display zone 1 - Check lock cylinder installation

¹⁾ DTC recorded if operated for longer than 5 minutes

V.A.G 1551 display	Possible cause	Corrective action
<p>01032</p> <p>Key button CL front passenger's side, locking</p> <p style="text-align: right;">Implausible signal</p> <p style="text-align: right;">Short to Ground¹⁾</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock cylinder sticks ◆ Faulty wiring or connectors 	<p>- Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , display zone 1</p> <p>- Check lock cylinder installation</p>
<p>01033</p> <p>Key button CL front passenger's side, unlocking</p> <p style="text-align: right;">Implausible signal</p> <p style="text-align: right;">Short to Ground¹⁾</p>		<p>- Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , display zone 1</p>

¹⁾ DTC recorded if operated for longer than 5 minutes

V.A.G 1551 display	Possible cause	Corrective action
01034 Electric window thermo protection active, driver	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ Electric window sticking or binding◆ Electric window motor binding	- Read Measuring Value Block; Display group number 003 ⇒ Page 01-256 , display zone 2
01035 Electric window thermo protection active, passenger		- Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , display zone 2

V.A.G 1551 display	Possible cause	Corrective action
01036 Electric window thermo protection active, RL	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ Electric window sticking or binding◆ Electric window motor binding	- Read Measuring Value Block; Display group number 008 ⇒ Page 01-266 , display zone 2
01037 Electric window thermo protection active, RR		- Read Measuring Value Block; Display group number 007 ⇒ Page 01-264 , display zone 2

V.A.G 1551 display	Possible cause	Corrective action
01038 Central locking thermo protection	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ Door lock stiff	- Read Measuring Value Block; Display group number 014 ⇒ Page 01-279 , display zone 4
01044 Control module incorrectly coded	<ul style="list-style-type: none">◆ Control module installed does not correspond to the vehicle equipment◆ Control module supplied is not programmed or not fully programmed	- Replace control module - Inform part supplier of the problem

V.A.G 1551 display	Possible cause	Corrective action
<p>01131</p> <p>Turn signal activation</p> <p>Undefined switch position</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Fuse S144 faulty 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Perform Output Diagnostic Test Mode (DTM) ⇒ Page 01-247 - Check fuses using wiring diagram or replace
<p>01134</p> <p>Alarm horn -H12-</p> <p>Undefined switch position</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Fuse S111 faulty ◆ Alarm horn -H12 malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Perform Output Diagnostic Test Mode (DTM) ⇒ Page 01-247 - Check fuses using wiring diagram or replace - Replace alarm horn -H12-

V.A.G 1551 display	Possible cause	Corrective action
01135 Interior monitoring sensors Open circuit Malfunctioning	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Sensors for monitoring interior not installed ◆ Sensors for monitoring interior malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 009 ⇒ Page 01-268 , display zone 4 - Check installation - Replace sensors for monitoring interior
01141 Luggage compartment unlocking switch -E165- Implausible signal	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Luggage compartment unlocking switch - E165- is malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Replace luggage compartment unlocking switch -E165-

V.A.G 1551 display	Possible cause	Corrective action
01179 Incorrect key programming	◆ Matching of keys (function 10) not performed correctly	- See description for matching keys with remote control, ⇒ Page 01-285 - Read Measuring Value Block; Display group number 013 ⇒ Page 01-277 , display zones 1 to 4 ¹⁾

¹⁾ Number of keys matched ("learned") will be displayed.

V.A.G 1551 display	Possible cause	Corrective action
<p>01329</p> <p>Convenience system data BUS in emergency mode</p>	<p>◆ Faulty wiring or connectors</p>	<p>- Check wiring and connectors using wiring diagram</p> <p>Wiring OK., then:</p> <p>- Disconnect all door main connectors and reconnect one after the other while observing measured value block</p> <p>- Replace the control module that has blocked the bus</p> <p>Note: New DTC's are stored, these must be erased</p> <p>- Read Measuring Value Block; Display group number 012 ⇒ Page 01-274 , display zone 1</p>

V.A.G 1551 display	Possible cause	Corrective action
<p>01330 Central control module for convenience system -J393-</p> <p style="padding-left: 40px;">Malfunctioning</p> <p style="padding-left: 40px;">Voltage supply too high</p> <p style="padding-left: 40px;">Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Central control module for convenience system malfunctioning ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning ◆ Battery -A- malfunctioning or discharged 	<ul style="list-style-type: none"> - Replace convenience system central control module - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 014 ⇒ Page 01-279 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
<p>01331</p> <p>Door control module driver's side -J386-</p> <p>Malfunctioning</p> <p>No communication</p> <p>Voltage supply too high</p> <p>Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Door control module, driver's side -J386 malfunctioning ◆ Faulty wiring or connectors ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning ◆ Battery -A- malfunctioning or discharged 	<ul style="list-style-type: none"> - Replace door control module, driver's side -J386 - Check wiring and connectors using wiring diagram - The system, even with the DTC entry, is OK. - Erase DTC memory - Perform functional check - Using Read Measuring Value Block; display group number 012 ⇒ Page 01-274 , display zone 2, a check can be made to see if the door control module is installed or not. - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 014 ⇒ Page 01-279 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
<p>01332</p> <p>Door control module, front passenger's side -J387-</p> <p>Malfunctioning</p> <p>No communication</p> <p>Voltage supply too high</p> <p>Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Door control module, passenger's side - J387- malfunctioning ◆ Faulty wiring or connectors ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning 	<ul style="list-style-type: none"> - Replace door control module, passenger's side -J387- - Check wiring and connectors using wiring diagram - The system, even with the DTC entry, is OK. - Erase DTC memory - Perform functional check - Using Read Measuring Value Block; display group number 012 ⇒ Page 01-274 , display zone 2, a check can be made to see if the door control module is installed or not. - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 014 ⇒ Page 01-279 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
<p>01333 Door control module, rear left -J388-</p> <p>Malfunctioning</p> <p>No communication</p> <p>Voltage supply too high</p> <p>Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Door control module, rear left - J388- malfunctioning ◆ Faulty wiring or connectors ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning 	<ul style="list-style-type: none"> - Replace door control module, rear left -J388- - Check wiring and connectors using wiring diagram - The system, even with the DTC entry, is OK. - Erase DTC memory - Perform functional check - Using Read Measuring Value Block; display group number 012 ⇒ Page 01-274 , display zone 3, a check can be made to see if the door control module is installed or not. - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 014 ⇒ Page 01-279 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
<p>01334</p> <p>Door control module, rear right -J389-</p> <p>Malfunctioning</p> <p>No communication</p> <p>Voltage supply too high</p> <p>Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Door control module, rear right - J389- malfunctioning ◆ Faulty wiring or connectors ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning 	<ul style="list-style-type: none"> - Replace door control module, rear right -J389- - Check wiring and connectors using wiring diagram - The system, even with the DTC entry, is OK. - Erase DTC memory - Perform functional check - Using Read Measuring Value Block; display group number 012 ⇒ Page 01-274 , display zone 3, a check can be made to see if the door control module is installed or not. - Read Measuring Value Block; Display group number 014 ⇒ Page 01-279 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
01335 Driver's seat/mirror position control module ¹⁾ Implausible signal No communication	♦ Faulty wiring or connectors ♦ Seat memory control module diagnosis (no communication with door control module) ¹⁾	- Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 012 ⇒ Page 01-274 , display zone 4 - The seat memory is equipped with its own K wire, this can be read via address word "36"

¹⁾ Function: The control module stores the seat and mirror positions and can reset to these positions

V.A.G 1551 display	Possible cause	Corrective action
01358 Interior locking switch, driver's side -E150- Implausible signal Short to Ground	◆ Faulty wiring or connectors ◆ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 001 ⇒ Page 01-252 , display zone 2
01359 Interior locking switch, front passenger's side -E198- Implausible signal Short to Ground	◆ Faulty wiring or connectors ◆ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 001 ⇒ Page 01-252 , display zone 2

V.A.G 1551 display	Possible cause	Corrective action
01362 Close switch for tailgate/trunk lid -F124- ²⁾ Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock operating mechanism or lock cylinder mechanical components binding 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check lock operating components and make serviceable - Replace lock cylinder - Read Measuring Value Block; Display group number 010 ⇒ Page 01-270 , display zone 3
01389 Open switch for tailgate/trunk lid -F124- ²⁾ Implausible signal Short to Ground ¹⁾		

1) DTC recorded if operated for longer than 5 minutes

2) Unclip contact switch on lock cylinder housing (with small lever)

V.A.G 1551 display	Possible cause	Corrective action
01483 Activation of rear lid remote unlocking Undefined switch position	♦ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram
01484 Central locking key button, lock Short to Ground ¹⁾	♦ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram
01485 Central locking key button, unlock Short to Ground ¹⁾	♦ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram

¹⁾ DTC recorded if operated for longer than 10 seconds

Output Diagnostic Test Mode (DTM), vehicles through 05.01

The components displayed in the Output Diagnostic Test Mode (DTM) can differ depending upon the equipment fitted to the vehicle. For example on vehicles without ATA there will be no step "1" as listed in the table below.

The Output Diagnostic Test Mode (DTM) activates the following components in the stated sequence:

Step	Display in tester	Reaction
	Alarm horn (for anti-theft alarm)	- Horn sounds continuously
	Turn signal lights activation (for anti-theft alarm)	- Activated continuously (lights up cont.)
	Interior light, reading lights	- Interior and reading lights are activated
	Signal close sliding roof	- Sliding roof closes ¹⁾
	"Safe" LED driver's door	- "Safe" LED lights up
	Instrument illumination	- Switch illumination in control module active
	END	- Information: End of regular final control test

¹⁾ When performing Output Diagnostic Test Mode (DTM) "Signal close sliding roof", the ignition and S-terminal must be inactive (no key in ignition/starter switch) and one of the front doors must be open.

Special tools, testers and auxiliary items

- ◆ V.A.G 1551 scan tool or vehicle V.A.G 1552 System tester with cable V.A.G 1551/3
- ◆ V.A.G 1594 Adapter set
- ◆ V.A.G 1527 LED test light
- ◆ Wiring diagram

Work sequence

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Operate scan tool taking into account the information on the display:
- Input 03 for "Output Diagnostic Test Mode (DTM)" function.
- Switch off ignition and remove ignition key from ignition lock.

Rapid data transfer Q
03 Output Diagnostic Test Mode (DTM)



Indicated on display:

- Confirm entry with the -Q- button.

Final Control Diagnosis →



Indicated on display:

Perform Output Diagnostic Test Mode (DTM) by pressing button for individual tests: See table on ⇒ [Page 01-247](#) .

Output Diagnostic Test Mode (DTM) can be terminated by pressing the - C- button.

- Press → button.

If a component does not function:

- Continue Output Diagnostic Test Mode (DTM) to the end.

Read measuring value block, vehicles through 05.01

Special tools, testers and auxiliary items

- ◆ V.A.G 1551 Scan tool with V.A.G 1551/3 cable

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .

The measured values in the functions Read Measuring Value Block and basic setting are described during the individual component test. This table serves only as an overview.

The measured value block is divided into 16 display group numbers. The assignment of the individual display zones can be taken from the display group overview ⇒ [Page 01-252](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- (08 initiates the "Read Measuring Value Block" function).

Rapid data transfer
08 Read Measuring Value Block

Q



Indicated on display:

- Confirm entry with the -Q- button.

Read Measuring Value Block
Input display group number XX

HELP



Indicated on display:

Note:

The display group number 001 is an example, to illustrate the sequence.

- Press buttons -0-, -0- and -1- for "Display group number 1" and confirm entry with -Q- button.

Read Measuring Value Block 1 → ↩
 1 2 3 4

Indicated on display: (1 to 4 = Display zones)

Note:

To change to another display group proceed as follows:

Display group	V.A.G 1551	V.A.G 1552
Higher	Press button - 3-	Press ↑ button
Lower	Press button - 1-	Press ↓ button
Skip	Press button - C-	Press button - C-

- Displayed after pressing -C- button.

Read Measuring Value Block HELP ↩
 Input display group number XXX

Indicated on display:

- Now enter the display group number required.

Display group overview, vehicles through 05.01

Break down of display content for display group number 001

Display group 001 -Driver's door-							
Read Measuring Value Block 1				◀ Indicated on display			
xxx	xxx	xxx		◀ Display zone		Specification	
1	2	3	4	Empty ¹⁾		Evaluation	
				Electric window - Hall signal, driver's side		turns, still	⇒ Page 01-253
				Driver's interior locking switch		lock unlock not operated, implausible	
				Child safety switch		off, on, not installed	

¹⁾ Empty means in this case: Display zone is blank

Evaluating display group number 001

Display zone	Designation	Display	Corrective action
1	Child safety switch	off on not installed	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display. If the display does not change after checking connections, repair malfunction or replace relevant component. - Erase DTC memory - Perform functional check - Check DTC memory again
2	Driver's interior locking switch	lock unlock not operated implausible	
3	Window lifter - Hall signal, driver's side	turns still	

Break down of display content for display group number 002

Display group 002 -Driver's door-						
Read Measuring Value Block 2 xxx xxx xxx xxx				◀ Indicated on display		
1	2	3	4	◀ Display zones	Specification	Evaluation
				Driver's switch for rear right electric window ^{1),2)}	autom. open, autom. close, man. open, man. close not operated, implausible	⇒ Page 01-255
				Driver's switch for rear left electric window ^{1),2)}	autom. open, autom. close, man. open, man. close not operated, implausible	
				Driver's switch for front passenger's side electric window ^{1),2)}	autom. open, autom. close, man. open, man. close not operated, implausible	
				Driver's side electric window switch ^{1),2)}	autom. open, autom. close, man. open, man. close not operated, implausible	

1) Part of door control module

2) Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Evaluating display group number 002

Display zone	Description	Display	Corrective action
1	Driver's side electric window switch ¹⁾	autom. open, autom. close man. open, man. close not operated, implausible	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Perform functional check - Check DTC memory again
2	Driver's switch for front passenger's side electric window ¹⁾	autom. open, autom. close, man. open, man. close, not operated, implausible	
			Continued on next page

¹⁾ Part of door operating unit

Display zone	Description	Display	Corrective action
3	Driver's switch for rear left electric window ^{1),2)}	autom. open, autom. close, man. open, man. close, not operated implausible not installed ²⁾	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Perform functional check - Check DTC memory again
4	Driver's switch for rear right electric window ^{1),2)}	autom. open, autom. close man. open, man. close not operated, implausible not installed ²⁾	

1) Part of door operating unit

2) Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Break down of display content for display group number 003

Display group 003 -Driver's door-						
Read Measuring Value → Block 3				◀ Indicated on display		
xxx	xxx	xxx	xxx	◀ Display zones		Specification
1	2	3	4			Evaluation
				Central locking feedback, driver's side	Safe not Safe	⇒ Page 01-257
				Central locking feedback, driver's side	locked, unlocked	
				Driver's side electric window thermal protection ²⁾	active: 0 inactive: 1	
				Rotary latch switch ¹⁾	dr. open: 1, dr. closed: 0	
				Driver's central locking Key switch	Open, close, not operated, implausible	

1) There is a contact switch in door lock

2) Software thermo protection (overload protection for electric window motor). The electric window will be switched off for approx. 10 to 20 seconds

Evaluating display group number 003

Display zone	Description	Display	Corrective action
1	Key switch driver's side	Open closed not operated implausible	<ul style="list-style-type: none"> - Visual check of wiring - Check lock mechanism - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Rotary latch switch / driver's side elec. w. thermo protection	Door open: 1 Door closed: 0 EW 0: Switched off	
3	Central locking feedback "locked", driver's side	locked unlocked	
4	Central locking feedback "safe", driver's side	safe not safe	

Break down of display content for display group number 004

Display group 004 -Driver's door-						
Read Measuring Value Block 4			→ ◀ Indicated on display			
xxx	xxx	xxx				
1	2	3	4	◀ Display zones	Specification	Evaluation
				Empty ¹⁾		
				Mirror release switch, driver's side	released, engaged, not installed	⇒ Page 01-259
				Mirror selection switch, driver's side	left, right, fold, not operated	
				Mirror adjustment switch, driver's side	Pos X+, Pos X - Pos Y+, Pos Y - not operated	

¹⁾ Empty means in this case: Display zone is blank

Evaluating display group number 004

Display zone	Description	Display	Corrective action
1	Driver's mirror adjustment switch FS	Pos X+ Pos X- Pos Y+ Pos Y- not operated	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Driver's mirror selection switch	left right move mirror, not operated	
3	Driver's mirror release switch	mid. pos. end pos. not installed	

Break down of display content for display group number 005

Display group 005 -Front passenger's door-						
Read Measuring Value Block 5 xxx xxx xxx				→	◀ Indicated on display	
1	2	3	4	◀ Display zones	Specification	Evaluation
				Empty ¹⁾		
				Mirror release switch, passenger side	released, engaged, not installed	⇒ Page 01-261
				Interior locking switch, front pass. -E198- (USA only)	lock, unlock, not operated, implausible	
				Electric window switch, front passenger's side	autom. open, automatic close, man. open, man. close, not operated, implausible	

¹⁾ Empty means in this case: Display zone is blank

Evaluating display group number 005

Display zone	Description	Display	Corrective action
1	Electric window switch, front passenger's side	autom. open, autom. close, man. open, man. close not operated implausible	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Interior locking switch, front passenger's side - E198 ²⁾	locked unlocked not operated implausible ¹⁾	
3	Mirror release switch, front passenger's side	mid. pos. end pos. not installed	

1) Implausible means: both directions simultaneously!

2) Lock/unlock switch, front passenger's side

Break down of display content for display group number 006

Display group 006 -Front passenger's door-						
Read Measuring Value Block 6				→ ◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Central locking feedback, front passenger's side	Safe not Safe	⇒ Page 01-263
				Central locking feedback, front passenger's side	locked, unlocked	
				Driver's side electric window thermal protection ²⁾ Rotary latch switch ¹⁾	active: 0 inactive: 1 dr. open: 1, dr. closed: 0	
				Key switch, front passenger's side	open, closed, not operated, implausible	

1) There is a contact switch in door lock

2) Software thermo protection (overload protection for electric window motor). The electric window will be switched off for approx. 10 to 20 seconds

Evaluating display group number 006

Display zone	Description	Display	Corrective action
1	Key switch, front passenger's side	open closed not operated implausible	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Rotary latch switch ¹⁾ Electric window thermo protection ²⁾ front passenger's side	dr. open: 1 dr. closed: 0 active: 0 inactive: 1	
3	Central locking feedback, front passenger's side	locked unlocked	
4	Central locking feedback, front passenger's side	safe not safe	

1) There is a contact switch in door lock

2) Software thermo protection (overload protection for electric window motor). The electric window will be switched off for approx. 10 to 20 seconds

Break down of display content for display group number 007

Display group 007 -Rear right door-						
Read Measuring Value Block 7 xxx xxx xxx xxx				→ ◀ Indicated on display		
1	2	3	4	◀ Display zones	Specification	Evaluation
				Central locking feedback, rear right	safe, not safe	⇒ Page 01-265
				Central locking feedback, rear right	locked, unlocked	
				Electric window thermo protection, rear right	active: 0 inactive: 1	
				Rotary latch switch	dr. open: 1 dr. closed: 0	
				Electric window switch, rear right	autom. open, autom. close, man. open, man. close, not operated, implausible	

2) Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Evaluating display group number 007

Display zone	Description	Display	Corrective action
1	Electric window switch, rear right ²⁾	autom. open, autom. close, man. open, man. close not operated implausible	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Rotary latch switch Electric window thermo protection, rear right	dr. open dr. closed active: 0 inactive: 1	
3	Central locking feedback, rear right	locked unlocked	
4	Central locking feedback, rear right	safe not safe	

²⁾ Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Break down of display content for display group number 008

Display group 008 -Rear left door-						
Read Measuring Value Block 8				→ Indicated on display		
xxx	xxx	xxx	xxx	◀ Display zones		Evaluation
1	2	3	4	Central locking feedback, rear left	safe, not safe	⇒ Page 01-267
				Central locking feedback, rear left	locked, unlocked	
		Electric window thermo protection, rear left ²⁾			active: 0 inactive: 1	
		Rotary latch switch			dr. open: 1 dr. closed: 0	
	Electric window switch, rear left ²⁾				autom. open, autom. close, man. open, man. close, not operated, implausible	

²⁾ Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Evaluating display group number 008

Display zone	Description	Display	Corrective action
1	Electric window switch, rear left ²⁾	autom. open, autom. close, man. open, man. close, not operated implausible	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Rotary latch switch Electric window thermo protection, rear left	dr. open dr. closed active: 0 inactive: 1	
3	Central locking feedback, rear left	locked unlocked	
4	Central locking feedback, rear left	safe not safe	

²⁾ Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Break down of display content for display group number 009

Display group 009 -Central control module-							
Read Measuring Value Block 9				→			◀ Indicated on display
xxx	xxx	xxx	xxx				
1	2	3	4	◀ Display zones	Specification	Evaluation	
				Interior monitor sensor	yes no not installed	⇒ Page 01-269	
				Remote control module key button	open, closed, RLR ¹⁾ , Panic ²⁾ (with 0 or 1)		
				Speed signal (Steps: 2 km/h)	mv 0 km/h (steps: 2 km/h)		
				Instrument illumination (in 16 steps, 0 to 100%)	mv (in 16 steps)		

1) Only vehicles for USA, RLR= Rear lid remote release

2) Only vehicles for USA, alarm system and turn signal lights are activated

Evaluating display group number 009

Display zone	Description	Display	Corrective action
1	Instrument illumination	mv = 0 to 100% (in 16 steps)	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Speed signal	mv = km/h (steps: 2km/h)	
3	Remote control key button	unlock, lock, RLR ¹⁾ , Panic ²⁾ (with 0 or 1)	
4	Interior monitor sensor	yes no not installed	

1) Only vehicles for USA, RLR= Rear lid remote release

2) Only vehicles for USA, alarm system and turn signal lights are activated

Break down of display content for display group number 010

Display group 010 -Central control module-						
Read Measuring Value Block 10				→ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Ignition	Terminal 15 on, Terminal 15 off	⇒ Page 01-271
				Trunk lid/tailgate Key switch ²⁾	open, closed, not oper. implausibl	
				Mirror heating	on, off not installed	
				S-terminal	operated not operated	

²⁾ Unclip contact switch on lock cylinder housing (with small lever)

Evaluating display group number 010

Display zone	Description	Display	Corrective action
1	S-terminal	operated not operated	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Mirror heating	on, off not installed	
3	Trunk lid/tailgate Key switch ²⁾	open closed not oper. implausible	
4	Ignition	Terminal 15 on Terminal 15 off	

²⁾ Unclip contact switch on lock cylinder housing (with small lever)

Break down of display content for display group number 011

Display group 011 -Central control module-							
Read Measuring Value Block 11				◀ Indicated on display			
xxx	xxx	xxx	xxx	◀ Display zones		Specification	
1	2	3	4	Empty ¹⁾		⇒ Page 01-273	
				Sliding/tilting sunroof released ²⁾			yes, no
				Trunk lid/tailgate contact switch ³⁾			open, closed
				Hood contact switch			operated, not operated, not installed

1) Empty means in this case: Display zone is blank

2) The central control modules sends a delayed terminal 15 signal to sliding sun-roof control module. The operation of the sliding/tilting sun-roof (STR) is possible until a front door is opened after switching off ignition.

3) Lock rotary latch must be engaged in second stage.

Evaluating display group number 011

Display zone	Description	Display	Corrective action
1	Hood contact switch	operated not operated not installed	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant control module - Erase DTC memory - Perform functional check - Check DTC memory again
2	Trunk lid/tailgate contact switch ³⁾	open closed	
3	Sliding/tilting roof released	yes no	

³⁾ Lock rotary latch must be engaged in second stage.

Break down of display content for display group number 012

Display group 012 -Central control module-						
Read Measuring Value → Block 12				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Optional equipment	Memory / empty ¹⁾	⇒ Page 01-275
				Rear equipment	rl rl and rr rr empty ¹⁾	
				Front equipment	driver driver and passenger passenger empty ¹⁾	
Check bus					Bus OK. Bus not OK.	

¹⁾ Empty means in this case: Display zone is blank

Evaluating display group number 012

Display zone	Description	Display	Corrective action
1	Check bus	Bus OK. Bus not OK.	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - If no changes occur, separate all door main connectors and reconnect one after the other again - Observe measured value block - If display changes, replace relevant control module - Erase DTC memory - Perform functional check - Check DTC memory again
			Continued on next page

Display zone	Description	Display	Corrective action
2	Front equipment	driver driver and passenger passenger empty ¹⁾	These display zones simply show the relevant vehicle equipment - For example, checks can be made to see which control modules are actively connected to the system and which are not
3	Rear equipment	rl rl and rr rr empty ¹⁾	
4	Optional equipment	memory empty ¹⁾	

¹⁾ Empty means in this case: Display zone is blank

Example:

For DTC "Door control module (DCU), rear left not answering" can be directly seen if the DCU is connected.

For example, only "rr" is shown in display zone 3.

Break down of display content for display group number 013

Display group 013 -Central control module-						
Read Measuring Value Block 13				→ ◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Key number	mv = display 0 to 4 0: not operated	⇒ Page 01-278
				Algorithm	OK. not OK. no measured value	
				Code within effective range	OK. not OK. no measured value ¹⁾	
				Permanent code known	OK. not OK. no measured value ¹⁾	

1) If the remote control key is operated several times the third display - no measured value - will change to "OK.".

Evaluating display group number 013

Display zone	Description	Display	Corrective action
1	Permanent code known	OK. not OK. no measured value ²⁾ (Key currently not being operated)	If not OK.: - Key code is outside the code range. "Re-synchronize" radio wave remote control via function 10 (adaptation) ⇒ Page 01-285 . For no measured value: - Battery in key is discharged. Change battery. - Radio wave remote control malfunctioning, replace key.
2	Code within effective range		
3	Algorithm		
1	key number	mv = 1 to 4 ¹⁾	When operating a "synchronized" radio wave key, the position of the "synchronized" key is shown. If the tester displays "0" even when the remote key is pressed, this key must be "re-synchronized" using adaptation (10).

1) A max. of 4 remote controls can be "learned".

2) If the remote control key is operated several times the third display - no measured value - will change to "OK."

Break down of display content for display group number 014

Display group 014 -Central control module-						
Read Measuring Value Block 14				→ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	Display zones	Specification	Evaluation
				Switch positions, central locking thermo protection	0= Cut-off 1= Operation ³⁾	⇒ Page 01-280
				Interior monitoring switch-off ¹⁾	on, off, not installed	
				Rear lid button and rear lid handle ^{2,4)}	not oper. TG hndl op implausible	
				Vehicle system voltage terminal 30	Volts	

1) Interior monitoring switch-off

2) Rear lid remote opening button and rear lid handle

3) Sequence for display: Driver's side (DS), front passenger's side (FPS), rear left (RL), rear right (RR), rear lid (rear)

4) DTC recorded if operated for longer than 10 seconds

Evaluating display group number 014

Display zone	Description	Display	Corrective action
1	Vehicle system voltage terminal 30	in Volts	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	RLR button and RL handle ²⁾	not operated RLR, RL, implausible	
3	Interior monitoring switch-off ¹⁾	on, off, not installed	
4	Switch position, central locking thermo protection	11 11 1 0= Cut-off 1= Operation ³⁾	

1) Interior monitoring switch-off

2) Rear lid remote opening button and rear lid handle

3) Sequence for display: Driver's side (DS), front passenger's side (FPS), rear left (RL), rear right (RR), rear lid (rear)

Break down of display content for display group number 015

Display group 015 -Central control module-						
Read Measuring Value Block 15				→ ◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				4. Alarm source (4th last)	Display, see table on ⇒ Page 01-282	⇒ Page 01-282
				3. Alarm source (3rd last)		
				2. Alarm source (2nd last)		
				1. Alarm source (last)		

Break down of display content for display group number 015

Display zone	Description	Display	Corrective action
1	Alarm source (last)	Display see table below	Only the last 4 ATA ¹⁾ activations are shown! For example "64" = Hood contact switch (see table below for possible sources of alarm)
2	Alarm source (2nd last)		
3	Alarm source (3rd last)		
4	Alarm source (4th last)		

¹⁾ Anti-theft alarm

Possible sources of alarm	Display
Trunk lid/tailgate contact switch	1
Rear right rotary latch switch	2
Rear left rotary latch switch	4
Front pass. rotary latch switch	8
Ignition	16
Immobilizer	17
Hood contact switch	32
Ignition terminal 15	64
Driver's rotary latch switch	128
No alarm	255

Break down of display content for display group number 016

Display group 016					
Read Measuring Value Block 16					
xxx	xxx	xxx	xxx		
1	2	3	4		
→				◀ Indicated on display	
◀ Display zones				Specification	
Empty ¹⁾				⇒ Page 01-284	
Rear, first detent ²⁾					open, closed, not installed
Automatic lock / unlock switch					not relevant
Immobilizer key recognition					yes, no, not installed

1) Empty means in this case: Display zone is blank

2) Lock rotary latch must be engaged in first detent

Evaluating display group number 016

Display zone	Description	Display	Corrective action
1	Immobilizer key recognition	yes, no, not installed	<ul style="list-style-type: none"> - Visual check of wiring - Watch display and check connectors of appropriate current circuit for correct engagement and tight fit - If the display does not change when checking connectors, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Automatic lock/unlock switch	Not relevant	
3	Rear, first detent ¹⁾	open, closed, not installed	

²⁾ Lock rotary latch must be engaged in first detent

DTC tables, vehicles from 06.01 on**Note:**

- ◆ *The DTC table is listed according to the 5 digit code on the left.*
- ◆ *Some of the mentioned DTC texts are only displayed on the VAS 5051. On the V.A.G 1551, only the DTC will be printed in this case.*
- ◆ *The possible malfunctions are dependant on the respective vehicle equipment.*
- ◆ *Explanation of the malfunction types (e.g. "open circuit/short circuit to Ground"):*

⇒ *Scan tool operating instructions*

- ◆ *Before replacing components indicated as being malfunctioning, check the wiring and connectors to these components as well as the Ground connections using wiring diagram. This is particularly relevant if DTC's are output as "occurring sporadically" (SP).*
- ◆ *The DTC's displayed can be localized using the test table.*

Note:

- ◆ *This malfunction "no communication" can also appear with the door control modules. This has no influence on the function of the convenience system and is therefore of no consequence. Erase DTC memory.*

01333 049

Door CU -J388

No communication



Scan tool print-out: The number shown here in bold 049 (e.g.) has no relevance.

V.A.G 1551 display	Possible cause	Corrective action
00000 No DTC recognized	If "No DTC recognized" appears after carrying out repairs On Board Diagnostic (OBD) is ended	
00849 S-terminal on ignition/starter switch -D- Undefined switch condition	<ul style="list-style-type: none">◆ Terminal 15 OK. but S-terminal malfunctioning ◆ Faulty wiring or connectors	- Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , Display zone 3

V.A.G 1551 display	Possible cause	Corrective action
00893 Button for tailgate/rear lid release -E234- Implausible signal ¹⁾	◆ Faulty wiring or connectors	- Read Measuring Value Block; Display group number 013 ⇒ Page 01-277 , display zone 1

¹⁾ DTC recorded if button pressed for longer than 5 minutes.

V.A.G 1551 display	Possible cause	Corrective action
00912 Electric window switch FL - E40- Implausible signal Short to Ground	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Electric window switch, FL -E40-malfunctioning 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 001 ⇒ Page 01-252 , display zone 1 - Check button
00913 Electric window switch FR, driver's door -E81- Implausible signal Short to Ground	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Electric window switch, FR -E81-malfunctioning 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 002 ⇒ Page 01-254 , display zone 1 - Check button

V.A.G 1551 display	Possible cause	Corrective action
<p>00914</p> <p>Electric window switch RL, driver's door -E53-</p> <p>Implausible signal</p> <p>Short to Ground</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Electric window switch, RL -E53- malfunctioning 	<p>- Read Measuring Value Block; Display group number 002 ⇒ Page 01-254 , display zone 2</p> <p>- Check button</p>
<p>00915</p> <p>Electric window switch RR, driver's door -E55-</p> <p>Implausible signal</p> <p>Short to Ground</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Electric window switch, RR -E55- malfunctioning 	<p>- Read Measuring Value Block; Display group number 002 ⇒ Page 01-254 , display zone 3</p> <p>- Check button</p>

V.A.G 1551 display	Possible cause	Corrective action
00928 Locking unit for driver's side CL -F220- Implausible signal Wrong equipment	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on driver's door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for driver's side central locking - F220- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to driver's door control module or to door main connector (lower left footwell) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for driver's door central locking -F220- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
00929 Locking unit for front passenger's side CL -F221- Implausible signal Wrong equipment	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on front passengers door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for front passenger's central locking -F221- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to front passenger's door control module or to door main connector (lower right footwell) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for front passenger's door central locking -F221- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
<p>00930 Locking unit for left rear CL -F222-</p> <p>Implausible signal</p> <p>Wrong equipment</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on left rear door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for left rear central locking -F222- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to rear left door control module or to door main connector (in B pillar left) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for rear left central locking - F222- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
00936 Window lifter switch, front passenger's side -E107- ¹⁾ Implausible signal ¹⁾ Short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Front passenger's window lifter switch - E107- malfunctioning 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 004 ⇒ Page 01-258 , display zone 1 - Check button

¹⁾ DTC recorded if button pressed in a direction for longer than 5 minutes, or both signals (open, close) occur simultaneously.

V.A.G 1551 display	Possible cause	Corrective action
00937 Window lifter switch, rear left -E52- ¹⁾ Implausible signal Short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Window lifter switch, left rear -E52- malfunctioning 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 005 ⇒ Page 01-260 , display zone 1 - Check button

¹⁾ DTC recorded if button pressed in a direction for longer than 5 minutes, or both signals (open, close) occur simultaneously.

V.A.G 1551 display	Possible cause	Corrective action
00938 Window lifter switch, right rear -E54- ¹⁾ Implausible signal Short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Button installation not OK., sticks when operated ◆ Window lifter switch right rear -E54- malfunctioning 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 005 ⇒ Page 01-260 , display zone 3 - Check button

¹⁾ DTC recorded if button pressed in a direction for longer than 5 minutes, or both signals (open, close) occur simultaneously.

V.A.G 1551 display	Possible cause	Corrective action
00939 Mirror adjustment motor, driver's side - V149-	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ No voltage supply to driver's door◆ Driver's side mirror adjustment motor -V149- malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram- Check voltage supply to driver's door control module or to door main connector (lower left footwell) (LHD)- Replace mirror adjustment motor, driver's side -V149-

V.A.G 1551 display	Possible cause	Corrective action
00940 Mirror adjustment motor, front passenger's side - V150-	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ No voltage supply for central locking on front passengers door◆ Front passenger's side mirror adjustment motor - V150- malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram- Check voltage supply to front passenger's door control module or to door main connector (lower right footwell)- Replace mirror adjustment motor, front passenger's side - V150-

V.A.G 1551 display	Possible cause	Corrective action
00941 Exterior mirror retraction motor, driver's side -V121-	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply to driver's door ◆ Exterior mirror retraction motor, driver's side - V121- malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to driver's door control module or to door main connector (lower left footwell) (LHD) - Replace exterior mirror retraction motor, driver's side - V121- - Check exterior mirror retraction function¹⁾

¹⁾ To do this the vehicle must be driven at ≥ 15 km/h (9 mph) either on a rolling road or during a test drive. The mirrors must not be retracted again. Retracting mirrors must though return to their normal position.

V.A.G 1551 display	Possible cause	Corrective action
00942 Exterior mirror retraction motor, passenger's side - V122-	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply to passenger's door ◆ Exterior mirror retraction motor, passenger's side - V122- malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to passenger's door control module or to door main connector (lower right footwell) (LHD) - Replace exterior mirror retraction motor, passenger's side -V122- - Check exterior mirror retraction function¹⁾

¹⁾ To do this the vehicle must be driven at ≥ 15 km/h (9 mph) either on a rolling road or during a test drive. The mirrors must not be retracted again. Retracting mirrors must though return to their normal position.

V.A.G 1551 display	Possible cause	Corrective action
00943 Heated exterior mirror, driver's side - Z4-	<ul style="list-style-type: none"> ◆ Mirror heater not installed ◆ Faulty wiring or connectors ◆ No voltage supply to driver's/front passenger's doors 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 003 ⇒ Page 01-256 , display zone 4. Measured value block shows if rear window button is being read correctly - Check wiring and connectors using wiring diagram - Check voltage supply to door control modules or to door main connectors (lower left and right foot wells)
00944 Heated exterior mirror, front passenger's side - Z5-		

V.A.G 1551 display	Possible cause	Corrective action
00945 Crash sensor for front airbag -G190- Short to Ground	♦ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram - Output can also be checked using Output Diagnostic Test Mode (DTM) ⇒ Page 01-87
00946 Interior light -W- Short to B+	♦ Faulty wiring or connectors ♦ Interior light or one of the reading lights are malfunctioning	- Check wiring and connectors using wiring diagram - Replace interior light or malfunctioning reading light

V.A.G 1551 display	Possible cause	Corrective action
00947 Tailgate/trunk lid remote control switch -E188- Short to Ground	<ul style="list-style-type: none">◆ Faulty wiring or connectors ◆ Tailgate/trunk lid remote control switch -E188- malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram - Replace tailgate/trunk lid remote control switch -E188-
00948 Signal, close sliding roof Short to B+	<ul style="list-style-type: none">◆ Faulty wiring or connectors	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram

V.A.G 1551 display	Possible cause	Corrective action
<p>00949 Motor for tailgate/trunk lid CL - V53- lock¹⁾</p> <p style="text-align: right;">Undefined switch position</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock mechanical components are stiff/partially seized ◆ Tailgate/trunk lid lock/unlock motor malfunctioning^{1), 2)} 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check lock mechanical components and make serviceable - Replace tailgate/trunk lid lock/unlock motor^{1), 2)}
<p>00950 Motor for tailgate/trunk lid CL - V53- unlock²⁾</p> <p style="text-align: right;">Undefined switch position</p>		

1) Lock = Lock

2) Unlock = Unlock

V.A.G 1551 display	Possible cause	Corrective action
00951 Release for tailgate/trunk lid remote release -J398- (Only USA) Short to B+	◆ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram
00952 Signal driver's door open Short to B+	◆ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram

V.A.G 1551 display	Possible cause	Corrective action
00953 Time limit interior light Undefined switch position	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Interior light, reading lights and luggage compartment connections malfunctioning ◆ Interior light malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check wiring and connectors using wiring diagram - Replace interior light
00954 Starter inhibitor relay - J433- ^{1),2)} Short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Starter inhibitor relay -J433- malfunctioning (USA) 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Replace starter inhibitor relay -J433-(USA)

1) Not displayed on scan tool display at present

2) Only vehicles for USA or vehicles without immobilizer

V.A.G 1551 display	Possible cause	Corrective action
00955 Key 1 Adaptation limit exceeded	<ul style="list-style-type: none"> ◆ Key not matched ◆ Key operated more than 200 times beyond range of system 	- Read Measuring Value Block; display group number 014 ⇒ Page 01-279 , display zone 1 to 4
00956 Key 2 Adaptation limit exceeded		
00957 Key 3 Adaptation limit exceeded		
00958 Key 4 Adaptation limit exceeded		

V.A.G 1551 display	Possible cause	Corrective action
01030 Key button CL driver's side, locking Implausible signal Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock cylinder sticks ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 007 ⇒ Page 01-264 , display zone 1 - Check lock cylinder installation
01031 Key button CL driver's side, unlocking Implausible signal Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock cylinder sticks ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 007 ⇒ Page 01-264 , display zone 1 - Check lock cylinder installation

¹⁾ DTC recorded if operated for longer than 5 minutes

V.A.G 1551 display	Possible cause	Corrective action
<p>01032 Key button CL front passenger's side, locking</p> <p style="text-align: right;">Implausible signal</p> <p style="text-align: right;">Short to Ground¹⁾</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock cylinder sticks ◆ Faulty wiring or connectors 	<p>- Read Measuring Value Block; Display group number 007 ⇒ Page 01-264 , display zone 2</p> <p>- Check lock cylinder installation</p>
<p>01033 Key button CL front passenger's side, unlocking</p> <p style="text-align: right;">Implausible signal</p> <p style="text-align: right;">Short to Ground¹⁾</p>		<p>- Read Measuring Value Block; Display group number 007 ⇒ Page 01-264 , display zone 2</p>

¹⁾ DTC recorded if operated for longer than 5 minutes

V.A.G 1551 display	Possible cause	Corrective action
01034 Electric window thermo protection active, driver	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ Electric window sticking or binding◆ Electric window motor binding	- Read Measuring Value Block; Display group number 001 ⇒ Page 01-252 , display zone 2
01035 Electric window thermo protection active, passenger		- Read Measuring Value Block; Display group number 004 ⇒ Page 01-258 , display zone 2

V.A.G 1551 display	Possible cause	Corrective action
01036 Electric window thermo protection active, RL	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ Electric window sticking or binding◆ Electric window motor binding	- Read Measuring Value Block; Display group number 005 ⇒ Page 01-261 , display zone 2
01037 Electric window thermo protection active, RR		- Read Measuring Value Block; Display group number 005 ⇒ Page 01-261 , display zone 4

V.A.G 1551 display	Possible cause	Corrective action
01038 Central locking thermo protection	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ Door lock stiff	<ul style="list-style-type: none">- Read Measuring Value Block; Display group number 008 ⇒ Page 01-266 , display zone 4
01044 Control module incorrectly coded	<ul style="list-style-type: none">◆ Control module installed does not correspond to the vehicle equipment◆ Control module supplied is not programmed or not fully programmed	<ul style="list-style-type: none">- Replace control module- Inform part supplier of the problem

V.A.G 1551 display	Possible cause	Corrective action
01131 Turn signal activation Undefined switch position	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Fuse S144 faulty 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Perform Output Diagnostic Test Mode (DTM) ⇒ Page 01-247 - Check fuses using wiring diagram or replace
01134 Alarm horn -H12- Undefined switch position	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Fuse S111 faulty ◆ Alarm horn -H12- malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Perform Output Diagnostic Test Mode (DTM) ⇒ Page 01-247 - Check fuses using wiring diagram or replace - Replace alarm horn -H12-

V.A.G 1551 display	Possible cause	Corrective action
01179 Incorrect key programming	◆ Matching of keys (function 10) not performed correctly	- See description for matching keys with remote control, ⇒ Page 01-285 - Read Measuring Value Block; Display group number 014 ⇒ Page 01-279 , display zones 1 to 4

V.A.G 1551 display	Possible cause	Corrective action
<p>01329</p> <p>Convenience system data BUS in emergency mode</p>	<p>◆ Faulty wiring or connectors</p>	<p>- Check wiring and connectors using wiring diagram</p> <p>Wiring OK., then:</p> <p>- Disconnect all door main connectors and reconnect one after the other while observing measured value block</p> <p>- Replace the control module that has blocked the bus</p> <p>Note: New DTC's are stored, these must be erased</p> <p>- Read Measuring Value Block; Display group number 011 ⇒ Page 01-272 , display zone 4</p>

V.A.G 1551 display	Possible cause	Corrective action
<p>01330 Central control module for convenience system -J393-</p> <p style="text-align: center;">Malfunctioning</p> <p style="text-align: center;">Voltage supply too high</p> <p style="text-align: center;">Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Central control module for convenience system malfunctioning ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning ◆ Battery -A- malfunctioning or discharged 	<ul style="list-style-type: none"> - Replace convenience system central control module - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
<p>01331</p> <p>Door control module driver's side -J386-</p> <p>Malfunctioning</p> <p>No communication</p> <p>Voltage supply too high</p> <p>Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Door control module, driver's side -J386- malfunctioning ◆ Faulty wiring or connectors ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning ◆ Battery -A- malfunctioning or discharged 	<ul style="list-style-type: none"> - Replace door control module, driver's side -J386- - Check wiring and connectors using wiring diagram - The system, even with the DTC entry, is OK. - Erase DTC memory - Perform functional check - Using Read Measuring Value Block; display group number 012 ⇒ Page 01-274 , display zone 2, a check can be made to see if the door control module is installed or not. - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
<p>01332</p> <p>Door control module, front passenger's side -J387-</p> <p>Malfunctioning</p> <p>No communication</p> <p>Voltage supply too high</p> <p>Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Door control module, passenger's side - J387- malfunctioning ◆ Faulty wiring or connectors ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning 	<ul style="list-style-type: none"> - Replace door control module, passenger's side -J387- - Check wiring and connectors using wiring diagram - The system, even with the DTC entry, is OK. - Erase DTC memory - Perform functional check - Using Read Measuring Value Block; display group number 012 ⇒ Page 01-274 , display zone 2, a check can be made to see if the door control module is installed or not. - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
<p>01333 Door control module, rear left -J388-</p> <p>Malfunctioning</p> <p>No communication</p> <p>Voltage supply too high</p> <p>Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Door control module, rear left - J388- malfunctioning ◆ Faulty wiring or connectors ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning 	<ul style="list-style-type: none"> - Replace door control module, rear left -J388- - Check wiring and connectors using wiring diagram - The system, even with the DTC entry, is OK. - Erase DTC memory - Perform functional check - Using Read Measuring Value Block; display group number 012 ⇒ Page 01-274 , display zone 3, a check can be made to see if the door control module is installed or not. - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
<p>01334</p> <p>Door control module, rear right -J389-</p> <p>Malfunctioning</p> <p>No communication</p> <p>Voltage supply too high</p> <p>Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Door control module, rear right - J389- malfunctioning ◆ Faulty wiring or connectors ◆ Battery -A- malfunctioning or discharged ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning 	<ul style="list-style-type: none"> - Replace door control module, rear right -J389- - Check wiring and connectors using wiring diagram - The system, even with the DTC entry, is OK. - Erase DTC memory - Perform functional check - Using Read Measuring Value Block; display group number 012 ⇒ Page 01-274 , display zone 4, a check can be made to see if the door control module is installed or not. - Read Measuring Value Block; Display group number 006 ⇒ Page 01-262 , display zone 1

V.A.G 1551 display	Possible cause	Corrective action
01335 Driver's seat/mirror position control module ¹⁾ Implausible signal No communication	♦ Faulty wiring or connectors ♦ Seat memory control module diagnosis (no communication with door control module) ¹⁾	- Check wiring and connectors using wiring diagram - The seat memory is equipped with its own K wire, this can be read via address word "36"

¹⁾ Function: The control module stores the seat and mirror positions and can reset to these positions

V.A.G 1551 display	Possible cause	Corrective action
<p>01358</p> <p>Interior locking switch, driver's side -E150-</p> <p>Implausible signal</p> <p>Short to Ground</p>	<p>◆ Faulty wiring or connectors</p> <p>◆ Faulty wiring or connectors</p>	<p>- Check wiring and connectors using wiring diagram</p> <p>- Read Measuring Value Block; Display group number 007 ⇒ Page 01-264 , display zone 3</p>
<p>01359</p> <p>Interior locking switch, front passenger's side -E198-</p> <p>Implausible signal</p> <p>Short to Ground</p>	<p>◆ Faulty wiring or connectors</p> <p>◆ Faulty wiring or connectors</p>	<p>- Check wiring and connectors using wiring diagram</p> <p>- Read Measuring Value Block; Display group number 007 ⇒ Page 01-264 , display zone 4</p>

V.A.G 1551 display	Possible cause	Corrective action
01362 Close switch for tailgate/trunk lid -F124- ²⁾ Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock operating mechanism or lock cylinder mechanical components binding 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check lock operating components and make serviceable - Replace lock cylinder - Read Measuring Value Block; Display group number 008 ⇒ Page 01-266 , display zone 2
01389 Open switch for tailgate/rear lid -F124- ²⁾ Implausible signal Short to Ground ¹⁾		

¹⁾ DTC recorded if operated for longer than 5 minutes

²⁾ Unclip contact switch on lock cylinder housing (with small screwdriver). -F124-
 =Contact switch in locking cylinder for tailgate/anti-theft alarm/central locking

V.A.G 1551 display	Possible cause	Corrective action
01483 Activation of rear lid remote unlocking Undefined switch position	♦ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram
01484 Central locking key button, lock Short to Ground ¹⁾	♦ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram
01485 Central locking key button, unlock Short to Ground ¹⁾	♦ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram

¹⁾ DTC recorded if operated for longer than 10 seconds

Output Diagnostic Test Mode (DTM), vehicles from 06.01 on

The components displayed in the Output Diagnostic Test Mode (DTM) can differ depending upon the equipment fitted to the vehicle. For example on vehicles without ATA there will be no step "1" as listed in the table below.

The Output Diagnostic Test Mode (DTM) activates the following components in the stated sequence:

Step	Display in tester	Reaction
1	Interior light, reading lights	- Interior and reading lights are activated
2	"Safe" LED driver's door	- "Safe" LED lights up
3	Instrument illumination	- Switch illumination in control module active
4	Signal close sliding roof	- Sliding roof closes ¹⁾
5	Turn signal lights activation (for anti-theft alarm)	- Activated continuously (lights up cont.)
6	Alarm horn (for anti-theft alarm)	- Horn sounds continuously
7	END	- Information: End of regular final control test

¹⁾ When performing Output Diagnostic Test Mode (DTM) "Signal close sliding roof", the ignition and S-terminal must be inactive (no key in ignition/starter switch) and one of the front doors must be open.

Special tools, testers and auxiliary items

- ◆ V.A.G 1551 Scan tool or V.A.G 1552 vehicle system tester with V.A.G 1551/3 cable
- ◆ V.A.G 1594 Adapter set
- ◆ V.A.G 1527 LED test light
- ◆ Wiring diagram

Work sequence

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Operate scan tool taking into account the information on the display:
- Input 03 for "Output Diagnostic Test Mode (DTM)" function.
- Switch off ignition and remove ignition key from ignition lock.

Rapid data transfer Q
03 Output Diagnostic Test Mode (DTM)



Indicated on display:

- Confirm entry with the -Q- button.

Final Control Diagnosis →



Indicated on display:

Perform Output Diagnostic Test Mode (DTM) by pressing button for each individual tests: See table on ⇒ [Page 01-247](#) .

Output Diagnostic Test Mode (DTM) can be terminated by pressing the - C- button.

- Press → button.

If a component does not function:

- Continue Output Diagnostic Test Mode (DTM) to the end.

Read measuring value block, vehicles from 06.01 on

Special tools, testers and auxiliary items

- ◆ V.A.G 1551 Scan tool with V.A.G 1551/3 cable

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .

The measured values in the functions Read Measuring Value Block and basic setting are described during the individual component test. This table serves only as an overview.

The measured value block is divided into 16 display group numbers. The assignment of the individual display zones can be taken from the display group overview ⇒ [Page 01-252](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- (08 initiates the "Read Measuring Value Block" function).

Rapid data transfer
08 Read Measuring Value Block

Q



Indicated on display:

- Confirm entry with the -Q- button.

Read Measuring Value Block
Input display group number XX

HELP



Indicated on display:

Note:

The display group number 001 is an example, to illustrate the sequence.

Read Measuring Value Block 1 →

1 2 3 4



- Press buttons -0-, -0- and -1- for "Display group number 1" and confirm entry with -Q- button.

Indicated on display: (1 to 4 = Display zones)

Note:

To change to another display group proceed as follows:

Display group	V.A.G 1551	V.A.G 1552
Higher	Press button - 3-	Press ↑ button
Lower	Press button - 1-	Press ↓ button
Skip	Press button - C-	Press button - C-

- Displayed after pressing -C- button.

Read Measuring Value Block HELP

Input display group number XXX



Indicated on display:

- Now enter the display group number required.

Display group overview, vehicles from 06.01 on

Break down of display content for display group number 001

Display group 001 -Driver's door-						
Read measured value block 1 xxx xxx xxx				→ ◀ Indicated on display		
1	2	3	4	◀ Display zone	Specification	Evaluation
				Empty ¹⁾		
				Child safety switch	yes, no, not installed	⇒ Page 01-253
				Driver's side electric window thermal protection ²⁾	yes, no	
				Electric window - Hall signal, driver's side	autom. open, autom. close, man. open, man. close not operated, implausible	

1) Empty means in this case: Display zone is blank

2) Software thermo protection (overload protection for electric window motor). The electric window will be switched off for approx. 10...20 seconds

Evaluating display group number 001

Display zone	Designation	Display	Corrective action
1	Window regulator - Hall signal, driver's side	autom. open, autom. close, man. open, man. close not operated, implausible	- Functions only when ignition is "on"
2	Driver's side electric window thermal protection ¹⁾	yes, no	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display. If the display does not change after checking connections, repair malfunction or replace relevant component. - Erase DTC memory - Perform functional check - Check DTC memory again
3	Child safety switch	off on not installed	

Break down of display content for display group number 002

Display group 002 -Driver's door-					
Read measured value block 2 →					
<div style="display: flex; align-items: center;"> ◀ Indicated on display </div>					
xxx	xxx	xxx	xxx		
1	2	3	4	Specification	Evaluation
			<div style="display: flex; align-items: center;"> ◀ Display zones </div>		
			Empty ¹⁾		⇒ Page 01-255
			Driver's switch for rear right electric window ^{1),2)}	autom. open, autom. close, man. open, man. close not operated, implausible	
			Driver's switch for rear left electric window ^{2),3)}	autom. open, autom. close, man. open, man. close not operated, implausible	
			Driver's switch for front passenger's side electric window ^{2),3)}	autom. open, autom. close, man. open, man. close not operated, implausible	

1) Empty means in this case: Display zone is blank

2) Part of door control module

3) Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Evaluating display group number 002

Display zone	Description	Display	Corrective action
1	Driver's switch for front passenger's side electric window ¹⁾	autom. open, autom. close, man. open, man. close, not operated, implausible	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Perform functional check - Check DTC memory again
2	Driver's switch for rear left electric window ^{1),2)}	autom. open, autom. close, man. open, man. close, not operated implausible not installed ²⁾	
3	Driver's switch for rear right electric window ^{1),2)}	autom. open, autom. close man. open, man. close not operated, implausible not installed ²⁾	

¹⁾ Part of door operating unit

²⁾ Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Break down of display content for display group number 003

Display group 003 -Driver's door-						
Read measured value block 3				→ ◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	Display zones	Specification	Evaluation
				Mirror heating	on, off not installed	⇒ Page 01-257
				Empty ¹⁾		
				Mirror selection switch, driver's side	left, right, fold, not operated	
				Mirror adjustment switch, driver's side	Pos X+, Pos X - Pos Y+, Pos Y - not operated	

¹⁾ Empty means in this case: Display zone is blank

Evaluating display group number 003

Display zone	Description	Display	Corrective action
1	Driver's mirror adjustment switch FS	Pos X+ Pos X- Pos Y+ Pos Y- not operated	<ul style="list-style-type: none"> - Visual check of wiring - Check lock mechanism - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Driver's mirror selection switch	left right move mirror, not operated	
3			
4	Mirror heating	on, off not installed	

Break down of display content for display group number 004

Display group 004 -Passenger's door-						
Read measured value block 4 xxx xxx xxx			→ ◀ Indicated on display			
1	2	3	4	Display zones	Specification	Evaluation
				◀ Display zones Empty ¹⁾		
				Empty ¹⁾		⇒ Page 01-259
				Passenger's side electric window thermal protection ²⁾	yes, no	
				Electric window switch, front passenger's side	autom. open, autom. close, man. open, man. close not operated, implausible	

1) Empty means in this case: Display zone is blank

2) Software thermo protection (overload protection for electric window motor). The electric window will be switched off for approx. 10...20 seconds

Evaluating display group number 004

Display zone	Description	Display	Corrective action
1	Electric window switch, front passenger's side	autom. open, autom. close, man. open, man. close not operated implausible	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely whilst simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Passenger's side elec. w. thermo protection ¹⁾	yes, no	
3			
4			

¹⁾ Software thermo protection (overload protection for electric window motor). The electric window will be switched off for approx. 10...20 seconds

Break down of display content for display group number 005

Display group 005 -Rear doors-						
Read measured value block 5 xxx xxx xxx			→ ◀ Indicated on display			
1	2	3	4	Display zones	Specification	Evaluation
				Electric window thermo protection, rear right ²⁾	yes, no	⇒ Page 01-261
				Electric window switch, rear right ¹⁾	autom. open, autom. close, man. open, man. close, not operated, implausible	
				Electric window thermo protection, rear left ²⁾	yes, no	
				Electric window switch, rear left ¹⁾	autom. open, autom. close, man. open, man. close, not operated, implausible	

¹⁾ Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

²⁾ Software thermo protection (overload protection for electric window motor). The electric window will be switched off for approx. 10...20 seconds

Evaluating display group number 005

Display zone	Description	Display	Corrective action
1	Electric window switch, rear left ¹⁾	autom. open, autom. close, man. open, man. close, not operated implausible	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Electric window thermo protection, rear left ²⁾	yes, no	
3	Electric window switch, rear right ¹⁾	autom. open, autom. close, man. open, man. close not operated implausible	
4	Electric window thermo protection, rear right ²⁾	yes, no	

¹⁾ Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

²⁾ Software thermo protection (overload protection for electric window motor). The electric window will be switched off for approx. 10...20 seconds

Break down of display content for display group number 006

Display group 006						
Read measured value block 6				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Speed signal (Steps: 2 km/h)	mv 0 km/h (steps: 2 km/h)	⇒ Page 01-263
				S-terminal	operated	
				Ignition	not operated	
				Vehicle system voltage terminal 30	Terminal 15 on, Terminal 15 off	
					Volts	

Evaluating display group number 006

Display zone	Description	Display	Corrective action
1	Vehicle system voltage terminal 30	in Volts	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Ignition	Terminal 15 on Terminal 15 off	
3	S-terminal	operated not operated	
4	Speed signal	mv = km/h (steps: 2km/h)	

Break down of display content for display group number 007

Display group 007 -Driver's and passenger's door-						
Read measured value block 7 xxx xxx xxx xxx				Indicated on display		
1	2	3	4	Display zones	Specification	Evaluation
				Interior locking switch, front pass. -E198- ¹⁾ (USA only)	lock, unlock, not operated, implausible ²⁾	⇒ Page 01-265
				Driver's interior locking switch	lock unlock not operated, implausible ²⁾	
				Key switch, front passenger's side	open, closed, not operated, implausible	
				Driver's central locking Key switch	Open, close, not operated, implausible	

1) Lock/unlock switch, front passenger's side

2) Implausible means: both directions simultaneously!

Evaluating display group number 007

Display zone	Description	Display	Corrective action
1	Driver's mirror adjustment switch FS	Open closed not operated implausible ²⁾	<ul style="list-style-type: none"> - Visual check of wiring - Check lock mechanism - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Key switch, front passenger's side	open closed not operated implausible	
3	Driver's interior locking switch	lock unlock not operated implausible ²⁾	
4	Interior locking switch, front passenger's side - E198- ¹⁾	locked unlocked not operated implausible ²⁾	

- 1) Lock/unlock switch, front passenger's side
- 2) Implausible means: both directions simultaneously!

Break down of display content for display group number 008

Display group 008 -Central control module-						
Read measured value block 8 xxx xxx xxx xxx				→ ◀ Indicated on display		
1	2	3	4	◀ Display zones	Specification	Evaluation
				Switch positions, central locking thermo protection	yes, no	⇒ Page 01-267
				Rear lid/tailgate contact switch 1)	open, closed	
				Rear lid/tailgate Key switch 2)	open, closed, not oper. implausible	
				Hood contact switch	operated, not operated, not installed	

1) Lock rotary latch must be engaged in second stage.

2) Unclip contact switch on lock cylinder housing (with small lever)

Evaluating display group number 008

Display zone	Description	Display	Corrective action
1	Hood contact switch	operated not operated not installed	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely whilst simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Rear lid/tailgate Key switch ²⁾	open closed not oper. implausible	
3	Rear lid/tailgate contact switch ¹⁾	open closed implausible	
4	Switch position, central locking thermo protection	yes, no	

1) Lock rotary latch must be engaged in second stage.

2) Unclip contact switch on lock cylinder housing (with small lever)

Break down of display content for display group number 009

Display group 009 -Central control module-						
Read measured value → block 9				◀ Indicated on display		
xxx	xxx	xxx	xxx	◀ Display zones		Specification
1	2	3	4			Evaluation
			Central locking feedback, rear right	safe, not safe locked, unlocked	⇒ Page 01-269	
			Central locking feedback, rear left	safe, not safe locked, unlocked		
			Central locking feedback, front passenger's side	Safe not Safe locked, unlocked		
			Central locking feedback, driver's side	Safe not Safe locked, unlocked		

1) Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Evaluating display group number 009

Display zone	Description	Display	Corrective action
1	Central locking feedback "locked", driver's side	safe not safe locked unlocked	<ul style="list-style-type: none"> - Visual check of wiring - Check lock mechanism - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Central locking feedback, front passenger's side	safe not safe locked unlocked	
3	Central locking feedback, rear left 1)	safe not safe locked unlocked	
4	Central locking feedback, rear right 1)	safe not safe locked unlocked	

1) Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Break down of display content for display group number 010

Display group 010 -Central control module-						
Read measured value →				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	Display zones	Specification	Evaluation
				Rotary latch switch, rear right ²⁾¹⁾	dr. open: 1 dr. closed: 0	⇒ Page 01-271
				Rotary latch switch, rear left ²⁾¹⁾	dr. open: 1 dr. closed: 0	
				Passenger's side rotary latch switch ¹⁾	dr. open: 1, dr. closed: 0	
				Driver's side rotary latch switch ¹⁾	dr. open: 1, dr. closed: 0	

1) There is a contact switch in door lock

2) Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Evaluating display group number 010

Display zone	Description	Display	Corrective action
1	Driver's side rotary latch switch ¹⁾	Door open: 1 Door closed: 0	<ul style="list-style-type: none"> - Visual check of wiring - Check lock mechanism - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Passenger's side rotary latch switch ¹⁾	dr. open: 1 dr. closed: 0	
3	Rotary latch switch, rear left ²⁾ 1)	dr. open: 1 dr. closed: 0	
4	Rotary latch switch, rear right ²⁾ 1)	dr. open: 1 dr. closed: 0	

1) There is a contact switch in door lock

2) Rear left and rear right for 2 door and Midi (4 door with electric front windows): not installed

Break down of display content for display group number 011

Display group 011						
Read measured value block 11				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	Display zones	Specification	Evaluation
				Two-wire	Two-wire	⇒ Page 01-273
				Sliding/tilting sunroof released ¹⁾	yes, no	
				Automatic lock / unlock switch	operated, not oper. implausible	
Immobilizer key recognition					yes, no, not installed	

1) The central control modules sends a delayed terminal 15 signal to sliding sun-roof control module. Operating the sliding/tilting sun-roof (STR) from inside vehicle is still possible until a front door is opened after switching off ignition.

Evaluating display group number 011

Display zone	Description	Display	Corrective action
1	Immobilizer key recognition	yes, no, not installed	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant control module - Erase DTC memory - Perform functional check - Check DTC memory again
2	Automatic lock/unlock switch	operated, not oper. implausible	
3	Sliding/tilting roof released ¹⁾	yes no	
4	One-wire/two-wire	two-wire = OK, Both data bus wires OK one-wire = not OK One wire of data bus wiring defective	- Check data bus to control module using wiring diagram

¹⁾ The central control modules sends a delayed terminal 15 signal to sliding sun-roof control module. Operating the sliding/tilting sun-roof (STR) from inside vehicle is still possible until a front door is opened after switching off ignition.

Break down of display content for display group number 012

Display group 012						
Read measured value block 12				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Door control module, right rear	RR door 1	⇒ Page 01-275
				Door control module, left rear	RL door 1	
				Door control module, passenger's side	ps.door 1	
				Door control module, driver's side	dr. door 1	

Evaluating display group number 012

Display zone	Description	Display	Corrective action
1	Door control module, driver's side	<p>dr. door = OK</p> <p>Data reception from driver's side door control module via convenience data bus OK</p> <p>dr. door 0= not OK</p> <p>No data reception from driver's side door control module via convenience data bus</p>	<p>If data bus reception not OK</p> <p>- Check data bus to control module using wiring diagram</p>
2	Door control module, passenger's side	<p>ps. door = OK</p> <p>Data reception from passenger's side door control module via convenience data bus OK</p> <p>ps. door 0= not OK</p> <p>No data reception from passenger's side door control module via convenience data bus</p>	
			Continued on next page

Evaluating display group number 012 - continued

Display zone	Description	Display	Corrective action
3	Door control module, rear left	RL door = OK Data reception from rear left door control module via convenience data bus OK RL door 0= not OK No data reception from rear left door control module via convenience data bus	If data bus reception not OK - Check data bus to control module using wiring diagram
4	Door control module, rear right	RR door = OK Data reception from rear right door control module via convenience data bus OK RR door 0= not OK No data reception from rear right door control module via convenience data bus	

Example:

For fault "Door control module (DCU), rear left not answering" can be directly seen if the DCU is connected.

For example, only "rr" is shown in display zone 3.

Break down of display content for display group number 013

Display group 013 -Central control module-							
Read measured value → block 13				◀ Indicated on display			
xxx	xxx	xxx	xxx	◀ Display zones		Specification	
1	2	3	4	Empty ¹⁾		Evaluation	
				Instrument illumination (in 16 steps, 0...100%)		mv (in 16 steps)	⇒ Page 01-278
				Rear, first detent ²⁾		open, closed, not installed	
				Rear lid button and rear lid handle ^{3,4)}		not oper. TG hndl op implausible	

1) Empty means in this case: Display zone is blank

2) Lock rotary latch must be engaged in first detent

3) Rear lid remote opening button and rear lid handle

4) Fault recorded if operated for longer than 10 seconds

Evaluating display group number 013

Display zone	Description	Display	Corrective action
1	RLR button and RL handle ¹⁾²⁾	not operated RLR, RL, implausible	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check memory again
2	Rear, first detent ³⁾	open, closed, not installed	
3	Instrument illumination	mv = 0...100% (in 16 steps)	

1) Rear lid remote opening button and rear lid handle

2) Fault recorded if operated for longer than 10 seconds

3) Lock rotary latch must be engaged in first detent

Break down of display content for display group number 014

Display group 014 -Central control module-						
Read measured value block 14				→ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	Display zones	Specification	Evaluation
				Key number	mv = display 0...4 0: not operated	⇒ Page 01-280
				Algorithm	OK. not OK. no measured value	
				Code within effective range	OK. not OK. no measured value ¹⁾	
				Permanent code known	OK. not OK. no measured value ¹⁾	

1) If the remote control button is operated several times the third display - no measured value - will change to "OK.".

Evaluating display group number 014

Display zone	Description	Display	Corrective action
1	Permanent code known	OK. not OK. no measured value ²⁾ (Key currently not being operated)	If not OK.: - Key code is outside the code range. "Re-synchronize" radio wave remote control via function 10 (adaptation) ⇒ Page 01-285 . For no measured value: - Battery in key is discharged. Change battery. - Radio wave remote control faulty, replace key.
2	Code within effective range		
3	Algorithm		
4	Key number	mv = 1...4 ¹⁾	When operating a "synchronised" radio wave key, the position of the "synchronised" key is shown. If the tester displays "0" even when the remote button is pressed, this key must be "re-synchronised" using adaptation (10).

1) A max. of 4 remote controls can be "learned".

2) If the remote control key is operated several times the third display - no measured value - will change to "OK."

Break down of display content for display group number 015

Display group 015 -Central control module-						
Read measured value block 15				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Empty ¹⁾		⇒ Page 01-282
				Interior monitoring switch-off ²⁾	on, off, not installed	
				Interior monitor sensor	yes no not installed	
				Remote control module key button	open, closed, RLR ³⁾ , Panic ⁴⁾ (with 0 or 1)	

1) Empty means in this case: Display zone is blank

2) Interior monitoring switch-off

3) Only vehicles for USA, RLR = Rear lid remote release

4) Only vehicles for USA, alarm system and turn signal lights are activated

Break down of display content for display group number 015

Display zone	Description	Display	Corrective action
1	Remote control key button	unlock, lock, RLR ²⁾ , Panic ³⁾ (with 0 or 1)	- If necessary adapt radio wave remote control (Function 10, adaptation ⇒ Page 01-285)
3	Interior monitor sensor	yes no not installed	
3	Interior monitoring switch-off ¹⁾	on, off, not installed	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again

1) Interior monitoring switch-off

2) Only vehicles for USA, RLR = Rear lid remote release

3) Only vehicles for USA, alarm system and turn signal lights are activated

Break down of display content for display group number 016

Display group 016 -Central control module-						
Read measured value block 16				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				4. Alarm source (4th last)	mv = Display, see table on ⇒ Page 01-284	⇒ Page 01-284
				3. Alarm source (3rd last)		
				2. Alarm source (2nd last)		
				1. Alarm source (last)		

Evaluating display group number 016

Display zone	Description	Display	Corrective action
1	Alarm source (last)	See table below	Only the last 4 ATA ¹⁾ activations are shown! For example "2" = Front passenger rotary latch switch (see table below for possible sources of alarm)
2	Alarm source (2nd last)		
3	Alarm source (3rd last)		
4	Alarm source (4th last)		

¹⁾ Anti-theft alarm

Possible sources of alarm	Display
Driver's rotary latch switch	1
Front passenger rotary latch switch.	2
Rear left rotary latch switch	4
Rear right rotary latch switch	8
Rear lid/tailgate contact switch	16
Immobilizer	17
Engine hood contact switch	32
Ignition	64
No alarm	255

Adaptation

Ignition keys, matching to radio wave remote control

Note:

- ◆ *If new or additional ignition keys are required they must be matched to the immobilizer and convenience system control electronics.*
- ◆ *The matching procedure must always be carried out for all the ignition keys, including the existing ones.*
- ◆ *The number of keys already matched will be displayed when the adaptation (matching) function is selected.*
- ◆ *With the introduction of this generation of convenience system it is possible to program additional functions. The functions and the programming are described ⇒ [Page 01-292](#) .*
- ◆ *The matching can be interrupted with the "C" button of the V.A.G 1551.*

WARNING!

The V.A.G 1551 dealership number (workshop code) will be stored in immobilizer control module when matching ignition keys.

Prerequisites

- ◆ All ignition keys available. If no old ignition key is available see "Lost key procedure",

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01; Matching ignition keys](#)

- ◆ Key fob with covered secret number is available, if not see "Establishing secret number",

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01; Matching ignition keys](#)

- Insert correct profile ignition key in the ignition lock.
- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .

The adaptation shown here is only an example.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -1- and -0- (10 selects function "Adaptation").

Rapid data transfer
10 - Adaptation

Q



Indicated on display:

- Confirm entry with the -Q- button.

Adaptation
Enter channel number XX



Indicated on display:

- Press buttons -0- and -0- (all buttons are erased with channel number 00).

- Confirm entry with the Q button.

Note:

It is not possible to match a new or additional key(s) without erasing existing learned/matched key(s).

Adaptation Erase learned values	Q	◀	Indicated on display: - Confirm entry with the -Q- button.
Adaptation Learned values are erased	→	◀	Indicated on display: - Press → button.
Rapid data transfer Select function XX	HELP	◀	Indicated on display: - Press buttons -1- and -0- (10 selects function "Adaptation").
Rapid data transfer 10 - Adaptation	Q	◀	Indicated on display: - Confirm entry with the -Q- button.
Adaptation Enter channel number XX		◀	Indicated on display: - Press buttons -0- and -1- (all keys are "learned" with channel number 01).
Adaptation Enter channel number 01	Q	◀	Indicated on display: - Confirm entry with the -Q- button.

<p>Channel 1.....Adaptation 1 Key 1</p>	<p>→ <-1 3-></p>	<p>←</p>	<p>Indicated on display:</p> <p>The top line displays number of keys to be "learned" (standard =1). Select number of keys with buttons 1 and 3.</p> <ul style="list-style-type: none"> - Press → button.
<p>Channel 1.....Adaptation 1 Enter matching value XXXXX</p>	<p>→</p>	<p>←</p>	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Press the -0- button four times and then enter the number of all ignition keys to be matched, including the existing key, (e.g. 00003); max. possible Qty. 4. - Press → button.
<p>Channel 1 Adaptation 3 Key 3</p>	<p>Q <-1 3-></p>	<p>←</p>	<p>Indicated on display: Number of radio wave key to be "learned".</p> <ul style="list-style-type: none"> - Confirm entry with the -Q- button.
<p>Channel 1 Adaptation 3 Store amended value?</p>	<p>Q</p>	<p>←</p>	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Confirm entry with the -Q- button.
<p>Channel 1 Adaptation 1 Amended value is stored</p>	<p>→</p>	<p>←</p>	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Press → button.
<p>Rapid data transfer Select function XX</p>	<p>HELP</p>	<p>←</p>	<p>Indicated on display:</p>

- A button must be pressed once, for at least 1 second, on each of the radio wave keys to be "learned" (in example above, 3 keys).
- Switch off ignition and remove ignition key.
- Perform functional check (e.g. 3) of radio wave keys.

Note:

- ◆ *All 3 keys (see example) can be "learned" in one matching sequence.*
- ◆ *15 seconds must not be exceeded when matching all ignition keys (pressing a button).*
- ◆ *A successful adaptation can be determined via Read Measuring Value Block, function 08, display group number 013, ⇒ [Page 01-277](#). When operation the radio wave unit both of first measurement values must have the status OK. Simultaneously the last measurement value will show the positional number of the button (i.e. first, second, third, fourth button).*
- ◆ *If the remote control button is operated several times the third display -no measured value- changes to "OK".*

The matching of ignition keys is automatically terminated when:

- ◆ number of keys to be matched is reached.
- ◆ a button of one of the keys to be "learned" is pressed frequently.
- ◆ Permissible matching period of 15 seconds is exceeded (DTC is stored).

- Select function 02 "Check DTC memory". If there is no DTC stored, the matching of the Keys has been successfully completed.

- Press buttons -0- and -6- to end the output.

Rapid data transfer

06 End output

Q



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer

Enter address word XX

HELP



Indicated on display:

- Switch off ignition.

- Disconnect connector to V.A.G 1551 scan tool.

New additional key, matching

From model year 1999

- Insert a correct profile ignition key (old) in the ignition switch/lock.
- Switch on ignition.
- Lock the vehicle mechanically (driver's door) with a new key (to be learned) and then operate one of the radio wave keys on the key.
- Then after a pause of more than one second operate the radio wave key on the key a second time.
- The adaptation process is completed and will be confirmed by the vehicle horn sounding.

Radio wave remote control function variations, vehicles through 05.98

The various functions listed in the table can be called up and adapted by selecting the channel numbers 03 to 10.

Channel number	Relevance	Measured value
03	Auto-lock ²⁾	on=1 off=0
04	Auto-unlock ²⁾	on=1 off=0
05	IM switch-off ¹⁾	on=1 off=0
08	unlock = turn signals flash	on=1 off=0
09	lock = turn signals flash	on=1 off=0
10	Settings Alarm horn	1=Rest Eur. 2=Germany 3=GB

1) Interior monitoring

2) The vehicle will be locked at a speed of 15 km/h (approx. 9.5 MPH)

3) The vehicle will be locked at a speed of 15 km/h (approx. 9.5 MPH) and unlocked when ignition key is removed

The various functions listed in the table can be called up and adapted by selecting the channel numbers 03 to 10.

Radio wave remote control functional variations, vehicles from 06.98 on

Channel number	Significance	Measured value
03	Auto lock/unlock: Vehicles will be locked when a speed of 15 km/h is reached	on=1 off= 0
04	Auto lock/unlock: Vehicles will be unlocked when the ignition key is withdrawn from the ignition lock	on=1 off= 0
05	IM switch-off: Interior monitoring is activated or deactivated by operating central locking closed twice	on=1 off= 0
06	Horn sounds when unlocking: Confirmation signal when unlocking ¹⁾	on=1 off= 0
07	Horn sounds when locking: Confirmation signal when locking ¹⁾	on=1 off= 0
08	Turn signals flash when unlocking: Unlocking is confirmed by turn signals flashing twice	on=1 off= 0
09	Horn sounds when locking: Locking is confirmed by turn signals flashing once	on=1 off= 0
10	Setting for alarm horn: Programming the horn operation when the alarm is triggered appropriate to the legislation of the countries	1= Rest of Europe 2= Germany 3= Great Britain

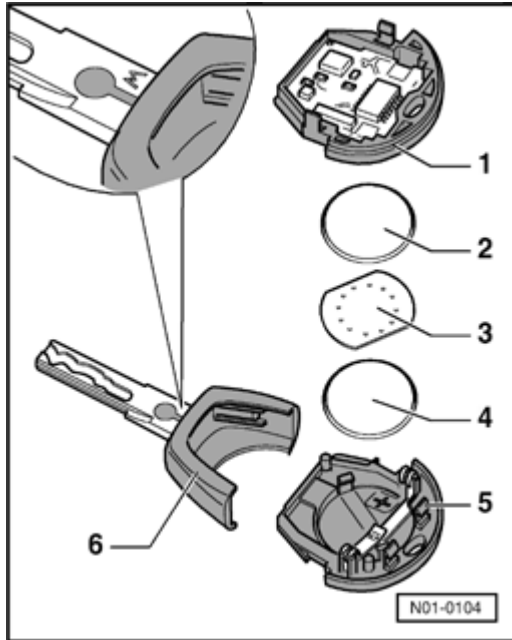
¹⁾ No longer allowed according to German legislation.

The matching shown here is only an example.

<p>Rapid data transfer Select function XX</p>	<p>HELP</p>	<p>←</p>	<p>Indicated on display: - Press buttons -1- and -0- (10 selects function "Adaptation").</p>
<p>Rapid data transfer 10 - Adaptation</p>	<p>Q</p>	<p>←</p>	<p>Indicated on display: - Confirm entry with the -Q- button.</p>
<p>Adaptation Enter channel number XX</p>		<p>←</p>	<p>Indicated on display: - Press buttons -0- and -8- (channel number 08 switches the turn signals on or off when unlocking).</p>
<p>Adaptation Enter channel number 08</p>	<p>Q</p>	<p>←</p>	<p>Indicated on display: - Confirm entry with the -Q- button.</p>
<p>Channel 8 Adaptation 1 Unlock Flashing on <-1 3-></p>	<p>→</p>	<p>←</p>	<p>Indicated on display: - Press → button.</p>
<p>Channel 8.....Adaptation 1 Enter adaptation value XXXXX</p>		<p>←</p>	<p>Indicated on display: - Press button -0- five times (e.g. 00000).</p>
<p>Channel 8.....Adaptation 0 Enter adaptation value 00000</p>	<p>Q</p>	<p>←</p>	<p>Indicated on display: - Confirm entry with the -Q- button.</p>

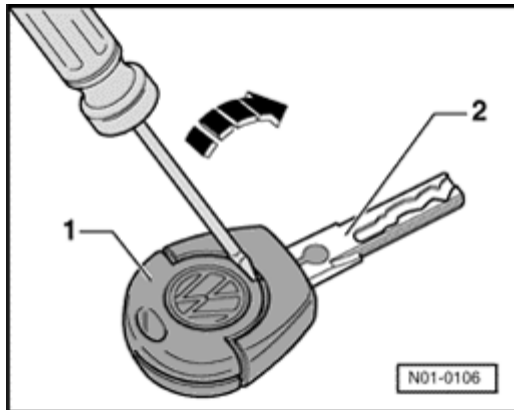
Channel 8 Adaptation 0 Unlock Flashing off <-1 3->	Q	←	Indicated on display: - Confirm entry with the -Q- button.
Channel 8 Adaptation 0 Store amended value?	Q	←	Indicated on display: - Confirm entry with the -Q- button.
Channel 8 Adaptation 0 Amended value is stored	→	←	Indicated on display: - Press → button.
Rapid data transfer Select function XX	HELP	←	Indicated on display: - Press buttons -0- and -6- to end the output.
Rapid data transfer 06 End output	Q	←	Indicated on display: - Confirm entry with the -Q- button.
Rapid data transfer Enter address word XX	HELP	←	Indicated on display: - Switch off ignition. - Disconnect connector to V.A.G 1551scan tool.

Batteries for the main key with radio wave remote control, removing and installing



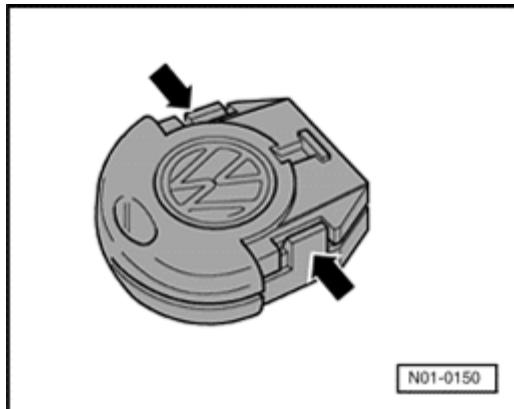
- 1 - Transmitter unit - upper part (turned-over)
- 2 - Key battery
- 3 - Contact plate
- 4 - Key battery
- 5 - Transmitter unit - lower part
- 6 - Main key with variable code transponder

To be able to differentiate between a key with transponder and a key with variable code transponder the main key has a "w" stamped on it.

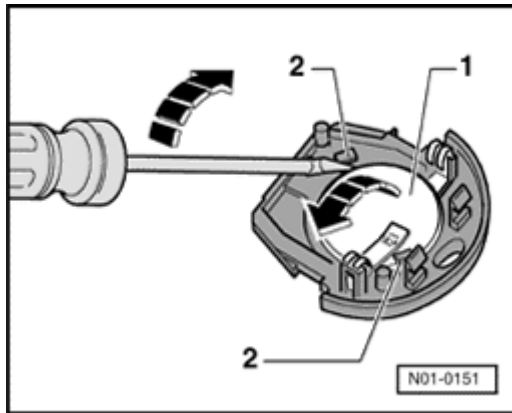


Removing

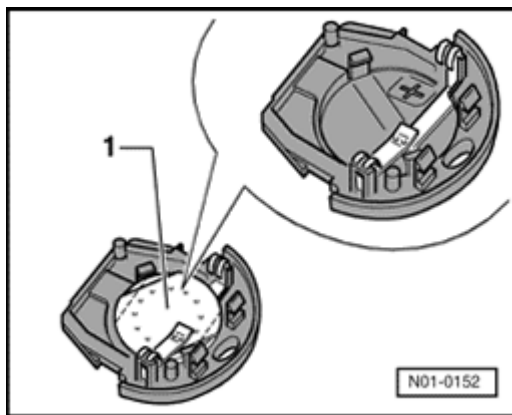
- ◀ - Insert a screwdriver in the slot between the transmitter unit -1- and the main key -2-.
- Move the screwdriver in direction of arrow and unclip the transmitter unit from the main key.



- ◀ - Lever the transmitter unit apart on the two locating lugs (arrows).



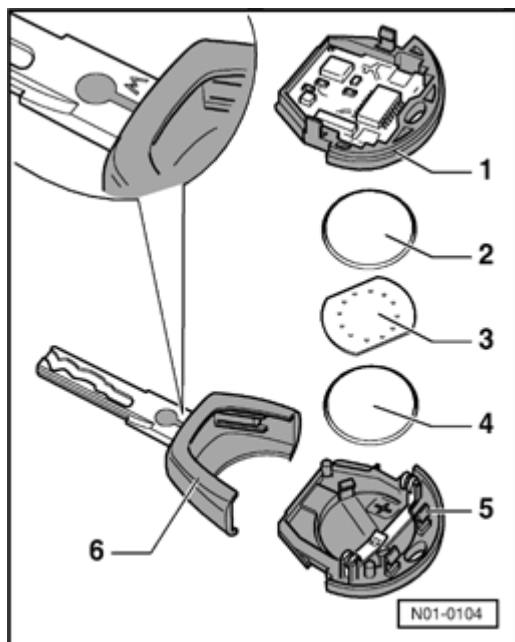
- Unclip upper battery -1- from the retainers -2- with a screwdriver in direction of arrow.



- The contact plate -1- has two straight edges. When these edges are turned towards the retainers the contact plate can be removed.
- The contact plate can also be unclipped with a screwdriver.
- Now unclip the lower battery from the retainers with a screwdriver.

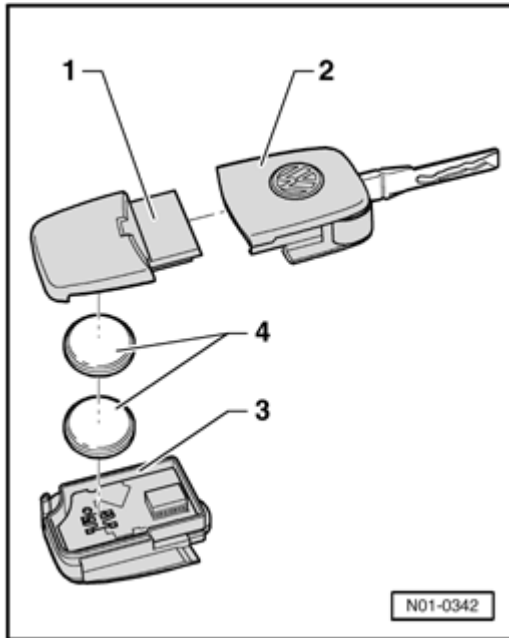
Installing

Note the polarity and correct position when installing the batteries.



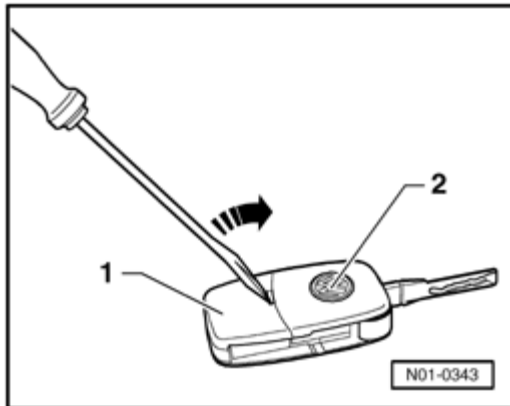
- Place the battery -4- with the positive terminal downwards into the sensor unit (positive terminal is marked on housing).
- Now place the contact plate -3- on the battery -4-.
- Place battery -2- with the positive terminal downwards onto the contact plate and secure.
- Place sensor unit -1- and sensor unit -5- together and clip together.
- Then engage the transmitter unit with the main key.

Batteries for the main key (folding) with radio wave remote control, removing and installing



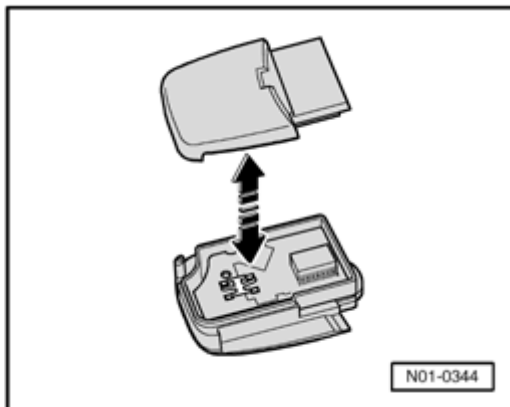
A

- 1 - Transmitter unit - upper part (turned-over)
- 2 - Main key with variable code transponder
- 3 - Transmitter unit - lower part
- 4 - Key battery

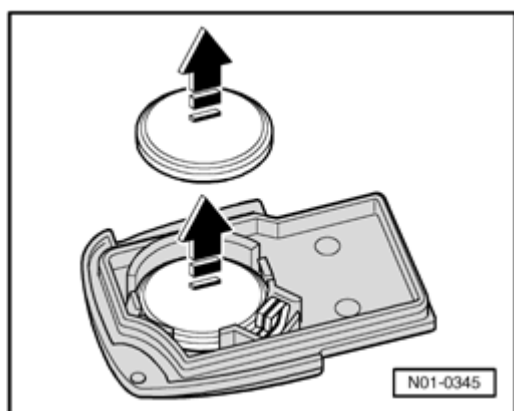


Removing

- Insert a screwdriver in the slot between the transmitter unit -1- and the main key -2-.
- Move the screwdriver in direction of arrow and unclip the transmitter unit from the main key.



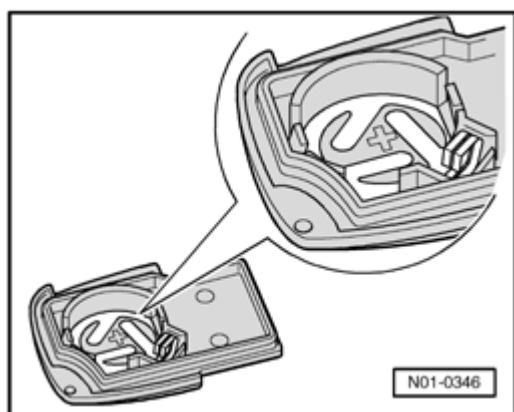
- Press the transmitter unit apart in direction of arrow.



- ✦ - Unclip batteries from the retainers in direction of arrow using a screwdriver.

Installing

Note the polarity and correct position when installing the batteries.



- ✦ - Place the battery with the positive terminal downwards into the sensor unit (positive terminal is marked on housing).
- Engage battery in transmitter body by pressing down lightly.
- Install cover on transmitter body (do not damage seal).
- Then engage the transmitter unit with the main key.

Central locking system (vehicles without power windows), On Board Diagnostic (OBD)

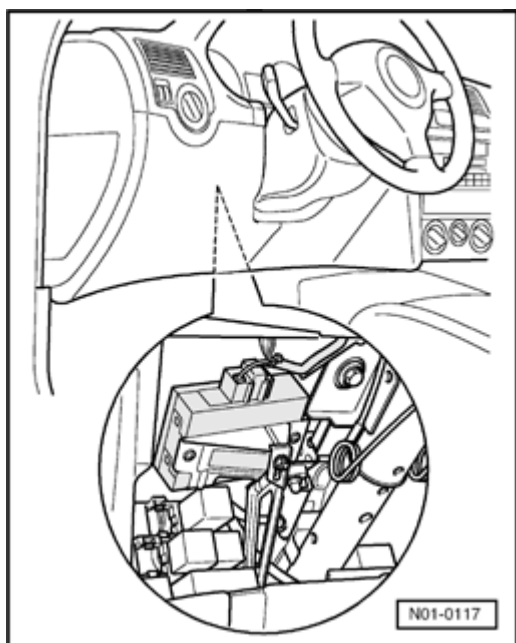
Functional description

The locking units located in the doors (door lock) have an electric motor.

The motor locks the door and also takes care of the "Safe" condition, i.e. after locking at an external lock (door lock, tailgate, radio remote control) the vehicle is protected against theft and can no longer be unlocked from the interior. The feedback on the respective condition in control module occurs via the contact switch in the locking unit.

All the known convenience functions can be performed with the electric convenience system, interior lights control, ATA with interior monitoring and the radio remote control.

If the Airbag Control Module is triggered, a signal is sent to the convenience control module to unlock the doors.



✦ The Central Locking Control Module -J379- is located under the instrument panel and is secured by a bracket to the steering column. It is equipped with a DTC memory. The On Board Diagnostic (OBD) connection is located under the driver's knee bar to left of the steering wheel.

The control module detects malfunctions in the central locking system and stores them in a permanent memory.

To commence troubleshooting, initiate self-diagnosis and retrieve the stored information with the V.A.G 1551 scan tool.

V.A.G 1552 System tester may also be used.

The malfunction information displayed is used to refer to a DTC table with notes on the possible causes for directed repair measures.

Malfunctions which can be attributed to a temporary open circuit in the wiring or a loose contact, will also be stored. These malfunctions will be displayed as sporadic DTCs "SP".

Determining the items which have possibly triggered the anti-theft alarm system

The breakdown of the display content illustrated on ⇒ [Page 01-368](#) for the display group number 10 gives information as to which component triggered the alarm system last, and can therefore help the troubleshooting/rectification.

This "DTC memory" cannot be erased.

Only statistical malfunctions are considered:

- ◆ Central locking inoperative
- ◆ Mirror positioning motor inoperative
- ◆ Electric window positioning motor inoperative
- ◆ CAN communication inoperative

Note:

Before changing a component erase DTC memory, perform functional checks and check DTC memory again.

System active indicator

The optical central locking system active indicator is via an additional LED in the upper part of the driver's door inner trim. The LED flashes for a period of time and then goes out.

When the LED is activated it will differentiate between the following functions:

- Central locking using SAFE system (lock once) LED activation then 50 milliseconds on and 950 milliseconds off, when the safe condition is obtained.
- Central locking not using SAFE system (lock twice) LED goes out.

The anti-theft alarm system (ATA) is not always displayed.

Convenience system, initiating On Board Diagnostic (OBD)

Test prerequisites:

- ◆ Voltage supply and fuses for the respective system OK.
- ◆ To initiate the On Board Diagnostic (OBD) the ignition must be switched on "Terminal 15 on".

Note:

- ◆ *If the display remains blank, check V.A.G 1551 voltage supply according to wiring diagram.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- ◆ *Additional operating information can be printed out depending on the program by pressing the HELP button of V.A.G 1551.*
- ◆ *The → button is used for advancing the program sequence.*
- ◆ *The PRINT button is used for switching on the printer (warning lamp in button lights up).*
- ◆ Connecting scan tool ⇒ [Page 01-3](#)

- Switch on ignition.
- Switch on printer with Print button (warning lamp in button lights up).

			- Press button -1- for "Rapid data transfer" mode.
Rapid data transfer	HELP	◀	Indicated on display:
Enter address word XX			Address word for the central locking: 35
Rapid data transfer	HELP	◀	Indicated on display:
Enter address word XX			- Press buttons -3- and -5-.
Rapid data transfer	Q	◀	Indicated in display after entering the address word 35:
35 Central locking			- Confirm entry with the -Q- button.
			and then the following appears in the display:
Rapid data transfer		◀	Indicated on display:
Tester sends the address word 35			
1C0962258 XX Cent. Lock.	0001 →	◀	The control module identification will be shown on the V.A.G 1551 display, e.g.:
Coding XXXXX	WSC XXXXX		
			- Press → button.
Rapid data transfer	HELP	◀	Indicated on display:
Select function XX			

Selectable functions, overview

	page
01 - Check Control Module Version	⇒ Page 01-310
02 - Check DTC Memory	⇒ Page 01-317
03 - Output Diagnostic Test Mode	⇒ Page 01-344
05 - Erase DTC Memory	⇒ Page 01-320
06 - End Output	⇒ Page 01-322
07 - Code Control Module	⇒ Page 01-313
08 - Read Measuring Value Block	⇒ Page 01-347
10 - Adaptation	⇒ Page 01-372

Note:

- ◆ *A list of possible functions is printed out after pressing the HELP button.*
- ◆ *Do not select further functions, which can be printed out after pressing the HELP button.*
- ◆ *After the function is completed the V.A.G 1551 returns to the following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display:

Check Control Module Version

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-307](#) .
- Switch on ignition.
- Press button -1- for "Rapid data transfer" mode.
- Switch on printer with Print button (warning lamp in button lights up).
- Press buttons -0- and -1-.

Rapid data transfer

Q



Indicated on display:

01-Check Control Module Version

- Confirm entry with the -Q- button.

1C0962258 XX Cent. Lock.

0001



The control module identification will be shown on the V.A.G 1551 scan tool display, e.g.:

Coding XXXXX

WSC XXXXX

Breakdown of the display:

◆ Upper line	Part No. of control module system designation (XX ²) Cent. Locking 0001)
◆ Lower line	Code number (dealer code number) ¹⁾

1)- Will be automatically stored in the control module when entering the system.

2) A number or number/letter combination (03 or 6Q, or others) indicate a correct programming of the control module.

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

Note:

Rapid data transfer HELP
control module does not answer!



◆ *If one of the malfunction messages opposite appears in the display, the possible causes of the malfunction can be printed out with the HELP button.*

Rapid data transfer HELP
K wire not switching to B+!



◆ *Ignition must be switched on.*

Rapid data transfer →
No signal from control module!



◆ *Malfunctions have occurred at the start of or during the program (external interference?).*

Rapid data transfer →
Fault in communication build up



◆ *Check diagnosis wires as well as voltage supply and Ground connection.*

- Press buttons -0- and -6- to end the output.

Rapid data transfer Q
06 End output



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer HELP
Enter address word XX



Indicated on display:

- Switch off ignition.

- Disconnect connector to V.A.G 1551 scan tool.

Central locking control module, coding

Note:

- ◆ *When supplied the control module is precoded according to the vehicle equipment.*
- ◆ *The coding is performed with the V.A.G 1551 scan tool ⇒ [Page 01-314](#) .*

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-307](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -7- (with 07 the function "Code control module" is selected).

Rapid data transfer
07 Code control module

Q



Indicated on display:

- Confirm entry with the -Q- button.

Code control module
Enter code number XXXXX (0-32000)

Q



Indicated on display:

- Enter code number according to table:

Coding table, vehicles with central locking
➤ 05.01

Address word	Code number	
	2 doors	4 doors
35 Central Locking Manual windows, one door	00256	04096
35 Central Locking Manual windows, all doors	00257	04097

Coding table, vehicles with central locking
06.01 ➤

Address word	Code number	
	2 doors	4 doors
35 Central Locking Manual windows, one door	00016	00018
35 Central Locking Manual windows, all doors	00017	00019

1C0962258 XX Cent. Lock. 00001 →
Coding XXXXX WSC XXXXX

- Confirm entry with the Q button.



The control module identification number will be displayed with the corresponding letter index, the code number and the workshop code.

If the contents of the display are as shown then the coding is successful.

If the code number entered is not accepted by the control module, the previous coding will appear in the display:

1C0962258 XX Cent. Lock 00001 →
Coding XXXXX WSC XXXXX



Indicated on display:

In this case the control module has not been programmed with the relevant data for the vehicle. A check must then be completed to see if the correct control module for the vehicle has been installed (compare Part No. and letter index), or whether an incorrect code number has been entered.

- Repeat coding.

If the control module cannot be coded (correct control module, correct code number), the control module is malfunctioning.

Ending function:

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -6- to end the output.
- Confirm entry with the -Q- button.

Rapid data transfer
06 End output

Q



Indicated on display:

- Switch off ignition.
- Disconnect connector to V.A.G 1551 scan tool.

Check DTC Memory

Note:

The vehicle system tester V.A.G 1552 can be used instead of the V.A.G 1551 scan tool, however a print-out is not possible.

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-307](#) .
- Switch on printer with Print button (warning lamp in button lights up).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -2- (the function "Check DTC memory" is entered with 02).

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Press "Print" button
- Confirm entry with the -Q- button.

X DTCs recognized!



The number of stored malfunctions appears in the display.

The stored malfunctions are displayed and printed out one after the other.

Note:

If a DTC is recognized:

◆ 1 . **Repair malfunction**

◆ 2. *Erase DTC memory (function 05).*

◆ 3. *Check DTC memory again (function 02).*

- The DTCs printed out can be repaired with aid of DTC table ⇒ [Page 01-323](#) .

- The function "Read Measuring Value Block" ⇒ [Page 01-347](#) and Display group overview ⇒ [Page 01-349](#) are additional aids.

The measured value block is divided into 10 display group numbers. The assignment of the individual display zones can be taken from the display group overview ⇒ [Page 01-349](#) .

No DTC recognized!



If "No DTC recognized" is displayed the program will return to the initial position after pressing the → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

If something else is displayed:

⇒ *Scan tool operating instructions*

- Press buttons -0- and -6- to end the output.

- Rapid data transfer** **Q** ◀ Indicated on display:
06 End output
- Confirm entry with the -Q- button.

- Rapid data transfer** **HELP** ◀ Indicated on display:
Enter address word XX
- Switch off ignition.
- Disconnect connector to V.A.G 1551 scan tool.

Erase DTC memory

Note:

The vehicle V.A.G 1552 System tester can be used instead of the V.A.G 1551 scan tool, however a print-out is not possible.

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-307](#) .

Prerequisites:

- ◆ DTCs are repaired
- ◆ Functional check has been carried out
- ◆ DTC memory checked again

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -5- (the function "Erase DTC memory" is entered with 05).

Rapid data transfer
05 Erase DTC memory

Q



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer
DTC memory is erased!

→



Indicated on display:

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

WARNING!

DTC memory was not checked



Note:

- ◆ *If this appears in the display, the test sequence is faulty.*
- ◆ *Adhere strictly to test sequence; first of all check DTC memory, then erase memory.*
- Press buttons -0- and -6- to end the output.

Rapid data transfer

Q

06 End output



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer

HELP

Enter address word XX



Indicated on display:

- Switch off ignition.
- Disconnect connector to V.A.G 1551 scan tool.

End Output

- Press buttons -0- and -6- to end the output.

Rapid data transfer Q
06 End output



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer HELP
Enter address word XX



Indicated on display:

- Switch off ignition.
- Disconnect connector to V.A.G 1551 scan tool.

DTC table

Note:

- ◆ *The DTC table is listed according to the 5 digit code on the left.*
- ◆ *Some of the mentioned DTC texts are only displayed on the VAS 5051. On the V.A.G 1551, only the DTC will be printed in this case.*
- ◆ *The possible malfunctions are dependant on the respective vehicle equipment.*
- ◆ *Explanation of the malfunction types (e.g. "open circuit/short circuit to Ground"):*

⇒ *Scan tool operating instructions*

- ◆ *Before replacing components indicated as malfunctioning, check the wiring and connectors to these components as well as the Ground connections using wiring diagram. This is particularly relevant if malfunctions are output as "occurring sporadically" (SP).*
- ◆ *The malfunctions displayed can be localized using the test table.*
- ◆ *This malfunction "no communication" can also appear with the door control modules. This has no influence on the function of the convenience system and is therefore of no consequence. Erase DTC memory.*

01333 049

Door CU -J388

no communication



Scan tool print-out: The number shown here in bold 049 (e.g.) has no relevance.

V.A.G 1551 display	Possible cause	Corrective action
00000 No DTC recognized	If "No DTC recognized" appears after carrying out repairs On Board Diagnostic (OBD) is ended	
00668 Vehicle voltage terminal 30 Signal too small	<ul style="list-style-type: none">◆ Battery discharged◆ Faulty wiring or connectors	<ul style="list-style-type: none">- Charge battery- Check wiring and connectors using wiring diagram

V.A.G 1551 display	Possible cause	Corrective action
00849 S-terminal on ignition/starter switch -D- Undefined switch condition	<ul style="list-style-type: none">◆ Terminal 15 OK. but S-terminal faulty ◆ Faulty wiring or connectors	- Read Measuring Value Block; Display group number 006 ⇒ Page 01-359 , Display zone 1

V.A.G 1551 display	Possible cause	Corrective action
00928 Locking unit for driver's side CL -F220- Implausible signal Wrong equipment	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on driver's door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for driver's side central locking - F220- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to driver's door control module or to door main connector (lower left footwell) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for driver's door central locking -F220- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
00929 Locking unit for front passenger's side CL -F221- Implausible signal Wrong equipment	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on front passenger's door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for front passenger's central locking -F221- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to front passenger's door control module or to door main connector (lower right footwell) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for front passenger's door central locking -F221- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
00930 Locking unit for rear left CL -F222- Implausible signal Wrong equipment	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on rear left door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for rear left central locking -F222- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to rear left door control module or to door main connector (in B pillar left) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for rear left central locking - F222- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
<p>00931</p> <p>Locking unit for rear right CL -F223-</p> <p>Implausible signal</p> <p>Wrong equipment</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ No voltage supply for central locking on rear right door ◆ Lock unit mechanics and operating components are stiff/partially seized ◆ Locking unit for rear right central locking - F223- malfunctioning ◆ Wrong locking unit installed¹⁾ 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check voltage supply to rear right door control module or to door main connector (in B pillar right) - Check lock unit mechanical components and operating components and make serviceable - Replace locking unit for rear right central locking - F223- - Replace locking unit

¹⁾ If a rest of world lock is installed in a USA vehicle, there is a safe feedback via an additional switch (safe switch).

V.A.G 1551 display	Possible cause	Corrective action
00945 Crash sensor for front airbag -G190- Short to Ground	♦ Faulty wiring or connectors	- Check wiring and connectors using wiring diagram - Output can also be checked using Output Diagnostic Test Mode (DTM) for airbag ⇒ Page 01-87
00946 Interior light -W- Short to B+	♦ Faulty wiring or connectors ♦ Interior light or one of the reading lights are malfunctioning	- Check wiring and connectors using wiring diagram - Replace interior light or malfunctioning reading light

V.A.G 1551 display	Possible cause	Corrective action
00947 Tailgate/trunk lid remote control switch -E188- Short to Ground	<ul style="list-style-type: none">◆ Faulty wiring or connectors ◆ Tailgate/trunk lid remote control switch -E188- malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram - Replace tailgate/trunk lid remote control switch -E188-

V.A.G 1551 display	Possible cause	Corrective action
<p>00949</p> <p>Motor for tailgate/trunk lid CL lock</p> <p>Undefined switch position</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock mechanical components are stiff/partially seized ◆ Tailgate/trunk lid lock/unlock motor malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check lock mechanical components and make serviceable - Replace tailgate/trunk lid lock/unlock motor
<p>00950</p> <p>Motor for tailgate/trunk lid CL unlock</p> <p>Undefined switch position</p>		
<p>00951</p> <p>Release for tailgate/trunk lid remote release -J398- (Only USA)</p> <p>Short to B+</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram

V.A.G 1551 display	Possible cause	Corrective action
00953 Time limit interior light Undefined switch position	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Interior light, reading lights and luggage compartment connections malfunctioning ◆ Interior light malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check wiring and connectors using wiring diagram - Replace interior light
00954 Starter inhibitor relay - J433- ^{1),2)} Short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Starter inhibitor relay -J433- malfunctioning (USA) 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Replace starter inhibitor relay -J433-(USA)

1) Not displayed on scan tool display at present

2) Only vehicles for USA or vehicles without immobilizer

V.A.G 1551 display	Possible cause	Corrective action
00955 Key 1 Adaptation limit exceeded	<ul style="list-style-type: none"> ◆ Key not matched ◆ Key operated more than 200 times beyond range of system 	- Read Measuring Value Block; display group number 006 ⇒ Page 01-367 , display zone 2
00956 Key 2 Adaptation limit exceeded		
00957 Key 3 Adaptation limit exceeded		
00958 Key 4 Adaptation limit exceeded		

V.A.G 1551 display	Possible cause	Corrective action
01030 CL key button driver's side, locking Implausible signal Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock cylinder sticks ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 001 ⇒ Page 01-350 , display zone 3 - Check lock cylinder installation
01031 CL key button driver's side, unlocking Implausible signal Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock cylinder sticks ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Read Measuring Value Block; Display group number 001 ⇒ Page 01-350 , display zone 3 - Check lock cylinder installation

¹⁾ Malfunction recorded if operated for longer than 5 minutes

V.A.G 1551 display	Possible cause	Corrective action
01032 CL key button passenger's side, locking Implausible signal Short to Ground ¹⁾	♦ Faulty wiring or connectors ♦ Lock cylinder sticks ♦ Faulty wiring or connectors	- Read Measuring Value Block; Display group number 002 ⇒ Page 01-351 , display zone 3 - Check lock cylinder installation
01033 CL key button passenger's side, unlocking Implausible signal Short to Ground ¹⁾	♦ Faulty wiring or connectors ♦ Lock cylinder sticks ♦ Faulty wiring or connectors	- Read Measuring Value Block; Display group number 002 ⇒ Page 01-351 , display zone 3 - Check lock cylinder installation

¹⁾ Malfunction recorded if operated for longer than 5 minutes

V.A.G 1551 display	Possible cause	Corrective action
01038 Central locking thermo protection	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ Door locks stiff	<ul style="list-style-type: none">- Read Measuring Value Block; Display group number 005 ⇒ Page 01-358 , display zone 1
01044 Control module incorrectly coded	<ul style="list-style-type: none">◆ The control module installed does not correspond to the vehicle equipment◆ Control module supplied is not programmed or not completely programmed	<ul style="list-style-type: none">- Replace control module- Inform spare part supplier of the problem

V.A.G 1551 display	Possible cause	Corrective action
01131 Turn signal activation Undefined switch position	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Fuse S144 faulty 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Perform Output Diagnostic Test Mode (DTM) ⇒ Page 01-247 - Check fuses using wiring diagram or replace
01134 Alarm horn -H12- Undefined switch position	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Fuse S111 Malfunctiony ◆ Alarm horn -H12- malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Perform Output Diagnostic Test Mode (DTM) ⇒ Page 01-344 - Check fuses using wiring diagram or replace - Replace alarm horn -H12-

V.A.G 1551 display	Possible cause	Corrective action
<p>01179</p> <p>Incorrect key programming</p>	<ul style="list-style-type: none"> ◆ Adaptation of keys (function 10) not performed correctly 	<ul style="list-style-type: none"> - See description for matching keys with radio remote control, ⇒ Page 01-372 - Read Measuring Value Block; Display group number 009 ⇒ Page 01-366 , display zone 3
<p>01355</p> <p>Signal; All windows open</p> <p style="text-align: right;">Short to B+</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock operating or lock cylinder mechanical components stiff 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check lock operating components and make serviceable - Replace lock cylinder - Read Measuring Value Block; Display group number 007 ⇒ Page 01-362 , display zone 4

V.A.G 1551 display	Possible cause	Corrective action
<p>01356 Signal; Close all windows and sliding/tilting roof</p> <p>Short to B+</p>	<ul style="list-style-type: none">◆ Faulty wiring or connectors ◆ Lock operating or lock cylinder mechanical components stiff	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram - Check lock operating components and make serviceable - Replace lock cylinder - Read Measuring Value Block; Display group number 007 ⇒ Page 01-362 , display zone 3

V.A.G 1551 display	Possible cause	Corrective action
01362 Close switch for tailgate/trunk lid -F124- ²⁾ Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock operating or lock cylinder mechanical components stiff 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check lock operating components and make serviceable - Replace lock cylinder - Read Measuring Value Block; Display group number 006 ⇒ Page 01-359 , display zone 3
01365 Lock/Unlock switch/interior lock button Short to Ground ¹⁾	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Driver's interior locking switch is malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Replace driver's interior locking switch

¹⁾ Malfunction recorded if operated for longer than 5 minutes

²⁾ Unclip contact switch on lock cylinder housing (with small lever)

V.A.G 1551 display	Possible cause	Corrective action
<p>01389</p> <p>Open switch for tailgate/trunk lid -F124-²⁾</p> <p style="text-align: right;">Short to Ground¹⁾</p>	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Lock operating or lock cylinder mechanical components stiff 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Check lock operating components and make serviceable - Replace lock cylinder - Read Measuring Value Block; Display group number 006 ⇒ Page 01-359 , display zone 3

1) Malfunction recorded if operated for longer than 5 minutes

2) Unclip contact switch on lock cylinder housing (with small lever)

Output Diagnostic Test Mode (DTM)

The components displayed in the Output Diagnostic Test Mode (DTM) can differ depending upon the equipment fitted to the vehicle. For example on vehicles without ATA there will be no step "1" as listed in the table below.

The Output Diagnostic Test Mode (DTM) activates the following components in the stated sequence:

Step	Display in tester	Reaction
	Alarm horn (for anti-theft alarm)	- Horn sounds continuously
	Turn signal lights activation (for anti-theft alarm)	- Activated continuously (lights up cont.)
	Interior light, reading lights	- Interior and reading lights are activated
	Close sliding roof signal	- Sliding roof closes ¹⁾
	"Safe" LED driver's door	- "Safe" LED lights up
	Instrument illumination	- Instrument illumination activated
	END	- Information: End of regular final control test

¹⁾ When performing final control test the "signal close sliding roof", the ignition and S-terminal must be inactive (no key in ignition/starter switch) and one of the front doors must be open.

Special tools, testers and auxiliary items

- ◆ V.A.G 1551 scan tool or vehicle V.A.G 1552 System tester with cable V.A.G 1551/3
- ◆ V.A.G 1594 Adapter set
- ◆ V.A.G 1527 LED test light
- ◆ Electrical wiring diagram

Work sequence

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-307](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Operate scan tool taking into account the information on the display:
- Input 03 for "Output Diagnostic Test Mode (DTM)" function.
- Switch off ignition and remove ignition key from ignition lock.

Rapid data transfer Q
03 Output Diagnostic Test Mode (DTM)



Indicated on display:

- Confirm entry with the -Q- button.

Output Diagnostic Test Mode (DTM) →



Indicated on display:

Perform individual tests: See table on ⇒ [Page 01-344](#) .

Output Diagnostic Test Mode (DTM) can be terminated by pressing the - C- button.

- Press → button.

If a component does not function:

- Continue Output Diagnostic Test Mode (DTM) to the end.

Read Measuring Value Block

Special tools, testers and auxiliary items

- ◆ V.A.G 1551 Scan tool with V.A.G 1551/3 cable

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-307](#) .

The measured values in the functions Read Measuring Value Block and basic setting are described during the individual component test. This table serves only as an overview.

The measured value block is divided into 10 display group numbers. The assignment of the individual display zones can be taken from the display group overview ⇒ [Page 01-349](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- (08 initiates the "Read Measuring Value Block" function).

Rapid data transfer
08 Read Measuring Value Block

Q



Indicated on display:

- Confirm entry with the -Q- button.

Read Measuring Value Block HELP
 Input display group number XX

← Indicated on display:

Note:

The display group number 001 is an example, to illustrate the sequence.

- Press buttons -0-, -0- and -1- for "Display group number 1" and confirm entry with -Q- button.

Read Measuring Value Block 1 →
 1 2 3 4

← Indicated on display: (1 to 4 = Display zones)

Note:

To change to another display group proceed as follows:

Display group	V.A.G 1551	V.A.G 1552
Higher	Press button -3-	Press ↑ button
Lower	Press button -1-	Press ↓ button
Skip	Press button -C-	Press button -C-

- Displayed after pressing -C- button.

Read Measuring Value Block HELP
 Input display group number XXX

← Indicated on display:

- Now enter the display group number required.

Display group overview

Break down of display content for display group number 001

Display group 001 -Driver's door-						
Read Measuring Value → Block 1				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Central locking feedback, driver's side	Safe not Safe	⇒ Page 01-350
				Central locking feedback, driver's side	locked, unlocked	
				Driver's interior locking switch	locked unlocked not operated, implausible	
				Driver's central locking Key switch	Open, close, not operated, implausible	

Evaluating display group number 001

Display zone	Description	Display	Corrective action
1	Key switch driver's side	Open closed not operated implausible	- Visual check of wiring - Check lock mechanism - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Driver's interior locking switch	locked unlocked not operated implausible	
3	Central locking feedback "locked", driver's side	locked unlocked	
4	Central locking feedback "safe", driver's side	safe not safe	

Break down of display content for display group number 002

Display group 002 -Driver's door-						
Read Measuring Value Block 2				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Central locking feedback, front passenger's side	Safe not Safe	⇒ Page 01-352
				Central locking feedback, front passenger's side	locked, unlocked	
				Interior locking switch, front pass. -E198 (USA only)	lock, unlock, not operated, implausible	
				Key switch, front passenger's side	open, closed, not operated, implausible	

Evaluating display group number 002

Display zone	Description	Display	Corrective action
1	Key switch CL passenger's side	Open closed not operated implausible	- Visual check of wiring - Check lock mechanism - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Interior locking switch, front passenger's side - E198-2)	locked unlocked not operated implausible ¹⁾	
3	Central locking feedback "locked", passenger's side	locked unlocked	
4	Central locking feedback "safe", passenger's side	safe not safe	

Break down of display content for display group number 003

Display group 003 -Rear doors-						
Read Measuring Value Block 3			→ ◀ Indicated on display			
xxx	xxx	xxx				
1	2	3	4	◀ Display zones	Specification	Evaluation
				Central locking feedback, rear left	safe, not safe	⇒ Page 01-354
				Central locking feedback, rear left	locked, unlocked	
				Central locking feedback, rear right	safe, not safe not installed	
				Central locking feedback, rear right	locked, unlocked not installed	

Evaluating display group number 003

Display zone	Description	Display	Corrective action
1	Central locking feedback, rear right	locked, unlocked not installed	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Central locking feedback, rear right	safe, not safe not installed	
3	Central locking feedback, rear left	locked unlocked not installed	
4	Central locking feedback, rear left	safe not safe not installed	

Break down of display content for display group number 004

Display group 004 -Driver's door-						
Read Measuring Value Block 4			→ Indicated on display			
xxx	xxx	xxx				
1	2	3	4	Display zones	Specification	Evaluation
				Empty ¹⁾		⇒ Page 01-356
				Rotary latch switch, rear	door open, door closed not installed	
				Rotary latch switch, front passenger's side	door open, door closed	
				Rotary latch switch, driver's side	door open, door closed	

1) Empty means in this case: Display zone is blank

Evaluating display group number 004

Display zone	Description	Display	Corrective action
1	Rotary latch switch, driver's side	door open, door closed	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Rotary latch switch, passenger's side	door open, door closed	
3	Rotary latch switch, rear	door open, door closed not installed	

Break down of display content for display group number 005

Display group 005 -Front passenger's door-						
Read Measuring Value Block 5				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	Display zones	Specification	Evaluation
				Interior monitor sensor	yes no not installed	⇒ Page 01-358
				Remote control module key button	open, closed, RLR ¹⁾ , Panic ²⁾ (with 0 or 1)	
				Speed signal (Steps: 2 km/h)	mv 0 km/h (steps: 2 km/h)	
				Central locking temperature switch-off	yes, no	

1) Only vehicles for USA, RLR= Rear lid remote release

2) Only vehicles for USA, alarm system and turn signal lights are activated

Evaluating display group number 005

Display zone	Description	Display	Corrective action
1	Central locking temperature switch-off	yes, no	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Speed signal	mv = km/h (steps: 2km/h)	
3	Remote control module key button	open, closed, RLR ¹⁾ , Panic ²⁾ (with 0 or 1)	
4	Interior monitor sensor	yes no not installed	

1) Only vehicles for USA, RLR= Rear lid remote release

2) Only vehicles for USA, alarm system and turn signal lights are activated

Break down of display content for display group number 006

Display group 006 -Front passenger's door-						
Read Measuring Value Block 6				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Ignition	terminal 15 on, terminal 15 off	⇒ Page 01-360
				Tailgate Key switch	open, closed, not operated implausible	
				Key number	mv = display 0..65546 (0: Not operated)	
				S-terminal	operated not operated	

Evaluating display group number 006

Display zone	Description	Display	Corrective action
1	S-terminal	operated not operated	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Key number	mv = 1 to 4 ¹⁾	When operating a "learned" radio wave key, the position of the "learned" key is shown. If the tester displays "0" even when the remote button is pressed, this key must be "re-synchronised" using adaptation (10).
			Continued on next page

¹⁾ A max. of 4 remote keys can be "learned".

Display zone	Description	Display	Corrective action
2	Key switch	open closed not operated implausible	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
3	Ignition	Terminal 15 on Terminal 15 off	

Break down of display content for display group number 007

Display group 007 -Central control module-						
Read Measuring Value → Block 7				◀ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Signal open all windows	yes, no not installed	⇒ Page 01-363
				Signal close all windows and sliding roof ¹⁾	yes, no	
				Trunk lid/tailgate contact switch	open, closed	
				Hood contact switch	open, closed, not installed	

¹⁾ The central control module transmits a switch-off delayed terminal 15 to the sliding roof control module. The sliding/tilting roof can then still be operated from the point when the ignition is switched off until one of the front doors is opened.

Evaluating display group number 007

Display zone	Description	Display	Corrective action
1	Hood contact switch	open closed, not installed	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Trunk lid/tailgate contact switch	open closed	
3	Signal close all windows and sliding roof	yes no	
4	Signal open all windows	yes, no not installed	

Break down of display content for display group number 008

Display group 008 -Central control module-						
Read Measuring Value Block 8				Indicated on display		
xxx	xxx	xxx	xxx	Display zones		Specification
1	2	3	4	Evaluation		
			Empty ¹⁾			⇒ Page 01-365
			Interior monitoring switch-off ³⁾		on, off, not installed	
			Rear lid button and rear lid handle ^{2,4)}		not oper. TG hndl op implausible	
Vehicle system voltage terminal 30						Volts

- 1) Empty means in this case: Display zone is blank
- 2) Rear lid remote unlocking button, rear lid handle
- 3) Interior monitoring switch-off
- 4) Malfunction recorded if operated for longer than 10 seconds

Evaluating display group number 008

Display zone	Description	Display	Corrective action
1	Vehicle system voltage terminal 30	on, off, not installed	- Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	RLR button and RL handle ^{2,4)}	not oper., TG hndl op, implausible	
3	Interior monitoring switch-off ³⁾	Volts	

2) Rear lid remote unlocking button, rear lid handle

3) Interior monitoring switch-off

4) Malfunction recorded if operated for longer than 10 seconds

Break down of display content for display group number 009

Display group 009 -Central control module-						
Read Measuring Value Block 9			→ ◀ Indicated on display			
xxx	xxx	xxx	◀ Display zones		Specification	Evaluation
1	2	3	Empty ¹⁾			
			Algorithm		OK. not OK. n. meas. val ²⁾	⇒ Page 01-367
			Code within effective range		OK. not OK. n. meas. val ²⁾	
			Permanent code known		OK. not OK. n. meas. val ²⁾	

1) Empty means in this case: Display zone is blank

2) If the remote control button is operated several times the third display - n. meas. val (no measured value) - will change to "OK."

Evaluating display group number 009

Display zone	Description	Display	Corrective action
1	Permanent code known	OK. not OK. no measured value ²⁾ (Key not being operated)	If not OK.: - Key code not within effective range. "Re-synchronize" radio wave remote control via function 10 (adaptation) ⇒ Page 01-372 . For no measured value: - Battery in Key is discharged. Change battery. - Radio wave remote control malfunctioning, replace key.
2	Code within effective range		
3	Algorithm		

²⁾ If the remote control button is operated several times the third display - n. meas. val (no measured value) - will change to "OK."

Break down of display content for display group number 010

Display group 010 -Central control module-						
Read Measuring Value Block 10				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				4. Alarm source (4th last)	mv = Display	⇒ Page 01-369
				3. Alarm source (3rd last)		
				2. Alarm source (2nd last)		
				1. Alarm source (last)		

Evaluating display group number 010

Display zone	Description	Display	Corrective action
1	Alarm source (last)	Display 1 to 65535	Only the last 4 ATA ¹⁾ activations are shown! For example "64" = Front passenger rotary latch switch (see table below for possible sources of alarm)
2	Alarm source (2nd last)		
3	Alarm source (3rd last)		
4	Alarm source (4th last)		

¹⁾ Anti-theft alarm

Possible sources of alarm	Display
Interior monitoring	2
Engine hood contact switch	4
Ignition	8
Rear lid contact switch	16
Rear right and left rotary latch switch	32
Front passenger rotary latch switch	64
Driver's rotary latch switch	128
No alarm	255

Break down of display content for display group number 011

Display group 011 -Central control module-					
Read Measuring Value →					
Block 11					
xxx	xxx	xxx	xxx		
1	2	3	4		
			◀ Indicated on display ▶ Display zones	Specification	Evaluation
			Empty ¹⁾		⇒ Page 01-371
			Rear first detent ²⁾	open, closed, not installed	
Automatic lock / unlock switch	not relevant				
Immobilizer key recognition	yes, no, not installed				

1) Empty means in this case: Display zone is blank

2) Lock rotary latch must be engaged in first detent

Evaluating display group number 011

Display zone	Description	Display	Corrective action
1	Immobilizer key recognition	yes, no, not installed	- Visual check of wiring - Watch display and check connectors of appropriate current circuit for correct engagement and tight fit - If the display does not change when checking connectors, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Automatic lock/unlock switch	Not relevant	
3	Rear, first detent ¹⁾	open, closed, not installed	

²⁾ Lock rotary latch must be engaged in first detent

Adaptation - function 10

Matching ignition keys to radio wave remote control

Note:

- ◆ *If new or additional ignition keys are required they must be matched to the immobilizer and convenience system control electronics.*
- ◆ *The matching procedure must always be carried out for all the ignition keys, including the existing ones.*
- ◆ *The number of keys already matched will be displayed when the adaptation (matching) function is selected.*
- ◆ *With the introduction of this generation of convenience system it is possible to program additional functions. The functions and the programming are described ⇒ [Page 01-292](#) .*
- ◆ *The matching can be interrupted with the "C" button of the V.A.G 1551.*

CAUTION!

The V.A.G 1551 dealership number (workshop code) will be stored in immobilizer control module when matching ignition keys.

Prerequisites

- ◆ All ignition keys available. If no old ignition key is available see "Lost key procedure",

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01; Matching ignition keys](#)

- ◆ Key fob with covered secret number is available, if not see "Establishing secret number",

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01; Matching ignition keys](#)

- Insert correct profile ignition key in the ignition lock.
- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-96](#) .

The adaptation shown here is only an example.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -1- and -0- (10 selects function "Adaptation").

Rapid data transfer
10 - Adaptation

Q



Indicated on display:

- Confirm entry with the -Q- button.

Adaptation
Enter channel number XX



Indicated on display:

- Press buttons -0- and -0- (all keys are erased with channel number 00).

- Confirm entry with the -Q- button.

Note:

It is not possible to match a new or additional key(s) without erasing existing learned/matched key(s).

Adaptation Erase learned values	Q	◀	Indicated on display: - Confirm entry with the -Q- button.
Adaptation Learned values are erased	→	◀	Indicated on display: - Press → button.
Rapid data transfer Select function XX	HELP	◀	Indicated on display: - Press buttons -1- and -0- (10 selects function "Adaptation").
Rapid data transfer 10 - Adaptation	Q	◀	Indicated on display: - Confirm entry with the -Q- button.
Adaptation Enter channel number XX		◀	Indicated on display: - Press buttons -0- and -1- (all keys are "learned" with channel number 01).
Adaptation Enter channel number 01	Q	◀	Indicated on display: - Confirm entry with the -Q- button.

<p>Channel 1.....Adaptation 1 → Key 1 <-1 3-></p>	<p>←</p>	<p>Indicated on display: The top line displays number of keys to be "learned" (standard =1). Select number of keys with buttons 1 and 3. - Press → button.</p>
<p>Channel 1.....Adaptation 1 → Enter matching value XXXXX</p>	<p>←</p>	<p>Indicated on display: - Press the -0- button four times and then enter the number of all ignition keys to be matched, including the existing key, (e.g. 00003); max. possible Qty. 4. - Press → button.</p>
<p>Channel 1 Adaptation 3 Q Key 3 <-1 3-></p>	<p>←</p>	<p>Indicated on display: Number of radio wave key to be "learned". - Confirm entry with the -Q- button.</p>
<p>Channel 1 Adaptation 3 Q Store amended value?</p>	<p>←</p>	<p>Indicated on display: - Confirm entry with the -Q- button.</p>
<p>Channel 1 Adaptation 1 → Amended value is stored</p>	<p>←</p>	<p>Indicated on display: - Press → button.</p>
<p>Rapid data transfer HELP Select function XX</p>	<p>←</p>	<p>Indicated on display:</p>

- A button must be pressed once on each of the radio wave keys to be "learned" (in example above, 3 keys).
- Switch off ignition and remove ignition key.
- Perform functional check (e.g. 3) of radio wave keys.

Note:

- ◆ *All 3 keys (see example) can be "learned" in one matching sequence.*
- ◆ *15 seconds must not be exceeded when matching all ignition keys (pressing a button).*
- ◆ *A successful adaptation can be determined via Read Measuring Value Block, function 08, display group number 013, ⇒ [Page 01-277](#). When operation the radio wave unit both of first measurement values must have the status OK. Simultaneously the last measurement value will show the positional number of the key (i.e. first, second, third, fourth key).*
- ◆ *If the remote control button is operated several times the third display -no measured value- changes to "OK".*

The matching of ignition keys is automatically terminated when:

- ◆ Number of keys to be matched is reached.
- ◆ A button of one of the keys to be "learned" is pressed frequently.
- ◆ Permissible matching period of 15 seconds is exceeded (malfunction is stored).

- Select function 02 "Check DTC memory". If there is no malfunction stored, the matching of the keys has been successfully completed.

- Press buttons -0- and -6- to end the output.

Rapid data transfer

Q



Indicated on display:

06 End output

- Confirm entry with the -Q- button.

Rapid data transfer

HELP



Indicated on display:

Enter address word XX

- Switch off ignition.

- Disconnect connector to V.A.G 1551 scan tool.

The various functions listed in the table can be called up and adapted by selecting the channel numbers 03 to 10.

Radio wave remote control functional variants

Channel number	Significance	Measured value
03	Auto lock/unlock: Vehicles will be locked when a speed of 15 km/h is reached	on=1 off= 0
04	Auto lock/unlock: Vehicles will be unlocked when the ignition key is withdrawn from the ignition lock	on=1 off= 0
05	IM switch-off: Interior monitoring is activated or deactivated by operating central locking closed twice	on=1 off= 0
06	Horn sounds when unlocking: Confirmation signal when unlocking ¹⁾	on=1 off= 0
07	Horn sounds when locking: Confirmation signal when locking ¹⁾	on=1 off= 0
08	Turn signals flash when unlocking: Unlocking is confirmed by turn signals flashing twice	on=1 off= 0
09	Horn sounds when locking: Locking is confirmed by turn signals flashing once	on=1 off= 0
10	Setting for alarm horn: Programming the horn operation when the alarm is triggered appropriate to the legislation of the countries	1= Rest of Europe 2= Germany 3= Great Britain

¹⁾ No longer allowed according to German legislation.

The matching shown here is only an example.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -1- and -0- (10 selects function "Adaptation").

Rapid data transfer
10 - Adaptation

Q



Indicated on display:

- Confirm entry with the -Q- button.

Adaptation
Enter channel number XX



Indicated on display:

- Press buttons -0- and -8- (channel number 08 switches the turn signals on or off when unlocking).

Channel 8 Adaptation 1
Unlock Flashing on <-1 3->

→



Indicated on display:

- Press → button.

Channel 8.....Adaptation 1
Enter adaptation value XXXXX

→



Indicated on display:

- Press → button.
- Press button -0- five times (e.g. 00000).

Channel 8.....Adaptation 0
Enter adaptation value 00000

Q

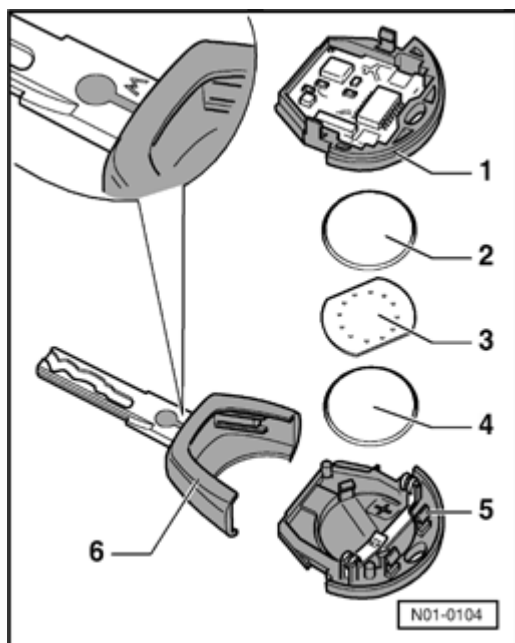


Indicated on display:

- Confirm entry with the -Q- button.

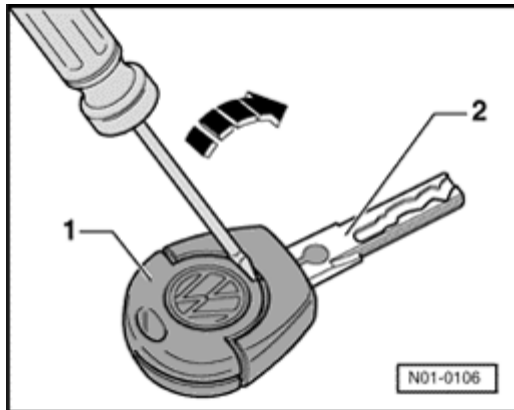
<p>Channel 8 Adaptation 0 Unlock Flashing off <-1 3-></p>	<p>Q</p>	<p>←</p>	<p>Indicated on display: - Confirm entry with the -Q- button.</p>
<p>Channel 8 Adaptation 0 Store amended value?</p>	<p>Q</p>	<p>←</p>	<p>Indicated on display: - Confirm entry with the -Q- button.</p>
<p>Channel 8 Adaptation 0 Amended value is stored</p>	<p>→</p>	<p>←</p>	<p>Indicated on display: - Press → button.</p>
<p>Rapid data transfer Select function XX</p>	<p>HELP</p>	<p>←</p>	<p>Indicated on display: - Press buttons -0- and -6- to end the output.</p>
<p>Rapid data transfer 06 End output</p>	<p>Q</p>	<p>←</p>	<p>Indicated on display: - Confirm entry with the -Q- button.</p>
<p>Rapid data transfer Enter address word XX</p>	<p>HELP</p>	<p>←</p>	<p>Indicated on display: - Switch off ignition. - Disconnect connector to V.A.G 1551 scan tool.</p>

Batteries for the main key with radio wave remote control, removing and installing



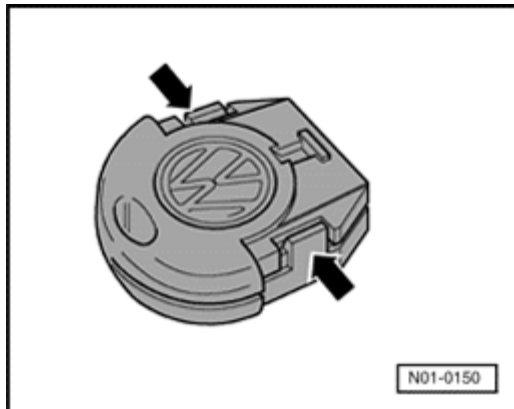
- 1 - Transmitter unit - upper part (turned-over)
- 2 - Key battery
- 3 - Contact plate
- 4 - Key battery
- 5 - Transmitter unit - lower part
- 6 - Main key with variable code transponder

To be able to differentiate between a key with transponder and a key with variable code transponder the main key has a "w" stamped on it.

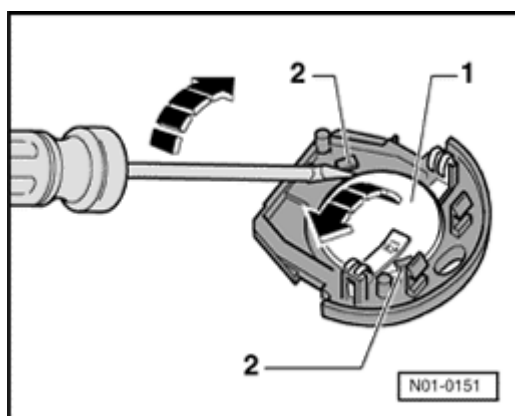


Removing

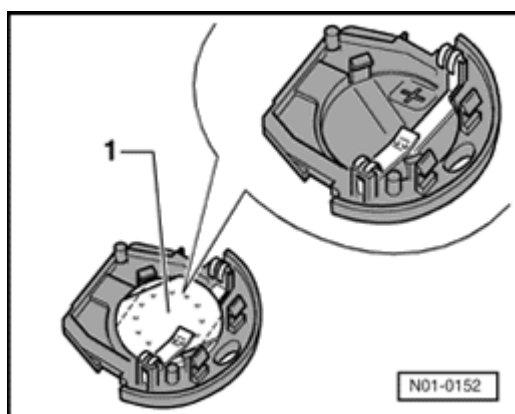
- Insert a screwdriver in the slot between the transmitter unit -1- and the main key -2-.
- Move the screwdriver in direction of arrow and unclip the transmitter unit from the main key.



- Lever the transmitter unit apart on the two locating lugs (arrows).



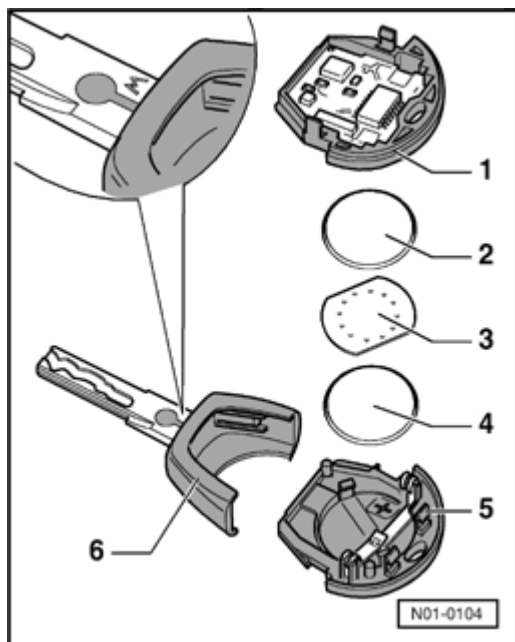
- Unclip upper battery -1- from the retainers -2- with a screwdriver in direction of arrow.



- The contact plate -1- has two straight edges. When these edges are turned towards the retainers the contact plate can be removed.
- The contact plate can also be unclipped with a screwdriver.
- Now unclip the lower battery from the retainers with a screwdriver.

Installing

Note the polarity and correct position when installing the batteries.

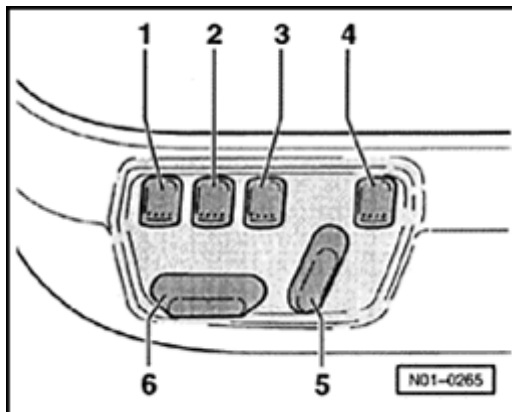


- Place the battery -4- with the positive terminal downwards into the sensor unit (positive terminal is marked on housing).
- Now place the contact plate -3- on the battery -4-.
- Place battery -2- with the positive terminal downwards onto the contact plate and secure.
- Place transmitter unit -1- and transmitter unit -5- halves together and clip to create one remote transmitter assembly.
- Then engage the transmitter unit with the main key.

Driver's side seat adjustment, On Board Diagnostic (OBD)

Seat adjustment, functional description

The 8-way seat is equipped with a seat and mirror memory function.



With this system individual seat and mirror adjustments can be stored in the memory. Each of the memory buttons -1-, -2-, -3- can be used to store the individual settings for one person.

The seat and mirrors will move automatically into the required position by pressing the appropriate button when there is a change of driver.

In the driver's seat adjustment, the position of the exterior mirrors (left and right) when driving forward and the position of the right exterior mirror for reversing can be stored and recalled for each memory button -1-, -2-, -3-.

The adjustments stored on a memory button can also be called up using the key for the radio wave remote control.

The memory system can be turned off at any time using the red switch -4- (MEM OFF). The seat and the exterior mirrors can then only be set manually with switches -5- and -6-.

On Board Diagnostic (OBD), functional description

It is an independent system and has the On Board Diagnostic (OBD) address word 36 "Seat adjustment driver's side".

The seat adjustment control module -J136- is located under the driver's seat and is connected to the convenience system via the CAN data bus.

It is equipped with a DTC memory. The On Board Diagnostic (OBD) connection is located under the driver's knee bar to left of the steering wheel.

The control module detects malfunctions in the system and stores them in a permanent memory.

To commence troubleshooting, initiate self-diagnosis and retrieve the stored information with the V.A.G 1551 scan tool.

V.A.G 1552 System tester may also be used.

The malfunction information displayed is used to refer to a DTC table with notes on the possible causes for directed repair measures.

Malfunctions which can be attributed to a temporary open circuit in the wiring or a loose contact, will also be stored. These malfunctions will be displayed as sporadic DTCs "SP".

The individual operating functions are described in the following description.

Memory system, initializing

Note:

- ◆ *All data stored for the seat and mirror settings will be lost when the vehicle battery is disconnected.*
- ◆ *This data will be retained in future control modules even after the battery has been disconnected.*
- ◆ *Each new setting stored on the same button will erase the previous data.*
- ◆ *It is not possible to store settings on the memory buttons if the red switch is switched-off (switch protrudes).*
- ◆ *The battery voltage must not be below 10.5 V. Otherwise the system detects low voltage and will store a malfunction in the DTC memory.*

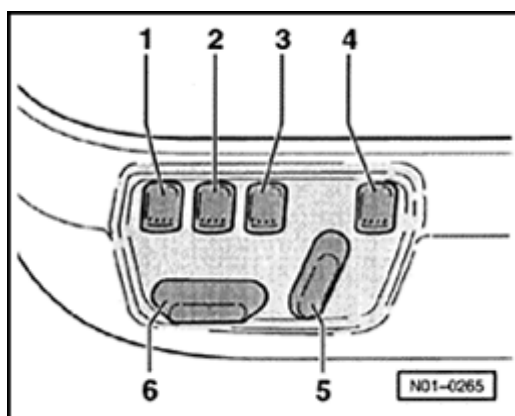
The following test steps must be performed for the initialization:

- Open driver's door.
- Switch on ignition.
- Then move the seat backrest forwards as far as stop.

This position will be recorded for reference when the stop limit switch-off occurs.

Seat and mirror settings for normal driving, storing

- Switch on ignition.
- Set the seat.
- Set both exterior mirrors.



- Now press one of the memory buttons (-1- to -3-) and hold it depressed for about 3 seconds until an acoustic signal confirms that the settings are stored in the memory.

The settings are now stored on the selected memory button.

The stored settings can be recalled via the memory buttons (-1- to -3-) as well as via the radio wave remote control.

Allocating a seat adjustment to a radio wave remote control button is described at the end.

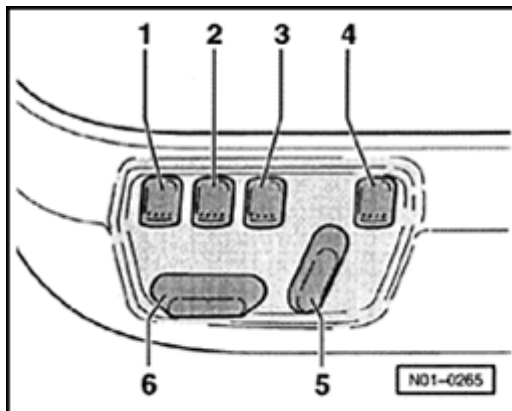
Note:

- ◆ *When the vehicle battery is disconnected all the data stored for the seat and mirror settings are lost.*
- ◆ *For future versions of the control module this data will be retained even when the battery is disconnected.*
- ◆ *Each time settings are stored on a button the previous data will be erased.*

Mirror setting for reversing, storing

This function cannot be performed until the seat/mirror settings for driving forwards have been stored ⇒ [Page 01-388](#) .

- Switch on ignition.
- Set mirror adjustment switch to right mirror.
- Select reverse gear.
- Set the mirror to the desired position.
- Now press one of the memory buttons (-1- to -3-) and hold it depressed for about 3 seconds until an acoustic signal confirms that the settings are stored in the memory.



The settings are now stored on the selected memory button.

The stored settings can be recalled via the memory buttons (-1- to -3-) as well as via the radio wave remote control.

Allocating a seat adjustment to a radio wave remote control button is described at the end.

Note:

- ◆ *When the vehicle battery is disconnected all the data stored for the seat and mirror settings are lost.*
- ◆ *For future versions of the control module this data will be retained even when the battery is disconnected.*
- ◆ *Each time settings are stored on a button the previous data will be erased.*
- ◆ *As soon as reverse gear is engaged the right exterior mirror moves into the currently stored position or into the previous set position. This procedure will be interrupted if the mirror is manually adjusted to a new position.*
- ◆ *As soon as the reverse gear is disengaged the right exterior mirror will move back to the position stored for normal driving.*
- ◆ *Every time the seat and mirror adjustment for normal driving is changed, the individual setting for the right exterior mirror for reversing must also be reset, otherwise the previously set position is active.*

Allocating radio wave remote control key to memory buttons

After storing the seat and mirror settings ⇒ [Page 01-388](#) there is a 10 second period where the radio wave remote control key can be allocated to the appropriate memory button.

The number of the radio wave remote control key will be transferred from the convenience system central control module via the CAN bus to the memory control module.

- Pull the radio wave remote control key out of the ignition lock.

- Press the open button of the radio wave remote control key and hold it depressed for at least 1 second until an acoustic signal confirms the allocation.

The settings are stored under the selected memory button.

Note:

- ◆ *If the remote control key was previously allocated to a different memory button, the old allocation will be erased.*
- ◆ *If the radio wave remote control key is allocated to a memory button to which another button is already allocated, the old allocation will also in this case be erased.*
- ◆ *The allocation of a radio wave remote control key to a memory button will be retained even when new seat and mirror settings are stored on this button.*
- ◆ *When the vehicle battery is disconnected all allocations for radio wave remote control keys to the memory buttons will be erased.*
- ◆ *For future versions of the control module this data will be retained even when the battery is disconnected.*

Seat and mirror settings for normal driving, activating

The settings stored can be activated via the memory buttons as well as by the radio wave remote control.

Activating via the memory buttons

For safety reasons the seat and mirror settings can only be activated with the ignition switched off.

There are two possibilities for activating the stored settings:

One touch automatic memory:

- With driver's door open briefly press the desired memory button. The seat and exterior mirrors move automatically to the stored positions.

Push and hold memory:

- With the driver's door opened or closed press the desired memory button until the seat and exterior mirrors have moved into the stored positions.

Activating via the radio wave remote control

For safety reasons the seat and mirror settings can only be activated with the ignition switched off.

- Briefly press the opening button of the radio wave remote control and then open the driver's door. The seat and exterior mirrors move automatically into the stored position.

Mirror setting for reversing, activating

- Set mirror change-over switch to the right exterior mirror.
- Engage reverse gear. The right exterior mirror moves automatically into the stored position.

Note:

As soon as the reverse gear is disengaged the right exterior mirror moves back to the position stored for normal driving.

Seat adjustment, initiating On Board Diagnostic (OBD)

Test prerequisites:

- ◆ Voltage supply and fuses for the respective system OK.
- ◆ To initiate the On Board Diagnostic (OBD) the ignition must be switched on "Terminal 15 on".

Note:

- ◆ *If the display remains blank, check V.A.G 1551 voltage supply according to wiring diagram.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- ◆ *Additional operating information can be printed out depending on the program by pressing the HELP button of V.A.G 1551.*
- ◆ *The → button is used for advancing the program sequence.*
- ◆ *The PRINT button is used for switching on the printer (warning lamp in button lights up).*
- ◆ Connecting scan tool ⇒ [Page 01-3](#)

- Switch on ignition.
- Switch on printer with Print button (warning lamp in button lights up).

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			- Press button -1- for "Rapid data transfer" mode.
Rapid data transfer	HELP	◀	Indicated on display:
Enter address word XX			Address word for the seat adjustment: 36
Rapid data transfer	HELP	◀	Indicated on display:
Enter address word XX			- Press buttons -3- and -6-.
Rapid data transfer	Q	◀	Indicated on display after entering the address word 36:
36 Seat adjustment			- Confirm entry with the -Q- button.
			and then the following appears in the display:
Rapid data transfer		◀	Indicated on display:
Tester sends the address word 36			
3B1959760XXSeat adjustmentFS 0001 →		◀	The control module identification will be shown on the V.A.G 1551 scan tool display, e.g.:
			- Press → button.
Rapid data transfer	HELP	◀	Indicated on display:
Select function XX			

Selectable functions, overview

	page
01 - Check Control Module Version	⇒ Page 01-398
02 - Check DTC Memory	⇒ Page 01-401
05 - Erase DTC memory	⇒ Page 01-404
06 - End Output	⇒ Page 01-406
08 - Read Measuring Value Block	⇒ Page 01-423

Note:

- ◆ *A list of possible functions is printed out after pressing the HELP button.*
- ◆ *Do not select further functions, which can be printed out after pressing the HELP button.*
- ◆ *After the function is completed the V.A.G 1551 returns to the following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display:

Check Control Module Version

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-395](#) .
- Switch on ignition.
- Press button -1- for "Rapid data transfer" mode.
- Switch on printer with Print button (warning lamp in button lights up).
- Press buttons -0- and -1-.

Rapid data transfer

Q



Indicated on display:

01-Check Control Module Version

- Confirm entry with the -Q- button.

3B1959760XXSeat adjustmentFS 0001 →



The control module identification will be shown on the V.A.G 1551 scan tool display, e.g.:

Breakdown of the display:

- ◆ Part No. of control module, System designation (XX seat adjustment DS 0001)

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

Note:

Rapid data transfer
control module does not answer!

HELP



- ◆ *If one of the malfunction messages opposite appears in the display, the possible causes of the malfunction can be printed out with the HELP button.*

Rapid data transfer
K wire not switching to B+!

HELP



- ◆ *Ignition must be switched on.*

Rapid data transfer
No signal from control module!



- ◆ *Malfunctions have occurred at the start of or during the program (external interference?).*

Rapid data transfer
Fault in communication build up



- ◆ *Check diagnosis wires as well as voltage supply and Ground connection.*

01-400

- | | | | |
|------------------------------------------------------|-------------|----------|--------------------------------------------------------------------------------------------------------------------------------|
| <p>Rapid data transfer
06 End output</p> | <p>Q</p> | <p>◀</p> | <p>- Press buttons -0- and -6- to end the output.</p> <p>Indicated on display:</p> <p>- Confirm entry with the -Q- button.</p> |
| <p>Rapid data transfer
Enter address word XX</p> | <p>HELP</p> | <p>◀</p> | <p>Indicated on display:</p> <p>- Switch off ignition.</p> <p>- Disconnect connector to V.A.G 1551 scan tool.</p> |

Check DTC Memory

Note:

The vehicle V.A.G 1552 System tester can be used instead of the V.A.G 1551 scan tool, however a print-out is not possible.

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-395](#) .
- Switch on printer with Print button (warning lamp in button lights up).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -2- (the function "Check DTC memory" is entered with 02).

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Press "Print" button
- Confirm entry with the -Q- button.

X DTCs recognized!



The number of stored malfunctions appears in the display.

The stored malfunctions are displayed and printed out one after the other.

Note:

If a DTC is recognized:

- ◆ 1 . **Repair malfunction**
- ◆ 2. *Erase DTC memory (function 05).*
- ◆ 3. *Check DTC memory again (function 02).*

- The DTCs printed out can be repaired with aid of DTC table ⇒ [Page 01-407](#) .
- The function "Read Measuring Value Block" ⇒ [Page 01-423](#) and Display group overview ⇒ [Page 01-425](#) are additional aids.

The measured value block is divided into 6 display group numbers. The assignment of the individual display zones can be taken from the display group overview ⇒ [Page 01-425](#) .

No DTC recognized!



If "No DTC recognized" is displayed the program will return to the initial position after pressing the → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

If something else is displayed:

⇒ *Scan tool operating instructions*

01-403

- | | | | |
|------------------------------|-------------|---|-------------------------------------------------|
| Rapid data transfer | Q | ◀ | - Press buttons -0- and -6- to end the output. |
| 06 End output | | | |
| Rapid data transfer | HELP | ◀ | Indicated on display: |
| Enter address word XX | | | - Confirm entry with the -Q- button. |
| | | | - Switch off ignition. |
| | | | - Disconnect connector to V.A.G 1551 scan tool. |

Erase DTC memory

Note:

The vehicle V.A.G 1552 System tester can be used instead of the V.A.G 1551 scan tool, however a print-out is not possible.

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-395](#) .

Prerequisites:

- ◆ DTCs are repaired
- ◆ Functional check has been carried out
- ◆ DTC memory checked again

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -5- (the function "Erase DTC memory" is entered with 05).

Rapid data transfer
05 Erase DTC memory

Q



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer
DTC memory is erased!

→



Indicated on display:

- Press → button.

Rapid data transfer HELP
Select function XX



Indicated on display:

Note:

WARNING!
DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

◆ *Adhere strictly to test sequence; first of all check DTC memory, then erase memory.*

- Press buttons -0- and -6- to end the output.

Rapid data transfer Q
06 End output



Indicated on display:

- Confirm entry with the -Q- button.

Rapid data transfer HELP
Enter address word XX



Indicated on display:

- Switch off ignition.

- Disconnect connector to V.A.G 1551 scan tool.

End Output

- Press buttons -0- and -6- to end the output.

Rapid data transfer

Q



Indicated on display:

06 End output

- Confirm entry with the -Q- button.

Rapid data transfer

HELP



Indicated on display:

Enter address word XX

- Switch off ignition.
- Disconnect connector to V.A.G 1551 scan tool.

DTC table

Note:

- ◆ *The DTC table is listed according to the 5 digit code on the left.*
- ◆ *Explanation of the malfunction types (e.g. "open circuit/short circuit to Ground"):*

⇒ *Scan tool operating instructions*

- ◆ *Before replacing components indicated as malfunctioning, check the wiring and connectors to these components as well as the Ground connections using wiring diagram. This is particularly relevant if malfunctions are output as "occurring sporadically" (SP).*
- ◆ *The malfunctions displayed can be localized using the test table.*
- ◆ *This malfunction "no communication" can also appear with the door control modules. This has no influence on the function of the convenience system and is therefore of no consequence. Erase DTC memory.*

00668 049

Vehicle system voltage terminal 30

Signal too high



Scan tool print out: The number 049 (e.g.) shown here in bold is not relevant.

01-408

V.A.G 1551 display	Possible cause	Corrective action
00000 No DTC recognized	If "No DTC recognized" appears after carrying out repairs On Board Diagnostic (OBD) is ended	
00668 Vehicle voltage terminal 30 Signal too small Signal too high	<ul style="list-style-type: none"> ◆ Battery discharged ◆ Faulty wiring or connectors ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning 	<ul style="list-style-type: none"> - Charge battery - Check wiring and connectors using wiring diagram - Replace Voltage regulator -C1- - Replace Alternator - C-
00994 Sender for driver's seat front height adjustment -G215- Short to Ground Open circuit/short to B+	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram

01-409

V.A.G 1551 display	Possible cause	Corrective action
<p>00995 Sender for driver's seat rear height adjustment -G216-</p> <p>Short to Ground</p> <p>Open circuit/short to B+</p>	<p>◆ Faulty wiring or connectors</p> <p>◆ Faulty wiring or connectors</p>	<p>- Check wiring and connectors using wiring diagram</p>
<p>00998 Motor for driver's seat backrest adjustment -V45-</p>	<p>◆ Faulty wiring or connectors</p> <p>◆ Motor malfunctioning</p>	<p>- Check wiring and connectors using wiring diagram</p> <p>- Replace motor</p>

01-410

V.A.G 1551 display	Possible cause	Corrective action
00999 Motor for driver's seat front height adjustment -V29-	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ Motor malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram- Replace motor
01000 Motor for driver's seat rear height adjustment -V30-	<ul style="list-style-type: none">◆ Faulty wiring or connectors◆ Motor malfunctioning	<ul style="list-style-type: none">- Check wiring and connectors using wiring diagram- Replace motor

01-411

V.A.G 1551 display	Possible cause	Corrective action
01002 Up button for driver's seat front height adjustment -E208- Short to Ground	<ul style="list-style-type: none"> ◆ Button malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace button¹⁾ - Check wiring and connectors using wiring diagram
01003 Down button for driver's seat front height adjustment -E209- Short to Ground	<ul style="list-style-type: none"> ◆ Button malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace button¹⁾ - Check wiring and connectors using wiring diagram

¹⁾ The button is a component part of the operating unit and can only be replaced as a complete unit.

01-412

V.A.G 1551 display	Possible cause	Corrective action
01004 Up button for driver's seat rear height adjustment -E210- Short to Ground	<ul style="list-style-type: none"> ◆ Button malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace button¹⁾ - Check wiring and connectors using wiring diagram
01005 Down button for driver's seat rear height adjustment -E211- Short to Ground	<ul style="list-style-type: none"> ◆ Button malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace button¹⁾ - Check wiring and connectors using wiring diagram

¹⁾ The button is a component part of the operating unit and can only be replaced as a complete unit.

01-413

V.A.G 1551 display	Possible cause	Corrective action
01006 Forward button for driver's seat fore and aft adjustment -E212- Short to Ground	<ul style="list-style-type: none"> ◆ Button malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace button¹⁾ - Check wiring and connectors using wiring diagram
01007 Rearward button for driver's seat fore and aft adjustment -E213- Short to Ground	<ul style="list-style-type: none"> ◆ Button malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace button¹⁾ - Check wiring and connectors using wiring diagram

¹⁾ The button is a component part of the operating unit and can only be replaced as a complete unit.

01-414

V.A.G 1551 display	Possible cause	Corrective action
01008 Note: Emergency switch operated! (MEM OFF switch not in detent -E190-)	♦ No memory operation	- Push in MEM OFF switch
01009 Sensor for driver's seat fore and aft adjustment -G218- Short to Ground Open circuit/short to B+	♦ Sensor malfunctioning ♦ Faulty wiring or connectors ♦ Faulty wiring or connectors	- Replace sensor ²⁾ - Check wiring and connectors using wiring diagram

²⁾ The sensor is a component part of the fore and aft adjustment motor and can only be replaced as a complete unit.

01-415

V.A.G 1551 display	Possible cause	Corrective action
01010 Driver's seat backrest sensor - G219- Open circuit/short to B+	<ul style="list-style-type: none"> ◆ Sender malfunctioning ◆ Faulty wiring or connectors ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace sensor²⁾ - Check wiring and connectors using wiring diagram
01173 Motor for driver's seat fore and aft adjustment -V28-	<ul style="list-style-type: none"> ◆ Faulty wiring or connectors ◆ Motor malfunctioning 	<ul style="list-style-type: none"> - Check wiring and connectors using wiring diagram - Replace motor

²⁾ The sensor is a component part of the fore and aft adjustment motor and can only be replaced as a complete unit.

01-417

V.A.G 1551 display	Possible cause	Corrective action
<p>01329</p> <p>Convenience system data BUS in emergency mode</p>	<p>◆ Faulty wiring or connectors</p>	<p>- Check wiring and connectors using wiring diagram</p> <p>Wiring OK., then:</p> <p>- Disconnect all door main connectors and reconnect one after the other while observing measured value block</p> <p>- Replace the control module that has blocked the bus</p> <p>Note: New malfunctions will be stored which can be erased</p> <p>- Read Measuring Value Block; Display group number 006 ⇒ Page 01-436 , display zone 1</p>

01-418

V.A.G 1551 display	Possible cause	Corrective action
<p>01330 Central control module for convenience system</p> <p style="padding-left: 40px;">Malfunctioning</p> <p style="padding-left: 40px;">Voltage supply too high</p> <p style="padding-left: 40px;">Voltage supply too low</p>	<ul style="list-style-type: none"> ◆ Central control module for convenience system malfunctioning ◆ Voltage regulator - C1- malfunctioning ◆ Alternator -C- malfunctioning ◆ Battery -A- malfunctioning or discharged 	<ul style="list-style-type: none"> - Replace convenience system central control module - Check wiring and connectors using wiring diagram - Read Measuring Value Block; Display group number 014 ⇒ Page 01-279 , display zone 1

01-421

V.A.G 1551 display	Possible cause	Corrective action
01455 Forwards switch for backrest adjustment -E96- Short to Ground	<ul style="list-style-type: none"> ◆ Switch malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace switch¹⁾ - Check wiring and connectors using wiring diagram
01456 Backwards switch for backrest adjustment -E96- Short to Ground	<ul style="list-style-type: none"> ◆ Switch malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace switch¹⁾ - Check wiring and connectors using wiring diagram
01459 Button -1- for driver's memory seat -E218- Short to Ground	<ul style="list-style-type: none"> ◆ Button malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace button¹⁾ - Check wiring and connectors using wiring diagram

¹⁾ The button is a component part of the operating unit and can only be replaced as a complete unit.

01-422

V.A.G 1551 display	Possible cause	Corrective action
01460 Button -2- for driver's memory seat -E219- Short to Ground	<ul style="list-style-type: none"> ◆ Button malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace button¹⁾ - Check wiring and connectors using wiring diagram
01461 Button -3- for driver's memory seat -E220- Short to Ground	<ul style="list-style-type: none"> ◆ Button malfunctioning ◆ Faulty wiring or connectors 	<ul style="list-style-type: none"> - Replace button¹⁾ - Check wiring and connectors using wiring diagram

¹⁾ The button is a component part of the operating unit and can only be replaced as a complete unit.

Read Measuring Value Block

Special tools, testers and auxiliary items

- ◆ V.A.G 1551 Scan tool with V.A.G 1551/3 cable

- Connecting scan tool ⇒ [Page 01-3](#) , initiating On Board Diagnostic (OBD) ⇒ [Page 01-395](#) .

The measured values in the functions Read Measuring Value Block and basic setting are described during the individual component test. This table serves only as an overview.

The measured value block is divided into 6 display group numbers. The assignment of the individual display zones can be taken from the display group overview ⇒ [Page 01-425](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- (08 initiates the "Read Measuring Value Block" function).

Rapid data transfer
08 Read Measuring Value Block

Q



Indicated on display:

- Confirm entry with the -Q- button.

Read Measuring Value Block
Input display group number XX

HELP



Indicated on display:

Note:

The display group number 001 is an example, to illustrate the sequence.

01-424

Read Measuring Value Block 1 →

1 2 3 4



- Press buttons -0-, -0- and -1- for "Display group number 1" and confirm entry with -Q- button.

Indicated on display: (1 to 4 = Display zones)

Note:

To change to another display group proceed as follows:

Display group	V.A.G 1551	V.A.G 1552
Higher	Press button - 3-	Press ↑ button
Lower	Press button - 1-	Press ↓ button
Skip	Press button - C-	Press button - C-

- Displayed after pressing -C- button.

Read Measuring Value Block HELP

Input display group number XXX



Indicated on display:

- Now enter the display group number required.

Display group overview

Break down of display content for display group number 001

Display group 001						
Read Measuring Value Block 1				→ Indicated on display		
xxx	xxx	xxx	xxx	← Display zones		Specification
1	2	3	4	Empty ¹⁾		Evaluation
			Key number		0 to 4	⇒ Page 01-426
		Switch position emergency off (MEM OFF)			0= off ¹⁾ 1= on	
		Door contact			1 = door op 0 = door cl	
	Individual switch positions -1-, -2-, -3-				0= off 1= on	

¹⁾ 0= Emergency off. No entries can be stored in this switch position.

Evaluating display group number 001

Display zone	Description	Display	Corrective action
1	Switch position for the individual keys -1-, -2-, -3-	0= off 1= on	<ul style="list-style-type: none"> - Visual check of wiring - Check that connectors of appropriate current circuit are correctly seated and tight while simultaneously watching the display - If the content of the display does not change when checking the connectors the malfunction must be repaired, or the component in question must be replaced - Erase DTC memory - Perform functional check - Check DTC memory again
2	Switch position emergency off (MEM OFF) Door contact	0 = off ¹⁾ , 1 = on 1 = door op, 0 = door cl	
3	Key number	0 to 4	

¹⁾ 0= Emergency off. No entries can be stored in this switch position.

Break down of display content for display group number 002

Display group 002							
Read Measuring Value Block 2				→ ◀ Indicated on display			
xxx	xxx	xxx	xxx	◀ Display zones		Specification	
1	2	3	4			Evaluation	
				Backrest adjustment current recorder level		30000 ¹⁾	⇒ Page 01-428
				Backrest adjustment button		forwards, backwards, not operat., implausible	
				Fore and aft adjustment current recorder level		30000 ¹⁾	
				Fore and aft adjustment button		forwards, backwards, not operat., implausible	

¹⁾ If the terminal 30 current supply is interrupted the recorders will lose their initialization and will be set to the value 30000. This value will change the settings for the seat correspondingly. For the seat to function correctly the initialization must be performed. For the forwards movement the recorder level will be larger for the fore and aft and backrest adjustment.

Evaluating display group number 002

Display zone	Description	Display	Corrective action
1	Fore and aft adjustment button	forwards, backwards, not operat. implausible	<ul style="list-style-type: none"> - Visual check of wiring - Check that connectors of appropriate current circuit are correctly seated and tight while simultaneously watching the display - If the content of the display does not change when checking the connectors the malfunction must be repaired, or the component in question must be replaced - Erase DTC memory - Perform functional check - Check DTC memory again
2	Fore and aft adjustment current recorder level	30000 ¹⁾	

¹⁾ If the terminal 30 current supply is interrupted the recorders will lose their initialization and will be set to the value 30000. This value will change the settings for the seat correspondingly. For the seat to function correctly the initialization must be performed. For the forwards movement the recorder level will be larger for the fore and aft and backrest adjustment.

Evaluating display group number 002 - continued

Display zone	Description	Display	Corrective action
3	Backrest adjustment button	forwards, backwards, not operat. implausible	
4	Backrest adjustment button current recorder level	30000 ¹⁾	

¹⁾ If the terminal 30 current supply is interrupted the recorders will loose their initialization and will be set to the value 30000. This value will change the settings for the seat correspondingly. For the seat to function correctly the initialization must be performed. For the forwards movement the recorder level will be larger for the fore and aft and backrest adjustment.

Break down of display content for display group number 003

Display group 003			
Read Measuring Value Block 3 xxx xxx xxx			→ ◀ Indicated on display
1	2	3	4
◀ Display zones			
		Seat rear height adjustment current recorder level	Specification
		Seat rear height adjustment button	Evaluation
		Seat front height adjustment current recorder level	
		Seat front height adjustment button	

¹⁾ If the terminal 30 current supply is interrupted the recorders will lose their initialization and will be set to the value 30000. This value will change the settings for the seat correspondingly. For the seat to function correctly the initialization must be performed. For the forwards movement the recorder level will be larger for the fore and aft and backrest adjustment.

01-431

Evaluating display group number 003

Display zone	Description	Display	Corrective action
1	Front seat height adjustment button	raising, lowering, not operat., implausible	<ul style="list-style-type: none"> - Visual check of wiring - Check that connectors of appropriate current circuit are correctly seated and tight while simultaneously watching the display - If the content of the display does not change when checking the connectors the malfunction must be repaired, or the component in question must be replaced - Erase DTC memory - Perform functional check - Check DTC memory again
2	Front seat height adjustment current recorder level	30000 ¹⁾	
3	Rear seat height adjustment button	raising, lowering, not operat., implausible	
4	Rear seat height adjustment current recorder level	30000 ¹⁾	

¹⁾ If the terminal 30 current supply is interrupted the recorders will lose their initialization and will be set to the value 30000. This value will change the settings for the seat correspondingly. For the seat to function correctly the initialization must be performed. For the forwards movement the recorder level will be larger for the fore and aft and backrest adjustment.

Break down of display content for display group number 004

Display group 004						
Read Measuring Value Block 4			→	◀ Indicated on display		
xxx	xxx	xxx				
1	2	3	4	◀ Display zones	Specification	Evaluation
				Passenger's side mirror potentiometer Y position	0 to 100% ¹⁾	⇒ Page 01-433
				Passenger's side mirror potentiometer X position	0 to 100% ¹⁾	
				Driver's side mirror potentiometer Y position	0 to 100% ¹⁾	
				Driver's side mirror potentiometer X position	0 to 100% ¹⁾	

¹⁾ The displayed values are dependent upon the mechanical swivelling range of the mirror and only serve as a rough check. During normal operation the values 0% and 100% will not be obtained. (0% corresponds to short to Ground, 100% responds to short to B+).

Evaluating display group number 004

Display zone	Description	Display	Corrective action
1	Driver's side mirror potentiometer X position	0 to 100 % ¹⁾	<ul style="list-style-type: none"> - Visual check of wiring - Check that connectors of appropriate current circuit are correctly seated and tight while simultaneously watching the display - If the content of the display does not change when checking the connectors the malfunction must be repaired, or the component in question must be replaced - Erase DTC memory - Perform functional check - Check DTC memory again
2	Driver's side mirror potentiometer Y position	0 to 100% ¹⁾	
3	Passenger's side mirror potentiometer X position	0 to 100% ¹⁾	
4	Passenger's side mirror potentiometer Y position	0 to 100% ¹⁾	

¹⁾ The displayed values are dependent upon the mechanical swivelling range of the mirror and only serve as a rough check. During normal operation the values 0% and 100% will not be obtained. (0% corresponds to short to Ground, 100% responds to short to B+).

Break down of display content for display group number 005

Display group 005						
Read Measuring Value Block 5				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display zones	Specification	Evaluation
				Empty ¹⁾		⇒ Page 01-435
				Switch position for last reason for switching off	Block, soft stop, running period ¹⁾	
				Switch position for inputs and initialization	Term. X, Reversing switch, Init. mode	
Vehicle system voltage terminal 30					Volts	

1)) 0= off, 1= on

01-435

Evaluating display group number 005

Display zone	Description	Display	Corrective action
1	Vehicle system voltage terminal 30	Volts	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Switch position for inputs and initialization	Terminal X, Reversing switch, Init. mode ¹⁾	
3	Switch position for last reason for switching off	Block, soft stop, running period ¹⁾	<ul style="list-style-type: none"> - If necessary readapt radio wave remote control (function 10, adaptation)

1)) 0= off, 1= on

Break down of display content for display group number 006

Display group 006						
Read Measuring Value Block 6 xxx xxx xxx xxx			→	◀ Indicated on display		
1	2	3	4	◀ Display zones	Specification	Evaluation
				Blank		
				Blank		
				Blank		
	Check bus				Bus OK. Bus not OK.	

01-437

Evaluating display group number 006

Display zone	Description	Display	Corrective action
1	Check bus	Bus OK. Bus not OK.	<ul style="list-style-type: none"> - Visual check of wiring - Check that connections of relevant current circuit are correctly connected and seated securely while simultaneously observing display - If the display does not change when operating, repair malfunction or replace relevant component - If no changes occur, separate all door main connectors and reconnect one after the other again - Observe measured value block - If display changes, replace relevant control module - Erase DTC memory - Perform functional check - Check DTC memory again

Select a topic

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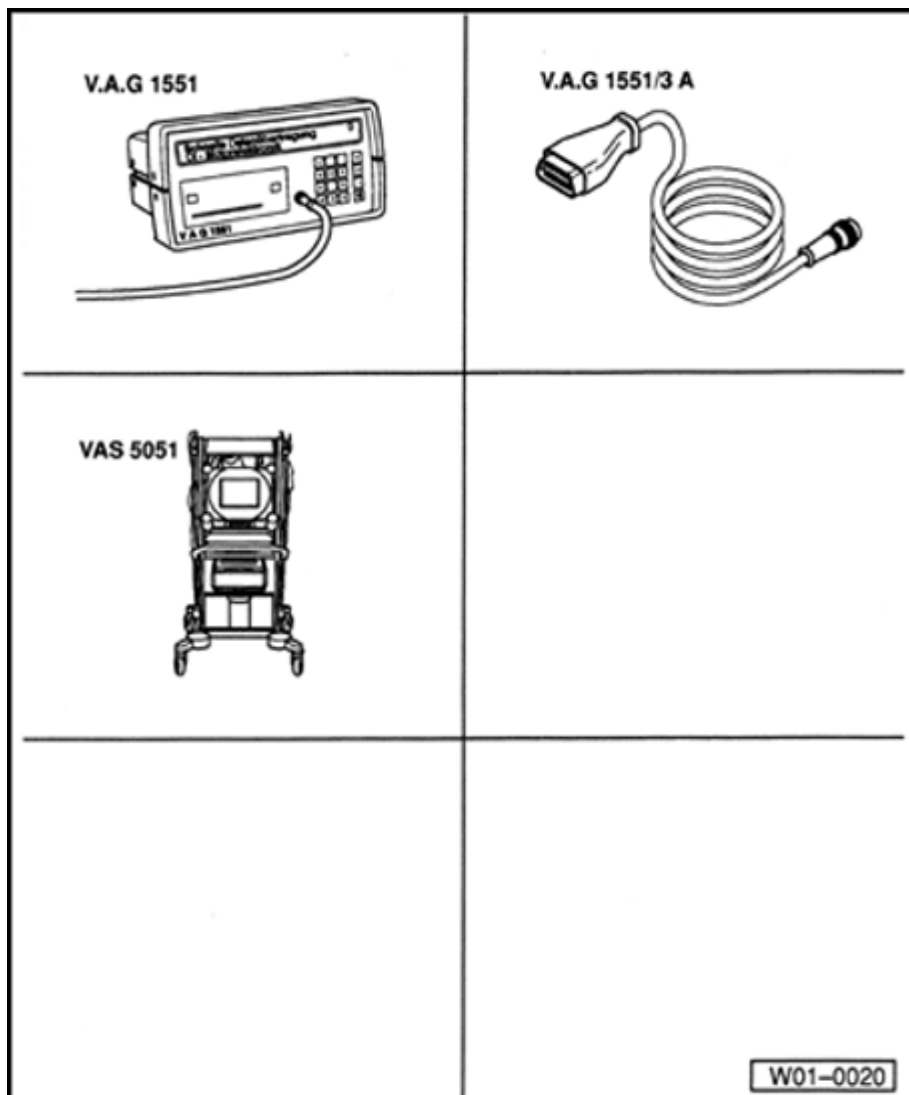
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On Board Diagnostic (OBD) through m.y. 2001

Tools

Special tools and equipment

- ◆ VAG 1551 Scan Tool (ST)
- ◆ VAG 1551/3B cable
- ◆ VAS 5051 Vehicle Diagnostic Testing and Information System

VAS 5051 or VAG 1551, connecting

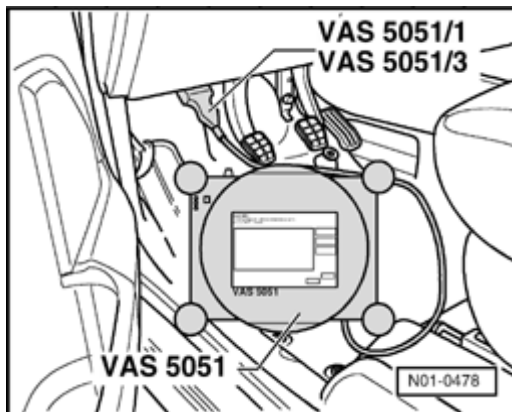
All functions previously performed with the VAG 1551 or VAG 1552 can also be performed using the VAS 5051 tester via operating mode vehicle self-diagnosis.

⇒ *Operating instructions for VAS 5051 tester.*

VAS 5051, connecting

Test requirements:

- ◆ All fuses OK according to wiring diagram.
- ◆ Battery voltage must be at least 11.5 volts.



- Connect VAS 5051/1 or VAS 5051/3 diagnostic wire to Data Link Connector (DLC)
- Switch on ignition.

Select operating mode, vehicle system and function:

- Press "Vehicle Self-Diagnosis" selection on display.
- Select the vehicle system to be tested on display (touch screen).
- Select the desired function on display.

Display will indicate the control module identification and the coding.

Display will indicate all relevant diagnostic functions.

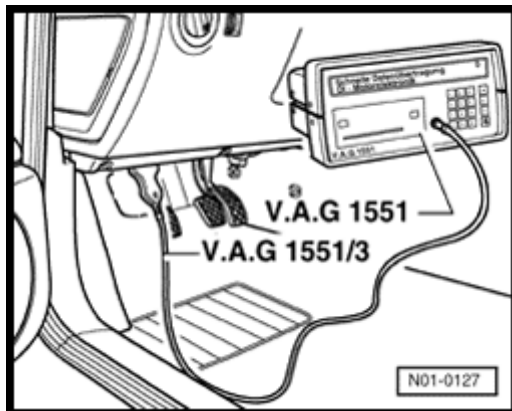
Notes:

- ◆ Display fields in functions 04 (Basic settings) and 08 (Read Measuring Value Block) are listed from top to bottom.
- ◆ The following test sequences are described in the VAG 1551 Scan Tool (ST).

VAG 1551, connecting

Test requirements:

- ◆ All fuses OK according to wiring diagram
- ◆ Battery voltage must be at least 11.5 vol
- ◆ - Connect VAG 1551 Scan Tool (ST) with VAG 1551/3B cable to Data Link Connector (DLC)

**Notes:**

- ◆ If nothing is indicated on display, check the power supply for VAG 1551 scan tool according to wiring diagram.

⇒ Electrical Wiring Diagrams, Troubleshooting, Component Locations

- ◆ Depending on the program, additional information can be printed out by pressing the HELP button of the VAG 1551 scan tool.
- ◆ Function 00 "Automatic test sequence" can be performed in operating mode 1 "Rapid data transfer". This automatically checks all components/modules installed in the vehicle.
- ◆ The → button is used for advancing through the program sequence.
- ◆ The PRINT button is used for switching on the printer (lamp in button lights up).

VAG- On Board Diagnostic HELP

1 - Rapid data transfer*

2 - Blink code output*



Indicated on display (* is displayed alternately):

- Press button 1 for "Rapid data transfer".
- Continue On Board Diagnostic (OBD) of vehicle system to be tested as described under "performing On Board Diagnostic (OBD) ⇒ table of contents

On Board Diagnostic (OBD) from m.y. 2002

General information

OBD program text/data generated by control modules installed on vehicles from m.y. 2002 may not be recognized by VAG 1551/1552 Scan Tools (ST) with the latest program card. For example: scan tool display shows "text 799", "01529 /references" or similar.

Only the VAS 5051 Vehicle Diagnostic Testing and Information System is capable of processing all display text/data on these vehicles.

All OBD program functions on vehicles from m.y. 2002 should be performed using the VAS 5051 Vehicle Diagnostic Testing and Information System in operating mode "Guided Fault Finding" or "Vehicle Self-Diagnosis".

Climatronic On Board Diagnostic (OBD) through m.y. 2001

General information

The Climatronic control module receives information from various electrical and electronic sensors. This information is processed by the control module according to specified values and then provides corresponding output signals that control electrical components (actuators).

The Climatronic control module -J255- is integrated into the A/C Control Head -E87- and cannot be serviced separately. To enable recognition of component malfunctions or if there is an open circuit, the control module is equipped with Diagnostic Trouble Code (DTC) memory.

Should a malfunction be detected in a monitored sensor or component, it is stored in DTC memory.

When malfunctions which have a permanent adverse effect on the operation of the Climatronic are stored in DTC memory, the A/C control head -E87- display flashes for approx. 15 seconds when the ignition is switched on. If there are DTCs that do not cause the display to flash, the Climatronic control module allows the Climatronic to continue to operate in emergency mode at the settings set on the display.

To determine malfunctions detected by OBD, initiate the On Board Diagnostic program and retrieve stored information using the VAG 1551/1552 Scan Tool (ST) or VAS 5051 Vehicle Diagnostic Testing and Information System.

Malfunction information displayed by the scan tool is listed on DTC tables that contain notes on possible causes and repairs.

Sporadic malfunctions (indicated in the readout by "SP") are automatically cancelled if not repeated in the next 50 engine starts.

Note:

Some components and functions of the Climatronic are not monitored by OBD (e.g. Interior Temperature Sensor Fan V42). If there is a specific complaint and no malfunctions are recognized after checking the Diagnostic Trouble Code (DTC) memory, refer to the information listed below.

Additional information:

- ◆ Climatronic, servicing ⇒ [Page 87-25](#)
- ◆ A/C refrigerant system, servicing ⇒ [Page 87-89](#)
- ◆ Wiring diagrams ⇒ "Electrical Wiring Diagrams, Troubleshooting & Component Locations"
- ◆ Information covering symptoms/causes and corresponding "Service Fixes" ⇒ Technical Bulletins.

Climatronic - On Board Diagnostic (OBD), initiating & checking control module versions

Note:

The following applies to models through m.y. 2001 ONLY. OBD from m.y. 2002 ⇒ [Page 01-5](#) .

Test requirements:

- ◆ All fuses OK according to wiring diagram
- ◆ Voltage supply OK (at least 11.5 V).
- ◆ Scan Tool VAG 1551 or VAG 1552 connected.

Notes:

- ◆ *Connecting Scan Tool ⇒ [Page 01-2](#) .*
- ◆ *The following description applies only to Scan Tool VAG 1551.*
- Switch on ignition.
- Switch on printer with the PRINT button (indicator lamp in button lights up).
- Press button -1- to select operating mode 1, "Rapid data transfer" .

Rapid data transfer Input address word XX	HELP	◀	Indicated on display: - Press buttons -0- and -8- to input address word 08, "AC/Heating Electronics".
Rapid data transfer 08 AC/Heating Electronics	Q	◀	Indicated on display: - Press -Q- button to confirm input.
Rapid data transfer Tester sends address word 08	Q	◀	Indicated on display:
3B1 907 044 A CLIMATRONIC Coding 01000	SXX WSC XXXXX	◀	Indicated on display (example only): - Blue (illumination) display 3B1 907 044 A, <ul style="list-style-type: none"> ◆ Control module part number ◆ Climatronic = System designation ◆ SXX = Software version ◆ Coding: (If no code has been input, e.g.: 00000, the display flashes) <p>Check control model coding ⇒ Page 01-41 ; Climatronic control module, coding (function 07).</p> <ul style="list-style-type: none"> ◆ WSC = Workshop code

CAUTION!

Part numbers are for reference only. Always check with your Parts Department for the latest parts information.

Notes:

Rapid data transfer HELP
control module does not answer!



◆ *If one of the DTCs shown appears in the display, the possible causes of the malfunction can be printed out with the HELP button.*

Rapid data transfer HELP
K wire not switching to positive!



(The ignition must be switched on!)

Rapid data transfer →
No signal from control module!



◆ *DTCs have occurred at the start or during the program (external reason for malfunctions?).*

Rapid data transfer →
Fault in communication build-up



- Check data link connector cables, voltage and ground supply connections.

Rapid data transfer
Tester sends address word 08



Display after input of address word 08:

3B1 907 044 A CLIMATRONIC SXX
Coding 01000 WSC XXXXX



The control module identification number is displayed:

- Press → button.

Rapid data transfer HELP
Select function XX



Indicated in display

List of available functions

Note:

The following applies to models through m.y. 2001 ONLY. OBD from m.y. 2002 ⇒ [Page 01-5](#).

Function	page
01 - Check Control Module Versions	⇒ Page 01-8
02 - Check DTC Memory	⇒ Page 01-12
03 - Output Diagnostic Test Mode (DTM)	⇒ Page 01-32
04 - Basic Setting	⇒ Page 01-35
05 - Erase DTC Memory	⇒ Page 01-39
06 - End Output	⇒ Page 01-40
07 - Code Control Module	⇒ Page 01-41
08 - Read Measuring Value Block	⇒ Page 01-43

Notes:

- ◆ Press **HELP** button to print out a complete list of available functions. This list indicates function capability of VAG 1551 Scan Tool (ST) only, and does not necessarily reflect function capability of vehicle systems equipped with OBD. For AC/Heating Electronics address word 08, do not attempt to select functions other than those listed above.
- ◆ After function is completed and forwarded with → button, VAG 1551 Scan Tool (ST) returns to following start position:

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

Diagnostic Trouble Code (DTC) memory, checking (function 02)

- Connect VAG 1551 scan tool, enter address word 08 "AC/Heating electronics" and press → until "Select function XX" appears in display ⇒ [Page 01-8](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display (function selection):

- Press buttons -0- and -2- to select function 02, check DTC memory.

Rapid data transfer
02 - Check DTC Memory

Q



Indicated on display:

- Press -Q- button to confirm entry.

X DTCs recognized!



The number of stored DTCs or "No DTCs recognized" appears in the display.

No DTCs recognized!



- Press → button.

The stored DTCs are displayed one after the other and printed out using the Print button.

- When the last DTC has been displayed and printed out, repair DTCs as described in DTC table ⇒ [Page 01-14](#) .
- Press → button.

Rapid data transfer

HELP



Select function XX

Indicated on display (function selection):

- End output (function 06) ⇒ [Page 01-40](#)
- Switch off ignition and disconnect data link connector.

Note:

If a malfunction was recognized:

- 1. *Make necessary repairs.*
- 2. *Erase DTC Memory (function 05).*
- 3. *Check DTC Memory (function 02).*

Diagnostic Trouble Code (DTC) table

Notes:

- ◆ The following table lists all malfunctions, with the corresponding 5 digit Diagnostic Trouble Codes (DTCs) that can be recognized by the Climatronic control module - J255- and printed out by the VAG 1551 Scan Tool (ST).
- ◆ *Malfunctions occurring intermittently are displayed as sporadic malfunctions ("SP").*
- ◆ *DTC codes appear only on the print-out.*
- ◆ The DTC table may also include a description of the type of malfunction.
- ◆ After you made the necessary repairs, always erase the DTC memory and check the DTC memory again with the VAG 1551 Scan Tool (ST).
- ◆ If there is a specific complaint and no malfunctions are recognized after checking the DTC memory, perform function 03 Output Diagnostic Test Mode (DTM) ⇒ [Page 01-32](#) or function 08 Read measuring value block 08 ⇒ [Page 01-43](#) . If the display flashes but no DTCs were recognized, perform function 07 Code control module and then function 04 Basic setting. If necessary, troubleshoot specific complaints using conventional methods without OBD ⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations binder.

VAG 1551 printout	Possible cause	Corrective actions
00000 No DTC recognized		If "No DTC recognized" appears after performing repairs, OBD is ended. If the display still flashes, select the following functions one after another: 07 Code control module ⇒ Page 01-41 & 04 Basic setting ⇒ Page 01-35

01-16

VAG 1551 printout	Possible cause	Corrective actions
00281 Vehicle Speed Sensor -G68- 1)	Short circuit or open circuit in wiring or connectors for speed signal from engine control module to Climatronic control module Speedometer Sensor -G22- malfunctioning (only if Speedometer -G21- is also not functioning)	- Check signal from -G22- using Read measuring value block ⇒ Page 01-43 - Check wires and connectors to control module using wiring diagram - Replace -G22-
Cannot be checked at the moment	This read-out appears only when the final control diagnosis was performed before checking the DTC memory. This DTC will be erased from DTC memory when the ignition is switched off. If -G68- is malfunctioning , the DTC will reappear when driving.	

1) A DTC was found for Speedometer Sensor -G22- and not for Vehicle Speed Sensor -G68-. The DTC is only recognized if 5 driving cycles take place within 4 minutes after starting the engine and no speed signal was measured. A driving cycle consists of start, drive over 15 km/h (approx. 9.5 mph), and switch off.

VAG 1551 printout	Possible cause	Corrective actions
00532 Supply Voltage (B+) Signal too large ¹⁾ Signal too small ¹⁾	Generator (GEN) malfunctioning Wires or connectors to Climatronic Control Module - J255-	<ul style="list-style-type: none"> - Check voltage (terminal 15) using function 08 Read measuring value block ⇒ Page 01-43 - Check generator ⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations binder - Check voltage (terminal 15) using function 08 Read measuring value block ⇒ Page 01-43 - Repair wires and connectors to control module using wiring diagram - Check generator ⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations binder

¹⁾ One of these messages will be displayed in addition to indication of relevant component.

VAG 1551 printout	Possible cause	Corrective actions
00538 Reference voltage Signal too large ¹⁾ Signal too small ¹⁾	<p>Short circuit or open circuit in wiring or connectors. Pay special attention to the wires from contact 8 of connector housing T16b on Climatronic control module -J255- to flap motors.</p> <p>Flap position sensors -G92-, -G112-, -G113- or -G114- malfunctioning .</p> <p>Control module malfunctioning</p>	<p>- Check wiring and connectors to control module using wiring diagram.</p> <p>- Check function of flap motors for regulating air conditioner using function 03 Output Diagnostic Test Mode (DTM) ⇒ Page 01-32</p> <p>- Disconnect electrical connectors to listed sensors one after another, erase DTC memory (⇒ Page 01-39) and check DTC memory again (⇒ Page 01-12). If the "Reference voltage" malfunction is no longer recognized (and the DTC reappears after reconnecting), the applicable flap motor must be replaced.</p> <p>- Replace control module if necessary. Then select the following functions one after another: 07 Code control module ⇒ Page 01-41 & 04 Basic setting ⇒ Page 01-35 .</p>

¹⁾ One of these messages will be displayed in addition to indication of relevant component.

VAG 1551 printout	Possible cause	Corrective actions
00603 Footwell/Defroster Flap Motor -V85-	Short circuit or open circuit in wiring or connectors to footwell/defroster flap motor - V85- -V85-malfunctioning ¹⁾	- Perform function 03 Output Diagnostic Test Mode (DTM) ⇒ Page 01-32 . - Check -V85- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram - Replace -V85-. Then select function 04 Basic setting ⇒ Page 01-35

¹⁾ This DTC is recognized in function 04 Basic setting, function 03 Output Diagnostic Test Mode (DTM), and in normal operation. Flap must reach both end stops.

VAG 1551 printout	Possible cause	Corrective actions
00779 Outside Air Temperature Sensor -G17- Open/short circuit to B+ ¹⁾ Short circuit to Ground ¹⁾	Short to positive or open circuit in wiring or connectors to outside temperature sensor -G17- Short circuit to Ground in wiring or connectors to outside temperature sensor -G17-. -G17- malfunctioning	- Check -G17- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring or connectors using wiring diagram. - Check -G17- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring or connectors using wiring diagram. - Replace -G17-

¹⁾ One of these messages will be displayed in addition to indication of relevant component.

01-21

VAG 1551 printout	Possible cause	Corrective actions
00787 Fresh Air Intake Duct Temperature Sensor -G89- Open/short circuit to B+ ¹⁾	Short to positive or open circuit in wiring or connectors to fresh air intake duct temperature sensor - G89-	- Check -G89- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram
Short circuit to Ground ¹⁾	Short circuit to Ground in wiring or connectors to fresh air intake duct temperature sensor -G89-	- Check -G89- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram
	-G89- malfunctioning	- Replace -G89-

¹⁾ One of these messages will be displayed in addition to indication of relevant component.

VAG 1551 printout	Possible cause	Corrective actions
00792 A/C Pressure Switch - F129- ⁴⁾	<p>Short or open circuit in wiring or connectors to A/C pressure switch - F129-</p> <p>Refrigerant system malfunctions:</p> <ul style="list-style-type: none"> ◆ over or insufficiently charged ◆ refrigerant system blockage ◆ insufficient air flow to condensor and/or engine radiator <p>-F129- malfunctioning</p>	<p>- Check -F129- using function 08 Read measuring value block ⇒ Page 01-43</p> <p>- Repair wiring and connectors using wiring diagram</p> <p>- Check refrigerant system ⇒ Page 87-89</p> <p>- Check engine cooling ⇒ <i>Repair Manual, Engine Mechanical, Repair Group 19</i></p> <p>- Replace -F129-</p>
Cannot be checked at present	<p>This display appears only if Output Diagnostic Test Mode (DTM) was performed and the pressure switch could not be checked (e.g. outside temperature below 12 °C (53 °F) before checking the DTC memory. This DTC is erased from the DTC memory after switching ignition off.</p>	

¹⁾ This malfunction cannot be recognized if the outside temperature is below 12 °C (53 °F), or if -G17- and -G89- malfunction. The switch is a three-part switch, the 2 bar/32 bar switch component is tested, the 16 bar switch component is not.

01-23

VAG 1551 printout	Possible cause	Corrective actions
00797 Sunlight Photo Sensor -G107- Open/short circuit to B+ ¹⁾ Short circuit to Ground ¹⁾	Open circuit or short to positive in wiring or connectors to sunlight photo sensor -G107- Short circuit to Ground in wiring or connectors to sunlight penetration photo sensor -G107- -G107- malfunctioning	- Check -G107- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram. - Check -G107- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram - Replace -G107-

¹⁾ One of these messages will be displayed in addition to indication of relevant component.

VAG 1551 printout	Possible cause	Corrective actions
01206 Ignition Time Period Signal Off ¹⁾	<p>-J285- is malfunctioning if the ABS warning light -K47- or brake system warning lamp -K118- indicates this DTC and it is also shown in the DTC memory-02.</p> <p>Short circuit or open circuit in wiring or connectors.</p> <p>Climatronic control module -J255- malfunctioning .</p>	<p>- Replace instrument cluster.</p> <p>- Check ignition off signal using function 08 Read measuring value block ⇒ Page 01-43</p> <p>- Repair wiring or connectors using wiring diagram.</p> <p>- Replace Climatronic control module -J255-. Then select the following functions one after another: 07 Code control module ⇒ Page 01-41 & 04 Basic setting ⇒ Page 01-35</p>

1) This "signal" comes from the control module within the instrument cluster (-J285-). The control module -J255- uses this signal after the engine was switched off and restarted within 2 hours, to replace the values of the current outside air temperature sensor -G17- and fresh air intake duct temperature sensor -G89- with the last operating temperature values. The measured values would otherwise be influenced by the radiated heat from the stopped (stationary) engine. The ignition off signal only occurs after starting the engine.

VAG 1551 printout	Possible cause	Corrective actions
01271 Temperature Regulator Flap Motor -V68- ²⁾	<p>Short circuit or open circuit in wiring or connectors to Temperature Regulator Flap Motor -V68-</p> <p>-V68- installed without using function 04 "Basic setting".</p> <p>-V68- blocked</p> <p>-V68- malfunctioning</p>	<p>- Check -V68- using function 08 Read measuring value block ⇒ Page 01-43</p> <p>- Repair wiring and connectors using wiring diagram</p> <p>- Check motor -V68- end positions when installed ⇒ Page 01-32</p> <p>- Perform function 03 Output Diagnostic Test Mode (DTM) ⇒ Page 01-32</p> <p>- Replace -V68- and perform function 04 Basic setting ⇒ Page 01-35 .</p>

1) This DTC is recognized in function 04 Basic setting, function 03 Output Diagnostic Test Mode (DTM), and in normal operation. Flap must reach both end stops.

VAG 1551 printout	Possible cause	Corrective actions
01272 Central Air Flap Motor -V70- ¹⁾	Short circuit or open circuit in wiring or connectors to central air flap motor -V70- -V70- blocked -V70- malfunctioning	- Check -V70- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram - Perform function 03 Output Diagnostic Test Mode (DTM) ⇒ Page 01-32 - Replace -V70- and perform function 04 Basic setting ⇒ Page 01-35 .

¹⁾ This DTC is recognized in function 04 Basic setting, function 03 Output Diagnostic Test Mode (DTM), and in normal operation. Flap must reach both end stops.

01-27

VAG 1551 printout	Possible cause	Corrective actions
01273 Fresh Air Blower -V2- or Control Module for Fresh Air Blower -J126-	Short circuit or open circuit in wiring or connectors to fresh air blower -V2- Blower control module -J126- or fresh air blower -V2- malfunctioning	- Check -V2- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram - Perform function 03 Output Diagnostic Test Mode (DTM) ⇒ Page 01-32 - Replace -J126- or -V2-.

VAG 1551 printout	Possible cause	Corrective actions
01274 Air Flow Flap Motor -V71- ¹⁾	Short circuit or open circuit in wiring or connectors to air flow flap motor -V71- -V71- blocked -V71- malfunctioning	- Check -V71- using function 08 Read measuring value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram - Perform function 03 Output Diagnostic Test Mode (DTM) ⇒ Page 01-32 - Replace -V71- and perform function 04 Basic setting ⇒ Page 01-35 .

¹⁾ This DTC is recognized in function 04 Basic setting", function 03 Output Diagnostic Test Mode (DTM)", and in normal operation. Flap must reach both end stops.

VAG 1551 printout	Possible cause	Corrective actions
01296 Center vent temperature sensor -G191-	No center vent temperature sensor - G191- installed.	
Open/short circuit to B+ ¹⁾	Climatronic control module -J255- incorrectly coded.	- Select the following functions one after another: 07 Code control module ⇒ Page 01-41 & 04 Basic setting ⇒ Page 01-35
Short circuit to Ground ¹⁾	Climatronic control module -J255- incorrectly coded.	- Select the following functions one after another: 07 Code control module ⇒ Page 01-41 & 04 Basic setting ⇒ Page 01-35

¹⁾ One of these messages will be displayed in addition to indication of relevant component.

VAG 1551 printout	Possible cause	Corrective actions
01297 Footwell vent temperature sensor -G192- Open/short circuit to B+ ¹⁾ Short circuit to Ground ¹⁾	Short to positive or open circuit in wiring or connectors to footwell vent temperature sensor -G192- Short circuit to Ground in wiring or connectors to footwell vent temperature sensor -G192- -G192- malfunctioning	- Check -G192- using function 08 Read measured value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram. - Check -G192- using function 08 Read measured value block ⇒ Page 01-43 - Repair wiring and connectors using wiring diagram. - Replace -G192-.

¹⁾ One of these messages will be displayed in addition to indication of relevant component.

01-31

VAG 1551 printout	Possible cause	Corrective actions
65535 Control module	Wiring or connectors to Climatronic control module -J255- Climatronic control module malfunctioning	<p>- Check wiring and connectors using wiring diagram.</p> <p>- Check Climatronic Control Module -J255- using function 08 Read measuring value block ⇒ Page 01-43</p> <p>Replace Climatronic Control Module -J255-. Then select following functions one after another: 07 Code control module ⇒ Page 01-41 & 04 Basic setting ⇒ Page 01-35</p>

Output Diagnostic Test Mode (DTM) (function 03)

Notes:

- ◆ *Output Diagnostic Test Mode (DTM) must be performed with engine not running, ignition switched on and Climatronic switched off. (Switch Climatronic off by pressing button to reduce blower speed ⇒ [Page 87-35](#), item 17).*
- ◆ *For definitive results, output DTM must be performed when the outside temperature is at least 12 ° C (53 ° F) as displayed on the A/C control head.*
- ◆ *Automatic regulation of Climatronic does not take place during output DTM.*
- ◆ *If necessary, output DTM can be repeated several times.*

Output Diagnostic Test Mode (DTM), initiating

- Connect VAG 1551 Scan Tool (ST) and enter address word "08 AC/Heating electronics" and then press → button, until "Select function XX" appears in display ⇒ [Page 01-8](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display (function selection):

- Press buttons -0- and -3- to select function 03 Output Diagnostic Test Mode (DTM).

Rapid data transfer
03 - Output Diagnostic Test Mode

Q



Indicated on display:

- Confirm input with -Q- button.

Output Diagnostic Test Mode**Self test**

Indicated on display:

The following tests are performed:

- ◆ A/C control head -E87- display ⇒ [Page 01-34](#)
- ◆ Functional test of the 4 flap motors
- ◆ Electrical circuit to fresh air blower -V2- is tested.
- ◆ Climatronic control module switching sequence for A/C clutch -N25- is tested.
- ◆ All sensors are checked.

After approx. 30 seconds, the checks are completed.

Function is not recognized or cannot →
be performed at the moment!



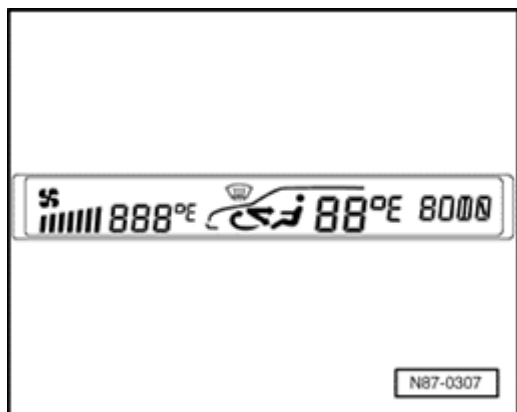
Indicated on display:

- If "Function is not recognized or cannot be performed at the moment" appears in display, output DTM has been concluded.
- Press → button.

Note:

After completing output DTM, always check DTC memory ⇒ [Page 01-12](#) .

01-34



A/C control head -E87- display, checking

◀ All display segments must show.

Note:

All display segments must appear during output DTM, otherwise replace Climatronic control module - J255-.

Basic setting (function 04)

Note:

If the display flashes after switching ignition on, even though no Diagnostic Trouble Codes (DTC) are in DTC memory, perform function 07 Code Control Module followed by function 04 Basic setting.

- Connect VAG 1551 Scan Tool (ST), enter address word 08 "AC./Heating electronics" and press → until "Select function XX" appears in display ⇒ [Page 01-8](#) .
- Switch printer on by pressing PRINT button (warning lamp in button lights up).
- Check DTC memory ⇒ [Page 01-12](#) and correct all malfunctions shown.
- Erase DTC memory ⇒ [Page 01-39](#)
- Check code ⇒ [Page 01-41](#) and correct if necessary.

Rapid data transfer Select function XX	HELP	◀	Indicated on display (function selection): - Press buttons -0- and -4- to select function 04 Basic setting.
Rapid data transfer 04 - Basic setting	Q	◀	Indicated on display: - Press -Q- button to confirm entry.
Basic setting Enter display group number XXX	HELP	◀	Indicated on display: - Enter display group number 000
Basic setting Enter display group number 000	Q	◀	Indicated on display: - Press -Q- button to confirm entry.

Note:

The Climatronic control module - J255- stores all flap motor position sensor (potentiometer) values when moving to their final positions and therefore takes on the basic setting of all flap motors.

01-37

System in basic setting 0
 XXX XXX XXX XXX



Indicated on display:

Note:

The movement of the four flap motors can be followed on the display. The changes in the feedback values do not give an indication of a malfunctioning motor.

Basic setting 0 →
 0 0 0 0



Indicated on display:

The basic setting is completed when the display reads "0 DTCs recognized" in the DTC memory.

- Press → button.

Rapid data transfer HELP
 Select function XX



Indicated on display (function selection):

- Press buttons -0- and -2- to select function 02 Check DTC memory.

Rapid data transfer Q
 02 - Check DTC memory



Indicated on display:

- Press -Q- button to confirm entry.

X DTCs recognized!



The number of stored DTCs or "No DTC recognized" appears in the display.

- Press → button.

The stored DTCs are displayed one after the other and printed out by pressing the Print button.

- When the last DTC has been displayed and printed out, repair DTCs using DTC table ⇒ [Page 01-14](#) .

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated in display (function selection, e.g. 02 - Check DTC memory):

Diagnostic Trouble Code (DTC) memory, erasing (function 05)

Prerequisites:

- ◆ DTC memory has been checked.

Erasing DTC memory

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -5- to select function 05 Erase DTC memory.

Rapid data transfer
05 Erase DTC memory

Q



Indicated on display:

- Press -Q- button to confirm entry.

Rapid data transfer
DTC memory is erased!

→



Indicated on display:

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

End output (function 06)

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -6- to select function 06 End output.

Rapid data transfer
06 End output

Q



Indicated on display:

- Press -Q- button to confirm entry.

Rapid data transfer
Enter address word XX

Help



Indicated on display:

- Switch off ignition.
- Disconnect VAG 1551 Scan Tool (ST) from data link connector.

Climatronic Control Module -J255-, coding (function 07)

Note:

- ◆ *Each replacement Climatronic control module - J255- must be coded after installing.*
- ◆ *Perform Basic setting (function: 04) after coding.*
- ◆ *The A/C control head - E87 flashes for 15 seconds when the control module -J255 has not been coded.*
- ◆ *If the appropriate vehicle code or the appropriate equipment level is not displayed, the control module must be coded as follows:*

- Connect VAG 1551 Scan Tool (ST), enter address word 08 "AC/Heating electronics" and press → until "Select function XX" appears in display ⇒ [Page 01-8](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -7- to select function 07 Code control module.

Rapid data transfer Q
07 - Code control module



Indicated on display:

- Press -Q- button to confirm entry.

Coding control module Q
Enter code number XXXXX (0-32000)



Indicated on display:

- Using scan tool button pad, enter code number and confirm entry with -Q- button.

Coding	For vehicles
01000	All USA/CDN

Coding control module Q
Enter code number 01000 (0-32000)



Indicated on display:

- Press -Q- button to confirm entry.

3B1 907 044 A SXX →
Coding 01000 WSC XXXXX



The VAG 1551 Scan Tool (ST) display will show the control module coding and the part number.

- Press → button.

Rapid data transfer HELP
Select function XX



Indicated on display:

- Select End output (function 06) ⇒ [Page 01-40](#)

Note:

The code entered and shown on the display will not be loaded into the Climatronic control module until the ignition has been switched off once.

Read Measuring Value Block (function 08)

Notes:

- ◆ *During the function Read measuring value block, the Climatronic regulation is in operation.*
- ◆ *8 display group numbers display up to 4 measuring values each.*
- ◆ *To safely read measuring values while driving, an assistant is required.*

- Connect VAG 1551 Scan Tool (ST) and enter address word "08 AC/Heating electronics" and then press → button, until "Select function XX" is shown in display ⇒ [Page 01-8](#) .

Rapid data transfer
Select function XX

HELP



Indicated on display (function selection):

- Press buttons -0- and -8- to select function 08 Read measuring value block.

Rapid data transfer
08 - Read measuring value block

Q



Indicated on display:

- Press -Q- button to confirm entry.

Read measuring value block
Enter display group number XXX



Indicated on display:

- Using the 1551 button pad, enter the required display group number (following example shows display group 001).

Read measuring value block Q
 Enter display group number 001



Indicated on display:

- Press -Q- button to confirm entry.

Read measuring value block 1 →
 1 2 3 4



Indicated on display:

Notes:

- ◆ *Interpreting measured values in individual display fields ⇒ tables beginning on ⇒ [Page 01-45](#) .*
- ◆ *With the printer is switched on, the information on the display will be printed out.*
- ◆ *After completing the Read measuring value block function, check DTC memory ⇒ [Page 01-12](#)*
- ◆ *If measured value specifications are met in all display fields:*

- Press → button.

Rapid data transfer HELP
 Select function XX



Indicated on display (function selection):

Note:

To easily change between display groups, proceed as follows:

Display group	VAG 1551	VAG 1552
Higher	Press button 3	Press ↑ button
Lower	Press button 1	Press ↓ button
Skip	Press button C	Press button C

Table of selectable display group numbers

Display group number	Display field	Designation
001	1	<p>A/C clutch -N25- switch-off conditions (Codes 1 to 12)</p> <p>Code 0: -N25- is not switched off</p> <p>Code 1: -N25- switched off by A/C pressure switch - F129- due to excess refrigerant system pressure.</p> <p>Code 2: -N25- switched off because of fresh air blower -V2- with control module for fresh air blower -J126- malfunction.</p> <p>Code 3: -N25- switched off by A/C pressure switch - F129- due to insufficient refrigerant system pressure.</p>

Continued on next page

01-46

Display group number	Display field	Designation
		<p>Code 4: Not displayed.</p> <p>Code: 5 -N25- switched off for 4 seconds (no malfunction). Code 5 is only displayed for 5 seconds. If continuous, check speed signal.</p> <p>Code 6: -N25- switched off with ECON button (no malfunction).</p> <p>Code 7: -N25- switched off because A/C system is switched off via button for fresh air blower speed (no malfunction).</p> <p>Code 8: -N25- switched off because ambient temperature is below 3 °C (37 ° F) (to prevent icing, no malfunction). Check temperature sensors -G17- and -G89-.</p>

Continued on next page

01-47

Display group number	Display field	Designation
		<p>Code 9: Not displayed.</p> <p>Code 10: -N25- switched off because voltage supply is below 9.5 V.</p> <p>Code 11: -N25- switched off by "Hot" warning lamp via Climatronic control module -J255-.</p> <p>Code 12: -N25- switched off by Automatic Transmission Control Module (TCM) or Engine Control Module (ECM) via Climatronic control module -J255-.</p>

Continued on next page

Display group number	Display field	Designation
	2	Engine speed recognized: Code 0: no Code 1: yes
	3	Road speed Display: 0 to 255 km/h
	4	Standing time Code 250: Battery was disconnected. Codes 0 to 240: Time for "ignition off" in minutes. Code 255: Transfer malfunction.

Continued on next page

01-49

Display group number	Display field	Designation
002	1	Temperature regulator flap motor -V68- Measured value codes: 0 to 255. (Permissible deviations from specifications ± 2)
	2	Temperature regulator flap motor -V68- Specification: 0 to 255
	3	Temperature regulator flap motor -V68- Flap position: air supply cooled. Codes 0 to 149: -V68- malfunctioning. Codes 150 to 250: -V68- OK, provided basic setting (function 04) was completed. Codes 251 to 255: -V68- malfunctioning.

Continued on next page

01-50

Display group number	Display field	Designation
	4	<p>Temperature regulator flap motor -V68-</p> <p>Flap position: air supply heated.</p> <p>Codes 0 to 4: -V68-malfunctioning.</p> <p>Codes 5 to 100: -V68-OK, provided basic setting (function 04) was completed.</p> <p>Codes 101 to 255: -V68-malfunctioning.</p>
003	1	<p>Central air flap motor - V70-</p> <p>Measured value codes: 0 to 255</p> <p>(Permissible deviations from specifications ± 2)</p>
	2	<p>Central air flap motor - V70-</p> <p>Specification: 0 to 255</p>

Continued on next page

01-51

Display group number	Display field	Designation
	3	<p>Central air flap motor - V70-</p> <p>Flap position: air flow to instrument panel vents.</p> <p>Codes 0 to 149: -V70-malfunctioning.</p> <p>Codes 150 to 250: -V70-OK, provided basic setting (function 04) was completed.</p> <p>Codes 251 to 255: -V70-malfunctioning.</p>
	4	<p>Central air flap motor - V70-</p> <p>Flap position: air flow to footwell/defroster vents.</p> <p>Codes 0 to 4: -V70-malfunctioning.</p> <p>Codes 5 to 100: -V70- OK, provided basic setting (function 04) was completed.</p> <p>Codes 101 to 255: -V70-malfunctioning.</p>

Continued on next page

01-52

Display group number	Display field	Designation
004	1	Footwell/defroster flap motor -V85- Measured value codes: 0 to 255 (Permissible deviations from specifications ± 2)
	2	Footwell/defroster flap motor -V85- Specification: 0 to 255
	3	Footwell/defroster flap motor -V85- Flap position: air flow to footwell. Codes 0 to 149: -V85-malfunctioning. Codes 150 to 250: -V85-OK, provided basic setting (function 04) was completed. Codes 251 to 255: -V85-malfunctioning.

Continued on next page

01-53

Display group number	Display field	Designation
	4	<p>Footwell/defroster flap motor -V85-</p> <p>Flap position: air flow to defroster vents.</p> <p>Codes 0 to 4: -V85-malfunctioning.</p> <p>Codes 5 to 100: -V85- OK, provided basic setting (function 04) was completed.</p> <p>Codes 101 to 255: -V85-malfunctioning)</p>
005	1	<p>Air flow flap motor -V71-</p> <p>Measured value codes: 0 to 255</p> <p>(Permissible deviation from specification ± 2)</p>
	2	<p>Air flow flap motor -V71-</p> <p>Specification: 0 to 255</p>

Continued on next page

01-54

Display group number	Display field	Designation
	3	<p>Alr flow flap motor -V71-</p> <p>Flap stop: fresh air flow to passenger compartment.</p> <p>Codes 0 to 149: -V71-malfunctioning.</p> <p>Codes 150 to 250: -V71-OK, provided basic setting (function 04) was completed.</p> <p>Codes 251 to 255: -V71-malfunctioning.</p>
	4	<p>Alr flow flap motor -V71-</p> <p>Flap position: recirculating air flow in passenger compartment.</p> <p>Codes 0 to 4: -V71-malfunctioning.</p> <p>Codes 5 to 100: -V71-OK, provided basic setting (function 04) was completed.</p> <p>Codes 101 to 255: -V71-malfunctioning.</p>

Continued on next page

01-55

Display group number	Display field	Designation
006	1	<p>Value calculated by Climatronic control module -J255- in ° C as displayed in A/C control head -E87-.</p> <p>Value is calculated from temperature measurement at fresh air intake duct temperature sensor -G89- and outside air temperature sensor -G17-.</p> <p>Value is less than measured value from -G17- and -G89- when the vehicle has just been parked.</p> <p>A malfunction is not present if the measured values of temperature sensors -G17- and -G89- display actual values.</p> <p>The values are almost equal when driving over a longer distance.</p> <p>-G17- or -G89- are malfunctioning if the values are extremely abnormal.</p>

Continued on next page

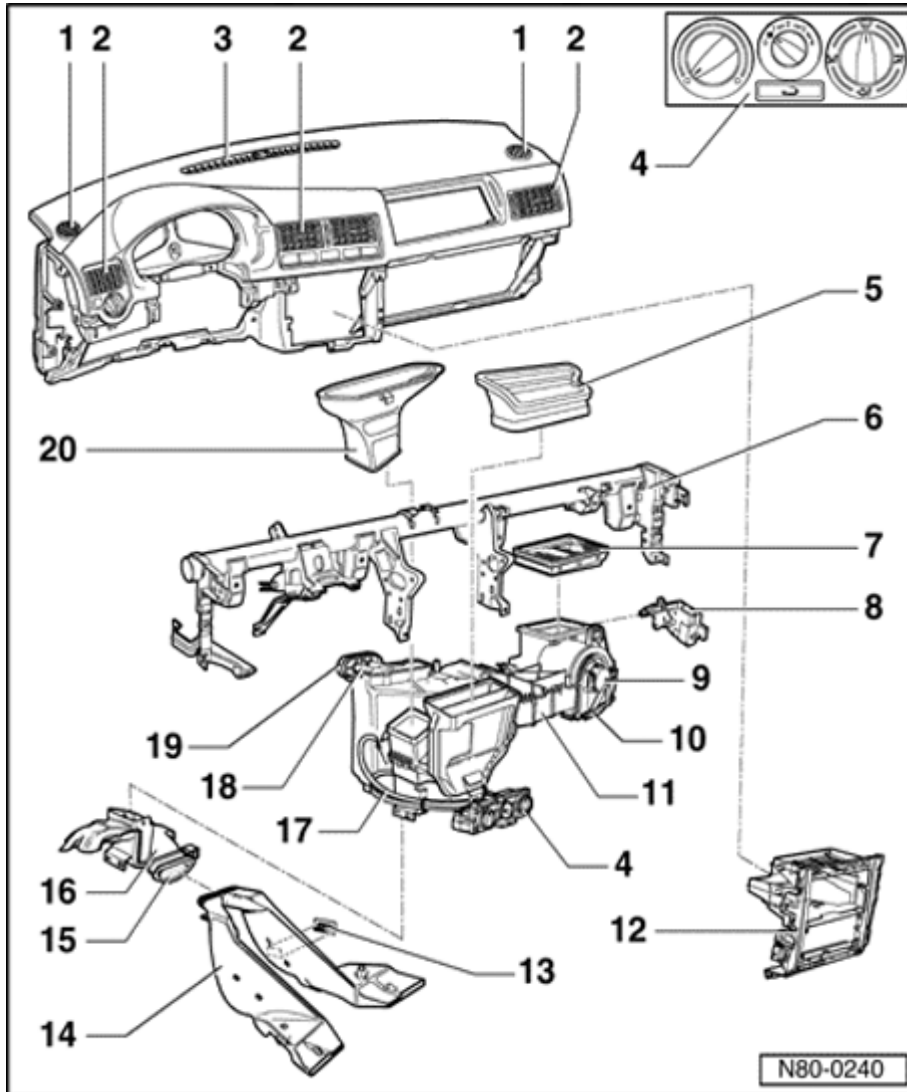
01-56

Display group number	Display field	Designation
	2	Fresh air intake duct temperature sensor - G89-. Actual measured value in ° C.
	3	Outside air temperature sensor -G17-. Actual measured value in ° C.
	4	Sunlight photo sensor G107-. Measured value in %, from 0 to 120.
	007	1
	2	Sender for outlet temperature, floor outlet -G192-. Actual measured value in ° C.
	3	Instrument panel interior temperature sensor -G56-. Actual measured value in ° C.
	4	Not applicable.

Continued on next page

01-57

Display group number	Display field	Designation
008	1	Fresh air blower -V2- with control module for fresh air blower -J126-. (Specifications measured in V) Blower off: 0 V One blower speed display segment: 3.6V Seven blower speed display segments: 12 V
	2	Fresh air blower -V2- with control module for fresh air blower -J126-. Actual value measured in V. (Permissible deviation from specification ± 0.8 V.)
	3	Terminal 15 Actual measured value in V.
	4	Voltage at A/C clutch - N25-. Actual measured value in V.



Heating and ventilation system, servicing

CAUTION!

Before beginning repairs:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch off ignition.**
- ◆ **Remove ignition key from ignition switch.**

1 - Side window air outlet

- ◆ Removing ⇒ [Fig. 1](#)

2 - Air outlets

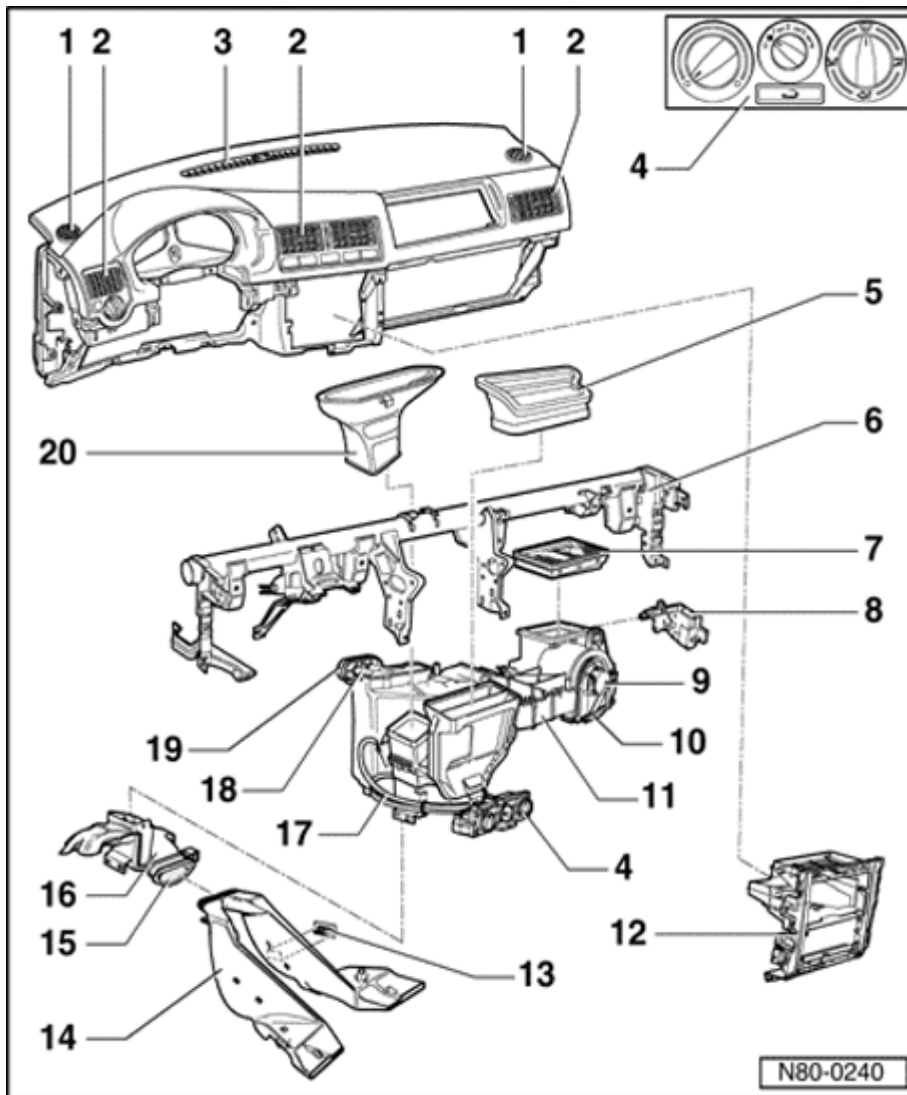
- ◆ Golf and Jetta have different types

- ◆ Removing ⇒ [Page 80-11](#)

3 - Defroster air outlet

- ◆ Removing and installing

⇒ [Repair
Manual, Body-
Interior, Repair
Group 70](#)



4 - Heating and ventilation controls

- ◆ With fresh air blower switch -E9-
- ◆ With fresh air/recirculation flap switch - E159-
- ◆ Removing and installing ⇒ [Page 80-15](#)
- ◆ Assembly = [Page 80-23](#)
- ◆ Cables, installing and adjusting = [Page 80-25](#)

5 - Intermediate duct

6 - Instrument panel cross member

- ◆ Loosening and tightening = [Fig. 5](#)

7 - Dust and pollen filter

- ◆ With activated charcoal filter
- ◆ Removing and installing ⇒ [Fig. 4](#)

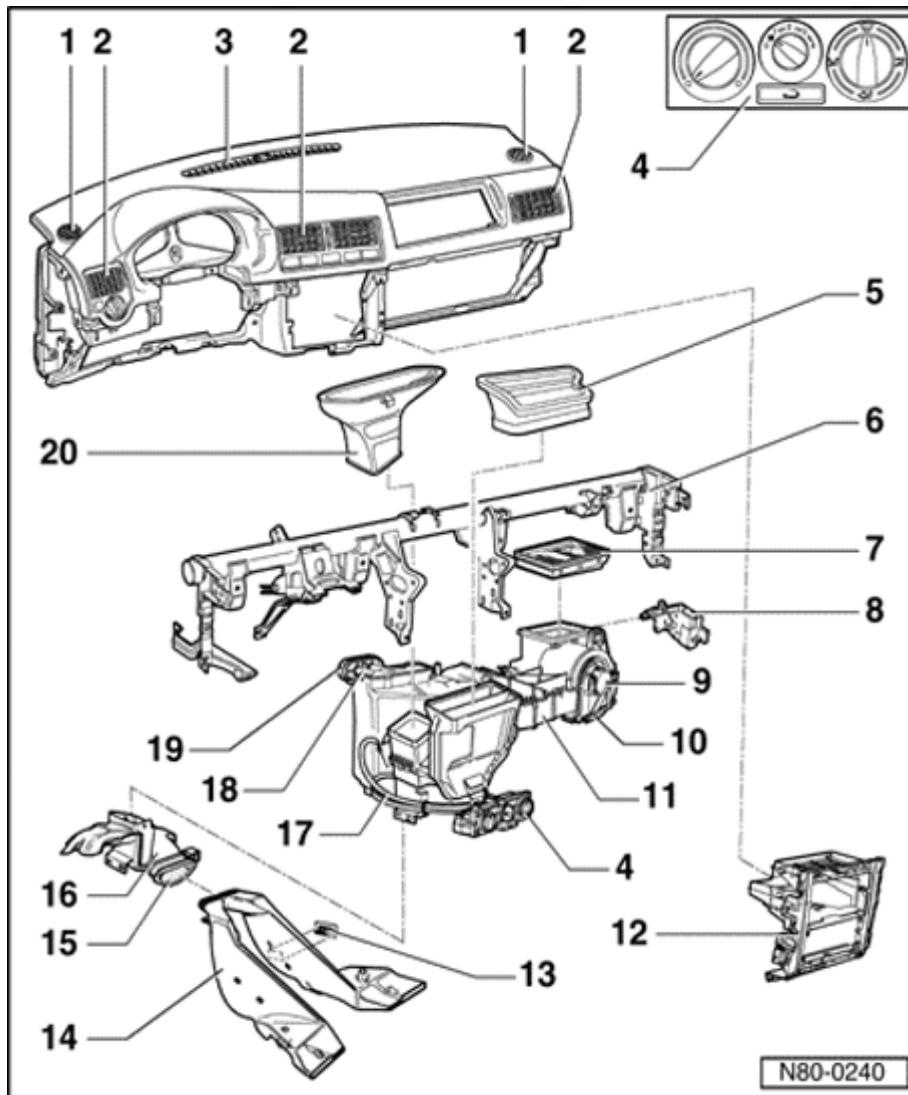
8 Servo motor for - fresh/recirculation air door -V154-

- ◆ Removing and installing

⇒ [Page 80](#)
[22](#)

**9 - Fresh air
blower -V2-**

◆ Removing :
[Fig. 3](#)



**10 Fresh air
- blower
series
resistance
with fuse -
N24-**

- ◆ Removing
⇒ [Page 80-7](#), ⇒ [Fig. 3](#),
Fresh air
blower -
V2-
,removing
and
installing

**11 Heating
- and
ventilation
unit**

- ◆ Assembly
⇒ [Page 80-19](#)
- ◆ Removing:
- Remove
instrument
panel

⇒ [Repair Manual, Body-Interior, Repair Group 70](#)

- Loosen
instrument
panel
cross
member
⇒ [Fig. 5](#)
- Carefully
pinch off
both
coolant
hoses to
heater
core and
disconnect

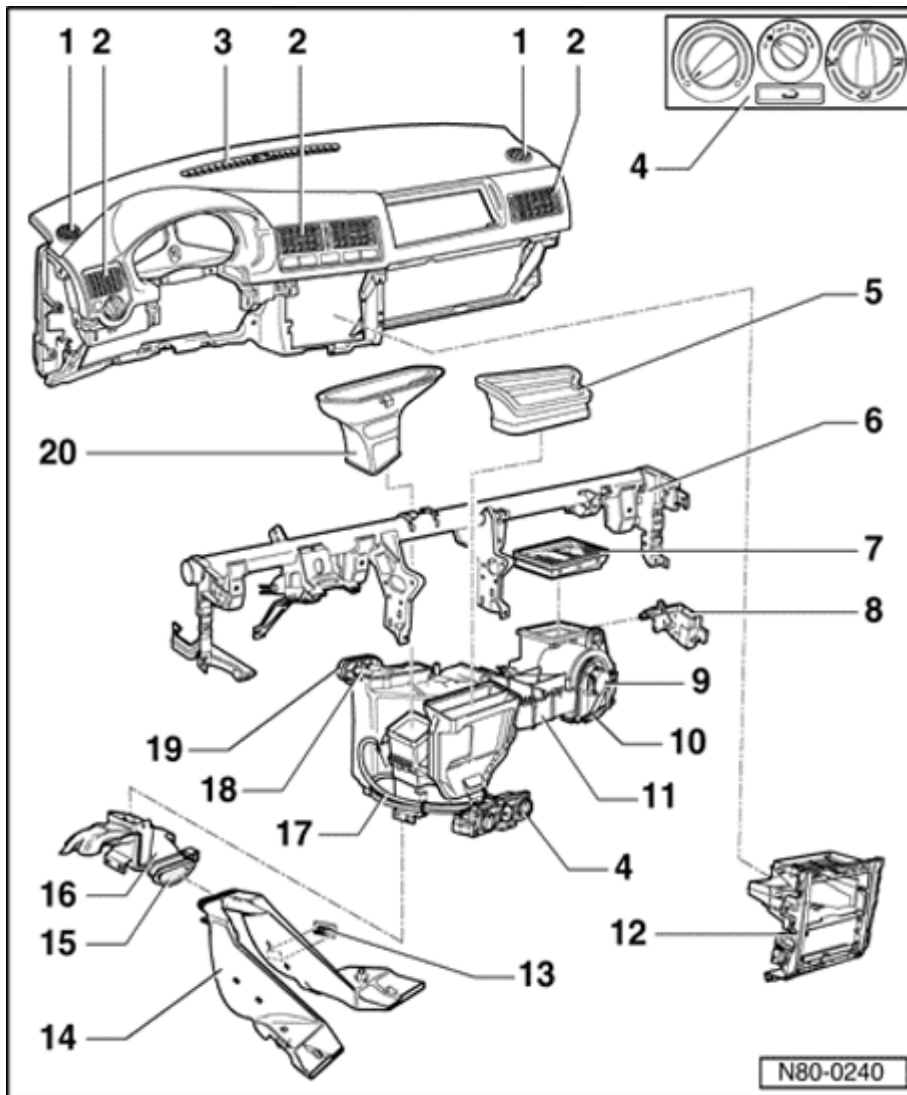
hoses.

- Seal off heater core to prevent coolant from running out

CAUTION!

The cooling system is pressurized when the engine is warm. Wear gloves and other protection and carefully release system pressure if necessary, before performing repairs.

- Locate and remove fasteners for heating and ventilation unit at bulkhead.
- Remove heating and ventilation unit.



12 - Center trim

13 - Footwell air outlet

◆ Passenger's side only

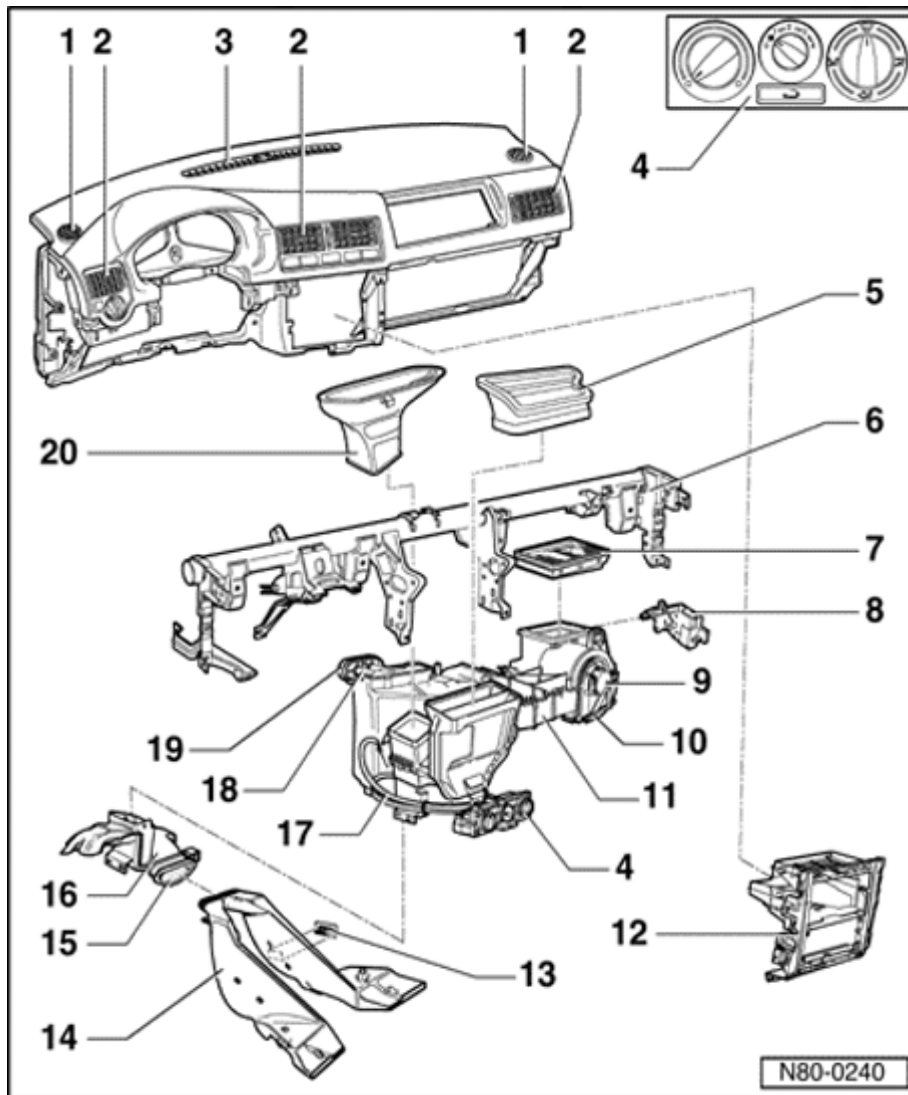
14 - Rear footwell air duct

15 - Gasket

16 Connecting - duct

◆ With driver's side footwell air outlet

◆ Removing ⇒ [Fig. 6](#)



17 - Cables

- ◆ Installing and adjusting = [Page 80-25](#)

18 - Heater core

- ◆ Always replace coolant after removal/replacement
- ◆ Replacing : [Page 80-19](#)

19 - Heater core/bulkhead seal

- ◆ Installation position ⇒ [Page 80-21 Fig. 2](#)

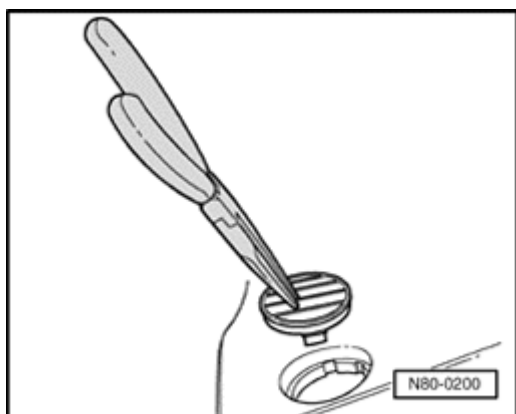
20 - Defroster duct

- ◆ Replacing:
 - Remove and install instrument panel.

⇒ [Repair Manual, Interior, Repair Group 70](#)

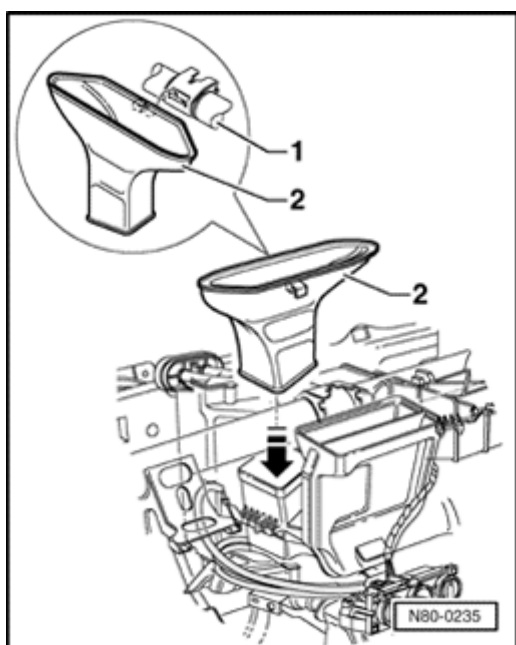
- Loosen instrument panel cross member [Fig. 5](#)

- ◆ Installation position ⇒ [2](#)



✦ **Fig. 1 Side window air outlet, removing**

- Carefully pull out using needle nose pliers



✦ **Fig. 2 Defroster duct, installation position**

- Attach defroster duct -2- to heater unit.
- At the same time position defroster duct -2- in instrument panel cross member -1-.

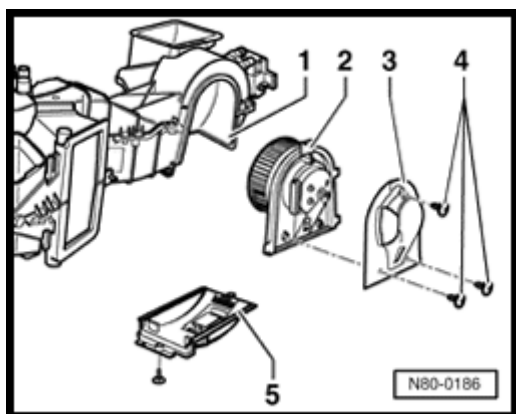


Fig. 3 Fresh air blower -V2-, removing

- 1 - Heater unit
- 2 - Fresh air blower -V2-
- 3 - Cover
- 4 - Screws
- 5 - Fresh Air Blower Series Resistance With Fuse -N24-

Removing

- Remove glove box.
⇒ [Repair Manual, Body-Interior, Repair Group 68](#)
- Disconnect electrical connector for fresh air blower series resistance with fuse -N24 .
- Disconnect electrical connector for heater fan.
- Remove resistor for fresh air blower.
- Remove fresh air blower downward.

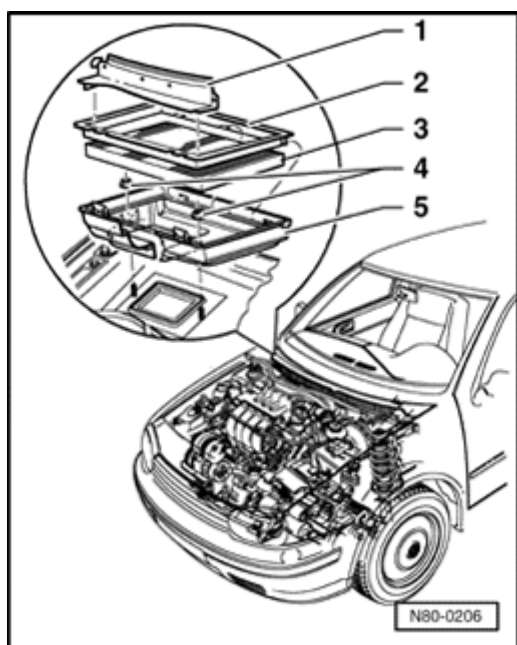


Fig. 4 Dust and pollen filter, removing and installing

- 1 - Air deflector
- 2 - Frame
- 3 - Dust and pollen filter element
- 4 - Plastic nut, 2.5 Nm (22 in. lb)
- 5 - Filter housing

Removing

With plenum cover removed:

- Depress tabs at front edge of frame -2-.
- Lift and pull out filter element with frame to front .

Installing

- Assemble filter element to frame
- Insert so that pins fit into into filter housing -5-.
- Clip frame into place.

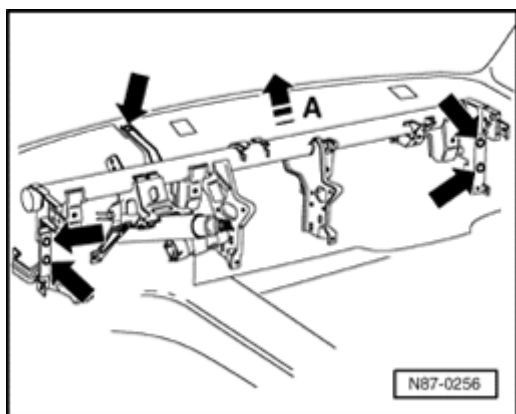


Fig. 5 Instrument panel cross member, loosening and tightening

- Remove bolts -arrows-
- ◆ Tightening torque: 25 Nm (18 ft. lb.)
- To access or remove heating unit and surrounding parts, lift cross member in direction of arrow -A- and support.

Note:

- ◆ *To avoid damage to the steering column, have a second technician assist.*
- ◆ *If removed components are not to be re-installed immediately, secure cross member to the bulkhead.*
- ◆ *Any wiring harnesses released from their retainers must be secured again at the same point, using the same retainers.*

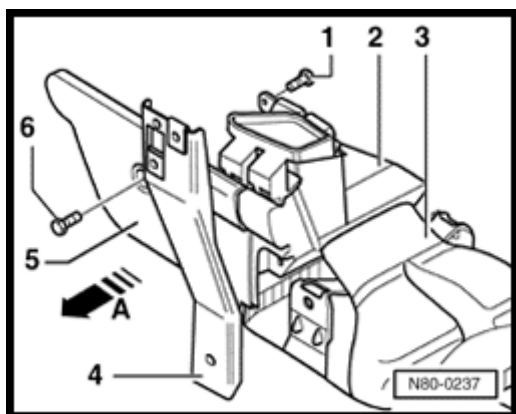


Fig. 6 Connecting duct, removing

- 1 - Bolt
- 2 - Air duct connector
- 3 - Rear footwell duct
- 4 - Bracket
- 5 - Cover
- 6 - Bolt

First do the following:

- Remove glove box
⇒ [Repair Manual, Body-Interior, Repair Group 68](#)
- Remove steering column cover.
⇒ [Repair Manual, Body-Interior, Repair Group 68](#)

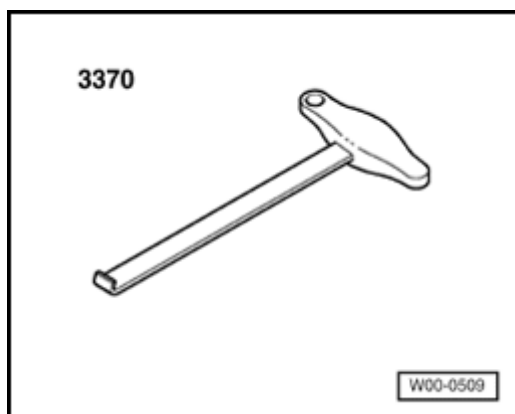
Removing

- Remove bracket -4-.
- Remove cover -5-.
- Remove duct in direction of footwell -arrow -A-.

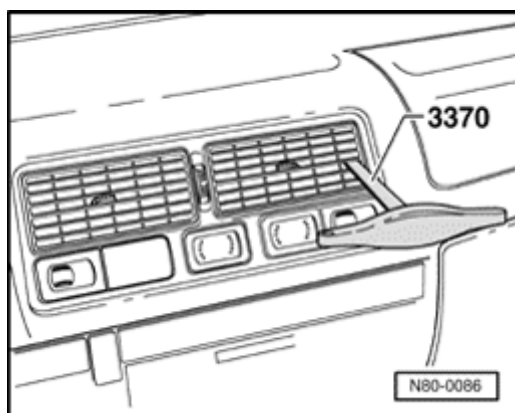
Air outlets, removing

Center air outlet (Golf), removing

Special tools and equipment required



- ◆ Special hook 3370



- Insert 3370 between the left side of each grille louver and outlet where the louver pivots, and gently pry each louver out from opening.

CAUTION!

The right side of each grille louver may pivot on a small rubber grommet that may dislodge during removal. Make sure to locate grommet on pivot prior to reinstalling grille louver.

- Remove both mounting screws located inside air outlet.
- Remove air outlet

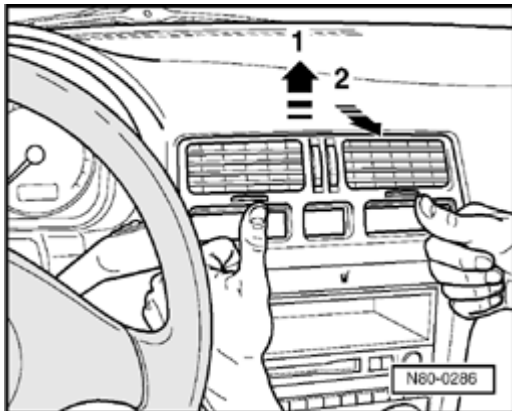
Center air outlet (Jetta), removing

- First remove all switches located in center outlet trim

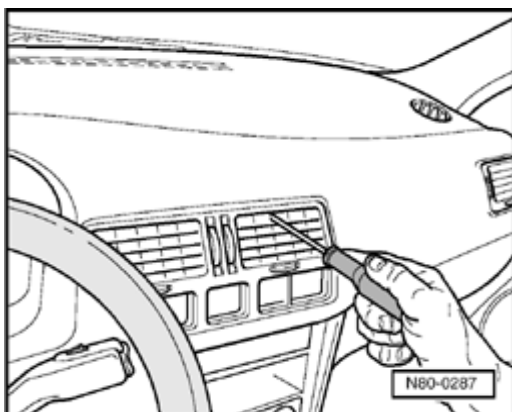
⇒ [Repair Manual, Electrical Equipment, Re Group 96](#)

CAUTION!

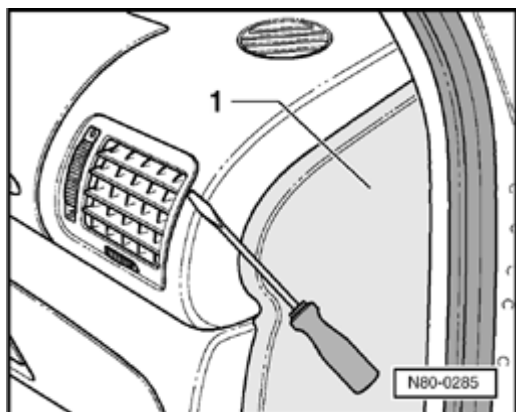
- ♦ **Be careful not to damage instrument panel when removing switches. Protect trim of switch with adhesive tape before re switch.**
- ♦ **Do Not pry out switches from the side. pull out from the top.**



- Carefully push trim panel upwards -arrow order to disengage lower mounting clips. doing so, pull lower portion of trim out from instrument panel -2-.



- Slide screwdriver into center of air outlet and disengage upper mounting retainers.
 - Pull out air outlet.
 - Remove glove box
- ⇒ [Repair Manual, Body Interior, Repair Group 96](#)
- Disconnect electrical connection for air outlet illumination.



Passenger's air outlet (Golf and Jetta), removing

- Insert small screwdriver between air outlet housing and instrument panel and gently pry air outlet housing out from opening.

CAUTION!

Be careful not to damage instrument panel when removing outlet. Protect instrument panel in area of trim with adhesive tape before removing.

- Pull out air outlet

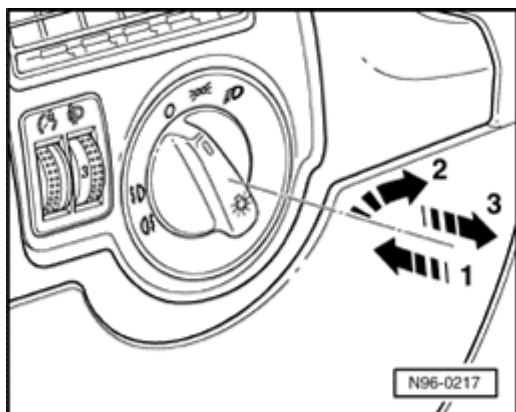
Jetta only:

- Remove glove box
⇒ [Repair Manual, Body Interior, Repair Group 68](#)
- Disconnect electrical connection for air outlet illumination.

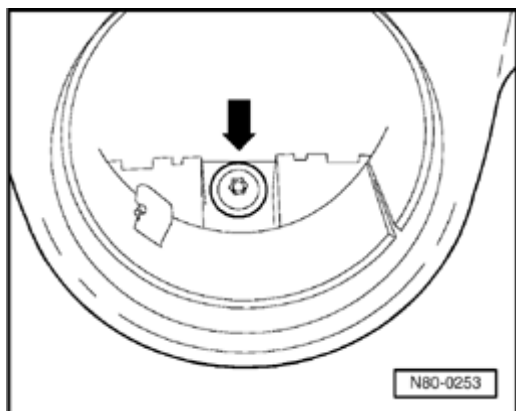
80-14

Driver's air outlet (Golf and Jetta), removing

First do the following:



- ✦ - Turn (light switch) rotary switch to "0" position.
- Press rotary part inward -1- and turn slightly to right -2-
- Hold rotary part in this position and pull light switch out -3-.
- Disconnect electrical connection.



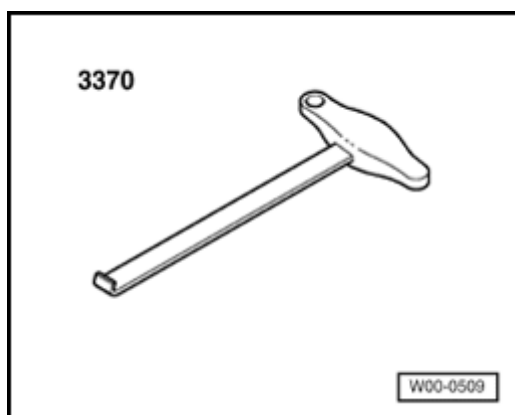
- ✦ - Remove screw -arrow-.
- Pull out air outlet

Jetta only:

- Remove glove box
- ⇒ [Repair Manual, Body Interior, Repair Group 68](#)
- Disconnect electrical connection for air outlet illumination.

Heating and ventilation controls, removing and installing

Special tools and equipment required

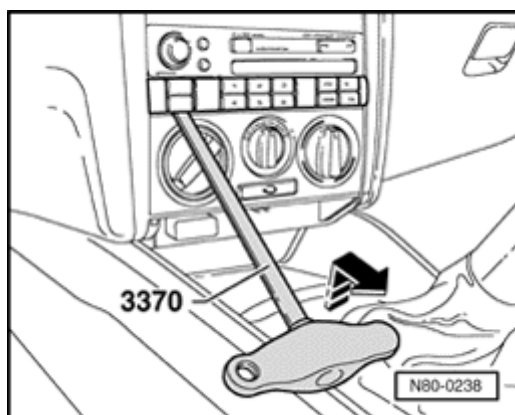


- ◆ Special hook 3370

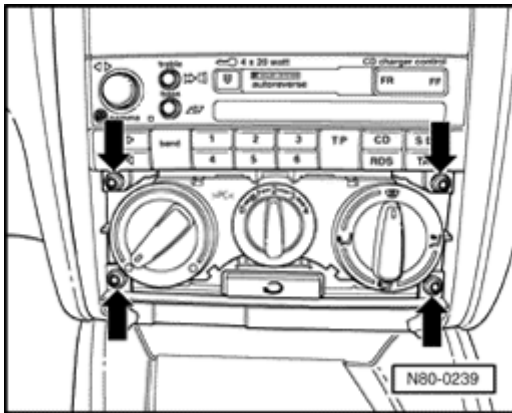
First do the following:

- Remove glove box
⇒ [Repair Manual, Body-Interior, Repair Group 68](#)
- Remove steering column cover.
⇒ [Repair Manual, Body-Interior, Repair Group 68](#)
- Remove center console.
⇒ [Repair Manual, Body-Interior, Repair Group 68](#)

Removing

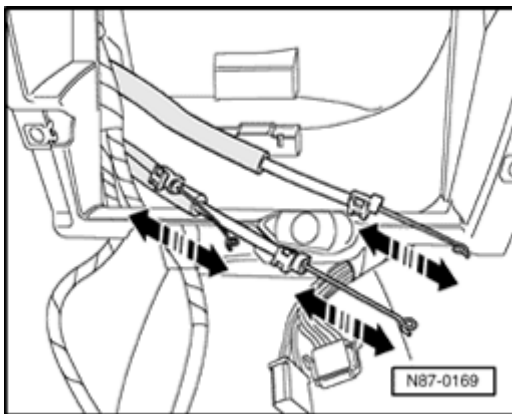


- ◆ Pull off heating controls trim panel with tool 3370.



- Remove screws -arrows-.
- Remove center trim.
- Remove controls with cables attached.
- Disengage cables from controls.
- Disconnect electrical connectors.

After removing controls, check all cables for free movement.



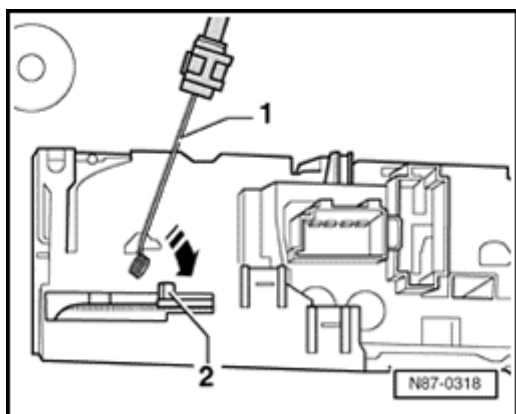
- Move cables back and forth in direction of arrows.
- Replace cables that are damaged or hard to move.

Installing

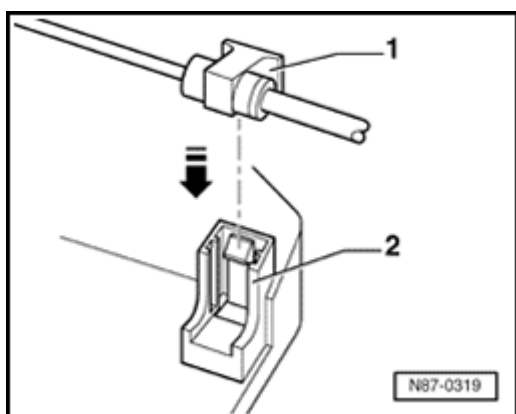
Note:

- ◆ Cable sleeve ends are color coded.
- ◆ All air flaps must audibly move onto end stops when turning controls.
- ◆ Always check cables before installing. Replace binding or damaged cables.

80-17



- Hold cable end -1- at an angle and press onto control lever -2-, -arrow-.



- Insert footwell/defrost flap cable, temperature flap cable and central flap cable -1- into clip -2- and press in to stop.

Cable sleeve end color code:

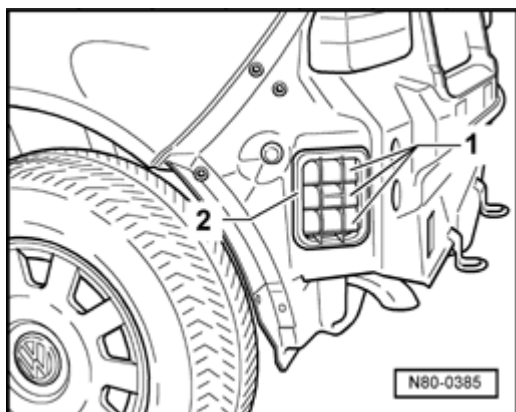
- Footwell/defroster flap: green
- Center flap: yellow
- Temperature flap: beige

Ventilation system, checking

Note:

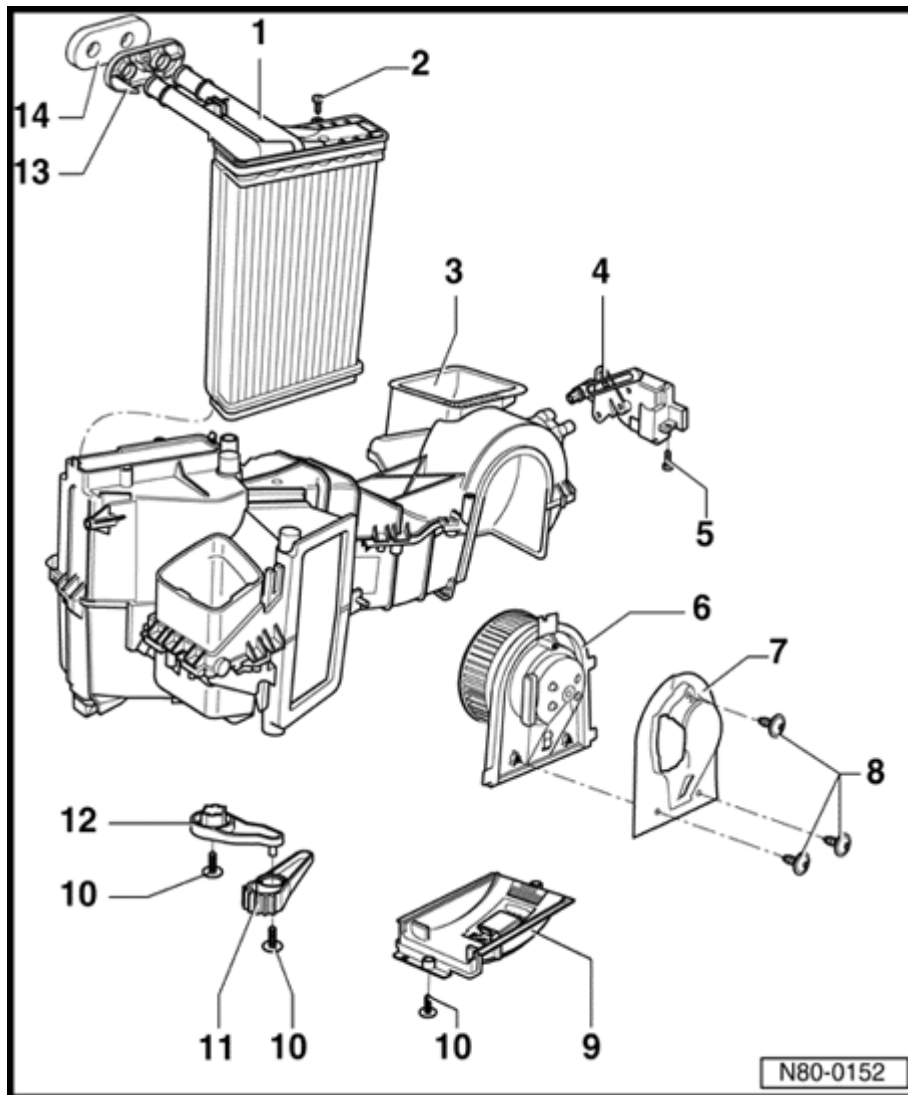
- ◆ *On sedan models, passenger compartment is vented to the outside through opening parcel shelf below the rear window.*
- ◆ *On wagon models, passenger compartment is vented to the outside through opening rear luggage compartment trim below the side windows.*
- ◆ *In order for the ventilation system to work properly, these openings must not be blocked.*
- ◆ *The outside vent frames are located in the left and right rear quarter panels behind the cover.*

Checking



- Vent flaps -1- in frame -2- must move freely and not stick.
- Observe installation position.

80-19



Heating and ventilation unit, assembly

1 - Heater core

- ◆ Always replace coolant after removal/replace

- ◆ Replacing:

- Remove instrument panel.

⇒ [Repair Manual, Interior, Repair Gro](#)

- Loosen instrument panel cross member
[Page 80- ⇒ Fig. 5](#)

- Carefully pinch off coolant hose to heater and disconnect hoses.

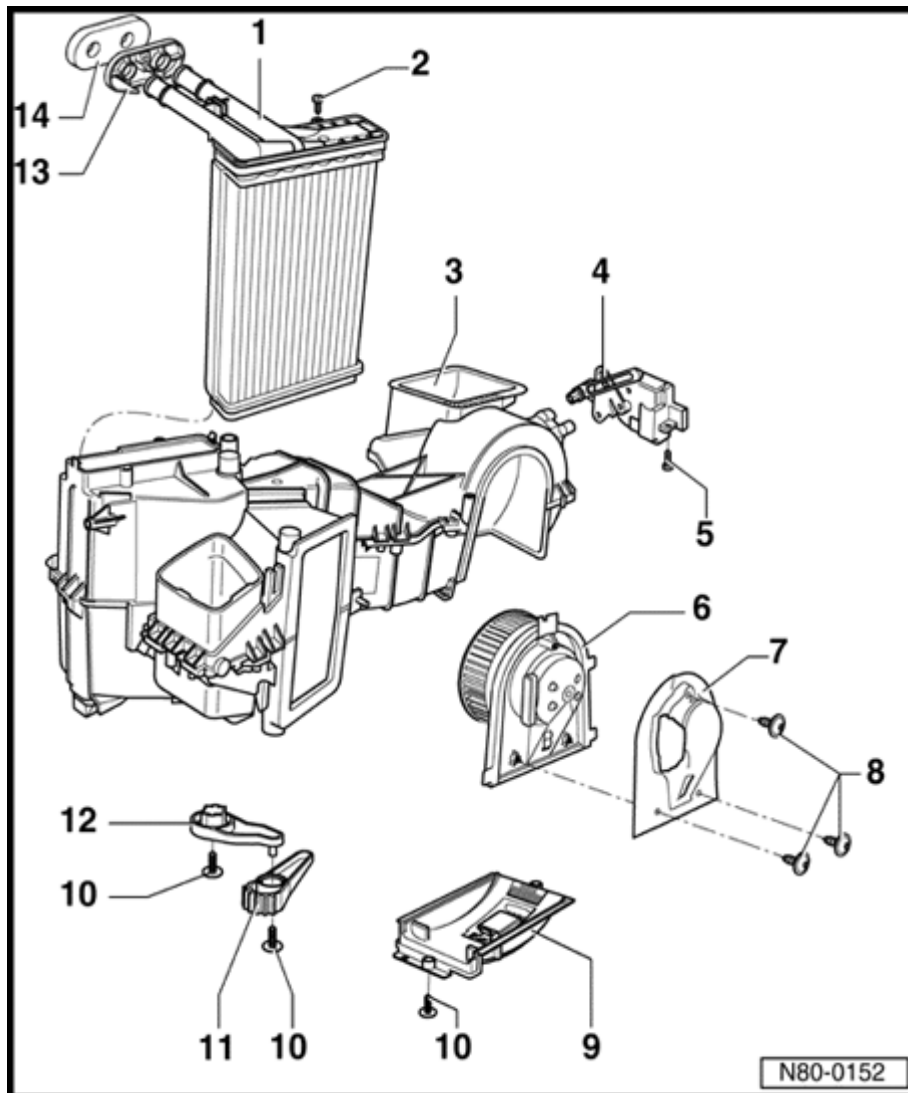
- Seal off heater core to prevent coolant from running out.

CAUTION!

The cooling system is pressurized when the engine is warm. Wear gloves and other protection and carefully release system pressure if necessary, before performing repair.

- Partially remove heating and ventilation unit.
- Press ret clips and remove heater coil

80-20



2 - Self tapping screw

- ◆ Use if retainer clip break

3 - Air distribution housing

4 Servo motor for - fresh/recirculati air door -V154-

- ◆ Removing and installir ⇒ [Page 80 22](#)

5 - Self tapping screw

6 - Fresh air blower -V2-

- ◆ Removing : [Page 80-7](#) ⇒ [Fig. 3](#)

7 - Cover

8 - Self tapping screw

9 - Series resist -N24-

- ◆ Removing : [Page 80-7](#) ⇒ [Fig. 3](#)

10 - Sheet metal screw

11 - Central flap lever

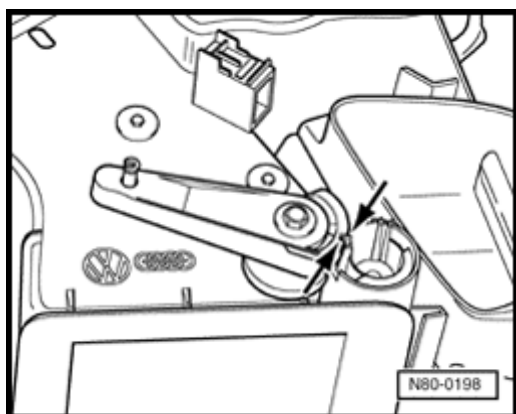
- ◆ Installing ar adjusting = [Fig. 1](#)

12 - Temperature flap lever

13 - Base plate

**14 - Heater
core/bulkhead
seal**

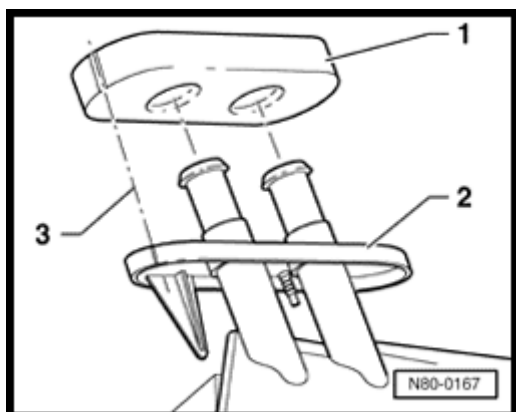
- ◆ Installation
position ⇒
[Fig. 2](#)



✦ **Fig. 1 Central flap lever, installing and adjusting**

The central flap pinion has an adjustment mark.

- Install the lever so that the notches on the lever and the pinion align -arrows-.



✦ **Fig. 2 Heater core/bulkhead seal, installation position**

The seal between the heater core and the bulkhead has a positioning mark.

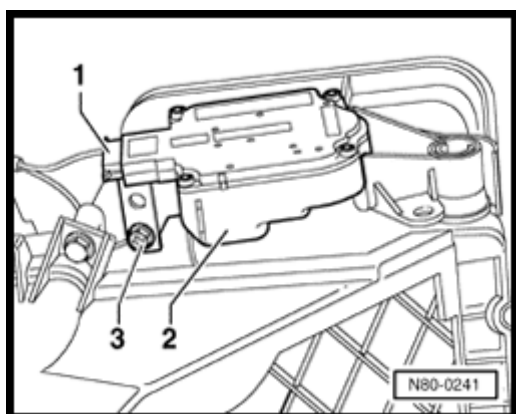
- Install seal -1- so that the notches on the seal and the base plate -2- align -3-.

Servo motor for fresh/recirculating air door -V154-, removing and installing

Removing

- Remove glove box.

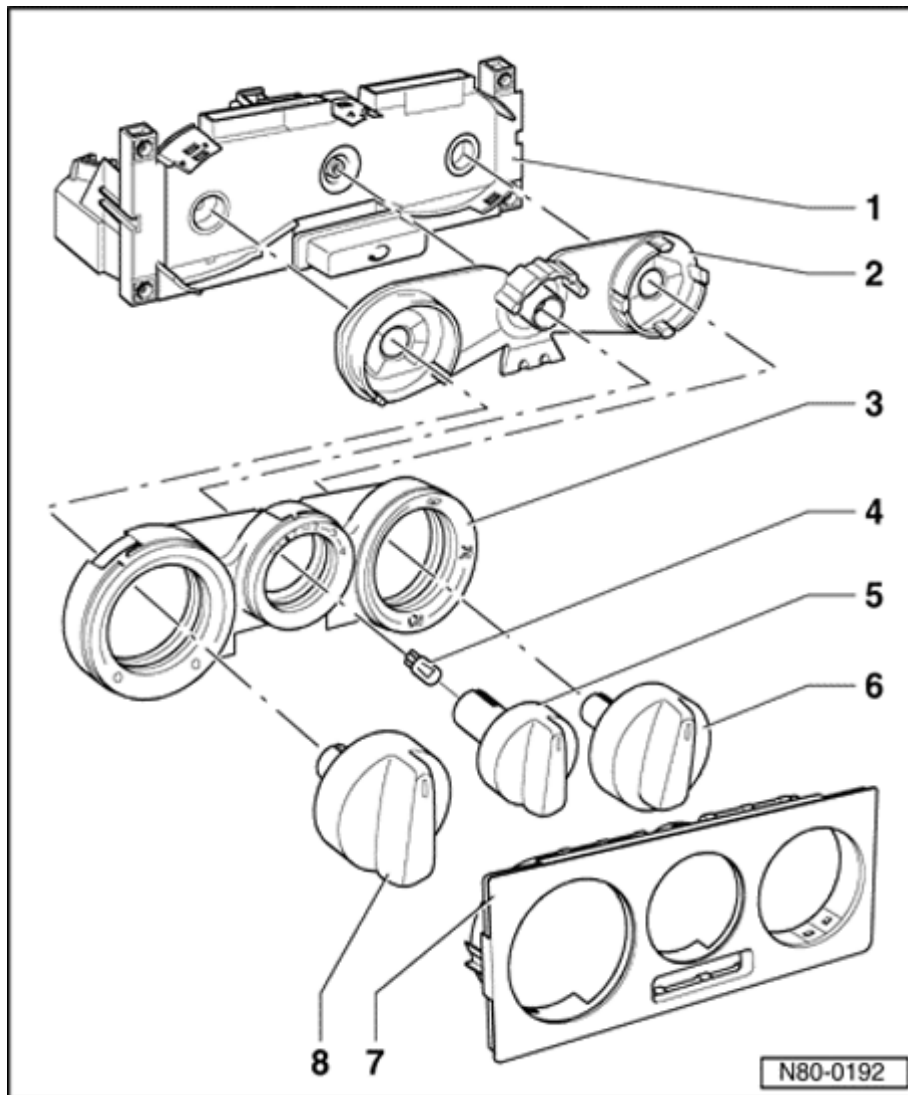
⇒ [Repair Manual, Body-Interior, Repair Group 68](#)



- Disconnect electrical connector - 1-.
- Remove screw -3-.
- Swing motor -2- downward.
- Disconnect motor -2- from fresh air/recirculating air flap lever.

Installing

- Engage flap motor -2- with fresh air/recirculating air lever.
- Position fresh air/recirculated air flap lever by hand depending on position of flap motor.
- Install screw -3-.



Heating and ventilation controls, assembly

1 - Heating and ventilation controls

- ◆ With fresh air blower switch - E9-
- ◆ With fresh air/recirculating flap switch - E159-
 - ◆ Removing ⇒ [Page 80-15](#)

2 - Illumination filter

3 - Trim panel

4 - Fresh air control lever light - L16-

- ◆ 12V, 1.2W

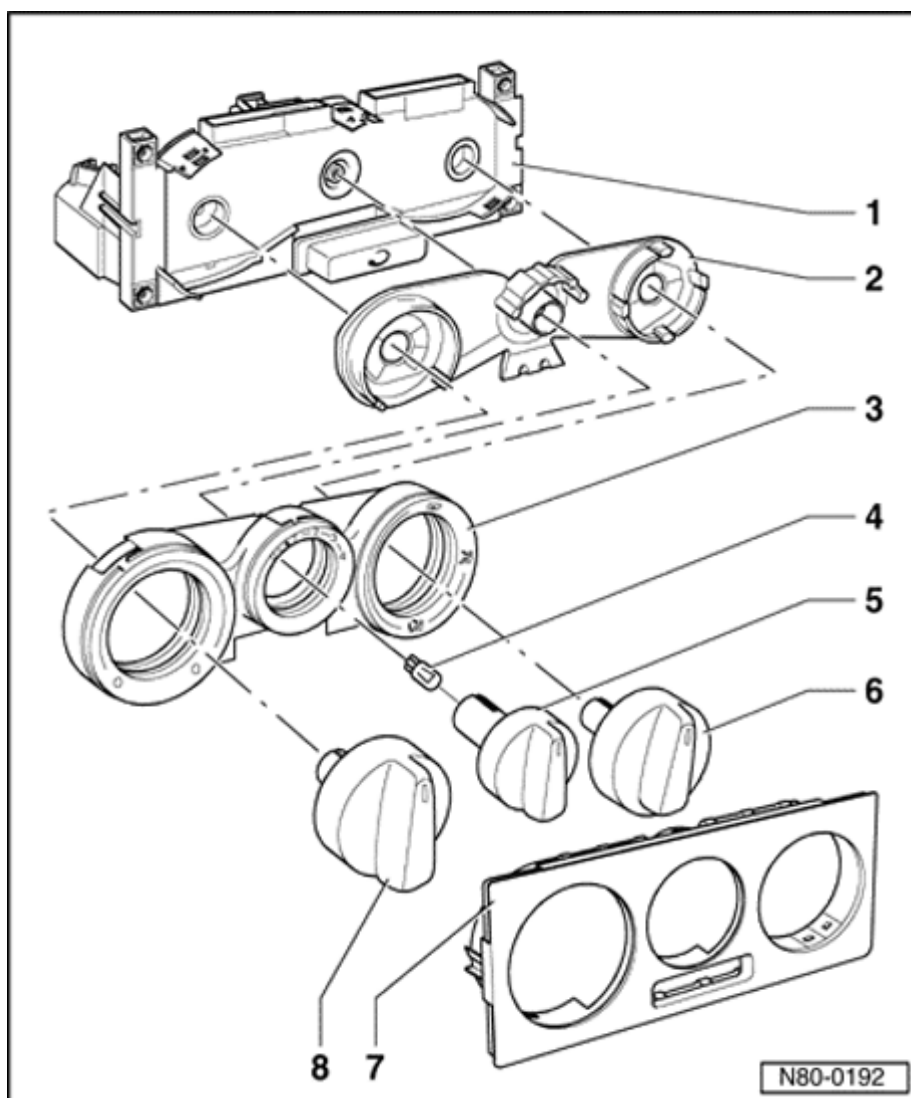
◆ Replacing:

- Unclip trim panel - item 7 - and rotary control - item 5 -.
- Pull out bulb using a piece of fuel

hose.

5 - Rotary control

- ◆ For blower speed
- ◆ To remove:
Use pliers with suitable plastic or rubber protection on jaws



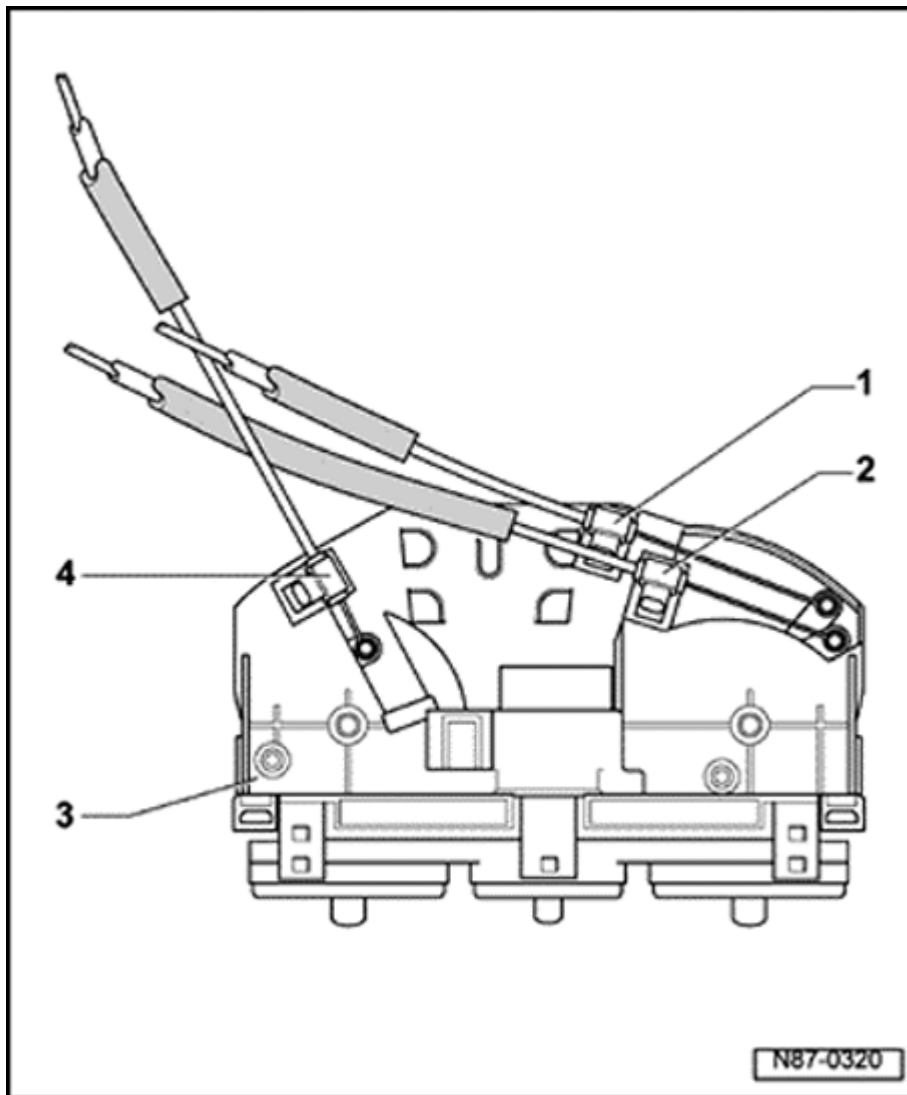
6 - Rotary control

- ◆ For air distribution
- ◆ To remove:
Use pliers with suitable plastic or rubber protection on jaws

7 - Trim panel

8 - Rotary control

- ◆ For interior temperature control
- ◆ To remove:
Use pliers with suitable plastic or rubber protection for jaws

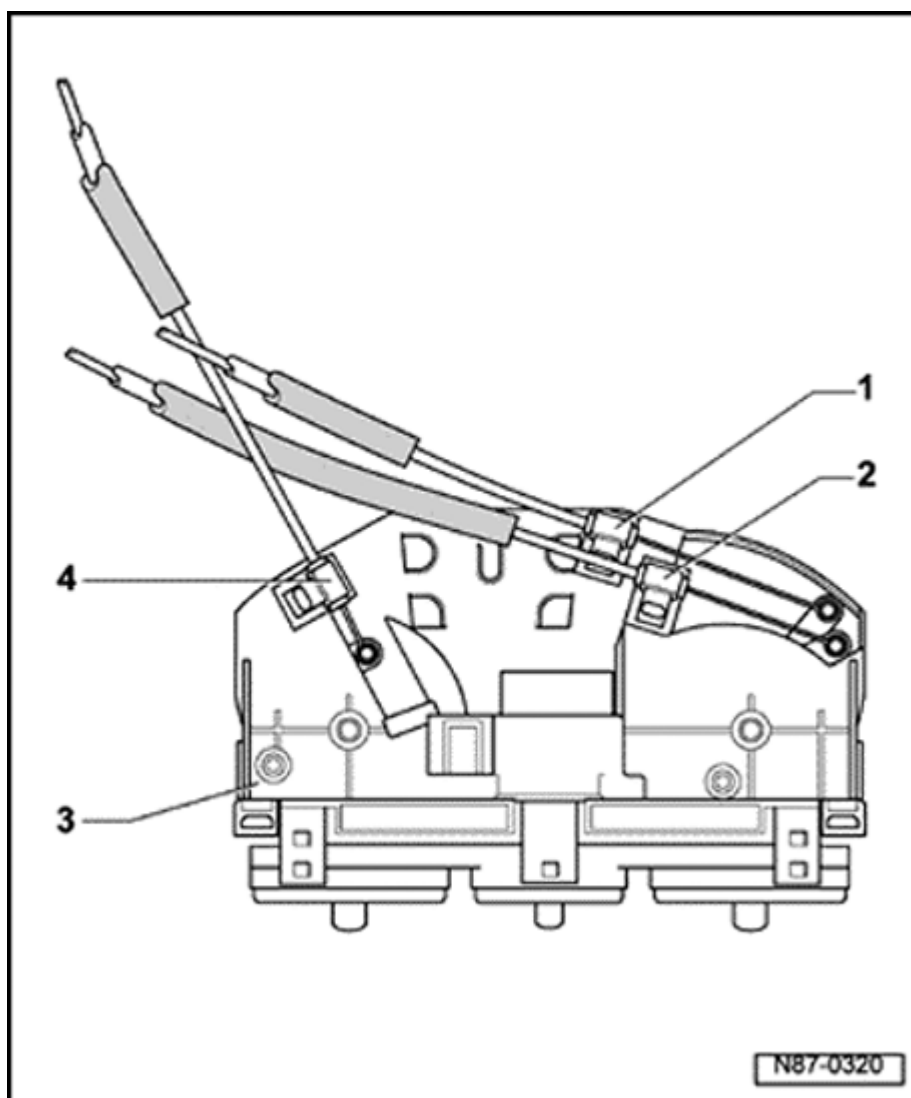


Cables, installing and adjusting

Notes:

- ◆ Cable sleeve ends are color coded.
- ◆ Always check cables before installing, replace binding or damaged cables.
- ◆ Attach cables to remove controls first and then attach cables to levers.
- ◆ All air flaps must audibly move onto end stops when turning controls.

80-26



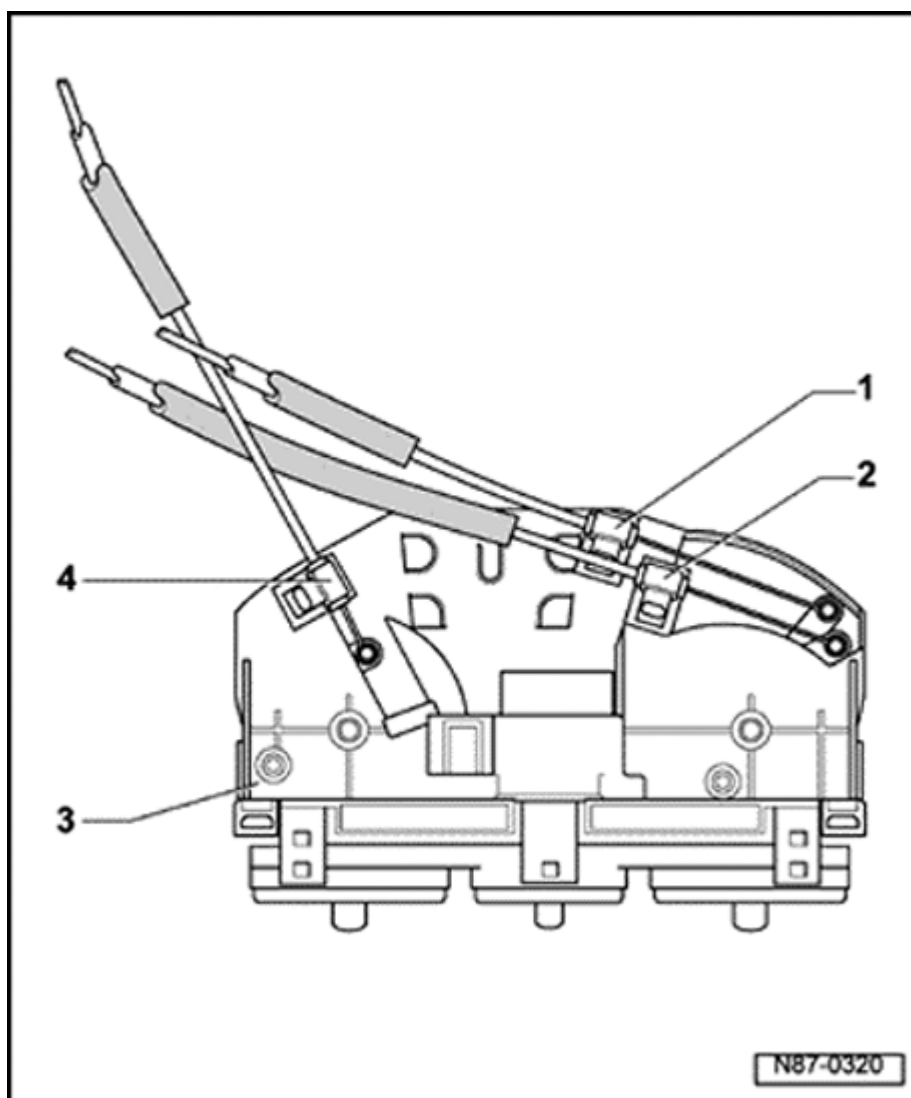
1 - Central flap cable

- ◆ From air distribution rotary control to central flap
- ◆ Cable sleeve marking: yellow
- ◆ Installing and adjusting = [Fig. 3](#)

2 Footwell/defrost - flap cable

- ◆ From air distribution rotary control to footwell/defrost flap
- ◆ Cable sleeve marking: green
- ◆ Installing and adjusting = [Fig. 2](#)

80-27



3 - Heating and ventilation controls

- ◆ Removing and installing
⇒ [Page 80-15](#)

4 Temperature - flap cable

- ◆ From temperature rotary control to temperature flap
- ◆ Cable sleeve marking: beige
- ◆ Installing and adjusting
⇒ [Fig. 1](#)

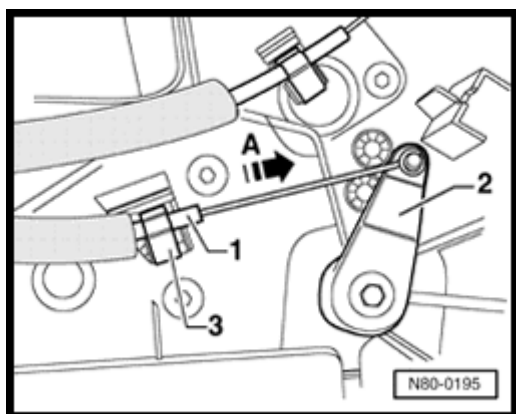


Fig. 1 Temperature flap cable, installing and adjusting

Prerequisites:

- ◆ Heating and ventilation controls are installed.
- ◆ Connecting duct removed ⇒ [Page 80-10](#) .

Adjusting

- Turn temperature rotary control knob to left onto stop.
- Attach center wire of cable -1- to the temperature flap lever -2-.
- Push temperature flap lever -2- to stop -arrow A- and secure outer cable -1- with clip -3-.
- Turn temperature rotary control knob to left and right onto stops.
- When turning the rotary control knob, both end stops must be reached.

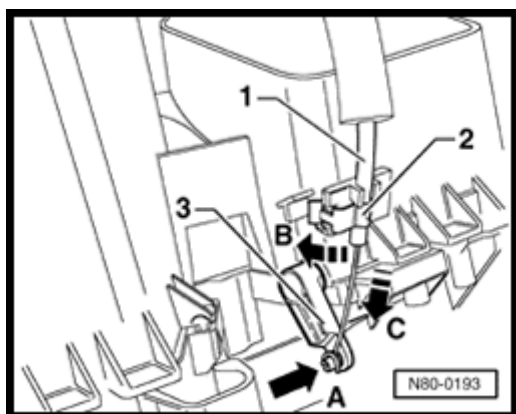


Fig. 2 Footwell/defroster flap cable, installing and adjusting

Prerequisite:

- ◆ Heating and ventilation controls are installed.

Adjusting

- Turn air distribution rotary knob to left to stop.
- Attach wire end of cable -1- to temperature flap lever -3-, arrow -A-.
- Push footwell/defroster flap lever to stop -arrow C- and attach outer cable -1- with clip -2-, -arrow B-.
- Turn air distribution rotary control knob to left and right to stops.
- When turning the rotary control knob, both end stops must be reached.

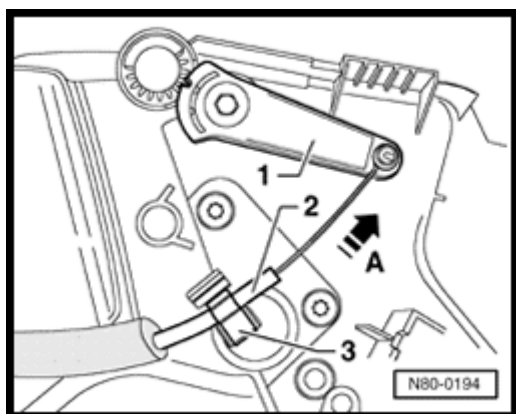


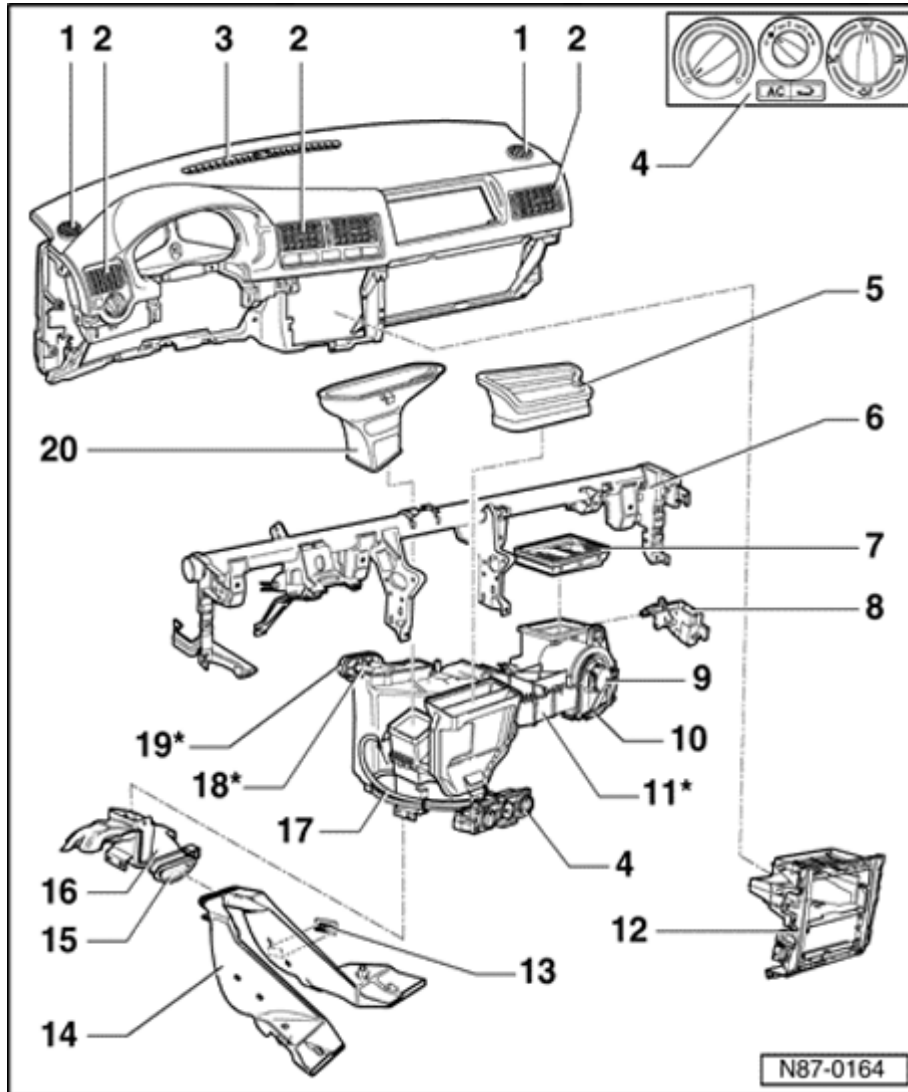
Fig. 3 Central flap cable, installing and adjusting

Prerequisites:

- ◆ Central flap lever correctly adjusted ⇒ [Page 80-21](#) , ⇒ [Fig. 1](#)
- ◆ Heating and ventilation controls are installed.
- ◆ Connecting duct removed ⇒ [Page 80-10](#) .

Adjusting

- Turn air distribution rotary control knob to left onto stop.
- Attach center wire of cable -2- to central flap lever -1- .
- Push central flap lever to stop - arrow A- and attach outer cable - 2- with clip -3-.
- Turn air distribution rotary control knob to left and right onto stops.
- When turning the rotary control knob both end stops must be reached.



Manual A/C

Heating and A/C components in passenger compartment, servicing

CAUTION!

Before beginning repairs:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch off ignition.**
- ◆ **Remove ignition key from ignition switch.**

Notes:

- ◆ *System components marked with an asterisk * can only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*
- ◆ *Before carrying out any work on the A/C refrigerant*

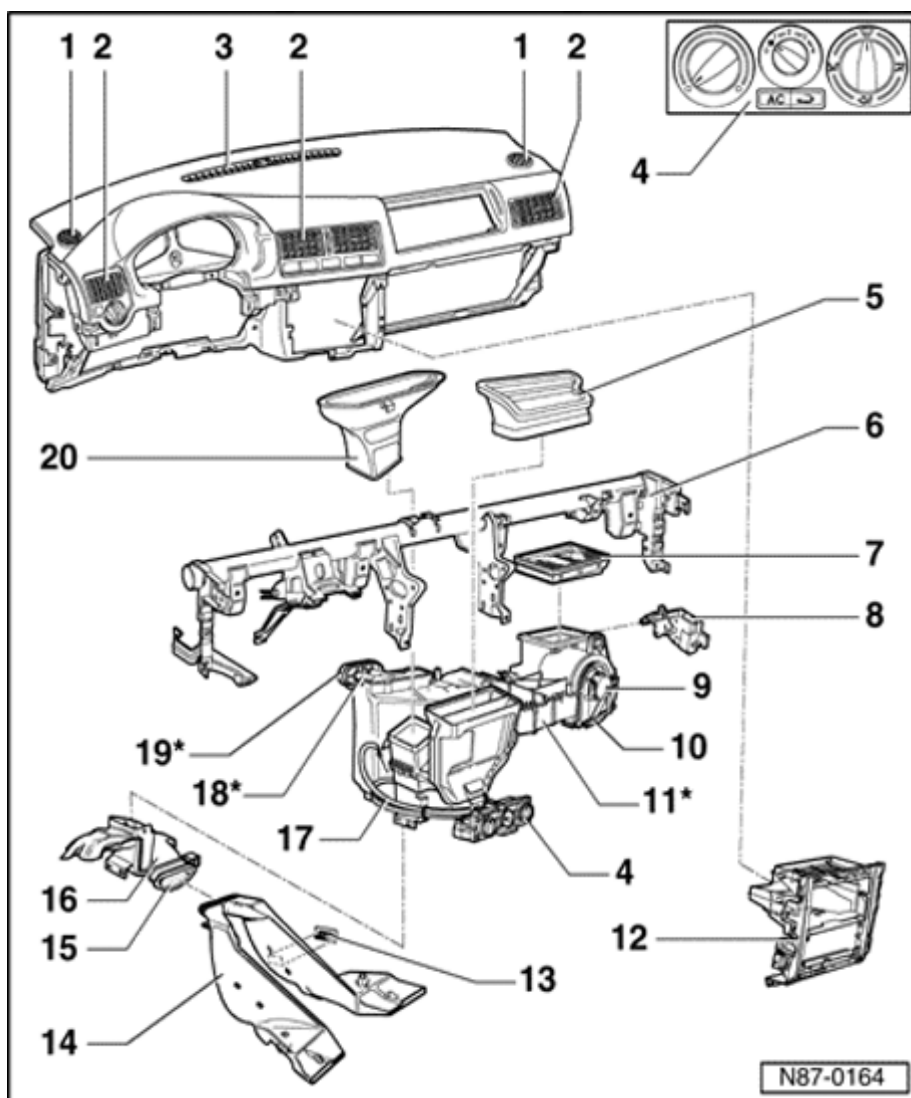
*system, refer
to A/C
refrigerant
system
safety
measures ⇒
[Page 87-69](#) .*

**1 - Side
window
air outlet**

- ◆ Removing
⇒ [Page
80-6](#) , Fig.
1

**2 - Side air
outlets**

- ◆ Removing
⇒ [Page
80-6](#)



3 - Defroster air outlet

- ◆ Removing and installing

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

4 - Heating and A/C controls

- ◆ With A/C switch - E35-
- ◆ With fresh air blower switch - E9-

- ◆ With fresh air/recirculating flap switch - E159-

- ◆ Removing and installing
⇒ [Page 87-7](#)

- ◆ Assembly
⇒ [Page 87-11](#)

- ◆ Cables, installing and adjusting
⇒ [Page 87-13](#)

5 - Intermediate duct

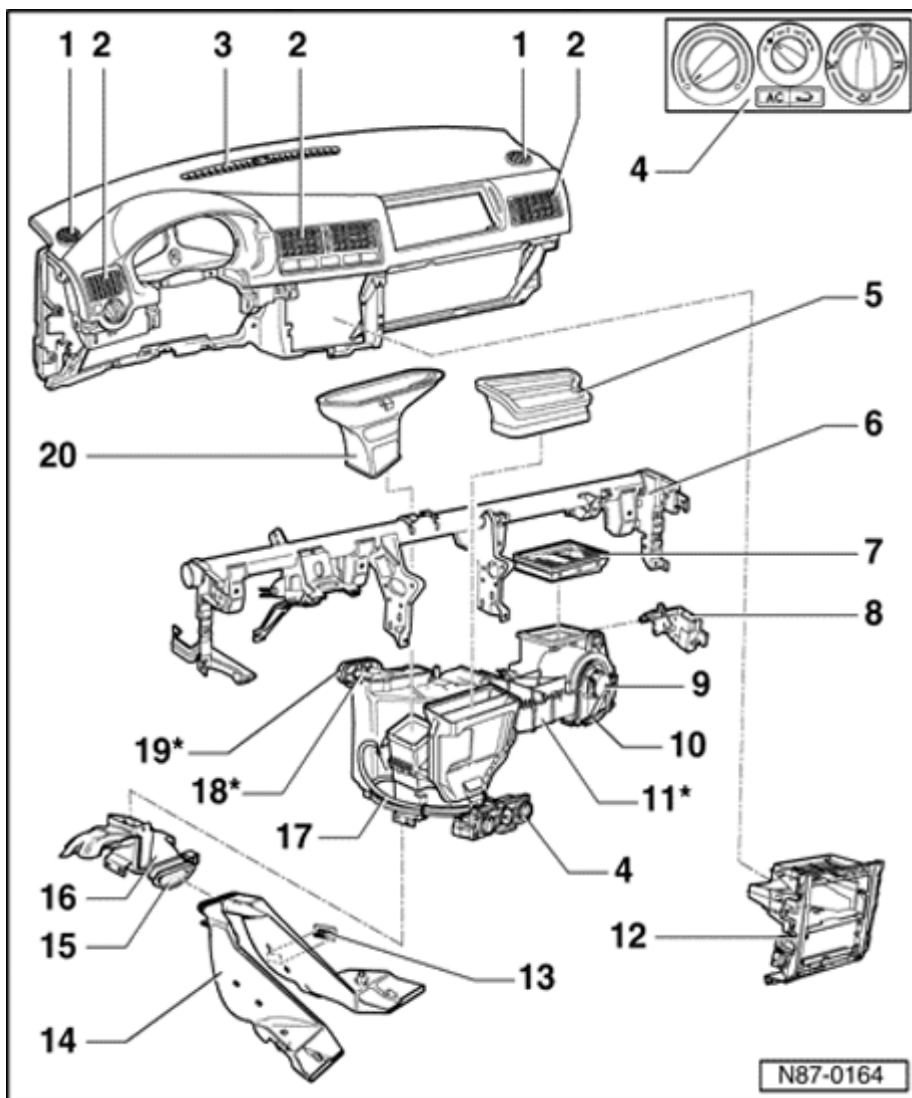
6 - Instrument panel cross member

- ◆ Loosening and

tightening
⇒ [Page 80-9](#) , Fig. 5

7 - Dust and pollen filter

- ◆ With activated charcoal filter
- ◆ Removing and installing
⇒ [Page 80-8](#) , Fig. 4



8 - Servo motor for fresh/recirculation air door -V154

◆ Removing and installing ⇒ [Page 87-6](#)

9 - Fresh air blower -V2-

◆ Removing and installing ⇒ [Page 80-7](#) Fig. 3

10 - Fresh air blower series resistance with fuse -N24-

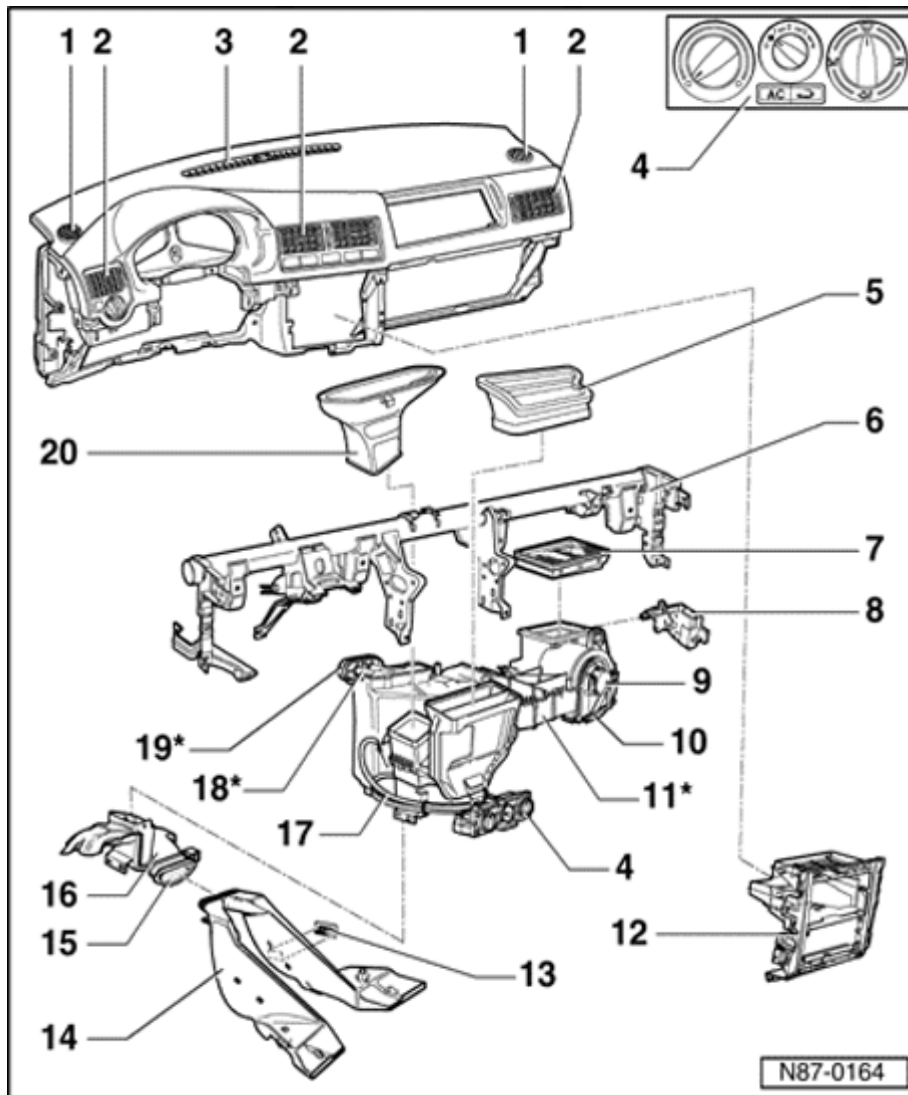
◆ Removing and installing ⇒ [Page 80-7](#) Fig. 3, (fresh air blower - removing and installing)

11 - Heating and unit*

- ◆ With heater core
- ◆ With evaporator

◆ Removing/assembly ⇒ [Page 87-114](#)

12 - Center trim



13 - Footwell air outlet

- ◆ Passenger side only

14 - Rear duct

15 - Gasket

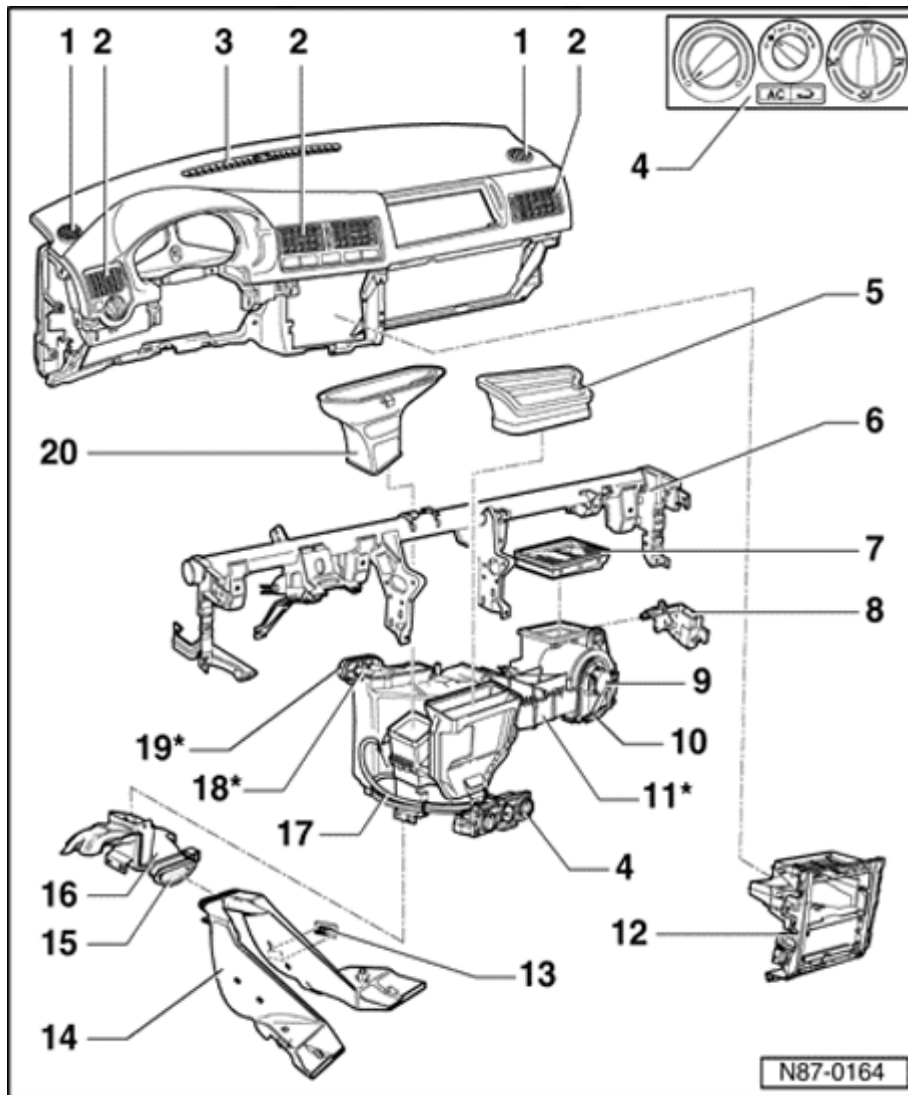
16 Connecting - duct

- ◆ With driver's side footwell air outlet

- ◆ Removing ⇒ [Page 80-10](#), Fig. 6

17 - Cables

- ◆ Installing and adjusting ⇒ [Page 87-13](#)



18 - Heater core*

- ◆ Always replace coolant after removal or replacing

◆ Removing:

- First remove heating and A/C unit ⇒ [Page 87-114](#)

19 Heater - core/bulkhead seal*

- ◆ Installation position ⇒ [Page 80-21](#), Fig. 2

20 - Defroster duct

- ◆ Replacing:
 - Removing and install instrument panel

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Loosen instrument panel cross member ⇒ [Page 80-9](#), Fig. 5.

- ◆ Installation position ⇒

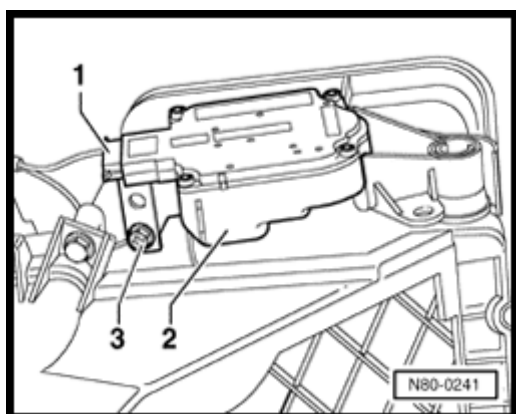
[Page 80-6](#) , Fig. 2

Servo motor for fresh/recirculating air door -V154-, removing and installing

Removing

- Remove glove box.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)



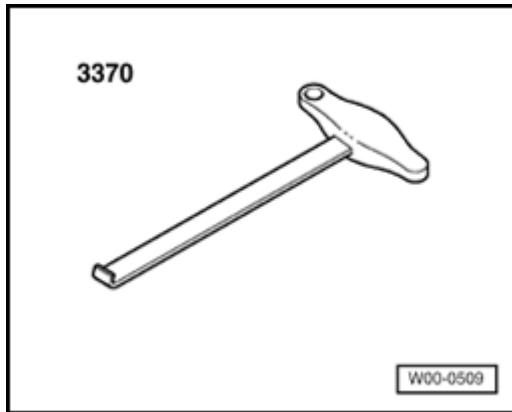
- Disconnect electrical connector - 1-.
- Remove screw -3-.
- Swing motor -2- downward.
- Disengage motor -2- from fresh air/recirculation air lever.

Installing

- Engage flap motor -2- to fresh air/recirculation air lever.
- Position fresh air/recirculated air flap lever by hand depending on position of flap motor.
- Install screw -3-.

Heating and A/C controls, removing and installing

Special tools and equipment required

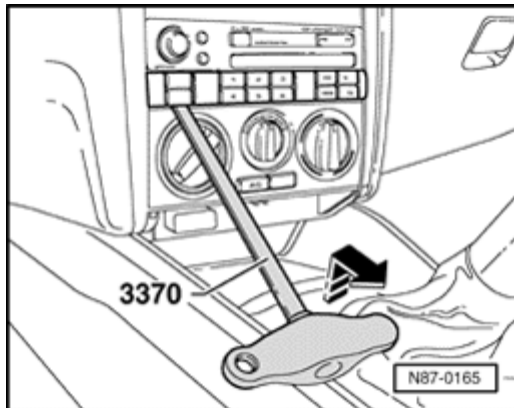


- ◆ Special hook 3370

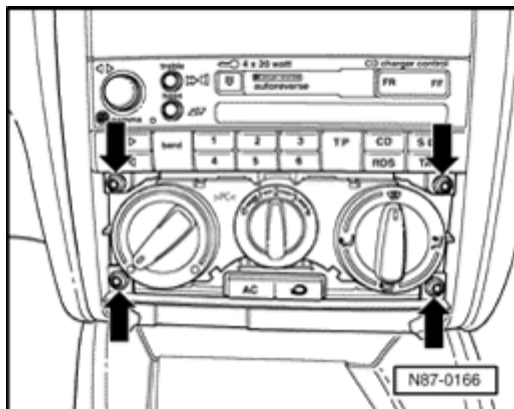
First do the following:

- Remove glove box.
⇒ [Repair Manual, Body Interior, Repair Group 68](#)
- Remove trim under the steering column.
⇒ [Repair Manual, Body Interior, Repair Group 68](#)
- Remove center console.
⇒ [Repair Manual, Body Interior, Repair Group 68](#)

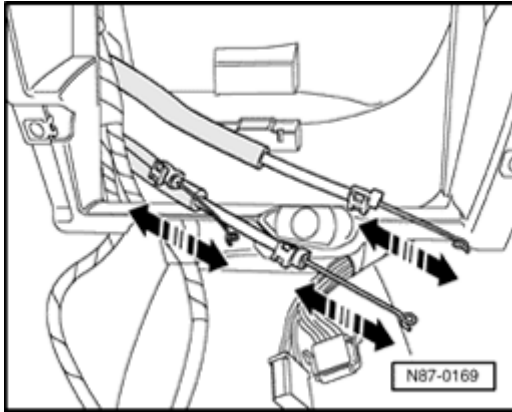
Removing



- ▲ - Pull off heating controls trim panel with tool 3370.



- ▲ - Remove screws -arrows-.
- Remove center trim.
- Remove controls with cables attached.
- Disengage cables from controls.
- Disconnect electrical connectors.



After removing controls, check all cables for free movement.

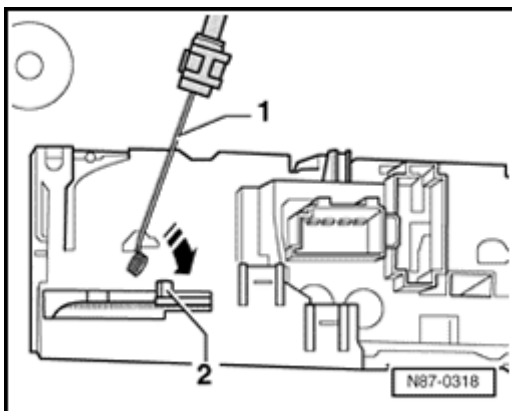


- Move cables back and forth in direction of arrows.
- Replace cables that are damaged or hard to move.

Installing

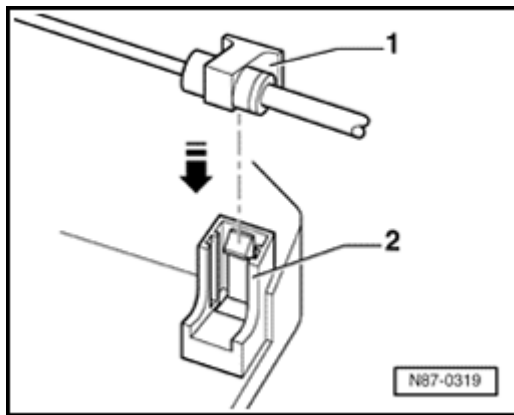
Notes:

- ◆ Cable sleeve ends are color coded.
- ◆ All air flaps must audibly move onto end stops when turning controls.
- ◆ Always check cables before installing. Replace binding or damaged cables.



- Hold cable end -1- at an angle and press onto control lever -2-, - arrow-.

87-10



- ✦ - Insert footwell/defrost flap cable, temperature flap cable, temperature flap cable and central flap cable -1- into clip -2- and press in to stop.

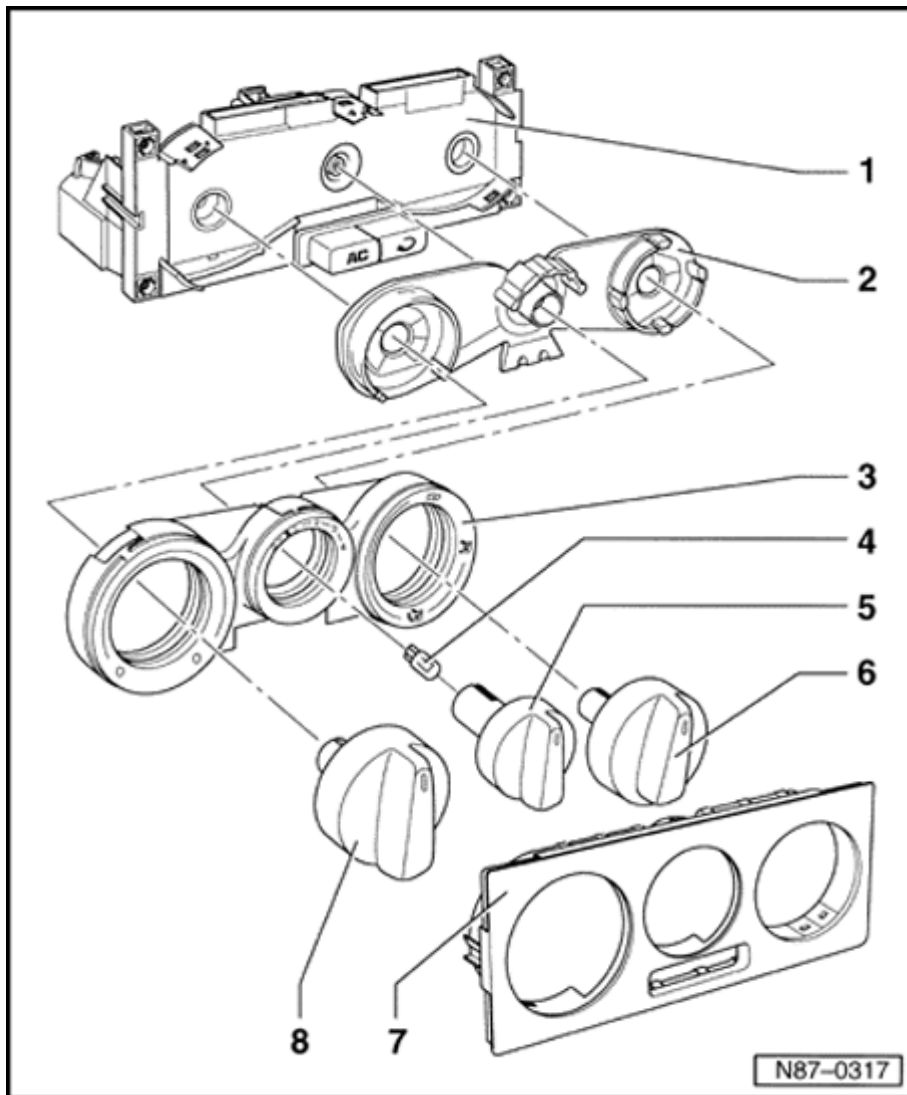
Cable sleeve end color code:

Footwell/defrost flaps cable: green

Central flap cable: yellow

Temperature flap cable: beige

87-11



Heating and A/C controls, assembly

1 - Heating and A/C controls

- ◆ With A/C switch - E35-
- ◆ With fresh air blower switch - E9-
- ◆ With fresh air/recirculating flap switch - E159-

◆ Removing
⇒ [Page 87-7](#)

2 - Illumination filter

3 - Trim panel

4 - Fresh air control lever light - L16-

◆ 12V,
1.2W

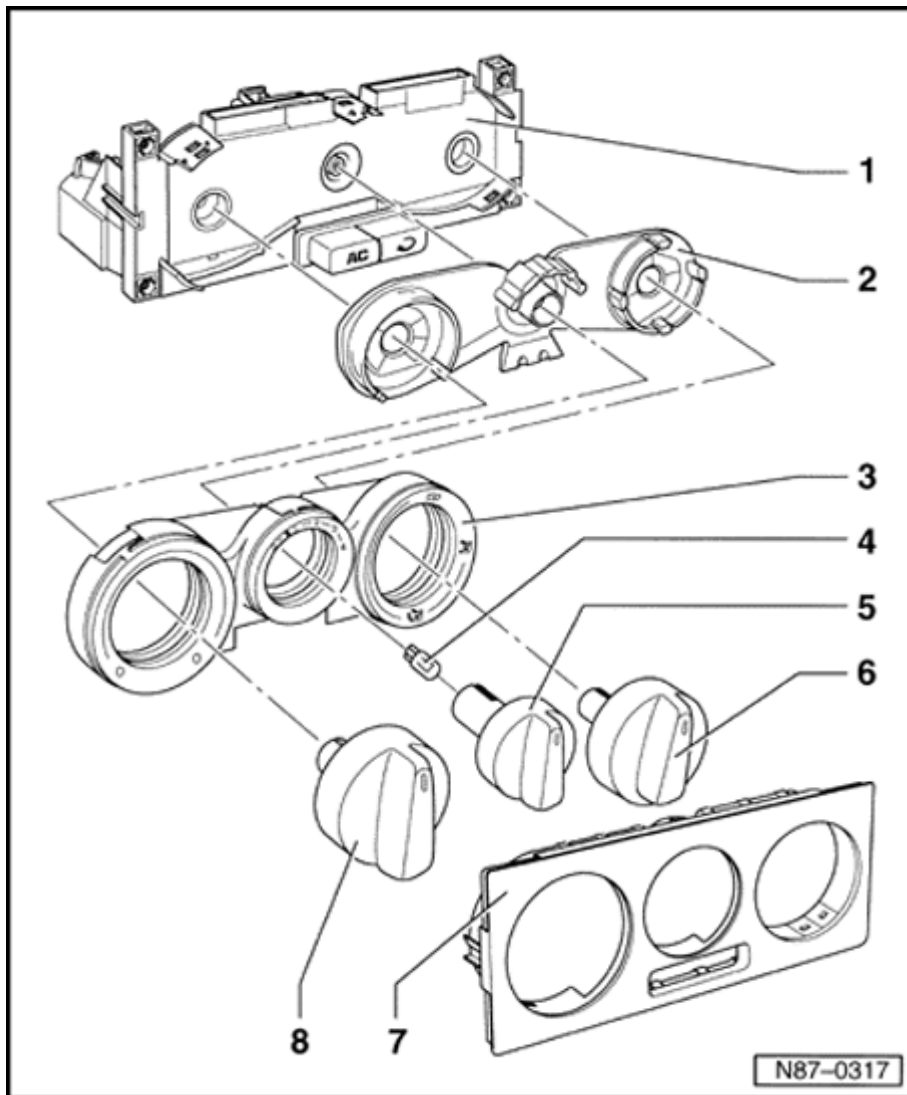
◆ Replacing:

- Unclip trim panel - item 7 - and rotary control - item 5 -.

- Pull out bulb using a piece of

fuel
hose.

87-12



5 - Rotary control

- ◆ For blower speed

- ◆ Removing: Use pliers with plastic or rubber protection for jaws

6 - Rotary control

- ◆ For air distribution

- ◆ Removing: Use pliers with plastic or rubber protection for jaws

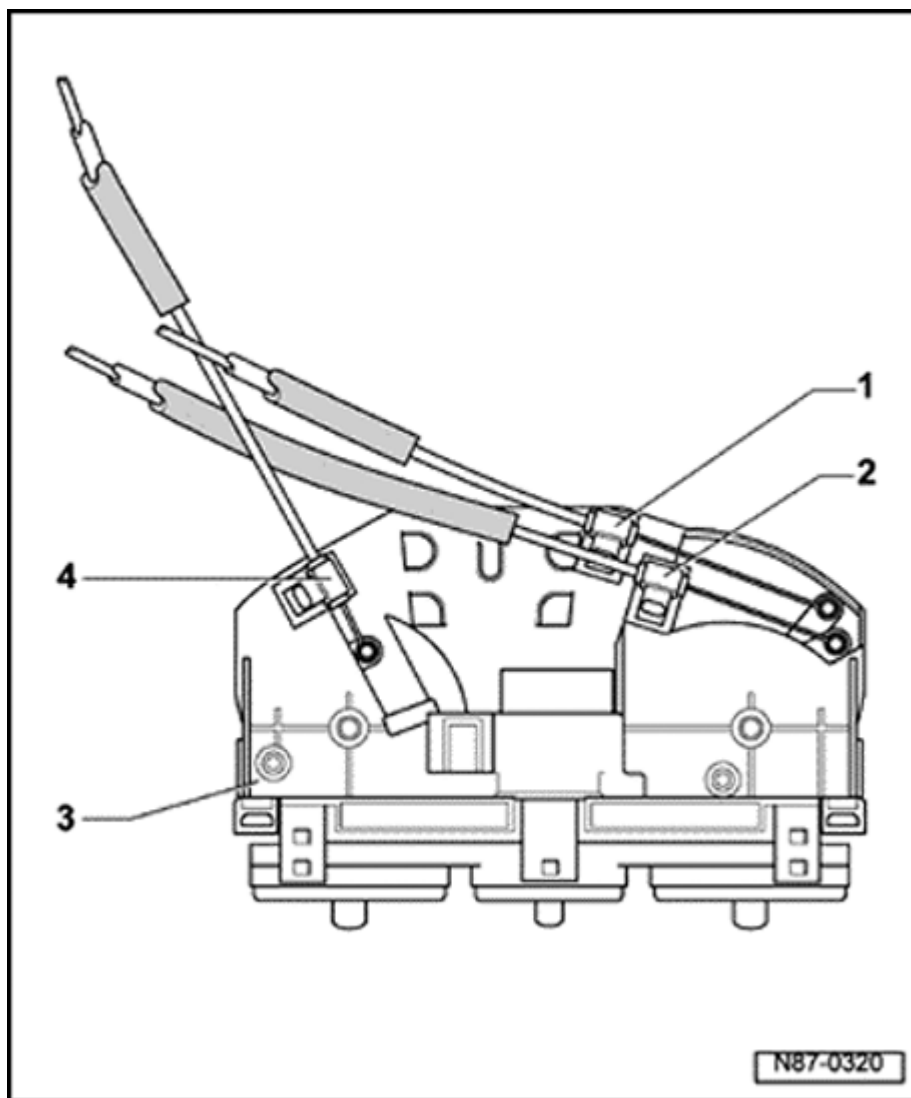
7 - Trim panel

8 - Rotary control

- ◆ For interior temperature control

- ◆ Removing: Use pliers with plastic or rubber protection for jaws

87-13



Cables, installing and adjusting

Note:

- ◆ Cable sleeve ends are color coded.
- ◆ Always check cables before installing. Replace stiff or damaged cables.
- ◆ First connect cables to removed controls, then adjust and secure cables to levers for A/C.
- ◆ When turning control knobs, all flaps must be heard to contact stops.

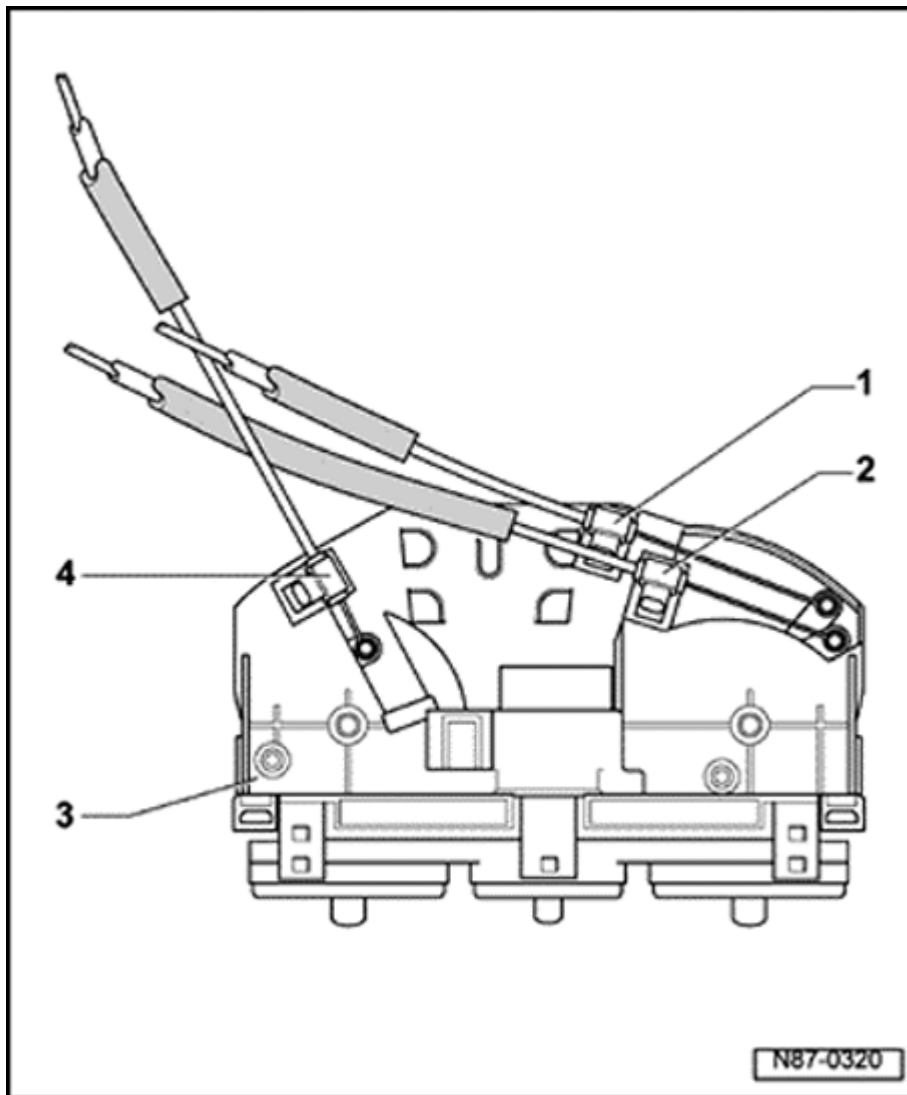
1 - Central flap cable

- ◆ From air distribution rotary control to

central
flap

- ◆ Cable sleeve marking: yellow
- ◆ Installing and adjusting
⇒ [Fig. 3](#)

87-14



2 Footwell/defrost - flap cable

- ◆ From air distribution rotary control to footwell/defrost flap

- ◆ Cable sleeve color: green

- ◆ Replacing:

- Remove heating and A/C controls : [Page 87-](#)
- Remove trim under steering column.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)

- Unclip cable at heating and A/C unit.

- ◆ Installing and adjusting = [Fig. 2](#)

3 - Heating and A/C controls

- ◆ Removing : [Page 87-7](#)

4 - Temperature flap cable

- ◆ From temperature rotary control to temperature flap

- ◆ Cable sleeve color: beige
- ◆ Installing and adjusting = [Fig. 1](#)

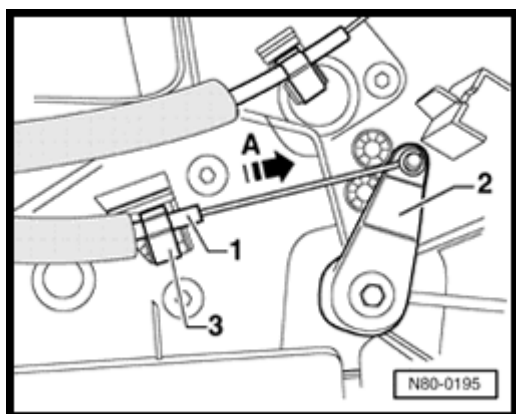


Fig. 1 Temperature flap cable, installing and adjusting

Prerequisites:

- ◆ Heating and A/C controls are installed.
- ◆ Connecting duct removed ⇒ [Page 80-10](#) .

Adjusting

- Turn temperature rotary control knob to left onto stop.
- Attach center wire of cable -1- to temperature flap lever -2-.
- Push temperature flap lever -2- to stop -arrow A- and secure outer cable -1- with clip -3-.
- Turn temperature rotary control knob to left and right onto stops.
- When turning the rotary control knob, both end stops must be reached.

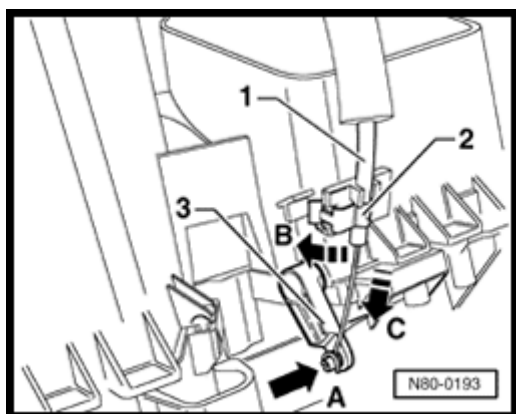


Fig. 2 Footwell/defroster flap cable, adjusting

Prerequisite:

- ◆ Heating and A/C controls are installed.

Adjusting

- Turn air distribution rotary knob to left onto stop.
- Attach wire end of cable -1- to temperature flap lever -3-, arrow -A-.
- Push footwell/defrost flap lever to stop -arrow C- and attach outer cable -1- with clip -2-, -arrow B-.
- Turn air distribution rotary control knob to left and right onto stops.
 - When turning the rotary control knob, both end stops must be reached.

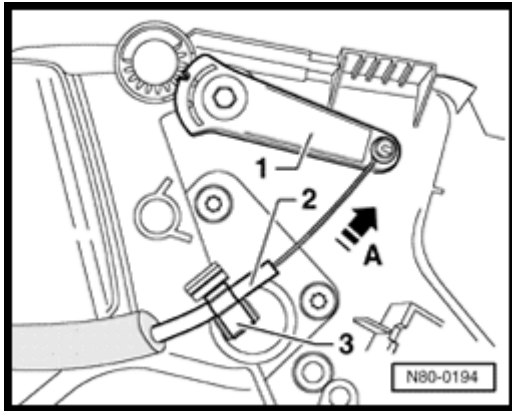


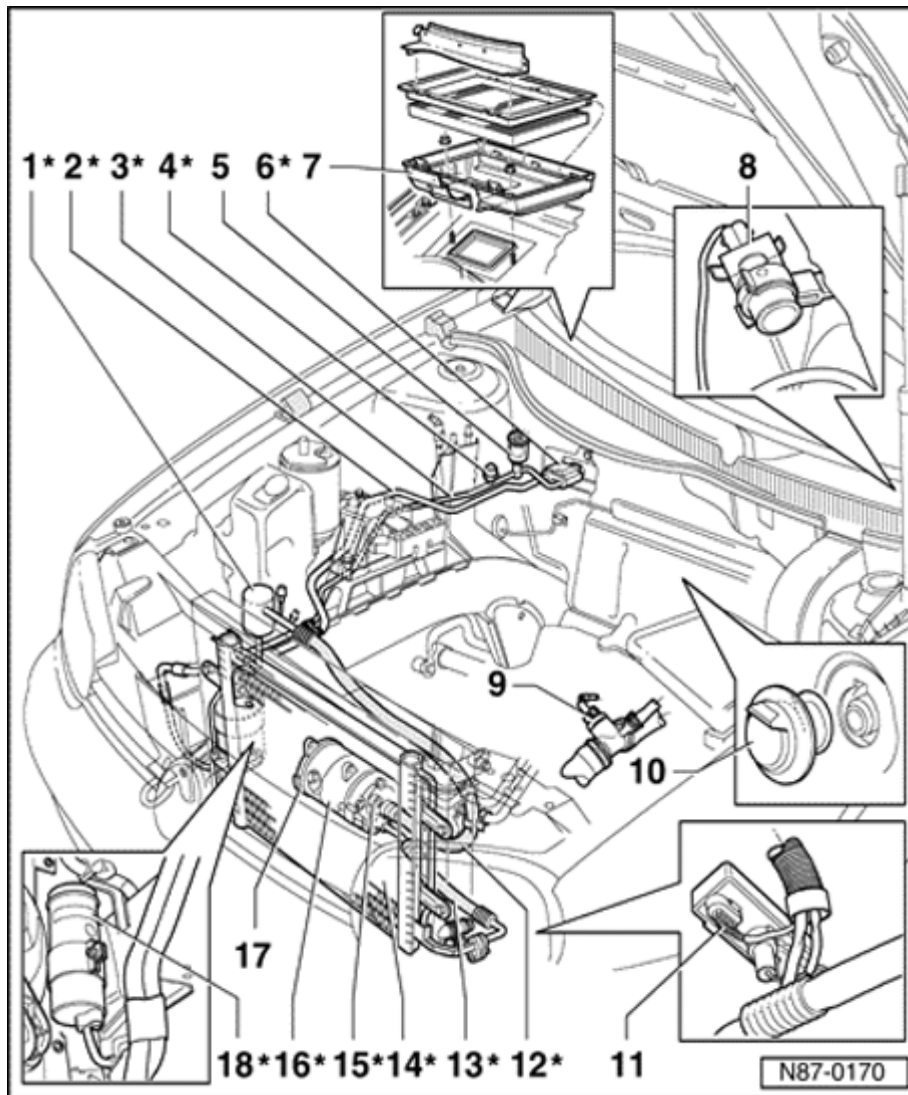
Fig. 3 Central flap cable, installing and adjusting

Prerequisites:

- ◆ Central flap lever correctly adjusted ⇒ [Page 80-21](#) , Fig. 1.
- ◆ Heating and A/C controls are installed.
- ◆ Connecting duct removed ⇒ [Page 80-10](#) .

Adjusting

- Turn air distribution rotary control knob to left onto stop.
- Attach center wire of cable -2- to the central flap lever -1- .
- Push central flap lever to stop - arrow A- and attach outer cable - 2- with clip -3-.
- Turn air distribution rotary control knob to left and right onto stops.
 - When turning the rotary control knob, both end stops must be reached.



Heating and A/C components in engine compartment, servicing

CAUTION!

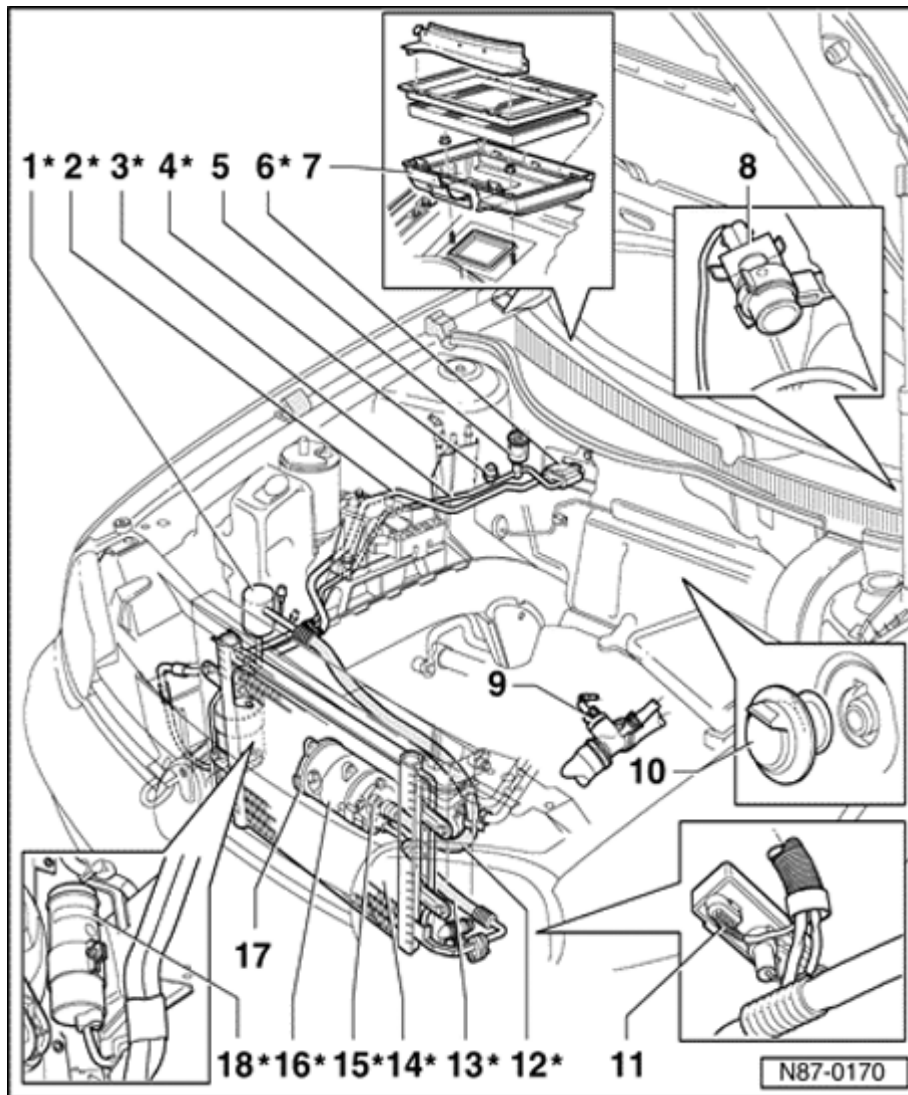
Before beginning repairs:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch off ignition.**
- ◆ **Remove ignition key from ignition switch.**

Notes:

- ◆ System components marked with an asterisk * can only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.
- ◆ Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system

*safety
measures* ⇒
[Page 87-69](#) .



1 - Damper with low pressure service valve*

- ◆ In refrigerant hose from expansion valve to compressor.
- ◆ Only use Kent Moore ACR4 or equivalent

2 - Refrigerant hose*

- ◆ From expansion valve to compressor
- ◆ With damper

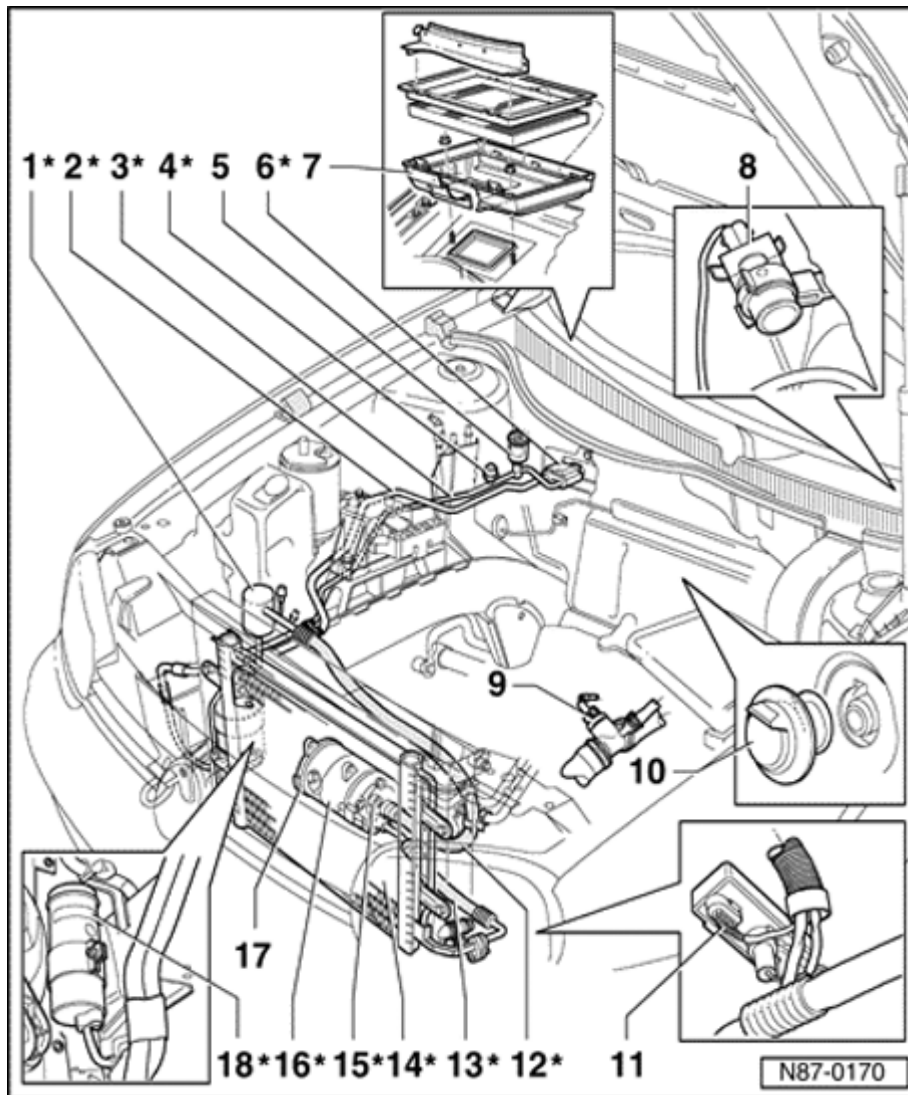
3 - Refrigerant pipe*

- ◆ From receiver dryer to expansion valve

4 - High pressure service valve*

- ◆ Only use Kent Moore ACR4 or equivalent

87-20



**5 - A/C
pressure
switch -
F129- or
high
pressure
sensor -
G65-**

- ◆ Switch/sensor can be removed without discharging refrigerant system.
- ◆ Tightening torque 8 Nm (71 in.lb)
- ◆ Always replace O ring.
- ◆ -F129- checking ⇒ [Page 87-100](#)
- ◆ -G65- checking ⇒ [Page 87-102](#)
- ◆ -F129- and -G65- can also be checked using VAS 5051 in mode "Guided Fault Finding".
- ◆ -G65- is monitored

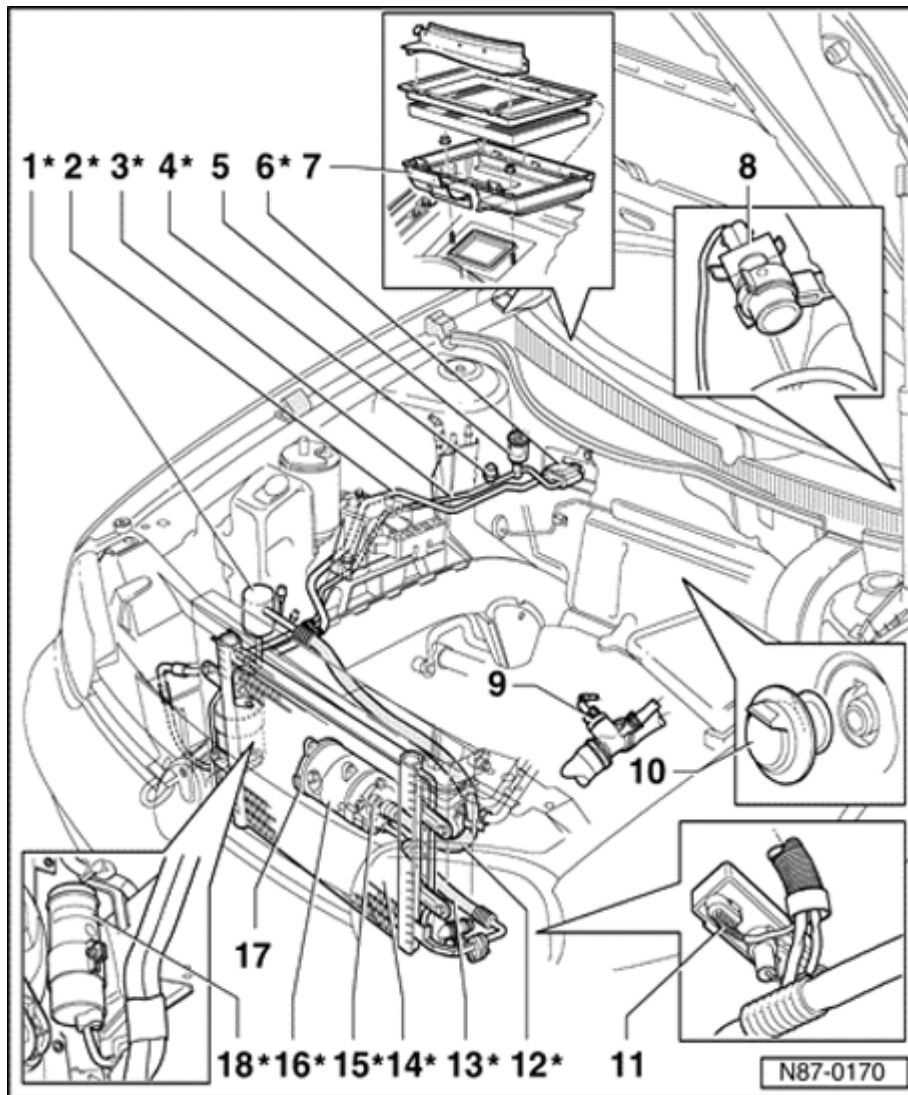
by OBD
of ECM.

Function:

- ◆ -F129-
switches
coolant
fan -V7-
to the
next
higher
speed
when
pressure
increases
in
refrigerant
circuit.
- ◆ -F129-
switches off
A/C clutch
whenever
excessive
refrigerant
system
pressure is
present (e.g.:
insufficient air
flow over
condensor or
if system is
overcharged).
- ◆ -F129-
switches
off A/C
clutch
whenever
insufficient
refrigerant
system
pressure
is present
(e.g.:
refrigerant
has
leaked
out).
- ◆
-G65-
supplies
refrigerant

system
pressure
signal to
coolant
fan
control
module -
J293- and
engine
control
module.

87-21



6 - Expansion valve*

- ◆ Removing
⇒ [Page 87-107](#)

7 - Dust and pollen filter

- ◆ With activated charcoal filter
- ◆ Removing and installing
⇒ [Page 80-8](#), Fig. 4.

8 - Ambient temperature switch -F38-

- ◆ Switches off A/C clutch - N25- at low outside temperatures.
 - ◆ Off at -1 °C (30 °F).
 - ◆ On at +7 °C (45 °F).

9 - A/C cut-out thermal switch -F163- through 04.99

- ◆ Switches off A/C clutch - N25- at excessively

high coolant temperatures.

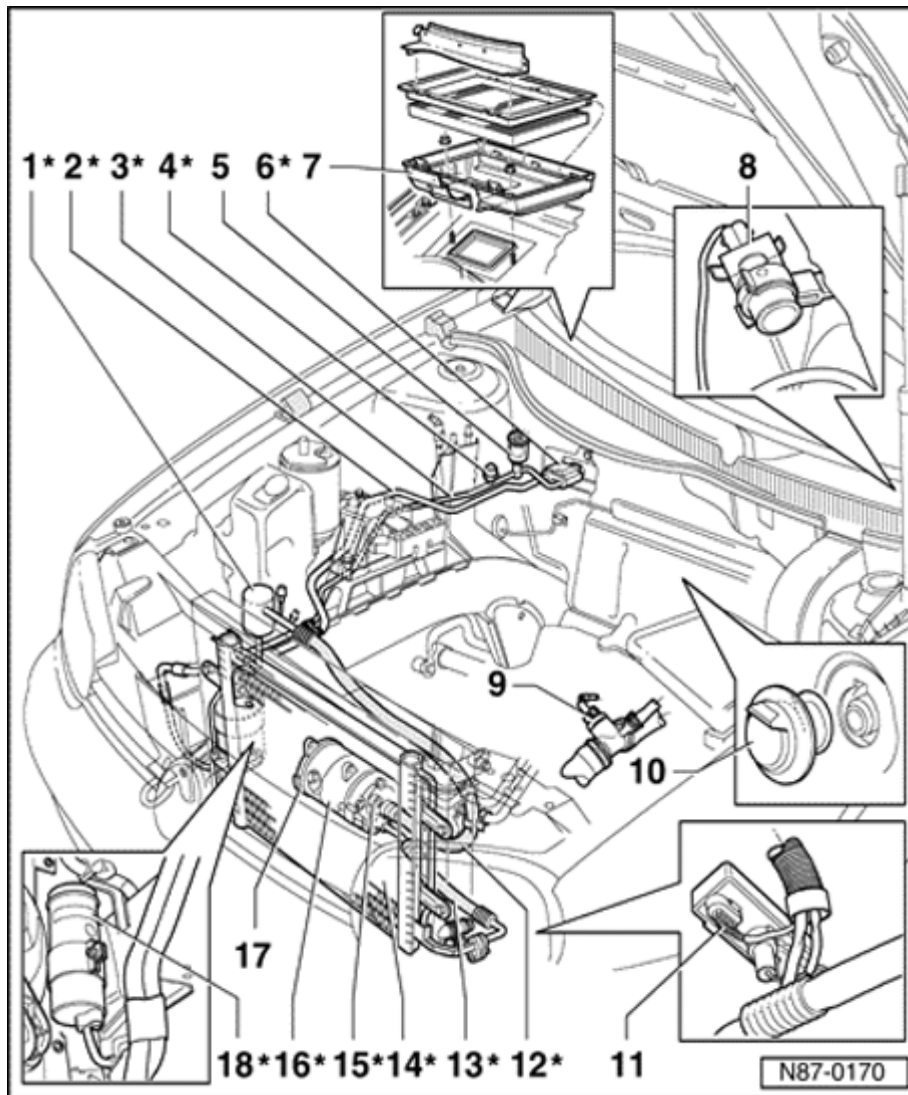
◆ Off at
119 ° C
(246 ° F)

◆ On at
112 ° C
(234
° F).

Note:

*-F163- deleted
from 05.99.
Thermal cut-out
function
assumed by
Engine Coolant
Temperature
(ECT) Sensor -
G62- via Engine
Control Module
(ECM).*

87-22



**10 Evaporator
- water
drain valve**

- ◆ Checking
⇒ [Fig. 1](#)

**11 - Coolant
Fan
Control
(FC)
Control
Module -
J293-**

**12 Refrigerant
- hose***

- ◆ From
expansion
valve to
compressor
- ◆ With
damper

**13 Refrigerant
- hose***

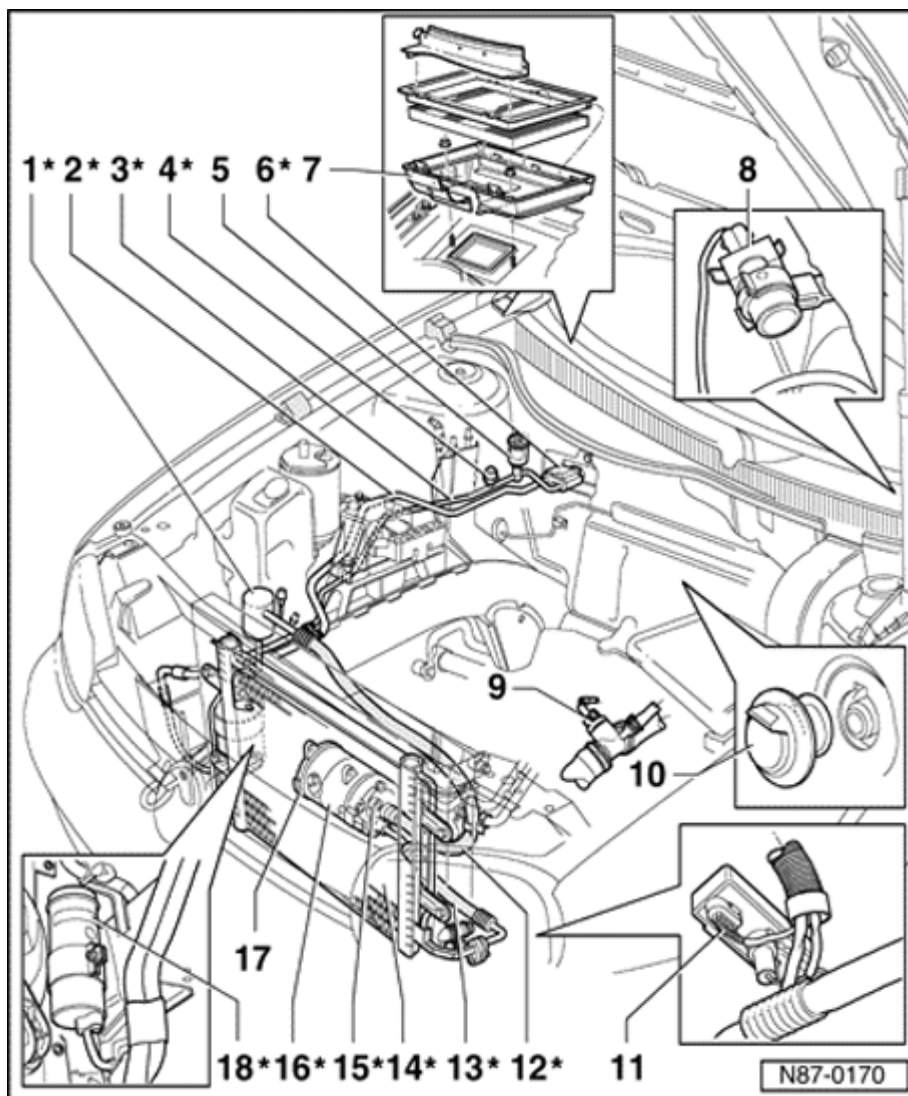
- ◆ From
compressor
to
condenser

**14
- Condenser***

**15 - Pressure
relief
valve***

- ◆ Checking
⇒ [Page
87-99](#) ,
[Fig. 3](#)

87-23



16 - Compressor*

- ◆ Manufacturer: Sanden, designation: SD7V16
- ◆ Manufacturer: Zexel, designation: DCW-17D

17 - A/C clutch -N25-

- ◆ Sanden, servicing: ⇒ [Page 87-158](#) .
- ◆ Zexel, servicing: ⇒ [Page 87-166](#) .

18 - Receiver drier*

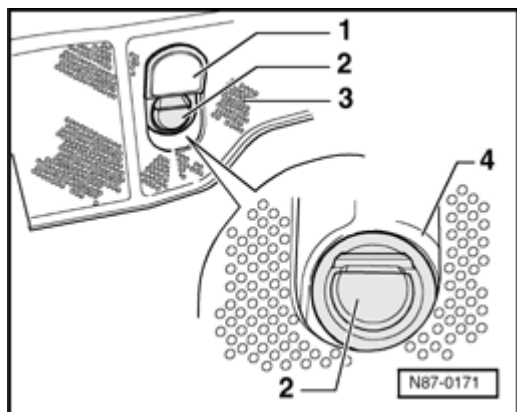


Fig. 1 Evaporator water drain valve, checking

- Fold cover -1- in bulkhead insulation mat upwards.
- Remove drain valve -2- from opening in bulkhead -4-.

Check water drain valve as follows:

- ◆ The water drain valve must not be stuck.
- ◆ Insulation mat must not be deformed or damaged in area of valve.
- ◆ The opening in the sealing cap of the water drain valve must point down.

Note:

When the cover cap -1- is closed, it must be with the insulation matting. If the cover cap pushed in too far, the water drain valve seal -2- can jam.

Climatronic

General information

Climatronic is a fully automatic climate control system. The temperature of the interior air supply, fresh air blower speeds and passenger compartment air distribution are regulated automatically. The system features fully digital electronic circuitry and On Board Diagnostic (OBD) capability.

In addition to fully automatic function, air distribution settings and fresh air blower speeds can be selected manually to suit individual needs.

The Climatronic control module -J255- is the heart of the system. It receives input information from the A/C control head -E87- and various electronic components (sensors and switches). This information is processed by the control module in accordance with specified values and provides corresponding output signals that control electrical components (actuators).

The system controls interior air temperature and distribution. The system continually samples and compares the selected interior air temperature with the actual air temperature measured by the system. Blower speeds, air temperature and distribution are then adjusted and regulated accordingly.

The A/C control head -E87- contains all controls and relevant displays needed to operate the Climatronic system. The system's functional status (mode selection, temperature and air distribution) is displayed in a LCD readout ⇒ [Page 87-31](#) .

All automatic or manual function selections are input into the A/C control head via buttons located below the display.

When AUTO mode is selected, fresh air blower speed and air distribution signals are provided by the A/C control head -E87-. The fresh air blower speed is high when there is a large difference between the selected temperature and the actual interior temperature, and low when the difference is small or the same.

The interior temperature setting, operation modes, approximate outside temperature and blower speed are indicated on the A/C control head display at all times. The defrost, vent and footwell air distribution symbols only appear in the display when air distribution is selected manually (AUTO function override). During manual air distribution, the "AUTO" display remains off until such time the "AUTO" button is pressed.

The system can be switched off completely by pressing the front passenger "decrease fan speed" button until "OFF" appears in the display.

Climate control options

- ◆ Automatic temperature and fan speed mode
- ◆ Manual temperature and fan speed mode
- ◆ Manual selection of air recirculation mode
- ◆ Manual selection of air flow to instrument panel vents
- ◆ Manual selection of air flow to footwell vents
- ◆ Manual selection of air flow to windshield defroster

Notes:

- ◆ *Pressing the button "AUTO" overrides all manually input settings.*
- ◆ *In ECON operation, only the compressor is switched off. Heating and A/C operations continue to be controlled electronically.*
- ◆ *Manually selected settings remain stored in memory when the ignition is switched off. Only the function "Air recirculation" is erased after 20 minutes.*
- ◆ *Climatronic manual operation ⇒ Owner's Manual.*
- ◆ *A malfunction is present if all display symbols on the A/C control head -E87- flash. In this case check the Diagnostic Trouble Code (DTC) Memory first ⇒ [Page 01-12](#) .*

On Board Diagnostic (OBD)

The Climatronic control module -J255- is controlled by an internal microprocessor with On Board Diagnostic (OBD) capability. If malfunctions, short or open circuits occur on monitored components, Diagnostic Trouble Codes (DTC) are stored in memory.

Perform OBD program using VAG 1551 Scan Tool or VAS 5051 Vehicle Diagnostic Testing and Information System in operating mode "Guided Fault Finding".

Performing OBD program on models through m.y. 2001 ⇒ [Page 01-12](#) .

Performing OBD program on models from m.y. 2002 ⇒ [Page 01-5](#) .

Components, checking and adjusting with VAS 5051

All OBD functions are possible using the VAS 5051 tester. Proceed as follows:

- Connect VAS 5051 to vehicle Data Link Connector (DLC) ⇒ [Page 01-2](#) , select mode "Guided Fault Finding"
- Enter appropriate model, equipment and model year information and press ">" to confirm.

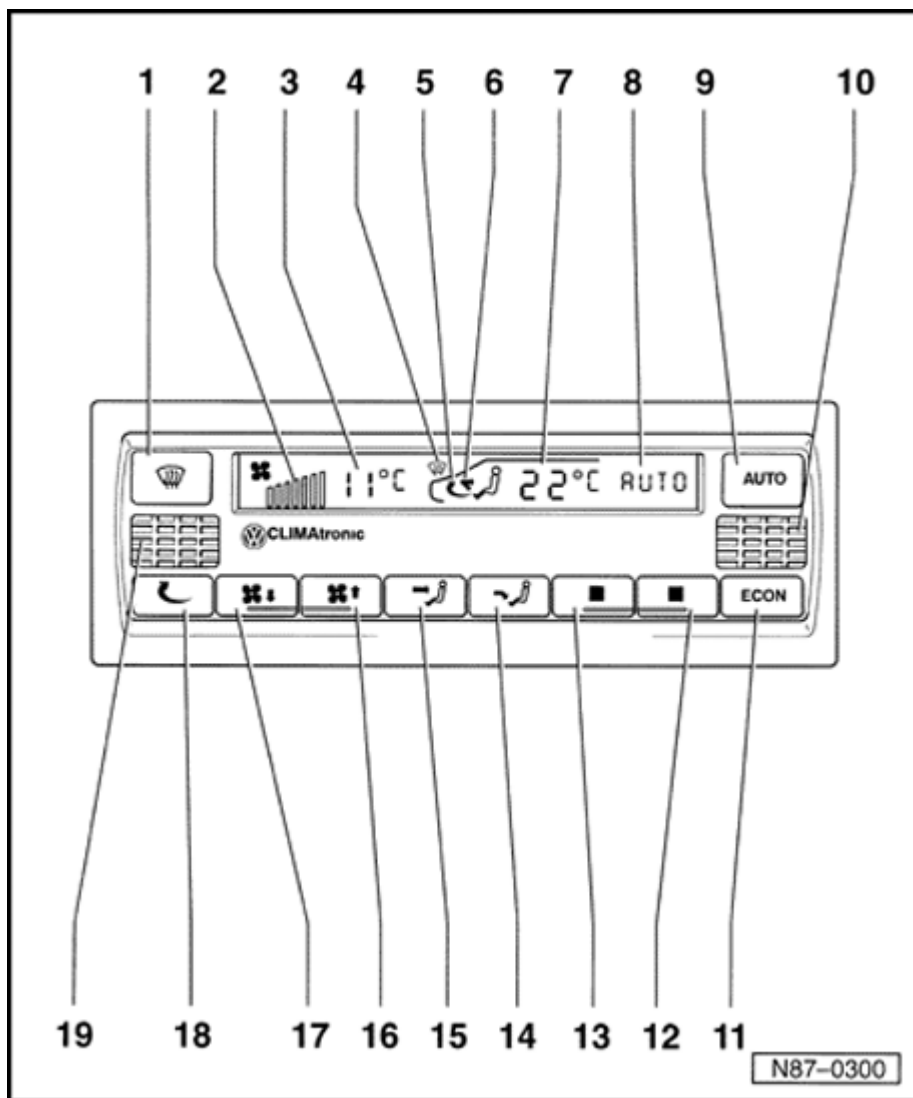
After all control modules have been registered and DTC memories checked,

- Press "Go to"
- Select "Function/Component Selection"
- Select "Body, (Repair Gr. 01, 27, 50 to 87)"
- Select "Heating, ventilation, air conditioning (Repair Gr. 01, 80 to 87"
- Select "Systems capable of self-diagnosis"
- Select "Climatronic"

Review displayed listing, choose and press ">" to confirm.

- ◆ Selecting "Function" allows access to "Basic settings", " Code control module", "Check cooling performance" etc.

- ◆ Selecting "Electrical Components" provides specific component function tests etc.



A/C control head -E87-, function

1 - Windshield defrost button

2 - Blower speed display

◆ In automatic operation - 8 -, a mid-range is displayed independent of actual blower speed.

3 Ambient - (outside) temperature display

◆ Display will not change when road speed is below 15 km/h (9.5 mph) and coolant temperature is above 70 °C (158 °F). Under these conditions the actual measured value is not shown because at low road speed the radiant heat from the vehicle

engine will
cause a
false
reading.

4 - Windshield defrost display

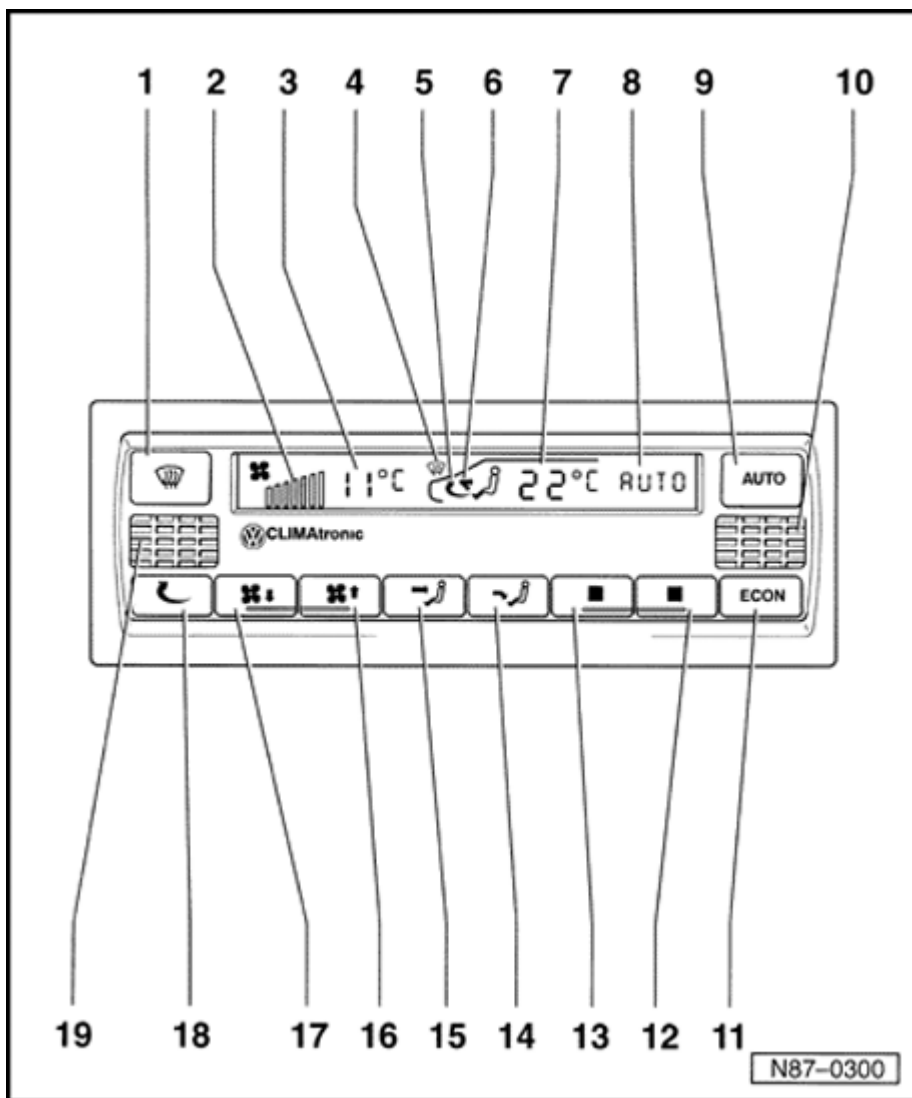
5 - Air recirculation display

6 - Air distribution display

- ◆ Function "air flow to footwell" is displayed or goes out when pressing button - 14 -.
- ◆ Function "air flow to upper body" is displayed or goes out when pressing button - 15 -.

7 - Selected temperature display

- ◆ To change from degrees Celsius to Fahrenheit and vice versa:
 - Press and hold button - 11 - and press button - 9 -.
- ◆ Selected temperature scale appears in display.



8 - Operating mode display

"AUTO":
Automatic mode

- ◆ In automatic mode the Climatronic maintains the selected inside temperature automatically. With this setting, the air outlet air temperature, the blower speed and the air distribution are controlled automatically.

"ECON":
A/C system off

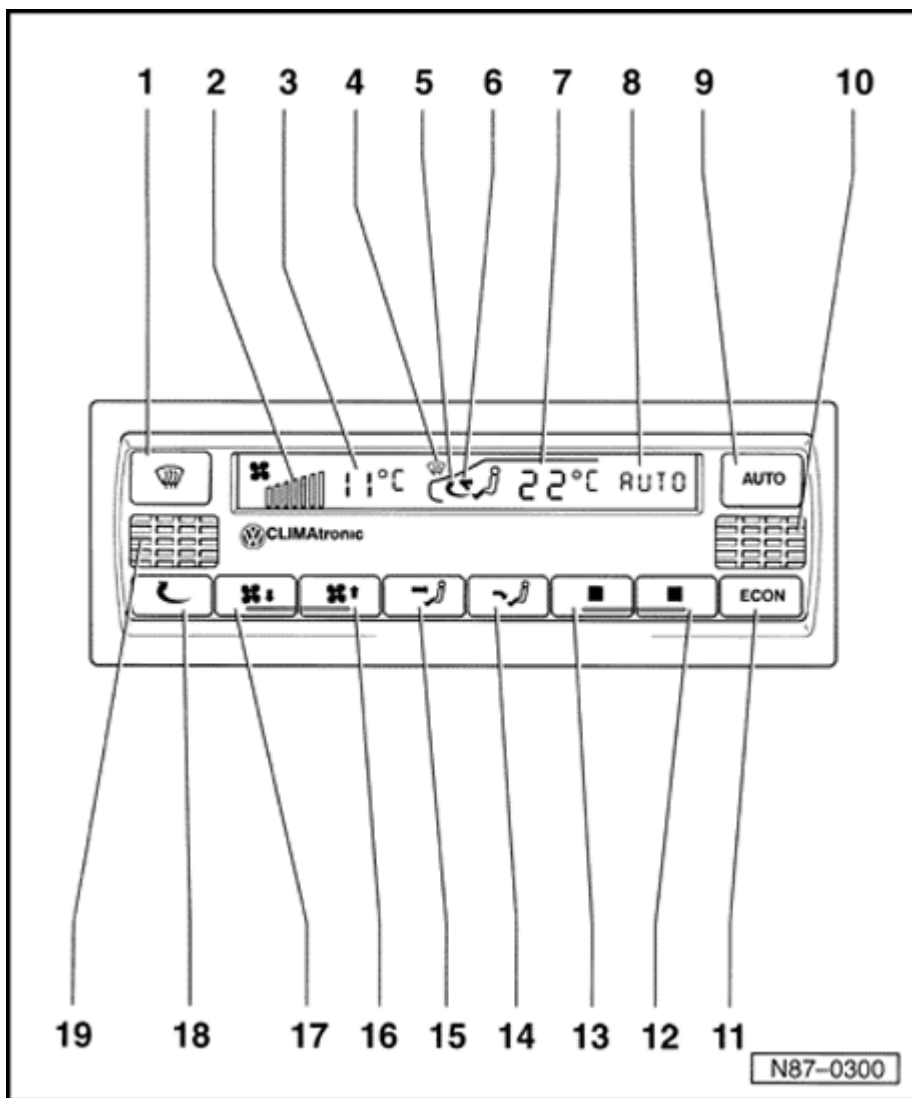
- ◆ In ECON mode only the compressor is switched off. Heating and air distribution continue to be controlled automatically.

"OFF":
Complete system is switched off

- ◆ Switch off with button -

17 -.

- ◆ In this mode, all flaps remain in the last set position before switching off. (Setting should only be used in case of a malfunction).



9 - Automatic operation button

10 - Instrument panel interior temperature sensor - G56- and interior temperature sensor fan - V42-

◆ Installation position for right-hand drive vehicles.

11 - "ECON" button

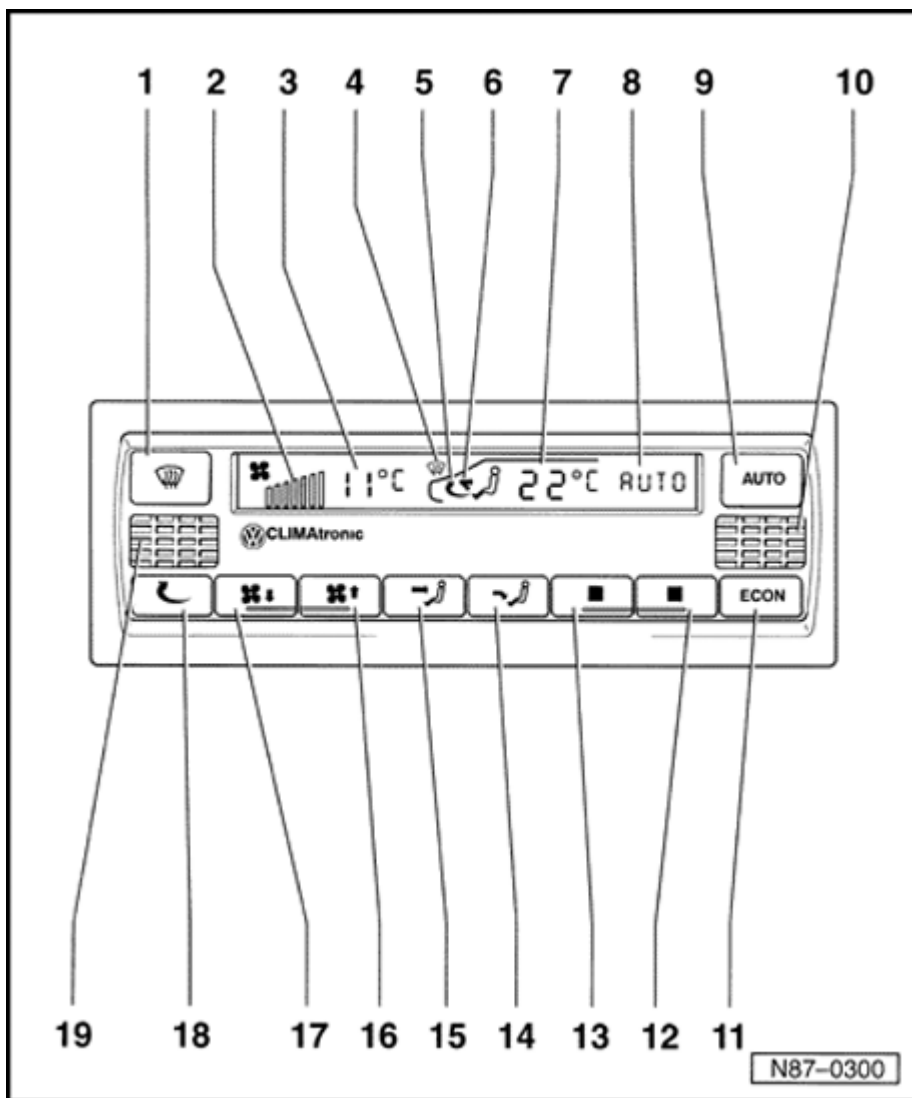
◆ In ECON mode only the compressor is switched off. The heater and air distribution continues to be controlled automatically.

12 - "Warmer" button

13 - "Colder" button

14 - "Air flow to footwell" button

15 - "Air flow to upper body" button



16 - "Increase blower speed" button

17 - "Decrease blower speed" button

◆ To switch off A/C system press and hold button until "OFF" appears in display.

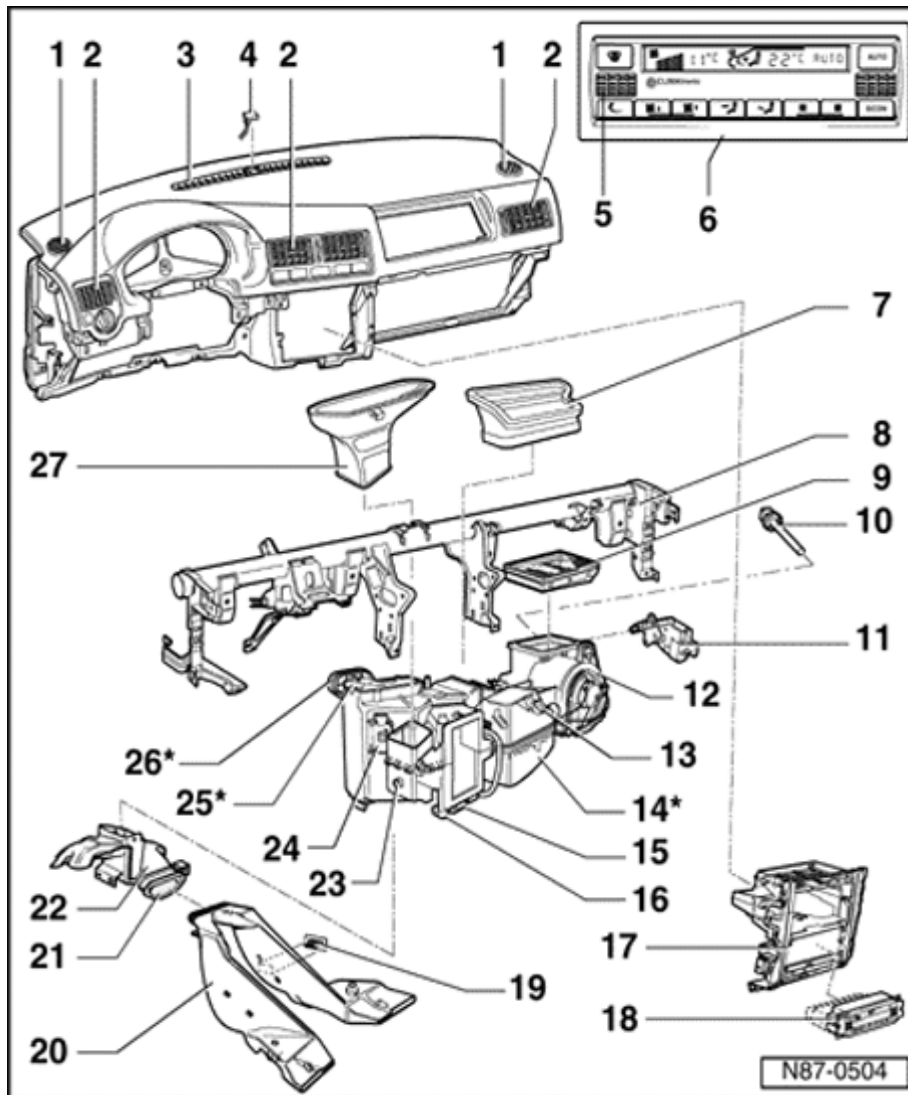
◆ In this mode, all flaps remain in the same position before switching off. (Setting should only be used in case of a malfunction)

18 Recirculating - air button

19 Instrument - panel interior temperature sensor - G56- and interior temperature sensor fan - V42-

◆ Installation position for left-

hand drive
vehicles.



Climatronic components in passenger compartment, servicing

CAUTION!

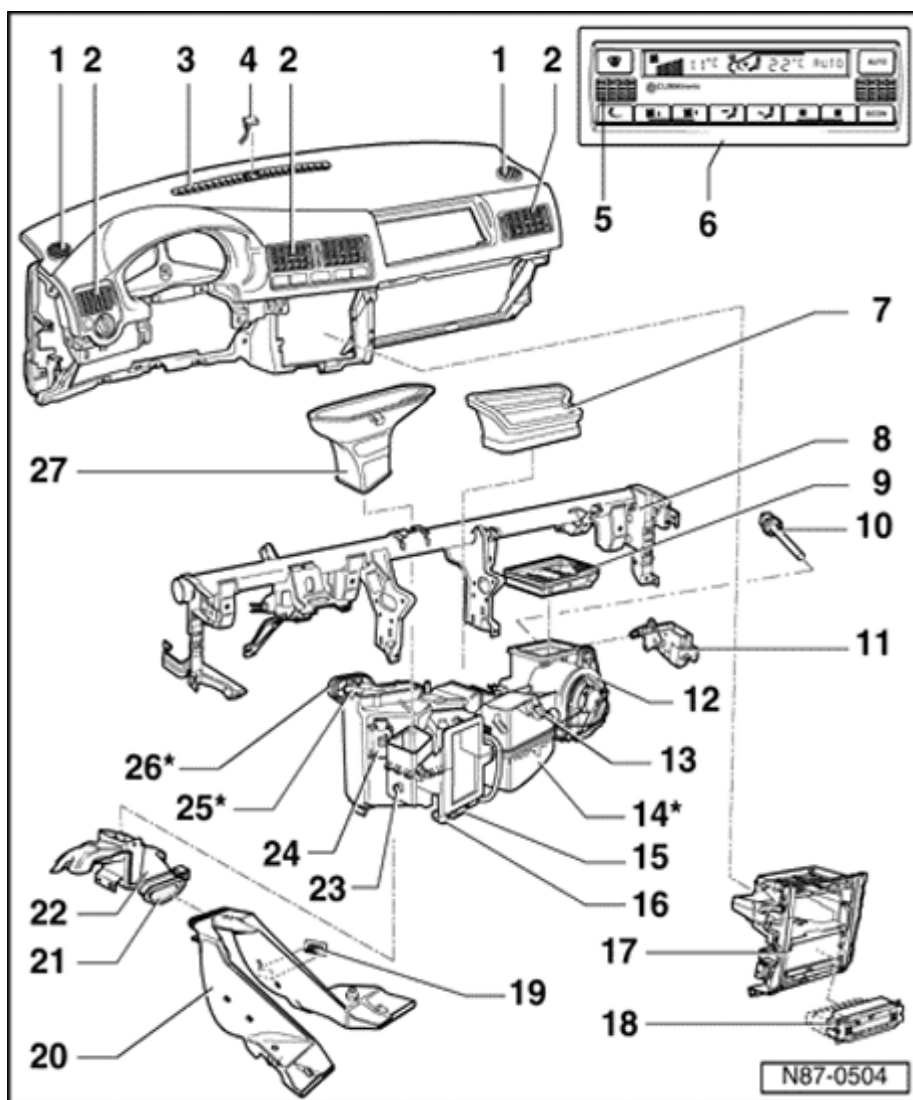
Before beginning repairs:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch off ignition.**
- ◆ **Remove ignition key from ignition switch.**

Notes:

- ◆ System components marked with an asterisk * can only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.
- ◆ Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety

measures ⇒
[Page 87-69](#) .



1 - Side window air outlet

◆ Removing ⇒ [Page 80-6](#), Fig. 1

2 - Air outlets

◆ Golf and Jetta have different types

◆ Removing ⇒ [Page 80-11](#)

3 - Defroster air outlet

◆ Removing and installing

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

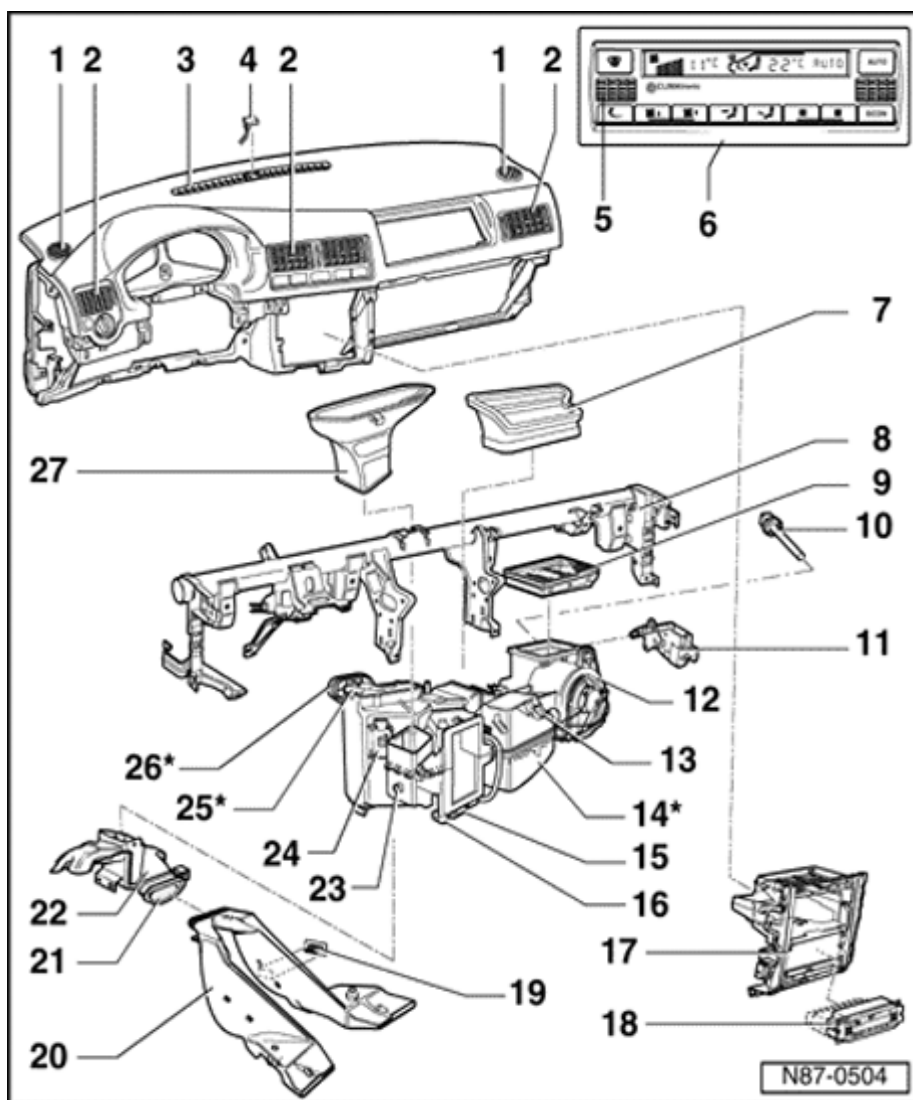
4 - Sunlight photo sensor - G107-

◆ Function: Controls temperature flap and fresh air blower speed depending on light intensity

◆ In event of failure:

Climatronic
Control
Module -
J255-
assumes
fixed value

- ◆ Checking
⇒ Repair
Group 01
or use
VAS
5051 in
mode
"Guided
Fault
Finding"
⇒ [Page
87-29](#)
- ◆ Removing
⇒ [Page
87-49](#) , ⇒
[Fig. 2](#)



5 Instrument - panel temperature sensor - G56- with interior temperature sensor fan - V42-

- ◆ Control unit -J255-, A/C control head -E87- and dash panel temperature sensor - G56- with temperature sensor blower - V42- are integrated into a single unit which cannot be serviced separately.

- ◆ Checking ⇒ Repair Group 01 or use VAS 5051 in mode "Guided Fault Finding" ⇒ [Page 87-29](#)

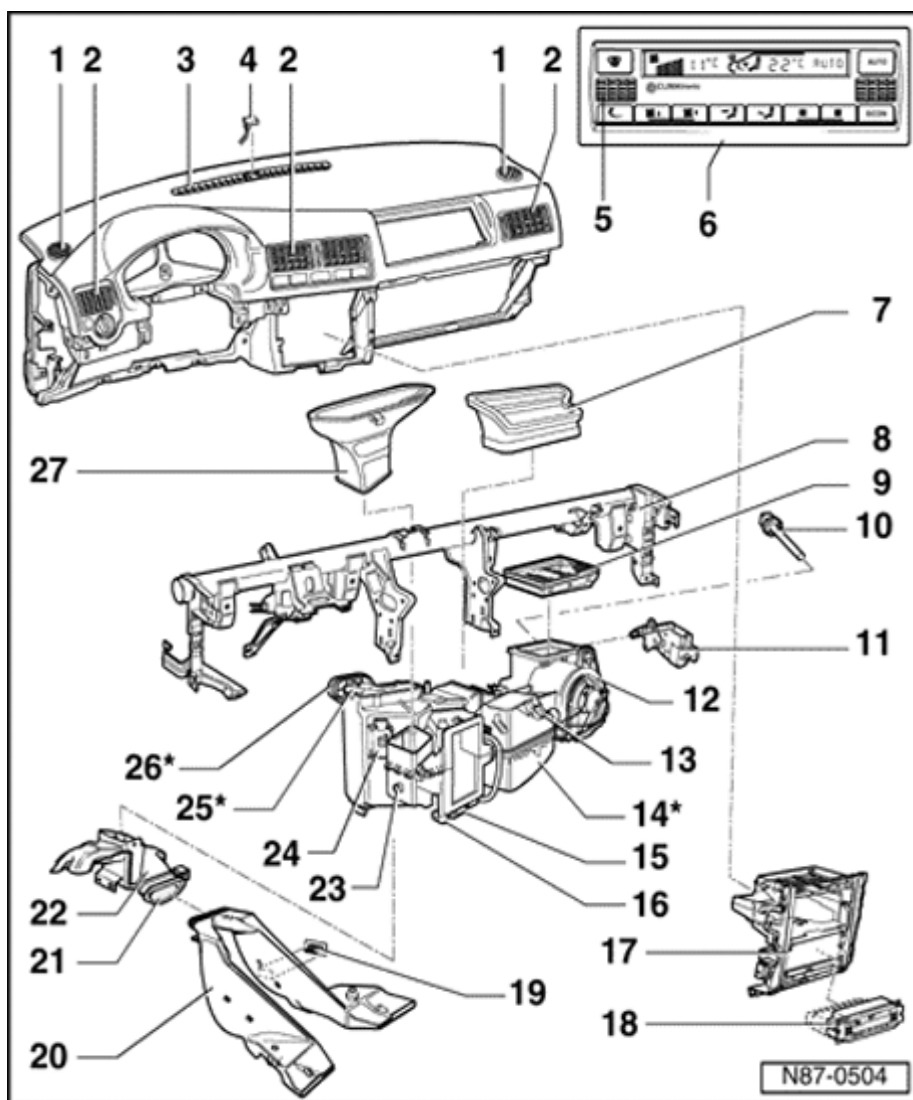
- ◆ Function: Temperature sensor controls temperature flap and fresh air blower

depending
on
temperature

◆ In event of -
G56-
malfunction,
operation
continues
assuming
value of
+24 ° C
(75 ° F)

◆ Replacing
and
adjusting:

- Code
Climatronic
control
module,
function 07
and then
initiate
Basic
setting,
function 04
using VAG
1551 Scan
Tool (ST)
⇒ [Page 01-1](#),
Climatronic,
OBD.



6 - A/C control head unit - E87-

◆ Climatronic control unit -J255-, A/C control head -E87- and instrument panel temperature sensor - G56- with interior temperature sensor blower - V42- are integrated into a single unit and cannot be serviced separately.

◆ Checking
⇒ Repair Group 01 or use VAS 5051 in mode "Guided Fault Finding"
⇒ [Page 87-29](#)

◆ Functions
⇒ [Page 87-31](#)

◆ Removing and installing
⇒ [Page 87-52](#)

- ◆ Replacing and adjusting:

- Code Climatronic control module, function 07 and then initiate Basic setting, function 04 using VAG 1551 Scan Tool (ST)
⇒ [Page 01-1](#), Climatronic, OBD.

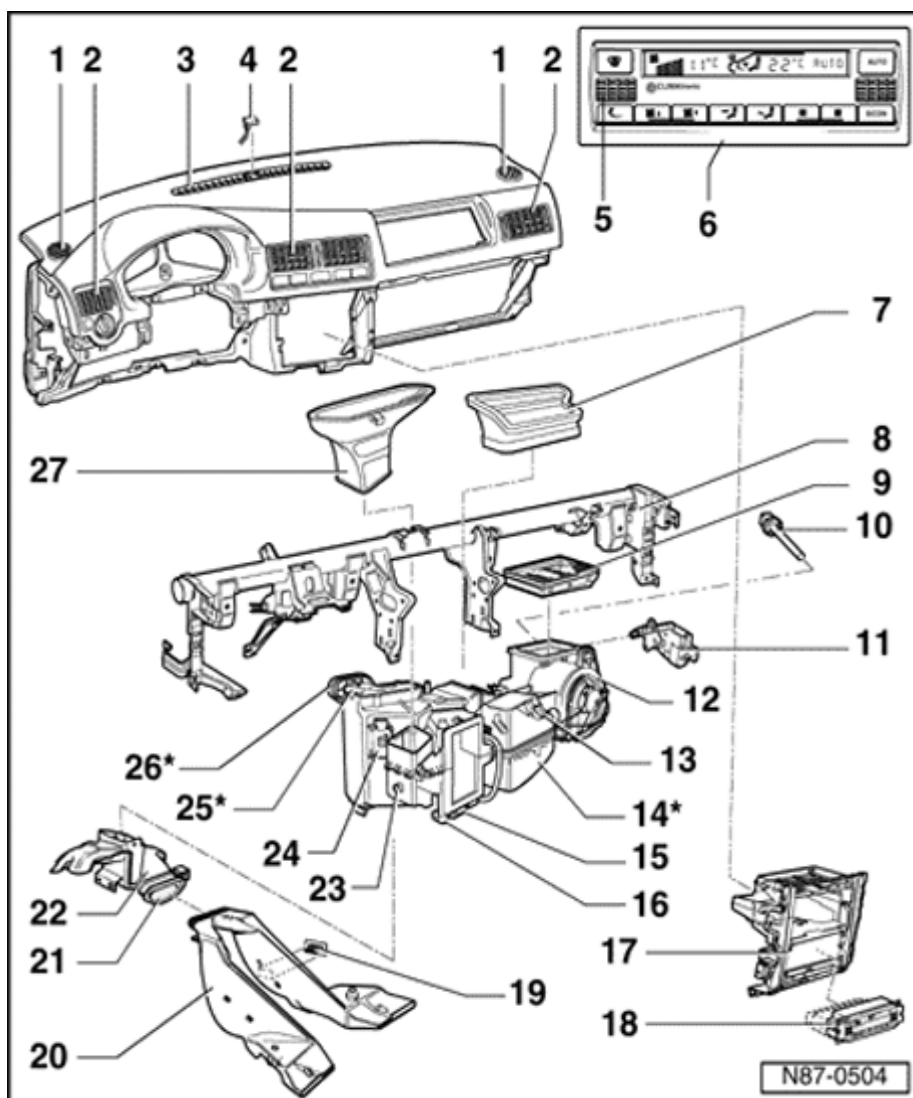
7 Intermediate - duct

8 - Instrument panel cross member

- ◆ Loosening and tightening
⇒ [Page 80-9](#), Fig. 5

9 - Dust and pollen filter

- ◆ With activated charcoal filter
- ◆ Removing and installing
⇒ [Page 80-8](#), Fig. 4



10 Fresh air - intake duct temperature sensor - G89-

◆ Function: Temperature sensor controls temperature flap and fresh air blower depending on temperature

◆ In event of malfunction: outside temperature sensor - G17- value is used instead.

◆ Checking ⇒ Repair Group 01 or use VAS 5051 in mode "Guided Fault Finding" ⇒ [Page 87-29](#)

◆ Replacing:
- Remove glove box.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)

- Reach behind

heating
and
A/C
unit.

- Turn
temperature
sensor 90°
and pull
out.

◆ Lubricate
seal with
oil when
installing.

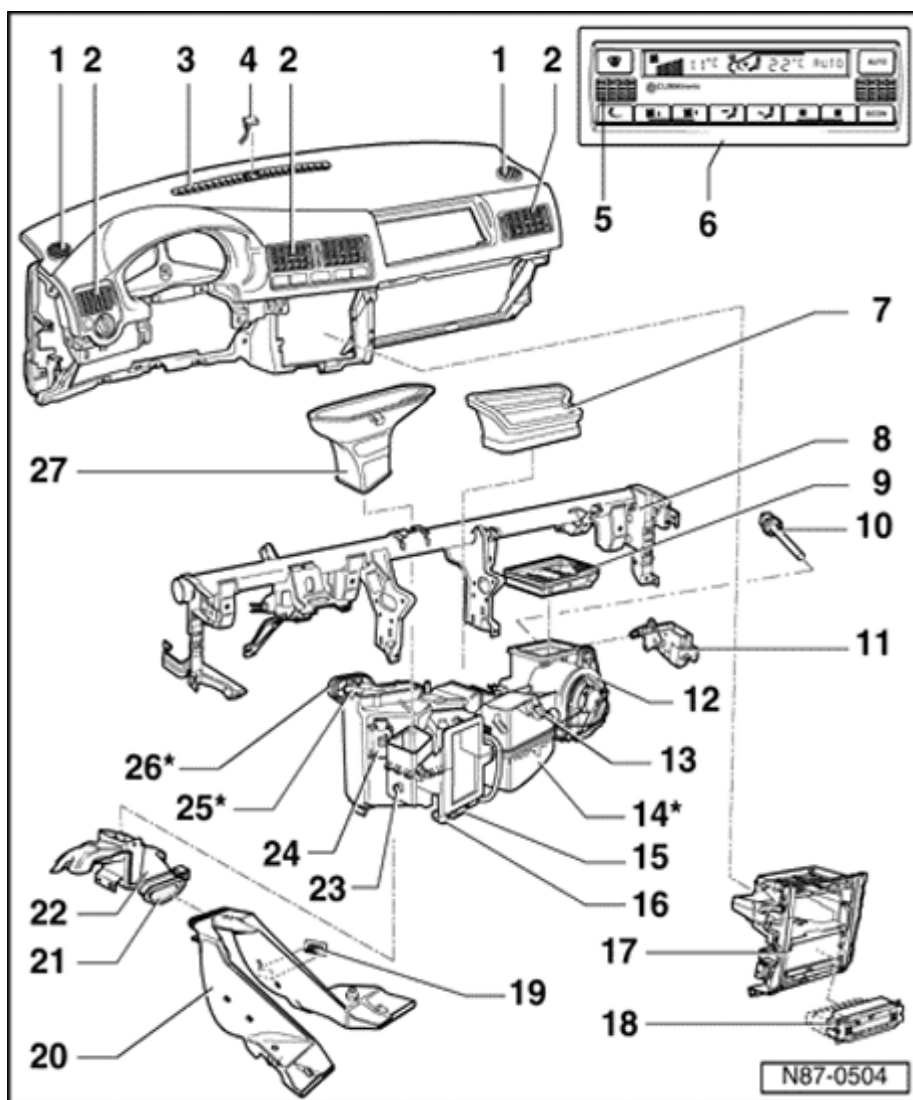
Note:

*If it is not
possible to
remove sensor
as described
above:*

- Remove
instrument panel
⇒ [Repair
Manual, Body
Interior, Repair
Group 70](#) .

- Loosen
instrument panel
cross member
⇒ [Page 80-9](#) ,
Fig. 5

- Partially
remove heating
and A/C unit.



11 - Air flow flap motor - V71-

◆ Also operates fresh and recirculating air flap

◆ Checking ⇒ Repair Group 01 or use VAS 5051 in mode "Guided Fault Finding" ⇒ [Page 87-29](#)

◆ Removing ⇒ [Page 87-54](#)

◆ Replacing and adjusting:

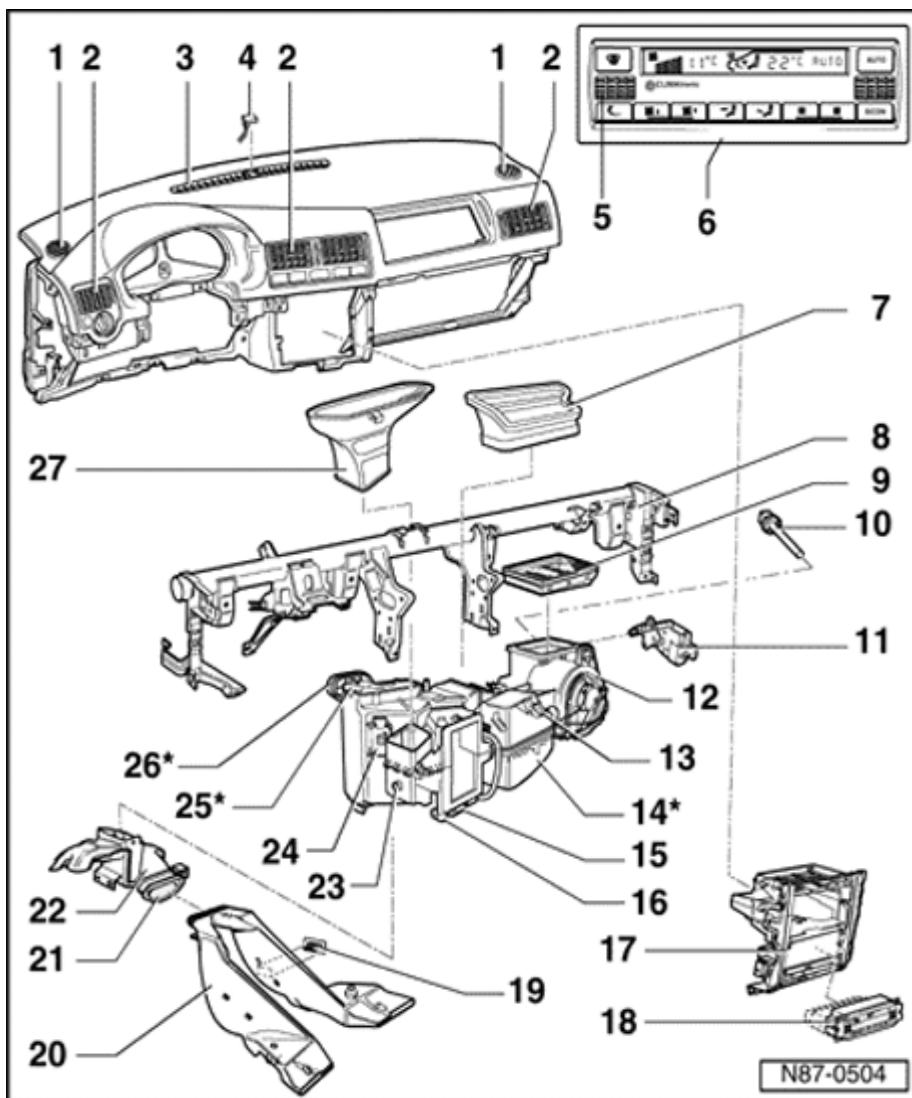
- Initiate Basic setting, function 04 using VAG 1551 Scan Tool (ST) ⇒ [Page 01-1](#), Climatronic, OBD.

12 - Fresh air blower - V2-

◆ Checking ⇒ Repair Group 01

or use
VAS
5051 in
mode
"Guided
Fault
Finding"
⇒ [Page
87-29](#)

◆ Removing:
⇒ [Fig. 4](#)

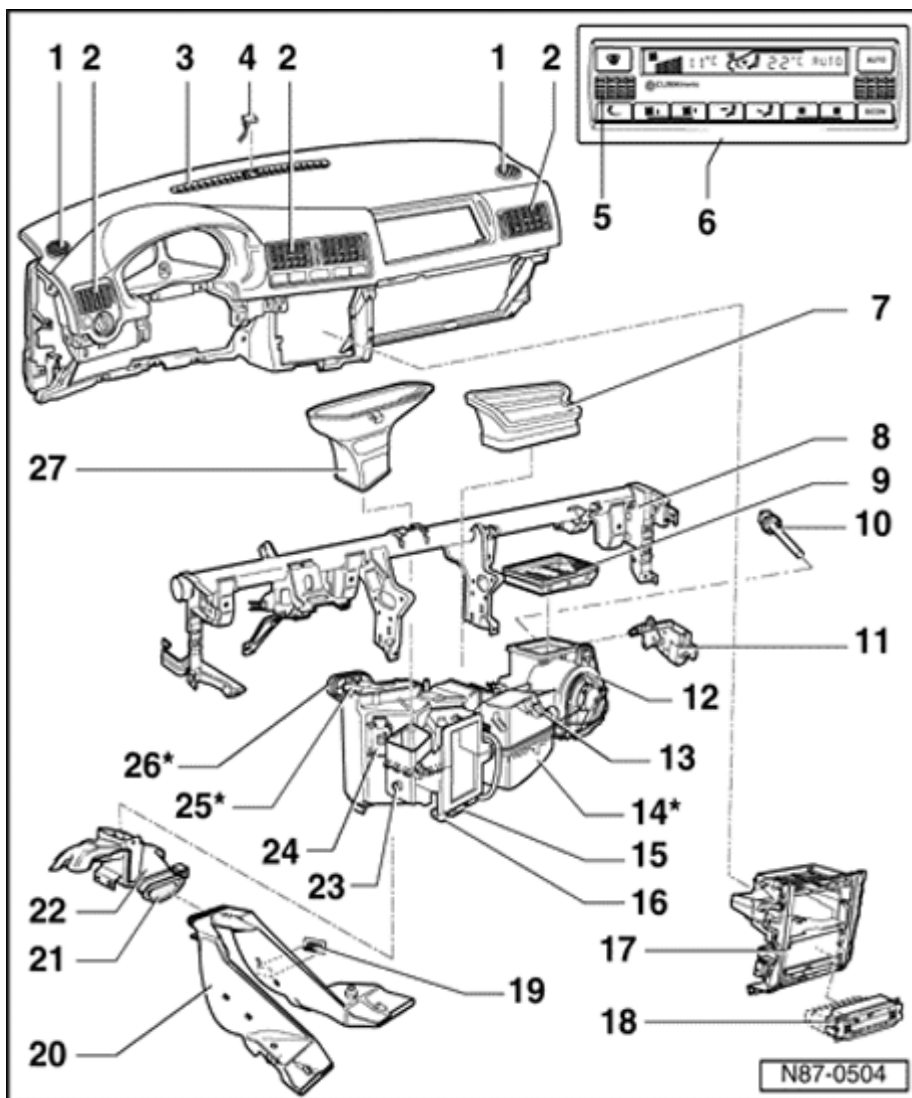


13 - Fresh air blower control module -J126-

- ◆ Function: Controls fresh air blower speed depending voltage signal
- ◆ Checking = Repair Group 01 or use V5051 in module "Guided Fault Finding" => [Page 87-29](#)
- ◆ Replacing : [Fig. 3](#)

14 - Heating and unit*

- ◆ With heater core
- ◆ With evaporator
- ◆ Removing/assembly => [Page 87-114](#)



15 - Central air flap motor -V70-

◆ Checking
 ⇒ Repair Group 01 or use VAS 5051 in mode "Guided Fault Finding"
 ⇒ [Page 87-29](#)

◆ Removing
 ⇒ [Page 87-54](#)

◆ Replacing and adjusting:

- Initiate Basic setting, function 04 using VAG 1551 Scan Tool (ST)
 ⇒ [Page 01-1](#), Climatronic, OBD.

16 Temperature - regulator flap motor - V68-

◆ Checking
 ⇒ Repair Group 01 or use VAS 5051 in mode "Guided Fault Finding"

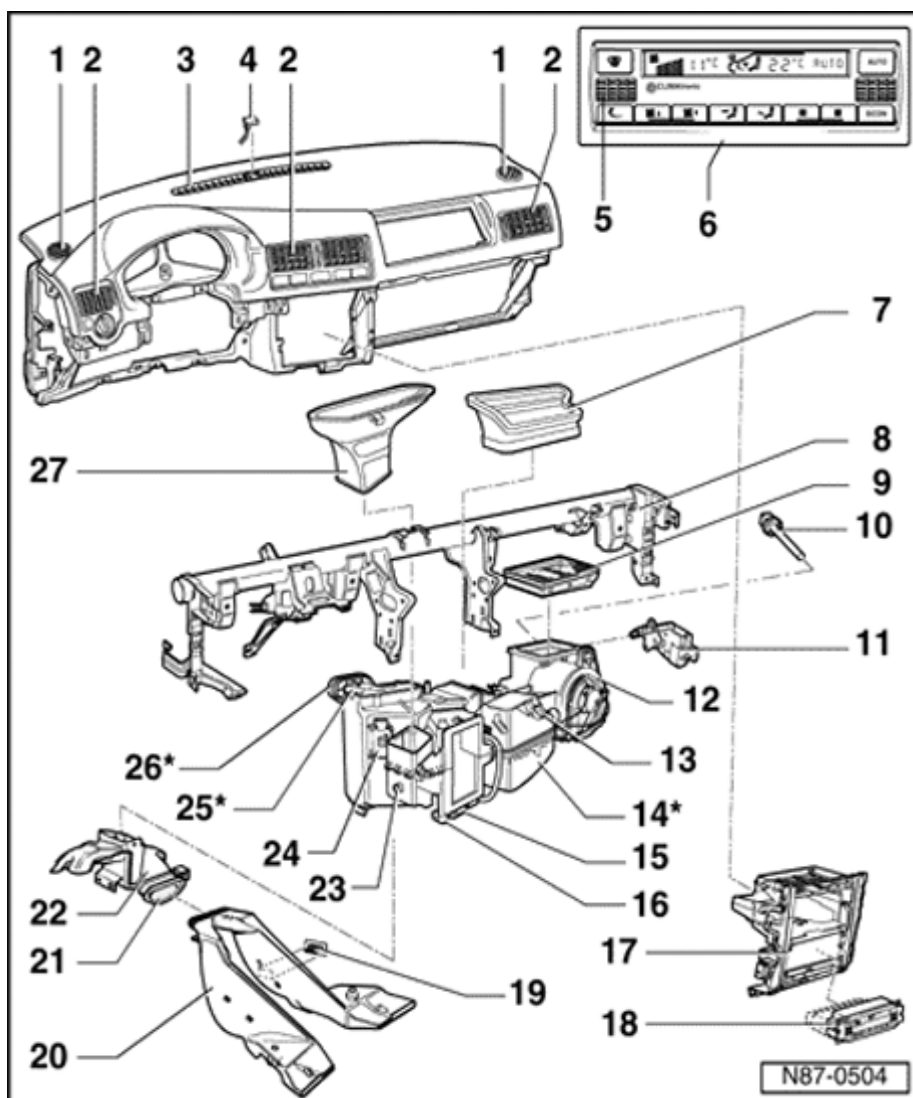
⇒ [Page 87-29](#)

◆ Removing
⇒ [Page 87-54](#)

◆ Replacing and adjusting:

- Initiate Basic setting, function 04 using VAG 1551 Scan Tool (ST)
⇒ [Page 01-1](#), Climatronic, OBD.

17 - Center trim



18 Climatronic - control module - J255-

- ◆ Climatronic control module - J255-, A/C control head -E87- and instrument panel temperature sensor - G56- with interior temperature sensor blower - V42- are integrated into a single unit and cannot be serviced separately.

- ◆ Checking
⇒ Repair Group 01 or use VAS 5051 in mode "Guided Fault Finding"
⇒ [Page 87-29](#)

- ◆ Removing and installing
⇒ [Page 87-52](#)

- ◆ After replacing:

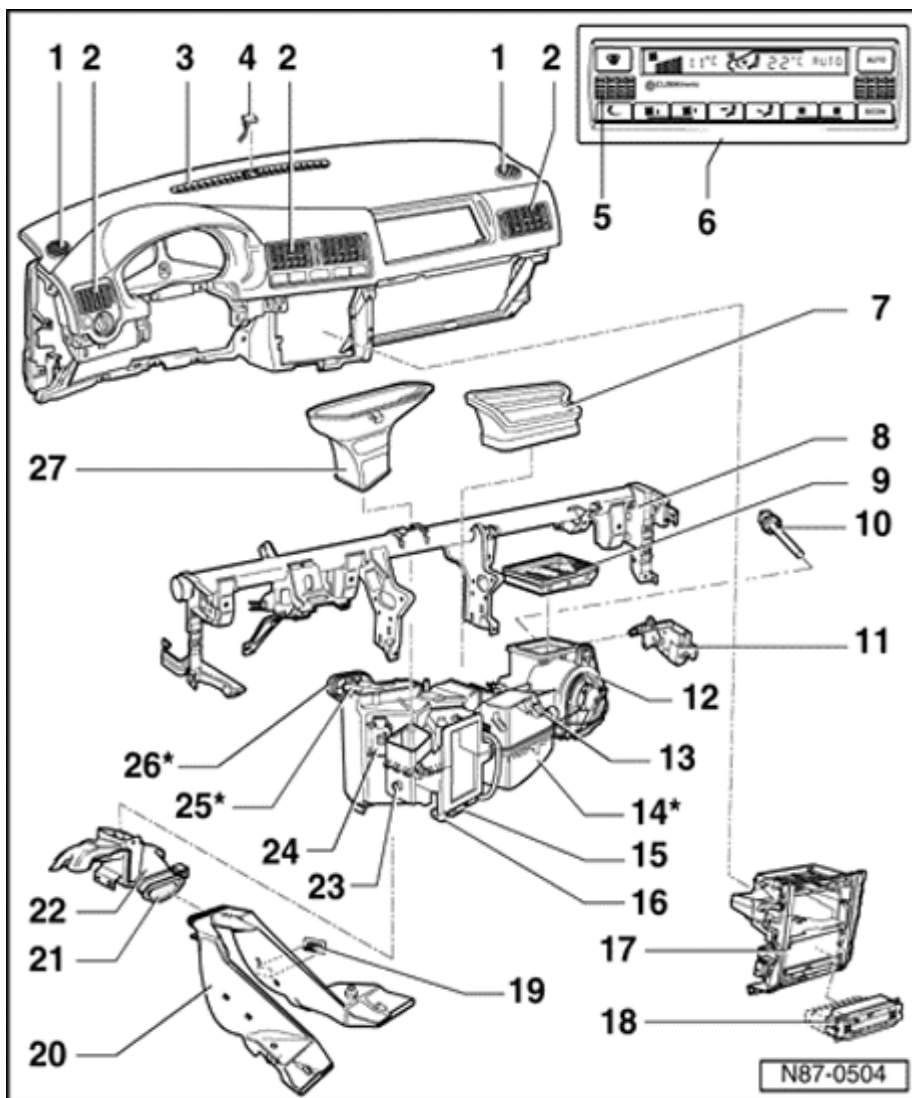
- Always

code
Climatronic
control
module,
function 07
and then
initiate
Basic
setting,
function 04
using VAG
1551 Scan
Tool (ST)
⇒ [Page 01-1](#),
Climatronic,
OBD.

19 - Footwell air outlet

- ◆ Passenger
side only

20 - Rear footwell air duct



21 - Gasket

22 - Connecting duct

- ◆ With driver's side footwell air outlet

- ◆ Removing ⇒ [Page 80-10](#), Fig. 6

23 - Footwell air outlet temperature sensor - G192-

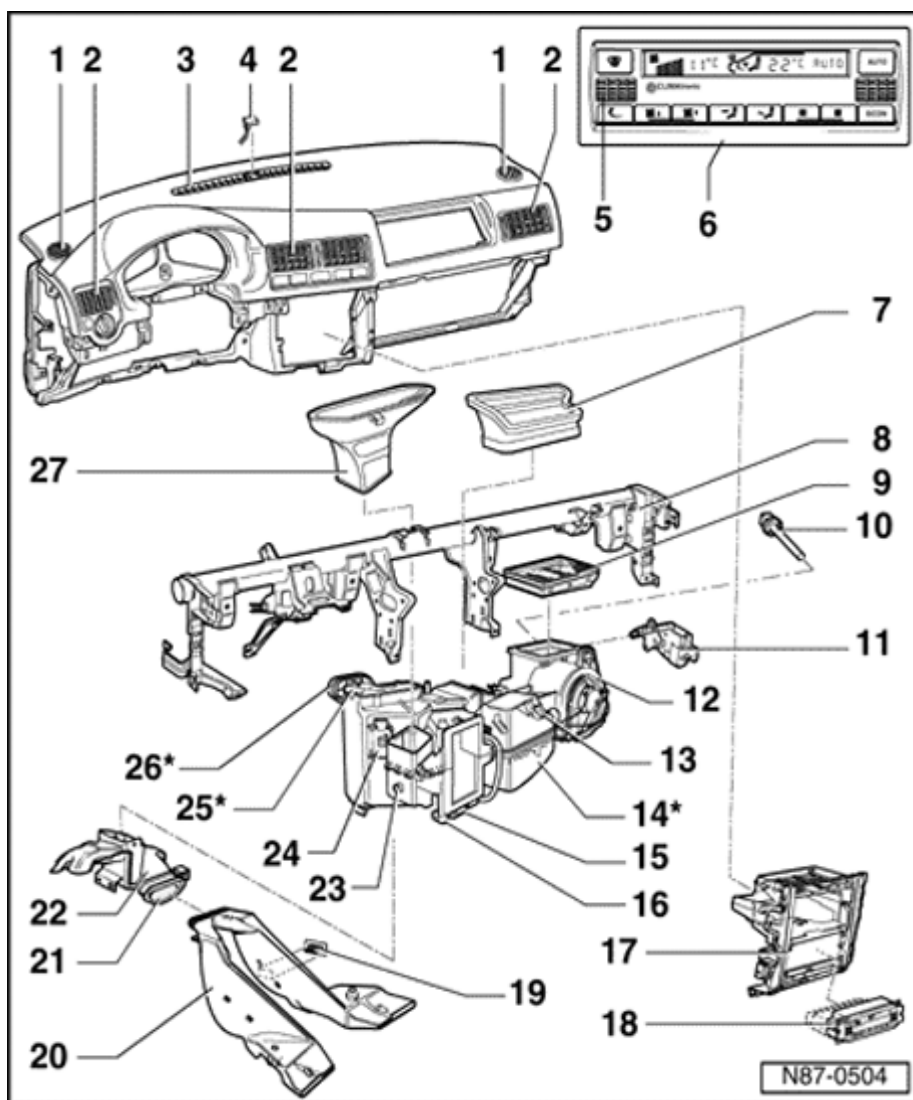
- ◆ Function: Controls air distribution defrost/footwell and fresh air blower speed depending on air outlet temperature measurement.

- ◆ Emergency running in event of failure: Continued operation assuming value of +80 °C (176 °F)

- ◆ Checking ⇒ Repair Group 01 or use VAS 5051 in mode "Guided Fault"

Finding"
⇒ [Page
87-29](#)

◆ Removing
and
installing
⇒ [Fig. 1](#)



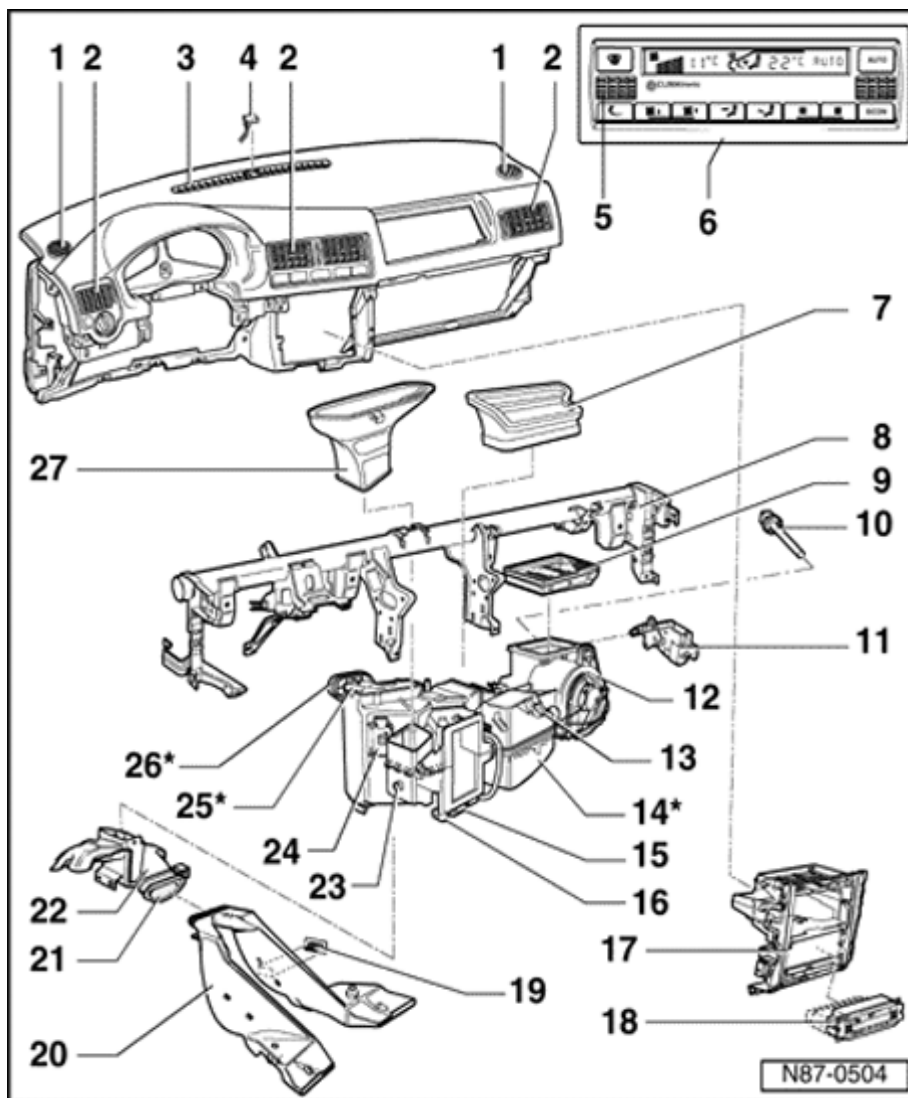
24 Footwell/defro: - flap motor -V8!

- ◆ Checking = Repair Gro 01 or use V 5051 in mo "Guided Fa Finding" ⇒ [Page 87-29](#)
- ◆ Removing : [Page 87-54](#)
- ◆ Replacing & adjusting:
 - Initiate B: setting, function (⇒ [Page \(1](#) , Climatronic OBD.

25 - Heater core*

- ◆ Always replace coolant after removal or replacing
- ◆ Removing : [Page 87-11](#) Heating and A/C unit, removing

87-47



26 Heater - core/bulkhead seal*

- ◆ Installation position ⇒ [Page 80-21](#), Fig. 2

27 - Defroster duct

- ◆ Replacing:
 - Remove instrument dash panel

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Loosen instrument panel cross member ⇒ [Page 80-8](#), Fig. 5.

- ◆ Note installation position ⇒ [Page 80-6](#), Fig. 2

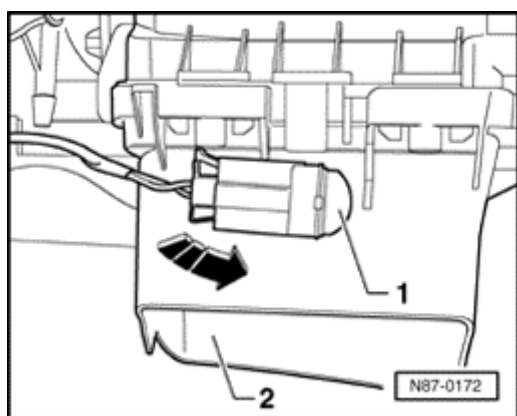


Fig. 1 Sender for outlet temperature, floor outlet -G192-, removing and installing

Removing

- Remove trim under the steering column.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)

- Disconnect electrical connector from floor outlet temperature sender -G192-.
- Turn temperature sender -1- 90° and take out from housing -2-.

Installing

Lubricate seal with oil when installing.

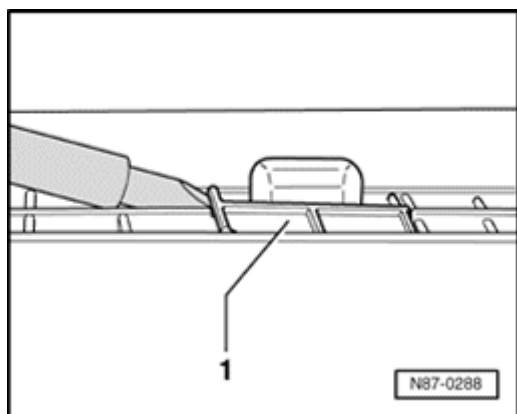


Fig. 2 Sunlight photo sensor - G107, removing

- Unclip sunlight photo sensor -1- with screwdriver.

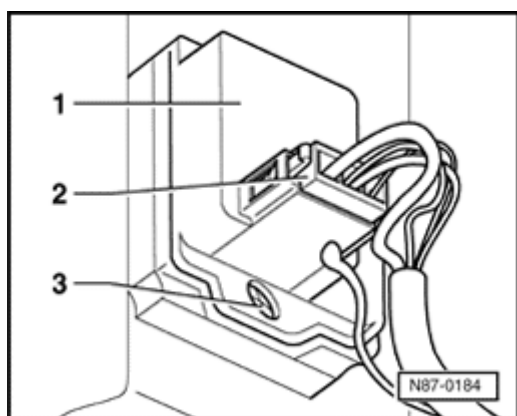
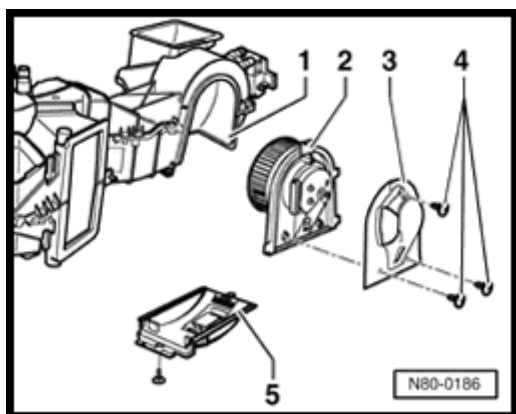


Fig. 3 Control module for fresh air blower -J126-, removing

- Remove glove box.
⇒ [Repair Manual, Body Interior, Repair Group 68](#)
- Disconnect electrical connector - 2- and remove screw -3-.
- Remove -J126-.

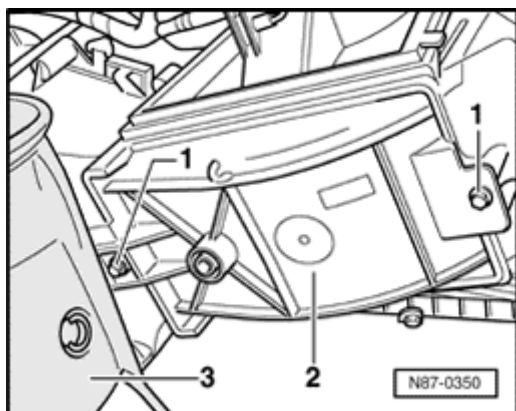


✦ **Fig. 4 - Fresh air blower -V2-, removing**

- 1 - Heating and ventilation unit
- 2 - Fresh air blower -V2-
- 3 - Cover
- 4 - Screws
- 5 - Cover

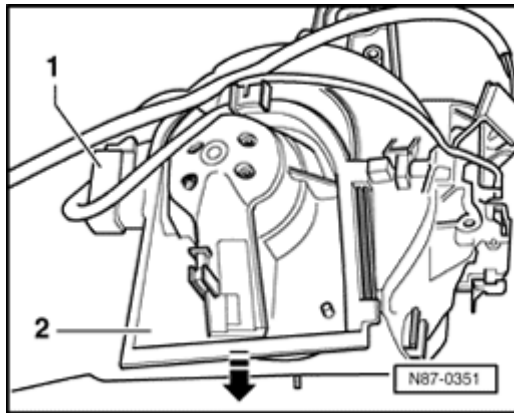
Removing

- Remove glove box.
- ⇒ [Repair Manual, Body Interior, Repair Group 68](#)



- ✦
- Remove plastic foam cover -3- below A/C unit.
 - Remove bolts -1-.
 - Remove cover -2-.

87-51



- Disconnect electrical connector - 1- for fresh air blower.
- Remove fresh air blower -2- downward.

A/C control head-E87- with Climatronic control module - J255-, removing and installing

CAUTION!

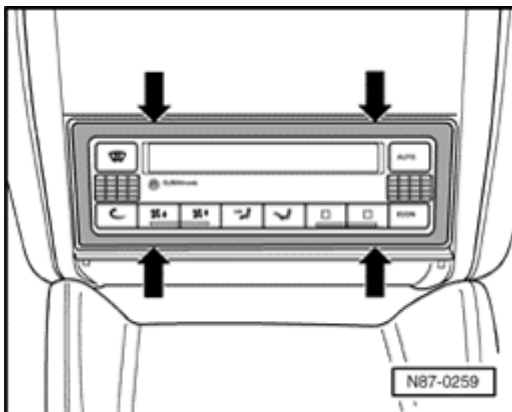
Before beginning repairs:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch off ignition.**
- ◆ **Remove ignition key from ignition switch.**

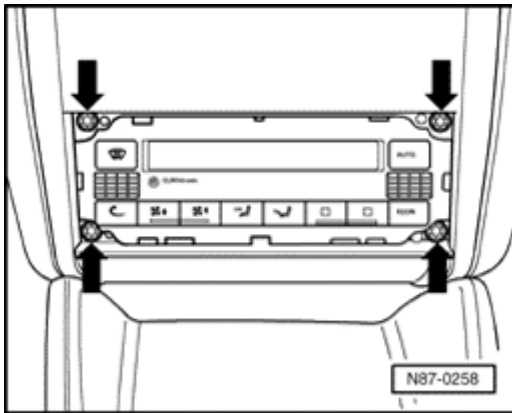
Note:

Climatronic Control Module -J255- and A/C Control Head -E87- are integrated into a single unit that cannot be serviced separately.

Removing



- Using a screwdriver with a protected tip, carefully unclip control head trim at locations indicated by -arrows-.



- Remove instrument panel screws -arrows-.
- Pull out A/C control head.
- Disconnect electrical connectors.
- Remove A/C control head with control module.

Installing

- Install in reverse order of removal, noting the following:

Through m.y. 2001: Code control module, function 07, and then initiate Basic setting, function 04 using VAG 1551 ⇒ [Page 01-1](#) or VAS 5051 ⇒ [page 87-29](#) .

From m.y. 2002: Code control module, function 07, and then initiate Basic setting, function 04 using VAS 5051 ⇒ [Page 87-29](#) .

Air flap motors (for climate control regulation), replacing

CAUTION!

Before beginning repairs:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch off ignition.**
- ◆ **Remove ignition key from ignition switch.**

Note:

After installing flap motors:

- Ensure wiring is correctly routed. Harnesses must be routed so that they do not come into contact with moving parts (for example the levers on the flap motors).

- Initiate Basic setting, OBD program function 04 using VAG 1551 Scan Tool (through m.y. 2001) or VAS 5051 Vehicle Diagnostic Testing and Information system in mode "Guided Fault Finding" (through m.y. 2001 and from m.y. 2002).

Air flow flap motor -V71-, removing and installing

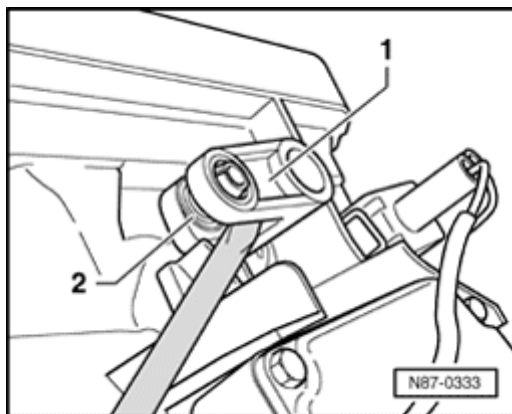
Note:

The air flow flap motor also operates the fresh/recirculating air flap.

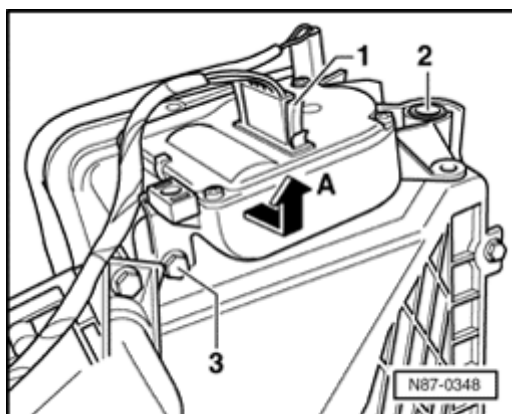
Removing

- Remove glove box.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)



- With screwdriver, carefully unclip air flow flap rod -1- from lever -2-.



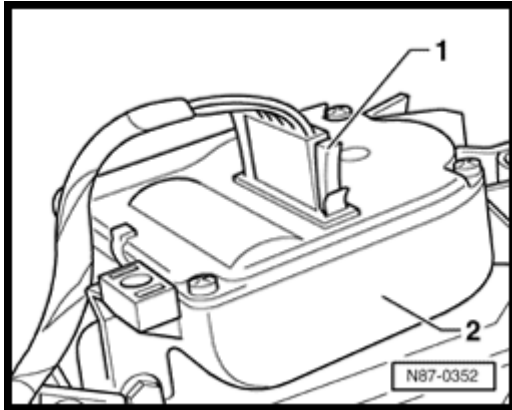
- Disconnect electrical connector -1-.
- Remove screw -3-.

The flap motor is connects to the evaporator housing portion of the heating and A/C unit. To prevent damage:

- Lower flap motor and at the same time pull off fresh air/recirculating air flap shaft -2-, arrow -A-.

Installing

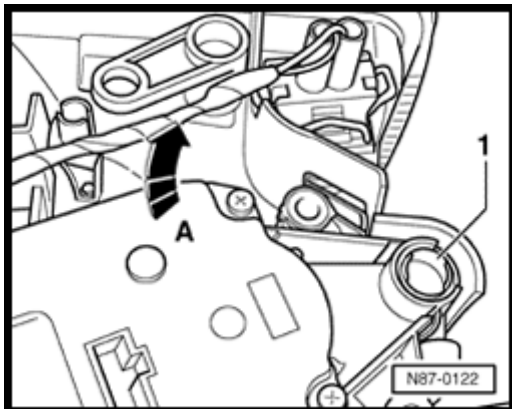
Replacement flap motors are supplied in the "recirculating air" position. To ease the installation, first do the following:



- ✦ - Connect electrical connector -1- to flap motor -2-.
- Switch on ignition.
- Operate button for fresh air/recirculating air.

When the center position has been reached:

- Disconnect electrical connector -1- from flap motor -2-.



- ✦ - Insert flap motor in fresh air/recirculating air shaft -1-.

If the flap motor cannot be attached to the fresh air/recirculating air flap shaft -1-, remove fresh air blower -V2-, ⇒ [Page 80-7](#) , Fig. 3 and attach flap by hand.

- Turn flap motor in direction of - arrow A- and tighten bolts.
- Attach operating rod for air flow flap.

Through m.y. 2001: Initiate Basic setting, function 04 using VAG 1551 ⇒ [Page 01-1](#) or VAS 5051 ⇒ [Page 87-29](#) .

From m.y. 2002: Initiate Basic setting, function 04 using VAS 5051 ⇒ [Page 87-29](#) .

Temperature flap motor -V68-, removing and installing

First do the following:

- Remove glove box.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)

- Remove trim under steering column.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)

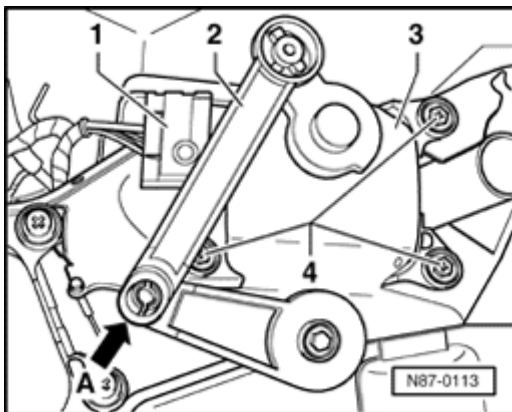
- Remove center console.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)

- Remove connecting duct ⇒ [Page 80-10](#) , Fig. 6

Removing

- Disconnect electrical connector - 1-.
- With screwdriver, carefully unclip operating rod -2- from lever - arrow A- .
- Remove screws -4-.
- Remove flap motor -3-.



Installing

- Install in reverse order of removal, noting the following:

Through m.y. 2001: Initiate Basic setting, function 04 using VAG 1551 ⇒ [Page 01-1](#) or VAS 5051 ⇒ [Page 87-29](#) .

From m.y. 2002: Initiate Basic setting, function 04 using VAS 5051 ⇒ [Page 87-29](#) .

Central flap motor -V70-, removing and installing

First do the following:

- Remove glove box.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)

- Remove trim under the steering column.

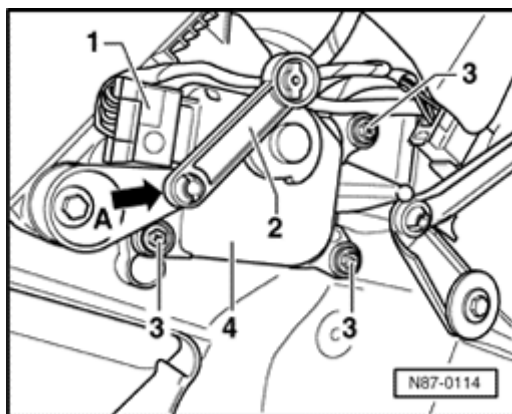
⇒ [Repair Manual, Body Interior, Repair Group 68](#)

- Remove center console.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)

- Remove connecting duct ⇒ [Page 80-10](#) , Fig. 6

Removing



- Disconnect electrical connector - 1-.
- With screwdriver, carefully unclip operating rod -2- from lever - arrow A- .
- Remove bolts -3-.
- Turn operating rod -2- and remove from flap motor -4-.
- Remove flap motor.

Installing

- Install in reverse order of removal, noting the following:

Through m.y. 2001: Initiate Basic setting, function 04 using VAG 1551 ⇒ [Page 01-1](#) or VAS 5051 ⇒ [Page 87-29](#) .

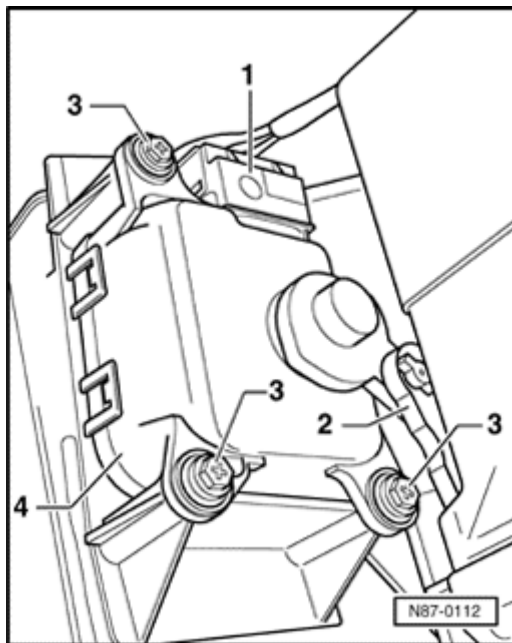
From m.y. 2002: Initiate Basic setting, function 04 using VAS 5051 ⇒ [Page 87-29](#) .

Footwell/defrost flap motor -V85-, removing and installing

Removing

- Remove trim under steering column.

⇒ [Repair Manual, Body Interior, Repair Group 68](#)



- Disconnect electrical connector - 1-.
- Turn flap motor -4- and disengage from operating rod -2-.
- Remove flap motor -4- from housing.

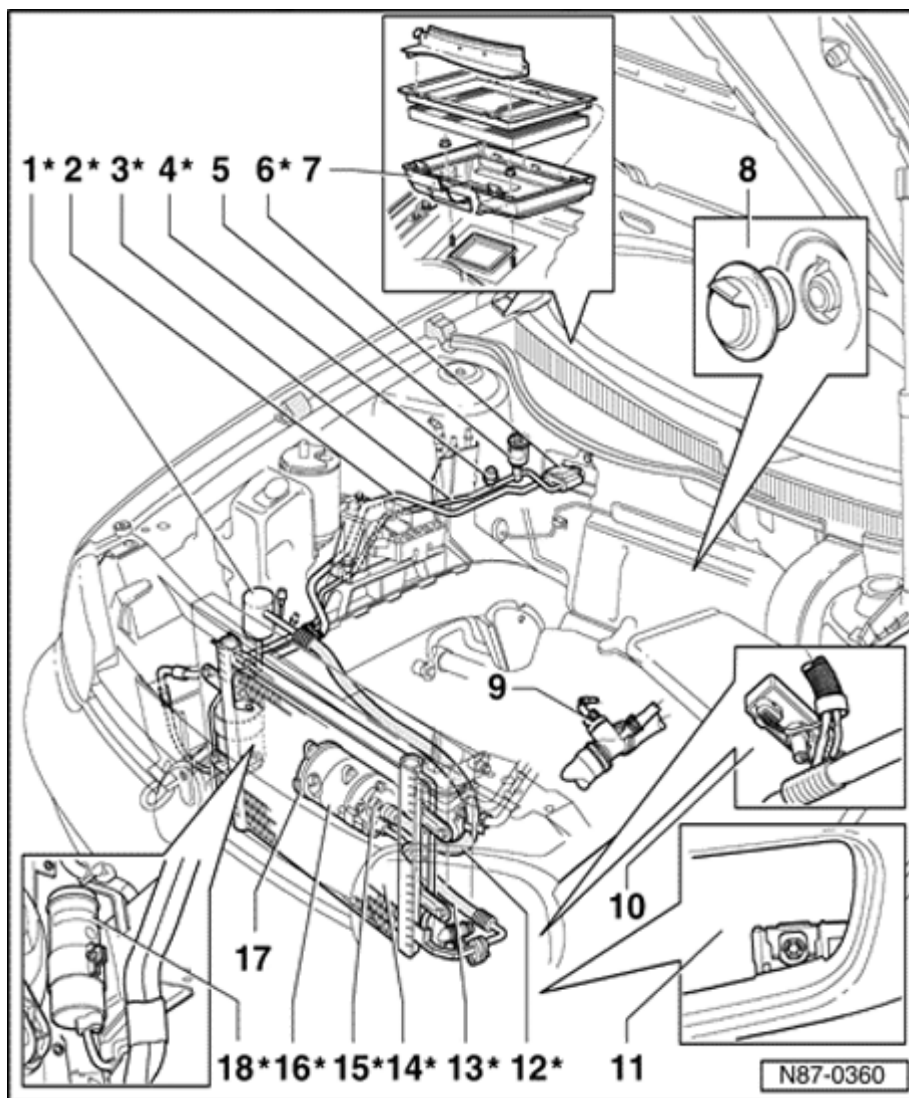
Installing

- Install in reverse order of removal, noting the following:

Through m.y. 2001: Initiate Basic setting, function 04 using VAG 1551 ⇒ [Page 01-1](#) or VAS 5051 ⇒ [Page 87-29](#) .

From m.y. 2002: Initiate Basic setting, function 04 using VAS 5051 ⇒ [Page 87-29](#) .

measures ⇒
[Page 87-69](#) .

**1 - Damper***

- ◆ In refrigerant hose from expansion valve to compressor.
- ◆ With low pressure service valve where applicable (use only use Kent Moore ACR4 or equivalent)

2 - Refrigerant hose*

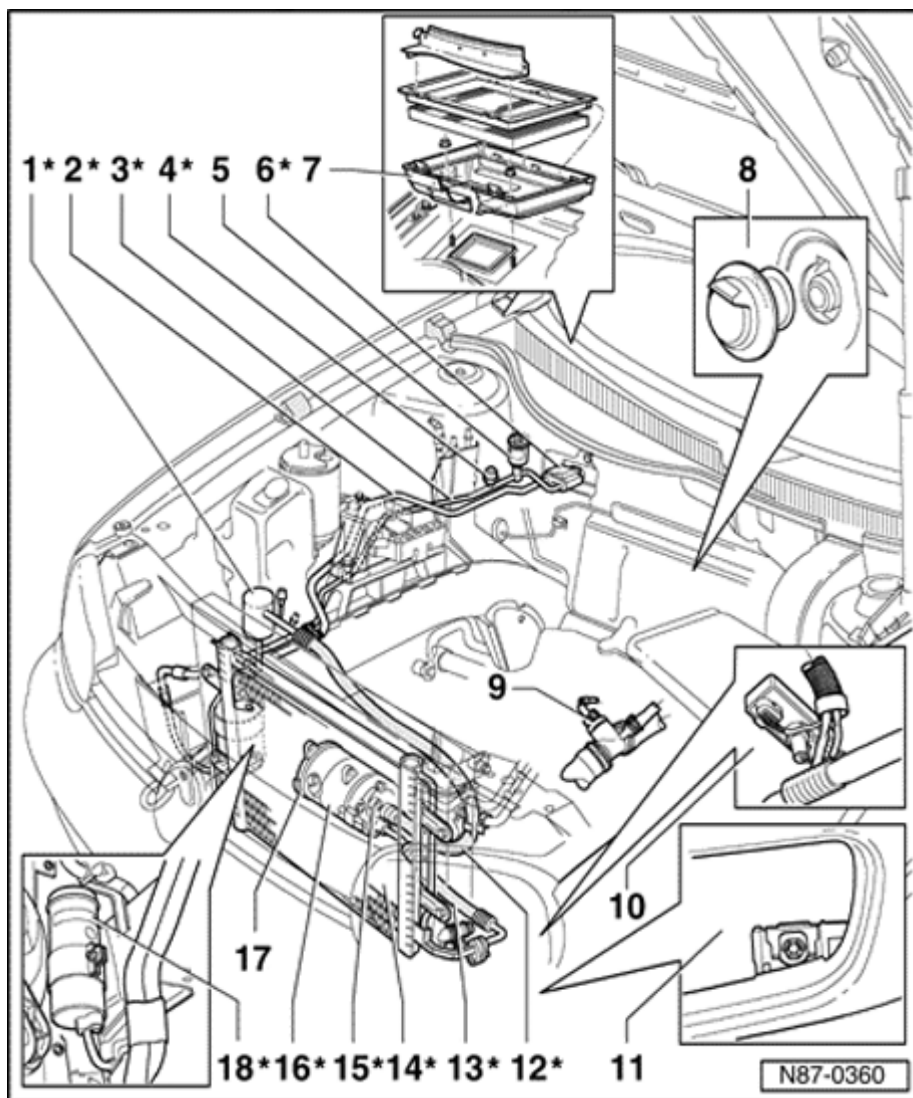
- ◆ From expansion valve to compressor (with damper)

3 - Refrigerant pipe*

- ◆ From receiver drier to expansion valve

4 - High pressure service valve*

- ◆ Only use Kent Moore ACR4 or equivalent



5 - A/C pressure switch - F129- or high pressure sensor - G65-

- ◆ A/C pressure switch or sensor can be removed without discharging refrigerant system.
- ◆ Tightening torque 8 Nm (71 in.lb)
- ◆ Always replace O ring (note Part No.).
- ◆ -F129- checking ⇒ [Page 87-100](#)
- ◆ -G65- checking ⇒ [Page 87-102](#)
- ◆ -F129- and -G65- can also be checked using VAS 5051 in mode

"Guided
Fault
Finding".

- ◆ -G65-
monitored
by On
Board
Diagnostics
of Engine
Control
Module
(ECM).

Function:

- ◆ -F129-
switches
the
coolant
fan -V7-
to next
higher
speed
when
pressure
increases
in
refrigerant
circuit.
- ◆ -F129-
switches off
A/C clutch
whenever
excessive
refrigerant
system
pressure is
present (e.g.:
insufficient air
flow over
condensor or
if system is
overcharged).
- ◆
-F129-
switches
off A/C
clutch
whenever
insufficient
refrigerant
system

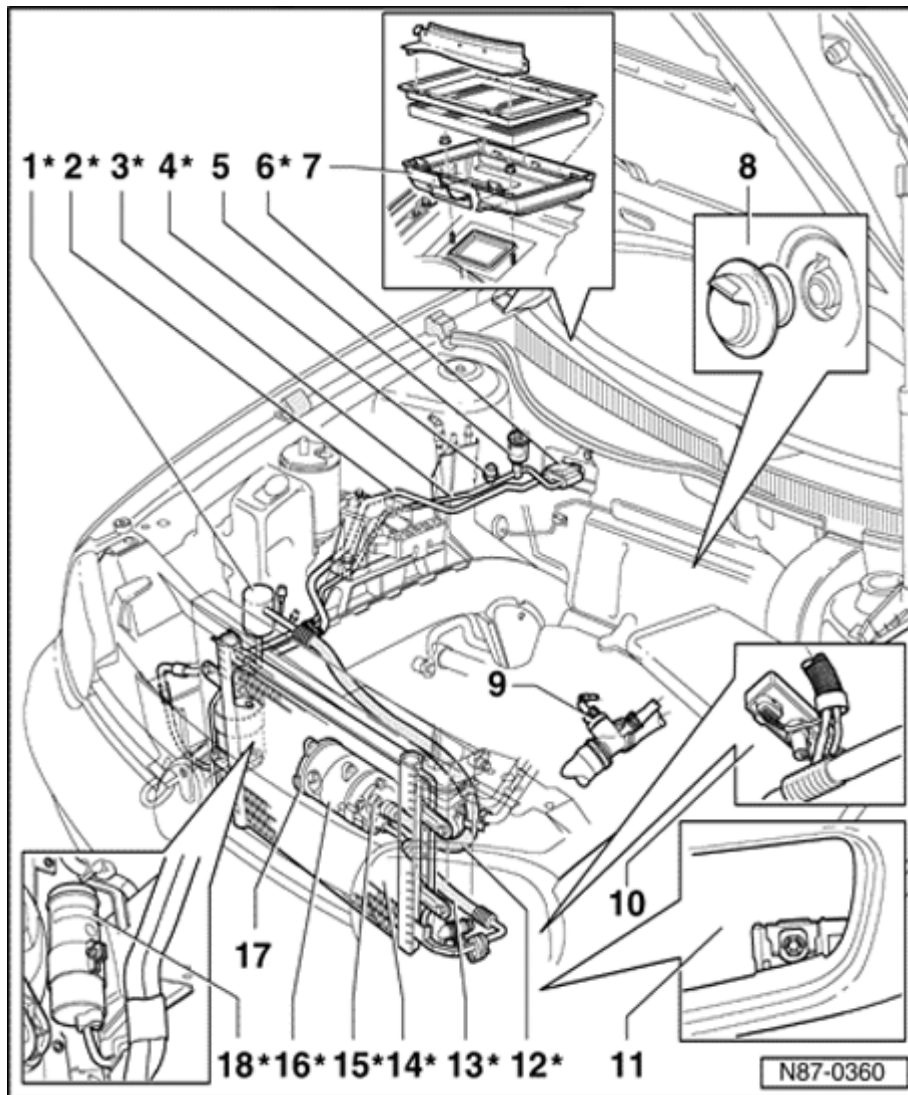
pressure
is present
(e.g.:
refrigerant
has
leaked
out).

- ◆ -G65-
supplies
refrigerant
system
pressure
signal to
coolant
fan
control
module -
J293- and
ECM.

° F).

Note:

*-F163- deleted
from 05.99.
Thermal cut-out
function
assumed by
Engine Coolant
Temperature
(ECT) Sensor -
G62- via Engine
Control Module
(ECM).*



10 - Coolant Fan Control (FC) Control Module - J293-

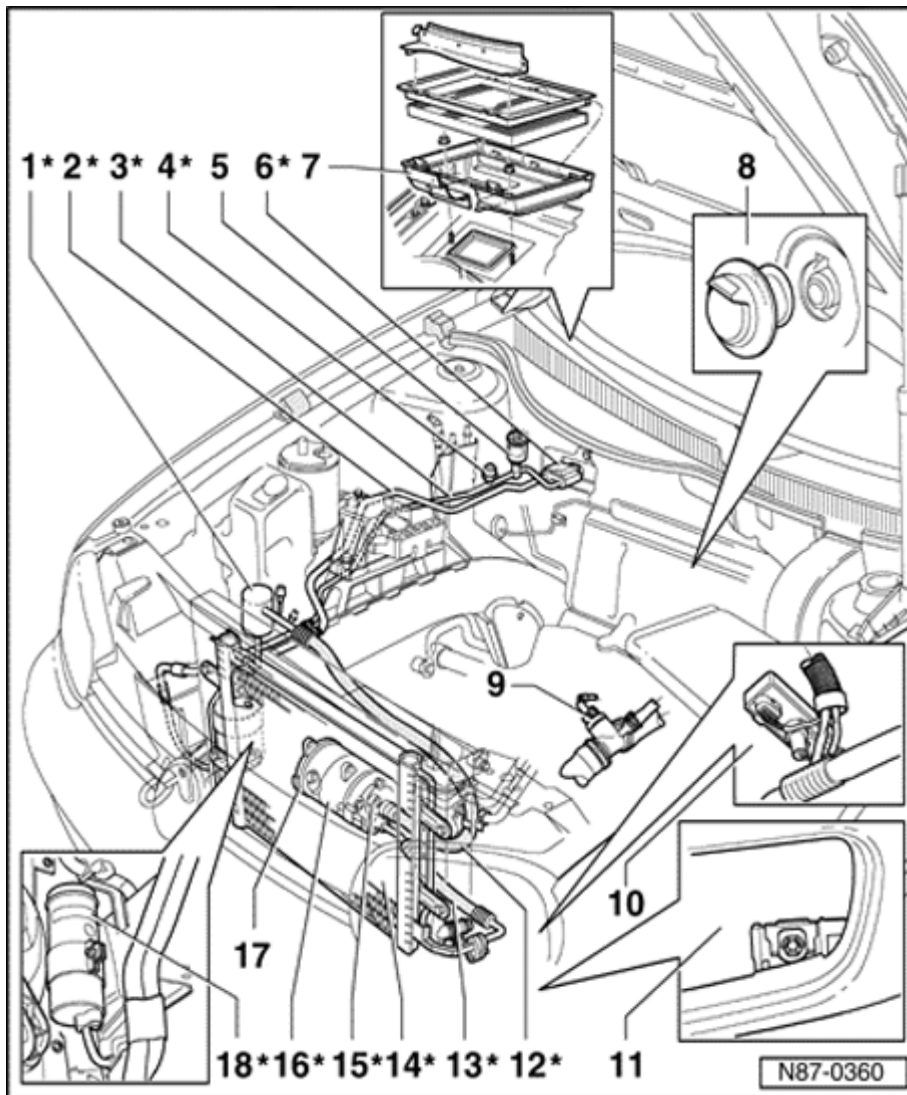
11 - Outside temperature sensor - G17-

◆ Function: Temperature sensor controls temperature flap and fresh air blower, depending on temperature

◆ In the event of malfunction: fresh air intake duct temperature sensor -G89- takes over. If both sensors are malfunctioning, operation continues assuming a value of +10 °C (50 ° F). Air recirculation not possible. A/C control head -E87- indicates: "--"

◆ Checking ⇒ Repair Group 01 or use VAS 5051

in mode
"Guided
Fault
Finding"
⇒ [Page
87-29](#)



12 Refrigerant - hose*

- ◆ From expansion valve to compressor
- ◆ With damper

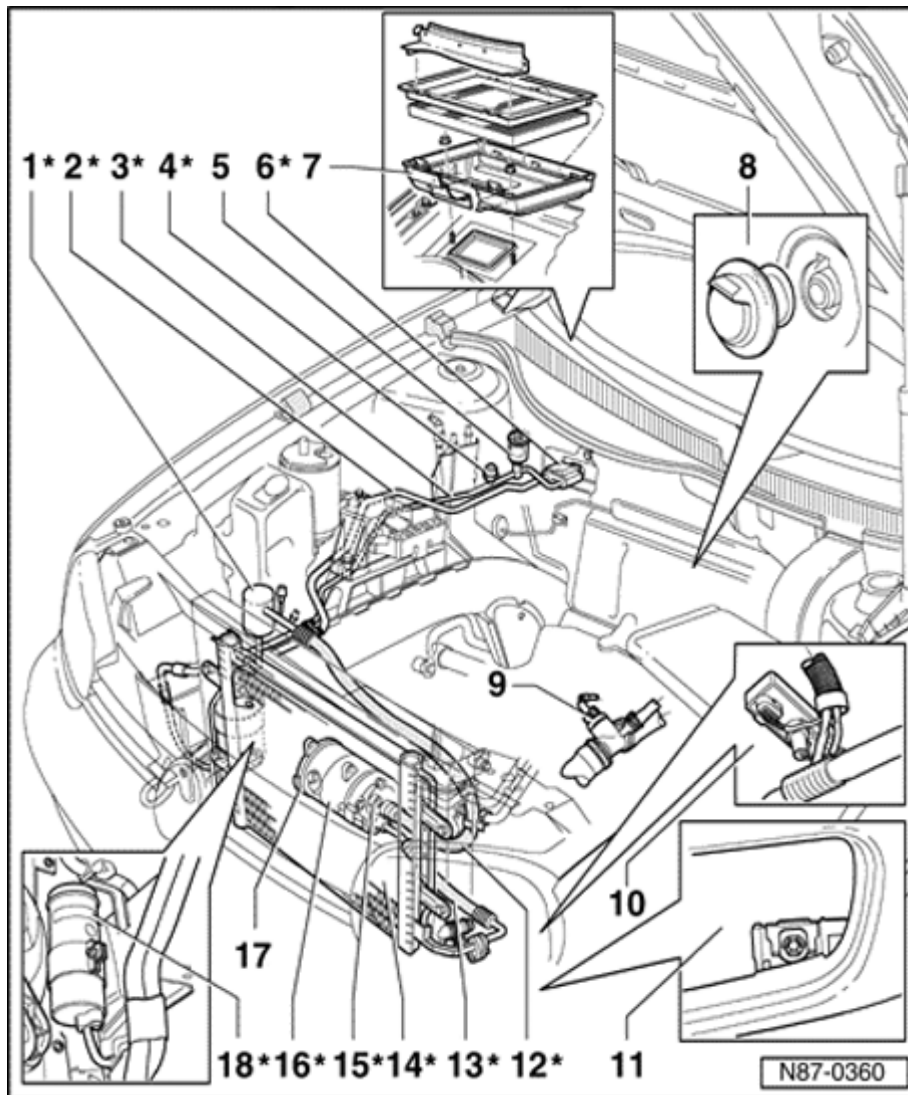
13 Refrigerant - hose*

- ◆ From compressor to condenser

14 Condenser*

15 - Pressure relief valve*

- ◆ Checking ⇒ [Page 87-99](#), Fig. 3



16 - Compressor*

- ◆ Manufacturer: Sanden, designation: SD7V16
- ◆ Manufacturer: Zexel, designation: DCW-17D

17 - A/C clutch -N25-

- ◆ Sanden, servicing: ⇒ [Page 87-158](#) .
- ◆ Zexel, servicing: ⇒ [Page 87-166](#) .

18 - Receiver drier*

A/C refrigerant system

Safety measures

The subassemblies and lines of the air conditioner are filled with Tetrafluoroethane also known as refrigerant R-134a.

A label on the lock carrier in the engine compartment indicates the refrigerant type and capacity.

WARNING!

- Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/recycling/recharging unit such as Kent-Moore ACR⁴, or equivalent, whenever discharging an R-134a A/C system

- As of January, 1992 any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified

- State and Provincial governments may have additional requirements regarding air conditioning servicing. Always comply with local laws

WARNING!

- **A/C system is filled with refrigerant gas which is under pressure**
- **Always be careful that refrigerant does not come in contact with your skin**
- **If liquid refrigerant has come in contact with your skin or eyes:**
 - ◆ **Do not rub skin or eyes**
 - ◆ **Immediately flush with cool water for 15 minutes**
 - ◆ **Rush to a doctor or hospital**
 - ◆ **Do not attempt to treat yourself**
- **Work in a well air ventilated area because refrigerant gases are heavier than air, displace oxygen and may cause suffocation in areas of poor air circulation, like under the car**
- **Avoid breathing refrigerant vapors. Exposure may irritate eyes, nose and throat**
- **Always wear hand and eye protection (gloves and goggles) when working around the A/C system**
- **Keep refrigerant containers stored below 50 ° C (122 ° F) and never drop from high places. DO NOT warm refrigerant containers with an open flame. If refrigerant needs to be warmed, place bottom of tank in warm water.**
- **Keep refrigerant away from open flames because poisonous gas will be produced if it burns. Do not smoke when refrigerant gases are present for the same reason**

WARNING!

- Electric welding near refrigerant hoses causes R-134a to decompose from ultraviolet light. Discharge system before electric welding

- Pressurized R-134a refrigerant in the presence of oxygen may form a combustible mixture. Never introduce compressed air into any R-134a container (full or empty), A/C component or piece of service equipment

- Do not expose any component of the A/C system to high temperatures (for example, open flames). Excessive heat will cause a pressure increase which could burst the system

- Do not steam clean condensers or evaporators. Use only cold water or compressed air

CAUTION!

- Before working on electrical system, obtain radio security code and disconnect battery Ground (GND) strap

- After reconnecting battery:

1) Always reactivate and check operation of vehicle equipment such as radio, clock, and power windows according to Repair Manual and/or Owner's Manual

2) Activate Readiness Code ⇒ Repair Manual, OBD II Fuel Injection & Ignition, Repair Group 01

- R-12 and R-134a refrigerant are NOT compatible. Never add R-12 refrigerant to an R-134a system or R-134a refrigerant to an R-12 system. If the refrigerants are mixed, total system contamination will occur and compressor failure may result

- Refrigerant oils used for the R-134a system and R-12 system are NOT compatible. Use only the specified synthetic oil (Polyalkylene Glycol/PAG) for the R-134a refrigerant system. DO NOT use R-12 system oil in an R-134a system or R-134a system oil in an R-12 system. If the refrigerant oils are mixed, system contamination will occur and compressor failure may result

- R-134a refrigerant system oil (PAG oil) absorbs moisture very rapidly. Moisture combines with the refrigerant to form acids which will damage the system. Use only the specified oil from a sealed container and ALWAYS reseal oil container immediately after use. DO NOT use oil if it has become contaminated with moisture

CAUTION!

- **Immediately plug open connections on A/C components to prevent dirt and moisture contamination. Likewise, DO NOT remove new components from packaging until ready to install. Immediately tighten component connections after installation**
- **Always use separate refrigerant recovery/recycling/recharging servicing equipment for R-12 and R-134a systems. DO NOT use one piece of equipment for both R-12 and R-134a systems. The residual traces of refrigerant will contaminate and damage the equipment. Servicing equipment includes recovery/recycling/recharging unit, charging station, vacuum pump, manifold gauges, etc.**
- **DO NOT use R-12 servicing equipment on R-134a systems or R-134a equipment on R-12 systems or damage to both the vehicle A/C system and servicing equipment may result. Use only equipment designed to meet Society of Automotive Engineers (SAE) standards**
- **R-134a and R-12 systems use different size service fittings. NEVER use adaptors to convert an R-12 fitting to R-134a size or R-134a fitting to R-12 size**
- **R-134a and R-12 A/C components including compressor, hoses, O-rings, evaporator, condenser, receiver-drier, etc. are NOT interchangeable. Components of the R-134a system are identified by lettering (R-134a) or by a green label (or stripe). In addition a label on the upper radiator support identifies which type refrigerant is used. Use only the correct system component for each refrigerant type**

CAUTION!

- Always replace damaged and/or leaking A/C system components. Do not attempt repair by soldering or welding

- Work area must be extremely clean when working on A/C system components

discharge A/C system before removing any A/C system component

- Always reinstall caps over A/C service valves

- Always replace O-rings, DO NOT reuse. Use only the correct size and type of O-rings specified for use with R-134a refrigerant. Lubricate O-ring with refrigerant oil before installing

A/C refrigerant R-134a, properties

Commercial designation

The following designations are used and appear on component labels and factor tags:

- ◆ R-134a
- ◆ Tetrafluoroethane
- ◆ $\text{CH}_2\text{F CF}_3$
- ◆ H-KW 134a
- ◆ SUVA[®] 134a
- ◆ ARCTON[®] 134a

Color

Refrigerant R-134a is colorless and is invisible as a gas. R-134a when viewed through the sight glass may appear milky due to the mixture of refrigerant and lubricating oil (PAG oil). ⇒ [Page 87-69](#)

Temperature/pressure relationship

R-134a in an enclosed container will have a specific temperature/pressure relationship.

Temperature in ° C (° F)	Pressure in bar (psi)
-30 (-22)	0.0 (0.0)
-20 (-4)	0.3 (4.4)
-10 (14)	1.0 (14.5)
0 (32)	1.9 (27.5)
10 (50)	3.1 (45.0)
20 (68)	4.7 (68.2)
30 (86)	6.7 (97.2)
40 (104)	9.1 (132.0)
50 (122)	12.2 (177.0)
60 (140)	15.8 (229.2)
70 (158)	20.2 (293.0)

Refrigerant oil

A special Polyalkylene Glycol (PAG) synthetic oil is used in R-134a systems. This oil is NOT compatible with mineral based oils used in R-12 systems. See safety measures ⇒ [Page 87-69](#) for Warnings and Cautions regarding proper oil usage.

Airborne properties

Escaped refrigerant gases are heavier than air and will gather first in low places, like under the car. R-134a refrigerant gas displaces oxygen and may cause suffocation in low areas of poor air circulation.

Refrigerant R-134a is not poisonous in any state (liquid or gas) and is safe when used properly.

Affects on plastic

Refrigerant R-134a will deteriorate some plastics. Therefore, when making system repairs, use only genuine VW replacement parts which are specified for use with R-134a refrigerant.

Affects on metal

In its pure state, refrigerant R-134a is chemically stable and will not attack iron, copper, brass or aluminum. However, the mixture of R-134a and PAG oil may deteriorate certain metals (copper). Therefore, when making system repairs, use only genuine VW replacement parts which are specified for use with R-134a refrigerant.

Water solubility

Liquid R-134a refrigerant will absorb only very minute quantities of moisture. However, R-134a vapor can absorb large amounts of moisture.

Flammability

R-134a refrigerant is not flammable.

Refrigerant containers

DO NOT exceed maximum rated capacity of refrigerant container.

Leak detection

Use halogen leak detector Hitec HI400A-TE or equivalent to check for R-134a system leaks. This tool can also be used to detect leaks in R-12 systems. Many currently available R-12 leak detectors cannot detect R-134a refrigerant leaks.

R-134a refrigerant oil

A special Polyalkylene Glycol (PAG) synthetic oil is used in R-134a systems. This oil is NOT compatible with mineral based oils used in R-12 systems.

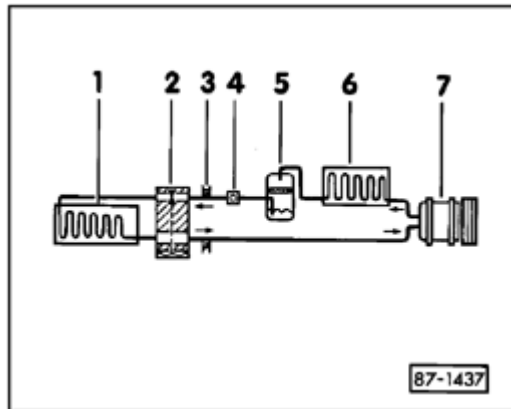
A/C refrigerant system, identification

Note:

Before carrying out any work on the A/C refrigerant system, refer to A/C system safety measures ⇒ [Page 87-69](#).

A/C refrigerant system is charged with refrigerant R-134a.

A label specifying refrigerant type may be located on the compressor or radiator support.



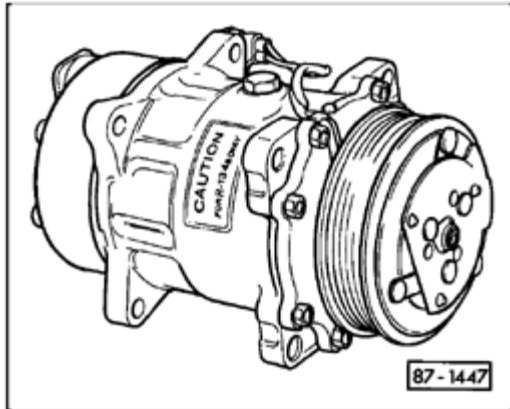
A/C refrigerant circuit with expansion valve and receiver drier

- 1 - Evaporator
- 2 - Expansion valve
- 3 - High pressure service valve
- 4 - Sight glass (if equipped)
- 5 - Receiver drier
- 6 - Condenser
- 7 - Compressor

Note:

Arrows indicate direction of refrigerant flow.

A/C refrigerant system, component overview



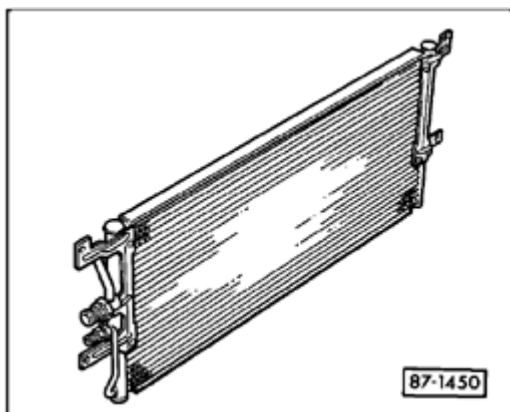
Compressor

The compressor is driven via a belt on the engine when the A/C clutch engages (A/C "ON").

Low-pressure refrigerant gas from the evaporator is compressed by the compressor. After compression, the refrigerant gas (now high-pressure) flows to the condenser.

Notes:

- ◆ *The compressor contains refrigerant oil that is mixable under all temperatures with the refrigerant.*
- ◆ *A label on the compressor indicates that compressor is for R-134a systems only.*

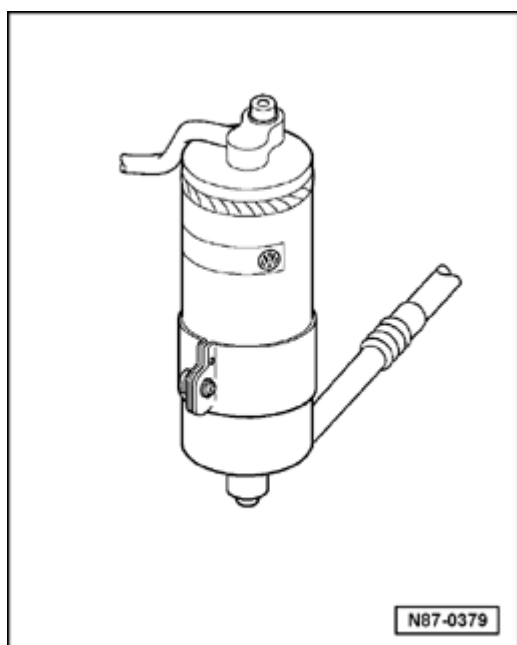


Condenser

The condenser transfers heat from the compressed refrigerant gas to the outside air which causes the refrigerant to change state from a gas to a liquid.

Note:

The condenser for the R-134a refrigerant system may be identified with a green label.



Receiver drier

The receiver drier acts as a refrigerant reservoir for the system. Any moisture in the system forms as droplets and is absorbed in the drier desiccant.

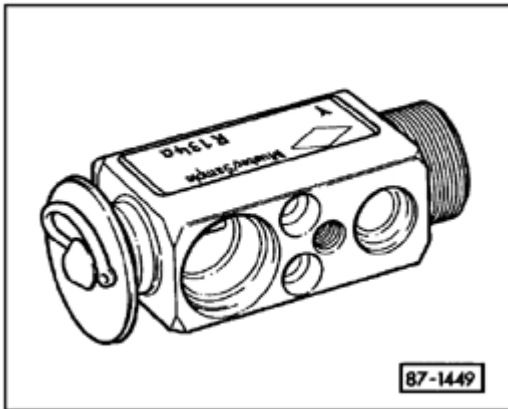
Note:

To ensure optimum system operation, replace receiver drier every time refrigerant system is opened.

CAUTION!

The receiver drier may be identified with a label that indicates the drier desiccant inside is only compatible with R-134a refrigerant. NEVER use an R-12 receiver drier in and R-134a system.

87-82

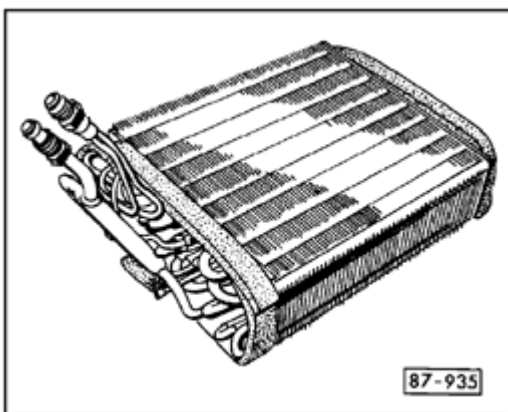


◀ Expansion valve

The expansion valve restricts and controls refrigerant flow to the evaporator thus lowering refrigerant temperature and pressure.

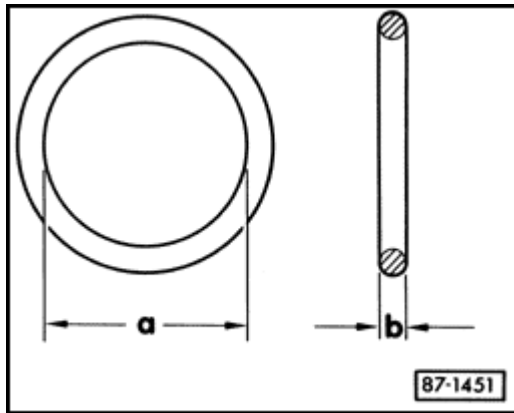
Note:

The R-134a expansion valve may be identified as such with a label.



◀ Evaporator

Liquid refrigerant entering the evaporator absorbs heat from air passing through the evaporator fins and cools the air. As the refrigerant absorbs heat it turns to vapor and then is suctioned by the compressor.

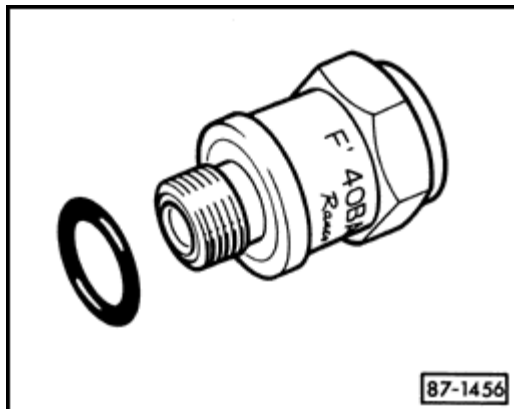


◀ O-rings

O-rings seal connections between A/C system components.

Notes:

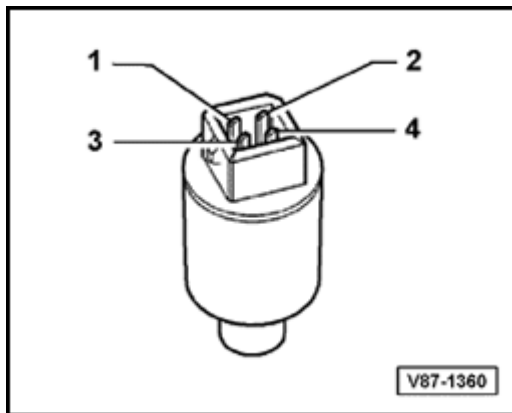
- ◆ Always use correct size O-rings (dimensions -a- and -b-).
- ◆ Do not reuse O-rings, always replace. Use only new O-rings that are compatible with R-134a refrigerant and refrigerant (PAG) oil on R-134a systems.
- ◆ O-rings for use only on R-134a systems may be red, green, violet or black.
- ◆ Lubricate O-rings with the appropriate refrigerant oil before installing (only use PAG oil).



◀ Pressure relief valve

The pressure relief valve is mounted on the compressor or compressor inlet/outlet manifold. At pressures above 40 bar (580 psi), the pressure relief valve opens to air outlet excessive pressure. When the system pressure is reduced, the valve closes to prevent total refrigerant loss.

An adhesive cap on the end of the pressure relief valve pops out when the valve has opened.



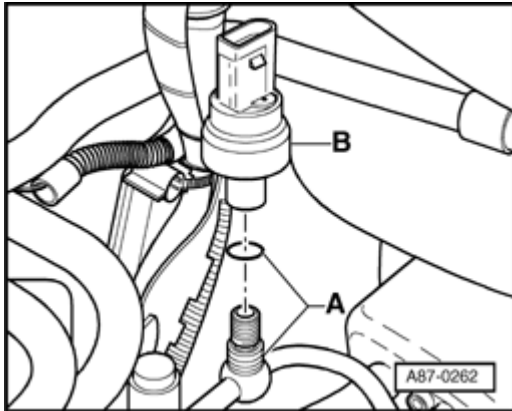
◀ A/C pressure switch -F129-

-F129- has three functions:

- ◆ Switches the A/C clutch -N25- off when excessive refrigerant circuit pressure is present (e.g.: insufficient air flow over condensor or when overcharged).
- ◆ Switches the A/C clutch -N25- off when insufficient refrigerant circuit pressure is present (e.g.: when refrigerant has leaked out)
- ◆ Switches on the second speed coolant fan -V7- when refrigerant circuit pressure increases.

Notes:

- ◆ *The presence of -F129- is engine dependant. Where -F129- is not used, high pressure sensor - G65- is used instead ⇒ [Page 87-85](#) .*
- ◆ *Always confirm system use of either -F129- or -G65- and applicable wiring circuit using applicable "Engine" and "Air conditioning" wiring diagrams.*



◀ High pressure sensor -G65-

Where applicable, high pressure sensor -G65- -B-, transmits a square wave signal to Coolant Fan Control (FC) Module -J293- at a rate which varies according to the refrigerant system pressure. -J293 reacts to the pulse rate of the signal from -G65 as follows:

- ◆ If the refrigerant system pressure rises, -J293- switches the radiator fan(s) to the second speed.
- ◆ Where excessive or insufficient refrigerant system pressure is present (E.g.: insufficient air flow over condenser or when overcharged), -J293- switches A/C clutch -N25- off (-N25- controlled by -J293-).
- ◆ On Climatronic equipped models it informs the A/C control head -E87- that the pressure in the refrigerant system is OK and that A/C clutch -N25- can be switched on (-N25- controlled by -J293-).

On applicable engines, the signal generated by -G65- is also provided as an input to the Motronic Engine Control Module (ECM). As the amount of torque needed to drive the A/C compressor varies according to the refrigerant system pressure, the ECM processes this signal in order to enhance engine performance.

Notes:

- ◆ *The presence of -G65- is engine dependant. Where -G65- is not used, A/C pressure switch -F129- is used instead ⇒ [Page 87-84](#) .*
- ◆ *Where -G65- is used, it's wiring circuit varies according to engine*

application (E.g.: some are connected to the ECM, some are not).

- ◆ *Always confirm system use of - G65- and applicable wiring circuit using applicable "Engine" and "Air conditioning" wiring diagrams.*

A/C system hoses and lines

The mixture of refrigerant oil (PAG oil) and refrigerant R-134a attacks some metals and alloys (for example, copper) and breaks down certain hose material. Use only factory specified replacement hoses and lines.

Hoses and lines are fastened together with threaded couplings/fittings and are retained (to bodywork or components) with specially isolated hose clamps.

Notes:

- ◆ *During servicing, all couplings, fittings and related fasteners must be torqued to specifications ⇒ [Page 87-89](#) .*
- ◆ *Ensure that only special tools (as specified) are used while servicing.*

A/C refrigerant system, replacing components

Replacement A/C compressors, evaporators and condensers supplied by the Parts Department are filled with Nitrogen. If gas (Nitrogen) does not escape when the component is first opened, the component may be faulty (leaking) and must not be installed.

Replacement A/C compressors are filled with the total refrigerant oil quantity needed for the entire refrigerant system.

Always replace the receiver drier whenever the refrigerant system has been left open. Install immediately after opening to prevent moisture contamination of drier desiccant. Moreover, keep refrigerant system and other replacement components sealed for as long as possible to minimize the chance of dirt and moisture contamination.

Always plug open refrigerant line connections to prevent dirt and moisture contamination.

If the system has been discharged because of a damaged or leaking component (refrigerant hose/line, compressor, evaporator, condenser, etc.), flush the refrigerant system first with compressed air, then with Nitrogen (available locally) and collect the oil that runs out. This will remove the refrigerant oil which may be saturated with moisture.

CAUTION!

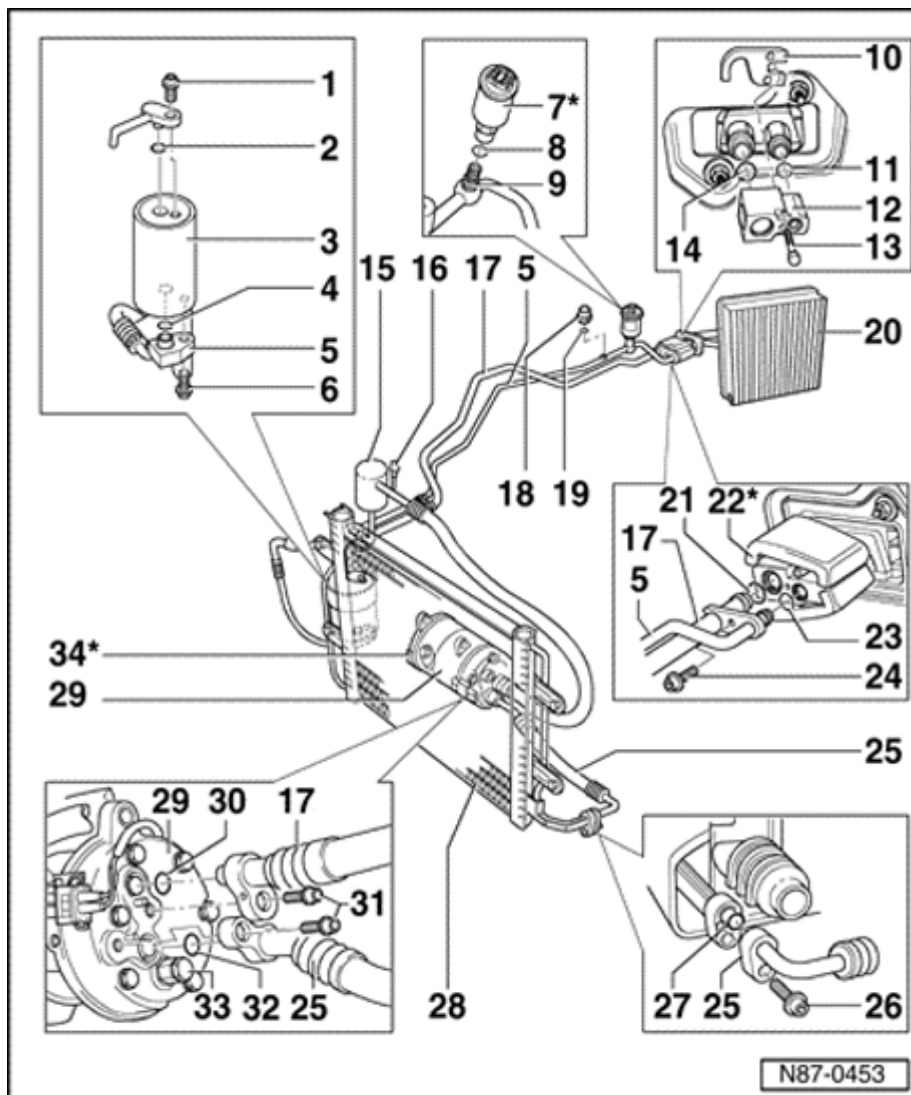
DO NOT flush R-134a refrigerant system with R-11. R-11 is not compatible with refrigerant R134a and PAG oil and will cause total system contamination.

If the compressor is not replaced after flushing the system, fill compressor with the correct type and quantity of refrigerant oil specified under A/C system capacities ⇒ [Page 87-141](#) . Fill compressor with the total system oil capacity.

If the compressor is replaced, do not add additional oil as the total amount of oil required is already in the compressor.

Dispose of contaminated refrigerant oil following laws governing hazardous waste disposal. Do not combine any refrigerant oil with any other old oils such as engine oil or transmission fluid.

Follow all applicable Warnings and Cautions when working on the A/C system ⇒ [Page 87-69](#) .



A/C refrigerant system, servicing

Notes:

- ◆ Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures ⇒ [Page 87-69](#).
- ◆ Except where indicated with *, all components illustrated must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.
- ◆ O-rings used on R-134a systems may be red, green, violet or black.
- ◆ Always plug open refrigerant line connections to prevent dirt and moisture contamination.

Pressures and temperatures, checking ⇒ [Page](#)

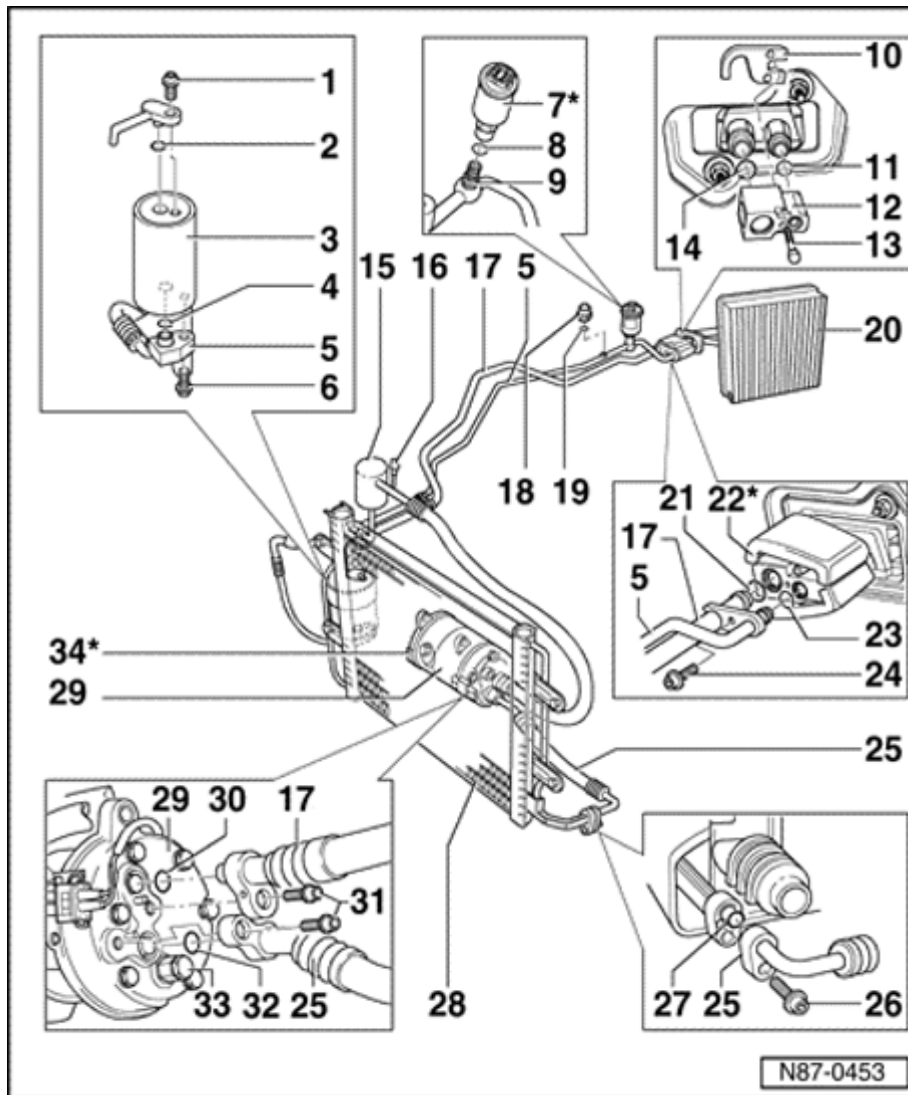
[87-118](#)

Testing with
pressure gauges
⇒ [Page 87-121](#)

Discharging ⇒
[Page 87-123](#)

Evacuating and
recharging ⇒
[Page 87-129](#)

Troubleshooting
⇒ [Page 87-131](#)



1 - Bolt

- ◆ 15 Nm (11 ft lb)

2 - O-ring

- ◆ Always replace
- ◆ 10.8 mm; 1.8 mm

3 - Receiver drier

- ◆ Always replace
- ◆ Function ⇒ [Page 87-81](#) .

4 - O-ring

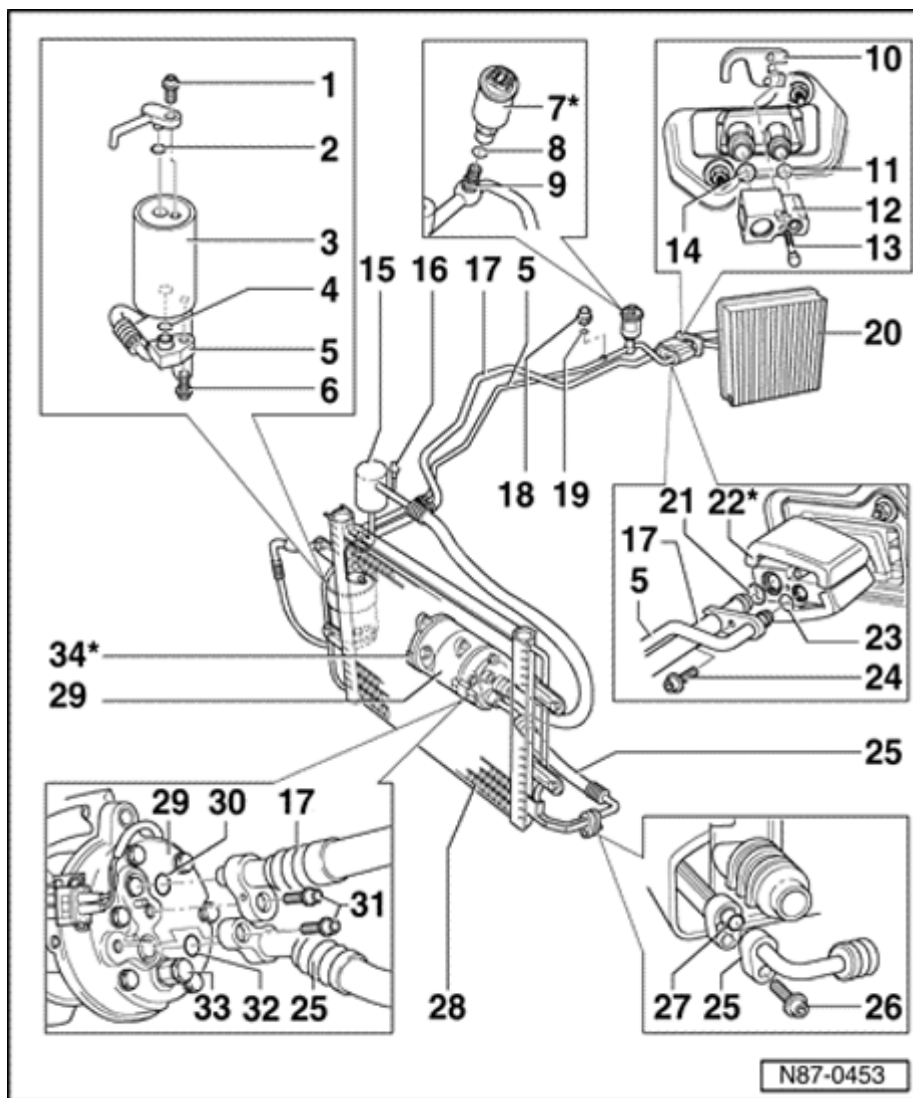
- ◆ Always replace
- ◆ 10.8 mm; 1.8 mm

5 Refrigerant - line

- ◆ From receiver drier to expansion valve

6 - Bolt

- ◆ 15 Nm (11 ft lb)



7 - A/C pressure switch - F129-* or high pressure sensor - G65-*

- ◆ 15 Nm (11 ft lb)
- ◆ Tightening torque 8 Nm (71 in.lb)
- ◆ Always replace O ring (note Part No.).
- ◆ -F129-checking ⇒ [Page 87-100](#)
- ◆ -G65-checking ⇒ [Page 87-102](#)
- ◆ -F129- and -G65- can also be checked using VAS 5051 in mode "Guided Fault Finding".
- ◆ -G65- monitored by On Board

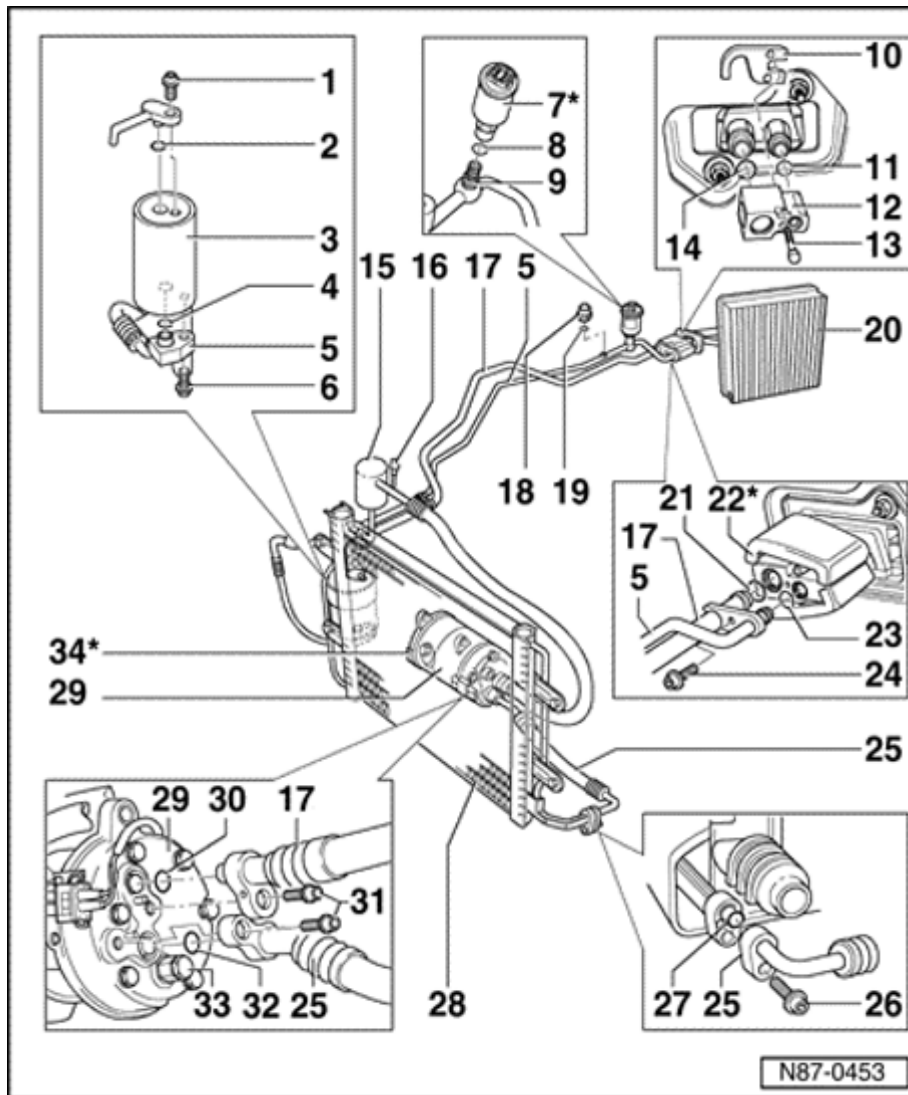
Diagnostic
of Engine
Control
Module
(ECM).

Function:

- ◆ -F129-
switches
the
coolant
fan -V7-
to next
higher
speed
when
pressure
increases
in
refrigerant
circuit.
- ◆ -F129-
switches off
A/C clutch
whenever
excessive
refrigerant
system
pressure is
present (e.g.:
insufficient air
flow over
condensor or
if system is
overcharged).
- ◆ -F129-
switches
off A/C
clutch
whenever
insufficient
refrigerant
system
pressure
is present
(e.g.:
refrigerant
has
leaked
out).

- ◆ -G65-
supplies
refrigerant
system
pressure
signal to
coolant
fan
control
module -
J293- and
ECM.

87-93

**13 - Bolt**

- ◆ 8 Nm
(71 in.
lb)

14 - O-ring

- ◆ Always
replace
- ◆ 14
mm;
1.8
mm

15 - Damper**16 - Low
pressure
service
valve**

- ◆ Only use
Kent
Moore
ACR4 or
equivalent.

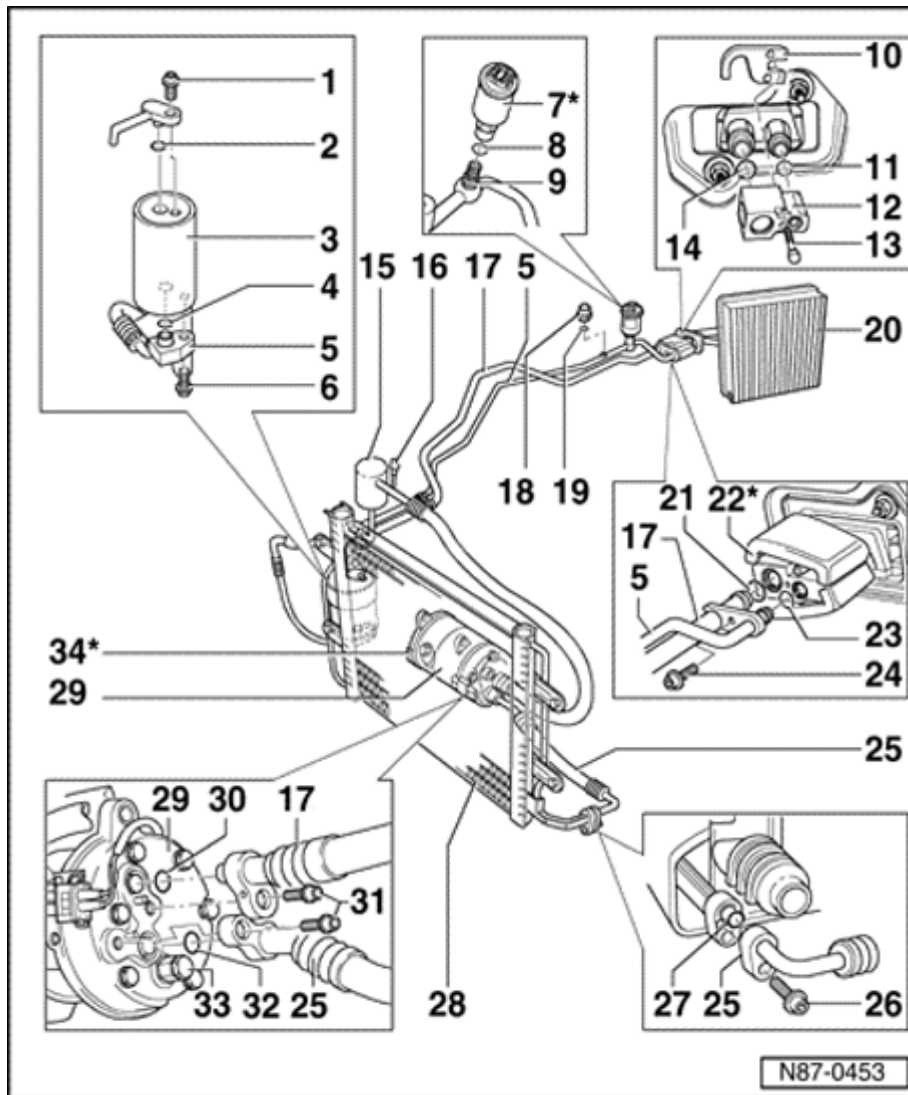
- ◆ Removing
and
installing
⇒ Fig. 1

- ◆ R-134a
capacity
⇒ [Page
87-141](#)

**17 Refrigerant
- hose**

- ◆ From
expansion
valve to
compressor
- ◆ With
damper

87-94



18 - High pressure service valve

- ◆ Only use K Moore ACF or equivalent
- ◆ Removing & installing ⇒ [Fig. 2](#)
- ◆ R-134a capacity ⇒ [Page 87-14](#)

19 - O-ring

- ◆ Always replace
- ◆ 10.8 mm; 1 mm

20 - Evaporator

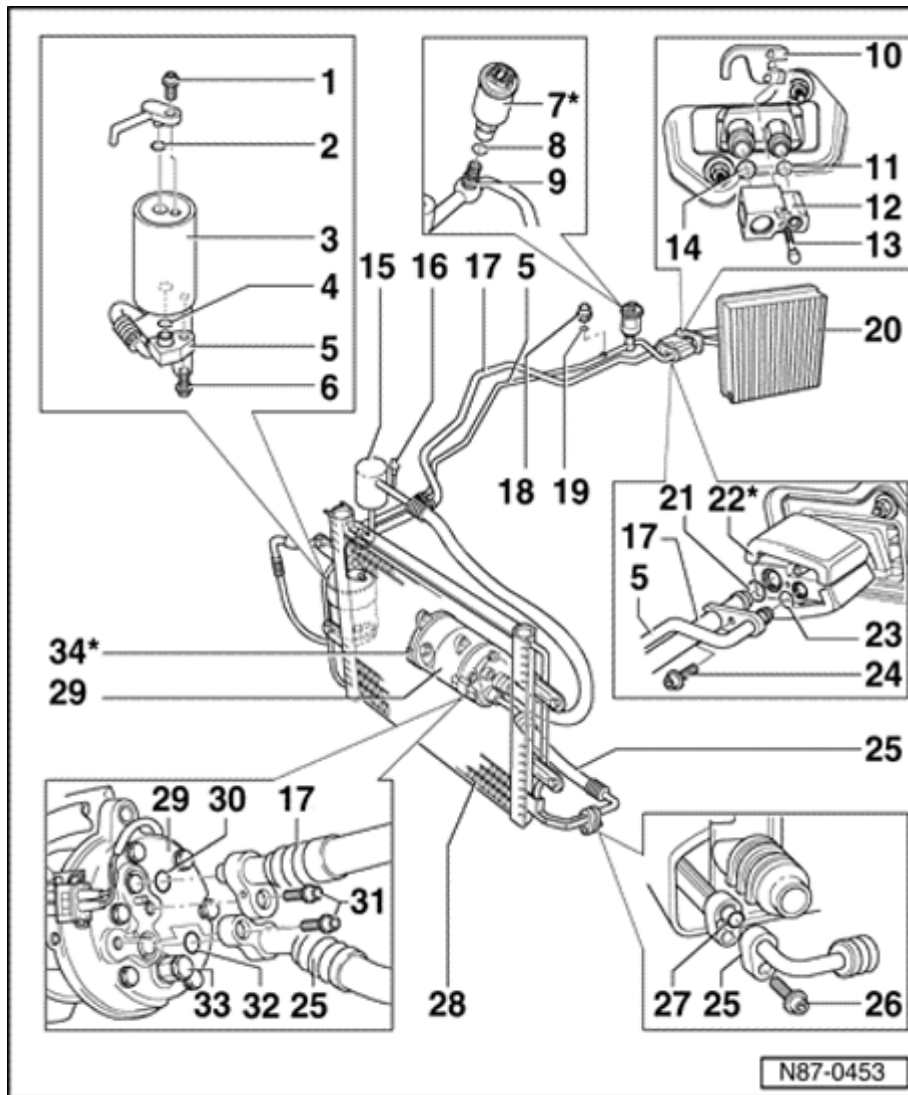
- ◆ In heating & A/C unit (in passenger compartment)
- ◆ Removing/assembly ⇒ [Page 87-114](#)

21 - O-ring

- ◆ Always replace
- ◆ 16.7 mm; 1 mm

22 - Insulation*

87-95

**23 - O-ring**

- ◆ Always replace
- ◆ 7.6 mm;
1.8 mm

24 - Bolt

- ◆ 8 Nm
(71 in.
lb)

25 - Refrigerant hose

- ◆ From compressor to condenser

26 - Bolt

- ◆ 15 Nm
(11 ft lb)

27 - O-ring

- ◆ Always replace
- ◆ 10.8 mm;
1.8 mm

28 - Condenser

- ◆ Removing
⇒ [Page 87-111](#)

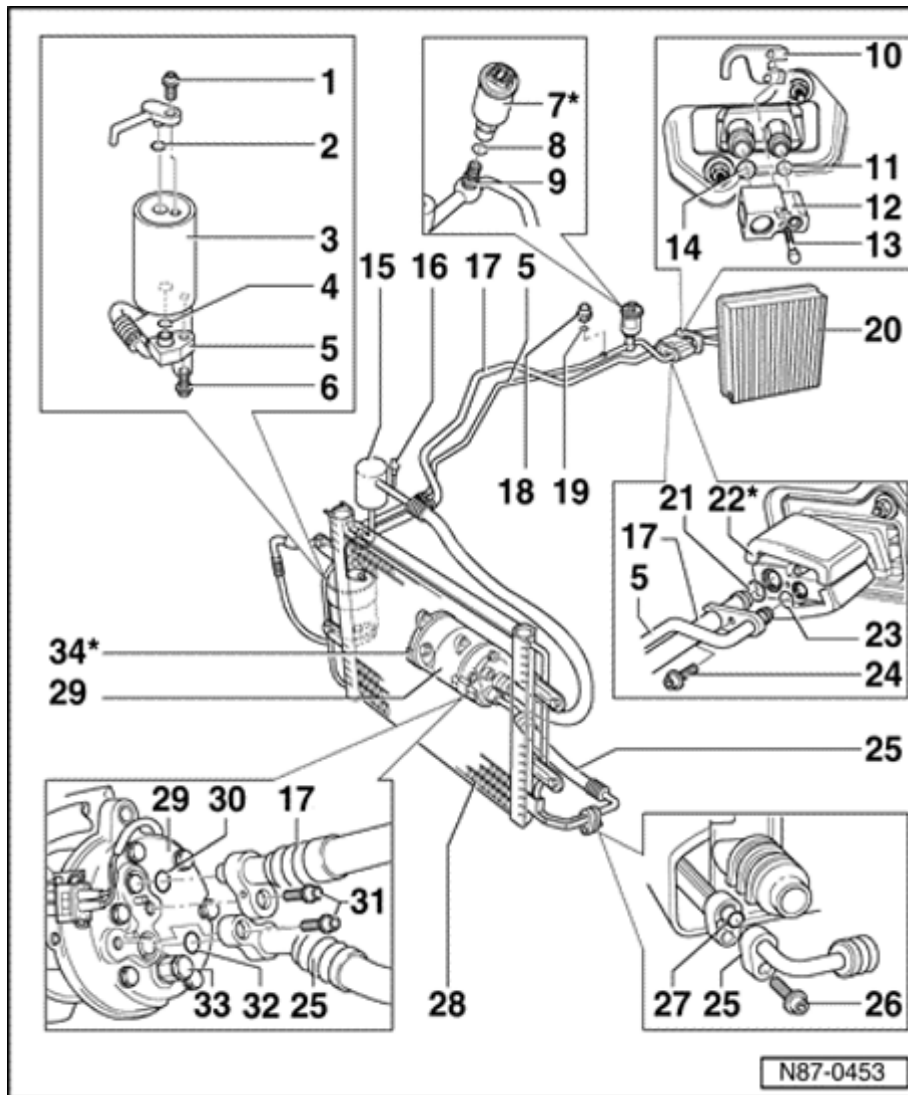
29 - Compressor

- ◆ Manufacturer: Sanden, designation: SD7V16
- ◆ Manufacturer: Zexel, designation: DCW-17D

- ◆ With A/C

clutch -
N25-

87-96

**30 - O-ring**

- ◆ Always replace
- ◆ 14.3 mm; 2.4 mm

31 - Bolt

- ◆ 20 Nm (15 ft lb)

32 - O-ring

- ◆ Always replace
- ◆ 10.8 mm; 1.8 mm

33 Pressure-relief valve

- ◆ Checking ⇒ [Fig. 3](#)

34 - A/C clutch - N25-*

- ◆ Sanden, servicing: ⇒ [Page 87-158](#) .
- ◆ Zexel, servicing: ⇒ [Page 87-166](#) .

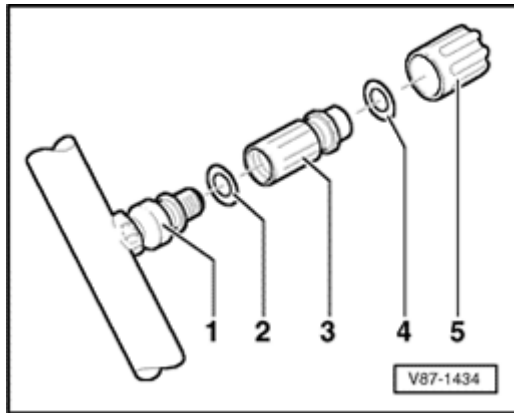


Fig. 1 Low pressure service valve, removing

- Discharge refrigerant system before replacing valve -3-. Only use Kent Moore ACR4 or equivalent .

Note:

Protect all opened components against contamination of dirt and moisture with suitable plastic caps.

- 1 - Base with outside thread and groove for -O-ring
- 2 - O-ring
 - Always replace
 - 7,6 mm; 1,8 mm
- 3 - Service valve
- 4 - O-ring
 - Always replace
 - 7,6 mm; 1,8 mm
- 5 - Cap

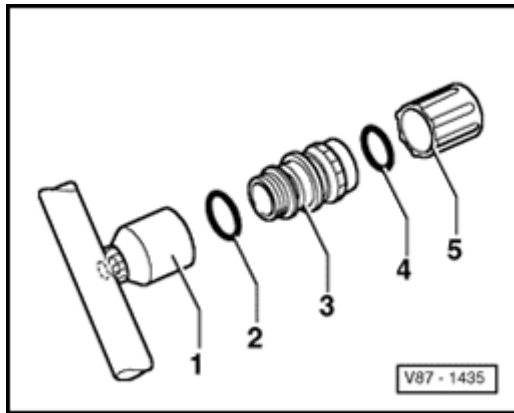


Fig. 2 High pressure service valve, removing

- Discharge refrigerant system before replacing valve -3-. Only use Kent Moore ACR4 or equivalent.

Note:

Protect all opened components against contamination of dirt and moisture with suitable plastic caps.

- 1 - Base with inside thread
- 2 - O-ring
 - Always replace
 - 10,8 mm; 1,8 mm
- 3 - Service valve with groove and inside thread for cap.
- 4 - O-ring
 - Always replace
 - 10,8 mm; 1,8 mm
- 5 - Cap

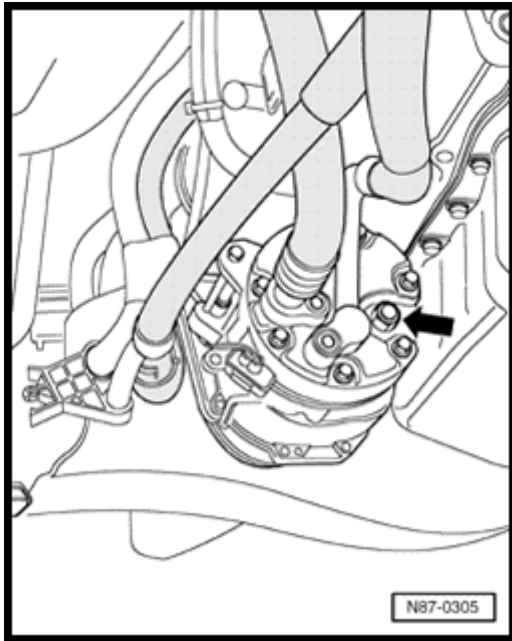


Fig. 3 Pressure relief valve, checking

- ◆ Function: Protects refrigerant circuit from excessive pressure.
- ◆ The pressure relief valve shows whether valve has opened. An adhesive sticker is pushed out.

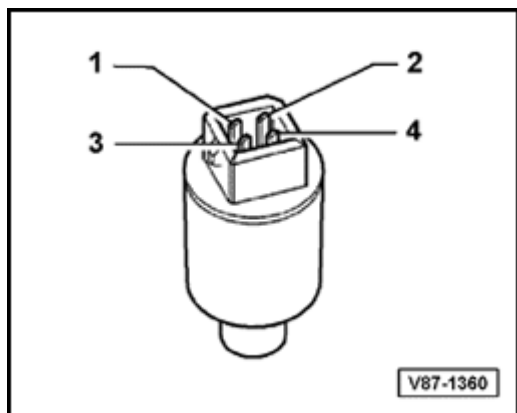
A/C pressure switch -F129-, checkin

Notes:

- ◆ The presence of -F129- is engine dependen. Where -F129- is not used, high pressure -G65- is used instead ⇒ [Page 87-85](#) .
- ◆ Always confirm system use of either -F129- or -G65- and applicable wiring circuit using applicable "Engine" and "Air conditioning" wiring diagrams.

The pressure switch can be removed without discharging refrigerant system.

- Visually check that O-ring 10,8 mm x 1,8 mm is positioned correctly in the groove.



Switch part between terminals 1 and 2 switches the A/C clutch -N25- when the system pressure is too high or when there is not enough refrigerant in the system .

- ◆ Switch opens when the pressure is below 2.4 bar and closes again above 2.4 bar (switch point).
- ◆ Switch opens above 32 bar and closes again below 24 bar (switch point).

Switch part between terminals 3 and 4 switches the coolant fan -V7- (via the coolant fan control -J293-) to the next higher fan speed when system pressures increase.

- ◆ Switch closes above 16 bar and opens again below 12.5 bar (switch point).

-F129- functional checks

To determine proper A/C system performance, perform the following functional checks with the switch installed and connected.

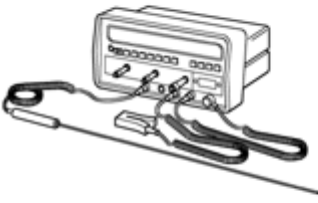
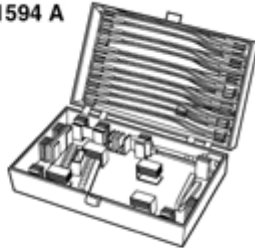
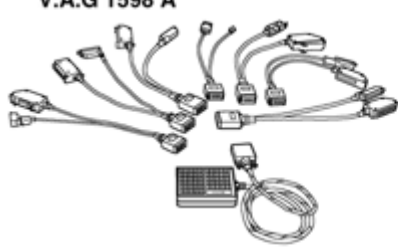

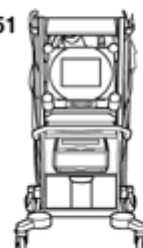
- With the engine running, briefly bridge terminal 1 and 2 of connector. If the A/C clutch -N25- engages, the refrigerant circuit is empty.
- Check refrigerant capacity (fill). If system pressure is too low (refrigerant leakage), -F129- switches A/C clutch off.
- Check cooling fan function. When system pressure increases, -F129- causes coolant fan - V7- to switch to next higher fan speed.
- Check if A/C system switches off. At excessive system pressures (e.g.: caused by high ambient temperatures or if condensor is blocked), -F129- switches A/C clutch off.

High pressure sensor -G65-, checking

Notes:

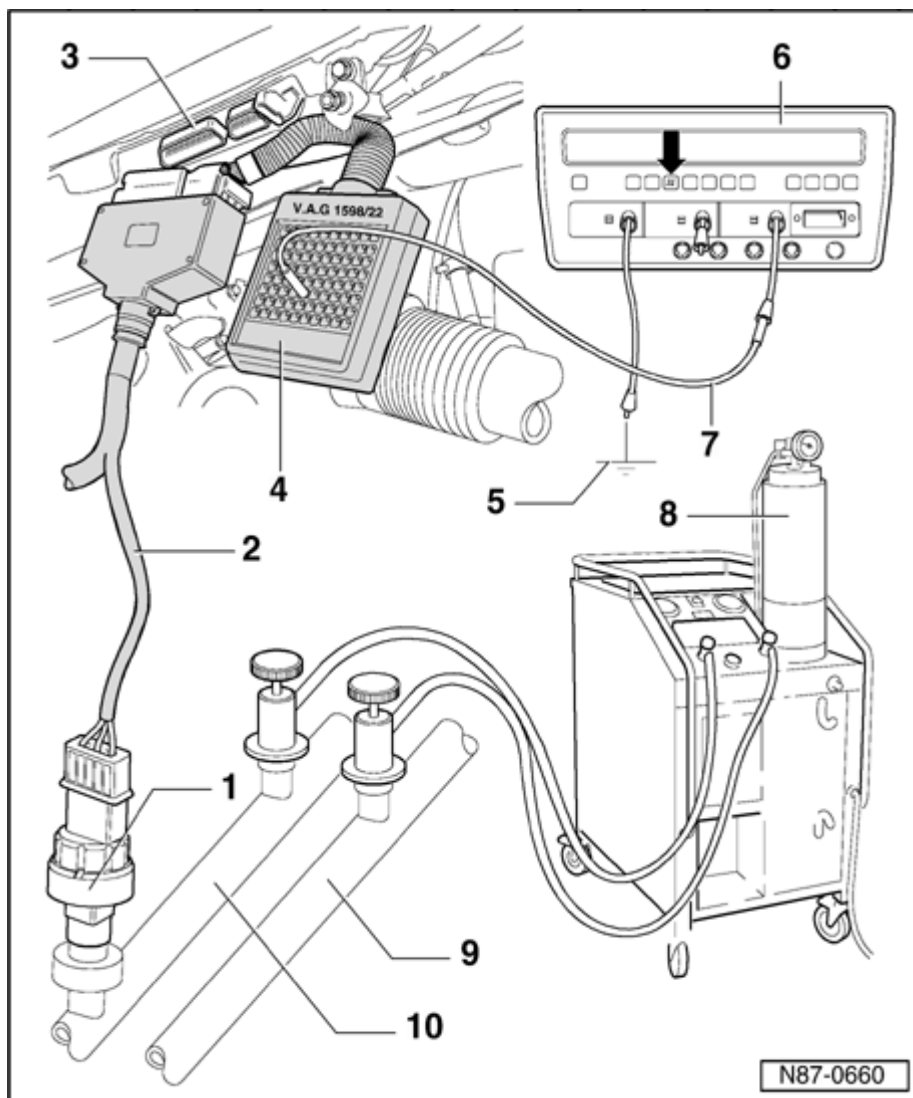
- ◆ *The presence of -G65- is engine dependant. Where -G65- is not used, A/C pressure switch - F129- is used instead.*
- ◆ *Where -G65- is used, it's wiring circuit varies according to engine application (E.g.: some are connected to the ECM, some are not).*
- ◆ *Always confirm system use of either -G65- or - F129- and applicable wiring circuit using applicable "Engine" and "Air conditioning" wiring diagrams.*

87-103

<p>V.A.G 1767</p> 	<p>V.A.G 1594 A</p> 
<p>V.A.G 1598 A</p> 	<p>V.A.G 1885</p> 
<p>VAS 5051</p> 	<p style="text-align: right;">W87-0007</p>

Special tools and equipment required

- ◆ VAG 1767 Ignition tester
- ◆ VAG 1594/A (or C) Connector test set
- ◆ VAG 1598 A Test box
- ◆ Applicable wiring diagram
- ◆ In cases where refrigerant system may need to be recharged, use Kent-Moore ACR4 (or equivalent) (VAG 1885 illustrated).
- ◆ Where necessary: VAG 1551/1552 Scan Tool
- ◆ Optional: VAS 5051 Vehicle Diagnostic Testing and Information System



Test conditions

- ◆ Workshop temperature: 20 30 ° C (68-86 ° F)
- ◆ Engine at Workshop temperature.

Making connections

Notes:

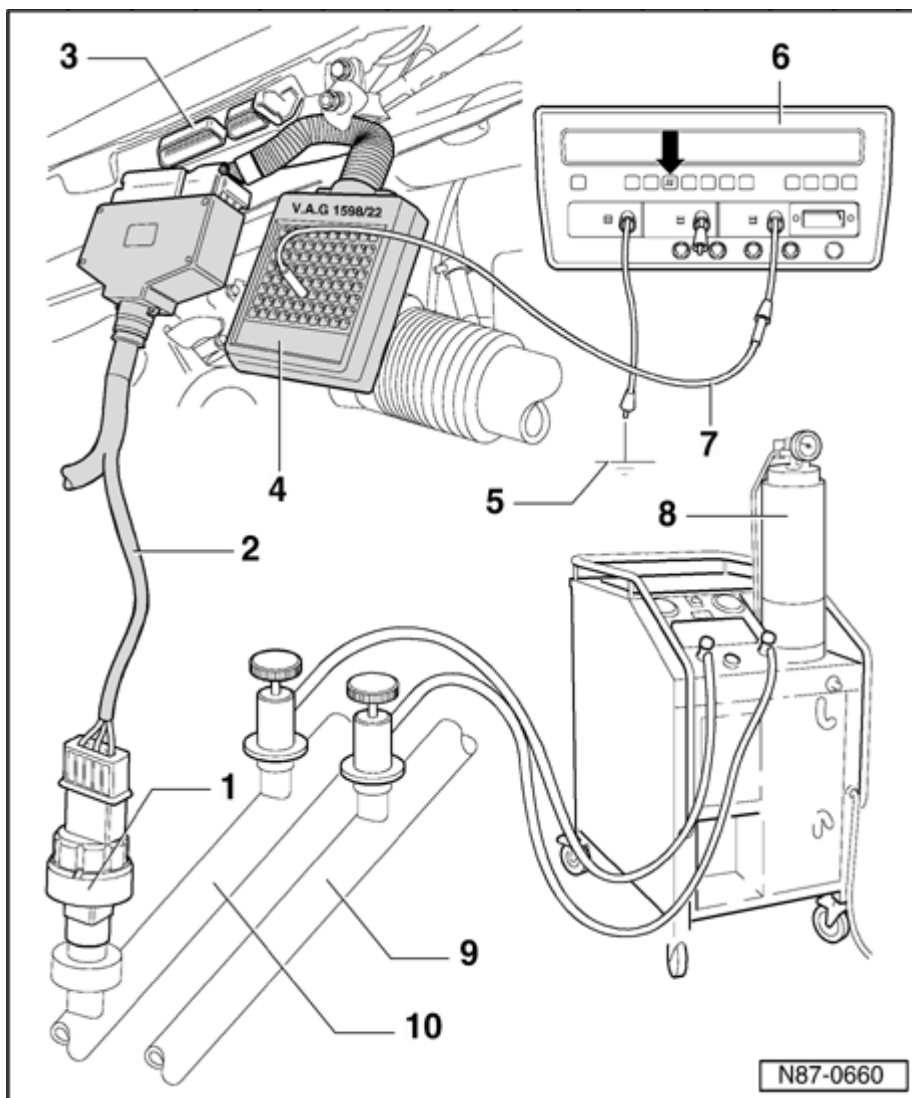
◆ The following procedure is only possible on vehicles where the -G65- squar wave signal to the coolant fan control module - J2293- is also transmitted to the Motronic Engine Control Module (ECM). Confirm G65- circuit wiring diagram.

◆ On vehicles where -G65- is NOT connected to the ECM, connect green clip from VAG 1767 directly to G65- pin 2 using appropriate VAG 1594 adapter cable -7-. Proceed directly to checking => [Page 87-105](#)

- Disconne engine harness electrical connecto

from
Engine
Control
Module
(ECM) -3

- Locate correct test box VAG1598A 4- and adapter according to pin assignments of ECM -3- and connect test box to engine wiring connector/harness -2-.



- Connect black clip from VAG1767 to Ground (GND) - 5-.

- Determine applicable - G65- signal input pin assignment to ECM using wiring diagram. Example: T121/61

Notes:

◆ As -G65- function primarily controls coolant fan and A/C clutch operation, the engine wiring diagrams may indicate the -G65- signal connection as being "Coolant fan control module connection".

◆ ECM terminal number assignments correspond with those on test box VAG1598A.

- Connect green clip from VAG1767 to the corresponding numbered position on test box VAG1598A connected to - G65- pin -2- using appropriate VAG 1594 adapter cable -7- .Example: 61

Checking

- Switch ignition on.
- Press button (arrow) for Duty Cycle measurement (modulation ratio) on ignition tester VAG 1767.

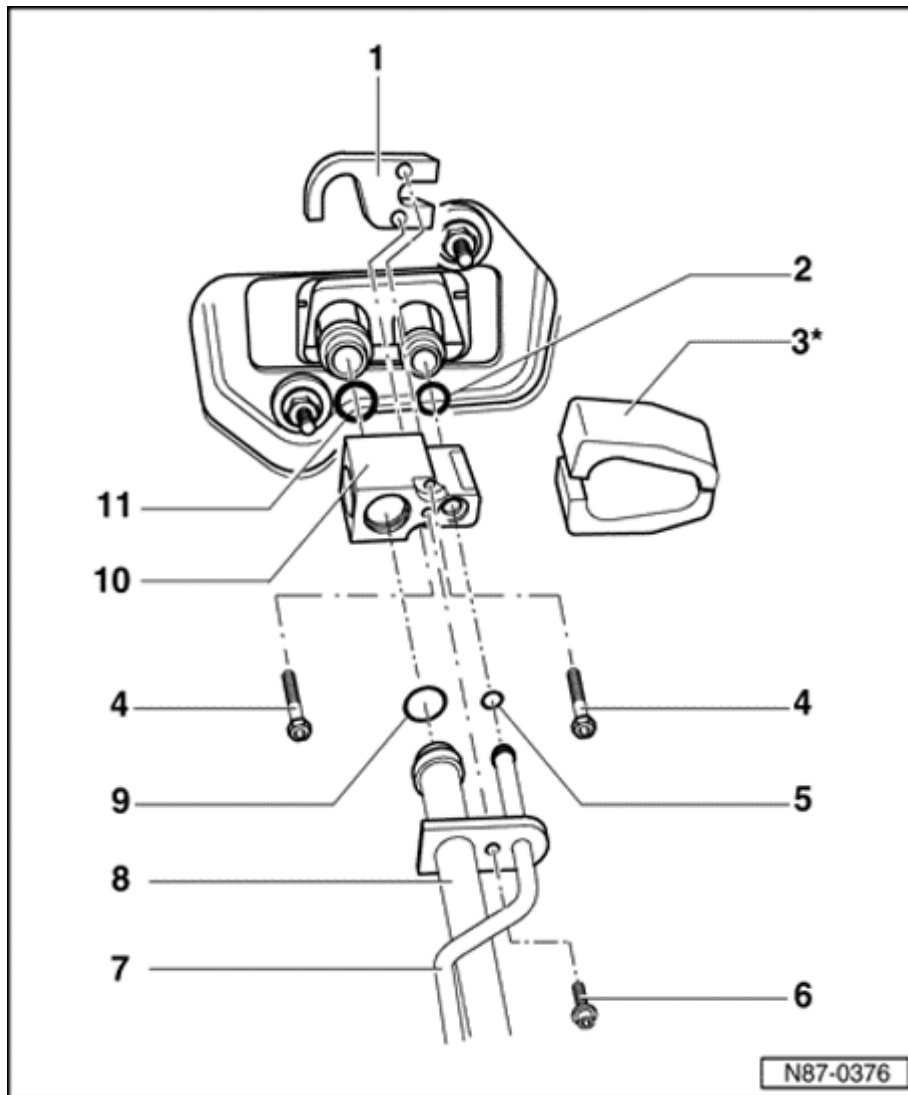
Test results, evaluating

Duty cycle	Possible cause	Corrective action
20-25%	◆ -G65 OK	
90%	◆ -G65 faulty	- Replace -G65 (refrigerant circuit does not need to be emptied)
5%	◆ Refrigerant circuit empty ◆ -G65 faulty	- Recharge refrigerant circuit ⇒ Page 87-129 - Replace -G65 (refrigerant circuit does not need to be emptied)

Note:

If a malfunction cannot be located, check DTC memory of Engine Control Module (ECM) and the Transmission Control Module (TCM) using VAG 1551/1552 Scan Tool ⇒ Repair Group 01. When doing so, note that DTCs related to high pressure sensor -G65- functions may be called-out as "A/C pressure switch -F129".

87-107

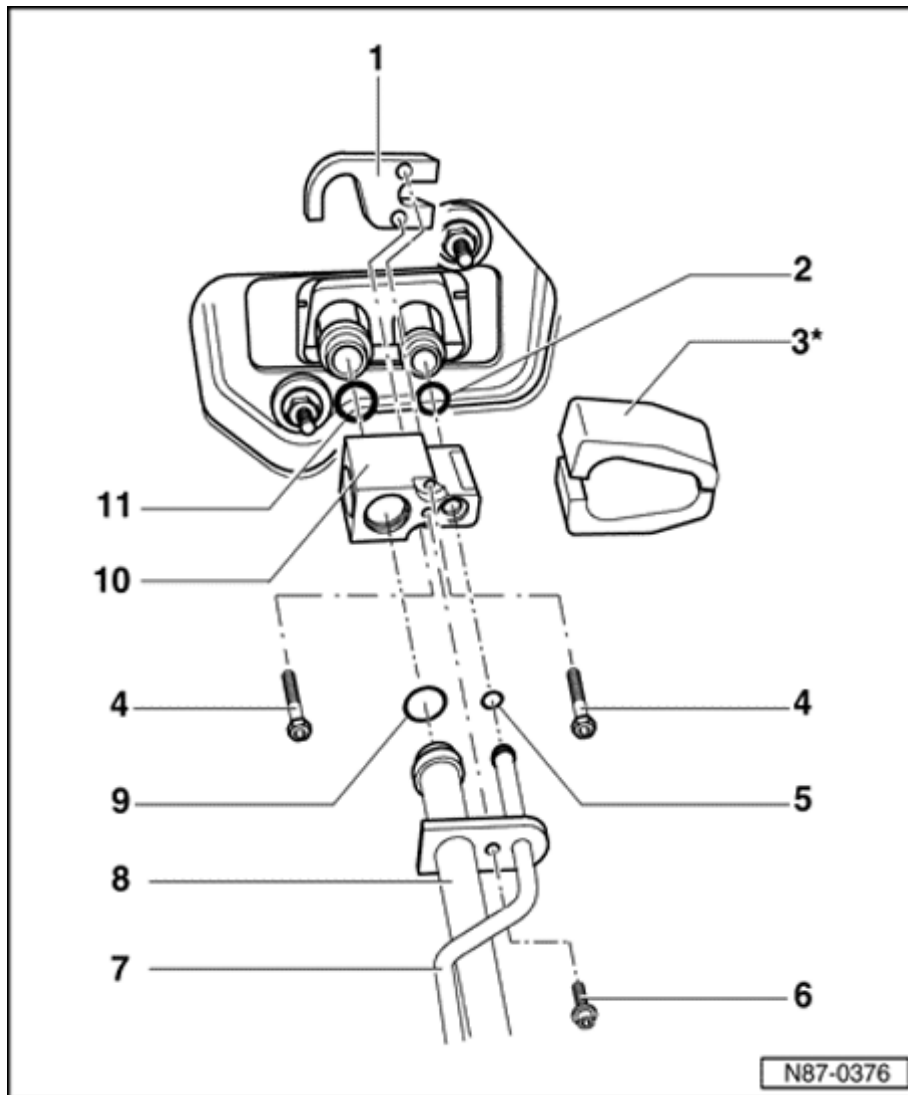


Expansion valve removing/assen

Notes:

- ◆ Before carrying any work on the A/C refrigerant system, refer to refrigerant system safety measures [Page 87-69](#).
- ◆ Except where indicated with *, components illustrated must be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.
- ◆ O-rings used on 134a systems may be red, green, v. or black.
- ◆ Always plug open refrigerant line connections to prevent dirt and moisture contamination.

87-108

**Assembly****1 - Threaded plate****2 - O-ring**

- ◆ Always replace

- ◆ 10.8 mm;
1.8 mm

3 - Insulator***4 - Bolt**

- ◆ 8 Nm (71 in. lb)

- ◆ Qty.: 2

5 - O-Ring

- ◆ Always replace

- ◆ 7.6 mm;
1.8 mm

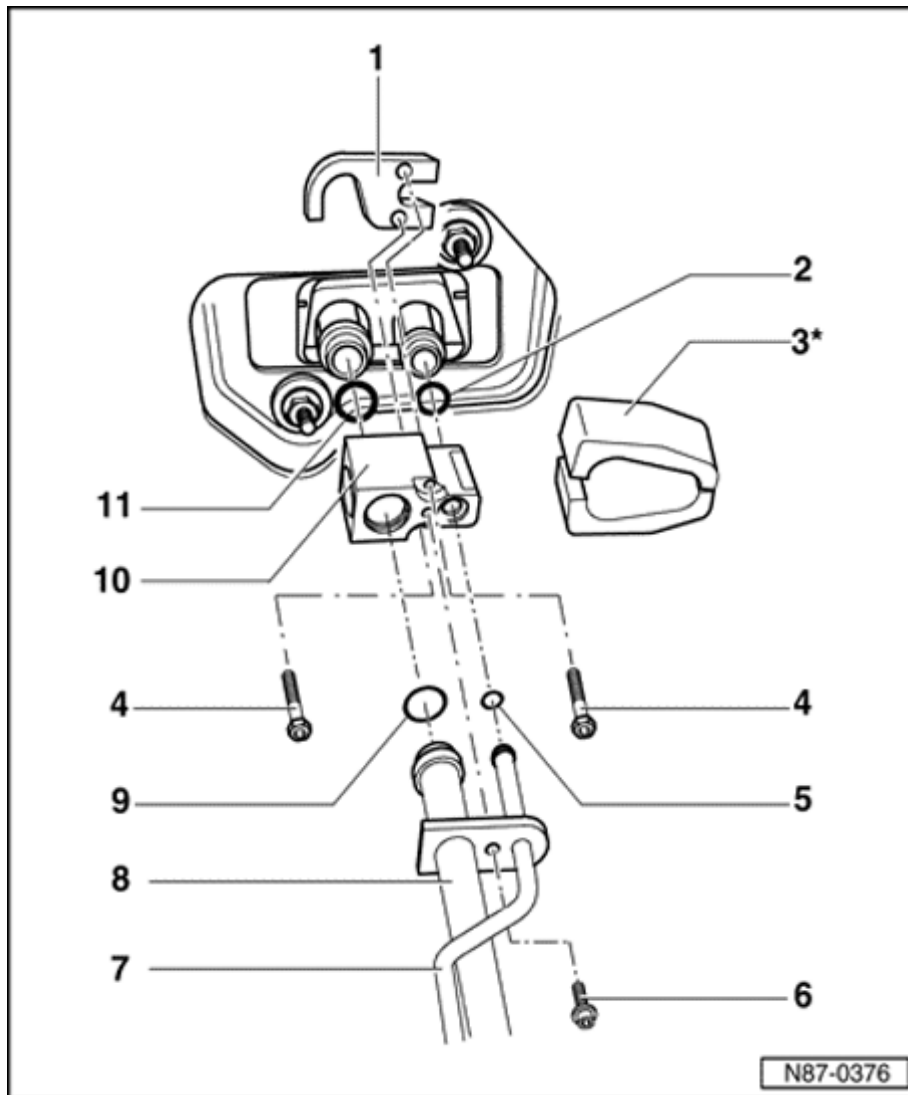
6 - Bolt

- ◆ 8 Nm (71 in. lb)

7 Refrigerant - line

- ◆ From receiver drier to expansion valve

87-109



8 - Refrigerant hose

- ◆ From expansion valve to compressor
- ◆ With damper

9 - O-ring

- ◆ Always replace
- ◆ 16.7 mm; 1.8 mm

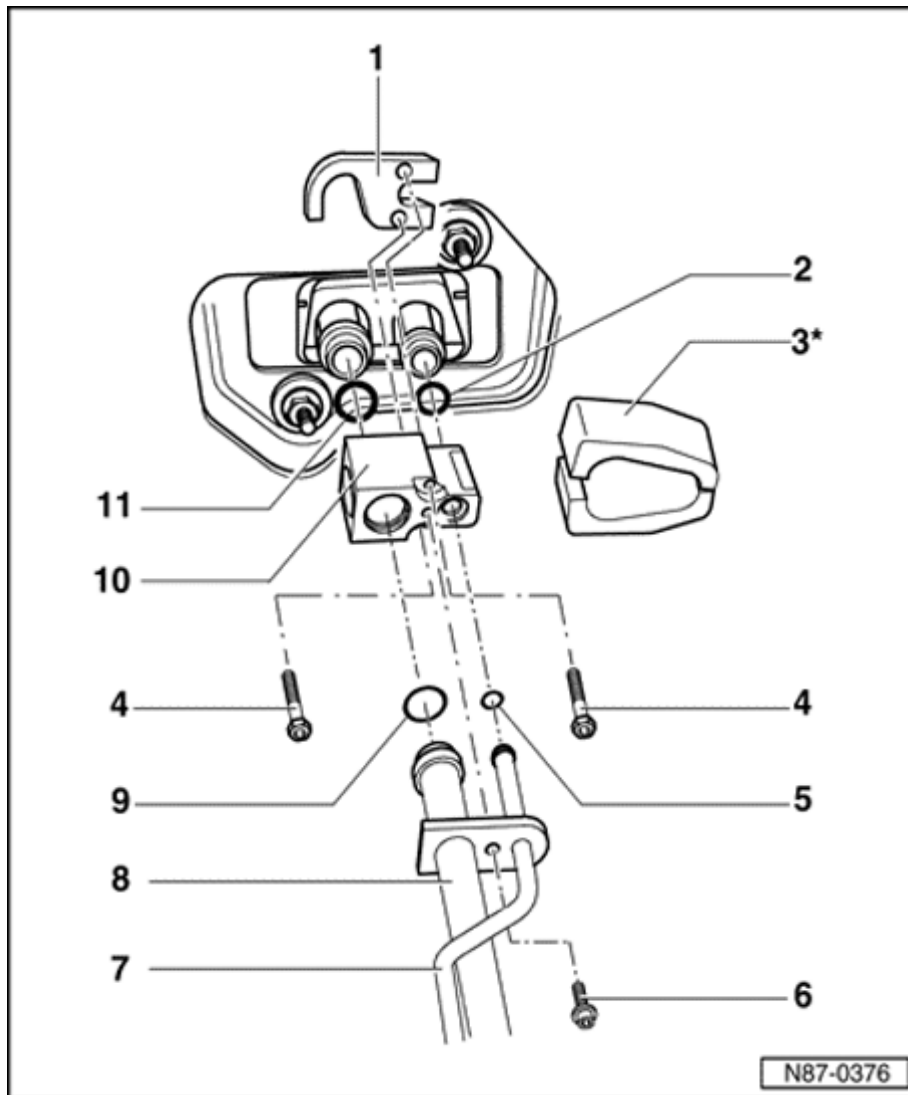
10 - Expansion valve

- ◆ Located in right side of engine compartment
- ◆ Removing
⇒ [Page 87-110](#)
- ◆ Hole for refrigerant lines at bulkhead must be sealed against splash water

11 - O-ring

- ◆ Always replace
- ◆ 14 mm; 1.8 mm

87-110

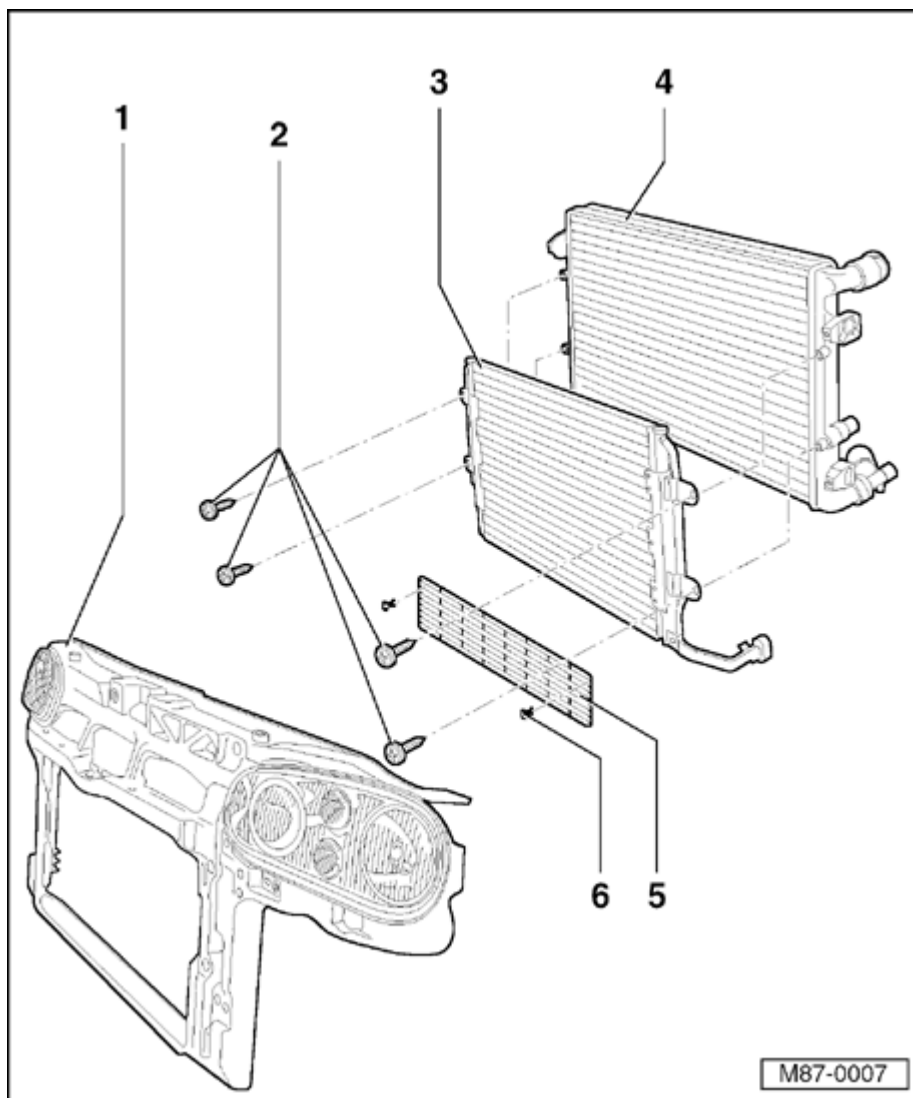


Removing

- Discharge refrigerant system ⇒ [Page 87-123](#)
- Remove insulator - 3 -.
- Remove retaining screw - 6 -.
- Pull out refrigerant lines - 7 - and - 8 - and move aside.
- Remove bolts - 4 -.
- Remove expansion valve - 10 -.

Note:

When replacing expansion valve, always replace O rings -5- & -9-, -2- & -11-.



Condenser, removing and installing

CAUTION!

Before beginning repairs:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch off ignition.**
- ◆ **Remove ignition key from ignition switch.**

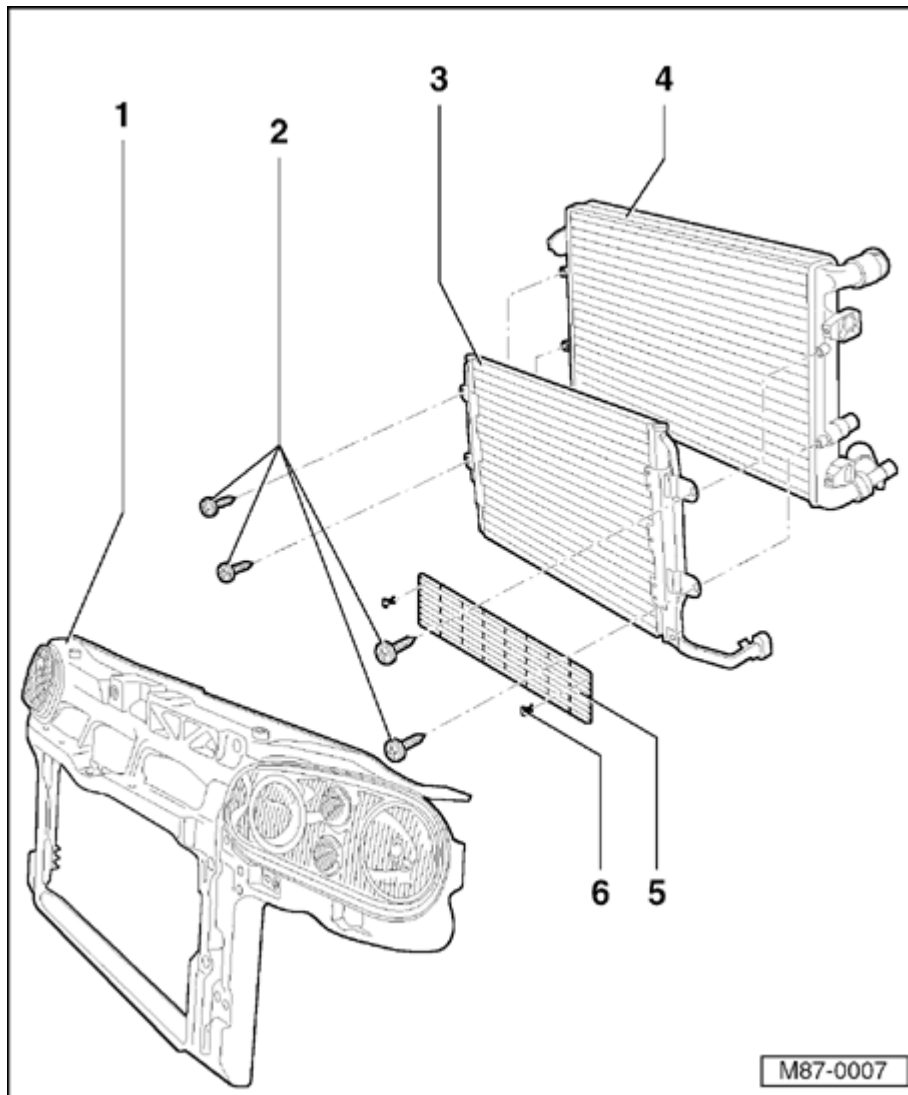
Notes:

- ◆ *Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures ⇒ [Page 87-69](#) .*
- ◆ *Condensator must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*
- ◆ *O-rings used on R-134a systems may be red, green,*

violet or black.

- ◆ *Always plug open refrigerant line connections to prevent dirt and moisture contamination.*

87-112

**1 - Lock carrier****2 - Screws**

◆ 8 Nm (71 ir

◆ Qty. 4

3 - Condenser**4 - Radiator**

◆ Always replace coolant after removal/replace

5 - Grille

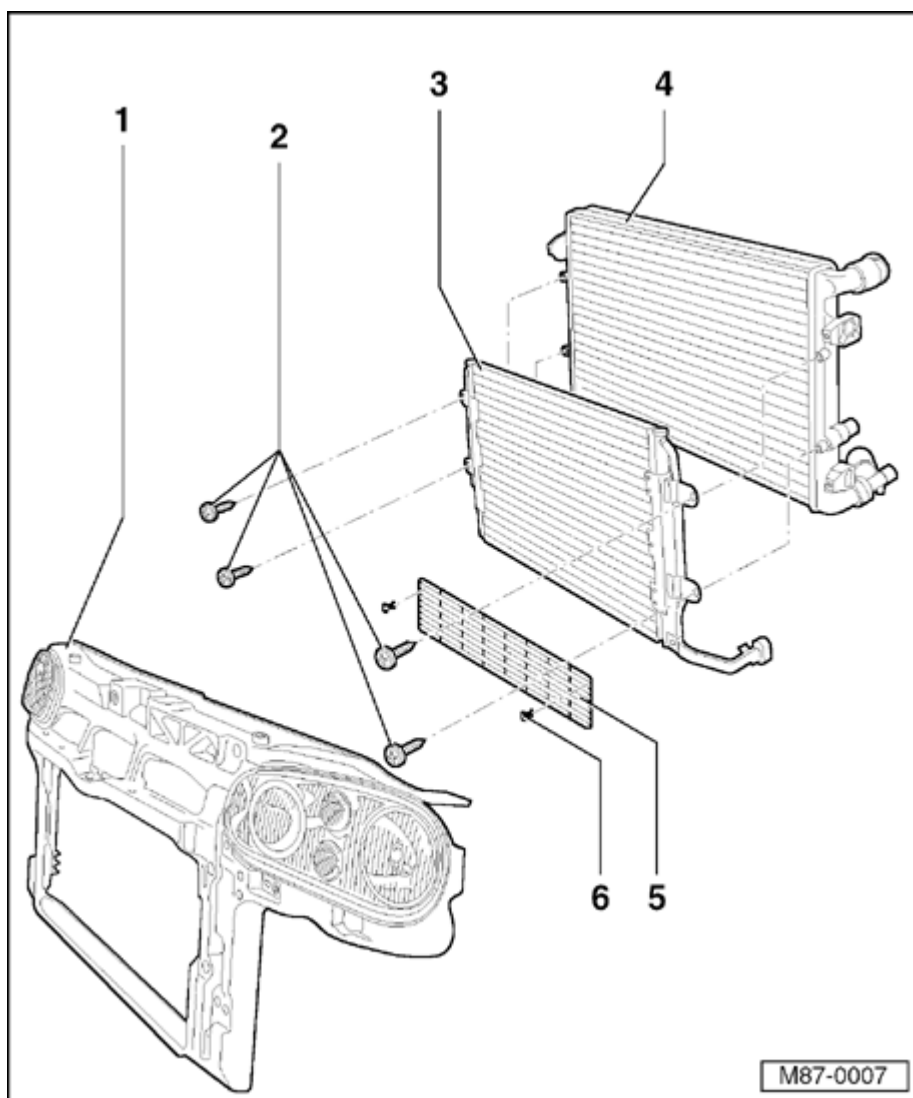
◆ Where applicable

6 - Clips

◆ Where applicable

M87-0007

87-113



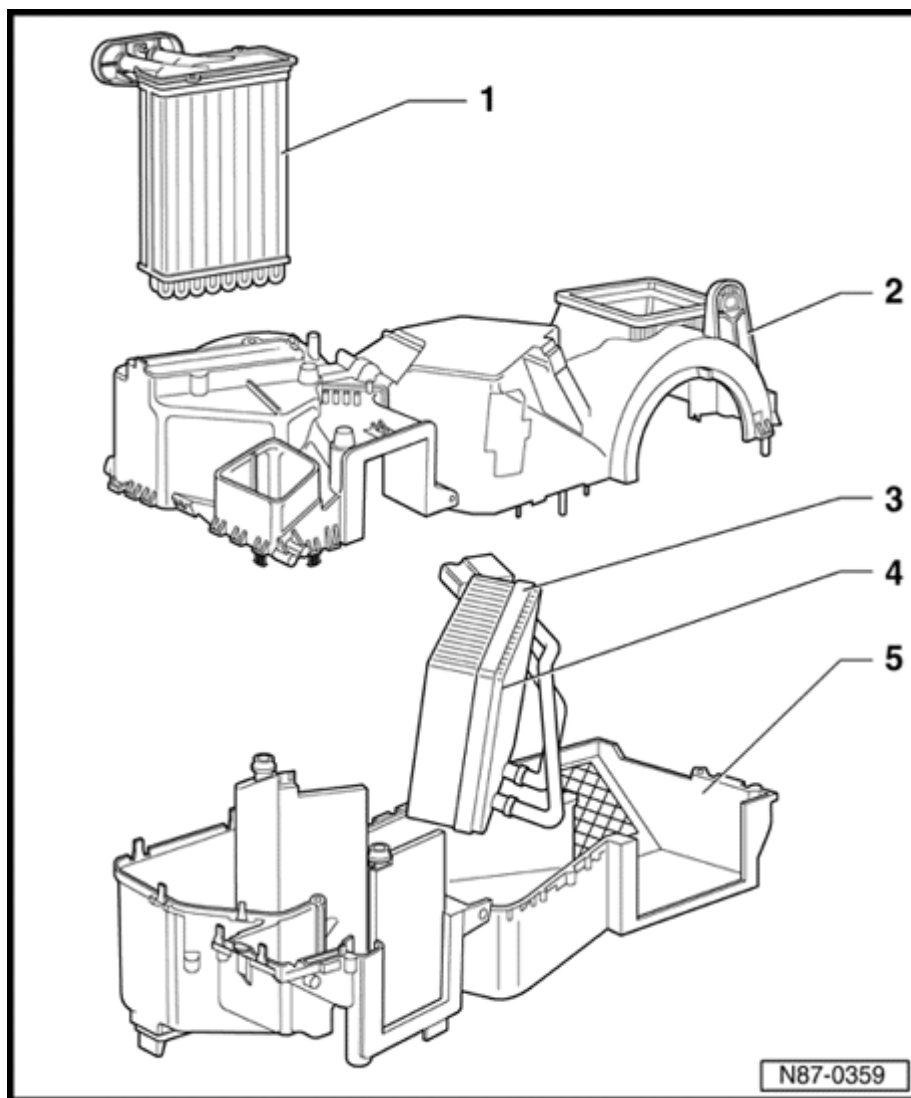
Removing

- Discharge refrigerant system ⇒ [Page 87-123](#)
- Remove refrigerant hoses at condenser and seal off.
- Remove lock carrier

⇒ [Repair Manual, Body Exterior, Repair Group 50](#)

- Remove screws - 2-
- Remove clips -6- and grille - 5- (where applicable).

87-114



Heating and A/C unit, removing/assen

CAUTION!

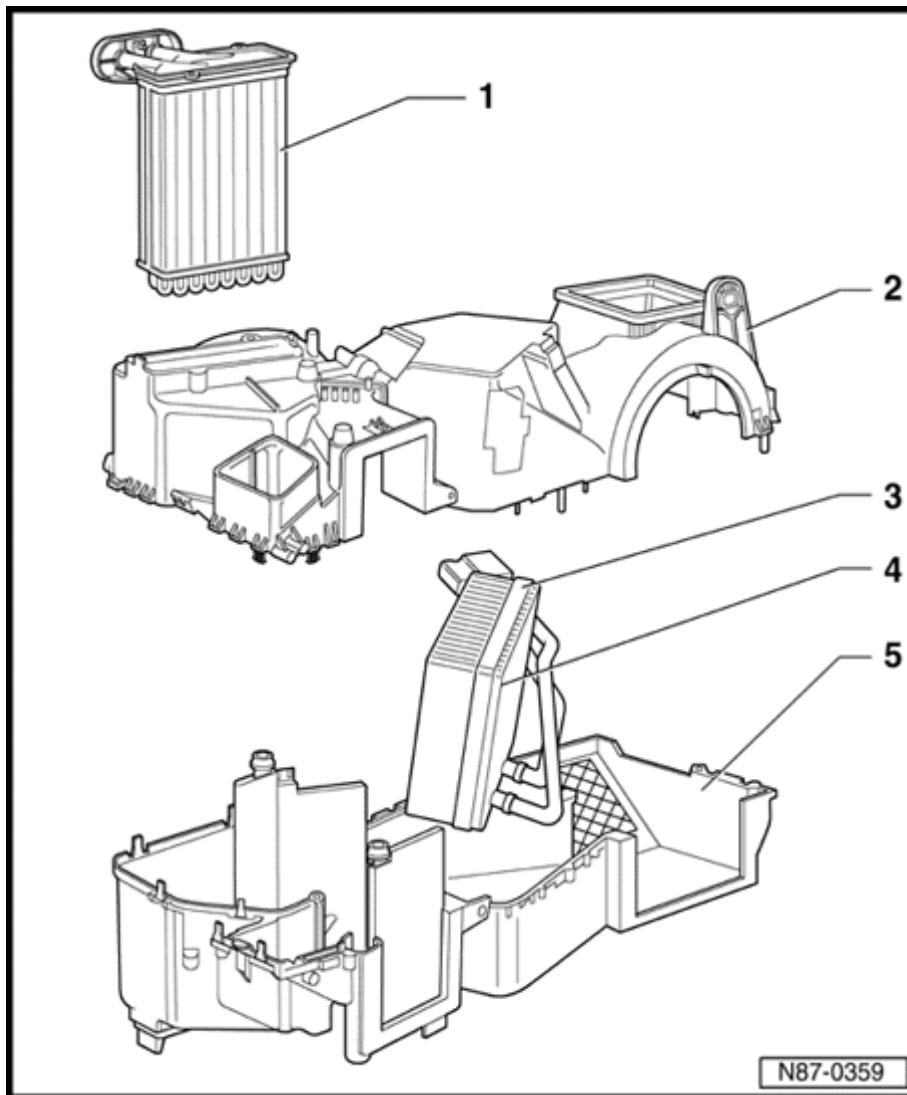
Before beginning repairs:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch off igniti**
- ◆ **Remove ignition key from ignitio switch.**

Notes:

- ◆ *Before carrying any work on the A/C refrigerant system, refer to refrigerant syste safety measures: [Page 87-69](#) .*
- ◆ *Heating and A/C unit must only b removed after discharging refrigerant syste Use Kent Moore ACR4 or equivalent.*
- ◆ *O-rings used on 134a systems m be red, green, v. or black.*
- ◆ *Always plug ope refrigerant line connections to prevent dirt and moisture contamination.*

87-115



Assembly

1 - Heater core

- ◆ Always replace coolant after removal/replace
 - ◆ Access release tabs for heater core after partially removing heating and unit ⇒ [Page 116](#).

2 - Housing, upper part

- ◆ With fresh air and recirculating flaps

3 - Evaporator shell

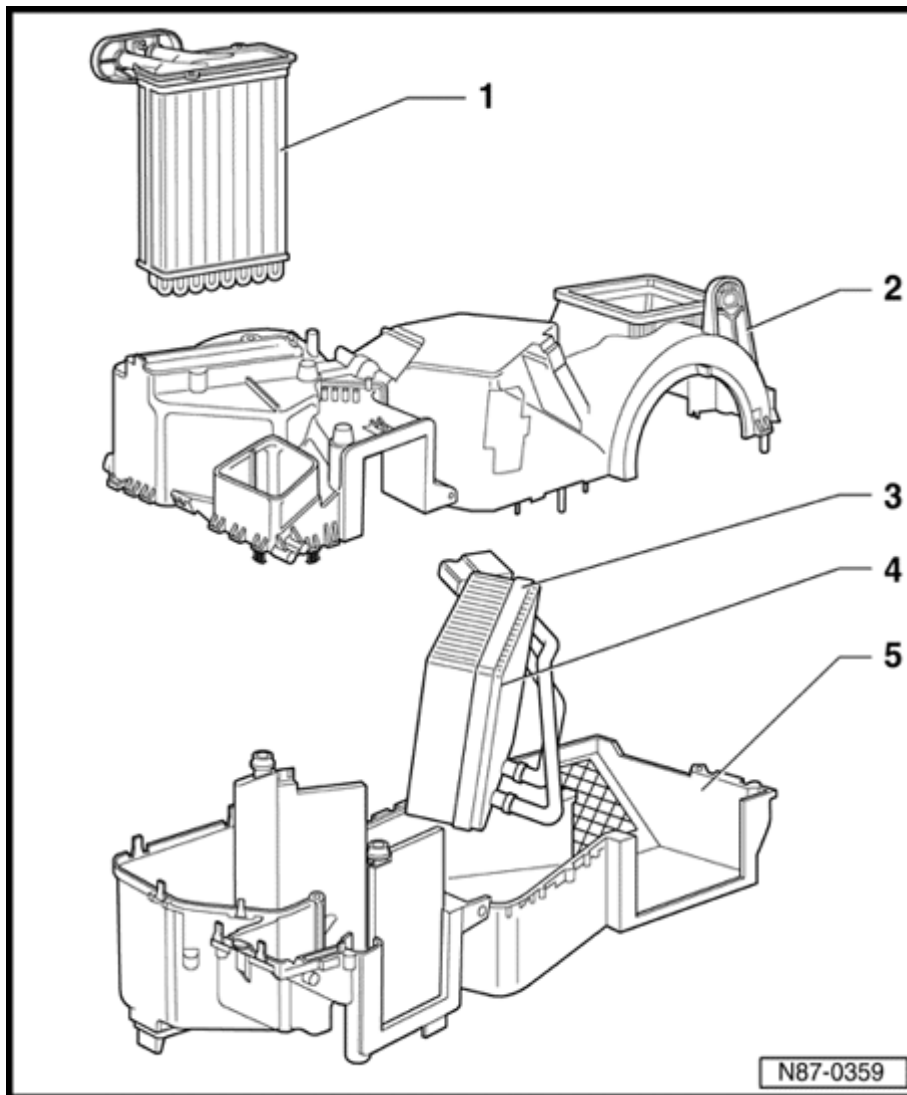
- ◆ Installing ⇒ [1](#)

4 - Evaporator

- ◆ Evaporator inlet/outlet ⇒ installing ⇒ [2](#)

5 - Housing, lower part

87-116



Removing

- Discharge refrigerant system ⇒ [Page 87-123](#)

- Drain engine coolant.

⇒ *Repair Manual, Engine Mechanical, Repair Group 19*

CAUTION!

The cooling system is pressurized when the engine is warm. Wear gloves and other protection and carefully release system pressure if necessary, before performing repairs.

- Remove instrument panel.

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Loosen instrument panel cross member

⇒ [Page 80-9](#) , Fig. 5

- Remove and clamp off coolant hoses to heater core in engine compartment at bulkhead.
- Seal off heater core inlet/outlet to prevent coolant from running out.
- Locate and remove fasteners for heating and A/C unit in engine compartment at bulkhead.
- Remove heating and A/C unit.

87-117

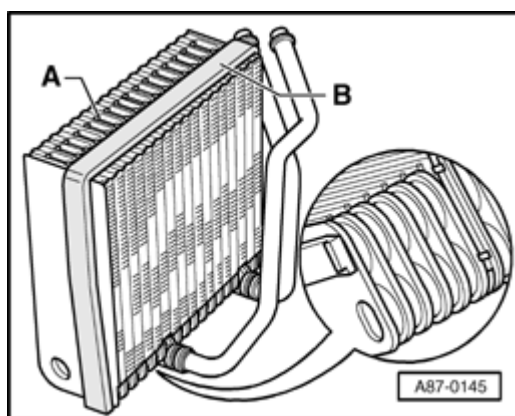


Fig. 1 Evaporator seal, installing

- Glue foam seal -B- around circumference of evaporator -A-.
- To allow evaporator water to drain, do not attach foam seal on evaporator in area -C-.

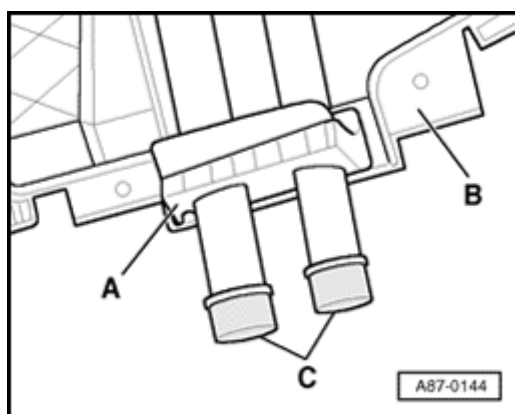
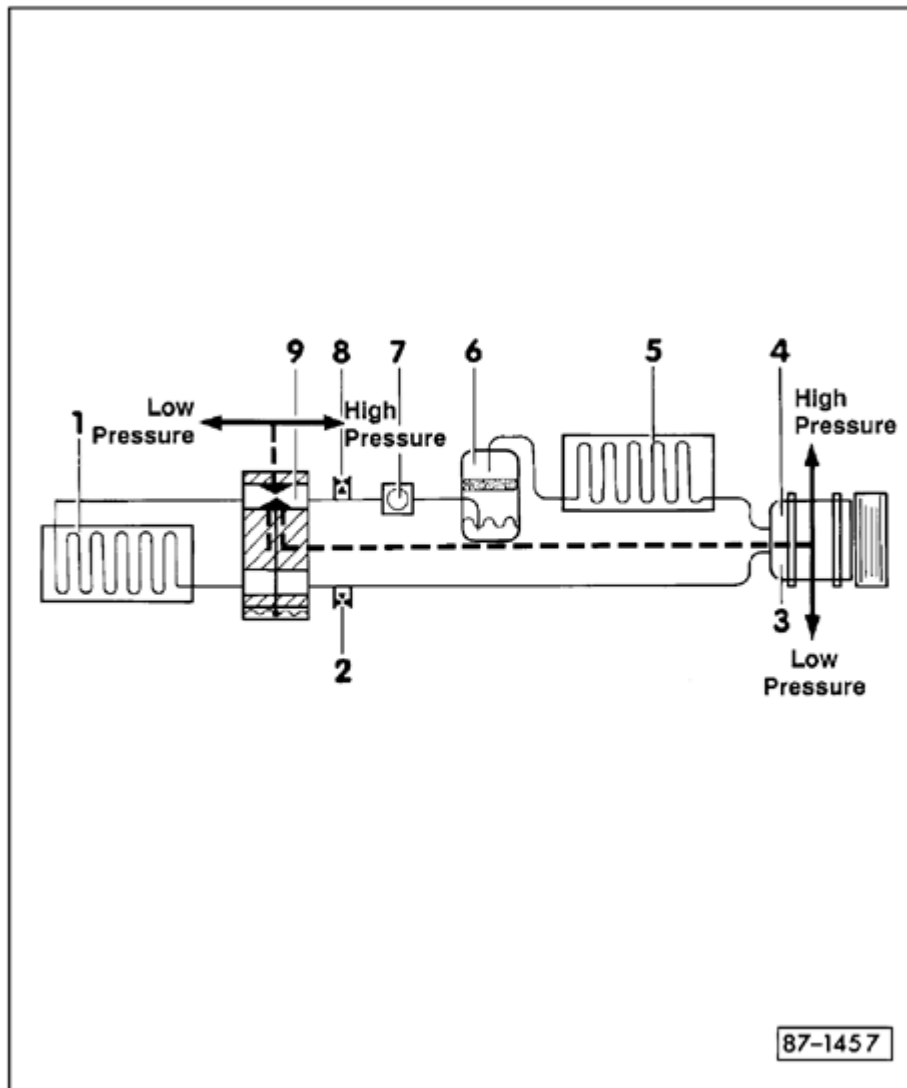


Fig. 2 Evaporator inlet/outlet seal, installing

- Insert seal -A- for refrigerant lines -C- in between housing halves -B-.



A/C refrigerant system pressures and temperatures, checking

The pressures and temperatures in the A/C system will vary depending on engine speed (RPM), coolant fan speed, engine coolant temperature, A/C clutch engagement, outside temperature, humidity, etc.

Pressure and temperature specifications are based on the following:

- ◆ Engine speed (RPM) at 1500
- ◆ Fresh air blower on high speed
- ◆ A/C adjusted to Max. cooling

Pressure and temperature specifications ⇒ [Page 87-120](#) .

1 - Evaporator

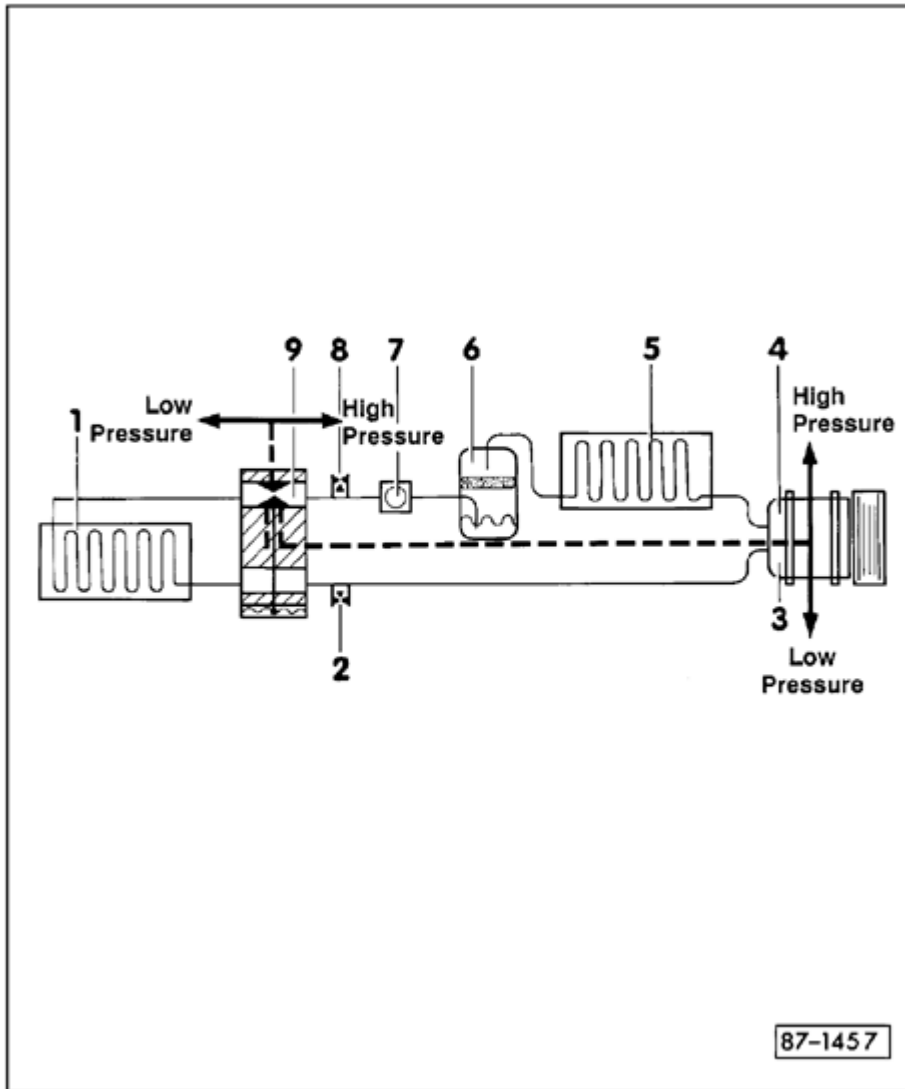
**2 - Low
pressure
service
valve**

**3 Compressor,
- low pressure
side**

**4 Compressor,
- high
pressure
side**

5 - Condenser

87-119



6 - Receiver drier

7 - Sight glass

◆ If equipped

8 - High pressure service valve

9 Expansion - valve

87-1457

Pressure and temperature specifications

◆ Refer to pages ⇒ [Page 87-118](#) and ⇒ [Page 87-119](#) for component identification.

Component	Refrigerant state	Approximate pressure (bar/psi)	Approximate temperature
1 - Evaporator, inlet to outlet	Vapor to Gas	1.2 bar (17.4 psi) ¹⁾	-7 ° C (19 ° F) ²⁾
2 - Low pressure service valve	Gas		-1 ° C (30 ° F)
3 - Compressor, low pressure side	Gas		
4 - Compressor, high pressure side	Gas	14 bar (203 psi)	65 ° C (149 ° F)
5 - Condenser	Gas to Vapor to Liquid		55 ° C (131 ° F) at outlet
6 - Receiver drier	Liquid		55 ° C (131 ° F)
7 - Sight glass (if equipped)	Liquid		
8 - High pressure service valve	Liquid		
9 - Expansion valve	Liquid to Vapor	Inlet: 14 bar (203 psi) Outlet: 1.2 bar (17.4 psi)	Inlet: 55 ° C (131 ° F) Outlet: -7 ° C (19 ° F)

1) Pressure maintained in the refrigerant system by the variable displacement compressor despite variables in temperature, load and engine speeds (RPM).

2) Temperature maintained in the refrigerant system by the variable displacement compressor despite variables in temperature, load and engine speeds (RPM).

A/C refrigerant system, testing with pressure gauges

Due to the constant temperature/pressure relationship of refrigerant R-134a, approximate high-side system temperature can be determined based on system pressure.

Pressure gauges may have one or more temperature scales in addition to the pressure scale. Since various refrigerants have different temperature/pressure relationships, each gauge is specific for a particular refrigerant.

Measuring pressure and temperature in a "switched-on" refrigerant system

Use the A/C refrigerant high-pressure gauge to measure high pressure between the compressor and restrictor (including condenser) with the A/C switched on.

Use the A/C refrigerant low-pressure gauge to measure low pressure between the restrictor and the compressor inlet (including evaporator) with the A/C switched on.

The temperature displays of the low- and high-pressure gauges apply only to a portion of the low- and high-pressure sides. The low-pressure gauge displays approximate temperature between the restrictor and evaporator outlet. The high-pressure gauge displays approximate temperature between the compressor outlet and restrictor.

Note:

The temperature/pressure relationship only holds true when the refrigerant system contains liquid and vapor, but not when it contains only gas. In the gaseous state, the temperature is approx. 10-30 ° C (18-54 ° F) higher than indicated on the pressure gauge.

Measuring pressure and temperature in a closed container or "switched-off" refrigerant system

Due to the constant temperature/pressure relationship of R-12 and R-134a, approximate temperature in a closed container or in a switched-off A/C system can be determined based on its pressure.

If the temperature displayed on a gauge is lower than the actual temperature of the refrigerant, the refrigerant container or system is empty (discharged).

Note:

The temperature/pressure relationship only holds true when the refrigerant system contains liquid and vapor, but not when it contains only gas. In the gaseous state, the temperature is approx. 10-30 ° C (18-54 ° F) higher than indicated on the pressure gauge.

A/C refrigerant system, discharging

WARNING!

- ◆ ***Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/recycling/recharging unit such as Kent-Moore ACR⁴, or equivalent, whenever discharging an R-134a A/C system.***

- ◆ ***Any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.***

- ◆ ***State and local governments may have additional requirements regarding air conditioning servicing. Always comply with state and local laws.***

- ◆ ***Always wear safety goggles when charging or discharging system.***

CAUTION!

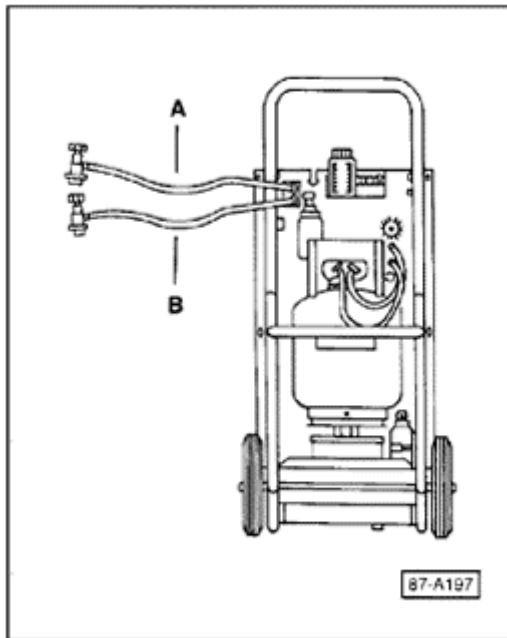
- ◆ **Always use separate refrigerant recovery/recycling/recharging servicing equipment for R-12 and R-134a systems. DO NOT use one piece of equipment for both R-12 and R-134a systems. The residual traces of refrigerant inside the equipment will contaminate and damage the equipment. Servicing equipment includes recovery/recycling/recharging unit, charging station, vacuum pump, manifold gauges, etc.**
- ◆ **DO NOT use R-12 servicing equipment on R-134a systems or R-134a equipment on R-12 systems or damage to both the vehicle A/C system and servicing equipment may result. Use only equipment designed to meet Society of Automotive Engineers (SAE) standards.**
- ◆ **R-134a and R-12 systems use different size service fittings. NEVER use adaptors to convert an R-12 fitting to R-134a size or R-134a fitting to R-12 size.**

Note:

Refer to safety measures starting on ⇒ [Page 87-69](#) prior to discharging or charging A/C refrigerant system.

Note:

Make sure that initial set-up of the refrigerant recovery/recycling/recharging unit has been completed before discharging the A/C system.



- Connect red high-pressure hose - A- of refrigerant recovery/recycling/recharging unit to high side fitting on vehicle and open coupler valve.
- Connect blue low-pressure hose - B- of refrigerant recovery/recycling/recharging unit to low side fitting on vehicle and open coupler valve.

CAUTION!

Always follow manufacturer's instructions when using a refrigerant recovery/recycling/recharging unit.

- Following refrigerant recovery/recycling/recharging unit manufacturer's instructions, discharge A/C system into refrigerant recovery/recycling/recharging unit.
- Disconnect power supply from A/C clutch to prevent accidental compressor operation with A/C system discharged.

A/C refrigerant system, flushing with compressed air and nitrogen

CAUTION!

- ◆ ***When using compressed nitrogen always use a pressure regulator and the proper adaptor hoses and fittings (available locally). During flushing, use existing exhaust/ventilation systems to draw off the gas mixture escaping from the A/C system.***

- ◆ ***DO NOT flush R-134a refrigerant system with R-11. R-11 is not compatible with R-134a refrigerant and PAG oil and will cause total system contamination.***

Flush refrigerant system with compressed air and nitrogen if:

- ◆ Refrigerant oil is dark and viscous (thick)

- ◆ Too much refrigerant oil is in the system following compressor replacement

- ◆ Unclear or do not know how much refrigerant oil is in the system

- ◆ Moisture, dirt or other impurities have entered the refrigerant system (i.e. following an accident)

- ◆ Unable to pull a constant vacuum during evacuation of a leak-free system due to excessive moisture in the system

- ◆ Refrigerant system has been open longer than the time required for normal repairs (i.e. following an accident)
- ◆ Based on temperature and pressure measurements, system is diagnosed with moisture contamination
- ◆ Compressor is replaced due to noises or internal damage
- ◆ Flushing is required after replacing certain components in certain situations ⇒ [Page 87-87](#) .

Flushing

- ◆ Use compressed air and nitrogen (available locally) to remove moisture, impurities and old refrigerant oil from A/C refrigerant system.
- ◆ First blow out old refrigerant oil and dirt with compressed air, then dry components with nitrogen.
- ◆ DO NOT blow compressed air and nitrogen through the compressor or expansion valve. Only blow compressed air and nitrogen through disconnected, free flowing components (i.e. disconnected hose, condenser, evaporator, etc.)
- ◆ DO NOT blow compressed air and nitrogen into a capped off A/C component. Pressurized R-134a refrigerant in the presence of oxygen may form a combustible mixture.

- ◆ Always flush components in opposite direction of refrigerant flow.
- ◆ Flush evaporator through the low-pressure line with the high-pressure line removed.
- ◆ If any component has dark thick deposits that cannot be removed with compressed air, replace component.
- ◆ Thin light gray deposits in refrigerant lines and hoses are normal and do not impair the function of the system.
- ◆ Always replace receiver drier after flushing.
- ◆ Dispose of contaminated refrigerant (PAG) oil following laws governing hazardous waste disposal. Do not combine PAG oil with any other old oils such as engine oil or transmission fluid.

A/C refrigerant system, evacuating and recharging

WARNING!

- ◆ *Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/recycling/recharging unit such as Kent-Moore ACR⁴, or equivalent, when evacuating and recharging an R-134a A/C system.*
- ◆ *Any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.*
- ◆ *State and local governments may have additional requirements regarding air conditioning servicing. Always comply with state and local laws.*
- ◆ *Always wear safety goggles when discharging, evacuating and recharging an A/C system.*

CAUTION!

Always follow manufacturer's instructions when using a refrigerant recovery/recycling/recharging unit.

Notes:

- ◆ *Refer to R-134a safety measures prior to discharging or charging A/C refrigerant system ⇒ [Page 87-69](#) .*
- ◆ *Follow refrigerant recovery/recycling/recharging unit manufacturer's instructions for evacuating and recharging A/C system.*
- ◆ *Evacuate refrigerant system for a minimum of 30 minutes.*
- ◆ *When recharging A/C system, add correct amount of refrigerant and PAG oil to system ⇒ [Page 87-141](#) .*
- ◆ *After system recharge, manually rotate A/C compressor approx. 10 turns before starting engine. Start engine with A/C OFF. After idle speed has stabilized, switch A/C ON and let engine idle (compressor running) for a minimum of two minutes before raising engine speed.*

A/C refrigerant system, troubleshooting

Requirements

- ◆ Electrical systems OK
- ◆ Air flow distribution systems (controls and cables) OK

Correct and repair as necessary before proceeding.

If any one of the following system conditions exists, check A/C refrigerant system pressures ⇒ [Page 87-133](#) .

- ◆ A/C does not cool (cooling has stopped completely)
- ◆ Insufficient cooling during all driving speeds or engine speeds (RPM)
- ◆ No cooling or insufficient cooling after a period of driving

Compressor noisy

- Tighten compressor and compressor bracket mounting bolts using torque wrench.
- Check routing of A/C refrigerant hoses and lines; hoses and lines must not contact other components and must be installed without tension or kinks, reposition or realign as necessary.

A/C compressor noisy immediately after switching A/C ON and/or when driving around corners or braking (refrigerant shock)-system overcharged

- Discharge A/C refrigerant system ⇒ [Page 87-123](#) , then evacuate and recharge ⇒ [Page 87-129](#) .

With an otherwise properly operating A/C system, water sprays out of instrument panel vents

- Check evaporator drain pipe for proper routing (should not be kinked or pinched).
- Check evaporator water drain valve.
 - Must not be plugged with wax, dirt or undercoating (clean if necessary)
 - Valve flap must open/close properly
- Check plenum tray.
 - Must be properly installed and not damaged

A/C refrigerant system pressures, checking

Check A/C refrigerant system pressures using these three tests:

1 - Air temperature drop from center instrument panel outlet (A/C system cooling performance)

2 - A/C system high pressure

3 - A/C system low pressure

The combined results of all three steps determine which part of the A/C system is causing the problem, see table ⇒ [Page 87-137](#) .

Test conditions

- ◆ A/C refrigerant system fully charged; discharge, evacuate and recharge system if necessary
- ◆ Condenser and radiator clean and free of obstructions (spray clean if necessary)
- ◆ Air distribution can be adjusted correctly using control knobs (all air distribution flaps reach end positions)
- ◆ Wiring OK per wiring diagram
- ◆ Outside (ambient) air temperature between 20-30 ° C (68-86 ° F)
- ◆ Drive belts for A/C compressor and Generator in good condition and properly tensioned

Test 1: Air temperature drop from center instrument panel outlet, checking (A/C system cooling performance)

- Start engine.
- Set temperature control to maximum "cold" (if manual A/C) or "LO" (if Climatronic).
- Manual A/C: Press "A/C" button and select second blower speed.
- Climatronic: Select minimum blower speed (manual override) by pressing "decrease blower speed" button (observe blower speed display in control head).
- Adjust air distribution to instrument panel outlets.
- Insert thermometer into center instrument panel outlet and raise engine speed to approximately 1500 RPM.

Specified result

With humidity normal and outside (ambient) temperature between 20-25 °C (68-77 °F), system is cooling satisfactorily if air temperature from center instrument panel vent drops below 10 °C (50 °F) within 1 minute.

For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

If specified reading is not obtained, perform tests 2 and 3, then compare results of all three tests ⇒ table, ⇒ [Page 87-137](#) .

Test 2: A/C system high pressure, checking

- Connect high- and low-pressure hoses of refrigerant recovery/ recycling/recharging unit Kent-Moore ACR⁴ or equivalent, to high- and low-pressure service valves.
- Disconnect electrical connector from coolant fan.
- Start engine.
- Set temperature control to maximum "hot" (if manual A/C) or "HI" (if Climatronic).
- Manual A/C: Press "A/C" button and select highest blower speed.
- Adjust air distribution to footwell outlets.
- Raise engine speed to approximately 1500 RPM.

Specified result

System high pressure is normal if high-pressure gauge reads 232 psi (16 bar) within 30 seconds.

If specified reading is not obtained, also perform test 3 and compare results of all three tests ⇒ table, ⇒ [Page 87-137](#) .

Test 3: A/C system low pressure, checking

- Connect high- and low-pressure hoses of refrigerant recovery/recycling/recharging unit Kent-Moore ACR⁴, or equivalent, to high- and low-pressure service valves.
- Start engine.
- Set temperature control to maximum "cold" (if manual A/C) or "LO" (if Climatronic).
- Manual A/C: Press "A/C" button and select first blower speed.
- Climatronic: Select minimum blower speed (manual override) by pressing "decrease blower speed" button (observe blower speed display in control head).
- Adjust air distribution to instrument panel outlets.
- Raise engine speed to 1500 RPM.

Specified result

System low pressure is normal if low-pressure gauge reads 22-36 psi (1.5-2.5 bar) within 30 seconds.

If specified reading is not obtained, compare results of all three tests ⇒ table, ⇒ [Page 87-137](#) .

87-137

Test 1 Temperature from center air vent¹⁾	Test 2 High pressure²⁾	Test 3 Low pressure²⁾	Possible causes of incorrect readings	Corrective measures
Normal	Normal	Normal	None	---
Too high	Normal	Normal	Temperature flap position incorrect	Adjust temperature flap cable
Too high	Too low	Normal	Compressor	Replace compressor
Normal	Too low	Normal	Compressor	Replace compressor
Normal	Normal	Too high or too low	Expansion valve or compressor	Clean/replace expansion valve or replace compressor
Too high	Normal	Too high or too low		
Normal	Too high or too low	Too high or too low		
<p>¹⁾ Normal air outlet temperature approx. 6 °C (43 °F). For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.</p> <p>²⁾ For normal system temperatures and pressures ⇒ Page 87-120 .</p>				

A/C refrigerant system cooling performance, checking

Note:

Variable displacement A/C compressor maintains temperature of 0 ° C (32 ° F) in evaporator.

Test conditions

- ◆ A/C refrigerant system fully charged
- ◆ A/C clutch -N25- and compressor function OK
- ◆ Condenser and radiator clean and free of obstructions
- ◆ Air distribution can be adjusted properly
- ◆ Wiring OK as per wiring diagram
- ◆ Outside (ambient) temperature 20 ° C-30 ° C (68 ° F-86 ° F)

Checking

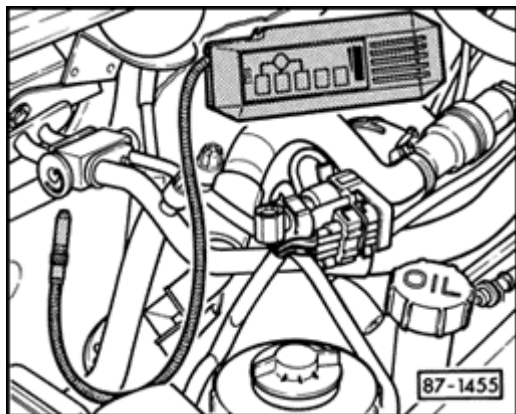
- Start engine.
- Set temperature control to maximum "cold".
- Press A/C button and select second blower speed.
- Adjust air distribution to instrument panel outlets.
- Insert thermometer into center instrument panel outlet.
- Raise engine speed to approximately 1500 RPM.

Specified result

With normal humidity and outside (ambient) temperature between 20 ° -25 ° C (68 ° -77 ° F), system is sufficiently charged if air temperature from center instrument panel vent drops below 10 ° C (50 ° F) within one minute.

For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

A/C refrigerant system, checking for leaks



- Use halogen leak detector, Hitec HI400A-TEL or equivalent, to check for refrigerant leaks, following the leak detector manufacturer's instructions.

Refrigerant gas dissipates very quickly. To make the job easier, avoid drafty or windy areas when checking for leaks.

If the refrigerant system is discharged (empty), re-charge the system with approx. 100 g (3.5 oz) of refrigerant in order to check for leaks.

A/C refrigerant system, capacities

Refrigerant R-134a, capacity

Compressor	Manufacturer	Quantity
SD7-V16	Sanden	750 + 50 g
DCW-17D	Zexel	(26 + 1.8 oz.)

Notes:

- ◆ *R-134a refrigerant is packaged in different containers. Some are used only for commercial applications which are sold in cylinders using a 1/4" flare fitting. This does not connect to the vehicle fittings and servicing equipment. Use only R-134a which come in containers having the correct type of service fitting.*
- ◆ *Refrigerant oil attracts moisture from the air. It is important that refrigerant oil containers are closed tightly immediately after use.*
- ◆ *Dispose of contaminated refrigerant oil following laws governing hazardous waste disposal. Do not combine any refrigerant oil with any other old oils such as engine oil or transmission fluid.*

Refrigerant (PAG) oil R-134a, identification

Use only the correct type of refrigerant oil (PAG oil) specified for use with R-134a and compressor type.

Refrigerant (PAG) oil applications:	
Sanden Compressor - D7-V16	G 052 154 A2
Zexel Compressor - DCW-17D	G 052 154 A2 /G 052 300 A2

CAUTION!

Part numbers are for reference only. Always contact the parts department for the latest part number information.

Refrigerant (PAG) oil R-134a, capacity

Type	Production date	Capacity
Golf/Jetta with Sanden compressor	from 10.98	135 ±15 cc*
Golf with Zexel compressor	from 11.98	115 ±20 cc*

*This is the total A/C system refrigerant oil capacity. Replacement A/C compressors supplied by the Parts Department are filled with 135 cc of refrigerant oil.

Refrigerant (PAG) oil R-134a, distribution

The total refrigerant oil quantity is distributed in the refrigerant circuit as follows:

Compressor approx. 50%

Condensor approx. 10%

Suction pipe approx. 10%

Discharge pipe --

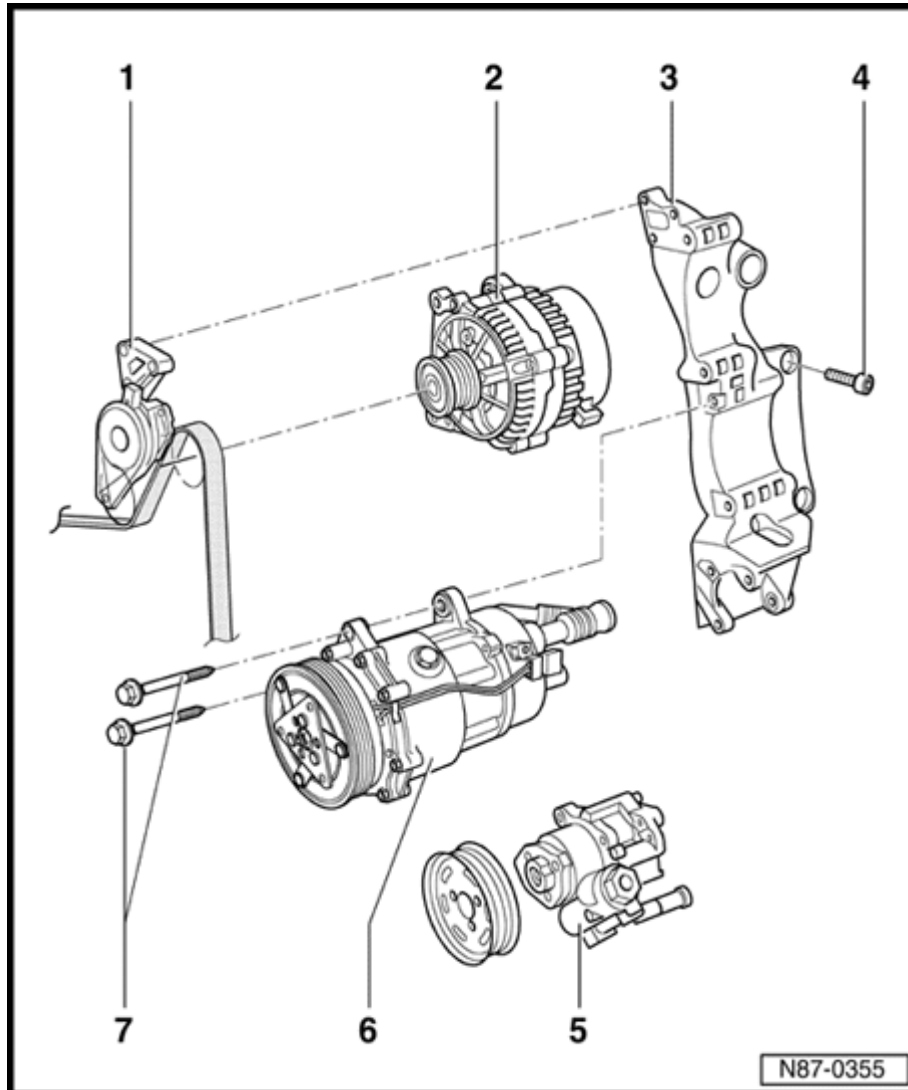
Evaporator approx. 20%

Receiver drier approx. 10%

Note:

When replacing refrigerant circuit components, fill an appropriate amount of refrigerant oil (as indicated above) into the new part before installation.

87-145



Compressor bracket, removing and installing

4-cylinder gasoline engine

Special tools and equipment required

- ◆ Torque wrench (5 - 50 Nm)

Note:

The compressor bracket and related components can be removed and installed without discharging the refrigerant circuit.

1 - Ribbed belt tensioner

- ◆ Ribbed belt routing ⇒ [Fig. 1](#)
- ◆ Ribbed belt, removing:

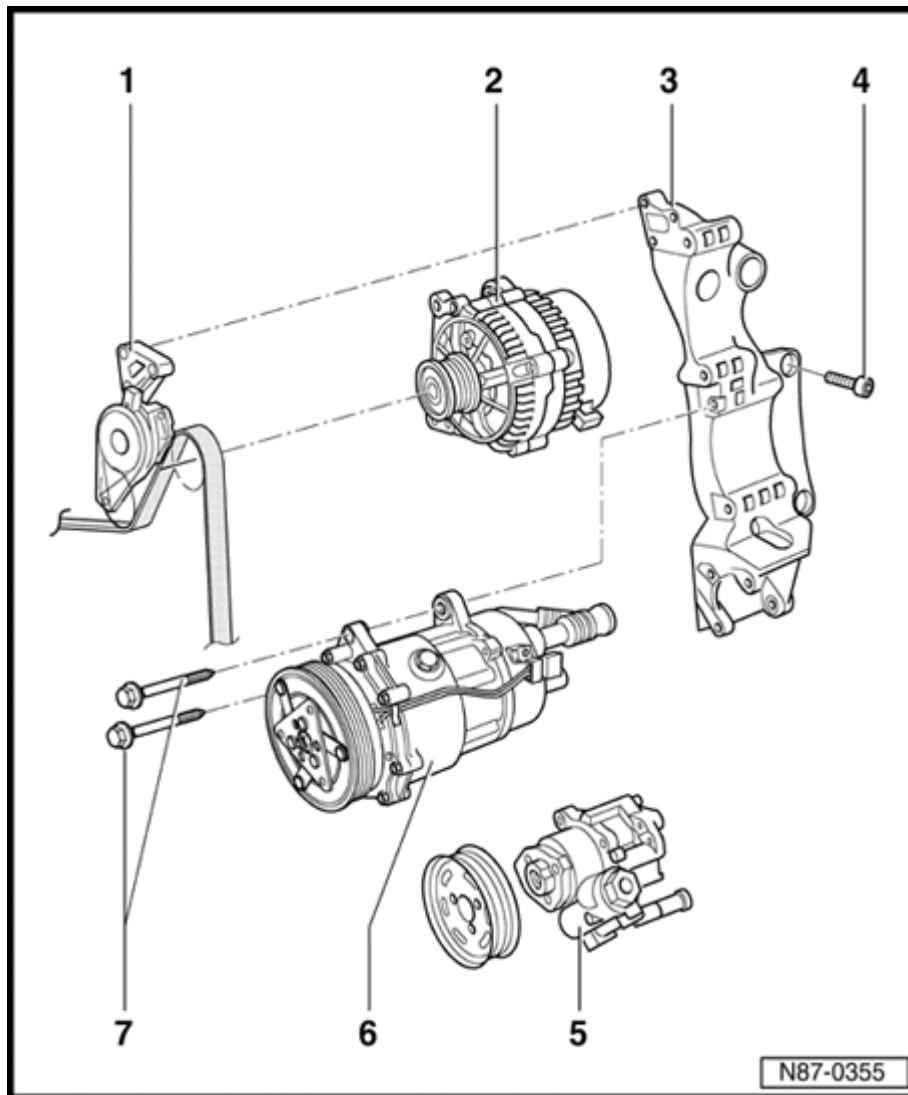
⇒ *Repair Manual, Engine Mechanical Repair Group 13*

2 - Generator

- ◆ Removing:

⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#)

87-146



3 Bracket for - generator, compressor and power steering pump

◆ Removing:

- First remove generator and power steering pump.

⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#) ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 48](#)

- Remove bolts -7-

- Remove compressor from bracket and suspend with wire on body.

- Remove socket head bolts -4- (qty. 4)

- Remove bracket from engine block.

**4 - Socket
head
bolt
M10x55**

◆ Qty. 4

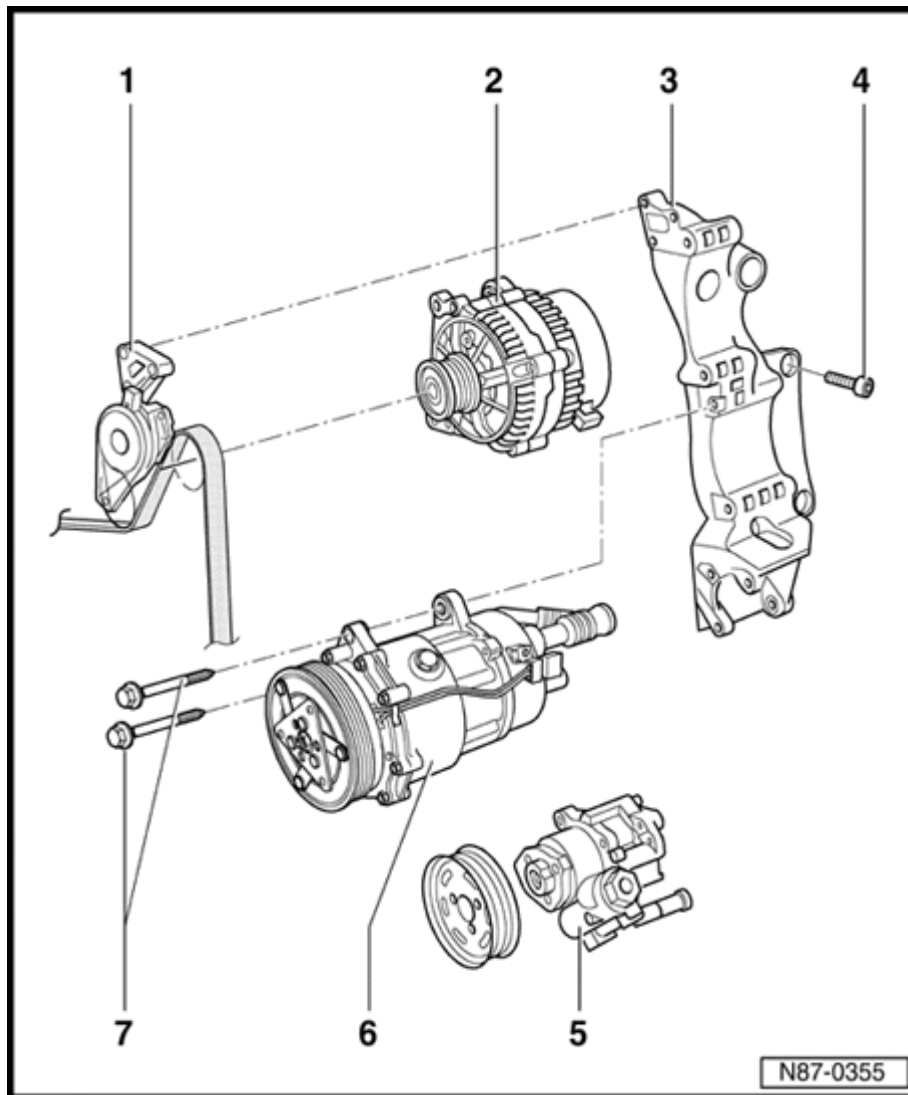
◆ 50 Nm
(37 ft
lb)

**5 - Power
steering
pump**

◆ Removing:

⇒ [Repair
Manual,
Suspension,
Wheels,
Steering,
Repair Group
48](#)

87-147

**6 - Compressor**

◆ Manufacturer:
Sanden,
designation:
SD7V16

◆ Manufacturer:
Zexel,
designation:
DCW-17D

◆ With A/C
clutch -
N25-

◆ -N25-
(Sanden),
servicing:
⇒ [Page
87-158](#) .

◆ -N25-
(Zexel),
servicing:
⇒ [Page
87-166](#) .

**7 - Bolt
M10x112**

◆ 45Nm
(33 ft lb)

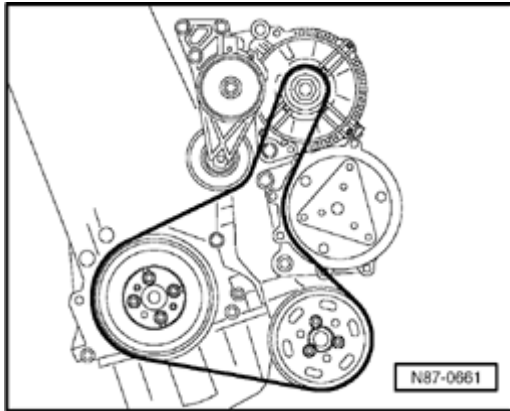
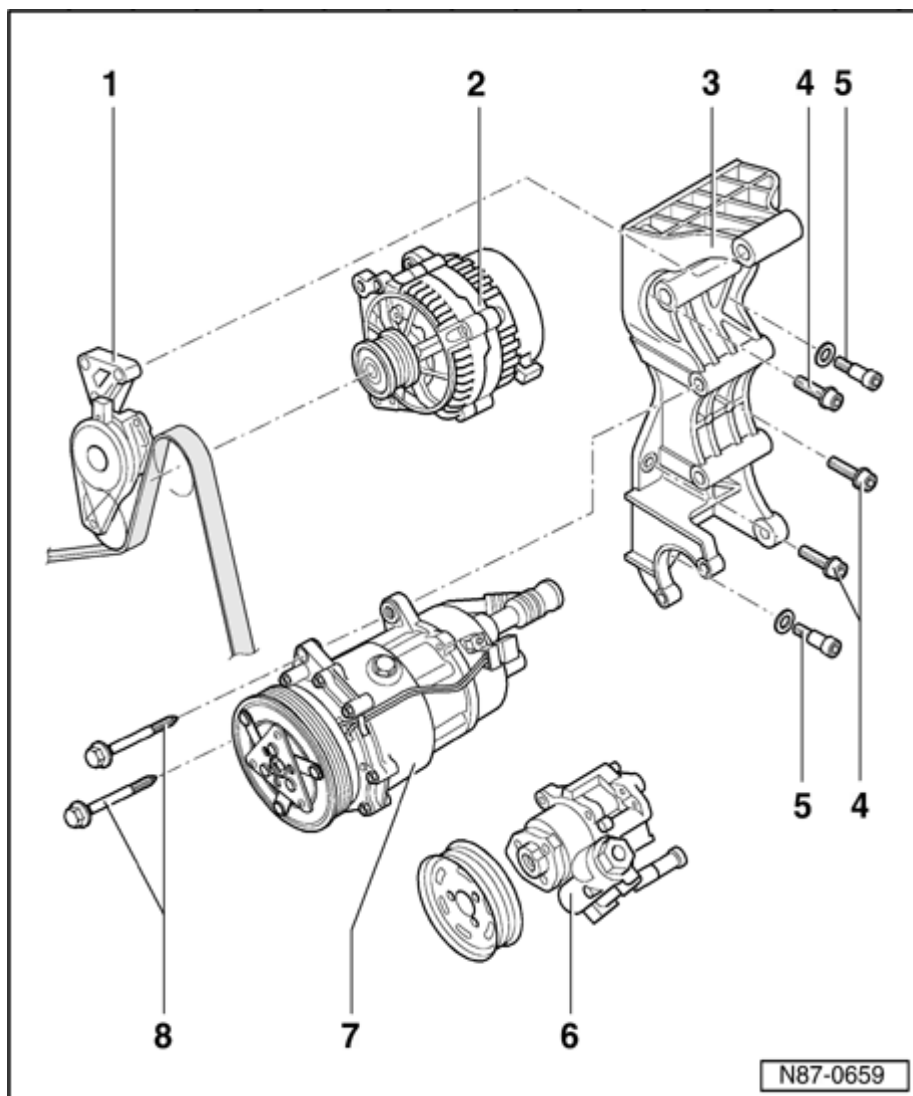


Fig. 1 Ribbed belt routing

Note:

Before removing ribbed belt, mark direction of rotation. When installing the belt ensure it is correctly seated in the pulley.

87-149



6-cylinder engine

Special tools and equipment required

- ◆ Torque wrench (5 - 50 Nm)

Note:

The compressor bracket and related components can be removed and installed without discharging the refrigerant circuit.

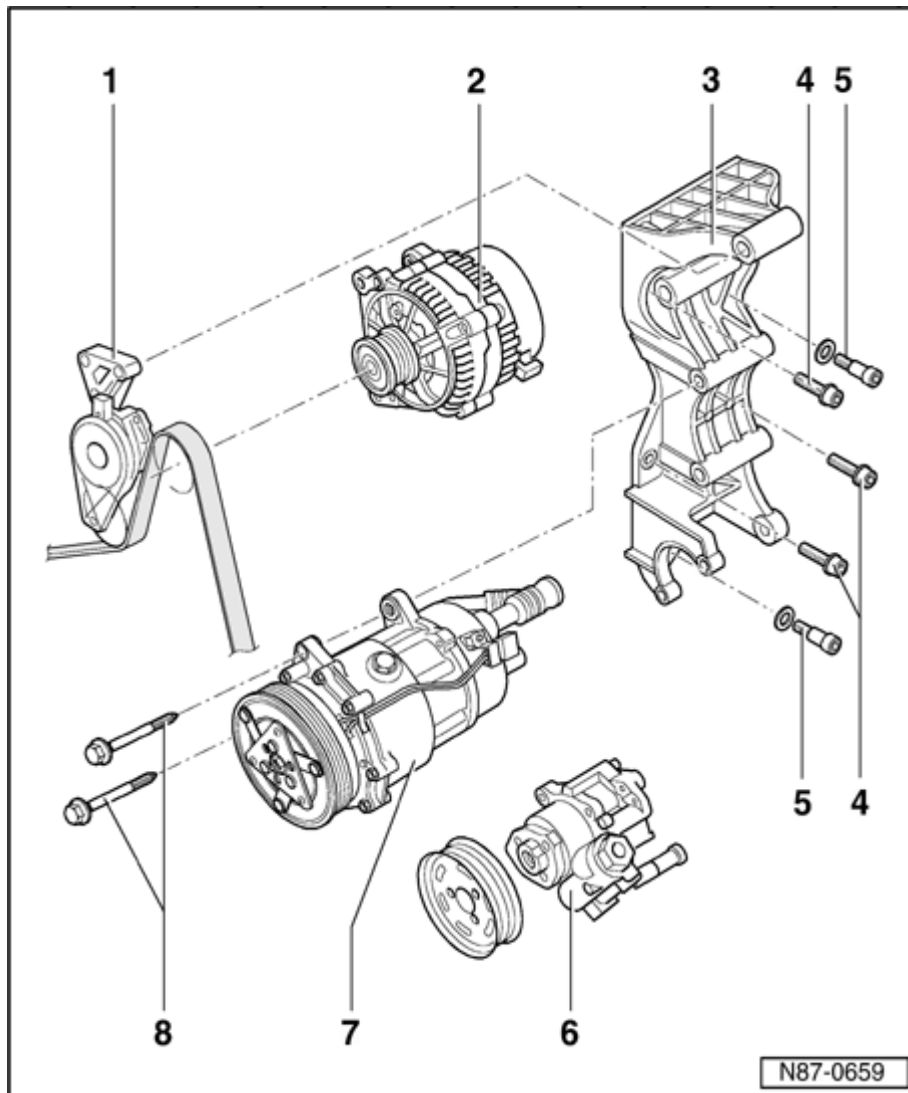
1 - Ribbed belt tensioner

- ◆ Ribbed belt routing ⇒ [Fig. 1](#)

2 Generator - (GEN)

- ◆ Removing: ⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#)

87-150



3 Bracket for - generator, compressor and power steering pump

◆ Removing:

- Move lock carrier into service position.

⇒ [Repair Manual, Body Exterior, Repair Group 50](#)

- Remove ribbed belt

⇒ [Repair Manual, Engine Mechanical, Repair Group 13](#)

- Remove generator and power steering pump.

⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#) ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 48](#)

- Remove

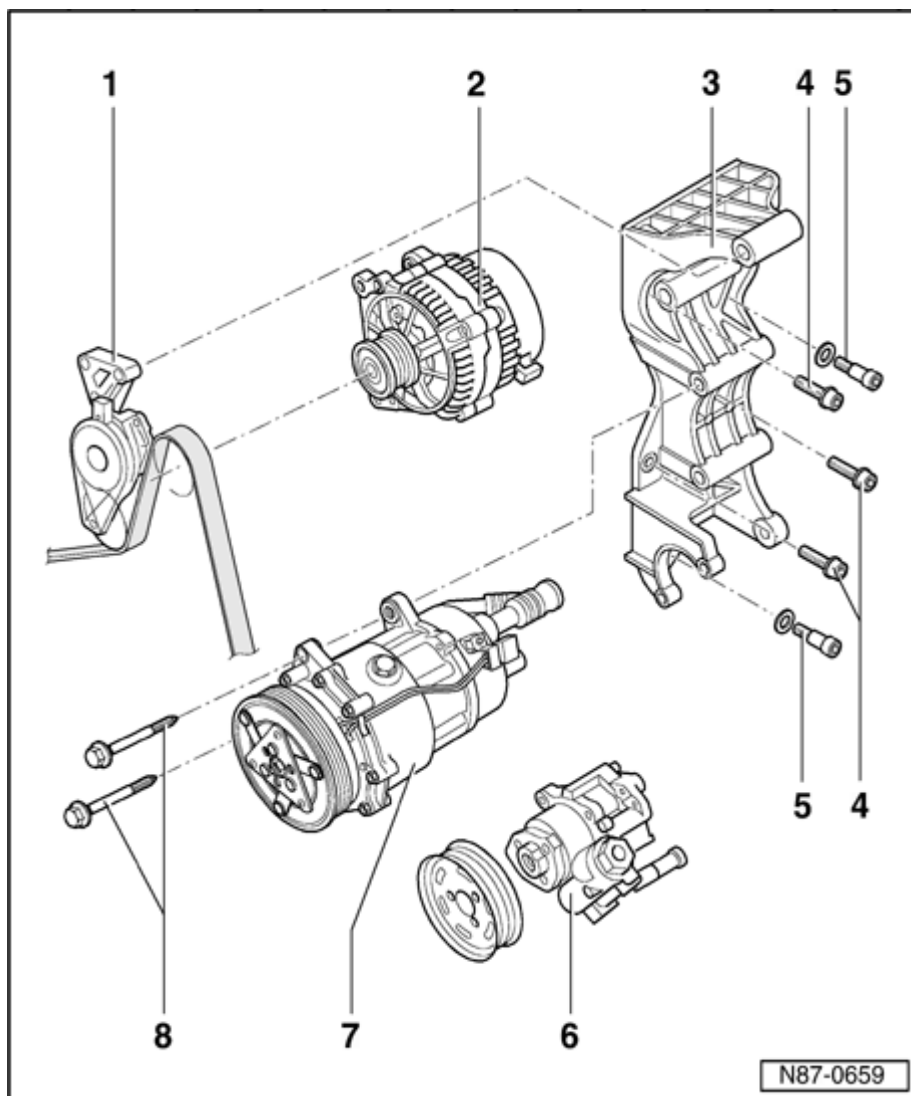
bolts -8-

- Remove compressor from bracket and suspend with wire on body.

- Remove socket head bolts -4- and -5-.

- Remove bracket from engine block.

87-151



4 - Socket head bolt M8x30

- ◆ 25 Nm (18 ft lb)
- ◆ Qty. 3

5 - Socket head bolt M8x28

- ◆ 25 Nm (18 ft lb)
- ◆ Qty. 2

6 - Power steering pump

- ◆ Removing:

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 48](#)

7 - Compressor

- ◆ Manufacturer: Sanden, designation: SD7V16
- ◆ Manufacturer: Zexel, designation: DCW-17D
 - ◆ With A/C clutch - N25-
 - ◆ -N25- (Sanden), servicing: ⇒ [Page 87-158](#).
 - ◆ -N25- (Zexel),

servicing:
⇒ [Page
87-166](#) .

**8 - Bolt
M10x112**

◆ 45 Nm
(33 ft.
lb.)

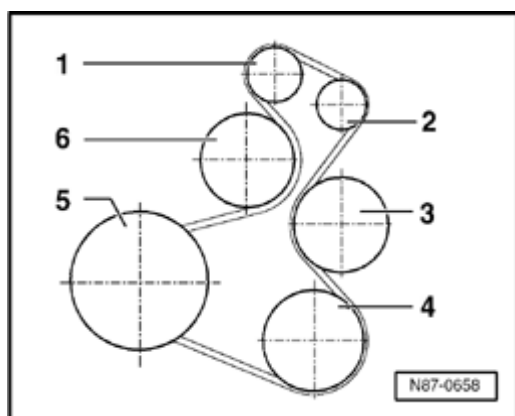


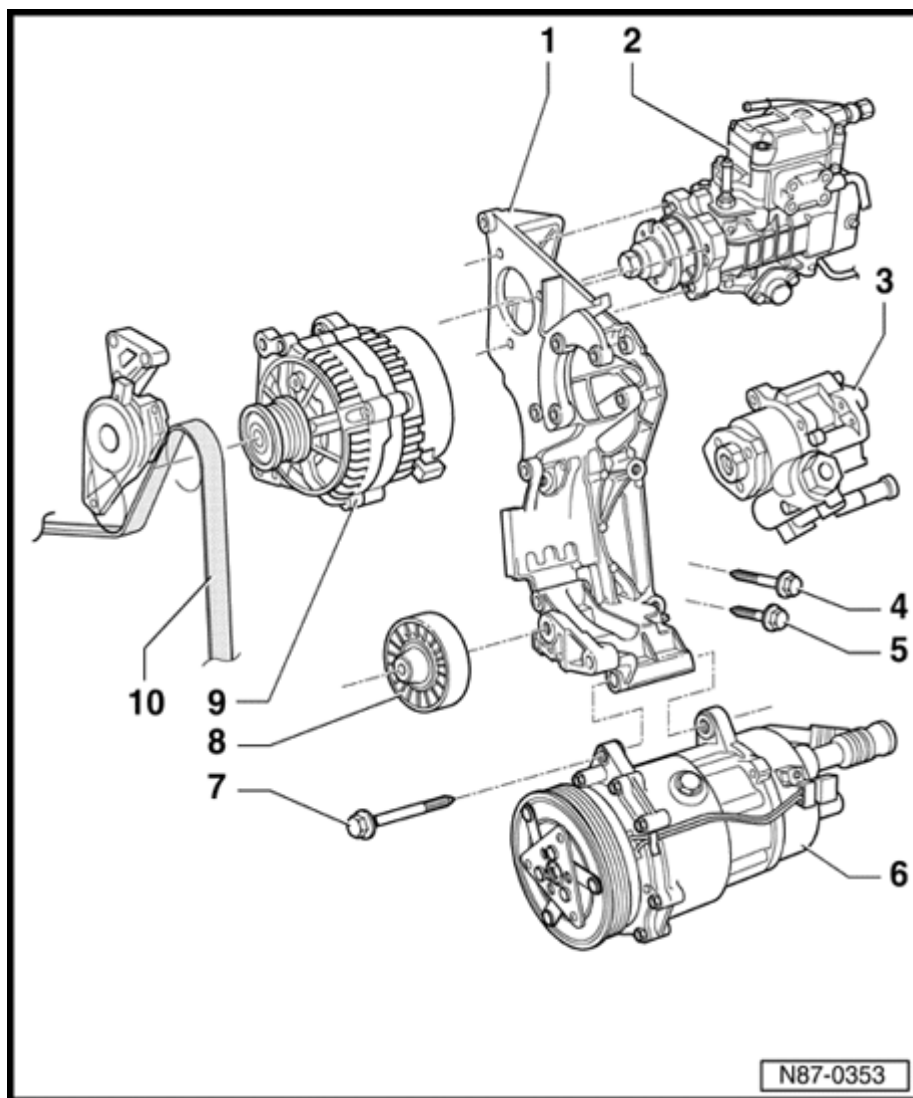
Fig. 1 Ribbed belt routing

Note:

Before removing ribbed belt, mark direction of rotation. When installing the belt ensure it is correctly seated in the pulley.

- 1 - Ribbed belt tensioner
- 2 - Generator pulley
- 3 - Compressor pulley
- 4 - Power steering pump pulley
- 5 - Crankshaft pulley/vibration dampener
- 6 - Water pump pulley

87-153



4-cylinder TDI engine

Special tools and equipment required

- ◆ Torque wrench (5 - 50 Nm)

Notes:

- ◆ *The compressor bracket and related components can be removed and installed without discharging the refrigerant circuit.*

1 Bracket for - injection pump, generator, compressor and power steering pump

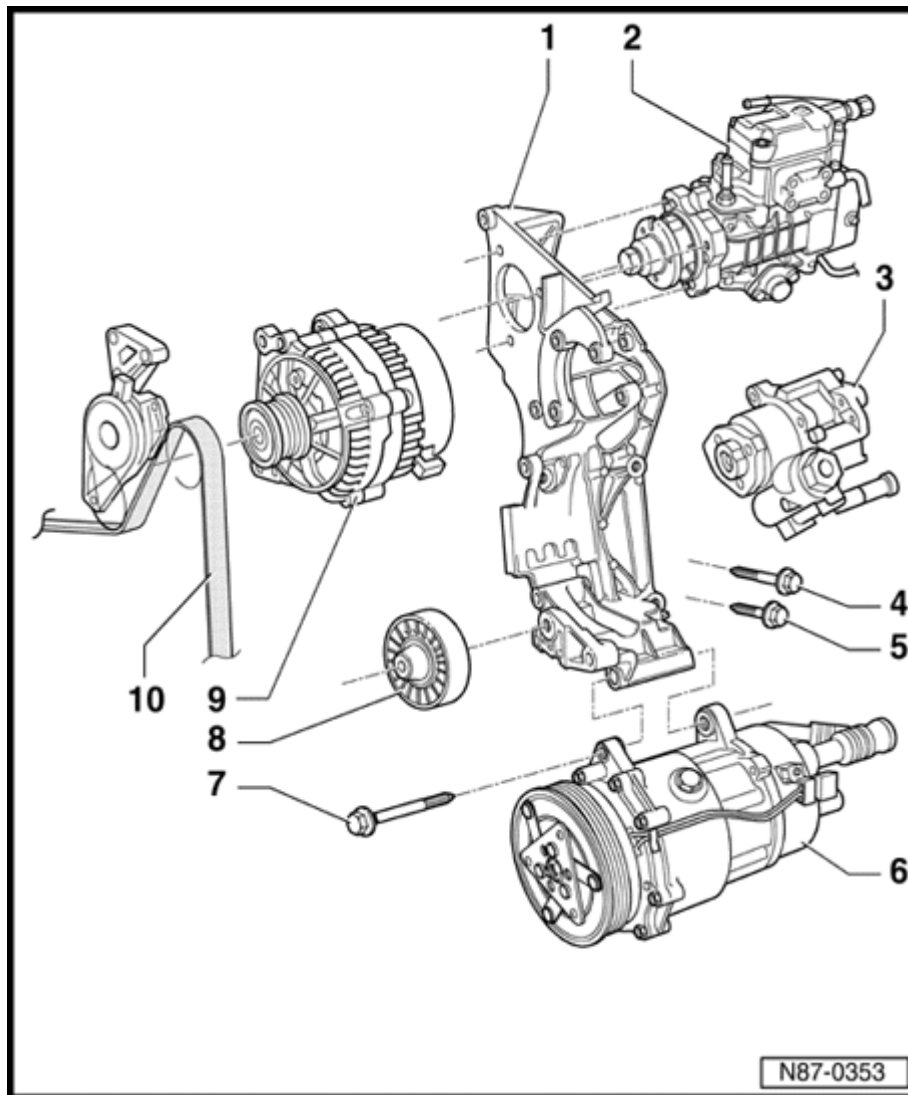
- ◆ Removing:
 - First remove injection pump, generator and power steering pump

⇒ [Repair Manual](#),

[Electrical](#)
[Equipment,](#)
[Repair Group](#)
[27](#) ⇒ [Repair](#)
[Manual,](#)
[Suspension,](#)
[Wheels,](#)
[Steering,](#)
[Repair Group](#)
[48](#) ⇒ [Repair](#)
[Manual, 1.9](#)
[Liter TDI 4-Cyl.](#)
[Diesel OBD II](#)
[Direct Fuel](#)
[Injection &](#)
[Glow Plug,](#)
[Repair Group](#)
[23](#)

- Remove bolts -7- (qty. 2)
- Remove compressor from bracket and suspend with wire on body.
- Remove bolts -4- and -5-.
- Remove bracket from engine block.

87-154



2 - Injection pump

◆ Removing:

⇒ *Repair Manual, 1.9 Liter TDI 4-Cyl. Diesel OBD II Direct Fuel Injection & Glow Plug, Repair Group 23*

3 - Power steering pump

◆ Removing:

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 48](#)

4 - Bolt

◆ M10X65

◆ 45 Nm
(33 ft lb)

◆ Qty.: 4

5 - Bolt

◆ M10X45

◆ 45 Nm
(33 ft lb)

◆ Qty.: 2

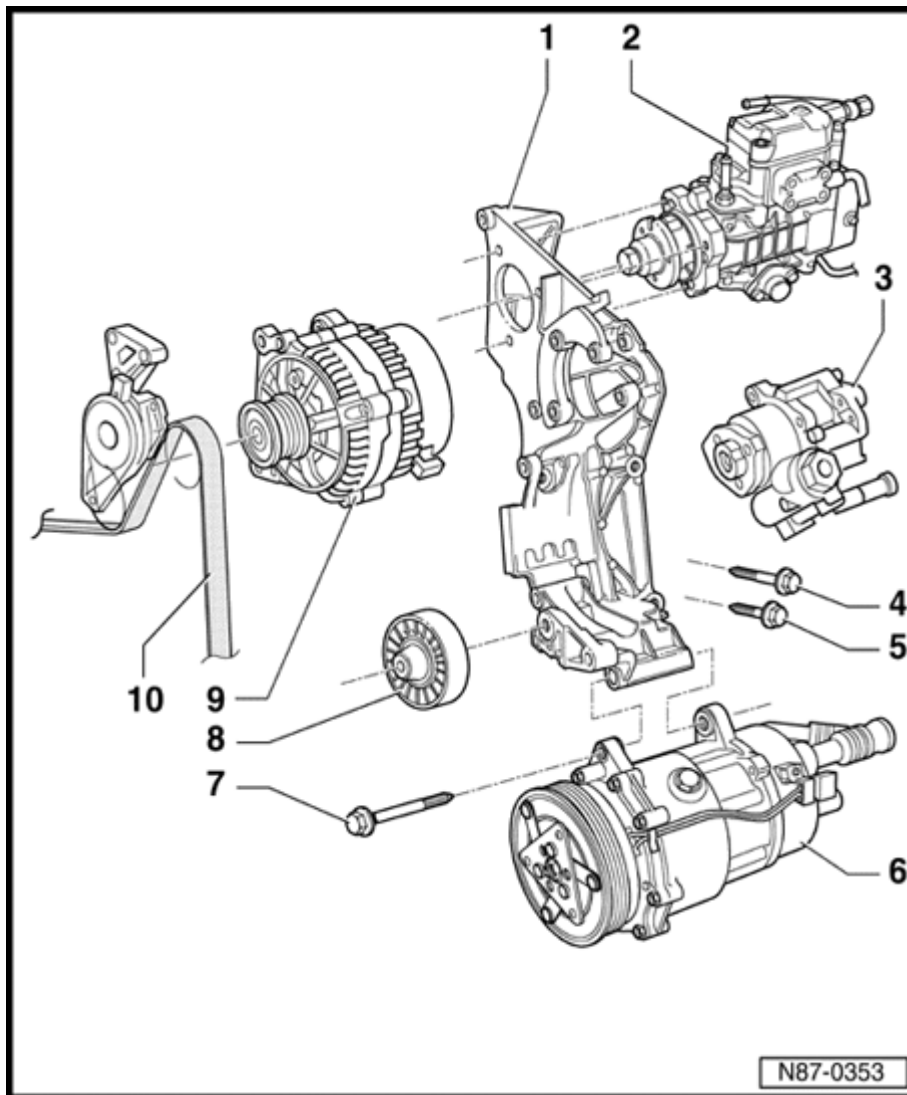
6 - Compressor

◆ Manufacturer: Sanden, designation: SD7V16

◆ Manufacturer: Zexel, designation: DCW-17D

- ◆ With A/C clutch - N25-
- ◆ -N25- (Sanden), servicing:
⇒ [Page 87-158](#) .
- ◆ -N25- (Zexel), servicing:
⇒ [Page 87-166](#) .

87-155

**7 - Bolt**

◆ M10X112

◆ 45 Nm
(33 ft lb)

◆ Qty. 2

8 - Idler pulley◆ Removing and installing
⇒ Fig. 2**9 - Generator**◆ Removing:
⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#)**10 - Ribbed belt**◆ Removing
⇒ [Fig. 1](#)◆ Ribbed belt routing
⇒ [Fig. 3](#)

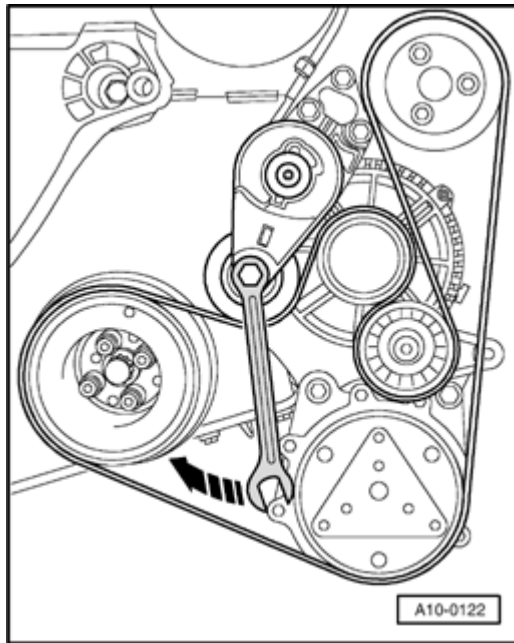


Fig. 1 Ribbed belt, removing (engine code ALH only)

Notes:

- ◆ Engine codes AEG and AFP ribbed belt, removing ⇒ Repair Manual, Engine Mechanical, Repair Group 13
- ◆ Before removing ribbed belt, mark the direction of rotation on the belt. When installing the belt be sure that it is correctly seated on the pulley.
- Apply flat ring wrench (16 mm) to hexagon of belt tensioner.
- Move wrench in direction of arrow.
- Remove ribbed belt.

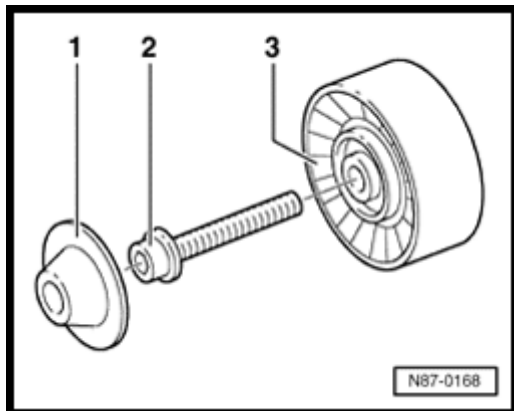


Fig. 2 Idler pulley, removing and installing

- 1 - Cover cap
- 2 - 25 Nm (18 ft lb)
- 3 - Idler roller

87-157

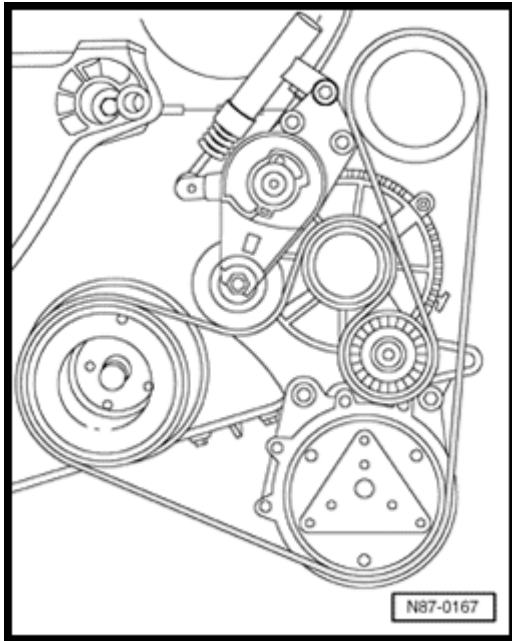
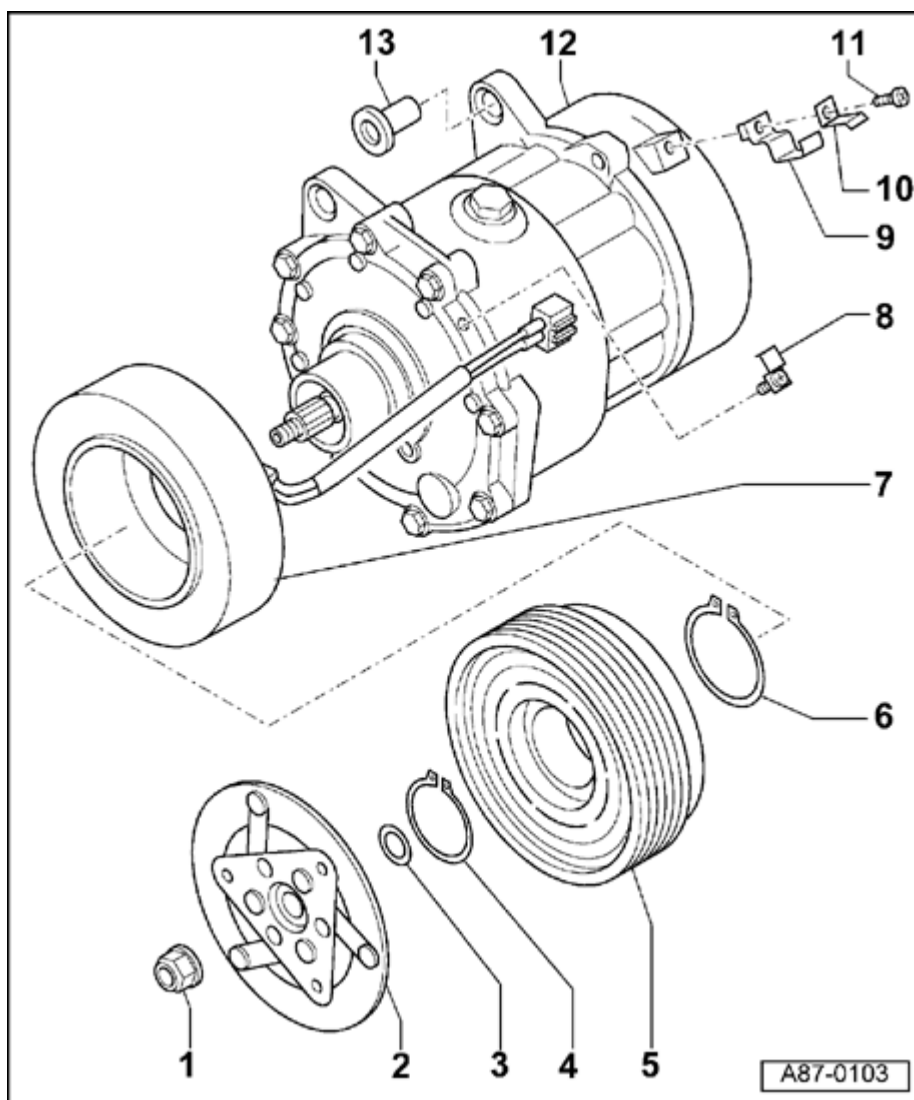


Fig. 3 Ribbed belt routing
(engine code ALH only)

Note:

When installing the belt, be sure that it is correctly seated on the pulley.

87-158



A/C clutch - N25- (Sanden), servicing

Special tools and equipment required

- ◆ Torque wrench (5 - 50 Nm)

Notes:

- ◆ *The compressor bracket and related components can be removed and installed without discharging the refrigerant circuit.*

- ◆ *Compressor can only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*

- ◆ *Removing ribbed belt:*

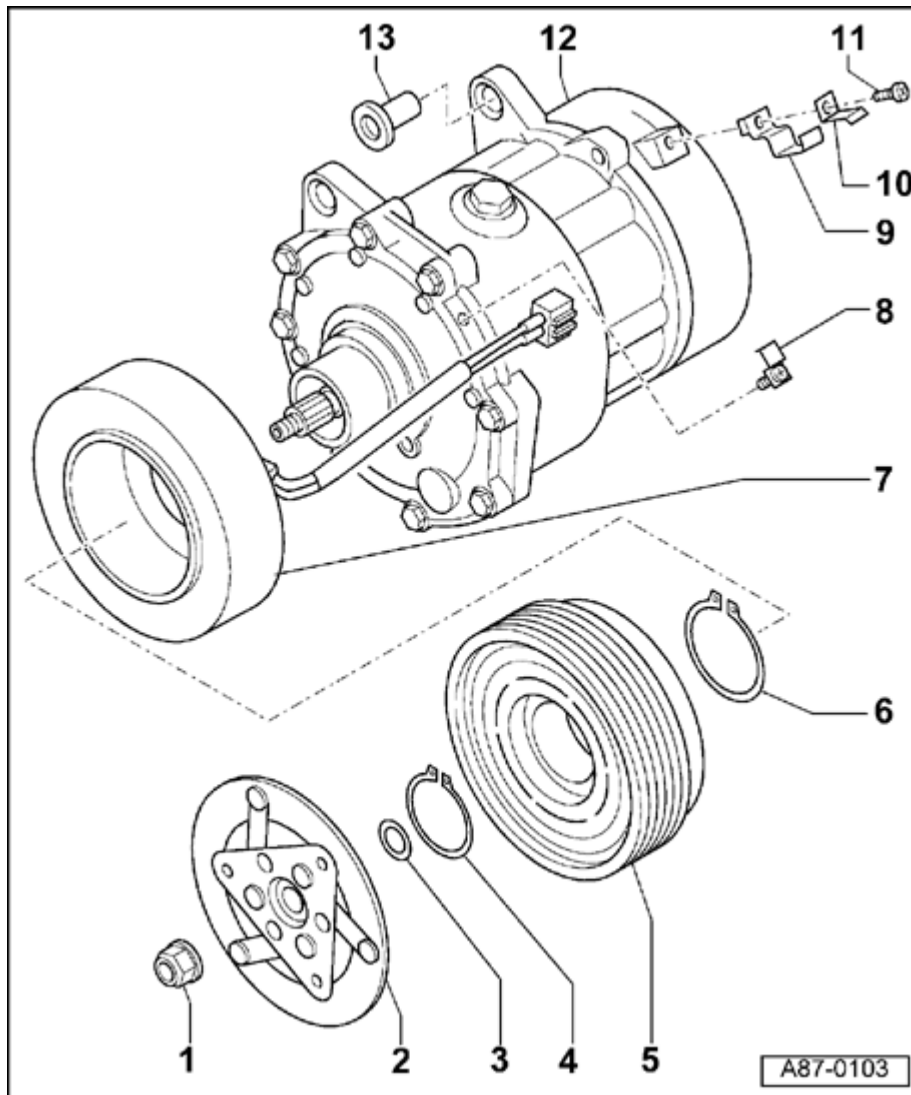
⇒ *Repair Manual, Engine Mechanical, Repair Group 13*

◆ *On Diesel engines, remove charge air cooler.*

⇒ *Repair Manual, 1.9 Liter TDI 4-Cyl. Diesel OBD II Direct Fuel Injection & Glow Plug, Repair Group 21*

◆ *A/C clutch, removing and installing ⇒ [Page 87-162](#).*

87-159

**1 - Nut**

- ◆ Self-locking
- ◆ Always replace
- ◆ 40 Nm
- ◆ Loosening and tightening ⇒ [Page 87-163](#)

2 - Clutch plate

- ◆ Removing ⇒ [Page 87-163](#)

3 - Shims

- ◆ To adjust gap between clutch plate and pulley

- ◆ Gap: 0.4...0.8 mm

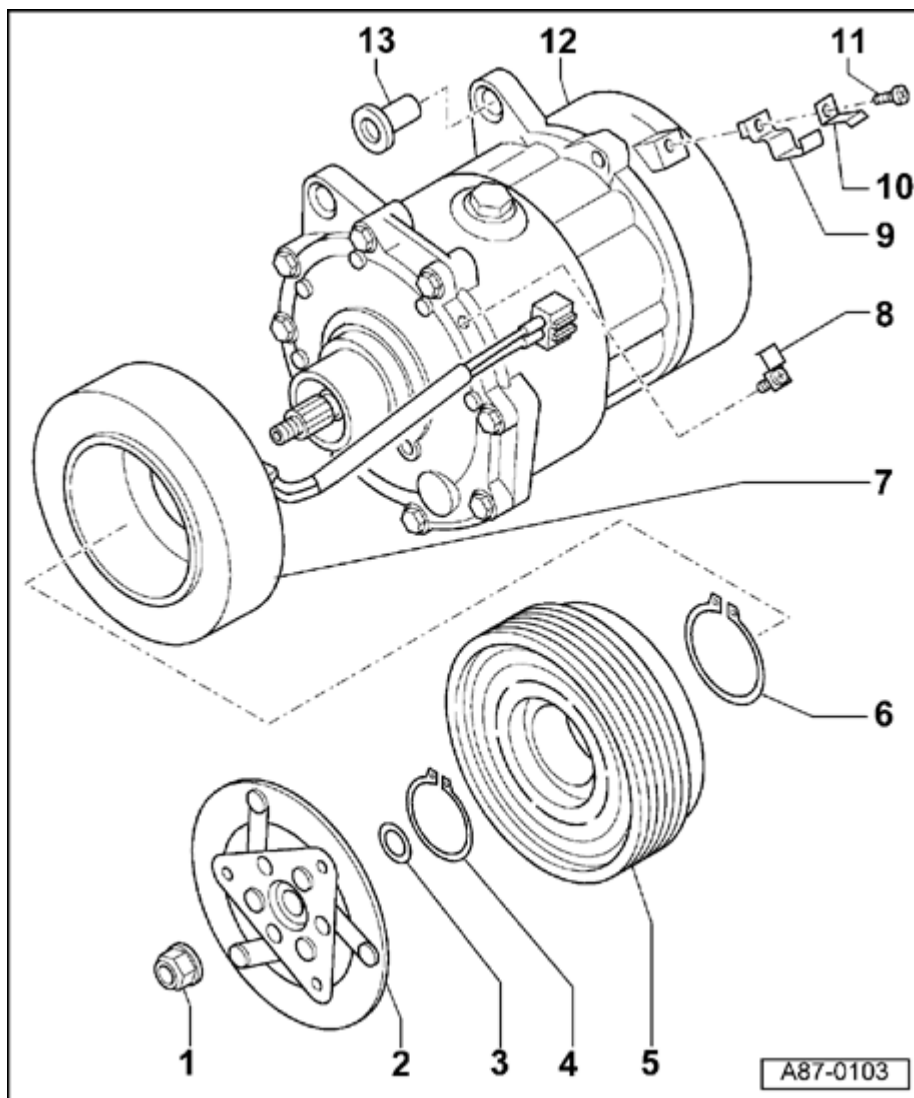
- ◆ Gap, checking ⇒ [Page 87-165](#)

4 - Circlip

- ◆ Always replace
- Flat side faces compressor
- ◆ Ensure proper seating

in
groove

87-160

**5 - Clutch pulley**

◆ Removing
⇒ [Page 87-164](#)

6 - Circlip

◆ Always replace

- Flat side must face compressor

◆ Must be seated correctly in groove

7 - Clutch coil

◆ Installing
⇒ [Page 87-164](#)

Note:

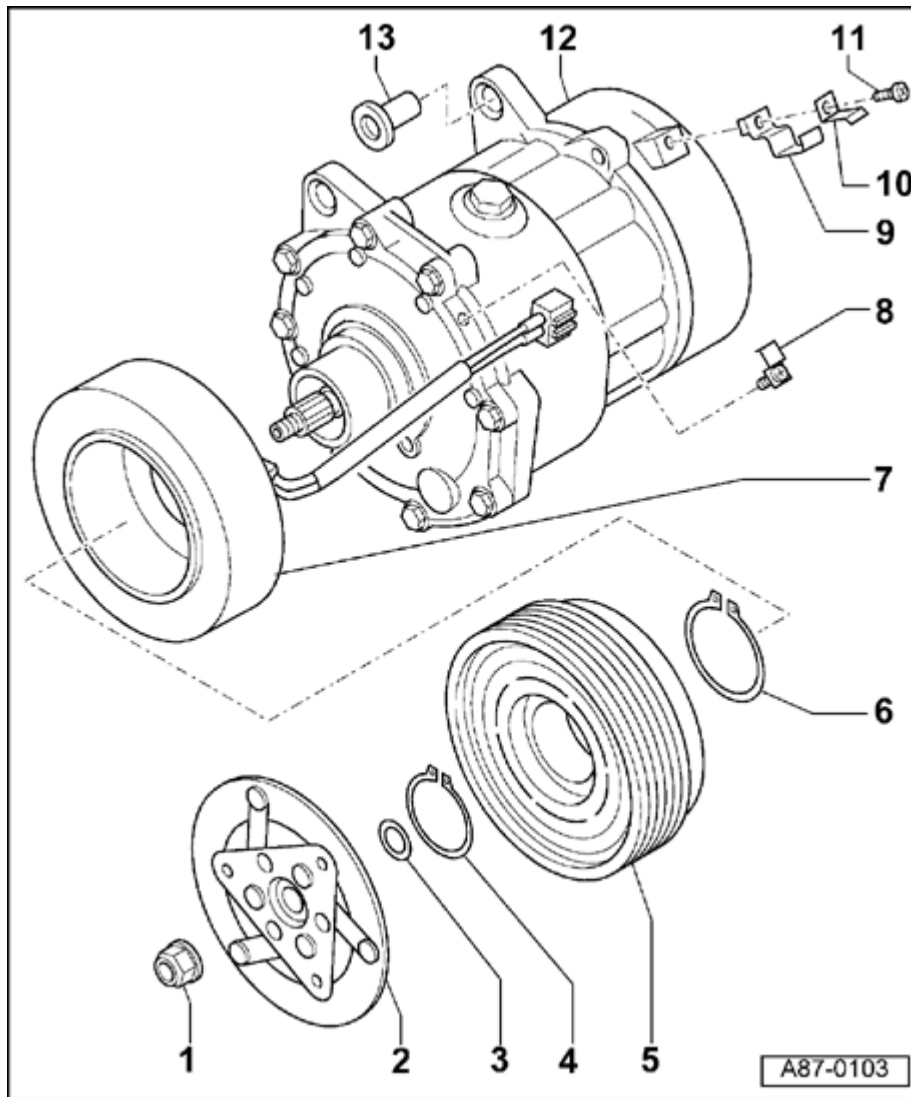
A thermo-fuse integrated into the clutch coil protects the A/C clutch in the event of overheating (e.g.: due to a binding compressor) The clutch coil circuit is interrupted.

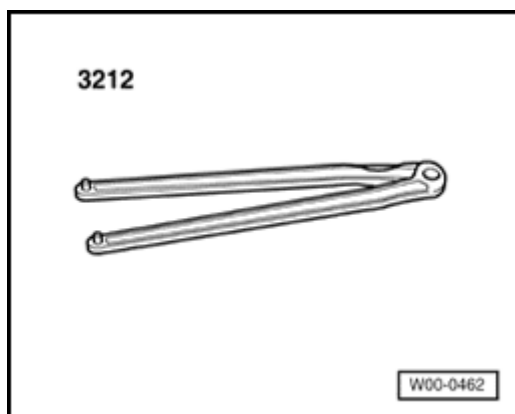
8 - Retainer

◆ With screw

9 - Retainer

87-161

**10 - Retainer****11 - Bolt****12 - Compressor**◆ Manufacturer:
Sanden**13 - Threaded
bushing**



A/C clutch -N25- (Sanden), removing and installing

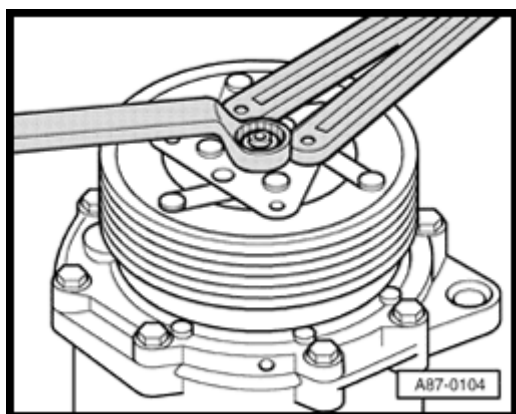
Special tools, testers, measuring instruments and auxiliary items required

- ◆ 3212 Spanner wrench (or equivalent two-hole pin wrench)
- ◆ Two arm puller
- ◆ Three arm puller
- ◆ Depth gauge
- ◆ Torque wrench (5 - 50 Nm)

Notes:

- ◆ *It is not necessary to discharge the refrigerant circuit to remove and install the A/C clutch.*
- ◆ *Remove ribbed belt ⇒ Repair Manual, Engine Mechanical, Repair Group 13 .*
- ◆ *On Diesel engines, remove charge air cooler ⇒ Repair Manual, 1.9 Liter TDI 4-Cyl. Diesel Engine Mechanical, Repair Group 21 .*

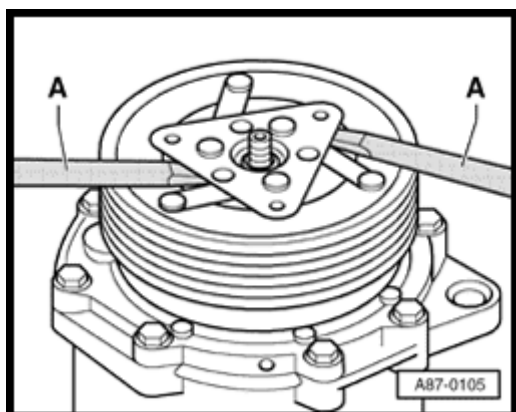
87-163



◀ Hex nut, removing and installing

◆ Tightening torque: 25 Nm (18 ft lb)

- Remove hex nut while counter holding with two-hole pin wrench 3212 (or equivalent with 4 mm pins).

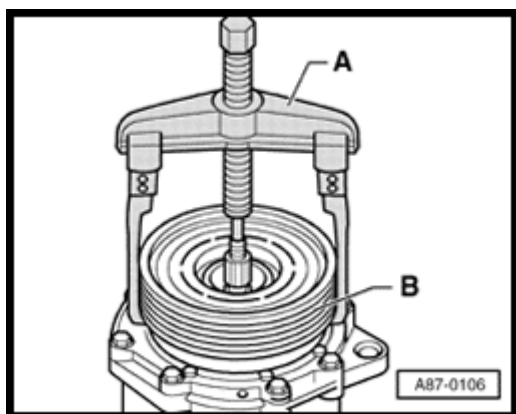


◀ Clutch plate, removing

- Carefully pry off clutch plate using two large screwdrivers -A-.

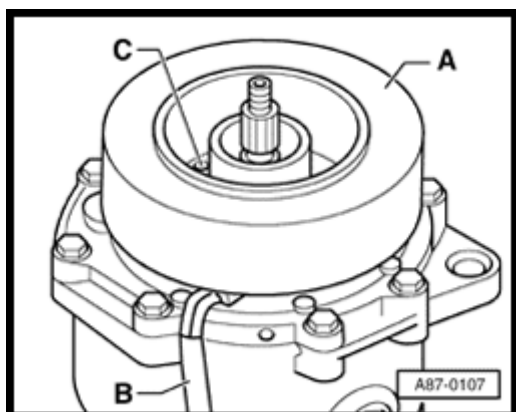
Use locally available two or three arm puller if plate is securely seated (difficult to remove).

87-164



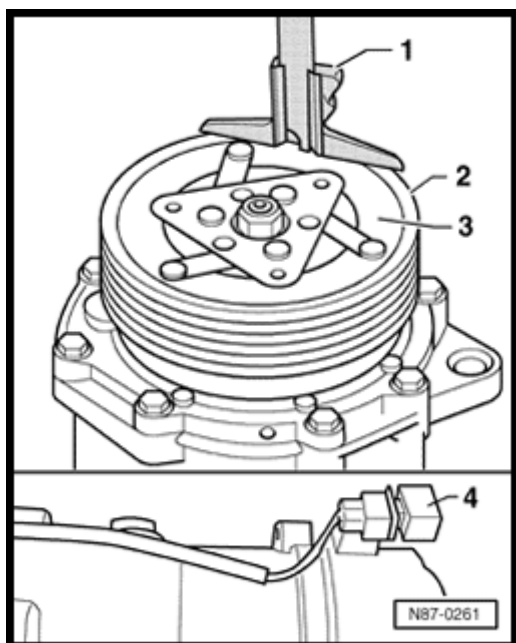
◀ Clutch pulley, removing

- Remove circlip ⇒ [Page 87-159](#) , key - 4 -
- Attach commercially available 2 arm puller -A- on shoulder -B- and pull off pulley.



◀ Clutch coil, installing

- Install coil on compressor.
- Locate locking pin on coil coil -A- into recess -C-.



◀ Clutch plate gap, checking

- ◆ Gap: 0.4...0.6 mm
(0.015...0.023 in)

Determining "Dimension 1"

- Using depth gauge -1-, measure gap between top of clutch plate -3- and pulley -2- at three equally spaced locations (measurement must not deviate). Note result.

Determining "Dimension 2"

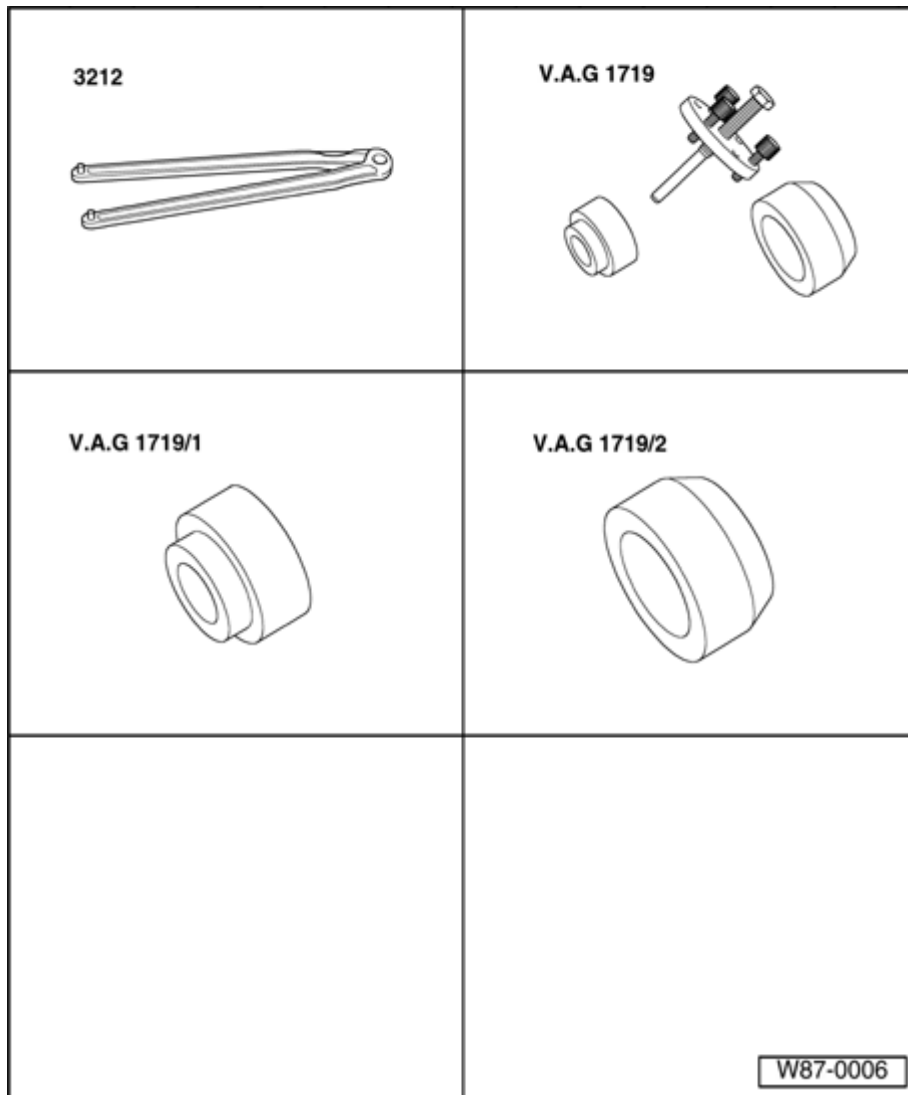
- If compressor is installed in vehicle, disconnect electrical connector -4- from vehicle wiring harness.
- Using a jumper wire, energize the clutch coil by applying 12V (B+) to connector -4-. If compressor is removed from vehicle, compressor must be grounded.
- With clutch energized, measure gap between belt pulley -2- and clutch plate -3- with depth gauge -1-. Note result.

The allowable gap (0.4...0.8 mm) is the difference between "Dimension 1" and "Dimension 2".

Notes:

- ◆ *Gap must be within tolerance around entire circumference.*
- ◆ *If the gap is outside the permitted tolerance range, remove clutch plate and adjust gap by adding or removing shims ⇒ [Page 87-159](#), key 3.*

87-166



A/C clutch - N25- (Zexel), servicing

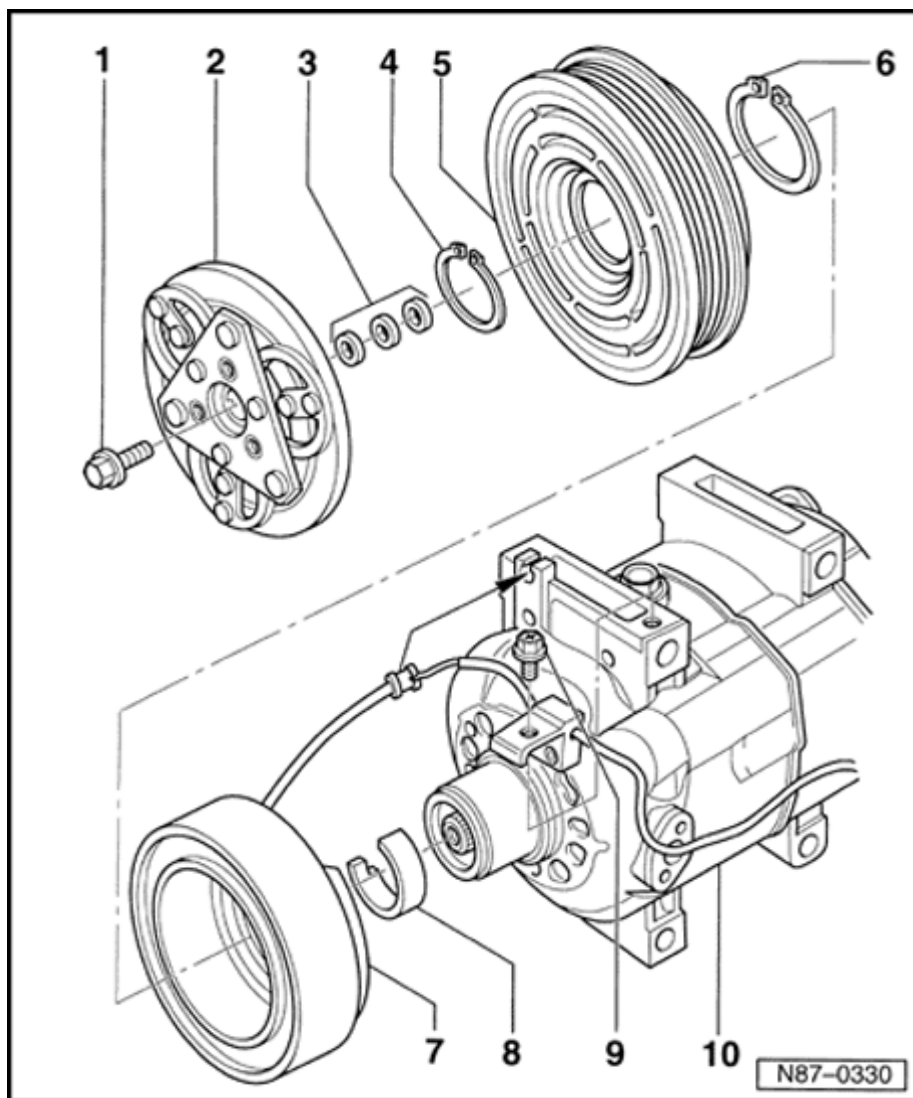
Special tools and equipment needed

- ◆ 3212
Spanner wrench (or equivalent two-hole pin wrench)
- ◆ VAG 1719
A/C clutch set
- ◆ VAG 1719/1
(included in VAG 1719)
- ◆ VAG 1719/2
(included in VAG 1719)

Not illustrated:

- ◆ Torque wrench 5 - 50 Nm
- ◆ Two arm puller Kukko 20-10 with 100 mm fixtures (or equivalent).
- ◆ Feeler gauge (locally available)

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**Notes:**

- ◆ *The compressor bracket and related components can be removed and installed without discharging the refrigerant circuit.*
- ◆ *Compressor can only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.*

1 - Clutch plate bolt

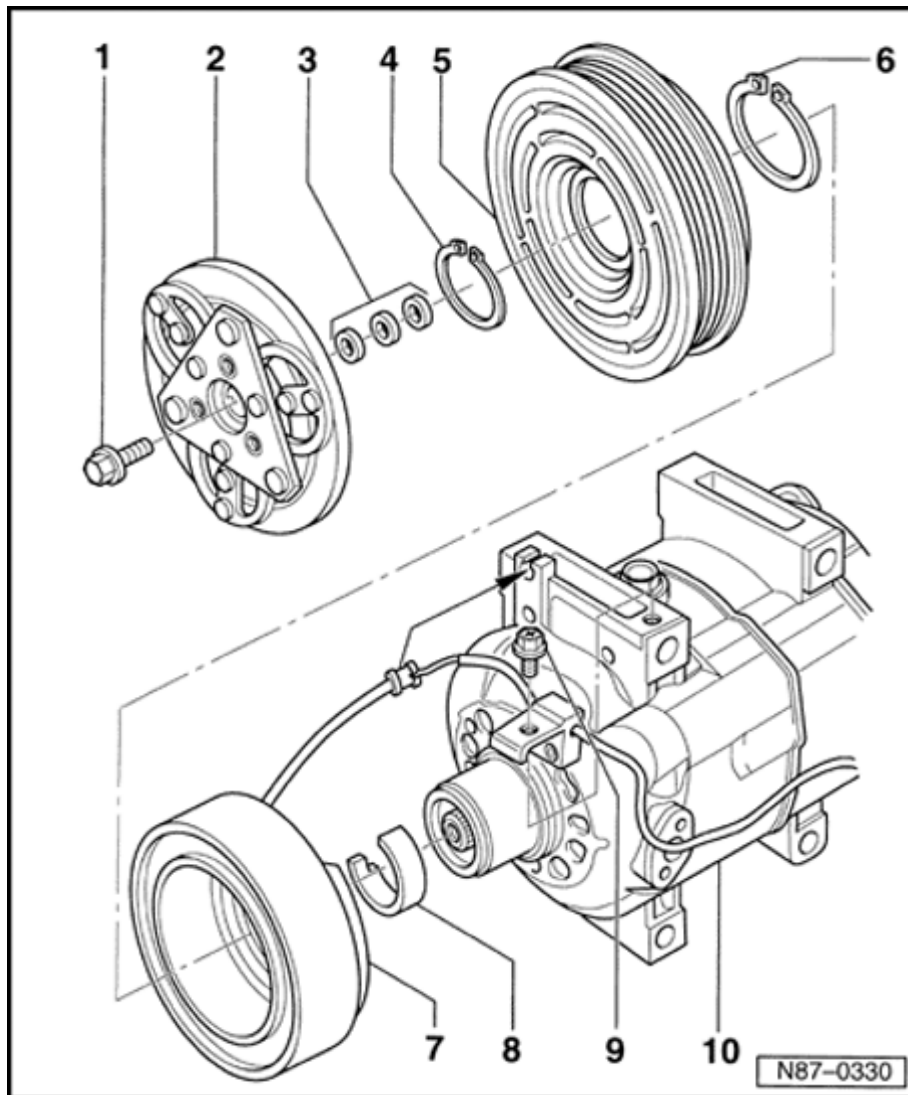
- ◆ 15 Nm (11 ft. lb.)

- ◆ Removing and installing ⇒ [Fig. 1](#)

2 - Clutch plate

- ◆ Removing ⇒ [Fig. 2](#)

87-168



3 - Shims

- ◆ To adjust gap between clutch plate and pulley

- ◆ Gap: 0.3 - 0.6 mm (0.0118 - 0.0236 in.)

- ◆ Gap, checking ⇒ [Fig. 6](#)

4 - Circlip

- ◆ Always replace
- Flat side must face compressor

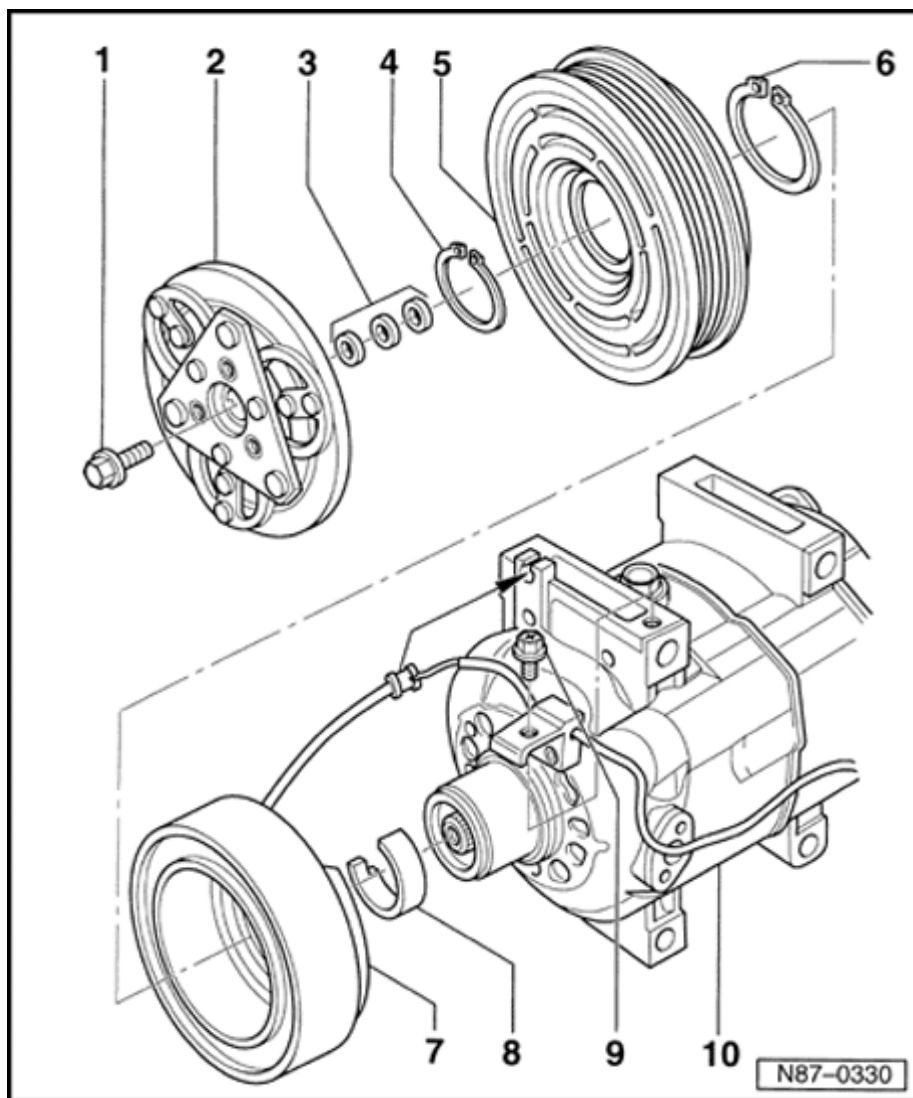
- ◆ Must be seated correctly in groove

5 - Clutch pulley

- ◆ Removing ⇒ [Fig. 3](#)

- ◆ Installing ⇒ [Fig. 4](#)

87-169

**6 - Circlip**

- ◆ Always replace
- Flat side must face compressor
- ◆ Must be seated correctly in groove

7 - Clutch coil

- ◆ Installing ⇒ [Fig. 5](#)

Note:

A thermo-fuse integrated into the clutch coil protects the A/C clutch in the event of overheating (e.g.: due to a binding compressor) The clutch coil circuit is interrupted.

8 - Felt gasket

- ◆ Always replace

9 - Screw**10 - Compressor**

- ◆ Manufacturer: Zexel

87-170

A/C clutch -N25- (Zexel), removing and installing.

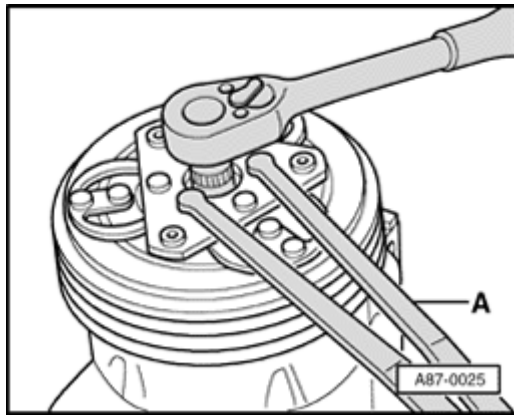


Fig. 1 Clutch plate bolt, removing

- Remove bolt
 - ◆ Tightening torque: 15 Nm (11 ft. lb.)

When removing and installing bolt, counter-hold with two-hole pin wrench -A- (3212 or equivalent with 4 mm pins).

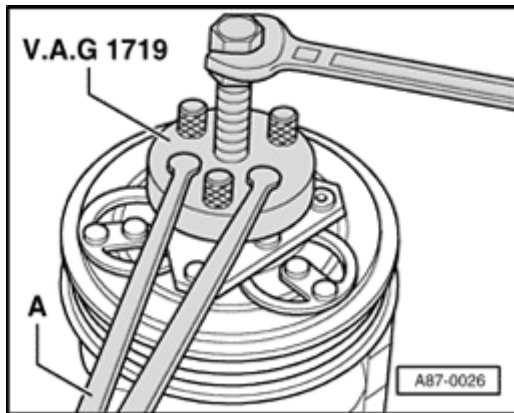
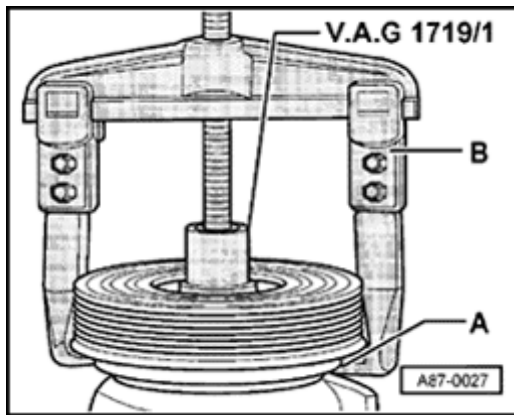


Fig. 2 Clutch plate, removing

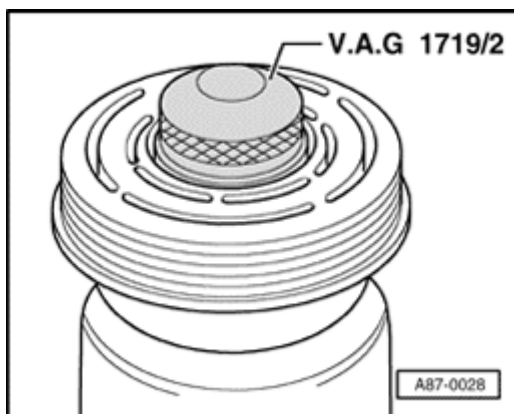
- Mount VAG 1719 and turn in center bolt to extract clutch plate.

When removing, counter-hold with two-hole pin wrench -A- (3212 or equivalent with 4 mm pins).

87-171

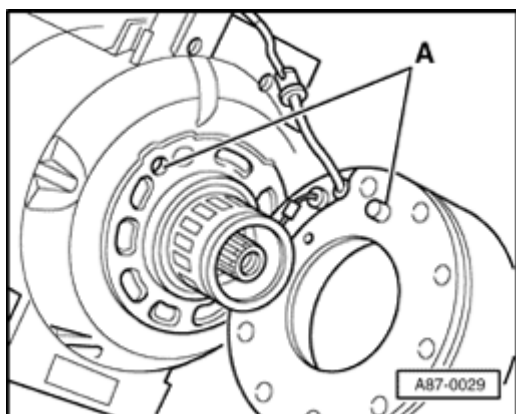
**Fig. 3 Clutch pulley, removing**

- Remove felt ring.
- Fit adapter VAG 1719/1 (or equivalent).
- Fit locally available 2 arm puller - B- on shoulder -A- and extract pulley.

**Fig. 4 Clutch pulley, installing**

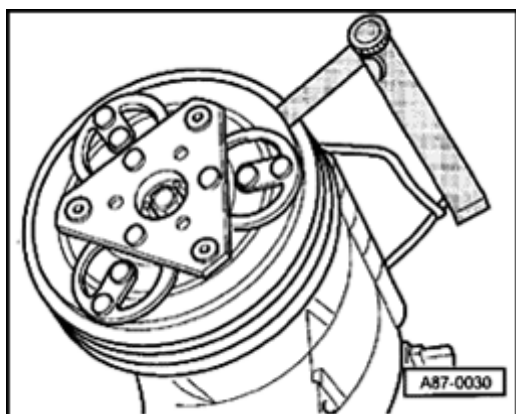
- Drive on belt pulley with plastic head hammer and VAG 1719/2 (or equivalent).

87-172



✦ **Fig. 5 Clutch coil, installing**

- Install coil on compressor.
- Position pin -A- in recess



✦ **Fig. 6 Clutch plate gap, checking**

- Check gap with feeler gauge.
 - ◆ Gap: 0.3 - 0.6 mm (0.0118 - 0.0236 in.)

Notes:

- ◆ *Gap must be within tolerance around entire circumference.*
- ◆ *If gap is outside tolerance range, remove clutch plate and adjust gap by adding or removing shims ⇒ item 3 , ⇒ [Page 87-168](#) .*

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[Characteristics of refrigerant R134a](#)

[Refrigerant oil](#)

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[Testing equipment and tools](#)

[List of testing equipment, tools and materials](#)

[Glossary](#)

General information for A/C system

Introduction

The purpose of this Repair Manual is to provide foremen and mechanics with the basic knowledge needed to ensure expert working.

Note:

- Only the careful study of this documentation and practical implementation of the information contained can guarantee expertise in the field of motor vehicle air conditioning systems.

It should also be available for presentation to the responsible supervisory agency on request.

Other reference material

- Technical Service Handbook outlining action to be taken to rectify current problems
- Repair Manual for model-specific servicing work
- Catalog of Electrical Wiring Diagrams, Troubleshooting Component Locations
- Self study programs
- Video programs for in-dealership training
- Catalog of Special tools / Workshop test binder
- Service Organization Volume 1 additional equipment

Principles of air conditioning systems

Physical principles:



The four known states of water also apply to air conditioning system refrigerants.

1. gaseous (invisible)
2. vapor
3. liquid
4. solid



When water is heated in a vessel (heat absorption), water vapor can be seen to rise. If the vapor is further heated through heat absorption, the visible vapor turns into invisible gas. The process is reversible. If heat is extracted from water in gaseous form, it changes first to vapor, then to water and finally to ice.

A - Heat absorption

B - Heat emission

Heat always flows from warmer to colder substance

Every substance consists of a mass of moving molecules. The fast moving molecules of a warmer substance give off some of their energy to the cooler and thus slower molecules. As a result, the molecular motion of the warmer substance slows down and that of the colder substance is accelerated. This process continues until the molecules of both substances are moving at the same speed. They are then at the same temperature and no further heat exchange takes place.

Pressure and boiling point

The boiling point given in tables for a liquid is always referenced to an atmospheric pressure of 1 bar. If the pressure acting on a liquid changes, its boiling point also changes.

For example, water boils at a lower temperature the lower the pressure.

The vapor pressure curves for water and refrigerant R134a show for example that, at constant pressure, reducing the temperature changes vapor to liquid (in condenser) or that, for instance, reducing pressure causes the refrigerant to change from liquid to vapor state (evaporator).



Vapor pressure curve of water

A - liquid

B - gaseous

C - Vapor pressure curve of water

1 - Pressure acting on liquid in bar (absolute)

2 - Temperature in C



Vapor pressure curve of refrigerant R134a

A - liquid

B - gaseous

D - Vapor pressure curve of refrigerant R134a

1 - Pressure acting on liquid in bar (absolute)

2 - Temperature in C

Vapor pressure table for refrigerant R134a

The vapor pressure table for every refrigerant is published in literature for refrigeration system engineers. This table makes it possible to determine the vapor pressure acting on the column of liquid in a vessel if the temperature of the vessel is known.

As there is a characteristic vapor pressure table for every refrigerant, refrigerant can be identified by measuring pressure and temperature.

Note:

- At absolute pressure, 0 bar corresponds to absolute vacuum. Normal ambient pressure (positive pressure) equals 1 bar absolute pressure. 0 pressure corresponds to an absolute pressure of one bar on most pressure gauges (indicated by -1 bar below 0).

Temperature in ° C	Pressure in bar (positive pressure) of R134a
-45	-0.61
-40	-0.49
-35	-0.34
-30	-0.16
-25	0.06
-20	0.32
-15	0.63
-10	1.00
-5	1.43
0	1.92
5	2.49
10	3.13
15	3.90
20	4.70
25	5.63
30	6.70
35	7.83

40	9.10
45	10.54
50	12.11
55	13.83
60	15.72
65	17.79
70	20.05
75	22.52
80	25.21
85	28.14
90	31.34

Refrigerant R134a

Vehicle air conditioning systems make use of the vaporization and condensation process. Use is made of a substance with a low boiling point, which is called refrigerant.

The refrigerant employed is tetrafluoroethane R134a, which boils at -26.5°C at a vapor pressure of 1 bar.

Physical data of refrigerant R134a

Chemical formula	CH_2FCF_3 or $\text{CF}_3\text{CH}_2\text{F}$
Chemical designation	Tetrafluoroethane
Boiling point at 1 bar	-26.5°C
Solidification point	-101.6°C
Critical temperature	100.6°C
Critical pressure	40.56 bar (absolute)

Critical point

The critical point (critical temperature and critical pressure) is that above which there is no longer a boundary between liquid and gas.

A substance above its critical point is always in the gaseous state.

At temperatures below the critical point, all types of refrigerant in pressure vessels exhibit both a liquid and a gas phase, i.e. there is a layer of gas above the liquid.

As long as both liquid and gas are present in the vessel, the pressure is governed by ambient temperature \Rightarrow [00-1, Vapor pressure table for refrigerant R134a](#) .

Note:

- Different types of refrigerant are never to be mixed. Only the refrigerant designated for the corresponding A/C

system may be used.

Environmental aspects of refrigerant R134a

- R134a is a fluorocarbon and contains no chlorine.
- R134a has a shorter atmospheric lifespan than refrigerant R12.
- R134a does not deplete the ozone layer.
- The global warming effect of R134a is ten times less than that of refrigerant R12.

Characteristics of refrigerant R134a

Trade names and designations

The refrigerant R134a is currently available under the following trade names:

- H-FKW 134a
- SUVA 134a
- KLEA 134a

Note:

- *Different trade names may be used in other countries.*
- *Of the wide range of refrigerants available, this is the only one which may be used for vehicles. The designations Frigen and Freon are trade names. They also apply to refrigerants which may not be used in automotive vehicles.*

Color

Like water, refrigerants are colorless in both vapor and liquid form. Gas is invisible. Only the boundary layer between gas and liquid is visible. (Liquid level in tube of charging cylinder or bubbles in sight glass). Refrigerant R134a liquid may appear colored (milky) in a sight glass. This cloudiness is caused by partially dissolved refrigerant oil and does not indicate a malfunction.

Vapor pressure

In a partially filled, closed vessel, the quantity of refrigerant evaporating from the surface equals the quantity returning to the liquid state as vapor particles condense. This state of equilibrium occurs under the influence of pressure and is often called vapor pressure. Vapor pressure is a function of

temperature ⇒ [00-1, Vapor pressure table for refrigerant R134a](#) .

Physical characteristics of R134a

The vapor pressure curves of R134a and other refrigerants are sometimes very similar, therefore it is not possible to make a certain distinction solely by pressure.

When using R134a, the compressor is lubricated by means of special synthetic refrigerant oils, e.g. PAG oils (polyalkylene glycol oils).

Reaction with metals

In its pure state, refrigerant R134a is chemically stable and does not corrode iron or aluminum.

Refrigerant impurities such as chlorine compounds however cause corrosion of certain metals and plastics. This can lead to blockage, leaks or deposits on the A/C compressor piston.

Critical temperature/critical pressure

The refrigerant R134a remains chemically stable up to a gas pressure of 39.5 bar (corresponding to a temperature of 101 ° C). Above this temperature, the refrigerant decomposes (refer to "Combustibility").

Water content

Only very small amounts of water are soluble in liquid refrigerant. On the other hand, refrigerant vapor and water vapor mix in any ratio.

Any water in the refrigerant circuit will be entrained in droplet form. Once the dryer, desiccant bag or dryer cartridge in the receiver or reservoir has absorbed as little as approx. 7 g of water, then it is saturated and cannot absorb any more water. If there is still water in the refrigerant circuit, it flows as far as the nozzle of the expansion valve or restrictor and turns to ice.

The A/C system no longer has a cooling effect.

Water destroys the air conditioner as it combines with other impurities at high pressures and temperatures to form acids.

Combustibility

Refrigerant is non-flammable. In fact, it has a fire-retardant

or extinguishing effect. Refrigerant decomposes when exposed to flames or red-hot surfaces. UV light (occurring for example during electric welding) also causes refrigerant decomposition. The resultant decomposition products are toxic and are not to be inhaled. However, irritation of the mucous membranes provides an adequate and timely warning.

Charge factor

A vessel must have space for vapor as well as liquid. As the temperature rises, the liquid expands. The vapor-filled space becomes smaller. At a certain point, there will only be liquid in the vessel. Beyond this, even a slight increase in temperature causes great pressure to build up in the vessel as the liquid attempts to continue expanding despite the absence of the necessary space. The resultant forces are sufficient to rupture the vessel. To avoid overfilling of vessels, regulations governing compressed gases specify the number of kilograms of refrigerant with which a vessel may be filled per liter of internal vessel volume. The product of multiplying this "charge factor" by the internal volume of the vessel is the permissible capacity. The figure for refrigerant used in vehicles is 1.15 kg/liter.

Leak detection

External damage, for example, can cause a leak in the refrigerant circuit. The small quantity of refrigerant escaping from minor leaks can be detected for example using an electronic leak detector or by introducing a leak detection additive into the refrigerant circuit. Electronic leak detectors are capable of registering leaks with refrigerant losses of less than 5 g per year. (Use must be made of leak detectors designed for the composition of the respective refrigerant. For example, a leak detector for R12 refrigerant is not appropriate for R134a, as R134a refrigerant has no chlorine atoms and the leak detector does not therefore respond).

Refrigerant oil

Refrigerant oil mixes with the refrigerant (about 20-40%, depending on compressor type and amount of refrigerant) and circulates constantly in the system, lubricating the moving parts.

Special synthetic refrigerant oils, e.g. polyalkylene glycol (PAG) oil, are used in conjunction with R134a air conditioning systems. This is necessary as mineral oil, for example, does not mix with R134a. In addition, the materials of the R134a air conditioning system could be corroded as a result of mixture flowing through the

refrigerant circuit under pressure at high temperatures or breakdown of the lubricating film in the compressor. The use of non-approved oils can lead to the failure of the air conditioning system and exclusive use is therefore to be made of authorized oils.

⇒ *Parts Catalog*

Type of oil for R134a in motor vehicles: PAG

Note:

- *Do not store refrigerant oils in open containers as they are extremely hygroscopic (water-absorbing).*
- *Always keep oil containers sealed.*
- *Do not re-use old refrigerant oil. Dispose of as used oil of unknown origin (refer to Disposal/Environmental Protection, Vol. 2-2. 43.1).*
- *Ester-based oils are only intended for use with large systems (not for motor vehicle air conditioners).*

Characteristics of refrigerant oil

The most important properties are a high degree of solubility with refrigerant, good lubricity, absence of acid and minimal water content. It is therefore only permissible to use certain specified oils. For list of approved refrigerant oils and capacities, refer to

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

.

PAG oils, which are appropriate for refrigerant R134a, are highly hygroscopic and do not mix with other oils. Opened containers should therefore be closed again immediately to prevent ingress of moisture. Moisture and acids promote ageing of refrigerant oil, causing it to become dark and viscous as well as corrosive towards metals.

Note:

- *For refrigerant circuits with refrigerant R134a, only the oil approved for the A/C compressor may be used. (Capacities*

⇒ *Repair Manual, Heating & Air Conditioning, Repair*

Group 87 ,

).

- On account of its chemical properties, refrigerant oil is not to be disposed of together with engine or gear oil ⇒
Disposal/Environmental Protection, Vol. 2-2. 43.1 .

Comfort

A basic requirement for concentration and safe driving is a feeling of comfort in the passenger compartment. Especially when it is hot and humid, comfort can only be attained through the use of air conditioning. Comfort can of course also be enhanced by opening windows/sun roof or increasing the air output, such a course of action is however associated with certain drawbacks for the occupants of the vehicle, e.g. more noise, draughts, exhaust fumes and unfiltered pollen (unpleasant for allergy sufferers).

Climate control together with a good heating and ventilation system concept can create a sense of wellbeing and comfort by regulating temperature, humidity and air circulation in the passenger compartment to suit ambient conditions, with the vehicle both stationary and moving.

Other important advantages of air conditioning:

- Purification of the air supplied to the passenger compartment (dust and pollen, for example, are washed out by the moist fins of the evaporator and removed with the condensate).
- Pleasant temperature levels (example: Mid-size car after short travelling time, ambient temperature 30 ° C in the shade and vehicle exposed to sunlight).

	With A/C system	Without A/C system
Head area	23 ° C	42 ° C
Upper body area	24 ° C	40 ° C
Foot area	30 ° C	35 ° C

Environmental aspects

Since roughly 1992, the air conditioning systems of newly manufactured cars have been successively converted to refrigerant R134a. This refrigerant contains no chlorine and therefore does not deplete the ozone layer.

Until roughly 1992, refrigerant R12 was used for air conditioning systems. Due to its chlorine atoms, this CFC has a high potential for depleting the ozone layer as well as

a tendency to increase the greenhouse effect.

Conversion programs are available for old existing systems filled with the ozone-depleting substance R12.

⇒ *Repair Manual for A/C systems with refrigerant R12*

For environmental protection reasons, refrigerants must not be released into the atmosphere ⇒ [00-3, Laws and regulations](#) (laws and regulations).

Mode of operation of air conditioning system

The temperature in the passenger compartment depends on the amount of heat radiated through the windows and conducted by the metal parts of the body. In hot weather it is possible to achieve a more comfortable temperature for the passengers by pumping off some of the heat.

As heat spreads into cooler areas, the passenger compartment is equipped with a unit for generating low temperatures with constant evaporation of refrigerant. The heat required for this is extracted from the air flowing through the evaporator.

After absorbing heat, the refrigerant is pumped off through the compressor. The action of the compressor increases the heat content and temperature of the refrigerant. Its temperature is then substantially higher than that of the surrounding air.

The hot refrigerant flows with its heat content to the condenser, where the refrigerant dissipates its heat to the surrounding air via the condenser due to the temperature gradient between the refrigerant and the surrounding air.

The refrigerant thus acts as a heat transfer medium. As it is to be reused, the refrigerant is returned to the evaporator.

For this reason all air conditioning systems are based on the refrigerant circulation principle. There are however differences in the combination of aggregates.

General work safety

- As per VBG 20, German industrial liability insurance association.

- Observe workshop specific instructions ⇒ *Environmental Protection Vol. 2-2. 23.0* , which must be hung in the refrigerant workshop.

Product characteristics

Refrigerants used in motor vehicle air conditioning systems belong to the new generation of refrigerants based on chlorine-free, partially fluorinated hydrocarbons (H-FKW, R134a).

With regard to their physical properties, these are refrigerants which have been liquefied under pressure. They are subject to the regulations governing pressure vessels and use is only to be made of approved and appropriately marked containers.

Compliance with specific conditions is required to ensure safe and proper use.

Refrigerant, handling

Warning!

There is a danger of ice-up.

Refrigerant may escape in liquid or vapor form.

Do not open vessels which store refrigerant.

If refrigerant vessels are opened, the contents may escape in liquid or vapor form. This process is intensified the higher the pressure in the vessel.

The pressure level is governed by two factors:

- The type of refrigerant in the vessel. "Rule: The lower the boiling point, the higher the pressure."
- The temperature level. "Rule: The higher the temperature, the higher the pressure."

Wear protective goggles

Put on protective goggles. It prevents refrigerant getting into the eyes, as this could cause severe injury from exposure to cold.

Wear protective gloves and apron

Greases and oils dissolve readily in refrigerants. They would therefore destroy the protective layer of grease if allowed to come into contact with the skin. Degreased skin is however sensitive to the cold and germs.

Do not allow liquid refrigerant to come into contact with the skin

The refrigerant draws heat for evaporation from the surrounding area - even if this is the skin. This may cause extremely low temperatures. Local frost bite may result (boiling point of R134a: -26.5°C at ambient pressure).

Do not inhale refrigerant vapor

Note:

- If highly concentrated refrigerant vapor escapes, it mixes with the surrounding air and displaces the oxygen necessary for breathing.

Absolutely no smoking

A burning cigarette can cause refrigerant to decompose. The resultant substances are toxic and must not be inhaled.

Welding and soldering on refrigeration systems

Before performing welding or soldering work on vehicles in the vicinity of air conditioning system components, extract refrigerant and remove remnants by flushing with nitrogen.

The products of refrigerant decomposition due to the effect of heat are not only toxic, but may also have a highly corrosive effect on pipes and system components. They mainly take the form of hydrogen fluoride.

Pungent odor

A pungent odor indicates that the products of decomposition mentioned above have already formed. Avoid inhaling these substances under all circumstances, as otherwise the respiratory system, lungs and other organs could be damaged.

First aid

- Following contact with eyes or mucous membranes, immediately rinse with copious amounts of running water and consult an eye specialist.
- Following contact with the skin, immediately remove clothing affected and rinse skin with copious amounts of water.
- Following inhalation of highly concentrated refrigerant vapors, person concerned is to be taken immediately into the open air. Call a doctor. Administer oxygen in the event of breathing difficulties. If the person affected is having great difficulty breathing or is not breathing at all, tilt back

head at neck and administer artificial respiration.

Pressure vessels, handling

- Secure vessels to prevent them falling over.

Secure upright cylinders to stop them falling over and cylinders lying flat to stop them rolling away.

- Do not throw vessels!

If dropped, the vessels could be so severely deformed that they rupture. The refrigerant evaporates immediately, liberating considerable force. Flying fragments of cylinders can cause severe injuries.

Valves may break off if cylinders are not properly transported. To protect the valves, cylinders are only to be transported with protective cap screwed on.

- Never store in the vicinity of radiators.

High temperatures may occur next to radiators. High temperatures are also accompanied by high pressures and the maximum permissible vessel pressure may be exceeded.

Do not heat above 50 ° C

To avoid possible risk, pressure vessel regulations specify that vessels are not to be heated to in excess of 50 ° C.

Do not heat in an uncontrolled manner

Do not heat with a naked flame under any circumstances. Localized overheating can cause structural changes in the vessel material, which then reduce its ability to withstand pressure. There is also a danger of refrigerant decomposition due to localized overheating.

Seal empty vessels

Empty refrigerant vessels must always be sealed to prevent the ingress of moisture. Moisture causes corrosion of steel vessels. This weakens the vessel walls. In addition, rust particles penetrating into refrigeration systems from vessels will cause malfunctioning.

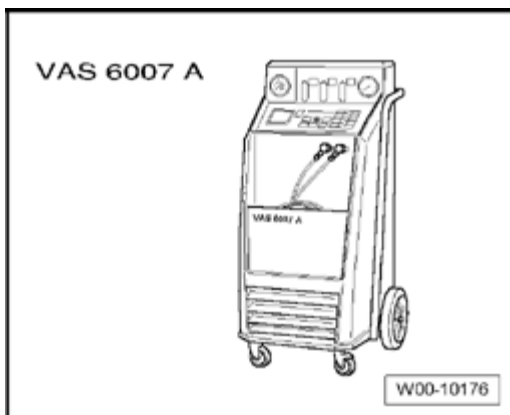
Safety regulations for working with extraction and charging systems

- Make sure the shut-off valves are closed before connecting the charging system to the air conditioning

system.

- Before disconnecting the charging system from the air conditioning system, make sure the charging process has been completed to stop refrigerant escaping into the atmosphere.
- Once the purified refrigerant from the charging system has been transferred to an external compressed-gas cylinder, close the hand shut-off valves at the cylinder and charging system.
- Do not expose charging system to moisture or use it in a wet environment.
- Disconnect from power supply before performing service work on the charging system.
- Never use an extension cable on account of the fire hazard. If the use of an extension cable is unavoidable, the minimum cross-section should be 2.5 mm².
- In case of fire, remove external cylinder.
- Entrained oil from the air conditioning system drawn by the suction unit into the measurement vessel supplied is subsequently to be transferred to a sealed container, as it contains a small quantity of refrigerant which must not be released into the environment.
- Following shutdown, service station is to be secured to stop it rolling away.

Safety measures for working on vehicles with air conditioning system and for handling refrigerant R134a



A/C service station VAS 6007A

Warning!

- It is recommended to have an eye-flushing bottle available.**
- If liquid refrigerant has come in contact with your skin and eyes, immediately flush with cool water for 15 minutes. Afterwards instill eye drops and consult a doctor immediately, even when the eyes are not hurting.**
- The doctor must be informed that the injury was caused by refrigerant R134a. Should refrigerant come into contact with other parts of the body despite compliance with safety regulations, these must likewise be rinsed immediately for at least 15 minutes with cold water.**
- Work on refrigerant system should only be performed in ventilated areas (workshops). Switch on existing ventilation systems.**
- Refrigerant must not be stored in low-level areas (e.g. cellars) and corresponding exits or light wells.**
- Do not attempt repair on filled air conditioning systems by soldering, brazing or welding. This applies also for welding and soldering work on the vehicle, in the event that parts of the A/C system may heat up. When performing paintwork repairs, the temperature in the drying booth or preheating zone must not exceed 80 ° C.

Reason:

Exposure to heat gives rise to considerable pressure in the system, which could cause the pressure relief valve to open.

Corrective action:

- Discharge refrigerant circuit using service station.

Note:

- Always replace damaged and/or leaking A/C system components. Do not attempt repair by soldering, brazing or welding.

Refrigerant vessels (e.g. charging cylinders of service station) must never be subjected to excessive heat or exposed to direct sunlight.

Corrective action:

- Vessels must never be completely filled with liquid refrigerant. Without sufficient room for expansion (gas

cushion), vessels will rupture with devastating effect in the event of an increase in temperature ⇒ [00-1, Characteristics of refrigerant R134a](#) .

Refrigerant is never to be transferred to systems or vessels in which air is present.

Corrective action:

- Evacuate systems and vessels before charging with refrigerant.

Basic rules for working on refrigerant circuit

- Observe workplace-specific instructions ⇒ *refer to Environmental Protection Vol. 2-2. 23.0* .

- Ensure absolute cleanliness when working.

- Wear safety goggles and gloves when working with refrigerant and nitrogen.

- Switch on existing ventilation systems.

- Use service station to discharge refrigerant circuit, only then open screw connections and replace malfunctioning components.

- Use caps to seal off opened assemblies and hoses to prevent ingress of moisture and dirt.

- Make exclusive use of tools and materials intended for refrigerant R134a.

- Re-seal opened refrigerant oil vessels to guard against moisture.

- Flush refrigerant circuit with compressed air and nitrogen if:

- Moisture or dirt has penetrated into refrigerant circuit (e.g. following an accident)

- Refrigerant oil is dark and viscous.

- There is too much refrigerant oil in the refrigerant circuit after compressor replacement.

- The A/C compressor had to be replaced on account of "internal" damage (e.g. noise or no output).

In vehicles with A/C compressor without A/C clutch:

Note:

- *The engine is only to be started following complete assembly of the refrigerant circuit.*
- *If possible start engine only with a filled refrigerant circuit.*
- *A/C compressor is driven permanently by the ribbed belt pulley/torsion elastic clutch (not installed with an A/C clutch):*
 - *If an A/C compressor locks-up the overload safeguard for the A/C compressor shaft is triggered. Also if no outward bulges are visible on ribbed belt pulley/ overload safeguard, it may also be that the A/C compressor is locked up. Another indicator is abraded rubber material in the area of the ribbed belt pulley/overload safeguard*
- *The A/C compressor is equipped with a protected oil supply, this prevents A/C compressor damage in the event that the system is empty. This means that approx.40 to 50 cm³ of refrigerant oil remains in the A/C compressor.*
- *The engine should only be started when the refrigerant circuit is completely and properly installed. For example; if the refrigerant lines are not connected to the A/C compressor, when the engine is running the A/C compressor may heat up (via internal heat generation) so much that the compressor will be destroyed.*
- *A/C Compressor Regulator Valve N280 is not activated when the refrigerant circuit is empty and the A/C compressor idles with the engine.*
- *If it is necessary to start the engine with a discharged refrigerant circuit:*
 - *Refrigerant circuit must be fully assembled.*
 - *At least 1/4 of the prescribed refrigerant oil must be in the A/C compressor.*
 - *Engine speed should not increase above 2500 RPM.*
 - *The engine should only run as long as absolutely necessary*

O-ring seals

- *Make exclusive use of seals which are resistant to refrigerant R134a and the related refrigerant oils. Color coding of O-rings is no longer employed. Colored and black O-rings are used.*
- *For used O-rings, make sure inner diameter is correct.*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

⇒ *Parts Catalog*

- Use O-rings only once.
- Before installing O-rings, coat lightly with refrigerant oil (PAG oil).

Note:

- *When flushing components with compressed air and nitrogen, always extract the gas mixture escaping from the components using suitable extraction units (workshop extraction system).*
- *After ending all service work, screw sealing caps (with seals) onto all connections with valve and service connections.*

Before starting up A/C system. Observe vehicle specific filling capacities

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

.

Do not top off refrigerant, extract refrigerant present and fill the system anew.

Before starting up A/C system after fresh charging

- After installing a new A/C compressor or fresh refrigerant oil has been filled into compressor (e.g. after flushing the A/C system), turn ribbed belt pulley of A/C compressor 10 rotations by hand before starting the engine. This prevents damage to the A/C compressor
- For 5-cyl. and 10 cyl. diesel engines, rotate A/C compressor 10 rotations by hand at overload safeguard. After that, install A/C compressor. This prevents damage to the A/C compressor
- Start engine with A/C system (A/C Clutch N25 and A/C Compressor Regulator Valve N280) switched off.
- Following engine idling speed stabilization, switch on A/C compressor and run it for at least 10 minutes at idling

speed with maximum cooling output.

General information on refrigerant circuit

Components of refrigerant circuit

- All components of the refrigerant circuit submitted for quality observation are always to be sealed (use original sealing caps of replacement part).
- Replace damaged or leaking components of refrigerant circuit ⇒ [00-8, Components, replacing](#) .
- To date, the following replacement parts (compressor, reservoir, receiver, evaporator and condenser) have been filled with nitrogen gas. This charge is being gradually discontinued. Little or no pressure equalization is therefore noticeable on unscrewing sealing plugs from replacement parts.

Arrangement of refrigerant circuit components and their influence on high and low pressure sides

On high pressure side are the condenser, receiver and restrictor or expansion valve to separate the high and low pressure liquid sides.

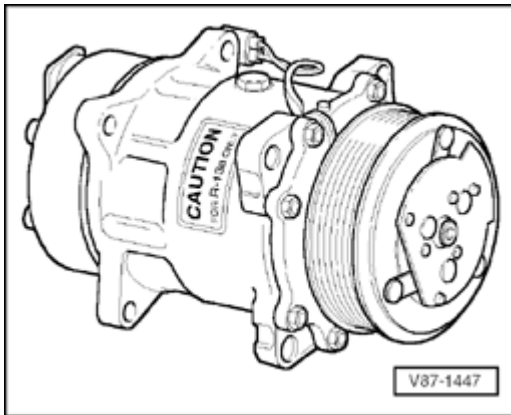
High pressure results from the restrictor or expansion valve forming a constriction and causing the refrigerant to accumulate, thus leading to an increase in pressure and temperature.

Excess pressure occurs if too much refrigerant or refrigerant oil is used, the condenser is contaminated, the radiator fan is malfunctioning, the system is blocked or in the event of moisture in the refrigerant circuit (icing-up of restrictor or expansion valve).

On low pressure side are the evaporator, reservoir, evaporator temperature sensor and compressor to separate high and low pressure gas sides

A drop in system pressure can be caused by loss of refrigerant, the restrictor or expansion valve (no constriction), a malfunctioning A/C compressor or an iced-up evaporator.

A/C compressor with A/C clutch



A/C compressor is driven by vehicle engine via a ribbed belt.

An electromagnetic clutch attached to A/C compressor provides the power link between the ribbed belt pulley and A/C compressor crankshaft with A/C system switched on.

A fuse installed in ribbed belt pulley of A/C compressor triggers the electromagnetic clutch when A/C compressor runs with resistance and protects the ribbed belt drive against overload.

The A/C compressor extracts the refrigerant gas from the evaporator, compresses it and relays it to the condenser.

Note:

- *The A/C compressor contains refrigerant oil, which can be mixed with refrigerant R134a under any temperature.*
- *The refrigerant for which the A/C compressor is designed is listed on the manufacturers plate. A regulator valve regulates pressure within the specified range (control characteristics) on the low pressure side.*
- *So that the A/C compressor is not damaged when refrigerant circuit is empty, the A/C clutch is switched off and the A/C Compressor Regulator Valve N280 is no longer activated (A/C compressor runs at idle with engine).*

A/C compressor without A/C clutch



A/C compressor is driven by vehicle engine via a ribbed belt.

An overload safeguard (bearing-type connection) installed in ribbed belt pulley of A/C compressor triggers when A/C compressor runs with resistance and protects the ribbed belt drive against overload.

The A/C compressor extracts the refrigerant gas from the evaporator, compresses it and relays it to the condenser.

Note:

- *The A/C compressor contains refrigerant oil, which can be mixed with refrigerant R134a under any temperature.*
- *The refrigerant for which the A/C compressor is designed is listed on the manufacturers plate. A regulator valve regulates pressure within the specified range (control characteristics) on the low pressure side.*
- *In this A/C compressor, the regulator valve is activated from outside.*
- *Engine should only be started when the refrigerant circuit is completely assembled ⇒ [00-1, Basic rules for working on refrigerant circuit](#) .*
- *The A/C compressor is equipped with a protected oil supply, this prevents A/C compressor damage in the event that the system is empty. This means that approx.40 to 50 cm³ of refrigerant oil remains in the A/C compressor.*

A/C compressor without A/C clutch with torsion-elastic clutch



A/C compressor is driven directly by the power steering vane pump.

An overload safeguard is installed on drive shaft of A/C compressor which shears off when A/C compressor locks up so that power steering vane pump remains functional.

The A/C compressor extracts the refrigerant gas from the evaporator, compresses it and relays it to the condenser.

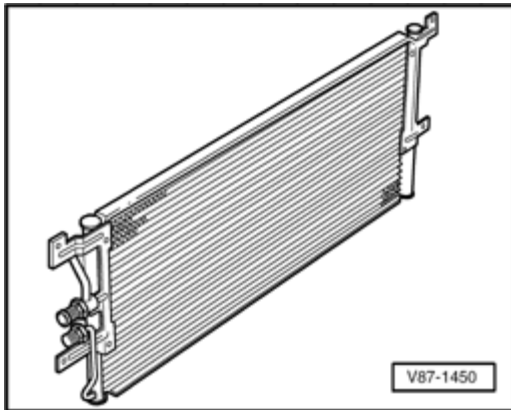
Note:

- *The A/C compressor contains refrigerant oil, which can be mixed with refrigerant R134a under any temperature.*
- *The refrigerant for which the A/C compressor is designed is listed on the manufacturers plate. A regulator valve regulates pressure within the specified range (control characteristics) on the low pressure side.*
- *In this A/C compressor, the regulator valve is activated from outside.*
- *Engine should only be started when the refrigerant circuit*

is completely assembled ⇒ [00-1, Basic rules for working on refrigerant circuit](#) .

- The A/C compressor is equipped with a protected oil supply, this prevents A/C compressor damage in the event that the system is empty. This means that approx.40 to 50 cm³ of refrigerant oil remains in the A/C compressor.

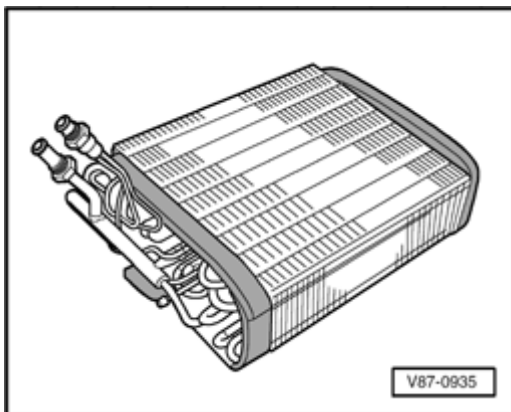
Condenser



The condenser conducts heat from compressed refrigerant gas to the ambient air.

This condenses the refrigerant gas to liquid.

Evaporator



The liquid refrigerant evaporates in the evaporator pipe coils. The heat required for this is drawn from the air flowing on the evaporator ribbing. The air cools off. Refrigerant evaporates and is extracted with the absorbed heat by the A/C compressor.

A defined amount of refrigerant is supplied to the evaporator by a restrictor or expansion valve. In systems with expansion valve, the flow is regulated so that only gaseous refrigerant escapes the evaporator outlet.

Reservoir



The reservoir collects the vaporized and gaseous mixture coming from the evaporator to ensure the A/C compressor only receives gaseous refrigerant. Gaseous refrigerant is formed from the vapor.

The refrigerant oil flowing in the circuit is not retained in the reservoir as it has an oil drilling.

Moisture which has entered the refrigerant circuit during repairs will be collected by a filter (desiccant bag) in the reservoir.

Gaseous refrigerant is extracted with oil by the A/C compressor.

Note:

- *Replace the reservoir if refrigerant circuit has been open for a long time (beyond the normal repair time) and moisture has penetrated inside, or if required due to a specific complaint ⇒ [00-8, Components, replacing](#) .*
- *Remove sealing plugs - **A** - and - **B** - only immediately prior to installing.*
- *A desiccant bag in an unsealed reservoir is saturated with moisture after a short period of time and unusable.*
- *When installing, note arrow for direction of flow if necessary.*

Restrictor

The restrictor creates a constriction. This constriction reduces the flow and creates high and low pressure sides in the refrigerant circuit. Before the restrictor the refrigerant which is under a higher pressure is warm. After the restrictor the refrigerant which is under a low pressure is cold. Before the constriction there is a strainer for contaminants and after the constriction there is a strainer, to atomize the refrigerant before it reaches the evaporator.

Note:



- *Arrow - **A** - on restrictor points to evaporator.*
- *Replace after each opening of the circuit.*

- *Note different versions.*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

⇒ *Parts Catalog*

Receiver



The receiver collects the liquid drops and then directs them in an uninterrupted stream to the expansion valve. Moisture which has entered the refrigerant circuit during repairs will be collected by the desiccant bag in the receiver.

Note:

- *Replace the receiver if refrigerant circuit has been open for a long time (beyond the normal repair time) and moisture has penetrated inside, or if required due to a specific complaint ⇒ [00-8, Components, replacing](#) .*
- *Only remove sealing plugs shortly before installation.*
- *A desiccant bag in an unsealed receiver is saturated with moisture after a short period of time and unusable.*
- *When installing, note arrow for direction of flow if necessary.*



The new generation of receivers are installed directly on the condenser and possess a dryer cartridge.

Note:

- *Replace the dryer cartridge if refrigerant circuit has been open for a long time (beyond the normal repair time) and moisture has penetrated inside, or if required due to a specific complaint ⇒ [00-8, Components, replacing](#) .*
- *Only unpack dryer cartridge immediately prior to installation.*
- *Dryer cartridge in unsealed packaging is saturated with moisture after a short period of time and unusable.*

Expansion valve



The expansion valve atomizes the streaming refrigerant and controls the flow quantity so that the vapor is gaseous only at the evaporator outlet, depending on the heat transmission.

O-ring seals

These rings seal off the connection points between individual components of the refrigerant circuit.

Only O-rings that are resistant to refrigerant R134a and refrigerant oil must be installed. Make sure they are original replacement parts.

⇒ *Parts Catalog*

O-ring seals:

- Always use only once.



- Make sure diameters - **a** - and - **b** - are correct.

- Lubricate with refrigerant oil before installing.

Note:

- *The color coding of O-rings for the R134a refrigerant circuits has been discontinued. Colored and black O-rings are used.*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

⇒ *Parts Catalog*

Refrigerant circuit pipes and hoses

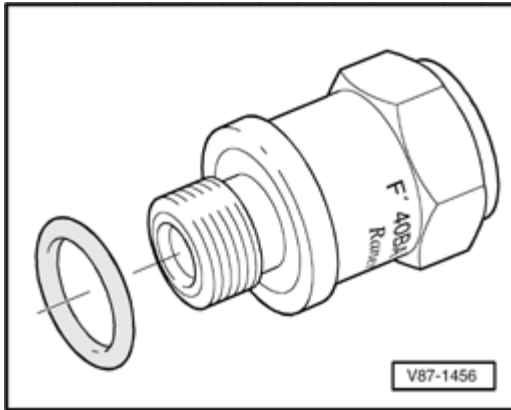
The mixture of refrigerant oil and refrigerant R134a corrodes certain metals (e.g. copper) and alloys and dissolves some hose materials. Therefore use original replacement parts only.

Pipes and hoses are joined together by threaded connections or via special plug connectors.

Note:

- Observe specified torques for threaded connections, use appropriate release tools for plug connectors.

Pressure relief valve



Pressure relief valve is installed on A/C compressor or receiver.

At a pressure of approx. 38 bar positive pressure, valve opens and closes again once pressure has dissipated (approx. 30 bar).

Refrigerant does not escape completely.

Depending on the version, a transparent plastic disc may be installed which breaks off as soon as the valve is activated.

Design of refrigerant circuit



Refrigerant circuit with expansion valve and evaporator

1. Evaporator
2. Expansion valve
3. Valve for extracting, filling and measuring
4. Receiver with desiccant bag / dryer cartridge
5. Condenser
6. A/C compressor

Note:

- Arrows point in direction of refrigerant flow.



Refrigerant circuit with restrictor and reservoir

1. A/C compressor
2. Condenser
3. Restrictor
4. Evaporator
5. Reservoir with desiccant bag

Note:

- Arrows point in direction of refrigerant flow.

Connections for quick-release coupling on refrigerant circuit**Warning!**

There is a danger of ice-up.

Refrigerant may leak out if refrigerant circuit is not discharged.

Refrigerant must be extracted before opening refrigerant circuit.

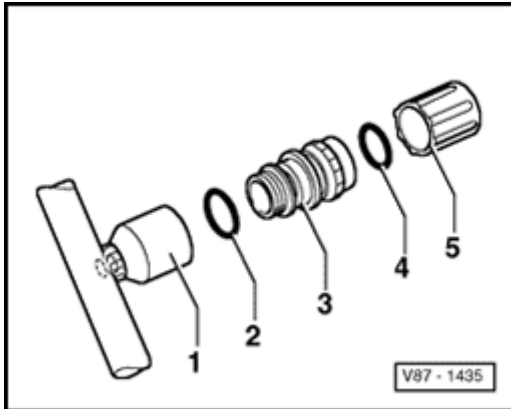
- Only valves and connections that are resistant to refrigerant R134a and refrigerant oil must be installed.
- Different connections (outer diameter) for high pressure and low pressure side.
- Always screw on sealing caps.

Arrangement in vehicle.

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87*,

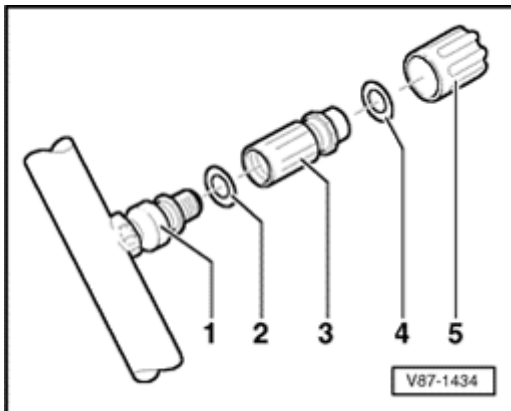
**Extraction and filling valve with Schrader valve**

- A - Service connection (soldered in)
- B - Schrader valve insert
- C - O-ring seal (belongs to valve)
- D - Sealing cap with seal



Evacuating and charging valve, high pressure side

1. Socket with external and internal threads
2. O-ring: 10.8 mm; 1.8 mm identification: black or colored
3. Evacuating and charging valve with groove for O-ring and external or internal thread M 8x1 for cap
4. O-ring for cap, 10.8 mm; 1.8 mm identification: black or colored
5. Cap



Evacuating and charging valve, low pressure side

1. Socket with external thread and groove for O-ring
2. O-ring: 7.6 mm; 1.8 mm identification: black or colored
3. Evacuating and charging valve internal thread for cap M 8x1
4. O-ring for cap, 7.6 mm; 1.8 mm identification: black or colored
5. Cap

Switches and sensors on refrigerant circuit and corresponding connections

Note:

- Switch pressures, removing and installing switches as well as switch arrangement and version, refer to vehicle specific refrigerant circuit.

⇒ Repair Manual, Heating & Air Conditioning, Repair Group 87 ,

A/C Refrigerant High Pressure Switch F23

Function:

Switches coolant fan to next higher stage upon pressure increase in refrigerant circuit (approx. 16 bar).

A/C Refrigerant High Pressure Switch F118

Function:

Switches off A/C compressor when there is excessive pressure in the refrigerant circuit (approx. 32 bar).

A/C Refrigerant Low Pressure Switch F73

Function:

Switches off A/C compressor when pressure drops in the refrigerant circuit (approx. 2 bar).

Connections with valve for switches on refrigerant circuit***Warning!***

There is a danger of ice-up.

Refrigerant may leak out if refrigerant circuit is not discharged.

Refrigerant must be extracted before removing valve - C - .

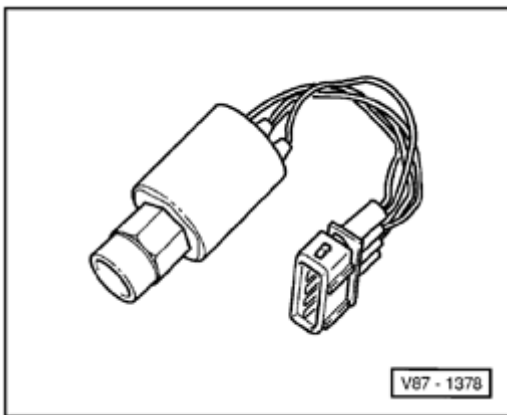
- Different threads for switch on high pressure and low pressure sides.



- Only valves and O-ring seals that are resistant to refrigerant R134a and refrigerant oil must be installed.

- A - Connection (soldered in)
- B - O-ring seal
- C - Valve (with O-ring seal)

A/C Pressure Switch F129



This pressure switch has 3 functions:

1. Switches coolant fan to next higher stage upon pressure increase in refrigerant circuit (approx. 16 bar).
2. Switches off A/C system if pressure is excessive (approx. 32 bar), e.g. because of insufficient engine cooling.
3. Switches off A/C system if pressure is insufficient (approx. 2 bar), e.g. loss of refrigerant.

Note:

- A/C Pressure Switch F129 replaces the A/C Refrigerant High Pressure Switch F23 , A/C Refrigerant Low Pressure Switch F73 and the A/C Refrigerant High Pressure Switch F118 .

High Pressure Sensor G65



This High Pressure Sensor G65 is installed instead of A/C Pressure Switch F129 .

When a voltage is applied, the high pressure sensor generates a square wave signal or a data telegram. This signal changes along with pressure in the system.

The downstream control modules (Coolant Fan Control (FC) Control Module, Engine Control Module (ECM), A/C Control Head E87 or Climatronic Control Module J255 , etc.) use this signal to calculate pressure in the refrigerant circuit and accordingly to activate coolant fans and motor, A/C Clutch N25 or to change activation of A/C Compressor Regulator Valve N280 .

A/C Pressure/temperature Sensor G395

Warning!

There is a danger of ice-up.

Refrigerant may leak out if refrigerant circuit is not discharged.

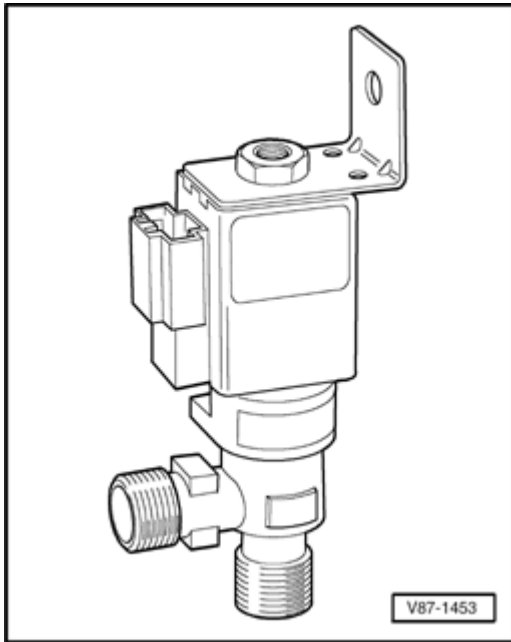
Refrigerant must be extracted before removing the A/C Pressure/temperature Sensor G395 .



This A/C Pressure/temperature Sensor G395 is installed instead of High Pressure Sensor G65 or A/C Pressure Switch F129 .

The pressure signal is continuously checked, where the temperature signal is only checked at temperatures above 0 ° C.

The Climatronic Control Module J255 operates with this information and accordingly controls the coolant fans and activation of the A/C Compressor Regulator Valve N280 .



A/C Refrigerant Shut-Off Valve N43

The flow of refrigerant in the second evaporator is switched on or off by the shut-off valve. It opens when voltage is applied, switched by the A/C Programmer.

A/C Compressor Regulator Valve N280



The regulator valve is installed in the A/C compressor. It is activated by the A/C Control Head E87 or the Climatronic Control Module J255 . Pressure on the low pressure side is influenced via the regulator valve and thus regulates the temperature in the evaporator.

Note:

- A/C Compressor Regulator Valve N280 is a structural component of the A/C compressor and cannot be replaced separately.

Electrical components not installed on the refrigerant circuit



A/C Programmer J127

This programmer switches off the refrigerant flow through the 2nd evaporator when the temperature on the cooling ribs of the 2nd evaporator sinks to the freezing point for

water (ice-up safeguard).

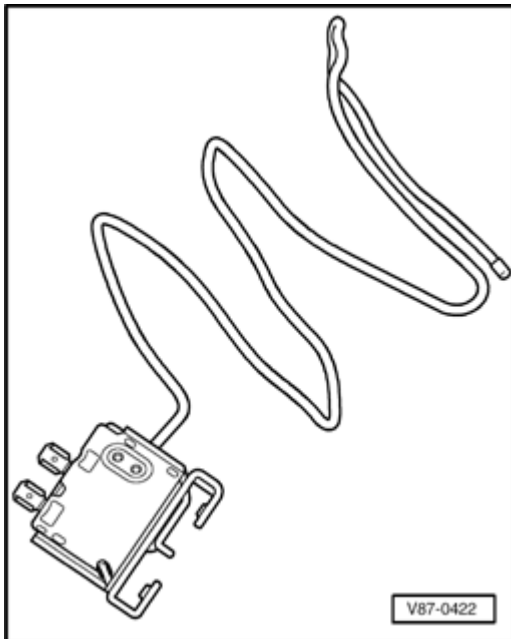
Coolant FC (Fan Control) Control Module J293

Note:

- There are various construction styles.



This control module switches on and off the A/C clutch and therefore the A/C compressor. It switches the coolant fans and (in vehicles with High Pressure Sensor G65 or A/C Pressure/temperature Sensor G395) calculates the pressure in the refrigerant circuit.



A/C Evaporator Temperature Switch E33

Function:

A/C Evaporator Temperature Switch E33 determines the temperature between the evaporator cooling ribs. It prevents the possibility of ice build-up between evaporator cooling ribs by interrupting the current supply to A/C clutch of A/C compressor when temperature at the cooling ribs sinks to the freezing point for air moisture.

Insertion depth of the sensor tube is marked or listed in the repair manual

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87* ,

Note:

- Installed in VW vehicles with A/C compressor driven via ribbed belt

**Evaporator Vent Temperature Sensor G263**

Function:

Evaporator Vent Temperature Sensor G263 determines temperature behind the evaporator. This value is sent to A/C system control module and serves as a reference signal for A/C compressor regulation.

Pressures and temperatures in refrigerant circuit***Warning!***

When performing work on refrigerant circuit, observe all generally applicable safety precautions and pressure vessel regulations.

The pressures and temperatures in refrigerant circuit are dependent on the current operating conditions (e.g. engine RPM, coolant fan stage 1, 2 or 3, engine temperature, A/C compressor on or off) as well as on the effects of ambient influences (e.g. ambient temperature, humidity, requested cooling output).

In vehicles with A/C Compressor Regulator Valve N280 , pressure is modified on the low pressure side by the valve.

For this reason, values indicated in the following table are valid only as reference points. They are attained at an engine speed of 1500 to 2000 RPM and an ambient temperature of 20 ° C after about 20 minutes.

The connections for the pressure gauge set intended for the pressure measurement are indicated on the vehicle specific refrigerant circuit.

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

At 20 ° C with the engine not running, the pressure in the

refrigerant circuit is 4.7 bar ⇒ [00-1, Vapor pressure table for refrigerant R134a](#) .

Refrigerant circuit with expansion valve

A- Low pressure side of refrigerant circuit.



B- High pressure side of refrigerant circuit.

Component	Aggregate state of refrigerant	Pressure (bar positive pressure)	Temperature in degrees Celsius
- 1 - Evaporator, from input to output	Vapor	approx. 1.2 bar ¹⁾ (approx. 1.8 bar) ³⁾	approx. -7 ° C ²⁾ (approx. -1 ° C) ³⁾
- 2 - A/C compressor A-side	Gas	approx. 1.2 bar ¹⁾ (approx. 1.8 bar) ³⁾	approx. -1 ° C (approx. +1 ° C) ³⁾
- 3 - A/C compressor B-side	Gas	approx. 14 bar	approx. +65 ° C
- 4 - Condenser	Gas, vapor, liquid	approx. 14 bar	approx. +55 ° C at outlet
- 5 - Receiver	liquid	approx. 14 bar	approx. +55 ° C
- 6 - Charging and evacuating valve B- side	liquid	approx. 14 bar	approx. +55 ° C
- 7 - Expansion valve	liquid, released as vapor	approx. 14 bar	approx. + 55 ° C, reduced to -7 ° C
- 8 - Charging and evacuating valve A- side	Gas	approx. 1.2 bar ¹⁾ (approx. 1.8 bar) ³⁾	approx. -7 ° C ²⁾ (approx. -1 ° C) ³⁾

1) Pressure in refrigerant circuits is maintained at approx. 2 bar, regulated by A/C compressor, even though heat transfer changes and engine speeds vary. However, this applies only within the performance range of the A/C compressor; if the performance limits of the A/C compressor are exceeded, the pressure increases ⇒ [00-7, Pressures, checking on vehicles](#) .

2) Within the control range of the A/C compressor, temperature in the refrigerant circuits is maintained, regulated by A/C compressor, even though heat transfer changes and engine speeds vary. However, this applies only within the performance range of the A/C compressor; if the performance limits of the A/C compressor are exceeded, the temperature increases ⇒ [00-7, Pressures,](#)

[checking on vehicles](#) .

3) Measured values for A/C systems with two evaporators

Note:

- A/C compressors which do not regulate their performance are switched off by the respective control module via the A/C Compressor Regulator Valve N280 at an evaporator temperature below 0 ° C.

- In vehicles with A/C Compressor Regulator Valve N280 , pressure is modified on the low pressure side by the valve.

Refrigerant circuit with restrictor and reservoir

Arrows point in direction of refrigerant flow.

A- Low pressure side of refrigerant circuit.



B- High pressure side of refrigerant circuit.

Component	Aggregate state of refrigerant	Pressure (bar positive pressure)	Temperature in degrees Celsius
- 1 - A/C compressor B- side	Gas	up to 20 bar	up to + 70 ° C
- 2 - Condenser	From gas to vapor to liquid	up to 20 bar	up to + 70 ° C
- 3 - Restrictor	From liquid to vapor	B-side up to 20 bar, A-side greater than 1.5 bar	B-side up to +60 ° C, A-side warmer than -4 ° C
- 4 - Evaporator	From vapor to gas	Greater than 1.5 bar	Warmer than -4 ° C
- 5 - Reservoir	Gas		
- 6 - A/C compressor A- side	Gas		

Pressures on A-side are maintained at approx. 2 bar by the "regulating" A/C compressor also at various engine speeds. However, this applies only within the performance range of the A/C compressor; if the performance limits of the A/C compressor are exceeded ⇒ [00-7, Pressures, checking on vehicles](#) .

Note:

- In vehicles with A/C Compressor Regulator Valve N280 ,

pressure is modified on the low pressure side by the valve.

Tests and measurements performed using pressure gauge



Indicators on pressure gauge

1. Temperature scale for refrigerant R134a $\text{CF}_3\text{CH}_2\text{F}$ or CH_2FCF_3 .
2. Pressure scale

Pressure gauge may have one or more temperature scales next to pressure scale. R134a scale values are allocated respectively in the vapor pressure table. Since various refrigerants create different vapor pressures at the same temperature, each temperature scale is identified for the respective refrigerant.

Pressure gauge makes the following tests and measurements possible

a Pressure and temperature measurement at refrigerant circuit

- High pressure gauge measures pressure and temperature, which expand uniformly from outlet of A/C compressor via the condenser up to constriction (restrictor, or expansion valve) with A/C system switched on.
- Low pressure gauge measures pressure and temperature, which expand uniformly from constriction (restrictor, or expansion valve) via evaporator up to input of A/C compressor with A/C system switched on.

Note:

- The relationship between pressure and temperature indicated on the gauges only exists in a refrigerant circuit containing liquid or vapor, but not gas. In gaseous state, the temperature is approx. 10°C to 30°C higher than indicated on the gauge.

b Verification of refrigerant in a closed vessel

Refrigerant R134a is present in a closed vessel or in a refrigerant circuit when temperature indicator on gauge matches the refrigerant temperature (standing liquid adopts the ambient temperature).

A closed vessel or a refrigerant circuit which has been switched off is empty when temperature indication on

gauge is below the temperature of the refrigerant.

Note:

- The relationship between pressure and temperature indicated on the gauges no longer applies if no liquid is present and the pressure is built up solely by gas.

Service and recycling units

At this time, service units for extracting, cleaning and filling refrigerant for motor vehicle A/C systems are available on the market from various manufacturers.

Classification of extraction systems in groups

Group 3:

Mobile extraction and charging systems for filling compressed-gas vessels permanently connected to the system.

The refrigerant or refrigerant/oil mixture is transferred to compressed gas vessels which are permanently connected to the mobile systems. In accordance with 3 Para. 5 No. 3 of pressure vessel regulations, compressed-gas vessels are classified as pressure vessels in this case.

The charging systems require:

- no permit
- Do not require expert testing, as the gas is transferred to compressed- gas vessels which are classed as being pressure vessels (systems used for transfer from these pressure vessels to compressed gas vessels for supplying to third parties do however require a permit and are subject to mandatory testing)

Note:

- The service and recycling units used in motor vehicle workshops are extraction and charging systems not requiring a permit (Group 3) but which are only to be operated by qualified personnel. Instructions for unit operation and maintenance can be found in the relevant manufacturers documentation.

Charging systems not requiring a permit

Charging systems not requiring a permit are ones used for transferring compressed gases to mobile compressed-gas vessels for internal use only.

Note:

Some service units are charging systems not requiring a permit. When working with such equipment, the refrigerant is not transferred to mobile compressed-gas vessels, but rather into a permanently installed charging cylinder with visible level gauge and float switch.

Recommendation:

It is advisable to use a portable cylinder with visible level gauge and pressure relief valve for surplus refrigerant for internal use.

Attention must be paid to TRG 402 (technical regulations for compressed gases) when transferring compressed gases to other compressed-gas vessels.

Refrigerant circuit repair information***Warning!***

When performing work on refrigerant circuit, observe all generally applicable safety precautions and pressure vessel regulations.

Special tools and accessories:

The performance of proper workmanlike repairs on an air conditioning system:

- Requires the use of special tools and materials as listed in ⇒ [00-9, Testing equipment and tools](#) .
- Requires compliance with the basic instructions for use of leak detectors ⇒ [00-4, Refrigerant circuit, tracing leaks using leak detector V.A.G 1796](#) .
- Requires expert knowledge.

Note:

- *Environmentally hazardous draining of refrigerant is an offense punishable by law* ⇒ [00-3, Laws and regulations](#) .

Laws and regulations

Note:

- The laws and regulations listed below are applicable in Germany. Different or additional laws and regulations may apply in other countries.

Laws and regulations

8 Operation, maintenance, shutdown, obligation to accept return

(1) With regard to operation, repair and shutdown of items containing refrigerants as defined in 33, it is prohibited to contravene the state of the art by allowing the substances they contain to escape into the atmosphere.

A record must be kept of the quantities used during operation and maintenance (refrigerant log, refer to Environmental Protection Vol. 2-2. 43.2) and presented to the relevant authorities on request.

(2) Distributors of the substances and preparations listed in 1 Para.1 and 2 are obliged to accept the return of such substances and preparations after use or to appoint a third party to accept return of these.

(3) The maintenance and shutdown of items containing refrigerants as defined in 3, as well as acceptance of return of the substances and preparations listed in 1 Para.1 and 2 may only be undertaken by persons with the necessary expert knowledge and technical equipment.

9 Criminal offenses and infringements of the law

(3) An infringement of the law in terms of 26 Para. 1 No. 7 of the Law on Chemicals is constituted by willful or negligent contravention of 8 Para. 1 Clause 1 during operation, maintenance or shutdown of items containing refrigerants as defined in 3 by allowing substances contained in these to escape into the atmosphere contrary to the state of the art, or by willful or negligent contravention of the obligation to keep records as defined by 8 Para. 1 Clause 2.

TRG (technical regulations for compressed gases) 400, 401, 402

Only excerpts concerning vehicle manufacturers and workshops are listed below.

TRG 400 (general regulations for charging systems)

2. Definition of terms and explanatory notes

2.1 Charging systems

2.1.1 Charging systems are systems for filling mobile compressed-gas vessels. The charging system includes the premises and facilities concerned.

2.4 Charging systems requiring a permit

Charging systems requiring a permit are ones used to transfer compressed gases to mobile compressed-gas vessels for supplying to third parties.

5 Charging systems not requiring a permit are ones used for transferring compressed gases to mobile compressed-gas vessels for internal use only.

TRG 401 (installation of charging systems)

Does not apply to vehicle manufacturers or workshops.

TRG 402 (operation of charging systems)

2. Employees and employee instruction

2.1 Charging systems are only to be operated and maintained by personnel

- Aged 18 and above
- Possessing the necessary technical knowledge
- Who can be relied on to work diligently

2.2 Supervised work may also be performed by personnel not satisfying the requirements stipulated in item 2.1, points 1 and 2.

2.3 Employees are to be given instruction on the following topics before beginning work and at regular, appropriate intervals, however at least once a year:

- Hazards specifically associated with handling compressed gases
- Safety regulations, particularly the applicable TRG
- Procedures in the event of malfunction, damage and accidents
- The use of fire-extinguishing and protective equipment
- Operation and maintenance of the charging system on the basis of the instructions for use.

Charging (a separate TRG applies to vessels from other countries and their charging)

A compressed-gas vessel is only to be filled with the compressed gas declared on it and the quantity must comply with the stipulated pressure, weight or volume data (refer to g15, Para. 2, pressure vessel regulations).

2. In the case of vessels approved for use with several types of compressed gas, the compressed gas with which it is to be filled and - if the compressed gas has a $t_c \geq -10^\circ \text{C}$ (t_c = critical temperature) - the maximum permissible charging weight in line with TRG 104 No. 3.3 must be marked on the vessel prior to connection for filling.

3. Compressed-gas vessels marked with the maximum permissible charge pressure in bar at 15°C must be filled manometrically. If, at the time of filling, the temperature is not 15°C , the pressure corresponding to the prevailing temperature must be established; it must be ensured that the permissible charge pressure at 15°C is not exceeded in the compressed- gas vessel. The charged vessels are to be checked by way of random pressure measurements to determine possible overfilling.

4. Compressed-gas vessels on which the maximum permissible capacity is indicated by the net weight (filling weight, permissible weight of fill) in kilograms must be filled gravimetrically. The vessels are to be weighed during filling and subsequently subjected to a weight check on special scales to establish possible overfilling. Scales used for this purpose must be calibrated.

5. Under certain conditions, gases with a $t_c \geq +70^\circ \text{C}$ may be transferred volumetrically from compressed-gas vessels with a maximum volume of 150 l to compressed-gas vessels with a volume of max. 1000 ccm. The stipulations of the TRG apply to the transfer of liquefied gas to cylinders used by workmen.

6. Vessels in vehicles for

(1) Gases with $t_c \geq +70^\circ \text{C}$ (refer to TRG 101 Annex 3)

(2) Industrial gas mixtures with $t_c \geq +70^\circ \text{C}$ (refer to TRG 102 Annex 1 Groups 3) or

Liquefied extremely low-temperature compressed gases (refer to TRG 103) may, contrary to item 4, be filled volumetrically if the charging system and/or the vessels is/are equipped with devices for measuring or limiting the volume of the charge and with the exception of motor vehicle vessels as per item 3 for measuring the temperature of the charge. When filling volumetrically, it

must be ensured that the permissible charge weight indicated on the vessel is not exceeded. To determine possible overfilling, the filled containers are to be checked gravimetrically on a calibrated scale or provided that the pressurized gases are not highly toxic volumetrically. Volumetric checking requires the use of appropriate equipment with completely separate charging and checking devices.

7. Charging and check measurements are to be performed by different people. Check measurements must be performed immediately upon completion of the filling process.

8. Overfilled vessels must be drained immediately and in a safe manner until the permissible fill is attained. The compressed-gas fill is then to be determined again.

9. Items 4 to 7 do not apply to vessels for liquefied, extremely low-temperature compressed gases which are neither flammable nor toxic; this does not affect the provisions of road traffic legislation.

10. When filling compressed gas vessels with liquefied gases at charging temperatures $\leq -20^{\circ}\text{C}$, the compressed gas vessel (if the vessel material has not been tested for temperatures $\leq -20^{\circ}\text{C}$) is not to be released from the charging system for transportation until the vessel wall temperature is $\geq +20^{\circ}\text{C}$.

Recycling and refuse law

Converting R12 refrigerant circuit to R134a refrigerant circuit and servicing (retrofit)

Note:

- For environmental reasons and on account of the corresponding legislation, refrigerant R12 can no longer be manufactured or supplied. Refrigerant R134a has been developed as a replacement for R12.

- Air conditioning systems developed and designed for refrigerant R12 cannot however simply be charged with refrigerant R134a. To ensure trouble-free operation of the air conditioning system even after conversion, various components of the refrigerant circuit must be replaced.

- A precise description of the conversion procedure and information on the servicing of converted refrigerant circuits can be found in \Rightarrow Repair Manual: Air conditioner with refrigerant R12 Parts 2 and 3 .

Keeping refrigerant records

The environmental statistics law requires records to be kept on the use of refrigerants.

Consequently, motor vehicle workshops may well have to provide the relevant local authorities with information on their use of refrigerant. It is therefore advisable to keep records ⇒ *HSO Environment Vol. 2-2. 43.2*

Recycling and refuse law

Legislation on the handling and disposal of refrigerants and refrigerant oils is contained in the BIMISCH (German Immission Protection Law) and the Recycling and Refuse law.

⇒ *Environment Vol. 2 and Vol. 3*

Disposal of refrigerant and refrigerant oil

Refrigerant

Refrigerants intended for disposal are to be transferred to marked recycling containers, observing the permissible filling quantity.

Refrigerant oil

Used refrigerant oils from systems employing halogenated hydrocarbons are to be disposed of as waste subject to special supervision. They are not to be mixed with other oils or substances. Proper storage and disposal must be ensured in line with local regulations.

German technical, work safety and accident prevention regulations can be obtained from

Beuth-Verlag GmbH

Burggrafenstr. 6

10787 Berlin

Carl Heymanns Verlag KG

Luxemburger Str.449

50674 Köln

(addresses in other countries can be obtained from the relevant authorities)

R12 refrigerant circuit, converting to R134a

refrigerant circuit and servicing (retrofit)

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Refrigerant circuit

Important repair notes on air conditioning systems

- Air conditioning systems designed for refrigerant R12 are never to be filled with refrigerant R134a without a retrofit ⇒ [00-3, R12 refrigerant circuit, converting to R134a refrigerant circuit and servicing \(retrofit\)](#) .
- The refrigerant oils specifically developed for R134a and R12 refrigerant circuits are never to be mixed.
- Service stations which come in contact with the refrigerant are only to be used for the intended refrigerant.
- Components of R134a refrigerant circuits can be recognized from their labelling, green stickers or design (e.g. different threads) to prevent interchange with components for refrigerant R12.
- A label indicating the refrigerant used is provided in the engine compartment on the lock carrier or in the plenum chamber.
- Different refrigerants are never to be mixed.

Note:

- *When working on the refrigerant circuit, always follow the information given in the Sections on "Safety measures" ⇒ [00-1, Safety measures for working on vehicles with air conditioning system and for handling refrigerant R134a](#) and "Basic rules for working on refrigerant circuit" ⇒ [00-1, Basic rules for working on refrigerant circuit](#) .*

Refrigerant circuits, converting from R12 refrigerant to R134a refrigerant

CFC refrigerants are no longer used in the automotive industry.

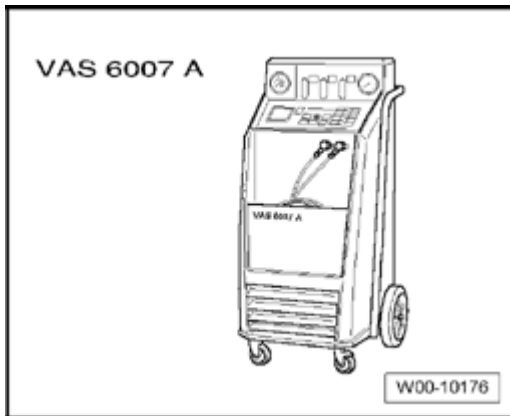
Converting refrigerant circuits from R12 refrigerant to R134a refrigerant and servicing converted circuits.

⇒ *Repair Manual Air conditioner with refrigerant R12 Parts 2 and 3*

Working with the service station

Important notes for working with the service

station



Observe the following with regard to service station operation (e.g. A/C service station VAS 6007A):

- The filters and dryers installed must be replaced at the latest on completion of the service life specified in the relevant operating instructions.
- Exclusive use is to be made of refrigerant oils which have been approved for the vehicle-specific refrigerant circuit.

⇒ *Parts Catalog*

In the following situations, extracted refrigerant is not to be re-used even after treatment in the service station:

- In the event of compressor damage causing decomposition of the refrigerant due to overheating.
- If dark, sticky deposits are present in the refrigerant circuit (this can only be determined after opening system).
- If there is any doubt about the composition of the refrigerant extracted from the refrigerant circuit.

The service station is to be drained in all these cases ⇒ [00-4, Refrigerant circuit, discharging using service station](#) , the system cleaned if necessary and the filters, dryers and refrigerant oil replaced.

Contaminated refrigerant can, e.g. in the Federal Republic of Germany, be returned to the supplier in so-called recycling containers for recycling or for environmentally safe disposal (other or additional regulations may apply in other countries).

Commercially available service stations can be classified in 2 groups:

- A. Service stations which clean extracted refrigerant for re-use (so-called extraction and recycling stations), e.g.

A/C service station VAS 6007A .

- B. Service stations which transfer extracted refrigerant to recycling containers (for large-scale recycling). These are referred to as extraction systems.

Service station, connecting for measurement and testing

- Work procedure may vary depending on the type of tools selected (the tool-specific operating instructions should therefore be followed).

Note:

- *The work procedure is always to be performed as described in the operating instructions for the r A/C service station VAS 6007A .*

The charging hoses are to be connected as follows to prevent the ingress of air or moisture into the refrigerant circuit:

- Switch ignition off.
- Connect service station to power supply.
- Unscrew caps from service connections or connections with valve (refer to vehicle-specific refrigerant circuit).

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

- Evacuate charging hoses if necessary.

Note:

- *Connect quick-release couplings to service connections of refrigerant circuit.*

Warning!

A/C compressor or service station may be damaged if quick-release couplings are opened.

A "short circuit" may occur between high and low-pressure sides of refrigerant circuit if engine is running and quick-release couplings have been opened.

Engine must not be running or quick-release couplings at service connections must be closed.

- Open quick-release couplings at service connections.

Refrigerant circuit, discharging using service station

- Work procedure may vary depending on the type of tools selected (the tool-specific operating instructions should therefore be followed).
- The refrigerant circuit is to be discharged if parts of the refrigerant circuit are to be removed, if there is any doubt about the quantity of refrigerant in the circuit or if safety precautions so require.
- All the necessary usage information for working with the refrigerant service station can be found in the service station operating instructions.

Draining:

- Switch off ignition.
- Connect service station in line with operating instructions to vehicle service connections

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

and start up service station.

Note:

- There is a possibility of refrigerant oil being extracted from the refrigerant circuit together with the refrigerant. To ensure compressor lubrication, the refrigerant oil in the circuit must be topped up with fresh oil

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

.

- On vehicles equipped with a compressor with no A/C clutch (with A/C Compressor Regulator Valve N280) the engine should not be run for longer than absolutely necessary with the refrigerant circuit empty (compressor always in operation as well).

- On vehicles with a compressor with A/C clutch, the engine is only to be started following complete assembly of the

refrigerant circuit.

Refrigerant circuit, evacuating using service station

- The work procedure is always to be performed as described in the operating instructions for the A/C service station.
- The procedure described here is for the A/C service station VAS 6007A .

The refrigerant circuit must be evacuated before it is filled with refrigerant (vacuum). Moisture is also extracted from the circuit.

Evacuating:

- Switch ignition off.
- Correct the refrigerant oil quantity in the refrigerant circuit if necessary, see vehicle specific Repair Manual

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

- Connect service station to power supply.
- Check quantity of refrigerant in the service station.
- Connect charging hoses of service station to vehicle refrigerant circuit with quick-release coupling adapter (refer to vehicle-specific refrigerant circuit).

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

- Screw in handwheel of quick-release coupling adapters until valves of service connections are definitely open (take care not to strain valve).

Note:

- *If pressure is to be measured after charging system on vehicles with a service connection on one side of the refrigerant circuit only, use valve adapter and charging hose with valve opener.*

- Initiate vacuum phase on the service station. Refrigerant circuit is evacuated automatically.

Once vacuum phase has ended, begin testing refrigerant circuit for proper seal. Negative pressure in bar and seconds will be displayed.

Proceed as follows if the vacuum is not maintained:

- Fill the circuit with 100 g of refrigerant, localize any leaks using leak detection system VAS 6196 and eliminate accordingly.

Leak detector V.A.G 1796 can also be used.

- Evacuate refrigerant circuit once more. Only when the vacuum is maintained can the refrigerant circuit be charged.

Refrigerant circuit, charging using service station

- The work procedure is always to be performed as described in the operating instructions for the A/C service station.
- Before pouring in refrigerant, correct the quantity of refrigerant oil

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87*,

.

- The entire refrigerant charge can be added to either the high or low pressure side.

Charging refrigerant circuit

- Switch ignition off.
- Evacuate refrigerant circuit using service station ⇒ [00-4, Refrigerant circuit, evacuating using service station](#) .
- Screw out handwheel at quick-release coupling adapter (to close it).
- Allow refrigerant to flow into charging hose.
- Screw in handwheel at quick-release coupling adapter (do not strain valve) and charge with the specified quantity of refrigerant.

- Switch off service station.

Note:

- *If the compressor has been removed, rotate it about 10 times by hand at ribbed belt pulley / freewheel prior to initial start-up to prevent damage caused by liquid impact when first switched on (any oil in compressor cylinder is forced out on rotation).*
- Start engine with compressor switched off (version with A/C clutch).
- Set compressor to minimum output, i.e. "Econ" or A/C off mode (version with no A/C clutch with regulating valve).
- Wait until idle speed has stabilized.
- Switch on compressor and operate system for at least 2 minutes at idling speed.
- If necessary, check pressures in refrigerant circuit using service station.
- Turn engine off.
- Screw out handwheel on quick-release coupling adapter.
- Disconnect charging hoses from refrigerant circuit.
- Screw protective caps back on.

Refrigerant, transferring to charging cylinder of service station

- The work procedure is always to be performed as described in the operating instructions for the A/C service station.
- A certain quantity of refrigerant is specified as charge for each air conditioning system. To ensure that neither too much nor too little refrigerant is added (either would reduce the cooling output), the charging cylinder has a scale indicating the weight.

Service station, draining**Note:**

- *If it is necessary to drain the service station (e.g. due to extraction of contaminated refrigerant), all filters and dryers must always be replaced (do not remove filter and dryer from the air-tight packaging until immediately before installation to minimize moisture absorption).*

- *Refrigerant containers filled with contaminated used refrigerant are referred to as "Recycling containers" .*
- *Always evacuate recycling containers prior to initial filling with refrigerant (if there is air in a refrigerant container it is not to be filled with refrigerant).*
- *Different types of refrigerant are not to be mixed (refrigerant mixtures cannot be recycled and are to be disposed of). If there is any doubt about the composition of the contents of the container, the refrigerant recycling company is to be informed accordingly.*

Warning!

- ***When filling recycling containers (compressed-gas vessels), observe applicable regulations, technical rules and laws.***
- ***Recycling containers are never to be overfilled (overfilled containers do not have a sufficient gas cushion to accommodate the liquid expansion caused by the effects of heat. There is a danger of rupture).***
- ***To ensure safety, make exclusive use of recycling containers equipped with a safety valve.***
- ***Recycling containers must be weighed on calibrated scales during the filling process. The maximum permissible capacity is 75% (charge factor 0.75) of the charge weight indicated on the recycling container (the possibility of refrigerant oil entering the recycling container along with the refrigerant cannot be ruled out).***

Refrigerant circuit, cleaning (flushing) with compressed air and nitrogen.

- Compressed air and nitrogen are to be used in order to force out moisture and other contaminants as well as old refrigerant oil as efficiently as possible, without wasting refrigerant, without the need for extensive assembly work and without endangering the environment.

Warning!

- ***Nitrogen can flow uncontrolled out of the cylinder.***
- ***Make exclusive use of pressure reducers for nitrogen cylinders.***
- ***Use appropriate extraction units to draw off gas mixture escaping from components.***

- Always flush components in direction opposite to refrigerant flow.

Restrictor, expansion valve, compressor, receiver and reservoir cannot be flushed with compressed air and nitrogen.

- Remove dryer cartridge on condensers with dryer.
- First flush out old refrigerant oil and dirt using compressed air and then use nitrogen to remove component moisture.

The compressed air must be routed through a compressed-air purifier for cleaning and drying. Use is therefore to be made of filter and dryer for compressed air (included in scope of delivery as tool for painting work).

⇒ *Workshop equipment and special tools catalog*

Note:

- *Observe the following items to prevent oil and moisture from the compressed-air system penetrating into the refrigerant circuit.*
- For refrigerant pipes with thread or union nut at connection, make use of adapters from adapter set V.A.G 1785 (1785/1 to adapter V.A.G 1785/8) for connection of 5/8" -18 UNF charging hoses.
- For refrigerant pipes with no thread or union nut at connection (for connecting adapters), make use of commercially available flushing gun with rubber end piece.
- Flush refrigerant circuit with compressed air and then with nitrogen.
- Compressed air/nitrogen emerging from components is to be drawn off by way of an appropriate system (workshop extraction system).

The circuit must be flushed:

- In the event of dirt or other contamination in the circuit.
- If vacuum reading is not maintained on evacuating a leak-free refrigerant circuit (pressure build-up due to moisture in refrigerant circuit).
- If refrigerant circuit has been left open for longer than normal (e.g. following an accident).
- If pressure and temperature measurements in the refrigerant circuit indicate the likelihood of moisture.
- In the event of doubt about the amount of refrigerant oil in

the circuit.

- The A/C compressor had to be replaced on account of internal damage (e.g. noise or no output).
- If stipulated by the vehicle-specific repair manual following replacement of certain components.

Refrigerant circuit, flushing

Note:

- *In the case of vehicles on which the refrigerant pipes have no threads for connection of adapter set V.A.G 1785 . Use is to be made, for example, of a flushing gun with rubber end piece for flushing the individual components. Special care must be taken not to damage the connections (crushing or scratching).*
- *Evaporator is to be flushed by way of connection for low-pressure pipe (large diameter) after removing expansion valve or removing restrictor.*
- *Always flush components in direction opposite to refrigerant flow.*
- *Check expansion valve and replace if dirty or corroded.*
- *Replace any components on which dark, sticky deposits cannot be removed with compressed air.*
- *Thin, light grey deposits on the insides of pipes do not impair the function of the components.*
- *After flushing, always replace receiver or reservoir and restrictor. Replace dryer cartridge on condensers with dryer.*

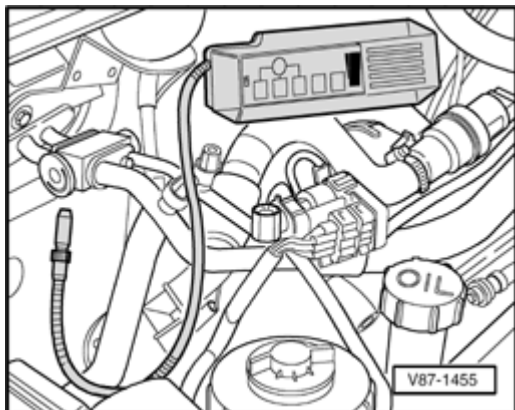
Refrigerant circuit, tracing leaks using leak detector V.A.G 1796

Note:

- *Minor leaks can be detected using an electronic leak detector for example.*
- *Currents of air quickly disperse refrigerant gas. Draughts must therefore be avoided during leak detection.*
- *If the refrigerant circuit is completely empty, charge with about 100 g of refrigerant.*

Leak detection:

- Start up leak detector in line with relevant operating instructions.
- Always hold test probe beneath suspected leak.



Depending on the model, leak detection is indicated by an increase in clicking rate or a warning tone (refer to operating instructions for leak detector).



Refrigerant circuit, tracing leaks using leak detection system VAS 6196

Note:

- *Minor leaks can be made visible e.g. using a fluorescent substance leak detection additive VAS 6196/1 .*

Leak detection:

- If the refrigerant circuit is completely empty, charge with about 100 g of refrigerant.
- Add leak detection additive VAS 6196/1 to refrigerant circuit and scan the refrigerant circuit using UV lamp.

Note:

- *Leak detection additive may remain in the refrigerant circuit.*

Complaints

Possible complaints at refrigerant circuit

Note:

- A/C system is functioning correctly when a temperature of 7⁰ C or lower escapes at instrument panel air vents.
- Setting on Climatronic "LO" .
- Setting on A/C system "AC" on; "max" ; "cold" .

Test requirements:

- On Board Diagnostics (OBD) of A/C system using diagnostic operation system VAS 5051A in "Guided Fault Finding" cannot detect any malfunction, no shut-off condition for A/C compressor is displayed in measuring value block (only in vehicles with "A/C system" OBD).

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

Possible complaints

Note:

- For all complaints marked by * ⇒ [00-7, Pressures, checking on vehicles](#) .
- Total failure of cooling system.*
- Insufficient cooling performance at all vehicles speeds or engine speeds.*
- None or insufficient cooling after driving a few miles.*
- A/C compressor, A/C Clutch N25 or A/C Compressor Regulator Valve N280 are switched off by A/C Refrigerant Low Pressure Switch F73 , A/C Refrigerant High Pressure Switch F118 , A/C Pressure Switch F129 or by A/C Control Head E87 or Climatronic Control Module J255 due to excessive or insufficient pressure.*
- None or sharp decrease in fresh-air supply after driving several miles (evaporator iced up).*

From these, the following complaints may also occur:

A/C compressor makes noise

- Re-tighten securing bolts for A/C compressor and A/C compressor bracket using a torque wrench.
- Check routing of refrigerant pipes; they must not touch other components and must not be subject to strain (align if necessary).

Noise (refrigerant hammer) occurring immediately after switching on air conditioner and/or when cornering or braking:

- Discharge, evacuate and re-charge refrigerant circuit (too much refrigerant in circuit).

Note:

- *Too much refrigerant oil in the circuit may also result in this problem (no adjustment of refrigerant oil quantity, for example, on replacing compressor).*

Water sprays out of vents (in dash panel or footwell) although air conditioning system is otherwise functioning properly:

- Check proper routing of condensate drain; it must not be crushed or kinked.
- Check valve for condensation water hose, it must not become stuck by wax or underbody sealant and must open and close properly.
- Check plenum chamber cover; it must not be damaged and must be properly installed (to stop water running into evaporator).
- Check water drains in plenum chamber; they must not be blocked (e.g. by leaves).

Service station, connecting

On vehicles with connection on low and high-pressure side of refrigerant circuit

Service station, connecting for measurement and testing

- Switch ignition off.
- Connect service station to power supply.
- Connect quick-release coupling adapter to charging hoses of service station (handwheels not screwed in/hand shut-off valve not open).
- Switch on service station and evacuate charging hoses (only necessary if there is air in charging hoses).
- Switch off service station.
- Unscrew caps from service connections (with valve).
- Connect service station via service connections with quick-release coupling adapters to vehicle refrigerant circuit.
- Screw in handwheel of quick-release coupling adapters until valves are definitely open at refrigerant circuit connection (observe pressure gauge, do not strain valves).
- Perform planned tests and measurements.

Pressures, checking on vehicles

Pressures in refrigerant circuit, checking (using service station)

Note:

- Check cooling performance. A/C system is functioning correctly when a temperature of 7 °C or lower escapes at instrument panel air vents.

- Setting on Climatronic "LO" .

- Setting on A/C system "AC" on; "max" ; "cold" .

- Connections with valve and service connections for measuring and testing.

Test requirements

- Radiator and condenser clean (clean if necessary)

- Thermal insulation at expansion valve OK and properly installed. See vehicle specific Repair Manual

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

.

- Ribbed belt is OK and properly tensioned. Ribbed belt for A/C compressor and generator are OK and correctly tensioned. See vehicle specific Repair Manual

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

.

- All air ducts, covers and seals OK and properly installed

- Electrical system and vacuum system fault-finding has not revealed any malfunctions. See vehicle specific Repair Manual

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

.

- On Board Diagnostics (OBD) of A/C system using diagnostic operation system VAS 5051A in "Guided Fault Finding" cannot detect any malfunction, no shut-off condition for A/C compressor is displayed in measuring value block (only in vehicles with "A/C system" OBD).

- Air flow through dust and pollen filter not obstructed by dirt. See vehicle specific Repair Manual

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

.

- Air conditioner unit not drawing in secondary air at maximum fresh air blower speed. Evaporator and heater not drawing in secondary air at maximum fresh-air blower speed. See vehicle specific Repair Manual

⇒ *Repair Manual, , Repair Group 87,*

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- Air flaps in air conditioner unit,

heater and evaporator reach end position. See vehicle specific Repair Manual

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

.

- Fresh-air intake ducts beneath hood and in passenger compartment as well as corresponding water drain valves OK, see vehicle specific Repair Manual

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

- Engine at normal operating temperature
- Vehicle not standing in direct sunlight
- The ambient temperature is greater than 15 ° C.
- All instrument panel vents open.
- With engine running and A/C system set to maximum cooling performance:

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

Set cooling performance to maximum.

Setting on A/C Control Head E87 :

- Preselect "Auto" mode (A/C compressor on).
- Set temperature selection "LO" for drivers and front passengers side.

Setting on heater controls:

- Press A/C button and Rec- or recirculated air button.
- Turn rotary temperature control towards "Cold" stop.
- Set rotary fresh-air blower control to "4" .
- Coolant Fan(s) V7 operating (at least stage 1).*

Note:

- *For certain versions, fan is switched on only after the pressure in refrigerant circuit has exceeded a specified value.*
- Operation of Fresh Air Blower V2 at maximum speed.
- Recirculated/fresh-air flap set to "Recirculated air mode" (within 1 min. after starting vehicle, air flow flap is closed and recirculated air flap opened).*
- Coolant shutoff valve closed.*
- Valves of pump valve unit closed and no coolant circulation pump delivery.*

Pressures, checking

- Switch ignition off.
- Connect service station ⇒ [00-6, Service station, connecting](#) .
- Take pressure gauge readings (two possible results).

Ambient temperature (in degrees Celsius)	Pressure in refrigerant circuit in bar positive pressure
+15 ° C	3.9
+20 ° C	4.7
+25 ° C	5.6
+30 ° C	6.7
+35 ° C	7.8
+40 ° C	9.1

+45 ° C

10.5

Note:

- Temperature of refrigerant circuit components should be equal to ambient temperature.

- Pressure will deviate from values in table if individual components of refrigerant circuit are warmer or colder.

- At absolute pressure, 0 bar corresponds to absolute vacuum. Normal ambient pressure (positive pressure) equals 1 bar absolute pressure. 0 pressure corresponds to an absolute pressure of one bar on most pressure gauges (indicated by -1 bar below 0).

- On vehicles with High Pressure Sensor G65 for which measured pressure is displayed in measured value block, pressure measured should coincide with values in table.

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87*,

Pressure in refrigerant circuit lower than indicated in table.

Not enough refrigerant in refrigerant circuit.

- Determine whether refrigerant circuit is leaking ⇒ [00-4, Refrigerant circuit, tracing leaks using leak detector V.A.G 1796](#) .

- Check pressure relief valve.

If pressure relief valve has responded:

- Check actuation of radiator fans.

- Check for constricted refrigerant pipe and hose cross-sections

caused by inadequate bending radii.

- Check refrigerant pipes and hoses for external damage.
- If no fault is found, flush refrigerant circuit with compressed air and nitrogen.

Pressure in refrigerant circuit in line with table or higher.

- Start engine.
- Set air conditioning system to maximum cooling output.

Note:

- *If the low pressure switch was removed to connect the service station, bridge the electrical connections in the corresponding connector for the pressure measurement.*
- A/C compressor is driven by the engine via A/C Clutch N25 .
- A/C Compressor Regulator Valve N280 is activated by Climatronic Control Module J255 .

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

If compressor is not driven with engine running or regulating valve is not actuated:

- Establish and eliminate cause e.g. by checking air conditioner DTC memory.
- Observe test conditions.
- Check voltage supply for A/C Clutch N25 , if this is OK, repair A/C clutch.
- Check activation of A/C

Compressor Regulator Valve
N280 .

⇒ *Repair Manual, Heating & Air
Conditioning, Repair Group 87 ,*

Continuation of pressure testing

- Checking pressures for vehicles
with restrictor and reservoir (with
internally regulated compressor)

⇒ [00-7, Restrictor and reservoir
\(with internally regulated
compressor\), checking .](#)

- Checking pressures for vehicles
with expansion valve and receiver
(with internally regulated
compressor) ⇒

[00-7, Expansion
valve and receiver \(with internally
regulated compressor\), checking .](#)

- Checking pressures for vehicles
with expansion valve and receiver
(without internally regulated
compressor) ⇒

[00-7, Expansion
valve and receiver \(without
internally regulated compressor\),
checking .](#)

- Checking pressures for vehicles
with restrictor, reservoir and A/C
Compressor Regulator Valve

N280 (externally regulated
compressor) ⇒ [00-7, Restrictor,
reservoir and A/C Compressor
Regulator Valve N280 \(externally
regulated compressor\), checking .](#)

Restrictor and reservoir (with internally regulated compressor), checking

Note:

- *Connect service station* ⇒ [00-6,
Service station, connecting .](#)

- *Observe test conditions* ⇒ [00-7. Pressures, checking on vehicles](#) .

- Set engine speed to 2000 RPM.

- Observe pressure gauge of service station.

Note:

- *Switching pressures for refrigerant circuit switches are vehicle-specific.*

- *Connection with valve for low-pressure switch or at evaporator is only to be used for vehicles with no service connection on low-pressure side and an inaccessible connection at compressor or reservoir (measurement accuracy). Only applies to certain vehicles.*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

Specified values:

High pressure side:

Increasing from initial pressure (on connecting pressure gauges) to max. 20 bar.

Low pressure side:



Decreasing from initial pressure (on connecting pressure gauges) to value in graph.

A - High pressure (measured at service connection) in bar

B - Low pressure (measured at connection with valve at compressor or reservoir) in bar.

C - Permissible tolerance range.

D - Low pressure (measured at connection with valve for low-pressure switch or at service connection) in bar.

E - Permissible tolerance range.

Possible deviation from specification	Possible cause	Corrective action
<ul style="list-style-type: none"> - High pressure remains constant or only increases slightly (above pressure with engine stopped), - Low pressure quickly drops to value in graph or below, - Required cooling output is not attained. 	<p>Not enough refrigerant in refrigerant circuit.</p>	<ul style="list-style-type: none"> - Localize leak using leak detector and eliminate. - Re-charge refrigerant circuit.
<ul style="list-style-type: none"> - High pressure normal, - Low pressure in line with value in graph, - Required cooling output is not attained. 		
<ul style="list-style-type: none"> - High pressure normal, - Low pressure too low (see graph), - Required cooling output is not attained. 		

Note:

- If no malfunction is found in relation to this complaint, flush refrigerant circuit with compressed air and nitrogen.

Possible deviation from specification	Possible cause	Corrective action
<ul style="list-style-type: none"> - High pressure only increases slightly above pressure with engine stopped, - Low pressure only drops slightly, - Required cooling output is not attained. 	<p>A/C compressor malfunctioning.</p>	<ul style="list-style-type: none"> - Flush refrigerant circuit with compressed air and nitrogen. - Replace compressor.

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Note:

- For the malfunction "high pressure normal, low pressure too low" , note the following:

- This malfunction may cause the evaporator to ice up or the A/C Refrigerant Low Pressure Switch F73 to shut off the compressor although the amount of refrigerant in the circuit is OK.

Possible deviation from specification	Possible cause	Corrective action
<ul style="list-style-type: none"> - High pressure normal or too high - Low pressure too high (see graph), - Compressor noise (particularly after switch-on) - Required cooling output is not 	<p>Too much refrigerant in circuit</p>	<ul style="list-style-type: none"> - Extract refrigerant from refrigerant circuit. - If quantity of refrigerant extracted roughly corresponds to specified capacity: - Replace A/C compressor.

attained.

- If quantity of refrigerant extracted is substantially greater than specified capacity:
- Re-charge refrigerant circuit.
- Repeat test.

Note:

- *Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*

Expansion valve and receiver (with internally regulated compressor), checking

Note:

- *Connect service station ⇒ [00-6, Service station, connecting](#) .*
- *Observe test conditions ⇒ [00-7, Pressures, checking on vehicles](#) .*
- Set engine speed to 2000 RPM.
- Observe pressure gauge set.

Note:

- *Switching pressures and arrangement of refrigerant circuit switches are vehicle-specific.*

Pressures must be measured at service connections; component locations of these connections are vehicle-specific

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

Specified values:

High pressure side:

Increasing from initial pressure (on connecting pressure gauges) to max. 20 bar.

Low pressure side:



Decreasing from initial pressure (on connecting pressure gauges) to value in graph.

A - High pressure in bar

B - Low pressure in bar

C - Permissible tolerance range.

Possible deviation from specification	Possible cause	Corrective action
<ul style="list-style-type: none"> - High pressure remains constant or only increases slightly (above pressure with engine stopped), - Low pressure quickly drops to value in graph or below, - Required cooling output is not attained. 	<p>Not enough refrigerant in circuit or expansion valve malfunctioning.</p>	<ul style="list-style-type: none"> - Extract refrigerant from refrigerant circuit. - If quantity of refrigerant extracted roughly corresponds to specified capacity: <ul style="list-style-type: none"> - Replace expansion valve. - Re-charge refrigerant circuit. - Repeat test.
<ul style="list-style-type: none"> - High pressure normal, - Low pressure in line with value in graph, - Required cooling output is not attained. 		<ul style="list-style-type: none"> - If quantity of refrigerant extracted is substantially less than specified capacity: <ul style="list-style-type: none"> - Localize leak using leak detector and eliminate. - Re-charge refrigerant circuit. - Repeat test.

Note:

- If no malfunction can be found and air conditioner operation is not OK when test is repeated, flush refrigerant circuit with compressed air and nitrogen.

Possible deviation from	Possible cause	Corrective
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specification		
<ul style="list-style-type: none"> - High pressure increases above specification - Low pressure quickly drops to value in graph or below, - Required cooling output is not attained. 	<ul style="list-style-type: none"> - Constriction or obstruction in refrigerant circuit - Expansion valve malfunctioning 	<ul style="list-style-type: none"> - Run hand over refr to check for different temperature - If difference in temp found at one compo - If hose or pipe is ki constricted, replace component. - In the event of an c flush refrigerant circi compressed air and replace expansion v. - If no malfunction ca - Flush refrigerant ci compressed air and - Repeat test.

Note:

- If operation is not OK after refrigerant circuit has been flushed, expansion valve must be replaced.

Possible deviation from specification	Possible cause	Corrective
<ul style="list-style-type: none"> - High and low pressure normal at first - After some time, high pressure increases above specification and low pressure drops to value in graph or below - Required cooling output is no longer attained. 	<ul style="list-style-type: none"> - Expansion valve malfunctioning - Moisture in refrigerant circuit 	<ul style="list-style-type: none"> - Examine expansion or corrosion; replace - Flush refrigerant ci compressed air and

Note:

- Always replace receiver for this malfunction.

Possible deviation from specification	Possible cause	Corrective
<ul style="list-style-type: none"> - High pressure normal or too high 	<ul style="list-style-type: none"> - Too much refrigerant in circuit 	<ul style="list-style-type: none"> - Extract refrigerant t

<p>(see diagram)</p> <ul style="list-style-type: none"> - Required cooling output is not attained. - Compressor noise (particularly after switch-on) 	<ul style="list-style-type: none"> - Expansion valve or compressor malfunctioning. 	<ul style="list-style-type: none"> refrigerant circuit. - If quantity of refrigerant roughly corresponds to capacity: <ul style="list-style-type: none"> - Replace expansion valve - Re-charge refrigerant - Repeat test. - If quantity of refrigerant is substantially greater than specified capacity: <ul style="list-style-type: none"> - Re-charge refrigerant - Repeat test.
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Note:

- If the function of the air conditioning system is not OK when the test is repeated, re-install old expansion valve and flush refrigerant circuit with compressed air and nitrogen. Then replace A/C compressor and receiver.

Possible deviation from specification	Possible cause	Corrective
<ul style="list-style-type: none"> - High pressure only increases slightly above pressure with engine stopped, - Low pressure only drops slightly, - Required cooling output is not attained. 	<ul style="list-style-type: none"> - A/C compressor malfunctioning. 	<ul style="list-style-type: none"> - Flush refrigerant circuit with compressed air and nitrogen. - Replace A/C compressor and receiver.

Note:

- If the function of the air conditioning system is not OK when the test is repeated, re-install old expansion valve and flush refrigerant circuit with compressed air and nitrogen. Then replace A/C compressor and receiver.

- *With this malfunction, evaporator may ice up although quantity of refrigerant in circuit is OK.*

Possible deviation from specification	Possible cause	Corrective action
- High and low pressure normal	Too much refrigerant in circuit	- Discharge refrigerant circuit.
- Required cooling output is not attained.		- Flush refrigerant circuit with compressed air and nitrogen.
- High and low pressure normal		
- Compressor noise (particularly after switch-on)		
- The required cooling level is obtained.		

Note:

- *Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*

Expansion valve and receiver (without internally regulated compressor), checking

Test requirements

- Radiator and condenser clean (clean if necessary)
- Ribbed belt for A/C compressor and generator is correctly tensioned.
- All air ducts, covers and seals OK and properly installed
- Flaps reach their end positions.
- Engine at normal operating temperature
- Evaporator and heater not drawing in secondary air at maximum fresh-air blower speed.

Note the following points when engine is running and A/C system set to maximum cooling output:

- Fresh air blower running.
- Coolant fan in operation or is switched on.
- Recirculating/fresh air door in "recirculating air" position.
- Ambient temperature greater than 15 ° C.
- A/C Evaporator Temperature Switch E33 is correctly installed and its switching temperatures are OK.

Checking

- Switch ignition off.
- Connect pressure gauge set (service station).
- Take pressure gauge reading. Two results A and B can be displayed.

Ambient temperature in degrees Celsius	Pressure in refrigerant circuit in bar positive pressure
+15 ° C	3.9
+20 ° C	4.7
+30 ° C	6.7
+40 ° C	9.1

- A- Pressure in refrigerant circuit is lower than indicated in the table, not enough refrigerant in circuit.
- Localize leak using leak detector.
- Pressure relief valve opened, check activation for coolant fan according to wiring diagram.

Check for constricted refrigerant pipe and hose cross-sections caused by inadequate bending radii or external damage. If no malfunction can be found, flush refrigerant circuit.

- B- Pressure in refrigerant circuit in line with table or higher:

- Start engine.

- Set air conditioning system to maximum cooling output.

- Open doors.

- Open air vents in instrument panel.

Engine drives A/C compressor by ribbed belt via A/C Clutch.

Note:

- If A/C compressor is not being driven, check voltage supply for A/C Clutch N25 according to wiring diagram.

- If voltage supply is OK, repair A/C clutch.

If A/C compressor is driven, check refrigerant circuit:

- Set engine speed to 2000 RPM.

- Observe pressure gauge set:

Specified values

High pressure side:

Increasing from pressure with engine switched off up to maximum 20 bar positive pressure.

Low pressure side:

Decreasing from pressure with engine switched off up to 1.3 bar positive pressure.

Restrictor, reservoir and A/C Compressor Regulator Valve N280 (externally regulated compressor), checking

Note:

- Connect service station ⇒ [00-6, Service station, connecting](#) .
- Observe test conditions ⇒ [00-7, Pressures, checking on vehicles](#) .
- Set engine speed to 2000 RPM.
- Observe pressure gauge of service station.

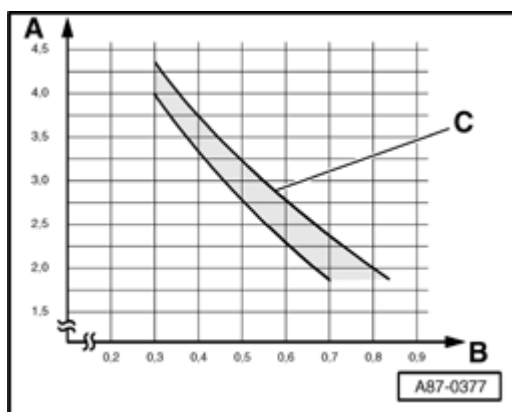
Note:

- Switching pressures for actuation of A/C Compressor Regulator Valve N280 and Coolant Fan V7 are vehicle-specific.

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

Specified values:**High pressure side:**

Increasing from initial pressure (on connecting pressure gauges) to 20 bar.

Low pressure side:

Decreasing from initial pressure (on connecting pressure gauges) to value in graph.

A - Low pressure (measured at service connection) in bar

absolute

B - Control current for A/C
Compressor Regulator Valve
N280

C - Permissible tolerance range.

Note:

- *Under unfavorable conditions (very high ambient temperatures, high humidity), pressure on high-pressure side may increase to max. 29 bar.*

- *Control current - **B** - is displayed in measured value block.*

- *High pressure is displayed in measured value block*

⇒ *Repair Manual, , Repair Group 87,*

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- *Low pressure settles as a function of control current for A/C Compressor Regulator Valve N280 within compressor output range in tolerance range.*

- *Under unfavorable conditions (very high ambient temperatures, high humidity), compressor output may not always be sufficient to attain the specified value.*

- *The specified operating current for the regulating valve must be greater than 0.3 A in order to ensure reliable valve actuation.*

- *In the setting "maximum cooling output" control current is regulated to approx. 0.8 A (displayed in measured value block)*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

- At absolute pressure, 0 bar corresponds to absolute vacuum. Normal ambient pressure equals 1 bar absolute pressure. 0 pressure corresponds to an absolute pressure of one bar on most pressure gauges (indicated by -1 bar below 0).

Possible deviation from specification	Possible cause	Corrective
- High pressure remains constant or only increases slightly (above pressure with engine stopped),	- Activation of A/C Compressor Regulator Valve N280 malfunctioning	- Check activation of Compressor Regulator N280 .
- Low pressure quickly drops to value in graph or below,	- Not enough refrigerant in refrigerant circuit.	- Localize leak using and eliminate.
- Required cooling output is not attained.		- Re-charge refrigerant
- High pressure normal,		
- Low pressure in line with value in graph,		
- Required cooling output is not attained.		
- High pressure normal,		
- Low pressure too low (see graph),		
- Required cooling output is not attained.		
- High pressure normal,		
- Low pressure too low (see graph),		
- Required cooling output is not attained.		

Note:

- If no malfunction is found in relation to this complaint, flush refrigerant circuit with compressed air and nitrogen.

Possible deviation from specification	Possible cause	Corrective
- High pressure only increases slightly above pressure with engine stopped,	- Activation of A/C Compressor Regulator Valve N280 malfunctioning	- Check activation of Compressor Regula N280 .
- Low pressure only drops slightly,	- A/C compressor malfunctioning.	- Flush refrigerant ci compressed air and
- Required cooling output is not attained.		- Replace compress
- High pressure increases above specification	- Constriction or obstruction in refrigerant circuit	- Run hand over refr to check for differen temperature
- Low pressure only drops slightly,		- If difference in temp found at one compo
- Required cooling output is not attained.		- If hose or pipe is ki constricted, replace component.
		- In the event of an c flush refrigerant circi compressed air and
		- If no malfunction ca
		- Flush refrigerant ci compressed air and
- High and low pressure normal at first, after some time high pressure increases above specification and	- Moisture in refrigerant circuit	- Flush refrigerant ci compressed air and
- Low pressure quickly drops to value in graph or below,		
- Required cooling output is no longer attained.		
- High pressure normal,	- Activation of A/C Compressor Regulator Valve N280 malfunctioning	- Check activation of Compressor Regula N280 .
- Low pressure too low (see graph),	- A/C compressor malfunctioning.	- Flush refrigerant ci compressed air and
- The required cooling level is obtained.		- Replace compress

Note:

- For the malfunction "high pressure normal, low pressure too

low" , note the following: If malfunctioning, evaporator may ice-up or cooling output is not reached.

- With this malfunction, evaporator may ice up although quantity of refrigerant in circuit is OK.

- Check measured values of Evaporator Vent Temperature Sensor G263 .

- Check activation of A/C Compressor Regulator Valve N280

⇒ Repair Manual, Heating & Air Conditioning, Repair Group 87 ,

Possible deviation from specification	Possible cause	Corrective
<ul style="list-style-type: none"> - High pressure normal or too high - Low pressure too high (see graph), - Compressor noise (particularly after switch-on) - Required cooling output is not attained. 	<ul style="list-style-type: none"> - Too much refrigerant in circuit 	<ul style="list-style-type: none"> - Extract refrigerant from refrigerant circuit. - If quantity of refrigerant roughly corresponds capacity: - Replace A/C compressor - If quantity of refrigerant is substantially greater than specified capacity: - Re-charge refrigerant - Repeat test.
<ul style="list-style-type: none"> - High and low pressure normal - Required cooling output is not attained. 	<ul style="list-style-type: none"> - Too much refrigerant in circuit 	<ul style="list-style-type: none"> - Discharge refrigerant - Flush refrigerant circuit, compressed air and
<ul style="list-style-type: none"> - High and low pressure normal - Compressor noise (particularly after switch-on) - The required cooling level is obtained. 		

Note:

- *Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.*

Expansion valve, receiver and A/C Compressor Regulator Valve N280 (externally regulated compressor), checking**Note:**

- *Connect service station ⇒ [00-6, Service station, connecting](#) .*

- *Observe test conditions ⇒ [00-7, Pressures, checking on vehicles](#) .*

- *Set engine speed to 2000 RPM.*

- *Observe pressure gauge of service station.*

Note:

- *Switching pressures for actuation of A/C Compressor Regulator Valve N280 and Coolant Fan V7 are vehicle-specific.*

- *Pressures must be measured at service connections; component locations of these connections are vehicle-specific*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

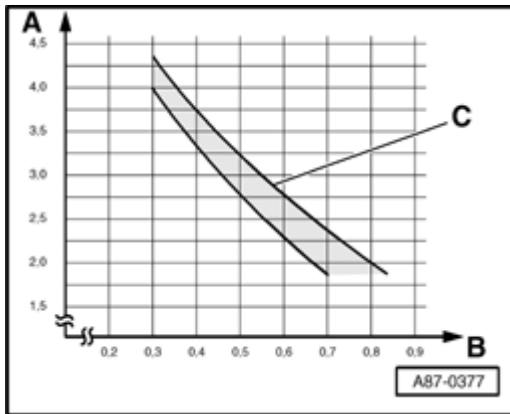
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⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

Specified values:

High pressure side:

Increasing from initial pressure (on connecting pressure gauges) to 20 bar.

Low pressure side:

Decreasing from initial pressure (on connecting pressure gauges) to value in graph.

A - Low pressure (measured at service connection) in bar absolute

B - Control current for A/C Compressor Regulator Valve N280

C - Permissible tolerance range.

Note:

- Under unfavorable conditions (very high ambient temperatures, high humidity), pressure on high-pressure side may increase to max. 29 bar.

- Control current - **B** - is displayed in measured value block.

- High pressure measured by High Pressure Sensor G65 is displayed in measured value block

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

- *Low pressure settles as a function of control current for A/C Compressor Regulator Valve N280 within compressor output range in tolerance range.*
- *Under unfavorable conditions (very high ambient temperatures, high humidity), compressor output may not always be sufficient to attain the specified value.*
- *The specified operating current for the regulating valve must be greater than 0.3 A in order to ensure reliable valve actuation.*
- *In the setting "maximum cooling output" control current is regulated to approx. 0.65 A up to 0.85 A (vehicle specific, displayed in measured value block)*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

- *At absolute pressure, 0 bar corresponds to absolute vacuum. Normal ambient pressure equals 1 bar absolute pressure. 0 pressure corresponds to an absolute pressure of one bar on most pressure gauges (indicated by -1 bar below 0).*

Possible deviation from specification	Possible cause	Corrective
- High pressure remains constant or only increases slightly (above pressure with engine stopped).	- Activation of A/C Compressor Regulator Valve N280 malfunctioning	- Check activation of Compressor Regulator Valve N280 .
- Low pressure quickly drops to value in graph or below.	- Not enough refrigerant in refrigerant circuit.	- Localize leak using and eliminate.
- Required cooling output is not attained.		- Re-charge refrigerant
- High pressure normal.		

- Low pressure in line with value in graph.		
- Required cooling output is not attained.		
- High pressure normal.	- Not enough refrigerant in refrigerant circuit.	- Extract refrigerant from refrigerant circuit.
- Low pressure too low (see graph).		- If quantity of refrigerant is substantially less than capacity.
- Required cooling output is not attained.		- Localize leak using ultrasonic and eliminate.
- High pressure normal.		- Re-charge refrigerant.
- Low pressure too low (see graph).		- Repeat test.
- Required cooling output is not attained.		- If quantity of refrigerant roughly corresponds to capacity:
	- Expansion valve malfunctioning	- Replace expansion valve.
		- Re-charge refrigerant.
		- Repeat test.

Note:

- If no malfunction is found in relation to this complaint, flush refrigerant circuit with compressed air and nitrogen.

- Check measured values of Evaporator Vent Temperature Sensor G263 and activation of A/C Compressor Regulator Valve N280 . If measured value of High Pressure Sensor G65 is not OK, evaporator may ice up or cooling output is not attained.

- If the function of the air conditioning system is not OK when the test is repeated after replacing expansion valve, re-install old expansion valve and flush refrigerant circuit with compressed air and nitrogen. Then replace A/C compressor and

receiver.

- With this malfunction, evaporator may ice up although quantity of refrigerant in circuit is OK.

- If expansion valve is malfunctioning (permanently closed or does not open sufficiently), A/C Compressor Regulator Valve N280 is actuated to maximum output and low pressure drops to value in graph or below (compressor draws off refrigerant from low-pressure side). As however refrigerant cannot flow via expansion valve, cooling output is not attained and high pressure may also not increase or only increase slightly due to the absence of energy conversion.

Possible deviation from specification	Possible cause	Corrective
- High pressure only increases slightly above pressure with engine stopped.	- Activation of A/C Compressor Regulator Valve N280 malfunctioning	- Check activation of Compressor Regula N280 .
- Low pressure only drops slightly.		
- Required cooling output is not attained.	- A/C compressor malfunctioning.	- Discharge refrigerant - Replace compressor - Re-charge refrigerant
- High pressure increases above specification.	- Activation of A/C Compressor Regulator Valve N280 malfunctioning	- Check activation of Compressor Regula N280 .
- Low pressure quickly drops to value in graph or below.		
- Required cooling output is not attained.	- Constriction or obstruction in refrigerant circuit	- Run hand over refrigerant to check for different temperature - If difference in temperature

	<p>found at one component</p> <ul style="list-style-type: none"> - If hose or pipe is kinked or constricted, replace component. - In the event of an air leak, flush refrigerant circuit with compressed air and - Re-charge refrigerant. - Repeat test. - If no malfunction caused, flush refrigerant circuit with compressed air and - Re-charge refrigerant. - Repeat test, if function is not restored. <p>- Expansion valve malfunctioning</p> <ul style="list-style-type: none"> - Discharge refrigerant. - Replace expansion receiver. - Re-charge refrigerant.
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Note:

- With this malfunction, evaporator may ice up although quantity of refrigerant in circuit is OK.

- If expansion valve is malfunctioning (permanently closed or does not open sufficiently), A/C Compressor Regulator Valve N280 is actuated to maximum output and low pressure drops to value in graph or below (compressor draws off refrigerant from low-pressure side). As however refrigerant cannot flow via expansion valve, cooling output is not attained and high pressure may also not increase or only increase slightly due to the absence of energy conversion.

Possible deviation from	Possible cause	Corrective
-------------------------	----------------	------------

specification		
<ul style="list-style-type: none"> - High and low pressure normal at first, after some time high pressure increases above specification. - After a time, low pressure drops to value in graph or below. - Required cooling output is no longer attained. 	<ul style="list-style-type: none"> - Activation of A/C Compressor Regulator Valve N280 malfunctioning 	<ul style="list-style-type: none"> - Check activation of Compressor Regulator Valve N280 .
<ul style="list-style-type: none"> - High and low pressure normal at first, after lengthy driving time, low pressure drops below specification (evaporator ices up). 	<ul style="list-style-type: none"> - Moisture in refrigerant circuit 	<ul style="list-style-type: none"> - Discharge refrigerant - Flush refrigerant circuit with compressed air and nitrogen - Replace receiver/drier - Evacuate refrigerant circuit for at least 3 hours. - Re-charge refrigerant - Repeat test.

Note:

- If problem involving moisture in refrigerant circuit only occurs after a lengthy operating period or only infrequently (low pressure drops below specification and evaporator ices up), it is sufficient to replace the dryer in the receiver. Adjust quantity of refrigerant oil. Refrigerant circuit is then to be evacuated for at least 3 hours.

- It is not initially necessary to flush the refrigerant circuit with compressed air and nitrogen when this problem occurs since normally, there is only a small quantity of moisture in the system which can be removed by lengthy evacuation.

- With this malfunction, evaporator may ice up although quantity of refrigerant in circuit is OK.

Possible deviation from specification	Possible cause	Corrective
----------------------------------------------	-----------------------	-------------------

- High pressure normal, low pressure too low (see graph), required cooling output attained.	- Activation of A/C Compressor Regulator Valve N280 malfunctioning.	- Check activation of Compressor Regulator Valve N280 .
	- Expansion valve or compressor malfunctioning.	- Discharge refrigerant circuit.
		- Flush refrigerant circuit with compressed air and dry nitrogen.
		- Replace expansion valve receiver.
		- Re-charge refrigerant.
		- Repeat test, if functional.
	- A/C compressor malfunctioning.	- Discharge refrigerant circuit.
		- Replace A/C compressor.
		- Re-charge refrigerant.
		- Repeat test.

Note:

- For the malfunction "high pressure normal, low pressure too low", note the following: If malfunctioning, evaporator may ice-up or cooling output is not reached.

- With this malfunction, evaporator may ice up although quantity of refrigerant in circuit is OK.

- Check measured values of Evaporator Vent Temperature Sensor G263 and activation of A/C Compressor Regulator Valve N280 . If measured value of High Pressure Sensor G65 is not OK, evaporator may ice up or cooling output is not attained.

- If the problem is with the A/C Compressor Regulator Valve N280 (regulating valve is not actuated but compressor operates nevertheless), refrigerant circuit does not have to be flushed. It is sufficient in this case to replace the compressor (adjust quantity of

refrigerant oil in compressor).

- If expansion valve is malfunctioning (permanently closed or does not open sufficiently), A/C Compressor Regulator Valve N280 is actuated to maximum output and low pressure drops to value in graph or below (compressor draws off refrigerant from low-pressure side). As however refrigerant cannot flow via expansion valve, cooling output is not attained and high pressure may also not increase or only increase slightly due to the absence of energy conversion.

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

Possible deviation from specification	Possible cause	Corrective
- High pressure normal or too high.	- Activation of A/C Compressor Regulator Valve N280 malfunctioning.	- Check activation of Compressor Regulator Valve N280 .
- Low pressure too high (see graph).	- Too much refrigerant in circuit	- Extract refrigerant from refrigerant circuit.
- Compressor noise (particularly after switch-on).		- If quantity of refrigerant roughly corresponds to specified capacity:
- Required cooling output is not attained.		- Replace A/C compressor
		- If quantity of refrigerant is substantially greater than specified capacity:
		- Re-charge refrigerant
		- Repeat test.
	- Too much refrigerant in circuit	- Discharge refrigerant
		- If quantity of refrigerant roughly corresponds to specified capacity:

- Flush refrigerant circuit with
compressed air and
- Re-charge refrigerant
- Repeat test.
- Expansion valve or compressor
malfunctioning.
- Discharge refrigerant
- Replace expansion
receiver.
- Re-charge refrigerant
- Repeat test, if func
- Replace A/C comp
- A/C compressor malfunctioning.
- Discharge refrigerant
- Replace A/C comp
- If quantity of refrigerant
is substantially greater than
specified capacity:
- Re-charge refrigerant
- Repeat test.

Note:

- If the problem is with the A/C Compressor Regulator Valve N280 (regulating valve is not actuated but compressor operates nevertheless), refrigerant circuit does not have to be flushed. It is sufficient in this case to replace the compressor (adjust quantity of refrigerant oil in compressor).

- If expansion valve is malfunctioning (permanently closed or does not open sufficiently), A/C Compressor Regulator Valve N280 is actuated to maximum output and low pressure drops to value in graph or below (compressor draws off refrigerant from low-pressure side). As however refrigerant cannot flow via expansion valve, cooling output is not attained and

high pressure may also not increase or only increase slightly due to the absence of energy conversion.

Possible deviation from specification	Possible cause	Corrective
- High and low pressure normal. - Required cooling output is not attained.	- Activation of A/C Compressor Regulator Valve N280 malfunctioning. - Too much refrigerant in circuit	- Check activation of Compressor Regulator Valve N280 . - Flush refrigerant circuit, compressed air and
- High and low pressure normal. - Compressor noise (particularly after switch-on). - The required cooling level is obtained.	- Too much refrigerant in circuit - Expansion valve malfunctioning	- Discharge refrigerant - Flush refrigerant circuit, compressed air and - Re-charge refrigerant - Repeat test. - Replace expansion valve

Note:

- Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.

- If expansion valve is malfunctioning (permanently open), evaporator temperature is no longer regulated such that only refrigerant in gas form exits from the evaporator. Under certain usage conditions, liquid droplets may then be drawn in by the compressor and cause noise (liquid cannot be compressed).

Components, replacing

- All components of the refrigerant circuit submitted for quality observation are always to be sealed (use original sealing caps of replacement part).
- To date, the following replacement parts (compressor, reservoir, receiver, evaporator and condenser) have been filled with nitrogen gas. This charge is being gradually discontinued/the pressure of the nitrogen charge is now so low that escape of gas is no longer perceptible on initial opening.
- On vehicles installed with a compressor with no A/C clutch, the engine is only to be started following complete assembly of the refrigerant circuit (compressor always in operation as well) ⇒ [00-1, Basic rules for working on refrigerant circuit](#) .
- So that the compressor with A/C Compressor Regulator Valve N280 (without A/C clutch) is not damaged when the refrigerant circuit is empty, it is equipped with a secured oil supply. This means that approx.40 to 50 cm³ of refrigerant oil remains in the A/C compressor ⇒ [00-1, Basic rules for working on refrigerant circuit](#) .

Note:

- *As parts are sometimes stored for lengthy periods and at different locations within the spare parts organization, it is entirely possible that gas will escape from some parts and not from others on initial opening (even in the case of identical spare part numbers). Sealing caps at replacement part connections are therefore to be removed carefully and the nitrogen gas allowed to escape slowly.*
- *The refrigerant circuit is installed either with a restrictor and reservoir or an expansion valve and receiver.*
- *Seal open connections and pipes (to prevent absorption of moisture).*
- *Always replace restrictor.*
- *Reservoir / receiver or desiccant bag/dryer cartridge must not be replaced under the following conditions.*
- *After an accident, however there is no damage at reservoir / receiver.*
- *Repairs are performed quickly (not beyond the normal repair time) and no moisture has penetrated. Vehicle is not older than 5 years.*

- Reservoir / receiver or dryer cartridge is to be replaced under the following conditions.
- Refrigerant circuit was opened and vehicle is older than 5 years.
- Refrigerant circuit has been open for an uncertain time period (creeping leak).
- Repairs proceed beyond the normal repair time period and moisture has penetrated.
- Always replace reservoir / receiver or dryer cartridge after flushing the refrigerant circuit, and keep them sealed for as long as possible so that the absorption of moisture is minimized.
- A/C compressor has locked-up.
- Reservoir / receiver is damaged (due to accident).

Warning!

- Contaminated refrigerant oils are to be disposed of as used oils of unknown origin.

⇒ **HSO Environment Vol. 2-2. 43. 1**

Components (except compressor, reservoir or receiver) leaking or damaged

Refrigerant circuit completely empty

- Remove malfunctioning component.
- Remove A/C compressor.
- Remove oil drain plug from compressor.

Note:

- The oil drain plug of "Denso" and "Nippondenso" compressors is equipped with an oil seal instead of an O-ring and this is always to be replaced ⇒ Parts Catalog
- To accelerate drainage of refrigerant oil, rotate compressor by way of clutch plate of A/C clutch for example.
- Pour old refrigerant oil out of compressor, see ⇒ HSO Environment Vol. 2-2. 43. 1 .
- Then fill compressor with quantity of fresh refrigerant oil corresponding to quantity of refrigerant oil in replacement compressor

⇒ *Repair Manual, , Repair Group 87,*

- *Use different refrigerant oils and quantities for the various compressors*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

- *To ensure compressor lubrication on start-up, at least 80 cm³ of refrigerant oil must be poured into the compressor, the remainder can be added for example to the new reservoir or receiver*

⇒ *Repair Manual, , Repair Group 87,*

- *If dirt has penetrated into the compressor with the refrigerant circuit open (e.g. after an accident), compressor is to be replaced.*

- *Clean (flush) refrigerant circuit with compressed air or nitrogen ⇒ [00-4, Refrigerant circuit, cleaning \(flushing\) with compressed air and nitrogen.](#) .*

- Replace receiver or reservoir and restrictor.

- Assemble, evacuate and re-charge refrigerant circuit.

There is still refrigerant in the refrigerant circuit

- Discharge refrigerant circuit.

- Remove malfunctioning component, flush with compressed air, collect escaping refrigerant oil.

- The new component is to be filled with the amount of refrigerant oil flushed out (plus 20 cm³ for evaporator, plus 10 cm³ for condenser, refrigerant pipes and refrigerant hoses) as fresh refrigerant oil fill.

- Replace restrictor.

- Assemble, evacuate and charge refrigerant circuit.

A/C compressor. replacing

Compressor, replacing without the need for flushing refrigerant circuit with compressed air and nitrogen (e.g. in the event of external damage following an accident)

- Discharge refrigerant circuit.
- Remove A/C compressor.
- Remove oil drain plug from compressor.

Note:

- *The oil drain plug of "Denso" (Nippondenso) compressors is equipped with an oil seal instead of an O-ring and this is always to be replaced.*

⇒ *Parts Catalog*

- To accelerate drainage of refrigerant oil, rotate compressor e.g. by way of clutch plate of A/C clutch for example.
- Pour old refrigerant oil out of compressor (observe disposal ⇒ *HSO Environment Vol. 2-2. 43. 1*).
- Remove oil drain plug from replacement compressor, pour out refrigerant oil and only add a quantity of fresh refrigerant oil equal to the amount poured out of the malfunctioning compressor.

Note:

- *If, for example, 70 cm³ of refrigerant oil has been poured out of the malfunctioning compressor and 220 cm³ out of the replacement compressor (a small quantity of refrigerant oil remains in the compressor). Fill the compressor to be installed with 70 cm³ of refrigerant oil (use can be made of oil poured out of replacement compressor).*

- *Use different refrigerant oils and quantities for the various compressors*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87,*

- *If a greater quantity of refrigerant oil (more than approx. 80 cm³) has been poured out of the malfunctioning compressor, the remaining refrigerant oil can also be added to the evaporator or reservoir/receiver*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87*,

- .
- Replace restrictor.
- Assemble, evacuate and charge refrigerant circuit.

Compressor, replacing on account of leakage or internal damage (e.g. noise or no output)

- Discharge refrigerant circuit.
- Remove A/C compressor.

Note:

- *In the event of internal (compressor) damage, check refrigerant hoses and condenser, If, e.g. swarf has penetrated, replace these refrigerant hoses.*
- Clean (flush) refrigerant circuit with compressed air and nitrogen ⇒ [00-4, Refrigerant circuit, cleaning \(flushing\) with compressed air and nitrogen.](#) .
- Replace receiver or dryer cartridge, reservoir and restrictor.
- Examine expansion valve for dirt or corrosion; replace if necessary.
- Assemble, evacuate and charge refrigerant circuit.

Receiver or reservoir and restrictor, replacing

Replacing after flushing refrigerant circuit, e.g. on account of ingress of moisture (refrigerant circuit open for lengthy period) or contamination

- Discharge refrigerant circuit.
- Remove A/C compressor.
- Rectify cause of trouble.
- Clean (flush) refrigerant circuit with compressed air and nitrogen ⇒ [00-4, Refrigerant circuit, cleaning \(flushing\) with compressed air and nitrogen.](#) .
- Examine expansion valve for dirt or corrosion; replace if necessary.

- Remove oil drain plug from compressor.

Note:

- *The oil drain plug of "Denso/Nippondenso" compressors is installed with an oil seal instead of an O-ring and this is always to be replaced ⇒ Parts Catalog*

- To accelerate drainage of refrigerant oil, rotate compressor e.g. by way of clutch plate of A/C clutch for example.

- Pour old refrigerant oil out of compressor, see ⇒ *HSO Environment Vol. 2-2. 43. 1* .

- Then fill compressor with quantity of fresh refrigerant oil corresponding to quantity of refrigerant oil in replacement compressor

⇒ *Repair Manual, , Repair Group 87,*

Note:

- *Use different refrigerant oils and quantities for the various compressors*

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 87 ,*

- *To ensure compressor lubrication on start-up, at least 80 cm³ of refrigerant oil must be poured into the compressor, the remainder can be added for example to the new reservoir or receiver*

⇒ *Repair Manual, , Repair Group 87,*

.

- *If dirt has penetrated into the compressor with the refrigerant circuit open (e.g. after an accident), compressor is to be replaced.*

- Replace receiver or reservoir and restrictor.

- Assemble, evacuate and charge refrigerant circuit.

Replacing without the need for flushing refrigerant circuit with compressed air and

**nitrogen (e.g. in the event of accident damage);
no escape of refrigerant and no penetration of
moisture and dirt into circuit**

- Discharge refrigerant circuit.
- Replace restrictor.
- Remove receiver or reservoir.
- Remove dirt from receiver or reservoir.
- Weigh receiver or reservoir removed.

Note:

- *Add refrigerant oil to new receiver or reservoir until weight of component removed has been attained.*
- *Install new receiver or reservoir.*
- Assemble, evacuate and charge refrigerant circuit.

Testing equipment and tools

List of testing equipment, tools and materials

Note:

- This list outlines the testers, tools and materials required for expert refrigerant circuit repair work.

Tools and materials available from regional sales center or importer

Overview	page
A/C service station VAS 6007A , other service stations ⇒ <i>Catalog V.A.G workshop equipment</i>	⇒ 00-9, (and other or currently available service stations)
Leak detector V.A.G 1796	⇒ 00-9, null
Leak detection system VAS 6196	⇒ 00-9, null
Leak detection additive VAS 6196/1	Not illustrated
Disengaging tool V.A.G 1795+1795/1	⇒ 00-9, null
Retainer V.A.G 1616	⇒ 00-9, for clutch plate (for
Puller V.A.G 1616/1 for A/C clutch (Sanden compressors)	⇒ 00-9, (for
A/C clutch set V.A.G 1719 (Zexel compressors)	⇒ 00-9, (for
Adapter set V.A.G 1785 -10 R134a	⇒ 00-9, null
Combined fine filter unit for compressed-air system (oil, dirt and water separator as used for painting facilities) ⇒ <i>Catalog workshop equipment</i>	Not illustrated
O-ring seals ⇒ <i>Parts Catalog</i>	Not illustrated
Refrigerant oil ⇒ <i>Parts Catalog</i>	Not illustrated

Commercially available tools and materials

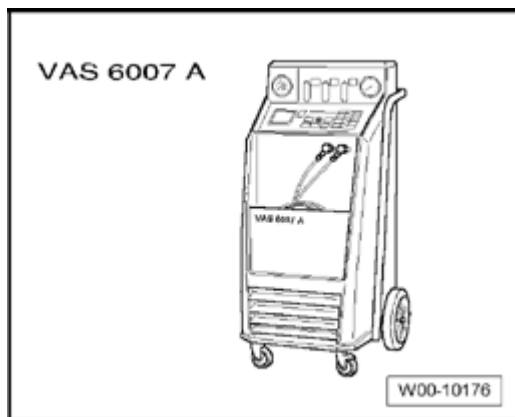
Overview	page
Fin comb	⇒ 00-9, Fin comb
Charging hoses 5/8" - 18 UNF with valve opener	⇒ 00-9, Charging hoses
Connection piece for refrigerant cylinder and seal with quick-release coupling connection or threaded connection 5/8" - 18 UNF	⇒ 00-9, Connection piece for refrigerant cylinder with seal, quick-release coupling connection or threaded connection 5/8" - 18 UNF
Valve caps 5/8"-18 UNF	⇒ 00-9, Valve caps with spare seals (for 5/8"-18 UNF thread)
Pressure gauge set with pressure reducer for	⇒ 00-9, Pressure gauge set with pressure

nitrogen	reducer for nitrogen (max. reducing pressure: 15 bar)
Quick-release coupling adapter for service connections, 2x included in scope of delivery of service station	⇒ 00-9, Quick-release coupling adapter for service connections
Open-ring wrench, size according to bolted joints at refrigerant pipes	Not illustrated
Valve opener for charging hoses	Not illustrated
Connecting nipple for conical seal 5/8"-18 UNF	Not illustrated
Compressed-air gun with rubber end piece	Not illustrated
Valve opener for Schrader valve	Not illustrated
Hand shut-off valve 5/8"-18 UNF	Not illustrated
Recycling container for refrigerant R134a	Not illustrated
Digital thermometer	Not illustrated
Protective gloves not illustrated	Not illustrated
Protective glasses	Not illustrated
Refrigerant R134a with cylinder (capacity as required)	Not illustrated
Nitrogen with compressed gas cylinder	Not illustrated
Band wrench (oil filter) as counterhold for ribbed belt pulley	Not illustrated

Improvised tools

Overview	page
Charging hose with connection for workshop compressed-air system	⇒ 00-9, Charging hose with connection for workshop compressed-air system

Tools and materials available from regional sales center or importer



A/C service station VAS 6007A (and other or currently available service stations)

⇒ *Catalog workshop equipment*

- The operations "testing, extraction (recycling), evacuation and charging" are to be performed in line with the relevant operating instructions.

- The filters and dryers installed are to be replaced at the latest at the end of the period of use specified in the operating instructions and whenever the station has been drained (keep replacement filter to hand; available from equipment manufacturer, refer to operating instructions).

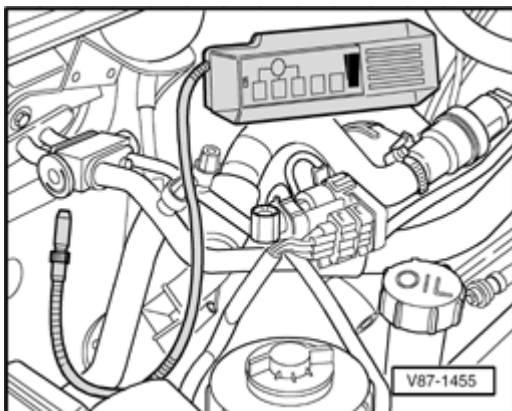
- Use can also be made of service stations not described here.

⇒ *Catalog workshop equipment*

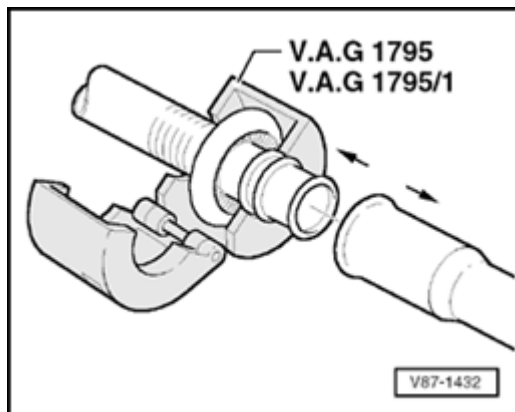
Note:

- *This service station comprises the following standard components: Charging cylinder, pressure gauge set, vacuum pump, shutoff valves and charging hoses.*

- *One quick-release coupling each (for service connections on high and low-pressure side) is included in the scope of delivery of this service station.*



Leak detector V.A.G 1796

**Leak detection system VAS 6196****Disengaging tool V.A.G
1795+1795/1****Retainer V.A.G 1616 for clutch
plate (for "Sanden" compressors)****Puller V.A.G 1616/1 (for "Sanden"
compressors)****A/C clutch set V.A.G 1719 (for
"Zexel" compressors)****Adapter set V.A.G 1785**

- Adapter for flushing with compressed air and nitrogen

A - 5/8"-18 UNF thread for conical seal

B - Union nut (for connection with O-ring) with thread

- M 18x1.5 V.A.G 1785/1

- M 20x1.5 V.A.G 1785/2

- M 24x1.5 V.A.G 1785/3

- M 28x1.5 V.A.G 1785/4

A - 5/8"-18 UNF thread for conical seal

B - Threaded connection for O-ring

- M 18x1.5 V.A.G 1785/5

- M 20x1.5 V.A.G 1785/6

- M 24x1.5 V.A.G 1785/7



- M 28x1.5 V.A.G 1785/8



Valve adapter

A - 5/8"-18 UNF thread for conical seal

B - Internal thread with valve opener M 10x1.25 V.A.G 1785/9 (for connections with valve on high-pressure side) M 12x1.5 V.A.G 1785/10 (for connections on low-pressure side)

Note:

- A Schrader valve is screwed into connection - **A** - .

- A valve opener must be installed in the charging hose connection.

Commercially available tools and materials



Fin comb



Charging hoses

5/8"-18 UNF thread

Note:

- Use differently colored charging hoses (1800 mm long).
- Have valve opener and spare seals to hand.



Connection piece for refrigerant cylinder with seal, quick-release coupling connection or threaded connection 5/8" - 18 UNF



Valve caps with spare seals (for 5/8"-18 UNF thread)

Seals can also be used for charging hoses.



Pressure gauge set with pressure reducer for nitrogen (max. reducing pressure: 15 bar)

1. Pressure gauge set
2. Pressure hose (inner diameter 5 mm, length 2 m)
3. Nitrogen
4. Hose fitting

Note:

- For connection to adapter set V.A.G 1785 with 5/8"-18 UNF thread

**Quick-release coupling adapter for service connections**

- High-pressure side, nominal size 16 mm
- Low-pressure side, nominal size 13 mm
- 2x release tool (Sharan)

Note:

- This quick-release coupling is included in the scope of delivery of the service station.

Improvised tools**Charging hose with connection for workshop compressed-air system**

A - Charging hose 5/8" - 18 UNF** (version with large inner diameter)

B - Connection for workshop compressed-air system ** (always use filter)

** Commercially available tools and materials

Glossary

Select a topic

01 - On Board Diagnostic (OBD)

[On Board Diagnostic \(OBD\) through m.y. 2001](#)

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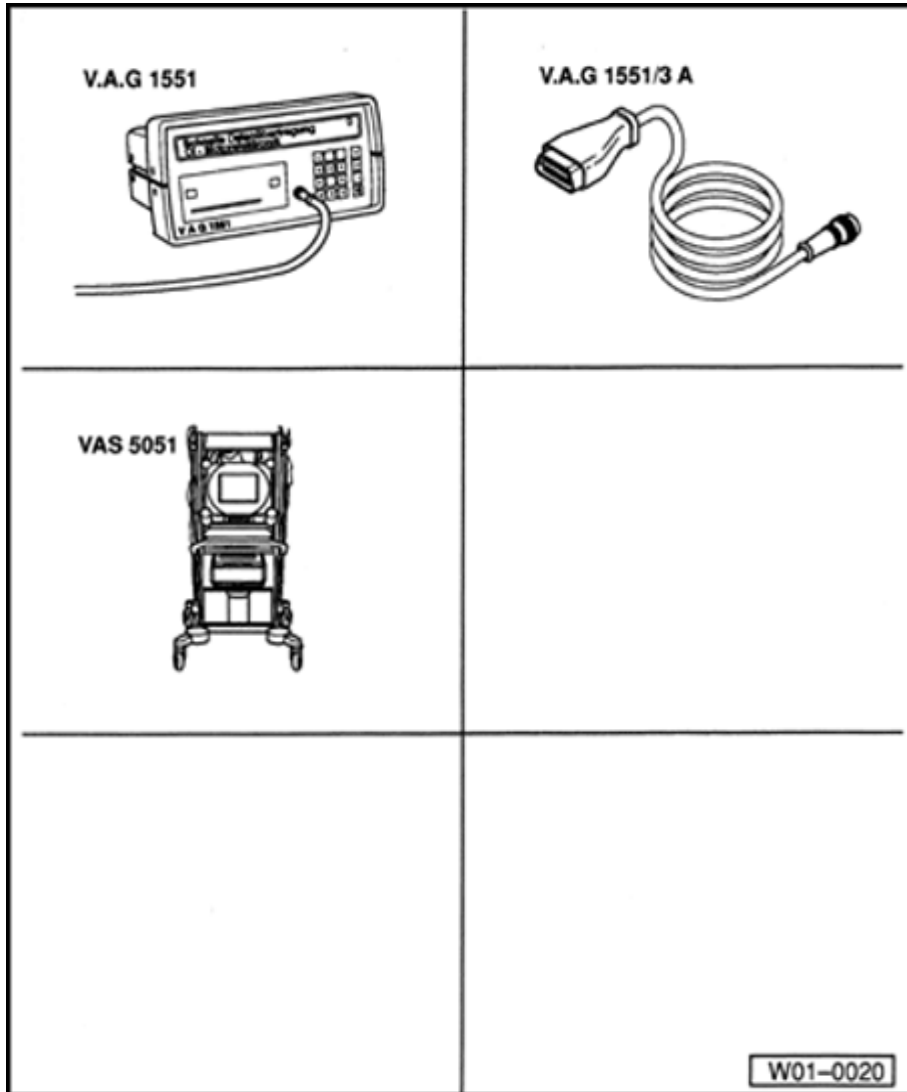
[Diagnostic Trouble Code \(DTC\) memory, erasing \(function 05\)](#)

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On Board Diagnostic (OBD) through m.y. 2001

Tools

Special tools and equipment

- ◆ VAG 1551/1552 Scan Tool (ST)
- ◆ VAG 1551/3C cable
- ◆ VAS 5051 or VAS 5052 Vehicle Diagnostic Testing and Information System

VAS 5051 or VAG 1551, connecting

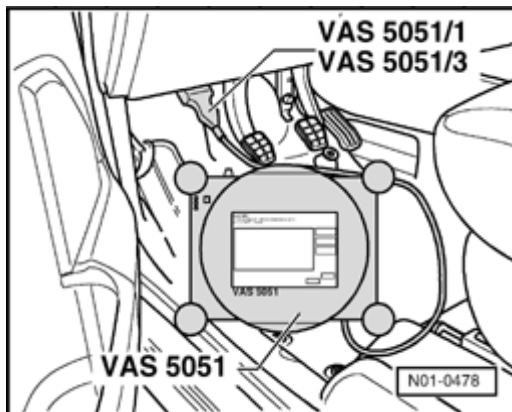
All functions previously performed with the VAG 1551 or VAG 1552 can also be performed using the VAS 5051 tester via operating mode vehicle self-diagnosis.

⇒ *Operating instructions for VAS 5051 tester.*

VAS 5051, connecting

Test requirements:

- ◆ All fuses OK according to wiring diagram.
- ◆ Battery voltage must be at least 11.5 volts.



- Connect VAS 5051/1 or VAS 5051/3 diagnostic wire to Data Link Connector (DLC)
- Switch on ignition.

Select operating mode, vehicle system and function:

- Press "Vehicle Self-Diagnosis" selection on display.
- Select the vehicle system to be tested on display (touch screen).
- Select the desired function on display.

Display will indicate the control module identification and the coding.

Display will indicate all relevant diagnostic functions.

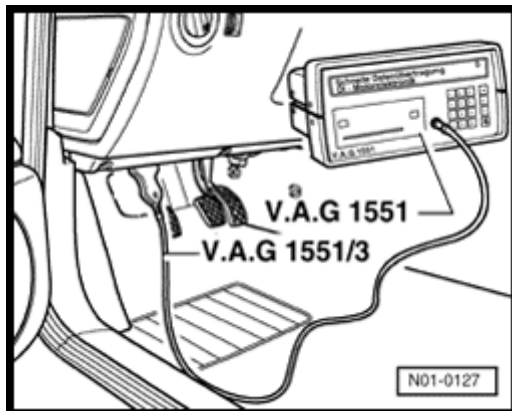
Notes:

- ◆ *Display fields in functions 04 (Basic settings) and 08 (Read Measuring Value Block) are listed from top to bottom.*
- ◆ *The following test sequences are described in the VAG 1551 Scan Tool (ST).*

VAG 1551, connecting

Test requirements:

- ◆ All fuses OK according to wiring diagram
- ◆ Battery voltage must be at least 11.5 vol



- Connect VAG 1551 Scan Tool (ST) with VAG 1551/3C cable to Data Link Connector (DLC)

Notes:

- ◆ *If nothing is indicated on display, check the power supply for VAG 1551 scan tool according to the wiring diagram.*

⇒ *Electrical Wiring Diagrams, Troubleshooting, Component Locations*

- ◆ *Depending on the program, additional information can be printed out by pressing the HELP button of the VAG 1551 scan tool.*
- ◆ *Function 00 "Automatic test sequence" can be performed in operating mode 1 "Rapid data transfer". This automatically checks all components and modules installed in the vehicle.*
- ◆ *The → button is used for advancing through the program sequence.*
- ◆ *The PRINT button is used for switching on the printer (lamp in button lights up).*

VAG- On Board Diagnostic HELP

1 - Rapid data transfer*

2 - Blink code output*



Indicated on display (* is displayed alternately):

- Press button 1 for "Rapid data transfer".
- Continue On Board Diagnostic (OBD) of vehicle system to be tested as described under "performing On Board Diagnostic (OBD) ⇒ table of contents

On Board Diagnostic (OBD) from m.y. 2002

General information

OBD program text/data generated by control modules installed on vehicles from m.y. 2002 may not be recognized by VAG 1551/1552 Scan Tools (ST) with the latest program card. For example: scan tool display shows "text 799", "01529 /references" or similar.

Only the VAS 5051 Vehicle Diagnostic Testing and Information System is capable of processing all display text/data on these vehicles.

All OBD program functions on vehicles from m.y. 2002 should be performed using the VAS 5051 Vehicle Diagnostic Testing and Information System in operating mode "Guided Fault Finding" or "Vehicle Self-Diagnosis".

Instrument cluster through m.y. 1999, On Board Diagnostic (OBD)

General information

The instrument cluster contains an electronic speedometer, tachometer, liquid crystal (LCD) displays for odometer, trip odometer/clock, as well as analog coolant temperature and fuel level gauges. Control and warning lamps are situated within and between the speedometer and tachometer. Automatic transmission models also contain an LCD gear indicator display.

Where available, an LCD multi-function trip computer (MFI) with two operating modes is located in the tachometer display. The MFI includes selectable displays for trip time/mileage, average trip speed, average trip fuel consumption and outside temperature.

The instrument cluster is controlled by an internal microprocessor with On Board Diagnostic (OBD) capability. If malfunctions occur in monitored sensors and components, Diagnostic Trouble Codes (DTC) will be stored in memory together with an indication of malfunction type. A maximum of 4 DTCs can be stored simultaneously.

Sporadic malfunctions (indicated in the readout by "SP") are automatically cancelled if not repeated in the next 50 engine starts.

Before performing any troubleshooting or inspection, always begin by checking for DTCs using the OBD program. DTCs stored in memory are retrieved/checked with either the VAG 1551/1552 Scan Tool (ST) or VAS 5051 Vehicle Diagnostic Testing and Information System.

Notes on exchanging instrument cluster

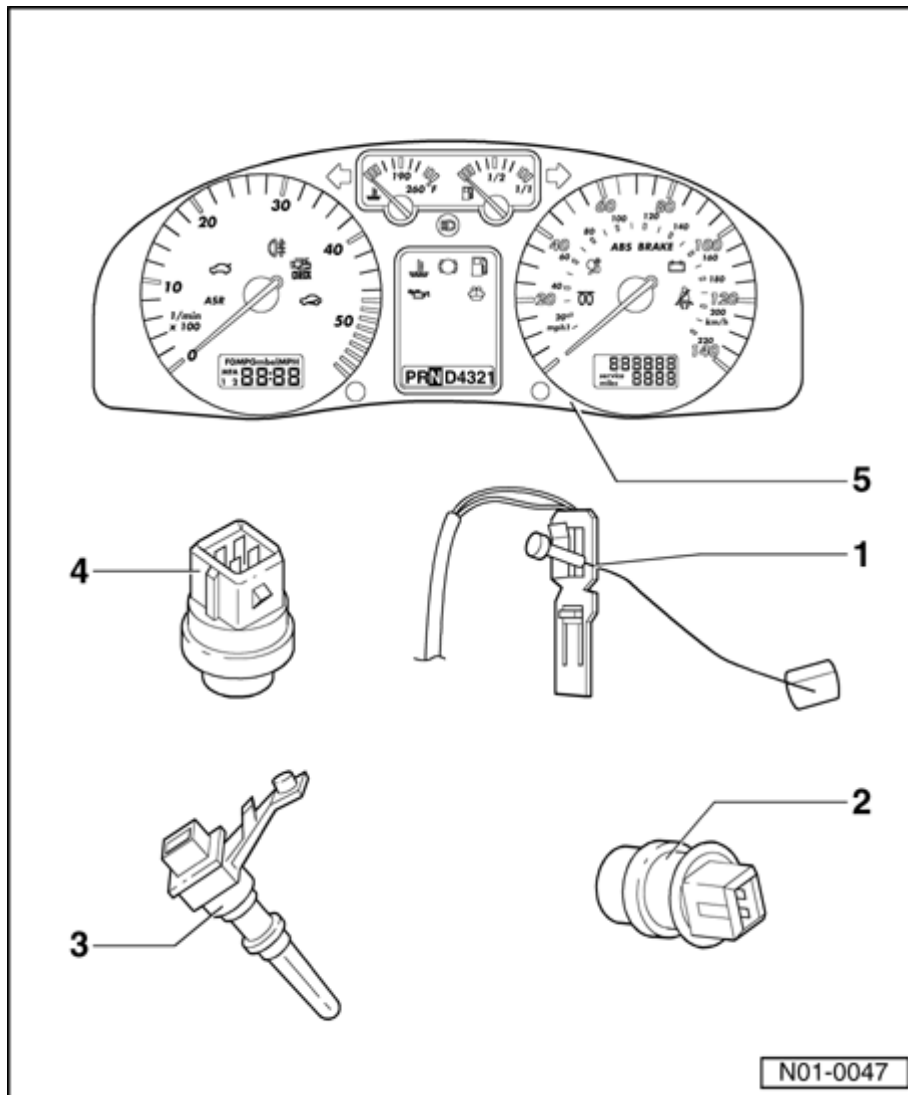
- ◆ Do not disassemble instrument cluster.
- ◆ Instrument clusters contain no field serviceable components. All malfunctions require replacement of instrument cluster.
- ◆ When the replacement of a malfunctioning instrument cluster is necessary, follow exchange part procedures.
- ◆ Complete the report form and return together with instrument cluster.
- ◆ Use the original packaging from the new cluster when returning modules.
- ◆ Replacement instrument clusters must be coded according to vehicle market version and equipment level variables using the OBD program ⇒ [Page 01-29](#) .
- ◆ Odometer reading must be adapted to the new/exchange instrument cluster using the OBD program ⇒ [Page 01-45](#) .

Additional information:

- ◆ Complaint/symptom based Technical Bulletins ("Service Fixes"):

⇒ *Technical Bulletins*

- ◆ Instrument cluster ⇒ [Repair Manual, Electrical Equipment, Repair Group 90](#) .



Electrical and electronic components, locations

CAUTION!

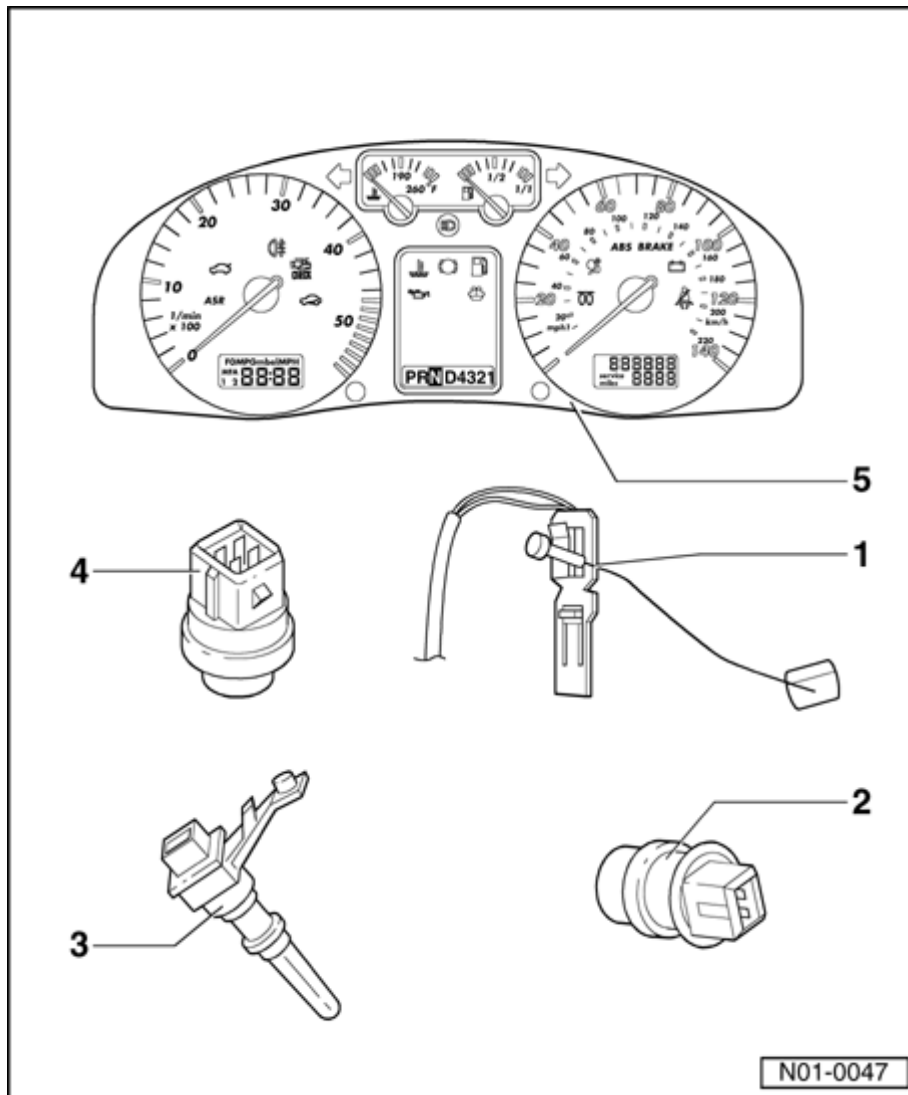
Before beginning repairs on the electrical system:

- ◆ **Obtain the anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Disconnect negative (-) battery terminal.**
- ◆ **When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as**

***specified in
Repair
Manual,
Electrical
Equipment,
Repair Group
27***

**1 - Sender for
fuel gauge
-G-**

- ◆ Location
⇒ [Fig. 1](#)
- ◆ Monitored
by OBD



**2 Outside Air
- Temperature
Sensor -
G17- (where
applicable)**

◆ Location
⇒ [Fig. 2](#)

◆ Monitored
by OBD

**3 Speedometer
- Vehicle
Speed
Sensor (VSS)
-G22-**

◆ Location
⇒ [Fig. 3](#)

◆ Monitored
by OBD

**4 Engine
- Coolant
Temperature
(ECT)
Sensor -G2-**

◆ Location
depends
on type
of
engine

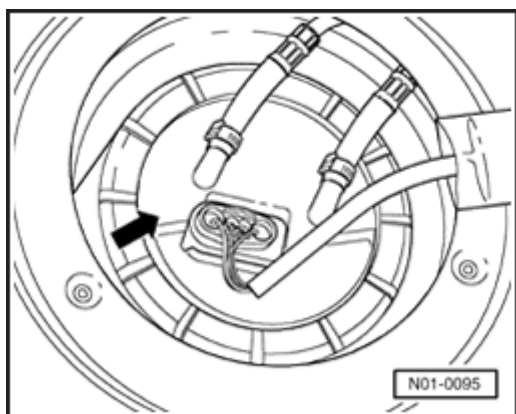
⇒ *Repair
Manual, Fuel
Injection &
Ignition, Repair
Group 24*

◆ Monitored
by On
Board
Diagnostic
(OBD)

**5 - Instrument
Cluster -K-**

◆ Monitored
by OBD

01-10

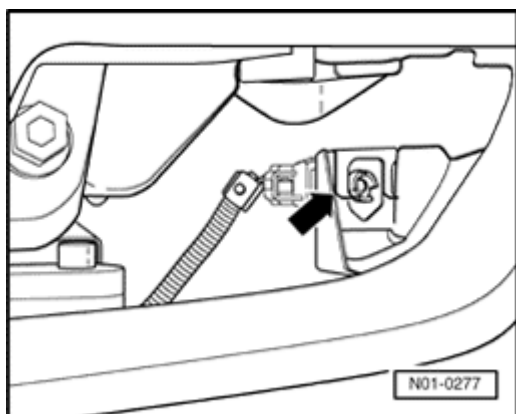


✦ **Fig. 1 Sender for fuel gauge - G-**

Located in fuel tank on fuel delivery unit -arrow-.

Removing and installing

⇒ *Repair Manual, Engine Mechanical, Repair Group 20*



✦ **Fig. 2 Outside Air Temperature Sensor -G17- (where applicable)**

Sensor - arrow- located on left of front bumper behind outer air grill.

Unclip air grill to remove sender.

⇒ *Repair Manual, Body Exterior, Repair Group 63*

01-11

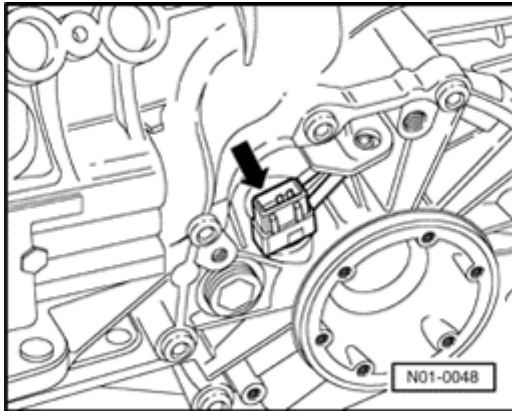


Fig. 3 Speedometer Vehicle Speed Sensor (VSS) - G22-

Sensor -arrow- located near left-hand drive shaft flange on manual and automatic transmission vehicles.

Instrument cluster On Board Diagnostic (OBD), initiating & checking control module versions

Test requirements:

- ◆ All fuses OK according to wiring diagram
- ◆ Voltage supply OK (at least 11.5 V).
- ◆ Scan Tool VAG 1551 or VAG 1552 connected.

Notes:

- ◆ *Connecting Scan Tool* ⇒ [Page 01-1](#) .
- ◆ *The following description applies only to Scan Tool VAG 1551.*
- Switch on ignition.
- Switch on printer with the PRINT button (indicator lamp in button lights up).
- Press button -1- to select operating mode 1, "Rapid data transfer" .

Rapid data transfer
Input address word XX

HELP



Indicated on display:

- Press buttons -1- and -7- to input address word 17, "Instrument cluster".

Rapid data transfer
17 Instrument cluster

Q



Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer Q
 Tester sends address word 17



Indicated on display:

1J0919860D A4-KOMBI INSTR VDO V04 →
 Coding 00042 WSC 00000



Indicated on display (example only):

Top line: Part No. of control
 module
 System designation
 (Combi instrument)
 Manufacturer's code:
 MMO = Motometer
 VDO = VDO
 Software level

Bottom line: Coding¹⁾

Workshop number²⁾

1 - Dependent on engine,
 transmission and additional
 equipment

2 - Automatically stored in the
 control module upon entry into the
 installed system. But not for coding
 of control modules that have
 already been used.

Control module does not answer! HELP



If this appears on display:

- Press "HELP" button and a list of possible causes is printed out.
- After repairing malfunctions, again enter address word 17 for instrument cluster and confirm with Q.
- Press → button.

Rapid data transfer

HELP



Indicated on display:

Select function XX

List of available functions

Function		page
01 -	Check Control Module version	⇒ Page 01-12
02 -	Check DTC memory	⇒ Page 01-15
03 -	Output Diagnostic Test Mode	⇒ Page 01-20
05 -	Erase DTC memory	⇒ Page 01-26
06 -	End Output	⇒ Page 01-28
07 -	Code Control Module	⇒ Page 01-29
08 -	Read Measuring Value Block	⇒ Page 01-33
10 -	Adaptation	⇒ Page 01-43
12 -	Digital clock (Motometer, where applicable), correction	⇒ Page 01-61

Notes:

Press HELP button to print out a complete list of available functions. This list indicates function capability of VAG 1551 Scan Tool (ST) only, and does not necessarily reflect function capability of vehicle systems equipped with OBD. For

instrument cluster address word 17, do not attempt to select functions other than those listed above.

- ◆ *After function is completed and forwarded with → button, VAG 1551 Scan Tool (ST) returns to following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

Diagnostic Trouble Code (DTC) memory, checking (function 02)

Note:

DTCs stored in memory along with corresponding malfunction descriptions can only be displayed by initiating the On Board Diagnostic program and checking DTC memory (function 02).

- Connect VAG 1551 Scan Tool, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17, "Instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" appears in display.
- Switch on printer with the PRINT button (indicator lamp in button lights up).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -2- to select "Check DTC memory" function 02.

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Press -Q- button to confirm input.

X DTC's recognized!



The number of stored DTCs appears in the display.

Stored DTCs are displayed and printed out one after another.

- Check print-out against DTC table and repair all malfunctions as necessary ⇒ [Page 01-17](#) .

No DTC recognized!



If "No DTC recognized" is displayed the program will return to the initial position after pressing → button.

Rapid data transfer

HELP



Indicated on display:

Select function XX

If something else is displayed:

⇒ *Scan tool operating instructions*

- End Output (function 06) ⇒ [Page 01-28](#) .
- Switch ignition off
- Disconnect VAG 1551 from Data Link Connector (DLC).

Diagnostic Trouble Code (DTC) table

Notes:

- ◆ *The following table lists all malfunctions, with the corresponding 5 digit code numbers, that can be recognized by control module with indicator unit in instrument cluster insert -J285- and printed out by the VAG 1551 Scan Tool (ST).*
- ◆ *If malfunctions do not occur regularly, these are displayed as occurring sporadically ("SP").*
- ◆ *DTC codes appear only on print-out.*
- ◆ *Before replacing components, check the wiring and connections to these components as well as ground connections, according to wiring diagram.*
- ◆ *When repair has been carried out, the Diagnostic Trouble Code (DTC) memory must always be erased and checked again with VAG 1551 Scan Tool (ST).*
- ◆ *If there is a specific complaint and no malfunctions are recognized after checking Diagnostic Trouble Code (DTC) memory, carry out function 03, "Output Diagnostic Test Mode (DTM)" ⇒ [Page 01-20](#) or function 08, "Read measuring value block" ⇒ [Page 01-33](#).*

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
00667* Ambient-Temperature Signal Open/Short circuit to B+ Short to Ground (GND)	<ul style="list-style-type: none"> ◆ Open/short circuit in wiring between Outside Air Temperature Sensor - G17- and instrument cluster. ◆ -G17- malfunctioning 	<ul style="list-style-type: none"> ◆ Dashes (- - -) appear on display in instrument cluster 	<ul style="list-style-type: none"> - Read Measuring Value Block ⇒ Page 01-33 - Check for open or short circuit in wiring using wiring diagram. - Replace -G17-

**Not for vehicles with Climatronic: A DTC entry is made when the malfunction has been registered continuously for at least 60 seconds.*

01-18

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
00771* Fuel Level Sensor -G- Open/Short circuit to B+ Short to Ground (GND)	<ul style="list-style-type: none"> ◆ Open or short circuit in wiring between Fuel Level Sensor -G- and instrument cluster ◆ -G- malfunctioning 	<ul style="list-style-type: none"> ◆ Fuel reserve displayed value 0 ("empty") 	<ul style="list-style-type: none"> - Read Measuring Value Block ⇒ Page 01-33 - Check for open or short circuit in wiring using wiring diagram. - Replace -G-
00779** Outside Air Temperature Sensor -G17- Open/Short circuit to B+ Short to Ground (GND)	<ul style="list-style-type: none"> ◆ Open or short circuit in wiring between Outside Air Temperature Sensor -G17- and instrument cluster ◆ -G17- malfunctioning 	<ul style="list-style-type: none"> ◆ Dashes (- - -) appear on display in instrument cluster 	<ul style="list-style-type: none"> - Read Measuring Value Block ⇒ Page 01-33 - Check for open or short circuit in wiring using wiring diagram. - Replace -G17-

* A DTC entry is made when the malfunction has been registered continuously for at least 20 seconds.

**For vehicles with multi-function indicator (MFA) but not with Climatronic

01-19

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
01039* ECT Sensor -G2- Open/Short circuit to B+ Short to Ground (GND)	<ul style="list-style-type: none"> ◆ Open or short circuit in wiring between ECT Sensor -G2- and instrument cluster ◆ -G2- malfunctioning 	<ul style="list-style-type: none"> ◆ Engine coolant temperature (ECT) gauge needle on left stop 	<ul style="list-style-type: none"> - Read Measuring Value Block ⇒ Page 01-33 - Check for open or short circuit in wiring using wiring diagram. - Replace -G2-
65535 Control module - Faulty	<ul style="list-style-type: none"> ◆ Control unit with display in instrument cluster -J285- malfunctioning 	<ul style="list-style-type: none"> ◆ No display ◆ Malfunction of display and warning lamps 	<ul style="list-style-type: none"> - Replace instrument cluster
Other DTC's	If other DTC's are displayed that are not shown in this DTC table, perform On Board Diagnostic (OBD) of anti-theft immobilizer system using VAS 5051 Vehicle Diagnostic Testing and Information System.		

** A DTC entry "Open circuit/short to positive" is made after the engine has been running for 30 minutes and the DTC is recognized.*

Output Diagnostic Test Mode (DTM) (function 03)

The Output Diagnostic Test Mode (DTM) is part of the electrical check. The following components and systems are checked via Output DTM:

- ◆ Speedometer
- ◆ Tachometer
- ◆ Engine Coolant Temperature (ECT) gauge
- ◆ Fuel gauge
- ◆ Brake system warning lamp
- ◆ Seat belt warning lamp
- ◆ Buzzer
- ◆ All liquid quartz displays (LCD): odometer, multi-function indicator (MFI) or digital clock & selector lever position display (automatic transmission)
- ◆ Engine Coolant Temperature (ECT) & low coolant indicator warning lamp
- ◆ Brake pad wear warning lamp (where applicable)
- ◆ Fuel reserve warning lamp
- ◆ Oil pressure warning lamp

- If a malfunction is determined when performing Output DTM, exchange instrument cluster.
- If no malfunction is determined when performing Output DTM, check wiring and connections to instrument cluster using wiring diagram.

Output Diagnostic Test Mode (DTM), initiating

Notes:

◆ *Output Diagnostic Test Mode (DTM) cannot be initiated, or will be interrupted if engine is running or vehicle is moving.*

◆ *Use the -C- button to exit the test sequence at any time.*

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is shown in display.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -3- to select "Output Diagnostic Test Mode" function 03.

Rapid data transfer

03 - Output Diagnostic Test Mode

Q



Indicated on display

Rapid data transfer



Analog display



- Press -Q- button to confirm input.

Indicated on display

After pressing the -Q- button, the following instrument functional checks are carried out simultaneously on VDO instrument clusters and sequentially on Motometer instrument clusters (press → button to advance through test sequence):

- ◆ coolant temperature needle moves over complete display range
- ◆ tachometer needle moves over complete display range
- ◆ speedometer needle moves over complete display range
- ◆ fuel gauge needle moves over complete display range

After sweep of display ranges, the following fixed values are displayed:

Coolant temperature gauge: 90 °C

Tachometer: 3000 rpm

Speedometer: 100 km/h (62mph)

Fuel gauge: 1/2

- Press → button.

Output Diagnostic Test Mode →
Combi instrument warning lamp test



Indicated on display:

The warning lamps for

- ◆ Brake system (low brake fluid level, ABS inoperative)
- ◆ Coolant temperature/low coolant level indicator
- ◆ Brake pad wear (where applicable)
- ◆ Fuel reserve
- ◆ Oil pressure

are activated and remain constantly lit.

- Press → button.

Output Diagnostic Test Mode →
Seat belt warning lamp - K19



Indicated on display:

The Seat Belt Warning Light -K19- lights up.

- Press → button.

Output Diagnostic Test Mode →
Signal



Indicated on display:

The buzzer/chime is activated: a warning tone sounds in intervals.

- Press → button.

Output Diagnostic Test Mode →
Segment test



Indicated on display:

All segments of LCD display in speedometer and tachometer are activated and become visible.

<p>Output Diagnostic Test Mode → Coolant, excessive temp test</p>	<p>←</p>	<p>- Press → button.</p> <p>Indicated on display:</p> <p>Instrument cluster VDO:</p> <p>Safety cut-off (A/C compressor cut-off- is activated approx. 5 seconds later (vehicles with A/C only)</p> <p>No indication is given in instrument cluster!</p> <p>Instrument cluster MMO:</p> <p>Engine Coolant Temperature (ECT) warning lamp lights and warning sound is given.</p> <p>Safety cut-off (A/C compressor cut-off- is activated approx. 5 seconds later (vehicles with A/C only)</p>
<p>Output Diagnostic Test Mode → END</p>	<p>←</p>	<p>- Press → button.</p> <p>Indicated on display:</p> <p>- Press → button.</p>
<p>Output Diagnostic Test Mode → END</p>	<p>←</p>	<p>Indicated on display, instrument cluster MMO:</p>
<p>Function is unknown or → cannot be carried out at the moment</p>	<p>←</p>	<p><i>Indicated on display, instrument cluster VDO:</i></p> <p>End Output Diagnostic Test Mode for VDO instrument clusters by pressing → button.</p>

			All actual values are displayed again.
Rapid data transfer Select function XX	HELP	◀	Indicated on display: - Press buttons -0- and -6- to select "End Output" function 06.
Rapid data transfer 06 - End Output	Q	◀	Indicated on display: - Press -Q- button to confirm input.
Rapid data transfer Enter address word XX	Help	◀	Indicated on display: The tester is now in basic function again.

Diagnostic Trouble Code (DTC) memory, erasing (function 05)

Note:

After DTC memory is erased, its contents are automatically output. If DTC memory cannot be erased, check DTC memory again and repair malfunction.

Prerequisites

- ◆ DTC memory checked ⇒ [Page 01-15](#).
- ◆ All malfunctions repaired.

After successful DTC memory check:

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -5- to select "Erase DTC memory" function 05.

Rapid data transfer
05 Erase DTC memory

Q



Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer
DTC memory is erased!

→



Indicated on display:

DTC memory is erased.

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

Notes:**WARNING!**

DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

Rapid data transfer



DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

◆ *Follow test sequence exactly: first check DTC memory, repair malfunction(s) if necessary, then erase.*

End Output (function 06)

- Press buttons -0- and -6- to select "End Output" function 06.

Rapid data transfer
06 - End Output

Q ◀

Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer
Enter address word XX

HELP ◀

Indicated on display:

- Switch off ignition.
- Disconnect VAG 1551 from Data Link Connector (DLC).

Instrument cluster, coding (function 07)

Using this function the instrument cluster can be coded as follows:

- ◆ Available equipment activation
- ◆ Market versions
- ◆ Cylinders (engine)
- ◆ Distance impulse number (K-number)

Note:

The code table lists only those combinations applicable to Golf/Jetta through m.y. 1999.

Initiating coding

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is displayed..

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -7- to select "Code control module" function 07.

Rapid data transfer
07 - Code control module

Q



Indicated on display:

Code Control Module

Enter code number XXXXX (0-32000)

- Press -Q- button to confirm input.



Indicated on display:

- Determine vehicle particulars and input code number using coding table ⇒ [Page 01-32](#) .

Example:**Note:**

Values shown below are examples only!!

02	Available equipment: seatbelt warning active
2	Market version: USA
4	4-cylinders
2	Distance impulse number

Code Control Module

Q

Enter code number 02242 (0-32000)



Indicated on display (example only):

- Press -Q- button to confirm input.

1J0919860D A4 COMBI INSTR VDO V04 →

Coding 02242 WSC 00000



Indicated on display (example only):

- Press → button.

Rapid data transfer

HELP

Select function XX



Indicated on display:

End function:

- Press buttons -0- and -6- to select function 06, "End Output".

01-31

Rapid data transfer

Q



Indicated on display:

06 - End Output

- Press -Q- button to confirm input.

Rapid data transfer

Help



Indicated on display

Enter address word XX

The tester is now in basic function again.

Code table:

Code assembly				Designations
1+2	3	4	5	Position
00				Available equipment¹⁾ None
01				Brake pad wear warning*
02				Seatbelt warning
04				Washer fluid level warning*, *where applicable
	2			Market version USA (US)
	3			Canada (CDN)
		4		Cylinders 4-cylinders
		6		6-cylinders
			2	Distance impulse number (K number)²⁾ 3538

1) To determine code number for first two positions, add applicable available equipment code numbers together. For example, to activate brake wear indicator and seatbelt warning: 01 + 02 = 03 (in positions 1+2).

2) Distance impulse number is a constant used to calculate speed indication and distance travelled. Code for USA/CDN Golf/Jetta is always 2. Distance impulse number can only be read/confirmed using function 10, "Adaptation" ⇒ [Page 01-43](#) .

Read Measuring Value Block (function 08)

Use this function to observe various instrument cluster inputs.

The measuring value block is divided into 4 display groups, each containing 4 display fields.

- Connect VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is displayed.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- to select "Read Measuring Value Block" function 08.

Rapid data transfer Q
08 - Read Measuring Value Block



Indicated on display:

- Press -Q- button to confirm input.

Read Measuring Value Block HELP
Enter display group number XXX



Indicated on display:

- Using the Scan Tool (ST) button pad, enter the required display group number (following example shows display group 001).
- Press -Q- button to confirm input.

Read Measuring Value Block 1



Indicated on display: (1...4 = Display fields)

1 2 3 4

Notes:

- ◆ *Interpreting display groups and evaluating measured values in individual display fields
⇒ tables beginning ⇒ [Page 01-35](#) .*
- ◆ *With the printer switched on, the information on the display is printed out.*
- ◆ *To easily change between display groups, proceed as follows:*

Display group	VAG 1551	VAG 1552
Higher	Press button 3	Press ↑ button
Lower	Press button 1	Press ↓ button
Skip	Press button C	Press button C

- Displayed after pressing C button.

Read Measuring Value Block HELP
Enter display group number XXX



Indicated on display:

- Enter alternate display group number as needed
⇒ tables beginning ⇒ [Page 01-35](#) .

Notes:

- ◆ *Display fields always show actual values transmitted from senders and sensors. However, instrument cluster display values can differ from those in the display fields due to internal filtering.*
- ◆ *Other display groups are possible, but are not required for On Board Diagnostic program!*

Display groups, interpreting

Display group 001						
Read Measuring Value Block 1				→ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Time	Clock time in hours and minutes	⇒ Page 01-36
				Oil pressure switch 0.9 bar	Oilp2<min Oilp2 OK.	
				Engine speed (RPM)	Engine speed in rpm	
Speed					Speed in km/h	

Evaluating display group 001

Display field	Description	Display	Corrective actions
1	Speed	Speed in km/h	<ul style="list-style-type: none"> - Visually check wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction or replace the relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Engine speed (RPM)	Engine speed in rpm	
3	Oil pressure switch 0.9 bar	Oilp2<min Oilp2 OK.	
4	Time	Clock time in hours and minutes	

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Display group 002						
Read Measuring Value Block 2				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Ambient temperature ¹⁾	Ambient temperature in °C	⇒ Page 01-38
				Ω value of sender for fuel gauge -G-	Resistance in Ω	
				Fuel level	Fuel level in liters	
				Distance travelled (odometer)	Distance in km	

¹⁾ For instrument clusters with Multi Function Indicator (MFI) or Climatronic

Evaluating display group 002

Display field	Description	Display	Corrective actions
1	Distance travelled (odometer)	Distance in km	<ul style="list-style-type: none"> - Visually check wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction or replace the relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Fuel level ¹⁾	Fuel level in liters	
3	Ω value of sender for fuel gauge -G-	Resistance in Ω	
4	Ambient temperature	Ambient temperature in $^{\circ}\text{C}$	

¹⁾ On vehicles with a VDO instrument cluster "0 L" is displayed in field 2 when fuel level sender has an open/short circuit and display field 3 remains blank.

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Display group 003						
Read Measuring Value Block 3				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Empty		
				Empty		
				Empty		
Engine Coolant Temperature (ECT)					Engine coolant temperature in °C	⇒ Page 01-40

Evaluating display group 003

Display field	Description	Display	Corrective actions
1	Engine Coolant Temperature (ECT) ¹⁾	Engine coolant temperature in °C	<ul style="list-style-type: none"> - Visually check wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction or replace the relevant component - Erase DTC memory - Perform functional check - Check DTC memory again

¹⁾ If the actual coolant temperature value lies between approx. 75 °C and 107 °C, the instrument cluster will always display 90 °C!

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Display group 050						
Read Measuring Value Block 50				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Engine Coolant Temperature (ECT)	Engine coolant temperature in °C	⇒ Page 01-42
				Engine Oil Temperature	Oil temperature in °C	
				Engine speed (RPM)	Engine speed in rpm	
				Distance travelled (odometer)	Distance travelled in km	

Evaluating display group 050

Display field	Description	Display	Corrective actions
1	Distance travelled	Distance travelled in km	<ul style="list-style-type: none"> - Visually check wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction or replace the relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Engine speed (RPM)	Engine speed in rpm	
3	Engine Oil temperature	Engine oil temperature in °C	
4	Engine Coolant Temperature (ECT)	Engine coolant temperature in °C	

Adaptation (function 10)

Use this function to initiate and store the following changes:

- ◆ Adaptation of odometer reading when replacing/exchanging instrument cluster.
- ◆ Adaptation of fuel gauge reading.
- ◆ Adaptation of Multi-function Indicator (MFA) fuel consumption indicator (where applicable).

Individual functions are called up using the appropriate channel number from adaptation table ⇒ [Page 01-44](#) .

Adaptation table

Adaptation channel	Adaptation functions
03	Multi-function Indicator (MFA) fuel consumption indicator (where applicable), adaptation ⇒ Page 01-58
09	Odometer, adaptation ⇒ Page 01-45
16	Distance impulse number (K-number), reading/confirming ⇒ Page 01-50
30	Fuel gauge, checking/adapation ⇒ Page 01-53

Note:

After changing an adaption value or ending an adaption channel the function "10 - Adaption" must be performed to select another adaption channel!

Odometer, adaptation

Notes:

- ◆ *Market and equipment appropriate coding of instrument cluster must be performed before adaptation of odometer reading ⇒ [Page 01-29](#).*
- ◆ *The total distance travelled by the vehicle can be read from the malfunctioning instrument cluster or determined by the vehicle service history.*
- ◆ *The total distance travelled display of new instrument cluster must not be more than 100 km (62 mi) before adaptation.*
- ◆ *The total distance travelled to be transferred to the new instrument cluster must exceed 100 km (62 mi).*
- ◆ *Adapting the total distance travelled is only possible once and only in a positive (upwards) direction.*
- ◆ *Adaptation can be interrupted with the "C" button of the VAG 1551*
- ◆ *Correcting a false entry which has been confirmed is not possible. The instrument cluster must be exchanged for a new one.*
- ◆ *Adaptation value must be entered in kilometers. For US models, adaptation value must be converted from miles to kilometers first (miles x 1.609 = kilometers).*

Adaptation, example

The malfunctioning instrument cluster has an odometer reading of 89627 km. This reading is transferred to the new instrument cluster as follows:

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is displayed.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press button -1- twice to select "Login" function 11.
- Press -Q- button to confirm input.

Rapid data transfer
11 - Login procedure

Q



Indicated on display:

- Press -Q- button to confirm input.

Login procedure
Enter code number XXXXX

Q



Indicated on display:

- Enter code number 13861.

Login procedure
Enter code number 13861

Q



Indicated on display:

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"FAIL" appears in odometer if a false code or secret number is entered 3 times.

In this case terminal 30 (battery) must be disconnected and reconnected again and the Login procedure repeated using the correct code number.

- Press -Q- button to confirm input.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -1- and -0- to select "Adaptation" function 10.

Rapid data transfer
10 - Adaptation

Q



Indicated on display:

- Press -Q- button to confirm input.

Adaptation
Enter channel number XX



Indicated on display:

- Press buttons -0- and -9- to select adaptation "channel 09".

- Press -Q- button to confirm input.

Channel 9 Adaptation 0

→

<-1 3->



- Indicated on display:

- Press → button to advance program sequence.

Channel 9 Adaptation 0
Enter adaptation value XXXXX



Indicated on display:

- Enter adaptation value using VAG 1551 button pad.

The last position of the kilometer reading must be rounded off to the nearest 10 kms. Therefore, a kilometer reading of 89627 produces an adaptation value of:

0 8 9 6 3

X					Hundred thou.: 100000 ... 655350 km
	X				Ten thousands: 10000 ... 90000 km
		X			Thousands: 1000 ... 9000 km
			X		Hundreds: 100 ... 900 km
				X	Tens: 10 ... 90 km
					Units: round up to next ten

- After entering adaptation value using VAG 1551 button pad,

Channel 9 Adaptation 0
Enter adaptation value 08963

q ◀

Indicated on display (example only):

- Press -Q- button to confirm input.

Channel 9 Adaptation 8963

q ◀

Indicated on display:

<-1 3->

The kilometer reading entered now appears in the display of the instrument cluster. If the displayed kilometer reading is not OK, e.g. false entry:

- Press -C- button and enter correct adaptation value again.

			<p>If the displayed kilometer reading in instrument cluster is OK:</p> <ul style="list-style-type: none"> - Press -Q- button to confirm input.
Channel 9 Adaptation 8963	Q	←	Indicated on display:
Store changed value?			<ul style="list-style-type: none"> - Press -Q- button to confirm input.
Channel 9 Adaptation 8963	→	←	Indicated on display:
Changed value is stored			<ul style="list-style-type: none"> - End odometer adaptation by pressing → button.
Rapid data transfer	HELP	←	Indicated on display:
Select function XX			<ul style="list-style-type: none"> - Press buttons -0- and -6- to select "End Output" function 06.
Rapid data transfer	Q	←	Indicated on display:
06 End Output			<ul style="list-style-type: none"> - Press -Q- button to confirm input.
Rapid data transfer	Help	←	Indicated on display:
Enter address word XX			<p>The tester is now in basic function again.</p>

Distance impulse number (K-number), reading/confirming

Distance impulse number can only be read/confirmed on VDO instrument clusters.

Distance impulse number for MMO instrument clusters ⇒ Code control module, ⇒ [Page 01-29](#) .

Notes:

- ◆ *The distance impulse number is a constant used to calculate the speed indication and distance travelled.*
- ◆ *The distance impulse number (K number) cannot be changed using the "Adaptation" function!*
- ◆ *For instrument clusters with mile indicators, the distance impulse number is shown in kilometers. The trip impulse number for mile values can be calculated as follows: Trip impulse number for kilometer values x 1.609 = trip impulse number for mile values.*
- ◆ *Press the -C- button on the VAG 1551 to abort the "Read distance impulse number" function.*

			<ul style="list-style-type: none"> - Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster". - Press -Q- button to confirm input. - Press → button until "Select function" appears in display.
Rapid data transfer Select function XX	HELP	←	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Press buttons -1- and -0- to select "Adaptation" function 10.
Rapid data transfer 10 - Adaptation	Q	←	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Press -Q- button to confirm input.
Adaptation Enter channel number XX		←	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Press buttons -1- and -6- to select adaptation "channel 16". - Press -Q- button to confirm input.
Channel 16 Adaptation 3538 <- 1 3 ->	→	←	<p>Indicated on display (example only):</p> <p>Read/confirm distance impulse number, ⇒ code table, ⇒ Page 01-32 .</p>

			- Interrupt "Reading distance impulse number" with "C" button.
Adaptation		◀	Indicated on display:
Enter channel number XX			- Press "C" button.
Rapid data transfer	HELP	◀	Indicated on display:
Select function XX			- Press buttons -0- and -6- to select "End Output" function 06.
Rapid data transfer	Q	◀	Indicated on display:
06 - End Output			- Press -Q- button to confirm input.
Rapid data transfer	Help	◀	Indicated on display:
Enter address word XX			The tester is now in basic function again.

Fuel gauge, checking

If the fuel gauge displays the contents of the fuel tanks as being too high or too low, the fuel gauge needle position can be corrected (adapted).

First perform the following procedures:

- Perform Output Diagnostic Test Mode (DTM) for instrument cluster ⇒ [Page 01-20](#) .

If Output Diagnostic Test Mode (DTM) does not recognize a malfunction, check function of sender for fuel gauge -G-:

- Check resistance value of sender for fuel gauge in read measuring value block, display group 002 ⇒ [Page 01-33](#) .

If Read Measuring Value Block does not indicate a short or open circuit in the wiring or the fuel gauge sender, continue with adaptation ⇒ [Page 01-54](#) .



Fuel gauge, adaptation

Special tools, testers, and auxiliary items required

- ◆ Fuel extraction unit VAG 1433 A (or equivalent, approved fuel cart)
- Switch off ignition.
- Drain fuel tank completely using fuel extraction unit, then fill with 7 liters (1.85 gallons) of fuel.

WARNING!

- ◆ **Fire hazard. DO NOT smoke or work near heaters or have anything in the area that can ignite fuel.**
- ◆ **Always drain fuel from fuel tank using an approved fuel cart.**
- ◆ **Wear fuel-resistant gloves whenever working with open parts of the fuel system.**
- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" appears in display.

Rapid data transfer
Select function XX

HELP

Indicated on display:

- Press buttons -1- and -0- to select "Adaptation" function 10.

Rapid data transfer Q
10 - Adaptation



Indicated on display:

- Press -Q- button to confirm input.

Adaptation
Enter channel number XX



Indicated on display:

- Press buttons -3- and -0- to select adaptation "channel 30".
- Press -Q- button to confirm input.

Channel 30 Adaptation 128 →



Indicated on display:

< - 1 3- >

Notes:

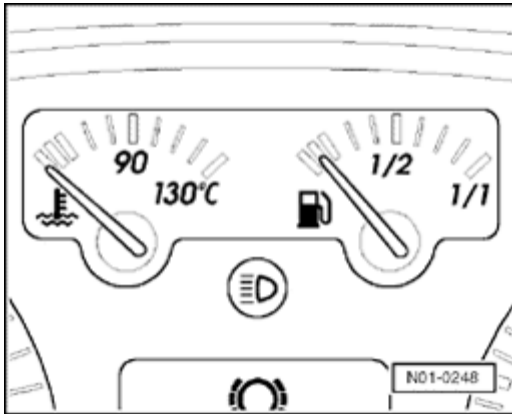
- ◆ *At least 60 seconds must pass between adding fuel and reading fuel gauge.*
- ◆ *Before this time passes, the fuel gauge reading is unreliable due to the movement of the added fuel.*

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Channel 30 Adaptation 130

Q

< - 1 3 - >



Channel 30 Adaptation 130

Q

Save modified value?

Channel 30 Adaptation 130

→

Modified value is saved

Rapid data transfer

Help

Enter address word XX

- Using button -1-, the adaptation value can be decreased as low as 120, using button -3- the value can be increased as high as 136, e

- Indicated on display:

The fuel gauge is adapted correctly when the needle rests on the center red demarcation (reserve)!

When indication is OK:

- Press -Q- button to confirm input.

- Indicated on display:

- Press -Q- button to confirm input.

- Indicated on display:

- End adaptation of fuel gauge with → button

Indicated on display:

Note:

Replace fuel gauge sender only if fuel gauge cannot be matched correctly.

- Press buttons -0- and -6- to select function 06, "End Output".

Rapid data transfer
06 End Output

Q ◀

Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer
Enter address word XX

Help ◀

Indicated on display:

The tester is now in basic function again.

Multi-function Indicator (MFI) fuel consumption indicator, adaptation

Notes:

◆ *Consumption indicator can only be adapted once between 85% and 115%.*

◆ *Value must be entered in steps of 5%.*

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" appears in display.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -1- and -0- to select "Adaptation" function 10.

Rapid data transfer
10 - Adaptation

Q



Indicated on display:

- Press -Q- button to confirm input.

Adaptation
Enter channel number XX



Indicated on display:

- Press buttons -0- and -3- to select adaptation "channel 03".
- Press -Q- button to confirm input.

Channel 03 Adaptation 100



< - 1 3 - >



Indicated on display:

- Press → button to continue.

Note:

Correction of fuel consumption display is only possible via direct input.

Channel 03 Adaptation 100

Enter adaptation value XXXXX



Indicated on display:

- Input desired correction value using scan tool button pad, filling initial positions with "0".

Example:

Desired input value: 90% = button pad entry: 00090

Channel 03 Adaptation 100

Q

Enter adaptation value 00090



Indicated on display:

- Press -Q- button to confirm input.

Channel 03 Adaptation 90

Q

< - 1 3 - >



Indicated on display:

- Press -Q- button to confirm input.

Channel 03 Adaptation 90

Q

Store changed value?



Indicated on display:

- Press -Q- button to confirm input.

Channel 03 Adaptation 90



Changed value is stored



Indicated on display:

- End consumption indicator adaptation with → button.

Rapid data transfer

HELP

Select function XX



Indicated on display:

Note:

A false entry switches the tester to "Select function" mode.

Function is unknown or



cannot be carried out at the moment



If the following display appears:

- Press → button.
- Select function "10 - Adaptation" and adaptation channel 03 again.
- Carry out corrections to consumption indicator and confirm with Q button.

Digital clock (Motometer - where applicable), correction

Notes:

- ◆ Correction of the clock is only possible w Motometer instrument clusters from a lim manufacturing period.
- ◆ Scan tool VAG 1551 with a program card version /8.0 is required for clock correctic

The digital clock in the instrument cluster ma deviate from the correct time by a maximum seconds within 24 hours

If the deviation is greater than 5 seconds:

- Check control module version ⇒ [Page 01](#)

1J0919861D A4 KOMBIINSTR. VDO V02 →
Coding 00042 WSC 00000



If indicated on display (example only): VDO instrument cluster - replace instrument clust (digital clock cannot be corrected).

1J0919861D KOMBI + WEGFAHRSP. MMO V02 →
Coding 00042 WSC 00000



If indicated on display (example only): Motor instrument cluster.

- First check VAG program card version, th check if the digital clock can be corrected:

VAG 1551 program card version, checking

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press → button.

- Press buttons -0- and -6- to select function 06, "End Output".

Rapid data transfer
06 - End Output

Q



Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer
Enter address word XX

HELP



Indicated on display:

- Switch off ignition.

- Disconnect VAG 1551 scan tool from Data Link Connector (DLC).

After approx. 5 seconds:

- Connect cable VAG 1551/3C to DLC again.

VAG 1551 -D / 8.0- 1.10.1998



The VAG 1551 display will show program card version , language and edition date for approx. 3 seconds:

If the display of the VAG 1551 does not indicate program card version /8.0:

- Obtain program card version / 9.0 and insert into VAG 1551.

If the display of the VAG 1551 indicates program card version /8.0 or /9.0, proceed as follows:

Digital clock, initiate correction

Notes:

◆ *The digital clock accuracy can only be adapted with a VAG 1551 in conjunction with program card /8.0 or /9.0.*

◆ *The VAG 1551 recognizes instrument cluster versions where clock correction is possible.*

- Select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "Instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" appears in display.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -1- and -2- to select function 12 "Clock correction".

When the VAG 1551 recognizes a instrument cluster without digital clock correction capabilities, "function 12" cannot be selected. In these cases, replace instrument cluster.

Rapid data transfer
12 - Clock correction

Q



Indicated on display:

- Press -Q- button to confirm input.

The VAG 1551 initiates an automatic sequence after pressing the -Q- button.

Rapid data transfer
Clock correction



Indicated on display during automatic sequence.

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Rapid data transfer Select function XX	HELP	◀	Indicated on display after completion of automatic sequence: - Press buttons -0- and -6- to select function 06, "End Output".
Rapid data transfer 06 - End Output	Q	◀	Indicated on display: - Press -Q- button to confirm input.
Rapid data transfer Enter address word XX	Help	◀	Indicated on display: - Switch off ignition. - Disconnect VAG 1551 scan tool from Data Link Connector (DLC).

Note:

After completion of the automatic sequence, the instrument cluster must be briefly disconnected from voltage supply terminal 30 to allow the clock correction to take effect.

- Switch off ignition.
- Remove Fuse No. 15 (5 A) from fuse holder, wait at least 10 seconds, and reinsert fuse.

The clock correction takes effect after reconnecting the instrument cluster to voltage supply terminal 30.

The digital clock accuracy is now corrected.

Instrument cluster m.y. 2000 through m.y. 2001, On Board Diagnostic (OBD)

General information

The instrument cluster contains an electronic speedometer, tachometer, liquid crystal (LCD) displays for odometer, trip odometer/clock, as well as analog coolant temperature and fuel level gauges. Control and warning lamps are situated within and between the speedometer and tachometer. Automatic transmission models also contain an LCD gear indicator display.

Where available, an LCD multi-function trip computer (MFI) with two operating modes is located in the tachometer display. The MFI includes selectable displays for trip time/mileage, average trip speed, average trip fuel consumption and outside temperature.

The instrument cluster is controlled by an internal microprocessor with On Board Diagnostic (OBD) capability. If malfunctions occur in monitored sensors and components, Diagnostic Trouble Codes (DTC) will be stored in memory together with an indication of malfunction type. A maximum of 4 DTCs can be stored simultaneously.

Sporadic malfunctions (indicated in the readout by "SP") are automatically cancelled if not repeated in the next 50 engine starts.

Instrument clusters from m.y. 2000 ➤ are integrated into the "Powertrain" CAN Data Bus network (may also be known as "CAN-Bus" or "Data-Bus").

The Data Bus On Board Diagnostic Interface - J533- (which is integrated into the instrument cluster) enables data to be exchanged between the "Powertrain" CAN Data-Bus network and the Data Link Connector (DLC) "K-wire".

The Data Bus On Board Diagnostic Interface - J533- has specific On Board Diagnostic (OBD) capabilities.

Before performing any troubleshooting or inspection, always begin by checking for DTCs using the OBD program. DTCs stored in memory are retrieved/checked with either the VAG 1551/1552 Scan Tool (ST) or VAS 5051 Vehicle Diagnostic Tester.

Notes on exchanging instrument cluster

- ◆ Do not disassemble instrument cluster.
- ◆ Instrument clusters contain no field serviceable components. All malfunctions require replacement of instrument cluster.
- ◆ When the replacement of a malfunctioning instrument cluster is necessary, follow exchange part procedures.
- ◆ Complete the report form and return together with instrument cluster.
- ◆ Use the original packaging from the new cluster when returning modules.

- ◆ Replacement instrument clusters must be coded according to vehicle market version and equipment level variables using the OBD program

Vehicles 05.99 ➤ 05.00 ⇒ [Page 01-95](#)

Vehicles 05.00 ➤ ⇒ [Page 01-99](#)

- ◆ Replacement instrument clusters must be adapted for anti-theft immobilizer function ⇒ table of contents for specific applications.
- ◆ The Data Bus On Board Diagnostic Interface - J533- must be coded depending on the vehicle equipment when replacing the instrument cluster ⇒ [Page 01-136](#) .

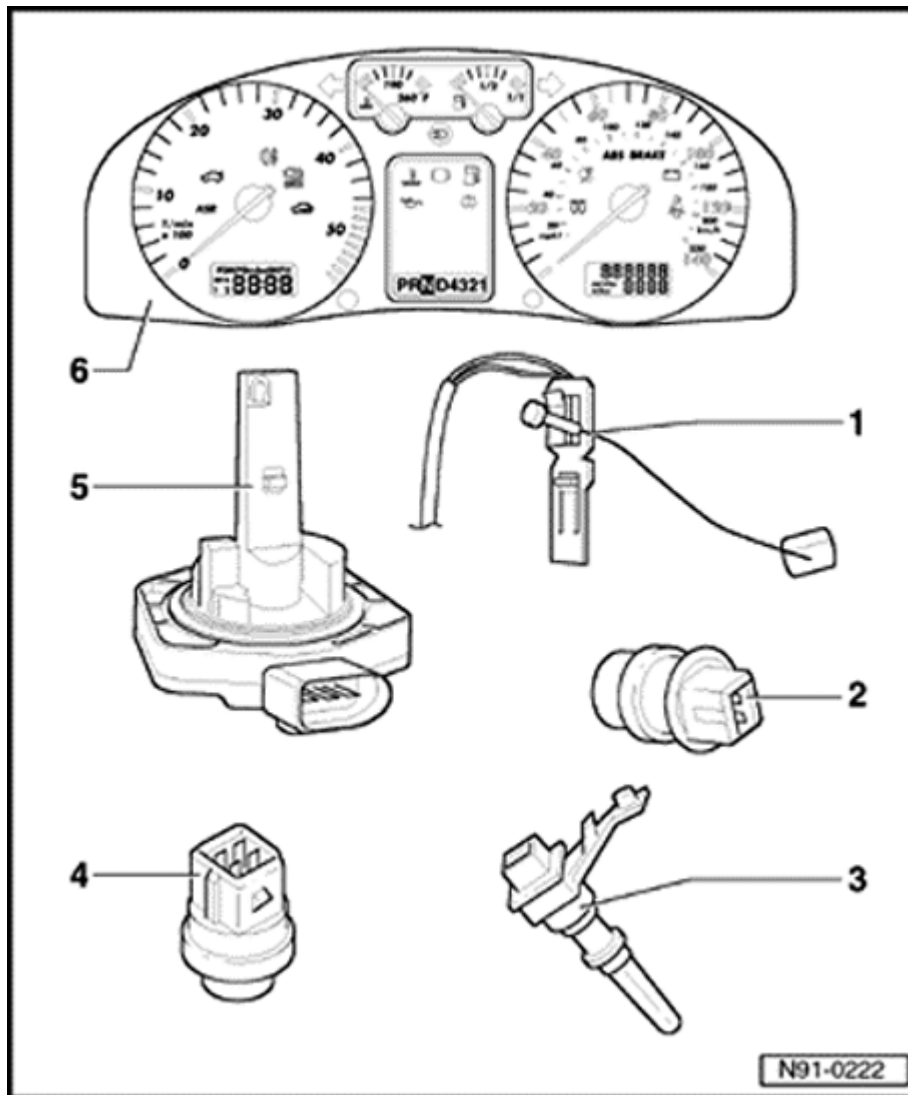
Additional information:

- ◆ Complaint/symptom based Technical Bulletins ("Service Fixes"):

⇒ *Technical Bulletins*

- ◆ Instrument cluster ⇒ [Repair Manual, Electrical Equipment, Repair Group 90](#) .

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Electrical and electronic components, locations

CAUTION!

Before beginning repairs on the electrical system:

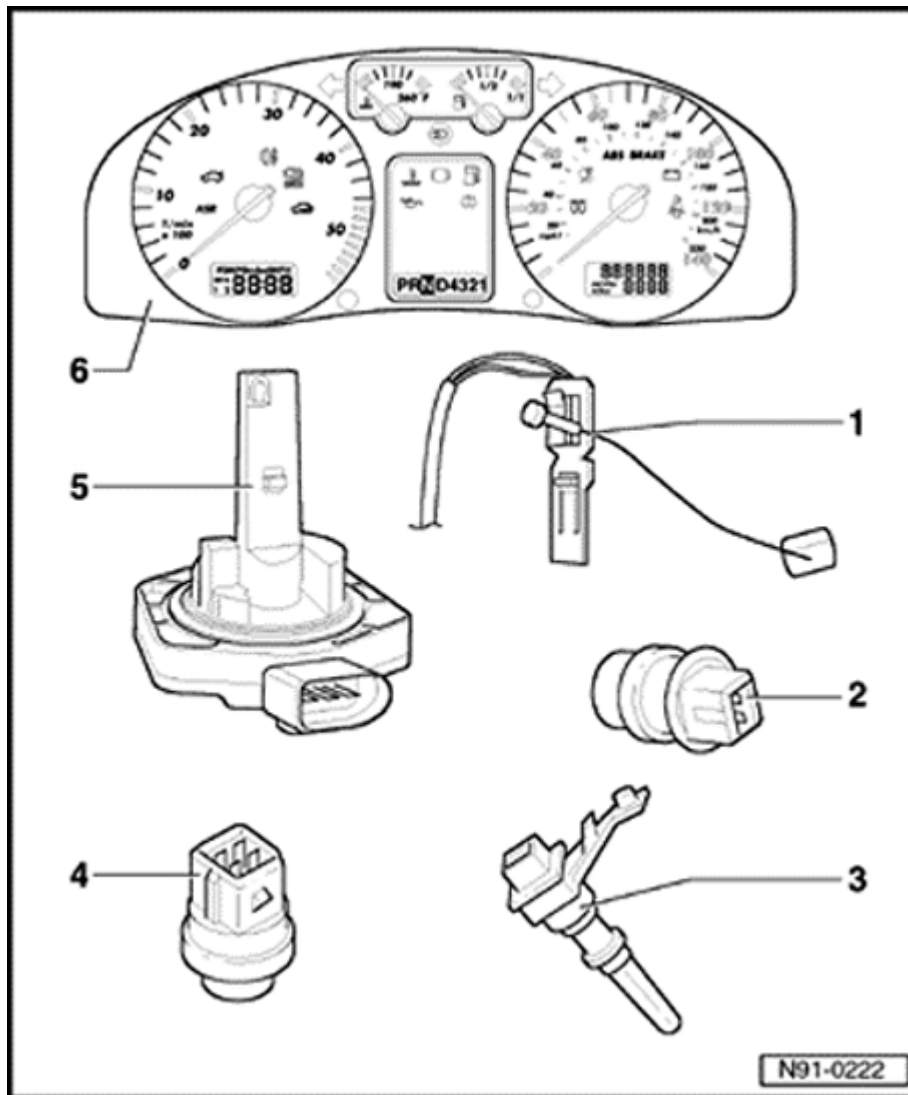
- ◆ **Obtain the anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Disconnect negative (-) battery terminal.**
- ◆ **When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as**

***specified in
Repair
Manual,
Electrical
Equipment,
Repair Group
27***

**1 - Sender for
gauge
sender -G-**

- ◆ Location
⇒ [Fig. 1](#)
- ◆ Monitored
by OBD

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**2 Outside Air
- Temperature
Sensor -
G17- (where
applicable)**

◆ Location
⇒ Fig. 2

◆ Monitored
by OBD

**3 Speedometer
- Vehicle
Speed
Sensor (VSS)
-G22-**

◆ Location
⇒ Fig. 3

**4 Engine
- Coolant
Temperature
(ECT)
Sensor -G2-**

◆ Location

⇒ *Repair
Manual, Fuel
Injection & Glow
Plug, Repair
Group 23* ⇒
*Repair Manual,
Fuel Injection &
Ignition, Repair
Group 24*

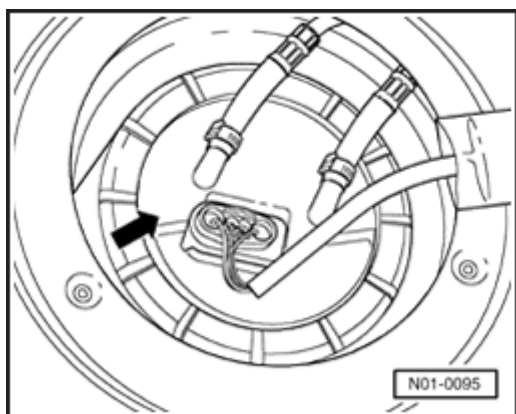
◆ Monitored
by OBD

**5 - Not
applicable**

**6 - Instrument
Cluster -K**

◆ Monitored
by OBD

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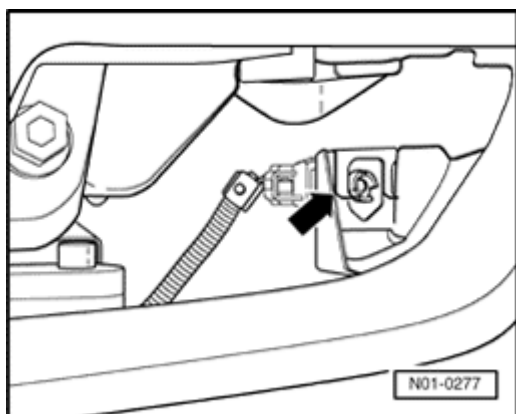


✦ **Fig. 1 Sender for fuel gauge - G-**

Located in fuel tank on fuel delivery unit -arrow-.

Removing and installing

⇒ *Repair Manual, Engine Mechanical, Repair Group 20*



✦ **Fig. 2 Outside Air Temperature Sensor -G17- (where applicable)**

Sensor -arrow- located on left of front bumper behind outer air grill.

Unclip air grill to remove sender.

⇒ *Repair Manual, Body Exterior, Repair Group 63*

01-71

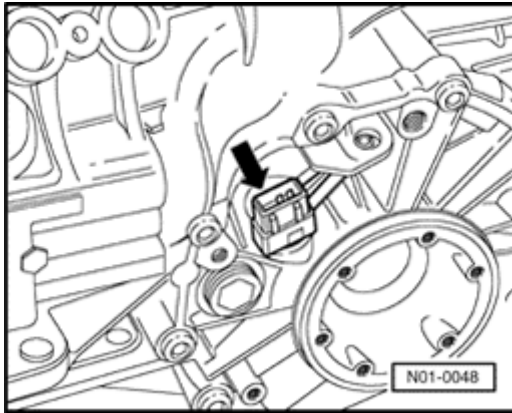


Fig. 3 Speedometer Vehicle Speed Sensor -G22-

Sensor -arrow- located near left-hand drive shaft flange on manual and automatic transmission vehicles.

Instrument cluster On Board Diagnostic (OBD), initiating & checking control module versions

Test requirements:

- ◆ All fuses OK according to wiring diagram
- ◆ Voltage supply OK (at least 11.5 V).
- ◆ Scan Tool VAG 1551 or VAG 1552 connected.

Notes:

- ◆ *Connecting Scan Tool* ⇒ [Page 01-1](#) .
- ◆ *The following description applies only to Scan Tool VAG 1551.*
- Switch on ignition.
- Switch on printer with the PRINT button (indicator lamp in button lights up).
- Press button -1- to select operating mode 1 "Rapid data transfer".

Rapid data transfer
Input address word XX

HELP



Indicated on display:

- Press buttons -1- and -7- to input address word 17, "Instrument cluster".

Rapid data transfer
17 Instrument cluster

Q



Indicated on display:

- Press -Q- button to confirm input.

01-73

Rapid data transfer Q
 Tester sends address word 17



Indicated on display:

1J0919860D A4-KOMBI INSTR VDO V04 →
 Coding 00042 WSC 00000



Indicated on display (example only):

Top line: Part No. of control
 module
 System designation
 (Combi instrument)
 Manufacturer's code³⁾:
 MMO = Motometer
 VDO = VDO
 Software level
 Bottom line: Coding¹⁾
 Workshop number²⁾

1 - Dependent on engine,
 transmission and additional
 equipment

2 - Automatically stored in the
 control module upon entry into the
 installed system. But not for coding
 of control modules that have
 already been used.

3 - On new instrument clusters the
 manufacturer code BOO may also
 appear instead of MMO.

Control module does not answer! HELP



If this appears on display:

- Press "HELP" button and a list of possible causes is printed out.
- After repairing malfunctions again enter address word 17 for instrument cluster and confirm with Q.

IMMO-IDENT No.: VWZ7Z0V0066808 →

- Press → button.

← Indicated on display (example only, only vehicles with anti-theft immobilizer):

Where applicable, Motometer instrument clusters are identified by IMMO-IDENTNO: VWZ6

Where applicable, VDO instrument clusters are identified by IMMO-IDENTNO: VWZ7

- Press → button until "Select function" appears in display.

Rapid data transfer
Select function XX

HELP

← Indicated on display:

List of available functions

Function		page
01 -	Check Control Module version	⇒ Page 01-72
02 -	Check DTC memory	⇒ Page 01-76
03 -	Output Diagnostic Test Mode	⇒ Page 01-86
05 -	Erase DTC memory	⇒ Page 01-92
06 -	End Output	⇒ Page 01-94
07 -	Code control module 05.99 ▶05.00	⇒ Page 01-95
07	Code control module 05.00 ▶	⇒ Page 01-99
08 -	Read Measuring Value Block	⇒ Page 01-104
10 -	Adaptation	⇒ Page 01-118

Notes:

- ◆ *Press HELP button to print out a complete list of available functions. This list indicates function capability of VAG 1551 Scan Tool (ST) only, and does not necessarily reflect function capability of vehicle systems equipped with OBD. For instrument cluster address word 17, do not attempt to select functions other than those listed above.*
- ◆ *After function is completed and forwarded with → button, VAG 1551 Scan Tool (ST) returns to following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display:

Diagnostic Trouble Code (DTC) memory, checking (function 02)

Note:

DTCs stored in memory along with corresponding malfunction descriptions can only be displayed by initiating the On Board Diagnostic program and checking DTC memory (function 02).

- Connect VAG 1551 Scan Tool, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17, "Instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" appears in display.
- Switch on printer with the PRINT button (indicator lamp in button lights up).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -2- to select "Check DTC memory" function 02.

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Press -Q- button to confirm input.

X DTC's recognized!



The number of stored DTCs appears in the display.

Stored DTCs are displayed and printed out one after another.

- Check print-out against DTC table and repair all malfunctions as necessary ⇒ [Page 01-78](#) .

No DTC recognized!



If "No DTC recognized" is displayed the program will return to the initial position after pressing → button.

Rapid data transfer

HELP



Indicated on display:

Select function XX

If something else is displayed:

⇒ *Scan tool operating instructions*

- End Output (function 06) ⇒ [Page 01-94](#) .
- Switch ignition off
- Disconnect VAG 1551 from Data Link Connector (DLC).

Diagnostic Trouble Code (DTC) table

Notes:

- ◆ *The following table lists all malfunctions, with the corresponding 5 digit code numbers, that can be recognized by control module with indicator unit in instrument cluster insert -J285- and printed out by the VAG 1551 Scan Tool (ST).*
- ◆ *If malfunctions do not occur regularly, these are displayed as occurring sporadically ("SP").*
- ◆ *DTC codes appear only on print-out.*
- ◆ *Before replacing components, check the wiring and connections to these components as well as ground connections, according to wiring diagram.*
- ◆ *When repair has been carried out, the Diagnostic Trouble Code (DTC) memory must always be erased and checked again with VAG 1551 Scan Tool (ST).*
- ◆ *If there is a specific complaint and no malfunctions are recognized after checking Diagnostic Trouble Code (DTC) memory, carry out function 03, "Output Diagnostic Test Mode (DTM)" ⇒ [Page 01-86](#) or function 08, "Read measuring value block" ⇒ [Page 01-104](#) .*

01-79

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
00562 ¹⁾ Oil level thermal sensor -G266- 1) - Open circuit/short circuit to B+ - Short circuit to Ground - implausible signal	<ul style="list-style-type: none"> ◆ Open/short circuit in wiring between Oil level thermal sensor - G266- and instrument cluster ◆ -G266- malfunctioning 	<ul style="list-style-type: none"> ◆ The oil level control lamp blinks for approx. 5 seconds after ignition is switched on. ◆ An oil temperature of 155 ° C is displayed in measuring value block and the engine oil level is displayed as not OK. 	<ul style="list-style-type: none"> - Read measuring value block ⇒ Page 01-104 - Check for open or short circuit in wiring using wiring diagram. - Replace - G266-

¹⁾ Where applicable.

01-80

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
00667* Ambient-Temperature Signal Open/Short circuit to B+ Short to Ground (GND)	<ul style="list-style-type: none"> ◆ Open/short circuit in wiring between Outside Air Temperature Sensor - G17- and instrument cluster. ◆ -G17- malfunctioning 	<ul style="list-style-type: none"> ◆ Dashes (- - -) appear on display in instrument cluster 	<ul style="list-style-type: none"> - Read Measuring Value Block ⇒ Page 01-104 - Check for open or short circuit in wiring using wiring diagram. - Replace -G17-
00771** Fuel Level Sensor -G- Open/Short circuit to B+ Short to Ground (GND)	<ul style="list-style-type: none"> ◆ Open or short circuit in wiring between Fuel Level Sensor -G- and instrument cluster ◆ -G- malfunctioning 	<ul style="list-style-type: none"> ◆ Fuel reserve displayed value 0 ("empty") 	<ul style="list-style-type: none"> - Read Measuring Value Block ⇒ Page 01-104 - Check for open or short circuit in wiring using wiring diagram. - Replace -G-

**Only for vehicles with Climatronic: A DTC entry is made when the malfunction has been registered continuously for at least 60 seconds.*

*** A DTC entry is made when the malfunction has been registered continuously for at least 20 seconds.*

01-81

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
00779** Outside Air Temperature Sensor -G17- Open/Short circuit to B+ Short to Ground (GND)	<ul style="list-style-type: none"> ◆ Open or short circuit in wiring between Outside Air Temperature Sensor -G17- and instrument cluster ◆ -G17- malfunctioning 	<ul style="list-style-type: none"> ◆ Dashes (- - -) appear on display in instrument cluster 	<ul style="list-style-type: none"> - Read Measuring Value Block ⇒ Page 01-104 - Check for open or short circuit in wiring using wiring diagram. - Replace -G17-
01039* ECT Sensor - G2- Open/Short circuit to B+ Short to Ground (GND)	<ul style="list-style-type: none"> ◆ Open or short circuit in wiring between ECT Sensor -G2- and instrument cluster ◆ -G2- malfunctioning 	<ul style="list-style-type: none"> ◆ Engine coolant temperature (ECT) gauge needle on left stop 	<ul style="list-style-type: none"> - Read Measuring Value Block ⇒ Page 01-104 - Check for open or short circuit in wiring using wiring diagram. - Replace -G2-

***For vehicles with multi-function indicator (MFA) but not with Climatronic*

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
01044 Control Module incorrectly coded	<ul style="list-style-type: none"> ◆ A control module connected to the power-train CAN Bus (Data Bus) is incorrectly coded ◆ A control module connected to the power-train CAN Bus (Data Bus) is malfunctioning 	<ul style="list-style-type: none"> ◆ Functions of systems connected to CAN-Bus not OK 	<ul style="list-style-type: none"> - Check DTC memory of all control modules connected to CAN-Bus and repair malfunctions if necessary - Check control module coding, correct if necessary - Replace control module if necessary
01312 Data Bus Drive - malfunctioning	<ul style="list-style-type: none"> ◆ Malfunction in data wires ◆ CAN Bus in "bus-off" condition 	<ul style="list-style-type: none"> ◆ Functions of systems connected to CAN-Bus not OK 	<ul style="list-style-type: none"> - Read measuring value block ⇒ Page 01-104 - Check control module coding - Check DTC memory of all control modules connected to CAN Bus and repair malfunctions if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.

01-83

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
01314 Engine Control Module (ECM) - No communication	◆ Data reception by Engine Control Module (ECM) via CAN Bus is not OK.	◆ Functions of systems connected to CAN-Bus not OK	- Read measuring value block ⇒ Page 01-104 - Check DTC memory of Engine Control Module (ECM) and repair malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.
01315 Transmission Control Module (TCM) - No communication	◆ Data reception by Transmission Control Module (TCM) via CAN Bus is not OK.	◆ Functions of systems connected to CAN-Bus not OK	- Read measuring value block ⇒ Page 01-104 - Check DTC memory of Transmission Control Module (TCM) and repair malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.

01-84

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
01316 Brake control module - No communication	<ul style="list-style-type: none"> ◆ Data reception by ABS control module via CAN Bus not OK 	<ul style="list-style-type: none"> ◆ Functions of systems connected to CAN-Bus not OK 	<ul style="list-style-type: none"> - Read measuring value block ⇒ Page 01-104 - Check DTC memory of ABS control module and repair malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.
01317 Control module with indicator unit in instrument cluster insert -J 285- - No communication	<ul style="list-style-type: none"> ◆ Malfunction in data wires ◆ Control module malfunctioning 	<ul style="list-style-type: none"> ◆ No indication or malfunctioning indication for indicator instruments and control lamps 	<ul style="list-style-type: none"> - Check DTC memory of all control modules connected to CAN Bus and repair malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.

01-85

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
01321 Airbag Control Module- -J234- no communication	<ul style="list-style-type: none"> ◆ Data reception by airbag control module control module via CAN Bus not OK 	<ul style="list-style-type: none"> ◆ Airbag indicator lamp is lit 	<ul style="list-style-type: none"> - Read measuring value block ⇒ Page 01-104 - Check DTC memory of airbag control module and eliminate malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.
65535 Control module - Faulty	<ul style="list-style-type: none"> ◆ Control unit with display in instrument cluster -J285- malfunctioning 	<ul style="list-style-type: none"> ◆ No display ◆ Malfunction of display and warning lamps 	<ul style="list-style-type: none"> - Replace instrument cluster
Other DTC's	If other DTC's are displayed that are not shown in this DTC table, perform On Board Diagnostic (OBD) of anti-theft immobilizer system using VAS 5051 Vehicle Diagnostic Testing and Information System.		

Output Diagnostic Test Mode (DTM) (function 03)

The Output Diagnostic Test Mode (DTM) is part of the electrical check. The following components and systems are checked via Output DTM:

- ◆ Speedometer
- ◆ Tachometer
- ◆ Engine Coolant Temperature (ECT) gauge
- ◆ Fuel gauge
- ◆ Brake system warning lamp
- ◆ Seat belt warning lamp
- ◆ Buzzer
- ◆ All liquid quartz displays (LCD): odometer, multi-function indicator (MFI) or digital clock & selector lever position display (automatic transmission)
- ◆ Engine Coolant Temperature (ECT) & low coolant indicator warning lamp
- ◆ Brake pad wear warning lamp (where applicable)
- ◆ Fuel reserve warning lamp
- ◆ Oil pressure warning lamp

- If a malfunction is determined when performing Output DTM, exchange instrument cluster.
- If no malfunction is determined when performing Output DTM, check wiring and connections to instrument cluster using wiring diagram.

Output Diagnostic Test Mode (DTM), initiating

Notes:

◆ *Output Diagnostic Test Mode (DTM) cannot be initiated, or will be interrupted if engine is running or vehicle is moving.*

◆ *Use the -C- button to exit the test sequence at any time.*

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is shown in display.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -3- to select "Output Diagnostic Test Mode" function 03.

Rapid data transfer

03 - Output Diagnostic Test Mode

Q



Indicated on display

Rapid data transfer



Analog display



- Press -Q- button to confirm input.

Indicated on display

After pressing the -Q- button, the following instrument functional checks are carried out simultaneously on VDO instrument clusters and sequentially on Motometer instrument clusters (press → button to advance through test sequence):

- ◆ Engine Coolant Temperature (ECT) Gauge needle moves over complete display range
- ◆ Tachometer needle moves over complete display range
- ◆ Speedometer needle moves over complete display range
- ◆ Fuel gauge needle moves over complete display range

After sweep of display ranges, the following fixed values are displayed:

Coolant temperature gauge: 90 °C

Tachometer: 3000 rpm

Speedometer: 100 km/h (62mph)

Fuel gauge: 1/2

- Press → button.

Output Diagnostic Test Mode →
Combi instrument warning lamp test



Indicated on display:

The warning lamps for

- ◆ Brake system (low brake fluid level, ABS inoperative)
- ◆ Coolant temperature/low coolant level indicator
- ◆ Brake pad wear (where applicable)¹⁾
- ◆ Fuel reserve
- ◆ Oil pressure
- ◆ Low washer fluid level (where applicable)¹⁾

are activated and remain constantly lit.

- Press → button.

Output Diagnostic Test Mode →
Seat belt warning lamp - K19



Indicated on display:

The Seat Belt Warning Light -K19-¹⁾ lights up.

¹⁾ Instrument cluster must be coded accordingly in order for these warning/indicator lights to function. Applications: vehicles 05.99 ➤ 05.00 ⇒ [Page 01-95](#) , vehicles 05.00 ➤ ⇒ [Page 01-99](#) .

<p>Output Diagnostic Test Mode Signal</p>	→	←	<p>- Press → button.</p> <p>Indicated on display:</p> <p>The buzzer/chime is activated: a warning tone sounds in intervals.</p> <p>- Press → button.</p>
<p>Output Diagnostic Test Mode Segment test</p>	→	←	<p>Indicated on display:</p> <p>All segments of LCD display in speedometer and tachometer are activated and become visible.</p> <p>- Press → button.</p>
<p>Output Diagnostic Test Mode Coolant, excessive temp test</p>	→	←	<p>Indicated on display:</p> <p>Instrument cluster VDO:</p> <p>Safety cut-off (A/C compressor cut-off- is activated approx. 5 seconds later (vehicles with A/C only)</p> <p>No indication is given in instrument cluster!</p> <p>Instrument cluster MMO:</p> <p>Engine Coolant Temperature (ECT) warning lamp lights and warning sound is given.</p> <p>Safety cut-off (A/C compressor cut-off- is activated approx. 5 seconds later (vehicles with A/C only)</p> <p>- Press → button.</p>

01-91

<p>Output Diagnostic Test Mode → END</p>	←	<p>Indicated on display: - Press → button.</p>
<p>Output Diagnostic Test Mode → END</p>	←	<p>Indicated on display, instrument cluster MMO:</p>
<p>Function is unknown or → cannot be carried out at the moment</p>	←	<p><i>Indicated on display, instrument cluster VDO:</i></p>
<p>End Output Diagnostic Test Mode for VDO instrument clusters by pressing → button.</p>		
<p>All actual values are displayed again.</p>		
<p>Rapid data transfer HELP Select function XX</p>	←	<p>Indicated on display: - Press buttons -0- and -6- to select function 06, "End Output".</p>
<p>Rapid data transfer Q 06 - End Output</p>	←	<p>Indicated on display: - Press -Q- button to confirm input.</p>
<p>Rapid data transfer Help Enter address word XX</p>	←	<p>Indicated on display: The tester is now in basic function again.</p>

Diagnostic Trouble Code (DTC) memory, erasing (function 05)

Note:

After DTC memory is erased, its contents are automatically output. If DTC memory cannot be erased, check DTC memory again and repair malfunction.

Prerequisites

- ◆ DTC memory checked ⇒ [Page 01-76](#).
- ◆ All malfunctions repaired.

After successful DTC memory check:

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -5- to select "Erase DTC memory" function 05.

Rapid data transfer
05 Erase DTC memory

Q



Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer
DTC memory is erased!

→



Indicated on display:

DTC memory is erased.

- Press → button.

Rapid data transfer
Select function XX

HELP



Indicated on display:

WARNING!

DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

Rapid data transfer



DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

◆ *Follow test sequence exactly: first check DTC memory, repair malfunction(s) if necessary, then erase.*

Note:

After erasing the DTC memory its contents will automatically be indicated. If the DTC memory cannot be erased, again check DTC memory and repair malfunctions.

End Output (function 06)

- Press buttons -0- and -6- to select "End Output" function 06.

Rapid data transfer

Q ←

Indicated on display:

06 - End Output

- Press -Q- button to confirm input.

Rapid data transfer

HELP ←

Indicated on display:

Enter address word XX

- Switch off ignition.
- Disconnect VAG 1551 from Data Link Connector (DLC).

Instrument cluster 05.99 ➤ 05.00, coding (function 07)

Using this function the instrument cluster can be coded as follows:

- ◆ Available equipment activation
- ◆ Market versions
- ◆ Cylinders (engine)
- ◆ Distance impulse number (K-number)

Note:

The code table lists only those combinations applicable to Golf/Jetta from 05.99 ➤ 05.00.

Initiating coding

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is displayed..

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -7- to select "Code Control Module" function 07.

Rapid data transfer Q
07 - Code control module



Indicated on display:

- Press -Q- button to confirm input.

Code Control Module
Enter code number XXXXX (0-32000)



Indicated on display:

- Determine vehicle particulars and input code number using coding table ⇒ [Page 01-98](#) .

Example:

Note:

Values shown below are examples only!!

02	Available equipment: seatbelt warning active
2	Market version: USA
4	4-cylinders
2	Distance impulse number

Code Control Module Q
Enter code number 02242 (0-32000)



Indicated on display (example only):

- Press -Q- button to confirm input.

1J0919860D A4 COMBI INSTR VDO V04 →
Coding 02242 WSC 00000



Indicated on display (example only):

- Press → button.

Rapid data transfer HELP
Select function XX



Indicated on display:

End function:

- Press buttons -0- and -6- to select "End Output" function 06.

Rapid data transfer

Q ←

Indicated on display:

06 - End Output

- Press -Q- button to confirm input.

Rapid data transfer

Help ←

Indicated on display

Enter address word XX

The tester is now in basic function again.

Code table:

Code assembly				Designations
1+2	3	4	5	Position
00				Available equipment¹⁾ None
01				Brake pad wear warning
02				Seatbelt warning
04				Washer fluid level warning
	2			Market version USA (US)
	3			Canada (CDN)
		4		Cylinders 4-cylinders
		6		6-cylinders
			2	Distance impulse number (K number)²⁾ 3538

1) To determine code number for first two positions, add applicable available equipment code numbers together. For example, to activate brake wear indicator and seatbelt warning: 01 + 02 = 03 (in positions 1+2).

2) Distance impulse number is a constant used to calculate speed indication and distance travelled. Code for USA/CDN Golf/Jetta is always 2. Distance impulse number can only be read/confirmed using function 10, "Adaptation" ⇒ [Page 01-125](#) .

Instrument cluster 05.00 ➤, coding (function 07)

Using this function the instrument cluster can be coded as follows:

- ◆ Available equipment activation
- ◆ Market versions
- ◆ Service Intervals
- ◆ Distance impulse number (K-number)

Note:

The code table lists only those combinations applicable to Golf/Jetta through from 05.00 ➤.

Initiating coding

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is displayed..

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -7- to select "Code control module" function 07.

Rapid data transfer Q
07 - Code control module



Indicated on display:

- Press -Q- button to confirm input.

Code Control Module
Enter code number XXXXX (0-32000)



Indicated on display:

- Determine vehicle particulars and input code number using coding table ⇒ [Page 01-102](#) .

Example:

Note:

Values shown below are examples only!!

02	Available equipment: seatbelt warning active
2	Market version: USA
3	Service Interval
2	Distance impulse number

Code Control Module Q
Enter code number 02232 (0-32000)



Indicated on display (example only):

- Press -Q- button to confirm input.

1J0919860D A4 COMBI INSTR VDO V04 →
Coding 02232 WSC 00000



Indicated on display (example only):

- Press → button.

Rapid data transfer HELP
Select function XX



Indicated on display:

End function:

- Press buttons -0- and -6- to select "End Output" function 06.

Rapid data transfer

Q ←

Indicated on display:

06 - End Output

- Press -Q- button to confirm input.

Rapid data transfer

Help ←

Indicated on display

Enter address word XX

The tester is now in basic function again.

Code table:

Code assembly				Designations
1+2	3	4	5	Position
00				Available equipment¹⁾ None
01				Brake pad wear warning
02				Seatbelt warning
04				Washer fluid level warning
	2			Market version USA (US)
	3			Canada (CDN)
		3		Service interval USA/CDN models without Service Interval display
			2	Distance impulse number (K number)²⁾ 3538
			4	3648

¹⁾ To determine code number for first two positions, add applicable available equipment code numbers together. For example, to activate brake wear indicator and seatbelt warning: 01 + 02 = 03 (in positions 1+2).

2) Distance impulse number is a constant used to calculate speed indication and distance travelled and is dependent on engine/transmission combination ⇒ [Page 01-103](#) . Distance impulse number can only be read/confirmed using function 10, "Adaptation" ⇒ [Page 01-125](#) .

01-103

Distance impulse number, determining

Engine/Transmission combinations:	Code:
all engines with 5-speed automatic transmission	4
all other engine/transmission combinations	2

Read Measuring Value Block (function 08)

Use this function to observe various instrument cluster inputs.

The measuring value block is divided into 6 display groups, each containing 4 display fields.

- Connect VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is displayed.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- to select "Read Measuring Value Block" function 08.

Rapid data transfer Q
08 - Read Measuring Value Block



Indicated on display:

- Press -Q- button to confirm input.

Read Measuring Value Block HELP
Enter display group number XXX



Indicated on display:

- Using the Scan Tool (ST) button pad, enter the required display group number (following example shows display group 001).
- Press -Q- button to confirm input.

Read Measuring Value Block 1



Indicated on display: (1...4 = Display fields)

1 2 3 4

Notes:

- ◆ *Interpreting display groups and evaluating measured values in individual display fields
⇒ tables beginning ⇒ [Page 01-106](#) .*
- ◆ *With the printer switched on, the information on the display is printed out.*
- ◆ *To easily change between display groups, proceed as follows:*

Display group	VAG 1551	VAG 1552
Higher	Press button 3	Press ↑ button
Lower	Press button 1	Press ↓ button
Skip	Press button C	Press button C

- Displayed after pressing C button.

Read Measuring Value Block HELP

Enter display group number XXX



Indicated on display:

- Enter alternate display group number as needed
⇒ tables beginning ⇒ [Page 01-106](#) .

Notes:

- ◆ *Display fields always show actual values transmitted from senders and sensors. However, instrument cluster display values can differ from those in the display fields due to internal filtering.*
- ◆ *Other display groups are possible, but are not required for On Board Diagnostic program!*

Display groups, interpreting

Display group 001						
Read Measuring Value Block 1				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Time	Clock time in hours and minutes	⇒ Page 01-107
				Oil pressure switch 0.9 bar	Oilp2<min Oilp2 OK.	
				Engine speed (RPM)	Engine speed in rpm	
Speed					Speed in km/h	

01-107

Evaluating display group 001

Display field	Description	Display	Corrective actions
1	Speed	Speed in km/h	<ul style="list-style-type: none"> - Visually check wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction or replace the relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Engine speed (RPM)	Engine speed in rpm	
3	Oil pressure switch 0.9 bar	Oilp2<min Oilp2 OK.	
4	Time	Clock time in hours and minutes	

Display group 002						
Read Measuring Value Block 2				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Ambient temperature ¹⁾	Ambient temperature in °C	⇒ Page 01-109
				Ω value of sender for fuel gauge -G-	Resistance in Ω	
		Fuel level		Fuel level in liters		
	Distance travelled (odometer)			Distance in km		

¹⁾ For instrument clusters with Multi Function Indicator (MFI) or Climatronic

01-109

Evaluating display group 002

Display field	Description	Display	Corrective actions
1	Distance travelled (odometer)	Distance in km	<ul style="list-style-type: none"> - Visually check wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction or replace the relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Fuel level ¹⁾	Fuel level in liters	
3	Ω value of sender for fuel gauge -G-	Resistance in Ω	
4	Ambient temperature	Ambient temperature in $^{\circ}\text{C}$	

¹⁾ When the fuel level sender has an open circuit, "0L " is displayed in display field 2, and 510 Ω is displayed in field 3. When the fuel level sender has a short circuit, "0L " is displayed in display field 2, and 0 Ω is displayed in field 3.

01-110

Display group 003						
Read Measuring Value Block 3				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Empty		
				Empty		
				Empty		
Engine Coolant Temperature (ECT)					Engine coolant temperature in °C	⇒ Page 01-111

01-111

Evaluating display group 003

Display field	Description	Display	Corrective actions
1	Engine Coolant Temperature (ECT) ¹⁾	Engine coolant temperature in °C	<ul style="list-style-type: none"> - Visually check wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction or replace the relevant component - Erase DTC memory - Perform functional check - Check DTC memory again

¹⁾ If the actual coolant temperature value lies between approx. 75 °C and 107 °C, the instrument cluster will always display 90 °C!

01-112

Display group 050						
Read Measuring Value Block 50				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	Display fields	Designation	Evaluating display fields
				Engine Coolant Temperature (ECT)	Engine coolant temperature in °C	⇒ Page 01-113
				Engine Oil Temperature ¹⁾	Oil temperature in °C	
				Engine speed (RPM)	Engine speed in rpm	
				Distance travelled (odometer)	Distance travelled in km	

¹⁾ Where applicable

01-113

Evaluating display group 050

Display field	Description	Display	Corrective actions
1	Distance travelled	Distance travelled in km	<ul style="list-style-type: none"> - Visually check wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction or replace the relevant component - Erase DTC memory - Perform functional check - Check DTC memory again
2	Engine speed (RPM)	Engine speed in rpm	
3	Engine Oil temperature ¹⁾	Engine oil temperature in °C	
4	Engine Coolant Temperature (ECT)	Engine coolant temperature in °C	

¹⁾ Where applicable

Notes:

- ◆ *Display fields in display groups 125 and 126 provides the CAN-Bus function status codes of various control modules connected to the "Powertrain" CAN-Bus network.*
- ◆ *If a vehicle is not equipped with control module (s) listed in the following display groups, the applicable display field remains blank. Check correct coding of CAN-Bus On Board Diagnostic (OBD) interface -J533- ⇒ [Page 01-149](#).*
- ◆ *Display field content differs between VDO and MMO instrument clusters!*

Display group 125						
Read Measuring Value Block 125				→ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Airbag Control Module ¹⁾	Airbag 1 ¹⁾	⇒ Page 01-115
				ABS Control Module	ABS 1	
				Automatic Transmission Control Module (TCM)	Transm. 1	
				Engine Control Module (ECM)	Engine 1	

¹⁾ Only for VDO. Motometer ⇒ Display group 126, display field 2.

01-115

Evaluating display group 125

Display field	Description	Display	Corrective actions
1	Engine Control Module (ECM)	<p>Engine 1 = OK, Data recieved from ECM</p> <p>Engine 0 = not OK, No data recieved from ECM</p>	<ul style="list-style-type: none"> - Visually check CAN Bus wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction - Erase DTC memory - Perform functional check - Check DTC memory again
2	Transmission Control Module (TCM)	<p>Transm. 1 = OK Data recieved from TCM</p> <p>Transm. 0 = not OK No data recieved from TCM</p>	
3	ABS-control module	<p>ABS 1 = OK, Data recieved from ABS control module</p> <p>ABS 0 = not OK, No data recieved from ABS control module</p>	

4	Airbag-control module (VDO only)	Airbag 1 = OK, Data received from Airbag control module Airbag 0 = not OK, No data received from Airbag control module	
---	----------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------	--

01-116

Display group 126						
Read Measuring Value Block 126				→	◀ Indicated on display	
xxx	xxx	xxx	xxx	◀ Display fields		Evaluating display fields
1	2	3	4	Empty		
Empty				Empty		
Airbag control module ¹⁾				Airbag 1	⇒ Page 01-117	
Empty						

¹⁾ Only for Motometer, VDO ⇒ Display group 125, display field 4.

01-117

Evaluating display group 126

Display field	Description	Display	Corrective actions
2	Airbag control module (Motometer only)	<p>Airbag 1 = OK, Data recieved from Airbag control module</p> <p>Airbag 0 = not OK, No data recieved from Airbag control module</p>	<ul style="list-style-type: none"> - Visually check CAN Bus wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction - Erase DTC memory - Perform functional check - Check DTC memory again

Adaptation (function 10)

Use this function to initiate and store the following changes:

- ◆ Adaptation of odometer reading when replacing/exchanging instrument cluster.
- ◆ Adaptation of fuel gauge reading.
- ◆ Adaptation of Multi-function Indicator (MFA) fuel consumption indicator (where applicable).

Individual functions are called up using the appropriate channel number from adaptation table ⇒ [Page 01-119](#) .

Adaptation table:

Adaptation channel	Adaptation functions
03	Multi-function Indicator (MFI) fuel consumption indicator (where applicable), adaptation ⇒ Page 01-133
09	Odometer, adaptation ⇒ Page 01-120
16	Distance impulse number (K number), reading/confirming ⇒ Page 01-125
30	Fuel gauge, checking/adaptation ⇒ Page 01-128

Note:

After changing an adaptation value or ending an adaptation channel the function "10 - Adaptation" must be performed to select another adaptation channel!

Odometer, adaptation

Notes:

- ◆ *Market and equipment appropriate coding of instrument cluster must be performed before adaptation of odometer reading. Vehicles. 05.99 ➤ 05.00 ⇒ [Page 01-95](#) , vehicles 05.00 ➤ ⇒ [Page 01-99](#) .*
- ◆ *The total distance travelled by the vehicle can be read from the malfunctioning instrument cluster or determined by the vehicle service history.*
- ◆ *The total distance travelled display of new instrument cluster must not be more than 100 km (62 mi) before adaptation.*
- ◆ *The total distance travelled to be transferred to the new instrument cluster must exceed 100 km (62 mi).*
- ◆ *Adapting the total distance travelled is only possible once and only in a positive (upwards) direction.*
- ◆ *Adaptation can be interrupted with the "C" button of the VAG 1551*
- ◆ *Correcting a false entry which has been confirmed is not possible. The instrument cluster must be exchanged for a new one.*
- ◆ *Adaptation value must be entered in kilometers. For US models, adaptation value must be converted from miles to kilometers first (miles x 1.609 = kilometers).*

Adaptation, example

The malfunctioning instrument cluster has an odometer reading of 89627 km. This reading is transferred to the new instrument cluster as follows:

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is displayed..

Note:

Login procedure is only needed for VDO instrument clusters. On Motometer instrument clusters, adaptation functions can be selected immediately.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press button -1- twice to select "Login" function 11.
- Press -Q- button to confirm input.

Rapid data transfer
11 - Login procedure

q



Indicated on display:

- Press -Q- button to confirm input.

Login procedure
Enter code number XXXXX

q



Indicated on display:

- Enter code number 13861.

Login procedure Enter code number 13861	Q	←	Indicated on display: "FAIL" appears in odometer if a false code or secret number is entered 3 times. In this case terminal 30 (battery) must be disconnected and reconnected again and the Login procedure repeated using the correct code number. - Press -Q- button to confirm input.
Rapid data transfer Select function XX	HELP	←	Indicated on display: - Press buttons -1- and -0- to select "Adaptation" function 10.
Rapid data transfer 10 - Adaptation	Q	←	Indicated on display: - Press -Q- button to confirm input.
Adaptation Enter channel number XX		←	Indicated on display: - Press buttons -0- and -9- to select adaptation "channel 09". - Press -Q- button to confirm input.
Channel 9 Adaptation 0	→ <-1 3->	←	- Indicated on display: - Press → button to advance program sequence.
Channel 9 Adaptation 0 Enter adaptation value XXXXX		←	Indicated on display:

- Enter adaptation value using VAG 1551 button pad.

The last position of the kilometer reading must be rounded off to the nearest 10 kms. Therefore, a kilometer reading of 89627 produces an adaptation value of:

0 8 9 6 3

X					Hundred thou.: 100000 ... 655350 km
	X				Ten thousands: 10000 ... 90000 km
		X			Thousands: 1000 ... 9000 km
			X		Hundreds: 100 ... 900 km
				X	Tens: 10 ... 90 km
					Units: round up to next ten

- After entering adaptation value using VAG 1551 button pad,

Channel 9 Adaptation 0
Enter adaptation value 08963

q ◀

Indicated on display (example only):

- Press -Q- button to confirm input.

Channel 9 Adaptation 8963

q ◀

Indicated on display:

<-1 3->

The kilometer reading entered now appears in the display of the instrument cluster. If the displayed kilometer reading is not OK, e.g. false entry:

- Press -C- button and enter correct adaptation value again.

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			If the displayed kilometer reading in instrument cluster is OK:
			- Press -Q- button to confirm input.
Channel 9 Adaptation 8963	Q	←	Indicated on display:
Store changed value?			- Press -Q- button to confirm input.
Channel 9 Adaptation 8963	→	←	Indicated on display:
Changed value is stored			- End odometer adaptation by pressing → button.
Rapid data transfer	HELP	←	Indicated on display:
Select function XX			- Press buttons -0- and -6- to select "End Output" function 06.
Rapid data transfer	Q	←	Indicated on display:
06 End Output			- Press -Q- button to confirm input.
Rapid data transfer	Help	←	Indicated on display:
Enter address word XX			The tester is now in basic function again.

Distance impulse number (K number), reading/confirming

Distance impulse number can only be read/confirmed on VDO instrument clusters.

Notes:

- ◆ *The distance impulse number is a constant used to calculate the speed indication and distance travelled.*
- ◆ *The distance impulse number (K number) cannot be changed using the "Adaptation" function. To change the distance impulse number, a code that corresponds to the vehicle engine/gearbox combination must be entered using "Code Control Module" function 07. Vehicles. 05.99 ➤ 05.00 ⇒ [Page 01-95](#) , vehicles 05.00 ➤ ⇒ [Page 01-99](#) .*
- ◆ *For instrument clusters with mile indicators, the distance impulse number is shown in kilometers. The trip impulse number for mile values can be calculated as follows: Trip impulse number for kilometer values x 1.609 = trip impulse number for mile values.*
- ◆ *Press the -C- button on the VAG 1551 to abort the "Read distance impulse number" function.*

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
 - Press -Q- button to confirm input.
 - Press → button until "Select function" appears in display.
- Rapid data transfer** **HELP** ◀ Indicated on display:
Select function XX
- Press buttons -1- and -0- to select "Adaptation" function 10.
- Rapid data transfer** **Q** ◀ Indicated on display:
10 - Adaptation
- Press -Q- button to confirm input.
- Adaptation** ◀ Indicated on display:
Enter channel number XX
- Press buttons -1- and -6- to select adaptation "channel 16".
 - Press -Q- button to confirm input.
- Channel 16 Adaptation 3538** → ◀ Indicated on display (example only):
<- 1 3 ->
- Read/confirm distance impulse number in accordance with production date and/or vehicle engine/gearbox combinations ⇒ code tables: vehicles 05.99 ➤ 05.00 ⇒ [Page 01-95](#) , vehicles 05.00 ➤ ⇒ [Page 01-99](#) .

			- Interrupt "Reading distance impulse number" with "C" button.
Adaptation Enter channel number XX		◀	Indicated on display: - Press "C" button.
Rapid data transfer Select function XX	HELP	◀	Indicated on display: - Press buttons -0- and -6- to select "End Output" function 06.
Rapid data transfer 06 - End Output	Q	◀	Indicated on display: - Press -Q- button to confirm input.
Rapid data transfer Enter address word XX	Help	◀	Indicated on display: The tester is now in basic function again.

Fuel gauge, checking

If the fuel gauge displays the contents of the fuel tanks as being too high or too low, the fuel gauge needle position can be corrected (adapted).

First perform the following procedures:

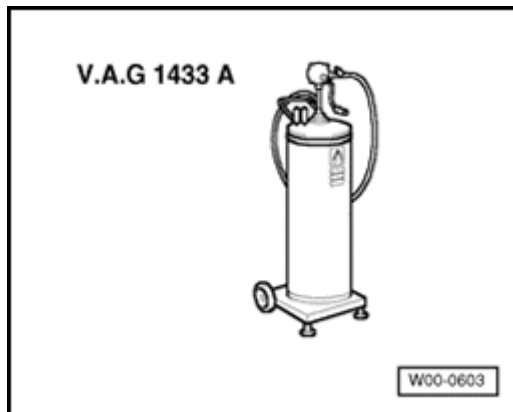
- Perform Output Diagnostic Test Mode (DTM) for instrument cluster ⇒ [Page 01-86](#) .

If Output Diagnostic Test Mode (DTM) does not recognize a malfunction, check function of sender for fuel gauge -G-:

- Check resistance value of sender for fuel gauge in read measuring value block, display group 002 ⇒ [Page 01-104](#) .

If Read Measuring Value Block does not indicate a short or open circuit in the wiring or the fuel gauge sender, continue with adaptation ⇒ [Page 01-129](#) .

01-129



Fuel gauge, adaptation

Special tools, testers, and auxiliary items required

- ◆ Fuel extraction unit VAG 1433 A (or equivalent, approved fuel cart)
- Switch off ignition.
- Drain fuel tank completely using fuel extraction unit, then fill with 7 liters (1.85 gallons) of fuel.

WARNING!

- ◆ **Fire hazard. DO NOT smoke or work near heaters or have anything in the area that can ignite fuel.**
- ◆ **Always drain fuel from fuel tank using an approved fuel cart.**
- ◆ **Wear fuel-resistant gloves whenever working with open parts of the fuel system.**
- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" appears in display.

Rapid data transfer
Select function XX

HELP

Indicated on display:

- Press buttons -1- and -0- to select "Adaptation" function 10.

Rapid data transfer Q
10 - Adaptation



Indicated on display:

- Press -Q- button to confirm input.

Adaptation
Enter channel number XX



Indicated on display:

- Press buttons -3- and -0- to select adaptation "channel 30".
- Press -Q- button to confirm input.

Channel 30 Adaptation 128 →
< - 1 3- >



Indicated on display:

Notes:

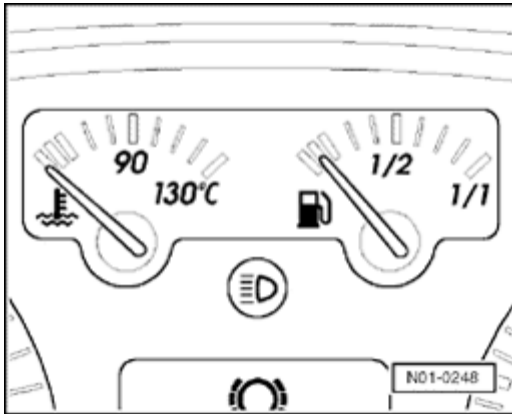
- ◆ *At least 60 seconds must pass between adding fuel and reading fuel gauge.*
- ◆ *Before this time passes, the fuel gauge reading is unreliable due to the movement of the added fuel.*

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Channel 30 Adaptation 130

Q

< - 1 3- >



Channel 30 Adaptation 130

Q

Save modified value?

Channel 30 Adaptation 130

→

Modified value is saved

Rapid data transfer

Help

Enter address word XX

- Using button -1-, the adaptation value can be decreased as low as 120, using button -3- the value can be increased as high as 136, e

- Indicated on display:

The fuel gauge is adapted correctly when the needle rests on the center red demarcation (reserve)!

When indication is OK:

- Press -Q- button to confirm input.

- Indicated on display:

- Press -Q- button to confirm input.

- Indicated on display:

- End adaptation of fuel gauge with → button

- Indicated on display:

Note:

Replace fuel gauge sender only if fuel gauge cannot be matched correctly.

- Press buttons -0- and -6- to select "End Output" function 06.

Rapid data transfer

Q



Indicated on display:

06 End Output

- Press -Q- button to confirm input.

Rapid data transfer

Help



Indicated on display:

Enter address word XX

The tester is now in basic function again.

Multi-function Indicator (MFI) fuel consumption indicator, adaptation

Notes:

◆ *Consumption indicator can only be adapted once between 85% and 115%.*

◆ *Value must be entered in steps of 5%.*

- Connect scan tool VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" appears in display.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -1- and -0- to select "Adaptation" function 10.

Rapid data transfer
10 - Adaptation

Q



Indicated on display:

- Press -Q- button to confirm input.

Adaptation
Enter channel number XX



Indicated on display:

- Press buttons -0- and -3- to select adaptation "channel 03".
- Press -Q- button to confirm input.

Channel 03 Adaptation 100



Indicated on display:

< - 1 3 - >

- Press → button to continue.

Note:

Correction of fuel consumption display is only possible via direct input.

Channel 03 Adaptation 100

Enter adaptation value XXXXX



Indicated on display:

- Input desired correction value using scan tool button pad, filling initial positions with "0".

Example:

Desired input value: 90% = button pad entry: 00090

Channel 03 Adaptation 100

Q



Indicated on display:

Enter adaptation value 00090

- Press -Q- button to confirm input.

Channel 03 Adaptation 90

Q



Indicated on display:

< - 1 3 - >

- Press -Q- button to confirm input.

Channel 03 Adaptation 90

Q



Indicated on display:

Store changed value?

- Press -Q- button to confirm input.

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Channel 03 Adaptation 90



Indicated on display:

Changed value is stored

- End consumption indicator adaptation with → button.

Rapid data transfer

HELP



Indicated on display:

Select function XX

Note:

A false entry switches the tester to "Select function" mode.

Function is unknown or

*If the following display appears:*

cannot be carried out at the moment

- Press → button.
- Select function "10 - Adaptation" and adaptation channel 03 again.
- Carry out corrections to consumption indicator and confirm with Q button.

Data Bus On Board Diagnostic Interface -J533- ("Gateway") m.y. 2000 through m.y. 2001, On Board Diagnostic (OBD)

General information

Instrument clusters from m.y. 2000 are integrated into the "Powertrain" CAN Data Bus network (may also be know as "CAN-Bus" or "Data-Bus").

The Data Bus On Board Diagnostic (OBD) interface -J533- (which is integrated into the instrument cluster) enables data to be exchanged between the various CAN-Bus networks and the Data Link Connector (DLC) "K-wire".

The Data Bus On Board Diagnostic (OBD) interface -J533- has specific On Board Diagnostic (OBD) capabilities via address word 19 "Gateway", and must always be coded separately from the instrument cluster ⇒ [Page 01-149](#) .

Data Bus On Board Diagnostic Interface, On Board Diagnostic (OBD), initiating & checking control module versions

Test requirements:

- ◆ All fuses OK according to wiring diagram
- ◆ Voltage supply OK (at least 11.5 V).
- ◆ Scan Tool VAG 1551 or VAG 1552 connected.

Notes:

- ◆ *Connecting Scan Tool* ⇒ [Page 01-1](#) .
- ◆ *The following description applies only to Scan Tool VAG 1551.*
- Switch on ignition.
- Switch on printer with the PRINT button (indicator lamp in button lights up).
- Press button -1- to select operating mode 1 "Rapid data transfer".

Rapid data transfer
Input address word XX

HELP



Indicated on display:

- Press buttons -1- and -9- to input "Gateway" address word 19.

Rapid data transfer
19 - Diagnostic Interface for Data Bus

Q



Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer Q

Tester sends address word 19



Indicated on display:

6N0909901 Gateway K <-> CAN 0001

Coding 00007 WSC 00000



Indicated on display (example only):

Top line: Part No. of control
 module

System designation

(Gateway K <-> CAN)
1)

Software level

Bottom
line: Coding²⁾

Workshop number

1) The Data Bus On Board Diagnostic Interface -J533- in instrument cluster is referred to in the OBD program as "Gateway".

2) Dependant on the control modules connected to the CAN Bus network.

- Press → button.

Rapid data transfer HELP

Select function XX



Indicated on display:

- After the HELP button is pressed, a list of the possible functions is printed out.

List of available functions

Function		page
01 -	Check Control Module Versions	⇒ Page 01-137
02 -	Check DTC memory	⇒ Page 01-140
05 -	Erase DTC memory	⇒ Page 01-146
06 -	End Output	⇒ Page 01-148
07 -	Code Control Module	⇒ Page 01-149
08 -	Read Measuring Value Block	⇒ Page 01-151

Notes:

- ◆ *Press HELP button to print out a complete list of available functions. This list indicates function capability of VAG 1551 Scan Tool (ST) only, and does not necessarily reflect function capability of vehicle systems equipped with OBD. For "Gateway" address word 19, do not attempt to select functions other than those listed above.*
- ◆ *After function is completed and forwarded with → button, VAG 1551 Scan Tool (ST) returns to following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display:

Diagnostic Trouble Code (DTC) memory, checking (function 02)

Note:

DTCs stored in memory along with corresponding malfunction descriptions can only be displayed by initiating the On Board Diagnostic program and checking DTC memory (function 02).

- Connect VAG 1551 Scan Tool, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 19, "Gateway".
- Press -Q- button to confirm input.
- Press → button until "Select function" appears in display.
- Switch on printer with the PRINT button (indicator lamp in button lights up).

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -2- to select "Check DTC memory" function 02.

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Press -Q- button to confirm input.

X DTC's recognized!



The number of stored DTCs appears in the display.

Stored DTCs are displayed and printed out one after another.

- Check print-out against DTC table and repair all malfunctions as necessary ⇒ [Page 01-142](#) .

No DTC recognized!



If "No DTC recognized" is displayed the program will return to the initial position after pressing → button.

Rapid data transfer

HELP



Indicated on display:

Select function XX

If something else is displayed:

⇒ *Scan tool operating instructions*

- End Output (function 06) ⇒ [Page 01-148](#) .
- Switch ignition off
- Disconnect VAG 1551 from Data Link Connector (DLC).

Diagnostic Trouble Code (DTC) table

Notes:

- ◆ *The following table lists all malfunctions, with the corresponding 5 digit code numbers, that can be recognized by the Data Bus On Board Diagnostic Interface - J533- and printed out by the VAG 1551 Scan Tool (ST).*
- ◆ *If malfunctions do not occur regularly, these are displayed as occurring sporadically ("SP").*
- ◆ *DTC codes appear only on print-out.*
- ◆ *Before replacing components, check the wiring and connections to these components as well as ground connections, according to wiring diagram.*
- ◆ *When repair has been carried out, the Diagnostic Trouble Code (DTC) memory must always be erased and checked again with VAG 1551 Scan Tool (ST).*
- ◆ *If there is a specific complaint and no malfunctions are recognized after checking Diagnostic Trouble Code (DTC) memory, carry out "Read measuring value block" ⇒ [Page 01-151](#) .*

VAG 1551 print out	Possible cause	Possible effects	Corrective action
01044 Control Module incorrectly coded	<ul style="list-style-type: none"> ◆ A control module connected to the power-train CAN Bus (Data Bus) is incorrectly coded ◆ A control module connected to the power-train CAN Bus (Data Bus) is malfunctioning 	Functions of systems connected to CAN-Bus not OK	<ul style="list-style-type: none"> - Check DTC memory of all control modules connected to CAN-Bus and repair malfunctions if necessary - Check control module coding, correct if necessary - Replace control module if necessary

VAG 1551 print out	Possible cause	Possible effects	Corrective action
01312 Data Bus Drive malfunctioning	<ul style="list-style-type: none"> ◆ Malfunction in data wires ◆ CAN Bus in "bus-off" condition 	<ul style="list-style-type: none"> ◆ Functions of systems connected to CAN-Bus not OK 	<ul style="list-style-type: none"> - Read measuring value block ⇒ Page 01-151 - Check control module coding - Check DTC memory of all control modules connected to CAN Bus and repair malfunctions if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.
01314 Engine Control Module (ECM) No communication	<ul style="list-style-type: none"> ◆ Data reception from Engine Control Module (ECM) via CAN Bus is not OK. 	<ul style="list-style-type: none"> ◆ Functions of systems connected to CAN-Bus not OK 	<ul style="list-style-type: none"> - Read measuring value block ⇒ Page 01-151 - Check DTC memory of Engine Control Module (ECM) and repair malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.

VAG 1551 print out	Possible cause	Possible effects	Corrective action
01315 Transmission Control Module (TCM) No communication	<ul style="list-style-type: none"> ◆ Data reception from Transmission Control Module (TCM) via CAN Bus is not OK. 	<ul style="list-style-type: none"> ◆ Functions of systems connected to CAN-Bus not OK 	<ul style="list-style-type: none"> - Read measuring value block ⇒ Page 01-151 - Check DTC memory of Transmission Control Module (TCM) and repair malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.
01316 Brake control module No communication	<ul style="list-style-type: none"> ◆ Data reception from ABS control module via CAN Bus not OK 	<ul style="list-style-type: none"> ◆ Functions of systems connected to CAN-Bus not OK 	<ul style="list-style-type: none"> - Read measuring value block ⇒ Page 01-151 - Check DTC memory of ABS control module and repair malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.

VAG 1551 print out	Possible cause	Possible effects	Corrective action
01317 Control module with indicator module in instrument cluster insert -J285- No communication	<ul style="list-style-type: none"> ◆ Malfunction in data wires ◆ Control module malfunctioning 	<ul style="list-style-type: none"> ◆ No indication or malfunctioning indication for indicator instruments and control lamps 	<ul style="list-style-type: none"> - Check DTC memory of all control modules connected to CAN Bus and repair malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.
01321 Airbag Control Module- -J234- No communication	<ul style="list-style-type: none"> ◆ Data reception by airbag control module control module via CAN Bus not OK 	<ul style="list-style-type: none"> ◆ Airbag indicator lamp is lit 	<ul style="list-style-type: none"> - Read measuring value block ⇒ Page 01-151 - Check DTC memory of airbag control module and eliminate malfunction if necessary - Check for open or short circuit in CAN Bus wiring using wiring diagram.

Diagnostic Trouble Code (DTC) memory, erasing (function 05)

Note:

After DTC memory is erased, its contents are automatically output. If DTC memory cannot be erased, check DTC memory again and repair malfunction.

Prerequisites

- ◆ DTC memory checked ⇒ [Page 01-140](#) .
- ◆ All malfunctions repaired.

After successful DTC memory check:

Rapid data transfer Select function XX	HELP	◀	Indicated on display: - Press buttons -0- and -5- to select "Erase DTC memory" function 05.
Rapid data transfer 05 Erase DTC memory	Q	◀	Indicated on display: - Press -Q- button to confirm input.
Rapid data transfer DTC memory is erased!	→	◀	Indicated on display: DTC memory is erased. - Press → button.
Rapid data transfer Select function XX	HELP	◀	Indicated on display:

Notes:

WARNING!

DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

Rapid data transfer



DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

◆ *Follow test sequence exactly: first check DTC memory, repair malfunction(s) if necessary, then erase.*

End Output (function 06)

- Press buttons -0- and -6- to select "End Output" function 06.

Rapid data transfer

Q ←

Indicated on display:

06 - End Output

- Press -Q- button to confirm input.

Rapid data transfer

HELP ←

Indicated on display:

Enter address word XX

- Switch off ignition.
- Disconnect VAG 1551 from Data Link Connector (DLC).

Gateway, coding (function 07)

When replacing the instrument cluster, the Data Bus On Board Diagnostic Interface -J533- must be coded according to vehicle equipment.

Note:

Coding must be performed regardless if the instrument cluster is new or has been previously coded (installed in a vehicle).

Initiating coding

- Press buttons -0- and -7- to select "Code Control Module". function 07.

Rapid data transfer
07 - Code control module

Q <

Indicated on display:

- Press -Q- button to confirm input.

Code Control Module
Enter code number XXXXX (0-32000)

<

Indicated on display:

- Determine code number using code table below:

Control Modules on "Powertrain" CAN Bus	Code:
Automatic transmission	00001
Anti-lock brake system (ABS)	00002
Airbag	00004

Code numbers for all control modules connected to the CAN-Bus must be added.

Example:

Airbag + ABS + Autom. transmission: 00004 + 00002 + 00001 = 00007

- Use scan tool button pad to enter code number.

6N0909901 Gateway K <-> CAN 0001
Coding 00007 WSC 00000



Indicated on display (example only):

- Press -Q- button to confirm input.

Rapid data transfer HELP
Select function XX



Indicated on display:

- Press buttons -0- and -6- to select "End Output" function 06.

The tester is again in basic function.

Read Measuring Value Block (function 08)

Use this function to observe status of communication between control modules via the Powertrain CAN Bus..

The measuring value block is divided into 2 display groups, each containing 4 display fields.

- Connect VAG 1551, select operating mode 1 "Rapid data transfer", switch on ignition and enter address word 17 "instrument cluster".
- Press -Q- button to confirm input.
- Press → button until "Select function" is displayed.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- to select "Read Measuring Value Block" function 08.

Rapid data transfer Q
08 - Read Measuring Value Block



Indicated on display:

- Press -Q- button to confirm input.

Read Measuring Value Block HELP
Enter display group number XXX



Indicated on display:

- Using the Scan Tool (ST) button pad, enter the required display group number (following example shows display group 001).
- Press -Q- button to confirm input.

Read Measuring Value Block 1



Indicated on display: (1...4 = Display fields)

1 2 3 4

Notes:

- ◆ *Interpreting display groups and evaluating measured values in individual display fields
⇒ tables beginning ⇒ [Page 01-153](#) .*
- ◆ *With the printer switched on, the information on the display is printed out.*
- ◆ *To easily change between display groups, proceed as follows:*

Display group	VAG 1551	VAG 1552
Higher	Press button 3	Press ↑ button
Lower	Press button 1	Press ↓ button
Skip	Press button C	Press button C

- Displayed after pressing C button.

Read Measuring Value Block HELP

Enter display group number XXX



Indicated on display:

- Enter alternate display group number as needed
⇒ tables beginning ⇒ [Page 01-153](#) .

Notes:

- ◆ *Display fields always show actual values transmitted from senders and sensors. However, instrument cluster display values can differ from those in the display fields due to internal filtering.*
- ◆ *Other display groups are possible, but are not required for On Board Diagnostic program!*

Notes:

- ◆ Display fields in display groups 125 and 126 provides the CAN-Bus function status codes of various control modules connected to the "Powertrain" CAN-Bus network.
- ◆ If a vehicle is not equipped with control module (s) listed in the following display groups, the applicable display field remains blank. Check correct coding of CAN-Bus On Board Diagnostic (OBD) interface -J533- ⇒ [Page 01-149](#).
- ◆ Display field content differs between VDO and MMO instrument clusters!

Display groups, interpreting

Display group 125						
Read Measuring Value Block 125				→ Indicated on display		
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Airbag-control module ¹⁾	Airbag 1 ¹⁾	⇒ Page 01-154
				ABS control module	ABS 1	
				Autom. transmission control module	Transm. 1	
				Engine	Engine 1	

¹⁾ Only for VDO. Motometer ⇒ Display group 126, display field 2.

Evaluating display group 125

Display field	Description	Display	Corrective action
1	Engine Control Module (ECM)	<p>Engine 1 = OK,</p> <p>Data reception via CAN Bus OK</p> <p>Engine 0 = not OK,</p> <p>Data reception via CAN Bus not OK</p>	<ul style="list-style-type: none"> - Visually check CAN Bus wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction - Erase DTC memory - Perform functional check - Check DTC memory again
2	Transmission Control Module (TCM)	<p>Transm. 1 = OK,</p> <p>Data reception via CAN Bus OK</p> <p>Transm. 0 = not OK,</p> <p>Data reception via CAN Bus not OK</p>	
3	ABS-control module	<p>ABS 1 = OK,</p> <p>Data reception via CAN Bus is OK</p> <p>ABS 0 = not OK,</p> <p>Data reception via CAN Bus not OK</p>	
4	Airbag-control module	Airbag 1 = OK,	

		Data reception via CAN Bus is OK Airbag 0 = not OK, Data reception via CAN Bus not OK	
--	--	--------------------------------------------------------------------------------------------------------------------	--

Display group 126						
Read Measuring Value Block 126				→	◀ Indicated on display	
xxx	xxx	xxx	xxx	◀ Display fields		Evaluating display fields
1	2	3	4	Empty		⇒ below
Empty				Empty		
Airbag control module				Airbag 1		
Empty						

Evaluating display group 126

Display field	Description	Display	Corrective action
2	Airbag control module	Airbag 1 = OK, Data reception via CAN Bus is OK Airbag 0 = not OK, Data reception via CAN Bus not OK	<ul style="list-style-type: none"> - Visually check CAN Bus wire routing - Check harness connectors of the appropriate electrical circuit for proper and secure seating and simultaneously observe display - If the display content does not change during operation, repair malfunction - Erase DTC memory - Perform functional check - Check DTC memory again

Anti-theft immobilizer, On Board Diagnostic (OBD)

General information

All anti-theft immobilizer OBD program functions must be performed using the VAS 5051 Vehicle Diagnostic Testing and Information System in operating mode "Guided Fault Finding" or "Vehicle Self-Diagnosis".

Anti-theft immobilizer system/component description and repairs ⇒ [Repair Manual, Electrical Equipment, Repair Group 96](#) .

Select a topic

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Battery

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety measures for lead-acid batteries ⇒ [Page 27-4](#) .

CAUTION!

In order to prevent damage to the battery or vehicle, observe battery type descriptions and notes ⇒ [Page 27-3](#) .

General information

The battery is one of the most important electrical components in the modern automobile. A battery that provides trouble-free service has a great influence on customer satisfaction. To ensure trouble-free service and optimum service life, batteries must be checked, serviced and maintained as per the instructions in this Manual.

Apart from starting the engine, the battery has other tasks. It acts as a buffer and also supplies electrical energy to the complete vehicle electrical system. In addition, the cyclical and capacity demands on the battery have increased due to additional safety and convenience features (electrical consumers) being installed.

The automobile battery has undergone many technical changes and improvements, and development of new battery technologies continues.

A new generation of maintenance free batteries uses physically and constructively optimized, lead-calcium coated positive electrodes. Advantages include minimal electrolyte consumption and servicing requirements, as well as improved charge stability over a longer period of time. Simplified checking of these batteries is also achieved with the charge indicator (magic eye).

Several different types of battery may be installed on Golf/Jetta vehicles ⇒ [Page 27-3](#) . Each requires specific servicing ⇒ [Page 27-7](#) .

Battery types

Low Maintenance Batteries: Batteries with electrolyte, lead-antimony coated electrodes and removable cell caps

A low maintenance battery is characterized as a lead-acid battery that, during normal operation, requires regular inspection and topping-up of distilled water as necessary. Cell caps may be covered with foil.

A low maintenance battery may or may not be equipped with a charge indicator ("magic eye") that displays electrolyte level and charge condition.

Maintenance Free Batteries: Batteries with electrolyte, lead-calcium coated electrodes and cells that are permanently sealed after initial filling

A maintenance free battery is characterized as a permanently sealed lead-acid battery that, during normal operation, does not require regular inspection and topping-up of distilled water. .

A maintenance free battery is always equipped with a charge indicator (magic eye) that displays electrolyte level and charge condition.

CAUTION!

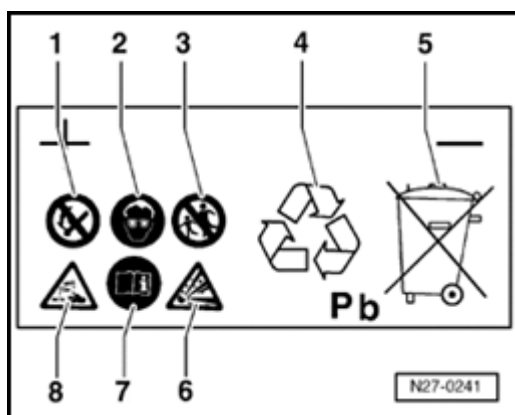
Under no circumstances should the cell cover (seal) on a maintenance free battery be removed. Battery will be damaged and become unusable.

Warnings and Safety Measures for lead-acid batteries

Safe interaction with vehicle batteries

Battery safety labels, understanding and prevention

The dangers inherent with vehicle batteries can be avoided when the Warnings and safety measures indicated on battery safety labels and listed in this Repair Manual are read, understood and followed.



WARNING!

1 - Keep open flames and sparks away and DO NOT smoke near batteries!

♦ **Avoid sparks when working with cables and electrical units.**

♦ **Always reinstall battery positive (B+) or negative (-) terminal covers if removed during servicing.**

2 - Always wear eye protection when working with electrolyte!

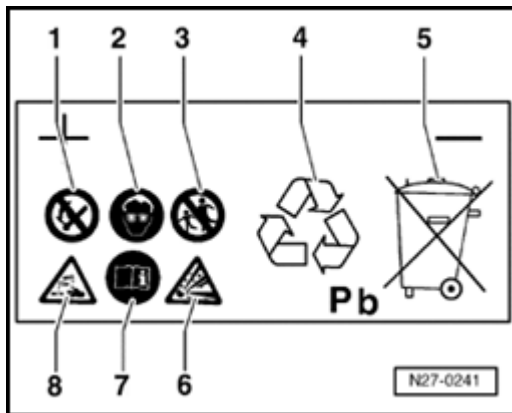
♦ **If electrolyte gets into eyes, flush with large quantities of water. Seek medical attention immediately!**

3 - Keep children away from batteries!

4 - Dispose of batteries properly!

♦ **Waste batteries must only be disposed of in appropriate waste disposal sites. Refer to local regulations pertaining to battery disposal.**

5 - Never dispose of batteries in household waste!



Battery safety labels, understanding and prevention

WARNING!

6 - Danger of explosion!

- ◆ **Batteries produce explosive gasses while being charged.**
- ◆ **Keep open flames and sparks away and DO NOT smoke near batteries.**
- ◆ **The battery charger MUST be turned off when connecting or disconnecting the cables at the battery.**
- ◆ **Battery cell caps must NOT be removed while charging.**
- ◆ **Ensure that battery is charged in a well ventilated area.**
- ◆ **Avoid short circuits. Always reinstall battery positive (B+) or negative (-) terminal covers if removed during servicing.**

7 - Read and follow all instructions on battery, contained in Repair Manual, Electrical Equipment, and in Owner's Manual!

8 - Battery acid can cause severe burns!

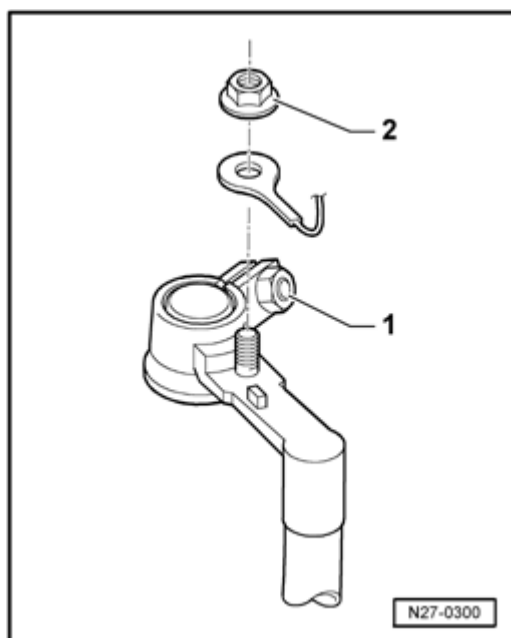
- ◆ **When working with electrolyte always wear eye protection, rubber gloves and a suitable apron. If electrolyte is spilled on eyes, skin, clothing (or painted surfaces), flush at once with large quantities of water.**
- ◆ **Never tip a battery on edge. Electrolyte can spill from the ventilation openings.**

Battery post/terminal, handling instructions

CAUTION!

In order to prevent damage to the battery terminals and battery posts, observe the following:

- ◆ ***Battery terminals must only be placed on battery posts without using force (by hand only).***
- ◆ ***Do not apply grease to battery posts.***
- ◆ ***Battery terminals must be securely seated on the battery post before tightening.***
- ◆ ***Battery terminals that are torqued to specification must NOT be tightened a further. Terminal damage will result.***
- ◆ ***Observe work procedure and Notes for disconnecting and reconnecting battery terminals ⇒ [Page 27-39](#) .***



⚡ Battery terminal -1- and additional terminal tightening torques ⇒ [Page 27-60](#) .

Battery, checking

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety Measures for lead-acid batteries ⇒ [Page 27-4](#) .

CAUTION!

In order to prevent damage to the battery or vehicle, observe battery type descriptions and notes ⇒ [Page 27-3](#) .

Battery, checking procedure

Perform battery checks in the following sequence:

1. Visual check ⇒ [Page 27-8](#) .
2. Battery with charge indicator (magic eye), checking:
 - ◆ Low maintenance battery ⇒ [Page 27-10](#) .
 - ◆ Maintenance free battery ⇒ [Page 27-16](#) .
3. Battery without charge indicator, checking ⇒ [Page 27-18](#) .
4. No load voltage, checking ⇒ [Page 27-27](#) .
5. Battery, testing ⇒ [Page 27-30](#) .

Visual check

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety Measures for lead-acid batteries ⇒ [Page 27-4](#) .

Prior to performing any measurements or tests, perform a visual check of the battery and battery terminals. Check for:

- ◆ Secure mounting of battery; must not be able to move battery in mounting by hand.
- ◆ Cracked battery case and resulting corrosion damage to surrounding area.
- ◆ Loose, damaged or corroded battery posts and terminals. If terminals are loose, observe battery terminal tightening torques ⇒ [Page 27-60](#) .

WARNING!

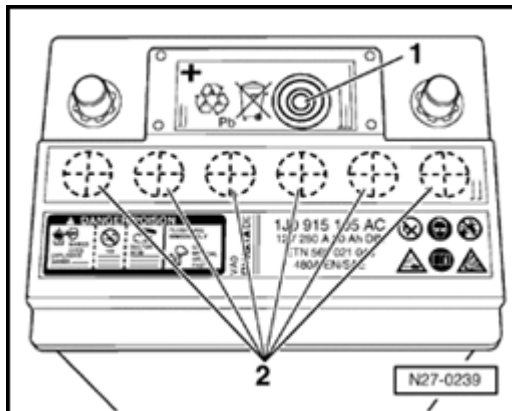
- ◆ *An improperly secured battery can lead to damage.*
- ◆ *Excessive vibration due to an improperly secured battery will reduce the battery service life, and the battery hold-down bracket could damage the battery housing and lead to electrolyte leakage.*
- ◆ *Ensure that all battery post/terminal connections are securely installed and tightened according to the torque value specified in this manual.*
- ◆ *Intermittent contact at battery terminals may spark or cause electrical system malfunctions.*

Low maintenance batteries with charge indicator (magic eye), checking

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety Measures for lead-acid batteries ⇒ [Page 27-4](#) .

Identification



- ◆ Battery cell caps -2- covered with plastic foil.
- ◆ Charge indicator -1- displays electrolyte level and charge condition.

Notes:

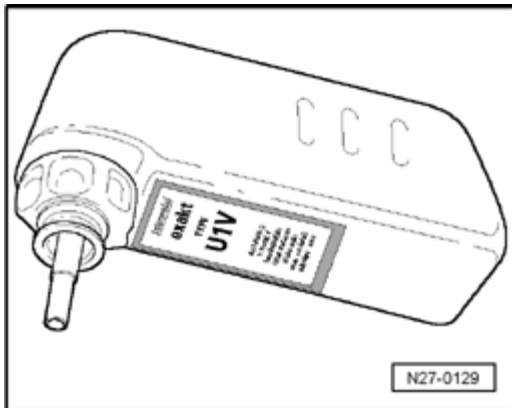
- ◆ As the charge indicator is located in a single cell, the indication is only valid for that cell. An exact assessment of battery condition should always be confirmed by performing battery test ⇒ [Page 27-30](#) .
- ◆ If the charge indicator on batteries in excess of 5 years old are colorless, DO NOT attempt to top and/or recharge battery. Battery must be replaced.
- ◆ Air bubbles that occur normally during battery charging (even during vehicle operation) may adversely affect charge indicator reading. To obtain an accurate reading, gently tap the charge indicator with a screwdriver handle or rock the vehicle in order to displace any possible air bubbles that have formed.

Charge indicator, readings

- Green → sufficient charge (and electrolyte level) OK
- Black → no charge or insufficient charge ⇒ [Page 27-34](#)
- Colorless or yellow → critically low electrolyte level. Top up with distilled water immediately ⇒ [Page 27-14](#)

Electrolyte level, checking

Special tools and auxiliary items needed



- ◆ VAS 5045 Battery filling bottle (or equivalent)

WARNING!

- ◆ **When checking electrolyte level with sealing caps removed, illuminate the inside of the battery housing/cells with a flashlight.**
- ◆ **Keep open flames and sparks away.**

The correct battery electrolyte specific gravity is an important factor in maintaining battery performance and service life.

Insufficient electrolyte levels allow cell plates to dry, resulting in a loss of battery capacity (reduced output). If the cell plates are not completely submerged by electrolyte, (sulfuric acid/water mixture) corrosion will occur on the plates, plate bridges and cell connector. Optimum battery function is not possible under these

conditions and battery failure
results.

27-12

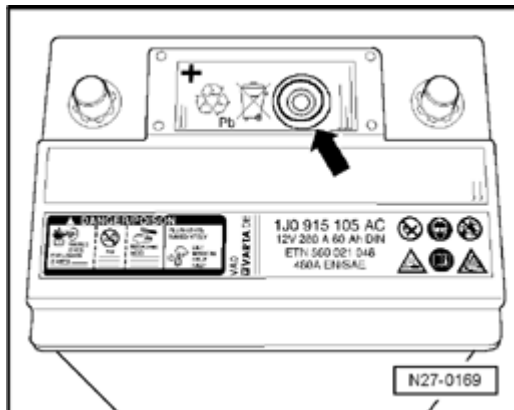
If electrolyte level is too high, electrolyte (sulphuric acid/water mixture) may leak out and damage the surrounding area, i.e.: plenum and engine compartment.

CAUTION!

Before beginning repairs on the electrical system

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Check electrolyte level visually, either via indicator (if equipped) or from min./max. markings on battery housing.

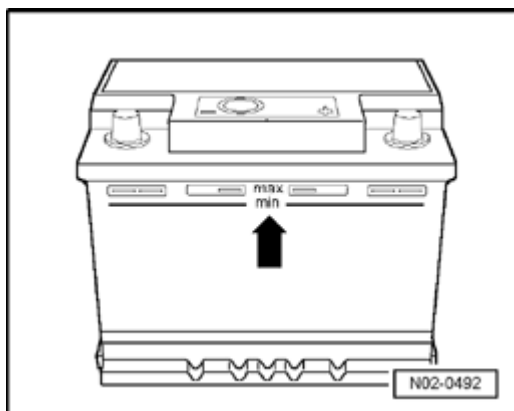


↳ Electrolyte level reading from charge indicator - arrow -.

- Green → electrolyte level OK
- Colorless or yellow → critically low electrolyte level. Top up with distilled water immediately. [Page 27-14](#)

CAUTION!

Do not use charge indicator to determine excessive electrolyte levels. Always check excessive electrolyte levels visually.



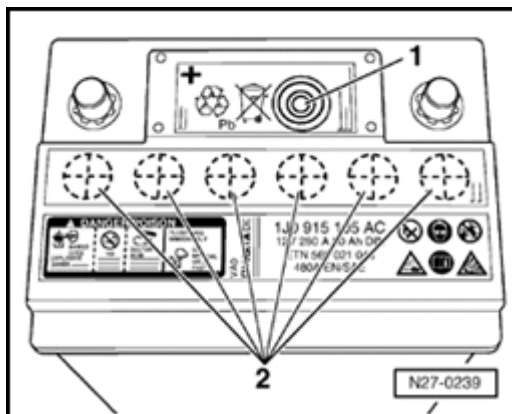
↳ Electrolyte level reading from min./max. markings on battery housing - arrow -.

- Electrolyte level must be above the minimum marking or just reach the maximum marking.

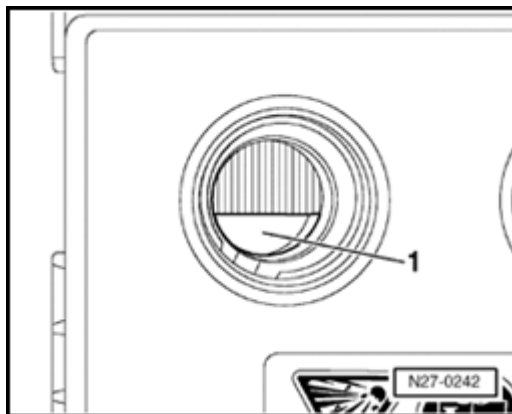
27-13

If no minimum and maximum markings are visible on the battery housing (either not marked or not visible due to installation location) and the battery housing is black, the sealing plug must be removed. Then determine electrolyte level by viewing inside the battery cells.

- First remove plastic foil from cell caps (where applicable), being sure not to disturb plastic safety warning label on battery.



- Unscrew cell caps -2-.
- Look into individual battery cells to determine electrolyte level.



- Electrolyte level must align with the internal electrolyte level indicator (lip) -1-. This level must be below the external "maximum" marking on the battery case.

Note:

On batteries with black housings, obtain accurate electrolyte level readings by illuminating the cells with a flashlight.

Electrolyte level too low ⇒ [Page 27-14](#)

Electrolyte level too high ⇒ [Page 27-15](#)

No load voltage, checking ⇒ [Page 27-27](#)

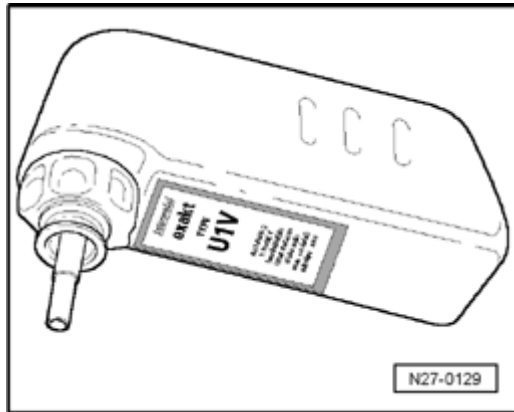
Battery test ⇒ [Page 27-30](#)

Electrolyte level too low

- Fill with distilled water using battery filling VAS 5045 (or equivalent) up to the max. marking

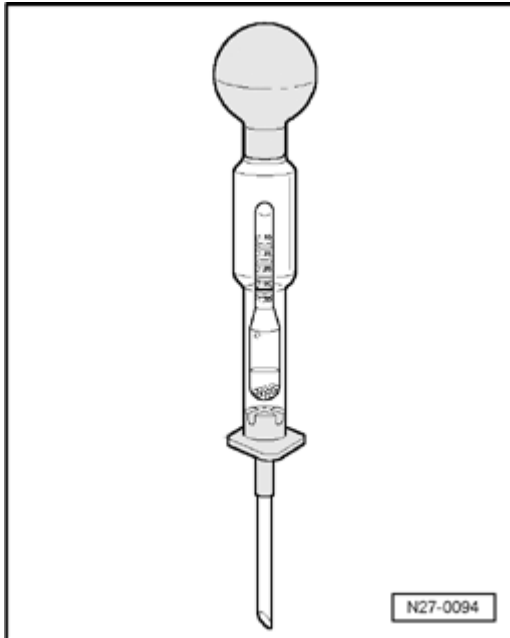
Note:

Design of filler support on filling bottle VAS prevents overfilling of battery cells and subsequent electrolyte leaks. When max. level is reached, flow of distilled water into battery cells stops.



CAUTION!

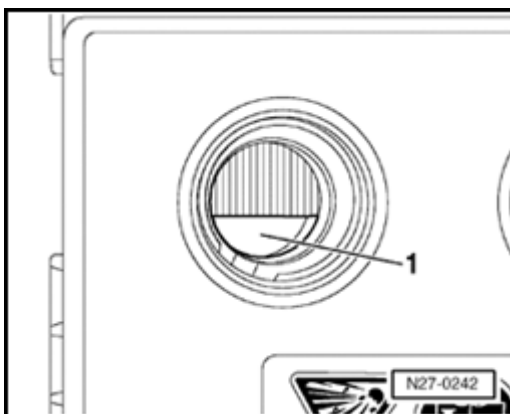
- ◆ **Only use distilled water to top-up battery. This prevents electrolyte impurities which cause self-discharging.**
- ◆ **DO NOT overfill the battery**
- ◆ **Overfilled batteries can boil over.**
- ◆ **Too little electrolyte reduces the service life of the battery.**
- ◆ **Use of genuine VW battery cell caps ensures the different battery cover systems are sealed correctly. Only use genuine caps of the same construction if lost or damaged. All cell caps must be equipped with an O-ring seal.**

Electrolyte level too high**Special tools and auxiliary items needed**

- ◆ Commercially available hydrometer

WARNING!

- ◆ **Refer to Warnings and Safety Measures** ⇒ [Page 27-4](#) .
- ◆ **If electrolyte level is too high, electrolyte (sulfuric acid/water mixture) may leak out and damage the surrounding area, i.e.: plenum and engine compartment.**
- ◆ **Excess electrolyte MUST be extracted using a hydrometer**
- ◆ **Dispose of electrolyte (sulfuric acid) properly! Waste electrolyte must only be disposed of in appropriate waste disposal sites. Refer to local regulations pertaining to electrolyte disposal.**
- Remove cell caps from cells with excess electrolyte.
- Extract excess electrolyte using hydrometer until electrolyte level is lowered to internal level indicator -1- or external maximum marking.

**CAUTION!**

Use use of genuine VW battery cell caps ensures the different battery cover systems are sealed correctly. Only use genuine cell caps of the same construction if lost or damaged. All cell caps must be equipped with an O-ring seal.

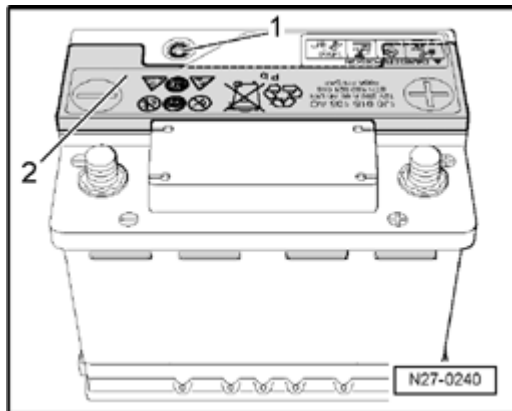
Maintenance free batteries with charge indicator (magic eye), checking

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety Measures for lead-acid batteries ⇒ [Page 27-4](#).

Identification

- ◆ Battery equipped with permanent cell cover -2-.
- ◆ Charge indicator -1- displays electrolyte level and charge condition.



CAUTION!

Under no circumstances should cover -2- be removed. Battery will be damaged and become unusable.

Notes:

- ◆ *As the charge indicator is located in a single cell, the indication is only valid for that cell. An exact assessment of battery condition should always be confirmed by performing battery test ⇒ [Page 27-30](#) .*
- ◆ *If the charge indicator on batteries in excess of 5 years old are colorless, DO NOT attempt to top and/or recharge battery. Battery must be replaced.*
- ◆ *Air bubbles that occur normally during battery charging (even during vehicle operation) may adversely affect charge indicator reading. To obtain an accurate reading, gently tap the charge indicator with a screwdriver handle or rock the vehicle in order to displace any possible air bubbles that have formed.*

Charge indicator, readings

- Green → sufficient charge (and electrolyte level) OK
- Black → no charge or insufficient charge ⇒ [Page 27-34](#)
- Colorless or yellow → replace battery

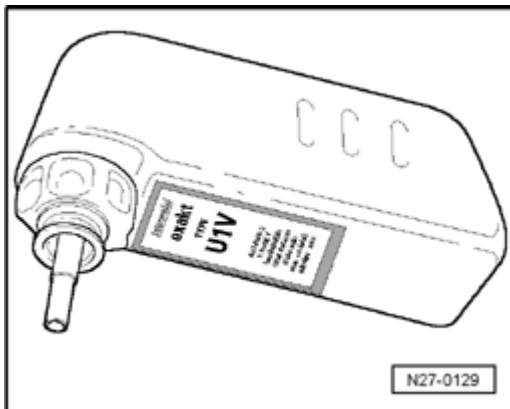
Batteries without charge indicator (magic eye), checking

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety Measures for lead-acid batteries ⇒ [Page 27-4](#).

Electrolyte level, checking (batteries without charge indicator)

Special tools and auxiliary items needed



- ◆ VAS 5045 Battery filling bottle (or equivalent)

WARNING!

- ◆ **When checking electrolyte level with sealing caps removed, illuminate the inside of the battery housing/cells with a flashlight.**
- ◆ **Keep open flames and sparks away.**

The correct battery electrolyte specific gravity is an important factor in maintaining battery performance and service life.

An insufficient electrolyte level allows the cell plates to dry, resulting in a loss of battery capacity (reduced output). If the cell plates are not completely submerged by electrolyte, (sulfuric acid/water mixture) corrosion will occur on the plates, plate bridges and cell connections. Optimum battery function is not possible under these conditions and battery failure results.

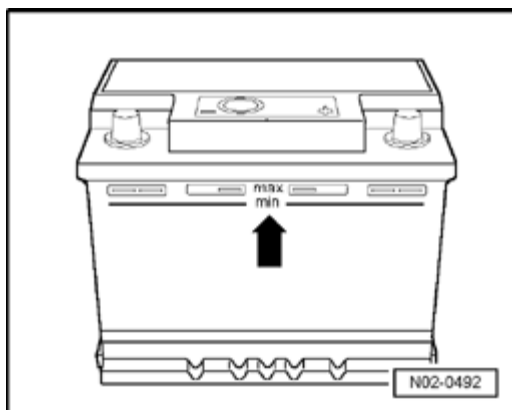
If electrolyte level is too high, electrolyte (sulfuric acid/water mixture) may leak out and damage the surrounding area, i.e.: plenum and engine compartment.

CAUTION!

Before beginning repairs on the electrical system

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Check electrolyte level visually, either via indicator (if equipped) or from min./max. markings on battery housing.

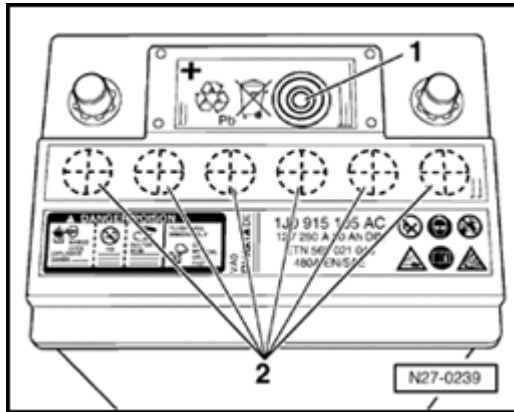


Electrolyte level reading from min./max. markings on battery housing -arrow-.

- Electrolyte level must be above the minimum marking or just reach the maximum marking.

If no minimum and maximum markings are visible on the battery housing (either not molded-in or not visible due to installation location) or if the battery housing is black, the sealing plugs must be removed. Then determine electrolyte level by viewing inside the battery cells.

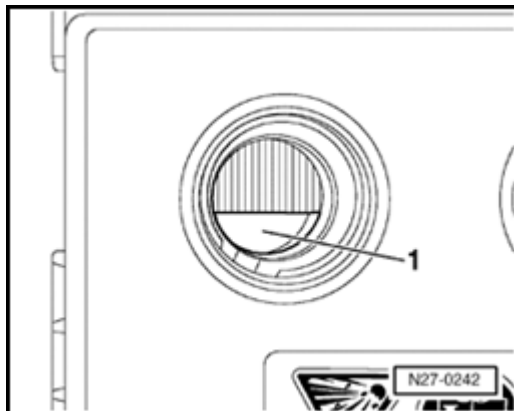
27-20



- First remove plastic foil from cell caps (if applicable), being sure not to disturb the safety warning label on battery.

- Unscrew cell caps -2-.

- Look into individual battery cells to determine electrolyte level.



- Electrolyte level must align with the internal electrolyte level indicator (lip) -1-. This corresponds to the external "maximum" marking on the battery case.

Note:

On batteries with black housings, obtain accurate electrolyte level readings by illuminating the cells with a flashlight.

Electrolyte level too low ⇒ [Page 27-21](#)

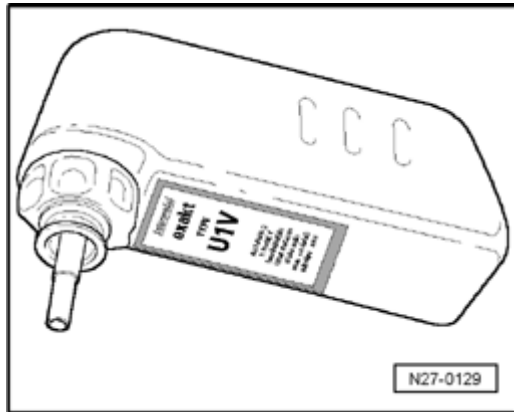
Electrolyte level too high ⇒ [Page 27-22](#)

Electrolyte level too low

- Fill with distilled water using battery filling VAS 5045 (or equivalent) up to the max. marking

Note:

Design of filler support on filling bottle VAS prevents overfilling of battery cells and subsequent electrolyte leaks. When max. level is reached flow of distilled water into battery cells stops.



CAUTION!

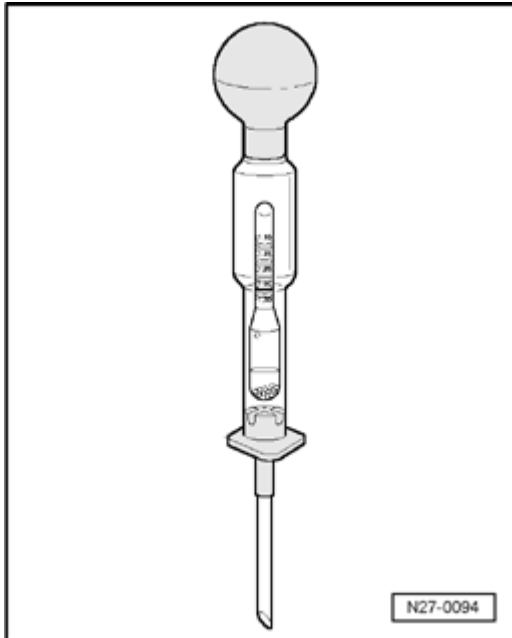
- ◆ **Only use distilled water to top-up battery. This prevents electrolyte impurities which cause self-discharging.**
- ◆ **DO NOT overfill the battery**
- ◆ **Overfilled batteries can boil over.**
- ◆ **Too little electrolyte reduces the service life of the battery.**
- ◆ **Use use of genuine VW battery cell caps ensures the different battery cover systems are sealed correctly. Only use genuine caps of the same construction if lost or damaged. All cell caps must be equipped with an O-ring seal.**

Note:

If it becomes necessary to top up the battery with distilled water, always perform battery test afterwards ⇒ [Page 27-30](#) .

Electrolyte level too high

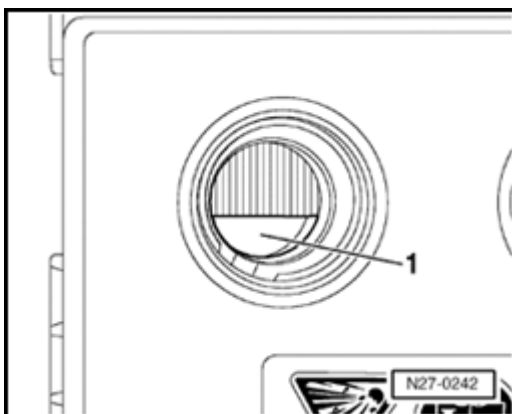
Special tools and auxiliary items needed



- ◆ Commercially available hydrometer

WARNING!

- ◆ **Refer to Warnings and Safety Measures ⇒ [Page 27-4](#) .**
- ◆ **If electrolyte level is too high, electrolyte (sulfuric acid/water mixture) may leak out and damage the surrounding area, i.e.: plenum and engine compartment.**
- ◆ **Excess electrolyte MUST be extracted using a hydrometer**
- ◆ **Dispose of electrolyte (sulfuric acid) properly! Waste electrolyte must only be disposed of in appropriate waste disposal sites. Refer to local regulations pertaining to electrolyte disposal.**
- Remove cell caps from cells with excess electrolyte.
- Extract excess electrolyte using hydrometer until electrolyte level is lowered to internal level indicator -1- or external maximum marking.



CAUTION!

Use use of genuine VW battery cell caps ensures the different battery cover systems are sealed correctly. Only use genuine cell caps of the same construction if lost or damaged. All cell caps must be equipped with an O-ring seal.

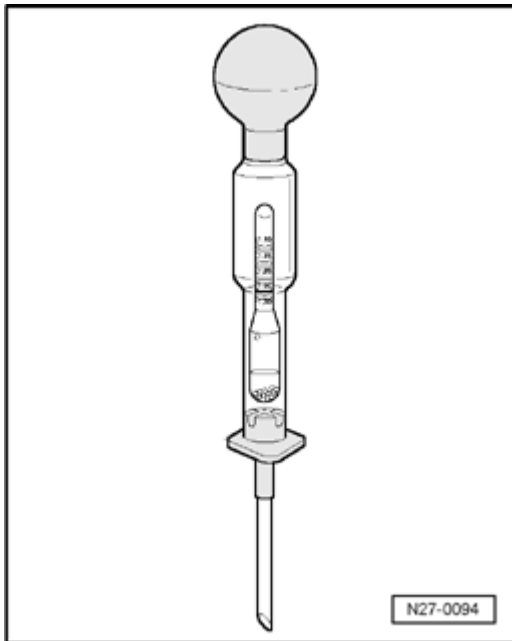
Specific gravity, checking

WARNING!

- ◆ **Prior to handling or servicing batteries understand and observe the Warning and Safety Measures for lead-acid batteries Page 27-4 .**
- ◆ **Dispose of electrolyte (sulfuric acid) properly! Waste electrolyte must only be disposed of in appropriate waste disposal sites. Refer to local regulations pertaining to electrolyte disposal.**
- ◆ **The following notes and procedures must be followed to ensure correct measurement.**

Special tools and auxiliary items needed

- ◆ Commercially available hydrometer
- ◆ Shop rags



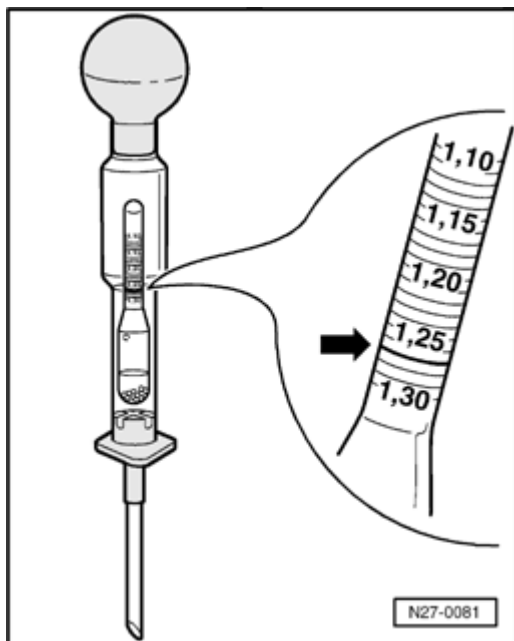
Notes:

- ◆ *Checking specific gravity shortly after top up with distilled water will result in erroneous readings. Charge battery after topping up distilled water, then check specific gravity.*
- ◆ *Minimum battery temperature of 10 ° C (F) is required when carrying out specific tests.*
- ◆ *Specific gravity of all cells must be checked.*

CAUTION!**Before beginning repairs on the electrical system**

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove all battery cell caps.



- Dip end of hydrometer into cell and extract sufficient electrolyte to allow indicator float to swim freely (the greater the electrolyte density in kg/dm³, the higher the indicator float position). Note each cell's specific gravity reading from float -arrow-. Repeat sequence until all cells checked.

- Review noted values and compare with values in table below:

Charge condition (normal climate)	Specific gravity in kg/dm ³
Discharged	1.15
Half charged	1.22
Fully charged	1.28

- Electrolyte density must be at least 1.24kg/dm³
- If specific density is too low, charge battery and recheck specific density afterwards.
- Electrolyte density must not vary more than 0.04kg/dm³ between cells.

Examples of unacceptable variations in specific gravity:

Specific gravity variations per cell in kg/dm ³						
Cell Number:	1	2	3	4	5	6
Example 1:	1.24	1.25	1.25	1.10	1.24	1.25
Example 2:	1.26	1.26	1.25	1.14	1.18	1.24

Example 1: Specific gravity in cell 4 (1.10) is too low.

Example 2: Specific gravity in cells 4 (1.10) and 5 (1.18) are too low and variation between cells exceeds 0.04kg/dm³.

If specific gravity specifications are not met, replace battery.

If specific gravity specifications are met, reinstall cell caps.

CAUTION!

Only the use of genuine VW battery cell caps ensures the different battery cover systems are sealed correctly. Only use genuine cell caps of the same construction if lost or damaged. All cell caps must be equipped with an O-ring seal.

No load voltage, checking

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety Measures for lead-acid batteries ⇒ [Page 27-4](#) .

The no load voltage test determines the performance capacity of the battery.

Note:

Battery to be tested must not have been charged or discharged for at least 2 hours before testing. Charging or discharging within two hours prior to performing test will result in erroneous results.

No Load Voltage	Charge Condition	Battery Condition
11.70 V	0 %	Discharged. Performance capacity diminished. Charging totally discharged batteries ⇒ page 27-37 .
12.20 V	50 %	Battery will begin to sulfate over time. Initial sulfating can be reversed by charging battery. Batteries allowed to sulfate for long periods of time become damaged internally.
12.35 V	65 %	<ul style="list-style-type: none"> ◆ Batteries with charge indicator: Indication changes from green to black. ◆ On new/inventory vehicles, battery should be charged.
12.70 V	100 %	Battery at full performance capacity.



Special tools and auxiliary items needed

- ◆ Multimeter VAG 1526 B, VAG 1526A, Fluke 83, Volt-Amp tester Sun VAT 40 or equivalent.

CAUTION!

Before beginning repairs on the electrical system

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- Disconnect battery ⇒ from ⇒ [Page 27-39](#) .
- Wait for a minimum of two hours. Battery must not be either charged or discharged during this time.
- Check voltage between battery terminals with voltmeter.

No load voltage	Actions required
$\geq 12.5 \text{ V}$	No load voltage OK. Perform battery test ⇒ Page 27-30 .
$< 12.5 \text{ V}$	Charge battery ⇒ page 27-34 .

If the battery requires charging as a result of the no load voltage test, proceed as follows:

- Wait for a minimum of two hours after charging. Battery must not be either charged or discharged during this time.

- Check voltage between battery terminals with voltmeter.

- No load voltage below 12.5 volts: Replace battery ⇒ from ⇒ [Page 27-52](#) .

Battery, testing

WARNING!

- ◆ **Prior to handling or servicing batteries, read, understand and observe the Warning and Safety Measures for lead-acid batteries ⇒ [Page 27-4](#) .**
- ◆ **Dispose of electrolyte (sulfuric acid/water mixture) properly! Waste electrolyte must only be disposed of in appropriate waste disposal sites. Refer to local regulations pertaining to electrolyte disposal.**
- ◆ **DO NOT battery test batteries which are gassing. Otherwise there is a risk of explosion.**
- ◆ **The following notes and procedures must be followed to ensure correct measurements.**

Notes:

- ◆ *In order to better determine a battery's overall condition, it is recommended to always perform the battery test in conjunction with the electrolyte specific gravity test ⇒ [Page 27-23](#) .*
- ◆ *Always follow the battery tester operating instructions.*
- ◆ *It is not necessary to remove battery from vehicle or disconnect battery terminals.*

Special tools and auxiliary items needed

- ◆ Battery Test Kit Midtronics MCR 340V

CAUTION!**Before beginning repairs on the electrical system**

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- Connect tester cable clamps to battery terminal
⇒ MCR 340V Instruction Manual Tester leads must be securely fastened and make proper contact with the battery posts.
- ◆ Clamps must have a good contact with battery terminals.
- Set tester to "Warranty Test" ⇒ MCR 340V Instruction Manual.
- Perform battery battery test by setting load current on tester according to battery (DIN) capacity ⇒ MCR 340V Instruction Manual.

Note:

Use print function of MCR 340V where test results are required for warranty claims.

Battery test results

Battery tester display / print-out	Required action
Good Battery	none
Good - Recharge	Charge battery where necessary ¹⁾ ⇒ Page 27-34
Use inCHARGE	Charge battery ¹⁾ ⇒ Page 27-34
Replace Battery	Replace battery ²⁾
Bad Cell - Replace	Replace battery ²⁾

1) Repeat battery battery test after recharging battery.

2) Replace battery with fastened fuse holder ⇒ [Page 27-52](#)

2) Replace battery with clipped fuse holder ⇒ [page 27-56](#)

A battery is in good condition if the voltage measured by the tester during the battery test drops gradually and does not fall below a specified value. The rate of decrease varies and depends on the battery capacity and cold cranking amp rating ("cold cranking amps" is the rated ability of the battery to perform at low temperatures and with high loads i.e.: high compression engines).

A battery is either faulty or in a low state of charge if the voltage measured during the battery test drops quickly and falls below the specified voltage.

After performing the battery test, a faulty battery will remain below the specified voltage and may only recover very slowly over a long period of time. The no load voltage (⇒ [Page 27-27](#)) is never reached.

Such batteries no longer have sufficient reserve and load capacity and must be replaced.

Battery, charging

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety measures for lead-acid batteries ⇒ [Page 27-4](#) .

Battery charger, connecting

WARNING!

Danger of explosion!

- ◆ ***Batteries produce explosive gasses while being charged.***
- ◆ ***Keep open flames and sparks away and DO NOT smoke near batteries.***
- ◆ ***The battery charger MUST be turned off when connecting or disconnecting the cables at the battery.***
- ◆ ***Battery cell caps must NOT be removed while charging.***
- ◆ ***"Boosting" a sulfated battery a high charging rate can cause an explosion.***
- ◆ ***Ensure that battery is charged in a well ventilated area.***
- ◆ ***Precision tools must not be kept in the same room where batteries are being charged. Tools may corrode due to chemical reaction.***

CAUTION!

In order to prevent damage to the battery or vehicle, observe battery type descriptions and notes ⇒ [Page 27-3](#).

Special tools and auxiliary items needed

- ◆ Battery Charging Station: Midtronics INC-940

Notes:

- ◆ *Before charging, battery must have a minimum temperature of 10 ° C (50 ° F)*
- ◆ *It is not necessary to remove battery from vehicle or disconnect battery terminals.*
- ◆ *Charging voltage must not exceed 14.4V.*
- ◆ *Always follow the battery charger operating instructions*
- ◆ *After charging, confirm battery no load voltage and electrolyte specific gravity before reuse in vehicle.*

CAUTION!

Before beginning repairs on the electrical system

- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***

- Connect battery charger to battery, positive to positive (+), negative to negative (-).
- Switch on battery charger.
- Adjust charging rate according to battery capacity (refer to charger instructions).

WARNING!

If battery begins gassing (boiling) violently when charging, REDUCE charging rate immediately.

Charging totally discharged batteries

Batteries that have not been used for long periods of time begin to self discharge (e.g. vehicles in storage). Under these conditions, the battery begins to sulfate and the surface area of the battery plates hardens. A battery is considered to be totally discharged if the no load voltage is below 11.6 volts. No load voltage, checking ⇒ [Page 27-27](#) .

On totally discharged batteries, the electrolyte (sulfuric acid/water mixture) is almost all water. When these batteries are exposed to freezing temperatures, permanent damage to the battery plates (and housing) results.

If a totally discharged battery is charged quickly ("quick charged" or "boost charged"), only a surface charge is accepted (if at all). The battery may even test OK immediately after charging. However, in this case the sulfating process continues inside the battery. Once a battery begins to sulfate, it's ability to further accept a routine charge (from the Generator) and provide adequate load and reserve performance will diminish until the battery malfunctions.

Totally discharged batteries must only be slow charged and re-tested.

- Apply a maximum charge current that is no more than 10% of battery capacity, e.g.: for a 60Ah battery, max. charge current = 6 amps.
- Charge a totally discharged battery for a minimum of 24 hours.

CAUTION!

Never "quick charge" a totally discharged battery. Effective charging will not take place, despite what appears to be a sufficient voltage applied. Batteries loaded in this manner may be incorrectly evaluated as OK and battery damage may result.

Battery, disconnecting and reconnecting

Battery with fastened fuse holder, disconnecting and reconnecting

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety measures for lead-acid batteries ⇒ [Page 27-4](#) .

CAUTION!

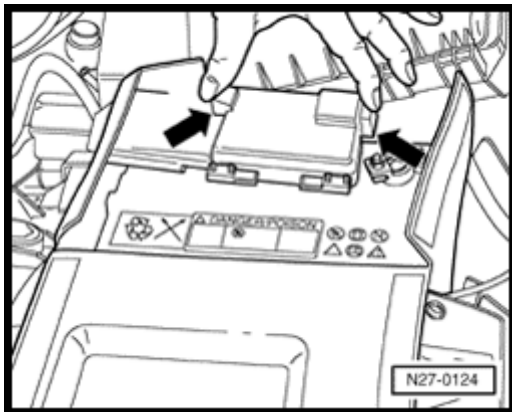
- ◆ ***Always ensure the vehicle electrical system is protected by disconnecting the battery negative (-) terminal (interrupted current flow to ground) prior to servicing key areas of the electrical system as specified in this Repair Manual.***
- ◆ ***Do not loosen or remove ground strap from body. Disconnect terminal from battery only.***
- ◆ ***Disconnecting the battery positive (B+) terminal must only be performed as required to remove battery from vehicle, and must only be carried out after the negative (-) terminal is disconnected.***
- ◆ ***When reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified in this Repair Manual.***

Battery, disconnecting**CAUTION!**

- ◆ **Obtain anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Do not loosen or remove ground strap body. Disconnect terminal from batter**

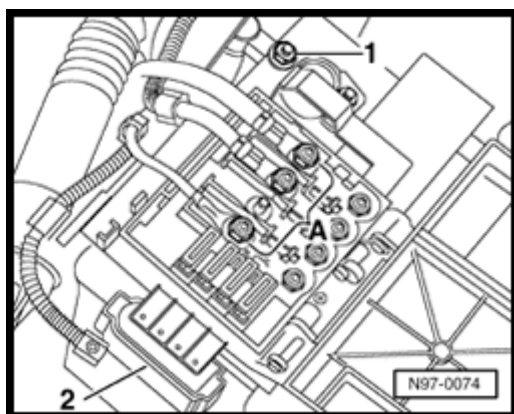
- First disconnect negative (-) terminal fro
battery.

In order to disconnect positive (B+) termin;
first remove fuse holder on top of battery:

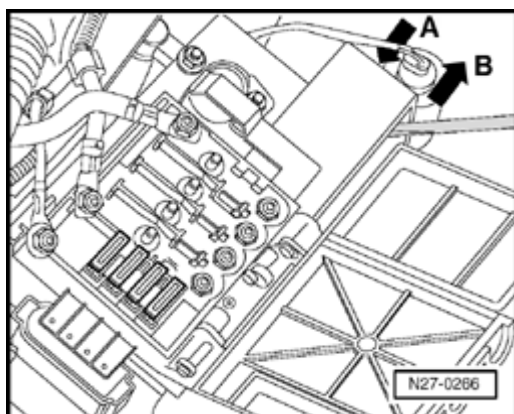


- Press locking lugs together -arrows- and
cover.

27-41

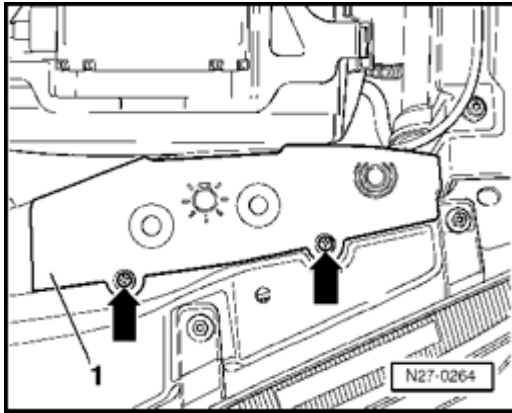


- Remove positive bus securing bolt -1- on (+) positive terminal clamp.
- Remove securing bolts -A- and remove cables to fuses, noting the installed positions.
- Disconnect electrical connection -2-.

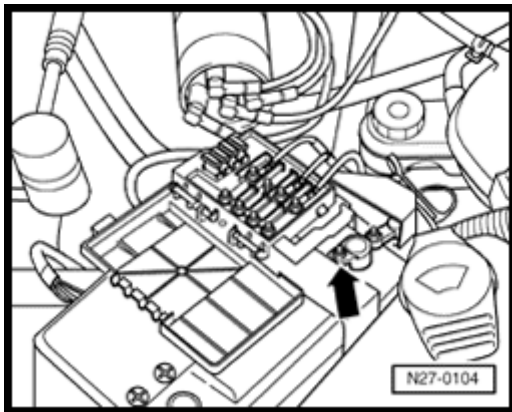


- Relieve tension on fuse holder mounting in direction of -arrow A- and release clip with screwdriver in direction of -arrow B-.
- Lift fuse holder from battery.

27-42



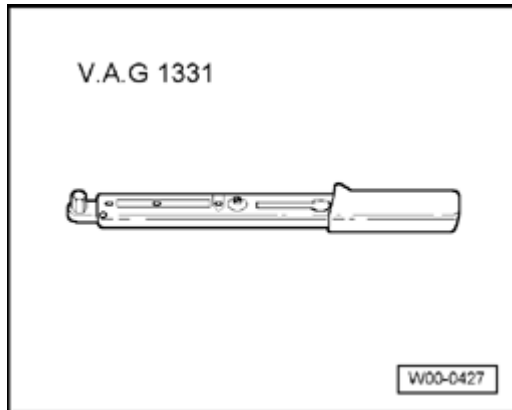
- If necessary, remove screws - arrows- and remove cover -1-.



- Release battery positive (B+) terminal clamp fastener -arrow- and remove terminal from battery post.

Battery, reconnecting

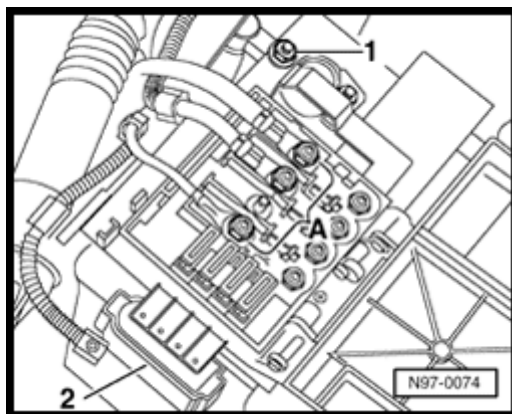
Special tools and auxiliary items needed



- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)

Notes:

- ◆ *In order to prevent damage to the battery housing, battery terminals must be placed on battery posts without using force (by hand only).*
- ◆ *Battery posts and terminals must no longer be greased.*
- Refit battery positive (B+) terminal on battery positive post.
- Torque positive (B+) terminal clamp fastener to 6 Nm.
- Fit fuse holder onto battery and install positive bus onto securing pins on battery positive terminal.
- Engage fuse holder clip in battery.



- Tighten securing bolt -1- for positive bus on positive (+) terminal clamp.
- Connect cables to strip fuses and tighten securing bolts -A-.

Note:

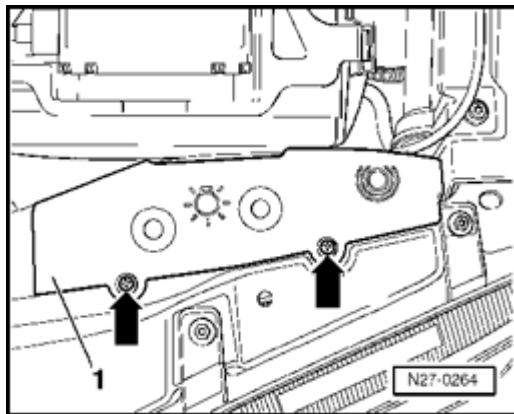
Refer to appropriate wiring diagram for installed positions of cables to fuses if necessary.

- Refit electrical connection -2-.

27-44

- Only after the fuse holder and positive (E terminal have been secured should the negative (-) terminal clamp be installed.

- Torque negative (-) terminal clamp fastener 6 Nm.



- If necessary, reinstall cover -1- with screws as shown by arrows.

- Perform work steps specified in table ⇒ [Table 27-51](#).

Battery with clipped fuse holder, disconnecting and reconnecting

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety measures for lead-acid batteries ⇒ [Page 27-4](#) .

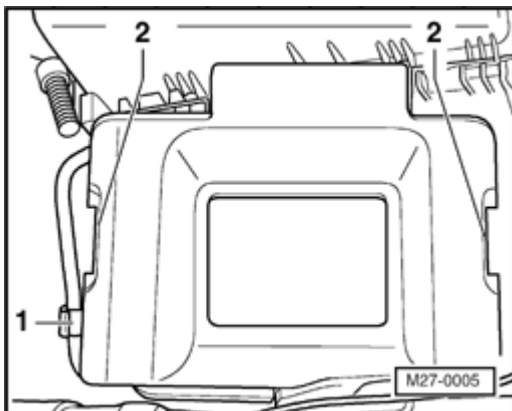
CAUTION!

- ◆ *Always ensure the vehicle electrical system is protected by disconnecting the battery negative (-) terminal (interrupted current flow to ground) prior to servicing key areas of the electrical system as specified in this Repair Manual.*
- ◆ *Do not loosen or remove ground strap from body. Disconnect terminal from battery only.*
- ◆ *Disconnecting the battery positive (B+) terminal must only be performed as required to remove battery from vehicle, and must only be carried out after the negative (-) terminal is disconnected.*
- ◆ *When reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified in this Repair Manual.*

Battery, disconnecting**CAUTION!**

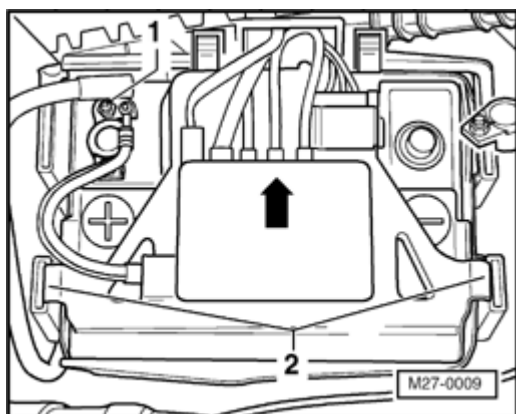
- ◆ **Obtain anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Do not loosen or remove ground strap body. Disconnect terminal from battery.**

First remove battery cover and fuse holder from battery:

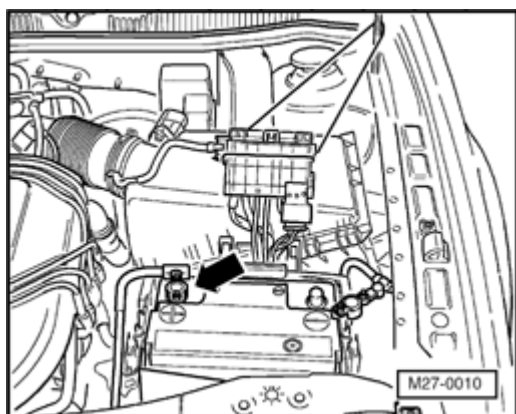


- Unclip battery positive cable from retaining bracket.
- Press locking lugs together -2- and lift/remove battery cover from battery.
- Disconnect negative (-) terminal from battery.

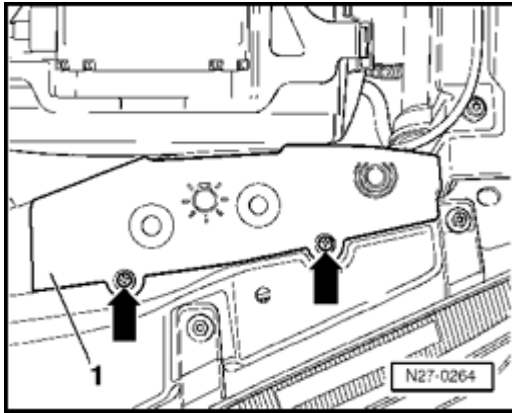
27-47



- Remove bolt -1- on positive (B+) terminal clamp.
- Unclip and lift/remove fuse holder mounting -2-.
- Slide fuse box out from mounting in direction of -arrow-.



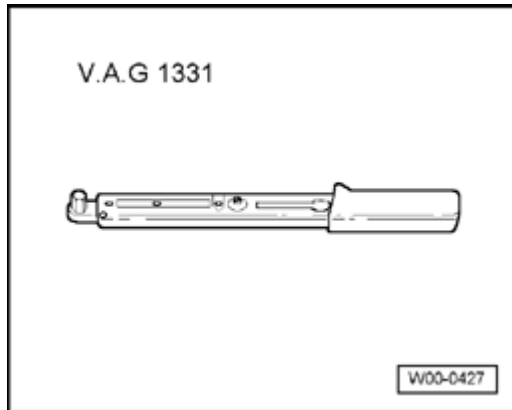
- Lift fuse box away from battery and secure to front hood support with elastic cord as illustrated.
- Release battery positive (B+) terminal clamp fastener -arrow- and remove terminal from battery post.



- if necessary, remove screws - arrows- and remove cover -1-.

Battery, reconnecting

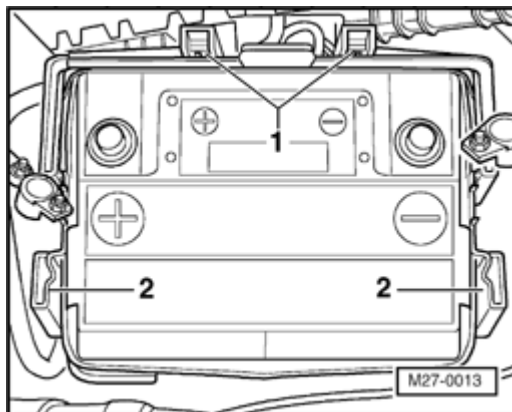
Special tools and auxiliary items needed



- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)

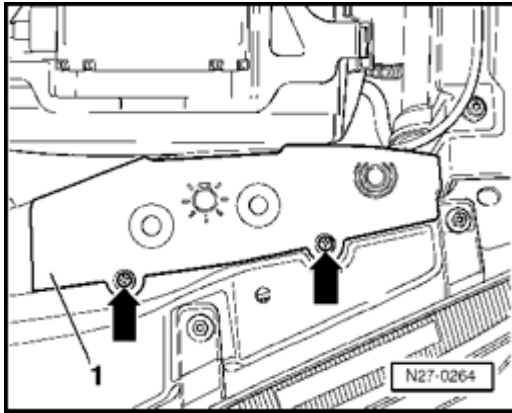
Notes:

- ◆ *In order to prevent damage to the battery housing, battery terminals must be placed on battery posts without using force (by hand only).*
- ◆ *Battery posts and terminals must no longer be greased.*
- Refit battery positive (B+) terminal on battery positive post.
- Torque positive (B+) terminal clamp fastener to 6 Nm.
- Release elastic cord from fuse holder and slide into mounting.



- Clip fuse holder mountings into battery box -1 and -2-
- Only after the fuse holder and positive (B+) terminal have been secured should the negative (-) terminal clamp be installed.
- Torque negative (-) terminal clamp fastener to 6 Nm.

27-50



- If necessary, reinstall cover -1- with screws -arrows-.
- Reinstall and secure battery cover.
- Clip positive cable into retainer.
- Perform work steps specified in table ⇒ [Page 27-51](#) .

Work steps required after reconnecting battery

Work steps	completed?
Ignition: Switch ignition on and then off again.	
Diagnostic Trouble Code (DTC) Memory: Check using VAS 5051 Tester in mode "Guided Fault Finding".	
Power windows (where applicable): Completely open and close all power windows.	
Radio: Input anti-theft radio code and check radio, CD & tape player functions as applicable.	
Clock: Check and reset to local time.	
All electrical consumers: Check function.	

Note:

If desired, print this page and use the table above as a checklist.

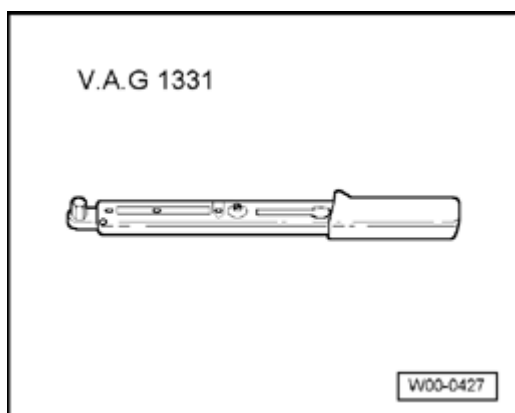
Battery, removing and installing

Battery with fastened fuse holder, removing and installing

WARNING!

Prior to handling or servicing batteries, read, understand and observe the Warning and Safety measures for lead-acid batteries ⇒ [Page 27-4](#).

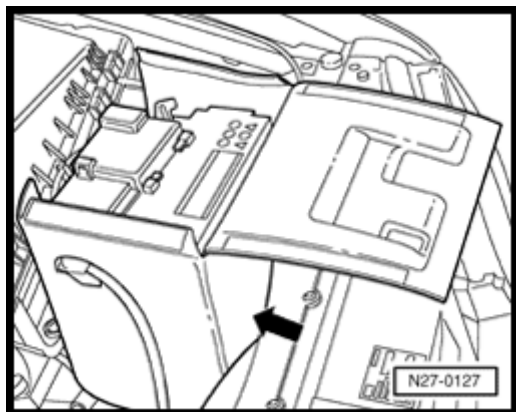
Special tools and auxiliary items needed



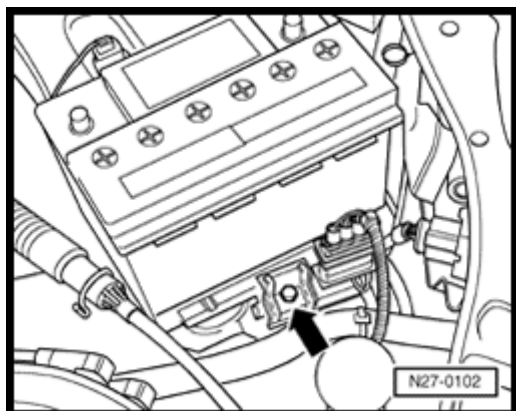
- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)

Battery, removing

- Disconnect battery ⇒ [Page 27-40](#) .



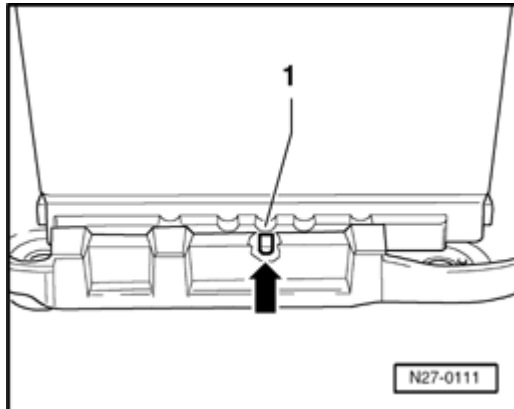
- ⚠ - Battery insulation jacket -arrow- can only be opened and removed (where applicable) after first removing battery terminal clamps from battery.



- ⚠ - Remove bolt -arrow-.
- Remove battery hold-down bracket.
- If present, disconnect central gas vent hose from top cover.
- Carefully lift battery from engine compartment.

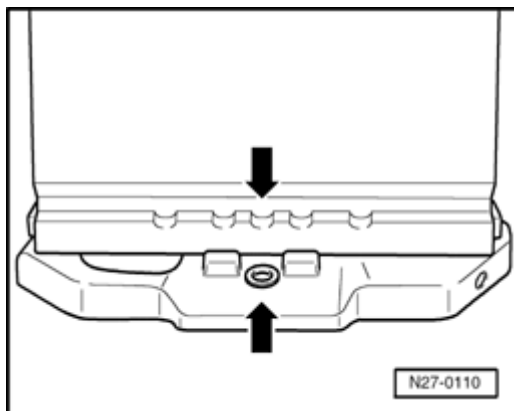
Battery, installing

To ensure battery seats securely, only install batteries with a 10.5 mm battery foot strip and adhere to the following work sequences:



- Install battery so battery carrier lug -arrow- engages in battery foot strip cut-out -1-.

It must not be possible to move a battery to the left or to the right.

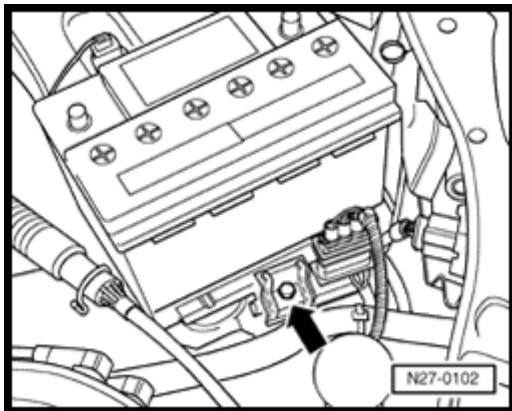


Battery is inserted correctly when center cut-out in battery foot strip aligns with threaded hole in battery carrier -arrows-.

- On batteries with a hose for central venting ensure that the hose is not squashed. Only then can the battery vent freely.
- On batteries without a hose for central venting ensure that the opening on the upper side of the battery cover is not blocked.

Note:

New generation batteries are equipped with a central gas venting system and integrated flame trap. Function: Gases produced during charging escape through a central opening on the side of the upper cover. The integrated flame trap prevents flammable gases in the battery from igniting. The flame trap is comprised of a small round fiberglass mat with a diameter of 15 mm and a thickness of 2 mm. Working as a one-way-valve, it allows gases produced during charging to vent.



- Install hold-down bracket with bolt (tightening torque: 25 Nm).
- Reinstall insulation jacket where applicable.
- Reconnect battery ⇒ [Page 27-43](#).

CAUTION!**Results of inadequately secured battery:**

- ◆ **Shorter battery service life due to vibration damage.**
- ◆ **Battery cell and plate damage.**
- ◆ **Electrolyte leakage due to battery case damage.**
- ◆ **Poor collision safety.**

Battery with clipped fuse holder, removing and installing

WARNING!

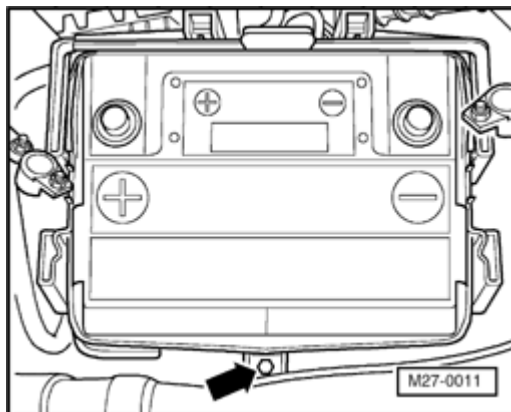
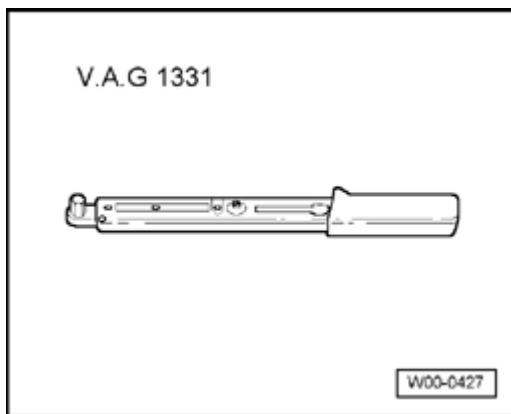
Prior to handling or servicing batteries, read, understand and observe the Warning and Safety measures for lead-acid batteries ⇒ [Page 27-4](#) .

Special tools and auxiliary items needed

- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)

Battery, removing

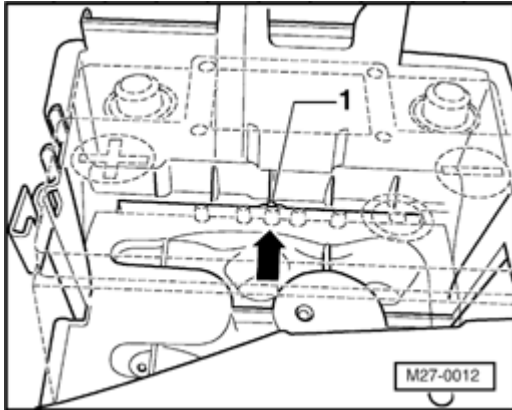
- Disconnect battery ⇒ [Page 27-46](#) .



- Remove bolt -arrow-.
- Remove battery hold-down bracket.
- If present, disconnect central gas vent hose from top cover.
- Carefully lift battery together with insulation from engine compartment.

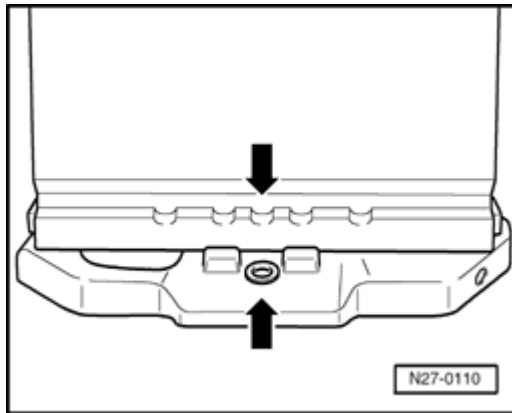
Battery, installing

To ensure battery seats securely, only install batteries with a 10.5 mm battery foot strip and adhere to the following work sequences:



- Install battery so battery carrier lug -arrow- engages in battery foot strip cut-out -1-.

It must not be possible to move a battery to the left or to the right.

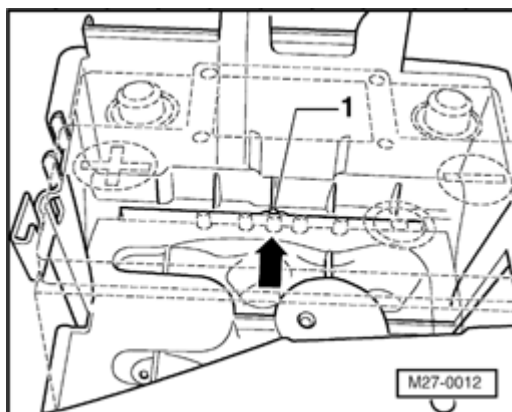


✦ Battery is inserted correctly when center cut-out in battery foot strip aligns with threaded hole in battery carrier -arrows-.

- On batteries with a hose for central venting ensure that the hose is not squashed. Only then can the battery vent freely.
- On batteries without a hose for central venting ensure that the opening on the upper side of the battery cover is not blocked.

Note:

New generation batteries are equipped with a central gas venting system and integrated flame trap. Function: Gases produced during charging escape through a central opening on the side of the upper cover. The integrated flame trap prevents flammable gases in the battery from igniting. The flame trap is comprised of a small round fiberglass mat with a diameter of 15 mm and a thickness of 2 mm. Working as a one-way-valve, it allows gases produced during charging to vent.



- ✦
- Install hold-down bracket with bolt (tightening torque: 25 Nm).
 - Reconnect battery ⇒ [Page 27-49](#) .

CAUTION!

Results of inadequately secured battery:

- ◆ **Shorter battery service life due to vibration damage.**
- ◆ **Battery cell and plate damage.**
- ◆ **Electrolyte leakage due to**

- battery case damage.***
- ♦ Poor collision safety.***

Batteries with central gas venting

Batteries with two different styles of central gas venting are installed:

- ◆ *Batteries with central gas vent hose*
- ◆ *Batteries without central gas vent hose*

CAUTION!

- ◆ ***Only new generation batteries with central gas venting are to be installed!***
- ◆ ***For proper function of central venting and flame trap, check vent hose (where applicable) for proper installation. Vent hose must NOT be disconnected or pinched.***
- ◆ ***Only the use of genuine VW battery cell caps ensures the different battery cover systems are sealed correctly.***
- ◆ ***Only use genuine VW cell caps of the same construction if lost or damaged.***
- ◆ ***Caps must be fitted with an O-ring seal.***

Battery, tightening torques

Location / Fastener	Tightening torque
Battery post terminals / nuts M6	6 Nm
Battery post terminals / additional terminal nuts M6	6 Nm
Battery hold-down bracket / bolt M8 X 25	25 Nm

Starter

General information

The following starters are installed:

through 03.00 production

- ◆ 4-cylinder gasoline engines: 12 V - 1.1 kW
- ◆ 2.8L gasoline engine: 12 V - 2.0 kW
- ◆ 4-cylinder TDI engine: 12 V - 2.0 kW

from 04.00 production

Modified starters are installed on TDI engines:

- ◆ Vehicles with manual transmission: 12 V - 2.0 kW
- ◆ Vehicles with automatic transmission: 12 V - 2.4 kW

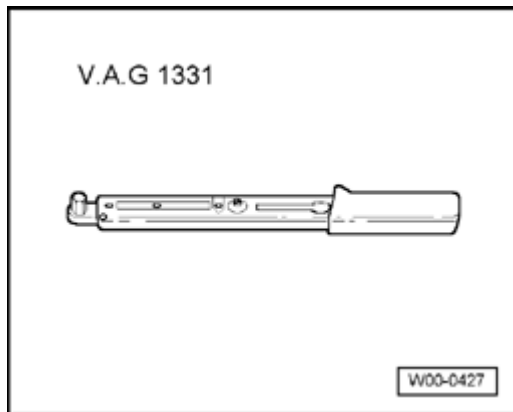
Refer to Parts Catalog for up-to-date replacement applications.

Starter, removing and installing

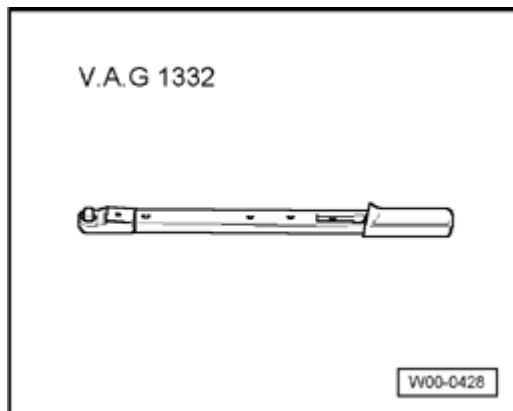
CAUTION!

Before beginning repairs on the electrical system:

- ◆ ***Obtain the anti-theft radio security code.***
- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***
- ◆ ***Disconnect negative (-) battery terminal.***
- ◆ ***When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified in this Repair Manual ⇒ [Page 27-39](#) .***

Special tools and auxiliary items needed

- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)



- ◆ VAG 1332 Torque wrench (or equivalent 40 - 200 Nm)

Vehicles with manual transmission or automatic transmission 01M ⇒ [Page 27-64](#) .

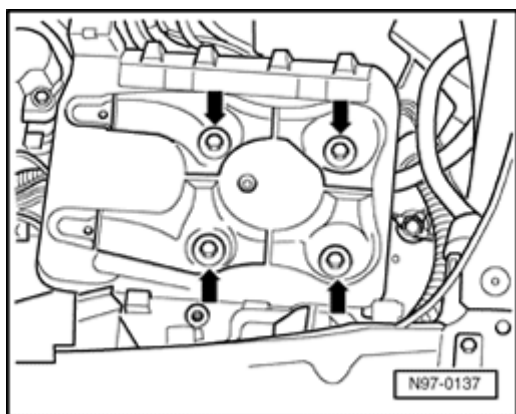
Vehicles with automatic transmission 09A ⇒ [Page 27-67](#) .

27-64

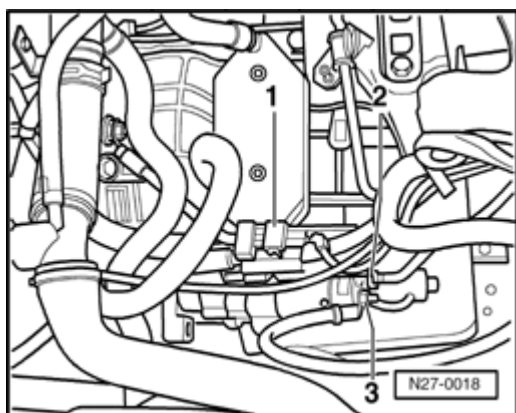
Starter - vehicles with manual transmission or automatic transmission 01M, removing

- Remove battery with fastened fuse holder [Page 27-52](#) .

- Remove battery with clipped fuse holder [27-56](#) .



- Remove bolts -arrows- and remove battery carrier.



- Disconnect electrical connection -1- and from retainer.

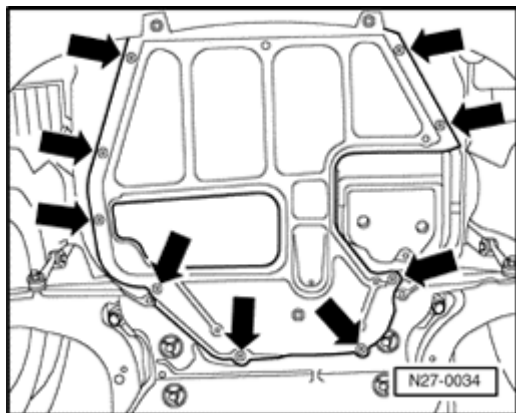
- Disconnect electrical connection at terminal connector -2-.

- Remove nut from solenoid terminal 3 and remove cable.

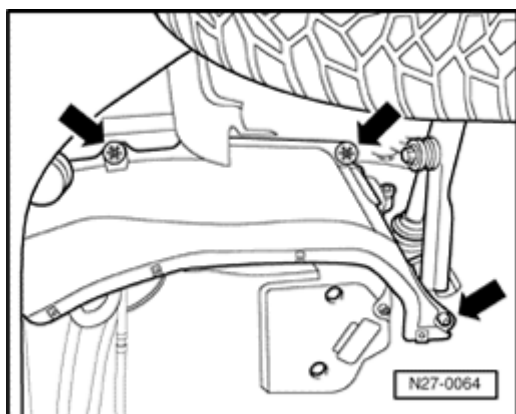
- Remove wiring from wiring guides.

- Remove wiring guides.

27-65

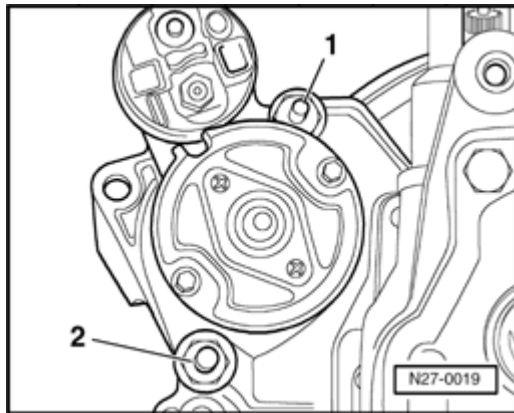


- Remove bolts -arrows- and remove middle cover of engine compartment noise insulation.



- Remove nut, unclip securing clips -arrows- and remove left-hand engine compartment section of noise insulation.
- Remove brackets/retainers for power steering pressure pipes/hoses and place to side.

27-66



- Remove bolts -1- and -2-.
- Take starter out downward.

Installing

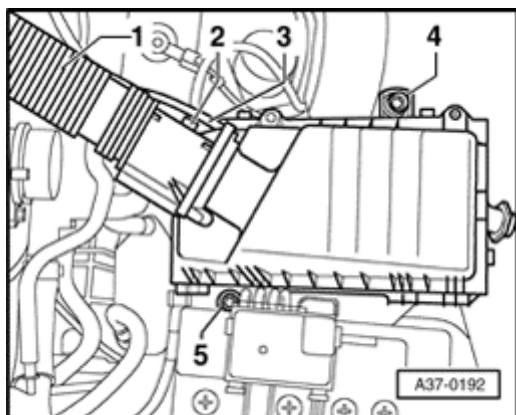
Install in reverse order of removal, noting the following:

- Install and torque all starter bolts and terminal nuts to values specified in table ⇒ [Page 27-70](#) .
- When reinstalling battery, torque all bolts and terminal nuts to values specified in table ⇒ [Page 27-60](#) .

**Starter - vehicles with automatic transmi
09A, removing****Note:**

*Components in engine compartment may a
different than illustrated. Removal procedur
applies.*

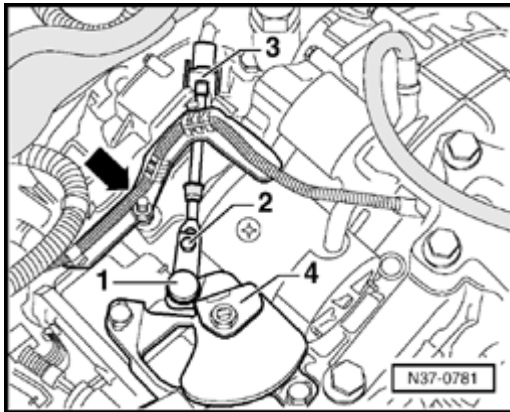
- Remove engine cover.
- Disconnect battery (note fuse holder type
[Page 27-39](#) .



- Remove intake hose -1- and disconnect
electrical connection -2-.
- Remove hose -3- from Mass Air Flow (M
Sensor where applicable.
- Remove hose from air filter housing to
secondary air injection pump where appli
- Remove screws -4- and -5- and remove
housing.

Note:

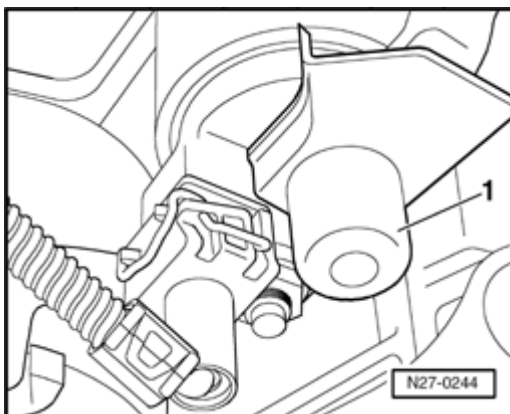
Starter can be removed without prior removal of battery and battery mounting. For clarity, the following illustrations show the battery removed.



- Remove bracket -arrow- from transmission.
- Ensure transmission selector is in "Park" and pry shifter cable end - 1- from shifter lever -4- using screwdriver.
- Unclip shifter cable from holder - 3- lift out shifter cable and set aside.

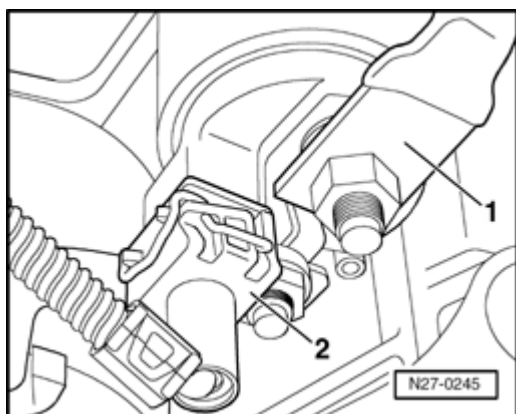
CAUTION!

- ◆ **Do not remove screw -2-.**
- ◆ **Do not kink shifter cable.**

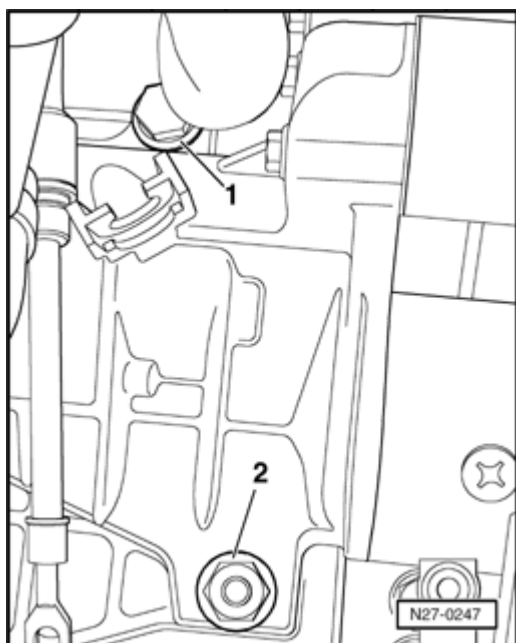


- Remove plastic cap -1- from solenoid.

27-69



- ✦ - Remove nut at solenoid terminal 30 and remove cable -1-.
- Disconnect electrical connection at starter terminal 50 -2-.



- ✦ - Remove bolts -1- and -2-.
- Lift starter up and out from transmission.

Installing

Install in reverse order of removal, noting the following:

- Install and torque all starter bolts and terminal nuts to values specified in table ⇒ [Page 27-70](#) .
- When reconnecting battery, torque terminal nuts to values specified in table ⇒ [Page 27-60](#) .

Starter, tightening torques

Location / Fastener	Tightening torque
Battery carrier / bolts	6 Nm
Starter terminal 30 / nut	13 Nm
Starter to engine block / bolt	65 Nm

Generator (GEN)

General information

CAUTION!

Before beginning repairs on the electrical system:

- ◆ ***Obtain the anti-theft radio security code.***
- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***
- ◆ ***Disconnect negative (-) battery terminal.***
- ◆ ***When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified in this Repair Manual ⇒ [Page 27-39](#) .***

Note:

Generator (GEN), checking:

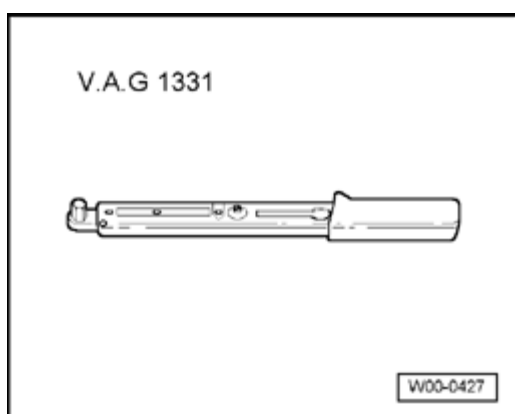
⇒ *Wiring Diagrams & Troubleshooting Procedures*

Generator (GEN) through 04.99

Generator (GEN) B+ & D+ connections, securing

Various D+ terminal connector configurations exist on installed generators.

Special tools and auxiliary items needed



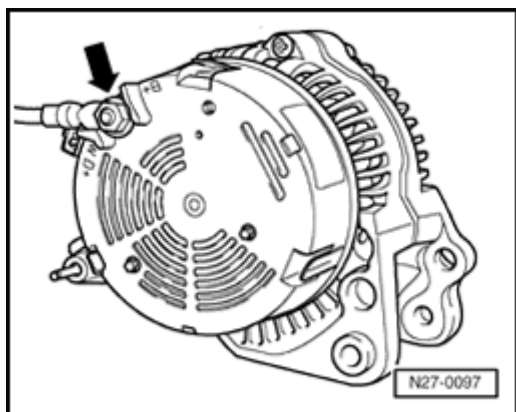
- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)

CAUTION!

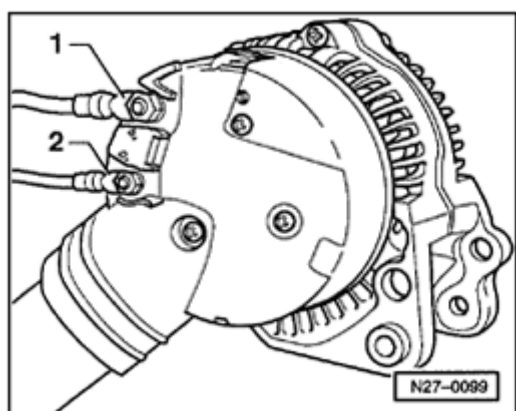
If the B+ or D+ terminal nut is not torqued as specified, the following may result:

- ◆ ***Battery will not be completely charged***
- ◆ ***Vehicle electrical system malfunctions***
- ◆ ***Danger of sparking***
- ◆ ***Damage to electronic components and control modules due to voltage spikes***

27-73

Generator with D+ terminal plug connection

- ⚡ Tightening torque for B+ terminal securing nut -arrow-: 15 Nm \pm 1 Nm.

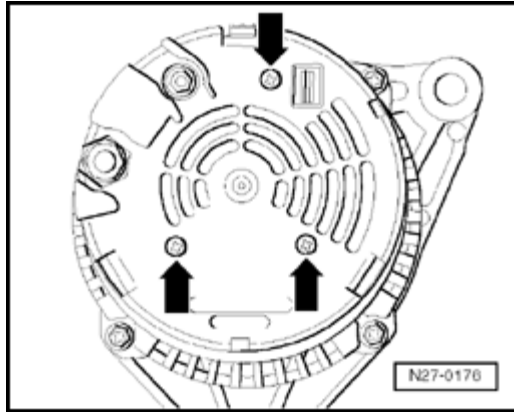
Generator with D+ terminal nut connection

- ⚡ Tightening torque for B+ terminal securing nut -1 (M8): 15 Nm \pm 1 Nm.

Tightening torque for D+ terminal securing nut -2- (M5): 3 Nm.

27-74

Voltage Regulator (VR), removing and installing

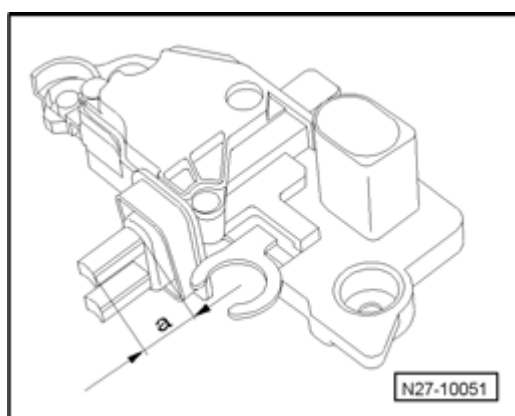


- Remove screws -arrows- and protection cover.
- Remove screws at voltage regulator and remove voltage regulator.
- Install in reverse order of removal.

Generator (GEN) carbon brushes, checking

Note:

Carbon brushes are integrated with the Voltage Regulator (VR) and cannot be replaced or serviced separately. Where carbon brushes malfunction or are worn beyond the wear limit, replace complete Voltage Regulator (VR).



◀ Length of new carbon brushes - a - = 12mm

Wear limit = 5mm

Carbon brush tolerance to one another = +1mm

Generator (GEN) from 05.99

General information

Compact generators are installed beginning with m.y. 2000. These units have new structures and terminal assignments.

External characteristics of new compact generators that differ from the previously used generators, include:

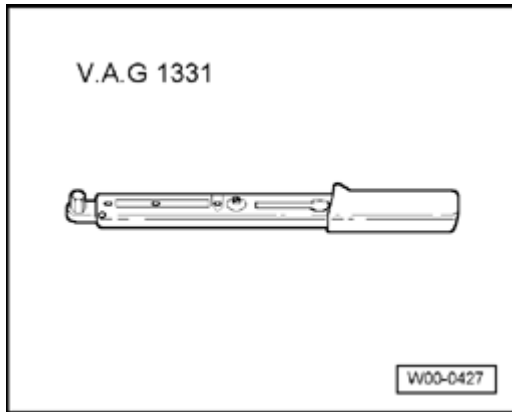
- ◆ modified Voltage Regulator (VR)
- ◆ oval, radially sealed connector mount for the 2-pin connector housing in place of the previous, angular 2-pin plug connection
- ◆ modified terminal assignments at connections

⇒ *Wiring Diagrams*

27-77

Generator (GEN) B+ & D+ connections, securing

Special tools and auxiliary items needed



- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)

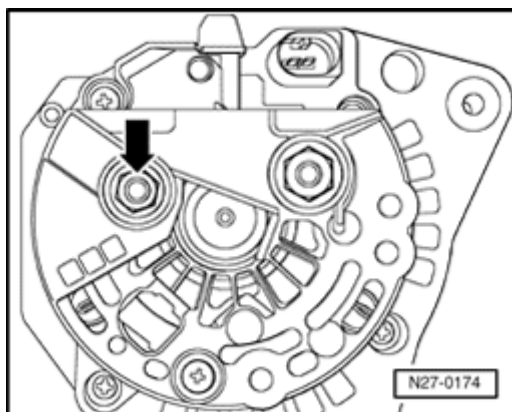
CAUTION!

If the B+ or D+ terminal nut is not torqued as specified, the following may result:

- ◆ ***Battery will not be completely charged***
- ◆ ***Vehicle electrical system malfunctions***
- ◆ ***Danger of sparking***
- ◆ ***Damage to electronic components and control modules due to voltage spikes***

Note:

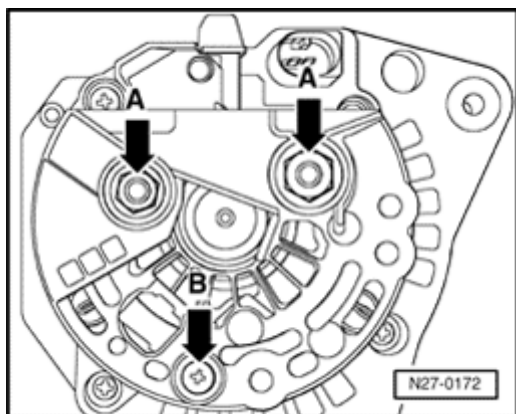
Screw connection for the B+ wire at compact generator is labeled B1+!



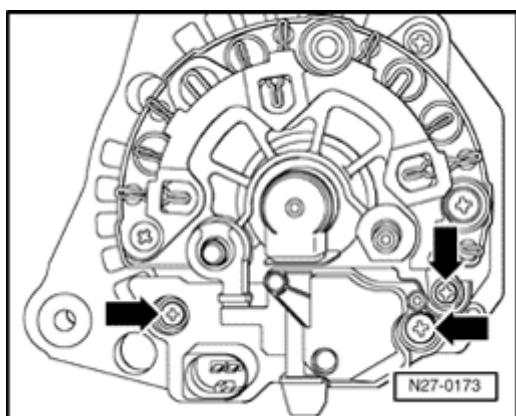
- ◆ The tightening torque for the B+ wire -arrow- securing nut is 15 Nm.

27-78

Voltage Regulator (VR), removing and installing



- ✦ - Remove mounting nuts (arrows - A-) and mounting bolt (arrow -B-) of protective cap.
- Remove protective cap.

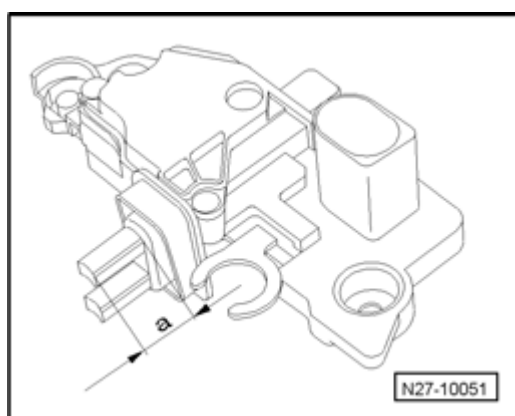


- ✦ - Remove mounting bolts (arrows) of Voltage regulator (VR) and remove Voltage regulator (VR) .

Generator (GEN) carbon brushes, checking

Note:

Carbon brushes are integrated with the Voltage Regulator (VR) and cannot be replaced or serviced separately. Where carbon brushes malfunction or are worn beyond the wear limit, replace complete Voltage Regulator (VR).



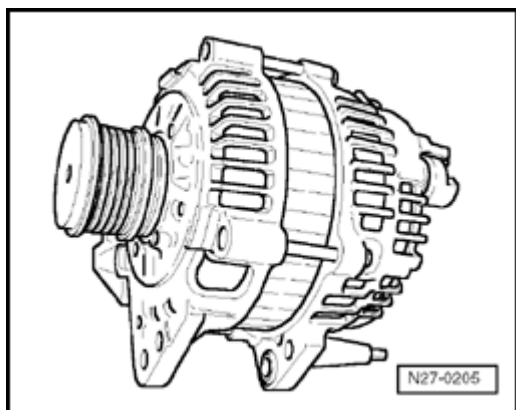
◀ Length of new carbon brushes -a- = 12mm

Wear limit = 5mm

Carbon brush tolerance to one another = +1mm

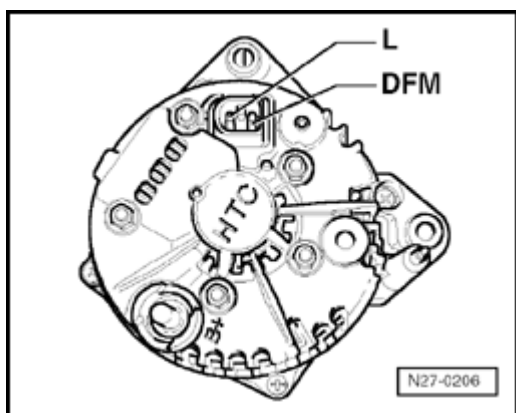
27-80

Generator (GEN) from 06.00



- Revised compact generators are installed as a running change beginning with m.y. 2001.

Terminal designations are maintained as with previous models.



- These generators have no removable protective cap and the voltage regulator can no longer be replaced.

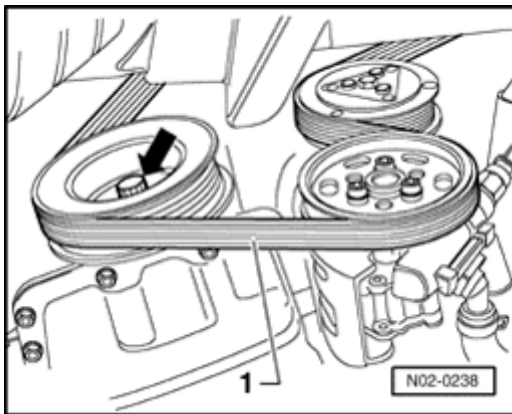
If the voltage regulator malfunctions, the complete generator must be replaced.

Ribbed belt, checking

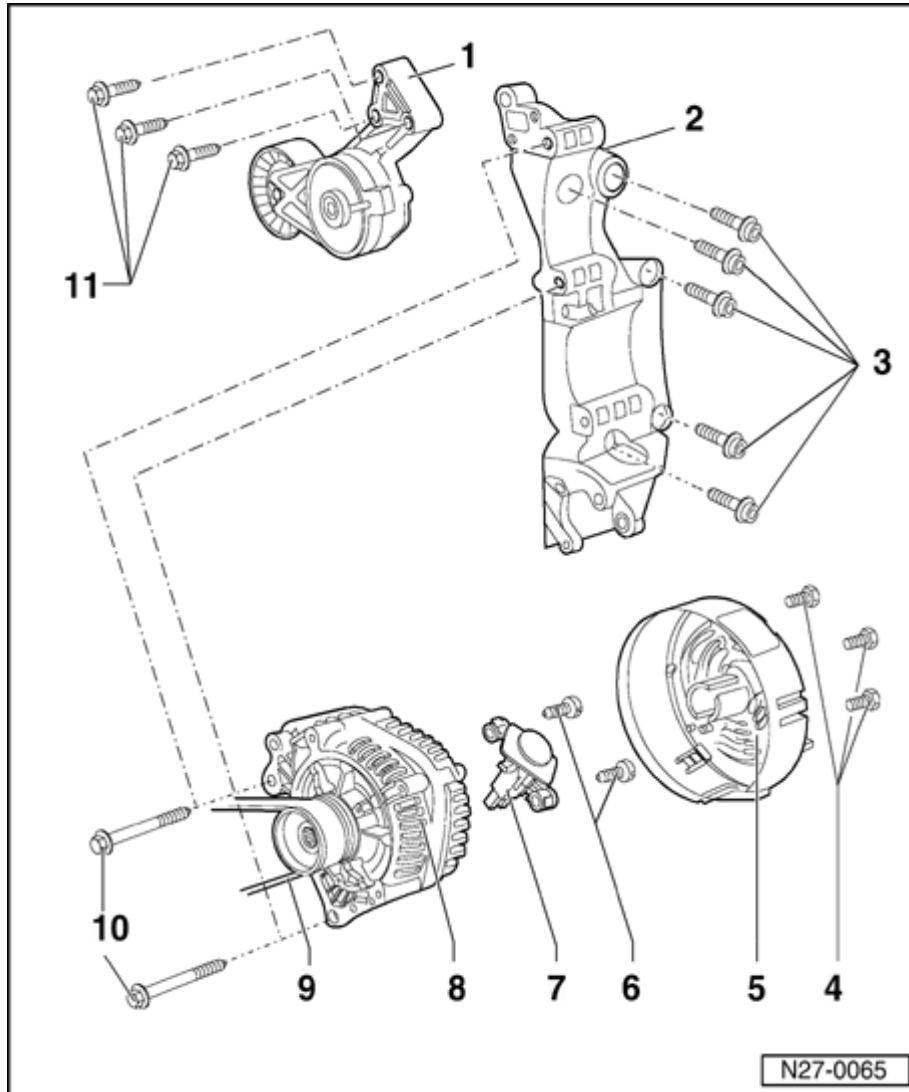
CAUTION!

Always replace ribbed belt if found to be faulty. This will avoid related failures or operating problems.

- Lift vehicle and check condition of ribbed



- Crank engine by hand at vibration dampener/pulley -arrow-. Check ribbed b
 - ◆ Sub-surface cracks (cracks, core rup cross sectional breaks)
 - ◆ Layer separation (top layer, cord stra
 - ◆ Base break-up
 - ◆ Fraying of cord strands
 - ◆ Flank wear (material wear, frayed flar flank brittleness -glassy flanks-, surfa cracks)
 - ◆ Traces of oil and grease



Generator (GEN) - 4-cylinder gasoline engines

4-cylinder gasoline engines through 04.99, assembly

1 - Tensioner

2 - Bracket

3 - Hex socket bolts

◆ M10 x 45mm

◆ 45 Nm

4 - Hex bolts

◆ M3 x 18mm

5 - Protective cap

6 - Screws

◆ M4 x 25mm

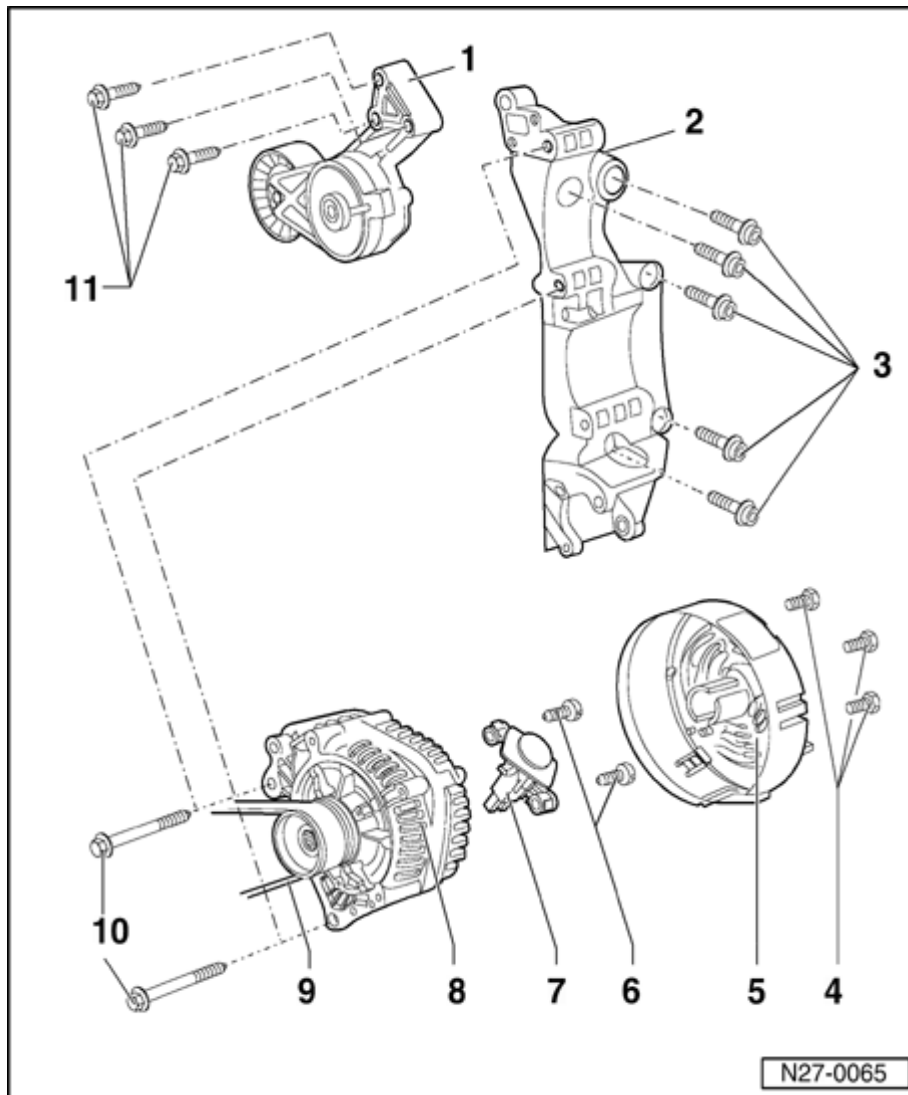
7 - Voltage Regulator (VR)

◆ Removing and installing
⇒ [Page 27-74](#)

◆ Checking carbon

brushes
⇒ [Page
27-75](#)

27-83



8 Generator - (GEN)

- ◆ Tightening torque of B+ wire to generator ⇒ [Page 27-72](#) .

9 - Ribbed belt

- ◆ Removing and installing ⇒ [Page 27-86](#)

- ◆ Ribbed belt routing ⇒ [Page 27-91](#)

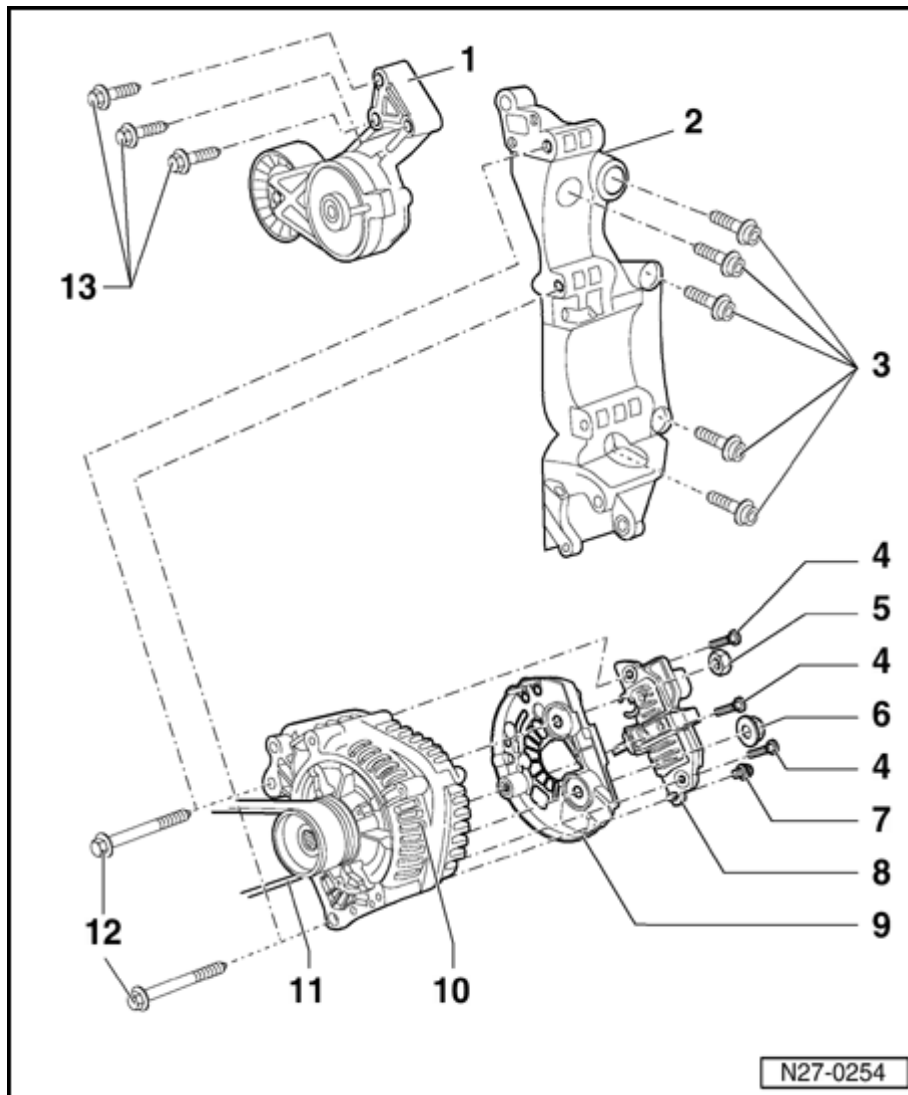
10 - Hex bolts

- ◆ M8 x 85mm
- ◆ 25 Nm

11 - Hex bolts

- ◆ M8 x 45mm
- ◆ 25 Nm

27-84



4-cylinder gasoline engines from 05.99, assembly

1 - Tensioner

2 - Bracket

3 - Hex
socket
bolts

◆ M10 x
45mm

◆ 45
Nm

4 - Screws

5 - Nut

◆ M8

6 - Nut

◆ M8

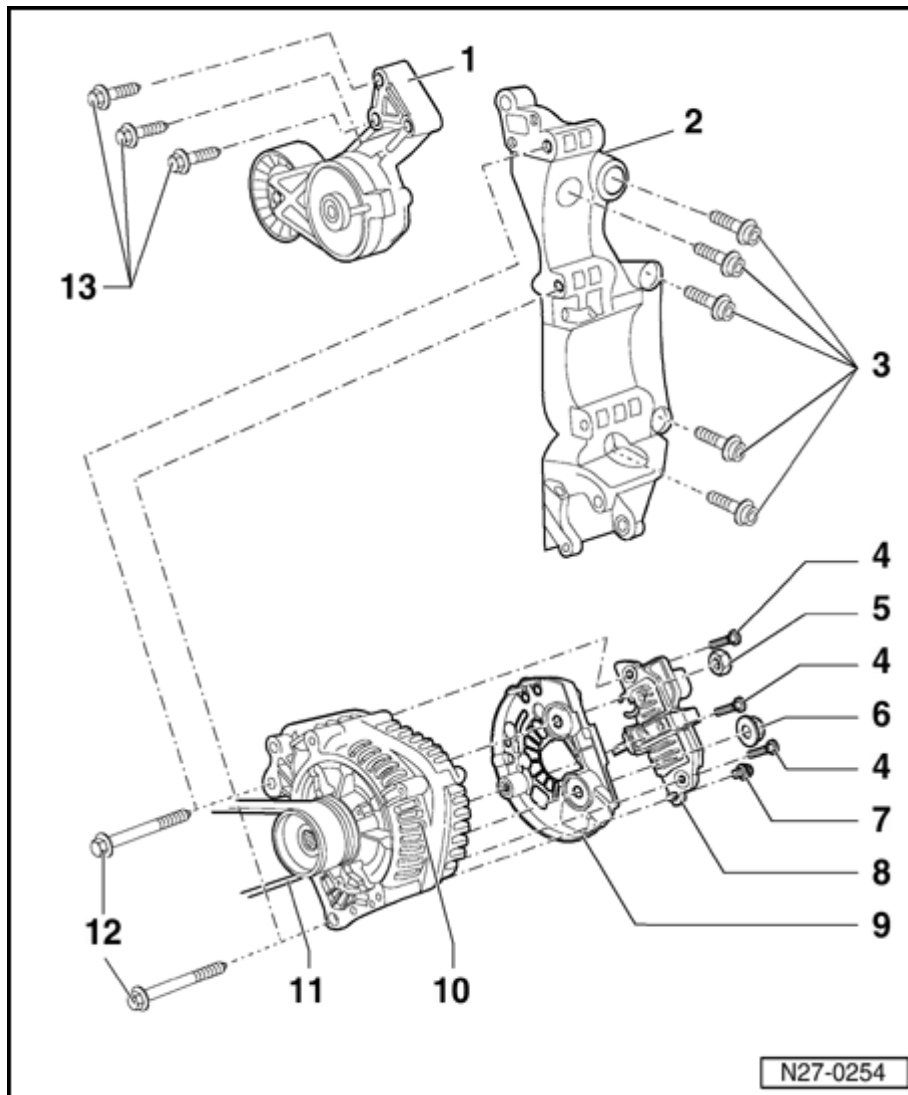
7 - Screw

8 - Voltage
Regulator
(VR)

◆ Removing
and
installing
⇒ [Page
27-78](#)

◆ Checking
carbon
brushes
⇒ [Page
27-79](#)

27-85



9 Protective - cap

10 Generator - (GEN)

- ◆ Tightening torque of B+ wire to generator
⇒ [Page 27-77](#)

11 - Ribbed belt

- ◆ Removing and installing
⇒ [Page 27-86](#)

- ◆ Ribbed belt routing
⇒ [Page 27-91](#)

12 - Hex bolts

- ◆ M8 x 85mm
- ◆ 25 Nm

13 - Hex bolts

- ◆ M8 x 45mm
- ◆ 25 Nm

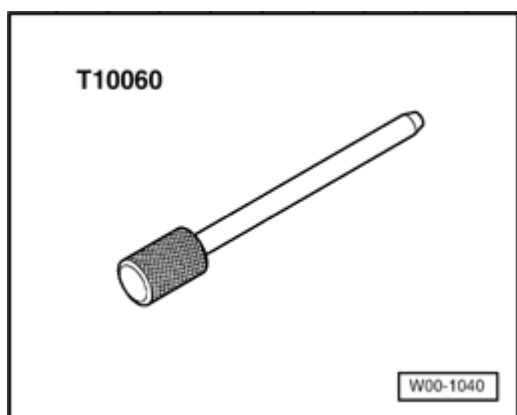
Ribbed belt, removing and installing

CAUTION!

- ◆ **Before removing ribbed belt, mark direction of rotation. Belt damage will result if not reinstalled in proper direction.**
- ◆ **Check ribbed belt ⇒ [page 27-81](#) . Always replace ribbed belt if found to be faulty will avoid related failures or operating problems.**

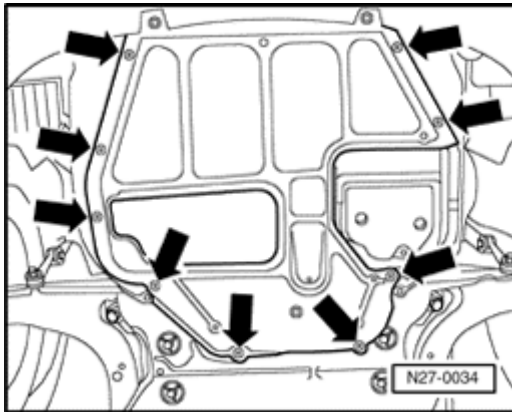
Special tools and auxiliary items needed

- ◆ Mandrel T10060 (or equivalent)

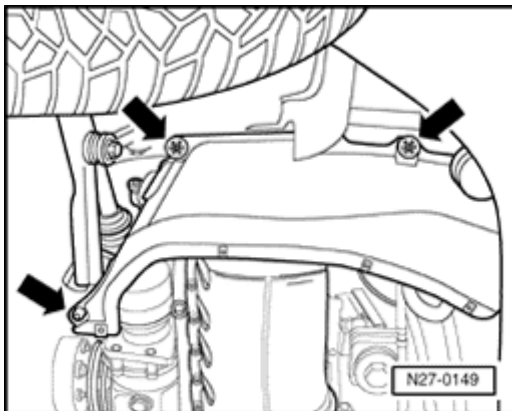


Removing

- Lift vehicle.



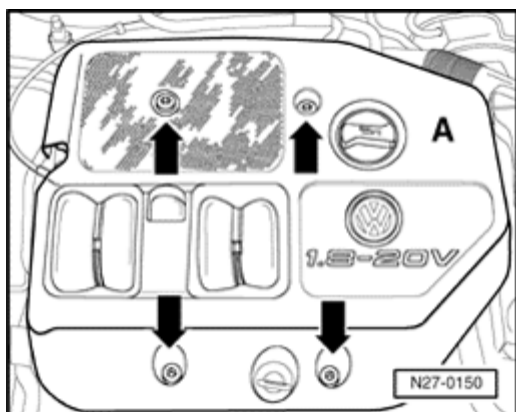
- Remove bolts -arrows- and remove middle lower engine cover (noise insulation).



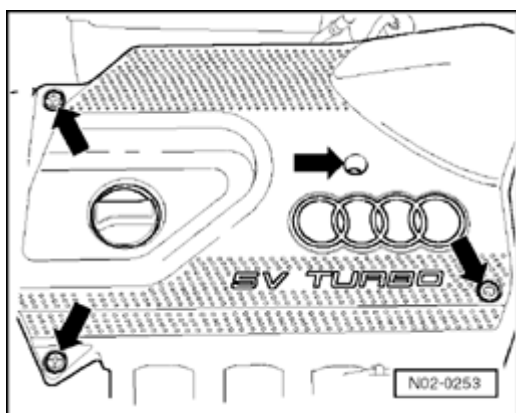
- Remove nut, release clips -arrows- and remove right lower engine cover (noise insulation).

2.0L 4-cylinder gasoline engine:**Note:**

European market 1.8L engine illustrated here. Engine cover on USA/CDN 2.0L engines is similar.



- Release nuts -arrows- and lift engine cover -A- from engine.

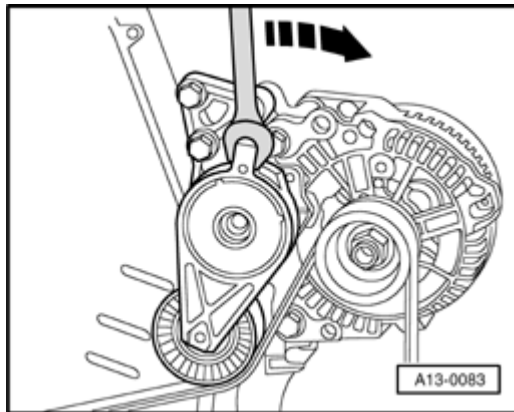
1.8L turbo 4-cylinder gasoline engine:

- Release screws -arrows- and lift engine cover from engine.

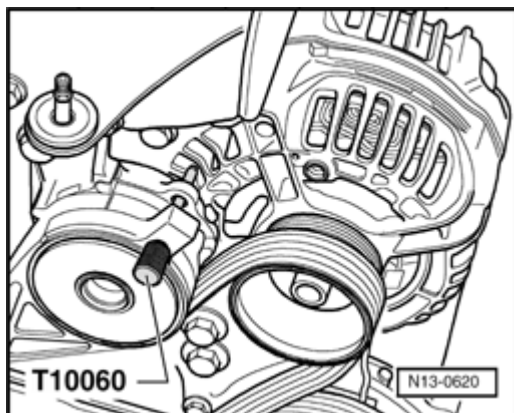
27-89

All gasoline engines, continued:

- Mark direction of rotation of ribbed belt if be reused.



- Loosen ribbed belt by turning tensioner in direction of -arrow-.

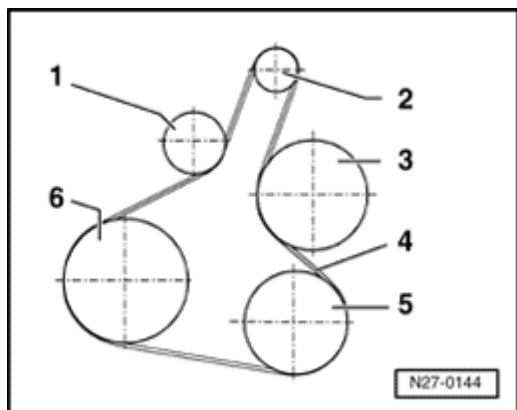


- Block tensioner with mandrel T10060 (or equivalent).
- Remove ribbed belt.

Installing

CAUTION!

- ◆ ***Note previously marked running direction of ribbed belt when reinstalling.***
- ◆ ***Before installing ribbed belt, make sure that all subassemblies (generator, a/c compressor, etc.) are securely mounted and turn freely.***
- ◆ ***When installing belt, ensure correct seating in the belt pulleys!***
- Install ribbed belt according to routing diagram
⇒ [Page 27-91](#) .
- Remove mandrel.
- Start engine and check belt running.
- Install engine cover.
- Install center and right (lower) engine covers (noise insulation).

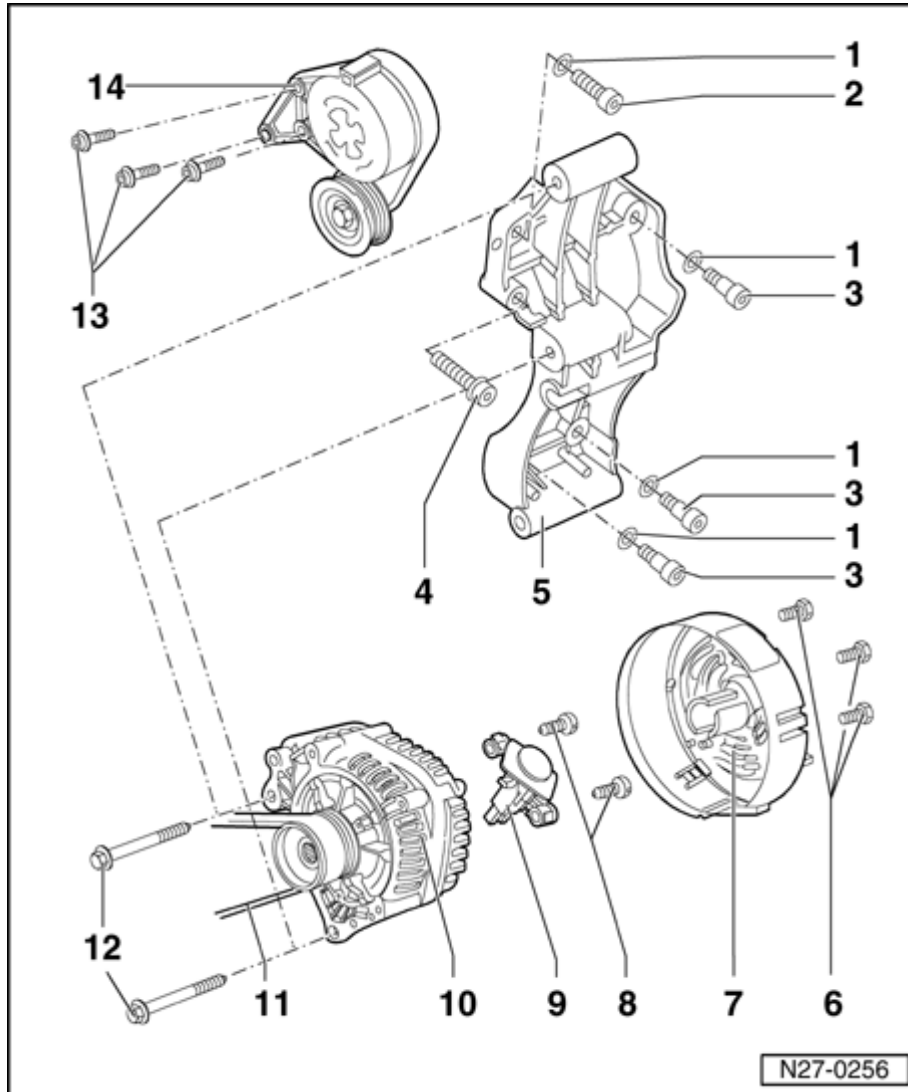


Ribbed belt routing



4-cylinder gasoline engine with power steering pump and A/C compressor

- 1 - Tensioning roller
- 2 - Pulley - generator (GEN)
- 3 - Pulley - a/c compressor
- 4 - Ribbed belt - generator, a/c compressor, power steering pump and crankshaft/vibration damper
- 5 - Pulley - power steering pump
- 6 - Pulley - crankshaft/vibration damper



Generator (GEN) - 6-cylinder gasoline engines

6-cylinder engines through 04.99, assembly

1 - Washers

2 - Hex socket bolt

◆ M8 x 30mm

◆ 25 Nm

3 - Hex socket bolts with shoulder

◆ M8 x 28 mm

◆ 25 Nm

4 - Hex socket bolts

◆ M8 x 30mm

◆ 25 Nm

5 - Bracket

6 - Hex bolts

◆ M3 x 18mm

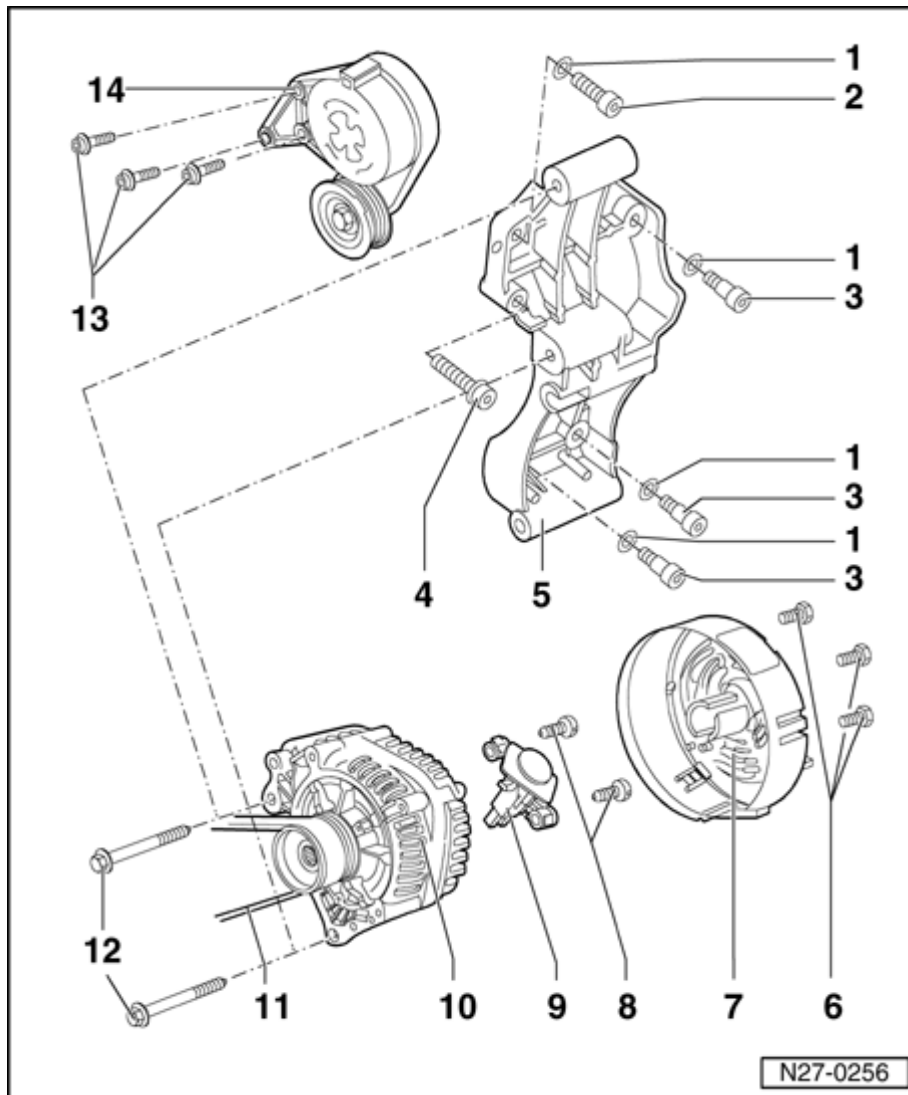
7 - Protective

cap

8 - Bolts

◆ M4 x
25mm

27-93



9 - Voltage Regulator (VR)

◆ Removing and installing
⇒ [Page 27-74](#)

◆ Checking carbon brushes
⇒ [Page 27-75](#)

10 Generator - (GEN)

◆ Tightening torque B+ wire to generator
⇒ [Page 27-72](#)

11 - Ribbed belt

◆ Removing and installing
⇒ [Page 27-96](#)

◆ Ribbed belt routing
⇒ [Page 27-100](#)

12 - Hex bolts

◆ M8 x 85mm

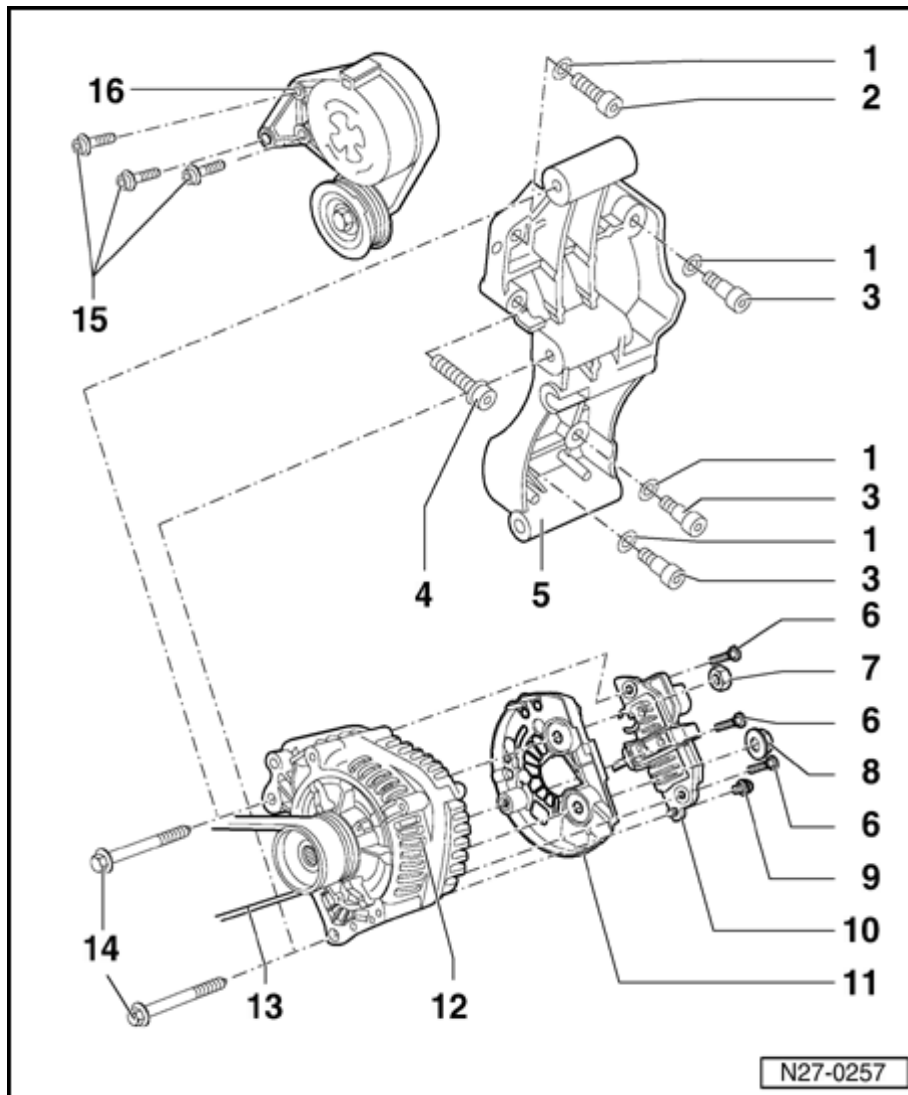
◆ 25 Nm

13 - Hex socket bolts

- ◆ M8 x
30mm
- ◆ 25
Nm

14
- **Tensioner**

27-94



6-cylinder engines from 05.99, assembly

1 - Washers

2 - Hex socket bolt

◆ M8 x 30mm

◆ 25 Nm

3 - Hex socket bolt with shoulder

◆ M8 x 28mm

◆ 25 Nm

4 - Hex socket bolt

◆ M8 x 30mm

◆ 25 Nm

5 - Bracket

6 - Screws

7 - Nut

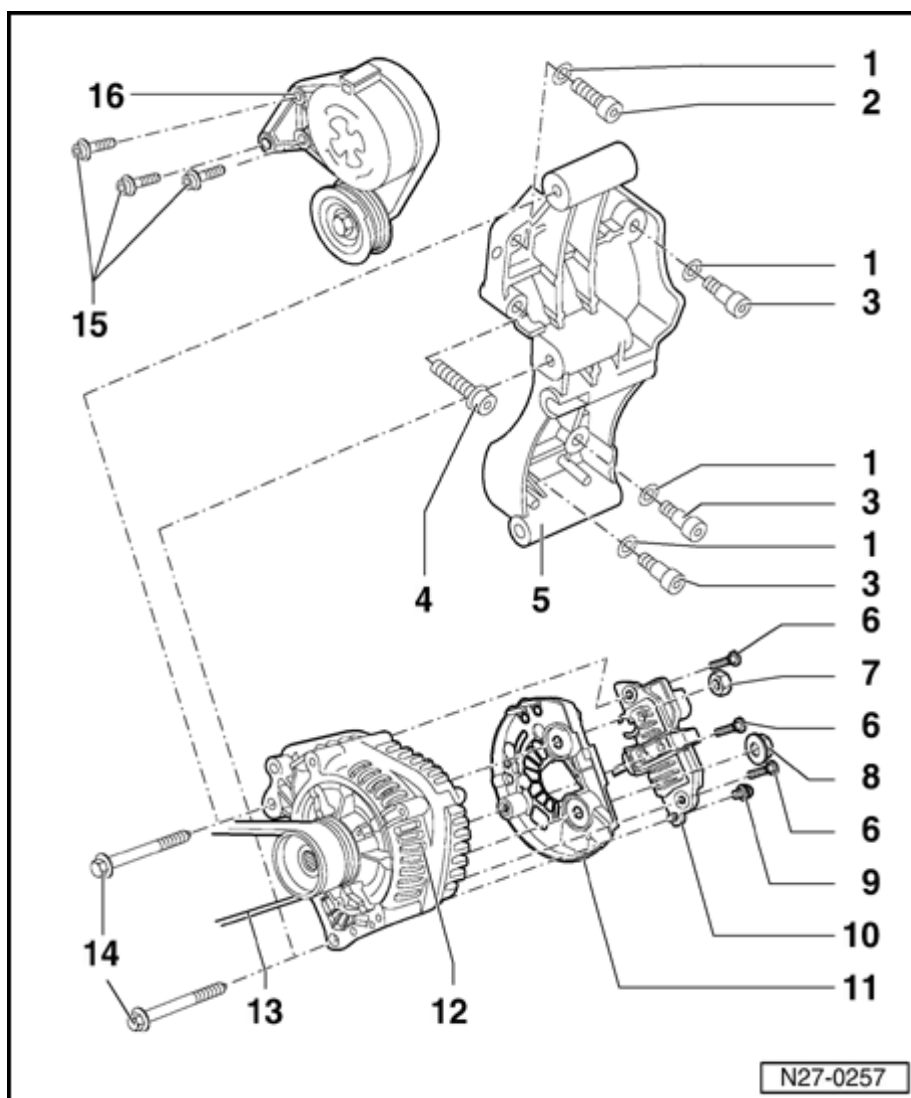
◆ M8

8 - Nut

◆ M8

9 - Screw

27-95



10 Voltage - Regulator (VR)

- ◆ Removing and installing
⇒ [Page 27-78](#)

- ◆ Checking carbon brushes
⇒ [Page 27-79](#)

11 Protective - cap

12 Generator - (GEN)

- ◆ Tightening torque B+ wire to generator
⇒ [Page 27-77](#)

- ◆ To remove generator, first remove A/C compressor (without opening refrigerant circuit)

⇒ [Repair Manual, Heating & Air Conditioning, Repair Group 87](#)

13 - Ribbed belt

- ◆ Removing and installing
⇒ [Page 27-96](#) .

- ◆ Ribbed belt routing
⇒
[Page 27-100](#)

14 - Hex bolts

- ◆ M8 x 85mm
- ◆ 25 Nm

15 - Hex socket bolts

- ◆ M8 x 30mm
- ◆ 25 Nm

16 - Tensioner

Ribbed belt, removing and installing

CAUTION!

- ◆ **Before removing ribbed belt, mark direction of rotation. Belt damage will result if not reinstalled in proper direction.**
- ◆ **Check ribbed belt ⇒ [Page 27-81](#) . Always replace ribbed belt if found to be faulty will avoid related failures or operating problems.**

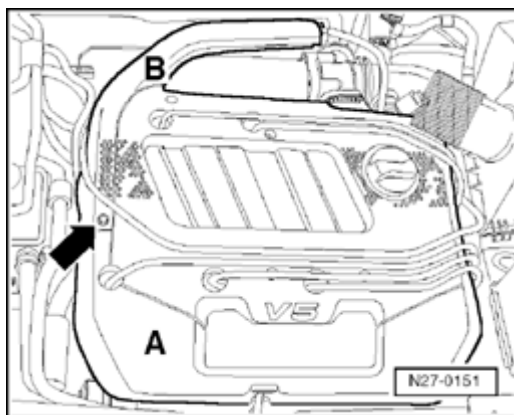
Special tools and auxiliary items needed

- ◆ Bolt - M8 X 50

Removing 2.8L - 2V

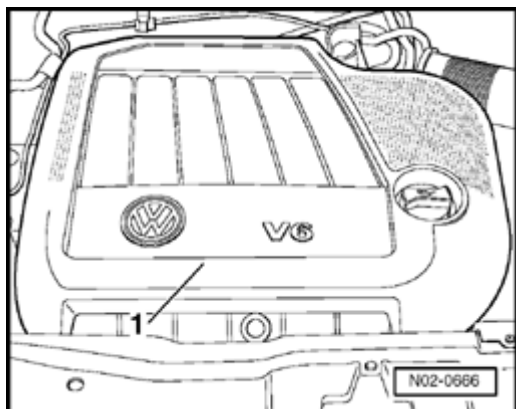
Note:

Engine cover on USA/CDN 2.8L - 2V is similar to European market 2.3L engine illustrated here.



- Release screw(s) -arrow-.
- Lift engine covers -A- and -B- where applicable from engine.

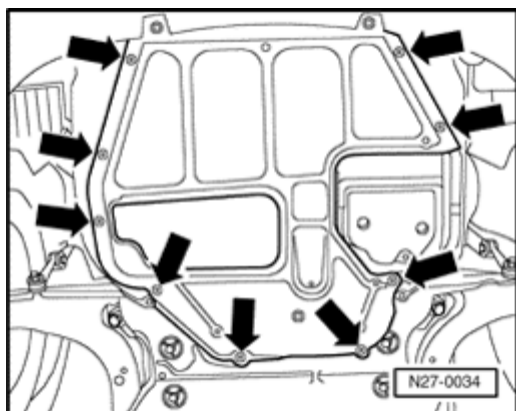
27-97

Removing 2.8L & 3.2L - 4V

- ▲ - Unclip and lift engine cover -1- from engine.

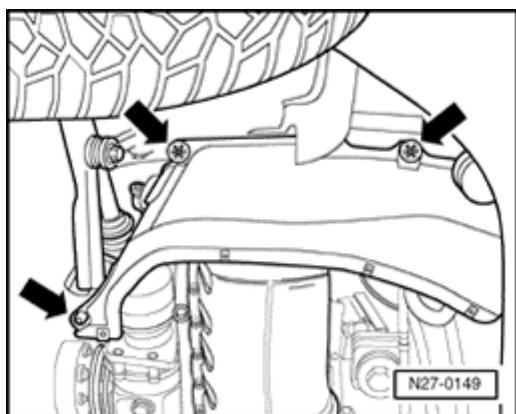
Continued for all

- Lift vehicle.

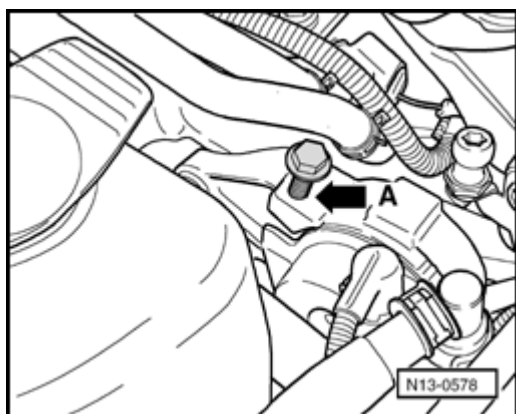


- ▲ - Remove bolts -arrows- and remove center sound insulation.

27-98



- Remove nut, release clips - arrows- and remove right sound insulation.
- Mark running direction of ribbed belt if it will be used again.



- Install and tighten M8 X 50 bolt - A- as illustrated until ribbed belt tension is relieved.

CAUTION!

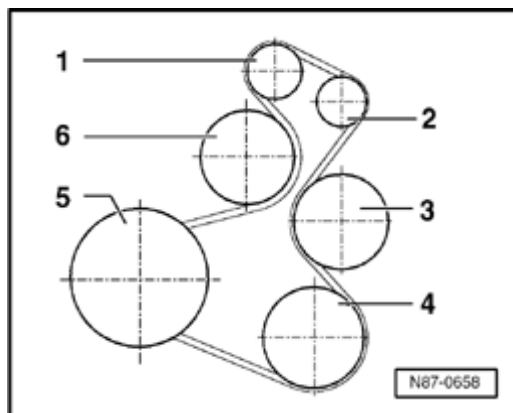
Tighten bolt -A- only as far as necessary to release ribbed belt tension for removal. Over-tightening bolt will result in damage to tensioner.

- Remove ribbed belt.

Installing

CAUTION!

- ◆ ***Note previously marked running direction of ribbed belt when reinstalling.***
- ◆ ***Before installing ribbed belt, make sure that all subassemblies (generator, a/c compressor, etc.) are securely mounted and turn freely.***
- ◆ ***When installing belt, ensure correct seating in the belt pulleys!***
- Install ribbed belt according to routing diagram
⇒ [Page 27-100](#) .
- Remove hex bolt to reapply tension to ribbed belt.
- Start engine and check running of belt.
- Install engine cover.
- Install center and right sound insulation.



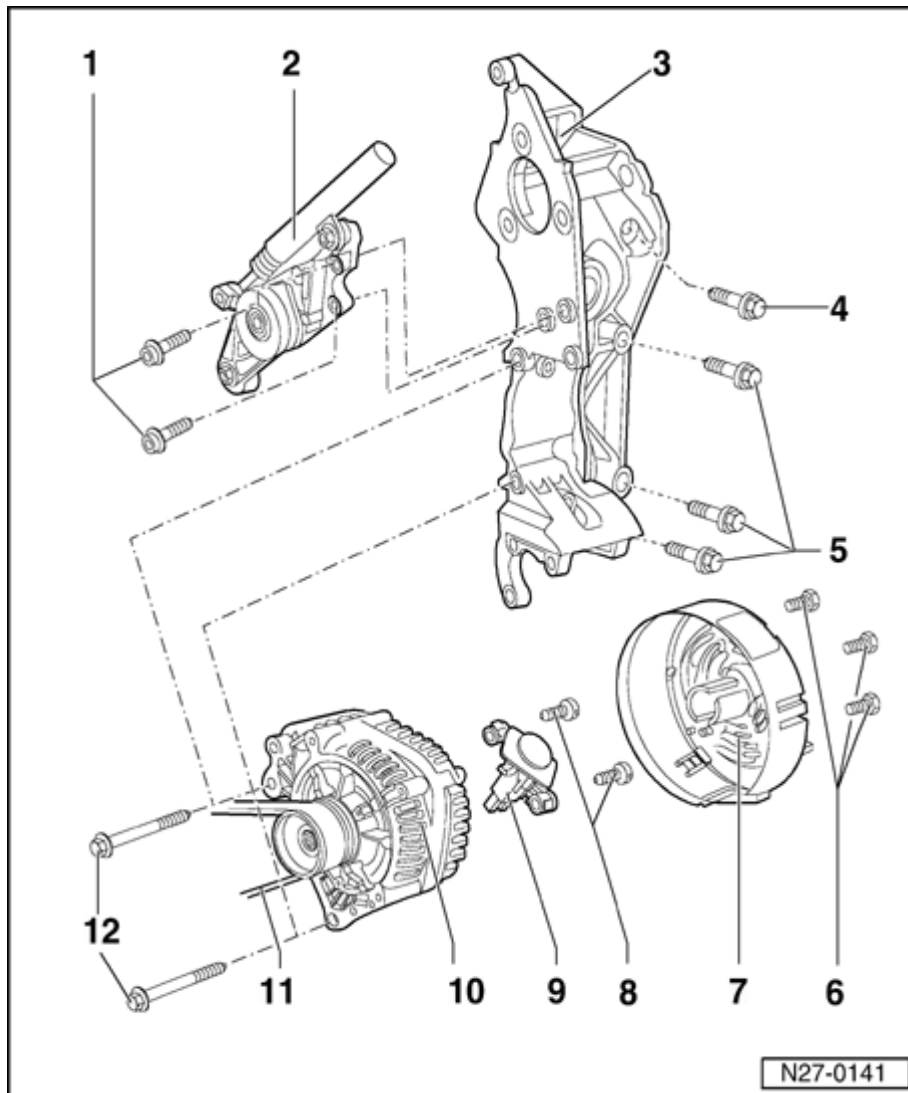
Ribbed belt, routing



6-cylinder engine with power steering pump and A/C compressor

- 1 - Tensioning roller
- 2 - Pulley - generator
- 3 - Pulley - a/c compressor
- 4 - Pulley - power steering pump
- 5 - Pulley - crankshaft/vibration damper
- 6 - Pulley - coolant pump

27-101



Generator (GEN) - 4-cylinder TDI engines

4-cylinder TDI engines with power steering through 04.99, assembly

1 - Hex bolts

◆ M8 x 45mm

◆ 25 Nm

2 - Tensioner

3 - Bracket

4 - Hex bolt

◆ M10 x 45mm

◆ 45 Nm

5 - Hex bolts

◆ M10 x 65mm

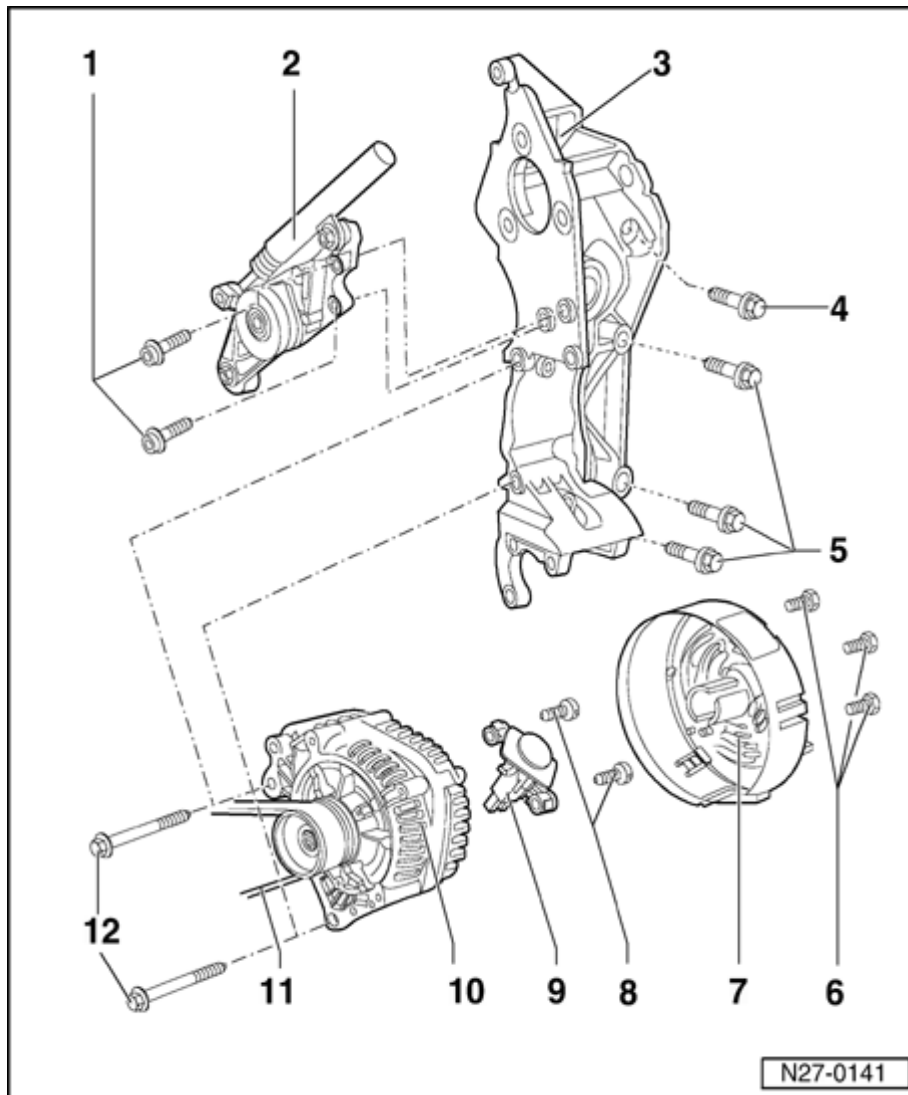
◆ 45 Nm

6 - Hex bolts

◆ M3 x 18mm

7 - Protective cap

27-102

**8 - Screws**

- ◆ M4 x 25mm

9 - Voltage Regulator (VR)

- ◆ Removing and installing
⇒ Items 6, 7, 8

- ◆ Checking carbon brushes
⇒ [Page 27-75](#)

10 Generator - (GEN)

- ◆ Tightening torque B+ wire to generator
⇒ [Page 27-72](#)

11 - Ribbed belt

- ◆ Removing and installing
⇒ [Page 27-109](#)

- ◆ Ribbed belt routing
⇒ [Page 27-113](#)

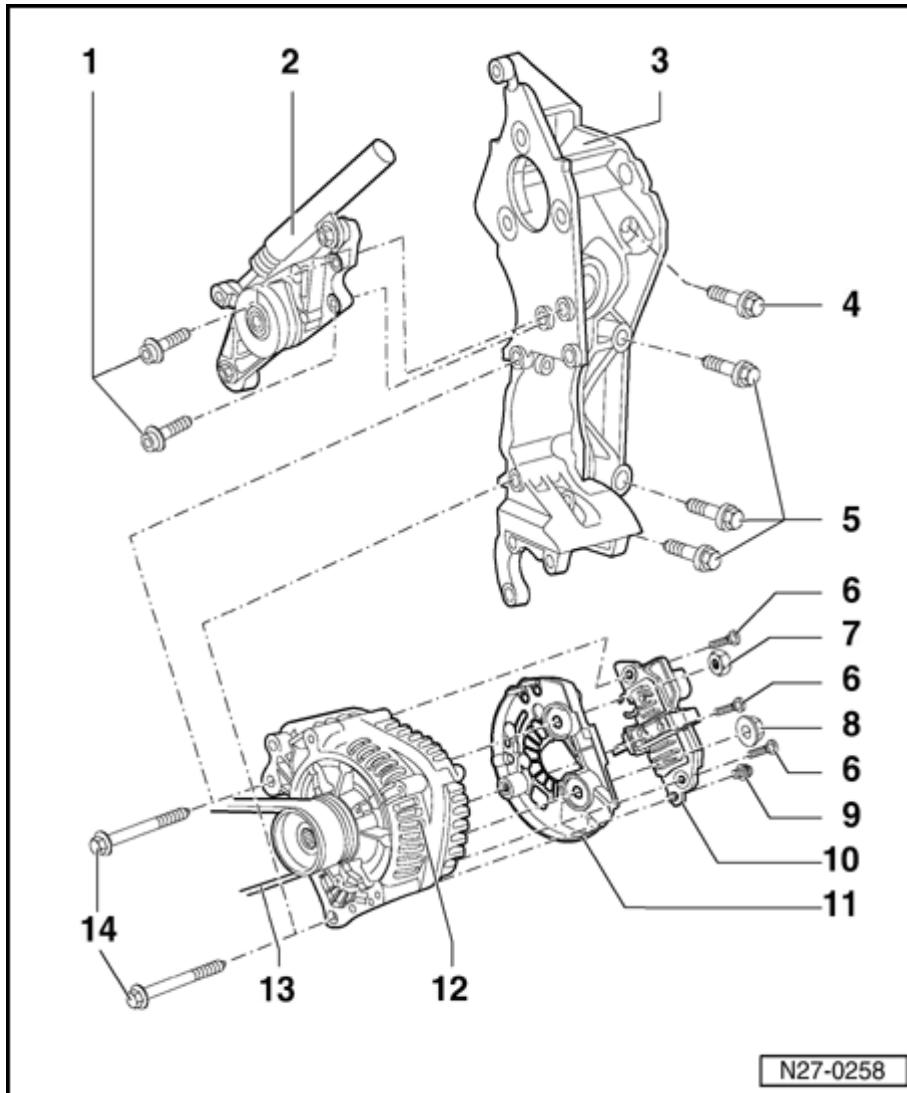
12 - Hex bolts

- ◆ M8 x 85mm

- ◆ 25

Nm

27-103



**4-cylinder
TDI engines
with power
steering
from 05.99,
assembly**

**1 - Hex
socket
bolts**

◆ M8 x
45mm

◆ 25
Nm

2 - Tensioner

3 - Bracket

**4 - Hex
bolt**

◆ M10 x
45mm

◆ 45
Nm

**5 - Hex
bolts**

◆ M10 x
65mm

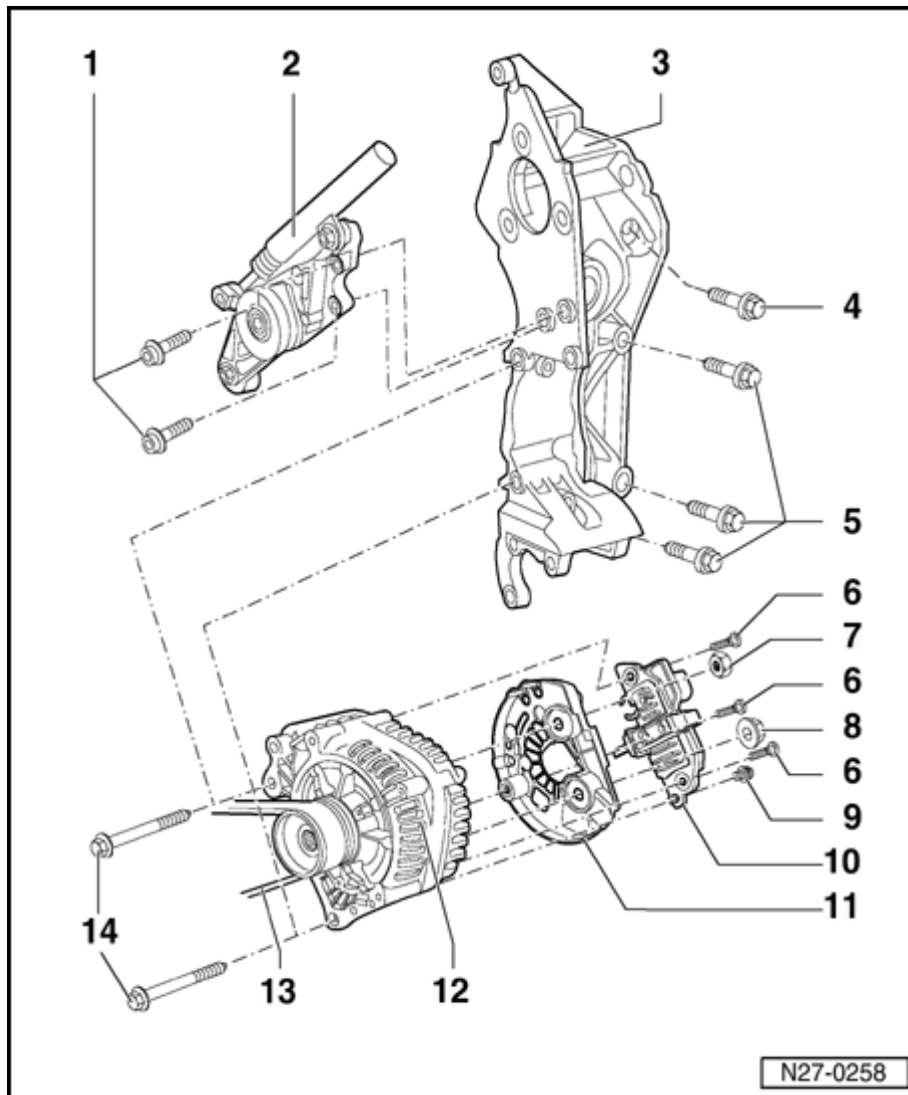
◆ 45
Nm

6 - Screws

7 - Nut

◆ M8

27-104

**8 - Nut**

- ◆ M8

9 - Screw**10 Voltage - Regulator (VR)**

- ◆ Removing and installing ⇒ [Page 27-78](#)

- ◆ Checking carbon brushes ⇒ [Page 27-79](#)

11 Protective - cap**12 Generator - (GEN)**

- ◆ Tightening torque B+ wire to generator ⇒ [Page 27-77](#)

13 - Ribbed belt

- ◆ Removing and installing ⇒ [Page 27-109](#)

- ◆ Ribbed belt routing ⇒ [Page 27-113](#)

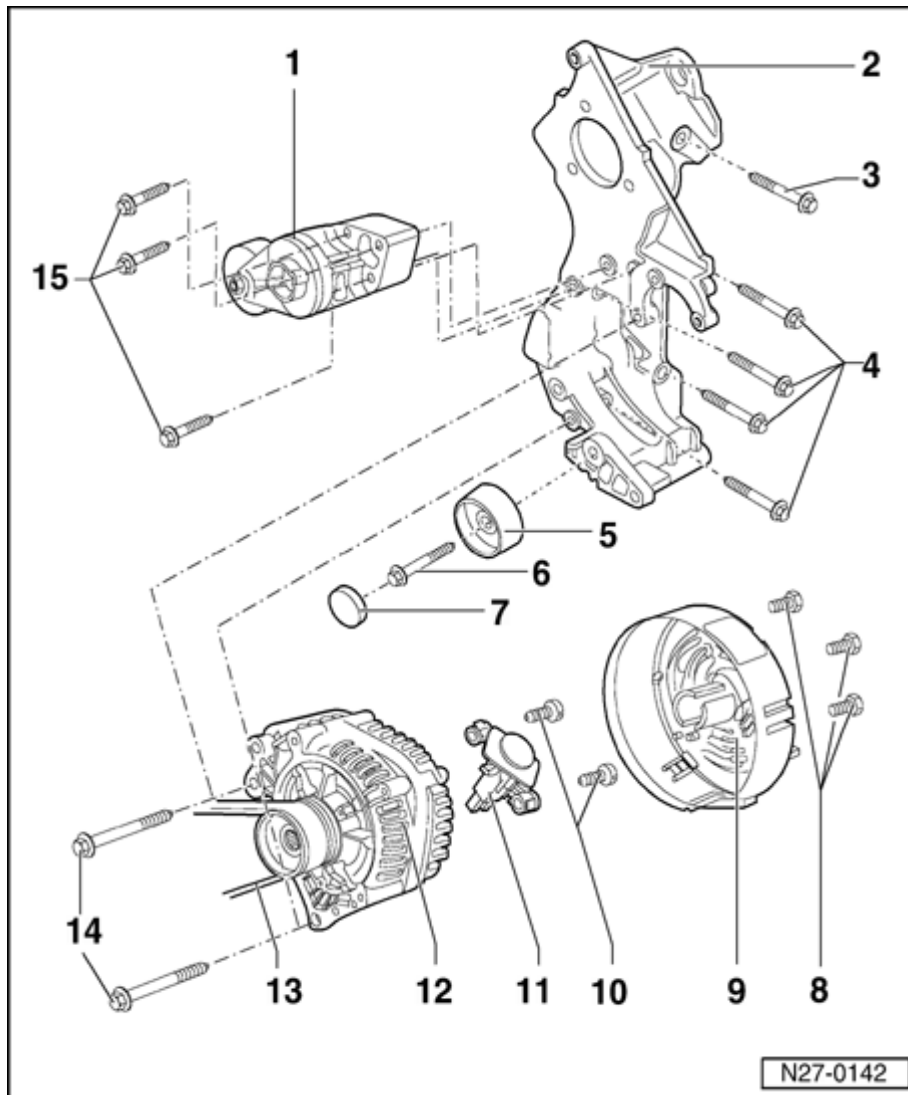
14 - Hex bolts

- ◆ M8 x

85mm

◆ 25
Nm

27-105



**4-cylinder
TDI engine
with power
steering
and A/C
compressor
through
04.99,
assembly**

1 - Tensioner

2 - Bracket

**3 - Hex
bolt**

◆ M10 x
45mm

◆ 45
Nm

**4 - Hex
bolts**

◆ M10 x
65mm

◆ 45
Nm

**5 - Relay
roller**

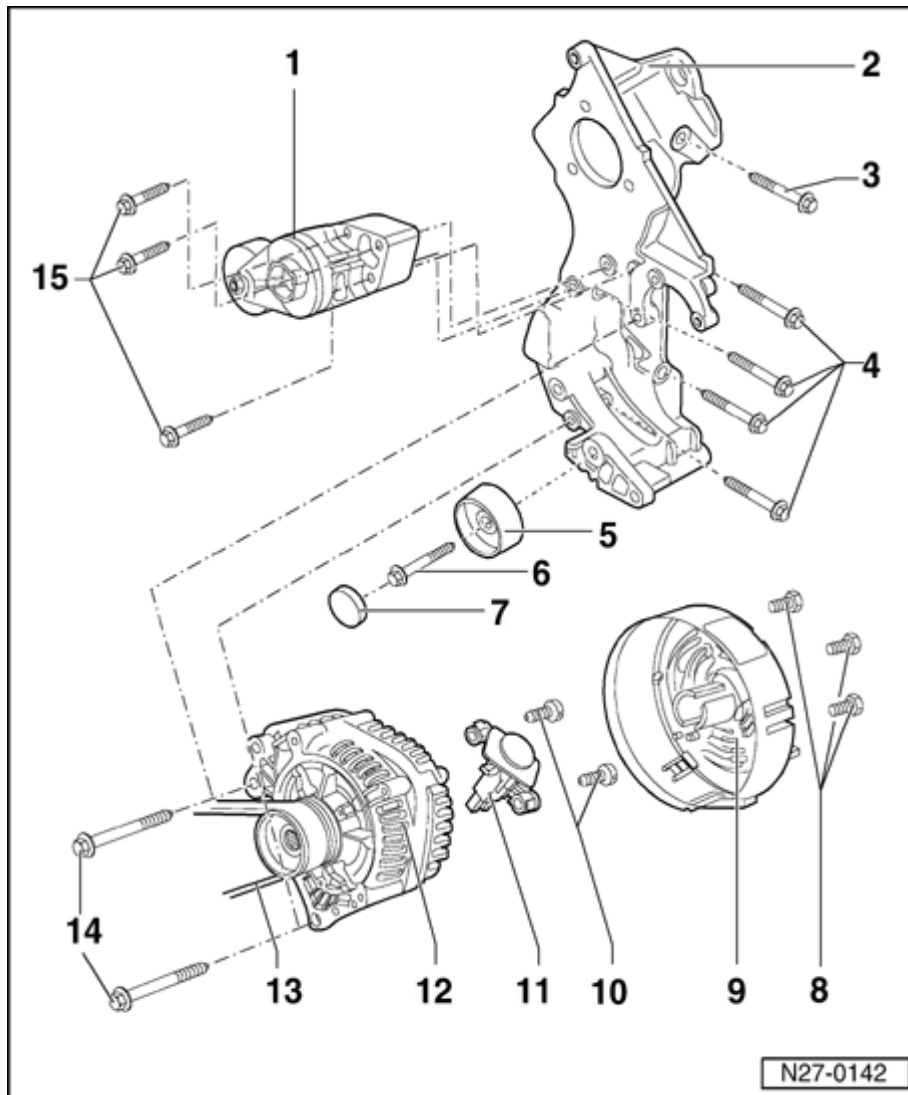
**6 - Hex
bolt**

◆ M8 x
50mm

◆ 25
Nm

**7 Relay
- roller
protective
cap**

27-106

**8 - Hex bolts**

- ◆ M3 x 18mm

9 Protective - cap**10 - Screws**

- ◆ M4 x 25mm

11 Voltage - Regulator (VR)

- ◆ Removing and installing
⇒ Items 8, 9, 10

- ◆ Checking carbon brushes
⇒ [Page 27-75](#)

12 Generator - (GEN)

- ◆ Tightening torque of B+ wire to generator
⇒ [Page 27-72](#)

13 - Ribbed belt

- ◆ Removing and installing
⇒ [Page 27-109](#)

- ◆ Ribbed belt routing
⇒ [Page](#)

[27-113](#)

**14 - Hex
bolts**

◆ M8 x
85mm

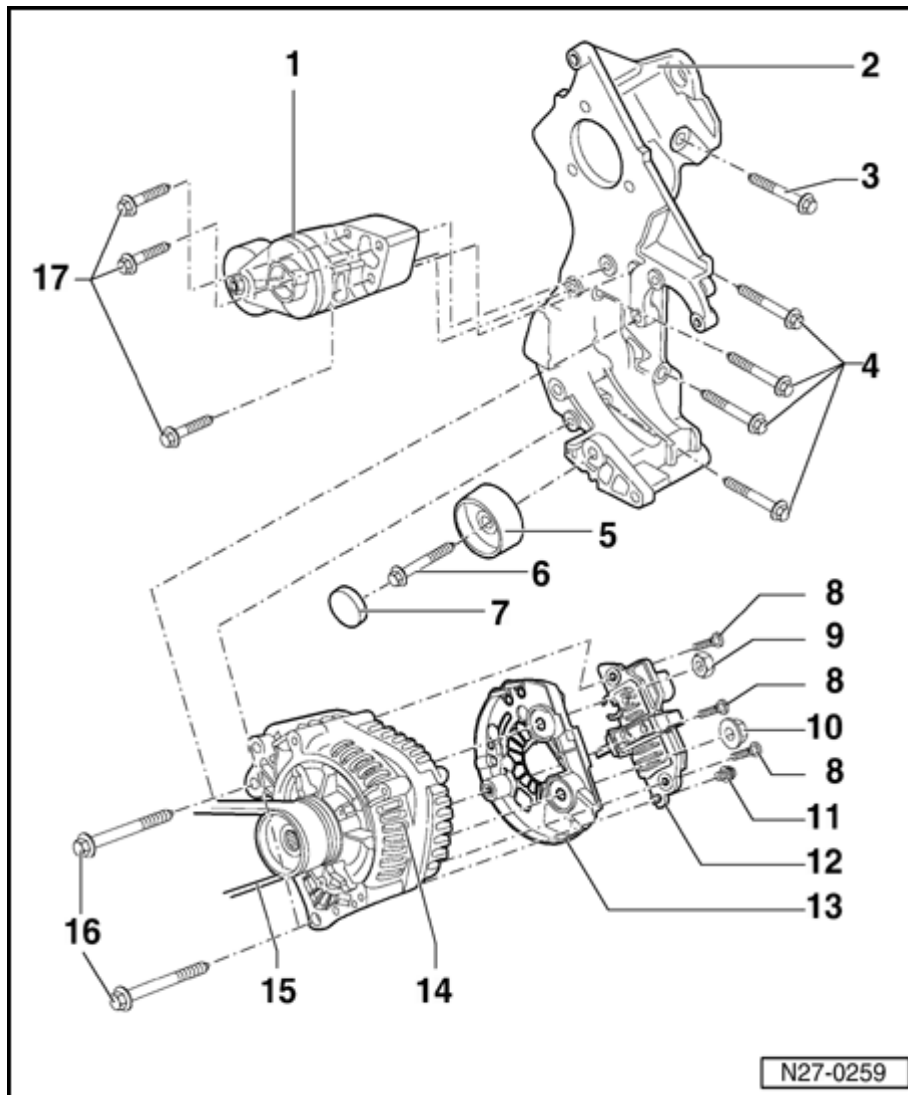
◆ 25
Nm

**15 - Hex
bolts**

◆ M8 x
45mm

◆ 25
Nm

27-107



4-cylinder TDI engine with power steering and A/C compressor from 05.99, assembly

1 - Tensioner

2 - Bracket

3 - Hex bolt

◆ M10 x 45mm

◆ 45 Nm

4 - Hex bolts

◆ M10 x 65mm

◆ 45 Nm

5 - Relay roller

6 - Hex bolt

◆ M8 x 50mm

◆ 25 Nm

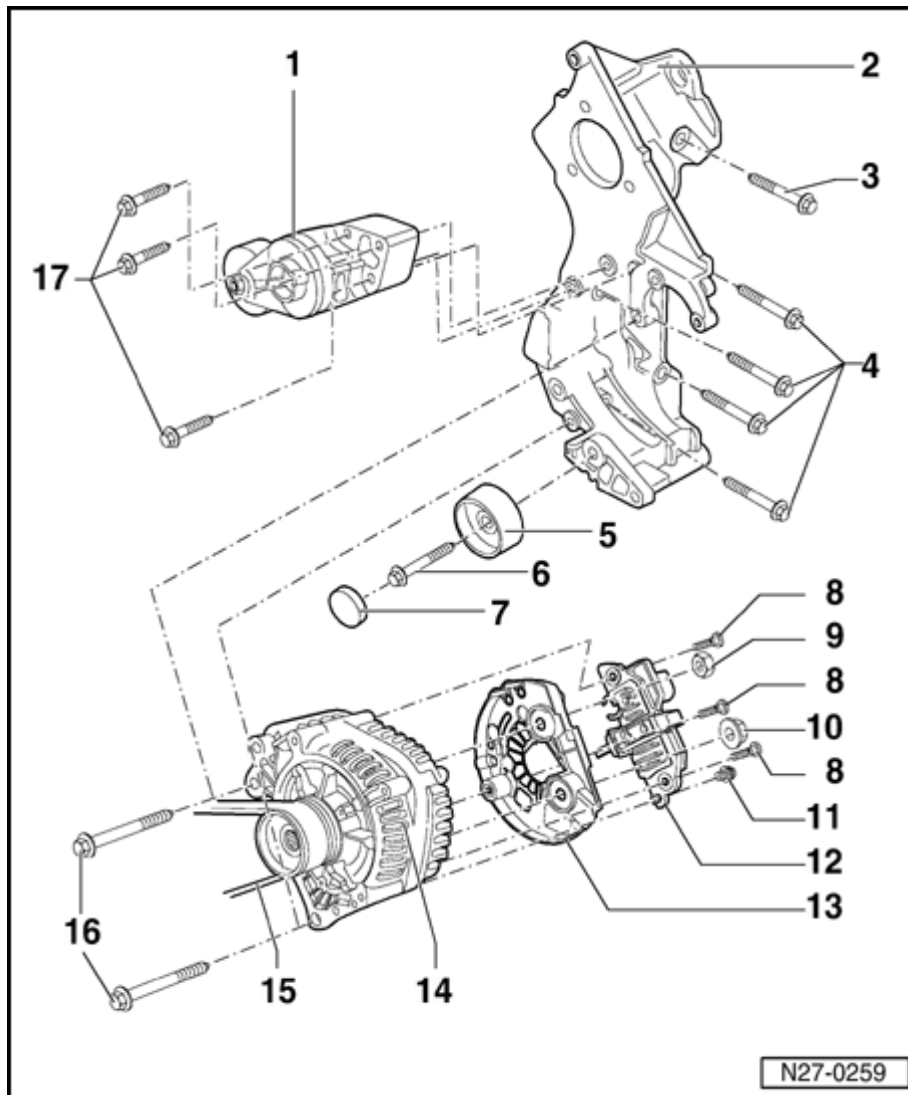
7 - Relay roller protective cap

8 - Screws

9 - Nut

◆ M8

27-108

**10 - Nut**

- ◆ M8

11 - Screw**12 Voltage - Regulator (VR)**

- ◆ Removing and installing ⇒ [Page 27-78](#)

- ◆ Checking carbon brushes ⇒ [Page 27-79](#)

13 Protective - cap**14 Generator - (GEN)**

- ◆ Tightening torque of B+ wire to generator ⇒ [Page 27-77](#)

15 - Ribbed belt

- ◆ Removing and installing ⇒ [Page 27-109](#)

- ◆ Ribbed belt routing ⇒ [Page 27-113](#)

16 - Hex bolts

- ◆ M8 x

85mm

◆ 25
Nm

**17 - Hex
bolts**

◆ M8 x
45mm

◆ 25
Nm

Ribbed belt, removing and installing

CAUTION!

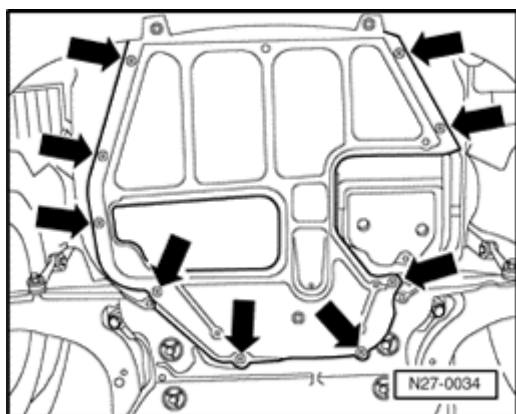
- ◆ **Before removing ribbed belt, mark direction of rotation. Belt damage will result if not reinstalled in proper direction.**
- ◆ **Check ribbed belt ⇒ [Page 27-81](#) . Always replace ribbed belt if found to be faulty will avoid related failures or operating problems.**

Special tools and auxiliary items needed

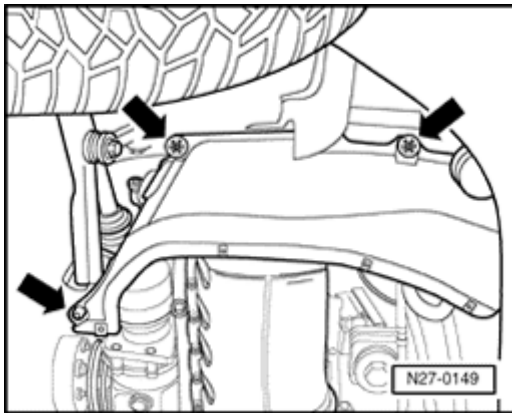
- ◆ Bolt - M8 X 50

Removing

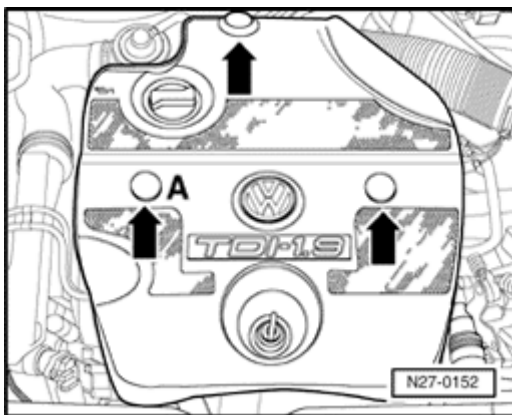
- Lift vehicle.
- Remove bolts -arrows- and remove center sound insulation.



27-110

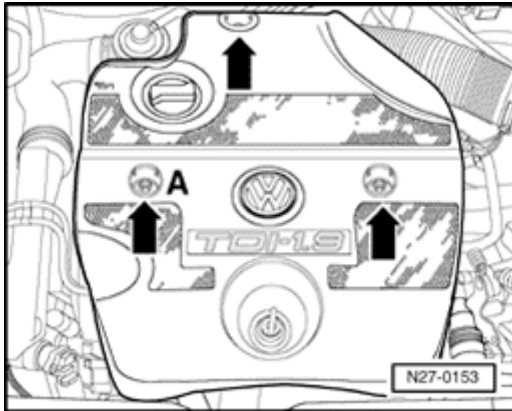


- ✦ - Remove nut, release clips - arrows- and remove right noise noise insulation.



- ✦ - Remove caps -arrows- on engine cover -A-.

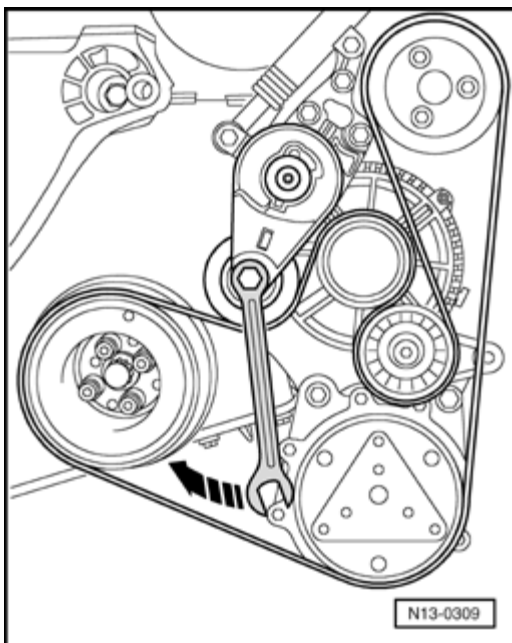
27-111



- Release nuts -arrows-.
- Lift engine cover -A- from engine.
- Remove charge air pipe between charge air cooler and exhaust turbocharger.

⇒ [Repair Manual, 1.9 Liter 4-Cyl. 2V TDI Engine Mechanical, Engine Code\(s\): ALH, Repair Group 21](#)

- Mark direction of rotation of ribbed belt if it is to be reused.



- Loosen ribbed belt by turning tensioner in direction of -arrow-.
- Remove ribbed belt.

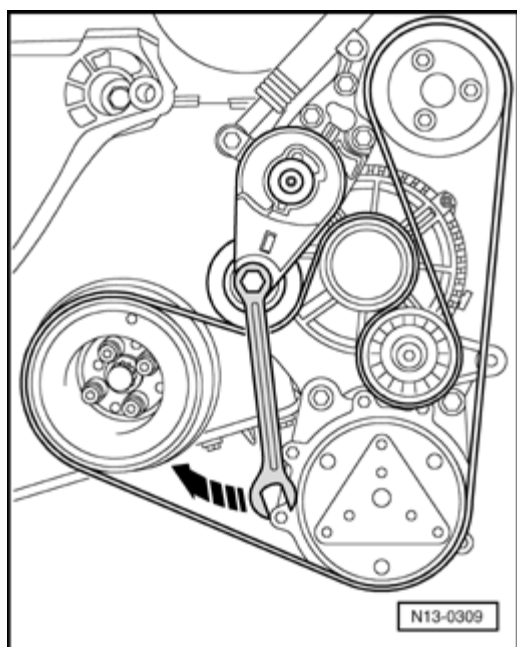
Note:

Remove ribbed belt from idler roller first.

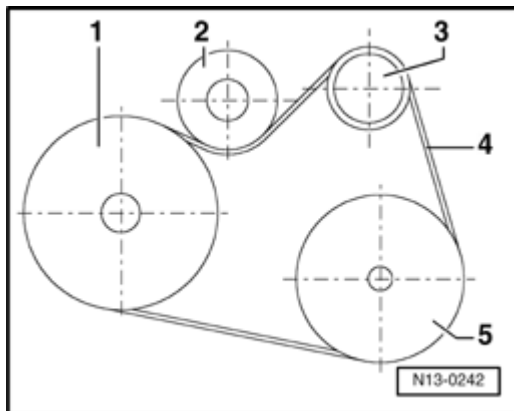
Installing

CAUTION!

- ◆ **Note previously marked running direction of ribbed belt when reinstalling.**
- ◆ **Before installing ribbed belt, make sure all subassemblies (generator, a/c compressor, etc.) are securely mounted and turn freely.**
- ◆ **When installing belt, ensure correct seating in the belt pulleys!**



- Turn tensioner in direction of -arrow-.
- Install ribbed belt according to routing diagram ⇒ [Page 27-113](#).
- Install charge air pipe.
- Start engine and check belt running.
- Install engine cover.
- Install center and right sound insulation.



Ribbed belt, routing

4-cylinder TDI engine with power steering pump

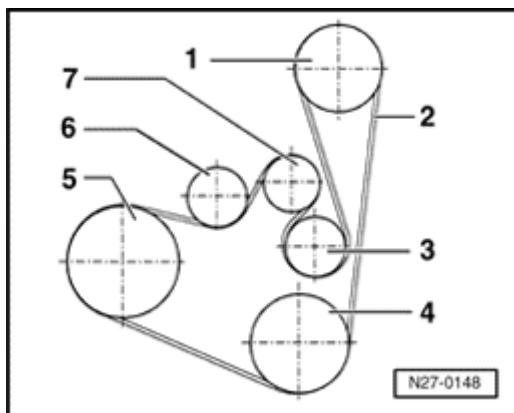
1 - Pulley - crankshaft/vibration damper

2 - Tensioning roller

3 - Pulley - generator

4 - Ribbed belt - crankshaft/vibration damper, tensioning roller, generator and power steering vane pump

5 - Pulley - power steering pump



4-cylinder TDI engine with power steering pump and A/C compressor

1 - Pulley - power steering pump

2 - Ribbed belt - power steering pump, idler roller, a/c compressor, crankshaft/vibration damper, tensioning roller and generator

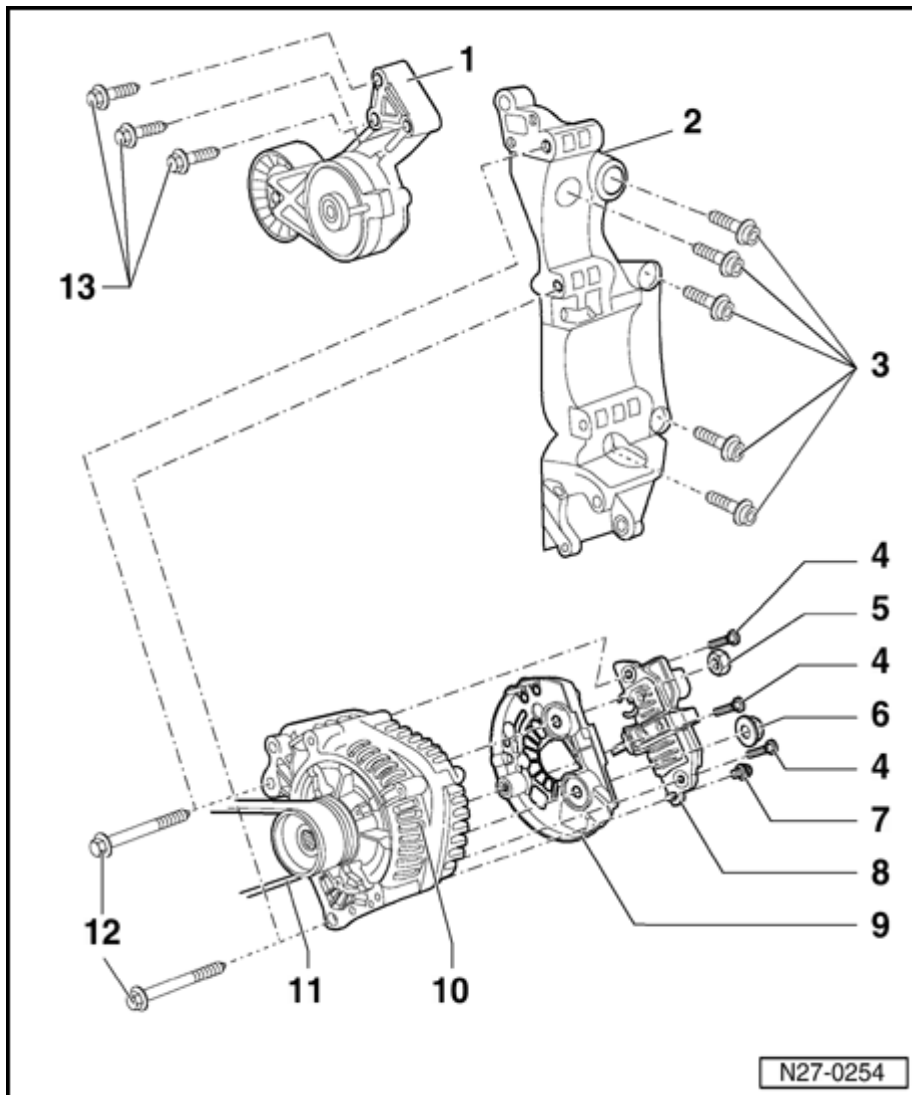
3 - Idler roller

4 - Pulley - a/c compressor

5 - Pulley - crankshaft/vibration damper

6 - Tensioning roller

7 - Pulley - generator



Generator (GEN) - 4-cylinder TDI - PD engines

4-cylinder TDI - PD engine, assembly

1 - Tensioner

2 - Bracket

3 - Hex socket bolt

◆ M10 x 45mm

◆ 45 Nm

4 - Screws

5 - Nut

◆ M8

6 - Hex bolts

◆ M10 x 65mm

◆ 45 Nm

7 - Screws

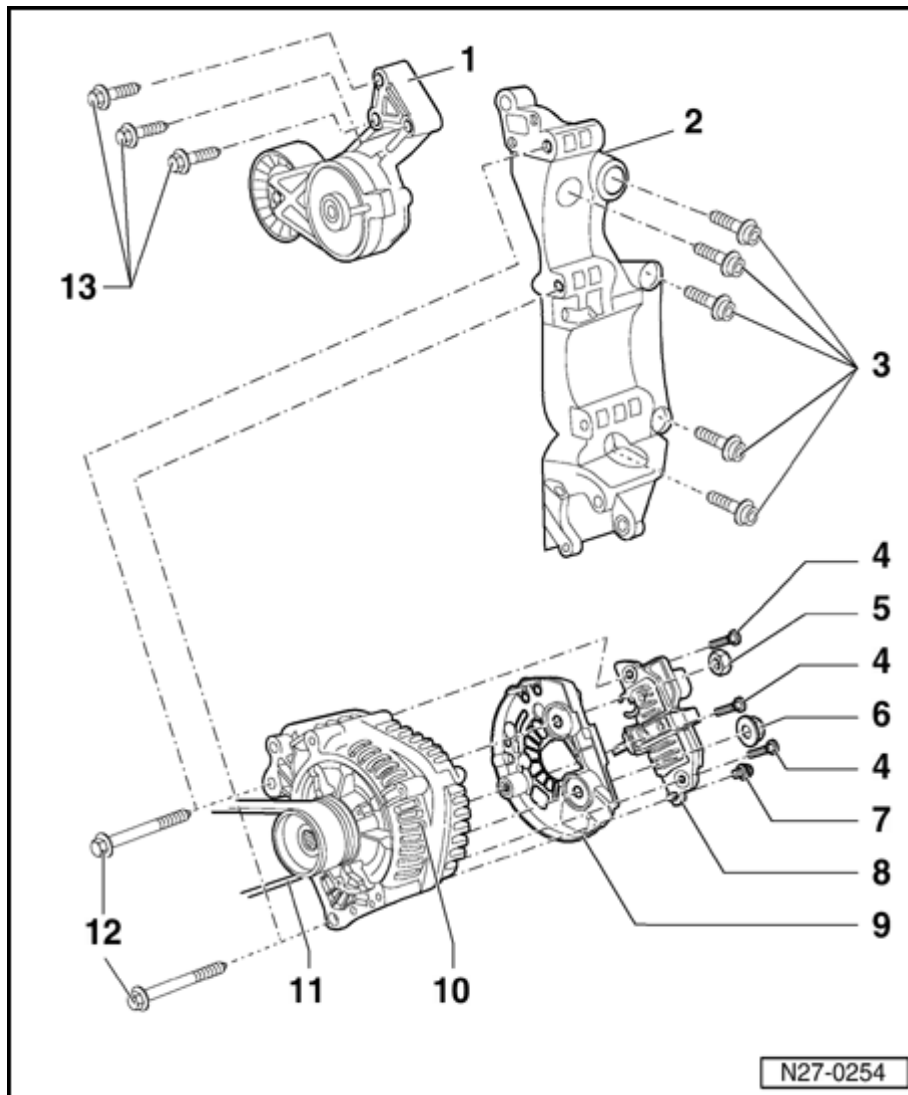
8 - Voltage Regulator (VR)

◆ Removing and installing
⇒ [Page 27-78](#)

◆ Checking carbon brushes

⇒ [Page](#)
[27-79](#)

27-115



9 Protective - cap

10 Generator - (GEN)

- ◆ Tightening torque of B+ wire to generator ⇒ [Page 27-77](#)

11 - Ribbed belt

- ◆ Removing and installing ⇒ [Page 27-116](#) .

- ◆ Ribbed belt routing ⇒ [Page 27-120](#) .

12 - Hex bolts

- ◆ M8 x 85mm
- ◆ 25 Nm

13 - Hex bolts

- ◆ M8 x 45mm
- ◆ 25 Nm

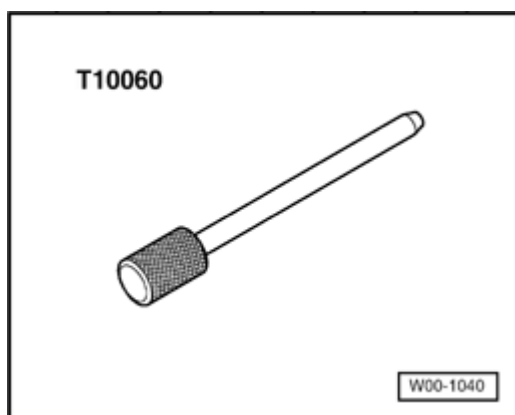
27-116

Ribbed belt, removing and installing

CAUTION!

- ◆ **Before removing ribbed belt, mark direction of rotation. Belt damage will result if not reinstalled in proper direction.**
- ◆ **Check ribbed belt ⇒ [Page 27-81](#) . Always replace ribbed belt if found to be faulty will avoid related failures or operating problems.**

Special tools and auxiliary items needed

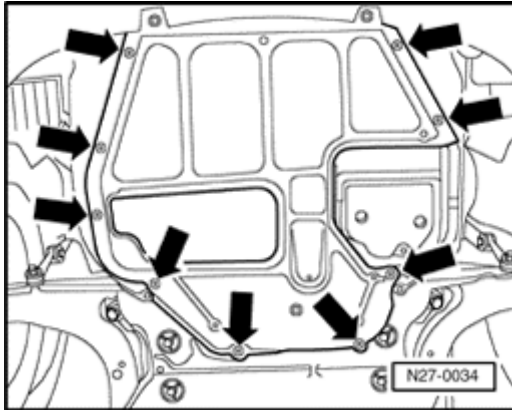


- ◆ Mandrel T10060 (or equivalent)

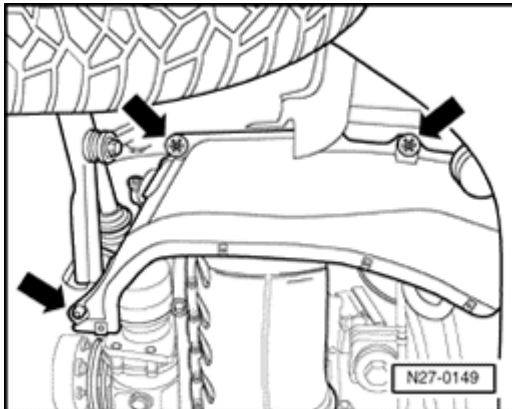
27-117

Removing

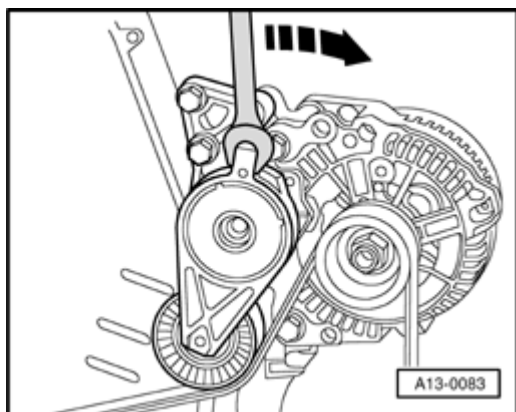
- Lift vehicle.
- ▲ - Remove bolts -arrows- and remove center sound insulation.



- ▲ - Remove nut, release clips -arrows- and remove right lower sound insulation.

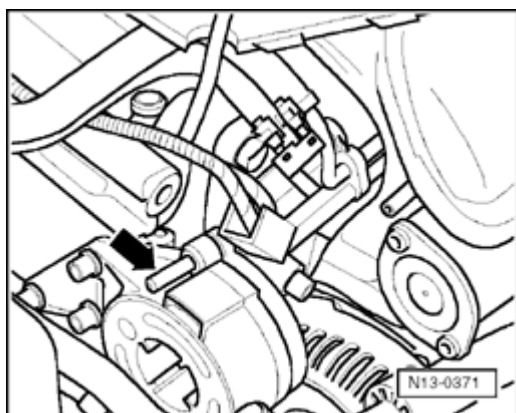


27-118



- Mark direction of rotation of ribbed belt if be reused.

- Loosen ribbed belt by turning tensioner in direction of -arrow-.



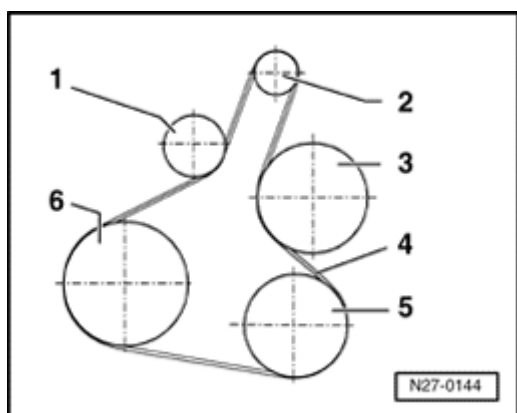
- Block tensioner with mandrel T10060 or equivalent.

- Remove ribbed belt.

Installing

CAUTION!

- ◆ **Note previously marked running direction of ribbed belt when reinstalling.**
 - ◆ **Before installing ribbed belt, make sure that all subassemblies (generator, a/c compressor, etc.) are securely mounted and turn freely.**
 - ◆ **When installing belt, ensure correct seating in the belt pulleys!**
- Install ribbed belt according to routing diagram
⇒ [Page 27-120](#) .
 - Remove mandrel T10060 .
 - Start engine and check belt running.
 - Install engine cover.
 - Install center and right sound insulation.



Ribbed belt, routing

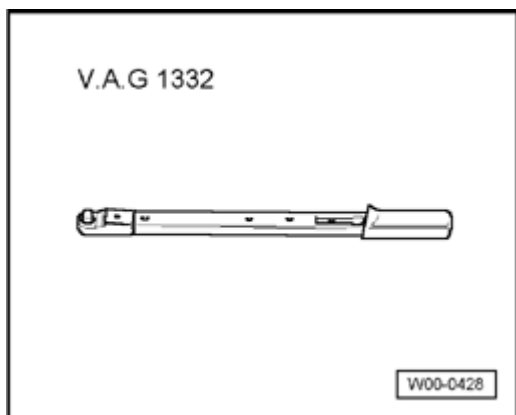


4-cylinder TDI - PD engine

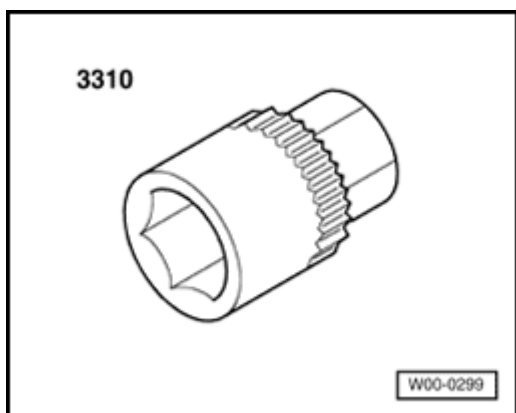
- 1 - Tensioning roller
- 2 - Pulley - generator
- 3 - Pulley - a/c compressor
- 4 - Ribbed belt - crankshaft/vibration damper, tensioning roller, generator, a/c compressor and power steering pump
- 5 - Pulley - power steering pump
- 6 - Pulley - crankshaft/vibration damper

Generator (GEN) ribbed belt pulley, replacing

Special tools and auxiliary items needed



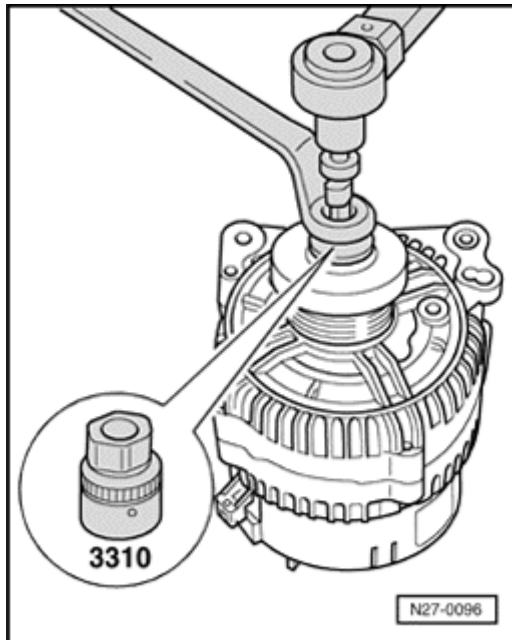
- ◆ VAG 1332 Torque wrench (40 - 200 Nm)



- ◆ 3310 Socket

27-122

Removing and installing



- Loosen/tighten nut at pulley with wrench and adapter 3310 while counter-holding generator drive with appropriate socket as illustrated
- Torque nut to 65 Nm.

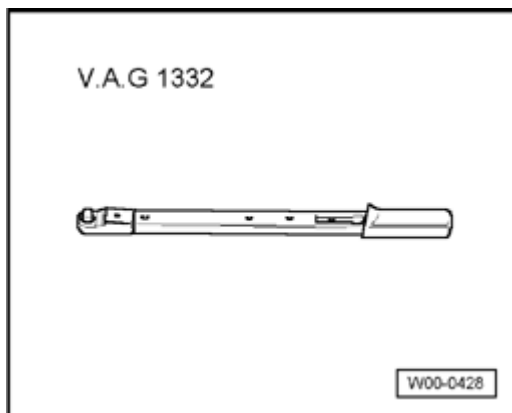
27-123

Ribbed belt pulley with freewheel, installing

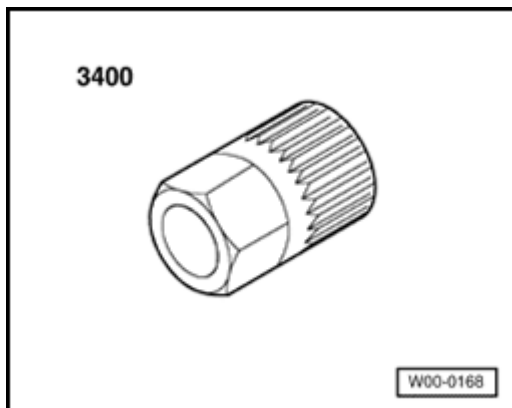
Notes:

- ◆ Ribbed belt pulley with freewheel may be retrofitted to Bosch generators on vehicle through 04.99 production.
- ◆ Ribbed belt pulley with freewheel may not be retrofitted to Valeo generators on vehicle through 04.99 production (replace Valeo Bosch generator and install freewheel pulley where necessary).
- ◆ Ribbed belt pulley with freewheel is installed as a running change on generators (regarding supplier) from 05.99 production.

Special tools and auxiliary items needed



- ◆ VAG 1332 Torque wrench (40 - 200 Nm)

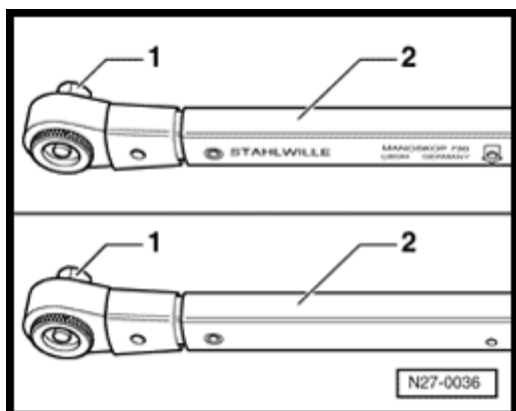


- ◆ 3400 Multi-tooth adapter
- ◆ 3410 10 mm socket

Installing

- If retrofitting pulley with freewheel, first re existing ribbed belt pulley ⇒ [Page 27-12](#)
- Insert multi-spline adapter 3400 in freewheel disc.
- Screw freewheel disc by hand onto generator drive shaft onto stop.

The torque wrench must be rearranged before installing the freewheel disc as follows:

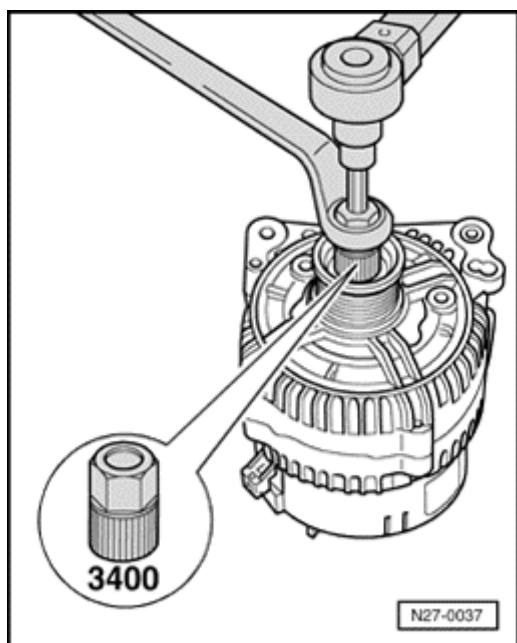


4

- Release socket drive -1- and pull off grip
- Turn torque wrench grip -2- through 180° and reinsert socket drive.

27-125

- Set wrench direction of turn on socket drive counter-clockwise.
- Set torque wrench tightening torque to 80
- Fit 10 mm socket 3410 onto generator drive shaft.



- Tighten nut at pulley with wrench and adapter 3400 while counter-holding generator drive socket 3410 as illustrated.
- Turn generator drive counter-clockwise a torque nut to 80 Nm.
- Clip protective cap onto freewheel disc.

Generator (GEN), tightening torques

All engines, tightening torques

Location / Fastener		Tightening torque
Generator B+ (1) terminal / nut	M8	15 Nm
Generator D+ terminal / nut	M5	3 Nm
Generator to bracket / bolt	M8 X 85	25 Nm
Generator pulley without freewheel / nut		65 Nm
Generator pulley with freewheel / nut		80 Nm

27-127

**4-cylinder gasoline engines,
tightening torques**

Location / Fastener	Tightening torque
Bracket to engine block / bolts M10	45 Nm
Tensioner to engine block / bolts M8	25 Nm

**6-cylinder gasoline engines,
tightening torques**

Location / Fastener	Tightening torque
Bracket to engine block / bolts M8	25 Nm
Tensioner to engine block / bolts M8	25 Nm

4-cylinder TDI engines, tightening torques

Location / Fastener	Tightening torque
Bracket to engine block / bolts M10	45 Nm
Tensioner to bracket / bolts M8	25 Nm

**4-cylinder TDI - PD engines,
tightening torques**

Location / Fastener	Tightening torque
Bracket to engine block / bolts M10	45 Nm
Tensioner to engine block / bolts M8	25 Nm

Cruise Control System (CCS) through m.y. 2001

General information

All cruise control system functions are controlled by the applicable Engine Control Module (ECM). The processing of electronic engine controls and cruise control functions are integrated in the ECM. Other than the cruise control switches on the steering column/multifunction steering wheel, the clutch and brake pedal switches and related wiring, there are no separate cruise control components to be serviced.

As all electronic throttle control operations are monitored by On Board Diagnostic (OBD), Diagnostic Trouble Codes (DTC) pertaining to engine electronics that are stored in DTC memory may be relevant to cruise control function.

Always check DTC memory first before troubleshooting (Function 02) ⇒ *Repair Manual, Fuel Injection and Ignition, Repair Group 01* .

Cruise Control System (CCS) through m.y. 2001, servicing

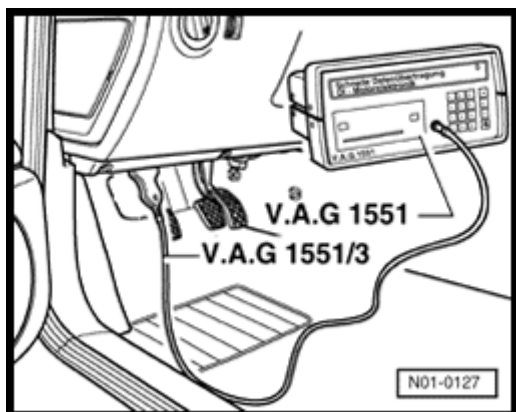
The operating status of the cruise control system, cruise control switches, brake and clutch switches can be checked using the following procedures:

Special tools and auxiliary items needed

- ◆ VAG 1551 / 1552 Scan Tool (ST) with VAG 1551/3 adapter cable, or VAS 5051 Vehicle Diagnostic Testing and Information System
- ◆ Connector test kit VW 1594
- ◆ Test box VAG 1598A
- ◆ Multimeter Fluke 83
- ◆ Wiring diagram

Test requirements

- Battery (B+) voltage at least 11.5 V
- Ground connections on engine, transmission and battery OK
- Diagnostic Trouble Code (DTC) memory of Engine Control Module (ECM) checked and OK
- Fuse S5 OK
- Fuse S43 OK



VAG - ON BOARD DIAGNOSTIC HELP

1 - Rapid data transfer

2 - Blink code output

VAG 1551 Scan Tool (ST), connecting and selecting functions

- ✦ - Connect VAG 1551 Scan Tool (ST) to Data Link Connector (DLC) using VAG 1551/3A adapter cable.

✦ Indicated on display ¹⁾

¹⁾ Operating modes 1 and 2 are displayed alternately

Notes:

- ◆ If the display remains blank, check VAG 1551 voltage supply according to wiring diagram

⇒ Electrical Wiring Diagrams, Troubleshooting & Component Locations

- ◆ Additional operating instructions can be printed out by pressing the HELP button.
- ◆ The → button is used to advance through the program sequence.
- ◆ In "Rapid data transfer" operating mode 1, all vehicle control modules with OBD capability can be checked automatically using "Automatic Test Sequence" address word 00.

- Switch ignition on.
- Switch printer on by pressing PRINT button (indicator light in button lights up).

Test sequence

Notes:

- ◆ *If cruise control is inoperative on models with 1.9L TDI engine, check if system is activated = [Page 27-139](#) .*
- ◆ *If cruise control is inoperative on models with 1.8L Turbo engines, 2.8L VR6 engines and 2.0L engines, code AVH & AZG, check if system is activated ⇒ [Page 27-141](#) .*
- Press buttons -0- and -1- to select Address wor 01: "Engine electronics".

06A906018AB Motronic M5.9.2 HS V06 →
Coding 00000 WSC 00000



Display will appear as shown (gasoline engine example only)

- Press → button.

Rapid data transfer HELP
Select function XX



Display will appear as shown

- Press buttons -0- and -8- to select Function 08: "Read measuring value block".
- Press -Q- button to enter input.

Read measuring value block HELP
Input Display group number XXX



Display will appear as shown

For 1.8L, 2.0L and 2.8L gasoline engines:

- Press buttons -0-, -6- and -6- to select "Display group 66".

For 1.9L TDI engine:

- Press buttons -0-, -0- and -6- to select "Display group 06".

Continued for all engines:

- Press -Q- button to enter input.

Read measuring value block XX →

1	2	3	4
---	---	---	---



Display will appear as shown

- Note values in display fields 2 - 4 and refer to the following engine type specific tables to interpret values:

- ◆ 1.8L Turbo and 2.8L VR6 ⇒ [Page 27-136](#) .
- ◆ 2.0L (code AEG) ⇒ [Page 27-137](#) .
- ◆ 2.0L (codes AVH & AZG) ⇒ [Page 27-136](#) .
- ◆ 1.9L TDI ⇒ [Page 27-138](#) .

Notes:

- ◆ *The road speed signal input to the ECM for cruise control function can be confirmed by performing a road test and observing that the km/h value indicated in display field 1 changes.*
- ◆ *Always observe the appropriate safety precautions during road test*

⇒ *Repair Manual, Fuel Injection and Ignition, Repair Group 01.*

1.8L Turbo and 2.8L VR6

2.0L (codes AVH & AZG)

Display Group	Display Field	Designation	Test Conditions	Display	Corrective Actions
66	2 ¹⁾	Clutch vacuum vent valve -F36- and Brake switch -F47-	Clutch and brake not depressed	1000 ¹⁾	- Check for open/short circuit in wiring and connections to -F36- and/or -F47- using wiring diagram - Checking -F36- and/or -F47- ⇒ <i>Repair Manual, Fuel Injection and Ignition, Repair Group 24, "Additional signals, checking"</i>
			Brake depressed	1011	
			Clutch depressed	1100	
	4	Cruise control switch -E45-	-E45- in OFF position	0000	- Check for open/short circuit in wiring and connections to -E45-, -E227- and Engine Control Module (ECM) using wiring diagram
			-E45- in OFF position before switch point	0001	
			-E45- in ON position	0011	
			-E45- in RES position	1011	
		Button for cruise control SET - E227-	-E45- in ON position -E227- SET	0111	

			button depressed		
--	--	--	---------------------	--	--

1) If the value indicated in display field 2 begins with 0 the cruise control system is not activated (e.g.: 0000 = clutch and brake not depressed, system not activated). To activate cruise control ⇒ [Page 27-141](#) .

2.0L (code AEG)

Display Group	Display Field	Designation	Test Conditions	Display	Corrective Actions
66	2	Clutch vacuum vent valve -F36- and Brake switch -F47-	Clutch and brake not depressed	1000	- Check for open/short circuit in wiring and connections to -F36- and/or -F47- using wiring diagram - Checking -F36- and/or -F47- ⇒ <i>Repair Manual, Fuel Injection and Ignition, Repair Group 24, "Additional signals, checking"</i>
			Brake depressed	1111	
			Clutch depressed	1110	
	4	Cruise control switch -E45-	-E45- in OFF position	0011	- Check for open/short circuit in wiring and connections to -E45-, -E227- and Engine Control Module (ECM) using wiring diagram
			-E45- in OFF position before switch point	0010	
			-E45- in ON position	0000	
			-E45- in RES position	1000	
		Button for cruise control SET - E227-	-E45- in ON position -E227- SET button depressed	0100	

1.9L TDI

Display Group	Display Field	Designation	Test Conditions	Display	Corrective Actions
06	2	Clutch vacuum vent valve -F36- and Brake switch -F47-	Clutch and brake not depressed	0 0 0	- Check for open/short circuit in wiring and connections to -F36- and/or -F47- using wiring diagram
			Brake depressed	0 1 1	
			Clutch depressed	1 0 0	
			Clutch and brake depressed	1 1 1	
	3	Cruise control switch -E45-	-E45- in OFF position	000000	- Check for open/short circuit in wiring and connections to -E45-, -E227- and Diesel Direct Fuel injection Control Module (ECM) using wiring diagram
			-E45- in OFF position before switch point	000001	
			-E45- in ON position	000011	
			-E45- in RES position	001011	
		Button for cruise control SET - E227-	-E45- in ON position -E227- SET button depressed	000111	
	4	System status	System activated, -	1	

			E45- in ON position		
			System activated, - E45- in OFF position	0	
			System not activated	255	- Activate cruise control ⇒ Page 27-139

Cruise control system - 1.9L TDI, activating

If a Diesel Direct Injection Engine Control Module (ECM) has been replaced, it may be necessary to activate the cruise control function in the new ECM. Check system status and activate/deactivate system using the following procedure:

- Connect VAG 1551 / 1552 Scan Tool ⇒ [Page 27-133](#) .
- Switch on ignition.
- Press buttons -0- and -1- to select Address word 01: "Engine electronics".

038906018M 1,9l R4 EDC G00SG 0602 →
Coding 00001 WSC XXXXX



Display (example only)

- ◆ If top line of display shows "G00SG", cruise control is activated.
- ◆ If top line of display shows "00SG", cruise control is not activated.

			<ul style="list-style-type: none">- To begin activation sequence press → button.
Rapid data transfer Select function XX	HELP	◀	<p>Display will appear as shown</p> <ul style="list-style-type: none">- Press buttons -1- and -1- to select function 11 "Login procedure"
Rapid data transfer 11 - Login procedure	Q	◀	<p>Display will appear as shown</p> <ul style="list-style-type: none">- Press -Q- button to enter input.
Login procedure Input Code Number XXXXX		◀	<p>Display will appear as shown</p> <ul style="list-style-type: none">- To activate cruise control, enter code number 11463- To deactivate cruise control, enter code number 16167- Press -Q- button to enter input.- End output (function 06) and perform test drive to confirm cruise control functions.

Cruise control system - 1.8L Turbo, 2.0L (codes AVH & AZG) and 2.8L VR6, activating

If a Motronic Engine Control Module (ECM) has been replaced, it may be necessary to activate the cruise control function in the new ECM. Activate/deactivate system using the following procedure:

- Connect VAG 1551 / 1552 Scan Tool ⇒ [Page 27-133](#) .
- Switch on ignition
- Press buttons -0- and -1- to select Address word 01: "Engine electronics".

021906018B Motronic ME7.1 G V06 →
Coding 00000 WSC XXXXX



Display (example only)

- Press → button.

Rapid data transfer HELP
Select function XX



Display will appear as shown

- Press buttons -1- and -1- to select function 11 "Login procedure"

Rapid data transfer Q
11 - Login procedure



Display will appear as shown

- Press -Q- button to enter input.

Login procedure

Input Code Number XXXXX



Display will appear as shown

- To activate or deactivate cruise control system, use scan tool key pad to enter appropriate value from table below:

Engine (code) - m.y.	Activate	Deactivate
1.8L & 2.8L - through m.y. 1999	00003	00004
2.0L, 1.8L & 2.8L - from m.y. 2000 through m.y.2001	11463	16167

- Press -Q- button to enter input.
- End output (function 06) and perform test drive to confirm cruise control functions.

Cruise Control System (CCS) from m.y. 2002

General information

All cruise control system functions are controlled by the applicable Engine Control Module (ECM). The processing of electronic engine controls and cruise control functions are integrated in the ECM. Other than the cruise control switches on the steering column/multifunction steering wheel, the clutch and brake pedal switches and related wiring, there are no separate cruise control components to be serviced.

As all electronic throttle control operations are monitored by On Board Diagnostic (OBD), Diagnostic Trouble Codes (DTC) pertaining to engine electronics that are stored in DTC memory may be relevant to cruise control function.

Always check DTC memory first before troubleshooting.

All CCS troubleshooting and OBD program functions on vehicles from m.y. 2002 should be performed using the VAS 5051 / 5052 Vehicle Diagnostic Testing and Information System in operating mode "Guided Fault Finding" or "Vehicle Self-Diagnosis"

Instrument cluster

General information

The instrument cluster contains an electronic speedometer, tachometer, liquid crystal (LCD) displays for odometer, trip odometer/clock, as well as analog coolant temperature and fuel level gauges. Control and warning lamps are situated within and between the speedometer and tachometer. Automatic transmission models also contain an LCD gear indicator display.

An LCD multi-function trip computer (MFI) with two operating modes is available on some models. When equipped, the MFI display is located between in the tachometer and speedometer. MFI functions include selectable displays for trip time/mileage, average trip speed, average trip fuel consumption and outside temperature.

The instrument cluster also supplements various warning lamp displays with control module-controlled acoustic warnings.

Notes on replacing instrument cluster

- ◆ Do not disassemble instrument cluster.
- ◆ All control and warning lights are Light Emitting Diodes (LEDs) which cannot be serviced separately. LED malfunctions require replacement of instrument cluster.
- ◆ Instrument clusters contain no field serviceable components. Malfunctions require replacement of instrument cluster.

- ◆ When the replacement of a malfunctioning instrument cluster is necessary, follow exchange part procedures.
- ◆ Complete report form and return together with inst. cluster.
- ◆ Use the original packaging from the new cluster when returning modules.
- ◆ The odometer reading must be matched to the new/exchange instrument cluster.

Through m.y. 1999:

⇒ [*Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01.*](#)

From m.y. 2000:

⇒ *VAS 5051/5052 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding"*

Additional information:

- ◆ Complaint/symptom based repairs ("Service Fixes")

⇒ *Technical Bulletins*

- ◆ Instrument cluster, On Board Diagnostic (OBD)

⇒ [*Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01.*](#)

⇒ *VAS 5051/5052 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding"*

On Board Diagnostic (OBD), function

The instrument cluster is controlled by an internal microprocessor with On Board Diagnostic (OBD) capability. If malfunctions occur in monitored sensors and components, Diagnostic Trouble Codes (DTC) will be stored in memory.

If OBD recognizes instrument cluster malfunctions related to the:

- ◆ odometer
- ◆ distance impulse number (K number)
- ◆ speedometer calibration

the trip odometer display will change to show "dEF."

In this case, replace speedometer ⇒ [Page 90-8](#).

Other malfunctions recognized by OBD will not cause the trip odometer display to change as described above.

However, before performing any troubleshooting or inspection, always begin by checking for DTCs using the On Board Diagnostic (OBD) program. DTCs stored in memory are retrieved/checked with VAG 1551 / 1552 Scan Tools (ST) or VAS 5051 / 5052 Diagnostic Testing and Information System

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01.](#)

or

⇒ *VAS 5051/5052 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding"*

Additional information, instrument clusters from m.y. 2000

Instrument clusters from m.y. 2000 are integrated into the vehicle CAN Data Bus network (also be known as "CAN-Bus" or "Data-Bus").

The Data Bus On Board Diagnostic Interface - J533- (which is integrated into the instrument cluster) enables data to be exchanged between the vehicle CAN Data-Bus network and the Data Link Connector (DLC) "K-wire".

The Data Bus On Board Diagnostic Interface - J533- has specific On Board Diagnostic (OBD) capabilities

⇒ [Repair Manual, Electrical Equipment-On Board Diagnostic \(OBD\), Repair Group 01](#)

or

⇒ *VAS 5051/5052 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding"*

Notes on replacing instrument cluster

- ◆ In addition to the normal service procedure of coding the instrument cluster and adapting the odometer reading, the Data Bus On Board Diagnostic Interface -J533- must also be separately coded according to vehicle market version and equipment level variables

From m.y. 2000:

⇒ *VAS 5051/5052 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding"*

Additional information:

- ◆ Complaint/symptom based repairs ("Service Fixes")

⇒ *Technical Bulletins*

- ◆ Instrument cluster, On Board Diagnostic (OBD)

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01.](#)

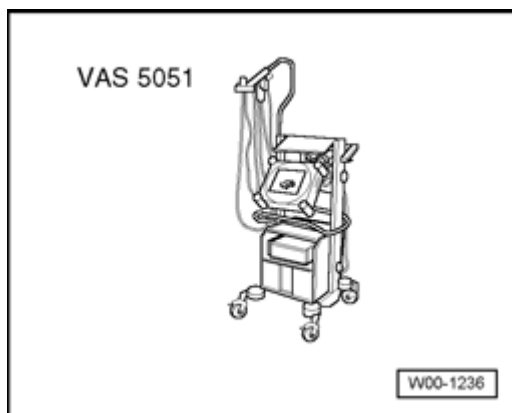
⇒ *VAS 5051/5052 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding"*

Instrument cluster from m.y. 2000, replacing

Note:

The following OBD program procedure applies only to Golf/Jetta/GTI from m.y. 2000 and is performed in conjunction with removal and replacement ⇒ [Page 90-8](#).

Special tools, testers and auxiliary items needed



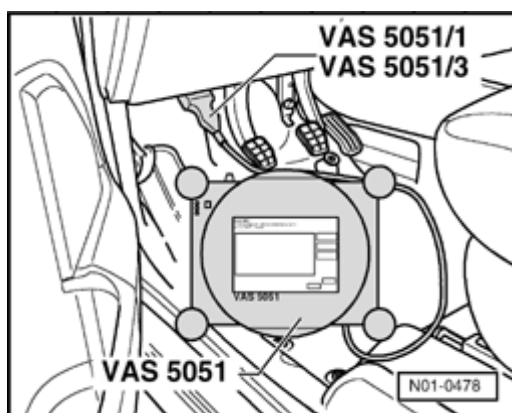
- ◆ VAS 5051 / 5052 Vehicle Diagnostic Testing and Information System
- ◆ Adapter cable VAS 5051/1 or VAS 5051/3

CAUTION!

Switch off all electrical consumers.

VAS 5051 / 5052 , connecting

- Engage parking brake.
- Automatic transmission: Selector lever in "N" or "P" position.
- Manual transmission: Selector lever in "Neutral" position.
- With ignition switched off, connect VAS 5051 / 5052 with adapter cable to Data Link Connector (DLC) located under the instrument panel, left.
- Switch on ignition



- Select mode "Guided Fault Finding"
- Enter appropriate model, equipment and model year information and press ">" to confirm.

After all Control Modules have been registered and DTC memories checked,

- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97)"
- Select "Electrical System (Repair Group 27; 90 to 97)"
- Select "01-Systems capable of self-diagnosis"
- Select "Instrument panel" or "dash panel insert" where indicated
- Select "Functions"
- Select "Replacing instrument cluster with immobilizer 3.gen" or "Instrument cluster, replacing" as applicable.
- Forward with "▶" button
- Follow/perform selected OBD program steps as prompted by tester.

Instrument cluster, removing and installing

Removing

WARNING!

Special safety precautions apply to vehicles equipped with airbags. Refer to Repair Manual, Body-Interior, Airbag: CAUTION and WARNINGS, Repair Group 69.

CAUTION!

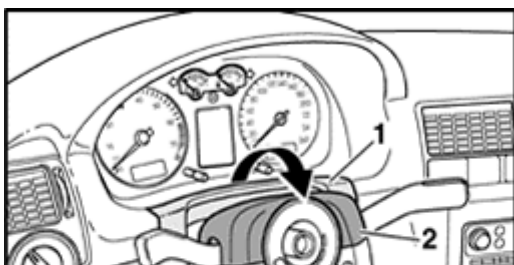
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

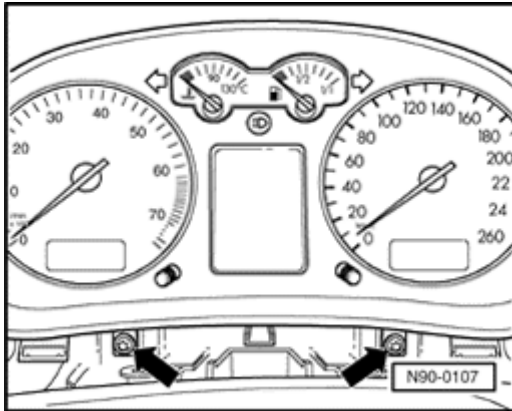
Notes:

- ◆ Removal of instrument cluster is possible without removing the steering wheel. In the following instructions, the steering wheel is shown removed for ease of illustration.
- ◆ All: Observe "Notes on replacing instrument cluster" ⇒ [Page 90-1](#)
- ◆ From m.y 2000: "Notes on replacing instrument cluster" ⇒ [Page 90-4](#).

If replacing a malfunctioning instrument cluster with a new one, note odometer reading on existing cluster prior to removal.

- Release steering wheel position lock, pull steering wheel out completely and lock at lowest position.
- Release cover -1- from clips and place on steering column switch -2- upper cover.

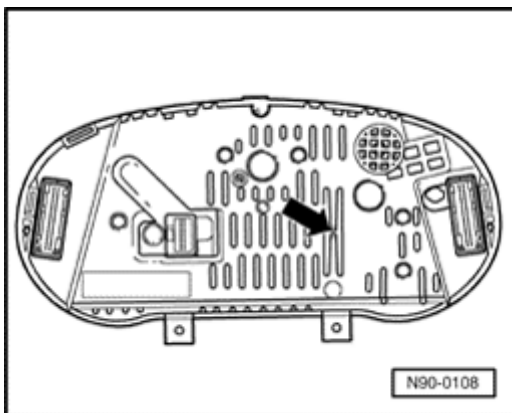




- Remove screws -arrows-.
- Pull instrument cluster out slightly and disconnect electrical connections on rear.
- Separate wiring harness for blue 32-pin multi-pin connector from retainer on rear of instrument cluster (where applicable).
- Remove instrument cluster.

Installing

- Insert instrument cluster into opening and reconnect electrical connections.



- Secure wiring harness for blue 32-pin multi-pin connection to retainer -arrow- on rear of instrument cluster (where applicable).
- Remaining installation in reverse order of removal.
- Perform functional check of instrument cluster.

If replacing a malfunctioning instrument cluster, and a function check shows no further malfunctions, proceed as follows:

Through m.y. 1999

- Code instrument cluster

⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01.](#)

- Adapt odometer reading.

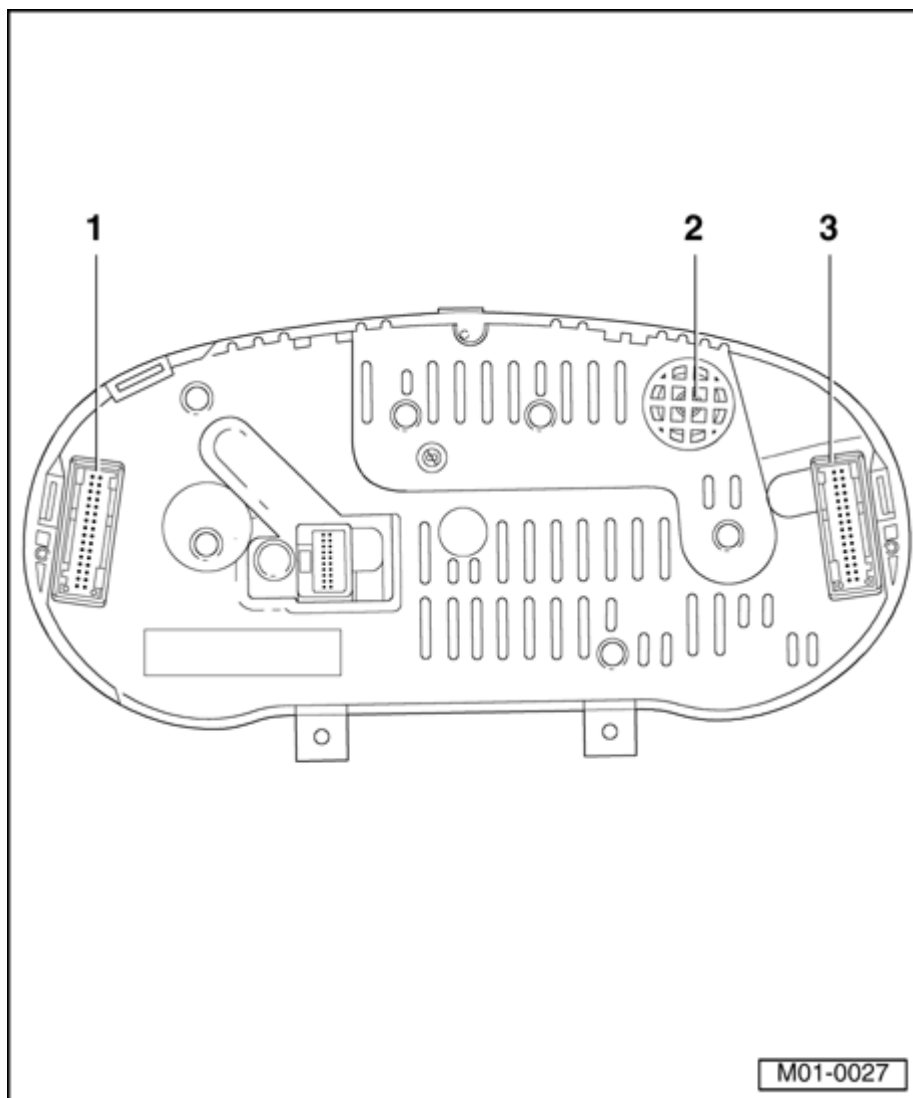
⇒ [Repair Manual, Electrical Equipment On Board Diagnostic \(OBD\), Repair Group 01.](#)

From m.y. 2000

- Perform necessary instrument cluster adaptations and coding, including coding the Data Bus On Board Diagnostic Interface -J533- as per OBD program

⇒ VAS 5051 / 5052 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding" ⇒ [Page 90-6](#) .

90-11



Instrument cluster, rear view

1 - 32 pin multi-pin connector

- ◆ Green
- ◆ Connector assignments through m.y. 1999 ⇒ [Page 90-14](#)
- ◆ Connector assignments from m.y. 2000 ⇒ [Page 90-18](#)

2 - Warning buzzer

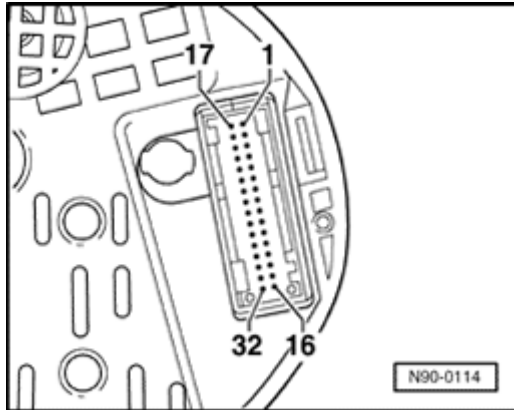
- ◆ Oil pressure warning
- ◆ Lights on warning
- ◆ Brake system malfunction
- ◆ Brake pad/lining wear warning
- ◆ Ignition key warning
- ◆ Seat belt warning

3 - 32 pin multi-pin connector

◆ Blue

◆ Connector assignments through m.y. 1999 ⇒ [Page 90-12](#)

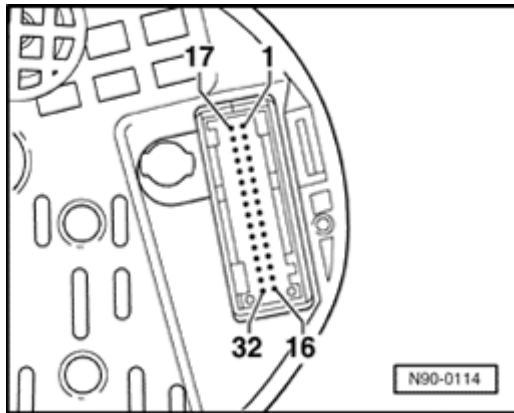
◆ Connector assignments from m.y. 2000 ⇒ [Page 90-16](#)



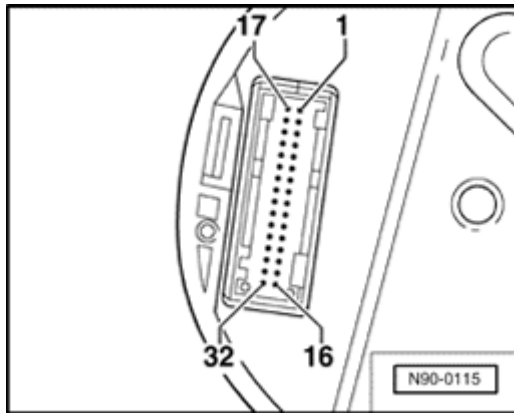
Instrument cluster multi-pin connector assignments through m.y. 1999

32-pin multi-pin connector -T32-, blue

- 1 - Terminal 15 - positive (ignition on)
- 2 - Indicator lamp for turn signal, right
- 3 - Output signal 1 from electronic speedometer
- 4 - Open
- 5 - Fuel gauge
- 6 - Airbag Malfunction Indicator Lamp (MIL)
- 7 - Terminal 31 - sensor/sender Ground (GND)
- 8 - Engine Coolant Temperature (ECT) gauge
- 9 - Terminal 31 - Ground (GND)
- 10 - Oil pressure warning lamp
- 11 - Engine Speed (RPM) signal
- 12 - Terminal 61 - warning lamp for Generator (GEN),
- 13 - Glow plug indicator lamp (Diesel models only)
- 14 - 15 - Open



- 16 - Warning lamp for rear hatch/trunk lid open
- 17 - Terminal 56a - indicator lamp for high beam headlight
- 18 - Indicator lamp for turn signal, left
- 19 - Warning lamp for Anti-lock Brake System (ABS)
- 20 - Terminal 58b - instrument cluster illumination
- 21 - Driver's door open warning buzzer
- 22 - Warning lamp for low Engine Coolant Level (ECL)
- 23 - Terminal 30 - positive (B+)
- 24 - Terminal 31 - Ground (GND)
- 25 - Data Link Connector (DLC) K-wire
- 26 - Parking lights, right (signal for "lights on" warning buzzer)
- 27 - Parking lights, left, (signal for "lights on" warning buzzer)
- 28 - Input signal - Speedometer Vehicle Speed Sensor (VSS)
- 29 - Brake fluid level warning lamp
- 30 - Terminal 86s - Ignition key warning buzzer
- 31 - Seat belt warning lamp/buzzer
- 32 - Malfunction Indicator Lamp (MIL)



◀ **32-pin multi-pin connector -T32a-, green**

1 - 4 - Open

5 - W-wire*

6 - Indicator lamp for low windshield washer fluid*

7 - Brake pad wear indicator*

8 - External buzzer*

9 - Open

10 - Low fuel level warning*

11 - Signal for vehicle stationary*

12 - A/C clutch cut-off - Engine Coolant Temperature (ECT) signal

13 - Warning lamp for dual circuit brake system and handbrake

14 - ASR indicator lamp (traction control)*

15 - 22 - Open

23 - Multi Function Trip Computer (MFI) - top row (display switches forwards)

*) Where applicable

24 - MFI - bottom row (display switches backwards)

25 - MFI - memory switch: reset

26 - MFI - ambient temperature display

27 - 29 - Open

30 - Output signal 2 from electronic speedometer

31 - Automatic transmission selector lever display*

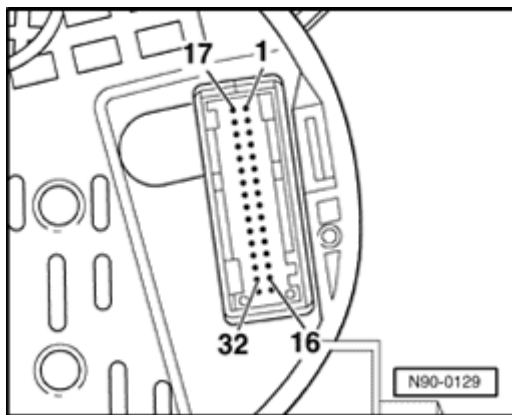
32 - Fuel consumption signal

*) Where applicable

Instrument cluster multi-pin connector assignments from m.y. 2000

Note:

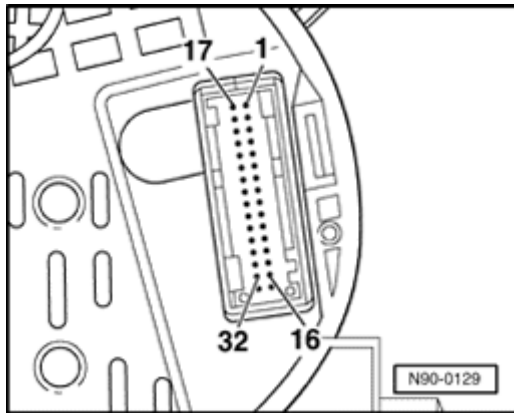
Pin assignments dependent on available/optional equipment present and applicable engine versions.



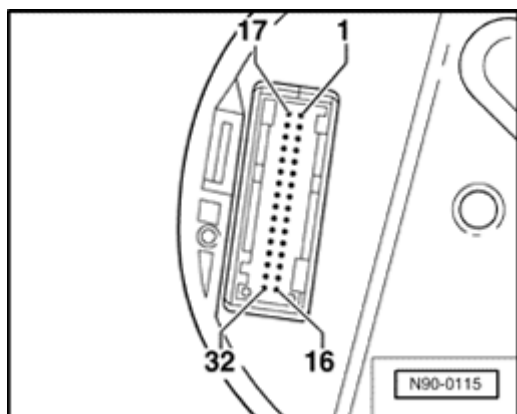
◀ 32 pin multi-connector -T32-, blue

- 1 - Terminal 15 - positive (ignition on)
- 2 - Indicator lamp for turn signal, right
- 3 - Output signal 1 from electronic speedometer
- 4 - Open
- 5 - Fuel gauge
- 6 - Airbag Malfunction Indicator Lamp (MIL)
- 7 - Terminal 31 - sensor/sender Ground (GND)
- 8 - Engine Coolant Temperature (ECT) gauge
- 9 - Terminal 31 - Ground (GND)
- 10 - Oil pressure warning lamp
- 11 - Open
- 12 - Terminal 61 - warning lamp for Generator (GEN),
- 13 - 15 - Open

90-17



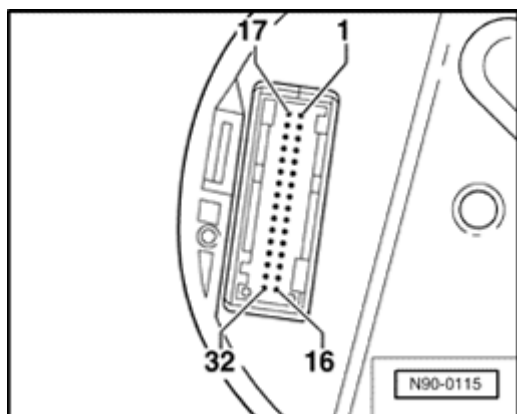
- 16 - Warning lamp for rear hatch/trunk lid open
- 17 - Terminal 56a - indicator lamp for high beam headlight
- 18 - Indicator lamp for turn signal, left
- 19 - Warning lamp for Anti-lock Brake System (ABS)
- 20 - Terminal 58b - instrument cluster illumination
- 21 - Driver's door open warning buzzer
- 22 - Warning lamp for low Engine Coolant Level (ECL)
- 23 - Terminal 30 - positive (B+)
- 24 - Terminal 31 - Ground (GND)
- 25 - Data Link Connector (DLC) K-wire
- 26 - Parking lights, right (signal for "lights on" warning buzzer)
- 27 - Parking lights, left, (signal for "lights on" warning buzzer)
- 28 - Input signal - Speedometer Vehicle Speed Sensor (VSS)
- 29 - Brake fluid level warning lamp
- 30 - Terminal 86s - Ignition key warning buzzer
- 31 - Seat belt warning lamp/buzzer
- 32 - Open



◀ **32 pin multi-connector -T32a-, green**

- 1 - Open
- 2 - Reader coil for immobilizer 1
- 3 - Indicator lamp for parking light*
- 4 - CAN Data Bus, shielded input
- 5 - W-wire*
- 6 - Indicator lamp for low windshield washer fluid
- 7 - Brake pad wear indicator
- 8 - 9 - Open
- 10 - Low fuel level warning
- 11 - Signal for vehicle stationary*
- 12 - A/C clutch cut-off - Engine Coolant Temperature (ECT) signal
- 13 - Warning lamp for dual circuit brake system and handbrake
- 14 - ASR/ESP Indicator lamp (traction control)*
- 15 - 16 - Open
- 17 - Reading coil for immobilizer 2

*) Where applicable



- 18 - Oil level thermal sensor*
- 19 - Interface - CAN Data Hi-Bus
- 20 - Interface - CAN Data Lo-Bus
- 21 - Open
- 22 - Hood alarm switch*
- 23 - Multi Function Trip Computer (MFI) - top row (forwards)
- 24 - MFI - bottom row (backwards)
- 25 - MFI - memory switch: reset
- 26 - MFI - ambient temperature display
- 27 - On Board Diagnostic (OBD) Interface - CAN Data Hi-Bus
- 27 - On Board Diagnostic (OBD) Interface - CAN Data Lo-Bus
- 29 - 32 - Open

*) Where applicable

Windshield wiper system

CAUTION!

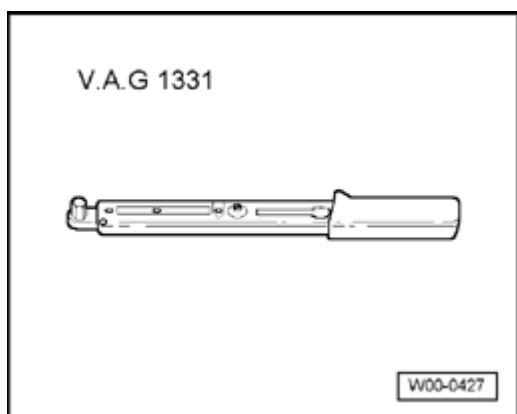
Before beginning repairs on the electrical system:

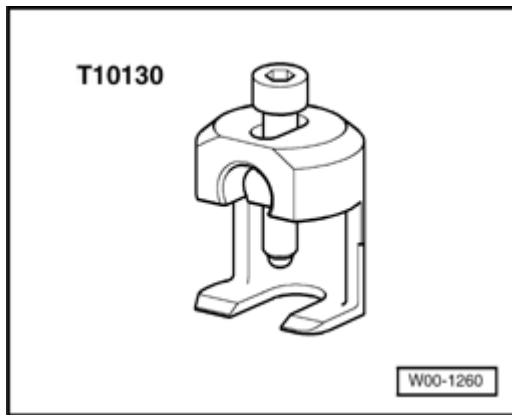
- ◆ **Obtain the anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Disconnect negative (-) battery terminal.**
- ◆ **When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD programming and electrical system function checks specified in this Repair Manual ⇒ [Page 39](#).**

Windshield wiper assembly, removal and installing

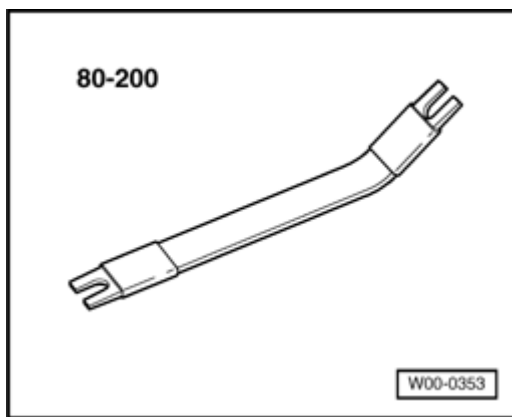
Special tools and auxiliary items needed

- ◆ VAG 1331 Torque wrench (or equivalent Nm)





◀ ◆ T10130 Puller



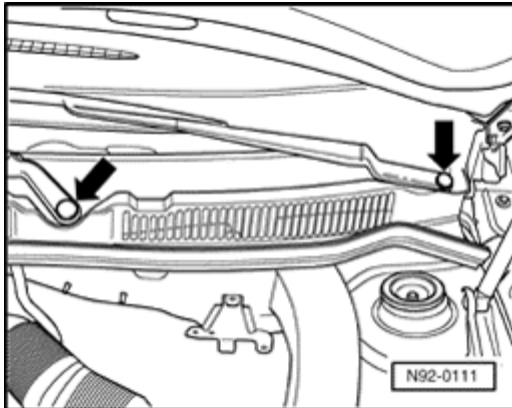
◀ ◆ 80-200 Pry lever

Windshield wiper assembly, removing

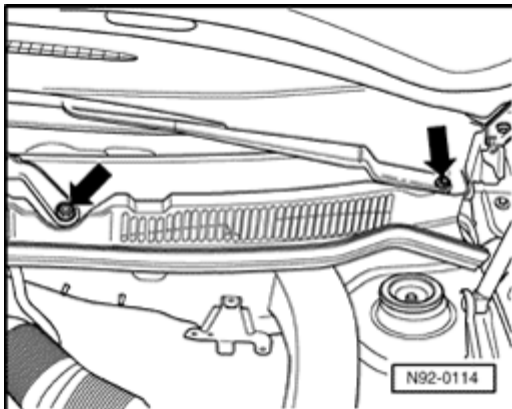
Notes:

- ◆ *Wiper arms and cowl panel must be removed prior to removal of wiper assembly (wiper motor, frame and linkage).*
- ◆ *Before removing wiper arms, briefly run wipers and confirm wiper motor is in park position. Only then can the wiper arm end position be correctly set when installing.*

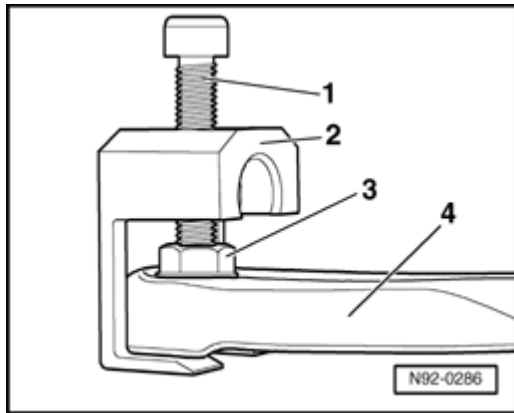
- Disconnect battery ⇒ [Page 27-39](#) .

Wiper arms, removing

- ▲ - Pry-off caps -arrows- with a screwdriver.



- ▲ - Loosen nuts -arrows- (do not remove).

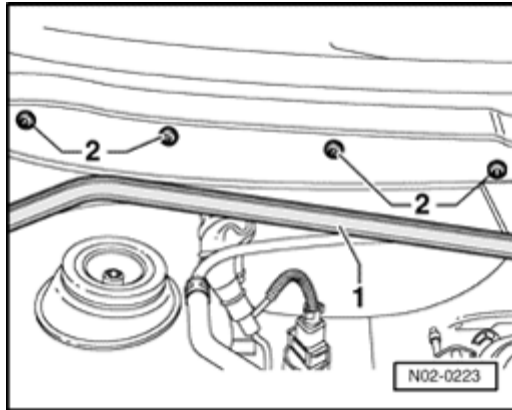


- Place locating arms of puller T10130 -2- under wiper arm -4- as illustrated.
- Turn spindle screw -1- clockwise until it engages the wiper shaft and previously loosened nut -3- (the nut serves as a centering guide for spindle - 1-).
- Continue to turn spindle screw -1- clockwise until the wiper arm -4- releases from shaft.
- Turn spindle screw -1- counterclockwise until puller can be released from assembly.
- Remove nut -3- completely and remove wiper arm -4-.
- Repeat for remaining wiper arm.

Cowl panel, removing

Note:

Cowl panel is clipped into a guide rail below windshield.

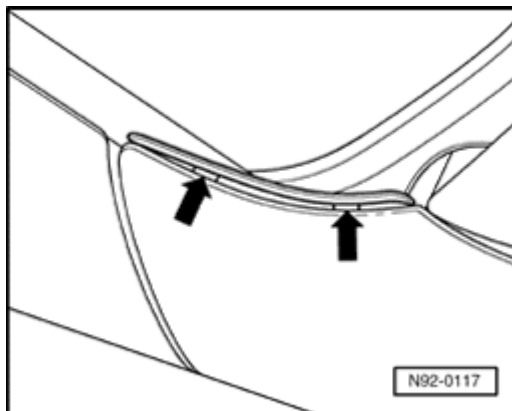


- Pull out rubber seal -1- and remove bolts -2-.

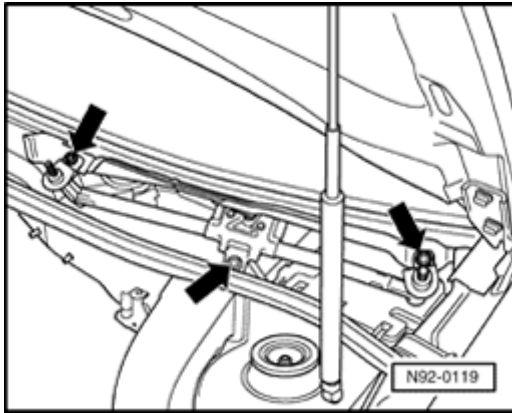
Note:

As of model year 1999, bolts -2- are no longer used, cowl is simply clipped on.

- Remove pollen filter cover.

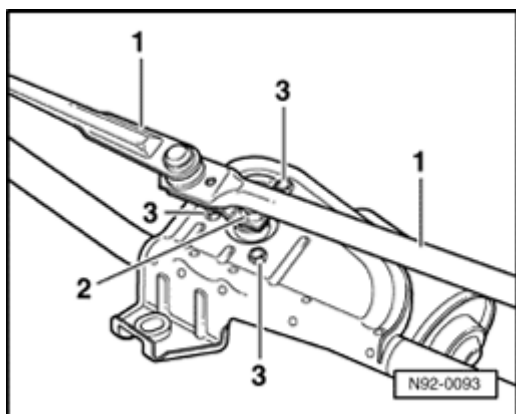


- Unclip inner fender trim -arrows- on both sides.
- Carefully press cowl panel out upward.



◀ Wiper assembly, removing

- Disconnect electrical connection to wiper motor.
- Remove hex bolts -arrows- and washers.
- Remove complete wiper assembly.



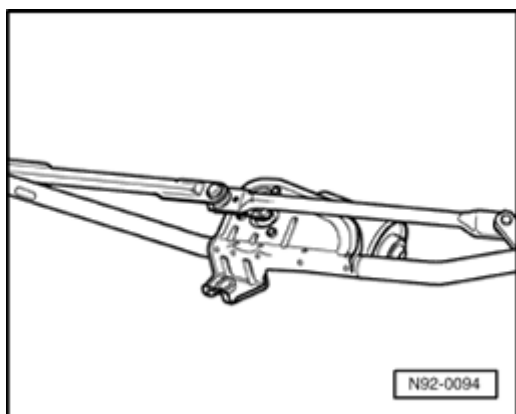
Wiper motor, removing from frame

- Lever both linkages -1- from crank using pry lever 80-200 .
- Remove hex nut -2-.
- Remove crank.
- Remove three mounting bolts -3-.
- Remove motor from frame.

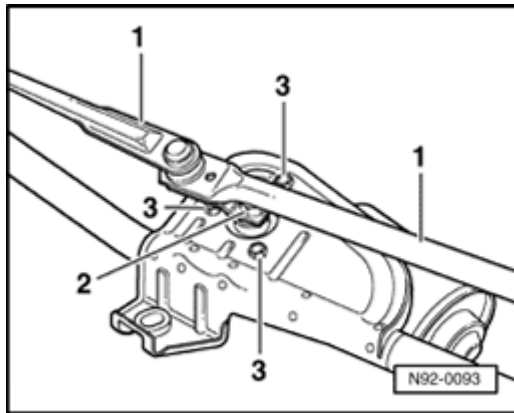
Wiper motor, installing in frame

- Ensure wiper motor is in park position by briefly connecting electrical connection to wiper motor, and operating wiper switch.
- Disconnect electrical connection, insert wiper motor into frame and tighten three mounting bolts.

Tightening torque: 8 Nm



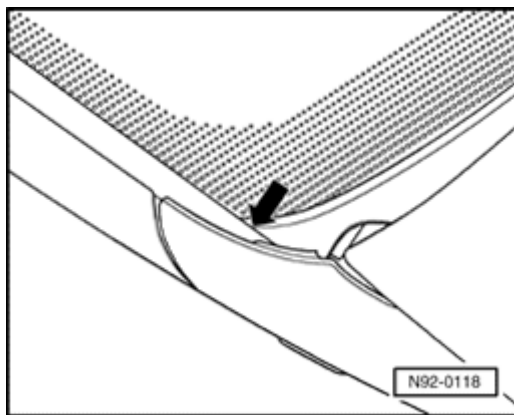
- Install crank onto wiper motor shaft, aligning the linkages so that they are in-line as illustrated.



- Tighten crank hex nut -2-.
- Tightening torque: 20 Nm
- Press linkages -1- onto crank.

Wiper assembly, installing

- Install in reverse order of removal, noting the following:



- Ensure ends of cowl panel are inserted under cowl panel rubber strip on A pillar -arrow-
- Reconnect battery ⇒ [Page 27-39](#) .
- Install wiper arms ⇒ [Page 92-10](#) .

Windshield wiper arms, removing and installing

Removing

Wiper arms, removing ⇒ [Page 92-4](#).

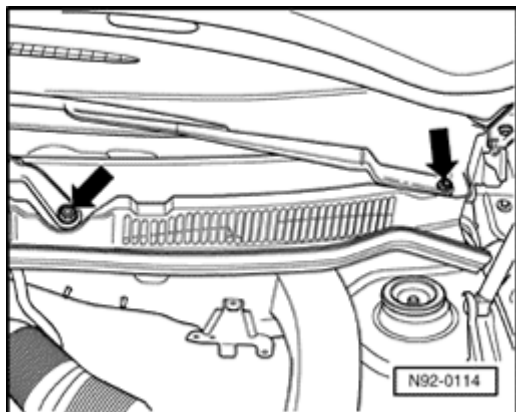
Installing

Note:



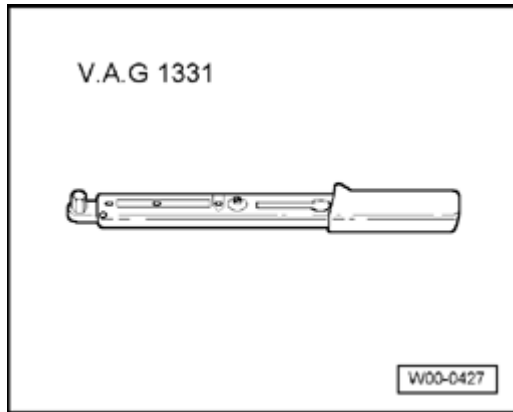
Wiper arm nuts -1- must be only be torqued after the wiper blade park position is adjusted properly.

- Switch ignition on and briefly turn wipers on and off (wipers must come to a complete stop)
- Switch off ignition and remove ignition key.
- Mount wiper arms to wiper shaft and loosely install nuts -1- (do not tighten).
- Adjust wiper blade park position ⇒ [Page 92-11](#).
- Reinstall cover caps.

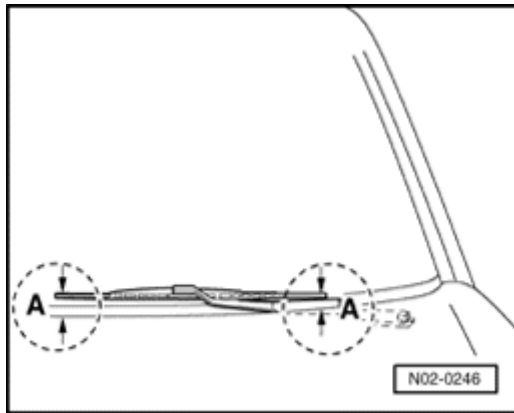


Wiper blade park position, adjusting

Special tools and auxiliary items needed



- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)

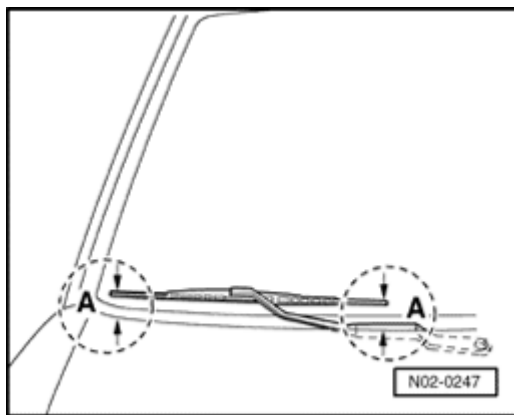


Driver's side:

A - 25 + 10mm (measured at ends of wiper blade)

- Loosen and adjust wiper arm to achieve spec. as necessary.

Wiper arm nut tightening torque: 20 Nm (15 ft. lb)



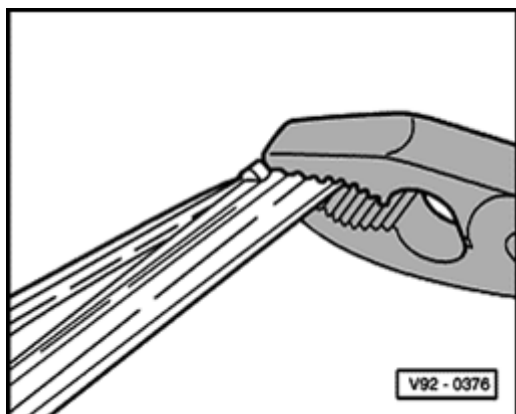
Front passenger's side:

A - 25 + 10mm (measured at ends of wiper blade)

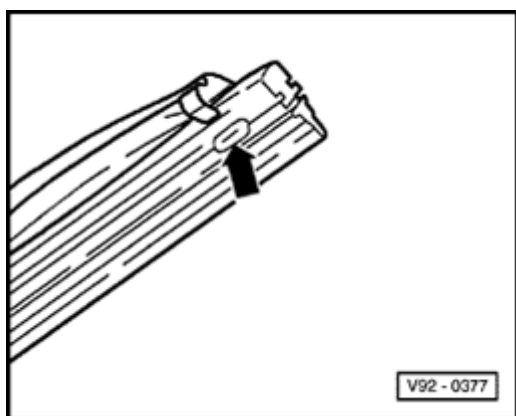
- Loosen and adjust wiper arm to achieve spec. as necessary.

Wiper arm nut tightening torque: 20 Nm (15 ft. lb)

Wiper rubber, removing and installing



- ✦ - Using a pair of pliers, press together both steel strips on enclosed side of rubber, slide rubber sideways out of upper clip and remove rubber complete (slide rubber through remaining clips).



- ✦ - Insert new rubber into lower clips of wiper blade.
- Insert both strips in the first groove of the rubber so that the recesses in the strips face the rubber and engage in the rubber lugs of the groove.
- Using pliers press both steel strips and rubber together and insert in the upper clips so that the lugs of the clips on both sides engage in the retaining slots - arrow- of the wiper blade rubber.

"Aero-wiper" blades, removing and installing

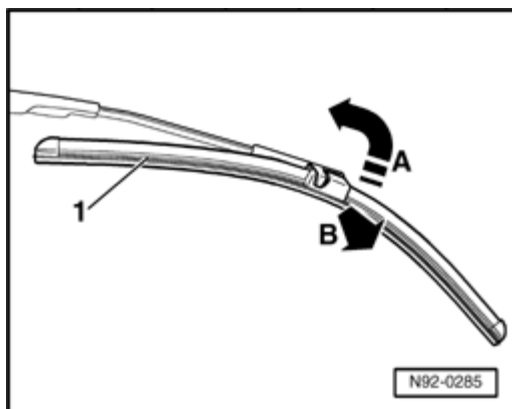
"Aero-wiper" system installed as a running change during m.y. 2002.

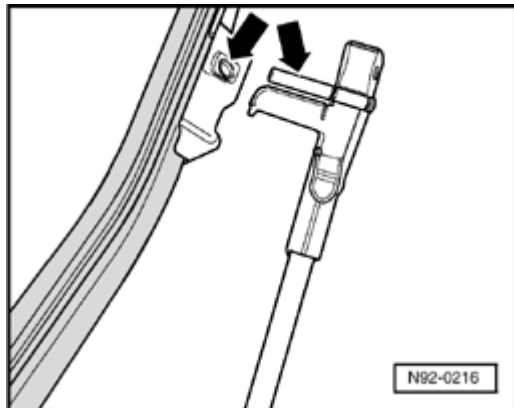
Removing

CAUTION!

- ♦ **To ensure proper wiper performance, grab/lift Aero-wiper blades at the mounting pivot on wiper arm when removing and installing.**
- ♦ **Driver and passenger wiper blades are different lengths. Damage will result if blades are interchanged.**

- Bring wiper arm to park position.
- Switch off all electrical consumers, switch ignition and remove ignition key.
- Lift Aero-wiper blade/arm assembly from windshield, noting CAUTION! above.
- Tilt wiper blade -1 on mounting pivot in direction of -arrow A- until it reaches stop.
- Detach wiper blade from mounting pivot in direction of -arrow B-.





Installing



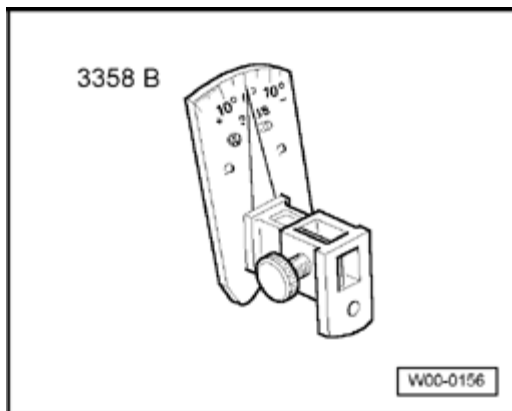
- Insert wiper blade onto wiper arm mounting pivot -arrows-.
- Engage blade by tilting on pivot until blade is parallel with arm.
- Return arm/blade assembly to windshield, noting CAUTION! above.

Wiper blade contact angle, checking and adjusting

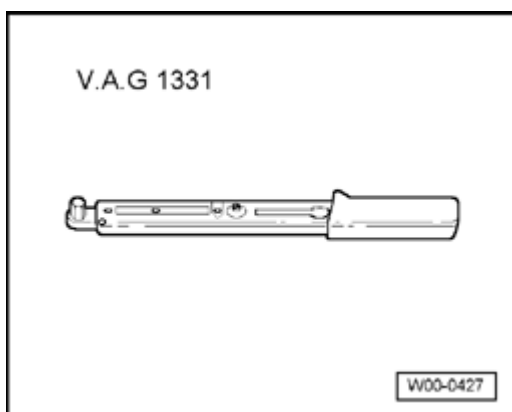
Notes:

- ◆ *The following procedure is not applicable "Aero-wiper" wiper arm/blade design ins as a running change during m.y. 2002.*
- ◆ *Check wiper blade contact angle on conventional blades (through m.y. 2001) wiper blades skip, judder or make noise.*

Special tools and equipment

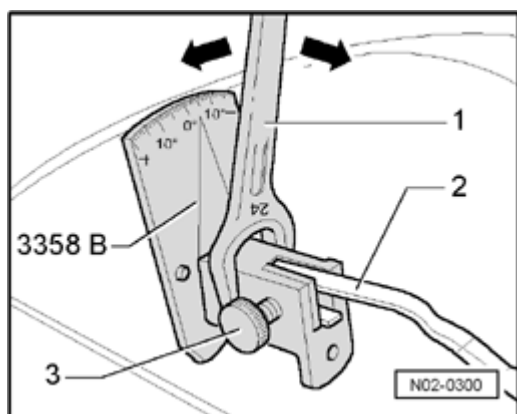


- ◆ Wiper arm setting device 3358B



- ◆ 24 mm open end wrench
- ◆ Torque wrench

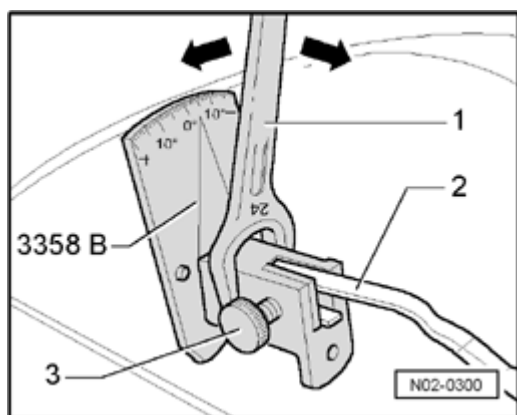
92-17



- Bring wiper arm to park position.
- Remove wiper blade.
- Insert wiper arm -2- into setting device and secure with lock screw -3-.
- Check contact angle.

Contact angle (specification)	
Driver's side	- 8.5 °
Passenger's side	- 1.0 °
Rear window wiper	0 °
Tolerance	± 2 °

Adjust contact angle to specification, if required, as follows:



- Place 24 mm open end wrench -1- on setting device and adjust wiper arm -2- to specification (arrows).
- Release wiper arm -2- from setting device and then re-secure with lock screw -3-.

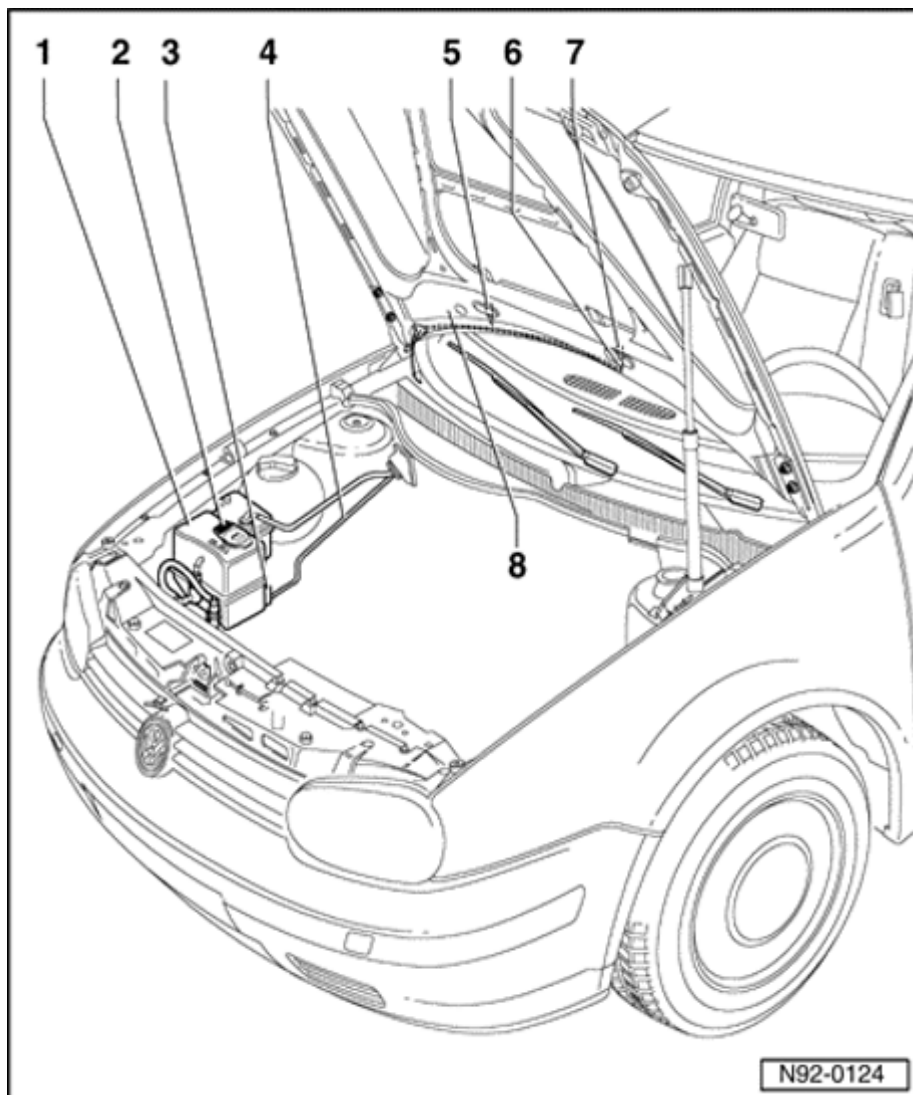
- Compare adjustment readout with table. If necessary repeat adjustment.
- Remove setting device and install wiper blade.

Wiper arm tightening torque: 20 Nm (15 ft. lb)

- Check that wiper system operates without skipping.

Windshield wiper system, tightening torques

Location / Fastener	Tightening torque
Wiper motor to mounting frame / bolts M6	8 Nm
Wiper motor crank to wiper motor / nut M8	20 Nm
Wiper arm to wiper shaft / nut M8	20 Nm



Washer system

Front and rear window washer system, overview

1 - Window & headlight* washer system reservoir

- ◆ Capacity 5.5 liters w/headlight washers*

- ◆ Removing and installing ⇒ [Page 92-22](#)

2 - Cap

3 Windshield - Washer Pump -V5-

- ◆ Removing and installing ⇒ [Page 92-25](#)

4 - Washer hose

- ◆ Repairing ⇒ [Page 92-40](#)

5 - Washer jet

- ◆ Checking and adjusting ⇒ [Page 92-27](#)

◆ Removing
⇒ [Page
92-26](#)

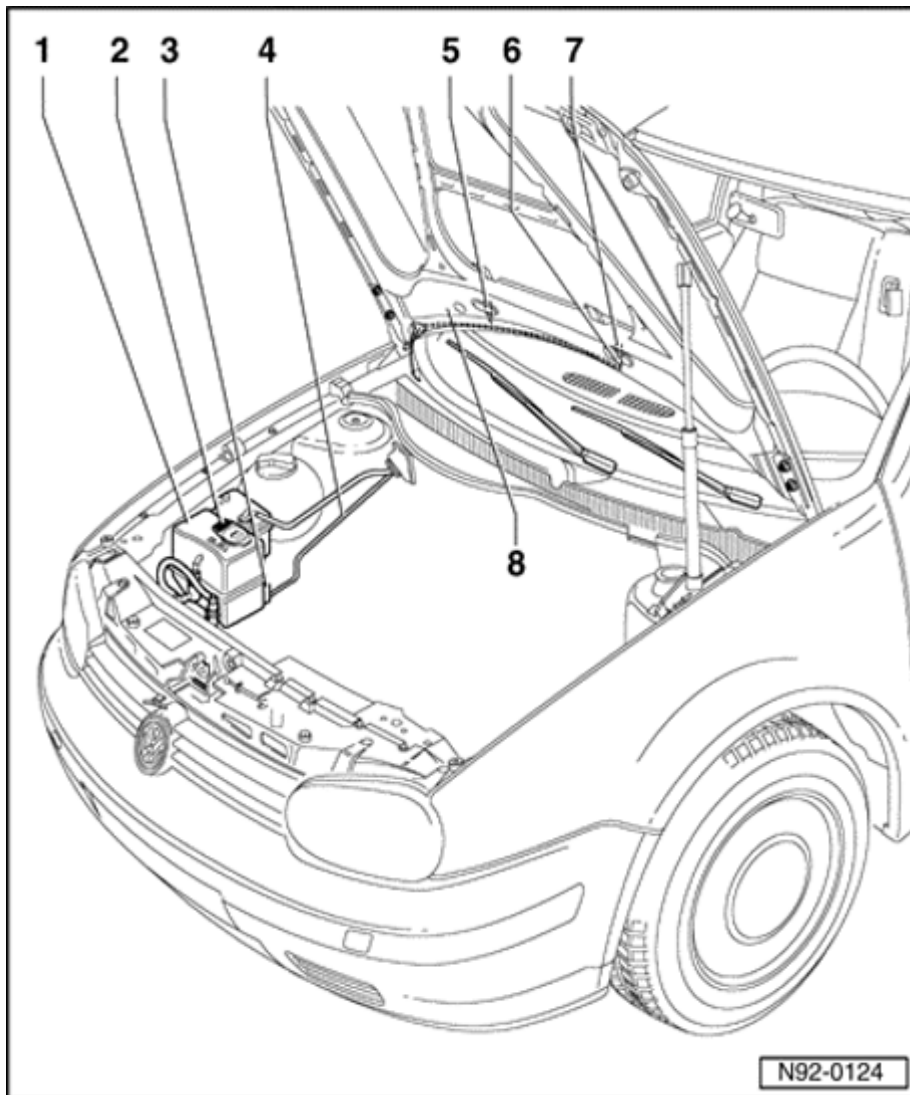
**6 - Washer
jet**

◆ Checking
and
adjusting
⇒ [Page
92-27](#)

◆ Removing
⇒ [Page
92-26](#)

*) Where
applicable

92-21



- 7 - Cover
- 8 - Junction (behind cap)

Window & headlight washer system reservoir, removing and installing

Note:

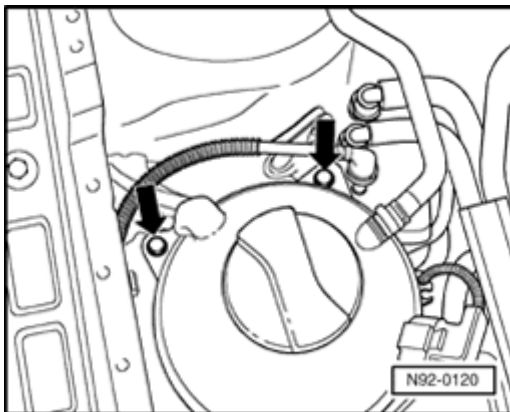
Headlight washer system where applicable.

Removing

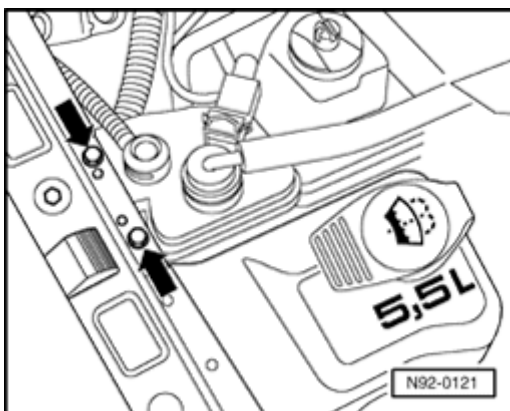
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

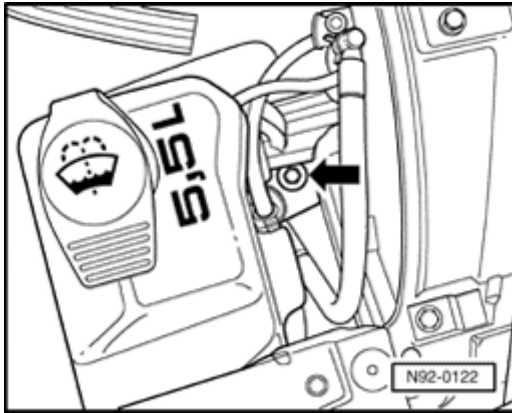


- ▲ - Remove bolts -arrows- for coolant expansion tank and place tank to side with pipes/hoses still connected.

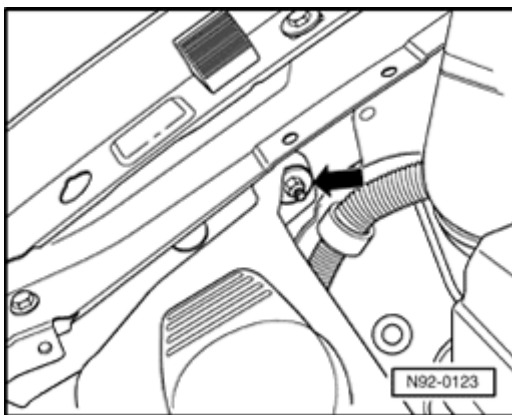


- ▲ - Remove bolts -arrows- from activated charcoal filter and place activated charcoal filter to side with pipes/hoses still connected.

92-23

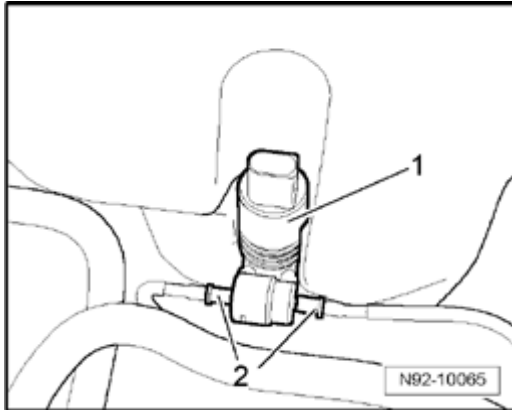


- Remove plastic nut -arrow- from windshield washer fluid reservoir.



- Remove plastic nut -arrow- from windshield washer fluid reservoir.

92-24



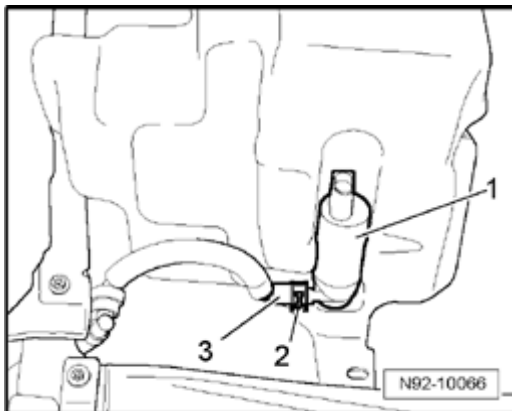
- Disconnect washer pump electrical connection.



- Remove washer hoses -2- from washer pump -1-.

- Allow any remaining washer fluid to drain into suitable container.

- Where applicable, disconnect headlight washer pump electrical connection.



- Release clamp -2- for washer hose connection -2-.

- Remove washer hose connection -2- from washer pump -1-.

- Remove washer reservoir from vehicle.

Installing

Install in reverse order of removal.

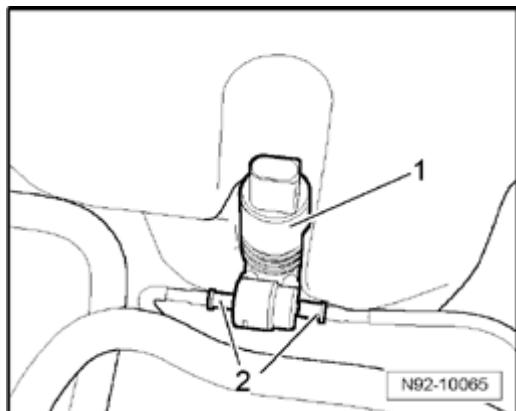
Windshield Washer Pump -V5- , removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Remove washer reservoir ⇒ [Page 92-22](#) .

With the electrical connection and washer hoses removed from the washer pump

- Pull washer pump -1- straight up and out of retainer in reservoir.

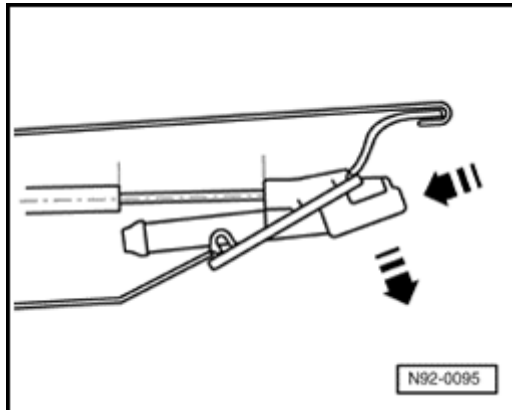
Installing

Install in reverse order of removal.

Windshield washer jets, removing a installing

Removing

- Pull hose off spray jet and disconnect ele connection (where applicable).
- Press jet forward and remove downward.



Installing

Install in reverse order of removal.

Check and adjust jets if necessary ⇒ [Page](#)

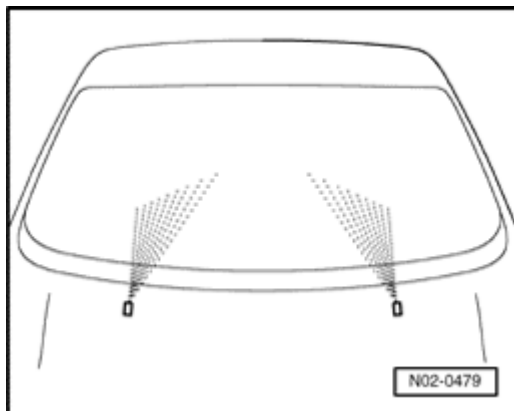
Windshield washer jets, checking and adjusting

CAUTION!

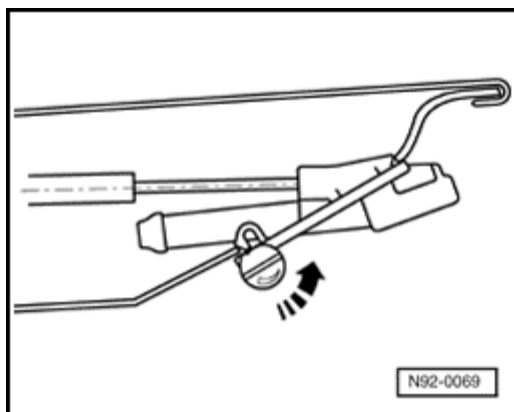
Washer jets must not be cleaned opposite to the spray direction, e.g.: blown through from front.

Through m.y. 1999

Washer jets are preset but small height adjustments can be made.



✦ If both spray fields are not at the same height (as illustrated), correct as follows:

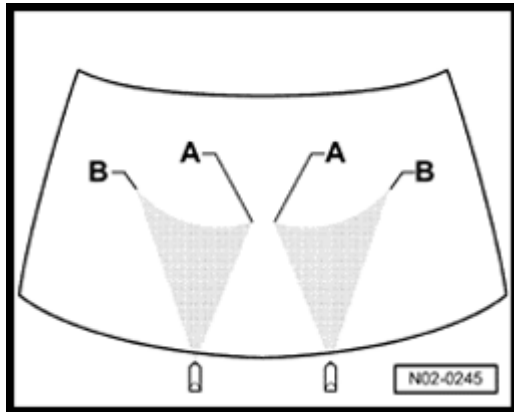


✦ - Slightly turn eccentric on spray jet in direction of arrow with a screwdriver.

From m.y. 2000

- ◆ New design washer jets are installed from 2000.

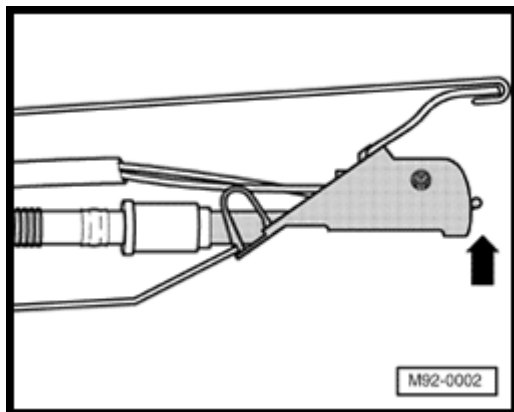
Washer jets are preset but small height adjustments can be made.



- ◀ Both spray fields are defined with points A & B

Distance between points A & B and upper windshield are indicated in a straight line as follows.

Point	Distance
A	480 mm (18.8 in.)
B	400 mm (15.7 in.)



- ◀ - Move spray jet in direction of arrow with f

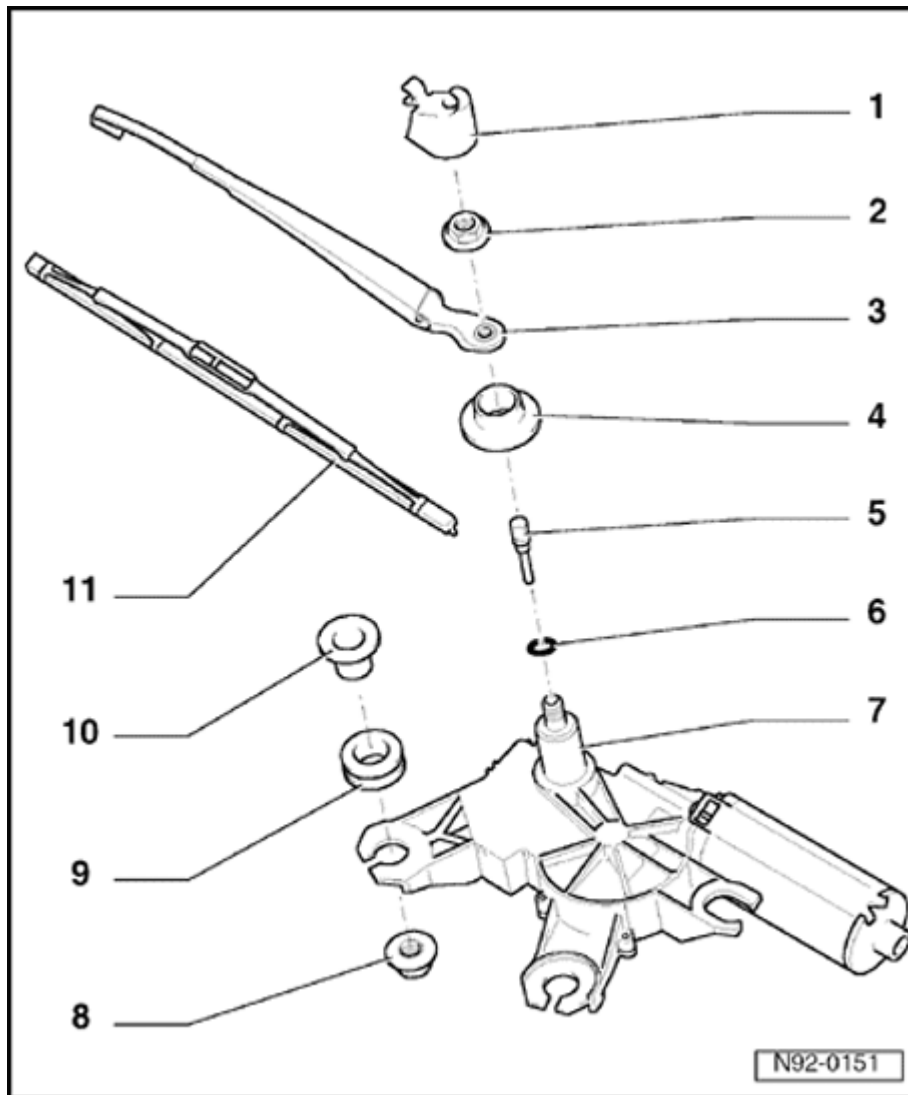
Rear window wiper & washer system

CAUTION!

Before beginning repairs on the electrical system:

- ◆ ***Obtain the anti-theft radio security code.***
- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***
- ◆ ***Disconnect negative (-) battery terminal.***
- ◆ ***When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified in this Repair Manual ⇒ [Page 27-39](#) .***

92-30



Rear window wiper & washer system, assembly

1 - Cap

2 - Hex nut
13mm

◆ 15
Nm

3 - Wiper
arm

◆ Adjusting
rest
position
⇒ [Page
92-35](#)

4 - Seal

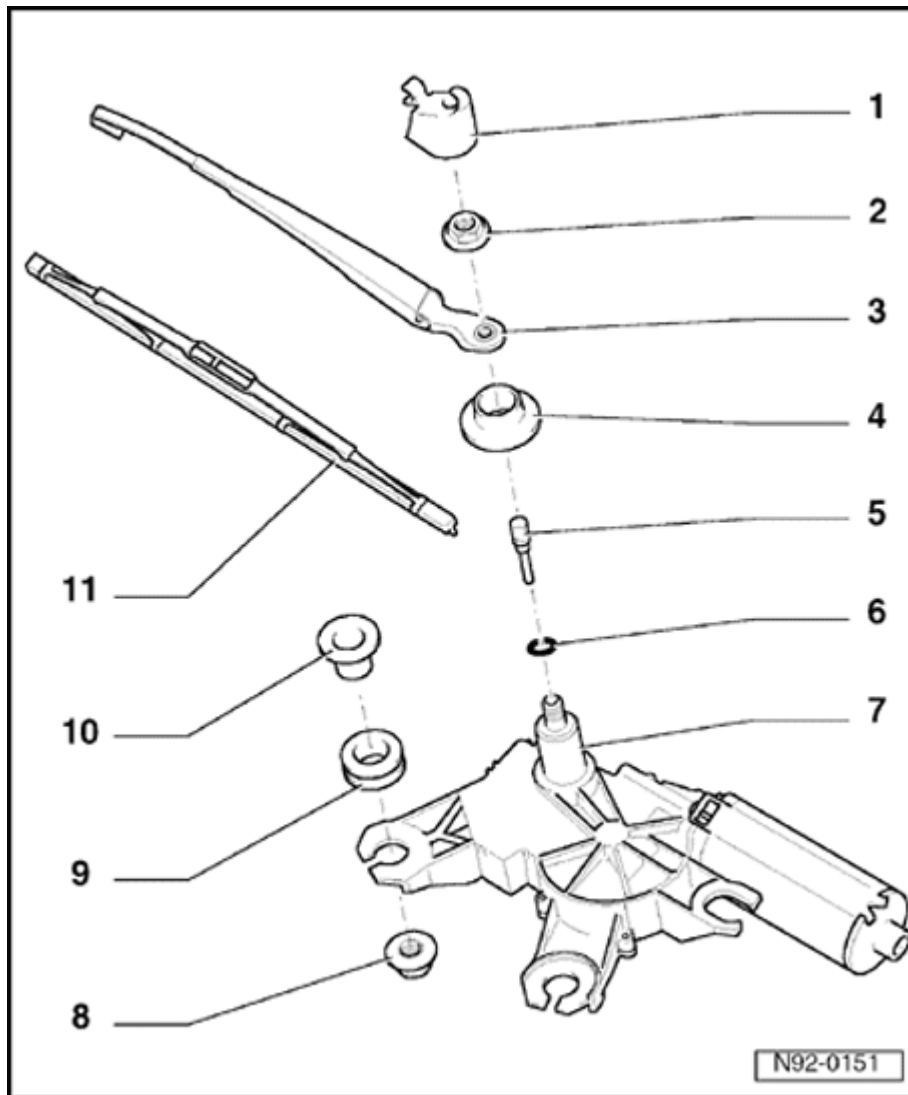
5 - Washer
jet

◆ Adjusting
⇒ [Page
92-37](#)

◆ Replacing
⇒ [Page
92-36](#)

6 - Seal

92-31



7 - Rear Window Wiper Motor - V12-

◆ Removing and installing
⇒ [Page 92-33](#)

8 - Hex nut M6

◆ 8 Nm

9 - Rubber ring

10 - Spacer

11 - Wiper blade

◆ Removing and installing wiper rubber ⇒ [Page 92-13](#)

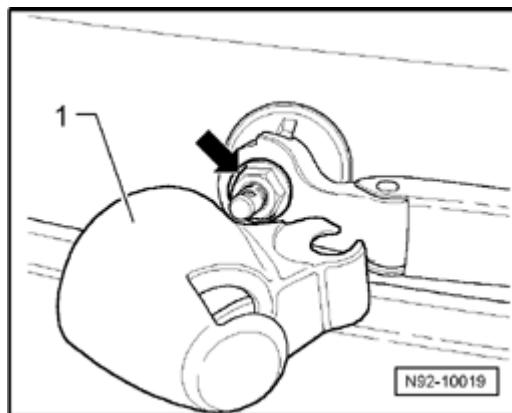
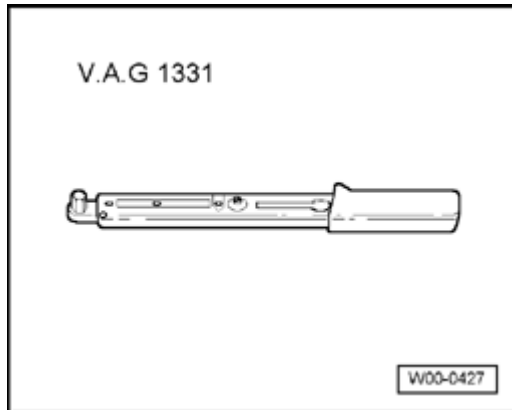
Rear window wiper assembly, removing and installing

Special tools and auxiliary items needed

- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)

Wiper arm, removing

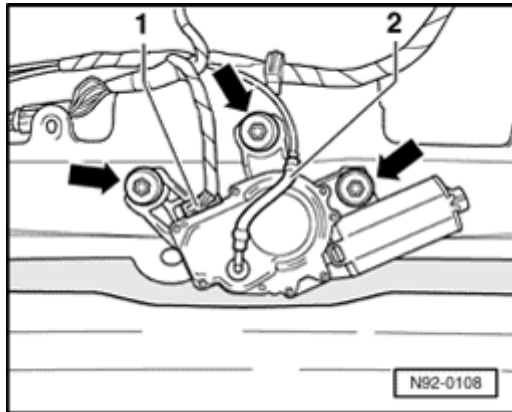
- Switch ignition on and briefly operate rear wiper to bring rear wiper to park position.
 - Disconnect battery ⇒ [Page 27-39](#).
-
- Fold open cover cap -1- and pull off from wiper arm.
 - Loosen nut -arrow-.
 - Fold up wiper arm and rock back and forth on shaft until it releases.
 - Remove nut and remove wiper arm.



Rear window wiper motor -V12-, removing

- Remove inner, lower trim from rear lid

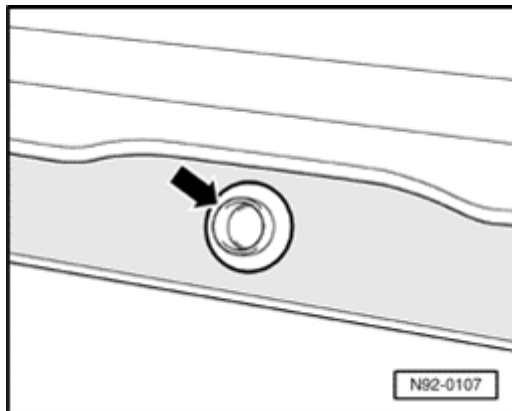
⇒ [Repair Manual, Body Interior, Repair Group 70](#)



- ◀ - Disconnect electrical connection - 1- from wiper motor.
- Pull off hose -2- to washer jet.
- Remove nuts -arrows- and remove wiper motor.

Installing

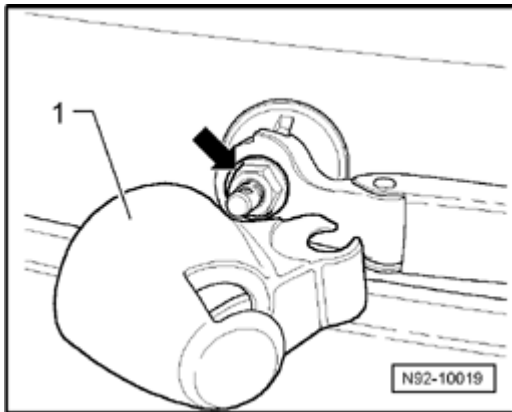
Install in reverse order of removal, noting the following:



- ◀ Ensure wiper shaft seal -arrow- seats correctly in rear window.
- Reconnect battery ⇒ [Page 27-39](#).

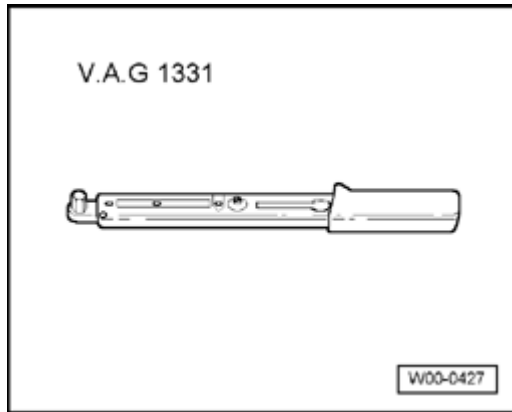
Wiper arm, installing

- Switch ignition on and briefly operate rear wiper to bring rear wiper to park position.
- place wiper arm on shaft in approximate rest position.
- Install nut -arrow- and tighten by hand on shaft.
- Set rear wiper rest position ⇒ [Page 92-3](#).

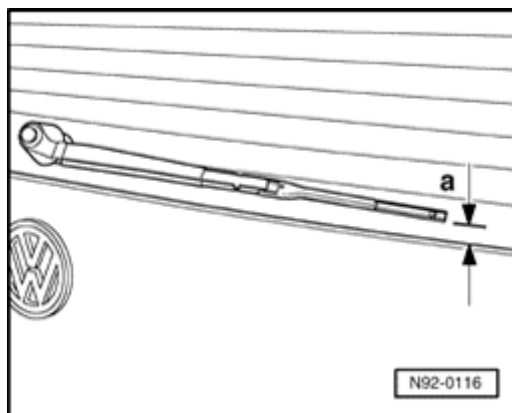


Rear window wiper rest position, adjusting

Special tools and auxiliary items needed



- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)



Gap -a- between wiper rubber and lower edge of windshield must be:

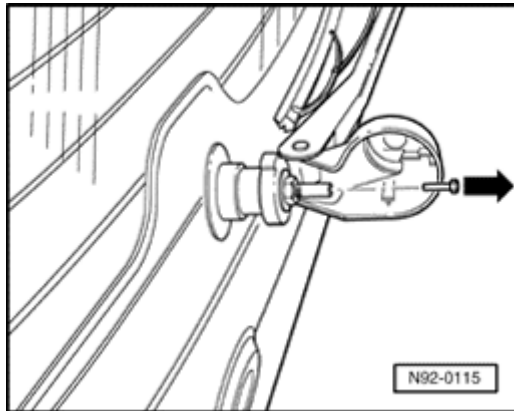
- ◆ Golf: 25 mm
 - ◆ Jetta Wagon: 20 mm
- Loosen and adjust wiper arm to achieve spec. as necessary.

Wiper arm tightening torque: 15 Nm

Rear window washer jet, replacing

Removing

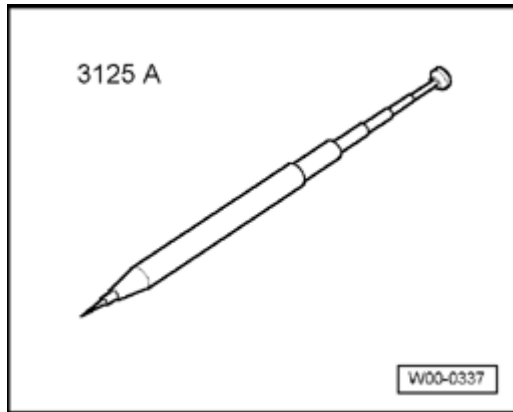
- Switch ignition on and briefly operate rear wiper to bring rear wiper to park position.
- Fold open cover cap -1- and pull off from wiper arm.
- Pull spray jet out carefully in direction of arrow using suitable pliers.



Installing

- Slide spray jet into wiper arm shaft onto stop with spray jet opening facing horizontally upward.
- Check and adjust spray pattern if necessary. [Page 92-37](#).
- Replace cover cap.

92-37



Rear window washer jets, adjusting

Special tools and auxiliary items needed

- ◆ T10127 Window washer jet adjusting tool (replaces 3125A)

CAUTION!

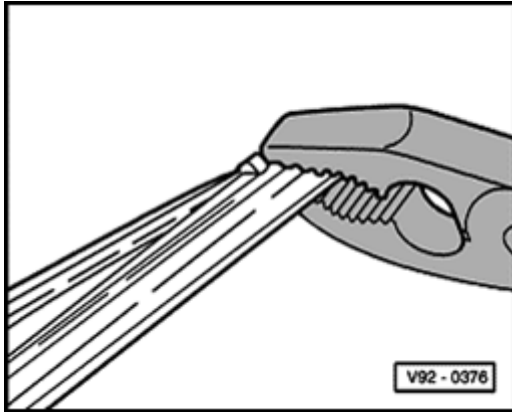
Washer jets must not be cleaned opposite to the spray direction, e.g.: blown through from front.

Note:

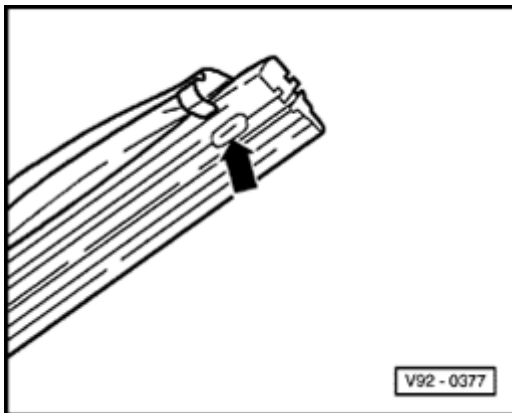
Replace jet if spray is irregular or cannot be adjusted to center of wiped area.

- Adjust washer jet so that spray is in center of wiped area.

Wiper rubber, removing and installing



- Using a pair of pliers, press together both steel strips on enclosed side of rubber, slide rubber sideways out of upper clip and remove rubber complete (slide rubber through remaining clips).



- Insert new rubber into lower clips of wiper blade.
- Insert both strips in the first groove of the rubber so that the recesses in the strips face the rubber and engage in the rubber lugs of the groove.
- Using pliers press both steel strips and rubber together and insert in the upper clips so that the lugs of the clips on both sides engage in the retaining slots - arrow- of the wiper blade rubber.

Rear window wiper system, tightening torques

Location / Fastener	Tightening torque
Wiper motor to rear lid / bolts M6	8 Nm
Wiper arm to wiper shaft / nut M8	15 Nm

Washer hoses, repairing

A concept has been developed to facilitate the repair of washer hoses.

Various individual hose connectors, adaptors, Ethylene Propylene Diene Methylene (EPDM) rubber hoses and shrink tubing will be offered as replacement parts.

General information

- ◆ Part numbers ⇒ Parts Catalog

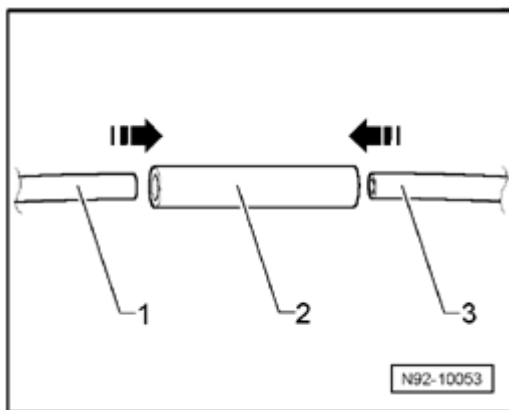
- ◆ Repair parts will be available for both smooth and corrugated hoses.

92-41

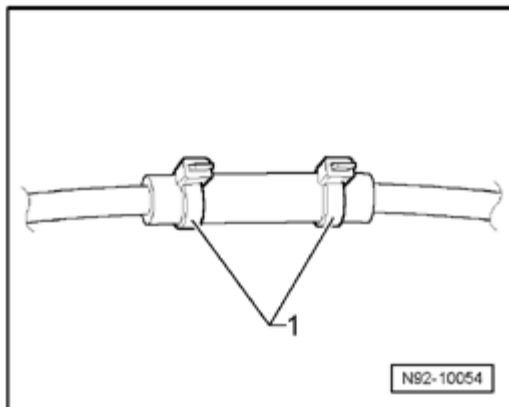
Smooth hoses, repairing

Smooth hoses with a diameter of 5 x 1 mm can be repaired with a EPDM repair hose section.

- Trim and remove damaged sections of hose
- Choose matching EPDM repair hose -2- and cable ties from Parts Catalog
- Insert hose -1- and -3- into ends of EPDM hose -2- to a depth of at least 10 mm -arr



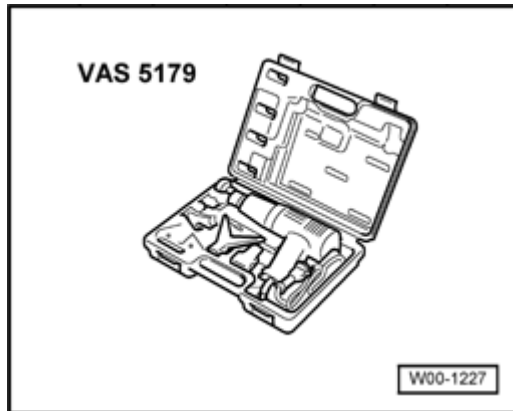
- Insert hose -1- and -3- into ends of EPDM hose -2- to a depth of at least 10 mm -arr



- Secure with cable ties -1- as illustrated.

Corrugated hoses, repairing

Special tools, testers and auxiliary items

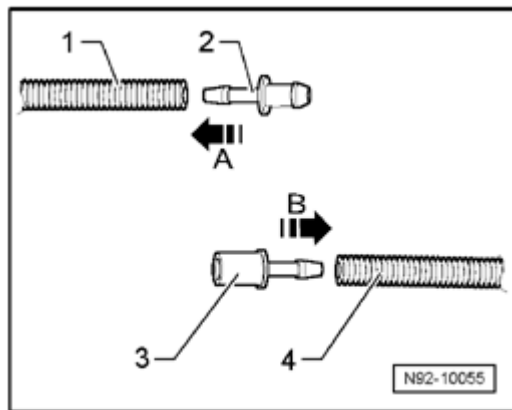


- ◆ VAS 1978/14 Hot Air Gun (or Kit VAS 5179 as illustrated)

Notes:

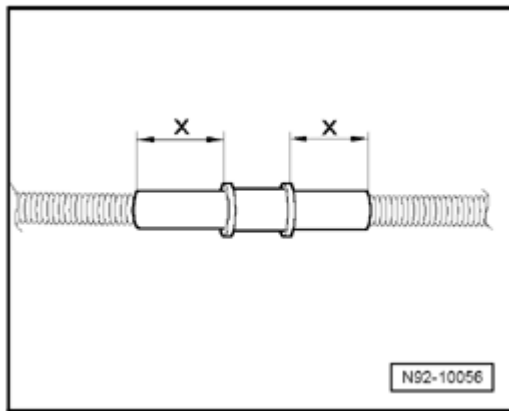
- ◆ Area to be repaired must but be under stress of stretching or bending.
- ◆ If damaged area is longer than 20 mm, a new section of corrugated hose must be obtained, and two sets of adapters inserted using following the following procedure.

- Trim and remove damaged sections of hose.



- Choose matching repair adapters -2- and -3- and appropriate shrink tubing from Parts Catalog.
- Carefully warm end of hose -1-.
- Insert repair adapter -2- into hose -1-, -A arrow-.
- Carefully warm end of hose -4-.
- Insert repair adapter -3- into hose -4-, -B arrow-.

92-43



- Trim shrink tubing sections so that corrugated hose is covered a minimum of 20 mm (-x-)
- Slide shrink tubing over corrugated hose, attach adapters together and secure repair with shrink tubing.

Headlights - Golf

General information

CAUTION!

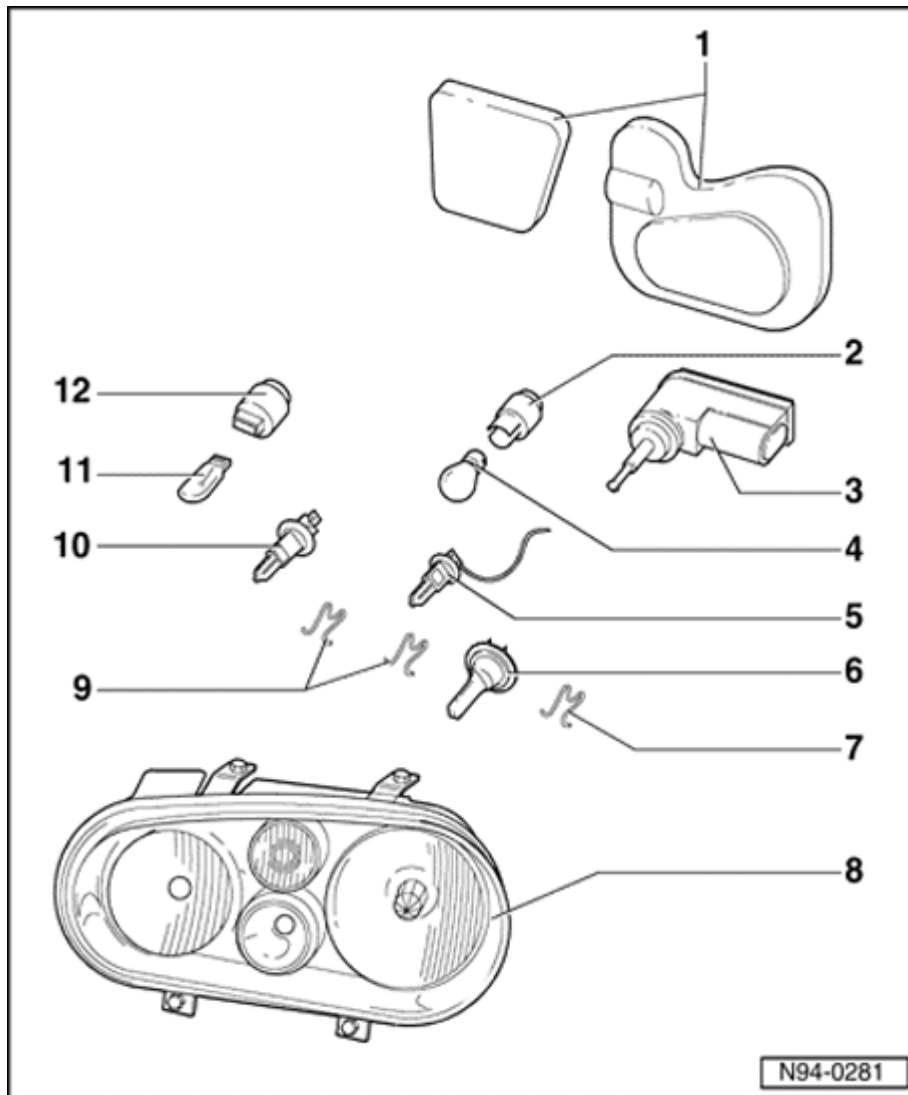
Before beginning repairs on the electrical system:

- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the headlight system. Always read the owner's manual and review specific system functions.

Additional information:

⇒ *Wiring Diagrams and Component Locations*



Headlights, assembly

Note:

After performing any repairs or service that could affect headlight aim, check/adjust aim ⇒ [Page 94-18](#).

1 - Sealing cap

2 - Turn Signal bulb holder

3 - Headlight beam adjusting motor

◆ Where applicable

◆ Removing and installing ⇒ [Page 94-16](#)

4 - Turn Signal bulb - M5- / - M7-

Bulb 12 V, 21 W

◆ Replacing ⇒ [Page 94-11](#)

5 - Fog

**Light
bulb -
L22- / -
L23-**

Bulb
H3, 12
V, 55
W

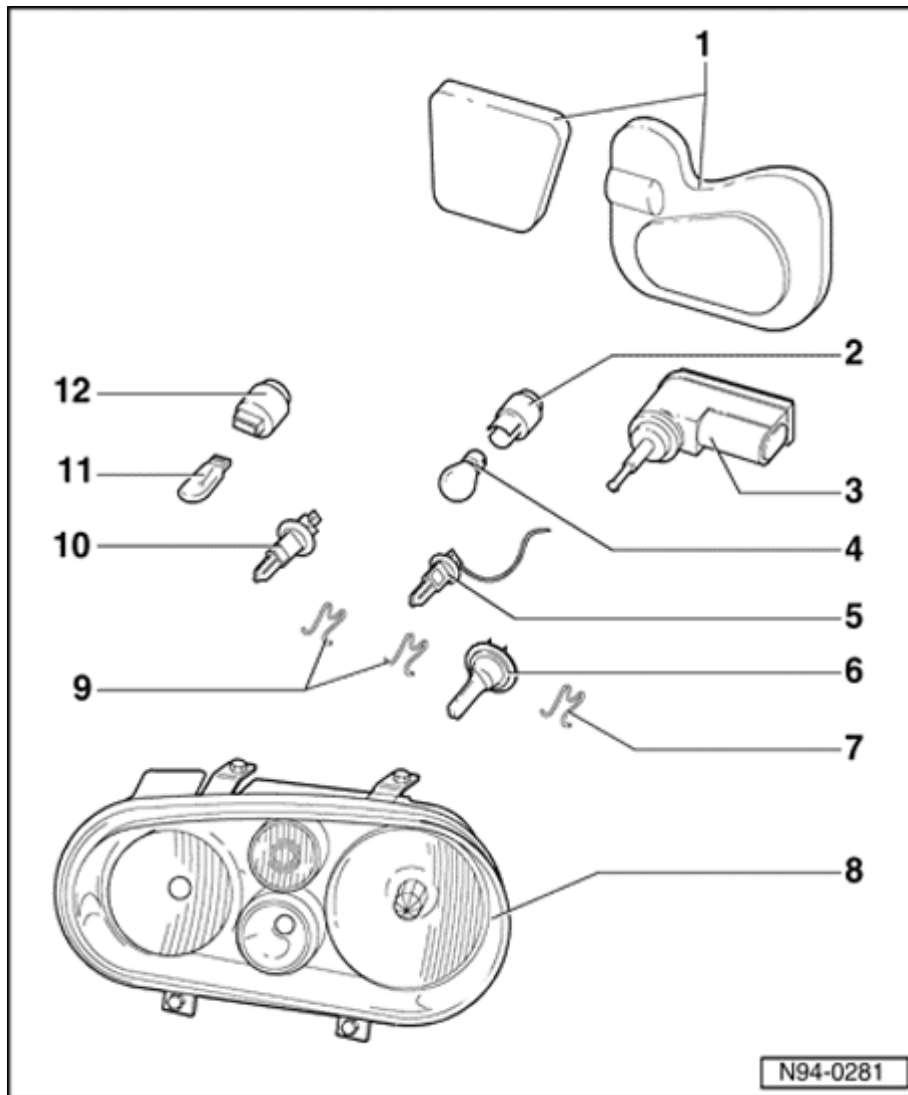
◆ Where
applicable

◆ Replacing
⇒ [Page
94-13](#)

**6 - Low
Beam
bulb -
M29- / -
M31-**

Bulb
H7, 12
V, 55
W

◆ Replacing
⇒ [Page
94-5](#)



7 - Spring clip

8 - Headlight housing

◆ Adjusting headlights
⇒ [Page 94-18](#)

◆ Removing and installing
⇒ [Page 94-4](#)

◆ Servicing upper housing securing lugs
⇒ [Page 94-15](#)

9 - Spring clip

10 - High Beam bulb - M30- / - M32-

Bulb
H1, 12
V, 55
W

◆ Replacing
⇒ [Page 94-7](#)

11 - Parking Light bulb - M1- / - M3-

Bulb 12
V, 5 W

◆ Replacing
⇒ [Page](#)

[94-9](#)

**12 - Parking
light
bulb
holder**

Headlights, removing and installing

Removing

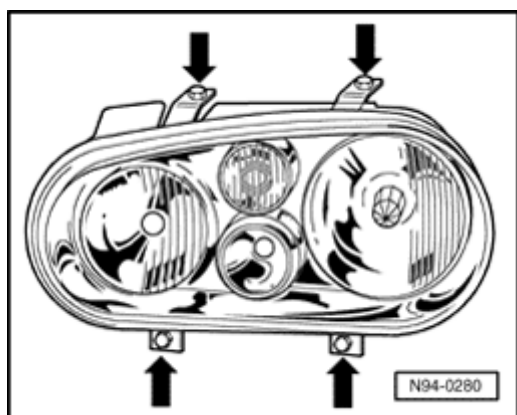
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove front bumper cover

⇒ [Repair Manual, Body Exterior, Repair Group 63](#)



- Remove mounting screws - arrows-
- Pull headlight housing out as far as electrical harness allows.
- Disconnect electrical connections.
- Remove headlight housing.

Installing

Install in reverse order of removal.

- Check and adjust headlight if necessary ⇒ [Page 94-18](#) .

Headlight bulbs, replacing

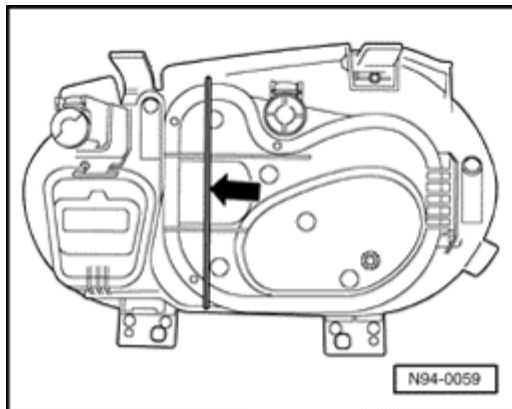
Low Beam Headlight bulb -M29- / -M31-, replacing

Removing

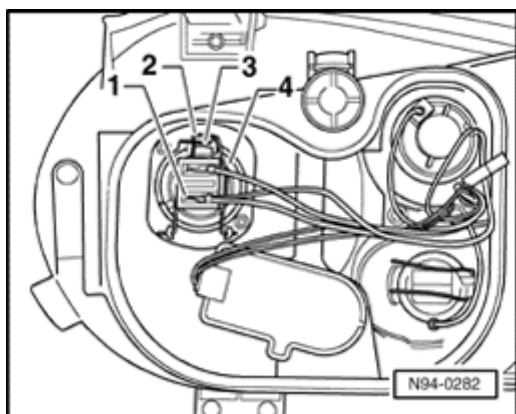
CAUTION!

Before beginning repairs on the electrical system:

- ♦ ***Switch off all electrical consumers.***
- ♦ ***Switch ignition off and remove ignition key.***



- ▲
- Release spring clip -arrow- and remove sealing cover.



- Disconnect electrical connector - 1- from bulb.
- Push retaining clip -2- over the lugs -3- and release.
- Pull bulb -4- out of reflector.

Installing

CAUTION!

Do not touch glass portion of bulb with bare hands. Even the smallest amount of moisture and/or contaminants from fingers that evaporates on the bulb during operation can cause the glass to cloud over.

- Insert new bulb so lugs on bulb plate align with cut-outs in reflector.
- Connect electrical connector -1-.
- Install sealing cover.
- Check headlight (bulb) function.

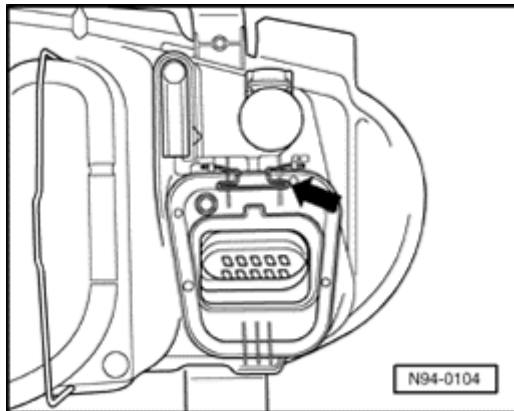
High Beam Headlight bulb -M30- / -M32-, replacing

Removing

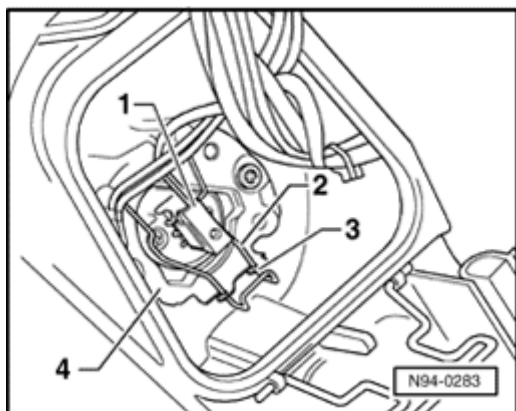
CAUTION!

Before beginning repairs on the electrical system:

- ♦ **Switch off all electrical consumers.**
- ♦ **Switch ignition off and remove ignition key.**



- Release spring clip -arrow- and remove sealing cover.



- Disconnect electrical connection - 1- from bulb.
- Push retaining clip -2- over lugs - 3- and release.
- Pull bulb -4- out of reflector.

Installing

CAUTION!

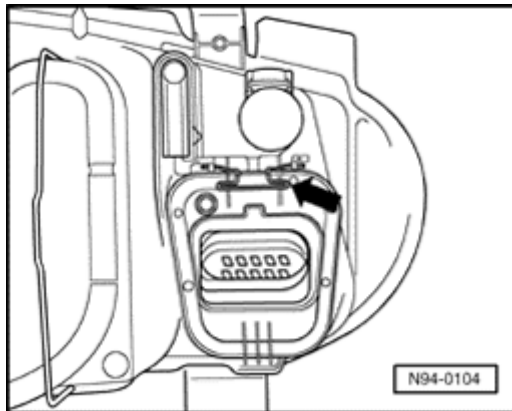
Do not touch glass portion of bulb with bare hands. Even the smallest amount of moisture and/or contaminants from fingers that evaporates on the bulb during operation can cause the glass to cloud over.

- Insert new bulb so lugs on bulb plate align with cut-outs in reflector.
- Connect electrical connector -1-.
- Install sealing cover.
- Check headlight (bulb) function.

**Parking Light bulb -M1- / M3-,
replacing****Removing****CAUTION!**

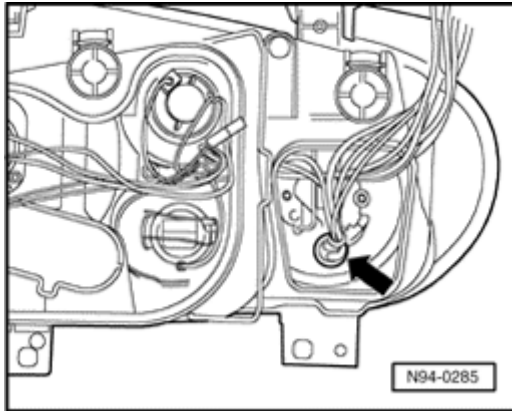
**Before beginning repairs on the
electrical system:**

- ♦ **Switch off all electrical
consumers.**
- ♦ **Switch ignition off and remove
ignition key.**



- Release spring clip -arrow- and
remove sealing cover.

94-10



- Pull bulb with holder on connector out of reflector -arrow-.

Installing

CAUTION!

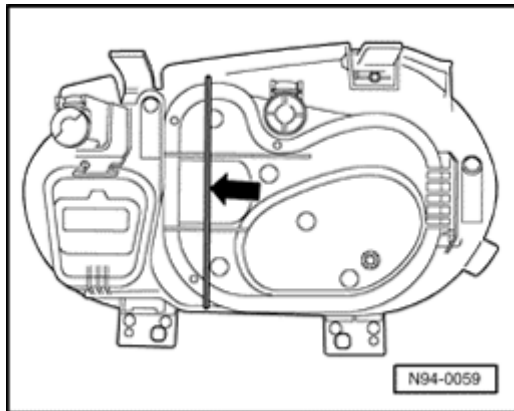
Do not touch glass portion of bulb with bare hands. Even the smallest amount of moisture and/or contaminants from fingers that evaporates on the bulb during operation can cause the glass to cloud over.

- Push bulb with holder fully into the reflector onto stop.
- Install sealing cover.
- Check parking light (bulb) function.

**Turn Signal bulb -M5- / -M7-,
replacing****Removing****CAUTION!**

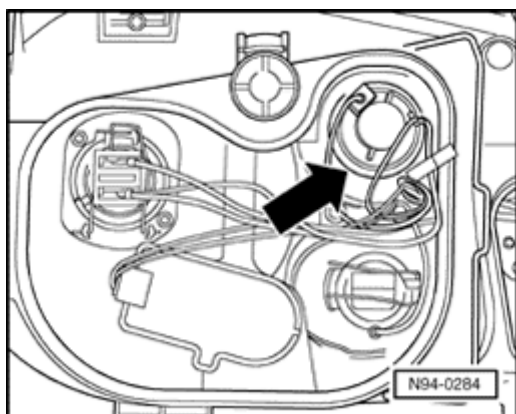
**Before beginning repairs on the
electrical system:**

- ♦ **Switch off all electrical
consumers.**
- ♦ **Switch ignition off and remove
ignition key.**



- Release spring clip -arrow- and
remove sealing cover.

94-12



- Turn bulb holder -arrow- to left and pull out of housing.
- Remove bulb from holder.

Installing

Install in reverse order of removal.

CAUTION!

Do not touch glass portion of bulb with bare hands. Even the smallest amount of moisture and/or contaminants from fingers that evaporates on the bulb during operation can cause the glass to cloud over.

Note:

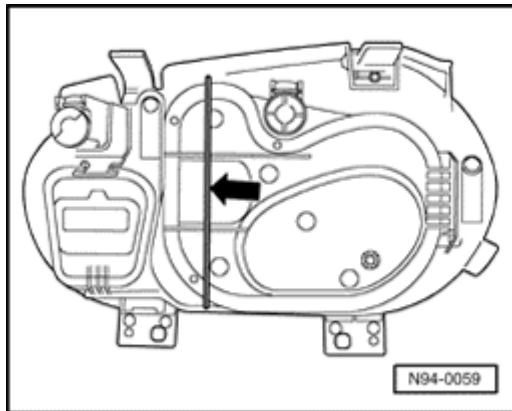
When installing, ensure bulb holder engages in bulb housing.

- Check turn signal (bulb) function.

**Fog Light bulb -L22- / -L23-,
replacing****Removing****CAUTION!**

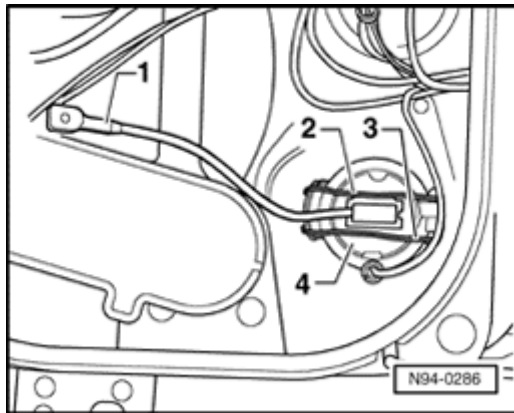
**Before beginning repairs on the
electrical system:**

- ♦ **Switch off all electrical
consumers.**
- ♦ **Switch ignition off and remove
ignition key.**



- ▲
- Release spring clip -arrow- and
remove sealing cover.

94-14



- Disconnect electrical connection - 1- from bulb.
- Push retaining clip -2- over lugs - 3- and release.
- Pull bulb -4- out of reflector.

Removing

CAUTION!

Do not touch glass portion of bulb with bare hands. Even the smallest amount of moisture and/or contaminants from fingers that evaporates on the bulb during operation can cause the glass to cloud over.

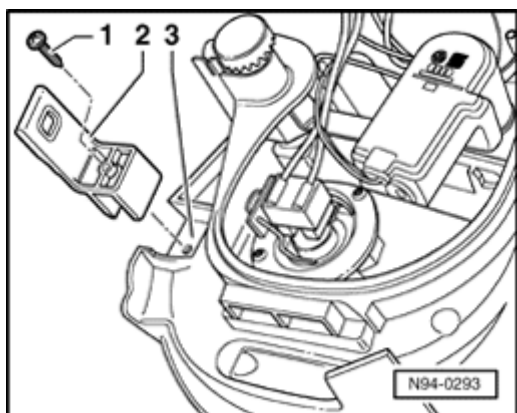
- Insert new bulb so lugs on bulb plate align with cut-outs in the reflector.
- Connect electrical connector -1-.
- Install sealing cover.
- Check fog light (bulb) function.

Headlight securing lugs, servicing

Note:

If headlight lower securing lugs break due to application of excessive force, it may still be possible to service headlight in a cost effective manner (though headlight housing must not be damaged).

- Remove headlight housing ⇒ [Page 94-4](#)
- Sand headlight tab socket breakage point headlight down flat.
- Set replacement part securing tab -2- on securing tab socket -3- and secure with screw -1-.
- Install headlights.
- Check and adjust headlight if necessary : [94-18](#) .



A

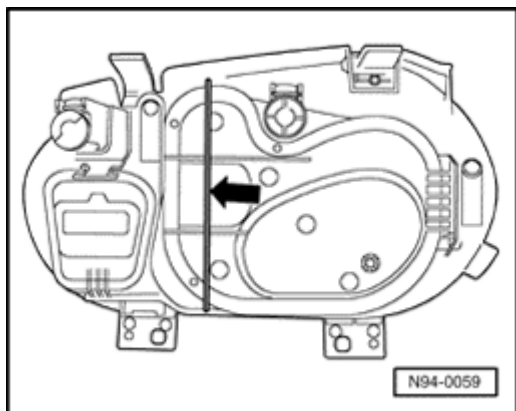
Headlight beam adjusting motor, removing and installing

Notes:

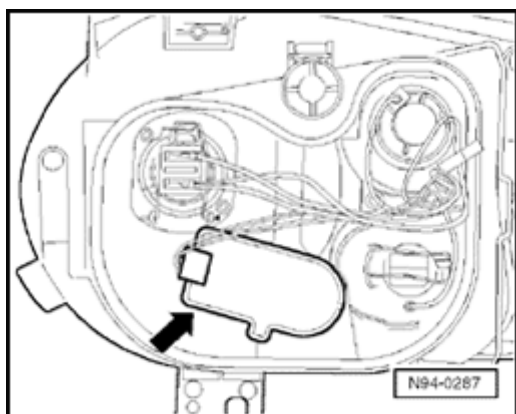
- ◆ *Headlight beam adjusting where applica*
- ◆ *Beam adjusting motor can only be remo*
installed with headlight housing remove
- ◆ *If positioning motors are removed and in*
or replaced, always carry out headlight k
setting with VAS 5107 Optical headlight
Inclination dimension is embossed on he
housing.

Removing

- Remove headlight ⇒ [Page 94-4](#) .
- Release spring clip -arrow- and remove s
cover.
- Disconnect electrical connector.

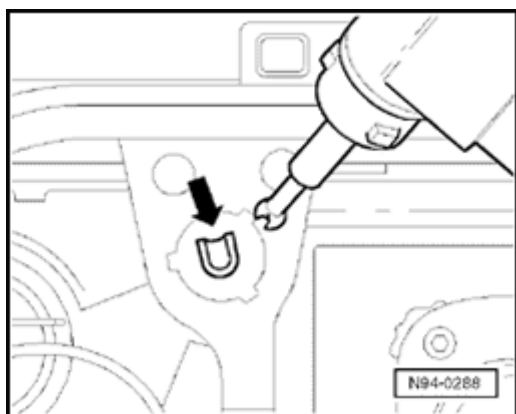


94-17



- Release left-hand positioning motor -arrow- by turning to left and right-hand by turning to right.
- Pull positioning shaft ball head out of locking device on reflector.

Installing



- Guide positioning motor positioning shaft into ball head mounting -arrow-, hold reflector base plate up through opening in headlight when doing this.
- Lock positioning motor in fitting position by turning.
- Connect electrical connections.
- Install sealing cover.
- Install headlight ⇒ [Page 94-4](#) .
- Check and adjust headlight if necessary ⇒ [Page 94-18](#) .

Headlights, adjusting

Special tools, testers and auxiliary items needed

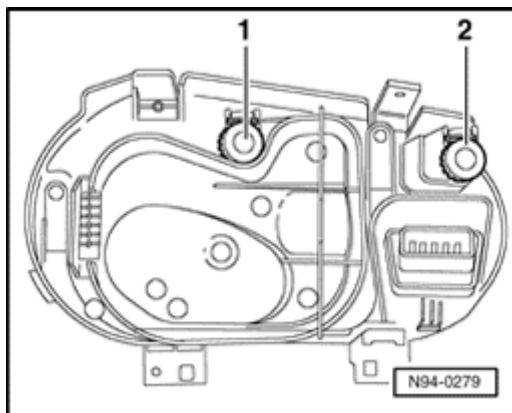
- ◆ VAS 5107 Optical headlight aimer

Notes:

- ◆ *Adjust headlights using detailed aiming procedures and specifications*

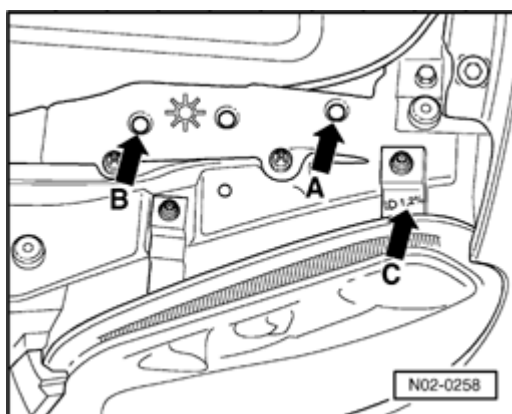
⇒ *Repair Manual, Maintenance*

- ◆ *Headlights and fog lights are adjusted simultaneously.*



◀ Where applicable, headlight adjusters on re headlight housing (left headlight shown, adj for right headlight are mirror image):

- 1 - Lateral adjustment
- 2 - Height adjustment



◀ Where applicable, headlight adjusters access through trim on radiator support (left headlight shown, adjusters for right headlight are mirror image):

- A - Lateral adjustment
- B - Height adjustment

To adjust the lateral and height setting, turn respective adjuster with a screwdriver.

Headlights - Jetta

General information

CAUTION!

Before beginning repairs on the electrical system:

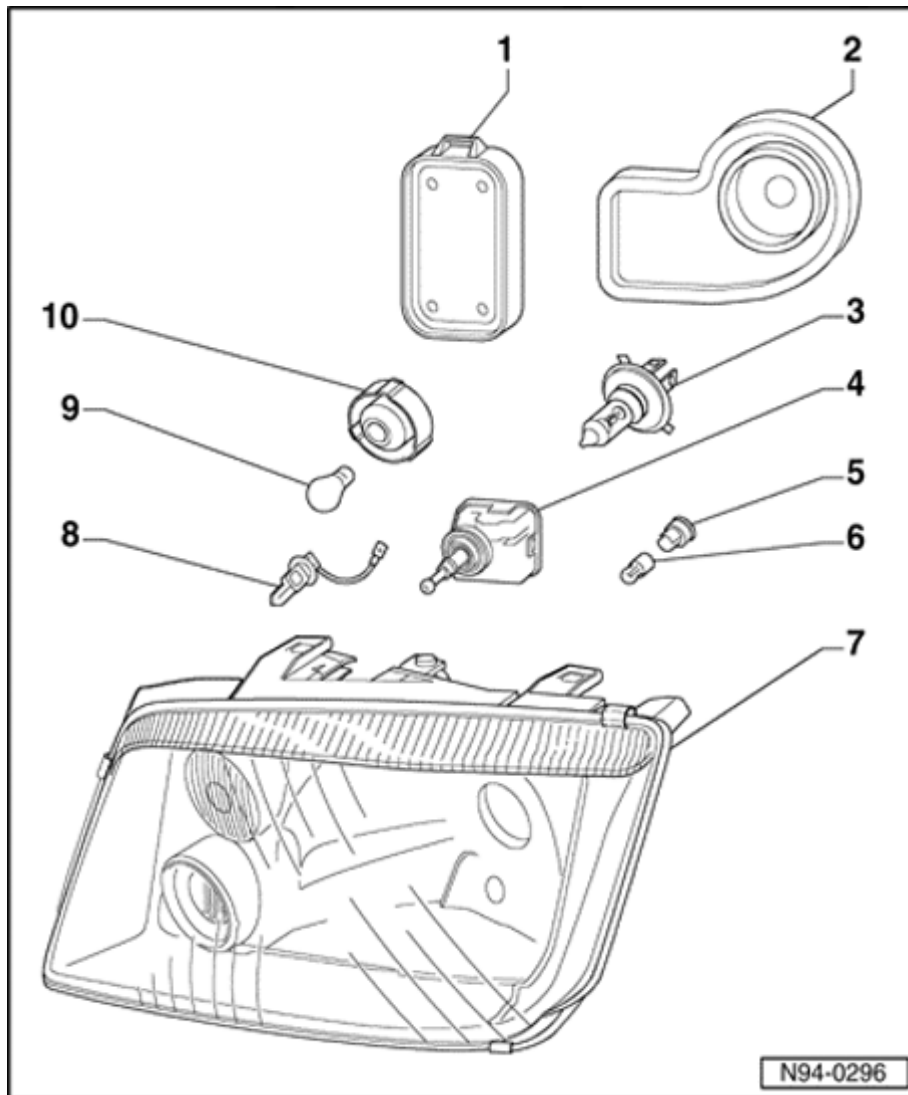
- ◆ ***Switch off all electrical consumers.***

- ◆ ***Switch ignition off and remove ignition key.***

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the headlight system. Always read the owner's manual and review specific system functions.

Additional information:

⇒ *Wiring Diagrams and Component Locations*



Headlights, assembly

Note:

After performing any repairs or service that could affect headlight aim, check/adjust aim ⇒ [Page 94-33](#).

- 1 - Sealing cap
- 2 - Sealing cap
- 3 - Headlight bulb (dual filament low/high beam) - L1- / -L2-

Bulb
H4, 12
V, 60
W/55
W

- ◆ Replacing ⇒ [Page 94-24](#)

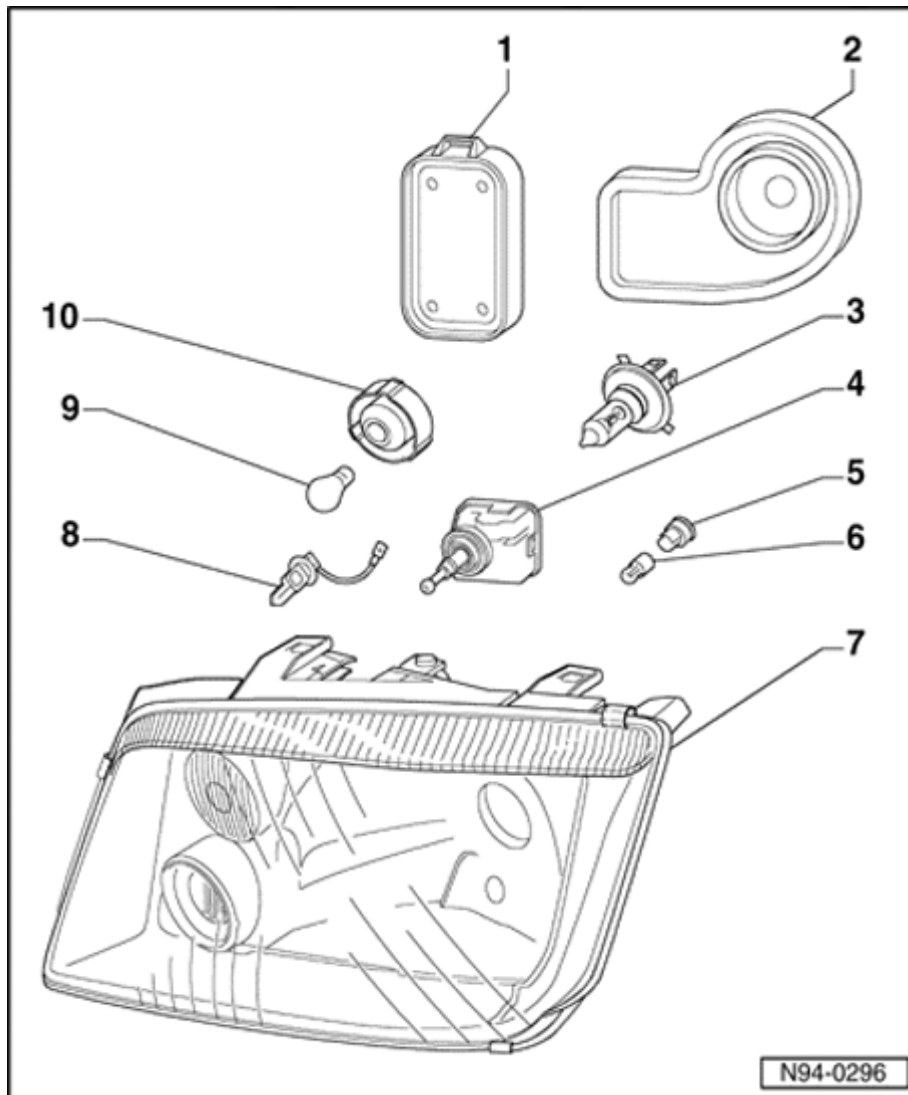
- 4 - Headlight beam adjusting motor

- ◆ Where applicable

- ◆ Removing and installing ⇒ [Page 94-31](#)

**5 Not
- applicable
to
USA/CDN**

94-21



6 - Not applicable to USA/CDN

7 - Headlight housing

◆ Adjusting headlight
⇒ [Page 94-33](#)

◆ Removing and installing
⇒ [Page 94-22](#)

◆ Servicing upper housing securing lugs ⇒ [Page 94-15](#)

8 - Fog Light bulb -L22- / L23-

Bulb H3,
12 V, 55 W

◆ Where applicable

◆ Replacing
⇒ [Page 94-28](#)

9 - Double filament bulb for parking/turn signal light

Bulb 12 V,
21W/5W

◆ Replacing
⇒ [Page](#)

[94-26](#)

**10 Parking/turn
- signal light
bulb holder**

Headlights, removing and installing

Removing

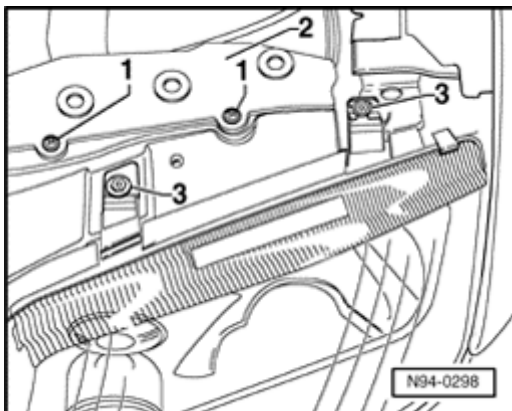
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove front bumper

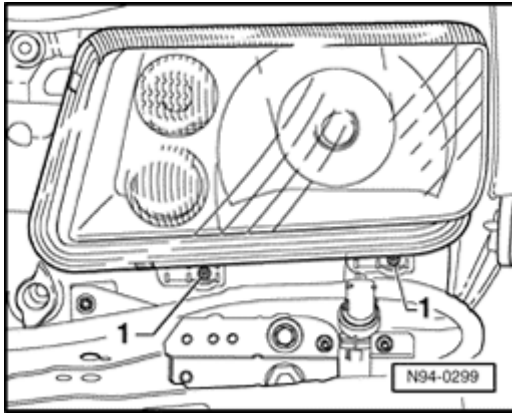
⇒ [Repair Manual, Body Exterior, Repair Group 63](#)



A

- Remove screws -1-.
- Remove headlight trim -2-.
- Remove screws -3-.

94-23



- Remove screws -1-.
- Disconnect electrical connections.
- Pull headlight housing out forward.

Installing

Install in reverse order of removal.

- Check and adjust headlight if necessary ⇒ [Page 94-33](#) .

Headlight bulbs, replacing

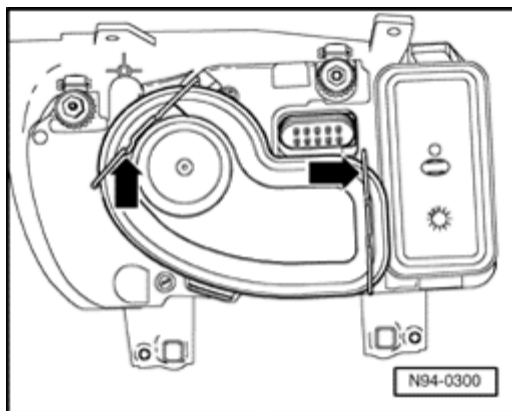
Headlight Bulb (dual filament low/high beam) -L1- / -L2-, replacing

Removing

CAUTION!

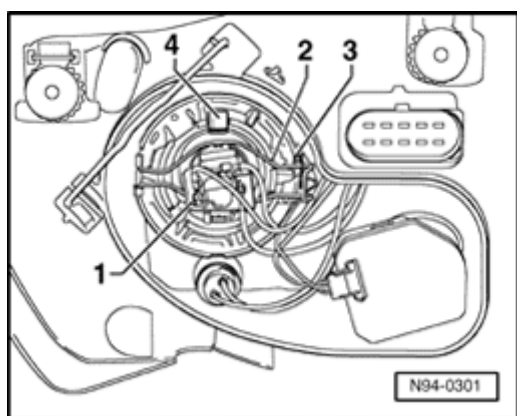
Before beginning repairs on the electrical system:

- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***



- ▲ - Release spring clip -arrow- and remove sealing cover.

94-25



- Disconnect electrical connector - 1- from bulb.
- Push retaining clip -2- over lugs - 3- and release.
- Pull bulb -4- out of reflector.

Installing

CAUTION!

Do not touch glass portion of bulb with bare hands. Even the smallest amount of moisture and/or contaminants from fingers that evaporates on the bulb during operation can cause the glass to cloud over.

- Insert new bulb so lugs on bulb plate align with cut-outs in reflector.
- Connect electrical connector -1-.
- Install sealing cover.
- Check headlight low and high beam (bulb) function.

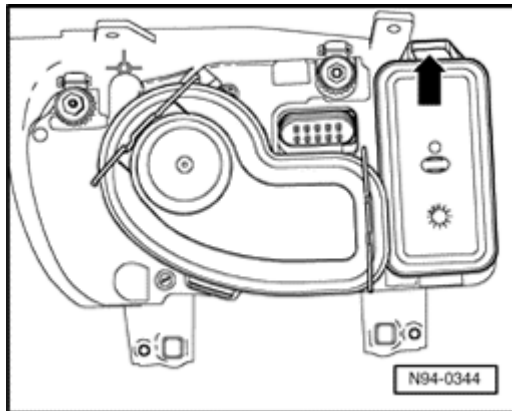
Parking Light/Turn Signal (dual filament) bulb, replacing

Removing

CAUTION!

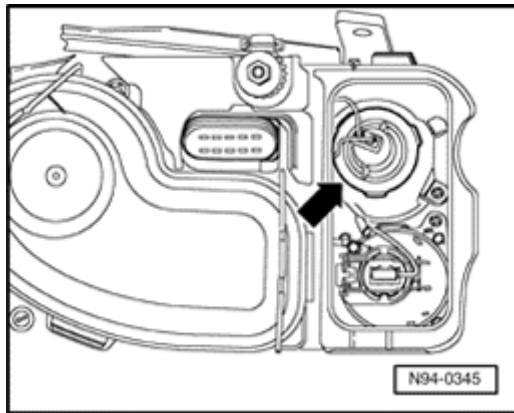
Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- ▲
- Release spring clip -arrow- and remove sealing cover.

94-27



- Turn bulb holder -arrow- to left and pull out of housing.
- Remove bulb from the holder.

Installing

CAUTION!

Do not touch glass portion of bulb with bare hands. Even the smallest amount of moisture and/or contaminants from fingers that evaporates on the bulb during operation can cause the glass to cloud over.

Install in reverse order of removal.

Note:

When installing, ensure bulb holder engages in bulb housing.

- Install sealing cover.
- Check turn signal (bulb) function.

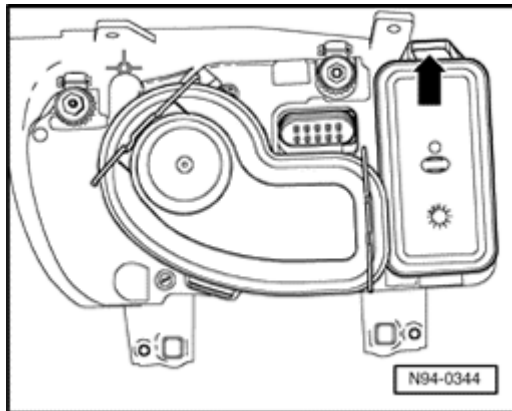
Fog Light bulb -L22- / -L23-, replacing

Removing

CAUTION!

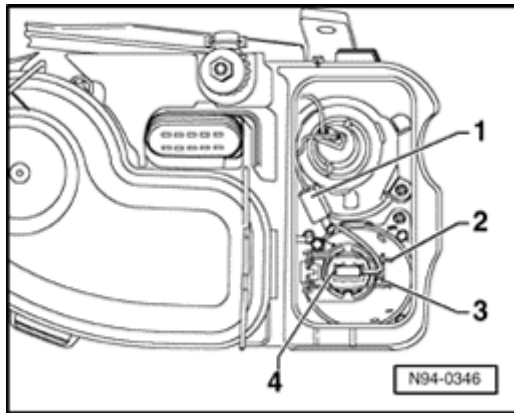
Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Release spring sealing cover - arrow- and remove.

94-29



- Disconnect electrical connector - 1- from bulb.
- Push retaining clip -2- over lugs - 3- and release.
- Pull bulb -4- out of reflector.

Installing

CAUTION!

Do not touch glass portion of bulb with bare hands. Even the smallest amount of moisture and/or contaminants from fingers that evaporates on the bulb during operation can cause the glass to cloud over.

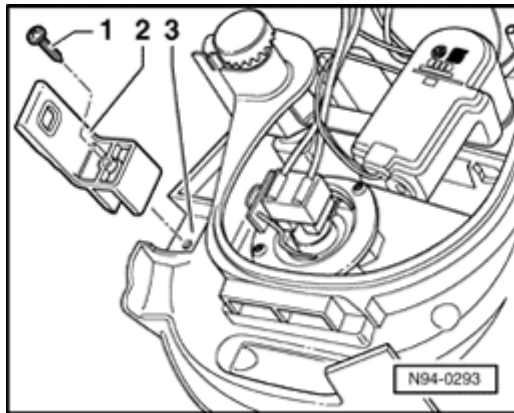
- Insert new bulb so lugs on bulb plate align with cut-outs in reflector.
- Connect electrical connector -1-.
- Install sealing cover.
- Check fog light (bulb) function.

Headlight securing lugs, servicing

Note:

If headlight lower securing lugs break due to application of excessive force, it may still be possible to service headlight in a cost effective manner (though headlight housing must not be damaged).

- Remove headlight housing ⇒ [Page 94-2](#)
- Sand headlight tab socket breakage point headlight down flat.
- Set replacement part securing tab -2- on securing tab socket -3- and secure with screw -1-.
- Install headlights.
- Check and adjust headlight if necessary : [94-33](#) .



A

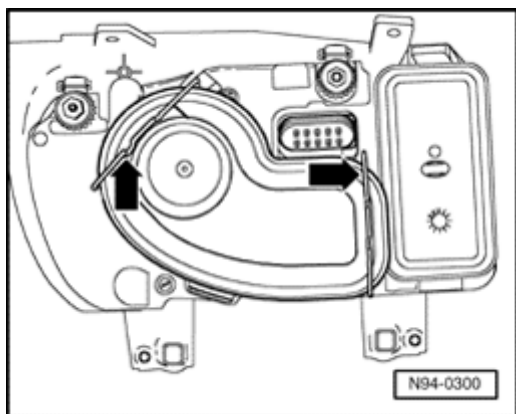
Headlight beam adjusting motor, removing and installing

Notes:

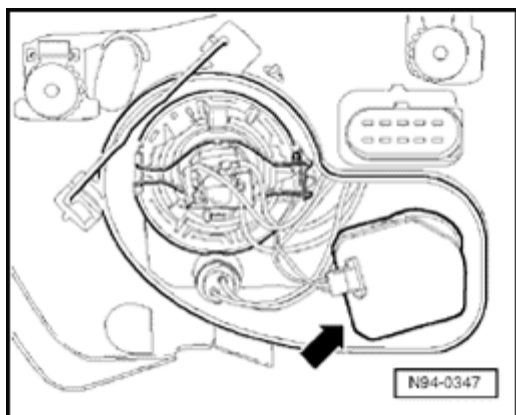
- ◆ *Headlight beam adjusting where applica*
- ◆ *The positioning motor can only be removed installed when the headlight housing has removed.*
- ◆ *If positioning motors are removed and in or replaced, always carry out headlight k setting with VAS 5107 Optical headlight Inclination dimension is embossed on he housing.*

Removing

- Remove headlight ⇒ [Page 94-22](#) .
- Release spring clip -arrow- and remove s cover.

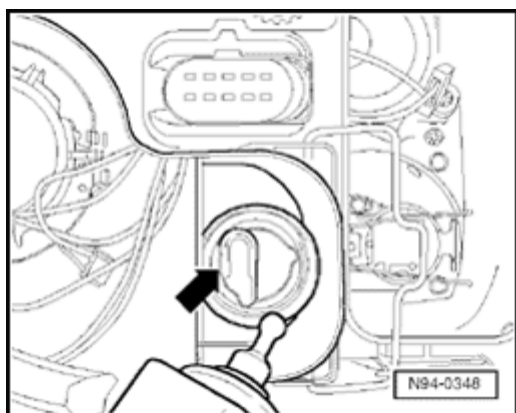


94-32



- Disconnect electrical connector.
- ✦ - Release left-hand positioning motor -arrow- by turning to left and right-hand by turning to right.
- Pull positioning shaft ball head out of locking device on reflector.

Installing



- ✦ - Guide positioning motor positioning shaft into ball head mounting -arrow-, hold reflector base plate up through opening in headlight when doing this.
- Lock positioning motor in fitting position by turning.
- Connect electrical connections.
- Install sealing cover.
- Install headlights ⇒ [Page 94-22](#) .
- Check headlight adjustment if necessary ⇒ [Page 94-33](#) .

Headlights, adjusting

Special tools, testers and auxiliary items needed

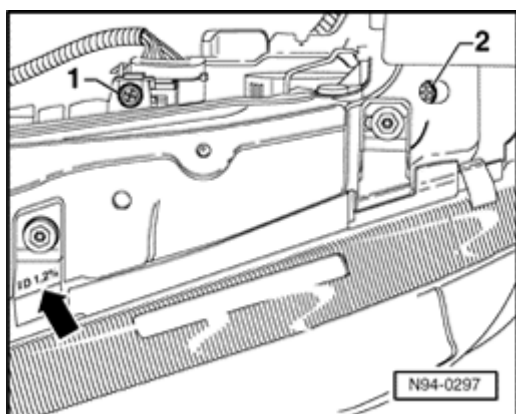
- ◆ VAS 5107 Optical headlight aimer

Notes:

- ◆ *Adjust headlights using detailed aiming procedures and specifications*

⇒ *Repair Manual, Maintenance*

- ◆ *Headlights and fog lights are adjusted simultaneously.*



◀ Left headlight (adjustment screws for right headlight are a mirror image):

- 1 - Lateral adjustment
- 2 - Height adjustment

To adjust the lateral and height setting, turn respective adjuster with a screwdriver.

Side mounted turn signals

Side mounted turn signals, removing and installing

Removing:

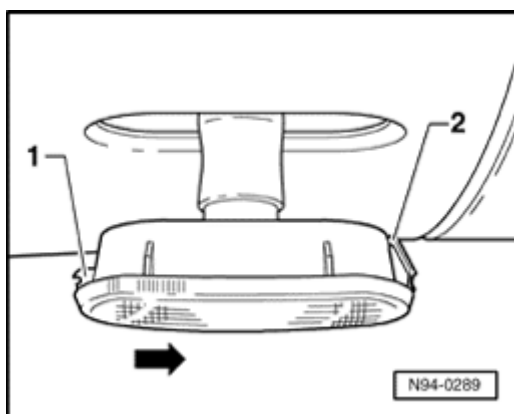
CAUTION!

Removal of turn signal lens/housing is possible in one direction. The side of the housing equipped with retainer clip is not obvious in its installed position. Use care when removing to prevent damage to retainer clip or housing.

CAUTION!

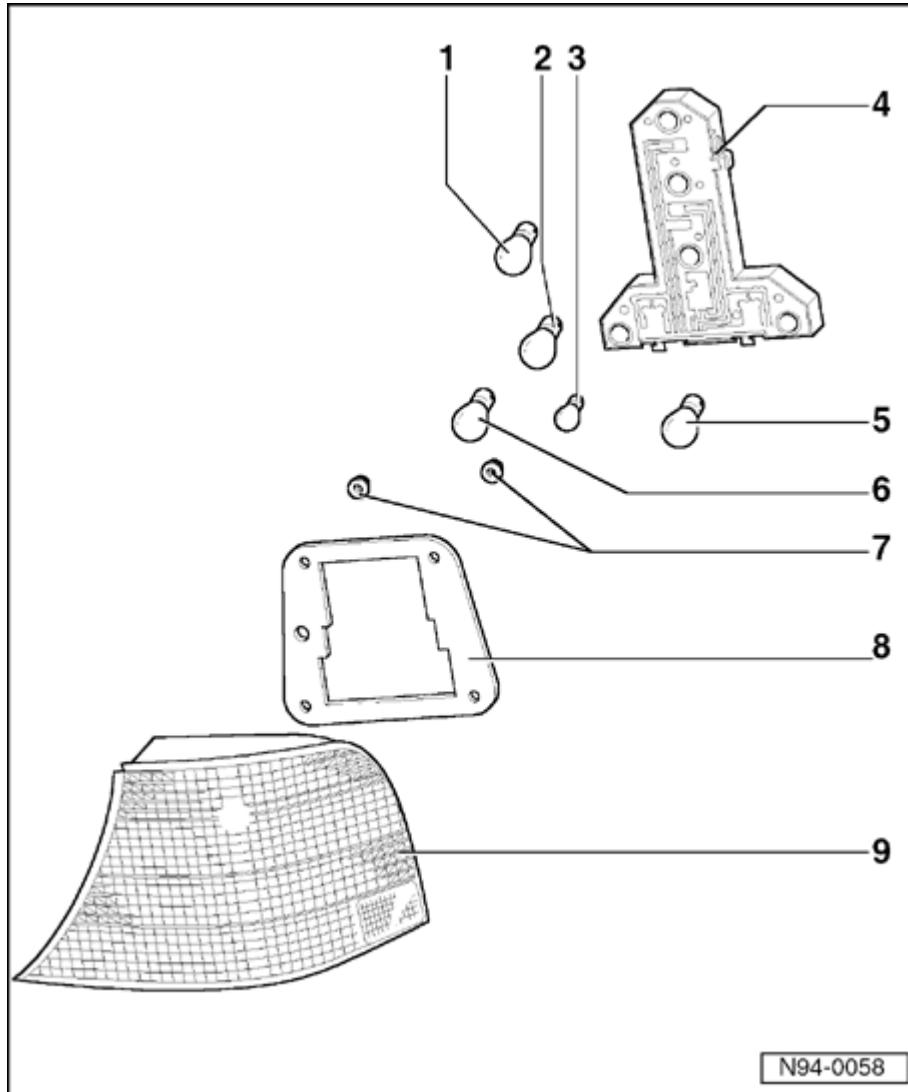
Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- Apply suitable tape in area of lamp in order to protect paintwork.
- Press turn signal with a suitable tool on the mounting position side -1- carefully in direction of arrow against the force of the spring clip on the opposite side and lever out.
- Pull rubber holder with push-fit bulb off bulb housing.
- Pull push-fit bulb (12 V/5 W) out of housing (not turn).



Installing:

- Fit rubber holder with push-fit bulb onto bulb housing and insert into fender opening.
- Check side turn signal (bulb) function.



Rear lights

Rear lights - Golf, assembly

1 - Brake Light bulb - M9- / - M10- 12V / 21W

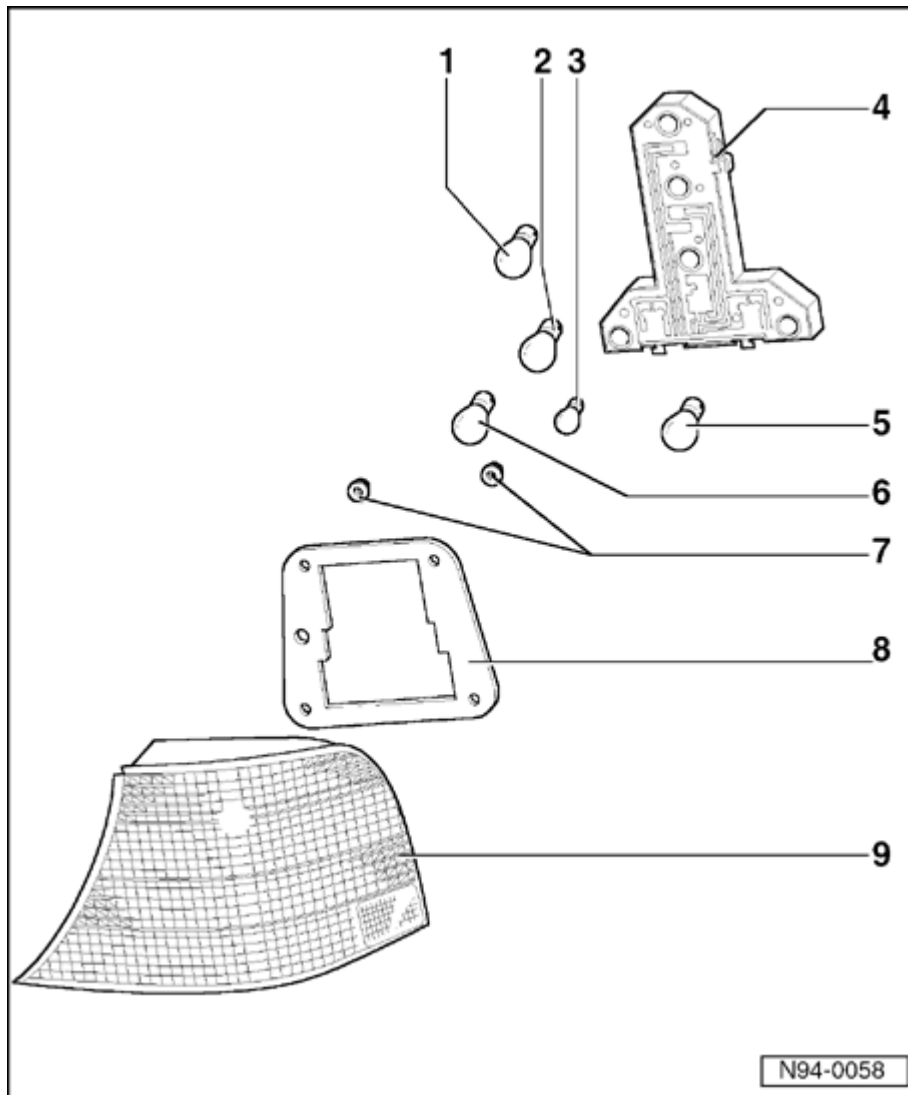
2 - Turn Signal bulb - M6- / - M8- 12V / 21W

3 - Tail Light bulb - M2- / - M4- 12V / 10W

4 - Bulb holder

◆ Removing and installing ⇒ [Page 94-45](#)

94-37



5 - Back-Up Light bulb - M16- / - M17-

12V /
21W

6 - Rear Fog Light Bulb - L20-

12V /
21W

Where applicable
- left side only

7 - Hex nuts M5

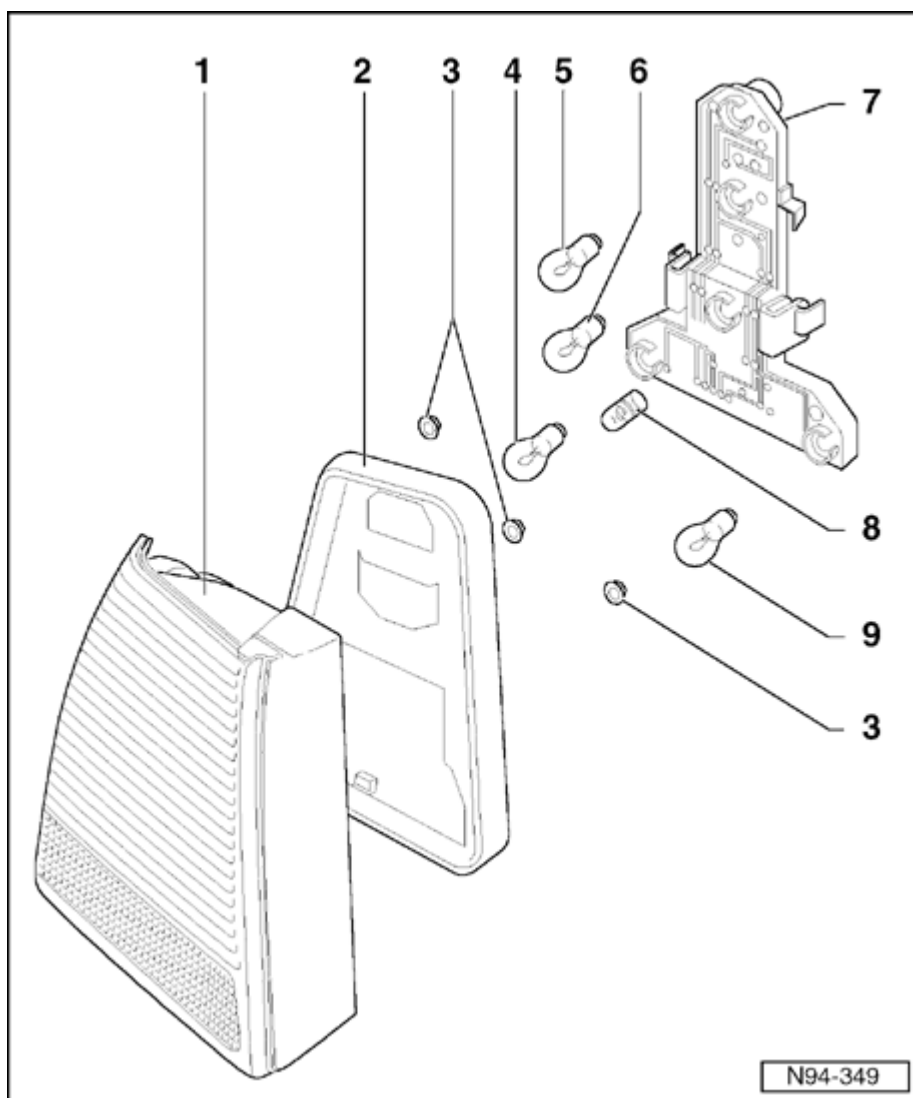
Qty. 3

8 - Gasket

◆ Replace if damaged

9 - Housing

◆ Removing and installing
⇒ [Page 94-42](#)



Rear lights - Jetta, assembly

1 - Housing

- ◆ Removing and installing
⇒ [Page 94-43](#)

2 - Gasket

- ◆ Replace if damaged

3 - Hex nuts M5

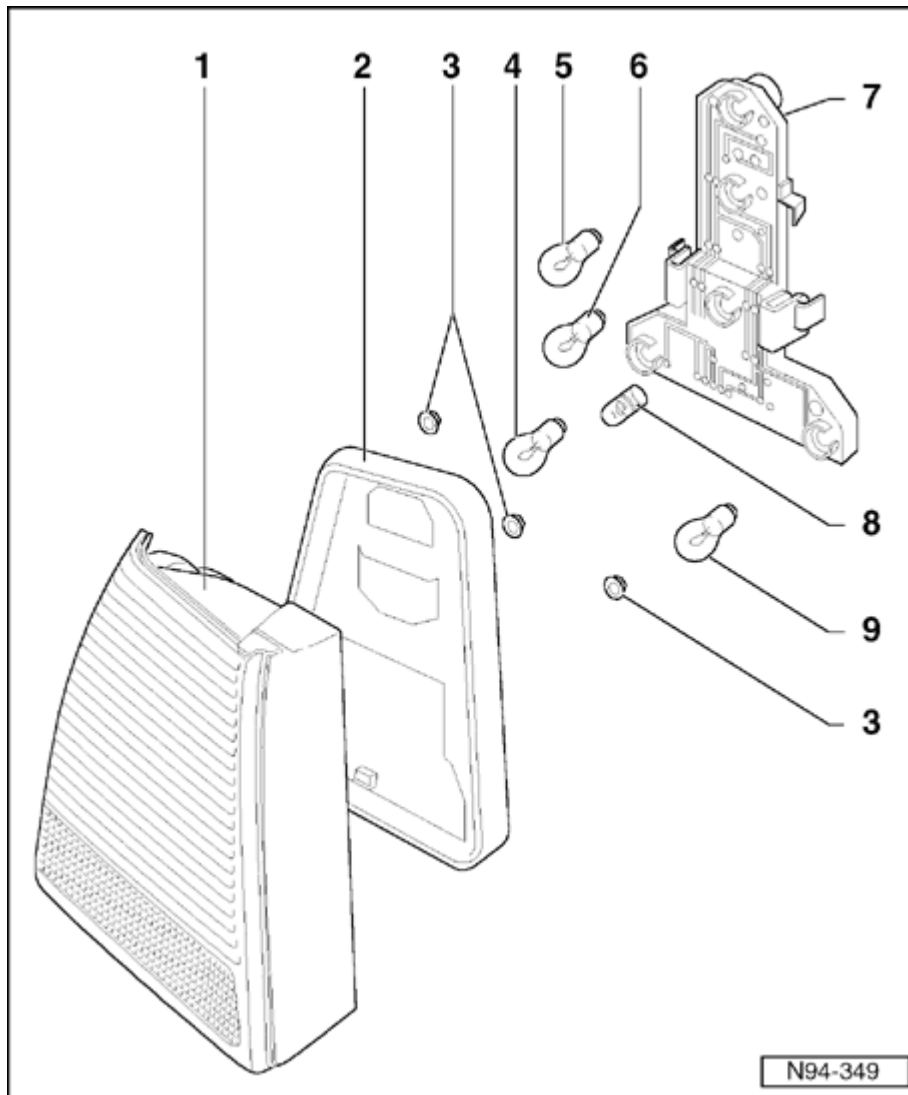
Qty. 3

4 - Rear Fog Light Bulb - L20-

12V /
21W

Where applicable
- left side
only

94-39



**5 - Brake
Light
bulb -
M9- / -
M10-**

12V /
21W

**6 - Turn
Signal
bulb -
M6- / -
M8-**

12V /
21W

**7 - Bulb
holder**

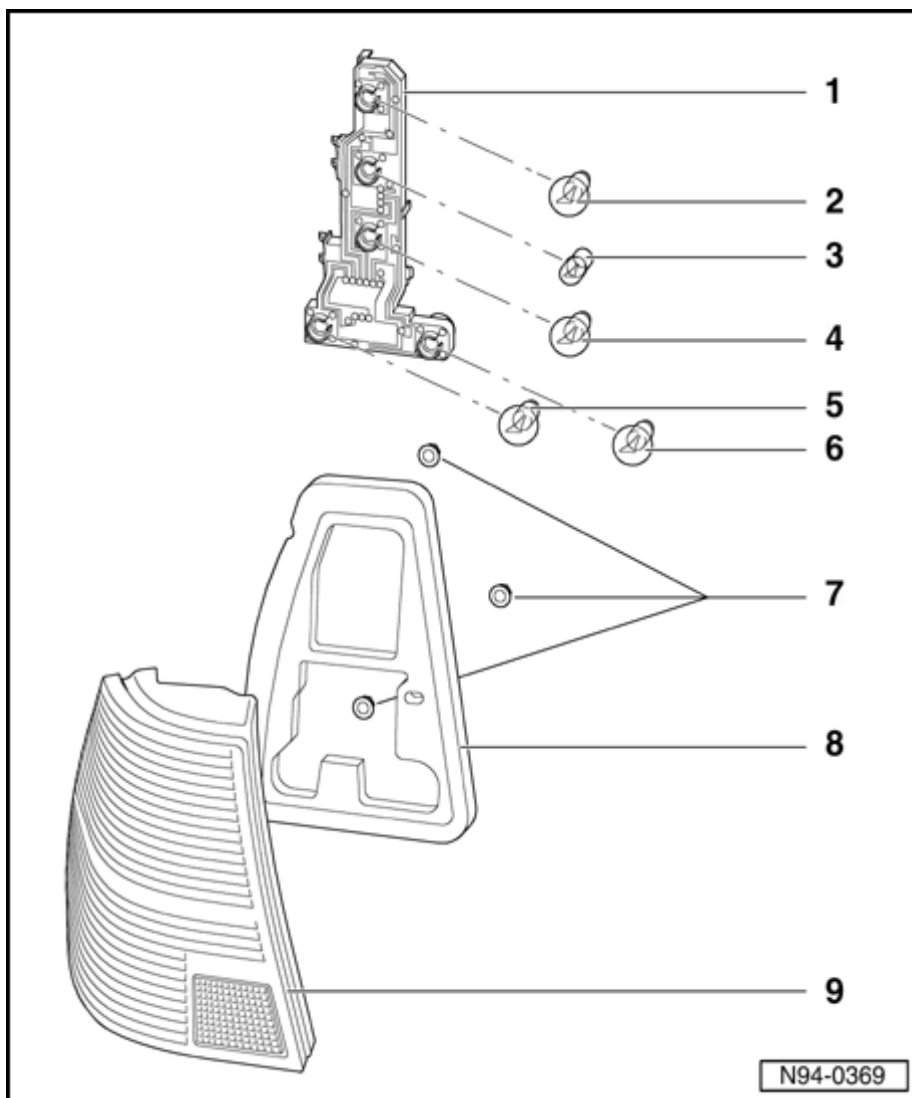
◆ Removing
and
installing
⇒ [Page
94-45](#)

**8 - Tail
Light
bulb -
M2- / -
M4-**

12V /
5W

**9 - Back-
Up
Light
bulb -
M16- / -
M17-**

12V /
21W



**Rear lights -
Jetta
Wagon,
assembly**

**1 - Bulb
holder**

◆ Removing
and
installing
⇒ [Page
94-45](#)

**2 Brake/Tail
- Light
bulb -
M21- / -
M22-**

12V /
21W/5W

**3 - Tail
Light
bulb -
M2- / -
M4-**

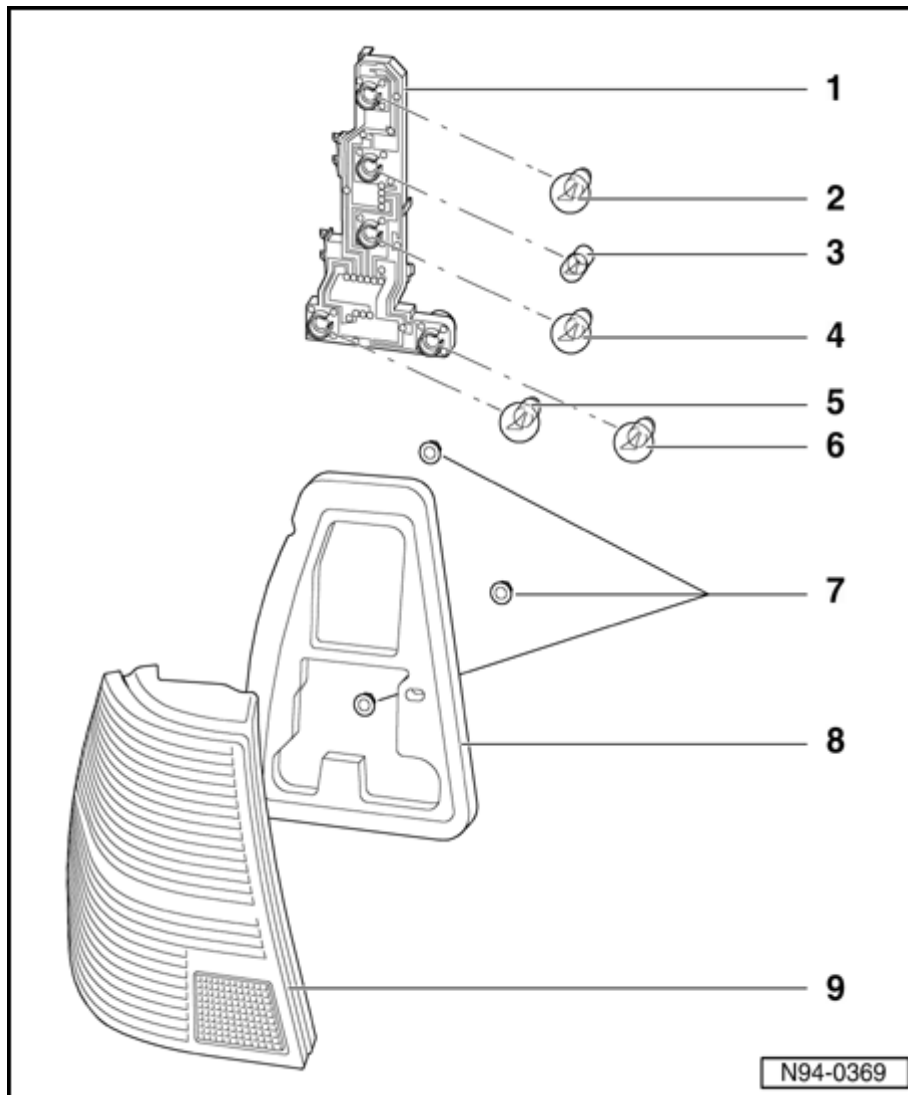
12V /
5W

Where
applicable

**4 - Turn
Signal
bulb -
M6- / -
M8-**

12V /
21W

94-41



**5 - Rear
Fog
Light
Bulb -
L20-**

12V /
21W

Where
applicable
- left side
only

**6 - Back-
Up
Light
bulb -
M16- /
M17-**

12V /
21W

**7 - Hex
nuts
M5**

Qty. 3

8 - Gasket

◆ Replace
if
damaged

9 - Housing

◆ Removing
and
installing
⇒ [Page
94-44](#)

Rear light housing - Golf, removing installing

Removing

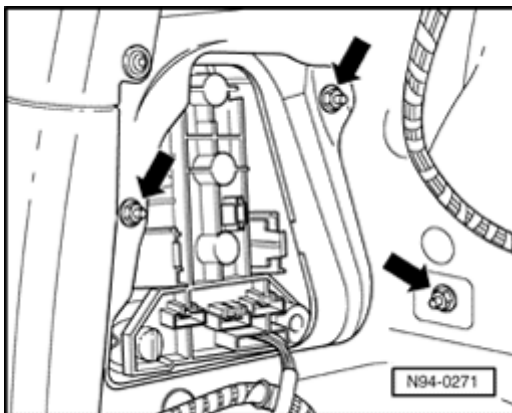
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove rear luggage compartment side trim (left or right):

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



▲

- Remove nuts -arrows- (Qty. 3) and remove housing.
- Remove bulb holder ⇒ [Page 94-45](#)

Installing

- Install bulb holder ⇒ [Page 94-45](#)
- Insert housing into body opening.
- Tighten nuts (3 Nm).
- Install applicable rear luggage compartment panel trim.

Rear light housing - Jetta, removing installing

Removing

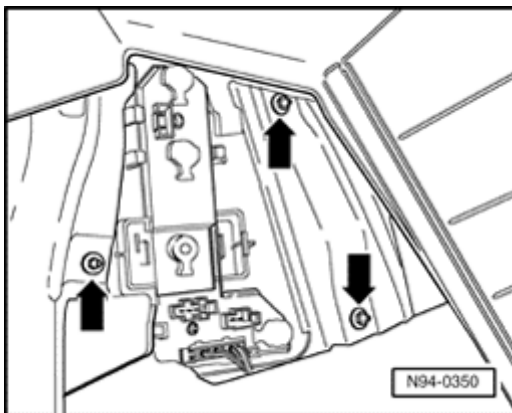
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove rear luggage compartment side trim (left or right):

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



- Remove nuts -arrows- (Qty. 3) and remove housing.
- Remove bulb holder ⇒ [Page 94-45](#)

Installing

- Install bulb holder ⇒ [Page 94-45](#)
- Insert housing into body opening.
- Tighten nuts (3 Nm).
- Install applicable rear luggage compartment panel trim.

Rear light housing - Jetta Wagon, removing and installing

Removing

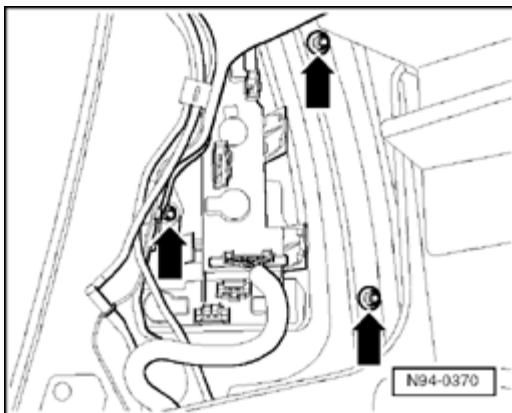
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove rear luggage compartment side trim/storage box (left or right):

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



▲

- Remove nuts -arrows- (Qty. 3) and remove housing.
- Remove bulb holder ⇒ [Page 94-45](#)

Installing

- Install bulb holder ⇒ [Page 94-45](#)
- Insert housing into body opening.
- Tighten nuts (3 Nm).
- Install applicable rear luggage compartment panel trim/storage box.

Rear light bulb holder - Golf/Jetta, removing and installing

Removing:

CAUTION!

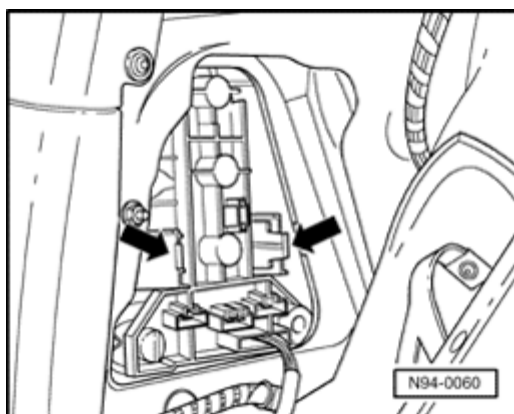
Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove rear luggage compartment side trim (left or right):

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Disconnect electrical connector.



- Depress retainers -arrows- and remove bulb holder.

Installing

Install in reverse order of removal.

Rear light bulb holder - Jetta Wagon removing and installing

Removing:

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove rear luggage compartment side trim (left or right):

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

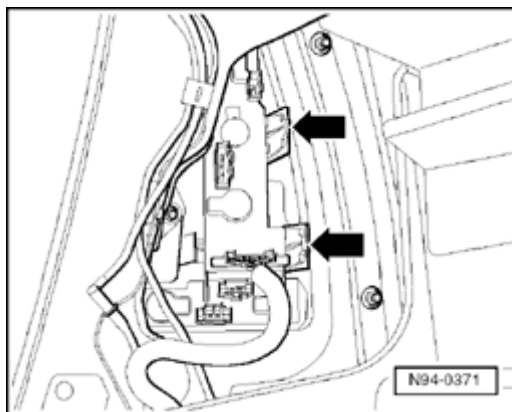
- Disconnect electrical connector.



- Depress retainers -arrows- and remove bulb holder.

Installing

Install in reverse order of removal.



Rear lights, tightening torques

Location / Fastener	Tightening torque
Rear light housing to rear body (all models) / nuts M5	3 Nm

License plate lights

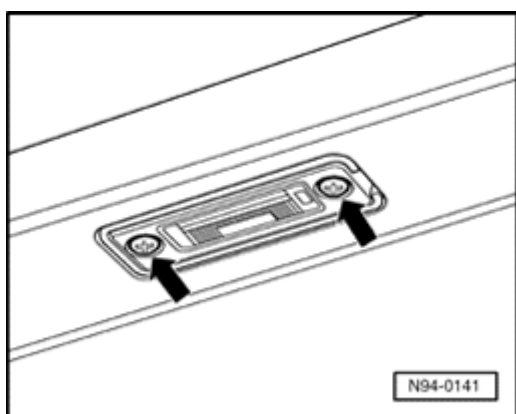
License plate light, removing and installing

Removing:

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Remove screws -arrows-.
- Remove lens with bulb.
- Remove bulb (12 Volt/5 Watt)

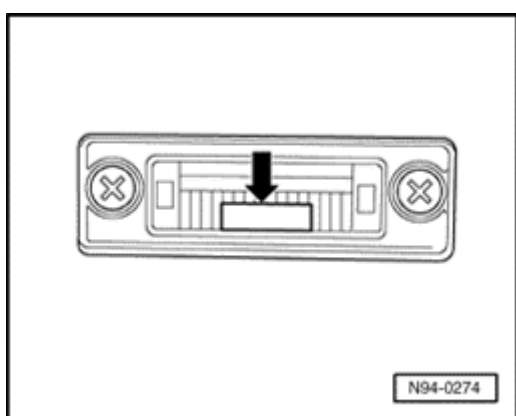
Installing:

Install in reverse order of removal.

Note:



The license plate light lens contains a silver reflector strip -arrow-. This must always face the bumper when installing.



High-mount brake light

High-mount brake light - Golf, removing and installing

The high-mount brake light is installed in the upper part of the rear window.

Note:

The bulb holder base plate contains soldered-in light emitting diodes (LEDs) that are not replaceable. In the event of LED malfunction, replace complete bulb holder.

Removing

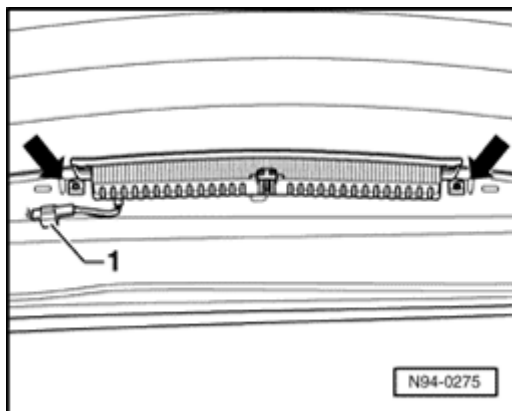
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove upper and lower rear lid trim

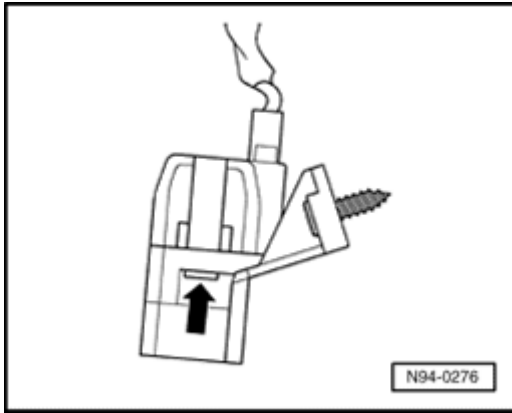
⇒ [Repair Manual, Body Interior, Repair Group 70](#)



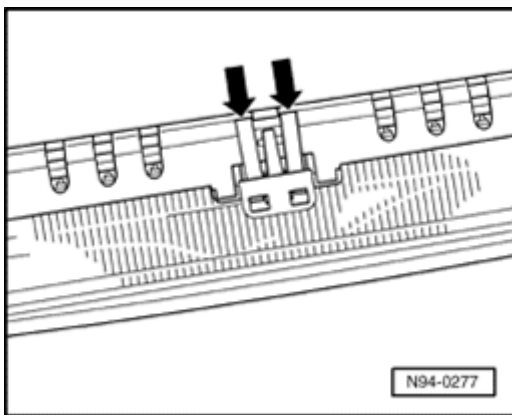
A

- Remove screws -arrows-.
- Disconnect electrical connector -1-

94-50



- ✦ - Unclip bulb housing at both short sides -arrow-.



- ✦ - Unclip bulb holder on both long sides -arrows-.

Installing

Install in reverse order of removal.

94-51

High-mount brake light - Jetta, removal and installing

The high-mount brake light is installed in the shelf.

Note:

The bulb holder base plate contains soldered light emitting diodes (LEDs) that are not replaceable. In the event of LED malfunction, replace complete bulb holder.

Removing

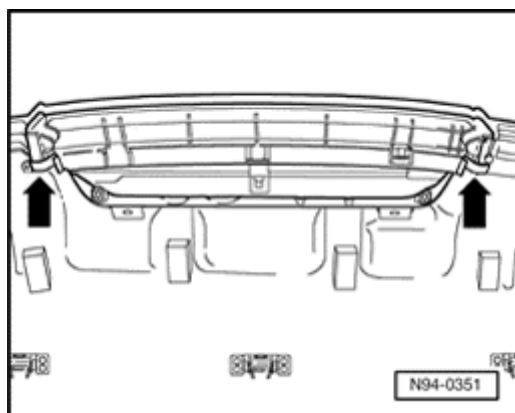
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- Disconnect electrical connector from high brake light.

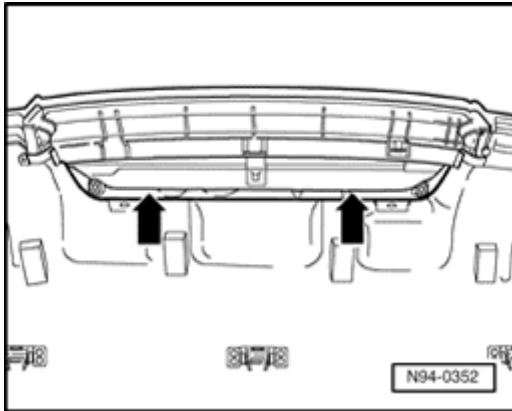
- Remove rear shelf

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



- Unclip high-mount brake light from rear shelf (arrows).

94-52



- Unclip bulb holder from bulb housing -arrows-.

Installing

Install in reverse order of removal.

High-mount brake light - Jetta Wagon, removing and installing

The high-mount brake light is installed in the upper part of the rear window.

Note:

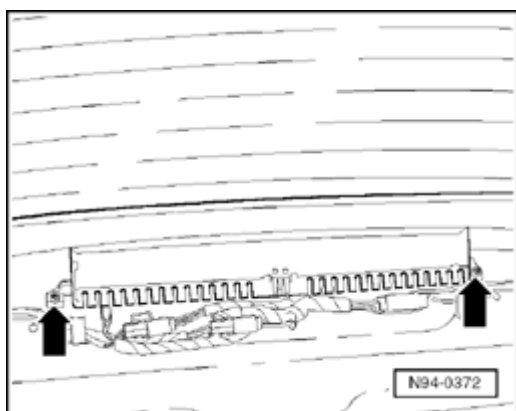
The bulb holder base plate contains soldered-in light emitting diodes (LEDs) that are not replaceable. In the event of LED malfunction, replace complete bulb holder.

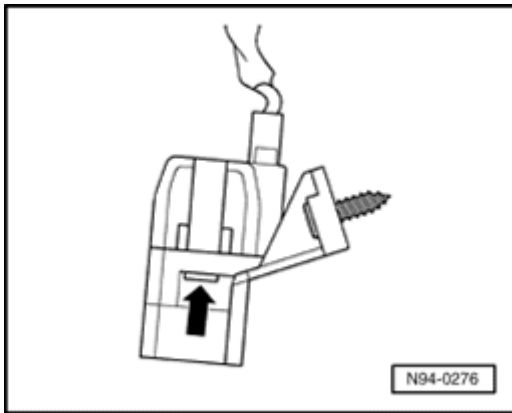
Removing

CAUTION!

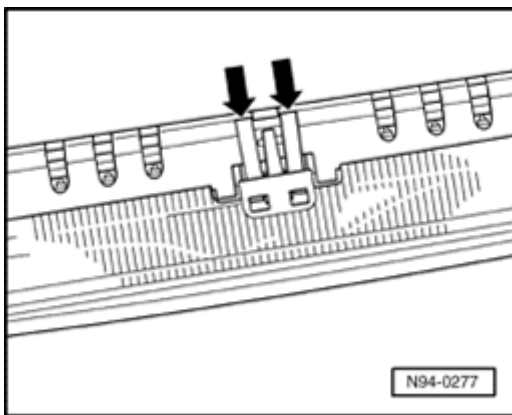
Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
 - ◆ **Switch ignition off and remove ignition key.**
 - Remove upper and lower rear lid trim
- ⇒ [Repair Manual, Body Interior, Repair Group 70](#)
- Remove screws -arrows-.
 - Disconnect electrical connector.





- ◀ - Unclip bulb housing at both short sides -arrow-.



- ◀ - Unclip bulb holder on both long sides -arrows-.

Installing

Install in reverse order of removal.

Steering column switches

Steering column switches, removing and installing

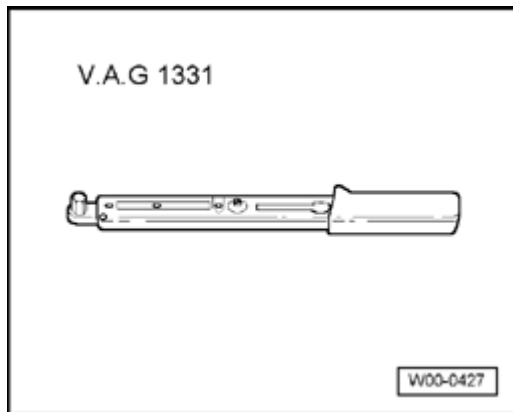
CAUTION!

Before beginning repairs on the electrical system:

- ◆ ***Obtain the anti-theft radio security code.***
- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***
- ◆ ***Disconnect negative (-) battery terminal.***
- ◆ ***When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified in this Repair Manual ⇒ [Page 27-39](#) .***

CAUTION!

Special safety precautions apply to vehicles equipped with airbags. Refer to Repair Manual, Body-Interior, Airbag: CAUTIONS and WARNINGS, Repair Group 69.



Special tools and auxiliary items needed

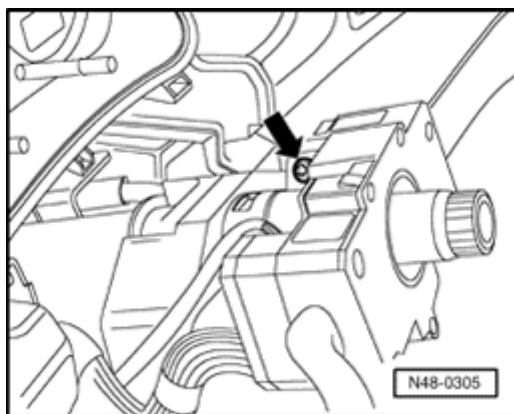
- ◆ VAG 1331 Torque wrench (or equivalent 5 - 50 Nm)

Removing

- Disconnect battery ⇒ [Page 27-39](#) .
- Remove driver's airbag
⇒ [Repair Manual, Body Interior, Repair Group 69](#)
- Remove steering wheel
⇒ [Repair Manual, Body Interior, Repair Group 69](#)
- Remove airbag spiral spring/return spring with slip ring
⇒ [Repair Manual, Body Interior, Repair Group 69](#)

CAUTION!

Heed special procedure for spiral spring etc. removal on vehicles equipped with ESP.



- Loosen clamping bolt for steering column switch and remove steering column switch.

Installing

Install in reverse order of removal, noting the following

- Install airbag spiral spring/return spring with slip ring

⇒ [Repair Manual, Body Interior, Repair Group 69](#)

- Install steering wheel

⇒ [Repair Manual, Body Interior, Repair Group 69](#)

- Install driver's airbag

⇒ [Repair Manual, Body Interior, Repair Group 69](#)

- Reconnect battery ⇒ [Page 27-39](#) .

Horn contact plate, removing and installing

CAUTION!

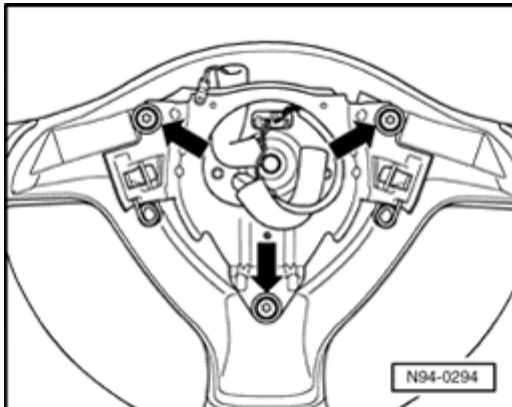
Special safety precautions apply to vehicles equipped with airbags. Refer to Repair Manual, Body-Interior, Airbag: CAUTIONS and WARNINGS, Repair Group 69.

Removing

- Disconnect battery ⇒ [Page 27-39](#) .

- Remove driver's airbag.

⇒ [Repair Manual, Body Interior, Repair Group 69](#)



- Remove screws -arrows-.

- Disconnect electrical connection and remove contact plate.

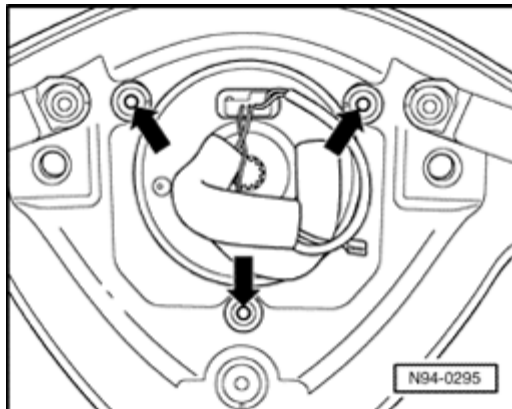
Installing

Install in reverse order of removal, noting the following:

Note:

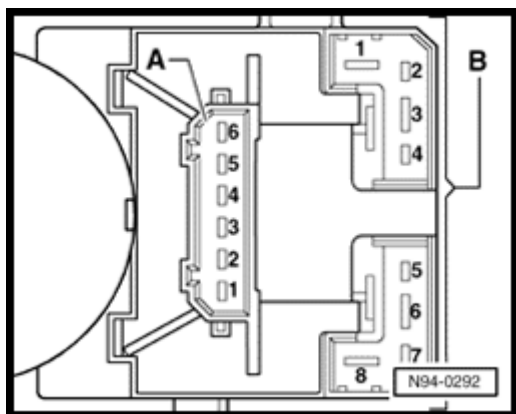
✦ *Ensure metal contact surfaces of contact plate as well as contact pins in steering wheel -arrows- are clean to metal.*

- Reconnect battery ⇒ [Page 27-39](#) .



Steering column switches, multi-pin connector assignments

Windshield wiper/washer and multi-function indicator (MFI) switches



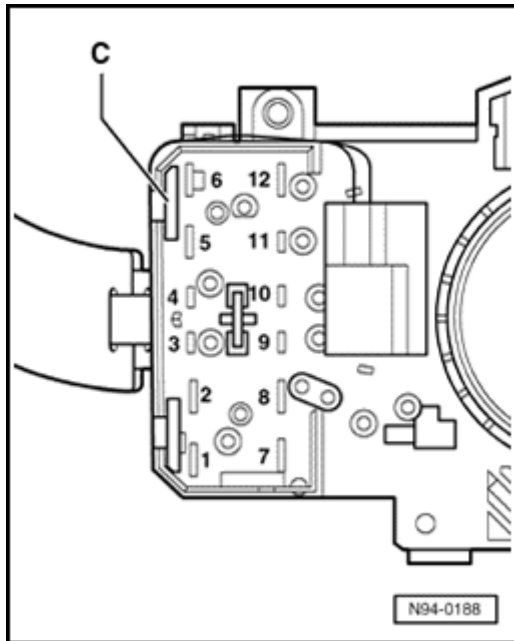
A - Connector, 4 pin

- 1 - MFI call-up button - right
- 2 - MFI call-up button - left
- 3 - MFI call-up button - terminal 31 (Ground)
- 4 - MFI safe switch - Reset
- 5 - Windshield wiper intermittent regulator - to intermittent wash/wipe relay
- 6 - Windshield wiper intermittent regulator - terminal 31 (Ground)

B - Connector, 8 pin

- 1 - Windshield wiper switch - terminal 53
- 2 - Windshield wiper switch - terminal 31
- 3 - Windshield wiper switch - terminal 53e
- 4 - Windshield wiper switch - terminal 53c
- 5 - Windshield wiper switch - rear window wiper
- 6 - Windshield wiper switch - terminal 53b
- 7 - Windshield wiper switch - intermittent operation
- 8 - Windshield wiper switch - terminal 53a

94-61



Turn Signal, headlight, flasher and parking light switch



C - Connector, 12 pin

1 - Switch for headlights/flasher - terminal 30

2 - Switch for headlights/flasher - terminal 30

3 - Turn Signal switch - terminal L

4 - Parking light switch - terminal P

5 - Turn Signal switch - terminal 49a

6 - Horn contact - terminal 71

7 - Switch for headlights/flasher - terminal 56

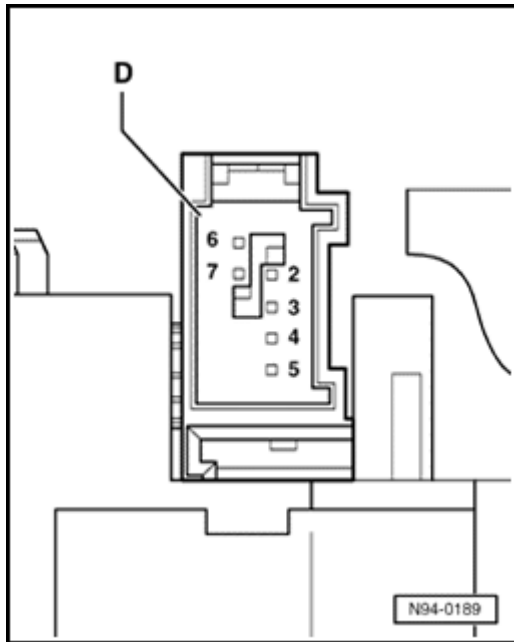
8 - Switch for headlights/flasher - terminal 56b

9 - Parking light switch - terminal PL

10 - Parking light switch - terminal PR

11 - Turn Signal switch - terminal R

12 - Switch for headlights/flasher - terminal 56a



Cruise control switch



D - Connector, 10 pin

- 1 - Open
- 2 - Switch for CCS - On / Off
- 3 - Switch for CCS - Set / delay
- 4 - Switch for CCS - Reset / Resume saved speed / Accelerate
- 5 - Switch for CCS - Reset / Resume saved speed / Accelerate
- 6 - Switch for CCS - On / Off
- 7 - Switch for CCS
- 8 - 10: Open

Ignition/starter switch and lock cylinder

Lock cylinder, removing and installi

CAUTION!

Before beginning repairs on the electrical system:

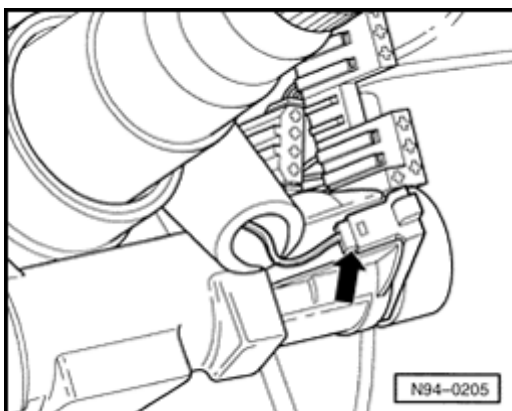
- ◆ **Obtain the anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Disconnect negative (-) battery terminal.**
- ◆ **When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD programming and electrical system function checks specified in this Repair Manual ⇒ [Page 39](#).**

Removing

- Disconnect battery ⇒ [Page 27-39](#).
- Remove steering column switches ⇒ [Page 55](#).
- Where applicable, carefully disconnect electrical connection for the induction coil for anti-theft immobilizer from lock cylinder.

Note:

If equipped, the induction coil for anti-theft immobilizer is integrated with the lock cylinder and cannot be serviced separately.

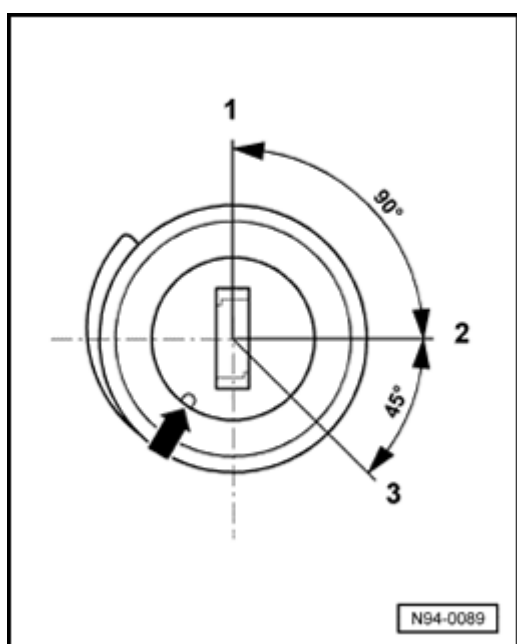


94-64

- Insert ignition key in lock cylinder and turn position "Drive".

Position of key in lock cylinder:

- 1 - Position "Stop"
- 2 - Position "Drive"
- 3 - Position "Start"



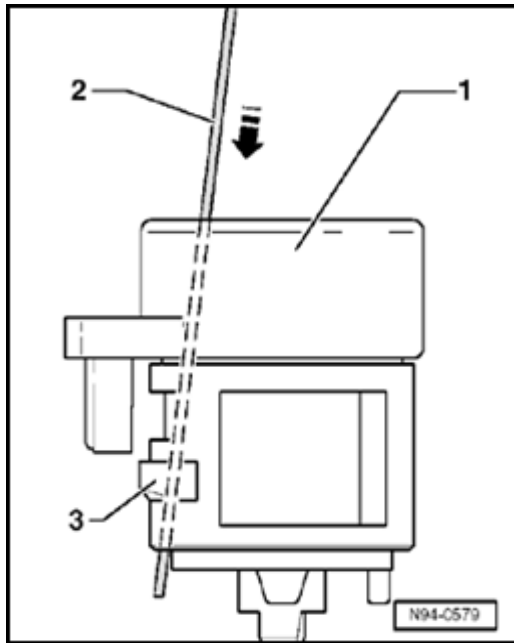
- Insert steel wire (approx. \varnothing 1.2 mm) in d next to ignition key -arrow-.

Note:

To enable steel wire to be inserted straight hole, ignition key may have to be dismantled inserted into lock cylinder without key head.

- Dismantling ignition key
⇒ [Repair Manual, Body Interior, Repair Gro](#)

94-65



- Release lock cylinder securing lever using wire -arrow- and remove lock cylinder from steering lock housing.

1 - Lock cylinder

2 - Steel wire (approx. \varnothing 1.2 mm)

3 - Securing lever

Installing

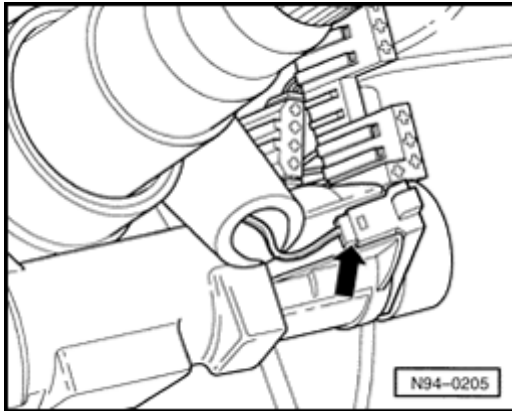
- Insert ignition key in lock cylinder and turn to position "Drive".
- Release securing lever using wire (approx. \varnothing 1.2 mm) and insert lock cylinder in steering lock housing.

Note:

Where applicable, ensure immobilizer induction coil electrical connection orientation in lock cylinder housing guide.

- Pull wire out of lock cylinder and ensure lock cylinder is secured properly in steering lock housing.

94-66



- Where applicable, reconnect immobilizer reading coil electrical connector -arrow- to lock cylinder.
- Install steering column switches and steering wheel ⇒ [Page 94-55](#) .
- Reconnect battery ⇒ [Page 27-39](#) .

Ignition/starter switch, removing and installing

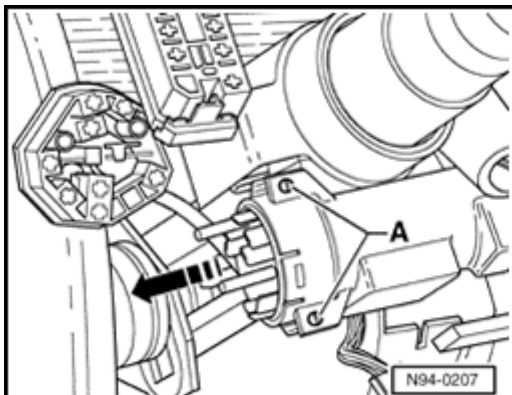
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Obtain the anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Disconnect negative (-) battery terminal.**
- ◆ **When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD programming and electrical system function checks specified in this Repair Manual ⇒ [Page 39](#).**

Removing

- Disconnect battery ⇒ [Page 27-39](#).
- Remove steering column switches ⇒ [Page 55](#).
- Disconnect electrical connector from ignition/starter switch.
- Remove locking paint on securing screws.
- Loosen two securing screws -A- slightly and pull ignition/starter switch out from steering lock housing in direction of -arrow-.



Installing

Install in reverse order of removal, noting the following:

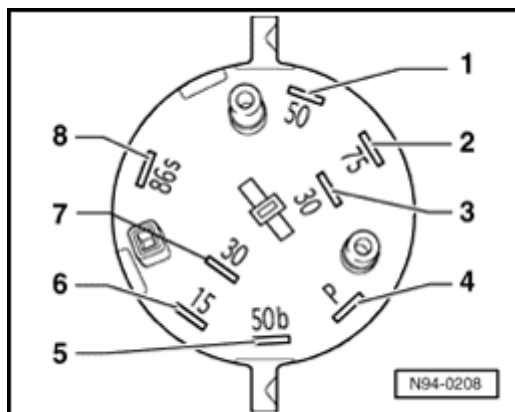
- Push ignition/starter switch into steering lock housing.

Note:

When installing the ignition/starter lock switch ensure that the ignition/starter lock switch and the lock cylinder are in the same position, e.g. "ignition on".

- Tighten securing screws and seal with locking paint.
- Connect electrical connector to ignition/starter switch.
- Reinstall steering column switches and steering wheel.

Ignition/starter switch, connector assignments



Connector, 8 pin

- 1 - Terminal 50 (starter)
- 2 - Terminal 75 ("X - relief" contact)
- 3 - Terminal 30 (Ground)
- 4 - Terminal P
- 5 - Terminal 50b
- 6 - Terminal 15 (Ignition ON)
- 7 - Terminal 30 (B+)
- 8 - Terminal 86s (Key warning buzzer)

Interior lights and switches

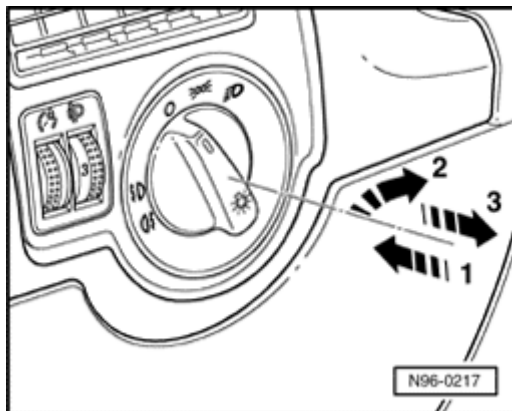
Light Switch -E1-, removing and installing

Removing

CAUTION!

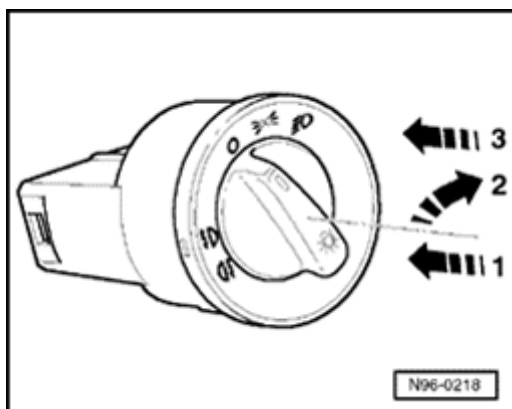
Before beginning repairs on the electrical system:

- ♦ **Switch off all electrical consumers.**
- ♦ **Switch ignition off and remove ignition key.**



- Turn rotary switch to "0" position.
- Press rotary part inward -arrow1- and turn slightly to right -arrow2-
- Hold rotary part in this position and pull light switch out from instrument panel -arrow3-.
- Disconnect electrical connection.

Installing



- Connect electrical connector.
- Hold light switch and press rotary part inward -arrow1- and turn slightly to right -arrow2-
- Hold rotary part in this position and insert light switch into instrument panel -arrow3-.
- Turn rotary part to position "0", release and engage switch

Instrument Panel Light Dimmer/Switch E20-, removing and installing

Note:

European-only market dimmer/switch that includes manual headlight beam adjuster is illustrated here. Procedure is the same for USA/CDN models.

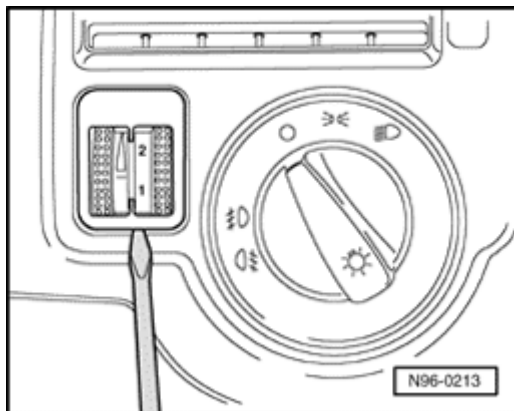
Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Apply tape to instrument panel in area around switch in order to protect instrument panel.



- Carefully pry out switch housing from instrument panel frame using screwdriver as illustrated.
- Pull out switch and disconnect electrical connector.

Installing

- Connect electrical connector.
- Insert headlight beam adjuster in guide on mounting frame and press in.

Sunroof Regulator -E139-, removing and installing

Note:

Sunroof Regulator -E139- cannot be replaced individually. The complete interior/reading light module with switch assembly must be replaced ⇒ [Page 96-4](#) .

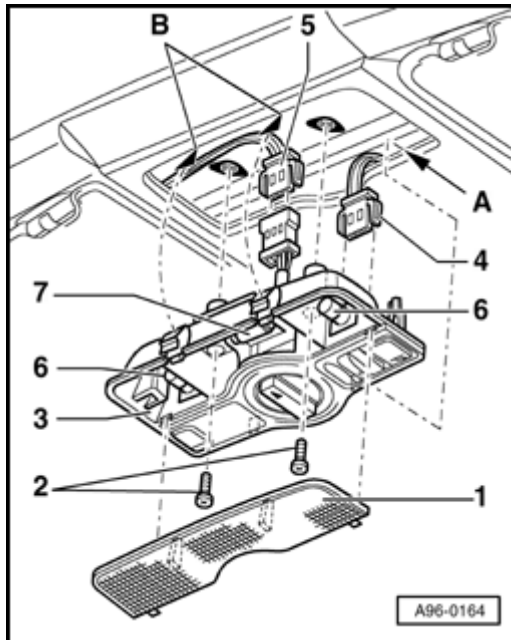
Front Interior Light -W1-, removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Carefully pry lens from interior light -1- and remove.
- Remove screws -2-.
- Pry out hooks -B- with screwdriver and then remove interior light assembly -3- from roof console.
- Disconnect electrical connections -4- and -5-.

Installing

Install in reverse order of removal

Power Window Regulator Switches in driver's door, removing and installing

Note:

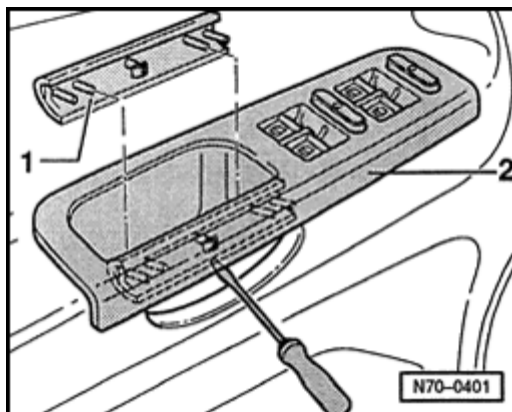
Power Window Regulator Switches in driver's door cannot be removed or serviced separately. In case of malfunctions, the complete switch module must be replaced.

Removing

CAUTION!

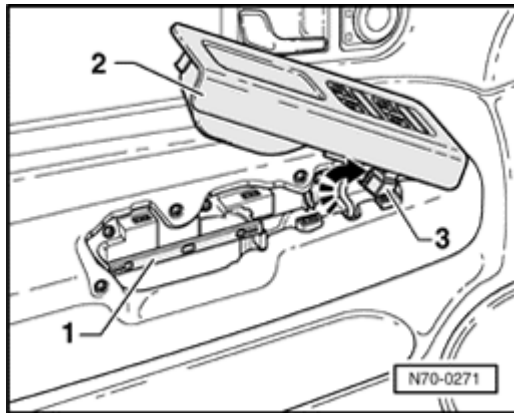
Before beginning repairs on the electrical system:

- ♦ **Switch off all electrical consumers.**
- ♦ **Switch ignition off and remove ignition key.**



- Carefully unclip handle -1- from armrest trim -2-.

96-6

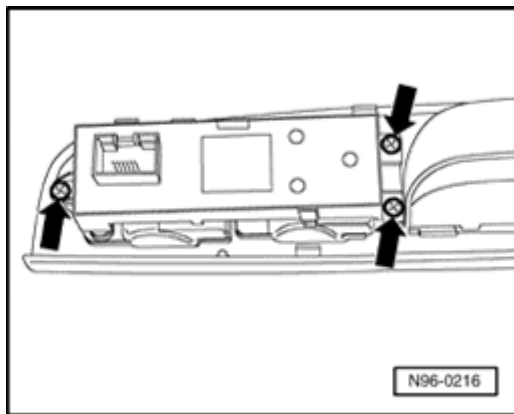


- Carefully unclip rear section of armrest trim with switch module upwards -arrow- from retainer -1-.

CAUTION!

Ensure retainer -1- is not damaged upon removal.

- Disconnect electrical connector - 3-.



- Remove screws -arrows- and remove switch module.

Installing

Install in reverse order of removal.

Power Window Regulator Switches in front passenger's door/rear doors, removing and installing

Note:

The procedure for removing and installing the

- ◆ *Right Front Power Window Regulator Switch - E41-*
- ◆ *Left Rear Power Window Regulator Switch - E52-*
- ◆ *Right Rear Power Window Regulator Switch - E54-*

is essentially the same for all switches.

The following illustrates the procedure for -E41-.

Removing

CAUTION!

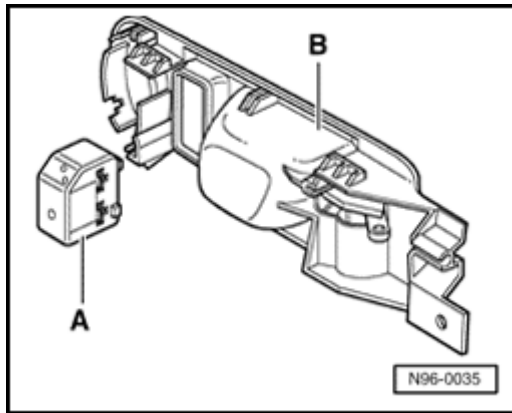
Before beginning repairs on the electrical system:

- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***

- Removing (appropriate) door trim

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Disconnect electrical connector at switch module.



- ✦ - Bend mounting frame -B- out on the longer switch side -A- and remove switch from mounting frame.

Installing

Install in reverse order of removal.

Mirror Adjustment Switch - E43- with Mirror Adjustment Selection Switch -E48-, removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

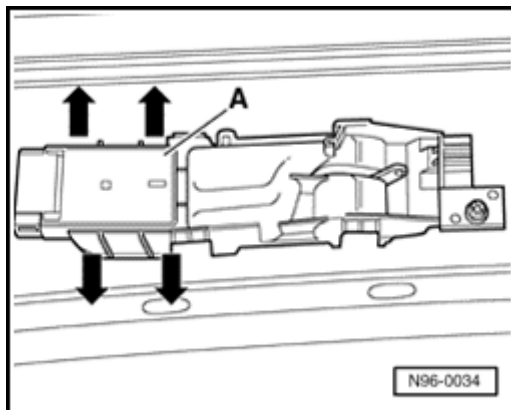
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Removing front door trim

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Disconnect electrical connector.

◀ - Bend mounting frame -B- out on the longer switch side -A- and remove from mounting frame.



Installing

Install in reverse order of removal.

Switches in instrument panel, removing and installing

Switches consists of a switch housing and trim plate with relevant symbol. The trim plate is clipped onto the switch housing. If the trim is released instead of the switch during removal, the trim must be re-clipped onto the switch housing afterwards.

Remove switches with connected wiring from instrument panel opening prior to disconnecting electrical connection on rear of switch.

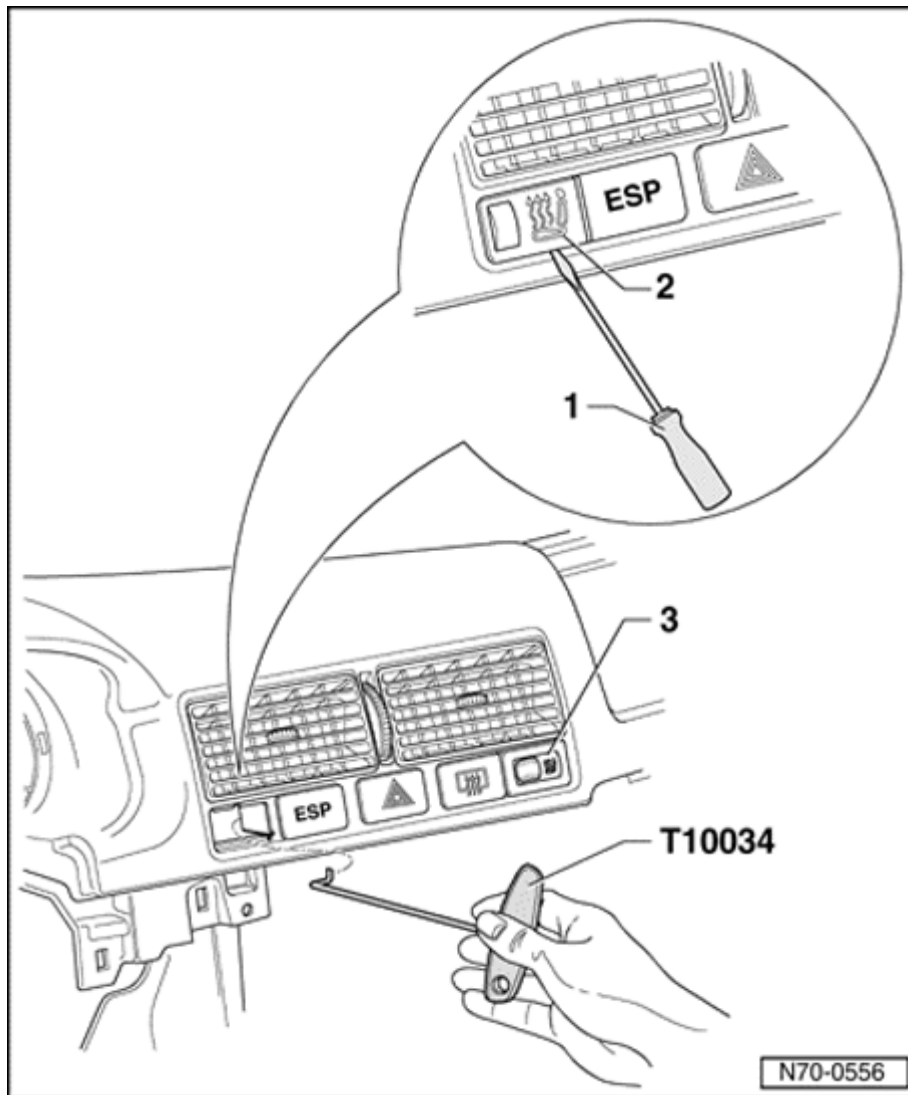
If necessary, temporarily remove switch to the left of of the switch to be removed/replaced to allow sufficient access to the wiring.

Switch blank-out covers (where applicable) are removed in the same manner as switches.

CAUTION!

- ◆ ***Be careful not to damage instrument panel when removing switch. Protect trim in area of switch with adhesive tape before removing switch.***
- ◆ ***Do Not pry out switches from the side. Only pull out from the top.***

96-11



Heated seat adjusters, removing and installing

Removing

CAUTION!

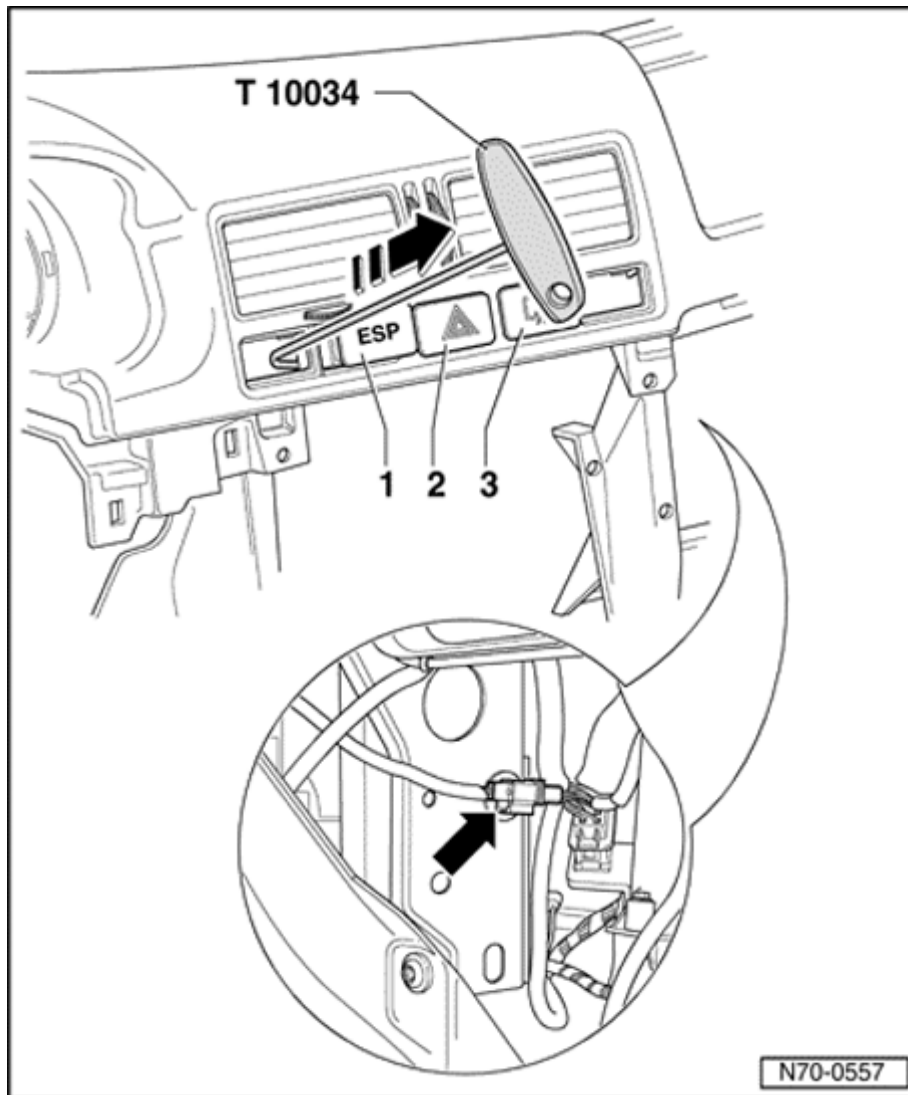
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Apply adhesive tape to instrument panel in area of switch.
- Carefully release switch -2- or -3- using a flat screwdriver -1- and remove.
- Disconnect electrical connectors.

Installing

Install in reverse order of removal.

96-12



Rear Window Defogger Switch -E15-, Emergency Flasher Switch -E3- and ASR/ESP Switch, removing and installing

Note:

Switches cannot be removed using a screwdriver due to the strong springs in their engagement mechanisms.

Removal and installation is the same for all switches. ASR/ESP switch removal is described below:

Removing

CAUTION!

◆ **Switch off all electrical consumers.**

◆ **Switch ignition off and remove ignition key.**

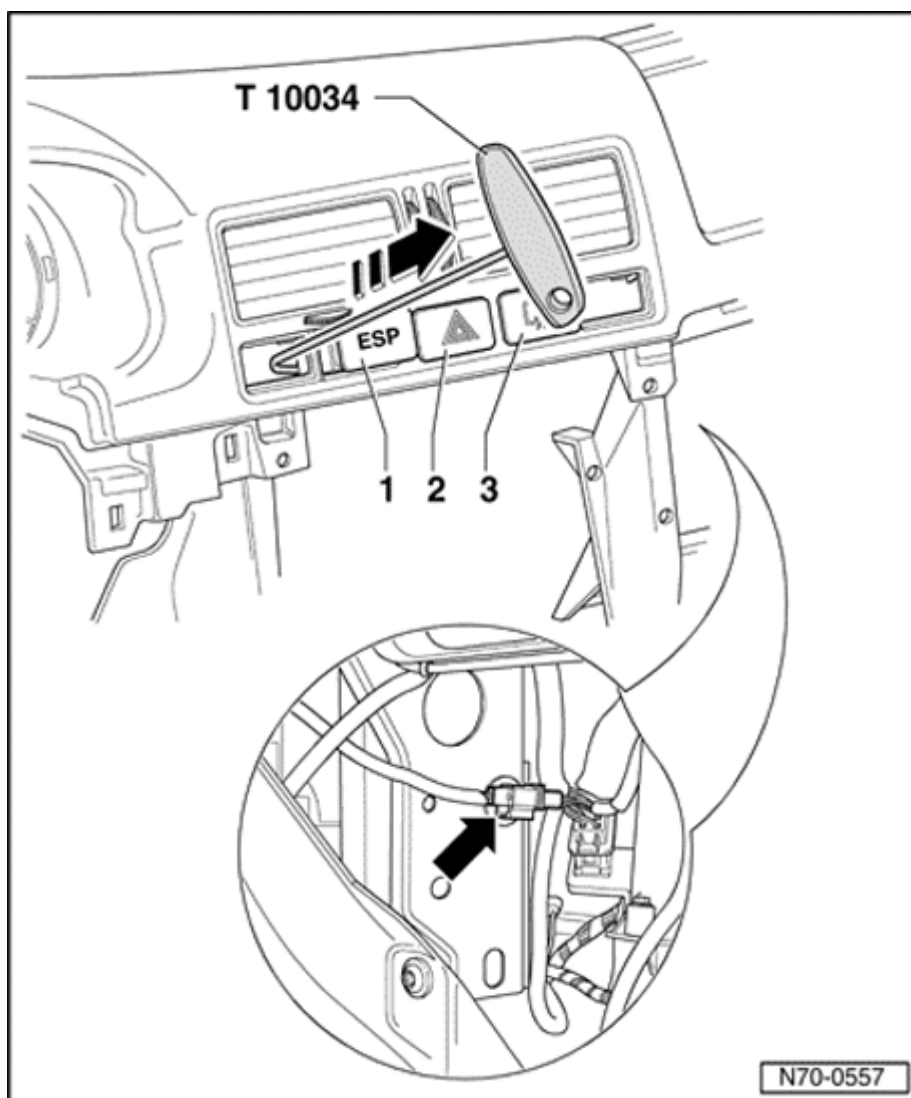
-

First remove

driver's
heated
adjuster ⇒
[Page 96-11](#)

- Reach
behind the
ESP switch
using the tip
of assembly
tool
T10034 .

96-13



- Release the button for ESP -1- using assembly tool T10034 and remove from vent.
- Disconnect electrical connector.
- Remove switch -2- and -3- in the same manner if necessary.

Installing

Install in reverse order of removal.

Door Warning Lights -M27- & -M28-, removing and installing

Note:

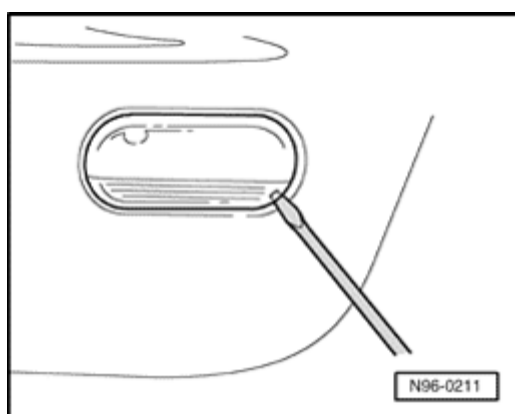
The procedure for removing and installing the door warning lights is the same for all doors.

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***



- Insert screwdriver behind lens and carefully pry outward.
- Disconnect electrical connection.

Installing

Install in reverse order of removal.

Door contact switches, removing and installing

- ◆ Driver's Door Contact Switch -F2-
- ◆ Front Passenger's Door Contact Switch - F3-
- ◆ Left Rear Door Contact Switch -F10-
- ◆ Right Rear Door Contact Switch -F11-

Door contact switches are integrated into the individual door lock mechanisms and cannot be replaced separately.

In case of door contact switch malfunction, replace complete door lock mechanism.

⇒ [Repair Manual, Body Exterior, Repair Group 57](#)

Luggage Compartment Light Switch -F5-, removing and installing

The luggage compartment light switch is integrated in the rear lid lock and cannot be replaced separately.

In case of switch malfunction, replace complete rear lid lock mechanism.

⇒ [*Repair Manual, Body Exterior, Repair Group 55*](#)

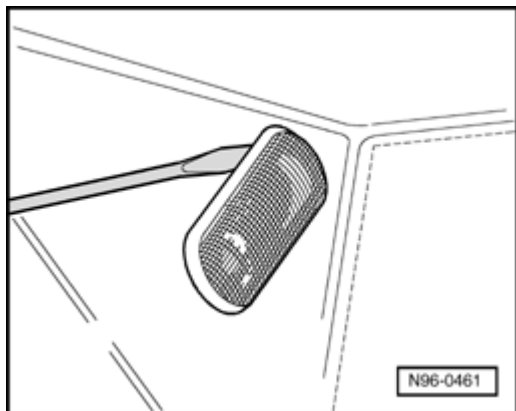
Glove Box Light -W6-, removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Insert screwdriver behind lens and carefully pry outwards.

CAUTION!

During removal, ensure light switch-off lever (where applicable) is not damaged.

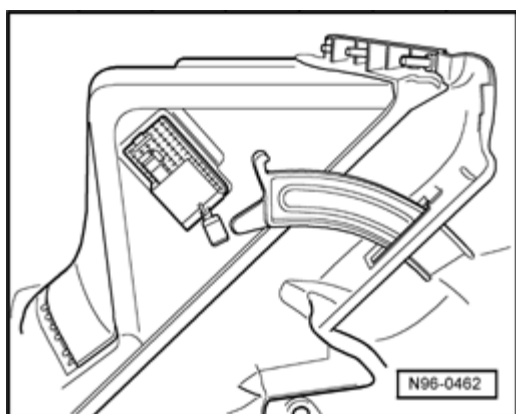
- Pull out lens with bulb holder and microswitch
- Disconnect electrical connection.
- Replace 12V/3W bulb as necessary

Installing

- Connect electrical connection.

Notes:

- ◆ *To ease illustration, glove compartment shown removed.*
- ◆ *Where applicable, note orientation of sw when installing: light switch-off lever must be in down position.*
- Insert lens with bulb holder and microswitch into glove box and clip-in.



Perform functional check of light and switch must go out with glovebox lid closed.

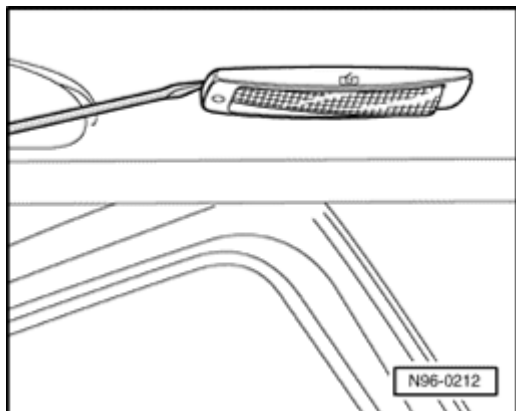
Rear Reading Lights -W11- & -W12-, removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Insert screwdriver into lens recess and carefully pry reading light out of mounting frame.
- Disconnect electrical connection.

Installing

Install in reverse order of removal.

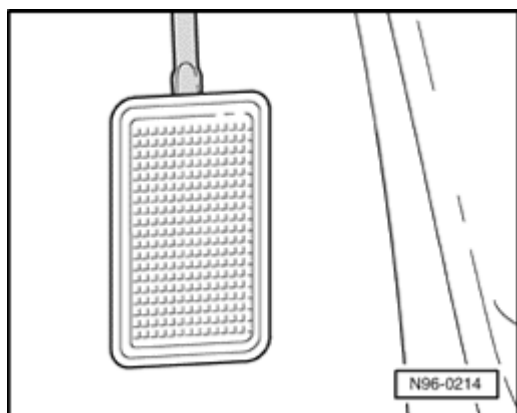
Luggage Compartment Light - W3- - Golf/Jetta, removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***



- Insert screwdriver at top behind the lens and carefully pry out.
- Disconnect electrical connector.

Installing

Install in reverse order of removal.

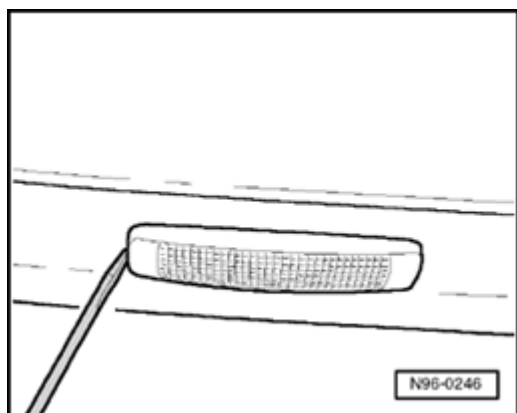
Luggage Compartment Light - W3- - Jetta Wagon, removing and installing

Upper light, removing

CAUTION!

Before beginning repairs on the electrical system:

- ♦ ***Switch off all electrical consumers.***
- ♦ ***Switch ignition off and remove ignition key.***



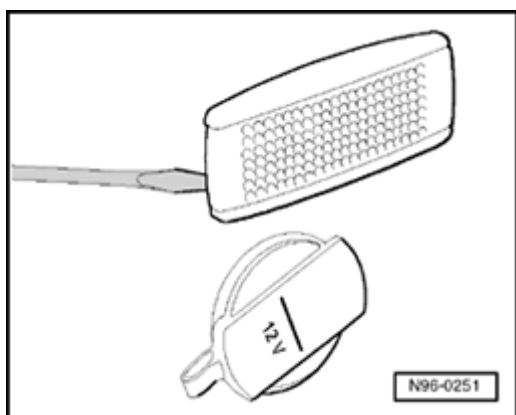
- Insert screwdriver at top behind the lens and carefully pry out.
- Disconnect electrical connector.

Light in side panel, removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Insert screwdriver at top behind the lens and carefully pry out.
- Disconnect electrical connector.

Installing

Install in reverse order of removal.

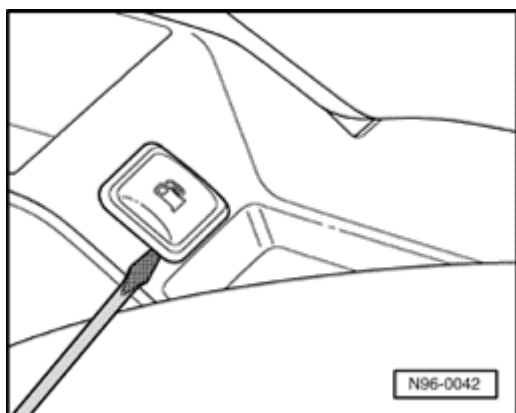
Remote Fuel Filler Flap Release Switch -E204-, removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***



- ▲ - Place screwdriver behind switch housing and carefully pry out of retainer.
- Disconnect electrical connection.

Installing

Install in reverse order of removal.

Rear Lid Handle Unlock Switch -E234- - Jetta, removing and installing

Removing

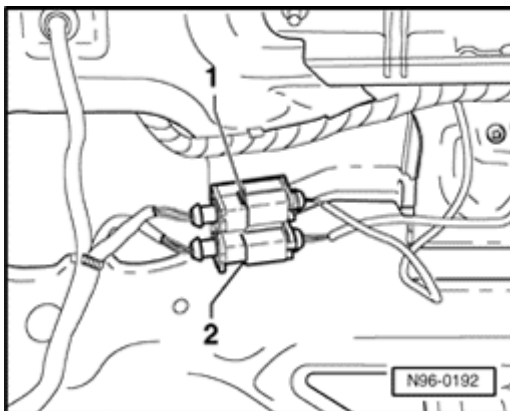
CAUTION!

Before beginning repairs on the electrical system:

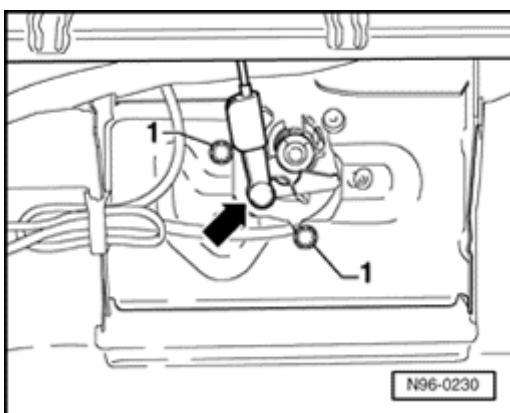
- ♦ **Switch off all electrical consumers.**
- ♦ **Switch ignition off and remove ignition key.**

- Removing inner rear lid trim

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

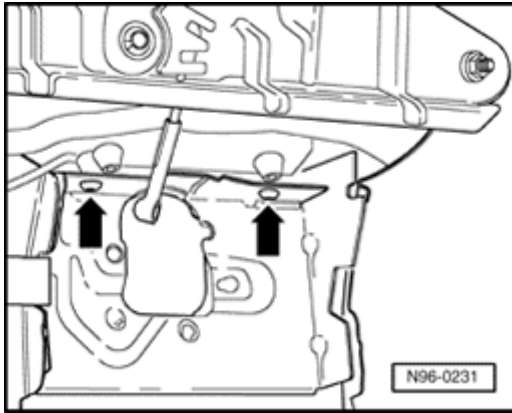


- Unclip multi-connectors -1- and -2- from retainers and disconnect.



- Unclip rod -arrow- from lock cylinder.
- Remove screws -1-.
- Remove lock cylinder upwards.

96-25



- Remove screws -arrows-
- Remove switch upwards.

Installing

Install in reverse order of removal.

Rear Lid Handle Unlock Switch -E234- - Jetta Wagon, removing and installing

Removing

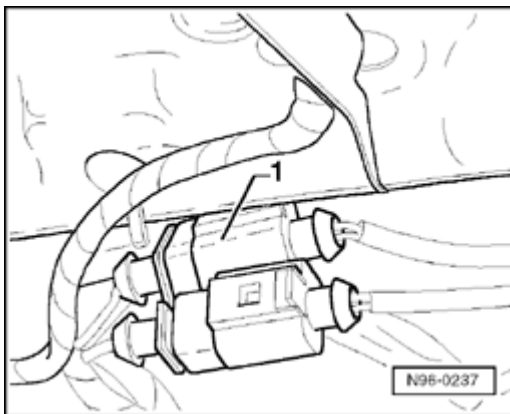
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

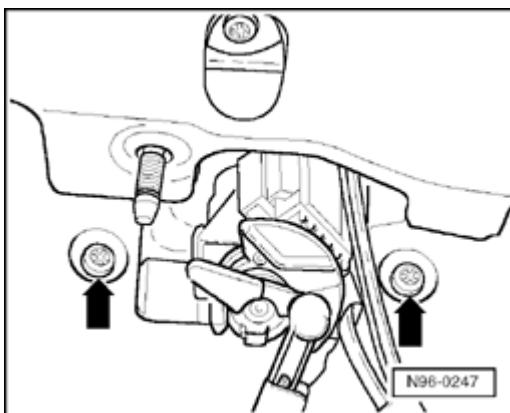
- Removing inner rear lid trim

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



▲

- Disconnect multi-connector -1-
- Remove rear wiper motor ⇒ [Page 92-33](#) .



▲

- Remove screws -arrows-.
- Remove switch upwards.

Installing

Install in reverse order of removal.

Anti-theft Immobilizer

General information

Golf/Jetta/GTI models from m.y. 2000 are equipped with an anti-theft immobilizer system.

Immobilizer functions supported by:

- ◆ control electronics ("control module") integrated with instrument cluster
- ◆ a warning light for anti-theft immobilizer -K117- in instrument cluster (speedometer display)
- ◆ an adapted Engine Control Module (ECM)
- ◆ an induction coil on the ignition lock
- ◆ Adapted ignition keys with electronic components (transponder and response reader memory)

Malfunction recognition and Diagnostic Trouble Code (DTC) display via warning light for anti-theft immobilizer -K117-

An intact immobilizer system is indicated by the warning light for anti-theft immobilizer -K117- lighting up and going out after approx. 3 seconds when the ignition is switched on.

When the ignition is switched "on", the warning lamp flashes or lights up continuously to indicate a malfunction in the system when:

- ◆ Adapting the ignition key has been carried out incorrectly

- ◆ No transponder (response reader memory) is present in ignition key.
- ◆ An unauthorized ignition key is used.
- ◆ An unauthorized engine control module is detected.
- ◆ A malfunction in the induction coil of anti-theft immobilizer -D2-.
- ◆ A malfunction in the data wiring is present.

The warning light for anti-theft immobilizer - K117- does not light up after switching on ignition:

- ◆ The immobilizer control module has detected an authorized key.
- ◆ The immobilizer control module has not detected an incorrect engine control module.
- ◆ The immobilizer control module is currently "adapting keys" and after adapting the keys no malfunction has occurred.
- ◆ To troubleshoot, perform On Board Diagnostic (OBD) program and retrieve stored information with VAS 5051 Vehicle Diagnostic, Testing and Information System in mode "Guided Fault Finding"

Anti-theft Immobilizer On Board Diagnostic (OBD), function

If malfunctions occur in sensors and components being monitored, they will be stored in the Diagnostic Trouble Code (DTC) memory together with an indication of the type of malfunction.

A maximum of 4 DTCs can be stored simultaneously.

Sporadic malfunctions are automatically cancelled if they are not repeated in next 50 engine starts.

On Board Diagnostic of the anti-theft immobilizer system is to be carried out using the VAS 5051 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding"

Anti-theft Immobilizer control module, replacing

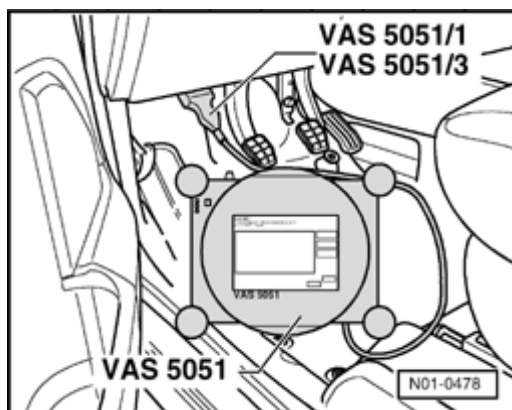
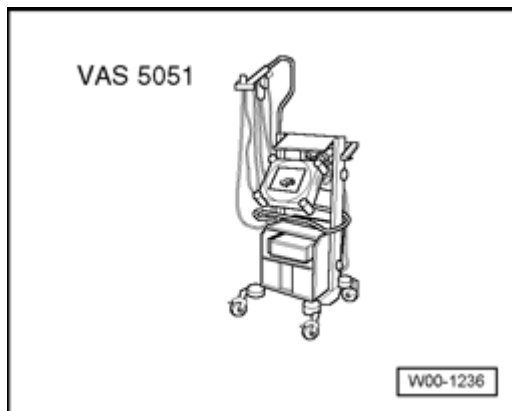
Replacement of instrument cluster with integrated immobilizer control module functions requires replacement unit to be adapted to the vehicle's Engine Control Module (ECM). The following OBD program steps initiate this procedure:

Special tools, testers and auxiliary items needed

- ◆ VAS 5051 Vehicle Diagnostic Testing and Information System
- ◆ Adapter cable VAS 5051/1 or VAS 5051/3

VAS 5051, connecting

- Switch off all electrical consumers.
 - Engage parking brake.
 - Automatic transmission: Selector lever in "N" or "P" position.
 - Manual transmission: Selector lever in "Neutral" position.
- ▲
- With ignition switched off, connect VAS 5051 with adapter cable to Data Link Connector (DLC) located under the instrument panel, left.
 - Switch on ignition



- Select mode "Guided Fault Finding"
- Enter appropriate model, equipment and model year information and press ">" to confirm.

After all Control Modules have been registered and DTC memories checked,

- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97)"
- Select "Electrical System (Repair Group 27; 90 to 97)"
- Select "01-Systems capable of self-diagnosis"
- Select "Anti-theft immobilizer" where indicated
- Select "Functions"
- Select "Adapt instrument cluster to Engine Control Module (ECM)."
- Forward with "▶" button
- Follow/perform selected OBD program steps as prompted by tester.

Anti-theft Immobilizer control module, removing and installing

Anti-theft immobilizer control module functions are integrated with the instrument cluster. In the event of faulty anti-theft immobilizer control module functions, the entire instrument cluster requires replacement ⇒ [Page 90-8](#) .

Induction Coil of Anti-theft Immobilizer -D2-, removing and installing

The induction coil of anti-theft immobilizer - D2- is integrated with the steering column lock cylinder housing and cannot be replaced separately.

In the event of immobilizer induction coil malfunction, the complete lock cylinder housing requires replacement ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 48](#) .

Transponder (key)

Replacement or servicing of the transponder integrated with the vehicle keys is not possible.

In the event of transponder malfunction, the complete key assembly requires replacement.

Fuse holder and relay carriers

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Obtain the anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Disconnect negative (-) battery terminal.**
- ◆ **When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified in this Repair Manual ⇒ [Page 27-39](#) .**

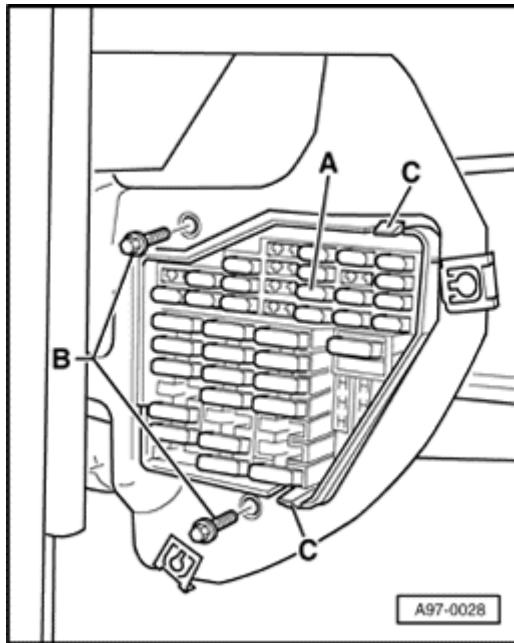
Fuse holder, removing and installing

Removing

- Disconnect battery ⇒ [Page 27-39](#) .
- Carefully pry-off side cover from instrument panel (left).
- Remove driver's side instrument panel trim.

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

97-2



- Remove screws -B- (2 Nm)
- Press locking tab -C- while doing pulling fuse holder -A- out inward.

Installing

Install in reverse order of removal, noting the following:

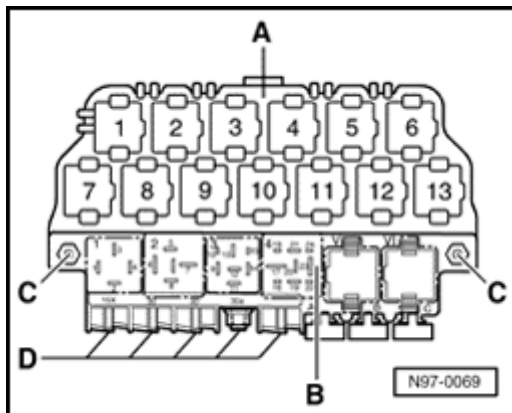
- Reconnect battery ⇒ [Page 27-39](#) .

Relay plate and 13 position relay carrier removing and installing

Removing

- Disconnect battery ⇒ [Page 27-39](#) .
- Unclip instrument panel side trim.
- Remove driver's side lower instrument panel trim.

⇒ [Repair Manual, Body Interior, Repair Group 70](#)



- Remove screws -C- (2 Nm)
- Disconnect all screwed connections -D- as necessary.
- Take out central electric -B- and relay carrier out downward.

Installing

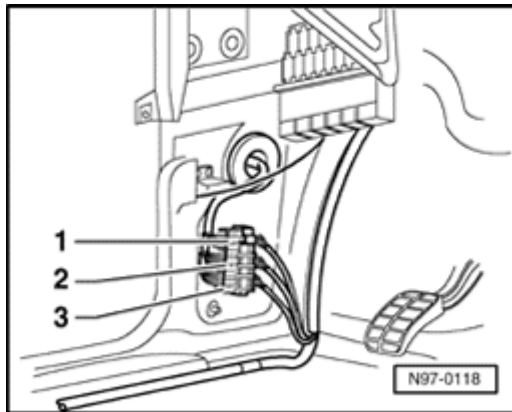
Install in reverse order of removal, noting the following:

- Reconnect battery ⇒ [Page 27-39](#) .

A-pillar coupling station

Note:

Driver's side A-pillar coupling station is illustrated. The front passenger side A pillar is a mirror image.



⚡ The coupling station is located in the front left footwell behind the footwell trim.

- 1 - Central locking
- 2 - Power window regulator, red
- 3 - Power mirror adjustment, blue

Fuse holder on battery, removing and installing

Fastened fuse holder, removing and installing ⇒ [Page 27-52](#) .

Clipped fuse holder, removing and installing ⇒ [Page 27-56](#) .

Note:

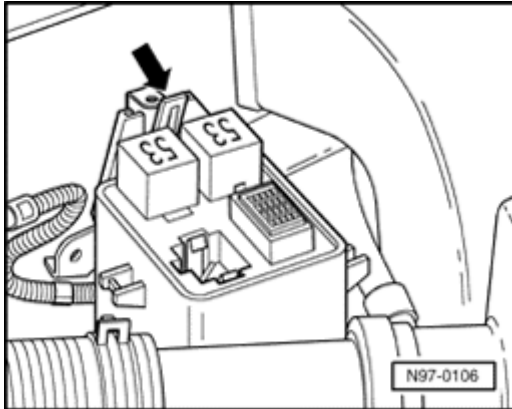
Obtain connector pin assignment from applicable wiring diagram!

⇒ *Electrical Wiring Diagrams*

Protective housing for relays in engine compartment, removing and installing

Removing

- Remove cover
- Press locking lug -arrow- forward and take protective housing off upward out of guides.
- Press sides of housing of lower part outward and release carrier plate from locking device.



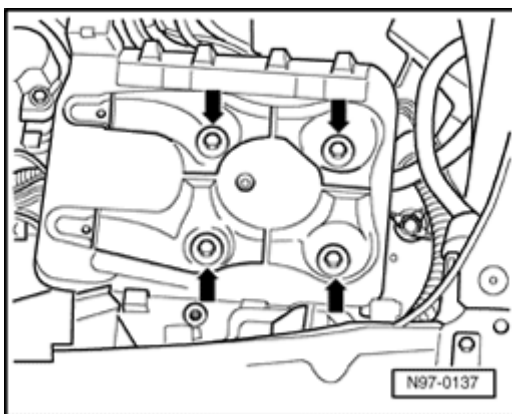
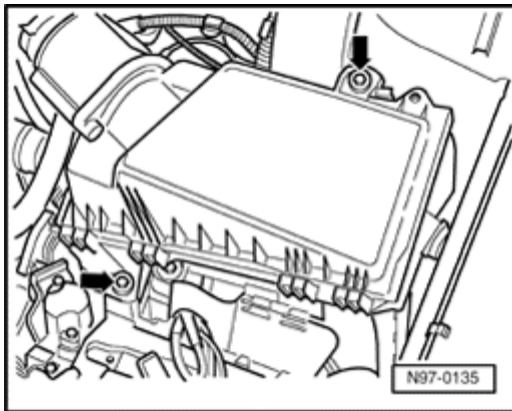
Installing

Install in reverse order of removal.

Cable channel in engine compartment removing and installing

Removing

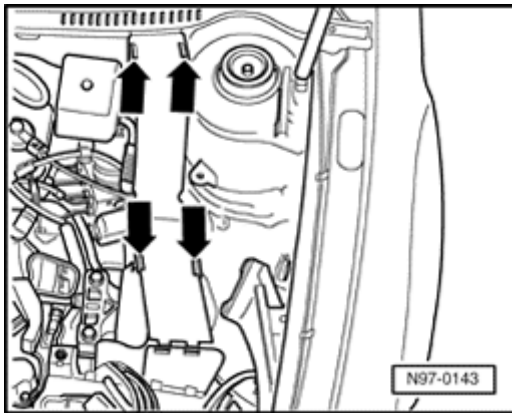
- Remove battery as applicable:
 - ◆ Battery with fastened fuse holder ⇒ [Page 52](#).
 - ◆ Battery with clipped fuse holder ⇒ [Page 56](#).
- Loosen connectors and hose connections cleaner housing.
- ↳ - Unscrew securing bolts -arrows- and take cleaner housing out upward.



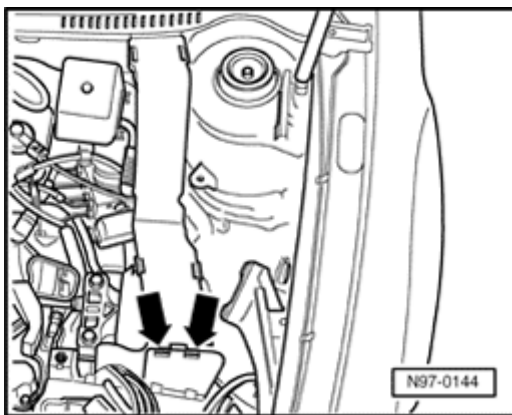
- ↳ - Remove bolts -arrows- and remove battery carrier.

Tightening torque: 6 Nm

97-8



- Unclip cable channel cover at the retaining lugs -arrows- and fold cable channel cover in direction of travel.



- Unclip the remaining retaining lugs -arrows- in this cable channel cover position and remove cable guide cover.
- Release all connectors necessary to remove wiring harness from cable channel.
- Unclip cable channel and take off.

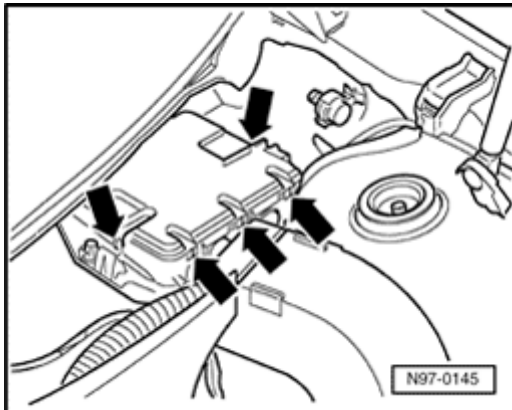
Installing

Install in reverse order of removal.

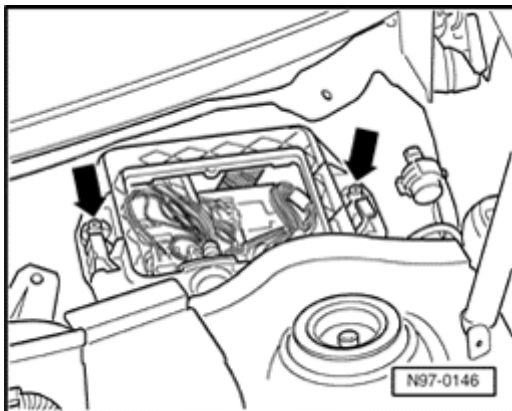
Protective housing in plenum cham removing and installing

Removing

- Removing windshield wiper system ⇒ [Page 10](#).



- Unclip protective housing cover at the ret lugs -arrows- and take out upward.
- Separate connectors and take wiring harness out of protective housing.



- Remove securing nuts -arrows- and remove protective housing.

Installing

Install in reverse order of removal.

Fuse holder and relay carriers, tightening torques

Location / Fastener	Tightening torque
Fuse holder to instrument panel / screws	2 Nm
Relay plate/relay carrier to instrument panel / screws	2 Nm
Battery carrier / bolts	6 Nm

Wiring harnesses and connectors, repairing

Safety measures

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Obtain the anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Disconnect negative (-) battery terminal.**
- ◆ **When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified in this Repair Manual ⇒ [Page 27-39](#) .**

WARNING!

- ◆ **HIGH VOLTAGE!**
- ◆ **Always disconnect battery negative (-) terminal prior to servicing any parts of vehicle electrical system marked with the yellow "HIGH VOLTAGE!" symbol.**
- ◆ **After disconnecting battery, briefly turn affected system on and off in order discharge any residual voltage ⇒ Repair Manual of affected system.**

WARNING!

- ◆ ***Airbag harness and connector repairs must only be performed using VAS 1978 Wiring Harness Repair Kit ⇒ VAS 1978 Instruction Manual.***

- ◆ ***Airbag harness and connector repairs must only be performed using genuine Volkswagen replacement terminals, connectors and harnesses ⇒ Parts catalog***

Electrical system, general repair measures

CAUTION!

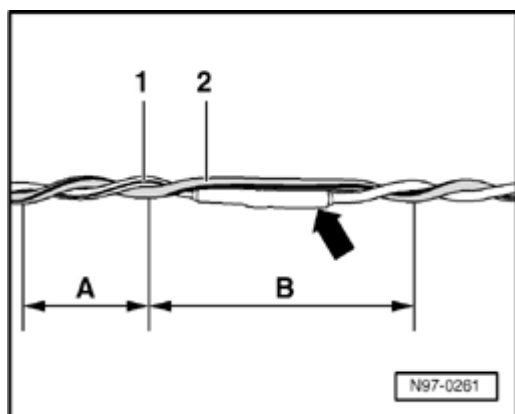
- ◆ *Always refer to and heed CAUTION! and WARNING! texts associated with repair and/or removal and installation information in the Repair Manual.*
- ◆ *Only the yellow repair cables and insulation tape supplied with VAS 1978 are to be used for wiring/connector repairs. The use of yellow repair wires and yellow insulation tape identifies that a repair has taken place ⇒ VAS 1978 Instruction Manual.*
- ◆ *Before beginning wiring and connector repairs, determine and rectify the cause of damage, Eg.: pinched between metal parts, malfunctioning electrical consumers, corrosion due to water ingress etc.*
- ◆ *Avoid loosening or removing any individual ground connections (potential for corrosion).*
- ◆ *When repairs are completed, always perform a functional check of the component or system. Where applicable, check and erase Diagnostic Trouble Codes (DTCs) and set basic setting ⇒ applicable Repair Manual, Repair Group 01 or use VAS 5051 tester.*

Wiring harnesses and connectors, general repair measures

CAUTION!

- ◆ **Note CAN-Bus wiring repair measures ⇒ [Page 97-15](#) .**
- ◆ **Soldering is not permitted!**
- ◆ **Do not repair welded connections in the wiring harness. Fabricate and connect an appropriate overlay harness instead.**
- ◆ **Wiring harness and connector repairs must only be performed using VAS 1978 Wiring Harness Repair Kit ⇒ VAS 1978 Instruction Manual.**
- ◆ **Only the yellow repair cables and insulation tape supplied with VAS 1978 are to be used for wiring/connector repairs. The use of yellow repair wires and yellow insulation tape identifies that a repair has taken place.**
- ◆ **All shielded wiring (Eg.: knock sensors, antenna etc.) are Not to be repaired! Replace complete wiring harnesses as necessary.**

CAN-Bus wiring, repair measures



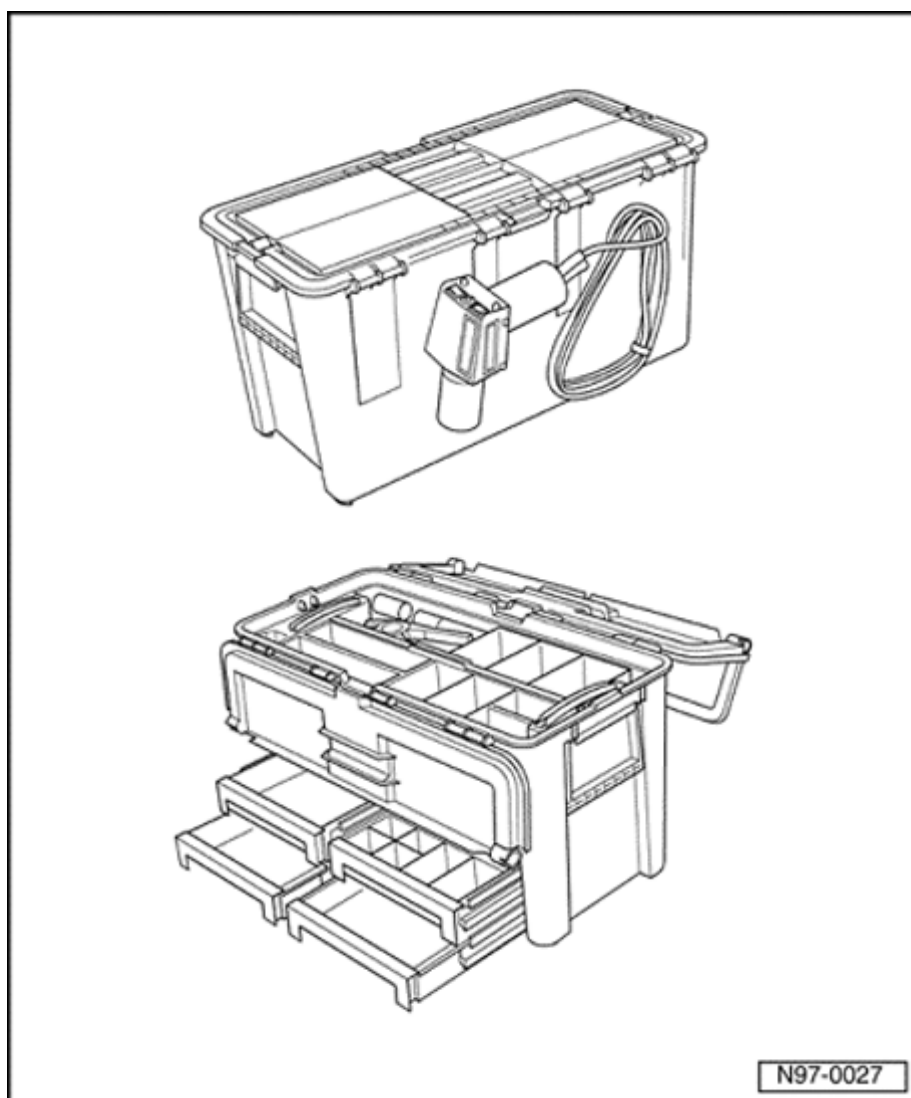
- ◆ CAN Bus wiring consists of unshielded, two-cable wiring -1- and -2- with a cross section of 0.35 mm^2 or 0.5 mm^2 .

- ◆ Color coding:

CAN high wire, Powertrain	orange/black
CAN high wire, Convenience	orange/green
CAN high wire, Infotainment	orange/violet
CAN low wire, (all)	orange-brown

CAUTION!

- ◆ **Perform wiring harness repairs only with yellow wires from VAS 1978 Wiring Harness Repair Kit. Mark repair locations with yellow tape.**
- ◆ **Both bus wires must be the same length. When both wires -1- and -2- are twisted, length -A- = 20 mm must be maintained for the twist.**
- ◆ **No part of the bus wiring in the vicinity of heat-shrink sleeves - arrow-, may be greater than B = 50 mm without the wires being twisted.**



VAS 1978 Wiring Harness Repair Kit

CAUTION!

***Wiring
harness and
connector
repairs must
only be
performed
using VAS
1978 !***

Wiring
Harness
Repair Kit VAS
1978 contains
a detailed
instruction
manual that
outlines all
aspects of
wiring harness
and connector
repair.

Always follow
applicable
safety and
repair
measures:

- ◆ Safety
measures
⇒ [Page
97-11](#) .
- ◆ Electrical
system,
general
repair
measures
⇒ [Page
97-13](#) .
- ◆ Wiring
harness

and
connectors,
repair
measures
⇒ [Page
97-14](#) .

◆ CAN-Bus
wiring,
repair
measures
⇒ [Page
97-15](#) .

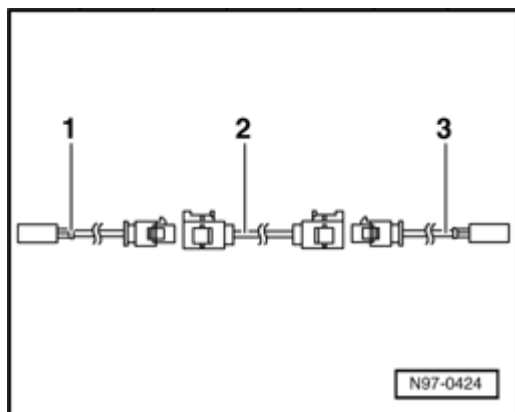
Antenna cables, replacing

A concept has been developed to facilitate the repair of antenna cables.

Instead of replacing an entire antenna cable, various individual cable connector sections (of different lengths) and adapter cables will be offered as replacement parts.

General information

- ◆ Antenna cables must only be repaired using cable connector sections and adapter cables offered as as Genuine Volkswagen replacement parts.
- ◆ Cable connector sections and adapters for all antenna cables are listed in the Parts Catalog (Sub-group 35)
- ◆ Replacement of entire antenna cable sections is not necessary.
- ◆ This antenna repair concept also applies to older Volkswagen models.
- ◆ Cable connector sections and adapter cables are suitable for all transmitter and receiver signals.
- ◆ The repair concept can also be used for testing or retrofitting.



Antenna cable repair system, assembly overview

For servicing purposes, the antenna cable system repair between the radio and antenna consists of the following individual antenna cable sections:

1 - Adapter cable to radio - Length approx. 30 cm.

2 - Connector cable - Available in various lengths.

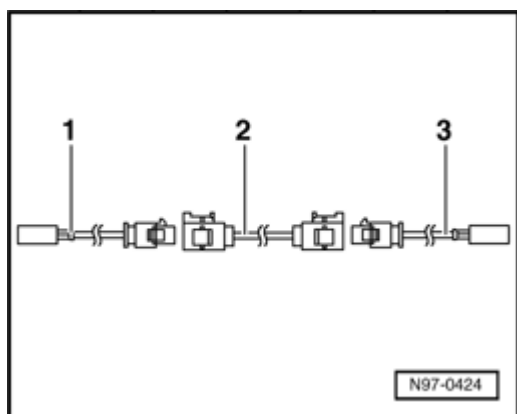
3 - Adapter cable to antenna - Length approx. 30 cm.

Antenna connector cable, replacing

Note:

The antenna cable system (antenna connector and adapter cable sections) depends on the available and optional audio equipment installed in the vehicle. The antenna cable system may also include routing to an antenna selection control module, splitter, antenna booster or signal processing unit as required by the radio system ⇒ Repair Manual, Radio, Telephone, Navigation, Repair Group 91. Regardless of layout, only the faulty antenna cable section (antenna connector cable or adapter) must be replaced.

- Disconnect cable connections from faulty antenna connector/adapter sections from radio, antenna etc.).
- Determine the routing of the antenna cable system in the vehicle and calculate the total length of the entire antenna cable layout between units (radio, antenna etc.).



Calculation of the total length includes the radio adapter cable sections -1 and/or -3-, and antenna cable section -2- where applicable.

- Subtract 60 cm from the total length calculated for a connector cable to account for the antenna cable sections.
- Using the calculated length, obtain the appropriate connector cable (and adapter if necessary) from the parts catalog.
- Cut the cable connection from the faulty antenna cable section.

The faulty antenna cable section remains in the vehicle.

- Remove interior trim as necessary ⇒ [Repair Manual, Body Interior, Repair Group 68](#) and 70.
- Overlay and install replacement antenna cable section parallel with old cable.

CAUTION!

Antenna cable must not be kinked or bent excessively during installation. Do not attempt to bend antenna cable in a radius smaller than 50mm.

- Connect replacement antenna cable sections as required.
- Reinstall interior trim as necessary ⇒ [Repair Manual, Body Interior, Repair Group 68](#) and 70.
- Perform functional test of radio/antenna system.

Select a topic

01 - On Board Diagnostic (OBD)

[Radio system - "Premium IV" and "Premium V" \(including "Monsoon"\) through 11.01, On Board Diagnostic \(OBD\)](#)

[General information](#)

[VAG 1551 Scan Tool \(ST\), connecting, selecting functions and checking control module \(radio\) versions](#)

[Diagnostic Trouble Code \(DTC\) memory, checking \(function 02\)](#)

[Diagnostic Trouble Code \(DTC\) table](#)

[Output Diagnostic Test Mode \(DTM\), \(function 03\)](#)

[Diagnostic Trouble Code \(DTC\) memory, erasing \(function 05\)](#)

[End Output \(function 06\)](#)

[Code Control Module \(radio\) \(function 07\)](#)

[Read Measuring Value Block \(function 08\)](#)

[Radio system - "Premium VI" \(including "Monsoon"\) from 12.01, On Board Diagnostic \(OBD\)](#)

[General information](#)

[Radio system "Premium VI" \(including "Monsoon"\) from 12.01, performing OBD program functions using VAS 5051](#)

[VAG 1551 Scan Tool \(ST\), connecting, selecting functions and checking control module \(radio\) versions](#)

[Diagnostic Trouble Code \(DTC\) memory, checking \(function 02\)](#)

[Diagnostic Trouble Code \(DTC\) table](#)

[Output Diagnostic Test Mode \(DTM\), \(function 03\)](#)

[Diagnostic Trouble Code \(DTC\) memory, erasing \(function 05\)](#)

[End Output \(function 06\)](#)

[Code Control Module \(radio\) \(function 07\)](#)

[Read Measuring Value Block \(function 08\)](#)

[Multi-function steering wheel through 11.01, On Board Diagnostic \(OBD\)](#)

[General information](#)

[VAG 1551 Scan Tool \(ST\), connecting, selecting functions and checking control module versions](#)

[Diagnostic Trouble Code \(DTC\) memory, checking \(function 02\)](#)

[Diagnostic Trouble Code \(DTC\) table](#)

[Output Diagnostic Test Mode \(DTM\) \(function 03\)](#)

[Diagnostic Trouble Code \(DTC\) memory, erasing \(function 05\)](#)

[End Output \(function 06\)](#)

[Code Control Module \(function 07\)](#)

[Read Measuring Value Block \(function 08\)](#)

[Multi-function steering wheel from 12.01, On Board Diagnostic \(OBD\)](#)

[General information](#)

[Multi-function steering wheel from 12.01, performing OBD program functions using VAS 5051](#)

91 - Radio, Telephone, Navigation, Trip computer

[Communication](#)

[General information](#)
[On Board Diagnostic \(OBD\), function](#)

[Radio systems](#)

[General information](#)

[Radio, "Premium IV"](#)

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[On Board Diagnostic \(OBD\), function](#)
[Radio, removing and installing](#)
[Radio, multi-pin connector assignments](#)
[Anti-theft security code, inputting](#)

[Radio, "Premium V" & "Premium V - Monsoon"](#)

[General information](#)
[On Board Diagnostic \(OBD\), function](#)
[Radio, removing and installing](#)
[Radio, multi-pin connector assignments](#)
[Anti-theft security code, inputting](#)

[Radio, "Premium VI" & "Premium VI - Monsoon"](#)

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[OBD program functions, performing using VAS 5051](#)
[Radio, removing and installing](#)
[Radio, multi-pin connector assignments](#)
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[Amplifier - Golf & GTI, removing and installing](#)
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[High-range speaker \(domed tweeter\) in rear doors, removing](#)
[Mid-range/bass speakers in front and rear doors, removing](#)

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[GPS/Telematics system antenna, assembly](#)
[Antenna - Jetta Wagon, Golf & GTI, removing and installing](#)
[Antenna - Jetta Sedan, removing and installing](#)
[Reception interference, suppression measures](#)
[Antenna cables and connectors, replacing](#)

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[CD Changer, removing and installing](#)
[CD Changer position \(V/H\) switches, setting](#)
[CD Changer retainer, removing and installing](#)

[CD Player, removing and installing](#)
[CD Player multi-pin connector assignments](#)

[Multi-function steering wheel](#)

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[On Board Diagnostic \(OBD\), function](#)
[Multi-function steering wheel, overview](#)
[Control unit in steering wheel -E221-, removing and installing](#)
[Control module for multi-function steering wheel -J453-, removing and installing](#)
[Control module for multi-function steering wheel multi-pin connector assignments](#)
[Multi-function steering wheel from 12.01, performing OBD program functions using VAS 5051](#)

[Telematics](#)

[General Information](#)
[On Board Diagnostic \(OBD\), function](#)
[Telematic system, component overview](#)
[Telematic Control Head - OnStar control buttons, description](#)
[Telematic Control Head - OnStar telematics indicator lamp, description](#)
[Telematic Control Head -E264-, removing and installing](#)
[Telematic Control Module -J499- - Jetta Wagon, Golf & GTI, removing and installing](#)
[Telematic Control Module -J499- - Jetta Sedan, removing and installing](#)
[Telematic Control Module -J499- multi-pin connector assignments](#)
[Telematic Control Module -J499-, coding](#)
[Telematic Control Module -J499-, reconfiguring](#)
[Telephone Microphone -R38-, removing and installing](#)
[Telematics system, troubleshooting using telematics indicator lamp](#)
[Transport Mode, deactivating](#)

[Mobile telephone and two-way radio operation, notes](#)

[General information](#)
[Performing repairs, notes](#)
[Battery, transmitter/receiver unit - fuse and wiring harness, overview](#)
[Transmitted output and antenna installation locations](#)

Radio system - "Premium IV" and "Premium V" (including "Monsoon") through 11.01, On Board Diagnostic (OBD)

General information

Radio system "Premium IV" is installed from start of production through m.y. 2000.

Radio System "Premium V" and the optional "Premium V - Monsoon" are installed from m.y. 2001 through m.y. 2002.

Radio system "Premium VI" and the optional "Premium VI - Monsoon" are installed as a running change during m.y. 2002 ⇒ [Page 01-27](#) .

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the applicable standard or optional radio system. Always read the radio owner's manual and review all radio, tape player and CD changer functions.

The radio is controlled by an internal microprocessor with On Board Diagnostic (OBD) capability. If malfunctions occur in monitored components, Diagnostic Trouble Codes (DTC) will be stored in memory together with an indication of malfunction type. A maximum of 4 DTCs can be stored simultaneously.

Sporadic malfunctions (indicated in the readout by "SP") are automatically cancelled if not repeated in the next 50 engine starts.

Before performing any troubleshooting or inspection, always begin by checking for DTCs using the On Board Diagnostic (OBD) program. DTCs stored in memory are retrieved/checked with VAG 1551/1552 Scan Tools (ST) or VAS 5051 Vehicle Diagnostic Testing and Information System.

Notes on exchanging radio

- ◆ Do not disassemble radio.
- ◆ When the replacement of a malfunctioning radio is necessary, follow exchange part procedures.
- ◆ Complete the report form and return together with radio.
- ◆ Use the original packaging from the new radio when returning.

Additional information:

- ◆ Complaint/symptom based Technical Bulletins ("Service Fixes"):

Technical Bulletins

- ◆ Radio system descriptions ⇒ [Page 91-4](#)

VAG 1551 Scan Tool (ST), connecting, selecting functions and checking control module (radio) versions

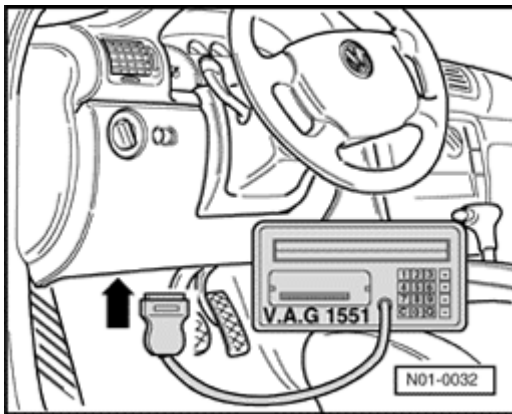
Prerequisites:

- ◆ All fuses OK according to wiring diagram
- ◆ Battery (B+) voltage at least 9 Volts.

Notes:

- ◆ VAG 1552 Scan Tool (ST) may be used of the VAG 1551 Scan Tool (ST), however print-out is not possible.
- ◆ The following procedure and display refer only to VAG 1551 Scan Tool (ST)

Connecting



With ignition switched off, connect VAG 1551 Scan Tool (ST) with adapter cable VAG 1551/3 to Data Link Connector (DLC) as follows:

- Remove cover for Data Link Connector (DLC) under left instrument panel.
- Connect Scan Tool using adapter cable VAG 1551/3.

On Board Diagnostic (OBD) HELP

1 - Rapid data transfer*

2 - Flash code output*

Indicated on display:

* Is displayed alternately

Functions, selecting

Notes:

- ◆ *If the display remains blank check Scan Tool (ST) voltage supply according to wiring diagram,*

Electrical Wiring Diagrams, Troubleshooting and Component Locations binder.

- ◆ *Additional operating instructions can be called up by pressing the HELP button.*

- ◆ *The → button is used to advance through the program sequence.*

- ◆ *In operating mode 1 "Rapid data transfer," function 00 "Automatic test sequence" can be carried out. The DTC memory of all control modules with OBD capability are checked automatically.*

- Switch on ignition.

- Switch on printer with the Print button (indicator lamp in button lights up).

- Press button -1- for "Rapid data transfer" mode.

Rapid data transfer
Input address word XX

HELP



Indicated on display:

- Press buttons -5- and -6- to select "Radio" address word 56.

Rapid data transfer
56 Radio

Q



Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer
Tester sends address word 56

Q



Indicated on display:

1JO035180 Radio 0001 →
Coding 04403 WSC 00000

Radio version, checking (example)



Indicated on display (example only):

Readout, top line

- ◆ 1JO 035 180 = Radio part number
- ◆ Radio = System designation
- ◆ 0001 = Software version

Readout, bottom line

- ◆ Coding 04403 = coding number (dependant on model and optional equipment) ⇒ [Page 01-20](#).
- ◆ WSC 00000 = Workshop code

CAUTION!

Part numbers are for reference only. Always check with your Parts Department for the latest parts information.

- Press → button.

_____ DIAG. _____



Indicated on radio display during OBD:

Rapid data transfer HELP
Control module does not answer!



Note:

If this message appears in the display:

- Press the HELP button to print out a list of possible malfunction causes.
- After correcting malfunctions, re-enter address word 56 for Radio and press -Q- button to confirm input.

1JO035152 Radio 0001 →
Coding 04403 WSC 00000



Indicated on display:

- Press → button.

Rapid data transfer HELP
Select function XX



Indicated on display (select function):

List of available functions

Function		page
01 -	Check Control Module (radio) version	⇒ Page 01-3
02 -	Check Diagnostic Trouble Code (DTC) memory	⇒ Page 01-8
03 -	Output Diagnostic Test Mode	⇒ Page 01-15
05 -	Erase DTC memory	⇒ Page 01-17
06 -	End Output	⇒ Page 01-19
07 -	Code Control Module (radio) version	⇒ Page 01-20
08 -	Read Measuring Value Block	⇒ Page 01-23

Notes:

- ◆ *Press the HELP button to print out a complete list of available functions. This list indicates the function capability of the VAG 1551 Scan Tool (ST) only, and does not necessarily reflect the function capability of vehicle systems equipped with OBD. For "Radio" address word 56, do not attempt to select functions other than those listed above.*
- ◆ *After the function is completed and forwarded with the → button, the VAG 1551 Scan Tool (ST) returns to the following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

Diagnostic Trouble Code (DTC) memory, checking (function 02)

Note:

DTCs stored in memory along with corresponding malfunction descriptions can only be displayed by initiating the On Board Diagnostic program and checking DTC memory (function 02).

- Connect VAG 1551 Scan Tool (ST), input address word 56, "Radio", and press → button until "Select function XX" appears in display.
- Switch on printer with the Print button (indicator lamp in button lights up).

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

- Press buttons -0- and -2- to select "Check Diagnostic Trouble Code (DTC) memory" function 02.

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Press -Q- button to confirm input.

X DTC recognized!



The number of stored malfunctions appears in the display.

The number of stored DTCs or "No DTC s recognized" appears in the display and are printed out one after another.

- When the last DTC has been displayed and printed out, correct malfunctions as described in DTC table ⇒ [Page 01-10](#) :

No DTC recognized!



If "No DTC recognized" is displayed, the program will return to the initial position after pressing → button.

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

If display not indicated as shown:

Scan tool operating instructions

- End output (function 06) ⇒ [Page 01-19](#) .
- Switch off ignition and disconnect Data Link Connector (DLC).

Note:

If DTCs were recognized, follow the sequence below:

- 1. *Correct malfunction.*
- 2. *Erase Diagnostic Trouble Code (DTC) memory (function 05).*
- 3. *Check Diagnostic Trouble Code (DTC) memory (function 02).*

Diagnostic Trouble Code (DTC) table

Notes:

- ◆ The following table lists all malfunctions, with the corresponding 5 digit code numbers, that can be recognized by the radio and printed out by the VAG 1551 Scan Tool (ST).
- ◆ *If malfunctions do not occur regularly, these are displayed as occurring sporadically ("SP").*
- ◆ *DTC codes appear only on print-out.*
- ◆ DTC table may also include a description of the type of malfunction.
- ◆ *Before replacing components, check the wiring and connections to these components as well as ground connections, according to wiring diagram.*
- ◆ When a repair has been carried out, the Diagnostic Trouble Code (DTC) memory must always be erased and checked again with the VAG 1551 Scan Tool (ST).
- ◆ If there is a specific complaint and no malfunctions are recognized after checking the Diagnostic Trouble Code (DTC) memory, carry out function 03, "Output Diagnostic Test Mode" ⇒ [Page 01-15](#) or function 08, "Read measuring value block" ⇒ [Page 01-23](#) .

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
00668			
Battery Positive Voltage (B+) Term. 30 Signal too low	<ul style="list-style-type: none"> ◆ Battery voltage less than 9.5V due to insufficient charge in battery ◆ Battery voltage less than 9.5V due to excessive use of electrical consumers 	<ul style="list-style-type: none"> ◆ Radio inoperative or poor performance 	<ul style="list-style-type: none"> - Charge/check battery ⇒ Repair Manual, Electrical Equipment, Repair Group 27 - Discontinue use of unnecessary electrical consumers

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
00852			
speaker front Short circuit Open circuit	<ul style="list-style-type: none"> ◆ Short circuit to ground at wiring to one front speaker ◆ Open circuit in wiring to one front speaker 	<ul style="list-style-type: none"> ◆ One front speaker inoperative 	<p>Short circuit between two speaker wires is only recognized during Output Diagnostic Test Mode</p> <p>- Check for short circuit in wiring and connections wiring diagram</p>
00853			
speaker rear Short circuit Open circuit	<ul style="list-style-type: none"> ◆ Short circuit to ground at wiring to one rear speaker ◆ Open circuit in wiring to one rear speaker 	<ul style="list-style-type: none"> ◆ One rear speaker inoperative 	<p>Short circuit between two speaker wires is only recognized during Output Diagnostic Test Mode</p> <p>- Check for open circuit in wiring and connections wiring diagram</p>

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
00855			
Connection to CD Changer No communication	◆ Open circuit in wiring to CD Changer	◆ CD Changer inoperative	- Check for open circuit in wiring and connections using wiring diagram
00856			
Radio Antenna Short circuit Open circuit	◆ Antenna not plugged-in to radio or damaged	◆ No radio reception	- Check antenna cable ⇒Electrical Wiring Diagrams, Troubleshooting and Component Locations binder

VAG 1551 print out	Possible cause	Possible effects	Corrective actions
00857			
CD-changer unit -R41-	<ul style="list-style-type: none"> ◆ Open circuit in wiring between radio and CD Changer ◆ CD Changer mechanical malfunction 	<ul style="list-style-type: none"> ◆ CD Changer inoperative 	<ul style="list-style-type: none"> - Check for open circuit in wiring and connections using wiring diagram - Replace CD Changer
01044			
Control Module incorrectly coded	<ul style="list-style-type: none"> ◆ Radio has yet to be coded 		<ul style="list-style-type: none"> - DTC cannot be erased - Code radio ⇒ Page 01-20
65535			
Control Module Malfunctioning		<ul style="list-style-type: none"> ◆ Radio malfunctioning 	<ul style="list-style-type: none"> - Replace/exchange radio

Output Diagnostic Test Mode (DTM), (function 03)

The Output Diagnostic Test Mode is part of the electrical check.

Output DTM checks for a short circuit between the speaker wires.

Check the DTC memory after performing output DTM.

Output Diagnostic Test Mode (DTM), initiating

Notes:

- ◆ *Output Diagnostic Test Mode cannot be initiated, or will be interrupted if engine is running or vehicle is moving,*
- ◆ *Use the -C- button to exit the test sequence at any time.*
- Connect VAG 1551 Scan Tool (ST), input address word 56 "Radio" and then press → button, until "Select function XX" is shown in display.

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

- Press buttons -0- and -3- to select "Output Diagnostic Test Mode" function 03.

Rapid data transfer

03 - Output Diagnostic Test Mode

Q



Indicated on display

- Press -Q- button to confirm input.

Output Diagnostic Test Mode →
Speaker



Indicated on display

Speakers are tested with a test current.

If a speaker circuit is detected as faulty by the system, a DTC will be stored in DTC memory.

- Check DTC memory.
- If necessary repair wiring or speaker, erase DTC memory and repeat Output Diagnostic Test Mode
- Press → button.

Output Diagnostic Test Mode →
Output Radio Display Instrument Cluster



Indicated on display:

- Press → button.

Output Diagnostic Test Mode →
END



Indicated on display:

- Press → button.

Rapid data transfer HELP
Select function XX



Indicated on display (select function):

- End output (function 06) ⇒ [Page 01-19](#) .

Diagnostic Trouble Code (DTC) memory, erasing (function 05)

Note:

After erasing the DTC memory its contents will automatically be indicated. If the DTC memory cannot be erased, again check DTC memory and repair malfunctions.

Requirements

- ◆ DTC memory checked ⇒ [Page 01-8](#)
- ◆ All malfunctions repaired.

After Diagnostic Trouble Code (DTC) memory has been successfully checked:

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press keys -0- and 5 to select "Erase DTC memory" function 05.

Rapid data transfer
05 Erase DTC memory

Q



Indicated on display:

- Confirm entry with key Q.

Rapid data transfer
DTC memory is erased!

→



Indicated on display:

The DTC memory is now erased.

- Press → key.

Rapid data transfer
Select function XX

HELP



Indicated on display:

Notes:

Warning!

DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

Rapid data transfer

DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

◆ *Adhere exactly to test sequence: First check DTC memory, if necessary repair malfunctions, then erase.*

End Output (function 06)

- Press buttons -0- and -6- to select "End output" function 06.

Rapid data transfer
06 End output

Q ◀

Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer
Enter address word XX

Help ◀

Indicated on display:

- Switch off ignition.
- Disconnect VAG 1551 Scan Tool (ST).

Code Control Module (radio) (function 07)

Use this function to code the radio with the various equipment variations available.

Coding

- Connect VAG 1551 Scan Tool (ST), input address word 56 "Radio" and then press → button, until "Select function XX" is shown in display.

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

- Press buttons -0- and -7- to select "Code Control Module" function 07.
- Press -Q- button to confirm input.

Coding control module
Enter code number XXXXX

(0-32000)



- Indicated on display:

Coding possibilities

- Check/enter applicable code number from code table (⇒ [Page 01-22](#)) according to model and equipment particulars.

Coding example: 02403 = Jetta with radio system "Premium V" and CD changer

Coding control module Q ◀
Enter code number 02403 (0-32000)

- Indicated on display (example only):
- Press -Q- button to confirm input.

Rapid data transfer HELP ◀
Select function XX

Indicated on display (select function):

- End output (function 06) ⇒ [Page 01-19](#) .

Code table

Code number				Designation
1 & 2	3	4	5	Position
				Sound Field Tuning¹⁾
01				Golf & GTI
02				Jetta
03				Jetta Wagon
				Radio/Speaker System
	0			Premium V - Monsoon
	4			Premium IV and Premium V
				Sound System Correction
		0		Premium IV and V (no correction)
		3		Premium V - Monsoon 2-door
		4		Premium V - Monsoon 4-door
				Radio System Configuration
			1	Without CD changer/player
			3	With CD changer/player

¹⁾ Sound field tuning provides various frequency response characteristics matched to vehicle interior volume.

Coding example: 02403 = Jetta with radio system "Premium V" and CD changer

Read Measuring Value Block (function 08)

Use this function to observe various radio system inputs.

The measuring value block is divided into 5 display groups, each containing up to 4 display fields.

- Connect VAG 1551 Scan Tool (ST), input address word 56 "Radio" and then press → button, until "Select function XX" is shown in display.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- to select "Read measuring value block" function 08.

Rapid data transfer
08 - Read measuring value block

Q



Indicated on display:

- Press -Q- button to confirm input.

Read measuring value block
Enter display group number XX

Q



Indicated on display:

- Using the Scan Tool (ST) button pad, enter required display group number (following example shows display group 001). Press keys 0, 0 and 1 for "Display group number 1" and press -Q- button to confirm input.

Read Measuring Value Block 1 →
 1 2 3 4

← Indicated on display: (1...4 =
 Display zones)

Notes:

- ◆ *Interpreting display groups and evaluating measured values in individual display fields ⇒ tables beginning ⇒ [Page 01-25](#) .*
- ◆ *With printer switched on, information on display is printed out.*
- ◆ *To easily change between display groups, proceed as follows:*

Display group	VAG 1551	VAG 1552
Higher	Press button 3	Press ↑ button
Lower	Press button 1	Press ↓ button
Skip	Press button C	Press button C

- Displayed after pressing -C- button.

Read Measuring Value Block Help
 Enter display group number XXX

← Indicated on display:

- Enter display group number as needed ⇒ tables beginning ⇒ [Page 01-25](#) .

Notes:

- ◆ *Display fields always show actual values transmitted from senders and sensors.*
- ◆ *Other display groups are possible, but are not required for On Board Diagnostic program!*

Table of selectable display group numbers

Display group number	Designations
001	1 = Open 2 = Power supply voltage 3 = Illumination in % 4 = S-contact status (on or off)
002	1 = Front speakers 2 = OK, short or open circuit 3 = Rear speakers 4 = OK, short or open circuit
003	1 = Passive or active 2 = Antenna 3 = OK, short or open circuit 4 = Open
004	1 = 0 (Power output to active amplifier OK) 1 = 1 (Power output to active amplifier short to ground) 2 = Open 3 = Open 4 = Open

Continued on next page

Display group number	Designations
005	1 = CD changer installed (even when not coded in radio) 2 = OK or not OK 3 = Open 4 = Open

Note:

After ending function 08 "Read Measuring Value Block", check DTC memory (function 02) ⇒ [Page 01-8](#).

Radio system - "Premium VI" (including "Monsoon") from 12.01, On Board Diagnostic (OBD)

General information

Radio systems "Premium VI" and optional "Premium VI - Monsoon" installed as a running change during m.y. 2002 have microprocessor controlled OBD capabilities.

Notes:

- ◆ *"Premium VI" systems are identified as "Premium CD" in the owner's literature.*
- ◆ *The "Premium VI" system head unit is recognizable by it's "Double DIN" format.*

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the applicable standard or optional radio system. Always read the radio owner's manual and review all radio, tape player and CD changer functions.

If malfunctions occur in monitored components, Diagnostic Trouble Codes (DTC) will be stored in memory together with an indication of malfunction type. A maximum of 4 DTCs can be stored simultaneously.

Sporadic malfunctions (indicated in the readout by "SP") are automatically cancelled if not repeated in the next 50 engine starts.

Before performing any troubleshooting or inspection, always begin by checking for DTCs using the On Board Diagnostic (OBD) program. DTCs stored in memory are retrieved/checked with VAS 5051 Vehicle Diagnostic Testing and Information System ⇒ [Page 01-29](#) , or VAG 1551/1552 Scan Tools (ST) ⇒ [Page 01-31](#) .

Notes on exchanging radio

- ◆ Do not disassemble radio.
- ◆ When the replacement of a malfunctioning radio is necessary, follow exchange part procedures.
- ◆ Complete the report form and return together with radio.
- ◆ Use the original packaging from the new radio when returning.

Additional information:

- ◆ Complaint/symptom based Technical Bulletins ("Service Fixes"):

Technical Bulletins

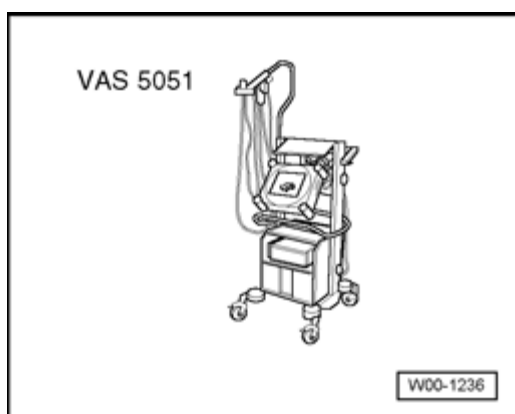
- ◆ Radio system descriptions ⇒ [Page 91-4](#)

Radio system "Premium VI" (including "Monsoon") from 12.01, performing OBD program functions using VAS 5051

Some OBD program text/data generated by "Premium VI" radios may not be recognized by VAG1551/1552 Scan Tools (ST) with the latest program card. For example: scan tool display shows "text 799", "01529 /references" or similar.

In these cases, OBD program functions on vehicles with "Premium VI" radio systems must be performed using the VAS VAS 5052 Vehicle Diagnostic Testing and Information System in mode "Self Diagnosis" or "Guided Fault Finding".

Special tools, testers and auxiliary items needed



- ◆ VAS 5051 Vehicle Diagnostic Testing and Information System
- ◆ Cable adapter VAS 5051/1 or VAS 5051/3
- Connect VAS 5051 with adapter cable to Data Link Connector (DLC) and select mode "Guided Fault Finding"
- Enter appropriate model, equipment and model year information and press ">" to confirm.

After all Control Modules have been registered and DTC memories checked,

- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97)"
- Select "Electrical System (Repair Group 27; 90 to 97)"
- Select "01-Systems capable of self-diagnosis"
- Select "Radio system"
- Select "Radio system functions" and press ">" to confirm
- Review displayed list of OBD program functions and select as necessary, e.g.: "Radio, coding"
- Perform selected OBD program steps as prompted by tester

VAG 1551 Scan Tool (ST), connecting, selecting functions and checking control module (radio) versions

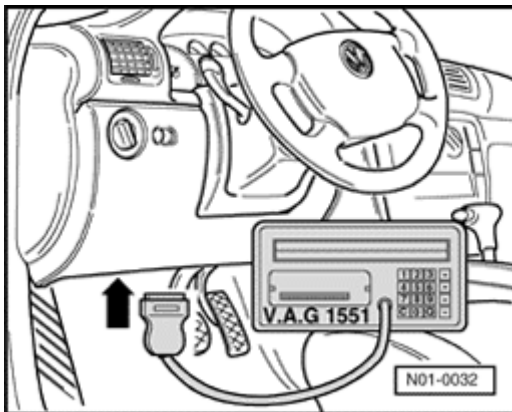
Prerequisites:

- ◆ All fuses OK according to wiring diagram
- ◆ Battery (B+) voltage at least 9 Volts.

Notes:

- ◆ VAG 1552 Scan Tool (ST) may be used of the VAG 1551 Scan Tool (ST), however print-out is not possible.
- ◆ The following procedure and display refer only to VAG 1551 Scan Tool (ST)

Connecting



With ignition switched off, connect VAG 1551 Scan Tool (ST) with adapter cable VAG 1551/3 to Data Link Connector (DLC) as follows:

- Remove cover for Data Link Connector (DLC) under left instrument panel.
- Connect Scan Tool using adapter cable VAG 1551/3.

On Board Diagnostic (OBD) HELP

1 - Rapid data transfer*

2 - Flash code output*

Indicated on display:

* Is displayed alternately

Functions, selecting

Notes:

- ◆ *If the display remains blank check Scan Tool (ST) voltage supply according to wiring diagram,*

Electrical Wiring Diagrams, Troubleshooting and Component Locations binder.

- ◆ *Additional operating instructions can be called up by pressing the HELP button.*
- ◆ *The → button is used to advance through the program sequence.*
- ◆ *In operating mode 1 "Rapid data transfer," function 00 "Automatic test sequence" can be carried out. The DTC memory of all control modules with OBD capability are checked automatically.*

- Switch on ignition.
- Switch on printer with the Print button (indicator lamp in button lights up).
- Press button 1 for "Rapid data transfer" mode.

Rapid data transfer
Input address word XX

HELP



Indicated on display:

- Press buttons -5- and -6- to select "Radio" address word 56.

Rapid data transfer
56 Radio

Q



Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer
Tester sends address word 56

Q



Indicated on display:

3B7035180 Radio 0001 →
Coding 04031 WSC 00000

Radio version, checking

← Indicated on display (example only):

Readout, top line

- ◆ 1JO 035 180 = Radio part number
- ◆ Radio = System designation
- ◆ 0001 = Software version

Readout, bottom line

- ◆ Coding 04031 = coding number (dependant on model and optional equipment) ⇒ [Page 01-49](#).
- ◆ WSC 00000 = Workshop code

CAUTION!

Part numbers are for reference only. Always check with your Parts Department for the latest parts information.

- Press → button.

_____DIAG._____

← Indicated on radio display during OBD:

Rapid data transfer HELP
Control module does not answer!



Note:

If this message appears in the display:

- Press the HELP button to print out a list of possible malfunction causes.
- After correcting malfunctions, re-enter address word 56 for Radio and press -Q- button to confirm input.

1JO035152 Radio 0001 →
Coding 04403 WSC 00000



Indicated on display:

- Press → button.

Rapid data transfer HELP
Select function XX



Indicated on display (select function):

List of available functions

Function		page
01 -	Check Control Module (radio) version	⇒ Page 01-31
02 -	Check Diagnostic Trouble Code (DTC) memory	⇒ Page 01-36
03 -	Output Diagnostic Test Mode	⇒ Page 01-44
05 -	Erase DTC memory	⇒ Page 01-46
06 -	End Output	⇒ Page 01-48
07 -	Code Control Module (radio) version	⇒ Page 01-49
08 -	Read Measuring Value Block	⇒ Page 01-52

Notes:

- ◆ *Press the HELP button to print out a complete list of available functions. This list indicates the function capability of the VAG 1551 Scan Tool (ST) only, and does not necessarily reflect the function capability of vehicle systems equipped with OBD. For "Radio" address word 56, do not attempt to select functions other than those listed above.*
- ◆ *After the function is completed and forwarded with the → button, the VAG 1551 Scan Tool (ST) returns to the following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

Diagnostic Trouble Code (DTC) memory, checking (function 02)

Note:

DTCs stored in memory along with corresponding malfunction descriptions can only be displayed by initiating the On Board Diagnostic program and checking DTC memory (function 02).

- Connect VAG 1551 Scan Tool (ST), input address word 56, "Radio", and press → button until "Select function XX" appears in display.
- Switch on printer with the Print button (indicator lamp in button lights up).

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

- Press buttons -0- and -2- to select "Check Diagnostic Trouble Code (DTC) memory" function 02.

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Press -Q- button to confirm input.

X DTC recognized!



The number of stored malfunctions appears in the display.

The number of stored DTCs or "No DTC s recognized" appears in the display and are printed out one after another.

- When the last DTC has been displayed and printed out, correct malfunctions as described in DTC table ⇒ [Page 01-38](#) .

No DTC recognized!



If "No DTC recognized" is displayed, the program will return to the initial position after pressing → button.

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

If display not indicated as shown:

Scan tool operating instructions

- End output (function 06) ⇒ [Page 01-48](#) .
- Switch off ignition and disconnect Data Link Connector (DLC).

Note:

If DTCs were recognized, follow the sequence below:

- 1. *Correct malfunction.*
- 2. *Erase Diagnostic Trouble Code (DTC) memory (function 05).*
- 3. *Check Diagnostic Trouble Code (DTC) memory (function 02).*

Diagnostic Trouble Code (DTC) table

Notes:

- ◆ The following table lists all malfunctions, with the corresponding 5 digit code numbers, that can be recognized by the radio and printed out by the VAG 1551 Scan Tool (ST).
- ◆ *If malfunctions do not occur regularly, these are displayed as occurring sporadically ("SP").*
- ◆ *DTC codes appear only on print-out.*
- ◆ DTC table may also include a description of the type of malfunction.
- ◆ *Before replacing components, check the wiring and connections to these components as well as ground connections, according to wiring diagram.*
- ◆ When a repair has been carried out, the Diagnostic Trouble Code (DTC) memory must always be erased and checked again with the VAG 1551 Scan Tool (ST).
- ◆ If there is a specific complaint and no malfunctions are recognized after checking the Diagnostic Trouble Code (DTC) memory, carry out function 03, "Output Diagnostic Test Mode" ⇒ [Page 01-44](#) , or function 08, "Read measuring value block" ⇒ [Page 01-52](#) .

VAG 1551 printout	Possible cause	Possible effects	Corrective action
00625			
Vehicle speed signal			
No signal	◆ Open circuit in wiring between radio and instrument cluster	◆ Poor radio performance or radio inoperative	- Check wiring and connections using wiring diagram.
	◆ Instrument cluster malfunctioning		- Replace instrument cluster.

VAG 1551 printout	Possible cause	Possible effects	Corrective action
00668			
Battery Positive Voltage (B+) Term. 30			
Signal too low	<ul style="list-style-type: none"> ◆ Battery voltage below 9.5 V ◆ Battery insufficiently charged 	<ul style="list-style-type: none"> ◆ Poor radio performance or radio inoperative 	<ul style="list-style-type: none"> - Charge/check battery ⇒ Repair Manual, Electrical Equipment, Repair Group 27
	<ul style="list-style-type: none"> ◆ Short circuit in vehicle electrical system 	<ul style="list-style-type: none"> ◆ Poor radio performance or radio inoperative 	<ul style="list-style-type: none"> - Check Generator (GEN) and charging system ⇒ Electrical Wiring Diagrams, Troubleshooting and Component Locations - Check wiring and connections according to wiring diagram.
00849			
S contact on ignition starter switch D			
Ignition starter switch	<ul style="list-style-type: none"> ◆ Ignition starter switch malfunctioning 	<ul style="list-style-type: none"> ◆ Poor radio performance or radio inoperative 	<ul style="list-style-type: none"> - Replace ignition starter switch.
Open circuit	<ul style="list-style-type: none"> ◆ Open circuit in wiring or connections between radio and ignition starter switch 	<ul style="list-style-type: none"> ◆ Poor radio performance or radio inoperative 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram.

VAG 1551 printout	Possible cause	Possible effects	Corrective action
00851			
speaker			
Short circuit	<ul style="list-style-type: none"> ◆ Short circuit in wiring or connections between + and - wiring to hands-free speaker 	<ul style="list-style-type: none"> ◆ Poor radio performance or radio inoperative 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram
00856			
Radio Antenna			
Short circuit	<ul style="list-style-type: none"> ◆ Short circuit in antenna cable 	<ul style="list-style-type: none"> ◆ Poor radio performance or radio inoperative 	<ul style="list-style-type: none"> - Check antenna cable using wiring diagram
Open circuit	<ul style="list-style-type: none"> ◆ Antenna cable not connected 		
00857			
CD-changer unit -R41-	<ul style="list-style-type: none"> ◆ Open circuit in wiring between radio and CD Changer ◆ CD Changer mechanical malfunction 	<ul style="list-style-type: none"> ◆ CD Changer inoperative 	<ul style="list-style-type: none"> - Check for open circuit in wiring and connections using wiring diagram - Replace CD Changer

VAG 1551 printout	Possible cause	Possible effects	Corrective action
00878			
Connections to left front speakers			
Short circuit	◆ Short circuit to ground	◆ Speaker inoperative	- Check wiring and connections using wiring diagram.
Open circuit	◆ Open circuit in wiring or connections to speaker		
00879			
Connections to right front speakers			
Short circuit	◆ Short circuit to ground	◆ Speaker inoperative	- Check wiring and connections using wiring diagram.
Open circuit	◆ Open circuit in wiring or connections to speaker		
00880			
Connections to left rear speaker			
Short circuit	◆ Short circuit to ground	◆ Speaker inoperative	- Check wiring and connections using wiring diagram.
Open circuit	◆ Open circuit in wiring or connections to speaker		

VAG 1551 printout	Possible cause	Possible effects	Corrective action
00881			
Connections to right rear speakers			
Short circuit	◆ Short circuit to ground	◆ Speaker inoperative	- Check wiring and connections using wiring diagram.
Open circuit	◆ Open circuit in wiring or connections to speaker		
01044			
Control Module incorrectly coded			
	◆ Radio not coded in accordance with radio system configuration and/or vehicle equipment	◆ Poor radio performance or radio inoperative	- Check and confirm radio coding in accordance with radio system configuration and/or vehicle equipment ⇒ Page 01-49
01303			
Telephone Transceiver - R36-			
No communication	◆ Open circuit between radio and Telephone transceiver -R36- (where applicable)	◆ Telephone transceiver inoperative	- Check wiring and connections using wiring diagram.

VAG 1551 printout	Possible cause	Possible effects	Corrective action
01317			
Control Module in dash panel insert			
No communication	◆ Open in wiring or connections between radio and instrument cluster	◆ Instruments inoperative	- Check wiring and connections using wiring diagram.
01326			
CM for Multi-func. st. wheel -J453-			
No communication	◆ Open in wiring or connections between radio and multi-function steering wheel	◆ Control of radio and/or cruise control functions via multi-function steering wheel inoperative	- Check wiring and connections using wiring diagram.
65535			
Control Module Malfunctioning	◆ Radio (internal) malfunction	◆ Poor radio performance or radio inoperative	- Replace radio.

Output Diagnostic Test Mode (DTM), (function 03)

The Output Diagnostic Test Mode is part of the electrical check.

Output DTM checks for a short circuit between the speaker wires.

Check the DTC memory after performing output DTM.

Output Diagnostic Test Mode (DTM), initiating

Notes:

- ◆ *Output Diagnostic Test Mode cannot be initiated, or will be interrupted if engine is running or vehicle is moving,*
- ◆ *Use the -C- button to exit the test sequence at any time.*
- Connect VAG 1551 Scan Tool (ST), input address word 56 "Radio" and then press → button, until "Select function XX" is shown in display.

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

- Press buttons -0- and -3- to select "Output Diagnostic Test Mode" function 03.

Rapid data transfer

03 - Output Diagnostic Test Mode

Q



Indicated on display

- Press -Q- button to confirm input.

<p>Output Diagnostic Test Mode → Speaker</p>	←	<p>Indicated on display</p> <p>Speakers are tested with a test current (a short, loud tone is heard).</p> <p>If a speaker circuit is detected as faulty by the system, a DTC will be stored in DTC memory.</p> <ul style="list-style-type: none"> - Check DTC memory. - If necessary repair wiring or speaker, erase DTC memory and repeat Output Diagnostic Test Mode - Press → button.
<p>Output Diagnostic Test Mode → Output Radio Display Instrument Cluster</p>	←	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Press → button.
<p>Output Diagnostic Test Mode → END</p>	←	<p>Indicated on display:</p> <ul style="list-style-type: none"> - Press → button.
<p>Rapid data transfer HELP Select function XX</p>	←	<p>Indicated on display (select function):</p> <ul style="list-style-type: none"> - End output (function 06) ⇒ Page 01-48 .

Diagnostic Trouble Code (DTC) memory, erasing (function 05)

Note:

After erasing the DTC memory its contents will automatically be indicated. If the DTC memory cannot be erased, again check DTC memory and repair malfunctions.

Requirements

- ◆ DTC memory checked ⇒ [Page 01-36](#).
- ◆ All malfunctions repaired.

After Diagnostic Trouble Code (DTC) memory has been successfully checked:

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press keys 0 and 5. (05 selects the "Erase DTC memory" function.)

Rapid data transfer
05 Erase DTC memory

Q



Indicated on display:

- Confirm entry with key Q.

Rapid data transfer
DTC memory is erased!

→



Indicated on display:

The DTC memory is now erased.

- Press → key.

Rapid data transfer HELP
Select function XX



Indicated on display:

Notes:

Warning!
DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

Rapid data transfer →
DTC memory was not checked



◆ *If this appears in the display, the test sequence is faulty.*

◆ *Adhere exactly to test sequence: First check DTC memory, if necessary repair malfunctions, then erase.*

End Output (function 06)

- Press buttons -0- and -6- to select function "End output".

Rapid data transfer

Q ←

Indicated on display:

06 End output

- Press -Q- button to confirm input.

Rapid data transfer

Help ←

Indicated on display:

Enter address word XX

- Switch off ignition.
- Disconnect VAG 1551 Scan Tool (ST).

Code Control Module (radio) (function 07)

Use this function to code the radio with the various equipment variations available.

Coding

- Connect VAG 1551 Scan Tool (ST), input address word 56 "Radio" and then press → button, until "Select function XX" is shown in display.

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

- Press buttons -0- and -7- to select "Code control module" function 07 " .
- Press -Q- button to confirm input.

Coding control module
Enter code number XXXXX

(0-32000)



- Indicated on display:

Coding possibilities

- Check/enter applicable code number from code table (⇒ [Page 01-51](#)) using model and equipment particulars.

Coding example: 00401 = Golf/Jetta with radio system "Premium VI" - without multi-function steering wheel and without CD changer.

Coding control module Q ⚡
Enter code number 00401 (0-32000)

- Indicated on display (example only):
- Press -Q- button to confirm input.

Rapid data transfer HELP ⚡
Select function XX

Indicated on display (select function):

- End output (function 06) ⇒ [Page 01-48](#) .

Code table

Code number				Designation
1 & 2	3	4	5	Position
				Radio System Configuration 1
00				Without multi-function steering wheel
04				With multi-function steering wheel
				Radio/Speaker System
	0			Premium VI - Monsoon
	4			Premium VI (standard speakers)
				Sound System Correction
		0		Premium VI (no correction)
		3		Premium VI - Monsoon
				Radio System Configuration 2
			1	Without CD changer
			3	With CD changer

Coding example: 00401 = Golf/Jetta with radio system "Premium VI" - without multi-function steering wheel and without CD changer.

Read Measuring Value Block (function 08)

Use this function to observe various radio system inputs.

The measuring value block is divided into 5 display groups, each containing up to 4 display fields.

- Connect VAG 1551 Scan Tool (ST), input address word 56 "Radio" and then press → button, until "Select function XX" is shown in display.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- to select "Read measuring value block" function 08.

Rapid data transfer
08 - Read measuring value block

Q



Indicated on display:

- Press -Q- button to confirm input.

Read measuring value block
Enter display group number XX

Q



Indicated on display:

- Using the Scan Tool (ST) button pad, enter required display group number (following example shows display group 001). Press keys 0, 0 and 1 for "Display group number 1" and press -Q- button to confirm input.

Read Measuring Value Block 1 →
 1 2 3 4



Indicated on display: (1...4 =
 Display zones)

Notes:

- ◆ *Interpreting display groups and evaluating measured values in individual display fields ⇒ tables beginning ⇒ [Page 01-54](#) .*
- ◆ *With printer switched on, information on display is printed out.*
- ◆ *To easily change between display groups, proceed as follows:*

Display group	VAG 1551	VAG 1552
Higher	Press button 3	Press ↑ button
Lower	Press button 1	Press ↓ button
Skip	Press button C	Press button C

- Displayed after pressing -C- button.

Read Measuring Value Block Help
 Enter display group number XXX



Indicated on display:

- Enter display group number as needed ⇒ tables beginning ⇒ [Page 01-54](#) .

Notes:

- ◆ *Display fields always show actual values transmitted from senders and sensors.*
- ◆ *Other display groups are possible, but are not required for On Board Diagnostic program!*

Table of selectable display group numbers

Display group number	Designations
001	1 = Power supply voltage 2 = Active amplifier output: OK, short or open circuit 3 = Telephone mute 4 = on or off
002	1 = Connection - LF speaker 2 = OK, short or open circuit 3 = Connection RF speaker 4 = OK, short or open circuit
003	1 = Connection - LR speaker 2 = OK, short or open circuit 3 = Connection RR speaker 4 = OK, short or open circuit
004	1 = Passive or active 2 = Antenna 3 = OK, short or open circuit 4 = Open

Continued on next page

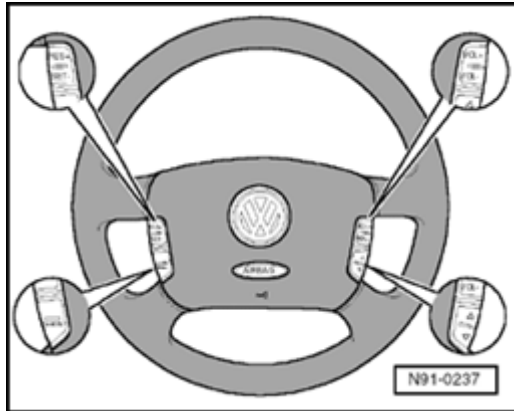
Display group number	Designations
005	1 = CD changer installed (even when not coded in radio) 2 = OK or not OK 3 = Open 4 = Open

Note:

After ending function 08 "Read Measuring Value Block", check DTC memory (function 02) ⇒ [Page 01-8](#).

Multi-function steering wheel through 11.01, On Board Diagnostic (OBD)

General information



The multi-function steering wheel allows the various functions of the radio and cruise control system to be selected from the steering wheel.

The multi-function steering wheel is comprised of the following components:

- ◆ The operating unit in steering wheel with two sets of buttons on left and right integrated electronics.
- ◆ The control module for the multi-function steering wheel.

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the applicable standard or optional radio system and cruise control system as controlled by the multi-function steering wheel. Always read the vehicle/radio owner's manual and review all radio, tape player and CD changer functions.

The On Board Diagnostic (OBD) must be initiated at the commencement of troubleshooting and the stored information checked with the VAG 1551/1552 scan tool or VAS 5051 Vehicle Diagnostic, Testing and Information system.

Note:

The following description and illustrations deal specifically with the VAG 1551 scan tool. VAG 1552 and VAS 5051 procedures are similar.

VAG 1551 Scan Tool (ST), connecting, selecting functions and checking control module versions

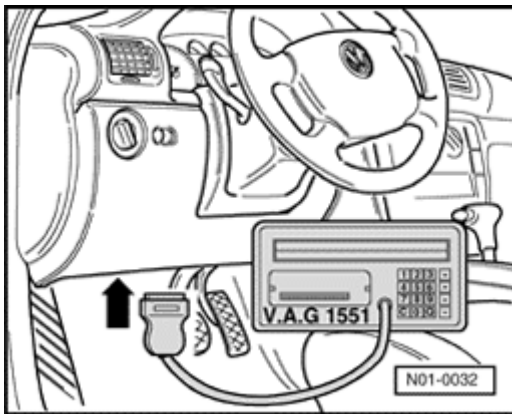
Prerequisites:

- ◆ All fuses OK according to wiring diagram
- ◆ Battery (B+) voltage at least 9 Volts.

Notes:

- ◆ VAG 1552 Scan Tool (ST) may be used of the VAG 1551 Scan Tool (ST), however print-out is not possible.
- ◆ The following procedure and display refer only to VAG 1551 Scan Tool (ST)

Connecting



With ignition switched off, connect VAG 1551 Scan Tool (ST) with adapter cable VAG 1551/3 to Data Link Connector (DLC) as follows:

- Remove cover for Data Link Connector (DLC) under left instrument panel.
- Connect Scan Tool using adapter cable VAG 1551/3.

On Board Diagnostic (OBD) HELP

1 - Rapid data transfer*

2 - Flash code output*

Indicated on display:

* Is displayed alternately

Functions, selecting

Notes:

- ◆ *If the display remains blank check Scan Tool (ST) voltage supply according to wiring diagram,*

Electrical Wiring Diagrams, Troubleshooting and Component Locations binder.

- ◆ *Additional operating instructions can be called up by pressing the HELP button.*

- ◆ *The → button is used to advance through the program sequence.*

- ◆ *In operating mode 1 "Rapid data transfer," function 00 "Automatic test sequence" can be carried out. The DTC memory of all control modules with OBD capability are checked automatically.*

- Switch on ignition.

- Switch on printer with the Print button (indicator lamp in button lights up).

- Press button 1 for "Rapid data transfer" mode.

Rapid data transfer
Input address word XX

HELP



Indicated on display:

- Press buttons -1- and -6- to enter "Steering wheel electronics" address word16.

Rapid data transfer
16 Steering Wheel Electronics

Q



Indicated on display:

- Confirm entry with Q button.

Rapid data transfer
Tester sends address word 16

Q



Indicated on display:

1J0907487 Steering wheel electron.x28 →
Coding 00008 WSC 00000



Check Control Module Versions

Indicated on display (example only):

Readout, top line

- ◆ 1JO 907 487 = Control module part number
- ◆ Steering wheel electron. = System designation
- ◆ x28 = Software version

Readout, bottom line

- ◆ Coding 00008 = coding number (dependant on control module part number ⇒ [Page 01-74](#)).
- ◆ WSC 00000 = Workshop code

CAUTION!

Part numbers are for reference only. Always check with your Parts Department for the latest parts information.

- Press → button.

Rapid data transfer HELP
Control module does not answer!

**Note:**

If this message appears in the display:

- Press the HELP button to print out a list of possible malfunction causes.
- After correcting malfunctions, re-enter address word 16 for Steering wheel electronics and press -Q- button to confirm input.

1JO035152 Radio 0001 →
Coding 04403 WSC 00000



Indicated on display:

- Press → button.

Rapid data transfer HELP
Select function XX



Indicated on display (select function):

List of available functions

Function		page
01 -	Check Control Module Versions	⇒ Page 01-59
02 -	Check DTC Memory	⇒ Page 01-62
03 -	Output Diagnostic Test Mode (DTM)	⇒ Page 01-68
05 -	Erase DTC Memory	⇒ Page 01-71
06 -	End Output	⇒ Page 01-73
07 -	Code Control Module	⇒ Page 01-74
08 -	Read Measuring Value Block	⇒ Page 01-76

Notes:

- ◆ *Press the HELP button to print out a complete list of available functions. This list indicates the function capability of the VAG 1551 Scan Tool (ST) only, and does not necessarily reflect the function capability of vehicle systems equipped with OBD. For "Steering wheel electronics" address word 16, do not attempt to select functions other than those listed above.*
- ◆ *After the function is completed and forwarded with the → button, the VAG 1551 Scan Tool (ST) returns to the following start position:*

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

Diagnostic Trouble Code (DTC) memory, checking (function 02)

Note:

DTCs stored in memory along with corresponding malfunction descriptions can only be displayed by initiating the On Board Diagnostic program and checking DTC memory (function 02).

- Connect VAG 1551 Scan Tool (ST), input address word 16, "Steering wheel electronics", and press → button until "Select function XX" appears in display.
- Switch on printer with the Print button (indicator lamp in button lights up).

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

- Press buttons -0- and -2- to select "Check Diagnostic Trouble Code (DTC) memory" function 02.

Rapid data transfer
02 - Check DTC memory

Q



Indicated on display:

- Press -Q- button to confirm input.

X DTC recognized!

→



The number of stored malfunctions appears in the display.

The number of stored DTCs or "No DTC s recognized" appears in the display and are printed out one after another.

- When the last DTC has been displayed and printed out, correct malfunctions as described in DTC table ⇒ [Page 01-64](#) .

No DTC recognized!



If "No DTC recognized" is displayed, the program will return to the initial position after pressing → button.

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

If display not indicated as shown:

Scan tool operating instructions

- End Output (function 06) ⇒ [Page 01-73](#) .
- Switch off ignition and disconnect Data Link Connector (DLC).

Note:

If DTCs were recognized, follow the sequence below:

- 1. *Correct malfunction.*
- 2. *Erase Diagnostic Trouble Code (DTC) memory (function 05).*
- 3. *Check Diagnostic Trouble Code (DTC) memory (function 02).*

Diagnostic Trouble Code (DTC) table

Notes:

- ◆ The following table lists all malfunctions, with the corresponding 5 digit code numbers, that can be recognized by the radio and printed out by the VAG 1551 Scan Tool (ST).
- ◆ *If malfunctions do not occur regularly, these are displayed as occurring sporadically ("SP").*
- ◆ *DTC codes appear only on print-out.*
- ◆ DTC table may also include a description of the type of malfunction.
- ◆ *Before replacing components, check the wiring and connections to these components as well as ground connections, according to wiring diagram.*
- ◆ When a repair has been carried out, the Diagnostic Trouble Code (DTC) memory must always be erased and checked again with the VAG 1551 Scan Tool (ST).
- ◆ If there is a specific complaint and no malfunctions are recognized after checking the Diagnostic Trouble Code (DTC) memory, carry out function 03, "Output Diagnostic Test Mode" ⇒ [Page 01-68](#) , or function 08, "Read measuring value block" ⇒ [Page 01-76](#) .

01-65

VAG 1551 print out	Possible cause	Possible effects	Corrective action
01426			
Control unit in steering wheel -E221-			
01716			
No communication Implausible signal	<ul style="list-style-type: none"> ◆ No CAN Bus connection between Control unit in steering wheel - E221- and Control module for multi-function steering wheel -J453- 	<ul style="list-style-type: none"> ◆ Radio and cruise control cannot be operated via multi-function steering wheel 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Read Measuring Value Block ⇒ Page 01-76 - Replace - J453- ⇒ Page 91-72 - Replace - E221- ⇒ Page 91-70
Resume cruise control activation/accelerating			
Short circuit to Ground Short circuit to B+ Open circuit	<ul style="list-style-type: none"> ◆ Output wiring or connections shorted to Ground (GND) ◆ Output wiring or connections short to B+ (positive) ◆ Output wiring or connections have open circuit 	<ul style="list-style-type: none"> ◆ Cruise control cannot be operated via the multi-function steering wheel 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Read Measuring Value Block ⇒ Page 01-76 - Replace - J453- ⇒ Page 91-72 - Replace - E221- ⇒ Page 91-70

01-66

VAG 1551 print out	Possible cause	Possible effects	Corrective action
01717			
Storing cruise control activation/reducing			
Short circuit to Ground	◆ Output wiring or connections shorted to Ground (GND)	◆ Cruise control cannot be operated via the multi-function steering wheel	- Check wiring and connections using wiring diagram
Short circuit to B+	◆ Output wiring or connections short to B+ (positive)		- Read Measuring Value Block ⇒ Page 01-76
Open circuit	◆ Output wiring or connections have open circuit		- Replace -J453- ⇒ Page 91-72 - Replace -E221- ⇒ Page 91-70

01-67

VAG 1551 print out	Possible cause	Possible effects	Corrective action
01718			
Switching off cruise control system activation			
Short circuit to Ground Short circuit to B+ Open circuit	<ul style="list-style-type: none"> ◆ Output wiring or connections shorted to Ground (GND) ◆ Output wiring or connections short to B+ (positive) ◆ Output wiring or connections have open circuit 	<ul style="list-style-type: none"> ◆ Cruise control cannot be operated via the multi-function steering wheel 	<ul style="list-style-type: none"> - Check wiring and connections using wiring diagram - Read Measuring Value Block ⇒ Page 01-76 - Replace -J453- ⇒ Page 91-72 - Replace -E221- ⇒ Page 91-70
65535 Control module malfunctioning	<ul style="list-style-type: none"> ◆ Multi-function steering wheel control module - J453- malfunctioning 	<ul style="list-style-type: none"> ◆ Multi-function steering wheel not operating correctly 	<ul style="list-style-type: none"> - Replace control module for multi-function steering wheel ⇒ Page 91-72

Output Diagnostic Test Mode (DTM) (function 03)

The Output Diagnostic Test Mode (DTM) is part of the electrical check.

The DTC memory must be checked after the Output Diagnostic Test Mode (DTM).

Output Diagnostic Test Mode (DTM), initiating

Notes:

- ◆ *Output Diagnostic Test Mode cannot be initiated, or will be interrupted if engine is running or vehicle is moving,*
- ◆ *Use the -C- button to exit the test sequence at any time.*
- Connect VAG 1551 Scan Tool (ST), input address word 56 "Radio" and then press → button, until "Select function XX" is shown in display.

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

- Press buttons -0- and -3- to select "Output Diagnostic Test Mode" function 03.

Rapid data transfer

03 - Output Diagnostic Test Mode

Q



Indicated on display

- Press -Q- button to confirm input.

<p>Output Diagnostic Test Mode → Segment test</p>	<p>←</p>	<p>Indicated on display: "AAAABBBBCCCCDDDD" will appear in the instrument cluster display.</p> <ul style="list-style-type: none"> - Switch on radio system, tune in radio program and set to middle volume. - Press → button.
<p>Output Diagnostic Test Mode → Radio louder</p>	<p>←</p>	<p>Indicated on display: The volume increases.</p> <ul style="list-style-type: none"> - Press → button.
<p>Output Diagnostic Test Mode → Radio quieter</p>	<p>←</p>	<p>Indicated on display: The volume decreases.</p> <ul style="list-style-type: none"> - Press → button.
<p>Output Diagnostic Test Mode → Station search up-band</p>	<p>←</p>	<p>Indicated on display: Station search for the next radio station up-band which will appear in radio display (and in display in instrument cluster where applicable).</p> <ul style="list-style-type: none"> - Press → button.

Output Diagnostic Test Mode Station search down-band	→	←	Indicated on display: Station search for next radio station down-band which will appear in radio display and (and in display in instrument cluster where applicable). - Press → button.
Output Diagnostic Test Mode END	→	←	Indicated on display: - Press → button.
Rapid data transfer Select function XX	HELP	←	Indicated on display: - End Output (function 06) ⇒ Page 01-73 .

Diagnostic Trouble Code (DTC) memory, erasing (function 05)

Note:

After erasing the DTC memory its contents will automatically be indicated. If the DTC memory cannot be erased, again check DTC memory and repair malfunctions.

Requirements

- ◆ All malfunctions repaired.
- ◆ DTC memory checked ⇒ [Page 01-62](#) .

After Diagnostic Trouble Code (DTC) memory has been successfully checked:

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press keys 0 and 5. (05 selects the "Erase DTC memory" function.)

Rapid data transfer
05 Erase DTC memory

Q



Indicated on display:

- Confirm entry with key Q.

Rapid data transfer
DTC memory is erased!

→



Indicated on display:

The DTC memory is now erased.

- Press → key.

01-72

Rapid data transfer

HELP



Indicated on display:

Select function XX

Notes:

Warning!



DTC memory was not checked

- ◆ *If this appears in the display, the test sequence is faulty.*

Rapid data transfer



DTC memory was not checked

- ◆ *If this appears in the display, the test sequence is faulty.*
- ◆ *Adhere exactly to test sequence: First check DTC memory, if necessary repair malfunctions, then erase.*

End Output (function 06)

- Press buttons -0- and -6- to select function "End output".

Rapid data transfer

Q



Indicated on display:

06 End output

- Press -Q- button to confirm input.

Rapid data transfer

Help



Indicated on display:

Enter address word XX

- Switch off ignition.
- Disconnect VAG 1551 Scan Tool (ST).

Code Control Module (function 07)

Use this function to code the Multi-function Steering Wheel (MSW) electronics.

Coding

- Connect VAG 1551 Scan Tool (ST), input address word 16 "Steering wheel electronics"

1J0907487 Steering wheel electron.x28 →
Coding 00008 WSC 00000



Indicated on display (example only):

Note:

Control module coding depends on the part number of the control module installed. Make note of the control module part number when displayed by the Scan Tool.

- Press → button

Rapid data transfer HELP
Select function XX



Indicated on display (select function):

- Press buttons -0- and -7- to select "Code control module" function 07".
- Press -Q- button to confirm input.

Coding control module
Enter code number XXXXX (0-32000)



- Indicated on display:
- Refer to control module part number noted earlier, and check/enter applicable code number from code tables ⇒ [Page 01-75](#) .

Code tables**Control modules without index, and with index B**

Example: 1J0 907 XXX _ or 1J0 907 XXX B

Code number	Designation
00008	Radio & cruise control system (CCS)

Control modules with index A

Example: 1J0 907 XXX A

Code number	Designation
00118	Radio & cruise control system (CCS)

Coding control module
Enter code number 00118

Q
(0-32000)



- Indicated on display (example only):
- Press -Q- button to confirm input.

Rapid data transfer
Select function XX

HELP



Indicated on display (select function):

Check DTC memory after coding ⇒ [Page 01-62](#) ,
and erase any DTCs stored.

- End output (function 06) ⇒ [Page 01-73](#) .

Read Measuring Value Block (function 08)

On Board Diagnostic (OBD) continually monitors the input signals and voltages required to operate the steering wheel electronics.

Use this function to observe various multi-function steering wheel system inputs.

The measuring value block is divided into 2 display groups, each containing up to 4 display fields.

- Connect VAG 1551 Scan Tool (ST), input address word 16, "Steering wheel electronics", and press → button until "Select function XX" appears in display.

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -8- to select "Read Measuring Value Block" function 08.

Rapid data transfer
08 - Read Measuring Value Block

Q



Indicated on display:

- Press -Q- button to confirm input.

Read Measuring Value Block
Enter display group number XXX

HELP



Indicated on display:

- Using the Scan Tool (ST) button pad, enter required display group number (following example shows display group 001). Press keys 0, 0 and 1 for "Display group number 1" and press -Q- button to confirm input.

Read Measuring Value Block 1 →
 1 2 3 4



Indicated on display: (1...4 =
 Display zones)

Notes:

- ◆ *Interpreting display groups and evaluating measured values in individual display fields ⇒ tables beginning ⇒ [Page 01-78](#) .*
- ◆ *With printer switched on, information on display is printed out.*
- ◆ *To easily change between display groups, proceed as follows:*

Display group	VAG 1551	VAG 1552
Higher	Press button 3	Press ↑ button
Lower	Press button 1	Press ↓ button
Skip	Press button C	Press button C

- Displayed after pressing -C- button.

Read Measuring Value Block Help
 Enter display group number XXX



Indicated on display:

- Enter display group number as needed ⇒ tables beginning ⇒ [Page 01-78](#) .

Notes:

- ◆ *Display fields always show actual values transmitted from senders and sensors.*
- ◆ *Other display groups are possible, but are not required for On Board Diagnostic program!*

Display groups, interpreting

Display group 001						
Read Measuring Value Block 1				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Station search "band-up"	not oper. = not operating mem. up > = operating button " Δ "	⇒ Page 01-79
				Station search "band-down"	not oper. = not operating mem. down > = operating button " ▽ "	
		Volume control "louder"			not oper. = not operating quieter > = operating button "Vol +"	
	Volume control "quieter"				not oper. = not operating quieter > = operating button "Vol -"	

Display group 001, evaluating

Display field	Description	Display	Corrective action
1	Volume control "quieter"	not oper. = not operating quieter > = operating button "Vol -"	<ul style="list-style-type: none"> - - Perform visual check of wiring and connections - Check wiring and connections of affected circuit for correct connection and tight fit while simultaneously observing display. - If display does not change after checking connections, troubleshoot wiring using wiring diagram - Replace relevant component, if necessary. - Erase DTC memory. - Perform functional check - Check DTC memory again.
2	Volume control "louder"	not oper. = not operating quieter > = operating button "Vol +"	
3	Station search "band-down"	not oper. = not operating mem. down > = operating button " ▽ "	
4	Station search "band-up"	not oper. = not operating mem. up > = operating button " Δ "	

Display group 002						
Read Measuring Value Block 2				→	◀ Indicated on display	
xxx	xxx	xxx	xxx			
1	2	3	4	◀ Display fields	Designation	Evaluating display fields
				Empty		
			Cruise control system "CANCEL"	not oper. = not operating OFF = operating button "CANCEL"		⇒ Page 01-81
		Cruise control system "RES+"		not oper. = not operating RES+ = operating button "RES+"		
	Cruise control system "SET -"			not oper. = not operating SET - = operating button "SET -"		

Display group 002, evaluating

Display field	Description	Display	Corrective action
1	Cruise control system "SET -"	not oper. = not operating SET - = operating button "SET -"	<ul style="list-style-type: none"> - - Perform visual check of wiring and connections - Check wiring and connections of affected circuit for correct connection and tight fit while simultaneously observing display. - If display does not change after checking connections, troubleshoot wiring using wiring diagram - Replace relevant component, if necessary. - Erase DTC memory. - Perform functional check - Check DTC memory again.
2	Cruise control system "RES+"	not oper. = not operating RES+ = operating button "RES+"	
3	Cruise control system "CANCEL"	not oper. = not operating OFF = operating button "CANCEL"	
4		Empty	

If the displayed values in all display zones are OK:

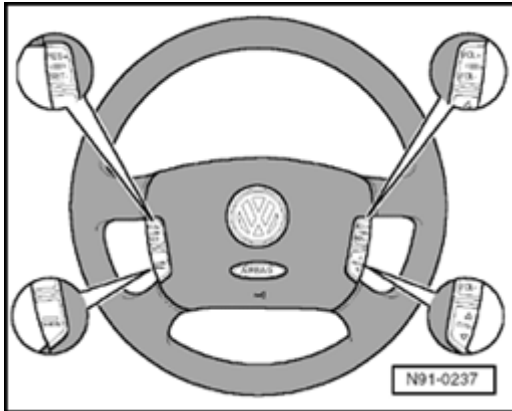
- Press → button.

Note:

Check DTC Memory after completing the function "Read Measuring Value Block" ⇒ [Page 01-62](#) .

Multi-function steering wheel from 12.01, On Board Diagnostic (OBD)

General information



The multi-function steering wheel allows the various functions of the radio and cruise control system to be selected from the steering wheel.

The multi-function steering wheel is comprised of the following components:

- ◆ The operating unit in steering wheel with two sets of buttons on left and right integrated electronics.
- ◆ The control module for the multi-function steering wheel.

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the applicable standard or optional radio system and cruise control system as controlled by the multi-function steering wheel. Always read the vehicle/radio owner's manual and review all radio, tape player and CD changer functions.

The On Board Diagnostic (OBD) must be initiated at the commencement of troubleshooting and the stored information checked with the VAS 5051 Vehicle Diagnostic Testing and Information System.

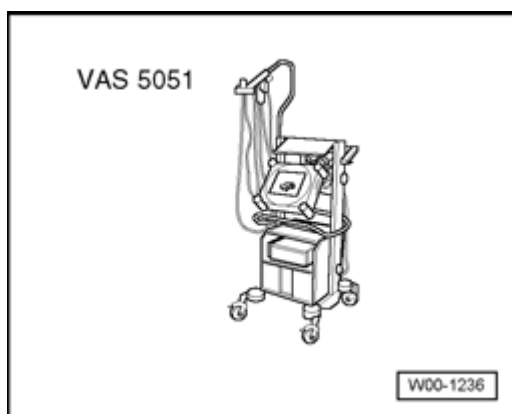
Multi-function steering wheel from 12.01, performing OBD program functions using VAS 5051

Some OBD program text/data generated by the multi-function steering wheel control module in vehicles from 12.01 production may not be recognized by VAG1551/1552 Scan Tools (ST) with the latest program card. For example: scan tool display shows "text 799", "01529 /references" or similar.

Only the VAS5051/5052 Vehicle Diagnostic Testing and Information System is capable of processing all display text/data on these vehicles.

OBD program functions for multi-function steering wheel must be performed using the VAS5051 Vehicle Diagnostic Testing and Information System in mode "Self Diagnosis" or "Guided Fault Finding".

Special tools, testers and auxiliary items needed



- ◆ VAS 5051 Vehicle Diagnostic Testing and Information System
- ◆ Cable adapter VAS 5051/1 or VAS 5051/3
- Connect VAS 5051 with adapter cable to Data Link Connector (DLC) and select mode "Guided Fault Finding"
- Enter appropriate model, equipment and model year information and press ">" to confirm.

After all Control Modules have been registered and DTC memories checked,

- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97)"
- Select "Electrical System (Repair Group 27; 90 to 97)"
- Select "01-Systems capable of self-diagnosis"
- Select "Multi-function steering wheel"
- Select "Multi-function steering wheel functions" and press ">" to confirm
- Review displayed list of OBD program functions and select as necessary, e.g.: "Multi-function steering wheel, coding"
- Perform selected OBD program steps as prompted by tester

Communication

General information

The integrated "Premium" radio, integrated CD Player (where applicable), optional CD Changer, "Monsoon" amplifier (where applicable), Multi-function steering wheel and Telematics systems are combined to form the Communication system.

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the applicable Communication system. Always read the owner's manual and review specific Communication system functions.

On Board Diagnostic (OBD), function

Communication systems have extensive On Board Diagnostic (OBD) capabilities.

In the event malfunctions occur, troubleshooting can be performed with VAG 1551/1552 Scan Tools or VAS 5051 Vehicle Diagnostic Testing and Information System in operating mode "Guided Fault Finding".

Method of performing OBD program is system and model year dependent. Refer to specific sections in this Repair Manual for applicable system OBD information:

Radio systems "Premium IV" & "Premium V" OBD

"Premium IV" & "Premium V" OBD program functions can be performed using VAG 1551/1552 Scan Tools (ST) ⇒ [Page 01-1](#)

or

use VAS 5051 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding" ⇒ [Page 91-27](#) .

Radio system "Premium VI" OBD

"Premium VI" OBD program functions must be performed using VAS 5051 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding" ⇒ [Page 91-27](#) .

**Multi-function steering wheel through
11.01 OBD**

OBD program functions can be performed using VAG 1551/1552 Scan Tools (ST) ⇒ [Page 01-56](#)

or

use VAS 5051 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding" ⇒ [Page 91-74](#) .

**Multi-function steering wheel from 12.01
OBD**

OBD program functions must be performed using VAS 5051 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding" ⇒ [Page 91-74](#) .

Radio systems

General information

Radio system "Premium IV" is installed from start of production through m.y. 2000 ⇒ [Page 91-5](#) .

Radio System "Premium V" and the optional "Premium V - Monsoon" are installed from m.y. 2001 through m.y. 2002 ⇒ [Page 91-15](#) .

Radio system "Premium VI" and the optional "Premium VI - Monsoon" replaces "Premium V" and "Premium V - Monsoon" as a running change during m.y. 2002 ⇒ [Page 91-25](#) .

Specific service information applies to each radio system.

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the applicable standard or optional radio system. Always read the radio owner's manual and review all radio, tape player and CD Changer functions.

All radios are protected with anti-theft security coding (fixed code) ⇒ Radio owners manual.

Notes:

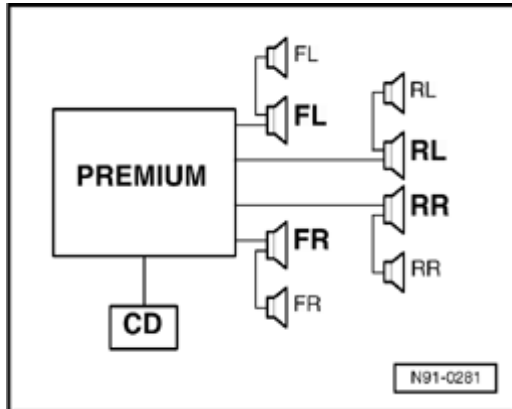
- ◆ *Only factory approved accessory radios and radio equipment (available from Volkswagen of America, Inc.) should be installed. This ensures proper installation and optimum function.*

- ◆ *When retrofitting components, carrying out diagnosis or repairs ⇒ Electrical Wiring Diagrams, Troubleshooting and Component Locations.*

Radio, "Premium IV"

General information

Installed from start of production through m.y. 2000.



The radio system consists of the receiver/tape unit and speakers located in the front and rear doors.

A 168 mm low-range/bass speaker is located in the lower portion of each front and rear door.

High-range speakers (domed tweeters) are integrated into the forward window trim on both front doors. Tweeters are integrated into the rear door handle trim next to the power window switches.

The system uses an amplified roof mounted antenna ⇒ [Page 91-47](#) .

The optional, luggage compartment mounted CD Changer wiring and mounting is pre-installed in production ⇒ [Page 91-58](#) .

On Board Diagnostic (OBD), function

"Premium IV" radio systems have On Board Diagnostic (OBD) capabilities.

The radio head unit has a Diagnostic Trouble Code (DTC) memory. If a malfunction occurs in one of the components or wires which is monitored by the system, a record of the type of malfunction is stored in DTC memory ⇒ [Page 01-1](#) .

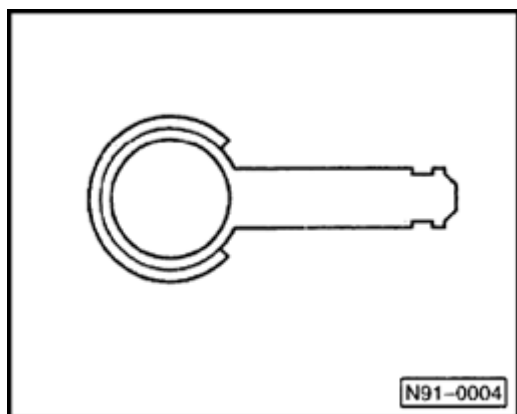
Radio, removing and installing

Notes:

If radio is exchanged or replaced:

- ◆ *Anti-theft security code for new radio must be entered before use ⇒ [Page 91-13](#) . Be sure to advise customer of new security code.*
- ◆ *Confirm radio coding for sound system functions using On Board Diagnostic procedure function 07: "Code Control Module".*
- ◆ *Radio sound system coding must be performed to account for presence of CD Changer (if installed) and interior sound field differences between models (where applicable).*

Special tools, testers and auxiliary items needed.



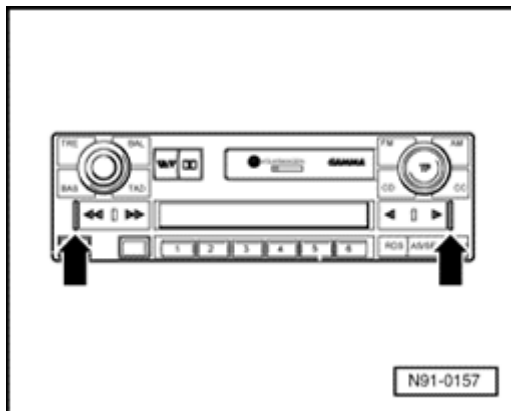
- ◆ Radio removal tool 3316 (two identical pieces)

Removing

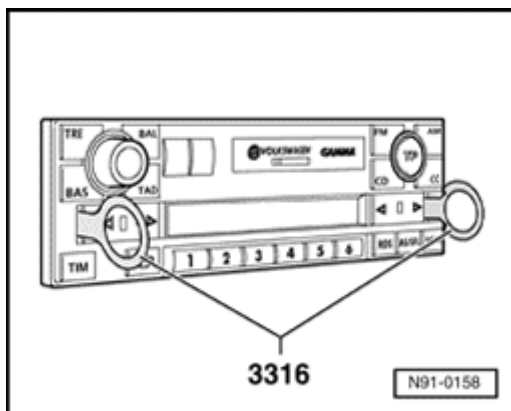
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Obtain anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Insert tool 3316 into openings on face of radio -arrows- until they engage.



- Pull radio from instrument panel opening using handles on tool 3316.
- Disconnect all electrical connection and antenna cable from rear of radio.

Notes:

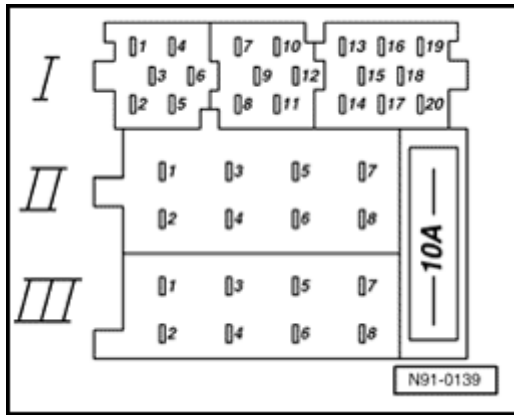
- ◆ *Radio must be pulled straight out from opening. Do not twist or tilt tools while removing.*
- ◆ *To remove tool from radio, release locking tabs on side of radio when removed.*

Installing

- Reconnect electrical connectors and antenna cable at rear of radio.
- Insert radio into instrument panel opening and push straight in until locking tabs engage.
- Input anti-theft security code ⇒ [Page 91-13](#) .
- Confirm radio coding for sound system functions using On Board Diagnostic program function 07, "Code Control Module" ⇒ [Page 01-20](#) .

Note:

Radio sound system coding must be performed to account for presence of CD Changer (if installed), Monsoon system (where applicable) and interior sound field differences between models.



Radio, multi-pin connector assignments

Connector I consists of three separate connector parts:

20 pin multi-connector I -T20-, part 1, yellow

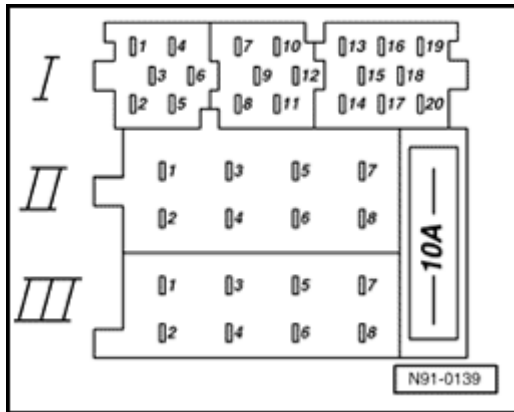
- 1 - Line out, left rear
- 2 - Line out, right rear
- 3 - Line out, Ground (GND)
- 4 - Line out, left front
- 5 - Line out, right front
- 6 - Switched positive (B+) for amplifier

20 pin multi-connector I -T20-, part 2, green*

- 7 - Open
- 8 - Clock
- 9 - DATA
- 10 - ENA
- 11 - Remote control (serial input)
- 12 - Open

*) Where applicable

91-11



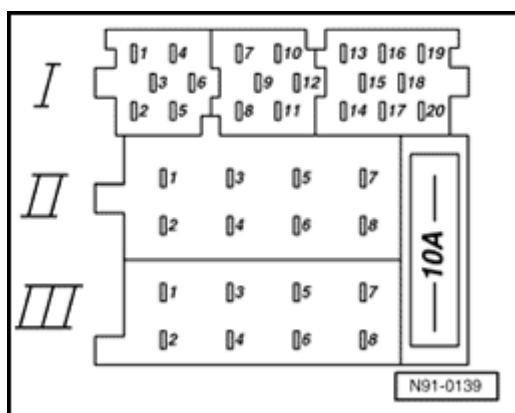
20 pin multi-connector I -T20-, part 3, blue

- 13 - CD Changer - DATA IN
- 14 - CD Changer - DATA OUT
- 15 - CD Changer - CLOCK
- 16 - CD Changer - Power supply, positive (B+) supply
- 17 - CD Changer - Control signal
- 18 - CD Changer - Ground (GND), terminal 31
- 19 - CD Changer - LINE OUT, left
- 20 - CD Changer - LINE OUT, right

8 pin multi-connector II -T8a-, brown

- 1 - Speaker + right rear
- 2 - Speaker - right rear
- 3 - Speaker + right front
- 4 - Speaker - right front
- 5 - Speaker + left front
- 6 - Speaker - left front
- 7 - Speaker + left rear
- 8 - Speaker - left rear

91-12



◀ **8 pin multi-connector III -T8-, black**

- 1 - Signal for anti-theft alarm system
- 2 - Open
- 3 - Data Link Connector (DLC) K-wire
- 4 - Ignition switch - S contact
- 5 - Battery, positive (B+) supply, terminal 30 (control input for "SAFE" display/anti-theft)
- 6 - Illumination, terminal 58b
- 7 - Battery, positive (B+) supply, terminal 30
- 8 - Battery, negative (-) ground supply, terminal 31

Anti-theft security code, inputting

The security code is "fixed", meaning the radio is programmed by the radio manufacturer to accept only one code. This code must be input during the new vehicle delivery inspection, into newly installed or existing units that have been removed and reinstalled.

Prerequisites:

- ◆ Obtain security code, either from code card or from customer.
- ◆ Radio power supply fuse OK (according to wiring diagram)

Inputting code / cancelling electronic lock-up

- Switch on radio
 - "SAFE" appears in radio display, followed by "1000" approximately 3 seconds later.
- Input the security code found on the radio card using the station preset buttons on the radio. Button "1" corresponds to the first number in the security code, "2" the second and so on. Press the applicable button repeatedly until the desired number appears in the display (E.g.: press button "1" three times if the first number in the code is 3).
- When the entire code has been input and appears on the display, press the right side of the "Seek" button ("▶") for longer than 2 seconds until an audible signal is heard.

Incorrect code number

If an incorrect code is entered, "SAFE" will appear in the display (first blinking and then continuous) and the radio will not function. The entire coding procedure can only be repeated one more time immediately (the number of attempts is displayed).

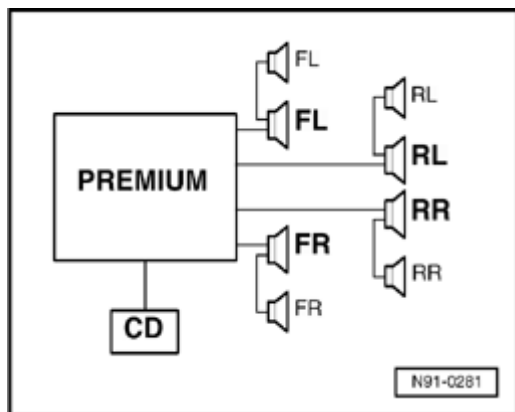
If during the second attempt an incorrect code is entered, the radio will lock-up for approximately one hour. Leave key in ignition, radio switched on for 1 hour and attempt coding again when the number of attempts on display goes out (ensure proper code is available).

Cycle: 2 attempts - 1 hour lock-up still applies.

Radio, "Premium V" & "Premium V - Monsoon"

General information

Installed from m.y. 2001 through m.y. 2002.



The radio system consists of the receiver/tape unit and speakers located in the front and rear doors.

A 168 mm low-range/bass speaker is located in the lower portion of each front and rear door.

High-range speakers (domed tweeters) are integrated into the forward window trim on both front doors. Tweeters are integrated into the rear door handle trim next to the power window switches.

The optional "Premium V- Monsoon" system consists of the "Premium V" receiver/tape unit supplemented by a separate high power amplifier mounted in the luggage compartment ⇒ [page 91-36](#) .

High power handling speakers specifically designed for the "Monsoon" system are located in the front and rear doors.

The system uses an amplified roof mounted antenna ⇒ [Page 91-47](#) .

The optional, luggage compartment mounted CD Changer wiring and mounting is pre-installed in production ⇒ [Page 91-58](#) .

The optional CD Player is mounted in the instrument panel ⇒ [Page 91-62](#) .

On Board Diagnostic (OBD), function

"Premium IV" radio systems have On Board Diagnostic (OBD) capabilities.

The radio head unit has a Diagnostic Trouble Code (DTC) memory. If a malfunction occurs in one of the components or wires which is monitored by the system, a record of the type of malfunction is stored in DTC memory ⇒ [Page 01-1](#) .

Radio, removing and installing

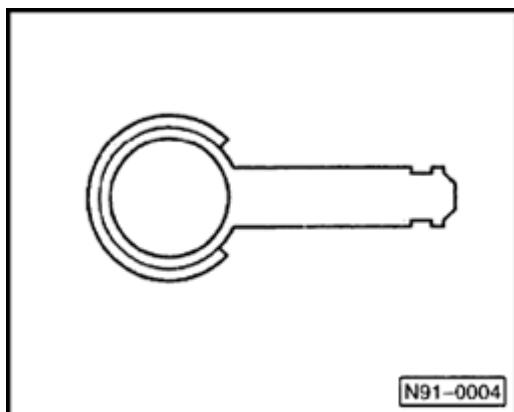
Notes:

If radio is exchanged or replaced:

- ◆ *Anti-theft security code for new radio must be entered before use ⇒ [Page 91-23](#) . Be sure to advise customer of new security code.*
- ◆ *Confirm radio coding for sound system functions using On Board Diagnostic procedure function 07: "Code Control Module".*
- ◆ *Radio sound system coding must be performed to account for presence of CD Changer (if installed), Monsoon system and interior lighting (where applicable).*

Special tools, testers and auxiliary items needed.

- ◆ Radio removal tool 3316 (two identical pieces)

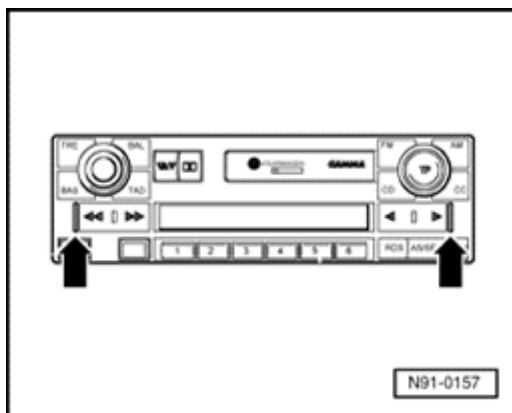


Removing

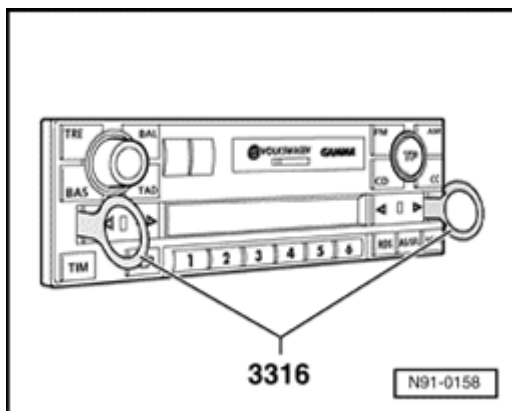
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Obtain anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Insert tool 3316 into openings on face of radio -arrows- until they engage.



- Pull radio from instrument panel opening using handles on tool 3316.
- Disconnect all electrical connection and antenna cable from rear of radio.

Notes:

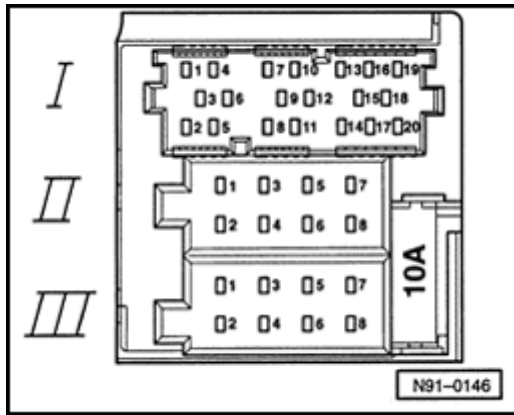
- ◆ *Radio must be pulled straight out from opening. Do not twist or tilt tools while removing.*
- ◆ *To remove tool from radio, release locking tabs on side of radio when removed.*

Installing

- Reconnect electrical connectors and antenna cable at rear of radio.
- Insert radio into instrument panel opening and push straight in until locking tabs engage.
- Input anti-theft security code ⇒ [Page 91-23](#) .
- Confirm radio coding for sound system functions using On Board Diagnostic program function 07, "Code Control Module" ⇒ [Page 01-20](#) .

Note:

Radio sound system coding must be performed to account for presence of CD Changer and Monsoon amplifier (if installed) and interior sound field differences between models.



Radio, multi-pin connector assignments

Connector I consists of three separate connector parts:

20 pin multi-connector I -T20-, part 1, yellow

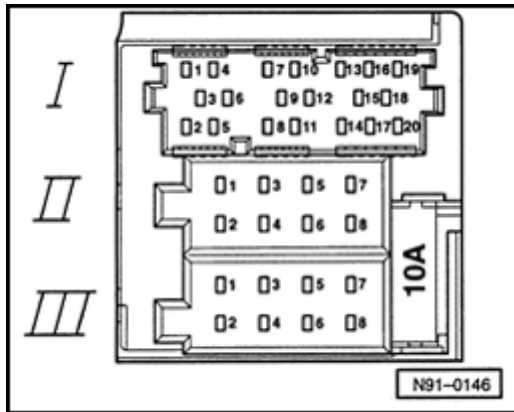
- 1 - Line out, left rear
- 2 - Line out, right rear
- 3 - Line out, Ground (GND)
- 4 - Line out, left front
- 5 - Line out, right front
- 6 - Switched positive (B+) for amplifier

20 pin multi-connector I -T20-, part 2, green*

- 7 - Open
- 8 - Clock
- 9 - DATA
- 10 - ENA
- 11 - Remote control (serial input)
- 12 - Open

*) Where applicable

91-21



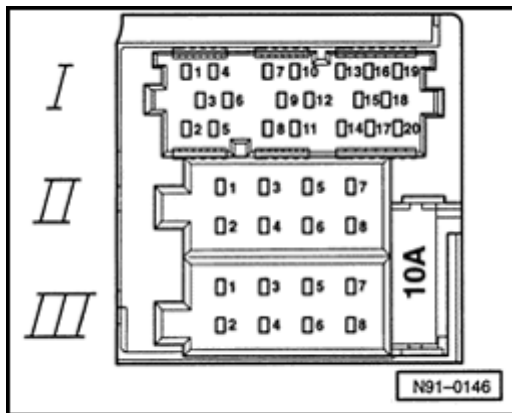
20 pin multi-connector I -T20-, part 3, blue

- 13 - CD Changer - DATA IN
- 14 - CD Changer - DATA OUT
- 15 - CD Changer - CLOCK
- 16 - CD Changer - Power supply, positive (B+) supply
- 17 - CD Changer - Control signal
- 18 - CD Changer - Ground (GND), terminal 31
- 19 - CD Changer - LINE OUT, left
- 20 - CD Changer - LINE OUT, right

"Premium V" 8 pin multi-connector II -T8a-, brown

- 1 - Speaker + right rear
- 2 - Speaker - right rear
- 3 - Speaker + right front
- 4 - Speaker - right front
- 5 - Speaker + left front
- 6 - Speaker - left front
- 7 - Speaker + left rear
- 8 - Speaker - left rear

91-22



◀ "Premium V - Monsoon" 8 pin multi-connector II -T8a-, brown

- 1 - Amplifier + right rear speaker signal
- 2 - Amplifier - right rear speaker signal
- 3 - Amplifier + right front speaker signal
- 4 - Amplifier - right front speaker signal
- 5 - Amplifier + left front speaker signal
- 6 - Amplifier - left front speaker signal
- 7 - Amplifier + left rear speaker signal
- 8 - Amplifier - left rear speaker signal

8 pin multi-connector III -T8-, black

- 1 - Signal for anti-theft alarm system
- 2 - Open
- 3 - Data Link Connector (DLC) K-wire
- 4 - Ignition switch - S contact
- 5 - Battery, positive (B+) supply, terminal 30 (control input for "SAFE" display/anti-theft)
- 6 - Illumination, terminal 58b
- 7 - Battery, positive (B+) supply, terminal 30
- 8 - Battery, negative (-) ground supply, terminal 31

Anti-theft security code, inputting

The security code is "fixed", meaning the radio is programmed by the radio manufacturer to accept only one code. This code must be input during the new vehicle delivery inspection, into newly installed or existing units that have been removed and reinstalled.

Prerequisites:

- ◆ Obtain security code, either from code card or from customer.
- ◆ Radio power supply fuse OK (according to wiring diagram)

Inputting code / cancelling electronic lock-up

- Switch on radio
 - "SAFE" appears in radio display, followed by "1000" approximately 3 seconds later.
- Input the security code found on the radio card using the station preset buttons on the radio. Button "1" corresponds to the first number in the security code, "2" the second and so on. Press the applicable button repeatedly until the desired number appears in the display (E.g.: press button "1" three times if the first number in the code is 3).
- When the entire code has been input and appears on the display, press the right side of the "Seek" button ("▶") for longer than 2 seconds until an audible signal is heard.

Incorrect code number

If an incorrect code is entered, "SAFE" will appear in the display (first blinking and then continuous) and the radio will not function. The entire coding procedure can only be repeated one more time immediately (the number of attempts is displayed).

If during the second attempt an incorrect code is entered, the radio will lock-up for approximately one hour. Leave key in ignition, radio switched on for 1 hour and attempt coding again when the number of attempts on display goes out (ensure proper code is available).

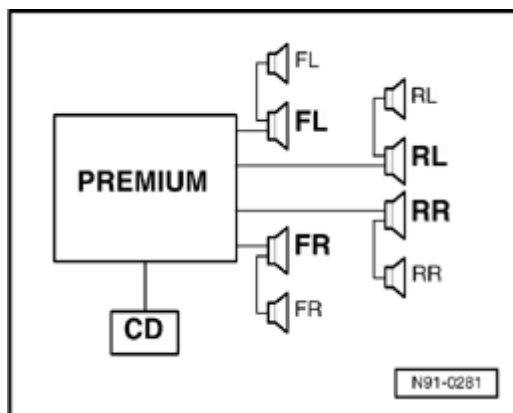
Cycle: 2 attempts - 1 hour lock-up still applies.

Radio, "Premium VI" & "Premium VI - Monsoon"

General information

Radio system "Premium VI" and "Premium VI - Monsoon" was installed as a running change during m.y. 2002. The system is immediately identifiable by it's "Double DIN" format.

"Premium VI radios are called "Premium CD" in the owner's literature.



The radio system consists of an integrated receiver/CD Player/tape head unit and speakers located in the front and rear doors.

A 168 mm low-range/bass speaker is located in the lower portion of each front and rear door.

High-range speakers (domed tweeters) are integrated into the forward window trim on both front doors. Tweeters are integrated into the rear door handle trim next to the power window switches.

The optional "Premium VI - Monsoon" system consists of the "Premium VI" receiver/tape unit supplemented by a separate high power amplifier mounted in the luggage compartment ⇒ [page 91-36](#) .

High power handling speakers specifically designed for the "Monsoon" system are located in the front and rear doors.

The system uses an amplified roof mounted antenna ⇒ [Page 91-47](#) .

The optional, luggage compartment mounted CD Changer wiring and mounting is pre-installed in production ⇒ [Page 91-58](#) .

On Board Diagnostic (OBD), function

"Premium VI" radio systems have On Board Diagnostic (OBD) capabilities.

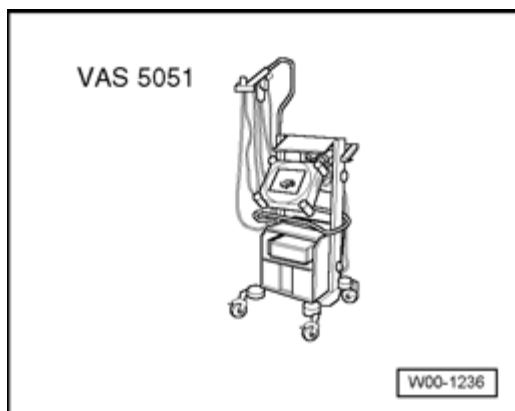
The radio head unit has a Diagnostic Trouble Code (DTC) memory. If a malfunction occurs in one of the components or wires which is monitored by the system, a record of the type of malfunction is stored in DTC memory ⇒ [Page 91-27](#) .

OBD program functions, performing using VAS 5051

OBD program text/data generated by "Premium VI" radios may not be recognized by VAG1551/1552 Scan Tools (ST) with the latest program card. For example: scan tool display shows "text 799", "01529 /references" or similar.

In these cases, OBD program functions on vehicles with "Premium VI" radio systems must be performed using the VAS VAS 5052 Vehicle Diagnostic Testing and Information System in mode "Self Diagnosis" or "Guided Fault Finding".

Special tools, testers and auxiliary items needed



- ◆ VAS 5051 Vehicle Diagnostic Testing and Information System
- ◆ Cable adapter VAS 5051/1 or VAS 5051/3
- Connect VAS 5051 with adapter cable to Data Link Connector (DLC) and select mode "Guided Fault Finding"
- Enter appropriate model, equipment and model year information and press ">" to confirm.

After all Control Modules have been registered and DTC memories checked,

- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97)"
- Select "Electrical System (Repair Group 27; 90 to 97)"
- Select "01-Systems capable of self-diagnosis"
- Select "Radio system"
- Select "Radio system functions" and press ">" to confirm
- Review displayed list of OBD program functions and select as necessary, e.g.: "Radio, coding"
- Perform selected OBD program steps as prompted by tester

Radio, removing and installing

Notes:

If radio is exchanged or replaced:

- ◆ *Anti-theft security code for new radio must be entered before use ⇒ [Page 91-34](#) . Be sure to advise customer of new security code.*
- ◆ *Confirm radio coding for sound system functions using On Board Diagnostic procedure function 07: "Code Control Module".*
- ◆ *Radio sound system coding must be performed to account for presence of CD Changer (if installed), Monsoon system and interior lighting (where applicable).*

Special tools, testers, and auxiliary items needed

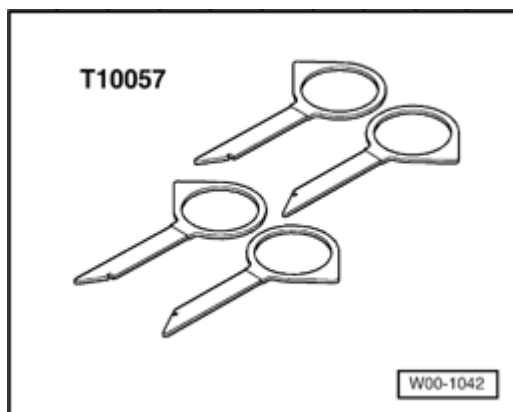
- ◆ Recommended: Radio removal tool JC4

or

- ◆ Radio removal tool T10057 (two identical pieces).

Note:

Individual tools are marked "Top L" for left upper and lower openings and "Top R" for right upper and lower openings.

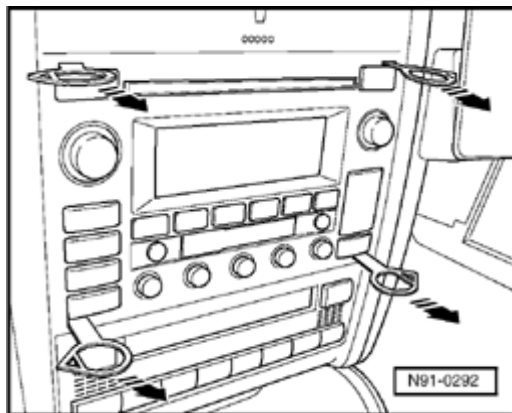


Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Obtain anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**



- Insert tool into openings on face of radio -arrows- until they are felt to engage.

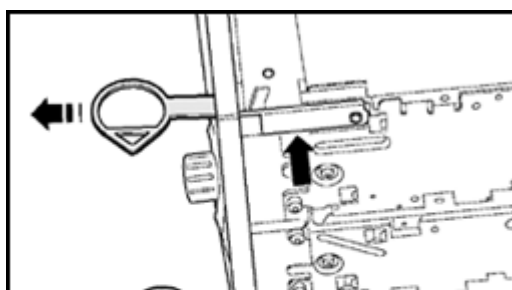
Note:

Use of separate tools T10057 is illustrated here. Procedure is essentially the same for tool JC4225 where all release prongs are integrated into a frame.

- Pull radio from instrument panel opening using handles on tool T10057 or frame of tool JC4225.
- Disconnect electrical connectors and antenna cable from radio.

Notes:

- ◆ *Radio must be pulled straight out from opening. Do not twist or tilt tools while removing.*
- ◆ *To remove tool from radio, release locking tabs -arrow- on side of radio when removed.*



Installing

- Reconnect electrical connectors and antenna cable at rear of radio.
- Insert radio into instrument panel opening and push straight in until locking tabs engage.

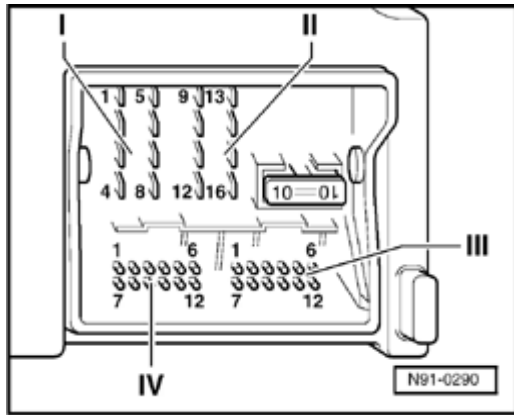
CAUTION!

When installing radio unit, do not press on display or control buttons in order to engage locking tabs. Damage will result.

- Input anti-theft security code ⇒ [Page 91-34](#) .
- Confirm radio coding for sound system functions using On Board Diagnostic program function 07 "Code Control Module" ⇒ [Page 01-49](#) .

Note:

Radio sound system coding must be performed in order to account for presence of CD Changer and Monsoon amplifier (if installed) and interior sound field differences between models.



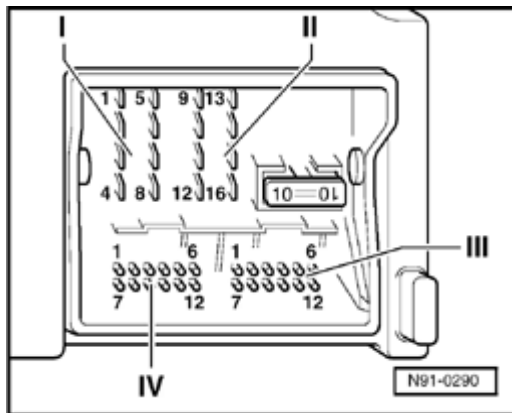
Radio, multi-pin connector assignments

8 pin multi-connector I

- 1 - Speaker + right rear
- 2 - Speaker + right front
- 3 - Speaker + left front
- 4 - Speaker + left rear
- 5 - Speaker - right rear
- 6 - Speaker - right front
- 7 - Speaker - left front
- 8 - Speaker - left rear

8 pin multi-connector II

- 9 - CAN-Bus plus
- 10 - CAN-Bus minus
- 11 - Mute
- 12 - Ground (GND)
- 13 - Radio, Control signal
- 14 - Contact alarm
- 15 - Battery positive (B+)
- 16 - Signal for anti-theft alarm



◀ 12 pin multi-connector III*

- 1-5 Open
- 6 - Signal for telephone minus (-)
- 7-11 Open
- 12 - Signal for telephone plus (+)

12 pin multi-connector IV

- 1 - Open
- 2 - CD Changer - left and right channel, Ground (GND)
- 3 - Open
- 4 - CD Changer - Positive (B+) supply
- 5 - Open
- 6 - CD Changer - DATA OUT
- 7 - Open
- 8 - CD Changer - left channel, CD/L
- 9 - CD Changer - right channel, CD/L
- 10 - CD Changer - Control signal
- 11 - CD Changer - DATA IN
- 12 - CD Changer - CLOCK

*) Where applicable

Anti-theft security code, inputting

The security code is "fixed", meaning the radio is programmed by the radio manufacturer to accept only one code. This code must be input during the new vehicle delivery inspection, into newly installed or existing units that have been removed and reinstalled.

Prerequisites:

- ◆ Obtain security code, either from code card or from customer.
- ◆ Radio power supply fuse OK (according to wiring diagram)

Inputting code / cancelling electronic lock-up

- Switch on radio
 - "SAFE" appears in radio display, followed by "1000" approximately 3 seconds later.
- Input the security code found on the radio card using the station preset buttons on the radio. Button "1" corresponds to the first number in the security code, "2" the second and so on. Press the applicable button repeatedly until the desired number appears in the display (E.g.: press button "1" three times if the first number in the code is 3).
- When the entire code has been input and appears on the display, either press the upper portion of the "Seek" button ("s") or the "Scan" button for longer than 2 seconds until an audible signal is heard.

The code is input properly when the display either indicates a radio frequency, or "LSM" (ready for use). When the radio is switched off and the ignition key removed, a flashing LED on the radio faceplate confirms the radio is security protected.

Incorrect code number

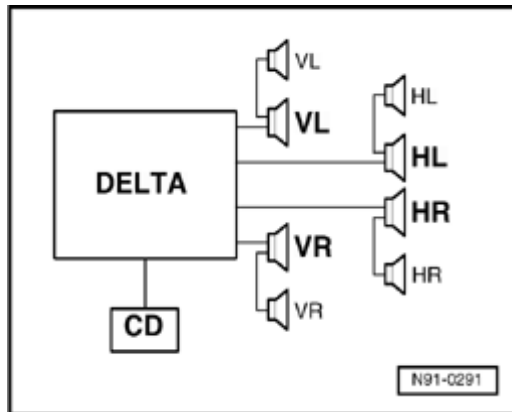
If an incorrect code is entered, "SAFE" will appear in the display (first blinking and then continuous) and the radio will not function. The entire coding procedure can only be repeated one more time immediately (the number of attempts is displayed).

If during the second attempt an incorrect code is entered, the radio will lock-up for approximately one hour. Leave key in ignition, radio switched on for 1 hour and attempt coding again when the number of attempts on display goes out (ensure proper code is available).

Cycle: 2 attempts - 1 hour lock-up still applies.

Amplifier system - "Monsoon"

General information



The optional "Premium V - Monsoon" and "Premium VI - Monsoon" systems consist of the "Premium" receiver/tape unit supplemented by a separate high power amplifier mounted in the luggage compartment.

High power handling speakers specifically designed for the "Monsoon" system are located in the front and rear doors.

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the applicable standard or optional radio system. Always read the radio owner's manual and review all radio, tape player and CD Changer functions.

Amplifier locations

- ◆ Golf & GTI: Behind left luggage compartment storage flap.
- ◆ Jetta: Under parcel shelf, right.

Note:

Always confirm radio system installed and check with the parts department for proper replacement radio unit, amplifier and speaker applications.

On Board Diagnostic (OBD), function

Amplifier functions are monitored by applicable radio system OBD.

- ◆ "Premium V - Monsoon" OBD ⇒ [Page 01-1](#)
- ◆ "Premium VI - Monsoon" OBD ⇒ [Page 91-27](#) .

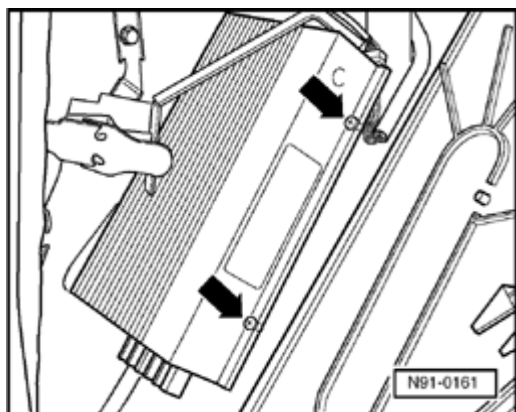
Amplifier - Golf & GTI , removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- Open left luggage compartment trim flap.
- Disconnect electrical connections at amplifier.
- A - Remove screws -arrows-.
- Remove amplifier from bracket.



Installing

- Install in reverse order of removal.
- Ensure radio is coded accordingly for "Monsoon" system using On Board Diagnostic program function 07, "Code Control Module": Radio system "Premium V" ⇒ [Page 01-20](#) . Radio system "Premium VI" ⇒ [Page 01-49](#) .

Note:

Radio sound system coding must be checked/performed in order to account for presence of CD Changer, Monsoon amplifier (if installed) and interior sound field differences between models.

Amplifier - Jetta, removing and installing

Removing

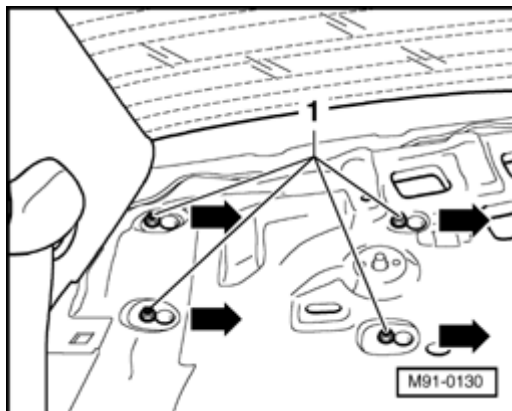
CAUTION!

Before beginning repairs on the electrical system:

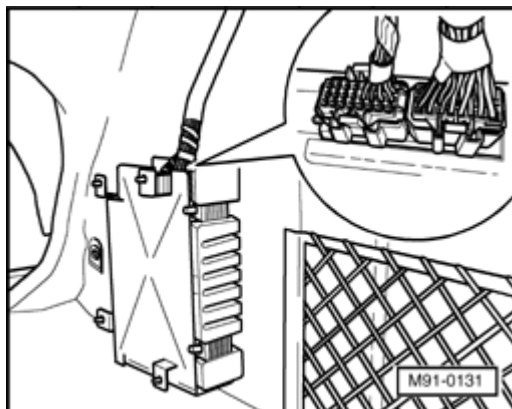
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove parcel shelf trim

⇒ [Repair Manual; Body Interior; Repair Group 70.](#)



- Loosen (do not remove) screws - 1- (tightening torque: 5.5 Nm).
- Release amplifier assembly from mounting position by sliding towards the perforations in the rear shelf sheet metal - arrow-.

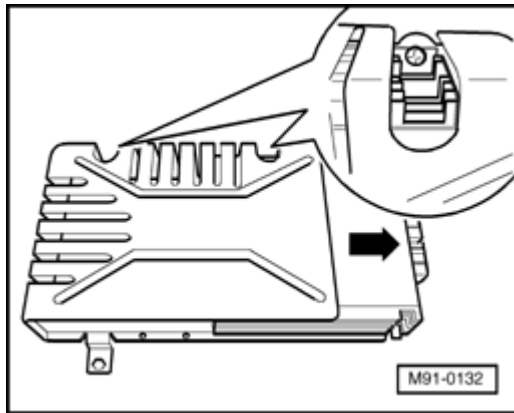


- Disconnect electrical connections at amplifier by depressing both securing lugs on each plug.

CAUTION!

Always disconnect the green plug last in order to better support the weight of the amplifier assembly when it hangs on the wiring harnesses.

91-41



- Remove amplifier mounting screws as illustrated in detail.
- Slide amplifier from mounting frame in direction of -arrow-.

Installing

- Install in reverse order of removal.
- Ensure radio is coded accordingly for "Monsoon" system using On Board Diagnostic program function 07, "Code Control Module": Radio system "Premium V" ⇒ [Page 01-20](#) . Radio system "Premium VI" ⇒ [Page 01-49](#) .

Note:

Radio sound system coding must be checked/performed in order to account for presence of CD Changer (if installed), Monsoon system (where applicable) and interior sound field differences between models.

Speaker system

General information

A 168 mm low-range/bass speaker is located in the lower portion of each front and rear door.

High-range speakers (domed tweeters) are integrated into the forward window trim on both front doors. Tweeters are integrated into the rear door handle trim next to the power window switches.

Note:

Vehicles equipped with "Monsoon" sound systems include high power handling speakers specifically designed for the "Monsoon" system. Always confirm radio system installed and check with the parts department for proper replacement speaker applications.

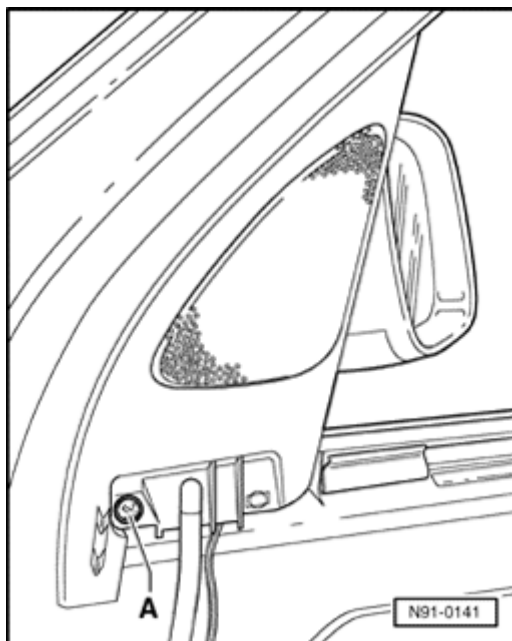
91-43

High-range speaker (domed tweeter front doors, removing)

The high-range speaker is integrated into the forward window trim (by the outside mirror mounting) on both front doors. The trim and speaker are constructed as a single unit and cannot be separated.

Removing

- Remove front door panel ⇒ [Repair Manual Body Interior, Repair Group 70](#) .
- Disconnect electrical harness connection speaker.
- Remove screw -A-
- Carefully push trim upward and remove trim/speaker.



CAUTION!

To avoid damage, do not pull or pry out trim. Only push upwards to disengage the locating tab.

High-range speaker (domed tweeter) in rear doors, removing

The high-range speaker is integrated into the inside door handle trim on both rear doors. The trim and speaker are constructed as a single unit and cannot be separated.

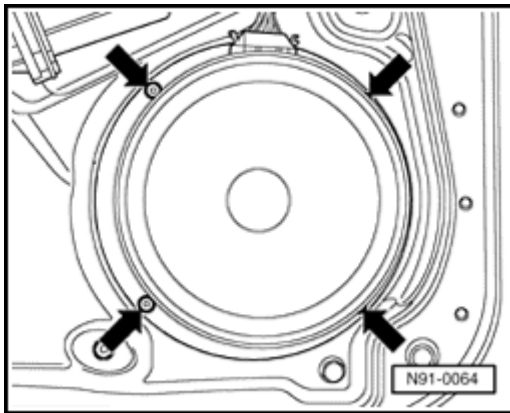
Removing

- Remove rear door panel and inside door handle trim ⇒ [Repair Manual, Body Interior, Repair Group 70](#) .
- Disconnect electrical harness connections to speaker and power window switch.
- Unclip power window switch from door handle trim and remove trim/speaker.

Mid-range/bass speakers in front and rear doors, removing

Removing

- Remove door panel ⇒ [Repair Manual, Book Interior, Repair Group 70](#) .
- Disconnect electrical harness connection speaker.
- Unclip power window switch from door handle trim and remove trim/speaker.
- Carefully drill out rivets at speaker frame (arrows) and remove speaker from opening.



CAUTION!

- ♦ *To prevent corrosion, ensure that all particles from drilling are removed from inside the door.*
- ♦ *If paint on door frame is damaged during drilling, touch-up immediately.*

Installing

- Mount speaker with locally available rivet proper dimension.
- Reconnect all electrical connections and all door panel trim, making sure the foam between the speaker and door panel is in place.

Antenna systems

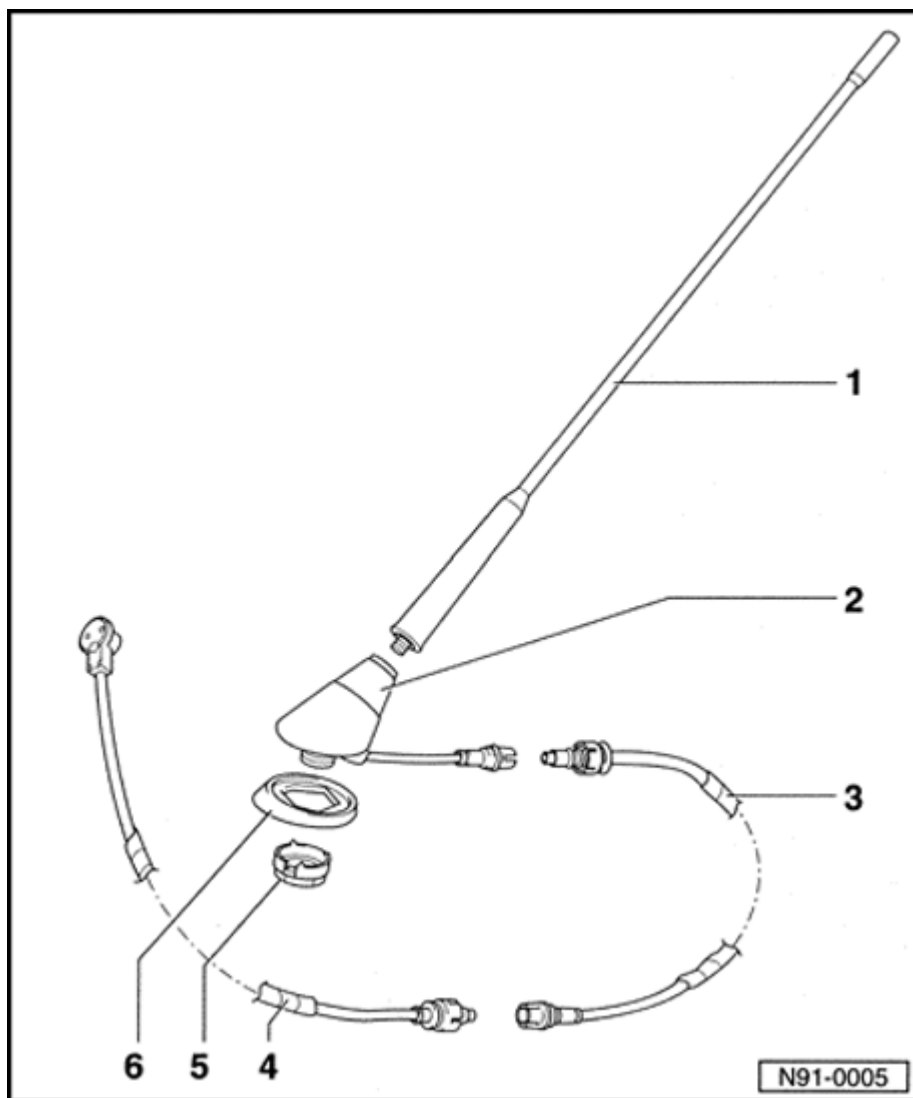
General information

Depending on equipment level, two different antenna systems are intalled.

- ◆ Roof mounted antenna for radio ⇒ [Page 91-47](#) .
- ◆ Roof mounted triplex antenna for radio and GPS/Telematics ⇒ page

These antennas process RF signals for the radio as well as GPS signals for the Telematics system (where applicable).

91-47



Radio system antenna, assembly

1 - Antenna rod

2 - Antenna base

◆ Roof antenna booster is located in antenna base.

◆ Jetta Wagon, Golf & GTI - removing and installing ⇒ [Page 91-49](#) .

◆ Jetta Sedan - removing and installing ⇒ [Page 91-53](#) .

3 - Antenna cable

◆ From roof antenna to front of center console

4 - Antenna cable

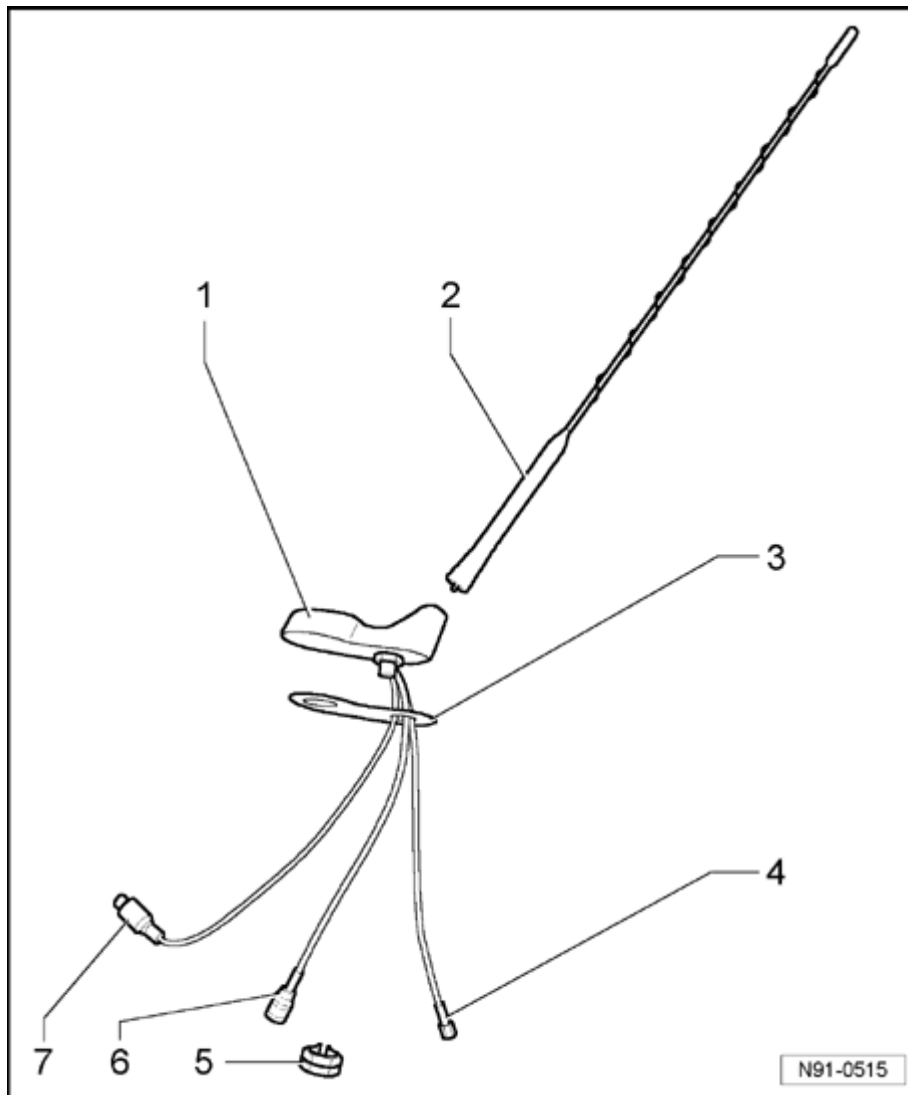
From

- ◆ center console to radio unit

5 - Hex nut M14 with serrated washer

- ◆ Serrated washer is attached to hex nut with a plastic ring.
- ◆ Apply contact grease to the inside of the roof in area of serrated washer.

6 - Seal



GPS/Telematics system antenna, assembly

1 - Antenna base

- ◆ Jetta Wagon, Golf & GTI - removing and installing ⇒ [Page 91-49](#) .
- ◆ Jetta Sedan - removing and installing ⇒ [Page 91-53](#) .

2 - Antenna mast

3 - Gasket

4 - Antenna connection - GPS

- ◆ Threaded

5 - Hex nut

6 - Antenna connection - Radio

- ◆ Plug
- ◆ Black

7 - Antenna connection - Telematics

- ◆ Plug
- ◆ Grey

Antenna - Jetta Wagon, Golf & GTI, removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

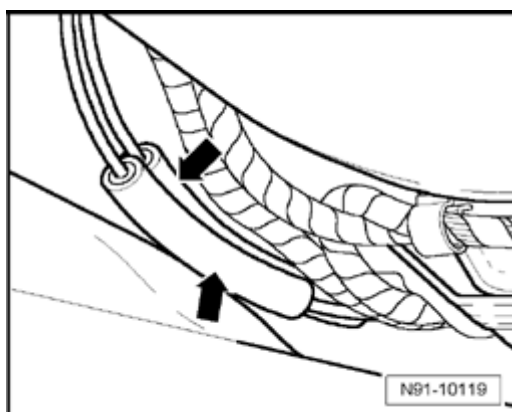
- Jetta Wagon - Unclip rear headliner trim and left/right D-pillar trim

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Golf & GTI - Unclip rear headliner trim and left/right C-pillar trim

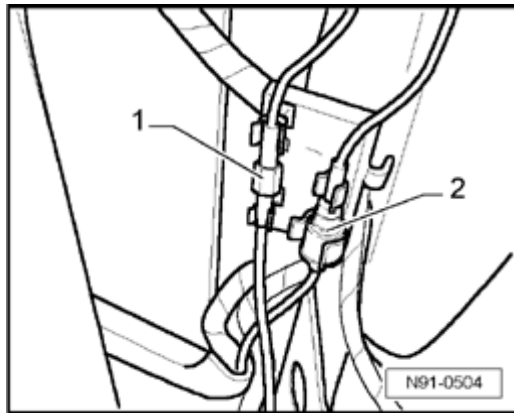
⇒ [Repair Manual, Body Interior, Repair Group 70](#)

- Carefully lower headliner at rear slightly in order to access antenna cables etc..

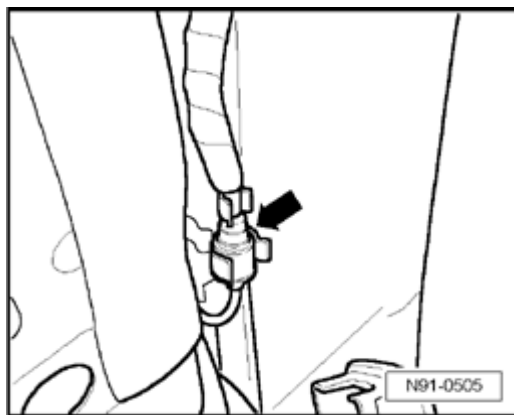


- Where applicable, open foam insulator section and disconnect cable connections inside

91-50

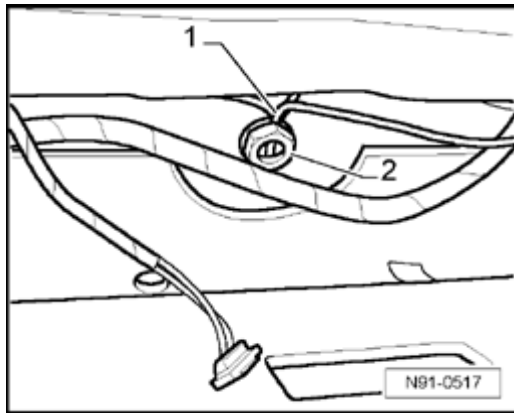


- Where applicable, unclip cable connections -1- and -2- from roof and separate connections.



- Where applicable, unclip cable connection -arrow- and separate connection.

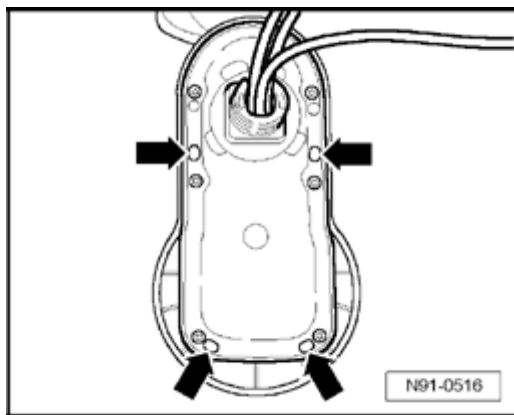
91-51



- Remove nut -2- and remove antenna.

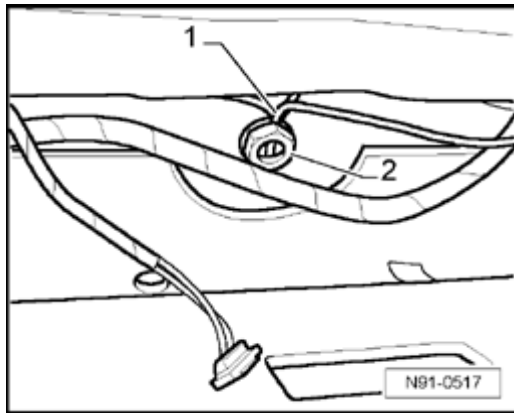
Installing

Install in reverse order of removal, noting the following:



- Ensure gasket is properly oriented in relation to relief areas -arrows- on antenna base

91-52



- Ensure stress free routing of antenna cables -1- through nut -2- .
- Apply contact grease in area where nut/serrated washer contacts roof sheet metal.

Antenna - Jetta Sedan, removing and installing

Removing

CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

- Remove complete headliner

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

Remaining removal and installation is taken over from Jetta Wagon, Golf & GTI ⇒ [Page 91-49](#) .

Reception interference, suppression measures

Most electrical consumers and features in the vehicle are developed to include radio interference measures. These include:

- ◆ Coolant fan -V7-
- ◆ Windshield wiper motor -V-
- ◆ Rear window wiper motor -V12-
- ◆ Braided ground strap from left fender mounting bolt to front hood.

Antenna cables and connectors, replacing

Detailed instructions for antenna cable/connector replacement Repair Manual, Electrical Equipment. Repair Group 97.

CD Changer / CD Player

General information

The optional 6-disc CD Changer is located behind the left luggage compartment storage flap and is mounted horizontally in Golf, and vertically in Jetta.

On models equipped with "Premium V" radios, the optional CD Player is mounted in the instrument panel in place of the storage bin, above/below the radio.

"Premium VI" radios have an integrated CD Player.

Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the applicable radio system and installed CD device. Always read the radio owner's manual and review all radio and CD Changer/Player functions.

Note:

If the CD Changer/Player plays commercially available CDs, but not home recorded CDs, the CD device is not malfunctioning. Replacement or exchange of CD device is not warranted for this reason.

CAUTION!

- ◆ **Do not use 8 cm diameter "mini disks". Should a "mini disk be inserted, it will not eject and CD Player damage will result.**
- ◆ **Do not use CDs that contain a mix of computer and music data.**

On Board Diagnostic (OBD), function

CD Changer/Player functions are monitored by applicable radio system OBD.

- ◆ "Premium IV" and "Premium V" OBD ⇒ [Page 01-1](#)
- ◆ "Premium VI" OBD ⇒ [Page 91-27](#) .

CD Changer, removing and installin

Removal and installation described here is essentially the same for both Golf and Jetta models.

Notes:

When installing a new CD Changer in vehic previously equipped with one:

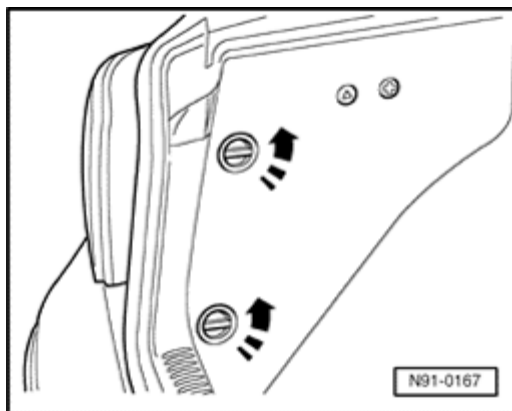
- ◆ *Prior to installation, CD Changer position (vertical or horizontal) must be set via th switches. Check and reset if necessary : [91-60](#) .*
- ◆ *Radio must be coded in order to support Changer functions. After installing new C input appropriate radio coding using On Diagnostic program function 07, "Code (Module".*

Removing

CAUTION!

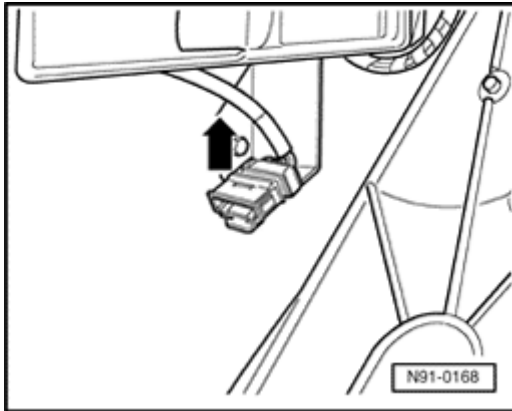
Before beginning repairs on the electric system:

- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***

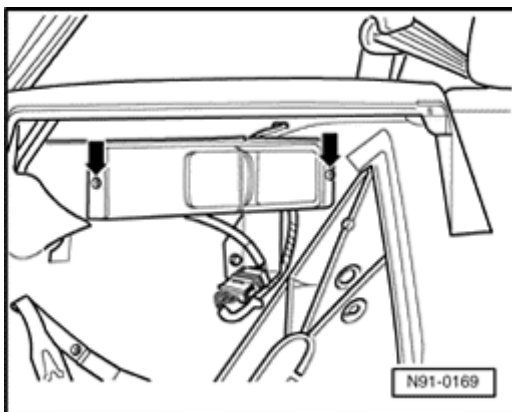


- Turn release knobs in direction of arrow a open trim flap.

91-59



- Disconnect electrical connection and unclip from retainer -arrow-.



- Remove bolts -arrows- and remove CD Changer from retainer.

Tightening torque: 3 Nm (27 in. lb.)

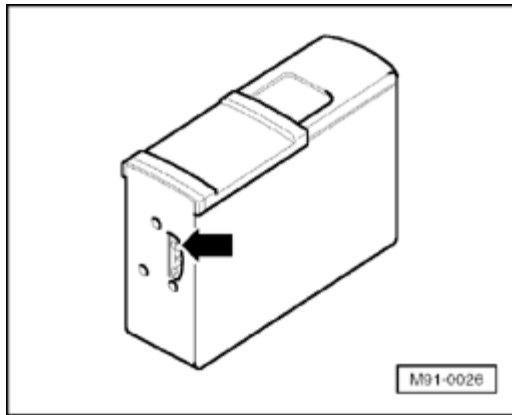
Installing

- Install in reverse order of removal.
- Ensure radio is coded accordingly for CD Changer functions using On Board Diagnostic program function 07, "Code Control Module": Radio system "Premium IV" and "Premium V" ⇒ [Page 01-20](#) . Radio system "Premium VI" ⇒ [Page 01-49](#) .

Note:

Radio sound system coding must be performed to account for presence of CD Changer, Monsoon amplifier (if installed) and interior sound field differences between models.

CD Changer position (V/H) switches, setting



- Check and confirm CD Changer position settings via V/H switch (or switches) -arrow- where applicable.
- Loosen V/H switch retaining screw, slide switch towards the appropriate position according to CD Changer's installation position ("V" = vertical, or "H" = horizontal) and tighten.
- ◆ Tightening torque: 3 Nm (27 in lb)

Notes:

- ◆ *CD playback will skip if switches are not set correctly.*
- ◆ *Always check/set switches prior to CD installation.*
- ◆ *Switches must move completely to their end positions.*
- ◆ *Before sliding CD Changer into CD Changer bracket ensure that the CD Changer cable and connector route to the front side of the CD Changer.*

CD Changer retainer, removing and installing

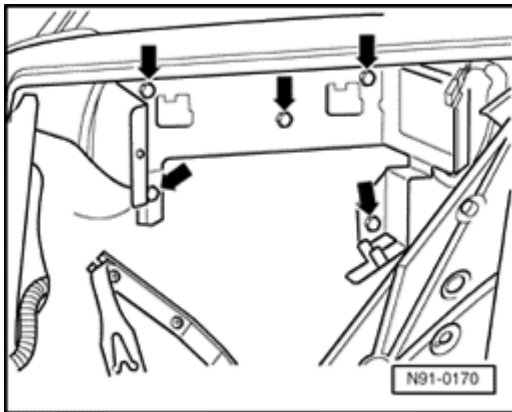
Removing

- Remove CD Changer.
- Remove bolts -arrows- and remove retainer.

Tightening torque: 5 Nm (44 in. lb.)

Installing

- Install in reverse order of removal.



CD Player, removing and installing

CD Player can be combined with "Premium V" and "Premium V - Monsoon" radios only.

CD Player also works with above radio systems that include a CD Changer. CD Changer is then manually controlled by CD Player.

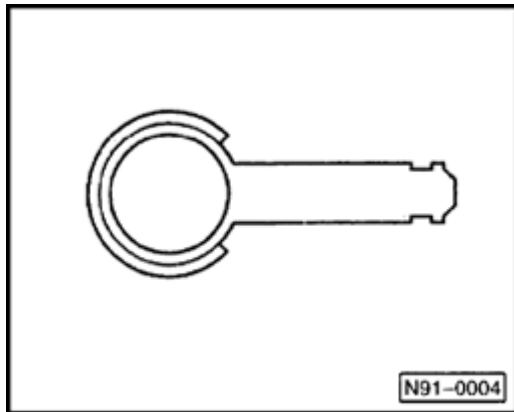
The CD Player is connected to the radio. If the CD Player/radio system includes a CD Changer, the CD Changer is connected to the CD Player.

Notes:

When installing a new CD Player in vehicle not previously equipped with one:

- ◆ *Radio must be coded in order to support CD Player functions. After installing new CD Player, input appropriate radio coding using On Board Diagnostic program function 07, "Code Control Module" ⇒ [Page 01-20](#) .*

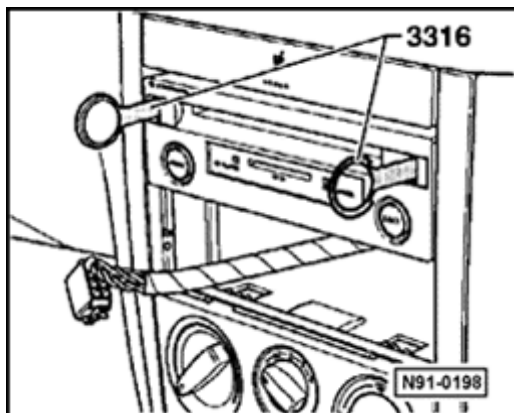
Special tools, testers and auxiliary items needed.



- ◆ Radio removal tool 3316 (two identical pieces).

Removing

- First remove radio ⇒ [Page 91-7](#) .



- Insert tool 3316 into openings on face of CD Player -arrow- until they are felt to engage.
- Pull CD Player from instrument panel opening using handles on tool 3316.
- Where applicable, disconnect electrical connection from CD Changer to CD Player.

Notes:

- ◆ *CD Player must be pulled straight out from opening. Do not twist or tilt tools while removing.*
- ◆ *To remove tool from CD Player, release locking tabs on side of CD Player when removed.*

Installing

- Install in reverse order of removal.

Note:

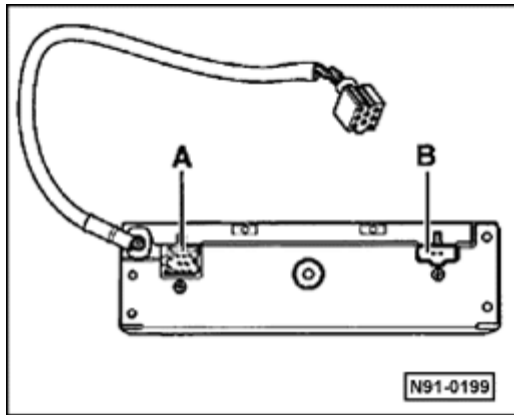
When installing CD Player in vehicle not previously equipped with one, remove storage bin above radio first.

- Reinstall radio.
- Input radio anti-theft security code ⇒ [Page 91-23](#) .
- Ensure radio is coded accordingly for CD Player functions using On Board Diagnostic program function 07, "Code Control Module": Radio system "Premium V" ⇒ [Page 01-20](#) .

Note:

Radio sound system coding must be performed to account for presence of CD Player, CD Changer (if installed), Monsoon system (where applicable) and interior sound field differences between models.

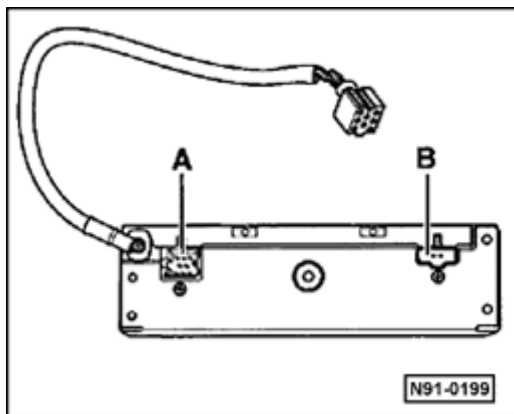
CD Player multi-pin connector assignments



Multi-pin connector "A"

Multi-pin connection "A" is identical to blue multi-pin connection I, part 3, on "Premium IV" and "Premium V" radios

- 13 - CD Changer - DATA IN
- 14 - CD Changer - DATA OUT
- 15 - CD Changer - CLOCK
- 16 - CD Changer - Power supply, positive (B+) supply
- 17 - CD Changer - Control signal
- 18 - CD Changer - Ground (GND), terminal 31
- 19 - CD Changer - LINE OUT, left
- 20 - CD Changer - LINE OUT, right

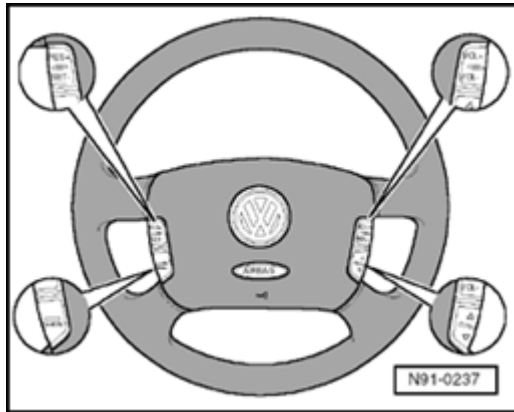


Multi-pin connector "B"

- 1 - CD Player Ground (GND), terminal 31
- 2 - CD Player illumination, terminal 58d

Multi-function steering wheel

General information



The optional multi-function steering allows functions of the radio and cruise control to be operated from the steering wheel.

The multi-function steering wheel system contains the following components:

- ◆ Operating unit in steering wheel with two key pads mounted left and the right on the steering wheel with integrated electronics.
- ◆ A control module for the multi-function steering wheel (located on the 13-position auxiliary relay panel).
- ◆ A counterweight is installed in the steering wheel on diesel vehicles

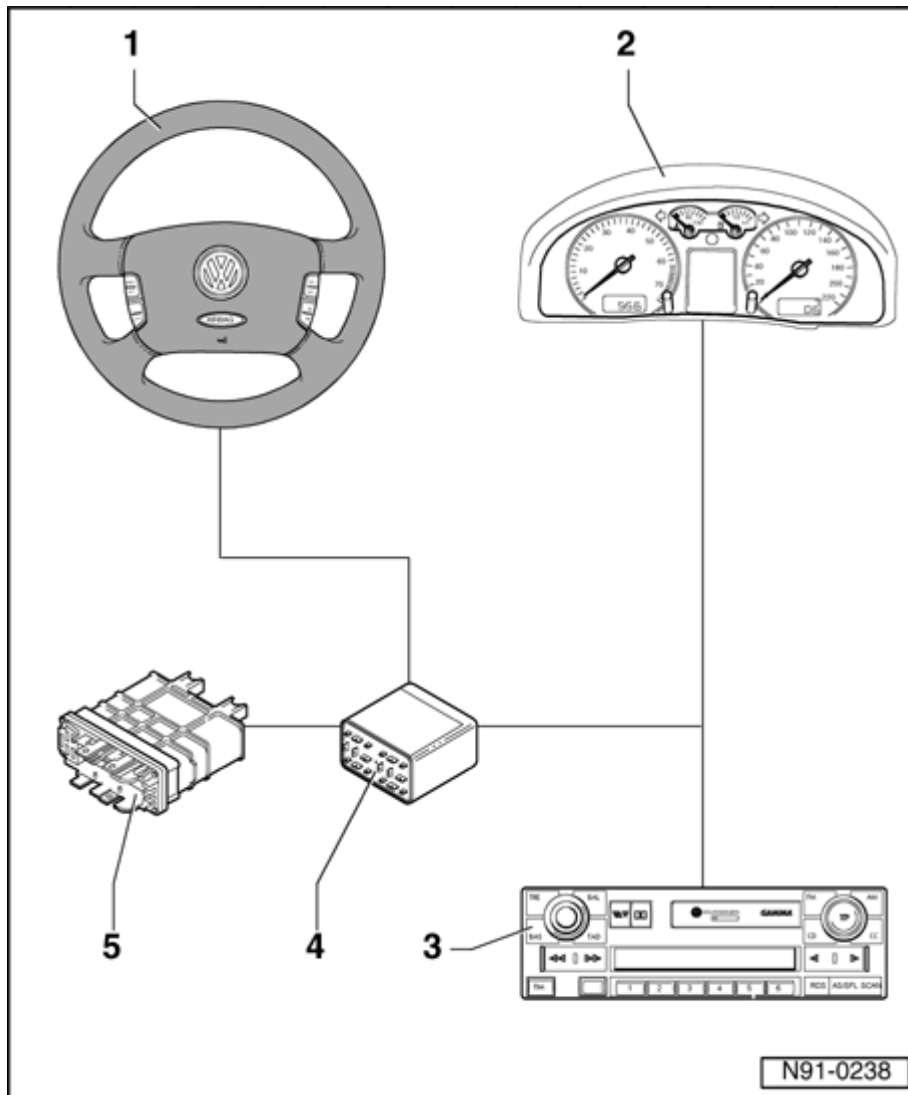
Before troubleshooting or servicing, technicians must be familiar with the functions and operation specifics of the applicable standard or optional radio system and cruise control system as controlled by the multi-function steering wheel. Always read the vehicle/radio owner's manual and review all radio, tape player and CD Changer functions as they pertain to multi-function steering wheel operation.

On Board Diagnostic (OBD), function

The multi-function steering wheel has On Board Diagnostic (OBD) capabilities.

Multi-function steering wheel OBD through 11.01 ⇒ [Page 01-56](#) .

Multi-function steering wheel OBD from 12.01 ⇒ [Page 01-83](#) .



Multi-function steering wheel, overview

1 - Multi-function steering wheel

- ◆ With integrated control unit - E221-
- ◆ Removing and installing
⇒ [Page 91-70](#)

2 Instrument - cluster

- ◆ Control module with display unit in instrument cluster - J285-
- ◆ Removing and installing instrument cluster

⇒ [Repair Manual, Electrical Equipment, Repair Group 90; Instrument panel, instruments; Instrument cluster; Removing and](#)

[installing
instrument
cluster](#)

3 - Radio

- ◆ Installed
in
center
console

Control unit in steering wheel -E221-, removing and installing

WARNING!

Special safety precautions apply to vehicles equipped with airbags. Refer to Repair Manual, Body-Interior, Airbag: CAUTIONS and WARNINGS, Repair Group 69.

CAUTION!

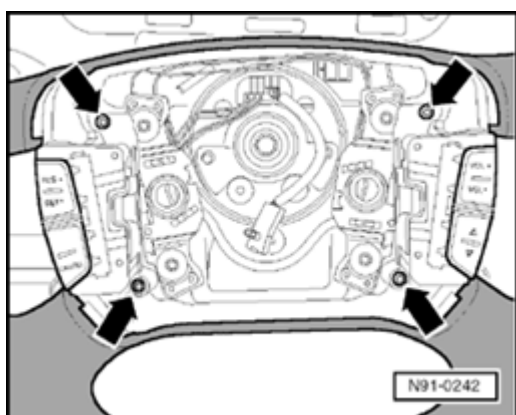
Before beginning repairs on the electrical system:

- ◆ **Obtain anti-theft radio security code.**
- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**
- ◆ **Disconnect negative (-) battery terminal.**
- ◆ **When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified ⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#) .**

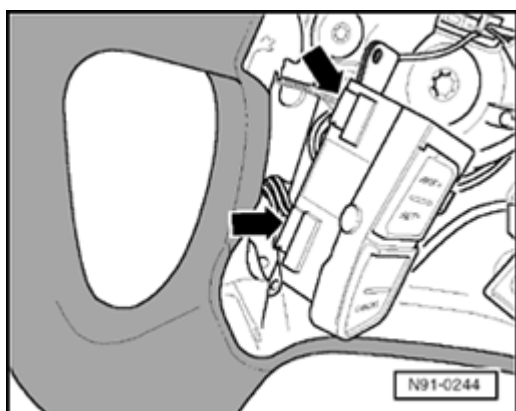
Removing

- Remove driver's airbag.

⇒ [Repair Manual, Body Interior, Repair Group 69](#)



- Remove bolts -arrows- from operating unit.



- Disconnect electrical connections - arrows-.
- Remove unit from steering wheel.

Installing

- Install in reverse order of removal.

Control module for multi-function steering wheel -J453-, removing and installing

Removing

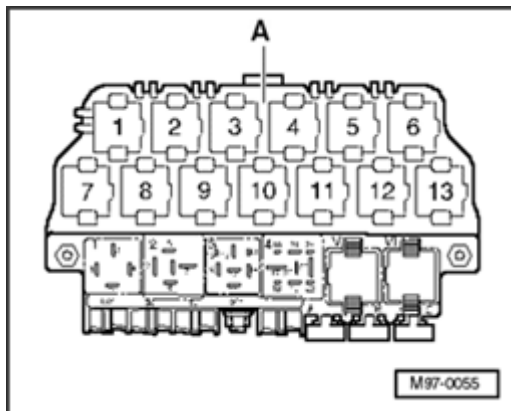
CAUTION!

Before beginning repairs on the electrical system:

- ◆ **Switch off all electrical consumers.**
- ◆ **Switch ignition off and remove ignition key.**

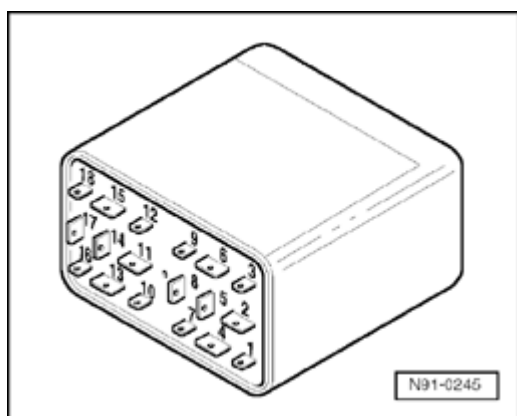
- Remove lower footwell cover to gain access to 13 position relay carrier.

- Remove module -J453- position -5- and - relay carrier -A-.



Installing

- Install in reverse order of removal.
- Coding multi-function steering wheel control module ⇒ [Page 01-74](#)



Control module for multi-function steering wheel multi-pin connector assignments

- 1 - Comfort CAN Bus - Low
- 2 - Open
- 3 - Comfort CAN Bus - High
- 4 - Open
- 5 - Radio, serial data
- 6 - Data Link Connector (DLC) K-wire
- 7 - Cruise Control System (CCS) - resume, accelerate
- 8 - CAN Bus Ground (GND)
- 9 - Open
- 10 - Ground (GND), terminal 31
- 11 - Double tone horn relay
- 12 - Terminal15
- 13 - Terminal 30
- 14 - Open
- 15 - Terminal 58d
- 16 - Cruise Control System (CCS) + (SET/ delay)
- 17 - Heating inlet "ON"
- 18 - CAN Bus to Control module in steering wheel -E221-

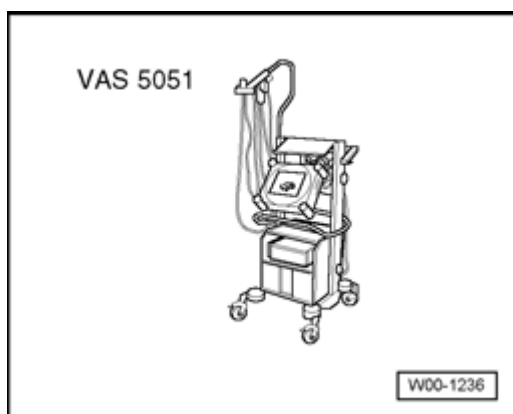
Multi-function steering wheel from 12.01, performing OBD program functions using VAS 5051

OBD program text/data generated by the multi-function steering wheel control module in vehicles from 12.01 production may not be recognized by VAG1551/1552 Scan Tools (ST) with the latest program card. For example: scan tool display shows "text 799", "01529 /references" or similar.

Only the VAS5051/5052 Vehicle Diagnostic Testing and Information System is capable of processing all display text/data on these vehicles.

OBD program functions for multi-function steering wheel must be performed using the VAS5051 Vehicle Diagnostic Testing and Information System in mode "Self Diagnosis" or "Guided Fault Finding".

Special tools, testers and auxiliary items needed



- ◆ VAS 5051 Vehicle Diagnostic Testing and Information System
- ◆ Cable adapter VAS 5051/1 or VAS 5051/3
- Connect VAS 5051 with adapter cable to Data Link Connector (DLC) and select mode "Guided Fault Finding"
- Enter appropriate model, equipment and model year information and press ">" to confirm.

After all Control Modules have been registered and DTC memories checked,

- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97)"
- Select "Electrical System (Repair Group 27; 90 to 97)"
- Select "01-Systems capable of self-diagnosis"
- Select "Multi-function steering wheel"
- Select "Multi-function steering wheel functions" and press ">" to confirm
- Review displayed list of OBD program functions and select as necessary, e.g.: "Multi-function steering wheel, coding"
- Perform selected OBD program steps as prompted by tester

Telematics

General Information

Telematics is an in-vehicle communication system that uses cellular and Global Positioning System (GPS) technologies to provide the customer with safety, security and convenience services.

GPS is a "constellation" of 24 satellites that orbit the earth and constantly broadcast radio signals. The Telematics Control Module receives GPS data, decodes it, and transmits the vehicle's location to the service provider's call center via the national cellular network.

Telematics services for Volkswagen customers are provided by OnStar[®] via a dedicated call center. Service plans may provide route directions and concierge services as well as emergency or vehicle repair services. For details ⇒ Volkswagen Telematics by OnStar[®] Owner's Manual.

Utilization of available Telematics services/features take place via customer's voice control ⇒ Volkswagen Telematics by OnStar[®] Owner's Manual.

Upon customer request, the Volkswagen Telematics by OnStar[®] call center can remotely perform or activate the following vehicle functions:

- ◆ Lock vehicle
- ◆ Unlock vehicle
- ◆ Activate Hazard Lights
- ◆ Activate horn

During events where the Airbag Control Module processes a crash signal, the vehicle hazard lights are activated and the doors are unlocked via the respective door control modules. In addition, the telematics system automatically places an emergency call to the OnStar® call center.

Telematics hardware includes the driver operated telematics control head (which contains the OnStar® control buttons and telematics indicator lamp), microphone, roof mounted GPS/Cellular antenna and Telematics Control Module (with supporting software) and related wiring.

All telematics components are factory installed/integrated into the vehicle electrical system.

Telematics system/component overview ⇒ [Page 91-79](#) .

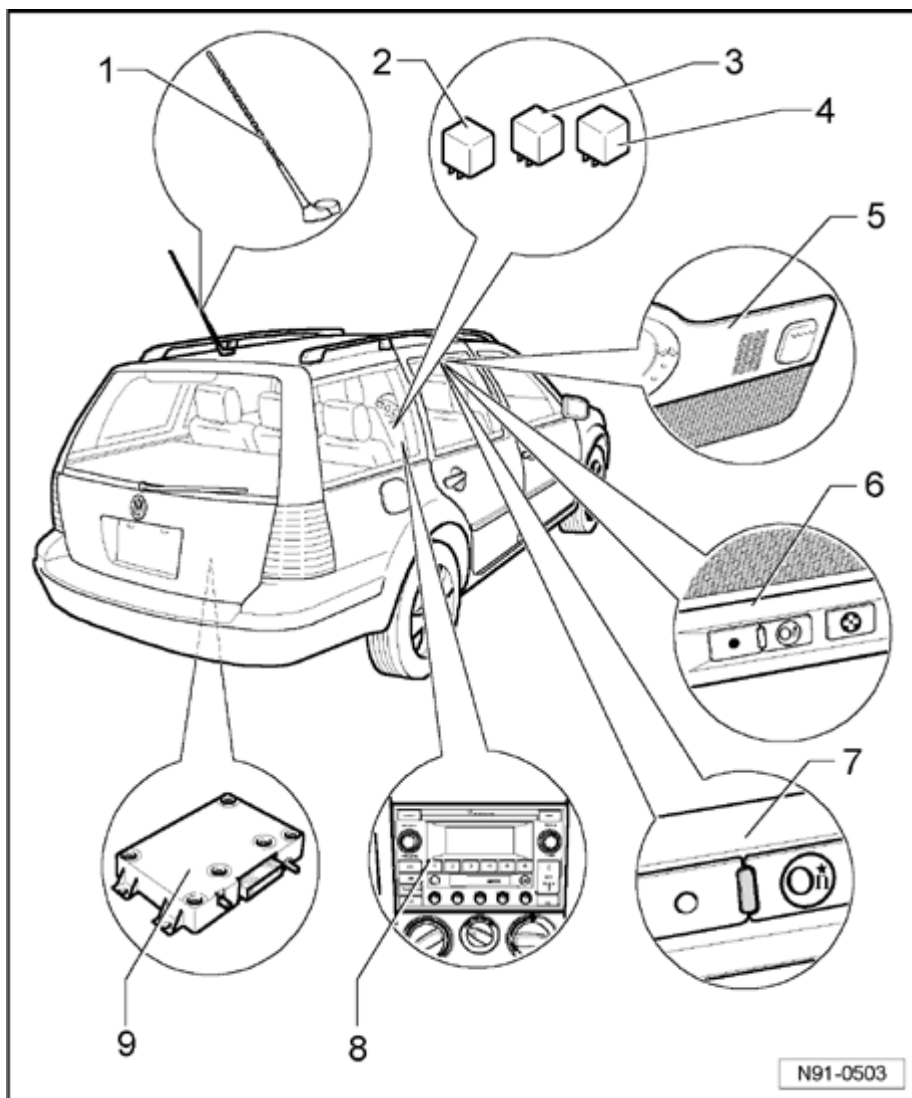
Before troubleshooting or servicing, technicians must be familiar with all telematics functions, operating specifics and the particular service plan which the customer subscribes to.

Refer to "Volkswagen Telematics by OnStar®" Self Study Program (SSP) and "Volkswagen Telematics by OnStar® Owner's Manual and/or OnStar® Quick Reference Guide" to become familiar with applicable features and functions.

On Board Diagnostic (OBD), function

The telematics system has extensive On Board Diagnostic (OBD) capabilities.

The Telematics/Telephone Control Module has a Diagnostic Trouble Code (DTC) memory. If a malfunction occurs in one of the components or wires which is monitored by the system, a record of the type of malfunction is stored in DTC memory. OBD program functions are performed using VAS 5051 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding".



Telematic system, component overview

1 Antenna - R11-, Antenna Amplifier - R24- and Antenna for Navigation System (GPS) - R50-

- ◆ On roof, rear
- ◆ Jetta Wagon, Golf & GTI, removing and installing, ⇒ [Page 91-49](#) .
- ◆ Jetta sedan, removing and installing ⇒ [Page 91-53](#) .

2 - Dual Horn Auxiliary Relay - J733-

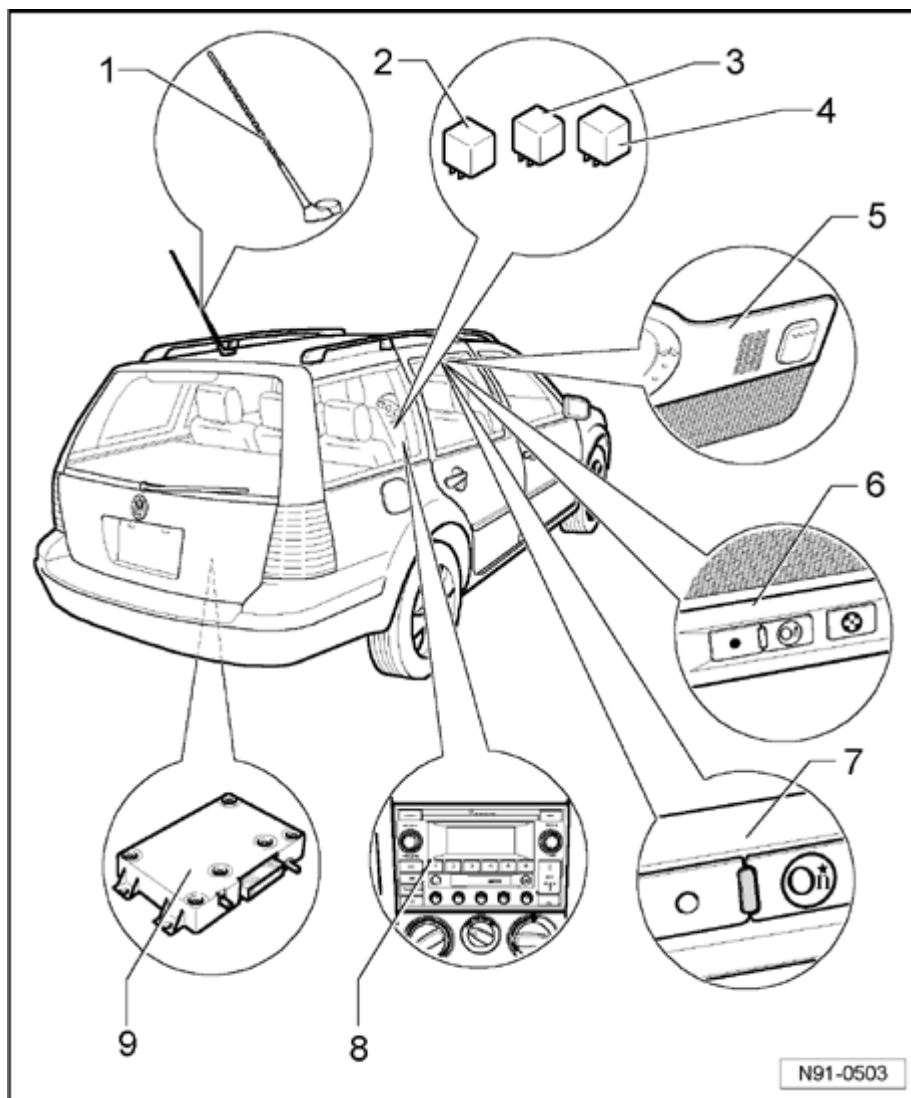
- ◆ On 13-position auxiliary relay panel, above

relay
panel.

**3 Auxiliary
- Emergency
Flasher
Relay -
J517-**

- ◆ On 13-
position
auxiliary
relay
panel,
above
relay
panel.

91-80



4 - Warning Lamp Auxiliary Relay - J734-

- ◆ On 13-position auxiliary relay panel, above relay panel.

5 Telephone - Microphone -R38-

- ◆ Integrated with front interior light module.
- ◆ Removing and installing ⇒ [Page 91-100](#) .

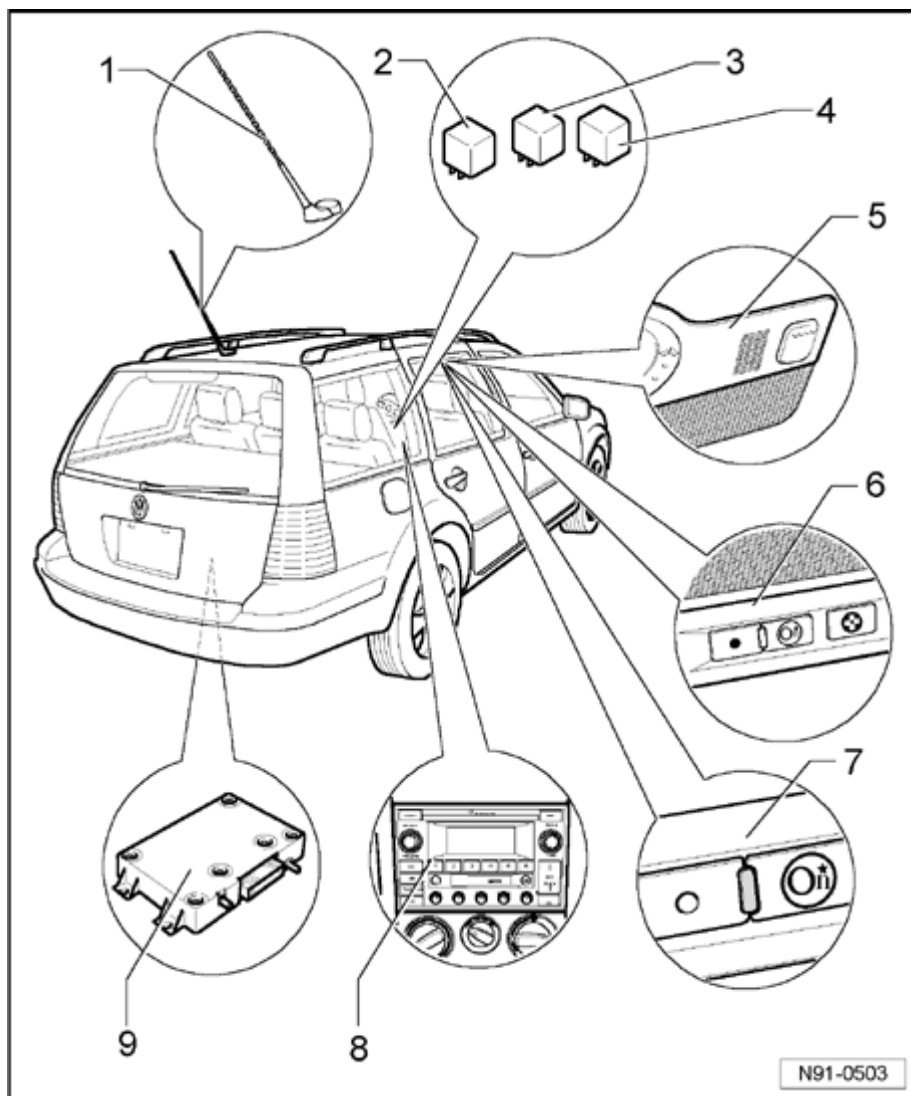
6 - Telematic Control Head - E264-

- ◆ In front headliner ahead of front interior light module.
- ◆ OnStar® buttons, description ⇒ [Page 91-82](#) .
- ◆ Includes telematics indicator

lamp.

- ◆ Removing and installing
⇒ [Page 91-84](#) .

91-81



7 - Telematics Indicator Lamp - K186-

- ◆ In Telematic Control Head.
- ◆ LED indicates telematic system operational status. Description ⇒ [Page 91-83](#) .
- ◆ Telematic system, troubleshooting using telematics indicator lamp ⇒ [Page 91-101](#) .

8 - Radio -R-

- ◆ In center console.

9 - Telematic Control Module - J499-


- ◆ Jetta Wagon, Golf & GTI - installed in luggage compartment in spare tire well.
- ◆ Jetta sedan - installed in luggage compartment under parcel

shelf.

- ◆ Jetta Wagon, Golf & GTI, removing and installing ⇒ [Page 91-85](#) .
- ◆ Jetta sedan, removing and installing ⇒ [Page 91-88](#) .
- ◆ Control module multi-pin connector terminal assignments ⇒ [Page 91-90](#) .

Telematic Control Head - OnStar® control buttons, description

The telematics control head is in the front headliner ahead of the front interior light module. The control head contains three separate buttons as well as a system telematics indicator lamp (LED).

The OnStar® ("On ) button is used to contact the OnStar® call center to request various convenience services. It is also used to initialize/activate the owner's subscription to OnStar® services and/or update the customer's account in the event that the Telephone/Telematics Control Module requires replacement.

The Emergency button is used to contact the OnStar® call center to request emergency services such as fire department, police etc.

The Communication ("DOT") button is used to end a call to the OnStar® call center, place or answer personal calls or cancel a call if one of the other buttons is accidentally pressed.

Note:

Use of certain OnStar® services requires a subscriber's Personal Identification Number (s) (PIN).

For complete system operation details ⇒ Volkswagen Telematics by OnStar® Owner's Manual.

Telematic Control Head - OnStar[®] [®] telematics indicator lamp, description

The telematics indicator lamp is located between the OnStar[®] and Communication buttons. The green light comes on after a self-check routine is performed (approx. 10- 15 seconds after ignition is switched on)

Indications:

- ◆ Green: Indicates system has passed self-test and is ready to place or receive calls. Light remains on even in areas without cellular coverage.
- ◆ Blinking green: Indicates a call has been initiated or is in progress.
- ◆ Red: Indicates system has not passed self-test or indicates system malfunction.

Note:

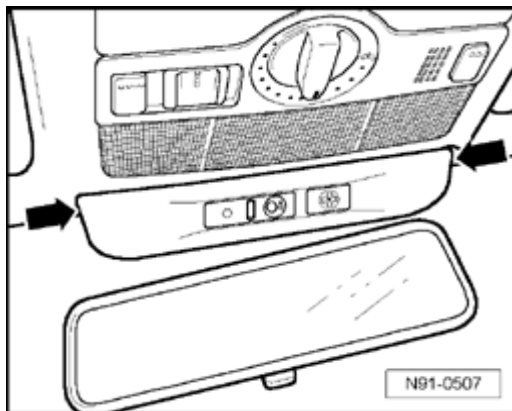
Additional information and system troubleshooting using telematics indicator lamp
⇒ [Page 91-101](#) .

Telematic Control Head -E264- , removing and installing

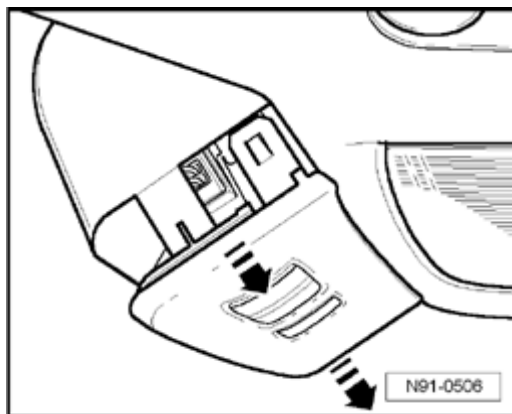
Removing

Before beginning repairs on the electrical system, disconnect battery!

⇒ [Repair Manual, Electrical Equipment; Repair Group 27; "Battery, disconnecting and reconnecting"](#).



- Using appropriate screwdriver, carefully unclip control head from areas indicated with -arrows-.



- Remove control head in direction of -arrows-.
- Disconnect electrical connection.

CAUTION!

Telematic control head buttons cannot be removed, dismantled or serviced separately. Should malfunctions occur, replace complete control head.

Installing

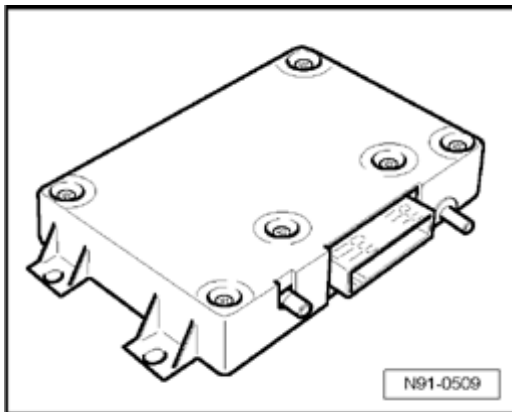
Install in reverse order of removal.

- Check telematic system coding and recode if necessary ⇒ [Page 91-93](#) .

Telematic Control Module -J499- - Jetta Wagon, Golf & GTI, removing and installing

Notes:

- ◆ If the telematic control module is replaced, the OnStar® system needs to be reconfigured. See [Page 91-95](#).
- ◆ DO NOT exchange Telephone/Telematic Control Modules between vehicles! Each module contains specific Station Identification (STID) and Electronic Serial Number (ESN) data unique to the VIN. This data is used by OnStar® and National Cellular Telephone Network to identify the vehicle and administer the customer's account.
- ◆ Using the VAS 5051 Vehicle Diagnostic and Information system in operating mode "Guided Fault Finding, and function "-J4 Telematic control module, replacing" it is possible to read the telematic control module coding from the existing module before removal. Note code prior to removal and input code into replacement control module.

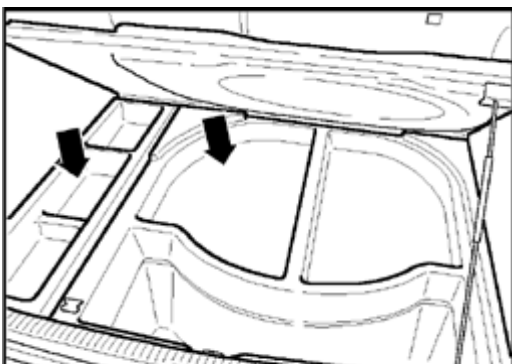


Removing

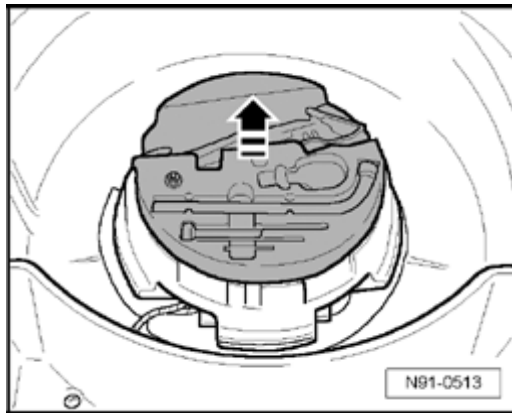
Before beginning repairs on the electrical system, disconnect battery!

⇒ [Repair Manual, Electrical Equipment; Repair Group 27; "Battery, disconnecting and reconnecting"](#).

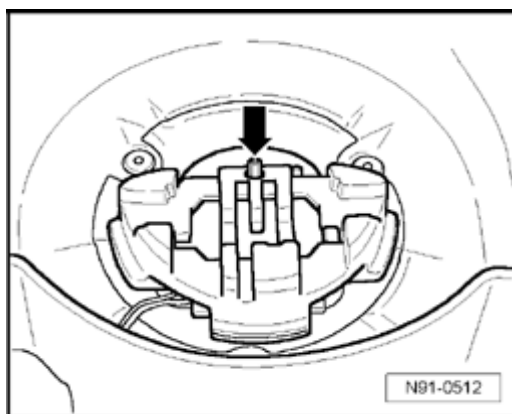
- Remove luggage compartment floor panel (Jetta Wagon) or carpet mat (Golf & GTI).
- Jetta Wagon: remove both storage trays (arrows).



91-86

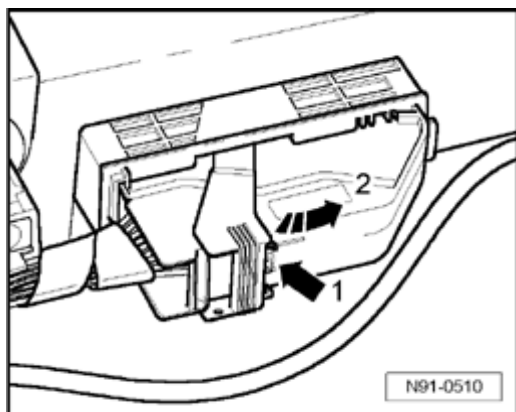


- Lift and remove tool/jack set insert in direction of -arrow-.



- Remove screw -arrow- from plastic retainer.
- Lift retainer as far as the electrical harness allows.
- Remove lower part of retainer base plate and remove telematic control module.

91-87



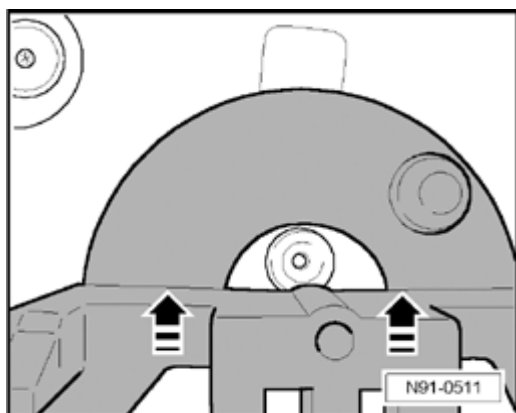
- First disconnect 42-pin connection from control module, as follows:



- Depress clip -arrow1- and slide locking lever in the direction of -arrow2-.
- Then disconnect antenna cable connection from control module.

Installing

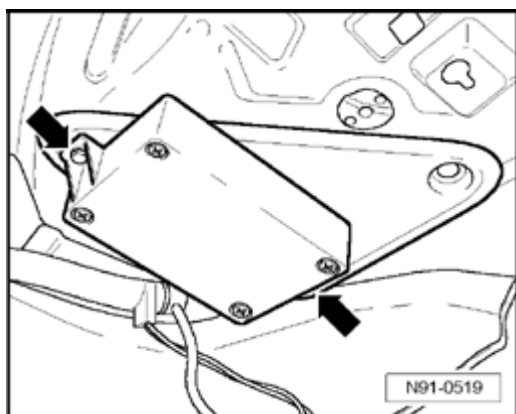
Install in reverse order of removal, noting the following:



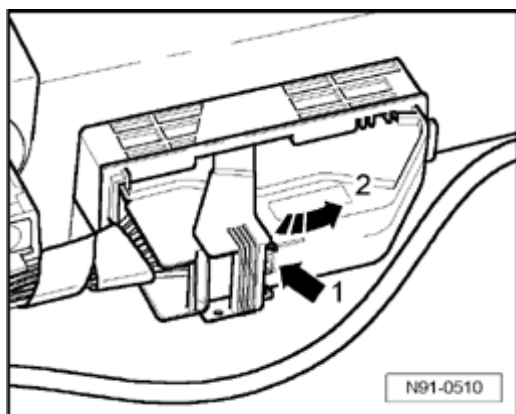
- When reinstalling plastic retainer, first insert it into the spare tire well as illustrated.
- Then, slide retainer forward (in the direction of arrow-) until the screw hole in the retainer lines up with the threaded insert underneath.
- Insert screw into screw hole in retainer and tighten.

If the telematics control module was replaced:

- Code telematics control module ⇒ [Page 91-88](#)
- Reconfigure telematics system for OnStar functions ⇒ [Page 91-95](#) .



- ✦ - Remove nuts -arrows-.
- Remove telematics control module.
- First disconnect 42-pin connection from control module, as follows:



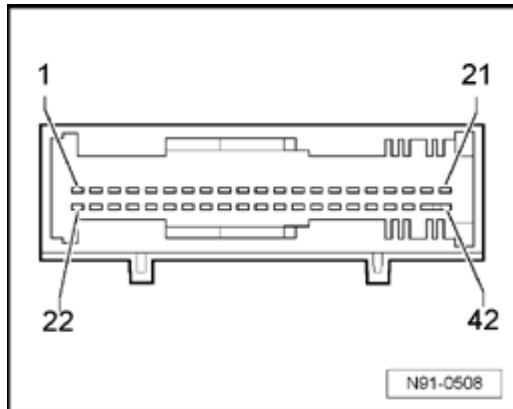
- ✦ - Depress clip -arrow1- and slide locking lever in direction of - arrow2-.
- Then disconnect antenna cable connections from control module.

Installing

Install in reverse order of removal, noting the following:

If telematics control module was replaced:

- Code telematics control module ⇒ [Page 91-93](#) .
- Reconfigure telematics system for OnStar[®] functions ⇒ [Page 91-95](#) .

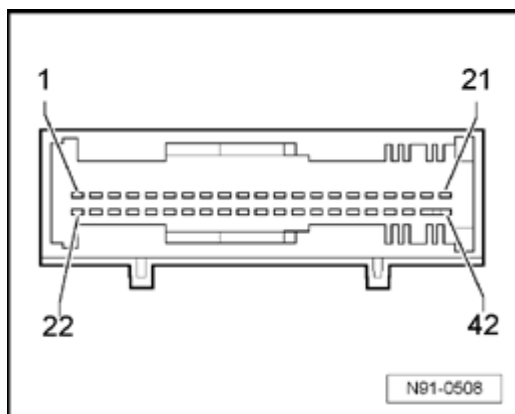


Telematic Control Module - J499- multi-pin connector assignments



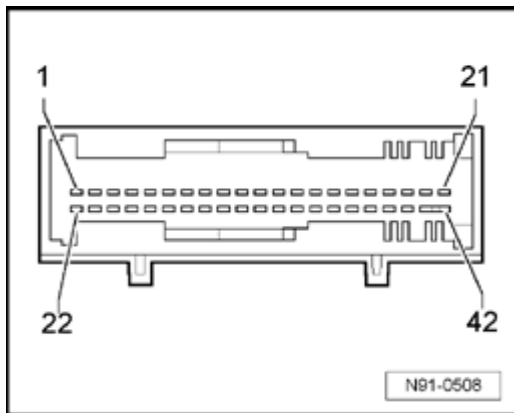
42 pin multi-connector -T42-

- 1 - Signal activation - Dual Horn Auxiliary Relay
- 2 - Signal activation - "lock vehicle"
- 3 - Cellular telephone connection - Audio in (not used)
- 4 - Cellular telephone connection - Battery Feedback (not used)
- 5 - Cellular telephone connection - Ground (GND)
- 6 - Cellular telephone connection - TXD-transfer (not used)
- 7 - Cellular telephone connection - RTS (not used)
- 8 - Cellular telephone connection - shielding Ground (GND) (not used)
- 9 - CAN Bus - High
- 10 - Line (+) Output to radio
- 11 - Auxiliary speaker (+) (not used)
- 12 - Telephone microphone (+)
- 13 - K-wire, Data Link Connector (DLC)
- 14 - Power supply - Terminal 15
- 15 - Telematic indicator LED "red" (in Telematic Control Head)
- 16 - Telematic indicator LED "green" (in Telematic Control Head)



- 17 - not used
- 18 - Ground (GND) (Terminal 31)
- 19 - Ground (GND) (Terminal 31)
- 20 - not used
- 21 - not used
- 22 - Signal activation - Auxiliary Emergency Flasher Relay
- 23 - Signal activation - "unlock vehicle"
- 24 - Cellular telephone connection - Audio out (not used)
- 25 - Cellular telephone connection - Audio Ground (GND) (not used)
- 26 - Cellular telephone connection - power supply (not used)
- 27 - Cellular telephone connection - RXD (not used)
- 28 - Cellular telephone connection - RTS (not used)
- 29 - Signal status - Telephone (not used)
- 30 - CAN Bus - Low
- 31 - Line (-) Output to radio

91-92

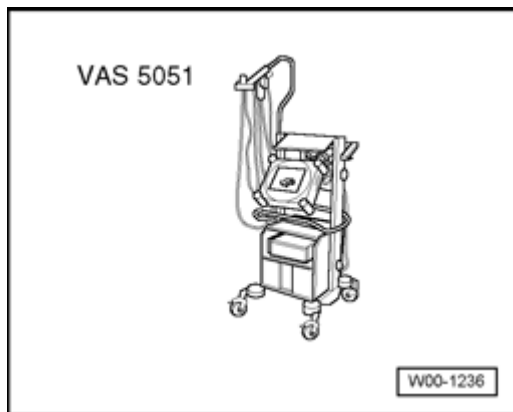


- 32 - Auxiliary speaker (-) (not used)
- 33 - Telephone microphone (-)
- 34 - Mute - Radio
- 35 - Input "SOS" from telematic control head
- 36 - Input "Power" from telematic control head
- 37 - (not used)
- 38 - Crash-Signal from airbag control module
- 39 - Terminal 30 (B+)
- 40 - Terminal 30 (B+)
- 41 - Emergency (backup) battery (+) (not used)
- 42 - Emergency (backup) battery (-) (not used)

Telematic Control Module - J499-, coding

After replacing the Telephone/Telematic Control Module, the control module must be coded and OnStar® system needs to be reconfigured.

Special tools, testers and auxiliary items needed



- ◆ VAS 5051 Vehicle Diagnostic Testing and Information System
- ◆ Cable adapter VAS 5051/5a or VAS 5051/6a

Notes:

- ◆ *DO NOT exchange Telephone/Telematic Control Modules between vehicles! Each module contains specific Station Identification (STID) and Electronic Serial Number (ESN) data unique to the VIN. This data is used by OnStar® and National Cellular Telephone Network to identify the vehicle and administer the customer's account.*
- ◆ *Using the VAS 5051 Vehicle Diagnostic Testing and Information system in operating mode "Guided Fault Finding, and function "-J499- Telematic control module, replacing" it is possible to read the telematic control module coding from the existing module before removal. Note code prior to removal in order input code into replacement control module.*
- Connect VAS 5051 with adapter cable to Data Link Connector (DLC) and select mode "Guided Fault Finding"

- Enter appropriate model, equipment and model year information and press ">" to confirm.

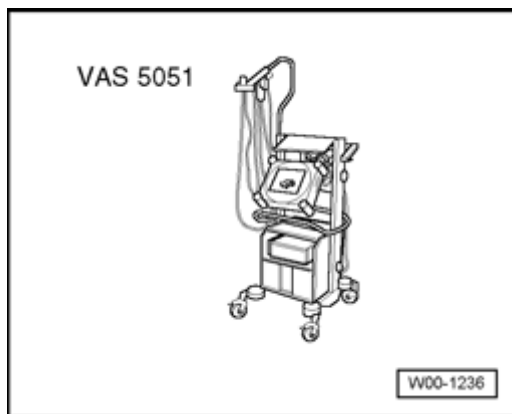
After all Control Modules have been registered and DTC memories checked:

- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97)"
- Select "Electrical System (Repair Group 27; 90 to 97)"
- Select "01-Systems capable of self-diagnosis"
- Select "Telematics NAR"
- Select "Functions - Telematics NAR" and press ">" to confirm.
- Select "Telematics control module, coding"
- Follow testers prompts.

Telematic Control Module - J499-, reconfiguring

After replacing the Telephone/Telematic Control Module, the control module must be coded and OnStar® system needs to be reconfigured as described below. Have the VIN and customer details on hand.

Special tools, testers and auxiliary items needed



- ◆ VAS 5051 Vehicle Diagnostic Testing and Information System
- ◆ Cable adapter VAS 5051/5a or VAS 5051/6a

Notes:

- ◆ *DO NOT exchange Telephone/Telematic Control Modules between vehicles! Each module contains specific Station Identification (STID) and Electronic Serial Number (ESN) data unique to the VIN. This data is used by OnStar® and National Cellular Telephone Network to identify the vehicle and administer the customer's account.*
- ◆ *Failure to reconfigure the control module after replacement will prevent OnStar® services and features from functioning, and will result in a customer return for repair.*

Prerequisite

- ◆ Telematics control module is coded ⇒ [Page 91-93](#) .

- Where applicable, carefully record the 8 character Station Identification (STID) number and Electronic Serial Number (ESN) from labels on replacement module.
- Connect VAS 5051 with adapter cable to Data Link Connector (DLC) and select mode "Guided Fault Finding"
- Enter appropriate model, equipment and model year information and press ">" to confirm.

After all Control Modules have been registered and DTC memories checked, see "Continued for all" ⇒ [Page 91-96](#) .

If the STID number and ESN DO NOT appear on labels on the new control module, proceed as follows:

- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97"
- Select "Electrical System (Repair Group 27; 90 to 97)
- Select "01-Systems capable of self-diagnosis"
- Select "Telematics NAR"
- Select "Functions - Telematics NAR" and press ">" to confirm.
- Select "Check control module versions - Telematics NAR".
- Record ESN and STID number from appropriate display fields.

Continued for all:



- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97)"
- Select "Electrical System (Repair Group 27; 90 to 97)"
- Select "01-Systems capable of self-diagnosis"
- Select "Telematics NAR"
- Select "Functions - Telematics NAR" and press ">" to confirm.
- Select "check/erase DTC memory Telematics NAR"
- Switch off ignition and wait a few moments.
- Switch on ignition.
- Enter address word 75 - "Telematics"
- Select "Go to"
- Select "Function / Component Selection"
- Select "Body (Repair Group 01; 27; 50 to 97)"
- Select "Electrical System (Repair Group 27; 90 to 97)"
- Select "01-Systems capable of self-diagnosis"


- Select "Telematics NAR"
- Select "Functions - Telematics NAR" and press ">" to confirm.
- Select "check DTC memory - Telematics NAR".

No DTCs must be present.

- Check and confirm the green telematics indicator lamp in Telematics Control Head is on.
- Exit operating mode "Guided Fault Finding".
- Disconnect VAS 5051 from DLC.

Reconfiguration

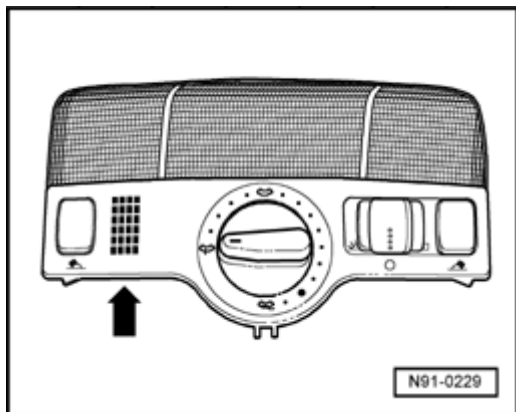
- Drive vehicle outside to area away from tall buildings, and with no overhead obstructions (trees, bridges, etc.).
- Press the blue OnStar[®] ("On ) button. A recorded introduction will be heard.
- Press the "On " button again at any time during the recording (it is not necessary to wait for the recording to finish).
- When an OnStar[®] call center advisor answers, identify yourself as an Volkswagen Technician, and that you have replaced the "Vehicle Communications Interface Unit (VCIM)".
- Supply advisor with STID number and ESN from new module. Supply the VIN and customer details if necessary. The advisor will guide you through the system reconfiguration and update of the customer's account.

- When reconfiguration is complete, end call by pressing the Communications ("DOT") button.
- Wait ten minutes and press the "On " button again to verify system operation. Inform call center advisor you are an Volkswagen Technician performing a quality check after VCIM replacement/system reconfiguration.
- End call by pressing the Communications ("DOT") button.

Notes:

- ◆ *Normal connection time is 10 - 15 seconds. However, depending on local cellular/GPS conditions, making a connection could take up to three minutes. Be patient.*
- ◆ *If the message: "unable to contact OnStar" is heard, try relocating vehicle to a more elevated or open area and repeat connection attempts. Depending on the local cellular/GPS traffic conditions, several connection attempts may be necessary (and are normal).*
- ◆ *If the message: "OnStar request ended" is heard, the cellular connection was interrupted before the connection was completed. Wait for a short period of time before repeating connection attempt.*
- ◆ *If you are still unable to connect, call OnStar [®] Customer Care at 1-888-390-4050. The advisor will verify the customer's OnStar [®] account is active.*

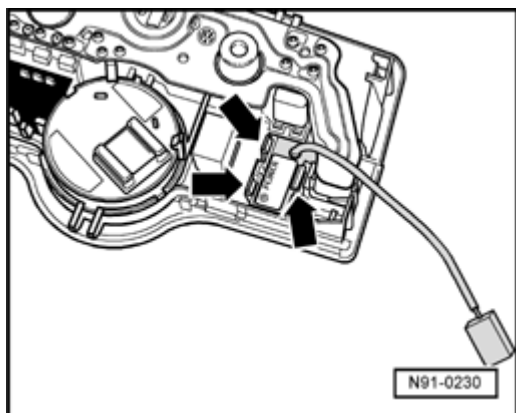
Telephone Microphone -R38-, removing and installing



- ✦ Telephone Microphone -R38- - arrow- is integrated with front interior light module.

Removing

- Remove front interior light module
⇒ [Repair Manual, Electrical Equipment., Repair Group 96.](#)
- Separate 2-pin electrical connection.



- ✦ - Carefully depress retaining clips - arrows-.
- Remove microphone.

Installing

Install in reverse order of removal.

Telematics system, troubleshooting using telematics indicator lamp

The following allows technicians to perform an initial evaluation of Telematics system operation status for troubleshooting using the OnStar[®] telematics indicator lamp (and pre-recorded system messages where applicable).

This serves only as an initial evaluation only and is not meant to supercede detailed OBD program procedures carried out with VAS 5051 Vehicle Diagnostic Testing and Information System in operating mode "Guided Fault Finding".

The telematic indicator lamp LED is located in the telematic control head. LED indications are red or green, lighting continuously, blinking slowly or quickly.

Telematic system status can be determined via the LED with the ignition switched on and referenced from the following table:

LED indication	System status:
Off	No connection, no malfunction
Red - continuously	No connection, malfunction in telematics hardware
Green - continuously	After completion of self-test or when OBD program is performed
Red - blinking slowly	Establishing connection, malfunction in telematics hardware
Red - blinking quickly	Connection active, malfunction in telematics hardware
Green - blinking slowly	Establishing connection, no malfunction
Green - blinking quickly	Connection active, no malfunction

Indications, overview:

- ◆ LED is off when ignition is off.
- ◆ The green LED comes on after a self-check routine is performed (approx. 10- 15 seconds after ignition is switched on). Sending or receiving voice communication with the OnStar® call center is now possible. LED remains on even in areas without cellular coverage.
- ◆ The green LED slowly blinking indicates a communication request has taken place and the system is in the process of establishing a cellular connection.
- ◆ The red LED indicates a malfunction in the telematics hardware was determined during the self check.

Note:

After pressing either the OnStar® or Emergency button, a recorded message announces: "connecting to OnStar," followed by progression tones. Normal connection time is 10 - 15 seconds. However, due to local cellular/GPS conditions, making a connection could take up to three minutes. Be patient.

Condition - telematics indicator lamp "green" plus:

- ◆ message "unable to contact OnStar®" and disconnect,
- ◆ message "OnStar® request ended",
- ◆ nothing happens,
- ◆ or a cellular message

indicates system cellular reception is affected.
Proceed as follows:

- Relocate vehicle to a more elevated or open area and repeat connection attempts. Depending on the local cellular/GPS traffic conditions, several connection attempts may be necessary (and are normal).
- Shortcomings in the vehicle's cellular/GPS antenna system also affects connectivity. Check all cellular/GPS antenna connections, and perform OBD program using VAS 5051 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding". Check for DTCs related to antenna function.

- If you are still unable to connect, record the VIN and customer details and call OnStar[®] Customer Care at 1-888-390-4050. Identify yourself to the advisor as an Volkswagen Technician. The advisor will verify the customer's OnStar[®] account is active. Further troubleshooting assistance may be given.

Condition - telematics indicator lamp "red"

indicates system hardware (vehicle portion) is affected. Proceed as follows:

- Perform OBD using VAS 5051 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding". Check/perform:

- ◆ DTC memory (function 02)
- ◆ Output DTM (function 03)
- ◆ Read Measuring Value Block (function 08)

Note:

In the event any of the OnStar[®] control buttons are either inadvertently or deliberately pressed for longer than 15 seconds, the OBD program assumes a button is sticking. The red status light will come on and a DTC loads in memory. Perform OBD program using VAS 5051 Vehicle Diagnostic Testing and Information System in mode "Guided Fault Finding". Check DTC memory for DTC 01526 "mechanical malfunction". Inform customers accordingly.

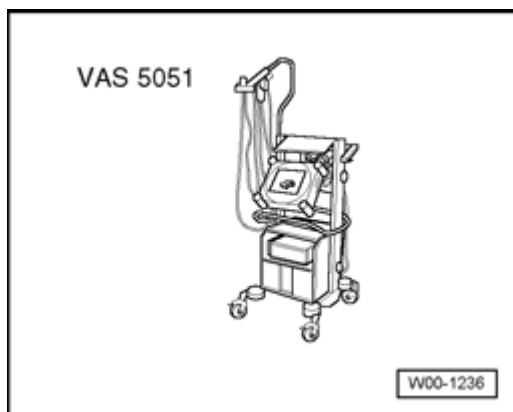
Transport Mode, deactivating

The Telematic system is disabled (switched-off) when Transport Mode is activated. This is necessary when vehicles are transported over long distances or stored for longer periods of time.

Volkswagen vehicles equipped with Telematics are initially delivered to dealerships with the system in Transport Mode, and must be deactivated using an OBD program function before delivery to the customer.

Deactivate Telematics Transport Mode and enable Telematics function by using VAS 5051 Vehicle Diagnostic Testing and Information System in operating mode "Vehicle Self Diagnosis" or "Guided Fault Finding".

Special tools, testers and auxiliary items needed



- ◆ VAS 5051 Vehicle Diagnostic Testing and Information System
- ◆ Cable adapter VAS 5051/1 or VAS 5051/3

- Connect VAS 5051 with adapter cable to Data Link Connector (DLC) and select mode "Vehicle Self Diagnosis"
- Select vehicle system (address word) "75 - Telematics"
- Select Function "10 - Adaptation" and press ">" to confirm
- Locate Channel 3
- Enter value "0" (Deactivate Transport Mode - Enable Telematics system)
- Remaining steps as prompted by

tester.

Mobile telephone and two-way radio operation, notes

General information

Mobile telephones or portable two-way radios may not be used in the vehicle without a separate external antenna.

- ◆ Radio remote controls (e.g. for garage door opener) and wireless units (e.g. keyboard or PC mouse) may only be used in the vehicle if the transmitted output is max. 100 mW.
- ◆ Installation of CE or e-marked units is only permitted (Europe only).
- ◆ It is absolutely necessary to observe the manufacturer's operating and installation instructions for mobile telephones, two-way radios and antennas.
- ◆ The optimum unit range is only reached via an external antenna.

- ◆ When telephone and two-way radio systems are installed properly there is no danger to safety system e.g. ABS or airbag. A prerequisite is however that there has been no intervention in their installations. Parallel wiring to such systems must be prevented.

- ◆ The use of a mobile telephone or a two-way radio without or with an incorrectly installed external antenna results in increased electro-magnetic fields in the vehicle interior.

In this case detrimental affects to health or malfunctions of vehicle electronics could be the consequence.

Installation and operation of radios/telephones with a transmitted output above 10 watt for the radio communication services listed in the table is only permitted regarding the following prerequisites:

- ◆ The transmitted output on point of the antenna base must not exceed the relevant max. values (see manufacturer's designations).

- ◆ The antenna locations listed in the table must be maintained.

Transmitted output and antenna fitting locations table, ⇒ [Page 91-115](#) .

Performing repairs, notes

CAUTION!

Before beginning repairs on the electrical system:

- ◆ ***Switch off all electrical consumers.***
- ◆ ***Switch ignition off and remove ignition key.***
- ◆ ***Disconnect negative (-) battery terminal.***
- ◆ ***When disconnecting and reconnecting battery terminals, observe all applicable Notes and torque specifications, as well as instructions on performing OBD program and electrical system function checks as specified ⇒ [Repair Manual, Electrical Equipment, Repair Group 27](#) .***

Use valid current flow diagram.

Wiring Diagrams & Component Locations.

Removing and installing interior trim

⇒ [Repair Manual, Body Interior, Repair Group 70](#)

Observe manufacturer's operating and installation instructions for mobile telephones, two-way radios and antennas.

Secure wiring harnesses to cable ties. Wrap connectors with foam to avoid rattling noises.

Transmitted output and possible installation locations

Volkswagen permits the installation and operation of radio units if the transmitted power on point of the antenna base, listed in table, is not exceeded. For prescribed antenna locations see table.

The limiting values according to VDE 0848 part 2 (max. permissible radiation strength for personal protection) must be adhered to by reducing the transmitted output.

Voltage supply

When retrofitting a transmitter/receiver unit in the vehicle, the battery is used to connect the positive and negative wire.

The wiring harness must be manufactured additionally:

- ◆ Voltage supply positive via red wire, 2.5 mm cross section.
- ◆ Voltage supply negative via brown wire, 2.5 mm cross-section.

The positive wire must have a fuse which must be located very close to the battery. Therefore a fuse holder must be secured next to the battery. Both wires must be encased in an insulating hose.

Make suitable connections at battery end.

On unit end proceed as per owner's manual.

The additional wiring harness must be routed separately from vehicle wiring, the distance apart must be at least 10 cm.

Note:

- ◆ *For some telephone systems and radio communication units an additional terminal 15 (ignition) is necessary. Then a black connection (1.5 mm cross-section) must be connected from transmitter/receiver unit to terminal 15a.*

Current flow diagrams, Electrical fault finding and Fitting locations

- ◆ *Ensure wiring connections are not routed parallel to the standard wiring.*

Antenna and antenna wire

A shielded wire must be used between transmitter/receiver unit and the antenna. The shielding must be grounded to unit and antenna.

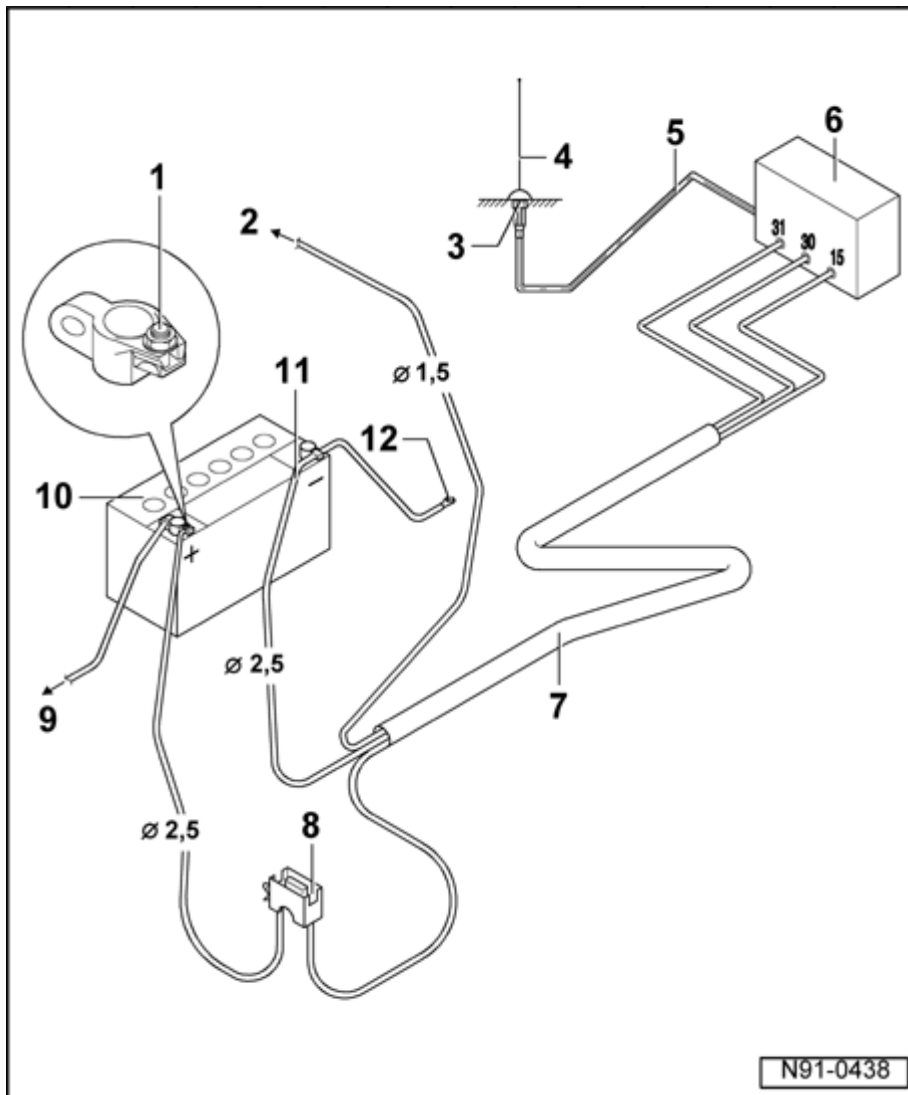
At the same time ensure correct and continuous Ground (GND) connection of antenna base wire to vehicle body.

The transmitting system must only be used when shielded to prevent interference in the antenna wiring. To ensure the system it is tuned and operating correctly it is recommended that an output/performance check is carried out.

Further additional installations

The installation of further electronic equipment like business equipment (e.g. TV, FAX) or household equipment (e.g. electrical cool box) is only permitted, if these appliances are marked with a CE or e-sign (Europe only).

Voltage supply is performed via a separate wiring harness and secured by a fuse.



Battery, transmitter/receiver unit - fuse and wiring harness, overview

1 - Positive connection

- ◆ Red wire w suitable connection.

2 - To terminal 15

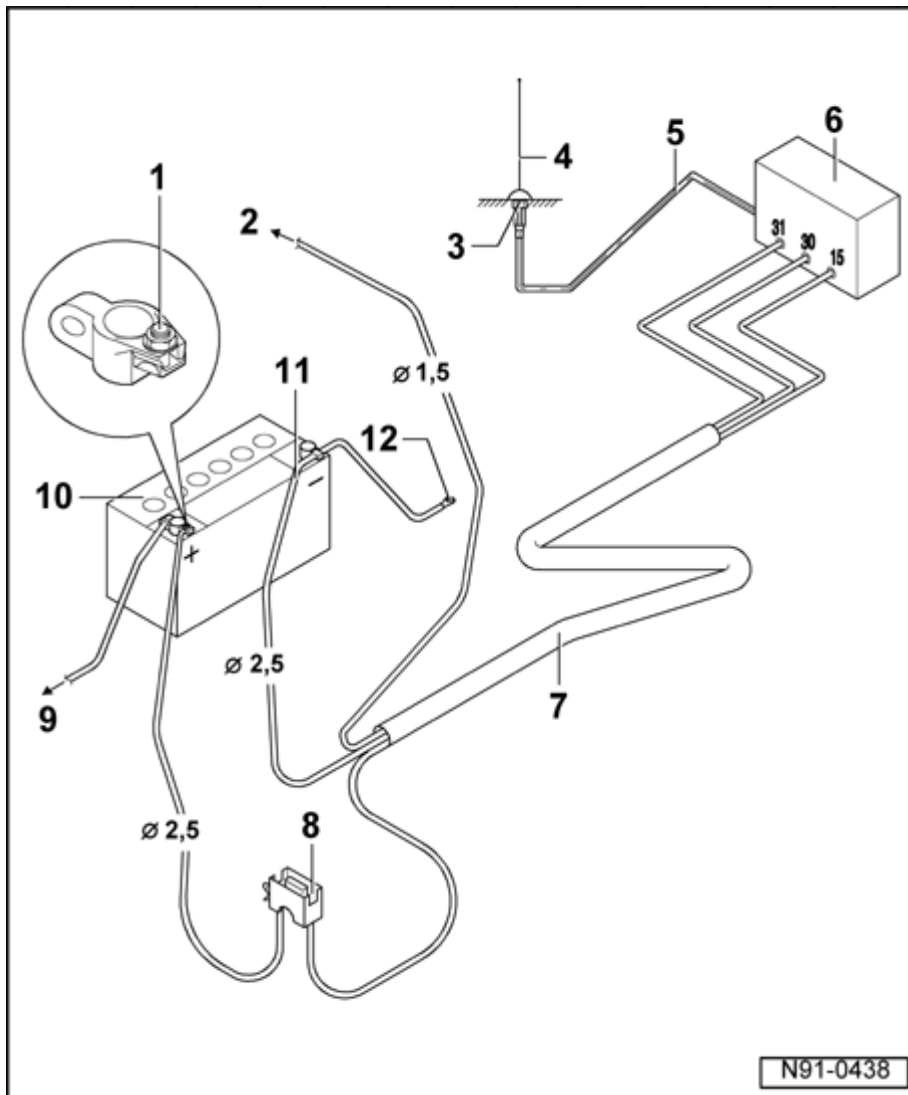
- ◆ Connection terminal 15

Wiring Diagrams and Component Locations

- ◆ Ensure wire protected by fuse.
- ◆ Fuse protection max. 15A

3 - Antenna Ground (GN)

- ◆ Ensure correct Ground (GN) connection to body.
- ◆ The antenna location must be treated with suitable corrosion protection.



4 Transmitter/receiver - antenna

- ◆ Fitting locations: = table ⇒ [Pa 91-115](#).

5 - Shielded antenna wire

- ◆ Wire with coaxial connector

6 Telephone or two-way radio transmitter/receiver unit

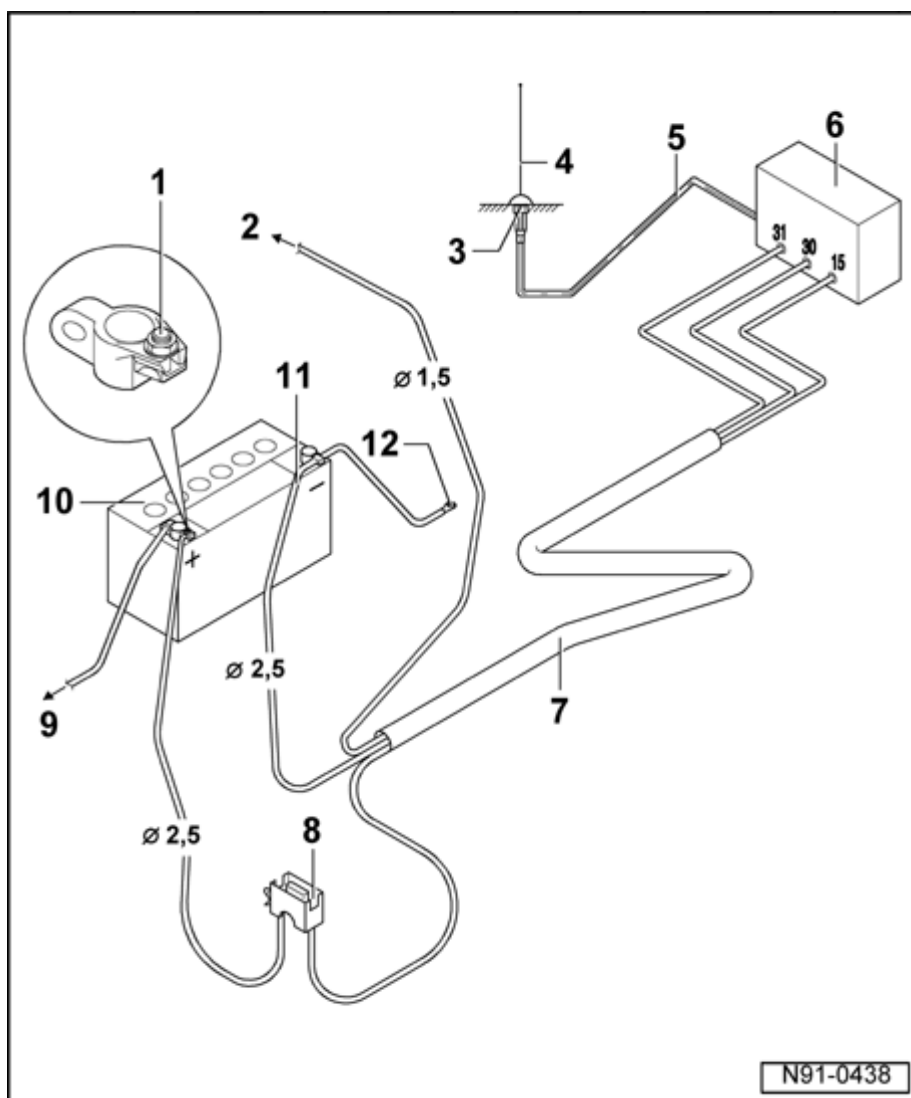
7 - Wiring harness

- ◆ Voltage supply positive via wire 2.5 mm cross section
- ◆ Voltage supply negative via brown wire mm cross section.
- ◆ If necessary wire to terminal 15a via black wire 1.5 mm cross section

8 - Fuse holder

- ◆ Install next battery.

91-114



9 - To Starter

10 - Battery

◆ Located in the engine compartment at the front left corner.

11 - Negative (-) wire

12 - Body Ground (GND)

Transmitted output and antenna installation locations

Golf 1998 ➤ Jetta 1999 ➤

Designation	Pmax/Watt	Prescribed antenna fitting locations
Short wave < 54 MHZ	100 (PEAK) ¹⁾	Front center of roof Center of roof Rear center of roof Rear bumper
4 m band	20 (eff.) ²⁾	All locations (on vehicle exterior)
2 m band	20 (eff.)	Front fender Front center of roof
2 m band	50 (eff.)	Center of roof Rear center of roof
70 cm	50 (eff.)	Center of roof Rear center of roof
23 cm	20 (eff.)	All locations (on vehicle exterior)
TETRA/TETRAPOL	25 (eff.)	All locations (on vehicle exterior)

Designation	Pmax/Watt	Prescribed antenna fitting locations
D network		
GSM 900	20 (Peak)	All locations (on vehicle exterior)
E network		
GSM 1800		
GSM 1900		
UMTS	10 (Peak)	All locations (on vehicle exterior)

1) PEAK = max. output (Peak Envelope Power)

2) eff. = effective transmitted output

Note:

Deviations from these guidelines (location of antenna, frequency, output) are only permitted in special isolated cases after a single-case test carried out by the EMV center of VW AG in Wolfsburg.

EMV = Electro-magnetic compatibility

Select a topic

Maintenance

[Engine overview](#)

[Service work](#)

[Oil change service](#)

[Delivery inspection](#)

[Maintenance service](#)

General

[Equipment which has been packed inside vehicle, installing](#)
[Engine compartment trim \(sound insulation\), removing and installing](#)
[Initial Installation of engine compartment cover \(sound insulation\)](#)
[\(R32\)](#)

[Type plate](#)

[Diagnostic scan tool, connecting](#)

[Vehicle Identification Number \(VIN\)](#)

[Service sticker, applying](#)

[Apply data sticker in service schedule \(for customers\)](#)

[Vehicle data sticker](#)

[Engine code and engine number](#)

[Vehicle, lifting](#)

[Tow starting/towing](#)

Description of work (part 1 of 2)

[Instrument panel cluster, adapting language](#)

[Power windows, 8-way memory seat, perform initialization](#)
[\(activation\)](#)

[Clock, setting](#)

[Climatronic, setting temperature to 72 F \(22 C\)](#)

[Radio and radio/navigation system, activating anti-theft coding](#)

[Wheel cover caps](#)

[Wheel bolts, tighten to correct torque setting](#)

[Wheelhousing liner, bolting to front apron \(only anniversary Golf GTI](#)
[with 132 kW engine\)](#)

[Transportation device, blocking pieces on front axle springs,](#)
[removing](#)

[Battery, check battery terminals for secure seating](#)

[Battery, checking](#)

[Engine oil level, checking](#)

[Airbag for driver and passenger, visual inspection of airbag](#)
[components](#)

[On Board Diagnostic \(OBD\), check DTC memory of all systems](#)

[Door check strap, lubricating](#)

[Sunroof, checking function, cleaning and lubricating guide rails](#)

[Windshield wash/wipe system and headlight wash system, check](#)
[function](#)

[Windshield wiper blades, check for damage; check parked position,](#)
[if necessary adjust; with pulsating wiper blades, check angle setting,](#)
[adjust if necessary](#)

[Transportation wiper blades, removing at vehicle delivery](#)
[Break-down set, replace tire sealant \(when shelf-life has expired\)](#)
[Tires, checking tire condition, wear pattern, inflation pressure and tread depth](#)
[Engine oils](#)
[Engine oil, draining or extracting and filling; replacing oil filter](#)
[Engine and components in engine compartment \(from above and below\): Visual check for leaks and damage](#)
[Ribbed belt, checking condition](#)
[CV joint boots, visual inspection](#)
[Manual Transmission / final drive oil level, checking](#)
[Automatic transmission final drive oil level, checking](#)

Description of work (part 2 of 2)

[Haldex clutch, replacing oil filter \(all wheel drive \(AWD\)\)](#)
[Haldex clutch, changing oil \(all wheel drive \(AWD\)\)](#)
[Brake system, visual check for leaks and damage](#)
[Brake pads \(front and rear\), check thickness](#)
[Underbody protection, perform visual check for damage](#)
[Exhaust system, perform visual inspection for leaks, attachment, and damage](#)
[Tie rod ends, check play and joint boots](#)
[Ball joints, visual inspection](#)
[Spark plugs, replace](#)
[Cooling system anti-freeze protection and coolant level, checking](#)
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[Air cleaner, clean housing and replace filter element](#)
[Toothed belt for camshaft drive, replacing \(Diesel engine 2001 - Engine code ALH\)](#)
[Toothed belt and idler pulley for camshaft drive, replacing \(Diesel engine 2002 - Engine code ALH\)](#)
[Toothed belt and toothed belt tensioner for camshaft drive, replacing \(4-cyl. - 5 valve gasoline engine\)](#)
[Toothed belt for camshaft drive, checking \(4-cyl. Gasoline Engine\)](#)
[Toothed belt, check wear \(diesel engine\)](#)
[Toothed belt for camshaft drive, check condition and tension \(Diesel engine - engine code ALH with automatic transmission\)](#)
[Fuel filter, replacing \(diesel engine\)](#)
[Fuel filter, draining \(diesel engine\)](#)
[Automatic transmission, check ATF level](#)
[Power assisted steering, check oil level](#)
[Brake fluid, changing](#)
[Brake fluid level \(depending on brake pad wear\), checking](#)
[Headlight adjustment, checking](#)
[Child restraint LATCH guidance fixture, installing](#)
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[Perform test drive](#)

Additional Information

Maintenance Schedules

[VW Maintenance Card 2003](#)

[VW Maintenance Card 2002](#)

[VW Maintenance Card 2001](#)
[VW Maintenance Card 2000](#)
[VW Maintenance Card 1999](#)

Engine overview

Engine Code		AEG	AFP	AWD	
Engines:	⇒	Gasoline engine	Gasoline engine	Gasoline engine	E
Manufactured		02.98	02.98	11.99	M
Number of cylinders/valves per cylinder		4 / 2	6 / 2	4 / 5	E
Displacement	L	2.0	2.8	1.8	E
Output	hp/rpm /Kw/rpm	115/5200 85/5200	175/5800 130/5800	150/5700 110/5700	N
Torque	ft.lbs /rpm Nm/rpm	122/2600 165/2600	180/3200 245/3200	151/1750 to 6000 210/1750 to 6000	D
Bore	∅ mm	82.5	81.0	81.0	O
Stroke	mm	92.8	90.3	86.4	T
Compression ratio		10:1	10:1	9.5:1	B
Fuel injection/Ignition system		Motronic M5.9	Motronic M 2.8 MFI	Motronic ME 7.5	S
RON	min.	95 unleaded 1)	95 unleaded 1)	95 unleaded 1)	C
On Board Diagnostic		OBD II	OBD II	OBD II	F
Three Way Catalytic Converter (TWC)		Yes	Yes	Yes	R
Oxygen sensor control		2 Sensors	2 Sensors	2 Sensors	O
Hydraulic valve lifters		Yes	Yes		T
Exhaust gas recirculation		No	No	No	O
Turbocharger		No	No	Yes	E
Intake manifold change-over		No	No	No	T
Camshaft adjustment		No	Yes	No	
Boost pressure regulation		No	No	Yes	
Secondary Air Injection (AIR) system		Yes	Yes	Yes	

1)91 RON unleaded gasoline is permissible, however with decreased power output

1)95 RON Super unleaded gasoline is permissible, however with decreased power output

Service work

Delivery inspection ⇒ [01-4, Delivery inspection](#)

Oil change service ⇒ [01-3, Oil change service](#)

Maintenance service ⇒ [01-5, Maintenance service](#)

Oil change service

⇒ Additional Information. Maintenance Schedule for appropriate model year

Also, for Oil specifications and capacities refer to: ⇒ Additional Information. Fluid Capacity Chart for appropriate model year

Delivery inspection

⇒ Additional Information. Maintenance Schedule for appropriate model year

Maintenance service

⇒ Additional Information. Maintenance Schedule for appropriate model year

Additional Information about GTI 337 Edition

Work to be completed	Page
Vehicle exterior	
- Installing equipment which has been packed inside vehicle (if part of original equipment): Mats, wiper arms, spoilers, roof antenna, wheel trims/cover caps, tire valve extensions.	⇒ 01-6, Equipment which has been packed inside vehicle, installing
- Wheel securing bolts (lug nuts): Tighten to correct torque setting	⇒ 01-7, Wheel bolts, tighten to correct torque setting
- Assembly tool for wheel trim: Place with vehicle tools (only GTI 337 Edition)	⇒ 01-7, Wheel bolts, tighten to correct torque setting
Vehicle interior	
- Telematics transport mode deactivation with VAS 5051 "Guided Fault Finding" and initialization of telematics service	

General

Engine compartment trim (sound insulation), removing and installing ⇒ [01-6, Engine compartment trim \(sound insulation\), removing and installing](#)

Type plate ⇒ [01-6, Type plate](#)

Diagnostic unit, connecting ⇒ [01-6, Diagnostic scan tool, connecting](#)

Vehicle Identification Number (VIN) ⇒ [01-6, Vehicle Identification Number \(VIN\)](#)

Vehicle data sticker ⇒ [01-6, Vehicle data sticker](#)

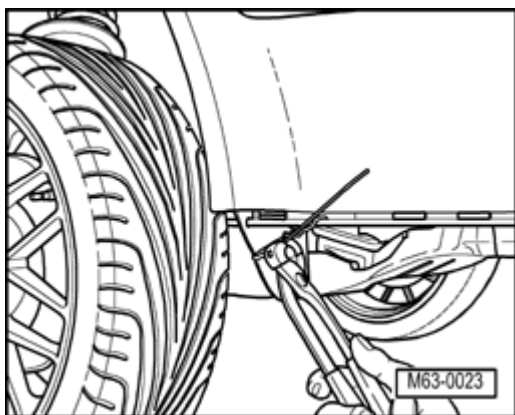
Engine code and engine number ⇒ [01-6, Engine code and engine number](#)

Vehicle, lifting ⇒ [01-6, Vehicle, lifting](#)

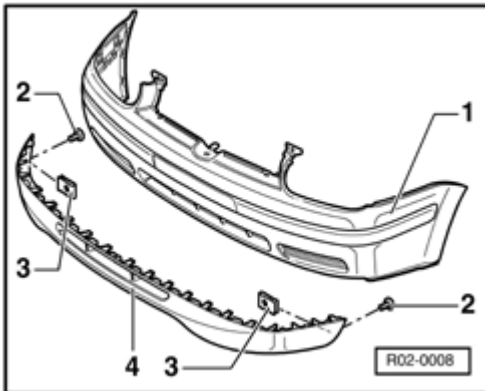
Tow starting/towing ⇒ [01-6, Tow starting/towing](#)

Equipment which has been packed inside vehicle, installing

Front valance spoiler (Jetta GLI)



- Before installing front valance, cut retaining plastic strap on both sides of vehicle



Installing front valance spoiler

1. Cover
2. Screw (Qty. 2). Torque specification: 2 Nm
3. Speed nut (Qty. 2)
4. Front valance spoiler. (Clipped to cover)

Warning!

When first installing front valance spoiler additional bolts must be installed on both sides.

Install additional bolts at front valance spoiler (Jetta GLI)

Note:

Additional screws must be installed on both sides of vehicle when first installing front valance spoiler. This prevents damage to front valance spoiler.

Following illustrations show right hand wheel housing liner. Mounting on left hand wheel housing is similar

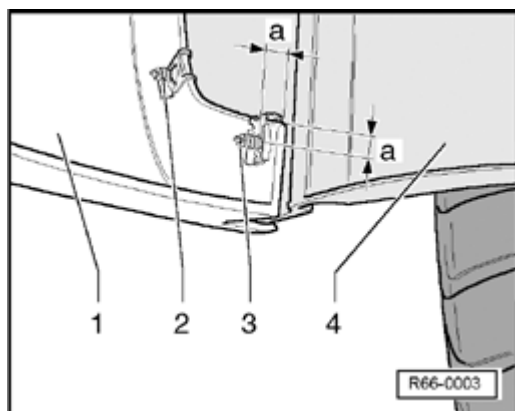
Mounting - 1 - shown in illustration has already been done in factory.

Material required

Speed nut (Qty. 2)

Self tapping screws (Qty. 2)

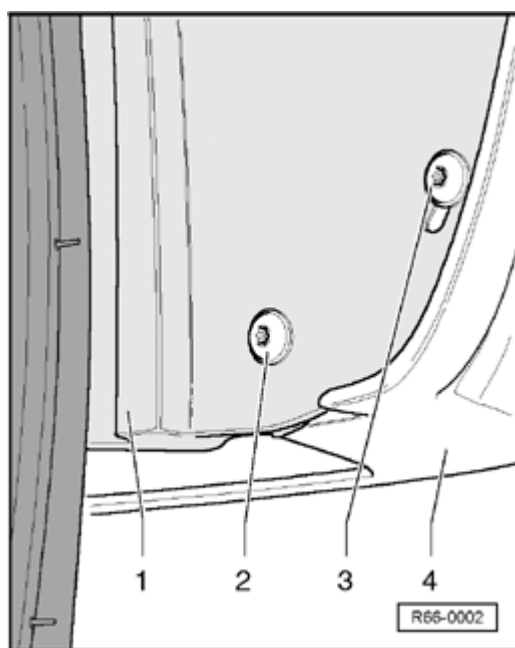
Additional bolts (rear view)



Dimensions - **a** - = 10 mm

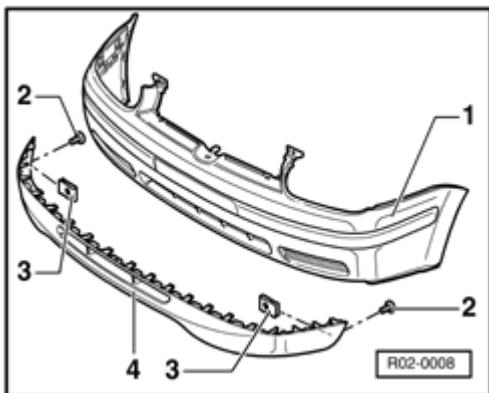
1. Front valence spoiler
2. Serial bolts. Tightening torque: 2 Nm
3. Additional bolts. Tightening torque: 2 Nm
4. Front wheel housing liner

- Install speed nut on front valence spoiler and then bolt front wheel housing liner and front valence spoiler - **3** - .



Additional bolts (front view)

1. Front wheel housing liner
2. Additional bolts. Tightening torque: 2 Nm
3. Serial bolts. Tightening torque: 2 Nm
4. Front valence spoiler



Front valance spoiler (Golf GTI)

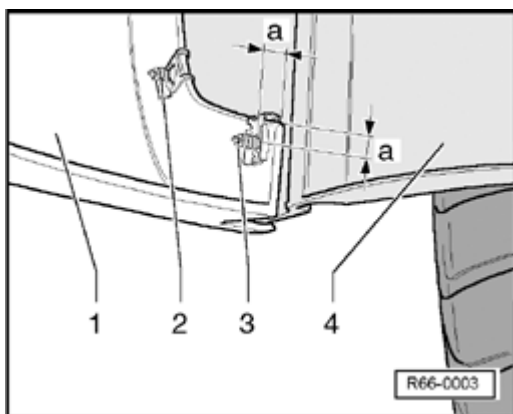
1. Cover
2. Screw (Qty. 2). Torque specification: 2 Nm.
3. Speed nut (Qty. 2)
4. Front valance spoiler (Clipped to cover)

Warning!

When first installing front valance spoiler additional bolts must be installed on both sides.

Install additional bolts at front valance spoiler (Golf GTI)

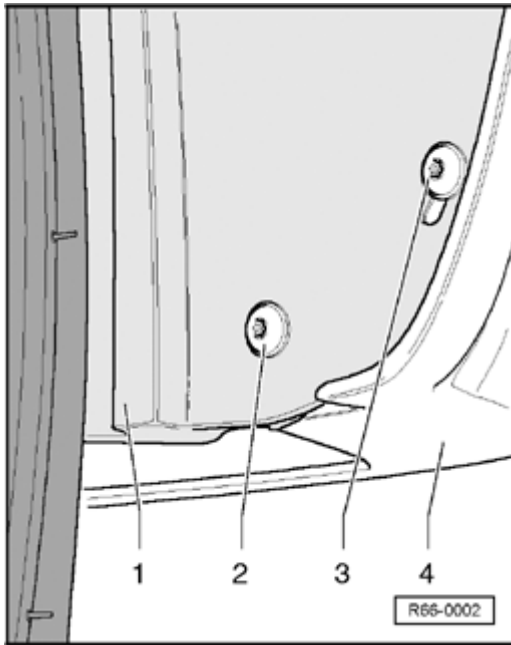
Additional bolts (rear view)



- Drill with 4mm drilling machine front valance spoiler and wheel housing liner. Hole must be approx. 10 mm away from both outer edges - **a** - 10 mm.

1. Front valance spoiler
2. Serial bolts. Tightening torque: 2 Nm
3. Additional bolts. Tightening torque: 2 Nm
4. Front wheel housing liner

Install speed nut on front valance spoiler and then bolt front wheel housing liner and front valance spoiler - **3** - .

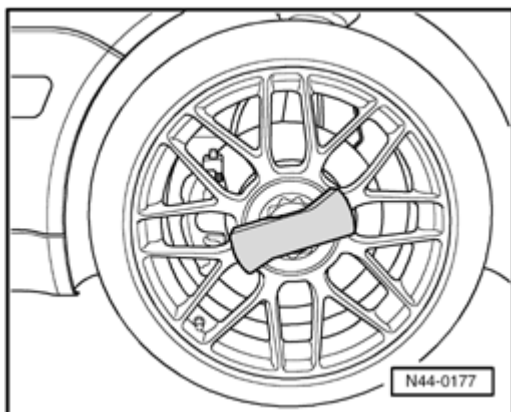


Additional bolts (front view)

1. Front wheel housing liner
2. Additional bolts. Tightening torque: 2 Nm
3. Serial bolts. Tightening torque: 2 Nm
4. Front valance spoiler

Wheel cover caps

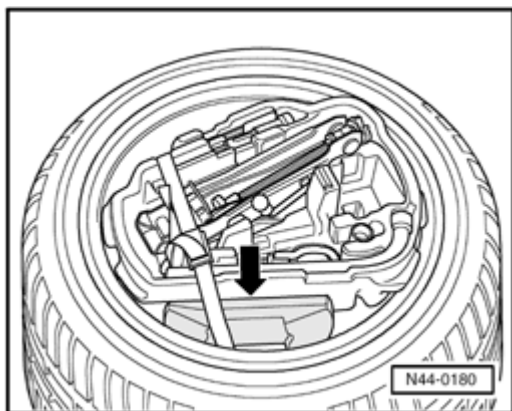
Removing and installing wheel cover caps



Alloy wheel of GTI 337 Edition has a bolted wheel trim. You can remove or install this using appropriate tool in vehicle.

Note:

Do not use other assembly tools! Otherwise wheel trim or alloy wheel can be damaged.

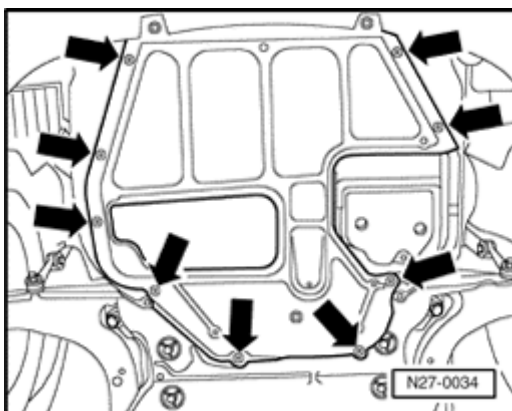


Assembly tool - **arrow** - for wheel trim can be found in tool kit.

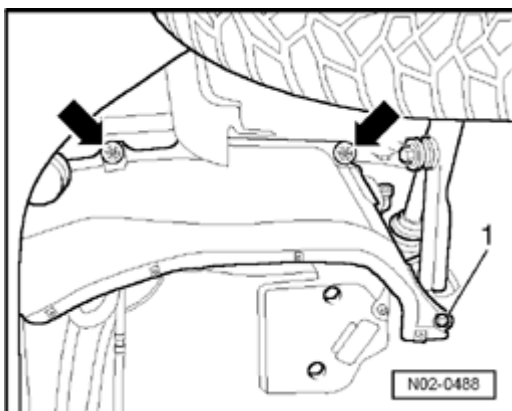
Engine compartment trim (sound insulation), removing and installing

Golf, Jetta

Perform the following work sequence:



- Remove screws - **arrows** -



- Remove screws - **arrows** - and remove center engine compartment cover.

- Unclip the fasteners - **arrows** - and remove screw - **1** - .
- Remove left and right engine compartment cover.

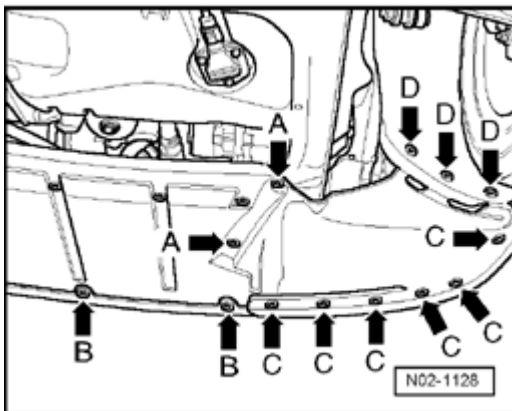
Note:

Do not reuse the fastening clips, replace after every time the engine compartment cover is removed.

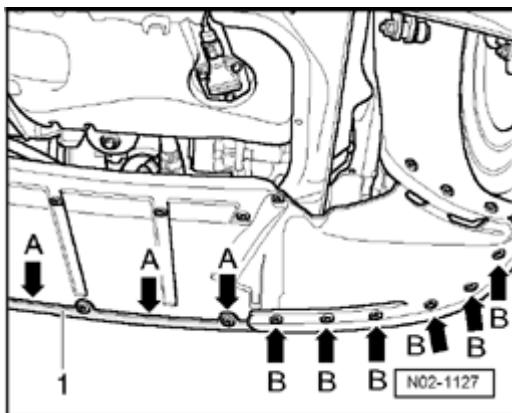
- Installation is the reverse of removal.

Golf R32**Removing****Note:**

The following illustration shows the right side of the engine compartment cover. The fastening of the left side is the same but reversed.



- Remove screws - **arrows** - and remove center engine compartment cover.

Installing

- Set the front edge of the engine compartment cover - **arrow A** - on the edge of the bumper cover - **1** - and push

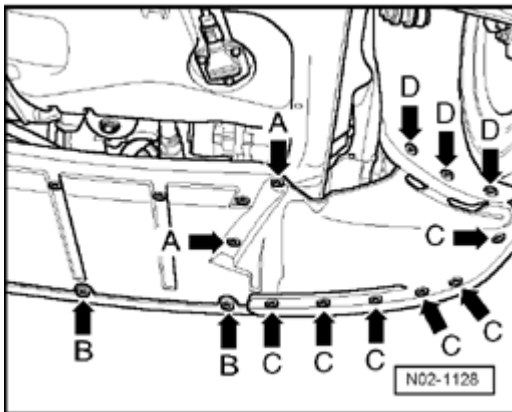
in. Thereafter push the engine compartment cover up and let a second person hold it.

Note:

*The front edge of the engine compartment cover - **arrow A** - must rest on the bumper cover - **1** - .*

*At the outer edges - **arrow B** - the engine compartment cover must rest under the bumper cover.*

- Install the screw - **arrow A** - , on the respective side and tighten to 1.5 Nm



- Install screws at front - **arrow B** - , then at the sides - **arrow C** - , and tighten to 1.5 Nm.

- Install screws - **arrow D** - at the wheel house liners and tighten to 1.5 Nm.

Initial Installation of engine compartment cover (sound insulation) (R32)

Note:

Engine compartment cover is not installed at factory and must be installed before delivery inspection.

Inside front wheel house liner, 3 additional holes must be drilled.

Engine compartment cover, fastening materials, as well as assembly instructions with drilling templates are found inside vehicle.

Necessary material:

4 spring nuts with self-tapping screws (anodized) for side engine compartment cover.

12 spring nuts with self-tapping screws (black) for bumper cover

9 spring nuts with self-tapping screws (black) for engine compartment cover outer edges

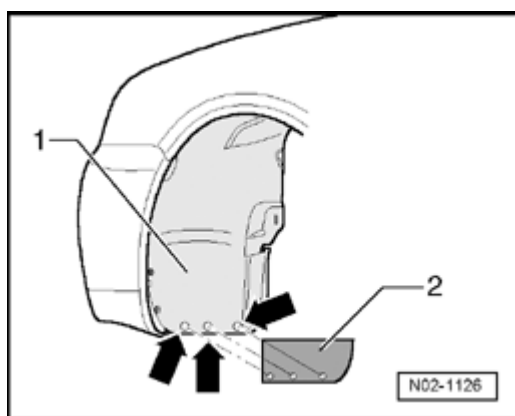
Removing

- Remove both front wheels.

Note:

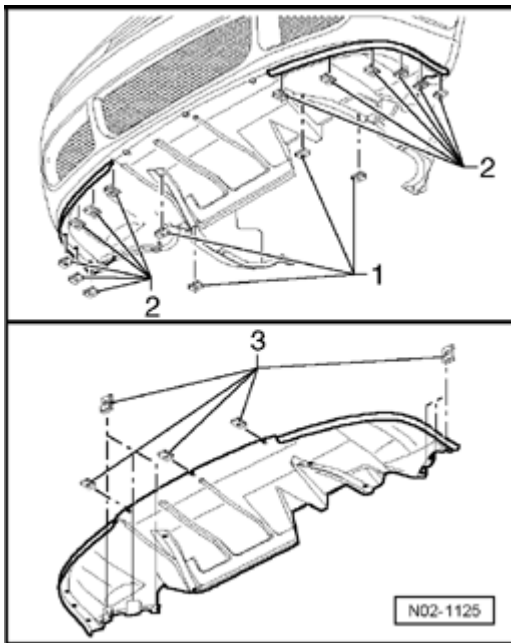
Following illustration shows left wheel house liner. Installation of right wheel house liner is similar.

- Cut out two drilling templates.



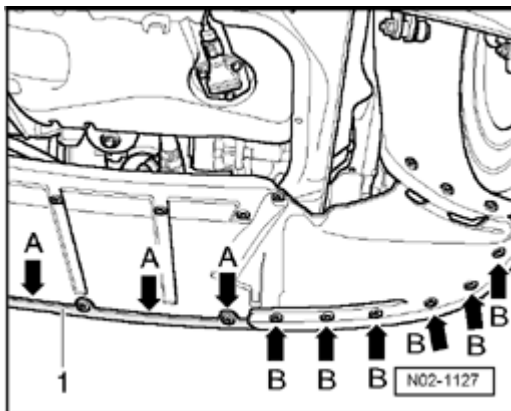
- Attach and align drilling template - **2** - to wheel house liner - **1** - and drill 3 holes - **arrows** - .

- Drill holes using a 6 mm \varnothing drill bit.



- Set spring nuts on indicated areas.

Installing



- Rest front edge of engine compartment cover - **arrow A** - on bumper cover - **1** - and push in. Afterwards, push engine compartment cover up and have a second person hold it.

Note:

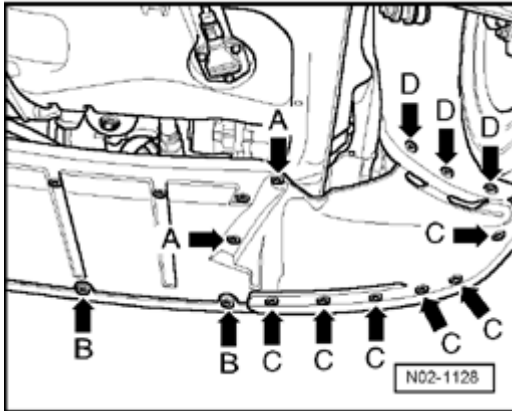
*Front edge of engine compartment cover - **arrow A** - must rest on bumper cover - **1** - .*

*At outer reaches - **arrow B** - engine compartment cover must rest on bumper cover.*

- Install screw - **arrow A** - on respective side and tighten to 1.5 Nm.

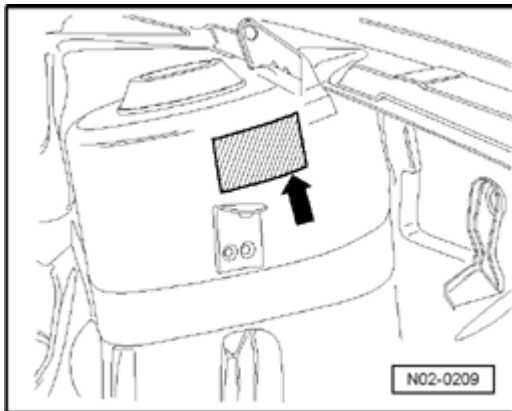
- Install screws at front - **arrow B** - then at sides - **arrow C** - and tighten to 1.5 Nm.

- Install screws - **arrow D** - at wheel house liners and tighten to 1.5 Nm.



- Install front wheels and tighten to specified tightening torque.

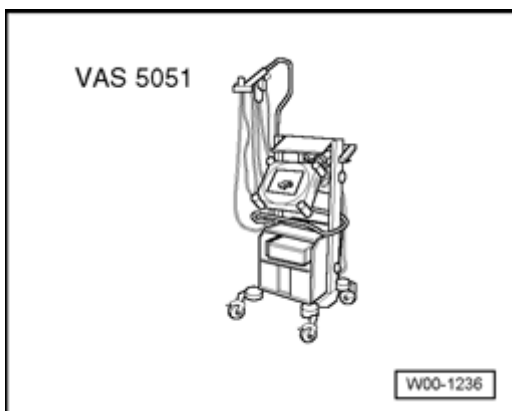
Type plate



- The type plate - **arrow** - is found on the right strut tower.
- Vehicles for certain countries have no type plate.

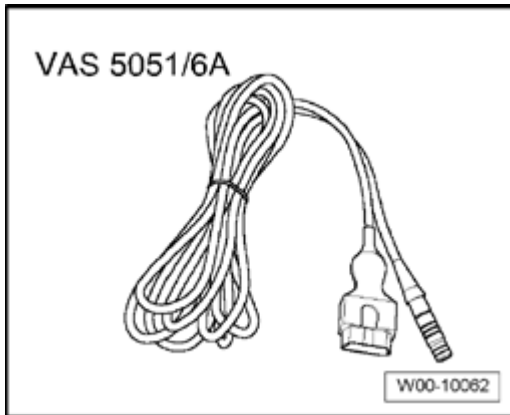
Diagnostic scan tool, connecting

Special tools, testers and auxiliary items required



Vehicle Diagnosis, Testing and Information System VAS 5051A

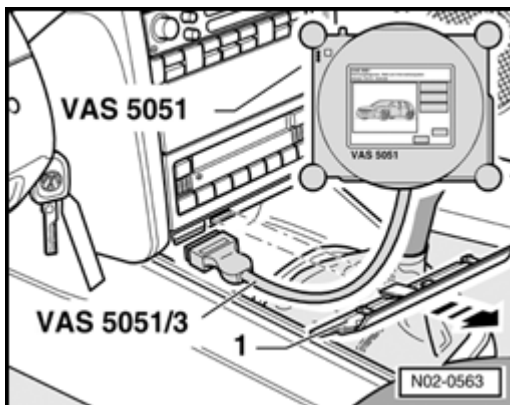
or Vehicle Diagnosis, Testing and Information System VAS 5052



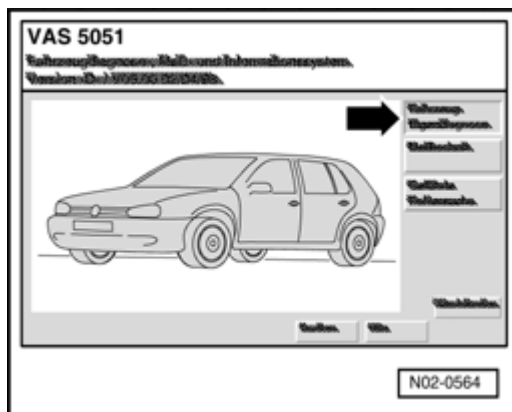
Diagnostic cable VAS 5051/6A

- Perform the following work sequence.
- Apply parking brake.
- Automatic transmission: Set selector lever in position "P" or "N" .
- Manual transmission: Gear stick in neutral.

Connect the Vehicle Diagnosis, Testing, and Information System VAS 5051A with the ignition off as follows:



- Open the cover - 1 - for the diagnostic connector above the ashtray.
- Connect Vehicle Diagnosis, Testing and Information System VAS 5051A using the Diagnostic cable VAS 5051/6A with ignition switched off.
- Switch ignition on



Indicated on display:

- Press button/field for "Guided Fault Finding" or "Guided Functions" on screen.

- Select one after another:

Brand

Model

Model year

Version

Engine Code

- Confirm data entered.

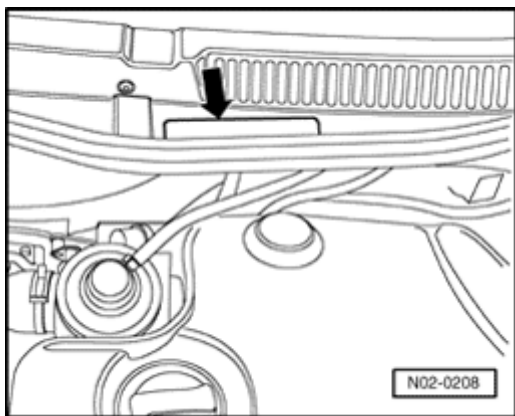
Note:

Wait until tester has checked all control modules in vehicle.

- Press "Goto" button and select "Function/component selection" function

Now follow information given on screen to start the desired functions.

Vehicle Identification Number (VIN)



The vehicle identification number is found in the plenum chamber. It is visible through a window - **arrow** - in the plenum chamber cover.

Meaning of Vehicle Identification Number (VIN):

WVW	ZZZ	1J	Z	Y (3) ¹⁾	W	000 279
Manufacturer code	Filler characters	Model	Filler characters	Model year 2000	Production location	Serial number

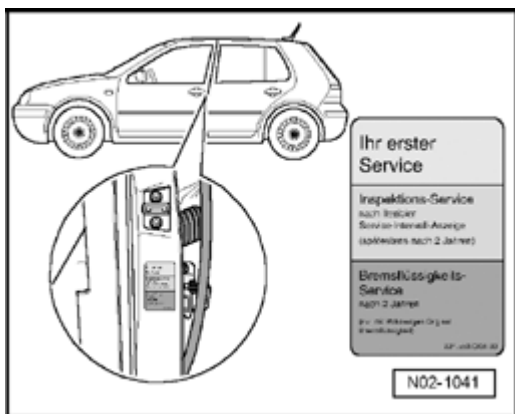
¹⁾Model year 2003

Service sticker, applying

Apply sticker "First service" (delivery inspection):

Apply sticker "Next service"

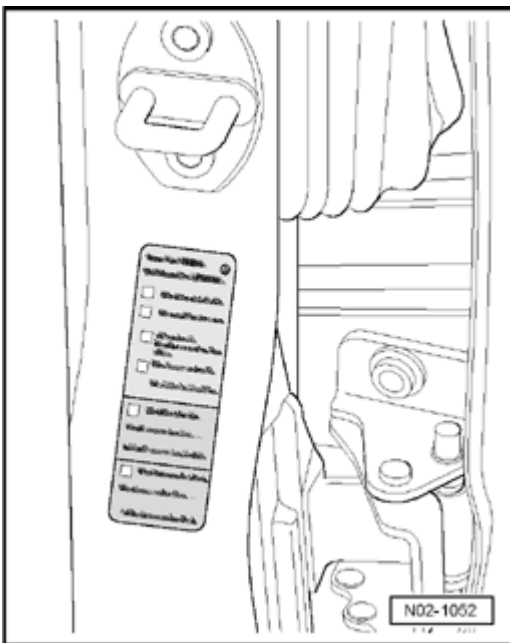
"First service" sticker



- Apply sticker on drivers side door jamb (B-pillar); sticker is located on an instruction which is attached at front in vehicle wallet. Destroy instruction after attaching sticker!

Apply sticker "Next service" :

- Service sticker "Next service" : Mark oil change service or inspection service (next due service) and enter date/odometer reading; if necessary also mark additional work (e.g. toothed belts replacement) and brake fluid service and enter date/odometer reading - service intervals



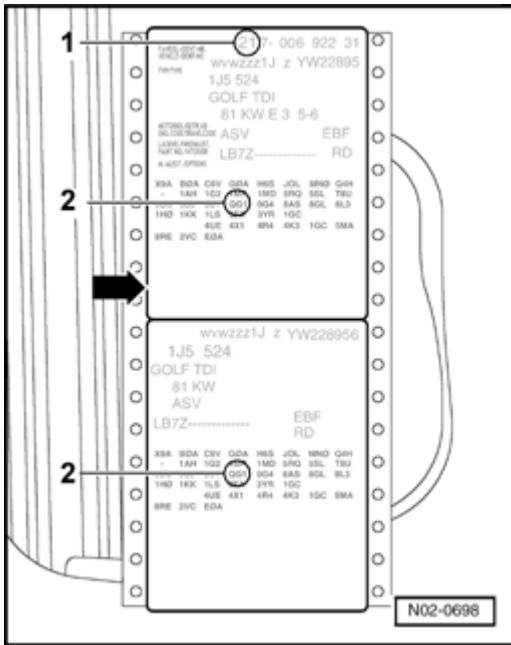
- Apply sticker to drivers side door jamb (B Pillar).

Apply data sticker in service schedule (for customers)

Note:

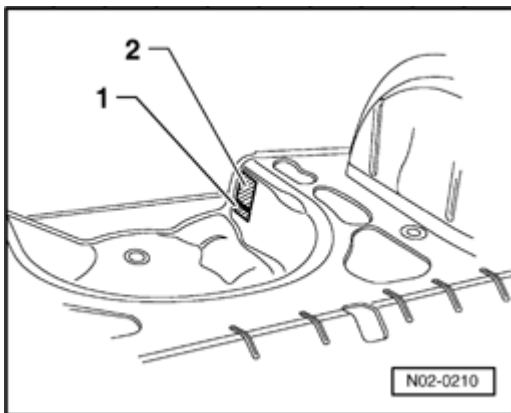
Both data stickers are found in luggage compartment.

- Affix data sticker in luggage compartment
- Apply upper of two data stickers - **arrow** - .
- - 1 - Planning week



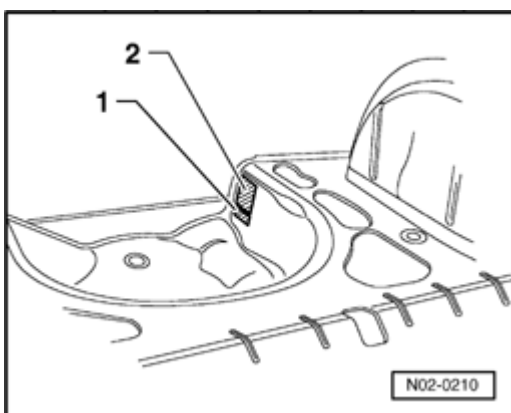
-- 2 - PR number

Affix data sticker in luggage compartment

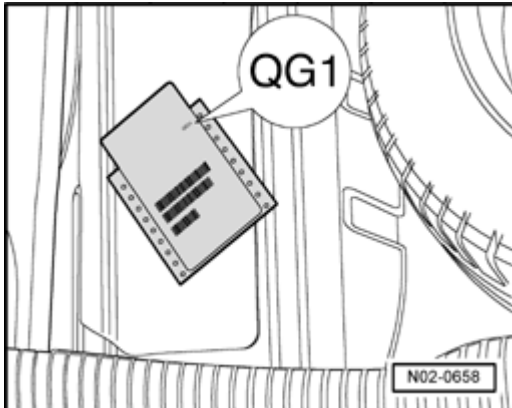


Affix lower of two data stickers - 2 - in luggage compartment. left in spare tire well.

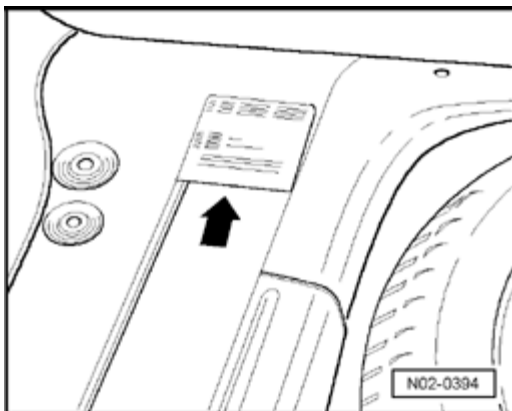
Vehicle data sticker



The vehicle data sticker - **2** - is located in rear of vehicle on the left by the spare wheel recess. The vehicle data sticker can also be found in the service schedule for the customer.



- Check the vehicle data label - **arrow** - (in trunk), to see if the vehicle is equipped with PR number "QG0 and/or QG2" . The PR number determines the service intervals.



Sticker contains the following vehicle data:

- 1 - Production control number
- 2 - Vehicle Identification Number (VIN)
- 3 - Model identification number
- 4 - Model explanation/engine output
- 5 - Engine and transmission code letters
- 6 - Paint number/interior equipment identification number
- 7 - Optional equipment identification numbers

Engine code and engine number

Engine code and engine number are found:

On a sticker on the toothed belt cover, on the intake tube, or on the subframe engine-side.

Stamped into the engine block and/or cylinder head

⇒ *Repair Manual, Technical Data, Repair Group 00, Engine number*

.

On the vehicle data sticker in the spare tire well or floor of the luggage compartment.

On the vehicle data sticker in the service plan for customers.

Vehicle, lifting

Warning!

Vehicle may only be lifted at points indicated in illustration in order to avoid damaging vehicle floor pan and to prevent vehicle from tipping.

Never start engine and engage a gear with vehicle lifted so long as even one wheel has contact with the floor. There is a risk of an accident if this is not observed!

If work is to be performed under vehicle it must be supported by suitable stands.

Floor jack:

Always use a suitable rubber or wooden block between the jack and the vehicle.

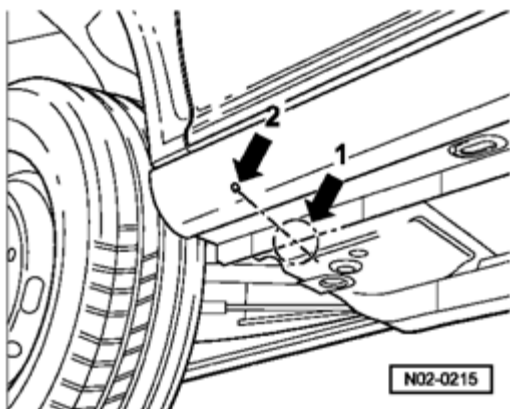
Do not lift the vehicle at the engine oil pan, transmission, or on front or rear axles as serious damage may result.

Vehicle hoist:

Before driving on to a hoist ensure there is sufficient clearance between low lying vehicle components and hoist.

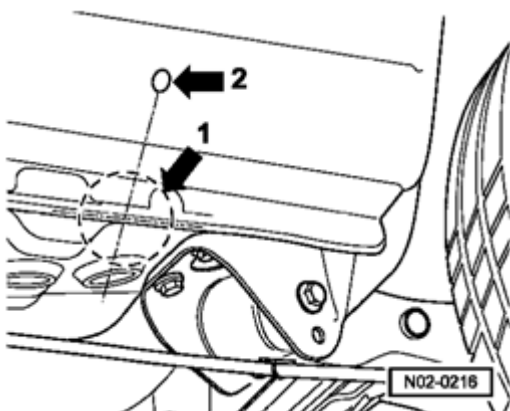
Lifting points for vehicle hoist

Front:



Position the support plate on the longitudinal reinforcement marked - **arrow 1** - . The center of hoist support plate must be aligned with the marking - **arrow 2** - .

Rear:

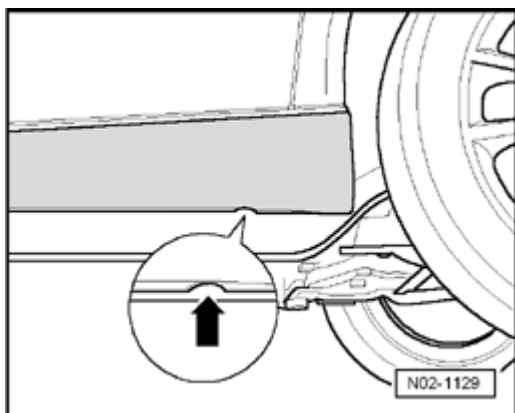


Position the support plate on the longitudinal reinforcement marked - **arrow 1** - . The center of hoist support plate must be aligned with the marking - **arrow 2** - .

Golf "R32" , lifting

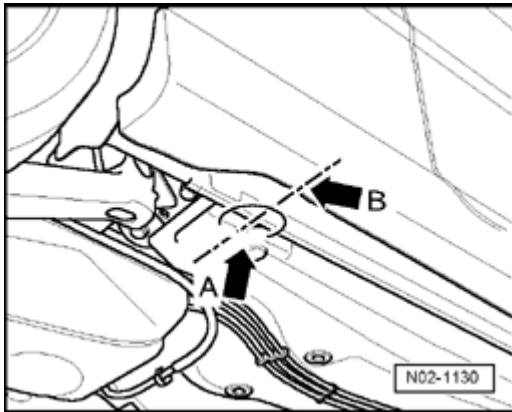
In the body cladding at the front and rear of the vehicle are recesses.

Lifting points for floor jack:



Front:

Behind these recesses - **arrow** - the vehicle can be lifted at the vertical reinforcement of the side rails.

**Rear:**

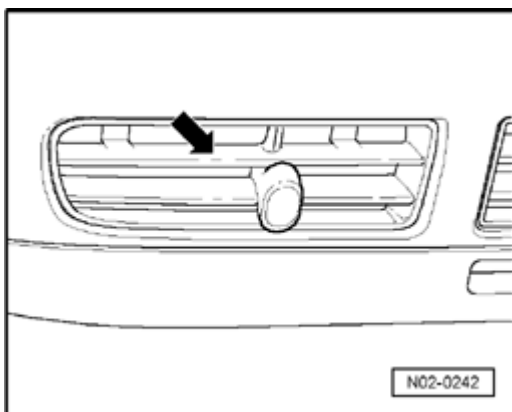
- **arrow A** - indicates the lifting point on the vertical reinforcement of the side rail, at the height of the mark on the vehicle jack - **arrow B** - .

Note:

The vehicle may only be lifted at the areas designated in these illustrations, otherwise serious damage to the vehicle may occur. Never lift the vehicle at the body cladding.

Tow starting/towing

Attach tow rope or tow bar only to following eyes:

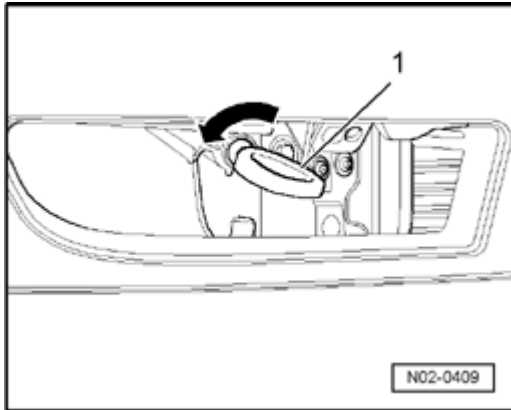
Front towing eye

To install towing eye, unclip cover - **arrow** - from lower part of bumper cover on right of vehicle.

- Install towing eye - **1** - (found in luggage compartment)

into hole in direction indicated until it stops.

- Tighten towing eye using wheel bolt wrench from vehicle tool kit.
- After use, remove towing eye and place with vehicle tools.



- Install cover.

Rear towing eye

Rear towing eye is located under rear bumper on right side.

Note:

Tow-rope should be able to stretch to reduce risk of damage to both vehicles. It is advisable to use synthetic fiber ropes or ropes of similar elastic material only. However, it is safer to use a tow-bar!

Avoid excessive towing effort and do not jerk. During towing operations on unsurfaced roads there is always a danger that attachment points will be overstressed and damaged.

Battery from another vehicle should be used for starting if possible before trying to start an engine by towing.

If vehicle has to be tow started or towed once, following must be noted:

Regulations concerning towing must be observed.

Both drivers must be familiar with specifics of towing procedures. Inexperienced drivers should not attempt to tow start or tow.

When using a tow rope driver of towing vehicle must engage clutch very gently when driving off and changing gear.

Driver of vehicle being towed must ensure that tow rope is always taut.

Emergency lights must be switched on on both vehicles - unless local regulations differ.

Ignition must be switched on so that steering wheel is not locked and turn signals, horn, windshield wipers, and windshield washer system can be operated.

Since brake booster only works with engine running, brake pedal must be stepped on with substantially more force when engine is switched off.

Since power assisted steering only works when engine is running, more force is required to turn steering wheel.

When there is no lubricant in a manual transmission or automatic transmission, vehicle may only be towed with driving wheels lifted.

Tow starting of vehicles with automatic transmission is not possible for technical reasons.

Important notes concerning tow starting a vehicle:

It is generally recommended not to tow start vehicle. Instead jump leads should be used.

Other reasons against tow starting a vehicle:

During tow starting, risk of an accident occurring is high. e.g. driving into vehicle towing.

Tow starting vehicles with an automatic transmission is for technical reasons not possible.

If a vehicle is to be tow started against recommendation anyway, note following:

- Before moving off, depress clutch pedal and hold then engage 2nd or 3rd gear.
- Switch ignition on
- When both vehicles are moving, release clutch pedal.
- As soon as engine starts, depress clutch and move gear stick into neutral to avoid running into towing vehicle.

Note:

On vehicles with a gasoline engine engine must not be tow started over a distance longer than 50 m when catalytic

converter is at operating temperature. Otherwise unburnt fuel may pass into catalytic converter and cause damage.

When towing a vehicle with automatic transmission following additional points must be observed:

Selector lever must be in "N" position.

Do not tow vehicle faster than 30 mph (50 km/h).

Do not tow further than 30 miles (50 km).

If towing over greater distances, vehicle must be suspended at front.

Reason: When engine is not running transmission oil pump is not working and transmission is not adequately lubricated for high speeds or long distances.

Using a breakdown vehicle, vehicle may only be towed suspended at front.

Reason: If given a rear suspended tow, drive shafts turn backward. This would cause planetary gears in automatic transmission to achieve such a high rpm that transmission would be heavily damaged within a very short time.

For vehicles with all wheel drive:

Using a breakdown vehicle vehicle may be towed suspended at front or rear.

Note:

Do not tow at speeds greater than 30 mph (50 km/h).

Maximum towing distance is 30 miles (50 km).

Note:

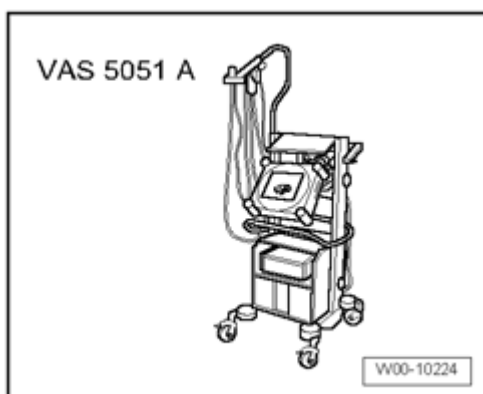
If normal towing of vehicle is not possible, vehicle must be transported on a special transporter or trailer. This is also valid for distances greater than 30 miles (50 km).

Description of work (part 1 of 2)

Instrument panel cluster, adapting language

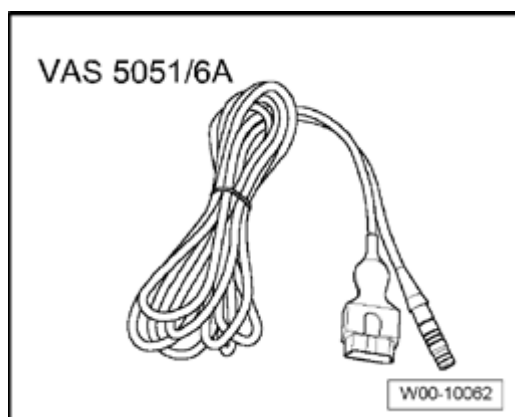
Note:

The language variations for driver information can only be adapted for midline and highline instrument panel clusters.

Special tools, testers and auxiliary items required

Vehicle Diagnosis, Testing and Information System VAS 5051 A or

Vehicle Diagnosis and Service System VAS 5052 or subsequent devices



Diagnostic cable VAS 5051/6A

- Connect the diagnostic tester.
- Switch ignition on.
- On the display of the diagnostic tester, select the mode of operation "Guided Fault-finding" .

- Then, perform the vehicle identification procedure on the diagnostic tester.
- Select "Instrument cluster" on the display.
- Select "Adapting language for Navigation" on the display.
- Confirm the selection by pressing the right arrow.
- Select the appropriate language and confirm with "Yes" .
- Complete the language adaptation by pressing the "Go to" and "End" buttons.
- Switch ignition off.

Power windows, 8-way memory seat, perform initialization (activation)

Power windows, perform initialization

Note:

Automatic opening and closing features for power windows do not function after disconnecting battery. Therefore, power windows must be reinitialized before a new vehicle is delivered. Do not disconnect battery again after initialization of power windows.

Warning!

After disconnecting and connecting the battery the excess force limitation function of the power windows does not function. This can cause serious injuries if e.g. fingers are caught in the window!

Make sure the customer is aware of this!

Perform the following work sequence to initialize the electric windows:

- Lock all doors completely.
- Lock the vehicle doors from the outside, either at the driver or passenger front door..
- Unlock vehicle.
- Lock the vehicle doors again from the outside, either at the driver or passenger front door.. Hold the key in the locking position for at least 1 second.

8-way memory seat, perform initialization

Note:

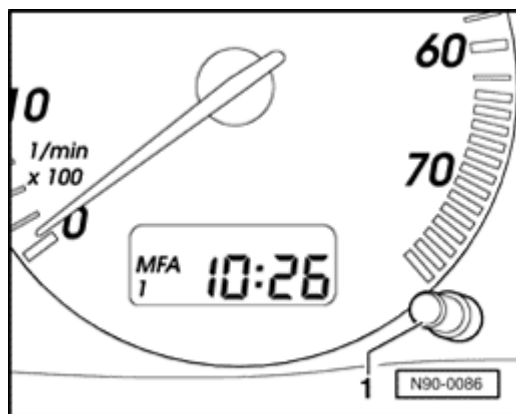
After disconnecting and connecting the vehicle battery, the power seat memory system does not function. Before delivering a new vehicle the memory seat must be initialized. Thereafter, the vehicle battery should not be disconnected again.

To initialize the electric seat memory system, perform the following work sequence:

- Open the driver door.
- Switch ignition on.
- Adjust the seating surface all the way up and forward until it stops.
- Adjust the back rest all the way forward until it stops.

Clock, setting

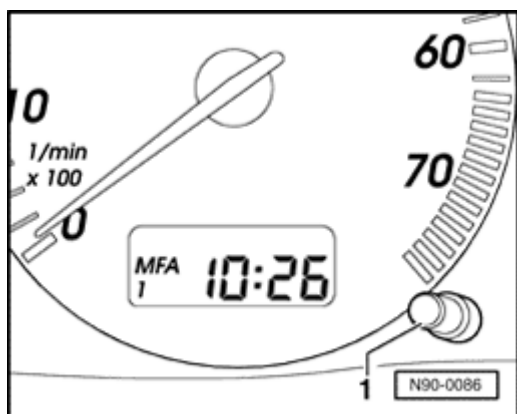
Please perform adjustment as follows:

Hour setting:

- Turn the adjusting button - 1 - (to the lower right of the tachometer) counterclockwise.

With every brief turn of the adjusting button, the setting changes by one hour. When turning and holding the adjusting button, the setting continually adjusts.

Minute setting:



- Turn the adjusting button - 1 - clockwise.

With every brief turn of the adjusting button, the setting changes by one minute. When turning and holding the adjusting button, the setting continually adjusts.

With the adjusting button - 1 - the clock can be set to the exact second:

- Turn the adjusting button to the right until the clock is one minute less than the time that is to be set.
- Briefly turn the adjusting button to the right as soon as the second indicator of the reference clock reaches the full minute mark.

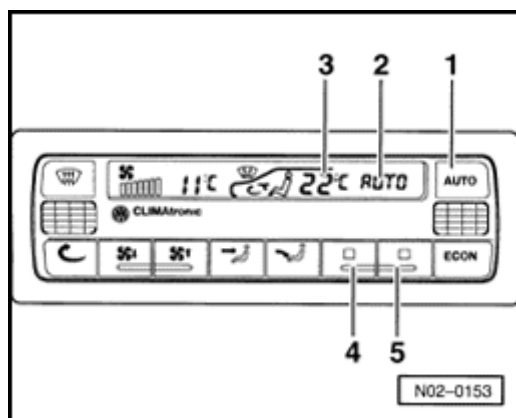
Climatronic, setting temperature to 72 ° F (22 ° C)

Note:

A comfortable climate in vehicle is reached most quickly at a temperature setting of 72 ° F (22 ° C)

Therefore, this setting should only be adjusted when it is personally preferred.

- Switch ignition on



- Check to see if 72 ° F (22 ° C) is set - **3** - in the display.

If necessary, perform the temperature setting as follows:

- Press button - **1** - for automatic operation. The display - **2** - will indicate AUTO.
- Adjust temperature to 72 ° F (22 ° C) by pressing button - **4** - for "cooler" or button - **5** - for "warmer" .

Radio and radio/navigation system, activating anti-theft coding

Radios and radio/navigation systems are delivered with a security code. Security code means that every unit with anti-theft coding is programmed with its own code. This code is not active from factory.

Perform work sequence

- Refer to

⇒ [Repair Manual, Communication, Repair Group 91, Radio, Telephone, Navigation, Trip computer](#)

Wheel cover caps

- Removing and installing wheel cover caps

Alloy wheel of Jetta GLI has a bolted wheel trim. You can remove or install this using appropriate tool in vehicle.

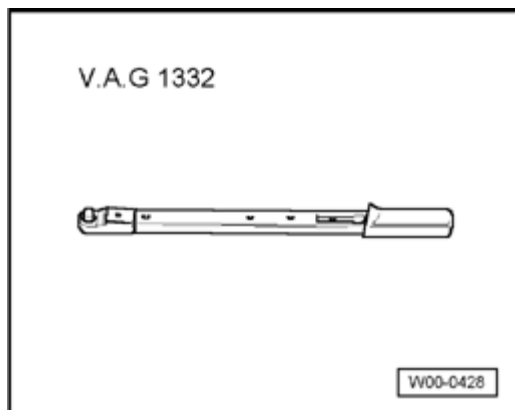
Assembly tool for wheel trim is located in glove box.

Warning!

Do not use other assembly tools! Otherwise wheel trim or alloy wheel can be damaged.

Wheel bolts, tighten to correct torque setting

Special tools, testers and auxiliary items required



Torque wrench V.A.G 1332/ (40 -200 Nm)

Wheel cover, removing

The removal hook is part of the vehicles tool kit

Wheel bolts

The adapter to loosen/tighten the anti-theft wheel bolts is located with the vehicle tool kit.

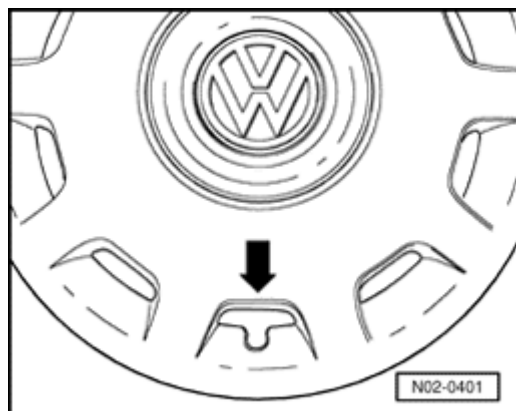
Note:

Be sure to tighten wheel bolts one after the other to the following specified torque:

Tightening torque: 120 Nm

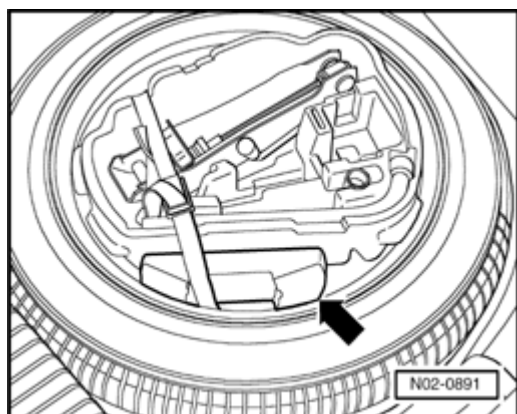
After completion of work, return adapter and hook for wheel cover to vehicle tool kit.

Full wheel cover, installing



- Install full wheel cover with tire valve positioned in the cut-out - **arrow** - .

Installation tool for wheel cover (Golf GTI 337 Edition)



- Place the wheel cover installation tool in the vehicle tool kit, as shown in the illustration - **arrow** - .

Wheelhousing liner, bolting to front apron (only anniversary Golf GTI with 132 kW engine)

Note:

The wheel house lining must be fastened to the front apron by an additional fixing bolt. This will help prevent damage to the wheel house lining.

The following illustration shows the right wheel house lining. The fastening of the left wheel house lining is the same but reversed.

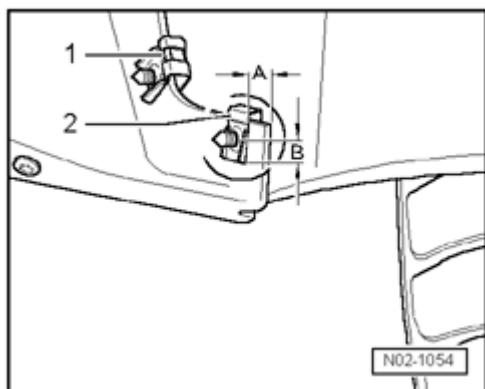
The fastening - 1 - in the illustration was performed by the factory.

Necessary material:

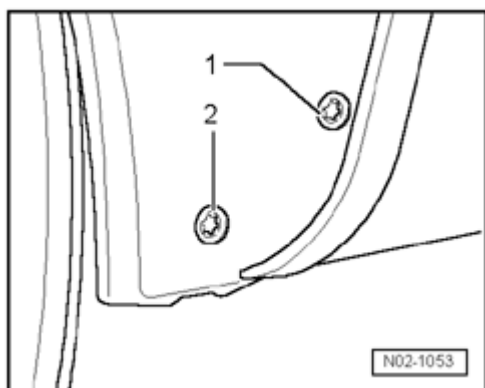
2 x "N 015 439 1" spring nut

2 x "N 907 750 01" Torx socket head self-tapping screw (4.8 x 16)

Work sequence for the additional fastener - 2 - :



- Attach and align spring nut - 2 - on the right front apron.
- The measurements - A - and - B - each amount to 10 mm.
- With a 4 mm diameter drill bit, drill a hole.



- Fasten the Torx screw - 1 - and the additional Torx screw N 907 750 01 (4.8 x 16) - 2 - to the wheel house lining.

Transportation device, blocking pieces on front axle springs, removing

Note:

On some vehicles, blocking pieces are installed to the piston rod of the struts.

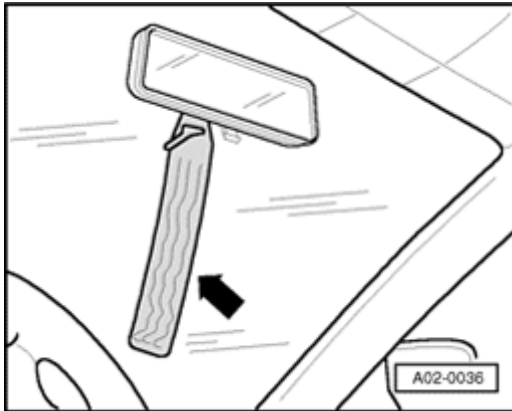
Other vehicles have blocking pieces installed in the front axle springs.

The transportation devices are designed to prevent damage to the vehicle when driven onto railroad cars or road transport vehicles.

Warning!

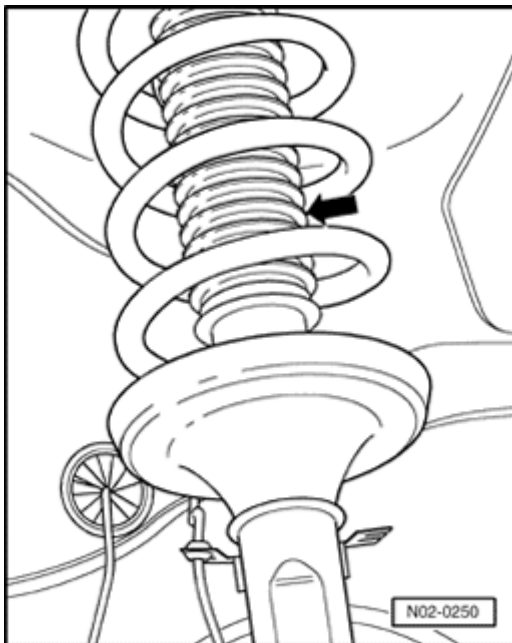
The transportation protection devices must be

removed before delivery of the vehicle! The "Warning" tag attached to the inside rear view mirror is a reminder of this important procedure.

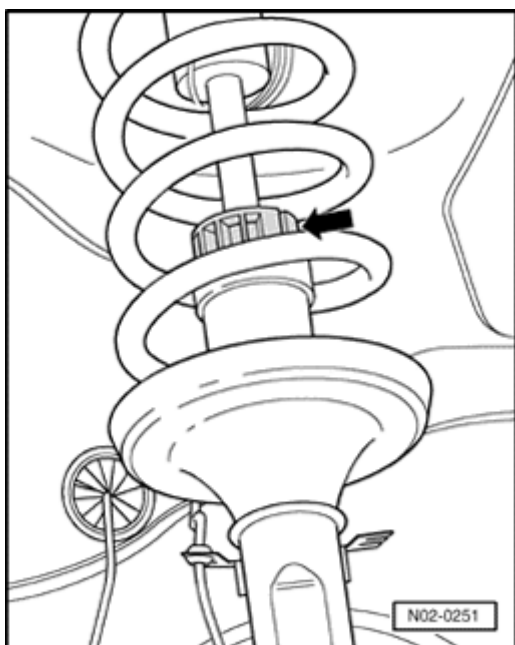


- Vehicles with blocking pieces in the struts are indicated by the notice hanging from the mirror - **arrow** - .

Blocking pieces on the piston rod, removing



- Push protective strut boot - **arrow** - upwards.



- Remove the blocking piece - **arrow** - from the piston rod.
- Push the protective strut boot back down.

Blocking pieces on the coil spring, removing

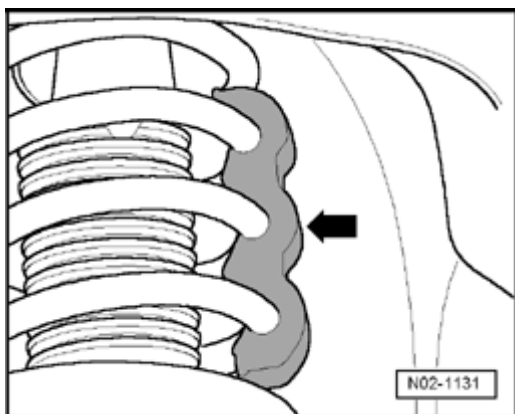
Perform the following work sequence:

Note:

It is necessary to remove the wheels.

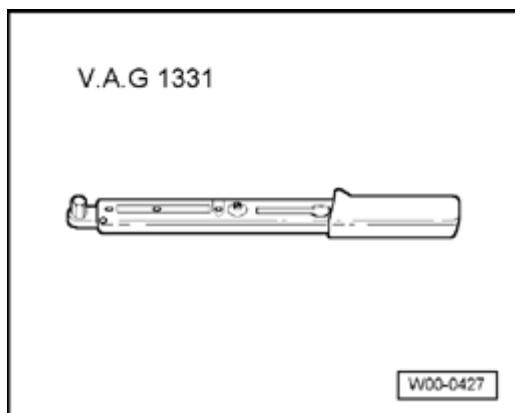
Be careful to not damage the surface of the springs.

- Release tension of coil springs by lifting vehicle with lift.



- Remove the blocking piece - **arrow** - from the piston rod.

Battery, check battery terminals for secure seating

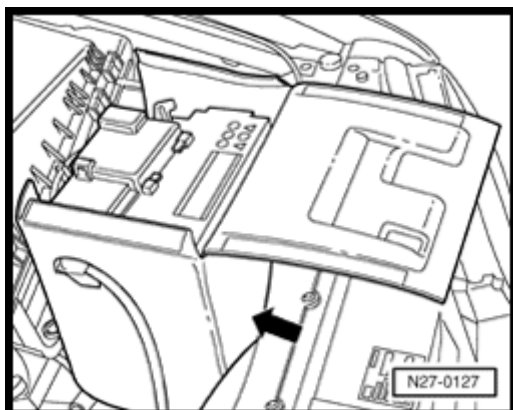
Special tools, testers and auxiliary items required

Torque wrench V.A.G 1331/ (5 - 50 Nm)

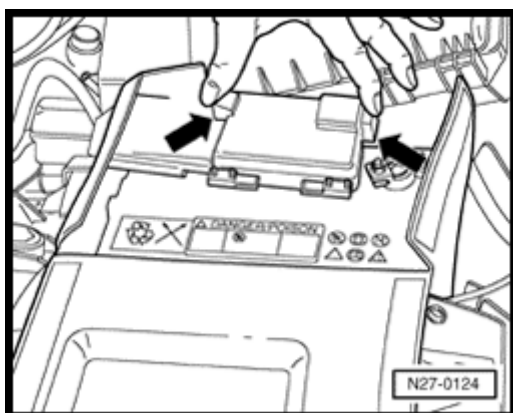
Note:

Tight battery connections assure trouble-free battery function and long service life.

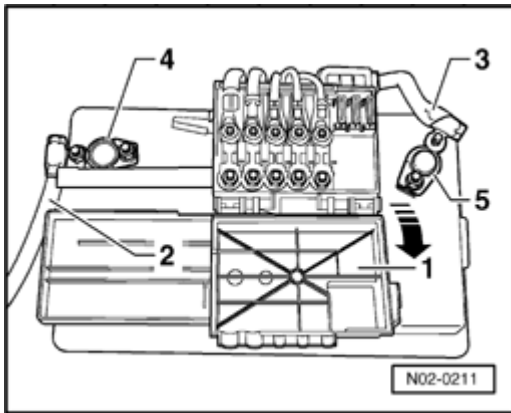
Perform the following work sequence:



- Open battery insulation jacket - **arrow** - (if equipped).



- Press tabs - **arrows** - together and fold the cover forward.

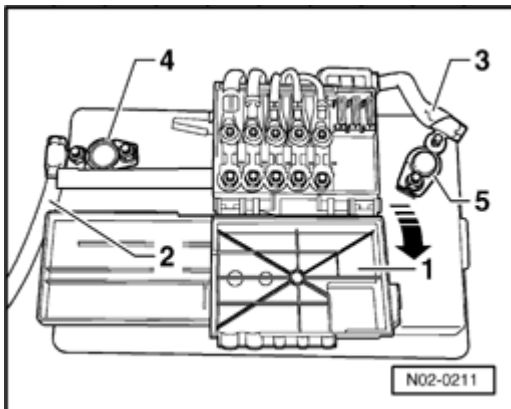


- By manually moving battery plus (B+) cable - 2 - and ground (GND) cable - 3 - check whether battery connections - 4 - and - 5 - are tight.

Warning!

If battery positive (B+) connection is loose, disconnect ground (GND) cable first before attempting to remove or tighten plus connection, to prevent personal injury.

If the battery clamp on positive terminal (B+) is not seated securely:



- Disconnect ground (GND) cable connection - 5 - on battery.

- Tighten battery plus (B+) connection to 5 Nm.

- Reconnect ground connection - 5 - on battery and tighten to 5 Nm.

If the battery clamp on negative terminal is not seated securely:

- Tighten ground connection - 5 - on battery to 5 Nm.

Battery, checking

- Work procedure:

⇒ [Repair Manual, Electrical Equipment, Repair Group 27, Battery](#)

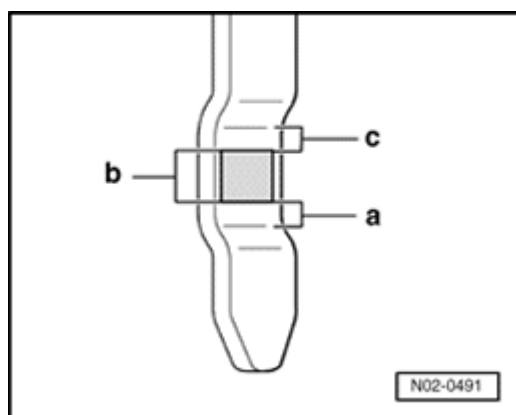
Engine oil level, checking

Note:

After stopping engine, wait at least 3 minutes to allow oil to flow back into oil pan.

Pull out oil dipstick and wipe with clean rag. Replace dipstick and push down to stop.

Observe waste disposal regulations



- Pull out dipstick again and read oil level.

Area a Oil must be topped off. After topping off it is sufficient when the oil level is somewhere in area - **b** - .

Area b Oil does not have to be topped off.

-

Area c Oil must not be topped off.

-

Note:

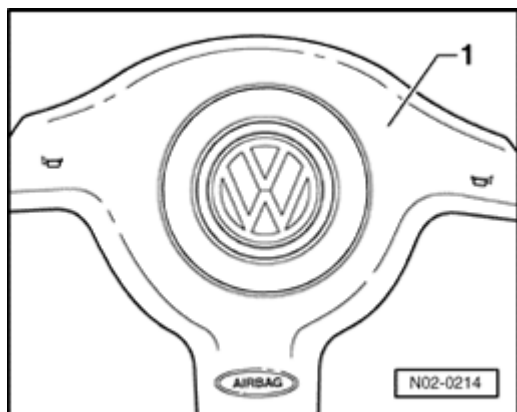
If oil level is above area - - c - -, the catalytic converter can be damaged.

If the oil level is below the -min- mark, fill up with oil to the -max- mark. Observe oil specification ⇒ [01-7, Engine oils](#) .

Airbag for driver and passenger, visual inspection of airbag components

Driver side airbag

Identification of airbag is embossed as "AIRBAG" on upholstered cover of steering wheel.



- Perform a visual inspection for any damages to upholstered cover - 1 - .

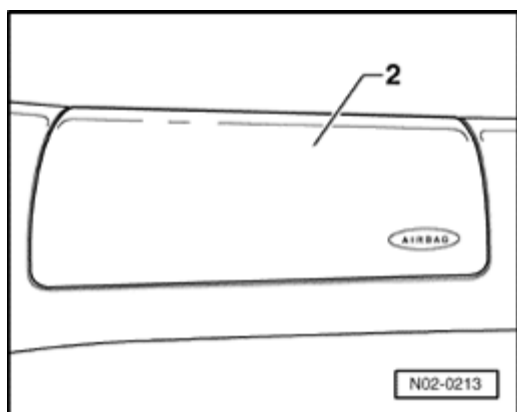
Warning!

Adhesive from tape, stickers, etc. and other residues or unauthorized work on airbag units can affect airbag function. So that future airbag function is ensured. make certain the customer is aware of this.

Upholstered cover of steering wheel may only be cleaned with a dry or damp cloth.

Front passenger side airbag

Identification of airbag is embossed as "AIRBAG" on right side of instrument panel.



- Perform a visual inspection for any damages to surface of instrument panel - 2 - .

Warning!

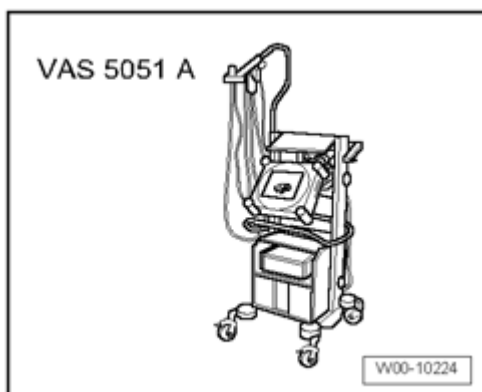
Adhesive from tape, stickers, etc and other residues or

Unauthorized work on airbag units can affect airbag function. So that future airbag function is ensured. make certain the customer is aware of this.

Surface of airbag module may only be cleaned with a dry or damp cloth.

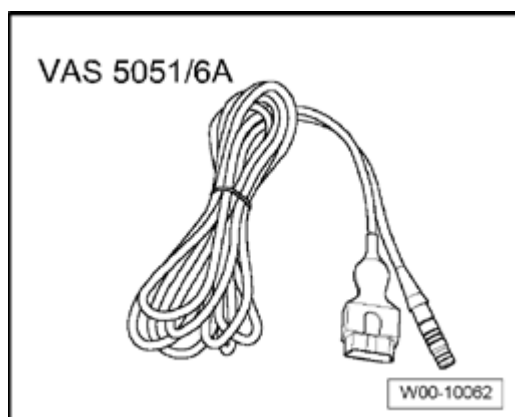
On Board Diagnostic (OBD), check DTC memory of all systems

Special tools, testers and auxiliary items required



Vehicle Diagnosis, Testing and Information System VAS 5051 A or

Vehicle Diagnosis and Service System VAS 5052 or subsequent devices



Diagnostic cable VAS 5051/6A

- Connect the diagnostic tester ⇒ [01-6, Diagnostic scan tool, connecting](#)
- Switch ignition on.
- On the display of the diagnostic tester, select the mode of operation "Guided Fault-finding" .

- Then, perform the vehicle identification procedure on the diagnostic tester.
- Select the function "Vehicle system test" on the display of the diagnostic tester.
- Start the system test by pressing the button "Start system test" on the display of the diagnostic tester.

Now the DTC memories of all possible control modules for this vehicle type are checked.

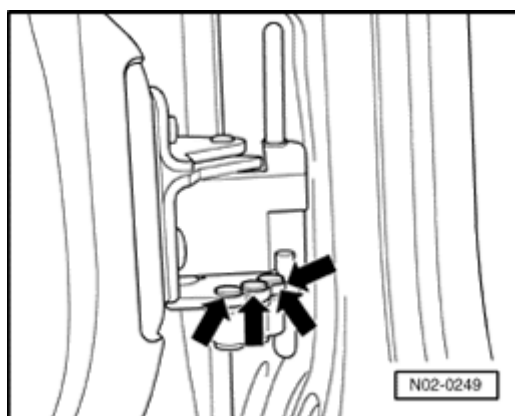
Note:

If the repair procedure is to be continued at a later time, e.g. after conclusion of maintenance, end the mode of operation "Guided Fault Finding". The DTC memory will not be cleared. This means that at a later time the "Guided Fault Finding" can be continued.

- End the system test by pressing Exit "End" or continue with fault-finding by changing the mode of operation.

Door check strap, lubricating

Perform the following work sequence:

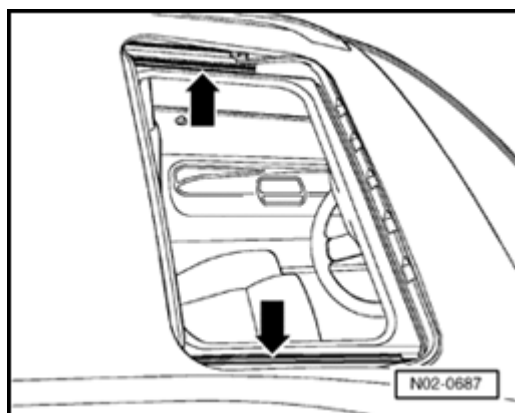


- Lube the door arrester at the areas indicated by the - **arrows** - .
- Use lubrication paste G 000 150 or lock cylinder grease spray G052778A2 .

Sunroof, checking function, cleaning and lubricating guide rails

Perform the following work sequence:

- Check function of sunroof.



- Clean guide rails - **arrows** - and lubricate with special grease. G 000 450 02

Windshield wash/wipe system and headlight wash system, check function

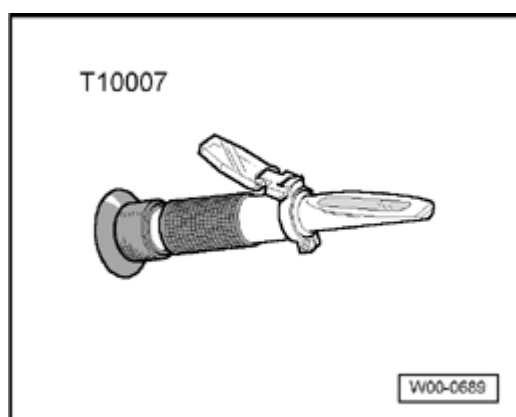
Note:

If during function test it is determined that wiper blades pulsate or make noises, check installed angle of wiper blades. ⇒ [01-7, Windshield wiper blades, check for damage; check parked position, if necessary adjust; with pulsating wiper blades, check angle setting, adjust if necessary](#)

Checking windshield wash/wipe system freeze protection concentration, add fluid if necessary

Checking freeze protection concentration:

Special tools, testers and auxiliary items required



Refractometer T10007

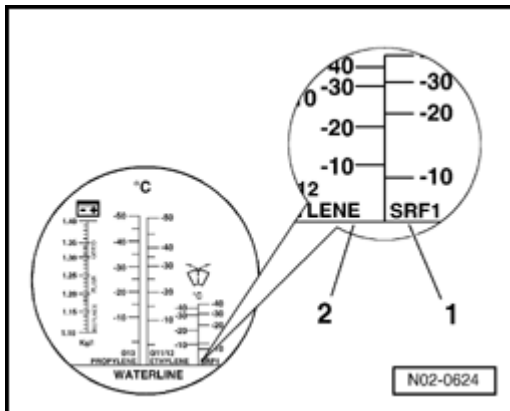
Note:

Read bright/dark boundary to obtain an accurate reading

for following tests. Place a drop of water on glass to improve readability of bright/dark boundary. Bright/dark boundary can be clearly recognized on "WATERLINE".

- Check concentration of anti-freeze additive using Refractometer T10007 (operating instructions).

Scale - 1 - of the Refractometer T10007 is designed specifically for genuine Volkswagen windshield cleaner "G052164".



Scale - 2 - is designed for commercially available windshield cleaner as well as a mixture of commercially available windshield cleaner and "G052164".

Mixture ratio:

Freeze protection to	W/shield clear G 052 164	Water
1.4 ° F - -0.4 ° F (-17/-18 ° C)	1 part	3 parts
-7.4 ° F - -9.4 ° F (-22/-23 ° C)	1 part	2 parts
-34.6 ° F - -36.4 ° F (-37/-38 ° C)	1 part	1 part

Topping-off with fluid:

Windshield wash/wipe system fluid reservoir must be filled up to edge.

Use only "Genuine Volkswagen Windshield Clear" all-year-round when topping-off windshield/wash/wipe system.

Note:

Vehicles with fan type spray nozzles must be filled with "Genuine Volkswagen windshield clear G052164" as this fluid has a low viscosity at minus temperatures. Complicated spray jet system could otherwise become blocked due to crystallized washer fluid and adversely affect fan pattern of spray jet. "Genuine Volkswagen windshield clear" assures that fan type spray nozzles remain functional even at low temperatures.

Genuine Volkswagen windshield cleaner "G052164" protects spray nozzles, fluid reservoir and hoses from freezing.

Use genuine Volkswagen windshield cleaner "G052164" in warmer periods of year also. Powerful cleaner removes wax and oil deposits from windows.

Freeze protection must be guaranteed to approx. 5 ° F (-15 ° C (approx. -31 ° F (-35 ° C) in countries with an arctic climate) in windshield washer system.

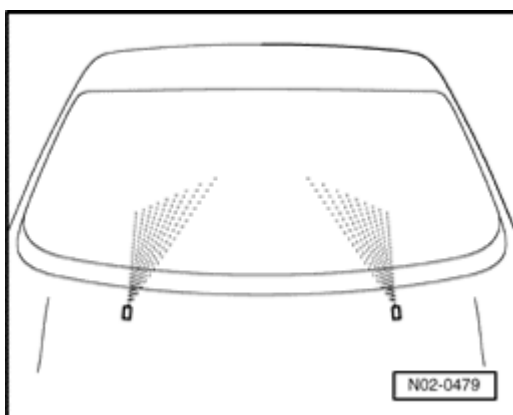
Windshield washer system, check jet setting, adjust nozzles if necessary

Windshield

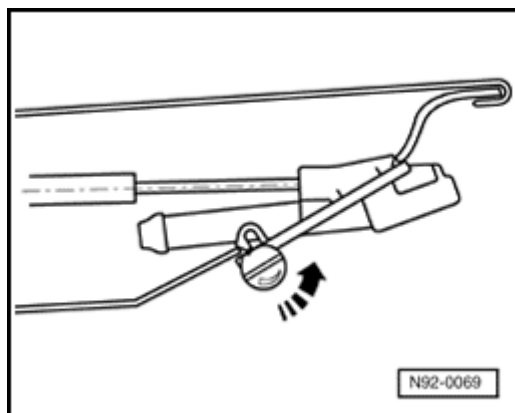
Note:

spray nozzles must not be cleaned opposite to direction of spray. e.g. blown-through from front.

Washer nozzles are preset. Small height adjustments can be made.



If both spray fields are not at same height, adjust spray direction upward or downward as follows:



- Turn eccentric at spray nozzles with a screwdriver in direction of - arrow - .

Rear window

Special tools, testers and auxiliary items required



Washer jet adjuster VAS 3125A

Note:

If spray field is uneven or does not adjust to middle of wiper field, replace washer jet (repair measures).

Never use a needle or similar tool to adjust washer nozzles, as damage to washer jet water canal may result.

- Check washer jet setting.

Rear window washer jet setting

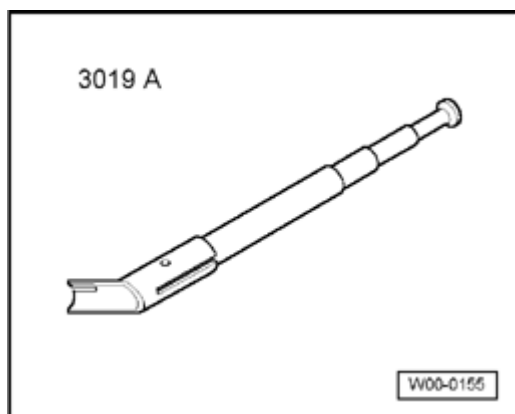
Spray field should make contact in middle of wiper field.

- If necessary, adjust washer jet with Washer jet adjuster VAS 3125A .

Headlight wash/wipe system (Golf), check jet setting, adjust nozzles if necessary

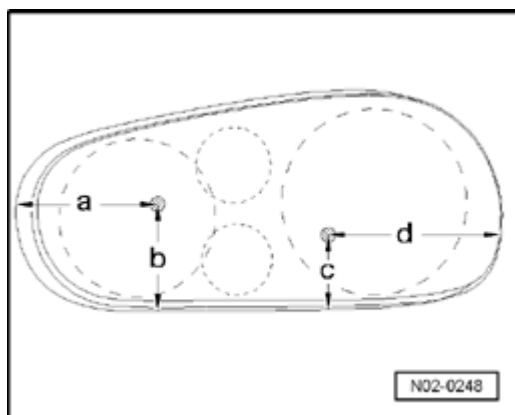
Headlight wash/wipe system (Jetta). ⇒ [01-7, Headlight wash/wipe system \(Jetta\), check jet setting, adjust nozzles if necessary](#)

Special tools, testers and auxiliary items required



Adjustment tool VAS 3019A

Perform following work sequence:



Spray jet adjustment for left headlight (right headlight is identical but reversed):

- Check spray jet setting.

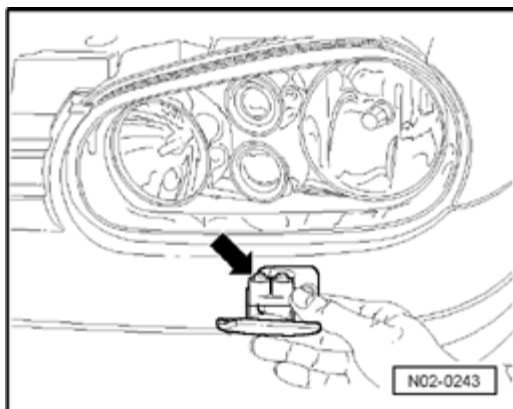
a 100 mm

c 55 mm

b 75 mm

d 125 mm

- If necessary, adjust spray nozzles as follows:



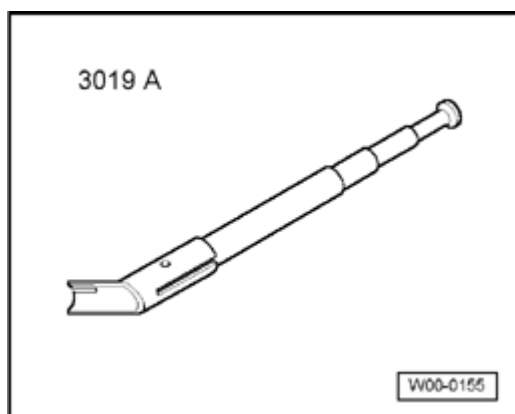
- Pull spray nozzles - **arrow** - out to stop and adjust spray to applicable points using Adjustment tool VAS 3019A .

Note:

If spray field is uneven or does not adjust to aforementioned specifications, replace washer jet (repair measures).

Headlight wash/wipe system (Jetta), check jet setting, adjust nozzles if necessary

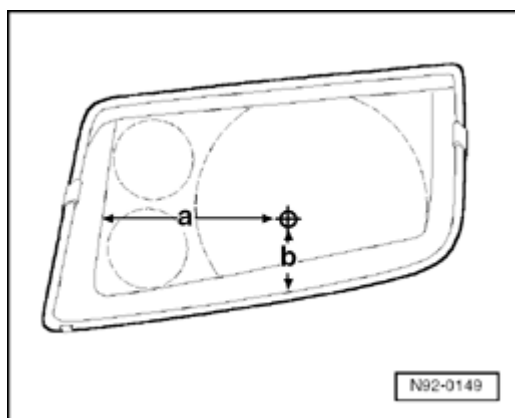
Special tools, testers and auxiliary items required



Adjustment tool VAS 3019A

Perform following work sequence:

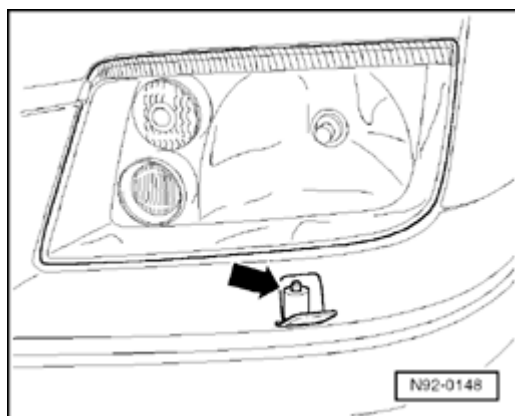
Spray jet adjustment for left headlight (right headlight is identical but reversed):



- Check spray jet setting:

a	165 mm
b	55 mm

- If necessary, adjust spray nozzles as follows:



- Pull spray nozzles - **arrow** - out to stop and adjust spray to applicable points using Adjustment tool VAS 3019A .

Note:

If spray field is uneven or does not adjust to aforementioned specifications, replace washer jet (repair measures).

Windshield wiper blades, check for damage; check parked position, if necessary adjust; with pulsating wiper blades, check angle setting, adjust if necessary

Windshield wiper blades parked position, adjust if necessary:

- Perform work sequence \Rightarrow *Repair Manual, Electrical equipment, Rep.-Gr.92; Windshield wash/wipe system;*

Windshield wiper system; Windshield wiper blades parked position, adjusting

Windshield wiper blades, check angle setting, adjust if necessary

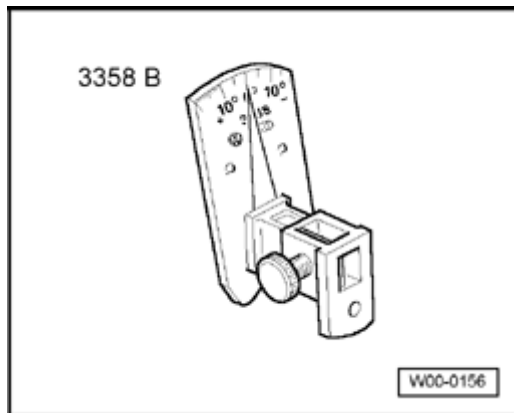
Note:

With the installation of Aero wiper blades the angle setting examination of the wiper arms is not valid.

The angle setting of the Aero wiper arm is always the same and can not be changed or adjusted.

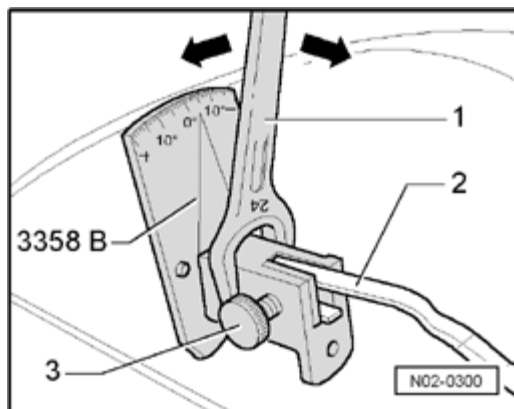
Check the angle setting of other wiper blades, and only if the wiper blades pulsate or make noise.

Special tools, testers and auxiliary items required



Wiper blade adjuster VAS 3358B

- Park windshield wiper arms.
- Remove windshield wiper.

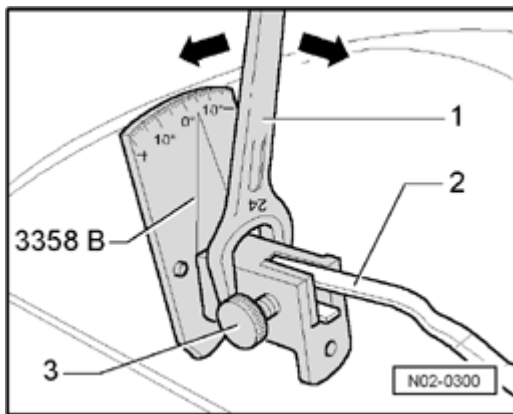


- Set windshield wiper arm - **2** - in the Wiper blade adjuster VAS 3358B and secure with the locking screw - **3** - .

- Check the angle setting.

Angle setting (specified values) for	
Left-hand drive vehicles	
Driver side	- 8.5 °
Passenger side	- 1.0 °
Rear wiper	0 °
Tolerance	± 2 °

If necessary, adjust angle setting to specified value as follows:



- Apply 24 mm open end wrench - **1** - on adjustment device and set wiper arm - **2** - to specified value - **arrows** - .
- Release wiper arm - **2** - from adjustment fixture and again tighten lock screw - **3** - .
- Compare adjusted value with specified value. If necessary repeat procedure until specified value is reached.
- Remove adjustment fixture and reinstall wiper blade.
- Check wiper blade for pulsation-free operation.

Transportation wiper blades, removing at vehicle delivery

Service

For all Models arriving at your dealership with transportation wiper blades:

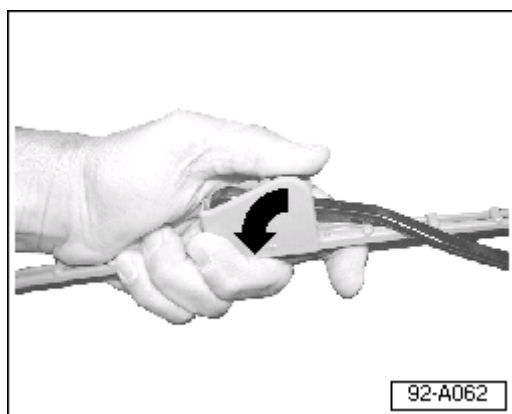
Transportation wiper blades are shorter than original equipment wiper blades and colored blue or yellow.

Original equipment blades are temporarily installed during Perfect Delivery Inspection to check wiper blade park position.

To ensure customer satisfaction, leave transportation wiper blades on vehicle until time of retail vehicle delivery.

Transportation wiper blades, removing

Transportation blades can easily be removed as follows:



- Grasp blade as shown and rotate in direction of - **arrow** - (toward windshield).
- Rotate blade in opposite direction (- **arrow** -) then carefully slide blade off wiper arm.

Note:

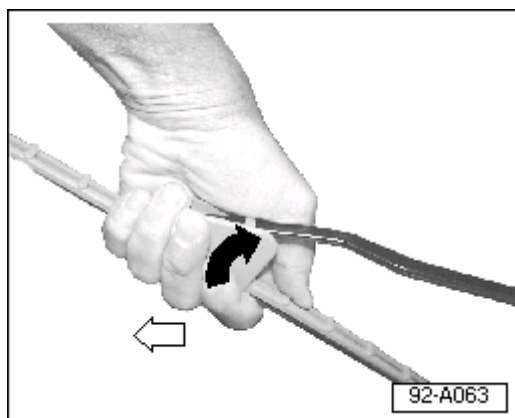
Wiper arm/blade alignment has been preset at factory then checked and adjusted (if necessary) during PDI.

DO NOT twist or bend wiper arm. If wiper arm/blade alignment is incorrect, chattering and/or streaking will occur.

If arm has been bent:

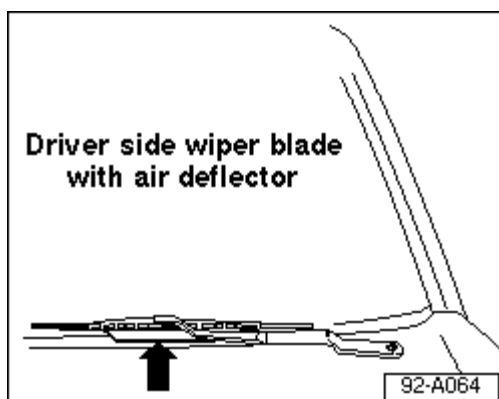
- Refer to

⇒ *Repair Manual, Electrical Equipment, Repair Group 92,*

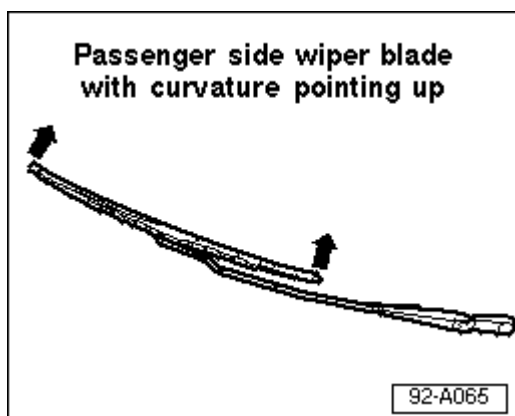


- Install original equipment wiper blades (located in trunk) at time of retail vehicle delivery.

Note:



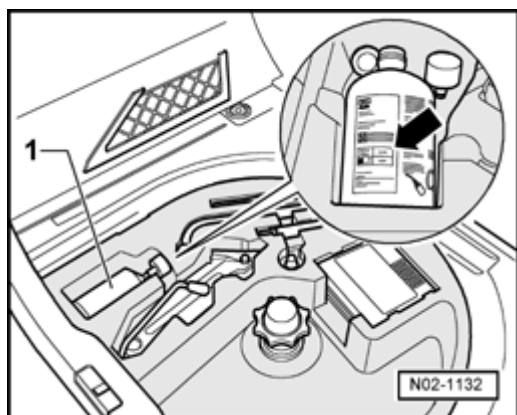
*Wiper blade with air deflector - **arrow** - must be installed on drivers side with deflector on bottom of wiper blade.*



*Passengers side wiper blade may be curved. Install with curved ends of blade pointing up - **arrow** - .*

Break-down set, replace tire sealant (when shelf-life has expired)

Golf R32



The tire sealant is located in the luggage compartment - **1** -

- Verify the expiration date.

The expiration date is printed on the tire sealant - **arrow** - .

- Replace the tire sealant when it is more than 3 years old.

Note:

If the tire sealant was already used once, it must be replaced.

Observe waste disposal regulations!

Tires, checking tire condition, wear pattern, inflation pressure and tread depth

Note:

For reasons of safety, only tires of same type and tread pattern should be installed on a vehicle.

On All Wheel Drive (AWD) vehicle tires of same type and tread pattern must be used. Otherwise center differential may be damaged.

Checking condition

Perform following work sequence:

Delivery inspection

- Check tires (tread and side walls) for damage and remove foreign bodies for example nails and glass splinters if necessary.

- Check that tires are same type and tread pattern.

Note:

If damage is found, it must be checked whether a new tire must be installed.

Maintenance service

- Check tires (tread and side walls) for damage and remove foreign bodies for example nails and glass splinters if necessary.

- Check tires for scuffing, one sided wear, porous side walls, cuts and fractures.

Note:

Customer must be informed of malfunctions found.

Checking tire wear pattern

Wear pattern of front wheels can be used to assess whether a check of track and camber is necessary:

"Feathering" on tread indicates incorrect toe setting.

One-sided tread wear is mainly attributed to incorrect camber.

When wear of this nature is noticed determine cause by performing alignment checks (repair measure).

Tire tread depth (including spare), checking

- Check tire tread depth

Minimum depth: 1.6 mm

Note:

This value may vary for individual countries due to different legislative regulations.

Minimum tread depth is reached when tires have worn down level with 1.6 mm high tread wear indicators positioned at intervals around tire.

If tread depth is approaching legal minimum permissible depth, customer must be informed.

Tire inflation pressure (including spare wheel),

checking and correcting inflation pressures if necessary

Special tools, testers and auxiliary items required

Tire pressure gauge

Note:

Observe that inflation pressure specifications refer to air pressure of cold tires. Do not reduce increased pressures on warm tires.

Important information about winter tires in "Fault finding - Wheels/Tires. Chapter 4; No. 2" .

Tires pressures for relevant model are on a sticker attached to inside of fuel tank flap.

Golf ⇒ [01-7, Tire inflation pressure table for normal tires](#)

GTI and R32 (AWD) ⇒ [01-7, GTI and R32 with all-wheel drive \(AWD\)](#)

Jetta ⇒ [01-7, Jetta](#)

Jetta with all-wheel drive ⇒ [01-7, Jetta with all-wheel drive \(AWD\)](#)

Golf Wagon. Jetta Wagon ⇒ [01-7, Golf Wagon, Jetta Wagon](#)

Golf wagon with all-wheel drive (AWD), Jetta wagon with all-wheel drive (AWD) ⇒ [01-7, Golf wagon with all-wheel drive \(AWD\), Jetta wagon with all-wheel drive \(AWD\)](#)

Tire inflation pressure table for normal tires

(For all factory installed tire sizes)

Tire pressure in bar

Golf

	Half load		Full load	
	front	rear	front	rear
Vehicles with gasoline engine:				
2.0l/85kW				
with tires				
195/65 R 15	1.9	1.9	2.1	2.6
205/60 R 15	1.9	1.9	2.1	2.6

205/55 R 16	1.9	1.9	2.1	2.6
225/45 R 17	1.9	1.9	2.1	2.6
Vehicles with diesel engine:				
1.9l/50kW				
with tires				
175/80 R 14	1.9	1.9	2.2	3.0
195/65 R 15	1.9	1.9	2.1	2.6
205/60 R 15	1.9	1.9	2.1	2.6
205/55 R 16	1.9	1.9	2.1	2.6
1.9l/66kW				
with tires				
195/65 R 15	1.9	1.9	2.1	2.6
205/60 R 15	1.9	1.9	2.1	2.6
205/55 R 16	1.9	1.9	2.1	2.6
225/45 R 17	1.9	1.9	2.1	2.6
1.9l/74kW				
with tires				
195/65 R 15	2.0	1.9	2.2	2.6
205/55 R 16	2.0	1.9	2.2	2.6
225/45 R 17	2.0	1.9	2.2	2.6
1.9l/81kW				
➤ 04.00				
with tires				
195/65 R 15	1.9	1.9	2.1	2.6
205/60 R 15	1.9	1.9	2.1	2.6
205/55 R 16	1.9	1.9	2.1	2.6
1.9l/81kW				
05.00 ➤				
with tires				
195/65 R 15	2.0	1.9	2.2	2.6
205/55 R 16	2.0	1.9	2.2	2.6
225/45 R 17	2.0	1.9	2.2	2.6
1.9l/85kW				
➤ 04.00				
with tires				
195/65 R 15	1.9	1.9	2.1	2.6
205/60 R 15	1.9	1.9	2.1	2.6
205/55 R 16	1.9	1.9	2.1	2.6
1.9l/85kW				
05.00 ➤				
with tires				
195/65 R 15	2.0	1.9	2.2	2.6
205/55 R 16	2.0	1.9	2.2	2.6
225/45 R 17	2.0	1.9	2.2	2.6
1.9l/96kW				
with tires				
195/65 R 15	2.1	1.9	2.3	2.6
205/55 R 16	2.1	1.9	2.3	2.6
225/45 R 17	2.1	1.9	2.3	2.6
1.9l/110kW				
with tires				
195/65 R 15	2.1	1.9	2.3	2.6

205/55 R 16	2.1	1.9	2.3	2.6
225/45 R 17	2.1	1.9	2.3	2.6
Spare wheel (all vehicles)				
Normal tire	Keep highest pressure intended for vehicle			

GTI and R32 with all-wheel drive (AWD)

	Half load		Full load	
	front	rear	front	rear
Vehicles with gasoline engine:				
1.8l/92kW				
with tires				
195/65 R 15	1.9	1.9	2.3	2.6
205/60 R 15	1.9	1.9	2.3	2.6
205/55 R 16	1.9	1.9	2.3	2.6
225/45 R 17	1.9	1.9	2.3	2.6
2.0l/85kW				
with tires				
195/65 R 15	1.9	1.9	2.3	2.6
205/55 R 16	1.9	1.9	2.3	2.6
225/45 R 17	1.9	1.9	2.3	2.6
2.8l/150kW				
➤ 04.00				
with tires				
205/55 R 16	2.4	2.2	2.6	3.0
2.8l/150kW				
05.00 ➤				
with tires				
205/55 R 16	2.3	2.2	2.5	2.8
225/45 R 17	2.3	2.2	2.5	2.8
3.2l/177kW				
with tires				
225/45 R 17	2.7	2.5	2.9	3.3
225/40 R 18	2.5	2.3	2.7	3.1
Vehicles with diesel engine:				
1.9l/66kW				
with tires				
195/65 R 15	1.9	1.9	2.3	2.6
205/60 R 15	1.9	1.9	2.3	2.6
205/55 R 16	1.9	1.9	2.3	2.6
225/45 R 17	1.9	1.9	2.3	2.6
1.9l/74kW				
with tires				
195/65 R 15	1.9	1.9	2.3	2.6
205/55 R 16	1.9	1.9	2.3	2.6
225/45 R 17	1.9	1.9	2.3	2.6
1.9l/85kW				
with tires				
195/65 R 15	1.9	1.9	2.3	2.6
205/60 R 15	1.9	1.9	2.3	2.6
205/55 R 16	1.9	1.9	2.3	2.6

225/45 R 17	1.9	1.9	2.3	2.6
1.9l/96kW with tires				
195/65 R 15	2.1	2.1	2.3	2.6
205/55 R 16	2.1	2.1	2.3	2.6
225/45 R 17	2.1	2.1	2.3	2.6
1.9l/110kW with tires				
195/65 R 15	2.2	2.2	2.4	2.8
205/55 R 16	2.2	2.2	2.4	2.8
225/45 R 17	2.2	2.2	2.4	2.8
Spare wheel (all vehicles)				
Normal tire	Keep highest pressure intended for vehicle			

Jetta

	Half load		Full load	
	front rear		front rear	
Vehicles with gasoline engine:				
1.8l/92kW with tires				
195/65 R 15	1.9	1.9	2.1	2.8
205/60 R 15	1.9	1.9	2.1	2.8
205/55 R 16	1.9	1.9	2.1	2.8
225/45 R 17	1.9	1.9	2.1	2.8
1.8l/110kW with tires				
195/65 R 15	2.1	1.9	2.3	2.9
205/55 R 16	2.1	1.9	2.3	2.9
225/45 R 17	2.1	1.9	2.3	2.9
2.0l/85kW with tires				
195/65 R 15	1.9	1.9	2.1	2.8
205/60 R 15	1.9	1.9	2.1	2.8
205/55 R 16	1.9	1.9	2.1	2.8
225/45 R 17	1.9	1.9	2.1	2.8
Vehicles with diesel engine:				
1.9l/50kW with tires				
195/65 R 15	1.9	1.9	2.1	2.8
205/60 R 15	1.9	1.9	2.1	2.8
205/55 R 16	1.9	1.9	2.1	2.8
1.9l/66kW with tires				
195/65 R 15	1.9	1.9	2.1	2.8
205/60 R 15	1.9	1.9	2.1	2.8
205/55 R 16	1.9	1.9	2.1	2.8
225/45 R 17	1.9	1.9	2.1	2.8
1.9l/74kW with tires				
195/65 R 15	2.0	1.9	2.2	2.8

205/55 R 16	2.0	1.9	2.2	2.8
225/45 R 17	2.0	1.9	2.2	2.8
1.9l/81kW				
➤ 04.00				
wih tires				
195/65 R 15	1.9	1.9	2.1	2.8
205/60 R 15	1.9	1.9	2.1	2.8
205/55 R 16	1.9	1.9	2.1	2.8
1.9l/81kW				
05.00 ➤				
wih tires				
195/65 R 15	2.0	1.9	2.2	2.8
205/55 R16	2.0	1.9	2.2	2.8
225/45 R 17	2.0	1.9	2.2	2.8
1.9l/85kW				
➤ 04.00				
wih tires				
195/65 R 15	1.9	1.9	2.1	2.8
205/60 R 15	1.9	1.9	2.1	2.8
205/55 R 16	1.9	1.9	2.1	2.8
1.9l/85kW				
05.00 ➤				
wih tires				
195/65 R 15	2.0	1.9	2.2	2.8
205/55 R 16	2.0	1.9	2.2	2.8
225/45 R 17	2.0	1.9	2.2	2.8
1.9l/96kW				
with tires				
195/65 R 15	2.1	1.9	2.3	2.9
205/55 R 16	2.1	1.9	2.3	2.9
225/45 R 17	2.1	1.9	2.3	2.9
1.9l/110kW				
with tires				
195/65 R 15	2.1	1.9	2.3	2.9
205/55 R 16	2.1	1.9	2.3	2.9
225/45 R 17	2.1	1.9	2.3	2.9
1.9l/110kW				
with tires				
195/65 R 15	2.1	1.9	2.3	2.9
205/55 R 16	2.1	1.9	2.3	2.9
225/45 R 17	2.1	1.9	2.3	2.9
Spare wheel (all vehicles)				
Normal tire	Keep highest pressure intended for vehicle			

Jetta with all-wheel drive (AWD)

Half load	Full load
front rear	front rear
Vehicles with gasoline engine:	
Half load	Full load

	front rear		front rear	
1.8l/92kW				
with tires				
195/65 R 15	1.9	1.9	2.4	3.0
205/60 R 15	1.9	1.9	2.4	3.0
205/55 R 16	1.9	1.9	2.4	3.0
225/45 R 17	1.9	1.9	2.4	3.0
2.0l/85kW				
with tires				
195/65 R 15	1.9	1.9	2.4	3.0
205/55 R 16	1.9	1.9	2.0	3.0
225/45 R 17	1.9	1.9	2.4	3.0
2.8l/150kW				
➤ 04.00				
with tires				
205/55 R 16	2.3	2.1	2.5	3.1
2.8l/150kW				
05.00 ➤				
with tires				
205/55 R 16	2.3	2.2	2.5	3.1
225/45 R 17	2.3	2.2	2.5	3.1
Vehicles with diesel engine:				
1.9l/66kW				
with tires				
195/65 R 15	1.9	1.9	2.4	3.0
205/60 R 15	1.9	1.9	2.4	3.0
205/55 R 16	1.9	1.9	2.4	3.0
225/45 R 17	1.9	1.9	2.4	3.0
1.9l/74kW				
with tires				
195/65 R 15	1.9	1.9	2.4	3.0
205/55 R 16	1.9	1.9	2.4	3.0
225/45 R 17	1.9	1.9	2.4	3.0
1.9l/85kW				
with tires				
195/65 R 15	2.0	2.0	2.4	3.0
205/60 R 15	2.0	2.0	2.4	3.0
205/55 R 16	2.0	2.0	2.4	3.0
225/45 R 17	2.0	2.0	2.4	3.0
1.9l/96kW				
with tires				
195/65 R 15	2.1	1.9	2.4	3.0
205/55 R 16	2.1	1.9	2.4	3.0
225/45 R 17	2.1	1.9	2.4	3.0
1.9l/110kW				
with tires				
195/65 R 15	2.1	1.9	2.4	3.0
205/55 R 16	2.1	1.9	2.4	3.0
225/45 R 17	2.1	1.9	2.4	3.0
Spare wheel (all vehicles)				
Normal tire	Keep highest pressure intended for vehicle			

Golf Wagon, Jetta Wagon

	Half load		Full load	
	front rear		front rear	
Vehicles with gasoline engine:				
1.8l/92kW				
with tires				
195/65 R 15	1.9	1.9	2.3	3.0
205/60 R 15	1.9	1.9	2.3	3.0
205/55 R 16	1.9	1.9	2.3	3.0
225/45 R 17	1.9	1.9	2.3	3.0
2.0l/85kW				
with tires				
195/65 R 15	1.9	1.9	2.3	3.0
205/60 R 15	1.9	1.9	2.3	3.0
205/55 R 16	1.9	1.9	2.3	3.0
225/45 R 17	1.9	1.9	2.3	3.0
Vehicles with diesel engine:				
1.9l/50kW				
with tires				
195/65 R 15	1.9	1.9	2.3	3.0
205/60 R 15	1.9	1.9	2.3	3.0
205/55 R 16	1.9	1.9	2.3	3.0
1.9l/66kW				
with tires				
195/65 R 15	1.9	1.9	2.3	3.0
205/60 R 15	1.9	1.9	2.3	3.0
205/55 R 16	1.9	1.9	2.3	3.0
225/45 R 17	1.9	1.9	2.3	3.0
1.9l/74kW				
with tires				
195/65 R 15	1.9	1.9	2.3	3.0
205/55 R 16	1.9	1.9	2.3	3.0
225/45 R 17	1.9	1.9	2.3	3.0
1.9l/81kW				
with tires				
195/65 R 15	1.9	1.9	2.3	3.0
205/60 R 15	1.9	1.9	2.3	3.0
205/55 R 16	1.9	1.9	2.3	3.0
225/45 R 17	1.9	1.9	2.3	3.0
1.9l/85kW				
➤ 04.99				
with tires				
195/65 R 15	1.9	1.9	2.3	3.0
205/60 R 15	1.9	1.9	2.3	3.0
205/55 R 16	1.9	1.9	2.3	3.0
1.9l/85kW				
05.99 ➤				
with tires				
195/65 R 15	2.0	1.9	2.3	3.0
205/60 R 15	2.0	1.9	2.3	3.0

205/55 R 16	2.0	1.9	2.3	3.0
225/45 R 17	2.0	1.9	2.3	3.0
1.9l/96kW with tires				
195/65 R 15	1.9	1.9	2.3	3.0
205/55 R 16	1.9	1.9	2.3	3.0
225/45 R 17	1.9	1.9	2.3	3.0
1.9l/110kW with tires				
195/65 R 15	1.9	1.9	2.3	3.0
205/55 R 16	1.9	1.9	2.3	3.0
225/45 R 17	1.9	1.9	2.3	3.0
Spare wheel (all vehicles)				
Normal tire	Keep highest pressure intended for vehicle			

Golf wagon with all-wheel drive (AWD), Jetta wagon with all-wheel drive (AWD)

	Half load		Full load	
	front rear		front rear	
Vehicles with gasoline engine:				
1.8l/92kW with tires				
195/65 R 15	2.0	2.0	2.5	3.2
205/60 R 15	2.0	2.0	2.5	3.2
205/55 R 16	2.0	2.0	2.5	3.2
225/45 R 17	2.0	2.0	2.5	3.2
2.0l/85kW with tires				
195/65 R 15	2.0	2.0	2.5	3.2
205/60 R 15	2.0	2.0	2.5	3.2
205/55 R 16	2.0	2.0	2.5	3.2
225/45 R 17	2.0	2.0	2.5	3.2
2.8l/150kW ➤ 04.00 with tires				
205/55 R 16	2.4	2.2	2.6	3.3
2.8l/150kW 05.00 ➤ with tires				
205/55 R 16	2.3	2.1	2.5	3.2
225/45 R 17	2.3	2.1	2.5	3.2
Vehicles with diesel engine:				
1.9l/66kW with tires				
195/65 R 15	2.0	2.0	2.5	3.2
205/60 R 15	2.0	2.0	2.5	3.2
205/55 R 16	2.0	2.0	2.5	3.2
225/45 R 17	2.0	2.0	2.5	3.2
1.9l/74kW with tires				

195/65 R 15	2.0	2.0	2.5	3.2
205/55 R 16	2.0	2.0	2.5	3.2
225/45 R 17	2.0	2.0	2.5	3.2
1.9l/85kW with tires				
195/65 R 15	2.0	2.0	2.5	3.2
205/60 R 15	2.0	2.0	2.5	3.2
205/55 R 16	2.0	2.0	2.5	3.2
225/45 R 17	2.0	2.0	2.5	3.2
1.9l/96kW with tires				
195/65 R 15	2.1	2.1	2.5	3.2
205/55 R 16	2.1	2.1	2.5	3.2
225/45 R 17	2.1	2.1	2.5	3.2
1.9l/110kW with tires	2.1	1.9	2.4	3.0
195/65 R 15	2.1	1.9	2.4	3.0
205/55 R 16				
225/45 R 17				
Spare wheel (all vehicles)				
Normal tire	Keep highest pressure intended for vehicle			

Engine oils

Released engine oil standards for vehicles

For released engine oil standards refer to ⇒ *Fluid Capacity Charts for appropriate model year*

Oil characteristics

Multi-weight oil conforming to VW standard 503 00, 506 00 for extended service intervals, are oils with the following characteristics:

Durable engine protection between the extended service intervals.

Protection from performance-reducing deposits.

High viscosity for consistent high fuel economy under all driving conditions.

Durable stability for consistent high efficiency during long distance driving.

Reduced pollutant emissions through decreased fuel consumption.

Multi-weight oil conforming to VW standard 501 01 and 505 00 are oils with the following characteristics:

All-season use in moderate climate zones.

Excellent cleansing properties.

Secure lubrication properties at all engine temperatures and load conditions.

High resistance to aging.

Multi-weight, light duty oil conforming to VW standard 500 00 furthermore include the following characteristics:

All-season use in almost every possible outside temperature.

Decreases friction loss in the engine.

Best possible cold start properties, even at very low temperatures.

Multi-weight, light duty oil conforming to VW standard 502 00:

This oil is suitable for gasoline engines, conforms to VW standard 501 01, 505 00, as well as 500 00, and furthermore includes the following characteristics: It is particularly suitable for the use in extreme operating conditions, e.g. difficult road conditions, predominant use of trailer, abundance of uphill driving, and driving in hot climate zones.

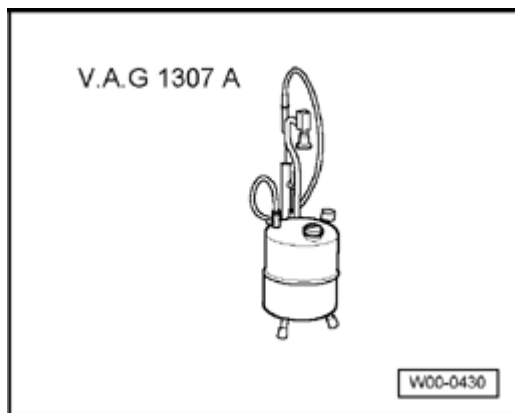
Note:

Single-grade oils are generally not used all year round because of their limited viscosity range. Therefore, these oils should only be used in extreme climate zones.

When using multi-weight oil SAE 5W-30, continuous high engine speeds and constant strong load must be avoided. This restriction does not apply to multi-weight, light duty oils.

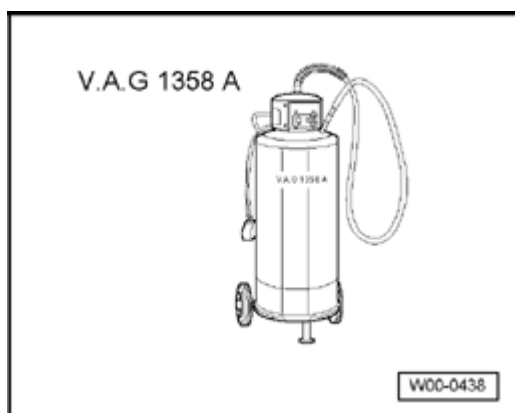
**Engine oil, draining or extracting and filling;
replacing oil filter**

Special tools, testers and auxiliary items required

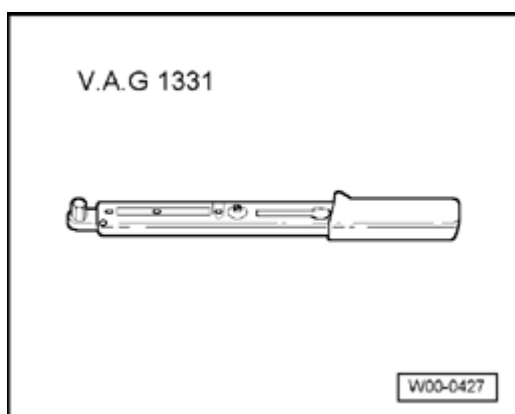


Oil extractor V.A.G 1307 A

or



Oil extractor V.A.G 1358 A



Torque wrench V.A.G 1331/ (5 - 50 Nm)

Note:

If oil is drained and not extracted with oil extractor, replace seal for oil drain plug. This helps prevent possible leaks.

Observe waste disposal regulations!

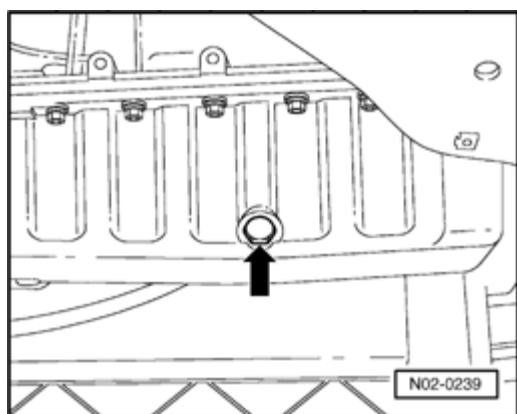
Turbo-engines:

- After engine oil and oil filter have been replaced, observe following when first starting engine:

As long as oil pressure warning light in instrument panel insert flashes, engine is only to run at idle. Do not touch accelerator pedal! Bumping accelerator pedal can damage turbocharger or destroy it completely.

Only when warning light turns off, is full oil pressure achieved, and engine can be accelerated.

Capacities with filter change: ⇒ *Additional Information. Fluid Capacity Charts for appropriate model year*



Tightening torque for oil drain plug (Replace if leaking) - **arrow** - :

Note:

Remember that following torque specifications must not be exceeded. A higher torque can lead to leaks in area of drain plug or even to damage.

4-cylinder engine 30 Nm

6-cylinder engine 30 Nm

Oil specification for gasoline engines:

For oil specification for gasoline engines, please refer to:

⇒ **Additional Information. Fluid Capacity Charts for appropriate model year**

Oil specification for diesel engines

For oil specification for gasoline engines, please refer to:

⇒ **Additional Information. Fluid Capacity Charts for appropriate model year**

Due to individual characteristics of oils ⇒ [01-7, Oil characteristics](#) use only following released engine oils:

Oil characteristics

Multi-weight oil conforming to VW standard 501 01 has following characteristics:

All-season use in moderate climate zones.

Excellent cleansing properties.

Secure lubrication properties at all engine temperatures and load conditions.

High resistance to aging.

Multi-weight light duty oil conforming to VW standard 500 00 furthermore include following characteristics:

All-season use in almost every possible outside temperature.

Decreases friction loss in engine.

Best possible cold start properties. even at very low temperatures.

Multi-weight light duty oil conforming to VW standard 502 00:

This oil is suitable for gasoline engines, conforms to VW standard 501 00. 505 00. as well as 500 00. furthermore, includes following characteristics: It is particularly suitable for use in extreme operating conditions, e.g. difficult road conditions, predominant use of trailer. abundance of uphill driving, and driving in hot climate zones.

Note:

Single-grade oils are generally not used all year round because of their limited viscosity range. Therefore, these oils should only be used in extreme climate zones.

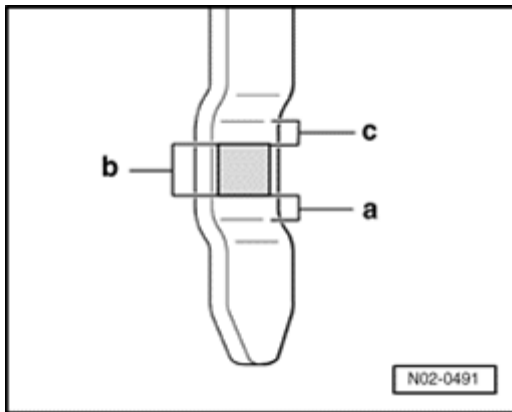
When using multi-weight oil SAE 5W-30, continuous high engine speeds and constant strong load must be avoided. This restriction does not apply to multi-weight light duty oils.

- After topping off with oil wait at least 3 minutes then check oil level.

- Pull out oil dipstick and wipe with clean rag. Replace dipstick and push down to stop.

Note:

Observe waste disposal regulations!



- Pull out dipstick and read oil level.

Area a Oil must be topped off. It is sufficient when oil level is within area - b - after topping off.

- Area b Oil does not have to be topped off.

-

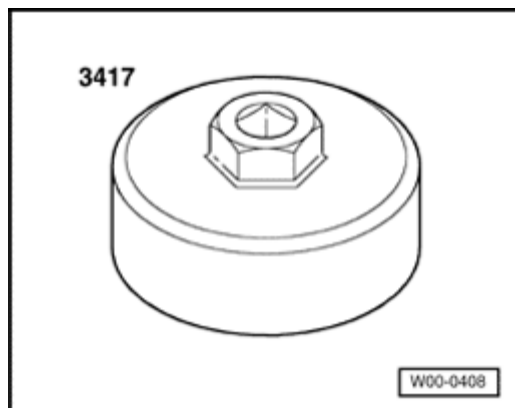
Area c - Oil must not be topped off.

Note:

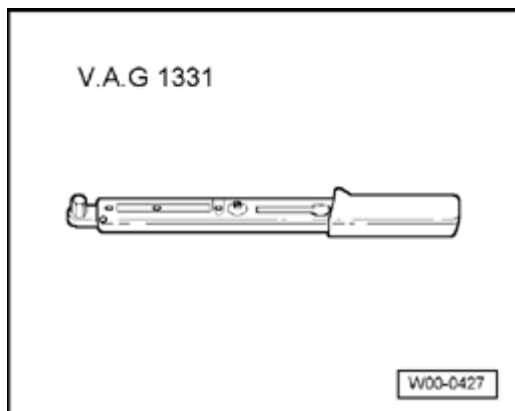
If oil level is above area - c - , catalytic converter can be damaged.

Oil filter, replacing

Special tools, testers and auxiliary items required



Oil filter wrench VAS 3417



Torque wrench V.A.G 1331/ (5 - 50 Nm)

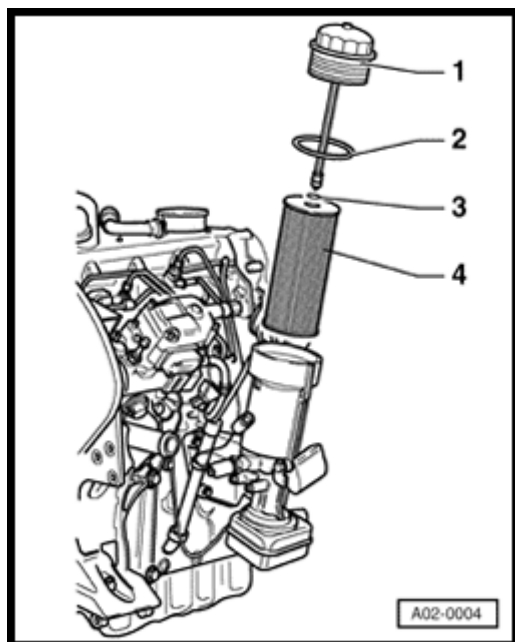
Oil filter wrench (commercially available)

or

Oil filter strap wrench

Perform following work sequence:

Engine code ALH



- Loosen cap - 1 - with Oil filter wrench VAS 3417 .

- Replace O-rings - 2 - and - 3 - along with oil filter - 4 - .

Note:

Observe waste disposal regulations!

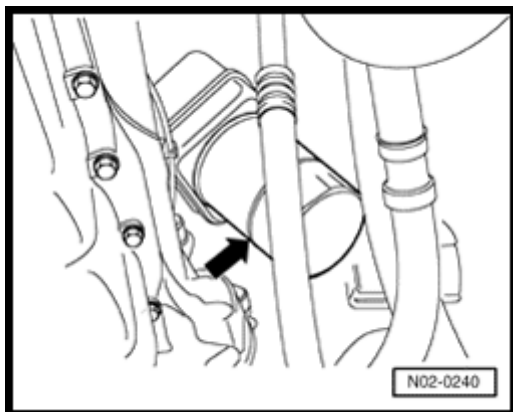
- Tighten cap - 1 - with Oil filter wrench VAS 3417 .

Cover tightening torque: 25 Nm

- Install engine cover.

Engine code AEG

- Remove engine sound insulator ⇒ [01-6, Engine compartment trim \(sound insulation\), removing and installing](#)



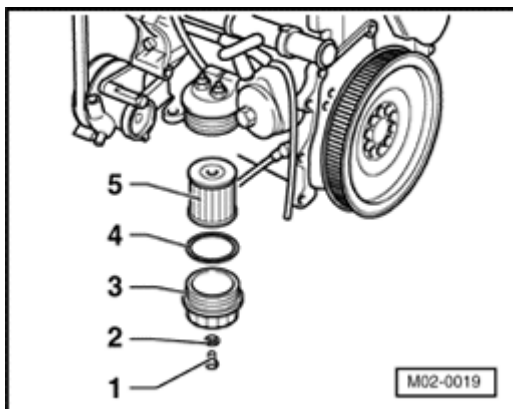
- Remove oil filter - **arrow** - using filter wrench or strap.

Note:

Observe waste disposal regulations!

- Clean engine sealing surface.
- Lightly oil rubber seal on new oil filter.
- Thread on new filter and tighten by hand.
- Install sound insulator.

Engine code AFP



- Drain oil via plug - 1 - .
- Remove filter lower part - 3 - with tools.

Note:

Observe waste disposal regulations!

- Install new filter element - 5 - and new O-ring - 4 - (moistened with oil).
- Tighten filter lower part to 25 Nm..

Engine and components in engine compartment (from above and below): Visual check for leaks and damage

Perform visual check as follows:

- Check engine and components in engine compartment for leaks and damage.
- Check hoses, pipes and connections of

Fuel system

Cooling and heating system

and brake system

For leaks, abrasions, porosity and brittleness.

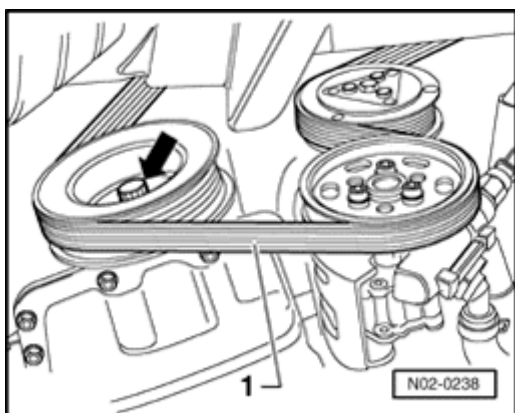
Note:

Ensure that all malfunctions detected are repaired within repair measures.

Determine cause of fluid loss which cannot be attributed to normal use and rectify (repair measure).

Ribbed belt, checking condition

Perform the following work sequence:



- Turn engine at vibration damper/ belt pulley - **arrow** - with socket wrench.

- Check ribbed belt - **1** - with raised vehicle from below for:

Sub-surface cracks (cracks, core ruptures, cross sectional breaks)

Layer separation (top layer, cord strands)

Base break-up

Fraying of cord strands

Flank wear (material wear, frayed flanks, flank brittleness - glassy flanks-, surface cracks)

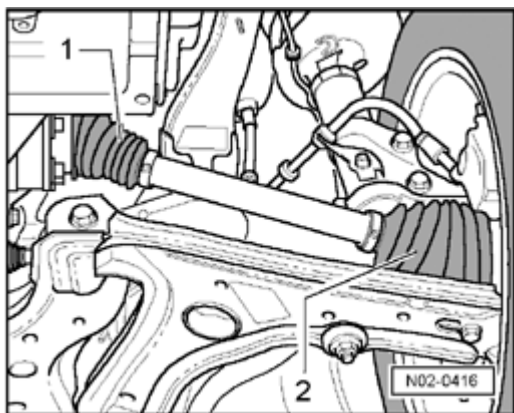
Traces of oil and grease

Note:

Replace the belt if any damage is found. This will avoid possible break-downs or operating problems. The replacement of a ribbed belt is a repair measure.

CV joint boots, visual inspection

Perform following work sequence:



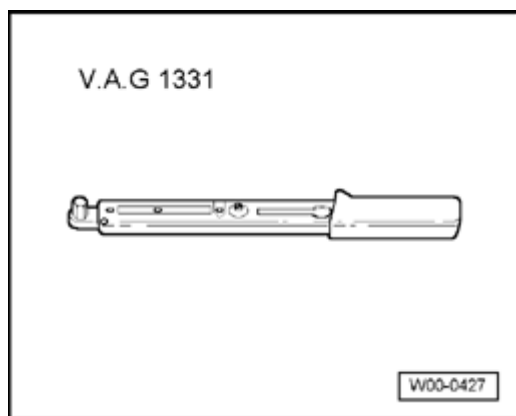
- Visually inspect outside CV joint boots - **2** - and inside CV joint boots - **1** - for leaks and damage.

Note:

On vehicles with all wheel drive, also inspect CV joint boots at rear axle.

Manual Transmission / final drive oil level, checking

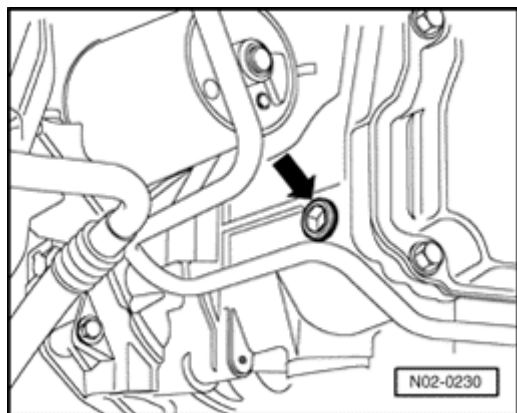
Special tools, testers and auxiliary items required



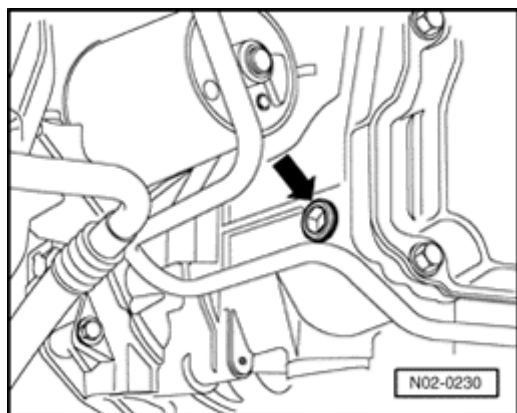
Torque wrench V.A.G 1331/ (5 - 50 Nm)

Perform the following work sequence:

5-speed manual transmission 02J

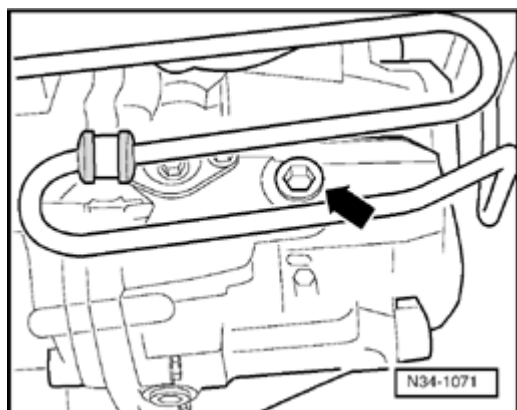


- Remove plug - **arrow** - from the oil filler hole.
- Check oil level: Oil level must be at lower edge of oil plug hole.
- If necessary top up with transmission oil "specification G 50 SAE 75W90 (synthetic oil)" to lower edge of oil filler hole.



- Install oil filler plug - **arrow** - and tighten to 25 Nm.

5 and 6-speed manual transmission 02M



- Remove plug - **arrow** - from the oil filler hole.
- Check oil level: Oil level must be at lower edge of oil plug

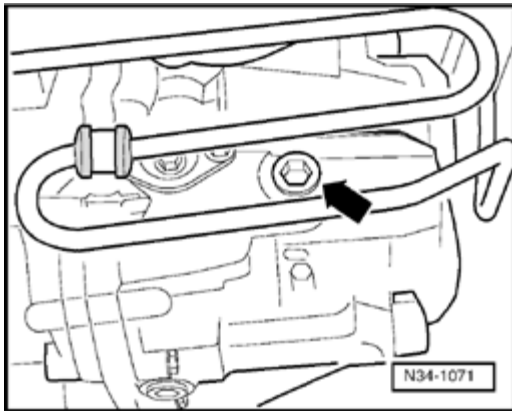
hole.

- If necessary top up with transmission oil "specification G 50 SAE 75W90 (synthetic oil) or G51 SAE 75W90 (synthetic oil)" to lower edge of oil filler hole.

Note:

The oil specification depends on the transmission code.

⇒ *Repair Manual, 5 and 6-spd. manual transmission, Repair Group 00, Transmission identification*



- Install oil filler plug - **arrow** - and tighten to 25 Nm.

Automatic transmission final drive oil level, checking

Perform the following work procedure

⇒ *Repair Manual, Automatic transmission 01M, Repair Group 39, Gear oil in final drive, checking*

Description of work (part 2 of 2)

Haldex clutch, replacing oil filter (all wheel drive (AWD))

- Perform work procedure

⇒ *Repair Manual, Transmission, Repair Group 39, Oil filter for Haldex clutch, changing*

Haldex clutch, changing oil (all wheel drive (AWD))

- Perform work procedure

⇒ *Repair Manual, Transmission, Repair Group 39, Oil in Haldex clutch, changing*

Brake system, visual check for leaks and damage

Check the following components for leaks and damage:

Brake master cylinder

Brake booster (on anti-lock braking system: Hydraulic unit)

Brake pressure regulator and

Brake calipers

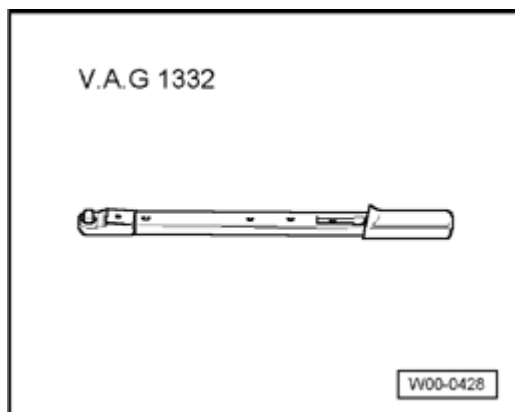
- Check that brake hoses are not twisted.
- Turn steering to left stop and to right stop. During this operation no brake hose must touch any vehicle components.
- Check brake hoses are not porous or brittle.
- Check brake hoses and pipes for chafing.
- Check brake connections and methods of securing for correct seating, leaks and corrosion.

Warning!

Malfunctions found must be repaired (repair measure).

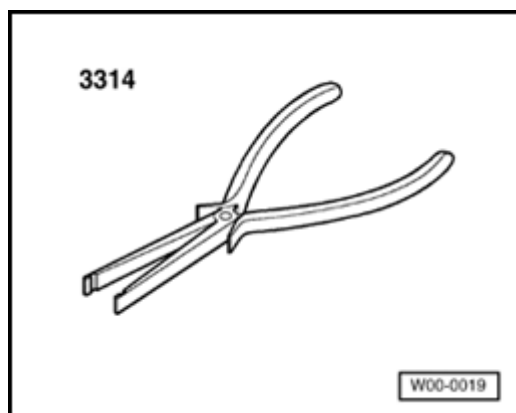
Brake pads (front and rear), check thickness

Special tools, testers and auxiliary items required



Torque wrench V.A.G 1332/ (40 -200 Nm)

Flashlight and mirror



Pliers VAS 3314

Remove full wheel cover

The removal hook is part of the vehicles tool kit.

Wheel bolts

The adapter to loosen/tighten the anti-theft wheel bolts is located with the vehicle tool kit. If the adapter is not present, ask the customer.

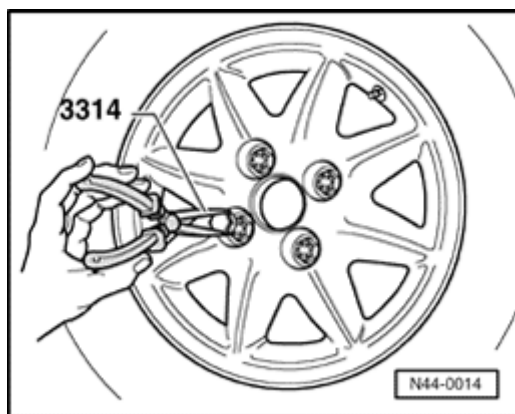
Perform the following work sequence:

Front disc brake pads

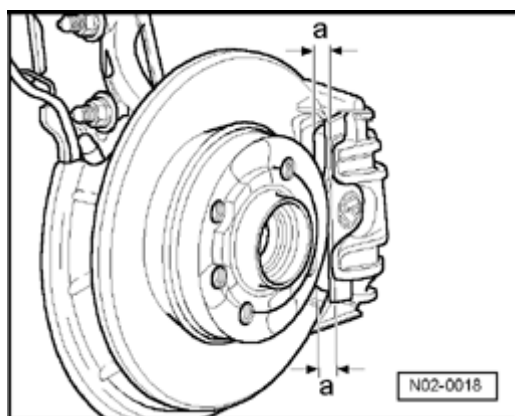
Note:

Adapter to loosen/tighten anti-theft wheel bolts is located with vehicle tool kit. If adapter is not present, ask customer.

- For better judgement of remaining pad thickness remove the front wheel on the drivers side.



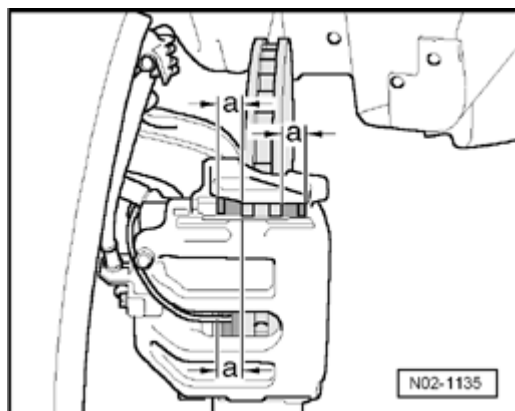
- If necessary, remove wheel bolt caps with Pliers VAS 3314 and/or remove wheel cover with removal hooks.
- Mark position of wheel in relation to brake disc.
- Unbolt wheel securing bolts and remove wheel.

Golf, Jetta

- Measure inner and outer pad thickness.
- a - Pad thickness, not including backing plate

Wear limit: 2 mm

Golf R32



- Measure inner and outer pad thickness.

a - Pad thickness, not including backing plate

Wear limit: 2 mm

Continued for all vehicles

With pad thickness (not including backing plate) of 2 mm, the brake pads have reached their wear limit and must be replaced (repair procedure). Inform customer!

Note:

If replacing the brake pads, check the brake discs for wear. Checking and if necessary replacing brake discs is a repair measure.

- Check brake discs for wear

⇒ [Repair Manual, Brake System, Repair Group 46, servicing front wheel brakes](#)

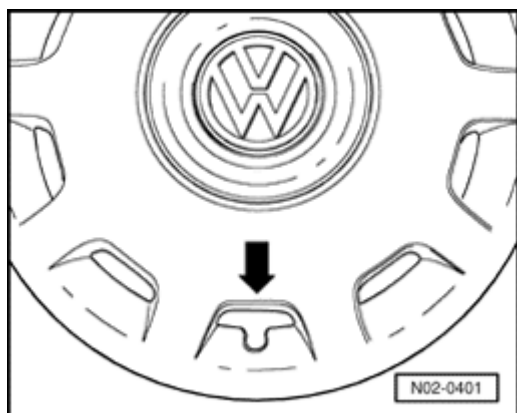
- Install wheel to marked position.

- Tighten wheel securing bolts, using diagonal sequence to following tightening torque:

Tightening torque: 120 Nm

- After completion of work, return adapter and hook for wheel cover to vehicle tool kit.

Full wheel cover, installing

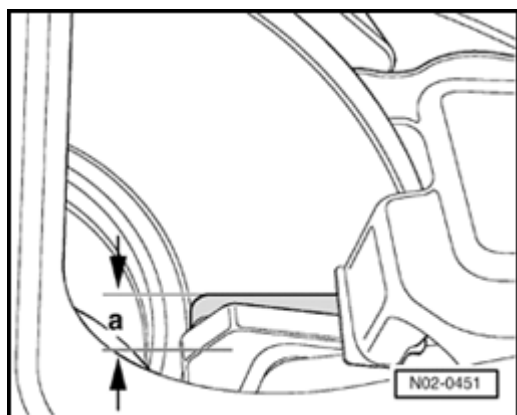


- Install full wheel cover with tire valve positioned in the cut-out - **arrow** - .
- Install wheel bolt covers if necessary.

Rear disc brake pads

- If necessary, remove wheel covers with removal hook.
- Illuminate area behind hole in wheel using a flashlight.

Golf, Jetta

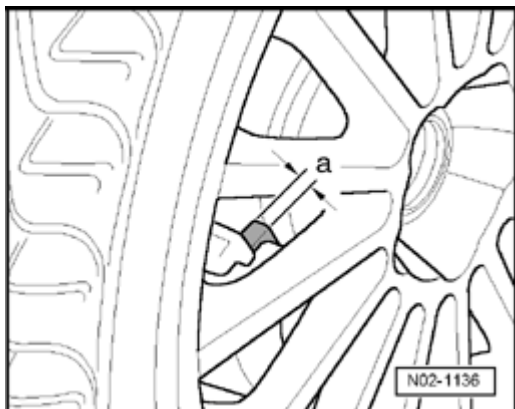


- Determine thickness of outer pad by checking visually.
- Illuminate inner pad using a flashlight and mirror.
- Determine thickness of inner pad by checking visually.

a - Pad thickness inner and outer, not including backing plate

Wear limit: 2mm

Golf R32



- Measure inner and outer pad thickness.

a - Pad thickness, not including backing plate

Wear limit: 2 mm

Continued for all vehicles

With pad thickness (not including backing plate) of 2 mm, the brake pads have reached their wear limit and must be replaced (repair procedure). Inform customer!

Note:

If replacing the brake pads, check the brake discs for wear. Checking and if necessary replacing brake discs is a repair measure.

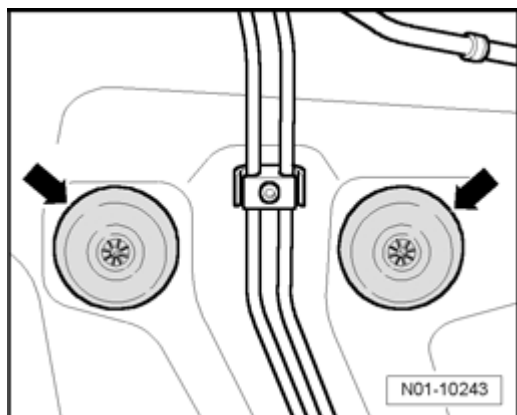
- Check brake discs for wear

⇒ [Repair Manual, Brake System, Repair Group 46, servicing rear wheel brakes](#)

- If necessary install wheel covers.

Underbody protection, perform visual check for damage

During the visual inspection, check the floor, wheel housings, rocker panels and especially all equipped sealing caps for damage!



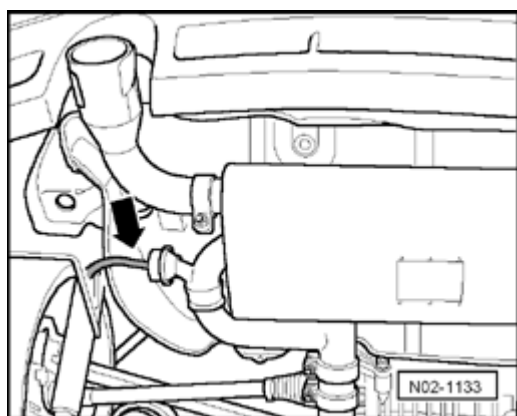
Pay special attention to any cracks, detachments and corrosion of the underbody protection when inspecting the caps - **arrows** - .

Note:

Malfunctions found must be repaired (repair measure). This inhibits corrosion and rusting through.

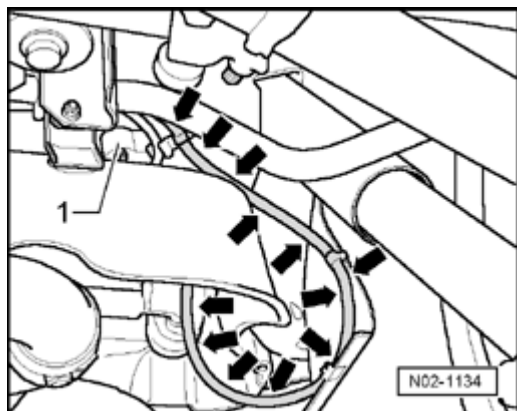
Exhaust system, perform visual inspection for leaks, attachment, and damage

Additional visual inspection Golf R32



On the Golf R32, there is an exhaust flap with a vacuum set element attached to the rear muffler of the exhaust system - **arrow** - . The exhaust flap is controlled by the exhaust flap valve 1 N321 .

- Check the vacuum line from the exhaust flap valve 1 N321 to the vacuum set element.



- The exhaust flap valve 1 N321 is located above the rear muffler shield, behind the stabilizer bar fastening point - **1** -

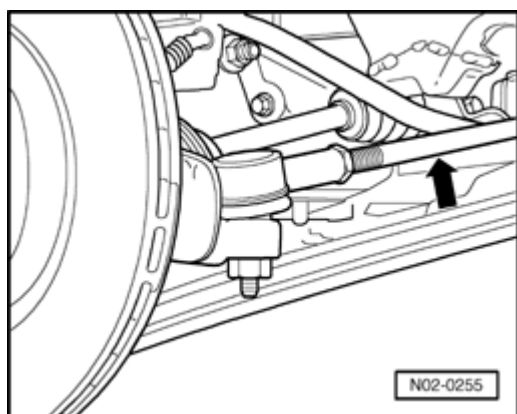
- Check the vacuum line - **arrow** - for proper routing and damage (Ex. tears, abrasions, porosity).

Note:

Malfunctions found must be repaired (repair measure).

Tie rod ends, check play and joint boots

Perform the following work sequence:



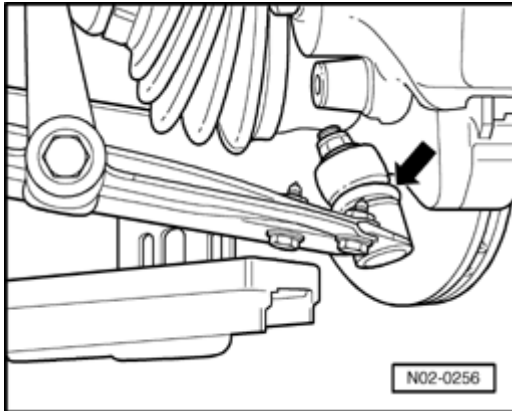
- With vehicle raised (wheels off ground) check tie rods by moving tie rods - **arrow** - and wheels. Play: zero play

- Check mountings.

- Check boots (left of - **arrow** -) for damage and proper installation.

Ball joints, visual inspection

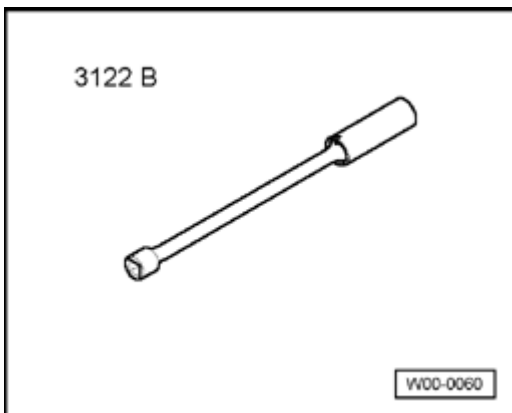
Perform the following work sequence:



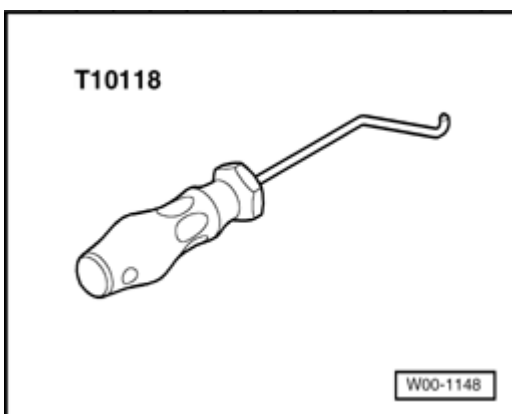
- Check ball joint boots - **arrow** - for leaks and damage.

Spark plugs, replace

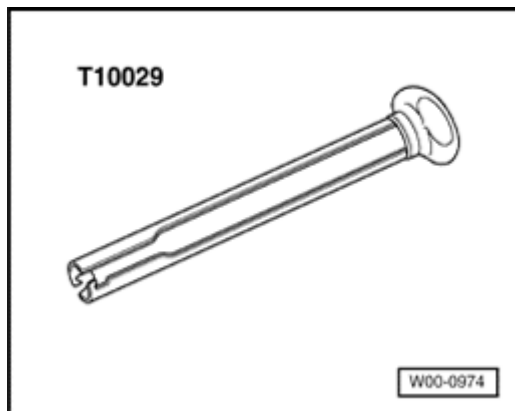
Special tools, testers and auxiliary items required



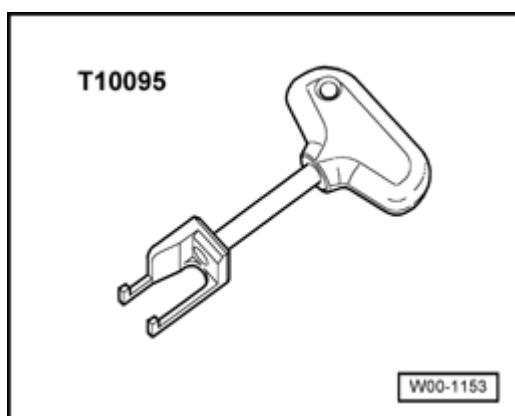
Spark plug wrench VAS 3122B



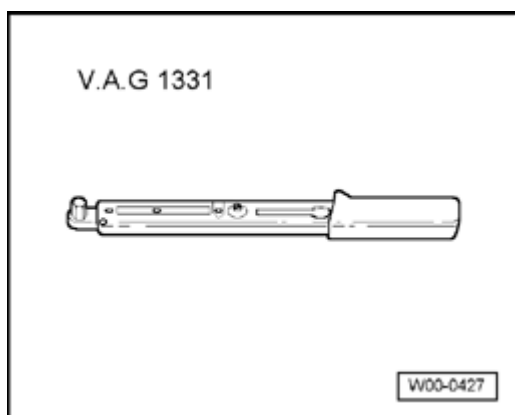
Seal puller T10018



Removal/Installation tool T10029



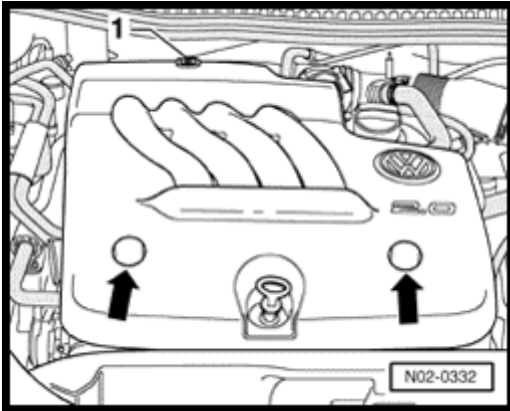
Puller T10095



Torque wrench V.A.G 1331/ (5 - 50 Nm)

Engine code(s) AEG, AVH, AZG, BBW, BEV

- Pry out plugs - **arrows** - and remove nuts underneath.
- Remove nut - **1** -
- Pull out oil dipstick.



- Remove engine cover.

Spark plugs	
VW Part No.	101 000 033 AA
Manufacturer designation	BKUR 6 ET 10 (NGK)
Spark gap	0.9 to 1.1 mm
Tightening torque	30 Nm

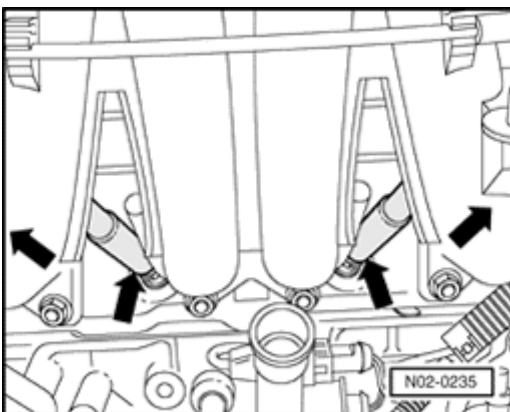
- Remove spark plug connector - **arrows** - using tool T10029.

- Remove spark plug using Spark plug wrench VAS 3122B
- **arrow** -

- Install spark plugs with Spark plug wrench VAS 3122B .

- Install spark plug connectors using Removal/Installation tool T10029

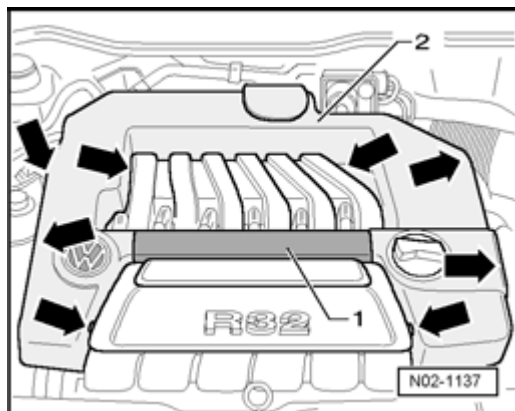
- Check that ignition wiring and spark plug connectors are seated securely.



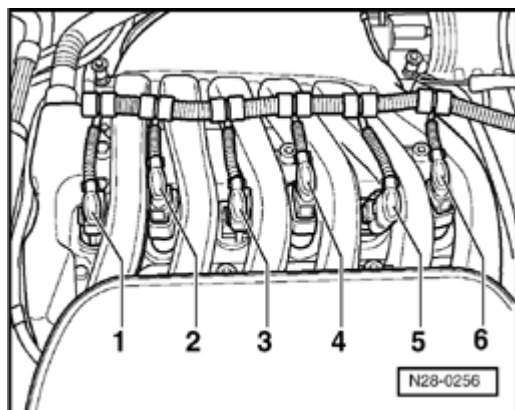
- Install engine compartment cover.

Engine code BJS

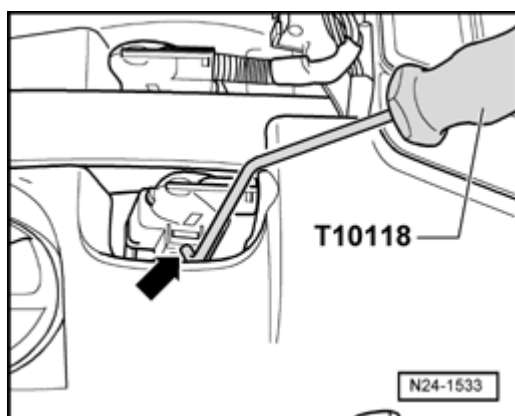
Perform the following work sequence:



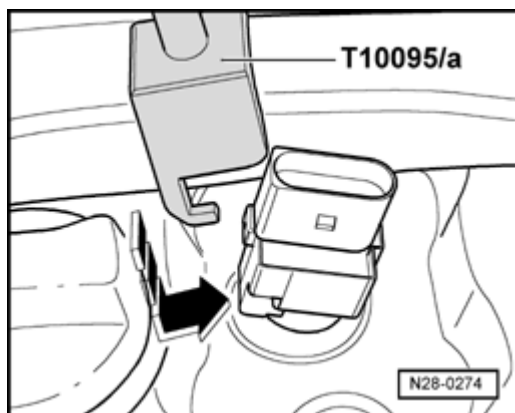
- Unclip and remove cover for wiring guides - **1** - .
- Remove engine cover - **2** - at the indicated points - **arrows** - and remove upward.



- Remove connectors for ignition coils with power output stages - **arrows** - .

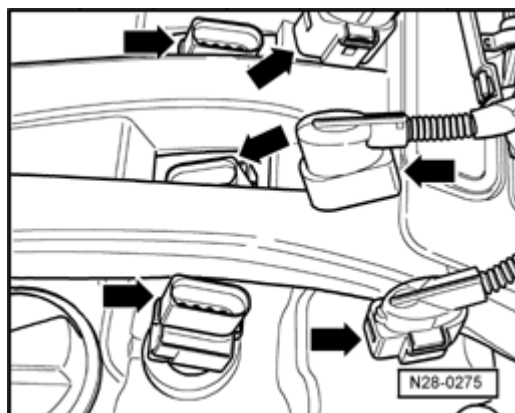


- Unlock the connector locating device with the Assembly tool T10118 .
- Place the Assembly device T10118 on the connector locating device - **arrow** - , and carefully pull the connector off.



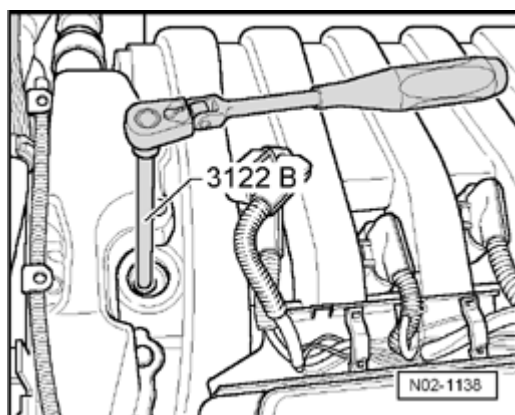
- Push the Remover T10095/a from the straight connector side, in the direction of the - **arrow** - , on the ignition coil with power output stage

- Pull the ignition coil with power output stage up perpendicularly and out.



- Observe the installed locations of the ignition coils with power output stages to the connectors, before they are removed - **arrows** - .

The straight side of the connector must fit to the straight side of the ignition coil with power output stage.



- Remove spark plugs with Spark plug wrench VAS 3122B .

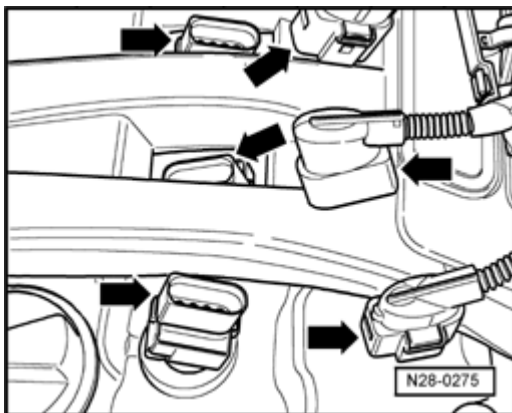
Note:

Observe waste disposal regulations!

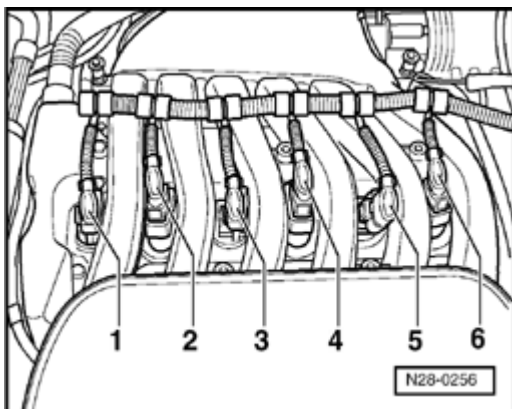
Spark plug identification and tightening torque

⇒ *Repair Manual, Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AEG, AVH, AZG, BBW, BEV, Repair Group 28, Ignition/Glow plug system, Test data, spark plugs Test data, spark plugs Ignition/Glow plug system , Test data, spark plugs Ignition system, servicing , Test data - Spark plugs*

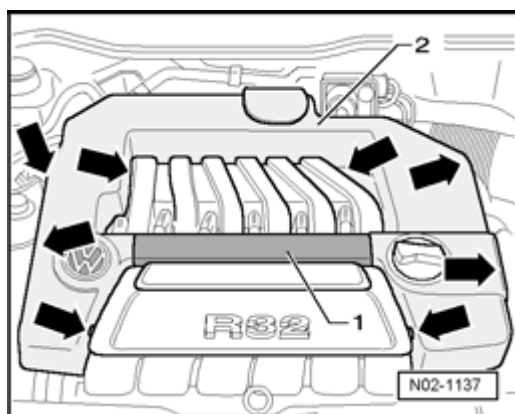
- Install new spark plugs with Spark plug wrench VAS 3122B .



- Carefully place the ignition coils with power output stages on the spark plug connectors, so that the straight connector sides match one another - **arrows** - .

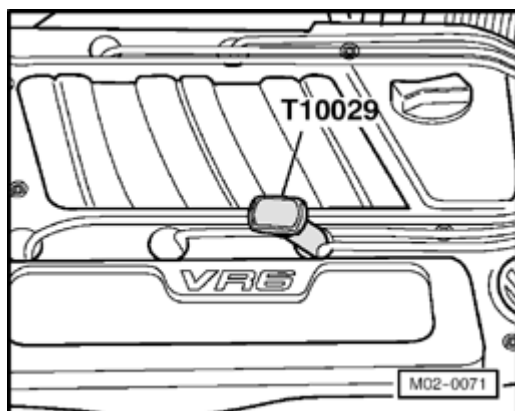


- Connect connectors 1 to 6 for ignition coils with power output stages.



- Set the engine cover - 2 - on the indicated points - **arrows**
- and secure into place.
- Install cover for wiring guides - 1 - .

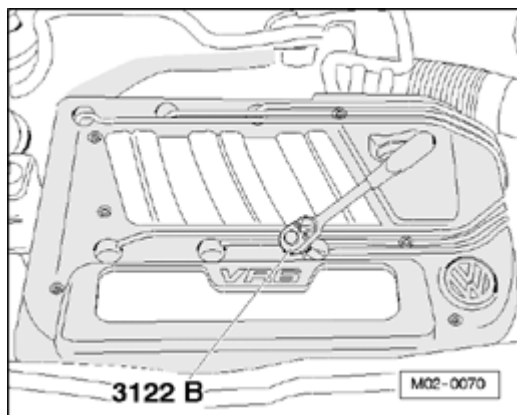
Engine code AFP



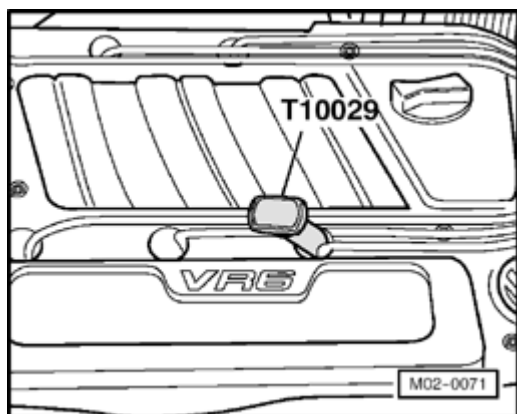
- Pull off spark plug connector using Removal/Installation tool T10029 .

Spark plugs	
VW Part No.	101 000 035 AH
Manufacturer designation	BKR 5 EKUP
Spark gap	0.7 mm
Tightening torque	25 Nm

- Remove spark plug using Spark plug wrench VAS 3122B or equivalent.



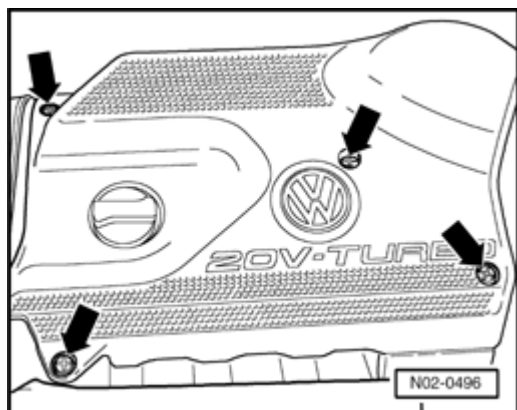
- Install spark plugs with spark plug wrench
- Install spark plug connectors using Removal/Installation tool T10029 .



- Check that ignition wiring and spark plug connectors are seated securely.

Engine code AWD

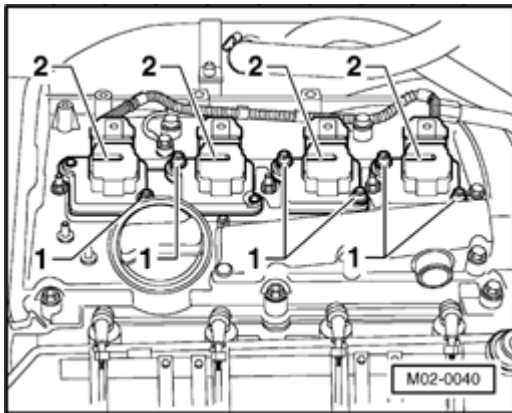
- Loosen screws - **arrows** - and remove engine cover upward.
- Disconnect recirculating valve for turbocharger and secondary air inlet valve.



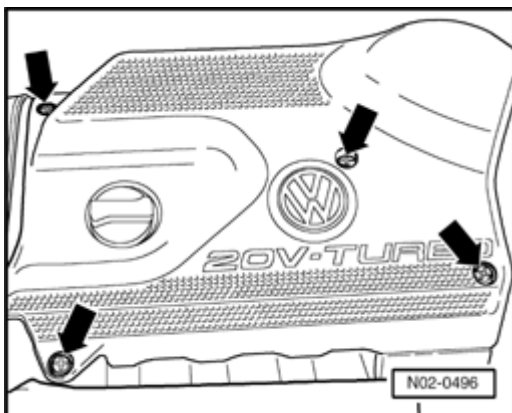
- Remove bracket for both valves and for vacuum reservoir.

Spark plugs	
VW Part No.	101 000 063 AA
Manufacturer designation	PFR 6 Q
Spark gap	MAX. 0.8 mm
Tightening torque	30 Nm

- Remove ignition coil screws - **1** - .
- Remove ignition coils - **2** - together with spark plug connectors.
- Remove spark plugs using Spark plug wrench VAS 3122B
- Install spark plugs with Spark plug wrench VAS 3122B .

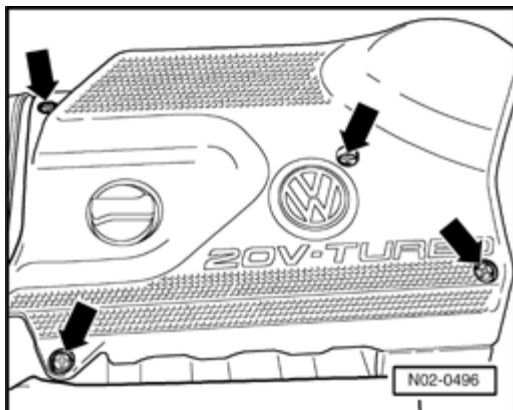


- Install ignition coils together with spark plug connectors.
- Connect recirculating valve for turbocharger and secondary air inlet valve.
- Install bracket for both valves and for vacuum reservoir.
- Check that ignition wiring and spark plug connectors are seated securely

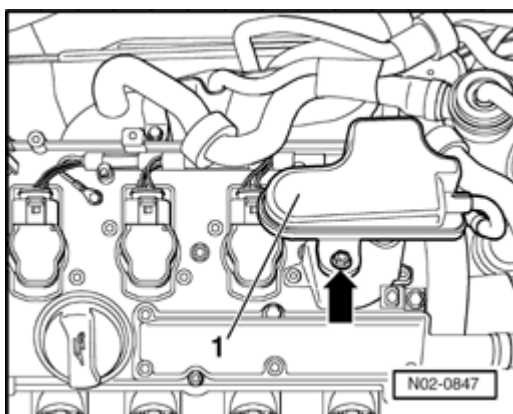


- Place engine cover and tighten screws - **arrows** - .

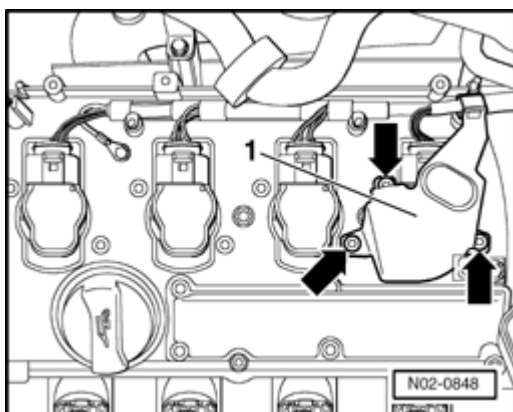
Engine code(s) AWW and AWP



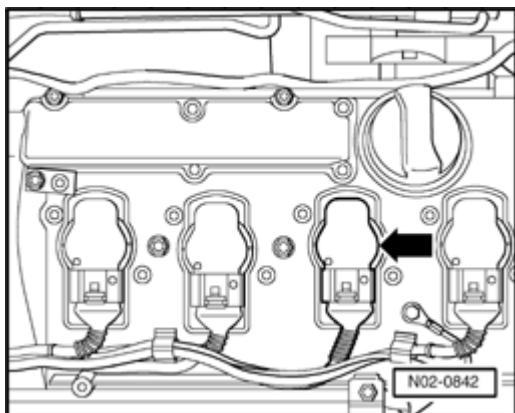
- Loosen screws - **arrows** - and remove engine cover upward.



- Remove hex nut - **arrow** - and vacuum reservoir - **1** - .



- Remove screws - **arrows** - and vacuum reservoir bracket - **1** - .



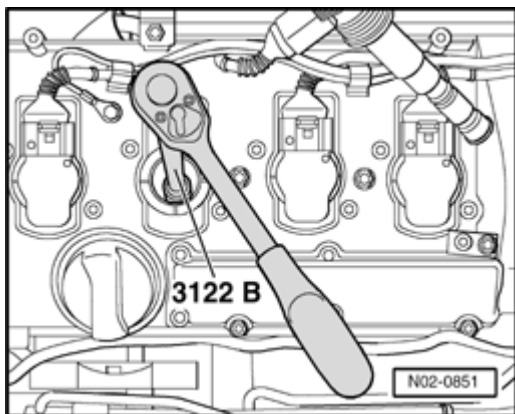
- Remove ignition coils together with spark plug connectors manually.

Spark plugs

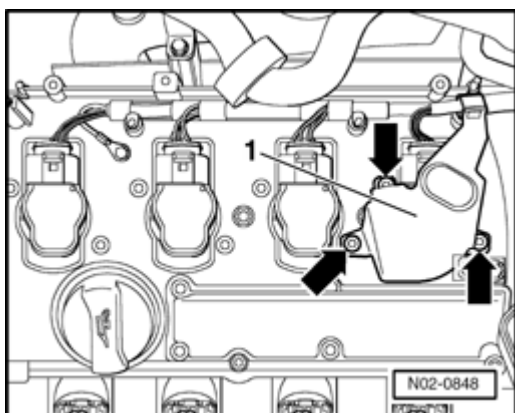
VW Part No.	101 000 063 AA
Manufacturer designation	PFR 6 Q
Spark gap	MAX. 0.8 mm
Tightening torque	30 Nm

- Remove spark plugs using Spark plug wrench VAS 3122 B .

- Install spark plugs with spark plug wrench.

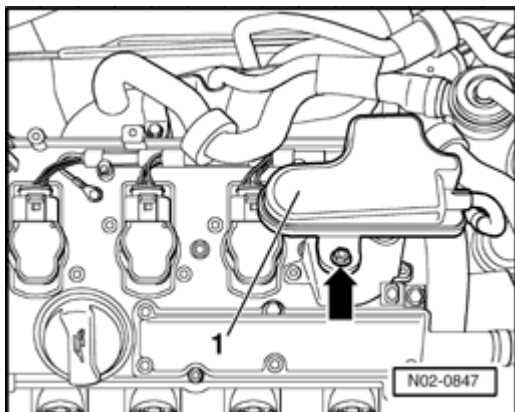


- Install ignition coils together with spark plug connectors.



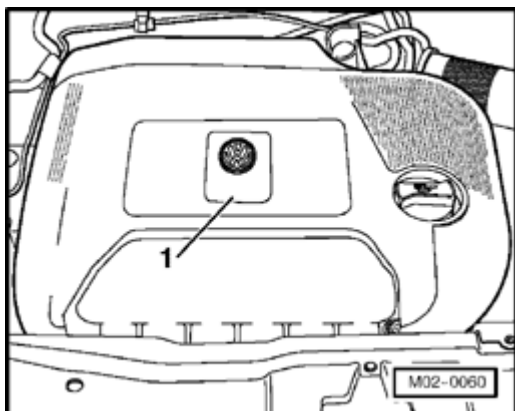
- Install vacuum reservoir bracket - **1** - and tighten screws - **arrows** - .

- Install vacuum reservoir - **1** - and tighten hex nut - - **arrow** - .



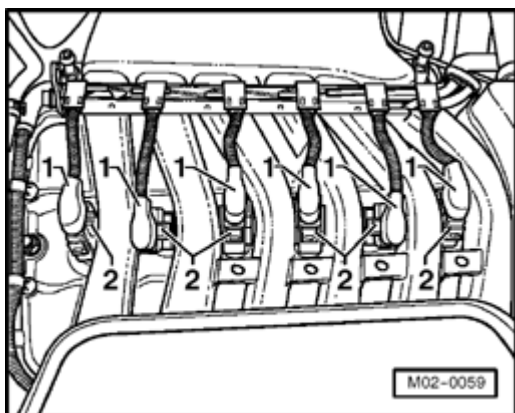
- Place engine cover and tighten screws - **arrows** -

Engine code BDF

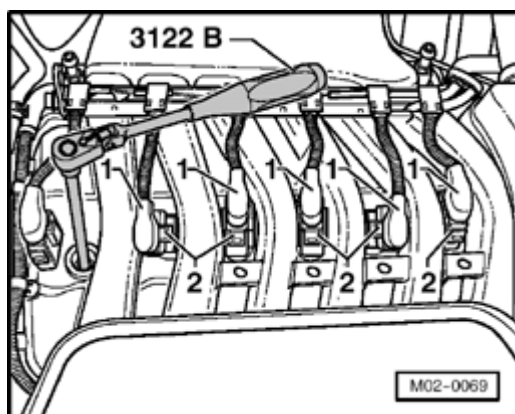


- Remove engine cover - **1** - upward.

- Release ignition coil connector - **1** - at ignition coil - **2** - and remove.



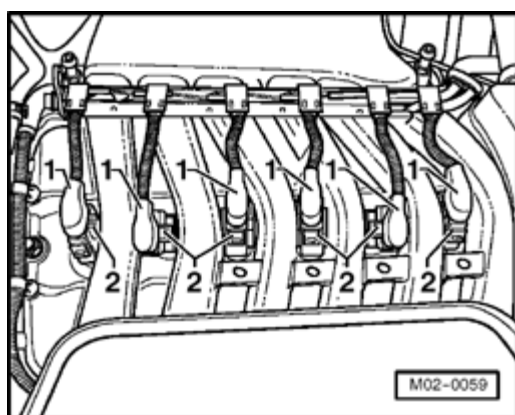
- Remove ignition coils using Puller T10095 .



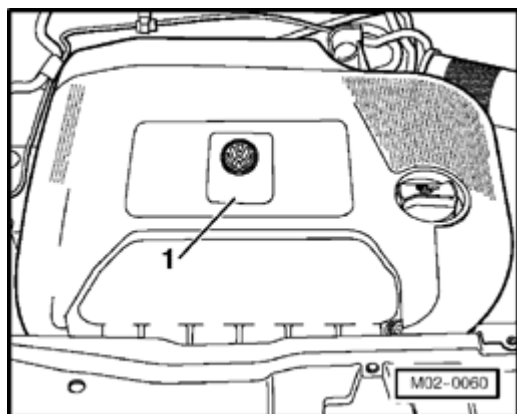
- Remove spark plugs using using Spark plug wrench VAS 3122B

Spark plugs	
VW Part No.	101 000 062 AB
Manufacturer designation	PZF R5D-11
Spark gap	MAX. 1.1 mm
Tightening torque	30 Nm

- Install spark plugs with spark plug wrench.
- Push ignition coils - **2** - onto spark plugs.
- Push ignition coil connectors - **1** - onto ignition coils and engage.



- Check that ignition wiring and spark plug connectors are seated securely.



- Install engine cover and clip in position.

Cooling system anti-freeze protection and coolant level, checking

Warning!

All new engines are filled with coolant additive G 12 Plus conforming to TL "VW 774 F" (color purple). G 12 is compatible with previous coolant additives G 11 and G 12 (red)! Make sure that only G 12 is refilled. due to its positive characteristics.

G 12 purple (conforming to TL "VW 774 F") is compatible with previous coolant additives G 11 and G 12 red!

Note:

G 12 Plus is suitable as a filled-for-life filling for cast iron and all-aluminum engines and gives optimum protection against freeze, corrosion damage, scaling and overheating.

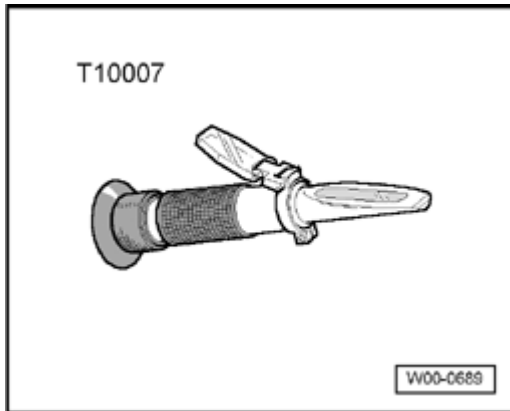
G 12 Plus raises boiling point to 275 F (135 ° C) and provides for better heat dissipation

coolant concentration must be at least 40 % (freeze protection to -13 F (-25 ° C)) and should never exceed 60 % (freeze protection to -40 F (-40 ° C) otherwise freeze protection will be reduced and cooling effect will also be reduced.

Freeze protection must be ensured to approximately -13 F (-25 ° C)

Checking freeze protection and adding coolant additive if necessary

Special tools, testers and auxiliary items required



Refractometer T10007

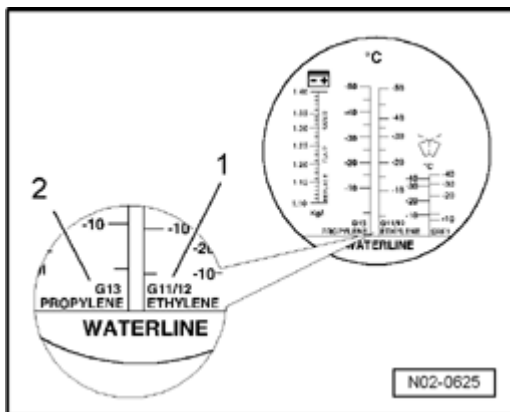
Note:

Read bright/dark boundary to obtain an accurate reading for following tests. Place a drop of water on glass to improve readability of bright/dark boundary. Bright/dark boundary can be clearly recognized on "WATERLINE".

- Check concentration of coolant additive using Refractometer T10007 (operating instructions).

Scale - 1 - of refractometer refers to coolant additives -G 12- . -G 12 Plus- and -G 11-.

Scale - 2 - refers only to coolant additive G 13. (previously L80)



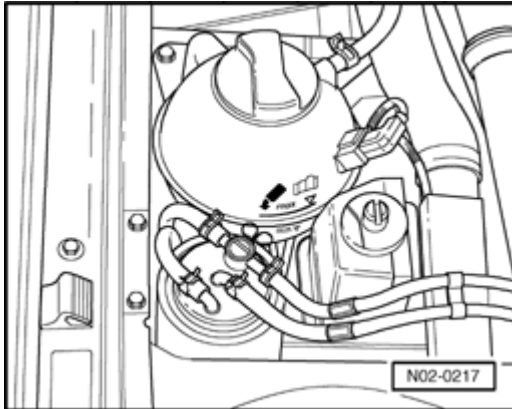
- If freeze protection ratio is too low. drain listed amount and replace it with coolant additive G 12 conforming to TL "VW 774 F" .

Checking coolant level and adding coolant if necessary

- Check coolant level in coolant resevoir with engine cold.

Delivery inspection: Coolant level at MAX. marking.

Inspection service: Coolant level between MIN. and MAX. marking.



- If coolant is too low. add required amount according to mixture ratio.

Note:

If fluid losses are greater than can be reasonably expected. determine cause and repair (repair measure)

Mixture ratio:

Freeze protection to	Coolant additive G 12 / TL VW774D	Water
- 25 C (- 13F)	approx. 40 %	approx. 60 %
- 35 C (- 31F)	approx. 50 %	approx. 50 %
- 40 C (- 40F)	approx. 60 %	approx. 40 %

Note:

Coolant additive G 12 conforming to TL "VW 774 F" prevents freeze and corrosion damage. scaling. and raises boiling point. For these reasons. cooling system must be filled with radiator freeze and corrosion protection fluid all year round.

Coolant concentration must not be reduced by adding water. even during warmer season. Coolant additive portion must be at least 40%.

Freeze protection table

Freeze protection to C (F)		Difference amount in liters	
Actual value	Specified value	4-cyl.	6-cyl.

0	-25 (-13F)	engine 3.5	engine 5.0
	-35 (-31F)	4.0	6.0
-5	-25 (-13F)	3.0	4.5
	-35 (-31F)	3.5	5.5
-10	-25 (-13F)	2.0	3.5
	-35 (-31F)	3.0	4.5
-15	-25 (-13F)	1.5	2.5
	-35 (-31F)	2.0	3.5
-20	-25 (-13F)	1.0	1.5
	-35 (-31F)	1.5	2.5
-25	-35 (-31F)	1.0	1.5
-30	-35 (-31F)	0.5	1.0
-35	-40 (-40F)	0.5	0.5

Note:

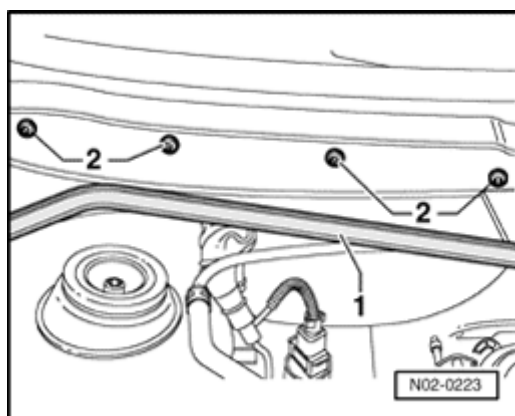
Observe waste disposal regulations!

- Check coolant additive concentration after test drive again.

Dust and pollen filter, replace filter element

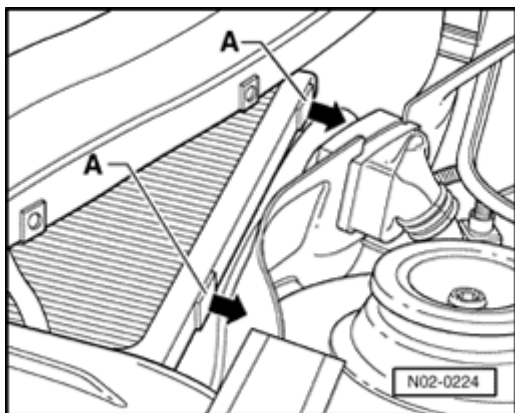
Filter is located on right side in plenum chamber under cover.

Perform the following work sequence:

Removing:

- Remove upward the rubber seal - **1** - on the right of the plenum chamber cover to center of the vehicle.

- Remove four screws - **2** - and remove the plenum chamber cover.



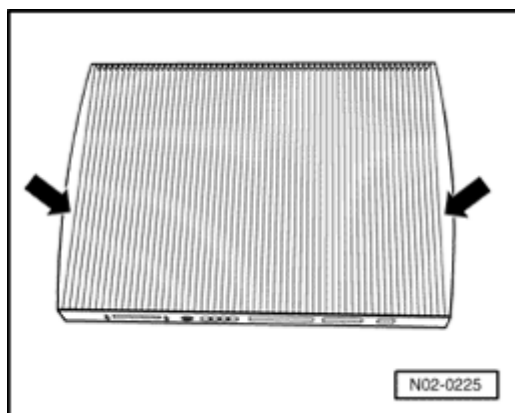
- Press the latches - **A** - of the filter housing in direction of - **arrow** - and remove filter element with frame upward.

- Remove filter from the frame.

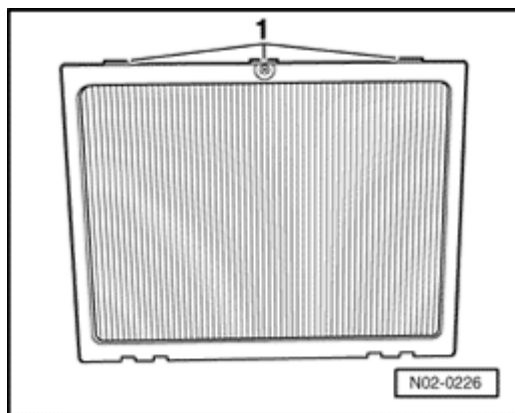
Note:

Observe waste disposal regulations!

Installing:

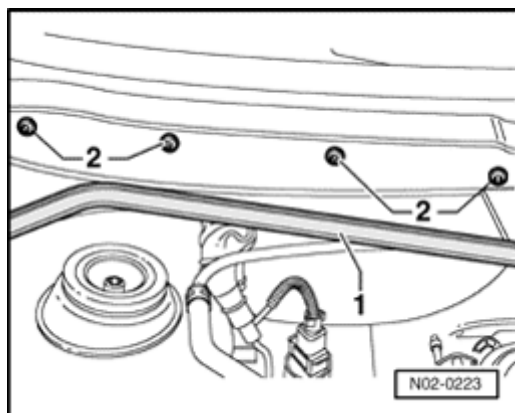


- Insert the left and right frame edges into the first fins of the new filter element - **arrows** - .



- Insert the frame into the appropriate recesses of the filter

housing and latches - 1 - and secure the frame with filter element by pushing down.



- Install the plenum chamber cover and fasten with 4 screws - 2 - .

- Press on rubber seal - 1 - .

Air cleaner, clean housing and replace filter element

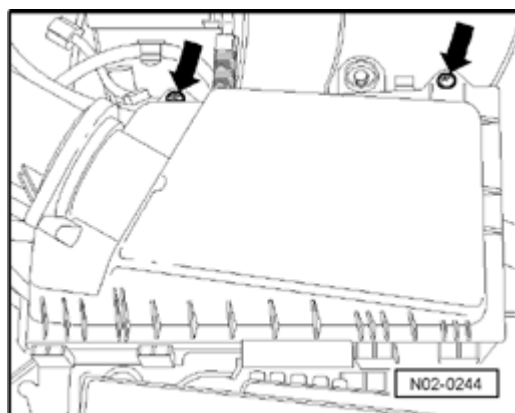
Note:

Depending on vehicle equipment, there is a screen built into the area of the intake canal. This screen prevents snow and ice from entering the air filter housing and clogging the air filter during winter months. If dirty, the screen should be blown clean with pressurized air.

All engines

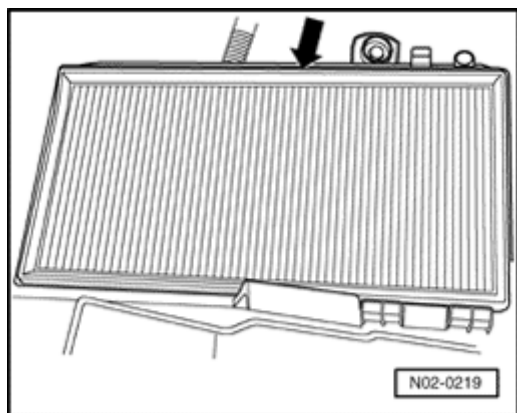
Perform the following work sequence:

Removing:



- Remove fastening bolts - **arrows** - .

- Remove the upper portion of the air filter housing upward.



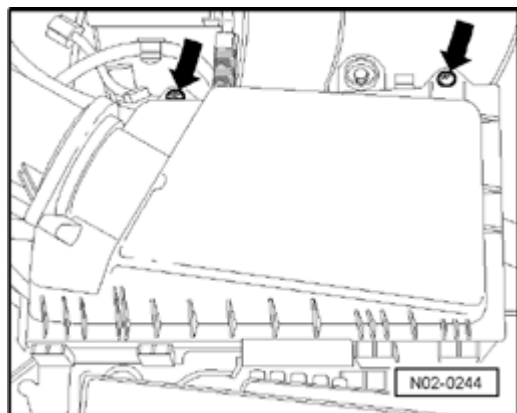
- Remove old air filter element - **arrow** - .

Note:

Observe waste disposal regulations!

Installing:

- Clean filter housing and install new air filter element.



- Install upper air filter housing and fasten with screws - **arrows** - .

Toothed belt for camshaft drive, replacing (Diesel engine ➤ 2001 - Engine code ALH)

- Perform work sequence ⇒ *Repair manual 4-cyl. Diesel Engine. Mechanical; Repair Group 13; Crankcase. disassembling and assembling, toothed belt, removing and installing, tensioning*

Toothed belt and idler pulley for camshaft drive, replacing (Diesel engine 2002 ➤ - Engine code ALH)

- Perform work sequence ⇒ *Repair manual 4-cyl. Diesel Engine. Mechanical; Repair Group 13; Crankcase. disassembling and assembling, toothed belt, removing and installing, tensioning*

Toothed belt and toothed belt tensioner for camshaft drive, replacing (4-cyl. - 5 valve gasoline engine)

- Toothed belt. removing and installing: ⇒ *Repair manual 4-cyl. Fuel injected engine (5 valve). Mechanical; Rep.- Gr.13; Crankshaft; Engine disassembling and reassembling; Toothed belt removing, installing, and tensioning*

Toothed belt for camshaft drive, checking (4-cyl. Gasoline Engine)

Check condition of toothed belt

- Open fasteners of upper toothed belt cover and remove cover.

- Check condition of toothed belt for:

Cracks, cross-sectional breaks

Separation (cover layer, belt cords)

Wear-through on cover layer

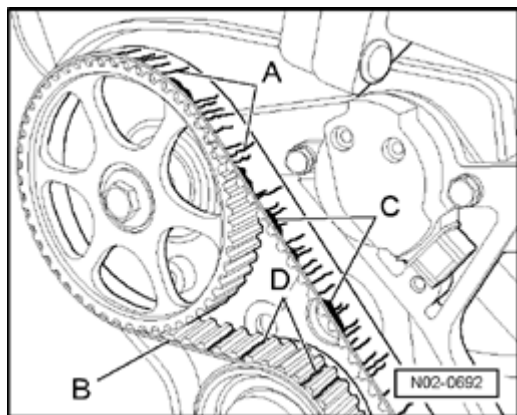
Fraying of cord strands

Surface cracks (plastic shroud)

Traces of oil and grease

Note:

It is essential to replace toothed belt if malfunctions are found. This will avoid possible break-downs or operating problems. Replacing the belt is a repair procedure.



While checking the condition, take notice of the following defects:

- A - Tears (cover side)
- B - Lateral movement
- C - Fraying
- D - Tears (in teeth)

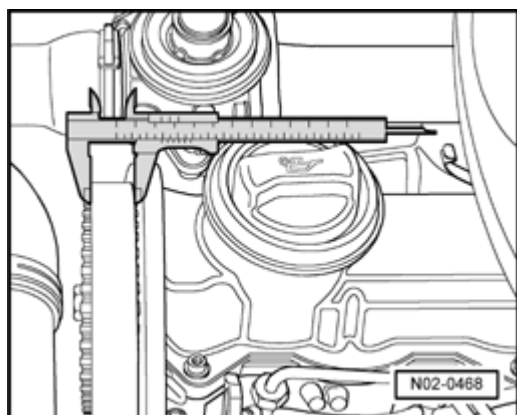
Toothed belt, check wear (diesel engine)

Special tools, testers and auxiliary items required

Vernier caliper (commercially available)

Perform the following work sequence:

- Remove engine cover.
- Open clips of upper toothed belt protection.
- Pull upper toothed belt cover to side and remove if necessary.



- Measure the width of the toothed belt with the caliper gauge.

Note:

If the belt width is 22 mm, it has reached the wear limit and must be replaced (repair measure). Inform customer!

When performing control and tuning work, under no circumstances may the engine be turned over free of the camshaft. Noncompliance may result in serious engine damage.

Toothed belt for camshaft drive, check condition and tension (Diesel engine - engine code ALH with automatic transmission)**Check condition of toothed belt**

- Open fasteners of upper toothed belt cover and remove cover.

- Check condition of toothed belt for:

Cracks, cross-sectional breaks

Separation (cover layer, belt cords)

Wear-through on cover layer

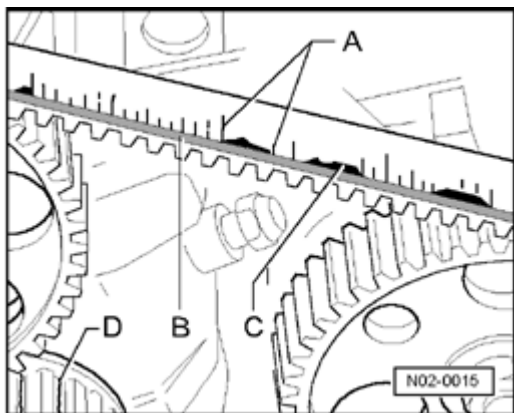
Fraying of cord strands

Surface cracks (plastic shroud)

Traces of oil and grease

Note:

It is essential to replace toothed belt if malfunctions are found. This will avoid possible break-downs or operating problems. Replacing the belt is a repair procedure.



While checking the condition, take notice of the following defects:

A - Tears (cover side)

B - Lateral movement

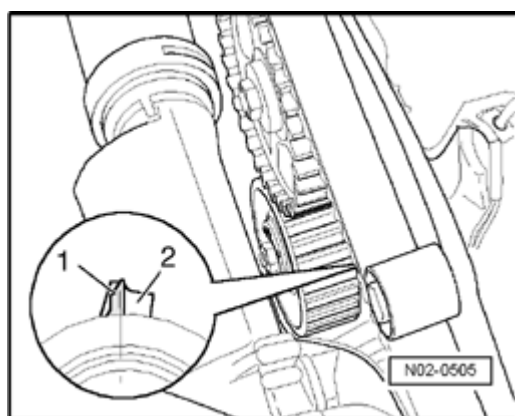
C - Fraying

D - Tears (in teeth)

Note:

The upper toothed belt cover must remain uninstalled to check the toothed belt tension.

Check toothed belt tension



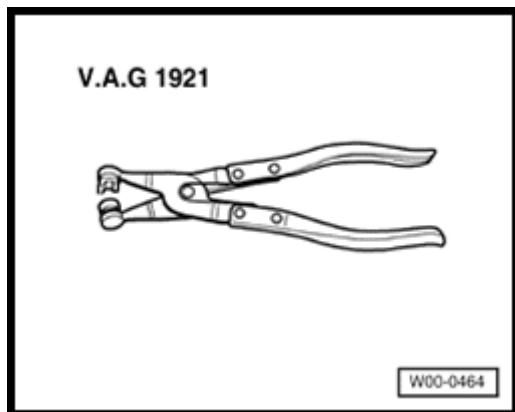
- Check if the notch - 1 - and marking tang - 2 - are aligned.

When the notch - 1 - and marking tang - 2 - align, the inspection is done.

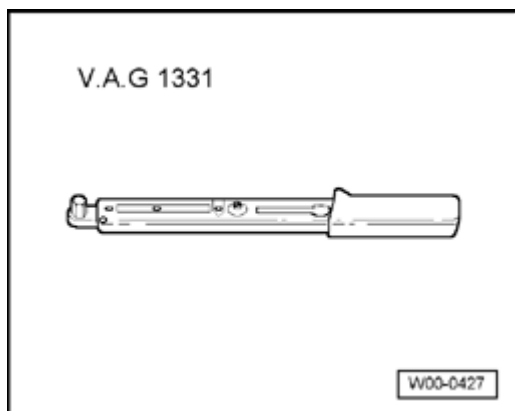
If the notch and raised area are not across from one another, the toothed belt must be tensioned.

Tensioning toothed belt

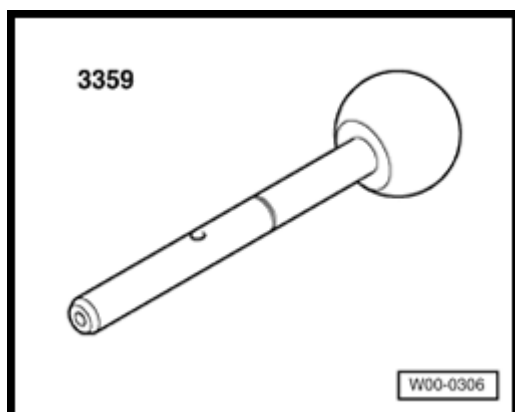
Special tools, testers and auxiliary items required



Hose clip pliers V.A.G 1921/ for spring strap clamps

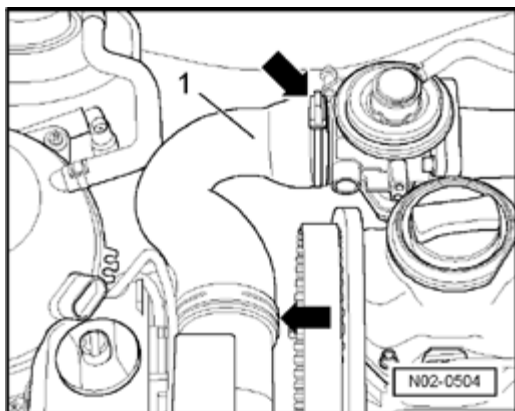


Torque wrench V.A.G 1331/ (5 - 50 Nm)



Alignment pin for diesel injection pump VAS 3359

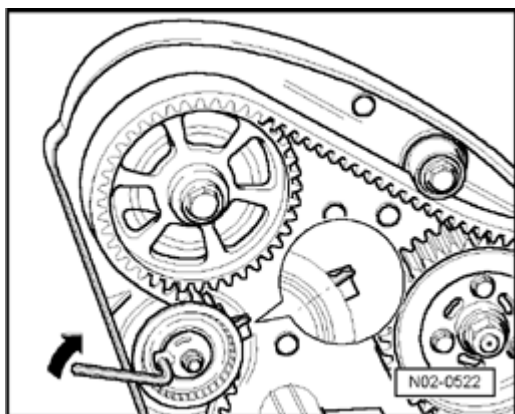
Perform the following work sequence:



- Open hose clamps - **arrows** - with Hose clip pliers V.A.G 1921/ and remove hose - **1** - .
- Loosen the fastening bolt for tensioner.
- Check the tensioner for damage and wear.

Note:

If any defects are determined, the toothed belt tensioner must be replaced (repair measure).

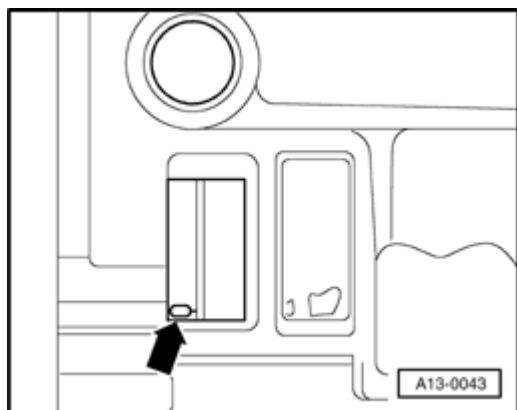


- Tension the toothed belt. Turn the eccentric clockwise with a commercially available hex key until the notch and the marking tang, in the area of the protrusion of the marking tang, align.

Note:

If the eccentric portion was turned too far once, the tensioner must be completely relieved of tension and then tensioned again. The eccentric portion should not be turned to the position that was too far.

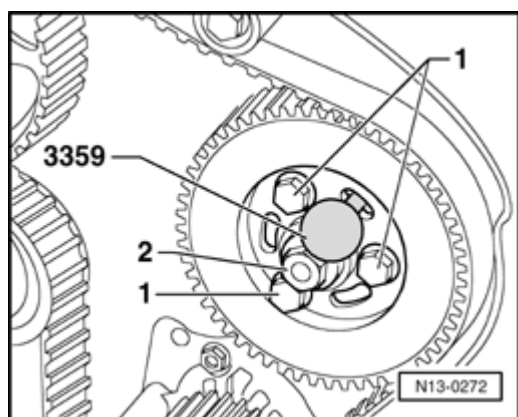
- Tighten the nut on the tensioner. Tightening torque: 20 Nm



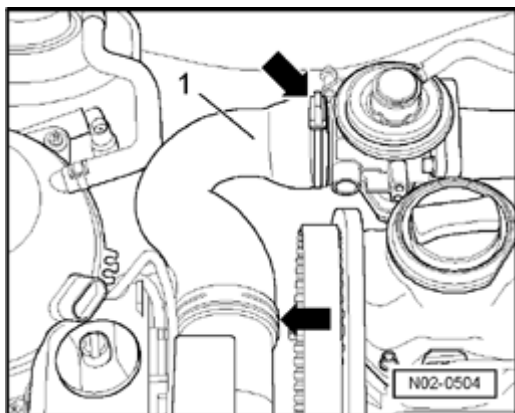
- Turn the crankshaft two revolutions in engine-turning direction, until the crankshaft is at TDC for cylinder 1 - **arrow** - .

Note:

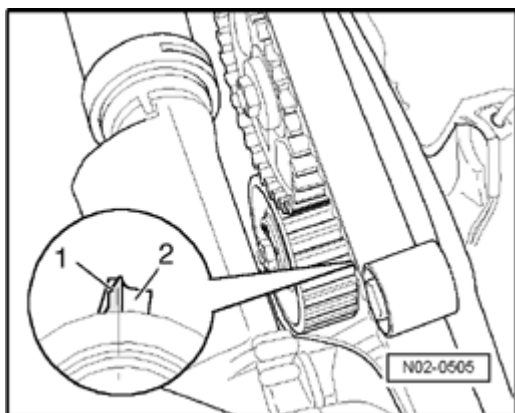
When performing control and tuning work, under no circumstances may the engine be turned over free of the camshaft. Noncompliance may result in serious engine damage.



- Lock the fuel injection pump wheel with the Alignment pin for diesel injection pump VAS 3359 .
- Make sure again that the crankshaft is at TDC for cylinder 1.
- Remove the Alignment pin for diesel injection pump VAS 3359 from the fuel injection pump wheel.



- Install hose - **1** - and secure with hose clamps - **arrows** - .
- Start engine and let run at idle for approx. 1 minute.
- Turn engine off.



- Verify again, that the notch - **1** - and the marking tang - **2** - , in the area of the marking tang protrusion, are aligned. If the notch and protrusion are not across from one another, the tensioning procedure must be repeated.
- Install upper toothed belt cover.

Fuel filter, replacing (diesel engine)

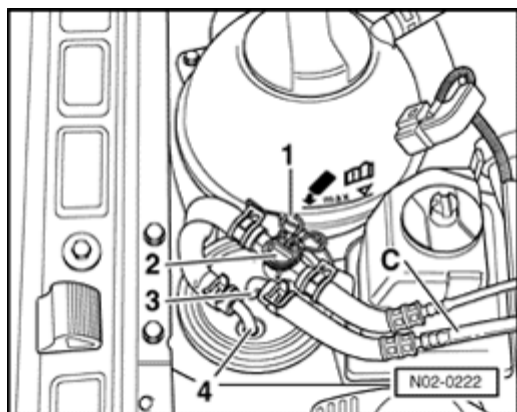
Note:

*Make sure that no diesel fuel gets onto the coolant hoses.
If necessary, clean hoses immediately!*

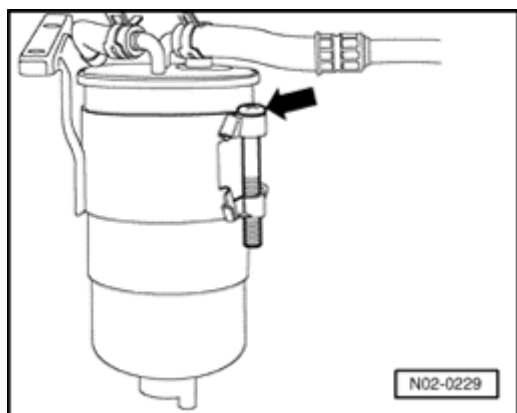
Observe waste disposal regulations!

Perform the following work sequence:

Removing:



- Remove the retaining clip - **1** - and remove regulator valve - **2** - with attached fuel lines.
- Remove fuel line from hose connections - **3** - and - **4** - .



- Loosen the filter securing screw - **arrow** - and remove filter upwards.

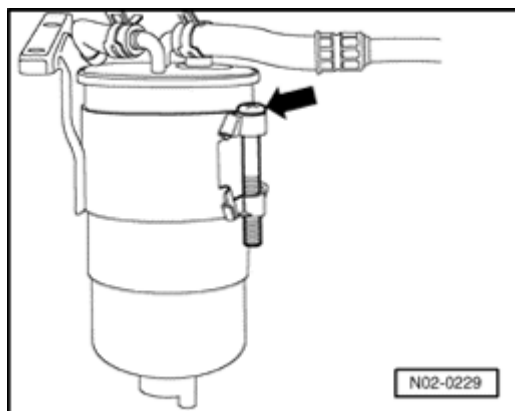
Installing:

- Install a new O-ring for the sealing of the regulating valve.

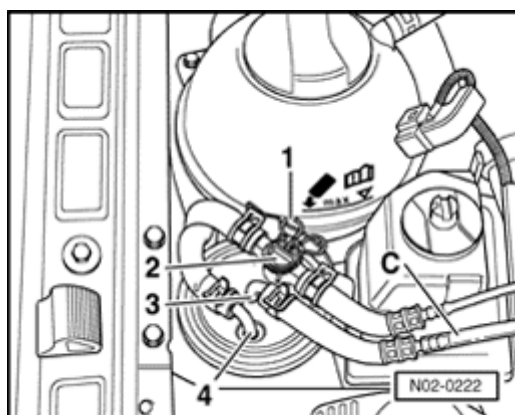
Note:

*The direction of fuel flow is indicated with - **arrows** - on the connections (do not switch connections).*

- Fill new filter with diesel fuel. This way the engine can be started faster.



- Install the filter and secure with screw - **arrow** - .



- Install regulator valve - **2** - and the retaining clip - **1** - .

- Install the fuel lines to the hose connections - **3** - and - **4** - and secure hoses with hose clamps.

- Start the engine and perform a visual inspection of the fuel system for leaks.

- Rev the engine several times. Thereafter, the fuel must flow through the see-through line - **C** - without any bubbles while at idle.

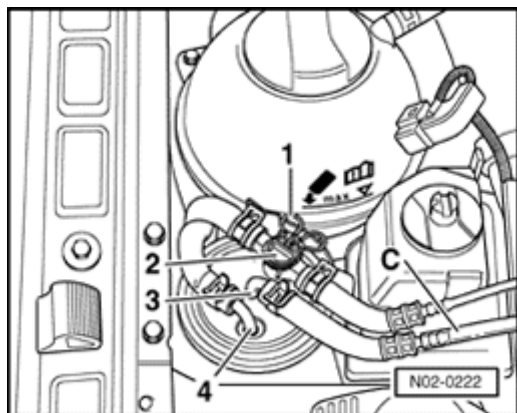
Fuel filter, draining (diesel engine)

Note:

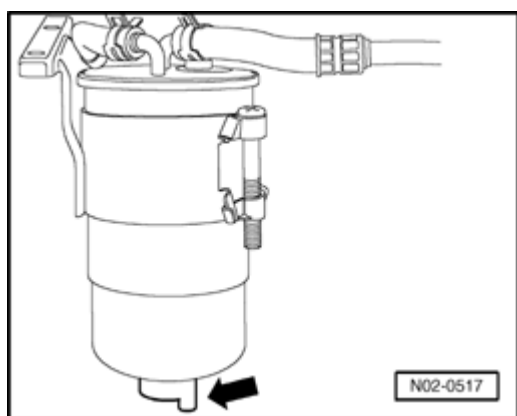
*Make sure that no diesel fuel gets onto the coolant hoses.
If necessary, clean hoses immediately!*

Observe waste disposal regulations!

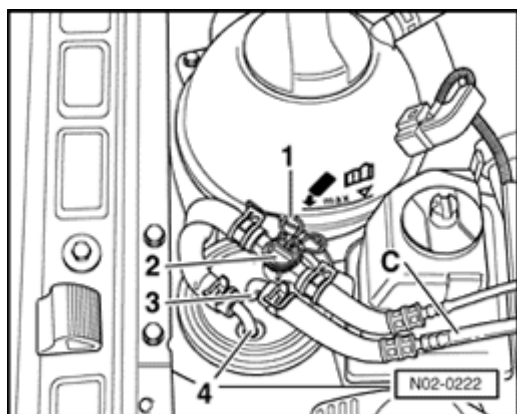
Perform the following work sequence:



- Remove the retaining clip - **1** - and remove regulator valve - **2** - with attached fuel lines.



- Place a hose onto the hose connection of the drain screw - **arrow** - , open the screw, and drain approx. 0.1 L of fluid.
- Tighten the drain screw - **arrow** - and remove the hose.
- Install a new O-ring for the sealing of the regulating valve.



- Install regulator valve - **2** - and the retaining clip - **1** - .
- Start the engine and perform a visual inspection of the fuel system for leaks.
- Rev the engine several times. Thereafter, the fuel must

flow through the see-through line - **C** - without any bubbles while at idle.

Automatic transmission, check ATF level

Perform the following work procedure

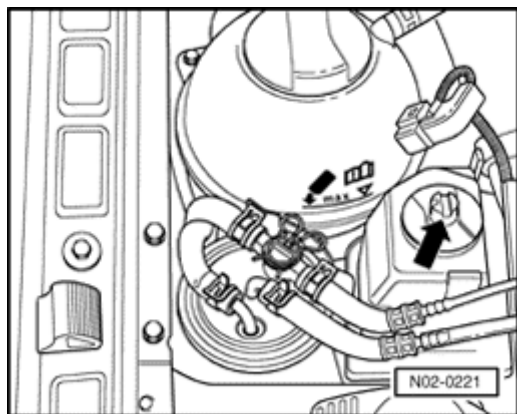
⇒ *Repair Manual, Automatic transmission, Repair Group 39, ATF level, checking and filling*

Power assisted steering, check oil level

Perform the following work sequence:

Oil, when cold

- With engine not running, move front wheels in straight-ahead position.



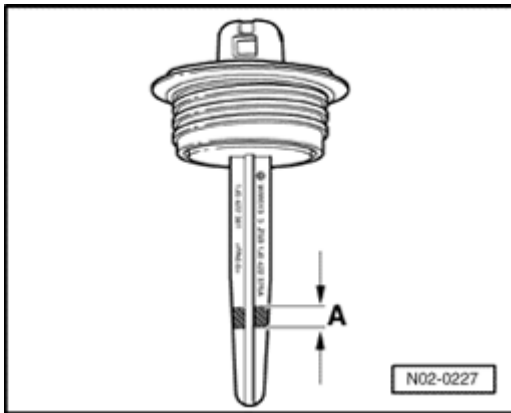
- Insert a suitable screwdriver into the recess at the cap - **arrow** - and unscrew caps with dipstick.

- Clean dipstick with clean cloth.

- Screw cap on hand-tight and remove again.

Note:

Screw cap fully in to get an accurate fluid level reading.



- Check oil level: The oil level must be in the range of the indicated field - **A** - .

Note:

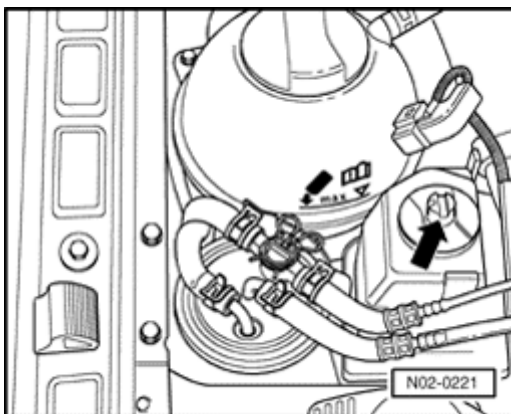
If fluid level is above the mark, some fluid must be extracted.

If the fluid level is below the specified level, check the hydraulic system for leaks (repair measure). It is not enough to simply top off with oil. If no leaks are detected, top off with hydraulic fluid "G 002 000" .

- Screw cap on hand-tight (with screwdriver).

Hydraulic fluid at operating temperature (from approx. 122 ° F (50 ° C)):

- With engine not running, move front wheels in straight-ahead position.



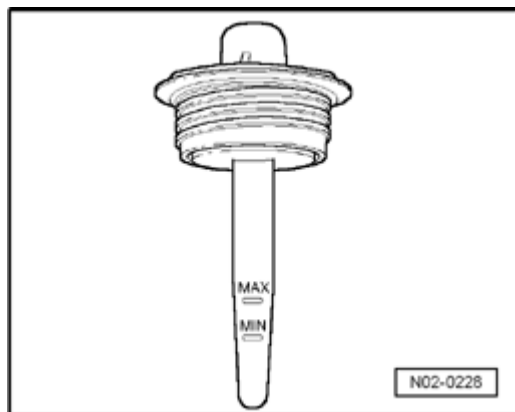
- Insert a suitable screwdriver into the recess at the cap - **arrow** - and unscrew caps with dipstick.

- Clean dipstick with clean cloth.

- Screw cap on hand-tight and remove again.

Note:

Screw cap fully in to get an accurate fluid level reading.



- Check oil level: Check fluid level. It must be between MIN and MAX markings.

Note:

If the fluid level is above the MAX mark, siphon fluid off.

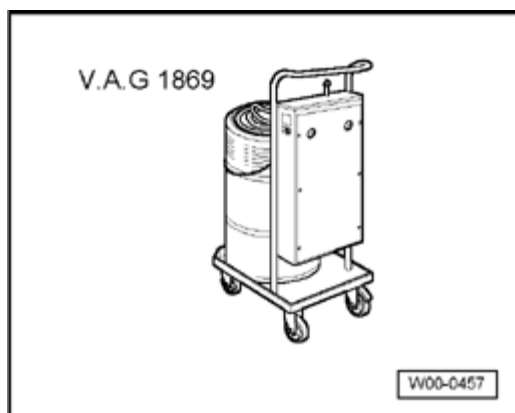
If the fluid level is below the MIN mark, check the hydraulic system for leaks (repair procedure). It is not enough to simply top off with oil. If no leaks are detected, top off with hydraulic fluid "G 002 000" .

- Screw cap on hand-tight (with screwdriver).

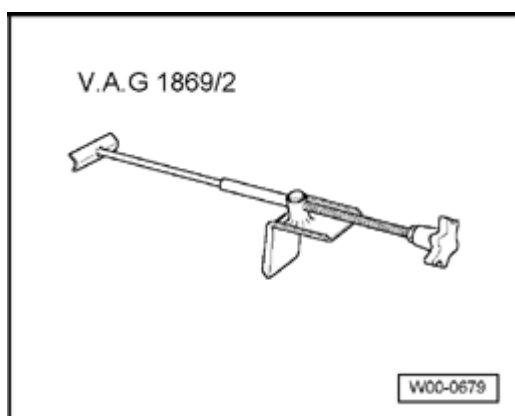
Brake fluid, changing**Special tools, testers and auxiliary items required**

Brake filler and bleeder unit VAS 5234

or



Brake filler and bleeder unit V.A.G 1869/ with Rigging set V.A.G 1869/4



Brake pedal depresser V.A.G 1869/2

Use only new brake fluid with replacement part number B 000 700 A (corresponds to US standard FMVSS 116 DOT 4)

Warning!

Brake fluid must never come into contact with fluids containing mineral oils (oil, gas, cleaning solutions). Oils containing minerals damage seals and sleeves on brake systems.

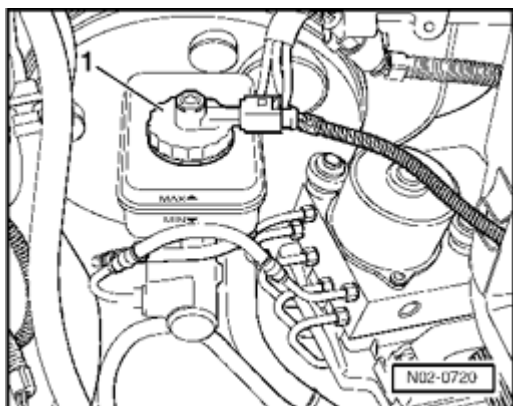
Brake fluid is poisonous. Due to its caustic nature, it must also never be brought into contact with paint.

Brake fluid is hygroscopic, which means that it absorbs moisture from the air. Always store brake fluid in air-tight containers.

Wash off brake fluid spillage using plenty of water.

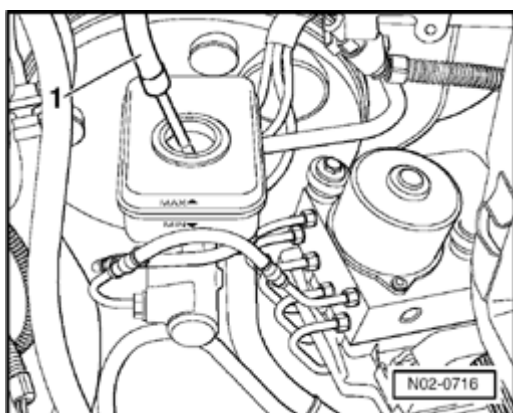
Observe waste disposal regulations!

Perform the following work sequence:



Follow user manual for Brake filling and bleeding tool VAS 5234 or Brake filling and bleeding tool V.A.G 1869/ !

- Remove brake fluid reservoir cap.



- With filter inserted, extract as much brake fluid as possible using the suction hose from Brake filler and bleeder unit VAS 5234 - 1 - or Brake filler and bleeder unit V.A.G 1869/ or with a suction bottle.

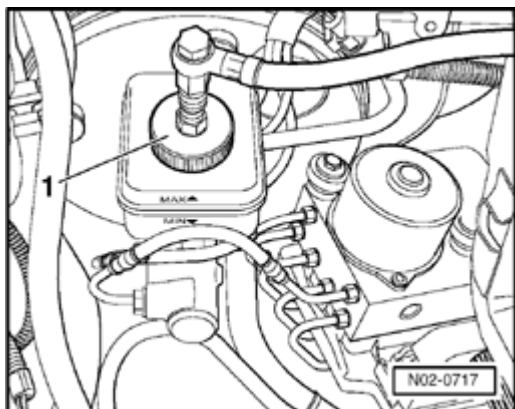
Note:

After extracting, observe that no further brake fluid runs into the reservoir (the brake fluid level in the reservoir must align with the lower edge of the strainer).

Warning!

Do not reuse, (used) extracted brake fluid.

- Install and extend Brake pedal depressor V.A.G 1869/2 between driver seat and brake pedal.



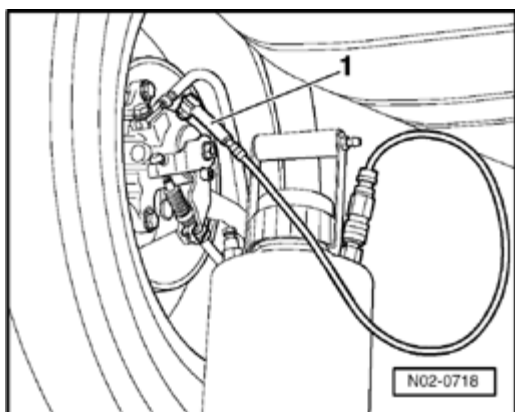
- Install adapter - 1 - to brake fluid reservoir.

Note:

If adapter - 1 - can not be used because of space limitations, use Adapter VAS 5234/1 or Adapter V.A.G 1869/1 A .

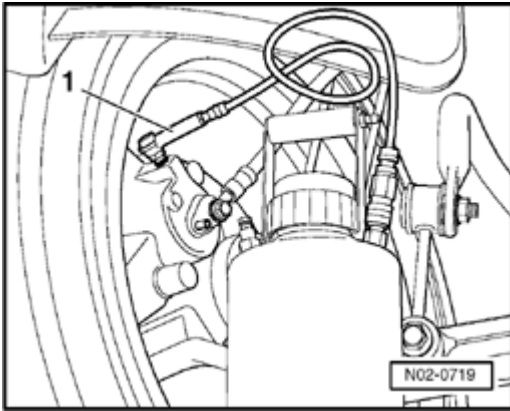
- Connect the filling hose from bBrake filler and bleeder unit VAS 5234 or from Brake filler and bleeder unit V.A.G 1869/ to the adapter.

- Remove caps from the bleeder screws.



- Connect collecting bottle bleeder hose - 1 - to rear bleeder screw, open bleeder screw and allow the appropriate quantity to flow out (see table on side). Close bleeder screw.

Repeat procedure on left rear.



- Connect collecting bottle bleeder hose - **1** - to front bleeder screw ⁾, open bleeder screw and allow the appropriate quantity to flow out (see table on side). Close bleeder screw.

Repeat procedure on left front.

Table - Sequence / quantity of brake fluid

Sequence: brake wheel cylinder, brake caliper	Brake fluid quantity which must flow out of wheel brake cylinders or brake calipers:
Right rear	0.25 liter
Left rear	0.25 liter
Right front	0.25 liter
Left front	0.25 liter

Total quantity: approx. 1.25 liter

⁾ Including brake fluid extracted from brake fluid reservoir and quantity from clutch slave cylinder.

- Install cover caps on brake wheel cylinder and/or brake caliper bleeder screws.
- Move filler lever on Brake filler and bleeder unit VAS 5234 or Brake filler and bleeder unit V.A.G 1869/ to position - **B** - (see operating instructions).
- Remove filler hose from adapter.
- Unscrew adapter from brake fluid reservoir.
- Check brake fluid level and correct if necessary.
- Install cap to brake fluid reservoir.
- Remove brake pedal depressor.
- Check pedal pressure and brake pedal free play. Free play: max. 1/3 of pedal travel

Brake fluid level (depending on brake pad wear), checking

Use only new brake fluid with replacement part number B 000 700 A (corresponds to US standard FMVSS 116 DOT 4)

Warning!

Brake fluid must never come into contact with fluids containing mineral oils (oil, gas, cleaning solutions). Oils containing minerals damage seals and sleeves on brake systems.

Brake fluid is poisonous. Due to its caustic nature, it must also never be brought into contact with paint.

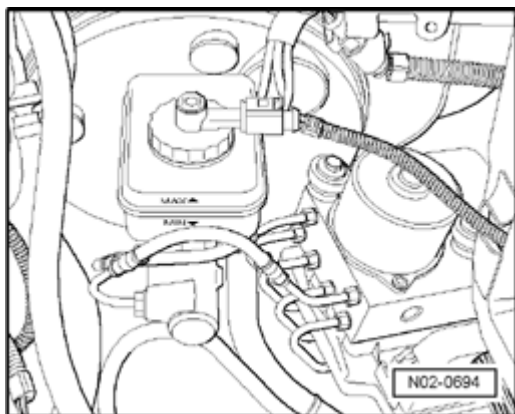
Brake fluid is hygroscopic, which means that it absorbs moisture from the air. Always store brake fluid in air-tight containers.

Wash off brake fluid spillage using plenty of water.

Observe waste disposal regulations!

Note the following:

Delivery inspection:



At time of delivery inspection, brake fluid level must be at MAX mark.

Note:

To prevent the brake fluid from overflowing from the reservoir, the level must not be over the MAX mark.

Inspection service:

- The fluid level must always be judged in conjunction with

brake pad wear. When vehicle is in use, the fluid level tends to drop slightly due to brake pad wear and automatic adjustment.

- With brake fluid at MIN mark or slightly above, topping off brake fluid is not necessary when wear limit of brake pads has been almost reached.
- When brake pads are new or if there is still enough brake lining left, the brake fluid level must be between MIN and MAX marks.
- If brake fluid level is below MIN mark, check brake system (repair procedure), before adding brake fluid.

Headlight adjustment, checking

Checking headlight adjustment for headlights with gas discharge lamps ⇒ [01-8, Headlight adjustment, checking headlight with gas discharge lamps](#)

Special tools, testers and auxiliary items required

Headlight setting unit VAS 5046/

or

Headlight setting unit VAS 5047/

The following test- and adjustment instructions are applicable to all countries. But national legislation and regulations of the respective country is to be adhered to.

Check and adjustment conditions:

Tire pressure OK.

Lenses must not be damaged or dirty.

Reflectors and bulbs OK.

Vehicle must be properly loaded.

Load: Vehicle must be loaded with one person on the drivers seat, weighing 75 kg, otherwise vehicle must be empty (curb weight).

The curb weight is the weight of the vehicle ready to be operated with filled fuel tank (at least 90% filled), including the weight of all equipment usually carried in the car such as spare wheel, tools, car jack, fire extinguisher, etc.

If the fuel tank is not at least 90% full, adjust the weight as follows:

- Read fuel level from fuel gauge. Calculate additional weight needed using the following table. Place extra weight in luggage compartment.

Tank filling table

Fuel level according to fuel gauge	Additional weight in luggage compartment in lbs (kg)
1/4	66 (30)
1/2	44 (20)
3/4	22 (10)
Full	0 (0)

Example:

If the fuel tank is half full, place a weight of 44 lbs (20kg) in the luggage compartment.

Note:

For additional weight use containers filled with water. A container filled with 5 liters of water weighs approx. 12 lbs (5kg) .

Move vehicle back and forth for 1 meter (3 to 4 feet) or bounce front and rear of vehicle several times up and down to settle suspension.

Vehicle and headlight adjuster must be on a level surface.
⇒ *User manual for headlight adjuster.*

Vehicle and headlight adjuster must be aligned.

Inclination must be set.

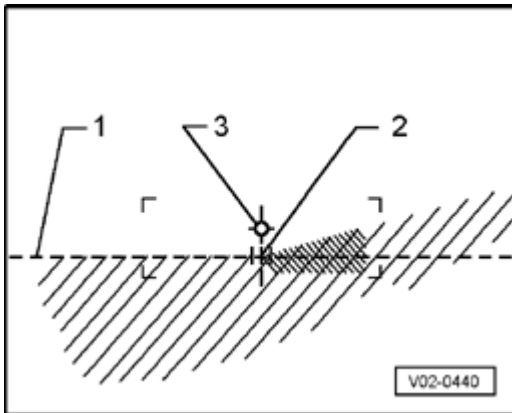
In the trim above the headlight, inclination measurements are stamped in "%". The headlights must be adjusted according to these measurements. Percentage information is based on a projection distance of 10 meters. For example: inclination of 1.2 % converts to approx. 12 cm.

The adjusting wheel for the beam width regulation must be located in basic setting (-).

Checking headlight setting (with new test screen without 15 ° -setting line)

Headlights:

Check the following:



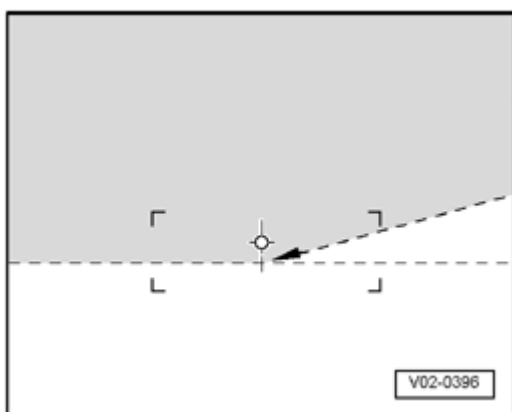
- With the low beam switched on check whether the horizontal light-dark border of the setting line - **1** - contacts the test surface.

- Check whether the break-away point - **2** - between the left horizontal part and the rising part on the right of the light-dark border runs vertically through the center point - **3** - . The bright core of the light beam must be on the right of the vertical line.

Note:

*To make it easier to find break-away point - **2** - cover and uncover left half of headlight (as viewed when looking forward) a few times. Then check low beam again.*

*After correct adjustment of low beams the center point of the main beam must lie on the center mark - **3** - .*



For the previous test screen with 15° -setting line, adjust as for new test screen. To avoid incorrect settings, ignore 15° setting line.

Other additional headlights:

Accessory auxiliary headlight systems must be checked

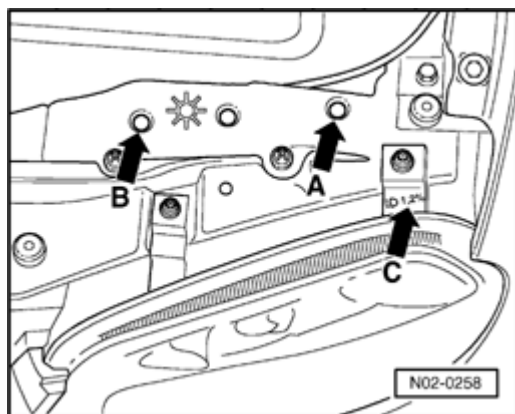
and adjusted according to the guidelines valid for them.

Adjusting headlights for the Golf

Adjusting headlights for the Jetta. ⇒ [01-8, Adjusting headlights for the Jetta](#)

Note:

At the same time the low-beam headlights are adjusted, the fog lamps and high-beam headlights are adjusted as well.



Headlight (left):

Both adjustment screws on right-hand headlight are a mirror image.

A - Lateral adjustment

B - Height adjustment

- Adjust headlights with a suitable phillips head screwdriver through the bores - **A** - and - **B** - .

Note:

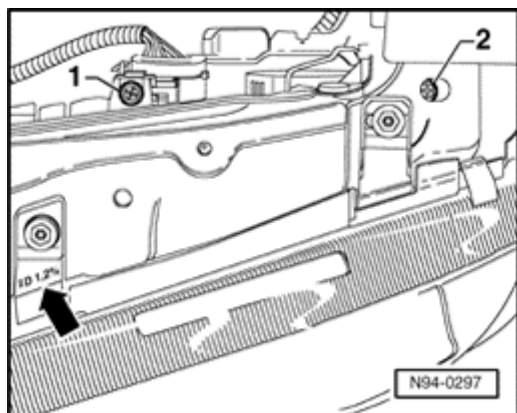
Also, check if the reflectors in both headlights adjust equally by manipulating the beam width regulation.

Adjusting headlights for the Jetta

Adjusting headlights for the Golf ⇒ [01-8, Adjusting headlights for the Golf](#)

Note:

At the same time the low-beam headlights are adjusted, the fog lamps and high-beam headlights are adjusted as well.



Headlight (left):

Both adjustment screws on right-hand headlight are a mirror image.

1 - Lateral adjustment

2 - Height adjustment

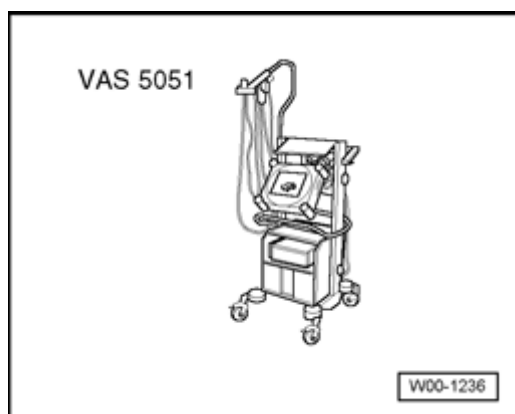
Adjust the adjustment wheel with a phillips head screwdriver to adjust the lateral and height settings.

Note:

Also, check if the reflectors in both headlights adjust equally by manipulating the beam width regulation.

Headlight adjustment, checking headlight with gas discharge lamps

Special tools, testers and auxiliary items required



Vehicle Diagnosis, Testing and Information System VAS 5051A

Diagnostic cable VAS 5051/6A

Headlight setting unit VAS 5046/

or

Headlight setting unit VAS 5047/

The following test- and adjustment instructions are applicable to all countries. But national legislation and regulations of the respective country is to be adhered to.

The following are prerequisites when adjusting headlights with gas discharge system:

Tire pressure OK.

Lenses must not be damaged or dirty.

Reflectors and bulbs OK.

The parking brake must not be engaged and no gear should be selected.

The steering wheel must be in straight-ahead position.

The vehicle may not be moved during the basic setting (including door "open and close" , leaning against, getting in and out).

Nobody may be in the vehicle and the vehicle must not be loaded.

Move vehicle back and forth for 1 meter (3 to 4 feet) or bounce front and rear of vehicle several times up and down to settle suspension.

Vehicle and headlight adjuster must be on a level surface.

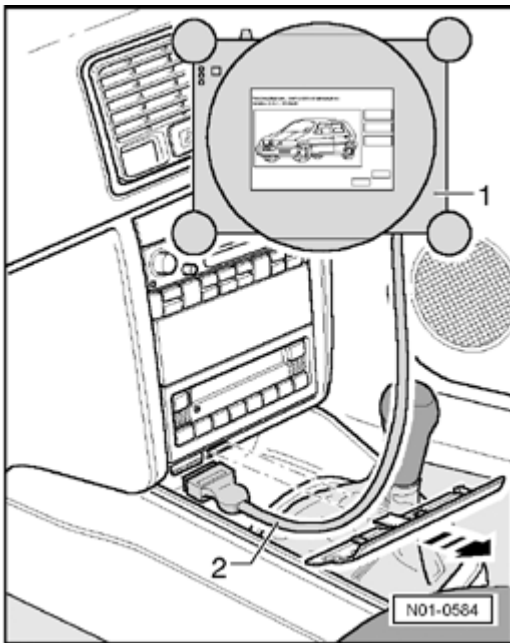
Vehicle and headlight adjuster must be aligned.

Inclination must be set.

In the trim above the headlight, inclination measurements are stamped in "%". The headlights must be adjusted according to these measurements. Percentage information is based on a projection distance of 10 meters. For example: inclination of 1.2 % converts to approx. 12 cm.

Headlight (left):

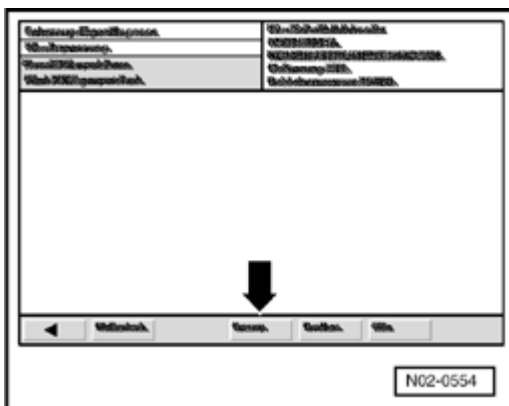
Perform basic setting with the Vehicle Diagnosis, Testing and Information System VAS 5051B :



- Connect Vehicle Diagnosis, Testing and Information System VAS 5051B using the Diagnostic cable VAS 5051/6A with ignition switched off .
- Switch ignition on
- Select "Guided Functions"
- Select "Automatic beam width regulation"
- Select "Perform basic setting"
- Follow the instructions on the tester.
- Check the headlight adjustment and, if necessary, adjust the headlights.

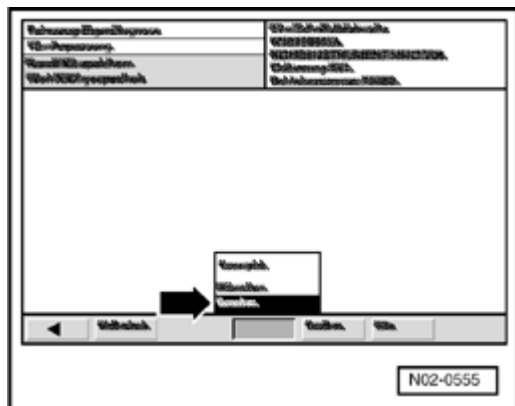
Adjusting procedure for Golf ⇒ [01-8, Adjusting headlights for the Golf](#) , for Jetta ⇒ [01-8, Adjusting headlights for the Jetta](#)

End adaptation



Indicated on display:

- Press the "Go to" button - **arrow** - on display.



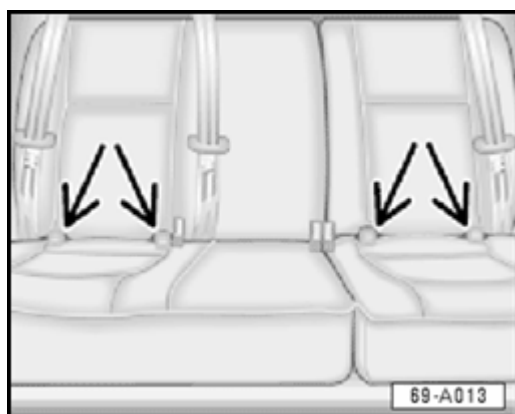
Indicated on display:

- Press "exit" button - **arrow** - on display.
- Press "exit" button in exit menu.
- Turn off ignition and disconnect diagnostic connection.

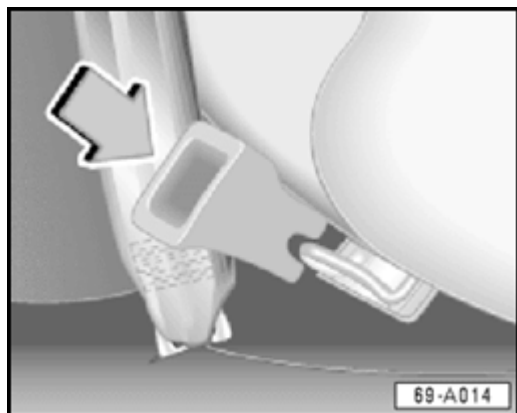
Child restraint LATCH guidance fixture, installing

Note:

LATCH guidance fixtures must remain on vehicle. Only customer may remove them.



- Locate four anchorage bars between rear seat back and rear seat cushion where fixtures are to be installed - **arrows** - .



- Install LATCH guidance fixture - **arrow** - by snapping over anchorage bars as shown. Part number on LATCH guidance fixture must face down when installed.

RAPGARD, inspection, removal and disposal

From my 2002

Service

Within 48 Hours after arrival at Dealer:

Inspection

- Inspect RAPGARD for damage or peeling.

If RAPGARD is disturbed (dented, scratched, etc.):

- You must note damage on Carrier Delivery Receipt, including damage type, extent and location. Failure to note damage on Carrier Delivery Receipt will result in non-payment of repair.

Within 72 Hours prior to delivery to Customer:

Remove RAPGARD from vehicle.

Wash vehicle exterior.

Inspect paint surfaces, moldings and glass.

Protect paint surface of all new vehicles by applying 3M Perfect-It Paste Wax or equivalent.

Removal

Vehicle must be at room temperature.

Ideal body surface temperature for RAPGARD removal is

60 ° F (15.5 ° C) to 80 ° F (26.6 ° C).

If body surface temperatures are below 60 ° F (15.5 ° C) or above 80 ° F (26.6 ° C) then:

Removal procedure should be performed indoors after surface temperatures have been allowed to stabilize within given range.

- Rinse vehicle thoroughly with water to remove surface dirt or dust and to help stabilize body surface temperatures.

- Starting at corners of each panel, carefully remove RAPGARD from vehicle.

RAPGARD. paint inspection after removal

- Inspect painted surfaces under one of following lighting conditions:

Indoors under fluorescent lighting

Outdoors under bright sunlight.

Important:

If any defects on exterior have been identified (scratches, dings, dents and other types of body damage):

- Contact your Service Manager and arrange to repair defects immediately.

Note:

After removal of RAPGARD, some vehicles may exhibit temporary paint discoloration or paint swelling (caused by trapped moisture under RAPGARD).

This temporary swelling is caused by paint finish absorbing moisture trapped under RAPGARD film.

This swelling will disappear with exposure to sun or heat lamps within 2 - 3 hours. Severe Paint swelling may require 2 - 3 days to recover.

DO NOT buff or refinish paint for this condition!

Adhesive residue removal

Warning!

Always read and follow manufacturer Cautions and

Warnings regarding use of product.

RAPGARD adhesive residue remains on paint finish, remove with a non-abrasive polishing product such as light colors or dark colors.

Thick lines of adhesive residue can be removed with general purpose adhesive cleaner or equivalent.

Note:

Paint discoloration (looks like shaded or dark magic marker lines) can be removed with a heat gun using following procedure:

- Hold heat gun approximately 3 in. away from affected paint surfaces and apply heat using slow oscillating motions until discoloration is gone.
- If discoloration remains, wipe heated area with Isopropyl alcohol and repeat procedure to increase surface drying.

Important!

After inspecting and removing RAPGARD, washing vehicle, inspecting and repairing any defects in paint surfaces, moldings and glass:

- Protect vehicle paint surface by applying 3M Perfect-It Paste Wax or equivalent.

RAPGARD Disposal

RAPGARD can be disposed as normal paper waste. If unsure about proper disposal procedures in your area, check local regulations.

Perform test drive

To what extent the following can be checked is dependent upon the vehicle equipment and local conditions (urban/country).

The following should be checked by means of a road test:

- Engine: Output, misfiring, idling speed, acceleration
- Clutch: Pulling away, pedal pressure, odors
- Gear selection: Ease of operation, shift lever position
- Automatic transmission: Selector lever position, shiftlock / ignition key interlock, shift behavior, display in instrument

cluster

- Foot and parking brake: Function, free travel and effectiveness, pulling to one side, juddering, squeal
- ABS function: A pulsing at the brake pedal must be felt when performing ABS controlled braking
- Steering: Function, steering free play, steering wheel centralized when wheels are in straight ahead position
- Sunroof: Function
- Radio: reception, GALA, interference
- Multi-function display (MFA): Functions
- A/C system: Function
- Vehicle: Moving off line when travelling straight ahead (level road)
- Imbalance: Wheels, drive shafts, prop shafts
- Wheel bearings: Noises
- Engine: Hot starting behavior