Easy-Pedal Heavy Duty Clutch

![Clutch Diagram]

- Intermediate Plate Drive Lug (4)
- Clutch Cover
- Pressure Plate
- Super Seal™
- Adjusting Ring
- Kwik-Adjust™
- Assist Springs (3)
- Release Sleeve
- Release Bearing Housing
- Release Bearing
- Snap Ring
- Release Bearing Cover
- Bronze Bushings (2)
- Thrust Washer
- Grease Zerk
- Tension Spring
- Levers (6)
- Super Seal™
- Return Springs (4)
- Positive Separator Pin™ (4) (15.5” Only)
- Retainer
- Damper Springs (No. depends upon disc type)
- Disc Hubs (2)
- Flywheel Cavity Area
- Flywheel
- Pressure Springs (6)
- Intermediate Plate
- Front Driven Disc
- Rear Driven Disc
Solo Adjustment-Free Heavy Duty Clutch

Clutch Diagrams

- Clutch Cover Mounting Bolt Holes (8)
- Pressure Plate Plate Spacer (4)
- Wear Indicator
- Assist Springs (3)
- Release Sleeve
- Release Yoke Cross Shaft (2)
- Wear Pad (2)
- Snap Ring
- Bronze Bushings (2)
- Release Bearing
- Release Bearing Cover
- Thrust Washer
- Grease Zerk
- Sliding Cams (2)
- Yellow Colored Shipping/Resetting Bolt (4)
- Clutch Cover
- Access Hole (4) (for setting positive separator pins)
- Front Driven Disc
- Rear Driven Disc
- Intermediate Plate Drive Lug (4)
- Disc Hubs (2)
- Release Yoke Finger (2)
- Damper Springs (No. depends upon disc type)
- Retainer
- Flywheel Cavity Area
- Lever (6)
- Flywheel
- Pressure Springs (6)
- Intermediate Plate
- Positive Separator Pin (4)
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Factors that Effect Clutch Performance

The major cause of clutch failure can be summarized with two words: “EXCESSIVE HEAT”. Extreme operating temperatures (excessive heat) can cause the clutch to fail because the heat generated between the flywheel, driven discs, intermediate plate, and pressure plate are high enough to cause the metal to flow and the friction material to be destroyed.

Heat or wear is practically nonexistent when a clutch is fully engaged. But, during the moment of engagement (when the clutch is picking up the load), it generates considerable heat. An improperly adjusted or slipping clutch will generate sufficient heat to rapidly self-destruct.

Proper training of drivers and mechanics can go a long way toward extending clutch life. Anyone who drives the truck, whether on or off highway, should learn how to operate the vehicle properly. The most critical points to cover in driver training programs are: learning to start in the right gear, proper clutch engagement, recognizing clutch malfunctions, and recognizing the need for readjustment.

Maintenance personnel may want to attend driver training programs to see what driver misuse can do to clutch life. This training will place them in a better position to spot and analyze failures during their clutch maintenance programs.

The most important areas to cover in the training programs that can affect clutch performance are:

STARTING THE VEHICLE IN THE PROPER GEAR
An empty truck can be started satisfactorily in a higher transmission gear ratio than when partially or fully loaded. If auxiliary transmissions or multi-speed axles are used, they must be in the lower ratios for satisfactory starts. Drivers should be shown what ratios can be used for safe starts when the truck is empty or loaded. Do not let the driver find out for himself; he can burn up the clutch by this experimentation. If the truck is diesel powered, a good rule of thumb for the driver to follow is: empty or loaded, select the gear combination that lets you take up the slack and start moving out with an idling engine or, if necessary, just enough throttle to prevent stalling the engine. After the clutch is fully engaged, the engine should be accelerated for the upshift into the next higher gear.

GEAR SHIFTING TECHNIQUES
Many drivers upshift into the next gear—or even skip-shift into a higher gear—before the vehicle has reached the proper speed. This type of shifting is almost as damaging as starting off in a gear that is too high, since the engine speed and vehicle speeds are too far apart, requiring the clutch to absorb the speed difference as heat (excessive slippage).

EXCESSIVE VEHICLE OVERLOAD OR OVERLOADING THE CLUTCH
Clutches are designed and recommended for specific vehicle applications and loads. These limitations should not be exceeded. Excessive or extreme overloading can not only damage the clutch, but the entire vehicle power train as well. If the total gear reduction in the power train is not sufficient to handle excessive overloads, the clutch will suffer, since it is forced to pick up the load at a higher speed differential.

RIDING THE CLUTCH PEDAL
This practice is very destructive to the clutch since a partial clutch engagement permits slippage and excessive heat. Riding the clutch pedal will also put a constant thrust load on the release bearing, which can thin out the lubricant and also cause excessive wear on the pads. Release bearing failures can be attributed to this type of operation.

HOLDING THE VEHICLE ON AN INCLINE WITH A SLIPPING CLUTCH
This procedure uses the clutch to do the job normally expected of the wheel brakes. A slipping clutch accumulates heat faster than it can be dissipated, resulting in early failures.

COASTING WITH THE CLUTCH RELEASED AND TRANSMISSION IN GEAR
This procedure can cause high driven disc R.P.M. through multiplication of ratios from the final drive and transmission. It can result in “throwing” the facing off the clutch discs. Driven disc speeds of over 10,000 R.P.M. have been encountered in such simple procedures as coasting tractors down an unloading ramp. While an ample safety factor is provided for normal operation, the burst strength of the facing is limited.
**Introduction**

**ENGAGING CLUTCH WHILE COASTING**
This procedure can result in tremendous shock loads and possible damage to the clutch, as well as the entire drivetrain.

**REPORTING ERRATIC CLUTCH OPERATION PROMPTLY**
Drivers should report erratic clutch operation as soon as possible, to give the maintenance personnel a chance to make the necessary inspection, internal clutch adjustment, linkage adjustments, lubrication, etc., thereby avoiding possible clutch failures and breakdowns while on the road. The importance of free-pedal travel (sometimes referred to as pedal lash) should be brought to the driver’s attention as well as the mechanic. This item should be included and commented on daily in the driver’s report, since clutch free-pedal is the maintenance personnel’s guide to the condition of the clutch and the release mechanism.

**CLUTCH ADJUSTMENTS**
Drivers and mechanics should be made aware of the fact that Eaton Fuller Angle-Spring and Easy-Pedal Clutches have provisions for an internal clutch adjustment. This permits the clutch “itself” to be readjusted while it is in the vehicle. Details of the clutch adjustment are covered in the Eaton Fuller Installation Instructions packaged with each clutch assembly.

When drivers and mechanics are properly trained, there are still certain problems that may occur. The following failure analysis and troubleshooting guide lists some common problems, their causes, and suggested corrective action. Note that some of these problems relate back to the previous discussion on poor driving and maintenance techniques.
WARNING!

DO NOT CLEAN ANY PART OF A CLUTCH SUBMITTED FOR WARRANTY EVALUATION!

The dirt or grease may be key evidence as to what may have caused the clutch to fail and become a warranty claim. Too little or too much grease may cause a clutch failure. Dirt on a clutch may illustrate unusual wear, or no wear, in places it should or should not be. These contaminants must be left intact to determine what to recommend as a solution to this truck’s problem(s) and avoid future warranty claims.

Any warranty claim submitted to D&W Clutch & Brake must include paperwork which includes all pertinent information about the unit claimed. D&W must be informed of the symptoms which lead to the failure, the part number of the clutch, installation date, removal date, mileage on the unit, year, make and model of the truck, the engine series and horsepower, the flywheel pilot bore size, and all necessary customer information.
Main Causes

Why Clutches Are Replaced

Here are some of the reasons that clutches are replaced.

- Normal wear.
- The clutch can not be adjusted.
- The clutch is out-of-adjustment.
- The clutch is not adjusted correctly.
- The clutch is not adjusted on a regular schedule.
- The driver does not use the clutch correctly.
- The clutch does not have the correct rated capacity for the application.
- The clutch is not lubricated correctly.
- The clutch is not installed correctly.

Clutch Can Not Be Adjusted

If the clutch can not be adjusted, check if the adjusting ring is able to move. See the procedure under “Adjusting Ring” in Section 3. Make sure an inspection cover is installed on the clutch housing. The inspection cover keeps dirt and contaminants from entering the clutch housing.

Clutch Is Out-Of-Adjustment

If the clutch is out-of-adjustment, damage will usually occur gradually unless the clutch is severely out-of-adjustment. “Slipping”, “dragging” or “will not disengage” are symptoms of an out-of-adjustment clutch. For more information, see the charts in this section.

The clutch is out-of-adjustment if the release bearing clearance is not correct and must be adjusted.

The clutch linkage is out-of-adjustment if:

- The release fork clearance is not correct and the linkage must be adjusted.
- The release bearing clearance is correct and the release fork clearance is not correct.

Release Bearing Clearance

The release bearing clearance is out-of-adjustment when the clearance is more than the specified clearance. (If the release bearing clearance is less than the specified clearance, the adjusting ring was turned the wrong way during adjustment.)

NOTE:
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. Figure 2.
Main Causes

As the linings on the discs wear, the release bearing clearance increases. The clutch will operate correctly until the release fork touches the wear pads on the release bearing. **Figure 3.**

When the release fork touches the wear pads on the release bearing, the driver will not have any free travel of the clutch pedal. The release bearing clearance must now be adjusted.

If the release bearing clearance is not adjusted when the fork touches the pads, the life of the clutch is greatly reduced.

The clutch must be adjusted internally before the release fork clearance is used up and before the pedal free travel is less than specifications.

**NOTE:**
For additional information on when the release bearing clearance is out-of-adjustment, see the “Release Bearing Clearance” chart in this section.

**Release Fork Clearance**

The linkage is correctly adjusted when the clearance between the tips of the release fork and the pads on the release bearing is 0.125 inch (3.17 mm) **MINIMUM** to 0.150 inch (3.81 mm) **MAXIMUM** with a **TARGET** clearance of 0.125 inch (3.17 mm). The clearance will be the very close to the same on both sides. **Figure 4**

If the clearance is not close to the same (very different) on each side of the fork, the bushings in the clutch housing or the cross shaft are worn or damaged. The clutch will not be adjusted correctly until the bushings and/or cross shaft are serviced.

If the clearance is more than 0.150 inch (3.81 mm), there will be too much clutch pedal free travel, and the release fork travels a greater distance before the clutch disengages. The clutch will be difficult to disengage, and may not disengage completely because the clutch pedal is at the end of travel and may not engage the clutch brake. **Figure 5.**
Main Causes

**Figure 5**

MORE THAN 0.150 INCH (3.81 mm) CLEARANCE

If the clearance is less than 0.125 inch (3.17 mm), the clutch will operate correctly until the fork touches the pads on the release bearing. Operating the vehicle with less than the specified clearance will cause wear and damage on the tips of the release fork and the wear pads on the release bearing housing. The driver will notice that free travel is less than the specified distance. **Figure 6.**

**Figure 7**

FORK TOUCHES PADS

clutch will overheat and require replacement earlier than normal. **Figure 7.**

**NOTE:**

For additional information on when the release fork clearance is out-of-adjustment, see the “Release Fork Clearance” chart in this section.

**Figure 6**

LESS THAN 0.125 INCH (3.17 mm) CLEARANCE

If there is no clearance, the vehicle is operating with the clutch always partially disengaged. The clutch will slip because the clamp load of the clutch is taken up by the clutch linkage. If not corrected, the clutch is not adjusted correctly.

When the clutch is not adjusted correctly, damage will occur gradually unless the clutch is severely out-of-adjustment. Slipping of the clutch during operation is one of the major signs of a clutch or linkage that is not adjusted correctly (for more information, see the charts in this section).

Typically, the clutch system is not adjusted until the driver complains that the free travel of the clutch pedal is more or less than the specified distance or that the clutch is slipping.

Many times, the linkage is adjusted to correct the free travel. The release bearing clearance is not checked or adjusted. The driver feels that the free travel is correct and that the clutch is operating...
correctly. But if the release bearing clearance is not adjusted, the life of the clutch is greatly reduced.

To determine if the release bearing clearance was adjusted:

**WARNING**

*To prevent serious eye injury, always wear safe eye protection when doing maintenance or service.*

1. If necessary, remove the clutch from the vehicle. See Maintenance Manual #25A, Clutches.

2. Remove the Allen-head capscrews that fasten the straps to the pressure plate.

3. Count the wear marks from the levers on the back of the pressure plate. Divide the number by “six” (6) to get the number of times the release bearing clearance was adjusted. **Figure 8.**

**Clutch Is Not Adjusted On A Regular Schedule**

When the clutch is not adjusted on a regular schedule, damage will occur gradually. Slipping of the clutch during operation is one of the major signs of an out-of-adjustment clutch (for more information, see the charts in this section).

Check the clutch adjustment as part of a Preventive Maintenance (PM) Schedule to determine if the release bearing clearance or the clutch linkage must be adjusted.

Rockwell recommends determining a schedule based on any of the following.

- Adjust the clutch according to the way the driver operates the vehicle.
- Adjust the clutch when required by the preventive maintenance schedule of the vehicle. For typical on-highway applications, the clutch is usually adjusted every 40,000-70,000 miles (64,000-112,000 km).
- Adjust the clutch each time the engine oil is changed.

**NOTE:**

*A sample of a clutch adjustment log is shown in Figure 9.*
Main Causes

Driver Does Not Use Clutch Correctly

When the driver does not use the clutch correctly, damage will occur gradually except in cases of a severe shock load.

If the driver does not use the clutch correctly (starting in the wrong gear, keeping a foot on the clutch pedal, etc.), the service life of the clutch is reduced.

*NOTE:*
For additional information on damage from operating procedures, see the “Vehicle Operations” chart in this section.

To determine if the clutch and engine are correctly matched, see the following.

⚠️ **WARNING**
To prevent serious eye injury, always wear safe eye protection when doing maintenance or service.

1. Remove the inspection cover on the clutch housing.
2. See the identification tag on the clutch and find the specification number. Figure 10.
3. Look at the third and fourth digits of the specification number. The number indicates the clutch diameter in inches and will be “14” or “15”. “14” indicates a 14 inch clutch is used. “15” indicates a 15-1/2 inch clutch is used. Figure 10.
4. Look at the last two digits on the specification number. The number is the pressure plate clamp load and will be “28”, “32” or “36”. Figure 10.
5. Determine if organic or ceramic discs are used.
6. Install the inspection cover.
Main Causes

7. Find the Engine Information Plate. See the vehicle operator's guide for the location of the plate. Look at the **Maximum Torque Rating** or the **Maximum Engine RPM** and record the information.

8. Find the GCW (Gross Combination Weight) of the vehicle.
Main Causes

Clutch Is Not Lubricated Correctly

When the clutch is not lubricated correctly, damage will occur gradually.

Many clutches are replaced because of lubrication problems that are usually indicated by a burnt condition in the area where lubricant is applied. Here are some of the common situations:

- **Clutch is not lubricated on a regular schedule.** Make sure the release bearing, the clutch linkage and the cross shaft bushings in the clutch housing are lubricated according to the schedule developed by the manufacturer of the vehicle or the fleet.

- **Too much lubricant is used.** If too much lubricant is used on the release bearing or cross shaft bushings in the clutch housing, a "chattering" noise can occur during operation and will
eventually grab or slip. Apply lubricant only until lubricant starts to come out of the grease fitting. Figures 12 and 13.

- The wrong lubricant is used. Rockwell recommends using a high temperature multi-purpose wheel bearing grease. If the wrong lubricant is used, the life of the clutch is reduced.

- The lubricant is contaminated. If the lubricant shows signs of contamination, make sure the inspection cover is installed to keep contaminants from entering the clutch housing. Also, check the operating environment of the vehicle that may require more frequent lubrication. Lubricant can also be contaminated by mixing different kinds of lubricants.

⚠️ WARNING
If a grease fitting with an extension tube is used, the release bearing is lubricated with the engine running. Make sure the extension tube extends through the opening of the inspection cover so that hands and tools do not touch any moving parts. To prevent serious personal injury and damage, make sure the vehicle will not move and be careful around any moving parts.

- The wrong procedure is used. If an extension tube is used on the grease fitting for the release bearing, lubricate the fitting with the engine operating. Make sure the passages in the extension tube are not blocked. If only a grease fitting is used, lubricate the fitting when the engine is not operating.

Clutch Is Not Installed Correctly
When the clutch is not installed correctly, damage will occur soon after the clutch is installed. Difficult engagement and disengagement of the clutch during operation is an indication that a clutch is not correctly installed (for more information, see the charts in this section).

The clutch and other related parts can be damaged by installation techniques that are not correct. Install the clutch according to the procedures described in Maintenance Manual Number 25A, “Clutches”.

**NOTE:**
For additional information on damage that occurs when the clutch is not correctly installed, see the “Installation Procedures” chart in this section.
Main Causes

Release Bearing Clearance

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>DRIVER NOTICES</th>
<th>OBSERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than specifications. ①</td>
<td>Pedal free travel is more than specifications. Early clutch brake engagement. Grinding or clashing noise. Clutch drags or does not fully disengage.</td>
<td>Early clutch brake replacement. Severe wear on release bearing cover that may remove rivets. Early clutch replacement because of too much wear on the facing of the disc, the pressure plate and the center plate.</td>
</tr>
<tr>
<td>More than specifications. Release fork doesn’t touch pads on release bearing.</td>
<td>Pedal free travel is less than specifications. Hard shifting into first and reverse gears.</td>
<td>The release bearing will not be damaged until the release fork touches the pads on the release bearing housing.</td>
</tr>
</tbody>
</table>

NOTES:

① The specified release bearing clearances between the front of the release bearing and the clutch brake is 0.500 inch (12.7 mm) MINIMUM to 0.562 inch MAXIMUM with a TARGET clearance of 0.531 inch (13.5 mm). If the clearance is 0.717 inch (18.0 mm), the release bearing clearance must be adjusted.

② The following will cause the release bearing clearance to be less than specifications:

1. The adjusting ring was turned more than the required amount when the release bearing clearance was last adjusted.

2. The clutch pedal was not pushed to the bottom of travel several times when the release bearing clearance was adjusted. The release bearing was not completely rearward in the correct position when the clearance was adjusted.
# Main Causes

## Release Fork Clearance

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>DRIVER NOTICES</th>
<th>OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than specifications.</td>
<td>Pedal free travel is more than specifications. Clutch is hard to operate. Grining or clashing noise. Clutch drags.</td>
<td>Severe wear. Early clutch replacement because of too much wear on the facing of the disc, the pressure plate and the center plate.</td>
</tr>
<tr>
<td>Less than specifications.</td>
<td>Pedal free travel is less than specifications.</td>
<td>The release bearing will not be damaged until the release fork touches the pads on the release bearing housing.</td>
</tr>
<tr>
<td>Release fork doesn't touch pads on release bearing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than specifications.</td>
<td>Pedal free travel does not exist. Clutch may slip due to being partially disengaged.</td>
<td>Early clutch assembly replacement. Severe wear on tips of release fork and pads on release bearing.</td>
</tr>
<tr>
<td>Release fork always touches pads on release bearing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release fork clearance or linkage adjusted instead of release bearing clearance.</td>
<td>Clutch does not disengage and slips. Hard shifting into first and reverse gears due to no clutch brake contact</td>
<td>Early clutch assembly replacement. Round wear pattern on the pressure plate side of the rear clutch disc and also on the retainer and sleeve assembly.</td>
</tr>
</tbody>
</table>

**NOTES:**

1. The specified clearance between the tip of the release fork and the wear pads on the release bearing is **0.125 inch (3.17 mm) MINIMUM to 0.150 inch (3.81 mm) MAXIMUM with a TARGET clearance of 0.125 inch (3.17 mm)**. The clearance on each side of the release bearing must be nearly equal.

2. Often only the clutch linkage is adjusted when the clutch must be internally checked and adjusted (release bearing clearance and release fork clearance). If only the clutch linkage is adjusted and the clutch internal clearances are not checked and adjusted, the clutch will require early replacement and all warranties are voided.
# Main Causes

## Vehicle Operations

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>RESULTS</th>
<th>OBSERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting and moving in a gear too high.</td>
<td>Not enough torque to move vehicle. Clutch slips and overheats.</td>
<td>Burnt or worn clutch assembly.</td>
</tr>
<tr>
<td>Shifting before minimum shift speed.</td>
<td>Shock load.</td>
<td>Broken hub in discs.</td>
</tr>
<tr>
<td>Keeping foot on the clutch pedal.</td>
<td>Clutch is always partially engaged or disengaged. Clutch slips and overheats. Lubricant in release bearing dries up and causes difficult clutch operation.</td>
<td>Burnt discs, center plate, pressure plate and flywheel. Look for excessive wear on tips of release fork and on the pads of the release bearing. Light burn marks on surface of release bearing assembly.</td>
</tr>
<tr>
<td>Pressing the clutch pedal too far when the vehicle is moving.</td>
<td>Too much force applied to clutch brake. Noise in first or reverse gears.</td>
<td>Broken, burnt or damaged clutch brake. Clutch brake requires early replace-ment.</td>
</tr>
<tr>
<td>&quot;Popping&quot; the clutch.</td>
<td>Shock load. Clutch also slips.</td>
<td>Weakens, cracks or breaks the clutch discs, the center plate and the transmission input shaft. Parts are also burnt.</td>
</tr>
<tr>
<td>Using the clutch as a brake.</td>
<td>Too much force against clutch. Clutch slips and overheats.</td>
<td>Early replacement of discs. Cracked, burnt or broken center plate.</td>
</tr>
<tr>
<td>Clutch is applied while coasting.</td>
<td>Shock load.</td>
<td>Broken hubs and/or discs. Broken or damaged transmission input shaft.</td>
</tr>
<tr>
<td>Coasting downhill with the transmission in gear and the clutch disengaged.</td>
<td>Rear axle drives the transmission and puts too many RPM's on the input shaft.</td>
<td>Springs, hubs or linings separate from disc.</td>
</tr>
</tbody>
</table>

**NOTES:**

⚠️ See 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 disengaged. If the vehicle coasts downhill with the transmission in gear and the clutch disengaged, the linings can separate from the discs and cause serious personal injury and damage.
Flywheel

Too Much Runout or Taper on Friction Surface

See Figure 14.

Driver Notices: Clutch engagement is erratic. Clutch drags when disengaged.

Observations: The runout is more than engine manufacturer's specifications. An abnormal wear pattern is in the area where the disc touches the flywheel.

Causes: The flywheel is damaged or not machined correctly.

Correction: Machine or replace the flywheel according to procedure and specifications of vehicle or engine manufacturer. This condition is not covered under Meritor warranty.

Too Much Runout in Pilot Bearing Bore

See Figure 15.

Driver Notices: Clutch disengagement is erratic and a squeal noise is heard. The clutch drags.

Observations: The pilot bearing outer surface is damaged. Heat damage is visible.

Causes: Runout of the pilot bearing bore is out-of-specification.

Correction: Check the runout of the pilot bearing bore. Service the flywheel according to the procedure of the vehicle or engine manufacturer. Replace the pilot bearing. This condition is not covered under Meritor warranty.
Flywheel Housing

Too Much Runout on Outer Surface

See Figure 16.

Driver Notices: Clutch is difficult to engage and disengage.

Observations: The runout is more than engine manufacturer's specifications.

Causes: The engine and the transmission are not correctly aligned.

Correction: Replace the flywheel housing. Check the engine-to-transmission alignment. This condition is not covered under Meritor warranty.
Clutch Cover/Intermediate Plate Failures

Failure - Yoke Bridge Rubbing into Cover

Possible Causes

The arrows in Figures 1 and 2 show the areas of contact between the release yoke bridge and the clutch cover. Overstroking of the yoke, in an attempt to obtain the required 1/2” - 1” clutch brake squeeze, is a typical cause of this failure.

The reason that normal clutch brake squeeze cannot be obtained may be due to one or more of the following situations:

- Worn clutch brake
- Broken or missing clutch brake
- Worn or incorrect transmission bearing retainer cap (refer to Figure 3)
- Excessive wear on release bearing wearing pads and/or the fingers of the yoke (refer to Figure 1)
- Improper set up of the linkage system. Consult your OEM service manual
- Incorrect yoke installed

Note: The clutch cover can be reused if the above items are corrected, a new yoke is installed, and there are no broken or cracked parts on the cover. The above failure is typically preceded by a noise complaint and/or vibrating clutch pedal at the point where the clutch pedal is fully depressed. Depending upon the amount of wear (at the bearing cap and/or yoke fingers/wear pads), it may be possible to adjust the linkage to eliminate the noise complaint.

TRANSMISSION BEARING RETAINER CAP

Dimension A, based on SAE standards, is 8.657” (219.9 mm) nominal, and should not be greater than 8.71” (221.5 mm) Ref. 1990 S.A.E. handbook 4.36.106
Failure - Yoke Fingers Rubbing into Clutch Cover

Possible Causes

Figures 4 - 5 show the damage that results when the release yoke contacts the clutch cover. More specifically, the fingers have become pinched between the clutch cover and release bearing, resulting in one or more of the following:

- A broken/cracked release bearing housing (not shown)
- Damage to the clutch cover (see arrows, Figure 4)
- Wear to the backside of the yoke fingers (see arrows in Figure 5, top yoke)
- Broken yoke finger(s) (see arrow in Figure 5 bottom yoke)

Some causes of the above failure are:

- Linkage system broke, allowing the loose yoke to contact cover
- Linkage system was improperly reinstalled (example: forgetting to reinstall the cotter key, allowing the clevis pin to come out)
- Adjusting the clutch with the linkage instead of internally using the adjusting ring
- Rotating the ring the wrong direction (counterclockwise instead of clockwise) when adjusting for clutch wear

Note: The above conditions may be preceded by a noise complaint.

Failure - Cracked/Broken Clutch Cover

Possible Causes

Referring to the arrow in Figure 6, this brand new clutch (Easy-Pedal 1402 S.D.) was damaged during transmission installation. More specifically, the release yoke “fingers” were elevated to the “straight out position” and were allowed to jam into the clutch cover. Subsequent damage might be a broken finger(s) (Figure 5) or bent release yoke/cross shafts. As a result, it is important that these parts be inspected for damage (and replaced if damaged) before installing a new clutch.

Failure - Broken Retainer Assembly

Possible Causes

Figure 7 shows what can happen when the levers break through the retainer’s nose. The primary cause of this failure is allowing the transmission to hang unsupported in the driven disc during transmission installation.
Failure - Clutch Cover Detached from Flywheel

Possible Causes
The broken mounting bolts, shown in Figure 8, are the direct result of insufficient torquing of these (8) bolts to the flywheel. More specifically, these bolts were loose enough to allow the clutch cover to hammer back and forth against each bolt until they broke. Also, the (8) mounting bolt holes in the clutch cover were "egg-shaped" as a result of the constant hammering.

Additional damage occurred to both the clutch cover and the release yoke as a result of their interference with each other (refer to the arrows in Figures 9 and 10). It is worth noting that this service clutch had accumulated 50,000+ miles before it failed.

Another potential cause of the above failure would be the over-torquing of the mounting bolts. Doing so can cause the bolts to fracture and eventually separate from the flywheel. Combining this scenario with low grade mounting bolts will increase the chances of failure.

Note: Refer to the Eaton Installation Instructions (packaged with each clutch) to determine the proper mounting bolt torque, minimum grade of bolt, etc., for the specific Eaton Fuller Clutch model you are installing.

See Torque Specs on page 73.

Correct mounting bolt torque:
45 ft. lbs. on 15½"
35 ft. lbs. on 14"

Improperly machined flywheel may leave a tapered edge at raised guide lip of flywheel keeping the clutch from seating properly to the wear surface of flywheel. This condition will also affect clutch release and allow slippage.
Failure - Worn Fingers on Release Yoke

Possible Causes
The yoke at the left is brand new. The yoke at the right is worn excessively and should be replaced. This wear can be the result of constant riding of the clutch pedal by the driver, and/or failure to maintain free play up in the cab (see Figures 28 and 29 for the resulting damage that can occur to the release bearing). Consequently, there will be continual contact between the release yoke fingers and the release bearing wear pads. A yoke that is worn excessively may hinder the engagement/control of the clutch. See Figures 1, 5, and 10 for additional photos and descriptions of release yoke failures.
Adjusting Mechanism and Clutch Brake

Failure - Bent/Broken Kwik-Adjust® Mechanism

Possible Causes
Referring to Figure 71, the kwik-adjust mechanism at the right is a normal and properly functioning adjuster while the one at the left has been damaged, as evidenced by the bent mounting bracket. The one pictured in Figure 72 also has a bent mounting bracket in addition to some broken gear teeth (see arrow). Some causes of these failures can be:

- Forgetting to depress the kwik adjuster while attempting to rotate the gear.
- Only partially depressing the mechanism while attempting to rotate the gear.
- Attempting to rotate the gear while the clutch pedal is in the up position (clutch is not released).

Failure - Worn Clutch Brake

Possible Causes
As shown in Figure 73, the facing material on this clutch brake is completely worn away. Figure 74 shows a clutch brake that is partially worn (see arrows). Both types of failures can be attributed to one or more of the following:

- A clutch that is releasing poorly (for corrective action, see the troubleshooting section titled “Poor Release”), thus making it more difficult for the clutch brake to stop the transmission input shaft.
- “Hitting” or engaging the clutch brake when the transmission is in gear and the vehicle is in motion.
- The clutch brake was set too high.
- Installing the new clutch brake in front of a worn/rough transmission bearing retainer cap.
- Clutch brake is simply worn out.

Note: A worn clutch brake should be replaced. Be sure to always check the transmission bearing retainer cap for any wear and replace if necessary (see Figure 3).
Clutch Brake

Burnt

See Figure 79.

Driver Notices: The transmission is hard to shift into first or reverse gears. The clutch may drag.

Observations: Clutch brake is heavily burnt.

Causes: The driver uses the clutch brake when the vehicle is moving. A worn or damaged pilot bearing may cause the clutch to drag.

Correction: Replace the clutch brake. Inspect the transmission input bearing retainer and replace if required. Inspect the pilot bearing and the flywheel and replace if necessary. Make sure the driver uses the clutch brake correctly. This condition is not covered under warranty.

Broken Tabs

See Figure 80.

Driver Notices: The transmission is hard to shift into first and reverse gears. Also a noise may be heard when the clutch is operated.

Observations: Clutch brake tabs are broken.

Causes: The driver uses the clutch brake when the vehicle is moving.

Correction: Replace the clutch brake. Inspect the transmission input bearing retainer and replace if required. Make sure the driver uses the clutch brake correctly. This condition is not covered under warranty.
Solo Clutch

Failure - Solo Cam Tab Broken Off

Possible Causes
In Figure 75, the tab was broken when someone was attempting to change the adjustment of the clutch. The clutch cannot break the tab. Many times the tab is broken to change the bearing to clutch brake distance when it is in the proper position. Do not attempt to change the clutch adjustment before measuring the release bearing to clutch brake distance.

Note: Consult the troubleshooting guides for help. If the release bearing is set to the correct dimension, do not attempt to use the cam tab to change the adjustment to the wrong dimension and break off the tab. Troubleshooting guides: CLTS-1296 (Medium-Duty) and CLTS-1295 (Heavy-Duty).

Failure - Solo Over Adjust Problem

Possible Causes
Measure the distance between the release bearing and clutch brake. Correct distance should be between .490" and .560" with the pedal up (Figure 76). If the bearing is close to the clutch brake and the clutch has not been removed and re-installed on the flywheel, then an overadjust might have occurred. Consult troubleshooting guides for help. Follow the fault tree for proper diagnosis and correction.

Failure - Bushing Wear and Bushing Failure

Possible Causes
As shown in Figures 77 and 78, incorrect lube or not enough lube can cause a failure. External contamination will also cause wear to the bushing. The transmission input shaft may be rough and require replacement. Use approved/compatible lube. (High-quality N.L.G.I #2 or #3 lithium soap grease with E.P. additives 325 degree operating temperature). Apply ample lube and let it flow out of the opening from the bearing housing. Apply additional lube onto the transmission shaft to ensure the bushing will have proper lube. Apply lube to the tips of the release yoke.

See Fig. 85 on page 31.

- Misalignment of input shaft can cause a side load on bushing which will pull it out.
- Worn cross shaft bushings will allow the cross shaft to pull back unevenly resulting in a side load condition on the bushing causing it to come out.
Solo Clutch

Failure - Solo Cam Tab Spring Broken - Solo Stops Adjusting

Possible Causes

- There is an immediate loss of free pedal in the cab.
- The release bearing is touching yoke and too far from transmission.

Consult troubleshooting guides for help. There will be no tension pulling the cam/wear indicator toward “replace.” Troubleshooting guides: CLTS-1296 (Medium-Duty) and CLTS-1295 (Heavy-Duty).

Failure - Solo Adjustment Rings Contaminated - Solo Stops Adjusting

Possible Causes

If there is excessive amounts of contamination allowed into the clutch housing, the Solo may stop adjusting and there will be a loss of free pedal in the cab (see Figure 80). Check to see if the inspection cover has been removed. In severe dust applications, it may be necessary to seal all openings in the clutch housing.

Eaton has created a tool that may help free up the clutch to allow it to continue adjusting. #CLPISOLOTOOL can be obtained by calling 800-826-HELP (4357).

Failure - Worn Wear Pad on Release Bearing caused by Running the Truck without Free Pedal

Possible Causes

When the clutch is properly maintained, there should always be free pedal in the cab. This will prevent fork contact with the bearing wear pads and reduce the wear to the pads and the release fork (Figure 81). Follow adjustment instructions for correct clutch and linkage adjustment. Adjust the clutch before free pedal is lost. Apply grease to the yoke fingers to reduce friction when the clutch pedal is stroked.
Failure - Cross Shaft Wear

Possible Causes
Figure 82 is an example of a worn cross shaft (release shaft). A worn cross shaft (see circle) will occur after high mileage and will be accelerated by a lack of lubrication. Some problems associated with worn cross shafts (and/or worn linkage systems) are:

- Sporadic changes in the amount of free play in the cab
- A binding condition in the linkage system
- Erratic engagement of the clutch
- Side loading of the release bearing housing

As a result, a typical complaint might be that it is impossible to maintain proper clutch adjustment. To prevent future clutch problems, always inspect the linkage system for excessive wear and/or binding conditions before installing the new clutch. Be sure to replace any worn components that might hinder clutch operation. Also, remember to lubricate the linkage pivot points.

Failure - Seized/Dry Pilot Bearing

Possible Causes
Once removed from the flywheel, a failed pilot bearing can be identified by one or more of the following conditions:

- The bearing is dry; it is difficult to turn (rough) or completely seized. Any condition which causes a dry bearing will have been accompanied by a noise complaint while it was in the vehicle.
- A damaged ball bearing cage (see arrow in Figure 83).
- A step is worn into the inner race. The step is caused when the input shaft spins within the inner race, a direct result of the seized pilot bearing.
- The seal is missing and/or damaged because of excessive heat generated by the dry bearing.

A typical complaint associated with a failed pilot bearing (other than noise) is poor release. Poor release can be the result of one or more of the following conditions:

- The outer race of the bearing fits too tightly in the flywheel.
- The inner race of the bearing fits too tightly on the input shaft.
Miscellaneous

- A seized or rough pilot bearing will allow the input shaft to continue rotating even when the clutch is completely disengaged. As a result, the clutch brake can become damaged and eventually fail (see Figure 73 of “Worn Clutch Brake”).

- If the bearing fits too loose, the end of the input shaft won’t be properly fitted. Also, if the fit is loose, the races will skid rather than rotate the ball bearings.

Failure - Input Shaft (Drive Gear) Spline Wear

Possible Causes
Drive gear spline wear will cause clutch release problems since the driven discs cannot slide freely on the splines. This is especially true if new driven discs are installed on a worn input shaft (Figure 84). Excessive spline wear can be attributed to torsional vibrations. This type of wear can be eliminated or lessened by the use of dampened driven discs. Spline wear will also occur on the mating driven disc hubs (see Figures 61-62). Misalignment can also be a factor in abnormal spline wear. It is important to always inspect the input shaft for wear before installing a new clutch. If worn, it is recommended that a new input shaft be installed to eliminate possible clutch problems later on.

Failure - Galled Input Shaft

Possible Causes
This failure resulted when the clutch’s release sleeve was being “side loaded” onto the input shaft (Figure 85). A worn linkage system and/or excessive wear on the release bearing “wear pads” and “release yoke fingers” can cause this side loading condition.

A galled or rough input shaft (in the non-splined area) will damage the bushing(s) of not only the original clutch, but also that of the newly installed clutch. As a result, make sure you replace the input shaft and any worn linkage components to prevent the failure from being repeated.
Release Fork

Wear Is Not Even on Tips
See Figure 75.

Driver Notices: The clutch pedal is hard to push.

Observations: Wear is very different on each tip. The ends of the tip are polished. The cross shaft and the cross shaft bushings are worn or damaged.

Causes: The capscrews that fasten the release fork to the cross shaft were too tight or not tightened evenly. The cross shaft may be damaged. The bushings were not lubricated.

Correction: Replace the release fork. Inspect the cross shaft and the bushings and replace if required. Make sure the bushings are lubricated at the correct intervals. This condition is not covered under warranty.
Release Fork Cross Shaft

Seized

See Figure 77.

Driver Notices: The clutch pedal is hard to push and does not return.

Observations: The cross shaft and the bushings are worn or damaged.

Causes: The cross shaft bushings were not lubricated at the specified intervals or with the correct grease.

Correction: Replace the cross shaft and the bushings. Lubricate the bushings at the specified intervals with the correct grease. This condition is not covered under warranty.

Wear Is Not Even

See Figure 78.

Driver Notices: The clutch pedal is hard to push down. The clutch may drag or not disengage.

Observations: Wear is different on either side of the shaft.

Driver Notices: There is a “rattle” noise coming from the area of the clutch. Light pressure on the clutch pedal makes the noise go away.

Observations: Excessive clearance between the cross shaft and the cross shaft bushings. Radial movement is present.

Causes: The cross shaft bushings were not lubricated at the specified intervals or with the correct grease.

Correction: Replace the cross shaft and the bushings. Lubricate the bushings at the specified intervals with the correct grease. This condition is not covered under warranty.
Transmission Input Bearing Retainer

Worn Surface
See Figure 82.

**Driver Notices:** The transmission is hard to shift into first and reverse gears.

**Observations:** Outer surface is worn with deep grooves and scratches. The wear is “cupped” towards the center of the retainer.

**Causes:** Normal wear. Also, the driver may be engaging the clutch brake when the vehicle is moving or trying to override drag from a seized pilot bearing.

**Correction:** Replace the transmission input bearing retainer. Inspect the clutch brake and replace if required. Inspect the pilot bearing and replace if required. Make sure the driver uses the clutch brake correctly. This condition is not covered under warranty.

**NOTE:**
The transmission input bearing retainer can also be checked by measuring the distance from the top of the splines on the input shaft to the top of the bearing retainer as shown in Figure 82A. The **TARGET** distance for the input shaft is 8.657 inch (219.9 mm). The dimensions are based on SAE Standard J-1463 from the 1994 SAE Handbook, 36.120.
Clutch Cover/Intermediate Plate

Failure - Damaged Sleeve Bushing

Possible Causes
Failure to center the input shaft with the sleeve of the release bearing assembly, when installing the transmission, can cause this failure. If the transmission hangs up during installation, investigate the cause before proceeding as excessive force can damage the bushing (see arrow in Figure 12). Allowing the transmission to hang unsupported in the sleeve bushing can damage the bushing. The arrow in Figure 11 shows another example of sleeve bushing damage on a heavy duty clutch.

Failure - Damaged Intermediate or Pressure Plate

Possible Causes
Figures 13 - 16 depict damaged clutch plates which resulted from an abnormal amount of clutch slippage/heat. Some causes of this abnormal slippage/excess heat can be one or more of the following:

1. Incorrect clutch applications. In otherwords, the engine’s torque rating exceeds the clutch’s torque rating.

   • Driver abuse. (refer to Factors that Effect Clutch Performance Sections concerning the specific driver practices that can lead to excessive heat).

   • Improper/ inadequate clutch adjustments. More specifically, operating the truck without free-play for extended periods of time; adjusting the clutch via the linkage instead of the required internal adjustment.

   • Overloading of the vehicle.

Figure 13 is an example of a cracked pressure plate. The heat flow was so great that the metal could not dissipate it quickly enough.
Clutch Cover / Intermediate Plate

Failure - Damaged Intermediate of Pressure Plate (Continued)

Possible Causes (Continued)
Figure 14 shows a broken intermediate plate. As in the previous example, the heat flow was so intense that the metal could not disperse the heat quickly enough.

In Figure 15, an area of the intermediate plate has been circled to reveal the damage of heat checks. These heat checks are actually small cracks with raised ridges that are capable of shaving off the facings of the driven disc.

Finally, Figure 16 reveals an example of a burned or scorched intermediate plate in which the metal became so hot that it began to flow. The typical evidence of such a failure will be one or more of the following:

- High and low spots on the plate
- Partial transfer of the facing material (ceramic or organic) from the driven disc onto the plate
- A blue discoloration throughout the failed part

To view the resulting damage that can occur to the facing material of the driven discs, please refer to Figures 53-56 and 58.

Failure - Grooved Pressure Plate

Possible Causes
The groove (see arrow in Figure 17) worn into the face of this pressure plate was caused by the rivets of the driven disc facing. (For the related disc failure, see the description under Figure 70). The same damage can occur on both the intermediate plate and flywheel. A surface that is grooved can damage the new driven discs that are installed. As a result, a new clutch assembly should be installed. Refer to the OEM service manual concerning flywheel resurfacing.
Clutch Cover / Intermediate Plate

Failure - Cocked Drive Pins (14” Pot-Style Clutches Only)

Possible Causes
The groove worn in the face of the drive pin slots are on the upper section of the face on one side of the slot (see arrow in Figure 18) and on the lower section on the opposite side of the slot. This indicates that the drive pins were cocked and causing the intermediate plate to hang-up. This will cause release problems and therefore hard shifting. Do not file the slots of the intermediate plate to correct the problem. Instead, you must reset the drive pin(s) until they are square to the flywheel.

Note: Always install new Eaton drive pins when installing a new Eaton Fuller 14” Heavy Duty Clutch. This is important because worn drive pins (against the new intermediate plate slots) can prevent the clutch from releasing cleanly. Also, ensure that the drive pins are set squarely to the flywheel’s friction surface (refer to the Eaton Installation Instructions packaged with each Eaton Fuller Clutch). Failure to set each drive pin squarely is the most prevalent reason for a “poor release complaint” on a recently installed clutch (Angle Spring and Easy-Pedal Plus 1402).

Failure - Filed Drive Slots

Possible Causes
As indicated by the shiny areas on the drive slots, (see arrow Figure 19) the slots of this intermediate plate were hand filed. Eaton does not recommend this practice since it can cause unequal loading on the drive pins in the flywheel. Instead, Eaton recommends that the drive pins be checked for squareness to the flywheel friction surface and reset if necessary (see Eaton Installation Instructions).
Clutch Cover / Intermediate Plate

Failure - Broken Drive Pins and Worn/Broken Drive Slots (14" Pot-Style Clutches Only)

Possible Causes
Figure 20 shows a broken drive pin head that has become wedged into the intermediate plate's drive slot. Figure 21 is the same intermediate plate but with excessively worn and broken drive slots. Figure 22 shows a broken drive pin. The above failures can be caused by one or more of the following:

- Failure to use the anti-rattle springs packaged with each super-duty clutch
- Misapplication of the clutch
- Unequal loading on the drive pins as a result of filing the drive slots.

Note: Failure to use the anti-rattle springs can cause other problems such as a noisy or poor releasing clutch.
Drive Pins

Normal Wear
See Figure 49.

Observations: Wear pattern is in the shape of the drive pin in the slot of the center plate. Drive pin shows even wear.

Causes: Normal wear.

Correction: Move center plate to next slot over drive pin during installation. If all slots are worn, replace plate and pins. This condition is not covered under warranty.

Not Correctly Installed
See Figure 50.

Driver Notices: Clutch may drag and/or slip.

Observations: Wear pattern is only in one area of the drive pin and slot.

Causes: Drive pins not correctly installed (cocked).

Correction: Replace drive pins. Use an installation tool to install pins. Move center plate to next slot during installation. If all slots are worn, replace center plate. This condition is not covered under warranty.
Failure - Anti-Rattle Springs Installed Backwards

Possible Causes
As shown in Figures 23 and 24, the intermediate plate was "hanging up" at the corners of the open sections of the anti-rattle springs. The driver’s complaint was a clutch that would not release. It is important that the rounded sections of the anti-rattle springs be installed TOWARDS the flywheel/engine.

Failure - Interference Between Retainer Assembly and Rear Disc Rivets

Possible Causes
Figure 25 shows the damage done to the nose of the retainer assembly (see arrow) due to contact with the disc rivets. Figure 57 shows the resulting damage done to the rear disc. Adjusting the clutch externally (with the linkage) instead of internally (rotation of adjusting ring) will cause the retainer sleeve/release bearing assembly to move too far forward as the clutch wears, leading to this failure.

An additional result from the above failure is that while the clutch is engaged, it can begin to slip due to the unloading condition created by the disc and retainer interference. This, in turn, will create excessive heat and can cause the pressure plate to break (see Figure 25, black arrow on pressure plate) and/or the ceramic buttons to separate from the disc (see Figure 58). The above failure may also be preceded by a noise complaint.
Clutch Cover/Intermediate Plate

Failure - Broken Leg

Possible Causes
- Abusing the clutch during shipping and handling.
- Dropping the clutch during installation or removal.

The photo in Figure 27 is a close-up of the broken leg shown in Figure 26. The arrow in this close-up shows where the leg contacted the concrete floor after the clutch was dropped.

The use of “guide studs” plus a “hydraulic clutch stand” will help prevent this 150 lb. clutch from being dropped during installation and removal.

Note: Eaton Clutch does not provide warranty coverage for this type of failure.

Failure - Release Bearing

Possible Causes
A failed release bearing (see Figure 28) can usually be attributed to one or more of the following situations:

- A dry release bearing due to lack of periodic lubrication (does not apply to sealed bearings).
- Failure to fully release or riding the clutch pedal will place a constant thrust load on the bearing, (see arrows in Figure 29) leading to higher temperatures and consequent loss of lubricant. Failure to maintain free play up in the cab can also cause this condition. Not only will the bearing begin to fail, constant contact in this area will cause both the release yoke fingers (Figure 79), and the wear pads (Figure 29), to wear excessively.
- A potential result of this wear is that the release yoke will force the bearing and sleeve assembly against the input shaft. Consequently, this “side loading” condition can damage the bushing, sleeve, and input shaft (see Figure 78).
- Failure to use the recommended high temperature lubricant can also cause a loss of lubricant, even under normal operating conditions. An impending release bearing failure may be accompanied by noise.

Note: In order to determine the proper greasing techniques, be sure to consult the Eaton Installation Instructions packaged with each Eaton Fuller Clutch.
Release Bearing Housing Assembly

Severe Wear on Wear Pads

See Figure 68.

Driver Notices: Clutch pedal free travel does not exist. Hard shifting into first and reverse gears. Clutch does not disengage and slips. The clutch pedal is hard to push.

Observations: Round wear into (and possibly through) the wear pads. In more severe cases, the wear is into the body of the release bearing housing.

Causes: Release bearing clearance was never adjusted or the linkage was adjusted instead of the release bearing clearance. The release fork-to-pad clearance is not correct. Also, the driver may keep a foot on the clutch pedal.

Correction: Replace the release bearing housing or the clutch assembly. Make sure the clutch is adjusted internally. Check and adjust the release bearing clearance at regular intervals. Inspect the release fork. Make sure the driver does not keep a foot on the clutch pedal. This condition is not covered under warranty.
Release Bearing Housing Assembly

Wear is Not Even on Wear Pads
See Figure 69.

Driver Notices: Clutch drags or is difficult to engage and disengage.

Observations: Wear is different on the wear pads on each side of the release bearing housing.

Causes: The cross shaft is worn or damaged or the bushings for the cross shaft in the clutch shaft are worn or damaged.

Correction: Replace the release bearing housing or the clutch assembly. Inspect the cross shaft, the release fork and the cross shaft bushings and service as required. Lubricate the bushings at scheduled intervals. This condition is not covered under warranty.

Burnt or Seized
See Figure 70.

Driver Notices: Clutch is noisy and difficult to engage or disengage.

Observations: Release bearing is severely burnt and may not rotate freely on the clutch assembly.

Causes: The release bearing is not lubricated at the specified intervals or with the correct lubricant.

Correction: Replace the release bearing housing. Inspect the release fork and replace if necessary. Lubricate the release bearing at the specified intervals with the correct lubricant. This condition is not covered under warranty.
Bearing Housing Cover Wear

See Figure 71.

**Driver Notices:** Hard shifting and noise into first and reverse gears.

**Observations:** Heavy wear pattern is on the release bearing cover.

**Causes:** The release bearing clearance and/or the clutch linkage are out-of-adjustment or not adjusted correctly which cause the clutch brake to touch the release bearing cover. Also the driver may be engaging the clutch brake when the vehicle is moving or trying to override drag from a seized pilot bearing.

**Correction:** Replace the release bearing housing. Adjust the release bearing clearance and the clutch linkage. Inspect the clutch brake and replace if required. Inspect the pilot bearing and replace if required. This condition is not covered under warranty.

Cover Separates from Bearing Housing

See Figure 72.

**Driver Notices:** Clutch is noisy when engaged or disengaged.

**Observations:** The cover is separated from the release bearing housing.

**Causes:** Clutch brake squeeze may not be adjusted correctly. Also the driver may apply too much pressure on the clutch pedal.

**Correction:** Replace the release bearing housing assembly. Make sure clutch brake squeeze adjustment is correct. Make sure the driver operates the vehicle correctly. This condition is not covered under warranty.
Clutch Cover / Intermediate Plate

Failure - Oil Soaked Cover

Possible Causes
A leaking transmission or a leaky rear main engine seal can coat the clutch cover with oil, as indicated in Figure 30. Figure 41 shows the disc which was run with this cover.

Failure - Bent/Damaged Positive Separator Pin

Possible Causes
The separator pin shown in Figure 31 became damaged (bent) when it was dropped during clutch installation. To prevent this from occurring, Eaton recommends the use of two (2) guide studs when mounting the intermediate plate and clutch cover to the flywheel (refer to the Eaton Installation Instructions).

The damage done to the separator pins in Figures 32 and 33 (see arrows) is the result of using the wrong tool combined with excessive force. All four pins (on each intermediate plate) were damaged. When “setting” the four (4) roll pins, the proper tool would be a 1/4” flat nose punch used in conjunction with a small hammer (to help ensure light taps).

A damaged pin(s) can prevent the intermediate plate from retracting evenly when the clutch is disengaged, leading to a “poor release” complaint from the driver. The same complaint can also occur if the mechanic forgets to “set” the four (4) positive separator pins upon installation of the clutch. In you forgot to set the separator pins before installing the transmission, you can still set them through the inspection opening of the transmission.
Center Plate

Normal Wear

See Figure 40.

Normal wear is a smooth and even wear on both sides of the plate. Minor damage such as heat marks can be removed with an emery cloth.

Too Much Wear

See Figure 41.

Driver Notices: Clutch slips.

Observations: The center plate must be replaced when the thickness of the plate is less than the following:

14 Inch Clutches With Ceramic Discs: 0.728 inch (18.5 mm).
14 Inch Clutches With Organic Discs: 0.610 inch (15.5 mm).
15-1/2 Inch Clutches: 0.681 inch (17.3 mm).

Causes: Center plate is not replaced at the correct interval.

Correction: Replace clutch assembly. Inspect clutch at regular intervals. This condition is not covered under warranty.

Wear Pattern is Not Even.

See Figure 42.

Driver Notices: Clutch drags.

Observations: Wear pattern is only in one area on both sides of center plate.

Causes: Warped or bent discs or center plate. Clutch not correctly installed.

Correction: Grind plate or replace clutch assembly. Make sure clutch is correctly installed. This condition is not covered under warranty.
Clutch Cover / Intermediate Plate

Failure - Aluminum Spacer Ring on the Intermediate Plate is Broken (Eaton Fuller Solo™ and Stamped Angle Spring 1402 only)

Possible Causes
As shown in Figure 34 (see arrow), the aluminum spacer ring broke when it was bolted up backwards onto the flywheel.

Note: The cover assembly mounting hole pads (see arrow in Figure 35) have made an indentation (see arrow in Figure 36) onto the spacer ring mounting hole pads (flywheel side). This evidence will confirm that the spacer ring/intermediate plate assembly was indeed installed backwards. The words “Flywheel side” (refer to Figure 37) will face the flywheel when properly installed. Mishandling of this assembly during installation and/or removal can also cause the spacer ring to break. Some results of installing the intermediate plate backwards are as follows:

• A clutch that will not release properly.

• The release bearing position may be closer than normal to the transmission bearing retainer cap immediately upon clutch installation.

• A “cracking” noise as you tighten the (8) mounting bolts that secure the cover to the flywheel.
A broken conversion ring (CR) or intermediate plate lug in a stamped angle spring clutch results from the mechanic installing the conversion ring in backwards. Weight has been removed from the backside of the conversion ring similarly to the machined intermediate plate guide slots on the pressure plate side for balance. When drawing in the mounting bolts to proper torque, either the intermediate plate lug or the conversion ring will break if the ring is in backwards. The correct “Flywheel Side” is marked on the ring.

**Damaged Tabs (15-1/2 Inch Clutch)**

**See Figure 48.**

**Driver Notices:** Clutch is noisy. Clutch may be difficult to engage and disengage.

**Observations:** Tabs are worn or damaged. The clearance between the tab and the slot in the clutch housing is less than 0.006 inch (0.152 mm).

**Causes:** Drivetrain vibration.

**Correction:** Replace the center plate. Correct the cause of drivetrain vibration. This condition is not covered under warranty.

**Figure 48**
Failure - Lever Wear

Possible Causes
As indicated by arrows in Figure 38, excessively worn levers are most likely the result of lack of maintenance. More specifically, lever wear can be the result of one or more of the following conditions:

- A dry, seized, or broken throw out bearing. Typical causes of a damaged bearing are:
  a. Operating the truck without free-play
  b. Constant riding of the clutch pedal

Both items 1 and 2 can cause the thinning and loss of bearing lubricant. They can also cause rapid lever wear due to constant contact with the bearing.

- A throw out bearing which fits too tightly on the front bearing cap stem. As a result, the return spring(s) (attached to the linkage or throw-out bearing) may not be capable of retracting the throw-out bearing away from the clutch levers. This will cause contact between these parts.

- Worn and/or binding linkages are causing the throw-out bearing to make “constant contact” with the clutch’s three (3) release levers (Figure 38).

- Using a throw out bearing of inferior quality.

Failure - Adjusting Linkage to Compensate for Clutch Wear

Possible Causes
Figure 39 shows the back of the pressure plate. This clutch has been properly adjusted (internally, using the adjusting ring) because each of the 6 levers has more than one witness mark (or lever fulcrum point).

Figure 40 depicts a clutch that has not been adjusted properly. As shown, there is only one witness mark per lever indicating that the clutch was improperly adjusted using the linkage.

WARNING: Continually adjusting for clutch wear via the linkage can lead to the failures shown in Figures 4, 5, 25, and 57-58.
Pressure Plate

Normal Wear

See Figure 51.

Normal wear is smooth and even.

Wear Pattern is Not Even.

See Figure 52.

Driver Notices: Clutch slips.

Observations: Wear pattern is only in one area with some heat damage.

Causes: Warped or bent pressure plate. Clutch not correctly installed. The plate is warped if the taper is more than 0.005 inch (0.127 mm).

Correction: Replace clutch assembly. Install clutch correctly. This condition is not covered under warranty.

Broken or Cracked

See Figure 53.

Driver Notices: Clutch slips and is difficult to engage or disengage. Clutch is noisy.

Observations: Pressure plate is cracked on the surface or is broken. Plate is severely burnt.

Causes: Excessive heat build-up, slipping or the clutch is out-of-adjustment or not adjusted correctly.

Correction: Replace clutch assembly. Make sure clutch is adjusted correctly. This condition is not covered under warranty.
Clutch Disc Assembly Failures

Failure - Oil Soaked Ceramic Disc

Possible Causes
After removal from the truck, the top half of this ceramic disc (Figure 41) was cleaned in order to reveal the contrast with the bottom half which is still oil soaked (Figure 30 shows the clutch cover that was run with this disc). Possible contributors to this condition are a leaking transmission and/or a leaking rear main engine seal.

Furthermore, oil on the disc buttons can cause the clutch to release poorly due to increased drag, and/or chatter/slip during engagement.

Note: Eaton does not recommend the reinstallation of any discs that are oil soaked because the button facings cannot be satisfactorily cleaned.

Failure - None

Normal Wear Patterns
When troubleshooting Eaton Fuller Clutches, do not be concerned with the wear pattern (darkened areas) of the disc buttons (see Figure 42). More specifically, it is normal for the darkened areas to vary in color, size, and their relative position upon each button.

The exception to the above wear pattern is described in detail in Figure 46. The title of this description is: "Failure - Abnormal wear pattern at middle of disc button".
Failure - Grease on Buttons of Ceramic Disc

Possible Causes
Figure 43 shows a disc with grease on its buttons, flywheel side. When this disc was removed from the truck, all four buttons had a heavy layer of grease on them. The left button has been cleaned to show the contrast with the grease-covered button on the right. Failing to remove the grease (rust preventative) from the flywheel (new or resurfaced) can cause this problem.

Greasing the splined areas of either the input shaft or disc hub(s) is not recommended because the grease can be spun onto the facing material of the driven disc(s) (refer to both arrows in Figure 44). The circled area in Figure 45 reveals the numerous paths which the grease took as it moved toward the buttons (facing material) of this ceramic driven disc. The photographs in Figures 44-45 are of the same driven disc.

Note: Eaton does not recommend the reinstallation of driven discs which have become contaminated with grease or oil.

A contaminated driven disc can cause one or more of the following problems:
- Poor release
- Clutch chatters during engagement
- Slipping clutch

Also, grease on the splined areas of the input shaft/disc hub(s) will attract dirt, worn facing material, etc. which can impede the free movement of the disc hub on the input shaft, potentially causing a "poor release" complaint.

Failure - Abnormal Wear Pattern at Middle of Disc Button

Possible Causes
As shown by the dark areas of the three buttons in Figure 46, this disc was making major contact at the middle of each button on the flywheel side. The buttons on the opposite side had normal wear patterns. This abnormal wear pattern is found on service clutches (not original equipment), and is usually caused by a flywheel that is worn unevenly. This condition may result from improper resurfacing of the flywheel.

Before resurfacing any flywheel, consult your OEM service manual for proper procedures.
Failure - Warped Driven Disc

Possible Causes
Shown in Figure 47 is a brand new driven disc which was warped during transmission installation (as indicated by the dummy input shaft which is not perpendicular to the disc’s hub). More specifically, the transmission was allowed to hang unsupported in the driven disc hub. A driven disc which has become bent due to improper installation techniques should not be reused because of the potential for a “poor release” complaint.

Fig 47

Failure - Front Disc and Flywheel Interference

Possible Causes
This failure can be attributed to one or more of the following specific conditions:

• The rivets of the disc (Figure 48) have been contacting the flywheel’s mounting bolts. Some potential causes of this particular interference are as follows:
  a. Loose flywheel mounting bolt(s) due to inadequate torquing.
  b. Forgetting to tighten one or more of the mounting bolts when reinstalling the flywheel.
  c. Installing an extra washer under the flywheel mounting bolt.
  d. A flywheel which has been resurfaced too many times.

• The damper springs (see arrows, Figure 49 and 50) have been contacting the flywheel mounting bolts because the front driven disc was installed backwards. The driven disc (in Figure 49) had been wearing for a period of time before the interference occurred (as indicated by the full wear pattern on the ceramic buttons) while the one in Figure 50 was run for a very short period.

Fig 48

Fig 49 (EPP 14")

Fig 50 (SAS 1402)
Clutch Disc Assembly

Fig 51

- A disintegrating pilot bearing which is interfering with both the hub and rivets of the driven disc (Figure 51).

Fig 52

- Installation of the wrong clutch. Figure 52 (see arrows) shows the points of interference that resulted when a 10-spring driven disc was installed where an 8-spring was previously being run. In other words, the recessed area of the flywheel (mounting bolt cavity) was too small for the 10-spring driven disc. Before you mount the new clutch, consult the Eaton Installation Instructions (packaged with each Eaton Fuller Clutch) concerning “potential damper interference”. A driver complaint, resulting from the above failure, can be:
  a. The clutch does not release
  b. The clutch is noisy during operation
Failure - Burnt Discs

Possible Causes
The failures shown in Figures 53-56 and 58 are the result of excessive heat due to prolonged slippage. Figures 53, 54, and 58 show discs that became so hot (due to slippage) that the ceramic material began to flow and eventually separate from the disc. Figures 55 and 56 show how the organic material separates from the disc due to bonding agent failure as a result of extreme heat. Burnt discs may result from:

- Lack of free pedal
- Constantly riding the clutch pedal
- Utilizing a slipping clutch as a brake on an incline
- Partial unloading of a clutch due to a binding linkage system, interference, etc.
- Installation and use of improper clutch (wrong application)
- Worn driven disc facings
Clutch Disc Assembly

Failure - Rear Disc Interfering with Retainer Assembly

Possible Causes
Figure 57 (see circle) shows the damage that will occur to the rear disc when it makes contact with the retainer assembly (refer to the arrow in Figure 25 concerning the subsequent damage to this part). This type of interference was so great that the clutch began to slip while engaged, thus creating enough heat to cause the ceramic buttons to self-destruct (Figure 58).

Failure - Cracked Damper Cover

Possible Causes
The cracks shown in Figures 59 and 60 (see arrows) can result from:

• Forcing the transmission input shaft into the disc hub during installation
• Allowing the transmission to hang unsupported in the driven disc(s) during installation
• Misalignment between the engine housing and the transmission bell housing
Clutch Disc Assembly

Failure - Hub of Rigid Driven Disc Worn Excessively or Fracturated

Possible Causes
Figure 61 shows a disc hub that has worn excessively (see arrow) and has also broken away from the disc. Note the narrow width of each spline compared with those on a new disc. Figure 62 reveals a hub in which the splines have been completely "pounded" out (see arrow.) The typical cause of worn splines is either torsional vibrations or misapplication of the clutch. A broken or cracked disc hub can be attributed to one or more of the following:

- A severe shock load, such as engaging the clutch while coasting down a hill.
- Misalignment between the transmission bell housing and engine housing due to loose transmission mounting bolts and/or worn mating faces of either housing.
- Misapplication—a rigid disc should not have been used, but rather a dampened disc assembly (D.D.A.).
- Torsional vibrations from the engine.
- Excessive flywheel runout.
- Allowing the transmission to hang unsupported in the driven disc during installation.

Failure - Non-Eaton Fuller Material

Possible Causes
Figure 63 is the disc of a non-Eaton rebuilt clutch. It is an old disc that was rebuilt, as indicated by the presence of dampener springs encased in rubber (see arrow). Consequently, the rubber covered springs can make the disc act as a rigid disc, thus increasing wear to the input shaft and the disc itself. As shown by an arrow in Figure 64, parts of this disc have broken. Also, the springs are wrapped in rubber to prevent any worn ones from falling out after the disc is put into service. Contrast this with the Eaton Fuller Reman Clutches in which only new discs are used.
Clutch Disc Assembly

Failure - Broken and/or Missing Dampener Springs

Possible Causes
A broken dampener or missing spring (see arrow in Figure 66) may result from severe shock loads or excessive torsional vibration from the engine in excess of what the dampener springs can absorb. If the clutch disc is not original equipment, verify whether it matches the vehicle’s application.

• Misapplication is the primary reason for the springs to break and come out of a disc spring cage. The spring cage window will become egg shaped over time and the dampening capability of the disc will decrease prior to failure.

• Driver abuse due to: starting in too high a gear; shock load from downshifting improperly to the wrong gear; letting the clutch out too quickly; or coasting and putting the clutch into gear while engine and rear RPM are not at the same rate will contribute to clutch disc damage and/or failure.

• Broken springs in a disc may also be the result of the disc spring cage rubbing against the heads of the flywheel mounting bolts. This may result from a flywheel that has been machined too deep, or a mechanic having used too thick a lock washer under the flywheel mounting bolt.
Failure - Burst Driven Disc, Friction Material Separates from Disc

Possible Causes
This type of failure is caused by very high RPM encountered when coasting in gear with the clutch released. In this situation, the rear wheels are driving the disc through the multiplication of the rear axle and transmission ratios. This can result in excess of 10,000 RPM which is beyond the burst strength of the facing material.

Example: Coasting a tractor down an unloading ramp can burst a driven disc. See Figures 67, 68, and 69.

Failure - Worn Driven Disc Facings

Possible Causes
When the rivets (those which secure the facing material to the driven disc) begin to contact either the pressure plate, intermediate plate, or flywheel, then the entire clutch assembly is ready for replacement. Referring to the arrow in Figure 70, this rivet has been making contact with the pressure plate shown in Figure 17. Note the “shiny” appearance of the rivet and also the resulting “groove” on the pressure plate.
Pilot Bearing

Pilot Bearing Recommendations

The following pilot bearings are currently the minimum Eaton Fuller Clutch recommendations. The operating temperature that the pilot bearing encounters has increased in the last several years. This creates operating conditions that are no longer acceptable to the standard pilot bearings and grease. In addition, the life of the clutch has increased. The use of a high temperature grease and Viton seals are now mandatory to ensure adequate bearing life.

Failure of the pilot bearing usually results in a warranty claim for drag or clutch noise, also resulting in a claim against Eaton Fuller Clutch. Below is a list of the recommended Pilot Bearings. All of these bearings have Viton seals and a high temperature grease in addition to a C3 fit. It is acceptable to use synthetic high temperature grease and a C5 fit if desired.

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Seal Type</th>
<th>6205 Bearing</th>
<th>6306 Bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTN</td>
<td>VITON</td>
<td>6205 LLUAV/C3</td>
<td>6306 LLUAV/C3</td>
</tr>
<tr>
<td>KOYO</td>
<td>VITON</td>
<td>6205 2RKF-S2/C3</td>
<td>6306 2RKF-S2/C3</td>
</tr>
<tr>
<td>NSK</td>
<td>VITON</td>
<td>6205 DDU7/C4 ENS</td>
<td>6306 DDU7/C4 ENS</td>
</tr>
<tr>
<td>SKF</td>
<td>VITON</td>
<td>6205 2RS2/C3</td>
<td>6306 2RS2/C3</td>
</tr>
<tr>
<td>FED-MOG</td>
<td>VITON</td>
<td>6205 VV/C3</td>
<td>6306 VV/C3</td>
</tr>
</tbody>
</table>
Troubleshooting

Clutch Troubleshooting

This section will provide the service technician assistance to diagnose a malfunctioning clutch using the following 3-step process:

1. Identify the customer’s specific “complaint”.
2. Investigate the “possible causes” that can be contributing to the customer’s complaint.
3. Perform appropriate “corrective actions” to remedy the customer’s complaint.

Additionally, it is intended that a thorough reading/understanding of the previous section (Failure Analysis) and the following section (Troubleshooting) will:

1. Allow the service technician to solve some complaint problems without removing the clutch.
2. If clutch removal is necessary, these sections will give the technician the appropriate information for determining why the clutch may have failed, thus preventing a possible recurrence of the complaint.

It is important to note that the statements/photos of failed components represent quality Eaton Fuller Clutch parts which were subjected to abuse and/or misapplication. Consequently, the failures pictured in no way represent defective Eaton Fuller Clutch components.

Checklist for Poor Releasing 15-1/2” Clutch

1. Typical customer release complaints:
   - Creeping with clutch pedal depressed.
   - Grinds going into first or reverse gear (given adequate time and vehicle stopped).
   - Clutch brake does not stop transmission.
   - Difficult to get out of gear (first & reverse).

2. Investigate the problem.
   - What is the customer’s complaint?
   - Questions to confirm clutch release complaint:
     a. Which gears are giving a problem?
     b. Does the clutch brake stop the transmission?
     c. How far off the clutch brake can you still pull in and out of gear?
     d. Does it grind going into gear or is it hard to pull in?

3. Measurements/checks to make:
   - Measure release bearing travel (take the free pedal out by pushing lightly on the pedal with your hand to load bearing).
   - Measure clutch brake squeeze (hint: use a business card or a .010” feeler) Response: Minimum 1/2”.
   - While pushing pedal down, check linkage for interference or premature bottoming.

4. Use a 1/4” diameter flat-nosed drift and lightly tap each of the four separator pins to ensure they are against the flywheel.

5. Does the clutch release?
## Troubleshooting

### Pull Type Clutches - Poor Release

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Causes</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor Release</td>
<td>Intermediate plate sticking on drive lugs due to cocked drive pins (AS and EP 1402 only) (see Figures 18 - 19)</td>
<td>Drive pins must be 90° square to the flywheel surface with .006 minimum clearance between drive pins and intermediate plate slots.</td>
</tr>
<tr>
<td></td>
<td>Pressure plate not fully retracting</td>
<td>Check pressure plate return springs to see if bent, stretched, or broken. These springs can be replaced through the inspection opening. Transmission removal is not necessary. Verify that the release bearing travel is 1/2&quot;—9/16&quot;. Determine if the lever nose is out of the groove in the release sleeve retainer. If it is, be sure to reinstall.</td>
</tr>
<tr>
<td></td>
<td>Excessive release bearing travel, causing lever to contact pressure plate (in excess of 5/8&quot;)</td>
<td>Adjust to 1/2&quot;—9/16” release bearing travel.</td>
</tr>
<tr>
<td>Incorrect pedal height</td>
<td>Set the pedal height so you can obtain:</td>
<td>Consult the truck service manual or Eaton’s Installation Instructions.</td>
</tr>
<tr>
<td></td>
<td>—1/2” to 9/16” release bearing travel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>—1/8” free travel at the release yoke and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>—1/2” to 1” clutch brake squeeze</td>
<td></td>
</tr>
<tr>
<td>No clutch brake squeeze</td>
<td>1/2”—1” required.</td>
<td></td>
</tr>
<tr>
<td>Damaged bushing in the release bearing sleeve assembly</td>
<td>Replace cover.</td>
<td></td>
</tr>
<tr>
<td>Cover assembly not properly seated into pilot of flywheel</td>
<td>Reseat into flywheel. Use crisscross pattern when tightening mounting bolts.</td>
<td></td>
</tr>
<tr>
<td>The spacer ring &amp; intermediate plate assembly (Solos and SAS 1402 only) was bolted up backwards onto the flywheel (see Figures 34 - 37)</td>
<td>If the clutch cover has already been bolted to the flywheel, it is imperative that it be replaced with a new intermediate plate assembly because permanent damage may have occurred to the drive straps and spacer ring. Also, thoroughly inspect the cover for any damage and replace if damaged.</td>
<td></td>
</tr>
<tr>
<td>The intermediate and/or pressure plate is either cracked or broken (see Figures 13 - 14 and 25)</td>
<td>Replace any damaged parts. This failure is caused by driver abuse or excessive heat as indicated by the following:</td>
<td>—Holding vehicle on hill with the clutch —Overload —Starting off in the wrong gear —Wrong cover assembly installed allowing clutch to slip (misapplication) —Intermediate plate hanging up, allowing clutch to slip</td>
</tr>
</tbody>
</table>
## Troubleshooting

### Poor Release

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Causes</th>
<th>Corrective Action</th>
</tr>
</thead>
</table>
| Poor Release (Continued) | Release sleeve bushing is contacting the transmission input shaft due to a side loading condition. This condition can be the result of one or more of the following items:  
— Cross shafts protruding through the release yoke  
— Finger(s) of release yoke are bent  
— Clutch cover is not mounted concentric and/or not properly seated into the flywheel pilot  
— Misalignment between the transmission bell housing and engine housing  
— Loose transmission mounting bolts  
— Improper setup of linkage | — Check for protruding cross shafts.  
— Install a new release yoke.  
— When mounting clutch cover to the flywheel, always tighten the mounting bolts to their proper torque using the crisscross pattern.  
— Refer to Eaton’s Installation Instructions on the proper techniques for checking misalignment.  
— Tighten bolts to proper torque.  
— Thoroughly examine the linkage to determine if it can be contributing to a side loading condition. |
| Driven disc distorted or warped (see Figure 47) | Damage to driven discs can be caused by poor installation methods. Do not force transmission drive gear into disc hubs. This will distort or bend driven disc causing poor release. Also, do not allow transmission to hang unsupported. Replace any distorted or warped discs. |  |
| Disc(s) installed backwards (see Figures 49 & 50) or front and rear discs were switched with each other | Install new discs. Also, investigate the clutch cover for any damage. Replace if damaged. |  |
| Spline worn on main drive gear of transmission. (see Figure 77) | Replace drive gear and check driven disc hubs for excessive wear. If worn, replace disc. Check flywheel housing alignment of engine and transmission. Make sure driven discs slide freely on drive gear splines. |  |
| Flywheel pilot bearing fits either too tight or too loose in the flywheel and/or end of input shaft | Check pilot bearing for proper fit. |  |
| Damaged or dry (rough) pilot bearing (see Figure 76) | Replace with new bearing. |  |
| Failure to use the anti-rattle springs packaged with all 14” AS and EP Super Duty clutches (see Figures 20 - 22) | Always use new anti-rattle springs. |  |
| (3) Anti-rattle springs were installed backwards (see Figures 23 - 24) | Install them so the rounded sections are pointing toward the flywheel/engine. |  |
| Failure to set the positive separator pins during clutch installation | It is important to note that the procedure for setting the positive separator pins (model 1552, Solo & SAS 1402 clutches) can be performed while the transmission is installed. The steps are as follows:  
1. Remove the transmission inspection hole cover.  
2. Rotate the clutch cover until one of the holes (for setting the pins) is at the 6 o’clock position.  
3. Using the appropriate tool, lightly tap the separator pin to verify that it is seated against the flywheel.  
4. Repeat steps 2 and 3 for the remaining three separator pins.  
5. Reinstall the transmission inspection hole cover. For additional information, refer to Eaton’s Installation Instructions. |  |
## Troubleshooting

### Poor Release

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Causes</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor Release (Continued)</td>
<td>Bent/damaged positive separator pin(s) (see Figures 31 - 33)</td>
<td>1. Be sure to use the proper tool when setting the pins. 2. Take great care when handling the intermediate plate.</td>
</tr>
<tr>
<td></td>
<td>The release yoke bridge is contacting the cover assembly at the full release position (clutch pedal to floor) (see Figures 1 - 2)</td>
<td>It is highly recommended that the (6) six items listed next to Figures 1 and 2 be thoroughly investigated before installing a new clutch.</td>
</tr>
<tr>
<td></td>
<td>Damaged or non-functioning clutch brake (see Figures 73 - 74)</td>
<td>Install new clutch brake when installing a new clutch and/or replace existing brake with 2 piece (Kwik-Konnect type).</td>
</tr>
<tr>
<td></td>
<td>Rust preventative, i.e. never seize, grease, etc. on transmission input drive gear (see Figures 43 - 45)</td>
<td>Drive gear should be clean and dry before installing discs.</td>
</tr>
<tr>
<td></td>
<td>Incorrect use of clutch brake when shifting into 1st gear. Sometimes when applying the clutch brake with the vehicle on a grade, the transmission gears can become locked together due to the applied torque, making it difficult to shift into and out of gear.</td>
<td>Let up on the clutch pedal a few inches in order to disengage the clutch brake. Doing so will allow the input shaft to roll-over slightly, eliminating the locking condition of the transmission gears and allow for effortless shifting.</td>
</tr>
<tr>
<td></td>
<td>Facing of driven disc assemblies are coated with oil or grease (see Figures 41, 43 - 44)</td>
<td>Replace the driven disc assemblies. Cleaning of old discs is not recommended.</td>
</tr>
<tr>
<td></td>
<td>Foreign material on the internal workings of the clutch cover (dirt, chaff, salt, etc.)</td>
<td>Remove foreign material. Ensure that the transmission inspection hole cover is reinstalled to minimize future problems.</td>
</tr>
</tbody>
</table>
## Troubleshooting

### Noisy/Rattling

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noisy/Rattling</td>
<td>Excessive flywheel runout</td>
<td>Consult Eaton’s Installation Instructions.</td>
</tr>
<tr>
<td></td>
<td>Corrosion of disc hubs to transmission input shaft</td>
<td>Clean the mating parts to ensure that the discs slide freely over input shaft.</td>
</tr>
<tr>
<td>Engine idling too fast</td>
<td></td>
<td>Readjust engine to proper idling speed.</td>
</tr>
<tr>
<td>Clutch release bearing is dry or</td>
<td></td>
<td>Lubricate the bearing. If the noise persists, install a new clutch cover (the</td>
</tr>
<tr>
<td>damaged (see Figures 28 - 29)</td>
<td></td>
<td>release bearing will be included with the cover).</td>
</tr>
<tr>
<td>Flywheel pilot bearing is dry or</td>
<td></td>
<td>Replace flywheel pilot bearing.</td>
</tr>
<tr>
<td>damaged (see Figure 76)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridge of the yoke hitting clutch</td>
<td></td>
<td>Refer to the section titled: “Failure - yoke bridge rubbing into clutch cover,”</td>
</tr>
<tr>
<td>cover</td>
<td></td>
<td>Figures 1 - 2.</td>
</tr>
<tr>
<td>Fingers of release yoke hitting</td>
<td></td>
<td>Refer to the section titled: “Failure - yoke fingers rubbing into clutch cover,”</td>
</tr>
<tr>
<td>clutch cover</td>
<td></td>
<td>Figures 4 - 5.</td>
</tr>
<tr>
<td>Failure to use the transmission</td>
<td></td>
<td>Re-install the cover.</td>
</tr>
<tr>
<td>inspection hole cover</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure to use anti-rattle springs</td>
<td>Always install the new anti-rattle springs packaged with each 14” Super-Duty</td>
<td></td>
</tr>
<tr>
<td>(AS and EP 1402 Super-Duty only)</td>
<td>clutch.</td>
<td></td>
</tr>
<tr>
<td>(see Figures 20 - 22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worn sleeve bushing</td>
<td>Investigate for any side loading conditions on the release bearing housing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Determine the cause, being sure to correct before installing the new clutch.</td>
<td></td>
</tr>
<tr>
<td>Linkage system is frozen, improperly</td>
<td>Clean, lubricate and reassemble or replace missing/worn parts.</td>
<td></td>
</tr>
<tr>
<td>lubricated, worn excessively, has</td>
<td></td>
<td></td>
</tr>
<tr>
<td>missing parts (washers, etc.), or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the linkage itself is rattling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>excessively</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idle gear rattle coming from the</td>
<td>Specify driven disc assemblies which feature Free-Travel design.</td>
<td></td>
</tr>
<tr>
<td>transmission</td>
<td>Check the engine for the correct idle speed. Consult the OEM engine manual.</td>
<td></td>
</tr>
<tr>
<td>Dampener spring cover of the</td>
<td>Install correct clutch assembly.</td>
<td></td>
</tr>
<tr>
<td>driven disc assembly interfering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with the flywheel (Figures 48 - 52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rivets of the rear disc are</td>
<td>Adjust the clutch internally (via the adjusting ring), not externally (via the</td>
<td></td>
</tr>
<tr>
<td>interfering with the retainer</td>
<td>linkage system).</td>
<td></td>
</tr>
<tr>
<td>assembly (see Figures 25 and 57)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clutch is loose on flywheel (see</td>
<td>Install a new clutch assembly and eight new mounting bolts.</td>
<td></td>
</tr>
<tr>
<td>Figures 8 - 10)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Troubleshooting

### Vibrating Clutch

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibrating Clutch</td>
<td>Loose flywheel</td>
<td>Retighten flywheel mounting bolts to the proper specifications.</td>
</tr>
<tr>
<td></td>
<td>Worn universal joints</td>
<td>Replace worn parts.</td>
</tr>
<tr>
<td></td>
<td>Improper phasing of driveshaft</td>
<td>Investigate for correct yoke phasing.</td>
</tr>
<tr>
<td></td>
<td>Driveshaft is not balanced</td>
<td>Balance and straighten driveshaft. Also, ensure that no balance weights have come off the driveshaft.</td>
</tr>
<tr>
<td></td>
<td>Incorrect driveline angles</td>
<td>Shim drivetrain components to equalize u-joint angles.</td>
</tr>
<tr>
<td></td>
<td>Flywheel is not balanced</td>
<td>Balance the flywheel.</td>
</tr>
<tr>
<td></td>
<td>Pilot area of the clutch is not completely seated into flywheel</td>
<td>Ensure that no dirt, burrs, etc. are preventing the cover from completely seating into the flywheel mounting surface.</td>
</tr>
<tr>
<td></td>
<td>Failure to tighten the clutch cover mounting bolts, using a criss cross sequence, can cause an out-of-balance condition. Loose mounting bolts can also induce this condition (Figures 8 - 10)</td>
<td>Consult Eaton Clutch Service Manual.</td>
</tr>
<tr>
<td></td>
<td>Damaged, loose, or worn out engine mounts</td>
<td>Replace any damaged/worn parts. Retighten all loose bolts to proper specifications. Refer to the OEM engine manufacturer's service manual.</td>
</tr>
<tr>
<td></td>
<td>Misfiring of engine</td>
<td>Refer to OEM engine manufacturer's service manual.</td>
</tr>
<tr>
<td></td>
<td>Excessive flywheel runout</td>
<td>Refer to Eaton's Installation Instructions.</td>
</tr>
<tr>
<td></td>
<td>Rivets of the rear disc are interfering with the retainer assembly (see Figures 25 and 57)</td>
<td>Adjust the clutch internally instead of externally.</td>
</tr>
<tr>
<td></td>
<td>Clutch is loose on flywheel (see Figures 8 - 10)</td>
<td>Install a new clutch assembly and eight new mounting bolts.</td>
</tr>
<tr>
<td></td>
<td>Insufficient amount of free travel. When the clutch was initially installed, the linkage was not adjusted to obtain a full 1/8” free travel</td>
<td>After first adjusting the clutch for 1/2”-9/16”release bearing travel, adjust the linkage to obtain an 1/8” free travel (distance between the release yoke fingers and the release bearing wear pads) travel.</td>
</tr>
<tr>
<td></td>
<td>Misapplication of clutch, causing premature wear</td>
<td>If a service clutch, determine whether the clutch is properly specified for the vehicle's particular application.</td>
</tr>
<tr>
<td></td>
<td>Starting out in too high a gear may lead to premature clutch wear</td>
<td>Start the vehicle in the proper gear. Refer to item 1 of “Factors That Effect Clutch Performance”.</td>
</tr>
<tr>
<td></td>
<td>Worn cross shafts and/or linkage system</td>
<td>Investigate entire linkage system to determine if it is binding or operating sporadically and/or worn excessively.</td>
</tr>
<tr>
<td></td>
<td>Clutch discs wore down to rivets</td>
<td>Install new clutch.</td>
</tr>
<tr>
<td></td>
<td>Riding of clutch pedal, causing premature wear</td>
<td>Refrain from using the clutch pedal as a foot rest.</td>
</tr>
</tbody>
</table>
# Troubleshooting

## Vibrating Clutch

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too much Free Play on Solo Clutch</td>
<td>Failure to install a clutch brake when one is required. This condition will cause the Solo's release bearing to adjust closer than normal to the transmission's bearing retainer cap and will also cause the wear tab to move toward the half worn position.</td>
<td>Reset the wear tab to the new position. Install a 2-piece Eaton Fuller Clutch Brake. Readjust the Solo using the normal adjusting procedures.</td>
</tr>
<tr>
<td></td>
<td>Solo Clutch has over adjusted (release bearing is less than .500” (standard stroke Solo) or .430” (short stroke) from the transmission)</td>
<td>Reset the wear tab to the new position. Readjust the Solo using the normal adjusting procedures.</td>
</tr>
<tr>
<td></td>
<td>Failure to properly set-up the clutch linkage</td>
<td>Reset the linkage to obtain a free travel (at the yoke) range of 1/16” - 1/8”.</td>
</tr>
<tr>
<td></td>
<td>Nothing is wrong. It is normal for the free play to increase during the Solo’s “Breaking in” period.</td>
<td>None is required, but if the additional free play is objectionable, you may readjust the linkage until you have 1/16” - 1/8” of free travel at the release yoke.</td>
</tr>
</tbody>
</table>

## Clutch Slippage

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No free pedal</td>
<td>Readjust clutch. Refer to adjustment instructions found in Eaton’s Installation Instructions.</td>
<td></td>
</tr>
<tr>
<td>Release mechanism binding</td>
<td>Free up mechanism and linkage, check clutch adjustment. Refer to adjustment instructions found in Eaton’s Installation Instructions.</td>
<td></td>
</tr>
<tr>
<td>Failure to remove shipping/resetting bolts (Solo HD &amp; MID)</td>
<td>Remove shipping/resetting bolts.</td>
<td></td>
</tr>
<tr>
<td>Grease or oil on facings (see Figures 41, 43 - 44)</td>
<td>Replace driven disc assembly.</td>
<td></td>
</tr>
<tr>
<td>Driver riding clutch pedal</td>
<td>Refrain from riding clutch pedal.</td>
<td></td>
</tr>
<tr>
<td>Overloaded clutch</td>
<td>Verify that the proper clutch has been specified for the vehicle’s application.</td>
<td></td>
</tr>
</tbody>
</table>
## Troubleshooting

### Chattering, Erratic Engagement, Clutch Grabs, truck is difficult to launch

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chattering, Erratic Engagement, Clutch Grabs</td>
<td>Input shaft spline wear (see Figure 77)</td>
<td>Replace input shaft.</td>
</tr>
<tr>
<td></td>
<td>Clutch is worn out - the driven disc assembly(s) have worn down to the facing rivets (see Figure 70)</td>
<td>Replace all worn components.</td>
</tr>
<tr>
<td></td>
<td>The linkage system is not operating freely, it is binding and/or worn excessively (see fig. 75)</td>
<td>Replace all worn parts, being sure to lubricate according to the OEM Service Manual.</td>
</tr>
<tr>
<td></td>
<td>Grease/oil on the disc(s) facing material (see Figure 41, 43 - 44)</td>
<td>Replace disc(s).</td>
</tr>
<tr>
<td></td>
<td>Loose engine mounts</td>
<td>Retighten to OEM specs.</td>
</tr>
<tr>
<td></td>
<td>The fingers of the release yoke and/or the wear pads on the release bearing are worn excessively (see Figures 29 and 79)</td>
<td>Replace all worn parts.</td>
</tr>
<tr>
<td></td>
<td>The electronic engine is not programmed properly regarding clutch engagement torque.</td>
<td>Consult with OEM engine manufacturer.</td>
</tr>
</tbody>
</table>

### Push - Type Clutches

#### Poor Release

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor Release</td>
<td>Insufficient amount of clutch pedal height may prevent the throw out bearing from traveling far enough to disengage the clutch</td>
<td>Consult the OEM Service Manual and/or Eaton’s Installation Instructions.</td>
</tr>
<tr>
<td></td>
<td>Incorrect throw out bearing was installed. A throw out bearing assembly that is too short cannot travel far enough to enable full disengagement of the clutch</td>
<td>Install the correct throw out bearing.</td>
</tr>
<tr>
<td></td>
<td>Excessive free pedal in the cab - the clutch cannot fully disengage</td>
<td>Consult the OEM Service Manual.</td>
</tr>
<tr>
<td></td>
<td>Throw out bearing is hanging up on the quill (stem) of transmission</td>
<td>Consult the OEM Service Manual.</td>
</tr>
<tr>
<td></td>
<td>Missing and/or improper torquing of clutch cover mounting bolts</td>
<td>Consult Eaton’s Installation Instructions.</td>
</tr>
<tr>
<td></td>
<td>Incorrect driven assembly installed - it is too thick</td>
<td>Install the correct disc.</td>
</tr>
</tbody>
</table>

### Noisy/Rattling

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise/Rattling</td>
<td>Throw out bearing is worn/seized</td>
<td>Replace the throw out bearing. If reusing the clutch, ensure that the release levers are not damaged (see Figure 38).</td>
</tr>
<tr>
<td></td>
<td>Incorrect driven disc has been installed</td>
<td>Install correct driven disc assembly.</td>
</tr>
</tbody>
</table>
## Troubleshooting

### Pedal Operation

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>POSSIBLE CAUSE</th>
<th>CORRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binds</td>
<td>1. Clutch linkage not lubricated.</td>
<td>1. Lubricate linkage at specified intervals with correct lubricant.</td>
</tr>
<tr>
<td></td>
<td>2. Damaged clutch linkage.</td>
<td>2. Repair linkage.</td>
</tr>
<tr>
<td></td>
<td>4. Damaged input shaft.</td>
<td>4. Replace input shaft. Make sure correct installation and driver operating</td>
</tr>
<tr>
<td></td>
<td>5. Linkage touches other components.</td>
<td>procedures are used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Route or repair linkage as required.</td>
</tr>
<tr>
<td>No Free Travel</td>
<td>1. Damaged clutch linkage.</td>
<td>1. Repair linkage.</td>
</tr>
<tr>
<td></td>
<td>2. Clutch and/or linkage out-of-adjustment.</td>
<td>2. Adjust release bearing clearance and clutch linkage.</td>
</tr>
<tr>
<td></td>
<td>3. Clutch not installed correctly.</td>
<td>3. Install clutch correctly.</td>
</tr>
<tr>
<td>Scrape</td>
<td>1. Clutch linkage not lubricated.</td>
<td>1. Lubricate linkage at specified intervals with correct lubricant.</td>
</tr>
<tr>
<td></td>
<td>2. Damaged linkage.</td>
<td>2. Repair linkage.</td>
</tr>
<tr>
<td></td>
<td>3. Linkage touches other components.</td>
<td>3. Route or repair linkage as required.</td>
</tr>
<tr>
<td>Squeak</td>
<td>1. Clutch linkage not lubricated.</td>
<td>1. Lubricate linkage at specified intervals with correct lubricant.</td>
</tr>
<tr>
<td></td>
<td>2. Damaged linkage.</td>
<td>2. Repair linkage.</td>
</tr>
<tr>
<td></td>
<td>3. Linkage touches other components.</td>
<td>3. Route or repair linkage as required.</td>
</tr>
</tbody>
</table>
# Specifications

## Pressure Plate Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>14-Inch Clutches</th>
<th>15-1/2-Inch Clutches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Plate Parallelism (New)</td>
<td>0.000-0.005 inch (0.000-0.127 mm)</td>
<td>0.000-0.005 inch (0.000-0.127 mm)</td>
</tr>
<tr>
<td>Pressure Plate Flatness (New)</td>
<td>0.000-0.005 inch (0.000-0.127 mm)</td>
<td>0.000-0.005 inch (0.000-0.127 mm)</td>
</tr>
<tr>
<td>Maximum Allowable Wear</td>
<td>0.060 inch (1.52 mm)</td>
<td>0.060 inch (1.52 mm)</td>
</tr>
</tbody>
</table>

## Center Plate Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>14-Inch Clutches</th>
<th>15-1/2-Inch Clutches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Plate Parallelism (New)</td>
<td>0.000-0.005 inch (0.000-0.127 mm)</td>
<td>0.000-0.005 inch (0.000-0.127 mm)</td>
</tr>
<tr>
<td>Center Plate Flatness (New)</td>
<td>0.000-0.005 inch (0.000-0.127 mm)</td>
<td>0.000-0.005 inch (0.000-0.127 mm)</td>
</tr>
<tr>
<td>Center Plate Minimum Thickness</td>
<td>0.728 inch (18.5 mm) Ceramic Linings</td>
<td>0.681 inch (17.3 mm) Ceramic Linings</td>
</tr>
<tr>
<td></td>
<td>0.610 inch (15.5 mm) Organic Linings</td>
<td></td>
</tr>
<tr>
<td>Center Plate Driving Method</td>
<td>Drive Pin in Flywheel</td>
<td>Tabs on Center Plate Mate in Clutch Cover Slots</td>
</tr>
<tr>
<td>Drive Pin-to-Center Plate Clearance</td>
<td>0.006 inch (0.152 mm) MIN.</td>
<td></td>
</tr>
<tr>
<td>Center Plate Tab-to-Cover Slot Clearance</td>
<td></td>
<td>0.006 inch (0.152 mm) MIN.</td>
</tr>
</tbody>
</table>

## Clutch Brake Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Play</td>
<td>$10^\circ$</td>
</tr>
<tr>
<td>Spline Diameter</td>
<td>1.75 Inch, 2.00 Inch</td>
</tr>
<tr>
<td>Torque Limited</td>
<td>15-30 lb-ft (2.1-4.0 kg-m)</td>
</tr>
</tbody>
</table>
## Specifications

### Clutch Disc Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>14 Inch Clutches</th>
<th>15-1/2 Inch Clutches</th>
<th>15-1/2 Inch LTD Clutches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Splines</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Spline Diameter</td>
<td>1.75 Inch</td>
<td>2.00 Inch</td>
<td>2.00 Inch</td>
</tr>
<tr>
<td>Hub Type</td>
<td>Dampered</td>
<td>Dampered</td>
<td>Dampered</td>
</tr>
<tr>
<td>Number of Co-Axial Spring Sets</td>
<td>8</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Ceramic Pad Material</td>
<td>Asbestos-Free, Ceramic and Metallic Material</td>
<td>Asbestos-Free, Ceramic and Metallic Material</td>
<td>Asbestos-Free, Ceramic and Metallic Material</td>
</tr>
<tr>
<td>Organic Pad Material</td>
<td>Asbestos-Free, Organic Material</td>
<td>Asbestos-Free, Organic Material</td>
<td>.............</td>
</tr>
<tr>
<td>Minimum Disc Thickness - Riveted Ceramic</td>
<td>To Top of Rivet</td>
<td>To Top of Rivet</td>
<td>To Top of Rivet</td>
</tr>
<tr>
<td>Minimum Disc Thickness - Molded Organic</td>
<td>0.283 inch (7.2 mm)</td>
<td>0.283 inch (7.2 mm)</td>
<td>.............</td>
</tr>
</tbody>
</table>

### Torque Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Lb-Ft</th>
<th>Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusting Ring Lock Capscrew</td>
<td>25-30</td>
<td>34-40</td>
</tr>
<tr>
<td>Strap-to-Cover Capscrew</td>
<td>29-43</td>
<td>40-58</td>
</tr>
<tr>
<td>Cover Assembly-to-Flywheel</td>
<td>25-35</td>
<td>34-47</td>
</tr>
<tr>
<td>Cap screw - 14 Inch Clutches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cover Assembly-to-Flywheel</td>
<td>40-50</td>
<td>54-68</td>
</tr>
<tr>
<td>Cap screw - 15-1/2 Inch Clutches</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Specifications

## Clutch Adjustment Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearance Between Release Bearing and Clutch Brake - Non-Synchronized Transmission</td>
<td>0.500 Inch (12.7 mm) MINIMUM</td>
</tr>
<tr>
<td></td>
<td>0.562 Inch (14.2 mm) MAXIMUM</td>
</tr>
<tr>
<td></td>
<td>0.531 Inch (13.5 mm) TARGET</td>
</tr>
<tr>
<td>Clearance Between Release Bearing and Cover - Synchronized Transmission</td>
<td>0.687 Inch (17.5 mm)</td>
</tr>
<tr>
<td>Clearance Between Tips of Release Fork and Pads on Release Bearing</td>
<td>0.125 Inch (3.17 mm) MINIMUM</td>
</tr>
<tr>
<td></td>
<td>0.150 Inch (3.81 mm) MAXIMUM</td>
</tr>
<tr>
<td></td>
<td>0.125 Inch (3.17 mm) TARGET</td>
</tr>
<tr>
<td>Clutch Pedal Free Travel - Varies 1</td>
<td>1.125 - 2.375 Inch (28.5 - 60.3 mm)</td>
</tr>
<tr>
<td>Clutch Brake Contact 2</td>
<td>0.500-1.00 inch (12.7-25.4mm) from floor</td>
</tr>
</tbody>
</table>

**NOTES:**

1. See 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.

## Lubricant Specifications

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

#### Clutch Inspection Check List

<table>
<thead>
<tr>
<th>Transmission and Bell Housing</th>
<th>Clutch Discs (Cont’d)</th>
<th>OK</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell housing is not worn or damaged.</td>
<td>Ceramic Facing: Facing wear is even or above the top of the rivet.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unused cross shaft bores in bell housing are plugged.</td>
<td>Molded Organic Facing: Facing thickness is 0.283 inch (7.2 mm) or less.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspection cover is installed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input bearing retainer is not worn or damaged.</td>
<td>Center Plate</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Distance between top of input shaft and top of input bearing retainer is 0.00 - 8.72 inches (000.00 - 221.48 mm).</td>
<td>14 Inch 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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release fork is straight.</td>
<td>15-1/2 Inch Clutches: Tab to slot clearance is at least 0.006 inch (0.152 mm). If not, index to get correct clearance or replace plate. Tabs on plate are not damaged. Thickness: Plates are at or above specified thickness. 14 Inch Clutches with Ceramic Facings: 0.728 Inch (18.5 mm) 14 Inch Clutches with Organic Facings: 0.610 Inch (15.5 mm) 15-1/2 Inch Clutches - All: 0.681 Inch (17.3 mm) Measured Thickness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fork tips are not worn or damaged.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross shaft moves freely.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radial or side-to-side movement of the cross shaft is not excessive.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The cross shaft and bushings (if used) are not worn or damaged.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input shaft splines are not worn or damaged.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clutch brake contact area (non-synchronized transmission only) on input bearing retainer is not worn or damaged.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Plate and Cover Assembly</td>
<td></td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Cover is not broken.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diaphragm spring is not damaged.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure plate is not cracked.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat marks can be removed with emery cloth. Replace plate if marks cannot be removed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scratches are less than 0.060 inch (1.52 mm) deep.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure plate flatness is 0.000 - 0.005 inch (0.000 - 0.127 mm). Measured Flatness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure plate runout is 0.002 inch (0.05 mm) or less. Measured Runout</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clutch Discs</td>
<td></td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Hub is not damaged.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coaxial springs (dampened discs only) do not have any axial movement.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil or grease is not on discs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facings are not damaged or loose.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Pilot Bearing**

Pilot bearing is not worn or damaged. *Replace pilot bearing every time clutch is removed with a bearing that uses a high temperature rubber seal and grease.*
# Specifications

## Clutch Inspection Check List (Cont'd)

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Drive Pins (14 Inch Clutches Only)</th>
<th>Release Bearing Clearance (Cont'd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive pins are not worn or damaged.</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Flat sides of pins are at a 90° angle to top of flywheel housing. If not, reinstall or replace pin.</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Center plate to drive pin clearance is at least 0.006 inch (0.152 mm). If not, reinstall or replace pin.</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td><strong>Flywheel and Flywheel Housing</strong></td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td><strong>NOTE:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For flywheel service information, see the procedure of the manufacturer of the vehicle or the engine.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runout of the outer surface of the flywheel is:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Inch Clutches: 0.007 Inch (0.177 mm) or less.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-1/2 Inch Clutches: 0.008 Inch (0.196 mm) or less.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured Runout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runout of the bore of the pilot bearing is 0.005 inch (0.127 mm) or less.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured Runout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crankshaft end play- See OEM or Vehicle Manufacturer Specifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runout of the outer surface of the flywheel housing is 0.009 inch (0.203 mm) or less.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured Runout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runout of the bore of the flywheel housing is 0.008 inch (0.203 mm) or less.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured Runout</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Release Bearing Clearance</strong></td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Non-Synchronized Transmissions: 0.50 inch (12.7 mm) - Minimum. Measure between release bearing housing and clutch brake.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synchronized Transmissions: between 0.687 inch (17.44 mm). Measure release bearing housing and clutch cover.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release fork-to-release bearing clearance is 0.125 inch (3.17 mm). If not at specified dimension, adjust linkage. See the procedure of the manufacturer of the vehicle.</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Measured Clearance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clutch Linkage</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Pedal Height Specifications: See vehicle manufacturer specifications. To adjust, see the procedure of the manufacturer of the vehicle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured Pedal Height</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Pedal Travel Specifications: See the specifications of the manufacturer of the vehicle. To adjust, see the procedure of the manufacturer of the vehicle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured Total Pedal Travel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clutch Brake Squeeze (Non-Synchronized Transmission): Release bearing housing must touch clutch brake when clutch pedal is typically 1.0 inch (25 mm) from end of pedal travel. For specifications, see the specifications of the manufacturer of the vehicle. To adjust, see the procedure of the manufacturer of the vehicle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured Clutch Brake Squeeze</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free travel varies from 1.125 to 2.375 inches (28-60 mm). To adjust, see the procedure and specifications of the manufacturer of the vehicle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured Free Travel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Specifications

INSTALLATION AND LUBRICATION INSTRUCTIONS
Spicer Pull-Type Clutches

INSTALLATION INSTRUCTIONS
1. A new pilot bearing should be used when replacing a clutch. If the old bearing is reused, clean and check the bearing thoroughly. Repack with lubricant.
2. Check condition of the flywheel. If it is cracked or warped, refer to the manufacturers' recommendations concerning replacement or regrinding.
3. Check condition of transmission drive gear spline. Use hand stone if necessary to dull the sharp edges of splines. If splines are worn excessively or notched, Driven Discs will not slide and drive gear should be replaced.
4. Make sure Drive Pin heads are square with flywheel friction face. Most vehicles use one or two setscrews per Drive Pin to lock the Drive Pin in position. These set-screws must be loosened or removed to turn or to replace Drive Pins.
5. New drive pins should be installed anytime the clutch is replaced. Worn or damaged drive pins can cause faulty clutch operation. Use 8 drive pins, with minimum of .006 clearance between Drive Pin and Intermediate Plate Slot at each location. (Some units use 4 drive pins only.)
6. Install Front Driven Disc, Intermediate Plate and Rear Driven Disc. See illustration for proper positioning of driven discs.
7. Place cover assembly in position on flywheel and start cap screws. Note: Lockstrap must be aligned with access hole in bell housing.
8. Insert spline aligning tool through Clutch Assembly and into pilot or pocket bearing.
9. Progressively tighten cap screws which hold Cover Assembly to flywheel. 35 to 40 lbs. ft. of torque is recommended.

Bolt Tightening Sequence
(35-40 Ft. Lbs.)

10. Remove the two wooden blocks from between the Release Bearing Housing and Flywheel Housing. Remove spline aligning tool.
11. If Clutch Brake is to be used, place brake parts on the main drive gear of the transmission and shift transmission into gear.
12. Rotate Clutch Release Bearing Housing so that flat section is on top. (If Cross Shaft is below center, rotate Bearing Housing (180°).)
13. Rotate Clutch Release Yoke so that release yoke fingers clear the pads on the Release Bearing Housing.

14. Use a sling or transmission jack to support and maintain the engine-to-transmission alignment while installing the transmission. Use care to avoid hanging the weight of the transmission on the clutch or forcing the transmission into the clutch or flywheel housing. Either of these abuses can cause bent or "sprung" Driven Discs and prevent the clutch from releasing. Rotate Clutch Release Yoke into proper position as transmission is moved into place.
15. Start all transmission bell housing cap screws and tighten progressively around the housing to torque recommended by vehicle manufacturer.
16. Connect clutch release linkage and check release bearing travel, clutch brake squeeze and proper free pedal. Adjust as necessary.

PROPER POSITION OF FRONT AND REAR DRIVEN DISCS IN INSTALLATION
(See below)

DAMPER CONSTRUCTION SHOWN ABOVE CENTER LINE

FLYWHEEL SURFACE

RIGID CONSTRUCTION SHOWN BELOW CENTER LINE

LUBRICATION INSTRUCTIONS

WARNING
1. The release bearing housing has been pre-packed with grease!
2. Only high temperature greases should be used. Chassis lube or all purpose lubricants are not recommended.
3. Add lubricant at each chassis lubrication period or more often if service is extreme.
4. To assure adequate distribution of the grease throughout the bearing, engine should be running while grease is being added.
Specifications

ADJUSTING PROCEDURE
Spicer Angle-Spring Clutches

Before adjusting anything, suppose we review the conditions required for proper clutch action.

A pull-type clutch permits use of a simple clutch brake. The brake "squeeze" should begin about 1 inch from the floor board or the end of pedal stroke.

Any clutch will slip and burn up if there is no free pedal.

To release properly, the clutch release bearing must move about 1/2 inch. This occurs between the end of free pedal travel and the brake actuation point.

**STEP 1** For Both Manual & Self Adjusting Clutches

Set Clutch Linkage to begin brake squeeze 1" above floor board or end of pedal stroke

Proper adjustment of clutch brake is achieved by shortening or lengthening the external linkage rod.

**NOTE:**

Hydraulic linkage—Refer to manufacturer's specifications for proper adjustment of system.

Synchronized Transmissions—(No Brake) Adjust external linkage so release bearing almost contacts transmission bearing cap when pedal is fully depressed.

Verify 1/2" release travel

**STEP 2** For Manual Adjusting Clutches Only

Adjust to approximately 1/2" free pedal. Pedal must be held down to move adjusting ring.

Remove adjusting lockstrap

Turning the adjusting ring clockwise moves the release bearing toward the transmission (Increases Free Pedal)

Turning adjusting ring counter-clockwise moves the release bearing toward the engine (Decreases Free Pedal)

**STEP 2** For Self-Adjusting Clutches Only

A. Remove right bolt. Loosen left bolt one turn.

B. Rotate adjuster upward. This will disengage worm gear from the adjusting ring to allow manual adjustment. Hold adjuster disengaged and tighten left bolt.

C. Rotate adjusting ring until approximately 1/2" of free pedal is acquired—pedal must be down. Rotate clockwise to increase free pedal, counter clockwise to decrease.

D. Loosen left hand bolt, rotate adjuster assembly downward to engage worm with adjusting ring tooth. Adjusting ring may have to be rotated slightly to allow worm to mesh.

E. Install right bolt and tighten both bolts (30-35 lbs. ft. torque).

**STEP 3** For Both Manual & Self Adjusting Clutches

Visually check both free travel and release travel shown below.

**STEP 4** For Manual Adjusting Clutches Only

Visually check to see if actuator arm (a) is inserted into release sleeve retainer (b). If adjusting assembly is installed properly, the adjuster assembly spring will move back and forth as pedal is stroked.

**NOTE:** The clutch will not self-adjust if the actuator arm is not inserted into the release sleeve retainer, or release bearing travel is less than 1/2".

**Flywheel Depth**

14" Diameter:
- Single Plate — 1.873" ± .010"
- Double Plate — 2.938" ± .010"

15 1/2" Diameter:
- Double Plate — .150" -.180"

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Specifications

ADJUSTING PROCEDURE
Spicer Type Angle-Spring Pull-Type Clutches

UNDERSTANDING SPICER CLUTCH ADJUSTMENT

To assure optimum performance of Spicer Clutches:

a. 1/2" x 1/4" release travel is required.

b. 1/8" free travel (difference between release bearing end play).

TERMINOLOGY:

1. RELEASE TRAVEL: 1/2" to 1/4". Proper release travel assures that the release bearing is capable of traveling far enough, usually 1/8" or 1/4", to allow the clutch to be released.

2. CLUTCH FREE PEDAL:

Pedal free play is an indication of clutch adjustment interval. When the free play is excessive, check adjustment procedures as outlined below.

3. CLUTCH TRAVEL, 1/8".

Free travel is the clearance between the release yoke and clutch release bearing in feet. This dimension is how much free travel is allowed in the clutch.

EXPLANATION OF ADJUSTMENT:

A set of small tools is used to adjust the clutch.

1. ADJUSTMENT (NORMAL SERVICE ADJUSTMENTS):

a. Check the clutch adjustment interval on the clutch shaft and check the condition of the adjusting ring.

b. Adjust the clutch for the proper release bearing end play and free travel.

2. LINKAGE ADJUSTMENT:

Adjustment should be performed in the following cases:

a. Wear or damage to any part of the clutch assembly.

b. Wear or damage to any part of the clutch assembly.

c. Wear or damage to any part of the clutch assembly.

d. Wear or damage to any part of the clutch assembly.


STEP 1

NOTE: Adjustments are performed with pedal depressed (clutch released).

There are three main types of adjustment mechanisms for the Stamped Angle-Spring Clutches. They are shown as follows.

Manual Adjust:

Lock Strap

Remove Lockstrap to Adjust.

Kwik-Adjust

Adjusting Strap

Degree Adjustment with Plastic

NOTE: Degree adjustments are not recommended.

Wear Compensator

Remove bolt

Kwik-Adjust

Assure Kwik-Adjust is related to the locked position with the boot face signed with chalk.

REPOSITION WEAR COMPENSATOR ASSEMBLY FOR WEAR COMPENSATOR CLUTCHES ONLY

A. Loosen left nut and move assembly downward to engage worn spot with adjusting ring. Adjusting ring may be reset easily to allow manual adjustment (see adjustment procedures and tighten left bolt).

B. Install lock bolt and tighten both bolts if necessary.

C. Visual check to see if actuator arm (A) is in neutral release plate position (B). If not, adjust by applying and releasing the actuator arm, adjusting the actuator lever (C) and adjusting the actuator lever (D).

D. NOTE: The clutch will not compensate for wear if the actuator arm is not inserted into the release plate recess, or release bearing travel is less than 1/8".
Friction Materials Their Use and Applications

Introduction
Friction materials as a whole have changed as much as horse power and torque ratings have changed in the past few years. Listed below is a short informational guide to friction material. Each engine, driver, and driving condition is unique. D&W can customize clutches by plate load, torque capacity, and application to optimize your clutch service. D&W has solved problems for UPS, local BFI, and Waste Management locations by switching them to a kevlar and ceramic button combination unit, which UPS now demands at the OE level. We can help you too.

Kevlar/Aramid
The kevlar/aramid fiber material that D&W utilizes is developed and manufactured in the U.S. When used in the proper applications, it can outlast other friction materials two to five times. Kevlar provides the pulling capabilities of ceramic button materials along with the smooth engagement properties of an organic facing. By its nature, kevlar allows for smooth clutch engagement which allows for prolonged life of universal joints, differential gears, and other drive line components. The major cost benefit savings of kevlar, aside from less downtime, is that all of the friction wear surfaces will show little or no wear compared to clutches using other friction materials. A truck originally equipped with a kevlar clutch, and kevlar replacement units, may never need the flywheel replaced!

Ceramic
Ceramic button-style clutch facings are very durable and have the ability to grab better as it heats. Organic facings tend to fade as they heat. A ceramic button clutch is appropriate for hard-working applications and has traditionally held up to expectations. However, there are downsides to ceramic material. First, this clutch is either in or it’s out; there is no soft engagement. Second, it is as hard as the material that it mates against, which means that the pressure plate, center plate, and flywheel wear at the same rate as the ceramic facing. This high rate of wear often means that the flywheel will wear out well before the engine or truck does. Therefore, there is an additional expense associated with using a ceramic button clutch. For those customers who work their trucks the hardest and carry the heaviest loads, the ceramic friction clutch is still the best choice because it handles the heat better than any other friction material. D&W offers ceramic buttons made by SK Wellman and Miba, OE suppliers, which are made in western Europe. Ceramic button clutches are the preferred and recommended choice for dump trucks, refuse vehicles, off-road equipment, and heavy hauling in mountainous terrain such as logging and coal hauling.

Fibertuff
Fibertuff is a product designed to give the wear of a ceramic facing, yet have the engagement and disengagement qualities of an organic material. Fibertuff is a product of Canada and is intended to wear against its mating surfaces like organic material. Used primarily in the stamped steel and 14” cast units, this product offers greater life than organic material with many of the same qualities that organic friction has traditionally offered. Around-town delivery trucks and mid-range applications find that this product works best.

Carbotic
Carbotic, recently introduced by the manufacturer of Fibertuff, was designed to offer super smooth engagement, like both the organic and kevlar materials. In addition to smooth engagement, this product has excellent service longevity and the ability to handle high horse power and high torque requirements like the ceramic button, but without the harsh wear of the mating surfaces. This product is best utilized in heavy hauling vehicles such as quarry dump trucks which encounter steep grades where clutch slippage and high heat generation are probable. We have also used it in tractor pulls and truck racing vehicles.

Organic
The basic organic disc has been in the industry for 50 plus years and has evolved considerably due to engine alterations as well as environmental issues. Organic facings were originally made with asbestos, but as health issues arose concerning the use of asbestos, it was phased out of the industry. Facings were then made of fiberglass and brass as its main ingredients. Varying ingredients by different manufacturers have caused brand loyalties to exist among rebuilders. D&W primarily uses FMC facings from the U.S. who also supplies Eaton Corp. An organic facing should be used in engines with low to medium horse power and torque where the clutch must be engaged and disengaged many times a day. This type of clutch is one of the smoothest engaging clutches in the industry today. Its downside is its short life span.

Dayton Parts
CLUTCHES
Light, Medium and Heavy Duty
DRIVELINE