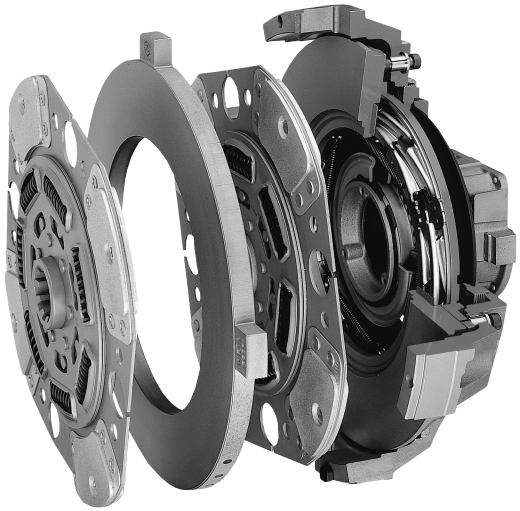
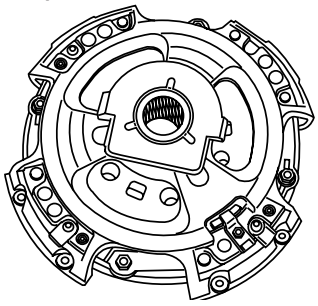
Embrayages



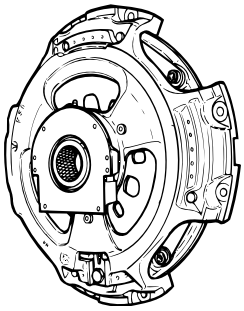
Description

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.

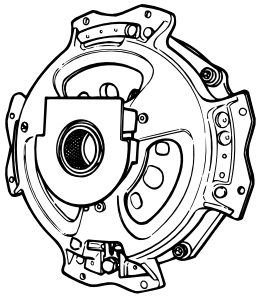
15-1/2" AUTOJUST™ CLUTCH



15-1/2" MANUAL ADJUST CLUTCH

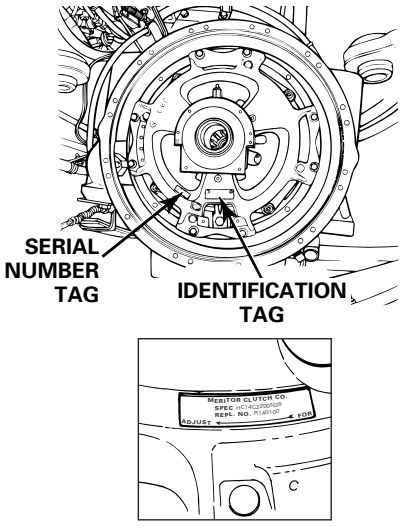


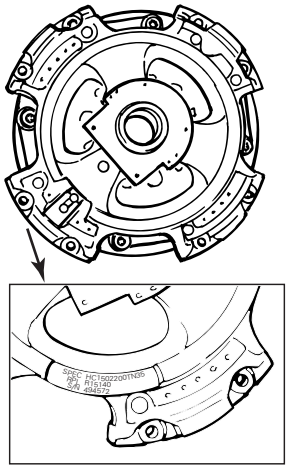
14" DUAL-PLATE MANUAL ADJUST CLUTCH



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.





ETCHED SERIAL NUMBER AND IDENTIFICATION INFORMATION

Disassembly

Removing the Clutch

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

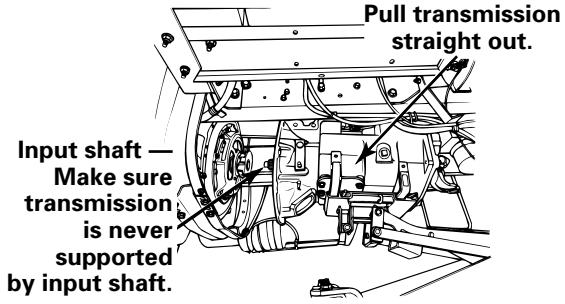
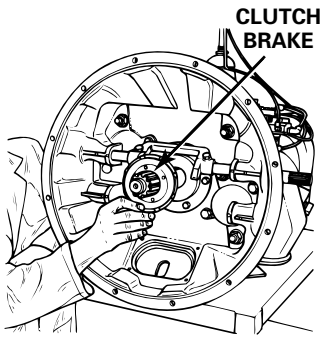


Figure 3.2



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

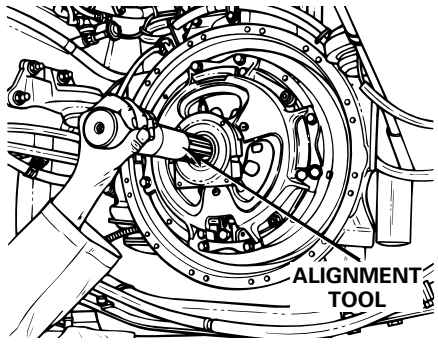
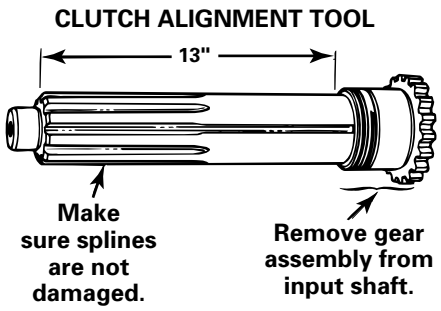


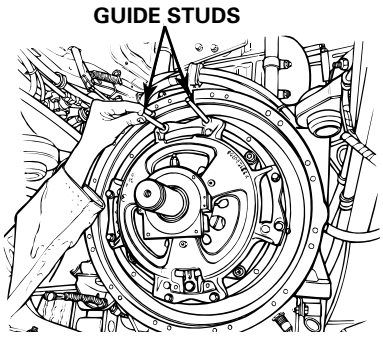
Figure 3.4



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

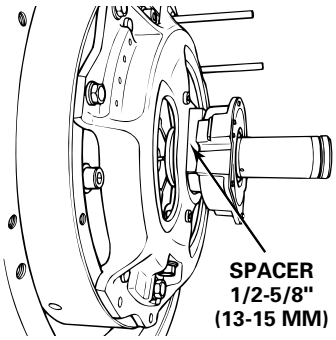
13. Remove the top two bolts that fasten the pressure plate and cover assembly to the flywheel. Install the two guide studs in the holes. **Figure 3.5**.

Figure 3.5



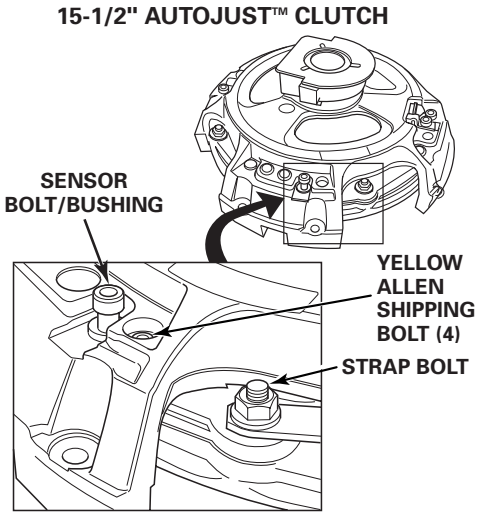
14. On 14-inch two-plate and 15-1/2-inch clutches: Place 1/2-5/8-inch (13-15 mm) spacers between the release bearing assembly and the clutch cover. The spacers ease removal and installation by preventing the diaphragm spring from applying force. **Figure 3.6**.

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**.

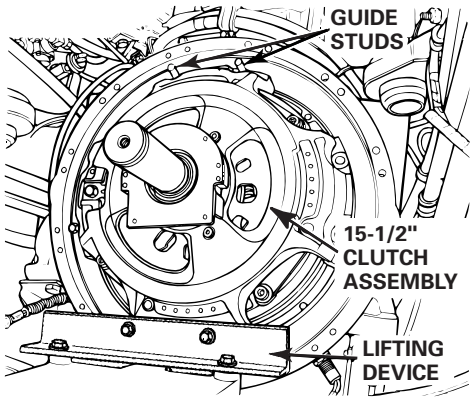
Figure 3.7



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

Figure 3.8



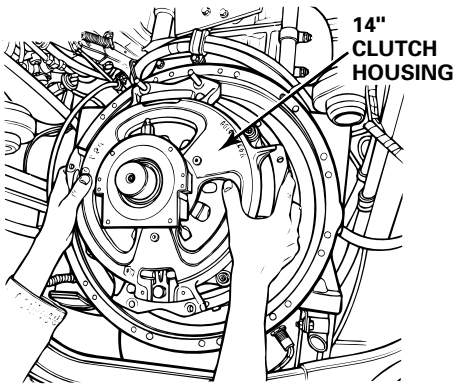
NOTE: When removing the 15-1/2-inch clutch, the discs and the center plate can stay in the cover. Be careful when removing the center plate and the discs.

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

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

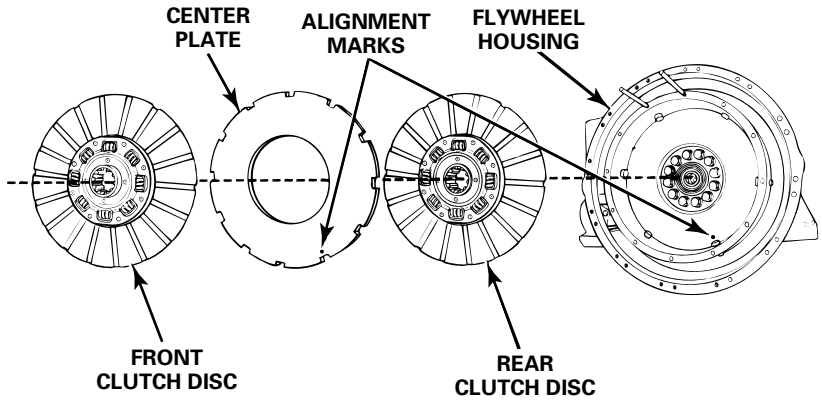
E. Remove the center plate. **Figure 3.10**.
F. Remove the front disc. **Figure 3.10**.
G. Remove the alignment tool from the flywheel.

Figure 3.9



Disassembly

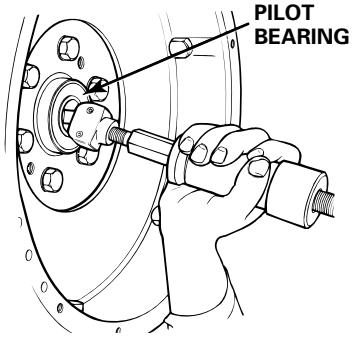
Figure 3.10



NOTE:

Every time the clutch assembly is servicedor 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**.

Figure 3.11

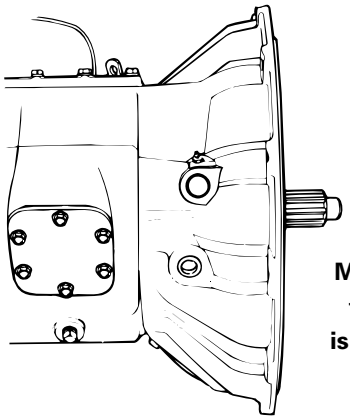


Inspecting the Bell Housing

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. **Figure 4.1**.

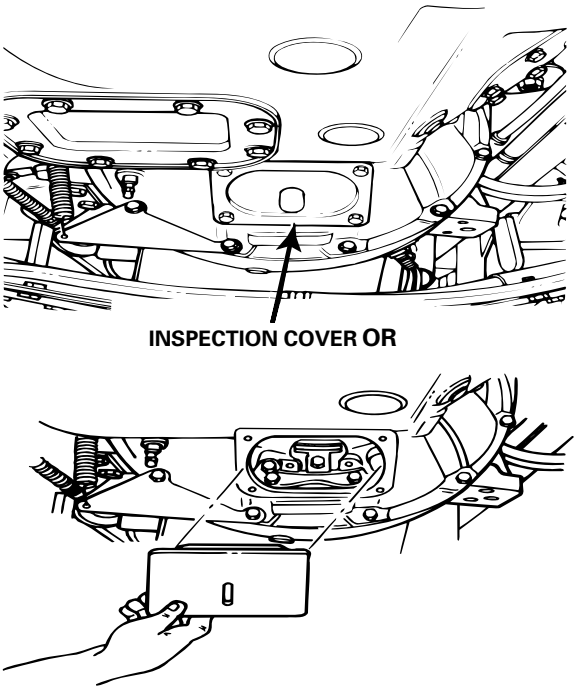
Figure 4.1



Make sure the bore is plugged.

Make sure an inspection cover is installed on the bottom of the bell housing. **Figure 4.2**.

Figure 4.2



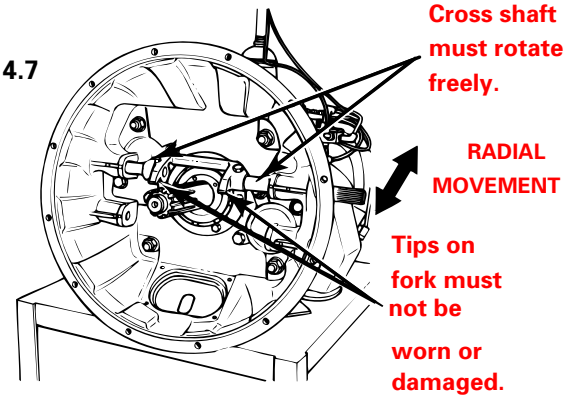
Inspection

#1 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**.

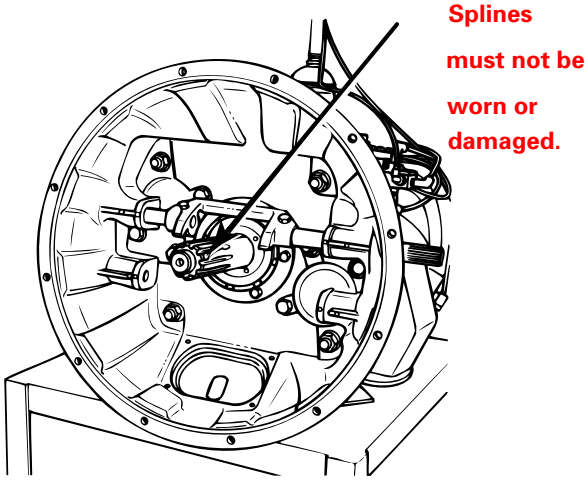
Figure 4.7



#2 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**.

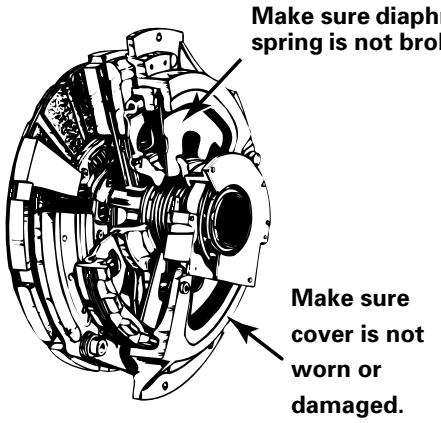
Figure 4.5



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**.

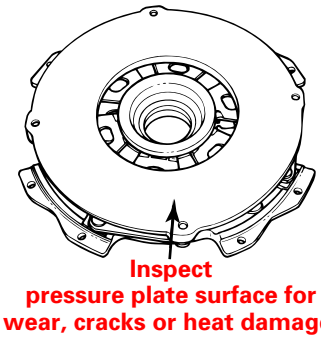
Figure 4.6



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.

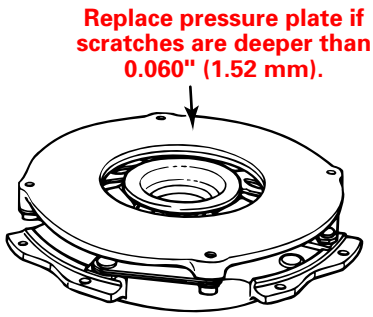
Figure 4.4



Inspection

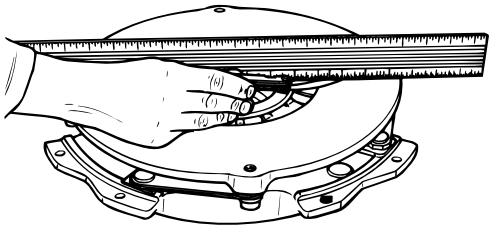
3. Place the pressure plate and cover assembly on a bench so that the plate is toward you.
4. Measure any deep scratches or scoring on the pressure plate. If the damage to the surface of the plate is more than 0.060-inch (1.52 mm), replace the pressure plate. **Figure 4.8**.

Figure 4.8



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



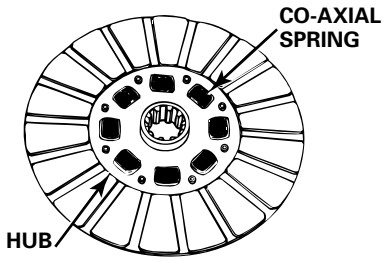
Inspection

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.

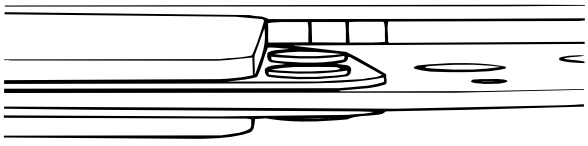
Figure 4.12



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**.

Figure 4.13

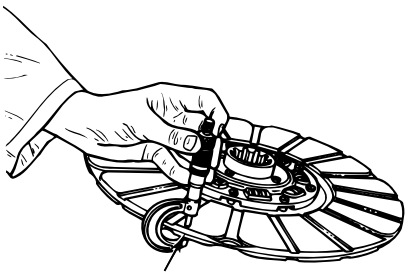


Replace the disc if the lining is even with or below the top of the rivet (ceramic disc shown).

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**.

Figure 4.14

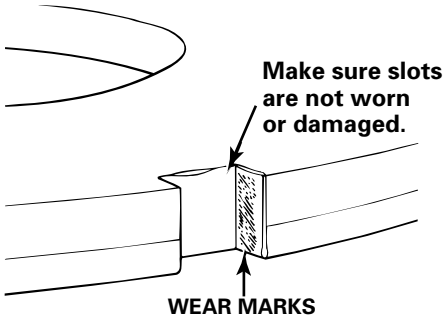


MINIMUM THICKNESS: 0.283" (7.2 MM)

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**.

Figure 4.15



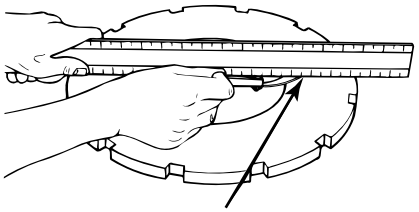
Inspection

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:

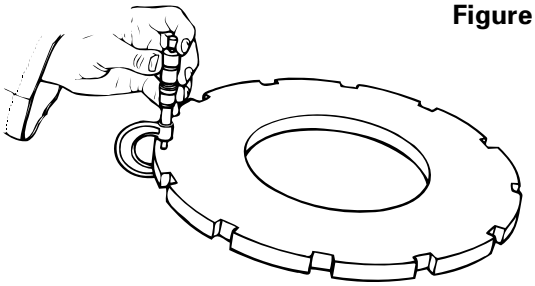
1. Use a micrometer or a caliper to measure the thickness of the center plate. If the thickness is less than 0.728-inch (18.5 mm) on 14-inch clutches with ceramic facings, 0.610-inch (15.5 mm) on 14-inch clutches with organic facings, or 0.681-inch (17.3 mm) on 15-1/2-inch clutches, replace the center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

Figure 4.17



Gap must be 0.002" (0.05 mm) or less.

Figure 4.18



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

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

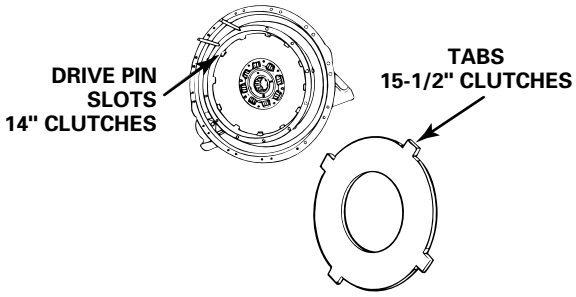
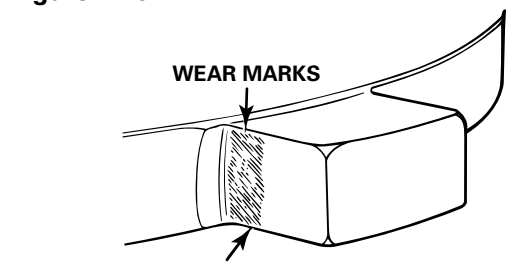


Figure 4.16

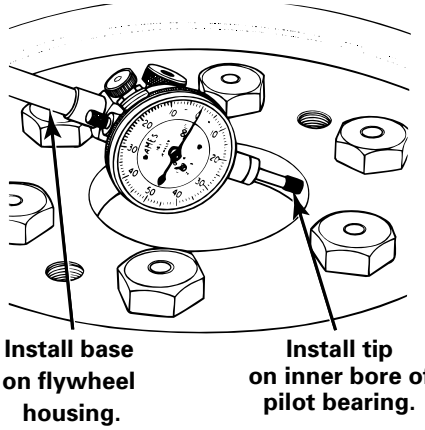


Checking the Runout on the Bore of the Pilot Bearing

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.
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).

Figure 4.30

RUNOUT — PILOT BEARING BORE



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.

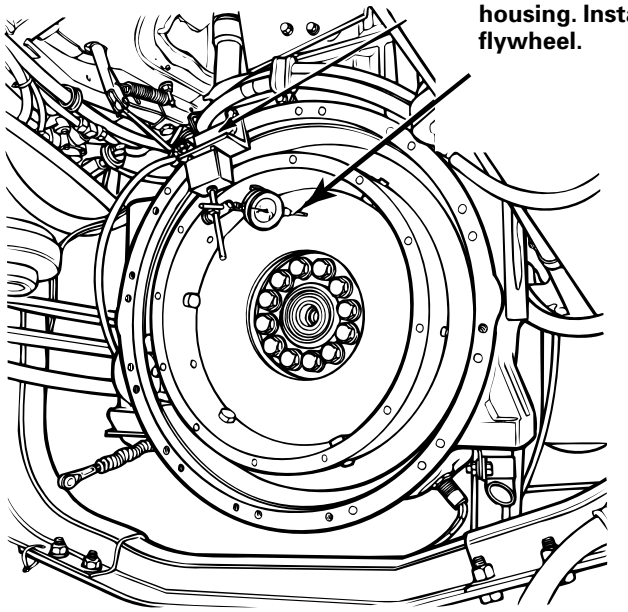
1. Push the flywheel toward the engine so that the end play of the crankshaft is not measured during the flywheel runout check.
2. Install a dial indicator so the base of the indicator is on the mounting surface of the flywheel housing. Place the dial indicator tip against the outer surface of the flywheel.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

Figure 4.29

RUNOUT — OUTER SURFACE OF FLYWHEEL

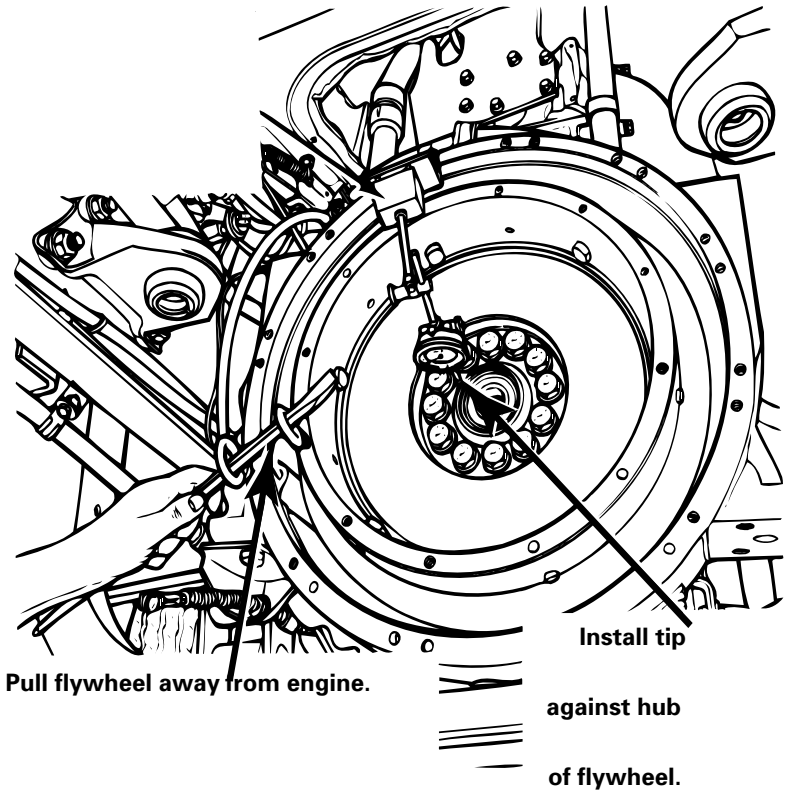


Checking the End Play of the Crankshaft

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.**
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.

Figure 4.31

END PLAY — CRANKSHAFT Install base on flywheel housing.



Assembly

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. 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.

D. Install the center plate over the disc in the pressure plate and clutch cover assembly.

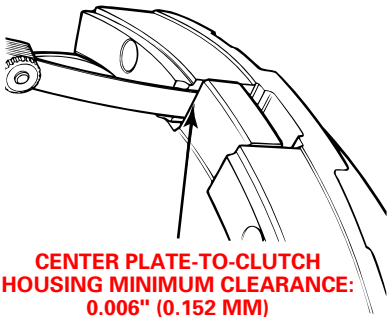
Make sure the tabs on the plate are in the slots on the cover. Be sure the center plate moves freely.

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. **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.

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 6.8



Assembly

Install and hand tighten the capscrews that fasten the clutch cover to the flywheel.

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

Tighten the capscrews to the specified torquein 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

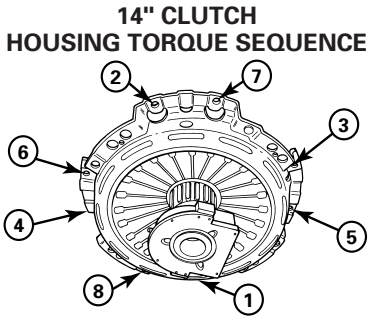
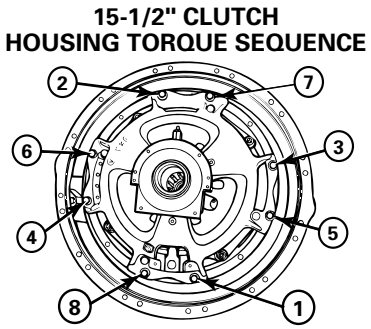
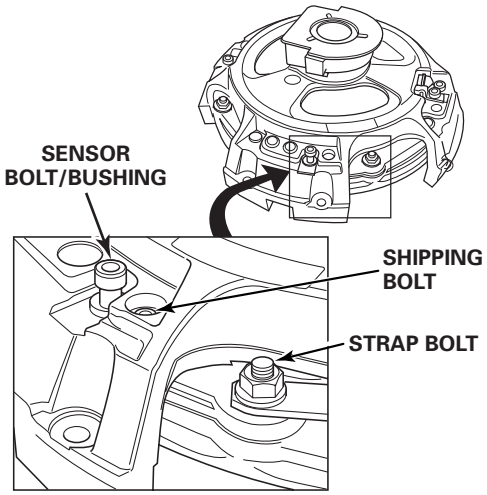


Figure 6.12



On AutoJust clutches, remove the fourshipping 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**.
11. Remove the inspection cover from the housing on the transmission.
12. Place the transmission on a transmission jack or lifting device.

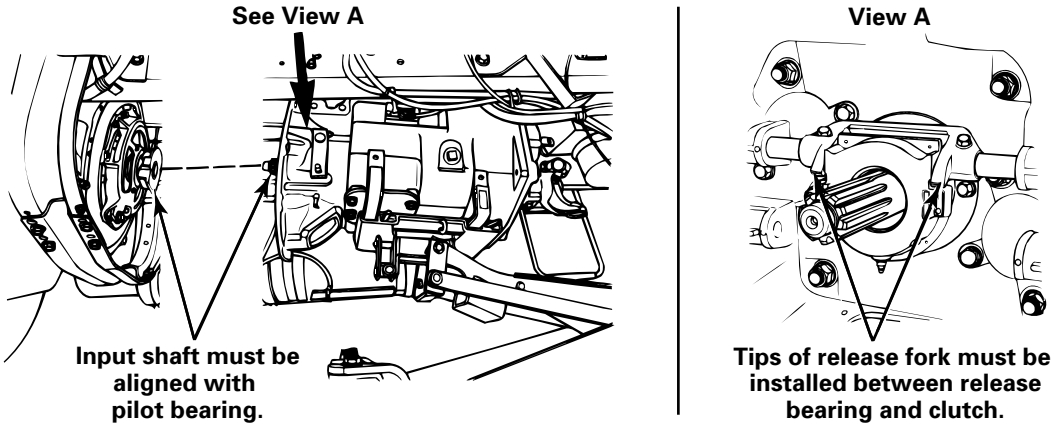
Assembly

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.

Adjustments

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 ever 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. Check that the release fork moves when you press the clutch pedal.

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 .Use ablock of wood to hold the clutch pedal, or have another person hold the clutch pedal, Hold the pedal in this position when moving the adjusting ring.
2. Remove the bell housing inspection cover.
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**.
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.
3. Measure the release bearing clearance.

   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 7.2

RELEASE BEARING CLEARANCE —NON-SYNCHRONIZED TRANSMISSION

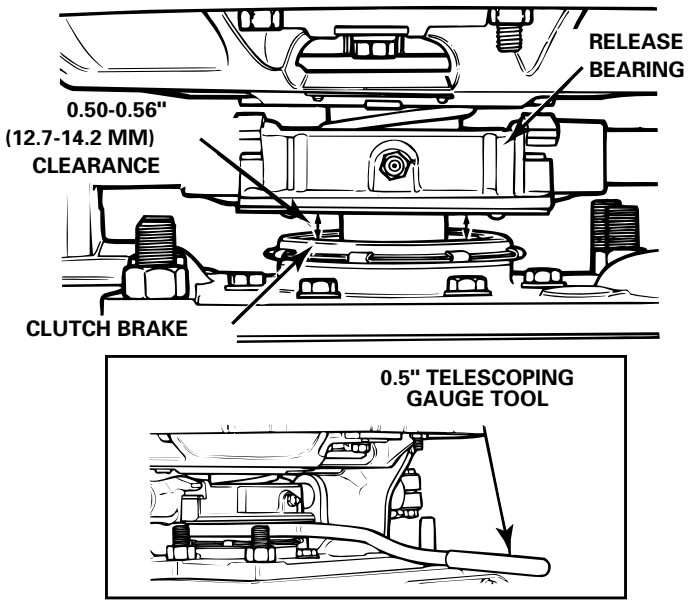
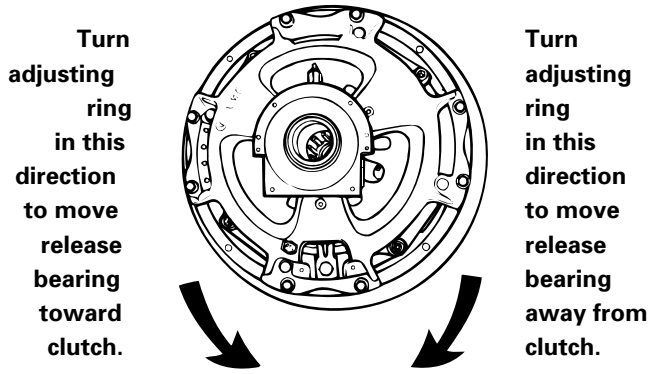


Figure 7.4

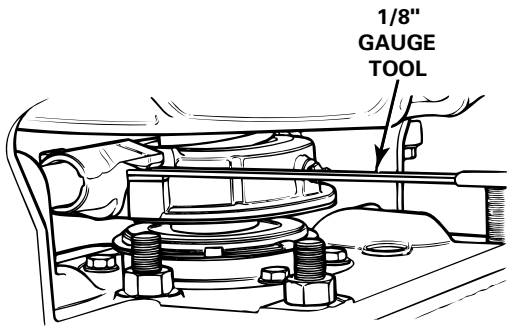


7. Check the release bearing clearance. Refer to Checking the Release Bearing Clearance in this section. If the clearance is outside specification, adjust the clearance.
8. Install the lock plate and capscrew. Tighten the capscrew to 25-30 lb-ft (34-40 N•m).
9. Check release fork clearance to determine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

Checking the Release Fork Clearance

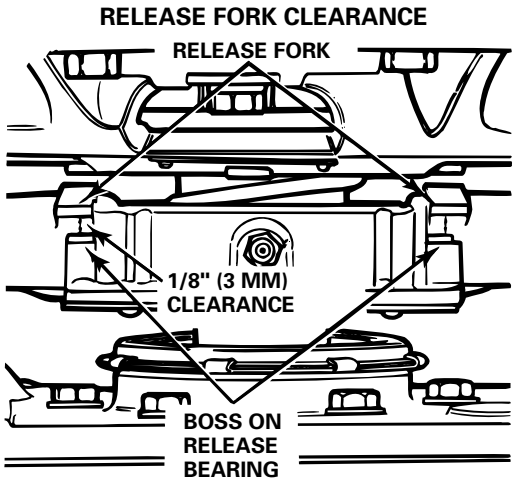
1. Release the clutch pedal.
2. Insert the 1/8-inch gauge tool between the tips of the release fork and release bearing bosses. **Figure 7.5**.

Figure 7.5



3. Check both sides. If the tool fits too loosely ordoes not fit, you must adjust the clutch linkage according to the vehicle manufacturer's procedure and specifications. **Figure 7.6**.
4. Install the bell housing inspection cover.

Figure 7.6



Adjusting the Clutch Linkage

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.

Adjustments

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.

Figure 7.7

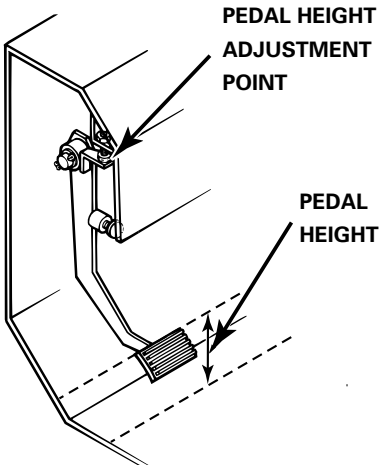
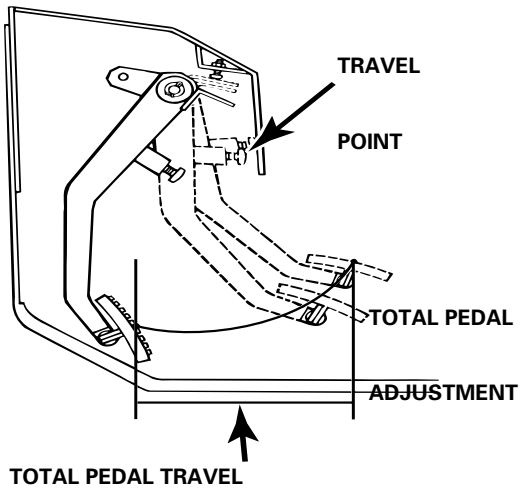


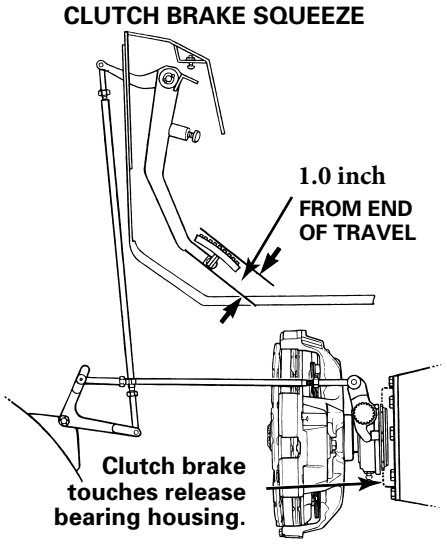
Figure 7.8



Clutch Brake Squeeze

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 1.0inch 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**.

Figure 7.9



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.

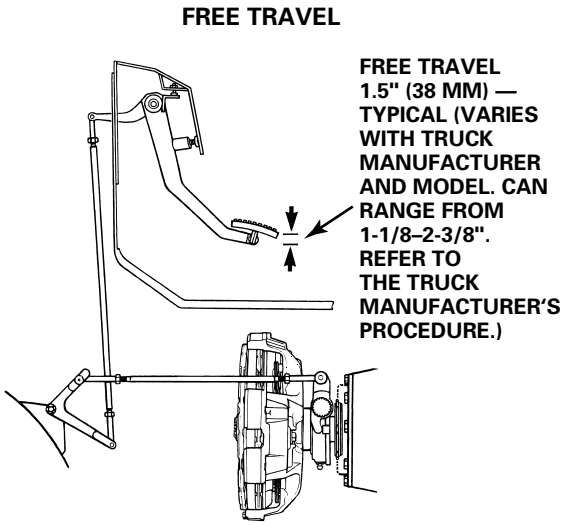
The pedal free travel is typically 1-1/2-inches (38 mm) from the beginning of pedal travel,

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

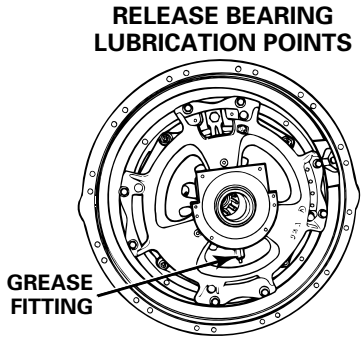


Lubrication and Maintenance

1. Remove the inspection cover on the clutch housing.
2. Clean all grease fittings prior to lubrication.
3. Properly lubricate the release bearing. Apply grease to the grease fitting on the release bearing until you see a small amount ofgrease 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. Install the inspection cover. Meritor recommends using a high temperature, multi-purpose wheel bearing grease **Figure 8.1**.

NOTE: Do not overgrease.

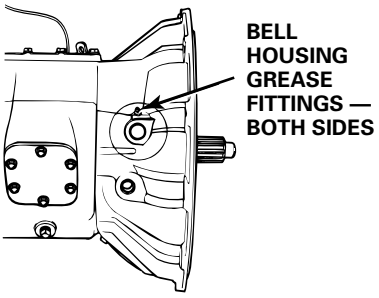
Figure 8.1



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 **Figure 8.2**.

Figure 8.2

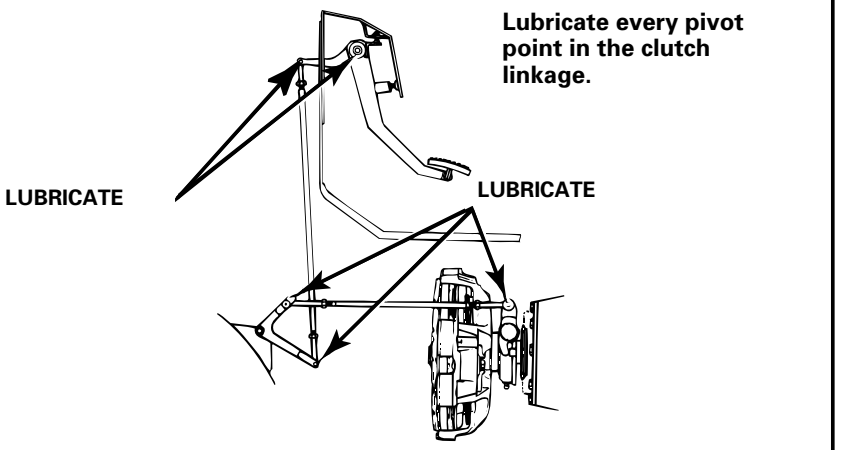


Lubrication and Maintenance

Clutch Linkage

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.

Figure 8.3



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	—	—	—	—

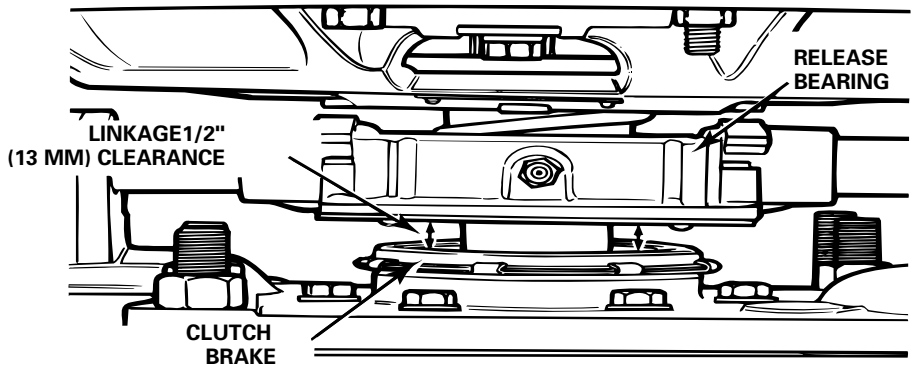
① Use the interval specified by the vehicle manufacturer or the fleet, but make sure the release bearing is greased once per month.

② Use the grease specified by the vehicle manufacturer.

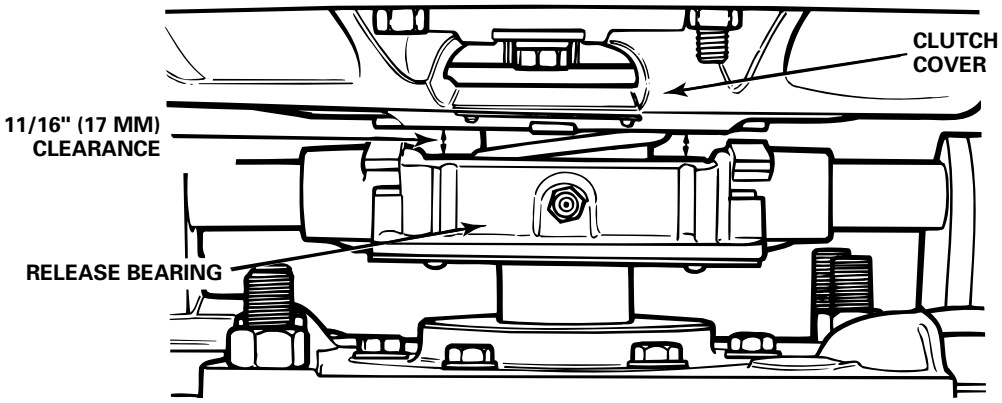
Approved Lubricants

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

RELEASE BEARING CLEARANCE — NON-SYNCHRONIZED TRANSMISSION



RELEASE BEARING CLEARANCE — SYNCHRONIZED TRANSMISSION



RELEASE BEARING CLEARANCE — AUTOJUST CLUTCH