# CLUTCH

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## CLUTCH

### DESCRIPTION

The clutch mechanism consists of a flywheel, a single, dry-type disc, and a diaphragm style clutch cover (Fig. 1). A hydraulic linkage is used to operate the clutch release bearing and fork. The flywheel is bolted to the rear flange of the crankshaft. The clutch pressure plate is bolted to the flywheel with the clutch disc located between these two components. The clutch system provides the mechanical, but still easily detachable, link between the engine and the transmission. The system is designed to ensure that the full torque output of the engine is transfered to the transmission while isolating the transmission from the engine firing pulses to minimize concerns such as gear rattle.

### OPERATION

Leverage, clamping force and friction are what make the clutch work. The disc serves as the friction element and a diaphragm spring and pressure plate provide the clamping force. The clutch pedal, hydraulic linkage, release lever and bearing provide the leverage.

The clutch master cylinder push rod is connected to the clutch pedal. When the clutch pedal is depressed, the slave cylinder is operated by the clutch master cylinder mounted on the dash panel. The release fork is actuated by the hydraulic slave cylinder mounted on the transmission housing. The release bearing is operated by a release fork pivoting on a ball stud mounted in the transmission housing. The release bearing then depresses the pressure plate spring fingers, releasing pressure on the clutch disc and allowing the engine crankshaft to spin independently of the transmission input shaft (Fig. 2).

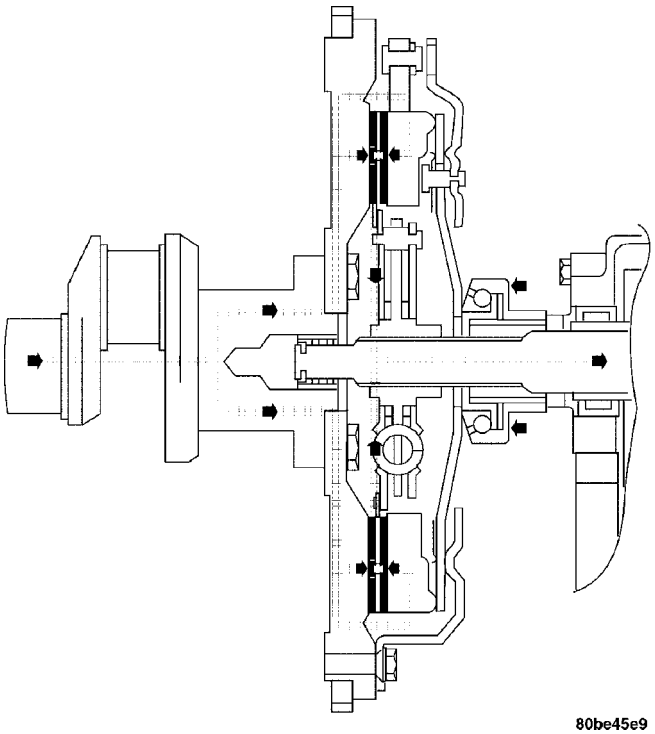


***Fig. 1 ENGINE POWERFLOW***

CLUTCH (Continued)

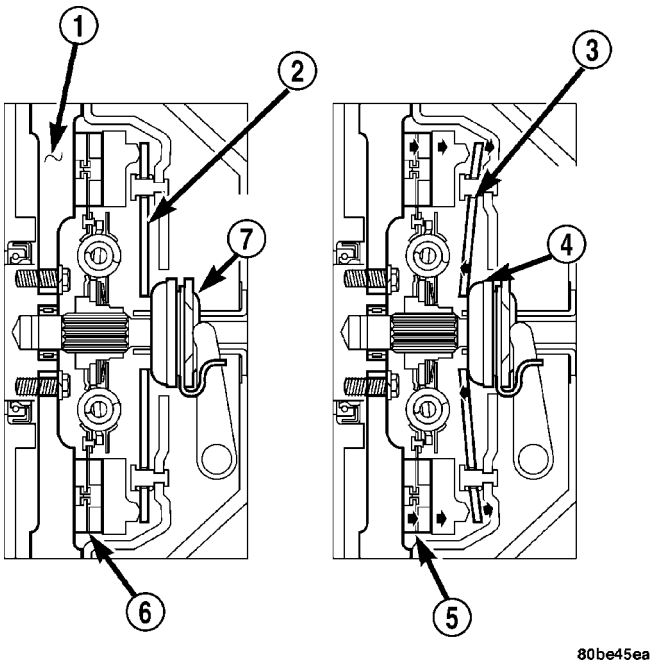


*Fig. 2 CLUTCH OPERATION*

1 - FLYWHEEL
2 - PRESSURE PLATE FINGERS
3 - PIVOT POINT
4 - RELEASE BEARING PUSHED IN
5 - CLUTCH DISC ENGAGED
6 - CLUTCH DISC ENGAGED
7 - RELEASE BEARING

## WARNING

**WARNING:: EXERCISE CARE WHEN SERVICING CLUTCH COMPONENTS. FACTORY INSTALLED CLUTCH DISCS DO NOT CONTAIN ASBESTOS FIBERS. DUST AND DIRT ON CLUTCH PARTS MAY CONTAIN ASBESTOS FIBERS FROM AFTERMARKET COMPONENTS. BREATHING EXCESSIVE CONCENTRATIONS OF THESE FIBERS CAN CAUSE SERIOUS BODILY HARM. WEAR A RESPIRATOR DURING SERVICE AND NEVER CLEAN CLUTCH COMPONENTS WITH COMPRESSED AIR OR WITH A DRY BRUSH. EITHER CLEAN THE COMPONENTS WITH A WATER DAMPENED RAGS OR USE A VACUUM CLEANER SPECIFICALLY DESIGNED FOR REMOVING ASBESTOS FIBERS AND DUST. DO NOT CREATE DUST BY SANDING A CLUTCH DISC. REPLACE THE DISC IF THE FRICTION MATERIAL IS DAMAGED OR CONTAMINATED. DISPOSE OF ALL DUST AND DIRT CONTAINING ASBESTOS FIBERS IN SEALED BAGS OR CONTAINERS. THIS WILL HELP MINIMIZE EXPOSURE TO YOURSELF AND TO OTHERS. FOLLOW ALL RECOMMENDED SAFETY PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL SAFETY AGENCY (EPA), FOR THE HANDLING AND DISPOSAL OF PRODUCTS CONTAINING ASBESTOS.**

## DIAGNOSIS AND TESTING

A road test and component inspection is recommended to determine a clutch problem. During a road test, drive the vehicle at normal speeds. Shift the transmission through all gear ranges and observe clutch action. If the clutch chatters, grabs, slips or does not release properly, remove and inspect the clutch components. If the problem is noise or hard shifting, further diagnosis may be needed as the transmission or another driveline component may be at fault.

### CLUTCH CONTAMINATION

Fluid contamination is a frequent cause of clutch malfunctions. Oil, water or clutch fluid on the clutch disc and pressure plate surfaces will cause chatter, slip and grab. Inspect components for oil, hydraulic fluid or water/road splash contamination.

Oil contamination indicates a leak at either the rear main seal or transmission input shaft. Clutch fluid leaks are usually from damaged slave cylinder push rod seals. Heat buildup caused by slippage between the pressure plate, disc and flywheel can bake the oil residue onto the components. The glaze-like residue ranges in color from amber to black.

Road splash contamination is dirt/water entering the clutch housing due to loose bolts, housing cracks. Driving through deep water puddles can force water/road splash into the housing through such openings.

### IMPROPER RELEASE OR CLUTCH ENGAGEMENT

Clutch release or engagement problems can be caused by worn or damage clutch components. A visual inspection of the release components will usually reveal the problem part.

Release problems can result in hard shifting and noise. Look for leaks at the clutch cylinders and interconnecting line and loose slave cylinder bolts. Also worn/loose release fork, pivot stud, clutch disc, pressure plate or release bearing.

Engagement problems can result in slip, chatter/shudder and noisy operation. The causes may be clutch disc contamination, wear, distortion or flywheel damage. Visually inspect to determine the actual cause of the problem.

### CLUTCH MISALIGNMENT

Clutch components must be in proper alignment with the crankshaft and transmission input shaft. Misalignment caused by excessive runout or warpage of any clutch component will cause grab, chatter and improper clutch release.

CLUTCH (Continued)

## CLUTCH COVER AND DISC RUNOUT

Check the clutch disc before installation. Axial (face) runout of a **new** disc should not exceed 0.50 mm (0.020 in.). Measure runout about 6 mm (1/4 in.) from the outer edge of the disc facing. Obtain another disc if runout is excessive.

Check condition of the clutch before installation. A warped cover or diaphragm spring will cause grab and incomplete release or engagement. Be careful when handling the cover and disc. Impact can distort the cover, diaphragm spring, release fingers and the hub of the clutch disc.

Use an alignment tool when positioning the disc on the flywheel. The tool prevents accidental misalignment which could result in cover distortion and disc damage.

A frequent cause of clutch cover distortion (and consequent misalignment) is improper bolt tightening.

## FLYWHEEL RUNOUT

Check flywheel runout whenever misalignment is suspected. Flywheel runout should not exceed 0.08 mm (0.003 in.). Measure runout at the outer edge of the flywheel face with a dial indicator.

Common causes of runout are:

- heat warpage
- improper machining
- incorrect bolt tightening
- improper seating on crankshaft flange shoulder
- foreign material on crankshaft flange

Flywheel machining is not recommended. The flywheel clutch surface is machined to a unique contour and machining will negate this feature. Minor flywheel scoring can be cleaned up by hand with 180 grit emery or with turning equipment. Remove only enough material to reduce scoring (approximately 0.001 - 0.003 in.). Heavy stock removal is **not recommended.** Replace the flywheel if scoring is severe and deeper than 0.076 mm (0.003 in.). Excessive stock removal can result in flywheel cracking or warpage after installation; it can also weaken the flywheel and interfere with proper clutch release.

Clean the crankshaft flange before mounting the flywheel. Dirt and grease on the flange surface may cock the flywheel causing excessive runout. Use new bolts when remounting a flywheel and secure the bolts with Mopar Lock And Seal or equivalent. Tighten flywheel bolts to specified torque only. Overtightening can distort the flywheel hub causing runout.

## DIAGNOSIS CHART

The diagnosis charts Diagnosis Chart describe common clutch problems, causes and correction. Fault conditions are listed at the top of each chart. Conditions, causes and corrective action are outlined in the indicated columns.

The charts are provided as a convenient reference when diagnosing faulty clutch operation.

*DIAGNOSIS CHART*

| CONDITION | POSSIBLE CAUSES | CORRECTION |
|---|---|---|
| Disc facing worn out | 1. Normal wear. | 1. Replace cover and disc. |
| | 2. Driver frequently rides (slips) the clutch. Results in rapid overheating and wear. | 2. Replace cover and disc. |
| | 3. Insufficient clutch cover diaphragm spring tension. | 3. Replace cover and disc. |
| Clutch disc facing contaminated with oil, grease, or clutch fluid. | 1. Leak at rear main engine seal or transmission input shaft seal. | 1. Replace appropriate seal. |
| | 2. Excessive amount of grease applied to the input shaft splines. | 2. Remove grease and apply the correct amount of grease. |
| | 3. Road splash, water entering housing. | 3. Replace clutch disc. Clean clutch cover and reuse if in good condition. |
| | 4. Slave cylinder leaking. | 4. Replace hydraulic clutch linkage. |
| Clutch is running partially disengaged. | 1. Release bearing sticking or binding and does not return to the normal running position. | 1. Verify failure. Replace the release bearing and transmission front bearing retainer as necessary. |

CLUTCH (Continued)

| CONDITION | POSSIBLE CAUSES | CORRECTION |
|---|---|---|
| Flywheel below minimum thickness specification. | 1. Improper flywheel machining. Flywheel has excessive taper or excessive material removal. | 1. Replace flywheel. |
| Clutch disc, cover and/or diaphragm spring warped or distorted. | 1. Rough handling. Impact bent cover, spring, or disc.<br>2. Improper bolt tightening procedure. | 1. Replace disc or cover as necessary.<br>2. Tighten clutch cover using proper procedure. |
| Facing on flywheel side of disc torn, gouged, or worn. | 1. Flywheel surface scored or nicked.<br>2. Clutch disc sticking or binding on transmission input shaft. | 1. Correct surface condition if possible. Replace flywheel and disc as necessary.<br>2. Inspect components and correct/replace as necessary. |
| Clutch disc facing burnt. Flywheel and cover pressure plate surfaces heavily glazed. | 1. Frequent operation under high loads or hard acceleration conditions.<br>2. Driver frequently rides (slips) clutch. Results in rapid wear and overheating of disc and cover. | 1. Correct condition of flywheel and pressure plate surface. Replace clutch cover and disc. Alert driver to problem cause.<br>2. Correct condition of flywheel and pressure plate surface. Replace clutch cover and disc. Alert driver to problem cause. |
| Clutch disc binds on input shaft splines. | 1. Clutch disc hub splines damaged during installation.<br>2. Input shaft splines rough, damaged, or corroded. | 1. Clean, smooth, and lubricate hub splines if possible. Replace disc if necessary.<br>2. Clean, smooth, and lubricate shaft splines if possible. Replace input shaft if necessary. |
| Clutch disc rusted to flywheel and/or pressure plate. | 1. Clutch not used for an extended period of time (e.g. long term vehicle storage). | 1. Sand rusted surfaces with 180 grit sanding paper. Replace clutch cover and flywheel if necessary. |
| Pilot bearing seized, loose, or rollers are worn. | 1. Bearing cocked during installation.<br>2. Bearing defective.<br>3. Bearing not lubricated.<br>4. Clutch misalignment. | 1. Install a new bearing.<br>2. Install a new bearing.<br>3. Install a new bearing.<br>4. Inspect clutch and correct as necessary. Install and lubricate a new bearing. |

CLUTCH (Continued)

| CONDITION | POSSIBLE CAUSES | CORRECTION |
|---|---|---|
| Clutch will not disengage properly. | 1. Low hydraulic linkage fluid level. | 1. Add hydraulic linkage fluid. |
| | 2. Clutch cover loose. | 2. Follow proper bolt tightening procedure. |
| | 3. Clutch disc bent or distorted. | 3. Replace clutch disc. |
| | 4. Clutch cover diaphragm spring bent or warped. | 4. Replace clutch cover. |
| | 5. Clutch disc installed backwards. | 5. Remove and install clutch disc correctly. |
| | 6. Release fork bent or fork pivot loose or damaged. | 6. Replace fork or pivot as necessary. |
| | 7. Clutch master or slave cylinder failure. | 7. Replace hydraulic linkage assembly. |
| Clutch pedal squeak. | 1. Pivot pin loose. | 1. Tighten pivot pin if possible. Replace clutch pedal if necessary. |
| | 2. Master cylinder bushing not lubricated. | 2. Lubricate master cylinder bushing. |
| | 3. Pedal bushings worn out or cracked. | 3. Replace and lubricate bushings. |
| | 4. Rough surface on front bearing retainer. | 4. Replace front bearing retainer. |
| Clutch master or slave cylinder plunger dragging andør binding | 1. Master or slave cylinder components worn or corroded. | 1. Replace clutch hydraulic linkage assembly. |
| Release bearing is noisy. | 1. Release bearing defective or damaged. | 1. Replace release bearing. |
| Contact surface of release bearing damaged. | 1. Clutch cover incorrect or release fingers bent or distorted. | 1. Replace clutch cover and release bearing. |
| | 2. Release bearing defective or damaged. | 2. Replace the release bearing. |
| | 3. Release bearing misaligned. | 3. Check and correct runout of clutch components. Check front bearing sleeve for damage/ alignment. Repair as necessary. |
| Partial engagement of clutch disc. One side of disc is worn and the other side is glazed and lightly worn. | 1. Clutch pressure plate position incorrect. | 1. Replace clutch disc and cover. |
| | 2. Clutch cover, spring, or release fingers bent or distorted. | 2. Replace clutch disc and cover. |
| | 3. Clutch disc damaged or distorted. | 2. Replace clutch disc. |
| | 4. Clutch misalignment. | 4. Check alignment and runout of flywheel, disc, pressure plate, andør clutch housing. Correct as necessary. |

CLUTCH (Continued)

## SPECIFICATIONS

*TORQUE SPECIFICATIONS*

| DESCRIPTION | N·m | Ft. Lbs. | In. Lbs. |
|---|---|---|---|
| Slave Cylinder Nuts | 23 | 17 | - |
| Clutch Master Cylinder Nuts | 28 | 21 | - |
| Pressure Plate Bolts - V6 & V8 | 50 | 37 | - |
| Pressure Plate Bolts - V10 | 30 | 22.5 | - |
| Pressure Plate Bolts - Diesel | 30 | 22.5 | - |
| Release Bearing Pivot | 23 | 17 | - |
| Flywheel Bolts | 95 | 70 | - |

# CLUTCH DISC

## REMOVAL

(1) Support engine with wood block and adjustable jack stand, to prevent strain on engine mounts.

(2) Remove transmission and transfer case, if equipped.

(3) If pressure plate will be reused, mark the position on flywheel with paint or scriber (Fig. 3). Also note location marks on the pressure next to the bolt holes. The mark will be a L or a circle with an X in it.

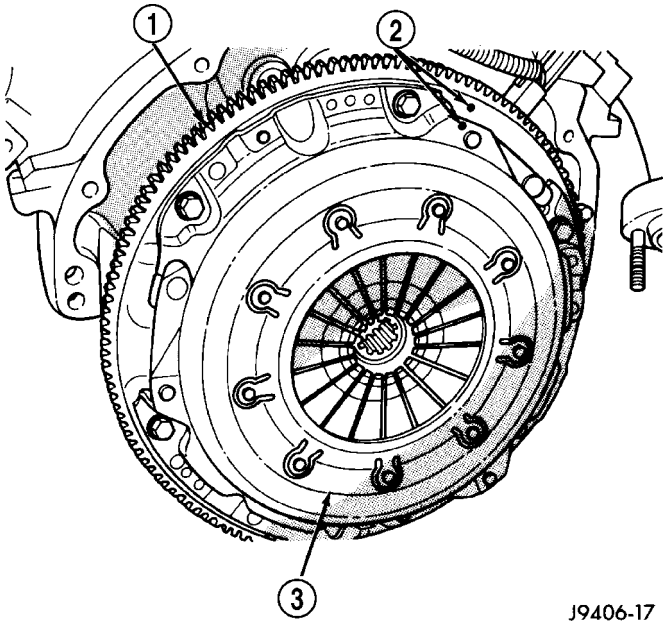


***Fig. 3 PRESSURE PLATE POSITION-TYPICAL***

1 - FLYWHEEL
2 - ALIGNMENT MARKS
3 - PRESSURE PLATE

(4) Insert clutch alignment tool through clutch disc and into pilot bushing, to hold disc in place while removing bolts.

(5) Loosen pressure plate bolts evenly, a few threads at a time and in a diagonal pattern to prevent warping the plate.

(6) Remove bolts completely and remove pressure plate, disc and alignment tool.

## INSTALLATION

(1) Check runout and free operation of new clutch disc.

(2) Lubricate crankshaft pilot bearing with a NLGI - 2 rated grease.

(3) Install clutch alignment tool in clutch disc hub with the raised side of hub is facing away from the flywheel.

**NOTE: Flywheel side is imprinted on the disc face.**

(4) Install alignment tool in pilot bearing and position disc on the flywheel.

(5) Position pressure plate over disc and onto the flywheel (Fig. 4).

(6) Align and hold pressure plate in position and install bolts finger tight.

(7) Tighten bolts evenly and a few threads at a time in a diagonal pattern.

**CAUTION: Bolts must be tightened evenly and to specified torque to avoid warping pressure plate cover.**

(8) Tighten pressure plate bolts to:

- V6 & V8 Engines - 50 N·m (37 ft. lbs.)
- V10 & Diesel Engines - 30 N·m (22.5 ft. lbs.)

(9) Remove release lever and release bearing from clutch housing. Apply Mopar high temperature bearing grease to bore of release bearing, release lever contact surfaces and release lever pivot stud (Fig. 5).

CLUTCH DISC (Continued)

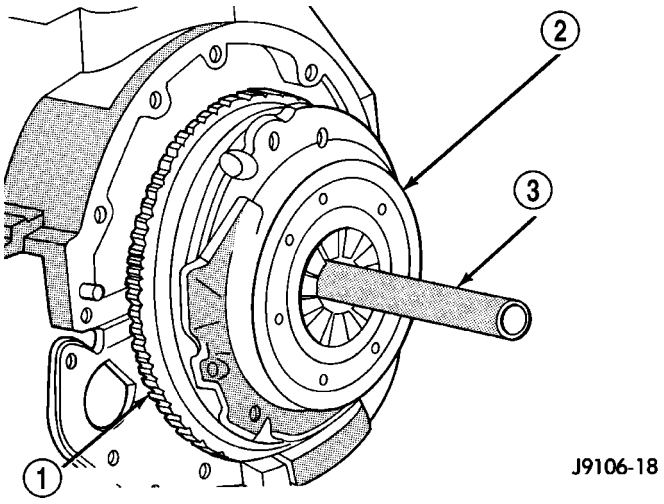


***Fig. 4 CLUTCH DISC AND PRESSURE PLATE***

1 - FLYWHEEL
2 - PRESSURE PLATE AND DISC
3 - ALIGNMENT TOOL

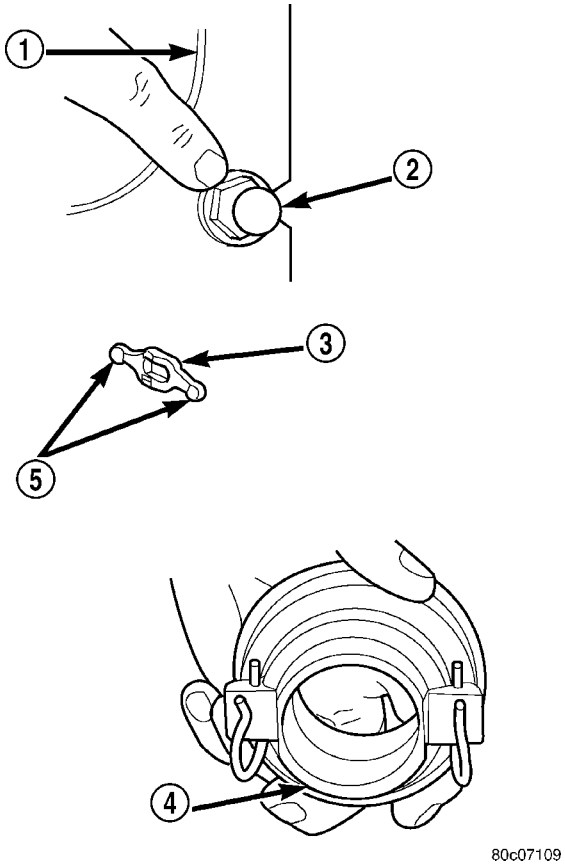


***Fig. 5 LUBRICATION POINTS***

1 - CLUTCH HOUSING
2 - FORK PIVOT BALL
3 - RELEASE FORK
4 - RELEASE BEARING BORE
5 - LUBE POINTS

(10) Apply light coat of Mopar high temperature bearing grease to splines of transmission input shaft and to release bearing slide surface of the transmission front bearing retainer (Fig. 6).

**CAUTION: Do not over lubricate shaft splines. This can result in grease contamination of the disc.**

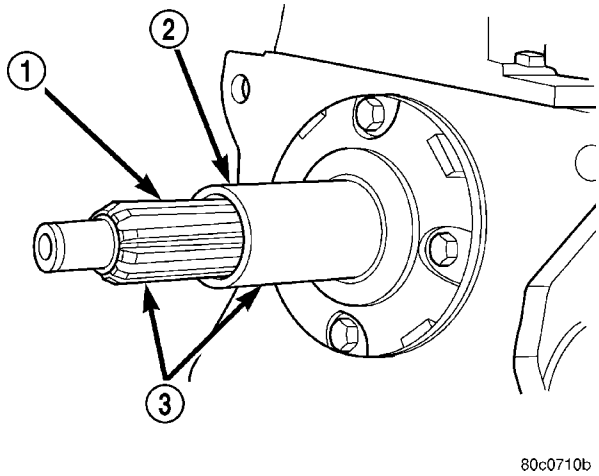


***Fig. 6 INPUT SHAFT LUBRICATION POINTS***

1 - INPUT SHAFT
2 - BEARING RETAINER
3 - SPLINE AND RELEASE BEARING SURFACE

(11) Wipe pilot bearing surface clean.

(12) Install release lever and bearing in clutch housing. Verify spring clips that retain fork on pivot ball and release bearing on fork are installed properly (Fig. 7).

**NOTE: If release lever is installed correctly, the lever part number will be toward the bottom of the transmission and right side up. There is also a stamped "I" in the lever which goes to the pivot ball side of the transmission.**

(13) Install transmission and transfer case if equipped.

CLUTCH DISC (Continued)

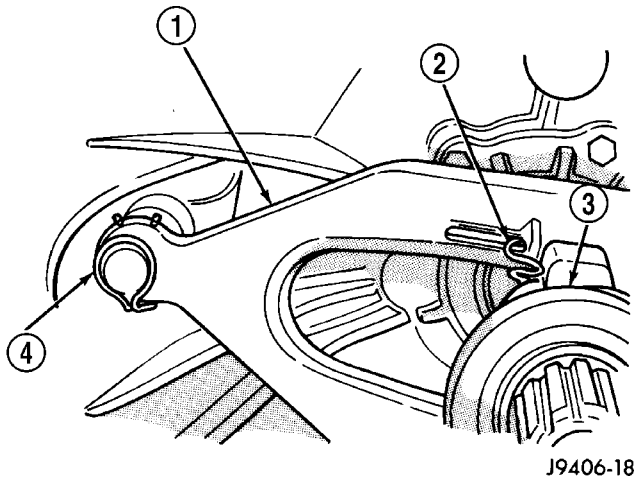


*Fig. 7 FORK, BEARING AND SPRING CLIPS*

1 - FORK
2 - SPRING CLIP
3 - BEARING
4 - SPRING CLIP

(14) Check fluid level in clutch master cylinder.

# CLUTCH HOUSING

## DIAGNOSIS AND TESTING

The clutch housing maintains alignment between the crankshaft and transmission input shaft. Misalignment can cause clutch noise, hard shifting, incomplete release and chatter. Also premature pilot bearing, cover release fingers and clutch disc wear. In severe cases, it can cause premature wear of the transmission input shaft and front bearing.

**NOTE: Only the NV4500 clutch housing can be checked using the following bore and face runout procedures. The NV5600 clutch housing is a integral part of the transmission and can only be checked off the vehicle.**

### CLUTCH HOUSING BORE RUNOUT

**CAUTION: On diesel engines if housing bore runout exceeds 0.015 inch, the clutch housing/transmission adapter plate must be replaced. On gas engines if housing bore runout exceeds 0.053 in. the clutch housing must be replaced.**

**NOTE: Offset dowels are available for gas engines to correct housing bore runout. They are not available for diesel engines.**

(1) Remove the clutch housing.
(2) Remove the clutch cover and disc.
(3) Replace one of the flywheel bolts with an appropriate size threaded rod that is 10 in. (25.4 cm) long (Fig. 8). The rod will be used to mount the dial indicator.

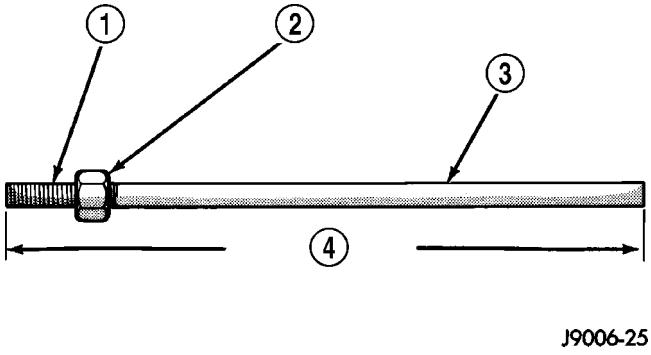


*Fig. 8 DIAL INDICATOR MOUNTING STUD*

1 - 7/16 - 20 THREAD
2 - NUT
3 - STUD OR THREADED ROD
4 - 10 INCHES LONG

(4) Remove release fork from the clutch housing.
(5) Install clutch housing. Tighten the housing bolts nearest the alignment dowels first.
(6) Mount dial indicator on the threaded rod and position indicator plunger on the clutch housing bore (Fig. 9).

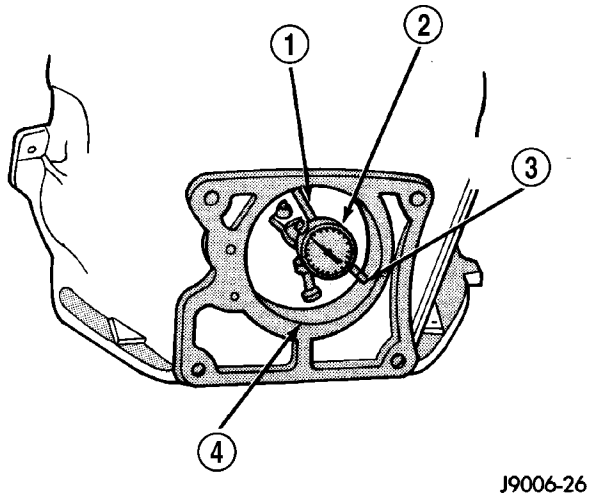


*Fig. 9 CLUTCH HOUSING BORE RUNOUT*

1 - MOUNTING STUD OR ROD
2 - DIAL INDICATOR
3 - INDICATOR PLUNGER
4 - CLUTCH HOUSING BORE

(7) Rotate crankshaft until indicator plunger is at the topof the housing bore. Zero the indicator at this point.
(8) Rotate crankshaft and record indicator readings at eight points (45° apart) around the bore (Fig. 10). Take measurement at least twice for accuracy.

CLUTCH HOUSING (Continued)

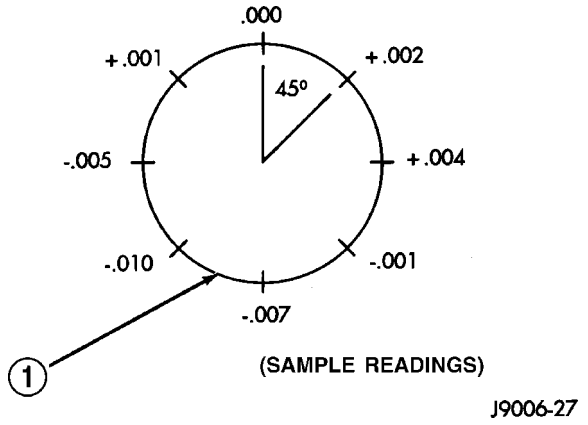


***Fig. 10 MEASUREMENT POINTS AND READINGS***

1 - CLUTCH HOUSING BORE CIRCLE

(9) Subtract each reading from the one 180° opposite to determine runout and direction. Bore runout example (Fig. 10):

- 0.000 – (–0.007) = 0.007 in.
- +0.002 – (–0.010) = 0.012 in.
- +0.004 – (–0.005) = 0.009 in.
- –0.001 – (+0.001) = –0.002 in.

In this example the largest or total indicator reading (TIR) difference is 0.012 inch. This means the housing bore is offset from the crankshaft centerline by 0.006 in. which is 1/2 of 0.012 inch. The dowels needed to correct this have an offset of 0.007 in. (Fig. 11).

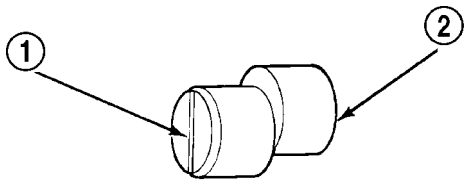


***Fig. 11 ALIGNMENT DOWEL SELECTION***

1 - SLOT DIRECTION OF OFFSET

2 - OFFSET DOWEL

| TIR VALUE | OFFSET DOWEL REQUIRED |
|---|---|
| 0.011 - 0.021 inch | 0.007 inch |
| 0.022 - 0.035 inch | 0.014 inch |
| 0.036 - 0.052 inch | 0.021 inch |

Remove housing and install dowels with the slotted side facing out so they can be turned with a screwdriver. Then install the housing and mount the dial indicator and check bore runout again. Rotate the dowels until the TIR is less than 0.010 inch.

## Clutch Housing Face Runout

(1) Position dial indicator towards the housing face (Fig. 12) with indicator plunger on the rim of the housing bore.

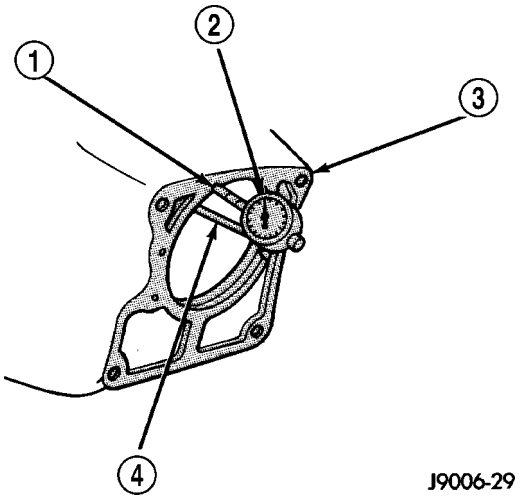


***Fig. 12 DIAL INDICATOR LOCATION***

1 - INDICATOR PLUNGER
2 - DIAL INDICATOR
3 - CLUTCH HOUSING FACE
4 - INDICATOR MOUNTING STUD OR ROD

(2) Rotate crankshaft until indicator plunger is at the 10 O'clock position and zero the dial indicator.

(3) Measure and record face runout readings at four points 90° apart (Fig. 13). Take measurement at least twice for accuracy.

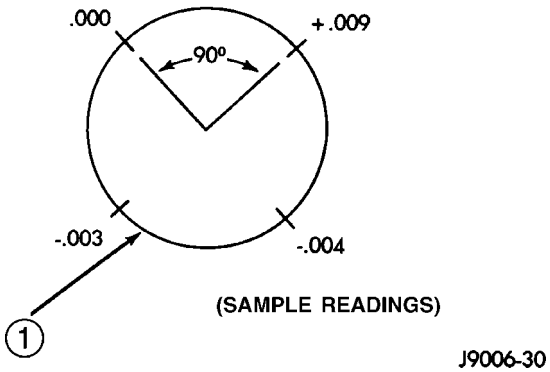


***Fig. 13 MEASUREMENT POINTS AND READINGS***

1 - CLUTCH HOUSING FACE CIRCLE (AT RIM OF BORE)

(4) Subtract lowest reading from highest to determine total runout. If low reading was **minus** 0.004 in. and highest reading was **plus** 0.009 in. the total runout is 0.013 inch.

CLUTCH HOUSING (Continued)

**NOTE: Maximum acceptable face runout is 0.010 inch.**

To correct this example (Fig. 13) the shims needed between the clutch housing and transmission are:

- 0.009 in. at the 0.000 corner
- 0.012 in. at the –0.003 corner
- 0.013 in. at the –0.004 corner

After installing the clutch assembly and housing, tighten the housing bolts nearest the alignment dowels first.

**NOTE: Shims can be made from shim stock or similar materials of the required thickness (Fig. 14).**

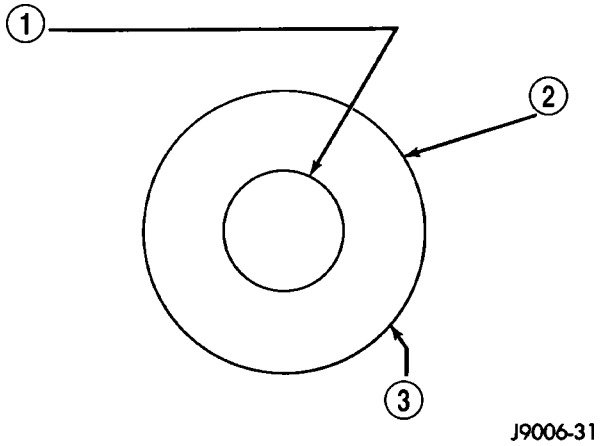


*Fig. 14 ALIGNMENT SHIMS*

1 - CUT/DRILL BOLT HOLE TO SIZE
2 - SHIM STOCK
3 - MAKE SHIM 1-INCH DIAMETER

## REMOVAL

(1) Remove transmission and transfer case (Fig. 15).

(2) Remove the starter from the clutch housing.

(3) Remove clutch housing bolts and remove housing from the engine.

## INSTALLATION

(1) Clean housing mounting surface of engine block with wax and grease remover.

(2) Verify that clutch housing alignment dowels are in good condition and properly seated.

(3) Transfer slave cylinder, release fork and boot, fork pivot stud and wire/hose brackets to new housing.

(4) Align and install clutch housing on transmission (Fig. 16). Tighten housing bolts closest to alignment dowels first and to the following torque values:

- 1/4in. diameter “A” bolts - 4.5 N·m (40 in.lb.).
- 3/8in. diameter “A” bolts - 47.5 N·m (35 ft.lb.).
- 7/16in. diameter “A” bolts - 68 N·m (50 ft.lb.).
- “B” bolts for 5.9L TD/8.0L applications - 47.5 N·m (35 ft.lb.).
- “C” bolts for 5.9L TD applications - 47.5 N·m (35 ft.lb.).

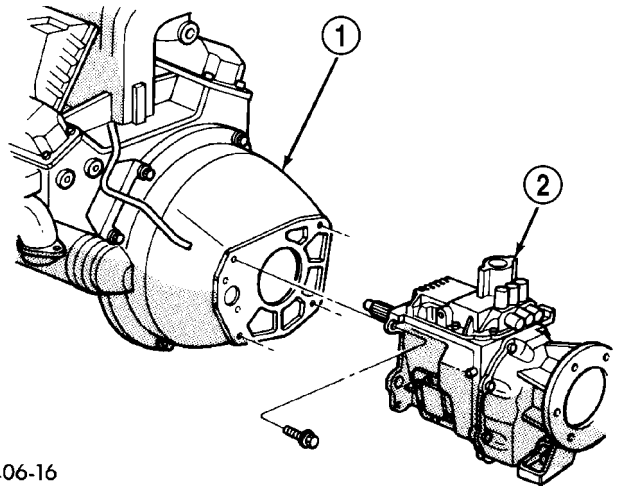


*Fig. 15 TRANSMISSION/CLUTCH HOUSING-NV4500*

1 - CLUTCH HOUSING
2 - TRANSMISSION

- “C” bolts for 8.0L applications - 74.5 N·m (55 ft.lb.).

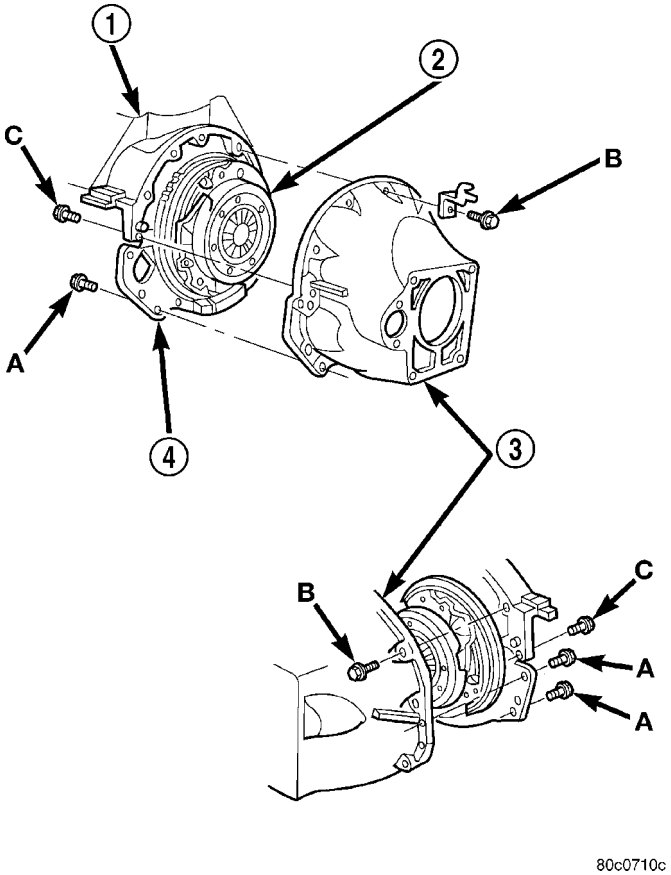


*Fig. 16 CLUTCH HOUSING INSTALLATION-NV4500*

1 - ENGINE BLOCK
2 - CLUTCH DISC AND COVER
3 - CLUTCH HOUSING
4 - DUST COVER

(5) Install the starter to the clutch housing.

CLUTCH HOUSING (Continued)

(6) Install the clutch housing dust shield to the clutch housing.

(7) Install transmission and transfer case, if equipped.

# CLUTCH RELEASE BEARING

## REMOVAL

(1) Remove transmission and transfer case, if equipped.

(2) Remove spring clip.

(3) Disconnect release bearing from release fork and remove bearing (Fig. 17).

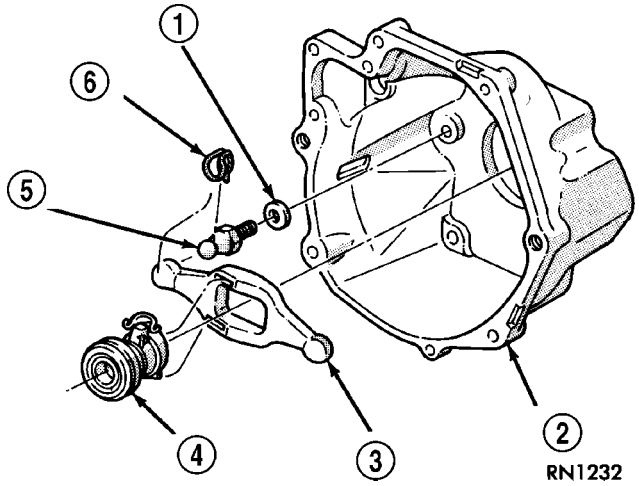


***Fig. 17 CLUTCH RELEASE COMPONENTS***

1 - CONED WASHER
2 - CLUTCH HOUSING
3 - RELEASE FORK
4 - RELEASE BEARING AND SLEEVE
5 - PIVOT 23 N·m (200 IN. LBS.)
6 - SPRING CLIP

## INSTALLATION

(1) Inspect bearing slide surface on transmission front bearing retainer. Replace retainer if slide surface is scored, worn, or cracked.

(2) Inspect release lever and pivot stud. Be sure stud is secure and in good condition. Be sure fork is not distorted or worn. Replace fork spring clips if bent or damaged.

(3) Lubricate input shaft splines, bearing retainer slide surface, lever pivot ball stud, and release lever pivot surface with Mopar® high temperature bearing grease.

(4) Install release fork and release bearing (Fig. 18). Be sure fork and bearing are properly secured by spring clips. Also be sure that the release fork is installed properly. The rear side of the release lever has one end with a raised area. This raised area goes toward the slave cylinder side of the transmission.

(5) Install clutch housing, if removed.

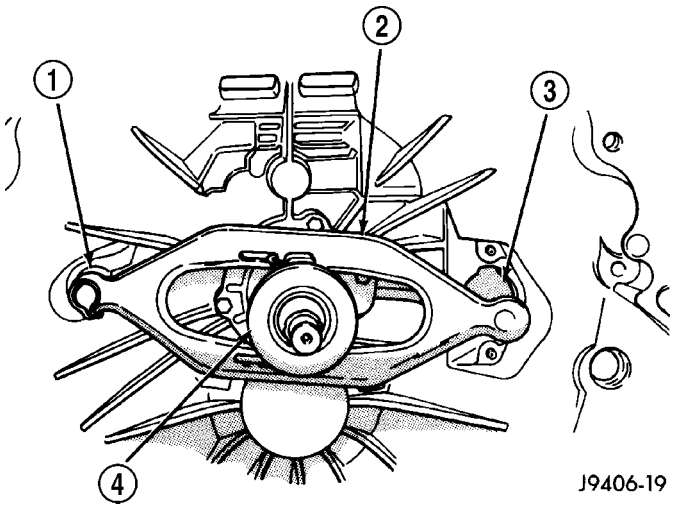


***Fig. 18 Clutch Release Fork And***

1 - PIVOT BALL
2 - FORK
3 - SLAVE CYLINDER OPENING
4 - BEARING

(6) Install transmission and transfer case.

(7) Check clutch master cylinder fluid level.

# FLYWHEEL

## DIAGNOSIS AND TESTING

Check flywheel runout whenever misalignment is suspected. Flywheel runout should not exceed 0.08 mm (0.003 in.). Measure runout at the outer edge of the flywheel face with a dial indicator. Mount the indicator on a stud installed in place of one of the flywheel bolts.

Common causes of runout are:

- heat warpage
- improper machining
- incorrect bolt tightening
- improper seating on crankshaft flange shoulder
- foreign material on crankshaft flange

Flywheel machining is not recommended. The flywheel clutch surface is machined to a unique contour and machining will negate this feature. Minor flywheel scoring can be cleaned up by hand with 180 grit emery or with surface grinding equipment. Remove only enough material to reduce scoring (approximately 0.001 - 0.003 in.). Heavy stock removal is **not recommended.** Replace the flywheel if scoring is severe and deeper than 0.076 mm (0.003 in.). Excessive stock removal can result in flywheel cracking or warpage after installation; it can also weaken the flywheel and interfere with proper clutch release.

Clean the crankshaft flange before mounting the flywheel. Dirt and grease on the flange surface may cock the flywheel causing excessive runout. Use new

FLYWHEEL (Continued)

bolts when remounting a flywheel and secure the bolts with Mopar Lock And Seal or equivalent. Tighten flywheel bolts to specified torque only. Overtightening can distort the flywheel hub causing runout.

## REMOVAL

(1) Remove transmission.
(2) Remove pressure plate and clutch.
(3) Remove flywheel bolts and remove flywheel.

## DISASSEMBLY

**NOTE: If the teeth are worn or damaged, the flywheel should be replaced as an assembly. This is the recommended repair. In cases where a new flywheel is not readily available, (V10/Diesel Engine only) a replacement ring gear can be installed. The following procedure must be observed to avoid damaging the flywheel and replacement gear.**

**WARNING: WEAR PROTECTIVE GOGGLES OR SAFETY GLASSES WHILE CUTTING RING GEAR.**

(1) Mark position of the old gear for alignment reference on the flywheel. Use a scriber for this purpose.
(2) Remove the old gear by cutting most of the way through it (at one point) with an abrasive cut-off wheel. Then complete removal with a cold chisel or punch.

## ASSEMBLY

**NOTE: The ring gear is a shrink fit on the flywheel. This means the gear must be expanded by heating in order to install it. The method of heating and expanding the 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 375° F.**

**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.**

**WARNING: WEAR PROTECTIVE GOGGLES OR SAFETY GLASSES AND HEAT RESISTENT GLOVES WHEN HANDLING A HEATED RING GEAR.**

(1) The heated gear must be installed evenly to avoid misalignment or distortion.
(2) Position and install the heated ring gear on the flywheel with a shop press and a suitable press plates.
(3) Place flywheel on work bench and let it cool in normal shop air. Allow the ring gear to cool down completely before installation it on the engine.

**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.**

## INSTALLATION

(1) Install flywheel on the crank shaft.
(2) Install flywheel bolts and tighten to 95 N·m (70 ft. lbs.).
(3) Install clutch.
(4) Install transmission.

# PILOT BEARING

## REMOVAL

(1) Remove transmission.
(2) Remove clutch disc.
(3) Use a suitable blind hole puller to remove pilot bearing.

## INSTALLATION

(1) Clean bearing bore with solvent and wipe dry with shop towel.
(2) Install new bearing with clutch alignment tool (Fig. 19). Drive bearing into place with the letter side of the bearing facing the transmission. Bearing should be flush with edge of bearing bore.

**CAUTION: Do not allow bearing to become cocked and do not recess bearing.**

PILOT BEARING (Continued)

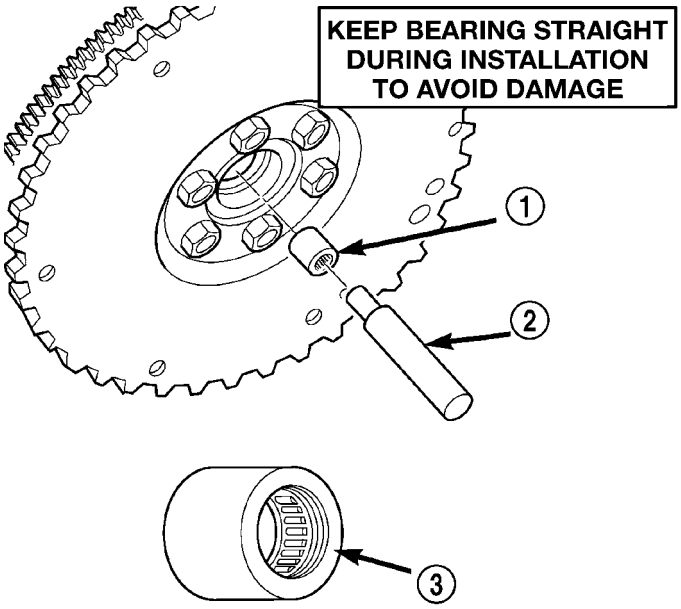


***Fig. 19 PILOT BEARING***

1 - PILOT BEARING
2 - ALIGNMENT TOOL
3 - LETTER SIDE MUST FACE TRANSMISSION

(3) Install clutch disc, pressure plate and transmission.

# LINKAGE

## REMOVAL

**CAUTION: The hydraulic linkage has a quick disconnect at the slave cylinder. This fitting should never be disconnected or tampered with. Once the hydraulic line is connected to the slave cylinder, it should never be disconnected.**

(1) Raise and support vehicle.
(2) Remove nuts attaching slave cylinder to studs on clutch housing (Fig. 20).
(3) Remove slave cylinder from clutch housing.
(4) Remove plastic clip securing the hydraulic line to the dash panel from the lower dash panel flange.
(5) Remove plastic clip securing hydraulic line to the dash panel from the upper dash panel stud.
(6) Lower vehicle.
(7) Disconnect clutch pedal interlock switch wires (Fig. 21).
(8) Remove clutch master cylinder rod pin.
(9) Verify that cap on clutch master cylinder reservoir is tight. This will avoid spillage during removal.
(10) Remove clutch master cylinder nuts holding the to the dash panel.

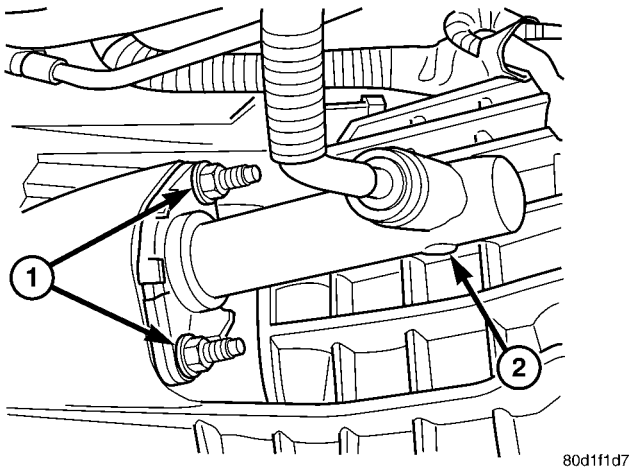


***Fig. 20 SLAVE CYLINDER***

1 - MOUNTING NUTS
2 - SLAVE CYLINDER

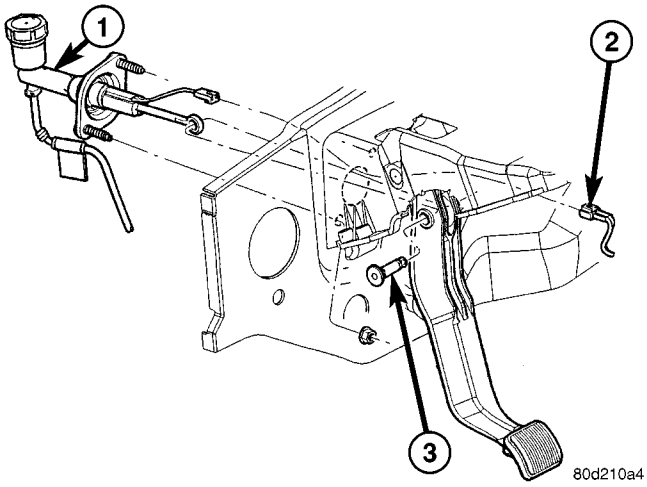


***Fig. 21 CLUTCH MASTER CYLINDER***

1 - MASTER CYLINDER
2 - INTERLOCK CONNECTOR
3 - ROD PIN

(11) Remove clutch cylinders, reservoir and connecting lines from vehicle.

## INSTALLATION

(1) Position cylinders and connecting line in vehicle engine compartment. Position clutch hydraulic line against the dash panel and behind all engine hoses and wiring.
(2) Apply a light coating of grease to the inside diameter of the master cylinder push rod eye.
(3) Install clutch master cylinder on dash panel and tighten clutch master cylinder nuts to 28 N·m (21 ft. lbs.).
(4) Install clutch master cylinder push rod pin.
(5) Connect clutch pedal position interlock switch wires.

LINKAGE (Continued)

(6) Install plastic clip securing hydraulic line to the dash panel into the lower dash panel flange.

(7) Install plastic clip securing hydraulic line to the dash panel onto the upper dash panel stud.

(8) Raise vehicle.

(9) Install slave cylinder and verify cylinder rod is properly seated in release lever.

(10) Install and tighten slave cylinder nuts to 23 N·m (17 ft. lbs.).

(11) If **new** clutch linkage is being installed, connect the clutch hydraulic line to the clutch slave cylinder.

**CAUTION: Once the clutch hydraulic line is connected to the slave cylinder, it should never be disconnected.**

(12) Lower vehicle.

(13) Operate linkage several times to verify proper operation.

# CLUTCH PEDAL POSITION SWITCH

## DESCRIPTION

A clutch pedal position (interlock) switch is mounted on the clutch master cylinder push rod (Fig. 22). The switch is actuated by clutch pedal movement.

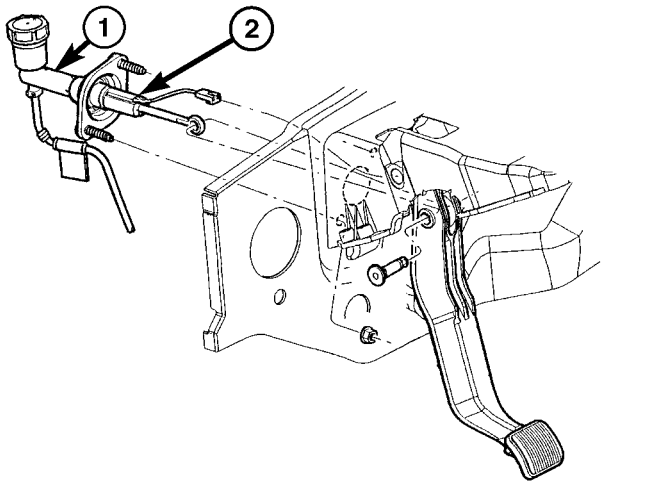


***Fig. 22 LOCATION, CLUTCH PEDAL POSITION SWITCH***

1 - CLUTCH MASTER CYLINDER
2 - CLUTCH PEDAL POSITION SWITCH

## OPERATION

The clutch pedal position switch is used to prevent starter motor engagement unless the clutch pedal is depressed.

An input from this switch is also used to either shut down and/or prevent operation of the speed control system when the clutch pedal is depressed.

The position switch is an integral part of the clutch master cylinder push rod and is not serviced separately.

## DIAGNOSIS AND TESTING

(1) Locate clutch switch 2-wire electrical connector. This will be the test point. This connector is attached to pedal support bracket located under instrument panel to left of clutch pedal (Fig. 23). Disconnect wiring at this point.

(2) Check for switch continuity with an ohmmeter while operating clutch pedal up and down. Continuity should be broken and reapplied each time pedal is pressed.

(3) If continuity is not present, or is always present at any pedal position, replace switch. Switch is not serviced separately. Replace clutch master cylinder.

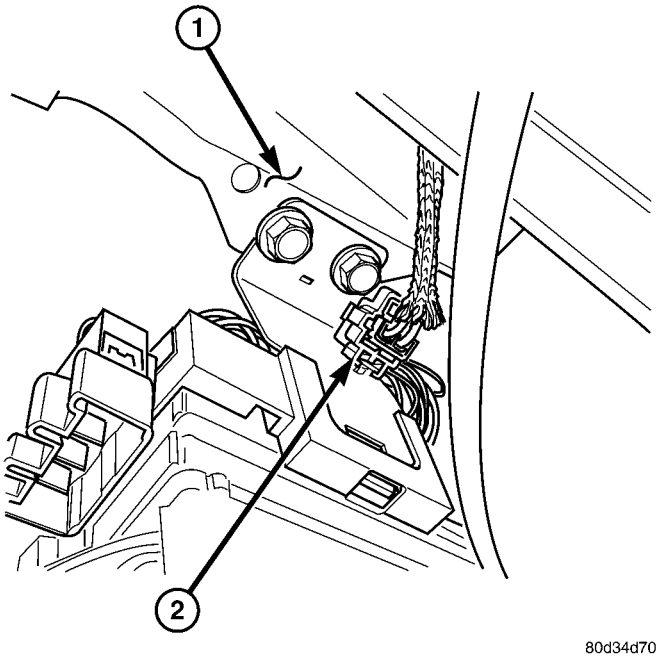


***Fig. 23 CLUTCH SWITCH TEST POINT***

1 - PEDAL SUPPORT BRACKET
2 - ELECTRICAL CONNECTOR