Service Manual

Eaton Gen III Automated Transmissions TRSM0930 EN-US

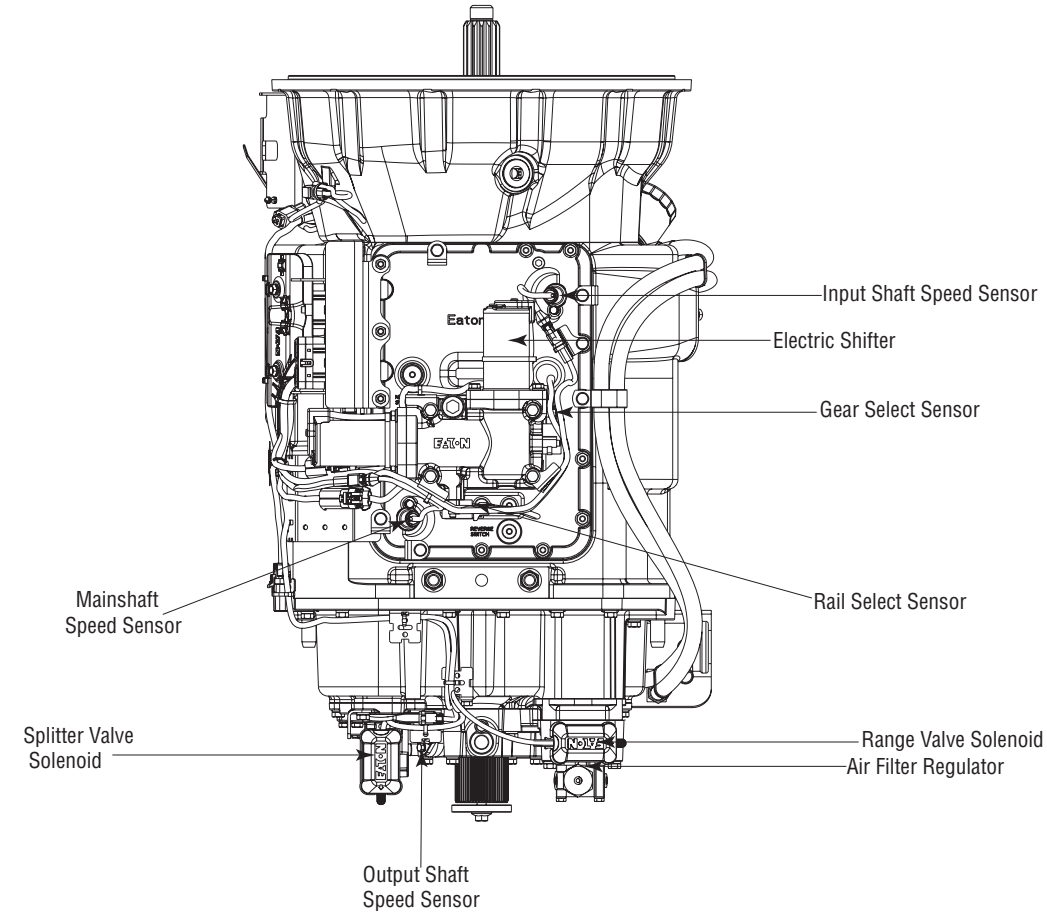
May 2013

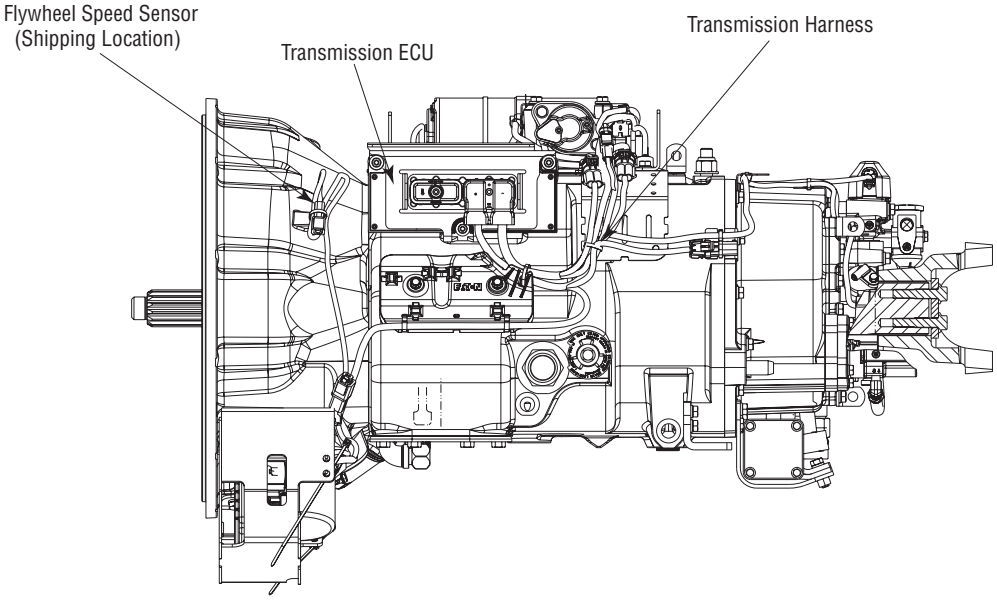
UltraShift®
AutoShift®
UltraShift® PLUS Linehaul Active Shifting (LAS)
UltraShift® PLUS Linehaul Small Step Efficiency (LSE)
UltraShift® PLUS Multipurpose Extreme Performance (MXP)
UltraShift® PLUS Multipurpose High Performance (MHP)
UltraShift® PLUS Vocational Active Shifting (VAS)
UltraShift® PLUS Vocational Construction Series (VCS)
UltraShift® PLUS Vocational High Performance (VHP)
UltraShift® PLUS Vocational Multipurpose Series (VMS)
UltraShift® PLUS Vocational Extreme Performance (VXP)
UltraShift® PLUS Passenger Vehicle (PV)

Powering Business Worldwide

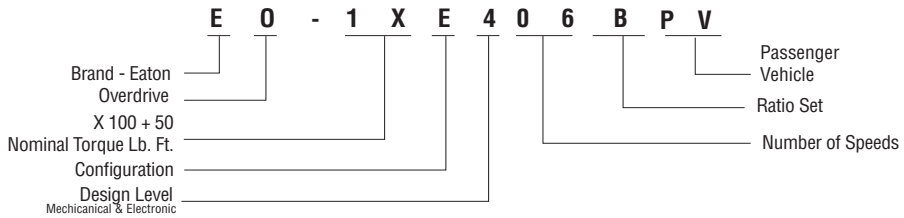
BACKED BY
Roadranger
SUPPORT

Heavy-Duty 13-Speed MHP/VHP, 16-Speed LSE & 18-Speed VXP/MXP

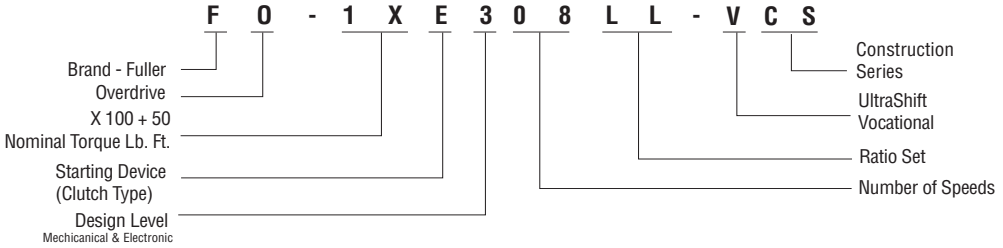




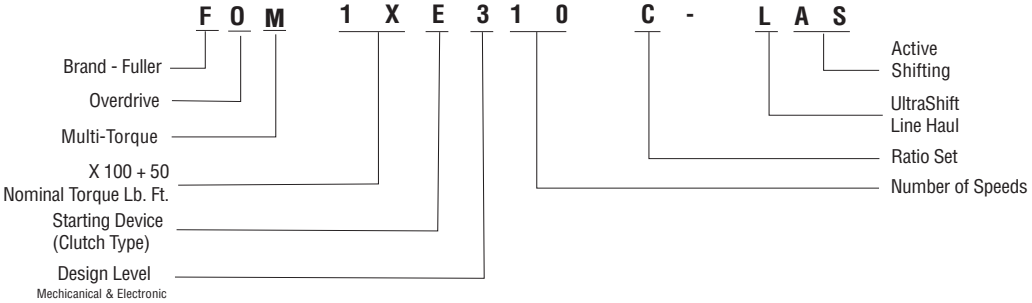
6-Speed



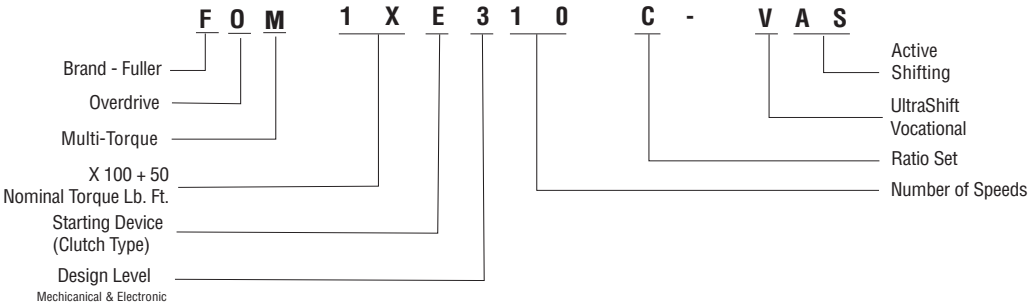
10-Speed



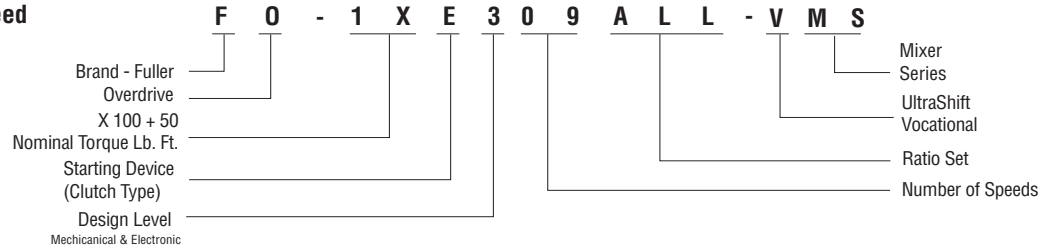
10-Speed



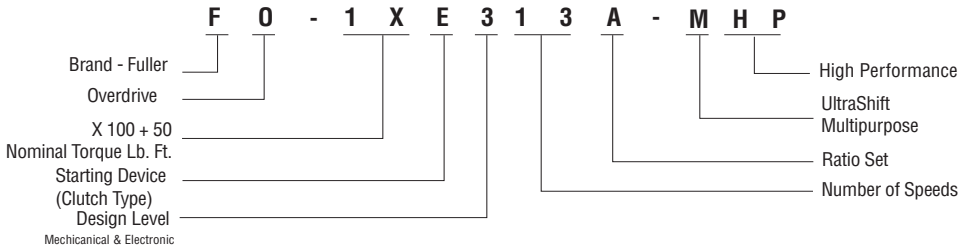
10-Speed



11-Speed



13-Speed

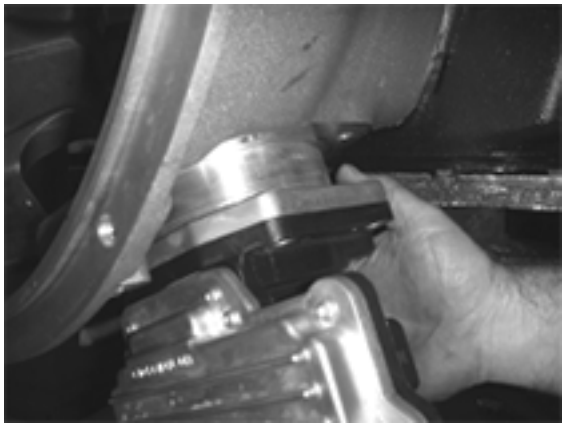


Procedure - Installation

1. Install the ECA into the clutch housing bore. Align it with the lower cross-shaft.

Note: The ECA will have to be rotated to align with the slot in the Clutch Housing.

Note: Ensure you rotate the Release Yoke as close to the Case Dowel in the Clutch Housing prior to mating with the cross-shaft. This allows the Release Yoke to clear the Release Bearing during installation.



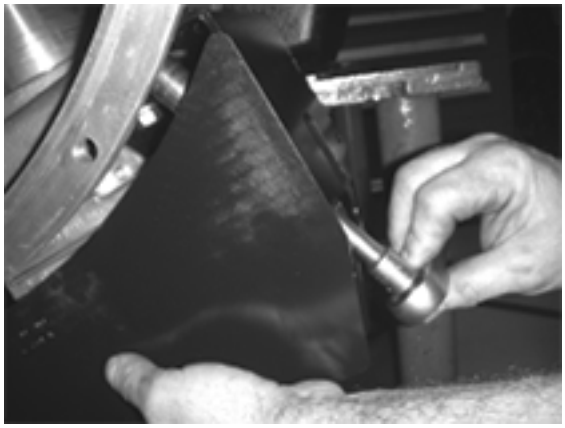
2. Install the 4 cap screws from the ECA Mounting Flange. Tighten them to 35-45 lb-ft. (47-61 Nm).

Note: Medium-duty models are mounted with 3 cap screws and 1 lock nut. Tighten to 35-45 lb-ft. (47-61 Nm).

Note: The cap screws for the ECA are longer than the ECA Bracket cap screws.

Note: Ensure the ECA does not bind on the cross-shaft by snugging all cap screws before tightening to the specified torque.

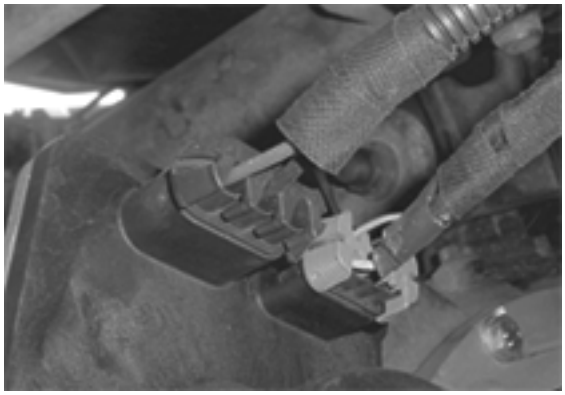
3. If applicable, install the 4 cap screws for the ECA shield. Tighten them to 35-45 lb-ft. (47-61 Nm).



4. Apply NyoGel to terminals and reconnect the 8-way and 3-way connectors to the ECA.

Note: Apply just enough material to cover the end of the terminal.

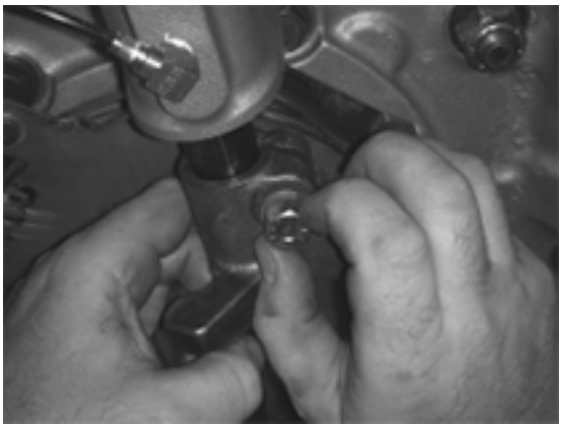
Note: Use only Eaton lubricant part number 5564527 (Nye Lubricants NYOGEL 760G. For MSDS safety or other information see www.nyelubricants.com.)



5. Reconnect the negative 12-volt battery cable.

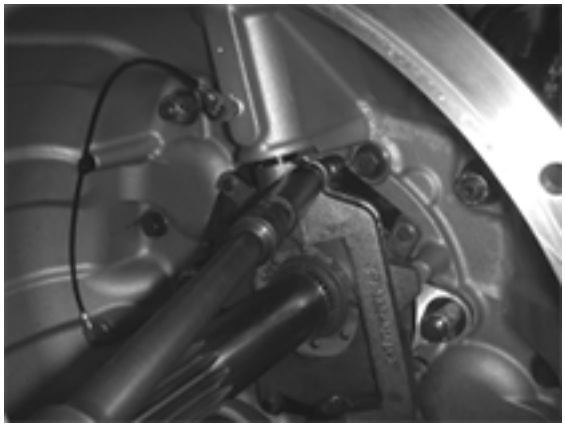
6. If previously removed, install the 8-bolt PTO after ECA installation. Follow the PTO manufacturer's guidelines for installation instructions.

5. Slide yoke onto upper Cross-shaft assembly and install 1 cap screw and lock washer by hand.

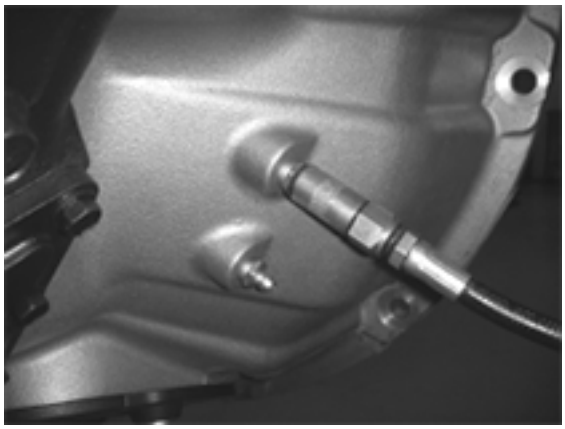


6. Install lower Cross-shaft assembly and install 1 cap screw and lock washer by hand.

7. Tighten the 2 Yoke cap screws to 35-45 lb-ft. (47-61 Nm).



8. Grease upper Cross-shaft assembly until grease purges from the bleed hole in the upper Cross-shaft boss.



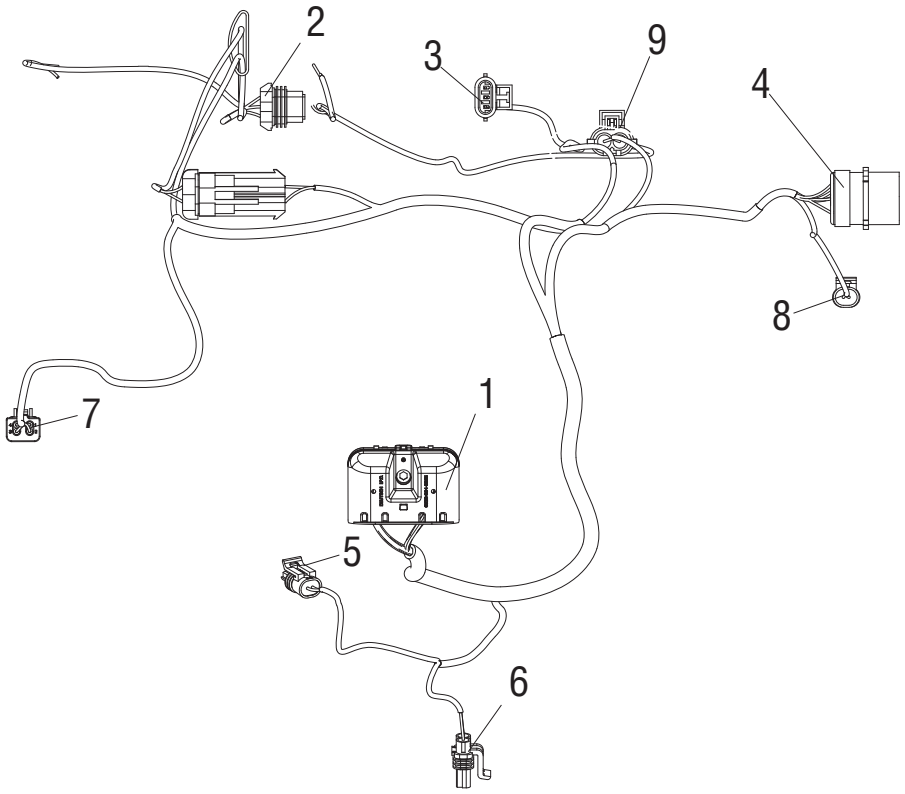
Medium-Duty Transmission Harness

Special Instructions
None

Special Tools
Basic hand tools

Component Identification

Medium-Duty



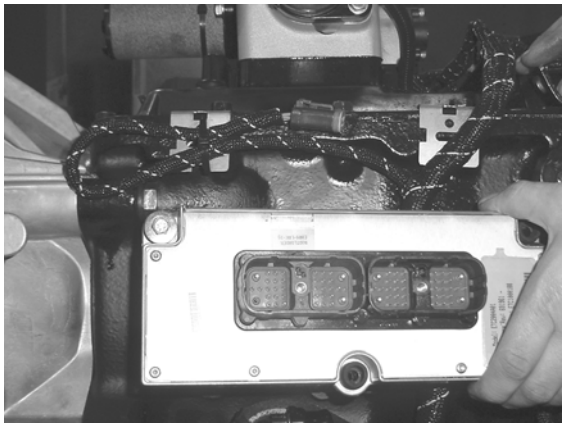
1. Transmission ECU 38-way Connector
2. Gear Sensor Connector
3. Rail Sensor Connector
4. Future position of 4-way Transmission Diagnostic Connector
5. Input Shaft Speed Sensor Connector
6. Inertia Brake Connector
7. Wet Clutch Solenoid Connector (AW3 only)
8. Output Shaft Speed Sensor Connector
9. Electric Shifter Connector

Procedure - Installation

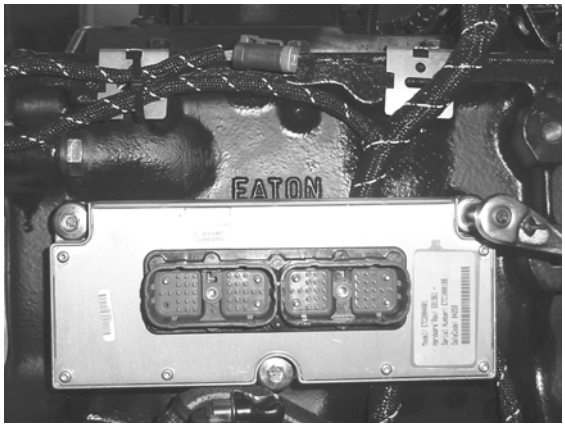
Caution: Battery negative must remain disconnected until the TECU 38-way connectors are installed.

Caution: Do not allow contamination into the TECU or connectors.

1. Position the Transmission Controller on the locating studs.



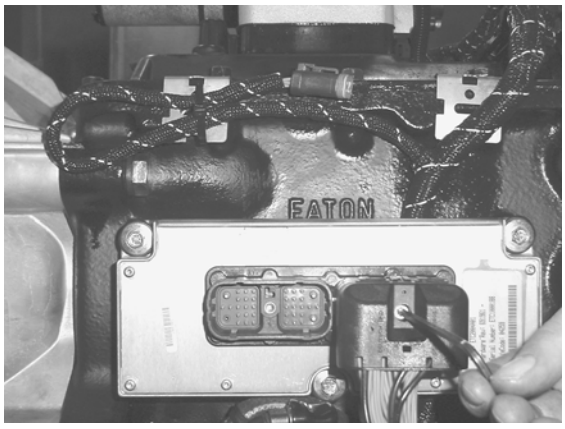
2. Using a 7/16” socket, install the 3 Transmission Controller mounting bolts and tighten to 7-9 lb-ft. (9.5-12.2 Nm).



3. Reconnect the following connectors:

Caution: Do not exceed the torque on the Transmission Harness or Vehicle Harness Connector or bolt failure will occur.

- Using a 5/32” wrench, reconnect the Transmission Harness 38-way Connector and tighten to 25 +/- 3 lb-in. (2.82 +/- 0.33 Nm).
- Using a 5/32” wrench, reconnect the Vehicle Interface 38-way Connector and tighten to 25 +/- 3 lb-in. (2.82 +/- 0.33 Nm).
- Reconnect the negative battery cable.



4. To operate properly, the system must be calibrated as follows:

Important: The Electric Shifter must be calibrated before the vehicle is placed in operation.

- Turn ignition switch on. Allow the transmission to power up.
- Turn ignition off and wait 2 minutes.

Note: UltraShift AW3- Perform clutch calibration: “Clutch Calibration” on page 143.

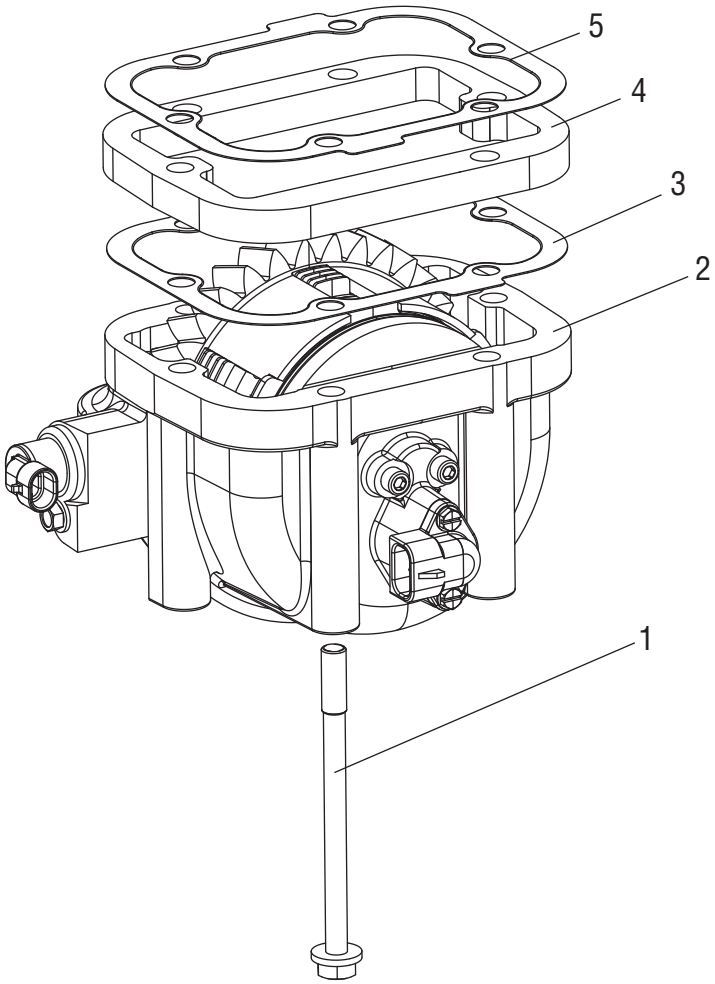
5. Connect ServiceRanger to vehicle and compare recorded configuration settings (step 1 in removal process) to the replacement TECU. Update and save all configurations that are different. (Refer to “ServiceRanger User Guide” TCMT-0071 for more information.)

Medium-Duty Inertia Brake

Special Instructions
None

Special Tools
Basic hand tools

Component Identification



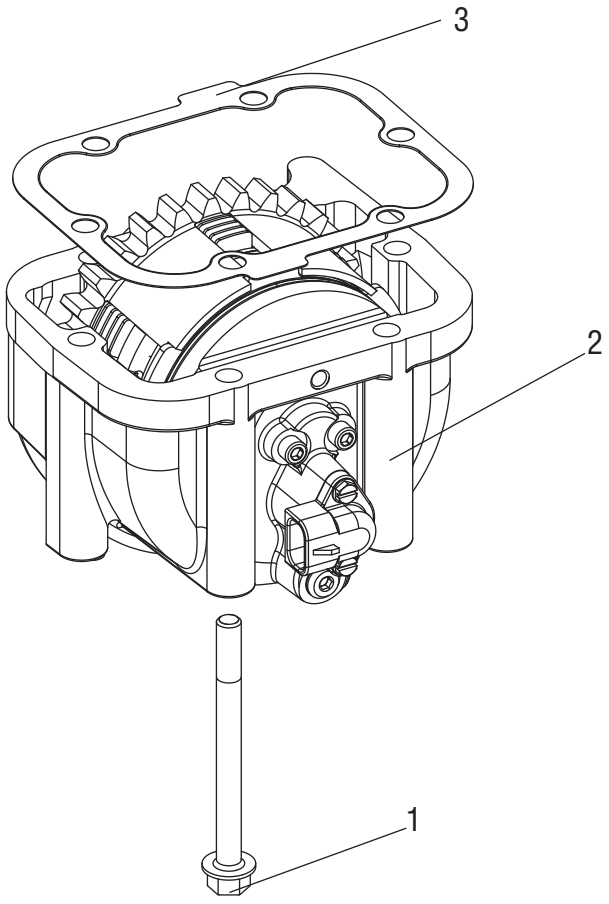
1. Cap Screw
2. Inertia Brake
3. Gasket
4. Spacer (Used on all Medium-Duty ratios except the “N”)
5. Gasket (Used on all Medium-Duty ratios except the “N”)

Heavy-Duty Inertia Brake

Special Instructions
None

Special Tools
Basic hand tools

Component Identification



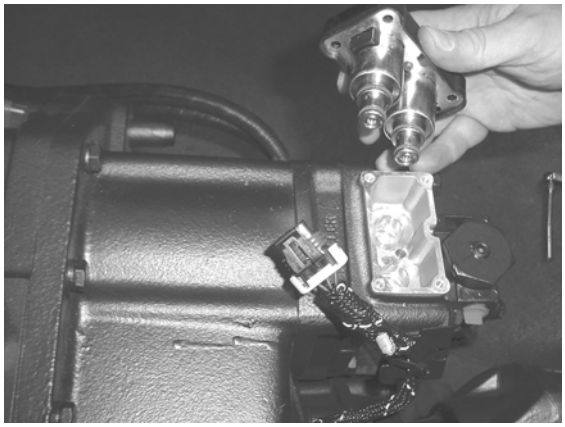
1. Cap Screw
2. Inertia Brake
3. Gasket

Procedure - Installation

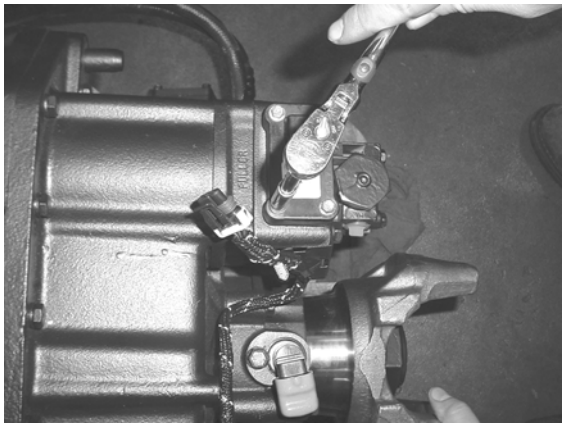
Important: Lubricate o-rings with Eaton Fuller silicone 71214 or equivalent.

Important: The valve is keyed to fit its mounting location. Take care to align the key with the notch in the housing.

1. Install and push the Range Valve down into the housing.

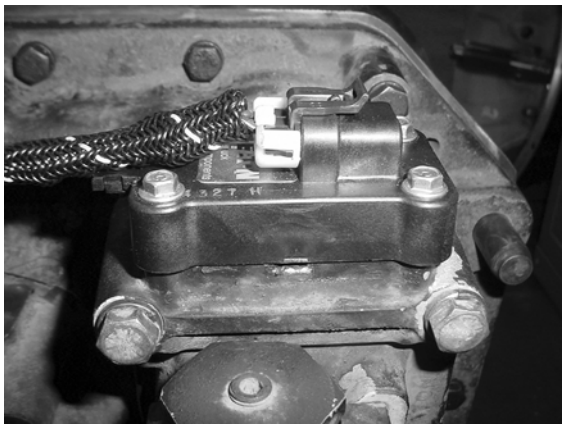


2. Using a 5/16” socket, install the 4 Range Valve mounting cap screws and tighten to 21-27 lb-in. (2.3-3.0 Nm) using a cross pattern.



3. Reconnect the Transmission Harness to the Range Valve and close all air tanks drains.

   Note: Install the Range Harness back into the tie-down on the Range Valve.



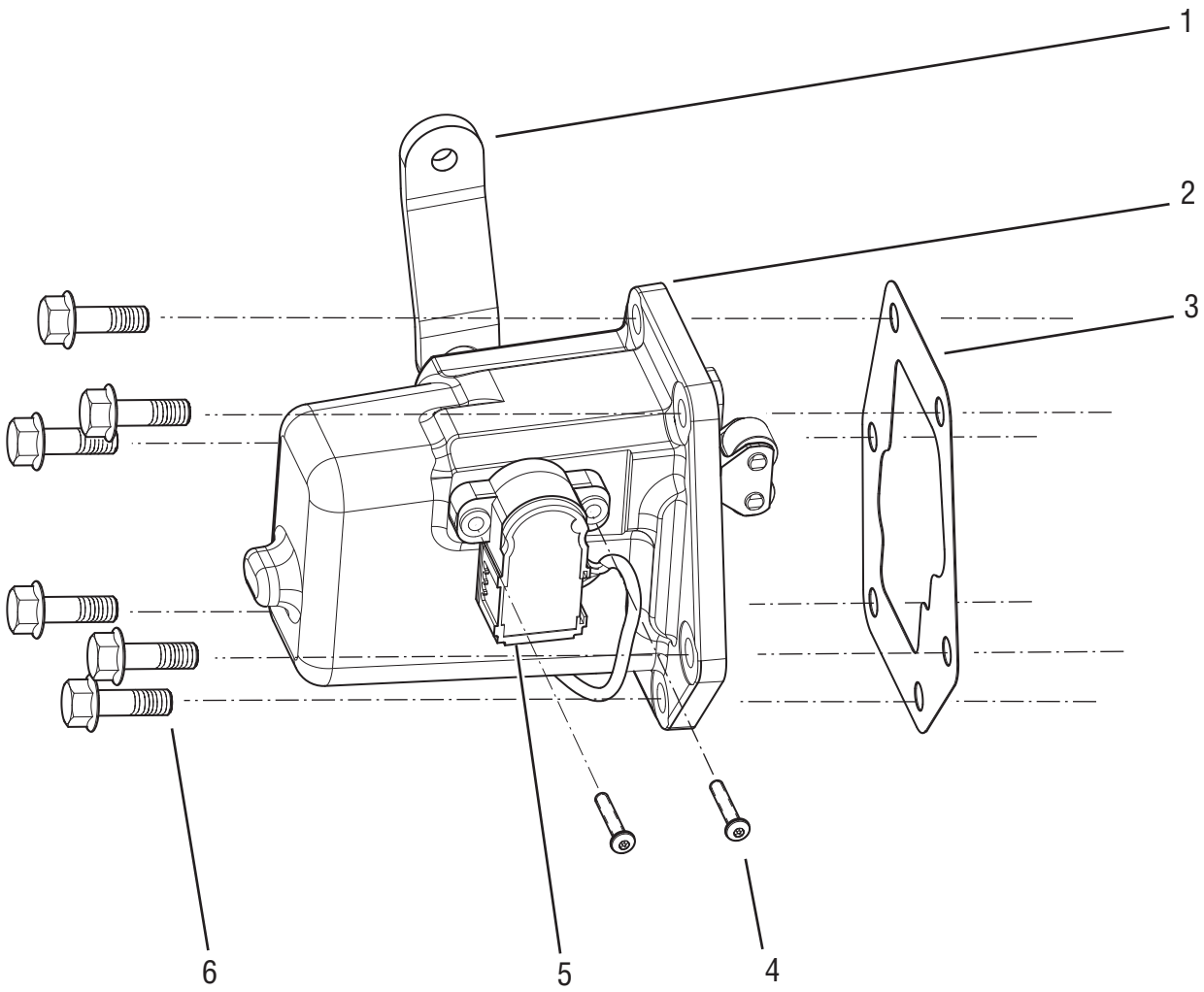
4. If equipped, install the Protective Cover. Push the cover down by hand until it snaps into place.

Park Actuator Assembly

Special Instructions
None

Special Tools
Basic hand tools

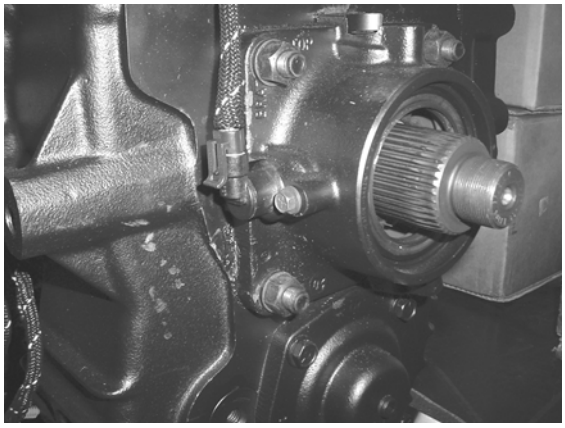
Component Identification



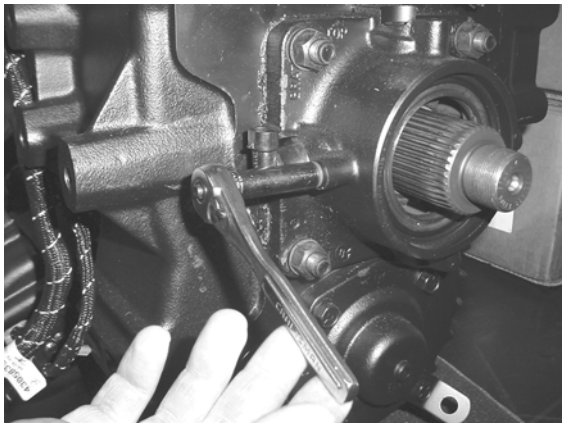
1. Shift Lever connection for OEM supplied Shift Cable
2. Park Actuator Assembly
3. Actuator Gasket
4. Sensor Fasteners (2)
5. Park Sensor
6. Actuator Fasteners (6)

Procedure - Removal

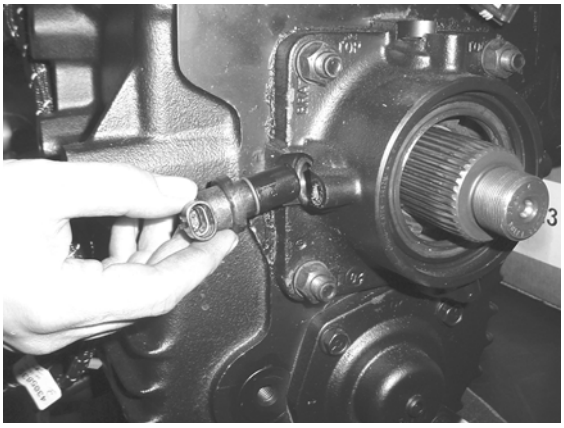
1. Disconnect the Transmission Harness from the Output Shaft Speed Sensor or Pigtail Connector, if equipped.



2. Using a 3/8” socket, remove the sensor retaining bolt.



3. Remove the Output Shaft Speed Sensor, with o-ring, from the transmission housing.



Medium-Duty Input Shaft Speed Sensor

Special Instructions

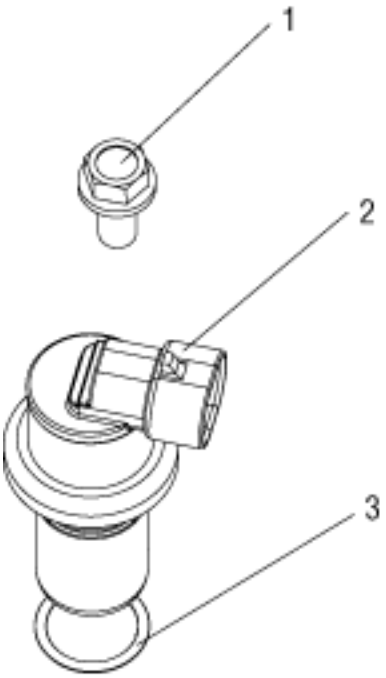
Input Shaft Speed Sensor location varies as follows:

- Medium-Duty: Top of Inertia Brake
- Heavy-Duty: Right front of Shift Bar Housing

Special Tools

Basic hand tools

Component Identification



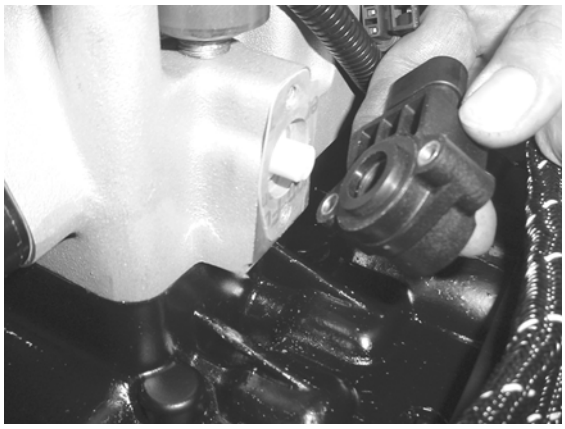
(Alternate Design with Pigtail Connector)

1. Cap Screw
2. Sensor
3. O-ring

Procedure - Installation

1. Align sensor tabs with the slot in the Electric Shifter rail. Then, insert the Rail Select Sensor, with gasket, into its mounting location.

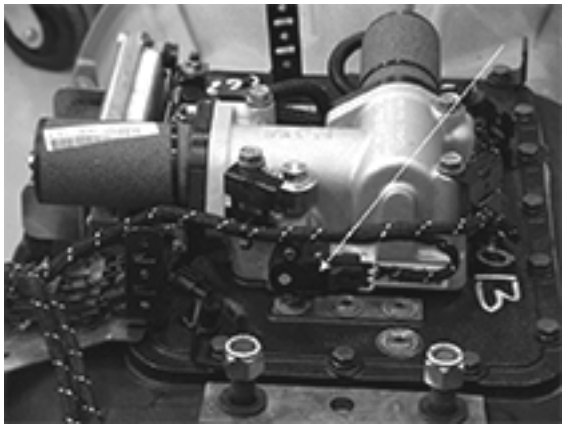
   Note: Install the sensor, so connector opening faces right side of the transmission. (As viewed from the rear of the transmission)



2. Using a 5/32” hex key wrench, install the 2 hex key mounting screws and tighten to 21-27 lb-in. (2.3-3.0 Nm).

Caution: Carefully hold sensor in position while installing the hex key mounting screws, or sensor can snap.

3. Reconnect the Transmission Harness to the Rail Select Sensor.



Operation and Basic Troubleshooting

Operation

For more detailed information on transmission operation and shifting, go to the Roadranger Literature Center (www.roadranger.com) and look for the “Driver’s Manual” on your transmission model.

- Generation 3 UltraShift Driver Instructions - TRDR0940
- Generation 3 AutoShift Driver Instructions - TRDR0930
- Driver Instructions for Fuller® UltraShift® PLUS models - TRDR1110

Basic Troubleshooting

For all Basic Troubleshooting questions refer to the appropriate service manual covering the base box procedures. These manuals can be found on Roadranger.com under the Literature Center.

Air System Operation and Troubleshooting

For all air system operation and troubleshooting questions refer to the “Eaton Gen III Automated Transmissions Troubleshooting Guide” TRTS0930, which is found on Roadranger.com under the Literature Center.

Description	Torque Value lb-ft. [N•m]	Thread size	Additional Comments
2 Rail Sensor Cap Screws	21–27 lb-in. [2.4–3.1 N•m]		
2 Gear Sensor Cap Screws	21–27 lb-in. [2.4–3.1 N•m]		
2 Air Filter Regulator Cap Screws	8–12 lb-ft. [10.8–16.02 N•m]	1/4"-20	Apply Loctite 242 to threads.
1 Lubricant fill plug (6-Speed)	45–55 lb-ft. [61–75 N•m]	3/4-14 NPT	
1 Lubricant fill plug (13,10,18-speed)	60–75 lb-ft. [81–102 N•m]	1¼-NPT	
1 Cross-shaft Plug	34–48 lb-ft. [46–65 N•m]	1.3125 - 12	
2 Lifting Bracket Cap Screws	35–45 lb-ft. [47–61 N•m]	3/8"-16	Apply Loctite 242 to threads.
1 Output Yoke Nut (6-Speed)	500 ± 25 lb-ft. [678 ±34 N•m]		
1 Output Yoke Nut (13,10,18-Speed)	450–500 lb-ft. [610–678 N•m]		
2 Output Yoke Cap Screws (ECA)	70–85 lb-ft. [95–115 N•m]	M12 x 1.25	Spiralock ThreadsTM: No thread adhesive necessary.
4 Rear Bearing Cover Cap Screws (6-Speed)	60–70 lb-ft. [81–95 N•m]	1/2-20	Apply Loctite 242 to threads.
Transmission Nodal Mount Cap Screws	Refer to OEM for Specification		Apply Loctite 242 to threads.
4 Rear Bearing Cover Cap Screws (13,10,18-Speed)	35–45 lb-ft. [47–61 N•m]	3/8-16	Apply Loctite 242 to threads.
Transmission Rear Mount Nuts/Cap Screws	Refer to OEM for Specification		
6-Speed AW3 Specific			
Oil cooler line fitting	50–60 lb-ft. [68–81 N•m]		
Oil cooler line nut	50–60 lb-ft. [68–81 N•m]		
2 Dipstick tube fitting	60–70 lb-ft. [81–95 N•m]	1 5/8"-12	
1 Wet clutch drain plug	34–48 lb-ft. [46–65 N•m]		