

Precautions

Cautions & Warnings



Read the entire driver instructions before operating this transmission.

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

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.

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



When towing the vehicle, the output shaft of the transmission must not be allowed to spin or turn. If the vehicle is towed with the drive wheels still in contact with the road surface, the vehicle axle shafts or driveline must be removed or disconnected.

WARNING: Serious internal transmission damage can result from improper vehicle towing.

Correct

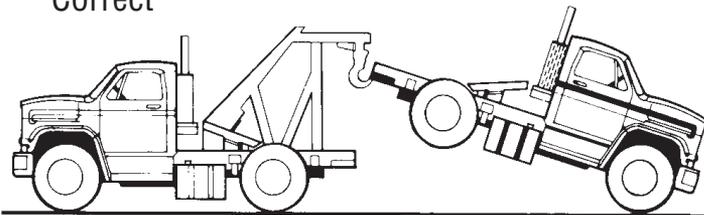


Table of Contents

Introduction

Identification Tag	1
--------------------------	---

Overview

Shift Lever Positions	2
-----------------------------	---

General Information

Shift Controls	3
----------------------	---

Operation

Transmission Features	6
-----------------------------	---

T2 Operation

Basic Operation & Overview	10
----------------------------------	----

Lubrication

Proper Lubrication	13
--------------------------	----

Appendix

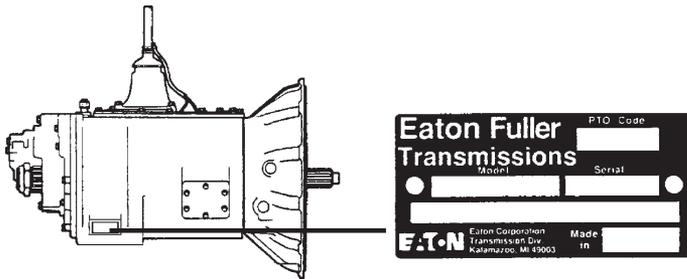
Definitions	15
-------------------	----

Introduction

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 bottom and then locate the numbers as shown.

DO NOT REMOVE OR DESTROY THE TRANSMISSION IDENTIFICATION TAG.

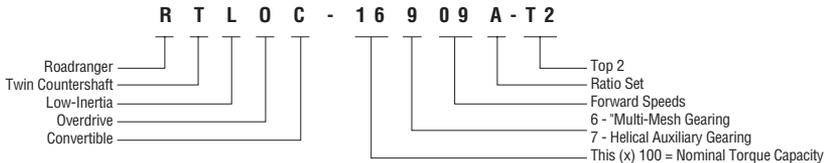


The blank spaces provided below are for recording transmission identification data. Have these reference numbers handy when ordering replacement parts or requesting service information:

Transmission Model _____

Transmission Serial Number _____

Nomenclature



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

Shift Lever Positions

RTLOC-1X909A-T2

Eaton Fuller Transmissions

9 SPEED Top 2

RANGE SELECTOR



HI
R
LO

5
1
3

Neutral

LO

6
2
4

8-9
AUTO

PRE-SELECT ALL RANGE SHIFTS
(MOVE RANGE SELECTOR BEFORE MOVING SHIFT LEVER)

UPSHIFTING
START WITH RANGE SELECTOR DOWN
SHIFT LO-1-2-3-4 RAISE RANGE SELECTOR
SHIFT 5-6-7
8-9 SHIFT IS AUTOMATIC

DOWNSHIFTING
8-9 SHIFT IS AUTOMATIC
SHIFT 5-6-5-6 MOVE RANGE SELECTOR DOWN
SHIFT 4-3-2-1-0

DO NOT CHANGE RANGE WHILE MOVING IN REVERSE

WARNING PUT TRANSMISSION IN NEUTRAL BEFORE STARTING ENGINE

EATON

51482023

RTOC-1X909A

Eaton Fuller Roadranger Transmissions

9 SPEED

RANGE SELECTOR



HI
R
LO

5
1
3

Neutral

LO

6
2
4

8

PRE-SELECT ALL RANGE SHIFTS
(MOVE RANGE SELECTOR BEFORE MOVING SHIFT LEVER)

UPSHIFTING
START WITH RANGE SELECTOR DOWN
SHIFT LO-1-2-3-4 RAISE RANGE SELECTOR
SHIFT 5-6-7-8

DOWNSHIFTING
SHIFT 8-6-5-6 MOVE RANGE SELECTOR DOWN
SHIFT 4-3-2-1-0

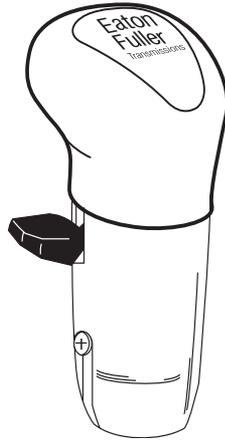
DO NOT CHANGE RANGE WHILE MOVING IN REVERSE

WARNING PUT TRANSMISSION IN NEUTRAL BEFORE STARTING ENGINE

EATON

General Information

Shift Controls



Models in this series provide nine forward speeds and two reverse gears.

The 1st position in the front section is used only as a starting gear. The other four ratios are used once in LO range and once again in HI range.

After shifting out of the 1st position, use the easy Roadranger repeat “H” shift pattern. LO range and HI range are selected with the Range Knob / Range Lever. It is used once during the upshift sequence and once during the downshift sequence.

Always preselect the range shift. After preselection, the transmission will automatically make the synchronizer range shift as the shift lever passes through neutral.

General Information

Gear Ratios - A Ratio

Range	Gear	Ratios 16909	Ratios 18909	% Steps	
HI	8th H	.73	.73	17	AUTO
	8th L	.86	.86	17	AUTO
	7th	1.00	1.00	38	
	6th	1.38	1.38	42	
	5th	1.95	1.94	41	
LO	4th	2.76	2.76	37	
	3rd	3.78	3.78	38	
	2nd	5.21	5.21	42	
	1st	7.37	7.33	42	
	LO	10.50	10.50		
HI	Reverse - HI	2.99	2.99		
LO	Reverse - LO	11.28	11.28		

General Information

Gear Ratios - E Ratio

Range	Gear	Ratios	% Steps
HI	8th	1.00	39
	7th	1.39	40
	6th	1.94	39
	5th	2.70	40
LO	4th	3.78	39
	3rd	5.26	40
	2nd	7.34	39
	1st	10.20	44
	LO	14.71	
HI	Reverse - HI	3.89	
LO	Reverse - LO	14.71	

Transmission Features

Range Shift

The range lever selects LO or HI range. It is used once during an upshift sequence and once during a downshift sequence.

Preselect

IMPORTANT: Always preselect all range and splitter shifts when upshifting or downshifting. Preselection requires that the range lever and/or splitter button are moved to the necessary position before starting the shift.

Preselected range shifts are completed automatically as the lever is moved through neutral and into the next gear. Preselecting all range shifts prevents damage to the transmission and provides for smoother shifts.

Driving Tips

- Always select an initial starting gear that provides sufficient reduction for the load and terrain.
- Always use normal double-clutching procedures when making lever shifts.
- 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 LO gear position when operating in HI range.
- 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.
- Never downshift at too high of a road speed.
- 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 gear.

Operation

Double-Clutching Procedure

When ready to make a shift:

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

* 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 allows the operator to speed up or slow down the mainshaft gearing to properly match the desired gear speed to the output shaft speed.

Initial Start-up



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



CAUTION: Before moving a vehicle, make sure you understand your shift pattern configuration. Somewhere in the vehicle's cab should be a shift label similar to the one in the "Shift Lever Position" section. If not, refer to the "Shift Lever Position" section to order one for your vehicle.

1. Make sure the shift lever is in neutral and the parking brakes are set.
2. Turn on the key and start the engine.
3. Allow the vehicle air pressure to build to the correct level. Refer to your Operations Manual supplied with the truck.
4. Apply the service brakes.
5. Release the parking brakes on the vehicle.
6. Make sure the range lever is down in the LO range position.
7. Depress the clutch pedal to the floor.
8. Move the shift lever to the desired initial gear.
9. Slowly release the clutch pedal and apply the accelerator.

Shifting

In the following instructions, it is assumed that the driver is familiar with operating heavy-duty trucks and tractors, and can coordinate the movement of the shift lever and clutch pedal to make smooth gear engagements while upshifting and downshifting. Always double-clutch when making lever shifts.



CAUTION: Never move the range lever or the splitter control button with the shift lever in neutral while the vehicle is moving.

Operation

Upshifting

Move the shift lever, double-clutching, to the next desired gear position in LO range.

Range Shift - LO to HI Range

When in the last gear position for LO range and ready for the next upshift, pull up the Range lever, double-clutching, to the next higher speed position according to your shift pattern. As the shift lever passes through neutral, the transmission will automatically shift from LO to HI range.



CAUTION: Never move the shift lever to the LO position after HI range preselection, or at any time the transmission is in HI range.

Downshifting

Move the shift lever, double-clutching, to the next desired gear position in HI range.

Range Shift from HI to LO Range

When in the last gear position for HI range and ready for the next downshift, push down the Range lever, double-clutching, to the next lower gear position. As the shift lever passes through neutral, the transmission will automatically shift from HI to LO range.

Continue moving the shift lever, double-clutching, to the next desired gear position in LO range.

T2 Operation

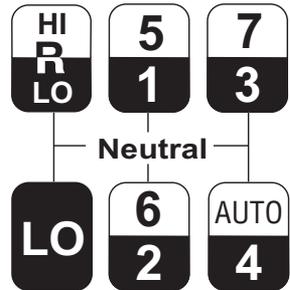
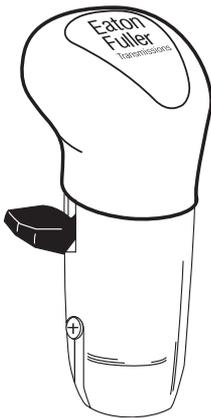
Basic Operation & Overview

RTLOC-1X909A-T2 Models

The 9-speed Top 2 Transmission operates like a normal 9-speed in 1st thru 7th gears. The transmission shifts automatically in the “AUTO” position based on engine speed and load.

When the transmission is in the Top 2 Mode, the system will:

- Shift the transmission between the top two gears automatically.
- Increase or decrease engine speed during a Top 2 shift.
- Momentarily interrupt cruise control or engine brake during the shift.



T2 Operation

Upshift Procedure

1. Upshift the transmission through the shift pattern to 7th position. Double-clutching during lever shifts and breaking torque during button shifts.
2. When the engine has reached the shift point, use the normal double-clutching procedure and move the shift lever into the “AUTO” position.
3. When the engine has reached the shift point, the transmission will automatically shift into top gear.

Downshift Procedure

1. To downshift from top gear: Once the engine has reached the shift point the transmission will automatically downshift.
2. To downshift from “AUTO” position to 7th position, use normal double-clutching procedures.:
 - Once the engine has reached the shift point move the lever to the next lower lever position while double-clutching.
3. Continue downshifting through the shift pattern, double-clutching during lever shifts.



CAUTION: Never move the shift lever to the LO gear position after HI range preselection, or at any time the transmission is in HI range.

Driving Tips

To activate Top 2 mode, the transmission must be shifted from 7th to “AUTO” once the engine has reached the normal shift point. If the operator moves the shift lever into the AUTO lever position below the engine’s normal shift point, the transmission will be in normal 9-speed mode. Once the engine reaches the normal shift point, Top 2 mode will become active.

Throttle position determines the upshift point. Less throttle will lower the shift point. Zero throttle (down hill push) will raise the upshift point. To reset the shift points the engine must drop below its normal shift point.

With the engine brake active, the up and down shift points will be raised.

A feature of Top 2 is ANTI HUNT mode. This is built in to avoid constant upshifts and downshifts. When the shift lever is in the AUTO position and the transmission has just completed an upshift, the downshift point will be lower than normal. If the transmission has just completed a downshift, the upshift point will now be higher than normal.

System Problem

If the system malfunctions, the transmission will typically default to 9-speed mode. For some malfunctions, the system will detect a failure that the operator must allow the Top 2 to **time out**. The time out process takes 9 seconds. During the 9 seconds the Top 2 will try to complete the shift. Once the Top 2 has timed out the operator must place the transmission in neutral to obtain manual 9-speed mode. The Top 2 function will be inactive until the vehicle is stopped and the key is turned off.

In some situations, the system can be reset at a stop by leaving the key off for 10 seconds and then restarting the engine. If this does not clear the problem verify air pressure and check the electrical connections to the Top 2. To help assure operation of the 9-speed Top 2, advise your maintenance personnel of any oil leaks, above normal operating temperatures, unusual noises, fault codes, or if the transmission is not operating correctly.

Lubrication

Proper Lubrication

Proper lubrication procedures are key to a good all-around maintenance program. If the lubricant is not doing its job or if the lubricant level is ignored, all the maintenance procedures in the world are not going to keep the transmission running or assure long transmission life.

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

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

1. Maintain lubricant level and inspect regularly.
2. Follow maintenance interval chart.
3. Use the correct grade and type of lubricant.
4. Buy lubricant from an approved dealer.

Mixing of Oil Types



CAUTION: Never mix engine oils & gear oils in the same transmission.

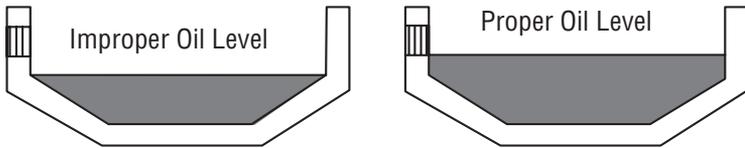
Engine oils and gear oils may not be compatible; mixing can cause breakdown of the lubricant and affect component performance. When switching between types of lubricants, all areas of each affected component must be thoroughly flushed.

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

Note: Additives and friction modifiers must not be introduced.

Proper Transmission Lubrication Level

Make sure the transmission lubricant is level with the bottom of the fill opening. Being able to reach the lubricant with your finger does not mean the lubricant is at the proper level. (On heavy duty transmissions, one inch of lubricant level equals about one gallon of lubricant.)



If the transmission operating angle is more than 12 degrees, improper lubrication can occur. The operating angle is the transmission mounting angle in the chassis plus the grade (expressed in degrees).

Any time the transmission operating angle of 12 degrees is exceeded for an extended period of time, the transmission must be equipped with an oil pump or cooler kit to insure proper lubrication.

For additional lubrication information, see TCMT-0021.

Lube Change Intervals

Lubricant changes should be based on a combination of the intervals shown in TCMT-0021 Roadranger Products Lubrication Manual, and user judgement based on the application and operating environment. Extending drain intervals beyond those shown in the tables is not recommended and will put warranties at risk.

Note: The first lube change for a Line-Haul vehicle may be extended to 500,000 miles (800,000 km) when a new transmission has been factory filled with a lube that is Eaton approved for 500,000 miles (800,000 km) (E-500, PS-164).

Note: Vocational service applications are those which require components to be consistently operated at heavy loads, in contaminated environments or on steep grades. For these applications, the Vocational Service section should be used.

Appendix

Definitions

Auto Position	When the shift lever is in the position labeled “AUTO”. This position is where the top 2 gears are located.
Break Torque	Releasing engine power or load from the transmission and drivetrain.
Double-Clutch	The shifting technique used when moving the shift lever to the next lever position. Procedures: Depress clutch, move lever to neutral, let up clutch, accelerate or decelerate engine to obtain synchronous, depress clutch pedal again, and move lever into gear.
Synchronous	The point at which the input gearing speed (engine) matches output gearing speed (road speed) and a shift can occur without grinding.
Top 2 Mode	The state where the transmission automatically shifts between the top two gears.

Appendix