Flywheel

Too Much Runout or Taper on Friction Surface

See Figure 14.

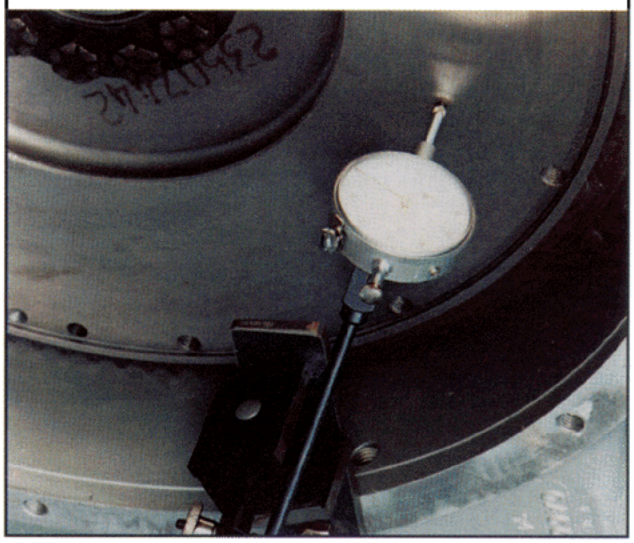
Driver Notices: Clutch engagement is erratic. Clutch drags when disengaged.

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.

Figure 14



Too Much Runout in Pilot Bearing Bore

See Figure 15.

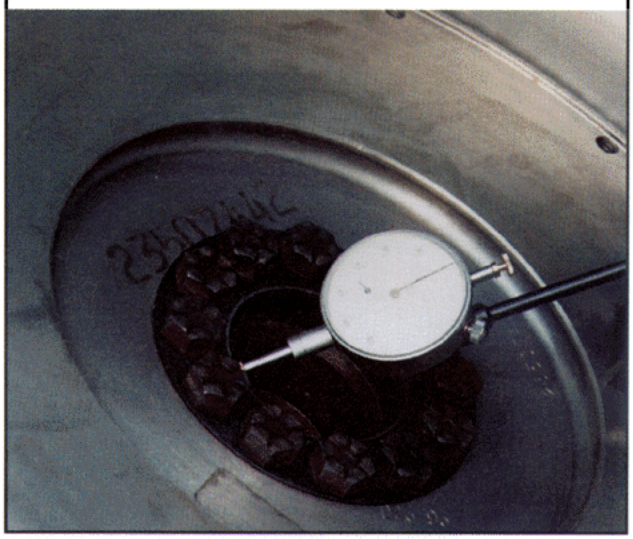
Driver Notices: Clutch disengagement is erratic and a squeal noise is heard. The clutch drags.

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.

Figure 15



Flywheel

Flywheel Housing

Too Much Runout on Outer Surface

See Figure 16.

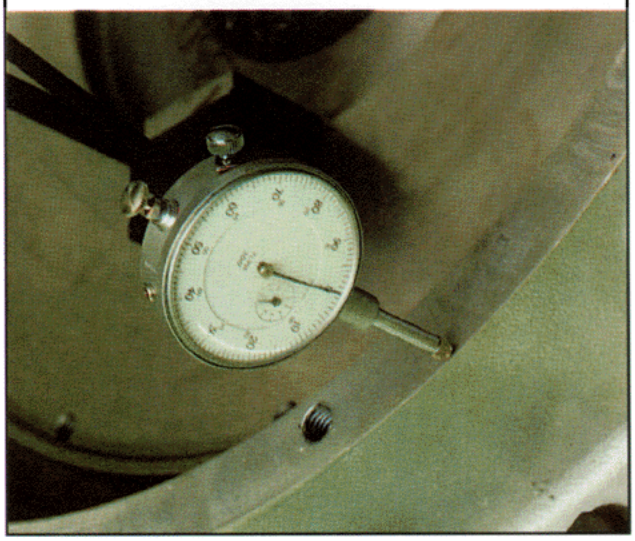
Driver Notices: Clutch is difficult to engage and disengage.

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.

Figure 16



Clutch Cover / Intermediate Plate

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.

Fig 1

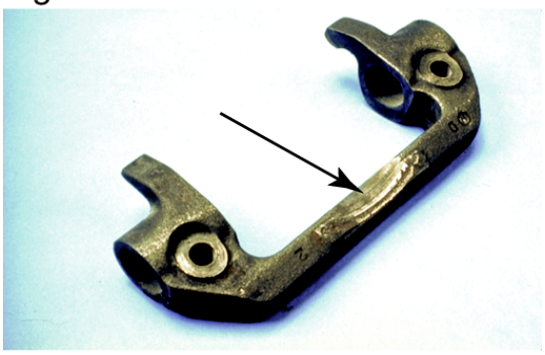
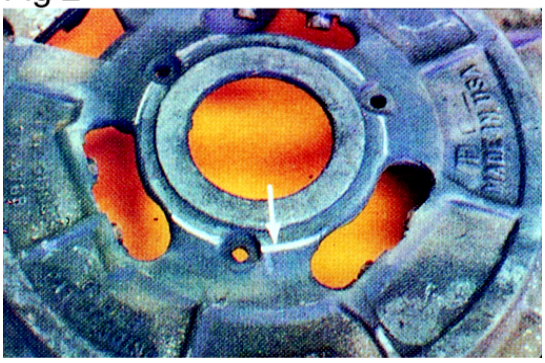


Fig 2



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

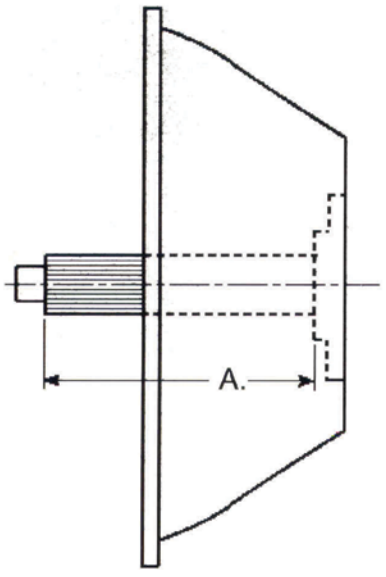


Figure 3

Clutch Cover / Intermediate Plate

Fig 4

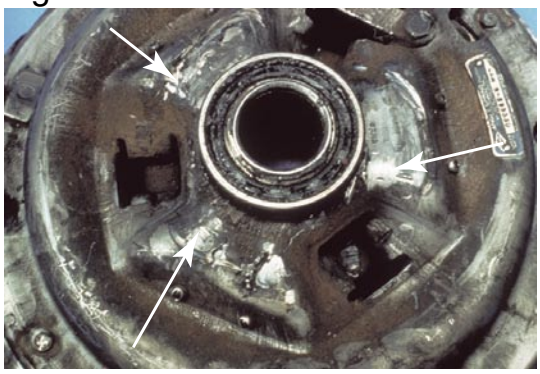


Fig 5

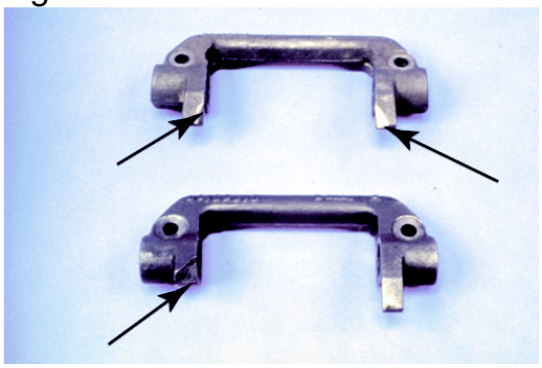


Fig 6

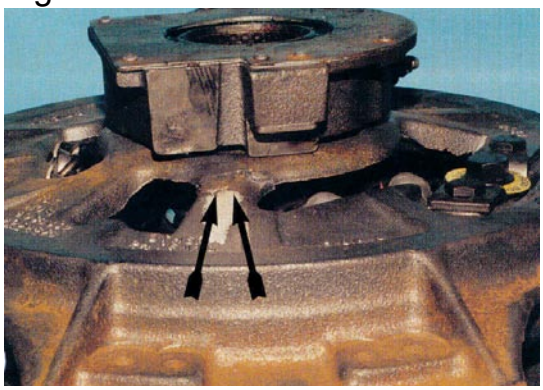
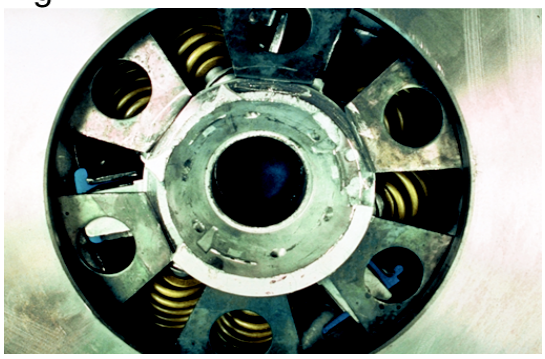


Fig 7



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.

Clutch Cover / Intermediate Plate

Failure - Clutch Cover Detached from Flywheel

Possible Causes

The broken mounting bolts, show 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 overtorquing 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

Fig 8

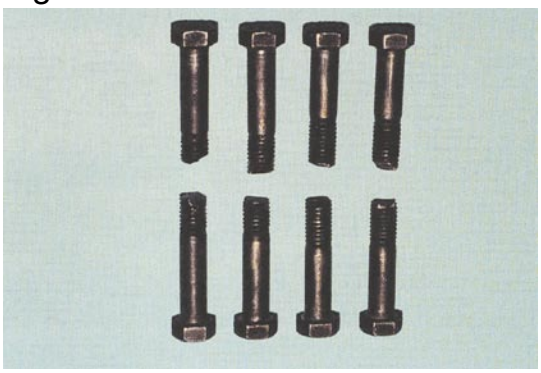
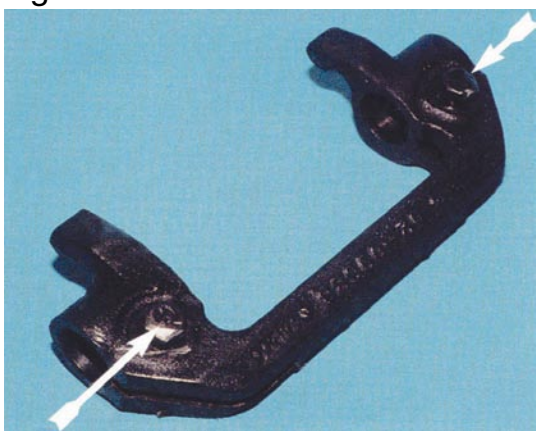


Fig 9

Fig 10



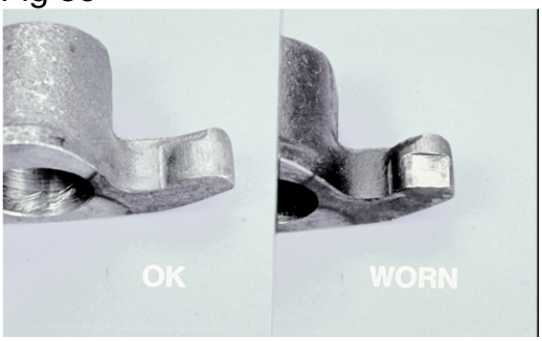
Miscellaneous

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.

Fig 86



Adjusting Mechanism and Clutch Brake

Fig 71

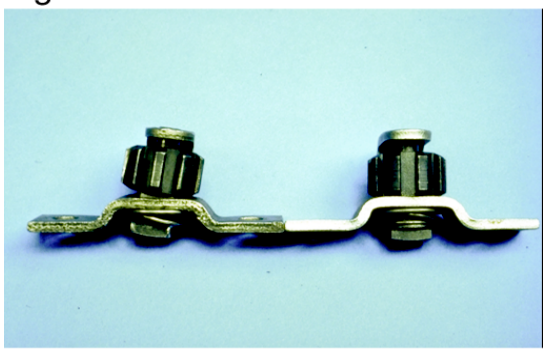
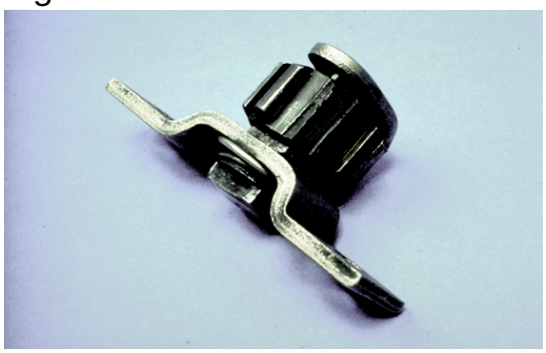


Fig 72



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).

Fig 73

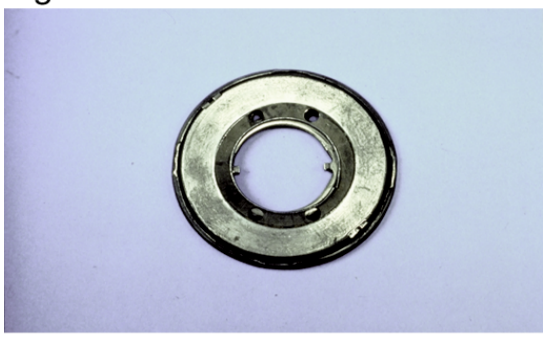
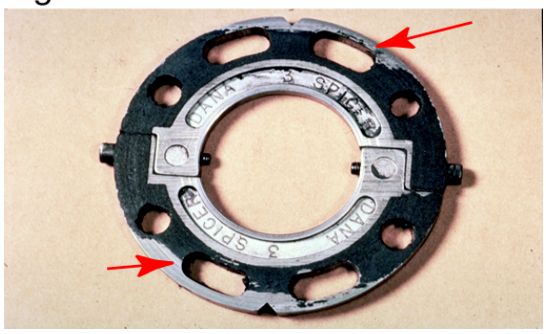


Fig 74



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.

Figure 79

Broken Tabs

See Figure 80.

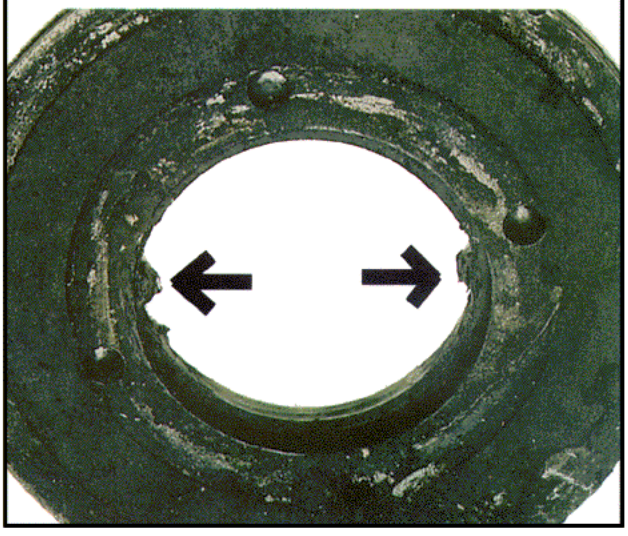
Driver Notices: The transmission is hard to shift into first and reverse gears. Also a noise may be heard when the clutch is operated.

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.

Figure 80



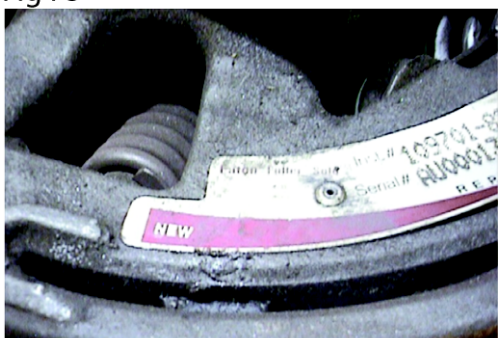
Solo Clutch

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).

Fig 75



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.

Fig 76

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.

Fig 77

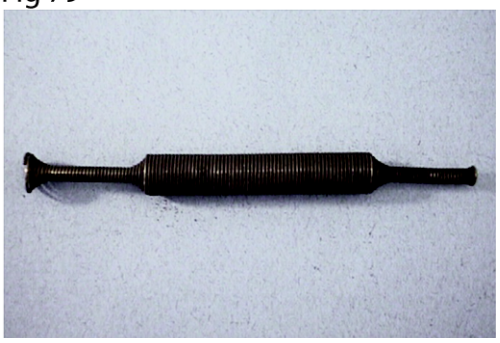
Fig 78

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

Fig 79



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).

Fig 80

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).

Fig 81

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.

Miscellaneous

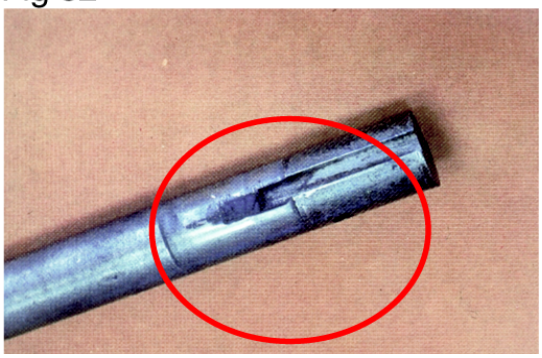
Failure - Cross Shaft Wear

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.

Fig 82



Failure - Seized/Dry Pilot Bearing

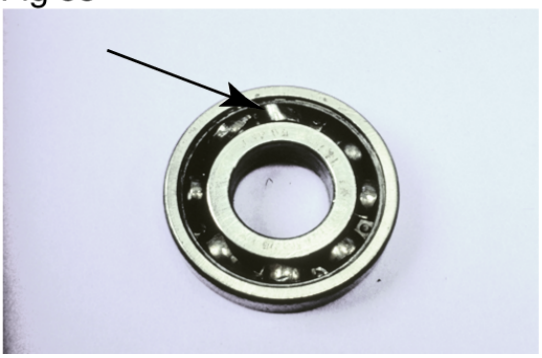
Possible Causes
Once removed from the flywheel, a failed pilot bearing can be identified by one or more of the following conditions:

- 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:

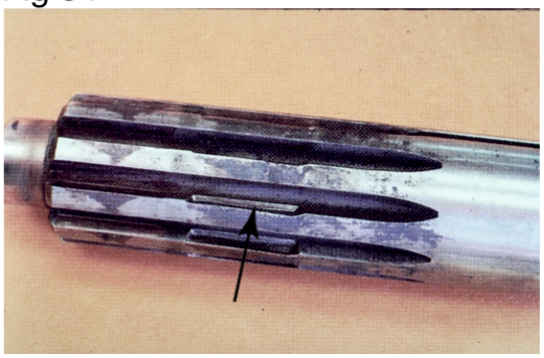
- The outer race of the bearing fits too tightly in the flywheel.
- The inner race of the bearing fits too tightly on the input shaft.

Fig 83



- 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.

Fig 84



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.

Fig 85

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.

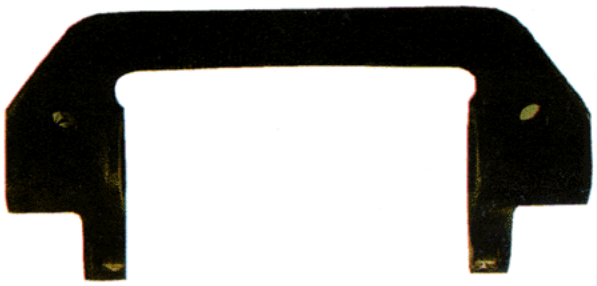
Driver Notices: The clutch pedal is hard to push.

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.

Figure 75



Release Fork Cross Shaft

Release Fork Cross Shaft

Seized

See Figure 77.

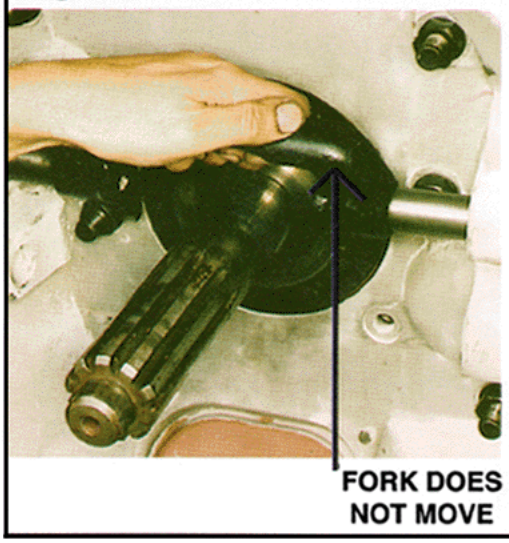
Driver Notices: The clutch pedal is hard to push and does not return.

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.

Figure 77



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.

Figure 78