

Endurant™ 12-Speed Automated Transmission TRDR0950 EN-US

April 2019



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SUPPORT

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Warnings and Cautions

The alert symbol, signal words (**DANGER**, **WARNING** and **CAUTION**) and statements throughout this manual indicate the potential severity of a situation. Ensure to read, understand and follow each statement to avoid vehicle damage, component damage, personal injury, severe injury and/or death.



DANGER: Indicates an immediate hazard. Failure to follow the indicated procedures will cause major vehicle component damage, severe injury or death.



WARNING: Indicates an immediate hazard. Failure to follow the indicated procedures may result in major vehicle component damage, severe injury or death.



CAUTION: Indicates a potential hazard. Failure to follow the indicated procedures could result in minor or moderate component damage and/or personal injury.

The **NOTICE** and **Note** statements through out this manual provide additional details required to avoid damaging a component or incorrectly completing a repair. Ensure to read, understand and follow each statement to properly complete a repair.

NOTICE: Indicates component or property damage could result if you do not follow the indicated procedure.

Note: Indicates additional detail that will aid in the repair of a component.

General Information



WARNING: Ensure to read, understand and follow each statement outlined below. Failure to read, understand and follow each statement outlined below may result in major vehicle component damage, property damage, severe injury or death.

- Read the entire driver instructions before operating this transmission.
- If engine cranks in any gear other than Neutral, service vehicle immediately.
- Before starting a vehicle always be seated in the driver's seat, select "N" on the Transmission Driver Interface Device, and set the vehicle parking brake.
- Before working on a vehicle, parking the vehicle, or leaving the cab with the engine running, place the transmission in Neutral, set the vehicle parking brake, and chock the wheels.
- Always depress and hold the service brake prior to selecting a gear position from Neutral.
- Always ensure that fuel is at a sufficient operating level before operating vehicle. A loss of engine power could result in diminished transmission operation.
- Do not release the vehicle parking brake or attempt to select a gear from Neutral until the vehicle air pressure is at the normal operating range.

General Information



CAUTION: Ensure to read, understand and follow each statement outlined below. Failure to read, understand and follow each statement outlined below could result in component damage.

- Before operating the PTO, refer to “Transmission Power Take Off Operation.”
- Prior to any type of welding on a vehicle equipped with this transmission disconnect the battery cables (+ and -).

Railroad Grade Crossing Requirements: It is a requirement that the driver of a commercial vehicle specified under paragraph A sections 1-6 of FMCSA regulation 392.10 need only cross railroad grade crossings in a gear that permits the vehicle to complete the crossing without a change of gears. Select MANUAL Mode on the Transmission Driver Interface Device to hold a gear while crossing a railroad grade, refer to “MANUAL Mode” on page 13.

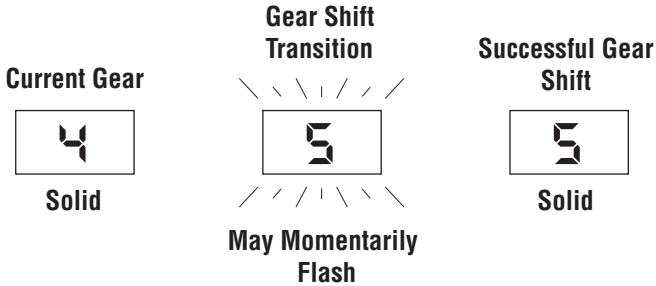


WARNING: Failure to select MANUAL Mode to hold a gear while crossing a railroad grade could result in major vehicle component damage, property damage, severe injury or death.

Operation

Display

The Display indicates the current gear position of the transmission. During an upshift or downshift the display may momentarily flash the target gear position.



The "DASH" indicates the transmission cannot achieve Neutral.



"CA" will appear in the display if a clutch abuse event is occurring.



"AN" will appear in the display if the transmission goes into Auto Neutral.



"CC" will appear in the display when the transmission is performing a clutch calibration.



Operation

Low Transmission Air Message: Allow the vehicle air system to reach normal operating range prior to transmission operation. Ensure the vehicle air system is operating and maintained per OEM guidelines.

NOTICE: If the low transmission air message is indicated, allow the engine to idle, shutting off the engine prolongs the condition. In most cases the transmission will recover and towing the vehicle is not required.

Clutch Temperature Message: Safely and immediately discontinue the operation that is being performed which is causing increased clutch temperature - depress and hold the service brake or apply the vehicle parking brake and idle the engine until the message is no longer indicated.

NOTICE: If the clutch temperature message is indicated, allow the engine to idle, shutting off the engine prolongs the condition. In most cases the transmission will recover and towing the vehicle is not required.

Note: If the low transmission air and/or clutch temperature message is indicated, and the condition no longer exists, some vehicle displays may require a manual reset to clear the message. Refer to OEM guidelines regarding the message reset procedure.

Transmission Driver Interface Device Modes

The Transmission Driver Interface Device is an OEM component. Refer to the OEM for more information on operation of the Transmission Driver Interface Device including Engine Brake settings.

R	Selects Reverse
N	Selects Neutral, used for Start-Up and Power Down
D	Selects Drive
MANUAL	Selects MANUAL mode
LOW	Selects LOW mode
Upshift/Downshift Requests	Used to select upshifts and downshifts and to change start gear

Note: The system may override or prevent an upshift/downshift request or automatically initiate a gear change based on vehicle conditions, refer to “Transmission MANUAL/LOW Override” on page 15.

Operation

Start-Up and Power Down

Start-Up

1. Turn ignition key to On and allow the transmission to power-up.

Note: Engine cranking is delayed until the transmission power-up is complete and the display shows a solid “N”. If Neutral, “N”, is not shown in the display, ensure that the vehicle air system is in the normal operating range before attempting to start the vehicle.

2. Start the engine.
3. Allow vehicle air system pressure to build to normal operating range.
4. Depress and hold the service brake.

Note: If the service brake is not depressed prior to selecting a start gear, the initial start gear request will be denied. If the initial start gear was denied, select Neutral, depress and hold the service brake and re-select the desired mode.

5. Select the desired mode and start gear on the Transmission Driver Interface Device.

Note: The system may override or prevent an upshift/downshift request or automatically initiate a gear change based on vehicle conditions, refer to Transmission MANUAL/LOW Override section.

6. Release the vehicle parking brake.

Power Down

1. Safely come to a complete stop.
2. Continue to depress and hold the service brake.
3. Select Neutral on the Transmission Driver Interface Device. A solid "N" in the vehicle gear display indicates Neutral has been achieved.

NOTICE: Neutral should always be achieved before initiating a power down except in cases of an emergency.

4. Set the vehicle parking brake.



WARNING: Apply vehicle parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement and may result in major vehicle component damage, property damage, severe injury or death.

5. Key off

Neutral Mode

- Selects Neutral.
- Initial Gear position after Start-Up.



WARNING: Apply vehicle parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement and may result in major vehicle component damage, property damage, severe injury or death.

Note: When attempting to start the engine and the engine does not crank, confirm Neutral is selected, vehicle parking brake is applied and service brake is depressed.

Reverse Mode

- Select Reverse.

Note: If the service brake is not depressed prior to selecting a mode from Neutral, the mode request will be denied. If the mode request was denied, select Neutral, depress and hold the service brake and reselect the desired mode.

- The driver may manually select the Reverse start gear using the upshift/downshift request with the Transmission Driver Interface Device, if the system allows. The system automatically selects the Reverse start gear based on vehicle operating conditions.
- If vehicle speed is greater than 2 MPH, the system will not allow engagement into Reverse.

Note: The system may override or prevent an upshift/downshift request or automatically initiate a gear change based on vehicle conditions, refer to Transmission MANUAL/LOW Override section.



CAUTION: Do not depress and hold the accelerator pedal and service brake pedal at the same time during a launch (two footing). Two footing during a launch may cause the vehicle and cab to rock and bounce resulting in component damage, property damage and/or personal injury.

Drive Mode (Auto Mode)

- Selects Drive.
- Smart Gear Selection automatically selects the appropriate gear based on vehicle operating conditions such as, load, grade, and axle ratio.
- Drive is the recommended mode for optimal vehicle performance while driving.

Note: If the service brake is not depressed prior to selecting a mode from Neutral, the mode request will be denied. If the mode request was denied, select Neutral, depress and hold the service brake and reselect the desired mode.

- The driver may manually select the Drive start gear using the upshift/downshift request with the Transmission Driver Interface Device, if the system allows. The system automatically selects the Drive start gear based on vehicle operating conditions.
- The driver may request a gear change while driving using the upshift/downshift request with the Transmission Driver Interface Device when the system is near the shift point. Multiple gear upshifts and downshifts may be allowed, each upshift/downshift request equals one gear change.

Note: The system may override or prevent an upshift/downshift request or automatically initiate a gear change based on vehicle conditions, refer to Transmission MANUAL/LOW Override section.



CAUTION: Do not depress and hold the accelerator pedal and service brake pedal at the same time during a launch (two footing). Two footing during a launch may cause the vehicle and cab to rock and bounce resulting in component damage, property damage and/or personal injury.

MANUAL Mode

MANUAL Mode is available to manually select a gear instead of letting Smart Gear Selection (Drive Mode) select the gear automatically.

- The system holds the current gear until the driver initiates an upshift/downshift request with the Transmission Driver Interface Device.
- The driver may manually select the gear using the upshift/downshift request with the Transmission Driver Interface Device. Multiple gear upshifts and downshifts may be allowed, each upshift/downshift request equals one gear change.

Note: The system may override or prevent an upshift/downshift request or automatically initiate a gear change based on vehicle conditions, refer to Transmission MANUAL/LOW Override section.

Note: Drive is the recommended mode for optimal vehicle performance while driving.

MANUAL/Hold Mode Gear

Hold Mode Gear can be configured to limit the use of MANUAL Mode. When Hold Mode Gear is configured to a gear number, MANUAL Mode becomes a hold gear function only. The default setting for this feature is Disabled and can be configured in the Transmission Control Module (TCM) using ServiceRanger.

- If MANUAL Mode is selected and the transmission is in a gear equal to or greater than the configured Hold Mode Gear; the transmission remains in the current gear, upshift/downshift requests with the Transmission Driver Interface are ignored and an audible tone may be emitted every 10 seconds.
- If MANUAL Mode is selected and the transmission is in a gear less than the configured Hold Mode Gear; the transmission allows standard MANUAL Mode operation.

Note: The system may automatically initiate a gear change based on vehicle operating conditions, refer to Transmission MANUAL/LOW Override section.

LOW Mode

LOW mode is available to maximize engine braking and minimize the use of the brake pedal, for example, when driving down long grades or when coming to a stop.

- If LOW Mode is selected while stationary the system shifts to 1st gear, upshift/downshift requests with the Transmission Driver Interface are ignored.
- If LOW Mode is selected while moving, the system will not upshift. The system will downshift at the earliest opportunity to enable higher engine RPM to provide maximum engine braking.



WARNING: On slippery surfaces minimize engine braking in LOW mode. Excessive engine braking at higher engine RPM may cause a loss of traction and vehicle control and may result in major vehicle component damage, severe injury or death.

Note: The system may automatically initiate a gear change based on vehicle operating conditions, refer to Transmission MANUAL/LOW Override section.

Transmission MANUAL/LOW Override

The transmission system may automatically override or prevent driver mode requests and upshift/downshift requests based on vehicle operating conditions. If the system overrides a request an audible tone may be emitted.

- If the transmission is being back driven and the engine is approaching a higher than normal RPM level, the system will override the MANUAL request or LOW Mode and perform an upshift.

NOTICE: The system initiates upshifts for engine overspeed protection.

- If the start gear is changed and it causes the engine to lug at a launch, the system will override the MANUAL request and select the appropriate gear.

Transmission Power Take Off Operation

The transmission Power Take Off (PTO) feature is available for Stationary PTO operation in Neutral and Mobile PTO operation in Drive (2nd or 4th) and Reverse (R2). Gear selection for Mobile PTO operation in Drive is automatically selected by the transmission based on grade, load and vehicle weight. All transmissions are equipped with a bottom mount 8-Bolt PTO opening. An optional Dual PTO Transmission with a rear mount 4-Bolt PTO opening is also available.

NOTICE: The default setting for this feature is Disabled unless Enabled at the OEM. The Transmission Control Module (TCM) must be configured for PTO operation using ServiceRanger. Failure to properly install the PTO and configure the TCM for PTO operation results in component damage.

PTO Operation

To engage the PTO:

1. Ensure the vehicle is at a complete stop.
2. Select Neutral Mode.
3. Depress and hold the service brake for Mobile PTO operation.
4. Set the vehicle parking brake for Stationary PTO operation.



WARNING: Apply vehicle parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement and may result in major vehicle component damage, property damage, severe injury or death.

Operation

5. Switch the transmission PTO switch to On.

Note: PTO is engaged when the PTO indicator lamp is illuminated and/or display message is indicated.

- For Stationary PTO operation, raise engine RPM as required to operate PTO.
- For Mobile PTO operation, select Forward or Reverse Mode as required for vehicle movement.

To disengage the PTO:

1. Ensure the vehicle is at a complete stop.
2. Depress and hold the service brake.
3. Switch the transmission PTO switch Off.

Snow/Ice Operation

- This transmission is designed to work in coordination with the vehicle's traction control system to ensure optimal operation. However, if the driver observes low friction road conditions (rain, ice, snow, etc.) and does not want the transmission to shift, risking wheel slippage, the driver may select MANUAL mode. MANUAL mode holds the current gear position, under most operating conditions, until the driver uses the Upshift/Downshift request or selects Drive mode. Once road conditions improve, the driver should select Drive mode.

Trailer Operation

Trailer Connecting and Sliding Trailer Axle

- Prior to backing under the trailer, ensure proper trailer height.
- Select the lowest available start gear for Drive (1st) and Reverse (R1).
- Refer to trailer manufacture guidelines for unlocking, sliding and locking the trailer axles.

Note: If repeat attempts are made and the automated clutch starts to overheat, the display may indicate “CA” (Clutch Abuse) and an audible tone may be emitted.

Features

Hill Start Aid

Hill Start Aid (HSA) momentarily requests the vehicle brake system to keep the foundation brakes applied after the service brake is released when stopped on a grade. This feature allows the driver to transition from the service brake pedal to the accelerator pedal for a controlled launch on grades.

The feature may be disabled for one launch by selecting the vehicle's HSA switch. When the HSA switch is selected, the lamp on the switch flashes indicating the feature is disabled. The feature automatically enables after a successful launch.

The default setting for this feature is Enabled and can be configured in the Transmission Control Module (TCM) using ServiceRanger to activate on a 1%, 2% or 3% grade.

Vehicle Facing Uphill – Forward Mode

1. Vehicle must be on incline greater than the configured grade and in a forward mode.
2. Bring vehicle to a stop and depress the service brake then release the service brake to launch the vehicle.



WARNING: HSA requests the vehicle to apply the foundation brakes for approximately 3 seconds. Vehicle may begin to move backward after the vehicle foundation brakes are released if the accelerator pedal is not depressed or the service brake pedal is not re-applied. Failure to depress the accelerator pedal or re-apply the service brake pedal after the vehicle foundation brakes are released may cause unintended vehicle movement and may result in major vehicle component damage, property damage, severe injury or death.

Vehicle Facing Downhill - Reverse Mode

1. Vehicle must be on a decline greater than the configured grade and in a reverse mode.
2. Bring vehicle to a stop and depress the service brake then release the service brake to launch the vehicle.



WARNING: HSA requests the vehicle to apply the foundation brakes for approximately 3 seconds. Vehicle may begin to move forward after the vehicle foundation brakes are released if the accelerator pedal is not depressed or the service brake pedal is not re-applied. Failure to depress the accelerator pedal or re-apply the service brake pedal after the vehicle foundation brakes are released may cause unintended vehicle movement and may result in major vehicle component damage, property damage, severe injury or death.

Clutch Abuse Protection

The clutch can overheat and slip with improper use. When Clutch Abuse Protection is active "CA" is indicated in the display and an audible tone may be emitted with an Amber Warning or Red Stop lamp.

- Safely and immediately discontinue the operation that is being performed which is causing increased clutch temperature:
 - Depress and hold the service brake or apply the vehicle parking brake and idle the engine until Clutch Abuse Protection goes inactive.

NOTICE: Allow the engine to idle, shutting off the engine prolongs the condition. In most cases the transmission will recover and towing the vehicle is not required.

NOTICE: When Clutch Abuse Protection is active and clutch abuse continues the system opens the clutch and takes away throttle control to allow the clutch temperature to decrease. During Clutch Abuse Protection events only 1st and R1 gear launches are allowed and Urge to Move and Creep mode may be disabled.

Follow the recommendations below to avoid increased clutch temperature:

- During low speed maneuvering, select the lowest available start gear for Drive (1st) and Reverse (R1).
- During operation on a grade:
 - Rely on Hill Start Aid (HSA) when transitioning from the service brake pedal to the accelerator pedal.
 - Avoid using the accelerator pedal to hold the vehicle on a grade - depress and hold the service brake pedal until vehicle movement is required.

Engine Overspeed Protection

- The transmission system will upshift if necessary to prevent engine overspeed in Drive, MANUAL and LOW modes.

Shuttle Shifting

- Shuttle shifting is available between a forward or reverse mode if the vehicle speed is approximately 2 MPH or less.

Smart Gear Selection

- Smart Gear Selection will automatically select the start gear depending on inputs such as grade, load, and vehicle weight.
- The start gear selection can be changed using the upshift/downshift request, however, if the selected mode is inappropriate for the conditions, the request will be denied and an audible tone may be emitted.
- Skip shifting is available when the transmission determines grade, vehicle weight, engine torque and driver demand are within the allowable limits (maximum 2 gears).

Auto Neutral

- The transmission system will automatically shift to Neutral if the vehicle is left in forward or reverse mode and the parking brake is set.
- “AN” will appear in the display. The driver must then select the desired forward or reverse mode with the service brake applied.

Operation

Load Based Shifting

- The transmission system constantly monitors the vehicle conditions and adapts the shift points to ensure the appropriate gear ratio is requested.

Coast Mode

- Coast Mode prevents the transmission from downshifting through each lower gear when coasting to a stop. When the transmission system determines the vehicle is coasting the transmission shifts to Neutral once the transmission is below the configured Coast Down Gear. This allows the transmission and vehicle to smoothly roll to a stop. Once the vehicle is stopped, the transmission shifts into the appropriate start gear. If the driver depresses the accelerator pedal during a Coast Mode event the transmission shifts into the appropriate gear based on the vehicle operating conditions. The Coast Down Gear is configured in the Transmission Control Module (TCM) using ServiceRanger.

Neutral Coast Mode

Neutral Coast Mode allows the transmission to disengage the driveline by pulling out of gear on slight downhill grades, where little to no engine power is required, when the vehicle is in cruise control and the transmission is in Drive mode. This feature is Enabled at the OEM.

- When Neutral Coast Mode is active, the engine will drop to idle speed and the transmission will disengage.
- The gear display may flash a gear number or indicate Neutral when Neutral Coast Mode is active, depending upon specific OEM implementation.

Operation

- If a flashing number is indicated in the gear display, this represents the gear that the transmission will select when it is necessary to engage a gear.
- The transmission will exit Neutral Coast Mode and reengage an appropriate gear under any of the following conditions:
 - Driver depresses service brake pedal
 - Driver depresses accelerator pedal
 - Cruise control is canceled
 - A mode other than Drive is selected
 - Driver performs upshift/downshift requests
 - Cruise high or low set speeds are exceeded
 - Maximum vehicle grade is exceeded
 - Request by an adaptive cruise system
- Various brand names may be used for Neutral Coast systems.

Operation

Urge to Move (AutoLaunch)

Urge to Move allows the vehicle to automatically start moving when the transmission is in gear and the driver releases the service brake. After the vehicle has launched the transmission system will transition to Creep Mode. This feature is useful for stop and go applications allowing the vehicle to launch and creep without applying the accelerator pedal.

Creep Mode

Creep allows the vehicle to be driven at a constant speed at engine idle without the need to apply the accelerator pedal. Upshifts and downshifts can be requested to increase or decrease vehicle speed if the conditions are appropriate. This feature is useful for slow speed applications where steady vehicle speed is required.

Transmission Oil Display Message

The Fluid Pressure Sensor monitors the transmission oil lubrication system pressure. If the Transmission Control Module (TCM) is configured with ServiceRanger and the Fluid Pressure Sensor reports low oil, a transmission low oil message is displayed and an audible tone may be emitted.

If the transmission low oil message is displayed, perform the following as soon as possible or transmission damage may occur:

1. Continue to drive the vehicle to the nearest safe location.
2. Select Neutral on the Transmission Driver Interface Device.
3. Set the vehicle parking brake.



WARNING: Apply vehicle parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement and may result in major vehicle component damage, property damage, severe injury or death.

4. Turn ignition key to Off and allow the engine to shut down.
5. Contact a service facility to have the transmission system evaluated.

Service and Maintenance

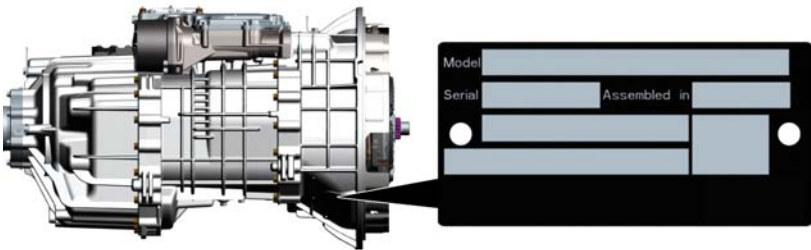
General Model Information

Serial Tag and Model Nomenclature

Transmission identification information is stamped on the serial tag located on the lower right side of the clutch housing.

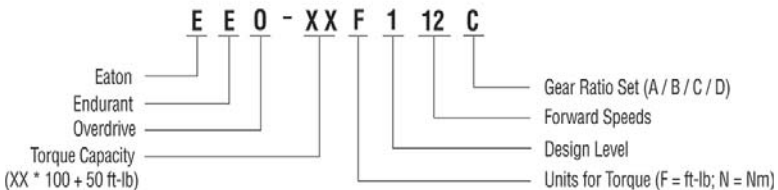
When calling for service assistance or parts, have the model and serial numbers handy.

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



Model Number

The model number gives basic information about the transmission and is explained below.



Serial Number

The serial number is the sequential identification number of the transmission.

Note: Record the Transmission Model and Serial Numbers in the blank spaces provided below.

Transmission Model _____

Transmission Serial Number _____

Troubleshooting

Diagnostics

In the event there is a problem with the transmission, there are three primary tasks the driver should perform:

1. Note the driving condition under which the problem occurred.
2. Note the condition of the transmission under which the problem occurred (i.e. operation mode (Drive, MANUAL, LOW), current gear, engine speed, etc.).
3. Transmission Reset Procedure.

Transmission Reset Procedure

In some cases, proper transmission operation can be restored by “resetting” the Transmission Control Module (TCM). Use the following procedure to reset the TCM.

1. Continue to drive the vehicle to a safe location.
2. Select Neutral on the Transmission Driver Interface Device.

Note: Once Neutral is selected, a gear engagement may not be allowed depending on the nature of the problem.

3. Place the Transmission Driver Interface Device in Neutral “N”.
4. Set the vehicle parking brake.



WARNING: Apply vehicle parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement and may result in major vehicle component damage, property damage, severe injury or death.

5. Turn ignition key to Off and allow the engine to shut down.
6. Wait at least 2 minutes.
7. Restart the engine.
8. If the problem continues, contact a service facility to have the vehicle and transmission system evaluated.

Service and Maintenance

Transmission Air Supply

For optimal performance, the transmission requires a nominal air supply operating range between 90 psi (620 kPA) and 130 psi (896 kPA). Air supply outside this range can result in degraded or complete loss of transmission engagement and shift capabilities.

Note: Vehicle air quality is important for transmission system operation. Refer to OEM guidelines for vehicle air and filter system maintenance.

Proper Transmission 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.

Transmission internal 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.

Lubrication Specifications

Use only Eaton approved lubricant. For information, see TCMT0021 *Eaton Lubrication Product Specification Manual*.



CAUTION: Failure to use the approved lubricant will affect the transmission performance and the warranty coverage.



CAUTION: Additives and/or friction modifiers are not approved. Additives of any kind will affect the transmission performance and the warranty coverage.

For a list of Eaton approved lubricant suppliers, see TCMT0020 *Eaton Approved Lubricant Suppliers Lubrication Guide*.

Transmission Oil Level Inspection Procedure

1. Park vehicle in a safe area on level ground.
2. Key off.
3. Set vehicle parking brake and chock wheels.



WARNING: Apply vehicle parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement and may result in major vehicle component damage, property damage, severe injury or death.

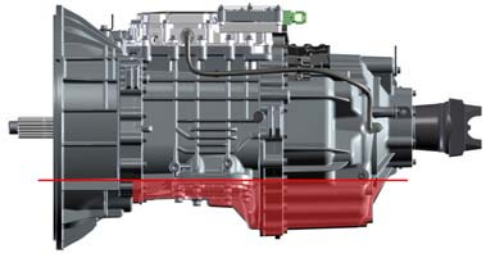
4. Locate the transmission check plug on the left side of the rear housing.
5. Place a suitable container under the Oil Check Plug and remove the check plug with a 6 mm hex key.
6. Oil level is correct when a small amount of oil runs out of the Oil Check Plug hole.

Note: If oil level is low, check for leaks (repair if necessary) and reference TRSM0950 Oil Fill Procedure.

7. Inspect the Oil Check Plug and O-ring for damage. If damaged, replace the Oil Check Plug; O-ring is serviced with plug.
8. Install the Oil Check Plug and torque to 24.5-29.5 Nm (18-22 lb-ft).



NOTICE: Do not over-torque the Oil Check Plug or transmission damage may occur.



CAUTION: Do not operate the transmission at an operating angle greater than 12° (approximately a 21% grade) or improper lubrication will occur causing damage to the transmission. The operating angle is the transmission mounting angle in the chassis plus the percent of upgrade (expressed in degrees)


Transmission Lubrication Change Intervals

Lubricant changes should be based on the intervals shown in TCMT0021 *Eaton Lubrication Product Specification Manual*. Extending drain intervals beyond those indicated are not recommended and will affect the transmission performance and the warranty coverage.

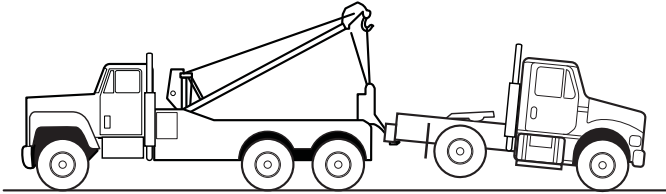
Service and Maintenance

Vehicle Towing

When towing the vehicle, do not allow the output shaft of the transmission to rotate. 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 prior to towing vehicle.

 **CAUTION:** Failure to follow the Vehicle Towing procedure will result in transmission damage and voids the transmission warranty.

Preferred



Must remove vehicle axle shafts or driveline prior to towing



Limited Driveline-Connected Towing

In an urgent situation, the vehicle may be towed after specific vehicle and transmission requirements are met at a limited road speed and distance with the driveline connected and the drive wheels in contact with the road surface.



CAUTION: Failure to follow the Limited Driveline-Connected Towing requirements listed below will result in transmission damage and voids the transmission warranty.

Vehicle and Transmission Requirements:

- Vehicle air pressure greater than 90 psi (620 kPa)
- Neutral (N) selected on the vehicle's transmission shift device
- Solid neutral (N) indicated in the vehicle's transmission shift device display
- Solid neutral (N) indicated in the vehicle's transmission gear display
- Key off

Limited Towing Speed and Distance Requirements:

- Road speed less than 25 mph (40 km/h)
- Distance less than 0.25 mile (0.40 km)

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For spec'ing or service assistance, call 1-800-826-HELP (4357) or visit www.eaton.com/roadranger. In Mexico, call 001-800-826-4357.

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