

# CLUTCH

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## DESCRIPTION AND OPERATION

### CLUTCH COMPONENTS

The clutch mechanism consists of a single, dry-type clutch disc and a diaphragm style clutch cover. A hydraulic linkage is used to operate the clutch disc and cover. The clutch components are very similar to those used in gas engine models.

A pilot bearing is used to support the transmission input shaft. The bearing is seated in a separate, removable housing bolted to the flywheel hub.

### CLUTCH HYDRAULIC SYSTEM

The clutch hydraulic system should not require additional fluid under normal circumstances.

**NOTE:** The reservoir fluid level will actually increase as normal clutch wear occurs. For this reason, it is important to avoid over filling, or removing fluid from the reservoir.

If inspection indicates additional fluid is needed, add fluid from a sealed container only. Use Mopar® brake fluid, or an equivalent meeting standards SAE J1703 and DOT 3. Do not use any other type of fluid.

## REMOVAL AND INSTALLATION

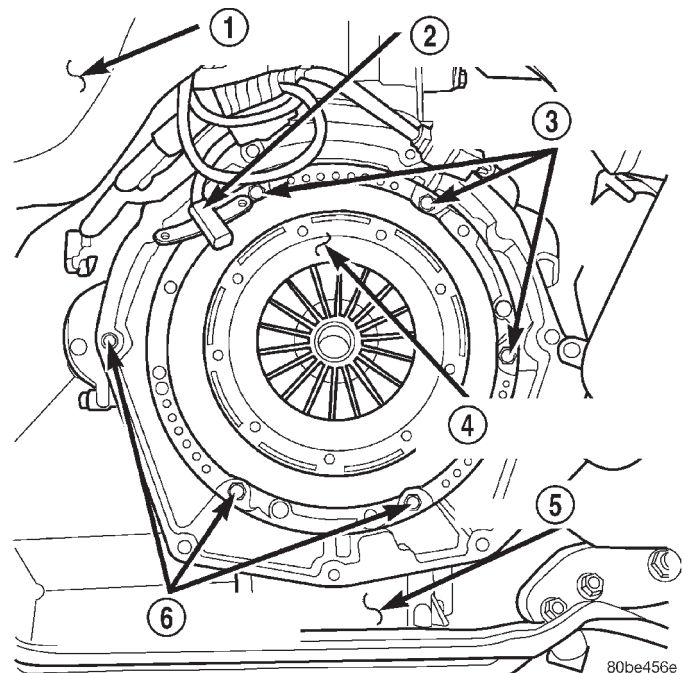
### CLUTCH COVER AND DISC

#### REMOVAL

(1) Remove the transmission. Refer to Group 21, Transmission and Transfer Case for procedure.

(2) If the original clutch cover will be reinstalled, mark position of cover on flywheel for assembly reference. Use paint or scribe for this purpose.

(3) If the clutch cover is to be replaced, cover bolts can be removed in any sequence. However, if original cover will be reinstalled, loosen cover bolts evenly in



**Fig. 1 Clutch Cover (Pressure Plate) View**

- 1 - VEHICLE UNDERBODY
- 2 - ENGINE SPEED SENSOR
- 3 - PRESSURE PLATE RETAINING BOLTS
- 4 - CLUTCH COVER (PRESSURE PLATE)
- 5 - ENGINE OIL PAN
- 6 - PRESSURE PLATE RETAINING BOLTS

a star pattern to relieve spring tension equally. This is necessary to avoid warping the cover.

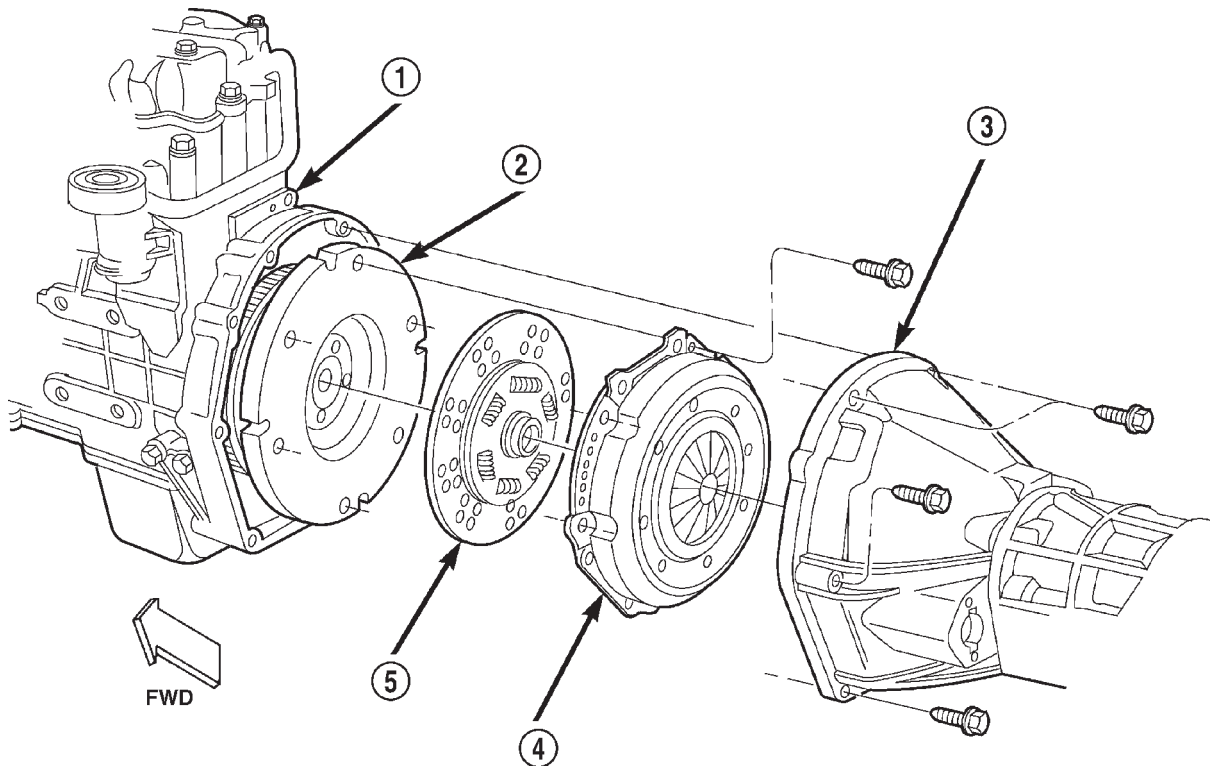
(4) Remove the clutch cover bolts and remove cover and disc (Fig. 1).

#### INSTALLATION

(1) Lightly scuff sand flywheel face with 180 grit emery cloth. Then clean surface with brake cleaner.

(2) Lightly lubricate the pilot bearing with Mopar® high temperature bearing grease.

## REMOVAL AND INSTALLATION (Continued)



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**Fig. 2 Clutch Components (VM Diesel)**

- |                                     |                  |
|-------------------------------------|------------------|
| 1 - ENGINE BLOCK                    | 4 - CLUTCH COVER |
| 2 - FLYWHEEL                        | 5 - CLUTCH DISC  |
| 3 - CLUTCH HOUSING AND TRANSMISSION |                  |

(3) Check free operation of clutch disc by sliding disc onto transmission output shaft splines. Disc should slide onto splines freely without binding.

(4) Position the clutch disc on flywheel. Be sure side of disc marked "flywheel side" is positioned against flywheel (Fig. 3). If disc is not marked, be sure flat side of disc hub is placed toward the flywheel.

(5) Insert the clutch alignment tool (Fig. 4) in clutch disc and pilot bearing.

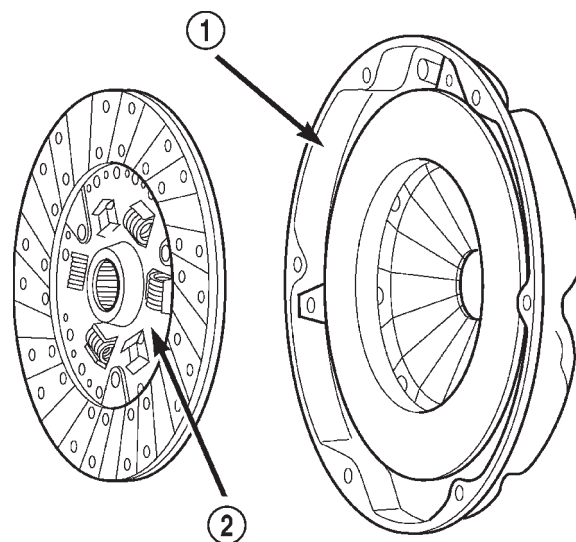
(6) Position the clutch cover over the disc and on the flywheel (Fig. 5).

(7) Install the clutch cover bolts finger tight (Fig. 5).

(8) Starting with the bolts marked "P" on the cover first, tighten clutch cover bolts in a star pattern to 50 N·m torque (37 ft. lbs.).

(9) Apply light coat of Mopar® high temperature bearing grease to pilot bearing and splines of transmission input shaft.

**CAUTION: Do not over-lubricate as this will result in grease contamination of the disc.**

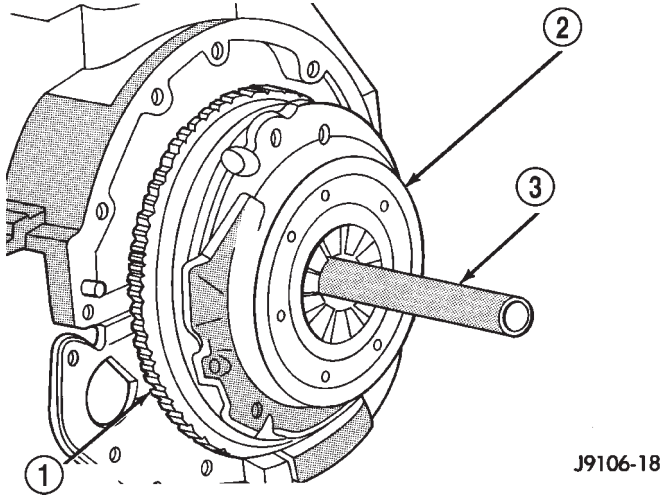


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**Fig. 3 Clutch Disc Position**

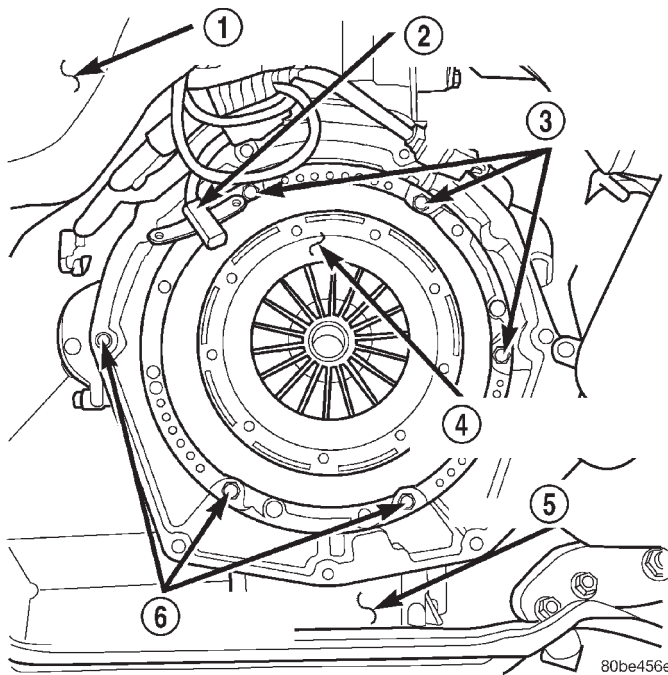
- |   |
|---|
| 1 - INSPECT THIS SURFACE                    |
| 2 - "FLYWHEEL SIDE" STAMPED ON THIS SURFACE |

REMOVAL AND INSTALLATION (Continued)



**Fig. 4 Clutch Disc Alignment – Typical**

- 1 – FLYWHEEL
- 2 – CLUTCH COVER AND DISC
- 3 – CLUTCH DISC ALIGNMENT TOOL



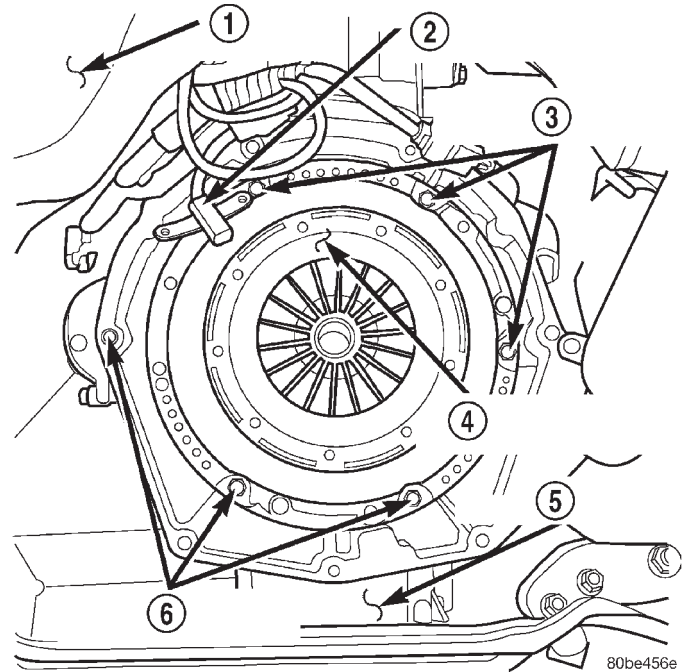
**Fig. 5 Clutch Cover (Pressure Plate) View**

- 1 – VEHICLE UNDERBODY
- 2 – ENGINE SPEED SENSOR
- 3 – PRESSURE PLATE RETAINING BOLTS
- 4 – CLUTCH COVER (PRESSURE PLATE)
- 5 – ENGINE OIL PAN
- 6 – PRESSURE PLATE RETAINING BOLTS

**PILOT BEARING**

**REMOVAL**

(1) Remove the transmission and transfer case. Refer to Group 21, Transmission and Transfer Case for procedures.



**Fig. 6 Clutch Cover (Pressure Plate) View**

- 1 – VEHICLE UNDERBODY
- 2 – ENGINE SPEED SENSOR
- 3 – PRESSURE PLATE RETAINING BOLTS
- 4 – CLUTCH COVER (PRESSURE PLATE)
- 5 – ENGINE OIL PAN
- 6 – PRESSURE PLATE RETAINING BOLTS

(2) Remove the clutch cover and disc (Fig. 6). Refer to clutch cover and disc removal and installation in this group.

(3) Remove the four bolts that attach the pilot bearing retainer to the flywheel (Fig. 7).

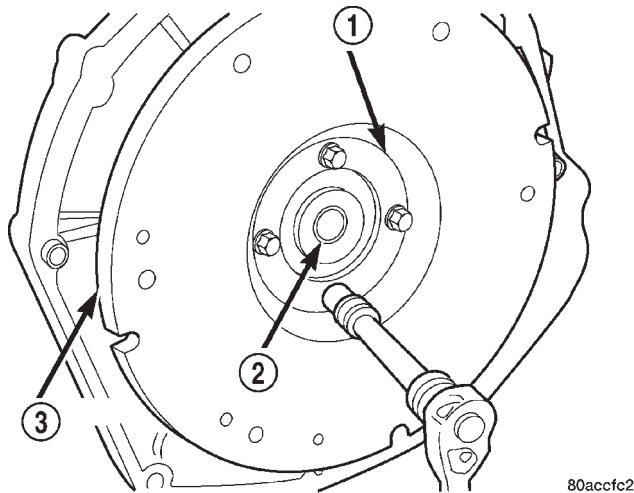
(4) Remove the pilot bearing retainer.

(5) Support the bearing retainer on two wood blocks.

(6) Remove the pilot bearing with a suitable sized socket and extension (Fig. 8). Use mallet to tap bearing out of retainer.

(10) Install the transmission and transfer case. Refer to Group 21, Transmission and Transfer Case for procedure.

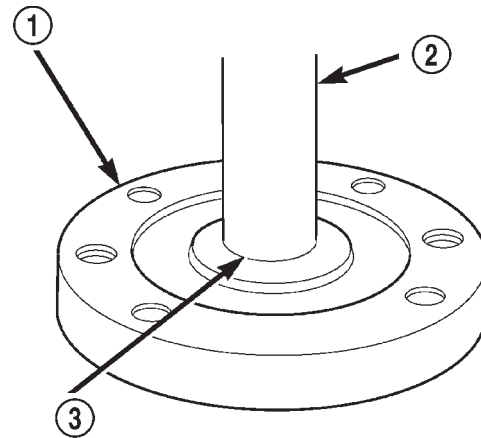
## REMOVAL AND INSTALLATION (Continued)



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**Fig. 7 Pilot Bearing Retainer Bolt Removal/Installation**

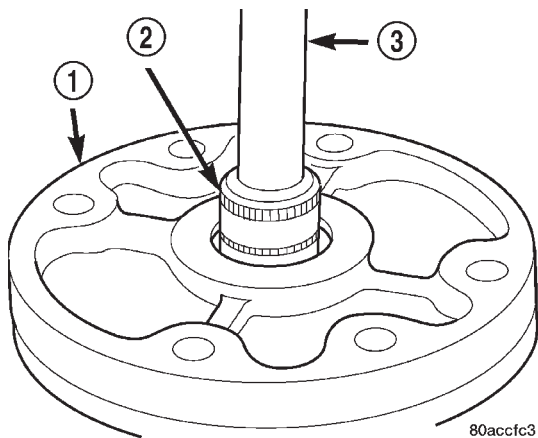
- 1 - RETAINER
- 2 - PILOT BEARING
- 3 - FLYWHEEL



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**Fig. 9 Pilot Bearing Installation**

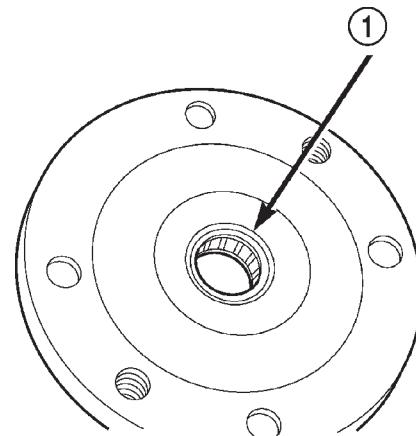
- 1 - HOUSING
- 2 - SPECIAL TOOL C-4171
- 3 - BEARING



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**Fig. 8 Pilot Bearing Removal**

- 1 - HOUSING
- 2 - SUITABLE SIZE SOCKET
- 3 - EXTENSION



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**Fig. 10 Pilot Bearing Seated In Retainer**

- 1 - SEAT PILOT BEARING FLUSH WITH LOWER EDGE OF CHAMFER (IN BORE)

## INSTALLATION

**CAUTION:** The bearing can be installed incorrectly if care is not exercised. Make sure the stamped letters on the bearing will be facing out (toward rear of vehicle) after installation.

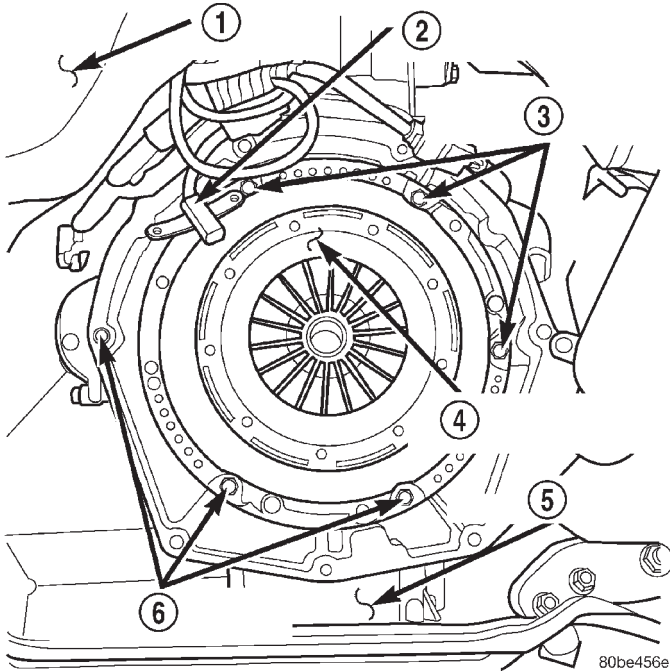
(1) Lightly scuff sand the flywheel surface with 180 grit emery cloth. Clean the surface with Mopar® brake or carburetor cleaner.

(2) Install the new pilot bearing with hammer and tool handle C-4171. (Fig. 9). Seat the bearing flush with lower edge of chamfer in retainer bore (Fig. 10). Reposition the bearing if necessary.

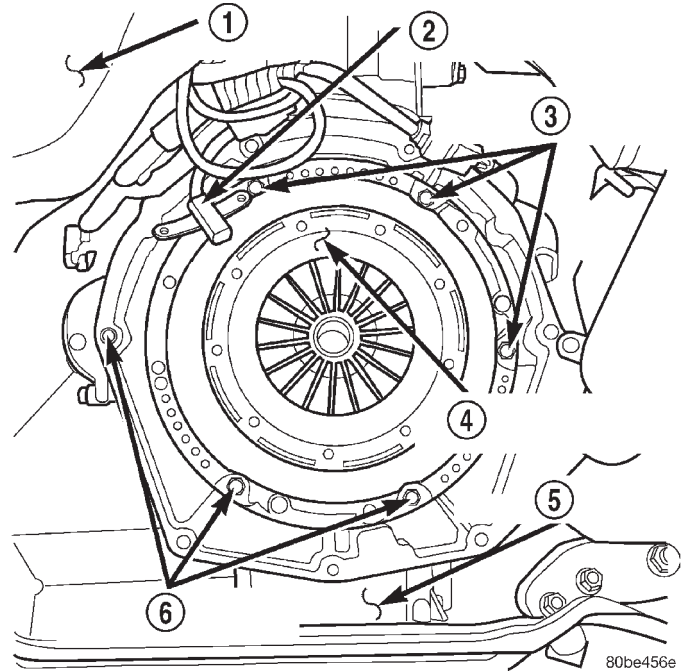
(3) Install the bearing retainer. Torque bolts to 28 N·m (20 ft. lbs.)

(4) Lubricate the pilot bearing with Mopar® high temperature wheel bearing grease.

## REMOVAL AND INSTALLATION (Continued)

**Fig. 11 Clutch Cover (Pressure Plate) View**

- 1 - VEHICLE UNDERBODY
- 2 - ENGINE SPEED SENSOR
- 3 - PRESSURE PLATE RETAINING BOLTS
- 4 - CLUTCH COVER (PRESSURE PLATE)
- 5 - ENGINE OIL PAN
- 6 - PRESSURE PLATE RETAINING BOLTS

**Fig. 12 Clutch Cover (Pressure Plate) View**

- 1 - VEHICLE UNDERBODY
- 2 - ENGINE SPEED SENSOR
- 3 - PRESSURE PLATE RETAINING BOLTS
- 4 - CLUTCH COVER (PRESSURE PLATE)
- 5 - ENGINE OIL PAN
- 6 - PRESSURE PLATE RETAINING BOLTS

(5) Install the clutch disc and cover (Fig. 11). Refer to clutch cover and disc removal and installation in this group.

(6) Install the transmission and transfer case. Refer to Group 21, Transmission and Transfer Case for procedures.

**FLYWHEEL****REMOVAL**

(1) Remove the transmission and clutch housing. Refer to Group 21, Transmission and Transfer Case for procedure.

(2) Remove the clutch cover and disc (Fig. 12) as described in this section.

(3) Remove the bolts that attach pilot bearing retainer to flywheel.

(4) Remove the pilot bearing and retainer.

(5) Remove the flywheel bolts.

(6) Grasp the flywheel firmly and work it off the crankshaft flange.

(7) Remove the o-ring from the crankshaft flange, or the mounting shoulder of the flywheel (Fig. 14).

(8) Clean the flywheel in solvent.

**INSPECTION**

Examine the flywheel mounting surfaces, clutch contact surface, and ring gear. Check condition of flywheel hub and attaching bolts. Replace flywheel if hub exhibits cracks in the area of attaching bolt holes. Replace ring gear if the teeth are damaged. Resurface the flywheel if the clutch contact surface is scored or rough (refer to flywheel finishing and ring gear replacement information in this section).

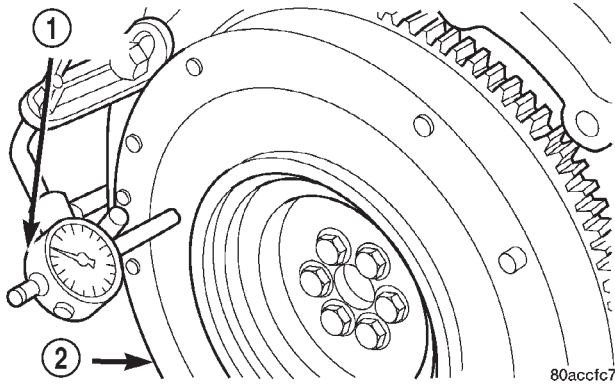
Check flywheel runout if misalignment is suspected. Runout should not exceed 0.08 mm. Measure flywheel face runout with a dial indicator (Fig. 13). Mount the indicator on a stud installed in the engine block or in one of the flywheel attaching bolt holes. Face runout can be corrected by resurfacing if necessary. Surface grinding equipment is recommended for this purpose. Stock removal should not exceed 0.25 mm.

**INSTALLATION**

**CAUTION:** Use **NEW** flywheel bolts for the following procedure.

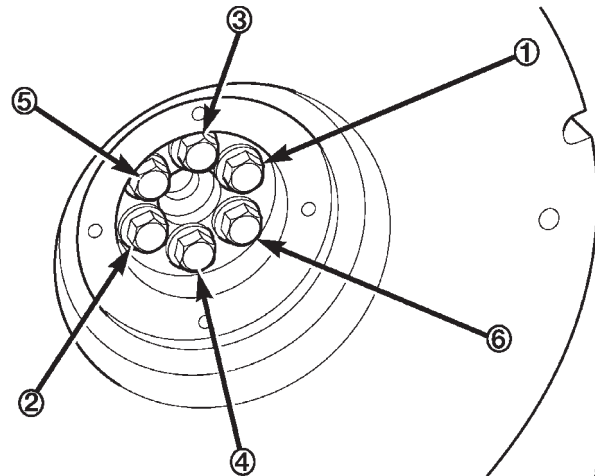
(1) Clean the crankshaft flange before mounting the flywheel. Dirt or grease on flange surface may cock flywheel causing run-out.

## REMOVAL AND INSTALLATION (Continued)



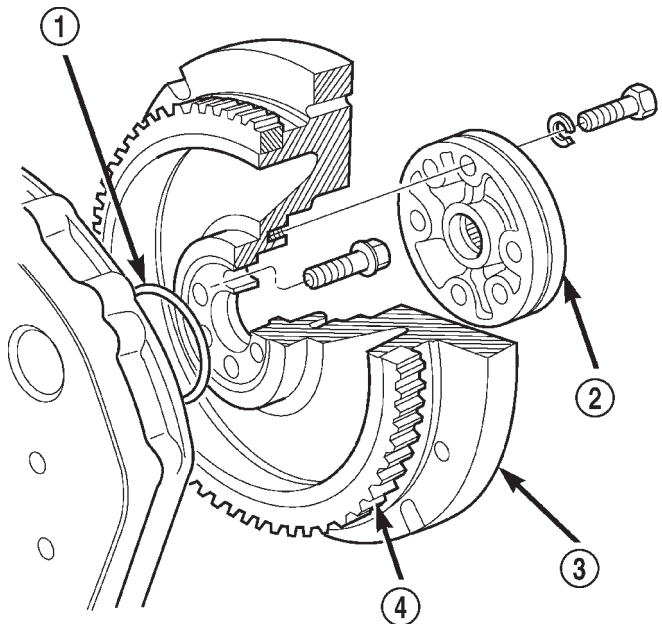
**Fig. 13 Checking Flywheel Runout**

- 1 - DIAL INDICATOR  
2 - FLYWHEEL FACE



**Fig. 15 Cross Tightening Method**

(c) Loosen one bolt at a time and tighten to 19.6 N•m (14 ft. lbs.) plus 75° using the cross tightening method until completion.



**Fig. 14 Flywheel Mounting (VM Diesel)**

- 1 - O-RING  
2 - PILOT BEARING HOUSING  
3 - FLYWHEEL  
4 - STARTER RING GEAR

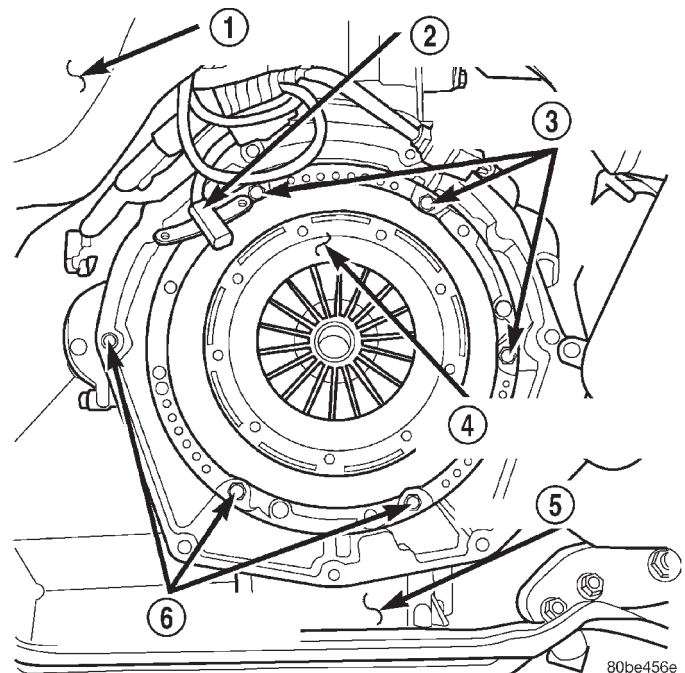
(2) Install new o-ring in the flywheel mounting flange (Fig. 14). Use grease to hold the ring in place.

(3) Install the flywheel on the crankshaft and align the bolt holes.

(4) Install and tighten the new flywheel bolts as follows:

(a) Lubricate and install the 6 new flywheel bolts.

(b) Torque the 6 flywheel bolts to 49 N•m (36 ft. lbs.) starting with one bolt and following with the opposite one (cross tightening) until completion, in a clockwise direction (Fig. 15).



**Fig. 16 Clutch Cover (Pressure Plate) View**

- 1 - VEHICLE UNDERBODY  
2 - ENGINE SPEED SENSOR  
3 - PRESSURE PLATE RETAINING BOLTS  
4 - CLUTCH COVER (PRESSURE PLATE)  
5 - ENGINE OIL PAN  
6 - PRESSURE PLATE RETAINING BOLTS

(5) Install the clutch cover and disc (Fig. 16). Refer to clutch cover and disc removal and installation procedure in this section.

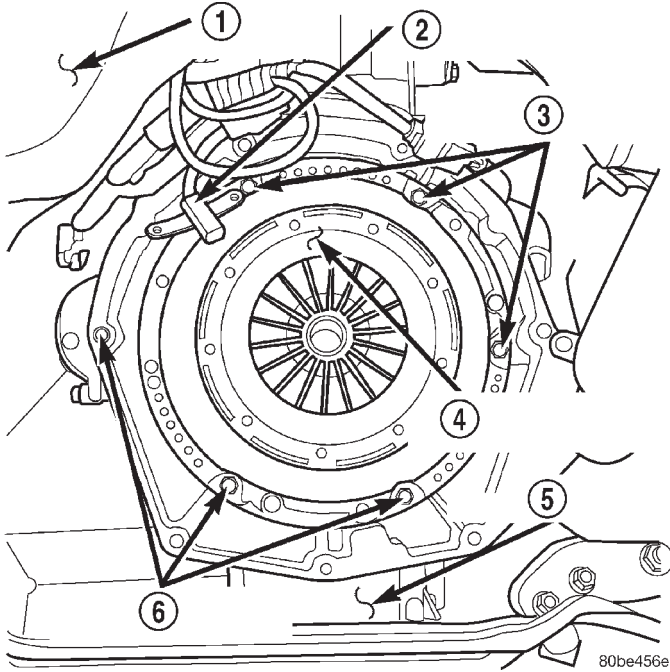
(6) Install the transmission and transfer case. Refer to Group 21, Transmission and Transfer Case for removal and installation procedure.

## REMOVAL AND INSTALLATION (Continued)

## FLYWHEEL RING GEAR

## REMOVAL

(1) Remove the transmission and transfer case. Refer to Group 21, Transmission and Transfer Case for removal and installation procedures.



**Fig. 17 Clutch Cover (Pressure Plate) View**

- 1 - VEHICLE UNDERBODY
- 2 - ENGINE SPEED SENSOR
- 3 - PRESSURE PLATE RETAINING BOLTS
- 4 - CLUTCH COVER (PRESSURE PLATE)
- 5 - ENGINE OIL PAN
- 6 - PRESSURE PLATE RETAINING BOLTS

(2) Remove the clutch cover and disc (Fig. 17). Refer to clutch cover and disc removal and installation in this group.

(3) Remove the flywheel. Refer to flywheel removal and installation in this group.

(4) Mark position of the old gear for alignment reference. Use a carbide tipped scribe to mark gear location on flywheel.

(5) Wear protective goggles or approved safety glasses.

(6) Remove the old gear by cutting most of the way through it at one point. Use an abrasive cut off wheel for this purpose. Break the ring gear at cut with a hammer and a cold chisel or punch

(7) Ring gear is shrink fit on flywheel. This means the gear must be expanded by heating in order to install it.

**NOTE:** The method of heating and expanding the new ring gear is extremely important. Every surface of the gear must be heated at the same time to produce uniform expansion. An oven or similar enclosed heating device must be used. Temperature required for uniform expansion is approximately 350°-375°.

**CAUTION:** Do not use an oxy/acetylene torch to remove the old gear, or to heat and expand a new gear. The high temperature of the torch flame can cause localized heating that will damage the flywheel. In addition, using the torch to heat a replacement gear will cause uneven heating and expansion. The torch flame can also anneal the gear teeth resulting in rapid wear and damage after installation.

## INSTALLATION

(1) Position and install the heated ring gear on the flywheel:

- (a) Wear heat resistant gloves to handle the hot ring gear.
- (b) Align the ring gear on the flywheel evenly.
- (c) Use hammer and brass drift to tap ring gear onto the flywheel.
- (d) Seat the ring gear on flywheel

(2) Allow the ring gear to cool down before installation on the engine. Place flywheel on work bench and let it cool in normal shop air.

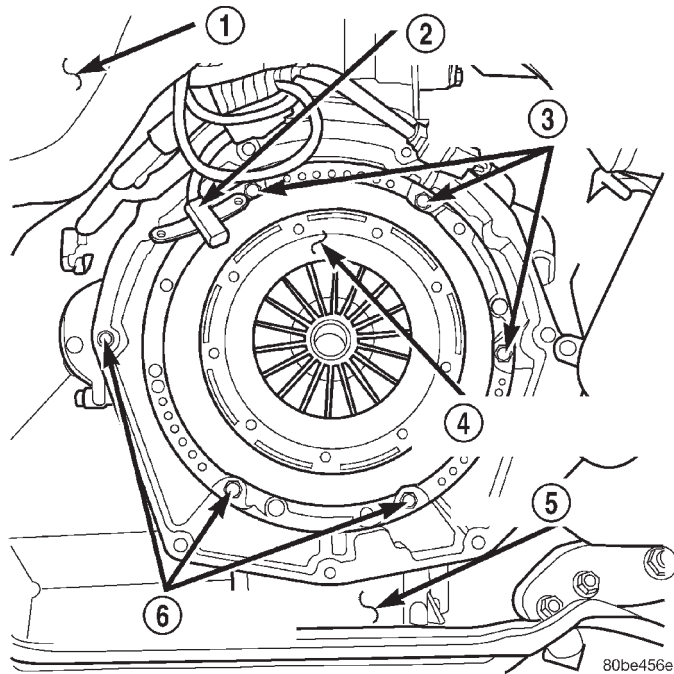
(3) Install the flywheel and torque bolts. Refer to flywheel removal and installation in this group.

(4) Install the clutch cover and disc (Fig. 18). Refer to clutch cover and disc removal and installation in this group.

(5) Install the transmission and transfer case. Refer to Group 21, Transmission and Transfer Case for removal and installation procedures.

**CAUTION:** Do not use water or compressed air to cool the flywheel. The rapid cooling produced by water or compressed air will distort or crack the new gear.

REMOVAL AND INSTALLATION (Continued)



**Fig. 18 Clutch Cover (Pressure Plate) View**

- 1 - VEHICLE UNDERBODY
- 2 - ENGINE SPEED SENSOR
- 3 - PRESSURE PLATE RETAINING BOLTS
- 4 - CLUTCH COVER (PRESSURE PLATE)
- 5 - ENGINE OIL PAN
- 6 - PRESSURE PLATE RETAINING BOLTS

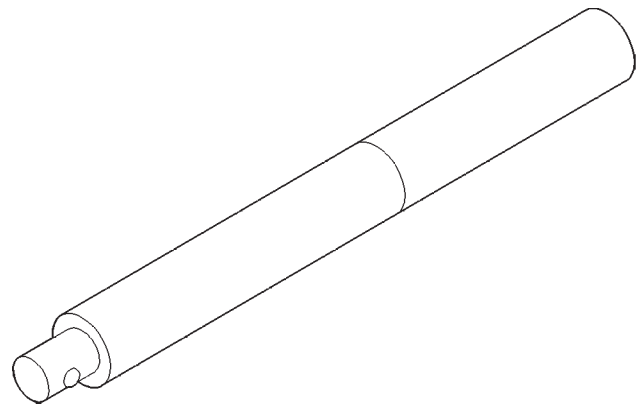
SPECIFICATIONS

SPECIFICATIONS

DESCRIPTION	TORQUE
<b>Clutch Cover to Flywheel</b>	
Bolts . . . . .	50 N·m (37 ft. lbs.)
<b>Clutch Housing to Transmission</b>	
Bolts . . . . .	46 N·m (34 ft. lbs.)
<b>Flywheel to Crankshaft</b>	
Bolts . . . . .	See removal and installation procedure.
<b>Pilot Bearing Retainer to Flywheel/Crankshaft</b>	
Bolts . . . . .	28 N·m (20 ft. lbs.)
<b>Clutch Housing to Engine</b>	
Top (2) Bolts . . . . .	37 N·m (27 ft. lbs.)
Middle (2) Bolts . . . . .	58 N·m (43 ft. lbs.)
Bottom (2) Bolts . . . . .	75 N·m (55 ft. lbs.)

SPECIAL TOOLS

SPECIAL TOOLS



**Universal Handle—C-4171**