

Bulletin: CLIB-0014

Date: February 4, 2011

Bulletin Type: Service

Topic: Eaton Clutch Performance Evaluation and Set-up

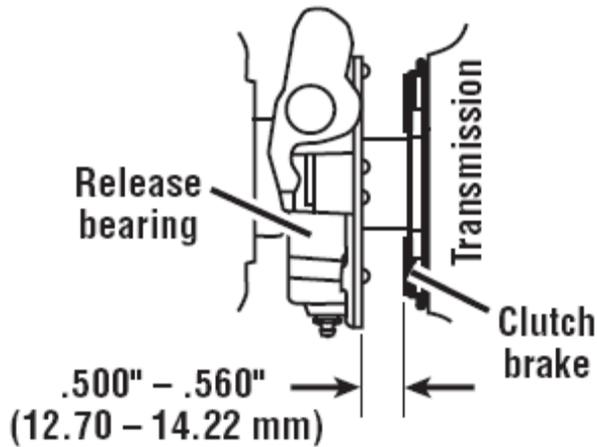
Issue Description: The purpose of communicating this information is to provide details as to how to evaluate the below list of topics relating to Eaton clutch products:

1. Steps for validating clutch release bearing travel with a clutch brake.
2. Steps for validating clutch pedal free play.
3. Steps for validating clutch brake contact (squeeze).
4. Steps for validating clutch brake operation (vehicle stationary).
5. Poor performance complaint – Engagement.
6. Poor performance complaint – High clutch pedal engagement.
7. Poor performance complaint – Rattle
8. Poor performance complaint validation.
9. Driving Operation
10. Double-Clutching Procedure
11. Vehicle Vibration Issues

Process:

1. Steps for validating clutch release bearing travel with a clutch brake

- Stroke the clutch pedal from its upper most stop to the floor or firewall to check for any binding or restrictions that may restrict proper movement of the clutch release bearing.
- Apply a light force on the clutch pedal to take up the clearance between the clutch release fork and the wear pads on the release bearing housing.
- Using an appropriate measuring tool measure the gap between the clutch release bearing housing and the clutch brake. **Note:** The tool used for taking this measurement should be of a type that can provide a valid measurement, i.e. Telescoping gage, transfer dividers, verified thickness gage.
- **Note 1:** This measurement should be 0.500 inch to 0.560 inch for a manually adjusted clutch and 0.490 inch to 0.560 inch for a Solo Automatic adjust clutch.
- **Note 2:** If using a thickness gage or solid bar DO NOT force the bar between the clutch release bearing housing and the clutch brake as this may give an inaccurate measurement of the gap between the release bearing and the clutch brake.



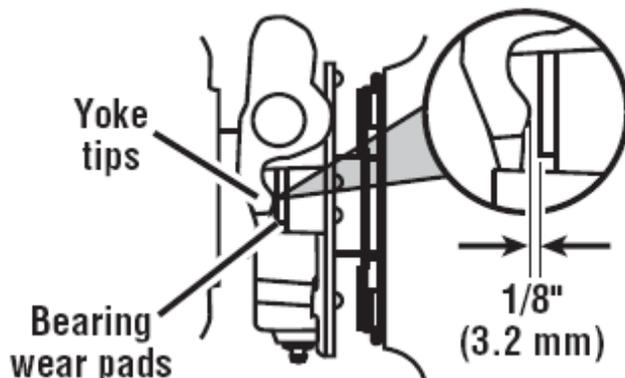
2. Steps for validating clutch pedal free play

Verify gap between the release yoke fingers and wear pads on the clutch release bearing housing

Specification manual adjusted clutches: 0.125 ± 0.025 inch.

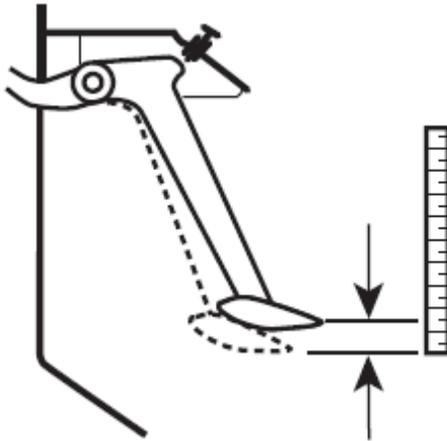
Specification Solo clutches: 0.0625 to 0.150 inch

- Using two (2) sets of feeler gauges measure the clearance between the release yoke fingers and wear pads on the release bearing housing.
- Insert an equal amount of feeler gauges between the release yoke fingers and wear pads on both sides of release bearing housing.
- Check that the slip feel of the feeler gauges are equal.
- Measure the two stacks of feeler gauges to get gap between the release yoke and pads on the release bearings.
 - **Note:** If the two stacks of feeler gauges are different add the two thickness of the feeler gauges together and average the two measurements.



- **Measurement of clutch pedal free play (in-cab)**
- Place the tape measure body at a fixed location and check for maximum arch of the clutch pedal stroke.
- Place end of tape measure at the center of the clutch pedal pad.

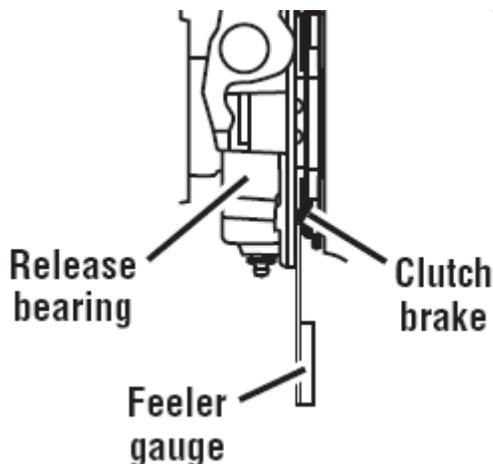
- Depress the clutch pedal with your hand until resistance is felt.
- Repeat above step to confirm or when consistent reading is achieved.
- **Note:** This measurement will be in relationship with the measurement taken at the clutch release fork fingers.



3. Steps for validating clutch brake contact (squeeze)

Clutch brake squeeze is achieved at the end of the clutch pedal stroke at the floor or firewall of the cab. It is recommended that clutch brake contact should occur at 0.500 inch to 1 inch from the floor or firewall. This should prevent the driver from activating the clutch brake while driving the vehicle down the road. The only time that the clutch brake should be utilized is when shifting the transmission into a 1st or reverse gear when the vehicle is stationary.

- Place a 0.010 inch feeler gauge between the release bearing and the clutch brake.
- Depress the clutch pedal to the floor clamping the 0.010 inch feeler gauge.
- Pull on the feeler gauge to verify that the feeler gauge CAN NOT be pulled out.
- Measuring the distance between the back of the clutch pedal and the floor and firewall this distance should be between ½ inch and 1 inch.
- **Note:** Make corrections in the adjustment of the clutch linkage, upper and lower clutch pedal stops may be needed to achieve correct clutch brake squeeze and clutch pedal free play. See OEM specific information as to how to make these adjustments.



4. Steps for validating clutch brake operation (vehicle stationary)

- Start engine and keep at idle
- Depress clutch pedal to the floor to contact the clutch brake
 - The transmission should shift into gear without any grinding of the gears
 - **Note:** If there is no grinding of the gears and the transmission will not shift into gear, let up on the clutch pedal slightly to get rotation on the transmission input shaft so that the gears within the transmission will mesh.
- If the clutch brake function is questionable use the following method.
 - With the clutch pedal up, foot off of the clutch pedal.
 - Move the transmission shift lever as to shift into a gear until you feel grinding of the gears.
 - Depress the clutch pedal to the floor to contact the clutch brake.
 - The transmission should shift into gear after waiting 2 to 3 seconds without any grinding of the transmission gears.

5. Poor performance complaint – Engagement

- When the customer has a complaint of poor clutch engagement (vehicle launch), inspect the following items and make necessary repairs prior to removal of the clutch.
 - Is the engine idle set to OEM specification? Adjusting the engine idle on some engines to either the upper or lower allow specification could improve the vehicle launch.
 - Inspect and replace if necessary front or rear engine mounts
 - Inspect and replace any clutch linkage that is worn excessively or damaged.
 - Evaluate driver's starting technique. Is he/she starting in the lowest possible gear for the vehicle load

6. Poor performance complaint – High clutch pedal engagement

- This is a condition where the vehicle starts to move when the clutch pedal reaches the top of its stroke.
 - This condition can be normal for a clutch with excellent release characteristic.
 - In Eaton Fuller Clutch manufacturing process for driven disc we are continuing to manufacture our driven disc flatter. By doing so this increases the clearances between the cast iron friction surfaces of the clutch assembly. The end results are a better/cleaner releasing clutch which could result in a high clutch pedal engagement.

7. Poor performance complaint – Rattle

- Confirm the component that the rattle noise is being observed, vehicle cab, clutch linkage, clutch area or transmission. The below items can be a source for rattle complaints.
 - Flywheel pilot bearing is dry or damaged.
 - Clutch release bearing is dry or damaged.
 - Clutch linkage system – frozen, worn excessively, improperly lubricated, linkage system is not adequately isolated from the engine, transmission or vehicles chassis.
 - Idle gear rattle coming from the transmission.
 - Check the engine for the correct idle speed.
 - Specify driven disc assemblies which feature a Pre-damper.

8. Poor performance complaints validation

- Ride with the driver to confirm the complaint
- Evaluate the driver's shifting technique

- Shifts using the clutch
- Float shift – technique not using the clutch to break torque
- Uses both methods
- Driver Technique
 - Train the driver on the proper technique for using the clutch and shifting the transmission
 - After training reconfirm if the driver still has complaints
- Non-Driver Technique
 - Confirm non-driver technique
 - Check to be sure that the clutch assembly is in proper adjustment and functioning as intended.
 - Verify proper release bearing position
 - Depress clutch pedal and using 0.010 inch feeler gauge verify clutch brake contact.
 - Lightly tap the intermediate plate separator pins.
 - With the engine running and the vehicle stationary, depress the clutch pedal to contact the clutch brake. Shift the transmission into gear. Lever should go into gear without any grinding to the gears.
 - Let up off of the clutch brake and shift the transmission out of gear. The lever should come out of gear with little to no resistance.
 - Drive the vehicle. If condition still exist compete the following while the condition is present (stuck in gear when vehicle stationary)
 - With the clutch released and the vehicle stationary, increase the engine rpm to above 1500 rpm and apply force to the shift lever in an attempt to shift the transmission out of gear. Transmission should shift to neutral with minimal force.

9. Driving Operation

Driving Tips

- Always use normal double-clutching procedures when making lever shifts.
- Always select an initial starting gear that provides sufficient reduction for the load and terrain.
- Never slam or jerk the shift lever to complete gear engagements.
- Never coast with the shift lever in the neutral position.
- Never downshift at too high of a road speed.
- Never move the range lever with the shift lever in neutral while the vehicle is moving.
- Never make a range shift while moving in reverse.
- In most cases, depending on the engine and axle ratios, you can save valuable fuel by operating the vehicle at less than governed RPM while cruising in 8th.

10. Double-Clutching Procedure

When ready to make a shift:

1. Depress pedal to disengage clutch.
2. Move the shift lever to neutral.
3. Release pedal to engage clutch.*
 - a. Upshifts—decelerate engine until engine RPM and road speed match.
 - b. Downshifts—accelerate engine until engine RPM and road speed match.
4. Quickly depress pedal to disengage clutch and move shift lever to next gear speed position.

5. Release pedal to engage clutch.

Note: *By engaging the clutch with the shift lever in the neutral position, the operator is able to control the mainshaft gear RPM since it is regulated by engine RPM. This procedure helps the operator match the mainshaft with the driveline.

11. Vehicle Vibration Issues

1. Vehicle vibration complaints are becoming more complex to address using techniques of the past.
2. Recommendation is the use of the DVA (Driveline Vibration Analysis) tool by TVT (Truck Vibration Technology).
3. Reference 2007-FSUD-856 MD 300 V Escalation Process.
4. Reference Service Bulletin CLIB-0016 Vehicle Vibration Analysis Process.

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