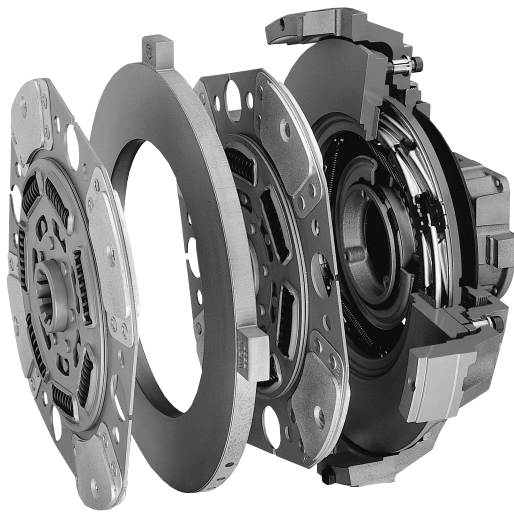


Clutches

Maintenance Manual 25A



AutoJust™






LTD

Before You Begin

This manual provides maintenance and service procedures for Meritor's AutoJust™ clutch and diaphragm spring, two-plate pull-type clutches. Before you begin procedures:

1. Read and understand all instructions and procedures before you begin to service components.
2. Read and observe all Caution and Warning safety alerts that precede instructions or procedures you will perform. These alerts help to avoid damage to components, serious personal injury, or both.
3. Follow your company's maintenance and service, installation, and diagnostics guidelines.
4. Use special tools when required to help avoid serious personal injury and damage to components.

Safety Alerts, Torque Symbol and Notes

 WARNING	A Warning alerts you to an instruction or procedure that you must follow exactly to avoid serious personal injury and damage to components.
 CAUTION	A Caution alerts you to an instruction or procedure that you must follow exactly to avoid damage to components and possible serious injury.
	A torque symbol alerts you to tighten fasteners to a specified torque value.
NOTE	A Note provides information or suggestions that help you correctly service a component.

Access Information on ArvinMeritor's Web Site

Additional maintenance and service information for ArvinMeritor's commercial vehicle systems component lineup is also available at www.arvinmeritor.com.

To access information, click on Products & Services/Tech Library Icon/HVS Publications. The screen will display an index of publications by type.

Additional Information

Call ArvinMeritor's Customer Service Center at 800-535-5560 to order the following publications.

- *Adjusting Meritor's 14- and 15-1/2-Inch Diaphragm Spring Clutches* (TP-9392)
- *Adjusting Meritor's 15-1/2-Inch AutoJust™ Clutch* (TP-0165)
- *Clutch Adjustment* (Video T93229V)
- *Drivetrain Plus™* by ArvinMeritor Technical Electronic Library on CD. Features product and service information on most Meritor, ZF Meritor and Meritor WABCO products. \$20. Order TP-9853.


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ASBESTOS FIBERS WARNING

The following procedures for servicing brakes are recommended to reduce exposure to asbestos fiber dust, a cancer and lung disease hazard. Material Safety Data Sheets are available from ArvinMeritor.

Hazard Summary

Because some brake linings contain asbestos, workers who service brakes must understand the potential hazards of asbestos and precautions for reducing risks. Exposure to airborne asbestos dust can cause serious and possibly fatal diseases, including asbestosis (a chronic lung disease) and cancer, principally lung cancer and mesothelioma (a cancer of the lining of the chest or abdominal cavities). Some studies show that the risk of lung cancer among persons who smoke and who are exposed to asbestos is much greater than the risk for non-smokers. Symptoms of these diseases may not become apparent for 15, 20 or more years after the first exposure to asbestos.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to asbestos dust follow. Consult your employer for more details.

Recommended Work Practices

1. **Separate Work Areas.** Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons. OSHA has set a maximum allowable level of exposure for asbestos of 0.1 f/cc as an 8-hour time-weighted average and 1.0 f/cc averaged over a 30-minute period. Scientists disagree, however, to what extent adherence to the maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling asbestos dust. OSHA requires that the following sign be posted at the entrance to areas where exposures exceed either of the maximum allowable levels:

**DANGER: ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA.**

2. **Respiratory Protection.** Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA for use with asbestos at all times when servicing brakes, beginning with the removal of the wheels.

3. **Procedures for Servicing Brakes.**

- a. Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.
- b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.
- c. If an enclosed vacuum system or brake washing equipment is not available, employers may adopt their own written procedures for servicing brakes, provided that the exposure levels associated with the employer's procedures do not exceed the levels associated with the enclosed vacuum system or brake washing equipment. Consult OSHA regulations for more details.
- d. Wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.
- e. NEVER use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. NEVER use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.

4. **Cleaning Work Areas.** Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. NEVER use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.

5. **Worker Clean-Up.** After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.

6. **Waste Disposal.** Dispose of discarded linings, used rags, cloths and HEPA filters with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

Regulatory Guidance

References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them for further guidance.



NON-ASBESTOS FIBERS WARNING

The following procedures for servicing brakes are recommended to reduce exposure to non-asbestos fiber dust, a cancer and lung disease hazard. Material Safety Data Sheets are available from ArvinMeritor.

Hazard Summary

Most recently manufactured brake linings do not contain asbestos fibers. These brake linings may contain one or more of a variety of ingredients, including glass fibers, mineral wool, aramid fibers, ceramic fibers and silica that can present health risks if inhaled. Scientists disagree on the extent of the risks from exposure to these substances. Nonetheless, exposure to silica dust can cause silicosis, a non-cancerous lung disease. Silicosis gradually reduces lung capacity and efficiency and can result in serious breathing difficulty. Some scientists believe other types of non-asbestos fibers, when inhaled, can cause similar diseases of the lung. In addition, silica dust and ceramic fiber dust are known to the State of California to cause lung cancer. U.S. and international agencies have also determined that dust from mineral wool, ceramic fibers and silica are potential causes of cancer.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to non-asbestos dust follow. Consult your employer for more details.

Recommended Work Practices

1. **Separate Work Areas.** Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons.

2. **Respiratory Protection.** OSHA has set a maximum allowable level of exposure for silica of 0.1 mg/m³ as an 8-hour time-weighted average. Some manufacturers of non-asbestos brake linings recommend that exposures to other ingredients found in non-asbestos brake linings be kept below 1.0 f/cc as an 8-hour time-weighted average. Scientists disagree, however, to what extent adherence to these maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling non-asbestos dust.

Therefore, wear respiratory protection at all times during brake servicing, beginning with the removal of the wheels. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA, if the exposure levels may exceed OSHA or manufacturers' recommended maximum levels. Even when exposures are expected to be within the maximum allowable levels, wearing such a respirator at all times during brake servicing will help minimize exposure.

3. **Procedures for Servicing Brakes.**

- a. Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.
- b. As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.
- c. If an enclosed vacuum system or brake washing equipment is not available, carefully clean the brake parts in the open air. Wet the parts with a solution applied with a pump-spray bottle that creates a fine mist. Use a solution containing water, and, if available, a biodegradable, non-phosphate, water-based detergent. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.
- d. Wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.
- e. NEVER use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. NEVER use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.

4. **Cleaning Work Areas.** Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. NEVER use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA, to minimize exposure. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.

5. **Worker Clean-Up.** After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.

6. **Waste Disposal.** Dispose of discarded linings, used rags, cloths and HEPA filters with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

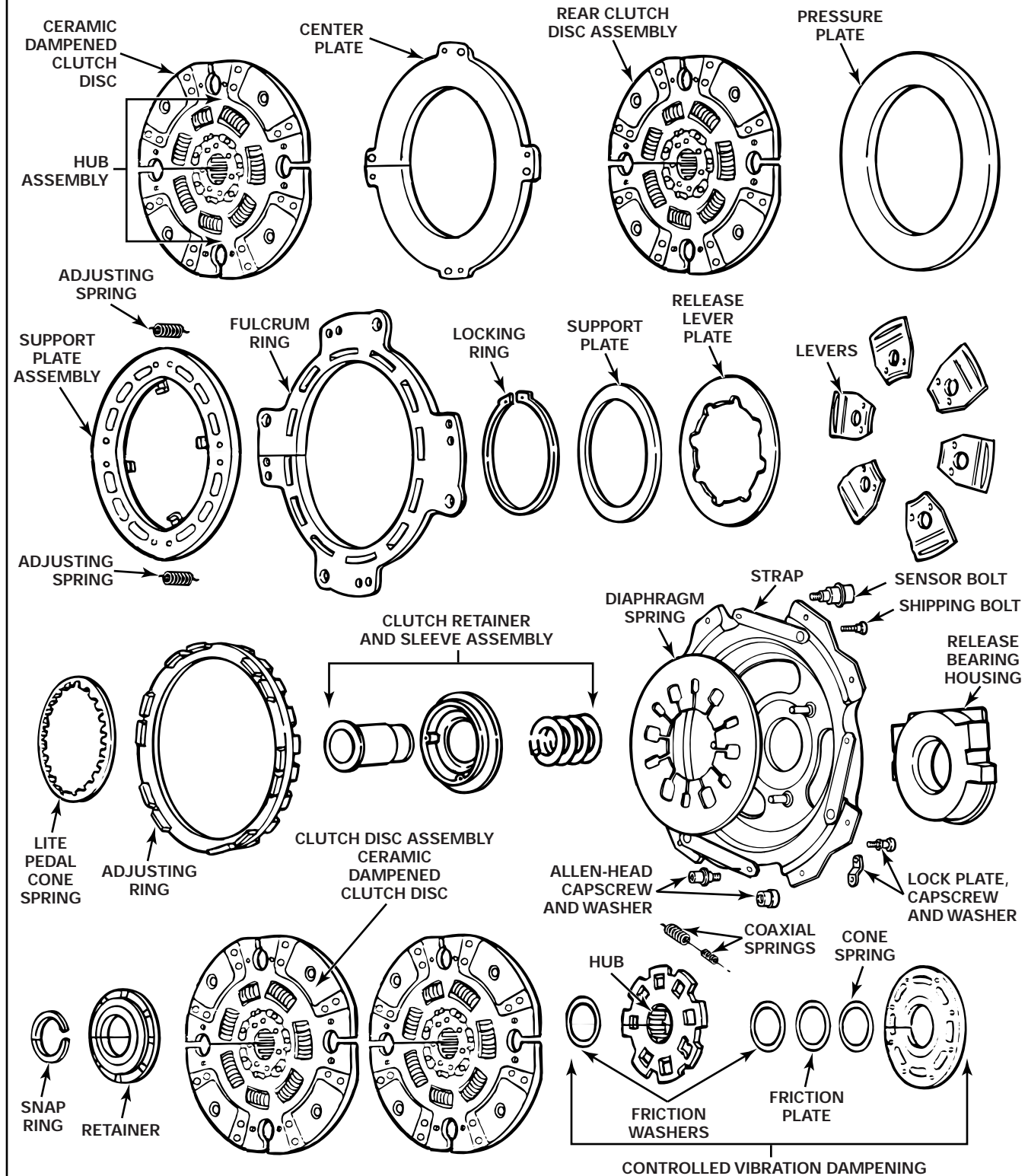
Regulatory Guidance

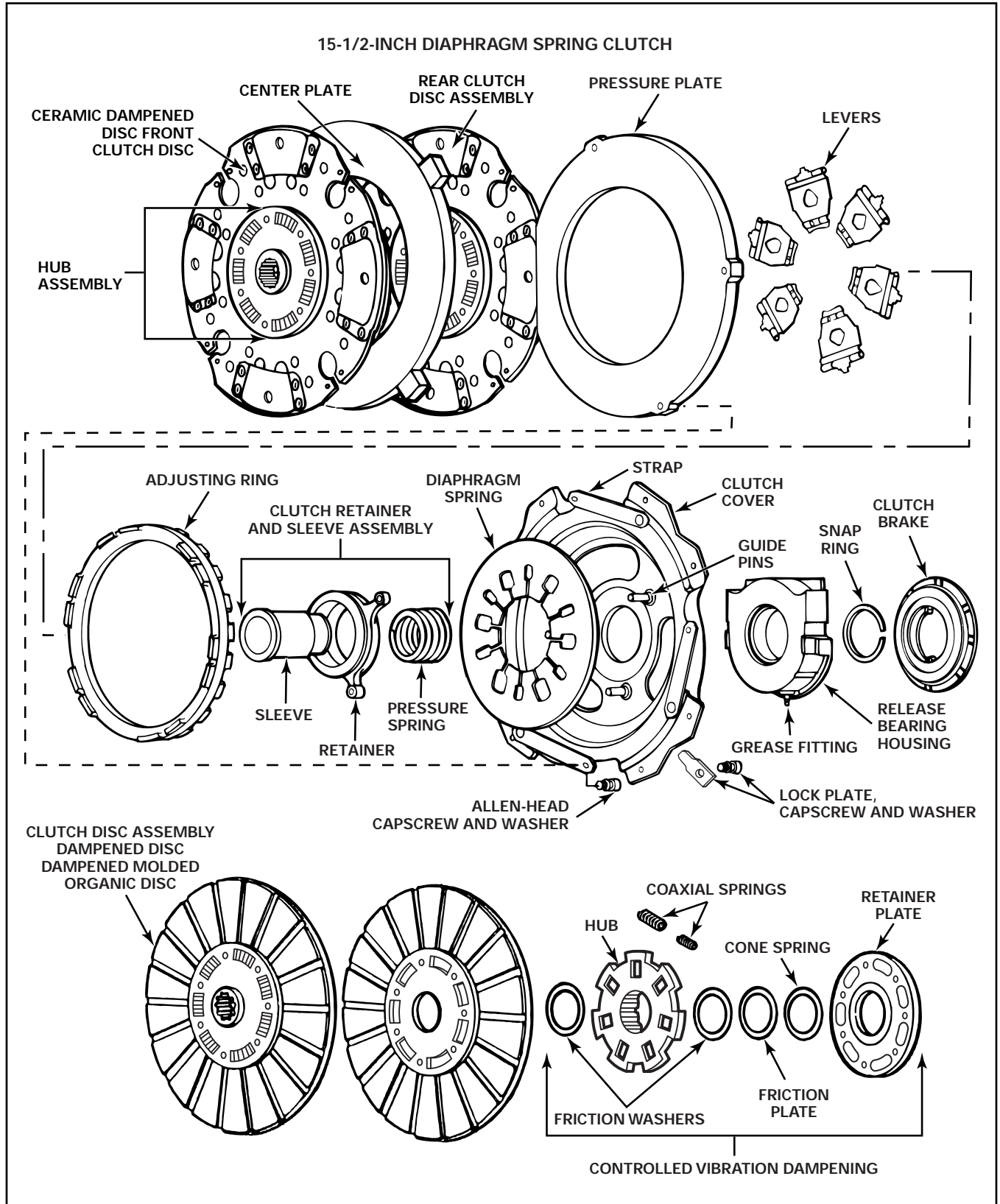
References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them for further guidance.

Section 1 Exploded Views

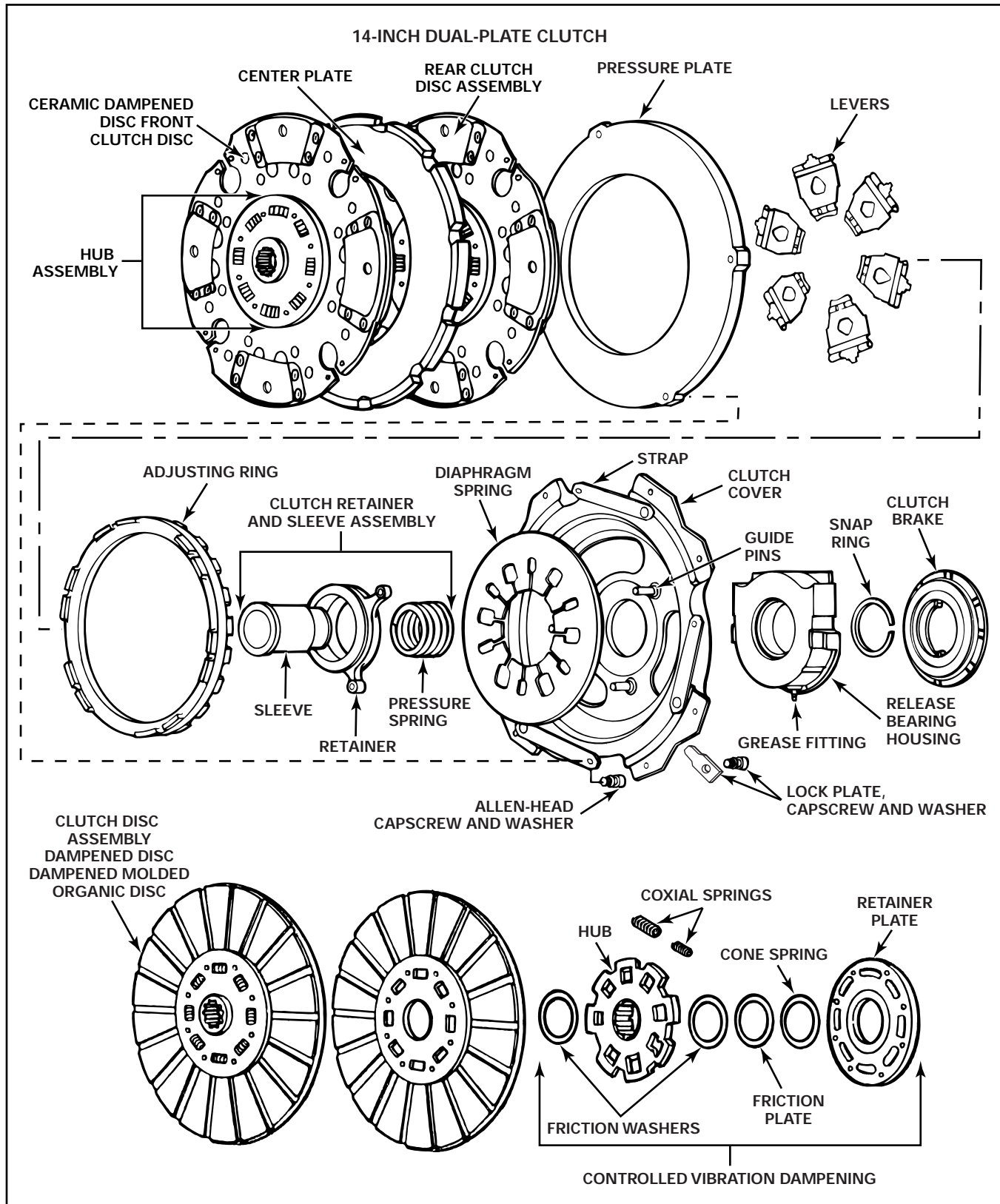


15-1/2-INCH AUTOJUST™ DIAPHRAGM SPRING CLUTCHES





Section 1 Exploded Views

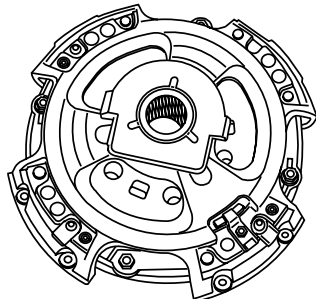


Description

Meritor clutches are primarily used on Class 6 to Class 8 series vehicles. The clutches are available in two sizes: 14-inch manual adjust, 15-1/2-inch manual adjust and 15-1/2-inch AutoJust™. The clutches are available in an eight-hole installation pattern. **Figures 2.1, 2.2 and 2.3.**

Figure 2.1

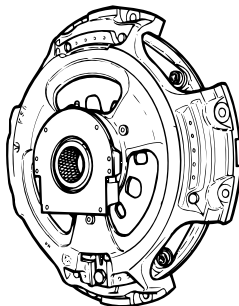
15-1/2" AUTOJUST™ CLUTCH



4001205a

Figure 2.2

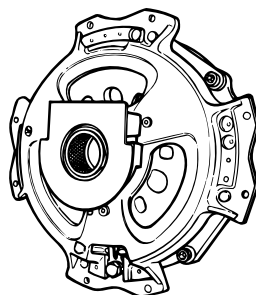
15-1/2" MANUAL ADJUST CLUTCH



4001206a

Figure 2.3

14" DUAL-PLATE MANUAL ADJUST CLUTCH



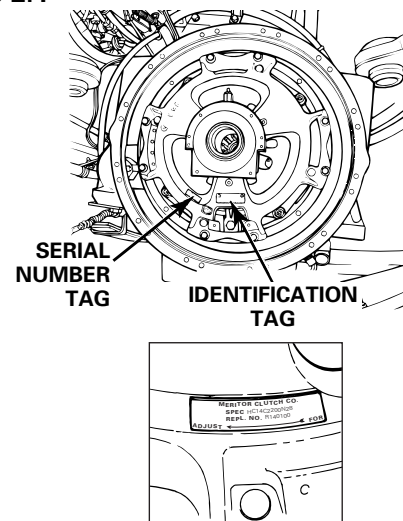
4001207a

Identification

To identify a clutch, refer to the identification and serial numbers located on the front of the clutch cover. Refer to these numbers when you replace parts. Use only the specified parts.

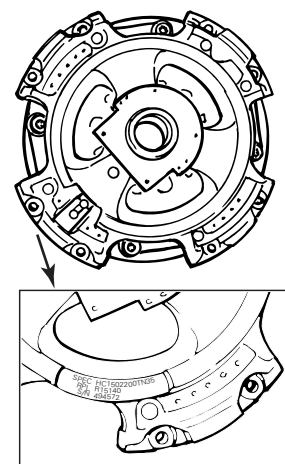
- **For clutch models manufactured on or before May 1999:** Refer to the identification tag and serial tag attached to the clutch cover. **Figure 2.4.**
- **For clutch models manufactured on or after May 1999:** Refer to the identification and serial numbers etched on the clutch housing. **Figure 2.5.**

Figure 2.4



4001208a

Figure 2.5



ETCHED SERIAL NUMBER AND IDENTIFICATION INFORMATION

4001209a

What Happens During Clutch Operation

The clutch is engaged at all times except when the driver pushes the clutch pedal. When the clutch is engaged, the input shaft of the transmission is connected to the engine through the plates and the clutch discs. **Figure 2.6.**

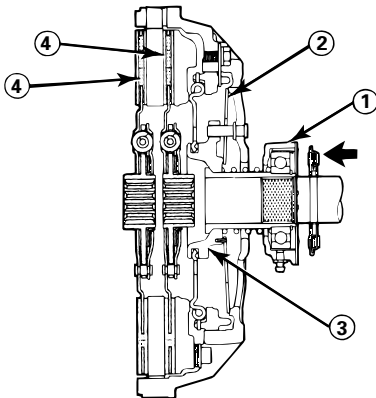
Here's what happens when the clutch is engaged:

1. The release fork does not touch the bosses on the release bearing, because the driver is not pushing down the clutch pedal.
2. The diaphragm spring is expanded in the cover and pushes the retainer toward the flywheel.
3. The retainer moves the levers and the levers pivot and push against the pressure plate toward the flywheel.
4. The front and rear clutch discs, which are connected to the input shaft, are squeezed together (sandwiched) between the pressure plate, the center plate and the flywheel. This is done because of the force of the spring and movement of the levers.

The squeezing together lets the discs and the input shaft rotate at the same speed as the engine.

Figure 2.6

ENGAGING THE CLUTCH



Disengaging the Clutch

The clutch is disengaged when the driver pushes the clutch pedal. The clutch must be disengaged to shift gears in the transmission. **Figure 2.7.**

When the clutch is disengaged, the input shaft of the transmission is not connected to the engine.

Here's what happens when the clutch is disengaged:

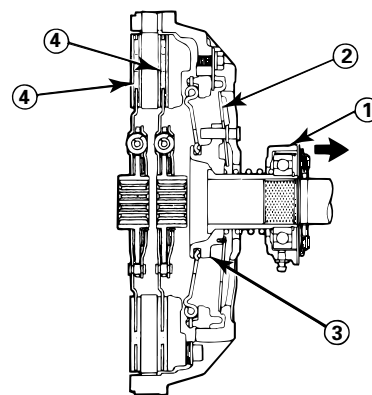
1. When the driver pushes the clutch pedal down, the linkage causes the release fork to pull the release bearing away from the clutch cover.
2. The release bearing and sleeve pull the retainer toward the front of the cover to compress the diaphragm spring.
3. The movement of the retainer moves the levers to release the force on the pressure plate by moving the pivot point of the lever toward the cover.
4. Without the force from the pressure plate, the discs move freely between the center plate and flywheel.

When the discs move freely, the input shaft of the transmission is disconnected from the engine. The operator now shifts the transmission into the correct gear.

When the driver releases the clutch pedal, the diaphragm spring and the levers put the clutch in the engaged position.

Figure 2.7

DISENGAGING THE CLUTCH



WARNING

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Removing the Clutch

WARNING

Meritor clutch facings and sintered buttons contain non-asbestos materials, whose long term health effects are unknown. You must use caution when you handle clutch linings.

Refer to the recommended procedure from the manufacturer of the vehicle to remove the clutch. The following is a general procedure to remove the clutch.

1. Remove the shift lever from the transmission. If necessary, remove the shift assembly from the transmission.
2. Mark the yoke or the flange of the driveshaft and the output shaft of the transmission. The marks on the driveshaft and the output shaft make sure the driveshaft is correctly reinstalled.
3. Remove the driveshaft.
4. Disconnect all the electrical connections from the transmission.
5. Disconnect all the air lines from the transmission.
6. If used, remove the spring from the clutch lever on the transmission. Mark and disconnect the clutch linkage from the clutch housing on the transmission.
7. If a hydraulic system is used on the clutch, disconnect the push rod and the spring from the release fork. Remove the hydraulic cylinder from the bracket on the transmission. Use wires to support the cylinder on the frame.
8. Support the transmission with an over head hoist or with a transmission jack. Make sure the transmission is securely supported.
9. Remove the fasteners that attach the transmission to the brackets on the frame.

CAUTION

Make sure the transmission does not hang by the input shaft in the pilot bearing bore in the flywheel. The clutch assembly and the pilot bearing will be damaged if the transmission is supported by the input shaft.

10. Remove the bolts and the washers that attach the bell housing to the engine. Pull the transmission straight out from the engine. Remove the transmission from the vehicle. **Figure 3.1.**
11. If used, remove the clutch brake assembly from the input shaft of the transmission. Inspect transmission input bearing retainer surface for excessive wear which can affect the clutch adjustment. Refer to Section 7. **Figure 3.2.**

Figure 3.1

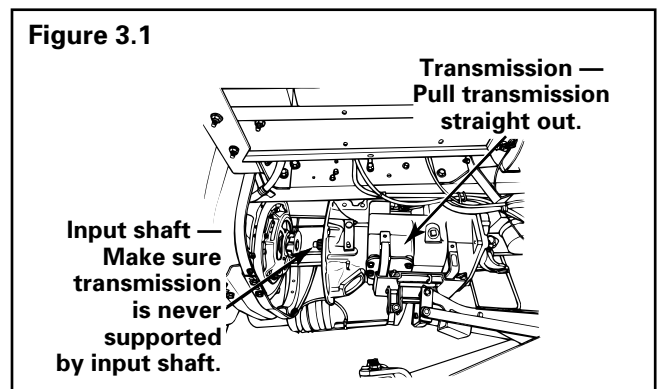
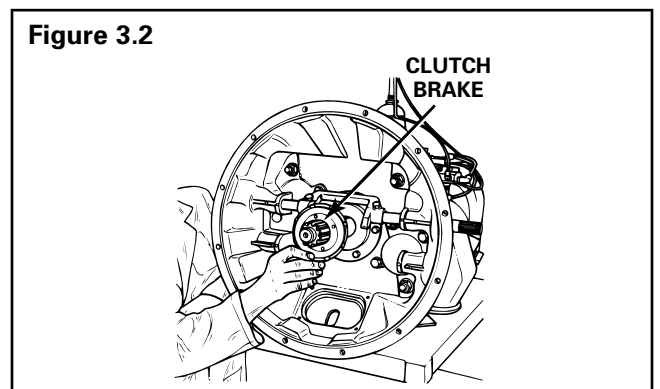


Figure 3.2



Section 3 Disassembly



NOTE: If the clutch is not being replaced, mark the cover of the clutch and the flywheel. The marks make sure that the clutch is correctly reinstalled on the flywheel.

12. Install a clutch alignment tool through the clutch and into the flywheel pilot bearing. The alignment tool supports the clutch assembly during removal. If an alignment tool is not available, use an input shaft from a manual transmission. Remove the gear from the end of the input shaft. Use the correct tool so that the splines of the tool match the splines in the clutch. **Figure 3.3.**

Clutch alignment tools are available from:

- Owatonna Tool Company: 7074-A (2-inch splines).
- SPX Kent-Moore Tools: J 26455-A (2-inch splines).
- Snap-on® Tools: HTT2501-3 (2-inch splines).

NOTE: If an alignment tool is not available, use an input shaft from a manual transmission to make a tool. Remove the gear from the end of the input shaft. **Figure 3.4.**

Figure 3.3

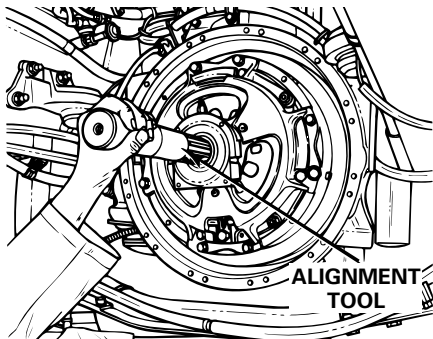
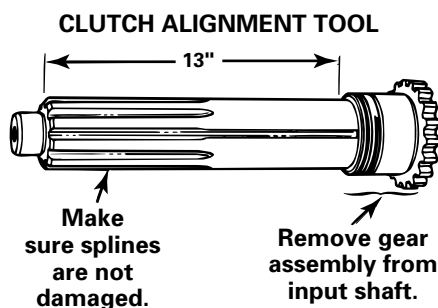


Figure 3.4

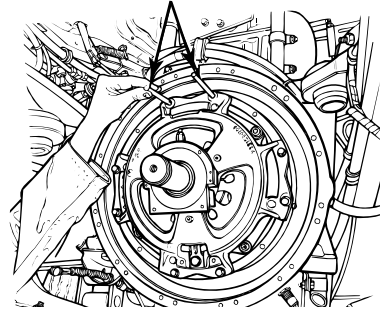


NOTE: You will use guide studs in the following step. For guide stud ordering information, refer to the Special Tools table in Section 10.

13. Remove the top two bolts that fasten the pressure plate and cover assembly to the flywheel. Install the two guide studs in the holes. **Figure 3.5.**

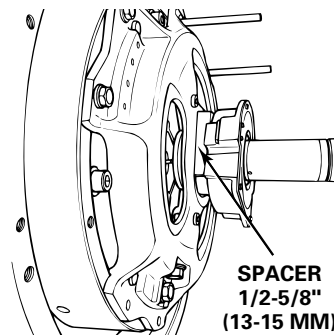
Figure 3.5

GUIDE STUDS

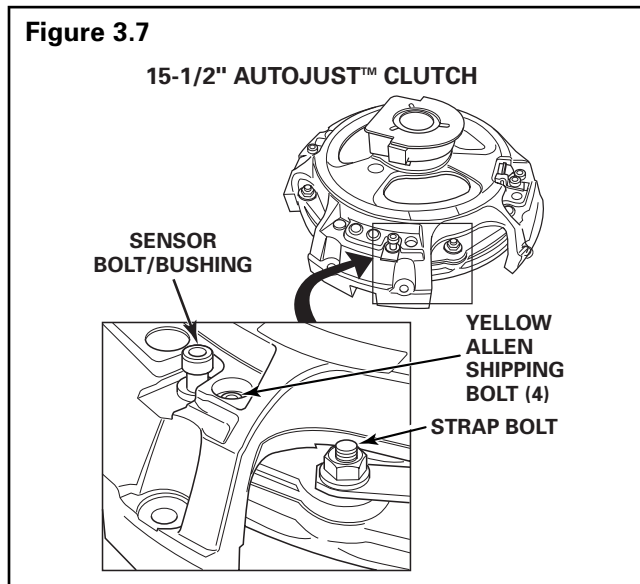


14. On 14-inch two-plate and 15-1/2-inch clutches: Place 1/2-5/8-inch (13-15 mm) spacers between the release bearing assembly and the clutch cover. The spacers ease removal and installation by preventing the diaphragm spring from applying force. **Figure 3.6.**

Figure 3.6



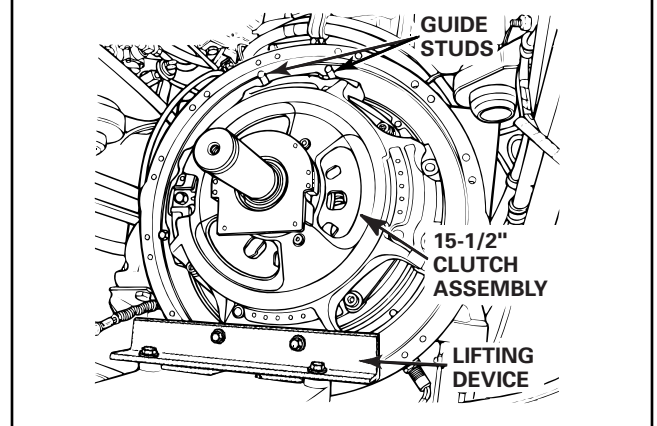
15. Removing a mounted clutch: When removing a 15-1/2-inch AutoJust mounted clutch from the flywheel, you must install the shipping bolts (socket head capscrew 10-32 x 1.75-inch) removed during installation before removing the clutch cover flywheel mounting bolts.
- Figure 3.7.**



NOTE: Truck Clutch and Flywheel Handler, tool number J 39613, is available from SPX Kent-Moore Tools. Refer to the Special Tools table in Section 10.

16. Remove the clutch according to the following procedures.
- On 15-1/2-inch clutches, connect a lifting device to the pressure plate and cover assembly. **Figure 3.8.**
 - Remove the remaining bolts that fasten the pressure plate and cover assembly to the flywheel.

Figure 3.8



NOTE: When removing the 15-1/2-inch clutch, the discs and the center plate can stay in the cover. Be careful when removing the center plate and the discs.

- Lift the pressure plate and cover assembly over the alignment tool and off the flywheel. **Figure 3.9.**
- Remove the rear disc. **Figure 3.10.**

NOTE: On 14-inch clutches, mark the position of one drive pin on the center plate.

- Remove the center plate. **Figure 3.10.**
- Remove the front disc. **Figure 3.10.**
- Remove the alignment tool from the flywheel.

Figure 3.9

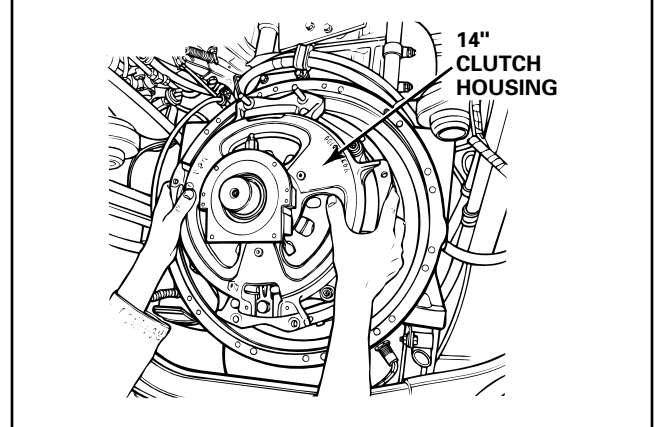
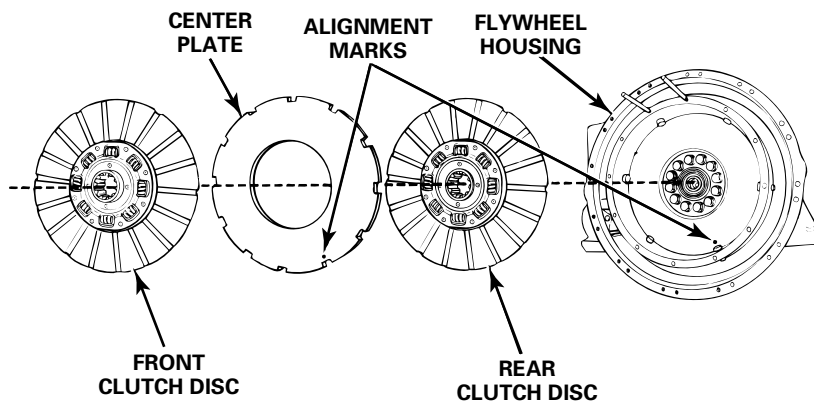


Figure 3.10

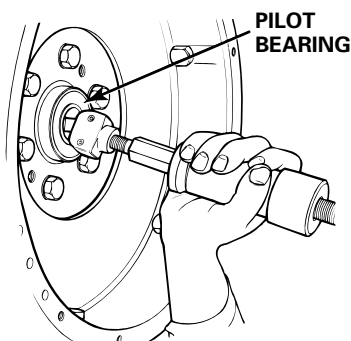


NOTE: Replace the pilot bearing with a pilot bearing that has a high temperature seal and uses high temperature grease. For severe high temperature applications, use a Viton seal.

17. **Every time the clutch assembly is serviced or the engine is removed, the pilot bearing in the flywheel must be removed and replaced.** Use an internal puller and a slide hammer to remove the pilot bearing. Discard the pilot bearing. **Figure 3.11.**

A pilot bearing puller is available from Snap-on Tools: SP2031. Refer to the Special Tools table in Section 10.

Figure 3.11



Removing the Release Bearing

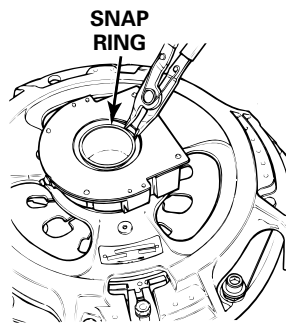


WARNING

When removing the release bearing, wear safe eye protection to prevent serious eye injury.

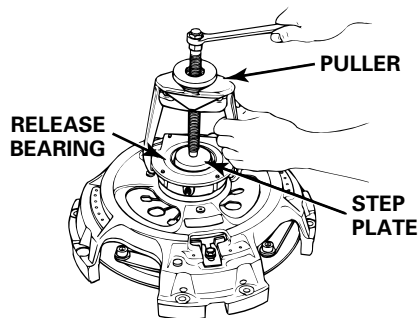
1. Remove the clutch as described in this section.
2. Remove the snap ring that fastens the release bearing to the sleeve. **Figure 3.12.**

Figure 3.12



3. Put a step plate on the outer diameter of the sleeve. Make sure the step plate extends over the outer diameter. **Figure 3.13.**
4. Use a two-jaw puller tool to remove the release bearing. Put the jaws of the puller under the bosses for the fork. **Figure 3.13.**

Figure 3.13



Section 4 Inspection



WARNING

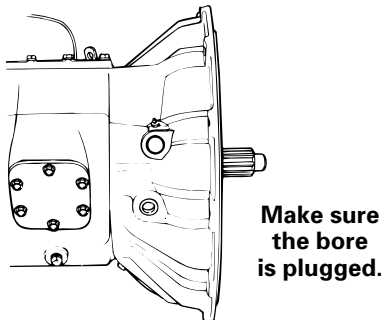
To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Inspecting the Bell Housing

Inspect the bell housing for wear and damage. Replace worn and damaged housings.

Inspect the cross shaft bores in the housing. Make sure plugs are in the bores that are not used. If the bores are not plugged, dirt and contaminants can enter into the clutch housing and damage the clutch. **Figure 4.1.**

Figure 4.1



Make sure an inspection cover is installed on the bottom of the bell housing. If an inspection cover is not used, dirt and contaminants can enter into the bell housing and damage the clutch. **Figure 4.2.**

Inspecting the Input Bearing Retainer

Inspect the input bearing retainer on the transmission. Check the area where the clutch brake touches the retainer. Replace worn or damaged retainers.

Measure the distance from the top of the splines on the input shaft to the top of the bearing retainer as shown in **Figure 4.3.** If the distance is more than 8.72-inches (221.48 mm), the input bearing retainer is worn and must be replaced.

Figure 4.2

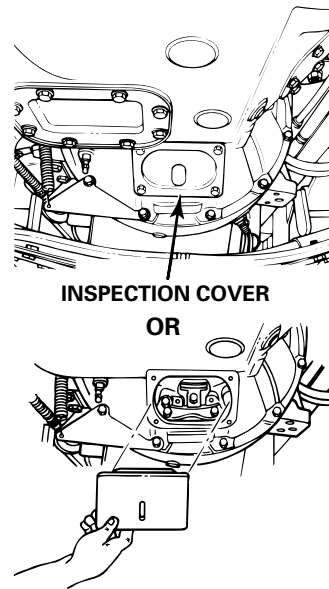
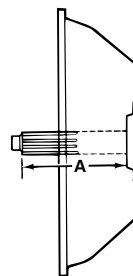


Figure 4.3

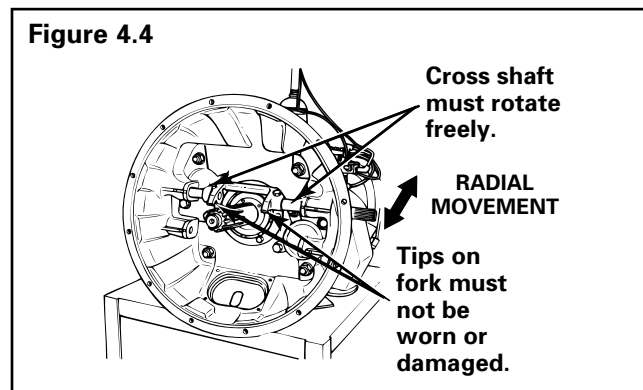


If dimension "A" is more than 8.72-inches (221.48 mm), replace the input bearing retainer.

Inspecting the Release Fork and Cross Shaft

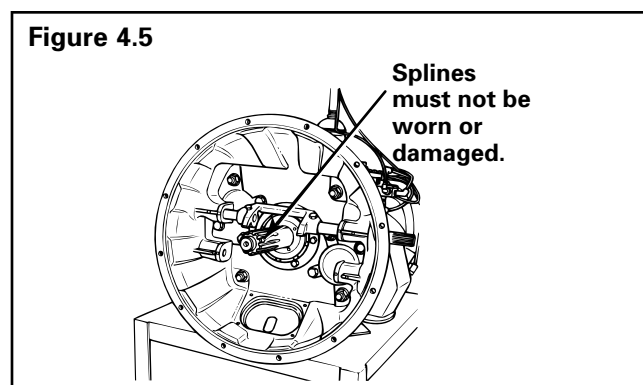
Inspect the shaft and the release fork. Make sure the release fork is straight and the tips of the fork are not worn or damaged. Replace forks that are worn or damaged. **Figure 4.4.**

Make sure the cross shafts rotate freely in the transmission housing. Make sure the shaft does not have any excessive radial (fore and aft) movement in the housing. If used, inspect the bushings for the shaft in the housing. Replace bushings and shafts that are worn or damaged. **Figure 4.4.**



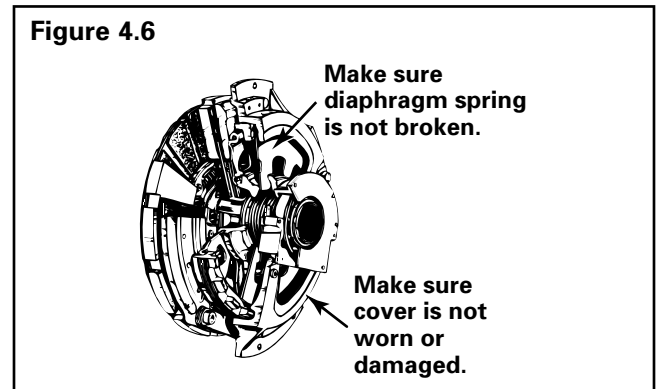
Inspecting the Input Shaft

Inspect the splines on the input shaft. Make sure the splines are not worn or damaged. Inspect the area of travel for the release bearing for damage. Use an emery cloth to remove small scratches from the input shaft. Replace input shafts that are worn or damaged. Any wear or damage on the input shaft causes the clutch not to operate correctly. **Figure 4.5.**



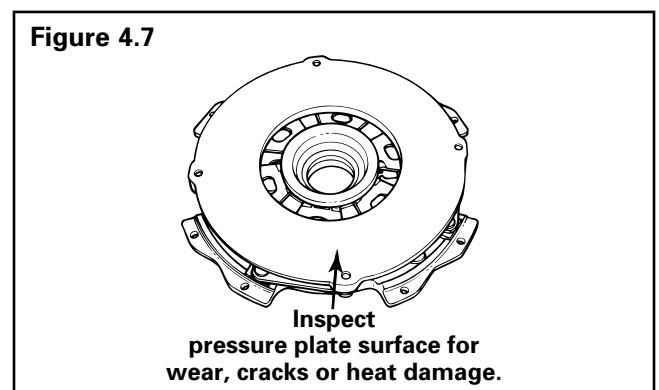
Inspecting the Cover Assembly

1. Remove dirt and contamination from the cover assembly with non-petroleum base cleaning solvents.
2. Inspect the cover for wear and damage. Make sure the diaphragm spring inside the cover is not broken. If the diaphragm spring is broken, the clutch cover must be disassembled to replace the spring. **Figure 4.6.**



Inspecting the Pressure Plate

1. Remove dirt and contaminants from the pressure plate with non-petroleum base cleaning solvents.
2. Inspect the pressure plate for wear or damage. **Figure 4.7.** Replace cracked pressure plates. Heat marks are a normal condition and may be removed with an emery cloth. If you cannot remove the heat marks, replace the pressure plate.

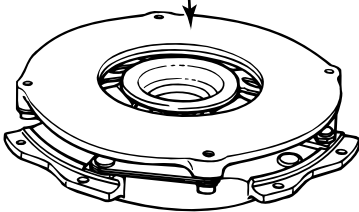


Section 4 Inspection

3. Place the pressure plate and cover assembly on a bench so that the plate is toward you.
4. Measure any deep scratches or scoring on the pressure plate. If the damage to the surface of the plate is more than 0.060-inch (1.52 mm), replace the pressure plate. **Figure 4.8.**

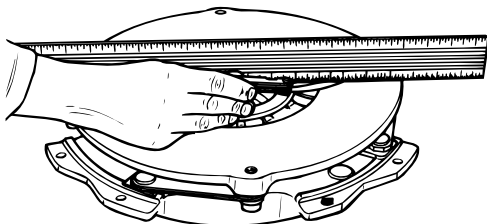
Figure 4.8

Replace pressure plate if scratches are deeper than 0.060" (1.52 mm).



5. Check the flatness on the surface of the pressure plate. Put a straightedge ruler across the complete surface of the pressure plate. Put a feeler gauge under each gap that appears between the ruler and the pressure plate. Measure the pressure plate at four positions. If the gap is more than 0.004-inch (0.10 mm), replace the pressure plate. **Figure 4.9.**

Figure 4.9



Pressure plate flatness: gap must not be more than 0.004" (0.10 mm).


6. Measure the runout of the pressure plate to make sure the surface is parallel. Refer to the following procedure.
 - A. Mark the cover and pressure plate. The marks make sure the pressure plate is installed in the original position of the cover.
 - B. Remove the capscrews that fasten the plate to the strap. **Figure 4.10.** Remove the pressure plate.
 - C. Place the pressure plate on a bench so that the smooth surface is towards you.
 - D. Put the base of a dial indicator inside the center of the plate. Put the tip of the dial indicator on the surface of the plate.
 - E. Set the dial indicator at "zero." Rotate the dial indicator one complete turn around the surface of the pressure plate.
 - F. If the reading on the dial indicator is more than 0.002-inch (0.05 mm), replace the pressure plate. **Figure 4.11.**
 - G. Put the pressure plate in the original position. Install and tighten the capscrews to 29-43 lb-ft (40-58 N•m). **Figure 4.10.** 

Figure 4.10

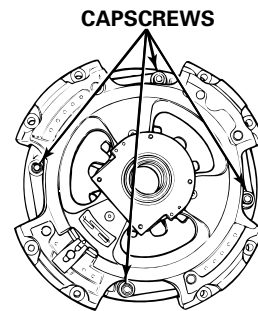
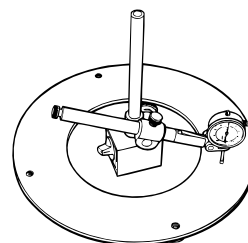


Figure 4.11



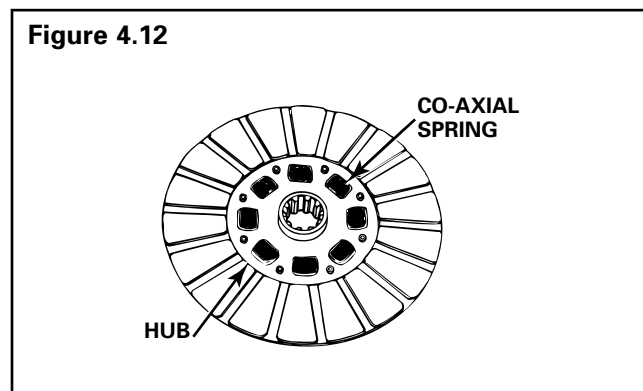
Pressure plate runout must not be more than 0.002-inch (0.05 mm).

Inspect the Clutch Discs

Inspect the clutch discs for wear or damage. Make sure the co-axial springs are not loose in the hub (springs that rattle are not loose). If the springs have any axial movement, the springs are loose. Make sure the splines in the hub are not damaged. Make sure the hub is fastened to the disc.

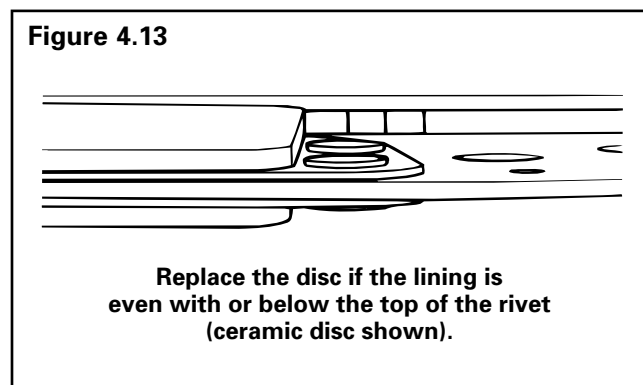
Figure 4.12.

Replace discs that are worn or damaged. Use a cleaning solvent with a non-petroleum base to remove grease and oil from the discs. If grease and oil cannot be removed, replace the disc.



Riveted Facings

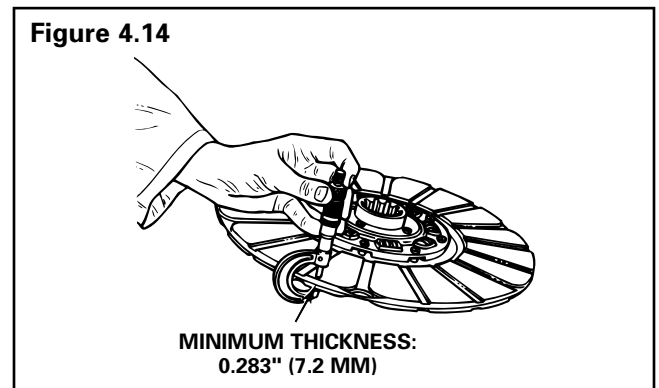
All ceramic facings and some organic facings are fastened to the disc with rivets. Replace the disc if the facing is loose or damaged. Replace the disc if the facing is worn to the top of the rivets or below the top of the rivets. **Figure 4.13.**



Molded Facings

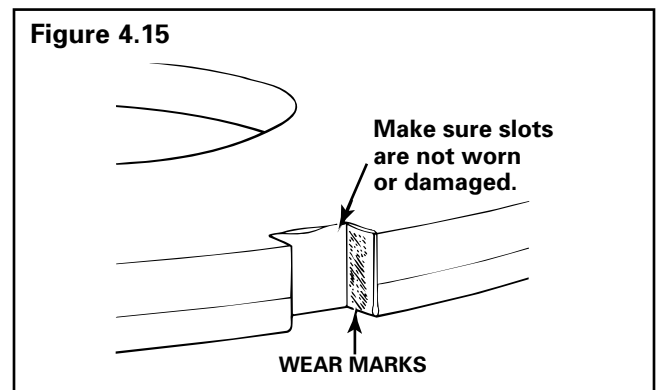
Some organic facings are integrally molded onto the disc. Replace the disc if the facing is loose or damaged. Use a micrometer to measure the thickness of the facing on the disc. If the thickness is less than 0.283-inch (7.2 mm), replace the disc.

Figure 4.14.



Inspect the Center Plate

On 14-inch clutches, inspect the drive pin slots for wear. If the slots are worn, move the plate so that the next slot is over the pin when the plate is installed. If all the slots are worn, replace the center plate. Do not repair worn or damaged slots by grinding. **Figure 4.15.**



Section 4 Inspection

On 15-1/2-inch clutches, inspect the tabs on the outer edge of the center plate. If the tabs are worn or damaged, replace the center plate. **Figure 4.16.**

Inspect the center plate for wear or damage. Make sure the plate is not cracked. Heat marks are a normal condition. The heat marks can be removed with an emery cloth. If heat marks cannot be removed, replace the center plate. Continue to check the center plate on each side of the plate according to the following procedure:

1. Use a micrometer or a caliper to measure the thickness of the center plate. If the thickness is less than 0.728-inch (18.5 mm) on 14-inch clutches with ceramic facings, 0.610-inch (15.5 mm) on 14-inch clutches with organic facings, or 0.681-inch (17.3 mm) on 15-1/2-inch clutches, replace the center plate. **Figure 4.17.**

Figure 4.16

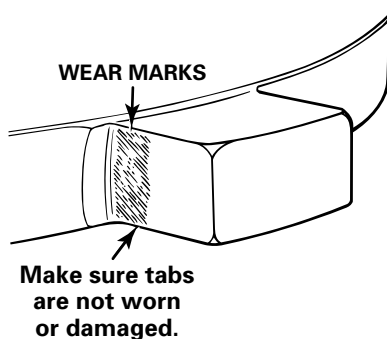
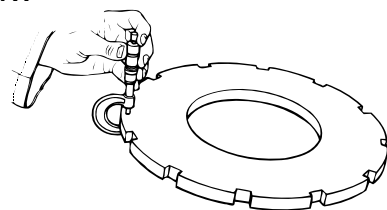


Figure 4.17



CENTER PLATE MINIMUM THICKNESS

Center Plate Size	Minimum Thickness	
	Inch	mm
14-Inch Organic Discs	0.610	15.5
14-Inch Ceramic Discs	0.728	18.5
15-1/2-Inch	0.681	17.3

2. Make sure the center plate is flat. Place a straightedge ruler across the complete surface of the plate. Place a feeler gauge under each gap that appears between the ruler and the center plate. If the gap is more than 0.002-inch (0.05 mm), refer to Step 4. **Figure 4.18.**
3. Measure the runout of the center plate to make sure the surface of the plate is parallel. Place the base of a dial indicator inside the center of the plate. Place the tip of the dial indicator on the surface of the plate. Set the dial indicator on "zero" (0). Rotate the dial indicator one complete turn around the surface of the center plate. If the reading on the dial indicator is more than 0.002-inch (0.05 mm), refer to Step 4. **Figure 4.19.**

Figure 4.18

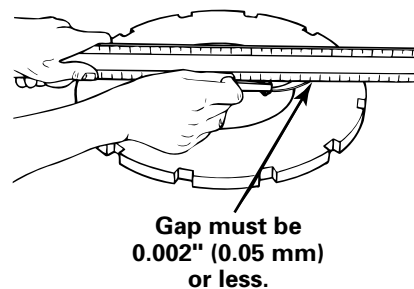
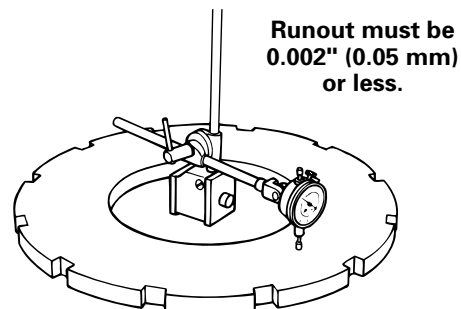


Figure 4.19



4. If either the runout or the flatness of the center plate is more than 0.002-inch (0.05 mm), grind a new outer surface on the center plate. Grind enough material from the plate so that the thickness is not less than 0.805-inch (20.07 mm) on 14-inch clutches with ceramic facings, 0.672-inch (17.27 mm) on 14-inch clutches with molded facings or 0.742-inch (18.84 mm) on 15-1/2-inch clutches. Repeat Steps 2 and 3.

Inspect the Pilot Bearing

Although the pilot bearings are replaced when the clutch is removed, inspect the old pilot bearing for wear and damage. Correct the cause of the wear and damage. **Figure 4.20.**

Flywheel Drive Pins — 14-Inch Clutches Only

On 14-inch clutches, inspect the drive pins in the flywheel. Replace any worn or damaged drive pins. Refer to the following procedure.

1. Remove the flywheel. Refer to the vehicle manufacturer's removal procedure.
2. Remove the set screw(s) that fasten each drive pin in the flywheel. **Figure 4.21.**



WARNING

Use a brass or leather mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off and cause serious personal injury.

3. Use a hammer and a punch to remove the drive pins from the flywheel. **Figure 4.22.**

Figure 4.21

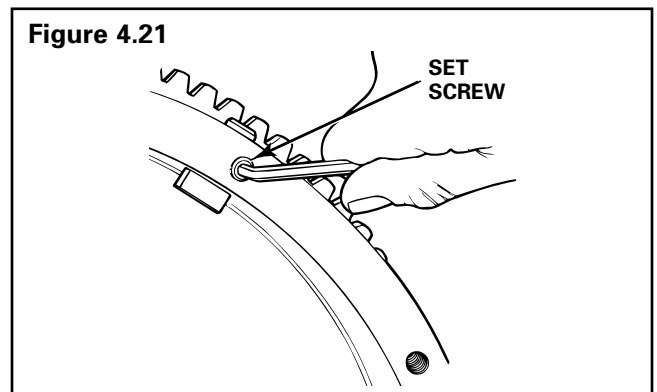


Figure 4.22

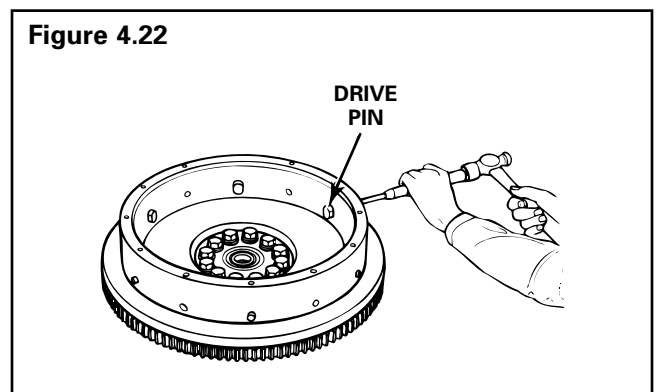
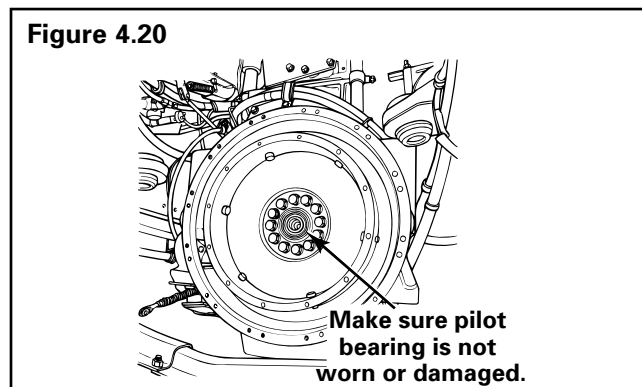


Figure 4.20



Section 4 Inspection

4. Install the drive pins according to the following procedure:
 - A. Place the drive pin in the flywheel so that the round sides of the head are toward the top and the bottom of the flywheel. Use a carpenter's square to make sure the flat sides of the pin are at a 90° angle to the top of the housing. **Figure 4.23.**



WARNING

Use a brass or leather mallet for assembly and disassembly procedures. Do not hit steel parts with a steel hammer. Pieces of a part can break off and cause serious personal injury.

- B. Use a drive pin installation tool and a brass hammer to install the drive pins in the flywheel. Using the installer tool is the preferred method of installation. **Figure 4.24.**

A drive pin installation tool is available from Snap-on Tools: SP2032. Refer to the Special Tools table in Section 10.

If a drive pin installation tool is not available, use a C-clamp to install the drive pin in the flywheel. Press the pin into the flywheel until the head of the pin touches the inner bore of the flywheel. **Figure 4.25.**

Figure 4.23

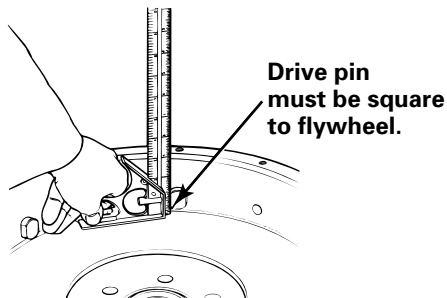


Figure 4.24

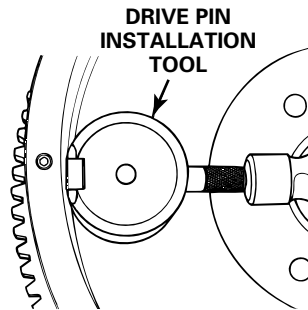
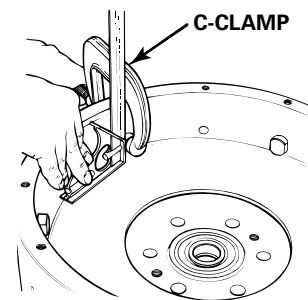


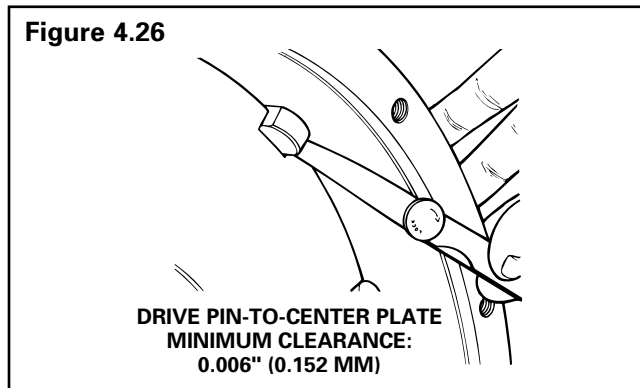
Figure 4.25



NOTE: Install the center plate so that the slot next to the original slot is installed over the drive pin.

5. Install the center plate in the flywheel. Make sure the slots in the plate are installed over the drive pins. Rotate the plate so that one side of the slot touches the drive pin. Use a feeler gauge to check the clearance between the slot and the opposite side of the drive pin. The minimum clearance between all drive pin slots is 0.006-inch (0.152 mm). If the clearance is less than 0.006-inch (0.152 mm), check the drive pin squareness again, and remove and correctly install the drive pin. **Figure 4.26.**

Figure 4.26



6. Install and tighten the set screw(s) that fasten the drive pin in the housing.
7. Install the flywheel. Refer to the vehicle manufacturer's installation procedure.

Flywheel

Inspect the flywheel for wear or damage. Heat marks may be a normal condition which can be removed with an emery cloth. Some wear or damage can be removed by grinding a new surface on the flywheel. If wear or damage cannot be removed, the flywheel must be replaced.

For service procedures, refer to the engine or vehicle manufacturer's procedure.



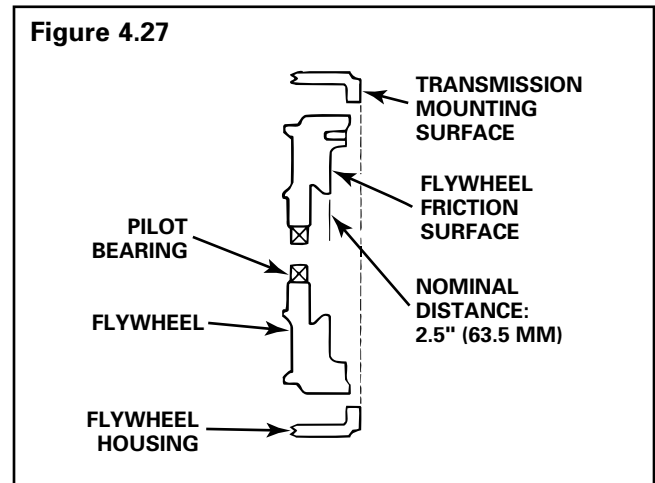
CAUTION

Grinding a new flywheel surface can cause the clutch to drag or the loss of clutch brake squeeze. Damage to components can result. Check with the engine manufacturer's recommended procedures on grinding of the flywheel.

If the flywheel has been ground, perform the following procedure:

1. Measure the distance between the flywheel friction surface and the transmission mounting surface as shown in **Figure 4.27**.
2. The nominal distance between the flywheel surface and the transmission mounting surface is 2.5-inches (63.5 mm).
3. If the clutch drags or the clutch brake squeeze is lost with a nominal distance of 2.5-inches (63.6 mm) between the surfaces, replace the flywheel.

Figure 4.27



NOTE: If a new surface is ground on the flywheel, make sure the flywheel depth is enough for the capscrews to fasten the clutch to the flywheel. Some flywheels have the threads for the capscrews below the surface of the flywheel. These flywheels use capscrews with a shoulder so that the clutch is securely fastened to the flywheel. If some of the surface of the flywheel is removed, the capscrews may "bottom out" and not fasten the clutch securely to the flywheel. Use new capscrews that are the correct length.

Inspect the ring gear teeth on the flywheel. If the teeth are worn or damaged, replace the ring gear or the flywheel. Refer to the procedure from the manufacturer of the engine or vehicle.

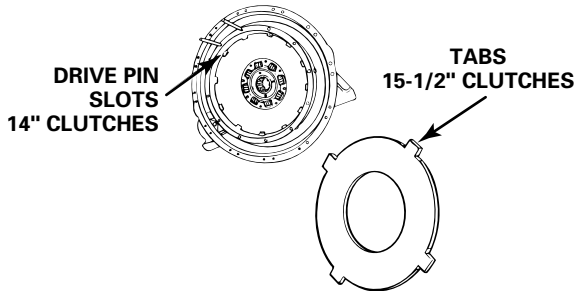
On 14-inch clutches, check the drive pins in the flywheel. Replace any worn or damaged drive pins. Make sure the pins are installed straight. Make sure the drive pins are installed square to the flywheel. **Figure 4.23.**

Section 4 Inspection



On 15-1/2-inch clutches, check the tabs on the outer edge of the center plate. Replace the center plate if the tabs are worn or damaged. **Figures 4.16 and 4.28.**

Figure 4.28



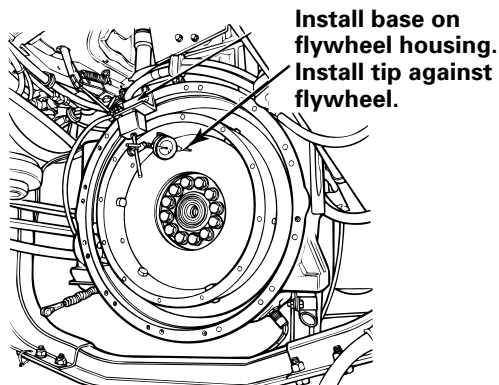
Checking the Runout on the Outer Surface of the Flywheel

The flywheel must have a flat surface so that the clutch can operate correctly. Check the runout of the outer surface of the flywheel to make sure the flywheel has a flat surface.

1. Push the flywheel toward the engine so that the end play of the crankshaft is not measured during the flywheel runout check.
2. Install a dial indicator so the base of the indicator is on the mounting surface of the flywheel housing. Place the dial indicator tip against the outer surface of the flywheel. **Figure 4.29.**

Figure 4.29

RUNOUT — OUTER SURFACE OF FLYWHEEL



3. Set the dial indicator on the "zero" mark.

NOTE: Do not use the starter to move the flywheel. Rotate the crankshaft with the correct size of socket on the front pulley. If the front pulley is difficult to turn, use a spanner wrench on the teeth of the flywheel to move the flywheel.

4. Manually turn the crankshaft one revolution in the direction of engine rotation.
5. Record the reading on the dial indicator. Typically, the runout for the outer surface of the flywheel is 0.007-inch (0.178 mm) on 14-inch clutches and 0.008-inch (0.203 mm) on 15-1/2-inch clutches. Refer to the vehicle or engine manufacturer's specifications for the maximum allowable runout.

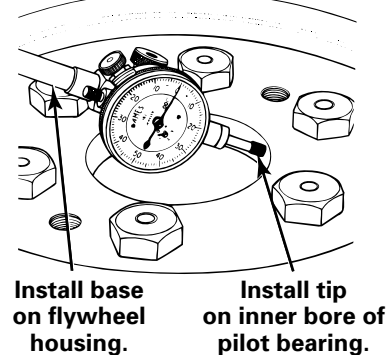
If the runout is more than the specified amount, service the flywheel as required. Refer to the procedure of the manufacturer of the engine or vehicle.

Checking the Runout on the Bore of the Pilot Bearing

1. Push the flywheel toward the engine so that the end play of the crankshaft is not measured.
2. Install a dial indicator so that the base of the indicator is on the mounting surface of the flywheel housing. Place the tip of the dial indicator against the outer surface of the bore for the pilot bearing. **Figure 4.30.**
3. Set the dial indicator on the "zero" mark.

Figure 4.30

RUNOUT — PILOT BEARING BORE



NOTE: Do not use the starter to move the flywheel. Rotate the crankshaft with the correct size of socket on the front pulley. If the front pulley is difficult to turn, use a spanner wrench on the teeth of the flywheel to move the flywheel.

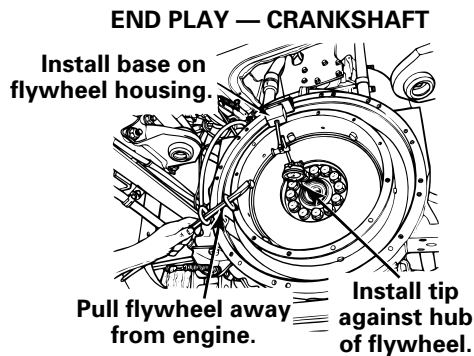
4. Manually turn the crankshaft one revolution in the direction of engine rotation.
5. Record the reading on the dial indicator. The maximum allowable runout for the surface of the bore of the pilot bearing is 0.005-inch (0.127 mm).

If the runout is more than 0.005-inch (0.127 mm), service the crankshaft as required. Refer to the vehicle or engine manufacturer's procedure.

Checking the End Play of the Crankshaft

1. Push the flywheel toward the engine.
2. Install a dial indicator so that the base of the indicator is on the flywheel housing. Place the tip of the dial indicator against the hub of the flywheel. **Figure 4.31.**

Figure 4.31

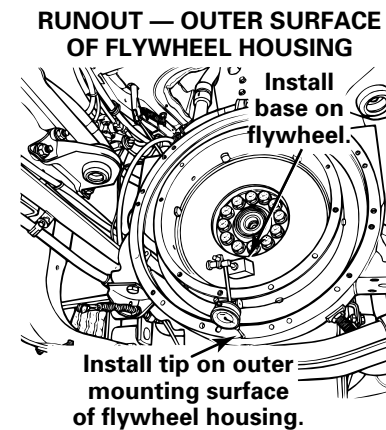


3. Set the dial indicator on the "zero" mark.
4. Pull the flywheel away from the engine.
5. Record the reading on the dial indicator. Check the reading against the specification of the manufacturer of the engine or vehicle. Service the crankshaft as required.

Checking the Runout of the Outer Surface and the Bore of the Flywheel Housing

1. Check the runout on the outer surface of the flywheel housing.
2. Push the flywheel toward the engine so that the end play of the crankshaft is not measured.
3. Install a dial indicator so that the base of the indicator is on the flywheel. Place the tip of the indicator against the mounting surface of the flywheel housing. **Figure 4.32.**

Figure 4.32



4. Set the dial indicator on the "zero" mark.

NOTE: Do not use the starter to move the flywheel. Rotate the crankshaft with the correct size of socket on the front pulley. If the front pulley is difficult to turn, use a spanner wrench on the teeth of the flywheel to move the flywheel.

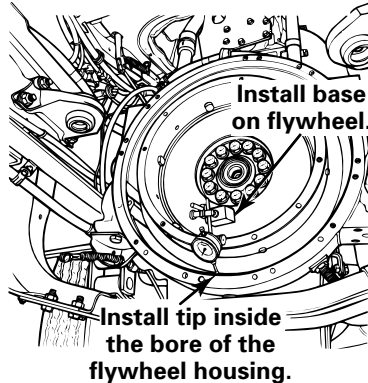
5. Manually turn the crankshaft one revolution in the direction of engine rotation.
6. Record the reading on the dial indicator. Typically, the maximum allowable runout for the outer surface of the flywheel housing is 0.008-inch (0.203 mm).
7. If the runout on the outer surface of the flywheel housing is more than 0.008-inch (0.203 mm), service the flywheel housing as required. Refer to the vehicle manufacturer's procedure.

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8. Check the runout on the inner bore of the flywheel housing.
9. Push the flywheel toward the engine so that the end play of the crankshaft is not measured.
10. Install a dial indicator so that the base of the indicator is over the center of the flywheel. Place the tip of the indicator against the inner bore of the flywheel housing. **Figure 4.33.**

Figure 4.33

RUNOUT — BORE OF FLYWHEEL HOUSING



11. Set the dial indicator on the "zero" mark.

NOTE: Do not use the starter to move the flywheel. Rotate the crankshaft with the correct size of socket on the front pulley. If the front pulley is difficult to turn, use a spanner wrench on the teeth of the flywheel to move the flywheel.

12. Manually turn the crankshaft one revolution in the direction of engine rotation.
13. Record the reading on the dial indicator. The maximum allowable runout for the inner bore of the flywheel housing is 0.008-inch (0.203 mm).
14. If the runout of the inner bore of the flywheel housing is more than 0.008-inch (0.203 mm), service the flywheel as required. Refer to the vehicle or engine manufacturer's procedure.



WARNING

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Solvent cleaners can be flammable, poisonous and cause burns. Examples of solvent cleaners are carbon tetrachloride, emulsion-type cleaners and petroleum-based cleaners. To avoid serious personal injury when you use solvent cleaners, you must carefully follow the manufacturer's product instructions and these procedures:

- ***Wear safe eye protection.***
- ***Wear clothing that protects your skin.***
- ***Work in a well-ventilated area.***
- ***Do not use gasoline, or solvents that contain gasoline. Gasoline can explode.***
- ***You must use hot solution tanks or alkaline solutions correctly. Follow the manufacturer's instructions carefully.***

Cleaning Ground or Polished Parts

Use a cleaning solvent to clean ground or polished parts and surfaces. Kerosene or diesel fuel can be used for this purpose. **DO NOT USE GASOLINE.**

Do NOT clean ground or polished parts in a hot solution tank or with water, steam or alkaline solutions. These solutions will cause corrosion of the parts.

Cleaning Rough Parts

Rough parts can be cleaned with the ground or polished parts. Rough parts also can be cleaned in hot solution tanks with a weak alkaline solution. Parts must remain in the hot solution tanks until they are completely cleaned and heated.

Drying Cleaned Parts

Parts must be dried immediately after cleaning. Dry parts with clean paper or rags, or compressed air.

Preventing Corrosion and Rust on Cleaned Parts

Apply lubricant to cleaned and dried parts that are not damaged and are to be immediately assembled. Do NOT apply lubricant to the linings.

If parts are to be stored, apply a special material that prevents corrosion and rust to all surfaces. Do NOT apply the material to the linings. Store the parts inside special paper or other material that prevents corrosion and rust.

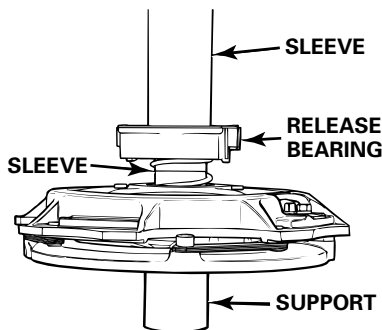
WARNING

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Installing the Release Bearing

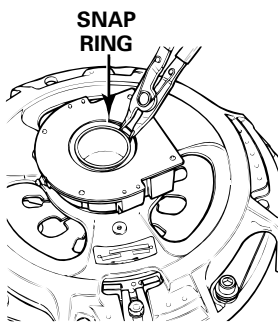
1. Place the cover on a press so that the cover is toward the top of the press. Place a support under the sleeve and lever assembly. **Figure 6.1.**

Figure 6.1



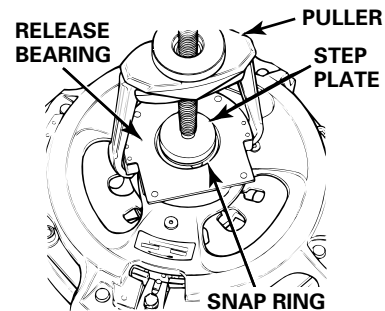
2. Install the release bearing on the sleeve so that the riveted plate on the bearing is away from the cover. **Figure 6.1.**
3. Make sure the release bearing is straight on the sleeve. Use a sleeve to press the bearing on the sleeve. The bearing is correctly installed when the bearing assembly touches the shoulder on the sleeve and groove for the snap ring is visible. **Figure 6.1.**
4. Install the snap ring that fastens the bearing on the sleeve. **Figure 6.2.**

Figure 6.2



5. Place a step plate on the outer diameter of the sleeve and install a puller tool on the release bearing. Pull the bearing against the snap ring. **Figure 6.3.**
6. Make sure the release bearing rotates freely on the sleeve.

Figure 6.3



Installing the Clutch

WARNING

Meritor clutch facings and sintered buttons contain non-asbestos materials, whose long term health effects are unknown. You must use caution when you handle clutch linings.

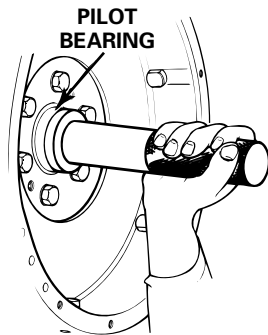
NOTE: Do not remove the shipping bolts spacers or the wood blocks between the release bearing and the clutch cover until after the clutch is installed. The shipping bolts, spacers or blocks keep the diaphragm spring from applying force to make installation of the clutch easier. The spacers will drop out and the shipping bolts are easily removed when the mounting bolts are tightened.

1. Lubricate the bore in the crankshaft for the pilot bearing with the specified lubricant. Make sure a high temperature multi-purpose grease is used. Do not use too much lubricant. If too much lubricant is used, the lubricant may get on the discs and causes the discs to slip.

NOTE: Replace the pilot bearing with a pilot bearing that has a high temperature rubber seal and uses high temperature grease. For severe high temperature applications, use a Viton seal.

2. Use the correct size of driver to install a new pilot bearing in the bore of the crankshaft. Refer to the procedure of the manufacturer of the vehicle or engine. **Figure 6.4.**

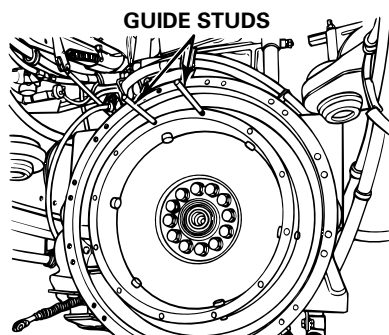
Figure 6.4



3. Install guide studs in two of the upper mounting holes for the cover and pressure plate assembly. **Figure 6.5.**

Guide studs are available from Snap-on Tools: SP2035 (7/16-inch studs for 14-inch clutches) and SP2036 (3/8-inch studs for 15-1/2-inch clutches). Refer to the Special Tools table in Section 10.

Figure 6.5



CAUTION

Use an alignment tool when installing the clutch. If an alignment tool is not used, the clutch may not be installed correctly. A clutch that is not correctly installed may damage the clutch, the flywheel or the input shaft of the transmission.

4. Install the clutch according to the following procedure.

14-Inch Clutches (Dual Plates)

- A. Install the alignment tool in the flywheel pilot bearing. **Figure 6.6.**
- B. Lightly lubricate the splines in the discs with the grease used on the release bearing. Meritor recommends a high temperature multi-purpose wheel bearing grease, but use the grease recommended by the vehicle manufacturer.
- C. Install the front clutch disc over the alignment tool. Make sure the words FLYWHEEL SIDE on the disc are toward the flywheel. **Figure 6.6.**
- D. On standard clutches, install the center plate in the flywheel housing so that the slot marked during removal is over one slot from the marked drive pin. Be sure the center plate moves freely and has the correct clearance (0.006-inch or 0.152 mm) between the drive pins and the plate. **Figure 6.7.**
- E. On standard clutches, install the rear disc over the alignment tool. Make sure the words PRESSURE PLATE SIDE on the disc will be toward the pressure plate. **Figure 6.6.**
- F. Install the pressure plate and cover assembly over the alignment tool and onto the guide studs. **Figure 6.6.**

Figure 6.6

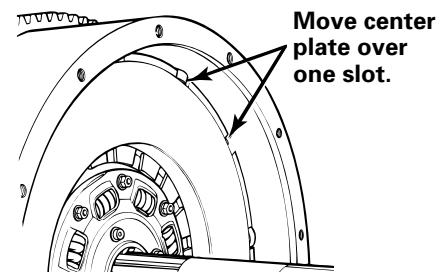
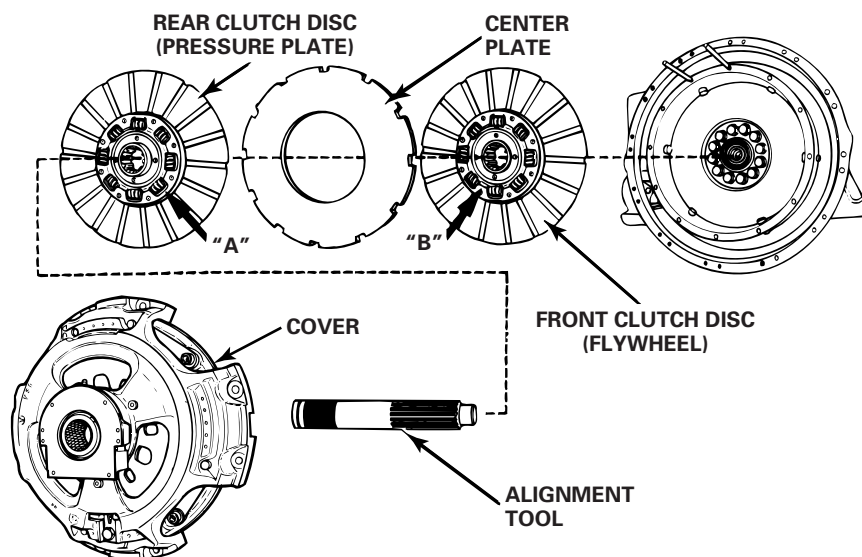
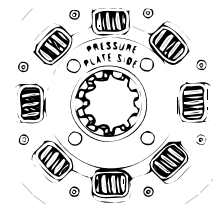


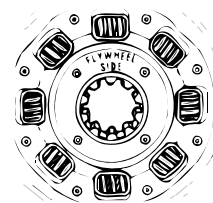
Figure 6.7



Arrow "A"
markings must be
toward pressure plate.



Arrow "B"
markings must be
toward flywheel.



15-1/2-Inch Clutches (Includes AutoJust)

NOTE: Truck Clutch and Flywheel Handler, Tool Number J 39613, is available from Kent-Moore Tools. Refer to the Special Tools table in Section 10.

- A. Connect a lifting device to the pressure plate and cover assembly. **Figure 6.9.**
- B. Lightly lubricate the splines in the clutch discs with the grease used for the release bearing. Meritor recommends using a high temperature multi-purpose wheel bearing grease, but use the lubricant recommended by the manufacturer of the vehicle.
- C. Install the rear disc in the pressure plate and clutch cover assembly. Make sure the words "INTERMEDIATE PLATE" on the disc are toward the intermediate plate. **Figure 6.9.**
- D. Install the center plate over the disc in the pressure plate and clutch cover assembly.

Make sure the tabs on the plate are in the slots on the cover. Be sure the center plate moves freely.

Check the clearance between the slots and the tabs. Move the center plate so that the tab touches the slot. Insert feeler gauge in the clearance on the other side. The minimum clearance is 0.006-inch (0.152 mm). If the clearance is less than 0.006-inch (0.152 mm), replace the center plate. DO NOT GRIND THE TABS OF THE CENTER PLATE. **Figure 6.8.**

- E. Install the front disc against the center plate. Make sure the words "INTERMEDIATE PLATE" on the disc are toward the intermediate plate. **Figure 6.9.**
- F. Install the alignment tool through the assembly. Rotate the discs so that the splines in the hub are aligned with the splines on the tool. **Figure 6.9.**

Figure 6.8

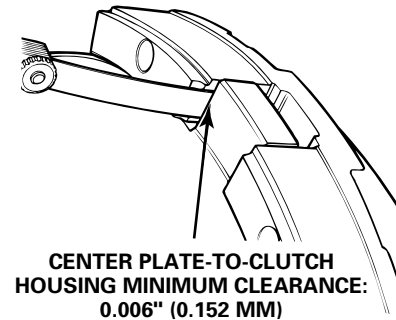
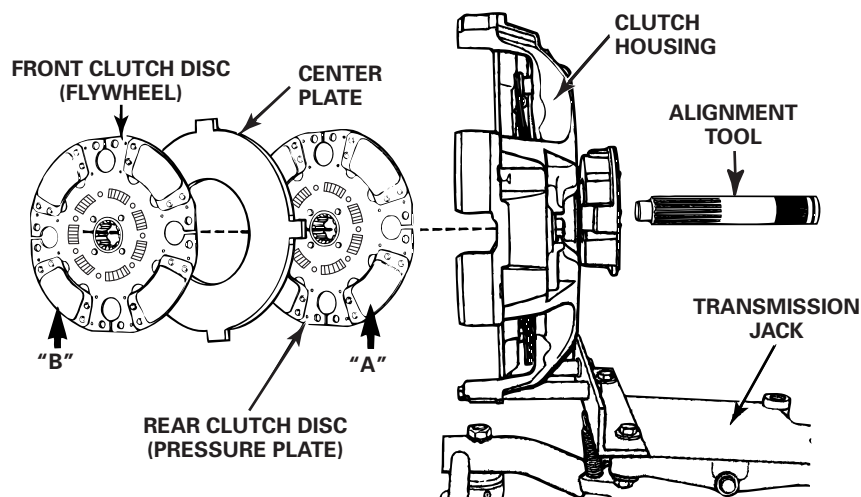
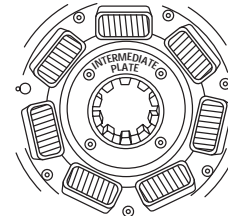


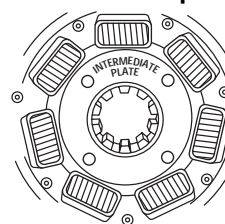
Figure 6.9



Arrow "A" markings must be toward intermediate plate.



Arrow "B" markings must be toward intermediate plate.

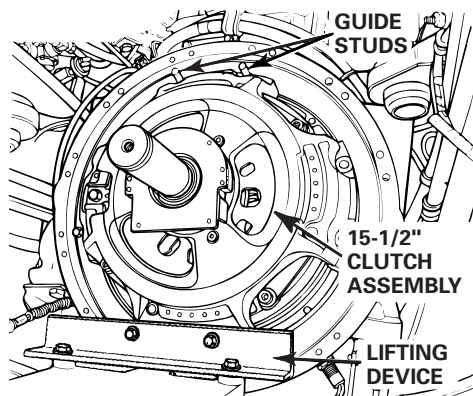


WARNING

Tilt the front of the tool up when the clutch assembly is installed. If the tool is not tilted up, components will fall off the tool and cause serious personal injury and damage the components.

- G. Use a lifting device to lift the clutch assembly on to the guide studs. Make sure the tool is installed in the flywheel pilot bearing. Install the clutch assembly against the flywheel. Remove the lifting device. **Figure 6.10.**

Figure 6.10



5. Install and hand tighten the capscrews that fasten the clutch cover to the flywheel.
6. Remove the studs. Install and hand tighten the remaining capscrews.

NOTE: When the capscrews are tightened, the woods blocks or spacers will fall from between the release bearing and the cover.

7. Tighten the capscrews to the specified torque in the pattern shown in **Figures 6.11 and 6.12**. Refer to the vehicle manufacturer's specifications for the capscrew torque range.

Figure 6.11

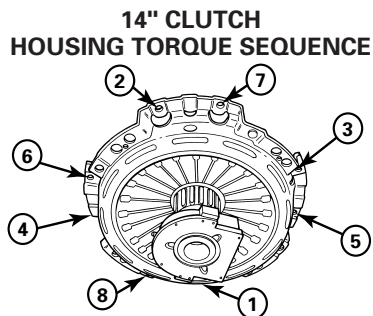
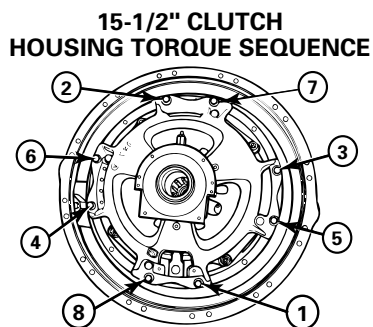


Figure 6.12

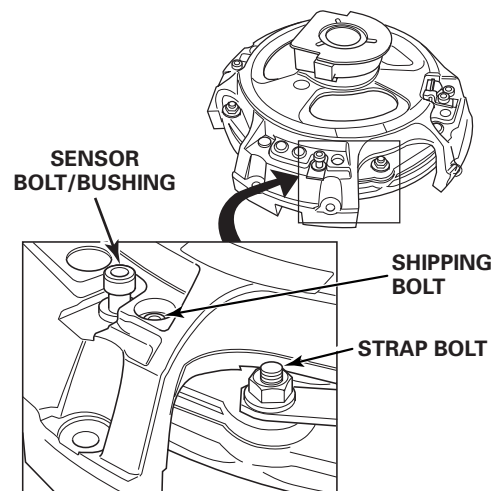


CAUTION

On AutoJust clutches, do not remove or loosen the sensor bolts or strap bolts, which can cause the automatic clutch adjustment feature to operate incorrectly. Damage to components can result.

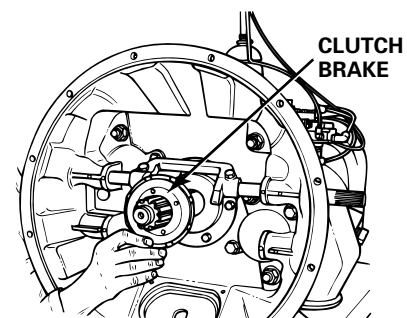
8. On AutoJust clutches, remove the four shipping bolts. Do not remove or loosen the sensor bolts or strap bolts. **Figure 6.13**.

Figure 6.13



9. Remove the alignment tool or the input shaft tool.
10. If used, install the clutch brake (large diameter towards the transmission) on the input shaft of the transmission. Make sure the tabs on the clutch brake engage the slots in the input shaft. **Figure 6.14**.

Figure 6.14



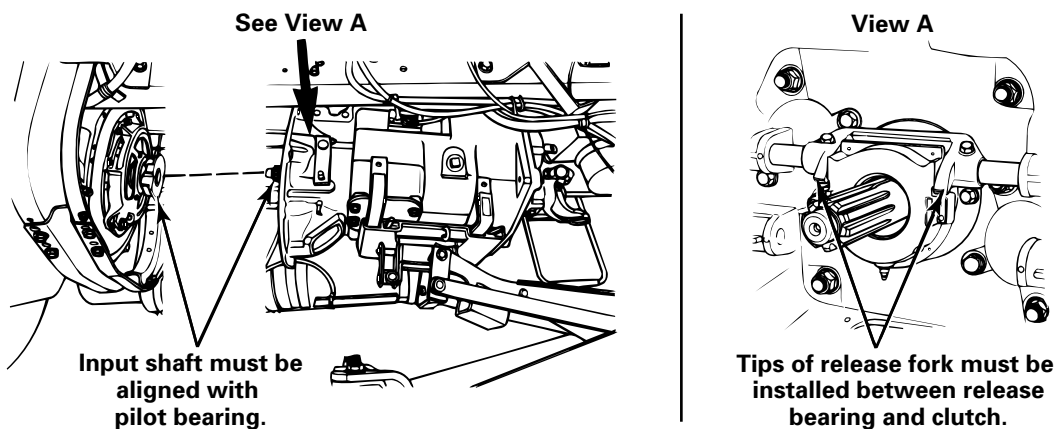
11. Remove the inspection cover from the housing on the transmission.
12. Place the transmission on a transmission jack or lifting device.

CAUTION

Be careful when installing the input shaft of the transmission in the hubs of the disc. If the transmission is forced or jammed, the clutch discs or the clutch assembly will be damaged. Also, do not let the transmission hang or be supported by the clutch or the discs. The clutch or the discs are damaged when the transmission is not correctly installed.

13. Position the transmission so that the input shaft is aligned with the pilot bearing. Move the input shaft into the clutch assembly. Make sure the two tips of the release fork are installed between the release bearing assembly and the clutch cover. If necessary, rotate the output shaft of the transmission to align the splines on the input shaft with the teeth in the hubs of the clutch discs. Push the transmission against the flywheel housing. **Figure 6.15.**
14. Install the capscrews that fasten the bell housing on the transmission to the flywheel housing. Tighten the capscrews to the specified torque and the sequence specified by the manufacturer of the vehicle or transmission.
15. Align the transmission with the brackets on the frame. Install the fasteners that hold the transmission on the brackets. Tighten the fasteners to the torque specified by the manufacturer of the vehicle.
16. Remove the transmission jack or lifting device from the transmission.

Figure 6.15



17. If a hydraulic assist system is used for the clutch, install the slave cylinder in the bracket on the transmission. Connect the push rod to the release lever on the transmission. Connect the spring to the release lever.
18. Connect the clutch linkage to the release lever on the transmission. Connect the spring to the release lever.
19. Connect the air lines to the transmission.
20. Connect the electrical connectors to the transmission.
21. Connect the driveshaft to the output yoke on the transmission. Make sure the alignment marks on the output yoke and the driveshaft that were made during removal are aligned.
22. Connect the shift lever to the transmission. If removed, install the shifter assembly on the transmission.
23. Lubricate the clutch housing, the cross shaft bushings and the release bearing housing. Refer to Section 8 in this manual.
24. Adjust the clutch and/or the linkage. Refer to Section 7 in this manual.



CAUTION

Make sure the inspection cover on the bell housing is used. If an inspection cover is not used, dirt and contaminants can enter the bell housing and damage the clutch.

25. Install the inspection cover. Install and tighten the capscrews. Tighten the capscrews to the specified torque of the manufacturer of the vehicle.
26. Operate the vehicle. Check for correct operation.

WARNING

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance and service.

Adjusting the Clutch

When You Should Adjust the Clutch

- At clutch removal or installation
- When servicing any component of the clutch linkage
- Whenever the clutch pedal free travel is less than 0.50-inch (13 mm).

Before You Adjust the Clutch

- Check that the clutch system is in good condition.
- Check that the linkage is tight and moves freely.
- Check for “false” free travel. Keep the clutch lever from moving and press the clutch pedal. If the pedal moves more than 0.50-inch (13 mm), “false” free travel in the linkage. Inspect the linkage and all pivot points for wear or damage. Service as necessary.
- Check that the release fork moves when you press the clutch pedal.
- When a hydraulic system is used, check that the fluid in the reservoir is at the specified level. Refer to the vehicle manufacturer’s procedures.

Checking the Release Bearing Clearance

NOTE: For ordering information on special tools used to adjust the clutch, refer to the Special Tools table in Section 10.

14-Inch Dual-Plate and 15-1/2-Inch Clutches (Includes AutoJust)

1. Push the clutch pedal to the end of travel several times to ensure the release bearing is fully REARWARD.
2. Remove the bell housing inspection cover.

NOTE: For non-synchronized transmissions, the specified release bearing clearance is 0.500-inch (12.7 mm) MINIMUM to 0.562-inch (14.2 mm) MAXIMUM with a TARGET clearance of 0.531-inch (13.5 mm) between the front of the release bearing and the clutch brake. If the clearance is 0.717-inch (18.0 mm) or more, the release bearing clearance MUST be adjusted.

3. Measure the release bearing clearance.

- **For synchronized transmissions:** The clearance between the front of the release bearing and the clutch cover must equal 11/16-inch (17 mm). **Figure 7.1.** Adjust the release bearing clearance if the clearance is not within specification.
- **For non-synchronized transmissions:** Use a 0.50-inch telescoping gauge tool to check the release bearing clearance. The tool must fit tightly between the release bearing and the clutch brake. Do not force the gauge tool. The release bearing can move FORWARD and can cause an incorrect measurement. **Figure 7.2.** Adjust the release bearing clearance when the telescoping gauge tool fits loosely or does not fit.

Figure 7.1

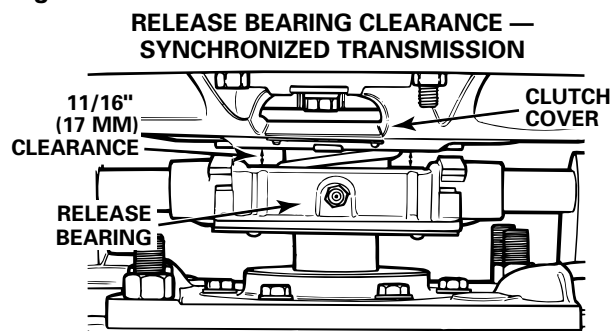
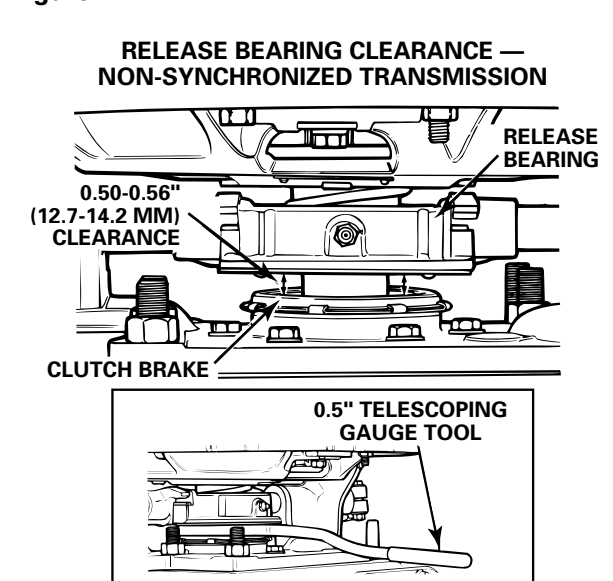


Figure 7.2



Adjust the Release Bearing Clearance

14-Inch Dual-Plate and 15-1/2-Inch Clutches

1. Push the clutch pedal to the end of travel several times to ensure the release bearing is fully REARWARD.

CAUTION

Overstroking can cause internal bottoming in the clutch and make the adjusting ring difficult to move.

On non-synchronized transmission, there must be a clearance of 1/8-inch (3 mm) between the release bearing and the clutch brake or the adjusting ring may not move.

On synchronized transmissions, there must be a clearance of 1-1/16-inch (27 mm) between the release bearing and the input bearing retainer or the adjusting ring may not move.

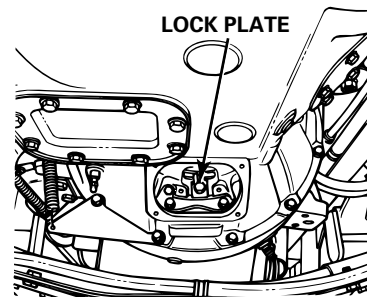
2. Allow the adjusting ring to rotate.
 - **For synchronized transmissions:** Use a block of wood to hold the clutch pedal, or have another person hold the clutch pedal, to provide clearance of at least 1-1/16-inch (27 mm) between the release bearing and the input bearing retainer. Hold the pedal in this position when moving the adjusting ring.
 - **For non-synchronized transmissions:** Use a block of wood to hold the clutch pedal, or have another person hold the clutch pedal, to provide clearance of at least 1/8-inch (3 mm) between the release bearing and the clutch brake. Hold the pedal in this position when moving the adjusting ring.

CAUTION

Use the correct size socket on the front pulley to move the flywheel. If the pulley is difficult to turn, use a spanner wrench on the teeth of the flywheel. Do not use the starter to move the flywheel. Damage to components can result.

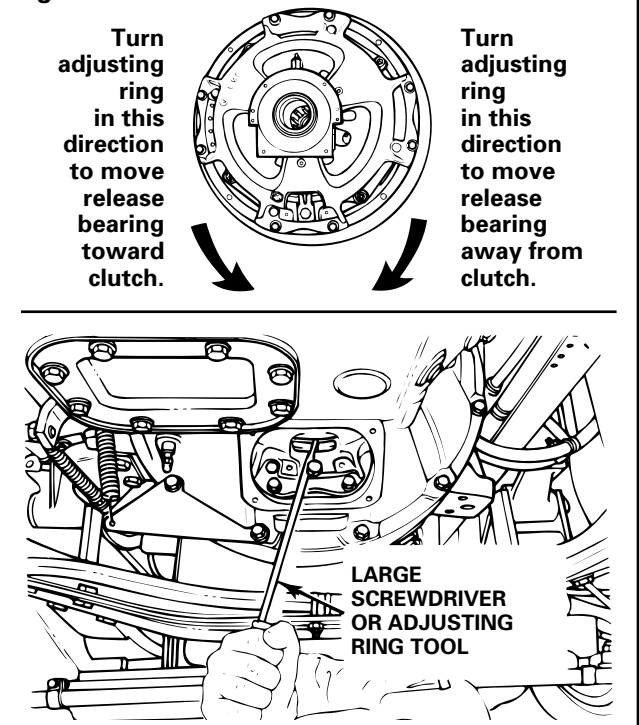
3. Move the flywheel so that the lock plate becomes visible through the inspection cover.
4. Remove the capscrew and washer on the lock plate. Remove the lock plate. **Figure 7.3.**

Figure 7.3




5. Rotate the adjusting ring: Use a screwdriver or an adjusting ring tool as a lever against the notches on the adjusting ring. When you move the adjusting ring one notch, the release bearing will move 0.020-inch (0.50 mm). For a normal adjustment, you will move the adjusting ring from four to eight notches. **Figure 7.4.**
6. Release the clutch pedal.

Figure 7.4



Section 7 Adjustments



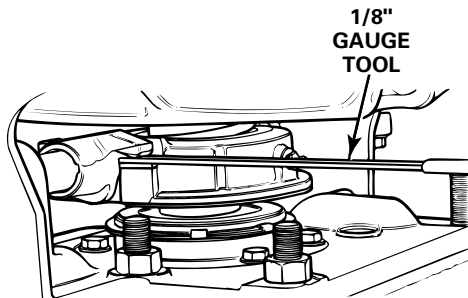
7. Check the release bearing clearance. Refer to Checking the Release Bearing Clearance in this section. If the clearance is outside specification, adjust the clearance.
8. Install the lock plate and capscrew. Tighten the capscrew to 25-30 lb-ft (34-40 N•m). 
9. Check release fork clearance to determine if you must adjust the clutch linkage. Refer to Checking the Release Fork Clearance in this section.

Checking the Release Fork Clearance

NOTE: To prevent the release bearing from moving on non-synchronized transmissions, insert a 0.50-inch telescoping gauge tool between the release bearing and the clutch brake.

1. Release the clutch pedal.
2. Insert the 1/8-inch gauge tool between the tips of the release fork and release bearing bosses. **Figure 7.5.**

Figure 7.5



3. Check both sides. If the tool fits too loosely or does not fit, you must adjust the clutch linkage according to the vehicle manufacturer's procedure and specifications. **Figure 7.6.**

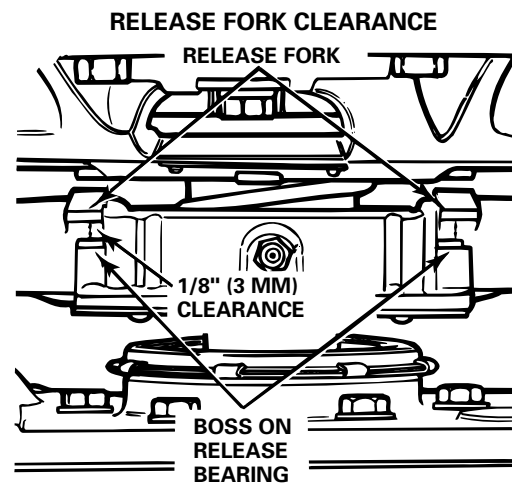


WARNING

Always install the bell housing inspection cover. If an inspection cover is missing during operation, dirt and contaminants can enter the bell housing. Damage to the clutch can result.

4. Install the bell housing inspection cover.

Figure 7.6



Adjusting the Clutch Linkage

The following is general information on adjusting the clutch linkage. For specific adjustment procedures of the clutch linkage, refer to the procedure of the manufacturer of the vehicle.

There are four adjustments for correct clutch linkage adjustment.

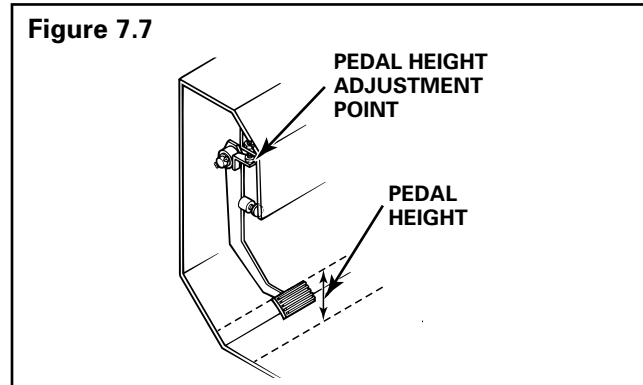
- Pedal Height.
- Total Pedal Travel.
- Clutch Brake Squeeze (Non-Synchronized Transmission Only).
- Free Travel.

The free travel adjustment is done after all the other adjustments are done.

Pedal Height

On some vehicles the height of the travel of the clutch pedal is adjusted. The height is adjusted by stop bolts. If the pedal height is not correct, the free travel will not be measured and adjusted correctly. **Figure 7.7.**

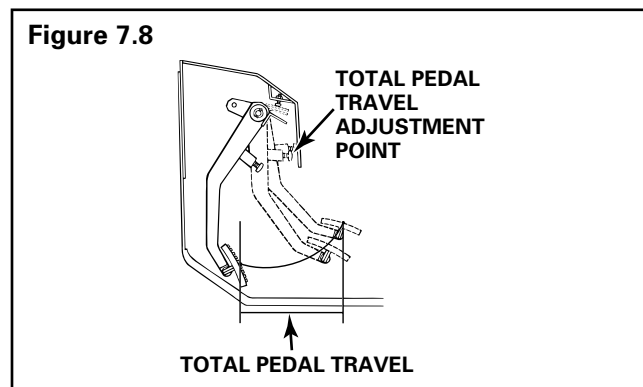
Refer to the vehicle manufacturer's specifications and procedures.



Total Pedal Travel

The total pedal travel is the complete distance the clutch pedal must move. It can be adjusted with bumpers and stop bolts in the cab or with stop bolts and pads on the linkage. Total travel makes sure that there is enough movement of the pedal to correctly engage and disengage the clutch and the clutch brake. **Figure 7.8.**

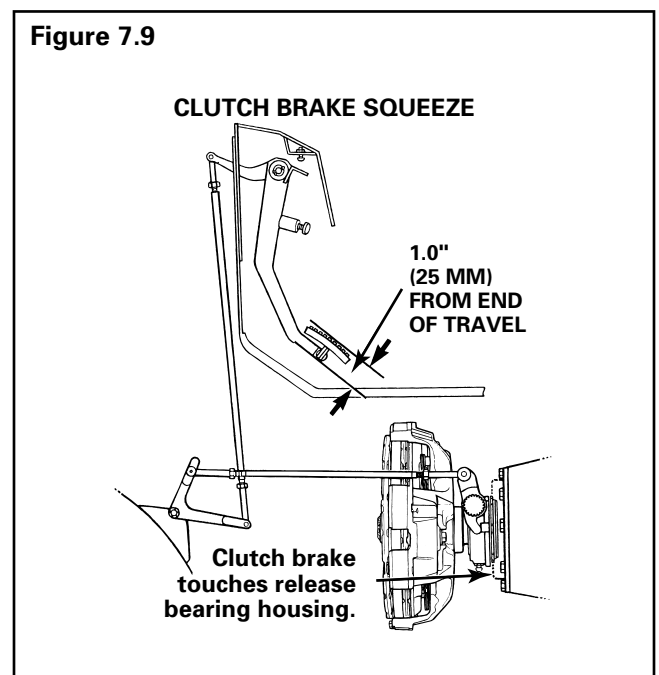
Refer to the vehicle manufacturer's specifications and procedures.



Clutch Brake Squeeze (Non-Synchronized Transmission Only)

Remove the cover for the inspection hole on the clutch housing. Adjust the linkage so that the release bearing housing touches the clutch brake when the clutch pedal is typically 1.0-inch (25 mm) from the end of pedal travel as defined by the manufacturer of the vehicle. Clutch brake squeeze is usually adjusted somewhere on the linkage between the release lever at the bell housing and the clutch pedal. **Figure 7.9.**

Refer to the vehicle manufacturer's specifications and procedures.



Section 7 Adjustments

Free Travel

The free travel makes sure that the release bearing does not touch the release fork during vehicle operation. As normal facing wear occurs, the release bearing moves toward the engine and reduces the clearance between the release bearing and the fork which also reduces the free travel of the clutch pedal. This is why PERIODIC CLUTCH ADJUSTMENTS ARE NECESSARY. Clutch pedal free travel and the fork and the bearing clearance must be restored to the specified dimension.

Figure 7.10.

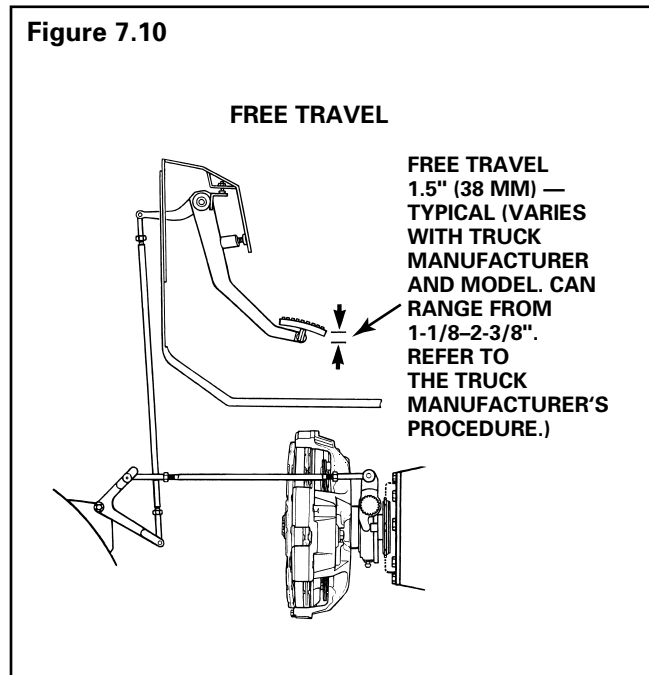
If the release bearing touches the release fork during vehicle operation, the clutch clamping forces load up the linkage instead of tightly squeezing the discs. The lower squeeze pressure causes the clutch to slip and results in excessive wear or heat.

The pedal free travel is typically 1-1/2-inches (38 mm) from the beginning of pedal travel, but each truck manufacturer has its own free travel specification for each of its models. This specification can vary from 1-1/8-inch to 2-3/8-inch (29-60 mm). The fork must not touch the release bearing when the clutch pedal is released.

If the free travel is more than the specified dimension, the clutch may not fully release. The clutch discs could touch the flywheel all the time. If the free travel is less than 1/2-inch (13 mm), the clutch may slip out of engagement.

Free travel is usually adjusted somewhere on the linkage between the release lever at the bell housing and the clutch pedal. Refer to the vehicle manufacturer's procedure.

Figure 7.10



WARNING

To prevent serious eye injury, always wear safe eye protection when you perform vehicle maintenance or service.

Release Bearing

CAUTION

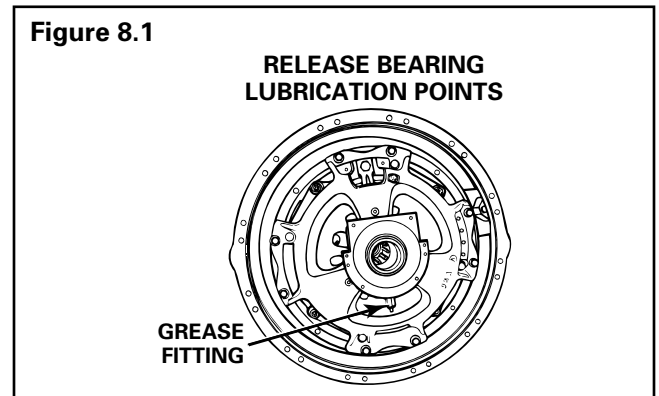
Make sure the inspection cover on the clutch housing is used. If an inspection cover is not used, dirt and contaminants can enter the clutch housing and damage the clutch.

1. Remove the inspection cover on the clutch housing.
2. Clean all grease fittings prior to lubrication.

NOTE: Do not overgrease.

3. Properly lubricate the release bearing. Apply grease to the grease fitting on the release bearing until you see a small amount of grease coming out of the bearing housing.
4. Apply grease to the release yoke tips where they contact the bearing housing. Also apply grease to the exposed transmission input shaft between the bearing housing and the transmission input bearing retainer to lubricate the release sleeve bushing.
5. If the release bearing is equipped with a lube tube, check that grease purges from the bearing housing, which ensures that lubricant is reaching the bearing. Be sure that the lube tube is secured and not damaged.
6. Use the same procedure for extended maintenance clutches.
7. Install the inspection cover. Meritor recommends using a high temperature, multi-purpose wheel bearing grease (Meritor Specification O-661), but use the lubricant recommended by the manufacturer of the vehicle. **Figure 8.1.**

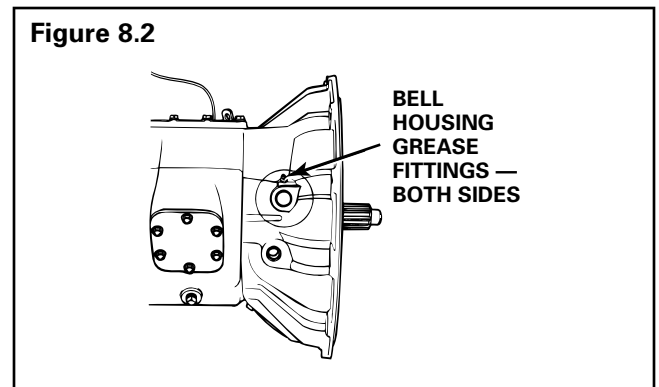
Figure 8.1



Bell Housing

1. Clean all grease fittings prior to lubrication.
2. Lubricate the release fork cross shaft by applying grease to each fitting on the bell housing until a small amount of grease purges out. Use the specified lubricant at the recommended interval. Refer to the lubricant specifications and maintenance intervals of the vehicle manufacturer. **Figure 8.2.**

Figure 8.2



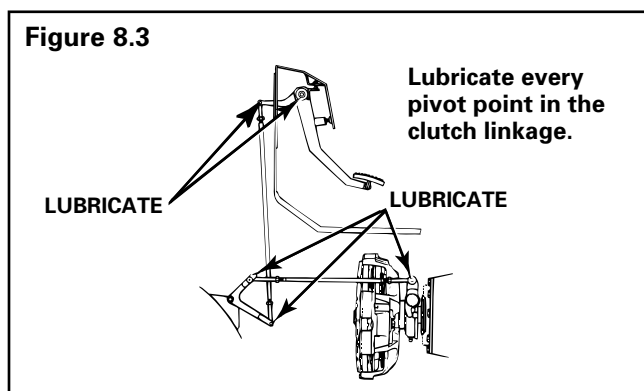
Section 8 Lubrication and Maintenance



Clutch Linkage

NOTE: Some vehicle manufacturers may use “lubed-for-life” ball joints in the clutch linkage. Refer to the vehicle manufacturer’s lubricant information.

You must lubricate each pivot point on the linkage according to the vehicle manufacturer’s procedure. **Figure 8.3.** Use the specified lubricant at the recommended interval. Refer to the lubricant specifications and maintenance intervals.



Greasing Interval and Specifications

Component	Greasing Interval	Grease	Meritor Specification	NLGI Grade	Grease Classification	Outside Temperature
Release Bearing	①	High Temperature Multi-Purpose Wheel Bearing Grease	O-661	3	Lithium Complex	Down to -40°F (-40°C)
Bell Housing	①	②	—	—	—	—
Clutch Linkage	①	②	—	—	—	—

① Use the interval specified by the vehicle manufacturer or the fleet, but make sure the release bearing is greased once per month.

② Use the grease specified by the vehicle manufacturer.

Approved Lubricants

Lubricant	Recommendation
Clutch Bearing Grease	Exxon Unirex N Grade 3 (NLGI Grade No. 3, Lithium Complex)

When to Inspect the Clutch

Check the clutch when any of the following occur:

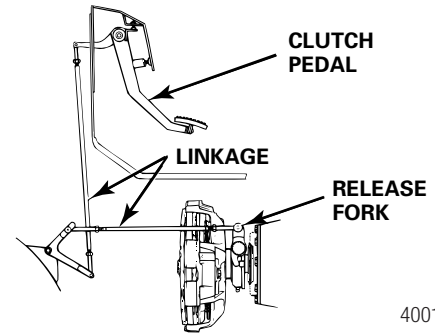
- As required by the maintenance schedule of the manufacturer of the vehicle.
- When any part of the clutch system is serviced.
- When the free travel of the clutch pedal is less than 1/2-inch (13 mm) or more than 1-1/2-inches (38 mm).

Inspecting the Clutch Linkage

The clutch linkage must be inspected carefully. The clutch will not operate correctly if the linkage is worn or damaged. Inspect the linkage according to the following procedures. **Figure 8.4.**

1. **The operation of the linkage.** Push down on the clutch pedal and have another person check the release fork for movement. The smallest movement of the clutch pedal must cause movement at the release fork. If the release fork does not move when the clutch pedal moves, find and service the cause of the free play condition.
2. **The condition of linkage operation.** The linkage must move when the pedal is actuated. Make sure the linkage is not obstructed. Make sure every pivot point operates freely. Make sure the linkage is not loose at any point. If the linkage does not operate freely, find and service the cause of the condition.
3. **The condition of all parts of the linkage.** Inspect the clutch linkage. Make sure the pedal, the springs, the brackets, the bushings, the shafts, the clevis pins, the levers, the cables and the rods are not worn or damaged. If a hydraulic system is used, make sure that the system is not leaking and that the reservoir is filled to the specified level. Replace any parts that are missing or damaged. **DO NOT STRAIGHTEN ANY DAMAGED PARTS. REPLACE THE PARTS.**
4. **Lubrication.** Make sure every pivot point in the linkage is lubricated. Use the lubricant specified by the manufacturer of the vehicle. Refer to Approved Lubricants in this section.

Figure 8.4



Inspecting the Internal Clutch Components

1. If used, remove the inspection cover capscrews.
2. Remove the inspection cover.
3. Inspect the internal clutch components listed below:

Release Fork: Remove and replace the release fork if the tips appear worn or damaged.
Figure 8.7.

Release Bearing: Replace the release bearing assembly if the bearing appears worn or damaged. Check that the release bearing is lubricated.

Input Shaft: If the splines appear worn or damaged, replace the input shaft.

Transmission Input Bearing Retainer: Inspect the input bearing retainer on the transmission. Check the area where the clutch brake touches the retainer.

Section 8 Lubrication and Maintenance



Release Bearing Clearance

- **For non-synchronized transmissions:** Check that a 1/2-inch (13 mm) clearance exists between the release bearing and the clutch cover. **Figure 8.5.** To order a 1/2-inch gauge tool, refer to the Special Tools table in Section 10. If the clearance does not equal 1/2-inch (13 mm), adjust the release bearing clearance. Refer to Section 7.
- **For synchronized transmissions:** Check that a 1-1/16-inch (17 mm) clearance exists between the release bearing and the clutch cover. **Figure 8.6.** If the clearance does not equal 1-1/16-inch (17 mm), adjust the release bearing clearance. Refer to Section 7.

Release Fork Clearance: Check that a 1/8-inch (3 mm) clearance exists between the fork and the boss on the release bearing. **Figure 8.7.** To order a 1/8-inch gauge tool, refer to the Special Tools table in Section 10. If the clearance does not equal 1/8-inch (3 mm), adjust the linkage. Refer to Section 7.



CAUTION

Make sure the inspection cover on the clutch is used. If an inspection cover is not used, dirt and contaminants can enter the clutch housing and damage the clutch.

4. Install the inspection cover.
5. If used, install and tighten the inspection cover capscrews. Refer to the vehicle manufacturer's specifications.

Inspecting the Internal Parts of the Clutch

Remove the capscrews from the inspection cover. Remove the cover. Inspect the internal parts of the clutch according to the following procedure.



CAUTION

Make sure the inspection cover on the clutch housing is used. If an inspection cover is not used, dirt and contaminants can get into the clutch housing and damage the clutch.

1. **Release Bearing Clearance-Non-Synchronized Transmission.** Adjust the release bearing clearance if the distance between the release bearing and the clutch brake is not 1/2-inch (13 mm). Refer to Section 7. **Figure 8.5.**

NOTE: A 1/2-inch Gauge Tool, SP2033, is available from Snap-on Tools. Refer to the Special Tools table in Section 10.

Release Bearing Clearance Synchronized Transmission. Adjust the release bearing clearance if the distance between the release bearing and the clutch cover is not 1-1/16-inch (17 mm). Refer to Section 7. **Figure 8.6.**

2. **Release Bearing Clearance.** AutoJust clutch clearance should be 0.500-inch to 0.560-inch.
3. **Release Fork Clearance.** Make sure there is a distance of 1/8-inch (3 mm) between the fork and the boss on the release bearing. If the distance is not 1/8-inch (3 mm), adjust the linkage. Refer to Section 7. **Figure 8.7.**

NOTE: A 1/8-inch Gauge Tool, SP2034, is available from Snap-on Tools. Refer to the Special Tools table in Section 10.

4. AutoJust sensor bolt clearance between bolt head and flange (.055-inch [1.4 mm] minimum).
5. **Release Fork Condition.** Remove and replace the release fork if the tips are worn or damaged. **Figure 8.7.**
6. **Release Bearing Condition.** Replace the release bearing assembly if the bearing is worn or damaged. Make sure the bearing is lubricated.
7. **Input Shaft Condition.** If the splines are worn or damaged, replace the input shaft.
8. **Transmission Input Bearing Retainer.** Inspect the input bearing retainer on the transmission. Check the area where the clutch brake touches the retainer.

Figure 8.5

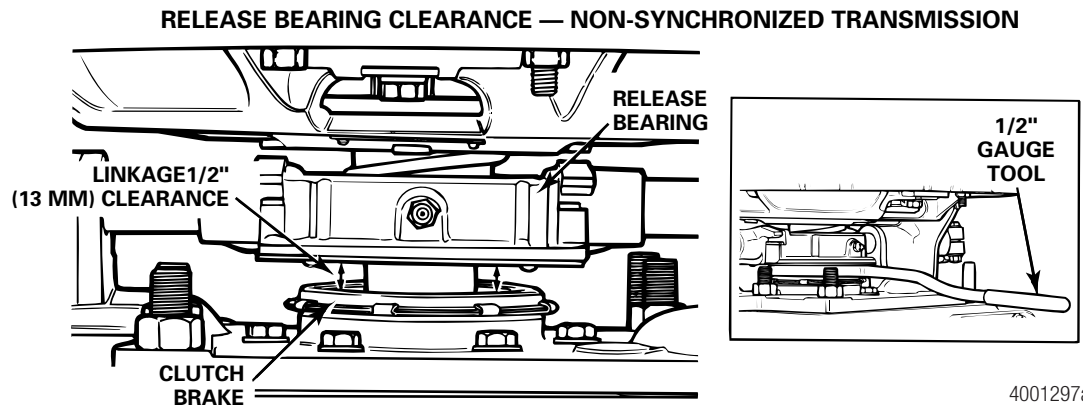


Figure 8.6

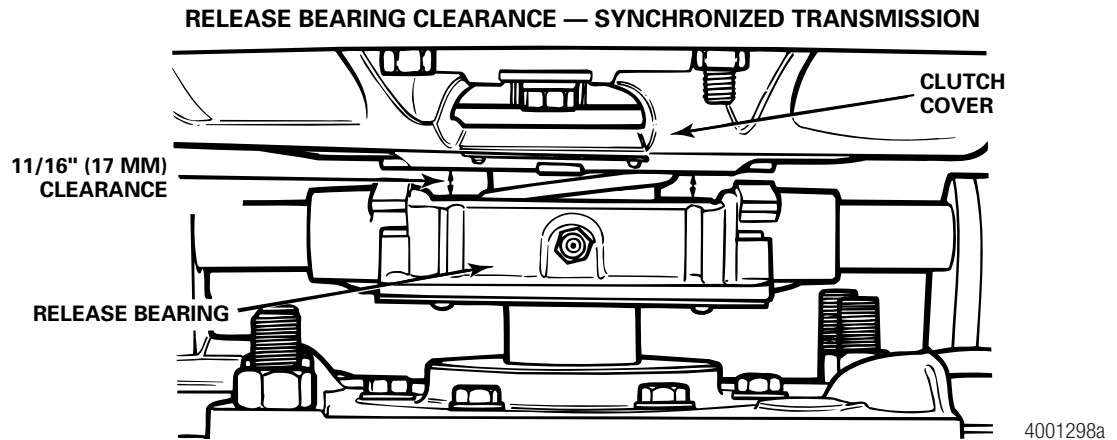
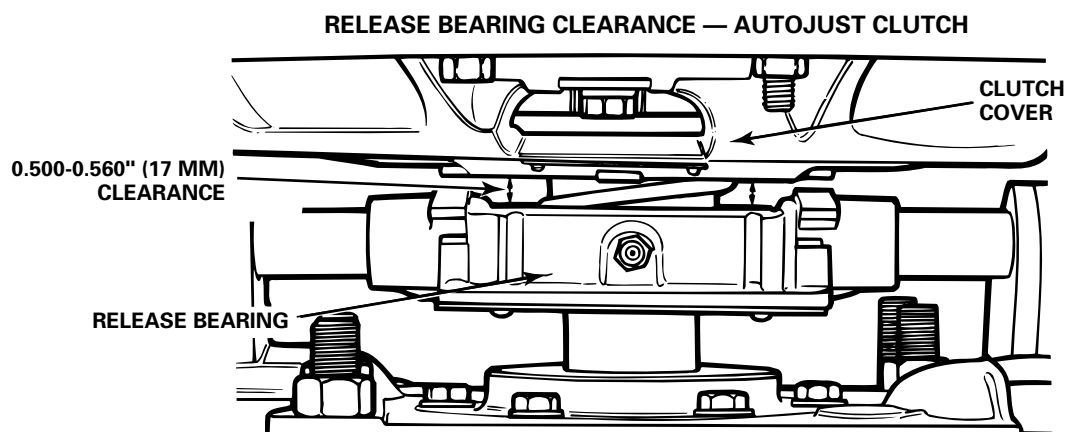


Figure 8.7



Troubleshooting

Before troubleshooting the clutch, make sure of the following:

1. The engine is operating correctly.
2. The engine mounts are in good condition.
3. The driveline angles of the engine, transmission, driveshaft and rear axle are correct.
4. The inspection cover is installed on the clutch housing.

Refer to the following charts to troubleshoot the clutch.

Table A: Troubleshooting — Operating Conditions

Condition	Possible Cause	Correction
Clutch does not release or does not release completely.	<ol style="list-style-type: none"> 1. Release bearing clearance needs adjustment. 2. Clutch linkage needs adjustment. 3. Worn or damaged linkage. 4. Worn or damaged release bearing. 5. Worn or damaged splines on input shaft. 6. Bell housing loose. 7. Worn or damaged pressure plate. 8. Worn or damaged center plate. 9. Center plate binding. 10. Damaged hub in clutch discs. 11. Facings worn below specified dimension. 12. Facings damaged. 13. Oil or grease on facings. 14. Facings not specified for vehicle operation. 15. Damaged pilot bearing. 	<ol style="list-style-type: none"> 1. Adjust release bearing clearance. 2. Adjust clutch linkage. 3. Lubricate linkage. Make sure the linkage is not loose. If condition still exists, replace linkage. 4. Lubricate release bearing. If condition still exists, replace release bearing. 5. Replace input shaft. 6. Tighten fasteners to specified torque. If necessary, replace fasteners. 7. Replace pressure plate and cover assembly. 8. Replace center plate. 9. 14-inch Clutch: Inspect drive pins in flywheel housing and slots in center plate. 15-1/2-inch Clutch: Inspect tabs on center plate and slots in cover. Service as necessary. 10. Replace discs. 11. Replace discs. 12. Replace discs. 13. Clean facings. If oil or grease cannot be removed, replace discs. 14. Install discs with correct facings. 15. Replace pilot bearing.
Clutch pedal is hard to operate.	<ol style="list-style-type: none"> 1. Damaged bosses on release bearing. 2. Tight or stiff pivots in clutch linkage. 3. Worn or damaged clutch components. 4. Worn or damaged pedal shaft and/or cross shaft bushings. 	<ol style="list-style-type: none"> 1. Replace release bearing assembly. Make sure clutch is correctly adjusted. 2. Lubricate linkage. If condition still exists, replace linkage. 3. Replace pressure plate and cover assembly. 4. Repair or replace as necessary.

Condition	Possible Cause	Correction
Clutch slips out of engagement.	<ol style="list-style-type: none"> 1. Driver keeps foot on clutch pedal. 2. Clutch release bearing clearance needs adjustment. 3. Clutch linkage needs adjustment. 4. Worn or damaged clutch components. 5. Worn or damaged facings. 6. Oil or grease on facings. 7. Facings not as specified for vehicle operation. 8. Worn or damaged flywheel. 	<ol style="list-style-type: none"> 1. Use correct vehicle operating procedure. 2. Adjust release bearing clearance. 3. Adjust clutch linkage. 4. Replace pressure plate and cover assembly. 5. Replace clutch discs. 6. Clean facings. If oil or grease cannot be removed, replace discs. 7. Use discs with correct facings. 8. Service flywheel as necessary. Refer to the procedure of engine or vehicle manufacturer.
Clutch is noisy.	<ol style="list-style-type: none"> 1. Release bearing clearance needs adjustment. 2. Clutch linkage needs adjustment. 3. Tight or stiff pivots in clutch linkage. 4. Worn or damaged release bearing. 5. Worn or damaged clutch housing. 6. Bell housing loose. 7. Damaged hub or broken co-axial springs in clutch discs. 8. Facings worn below specified dimension. 9. Facings damaged. 10. Oil or grease on facings. 11. Damaged pilot bearing. 	<ol style="list-style-type: none"> 1. Adjust release bearing clearance. 2. Adjust linkage. 3. Lubricate linkage. If condition still exists, replace linkage. 4. Lubricate release bearing. If condition still exists, replace release bearing. 5. Replace clutch housing and pressure plate assembly. 6. Tighten fasteners to specified torque. If necessary, replace fasteners. 7. Replace clutch discs. 8. Replace clutch discs. 9. Replace discs. 10. Clean facings. If oil or grease cannot be removed, replace discs. 11. Replace pilot bearing.
Clutch vibrates.	<ol style="list-style-type: none"> 1. Worn or damaged splines on input shaft. 2. Pressure plate and cover assembly out-of-balance. 3. Worn or damaged splines in hub of clutch discs. 4. Loose flywheel. 5. Transmission-to-engine misalignment. 	<ol style="list-style-type: none"> 1. Replace input shaft. 2. Remove, check balance and install pressure plate and cover assembly. If condition still exists, replace pressure plate and cover assembly. 3. Replace clutch discs. 4. Tighten fasteners to specified torque. If necessary, replace fasteners. Check flywheel mounting surface for damage, replace if necessary. 5. Check runout of flywheel and bell housing. Make sure the transmission-to-engine alignment is correct. Refer to vehicle manufacturer's procedure.

Section 9 Diagnostics



Table B: Troubleshooting — Components

Condition	Possible Cause	Correction
Broken tabs on clutch brake.	<ol style="list-style-type: none"> 1. Vibration. 2. Release bearing clearance needs adjustment. 3. Clutch linkage needs adjustment. 4. Driver engages clutch brake improperly while vehicle is moving. 	<ol style="list-style-type: none"> 1. Inspect hubs of clutch discs. Also check clutch installation. Make sure dampened clutch discs are used. 2. Adjust release bearing clearance. 3. Adjust clutch linkage. 4. Use correct driving procedures.
Worn or damaged release bearing housing.	<ol style="list-style-type: none"> 1. Driver keeps foot on clutch pedal. 2. Free travel not adjusted correctly. 	<ol style="list-style-type: none"> 1. Use correct vehicle operating procedures. 2. Adjust free travel correctly.
Worn bosses on release bearing housing.	<ol style="list-style-type: none"> 1. Damaged or out-of-adjustment linkage. 2. Release yoke binding. 3. Free travel out-of-adjustment. 	<ol style="list-style-type: none"> 1. Lubricate and adjust linkage. Inspect linkage for wear or damage. 2. Lubricate shaft of release yoke. If yoke does not move freely, replace shaft and yoke assembly. 3. Adjust free travel to specifications.
Worn or damaged input shaft splines.	<ol style="list-style-type: none"> 1. Transmission not aligned. 2. Incorrect transmission installation procedures. 3. Damaged hubs in clutch discs. 4. Worn or damaged pilot bearing. 5. Engine vibration. 	<ol style="list-style-type: none"> 1. Make sure driveline angles are correct. 2. Install transmission correctly. 3. Replace clutch discs. 4. Replace pilot bearing. 5. Make sure dampened discs are used. Lubricate at scheduled intervals.
Pressure plate cracked or damaged by heat.	<ol style="list-style-type: none"> 1. Driver engages clutch while vehicle is coasting to create shock load. 2. Driver uses clutch as a brake to hold vehicle on a grade. 3. Free travel not adjusted correctly. 4. Oil or grease on facings. 5. Worn or damaged diaphragm spring. 6. Driver slips clutch excessively during engagement. 	<ol style="list-style-type: none"> 1. Use correct vehicle operating procedures. 2. Use correct vehicle operating procedures. 3. Adjust free travel to specifications. 4. Clean discs. If oil or grease cannot be removed, replace discs. Repair cause of grease or oil leak. 5. Replace pressure plate and cover assembly. 6. Use correct vehicle operating procedures.
Grooves worn in pressure plate.	<ol style="list-style-type: none"> 1. Worn or damaged clutch discs. 	<ol style="list-style-type: none"> 1. Replace clutch discs. Also, replace pressure plate, center plate or flywheel if damaged.
Adjusting ring does not move.	<ol style="list-style-type: none"> 1. During adjustment, clutch pedal pushed down too far. 2. Too much dirt in bell housing. 3. Worn or damaged adjusting ring. 	<ol style="list-style-type: none"> 1. During adjustment, push the clutch pedal to within 0.5-inch (13 mm) or clutch brake contact. 2. Remove dirt from bell housing. Service as necessary. Make sure inspection cover is installed. 3. Replace clutch as pressure plate assembly.
Warped hub in clutch disc.	<ol style="list-style-type: none"> 1. Incorrect transmission installation procedures. 	<ol style="list-style-type: none"> 1. Replace discs. Install transmission correctly.
Hub separates from disc.	<ol style="list-style-type: none"> 1. Excessive engine vibration. 2. Incorrect transmission installation procedures. 3. Clutch housing loose. 4. Clutch engaged while vehicle is coasting. 5. Shock loading. 	<ol style="list-style-type: none"> 1. Repair engine. 2. Install transmission correctly. 3. Tighten clutch housing to specified torque. If necessary, replace fasteners. 4. Use correct vehicle operating procedures. 5. Use correct vehicle operating procedures.

Condition	Possible Cause	Correction
Co-axial springs separate from disc.	<ol style="list-style-type: none"> Excessive engine vibration. Driver engages clutch while coasting. Shock loading. 	<ol style="list-style-type: none"> Repair engine as required. Use correct vehicle operating procedures. Use correct vehicle operating procedures.
Heat damage on disc.	<ol style="list-style-type: none"> Driver keeps foot on clutch pedal or slips clutch. Clutch does not engage or disengage completely Free travel not adjusted correctly. Worn or damaged diaphragm spring. Grease or oil on facings. 	<ol style="list-style-type: none"> Use correct vehicle operating procedures Refer to Table A: Troubleshooting — Operating Conditions. Adjust free travel correctly. Replace pressure plate and cover assembly. Clean facings. If oil or grease cannot be removed, replace discs.
Linings separate from discs.	<ol style="list-style-type: none"> Facings worn past specified dimension. Vehicle coasting downhill with transmission in gear and clutch engaged. 	<ol style="list-style-type: none"> Replace discs. Use correct vehicle operating procedures.
Cracked or damaged center plate.	<ol style="list-style-type: none"> Driver does not start vehicle in correct gear. Driver uses clutch as a brake to hold vehicle on a grade. 14-inch Clutch: Worn or damaged drive pins in flywheel housing. 15-1/2-inch Clutch: Tabs on center plate binding in clutch cover. Driver slips clutch excessively during engagement. 	<ol style="list-style-type: none"> Use correct vehicle operating procedures. Use correct vehicle operating procedures. Make sure drive pins are correctly installed. Service drive pins as necessary. Replace pressure plate and cover assembly and/or center plate. Use correct vehicle operating procedures.

Table C: Troubleshooting — Driver Procedures

Driver Procedures	Results
Driver keeps foot on clutch pedal.	Clutch is always partially disengaged. Results in too much slipping and causes clutch to overheat. Overheating causes damage to the linings, the pressure plate, the center plate and flywheel. Release bearing also damaged.
Driver uses clutch as a brake.	Promotes faster wear of linings on disc and causes clutch to overheat.
Driver shifts transmission before minimum shift speed.	Puts a severe shock on the drivetrain. Will damage disc hub assemblies.
Driver coasts downhill with the transmission in gear and the clutch released.	Will put too many RPMs on input shaft due to rear axle driving transmission. Can cause facings to separate from disc. ①
Driver applies clutch while coasting downhill.	Puts a severe shock load on the drivetrain. Will damage disc and hub assemblies, as well as the entire powertrain.
Driver applies clutch brake while shifting when vehicle is moving.	Damages clutch brake. Damaged clutch brake results in gear clash (noise) when engaging first or reverse gears.

① Refer to the following Warning.



WARNING

Operate the vehicle according to the procedure of the manufacturer of the vehicle. Do not coast downhill with the transmission in gear and the clutch released. If the vehicle coasts downhill with the transmission in gear and the clutch released, the facings can separate from the disc and cause serious personal injury and damage.

Section 10 Specifications



General Clutch Specifications

Description	14" Manual Adjust Clutches	15-1/2" AutoJust Clutches	15-1/2" Manual Adjust Clutches	15-1/2" LTD Clutches
Clutch Size	14-inches (356 mm)	15-1/2-inches (394 mm)	15-1/2-inches (394 mm)	15-1/2-inches (394 mm)
Truck Class Application	8, some 7	8-7	8, some 7	8, some 7
Actuation Type	Pull	Pull	Pull	Pull
Minimum Bell Housing Size for Mounting (S.A.E.)	Number 2	Number 2	Number 2	Number 2
Number of Bolt Holes in Clutch Housing	8	8	8	8
Pressure Plate Actuation	Single Diaphragm Spring and Six Levers	Single Diaphragm Spring and Six Levers	Single Diaphragm Spring and Six Levers	Single Diaphragm Spring and Six Levers
Type of Spring	Diaphragm	Diaphragm	Diaphragm	Diaphragm
Number of Springs	1	1	1	1
Clamp Load	2800 lbs. (12454 N) 3200 lbs. (14234 N) —	2800 lbs. (12454 N) 3200 lbs. (14234 N) 3600 lbs. (16013 N) 4000 lbs. (17800 N)	2800 lbs. (12454 N) 3200 lbs. (14234 N) 3600 lbs. (16013 N)	2800 lbs. (12454 N) 3200 lbs. (14234 N) 3600 lbs. (16013 N) 4000 lbs. (17800 N)
Pressure Plate Travel with Wear	0.019-inch (0.489 mm)	0.197-0.236-inch (5-6 mm)	0.019-inch (0.489 mm)	0.019-inch (0.489 mm)
Bearing Load (MAXIMUM) A. Load at Peak B. Load at Maximum Pedal Stroke	578 lbs. (262 kg) 368 lbs. (167 kg)	660 lbs. (300 kg) 526 lbs. (239 kg)	644 lbs. (292 kg) 390 lbs. (177 kg)	644 lbs. (292 kg) 390 lbs. (177 kg)
Pressure Plate Lift at 0.5-inch (13 mm) Bearing Stroke	0.055-inch (1.4 mm) Minimum 0.059-inch (1.51 mm) Nominal	0.059-inch (1.5 mm)	0.055-inch (1.4 mm) Minimum 0.059-inch (1.51 mm) Nominal	0.055-inch (1.4 mm) Minimum 0.059-inch (1.51 mm) Nominal
Lever Ratio	6.5:1	6.5:1	6.5:1	6.5:1
Adjustment	Manual	Auto	Manual	Manual
Weight A. Center Plate — Ceramic Center Plate — Organic B. Clutch Cover C. Clutch Disc Organic Ceramic	21.4 lbs. (9.7 kg) 21.2 lbs. (9.6 kg) 60.63 lbs. (27.5 kg) 9.5 lbs. (4.3 kg) 10.5 lbs. (4.8 kg)	22.44 lbs. (10.2 kg) 83.84 lbs. (38.1 kg) 15.87 lbs. (7.2 kg)	22.44 lbs. (10.2 kg) 26.57 lbs. (12.1 kg) 79.59 lbs. (36.1 kg) 12.19 lbs. (5.5 kg) 13.10 lbs. (5.9 kg)	22.44 lbs. (10.2 kg) 26.57 lbs. (12.1 kg) 79.59 lbs. (36.1 kg) — 15.87 lbs. (7.2 kg)
Organic Facing Size Per Disc	105.2 square inches (678.6 sq cm)	—	126.2 square inches (814.5 sq cm)	—
Ceramic Facing Size Per Disc	32.00 square inches (206.4 sq cm)	32.00 square inches (206.4 sq cm)	32.00 square inches (206.4 sq cm)	32.00 square inches (206.4 sq cm)

Description	14" Manual Adjust Clutches	15-1/2" AutoJust Clutches	15-1/2" Manual Adjust Clutches	15-1/2" LTD Clutches
Disc Damper — Standard Single Stage				
A. Number of Coaxial Spring Sets	8	7	8	7
B. Number of Spring Stages	1	1	1	1
C. Maximum Torque	1400 lb-ft (193 kg-m)	1860 lb-ft (255 kg-m)	1750 lb-ft (241 kg-m)	1860 lb-ft (255 kg-m)
Disc Damper — Two Stage				
A. Number of Coaxial Spring Sets	8		8	—
B. Number of Spring Stages	2		2	—
C. Maximum Torque	1400 lb-ft (193 kg-m)		1750 lb-ft (241 kg-m)	—
Lining Availability	Ceramic or Organic	Ceramic	Ceramic or Organic	Ceramic
Lining-to-Disc Fastener				
Ceramic	Rivet	Rivet	Rivet	Rivet
Organic	Molded Integrally to Plate	—	Molded Integrally to Plate	—

Maximum Torque Application Specifications

Clutch Size (Inches)	Number of Clutch Discs	Lining Material	Plate Load lbs. (kg)	Maximum Torque lb-ft (N·m)	Maximum GCW lbs. (kg)	Maximum Engine RPM
14		Organic	2800 (1271)	1000 (138)	80,000 (36,320)	3300
14		Organic	3200 (1453)	1130 (156)	80,000 (36,320)	3300
14		Ceramic	2800 (1271)	1170 (161)	80,000 (36,320)	3300
14		Ceramic	3200 (1453)	1400 (193)	80,000 (36,320)	2600
15-1/2		Organic	2800 (1271)	1170 (161)	80,000 (36,320)	2600
15-1/2		Organic	3200 (1453)	1310 (181)	80,000 (36,320)	2600
15-1/2		Organic	3600 (1634)	1450 (200)	150,000 (68,100)	2600
15-1/2		Ceramic	2800 (1271)	1320 (182)	80,000 (36,320)	2600
15-1/2		Ceramic	3200 (1453)	1490 (206)	80,000 (36,320)	2600
15-1/2		Ceramic	3600 (1634)	1750 (242)	200,000 (90,800)	2600
15-1/2 ①		Ceramic	3600 (1634)	1860 (257)	200,000 (90,800)	2600

NOTE: ① LTD (Long Travel Damper) Clutch.

Section 10 Specifications



Pressure Plate Specifications

Description	14" Manual Adjust Clutches	15-1/2" Manual Adjust Clutches
Pressure Plate Parallelism	0.000-0.005" (0.000-0.127 mm)	0.000-0.005" (0.000-0.127 mm)
Pressure Plate Flatness	0.000-0.005" (0.000-0.127 mm)	0.000-0.005" (0.000-0.127 mm)
Maximum Allowable Wear	0.060" (1.52 mm)	0.060" (1.52 mm)

Center Plate Specifications

Description	14" Dual-Plate Clutches	15-1/2" Clutches
Center Plate Parallelism	0.000-0.005" (0.000-0.127 mm)	0.000-0.005" (0.000-0.127 mm)
Center Plate Flatness	0.000-0.005" (0.000-0.127 mm)	0.000-0.005" (0.000-0.127 mm)
Center Plate Minimum Thickness	0.728" (18.5 mm) Ceramic Linings	0.681" (17.3 mm)
	0.610" (15.5 mm) Organic Linings	
Center Plate Driving Method	Drive Pin in Flywheel	Tabs on Center Plate in Clutch Cover
Drive Pin-to-Center Plate Clearance	0.006" (0.152 mm) Minimum	—
Center Plate Tab-to-Cover Slot Clearance	—	0.006" (0.152 mm) Minimum

Clutch Brake Specifications

Description	Specification
Free Play	10°
Spline Diameter	1.75" 2.00"
Torque Limitations	15-30 lb-ft (2.1-4.0 kg-m)

Clutch Disc Specifications

Description	14" Clutches	15-1/2" Clutches	15-1/2" LTD Clutches
Number of Splines	10	10	10
Spline Diameter	1.75" 2.00"	2.00"	2.00"
Hub Type	Dampened	Dampened	Dampened
Number of Co-Axial Spring Sets	8	8	7
Ceramic Pad Material	Asbestos-Free, Ceramic and Metallic Material	Asbestos-Free, Ceramic and Metallic Material	Asbestos-Free, Ceramic and Metallic Material
Organic Pad Material	Asbestos-Free, Organic Material	Asbestos-Free, Organic Material	—
Minimum Disc Thickness — Riveted Ceramic	To Top of Rivet	To Top of Rivet	To Top of Rivet
Minimum Disc Thickness — Molded Organic	0.283" (7.2 mm)	0.283" (7.2 mm)	—

Torque Specifications

Description	lb-ft	N•m
Adjusting Ring Lock Capscrew	25-30	34-40
Strap-to-Cover Capscrew	29-43	40-58
Cover Assembly-to-Flywheel Capscrew — 14" Manual Adjust Clutches	25-35	34-47
Cover Assembly-to-Flywheel Capscrew — 15" Manual Adjust Clutches	40-50	54-68

Clutch Adjustment Specifications

Description	Specification
Clearance Between Release Bearing and Clutch Brake — Non-Synchronized Transmission	0.500" (12.7 mm) MINIMUM 0.562" (14.2 mm) MAXIMUM 0.531" (13.5 mm) TARGET
Clearance Between Release Bearing and Cover — Synchronized Transmission	0.687" (17.5 mm)
Clearance Between Tips of Release Fork and Pads on Release Bearing	0.125" (3.17 mm) MINIMUM 0.150" (3.81 mm) MAXIMUM 0.125" (3.17 mm) TARGET
Clutch Pedal Free Travel — Varies ①	1.125-2.375" (28.5-60.3 mm)
Clutch Brake Contact ②	0.500-1.000" (12.7-25.4 mm) from floor

① Refer to the specifications of the manufacturer of the vehicle. Free travel specifications vary with the vehicle manufacturer.

② A 0.010-inch (0.254 mm) feeler gauge must fit snugly between the release bearing and the clutch brake when the clutch pedal is fully depressed.

Section 10 Specifications



Lubricant Specifications

Component	Lubricant	Interval
Release Bearing	High Temperature Multi-Purpose Wheel Bearing Grease (Meritor Specification O-661), Lithium Complex Grease, NLGI Grade #3	Use the interval specified by manufacturer of the vehicle or the fleet, but make sure the release bearing is lubricated once per month.
Cross Shaft Bushings In Clutch Housing	Use the lubricant specified by the manufacturer of the vehicle.	Use the interval specified by manufacturer of the vehicle or the fleet.
Clutch Linkage	Use the lubricant specified by the manufacturer of the vehicle.	Use the interval specified by manufacturer of the vehicle or the fleet.

Special Tools

Description	SPX Kent-Moore Tool Number ①	Owatonna Tool Number ②	Snap-on Tool Number ③	Meritor Tool Number
Clutch Alignment Tool — 1-3/4"	J 35990	7073-A	HTT2501-2	R170175
Clutch Alignment Tool — 2"	J 26455-A	7074-A	HTT2501-3	R170200
Clutch Adjustment Tool	J 36216	7028	GA454	R170000
Truck Clutch and Flywheel Handler	J 39613	—	—	—
Pedal Pusher	J 39610	—	—	—
Pilot Bearing Puller	—	—	SP2031 ④	—
Drive Pin Installation Tool	—	—	SP2032 ④	—
1/2" Gauge Tool (Non-Synchronized Transmission)	—	—	SP2033 ④	—
1/8" Gauge Tool	—	—	SP2034 ④	—
7/16" Guide Studs (15-1/2" Clutches)	—	—	SP2035 ④	—
3/8" Guide Studs (14" Manual Adjust Clutches)	—	—	SP2036 ④	—

① Order SPX Kent-Moore tools by calling 800-328-6657.

② Order Owatonna tools from OTC Tool and Equipment Division, 655 Eisenhower Drive, Owatonna, MN 55060.

③ See your local Snap-on dealer.

④ All tools listed in this table are part of Tool Kit 2030CS.

Clutch Inspection Check List

Transmission and Bell Housing	OK	OK
Bell housing is not worn or damaged.		
Unused cross shaft bores in bell housing are plugged.		
Inspection cover is installed.		
Input bearing retainer is not worn or damaged.		
Distance between top of input shaft and top of input bearing retainer is 0.00-8.72" (000.00-221.48 mm).		
Release fork is straight.		
Fork tips are not worn or damaged.		
Cross shaft moves freely.		
Radial or side-to-side movement of the cross shaft is not excessive.		
The cross shaft and bushings (if used) are not worn or damaged.		
Input shaft splines are not worn or damaged.		
Clutch brake contact area (non-synchronized transmission only) on input bearing retainer is not worn or damaged.		
Pressure Plate and Cover Assembly	OK	OK
Cover is not broken.		
Diaphragm spring is not damaged.		
Pressure plate is not cracked.		
Heat marks can be removed with emery cloth. Replace plate if marks cannot be removed.		
Scratches are less than 0.060" (1.52 mm) deep.		

Pressure Plate and Cover Assembly	OK	OK
Pressure plate flatness is 0.000-0.005" (0.000-0.127 mm) Measured Flatness_____		
Pressure plate runout is 0.002" (0.05 mm) or less. Measured Runout_____		
Clutch Discs	OK	OK
Hub is not damaged.		
Coaxial springs (dampened discs only) do not have any axial movement.		
Oil or grease is not on discs.		
Facings are not damaged or loose.		
Ceramic Facing: Facing wear is even or above the top of the rivet.		
Molded Organic Facing: Facing thickness is 0.283" (7.2 mm) or less.		
Center Plate	OK	OK
14" Clutches: Slots in plate are not damaged. If every other slot is damaged, install good slots over drive pins. If all slots are damaged, replace plate.		

Section 10 Specifications



Clutch Inspection Check List

Center Plate	OK	OK
<p>15-1/2" Clutches:</p> <p>Tab to slot clearance is at least 0.006" (0.152 mm). If not, index to get correct clearance or replace plate.</p> <p>Tabs on plate are not damaged.</p> <p>Thickness: Plates are at or above specified thickness.</p> <p>14" Clutches with Ceramic Facings: 0.728" (18.5 mm)</p> <p>14" Clutches with Organic Facings: 0.610" (15.5 mm)</p> <p>15-1/2" Clutches — All: 0.681" (17.3 mm)</p> <p>Measured Thickness_____</p>		
<p>Center Plate Flatness is 0.005" (0.127 mm) or less — new.</p> <p>If flatness is more than 0.005" (0.0127 mm), grind a new surface on the plate. With new surface, plate must be at or above minimum thickness.</p> <p>Measured Flatness_____</p>		
<p>Center Plate Runout is 0.005" (0.127 mm) or less — new.</p> <p>If runout is more than 0.005" (0.0127 mm), grind a new surface on the plate. With new surface, plate must be at or above minimum thickness</p> <p>Measured Runout_____</p>		
Pilot Bearing	OK	OK
<p>Pilot bearing is not worn or damaged. Replace pilot bearing every time clutch is removed with a bearing that uses high temperature rubber seal and grease.</p>		
Drive Pins (14" Clutches Only)	OK	OK
<p>Drive pins are not worn or damaged.</p>		
<p>Flat sides of pins are at a 90° angle to top of flywheel housing. If not, reinstall or replace pin.</p>		
<p>Center plate to drive pin clearance is at least 0.006" (0.152 mm). If not, reinstall or replace pin.</p>		

Flywheel and Flywheel Housing	OK	OK
<p>NOTE: For flywheel service information, refer to the procedure of the manufacturer of the vehicle or the engine.</p>		
<p>Runout of the outer surface of the flywheel is:</p> <p>14" Clutches: 0.007" (0.177 mm) or less.</p> <p>15-1/2" Clutches: 0.008" (0.196 mm) or less.</p> <p>Measured Runout_____</p>		
<p>Runout of the bore of the pilot bearing is 0.005" (0.127 mm) or less.</p> <p>Measured Runout_____</p>		
<p>Crankshaft end play — Refer to OEM or Vehicle Manufacturer Specifications</p>		
<p>Runout of the outer surface of the flywheel housing is 0.008" (0.203 mm) or less.</p> <p>Measured Runout_____</p>		
<p>Runout of the bore of the flywheel housing is 0.008" (0.203 mm) or less.</p> <p>Measured Runout_____</p>		
Release Bearing Clearance	OK	OK
<p>Non-Synchronized Transmissions: +0.50"-0.56" (12.7-14.2 mm) Minimum-Maximum. Measure between release bearing housing and clutch brake.</p> <p>Synchronized Transmissions: between 0.687" (17.44 mm). Measure release bearing housing and clutch cover.</p>		
<p>If not at specified dimension, adjust release bearing clearance.</p> <p>Measured Clearance_____</p>		
Release Fork-to-Release Bearing Clearance	OK	OK
<p>Release fork-to-release bearing clearance is 0.125" (3.17 mm).</p> <p>If not at specified dimension, adjust linkage. Refer to the procedure of the manufacturer of the vehicle.</p> <p>Measured Clearance_____</p>		

Clutch Inspection Check List

Clutch Linkage	OK	OK
Pedal Height Specifications: Refer to vehicle manufacturer specifications. To adjust, refer to the procedure of the manufacturer of the vehicle. Measured Pedal Height_____		
Total Pedal Travel Specifications: Refer to the specifications of the manufacturer of the vehicle. To adjust, refer to the procedure of the manufacturer of the vehicle. Measured Total Pedal Travel_____		
Clutch Brake Squeeze (Non-Synchronized Transmission): Release bearing housing must touch clutch brake when clutch pedal is typically 1.0" (25 mm) from end of pedal travel. For specifications, refer to the specifications of the manufacturer of the vehicle. To adjust, refer to the procedure of the manufacturer of the vehicle. Measured Clutch Brake Squeeze_____		
Free travel varies from 1.125-2.375" (28-60 mm). To adjust, refer to the procedure and specifications of the manufacturer of the vehicle. Measured Free Travel_____		

Components of the Clutch

The following components are used in the clutches. **Figures 11.1, 11.2 and 11.3.**

- Clutch Brake (non-synchronized transmission only)
- Release Bearing Assembly (part of pressure plate and cover assembly)
- Pressure Plate and Cover Assembly
- Clutch Discs with Dampened Hubs
- Organic or Ceramic Facings are available on the Clutch Discs
- Adjusting Ring
- Center Plate
- Fulcrum Ring Assembly (AutoJust)
- Support Plate (AutoJust)
- Adjusting Springs (AutoJust)

Figure 11.1

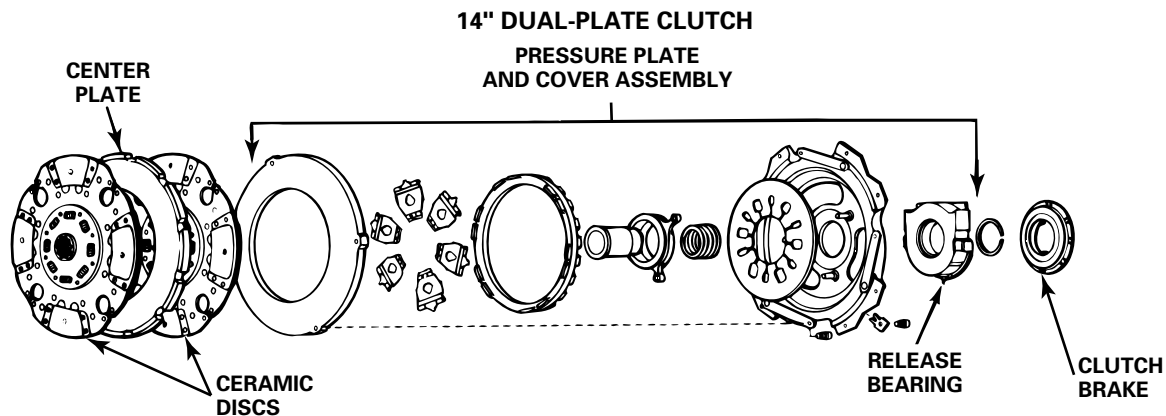


Figure 11.2

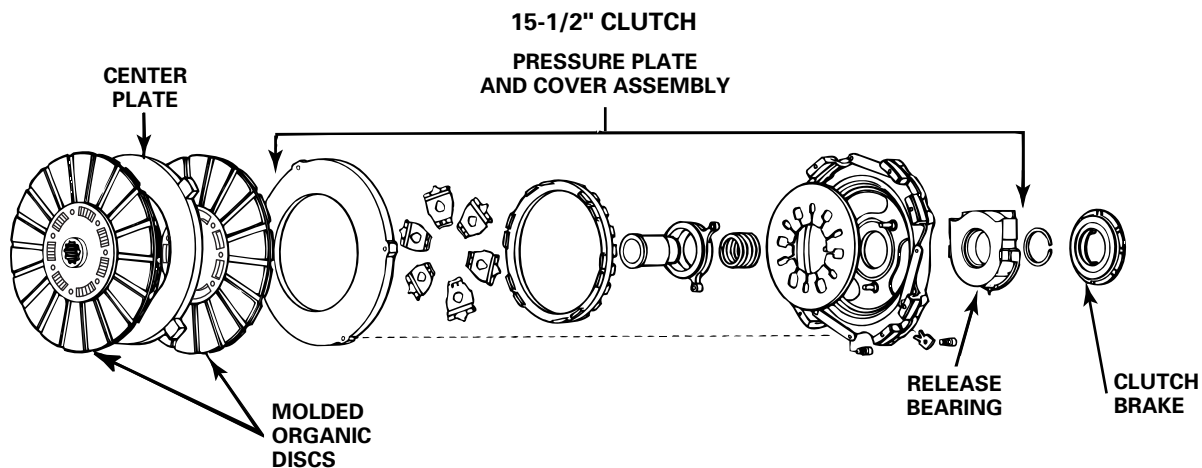
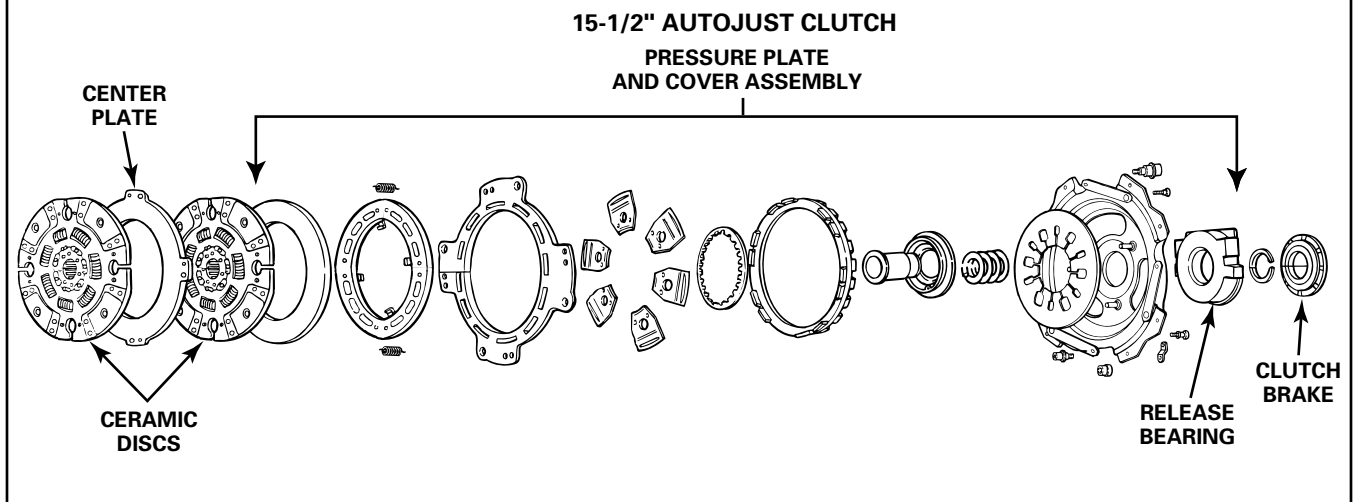


Figure 11.3



Clutch Brake

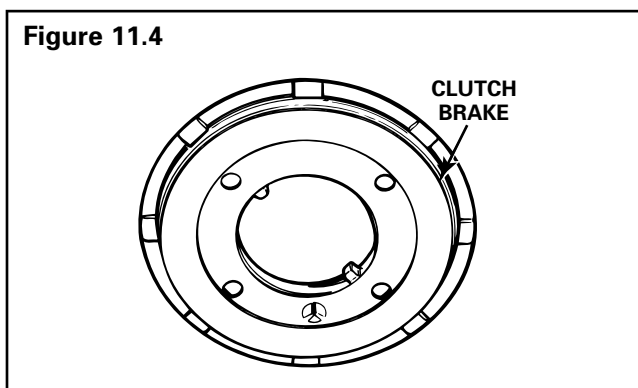
The clutch brake is used only on vehicles with a non-synchronized transmission. The clutch brake is installed on the input shaft of the transmission.

Figure 11.4.

The clutch brake stops the gears in the transmission from rotating when the truck is stopped and when shifting into first (low) or reverse gears. This action lets the gears quickly engage without gear clash.

The clutch brake is engaged by fully depressing the clutch pedal. The clutch brake should not be engaged when the vehicle is moving.

Figure 11.4

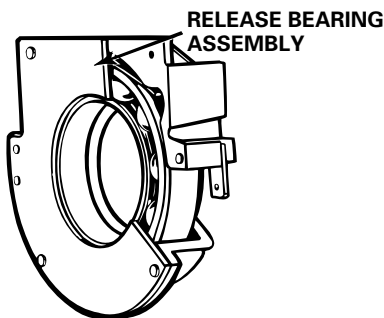


Release Bearing Assembly

The release bearing assembly transfers the movement of the clutch linkage to engage or disengage the clutch.

The release bearing assembly is available with a grease fitting or as a “lubed for life” assembly. Single or dual grease fittings are available on greaseable release bearings. **Figure 11.5.**

Figure 11.5



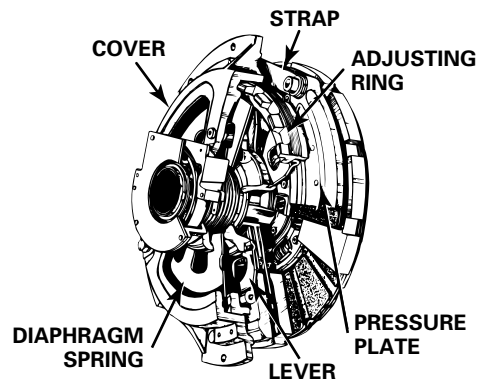
Ball bearings permit the release bearing to rotate freely. A coil spring is installed on the sleeve between the release bearing and the retainer. The coil spring holds the sleeve on the retainer in a “ball joint” arrangement. The “ball joint” arrangement prevents vibration and allows for small misalignments which may occur between the transmission and engine due to tolerances between the mounting surface dimensions.

Pressure Plate and Cover Assembly

The pressure plate and cover assembly applies the force necessary to engage the clutch.

The following parts are in the pressure plate and cover assembly. **Figure 11.6.**

Figure 11.6



- **Cover.** The cover is the housing for the diaphragm spring, adjusting ring, levers, retainer and sleeve of the release bearing. Three holes in the cover permit air flow to remove heat from the clutch.
- **Diaphragm Spring.** The one-piece diaphragm spring characteristic reduces the effort to push the clutch pedal to the floor. Also, the spring gives the pressure to lock the discs between the pressure plate, center plate and flywheel. The spring is positioned and held in the cover by the retainer.
- **Levers.** Six levers connect the cover assembly to the sleeve of the release bearing. The levers multiply and transfer the force of the diaphragm spring from the retainer to the pressure plate.
- **Adjusting Ring.** The adjusting ring is inside the cover and in front of the pressure plate. The adjusting ring controls the release bearing clearance. The clearance must be adjusted periodically to compensate for the wearing away of the linings on the discs.
- **Straps.** Straps connect the cover to the pressure plate. The straps transmit engine torque through the rotation of the flywheel and the clutch cover to the discs. The straps also operate as springs to retract the pressure plate when the clutch is disengaged.
- **Pressure Plate.** The pressure plate applies the force from the diaphragm spring and locks the clutch discs between the center plate and the flywheel.

Clutch Discs

The splines in the hubs of the clutch discs allow the discs to send engine torque to the transmission and to move axially on the input shaft of the transmission. The discs connect the engine to the transmission. The linings on the discs provide a wearable friction surface as the clutch is engaged. **Figure 11.7.**

Dampened hubs are on all clutch discs. The dampened hub absorbs vibration with the following: **Figure 11.8.**

- Cone springs and friction plates (and friction washers on two-stage clutches) between the hub and the disc dampen vibration between the hubs and the discs and also between the input shaft and the discs.
- Co-axial torsion springs in the hub reduce torque shock and vibration between the input shaft and the clutch discs.

Two kinds of dampened hubs are used: a standard dampened hub and a two-stage dampened hub. The two-stage dampened hub eliminates gear rattle in the transmission when the vehicle is idling in NEUTRAL. The two-stage hub is also referred to as a “free travel” hub.

Ceramic Disc Facings

Ceramic disc facings are made from ceramic and bronze material. Rivets fasten the ceramic facing to the disc. **Figure 11.9.**

The ceramic material gives a sudden and direct engagement of the clutch.

Figure 11.9

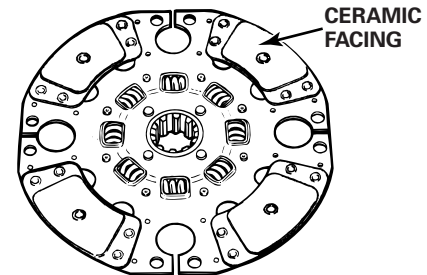


Figure 11.7

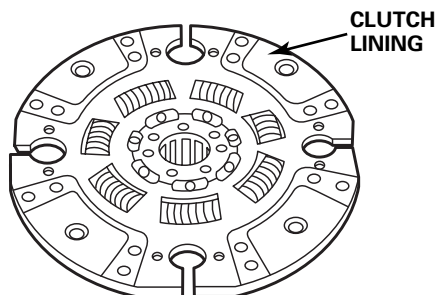
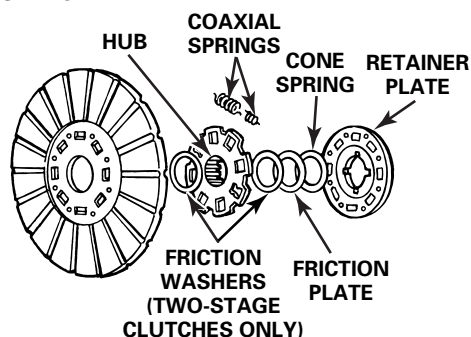


Figure 11.8



Section 11 Components

Center Plate

The center plate increases the torque capacity of the clutch. The center plate gives more surface for the generation of torque capacity. The center plate moves between the flywheel and the pressure plate and clutch cover assembly. The center plate is driven by the flywheel on 14-inch clutches and by the clutch cover on 15-1/2-inch clutches (includes AutoJust).

On the 14-inch clutches, the slots in the plate are installed over drive pins in the flywheel housing.

Figure 11.10.

On the 15-1/2-inch clutches, tabs on the plate are installed in slots in the clutch cover. **Figure 11.11.**

Figure 11.10

14" CLUTCH CENTER PLATE

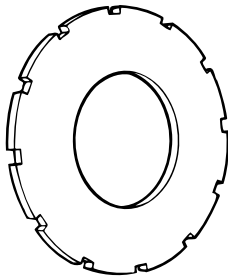
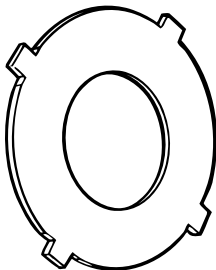


Figure 11.11

15-1/2" CLUTCH CENTER PLATE



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