STEERING

CONTENTS

POWER STEERING

INDEX

DESCRIPTION AND OPERATION

POWER STEERING SYSTEM

The power steering pump (Fig. 1) is a constant flow rate and displacement vane type pump. The pump reservoir is attached to the pump body. The pump is connected to the steering by the pressure and return hoses.

The steering gear (Fig. 1) used is a recirculating ball type gear. The rack piston balls act as a rolling thread between the worm shaft and rack piston. The worm shaft is supported by a thrust bearing at the lower end and a bearing assembly at the upper end. When the worm shaft is turned the rack piston moves. The rack piston teeth mesh with the pitman shaft. Turning the worm shaft turns the pitman shaft, which moves the steering linkage.

The power steering system consists of:

- Hydraulic pump
- Recirculating ball steering gear
- Steering column
- Steering linkage
- Cooler (optional)

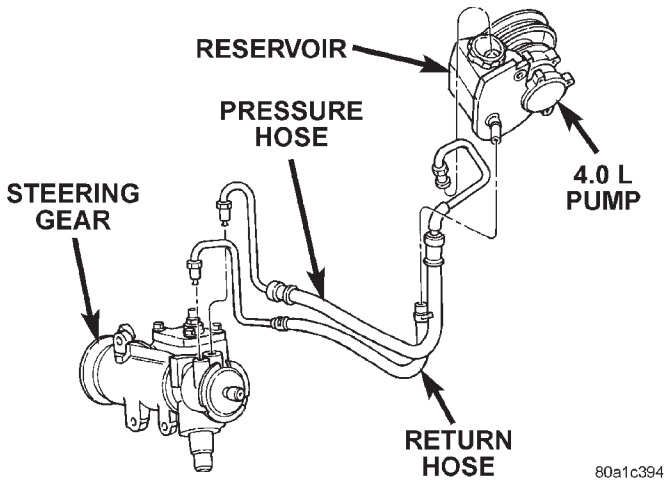


Fig. 1 Typical - Power Steering Gear & Pump

DIAGNOSIS AND TESTING

POWER STEERING SYSTEM DIAGNOSIS CHARTS

STEERING NOISE

There is some noise in all power steering systems. One of the most common is a hissing sound evident at a standstill parking. Or when the steering wheel is at the end of it's travel. Hiss is a high frequency noise similar to that of a water tap being closed slowly. The noise is present in all valves that have a high velocity fluid passing through an orifice. There is no relationship between this noise and steering performance.

CONDITION	POSSIBLE CAUSES	CORRECTION
OBJECTIONAL HISS OR WHISTLE	1. Steering intermediate shaft to dash panel seal.	1. Check and repair seal at dash panel.
	2. Noisy valve in power steering gear.	2. Replace steering gear.
RATTLE OR CLUNK	1. Gear mounting bolts loose.	1. Tighten bolts to specification.
	2. Loose or damaged suspension components/track bar.	2. Inspect and repair suspension.
	3. Loose or damaged steering linkage.	3. Inspect and repair steering linkage.
	4. Internal gear noise.	4. Replace gear.
	5. Pressure hose in contact with other components.	5. Reposition hose.
CHIRP OR SQUEAL	1. Loose belt.	1. Adjust or replace.
WHINE OR GROWL	1. Low fluid level.	1. Fill to proper level.
	2. Pressure hose in contact with other components.	2. Reposition hose.
	3. Internal pump noise.	3. Replace pump.
	4. Air in the system.	4. Perform pump initial operation.
SUCKING AIR SOUND	1. Loose return line clamp.	1. Replace clamp.
	2. O-ring missing or damaged on hose fitting.	2. Replace o-ring.
	3. Low fluid level.	3. Fill to proper level.
	4. Air leak between pump and reservoir.	4. Repair as necessary.
SCRUBBING OR KNOCKING	1. Wrong tire size.	1. Verify tire size.
	2. Wrong gear.	2. Verify gear.

DIAGNOSIS AND TESTING (Continued)

BINDING AND STICKING

CONDITION	POSSIBLE CAUSE	CORRECTION
DIFFICULT TO TURN WHEEL STICKS OR BINDS	1. Low fluid level.	1. Fill to proper level.
	2. Tire pressure.	2. Adjust tire pressure.
	3. Steering component.	3. Inspect and lube.
	4. Loose belt.	4. Adjust or replace.
	5. Low pump pressure.	5. Pressure test and replace if necessary.
	6. Column shaft coupler binding.	6. Replace coupler.
	7. Steering gear worn or out of adjustment.	7. Repair or replace gear.
	8. Ball joints binding.	8. Inspect and repair as necessary.

INSUFFICIENT ASST. OR POOR RETURN TO CENTER

CONDITION	POSSIBLE CAUSE	CORRECTION
HARD TURNING OR MOMENTARY INCREASE IN TURNING EFFORT	1. Tire pressure.	1. Adjust tire pressure.
	2. Low fluid level.	2. Fill to proper level.
	3. Loose belt.	3. Adjust or replace.
	4. Lack of lubrication.	4. Inspect and lubricate steering and suspension compnents.
	5. Low pump pressure.	5. Pressure test and repair as necessary.
	6. Internal gear leak.	6. Pressure and flow test, and repair as necessary.
STEERING WHEEL DOES NOT WANT TO RETURN TO CENTER POSITION	1. Tire pressure.	1. Adjust tire pressure.
	2. Wheel alignment.	2. Align front end.
	3. Lack of lubrication.	3. Inspect and lubricate steering and suspension compnents.
	4. High friction in steering gear.	4. Test and adjust as necessary.
	5. Ball joints binding.	5. Inspect and repair as necessary.

DIAGNOSIS AND TESTING (Continued)

LOOSE STEERING AND VEHICLE LEAD

CONDITION	POSSIBLE CAUSE	CORRECTION
EXCESSIVE PLAY IN STEERING WHEEL	1. Worn or loose suspension or steering components.	1. Repair as necessary.
	2. Worn or loose wheel bearings.	2. Repair as necessary.
	3. Steering gear mounting.	3. Tighten gear mounting bolts to specification.
	4. Gear out of adjustment.	4. Adjust gear to specification.
	5. Worn or loose steering coupler.	5. Repair as necessary.
VEHICLE PULLS OR LEADS TO ONE SIDE	1. Tire Pressure.	1. Adjust tire pressure.
	2. Radial tire lead.	2. Cross front tires.
	3. Brakes dragging.	3. Repair as necessary.
	4. Wheel alignment.	4. Align vehicle.
	5. Weak or broken spring.	5. Replace spring.
	6. Loose or worn steering or suspension components.	6. Repair as necessary.

STEERING FLOW AND PRESSURE

The following procedure is used to test the operation of the power steering system on the vehicle. This test will provide the gallons per minute (GPM) or flow rate of the power steering pump along with the maximum relief pressure. Perform test any time a power steering system problem is present. This test will determine if the power steering pump or power steering gear is not functioning properly. The following pressure and flow test is performed using Power Steering Analyzer Tool kit 6815 (Fig. 2) and Adapter Kit 6893.

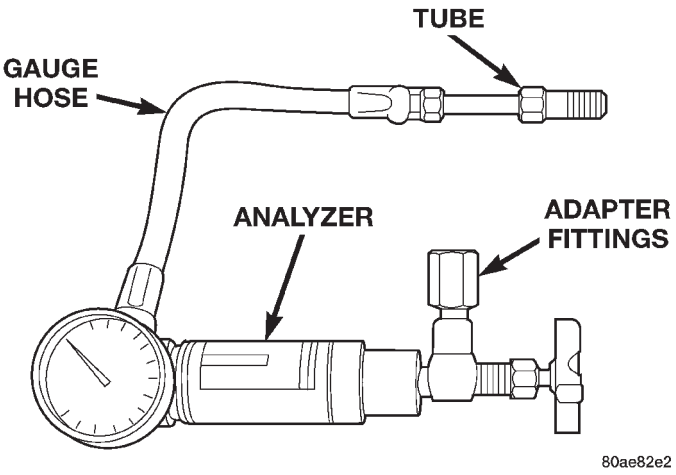


Fig. 2 Power Steering Analyzer

FLOW AND PRESSURE TEST

(1) Check the power steering belt to ensure it is in good condition and adjusted properly.

(2) Connect pressure gauge hose from the Power Steering Analyzer to Tube 6865.

(3) Connect Adapter 6826 to Power Steering Analyzer test valve end.

(4) Disconnect the high pressure hose from the power steering pump.

(5) Connect Tube 6865 to the pump hose fitting.

(6) Connect the power steering hose from the steering gear to Adapter 6826.

(7) Open the test valve completely.

(8) Start engine and let idle long enough to circulate power steering fluid through flow/pressure test gauge.

(9) Shut off the engine and check the fluid level, add fluid as necessary. Start engine again and let idle.

(10) The initial pressure reading should be 345-552 kPa (50-80 psi). If pressure is higher inspect the hoses for restrictions and repair as necessary.

(11) Increase the engine speed to 1500 RPM and read the flow meter. The reading should be 2.4 - 2.8 GPM, if the reading is below this specification the pump should be replaced.

CAUTION: This next step involves testing maximum pump pressure output and flow control valve operation. Do not leave valve closed for more than three seconds as the pump could be damaged.

(12) Close valve fully three times for three seconds and record highest pressure indicated each time. **All three readings must be at pump relief pressure**

DIAGNOSIS AND TESTING (Continued)

specifications and within 345 kPa (50 psi) of each other.

- Pressures above specifications but not within 345 kPa (50 psi) of each other, replace pump.
- Pressures within 345 kPa (50 psi) of each other but below specifications, replace pump.

(13) Open the test valve and turn the steering wheel to the extreme left and right positions against the stops. Record the highest pressure reading at each position. Compare readings to the pump specifications chart. If pressures readings are not within 50 psi. of each other, the gear is leaking internally and must be repaired.

CAUTION: Do not force the pump to operate against the stops for more than 2 to 4 seconds at a time because, pump damage will result.

PUMP SPECIFICATIONS

ENGINE	RELIEF PRESSURE ± 50	FLOW RATE (GPM)
4.0L	9653 kPa (1400 psi)	1500 RPM 2.4 - 2.8 GPM
4.7L	9653 kPa (1400 psi)	

POWER STEERING PUMP

INDEX

DESCRIPTION AND OPERATION

POWER STEERING PUMP

Hydraulic pressure for the power steering system is provided by a belt driven power steering pump (Fig. 1). The pump shaft has a pressed-on drive pulley that is belt driven by the crankshaft pulley. The power steering pump is a constant flow rate and displacement, vane-type pump. The pump internal parts operate submerged in fluid. The flow control orifice is part of the high pressure line fitting. The pressure relief valve inside the flow control valve limits the pump pressure. The reservoir is attached to the pump body with spring clips. The power steering pump is connected to the steering gear by the pressure and return hoses.

NOTE: Power steering pumps have different pressure rates and are not interchangeable with other pumps.

POWER STEERING PRESSURE LINE

Power steering pressure line, is used to transfer high pressure power steering fluid, from the power steering pump to the power steering gear.The hose consists of two metal ends and rubber center section that contains a tuning cable.

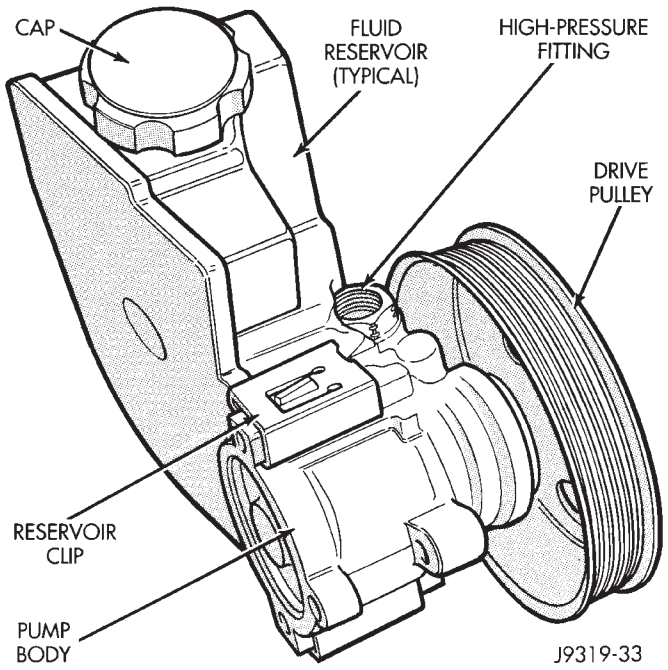


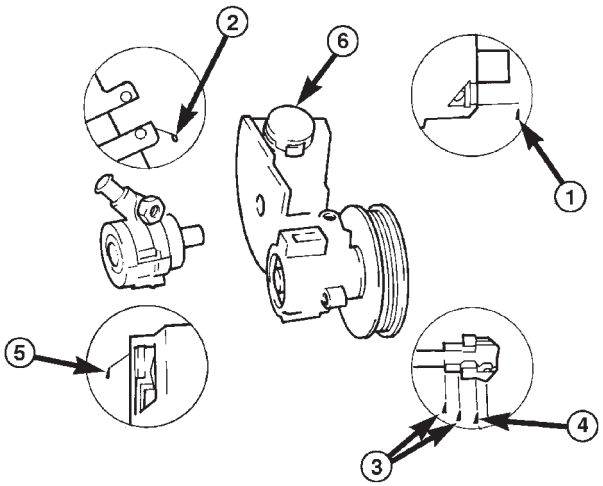
Fig. 1 Pump With Integral Reservoir

POWER STEERING RETURN LINE

Power steering return line, is used to transfer low pressure power steering fluid, from the power steering gear to the power steering pump.The hose is clamped at the pump and the gear.

DIAGNOSIS AND TESTING

PUMP LEAKAGE DIAGNOSIS



1. BUSHING (BEARING) WORN, SEAL WORN. REPLACE PUMP.
2. REPLACE RESERVOIR O-RING SEAL.
3. TORQUE HOSE FITTING NUT TO SPECIFICATIONS. IF LEAKAGE PERSISTS, REPLACE O-RING SEAL.
4. TORQUE FITTING TO SPECIFICATIONS. IF LEAKAGE PERSISTS, REPLACE O-RING SEAL.
5. REPLACE PUMP.
6. CHECK OIL LEVEL: IF LEAKAGE PERSISTS WITH THE LEVEL CORRECT AND CAP TIGHT, REPLACE THE CAP.

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SERVICE PROCEDURES

POWER STEERING PUMP – INITIAL OPERATION

WARNING: THE FLUID LEVEL SHOULD BE CHECKED WITH ENGINE OFF TO PREVENT INJURY FROM MOVING COMPONENTS.

CAUTION: Use MOPAR Power Steering Fluid or equivalent. Do not use automatic transmission fluid and do not overfill.

Wipe filler cap clean, then check the fluid level. The dipstick should indicate **COLD** when the fluid is at normal ambient temperature.

(1) Fill the pump fluid reservoir to the proper level and let the fluid settle for at least two minutes.

(2) Start the engine and let run for a few seconds then turn engine off.

(3) Add fluid if necessary. Repeat the above procedure until the fluid level remains constant after running the engine.

(4) Raise the front wheels off the ground.

(5) Slowly turn the steering wheel right and left, lightly contacting the wheel stops at least 20 times.

(6) Check the fluid level add if necessary.

(7) Lower the vehicle, start the engine and turn the steering wheel slowly from lock to lock.

(8) Stop the engine and check the fluid level and refill as required.

(9) If the fluid is extremely foamy or milky looking, allow the vehicle to stand a few minutes and repeat the procedure.

CAUTION: Do not run a vehicle with foamy fluid for an extended period. This may cause pump damage.

REMOVAL AND INSTALLATION

POWER STEERING PUMP - 4.0L

REMOVAL

(1) Remove serpentine drive belt, refer to Group 7 Cooling.

(2) Remove pressure and return hoses from pump and drain pump.

(3) Remove 3 pump mounting bolts through pulley access holes.

(4) Tilt pump downward and remove from engine.

(5) Remove pulley from pump.

INSTALLATION

(1) Install pulley on pump.

(2) Install pump on engine.

(3) Install 3 pump mounting bolts and tighten to 28 N·m (21 ft. lbs.).

(4) Install the pressure and return hoses to pump.

(5) Install drive belt, refer to Group 7 Cooling.

(6) Add power steering fluid. Refer to Power Steering Pump Initial Operation.

REMOVAL AND INSTALLATION (Continued)

POWER STEERING PUMP - 4.7L

REMOVAL

(1) Remove the serpentine drive belt. Refer to Group 7 Cooling.

(2) Remove the pressure and return hoses from pump and drain pump.

(3) Remove 3 pump mounting bolts through pulley access holes (Fig. 2).

(4) Remove the pump from the vehicle.

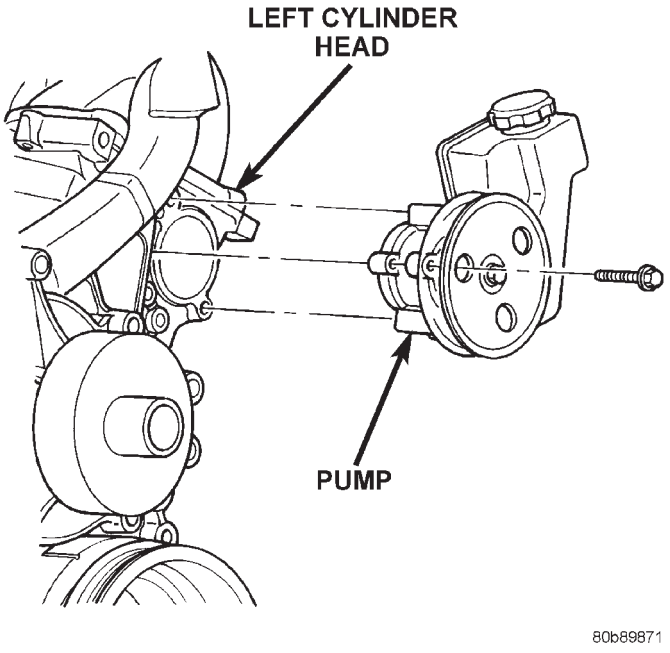


Fig. 2 Pump Mounting

INSTALLATION

(1) Position the pump on the left cylinder head and install bolts through pulley access holes. Tighten bolts to 40 N·m (30 ft. lbs.).

(2) Install the pressure and return hoses to pump.

(3) Install serpentine drive belt, refer to Group 7 Cooling.

(4) Add power steering fluid. Refer to Power Steering Pump Initial Operation in this section.

DISASSEMBLY AND ASSEMBLY

PUMP PULLEY

DISASSEMBLY

(1) Remove pump assembly.

(2) Remove pulley from pump with Puller C-4333 (Fig. 3).

ASSEMBLY

(1) Replace pulley if bent, cracked, or loose.

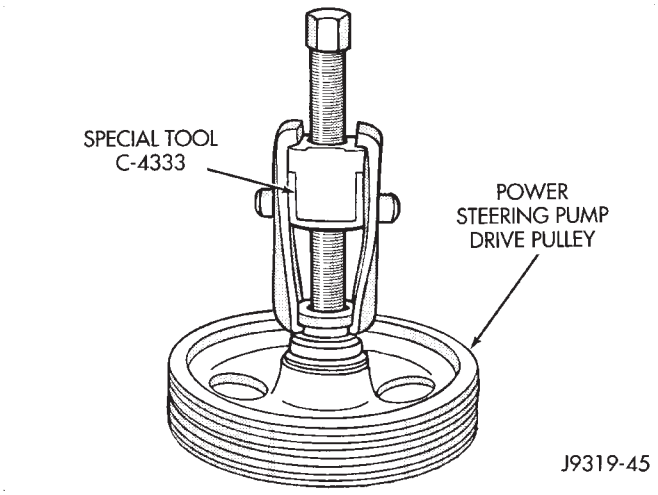


Fig. 3 Pulley Removal

(2) Install pulley on pump with Installer C-4063-B (Fig. 4) flush with the end of the shaft. Ensure the tool and pulley remain aligned with the pump shaft.

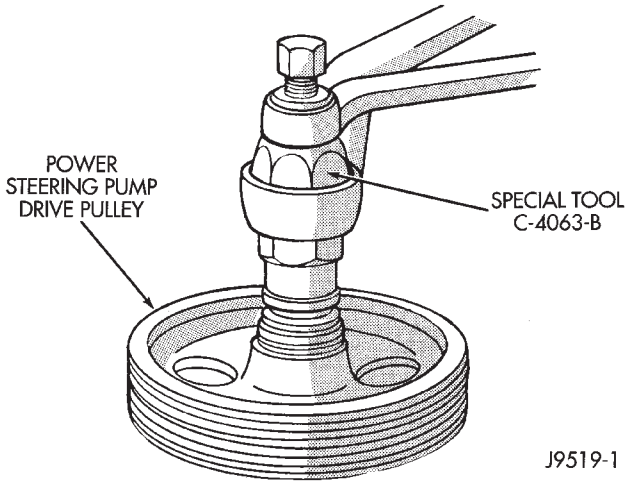


Fig. 4 Pulley Installation

(3) Install pump assembly.

(4) With Serpentine Belt, run engine until warm (5 min.) and note any belt chirp. If chirp exists, move pulley outward approximately 0.5 mm (0.020 in.). If noise increases, press on 1.0 mm (0.040 in.). **Be careful that pulley does not contact mounting bolts.**

PUMP RESERVOIR

DISASSEMBLY

(1) Remove power steering pump.

(2) Clean exterior of pump.

(3) Clamp the pump body in a soft jaw vice.

(4) Pry up tab and slide the retaining clips off (Fig. 5).

NOTE: Use new retaining clips for installtion.

DISASSEMBLY AND ASSEMBLY (Continued)

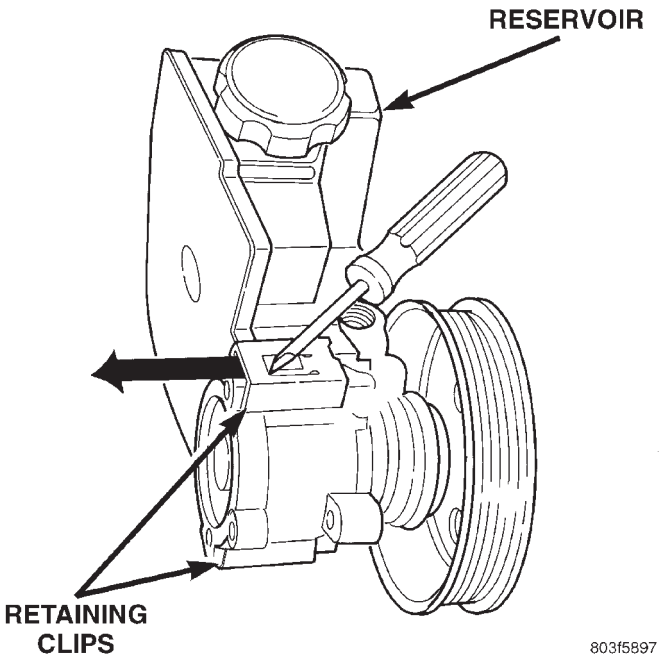


Fig. 5 Pump Reservoir Clips

(5) Remove fluid reservoir from pump body. Remove and discard O-ring seal.

ASSEMBLY

(1) Lubricate new O-ring Seal with Mopar Power Steering Fluid or equivalent.
(2) Install O-ring seal in housing.
(3) Install reservoir onto housing.
(4) Slide and tap in **new** reservoir retainer clips until tab locks to housing.
(5) Install power steering pump.
(6) Add power steering fluid, refer to Pump Initial Operation.

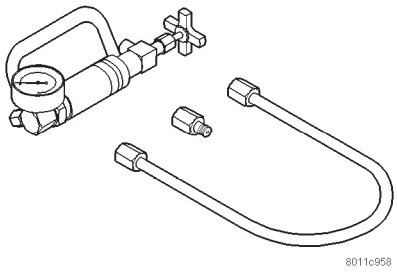
SPECIFICATIONS

TORQUE CHART

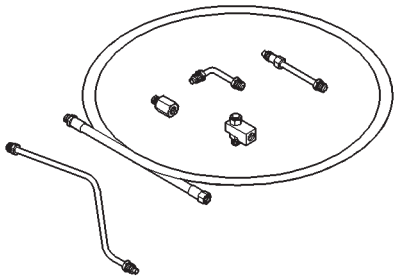
DESCRIPTION	TORQUE
Power Steering Pump	
Bracket Bolt-4.0L	57 N·m (42 ft. lbs.)
Pump Bolts-4.0L	28 N·m (21 ft. lbs.)
Pump Bolts-4.7L	40 N·m (30 ft. lbs.)
Flow Control Valve	75 N·m (55 ft. lbs.)
Pressure Line	20-38 N·m (14-28 ft. lbs.)
Return Line	20-38 N·m (14-28 ft. lbs.)

SPECIAL TOOLS

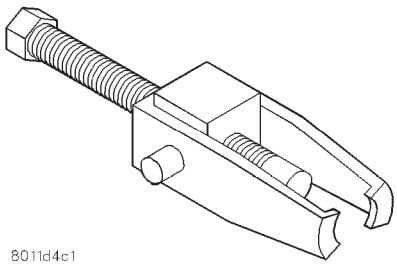
POWER STEERING PUMP



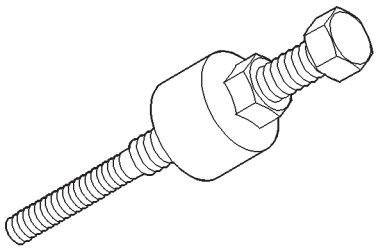
Analyzer Set, Power Steering Flow/Pressure 6815



Adapters, Power Steering Flow/Pressure Tester 6893



Puller C-4333



Installer, Power Steering Pulley C-4063–B

POWER STEERING GEAR

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DESCRIPTION AND OPERATION

POWER STEERING GEAR

The power steering gear is a recirculating ball type gear (Fig. 1). The gear acts as a rolling thread between the worm shaft and rack piston. The worm shaft is supported by a thrust bearing at the lower end and a bearing assembly at the upper end. When the worm shaft is turned the rack piston moves. The rack piston teeth mesh with the pitman shaft. Turning the worm shaft turns the pitman shaft, which turns the steering linkage.

The following gear components can be serviced:

- Pitman Shaft and Cover
- Pitman Shaft Bearings
- Pitman Shaft Oil Seal/Dust Seal
- Stud Shaft Housing with Seal
- O-Rings and Teflon Rings

NOTE: If rack piston assembly is damaged the gear must be replaced.

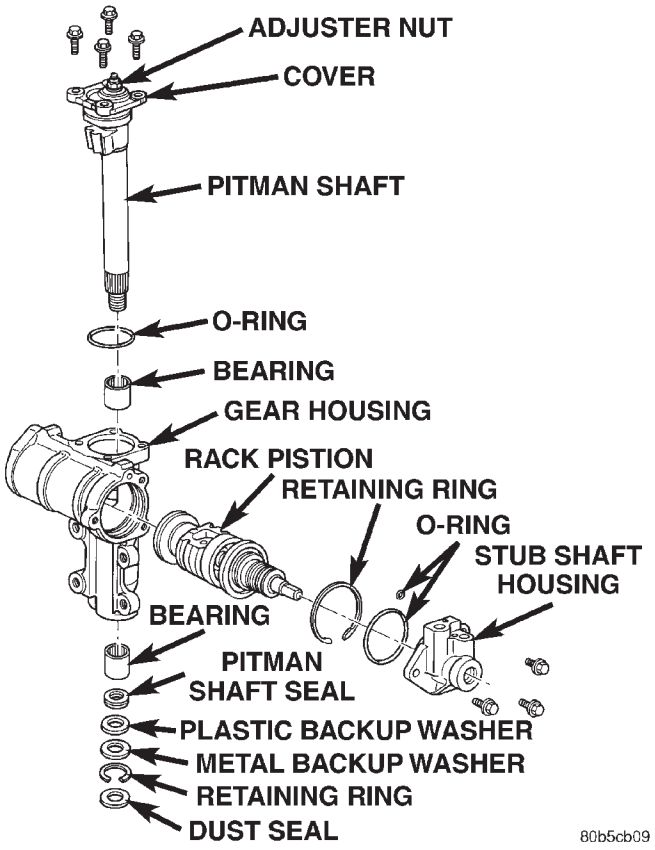
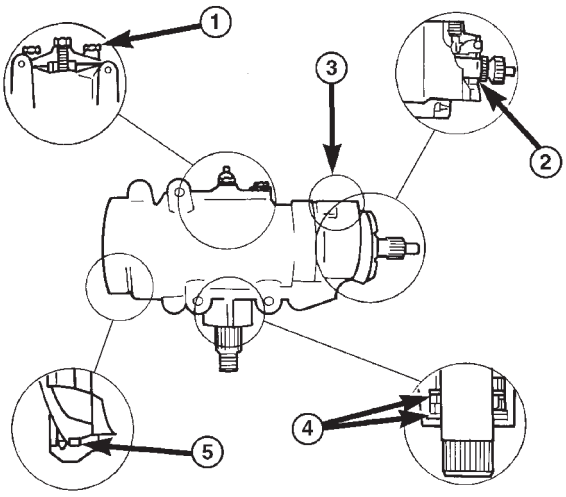


Fig. 1 Recirculating Ball Type Gear

DIAGNOSIS AND TESTING

POWER STEERING GEAR LEAKAGE DIAGNOSIS



1. SIDE COVER LEAK - TORQUE SIDE COVER BOLTS TO SPECIFICATION. REPLACE THE SIDE COVER SEAL IF THE LEAKAGE PERSISTS.
2. ADJUSTER PLUG SEAL - REPLACE THE ADJUSTER PLUG SEALS.
3. PRESSURE LINE FITTING - TORQUE THE HOSE FITTING NUT TO SPECIFICATIONS. IF LEAKAGE PERSISTS, REPLACE THE SEAL.
4. PITMAN SHAFT SEALS - REPLACE THE SEALS.
5. TOP COVER SEAL - REPLACE THE SEAL.

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REMOVAL AND INSTALLATION

STEERING GEAR

REMOVAL

(1) Place the front wheels in the straight ahead position with the steering wheel centered.

(2) Remove the air cleaner housing, refer to Group 14 Fuel System.

(3) Remove and cap the pressure and return lines (Fig. 2) from the steering gear.

(4) Remove the column coupler shaft bolt (Fig. 2) and remove the shaft from the gear.

(5) Remove left front wheel and tire assembly.

(6) Remove pitman arm from gear with Puller C-4150A.

(7) Remove windshield washer reservoir refer to Group 8 Electrical.

(8) Remove the steering gear mounting bolts. Remove the steering gear out of the engine compartment (Fig. 3).

INSTALLATION

(1) Position the steering gear on the frame rail and install the bolts. Tighten the bolts to 108 N·m (80 ft. lbs.) torque.

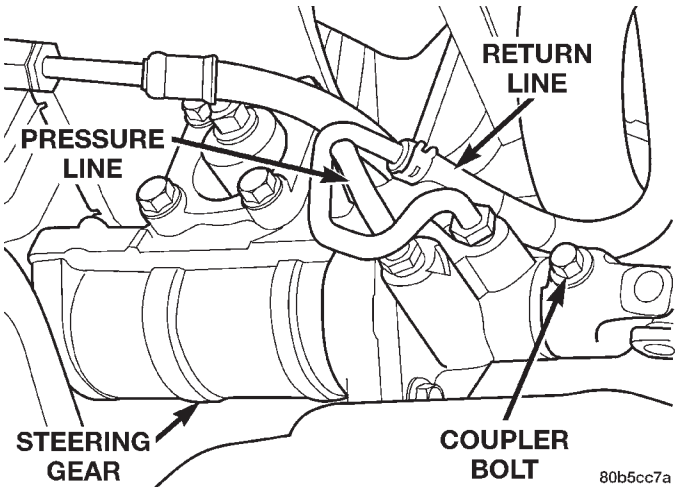


Fig. 2 Pressure And Return Lines

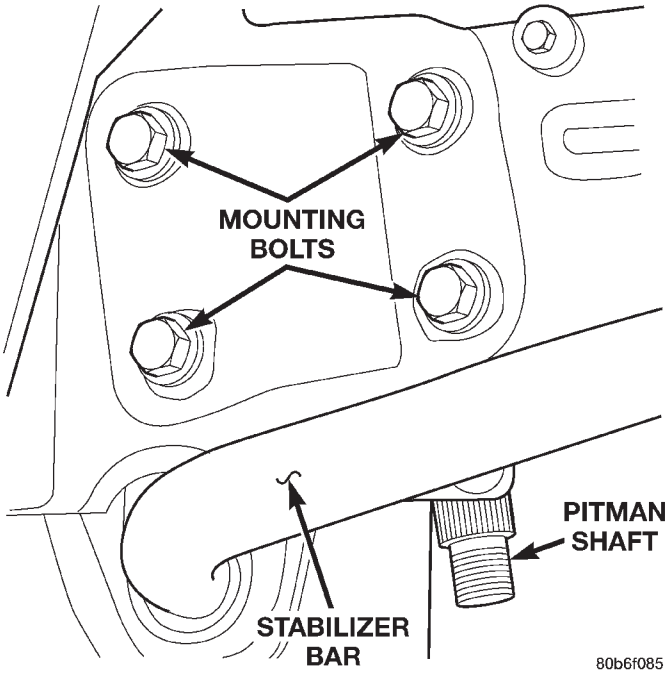


Fig. 3 Steering Gear Mounting

(2) Install the pitman arm and tighten nut to 251 N·m (185 ft. lbs.).

(3) Install windshield washer reservoir refer to Group 8 Electrical.

(4) Install the wheel and tire assembly.

(5) Install the pressure and return hoses to the steering gear and tighten to 20-38 N·m (14-28 ft. lbs.).

(6) Install the column coupler shaft.

(7) Install the air cleaner housing refer to Group 14 Fuel System.

(8) Fill the power steering pump.

DISASSEMBLY AND ASSEMBLY

STUB SHAFT HOUSING

NOTE: If stub shaft housing, seal or bearing is damaged the housing must be replaced.

DISASSEMBLY

(1) Remove stub shaft housing bolts (Fig. 4).
(2) Remove housing from the steering gear (Fig. 5).
(3) Remove stub shaft housing o-rings (Fig. 6).

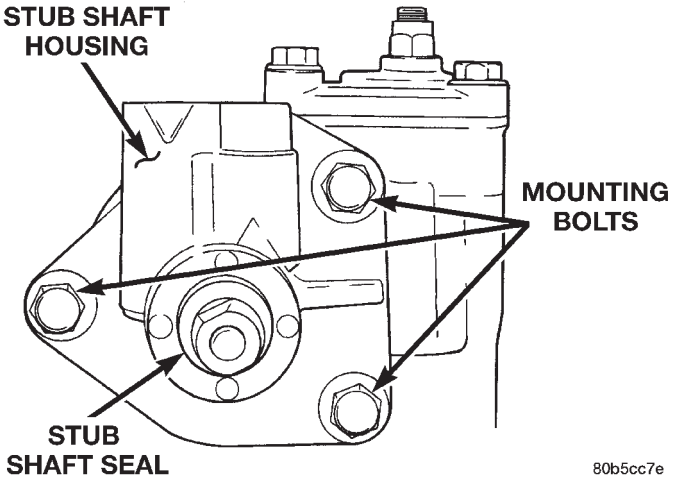


Fig. 4 Stub Shaft Housing

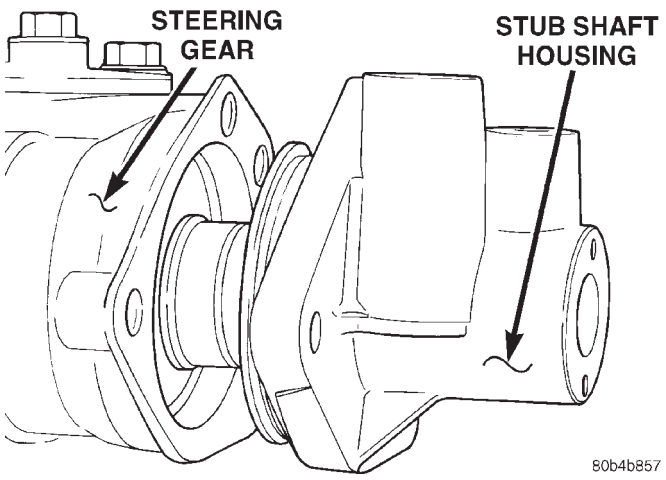


Fig. 5 Housing Removal

ASSEMBLY

(1) Grease stub shaft seal with **special grease** supplied with new stub shaft housing.
(2) Install new stub shaft housing o-rings.
(3) Install housing on the steering gear.
(4) Install the housing bolts and tighten to 62 N·m (46 ft. lbs.).

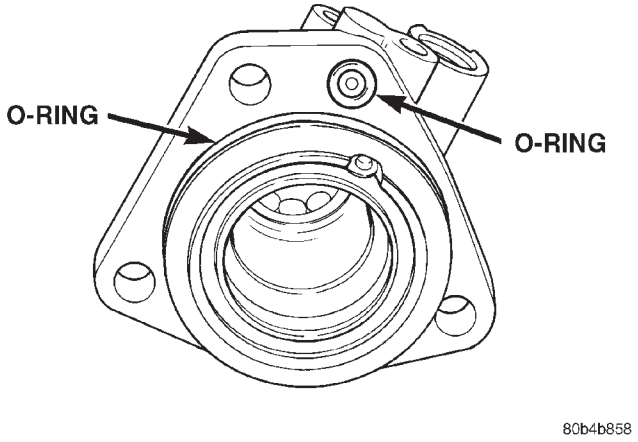


Fig. 6 O-Rings

PITMAN SHAFT/SEALS/BEARINGS

DISASSEMBLY

(1) Clean exposed end of pitman shaft and housing with a wire brush.
(2) Rotate the stub shaft with a wrench (Fig. 7) from stop to stop and count the number of turns.
(3) Center the stub shaft by rotating it from the stop 1/2 of the total amount of turns.

NOTE: The pitman shaft will not clear the housing if it is not centered.

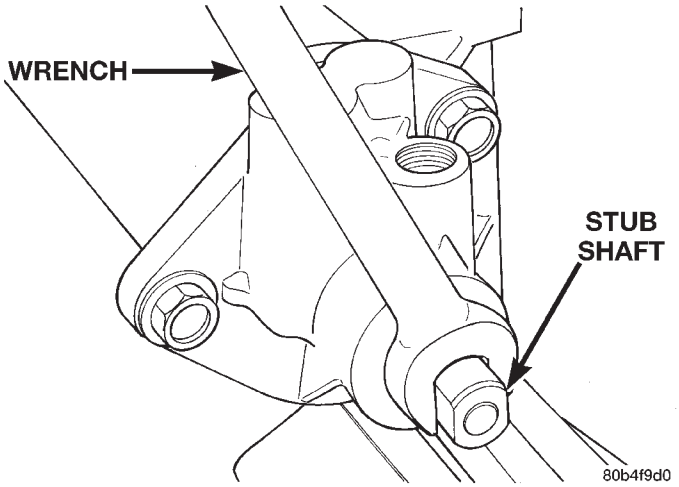


Fig. 7 Center Stub Shaft

(4) Remove pitman shaft cover bolts and remove the shaft assembly (Fig. 8).
(5) Remove pitman shaft cover o-ring.
(6) Remove pitman shaft dust seal from the housing with a Puller 7794-A and Slide Hammer C-637 (Fig. 9).
(7) Remove the pitman shaft oil seal retaining ring with snap ring pliers (Fig. 10).

DISASSEMBLY AND ASSEMBLY (Continued)

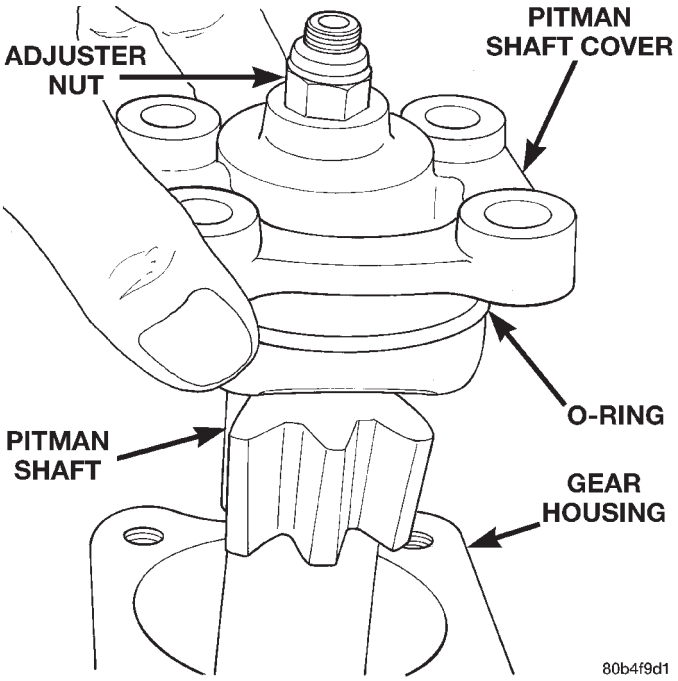


Fig. 8 Cover and Pitman Shaft

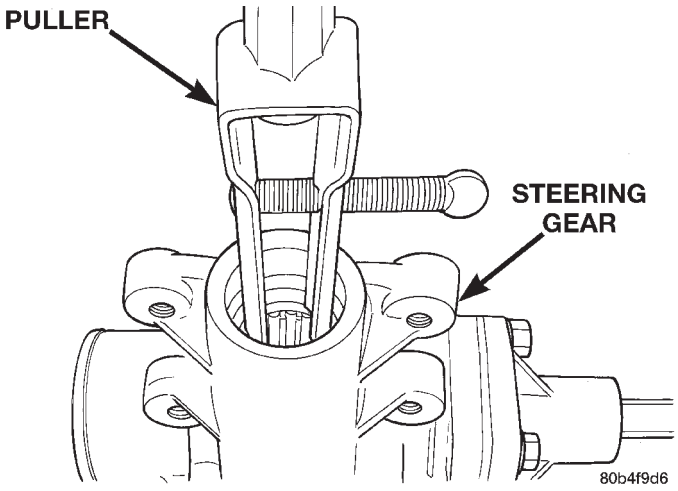


Fig. 9 Dust Seal Removal

(8) Remove oil seal metal backup washer then plastic backup washer from the housing (Fig. 11).

(9) Remove pitman shaft oil seal from the housing with a Puller 7794-A and Slide Hammer C-637 (Fig. 12).

(10) Drop Driver 8277 through the top bearing and align the driver up with the lower bearing. (Fig. 13). Install Handle C-4171 into the driver and remove the lower bearing.

(11) Turn the gear over and remover the upper bearing with Driver 8277 and Handle C-4171.

ASSEMBLY

(1) Install upper pitman shaft bearing, with Driver 8294 and Handle C-4171 (Fig. 14). Drive bearing into housing until the driver bottoms out.

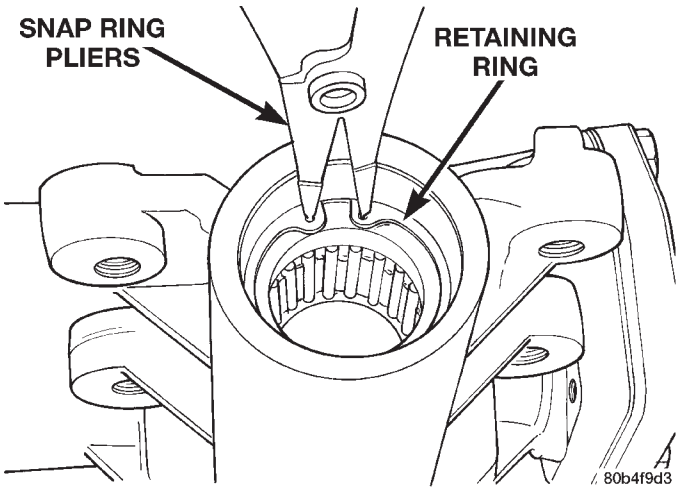


Fig. 10 Oil Seal Retaining Ring

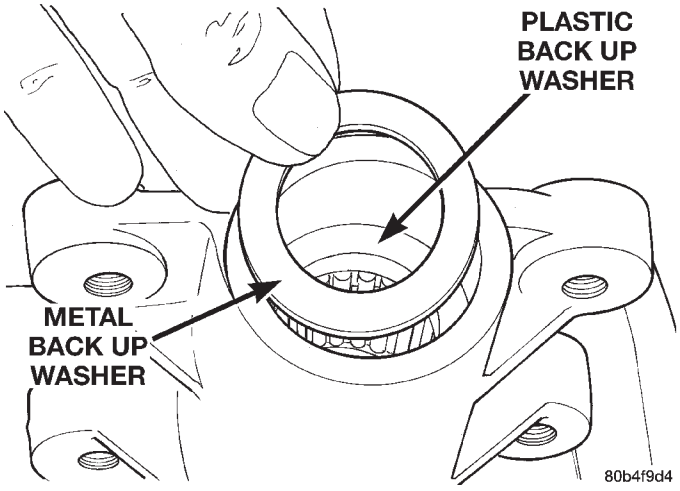


Fig. 11 Backup Washers

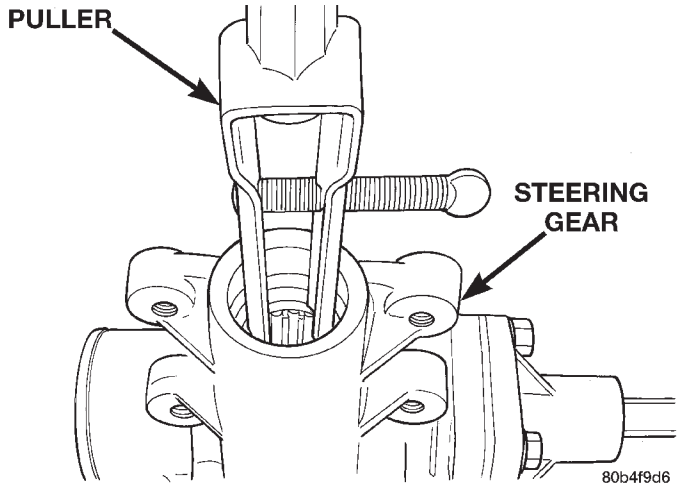


Fig. 12 Oil Seal Removal

NOTE: Install upper pitman shaft bearing with the part number/letters facing the driver.

DISASSEMBLY AND ASSEMBLY (Continued)

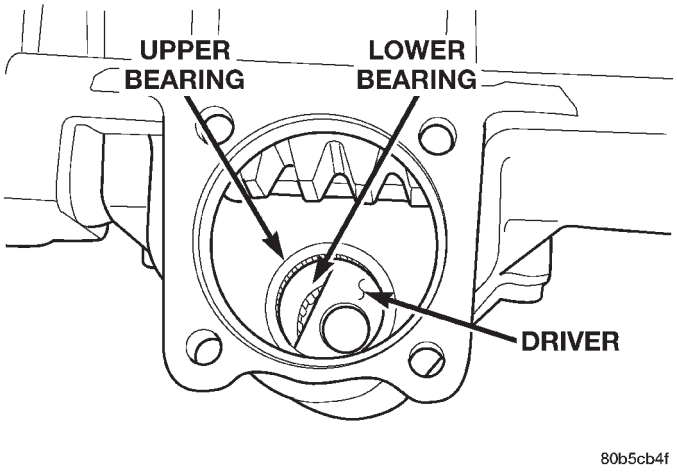


Fig. 13 Bearing Driver

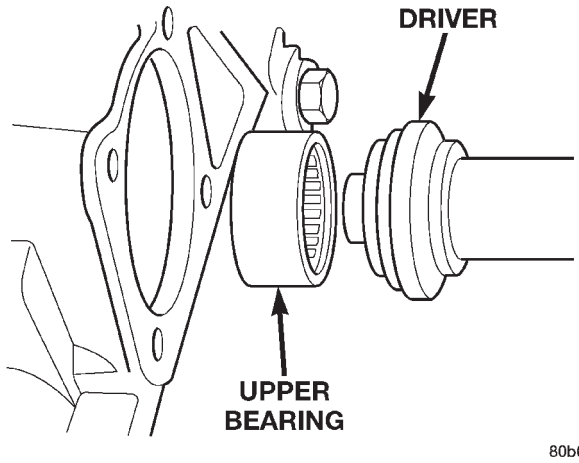


Fig. 14 Upper Pitman Shaft Bearing

(2) Install lower pitman shaft bearing with the other side Driver 8294 and Handle C-4171 (Fig. 15). Drive bearing into housing until the bearing shoulder is seated against the housing.

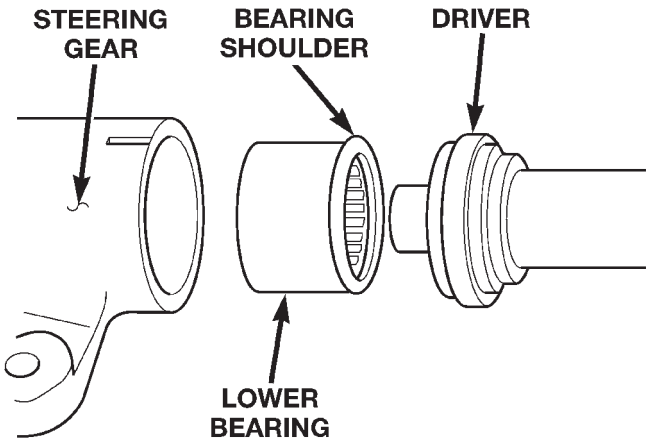


Fig. 15 Lower Pitman Shaft Bearing

(3) Coat the oil seal and backup washers with **special grease** supplied with the new seal.

(4) Install the oil seal with Driver 8294 and Handle C-4171.

(5) Install plastic backup washer.

NOTE: The plastic backup washer has a lip on the inside diameter that faces down towards the oil seal.

(6) Install metal backup washer.

(7) Install the retainer ring with snap ring pliers.

(8) Coat the dust seal with **special grease** supplied with the new seal.

(9) Install dust seal with Driver 8294 and Handle C-4171.

(10) Install new pitman shaft cover o-ring.

(11) Install pitman shaft assembly into the housing.

(12) Install cover bolts and tighten to 62 N·m (46 ft. lbs.).

(13) Perform over-center rotation torque adjustment.

RACK PISTON/VALVE ASSEMBLY

DISASSEMBLY

(1) Clean exposed end of pitman shaft and housing with a wire brush.

(2) Rotate the stub shaft with a wrench (Fig. 16) from stop to stop and count the number of turns.

(3) Center the stub shaft by rotating it from the stop 1/2 of the total amount of turns.

NOTE: The pitman shaft will not clear the housing if it is not centered.

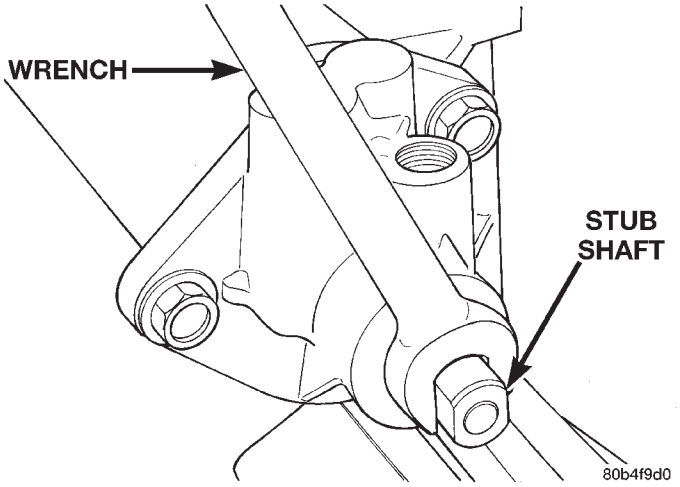


Fig. 16 Center Stub Shaft

(4) Remove pitman shaft cover bolts and remove the shaft assembly (Fig. 17).

(5) Remove the pitman shaft cover o-ring.

DISASSEMBLY AND ASSEMBLY (Continued)

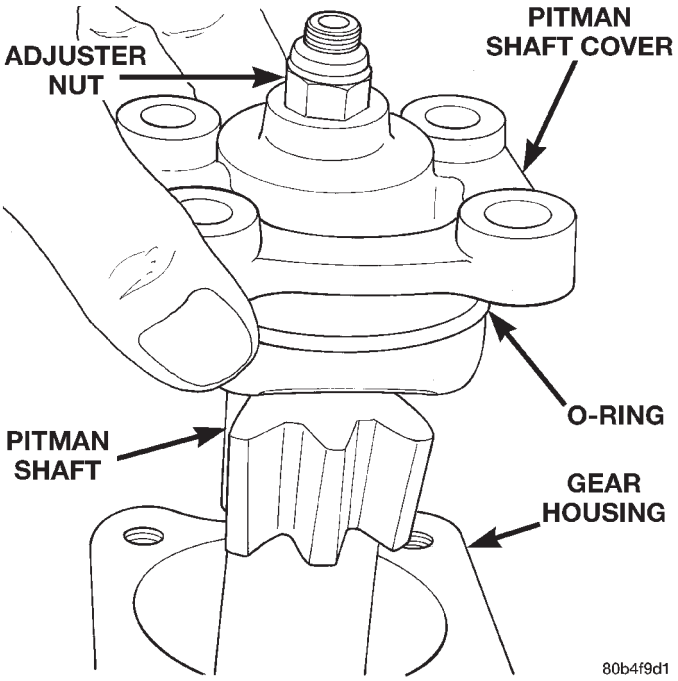


Fig. 17 Cover and Pitman Shaft

(6) Remove stub shaft housing bolts (Fig. 18).

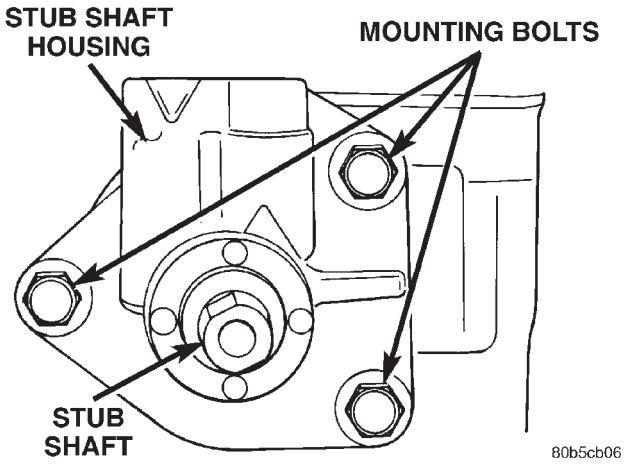


Fig. 18 Stub Shaft Housing

(7) Remove the housing from the stub shaft (Fig. 19).

(8) Remove stub shaft housing o-rings (Fig. 20).

(9) Remove the rack piston/valve assembly retaining ring with snap ring pliers (Fig. 21).

(10) Pull the rack piston/valve assembly out of the gear housing (Fig. 22).

NOTE: If the rack piston is damage the gear assembly must be replaced.

(11) Remove teflon rings and o-ring (Fig. 23) from the rack piston/valve assembly.

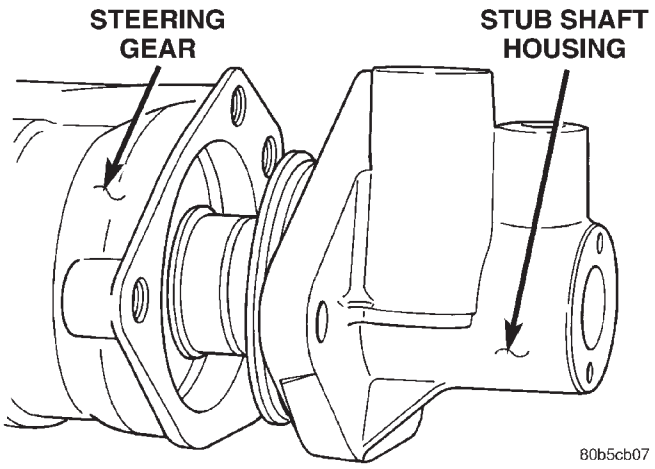


Fig. 19 Housing Removal

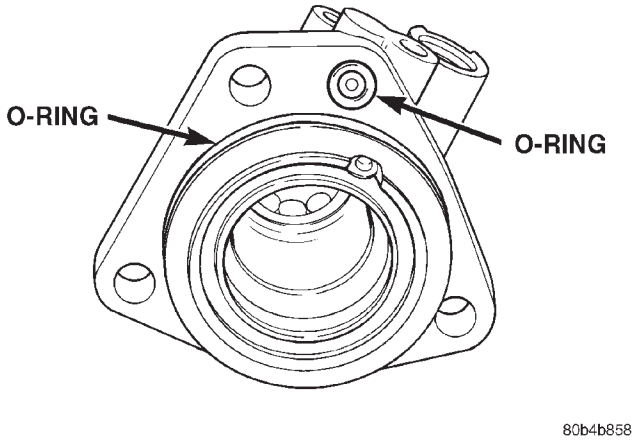


Fig. 20 O-Rings

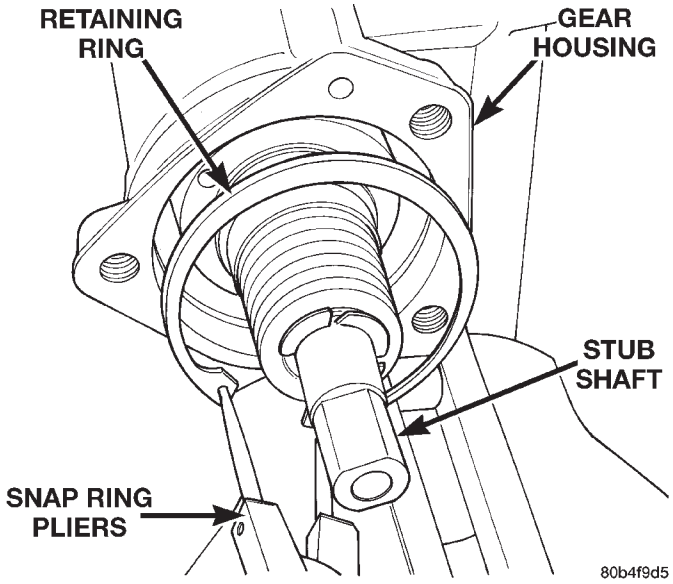


Fig. 21 Retaining Ring

DISASSEMBLY AND ASSEMBLY (Continued)

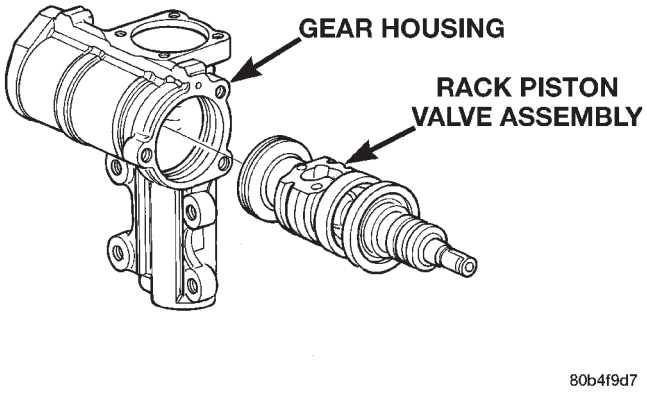


Fig. 22 Rack Piston/Valve Assembly

CAUTION: The rack piston teflon ring and o-ring must be replaced whenever the assembly is removed from the housing.

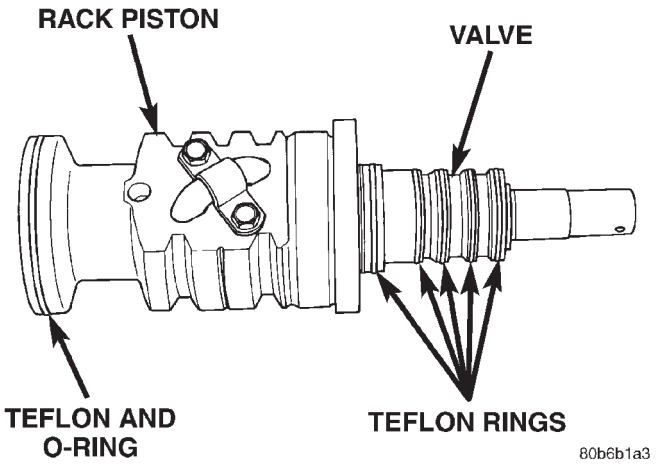


Fig. 23 Teflon Rings And O-Ring

(12) Remove pitman shaft dust seal from the housing with Puller 7794-A and Slide Hammer C-637 (Fig. 24).

(13) Remove pitman shaft oil seal retaining ring from the housing with snap ring pliers (Fig. 25).

(14) Remove metal backup washer then plastic backup washer from the housing (Fig. 26).

(15) Remove oil seal from the housing with a Puller 7794-A and Slide Hammer C-637 (Fig. 27).

ASSEMBLY

(1) Coat the oil seal and backup washers with **special grease** supplied with the new seal.

(2) Install the oil seal with Driver 8294 and Handle C-4171.

(3) Install plastic backup washer.

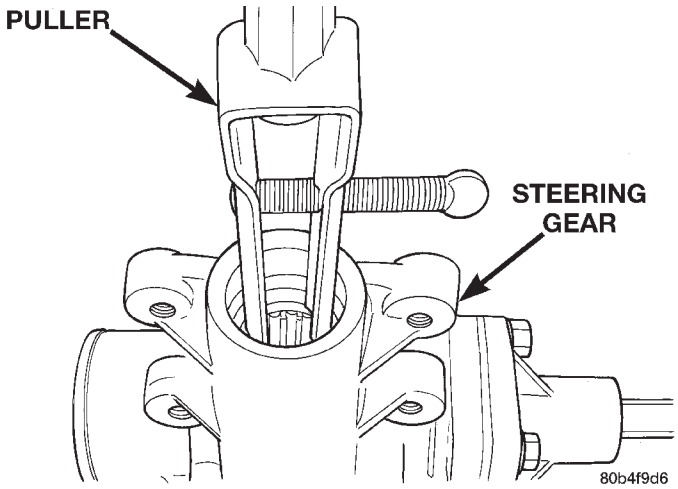


Fig. 24 Dust Seal

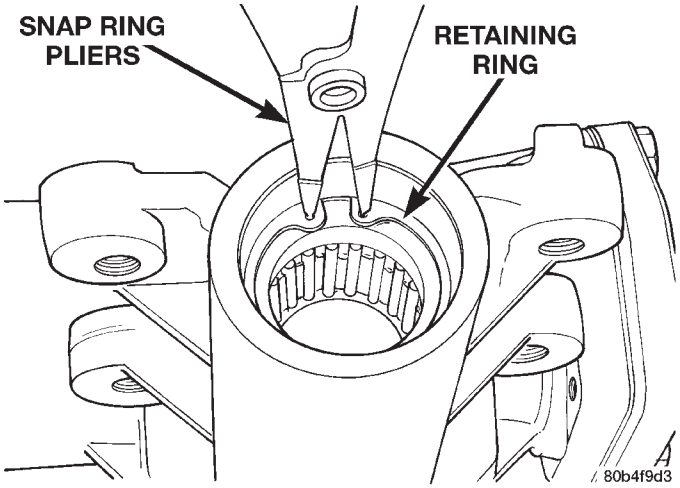


Fig. 25 Oil Seal Retaining Ring

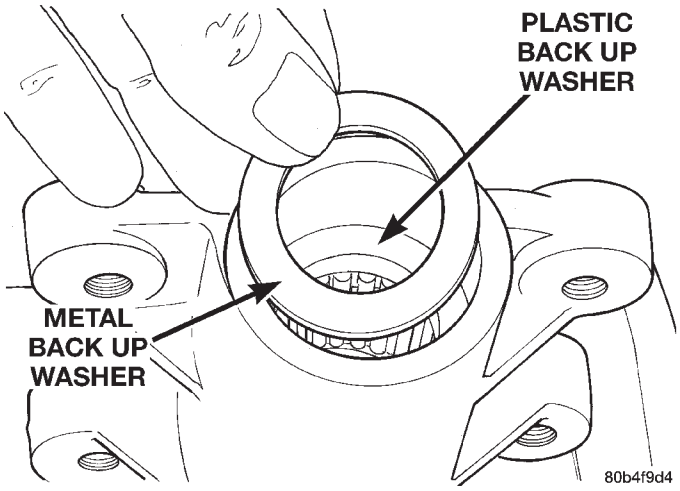


Fig. 26 Oil Seal Backup Washers

NOTE: The plastic backup washer has a lip on the inside diameter that faces down towards the oil seal.

DISASSEMBLY AND ASSEMBLY (Continued)

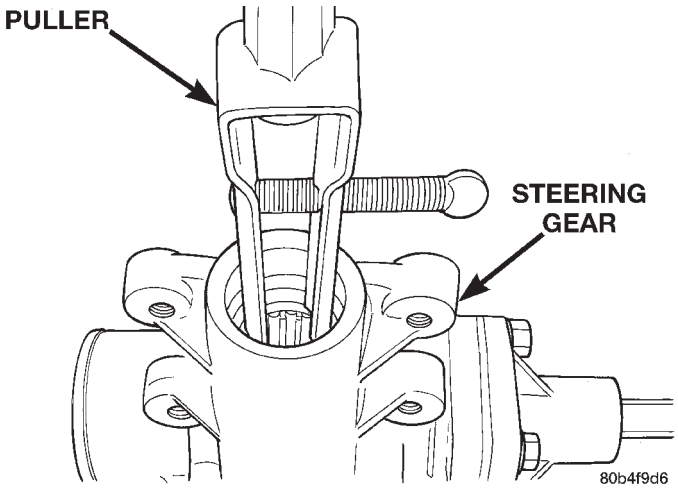


Fig. 27 Oil Seal Removal

(4) Install metal backup washer.
(5) Install the retainer ring with snap ring pliers.
(6) Coat the dust seal with **special grease** supplied with the new seal.
(7) Install dust seal with Driver 8294 and Handle C-4171.
(8) Lubricate new o-ring and teflon rings with power steering fluid and install on the rack piston/valve assembly.
(9) Lubricate the rack piston/valve assembly with power steering fluid.
(10) Slide the assembly into the gear housing.
(11) Install new stub shaft housing o-rings and install the housing. Tighten the housing bolts to 62 N·m (46 ft. lbs.).
(12) Install new o-ring on the pitman shaft cover.
(13) Install the pitman shaft into the gear housing.
(14) Install the pitman shaft cover bolts and tighten to 62 N·m (46 ft. lbs.).
(15) Perform over-center rotation torque adjustment.

ADJUSTMENTS

STEERING GEAR

NOTE: Adjusting the steering gear in the vehicle is not recommended. Remove gear from the vehicle and drain the fluid. Then mount gear in a vise to perform adjustments.

OVER-CENTER

(1) Rotate the stub shaft with Socket 8343 from stop to stop and count the number of turns.
(2) Center the stub shaft by rotating it from the stop 1/2 of the total amount of turns.
(3) Place torque wrench and Socket 8343 in a vertical position on the stub shaft. Rotate the wrench 45 degrees each side of the center and record the highest rotational torque in this range (Fig. 28). This is the Over-Center Rotating Torque.

NOTE: The stub shaft must rotate smoothly without sticking or binding.

(4) Rotate the stub shaft between 90° and 180° to the left of center and record the left off-center preload. Repeat this to the right of center and record the right off-center preload. The average of these two recorded readings is the Preload Rotating Torque.
(5) The Over-Center Rotating Torque should be 0.45-0.80 N·m (4-7 in. lbs.) **higher** than the Preload Rotating Torque.
(6) If an adjustment to the Over-Center Rotating Torque is necessary, first loosen the adjuster lock nut. Then turn the pitman shaft adjuster screw back (COUNTERCLOCKWISE) until fully extended, then turn back in (CLOCKWISE) one full turn.

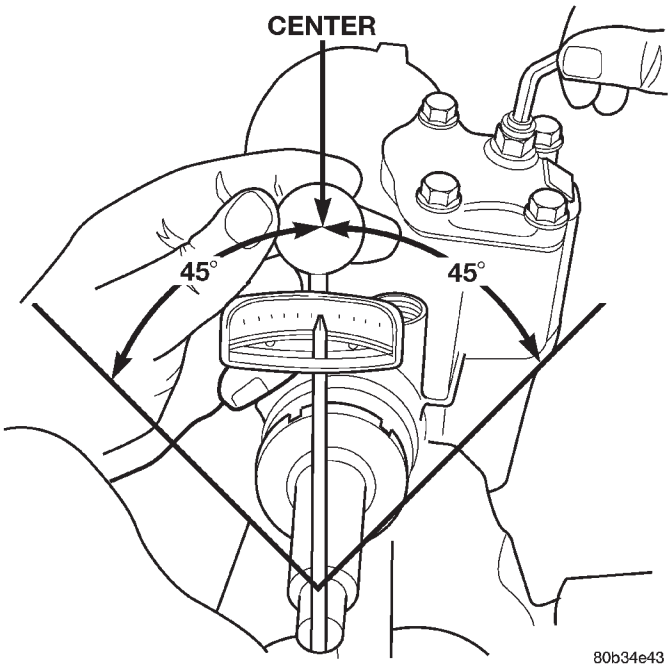


Fig. 28 Checking Over-center Rotation Torque

(7) Remeasure Over-Center Rotating Torque. If necessary turn the adjuster screw and repeat measurement until correct Over-Center Rotating Torque is reached.

NOTE: To increase the Over-Center Rotating Torque turn the screw CLOCKWISE.

(8) Prevent the adjuster screw from turning while tightening adjuster lock nut. Tighten the adjuster lock nut to 37-52 N·m (27-38 ft. lbs.).

SPECIFICATIONS

POWER STEERING GEAR

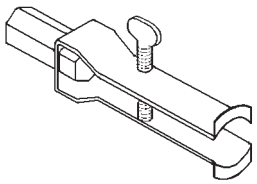
Steering Gear
Type . . . . . Recirculating Ball
Overall Ratio 12.7:1
Pitman Shaft Overcenter Drag
New Gear (under 400 miles) . . . . . 0.45-0.80 N·m (4-7 in. lbs.) + Worm Shaft Preload
Used Gear (over 400 miles) . . . . . 0.5-0.6 N·m (4-5 in. lbs.) + Worm Shaft Preload

TORQUE CHART

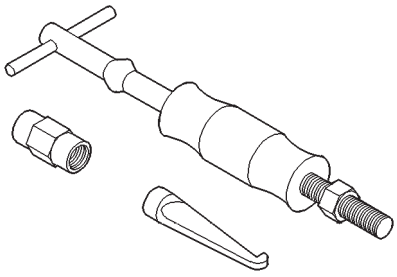
DESCRIPTION	TORQUE
Power Steering Gear	
Adjustment Screw Locknut	37-52 N·m (27-38 ft. lbs.)
Gear to Frame Bolts	108 N·m (80 ft. lbs.)
Pitman Shaft Nut	251 N·m (185 ft. lbs.)
Pitman Shaft Cover Bolts	62 N·m (46 ft. lbs.)
Stub Shaft Housing Bolts	62 N·m (46 ft. lbs.)
Pressure Line	20-38 N·m (14-28 ft. lbs.)
Return Line	20-38 N·m (14-28 ft. lbs.)

SPECIAL TOOLS

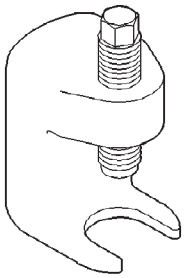
POWER STEERING GEAR



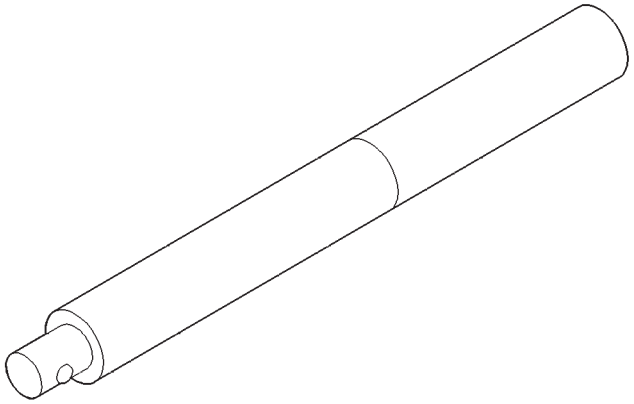
Puller Seal 7794-A



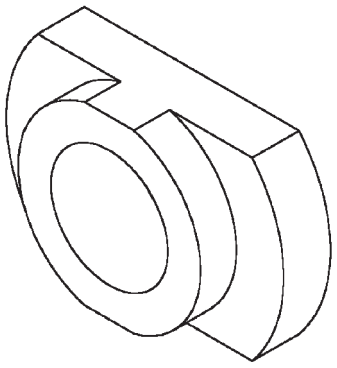
Slide Hammer C-637



Remover, Pitman Arm C-4150A

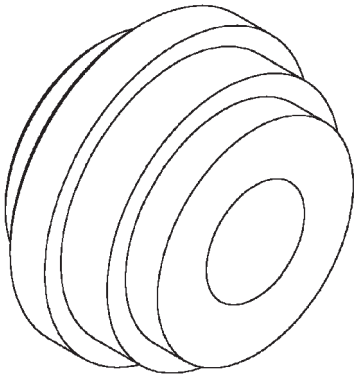


Handle C-4171

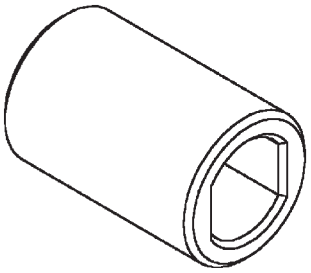


Driver 8277

SPECIAL TOOLS (Continued)



Driver 8294



Scoket 8343

STEERING LINKAGE

INDEX

DESCRIPTION AND OPERATION

STEERING LINKAGE

The steering linkage consists of a pitman arm, drag link, tie rod, and steering dampener (Fig. 1). An adjustment sleeve on the tie rod is used to set wheel toe position. The sleeve on the drag link is used for steering wheel centering.

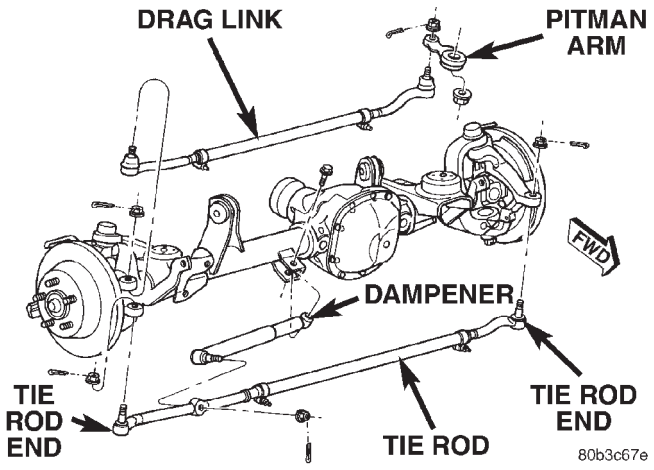


Fig. 1 Steering Linkage

CAUTION: If any steering components are replaced or serviced an alignment must be performed, to ensure the vehicle meets all alignment specifications.

CAUTION: Components attached with a nut and cotter pin must be torqued to specification. Then if the slot in the nut does not line up with the cotter pin hole, tighten nut until it is aligned. Never loosen the nut to align the cotter pin hole.

TIE ROD ENDS

The tie rod ends connect the drag link to the wheel assembly. The ends are forged, with a lubed for life ball socket. The tie rod provides toe alignment and transfers steering input from the drag link to the wheels.

PITMAN ARM

The pitman arm is attached at one end of the steering gear's sector shaft. The other end is connected to the drag link. the pitman arm transfers rotary motion into side to side motion. The arm is splined to the steering gear shaft.

DRAG LINK AND ENDS

The drag link and ends are comprised of two forged ends connected by a steel adjusting tube. The drag link connects the steering gear pitman arm to the steering knuckle. The larger offset end is attached to the pitman arm. The sleeve is used for steering wheel centering.

STEERING DAMPER

The steering damper provides steering system dampening. The damper is mounted to the axle housing and the tie rod end. The damper consists of steel tube shock absorber with a permanent bushed end.

REMOVAL AND INSTALLATION

TIE ROD

REMOVAL

(1) Raise and support the vehicle.
(2) Remove wheel and tire assemblies.
(3) Remove the damper cotter pin and nut from the tie rod (Fig. 2).

REMOVAL AND INSTALLATION (Continued)

(4) Remove the damper from the tie rod with Puller C-3894-A.

(5) Remove the cotter pins and nuts from the tie rod ends at the steering knuckles (Fig. 2).

(6) Remove the tie rod ends from the steering knuckles with Puller C-3894-A.

(7) Loosen the adjustment sleeve clamp bolts and unscrew the tie rod ends from the sleeve.

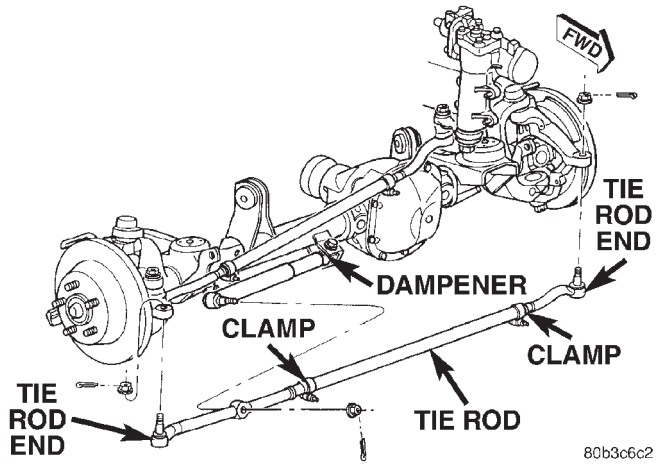


Fig. 2 Tie Rod Assembly

INSTALLATION

(1) Screw the tie rod ends into the adjustment sleeve.

(2) Install the tie rod on the steering knuckles and install the nuts.

(3) Tighten the nuts to 47 N·m (35 ft. lbs.). Install new cotter pins and bend end 60°.

(4) Position the adjustment sleeve clamp bolts to their original location and tighten to 68 N·m (50 ft. lbs.).

(5) Install the damper on the tie rod and install the nut.

(6) Tighten the nut to 68 N·m (50 ft. lbs.). Install new cotter pins and bend end 60°.

(7) Install wheel and tire assemblies.

(8) Remove support and lower the vehicle.

(9) Perform toe position adjustment.

PITMAN ARM

REMOVAL

(1) Remove the cotter pin and nut from the drag link at the pitman arm (Fig. 3).

(2) Remove the drag link ball stud from the pitman arm with a puller.

(3) Remove the nut and washer from the steering gear shaft. Mark the pitman shaft and pitman arm for installation reference. Remove the pitman arm from steering gear with Puller C-4150A (Fig. 4).

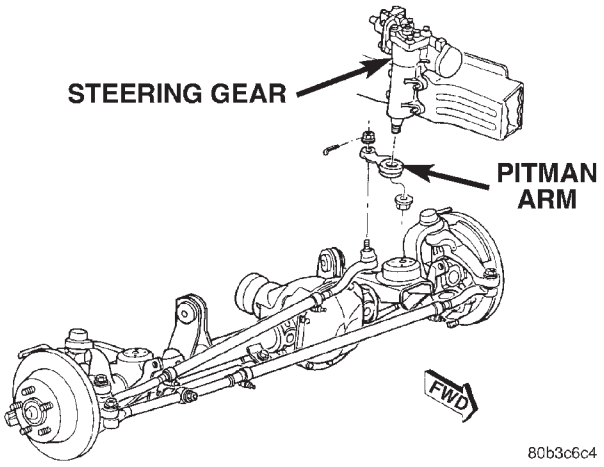


Fig. 3 Pitman Arm

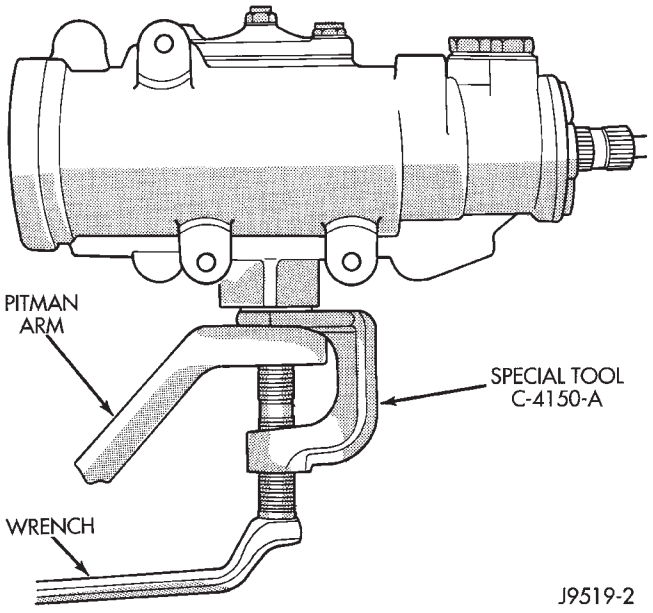


Fig. 4 Pitman Arm Removal

INSTALLATION

(1) Align and install the pitman arm on steering gear shaft.

(2) Install the washer and nut on the shaft and tighten the nut to 251 N·m (185 ft. lbs.).

(3) Install drag link ball stud to pitman arm. Install nut and tighten to 88 N·m (65 ft. lbs.). Install a new cotter pin.

DRAG LINK

REMOVAL

(1) Raise and support the vehicle.

(2) Remove right wheel and tire assembly.

(3) Remove the cotter pins and nuts at the right steering knuckle and pitman arm (Fig. 5).

REMOVAL AND INSTALLATION (Continued)

(4) Remove the drag link from the steering knuckle and pitman arm Puller C-3894-A.

(5) Loosen adjustment sleeve clamp bolts and unscrew the tie rod ends from the adjustment sleeve.

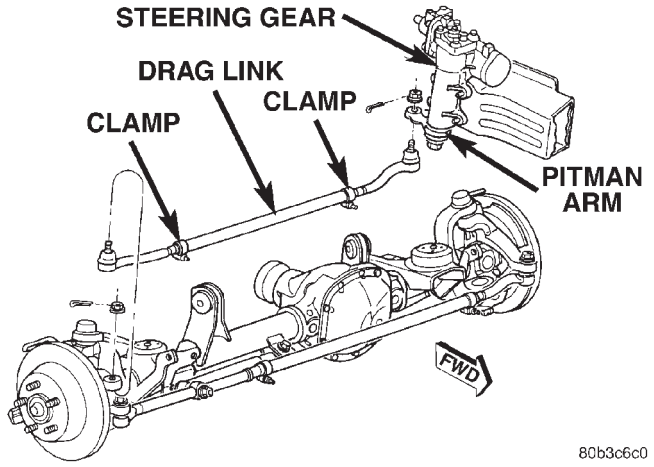


Fig. 5 Drag Link Assembly

INSTALLATION

(1) Screw the tie rod ends into the adjustment sleeve.

(2) Install the drag link onto the right steering knuckle and pitman arm.

(3) Tighten the nut at the steering knuckle to 47 N·m (35 ft. lbs.). Tighten the pitman nut to 88 N·m (65 ft. lbs.). Install new cotter pins.

(4) Position clamp bolts to their original position and tighten to 68 N·m (50 ft. lbs.).

(5) Install right wheel and tire assembly.

(6) Remove support and lower the vehicle.

(7) Center the steering wheel.

STEERING DAMPER

REMOVAL

(1) Remove the cotter pin and nut from the ball stud at the tie rod.

(2) Remove the steering damper from the tie rod with Puller C-3894-A (Fig. 6).

(3) Remove the steering damper nut and bolt from the axle bracket (Fig. 7).

INSTALLATION

(1) Install the steering damper to the axle bracket and tie rod.

(2) Install the steering damper bolt in the axle bracket and tighten bolt to 88 N·m (65 ft. lbs.).

(3) Install the nut at the tie rod and tighten to 68 N·m (50 ft. lbs.). Install a new cotter pin.

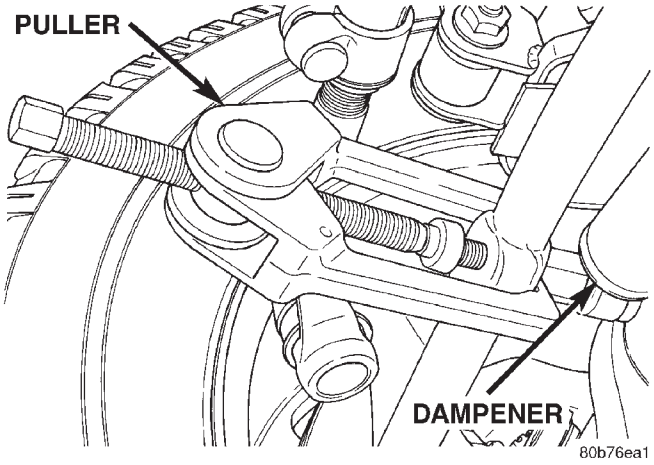


Fig. 6 Steering Damper Puller

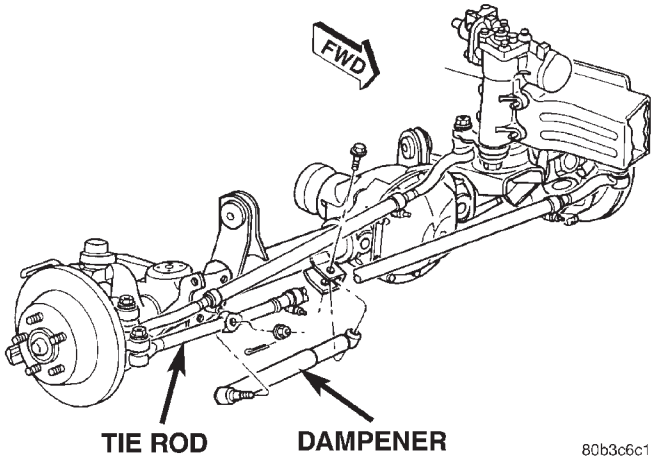


Fig. 7 Steering Damper

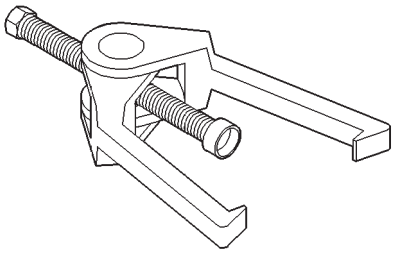
SPECIFICATIONS

TORQUE CHART

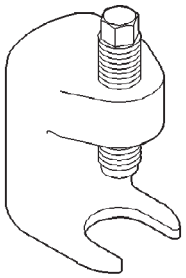
DESCRIPTION	TORQUE
Pitman Arm	
Shaft Nut	251 N·m (185 ft. lbs.)
Drag Link	
Pitman Arm Nut	88 N·m (65 ft. lbs.)
Knuckle Nut	47 N·m (35 ft. lbs.)
Clamp Nuts	68 N·m (50 ft. lbs.)
Tie Rod	
Knuckle Nut	47 N·m (35 ft. lbs.)
Clamp Nuts	68 N·m (50 ft. lbs.)
Steering Damper	
Axle Bolt	88 N·m (65 ft. lbs.)
Tie Rod Nut	68 N·m (50 ft. lbs.)

SPECIAL TOOLS

STEERING LINKAGE



Puller C-3894–A



Remover Pitman C-4150A

STEERING COLUMN

INDEX

DESCRIPTION AND OPERATION

STEERING COLUMN

The tilt column (Fig. 1) has been designed to be serviced as an assembly, less the wiring, switches, shrouds, steering wheel, etc. Most steering column components can be serviced without removing the steering column from the vehicle.

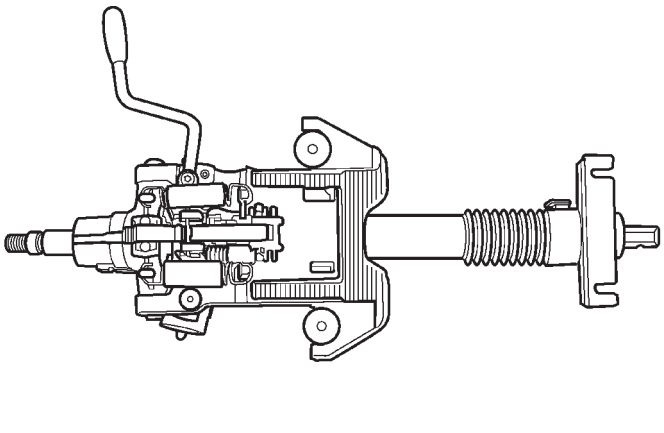


Fig. 1 Steering Column

SERVICE WARNINGS AND CAUTIONS

To service the steering wheel, switches or airbag, refer to Group 8M and follow all WARNINGS and CAUTIONS.

WARNING: THE AIRBAG SYSTEM IS A SENSITIVE, COMPLEX ELECTRO-MECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL THE AIRBAG SYSTEM COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIRBAG AND POSSIBLE PERSONAL INJURY. THE FASTENERS, SCREWS, AND BOLTS, ORIGINALLY USED FOR THE AIRBAG COMPONENTS, HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANYTIME A NEW FASTENER IS NEEDED, REPLACE WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR FASTENERS LISTED IN THE PARTS BOOKS.

CAUTION: Safety goggles should be worn at all times when working on steering columns.

REMOVAL AND INSTALLATION

STEERING COLUMN

WARNING: BEFORE SERVICING THE STEERING COLUMN THE AIRBAG SYSTEM MUST BE DISARMED. FAILURE TO DO SO MAY RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIRBAG AND POSSIBLE PERSONAL INJURY. REFER TO GROUP 8M RESTRAINT SYSTEMS FOR SERVICE PROCEDURES.

REMOVAL

(1) Position front wheels straight ahead.
(2) Disconnect and isolate the negative (ground) cable from the battery.
(3) Remove the airbag, refer to Group 8M Restraint Systems for service procedures.
(4) Remove the steering wheel nut and remove wheel with Puller C-3894-A (Fig. 2).

NOTE: Ensure the puller jaws are seated in the pockets (Fig. 3) of the steering wheel armature.

(5) Remove the cluster bezel by pulling it from the instrument panel (Fig. 4).
(6) Remove the knee blocker cover (Fig. 5), refer to Group 8E Instrument Panel Systems.
(7) Remove the lower steering column shroud mounting screw (Fig. 6).

REMOVAL AND INSTALLATION (Continued)

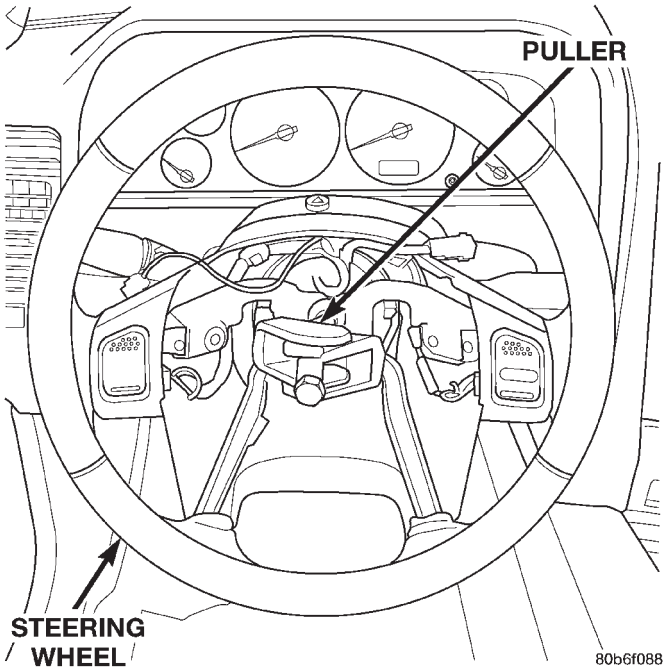


Fig. 2 Steering Wheel Puller

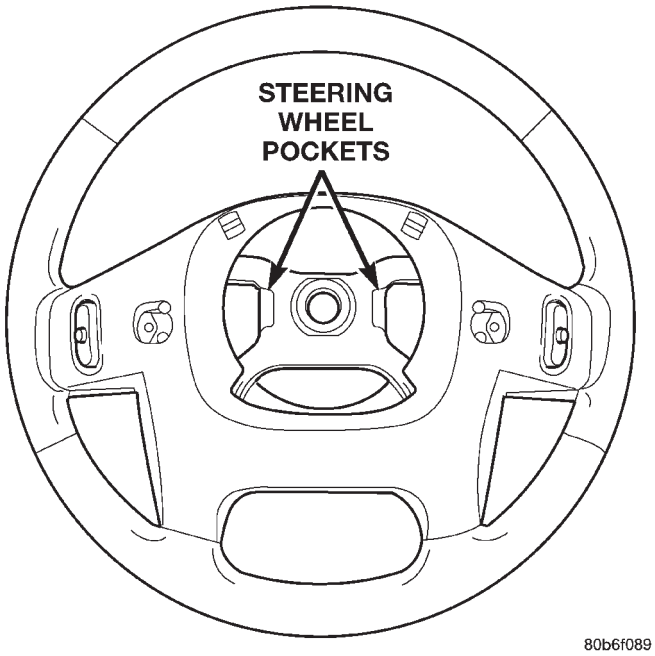


Fig. 3 Steering Wheel Pockets

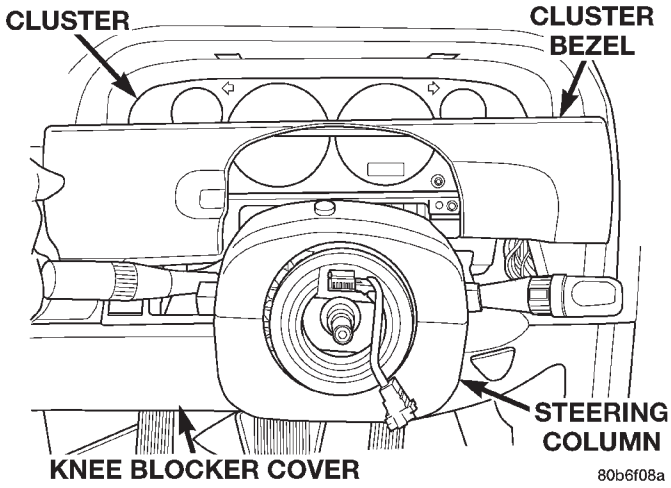


Fig. 4 Cluster Bezel

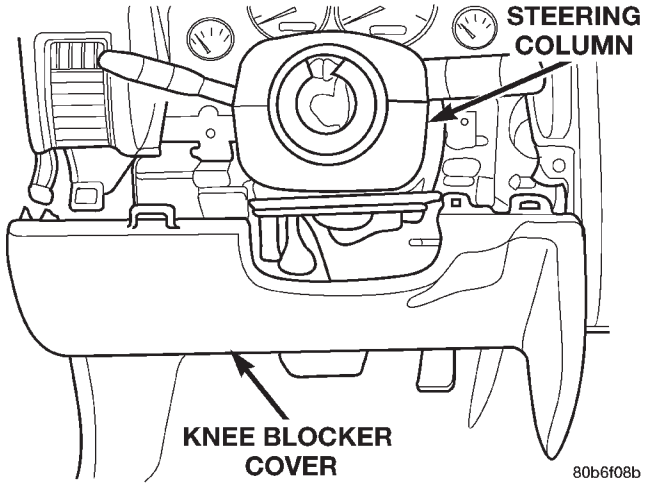


Fig. 5 Knee Blocker Cover

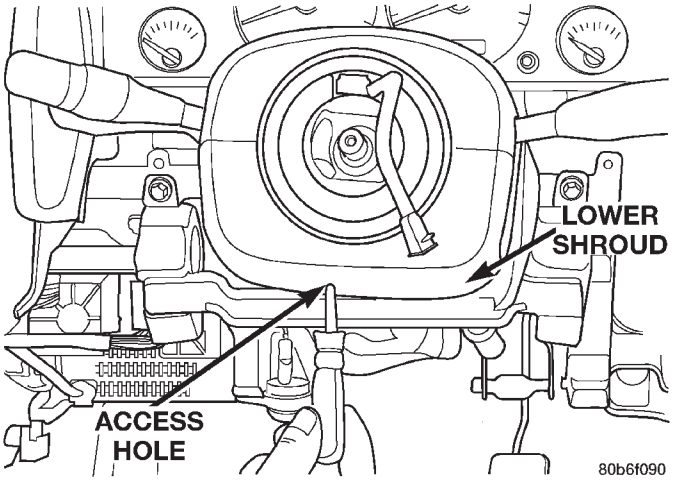


Fig. 6 Column Shroud Mounting Screw

REMOVAL AND INSTALLATION (Continued)

(8) Unsnap the two halves of the column shrouds by pressing on the sides of the upper shroud and tilting the rear of the upper shroud up. Remove the shrouds from the steering column (Fig. 7).

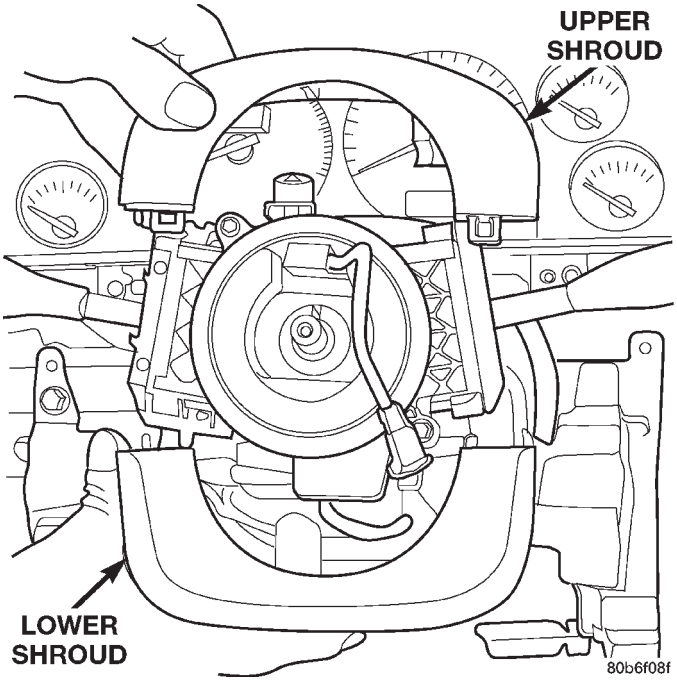


Fig. 7 Column Shrouds

(9) Remove the upper fixed shroud mounting screws and remove the shroud (Fig. 8).

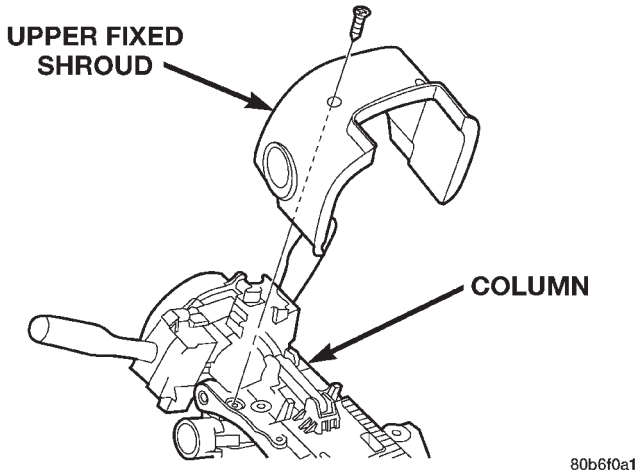


Fig. 8 Upper Fixed Shroud

(10) Disconnect the multifuction switch (Fig. 9) and ignition switch harness.

(11) Remove the multifuction switch screw from underneath the switch (Fig. 10). Slide the multifuction switch and clock spring off the column as an assembly (Fig. 11).

(12) Turn the ignition key to the on position then release and remove the shifter interlock cable (Fig. 12) from the ignition lock cylinder housing.

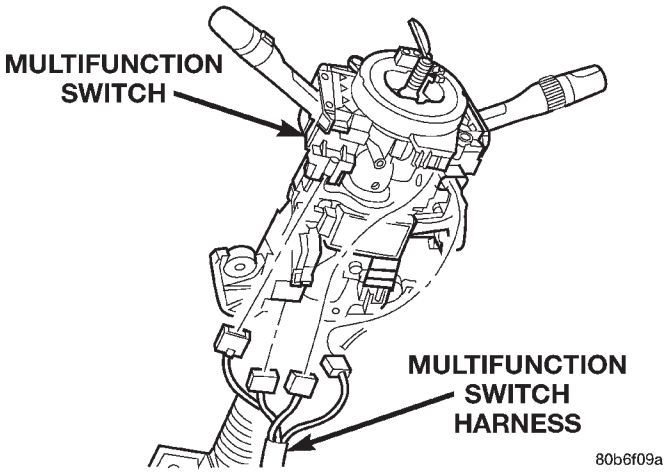


Fig. 9 Multifuction Switch Harness

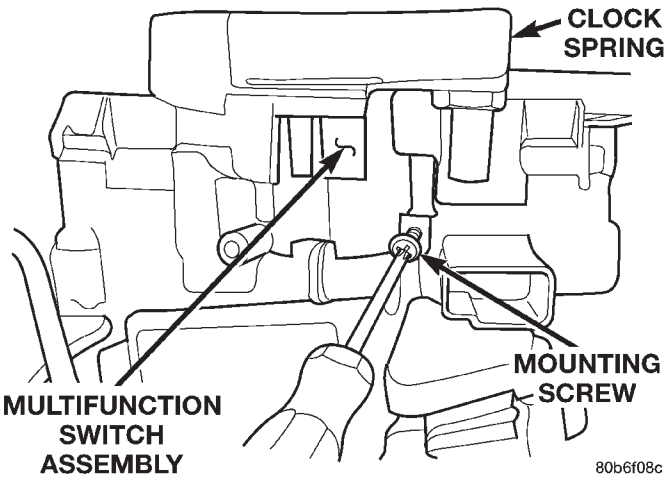


Fig. 10 Multifuction Switch Screw

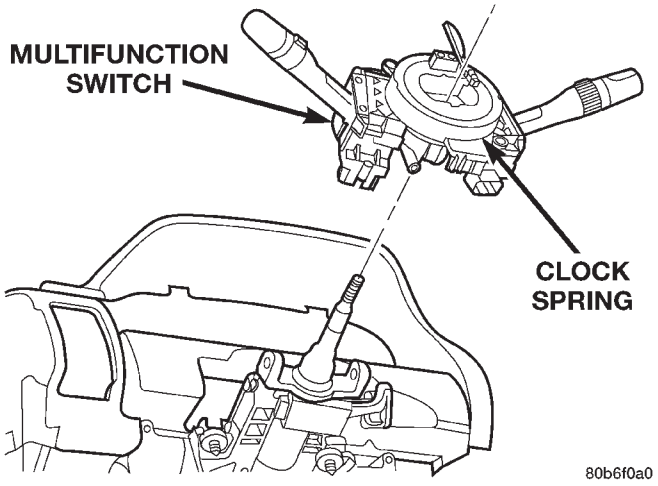


Fig. 11 Multifuction Switch And Clock Spring

REMOVAL AND INSTALLATION (Continued)

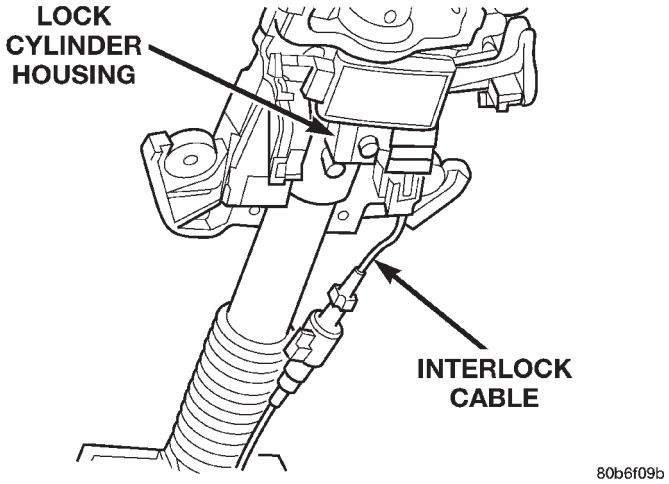


Fig. 12 Shifter Interlock Cable

(13) Remove the column coupler bolt (Fig. 13) and slide the coupler off the column shaft.

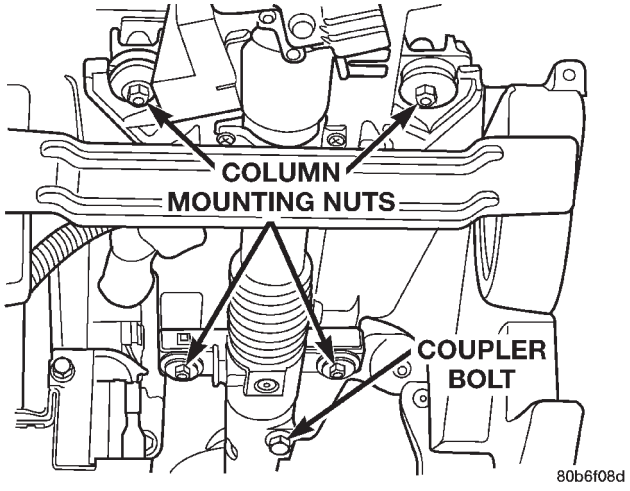


Fig. 13 Column Coupler Bolt And Mounting Nuts

(14) Remove the column mounting nuts (Fig. 13) and lower column off mounting studs. Remove the column from the vehicle.

(15) Remove the ignition switch, cylinder and SKIM (Fig. 14), refer to Group 8D Ignition System.

INSTALLATION

(1) Install the ignition switch, cylinder and SKIM, refer to Group 8D Ignition System.

(2) Install the column into the vehicle and lift the column up onto the mounting studs. Install the mounting nuts and tighten to 12 N·m (105 in. lbs.).

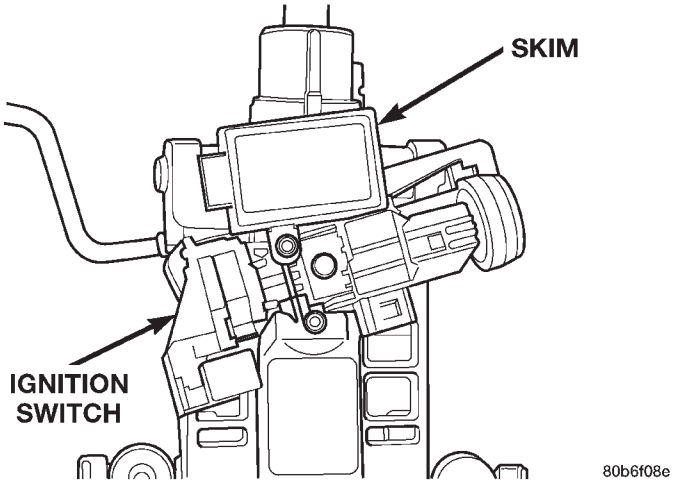


Fig. 14 Ignition Switch And SKIM

(3) Slid the coupler onto the column shaft and install the coupler bolt. Tighten the coupler bolt to 49 N·m (36 ft. lbs.).

(4) Turn the ignition key to the on position then release and install the shifter interlock cable (Fig. 12) into ignition lock cylinder housing.

(5) Slide the multifuction switch and clock spring onto the column as an assembly (Fig. 11).

(6) Install the multifuction switch mounting screw (Fig. 10).

(7) Connect the multifuction switch (Fig. 9) and ignition switch harness.

(8) Install the upper fixed shroud and mounting screws (Fig. 8).

(9) Install the lower steering column shroud to the steering column. Install and tighten the mounting screw.

(10) Install the upper column shroud. Align the upper shroud to the lower shroud and snap the two shroud halves together.

(11) Install the knee blocker cover (Fig. 5), refer to Group 8E Instrument Panel Systems.

(12) Install the cluster bezel by pulling it from the instrument panel (Fig. 4).

(13) Align the steering wheel with the column index spline and install the wheel on the column shaft. Pull the clockspring wire harness through the steering wheel armature spokes.

(14) Install and tighten the steering wheel mounting nut to 61 N·m (45 ft. lbs.).

(15) Connect the steering wheel wire harness connector to the clock spring connector.

(16) Install the airbag, refer to Group 8M Restraint Systems for service procedures.

(17) Connect the negative (ground) cable to the battery.

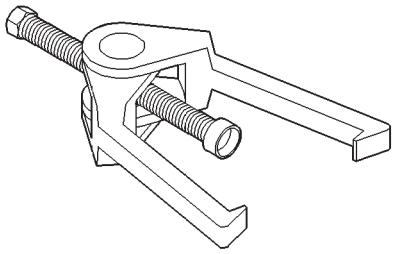
SPECIFICATIONS

TORQUE CHART

DESCRIPTION	TORQUE
Steering Column	
Steering Wheel Nut	61 N·m (45 ft. lbs.)
Column Bracket Nuts	12 N·m (105 in. lbs.)
Shaft Coupler Bolts	49 N·m (36 ft. lbs.)

SPECIAL TOOLS

STEERING COLUMN



Puller C-3894-A