

# CLUTCH

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## GENERAL INFORMATION

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### CLUTCH COMPONENTS

The clutch mechanism in XJ/YJ models consists of a single, dry-type disc and a diaphragm style clutch cover. A hydraulic linkage is used to operate the clutch release bearing and fork.

A needle-type pilot bearing supports the transmission input shaft in the crankshaft. A sleeve type release bearing is used to engage and disengage the clutch cover pressure plate.

The release bearing is operated by a release fork in the clutch housing. The fork pivots on a ball stud mounted in the housing. The release fork is actuated by a hydraulic slave cylinder mounted in the housing. The slave cylinder is operated by a clutch master cylinder mounted on the dash panel. The cylinder push rod is connected to the clutch pedal.

The clutch disc has cushion springs in the disc hub. The clutch disc facing is riveted to the hub. The facing is made from a non-asbestos material. The clutch cover pressure plate is a diaphragm type with a one-piece spring and multiple release fingers. The pressure plate release fingers are preset during manufacture and are not adjustable.

### HYDRAULIC LINKAGE COMPONENTS

The hydraulic linkage consists of a clutch master cylinder with integral reservoir, a clutch slave cylinder and an interconnecting fluid line.

The clutch master cylinder push rod is connected to the clutch pedal. The slave cylinder push rod is connected to the clutch release fork. The master cylinder is mounted on the driver side of the dash panel adjacent to the brake master cylinder and booster assembly. This positioning is similar for both left and right hand drive models.

### CLUTCH LINKAGE FLUID

The integral clutch master cylinder reservoir, slave cylinder and fluid lines are prefilled with fluid prior to assembly operations.

The hydraulic system should not require additional fluid under normal circumstances. In fact, **the reservoir fluid level will actually increase as normal clutch wear occurs. For this reason, it is important to avoid overfilling, or removing fluid from the reservoir. This will cause clutch release problems.**

If inspection or diagnosis indicates additional fluid may be needed, use Mopar brake fluid, or an equivalent meeting standards SAE J1703 and DOT 3. Do not use any other type of fluid.

## CLUTCH 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 cover assembly clamps the disc against the flywheel. The assembly consists of the cover, diaphragm spring, pressure plate, and fulcrum components. The pressure plate clamps the clutch disc against the flywheel and the spring provides the clamping force.

The clutch disc friction material is riveted to the disc hub. The hub bore is splined for installation on the transmission input shaft. The hub splines connect the disc to the transmission.

The clutch linkage uses hydraulic pressure to operate the clutch. The clutch master cylinder push rod is connected to the clutch pedal and the slave cylinder push rod is connected to the release lever in the clutch housing.

Depressing the clutch pedal develops fluid pressure in the clutch master cylinder. This pressure is trans-

mitted to the slave cylinder through a connecting line. In turn, the slave cylinder operates the clutch release lever.

The clutch release bearing is mounted on the transmission front bearing retainer. The bearing is attached to the release lever, which moves the bearing into contact with the clutch cover diaphragm spring.

Slave cylinder force causes the release lever to move the release bearing into contact with the diaphragm spring. As additional force is applied, the bearing presses the diaphragm spring fingers inward on the fulcrums. This action moves the pressure plate rearward relieving clamp force on the disc. The clutch disc is disengaged and freewheeling at this point.

The process of clutch re-engagement, is simply the reverse of what occurs during disengagement. Releasing pedal pressure removes clutch linkage pressure. The release bearing moves away from the diaphragm spring which allows the pressure plate to exert clamping force on the clutch disc.

## CLUTCH DIAGNOSIS

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## GENERAL DIAGNOSIS INFORMATION

Unless the cause of a clutch problem is obvious, accurate problem diagnosis will usually require a road test to confirm a problem. Component inspection will then be required to determine the actual problem cause.

During a road test, drive the vehicle at normal speeds. Shift the transmission through all gear ranges and observe clutch action. If chatter, grab, slip, or improper release is experienced, remove and inspect the clutch components. However, if the problem is noise or hard shifting, further diagnosis may be needed as the transmission or another driveline component may be at fault. Careful observation during the test will help narrow the problem area.

## 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. This type of leak can only be confirmed by visual inspection.

## 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.

## 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. 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. However, 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. Tighten flywheel bolts to specified torque only. Overtightening can distort the flywheel hub causing runout.

## 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. To avoid warping the cover, the bolts must tightened alternately (diagonal pattern) and evenly (2-3 threads at a time) to specified torque.

### CLUTCH HOUSING MISALIGNMENT

Clutch housing alignment is important to proper clutch operation. The housing maintains alignment between the crankshaft and transmission input shaft. Misalignment can cause clutch noise, hard shifting, incomplete release and chatter. It can also result in premature wear of the pilot bearing, cover release fingers and clutch disc. In severe cases, misalignment can also cause premature wear of the transmission input shaft and front bearing.

Housing misalignment is generally caused by incorrect seating on the engine or transmission, loose housing bolts, missing alignment dowels, or housing damage. Infrequently, misalignment may also be caused by housing mounting surfaces that are not completely parallel. Misalignment can be corrected with shims.

### INSTALLATION METHODS AND PARTS USAGE

Distortion of clutch components during installation and the use of non-standard components are additional causes of clutch malfunction.

Improper clutch cover bolt tightening can distort the cover. The usual result is clutch grab, chatter and rapid wear. Tighten the cover bolts as described in Clutch Service section.

An improperly seated flywheel and/or clutch housing are additional causes of clutch failure. Improper seating will produce misalignment and additional clutch problems.

The use of non-standard or low quality parts will also lead to problems and wear. Use recommended factory quality parts to avoid comebacks.

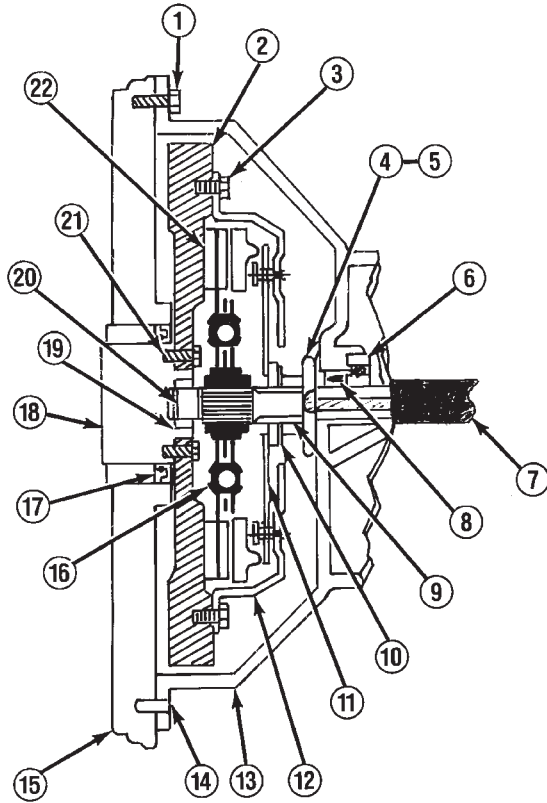
A cocked pilot bearing is another cause of clutch noise, drag, and hard shifting, and rapid bearing wear. Always use an alignment tool to install a new bearing. This practice helps avoid cocking the bearing during installation.

### INSPECTION AND DIAGNOSIS CHARTS

The clutch inspection chart (Fig. 1) 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 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.



- 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 Make sure side of clutch disc marked "flywheel side" is toward flywheel.
- 17 Check rear main seal if clutch disc and cover were oil covered. Replace seal if necessary.
- 18 Check crankshaft flange (if flywheel is removed). Be sure flange is clean and flywheel bolt threads are in good condition.
- 19 Check pilot bearing. Replace bearing if damaged. Lube with Mopar high temp. bearing grease before installation.
- 20 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.
- 21 Check flywheel bolt torque. If bolts are loose, replace them. Use Mopar Lock N'Seal to secure new bolts.
- 22 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.).

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**Fig. 1 Clutch Inspection Points**

CONDITION	POSSIBLE CAUSES	CORRECTION
DISC FACING WORN OUT	1. Normal wear. Driver frequently rides (slips) clutch. Results in rapid wear overheating. Insufficient clutch cover diaphragm spring tension.	1. Replace clutch disc. Also replace cover if spring is weak or pressure plate surface is damaged.
CLUTCH DISC FACING CONTAMINATED WITH OIL, GREASE, OR CLUTCH FLUID	1. Leak at rear main seal or at transmission input shaft seal. Excessive amount of grease applied to input shaft splines. Road splash, water entering housing. Slave cylinder leaking.	1. Replace leaking seals. Apply less grease to input shaft splines. Replace clutch disc (do not clean and reuse). Clean clutch cover and reuse only if cover is in good condition. Replace slave cylinder if leaking.
CLUTCH IS RUNNING PARTIALLY DISENGAGED	1. Release bearing sticking-binding. Does not return to normal running position.	1. Verify that bearing is actually binding, then replace bearing and transmission front bearing retainer if sleeve surface is damaged.
FLYWHEEL HEIGHT INCORRECT	1. Flywheel surface improperly machined. Too much stock removed or surface is tapered.	1. Replace flywheel.
WRONG DISC OR PRESSURE PLATE INSTALLED	1. Incorrect parts order or model number.	1. Replace with correct parts. Compare old and new parts before installation.
CLUTCH DISC, COVER AND/OR DIAPHRAGM SPRING, WARPED, DISTORTED	1. Rough handling (impact) bent cover, spring, or disc. Incorrect bolt tightening sequence and method caused warped cover.	1. Install new disc or cover as needed. Follow installation/tightening instructions.
FACING ON FLYWHEEL SIDE OF DISC TORN, GOUGED, WORN	1. Flywheel surface scored and nicked.	1. Reduce scores and nicks by sanding or surface grinding. Replace flywheel if scores-nicks are deeper than .002-.004 inch.
CLUTCH DISC FACING BURNT (CHARRED). FLYWHEEL AND COVER PRESSURE PLATE SURFACES HEAVILY GLAZED	1. Frequent operation under high loads or hard acceleration conditions. Driver frequently rides (slips) clutch. Results in rapid wear and overheating of disc and cover.	1. Scuff sand flywheel. Replace clutch cover and disc. Alert driver to problem cause.

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH DISC WARPED	1. New disc not checked for axial runout before installation.	1. Replace disc. Be sure runout of new disc is less than .5 mm (.020 in.).
CLUTCH DISC BINDS ON INPUT SHAFT SPLINES	1. Clutch disc hub splines damaged during installation. Input shaft splines rough, damaged. Corrosion, rust formations on splines of disc and input shaft.	1. Clean, smooth and lubricate disc and shaft splines. Replace disc and/or input shaft if splines are severely damaged.
CLUTCH DISC RUSTED TO FLYWHEEL AND/OR PRESSURE PLATE	1. Occurs in vehicles stored, or not driven for extended periods of time. Also occurs after steam cleaning if vehicle is not used for extended period.	1. Remove clutch cover and disc. Sand rusted surfaces clean with 180 grit paper. Replace disc cover, and flywheel if corrosion is severe.
CLUTCH DISC FACING STICKS TO FLYWHEEL	1. Vacuum may form in pockets over rivet heads in clutch disc. Occurs as clutch cools down after use.	1. Drill 1/16 inch diameter hole through rivets and scuff sand disc facing with 180 grit paper.
CLUTCH DISC TOO THICK	1. Wrong disc installed.	1. Replace disc.
PILOT BEARING SEIZED, LOOSE, OR ROLLERS ARE WORN	1. Bearing cocked during installation. Bearing defective. Bearing not lubricated. Clutch misalignment.	1. Lubricate and install new bearing. Check and correct any misalignment.
CLUTCH WILL NOT DISENGAGE PROPERLY	<ol style="list-style-type: none"> <li>1. Low clutch fluid level.</li> <li>2. Clutch cover loose.</li> <li>3. Wrong clutch disc.</li> <li>4. Disc bent, distorted during installation.</li> <li>5. Clutch cover diaphragm spring bent or warped during transmission installation.</li> <li>6. Clutch disc installed backwards.</li> <li>7. Release fork bent or fork pivot is loose or damaged.</li> <li>8. Clutch master or slave cylinder fault.</li> </ol>	<ol style="list-style-type: none"> <li>1. Top off reservoir and check for leaks.</li> <li>2. Tighten bolts.</li> <li>3. Install correct disc.</li> <li>4. Replace disc.</li> <li>5. Replace cover.</li> <li>6. Remove and reinstall disc correctly. Be sure disc side marked "to flywheel" is actually toward flywheel.</li> <li>7. Replace fork and pivot if worn or damaged.</li> <li>8. Replace master and slave cylinder as assembly.</li> </ol>

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH DISC FACING COVERED WITH OIL, GREASE, OR CLUTCH FLUID	<ol style="list-style-type: none"> <li>1. Oil leak at rear main or input shaft seal.</li> <li>2. Too much grease applied to splines or disc and input shaft.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct leak and replace disc (do not clean and reuse the disc).</li> <li>2. Apply lighter grease coating to splines and replace disc (do not clean and reuse the disc).</li> </ol>
CLUTCH DISC AND/OR COVER WARPED, OR DISC FACINGS EXHIBIT UNUSUAL WRONG TYPE	<ol style="list-style-type: none"> <li>1. Incorrect or substandard parts.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace disc and/or cover with correct parts.</li> </ol>
CLUTCH MASTER OR SLAVE CYLINDER PLUNGER DRAGGING-BINDING	<ol style="list-style-type: none"> <li>1. Master or slave cylinder components worn or corroded.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace both cylinders as assembly (and reservoir).</li> </ol>
NO FAULT FOUND WITH CLUTCH COMPONENTS	<ol style="list-style-type: none"> <li>1. Problem actually related to suspension or driveline component.</li> <li>2. Engine related problem.</li> </ol>	<ol style="list-style-type: none"> <li>1. Further diagnosis required. Check engine/transmission mounts, propeller shafts and U-joints, tires, suspension attaching parts and other driveline components as needed.</li> <li>2. Check EFI and ignition systems.</li> </ol>
PARTIAL ENGAGEMENT OF CLUTCH DISC (ONE SIDE WORN-OPPOSITE SIDE GLAZED AND LIGHTLY WORN)	<ol style="list-style-type: none"> <li>1. Clutch pressure plate position setting incorrect or modified.</li> <li>2. Clutch cover, spring, or release fingers bent, distorted (rough handling, improper assembly).</li> <li>3. Clutch disc damaged or distorted.</li> <li>4. Clutch misalignment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace clutch cover and disc.</li> <li>2. Replace clutch cover and disc.</li> <li>3. Replace disc.</li> <li>4. Check alignment and runout of flywheel, disc, or cover and/or clutch housing. Correct as necessary.</li> </ol>



CONDITION	POSSIBLE CAUSE	CORRECTION
Clutch components damaged or worn out prematurely.	1. Incorrect or sub-standard clutch parts.	1. Replace with parts of correct type and quality.
Pilot bearing damaged.	1. Bearing cocked during installation. Bearing not lubricated prior to installation. Bearing defect. 2. Clutch misalignment.	1. Replace bearing. Be sure it is properly seated and lubricated before installing clutch. 2. Check and correct misalignment caused by excessive runout of flywheel, disc, cover or clutch housing. Replace input shaft if bearing hub is damaged.
Loose components.	1. Attaching bolts loose at flywheel, cover, or clutch housing.	1. Tighten bolts to specified torque. Replace any clutch bolts that are damaged.
Components appear overheated. Hub of disc cracked or torsion damper springs are distorted or broken.	1. Frequent high load, full throttle operation.	1. Replace parts as needed. Alert driver to condition causes.
Contact surface of release bearing damaged.	1. Clutch cover incorrect, or release fingers are bent or distorted causing damage. 2. Release bearing defect. 3. Release bearing misaligned.	1. Replace clutch cover and bearing. 2. Replace bearing. 3. Check and correct runout of clutch components. Check front bearing retainer sleeve surface. Replace if damaged.
Release bearing is noisy.	1. Release bearing defect.	1. Replace bearing.
Clutch pedal squeak.	1. Pivot pin loose. Pedal bushings worn out or cracked.	1. Tighten pivot pin. Replace bushings if worn or damaged. Lubricate pin and bushings with silicone base lubricator chassis grease.

## CLUTCH SERVICE

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## CLUTCH SAFETY PRECAUTIONS

**WARNING: EXERCISE CARE WHEN SERVICING CLUTCH COMPONENTS. DUST AND DIRT ON CLUTCH PARTS USE MAY CONTAIN ASBESTOS FIBERS. 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.**

## CLUTCH COMPONENT LUBRICATION

Proper clutch component lubrication is important to satisfactory operation. Using the correct lubricant and not overlubricating are equally important. Apply recommended lubricant sparingly to avoid disc and pressure plate contamination.

Clutch and transmission components requiring lubrication are:

- pilot bearing
- release lever pivot ball stud
- release lever contact surfaces
- release bearing bore
- clutch disc hub splines
- clutch pedal pivot shaft bore
- clutch pedal bushings

- input shaft splines
  - input shaft pilot hub
  - transmission front bearing retainer slide surface
- Never apply grease to any part of the clutch cover, or disc.**

## Recommended Lubricants

Use Mopar multi-purpose grease for the clutch pedal bushings and pivot shaft. Use Mopar high temperature grease (or equivalent) for all other lubrication requirements. Apply recommended amounts and do not overlubricate.

## CLUTCH COVER AND DISC REMOVAL

(1) Remove transmission. Refer to procedures in Group 21.

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

(3) If 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 and in rotation to relieve spring tension equally. This is necessary avoid warping cover.

(4) Remove cover bolts and remove cover and disc (Fig. 2).

## CLUTCH COVER AND DISC INSTALLATION

(1) Lightly scuff sand flywheel face with 180 grit emery cloth. Then clean surface with a wax and grease remover.

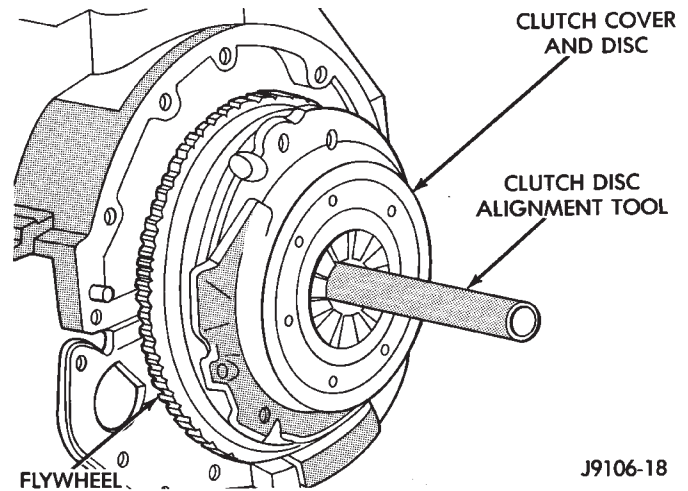
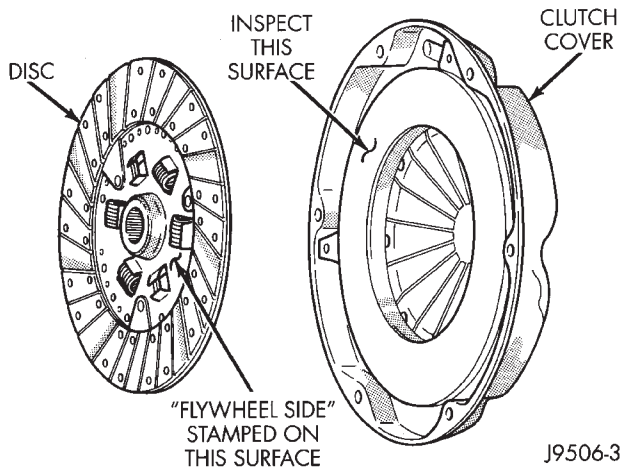
(2) Lubricate pilot bearing with Mopar high temperature bearing grease.

(3) Check runout and free operation of new clutch disc as follows:

(a) Slide disc onto transmission input shaft splines. Disc should slide freely on splines.

(b) Leave disc on shaft and check face runout with dial indicator. Check runout at disc hub and about 6 mm (1/4 in.) from outer edge of facing.

(c) Face runout should not exceed 0.5 mm (0.020 in.). Obtain another clutch disc if runout exceeds this limit.



**Fig. 2 Clutch Disc And Pressure Plate Inspection**

**Fig. 3 Typical Method Of Aligning Clutch Disc**

(4) Position clutch disc on flywheel. Be sure side of disc marked flywheel side is positioned against flywheel (Fig. 2). If disc is not marked, be sure flat side of disc hub is toward flywheel.

(5) Inspect condition of pressure plate surface of clutch cover (Fig. 2). Replace cover if this surface is worn, heat checked, cracked, or scored.

(6) Insert clutch alignment tool in clutch disc (Fig. 3).

(7) Insert alignment tool in pilot bearing and position disc on flywheel. Be sure disc hub is positioned correctly. Side of hub marked Flywheel Side should face flywheel (Fig. 2). If disc is not marked, place flat side of disc against flywheel.

(8) Position clutch cover over disc and on flywheel (Fig. 3).

(9) Install clutch cover bolts finger tight.

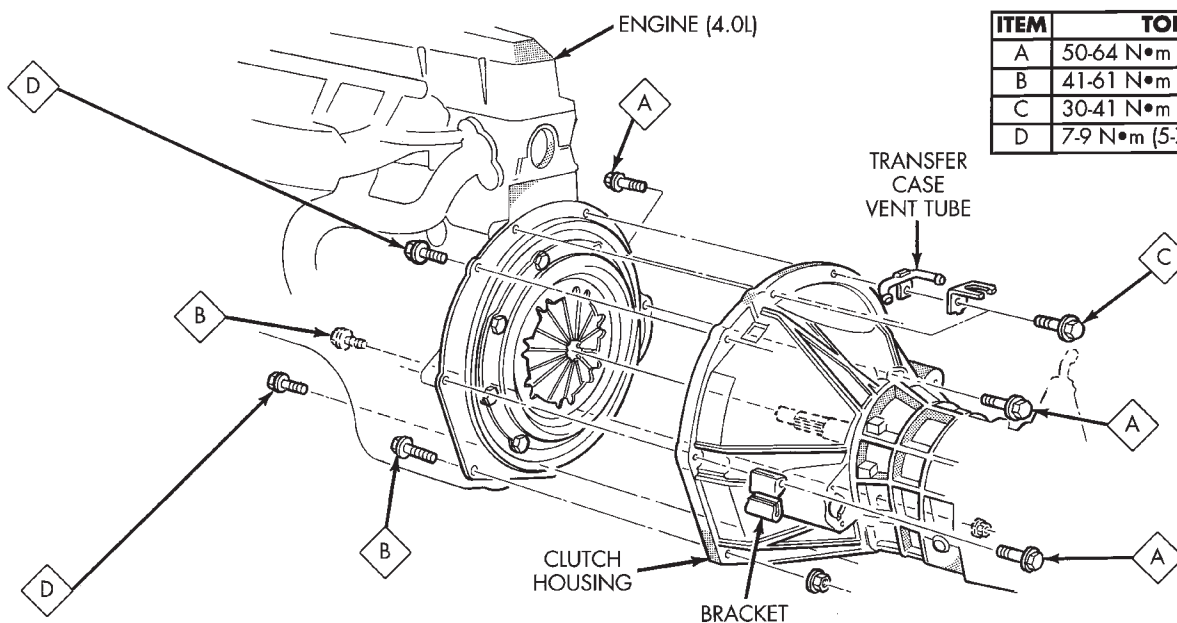
(10) Tighten cover bolts evenly and in rotation a few threads at a time. **Cover bolts must be tightened evenly and to specified torque to avoid distorting cover. Tightening torques are 31 N•m (23 ft. lbs.) on 2.5L engines and 54 N•m (40 ft. lbs.) on 4.0L engines.**

(11) Apply light coat of Mopar high temperature bearing grease to pilot bearing hub and splines of transmission input shaft. **Do not overlubricate shaft splines. This will result in grease contamination of disc.**

(12) Install transmission (Figs. 4 and 5). Refer to procedures in Group 21.

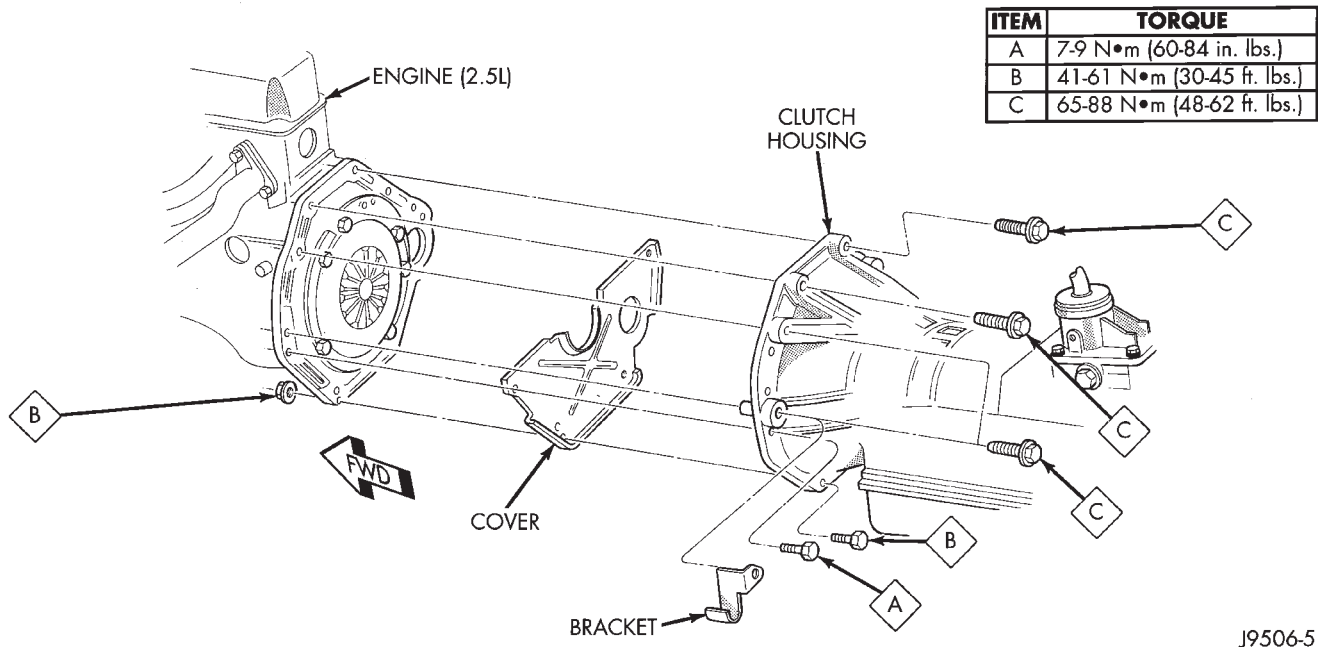
**RELEASE BEARING REPLACEMENT**

(1) Remove transmission as described in Group 21.



ITEM	TORQUE
A	50-64 N•m (37-47 ft. lbs.)
B	41-61 N•m (30-45 ft. lbs.)
C	30-41 N•m (22-30 ft. lbs.)
D	7-9 N•m (5-7 ft. lbs.)

**Fig. 4 Manual Transmission Mounting (4.0L)**



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**Fig. 5 Manual Transmission Mounting (2.5L)**

(2) Disconnect release bearing from release lever and remove bearing (Fig. 6).

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

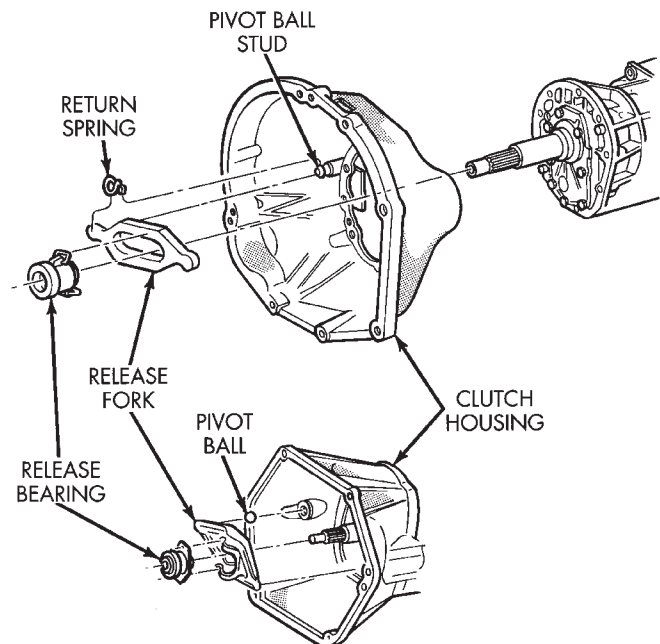
(4) Inspect release fork and fork pivot. Be sure pivot is secure and in good condition. Be sure fork is not distorted or worn. Replace release fork return spring if bent or damaged in any way.

(5) Lubricate crankshaft pilot bearing with Mopar high temperature bearing grease. Apply grease to end of long shank, small diameter flat blade screwdriver. Then insert tool through clutch disc hub to reach bearing.

(6) Lubricate input shaft splines, bearing retainer slide surface, fork pivot and release fork pivot surface with Mopar high temperature grease.

(7) Install new release bearing. Be sure bearing is properly secured to release fork.

(8) Install transmission as described in Group 21.



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**Fig. 6 Release Bearing Attachment**

### PILOT BEARING REPLACEMENT

(1) Remove transmission. Refer to Group 21 for procedure.

(2) Remove clutch cover and disc.

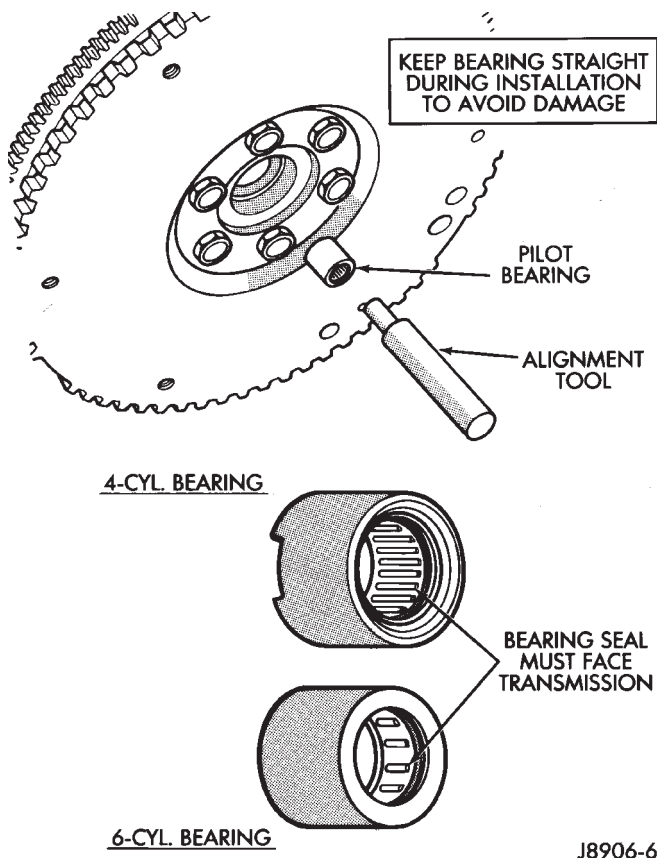
(3) Remove pilot bearing. Use internal (blind hole) puller such as those as supplied in Snap On Tool Set CG40CB to remove bearing.

(4) Lubricate new bearing with Mopar high temperature bearing grease.

(5) Start new bearing into crankshaft by hand. Then seat bearing with clutch alignment tool (Fig. 7).

(6) Lightly scuff sand flywheel surface with 180 grit emery cloth. Then clean surface with wax and grease remover.

(7) Install clutch disc and cover as described in this section.



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Fig. 7 Pilot Bearing Installation

(8) Install transmission. Refer to Group 21 for procedure.

### CLUTCH HOUSING REPLACEMENT

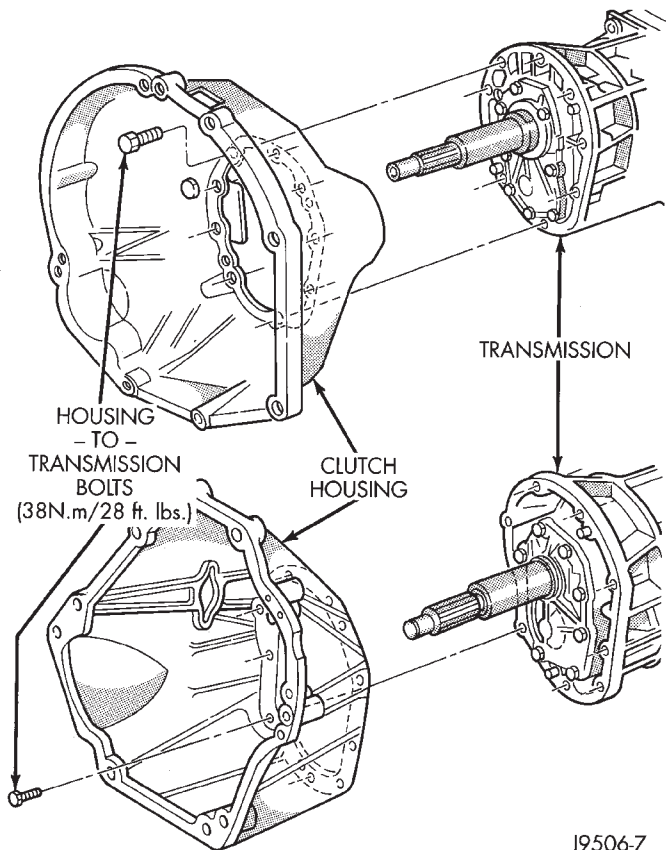
The clutch housing is removable and can be replaced when the transmission is out of the vehicle.

The bolts attaching the housing to the transmission case are located inside the housing (Fig. 8). Recommended tightening torque for the clutch housing-to-transmission bolts is 38 N·m (28 ft. lbs.).

**Be sure the transmission and housing mating surfaces are clean before installing an original, or replacement clutch housing. Dirt/foreign material trapped between the housing and transmission will cause misalignment. If misalignment is severe enough, the result will be clutch drag, incomplete release and hard shifting.**

### CLUTCH HYDRAULIC LINKAGE REMOVAL

The clutch master cylinder, slave cylinder and connecting line are serviced as an assembly only. The linkage components cannot be overhauled or serviced separately. The cylinders and connecting line are sealed units. Also note that removal/installation procedures for



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Fig. 8 Clutch Housing Attachment

**right and left hand drive models are basically the same. Only master cylinder location is different.**

- (1) Raise vehicle.
- (2) Remove fasteners attaching slave cylinder to clutch housing.
- (3) Remove slave cylinder from clutch housing (Fig. 9).
- (4) Disengage clutch fluid line from body clips.
- (5) Lower vehicle.
- (6) Verify that cap on clutch master cylinder reservoir is tight. This is necessary to avoid undue spillage during removal.
- (7) Remove clutch master cylinder attaching nuts. Note that one nut is accessible from engine compartment and one nut is accessible from under instrument panel (Figs. 10 and 11).
- (8) Remove clip securing clutch master cylinder push rod to pedal and slide push rod off pedal pin.
- (9) Disconnect clutch pedal position switch wires.
- (10) If pedal pin is equipped with bushing, inspect condition of bushing and replace it if worn or damaged.
- (11) Remove clutch hydraulic linkage through engine compartment.

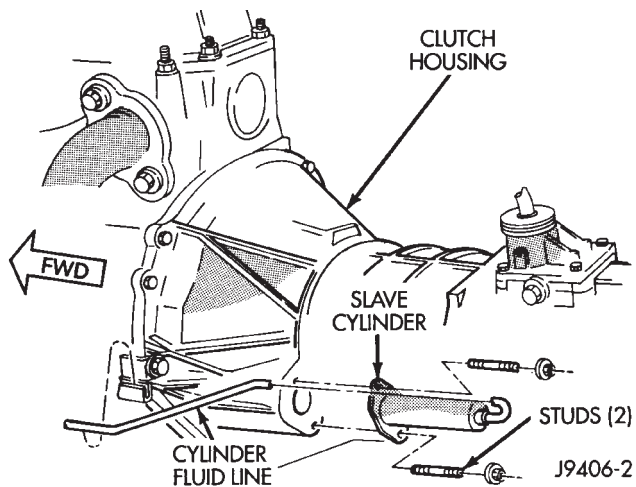


Fig. 9 Slave Cylinder Attachment

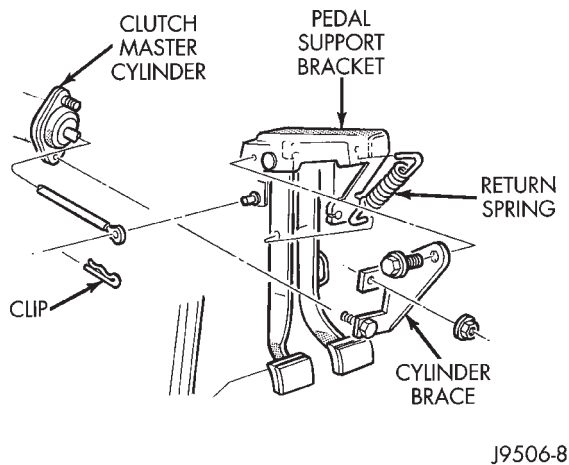


Fig. 10 Clutch Master Cylinder And Push Rod Attachment (Left Hand Drive Models)

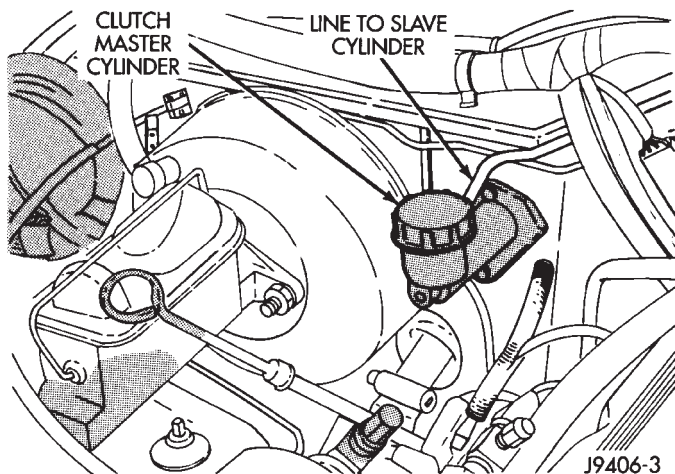


Fig. 11 Clutch Master Cylinder Location (Right Hand Drive Models)

## CLUTCH HYDRAULIC LINKAGE INSTALLATION

- (1) Be sure reservoir cover on clutch master cylinder is tight to avoid spills.
- (2) Position clutch linkage components in vehicle. Work connecting line and slave cylinder downward past engine and adjacent to clutch housing.
- (3) Position clutch master cylinder on dash panel (Fig. 12).
- (4) Attach clutch master cylinder push rod to pin on clutch pedal. Secure rod with new clip if necessary.
- (5) Install and tighten clutch master cylinder attaching nuts to 23-34 N·m (200-300 in. lbs.) torque.
- (6) Raise vehicle.
- (7) Insert slave cylinder push rod through clutch housing opening and into release lever. Be sure cap on end of rod is securely engaged in lever. Check this before installing cylinder attaching nuts.
- (8) Install and tighten slave cylinder attaching nuts to 23-34 N·m (200-300 in. lbs.) torque.
- (9) Secure clutch fluid line in body clips.
- (10) Lower vehicle.
- (11) Connect clutch pedal position switch wires.

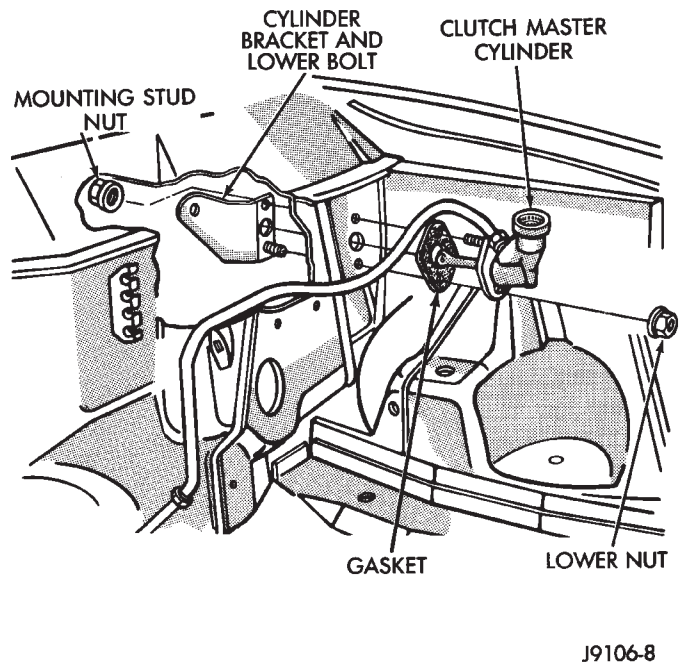
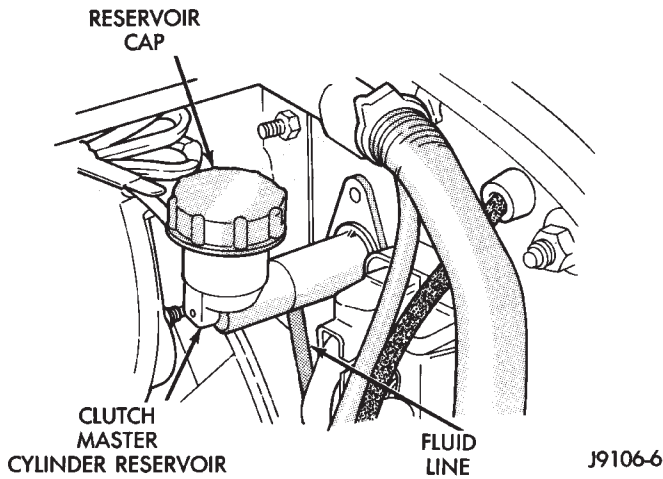


Fig. 12 Clutch Master Cylinder Mounting (Typical)

## CLUTCH FLUID LEVEL

The clutch fluid reservoir, master cylinder, slave cylinder and fluid lines are prefilled with fluid at the factory during assembly operations.

The hydraulic system should not require additional fluid under normal circumstances. In fact, **the reservoir fluid level will actually increase as normal clutch wear occurs. For this reason, it is important to avoid overfilling, or removing fluid from the reservoir.**



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**Fig. 13 Clutch Master Cylinder Reservoir And Cap**

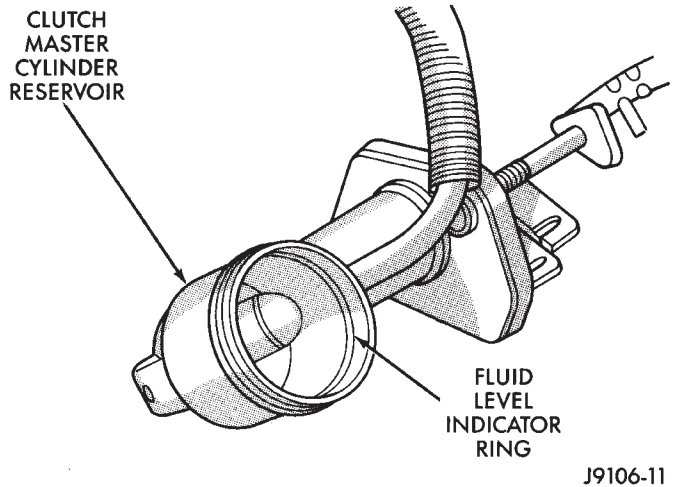
If inspection or diagnosis indicates additional fluid may be needed, use Mopar brake fluid, or an equivalent meeting standards SAE J1703 and DOT 3. Do not use any other type of fluid.

Clutch fluid level is checked at the master cylinder reservoir (Fig. 13). An indicator ring is provided either on the side, or interior rim of the reservoir (Fig. 14).

Be sure to wipe the reservoir and cover clean before removing the cover. This will avoid having dirt or foreign material fall into the reservoir during a fluid level check.

**CLUTCH PEDAL REMOVAL**

(1) Remove instrument panel lower trim cover for extra working clearance.



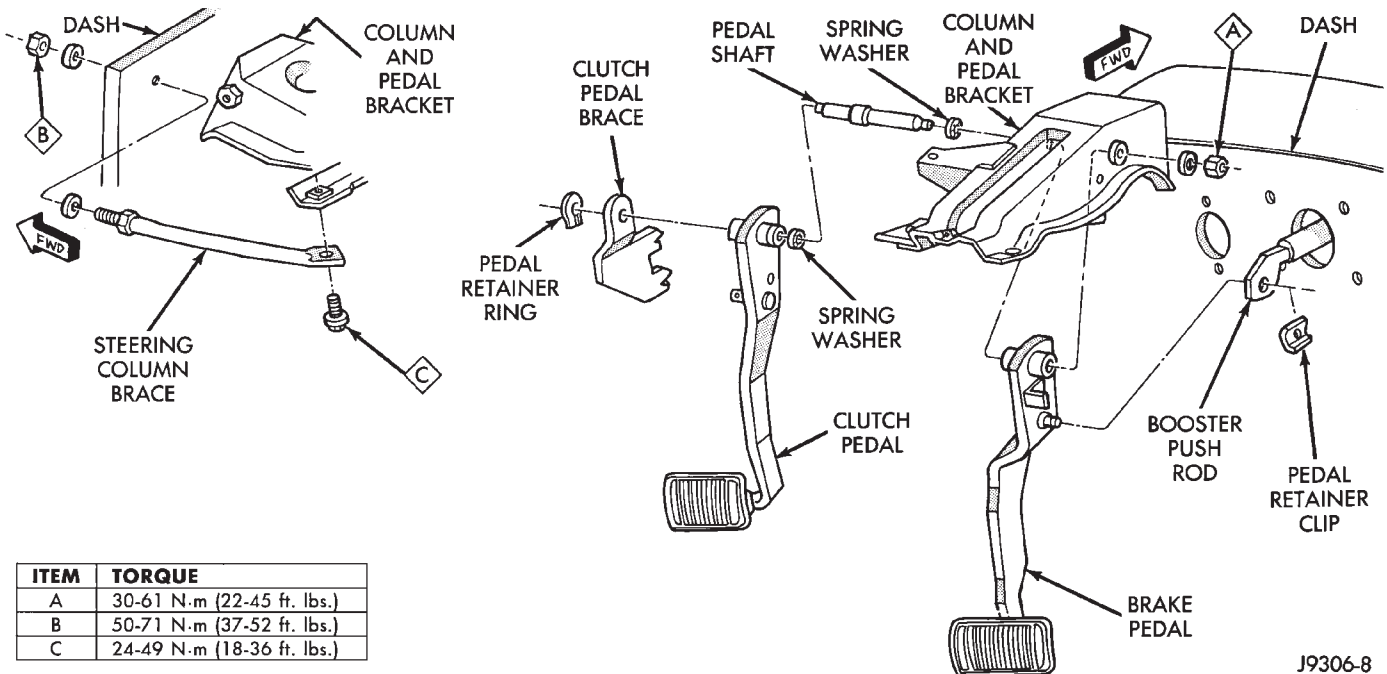
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**Fig. 14 Reservoir Fluid Level Indicator Ring**

- (2) Disconnect clutch pedal position switch wires.
- (3) Remove retainer clip that attaches clutch master cylinder push rod to pedal.
- (4) On YJ, remove retaining ring securing pedal to pivot shaft (Fig. 15). On XJ, remove nut securing pedal to pivot shaft (Fig. 16).
- (5) Move pedal pivot shaft to right and slide pedal off shaft.

**CLUTCH PEDAL INSTALLATION**

- (1) Lubricate clutch pedal pivot shaft and pedal bushings or sleeve with Mopar multi-mileage grease.
- (2) Position pedal on pivot shaft and through brace. Secure pedal with washer and retaining ring on YJ, or with washer and nut on XJ.



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ITEM	TORQUE
A	30-61 N.m (22-45 ft. lbs.)
B	50-71 N.m (37-52 ft. lbs.)
C	24-49 N.m (18-36 ft. lbs.)

**Fig. 15 Clutch Pedal Mounting (YJ)**

- (3) Install clutch master cylinder push rod on pedal. Secure rod with washer(s) and new cotter pin.
- (4) Connect clutch pedal position switch wires.
- (5) Install instrument panel lower trim cover, if removed.

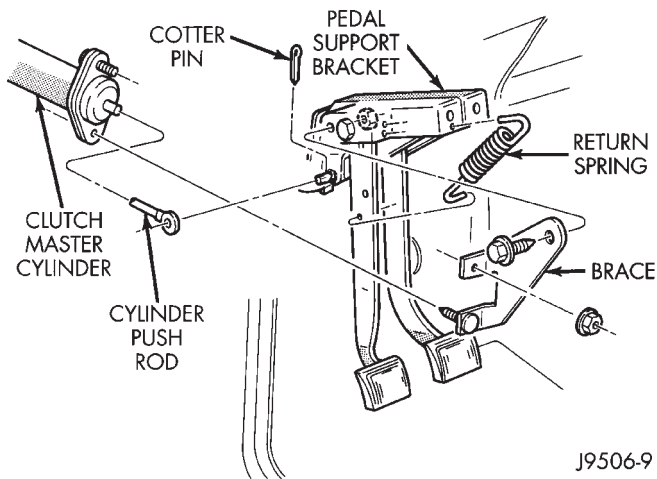


Fig. 16 Clutch Pedal Mounting (XJ)

## FLYWHEEL SERVICE

Inspect the flywheel whenever the clutch disc, cover and housing are removed for service. Check condition of the flywheel face, hub, ring gear teeth, and flywheel bolts.

Minor scratches, burrs, or glazing on the flywheel face can be reduced with 180 grit emery cloth. However, the flywheel should be replaced if the disc contact surface is severely scored, heat checked, cracked, or obviously worn.

Flywheel machining is not recommended. The flywheel surface is manufactured with a unique contour that would be negated by machining. However, cleanup of minor flywheel scoring can be performed by hand with 180 grit emery, or with surface grinding equipment. Replace the flywheel if scoring is deeper than 0.0762 mm (0.003 in.).

Heavy stock removal by grinding is **not recommended**. Excessive stock removal can result in flywheel cracking or warpage after installation. It can also weaken the flywheel and interfere with proper clutch release.

Check flywheel runout if misalignment is suspected. 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 dial indicator on a stud installed in place of one of the flywheel attaching bolts.

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

Check condition of the flywheel hub and attaching bolts. Replace the flywheel if the hub exhibits cracks in the area of the attaching bolt holes.

Install new attaching bolts whenever the flywheel

is replaced and use Mopar Lock N' Seal, or Loctite 242 on the replacement bolt threads.

Recommended flywheel bolt torques are:

- 142 N·m (105 ft. lbs.) for 6-cylinder flywheels
- 68 N·m (50 ft. lbs.) plus an additional turn of 60° for 4-cylinder flywheels

Inspect the teeth on the starter ring gear. **If the teeth are worn or damaged, the flywheel should be replaced as an assembly. This is the recommended and preferred method of repair.**

In cases where a new flywheel is not readily available, a replacement ring gear can be installed. However, the following precautions must be observed to avoid damaging the flywheel and replacement gear.

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

(b) Wear protective goggles or approved safety glasses. Also wear heat resistant gloves when handling a heated ring gear.

(c) 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.

(d) 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.

(e) The heated gear must be installed evenly to avoid misalignment or distortion. A shop press and suitable press plates should be used to install the gear if at all possible.

(f) Be sure to wear eye and hand protection. Heat resistant gloves and safety goggles are needed for personal safety. Also use metal tongs, vise grips, or similar tools to position the gear as necessary for installation.

(g) Allow the flywheel and ring gear to cool down before installation. Set the assembly on a workbench and let it cool in normal shop air.



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

*TORQUE SPECIFICATIONS*

Item	Torque
Clutch Cover bolts:	
2.5L .....	31 N.m (23 ft. lbs.)
4.0L .....	52 N.m (38 ft. lbs.)
Clutch Cylinder Mounting	
Bolts/Nuts .....	23 N.m (200 in. lbs.)
Clutch Housing-To-Engine Bolts:	
M12 x 1.75 .....	75 N.m (55 ft. lbs.)
3/8-16 .....	37 N.m (27 ft. lbs.)
7/16-14 .....	58 N.m (43 ft. lbs.)
Clutch Housing Dust Shield:	
M8 x 2.12 bolt .....	8 N.m (72 in. lbs.)
lower bolt and nut .....	50 N.m (37 ft. lbs.)
Clutch Housing-To-Transmission	
Bolt (AX 5/AX 15) .....	38 N.m (28 ft. lbs.)
Crossmember-To-Frame Bolt .....	41 N.m (30 ft. lbs.)
Flywheel Bolts:	
4.0L .....	142 N.m (105 ft. lbs.)
2.5L .....	68 N.m (50 ft. lbs.)
	Plus additional turn of 60 degrees
Starter Motor Dowel Bolt .....	45 N.m (33 ft. lbs.)
U-joint Clamp Bolts .....	19 N.m (170 in. lbs.)
Rear Support-To- Crossmember Bolt .....	45 N.m (33 ft. lbs.)

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