

Roadranger®

Eaton® Fuller® Heavy Duty Transmissions

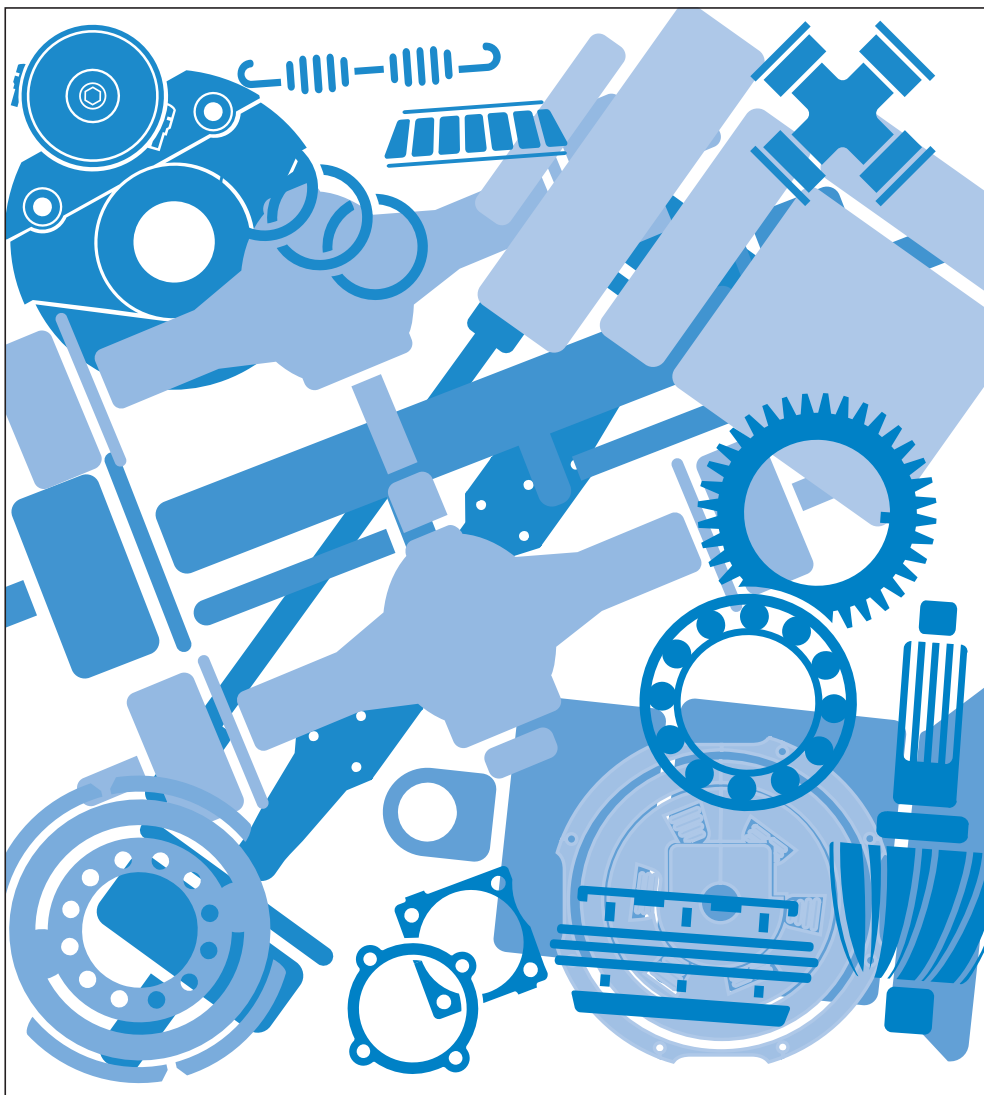
CEEMAT



EAT•N

One Great Drivetrain from Two Great Companies

Drivers Instructions TRDR-0020 April 2004



For the most current information, visit the Roadranger web site at www.roadranger.com

Warnings

Warnings and Cautions



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 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 a 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.

Before operating the PTO, refer to the "Countershaft PTO Operation" section.

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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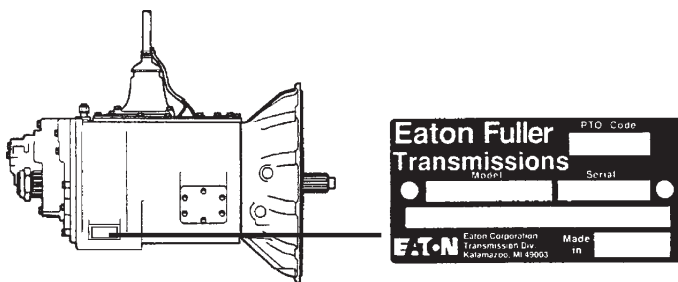
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Reference Numbers

Tag Information

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.



WARNING: Do not remove or destroy the transmission identification tag.

Reference Numbers

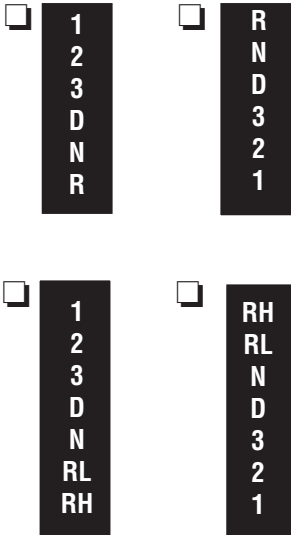
The blank spaces provided below are for recording transmission identification data and part numbers of maintenance items. Have these reference numbers handy when ordering replacement parts or requesting service repairs:

Transmission Model	_____
Transmission Serial Number	_____
Transmission Controller	_____
Software Number	_____
Shift Control	_____
Software Number	_____

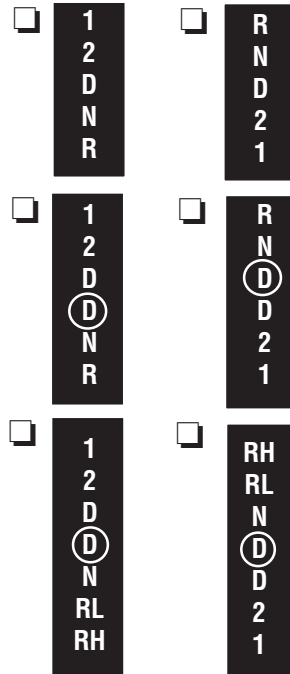
Reference Numbers

Shift Pattern Identification

Electronic Shift Lever Models



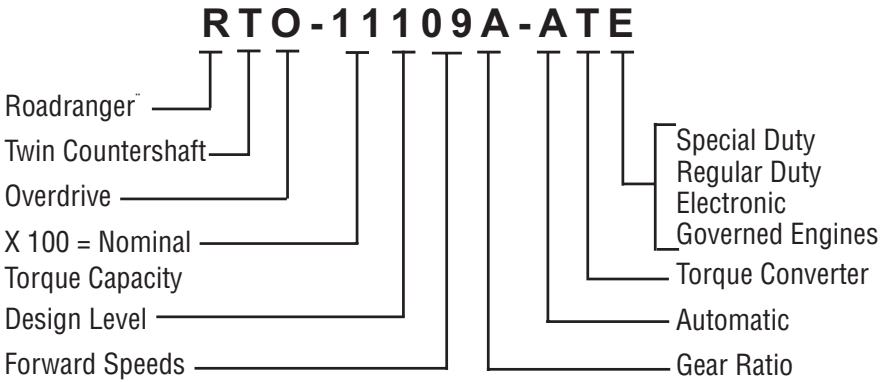
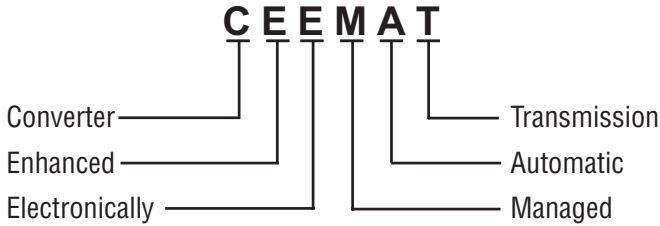
Cable Shift Lever Models



Every effort has been made to ensure the accuracy of all information in this brochure. However, Eaton Corporation makes no expressed or implied warranty or representation based on the enclosed information. Any errors or omissions may be reported to Technical Service, Eaton Corporation, P.O. Box 4013, Kalamazoo, Michigan 49003-4013.

Model Designations

Nomenclature



Overview

The CEEMAT™ is an electronically controlled version of the Eaton® Fuller® 9-speed Roadranger® transmission that shifts itself automatically based on road, load conditions, and operator power demand.

The CEEMAT™ utilizes the following modular components which perform certain functions normally done by the operator of a manual shift transmission.

Torque Converter System

Used instead of a dry clutch, the torque converter provides smooth, controllable starts, as well as offering increased performance through torque multiplication during the start-up.

Synchronizer System

This device is responsible for the rapid upshifts and downshifts of the CEEMAT™. The synchronizer system automatically raises or lowers the input speed during the shift sequence. It mimics what a driver would do while double-clutch shifting a non-synchronized manual transmission.

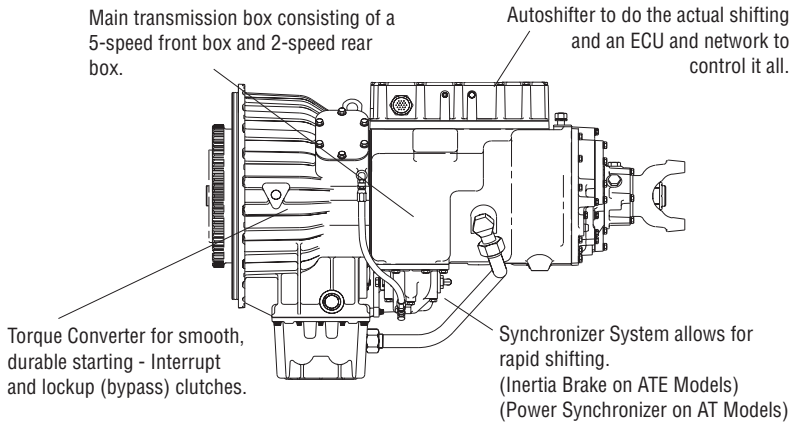
Autoshift System

This electro-pneumatic device takes the place of the manual transmission's gear shift lever and tower, and actually performs the mechanical shifting inside the transmission.

Electronics System

The electronic control unit, or ECU, contains the “brains” of the CEEMAT™. The microprocessor within the ECU receives information from various sensors and input devices such as the throttle position sensor, speed sensors, and shift lever. It then uses the information to send signals to control the synchronizer system, torque converter, and autoshibter.

Operation



Transmission Features

Each of the following features are performed automatically by the transmission.

Engine Overspeed Protection

The upshift inhibit prevents further upshifts from occurring under normal conditions. If the engine exceeds its high limit speed, the transmission upshifts one gear.

Anti Skid

In “emergency” or “panic” stop situations, when the truck's wheels lock-up, the transmission does not upshift or downshift until the service brakes are released and throttle operation is resumed.

Skip Shifts

On steep grades, the transmission may skip down more than one gear. During downshifts, vehicle deceleration is monitored and a target gear is calculated. There may be a brief hesitation, especially if the skip shift must shift both the front section and the auxiliary section. Torque should recover in an appropriate period of time and the gear selected should allow for continuation up the grade.

Shift Shock Protection

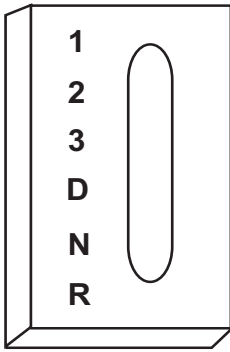
The transmission will not shift into drive or reverse from neutral when the engine is above 1000 RPM's for more than 5 seconds. The operator must reselect neutral and then shift to drive or reverse to resume operation. There is also a maximum speed for shifts from drive to reverse or reverse to drive for driveline shock protection.

Electronic Shift Lever

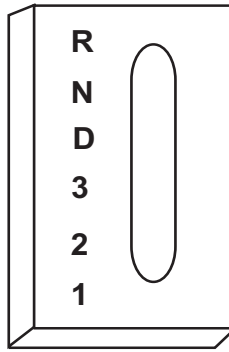
Shift Lever Positions

6-Position Shift Lever

(Choice of 4 Forward Gears)



OR



R - Reverse

N - Neutral

**D - Drive
(Automatic
Shifting)**

3 - Drive (3)

2 - Drive (2)

1 - Drive (1)

Shift Lever Positions Defined:

R - The vehicle travels backwards. The vehicle does not have to be stopped to shift into reverse; however, the shift does not occur until the vehicle road speed is under 3 MPH.

N - Place shift lever in neutral before starting engine. Neutral is used for starting, parking, or any stationary operation. No gear is selected.

D - The transmission selects a forward starting gear and shifts automatically.

3 - When the transmission is in this position and the service brake is depressed, the transmission selects 3rd gear at appropriate speed and stays in 3rd gear until the selector is moved to "D". This position has additional features: upshift inhibiting, optimal engine braking, and increased transmission cooling.

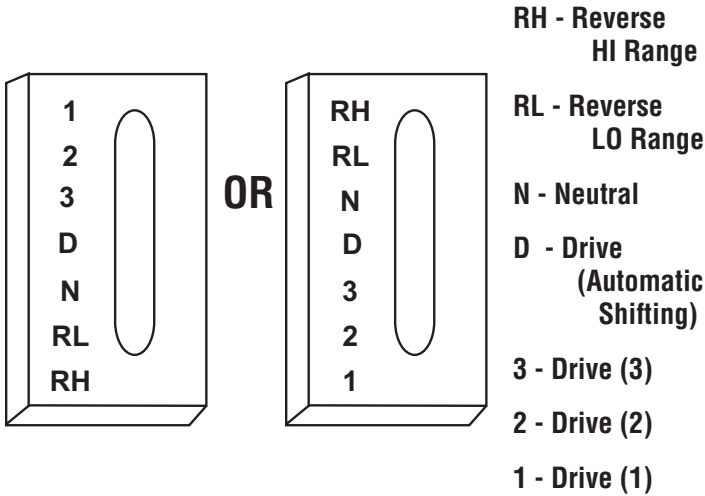
2 - When the transmission is in this position and the service brake is depressed, the transmission selects 2nd gear at appropriate speed and stays in 2nd gear until the selector is moved to 3 or "D". This position has additional features: upshift inhibiting, optimal engine braking, and increased transmission cooling.

1 - When the transmission is in this position and the service brake is depressed, the transmission selects 1st gear at appropriate speed and stays in 1st gear until the selector is moved to 2, 3, or "D". This position has additional features: upshift inhibiting, optimal engine braking, and increased transmission cooling.

Electronic Shift Lever

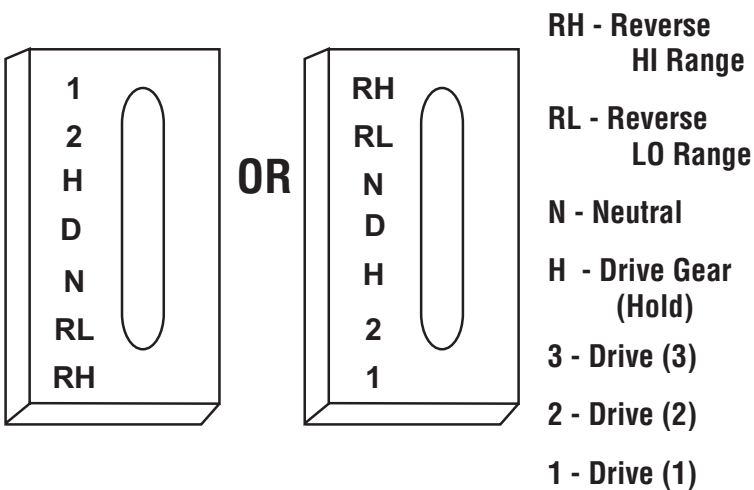
7-Position Shift Lever

(Choice of 4 Forward, 2 Reverse Gears) Option (with Application Approval)



7-Position Shift Lever

(Choice of 4 Forward, 2 Reverse Gears) Option (with Application Approval)



Shift Lever Positions Defined:

RH - The vehicle travels backwards at high speed. The vehicle does not have to be stopped to shift into either reverse; however, the shift does not occur until the vehicle road speed is under 3 MPH. Vehicle must be stopped and service brakes applied to change reverse range.

RL - The vehicle travels backwards at low speed. The vehicle does not have to be stopped to shift into either reverse; however, the shift does not occur until the vehicle road speed is under 3 MPH. Vehicle must be stopped and service brakes applied to change reverse range.

N - Place shift lever in neutral before starting engine. Neutral is used for starting, parking, or any stationary operation. No gear is selected.

D - The transmission selects 4th as the starting gear and shifts automatically between 4th and 9th gears.

H - When stopped and the shift lever is in this position, the transmission selects 3rd gear at stays in 3rd gear until the selector is moved to “D”. This position has an additional feature. When in drive and this position is selected, the transmission will inhibit shifting and will remain in the current gear until road speed is under 3 MPH. When this is achieved, the transmission will select 3rd gear. **Note: Care should be taken using this position to avoid overheating the transmission.**

2 - When the transmission is in this position and the service brake is depressed, the transmission selects 2nd gear at appropriate speed and stays in 2nd gear until the selector is moved to 3 or “D”. This position has additional features: upshift inhibiting, optimal engine braking, and increased transmission cooling.

1 - When the transmission is in this position and the service brake is depressed, the transmission selects 1st gear at appropriate speed and stays in 1st gear until the selector is moved to 2, 3, or “D”. This position has additional features: upshift inhibiting, optimal engine braking, and increased transmission cooling.

Electronic Shift Lever

Driving Tips

- Always select an initial starting gear that provides sufficient reduction for the load and terrain.
- In order to shift from a higher starting gear to a lower starting gear, press the service brakes (example: “3”, press brakes—3rd gear start).
- For normal driving, place the shift lever in D. You should not have to move the shift lever again unless driving conditions change.
- For manual control of upshifts, place lever in “3”, “2” or “1”. When upshift is desired, move shift to D and then back to “3”, “2” or “1”.
- Under severe conditions, for the best operation and increased transmission cooling when driving up a long, steep grade, move the shift to “3”, “2” or “1” from D. Select proper gear before starting uphill.
- To increase downshift points for optimal uphill driving, move the shift lever into “3”, “2” or “1”.
- Never coast with the gear shift lever in the neutral position.
- To inhibit upshifts during downhill driving and for optimal engine braking, move the shift to “3”, “2” or “1”. There will be no further upshifts, except to protect engine from overspeeding. The shift lever can be moved at any speed.
- For maximum downhill engine braking, move the gear selector to “1”, depress the service brake, and operate the vehicle below 3 MPH.
- When driving through adverse conditions, such as deep sand or mud, move the gear selector to “3”, “2” or “1.” To engage these gears while moving, the vehicle must be slowed to less than 3 MPH.
- When parking the vehicle, move the shift lever to “N” and set the parking brake. If you stop on an incline, for safety reasons, block the wheels.
- There is a speed limit on reverse engagements, yet the driver can effectively rock the vehicle by moving the shift lever from reverse to drive and drive to reverse.

Initial Start-Up



WARNING: Before starting a vehicle always be seated in the driver's seat, move the gear select lever to neutral, set the parking brakes.

1. Make sure the select lever is in neutral and parking brake is set.
2. Turn on the key switch, start the engine.

Note: If engine cranks in any other gear than neutral, service your neutral safety start circuit immediately.

3. Allow vehicle air pressure to build to 90 PSI.
4. Apply the service brakes and release the spring brakes.
5. Move the gear select lever to desired gear position.

Automatic Shifting with 6 or 7-Position Shift Lever

- N to D = Selects appropriate starting gear and provides automatic shifting
 - N to H to D = Starts in 3rd gear and shifts through top gear
 - N to 3 to D = Starts in 3rd gear and shifts through top gear
 - N to 2 to D = Starts in 2nd gear and shifts through top gear
 - N to 1 to D = Starts in 1st gear and shifts through top gear
6. Remove your foot from the service brakes. The truck immediately moves.

Electronic Shift Lever

Special Features

Upshift Inhibiting

Where to use: For optimal engine braking, increased cooling.

By moving selector from D to “3”, “2” or “1” there will be no further upshifts, except to protect engine from overspeeding. Downshifts occur at slightly higher speeds. These raised downshift points force the engine to operate within the desired engine torque range and higher RPM's for optimal engine braking. If your vehicle is equipped with an engine brake, this technique enhances its operation. Moving selector back to D resumes normal operation.

Increased Cooling

Where to use: When transmission is too warm

To help cool the transmission, watch the transmission converter outlet temperature gauge. If the gauge reads above 275°F, select shift lever position “3”, “2” or “1” which forces earlier downshifts. If the temperature continues to read too high, operate the transmission in a low gear with high engine RPM. Check for proper lubrication levels. Refer to CEEMAT™ Transmission Lubrication located inside this driver's instruction manual.

Maximum Cooling

Where to use: When transmission is hot (300°F).

For maximum cooling of the transmission, stop the vehicle at a safe location. Select shift lever position “N.” Increase engine RPM's to 1200-1500 until transmission temperature cools. If the temperature continues to read too high, check for proper lubrication levels. Refer to CEEMAT™ Transmission Lubrication located inside this driver's instruction manual.

Forced Downshifts

Where to use: Slight inclines.

Pulling the shift lever to “1”, “2” or “3” from D when in higher gears (3rd- 9th) raises the downshift point. These raised downshift points force the engine to operate within the desired engine torque range and higher RPM's for optimal (non-retarder) engine braking.

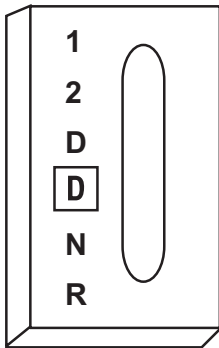
Cable Shift Lever

Cable Shift Lever Positions

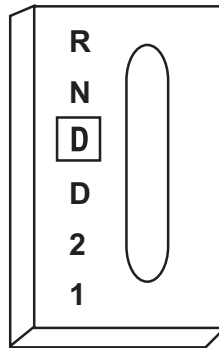
5 & 6-Position Shift Levers

6-Position Shift Lever

(Choice of 4 Forward Gears)



OR



R - Reverse

N - Neutral

D - Drive
(4 through 9)

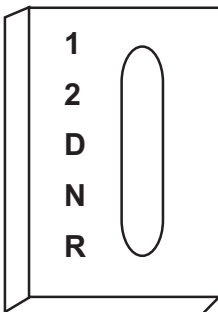
D - Drive
(3 through 8)

2 - Drive (2)

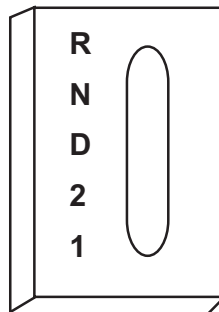
1 - Drive (1)

5-Position Shift Lever

(Choice of 3 Forward Gears)



OR



R - Reverse

N - Neutral

D - Drive
(3 through 9)

2 - Drive (2)

1 - Drive (1)

Cable Shift Lever

Shift Lever Positions Defined

R - The vehicle travels backwards. The vehicle does not have to be stopped to shift into reverse; however, the shift does not occur until the vehicle road speed is under 3 MPH.

N - Place shift lever in neutral before starting engine. Neutral is used for starting, parking, or any stationary operation. No gear is selected.

D with square - The transmission selects 4th as the starting gear and shifts automatically between 4th and 9th gears.

D - The transmission selects 3rd as the starting gear and shifts automatically between 3rd and 8th gears (3rd–9th gears for 5-position shift lever).

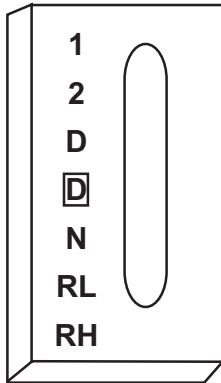
2 - When the shift lever is in this position **and** the service brake is depressed, the transmission selects 2nd gear at appropriate speed and stays in 2nd gear until the selector is moved to “D” or “D with square”. This position has additional features: upshift inhibiting, optimal engine braking, and increased transmission cooling.

1 - When the shift lever is in this position **and** the service brake is depressed, the transmission selects 1st gear at appropriate speed and stays in 1st gear until the selector is moved to 2, “D”, or “D” with square. This position has additional features: upshift inhibiting, optimal engine braking, and increased transmission cooling.

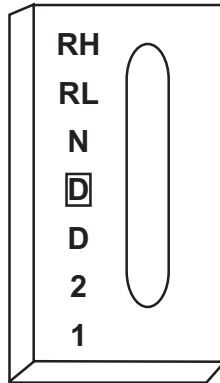
Cable Shift Lever

7-Position Shift Lever

(Choice of 4 Forward, 2 Reverse Gears) Option (with Application Approval)



OR



RH - Reverse
HI Range

RL - Reverse
LO Range

N - Neutral

D - Drive
(4 through 9)

D - Drive
(3 through 8)

2 - Drive (2)

1 - Drive (1)

Cable Shift Lever

Shift Lever Positions Defined

RH - The vehicle travels backwards at high speed. The vehicle does not have to be stopped to shift into either reverse; however, the shift does not occur until the vehicle road speed is under 3 MPH. **Neutral must be selected before reverse range is changed.**

RL - The vehicle travels backwards at low speed. The vehicle does not have to be stopped to shift into either reverse; however, the shift does not occur until the vehicle road speed is under 3 MPH. **Neutral must be selected before reverse range is changed.**

N - Place shift lever in neutral before starting engine. Neutral is used for starting, parking, or any stationary operation. No gear is selected.

D with square- The transmission selects 4th as the starting gear and shifts automatically between 4th and 9th gears.

D - The transmission selects 3rd as the starting gear and shifts automatically between 3rd and 8th gears. The transmission selects a HI range starting gear when shuttle shifted from RH when the service brake is not depressed.

2 - When the shift lever is in this position **and** the service brake is depressed, the transmission selects 2nd gear at appropriate speed and stays in 2nd gear until the selector is moved to "D" or "D with square". This position has additional features: upshift inhibiting, optimal engine braking, and increased transmission cooling.

1 - When the shift lever is in this position **and** the service brake is depressed, the transmission selects 1st gear at appropriate speed and stays in 1st gear until the selector is moved to 2, "D", or "D with square". This position has additional features: upshift inhibiting, optimal engine braking, and increased transmission cooling.

Cable Shift Lever

Driving Tips

- Always select an initial starting gear that provides sufficient reduction for the load and terrain.
- In order to shift from a higher starting gear to a lower starting gear, press the service brakes (example: D to “D with square”, press brakes—3rd gear start).
- For normal driving, place the shift lever in “D with square” for 6 or 7-position shift levers or D for 5-position shift levers. You should not have to move the shift lever again unless driving conditions change.
- For manual control of upshifts, place lever in “2” or “1”. When upshift is desired, move gear selector to D or “D with square” and then back to “2” or “1”.
- Under severe conditions, for the best operation and increased transmission cooling when driving up a long, steep grade, move the gear selector to “2” or “1” from D or “D with square”. Select proper gear before starting uphill.
- To increase downshift points for optimal uphill driving, move the shift lever into “2” or “1”.
- Never coast with the gear shift lever in the neutral position.
- To inhibit upshifts during downhill driving and for optimal engine braking, move the gear selector to “2” or “1”. There will be no further upshifts, except to protect engine from overspeeding. The gear selector can be moved at any speed.
- For maximum downhill engine braking, move the gear selector to “1”, depress the service brake, and operate the vehicle below 3 MPH.
- When driving through adverse conditions, such as deep sand or mud, move the gear selector to “2” or “1.” To engage these gears while moving, the vehicle must be slowed to less than 3 MPH.
- When parking the vehicle, move the shift lever to “N” and set the parking brake. If you stop on an incline, for safety reasons, block the wheels.
- There is a speed limit on reverse engagements, yet the driver can effectively rock the vehicle by moving the shift lever from reverse to drive and drive to reverse.

Cable Shift Lever

Initial Start-Up



WARNING: Before starting a vehicle always be seated in the drivers seat, move the shift lever to neutral and set the parking brakes.

1. Make sure the shift lever is in neutral and parking brake is set.
2. Turn on the key switch, start the engine.



WARNING: If engine cranks in any other gear than neutral, service your vehicle neutral safety start circuit immediately.

3. Allow vehicle air pressure to build to 90 PSI.
4. Apply the service brakes.
5. Move the shift lever to desired gear position.

Automatic Shifting with 6 or 7-Position Shift Lever

- N to "D with square" = Starts in 4th and shifts through 9th
- N to "D with square" = Starts in 3rd and shifts through 8th
- N to D to "D with square" = Starts in 3rd gear and shifts through 9th
- N to 2 to "D with square" = Starts in 2nd gear and shifts through 9th
- N to 1 to "D with square" = Starts in 1st gear and shifts through 9th

Automatic Shifting with 5-Position Shift Lever

- N to D = Starts in 3rd gear and shifts through 9th
 - N to 2 to D = Starts in 2nd gear and shifts through 9th
 - N to 1 to D = Starts in 1st gear and shifts through 9th
6. Release spring brakes with clutch. Remove your foot from the service brakes. The truck immediately moves.

Special Features

Upshift Inhibiting

Where to use: For optimal engine braking, increased cooling.

By moving selector from D or “D with square” to “2” or “1” there will be no further upshifts, except to protect engine from overspeeding. Downshifts occur at slightly higher speeds. These raised downshift points force the engine to operate within the desired engine torque range and higher rpm’s for optimal engine braking. If your vehicle is equipped with an engine brake, this technique enhances its operation. Moving selector back to D or “D with square” resumes normal operation.

Increased Cooling

Where to use: When transmission is too warm.

To help cool the transmission, watch the transmission converter outlet temperature gauge. If the gauge reads above 275°F, select shift lever position “2” or “1” which forces earlier downshifts. If the temperature continues to read too high, operate the transmission in a low gear with high engine rpm. Check for proper lubrication levels. Refer to CEEMAT™ Transmission Lubrication.

Maximum Cooling

Where to use: When transmission is hot (300°F).

For maximum cooling of the transmission, stop the vehicle at a safe location. Select shift lever position “N.” Increase engine rpm’s to 1200-1500 until transmission temperature cools. If the temperature continues to read too high, check for proper lubrication levels. Refer to CEEMAT™ Transmission Lubrication.

Forced Downshifts

Where to use: Slight Inclines.

Pulling the shift lever to “1” or “2” from “D” or “D with square” when in higher gears (3rd-9th) raises the downshift point. These raised downshift points force the engine to operate within the desired engine torque range and higher rpm’s for optimal (non-retarder) engine braking.

Features

Features

PTO Operation

The CEEMAT™ transmission models have been engineered for both 6 bolt and 8 bolt transmission countershaft PTOs, as well as a 6 bolt torque converter housing mounted engine driven PTO's.

Stationary PTO Operation (Transmission in Neutral)

The 6 and 8 bolt transmission countershaft PTOs are normally used in this application.

Place the transmission shift lever in “D” with the engine at idle and the vehicle stopped (this stops the countershaft rotation to allow PTO engagement), select the transmission PTO switch, move the shift lever to “N” for PTO operation. (The countershaft is driven with the torque converter in lockup.)

The 6 bolt torque converter housing mounted engine driven PTO is independent of transmission operation.



WARNING: During stationary operation, for safety reasons, set the parking brakes.

Mobile PTO Operation

Limited Mobile PTO Operation

The 6 and 8 bolt transmission countershaft PTO provides limited mobile operation in the starting gears.

Place the transmission shift lever in “D” with the engine at idle and the vehicle stopped (this stops the countershaft rotation to allow PTO engagement), select the transmission PTO switch. While the PTO is engaged, you can shuttle shift between reverse/neutral/drive if the vehicle speed is under 3 MPH.

Unlimited Mobile Operation

The 6 bolt torque converter housing mounted engine driven PTO is normally used in this application and is independent of transmission operation.

Optional Features

Neutral Output — All Shift Levers

This is a 12v output signal directly from the transmission, which is generated only when the transmission is in neutral. This feature is used extensively in vocational applications where a neutral signal is required to activate or enable a remote throttle.

Quick to Neutral (QTN) — Electronic Shift Lever Only

Sometimes called forced neutral, this function uses a 12v input to the transmission to neutralize the transmission by disengaging the torque converter, leaving the gearbox engaged. Once the signal is switched off, the converter can re-engage. For re-engagement, the engine must be below 1000 rpm and the engagement must be within 5 seconds from release of the brake signal. If this time window is surpassed, the operator must select neutral and then place the lever back in gear. This feature is for special vocational applications where frequent stopping is required without movement of the shift lever. Activation of this circuit is usually controlled by a “enable” switch located on the dash panel. Note that this function is only operational at road speeds below 6 mph.

Auto Neutral — Electronic Shift Lever Only

This feature uses the electronic shifter auxiliary input to neutralize the transmission. This is accomplished when this input is grounded. This function is usually tied into the parking brake via a pressure switch. When the park brake is applied, the input is grounded, thus neutralizing the transmission. To de-activate Auto Neutral, the operator must release the parking brake while the lever is in neutral.

Pump Mode — All

This feature is used in conjunction with split shaft PTO operation. The CEEMAT senses engagement of the PTO via a spare electrical input to the transmission, and thus will engage high range direct gear when the shift lever is placed in “D”.

Trans in Gear Signal — Electronic Shift Lever Only

This output from the electronic shifter, generates a 12v signal when the shifter is in a “non-neutral” position. This signal could be used to activate and alarm or horn relay to warn the driver that an on board control is still active prior to vehicle movement. For example, the dump body is not properly latched or a hydraulic pump is still engaged.

Lubrication

Proper Lubrication

The Key to Long Transmission Life

Proper lubrication procedures are the key to a good all-around maintenance program.

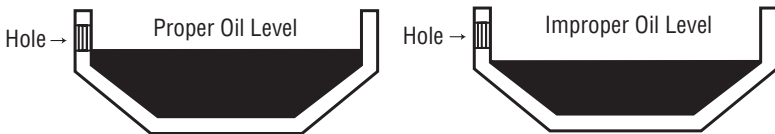
Eaton® Fuller® Transmissions are designed so that the internal parts operate in an oil circulating bath created by the motion of the gears and shafts.

All parts will be properly lubricated if these procedures are closely followed:

- Maintain oil level. Inspect regularly.
- Follow maintenance interval chart.
- Use the correct grade and type of oil.
- Buy from a reputable dealer.

Maintain Proper Oil Level

Make sure oil is level with the filler opening. Being able to reach oil with your finger does not mean oil is at proper level. **(One inch of oil level is about one gallon of oil.)**



For additional lubrication information, see TCMT-0021.

If your vehicle has a transmission oil filter, you must change the filter when fluid or lubricant is changed.

**Additive and friction modifiers must not be introduced.
Never mix engine oils and gear oils in the same transmission.**

The use of lubricants not meeting these requirements will affect warranty coverage.

For a list of Eaton Approved Synthetic Lubricants see TCMT-0020 or call 1-800-826-HELP (4357).

Buy from a reputable dealer

For a complete list of approved and reputable dealers see TCMT-0020 or write to:

Eaton Corporation

Truck Components

Global Marketing Services

P.O. Box 4013

Kalamazoo, MI 49003

www.roadranger.com

Transmission Operating Angles

If the transmission operating angle is more than 12 degrees, improper lubrication will occur. The operating angle is the transmission mounting angle in the chassis plus the percent of upgrade (expressed in degrees).

For operating angles over 12 degrees, the transmission must be equipped with an oil pump or cooler kit to insure proper lubrication.

Lubrication

Operating Temperatures with Oil Coolers

Operating at temperatures above 250° F (120°C) causes loaded gear tooth temperatures to exceed 350°F (177°C) which will ultimately destroy the heat treatment of the gears. Temperatures above 250°F (120°C) should be regarded as a warning of inadequate cooling. If the elevated temperature is associated with unusual operating conditions that will reoccur, a cooler should be added, or the capacity of the existing cooling system increased.

The following conditions in any combination can cause operating temperatures of over 250°F:

- Operating consistently at slow speed.
- High ambient temperatures.
- Restricted air flow around transmission.
- Exhaust system too close to transmission.
- High horsepower operation.

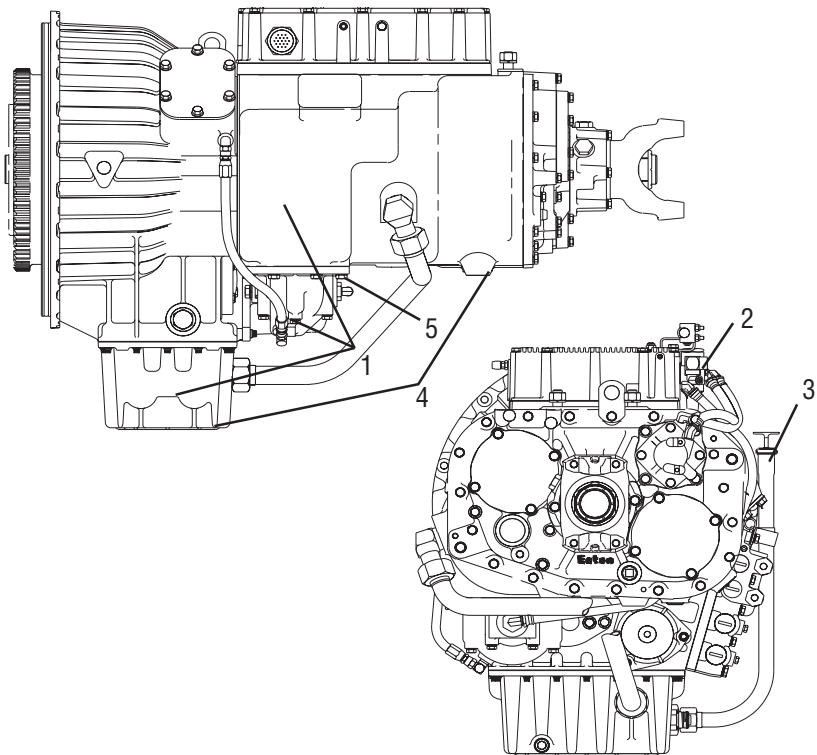
External oil coolers are available to reduce operating temperatures when the above conditions are encountered.

Oil Cooler Chart

Transmission Oil Coolers are:
Recommended
• With engines of 350 H.P. and above.
Required
• With engines 399 H.P. and above and GCW's over 90,000 lbs.
• With engines 399 H.P. and above and 1400 lbs. ft. or greater torque.
• With engines 450 H.P. and above.

Maintenance Checks

Note: Item numbers refer to the illustration.



Preventative Maintenance

1. **Lubricant and Filter**

- Change at specified service intervals.
- Use only the types and grades recommended.
- Check lubrication lines and cooling circuit for leaks.
- Use only genuine Eaton® Fuller® filter elements, when servicing filter.

2. **Air System**

- Annually replace the filter regulator element. If excessive contamination is present, service vehicle air/dryer system. The CEEMAT requires clean, dry air for proper operation. Check vehicle air dryer system regularly for proper operation.

3. **Dipstick**

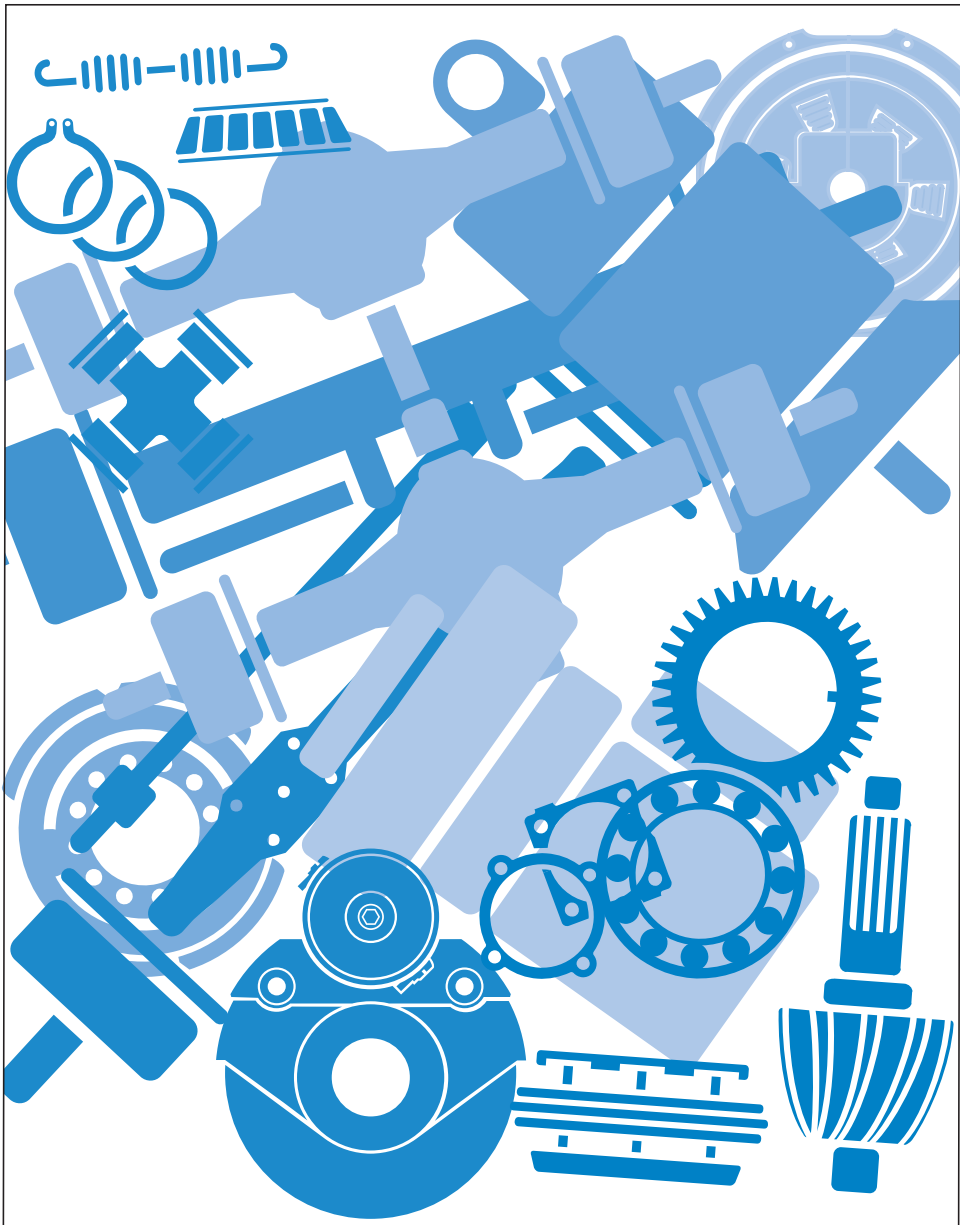
- Monitor oil level.
- Add oil if necessary.
- Tighten dipstick securely.

4. **Drain Plugs**

- Tighten the drain plugs securely. Tighten the main case drain plug to 45-50 lbs. ft. of torque. Tighten oil pan plugs to 14-20 lbs. ft. of torque.

5. **Capscrews and Gaskets**

- Check all capscrews, especially those on the PTO covers and rear bearing covers for looseness which can cause oil leakage. Tighten capscrews to 35-45 lbs. ft. of torque.
- Check PTO opening, oil sump pan/strainer, and rear bearing covers for oil leakage due to faulty gaskets.



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