

CLUTCH

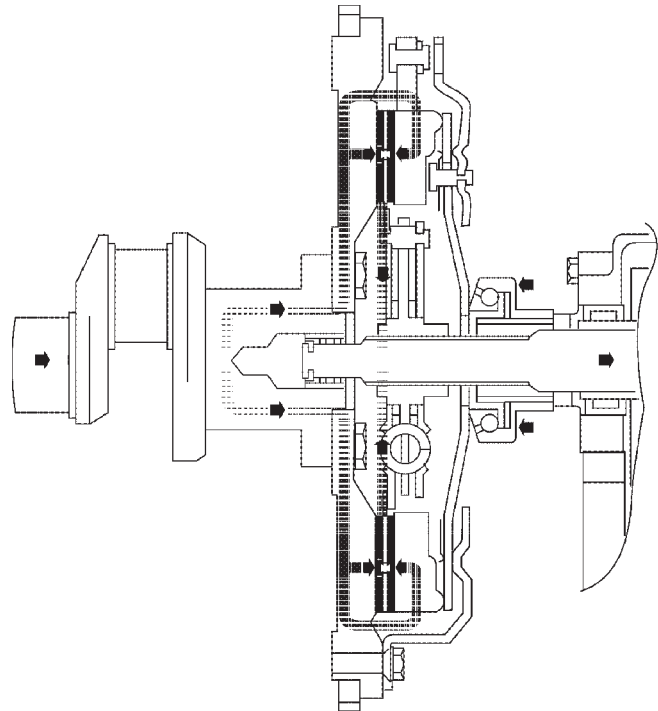
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CLUTCH

DESCRIPTION

The clutch mechanism consists of a flywheel, dry-type disc, diaphragm style pressure plate (Fig. 1) and hydraulic linkage. The flywheel is bolted to the rear flange of the crankshaft. The clutch pressure plate is bolted to the flywheel with the clutch disc between these two components. The clutch system provides the mechanical, link between the engine and the transmission. The system is designed to transfer the torque output of the engine, to the transmission while isolating the transmission from the engine firing pulses to minimize concerns such as gear rattle.



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Fig. 1 ENGINE POWERFLOW

CLUTCH (Continued)

OPERATION

When the clutch pedal is depressed, it actuates the clutch master cylinder. This sends hydraulic pressure to the clutch slave cylinder. The release fork is then actuated by the slave cylinder mounted on the transmission housing. The release fork pivots on a ball stud mounted in the transmission housing and pushes the release bearing. The release bearing then depresses the pressure plate spring fingers, thereby releasing pressure on the clutch disc and allowing the engine crankshaft to spin independently of the transmission input shaft (Fig. 2).

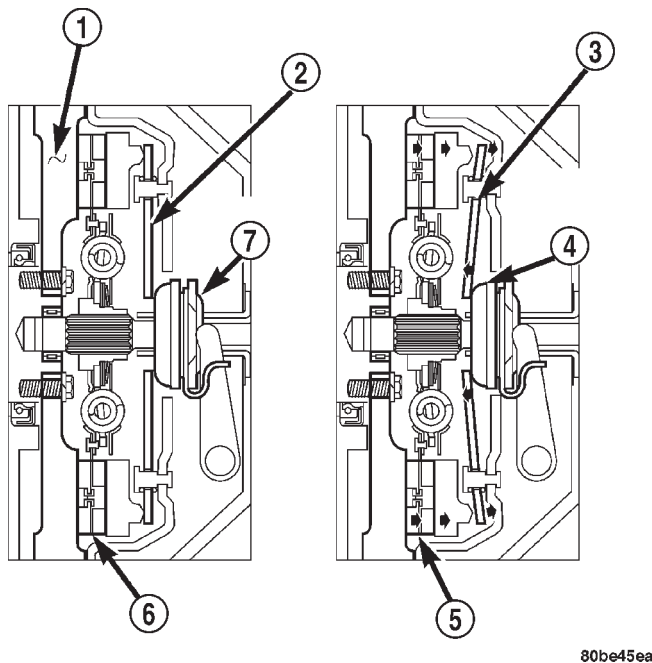


Fig. 2 CLUTCH OPERATION

- 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 - CLUTCH

A road test and component inspection (Fig. 3) 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.

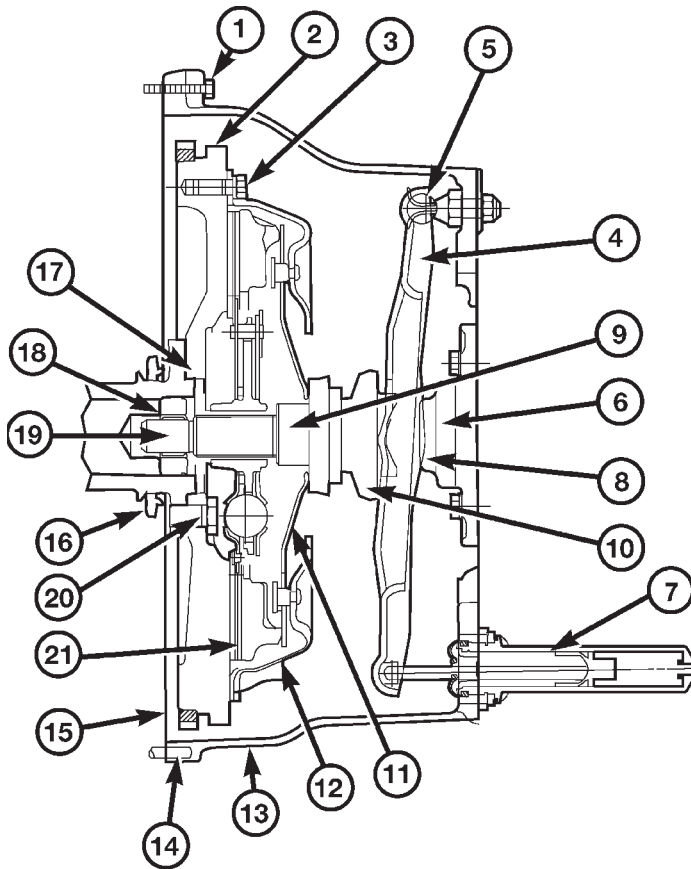
During inspection, note if any components are contaminated with oil, hydraulic fluid or water/road splash.

Oil contamination indicates a leak at either the rear main seal or transmission input shaft. Oil leakage produces a residue of oil on the housing interior and on the clutch cover and flywheel. Heat buildup caused by slippage between the cover, disc and flywheel, can sometimes bake the oil residue onto the components. The glaze-like residue ranges in color from amber to black.

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

Clutch fluid leaks are usually from damaged slave cylinder push rod seals.

CLUTCH (Continued)



1 Check clutch housing bolts. Tighten if loose. Be sure housing is fully seated on engine block.

2 Check flywheel. Scuff sand face to remove glaze. Clean surface with wax and grease remover. Replace flywheel if severely scored, worn or cracked. Secure flywheel with new bolts (if removed). Do not reuse old bolts. Use Mopar Lock N'Seal on bolts.

3 Tighten clutch cover bolts 2-3 threads at a time, alternately and evenly (in a star pattern) to specified torque. Failure to do so could warp the cover.

4 Check release fork. Replace fork if bent or worn. Make sure pivot and bearing contact surfaces are lubricated.

5 Check release fork pivot (in housing). Be sure pivot is secure and ball end is lubricated.

6 Transmission input shaft bearing will cause noise, chatter, or improper release if damaged. Check condition before installing transmission.

7 Check slave cylinder. Replace it if leaking. Be sure cylinder is properly secured in housing and cylinder piston is seated in release fork.

8 Check input shaft seal if clutch cover and disc were oil covered. Replace seal if worn, or cut.

9 Inspect release bearing slide surface of trans. front bearing retainer. Surface should be smooth, free of nicks, scores. Replace retainer if necessary. Lubricate slide surface before installing release bearing.

10 Do not replace release bearing unless actually faulty. Replace bearing only if seized, noisy, or damaged.

11 Check clutch cover diaphragm spring and release fingers. Replace cover if spring or fingers are bent, warped, broken, cracked. Do not tamper with factory spring setting as clutch problems will result.

12 Check condition of clutch cover. Replace clutch cover if plate surface is deeply scored, warped, worn, or cracked. Be sure cover is correct size and properly aligned on disc and flywheel.

13 Inspect clutch housing. Be sure bolts are tight. Replace housing if damaged.

14 Verify that housing alignment dowels are in position before installing housing.

15 Clean engine block surface before installing clutch housing. Dirt, grime can produce misalignment.

16 Check rear main seal if clutch disc and cover were oil covered. Replace seal if necessary.

17 Check crankshaft flange (if flywheel is removed). Be sure flange is clean and flywheel bolt threads are in good condition.

18 Check pilot bearing. Replace bearing if damaged. Lube with Mopar high temp. bearing grease before installation.

19 Check transmission input shaft. Disc must slide freely on shaft splines. Lightly grease splines before installation. Replace shaft if splines or pilot bearing hub are damaged.

20 Check flywheel bolt torque. If bolts are loose, replace them. Use Mopar Lock N'Seal to secure new bolts.

21 Check clutch disc facing. Replace disc if facing is charred, scored, flaking off, or worn. Also check runout of new disc. Runout should not exceed 0.5 mm (0.02 in.).

Fig. 3 CLUTCH COMPONENTS AND INSPECTION

CLUTCH (Continued)

IMPROPER RELEASE OR CLUTCH ENGAGEMENT

Clutch release or engagement problems are caused by wear or damage to one or more clutch components. A visual inspection of the release components will usually reveal the problem part.

Release problems can result in hard shifting and noise. Items to look for are: leaks at the clutch cylinders and interconnecting line; loose slave cylinder bolts; worn/loose release fork and pivot stud; damaged release bearing; and a worn clutch disc, or pressure plate.

Normal condensation in vehicles that are stored or out of service for long periods of time can generate enough corrosion to make the disc stick to the flywheel, or pressure plate. If this condition is experienced, correction only requires that the disc be loosened manually through the inspection plate opening.

Engagement problems usually result in slip, chatter/shudder, and noisy operation. The primary causes are clutch disc contamination; clutch disc wear; misalignment, or distortion; flywheel damage; or a combination of the foregoing. A visual inspection is required to determine the part actually causing 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 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.

DIAGNOSIS CHART

The clutch inspection chart (Fig. 3) outlines items to be checked before and during clutch installation. Use the chart as a check list to help avoid overlooking potential problem sources during service operations.

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. 2. Driver frequently rides (slips) the clutch. Results in rapid overheating and wear. 3. Insufficient clutch cover diaphragm spring tension.	1. Replace cover and disc. 2. Replace cover and disc. 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. 2. Excessive amount of grease applied to the input shaft splines. 3. Road splash, water entering housing. 4. Slave cylinder leaking.	1. Replace appropriate seal. 2. Remove grease and apply the correct amount of grease. 3. Replace clutch disc. Clean clutch cover and reuse if in good condition. 4. Replace hydraulic clutch linkage.

CLUTCH (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
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.
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. 2. Improper bolt tightening procedure.	1. Replace disc or cover as necessary. 2. Tighten clutch cover using proper procedure.
Facing on flywheel side of disc torn, gouged, or worn.	1. Flywheel surface scored or nicked. 2. Clutch disc sticking or binding on transmission input shaft.	1. Correct surface condition if possible. Replace flywheel and disc as necessary. 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. 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. 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. 2. Input shaft splines rough, damaged, or corroded.	1. Clean, smooth, and lubricate hub splines if possible. Replace disc if necessary. 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 and 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. 2. Bearing defective. 3. Bearing not lubricated. 4. Clutch misalignment.	1. Install and lubricate a new bearing. 2. Install and lubricate a new bearing. 3. Install and lubricate a new bearing. 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 clutch fluid level. 2. Clutch cover loose. 3. Clutch disc bent or distorted. 4. Clutch cover diaphragm spring bent or warped. 5. Clutch disc installed backwards. 6. Release fork bent or fork pivot loose or damaged. 7. Clutch master or slave cylinder failure.	1. Add Fluid / Replace hydraulic linkage assembly. 2. Follow proper bolt tightening procedure. 3. Replace clutch disc. 4. Replace clutch cover. 5. Remove and install clutch disc correctly. 6. Replace fork or pivot as necessary. 7. Replace hydraulic linkage assembly.
Clutch pedal squeak.	1. Pivot pin loose. 2. Master cylinder bushing not lubricated. 3. Pedal bushings worn out or cracked.	1. Tighten pivot pin if possible. Replace clutch pedal if necessary. 2. Lubricate master cylinder bushing. 3. Replace and lubricate bushings.
Clutch master or slave cylinder plunger dragging and/or 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. 2. Release bearing defective or damaged. 3. Release bearing misaligned.	1. Replace clutch cover and release bearing. 2. Replace the release bearing. 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. 2. Clutch cover, spring, or release fingers bent or distorted. 3. Clutch disc damaged or distorted. 4. Clutch misalignment.	1. Replace clutch disc and cover. 2. Replace clutch disc and cover. 3. Replace clutch disc. 4. Check alignment and runout of flywheel, disc, pressure plate, and/or clutch housing. Correct as necessary.

CLUTCH (Continued)

SPECIFICATIONS - CLUTCH

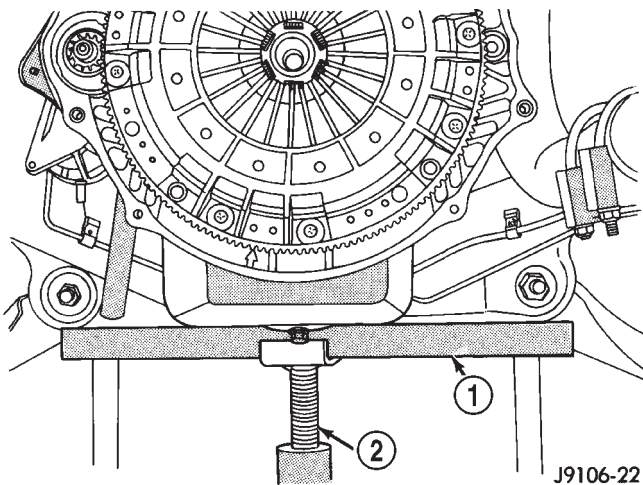
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Nut, slave cylinder	19-26	14-19	170-230
Bolt, clutch cover-5/16 in.	23	17	-
Bolt, clutch cover-3/8 in.	41	30	-
Pivot, release bearing	23	17	-
Screw, fluid reservoir	5	-	40

CLUTCH DISC

REMOVAL

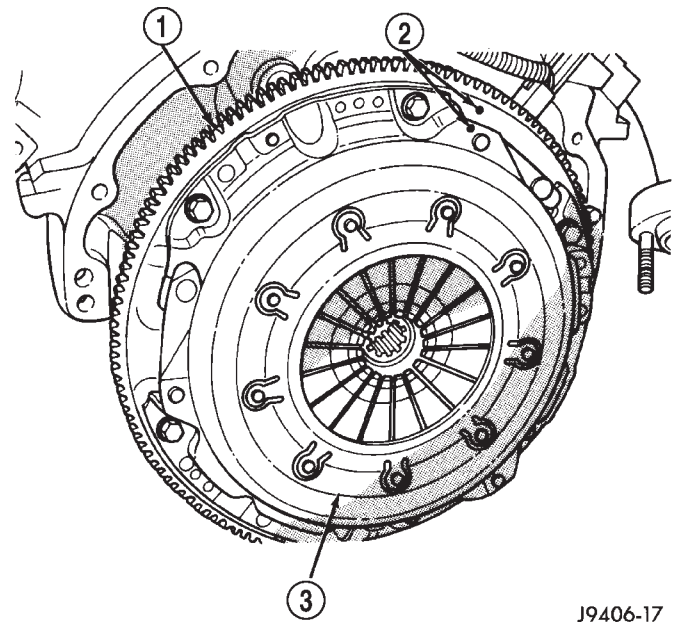
- (1) Raise and support vehicle.
- (2) Support engine with wood block and adjustable jack stand, so engine mounts are not strained (Fig. 4).

**Fig. 4 Supporting Engine -Diesel Model Shown**

- 1 - WOOD BLOCK
- 2 - ADJUSTABLE JACK STAND

(3) Remove transmission and transfer case, if equipped. Refer to 21 Transmission and Transfer Case for procedures.

- (4) If pressure plate will be reused, mark position of cover on flywheel with paint or scribe (Fig. 5).

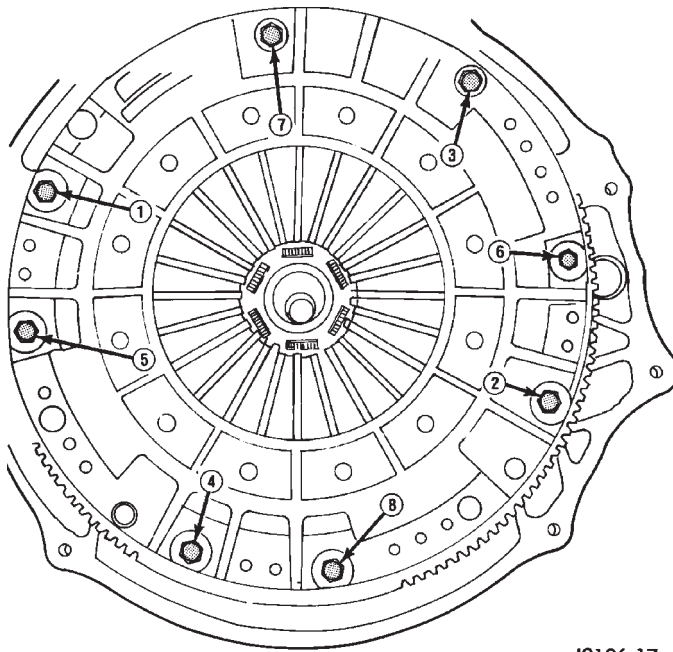
**Fig. 5 Marking Pressure Plate Position**

- 1 - FLYWHEEL
- 2 - ALIGNMENT MARKS
- 3 - PRESSURE PLATE

- (5) Insert clutch alignment tool through clutch disc and into pilot bushing, to hold disc in place.

CLUTCH DISC (Continued)

(6) If pressure plate will be reused, loosen cover bolts evenly only few threads at a time in a diagonal pattern (Fig. 6). This relieves cover spring tension evenly to avoid warping.



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Fig. 6 Bolt Loosening/Tightening Pattern

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

INSTALLATION

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

(2) Insert clutch alignment tool in pressure plate and clutch disc.

(3) Insert alignment tool in pilot bearing and position plate and disc on flywheel (Fig. 7).

NOTE: Raised side of disc hub faces away from the flywheel.

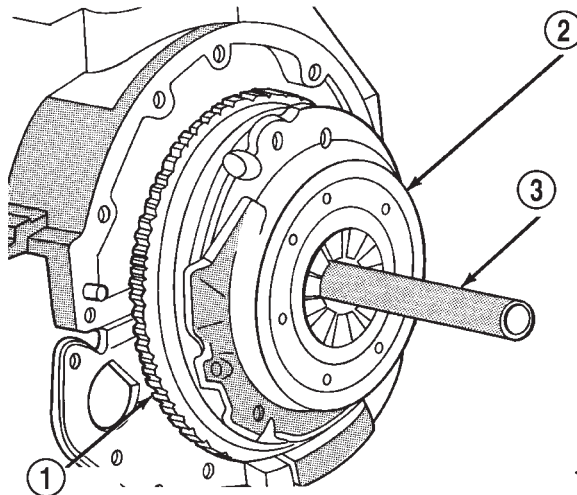
(4) Install cover bolts finger tight.

(5) Tighten cover bolts evenly and a few threads at a time.

CAUTION: Cover bolts must be tightened evenly to avoid distorting cover.

(6) Tighten clutch cover bolts to:

- 5/16 in. diameter bolts to 23 N·m (17 ft. lbs.).
- 3/8 in. diameter bolts to 41 N·m (30 ft. lbs.).



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Fig. 7 Pressure Plate And Disc Alignment

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

(7) Remove release lever and release bearing from clutch housing. Apply Mopar high temperature bearing grease or equivalent to bore of release bearing, release lever contact surfaces and release lever pivot stud (Fig. 8).

(8) Apply light coat of Mopar high temperature bearing grease or equivalent to splines of transmission input shaft (or drive gear) and to release bearing slide surface of the transmission front bearing retainer (Fig. 9).

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

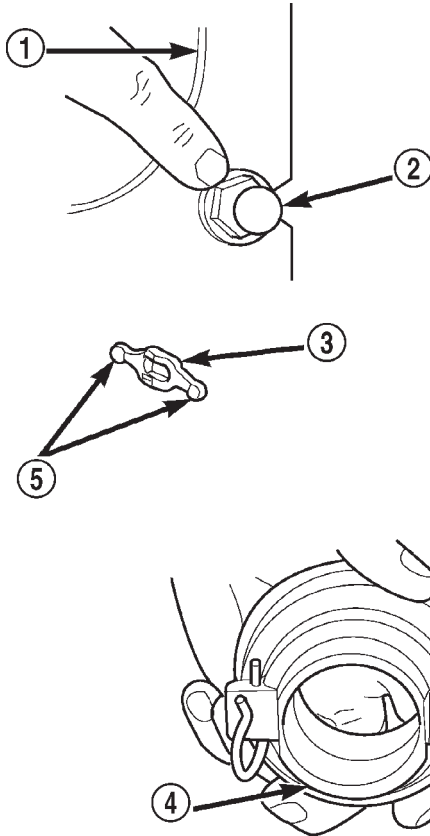
(9) Install release lever and bearing in clutch housing. Be sure spring clips that retain fork on pivot ball and release bearing on fork are secure (Fig. 10). Also verify that the release lever is installed properly.

NOTE: Release lever is installed correctly, when lever part number is toward the bottom of the transmission. Also a stamped "I" in the lever goes towards the pivot ball side of the transmission.

(10) Install transmission. Refer to 21 Transmission and Transfer Case for procedures.

(11) Check fluid level in clutch master cylinder.

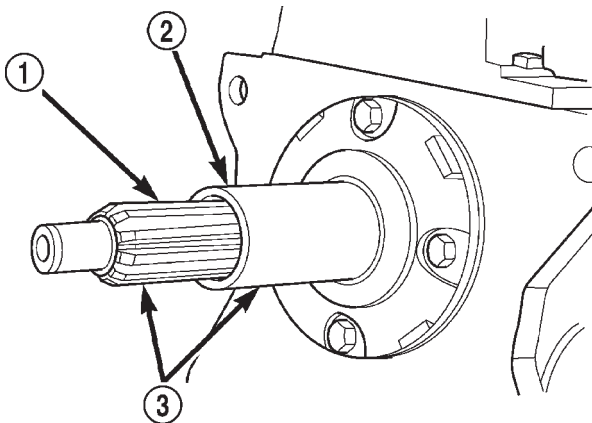
CLUTCH DISC (Continued)



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Fig. 8 Clutch Release Component Lubrication Points

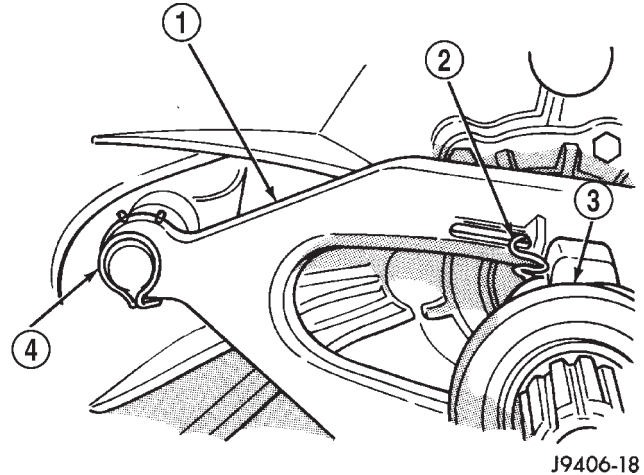
- 1 - CLUTCH HOUSING
- 2 - RELEASE FORK PIVOT BALL STUD
- 3 - RELEASE FORK
- 4 - RELEASE BEARING BORE
- 5 - LUBE POINTS (HIGH TEMP. GREASE)



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Fig. 9 Lubrication Points

- 1 - INPUT SHAFT
- 2 - BEARING RETAINER
- 3 - LUBRICATION POINTS



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Fig. 10 Release Fork And Bearing Spring Clip Position

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

CLUTCH HOUSING

DIAGNOSIS AND TESTING - CLUTCH HOUSING

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

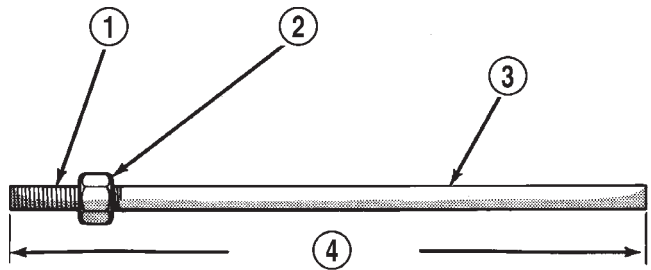
CAUTION: On diesel engines if housing bore runout exceeds 0.015 inch, the clutch housing/transmission adapter plate must be replaced. On gas engines if housing bore runout exceeds 0.053 in. the clutch housing must be replaced.

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 and strut.
- (2) Remove the clutch cover and disc.

CLUTCH HOUSING (Continued)

(3) Replace one of the flywheel bolts with an appropriate size threaded rod that is 10 in. (25.4 cm) long (Fig. 11). The rod will be used to mount the dial indicator.

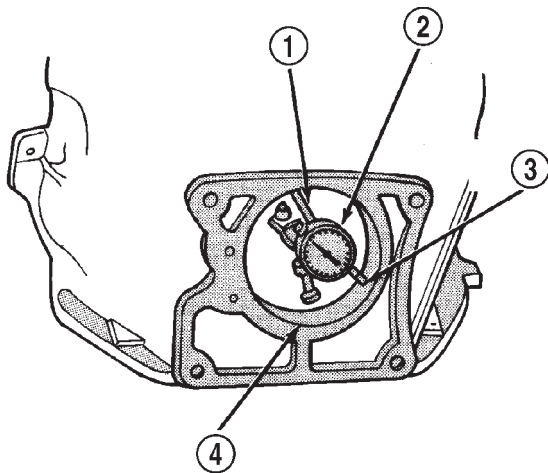


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Fig. 11 Dial Indicator Mounting Stud Or Rod

- 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. 12).



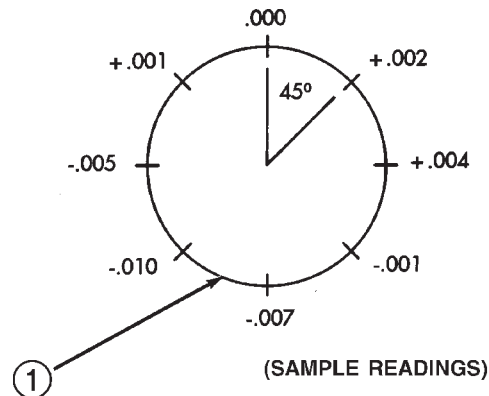
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Fig. 12 CLUTCH HOUSING BORE RUNOUT

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

(7) Rotate crankshaft until indicator plunger is at the top of 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. 13). Take measurement at least twice for accuracy.



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Fig. 13 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. 13):

- $0.000 - (-0.007) = 0.007$ 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. 14).

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. 15) with indicator plunger on the rim of the housing bore.

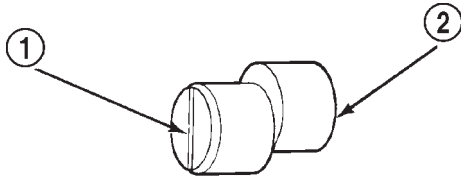
(2) Rotate crankshaft until indicator plunger is at the 10 O'clock position and zero the dial indicator.

(3) Measure and record face runout readings at four points 90° apart (Fig. 16). Take measurement at least twice for accuracy.

(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.

NOTE: Maximum acceptable face runout is 0.010 inch.

CLUTCH HOUSING (Continued)



DOWEL SELECTION

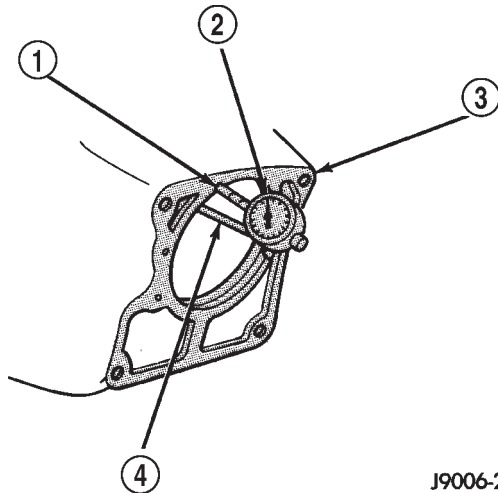
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Fig. 14 Housing Bore Alignment Dowel Selection

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



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Fig. 15 DIAL INDICATOR LOCATION

1 - INDICATOR PLUNGER

2 - DIAL INDICATOR

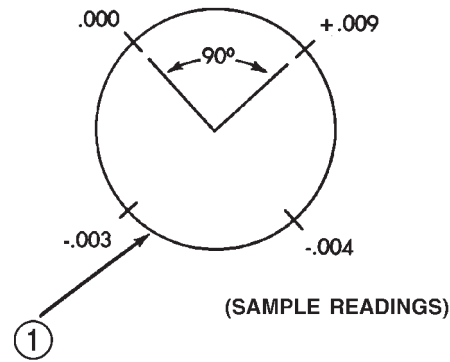
3 - CLUTCH HOUSING FACE

4 - INDICATOR MOUNTING STUD OR ROD

To correct this example (Fig. 16) 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.

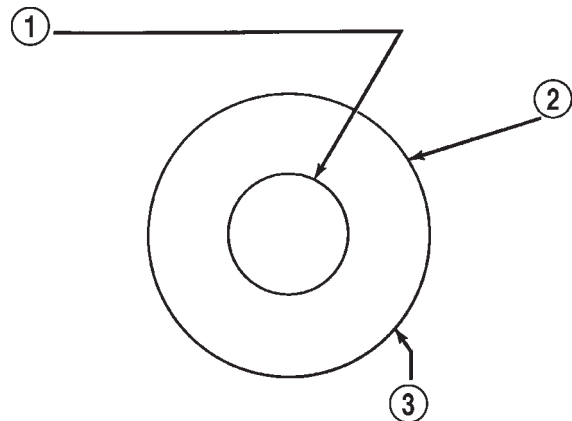


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Fig. 16 MEASUREMENT POINTS AND READINGS

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

NOTE: Shims can be made from shim stock or similar materials of the required thickness (Fig. 17).



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Fig. 17 ALIGNMENT SHIMS

1 - CUT/DRILL BOLT HOLE TO SIZE

2 - SHIM STOCK

3 - MAKE SHIM 1-INCH DIAMETER

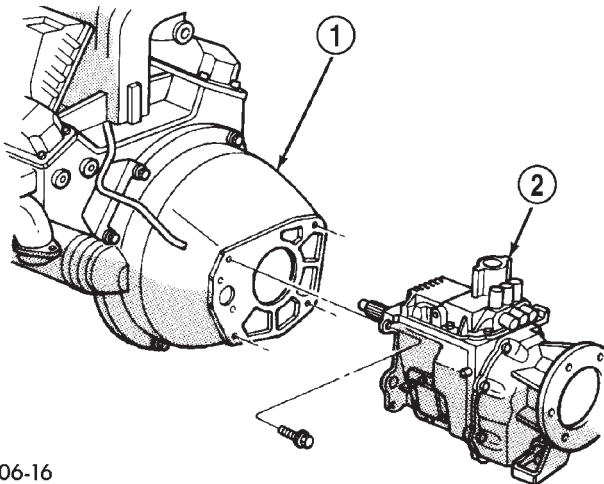
REMOVAL

- (1) Raise and support vehicle.
- (2) Remove transmission and transfer case, if equipped. Refer to 21 Transmission and Transfer Case for proper procedures.
- (3) Remove the starter from the clutch housing.
- (4) Remove the clutch housing dust shield from the clutch housing.
- (5) Remove clutch housing bolts and remove housing from engine (Fig. 18) and (Fig. 19).

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.

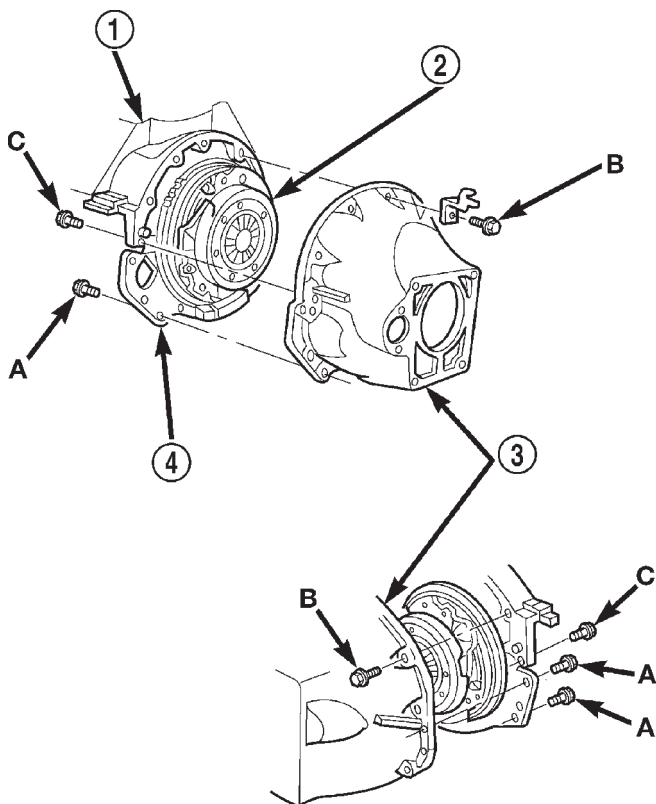
CLUTCH HOUSING (Continued)



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Fig. 18 Transmission/Clutch Housing - NV4500

- 1 - CLUTCH HOUSING
2 - TRANSMISSION



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Fig. 19 Clutch Housing Installation - NV4500

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

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

(4) Lubricate release fork and pivot contact surfaces with Mopar High Temperature wheel bearing grease or equivalent before installation.

(5) Align and install clutch housing on transmission (Fig. 19). 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 5.2L/5.9L applications - 41 N·m (30 ft.lb.).
- "B" bolts for 5.9L TD/8.0L applications - 47.5 N·m (35 ft.lb.).
- "C" bolts for 5.2/5.9L applications - 68 N·m (50 ft.lb.).
- "C" bolts for 5.9L TD applications - 47.5 N·m (35 ft.lb.).
- "C" bolts for 8.0L applications - 74.5 N·m (55 ft.lb.).

(6) Install transmission-to-engine strut after installing clutch housing. Tighten bolt attaching strut to clutch housing first and engine bolt last.

(7) Install the starter to the clutch housing.

(8) Install the clutch housing dust shield to the clutch housing. Tighten the bolts to

(9) Install transmission and transfer case, if equipped. Refer to 21Transmission and Transfer Case for proper procedures.

CLUTCH RELEASE BEARING

REMOVAL

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

(2) Remove clutch housing, for NV4500 equipped vehicles.

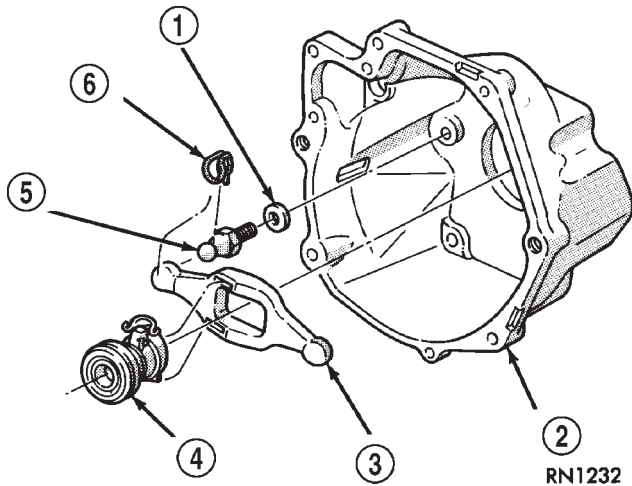
(3) Disconnect release bearing from release fork and remove bearing (Fig. 20).

INSTALLATION

NOTE: Inspect bearing slide surface on transmission front bearing retainer. Replace retainer if slide surface is scored, worn or cracked. 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.

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

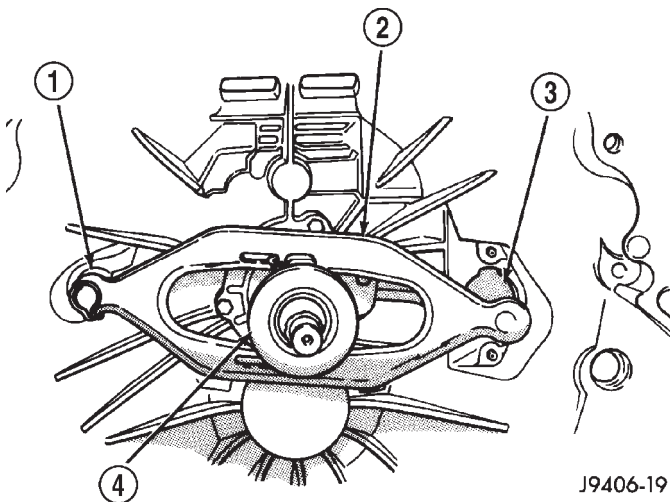
CLUTCH RELEASE BEARING (Continued)

**Fig. 20 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

(2) Install release fork and release bearing (Fig. 21) and verify fork and bearing are secured by spring clips. Also be sure that the release fork is installed properly.

NOTE: 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.

**Fig. 21 Clutch Release Fork**

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

(3) Install clutch housing, if removed.

(4) Install transmission and transfer case, if equipped. Refer to 21 Transmission and Transfer Case for procedures.

FLYWHEEL

DIAGNOSIS AND TESTING - FLYWHEEL

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

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.

FLYWHEEL (Continued)

(1) Mark position of the old gear for alignment reference on the flywheel. Use a scribe 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.

PILOT BEARING

REMOVAL

(1) Remove transmission, transfer case, if equipped and clutch housing. Refer to 21 Transmission and Transfer Case for procedures.

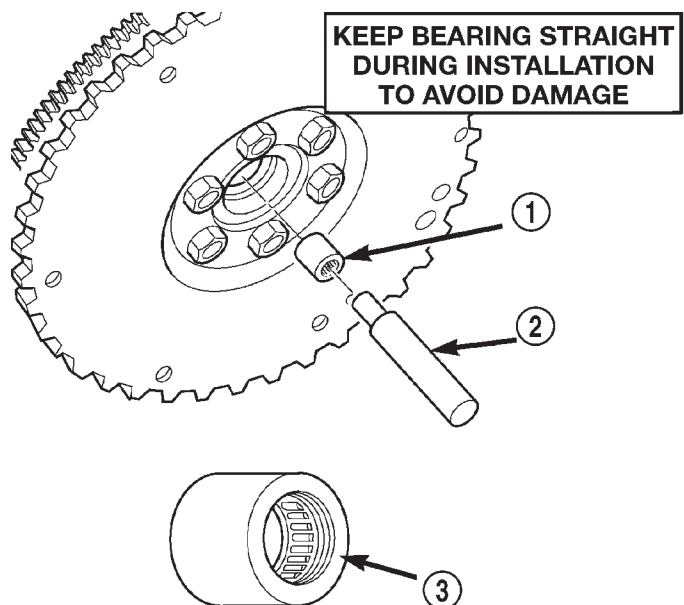
(2) Remove pressure plate and disc.

(3) Using 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. 22). Keep bearing straight and tap bearing into place until flush with edge of bearing bore. Do not recess bearing.



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Fig. 22 Installing Pilot Bearing

1 - PILOT BEARING

2 - ALIGNMENT TOOL

3 - LETTER SIDE MUST FACE TRANSMISSION

(3) Install clutch cover and disc.

(4) Install clutch housing, transmission and transfer case, if equipped. Refer to 21 Transmission and Transfer Case for procedures.

CLUTCH PEDAL

REMOVAL

- (1) Remove knee bolster for access to pedal pivot shaft.
- (2) Remove brake lamp switch.
- (3) Remove retaining clips that secure the brake and clutch pedals to the push rods (Fig. 23).

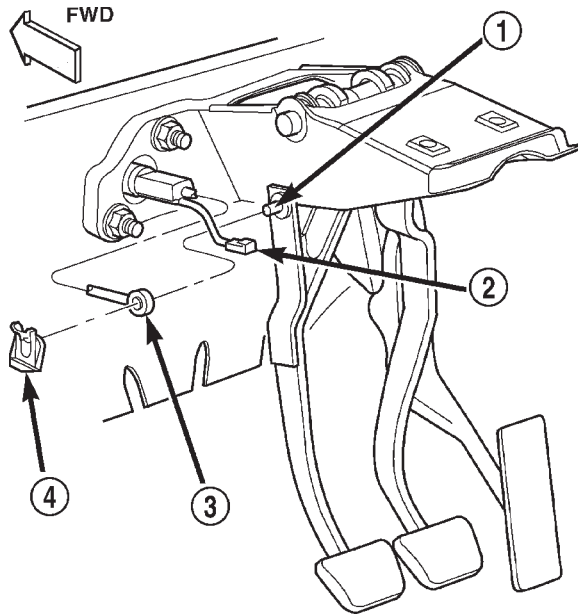


Fig. 23 Clutch Cylinder And Push Rod

- 1 - PIN
- 2 - CLUTCH INTERLOCK WIRE
- 3 - PUSH ROD
- 4 - CLIP

(4) Remove the brake and clutch master cylinder pushrods from the pedals.

(5) Remove retainer from passenger side of pedal pivot shaft (Fig. 24).

(6) Push pedal pivot shaft toward driver side of support only enough to remove clutch pedal. It is not necessary to remove shaft from pedal support entirely.

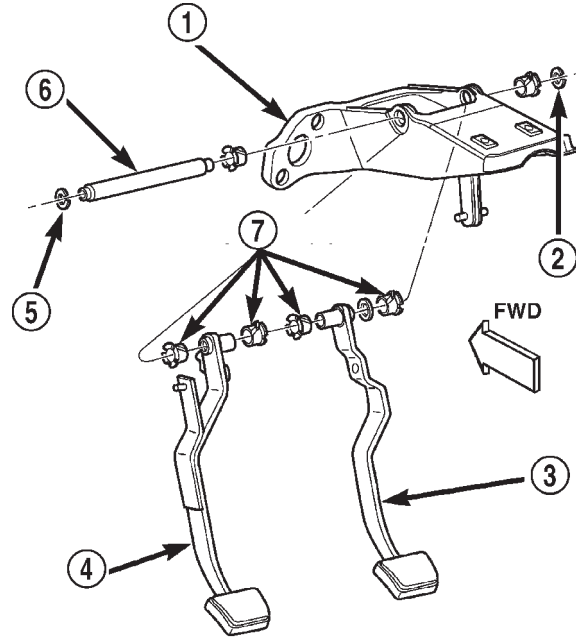
(7) Remove clutch pedal.

INSTALLATION

Inspect bushings in clutch and brake pedals (Fig. 24). Replace bushings if worn, cracked, or distorted.

(1) Lubricate pedal shaft, pedal shaft bore (Fig. 24) and all bushings with Mopar Multi Mileage or high temperature bearing grease.

(2) Position clutch pedal in support. Align pedal with pivot shaft and slide shaft through pedal bushings. Then repeat process for brake pedal.



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Fig. 24 Clutch/Brake Pedal Mounting

- 1 - PEDAL SUPPORT
- 2 - SHAFT RETAINER
- 3 - BRAKE PEDAL
- 4 - CLUTCH PEDAL
- 5 - SHAFT RETAINER
- 6 - PEDAL PIVOT SHAFT
- 7 - BUSHINGS

(3) Slide pedal shaft through support and install shaft retainer.

(4) Secure push rods to clutch and brake pedals.

(5) Install brake lamp switch in bracket.

(6) Install knee bolster.

LINKAGE

REMOVAL

NOTE: The factory installed hydraulic linkage has a quick disconnect at the slave cylinder. This fitting should not be disconnected, the hydraulic linkage is serviced as an assembly only, but it comes as two pieces to ease installation. Once the clutch hydraulic line is connected to the slave cylinder, it should not be disconnected.

(1) Raise and support vehicle.

(2) Remove nuts attaching slave cylinder to studs on clutch housing (Fig. 25).

(3) Remove slave cylinder from clutch housing.

(4) Remove the plastic clip securing the hydraulic line to the dash panel from the lower dash panel flange.

LINKAGE (Continued)

(5) Remove the plastic clip securing the hydraulic line to the dash panel from the upper dash panel stud.

(6) Lower vehicle.

(7) Disconnect clutch pedal interlock switch wires.

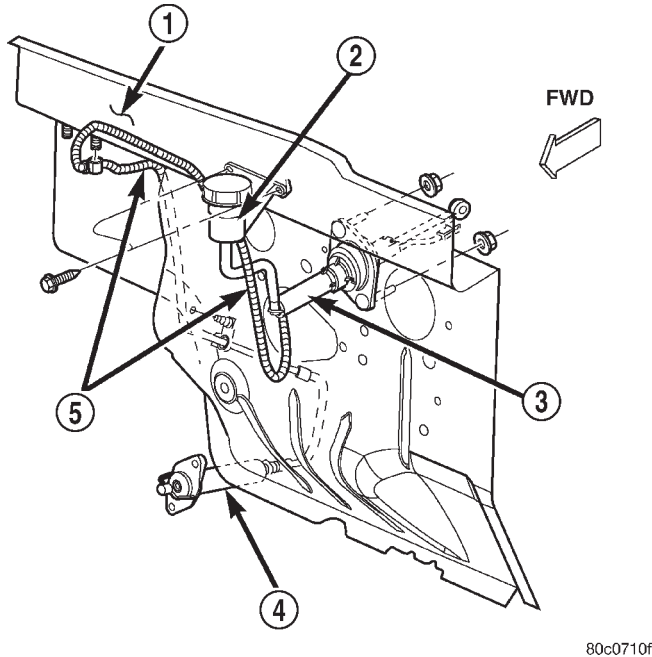


Fig. 25 Hydraulic Clutch Linkage

- 1 - DASH PANEL
- 2 - CYLINDER RESERVOIR
- 3 - CLUTCH MASTER CYLINDER
- 4 - SLAVE CYLINDER
- 5 - CLUTCH HYDRAULIC LINE

(8) Remove retaining clip (Fig. 26).

(9) Slide clutch master cylinder push rod off pedal pin.

(10) Inspect condition of bushing in the clutch master cylinder pushrod (Fig. 26). Replace the clutch hydraulic linkage if bushing is worn or damaged.

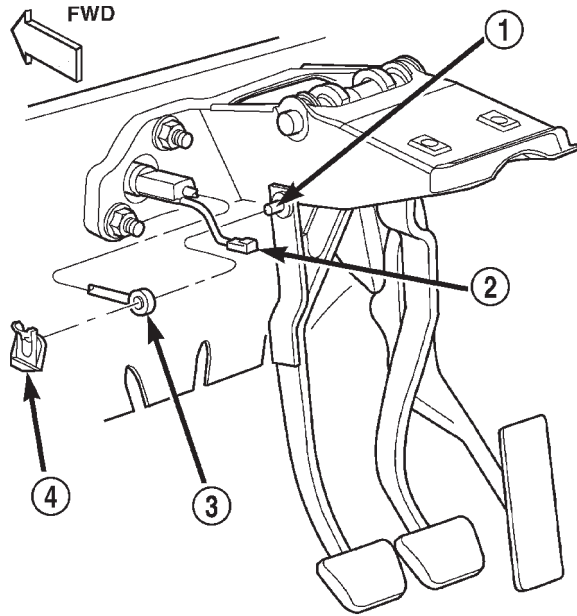
(11) Verify that cap on clutch master cylinder reservoir is tight. This will avoid spillage during removal.

(12) Remove the nuts holding the clutch master cylinder to the dash panel.

(13) Remove screws that attach clutch fluid reservoir to dash panel.

(14) Remove the clutch master cylinder from the dash panel.

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



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Fig. 26 Clutch Cylinder Push Rod Attachment

- 1 - PIN
- 2 - CLUTCH INTERLOCK WIRE
- 3 - PUSH ROD
- 4 - CLIP

INSTALLATION

NOTE: The factory installed hydraulic linkage has a quick disconnect at the slave cylinder, this fitting should not be disconnected. The hydraulic linkage is serviced as an assembly only, but it comes as two pieces to ease installation. Once the clutch hydraulic line is connected to the slave cylinder, it should not be disconnected.

(1) Tighten cap on clutch fluid reservoir to avoid spillage during installation.

(2) Position cylinders, connecting lines and reservoir in vehicle engine compartment. Locate the clutch hydraulic line against the dash panel and behind all engine hoses and wiring.

(3) Insert clutch master cylinder in dash panel. Install and tighten the nuts to hold the clutch master cylinder to the dash panel.

(4) Apply a light coating of grease to the inside and outside diameter of the master cylinder bushing.

(5) Install clutch master cylinder push rod on clutch pedal pin. Secure rod with retaining clip.

(6) Connect clutch pedal position (interlock) switch wires.

LINKAGE (Continued)

(7) Position clutch fluid reservoir on dash panel and install reservoir screws. Tighten screws to 5 N·m (40 in. lbs.).

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

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

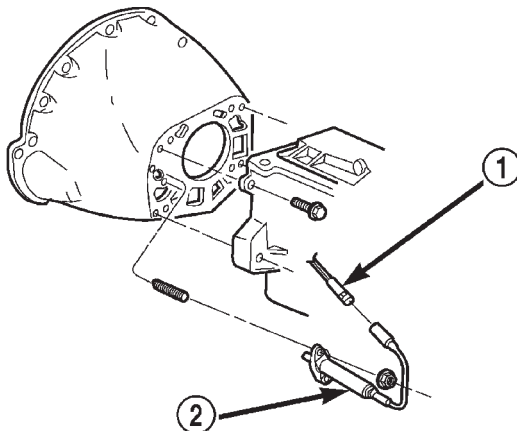
(10) Raise vehicle.

(11) Install slave cylinder. Be sure cap at end of cylinder rod is seated in release lever. Check this before installing cylinder attaching nuts.

NOTE: If new linkage is being installed, do not remove the plastic shipping strap from slave cylinder push rod. The shipping strap will break on its own upon the first clutch application.

(12) Install and tighten slave cylinder attaching nuts to 23 N·m (200 in. lbs.).

(13) If a new clutch linkage is being installed, connect the clutch hydraulic line (Fig. 27) to the clutch slave cylinder.



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Fig. 27 Clutch Slave Cylinder

- 1 - CLUTCH HYDRAULIC LINE
- 2 - CLUTCH SLAVE CYLINDER

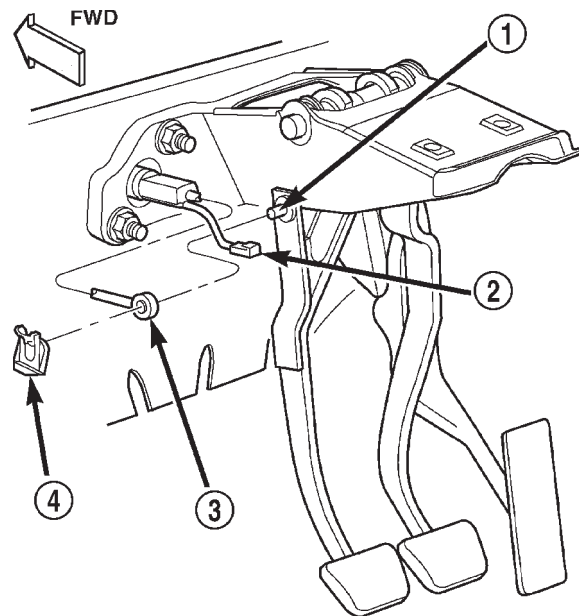
(14) Lower vehicle.

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

CLUTCH PEDAL POSITION SWITCH

DESCRIPTION

A clutch pedal position (interlock) switch is in the starter relay circuit and is mounted on the clutch master cylinder push rod (Fig. 28). The switch is actuated by clutch pedal movement.



80c07122

Fig. 28 Clutch Pedal Position (Interlock) Switch

- 1 - PIN
- 2 - CLUTCH INTERLOCK WIRE
- 3 - PUSH ROD
- 4 - CLIP

OPERATION

The switch, which is in circuit with the starter solenoid, requires that the clutch pedal be fully depressed in order to start the engine. Switch circuitry and operation is provided in section 8W of Group 8.

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

