Component Procedures: Clutch

Table of Contents

Component Procedures: Clutch

General Information (Article 2078705)

GENERAL INFORMATION
CLUTCH
COMPONENTS
The clutch mechanism in TJ 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 conventional 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 on 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 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 transmitted 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 Cover and Disc Removal and Installation (Article 2078904)

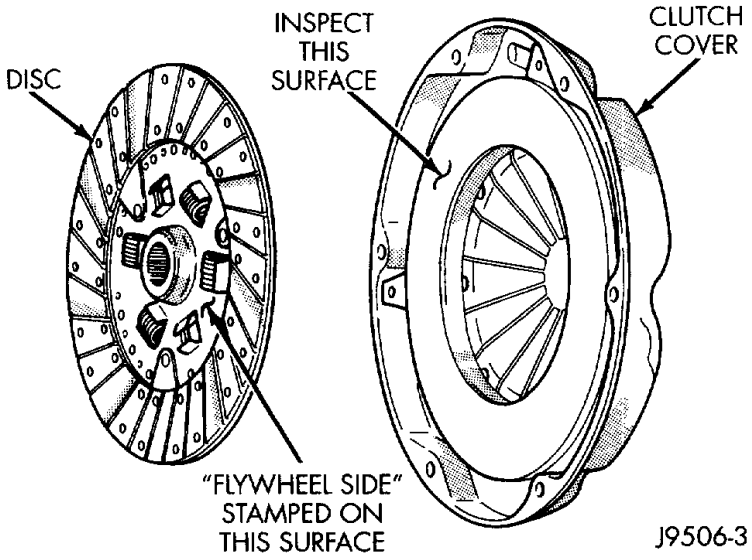


Fig. 4 Clutch Disc And Pressure Plate Inspection

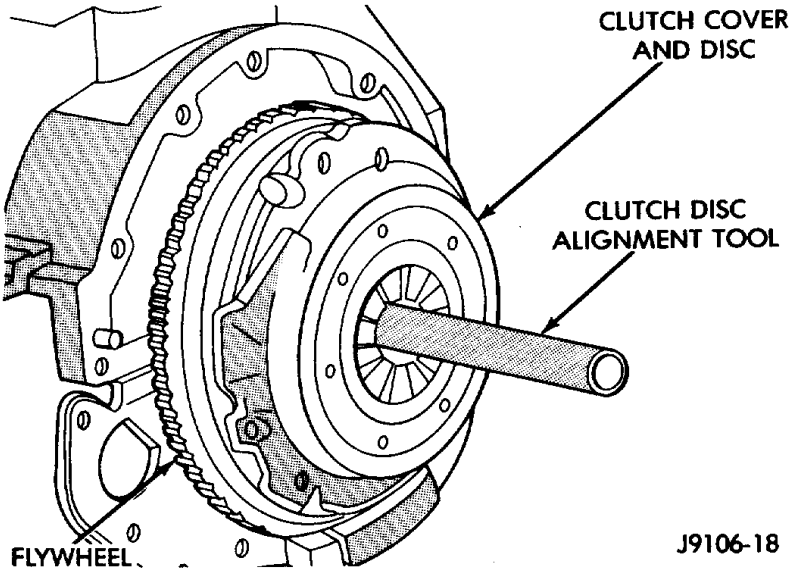


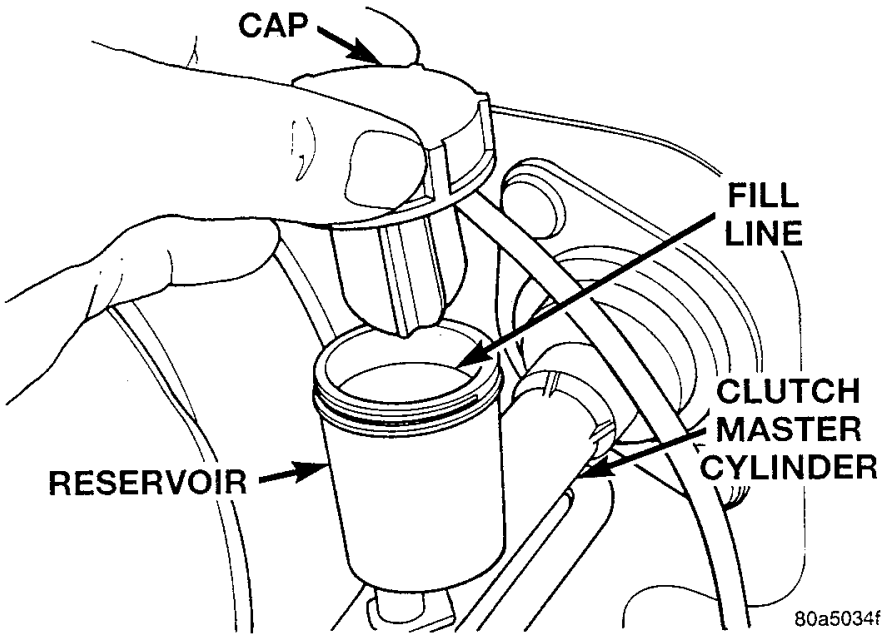
Fig. 5 Typical Method Of Aligning Clutch Disc

Clutch Component Lubrication (Article 2078927)

Proper
clutch
component lubrication is important to satisfactory operation. Using the correct lubricant and not over lubricating 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
- Input shaft pilot hub.
- Transmission front bearing retainer slide surface.
NOTE:
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 over lubricate.

Clutch Fluid Level (Article 2078929)



Hydraulic System Bleed (Article 2078909)

See: Clutch, M/T > Procedures > Clutch Fluid Level

Installation Methods and Parts Usage (Article 2080500)

Distortion of
clutch
components during installation and the use of non-standard components are common 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 Removal and Installation.
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, 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.

Tightening Specifications (Article 2080442)

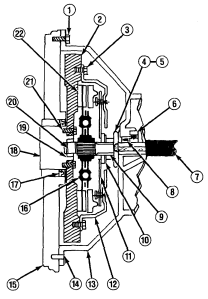
TORQUE SPECIFICATIONS
Bolts,
Clutch Cover
NOTE: Tighten bolts evenly and in rotation a few threads at a time.
2.5 L ..... 31 Nm (23 ft. lbs.)
4.0 L ..... 52 Nm (38 ft. lbs.)

Inspection And Diagnotic Charts (Article 2078963)

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 inch)
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 inch)
. 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
clutch housing
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 Mopar8 Lock N' Seal, or Loctite 242 on

the replacement bolt threads.
Recommended flywheel bolt torques are:
142 Nm (105 ft. lbs.)
for 6-cylinder flywheels
68 Nm (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.
1. Mark position of the old gear for alignment reference on the flywheel. Use a scriber for this purpose.
2. Wear protective goggles or approved safety glasses. Also wear heat resistant gloves when handling a heated ring gear.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
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.

General Diagnostic Information (Article 2078964)



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.).

J9506-2

Fig. 2 Clutch Components And Inspection

Flywheel Runout (Article 2078965)

Check
flywheel
runout whenever misalignment is suspected. Flywheel runout should not exceed
0.08 mm (0.003 inch)
. 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 inch
). Heavy stock removal is not recommended. Replace the flywheel if scoring is severe and deeper than
0.076 mm (0.003 inch)
. 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 (Article 2078966)

Check the
clutch disc
before installation. Axial (face) runout of a new disc should not exceed
0.50 mm (0.020 inch)
. Measure runout about
6 mm (1/4 inch)
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.

Clutch Contamination (Article 2078955)

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
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 Housing Misalignment (Article 2078967)

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.