Eaton® Fuller®

Heavy Duty Transmissions

Driver Instructions

SynchroShift™ Fuller Heavy Duty Synchronized Transmissions
FTS- XX112L
November 2009

Read the entire driver instructions before operating this transmission.

Set the parking brakes before starting a vehicle, always be seated in the driver's seat, move the shift lever to neutral, and depress the master clutch.

If the engine cranks in any gear other than neutral or without the master clutch depressed, service your vehicle neutral safety start circuit immediately.

Before working on vehicle or when leaving the cab with the engine running, place the transmission in neutral, set the parking brakes, and block the wheels.

Do not release the parking brake or attempt to select a gear until the air pressure is at the correct level.

When parking the vehicle or leaving the cab, always place the shift lever in neutral and set the parking brakes.

If your vehicle is equipped with a remote throttle, before operation, the transmission must be in neutral.

TOWING: To avoid damage to the transmission during towing, disconnect the driveline.

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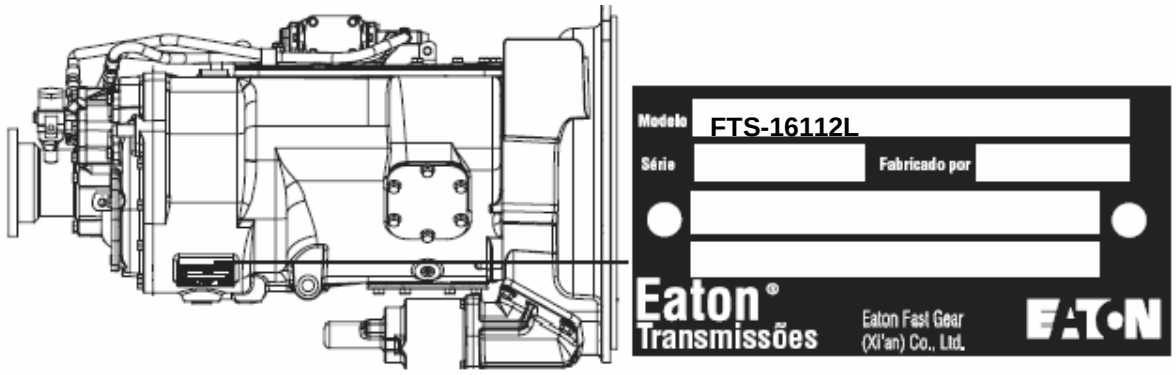
Identification Tag

Transmission model designation and other transmission identification information are stamped on the transmission tag. To identify the transmission model designation and serial number, locate the tag on the transmission and then locate the numbers as shown.

DO NOT REMOVE OR DESTROY THE TRANSMISSION IDENTIFICATION TAG.



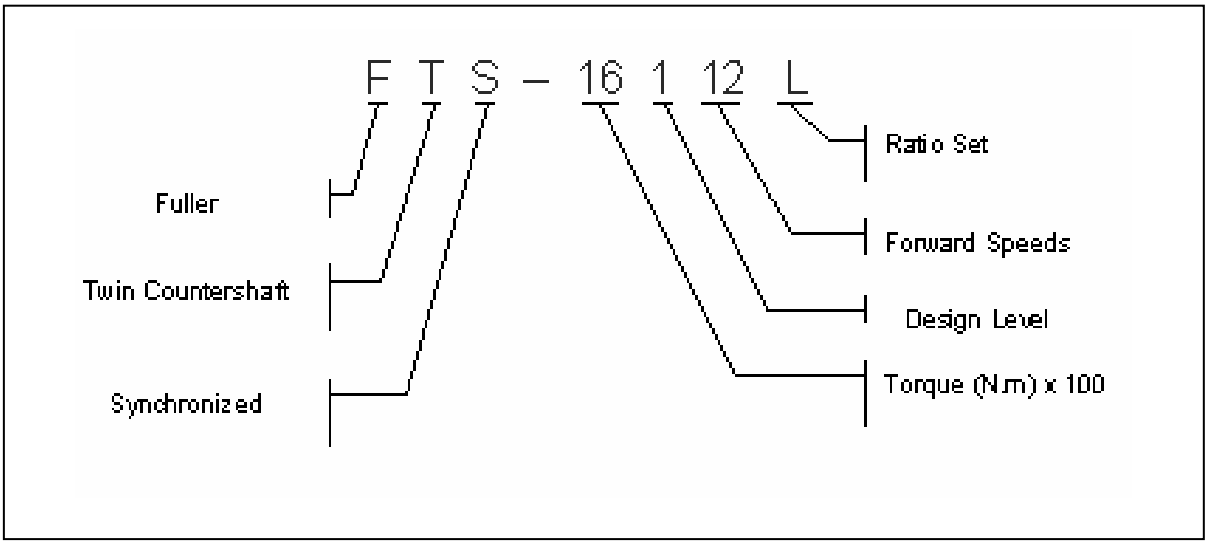
Record transmission identification data. Have these reference numbers handy when ordering replacement parts or requesting service information.

Transmission Model _____

Transmission Serial Number _____

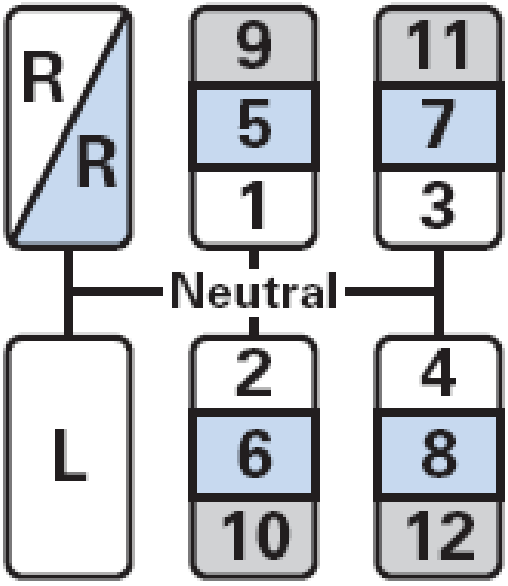
Model Designation

Nomenclature:



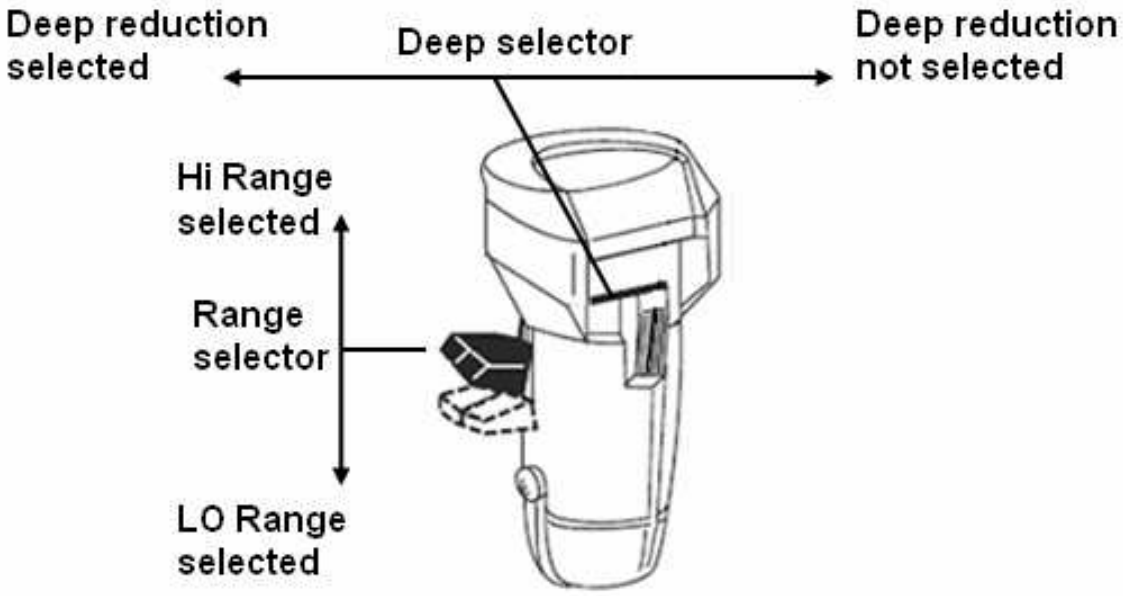
Shift Lever Positions

Shift Lever Positions



Shift Controls

Master Control Valve
(A-6815)



General Information

Models in this series provide 12 forward speeds, one reduced (LO) and three reverse, consisting of a 5-speed front section and a 3-speed auxiliary section. The auxiliary section contains Deep and LO range ratios.

LO gear lever position is used only as a starting gear in severe conditions. The other four ratios are used once in Deep range, once again in LO range and then in HI range. The Range Selector is used once during the upshift sequence and once during the downshift sequence.

Shifting is simple and easy with the repeat "H" shift pattern. The gear shift lever position for 9^{th} HI range is the same as 5^{th} in Lo range and 1^{st} in Deep range, 10^{th} Hi range is the same as 6^{th} in Lo range and 2^{nd} in Deep range, 11^{th} Hi range is the same as 7^{th} Lo range and 3^{rd} in Deep range, and 12^{th} Hi range is the same as 8^{th} in Lo range and 4^{th} in Deep range.

High Speed Downshift Protection System

The **SynchroShift™** control module is equipped with advanced diagnostic features to evaluate the integrity of the system and provide operator feedback of a system fault. In addition, if the fault shall result in a condition that will compromise the reliability of the transmission or result in a safety risk, the system logic will compensate and default to a safe mode. The diagnostic capability of the control module includes identification of component failures. The service light used for identification of a component failure is on for 2 seconds upon vehicle start up to allow for identification of a malfunctioning service light.

Prevent Deep Reduction when Hi range is selected

To prevent transmission damage and operator confusion, the system is designed to avoid deep reduction when high range is selected. This is prevented by using a mechanical interlock in the master control valve. However, there are electrical and pneumatic failure modes that can result in a Hi range to deep reduction shift. The control module is equipped with logic to recognize this and automatically hold the transmission to high range.

General Information

Optional Equipment:

By-pass System

When in downshift protection, the transmission will engage high range at the first opportunity and will keep it in Hi range until the source of the failure is gone. By-pass mode will allow the operator to drive the vehicle – only in low range – to a place where the repair can be done. To turn on the by-pass system the driver must stop the vehicle, use the parking brake and turn on the by-pass control (inside the vehicle cabin).

Shift Pattern Diagram

A shift pattern diagram should be in your vehicle. If it has been lost, a replacement may be obtained by writing to:

Eaton Corporation
Truck Components
Rua Clark, 2061, Bairro Macuco – CEP 13279-400.
Valinhos - São Paulo - Brasil.
Phone: 0800-170551.

Please specify shifting controls used and transmission model number when making request.

Transmission Features

Range Shift

The Range Selector lever is used to select Deep, LO or HI range. It is used once during an upshift sequence and once during a downshift sequence.

Pre-select

IMPORTANT: Always pre-select all range shifts when upshifting or downshifting. Pre-selection requires that the Range Selector lever is moved to the needed position before starting the lever shift.

Pre-selected range shifts are completed automatically as the lever is moved through neutral and into the next gear position. Pre-selecting all range shifts prevents damage to the transmission range synchronizers and provides for smoother shifts.

Operation

Driving Tips

- 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 move the shift lever to the Deep speed gear position while operating in LO or HI range.
- Never move the range selection lever with the shift lever in neutral while the vehicle is moving.
- Never make a range shift while moving in reverse.
- Avoid downshifting at high speed, because these damage the synchronizer elements.

Operation

Initial Start Up

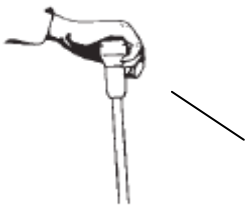
Special Instructions

Before starting a vehicle always be seated in the driver's seat, move the shift lever to neutral, and set the parking brakes.

Before moving a vehicle, make sure you understand your shift pattern configuration. A shift label should be in your vehicle's cab. If not, refer to General Information section to order.

Procedure

1. Make sure the shift lever is in neutral and the parking brakes are set.
2. Turn on the key switch, start the engine.
3. Allow the vehicle air pressure to build to the correct level. Refer to your "Operator and Service Manual" supplied with the truck.
4. Apply the service brakes.
5. Make sure the range selection is in the Deep range position.



Range Lever MUST be in the Deep Range position to start the movement.

6. To move the vehicle in adverse conditions, when is needed: make sure to operate in the Deep range position.

7. Press the clutch all the way down.

8. Move the shift lever to start gear position initial that provides sufficient reduction for the load and terrain.

9. Disengage the park brake.

10. Disengage the clutch while simultaneously pushing on the accelerator pedal to move the vehicle.

Operation

In the instructions below, is assumed that the driver is familiarized with the operation of Heavy Duty trucks - Towing - can control the shift lever and the clutch to obtain exact and smooth shifts, in upshifting and downshifting sequences.

Upshifting

Range Change –Deep Reduction to LO Range

1. When all Deep range gears have been achieved, pre-select the deep reduction selector button rearward to select the LO range and move the shift lever as the diagram shows. When the shift lever passes neutral, the transmission will automatically change from Deep Reduction to LO range.

Range Change –LO to HI Range

2. When all LO range gears have been achieved, pre-select the range selection lever up (HI) to select the HI range and move the shift lever as the diagram shows. When the shift lever passes neutral, the transmission will automatically change from LO to HI range.

Warning: Never move the shift lever to Deep gear position after lo range (LO) or high range (HI) was pre-selected, or during the operation in the lo range (LO) or high range.

Operation

Downshifting

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1. Disengage the accelerator and press the clutch half-way, to stop torque to the transmission then move the shift lever to the next desired gear position and re-engage the clutch. Continue driving the vehicle, downshifting when it's necessary.

Range Change – HI Range to LO Range

2. With the transmission in high range and ready to start downshifting, pre-select the range selection lever to the down position.

3. Disengage the clutch half-way and move the shift lever to the next position wanted in the low system (LO). When the shift lever passes the neutral position, the transmission range will change automatically from HI range to LO range.

4. Continue to downshifting to desired next position wanted in the LO range.

Range Change –LO Range to Deep Reduction

5. With the transmission in LO range and ready to start downshifting, pre-select the deep reduction button forward.

6. Disengage the clutch half-way and move the shift lever to the next position wanted in the Deep system (Deep Reduction). When the shift lever passes the neutral position, the transmission range will change automatically from LO range to Deep reduction.

7. Continue to downshifting to desired next position wanted in the Deep reduction.

Lubrication

Proper Lubrication...
the Key to long transmission life

Proper lubrication procedures are the key to a good all-around maintenance program. If the improper lubricant is used or if the lubricant level is ignored, general maintenance will not keep the transmission running properly or assure long transmission life.

Eaton® Fuller® Transmissions are designed so that the internal parts operate in a bath of oil circulated by the motion of gears and shafts.

Thus, all parts will be amply lubricated if these procedures are closely followed:

1. **Maintain oil level. Inspect regularly**
2. **Change oil regularly.**
3. **Use the correct grade and type of oil.**
4. **Buy from a reputable dealer.**

Lubrication

* To obtain a reputable lubricate dealers list, write to:

Eaton Corporation
Truck Components
Rua Clark, 2061, Bairro Macuco – CEP 13279-400.
Valinhos - São Paulo - Brasil.
Phone: 0800-170551.
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Product	Type of Lubricate	Specification	Lubrication change HIGHWAY USE	Lubrication change OFF-HIGHWAY USE
FTS-16108LL	Mineral	MIL-PRF-2104H (SAE 50)	62500 miles or 1 year	31250 miles or 1 year
	Mineral	CAT TO-4 (SAE 40 or SAE 50)	62500 miles or 1 year	31250 miles or 1 year
	Mineral	API CF-4 (SAE 40 or SAE 50)	62500 miles or 1 year	31250 miles or 1 year

Additives and friction modifiers are not recommended for use in Eaton Fuller transmissions.
Never mix engine oil with gear oil in a transmission.

Lubrication

Proper Oil level

Make sure Oil is level with filler opening. Because you can reach oil with you fingers does not mean oil is at proper level. **One inch of oil level is about one gallon of oil.** Make sure vehicle is parked on level surface when checking for proper oil level.

Draining Oil

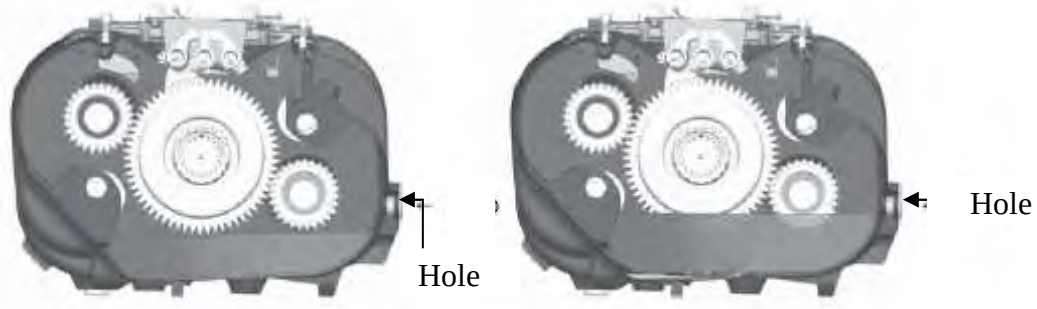
Drain transmission while oil is warm. To drain oil removes the drain plug at bottom of case. Clean the drain plug before re-installing and torque the drain plug to proper specification.

Refilling

Clean case around filler plug and remove plug from side of case. Fill the transmission to the level of the filler opening, as shown below. Reinstall the fill plug and torque to the proper specification.

The exact amount of oil will depend on the transmission inclination and model. Do not over fill-this will cause oil to be forced out of the transmission.

The oil level of the transmission FTS-16112L is around 4.5 gallons.



When adding oil, types and brands of oil should not be mixed because of possible incompability.

Preventive Maintenance

The maintenance items below must be observed to prevent fails in transmission, resulting in unnecessary repairs that are not covered for warranty.

1. **Air System and Connections**

- Check daily for air leaks, worn hoses and air lines; repair immediately.
- If the vehicle has air dehumidification equipment installed check to ensure the system is working correctly. Repair as needed.
- Check and repair air compressor as is needed. The vehicles air compressor can allow oil to enter in the air system if not working properly.

2. **Clutch Housing Mounting**

- Check all capscrews of clutch housing for looseness.

3. **Clutch Release Bearing (Not Shown)**

- Remove hand hole cover and check radial and axial clearance in release bearing.
- Check relative position of thrust surface of release bearing with thrust sleeve on push-type clutches.

4. **Clutch Pedal Shaft and Bores**

- Pry upward on shafts to check wear.
- If excessive movement is found, remove clutch release mechanism and check the bushing and bore and shafts for wear.

5. **Lubricant**

- Change at specified service intervals.
- Use only the types and grades of oils recommended.

6. **Filler and Drain Plugs**

    - Remove filler plugs and check level of lubricant at specified intervals. Tighten fill and drain plugs to proper torque specification.

7. **Capscrews and Gaskets**

    - Check all capscrews, especially those on PTO covers and rear bearing covers for looseness which could cause oil leakage.

8. **Gear Shift Lever Housing**

    - Remove air lines at air valve. Remove the gear shift lever housing assembly from the transmission.
    - Check the tension spring and washer for set and wear.
    - Check the gear shift lever spade pin and slot for wear.
    - Check bottom end of gear shift lever for wear and check slot of yokes and blocks in shift bar housing for wear at contact points with shift lever.

General Inspection

During the lubricate intervals specified by the vehicle chassis manufacturer, check for missing or loose transmission mounting capscrews that attach the transmission to the engine.

Preventive Maintenance