

PACCAR TRANSMISSIONS



Operator's Manual 12 Speed

Safety

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This manual illustrates and describes the operation of features or equipment which may be either standard or optional on this vehicle. This manual may also include a description of features and equipment which are no longer available or were not ordered on this vehicle. Please disregard any illustrations or descriptions relating to features or equipment which are not on this vehicle. PACCAR reserves the right to discontinue, change specifications, or change the design of its vehicles at any time without notice and without incurring any obligation. The information contained in this manual is proprietary to PACCAR. Reproduction, in whole or in part, by any means is strictly prohibited without prior written authorization from PACCAR Inc.


Chapter 1 | SAFETY

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Using this Manual

Please take the time to get acquainted with your vehicle by reading this Operator's Manual. We recommend that you read and understand this manual from beginning to end before you operate this equipment. This manual contains useful information for the safe and efficient operation of this equipment. It also provides service information, with an outline for performing safety checks and basic preventive maintenance inspections. We have tried to present the information you'll need to learn about functions, controls, and operation—and to present it as clearly as possible. We hope you'll find this manual easy to use. There will be times when you need to take this manual out of the glovebox. When you do, please be sure to return it when you are finished using it. That way it will be there when you need it the next time or when you pass the vehicle on to the next user.

	NOTE
<p>After you've read this manual, it should be stored in the cab for convenient reference and remain with this truck when sold.</p>	

Your vehicle may not have all the features or options mentioned in this manual. Therefore, you should pay careful attention to the instructions that pertain to just your vehicle. In addition, if your vehicle is equipped with special equipment or options not discussed in this manual, consult your dealer or the manufacturer of the equipment. There are several tools built into this manual to help you find what you need quickly and easily. First is the Quick Table of Contents. Located at the front of the manual, this lists the main subjects covered and gives section numbers where you can find these subjects. Use the Quick Table of Contents to find information on a large subject like "Maintenance." Cross-referenced citations also help you get the information you need. If some other part of the manual contains further information on the subject you are reading about, we'll

indicate that in a cross-reference like this: (See [Safety Alerts](#) on page 5). You won't have to go searching for more information. Finally you'll find a helpful Subject Index. It's in the back of the manual and alphabetically lists the subjects covered. So if you want information on brakes, for example, just look under Brake in the Subject Index. You'll find all the pages listed where brakes or braking are discussed. All information contained in this manual is based on the latest production information available at the time of publication. Kenworth Truck Company Peterbilt Motors Company reserves the right to make changes at any time without notice.

Safety Alerts

Please read and follow all of the safety alerts contained in this manual. They are there for your protection and information. These alerts can help you avoid injury to yourself, your passengers and help prevent costly damage to the vehicle. Safety alerts are highlighted by safety alert symbols and signal words such as "WARNING",

“CAUTION”, or “NOTE”. Please DO NOT ignore any of these alerts.

Warnings



The safety message following this symbol and signal word provides a warning against operating procedures which could cause death or injury. They could also cause equipment or property damage. The alert will identify the hazard, how to avoid it and the probable consequence of not avoiding the hazard.



WARNING

Hot engine oil can be dangerous. You could be burned. Let the engine oil cool down before changing it. Failure to comply may result in death, personal injury, equipment or property damage.

Cautions



The safety message following this symbol and signal word provides a caution against operating procedures which could cause equipment or property damage. The alert will identify the hazard, how to avoid it, and the probable consequence of not avoiding the hazard.



CAUTION

Continuing to operate your vehicle with insufficient oil pressure will cause serious engine damage. Failure to comply may result in equipment or property damage.

Notes



The message following this symbol and signal word provides important information that is not safety related but should be followed. The alert will highlight things that may not be obvious and is useful to your efficient operation of the vehicle.



NOTE


Pumping the accelerator will not assist in starting the engine.

Illustrations

Some of the illustrations throughout this manual are generic and will NOT look exactly like the engine or parts used in your application. The illustrations can contain symbols to indicate an action required and/or an acceptable or NOT acceptable condition. The illustrations are intended to show repair or replacement procedures. The procedure will be the same for all applications, although the illustration may differ.

General Safety Instructions

Important safety notices about operating and servicing your engine.

	WARNING
Improper practices, carelessness, or ignoring any warnings may cause death, personal injury, equipment or property damage.	


Before performing any repair, read and understand all of the safety precautions and warnings. The following is a list of general safety precautions that must be followed to provide personal safety. Failure to follow these instructions may cause death or injury. Special safety precautions are included in the procedures when they apply.

Keep in mind that even a well maintained vehicle must be operated within the range of its mechanical capabilities and the limits of its load ratings. See the Weight Ratings label on the driver's door edge. Every new vehicle is designed to conform to all Federal Motor Vehicle Safety

Standards applicable at the time of manufacture. Even with these safety features, continued safe and reliable operation depends greatly upon regular vehicle maintenance. Follow the maintenance recommendations found in Preventive Maintenance section. This will help preserve your investment. Make sure your vehicle is in top working condition before heading out on the road, it is the responsible driver's duty to do so. Inspect the vehicle according to the Driver's Check List.

- Use the proper tool for manually rotating the engine. DO NOT attempt to rotate the crankshaft by pulling or prying on the fan. This practice can cause death, personal injury, equipment damage, or damage to the fan blades, causing premature fan failure.
- Work areas should be dry, well lit, well ventilated, free from clutter, loose tools, parts, ignition sources and hazardous substances.
- Wear protective glasses and protective shoes when working.
- DO NOT wear loose-fitting or torn clothing. Tie back and/or tuck in long hair. Remove all jewelry when working.

- Before beginning any repair, disconnect the battery (negative [-] cable) and discharge any capacitors.
- Put a "DO NOT OPERATE" tag in the operator's compartment or on the controls.
- Allow the engine to cool before slowly loosening the coolant filler cap to relieve the pressure from the cooling system.

	WARNING
Removing the fill cap on a hot engine can cause scalding coolant to spray out and burn you badly. If the engine has been in operation within the previous 30 minutes, be very careful in removing the fill cap. Protect face, hands, and arms against escaping fluid and steam by covering the cap with a large, thick rag. DO NOT try to remove it until the surge tank cools down or if you see any steam or coolant escaping. In any situation, remove the cap very slowly and carefully. Be ready to back off if any steam or coolant begins to escape.	

- Always use wheel chocks or proper jack stands to support the vehicle or vehicle components before performing any service work. DO NOT work on anything that is supported only by lifting jacks or a hoist. Before resting a vehicle on jack stands, be sure the stands are rated for the load you will be placing on them.
- Before removing or disconnecting any lines, fittings, or related items, relieve all pressure in the air, oil, fuel, and cooling systems. Remain alert for possible pressure when disconnecting any device from a system that contains pressure. High pressure oil or fuel can cause death or personal injury.
- Always wear protective clothing when working on any refrigerant lines and make sure that the workplace is well ventilated. Inhalation of fumes can cause death or personal injury. To protect the environment, liquid refrigerant systems must be properly emptied and filled using equipment that prevents the release of refrigerant gas. Federal law requires capturing and recycling refrigerant.
- When moving or lifting any heavy equipment or parts, make sure to use proper techniques and assistance. Ensure all lifting devices such as chains, hooks, or slings are in good condition and are of the correct load capacity. Make sure all lifting devices are positioned correctly.
- Corrosion inhibitors and lubricating oils may contain alkali. DO NOT get the substance in eyes and avoid prolonged or repeated contact with skin. DO NOT swallow. If ingested, seek immediate medical attention. DO NOT induce vomiting. In case of contact, immediately wash skin with soap and water. In case of harmful contact, immediately contact a physician. Always keep any chemicals OUT OF REACH OF CHILDREN.
- Naptha and Methyl Ethyl Ketone (MEK) are flammable materials and must be used with caution. Follow the manufacturer's instructions to ensure safety when using these materials. Always keep any chemicals OUT OF REACH OF CHILDREN.
- When working on the vehicle, be alert for hot parts on systems that have just been turned off, exhaust gas flow, and hot fluids in lines, tubes, and compartments. Contact with any hot surface may cause burns.
- Always use tools that are in good condition. Make sure you have the proper understanding of how to use the tools before performing any service work. Use only genuine replacement parts from PACCAR.
- Always use the same fastener part number (or equivalent) when replacing items. DO NOT use a fastener of lesser quality if replacements are necessary. (e.g., Do not replace a 10.9 grade with 8.8 grade fastener.)
- Always torque fasteners and fuel connections to the required specifications. Overtightening or under-tightening can allow leakage.
- Close the manual fuel valves prior to performing maintenance and repairs, and when storing the vehicle inside.
- DO NOT perform any repair when impaired, tired, fatigued or after

- consuming alcohol or drugs that can impair your functioning.
- Some state and federal agencies in the United States of America have determined that used engine oil can be carcinogenic and can cause reproductive toxicity. Avoid inhalation of vapors, ingestion, and prolonged contact with used engine oil.
- DO NOT connect the jump starting or battery charging cables to any ignition or governor control wiring. This can cause electrical damage to the ignition or governor.
- Coolant is toxic. If not reused, dispose of coolant in accordance with local environmental regulations.

**CAUTION**

Corrosive chemicals can damage the engine. DO NOT use corrosive chemicals on the engine. Failure to comply may result in equipment, or property damage.

California Proposition 65 Warning

- Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.
- The catalyst substrate located in the Diesel Particulate Filter (DPF) contains vanadium pentoxide, which has been determined by the State of California to cause cancer. Always wear protective clothing and eye protection when handling the catalyst assembly. Dispose of the catalyst in accordance with local regulations. If catalyst material gets into the eyes, immediately flood eyes with water for a minimum of 15 minutes. Avoid prolonged contact with skin. In case of contact, immediately wash skin with soap and water. In case of harmful contact, immediately contact a physician.
- Other chemicals in this vehicle are also known to the State of California to cause cancer, birth defects or other reproductive harm.
- Battery posts, terminals, and related accessories contain lead

and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Warnings and Cautions**A Special Word About Repairs****WARNING**

Do not attempt repair work without sufficient training, service manuals, and the proper tools. You could be killed or injured, or you could make your vehicle unsafe. Do only those tasks you are fully qualified to do.



WARNING

Modifying your vehicle can make it unsafe. Some modifications can affect your vehicle's electrical system, stability, or other important functions. Before modifying your vehicle, check with your dealer to make sure it can be done safely. Improper modifications can cause death or personal injury.



CAUTION

The installation of electronic devices to the On Board Diagnostics (OBD) connector, the vehicle Controller Area Network (CAN), or their associated wiring is not permitted. Doing so can adversely affect vehicle performance and/or cause fault codes to be recorded. The OBD connector is provided for temporary connection of service tools and for diagnostic purposes only.

Your dealer's service center is the best place to have your vehicle repaired. You can find dealers all over the country with the equipment and trained personnel to get

you back on the road quickly—and keep you there.

Your vehicle is a complex machine. Anyone attempting repairs on it needs good mechanical training and the proper tools. If you are sure you have these requirements, then you can probably perform some repairs yourself. However, all warranty repairs must be performed by an authorized service facility. If you aren't an experienced mechanic, or don't have the right equipment, please leave all repairs to an authorized service facility. They are the ones equipped to do the job safely and correctly.

Maintenance Manuals

If you do decide to do any complex repair work, you'll need the maintenance manuals. Order them from your authorized dealer. Please provide your Chassis Serial Number when you order, to be sure you get the correct manuals for your vehicle. Allow about four weeks for delivery. There will be a charge for these manuals.

Final Chassis Bill of Material

A complete, non-illustrated computer printout listing of the parts used to custom-build your vehicle is available through the

dealer from whom you purchased your vehicle.

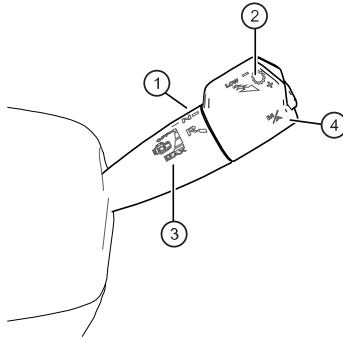
Chapter 2 | DRIVING

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Controls on the Right Hand of the Steering Column

This vehicle may be equipped with the PACCAR Transmission. The lever on the right hand side of the steering column will operate the transmission functions in addition to operating the engine brake.

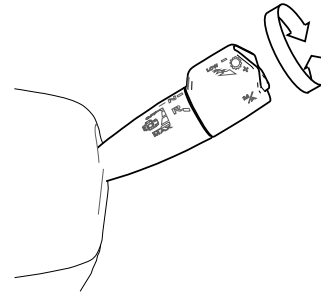


- 1 Transmission **D - N - R** Function
- 2 Up (+) and Down (-) Shift and **Low** Mode

- 3 Engine Brake and **Max** Mode
- 4 Manual (**M**) / Automatic (**A**) Mode Button

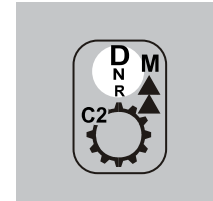
Related concepts
Related tasks

Drive Neutral Reverse Selector

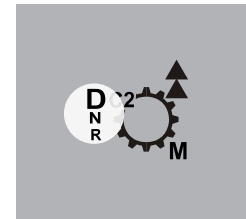


Transmission mode is selected by rotating the lever's outer knob. There is a detent for **Drive, Neutral, Reverse**. The instrument cluster will display the corresponding mode.

For Kenworth Vehicles



For Peterbilt Vehicles





NOTE

Selector (the transmission) must be in **N** (Neutral) to start the truck.

Neutral Mode

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



WARNING

Apply parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement resulting in death, serious injury or damage to property.



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

- Reverse mode selects the default Reverse gear.



NOTE

If the driver attempts to select a non-neutral mode without depressing the service brakes the transmission will not shift into gear and you will have to return to Neutral and depress the service brakes before selecting the desired mode again.

- Each time Reverse is selected from Neutral, the default Reverse gear is engaged.

Drive Mode (Auto Mode)

- Intelligent Start Gear Selection will automatically select the start gear depending on inputs such as, load, grade, and axle/transmission ratio. This start gear can be changed by using the up/downshift request procedure, as long as the selection still falls into a gear that would allow the vehicle to launch without

causing damage to the transmission.



NOTE

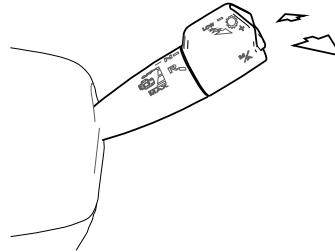
If the driver attempts to select a non-neutral mode without depressing the service brakes the transmission will not shift into gear. The driver must re-select Neutral and depress the service brakes before selecting the desired mode again.

- If the start gear is changed using the up/downshift request procedure, it will remain as the default until the vehicle is powered down or the selection is changed. However, conditions such as, grade, may still override the default start gear selection.
- A shift can be advanced by using the up/downshift request procedure when the transmission is near the shift point.

**NOTE**

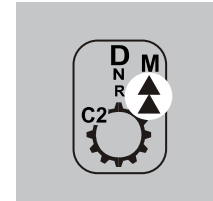
Multiple gear upshifts and downshifts may be allowed when the up/downshift request procedure is performed multiple times (Each request equals one gear change request).

- The transmission may also deny a shift while ascending or descending grades if the load of the vehicle and grade of the terrain in combination with the drivetrain ratio and engine torque will fall outside of the acceptable range to perform a shift. If the shift is denied it will sound a tone.

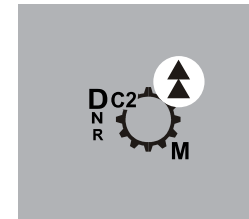
Up or Down Shifting

When in the Manual mode, the transmission gears can be manually selected by pushing or pulling on the lever. Pushing the lever forward will down shift. Pushing and holding the lever forward will engage the LOW gear range. Pulling the lever towards the driver will upshift the transmission. Some vehicles may have a feature that prompts the operator to shift for optimal fuel economy.

For Kenworth Vehicle with Shift Assist



For Peterbilt Vehicles with Shift Assist



If the prompt appears in the instrument cluster, use the manual gear selector lever to change gears.

The instrument cluster will illuminate with the corresponding gear.



Gear Display



LOW Mode

LOW mode should be used any time you want 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.

- Selects lowest available gear for start gear. The starting gear cannot be changed in LOW mode.



NOTE

If the driver attempts to select a non-neutral mode without depressing the service brakes the transmission will not shift into gear. The driver must re-select Neutral and depress the service brakes before selecting the desired mode again.

- If LOW is selected while moving, the transmission will not upshift (except for the Transmission Override conditions noted on the previous page). The transmission system will downshift at the earliest opportunity to enable higher than normal engine RPM to provide maximum engine braking.



WARNING

On slippery surfaces minimize engine braking in LOW mode. Excessive engine braking at higher engine RPM could cause a loss of traction and vehicle control.



NOTE

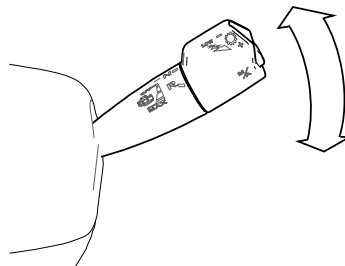
The PACCAR Automated Transmission initiates upshifts from MANUAL and LOW for engine overspeed protection.

How to Deactivate MAX Mode

Vehicles with automated transmissions will have the engine brake function integrated with the transmission controls. Follow these steps to deactivate **MAX** engine brake mode.

1. Accelerate with the throttle pedal.
2. Upshift, see [Up or Down Shifting](#) on page 15.
3. Wait for the transmission coast down gear to engage.

4. Reduce engine brake level, see [Engine Brake Operation for a Vehicle with Automated Transmission](#) on page 17.
5. Re-initiate **MAX** mode, see [Engine Brake Operation for a Vehicle with Automated Transmission](#) on page 17.
6. Select Neutral **N**, see [Drive Neutral Reverse Selector](#) on page 13.
7. Select **LOW** mode, see [Engine Brake Operation for a Vehicle with Automated Transmission](#) on page 17.



Position	Amount of Engine Brake
4*	100% AND will engage transmission low gear
	* This position is momentary and will revert back to position 3 when the lever is released.

The corresponding engine brake level (or MAX mode) will be illuminated in the instrument cluster.

Engine Brake Operation for a Vehicle with Automated Transmission

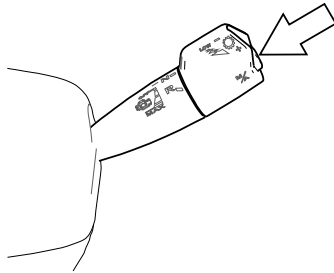
Moving the lever clockwise will engage the engine brake. Increase the amount of engine brake by moving the lever further clockwise. Each position has a corresponding level of engine brake.

Position	Amount of Engine Brake
Off	0 %
1	33%
2	66%
3	100%

2

Related tasks

Using the Manual - Automatic Button



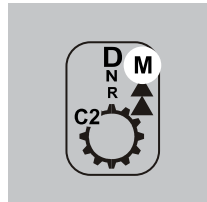
This button will put the transmission into manual mode. Manual mode will allow the operator to select the gear. See [Up or Down Shifting](#) on page 15.

To activate, put the gear selector in the **D** (drive) mode and then depress the **M/A** button. The instrument cluster will display the corresponding selection.

For Peterbilt Vehicles



For Kenworth Vehicles



MANUAL Mode

MANUAL mode should be used whenever the driver wants to select the shifts instead

of letting the transmission select them automatically.

- Driver manually selects the start gear and uses the up/downshift request to shift.

i NOTE

Multiple gear upshifts and downshifts may be allowed when the up/downshift request procedure is performed multiple times (Each request equals one gear change request).

- If the driver attempts to select a non-neutral mode without depressing the service brakes the transmission will not shift into gear. The driver must re-select Neutral and depress the service brakes before selecting the desired mode again.
- System holds current gear unless otherwise prompted by using up/downshift request, except for the "Transmission Manual Override" conditions noted below.

**NOTE**

For optimal vehicle performance, it is recommended the vehicle be operated in "D" Drive mode.

Transmission Manual Override

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

**NOTE**

The transmission initiates upshifts from MANUAL and LOW for engine overspeed protection.

If the start gear is changed and it causes the engine to lug at takeoff, the transmission system will override the MANUAL position and select the best available gear.

Start-Up and Power Down

Start-Up

1. Ensure **N**, Neutral, is selected on the Transmission Driver Interface Device.

**NOTE**

The transmission will not allow the engine to crank if a mode other than Neutral is selected, on Transmission Driver Interface Device, when attempting to start the engine.

2. Turn the ignition key to "ON" and allow the PACCAR Automated Transmission to power-up.

**NOTE**

Engine cranking is delayed until the transmission power-up is complete and the gear display shows a solid **N**. If Neutral, **N**, is not shown in the gear display, ensure that the vehicle air sys-

tem is at normal operating range before attempting to start the vehicle.

3. Start the engine.
4. Allow vehicle air system pressure to build to normal operating range.
5. Apply service brake.

**NOTE**

If the service brake is not applied while selecting a starting gear, the initial start gear will not be engaged and the driver will have to reselect Neutral and press the brake while re-selecting the desired mode.

6. Select the desired mode and starting gear on the Transmission Driver Interface Device.

**NOTE**

The transmission will override inappropriate start gear selections to avoid driveline damage.

7. Release the vehicle parking brakes.
8. Release service brake and Urge to Move will allow the vehicle to

automatically launch and creep at constant engine idle.

- Upshifts and downshifts can be made while at constant engine idle by utilizing the up/downshift request procedure. The transmission may deny a shift and sound a tone if the load of the vehicle or grade of the terrain falls outside the acceptable range to perform a shift.

Power Down

1. Select **N** Neutral on the Transmission Driver Interface Device.
 - If gear display does not show solid **N**, neutral has not yet been obtained.



NOTE

Neutral should always be reached before initiating power down, except in cases of emergency.

2. Set the vehicle parking brakes.



WARNING

Apply parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement resulting in death, serious injury or damage to property.

3. Turn ignition key to **OFF** and allow the engine to shut down.

Transmission Power Take Off (PTO)

The transmission may have a PTO installed. Engaging the PTO differs if it is operating in either a mobile or a stationary application.

Stationary PTO Operation

The transmission countershaft PTO is used in this application. To engage the PTO for stationary operation, perform the following steps:

1. Bring the vehicle to a complete stop and apply the parking brake.



WARNING

Apply parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement resulting in death, serious injury or damage to property.

2. Select “N” on the Transmission Driver Interface Device.
3. Select the transmission PTO switch.
4. Raise engine speed as required to operate PTO.



NOTE

Use the transmission PTO switch to disengage the PTO.

Mobile PTO Operation

The transmission countershaft PTO is used in this application and provides limited mobile operation in the start gears. To engage the PTO for mobile operation, perform the following steps:

1. Bring the vehicle to a complete stop and depress the service brake.
2. Select "N" on the Transmission Driver Interface Device.
3. Select the transmission PTO switch.
4. Select "Drive" or "Reverse" as required for vehicle movement.
5. Release the service brake to engage the clutch and the PTO.
6. Raise engine speed as required to operate PTO.

**NOTE**

Use the transmission PTO switch to disengage the PTO.

Snow/Ice Operation

The PACCAR Automated Transmission is designed to work in coordination with the ATC system to ensure optimal operation. However, if the driver observes low friction road conditions (snow, rain, ice, etc.) and does not want the transmission to shift, risking wheel slippage, the driver should

select MANUAL mode. MANUAL mode holds the current gear position under most operating conditions- the transmission will only shift when the driver uses the up/downshift request. Once road conditions improve, the driver should revert back to Drive mode.

Trailer Operation

Trailer Connecting

- Prior to backing under the trailer, ensure proper trailer height.
- Use Low mode (1st gear) for forward direction and Reverse (R1) for reverse direction.

Sliding Trailer Axle

- Ensure axle rails and locks are properly maintained.
- Follow proper procedure for unlocking and sliding the trailer axles.
- Use Low mode (1st gear) for forward direction and Reverse (R1) for reverse direction.

- Avoid repeat attempts if the sliding axle is not moving.

**NOTE**

If repeat attempts are made and the automated clutch starts to overheat, the display will indicate "CA" along with a warning tone.

Features

Hill Start Aid Operation (HSA)

Hill Start Aid defaults to the "On" position. In PACCAR Automated Transmissions, it can be turned "Off" by pressing and releasing the Hill Start Aid switch, however, it will turn back on after the first successful launch. If the switch is turned off, the lamp in the Hill Start switch will flash. The grade at which Hill Start Aid is active is defaulted to 1% but can be configured to activate on a 2% or 3% grade.

Vehicle Facing Uphill – Forward Mode

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



WARNING

Apply the vehicle service brakes or launch the vehicle using the accelerator pedal after Hill Start Aid releases. Failure to do so could result in unintended vehicle movement resulting in death, serious injury or damage to property.

Vehicle Facing Downhill - Reverse Mode

1. Vehicle must be on a decline greater than 1% and in Reverse mode.
2. Bring vehicle to a stop and depress the service brakes then release the service brakes to launch the vehicle.



WARNING

Apply the vehicle service brakes or launch the vehicle using the accelerator pedal after Hill Start Aid releases. Failure to do so could result in unintended vehicle movement resulting in death, serious injury or damage to property.

Clutch Abuse Protection



CAUTION

The PACCAR Automated Transmission clutch can overheat and slip with improper use.

- DO select the lowest possible start gear for the application. If moving slowly is required, select 1st or R1.
- DO use the Service Brakes and let Hill Start Aid assist you when launching on an incline.
- Do NOT use the accelerator pedal to hold the vehicle on an incline. (Use Service Brakes).
- Do NOT use the accelerator pedal to stop roll back on an incline after

Hill Start Aid disengages. (Use Service Brakes and then relaunch).

- If the PACCAR Automated Transmission clutch does start to overheat, the display will show "CA" along with a warning tone. If "CA" is active in the gear display, immediately discontinue the operation that is being performed which is causing the clutch to overheat.
- If the driver continues abusive operation, the system will either open the clutch if the accelerator pedal is not applied or close the clutch if the accelerator pedal is applied.
- If the abuse continues, the system will open the clutch and take away accelerator pedal control for a short period of time to allow the clutch to cool down. Urge to Move may be inoperable when the clutch is overheated.

Engine Overspeed Protection

- The transmission system will upshift if necessary to prevent

engine overspeed in Drive, MANUAL and LOW modes.

Shuttle Shifting

- Shuttle shifting from Reverse to any forward mode is only allowed if the vehicle speed is approximately zero.

Intelligent Start Gear Selection

- Intelligent Start Gear Selection will automatically select the start gear depending on inputs such as load, grade and axle/transmission ratio.
- The start gear selection can be changed using the up/downshift request, however, if the selection requested could cause damage or engine lugging the request will be denied and an audible tone will sound.

Skip Shifting

- The Automated Transmission will shift multiple gears at one time (skip shift) with moderate to high accelerator pedal input while in Drive mode, up to 8th gear.

Auto Neutral

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

Load Based Shifting

- The transmission system will adapt to the conditions of the vehicle to change the shift points based on the followings inputs:
 - Vehicle grade
 - Engine RPM
 - Accelerator pedal position
 - Vehicle load
- After changing loads or powering up the transmission system needs to relearn these inputs for the first few shifts to make the proper adjustments.

Coast Mode

- When coasting to a stop, in Drive mode, on level terrain the

transmission system may not downshift into lower gears. This allows the transmission to coast to a stop.

Cruise Control

- This transmission system is compatible with cruise control.

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.

- 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.
- 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:
 - Vehicle brakes are applied
 - Driver depresses accelerator pedal
 - Cruise control is canceled
 - A mode other than Drive is selected
 - Driver performs up/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.

Urge to Move

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 vehicle will creep

at a constant speed at engine idle without the need to apply the accelerator pedal. The configuration is useful for stop and go applications allowing the vehicle to launch and creep without applying the accelerator.

Creep Mode

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

Chapter 3 | MAINTENANCE


3

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What is a Maintenance Program?

Preventive maintenance program begins with the daily checks. Routine vehicle checks can help avoid many large, expensive, and time consuming repairs. The vehicle will operate better, be safer, and last longer. Neglect of recommended maintenance can void your vehicle's warranty. Some maintenance operations demand skills and equipment you may not have. For such situations, please take your vehicle to an authorized Service Center.

 **WARNING**

Always support the vehicle with appropriate safety stands if it is necessary to work underneath the vehicle. A jack is not adequate for this purpose. Failure to comply may result in death, person-

al injury, equipment or property damage.

 **WARNING**

When working underneath the vehicle without appropriate safety stands but with the wheels on the ground (not supported), make sure that (1) the vehicle is on hard level ground, (2) the parking brake is applied, (3) all wheels are blocked (front and rear) and (4) remove the ignition key so that the engine cannot be started. Failure to comply may result in death, personal injury, equipment or property damage.

The following pages contain a table of maintenance tasks with the related intervals for each task on the right side of the table. The top of the table displays a guide to a maintenance interval and its schedule. Some tasks are dependent on the vehicle application. These tasks will be shown as separate tasks and will have the

words "ON HIGHWAY", "CITY DELIVERY" or "OFF-HIGHWAY" after the description. These tasks are differentiated because they are dependent on the vehicle's operating environment. On highway is defined for applications where the vehicle is NOT used off of a paved road during normal operation. City Delivery is defined for applications where frequent start and stopping is required during normal operation and the highway is used infrequently and for short periods of time. Off highway is defined for applications where the vehicle may be driven off the pavement on a regular basis, even if it is an infrequent basis and/or for a brief time period. Please contact an authorized service dealership if there are questions regarding which interval to follow. Consult the supplier for specific recommendations where discrepancies develop between these recommendations in this table and component supplier recommendations.

PACCAR Transmission Maintenance Schedule

MAINTENANCE - What is a Maintenance Program?

3

I	A	B	C	D	E
At first 15,000 mi/ 24,000 km or at first PM	15,000 mi/24,000 km/Monthly	30,000 mi/48,000 km	60,000 mi/96,000 km/ 6 Months	120,000 mi/ 192,000 km/ Annually	240,000 mi/ 384,000 km

System	Component	Task	I	A	B	C	D	E
Air	Air Compressor Governor	Replace air strainer.			•			
	Air Lines	Check condition and routing to prevent chafing.			•			
	System	Lubricate; see What is the Air System? on page 29.				•		
	Inline Filters	Replace elements or clean with solvent.				•		
	Air Dryer	Perform the checks listed.			•			
	Air Dryer (Oil-Coalescing Desiccant Cartridge)	Replace Cartridge						Annually regardless of mileage

System	Component	Task	I	A	B	C	D	E
Main and Auxiliary Transmission	Main and Auxiliary Transmission and Transfer Case	Inspect for visible damage, signs of overheating, and leaks.	•	•				
		Check the drain plugs for tightness.			•			
	Mounting Brackets and Fasteners	Check the condition of the fasteners and their torque. Tighten to the specified torque value as required.				•		
	Oil Cooler	Clean the fins (air-to-oil type) and body. Check the hose condition and for leaks: replace as required.				•		
	Main and Auxiliary Transmission	Check the oil level: refill as required.			•			
	Main and Auxiliary Transmission (ON HIGHWAY)	Drain lubricant while warm. Flush each unit with clean flushing oil.	500,000 miles/ 800,000 km					
	Main and Auxiliary Transmission (OFF HIGHWAY)	Drain lubricant while warm. Flush each unit with clean flushing oil.	•			•		

Related concepts
Related reference

The operation of the vehicle's braking system and many vehicle accessories depends upon the storage and application of a high-pressure air supply.

What is the Air System?

Important safety information about your vehicle's air system.



WARNING

Do not attempt to modify, alter, repair or disconnect any component of the air system. Repairs or modifications to the air system, other than what is described in this section, should only be performed by an authorized dealer. Failure to comply may result in death or personal injury.



WARNING

Prior to the removal of any air system component, always block and hold the vehicle by a secure means other than the vehicle's own brakes. Depleting air system pressure may cause the vehicle to roll unexpectedly resulting in an accident causing death or personal injuries. Keep hands away from chamber push rods and slack adjusters, they may apply as system pressure drops.



WARNING

After completing any repairs to the air system, always test for air leaks, and check the brakes for safe operation before putting the vehicle in service. Failure to comply may result in death, personal injury, equipment or property damage.



WARNING

Never connect or disconnect a hose or line containing air pressure. It may whip as air escapes. Never remove a component or pipe plug unless you are certain all system pressure has been depleted. Failure to comply may result in death, personal injury, equipment or property damage.



WARNING


Never exceed recommended air pressure and always wear safety glasses when working with air pressure. Never look into air jets or direct them at any-

one. Failure to comply may result in death, personal injury, equipment or property damage.




WARNING

Never attempt to disassemble a component until you have read and understood recommended procedures. Some components contain powerful springs and injury can result if not properly disassembled. Use only proper tools and observe all precautions pertaining to use of those tools. Failure to comply may result in death, personal injury, equipment or property damage.


 **WARNING**

Completely bypassing a Bendix® ADIS air dryer will bypass the system's pressure protection valves. This could lead to loss of air pressure or damage to the vehicle's air system, which could cause an accident involving death or personal injury. Always adhere to the manufacturer's procedure if it is necessary in an emergency to temporarily bypass an ADIS series air dryer. Failure to comply may result in death, personal injury, equipment or property damage.

 **WARNING**

If a different air dryer brand or model is installed on the vehicle other than what was originally installed, it could cause the air system to not perform correctly unless the full air system design is reviewed and modifications made to comply with Federal Motor Vehicle Safety Standards (FMVSS) 121 AirBrake Systems. Failure to abide by this warning and maintain

compliance to FMVSS 121 could cause loss of vehicle control and may lead to death or serious personal injury.

 **WARNING**

If the supply and service air tanks are not drained at the recommended frequency, water could enter the air lines and valves. This could cause corrosion or blockage, which could compromise the brake system safety and potentially cause an accident. Failure to comply may result in death, personal injury, equipment or property damage.

Your vehicle's compressor takes outside air and compresses it, usually to 100-120 psi (689-827 kPa). The compressed air then goes to the reservoirs to be stored until needed. When you operate your air brakes, the stored compressed air flows into the chambers where it is used to apply your truck and trailer brakes. That is why, when you push down on your brake pedal, you don't feel the same amount of pressure on the pedal that you do when you apply the brakes on your car. All you are doing on your truck is opening an air

valve to allow air to flow into the brake chambers. Contamination of the air supply system is the major cause of problems in air-operated components such as brake valves, and suspension height control valves. To keep contaminants to the lowest possible level, follow these maintenance procedures.

Daily Checks

- Drain moisture from the supply and service air tanks.
- Operate air devices to circulate lubricants within the unit.

Periodically

- Clean filter screens ahead of the valves by removing the screens and soaking them in solvent. Blow them dry with pressurized air before reinstalling them.

Twice a Year

- Maintain the air compressor to prevent excessive oil by-pass. See your maintenance manual for details.
- Replace worn seals in valves and air motors as they are needed.

Air Dryer Maintenance

Vehicles equipped with a PACCAR Transmission will have an air dryer fitted with an oil-coalescing desiccant cartridge. This air dryer cartridge must be replaced every 1 year regardless of mileage.



CAUTION

Replace oil-coalescing desiccant air dryer cartridge every 1 year regardless of mileage. Only use oil-coalescing desiccant replacement cartridge when replacing. Failure to perform this maintenance task will void the PACCAR Transmission warranty and may result in expensive transmission damage.

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 other

maintenance procedures 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 intervals, see [Transmission Lubrication Change Intervals](#) on page 33.
3. Use the correct grade and type of lubricant, see [PACCAR Transmission Lube Specification](#) on page 37.
4. Buy lubricant from an approved dealer.

Mixing of Oil Types



CAUTION

Do not mix engine and gear oil in the same transmission. Mixing engine and gear oils could cause damage to the 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 Approved Synthetic Lubricants, see vehicle operator manual.



NOTE

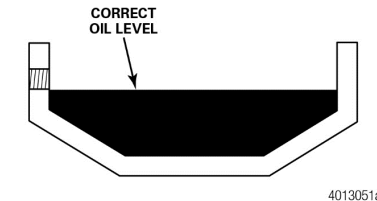
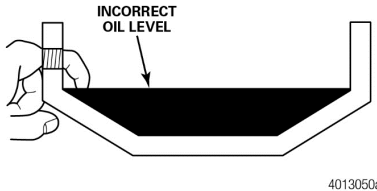
Additives and friction modifiers must not be introduced.

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.

i NOTE

Before checking the oil level, the engine must be idling and the transmission in neutral for at least 2 minutes. Lubricant temperature must be between 60 °F and 120 °F (15.5 °C and 48.8 °C).



If the transmission operating angle is more than 12° (or roughly a 21% grade), improper lubrication will occur. 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 a combination of the intervals shown in vehicle operator manual Lubrication Specification Manual, and user judgment 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. Inspect the transmission exterior for leaks. Look around the oil filter and exterior seals for damage and replace as necessary.

On-Highway

Check fluid levels and inspect for leaks at regular PM maintenance intervals, not to exceed 12,000miles. Drain and replace lubricant every 500,000 miles / 800,000 km.

Off-Highway

Check fluid levels and inspect for leaks every week. Drain and replace lubricant

interval should not exceed 60,000 mi / 96,000 km / 6 Months.

Vehicle Towing

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.

CAUTION

Always follow proper manufacturer towing procedures. Failure to follow proper towing procedures could result in damage to the transmission.

How to Drain Fluid

1. Use a drain pan under the transmission drain plug to collect oil from the bottom of the transmission.

2. Make sure the oil temperature is cool.
3. Clean around drain plug and remove plug.
4. Allow transmission oil to drain out.
5. Clean drain plug and torque as required.

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. Reset system.

How to Fill Fluid

1. Remove transmission oil fill plug.
2. Make sure drain plug is properly installed.
3. Fill with approved oil until the oil starts flowing out the fill hole.
4. Clean, install, and properly and torque fill plug.

Troubleshooting

Diagnostics

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

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 before selecting “N” NEUTRAL.



NOTE

Once “N” NEUTRAL is selected, a gear engagement may not be allowed depending on the nature of the problem.

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



WARNING

Apply parking brake and follow vehicle manufacturer parking instructions. Failure to follow these instructions could cause unintended vehicle movement resulting in death, serious injury or damage to property.

4. Turn the vehicle ignition to the “off” position.
5. Wait at least 2 minutes.
6. Restart the engine.
7. If the problem continues, contact a service facility to have the vehicle and transmission system evaluated.

Transmission Air Supply

For optimal performance, the PACCAR Automated Transmission requires a nominal air supply operating range between 90 psi (5.9 bar) and 130 psi (9.0 bar).



WARNING

Maintain specified transmission air system pressure range between 90 psi (5.9 bar) and 130 psi (9.0 bar). Failure to maintain proper air system pressure could result in degraded or complete loss of transmission engagement and shift capabilities resulting in death, serious injury or damage to property.

Roadside Assistance

What to do in an emergency and roadside assistance information.

Call toll-free to talk to someone at the PACCAR Customer Center:

- Kenworth customers call: **1-800-KW-Assist (1-800-592-7747)** | Peterbilt customers call: **1-800-4Peterbilt (800-473-8372)**
- Open 24-7-365 days a year.
- They can help you get roadside assistance.
- They have a custom mapping system which locates authorized PACCAR engine dealers and Independent Service Providers

(ISPs) near you and lists types of services offered, hours of operation and contact information.

- They can assist with jump and pull starts, tires, trailers, fines and permits, chains, towing, hazardous clean-up, out of fuel (roadside), mechanical repairs and preventive maintenance services.
- They have multilingual agents and access to a translation service to ensure quality assistance for customers in any language.
- They can't answer your warranty questions, but can get you in contact with an authorized dealer who can.
- The PACCAR Customer Center service is FREE.

Chapter 4 | INFORMATION

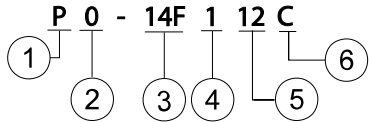
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General Model Information

Nomenclature

Following is a nomenclature tree that describes the multiple configurations of the transmission model numbers:

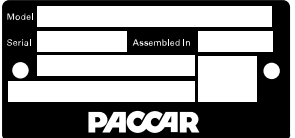


- 1 PACCAR Transmission
- 2 Overdrive
- 3 Torque Capacity (ft-lb) # x 100 +50
- 4 Design Level
- 5 Forward Speeds
- 6 Ratio Set

Transmission Identification Nomenclature

The blank spaces provided below are for recording transmission identification data and part numbers of maintenance items.

All transmissions are identified by the model and serial number. This information is stamped on the transmission identification tag and affixed to the case.



i

NOTE

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 _____

PACCAR Transmission Lubricant Capacities

Transmissions equipped with Power Take Off (PTO) or oil coolers are great than the capacities listed here. These values are approximate. Always use the fill hole as a finale reference.

Pints (US)	Liters
16	7.5

PACCAR Transmission Lube Specification

PACCAR approves the PACCAR Genuine PS-386 (Eaton approved) synthetic transmission fluid to ensure the highest performing lubricants for maximum performance. All other approved

rebranders for PS-386 are also acceptable.

PACCAR
GENUINE PARTS

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