

M O D E L
579



Model 579 Operator's Manual

© 2025 PACCAR Inc. - All Rights Reserved

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.

Safety	1
Emergency	2
Controls	3
Driving	4
Maintenance	5
Information	6

CHAPTER 1: SAFETY

1

1	Using This Manual.....	6
2	Safety Messages and Notes.....	6
3	Illustrations.....	7
4	General Safety Instructions.....	7
5	Data Recorder.....	10
6	Environmental Protection Agency.....	10
7	Repairs.....	10
8	Additional Sources of Information.....	11
9	Cab Access.....	12
10	Sleeper Bunks and Restraints.....	13
11	How to Access the Upper Bunk.....	15
12	Deckplate Access.....	20
13	How to Open the Hood.....	21
14	Seat.....	24
15	What to Do Before Starting the Vehicle.....	33
16	Vehicle Loading.....	34
17	Visual Inspection While Approaching the Vehicle.....	35

18	Daily Checks.....	35
19	Weekly Checks.....	36
20	Systems Check.....	37

1 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 maintenance information, with an outline for performing safety checks and basic preventive maintenance inspections. When replacement parts are needed, we recommend using only genuine PACCAR parts.

We have tried to present the information needed to learn about functions, controls, and operation—and to present it as clearly as possible. Occasionally, you may need to reference this manual, and we hope you find it easy to use.

NOTE

After you have read this manual, it should be stored in the cab for convenient reference and remain with this vehicle when sold.

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 Table of Contents. Located at the front of the manual, this table arranges the subject matter into chapters, which can be quickly referenced using the numbers shown in the outer margin. The first page of each chapter presents a list of the major subjects contained in that chapter. Cross-referenced citations can also help you find information. If more information on the current subject is located elsewhere in the manual, a cross-reference may be provided, such as "see Safety Messages and Notes." Finally, you will find a helpful index at the back of the manual which lists the subjects covered alphabetically.

All information contained in this manual is based on the latest production information available at the time of publication. If you find differences between your instruments and the information in this manual, con-

tact an authorized Peterbilt dealer. Peterbilt Motors Company reserves the right to make changes at any time without notice.

2 SAFETY MESSAGES AND NOTES

Read and follow ALL safety messages in this manual. When followed, injury to yourself and others, damage to equipment and/or property, or other unknown hazards are reduced. Both safety messages and notes are emphasized using a safety message symbol and one of three signal words: WARNING, CAUTION, or NOTE. **Do not** ignore any of these messages.

Warnings



Safety messages that follow this symbol and signal word provide a warning against operating procedures, actions, or a lack of action that could result in death or injury. An unheeded warning may also result in damage to equipment, property, or the environment. Warning messages will identify the hazard, how to avoid it, and the probable consequence of not avoiding the hazard.

Example:



WARNING

DO NOT change hot engine oil as you could be burned. Let the engine cool down before changing the engine oil. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Cautions



Safety messages that follow this symbol and signal word provide a caution against operating procedures, actions, or a lack of action that could result in equipment, property, or environmental damage. Caution messages will identify the hazard, how to avoid it, and the probable consequence of not avoiding the hazard.

Example:



CAUTION

DO NOT operate your vehicle with insufficient oil pressure as this will cause serious engine damage. Failure

to comply may result in equipment or property damage.

Notes



Messages that follow this symbol and signal word provide important information that, while not safety related, should still be followed. A note will provide information that may be useful to the reader: clarifying the topic, providing valuable insight into the topic or process, or saving the reader time and effort.

Example:



NOTE

Pumping the accelerator pedal will not assist in starting the engine.

3 ILLUSTRATIONS

Some of the illustrations found in this manual are generic. They will not look exactly like the parts or assemblies you find installed on the vehicle.

When an illustration differs from what you see physically present on the vehicle, the language describing the procedure is still correct for the application.

4 GENERAL SAFETY INSTRUCTIONS



WARNING

Improper practices, carelessness, or ignoring safety messages – Warnings and Cautions – may cause death, personal injury, equipment damage, or property damage.



WARNING

Improper practices, carelessness, or ignoring safety messages – Warnings and Cautions – may result in death, personal injury, equipment damage, 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 upon regular vehicle maintenance. Follow the maintenance recommendations found in the Maintenance section. Following maintenance recommendations will help your vehicle maintain quality conditions.

Make sure your vehicle is in top working condition before heading out on the road, it is the driver's duty to do so. Inspect the vehicle according to the Driver's Check List:

- 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.
- Wear protective gloves when working

with hot liquids or surfaces, and when working with components that have sharp edges.

- 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 fill cap to relieve the pressure from the cooling system.



WARNING

DO NOT remove the coolant fill cap while the engine is hot. Wait until coolant temperature is below 120°F (50°C). Scalding steam and fluid under pressure may escape and cause serious burns. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT attempt to service the high-pressure fuel system unless you are a certified technician. Escaping high-pressure fuel is dangerous. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT attempt to service the high-pressure fuel system unless you are a certified technician. Escaping high-pressure fuel is dangerous. Failure to comply may result in death, personal injury, equipment damage, or property damage.

- 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 loosening or disconnecting

lines, fittings, or related items, always release line pressure in the system. Make sure to use the approved system point and method for the specific system (fuel, oil). Escaping high-pressure fluids can cause severe injury. PACCAR does not provide the approved system points and methods in operator's manuals. The service literature provides this information. You can obtain service literature through a certified service center.

- 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 rated for 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.

- 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 Metric 10.9 grade with 8.8 grade fastener).
- Always torque fasteners and fuel connections to the required

specifications. Overtightening or undertightening 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 or transmission oil can be carcinogenic and can cause reproductive toxicity. Avoid inhalation of vapors, ingestion, and prolonged contact with used engine or transmission oil.
- Coolant is toxic. If not reused, dispose of coolant in accordance with local environmental regulations.

CAUTION

DO NOT use corrosive chemicals on any part of the vehicle unless expressly directed. Corrosive chemicals can damage vehicle components. 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.

5 DATA RECORDER

California Vehicle Code - Section 9951 - Disclosure of Recording Device

Your vehicle may be equipped with one or more recording devices commonly referred to as "event data recorders" (EDR) or "sensing and diagnostic modules" (SDM). If you are involved in an accident, the device(s) may have the ability to record vehicle data that occurred just prior to and/or during the accident. For additional information on your rights associated with the use of this data, contact:

- The California Department of Motor Vehicles - Licensing Operations Division
- <http://www.dmv.ca.gov/>

6 ENVIRONMENTAL PROTECTION AGENCY

Some of the ingredients in engine oil, hydraulic oil, transmission and axle oil, engine coolant, diesel fuel, air conditioning refrigerant (R12, R134a, and PAG oil), batteries, etc., may contaminate the environment if spilled or not disposed of properly.

** WARNING**

Engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm. Other chemicals in this vehicle are also known to the State of California to cause cancer, birth defects or other reproductive harm. This warning requirement is mandated by California law (Proposition 65) and does not result from any change in the manner in which vehicles are manufactured.

Contact your local government agency for information concerning proper disposal.

7 REPAIRS**7.1 Repairs**** WARNING**

DO NOT attempt maintenance or repairs without proper training, tools, and up-to-date service instructions. Only carry out those tasks you are fully qualified to perform to prevent risks to yourself, others, or the vehicle. Failure

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



WARNING

Modifying your vehicle can make it unsafe. Some modifications can affect your vehicle's electrical system, stability control system, or other important functions. Before modifying your vehicle, check with your dealer to make sure it can be done safely. Failure to comply may result in death, personal injury, equipment damage, or property damage.



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. Failure to com-

ply may result in equipment or property damage.

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 proper mechanical training and the proper tools. However, all warranty repairs must be performed by an authorized service facility. If you are not an experienced technician, or do not have the right equipment, please leave all repairs to an authorized service facility. They are the ones best equipped to do the job safely and correctly.

7.2 Maintenance Manuals

If you do decide to do any complex repair work, you will 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.

7.3 Final Chassis Bill of Material

A complete, non-illustrated computer print-out listing of the parts used to custom-build your vehicle is available through the dealer from whom you purchased your vehicle.

8 ADDITIONAL SOURCES OF INFORMATION

Major component suppliers also supply operation manuals specific to their products. The glove box contains these manuals and other pieces of literature. Look for information on products such as the engine, driver's seat, transmission, axles, wheels, tires, antilock braking system and electronic stability control (ABS/ESC), radio, fifth wheel, lane departure, and adaptive cruise control. If you are missing these pieces of literature, ask your dealer for copies.

Another place to learn more about trucking is from local truck driving schools. Contact one near you to learn about the courses they offer. Federal and state agencies, such as the Department of Licensing, also have information.

9 CAB ACCESS

9.1 Cab Access

WARNING

Always reinstall steps before entering the cab or accessing the deck plate. Without steps you could slip and fall. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Clean any fuel, oil, or grease off of vehicle steps and handles before entering, exiting, or climbing onto the vehicle. Keep vehicle steps and handles clean to avoid a slip or fall. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Use care when entering, exiting, or climbing onto the vehicle when the steps, handholds, or footwear are wet,

muddy, or coated with ice or snow to avoid a slip or fall. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Always face toward the vehicle and DO NOT jump when entering or exiting the cab. Use the steps, handles, and anti-skid surfaces provided instead of components not designed for entry or exit. Always maintain at least three points of contact between your hands, feet, and the vehicle to avoid a slip or fall. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Be careful whenever you get into or out of the vehicle's cab. Always maintain at least three points of contact with the vehicle when entering or exiting. The placement of hands on the grab handles and feet on the steps meet this requirement. The following shows the best way to enter and exit the cab:



9.2 How to Lock and Unlock the Cab Doors

The vehicle has one key for cab doors, the start switch, and the optional sleeper luggage compartment. Frame-mounted tool box locks and locking fuel tank caps each have separate, individual keys.

WARNING

To reduce the possibility of personal injury or death, always lock the doors before driving the vehicle. Along with using the seat belt properly, locking the doors helps prevent doors from inadvertently opening and occupants from being ejected from the vehicle. Failure

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

To lock or unlock the doors from outside the cab:

1. To lock, rotate the key toward the rear of the vehicle (clockwise).
2. To unlock, rotate the key toward the front of the vehicle (counter clockwise).

9.3 Remote Keyless Entry (Option)

Remote Keyless Entry (RKE) is a system that adds security and convenience to your vehicle. The system will lock or unlock cab doors with the key fob. The system will alert you with parking lights when the selected doors are locked or unlocked. The system includes two key fobs that provide secure rolling code technology that prevents someone from recording the entry signal.

NOTE

FCC ID: L2C0031T IC: 3432A-0031T
FCC ID: L2C0032R IC: 3432A-0032R
This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada. Operation is subject to the following two conditions (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The term IC: before the radio certification number only signifies that Industry Canada technical specifications were met.

9.4 Operate Door Locks using Remote Keyless Entry

Open doors will not lock using the key fob. The key fob should be within 30 ft. (9 m) of the vehicle and should not be in proximity

of other radio frequency sources such as television, radio, or cell phone transmitters.

To unlock the cab doors:

1. Press the **UNLOCK** button once. The driver's door will unlock and the parking lights will come on for 40 seconds.
2. Quickly press the **UNLOCK** button a second time within 5 seconds to unlock the passenger door.
3. Press the **LOCK** button. The doors will lock and the parking lights will come on for 2 seconds.

10 SLEEPER BUNKS AND RESTRAINTS

This vehicle comes equipped with a sleeper bunk restraint for the primary lower bunk and the optional upper bunk. Sleeper bunk restraints must be used whenever the bunks are occupied by a person while the vehicle is in motion. The sleeper bunk restraint protects sleeping passengers and reduces the risk of being thrown from the bunk in a crash. This device is not designed to hold the occupant in a fixed position on the bunk and cannot prevent all injuries in a crash.

⚠ WARNING

Always use the sleeper restraint when an individual is in the sleeper bunk while the vehicle is moving. In the event of an accident, an unrestrained occupant could be thrown from the bunk. Failure to comply may result in death, personal injury, equipment damage, or property damage.

⚠ WARNING

Fully retract and properly stow seatbelts when not in use. The metal tongue on a loose safety restraint can become a projectile during a sudden stop or crash. Failure to comply may result in death, personal injury, equipment damage, or property damage.

i NOTE

Responsible operators make sure that all vehicle passengers ride safely. The operator is responsible for informing passengers and co-drivers how to properly use all available safety restraints while in the vehicle.

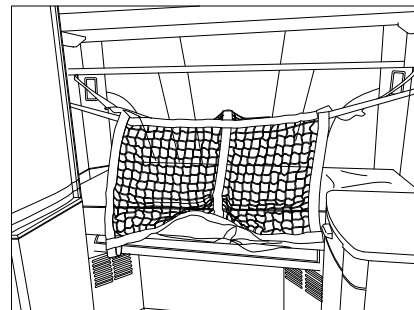
Lower Sleeper Bunk**⚠ WARNING**

Make sure the lower bunk is in the horizontal, latched position during vehicle operation. If left open, stored items may become projectiles during sudden stops or collisions. Failure to comply may result in death, personal injury, equipment damage, or property damage.

⚠ WARNING

Secure all loose items on the upper and lower bunks before operating the vehicle. Unsecured items can become projectiles when the vehicle is in motion. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Before you move the vehicle, check to be sure the lower bunk is in the down position.

Figure 1: Lower Sleeper Bunk Restraints**Upper Sleeper Bunk****⚠ WARNING**

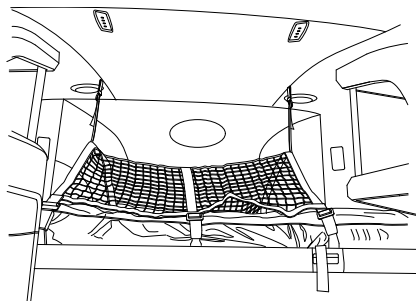
Make sure the latch that holds the upper bunk in the folded position is working properly so the bunk will not fall open during vehicle operation. Pull on the bunk to make sure the bunk is latched securely. Failure to comply may result in death, personal injury, equipment or property damage.

**WARNING**

Secure all loose items on the upper and lower bunks before operating the vehicle. Unsecured items can become projectiles when the vehicle is in motion. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Federal law prohibits the transportation of persons in commercial vehicles unless they are specifically authorized in writing by the motor carrier. See FMCSR 392.60 - Unauthorized Persons Not to be Transported for a complete description of the regulation and exemptions.

Figure 2: Upper Sleeper Bunk Restraints

**Upper Rear Sleeper Storage**

Some vehicles are equipped with an upper storage shelf above the lower bunk.

**WARNING**

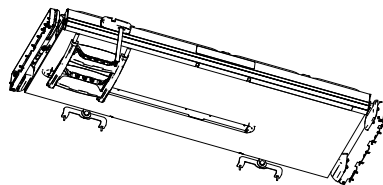
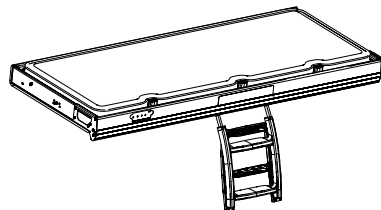
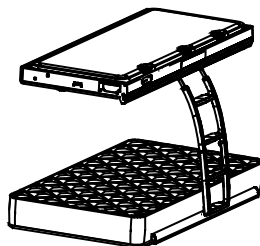
Make sure the lower bunk is in the horizontal, latched position during vehicle operation. If left open, stored items may become projectiles during sudden stops or collisions. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Compartments in the cab and sleeper are provided for storage of necessary items used during operation. The storage areas above the door are designed to hold a combined total not exceeding 14 lbs (6 kg) per compartment. The other overhead compartments (including compartments in the optional sleeper) must hold a combined total not exceeding 5 lbs (2.2 kg) per compartment.

11 HOW TO ACCESS THE UPPER BUNK

11.1 Upper Bunk Ladder

This vehicle may be equipped with an upper bunk ladder. The ladder enables you to conveniently climb into the upper bunk without stepping on the lower bunk. The ladder can be unfolded when needed. The ladder folds up into the upper bunk structure when not in use, while driving, or when accessing the lower bunk. The ladder can be folded up into the upper bunk.

Ladder Folded and Latched**Ladder Partially Unfolded****Ladder Unfolded**

11.2 How to Unfold the Upper Bunk Ladder

It is important to follow all specified safety instructions when unfolding the upper bunk ladder.

WARNING

DO NOT attempt to fold or unfold the ladder while an occupant is in the lower bunk. Allow the lower bunk occupant to vacate the bunk before folding or unfolding the ladder. Failure to comply may result in death, personal injury,

equipment damage, or property damage.

CAUTION

Upper bunk must be in down position before folding and unfolding the ladder. Always lower the upper bunk before folding and unfolding the ladder. Failure to comply may result in equipment or property damage.

CAUTION

Lower bunk must be in down position before folding and unfolding the ladder. Always fold the ladder before raising the lower bunk. Failure to comply may result in equipment or property damage.

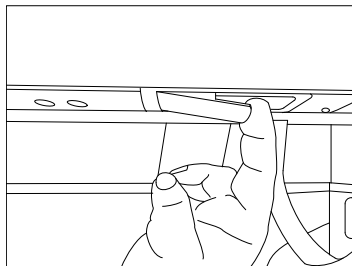
CAUTION

Make sure floor area is clear prior to folding and unfolding the ladder. There should be nothing between the ladder leg and floor carpet when the ladder is

unfolded. Failure to comply may result in equipment or property damage.

1. Ensure the lower bunk is in the down position.
2. Lower the upper bunk.
3. Locate the release latch on the driver's side front edge of the upper bunk.
4. Release the ladder by pulling the latch out.

Figure 3: Unlatching the ladder



5. Position your left hand, open palm, beside the latch to control the unfolding action of the ladder as it separates from the bunk structure. Maintain contact with your left hand, open palm, in the same position until the ladder is completely unfolded.

6.



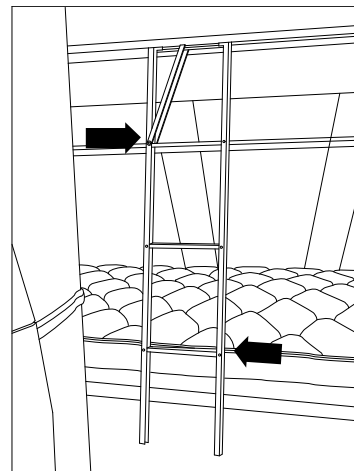
WARNING

DO NOT grip the ladder while folding and unfolding it. Always use an open hand when folding and unfolding the ladder to prevent injuries and pinching of fingers. Failure to comply may result in death, personal injury, equipment damage, or property damage.

When the ladder is about half way unfolded, position your right hand, open palm, on the upper right side of the ladder to help guide the ladder into position.

Apply pressure in opposite directions to ensure smooth operation of the ladder.

Figure 4: Hand Positions to Unfold the Ladder



7.



CAUTION

DO NOT attempt to open the lower bunk when the ladder is unfolded and vertical. Failure to comply may result in equipment or property damage.

CAUTION

Never attempt to pull the bottom of the ladder forward when the ladder is in the down position. Failure to comply may result in equipment or property damage.

CAUTION

Never attempt to fold or force the ladder toward the passenger side of the vehicle once the ladder has reached vertical position and is against the internal stop inside the upper bunk. Doing so can cause damage to the ladder. Failure to comply may result in equipment or property damage.

Make sure the ladder is completely unfolded against the internal stop. The ladder should be vertical at this point.

11.3 How to Climb In and Out of the Upper Bunk

WARNING

Make sure the ladder is fully open before climbing up or down the ladder. The ladder should be against internal stops and vertical before using it. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Never use the ladder while the vehicle is in motion. Always fold and stow the ladder before moving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

DO NOT exceed the weight limit of 320 lb on the ladder. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

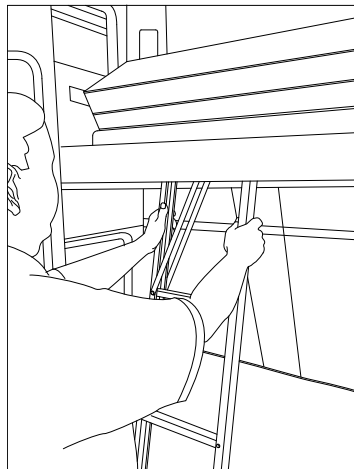
Never climb a damaged, bent, or broken ladder. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

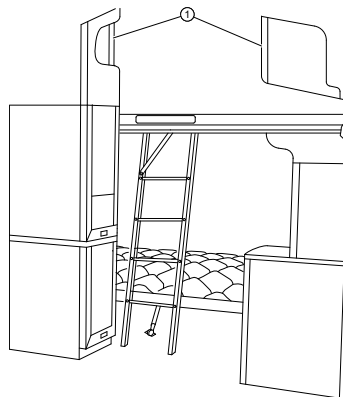
Never allow multiple people on the ladder at the same time. Only one person on the ladder at any time. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Make sure the ladder is in the unfolded position.

1. Face the ladder when climbing up or down.

Figure 5: Face the ladder

2. Maintain a firm grip when climbing up or down the ladder. Use the ladder and grab handles provided, and always keep at least three points of contact between your hands and feet and the truck. Always face toward the bunk when entering or exiting the upper bunk and look where you are going.
3. As you get higher on the ladder, maintain contact with the sleeper upper grab handles as you get onto the upper bunk.

Upper Grab Handles

1. Upper Grab Handles

11.4 How to Fold the Upper Bunk Ladder

WARNING

DO NOT attempt to fold or unfold the ladder while an occupant is in the lower bunk. Allow the lower bunk occupant to vacate the bunk before folding or unfolding the ladder. Failure to comply may result in death, personal injury, equipment damage, or property damage.

ply may result in death, personal injury, equipment damage, or property damage.

CAUTION

Lower bunk must be in down position before folding and unfolding the ladder. Always fold the ladder before raising the lower bunk. Failure to comply may result in equipment or property damage.

1. Ensure that the lower bunk is in the down position.
2. Position your left hand, open palm, against the lower left side of the ladder. Maintain contact with your left hand, open palm, in the same position until the ladder is completely folded.

3.

WARNING

Right hand must be clear of the ladder when it is approximately half-way folded. Failure to comply may result in death, personal injury, equipment damage or property damage.

**CAUTION**

Lower bunk must be in down position before folding and unfolding the ladder. Always fold the ladder before raising the lower bunk. Failure to comply may result in equipment or property damage.

**WARNING**

DO NOT grip the ladder while folding and unfolding it. Always use an open hand when folding and unfolding the ladder to prevent injuries and pinching of fingers. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Position your right hand, open palm, against the upper right side of the ladder. Maintain contact with your left hand, open palm, in the same position until the ladder is approximately half-way folded.

Figure 6: Hand Positions to Fold the Ladder



Apply pressure in opposite directions to ensure smooth operation of the ladder.

4. Use the right hand to apply pressure to the left and simultaneously use the left hand to apply pressure to the right. The ladder will begin to fold up.
5. When the ladder is approximately half-way folded, remove your right hand from the right side of the ladder.
6. Continue to push with your left hand

until the ladder has been folded into the upper bunk structure.

7. Secure the latch.

Result:

**CAUTION**

Make sure the ladder is fully closed while the vehicle is in motion. Failure to do so may result in property damage.

12 DECKPLATE ACCESS

**WARNING**

Always reinstall steps before entering the cab or accessing the deck plate. Without steps you could slip and fall. Failure to comply may result in death, personal injury, equipment damage, or property damage.

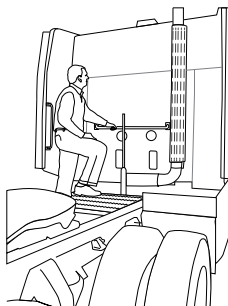
**WARNING**

Clean any fuel, oil, or grease off of vehicle steps and handles before entering, exiting, or climbing onto the vehicle. Keep vehicle steps and handles clean to avoid a slip or fall. Failure to com-

ply may result in death, personal injury, equipment damage, or property damage.

WARNING

When you are climbing onto and off the deckplate, maintain at least three points of contact with your hands on the grab handles and your feet on the steps. Always face toward the vehicle when entering or exiting the cab and look where you are going. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

When stepping onto a surface to enter the cab or access the deckplate, only use the steps and grab handles installed and designed for that purpose. Failure to comply may result in death, personal injury, equipment damage, or property damage.

NOTE

Any alteration (adding bulkheads, headache racks, tool boxes, etc.) behind the cab that affects the utilization of installed grab handles, deckplates, or frame access steps should

comply with Federal Motor Carrier Safety Regulation 399.

13 HOW TO OPEN THE HOOD

13.1 How to Open the Hood

WARNING

Always open the hood with both feet planted firmly on the ground and one or both hands on the hood. If you lose your footing, the hood may open or close uncontrollably. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

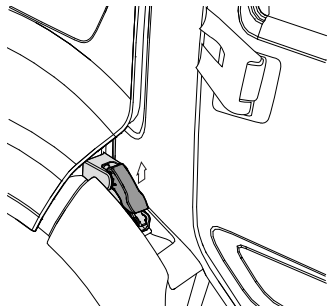
Always ensure the hood lock has engaged whenever the hood is opened. If not properly locked open, the hood may close uncontrollably and without warning. Failure to comply may result in

death, personal injury, equipment damage, or property damage.

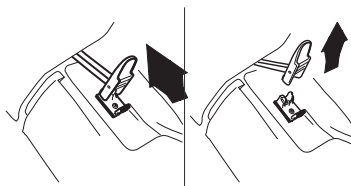
! WARNING

Be sure to latch the hood securely. A hood not latched securely could open during operation and cause vehicle damage. Failure to comply may result in death, personal injury, equipment damage, or property damage.

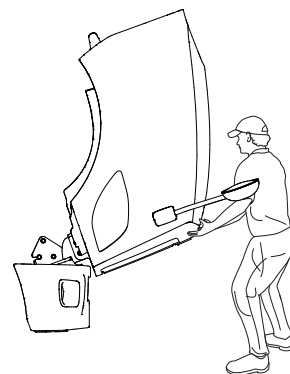
Access the engine by opening the hood. The hood is held in the closed position by two latches called hold-downs. The hold-downs are mounted on either side of the vehicle hood.



1. Release the hood hold-downs.



2. Place one or both hands at top of hood front, and tilt hood forward by pulling hood. Keep both feet on the ground for stability.



Tilt hood forward until it stops. When fully opened, the hood lock engages automatically.

3. Ensure hood lock is engaged (when the hood lock is engaged, the strut is visible above the lock).

Figure 7: Left Hood Lock

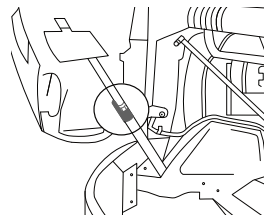
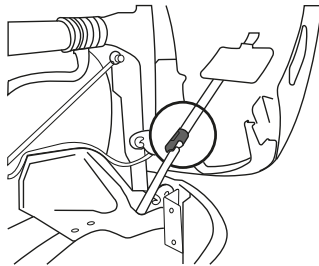
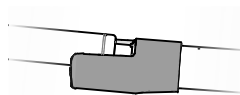


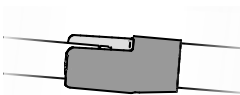
Figure 8: Right Hood Lock



Hood Lock - Engaged



Hood Lock - NOT Engaged

**Result:**

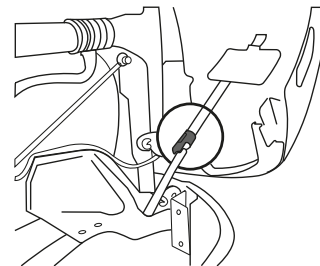
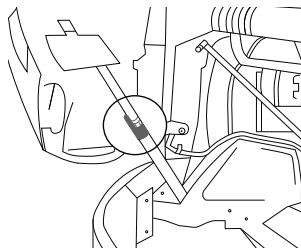
A hood that closes uncontrollably may result in personal injury.

13.2 Close the Hood

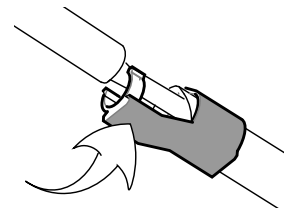
**WARNING**

Always make sure that there are no objects in the way before closing the hood. Grab the hood firmly and close it in a controlled manner with your feet placed on a stable, non-slip surface. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The hood lock will only be engaged if the vehicle hood is fully open. Once it is fully open, the latch will automatically engage and will need to be disengaged by the operator. The release lever for the hood lock is located near the front hinge of the hood.



To disengage the hood lock, press the collar toward the strut until a snap is felt and the collar surrounds the strut bar. When the hood lock is disengaged, the strut will no longer be visible above the hood lock collar.



When closing the hood, be sure that you maintain the same point of contact (top of hood) to control the movement of the hood as it closes. Gently lower the hood into place to avoid damage to the hood or cab.

13.3 Under Hood Air Intake (Option)

The optional under hood intake switch allows the operator to use air from under the hood in the event the air filter housing's inlet is blocked by snow or ice.



WARNING

DO NOT open the under hood air door with hands. This door is held closed with a spring which may pull the door closed unexpectedly. Failure to comply may result in death, personal injury, equipment damage, or property damage.



CAUTION

Only operate the under-hood intake air switch when outside temperatures are below 32°F (0°C). Engaging the under-hood air intake while temperatures are above freezing may damage the engine. Failure to comply may result in equipment or property damage.

The switch is directly wired to a solenoid on the air filter housing. This air solenoid (normally closed) will engage when signaled which will supply air to a piston. This air pressure will overcome a spring which holds a door closed inside the air filter housing. Fully engaged, the door will open and air will enter from under the hood instead of the opening on the side of the hood.

14 SEAT

14.1 Seat

This seat has up to ten different controls that maximize the driver's comfort.

Lumbar (and bolster support if available) are provided for superior support to the back during operation. Lower support is standard and the optional functions include upper lumbar and bolster functions. Pressing on the "+" symbol of the button will add support in the area. Pressing the opposite side of the button releases pressure and will reduce support in the area.



The seats in this vehicle are equipped with a switch that locks out the fore-aft isolator function in the seat. When locked, the seat will not move back and forth. It is rigidly fixed and only allowed to move up and down with the vehicle's movements.

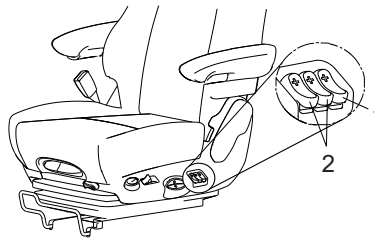
This vehicle may be equipped with a swivel function on the passenger seat. This function allows the passenger seat to rotate and face toward the inside of the cab.

! WARNING

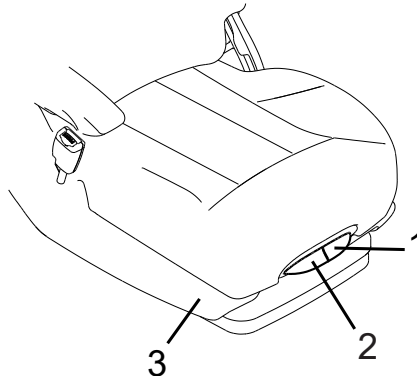
Always make sure that the passenger seat is locked into the forward facing position when the vehicle is in motion. Locking the swivel seat into the forward-facing position maximizes visibility to the surrounding area. Failure to comply may result in death, personal injury, equipment damage, or property damage.

! WARNING

DO NOT use the seat swivel function while a passenger is in the seat and the vehicle is in motion. The seat belt will not provide proper protection if the passenger seat is not locked facing forward and the vehicle is in an accident or other scenarios, like heavy braking. Failure to comply may result in death, personal injury, equipment damage, or property damage.



- 1 Bolster adjustment (option)
- 2 Lower and upper lumbar adjustment



- 1 Seat bottom angle adjustment
- 2 Seat thigh support up/down
- 3 Seat heater/cooler

! WARNING

This seat may be equipped with a seat heater or ventilation system. There is a possibility that some people may suffer heat-induced burns or excessive cooling when using the system. DO NOT use either of these systems if you have a diminished ability to sense temperature, a reduced ability to feel pain, or have sensitive skin. Failure to comply may result in death, personal injury, equipment damage, or property damage.

! WARNING

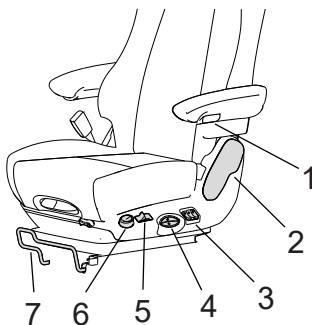
When using the seat heater or ventilation system, DO NOT place anything on the seat such as a blanket, cushion, or similar items. Objects placed between the occupant and the seat cushion may cause the seat heater or ventilation system to overheat, which may injure the seat occupant or may damage the seat. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

DO NOT use the seat heater for more than 10 minutes at a time. Always switch off the seat heaters when they are not needed. Overuse of the seat heater may drain the vehicle's low-voltage batteries. Failure to comply may result in equipment damage or property damage.

CAUTION

DO NOT use the seat heater for more than 10 minutes when the vehicle is off. Overuse of the seat heater may drain the vehicle's batteries. Failure to comply may result in equipment or property damage.



- 1 Armrest angle
- 2 Recline
- 3 Lumbar and bolster (bolster is an optional feature)
- 4 Seat height
- 5 Suspension stiffness
- 6 Express down
- 7 Seat fore-aft

WARNING

DO NOT drive or ride with your seat back in the reclined position. You could be injured by sliding under the seat belts in a collision. Failure to comply

may result in death, personal injury, equipment damage, or property damage.

14.2 How to adjust a seat**WARNING**

DO NOT adjust the driver's seat while the vehicle is moving. The seat could slide or tilt suddenly during adjustment and cause the driver to lose control of the vehicle. Make all adjustments to the seat while the vehicle is stationary and ensure that the seat is firmly latched at the new position. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

DO NOT adjust the driver's seat while the vehicle is moving, as sudden seat movement can cause loss of vehicle control. Before driving, ensure the seat is firmly latched and there is adequate head clearance at maximum upward travel. Failure to comply may result in

death, personal injury, equipment damage, or property damage.

1. Set the seat's fore/aft position via the bar located below the seat cushion. This is a mechanical latch that does not involve any electric or air operated devices to control adjustment.
2. Set the seat height via the large switch on the left side of the seat cushion. This switch is located in the center of the seat pad and uses air to adjust the seat height.
3. Adjust the thigh support by toggling the switch located immediately under the seat bottom cushion and above the fore/aft position adjustment lever.
4. Adjust the seat bottom angle using the switch next to the thigh support.
5. Adjust the seat back recline angle using the large lever situated near the seat belt buckle.
6. Adjust the lumbar support by using the switch bank located on the side the seat cushion between the up/down adjustment switch and the seat recline adjustment lever.
7. Adjust the steering wheel.
8. Adjust the cab side mirrors.

14.3 Passenger Seat Swivel (Option)

This vehicle may be equipped with a swivel function on the passenger seat. This function allows the passenger seat to rotate and face towards the inside of the cab.



WARNING

Always make sure that the passenger seat is locked into the forward facing position when the vehicle is in motion. Locking the swivel seat into the forward-facing position maximizes visibility to the surrounding area. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT use the seat swivel function while a passenger is in the seat and the vehicle is in motion. The seat belt will not provide proper protection if the passenger seat is not locked facing forward and the vehicle is in an accident or other scenarios, like heavy braking. Failure to comply may result in death,

personal injury, equipment damage, or property damage.

14.4 Seat Belts

Seat belts have a locking mechanism. This mechanism adjusts automatically to a person's size and movements as long as the pull on the belt is slow. Hard braking or a collision locks the belt. The belt locks when driving up or down a steep hill or in a sharp curve.

Unbelted occupants may be ejected from the cab, strike other cab occupants, and sustain more severe injuries in an accident. Always observe user warnings pertaining to seat belts. The vehicle has a seat belt indicator lamp located on the dash.



WARNING

DO NOT drive without the seat belts properly fastened. Fasten in only one occupant per belt and avoid fastening the belt over breakable objects such as eyeglasses, keys, or pens. Ensure all passengers wear and adjust their seat belts before placing the vehicle into motion. Failure to comply may result in

death, personal injury, equipment damage, or property damage.

! WARNING

DO NOT use the seat swivel function while a passenger is in the seat and the vehicle is in motion. The seat belt will not provide proper protection if the passenger seat is not locked facing forward and the vehicle is in an accident or other scenarios, like heavy braking. Failure to comply may result in death, personal injury, equipment damage, or property damage.

! WARNING

Fully retract and properly stow seatbelts when not in use. The metal tongue on a loose safety restraint can become a projectile during a sudden stop or crash. Failure to comply may result in death, personal injury, equipment damage, or property damage.

! WARNING

DO NOT modify or disassemble the safety restraints in your vehicle. Modified safety restraints may not function as intended. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Correct Seat Belt Use

i NOTE

Responsible operators make sure that all vehicle passengers ride safely. The operator is responsible for informing passengers and co-drivers how to properly use all available safety restraints while in the vehicle.

Figure 9: Correct Placement of Lap Belt

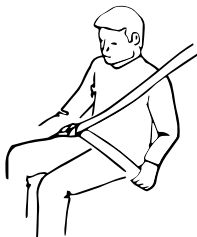


Figure 10: Correct Placement of Shoulder Belt



Incorrect Seat Belt Use

! WARNING

DO NOT drive without the seat belts properly fastened. Fasten in only one occupant per belt and avoid fastening the belt over breakable objects such as eyeglasses, keys, or pens. Ensure all passengers wear and adjust their seat belts before placing the vehicle into motion. Failure to comply may result in

death, personal injury, equipment damage, or property damage.

Figure 11: Lap Belt Too High on Hip



Figure 12: Shoulder Belt Incorrectly Positioned Under the Arm



Figure 13: Seat Belt Twisted



Seat Belt Use During Pregnancy

⚠ WARNING

Pregnant women should always wear a seat belt in the proper position. A properly worn seat belt significantly reduces the risk of injury to a woman or baby in the event of a crash. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The lap belt portion must be worn snugly and as low as possible across the pelvis. To avoid pressure on the abdomen, the belt must never pass over the waist. A properly worn seat belt significantly reduces the risk of injury to a woman or baby in a crash.



Safety Restraint Cleaning

All safety restraints must be kept clean or the retractors may not work properly. Clean the safety restraints by following the care label on the belts. Let them dry completely before allowing them to retract or be stowed away.

⚠ WARNING

DO NOT use bleach or dye to clean a safety restraint. Chemicals can make safety restraint components weak and may cause them to not function as intended. Failure to comply may result in death, personal injury, equipment damage, or property damage.

14.5 How to Use a Seat Belt

Follow these steps to fasten the seat belt. Make sure that all other occupants do the same.



WARNING

DO NOT drive without the seat belts properly fastened. Fasten in only one occupant per belt and avoid fastening the belt over breakable objects such as eyeglasses, keys, or pens. Ensure all passengers wear and adjust their seat belts before placing the vehicle into motion. Failure to comply may result in death, personal injury, equipment damage, or property damage.

To fasten the belt:

1. Grasp the belt latch.
2. Pull the belt in a continuous slow motion across the chest and lap.
3. Insert the belt latch plate into the buckle on the inboard side of the seat.

4.



NOTE

Make sure there are no obstructions in or on the buckle that could prevent secure safety restraint locking.

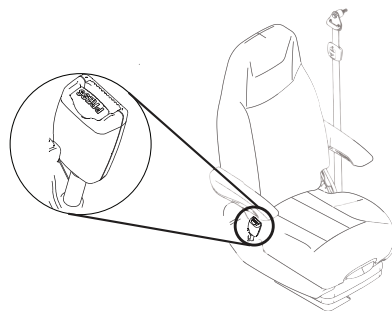
Push down until the latch is securely locked with an audible click.

5. Pull the belt to check for proper fastening and adjustment.
 - a. Pull the shoulder belt to make sure that the belt fits snugly across the chest and pelvis.
 - b. There must be less than one inch (in) (25 mm) gap between the body and the belt.
 - c. Position the shoulder restraint over the shoulder. Never allow a shoulder belt to rest against the neck. Never wear the belt under the arm.
 - d. Make sure that any slack is wound up on the retractor. Make sure that the belt is not twisted.

Result:

If the belt is locked, lean back to remove any tension in the belt. After releasing the belt, allow the belt to retract completely.

Guide the belt latch until the belt comes to a stop. To unfasten the belt, push the release button on the buckle. The seat belt indicator lamp switches on when the driver's seat belt is unfastened.



14.6 Tether Belts



WARNING

DO NOT remove, modify, or replace the tether belt system with a different tether system. A failed or missing tether belt could allow the seat base to fully extend in the event of an accident. Failure to comply may result in death or personal injury.

**WARNING**

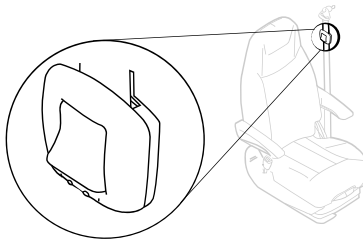
Ensure tether belts are adjusted so they are tight when the seat is in its highest and most forward position. An improperly adjusted tether belt may allow excessive movement during an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Make sure that the tether belt is attached to the cab floor and seat frame. It should be routed through the buckle on each side. Often the attachments are made using a split-type hook. Make sure both halves of the hook are around the anchor bracket.

Adjust an external tether by either lengthening or shortening the strap. To lengthen it:

1. Turn the buckle to a right angle to the webbing.
2. Then pull the buckle.
3. To shorten the tether, pull on the strap.

14.7 Komfort Latch Feature

**WARNING**

DO NOT set the Komfort Latch with too much slack. Too much slack may reduce the effectiveness of the seat belt. Failure to comply may result in death or personal injury.

To eliminate cinching, simply activate the Komfort Latch device located on the seat belt webbing at the appropriate time:

1. Adjust the seat to its proper driving position.
2. Latch the seat belt.

3. If available, adjust the seat belt height adjuster to a comfortable driving position.
4. While seated appropriately, push the "on" button to engage the Komfort Latch.
5. Lean forward in the seat until you hear a "click."
6. Return to normal driving position, and the Komfort Latch maintains the preset amount of tension relief.

Result:

More information and video tutorials can be found at: <https://www.imminet.com/resources/click-tug-snug/>

To disengage the mechanism unbuckle the seat belt and then press the **OFF** button of the Komfort Latch or tug on the shoulder strap.



14.8 Safety Restraint Maintenance

WARNING

Safety restraints can be damaged during everyday use at all parts of the assembly (such as webbing, bindings, buckles, or retractors). Since a damaged or worn safety restraint may not protect the wearer, if the restraint shows signs of damage or wear, it must be replaced. Failure to comply may result in death, personal injury, equipment damage or property damage.

WARNING

Any safety restraint that has stretched must be replaced. Since a damaged or worn safety restraint may not protect the wearer, if the restraint shows signs of damage or wear it must be replaced. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

A safety restraint that gets caught in vehicle hardware (such as the door, bunk, or seat) or rubs against a sharp object must be inspected. If the restraint shows signs of damage or wear, it may not protect the wearer and so must be replaced. Failure to comply may result in death, personal injury, equipment or property damage.

WARNING

All safety restraints and safety restraint systems on a vehicle that has been in an accident must be replaced, regardless of whether the safety restraint was in use at the time of the accident or the accident's severity. Visible and invisible damage or wear can prevent safety restraints from protecting the wearer. Failure to comply may result in death, personal injury, equipment or property damage.

WARNING

If the vehicle has been in an accident, all safety restraints and safety restraint

systems must be replaced, regardless of accident severity or whether the restraint was in use at the time of the accident. Visible and non-visible damage or wear can reduce the effectiveness of the safety restraint and may lead to restraint failure. Failure to comply may result in death, personal injury, equipment damage, or property damage.

NOTE

If any safety restraint is not working properly, see an Authorized Service Center for repair or replacement.

Damaged safety restraints in the cab must be replaced. Safety restraints that have been stretched, cut, or worn out may not protect you in an accident.

For further information on safety restraints and safety restraint maintenance, see Safety Restraint System - Inspection.

15 WHAT TO DO BEFORE STARTING THE VEHICLE

Safe Vehicle Operation

Make sure to perform pre-trip inspections before starting and operating the vehicle. For your safety, and bystanders, observe the following:

- If you drink alcohol, do not drive.
- Do not drive if you are tired, ill or under emotional stress.

Safe driving is only possible with the proper concentration on the driving task. Keep distractions to a minimum to improve concentration. Examples of distractions include radio controls, GPS navigation controls, cellular telephone calls, cellular text messages, reading or reaching for something on the floor. Minimizing distractions improves safe driving and helps avoid an accident involving death or personal injury.

Be aware of local regulations that surrounding the use of cellular telephones while driving. In addition to being an unsafe practice, some local or federal ordinances forbid you to use cellular devices while operating the vehicle.

The vehicle was manufactured with advanced engineering techniques, rigid quality control, and demanding inspections.

These manufacturing processes benefit from a safe driver, who observes the following and:

- knows and understands how to operate the vehicle and all its controls.
- maintains the vehicle properly.
- applies driving skills wisely.

This manual is not a training manual. It cannot tell you everything you must know about driving a vehicle. For that, you need a proper training program or truck driving school. If you have not been trained, get the proper training before you drive. Only qualified drivers should drive this vehicle.

For more information, refer to Department of Transportation Regulation 392.7, which states that interstate commercial motor vehicles are not to be driven unless the driver is sure that certain parts and accessories are in working order.

Do not drive under the influence of alcohol. Your reflexes, perceptions, and judgment can be affected by even a small amount of alcohol. You could have a serious or fatal accident if you drive after drinking. DO NOT drink and drive or ride with a driver who has been drinking.

WARNING

DO NOT operate the vehicle while impaired. The use of alcohol, drugs, and certain medications can impair perception, reactions, and driving ability. These circumstances can substantially increase the risk of an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

DO NOT text and drive. Your reaction time, perceptions, and judgment can be affected while texting or using any other form of mobile messaging while driving. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Emergency Equipment

It is good practice to carry an emergency equipment kit in the vehicle. If you have a roadside emergency, you will be equipped with the following items:

- Window scraper
- Snow brush

- Container or bag of sand or salt
- Emergency light
- Warning triangles
- Small shovel
- First aid kit
- Fire extinguisher
- Vehicle recovery hitches

Drivers Checklist

Make a thorough inspection every day before you drive. Daily inspections keep the vehicle in top shape. It also maintains a high level of safety for you, the passengers, and the load. You save maintenance time later, and the safety checks could help prevent a serious accident. Remember that Federal Motor Carrier Safety Regulation 392.7 requires a pre-trip inspection. So do commercial trucking companies.

The purpose of the inspections is to find anything that could interfere with the safe transportation of yourself, the passengers, and the load. If you find something wrong and cannot fix it yourself, have a qualified technician repair the vehicle.

The following operations must be performed by the driver: Performing these checks and following the maintenance procedures in this manual helps to keep the vehicle running properly.

16 VEHICLE LOADING

WARNING

DO NOT exceed the specified load rating. Overloading can result in loss of vehicle control, either by causing component failures or by affecting vehicle handling. Exceeding load ratings can also shorten the service life of the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Ensure the vehicle load is distributed evenly and avoids excessive load over any one axle. An unevenly distributed load or an excessive load over one axle can adversely affect the braking and handling of the vehicle. Even if your load is under the legal limits, be sure it is distributed evenly. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The Gross Vehicle Weight Rating (GVWR) and the maximum front and rear Gross Axle Weight Ratings are determined by the components installed from the factory. See the label on the inside edge of the driver's side door for vehicle axle weight ratings.

Gross Vehicle Weight Rating (GVWR) This specification is the MAXIMUM WEIGHT that the vehicle is allowed to carry. This weight includes the weight of the empty vehicle, the loading platform, occupants, fuel, and any load. Never exceed the GVWR of the vehicle.

Gross Combination Weight (GCW) This weight is the actual combined weight of the vehicle and its load: vehicle, plus trailers, plus cargo.

Gross Axle Weight Rating (GAWR) This weight is the total weight that one axle is designed to transmit to the ground. This number is listed on the inside edge of the driver's side door.

Load Distribution Make sure the vehicle's load is distributed so that no one axle exceeds its GAWR.

Regardless of a correct GAWR, the vehicle and its total load including trailers must never exceed the GCW.

17 VISUAL INSPECTION WHILE APPROACHING THE VEHICLE

While approaching the vehicle, inspect the general appearance of the vehicle and its surroundings for any signs of needed attention.



WARNING

If equipped with a three-piece roof fairing, DO NOT DRIVE WITH ROOF FAIRING FOLDED DOWN, since the marker lamps will not be effective in that position. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Perform these basic inspection steps before operating the vehicle.

1. Check the overall appearance and condition. Are windows, mirrors, and lights clean and unobstructed?
2. Is the air-intake opening clear of obstructions?
3. Check beneath the vehicle. Are there signs of fuel, oil, or water leaks?
4. Check for damaged, loose, or

missing parts. Are there parts showing signs of excessive wear or lack of lubrication? Have a qualified technician examine any questionable items and repair them without delay.

5. Check your load. Is it secured properly?

18 DAILY CHECKS



NOTE

These checks are in addition to, not in place of, Federal Motor Carrier Safety Regulations. These regulations may be purchased by writing to: Superintendent of Documents U.S. Government Printing Office Bookstore 710 N. Capitol St. N.W. Washington, DC 20402, or ContactCenter@gpo.gov.

Engine

- Engine oil
- Engine coolant
- Power steering fluid
- Engine belt
- Fuel filter (water separator) Fuel System.
- Windshield washer fluid

- Battery cables - check the condition of the battery and alternator cables for signs of chafing or rubbing. Make sure that all clamps (straps) holding the cables are present and in good working order.
- Hood latch
- Brake lines and hoses
- Steering components. Check for loose, broken, or missing parts. Check the pitman arm, drag link, tie rod, steering shaft, and power steering hoses.
- Hydraulic clutch fluid

Chassis and Cab Exterior

- Lamps - are any exterior lamps cracked or damaged? Perform an exterior lamp test. See Exterior Lighting Self-Test (ELST) for more information.
- Is the air-intake opening clear of obstructions?
- Window and mirrors - clean and adjusted?
- Tires, wheels, and hubs: Tires, Wheels, and Systems Check.
- Suspension components - check for loose or missing fasteners. Check damage to springs or other suspension parts such as cracks, gouges, distortions, bulges, or chafing.

- Brake lines and hoses - check lines, linkages, chambers, parking and service brake operation.
- Air system - Air System.
- Steps and grab handles
- Frame-mounted tanks (fuel, diesel exhaust fluid (DEF), and so on) - check underneath the vehicle for signs of fluid leaks. If any are found, correct before operating the vehicle. Is the tank fill cap secure? Are the tank straps tight? Is the strap webbing in place?
- Trailer connections - are they secure and the lines clear? If they are not being used, are they stored properly? Is the trailer spare wheel secure and inflated? Is the landing gear up and the handle secured?
- Fifth wheel - Is the kingpin or the sliding fifth wheel locked?

Cab Interior

- Seat - adjust the seat for easy reach of controls and visibility.
- Safety Restraints - fasten and adjust safety restraints (including sleeper bunk restraints).
- Steering column - adjust for easy reach and visibility.
- Mirrors - check and readjust mirrors if

necessary.

- Lamps - Turn the ignition key to the ON position to allow the bulb check and the systems check to test the truck systems. Perform an Exterior Light Self-Test.
- Instruments - Check all instruments (see Systems Check).
- Windshield - Check the operation of windshield wipers and washers.
- Horn - check operation of horn.
- Fuel - Check the vehicle's fuel level. Is there enough fuel?
- Diesel exhaust fluid (DEF) - check level. Is there enough fluid?
- Air conditioning (AC) filters in the cab and/or sleeper - check the condition of the sleeper air conditioning (AC) air filter. Keep the sleeper floor area behind the front passenger seat clear of debris and pet hair. The sleeper air conditioner draws air from this area. Excessive dirt or pet hair shortens the service life of the sleeper air conditioning (AC) air filter.

19 WEEKLY CHECKS

***i* NOTE**

These checks are in addition to, not in place of, Federal Motor Carrier Safety Regulations. These regulations may be purchased by writing to: Superintendent of Documents U.S. Government Printing Office Bookstore 710 N. Capitol St. N.W. Washington, DC 20402, or ContactCenter@gpo.gov.

Engine

- Belts
- Hoses
- Clamps
- Radiator
- Air filter and its housing
- Engine Aftertreatment system components
- Exhaust pipes
- Engine air pre-cleaner (option) - For vocational vehicles with optional engine air pre-cleaner, check the purge valve at the bottom of the hood mounted engine air pre-cleaner for any obstructions. Make sure the purge valve will open and close as needed to

purge dirt and water from the engine intake air.

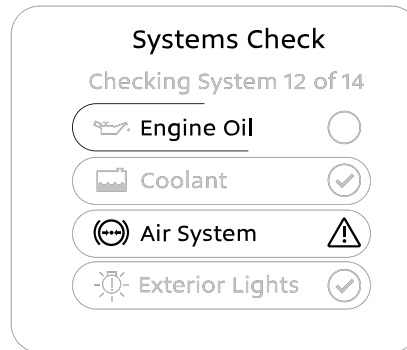
Chassis and Cab Exterior

- Battery - check battery and terminals.
- Wheel cap nuts - are they all in place and torqued properly - tighten if necessary. Wheels
- Controls and wiring - check for condition and adjustment
- Steering components - check pitman arm, drag link, intermediate shaft U-joint pinch bolt, tie rod, steering shaft and power steering hoses, etc., for loose, broken, or missing parts.
- Cab air conditioner fresh air filter - check for condition and cleanliness.
- PACCAR FX-20 Front Axle Kingpin Joint Grease/Tie Rod Ends (option) (VOCATIONAL USE) - For vocational vehicles with this axle, grease with Heavy-Duty Multipurpose Lithium Based: #1 or #2 grade, every 50 hours. (Refer to Front Axle and Suspension for maintenance instructions.)

20 SYSTEMS CHECK

Systems Check evaluates each monitored system and displays its fault status for the operator. The Systems Check can be viewed in the Notifications sub-menu. The Systems Check will also appear when the Exterior Lighting Self-Test (ELST) is activated.

Figure 14: Systems Check Display



This Systems Check example illustrates the following conditions:

- Engine Oil – Check in process
- Coolant – OK (no issues)
- Air System – Non-critical issue
- Exterior Lights – OK (no issues)

Other systems may also be checked depending on features installed.

Systems Check can be interrupted at any time by:

- Pressing **Select**
- Switching the ELST switch to OFF
- Turning the ignition key to OFF or ACC
- Releasing the Parking Brake

Once the Systems Check has completed, the results will display in a summary. A detailed explanation of this summary can be viewed by accessing the Menu after a Systems Check has completed. The Systems Check can also present the following optional features:

Setting the Trailer End Line

To Set Trailer End Line through the menu, with **Parking BRAKE ENGAGED**

Enter the menu – press (5).

Navigate to Set Trailer End Line – press (6) until Set Trailer End Line is highlighted.

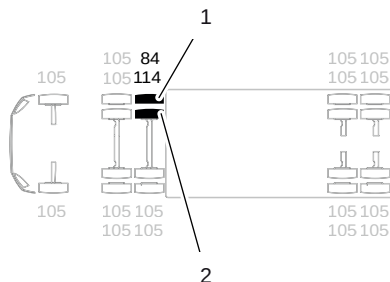
Enter Set Trailer End Line – press (5).

Locate the line to end of trailer – press (6) until the line is aligned with the end of trailer reference object.

Refer to Set Trailer End Line for more information.

Tire Pressure Monitoring System (TPMS) (option)

One of the systems the vehicle monitors is the Tire Pressure Monitoring System (TPMS).

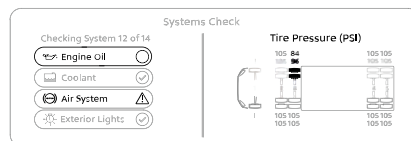


TPMS shows individual tire pressures for each location and will change the color of the tire:

- Outlined – Tire pressure not available
- Gray – Nominal
- Amber – High or low pressure
- Red – Very low or high pressure, or high temperature

To read about tires and recommended maintenance practices, see [Tires](#).

Figure 15: System Check with TPMS



Driver Rewards (option)

If enabled, the Driver Rewards score for Fuel Economy, Engine Idle Time, or both Fuel Economy and Engine Idle Time are shown, as well as general driving tips that can improve brake saving and fuel economy (see [Driver Rewards](#)).

Driver Performance Assistant (DPA) (option)

If enabled, The Driver Performance Assistant score for Braking Habits is shown, as well as general driving tips that can improve brake saving and fuel economy (see [DPA](#)).

CHAPTER 2: EMERGENCY

1	Roadside Assistance.....	41
2	Low Air Actions.....	41
3	Stop Engine.....	41
4	Low Oil Pressure.....	42
5	Engine Is Overheating.....	42
6	How to Inspect and Replace a Fuse.....	43
7	Where Are the Fuses Located?.....	45
8	How to Jump Start a Battery.....	45
9	How to Recover a Vehicle.....	47

1 ROADSIDE ASSISTANCE

Call toll-free to talk to someone at the PAC-CAR Customer Center.



Total Customer Support

1-800-4Peterbilt (1-800-473-8372).

The Customer Call Center is open 24/7-365 days a year. It is staffed with trained personnel (English and other languages if necessary), free of charge, to provide total roadside assistance. Their custom-mapping system can locate the nearest authorized dealers and Independent Service Providers (ISPs) based on the vehicle's location. In addition, the customer center can dispatch services for jump and pull starts, tires, trailers, fines and permits, chains, towing, hazardous clean-up, out of fuel (roadside), mechanical repairs, and preventive maintenance services. If they cannot answer a specific question, they can direct you to a representative who can.

2 LOW AIR ACTIONS



WARNING

If an air pressure warning light appears, an air pressure gauge changes color, or the low air pressure alert is heard, immediately bring the vehicle to a safe stop. If vehicle air pressure falls below 60 psi (4.14 bar/414 kPa), the spring brakes may abruptly stop the vehicle. DO NOT drive the vehicle until it is serviced. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

The instrument cluster gauges may appear (if hidden from view), change brightness, and change color to bring attention to a particular system.



These warning lights will illuminate during the start-up self-check. Take no action until you have given them time to extinguish. If either of these warning lights appear while

operating the vehicle, perform the following actions:

1. Slow down carefully.
2. Move a safe distance off the road and stop.
3. Place the transmission in neutral (park with an automatic transmission, if equipped). Set the parking brake.
4. Turn OFF the engine.
5. Turn ON the emergency flasher. Also use other warning devices to alert other motorists if you have them (reflective triangles, portable lights).

Result:

If the warning lights appear, or audible alarm sounds, (while not in start-up self-check) DO NOT attempt to drive the vehicle. Contact the nearest authorized dealer to have the problem corrected.

3 STOP ENGINE



This warning light appears with an audible alarm tone when a major engine system problem exists.

**WARNING**

If the stop engine warning light turns on, a serious engine system problem has occurred. Safely stop the vehicle and turn OFF the engine. DO NOT drive the vehicle until the vehicle has been serviced. Failure to comply may result in death, personal injury, equipment damage, or property damage.

4 LOW OIL PRESSURE

**CAUTION**

DO NOT operate your vehicle with insufficient oil pressure as this will cause serious engine damage. Failure to comply may result in equipment or property damage.

It is important to maintain oil pressure within acceptable limits. If oil pressure drops below the minimum psi (bar/kPa) the

oil pressure gauge illuminates and changes color. Additionally, the Stop Engine Lamp turns red.

1. Slow down carefully.
2. Move a safe distance off the road and stop.
3. Place the transmission in neutral (park with automatic transmissions, if equipped). Set the parking brake.
4. Turn OFF the engine.
5. Turn ON the emergency flasher. Use other warning devices to alert other motorists.
6. Wait a few minutes to allow the oil to drain into the engine oil pan. Check the oil level.
7. If necessary, add oil. If the problem persists, contact an authorized dealer as soon as possible.

Result:

5 ENGINE IS OVERHEATING

**CAUTION**

Routinely inspect cooling system hoses and clamps for damage. A cracked, split, worn, or loose hose or clamp could result in a leak, leading to a sudden loss of coolant resulting in an overheat condition. Failure to comply may result in equipment damage or property damage.

**NOTE**

The system may also temporarily overheat during severe operating conditions such as:

- Climbing a hill on a hot day
- Stopping after high-speed/high-load driving
- Debris blocking air flow through the cooling module (radiator)

If the engine overheats, DO NOT TURN THE ENGINE OFF UNLESS a low water warning device indicates a loss of coolant. The following applies if the engine coolant temperature rises, or is already above normal: (Also, there cannot be any other warn-

ing alarms displayed in the instrument cluster.) If so, complete the following steps:

1.



WARNING

DO NOT remove the coolant fill cap while the engine is hot. Wait until coolant temperature is below 120°F (50°C). Scalding steam and fluid under pressure may escape and cause serious burns. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT leave the engine idling without an alert driver present. If the engine overheats, as indicated by the coolant temperature light, take immediate action. Continued unattended operation, even briefly, may cause serious engine damage or a fire. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Reduce the engine speed. You can also stop the vehicle. If stopped,

place the transmission in neutral (N). Set the parking brake. Keep the engine running.



NOTE

Keep the engine running at idle speed. Only shut off the engine if a warning icon indicates to do so.

2. Check to make sure that the oil pressure gauge reads normal.
3. Make sure that the engine fan rotates by switching the **Engine Fan Switch** (if equipped) from AUTO to MAN (Manual).
4. Idle the engine to reduce the coolant temperature. If the temperature does not begin to drop, shut off the engine. Then contact the nearest authorized dealer.
5. If the temperature begins to return to normal, allow the engine to idle for 3 to 5 minutes. Shut it off only after the temperature returns to normal. Idling the engine allows the engine to cool gradually and uniformly.
6. If overheating came from severe operating conditions, the temperature must drop while parked. If it has not, stop the engine. Let it

cool before checking to see if the coolant is low.

7. Park on level ground to receive accurate readings. Check the coolant level at the coolant surge tank.

Result:

Check the coolant level after each trip when the engine is cool. The coolant level must be visible within the surge tank. If necessary, add coolant.

6 HOW TO INSPECT AND REPLACE A FUSE

Turn off the engine. Switch off all lights. Locate the fuses in either the cab, sleeper, or main power fuse box.

All the electrical circuits have fuses to protect them from a short circuit or overload. If an electrical component on the chassis stops working, the first thing you must check for is a blown fuse.



WARNING

Only replace a fuse with one of the correct size and amperage rating. Installing a fuse of the wrong rating may cause serious electrical damage or result in a

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

WARNING

DO NOT patch or repair fuses. This may cause a fire or otherwise damage the electrical circuit. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

If a circuit keeps blowing fuses, have the electrical system inspected for a short circuit or overload by an authorized dealer. Delaying could cause serious damage to the electrical system or vehicle. Failure to comply may result in equipment or property damage.

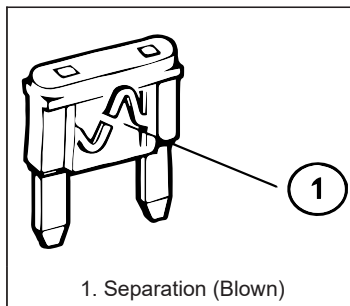
CAUTION

Before replacing a fuse, turn OFF all lights and accessories and remove the key from the start switch to avoid damaging the electrical system. Failure

to comply may result in equipment or property damage.

1. Switch off all lights and accessories. Remove the start key to avoid damaging the electrical system.
2. Determine from the chart on the fuse panel which fuse controls that component.
 - If the circuit has a fuse, remove that fuse. See if it is blown.
 - If the circuit has a poly switch, have the electrical system inspected by an authorized dealer.

Table 1: Blown Fuse



3.

WARNING

Always use an approved Type II modified reset polyswitch (circuit breaker) with a current rating equal to or less than the polyswitch being replaced. Never use a Type I (automatic reset) or Type III (manual reset) polyswitch. Use of an improper polyswitch can result in a temperature increase along the electrical path causing severe damage to the electrical system. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

Always close and latch the engine compartment fuse box cover. A latched cover ensures a watertight seal which will protect electrical components. Failure to comply may result in equipment or property damage.

If the fuse is blown or faulty due to internal damage, short circuit, or cor-

rosion on the fuse terminals, replace it with a fuse of the same rating (or lower rating if necessary). If an electrical component displays signs of a blown fuse without being visibly blown, it is advisable to temporarily use a fuse from a non-essential system (for example, an accessory's circuit or radio) in a roadside/emergency situation.

7 WHERE ARE THE FUSES LOCATED?

Fuses for the cab are located in the fuse panel behind the driver's side kick panel. Main power relays are located in the Power Distribution Center (PDC), in the engine compartment, mounted to the front wall of the cab.

Fuses for the optional sleeper are located in a separate fuse box accessible through the luggage compartment door.

8 HOW TO JUMP START A BATTERY

WARNING

DO NOT ignore any safety procedure as the battery can overheat and catch fire or explode. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Never jump start a battery near fire, flames, or electrical sparks. Batteries generate gases that could explode. Keep sparks, flames, and lighted cigarettes away from batteries. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

When jump starting using a battery charger/booster, verify that the battery charger/booster is set to the same jump start voltage and amperage specifications as the vehicle electrical system and batteries (for example, if the vehicle electrical system is a 12 volt system, the jump start voltage on the battery charger/booster shall be set at no

higher than a 12 volt setting). Applying a higher voltage will cause expensive damage to electronic components. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Heed all warnings and instructions of the jumper cable manufacturer. Failure to comply may result in death, personal injury, equipment or property damage.

CAUTION

Not following the prescribed jump-start procedure can damage the alternator or cause serious damage to both vehicles. Failure to comply may result in equipment or property damage.

CAUTION

Vehicles equipped with an Engine Start Module (ESM) should not be jumped using the ESM Starter terminal (S+) to avoid arcing or battery damage. Failure

to comply may result in equipment or property damage.

1. Remove any conductive jewelry. It cannot come in contact with the battery terminals.
2. Select a jumper cable that is long enough to attach to both vehicles. Make sure that neither vehicle touches each other.
3. Position the two vehicles together, but do not allow them to touch.
4. Turn OFF all lights, heater, radio, and any other accessory on both vehicles.
5. Set the parking brake.
6. Shift the transmission into park position or neutral for manual transmissions.
7. If either vehicle is equipped with battery disconnects, make sure that they are in the **OFF** position before connecting the two vehicles.
8. Attach one end of a jumper cable to the **positive (+)** terminal of the discharged (dead) battery. The positive terminal has a large red + or P on the battery case, post, or clamp.

**NOTE**

If your vehicle is equipped with an Engine Start Module (ESM), attach the positive (+) cable to the vehicle battery and not the ESM Starter terminal (S+). See the Maxwell Installation Guide and User Manual for additional information about LED status conditions, maintenance, and troubleshooting.

9. Attach the other end of the same cable to the **positive (+)** terminal of the good (booster) battery.
10. Attach the remaining jumper cable **FIRST** to the negative (-) terminal (black or N) of the charged battery.
- 11.

**WARNING**

Always connect the cables from positive to positive (+ to +) and negative to negative (- to -). Improperly attaching the cables could cause the battery to explode. Failure to comply may result death, personal injury,

equipment damage, or property damage.

Attach the other end of the negative cable to the negative (-) terminal of the dead battery.

12. If either vehicle is equipped with battery disconnects, make sure that they are in the **ON** position.
13. Start the vehicle that has the good battery first.
 - Let it run for 5 minutes, or
 - If charging a system containing an Engine Start Module (ESM), let it run for 15 minutes. Briefly pressing the Push-to-Test button on the ESM indicates the ESM's charge state. When the status LED presents a solid green light, the ESM is sufficiently charged.
14. Start the vehicle that has the discharged (dead) battery.

Result:

The engine must start. If the engine fails to start, do not continue to crank the starter. Instead, contact the nearest authorized dealer.

**WARNING**

When disconnecting jumper cables, make sure they do not get caught in any moving parts in the engine compartment. Failure to comply may result in death, personal injury, equipment or property damage.

Reverse the above procedure exactly when removing the jumper cables. With the engine running, disconnect the jumper cables from both vehicles in the exact reverse order. Make sure to first remove the negative cable from the vehicle with the discharged battery.

9 HOW TO RECOVER A VEHICLE

9.1 How to Recover a Vehicle

**CAUTION**

Remove the drive axle shafts or lift the driving wheels off the ground before towing the vehicle. Towing the vehicle with the wheels on the ground and the

axle shafts in the axles will cause damage to the axle gears. Failure to comply may result in equipment or property damage.

**CAUTION**

When towing vehicles with a driver-controlled main differential lock, install the caging bolt for the differential lock so that internal components maintain their position. Failure to comply may result in equipment or property damage.

**CAUTION**

DO NOT attach recovery rigging to bumpers or brackets. Connect to appropriate hitch points using the proper double chain setup to properly distribute weight. Failure to comply may result in equipment or property damage.

**WARNING**

Before towing a vehicle with a connected air system, test and inspect the recovery vehicle air system and brakes to ensure they are connected correctly

and working properly. If the vehicle's air system is improperly connected it could lead to a loss of vehicle control, causing an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

All lubricating and clutch application oil pressure is provided by an engine-driven pump, which will not work when the engine is stopped. You could seriously damage your vehicle by towing it with the driveline connected and the drive wheels on the ground. When vehicles are towed, either by wrecker or piggyback, the lubricant in the top front of the drive axle will drain to the rear and will leave the top components dry. The resulting friction may damage them. Always remove the main drive axle shafts before towing your vehicle.

1. Review and understand all the cautions and warnings of this section.
2. Disconnect the drive axle shafts and cover the open hubs. This is necessary because no lubricant will reach the gears and bearings if the transmission is driven by the driveshaft (rear wheels on the ground), causing damage to the transmission.

See Preparing the Axles for Towing.

3. Connect the towing chain or cable using best recovery practices.
See Best Practices for Recovery Rigging.
4. Make sure the recovered vehicle's parking brake is released.
See Parking Brake Manual Release.
5. If you desire to use the recovered vehicle's brake, ensure that the vehicle's air system is connected to that of the recovery vehicle. Ensure that any air line that has been removed from a driver-controlled main differential lock is firmly capped to prevent loss of air pressure from the recovery vehicle if it is supplying air pressure. If you do not desire to use the recovered vehicle's brake, ensure that you cage the spring brakes before attempting to move the vehicle.
See Manually Locking a Differential.
6. Follow state/provincial and local laws that apply to vehicles in tow.
7. Do not tow vehicles at speeds in excess of 55 mph (90 km/h).

Result:

For additional information concerning heavy duty truck recovery, refer to the following Technology & Maintenance Council (TMC) literature.

- Recommended Practice #602-A — "Front Towing Devices For Trucks and Tractors"
- Recommended Practice #602-B — "Recovery Attachment Points For Trucks, Tractors, and Combination Vehicles"
- Recommended Practice #626 — "Heavy Duty Truck Towing Procedures"

Copies of this literature can be obtained from the following address: Technology & Maintenance Council 950 N. Glebe Road Arlington, VA 22203 Phone: (703) 838-1763 Email: tmc@trucking.org Website: <https://tmc.trucking.org/>

9.2 Parking Brake Manual Release

When brake air pressure is too low, you cannot release the parking brake from the cab. In such cases, the parking brake (or spring brake) can be manually released.



WARNING

DO NOT drive a vehicle with malfunctioning brakes. If one of the brake circuits (front or rear) becomes inoperative, braking distances will increase substantially and handling characteristics while braking will be affected. Bring the vehicle to a safe stop and have it towed to the nearest dealer or qualified repair facility. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT operate a vehicle when the spring brakes have been manually released. Driving a vehicle after its spring brakes are manually released is extremely dangerous. The brakes may not function. Failure to comply may result in death, personal injury, equipment or property damage.



WARNING

DO NOT disassemble a spring brake chamber. These chambers contain a powerful, compressed spring that

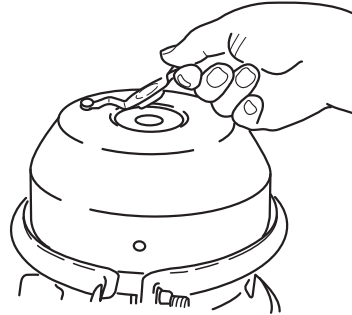
would become dangerous if suddenly released. Failure to comply may result in death, personal injury, equipment damage, or property damage.

⚠ WARNING

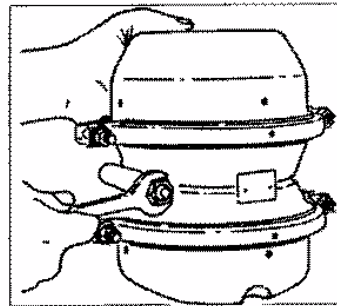
Before manually releasing the spring brakes, always secure the vehicle with wheel chocks, chains, or other safe means to prevent the vehicle from rolling. An unattended, rolling vehicle could lead to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Manually release the spring brake system by performing the following procedure:

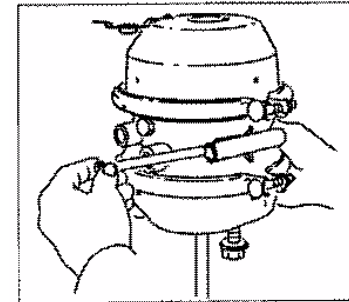
1. Remove the cap from the spring chamber.



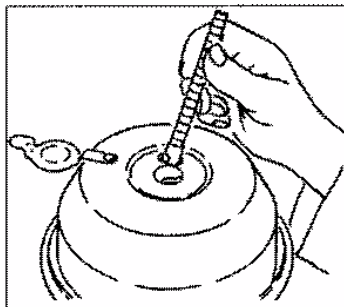
2. Remove the release stud assembly from the side pocket. Then remove the release nut and washer from the release stud.



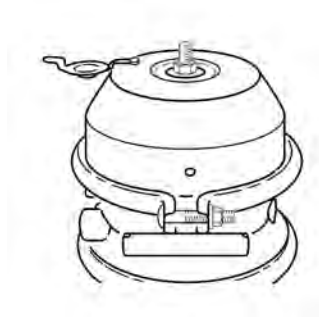
3. Slide out the release stud.



4. Insert the release stud through the opening in the spring chamber where the cap was removed. Insert it into the pressure plate. Turn the release stud 1/4 turn clockwise in the pressure plate. This action secures the cross pin into the cross pin area of the pressure plate. It also locks it into the manual release position.

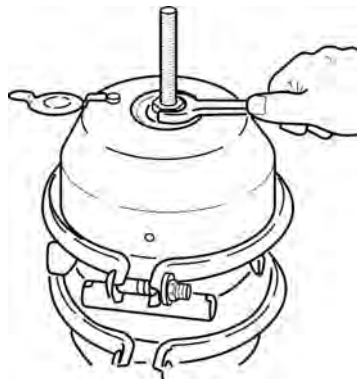


5. Assemble the release stud washer and nut on the release stud.



6. With a wrench, turn the release stud assembly nut until the compression spring is 90-95 percent caged. While turning, make sure that the

pushrod (adapter pushrod, or service pushrod) retracts. DO NOT over-torque the release stud assembly. (S-cam-type maximum: 50 lb-ft (68 N·m), Wedge-type maximum: 30 lb-ft (41 N·m)). The spring brake is now mechanically released.

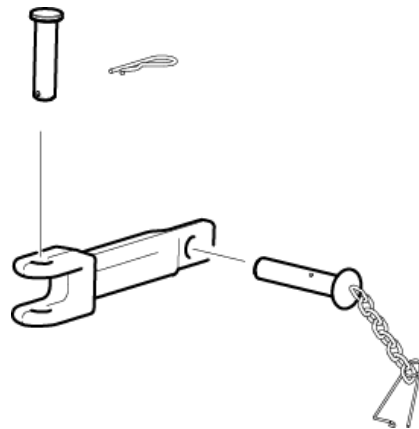


9.3 Recovery Hitch

The vehicle is equipped with a removable recovery hitch. This hitch is a device that attaches to the sockets in the front bumper used when the vehicle requires recovery. These hitches are designed for short distance and intermittent duty to help pull a

vehicle. These hitches are not designed to be used as towing devices for a long distance.

Specially designed hitches are required to recover the vehicle. The recovery hitches attach to the frame. Two hitch assemblies, made up of the following parts, are recommended for the proper recovery of the vehicle:



If the vehicle is not equipped with the proper recovery hitch assembly, contact an authorized dealer to obtain the proper equipment.

**WARNING**

DO NOT use parts from other vehicles or substitute materials to repair or replace a recovery hitch. Only use components specifically designed and rated for vehicle recovery to ensure structural integrity and safety. Failure to comply may result in death, personal injury, equipment damage, or property damage.

**CAUTION**

DO NOT attach recovery rigging to bumpers or brackets. Connect to appropriate hitch points using the proper double chain setup to properly distribute weight. Failure to comply may result in equipment or property damage.

9.4 How To Use a Recovery Hitch

**CAUTION**

Recovery pull maximums assume that the tow rigging evenly distributes the

load between both recovery hitches. Connect the rigging according to recovery rigging instructions to avoid serious vehicle damage. Failure to comply may result in equipment or property damage.

**CAUTION**

When recovering ditched or bogged vehicles, stay well below maximum capacities. Even at loads below maximum, the stresses of extraction can damage various parts of the vehicle. Failure to comply may result in equipment or property damage.

Use the following procedure to install the Vehicle Recovery Hitches. See the Recovery Hitch Assembly illustration for part identification.

1. Check the square sockets behind the lower front bumper for obstructions. If necessary, clear them.
2. With lock pins removed, insert the hitches through the bumper and into the square hitch socket.
3. Align the hole in the tow hitch with the square hitch socket hole.
4. Insert the lock pin into the square hitch socket hole. Make sure that the

lock pin lock tab is within the socket.

5. Rotate the lock pin 90 degrees to secure the pin in place.
6. Make sure to install the tow pin and lock clip before using the hitch.
7. Remove the hitches after recovering the vehicle. Store all parts for future use.

9.5 Preparing the Axles for Towing

Towing the vehicle with the front end raised can damage the differentials. To avoid this damage, prepare the axles before towing.

It is possible to connect the air lines of both vehicles during towing. If so, make sure that the recovered vehicle does not have an open air line. An open air line on the recovered vehicle causes a leak in the air system of the recovery vehicle. This leak could cause a loss of system air, which can cause the service brakes not to function. This failure results in the sudden application of the spring brakes causing wheel lock-up and loss of control. This condition can lead to a rear-end collision with a following vehicle.

**WARNING**

If a recovery vehicle is supplying air pressure, ensure any disconnected air lines from a driver-controlled main differential lock are firmly capped. An open air line on the recovered vehicle will cause a leak in the recovery vehicle air system when both vehicles' brake systems are connected. This could lead to a loss of system air and may result in the sudden application of the parking (spring) brakes, resulting in wheel lock-up, possible loss of control, or overtake by a following vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

1.

**CAUTION**

Lift the driving wheels off the ground or remove the driveline and axle shafts before towing the vehicle. All lubricating and clutch application oil pressure is provided by an engine-driven pump, which does not work when the engine is stopped. When vehicles are towed either by wrecker

or piggyback, lubricant in the top front of the drive axle will drain to the rear, leaving the top components dry. This results in friction that will seriously damage top axle components. Failure to comply may result in equipment or property damage.

Lift the driving wheels off the ground. Alternatively, you can remove the driveline and axle shafts before towing the vehicle.

2. If the vehicle has a driver-controlled differential lock, then manually lock the differential.
3. Remove drive axle shafts.
- 4.

**CAUTION**

Cover hubs with plastic whenever a drive axle shaft is removed. Water, dirt, and other materials can enter an open hub or axle and contaminate the axle fluid, possibly damaging axle components. Failure to comply may result in equipment or property damage.

Cover the open ends of the hubs to prevent dirt and debris from entering the axle.

9.6 Manually Locking a Differential

Follow these procedures if the vehicle has a driver controlled differential lock.

Always lock the differential when the axles are being removed to aid in re-installation.

This procedure should be done before the axle shafts are removed.

**CAUTION**

When towing vehicles with a driver-controlled main differential lock, install the caging bolt for the differential lock so that internal components maintain their position. Failure to comply may result in equipment or property damage.

**WARNING**

If a recovery vehicle is supplying air pressure, ensure any disconnected air lines from a driver-controlled main

differential lock are firmly capped. An open air line on the recovered vehicle will cause a leak in the recovery vehicle air system when both vehicles' brake systems are connected. This could lead to a loss of system air and may result in the sudden application of the parking (spring) brakes, resulting in wheel lock-up, possible loss of control, or overtake by a following vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

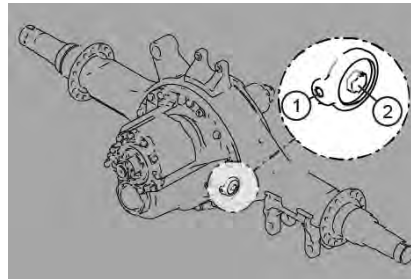
WARNING

If a recovery vehicle is not supplying air to the recovered vehicle, cage the recovered vehicle's brakes. A non-operating vehicle has the spring brakes applied. Those brakes need to be caged so the wheels can roll during a tow. Failure to comply may result in death, personal injury, equipment damage, or property damage.

- To use the recovered vehicle's brakes, connect the vehicle's air system to that of the recovery vehicle. Firmly cap any air line that has been removed from a driver-controlled main differential lock.

The cap prevents loss of air pressure from the recovery vehicle.

- If you are not using the recovered vehicle's brakes, cage the spring brakes before attempting to move the vehicle.



- Remove the air line and firmly cap the air line from the vehicle. (2)
- Remove the caging bolt from its storage hole. (1)
- Screw the caging bolt into the air line hole. (2)
- When fully engaged, a 0.25-0.5 in. (6.35-12.7 mm) space will remain between the air cylinder and the bolt head. This action will lock the differential by pushing a piston into a "lock" position.

9.7 Recovery Hitch Capacities

The maximum rated loads for vehicle recovery varies depending on the direction or angle of pull. These capacities are listed in the table below and are for the two hitches working together, simultaneously.

Direction of Pull	Maximum Capacity lbs. (kg)
Directly forward	80,000 (36,000)
Directly vertical or horizontally to the side	14,600 (6,600)
45 degrees in any direction	20,000 (9,000)

9.8 Best Practices for Recovery Rigging

CAUTION

Recovery pull maximums assume that the tow rigging evenly distributes the load between both recovery hitches. Connect the rigging according to recovery

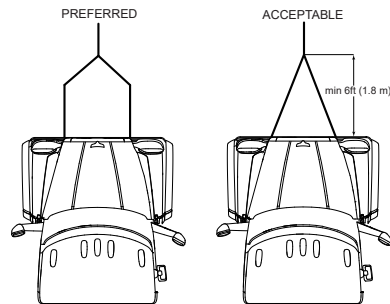
ery rigging instructions to avoid serious vehicle damage. Failure to comply may result in equipment or property damage.



CAUTION

When recovering ditched or bogged vehicles, stay well below maximum capacities. Even at loads below maximum, the stresses of extraction can damage various parts of the vehicle. Failure to comply may result in equipment or property damage.

Table 2: Recovery Rigging Options



Use a double chain or cable setup that distributes the load equally to both hitches (see either example in the Recovery Rigging Options illustration):

- Never loop a single chain or cable through both hitches, also known as reeving (not shown).
- Use a spreader or equalizer bar to distribute the load on both hitches (preferred), or
- If a spreader bar is unavailable: connect the main tow chain or cable no closer than 6 ft. (1.8 m) from the vehicle (acceptable).
- Secure the towed vehicle using two additional chains or cables.

9.9 Returning to Service After Recovering

Once the vehicle is recovered, the axles must have oil added to prevent gear damage during operation.

1. Into the pinion cage, add 1 pt (.47 L) of lubricant or into the interaxle differential, add 2 pt (.94 L) of approved lubricant.
2. After adding the specified type and amount of lubricant, drive the

vehicle. It must be unloaded. Drive 1 mi to 2 mi (1.5 km to 3 km) at a speed lower than 25 mph (40 km/h). This action circulates the lubricant through the assembly.

3. If the parking brake is manually released, they must be modified back to their normal operating condition.
4. If the differential lock was manually locked, it must be re-locked. The caging bolt must be put back in its storage location. The differential lock air line must also be re-installed in its normal position.

Result:

Add the correct lubricant back to the axles after recovering the vehicle and before putting it back into service.

9.10 What to do if the Vehicle is Stuck in Sand, Mud, Snow, or Ice



WARNING

DO NOT spin the wheels faster than 35 mph (55 km/h). Under some conditions, a tire may spin twice as fast as

that shown on the speedometer. Spinning a tire faster than 35 mph (55 km/h) could cause tread separation or the tire to explode. Failure to comply may result in death, personal injury, equipment damage, or property damage.

These suggestions are provided to improve the ability to free a vehicle if the vehicle gets stuck in sand, mud, snow, or ice:

- Move the gearshift lever or selector from first gear to reverse.
- Apply light pressure on the accelerator pedal while the transmission is in gear.
- Remove the foot from the accelerator while shifting.
- Do not race the engine.
- For the best traction and safety, avoid spinning the wheels.

Follow these practices to avoid transmission damage:

- Always start the vehicle in motion with the shift lever in first gear.
- Make sure that the transmission is fully engaged in gear before releasing the clutch pedal (manual only).
- Do not shift into reverse while the vehicle moves forward.

- Another vehicle can be used to pull the vehicle free. If so, do not permit the vehicle to be towed for long distances before removing the driveshaft.

If tire chains are needed, make sure that they are installed on both sides of the driving axle. Installing chains on only one side of the axle can cause equipment damage.



CAUTION

DO NOT install tire chains on only one tandem axle. Installing chains on the tires of only one tandem axle can damage the driveline U-joints and the inter-axle differential. Failure to comply may result in equipment or property damage.

9.11 Towing the Vehicle

Dealer or commercial towing services have the necessary equipment to tow the vehicle safely. The towing service is aware of towing regulations and safety precautions.

Using a towing service makes sure that the following precautions are taken:

- Use of a safety chain system
- Follow all local towing regulations
- Make sure that the towing device does

not contact any surfaces that could be damaged while in transit

- If towing from the front, make sure that the rear axles are prepared for towing
- If towing from the rear, make sure that all body components are secured. These items can include roof, side, and chassis fairings. Damage occurs if you do not secure these items.



WARNING

Secure the roof, side, and chassis fairings while towing from the rear. An unsecured fairing may come off of the vehicle during transit while towing from the rear. Failure to comply may result in death, personal injury, equipment damage, or property damage.

- If towing from the rear in a tractor configuration vehicle, make sure that the roof fairings are removed. Damage occurs if you do not remove them.

CHAPTER 3: CONTROLS

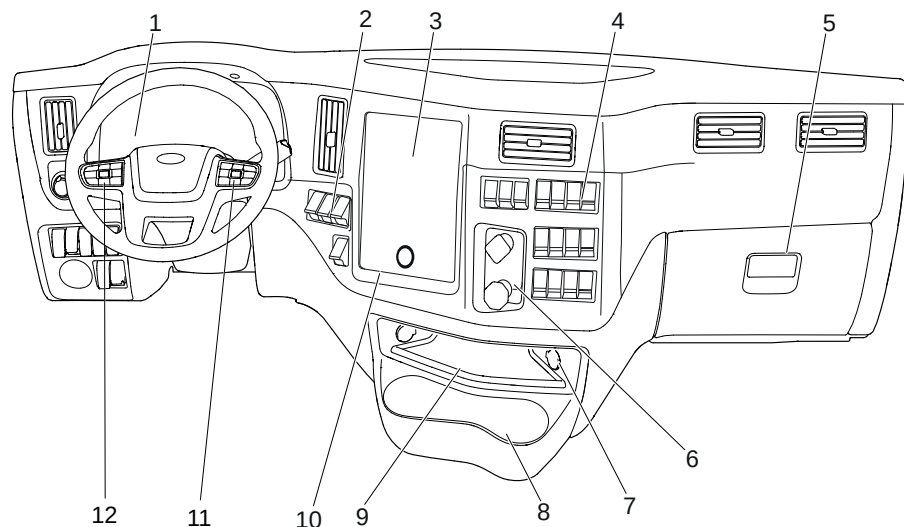
1	Instrument Cluster.....	58
2	Steering Wheel Controls.....	61
3	Steering Column Controls.....	62
4	Digital Display Controls.....	67
5	Digital Display.....	68
6	Selecting a View.....	73
7	Menu Configurations.....	79
8	Truck Information.....	84
9	Drive Summary.....	84
10	Driver Rewards (option).....	84
11	Driver Performance Assistant (Option).....	85
12	Bulb Check.....	86
13	Notifications.....	86
14	Warning Lights and Indicators.....	87
15	Optional Gauges.....	105
16	Dash Switches.....	106
17	Auto Start (Option).....	128

18	Door Mounted Mirror Controls.....	131
19	Digital Mirror System.....	132
20	Heating and Air Conditioning (AC).....	146
21	Sleeper Alarm Clock.....	156
22	Auto Start Sleeper Temperature Control.....	157
23	Cab Accessories.....	159

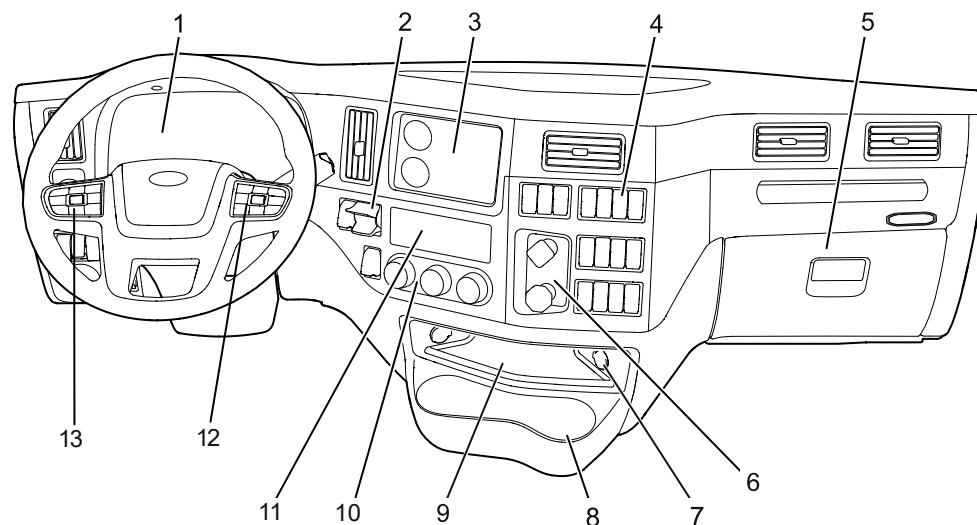
1 INSTRUMENT CLUSTER

For information on using the dash and instrument cluster options while driving, see the paragraphs that follow. Please remember that each vehicle is custom-made. Your instrument panel may not look exactly like the one in the pictures that follow. We have tried to describe the most common features and controls available.

Table 3: Instrument Panel with SmartDisplay



1. Digital display
2. Compact trailer valve
3. SmartDisplay (or optional gauges)
4. Switches
5. Glove box
6. Parking brakes
7. USB ports, 12 V outlet, or lighter
8. Cupholders
9. Wireless charger
10. Air conditioning controls
11. Steering wheel switches (right switch pod)
12. Steering wheel switches (left switch pod)

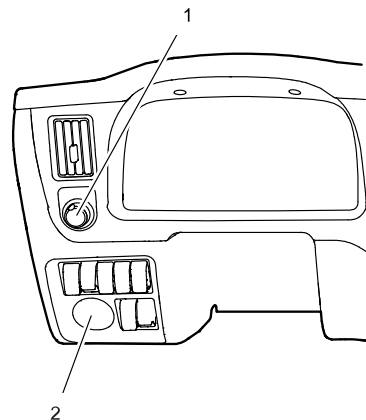
Table 4: Instrument Panel without SmartDisplay

1. Digital display
2. Compact trailer valve
3. Optional content panels (gauges, storage, bins, etc.)
4. Switches
5. Glove box
6. Parking brakes switches
7. USB ports, 12 V outlet, or lighter
8. Cupholders
9. Wireless charger
10. Air conditioning
11. Radio
12. Steering wheel switches (right switch pod)
13. Steering wheel switches (left switch pod)

i NOTE

For more information on SmartDisplay features, refer to Peterbilt SmartDisplay Operator's Manual.

Left-Side Dash



1. Ignition Switch
2. Master Lighting Switch

2 STEERING WHEEL CONTROLS

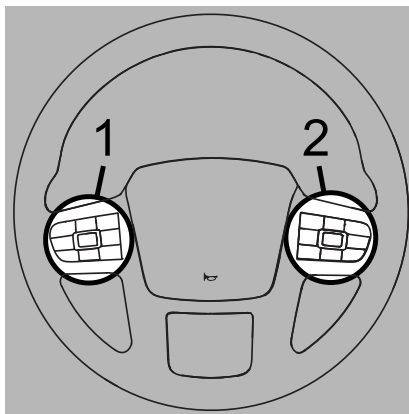
2.1 Steering Wheel Controls



WARNING

DO NOT attempt to service the steering wheel, clockspring, steering components (steering column, steering drive-line, or steering gear), or any electrical wiring in the multiplex system. Tampering with these components may affect steering and lead to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The steering wheel contains controls for commonly used functions to help operator keep their hands on the steering wheel. These controls are also used to interface with the display.



1. Left switch pod
2. Right switch pod

Switches on the left side of the horn pad may include: cruise control functions, way-point marking, an optional road speed limiter, and an optional toggle to set functions such as variable road speed limiter (VRSL), adaptive cruise control (ACC), and predictive cruise control (PCC). See Cruise Control.

Switches on the right side of the horn pad control the SmartDisplay (see Cab Accessories) as well as navigate and configure the instrument cluster (see Digital Display on page 69).

2.2 City Horn

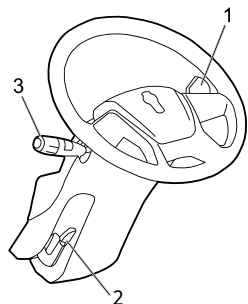
Depressing the horn pad in the center of the steering wheel activates the city horn.

2.3 Air Horn

Your vehicle may be equipped with optional air horns. To operate, pull on the lanyard extending from the overhead panel on the driver's side.

3 STEERING COLUMN CONTROLS

3.1 Steering Column Controls



1. Engine brake and/or shifter lever
2. Tilt/telescope lever
3. Turn signal lever

Turn Signal Lever

This lever controls several functions: turn signal, high beam, and windshield wiper control. The turn signal lever will only operate when the key is in the ignition in the ACC or ON position.

Tilt/Telescope Lever

The steering column both tilts and telescopes to allow optimal comfort, visibility to the instrument panel, and reach to the pedals or steering wheel.

- The tilt feature allows the wheel to be moved up and down.
- The telescoping feature allows forward and rearward movement of the wheel.



WARNING

Only adjust the tilt/telescoping steering wheel while the vehicle is stopped. Adjusting it while driving can cause a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Engine Brake and/or Shifter Lever

Depending on your vehicle's configuration, this lever will control engine brakes and might also have integrated transmission shifter controls.

3.2 Turn Signal Lever

HOW TO USE THE TURN SIGNAL

The lever-action turn signal/high beam switch is located on the left side of the steering column. The start key switch must be turned to ON for the signal/switch to operate.

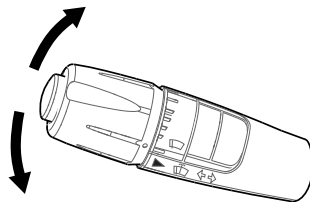


WARNING

If the turn signal lamps or turn signal indicators begin flashing at an accelerated rate (115 cycles per minute) there might be a problem with the turn signal stalk or module, and not the bulb. Please contact your nearest authorized dealer to have the problem corrected as soon as possible. Failure to comply may

result in death, personal injury, equipment damage, or property damage.

1. Push the **Signal stalk** lever up to engage the RIGHT turn signal and down to engage the LEFT turn signal.



2. Release the signal stalk.
3. To cancel the turn signal, move the lever back to the middle position.

Result:

An audible beep is associated with each time a turn indicator is activated.

WARNING

After you complete a turn, shut the turn signal off by returning the lever to the "OFF" (center) position. Failure to shut off a turn signal could confuse other drivers and result in an accident. An indicator light in the instrument panel will

flash until the turn signal is turned off. Failure to comply may result in death, personal injury, equipment damage, or property damage.

HIGH BEAM OPERATION

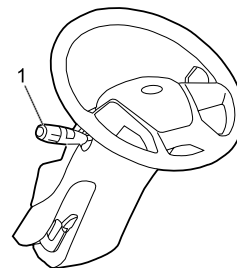
WARNING

DO NOT use high beams in the presence of oncoming traffic. High beam glare can blind other drivers which increases the risk of an accident. Failure to comply may result in death, personal injury, equipment, or property damage.

NOTE

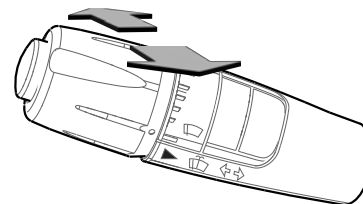
The high beams and flash-to-warn activation methods use the same action. To activate the high beams, turn the low beams ON. To activate flash-to-warn, turn the low beams OFF.

High beams are operated using the turn signal lever:



1. Turn signal lever

1. When the headlights are ON, pull the **Turn Signal** towards the operator until it clicks.



2. Release the **Turn Signal** lever to the original position. This will cycle the headlights between low and high beam.

Result:

The blue, high beams indicator light on the instrument panel will be lit when the high beams are active.

EXTERIOR LIGHTING FLASHES

This vehicle comes equipped with exterior lighting flashes used to signal other drivers on the road.

FLASH-TO-WARN**! WARNING**

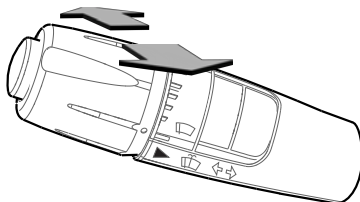
DO NOT use high beams in the presence of oncoming traffic. High beam glare can blind other drivers which increases the risk of an accident. Failure to comply may result in death, personal injury, equipment, or property damage.

i NOTE

The high beams and flash-to-warn activation methods use the same action. To activate the high beams, turn the low beams ON. To activate flash-to-warn, turn the low beams OFF.

Flash-to-warn, or "high beams flash", allows the operator to warn other drivers by briefly flashing the high beam headlights when the headlights are turned OFF. To activate flash-to-warn:

1. When the headlights are OFF, pull the turn signal lever towards the operator to flash the headlights.



- 2.

! WARNING

DO NOT hold the turn signal lever longer than necessary when activating flash-to-warn. The high beams could blind other drivers and increase the risk of an accident. Failure to comply may result in death, personal injury, equipment, or property damage.

Release the turn signal lever to the original position to end the flash-to-warn function.

Result:

The blue high beams indicator light on the instrument panel will momentarily turn on while the high beams are active.

FLASH-TO-PASS

Flash-to-pass, sometimes called "low beams flash", allows the operator to signal other drivers. The flash looks different depending on the vehicle's headlight type.

Halogen headlamps act one of three ways based on the headlight's initial state:

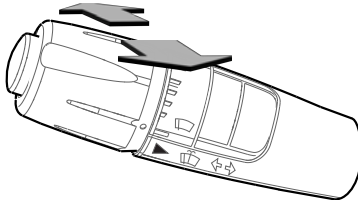
- If the low beam headlights are ON, the flash-to-pass operation will momentarily dim the headlights.
- If the low beam headlights are OFF, the flash-to-pass will turn ON and then flash the low beam headlights.
- If the high beam headlights are ON, the flash-to-pass will turn OFF the high beams and flash the low beams.

For LED (option) and HID headlamps, the flash-to-pass operation will flash the high beams. The high beams will turn off immediately after the operation is complete. Flash-to-pass does not affect the state of HID and LED low beams.

Regardless of the headlamp type, if the vehicle is using high beams, flash-to-pass will immediately deactivate the high beams. The high beams must be reactivated again after flash-to-pass is complete.

To activate flash-to-pass:

1. Push the turn signal lever away from the steering wheel.

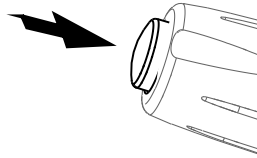


2. Release the turn signal lever to the original position.

FLASH-TO-THANK

Flash-to-thank, or "marker lights flash", allows the operator to signal other drivers by changing the state of the marker lights. To activate flash-to-thank:

1. Press the button at the end of the turn signal lever to invert the state of the marker lights



2. Release the button to return to the original state of the marker lights.

OPERATE THE WINDSHIELD WIPERS



WARNING

Clean blades regularly with a damp cloth to remove road film and wax buildup. DO NOT drive with worn or dirty wiper blades. They can reduce visibility, making driving hazardous which may lead to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

This vehicle is equipped with a two speed, intermittent windshield wiper system. The windshield wiper system is integrated with the exterior lights so that the low beam

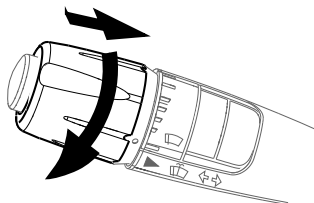
headlights will turn on when the windshield wipers turn on.

To override this function once, turn the headlights on and then off again. To permanently override this function, open the settings menu, select **Settings > Wiper Interlock** in the instrument cluster display, and select OFF.

Use washer fluid when running the wiper blades over a dry windshield to reduce the chance that the blades may scratch the glass. Scratched windshields reduce visibility.

A seven-position rotary wiper switch (located on the turn signal lever) operates the windshield wipers and washer. If you need to use the windshield wipers:

1. Rotate the end of the turn signal lever to change the wiper mode from off to on.
2. Rotate the outer knob of the turn stalk lever to adjust the wiper speed.



- Four levels of intermittent speeds
- Low wiper speed
- High wiper speed

Result:

HOW TO SPRAY WINDSHIELD WASHER FLUID

This vehicle is equipped with a function to wash the windshield and simultaneously engage the wipers.



CAUTION

DO NOT use antifreeze or coolant in the windshield washer reservoir. These are harmful fluids to the seals and other components. Failure to comply may result in equipment or property damage.

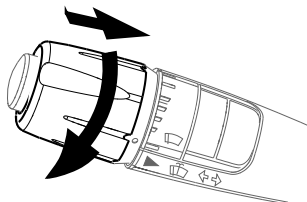


CAUTION

DO NOT operate the electric pump for a long period (more than 15 seconds) with a dry reservoir, or the pump motor may be damaged. Failure to comply may result in equipment or property damage.

If you need to use the windshield washer:

1. Push the **Turn Signal Lever Outer Knob** in.

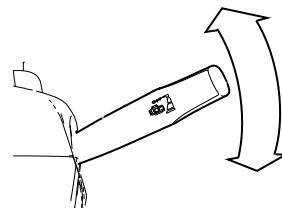


- Press and hold will activate the washer fluid and wipers.
- Instant press and release will activate the washer fluid only.

3.3 Column Shifter

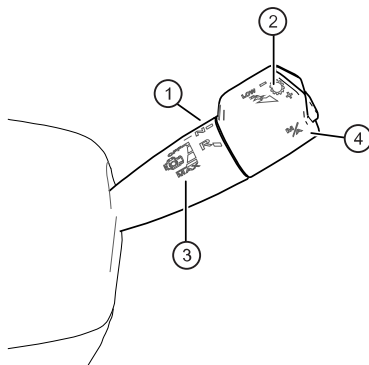
ENGINE BRAKE ONLY VERSION

The lever on the right-hand side of the steering column will operate the engine brakes for the vehicle with manual transmissions or Allison automatic transmissions.



Vehicles with PACCAR or Eaton Transmissions

The vehicle may be equipped with a PACCAR or Eaton automated manual transmission. The lever on the right side of the steering column will operate transmission functions in addition to operating the engine brakes.



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

3.4 Tilt/telescope Lever

HOW TO ADJUST TILT/ TELESCOPING STEERING COLUMN



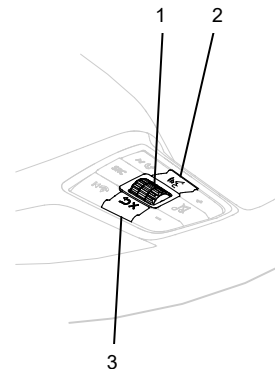
WARNING

Only adjust the tilt/telescoping steering wheel while the vehicle is stopped. Adjusting it while driving can cause a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

1. Push and hold the **Tilt/Telescoping** lever down fully.
2. Push or pull the steering wheel to the desired height and angle.
3. Push the **Tilt/Telescoping** lever back into the locked position.

4 DIGITAL DISPLAY CONTROLS

4.1 Steering Wheel Pod Use

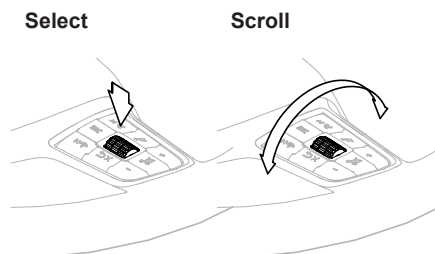


1. Scroll wheel
2. Shortcut/voice assistant (voice assistant only available on SmartDisplay).
3. Back/cancel

The controls located on the right switch pod of the steering wheel are used to manipulate content within the digital display and SmartDisplay. The shortcut button accesses items that are configured in the settings, see [Shortcuts](#).

4.2 Scroll Wheel

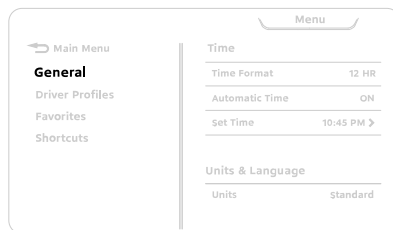
Use the scroll wheel to adjust the level of gauge view detail within the display or navigate through menus and make selections. The scroll wheel is bi-directional and is also a button. Press down on the scroll wheel to open and select menu options, to change settings when in the menu, and suppress notification messages when allowed.



For example, vehicle time can be set using the Scroll Wheel.

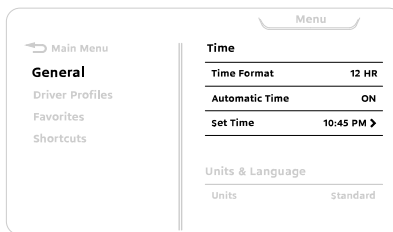
Press down **Select** to open the menu:

Figure 16: Menu Example: Main



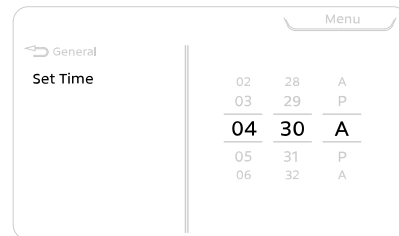
Scroll to Settings and then **Select** again to choose the Settings sub-menu: Then **Scroll** to Set Time and press **Select**.

Figure 17: Menu Example: Time



Finally, **Scroll** through the values and press **Select** to set the time.

Figure 18: Menu Example Set Function



The display indicates that the Scroll Wheel can be used to **Select** with this icon:

Figure 19: Select



4.3 Back/Cancel

Use the **Back/Cancel** button to return to the previous menu, suppress a notification, or cancel a selection. See [Notifications](#).

5 DIGITAL DISPLAY

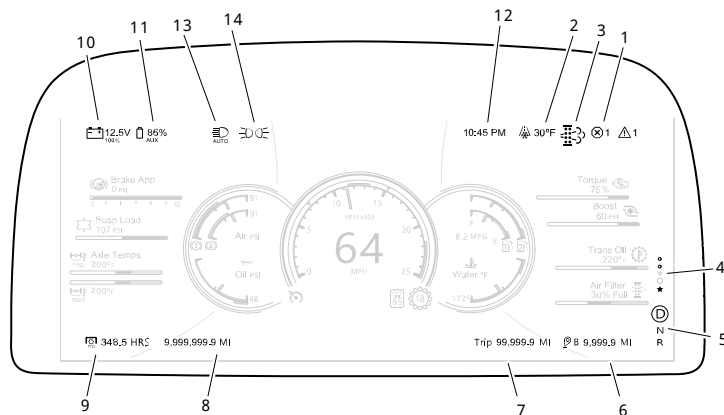
5.1 Digital Display

The digital display is visible during all driving situations and in some parked situations. When the parking brake is set, the following actions will wake the display, making it visible:

- Opening (or keeping open) the cab doors
- Using steering wheel switches
- Tapping the brake
- Turning the start switch to **ON**, **ACC**, or **START**
- Starting the engine

If after 20 seconds, none of these actions are taken, the display will darken to conserve power, but will awaken when any wake action is performed. If the Anti-Theft option is active and you attempt to start the engine, a passcode prompt will appear. The engine cannot be started until the correct passcode is entered (see [Anti-Theft](#)).

Display Indications



1. Active Warnings
2. Outside Air Temperature
3. Diesel Particulate Filter Status
4. View Indicator
5. Gear Shift Indicator
6. Trip Segment
7. Trip Odometer
8. Odometer
9. Power Take Off (PTO) Hours
10. Battery
11. Aux Battery Indicator
12. Clock
13. High Beam Assist (HBA)¹
14. Aux Lamp

¹ Not on all models.

5.2 Active Warnings

Red or amber in-dash notifications are counted, and the total is displayed by the active warning indicator. In addition, these counts are also presented in:

- Systems Check
- The Notifications Sub-menu
- A Drive Summary

The total count may change without user interaction if individual warnings are intermittent, time based, self-correcting, or are otherwise rectified.

5.3 Outside Air Temperature



Outside Air Temperature monitors the ambient air temperature outside the vehicle.

The display alerts the operator to high and low temperature conditions. When the outside temperature approaches freezing (36°F or 2°C) an icon appears next to the temperature (snowflake for freezing and thermometer for high) and a chime will sound. The system's unit of measure

(Fahrenheit or Celsius) can be changed from the settings menu. The outside air temperature display uses a sensor (located at the bottom of the driver's side mirror assembly) to measure outside air temperature only. The outside air temperature does not display the temperature of the road surface on either the temperature display or the snowflake icon. Additionally, the outside air temperature reading may be affected by exposure to direct sunlight.

5.4 View Indicator

The View Indicator identifies which view is currently selected:

- Minimized
- Minimized with Advance Driving Assistance (Optional)
- Basic
- Enhanced
- Favorites (if enabled)

5.5 Drive, Neutral, and Reverse Indicator



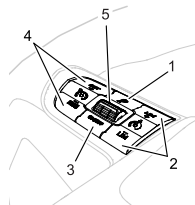
The Drive, Neutral, and Reverse Indicator reflects the shifter position for automatic and automated transmissions. Manual transmissions and certain automatic transmissions do not provide feedback to the display. Instead, the transmission shifter indicates the gear condition.

5.6 Trip Odometer

The Trip Odometer shows how far the vehicle has traveled during the current trip (since it was last reset). The current trip can be segmented with way-point markers. The maximum distance that can be shown on the **Trip Odometer** is 62,137.0 mi (99,999.9 km) at which point the operator needs to reset.

Press and quickly release the **Way-point marker** to set segments. Press and hold the **Way-point marker** to reset the total trip and reset the segment back to A. (Item 1 in the following image):

Figure 20: Left Switch Pod



1. Trip way-point marker
2. Limiter control
3. Cruise control ON/OFF
4. Cruise control set-resume
5. Toggle switch

The operator can then view the marked segments and total trip data captured in the [Trip Summary](#).

5.7 Trip Segment Odometer

The Trip Segment Odometer can be split into smaller segments denoted with letters from A to Z. Pressing the way-point marker

button on the steering wheel causes the segments to increment. Segment B is the first indicated because Segment A is the total trip until the way-point marking is used. The maximum distance that the segment will show is 6,214.9 mi (9,999.9 km) at which point the system automatically increments to the next letter. If the total trip or segments exceed the systems capacity, there is a notification on the screen or the data collection will stop until the total trip is reset. Trip data and the segmentation information can be found in the menu under [Trip Summary](#).

5.8 Odometer

The Odometer displays the total elapsed mileage of the truck. The maximum distance that can be shown on the Odometer indicator is 6,213,711.86 mi (9,999,999.9 km). The Odometer rolls over to zero if the maximum mileage is achieved.

5.9 Engine Hours

Engine hours display the total number of hours operated by the engine. The maximum hours displayable by the counter are 99,999.9 before the counter rolls over to zero.

5.10 Battery Voltage

The Battery Voltage indicator shows the battery icon, voltage, and the state of charge. The battery icon will be replaced with the Low Voltage Disconnect (LVD) icon when Low Voltage Disconnect is active. The battery icon is gray when operating normally, but changes to amber to indicate a low voltage condition and red to indicate a high or very low voltage condition.

5.11 Clock

The clock displays either a 12-hour or 24-hour format. Change clock settings in the Settings Sub-menu.

5.12 Transmission Gear Display

Vehicles with PACCAR TX-12/TX-18 series or Eaton Endurant automated transmissions will show the transmission mode, current gear, and diagnostic information associated with the transmission. Vehicles with manual transmissions will show the current gear. This display does not apply for vehicles with Allison transmissions.

6 SELECTING A VIEW

6.1 Selecting a View

The instrument cluster has 5 views for the operator to use.

- Minimized
- (Optional) Minimized with Advanced Driver Assistant
- Basic View
- Enhanced View
- Favorites

Each view is identified by a specific view indicator on the right side of the display area.

6.2 Minimized View

MINIMIZED VIEW

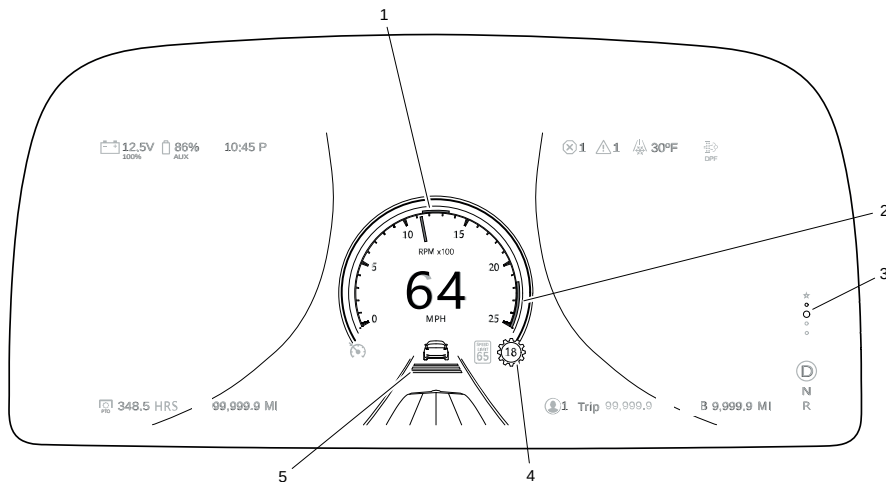
A combination speedometer and tachometer will show in the center of the Minimized View.

SPEEDOMETER AND TACHOMETER

Vehicle and engine speed are presented at the center of the display. The vehicle speed units default to the requirements where the vehicle was originally purchased. The operator may select the Dual Speedometer that shows both Standard and Metric units from the Digital Display menu (see [Units and Language](#)) or by using the steering wheel **Shortcut** button (see [Digital Display on page 69](#)).

6.3 Minimized View with Driver Assistance (Option)

MINIMIZED VIEW WITH DRIVER ASSISTANCE (OPTION)



1. Optimal RPM Indicator
2. Engine Speed
3. View Indicator
4. Transmission Gear
5. Driver Assistance Area

ADAPTIVE CRUISE CONTROL NOTIFICATION (OPTION)



Adaptive Cruise
Control Installed

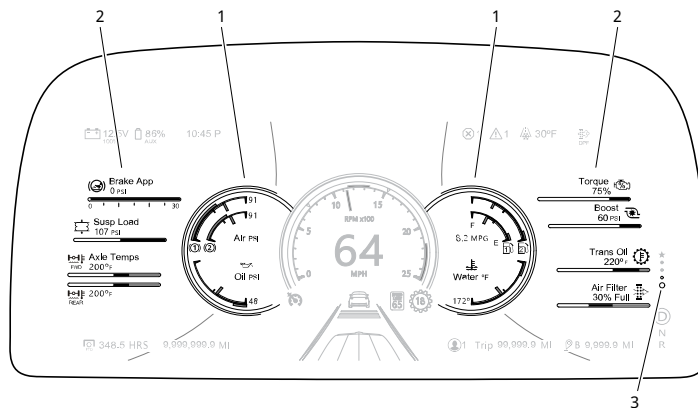
Review Manual

This indication at vehicle start means it is equipped with Adaptive Cruise Control (ACC) and Collision Mitigation. These features work together to improve driver safety and enhance the driving experience.

When Cruise Control is active, ACC accelerates and slows the vehicle to maintain a chosen distance from a detected forward vehicle. Collision Mitigation attempts to prevent a forward collision when the vehicle is advancing at speeds greater than 15 mph (24 kph). Please review the ACC section of this manual, and the manufacturer's manual, prior to driving this vehicle.

6.4 Basic View and Enhanced View

BASIC VIEW AND ENHANCED VIEW



1. Gauges for Basic View
2. Gauges for Enhanced View Only

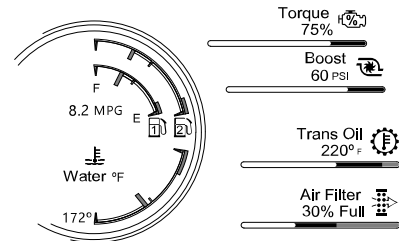
BASIC VIEW

This view combines the instrumentation presented in Minimized View with gauges such as Air Pressure, Oil Pressure, and Coolant Temp.

ENHANCED VIEW

This view includes all the gauges present in the Basic View, adding gauges on the left and right in the display. The gauges in this view are determined by the way the truck was configured at the factory and their layout is based upon priority. Additional gauges might show on the screen if they go into a warning state and will appear below these enhanced gauges, which will shrink to make room.

GAUGES



Gauge Locations are determined by a prioritized layout at the factory. A customizable layout is available in a feature called 'Favorites' located at the bottom of the View Indicator. (See [Favorites](#).)

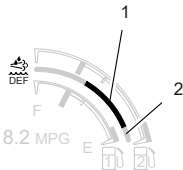
 **NOTE**

The instrument cluster gauges may appear (if hidden from view), change brightness, and change color to bring attention to a particular system.

DIESEL EXHAUST FLUID (DEF) - DIESEL ENGINES ONLY

The diesel exhaust fluid gauge shows the approximate amount of DEF fluid in the DEF tank.

Figure 21: DEF Level Gauge (dual tank version)



1. Level indicator
2. Low warning threshold

 CAUTION

Only use diesel exhaust fluid (DEF). Using a fluid other than DEF can damage diesel particulate filter (DPF) components. Failure to comply may result in equipment or property damage.

Besides empty and full, the gauge also indicates 1/4, 1/2, and 3/4 of total capacity. DEF fluid is required to meet certain emission requirements. A warning icon and notification message will appear when the DEF level is low. Warnings can also occur if something other than DEF is put in the tank or if the system is tampered with. In this case the needle will still read high in the scale, but the gauge will show red warning colors and icons. Ignoring these warnings can result in an engine derate that progresses until the warnings are corrected. Do not allow your DEF tank to remain empty. Please refer to your emission supplemental manual for more details about DEF fluid.

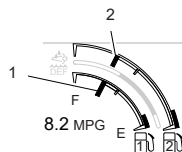
 **NOTE**

The instrument cluster gauges may appear (if hidden from view), change

brightness, and change color to bring attention to a particular system.

FUEL LEVEL

Figure 22: Fuel Level Gauge (Dual Tank Version)



1. Tank 1 Level Indicator
2. Tank 2 Level Indicator

The fuel gauge indicates the fuel level. When the fuel level gets low, gauges will highlight with colors to highlight the warning. The MPG gauge will change to the usage rate of fuel when idling.



WARNING

DO NOT carry additional fuel containers in your vehicle. Fuel containers, either empty or full, might leak, cause or feed a fire, or could possibly explode. Failure to comply may result in death, personal

injury, equipment damage, or property damage.



WARNING

DO NOT remove a fuel tank cap near sparks, flames, or smoking materials. Fuel in the presence of an ignition source could cause an explosion. A mixture of gasoline or alcohol with diesel fuel increases this risk of explosion. Use only the fuel or additives recommended for your engine. Failure to comply may result in death, personal injury, equipment damage, or property damage.



CAUTION

For diesel vehicles, use only Ultra Low Sulfur Diesel (ULSD) fuel as recommended by engine manufacturers. High-sulfur diesel fuel can damage the aftertreatment system and affect engine emissions, leading to non-compliance with emission regulations. Failure to comply may result in equipment or property damage.



NOTE

For more information on fuel specifications, consult the engine operator's manual.



NOTE

PACCAR recommends that you do not operate your vehicle with less than one-quarter of your vehicle's fuel capacity. Vehicles are manufactured with different fuel systems, drawing fuel from different heights within the tank. Road crown can also affect fuel position and availability. Because of these factors, allowing the fuel level to go below one-quarter capacity could result in insufficient fuel to keep the engine running.



NOTE

The instrument cluster gauges may appear (if hidden from view), change brightness, and change color to bring attention to a particular system.

6.5 Favorites View (optional)

Vehicles with Favorites View will allow the operator to customize the arrangement of many of the gauges. Using the Favorites View requires the operator to **Scroll** to select the View. The Favorites view (if available) is located below Enhanced View. See [Favorites](#) to customize the Favorites view.

7 MENU CONFIGURATIONS

7.1 Menu Configurations

The following menus

- Notifications
- Trip Summary
- Settings
- Truck Information

are accessible when

1. The parking brake is set
2. All active popup messages are viewed and suppressed
3. The **Select** button is pressed

These menus allow the operator to configure settings on the vehicle.

7.2 Notifications

Notifications display system messages related to the condition of your vehicle. It displays:

- Tire Pressure Monitoring System (TPMS) (optional)
- Active messages
- Systems Check Summary

7.3 Trip Summary

Trip Summary presents a summary of details such as fuel economy and distance of the trip, collected during the main trip and/or trip segments. These details will be collected until the Trip is reset, or the max trip distance (99,999.9 miles for main trips, 9,999.9 for trip segments) is reached.

7.4 Settings

SETTINGS

Settings allows the operator to customize the Display. Settings in this area of the menu include general aspects, favorites

configuration, and assigning a shortcut. If Anti-Theft is enabled, the settings will not be accessible until the correct passcode is entered.

7.5 General

TIME

This menu allows the operator to customize the clock.

24-Hour Time Choose between a 12- or 24-hour format. AM or PM (A or P) displays only in the 12-hour time format.

Automatic Time (optional) When enabled, trucks with Automatic Time receive time zone appropriate data.

Set Time Using Automatic Time disables Set Time. Set the clock to indicate the local time.

UNITS AND LANGUAGE

Units and language are configured in the digital display settings and if installed, shared with SmartDisplay automatically.

Units

Use this setting to change the units of measurement between Standard, Metric (Bar), and Metric (psi).

i NOTE

This feature may be disabled on some trucks.

Language

The languages available on the digital display are the following:

- English
- Spanish
- French

The language you select in the digital display will be the same in the SmartDisplay.

PRESSURE UNITS

The Digital Display offers the following units of measurement for pressure:

- Pounds per Square Inch (psi)
- Bar (bar)

The default unit is psi for both imperial and metric systems. Metric users may switch from psi to bar in the settings.

7.6 Features**FEATURES**

Features allows the operator to enable optional features on the vehicle to customize their experience.

PREDICTIVE CRUISE CONTROL OVERSHOOT

Configure the Predictive Cruise Control Overshoot through this menu item. See [Predictive Cruise Control \(Option\)](#) for more details about Overshoot and Predictive Cruise Control.

LOW VOLTAGE DISCONNECT (LVD) SETUP

Change the LVD battery voltage set point for the LVD to switch on [Low Voltage Disconnect \(LVD\) \(Option\)](#).

TRAILER DETECTION (OPTION)

When enabled, the Trailer Detection feature detects a connected trailer. The system also notifies the operator when a trailer connection is absent.

DIGITAL RPM

Digital RPM provides a digital numeric readout of the engine speed in the speedometer. Digital RPM is automatically shown when using PTO and may also be shown when not using PTO if selected in settings.

i NOTE

If dual speedometer is selected, Digital RPM may not be shown.

WINDSHIELD WIPER INTERLOCK

Windshield Wiper Interlock activates the headlights when the windshield wipers switch on.

i NOTE

Some fleets may configure trucks to default to this behavior and remove the option to set this from the menu.

DARK CABIN

A dark cabin prevents cab interior lights from switching on when a cab door opens.

SHUTDOWN TIMER



WARNING

Never idle your vehicle for prolonged periods of time if you sense that exhaust fumes are entering the cabin. Investigate the cause of the fumes and correct it as soon as possible. If the vehicle must be driven under these conditions, drive only with the windows open. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

DO NOT stay in the vehicle with the engine running or idling for more than 10 minutes with the vehicle's Heater and A/C ventilation system in RECIRC or at LOW FAN SPEED. Even with the ventilation system on, running the engine while parked or stopped for pro-

longed periods of time is not recommended.



CAUTION

DO NOT idle engine longer than five minutes at low rpm (400-600 rpm). DO NOT allow the engine to operate at idle for extended periods at temperatures at or below 160°F (71°C). Long idle periods after the engine has reached operating temperatures can result in gummed piston rings, clogged injectors, and break down engine lubrication resulting in engine damage. Torsional vibrations at low idle can cause transmission wear. Failure to comply can result in equipment or property damage.



NOTE

If you are required to idle your vehicle for long periods of time, install an auxiliary heater or automatic idle control. These auxiliary devices can reduce fuel consumption and save you money.

When active, the Shutdown Timer will keep the engine running briefly after the ignition is switched OFF and the key can be

removed. This feature allows the driver to exit the cab, lock the doors, and walk away. Normally, keeping the engine running requires the key to remain in the ignition, potentially leaving the cab unlocked and accessible. When the timer reaches zero, the engine stops, and the electrical system shuts down just as if the key were moved to the OFF position.

When activated, the Shutdown Timer duration remaining shows below the Drive Summary. This duration can be altered by using the scroll wheel on the steering wheel. (See [How to Set the Shutdown Timer](#)). The timer is limited to a maximum of 30 minutes.

The truck can have the Engine Idle Shutdown Timer (EIST) option. If so, and if it is set for a shorter shutdown time, the engine shuts down at the shorter timer setting.

7.7 Favorites

FAVORITES

To disable Favorites, contact an authorized dealer. When Favorites View is active, the operator can create a customized arrange-

ment of all but centrally located gauges. To change the Favorites configuration, stop the truck, set the parking brake and:

- Access Favorites via the Settings Sub-menu. OR
- **Scroll** to Favorites (represented by a star in the View Indicator) and press **Select**.

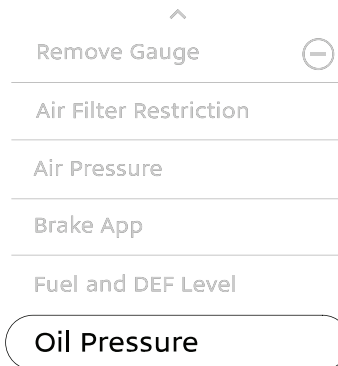
ADDING A GAUGE TO FAVORITES

The truck must have the parking brake set to add a gauge. Navigate to the "Edit Your Favorites" menu to perform this procedure.

It is not possible to assign an already assigned gauge. Remove the gauge first. See [Removing a Gauge From Favorites](#).

1. **Scroll** the list until you locate the desired gauge or compound gauge.

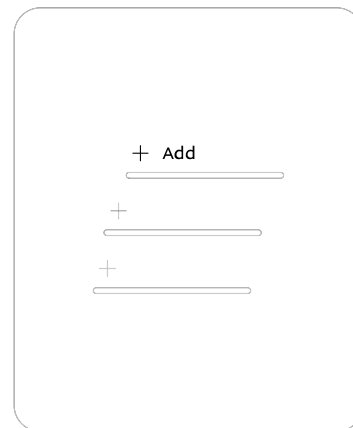
Figure 23: Edit Your Favorites
Continue editing Favorites or save configuration



If the gauge is already present in the Favorites view, it is not present as a menu option.

2. **Select** to choose the gauge you want to position.
3. **Scroll** through the valid locations. (These positions can include positions currently holding a gauge). Highlight that position. An invalid position reads "Not Available."

Figure 24: Edit Your Favorites
(Left-Side of Image)



4. **Select** to add or replace the gauge.

Result:

Navigate and **Select** "Save Configuration" when you are happy with the arrangement. The display reads "Your favorite configuration has been saved." Press **Back** to exit Editing Favorites.

REMOVING A GAUGE FROM FAVORITES

Set the parking brake. At least one gauge must be in the Favorites view. You cannot

remove the speedometer, tachometer, fuel, or air pressure gauges. If the gauge you want to remove is part of a multiple gauge group, you must remove the whole group.

1. **Select** "Remove Gauge."
2. **Scroll** to highlight the gauge and **Select**.

Result:

Navigate and **Select** "Save Configuration" if this is the last change you want to make to Favorites view. The display reads "Your favorites configuration has been saved." Press **Back** to exit Editing Favorites.

7.8 Shortcuts

Use the Shortcuts option to assign one of the following features to the **Shortcut** button:

- Dark Cabin – Toggles Dark Cabin On/Off.
- Digital rpm – Provides a numeric readout of rpm within the speedometer.
- Dual Speedometer – Shows a compound Speedometer with both Standard and Metric values.
- Favorites – Selects the Favorites View on the Display.
- Metric Units – Switches all measured

units used on the display between Standard and Metric.

7.9 Anti-Theft

ANTI-THEFT

Anti-Theft prevents a driver from starting the engine unless the Anti-Theft passcode is entered. Anti-Theft also prevents accessing the settings sub-menu.

If Anti-Theft is enabled, turning the start switch to **START** prompts the operator to enter the passcode. Once the correct passcode is entered, the driver will have five minutes to start the engine. If the engine is not started within that time, the passcode must be entered again. The timer can be postponed in one-minute intervals using any steering wheel switch.

To enable or disable Anti-Theft, toggle the Anti-Theft (ON/OFF) state in the settings sub-menu, and then enter the current passcode.

HOW TO ENTER THE PASSCODE

You must have the ignition key and the current passcode.

The default passcode is 0000 at the factory. See an authorized dealer if you need a custom passcode. With the anti-theft feature switched off, the operator does not need a passcode to start the engine.

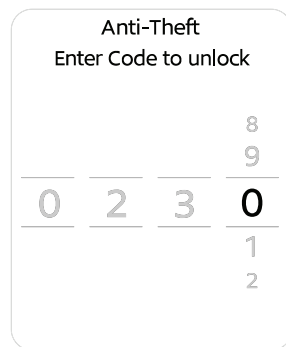
1. Using the **Scroll**, scroll to the first number in the code. Then press **Select**.

Figure 25: Anti-theft First Digit

Anti-Theft			
Enter Code to unlock			
8	_____	_____	_____
9	_____	_____	_____
0	_____	_____	_____
1	_____	_____	_____
2	_____	_____	_____

The next digit is selected.

2. **Scroll** to the number that you want for this digit and press **Select**. The next digit is selected.
3. Use this process to select all four digits.

Figure 26: Anti-theft Last Digit**Result:**

The display reads "turnkey to Start Engine."

8 TRUCK INFORMATION

Truck Information stores specifications and data about the vehicle:

- Chassis
- Engine
- ABS
- Transmission (option)
- Adaptive Cruise (option)
- Predictive Cruise (PACCAR Engines

only)

- GHG Speed Limiter (option)
- Tire Pressure Monitor (option)
- Digital Vision System (option)
- Lane Departure Warning (option)
- Lane Change Assist (option)
- Lane Keeping Assist (option)
- Other Software
- PTO (option)
- Pedestrian Detection (option)
- Advanced Emergency Braking (option)
- Stability Control (option)

Detailed information for listed components or features can be shown by scrolling (using the **Scroll**) to the item and then pressing **Select**.

9 DRIVE SUMMARY

The Drive Summary presents information about the most recent leg of travel and is shown when the ignition key is turned to "off." The Drive Summary consists of

- Critical and Non-critical Issues (see [Systems CheckSystems Check](#))
- Shut Down Timer (if active) (see [Systems CheckSystems Check](#))
- TPMS (option) (see [Systems](#)

[CheckSystems Check](#))

- Driver Rewards (option) (see [Systems CheckSystems Check](#))
- Driver Performance Assistant (option) (see [Systems CheckSystems Check](#))
- Three customer-selected reports (i.e. Idle Time, Fuel Economy)

The Drive Summary collects information since the last time the engine was off for at least two hours. When insufficient information has been collected, Drive Summary will show dashes for the monitored component or report. Customer-selected reports can be changed at your local dealership.

10 DRIVER REWARDS (OPTION)

If enabled, Driver Rewards raises or lowers the vehicle's max-allowable speed based on whether a programmed, fuel economy goal is met. This goal is defined by the customer and can be based on fuel consumption, engine idle time, or both fuel consumption and idle time. The driver is assigned a score based on how successfully they meet or exceed this goal. Driver Rewards is only available for vehicles equipped with a PACCAR MX engine.

The fuel consumption goal is met by reducing the amount of fuel used over a given distance. This is achieved by

- Driving slower
- Minimize Speed Changes
- Accelerating gently
- Coasting in gear
- Using the Cruise Control
- Maintaining optimal tire pressure
- Reducing the trailer gap
- Running a Warmer Cab
- Turning off extra electrical loads

The engine idle time goal is met by reducing the time the engine idles (running the engine when the vehicle is not in motion).

The Driver Rewards score is based on driving habits. This score is compared to the goal and a max-speed bonus or penalty is determined. The Driver Rewards score is shown during a Systems Check and in the Driver Summary. When there is a bonus or penalty, it appears below the Cruise Control (CC) indicator on the dash, and the max-allowed speed shows to the right of the CC indicator. Driving habits that reduce fuel use will earn the operator a higher max speed; habits that consume more fuel will lower the max speed. Driver Rewards

will never grant a bonus that exceeds programmed federal emission regulated or customer defined speed limits.

During the Systems Check, the Driver Rewards and DPA features offer general driving tips that can increase fuel economy and brake savings. These features also provide feedback in the Driver Summary based on a driver's specific driving habits. This advice if followed can improve future Driver Rewards and DPA scores.

Driver Rewards has three customer-determined modes of activation: only when CC is in use, when CC is not being used, or at all times. The Driver Rewards goal and the amount of penalty or bonus is also customer-determined and should be based on reasonable expectations for a known route of travel. The Driver Rewards goal should be reconsidered if the manner of vehicle use or the vehicle route changes significantly.

To enable or disable Driver Rewards, or change the mode of activation, reward amounts, or set a new Driver Rewards goal, contact your dealership.

11 DRIVER PERFORMANCE ASSISTANT (OPTION)

If enabled, the Driver Performance Assistant (DPA) determines how skillfully the operator uses coasting and the engine brake when reducing vehicle speed. Coasting and engine brake use, instead of frequent, aggressive use of the service brakes, can extend brake life and increase fuel economy. The DPA assigns the driver a score based on their braking habits and provides suggestions on how to improve these habits. The DPA feature is only available for vehicles equipped with a PACCAR MX engine.

The driver's DPA score is determined by comparing their braking and coasting habits against a customer-defined goal for braking use and coasting. A score that meets or exceeds this goal will award positive feedback in the Driver Summary.

During the Systems Check, the DPA and Driver Rewards features offer general driving tips that can increase fuel economy and brake savings. These features also provide feedback in the Driver Summary based on a driver's specific driving habits.

This advice, if followed, can improve future DPA and Driver Rewards scores (see Driver Rewards).

To enable or disable the DPA or set a new DPA goal, contact your dealership.

12 BULB CHECK

When the start key switch is in the ON position, multiple warning icons will be displayed in a sequence to test each warning light indicator. The total sequence should take no more than 10 seconds to complete. Have your instrumentation system checked by a qualified service technician if it does not successfully complete.

Audible Alarm

The audible alarm will sound in conjunction with most warning lights. These events include but are not limited to headlight on, fifth wheel, stop engine, primary/secondary air, and driver door open warnings.

Optional Icons

Additional icons may be operational depending on individual vehicle specifications.

NOTE

Some optional lights may illuminate even though your vehicle is not equipped with that particular feature.

13 NOTIFICATIONS

13.1 Notifications

A notification communicates vehicle information. Notifications can be red, amber or white. Red and amber notifications are totaled in the Active Warnings Indicator at the top of the display. Notifications' characteristics (color, brilliance, and whether it flashes or has an audible alarm) depend on the condition that generated the notification.



1. Stack Size – The lower number indicates how many notifications are in the stack (suppressible and non-suppressible), and the upper, which notification is being viewed.

2. Title – Notification.
3. Suppressibility – Indicates if the current notification is suppressible. The **Select** icon shown is for vehicles equipped with a Menu Control Switch (MCS); steering wheel switches indicate differently.
4. Instructions – Contains instructions or elaborating information.

When multiple notifications are present, each is assigned a priority and placed in a stack. Higher priority notifications are placed towards the front of the stack. The **Select** button cycles through the active notifications, allowing each notification in the stack to be viewed.

Some notifications, once viewed, are removed from the stack; these notifications are called suppressible. Suppressible notifications show an "X" below the **Select** icon and typically don't require an immediate response. Suppress these notifications using the **Back/Cancel** button (or the **Select** button when the parking brake is set). Non-suppressible notifications cannot be removed from the stack until the parking brake is set.

**NOTE**

The menu is not accessible until all notifications have been suppressed. All notifications become suppressible when the parking brake is set.

13.2 Viewing and Suppressing Popups

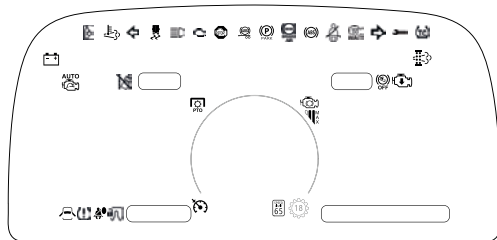
A Popup can be read and suppressed by pressing the Scroll Wheel. Some situations may require pressing **Back/Cancel** instead. For example, the popup in the following image is suppressed by pressing the Scroll Wheel (indicated with a down arrow) OR by pressing the **Back/Cancel** (indicated with an X below the roller).

Figure 27: Suppressable Popup Message



14 WARNING LIGHTS AND INDICATORS

14.1 Warning Lights and Indicators



The instrument panel communicates many vehicle conditions using warning lights (also called telltales), indicators, and audible alarms and tones. Alarms and tones are sometimes accompanied by an indicator or warning light. Some indications are communicated for informational purposes only – indicators – while warning lights often require an operator response and are frequently accompanied with a notification (see [Notifications](#)).

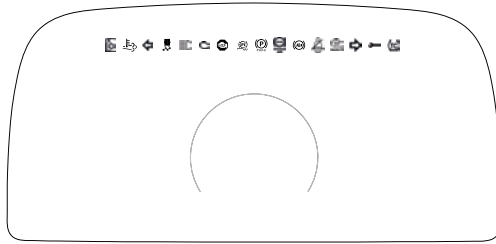
Warning lights, indicators, and audible alarms and tones may indicate a system malfunction or attempt to draw attention to the component it monitors, so they should be checked frequently and responded to promptly. These indications could save you from a serious accident.

Some of these indications also present an associated notification, providing additional information (see [Notifications](#)). Red and amber notifications are tallied at the top of the display and can be viewed in the notifications sub-menu when the parking brake is set. Additionally, gauges may become visible on the Digital Display and may change color or brightness to bring the gauge to the operator's attention.



WARNING

DO NOT ignore any type of tone or lights. These signals tell you that something is malfunctioning on your vehicle and provide you an indication of what system is affected. It could be a failure of an important system, such as the brakes, which could lead to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

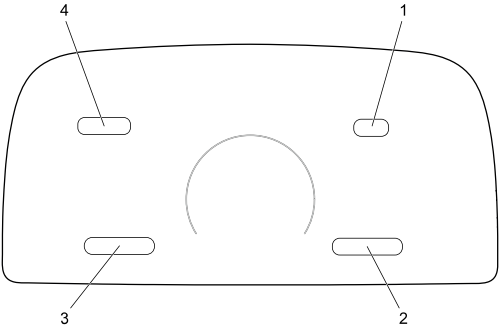
Physical Telltales

Physical telltales will always appear across the top of the display.

Dedicated Telltales

Dedicated Telltales always appear in the same location on the display. Some are visible only when active but most signify that the monitored component requires operator attention.

Dynamic Telltales



Dynamic telltales appear on the display in the rows indicated. A dynamic telltale communicates the status of a monitored component, which may require the operator to respond or take action.

Table 5: Indications

Title	Symbol	Color	Std	Opt
<u>ADAS Camera Fault</u>		Amber		•
<u>Antilock Brake System (ABS)</u>		Amber	•	

Table 5: Indications

Title	Symbol	Color	Std	Opt
<u>Anti-lock Brake System (ABS), Trailer</u>		Amber	•	
<u>Stability Control (Option)</u>		Amber	•	
<u>Traction Control</u>		Amber	•	
<u>Transmission, Failure</u>		Red		•
<u>Diesel Particulate Filter (DPF)</u>		Amber	•	
<u>Differential, Inter-Axle Lock</u>		Green		•
<u>Dump Truck, Body Up</u>		Red		•

Table 5: Indications

Title	Symbol	Color	Std	Opt
<u>Dump Truck, Gate</u>		Amber		•
<u>Engine, Check Engine</u>		Amber	•	
<u>Engine Brake Indicator</u>		Green		•
<u>Engine, Low Coolant Level</u>		Amber	•	
<u>Engine, Overspeed</u>		Red		•
<u>Stop Engine</u>		Red	•	
<u>Engine Wait-to-Start Light</u>		Amber		•
<u>Emissions, High Exhaust System Temperature</u>		Amber	•	

Table 5: Indications

Title	Symbol	Color	Std	Opt
<u>Emissions, Engine Derate</u>		Amber	•	
<u>High Beam Assist (HBA)</u>		Green		•
<u>Hill Hold</u>		Amber		•
<u>Lane Departure Warning (LDW)</u>		Amber		•
<u>Lane Departure Warning (LDW) Fault</u>		Amber		•
<u>Lights, High Beam</u>		Blue		•
<u>Malfunction Indicator Light (MIL)</u>		Amber		•

Table 5: Indications

Title	Symbol	Color	Std	Opt
<u>Park Brake</u>		Red	•	
<u>Seat Belt, Fasten</u>		Red	•	
<u>Transmission, Oil Temperature High</u>		Amber		•
<u>Turn Signal, Left</u>		Green	•	
<u>Turn Signal, Right</u>		Green	•	

14.2 ADAS Camera Fault



This amber warning light appears when a fault occurs with the camera used by the various Advanced Driver Assist Systems (ADAS) features: Lane Departure Warning (LDW), Lane Keeping Assist (LKA), and Adaptive Cruise Control (ACC). The LDW and optional LKA features are both dependent on the ADAS camera, and both will be disabled when this warning occurs.

In addition to issues internal to the camera, please read the topic Lane Departure Warning (LDW) for conditions which may limit camera performance, resulting in an ADAS Camera Fault.

14.3 Antilock Brake System (ABS)



Illuminates during the Bulb Check (see [Bulb Check](#)). Have the ABS checked by an authorized dealer if the ABS warning lamp stays on for more than 3 s.

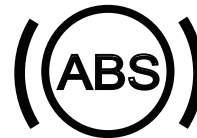
- Illuminates during normal operating conditions to indicate a problem with the ABS.
- Illuminates when a problem exists with Automatic Traction Control (ATC).

See also Automatic Traction Control on page 4-33.

NOTE

After servicing the ABS, the lamp stays on after the power-on self-test. This indicates that the ABS wheel sensors have not been checked by the ABS. As soon as the vehicle is driven at speeds above 4 mph (6 km/h) the lamp turns off, indicating that the wheel sensors have been checked by the ABS.

14.4 Anti-lock Brake System (ABS), Trailer



Illuminates during bulb check. Have the ABS system checked by an authorized dealer if the ABS Warning Lamp stays on for more than 3 seconds.

- Illuminates during normal operating conditions to indicate a problem with the ABS system.
- Illuminates when a problem exists with Automatic Traction Control (ATC).

This should be checked by an authorized dealer as soon as possible.

NOTE

Tractors/trucks and trailers built after 03/01/2001 must be able to turn on an In-Cab Trailer ABS Warning Light (per U.S. FMVSS121). The industry chose Power Line Communication (PLC) as the standard method to turn it on. On trailers built prior to 03/01/2001, ver-

ify trailer ABS system status via the required external warning light mounted on the trailer. The indicator light on the trailer should be amber and identified with the letters ABS.

14.5 Stability Control (Option)



Calculates the driver's intended path of travel from wheel speed and steering angle sensors, then compares calculations to the actual direction of travel. The system uses individual wheel brakes to re-adjust the path of the vehicle.

- The Stability Control Icon (ESC or Electronic Stability Control) illuminates during the Bulb Check when the engine is ON. The lamp switches off after a few seconds if no system problems are detected. If a problem is detected, the ESC Warning Lamp will switch on and stay on.
- Illuminates when the ESC system is regulating individual wheel brakes to correct the vehicle's direction of travel.

(Refer to Advanced ABS with Stability Control for more information.)

WARNING

Any modification to a vehicle with Electronic Stability Control (ESC) may result in a loss of vehicle control or non-compliance with Federal Motor Vehicle Safety Standards. Modifications include but are not limited to changes to the vehicle's axle weight ratings, number of axles, front and rear suspension, wheel-base length or frame, steering controls, or intended body type and size. A modified vehicle with ESC must be evaluated by a qualified technician before it can be operated. Contact your authorized dealer for evaluations. Failure to comply may result in death, personal injury, equipment damage, or property damage.

NOTE

For more information about the stability control system installed on your vehicle, please refer to additional material supplied with this operator manual, included in your glove box informational packet.

14.6 Traction Control



Monitors wheel speed for poor traction. If a wheel begins to slip due to poor traction, Traction Control will reduce engine power, and or apply brakes in an effort to regain traction.

- Illuminates during the Bulb Check when the engine is ON. The lamp switches off after a few seconds if no system problems are detected. If an ATC problem continues, the ATC warning light will switch on, and stay on.
- Illuminates when the ATC is regulating wheel spin and switches off after the traction control event has ended.
- Flashes continuously when the ATC/Deep Snow & Mud switch is placed in the on position, indicating that this feature is active.

**WARNING**

Any modification to a vehicle with Electronic Stability Control (ESC) may result in a loss of vehicle control or non-compliance with Federal Motor Vehicle Safety Standards. Modifications include but are not limited to changes to the vehicle's axle weight ratings, number of axles, front and rear suspension, wheel-base length or frame, steering controls, or intended body type and size. A modified vehicle with ESC must be evaluated by a qualified technician before it can be operated. Contact your authorized dealer for evaluations. Failure to comply may result in death, personal injury, equipment damage, or property damage.

**NOTE**

For more information about the stability control system installed on your vehicle, please refer to additional material supplied with this operator manual, included in your glove box informational packet.

14.7 Park Brake



Illuminates when the parking brake is applied.

The Park Brake lamp flashes and warning tone sounds anytime the parking brake is not set and driver's door is open.

Audible alarm sounds if the parking brake is set and speed is greater than 5 miles per hour.

**NOTE**

If equipped with Electronic Park Brake (EPB) system, the Parking Brake may automatically activate. For more information refer to the Bendix manual provided with your vehicle.

14.8 Brakes, Low Air



Illuminates when system air pressure falls below 60 psi.

14.9 Cruise Control



This indicator shows the operator which Cruise Control function is currently enabled or active. This includes

- Cruise Control
- Adaptive Cruise Control (optional)
- Predictive Cruise Control (optional)
- Variable Road Speed Limiter (optional)

When a Cruise Control function is enabled, a white indicator will appear. When a Cruise Control function has been activated, the indicator will change from white to green. For more information on use of the various Cruise Control functions, see Cruise Control, Adaptive Cruise Control, Predictive Cruise Control, and Variable Road Speed Limiter.

14.10 Differential, Inter-Axle Lock



Illuminates when the inter-axle differential switch is ON thus locking the inter-axle differential. This powers the forward rear and the rear rear differentials equally. When the switch is turned off (inter-axle differential unlocked) the engine power is allowed to flow to any of the four drive tires based on the differential effect (mostly to the forward rear differential). This feature is standard on all tandem axles.

i NOTE

Tractors/trucks and trailers built after 03/01/2001 must be able to turn on an In-Cab Trailer ABS Warning Light (per U.S. FMVSS121). The industry chose Power Line Communication (PLC) as the standard method to turn it on. On trailers built prior to 03/01/2001, verify trailer ABS system status via the required external warning light mounted on the trailer. The indicator light on the

trailer should be amber and identified with the letters ABS.

14.11 Dump Truck, Body Up



Illuminates when Truck Dump Body is up.

Related Links

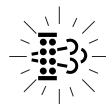
14.12 Dump Truck, Gate



Illuminates when Truck Dump gate is open.

Related Links

14.13 Diesel Particulate Filter (DPF)



This warning means that the DPF needs to be regenerated and appears when soot in the DPF exceeds an acceptable amount or a significant amount of hydrocarbons (HC) are detected.

This warning may also appear if the system is attempting to regenerate automatically while the vehicle is in Power Take-off (PTO) mode.

For more information about this warning, consult the Engine Aftertreatment System operator's manual.

i NOTE

This manual describes only the most basic aftertreatment information essential for a driver to operate the vehicle safely. For a more thorough explanation of the emissions system is available in the video linked to the QR code below

or in the Engine Aftertreatment Systems Operator's Manual.



14.14 Emissions, High Exhaust System Temperature



Illuminates when the exhaust gas temperature and exhaust components become extremely hot.

WARNING

If the High Exhaust System Temperature (HEST) warning light is on, DO NOT park near people, combustible materials, or combustible vapors. A person coming within 5 ft. (1.5 m) of the exhaust (outlet) stream or into contact with an engine aftertreatment system (EAS) component may incur serious

burns. Combustibles need to be at least 5 ft. (1.5 m) away from the exhaust stream as it exits the tail pipe. Failure to maintain this margin could ignite the material or cause an explosion. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

When the High Exhaust System Temperature (HEST) warning light is on, allow adequate cooling time before attempting to approach or work on any part of the exhaust system or surrounding components. When the HEST warning light is on, the temperature of the exhaust system is elevated and can cause serious burns. This system includes the tailpipe, exhaust pipes, diesel particulate filter (DPF)/selective catalytic reduction (SCR) device, and surrounding components, including enclosures and steps. Failure to comply may result in death, personal injury, equipment damage, or property damage.

14.15 Malfunction Indicator Lamp (MIL)



Illuminates when an engine emissions failure has occurred. The vehicle can be safely driven but should be serviced to correct the problem. The situation should not be considered an emergency. In some cases, the Malfunction Indicator Lamp activates in conjunction with the High Exhaust Temperature, Diesel Particulate Filter (DPF) and Diesel Exhaust Fluid (DEF) Warning Lights.

NOTE

Only for engines equipped with emissions aftertreatment.

14.16 Engine Brake Indicator



This indicator appears when the engine braking (compression brake or exhaust brake) is active. It shows available engine braking levels near the indicator, with the selected braking level highlighted:

When using engine braking, the engine brake indicator turns green. An override of active engine braking can occur when the operator (or a vehicle feature, such as Adaptive Cruise Control (ACC)) provides acceleration. In these cases, the engine brake indicator turns white (enabled but not active) while the vehicle accelerates.

14.17 Engine, Check Engine



Illuminates when a problem exists, but the vehicle can still be safely driven. Vehicle should be serviced to correct the problem, but the situation should not be considered an emergency.

The Check Engine Lamp activates for several reasons including, but not limited to, Water in Fuel, No-Idle Shutdown alert screens, High Exhaust Temperature, Diesel Particulate Filter (DPF), and Diesel

Exhaust Fluid (DEF) warning lights. Refer to your Engine Operator's Manual for additional information.

NOTE

Only for engines equipped with emissions aftertreatment.

14.18 Engine, Low Coolant Level



Illuminates with an audible alarm indicating critically low coolant level. The vehicle must be serviced to correct the problem but the situation should not be considered an emergency.

14.19 Engine, Overspeed



Illuminates when engine RPM is exceeded (Allison Transmissions).

14.20 Engine, Overspeed Air Shutdown



Illuminates when the Engine overspeed air shutdown system is activated.

14.21 Stop Engine



This warning light appears with an audible alarm tone when the 48 V generator (MX-13 CARB engines only) has failed or when a major engine system problem exists.

**WARNING**

If the stop engine warning light turns on, a serious engine system problem has occurred. Safely stop the vehicle and turn OFF the engine. DO NOT drive the vehicle until the vehicle has been serviced. Failure to comply may result in death, personal injury, equipment damage, or property damage.

14.22 Engine Wait-to-Start Light

This warning Icon appears when the system needs some time before attempting to start the engine. The light illuminates at key ON, and stays on for as long as 30 seconds.

**NOTE**

The length of time the 'Wait-To-Start' lamp remains illuminated depends on the ambient temperature. The lower the ambient temperature, the longer the lamp will be illuminated.

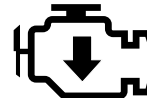
Once the Wait-to-Start light switches off, turn the key to the starting position to start the engine.

You see this light appear when the starter overheats. Alternatively, you can see it when the engine grid heater needs time to warm up.

**NOTE**

Some engines are equipped with an engine starting motor protection feature. If the starting motor is engaged for 30 or more seconds without the engine starting, the starter is locked out from operating, allowing for proper cooling of the starting motor. During this time, the 'Wait-To-Start' lamp flashes for 2 minutes. Once the lamp stops flashing, the starting motor is allowed to function.

14.23 Emissions, Engine Derate



This indicator Illuminates when a derate is active. This indicator not only appears when an emission derate is active, there are several reasons for all derate and shut-down strategies to stop the engine to prevent severe damage to the aftertreatment system. The following are some reasons related to high temperature derate and shutdown.

- Durability - Prevents failure: Used to prevent engine or aftertreatment system damage due to high inlet air temperature.
- Durability - Post failure/prevents further damage: Used after a subsystem failure to prevent further damage to the engine or aftertreatment system due to Diesel Particulate Filter (DPF) over temperature.
- Regulatory: Used to perform the intent of a regulation (e.g.: derate due to low Diesel Exhaust Fluid (DEF) levels).
- Safety: Used to address a concern

over safe operation of the vehicle (e.g.: derate and shutdown of the engine associated with DPF exotherm event).

14.24 Fast Idle Control

The display will show the Fast Idle Control (FIC) indicator when enabled or activated. The indicator shows the set RPM value. See [Indicators Around the Speedometer](#).

14.25 High Beam Assist (HBA)



If your vehicle is equipped with High Beam Assist (HBA), and it is turned ON in the menu, the HBA indicator will illuminate green when enabled, the indicator will illuminate gray when overridden, and the indicator will disappear when disabled. There are two driver override states, see [High Beam Assist \(HBA\)](#).

14.26 Hill Hold



If equipped with a PACCAR TX-12/TX-18 series or Eaton Endurant automated transmission, indicator blinks when disabled by switch (once per second), or continuous with fault.

The hill stop aid helps control unwanted vehicle movement on steep grades when transitioning from the brake to throttle pedal.

14.27 Lights, High Beam



Illuminates when the high beams are on. This icon flashes with an audible alarm if the headlights are left ON when the door is opened and the key switch is OFF.

In addition, this icon flashes, but without an audible alarm, if there is a problem with the low beam headlights or the low beam

headlight wiring. In such event, the high beam headlights turn on at 50% normal brightness.

14.28 Lane Departure Warning (LDW)



Illuminates when LDW system is not able to track the vehicle's position within the lane.

i NOTE

For vehicles equipped with Lane Departure Warning, please refer to Lane Departure Warning Operator's Manual for additional information.

14.29 Lane Departure Warning (LDW) Fault



This amber warning light will appear when a fault occurs in the Lane Departure Warning (LDW) system. If this occurs, the LDW feature will be disabled.

14.30 Lane Keeping Assist (LKA) Disable (option)



This optional switch will disable the Lane Keeping Assist (LKA) feature. LKA will remain disabled until the next key cycle unless re-enabled by toggling this switch again.

This switch lights up green when active.

14.31 Lane Keeping Assist (LKA) Fault



This white warning light will appear when there is a fault in the Lane Keeping Assist (LKA) system. When this occurs, the LKA feature will be disabled.

14.32 Lane Keeping Assist (LKA) Enabled/ Engaged



Indicates, when white, that the Lane Keeping Assist (LKA) feature is enabled. When green, this indicator signifies that the conditions for LKA have been met and that the vehicle is actively engaged in lane keeping (see [Lane Keeping Assist \(LKA\)](#)).

14.33 Malfunction Indicator Light (MIL)



This warning light turns on when an engine emissions failure occurs. An emissions failure is not an emergency, and the vehi-

cle can be safely driven, but should be serviced to correct the problem. In some cases, the MIL will activate in conjunction with the High Exhaust System Temperature (HEST), diesel particulate filter (DPF), and Diesel Exhaust Fluid (DEF) warning lights.

NOTE

The Malfunction Indicator Light (MIL) turns on if the on-board diagnostics (OBD) system detects a possible emissions system failure. To ensure the condition is corrected, the vehicle should be brought in for service at the earliest opportunity.

14.34 Refrigerator



Illuminates to indicate that the refrigerator is on and ignition is off.

14.35 Seat Belt, Fasten



Illuminates for 5 seconds whenever the start key switch is turned on, then it turns off. The warning lamp may also come on if the driver's seat belt is not fastened (if the vehicle was ordered with a seat belt warning light option).

14.36 Tire Inflation (TPMS)



Illuminates when tire pressures need to be checked.

14.37 Torque Assisted Steering Fault



This amber warning light appears inside a Popup when there is a fault in the Torque Assisted Steering system. When the Popup with this symbol occurs, Torque Assisted Steering is not available.

NOTE

Because the optional Lane Keeping Assist (LKA) feature uses the Torque Assisted Steering system, a fault in the Torque Assisted Steering system will also deactivate LKA, if equipped.

14.38 Auxiliary Transmission - Neutral



Indicates the auxiliary transmission is engaged and in neutral.

Related Links

14.39 Transmission, Failure



Indicates a fault with the transmission. Refer to transmission manual.

14.40 Transmission, Oil Temperature High



Illuminates when transmission lubricant temperature is too high.

CAUTION

DO NOT continue to operate an engine when the temperature gauge indicates that the engine is in an overheated state. Continuing to operate an overheating engine can severely damage

the engine and other vehicle components (the transmission, for example). The vehicle must be serviced and the problem corrected as soon as possible to avoid causing severe, non-warrantable equipment damage. Failure to comply may result in equipment or property damage.

14.41 Turn Signal, Left



Blinks when the left turn signal or the hazard light function is operating.

14.42 Turn Signal, Right



Blinks when the right turn signal or the hazard light function is operating.

15 OPTIONAL GAUGES

15.1 Optional Gauges

For vehicles with a telematic navigation screen, optional gauges will be part of the screen functions. Please refer to the navigation system supplement for further details about its functions and how it works. Some vehicles may have optional analog gauges installed at the factory in place of the navigation screen.

15.2 Drive Axle Temperature Gauge (Forward and Rear)



These gauges indicate the temperature of the lubricant in your vehicle's axle(s). These temperatures will vary with the kind of load you are carrying and the driving conditions you encounter. Maximum axle temperature may vary, depending upon the axle and type of lubricant. Very high temperatures signal a need to have your axle lubrication checked.



CAUTION

Driving with very hot temperatures in the rear axles can cause serious damage to the axle bearings and seals. If you notice a sign of overheating, please have your axle lubrication checked. Failure to comply may result in equipment or property damage.

Depending on the vehicle configuration, there may be a single gauge for more than just the forward and rear driver. The icon will have an "X" over the representative axle to indicate which axle's temperature is being displayed in the gauge.

15.3 Manifold Pressure Gauge

This gauge indicates the pressure in the intake manifold. The pressure in the manifold is directly related to the turbo output and is related to the engine power output.



If the pressure indicated by your manifold pressure gauge goes down, there may be something wrong with your engine. Have it checked by a qualified service technician.

16 DASH SWITCHES

16.1 Dash Switches

This custom vehicle has a wide variety of switch-controlled equipment. It is not possible to identify every switch in this section of the operator's manual. Some air device switches can be dependent upon the state of another device to work when switched. Some variables include: a specific vehicle speed, parking brake status, or that another device is on for the air device to operate as expected. The instrument display shows information regarding what must change for the air device to operate as expected. The following table provides a complete list of possible switch icons:

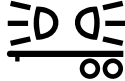
Title	Symbol	Color When Active	Std	Opt
<u>Auto Start</u>		Red		•
<u>Axle, Diff. Lock - Dual</u>		Amber		•
<u>Axle, Differential Lock - Tridrive</u>		Amber		•
<u>Axle, Diff-Lock - Forward Rear</u>		Amber		•
<u>Axle, Diff-Lock - Steer</u>		Amber		•

Title	Symbol	Color When Active	Std	Opt
<u>Axle, Diff-Lock - Rear Rear</u>		Amber		•
<u>Axle, Diff-Lock - Single Rear</u>		Amber		•
<u>Axle, Inter-Axle Differential Locked (Tandem)</u>		Amber		•
<u>Axle, Two Speed</u>		Green		•
<u>Back Up Alarm Mute</u>		Amber		•
<u>Batteries, Low-Voltage Disconnect (LVD)</u>		None	•	
<u>Brakes, ABS Off-Road</u>		Amber		•

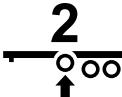
Title	Symbol	Color When Active	Std	Opt
<u>Brake, Parking Brake Valve</u>		Yellow	•	
<u>Brake, Trailer Hand</u>		None		•
<u>Lights, Cab Dimmer Switch</u>		None	•	
<u>Dump Truck Gate</u>		Red		•
<u>Engine Fan Override</u>		Green		•
<u>Engine, Heater</u>		Green		•
<u>Engine, Remote Throttle</u>	PUMP MODE	Amber		•

Title	Symbol	Color When Active	Std	Opt
<u>Engine, Under Hood Air Intake</u>		None		•
<u>Exhaust, Diesel Particulate Filter (DPF) Regeneration</u>		None	•	
<u>Fifth Wheel Slide</u>		Red		•
<u>Fuel Heater</u>		Amber		•
<u>Generic Air, Accessory</u>		Green		•
<u>Generic, Spare SPARE</u>	SPARE	Green		•
<u>Ignition Key Switch</u>		None	•	
<u>Lane Departure Warning (LDW) Disable</u>		Green		•

Title	Symbol	Color When Active	Stnd	Opt
<u>Lights, Beacon</u>		Green		•
<u>Exterior Lighting Self-Test (ELST)</u>		None	•	
<u>Lights, Headlight</u>		Green	•	
<u>AUTO (Automatic Headlights)</u>		Green	•	
<u>Lights, Daytime Running (Override)</u>		Green		•
<u>Lights, Work</u>		Green		•
<u>Lights, Dome</u>		None	•	
<u>Lights, Flood (Spare)</u>		Green		•

Title	Symbol	Color When Active	Std	Opt
<u>Lights, Fog</u>		Green		•
<u>Lights, Hazard</u>		Red	•	
<u>Lights, Marker/Clearance/Trailer</u>		None		•
<u>Lights, Master</u>		None	•	
<u>Lights, Auxiliary</u> <u>Lights, Auxiliary</u>		Green	•	
<u>Lights, Spot</u>		Green		•
<u>Power Take-off (PTO)</u>		Amber		•

Title	Symbol	Color When Active	Std	Opt
<u>Power Take-off (PTO), Forward</u>		None		•
<u>Power Take-off (PTO), Rear</u>		None		•
<u>Suspension, Air Retention</u>		Amber		•
<u>Suspension, Axle, Pusher</u>		Green		•
<u>Suspension, Axle, Tag</u>		Green		•
<u>Suspension, Dump</u>		Amber		•
<u>Trailer, Axle (3rd Axle) Lift</u>		Green		•

Title	Symbol	Color When Active	Stnd	Opt
<u>Mud and Snow Traction Control</u>		None	•	
<u>Pintle Hook</u>		Green		•
<u>Trailer Air Supply</u>		Red	•	
<u>Trailer, Axle (3rd Axle) Lift</u>		Green		•
<u>Trailer, Axle Lift Forward</u>		Green		•
<u>Trailer, Axle Lift Rear</u>		Green		•

Title	Symbol	Color When Active	Stnd	Opt
<u>Trailer, Front Dump Gate</u>		Red		•
<u>Trailer, Dump Gate</u>		Red		•
<u>Trailer, Belly Dump Gate Center</u>		Red		•
<u>Trailer, Belly Dump Gate Rear</u>		Red		•
<u>Trailer, Hotline</u>		Green		•
<u>Trailer, Suspension Air Dump</u>		Amber		•
<u>Transmission, Transfer Case</u>		Amber		•

16.2 Auto Start

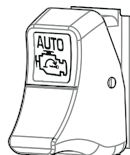
The auto start switch is a three-position switch labeled "AUTO" with the following picture of an engine:

Figure 28: Auto Start Icon



Switch Positions

Figure 29: Lowest Position



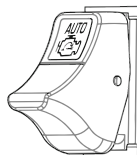
The lowest position disables the auto start system.

Figure 30: Center Position



The center position means that the auto start system is currently enabled.

Figure 31: Highest Position



The highest position enables the auto start system. The switch moves to the middle position when released.

16.3 Axle, Diff. Lock - Dual



Turn switch on to engage Front and Rear Axle Diff Lock.

16.4 Axle, Diff-Lock - Forward Rear



Turn switch on to engage Forward Rear Axle Diff Lock.

16.5 Axle, Diff-Lock - Steer



Turn switch on to engage Front Axle Diff Lock.

16.6 Axle, Diff-Lock - Rear Rear



Turn switch on to engage Rear Rear Axle Diff Lock.

16.7 Axle, Diff-Lock - Single Rear



Turn switch on to engage Single Rear Axle Diff Lock.

16.8 Axle, Differential Lock - Tridrive



Tridrives will have these axle differential lock controls and are 2 separate switches. **FRONT** will control the forward rear and **REAR** will control the center/rear-rear axle differential. In addition, a vehicle with Tridrive will have an interaxle differential lock switch.

16.9 Axle, Inter-Axle Differential Locked (Tandem)



Turn switch on to engage Inter-Axle Differential Lock.

16.10 Axle, Two Speed



If equipped, the two speed axle switch allows you to select axle high and low ranges. The low range (Off) provides maximum torque for operating off-highway. The high range (On) is a faster ratio for highway speeds.

16.11 Back Up Alarm Mute



Turn switch on to mute Back Up Alarm.

NOTE

The mute function use is discouraged. Only use mute when legally required.

16.12 Batteries, Low-Voltage Disconnect (LVD)



If your vehicle is equipped with a Low-Voltage Disconnect (LVD) feature, the LVD module is located inside the driver's side kick panel.

16.13 Brakes, ABS Off-Road



Turn switch on to engage ABS Off-Road mode. See [Antilock Brake Systems \(ABS\)](#).

16.14 Brake, Parking Brake Valve



Pull yellow knob to activate parking brake.

16.15 Brake, Trailer Hand



This dash mounted switch provides air pressure to apply the trailer brake only. It operates independently of the foot treadle valve.

16.16 Dump Truck Gate



Turn switch on to open Dump Truck Gate.

16.17 Engine Fan Override



The engine fan switch allows you to control the engine fan manually or automatically. With the start key switch ON and the fan switch in the MANUAL position, the

engine fan will be on regardless of engine temperature. With the engine fan switch in the AUTOMATIC position, the engine fan will automatically turn on when the engine coolant reaches a temperature of about 200°F (93°C) or when the air conditioning system has reached set point pressure. With an electronic engine, the fan may also be activated by air intake temperature, oil temperature and compression brake usage.

WARNING

DO NOT work on or near the engine fan while the engine is running. The fan can start at any time without warning, and anyone near the fan when it turns on could be injured. If the manual fan switch is set to MANUAL, the fan will turn on when the start key switch is turned to the ON position. If the switch is set to AUTO, it could engage suddenly at any time without warning. Before starting the engine or switching the manual fan switch from AUTO to MANUAL, make sure no one is near the fan. Failure to comply may result in death, personal injury, equipment damage or property damage.

CAUTION

The fan or equipment near it could be damaged if the fan turns on suddenly when you do not expect it. Keep all tools and equipment away from the fan. Failure to comply may result in equipment or property damage.

CAUTION

DO NOT operate the engine fan in the MANUAL position for extended periods of time. The fan hub was designed for intermittent operation. Sustained operation will shorten the fan hub's service life as well as reduce fuel economy. Failure to comply may result in equipment or property damage.

16.18 Engine, Heater



Turn switch on to activate the Engine Heater.

16.19 Engine, Under Hood Air Intake

This switch opens a door in the engine air filter housing. This action allows intake of air from under the hood instead of outside air. This switch can be useful when starting the vehicle in cold-weather conditions.



CAUTION

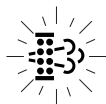
Only operate the under-hood intake air switch when outside temperatures are below 32°F (0°C). Engaging the under-hood air intake while temperatures are above freezing may damage the engine. Failure to comply may result in equipment or property damage.

16.20 Engine, Remote Throttle

PUMP MODE

Turn switch on to activate Remote Throttle Control.

16.21 Exhaust, Diesel Particulate Filter (DPF) Regeneration



Manually controls the diesel particulate filter (DPF) regeneration process. Refer to Engine Aftertreatment Controls Operator's Manual for additional information.

16.22 Fifth Wheel Slide



Turn switch on to unlock Fifth Wheel Slide mechanism. The switch is guarded to protect you from accidentally activating or releasing the lock.



WARNING

DO NOT move the fifth wheel while the tractor-trailer is in motion. Your load could shift suddenly, causing you to lose control of the vehicle. Never operate the vehicle with the switch in the UNLOCK position. Always inspect the fifth wheel after you lock the switch to be sure the fifth wheel slide lock is engaged. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

Vehicles having an air slide fifth wheel have a fifth wheel slider lock controlled by a switch on the instrument panel. By placing the switch in the unlock position you can slide the fifth wheel to various positions to adjust weight distribution.

16.23 Fuel Heater



Turn switch on to activate Fuel Heater.

16.24 Generic Air, Accessory



Provides accessory air at the frame mounted solenoid bank. Air hose plumbing will need to be added to the solenoid bank to connect to the accessory that is intended to control with air accessory switch.

16.25 Generic, Spare SPARE

SPARE

Turn switch on to power customer installed accessory.

16.26 Ignition Key Switch

The ignition key switch located to the left of the steering column has four positions: ACC (Accessories), OFF, ON, and START.



OFF: In this position, all accessories are OFF (except those listed below) and you can remove the key.
The following lights and accessories have power when the key is in the OFF position:

- Brake lights
- Emergency hazard flasher
- Dome and courtesy lamps (on doors)
- City horn
- Cigarette lighter
- Tail lights
- Marker lamps
- Headlights
- Radio station memory
- Instrument lights
- Auxiliary power
- Instrument panel memory settings

ACC (Accessory): With the key in this position, you can play the radio, defrost mirrors (if equipped with mirror heat) or use other accessories.
ON: In the ON position, all circuits are energized. Panel warning lights will light and the buzzer will sound until (1) the engine is started, (2) normal oil operating pressure is reached, and (3) air brake system pressure is above 65 psi (4.48 bar/448 kPa). In this position, the ignition key cannot be removed.

START: Turn the key to this position to start your engine. Release the key after the engine has started.

16.27 Lane Departure Warning (LDW) Disable



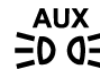
The Lane Departure Warning (LDW) Disable switch disables both audible and visual Lane Departure Warning alerts for 15 minutes (or until the next ignition key cycle) after which time LDW will automatically re-enable. This switch will not affect any audible or visual alerts for the Adaptive Cruise Control (ACC) feature.

This switch lights up green when active.

NOTE

Disabling Lane Departure Warning (LDW) will also disable Lane Keeping Assist until the LDW system is re-enabled.

16.28 Lights, Auxiliary



Turn switch on for Auxiliary Lights.

16.29 Lights, Beacon



Turn switch on for Beacon Light(s). In Medium Duty two types of switches are optioned: a traditional rocker switch and a push button over on the left panel.

16.30 Lights, Cab Dimmer Switch



This switch is used to alter the brightness of the instrument panel lights.

NOTE

The Headlight Switch is an ON or OFF switch. The panel lights are on full intensity during the day and dim when headlights are on.

16.31 Lights, Headlight



Turn switch for park/marker lights and headlights. When the headlights are ON, the dash lights, side, and tail lights are also on. Headlights will turn on if the windshield wipers are turned on. Manually turning the headlights on and then off will override this function until the next time the vehicle is turned on.



WARNING

If the vehicle's low beam wiring circuit does not function correctly, pull completely off the road and call the nearest dealer for assistance. DO NOT drive the vehicle using the high beams, as high beam glare can blind other drivers and increase the risk of an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

If the vehicle has LED headlights, the operator can turn on the mirror heat switch to heat up the lens of the headlights and

remove any condensation. See [Door Mounted Mirror Controls](#) for the mirror heat switch location.

16.32 AUTO (Automatic Headlights)

AUTO (Automatic Headlights)



Automatic Headlights turns on the vehicle exterior lights when a low-light condition is detected and turns off those lights when lighting conditions brighten.

When enabled, Automatic Headlights turns on the following lights during a low-light condition:

- Low beam headlights
- Parking
- Clearance and Identification (tractor and trailer)
- Marker lights (tractor and trailer)
- Tail (tractor and trailer)
- License plate (tractor and trailer)

16.33 Lights, Daytime Running (Override)



This switch overrides the normal operation of the Daytime Running Light (DRL) system. During normal operation, the DRL turns on lights when the headlights are turned off, engine is on, and the park brakes are disengaged. The override switch turns the DRL off in these instances. The DRL is also turned off when the headlights are turned ON.



WARNING

DO NOT use daytime running lights (DRL) during periods of darkness or reduced visibility. DO NOT use DRL as a substitute for headlights or other lights during operations that require lighting of your vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

If the headlight switch is turned OFF, the DRL system engages automatically after the engine starts and you release the park-

ing brake. If the headlight switch is ON, the DRL system is overridden, and headlights operate normally. Also, the DRL is temporarily turned off during engine cranking.

16.34 Lights, Dome



Turn switch on for Cab Dome Lights.

16.35 Exterior Lighting Self-Test (ELST)

EXTERIOR LIGHTING SELF-TEST (ELST)



The Exterior Lighting Self-Test (ELST) allows the operator to examine all exterior lights as part of a pre-trip inspection. An ELST can be activated via the dash switch or the key fob. A full ELST can only be activated with the start key switch in the ON position; otherwise, a limited ELST is performed.

The ELST will run for fifteen minutes. You can confirm exterior light functionality by reading the instrument cluster for displayed faults and by watching the lights from outside the vehicle. Turning the vehicle off or activating the switch a second time while the test is running interrupts the test. The ELST will also start the system check ([Systems Check](#)).

Full ELST

When a full ELST is activated, it will alternately turn on and then off the following lights:

- Park lights
- License plate lights
- Hazard/turn signals
- Low beam headlights
- High beam headlights
- First set of fog/driving lights
- Tail lights
- Stop lights
- Reverse lights
- Fog lights (option)
- Driving lights (option)
- Daytime Running Lights (option)

The following lights stay on during the duration of a full test:

- Clearance lights
- Identification lights
- Side Marker lights
- Beacon/Strobe (option)
- Work/Load lights (option)
- Sign light (option)

Limited ELST

A limited ELST will alternately turn on and then off the following lights:

- Hazard/turn signals
- Low beam headlights
- High beam headlights
- Park lights
- Daytime running lights (option)
- License plate lights
- Tail lights
- Stop lights

The following lights will stay on during the duration of a limited test:

- Clearance lights
- Identification lights
- Side marker lights

TEST THE EXTERIOR LIGHTS

To start the Exterior Light Self Test (ELST) feature:

1. Park the vehicle and set the parking brake.
2. Insert the key into the ignition and turn the key to the ON position. Allow the vehicle to run through bulb check.
3. Press the momentary switch on the dash to start the ELST.



16.36 Lights, Flood (Spare)



Turn switch on for trailer mounted Flood Lights.

16.37 Lights, Fog



Turn switch on for Fog Lights.

i NOTE

Fog lights should be used in the presence of fog, rain, dust, snow, or smoke. DO NOT use during general operation because this is illegal in some locations.

i NOTE

Across the U.S.A. and Canada, State/Provincial requirements vary as to when high beams and fog lights can and cannot be used together. Some states allow only four lights to be used together, while some allow more. How your lights are arranged will affect whether you can operate headlights and fog lights concurrently always comply with the state or provincial requirements where you are driving.

16.38 Lights, Hazard



This switch operates the emergency flashers. With the switch in the ON position, the emergency flasher makes all four turn signals (front and rear) flash simultaneously. The flasher works independently of the ignition switch. You should always use the flasher if the vehicle is disabled or parked under emergency conditions.



WARNING

Be aware of all governing Hazard Warning Light laws and keep all necessary emergency signals in the vehicle per FMCSR 392.22. During unusual or emergency situations, use all relevant lights and signals since hard-to-see vehicles can increase the risk of accidents. Failure to comply may result in death, personal injury, equipment damage, or property damage.

16.39 Lights, Marker/Clearance



Turn switch on to control Cab and Vehicle Marker/Clearance lights.



NOTE

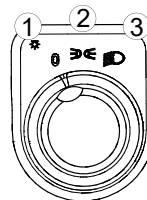
An interrupt switch for the trailer marker lights is mounted on the end of the turn signal lever.

16.40 Lights, Marker/Clearance/Trailer



Turn switch on to control trailer marker/clearance lights separately from the vehicle marker/clearance lights.

16.41 Lights, Master



1. OFF
2. AUX
3. Headlights

Three-position switch that activates either the auxiliary lighting group (AUX) – parking and marker lights – or the headlights and the aux lighting group.

OFF

Turns off all exterior lights. DRL may still be active (see [Lights, Daytime Running \(Override\)](#)).

16.42 Lights, Park Light



Turn switch on for Park Lights. When the Park Lights are on the dash lights, side and tail lights are also on.

16.43 Lights, Sleeper Dome (option)



Turn switch on to activate the sleeper dome lights.

16.44 Lights, Spot



Turn switch on for Spot Light.

16.45 Lights, Work



Turn switch on for cab mounted Flood Lights. Switches 1 and 2 are push buttons, but 3 is a rocker switch.

16.46 Mud and Snow Traction Control



Momentarily push switch in to engage Traction Control (TC).

16.47 Pintle Hook



Turn switch on to remove the slack from the hook.

16.48 Power Take-off (PTO)



This vehicle may be equipped with a dash-mounted switch that controls PTO engagement/disengagement. When the operator activates the switch for the PTO, the status indicator light (located on the switch) will immediately illuminate even though PTO engagement may not have occurred. If the PTO is engaged and the operator turns the switch **OFF**, the PTO status indicator light (located on the switch) will turn off immediately even though PTO disengagement may not have occurred.

CAUTION

Increasing RPM before the PTO is engaged can prevent the PTO from engaging. Failure to comply may result in equipment or property damage.

NOTE

The PTO cannot engage instantly. There is a slight delay.

NOTE

Actual PTO status may be indicated on dash display depending on vehicle configuration.

16.49 Power Take-off (PTO), Forward



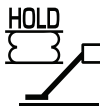
Your vehicle may be equipped with a dash mounted switch that controls forward PTO engagement/disengagement.

16.50 Power Take-off (PTO), Rear



Your vehicle may be equipped with a dash mounted switch that controls the rear PTO engagement/disengagement.

16.51 Suspension, Air Retention



16.52 Suspension, Axle, Pusher



Turn switch on to lower Single or Forward Pusher Axle.

16.53 Suspension, Axle, Tag



Turn switch on to lower tag axle.

16.54 Suspension, Dump



Turn switch on to deflate suspension air bags. The switch is guarded to protect you from accidentally deflating the suspension.

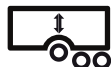
WARNING

DO NOT operate the Air Suspension Deflate Switch (Dump Valve) while driving. Sudden deflation while your vehicle is moving can affect handling and control and could lead to an accident. Use this switch only when your vehicle is not moving. Failure to comply may result in death, personal injury, property damage, or equipment damage.

CAUTION

Operating a vehicle with air suspension bags either overinflated or underinflated may cause damage to driveline components. If a vehicle must be operated under such conditions, DO NOT exceed 5 mph (8 km/h). Failure to comply may result in equipment or property damage.

16.55 Suspension, Third Axle Lift



Turn switch on to raise Third Axle.

16.56 Torque Assisted Steering Effort Adjustment



Three-position switch that adjusts how much steering assistance is provided for vehicles equipped with Torque Assisted Steering.

The top position provides the most assistance (requiring the operator to exert less effort to turn the wheel), the middle position moderate assistance, and the bottom position the least amount of steering assistance (requiring more effort to turn the wheel than the top and middle positions).

16.57 Trailer Air Supply



The red octagonal knob controls the air supply to the trailer.

16.58 Trailer, Axle (3rd Axle) Lift



Turn switch ON to lift 3rd Trailer Axle.

16.59 Trailer, Axle Lift Forward



Turn switch on to lift Forward Trailer Axle.

16.60 Trailer, Axle Lift Rear



Turn switch on to lift Rear Trailer Axle.

16.61 Trailer, Belly Dump Gate Center



Turn switch on to open Trailer Center Belly Dump Gate.

16.62 Trailer, Front Dump Gate



Turn switch on to open Trailer Front Belly Dump Gate.

16.63 Trailer, Belly Dump Gate Rear



Turn switch on to open Trailer Rear Belly Dump Gate.

16.64 Trailer, Dump Gate



Turn switch on to open Trailer Dump Gate.

16.65 Trailer, Hotline



Turn switch on to supply electrical power to trailer accessories.

16.66 Trailer, Suspension Air Dump



Turn switch on to deflate trailer air suspension.

16.67 Transmission, Transfer Case



Turn switch on to shift the transfer case.

16.68 Transmission, Transfer Case Two-Speed



Turn switch on to shift the two-speed transfer case.

17 AUTO START (OPTION)

17.1 Auto Start (Option)

WARNING

Disable the auto start system and disconnect battery power from the starter before servicing the vehicle. This prevents the engine from starting if a person is around moveable components, such as when working under the hood. Failure to comply may result in death, personal injury, equipment damage, or property damage.

NOTE

Operators must know and follow local idle restrictions. Auto start is not programmed to follow local idle laws automatically.

NOTE

When the auto start system starts and runs the engine, the vehicle's park lights

stay illuminated until after the engine stops.

The auto start (option) system starts and stops the engine to maintain one of the following:

- Battery state-of-charge (SOC) in main and auxiliary batteries
- Sleeper air temperature (option)
- Engine oil temperature (option)
- Fuel temperature (option)

The auto start system runs the engine at an above-average idle speed. The increased speed puts less load on the engine aftertreatment system (EAS) and reduces how many regenerations the EAS needs. The speed also charges the batteries faster when using auto start to recover battery SOC.

If a door is open, then five seconds before the engine starts, the vehicle horn makes two short, consecutive honks. If the vehicle has a safety check override (option) that requires shut doors to run the auto start, then the auto start system disables until the operator shuts the doors and resets the system. Auto start may also override the Engine Idle Shutdown Timer (EIST) when both systems are active.

17.2 Auto Start Safety Checks



WARNING

DO NOT tamper with the Auto Start system safety checks which is designed to prevent the engine from starting when the operator may be in the vicinity of moving components, such as when working under the vehicle's hood. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The auto start system runs the following safety checks before it starts the engine:

- Check that these indicators are off:
 - Engine Lamp
 - Stop Engine Lamp
 - Engine Diesel Particulate Filter (DPF) Lamp
 - Check Engine Lamp
 - Engine Malfunction Indicator Lamp
 - Engine Protection Indicator Lamp
 - Engine High Exhaust System Temperature (HEST)

- Check that the start switch is either in the ACC or OFF position or the key is out.
- Confirm that the cab HVAC meets these settings:
 - HVAC controls are in AUTO mode (light on).
 - HVAC and auto start sleeper temperature settings match.
 - HVAC "Sleeper HVAC Override" button is on (light on).
- Enable auto start.
- Disable Power Take-Off (PTO).
- Apply the tractor parking brake.
- Put the gear in NEUTRAL.
- Set park brake.
- Do not press the foot brake.
- Do not press the clutch pedal.
- Shut the hood.
- Check that the hood switch does not have a circuit issue or another error.
- Turn OFF anti-theft.
- Shut the doors (option).

When one of these checks fails, the auto start system disables and turns off the engine.

17.3 Auto Start Conditions

The auto start system starts the engine and keeps it running once it meets all safety checks and one of the following conditions:

- The batteries fall below a preset voltage.
- The engine oil temperature is too cold (option).
- The fuel temperature is too cold (option).
- The sleeper temperature drops above or below a user preset (option).

NOTE

Vehicles with Espar bunk heaters use the Espar unit to heat the cab interior instead of the engine. These systems operate independently of one another.

The auto start system runs the engine within the following conditions before stopping the engine:

- Battery state of charge (SoC):
 - Start: SOC drops below preset percentage
 - Stop: Max runtime is up to 3 hours

with a 10 minute cooldown in between cycles until SOC meets preset conditions

- Oil temperature (option):
 - Start: 20°F (-7°C)
 - Start: 100°F (38°C)
- Fuel temperature (option):
 - Start: 0°F (-18°C)
 - Stop: After 30 minutes of runtime
- Sleeper temperature (option):
 - Start: The sleeper drops below a preset temperature
 - Stop: Max runtime up to 1.5 hours

The auto start system stops the engine once it meets a preselected condition. The operator can use the vehicle settings to pick one of the following conditions:

- The batteries exceed a preset state of charge (SoC).
- The oil temperature meets requirements (option).
- The fuel temperature meets requirements (option).
- The engine runtime for fuel temperature expires (option).

- The sleeper temperature meets the user preset temperature (option).

The auto start system disables when it meets any of the following conditions:

- The engine does not start within three attempts.
- Either the Check Engine warning light or the Malfunction Indicator Light (MIL) illuminates while the engine runs.
- The operator turns the key to the "ON" position.

17.4 Operating Auto Start

Confirm that the auto start safety checks pass before you begin.

Follow these steps to enable auto start.

1. Push the auto start dash switch (see [Auto Start](#)) to the highest position.
2. Hold for three to ten seconds while the Digital Display shows a three second countdown and then the following message: "Auto Start Enabled."

i NOTE

If the switch is pressed longer than ten seconds, an error message displays and the auto start system disables.

3. Release the switch.
When the switch moves to the middle position, auto start is enabled.

18 DOOR MOUNTED MIRROR CONTROLS

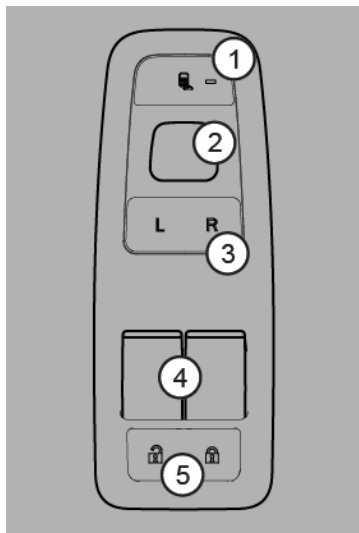
18.1 Door Mounted Mirror Controls

The vehicle can have power mirrors. If so, the mirror controls are on the driver-side door pad. You can adjust mirrors in four directions. To provide good visibility, adjust the mirror so the side of the vehicle appears in the inboard part of the mirror.

i NOTE

The vehicle can come with a digital side-view mirror option. Refer to the PACCAR Digital Vision System with Mir-

rors operator's manual for instructions. This manual is in the glove box.



1. Mirror heat
2. Mirrors adjust
3. Left or right mirror adjustment selector
4. Window controls
5. Door lock control

Mirror Heat Switch

The vehicle can come with optional heated mirrors. You can control mirror heat with the mirror heat button. If the vehicle has optional hood-mounted heated mirrors, this switch also activates heat to those mirrors.

i NOTE

If the vehicle has optional LED headlights, this switch also activates heat to those headlights.

Power Mirror Switch

If the vehicle comes with power mirrors, the directional controls for both mirrors are on the top of the driver-side door.

Power Door Lock Switch

Power door lock rocker switches are on the door pads. To toggle all door locks simultaneously, press any door lock switch marked with a padlock symbol.

Power Window Switch

Power window rocker switches are on the door pads. Depress the switch to open the window. Pull up on the switch to close the window. Release the switch to stop window movement. The driver-side window has an express down feature. Holding the

switch down activates the express down feature. Release the button and the window descends until it is fully open.

18.2 How To Use Power Mirror Adjustment Switches



WARNING

Only adjust mirrors and cameras before driving the vehicle. Adjusting a mirror or cameras while driving can cause you to take your eyes off the road, which could result in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

When using convex mirrors, keep plenty of space between your vehicle and others. This space is particularly important when you are turning or changing lanes. Convex mirrors can distort images, making objects that are close to you seem far away. Be aware of this possible distortion to avoid a collision

when you are turning or changing lanes. Failure to comply may result in death, personal injury, equipment damage, or property damage.

1. Move the **Mirror Selector** switch (3) to the right or left to select the desired mirror for adjustment.
2. Depress the **Mirror Directional Control** pad (2) in one of its four arrow directions. The mirror moves in that direction.
3. Adjust the mirror so the side of the vehicle appears in the inboard part of the mirror.
4. When you are finished with adjustments, return the **Mirror Selector** switch back (3) to the center (neutral) position. This step prevents unintentional adjustments to the mirrors.

19 DIGITAL MIRROR SYSTEM

19.1 Digital Mirror System

The PACCAR Digital Mirror System (DM) is a camera-based mirror enhancement solution intended to work WITH aerodynamic-

cally improved traditional mirrors, providing a familiar, natural driving experience. The PACCAR DM system enhances both direct vision and night vision, while reducing aerodynamic drag.



WARNING

Only adjust mirrors and cameras before driving the vehicle. Adjusting a mirror or cameras while driving can cause you to take your eyes off the road, which could result in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

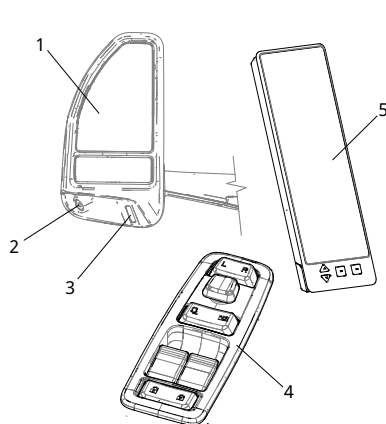


WARNING

The driver is always responsible for safely operating the vehicle. If the DM system fails, use the traditional mirrors to maneuver the vehicle and seek service immediately. Failure to comply may result in death, personal injury, equipment damage, or property damage.

19.2 Components

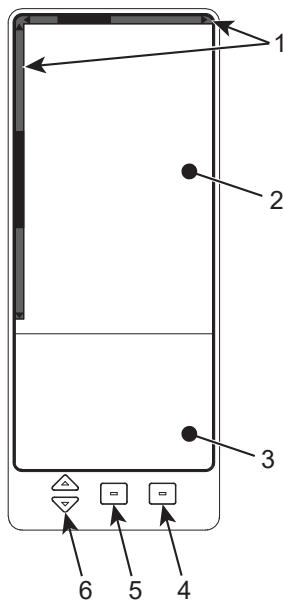
Table 6: DM Components



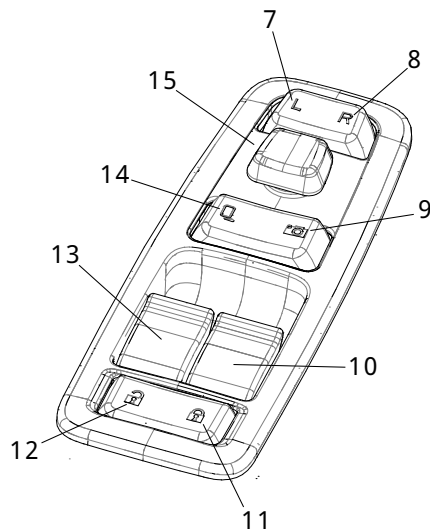
1. Compact Aero Mirror
2. Camera
3. Infrared Lamp
4. Door Mounted Control Module (driver's side only)
5. Digital Mirror Display
6. Heater Switch for Glass Mirror and Camera Lens (Not shown, dash- mounted, location may vary by vehicle model)

19.3 Digital Mirrors/Digital Vision System Controls

Driver's Side
Digital Camera Display



Driver's Side
Door Control Module



1. Camera pan-angle indicator bars
2. Main display field for camera feed(s)
3. Soft key label area
4. Multi-Function. View-Type cycle, Back, or Menu-Exit
5. Dual Function. Night Vision OR menu access. (NOTE: Menu will only show when the PARKING BRAKE is engaged.)
6. Dual Function. Brightness or menu scroll
7. Left side selector
8. Right side selector
9. Digital Mirror selector
10. Right window up/down switch
11. Electric door lock
12. Electric door unlock
13. Left window up/down switch
14. Traditional glass mirror selector
15. Mode-dependent joystick

19.4 Enabling the DM

The DM will turn on temporarily when the vehicle is unlocked with the vehicle key fob, OR when the door is opened if it is already unlocked. After two minutes the system will go into a sleep-state unless the operator turns the ignition key to the ON position OR presses on the door control module, the joystick (15), digital mirror selector (9), unlock (12) OR any button on the display controls. If the ignition is shut off, the system will again wait two minutes before going to sleep.

NOTE

The joystick will not wake the DM when the controls lockout is engaged, or when traditional glass mirrors are selected on the controller (14).

NOTE

The DM displays will actively display while the key is in the on position and cannot be shut off.

NOTE

System settings will default to most of those that were active prior to a system power-down (key off).

NOTE

The last user selected view-type is saved before the system enters deep sleep. Deep sleep is activated after 7 minutes of inactivity. After 7 minutes, or battery disconnect, it will revert to the default view-type.

WARNING

Only adjust mirrors and cameras before driving the vehicle. Adjusting a mirror or cameras while driving can cause you to take your eyes off the road, which could result in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

19.5 Initial Set Up

INITIAL SET UP

Language Selection

The DM has three languages to choose from: English, Spanish, and French.

NOTE

Language selection is found in the menu which can only be accessed with the parking BRAKE ENGAGED.

To change the language

1. **Select the Digital Mirrors** – press (9).
2. **Select the Menu** – press (5).
3. **Navigate to Language** – press (6) until the Language line is highlighted.
4. **Cycle to the desired option** (English, Spanish, or French) – press (5).
5. Either continue to navigate to other settings if desired, or press the back button (labeled on screen).

i NOTE

Language selection in the Digital Mirrors is independent from language selection in the Digital Display. Separate procedures must be followed for each system.

Digital Mirrors Not Selected



The “Digital Mirrors Not Selected” icon will appear on the Digital Mirror Display to indicate that the Traditional Glass Mirrors selector button (14) (see [Digital Mirrors/Digital Vision System Controls](#)) OR if controls lockout is active on the door control module. To use the door control module or monitor buttons to control the Digital Mirrors, ensure the Digital Mirror selector (9) has been selected.

i NOTE

Throughout this manual, the numbers shown in parentheses (X) in instructions

refer to a specific DM control button. The location of a button is shown in the figures found in [Digital Mirrors/Digital Vision System Controls](#).

Selecting View-Types

The DM uses three View-Types to present what its cameras see.

- **Expanded View Type - (only available on passenger side display)**
- Two views are displayed. An upper, larger portion of the display is a panoramic view, while the lower is a look-down view of the passenger side front wheel area.
- **Traditional View-Type** - The upper and largest area of the display shows an image similar to that of a traditional flat-glass, physical mirror, while a lower, smaller portion shows a view similar to a convex bubble mirror.
- **Panoramic View-Type** - Fills the entire display and has some of the characteristics of a traditional convex “bubble” mirror.

⚠ WARNING

DO NOT use panoramic view to judge distance or clearances between objects. The panoramic view is only intended to show you that an object is present, and its general direction relative to your vehicle. When using panoramic view, exercise the same caution you would use with a glass convex (bubble) mirror. Failure to comply may result in death, personal injury, equipment damage, or property damage.

To change View Types:

1. **Select the Digital Mirrors (general)** - Press (9)
2. **Select which side** Digital Mirror you would like to change settings for - Press (7) or (8) until the desired display is bordered by green

i NOTE

Whenever the Digital Mirrors are selected, a green border will appear around the perimeter of one display, while a red border will appear around the other. A green

border indicates that a display is ready to accept settings changes. A red perimeter indicates a display that cannot

receive changes. You may toggle the left and right side selector buttons to change the 'ready' monitor as needed.

3. **Change the current View-Type** - press (4) until the desired View-Type appears on the display.

SET TRAILER END LINE

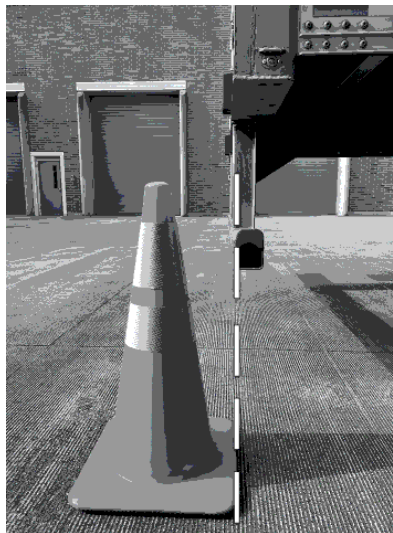
The DM places a line on screen that provides the ability to visually locate the end of the trailer quickly. Because overall combination vehicle lengths can vary, this line position is user adjustable. The line must be adjusted each time the overall vehicle length changes.

i NOTE

Trailer End Line Adjustments are found in the menu which can only be accessed with the PARKING BRAKE ENGAGED.

i NOTE

Placing a physical object for reference - like a traffic cone or triangle - at the end of the trailer can make the on-screen adjustment of the end line significantly easier.



To Set Trailer End Line through the menu, with **Parking BRAKE ENGAGED**
Enter the menu – press (5).

Navigate to Set Trailer End Line – press (6) until Set Trailer End Line Is highlighted.

Enter Set Trailer End Line – press (5).

Locate the line to end of trailer – press (6) until the line is aligned with the end of trailer reference object.

i NOTE

BEST PRACTICE is to position top of the trailer end line at the base of the reference object.



The DM will also automatically detect when an electrical truck-to-trailer connection is made, and inform the operator with the following on-screen message:

Trailer Detected. Is Trailer End Line correct?

The choices are

- **Yes**

or

- **Adjust**

If "Yes" is selected, the pop-up message disappears, and the system returns to the last active view mode and is ready for driving.

If "Adjust" is selected, the end-line adjustment screen goes active, and the user is then permitted to set the end line using a guided process.

DISTANCE LINES

Record the new end line position - press (3).

The system then returns to the root menu.

If no other system changes are desired, the user can then

Exit the menu- press (2).

The system returns to the previous view-type, and is ready for use.

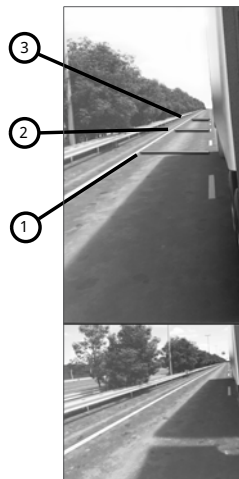
Failure to comply may result in death, personal injury, or property damage.

WARNING

Distance line values are approximate and vary depending on the topography surrounding the vehicle. DO NOT rely solely on distance line values to determine the specific distance to surrounding objects. Ultimate responsibility for the safe operation of the vehicle remains with the driver at all times. Failure to comply may result in death, personal injury, or property damage.

WARNING

Trailer end line, and corresponding distance lines, are dependent upon your calibrations in the menu. The trailer end line must be reset when adjusting king pin settings or using a different trailer.



1. Trailer End Line
2. First Distance Line
3. Second Distance Line

The DM also gives the option to use preset distance lines that accompany the trailer end line, which can be enabled through the menu.

In forward gear, the first distance line represents approximately 40 ft behind the trailer end line, and the second distance line represents approximately 80 ft behind the trailer end line.

In reverse gear, the first line represents approximately 10 ft behind the trailer end line and the second line represents approximately 20 ft behind the trailer end line.

These distance lines move with the trailer end line as it is adjusted but remain a set distances away from it, as specified above.

LEFT/RIGHT (L/R) ENDLINE CALIBRATION

The L/R End Line Calibration is completed at the factory. While the calibration settings can be accessed by the operator, calibrating the system is unnecessary and **SHOULD NOT** be done unless a Digital mirror is replaced or repaired.



WARNING

If any external damage occurs, or if a traditional glass mirror is replaced

, the L/R End Line Calibration **MUST** be performed before operating the vehicle. Failure to comply may result in property damage, physical injury, or death.

L/R Endline Calibration Instructions:

1. Set up a marker on the ground that is 10.2 meters behind the center of the front axle.
2. Navigate to the Menu (3) on the Digital Mirrors, then select "Set Trailer End Line".
3. To then enter the L/R End Line Calibration Mode:
 - With the **Parking Brake Engaged** and the Door Control Module set to Digital Mirror selector (9) and Right-side selector (8), press and hold the middle button (3) on the digital mirror display for 5 seconds. Passenger Side (PS) & Driver Side (DS) trailer end lines will now move independently.
4. Using the arrow buttons (4), direct the top of PS end line to the 10.2-meter mark on the ground. A green box on the display will indicate that the PS is active.
5. Use the DCM to switch to Left side selector (7) and direct the top of the DS end line to the 10.2-meter mark. A green box on the display will indicate that the DS is active.
6. Once both lines are set to the 10.2-meter mark, select the middle button

(3) on the digital mirror display to confirm and exit the calibration mode.

7. Follow "Set Trailer End Line" procedure to set calibrated trailer end lines to the desired end of trailer location.

i NOTE

When the calibrated lines are confirmed and the calibration mode is exited, the lines will jump above the 10.2-meter mark to their default location. Trailer End Lines will remain at same position relative to each other.

MANUAL CAMERA PANNING

Manual panning can be useful for reviewing specific objects that are outside the default panning angle. Both left and right-side cameras can be manually panned independently of one another.

i NOTE

Panning is not available in every View-Type. IF panning is available in the current View-Type, panning direction bars will appear on the top and/or edge of

the screen when the joystick (15) is used.

To activate manual panning:

1. Select Digital Mirrors - press (9).
2. Select the side to change the settings - press (7) or (8) settings. The desired Digital Mirror Display must be bordered by green to accept changes.
3. Direct the view of the camera (AKA, "pan") as desired with the joystick (15). Panning bar(s) will appear and move as the camera is panned.
4. To **save** the camera panning angle - press directly down on the joystick (15).
5. To leave the camera panning angle **unsaved** - do not press down on the joystick (15).

i NOTE

SAVED PANNING ANGLE TIMEOUT - A saved manual pan will persist indefinitely unless a new manual camera pan is saved. The opportunity to save a manual pan will be available for 45 seconds when vehicle speed is below 25 mph and 10 seconds when vehi-

cle speed is above 25 mph. A save icon will appear on the Digital Mirror Display during this time.

i NOTE

Unsaved Panning Angle Timeout - An unsaved manual pan made when the vehicle speed is under 25 mph will persist indefinitely. However, if the vehicle speed then increases above 25 mph it will immediately revert to the default panning angle. An unsaved manual pan made over 25 mph will only persist for 10 seconds then revert to the default panning angle.



DISPLAY SETTINGS

i NOTE

To make changes to Digital Mirror Display settings, you must first select one, and only one, of the Digital Mirrors Displays.

1. Select the Digital Mirror (as opposed to the Traditional Glass Mirror) - press (9).
2. Select which side Digital Mirror you would like to change settings for - press (7) or (8).

i NOTE

Panning Bars may appear on the top and side of the Digital Mirror Displays, and a green border will appear around the selected Digital Mirror Display to indicate it alone is ready to accept settings. A Digital Mirror Display with a RED border cannot accept settings changes.

NIGHT VISION

Night Vision is intended to increase object visibility in a variety of low-light settings. These include, but are not limited to; dusk, dawn, overcast, night, or when passing through tunnels and poorly-lit warehouses. When activated, Night Vision creates an infrared enhanced rendering of the camera feeds.

There are three Night Vision settings

- ON
- OFF
- AUTO

To cycle through these settings - with the PARKING BRAKE RELEASED

1. Repeatedly press (3) on the driver's side Digital Camera Display until you achieve the desired night vision setting. The current setting state will show on the display.

To change Night Vision settings through the menu - with the PARKING BRAKE ENGAGED

1. **Access the menu** - press (3).
2. **Navigate to Night Vision** - press (4) until Night Vision line is highlighted.
3. **Cycle to the desired option** (ON, OFF or AUTO) - press (3).

4. Either continue to navigate to other settings if desired or press the back button (labeled on screen). Pressing the back buttons saves the selected settings.

i NOTE

The "look down" camera does not use Night Vision and may appear darker at night.

ADJUST DISPLAY BRIGHTNESS**i NOTE**

The Digital Mirror Display brightness levels will always change automatically - regardless of user settings - with a change in ambient light level (transitioning from a tunnel to daylight, for example). This feature cannot be shut off.

i NOTE

Even though the system will always continually adjust display brightnesses, user brightness adjustments are necessary when a driver first uses the DM, and occasionally thereafter. The dri-

ver SHOULD adjust brightness WHEN-
EVER they feel it will improve the Digital
Camera Display visibility.

NOTE

Your left and right displays brightness
levels can and will change independent
of one another based on ambient light-
ing levels.

The system records a driver's screen
brightness settings along with the ambient
lighting at the time of the adjustment. When
the system sees the same ambient lighting
in the future, it will automatically adjust the
display brightness to match the recorded
display brightness for that ambient (AKA,
"outside") light level. The goal of this sys-
tem is to reach a state where driver bright-
ness adjustments are mostly unnecessary.

To adjust the display brightness:

1. Select the Digital Mirror Display -
press (9).
2. Select which side Digital Mirror
Display you would like to change
settings for - press (7) or (8).
3. Adjust display brightness to the
desired level - use the up or down

arrows (6).

4. Return the Digital/Glass Camera
selector switch to the controls
lockout position.

TRADITIONAL GLASS MIRROR ADJUSTMENT

WARNING

Only adjust mirrors and cameras before
driving the vehicle. Adjusting a mirror or
cameras while driving can cause you to
take your eyes off the road, which could
result in an accident. Failure to com-
ply may result in death, personal injury,
equipment damage, or property dam-
age.

WARNING

When using convex mirrors, keep plenty
of space between your vehicle and oth-
ers. This space is particularly impor-
tant when you are turning or chang-
ing lanes. Convex mirrors can distort
images, making objects that are close
to you seem far away. Be aware of this
possible distortion to avoid a collision
when you are turning or changing lanes.

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

NOTE

The Mirror-Type Selector (Digital/Glass)
found on the Door Control Module is a
3 position switch. The center position is
unlabeled and deactivates the vehicle
side selector, and joystick. After inten-
tional adjustments, return the switch to
the controls lockout position.

Use the following steps to adjust the
vehicle's traditional glass mirrors:

1. **Select the Traditional Glass Mirror**
- press (14). The joystick will now
adjust the glass mirrors, but have no
effect on the Digital Mirror settings.
2. **Select which side** Traditional Glass
Mirror you would like to adjust -
press (7) or (8).
3. **Adjust the mirror** - use the joystick
(15).
4. **Repeat these steps** for the opposite
mirror if necessary.
5. **Return the Camera Type Selector**
switch back to the controls lockout

position to prevent unintentional adjustments to the mirrors.

TRAILER TRACKING

This feature continuously adjusts a camera's angle to keep the end of a trailer in view while the vehicle is turning.



WARNING

DO NOT use the Trailer Tracking feature when towing multiple trailers. The camera panning angle-limits may not allow the camera to see the end of the rear-most trailer. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Due to limitations in the Infrared Lamp (3), Reverse Trailer Tracking does not function in low light conditions. When in low light conditions with Night Vision OFF, TURN TRAILER TRACKING TO FWD ONLY and use the traditional glass mirrors while backing. If Night Vision is set to AUTO or ON, reverse trailer tracking is automatically disabled in low light conditions. Failure to com-

ply may result in death, personal injury, equipment damage, or property damage.

Trailer Tracking can be activated or deactivated in the settings menu. To toggle the state, first make certain that the PARKING BRAKE IS ENGAGED, then

1. **Select the Digital Mirrors** - press (9).
2. **Select the Menu** - press (5)
3. **Select "Trailer Tracking"** - press either arrow found at (6) on the Digital Camera Display until "Trailer Tracking" is highlighted.
4. **Toggle "Trailer Tracking" to FWD ONLY, FWD/REV or OFF** – repeatedly press (5) until the desired state (FWD ONLY, FWD/REV, OFF) is selected.
5. **Exit the menu** - press (4).

The FWD ONLY setting activates forward trailer tracking, disabling reverse. The FWD/REV setting activates both forward and reverse trailer tracking. The OFF setting deactivates all trailer tracking. The system will retain user selection of FWD ONLY, FWD/REV, or OFF over key and battery cycle when a trailer is detected.



WARNING

Reverse trailer tracking may reduce rearward visibility based on tractor or trailer set up. If camera panning is unable to follow the end of the trailer while set to FWD/REV, disable reverse trailer tracking by changing the setting to FWD ONLY. Failure to comply may result in death, personal injury, equipment damage, or property damage.

When operating an uncoupled tractor (AKA bob-tailing) the trailer tracking feature will revert to a 'paused' state until it again detects a truck-to-trailer electrical connection. Trailer tracking is on by default but can be turned OFF in the Settings Menu.

SIDE OBJECT DETECTION (SOD)



On vehicles optioned with driver side SOD, and that are also equipped with Digital Mirrors, when an object is detected by SOD on the driver's side there will be a continuous visual indication on the driver side Digital Mirror display.

On vehicles optioned with passenger side SOD and Digital Mirrors, when an object is detected by the passenger side SOD function, there will be a continuous visual indication on the passenger side Digital Mirror display.

19.6 Cold Weather Operation and Lens Heating



WARNING

DO NOT drive the vehicle if the cab interior temperature is below 14°F (-10°C). Digital Mirror displays may experience a delay that makes the system unsafe at extremely cold temperatures. Allow the cab interior to warm to above 14°F (-10°C) before travel. Failure comply may result in death, personal injury, equipment damage or property damage.

WARNING

Ice, condensation, or other substances can reduce or completely obstruct

the camera's field-of-view. Remove any form of blockage from the camera before moving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

In cold or inclement weather, make certain the camera's field of view is clear of snow, ice, or condensation BEFORE MOVING THE VEHICLE. If the camera lens is blocked by ice or condensation, first determine if the lens heater has turned on automatically. If it has not, activate the heater manually, and then wait until the lens is clear before driving.

NOTE

The lens heater switch will be dash mounted, and varies by truck model, optioning and configuration. Refer to your general truck operator's manual, or contact your dealership if you need assistance in locating it.

You may wipe condensation away from the lens with a soft cloth, but depending on weather conditions it may return almost

immediately. The lens heater will provide continuous protection from ice and condensation.

CAUTION

DO NOT scrape ice or apply chemical deicers to the mirror or camera lens. Use the mirror heater function to clear ice or condensation. Failure to comply may result in equipment or property damage.

19.7 Caring For the DM System

WARNING

There are no user-serviceable components in the digital mirror (DM) system. DO NOT attempt to repair or replace the DM system. PACCAR Inc. is not responsible for liability arising from unauthorized repair, modifications or misuse of the DM system. DO NOT attempt to service the Digital Mirrors. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

DO NOT allow direct jet wash or abrasive cleaners to be applied to the lenses of your DM cameras or infrared modules. Failure to comply may result in non-warrantable equipment damage.

CAUTION

DO NOT allow direct jet wash or abrasive cleaners to be applied to the lenses of your DM (digital mirror) cameras or infrared modules. Failure to comply can result in equipment or property damage.

NOTE

If you notice a "halo effect" wipe the camera lens with a damp microfiber cloth. If condition remains, contact your nearest dealer.

Use Normal Truck Wash:

- Request no direct jet wash to cameras
- No additional care needed
- Standing water drop will dry after short time driving or can be gently wiped

away with a clean microfiber towel (to prevent scratching to plastic camera lense)

- If you notice soap standing on the lens after a truck wash, gently wipe the lens dry with a damp microfiber towel

Do the following actions:

Pre-trip Inspection:

1. Visually inspect mirror arms and cameras for damage.
2. Visually inspect all Digital Camera Displays for damage.
3. Press the door unlock button and wait for system to power up.
4. Inspect to see if any red status indicator are visible that would indicate a system issue.
5. Check to see if the trailer is visible on both Digital Camera Displays, and that an image is present from the look-down camera.
6. Check to see a clear image in all monitors.

19.8 Monitor At Dusk 'blue/purple effect'

During periods of low light, such as at dawn or dusk, the DVS-M system may show a blue or purple effect on the Digital Mirror Displays. This phenomenon is created by specific frequencies of light interacting with the cameras and does not indicate a problem with the DVS-M system. This is not a permanent effect and it will go away shortly after it appears, as the sun continues to rise or set.

19.9 System Fault Alerts



There are multiple types of faults that can occur in the DM system. When this happens a fault symbol will show both on the driver's side display, AND on the digital

instrument display in the dashboard. The in-dash message may or may not instruct the operator what to do to address it.

1. **General Fault** - The system has a fault that may not be immediately noticeable by the driver.
2. **Latency Fault** - The system isn't displaying images in real time (delay of at least 0.5 seconds), which may be difficult for a driver to notice.
3. **Light sensor is blocked** - The system can't display the appropriate screen brightness level if the sensors are covered.

20 HEATING AND AIR CONDITIONING (AC)

20.1 Heating and Air Conditioning (AC)

This vehicle's heating and air conditioning (AC) system operates in four distinct modes: manual, automatic, semi-automatic and, maximum defrost. Each mode provides the driver with the greatest level of comfort and convenience.

The recommended mode for all conditions that do not require windshield defrosting is the automatic mode. Automatic mode maintains cab comfort under various driving conditions without driver interaction. The cab heater and air conditioner controls sit together in the center of the dash. They sit to the right of the steering column. The bunk heater and air conditioning (AC) controls are in the sleeper control panel.



WARNING

DO NOT drive with visibility reduced or obscured by fog, condensation, or frost on the windshield. Follow the instructions of the ventilation/heating and defogging/defrosting system. Maximum heating output and fast defrosting can be obtained only after reaching the vehicle's operating temperature. If in doubt, consult your dealer. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT breathe engine exhaust. Engine exhaust fumes contain carbon monoxide, a poisonous, colorless, odor-

less gas. Exhaust fumes can enter the cab from a poorly maintained exhaust system or from nearby vehicles. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Routinely inspect and maintain your vehicle exhaust system. A poorly maintained, damaged, or corroded exhaust system can allow exhaust fumes to enter the cab. Engine exhaust fumes contain carbon monoxide, a poisonous, colorless, odorless gas. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Never idle your vehicle for prolonged periods of time if you sense that exhaust fumes are entering the cabin. Investigate the cause of the fumes and correct it as soon as possible. If the vehicle must be driven under these conditions, drive only with the windows open. Failure to comply may result in

death, personal injury, equipment damage, or property damage.

NOTE

DO NOT stay in the vehicle with the engine running or idling for more than 10 minutes with the vehicle's Heater and A/C ventilation system in RECIRC or at LOW FAN SPEED. Even with the ventilation system on, running the engine while parked or stopped for prolonged periods of time is not recommended.

NOTE

Keep the engine exhaust system and the vehicle's cab ventilation system properly maintained. It is recommended that the vehicle's exhaust system and cab be inspected (1) By a competent technician every 15,000 miles (24,140 km); (2) Whenever a change is noticed in the sound of the exhaust system; or (3) Whenever the exhaust system, underbody, or cab is damaged.

NOTE

If you are required to idle your vehicle for long periods of time, install an auxiliary heater or automatic idle control. These auxiliary devices can reduce fuel consumption and save you money.

WARNING

If you are parked next to idling vehicles, move your vehicle or minimize your time in the cab or sleeper. Engine exhaust fumes contain carbon monoxide, a poisonous, colorless, odorless gas which can enter the cab from nearby exhaust systems. Failure to comply may result in death, personal injury, equipment damage, or property damage.

20.2 Air Conditioning Controls

AIR CONDITIONING CONTROLS

Table 7: Air Conditioning Controls with SmartDisplay (Option)

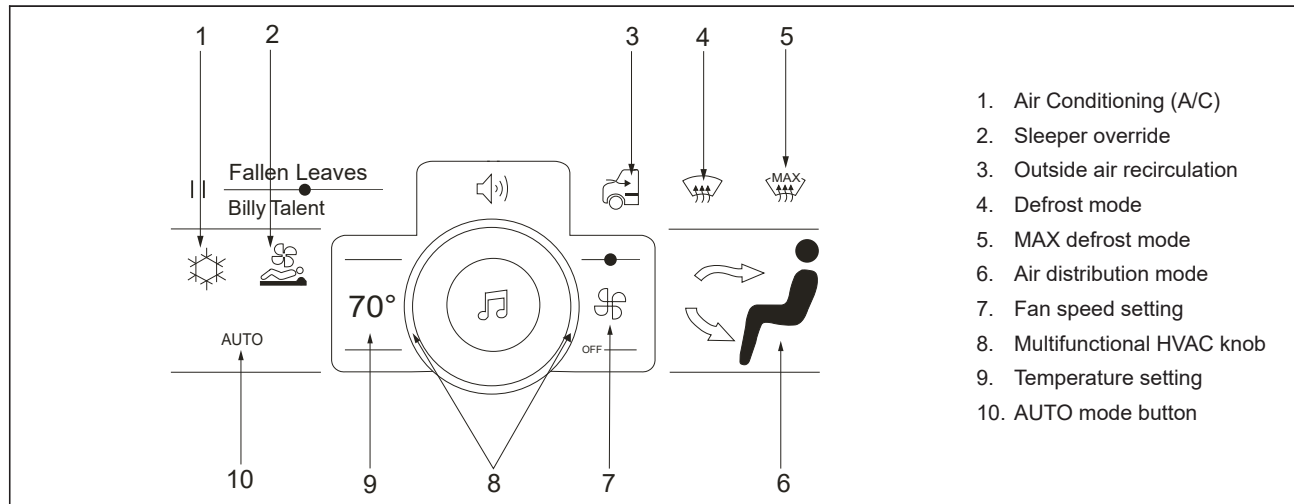
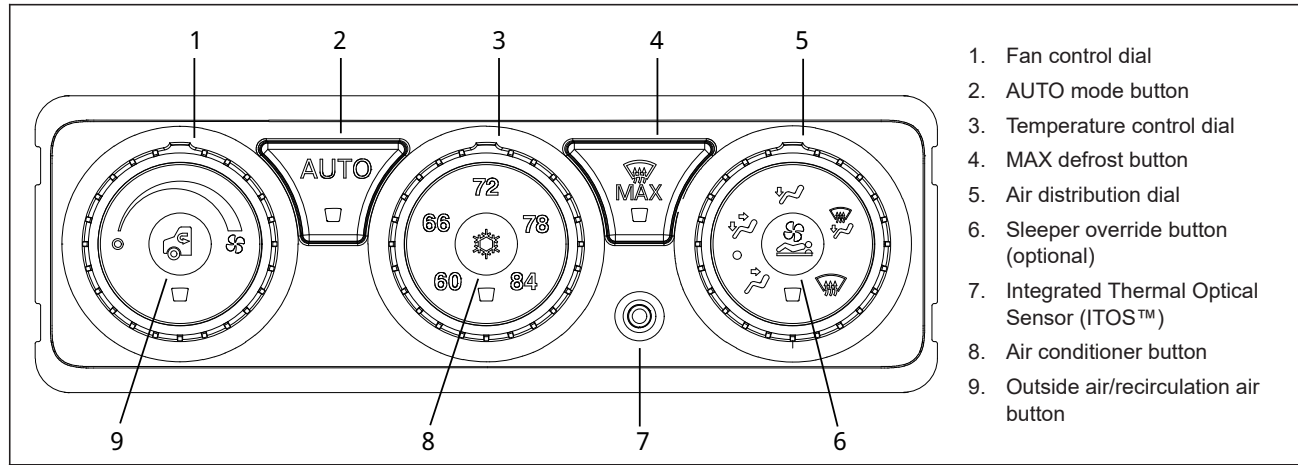


Table 8: Physical Air Conditioning Controls

INTEGRATED THERMAL OPTICAL SENSOR (ITOS™) AND SUNLOAD SENSOR

The Integrated Thermal Optical Sensor (ITOS™) is located on the HVAC controls or under the steering wheel (if your vehicle is equipped with SmartDisplay). The sunload sensor is located on driver's side of the dashboard. These sensors are used to calculate the air temperature inside of the cabin. The information collected by the sensors help control the internal temperature of the cabin.



CAUTION

DO NOT cover the sunload sensor. Covering the sensor can change cabin temperature data received by the HVAC system, affecting HVAC performance and reducing its efficiency to defrost or defog the windshield. Failure to comply may result in equipment or property damage.

Figure 32: ITOS Sensor - Under the Steering Wheel

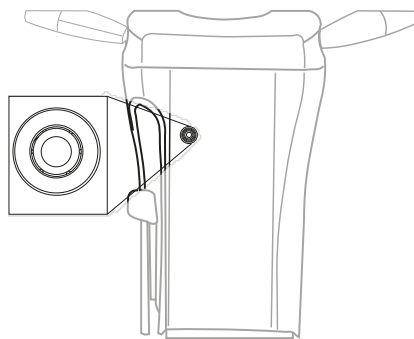


Figure 33: ITOS Sensor - On the HVAC Controls

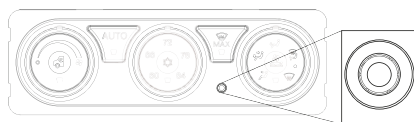
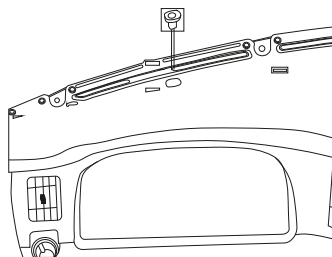


Figure 34: Sunload Sensor - On the Driver's Side



20.3 Air Conditioning (AC) Functions

Table 9: Symbols for the AC Control Panel

Image	Function
	You can choose inside (cabin) or outside air for AC. To change the air source selection, use the button inside the fan speed control dial. Recirculated (cabin) air selects automatically in defrost modes.
	The fan speed is adjusted by rotating the dial clockwise to increase speed or counterclockwise to decrease speed.
AUTO	Automatic air conditioner function

Table 9: Symbols for the AC Control Panel

Image	Function
	The button inside the temperature control dial engages the AC compressor. When activated the indicator on the button illuminates. During AUTO mode, the AC button indicator remains illuminated constantly, even when the compressor cycles.
	Maximum defrost function
	Toggle the power to the sleeper HVAC unit using the button inside the air distribution dial. When activated, the indicator on the button illuminates. The sleeper HVAC unit functions to the settings of the sleeper control.
	Floor Vents

Table 9: Symbols for the AC Control Panel

Image	Function
	Defrost vents (and fresh air intake)
	Panel and Floor Vents
	Panel Vents
	Floor and defrost vents (and fresh air intake)

20.4 How to Manually Control the Cab Air Conditioner

Temperature Control Set Point Set the cab temperature using the temperature control dial. The operating range is 60°F (16°C) and 84°F (28°C). Adjustments are made in two degree Fahrenheit increments.

Air Conditioner The button inside the temperature control dial engages the AC compressor. When activated the indicator on the button illuminates. During AUTO mode, the AC button indicator remains illuminated constantly, even while the compressor cycles.

NOTE

Fan Control Dial must also be in the ON position for A/C to be on. A/C engages automatically in AUTO, defrost, and floor/defrost.

The air conditioner defaults to manual mode when switched on. Select the fan speed, air temperature, and air outlets using the dials on the controller.

1. To adjust the fan speed, turn the **Fan control** dial clockwise to increase speed or counterclockwise to decrease speed.
2. To adjust the temperature setting, turn the **Temperature control** dial to the desired temperature. The system automatically adjusts the outlet air temperature to achieve the desired cab temperature.
3. Push the **Air Conditioner** button if the air temperature must be colder, this button switches on the

compressor.



4. To adjust the air distribution, turn the **Air Distribution** dial to distribute cab air as indicated by the dial graphics.
5. Press the **Recirculation** button to use cab air instead of outside air.



Result:

The temperature of the air from the vents fluctuates as the vehicle works to achieve the chosen cab temperature. When idling for short periods of time, switch the fan ON. Then turn OFF **recirculation**. For vehicles with a sleeper, use the cab control to activate or deactivate the sleeper HVAC. Use the button inside the mode dial.

20.5 Auto Mode for the Air Conditioner

The AUTO mode manipulates several variables. These include air distribution, air temperature, fan speed, AC compressor, and cab air recirculation. The Auto

mode adjusts to achieve the comfort level selected on the temperature dial. Depending on the specific environmental conditions, the air temperature can be slightly higher or lower than the set point. This variation is a normal function of the AUTO mode and is not a malfunction. The button that enables automatic mode is labeled **AUTO**.

Adjust the temperature knob, and the system responds to obtain the selected comfort level as quickly as possible.



Set the cab temperature using the temperature control dial. The operating range is 60°F (16°C) and 84°F (28°C). Adjustments are made in two-degree increments.

The AUTO function uses a sunlight sensor to measure the amount of sunlight entering the cab. You can find this sensor at the base of the windshield on the driver's side. Do not block this sensor.

The system remains in automatic mode until the driver adjusts both the fan speed and air distribution dials on the control.

Semi-Automatic Mode

During AUTO mode, the operator can override any settings and operate in a semi-automatic mode. You can override AUTO mode using the dials and/or buttons on the HVAC control. In semi-automatic mode, the AUTO button indicator extinguishes. Instead, the indicator of the adjusted setting illuminates. For example, if the driver adjusts the fan dial while in AUTO mode, the fan dial indicator illuminates. The fan speed also adjusts to the setting of the dial. However, the temperature and air outlet settings continue to function automatically. Also, if the user adjusts the air distribution setting while in AUTO mode, the air distribution dial indicator illuminates. Then the distribution adjusts to the setting of the dial. The fan and temperature settings continue to function automatically.

Economy Function

An economy function is also available in semi-automatic mode. In this mode, the system operates in AUTO mode without the use of the AC compressor. The operator can select economy by initiating AUTO mode and then pressing the AC button to disengage the compressor. The indicators for AC compressor and AUTO mode do not illuminate while operating in economy mode.

20.6 How To Operate an Automatic Cab Air Conditioner

Follow these steps to activate the Auto Mode:

1. Press the **AUTO** button.
2. Rotate the **Temperature Control** dial to the desired temperature.

Result:

The system achieves the comfort level associated with the temperature selected. Cab temperature can be slightly higher or lower than the selected temperature. This variation is normal when in **AUTO** mode. This fluctuation is not a system malfunction.

20.7 MAX Defrost Mode

The heating and air conditioning (AC) system provides for one-touch windshield defrosting. Certain driving conditions cause fog or ice to form on the windshield. By pressing the **MAX** defroster button, the system automatically adjusts certain settings to maximize clearing of the windshield. These settings include the blower

speed, recirculation, air temperature, and air outlet distribution. The system remains in this mode until the driver presses the button again or adjusts the dials.



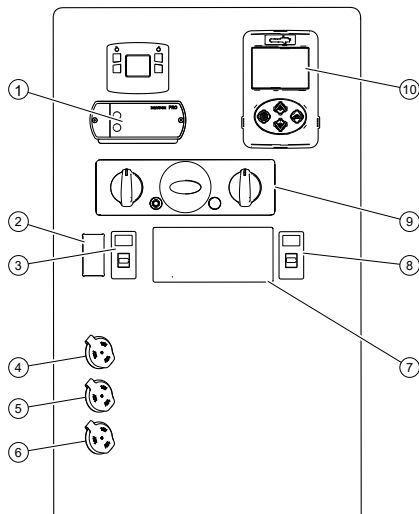
The air temperature in MAX defrosts mode adjusts to the warmest temperature setting. This setting helps to clear the windshield of ice and fog more quickly. Outside air mode and the air conditioner compressor are also active to maximize performance. The AC compressor and recirculation switches do not function in MAX Defrost, and the lights on those switches blink when pressed.

20.8 Sleeper Control Panel

SLEEPER CONTROL PANEL

Vehicles with optional sleeper units will have a control panel next to the bunk to operate various functions from the comfort of the sleeper bed.

Figure 35: Sleeper Control Panel



1. Inverter Control Module (Depending on options selected)
2. Point Light Switch (Depending on options selected)
3. Cab Door Lock Switch
4. 12V Power Port OR Cigarette Lighter (Depending on options selected)
5. 12V Power Port
6. 12V Power Port OR USB Charging Port (Depending on options selected)
7. [Unlabeled control]
8. [Unlabeled control]
9. [Unlabeled control]
10. [Unlabeled control]

7. Digital Alarm Clock OR Digital Alarm Clock with Sleeper Audio Controls (Depending on options selected)
8. Dome Light Switch
9. HVAC Controls
10. SmartAir/Fuel Fired Heater Controls (Depending on options selected)

Optional alert switch not shown.

ALERT SWITCH

Figure 36: Alert Switch

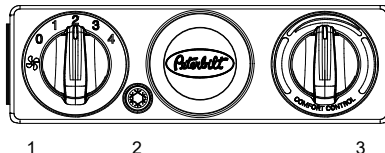


ALERT

The alert switch is an optional switch mounted in the sleeper control panel. The truck's exterior lights will start flashing and the city horn will sound when this switch is pressed.

20.9 Bunk Heater and Air Conditioner Controls (Option)

Unlike the cabin air temperature controls, the sleeper temperature control alters the air temperature based on the knob setting.



1. Air speed
2. Compressor
3. Temperature adjustment

The temperature control does not align to specific temperatures. Turning counterclockwise means cooler than it is now. Clockwise means warmer than it is now. Once reached, the desired temperature holds automatically. A separate switch on the dash HVAC unit sends power to the "bunk" or sleeper control unit. Switch the button on the cab HVAC panel to the ON position to use the sleeper controls.

You can toggle power to the sleeper HVAC unit using the button inside the air distribution dial. When activated, the indicator on the button illuminates. The sleeper HVAC unit functions to the settings of the sleeper control.

NOTE

On the Cab Control Unit, the sleeper enable switch must be pressed to turn ON power to the sleeper control unit. In addition, if air conditioning is requested in the sleeper, the air conditioner switch on the cab control unit will be turned ON and fan in the cab heater and air conditioning unit will be turned on low (if it was OFF) automatically.

NOTE

The sensor is located on the sleeper HVAC control panel and measures the sleeper air temperature at the panel. There will be a time delay between temperature control adjustment and sleeper air temperature change. Also, be careful of any heat source which could affect the air temperature by the sensor. Avoid hanging items (shirt, jacket, hat, etc.) which could block the airflow to the sensor.

20.10 Air Conditioner Operating Tips



CAUTION

During extreme cold weather, blowing hot defroster air onto a cold windshield can crack the glass. When the heater core is hot and the windshield is cold (such as idling the engine when the HVAC has been off), move the Temperature Control Dial to "COOL." Gradually increase the temperature as the windshield warms up. Failure to comply may result in equipment or property damage.

Defrosting and Defogging the Windshield

You can clear the cab windshield and side windows of ice and fog in two ways. The first is to use the **MAX** defrost mode. You can also manually adjust the air distribution dial to the defroster position.

The manual defrost-defogging mode differs from the **MAX** defrost mode by allowing the driver to select an air temperature other than full heat. This mode allows the

driver to maintain a constant cab temperature while defrosting the windshield. However, reduced performance can follow.

- Adjust the fan speed too high by rotating the fan control dial clockwise.
- Set the air distribution dial to the defroster mode setting. This mode automatically engages the outside air and the air conditioner compressor.
- Adjust the temperature dial to add heat as needed.

For maximum performance, adjust the temperature to maximum heat by rotating the temperature dial clockwise. The driver can also use the Floor or defrost setting on the air control.

For Maximum Cooling

- Adjust the fan speed to its highest setting by rotating the fan control dial clockwise.
- Set the air distribution dial to the panel setting.
- Adjust the air temperature to maximum cooling by rotating the temperature dial counterclockwise.
- Engage the air conditioner compressor by pressing the air conditioner button.
- Set the air source to recirculation mode by pressing the outside air-recirculation

air button. The button indicator light illuminates.

For Maximum Heating

- Adjust the fan speed to its highest setting by rotating the fan control dial clockwise.
- Set the air distribution dial to the Floor setting.
- Adjust the air temperature to maximum heat by rotating the temperature dial clockwise.



NOTE

The engine must be at operating temperature for maximum heating. If operating in AUTO mode, heating airflow is not allowed until the engine warms sufficiently to provide required coolant temperatures.

Air Dehumidification

You can also use the air conditioner system to reduce the humidity level of the cab and clear fog from the windshield.

- Adjust the fan speed to the desired airflow setting.
- Engage the air conditioner compressor by pressing the air conditioner button.

- Set the air source to outside air mode by pressing the outside air and recirculation air button. The button indicator light must NOT be illuminated.

NOTE

The A/C compressor may not engage when the outside temperature is below 34°F (1°C).

Cab Air Distribution

Equal distribution of air is important in maintaining a constant cab interior temperature. For best performance, all vents must remain open to allow AUTO mode to function properly. To maintain the selected cab temperature, AUTO mode can provide an air temperature from the vents that differs from the temperature set point. The driver can redirect the air instead of adjusting the temperature set point or closing the vent. The system can have difficulties in obtaining the desired cabin temperature when the temperature setting rapidly changes.

You set the mode of air distribution inside the cab using the air distribution dial. Five icons on the dial indicate the primary mode options. The driver can also select a sec-

ondary mode in between the primary modes indicated by points on the dial. The side windows receive airflow in all modes.

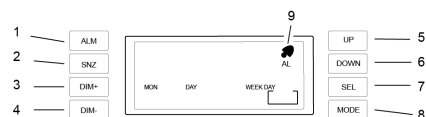
Outside Air or Recirculation Air

Selecting air recirculation mode completely isolates the cab interior from the outside air. This mode is helpful in preventing dust, pollen, and odors from entering the cab. Additionally, recirculation mode can reduce the amount of time required to cool down the vehicle while in maximum cool down.

This mode can increase fogging on the windshield. A coarse air filter provides for recirculation air. This filter is under the instrument panel. The outside air mode provides for 100% outside air into the cab. This mode is helpful with windshield defogging. A pleated air filter located under the hood provides filtration for dust, pollen, and debris. If equipped, the vehicle can also provide for ember filtration or fine particulate filtration.

21 SLEEPER ALARM CLOCK

21.1 Sleeper Alarm Clock



- Alarm - press to switch on the alarm
- Snooze - press to snooze the alarm bell
- Dimmer or brighter - press to make the display brighter
- Dimmer - press to make the display less bright
- Increase the value of setting
- Decrease value of setting
- Select - press to choose a setting while adjusting either the time or the alarm
- Time and Alarm value setting - press to change the time-date and or alarm setting
- Active alarm icon

Turning the Alarm On/Off

Press the **ALM** button to switch the alarm on and off. The icon (9) illuminates when the alarm is active. When the time reaches the set time, the alarm rings. Without pressing the **SNZ** button, the alarm continues ringing for 15 minutes before stopping. Pressing any other button except **SNZ** (2) switches off the alarm.

Snooze Operation

When the alarm rings press the **SNZ** button (2) to silence the alarm for 9 minutes. While the alarm is on, the small bell icon (9) flashes. You can use the **SNZ** button as many times as desired.

Dim Control Operation

Press the DIM+ or DIM-buttons (3, 4) to change the brightness of the display.

21.2 Set the Sleeper Alarm Clock Time

1. Press the **MODE** button until the screen begins flashing.
2. Use the **UP** and **DOWN** buttons to adjust the value.
3. Press the **SEL** button to adjust the next setting and use the **up** and

DOWN buttons to change the value.

4. Repeat this process for all settings. The alarm clock scrolls in the following order each time you press the **SEL** button:
 - Year
 - Month
 - Day
 - Hours
 - Minutes
5. Press the **MODE** button once you set the minutes. This exits and saves the settings.

21.3 Set the Sleeper Clock Alarm

1. Press the **MODE** button twice until the screen displays the AL icon.
2. Use the **UP** and **DOWN** buttons to adjust the setting.
3. Press the **SEL** button to adjust the next setting and use the **UP** and **DOWN** buttons to change the setting.
4. Repeat this for all areas. The alarm clock will scroll in the following order

each time you press the **SEL** button.

- Hours
 - Minutes
5. To exit and save your settings, press the **MODE** button once you have set the minutes.

22 AUTO START SLEEPER TEMPERATURE CONTROL

22.1 Auto Start Sleeper Temperature Control

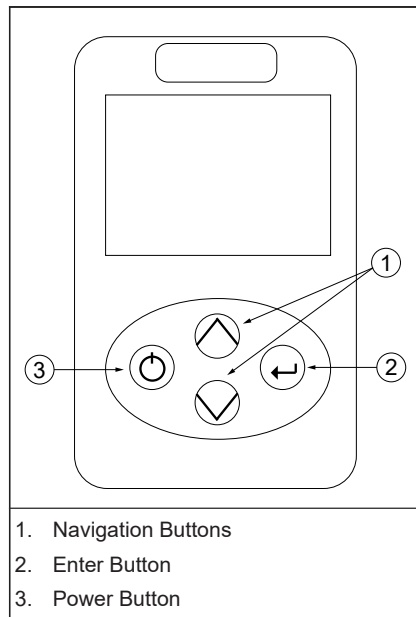
The auto start sleeper temperature control (option) is a separate control from the sleeper control panel. This control checks the auto start system status and changes the preset temperature used to restart the engine.

The sleeper temperature control works in the following three modes:

- Auto – Heats or cools the cab and sleeper interior automatically based on the cabin air temperature.
- Heat – Heats the cab and sleeper interior by running the engine or the Espar bunk heater (option).
- Cool – Cools the cab and sleeper interior by running the engine.

The panel has the following navigation buttons:

Table 10: Auto Start Sleeper Temperature Control Panel



After setting the temperature, the auto start system prepares to start the engine and rear blower. The sleeper temperature con-

trol screen displays a flashing fan icon for 30 seconds before the engine starts. Once the engine starts, the fan icon appears without flashing, which means the engine and rear blower are on.

When the auto start system is enabled while the control is off, the auto start system uses the preset auto start conditions by default.

i NOTE

Vehicles with Espar bunk heaters use the Espar unit to heat the cab interior instead of the engine. These systems operate independently of one another.

22.2 Setting Auto Start Sleeper Temperature Control

Follow these steps to set the auto start sleeper temperature control.

1. Enable auto start.
The sleeper temperature control (option) screen displays an "A" to indicate that auto start is enabled.
2. Set the following cab heating and air

conditioning controls:

- a. Turn on the AUTO button (light on).
 - b. Set the cab temperature to the same temperature as the sleeper temperature control.
 - c. Turn on the sleeper override button (light on) located on the air conditioning controls.
3. Turn on the sleeper temperature control.

i NOTE

To choose between imperial or metric units systems, press the enter button twice, and to return to the main screen, press it again once.

4. Use the navigation buttons to select a comfortable temperature.
5. Press the enter button to confirm the temperature.
6. Press the enter button once to adjust the mode.
7. Use the navigation buttons to select the desired mode.
8. Press the enter button again to accept the mode.

23 CAB ACCESSORIES

23.1 Cab Accessories

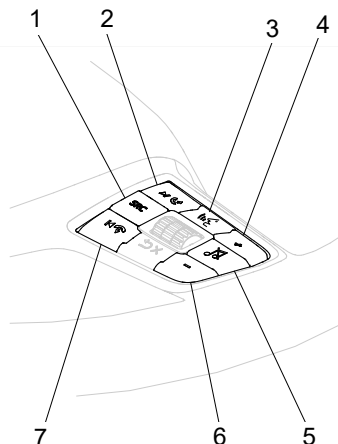
Radio (Option)

The vehicle has one of two stereo systems. An AM/FM stereo receiver is standard equipment and may have a combination of satellite radio, USB media, or Bluetooth®. A touchscreen display based stereo system called SmartDisplay is available which optionally integrates different applications such as media player, phone projection, GPS navigation, operator manuals, vehicle health telematics, etc. For instructions on how to operate the particular radio or SmartDisplay, see the supplemental operating manual for those units.

For vehicles equipped with SmartDisplay, the radio application is installed by default.

Additional controls for radio or SmartDisplay are located on the right switch pod of the steering wheel.

Figure 37: Right Switch Pod (and Radio)



1. Media source
2. Next track
3. Voice assistant (voice assistant only available on SmartDisplay).
4. Volume increase
5. Mute
6. Volume decrease
7. Previous or cancel

USB Ports, Cigarette Lighter, and Ashtray (Option)

i NOTE

The 12V accessory power port will operate with the start switch in either the OFF, ACC (accessory), or ON position.

This vehicle comes standard with two cupholders and power ports located in the center of the dashboard. Depending on vehicle configuration, this area may include optional features such as USB ports, an ashtray insert (for the cupholder), or a cigarette lighter instead of a power port.

The optional USB ports are located above the cupholder on the dash. These ports can charge and connect compatible devices to SmartDisplay. The USB Type-C port can be used as a 15 W charging power source and for data transfer when connecting an Apple device to the vehicle.

To operate the optional cigarette lighter, push in on the knob end of the lighter. After a few moments, the lighter will automatically pop out, glowing hot and ready to use. After use, insert the lighter back into the socket without pushing all the way in. The socket of the cigarette lighter may be

used to operate 12 V, 15 amp appliances, such as a hand spotlight or small vacuum cleaner.

 WARNING

DO NOT attempt to operate a cigarette lighter using the 12V power port receptacle. A cigarette lighter inserted into the 12V power port will heat up and be expelled into the cab, potentially causing fire. Failure to comply may result in death, personal injury, equipment damage, or property damage.

 WARNING

DO NOT place paper or other combustible substances in an ashtray, it could cause a fire. Keep all non-tobacco related substances out of the ashtray. Failure to comply may result in death, personal injury, equipment damage, or property damage.

 WARNING

DO NOT exceed the voltage/amperage capacity of the accessory power port. It could result in a fire. Follow all warn-

ings and instructions in the operator's manual for the appliance you are using. Failure to comply may result in death, personal injury, equipment or property damage.

Glove Box

The vehicle has a glove box to store important documents like the vehicle literature set (including this Operator's Manual), and other related materials. You can choose from various other interior storage options available to store personal supplies or small tools:

- Center console
- Map pocket on the door
- Overhead storage compartments

 WARNING

DO NOT drive with the glove box open. In an accident or sudden stop, you or a passenger could be thrown against the open cover and be injured. To reduce the risk of personal injury during an accident or sudden stop, keep the glove box closed when the vehicle is in motion. Failure to comply may result in

death, personal injury, equipment damage, or property damage.

 WARNING

DO NOT carry loose objects in your cab. In a sudden stop, or even going over a bump in the road, they could fly through the air and strike you or a passenger. Secure all loose objects in the cab before moving the vehicle. Carry heavy objects such as luggage in the exterior storage compartment and close it securely. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Appliances

If the vehicle has a television or other appliance, make sure that they are compatible with the vehicle's electrical system. Secure them in the cab so they cannot come loose in a sudden stop.

 WARNING

Secure any appliance (such as a radio or TV) you add to your sleeper or cab. In a sudden stop or collision, these objects could strike you or a passenger.

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

Vehicle Telematic System

The vehicle can be equipped with an onboard telematics system. This system is a Global Positioning Satellite (GPS)-linked computer. It receives input from multiple sources to locate the vehicle. Read and understand the Supplemental Telematics and Navigation System Owner's Manual. Observe the warnings, cautions, and notes that follow before using the system.

WARNING

Verify legal weight and height restrictions for the route suggested by the telematic system. Not verifying height restrictions could lead to an impact. Not verifying weight restrictions could result in a traffic infraction. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Only glance at the system monitor while driving. Prolonged periods of viewing while driving could result in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

DO NOT program the telematic system while driving. Always stop the vehicle before changing settings to avoid potential accidents. Failure to comply may result in death, personal injury, equipment, or property damage.

WARNING

Regardless of the navigation system's directions, it is the operator's responsibility to operate the vehicle in a safe and legal manner. Failure to comply may result in death, personal injury, equipment or property damage.

WARNING

Ensure the volume level of all audio devices is set to a level that still allows you to hear outside traffic and emergency vehicles. Failure to comply may result in death, personal injury, equipment or property damage.

NOTE

DO NOT rely on the telematic system to route you to the closest emergency services. Not all emergency services are in the database.

NOTE

The map database is the most current available at the time of production. The database is designed to provide you with route suggestions and does not take into account the relative safety of a suggested route or of factors that may affect the time required to reach your destination. See the Supplemental Navigation System Owner's Manual for more information.

23.2 Wireless Charger (Option)

WIRELESS CHARGER

CAUTION

DO NOT place magnetic or metal items on the wireless charger. These can interfere with charging, reduce charging speed, and damage the phone battery. Failure to comply may result in equipment or property damage.

CAUTION

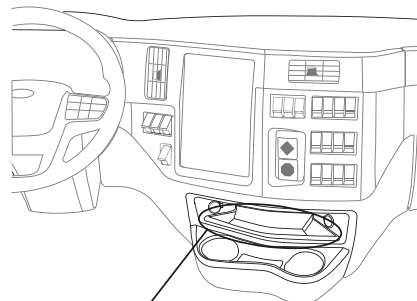
DO NOT place radio frequency ID cards or metal objects on the wireless charger. They emit magnetic fields that can lead to overheating, resulting in deactivation or damage to the wireless charger. Failure to comply may result in equipment damage or property damage.

CAUTION

DO NOT remove the rubber mat before wireless charging or use the charger if the mat is hot. Doing so increases the risks of overheating, abnormal operation, charging interruptions, or device damage. Failure to comply may result in equipment or property damage.

The wireless charger is a device that provides the operator with a 15 W power source to charge their device, it is located above the cup holder.

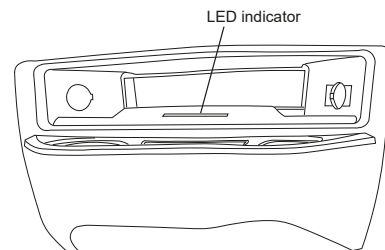
The wireless charger activates automatically when the start switch is in the **ON**, **START**, or **IGNITION/ACC** mode. The wireless charger automatically deactivates when the device reaches 100% charge. It continuously monitors the temperature and shuts off automatically if it detects a temperature increase.



Wireless Charger

NOTE

A LED indicator turns white when the wireless charger is activated by a compatible device and remains on as long as the charger is powered on.



The wireless charger does not support all phones. Verify if this function is available on your phone; if not, charge it via USB ports.

 **NOTE**

The wireless charger only supports Qi compatible devices. Verify the device compatibility in the user manual.

WIRELESS CHARGING
TROUBLESHOOTING

Follow the steps below if the phone is not charging.

- 1. Ensure the phone is well centered on the charging area.
- 2. Remove any thick phone cases, such as the MAGSafe, from the phone.
- 3. Restart the phone.
- 4. If the phone overheats, stop all attempts and try again once the phone has cooled down.

Result:

Please contact a qualified dealer if more support is necessary.

23.3 Using the Telematic
System

Screen Display On/Off

- 1. Press and hold the **Power (Light)** button for approximately 1 second.
- 2. Switching on the screen displays the following warning and informational screen:

Table 11: Warning and Informational Screen

WARNING



DO NOT let this device distract you while driving. Always concentrate on driving. Distractions could cause an accident resulting in injuries to you or others.

IMPORTANT

Disclaimer: Map data can be inaccurate and navigation routes cannot be available for larger-size vehicles. It is the responsibility to operate the vehicle in a safe and legal manner. This obligation is regardless of how and where the Navigation System directs you. **Note:** Before using this system, read the Owner's manual to learn how the navigation system operates. Some functions of this system cannot operate when the truck is in motion.

Warning and Informational Screen:
DO NOT let this device distract you

while driving. Always concentrate on driving. Distractions could cause an accident resulting in injuries to you or others.

3. After reading the information, touch the **T** in the upper right corner of the screen with the finger indicating you acknowledge and understand the information. The menu screen appears next.
4. To switch off the system, press and hold the **Power (Light)** button for 3 seconds.

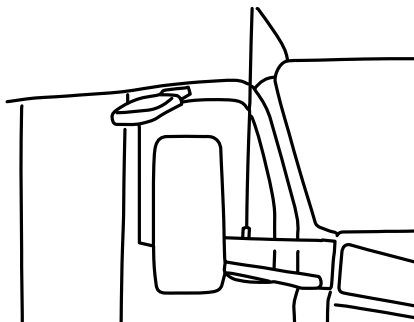
Disclaimer: The vehicle manufacturer is not responsible for erroneous map data, incorrect routing or any downtime. This responsibility includes all other damages associated with, or arising from the use of the Navigation System.

23.4 Passenger Side 'Down' Mirror

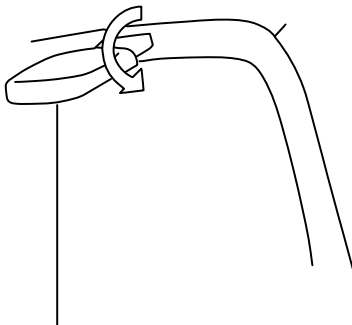
NOTE

The vehicle can come with a digital side-view mirror option. Refer to the PACCAR Digital Vision System with Mir-

rors operator's manual for instructions. This manual is in the glove box.



A mirror is located above the passenger door that provides a quick view of the blind spot created by the passenger door.



Loosen the screws on the top of the mirror to rotate the mirror up or down to get the desired view. Tighten the screws when the position is correct.

CHAPTER 4: DRIVING

1	Starting and Operating.....	167
2	Engine Operations.....	171
3	Lighting.....	178
4	Driver Assistance.....	181
5	Transmission.....	197
6	Brakes.....	204
7	Axle and Suspension.....	215
8	Trailer Operations.....	223
9	Driving Tips and Techniques.....	227
10	What to Consider when using a Sleeper Bunk.....	229
11	Stopping the Vehicle.....	230

1 STARTING AND OPERATING

1.1 Starting and Operating

Since each vehicle is custom-equipped, all engine operation instructions in this manual are general. You will want to consult the manual for your engine to find out details about your specific engine's needs. You may need to use a slightly different procedure from the one outlined here.

1.2 Anti-theft

With Anti-theft active, you must enter the correct passcode to start the engine.

i NOTE

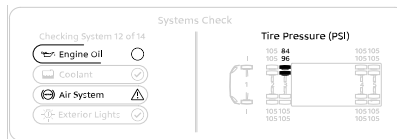
Enabling Anti-theft requires drivers that share this vehicle to enter a passcode before starting the engine. This action is done by entering the Settings sub-menu. It is also possible to disable Anti-theft or alter the Favorites View there.

After entering the passcode, you have five minutes to start the engine. After five minutes of engine off, you must re-enter

the passcode. You can postpone this safety measure in one minute intervals by using any steering wheel switch. Upon re-enabling the Anti-theft feature, the previous passcode is still the passcode. Anti-theft allows for only one passcode per vehicle.

1.3 Systems Check Summary

Figure 38: Systems Check



After completion of a system check, you can view the results in a summary. You can view a detailed explanation of this summary by accessing the Menu after the Systems Check.

1.4 How To Start Vehicle in Normal Weather

HOW TO START VEHICLE IN NORMAL WEATHER

⚠ CAUTION

Never operate the starter motor with the engine running. The starter and flywheel gears could clash or jam, severely damaging them. Failure to comply may result in equipment damage or property damage.

i NOTE

Some starters are equipped with overcrank protection. Check the Engine Operation and Maintenance Manual for details.

When the outside temperature is above 50°F (10°C), use the following procedure: With anti-theft enabled, the first time you turn the start key switch to START, you must enter the passcode.

1. Set the parking brake.
2. Put the main transmission in neutral.
3. Disengage (depress) the clutch (with manual transmission).
4. Turn ON the engine to START.

**NOTE**

With anti-theft enabled, you must enter the passcode to start the engine (see [Anti-Theft](#)).

5. If the engine does not start within 30 seconds, release the start key switch. To avoid overtaxing the starter motor or the batteries, do not use the starter for more than 30 seconds. Let the starter motor cool and the batteries recover for two minutes before trying again. While waiting, check the fuel lines for possible fuel starvation or air leaks. Starting failure can mean that there is no fuel reaching the injectors.
6. When the engine starts, begin to watch the oil pressure gauge. Check the engine manufacturer's manual for the right pressure for the engine. If the oil pressure does not rise within a few seconds, stop the engine. Find out what is wrong before restarting the engine.
7. Slowly engage (release) the clutch after the engine starts.
8. Wait for the oil pressure to reach normal operating pressure before driving the vehicle. Also do not idle

faster than 1,000 rpm.

ENGINE WARM UP

Engine warm-up allows oil film to establish between pistons and liners, shafts, and bearings. It creates this film while the engine gradually reaches operating temperature.

1. After starting the engine, idle it at approximately 600 rpm while checking the following:
 - Oil pressure
 - Air pressure
 - Alternator output
2. After a few minutes of idling the engine, increase the idle speed to 900 rpm or 1,000 rpm. Continue the warm-up. This procedure allows the oil to warm and flow freely. This permits pistons, liners, shafts, and bearings to expand slowly and evenly. In cold temperatures, it could help to increase idle speed.

**NOTE**

In colder climates where the temperature is often below freezing, the warm-up for turbocharged

engines is especially important. Chilled external oil lines leading to the turbocharger will slow the oil flow until the oil warms, reducing oil available for the bearings. Watch the engine oil temperature or pressure gauge for a warming trend before increasing engine idle speed (rpm).

3.

**WARNING**

DO NOT leave the engine idling without an alert driver present. If the engine overheats, as indicated by the coolant temperature light, take immediate action. Continued unattended operation, even briefly, may cause serious engine damage or a fire. Failure to comply may result in death, personal injury, equipment damage, or property damage.

**WARNING**

DO NOT breathe engine exhaust. Engine exhaust fumes contain carbon monoxide, a poisonous,

colorless, odorless gas. Exhaust fumes can enter the cab from a poorly maintained exhaust system or from nearby vehicles. Failure to comply may result in death, personal injury, equipment damage, or property damage.

 WARNING

Never idle your vehicle for prolonged periods of time if you sense that exhaust fumes are entering the cabin. Investigate the cause of the fumes and correct it as soon as possible. If the vehicle must be driven under these conditions, drive only with the windows open. Failure to comply may result in death, personal injury, equipment damage, or property damage.

 WARNING

Routinely inspect and maintain your vehicle exhaust system. A poorly maintained, damaged, or corroded exhaust system can allow exhaust fumes to enter the

cab. Engine exhaust fumes contain carbon monoxide, a poisonous, colorless, odorless gas. Failure to comply may result in death, personal injury, equipment damage, or property damage.

 WARNING

If you are parked next to idling vehicles, move your vehicle or minimize your time in the cab or sleeper. Engine exhaust fumes contain carbon monoxide, a poisonous, colorless, odorless gas which can enter the cab from nearby exhaust systems. Failure to comply may result in death, personal injury, equipment damage, or property damage.

 CAUTION

A winterfront should only be used at temperatures below 40°F (4°C). Use of a winterfront above 40°F (4°C) can decrease the life of cooling module components and result in excessive coolant, engine oil, and intake air temper-

atures. This may lead to overheating, engine or coolant module damage, and emissions non-compliance. Failure to comply may result in equipment or property damage.

 CAUTION

DO NOT idle engine longer than five minutes at low rpm (400-600 rpm). DO NOT allow the engine to operate at idle for extended periods at temperatures at or below 160°F (71°C). Long idle periods after the engine has reached operating temperatures can result in gummed piston rings, clogged injectors, and break down engine lubrication resulting in engine damage. Torsional vibrations at low idle can cause transmission wear. Failure to comply can result in equipment or property damage.

Continue the engine warm-up until the coolant temperature reaches at least 130°F (54°C). At this temperature, you can use partial throttle. Wait until the coolant temperature is

at least 160°F (71°C) before operating at full throttle.

**NOTE**

Under most circumstances, idling the engine for long periods merely wastes fuel. In severe arctic weather conditions, however, you may need longer idling to make sure that all parts of the engine are fully lubricated.

**NOTE**

Keep the engine exhaust system and the vehicle's cab ventilation system properly maintained. It is recommended that the vehicle's exhaust system and cab be inspected (1) By a competent technician every 15,000 miles (24,140 km); (2) Whenever a change is noticed in the sound of the exhaust system; or (3) Whenever the exhaust system, underbody, or cab is damaged.

1.5 Tips To Remember When Starting a Vehicle in Cold Weather

TIPS TO REMEMBER WHEN STARTING A VEHICLE IN COLD WEATHER

By following a few simple guidelines, you can extend the service life of the engine:

- Keep the electrical system in top condition.
- Use the best quality fuel of the recommended grade.
- Use the recommended engine lubricating oil.
- For manual transmissions and auxiliary (AUX) transmissions, leave the transmission in neutral. This action allows the transmission lubricating oil to warm up (approximately 3-5 min) before operating the vehicle.

ENGINE BLOCK HEATER (OPTION)

To preheat the engine before starting, plug the optional engine block heater into a properly grounded AC electrical source. DO NOT start the engine with the heater plugged in.

**WARNING**

Regularly inspect, and properly maintain and operate, the engine block heater. DO NOT use the heater if there are frayed wires or connector damage. If not properly maintained and operated, engine block heaters can cause fires. Contact an authorized dealer or the heater manufacturer if information or repairs are needed. Failure to comply may result in death, personal injury, equipment damage, or property damage.

**CAUTION**

Always unplug the engine block heater before starting the engine. If the heater is not turned OFF (unplugged), the cooling system could be damaged. Failure

to comply may result in equipment or property damage.

Depending on engine make, when the temperature falls below -10°F (-24°C), the block heater is required.

ENGINE, UNDER HOOD AIR INTAKE

This switch opens a door in the engine air filter housing. This action allows intake of air from under the hood instead of outside air. This switch can be useful when starting the vehicle in cold-weather conditions.



CAUTION

Only operate the under-hood intake air switch when outside temperatures are below 32°F (0°C). Engaging the under-hood air intake while temperatures are above freezing may damage the engine. Failure to comply may result in equipment or property damage.

1.6 How to Warm up the Transmission

In cold weather (below 32°F (0°C)), shifting can be sluggish upon initial start-up. Transmission warm-up is especially important under these conditions, but it is always a good idea to warm up the transmission before starting out on the road.

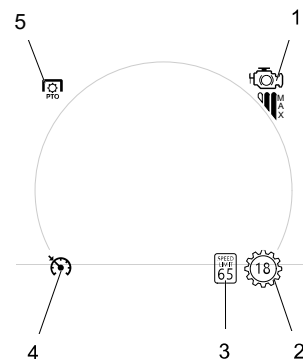
To warm up the transmission lubricating oil during engine warm up, with a single transmission (manual and automatic):

1. Put the transmission in neutral.
2. Release the clutch pedal (manual only). Operate the transmission in neutral for 3 to 5 minutes before moving the vehicle.
3. If you have a two-transmission combination:
 - a. Put the main transmission in gear.
 - b. Put the auxiliary (AUX) transmission in neutral. This action allows the transmission countershaft to turn, agitating the oil and warming it.

2 ENGINE OPERATIONS

2.1 Indicators Around the Speedometer

Figure 39: Indicators Around the Speedometer



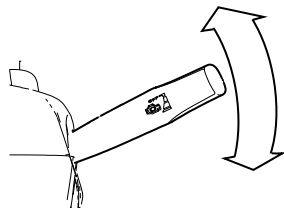
1. Engine Brake
2. Transmission Gear Indicator
3. Speed Limit Recognition (Option)
4. Cruise Control, Adaptive Cruise (Option), Predictive Cruise (Option)
5. Power Take Off (PTO)

2.2 Speed Limit



Certain PACCAR vehicles can recognize traffic signs for speed limits (both US and Canada). The indicator can change color when the vehicle travels faster than a posted speed limit. Where metric signs apply, the display cannot change to KPH until scanning at least 3 metric traffic signs.

2.3 Engine Brake Operation

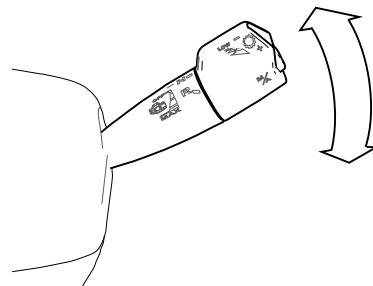


Moving the lever clockwise will engage the engine brake. Increase the amount of engine brake by moving the lever further clockwise. Each position has a corresponding level of engine brake.

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

2.4 Engine Brake Operation for a Vehicle

With Automated Transmission



Moving the shifter down (clockwise) engages the engine brake, with each downward position providing more engine braking. The bottom-most position (Position 4) is a momentary position and activates MAX mode.

Position	Amount of engine brake
Off	0 %
1	33%
2	66%

Position	Amount of engine brake
3	100%
4	100% AND engages MAX mode. (this position is momentary and reverts back to position 3 upon releasing the shifter)

The corresponding engine brake level (and MAX mode) indicates on the engine brake indicator.

2.5 MAX Mode Operation (option)

MAX MODE OPERATION (OPTION)

Some vehicles have a MAX mode. Use this feature when a situation requires 100% engine brake and the additional resistance from using the transmission lower gears.

1. Move the transmission shifter to the 3rd position, enabling 100% engine braking.
2. Pull the transmission shifter down again. Then allow the shifter to move back up to the previous position (3rd position).

Figure 40: Engine Brake + MAX



HOW TO DEACTIVATE MAX MODE

Vehicles with PACCAR TX-12/TX-18 series or Eaton Endurant automated transmissions 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](#).
3. Wait for the transmission coast down gear to engage.
4. Reduce the engine brake level.
5. Re-initiate **MAX** mode.
6. Select Neutral **N**. See [Drive Neutral Reverse Selector](#).
7. Select **LOW** mode.

2.6 Engine Brake Indicator



This indicator appears when the engine braking (compression brake or exhaust brake) is active. It shows available engine braking levels near the indicator, with the selected braking level highlighted:

When using engine braking, the engine brake indicator turns green. An override of active engine braking can occur when the operator (or a vehicle feature, such as Adaptive Cruise Control (ACC)) provides acceleration. In these cases, the engine brake indicator turns white (enabled but not active) while the vehicle accelerates.

2.7 How To Change Fast Idle Control (FIC) Speed

The truck must be stationary, the transmission in neutral, and the park brake set.

CAUTION

DO NOT let the engine rpm operate beyond the maximum governing rpm. Operating the engine above the maximum governing rpm can result in engine damage. Failure to comply may result in equipment or property damage.

1. Press the Cruise Control **ON-OFF** toggle.
If enabled, the white FIC indicator appears near the Speedometer/Tachometer.
2. To set the FIC speed:
 - Press **RES** - to resume the last used FIC speed.
 - Alternatively, use the accelerator to increase rpm. Then press **SET** +.
 - You can also press and hold **SET** + to increase and set the new FIC speed.
 - You can also press and hold **RES** - to reduce FIC speed. Then press **SET** +.

When active, the FIC indicator is green.

2.8 How To Start the Power Take Off (PTO)

You can activate PTO mode in several different ways. If you have the MX engine option, PTO Mode is typically activated by engaging a PTO. You can also activate it by using the Dash PTO Mode Control Switch. For the Cummins engine, the PTO mode is typically activated by engaging a PTO. You can also activate it by setting the Cruise Control Switch to ON but while the vehicle is stationary.

The following information provides the basic process of enabling and activating PTO engine speed control.

NOTE

The PTO cannot engage instantly. There is a slight delay.

CAUTION

Increasing RPM before the PTO is engaged can prevent the PTO from

engaging. Failure to comply may result in equipment or property damage.

1. Toggle the **PTO ON/OFF** switch, or the Dash PTO Mode Control Switch, to the ON position. Text indicating PTO engagement and/or PTO Mode control location will appear inside the speedometer. If the vehicle has the PACCAR TX-12/ TX-18 series or Eaton Endurant automated transmission, the letters AN will appear in the transmission gear indicator when the PTO is active.
2. Press the Cruise Control (CC) **ON/OFF** switch to enable PTO Speed Control operations. A white speed control-enabled will appear.
3. **Optional:** The PTO may have optional PTO presets mounted on the dashboard.
 - If equipped with dash-mounted PTO preset switches, toggle the desired **PTO Preset** switch. You can also use the dash-mounted **PRESET Increment and Decrement** switch to cycle through the PTO presets and select the desired preset.
 - If not equipped, press the **SET**

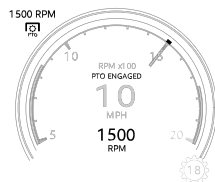
+ and **RES** – buttons on the steering wheel to set a desired engine speed.

PTO Speed Control is now active. Vehicles with an MX engine display a green PTO indicator with a target PTO engine speed.

4. **Optional:** Without PTO preset switches, press the **SET +** and **RES** – buttons. These buttons are on the steering wheel to command a desired engine speed. PTO Speed Control is now active. Vehicles with an MX engine display a green PTO indicator with a target PTO engine speed.
5. To alter PTO engine speed, use a combination of short and long presses of the **SET+** and **RES-** buttons on the steering wheel.

Result:

Vehicles powered with PACCAR MX engines display the PTO engine speed above the PTO indicator.



2.9 Engine Fan Control

The engine fan switch on the dash has a manual and an automatic mode. In the manual mode, the engine fan will engage until the switch is back into automatic mode. In automatic mode, the engine fan operation is controlled by the engine computer.



WARNING

DO NOT work on or near the engine fan while the engine is running. The fan can start at any time without warning, and anyone near the fan when it turns on could be injured. If the manual fan switch is set to MANUAL, the fan will turn on when the start key switch is turned to the ON position. If the switch is set to AUTO, it could engage suddenly at any time without warning. Before starting the engine or switching the manual fan switch from AUTO to MANUAL, make sure no one is near the fan. Failure to comply may result in death, personal injury, equipment damage or property damage.



CAUTION

DO NOT operate the engine fan in the MANUAL position for extended periods of time. The fan hub was designed for intermittent operation. Sustained operation will shorten the fan hub's service life as well as reduce fuel economy. Failure to comply may result in equipment or property damage.



CAUTION

The fan or equipment near it could be damaged if the fan turns on suddenly when you do not expect it. Keep all tools and equipment away from the fan. Failure to comply may result in equipment or property damage.

2.10 Using a Winterfront



CAUTION

A winterfront should only be used at temperatures below 40°F (4°C). Use of a winterfront above 40°F (4°C) can decrease the life of cooling module components and result in excessive

coolant, engine oil, and intake air temperatures. This may lead to overheating, engine or coolant module damage, and emissions non-compliance. Failure to comply may result in equipment or property damage.

The winterfront is designed to minimize the temperature differences across the radiator and reduce the possibility of cooling module damage. Aftermarket winterfronts may not provide the proper airflow distribution and could cause cooling module damage.

2.11 How to Set the Shutdown Timer

The Shutdown Timer must first be enabled. Enabling the shutdown timer is located in the Settings Sub-menu.

Follow these steps to turn on the engine idle shutdown timer. The shutdown timer will default to 5 minutes (or the last value used) and can be set up to 30 minutes unless limited by the Engine Shutdown System (Clean Idle).



WARNING

Never idle your vehicle for prolonged periods of time if you sense that exhaust fumes are entering the cabin. Investigate the cause of the fumes and correct it as soon as possible. If the vehicle must be driven under these conditions, drive only with the windows open. Failure to comply may result in death, personal injury, equipment damage, or property damage.



CAUTION

DO NOT idle engine longer than five minutes at low rpm (400-600 rpm). DO NOT allow the engine to operate at idle for extended periods at temperatures at or below 160°F (71°C). Long idle periods after the engine has reached operating temperatures can result in gummed piston rings, clogged injectors, and break down engine lubrication resulting in engine damage. Torsional vibrations at low idle can cause transmission wear. Failure to comply can result in equipment or property damage.

1. Using the **Scroll Wheel**, target the number of minutes and press

Select.

2. **Back** to return to the Settings menu.

2.12 Engine Aftertreatment System

This vehicle has an engine aftertreatment system (EAS) to control vehicle exhaust emissions. The EAS consists of the following:

- Diesel Particulate Filter (DPF)
- Selective Catalytic Reduction (SCR)
- Diesel Exhaust Fluid (DEF) filter
- DEF coolant filter
- DPF switch
- Warning lights

The DPF will trap soot from the engine exhaust gases. The SCR uses Diesel Exhaust Fluid (DEF) to reduce the levels of Nitrogen Oxides (NOx) in the engine exhaust. The EAS will periodically clean (regenerate) the DPF.

If your vehicle is equipped with a Compact Twin canister, a 48 V generator will be located between the engine flywheel and the transmission clutch.

**CAUTION**

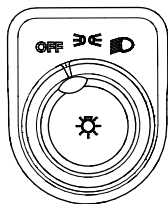
DO NOT use the 48 V cables or coolant lines attached to the 48 V generator as a support to perform an inspection or work under the vehicle. This will damage the cable connectors or coolant lines. Failure to comply may result in equipment or property damage.

Please refer to the Engine Aftertreatment System Supplement provided with the vehicle for a more detailed description of functionality and warnings.

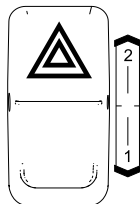
3 LIGHTING

Table 12: Lighting Switches

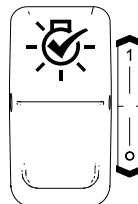
Master Lighting Switch



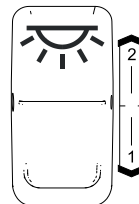
Hazard Warning



Exterior Lights Self-Test (ELST)



Dome



Dome Light

Turns on cab interior overhead light. See [Lights, Dome](#).

ELST

Starts an Exterior Lights Self Test. See [Exterior Lighting Self-Test \(ELST\)](#).

Hazard Lights

Turns on Hazard Warning Lights. See [Lights, Hazard](#).

Master Lighting Switch

Three-position switch that activates either the auxiliary lighting group (aux) – parking and marker lights – or the headlights and the aux lighting group. See [Lights, Master](#).



NOTE

The high beams and flash-to-warn activation methods use the same action. To activate the high beams, turn the low beams ON. To activate flash-to-warn, turn the low beams OFF.



WARNING

If the vehicle's low beam wiring circuit does not function correctly, pull completely off the road and call the nearest dealer for assistance. DO NOT drive the vehicle using the high beams, as high beam glare can blind other drivers and increase the risk of an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Table 13: Optional Lighting Switches



Lights, Beacon .



Lights, Daytime Running (Override) .



Lights, Fog .



Lights, Marker/Clearance/Trailer .

Table 13: Optional Lighting Switches



Lights, Sleeper Dome (option).



Lights, Spot .



Lights, Work .



Lights, Flood (Spare).

Headlight flashing

- **Flash-to-Warn** (or High Beams Flash) - Warn other drivers by briefly activating high beam headlights. See Flash-to-Warn.
- **Flash-to-Pass** (sometimes called Low Beams Flash) - Signal other drivers by briefly changing headlight intensity. See Flash-to-Pass.
- **Flash-to-Thank** (or Marker Lights Flash) - Signals other drivers by briefly flashing the marker lights. See Flash-to-Thank.

4 DRIVER ASSISTANCE

4.1 Driver Assistance

Driver Assistance (or Advanced Driver-Assistance Systems (ADAS)) defines various electronic features that assist the operator while driving. These features improve operator and vehicle safety by alerting the operator (and sometimes acting) to the driving environment. Driver Assistance features use electronic and hardware improvements to accomplish this task: cameras, radar, sensors, and in-cab notifications.

The features described in this section are a supplement to the ADAS OEM operator's manuals. These manuals are in the glove compartment of the vehicle. There can be various ADAS components optioned for the vehicle. Each option has its own manual. It is important that the operator becomes familiar with the OEM manuals for the ADAS equipment. They must read them before driving the vehicle.

Table 14: ZF WABCO™ Advanced Driver-Assistance Systems (ADAS)

Product	Feature
ZF WABCO™ OnLane ALERT	Lane Departure Warning (LDW)
ZF WABCO™ OnGuard ACTIVE	Adaptive Cruise Control (ACC)
	Collision Mitigation

Table 15: Bendix™ Advanced Driver-Assistance Systems (ADAS)

Product	Feature
Bendix™ Wingman Advanced	Adaptive Cruise Control (ACC)
	Collision Mitigation

Table 15: Bendix™ Advanced Driver-Assistance Systems (ADAS)

Product	Feature
Bendix™ Fusion	Adaptive Cruise Control (ACC)
	Collision Mitigation
	Speed Limit Recognition
	Highway Departure Braking
	Lane Departure Warning (LDW)
	Advanced Emergency Braking
	Traffic sign recognition
	High Beam Assist

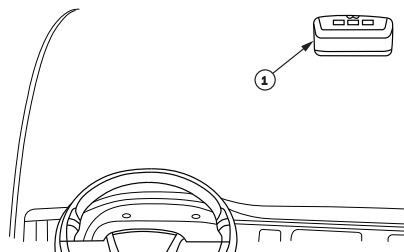
4.2 Bendix Fusion Camera

The camera is forward-looking and has a sensor for integrated fusion. The camera has high resolution and high dynamic range. These specifications provide a high

image quality even under non-ideal lighting conditions. The camera supports driver assistance systems (ADAS).

The camera is a component used for:

- Lane Keeping Assistant (LKA) system
- Lane Departure Warning (LDW) system
- Highway Departure Braking (HDB)
- Torque Assisted Steering (TAS)
- High Beam Assist (HBA)



1. Camera

i NOTE

The camera has overvoltage protection up to 42 V. It can withstand load dump surges up to at least 58 V for up to 400 ms without damage. The overvoltage protection concept includes a system-

atic shutdown of the camera, which leads to temporary loss of function.

i NOTE

The system detects and stores errors during camera operation. Some errors trigger a restart of the system, others trigger a warning to the operator in case functionalities are temporarily not available.

i NOTE

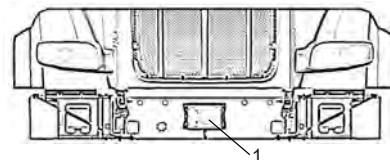
At extreme conditions, such as high outside temperatures, with deactivated air conditioning (AC), the camera may enter limited mode or shutdown.

i NOTE

Avoid heating of the camera to temperatures above 105 °C to prevent hardware damage.

4.3 Bendix Fusion Radar

The radar sensor is mounted to the bumper at the front of the vehicle. The sensor detects road lane markers and other vehicles traveling in the same lane.



1. Bendix Fusion Radar

4.4 Bendix SafetyDirect Processor

The processor has capabilities for the online SafetyDirect platform by Bendix. These include a digital video recorder (DVR) that continuously records up to 145 hours of streaming video from Bendix's forward-facing camera, a new high-definition color driver-facing camera, and an internal battery backup to help prevent data loss.

4.5 Cruise Control

CRUISE CONTROL

WARNING

DO NOT use a retarder (such as the engine brake, exhaust brake, transmission retarder, or regenerative braking) when operating on road surfaces with poor traction (such as wet, icy, or snow covered roads, or gravel). Retarders can cause the wheels to skid on a slippery surface. You could lose control of the vehicle or jackknife if the wheels begin to skid, resulting in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

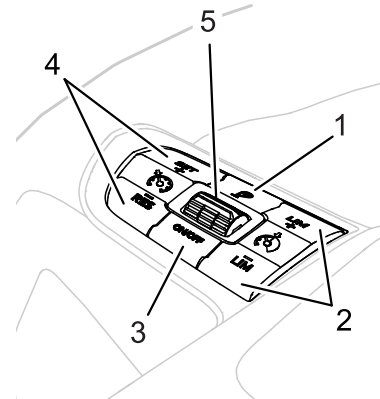
DO NOT use a retarder (engine brake, exhaust brake, transmission retarder, or regenerative braking) in heavy traffic. Most retarders slow the vehicle without activating brake lights, which may not alert following drivers and can lead to rear-end collisions. Failure to comply may result in death, personal injury,

equipment damage, or property damage.

Cruise control functions and features may vary depending upon which engine you have. For a specific explanation of your cruise control, see the cruise control or engine manual included with your vehicle. This vehicle's electronic system will perform a 'rationality check' every time the vehicle is started. This check is to ensure that the service brakes are working before allowing cruise control to function. This safety feature is designed to ensure that a driver is able to cancel the cruise set speed by using the service brake pedal. The system will not allow cruise control operation if it does not pass the 'rationality check.' The display will prompt you to press the service brake pedal if it has not been pressed since the vehicle has been started. In vehicles with PACCAR TX-12/TX-18 or Eaton Endurant transmission, the cruise control switches may be located on the shift control knob.

The left switch pod on the steering wheel contain buttons for the cruise control.

Figure 41: Left Switch Pod



1. **Trip**
2. **Variable Road Speed Limiter (VRSL) LIM+ and LIM- (option)**
3. **Cruise Control ON/OFF**
4. **Cruise Control (CC) SET+ and RES-**
5. **Toggle**

The switches on the left side of horn pad manage vehicle speed functions like cruise control and variable road speed limiter (option). If the vehicle has adaptive cruise control (option), predictive cruise control (option), etc., the toggle switch is also used to operate that system.

CRUISE CONTROL INDICATOR



This indicator shows the operator which Cruise Control function is currently enabled or active. This includes:

- Cruise Control
- Adaptive Cruise Control (optional)
- Predictive Cruise Control (optional)

The indicator is white when the system is on and turns green when the cruise control set speed is active. For more information see [Cruise Control](#).

HOW TO SET CRUISE CONTROL SPEED WHEN DRIVING

The vehicle speed must be greater than 19 mph (30 kph) for PACCAR powered vehicles or 30 mph (49 kph) for Cummins powered vehicles and the engine speed must be over 1,100 rpm for the cruise set speed to work.

To Set the Cruise Speed:

1. Turn the cruise function on by using the ON/OFF button.
The cruise icon will appear in the display.



2. Accelerate the vehicle via accelerator pedal to the desired cruise speed.
- 3.



WARNING

Cruise Control may not hold the set speed going downhill. If the speed increases going downhill, use the brakes to slow down and cancel Cruise Control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Press the "SET +" button to set the cruise speed.

The cruise set speed will appear in the display.

HOW TO CHANGE CRUISE SET SPEED

The vehicle cruise control must be ON and the cruise speed engaged.

1. To increase vehicle speed
 - Press or long press **SET +** until you reach the desired speed, or
 - Use the Accelerator Pedal to reach the desired speed, and then press the **Set +**
2. To decrease vehicle speed, press or long press **RES -** until you achieve the desired speed, and then press **SET +**.

Result:

The new cruise speed can be seen next to the Cruise Control Indicator.

CANCELING AND RESUMING CRUISE CONTROL

There are four ways to cancel the set speed in cruise control:

1. Tap the brake pedal
2. Tap the clutch pedal
3. Turn the cruise control system OFF (ON/OFF button on steering wheel)

- Press the Variable Road Speed Limit buttons

Using the brake or clutch pedal to cancel set speed allows the operator to use the RESUME feature. Pressing the **RES** – button will resume the vehicle speed previously set.

Pressing **ON/OFF** once will deactivate cruise control, and pressing it twice will turn off the system. When turning the system OFF, the previous set speed is removed from memory. The operator will have to manually reset the vehicle's cruise speed.

VARIABLE ROAD SPEED LIMITER (OPTION)

The Variable Road Speed Limiter (VRSL) prevents the vehicle from exceeding a chosen vehicle speed limit. This limit is selected by the operator and can be changed while driving. VRSL uses various braking methods to enforce the limit including ignoring further input from the accelerator pedal, but will only use engine braking if available and enabled.

VRSL replaces the Cruise Control indicator when active and will show the VRSL limit to the right of the indicator. This limit is shown in gray but turns white when actively limiting vehicle speed. MX engines, additionally, show "LIMITED" on the speedometer.

When active, the VRSL speed limit can be changed using the **LIM+** and **LIM-** buttons in the right, steering wheel switch pod. See How to Set the Variable Road Speed Limiter. Enabling VRSL will disable Cruise Control.

VRSL can be canceled by

- A long press of the Cruise Control **ON/OFF**.
- Stopping then parking the vehicle.
- Activating the PTO (option) (MX engine only).

HOW TO SET THE VARIABLE ROAD SPEED LIMITER

The Variable Road Speed Limiter (VRSL) cannot establish a limit while the parking brake is set or the PTO is in operation. The minimum VRSL setting is 25 mph (40 kph). Enabling VRSL will disable Cruise Control if Cruise Control is active.

- Press the Cruise Control **ON/OFF** button in the left, steering wheel switch pod.



Indicates that the VRSL feature is awaiting input.

- Press, or press and hold, **LIM+** or **LIM-** to incrementally, or continuously, raise or lower the VRSL limit.

The green VRSL indicator will replace the Cruise Control indicator, indicating that VRSL is enabled. VRSL (like Cruise Control) will use the current vehicle speed as the VRSL limit until changed.

Result:

Pressing either **LIM+** or **LIM-** will adjust the VRSL limit while this feature is active.

4.6 Adaptive Cruise Control

ADAPTIVE CRUISE CONTROL (OPTION)

WARNING

The driver must remain alert, react appropriately, and use safe driving practices while using this driver assistance feature. Ultimate responsibility for safe operation of the vehicle remains with

the driver at all times. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

The driver must remain visually aware of the roadway and traffic and not rely solely on Drivers Assistance features to identify and respond to the variety of vehicles or objects sharing the road. The driver must read the ADAS operator's manual associated with this feature and understand its limitations prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Driver Assistance features respond differently to specific road, weather, and traffic conditions. The operator must read the ADAS operator's manual associated with this feature and understand how it responds to these specific conditions prior to driving the vehicle. Failure to comply may result in death, personal

injury, equipment damage, or property damage.



When Cruise Control is active, ACC accelerates and slows the vehicle to maintain a chosen distance from a detected forward vehicle. Collision Mitigation attempts to prevent a forward collision when the vehicle is advancing at speeds greater than 15 mph (24 kph). Please review the ACC section of this manual, and the manufacturer's manual, prior to driving this vehicle.

ADAPTIVE CRUISE DISPLAY

The display area for Active Cruise will contain dynamic visuals related to whether a tracked vehicle is in front and the amount of following distance set for Active Cruise. It will show an outline of a car in the display area when the radar is tracking a vehicle. Once it locks on to a tracked vehicle, it will display horizontal bars to represent the amount of following distance from the tracked vehicle. Once it locks and tracks

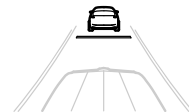
a target vehicle, the system will adjust the speed to accommodate the speed of the tracked vehicle in front of it.

Figure 42: No Tracked Vehicle



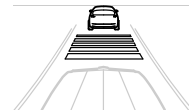
The operator can set the amount of following distance from the tracked vehicle. There are five preset distances to choose from, represented by horizontal bars between the hood and the forward car. One bar represents the nearest following distance.

Figure 43: Following Distance One Bar



Five bars represents a farther distance.

Figure 44: Following Distance Five Bars



See [Set ACC Following Distance](#).

SET ACC FOLLOWING DISTANCE

Follow these steps to adjust the following distance for Adaptive Cruise Control:

1. Press the **Toggle** until the following distance bars illuminate in the view. If the vehicle has Predictive Cruise Control, you may have to press multiple times to cycle through the other settings for PCC.
2. Rotate the **Toggle** up or down to choose the amount of following distance.
3. Push the **Toggle** again to set the following distance.

FOLLOWING DISTANCE ALERTS

The display is white when a tracked vehicle is at a proper following distance. If the following distance decreases (less than 1.5 seconds), the following distance bars turn amber. When the following distance decrease more (0.5 seconds), the following distance bars turn red (following distance value may differ based on vehicle option codes).

OBJECT DETECTED ALERT

When Collision Mitigation instrumentation detects a roadway object not recognized as a vehicle, the following graphic will show in the Driver Assistance area of the Digital Display:

Figure 45: Active Cruise - Object Detected



Because ACC does not classify the forward object as a vehicle, Collision Mitigation braking will not occur (see Collision Mitigation); instead, this graphic is accompanied by an audible alert, allowing the operator to decide how to best respond to the detected object.

For more information on the characteristics of the Adaptive Cruise Control feature, please read the ADAS OEM Operator's Manual specific for your vehicle.

COLLISION MITIGATION



WARNING

The driver must remain alert, react appropriately, and use safe driving practices

while using this driver assistance feature. Ultimate responsibility for safe operation of the vehicle remains with the driver at all times. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

The driver must remain visually aware of the roadway and traffic and not rely solely on Drivers Assistance features to identify and respond to the variety of vehicles or objects sharing the road. The driver must read the ADAS operator's manual associated with this feature and understand its limitations prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Driver Assistance features respond differently to specific road, weather, and traffic conditions. The operator must read the ADAS operator's manual associated with this feature and understand

how it responds to these specific conditions prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.



Additionally, this notification will appear instructing the operator to take control:

Collision Alert
BRAKE!

Collision Mitigation should not be used to stop or slow the vehicle without operator intervention. A Collision Mitigation braking event will temporarily disable both ACC and standard Cruise Control, requiring these features to be reactivated by the operator.

Collision Mitigation will continue to slow down the vehicle until the potential for a collision has been averted, whether the potential collision be that the vehicle has triggered the braking event, or that the system has determined that another forward vehicle may likely impact. The operator can cancel the braking event by using either the accelerator pedal or the service brake. This lets Collision Mitigation know that the triggering event has been acknowledged.

To prevent abuse of this emergency feature, after three Collision Mitigation braking events, ACC and Collision Mitigation will be disabled until the next time the ignition switch is cycled. This is to prevent using Collision Mitigation irresponsibly or in a manner for which it was not intended. Please read the ADAS operator's manual specific for your vehicle to become familiar with the limitations of Collision Mitigation (Automated Emergency Braking).

4.7 Predictive Cruise Control

PREDICTIVE CRUISE CONTROL (OPTION)



Predictive Cruise Control (PCC) uses satellite technology and GPS maps to look at upcoming roads to dynamically calculate optimal fuel-efficient speed over a given terrain.

Figure 46: Adaptive Cruise - Brake!

i NOTE

There are many other factors that may influence the overall fuel economy of your vehicle (i.e., head wind and slope terrain, etc.).

Predictive Cruise Control operates similarly to standard cruise control. With PCC, vehicle speed is maintained without holding down the accelerator and can be used at 19 mph (30 km/h) or more.

PCC will also actively recalculate and change the target cruising speed for best fuel economy rather than maintaining a constant set speed. The range of the PCC target cruise speed is defined by an overshoot and undershoot speed values. These values are adjustable by the operator.

i NOTE

Adaptive Cruise Control (ACC) has the ability to override Eco cruise. This is because ACC is designed to decelerate the vehicle to match the speed of traffic in front of the ACC equipped truck.

PCC BEHAVIOR

As the vehicle approaches the top of a hill, PCC will decrease the vehicle speed (up to 8% below the set speed) to prevent the vehicle from exceeding the set speed while traveling downhill. This will result in a smoother, more fuel efficient ride as the vehicle approaches the crest of the hill.

Once over the crest, momentum takes over and the system allows a predetermined amount of speed over the set speed.

PCC can also activate Neutral Coast (NC) mode. NC mode disengages the vehicle's driveline, reducing fuel consumption while maintaining overall vehicle speed. Once the vehicle can no longer maintain speed while coasting, NC is deactivated and the driveline re-engages.

If the driver has activated one of the vehicle's retarder systems (engine, transmission, or driveline), the vehicle speed may increase until it reaches the cruise control set speed plus the retarder offset. For more information about engine retarders, see your vehicle Operator's Manual.

If the vehicle drops outside the speed range, PCC will accelerate the vehicle back to the minimum PCC speed.

As the vehicle reaches flat ground after the hill, PCC will maintain the set-speed until the crest of the next hill.

If the vehicle is equipped with Adaptive Cruise Control (ACC) and senses traffic slowing, it will overrule PCC and slow the vehicle. This event will cancel PCC only if the service brakes are required to slow the vehicle. If the service brakes are not used by ACC to maintain a safe following distance, PCC will remain engaged and resume automatically after the ACC event.

i NOTE

PCC was calibrated using a loaded vehicle. Your results may vary, depending on your vehicle's configuration.

PCC INTERRUPT

There are three conditions that will automatically deactivate PCC:

- If there is no data for the current road.
- If the GPS signal is lost.
- If the PCC system detects a fault.

When this happens, the vehicle will revert to standard cruise control. This CC state will be standard cruise control which will maintain the same cruise speed that was selected for PCC.

Once the system regains GPS signal and road data, PCC will resume.

NOTE

PCC Map coverage will include most interstate and state highways.

TROUBLESHOOTING

The display will show a message if it detects an error with the PCC system. PCC faults may result from the unavailability of map, slope, vehicle position, etc. To effectively diagnose and clear the fault codes, the truck must be taken to your local dealership.

FUEL ECONOMY SAVINGS NOT ACHIEVED

Certain conditions may cause the optimal vehicle speed, calculated by PCC, to be overruled. For example, PCC will be overruled in the following scenarios:

- Greenhouse Gas functionality

- Adaptive Cruise Control Following Event (if equipped)
- Adaptive Cruise Control Error State (if equipped)

DISABLING PREDICTIVE CRUISE CONTROL

To disable PCC and enable standard cruise control, the truck must be taken to an authorized dealer.

SOFTWARE INFORMATION

The PCC ECU Software version and Map Data Version number can be found in the Menu [Truck Information](#). It may take up to two minutes for this information to be displayed after the truck has been keyed-on.

PCC CONTROLS

PCC uses the same buttons as Cruise Control. See [Cruise Control](#).

PCC UNDERSHOOT

Follow these steps to adjust the undershoot value for Predictive Cruise Control:

1. Press the **Toggle** twice.



The bottom value below the set speed will illuminate.

2. Rotate the **Toggle** up or down to set the value.
3. Push the **Toggle** again to confirm the value.

Result:

If you want to set the Overshoot value, see [Predictive Cruise Control Overshoot](#).

4.8 Lane Departure Warning (LDW)

WARNING

The driver must remain alert, react appropriately, and use safe driving practices while using this driver assistance feature. Ultimate responsibility for safe operation of the vehicle remains with the driver at all times. Failure to comply may result in death, personal injury, equipment damage, or property damage.

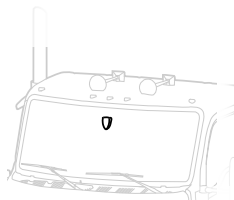
WARNING

The driver must remain visually aware of the roadway and traffic and not rely solely on Drivers Assistance features to identify and respond to the variety of vehicles or objects sharing the road. The driver must read the ADAS operator's manual associated with this feature and understand its limitations prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Driver Assistance features respond differently to specific road, weather, and traffic conditions. The operator must read the ADAS operator's manual associated with this feature and understand how it responds to these specific conditions prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Using a windshield-mounted, forward facing camera, the Lane Departure Warning (LDW) feature monitors the road for lane markings and alerts the driver when the vehicle departs its lane without the use of the turn signal. Lane departure warning is only active at speeds greater than 37 MPH (60 km/h).



LDW is not available when the system cannot accurately detect lane markings; therefore, the camera should be clear of potential obstructions for the LDW feature to operate properly.

The following lists some conditions that can limit the performance of the features that use the camera:

- Buildup of dirt, mud, water, snow, ice, bugs, etc. on the windshield. These should be able to be resolved with proper use of the windshield washer/wiper system as the camera is intentionally installed in the wiper path.
- Windshield damage directly in front of

the camera. This should be fixed as soon as possible.

- Items on the windshield like stickers, paint, window tint, etc. These should not be placed in front of the camera.
- Items on the exterior of the truck such as aftermarket visors, wind deflectors, hood ornaments, car racks, crane booms / hooks / buckets, snowplows, mirrors, etc.

The Driver Assistance area of the Digital Display indicates if the LDW system recognizes lane markings as follows:

- White lines indicate detected lanes.
- Gray lines indicate where the road is monitored for lane markings, but none are detected.
- Black lines mean that the LDW feature is disabled.
- A yellow line indicates an active lane departure event.

A lane departure event occurs when the vehicle tire crosses a lane marking without the use of the turn signal. A lane departure event is accompanied by an audible alert.



The LDW feature provides audible and visual alerts only and does not attempt to correct the vehicle's position in the lane.

The operator can temporarily disable LDW (disabling audible and visual alerts) by using the dash mounted Lane Departure Warning Disable switch (See [Lane Departure Warning Disable](#)).

For more information on Lane Departure Warning, see the ADAS OEM operator's manual specific for your vehicle.

4.9 Highway Departure Braking (option)

WARNING

The driver must remain alert, react appropriately, and use safe driving practices while using this driver assistance feature. Ultimate responsibility for safe operation of the vehicle remains with the driver at all times. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

The driver must remain visually aware of the roadway and traffic and not rely solely on Drivers Assistance features to identify and respond to the variety of vehicles or objects sharing the road. The driver must read the ADAS operator's manual associated with this feature and understand its limitations prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Driver Assistance features respond differently to specific road, weather, and traffic conditions. The operator must read the ADAS operator's manual associated with this feature and understand how it responds to these specific conditions prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Highway Departure Braking (HDB) will slow the vehicle when the feature determines the vehicle has unintentionally left the roadway. HDB is only active at speeds above 37 mph (60 kph).

When the midpoint of the vehicle crosses the solid white, outside lane line (also called the Fog Line) without use of the turn signal or hazards, HDB presumes an unplanned road departure and applies the service brakes. HDB will not bring the vehicle to a stop on its own (however, see Collision Mitigation), but is capable of reducing vehicle speed by up to 30 mph (48 kph).

The digital display will notify the operator of a Highway Departure Braking event with a notification and show this graphic in the Driver Assistance area accompanied by an audible alert:



HDB works along with Lane Departure Warning (LDW). LDW can warn of a highway departure prior to the braking action taken during a HDB event (see Lane Departure Warning).

The operator can acknowledge and cancel a Highway Departure Braking (HDB) event by

- Applying the service brake and braking more than that applied by HDB.
- Pressing the accelerator pedal and pressing more than 90% of the pedal range.
- Activating the turn signal.
- Activating the hazards.
- Steering the vehicle back into the lane.

To prevent abuse of this feature, after six Highway Departure Braking events, HDB will be disabled until the next time the ignition switch is cycled. This is to prevent using HDB irresponsibly or in a manner for which it was not intended. Please read the ADAS OEM operator's manual specific for your vehicle for more information about Highway Departure Braking.

4.10 Speed Limit Recognition

Using the forward camera of your Driver Assistance instrumentation, your vehicle can read most North American speed limit signs. The detected, posted speed limit is

presented on the display using a road sign located in the Driver Assistance area (see Minimized View with Driver Assistance):



When vehicle speed exceeds the posted speed limit by 5 mph (8 kph) or more, the operator is notified using alternating red and blue "cop" lights, indicating above the sign on the display. This is accompanied by an audible alert.

Please read the ADAS OEM operator's manual specific for your vehicle for more information about Speed Limit Recognition.

4.11 Lane Keeping Assist (LKA)



WARNING

The driver must remain alert, react appropriately, and use safe driving practices while using this driver assistance feature. Ultimate responsibility for safe operation of the vehicle remains with the driver at all times. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

The driver must remain visually aware of the roadway and traffic and not rely solely on Drivers Assistance features to identify and respond to the variety of vehicles or objects sharing the road. The driver must read the ADAS operator's manual associated with this feature and understand its limitations prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Driver Assistance features respond differently to specific road, weather, and traffic conditions. The operator must read the ADAS operator's manual associated with this feature and understand how it responds to these specific conditions prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Vehicles with Lane Keeping Assist (LKA) will provide steering assistance when the system detects the vehicle is departing the lane without the use of a turn signal. Using Torque Assisted Steering, LKA will steer the vehicle in an attempt to nudge the vehicle back into the lane. LKA can always be overcome by the operator.

NOTE

The driver is expected to keep their hands on the steering wheel at all times.

Using this feature may increase or decrease awareness to components that are in need of inspection or maintenance, such as (but not limited to) improper tire inflation, suspension, or brake drag.

The operator is informed that their vehicle is equipped with the Lane Keeping Assist feature at vehicle start using the following Popup notification:

Figure 47: Lane Keeping Assist Installed Popup



Additionally, when LKA is enabled or engaged, the Lane Keeping Assist Enabled/ Engaged indicator is present:

Figure 48: Lane Keeping Assist Enabled/ Engaged Indicator



(See [Lane Keeping Assist \(LKA\) Enabled/ Engaged.](#))

When the vehicle speed is above 40 mph (65 km/h), the conditions are right, and the system is ready to assist in keeping the vehicle in the lane, the steering wheel on the indicator will turn green, indicating that the system is active and ready to assist in lane keeping.

NOTE

Lane Keeping Assist will disengage if vehicle speed drops below the minimum speed setpoint of 31 mph (49 km/h).

When Lane Keeping Assist system operating conditions are not met, the LKA feature may disengage (the indicator will turn white), re-engaging once the operating conditions are again satisfied. Some of

these conditions include an inability to identify lane markings, vehicle speed dropping below the minimum speed setpoint, rapid deceleration, or activating the vehicle hazard lights.

Lane Keeping can be disabled using the Lane Keeping Assist Disable switch, if optioned (see [Lane Keeping Assist \(LKA\) Disable \(option\)](#)).

For the LKA feature to operate as intended, the driver must remain in control of the vehicle with their hands on the wheel. If the system cannot detect the presence of the driver's hands on the wheel, it will disengage the LKA feature.

For more information on the Lane Keeping Assist feature, see the Lane Keeping Assist OEM operator's manual.

4.12 High Beam Assist (HBA)

WARNING

The driver must remain visually aware of the roadway and traffic and not rely solely on Drivers Assistance features to identify and respond to the variety of vehicles or objects sharing the road. The driver must read the ADAS

operator's manual associated with this feature and understand its limitations prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The High Beam Assist (HBA) is a function to support the driver by automatically controlling the high beams. The HBA system utilizes a forward-facing camera to detect the presence of other road users in front of the subject vehicle as well as detect ambient lighting conditions.

A settings menu option is available to permanently enable and disable the HBA. If the HBA is set to **enabled** in the settings menu, the driver does not have to perform any further action to enable the HBA. The HBA will be enabled when the enablement conditions are met. The HBA selection made in the settings menu will persist through key cycles. However, the state of the HBA (i.e. disabled, enabled, driver override, etc.) will not. On startup, the HBA will always be disabled and not controlling the high beams until all of the enablement conditions have been met.

NOTE

The driver can override the HBA by pulling back on the Turn Signal lever.

There are two driver override states:

- If the HBA is controlling the high beams and the high beams are on, the driver can override the HBA and turn the high beams off by pulling back on the turn stalk. The high beams will remain OFF until the driver pulls back on the turn stalk again, which will return the control of the high beams to the HBA.
- If the HBA is controlling the high beams and the high beams are off, the driver can override the HBA and turn the high beams on continuously by pulling back on the turn stalk. The high beams will remain ON continuously until the driver pulls back on the turn stalk again, which will return control of the high beams to the HBA.

NOTE

Regardless of the state of the high beams and the HBA, the driver will always have flash-to-pass function-

ality by pushing forward on the Turn Signal lever.

The HBA may not function correctly in the following situations and your intervention may be necessary:

- In strong weather conditions like dense fog or heavy precipitation.
- In the presence of poorly lit traffic participants like cyclists, pedestrians, or animals.
- In tight curves, at hilltops or depressions, at intersections.
- In poorly lit built-up areas, in the presence of highly reflective signs or other unusual lighting conditions.
- When the windshield in front of the camera is fogged, dirty, or otherwise obscured.

If there is a problem with the HBA, the following notification will appear on the Digital Display indicating that inspection or service must be performed.

 **High Beam Assist Fault**
Inspect Camera
Or Seek Service

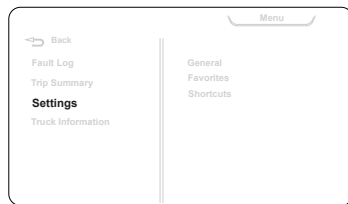


1/2

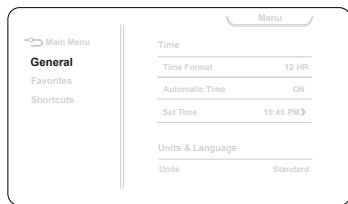
4.13 Activating the High Beam Assist (HBA)

To activate the High Beam Assist (HBA) feature, perform the following procedure:

1. Go to the Main Menu in the Digital Display.
2. Select the **Settings** option.

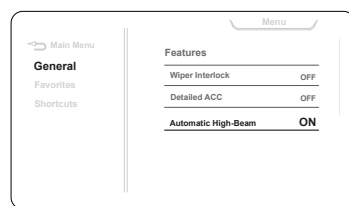


3. Select the **General** option.



4. Scroll down until you see the **Features** section.
5. Scroll down, select **Automatic High-Beam**, and set this feature to

the **ON** position.



4.14 Hands Off Detection



WARNING

The driver must remain visually aware of the roadway and traffic and not rely solely on Drivers Assistance features to identify and respond to the variety of vehicles or objects sharing the road. The driver must read the ADAS operator's manual associated with this feature and understand its limitations prior to driving the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The Hands Off Detection (HOD) is a feature that detects when the driver's hands are not on the wheel.



NOTE

The HOD works independent of the LKA.



NOTE

LKA is not responsible for moving the vehicle back to its lane. The driver must remain in full control of the vehicle at all times.

When the driver is properly operating the vehicle with driver control of the steering wheel, the arms on the LKA icon will be white.

When the driver removes their hands from the steering wheel for a certain period, the arms on the LKA icon will change color and there will also be notification messages along with audible alerts stating warnings depending on how long the driver's hands were off.

Time With Hands off	Color in Arms	Message Displayed
10 seconds	Amber	Steering Assist System Installed, Keep Hands on Wheel At All Times
15 seconds	Red	Keep Hands on Wheel, Steering Assist will Disable!
30 seconds	Red	Driver Take Control
60 seconds	Grey	Steering Assist Disabled, Driver Take Over

NOTE

After 60 seconds with the hands off, the LKA system will disengage and the audible alert will continue until the driver has taken control of the steering wheel again. When the driver takes control of

the steering wheel again, the system will return to its enabled state.

5 TRANSMISSION

5.1 Transmission Tips

Riding the Clutch

The clutch is not a footrest. Do not drive with your foot resting on the clutch pedal. Release fully the pedal because riding the clutch results in the disc slipping and causes excessive heat and wear on it.

Release Bearing Wear

When idling the engine, shift the transmission to neutral and disengage the clutch by removing your foot from the pedal. Disengaging the clutch in idle prevents unnecessary wear to the clutch release bearing and is less tiring for drivers.

More Tips

- Always use the clutch when making upshifts or downshifts.
- Always select a starting gear that provides sufficient gear reduction for the load and terrain.
- Never downshift when the vehicle is moving too fast.

- Never slam or jerk the shift lever to complete gear engagement.
- Never coast with the transmission in neutral and the clutch disengaged. To provide smooth gear engagements while shifting, use proper coordination between shift lever and clutch.
- Double clutching is a very effective means to increase the service life of the transmission. Double clutching refers to a technique where the clutch pedal is used twice per shift instead of once. It also requires that you adjust the engine rpm in the middle of the shift which ultimately synchronizes the gears during shifting. Synchronizing reduces wear on the gears.

5.2 Operating Manual Transmissions

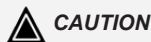
OPERATING MANUAL TRANSMISSIONS

The transmission shift pattern for your vehicle may be located on the shift control knob. In addition to understanding the shift pattern and its location, you should read the transmission manufacturer's manual provided with your vehicle before oper-

ating the vehicle. After making sure the vehicle's oil and air pressure are correct and all other parts and systems are in proper working condition:

1. For vehicles with a clutch pedal, locate the clutch pedal and engage the clutch brake.

- 2.



CAUTION

Always use first gear or a low speed range to start the vehicle in motion. The use of a higher gear or speed range forces undue strain on the engine, clutch, and other transmission components. Failure to comply may result in equipment or property damage.

Shift into a low gear.

3. Evaluate the road surface conditions and terrain. Select a gear low enough to let the vehicle start forward with the throttle at idle.
4. Push the parking brake valve handle (yellow) against the dash panel to release the brake.
5. Release the clutch pedal (manual only), then gradually accelerate to

permit smooth starting.

6. DO NOT allow the vehicle to roll (even a little) in the opposite direction during clutch engagement. When starting on an incline, apply the service brakes before releasing the parking brake. Then, release the service brake as you engage the clutch and apply throttle.

Result:

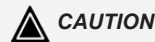
For further instructions on operating the transmission, see the transmission manufacturer's Driver/Operator's Instruction Manual.

To shift directly into any gear other than first or reverse, depress the clutch pedal only far enough to release the clutch. Fully depressing the pedal applies the clutch brake and could cause gear hang-up.

If the vehicle has a misaligned gear condition and cannot start, gradually release the clutch, allowing the drive gear teeth to line up properly. Then the drive gear can roll enough to allow the teeth to line up properly and complete the shift. The best engine performance and maximum economy is obtained if gears are properly selected. This efficiency is achieved by always selecting gears within optimum engine rpm, which is where maximum torque and power are obtained.

Shift carefully in a new vehicle or one that has been exposed to cold water. The transmission may be a little stiff at first because the transmission lubricant has not yet circulated and coated the contacting surfaces of the gears. To avoid gear clashing, closely follow these procedures:

- Always select a starting gear that will provide sufficient gear reduction for the load and terrain.
- Never downshift when the vehicle is moving too fast.
- Never slam or jerk the shift lever to complete gear engagement.
- Never coast with the transmission in neutral and the clutch disengaged.



CAUTION

When starting the vehicle, wait a few seconds before placing the vehicle in gear. This pause allows lubricant to coat contacting metal surfaces. Metal contacting metal in moving parts may seriously damage your transmission. Once the vehicle is in motion, avoid driving in first gear unnecessarily. Failure to comply may result in equipment or property damage.

HOW TO USE THE HYDRAULIC CLUTCH



CAUTION

Be careful not to apply the clutch brake while the vehicle is moving. The purpose of the clutch brake is to stop the transmission so that you can shift into a starting gear without grinding gears. Applying the clutch brake when the vehicle is moving causes a braking effect on the drivetrain and shortens the service life of the clutch brake. Failure to comply may result in equipment or property damage.



CAUTION

DO NOT push the clutch pedal completely to the floor when shifting while the vehicle is in motion. Using the clutch brake while shifting a vehicle in motion will damage the clutch brake. A non-functioning clutch brake will make shifting very difficult when the vehicle is stationary. Failure to comply may result in equipment or property damage.

1. The clutch pedal only needs to be

fully depressed when it is necessary to engage the clutch brake. Typically, this is only when starting from a stop to help mesh the gears.

2. For the remainder of the more typical gear changes, it is not necessary to fully apply the clutch pedal, and instead the pedal should only be partially depressed. A force ramp can be felt near the end of the clutch travel to help avoid engaging the clutch brake when not needed.

Result:

The clutch brake is used for stopping transmission gears, allowing shifting into first gear or reverse without grinding gears. It is not necessary to use the clutch brake to shift gears when the vehicle is in motion.

If the clutch pedal is pressed completely to the floor, and the transmission is not shifting, it is time to have the clutch adjusted or serviced.

If the transmission has a butt-tooth condition and you cannot engage a gear, gradually release the clutch. Then the drive gear can roll enough to allow the teeth to line up properly and complete the shift.

The clutch is not a footrest. Do not drive with your foot resting on the clutch pedal. It will allow your clutch to slip, causing excessive heat and wear. Damage could result.

When idling the engine, shift the transmission to neutral and disengage the clutch by removing your foot from the pedal. Disengaging the clutch in idle prevents unnecessary wear to the clutch release bearing and is less tiring for drivers.

- Always use the clutch when making upshifts or downshifts.
- Never coast with the transmission in neutral and the clutch disengaged.
- To provide smooth gear engagements while shifting, use proper coordination between shift lever and clutch.

HOW TO SHIFT USING DOUBLE CLUTCH METHOD

Double clutching is easier on the transmission and on the engine, helping match the vehicle's engine speed with driveline speed to achieve clash-free shifts.

The manual transmission in the vehicle is not equipped with gear synchronizers. Whether you are upshifting or downshifting, it is best to double clutch.

To double clutch:

1. Push the clutch pedal down to disengage the clutch.
2. Move the gear shift lever to neutral.

3. Release the pedal to engage the clutch. This lets you control the rpm of the transmission mainshaft gears, allowing you to match the rpm of the mainshaft gears to those of the output shaft.
 - Upshifts: let the engine and gears slow down to the rpm required for the next gear.
 - Downshifts: press accelerator, increase engine and gear speed to the rpm required in the lower gear.
4. Now quickly press the pedal to disengage the clutch and move the gear shift lever to the next gear speed position.
5. Release the pedal to engage the clutch.

5.3 Automated Transmissions

AUTOMATED TRANSMISSIONS

This vehicle may have a PACCAR TX-12/ TX-18 series or Eaton Endurant automated transmission. It is important to understand how to operate the transmission to optimize

its efficiency. Please read the manual for the automated transmission included with your vehicle.

Always apply the parking brake before leaving the cab.



WARNING

If your vehicle has an automated or automatic transmission, the vehicle can roll backwards when stopped or started on a hill or grade. To prevent rolling, observe the following guidelines:

- When stopped on a hill or grade, press the brake pedal.
- When starting from a stop on a hill or grade, quickly remove your foot from the brake pedal and firmly press on the accelerator pedal.

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



WARNING

DO NOT leave the cab of the vehicle without first applying the parking brake. The vehicle could roll and cause an accident. Failure to comply may result

in death, personal injury, equipment damage, or property damage.

Hill Hold



The hill hold feature is available as an option with certain automated transmissions. This feature holds the vehicle while on a hill to allow the operator to release the service brakes and press the accelerator. This feature will hold the vehicle if the vehicle is attempting to go up a hill from a stop in either drive or reverse. There is usually a switch associated with defeating this hold feature, should it be desirable to intentionally roll back, such as down a loading ramp for example.

Shift Configuration

Some transmissions are equipped with more than one shifting configuration to match various operating conditions. Please read the automated transmission manual included with your vehicle for instructions on how to change shift configurations. When the transmission is in an alternate configuration, there is usually some kind

of indication near the gear graphic. The letters 'C2' may appear, for example, or words describing the configuration such as "Tanker" or "Off-Road".

TRANSMISSION GEAR DISPLAY



This indicator shows the transmission mode and current gear. This display location does not apply to vehicles with Allison automatic transmissions.

- Max mode
- Low gear mode
- Manual Mode
- Neutral Coast
- Driver Shift Aid
- Configuration 2

Inside the gear icon, the indicator normally shows the current gear number and may at times show:

- **AN** - Auto Neutral
- **CA** - Clutch Abuse
- **GI** - Grease Service Interval
- **!** - Error State

Figure 49: Transmission Error

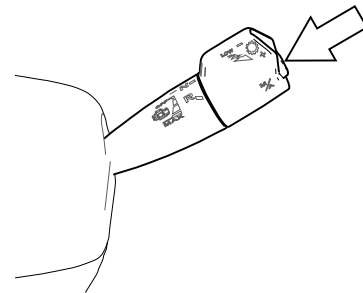


This icon indicates an error in the transmission. Attempt to reset the transmission by switching off the vehicle. After two minutes, restart the engine. Then see if the same icon appears in the display. Contact the nearest authorized dealership if the condition persists.

CONTROLS FOR VEHICLES WITH A PACCAR TX-12/TX-18 SERIES OR EATON ENDURANT TRANSMISSION

This vehicle may be equipped with either a PACCAR TX-12/TX-18 series or Eaton Endurant Transmission. The Automated or PACCAR Transmission controls are located on the right hand side of the steering column.

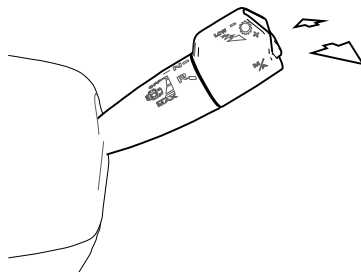
USING THE MANUAL - AUTOMATIC BUTTON



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

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 in the transmission mode area of the display. See [Drive, Neutral, and Reverse Indicator](#).

UP OR DOWN SHIFTING



The instrument cluster will illuminate with the corresponding gear.

Figure 51: Transmission Gear



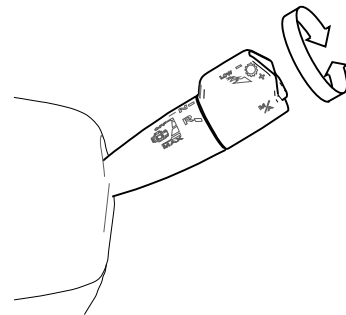
When in the Manual mode, the transmission gears can be manually selected by pushing or pulling on the lever. Pushing the lever forward will down shift. Pushing and holding the lever forward will engage the LOW gear range. Pulling the lever towards the driver will upshift the transmission.

Some vehicles may have a feature that prompts the operator to shift for optimal fuel economy.

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

Figure 50: Gear Shift Assist

DRIVE NEUTRAL REVERSE SELECTOR



Transmission mode is selected by rotating the lever outer knob. There is a position for Drive (**D**), Neutral (**N**), and Reverse (**R**).

The Digital Display will indicate the corresponding mode. See [Drive, Neutral, and Reverse Indicator](#).

i NOTE

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

AUTO-NEUTRAL



The Auto-neutral feature will automatically shift the transmission into Neutral if it is left in a forward or reverse mode (such as Low, Drive, or Reverse) and the parking brake is set. The transmission gear display shows **AN** when Auto-neutral is activated. This mode might also activate if the driver does not apply the foot brake before shifting. When this happens, the selector might have to be cycled with the correct brake application to perform the desired gear selection.

NOTE

If Auto-neutral has been activated, the transmission will not shift into Drive (**D**) or Reverse (**R**) until the shifter is first moved to Neutral (**N**) before selecting another transmission mode.

NEUTRAL COAST MODE

Neutral Coast mode places the transmission into Neutral on slight downhill grades, improving fuel economy. Neutral Coast mode only operates when cruise control is active and the transmission is in Drive.

When Neutral Coast Mode is active, the engine will drop to idle speed and the transmission will disengage. The gear display shows a green **N** when Neutral Coast mode is active. The transmission exits Neutral Coast, returning to an appropriate gear, when the

- Vehicle brake is applied
- Operator depresses accelerator pedal
- A mode other than Drive is selected
- Operator performs an upshift or downshift request
- Cruise control is canceled
- Cruise high or low set speeds are exceeded
- Maximum vehicle grade is exceeded
- Driver Assistance systems (ADAS) make a brake request

CLUTCH ABUSE PROTECTION

The clutch can overheat and slip with improper use. Select the lowest possible start gear for the application.

- If moving slowly is required, select 1st or R1.
- Use the service brake and let Hill Start Aid assist you when launching on an incline.
- Do NOT use the throttle to hold the vehicle on an incline. (Use Service Brake).
- Do NOT use the throttle to stop roll back on an incline after Hill Start Aid disengages. (Use service brake, and then relaunch).

Figure 52: Transmission Gear Display (Clutch Abuse)



If the clutch starts to overheat, the transmission gear display will show **CA** and sound a warning tone. Full clutch actuation must be completed quickly. If not, the system will either open the clutch if not on the throttle or close the clutch if on the throttle. If the abuse continues, the system will

open the clutch and take away throttle control for a short period of time to allow the clutch to cool down.

5.4 Automatic Transmissions

An automatic transmission makes shifting much easier. It is important to understand how to operate the transmission to optimize its efficiency. Please read the manual for your automatic transmission included with your vehicle.

Some automatic transmissions (TX-8, Allison 1k/2k) have a "park" position. Always use a parking brake before leaving the cab.

NOTE

PACCAR TX-8 transmissions are not offered in vehicles equipped with MX-10 engines.

WARNING

DO NOT leave the cab of the vehicle without first applying the parking brake. The vehicle could roll and cause an accident. Failure to comply may result

in death, personal injury, equipment damage, or property damage.

5.5 Auxiliary Transmission

If you have an auxiliary transmission, see your transmission manufacturer's manual for its proper operation.

6 BRAKES

6.1 Air Brake System

WARNING

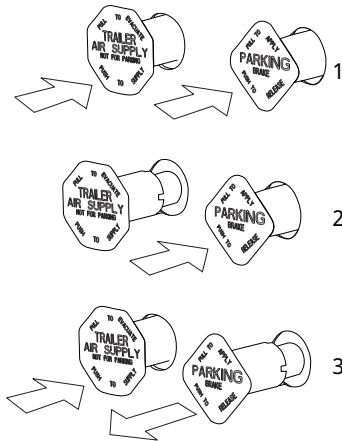
DO NOT drive through water deep enough to wet brake components. It may cause the brakes to work less efficiently than normal. The vehicle stopping distance may be longer than expected or the vehicle may pull to the left or right when brakes are applied, causing an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Compressed air is delivered to the brake system through the valve at the brake pedal and is controlled with various valves and braking circuits. The brake system is designed with separate front, rear, and (when applicable) trailer circuits so that if one circuit is compromised and loses air, the other circuits will not be affected. Safety valves in each circuit will protect the other circuits in the event that a circuit loses air. The air compressor on the engine will typically provide 100 to 130 psi (6.89 to 8.96 bar/689 to 896 kPa) to the air tanks. The vehicle is also designed with an air dryer, which removes moisture from the compressed air in order to protect all components in the air system.

The brake system may be further enhanced by additional devices such as brake proportioning valves, antilock braking systems, or sensors designed to let you know if your brake pads need to be serviced. Certain conditions may result in the brake surfaces getting wet. Brake surfaces that are wet do not perform as well as when they are dry. There may be situations where wet brake surfaces cannot be avoided. In such situations, apply the brakes while in motion, to dry the brake surfaces.

Certain conditions may result in your brake surfaces becoming overheated (above 800°F or 427°C). Overheated brakes will damage linings and drum surfaces, ultimately decreasing brake performance. Refer to Retarders and Descending a grade to avoid overheating the brakes.

Parking Brake



1. Normal run position
2. Trailer park with vehicle released
3. System park or trailer charge with vehicle parked

Commercial Truck Parking brake works in reverse action of automotive hydraulic brakes. When the parking brake is engaged, air is exhausted from the spring chambers, which allows the spring to engage the brake. This design also provides a safety function if a brake circuit has a leak and loses air. In such a scenario, the parking brake will apply.

The vehicle's parking brake controls are the yellow diamond shaped knob on your dash board. If the vehicle is equipped to tow a trailer, then there will be an additional red octagon shaped knob for the trailer parking brake. The parking brake will be engaged when either of these knobs are pulled OUT. (If one knob is pulled out, the other knob will automatically pop out.)

Pushing IN a knob will disengage the respective parking brake. If you push in the yellow knob only, you will disengage the vehicle's parking brake but will not disengage the trailer parking brake (if applicable). Either knob will pop back out if the system pressure is not above 60 psi (4.14 bar/414 kPa). The instrument panel display will provide a message any time the parking brake (vehicle or the trailer) are set and the vehicle is put into motion.

6.2 Engage Trailer Hand Brakes



Press the lever down to engage the Trailer Hand Brake. If the brake does not self release, raise the lever back up manually to disengage the Trailer Hand Brake.

6.3 Automatic Traction Control



The truck-tractor antilock brake system (ABS) has an Automatic Traction Control (ATC) feature. A switch on the dash controls this feature. Check for illumination of the ABS and traction control warning lamps when first starting the vehicle. Monitor these lamps while driving. Other than these provisions, there are no special operating procedures required. For a detailed system description, see the literature for the specific ABS that came with the vehicle.

i NOTE

DO NOT allow the traction control lamp to remain on continuously for an extended length of time. Continuous use of the ATC can cause overheating of the drive wheel brakes. Reduce the engine torque or vehicle speed to eliminate wheel spin.

6.4 Antilock Brake Systems (ABS)

This vehicle can have an Antilock Brake System (ABS). The ABS adjusts air pressure at the appropriate wheels to prevent wheel lock-up. The ABS arms when the start key switch is in the ON position.

**WARNING**

The antilock brake system (ABS) is a critical vehicle safety system. For the safety of you and others around you, have the vehicle submitted for periodic preventive maintenance checks. If you suspect problems, immediately contact an authorized dealer. Failure to maintain the brake system properly can lead to serious accidents. Failure to comply may result in death, personal injury, equipment damage, or property damage.

**WARNING**

DO NOT rely on an antilock brake system that is functioning improperly. You could lose control of the vehicle resulting in a severe accident, causing per-

sonal injury or death. If your ABS lamp goes on while you are driving or stays on after the self-check, your antilock system might not be working. The ABS may not function in an emergency. You will still have conventional brakes, but not antilock brakes. If the lamp indicates a problem, have the ABS checked. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Vehicles without ABS are typically equipped with a bobtail brake proportioning system. When a trailer is not connected, the drive axle brake application pressure will automatically be limited by the proportioning system. When driven in a bobtail mode, these tractors will require greater brake pedal application to provide the equivalent braking to a bobtail tractor not equipped with a proportioning system.

Trailer ABS Power Line Communication (PLC)

North American on-highway vehicles are equipped with a separate electrical circuit to power the ABS on towed vehicle(s). In most cases, the ABS power will be supplied through the Auxiliary circuit on the primary 7-way trailer light line connector. If the vehicle was manufactured with a switch-

able Auxiliary circuit for trailer accessories, an additional 7-way connector would have been provided for trailer ABS power. In either case, the ABS power line on the vehicle will be PLC equipped.

**WARNING**

DO NOT splice into the non-switchable Auxiliary circuit on the primary 7-way trailer light line. Doing so may cause the trailer ABS to malfunction. This circuit is dedicated for trailer ABS power. To add a switchable auxiliary circuit, contact a dealership. Failure to comply may result in death, personal injury, equipment damage, or property damage.

**NOTE**

Tractors/trucks and trailers built after 03/01/2001 must be able to turn on an In-Cab Trailer ABS Warning Light (per U.S. FMVSS121). The industry chose Power Line Communication (PLC) as the standard method to turn it on. On trailers built prior to 03/01/2001, verify trailer ABS system status via the required external warning light mounted on the trailer. The indicator light on the

trailer should be amber and identified with the letters ABS.

For doubles or triples, the lamp does not distinguish between trailers. An ABS problem in any of the trailers will activate the Trailer ABS Warning Lamp.

If you change the intended service in any way (for example, number of axles, multiple trailers, add switchable trailer accessories, etc.) from the date the vehicle was manufactured, you should contact your trailer manufacturer, your trailer antilock brake manufacturer, or both to determine if the power available at the 7-way trailer light line is adequate. Failure to do so might result in insufficient power to the trailer ABS system, which may affect its operation.

**WARNING**

Make sure the center pin of the 7-way trailer light line does not accidentally turn on trailer equipment. It might result in insufficient power to the trailer ABS system, which may affect its operation. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Special Trailer ABS Without PLC (Option)

If a trailer does not have Power Line Communication (PLC), but it does have Anti-Lock Brake Systems (ABS) that is powered through an optional second trailer connector (ISO 3731) and that trailer ABS is designed to control the Trailer ABS Warning Lamp in the cab and the vehicle has been ordered with the option to turn on this lamp for these types of trailers, then this lamp will turn on when that trailer ABS has a system problem. This should be checked by a dealer as soon as possible. The Trailer ABS Warning Lamp will not turn on for the power-on test when connected to these types of trailers.

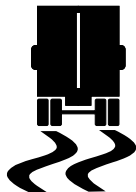
**NOTE**

Very few trailers built before 03/01/2001 have this option. Trailers built after 03/01/2001 are built with PLC technology.

6.5 Advanced ABS With Stability Control

ADVANCED ABS WITH STABILITY CONTROL

Advanced ABS with Stability Control is a feature that reduces the risk of rollovers and other loss of control situations. For vehicles towing trailers, the feature can reduce the risk of a trailer jack-knifing. During operation, the system constantly compares performance models to the vehicle's actual movement. It uses the wheel speed sensors of the antilock brake system (ABS), and lateral, yaw, and steering angle sensors. If the vehicle begins to leave the appropriate travel path, the system intervenes to assist the driver.



Electronic Stability Control can reduce the vehicle speed automatically. To minimize unexpected deceleration and reduce the risk of a collision, the operator must:

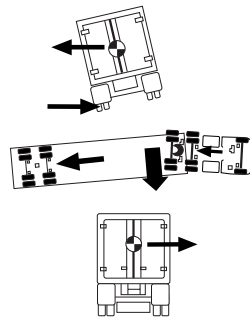
- Avoid aggressive driving maneuvers, such as sharp turns or abrupt lane changes at high speeds, which can trigger the stability system.
- Always operate the vehicle safely. Drive defensively, anticipate obstacles and pay attention to road, weather, and traffic conditions. ABS, ATC, and ESC stability systems are no substitute for prudent, careful driving.

ROLL STABILITY

A REAL WORLD EXAMPLE OF HOW THE SYSTEM OPERATES

Excessive speed for road conditions creates forces that exceed the threshold at which a vehicle is likely to roll over on a higher-friction surface. The system automatically reduces engine torque and applies the service brakes (based on the projected rollover risk) to reduce the vehicle speed, thereby reducing the tendency to roll over.

ROLL STABILITY EXAMPLE



YAW STABILITY

Yaw stability counteracts the tendency of a vehicle to spin about its vertical axis. During operation, if the friction between the road surface and the tires is not sufficient to oppose lateral (side) forces, one or more of the tires can slide, causing the truck/tractor to spin. These yaw events are referred to as either "under-steer" (where there is a lack of vehicle response to steering input due to tire slide on the steer axle) or "over-steer" (where the tractor's rear end slides out due to tire slide on the rear axle) situation. Generally, shorter wheelbase vehicles (tractors, for instance) have less natural yaw stability, while longer wheelbase

vehicles (straight trucks, for instance) have greater natural yaw stability. Factors that influence yaw stability are: wheelbase, suspension, steering geometry, weight distribution front to rear, and vehicle track width.

YAW CONTROL

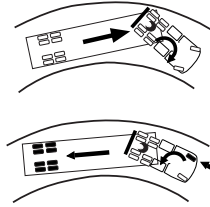
Yaw Control responds to a wide range of low- to high-friction surface scenarios including rollover, jackknife and loss of control. In the case of vehicle slide (over-steer or under-steer situations), the system will reduce the throttle and then brake one or more of the "four corners" of the vehicle (in addition to potentially applying the trailer brakes), thus applying a counter-force to better align the vehicle with an appropriate path of travel. For example, in an over-steer situation, the system applies the "outside" front brake; while in an under-steer condition, the "inside" rear brake is applied.

A REAL WORLD EXAMPLE OF HOW YAW CONTROL OPERATES

Excessive speed exceeds the threshold, creating a situation where a vehicle is likely to spin and, where applicable, jackknife. The system reduces engine throttle and

selectively applies brakes to reduce the vehicle speed, thereby reducing the tendency to jackknife.

YAW CONTROL EXAMPLE



AUTOMATIC TRACTION CONTROL



Your truck/tractor ABS has an automatic traction control (ATC) feature. This feature is controlled by a switch. This feature is monitored by a warning lamp located on the switch. The Traction Control warning lamp will briefly illuminate and then go out when the ignition switch is first turned on. The traction control warning lamp will illu-

minate whenever the ATC system detects drive wheel spin. The lamp will remain illuminated as long as wheel spin is detected and the ATC system is applying the drive wheel brakes or reducing engine torque. Engine torque or vehicle speed should be reduced to eliminate wheel spin and prevent excessive application of the ATC system.

Except for checking for proper illumination of the ABS and traction control warning lamps when first starting the vehicle, and for monitoring these lamps while driving, no special operating procedures are required. For detailed system description, see literature for your specific ABS that was provided with your vehicle.

This feature helps improve traction when vehicles are on slippery surfaces or surfaces with poor traction (for example, mud or snow) by reducing drive wheel overspin. Automatic traction control works automatically in two different ways:

- If a drive wheel starts to spin, Automatic Traction Control (ATC) applies air pressure to brake the wheel. This transfers engine torque to the wheels with better traction.
- If all drive wheels spin, reduces engine torque to provide improved traction.

turns itself ON and OFF. If drive wheels spin during acceleration, the warning lamp comes ON, indicating wheel spin control is active.

DEEP SNOW AND MUD SWITCH

A deep snow and mud switch is included with Automatic Traction Control (ATC). The Deep Snow and Mud feature is helpful during acceleration. This function increases available traction on extra soft surfaces like snow, mud, or gravel, by slightly increasing the permissible wheel spin. When this function is in use, the ATC Warning Lamp blinks continuously.

OFF-ROAD ABS FUNCTION SWITCH (OPTIONAL)

The vehicle can have a separate switch to activate an off-road ABS function. Do not use this function for on-highway driving. Its intended use is to improve stopping performance in off-highway conditions (for example, loose gravel and mud). The off-road ABS function works by allowing a "wedge" of material to build-up in front of locked wheels.

- Changes the ABS control limits to allow for a more aggressive ABS function while off-road.

- Improves vehicle control and helps reduce stopping distances in off-road conditions. This feature also works on poor traction surfaces such as loose gravel, sand, and dirt.
- Allows retarders to function independently of the ABS function.
- If the vehicle does not have an engine retarder, the Off- road ABS switch functions the same.



WARNING

Off-road mode can improve vehicle control and shorten stopping distances. However, steering ability can suffer during its use on certain surfaces due to the momentary sliding of tires. Always operate the vehicle at safe operating speeds. Failure to do so can cause you to lose control of the vehicle. Failure to comply can result in death, personal injury, equipment damage, or property damage.



WARNING

Never drive the vehicle on paved roads and highways with the off-road ABS function switched on. When you drive

the vehicle onto a paved road surface or highway, immediately turn off the off-road ABS switch. Failure to do so can cause the antilock brake system (ABS) to not function properly under 25 mph (40 km/h). Failure to comply may result in death, personal injury, equipment damage, or property damage.

The ABS lamp flashes slowly during off-road mode engagement. This action is to alert you of a modification to the ABS control software. At speeds above 25 mph (40 km/h), the ABS controller operates in the normal on-highway mode. At speeds between 10 mph and 25 mph (16 km/h and 40 km/h), the ABS control software allows short periods (0.25 seconds) of locked-wheel cycles. At speeds below 10 mph (16 km/h), the ABS control software switches off to allow locked wheels. When the off-road ABS function is active, the Retarder Disable output switches off. This action leaves the engine retarders to function without ABS intervention. For additional information, see the Off-Road ABS pamphlet in the vehicle's glove box.

EFFECTIVENESS AND LIMITATIONS

ESC is designed and optimized for trucks and for tractors that tow single trailers. If a tractor equipped with ESC is used to power multiple trailer combinations (known as "doubles" or "triples") the effectiveness of the ESC system may be greatly reduced.



WARNING

Exercise extreme care when towing doubles or triples with a vehicle equipped with electronic stability control (ESC). Excessive speed and aggressive maneuvers, such as sharp turns, sudden steering inputs, and abrupt lane changes should all be avoided as they could cause a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Additionally, the ESC stability system's effectiveness may be greatly reduced if:

- The load shifts due to improper retention, accident damage or the inherently mobile nature of some loads (for example, hanging meat, live animals or partially laden tankers).

- The vehicle has an unusually high or offset center of gravity (CG).
- One side of the vehicle drops off the pavement at an angle that is too large to be counteracted by a reduction in speed.
- The vehicle is used to haul double or triple trailer combinations.
- Very rapidly winding steering inputs are inputted at high speeds.
- There are mechanical problems with suspension leveling of the tractor or trailer resulting in uneven loads.
- The vehicle is maneuvering on a high banked road creating either additional side forces due to the weight (mass) of the vehicle or a deviation between expected and actual yaw rates.
- Gusty winds are strong enough to cause significant side forces on the vehicle and any towed vehicles.

To maximize the effectiveness of ESC:

- Loads must be properly secured and evenly distributed at all times.
- Drivers need to exercise extreme caution at all times, and avoid sharp turns, sudden steering inputs or abrupt lane changes at high speeds, particularly if:

- The vehicle hauls loads that could shift
- The vehicle or load has a high or offset center of gravity (CG) when loaded
- The vehicle tows doubles or triples

The ESC system was specifically calibrated and validated only for your vehicle's original factory-built configuration. If your vehicle's chassis components are altered (for example; a wheelbase extension or reduction, tag axle addition or removal, tractor to truck conversion or steering system component change) the ESC system must be disabled immediately by a qualified mechanic.



WARNING

Any modification to a vehicle with Electronic Stability Control (ESC) may result in a loss of vehicle control or non-compliance with Federal Motor Vehicle Safety Standards. Modifications include but are not limited to changes to the vehicle's axle weight ratings, number of axles, front and rear suspension, wheelbase length or frame, steering controls, or intended body type and size. A modified vehicle with ESC must be evalu-

ated by a qualified technician before it can be operated. Contact your authorized dealer for evaluations. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

For vehicles equipped with ESC (Electronic Stability Control) DO NOT replace the steering wheel with any model other than the one originally supplied. Use of an aftermarket wheel or wheel with a different part number could cause the ESC to malfunction, resulting in a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Whenever maintenance or repair work is performed to the steering mechanism, linkage, gear, adjustment of the wheel track, or if the steering angle sensor is replaced or the steering wheel is changed or re-centered, the Steering Angle Sensor must be re-calibrated.



WARNING

On chassis equipped with Electronic Stability Control (ESC), recalibrate the steering angle sensor when servicing, removing, or replacing any part of the steering system. The steering system includes, but is not limited to the wheels, steering column, tie rods, steering rack, and the steering angle sensor itself. The sensor should also be recalibrated in the event of airbag deployment. An uncalibrated steering angle sensor could result in a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

6.6 Towing Doubles or Triples Can Reduce the Effectiveness of Stability Systems

ESC works best for trucks, and for tractors that tow single trailers. If a tractor equipped with an ESC tows multiple trailer combinations (known as "doubles" or "triples"), it reduces the effectiveness of the ESC system.



WARNING

Exercise extreme care when towing doubles or triples with a vehicle equipped with electronic stability control (ESC). Excessive speed and aggressive maneuvers, such as sharp turns, sudden steering inputs, and abrupt lane changes should all be avoided as they could cause a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Additionally, a significant reduction of the ESC effectiveness occurs if:

- The load shifts due to improper retention. Also, accident damage or the inherently mobile nature of some loads (for example, hanging meat, live animals or partially laden tankers).
- The vehicle has an unusually high or offset Center of Gravity (CG).
- One side of the vehicle drops off the pavement at an angle that speed reduction cannot compensate for.
- You use the vehicle to haul double or triple trailer combinations.
- If you apply rapidly changing steering inputs at high speeds

- There are mechanical problems with suspension leveling of the tractor or trailer resulting in uneven loads.
- If the vehicle maneuvers on a high-banked road, this action creates additional side forces due to the weight (mass) of the vehicle. It can also cause a deviation between expected and actual yaw rates.
- Gusty winds are strong enough to cause significant side forces on the vehicle and any towed vehicles.

To maximize the effectiveness of ESC:

- Always properly secure, and evenly distribute the load.
- Drivers must exercise extreme caution always. Precautions must include: the avoidance of sharp turns, sudden steering inputs or abrupt lane changes at high speeds. This caution is important if:
 - The vehicle hauls loads that could shift
 - The vehicle or load has a high or offset Center of Gravity (CG) of when loaded
 - The vehicle tows doubles or triples

PACCAR tuned and validated the ESC system for the vehicle's original factory-built configuration only. It is possible to alter the vehicle's chassis components after purchase. Some examples include: a wheel-base extension or reduction, tag axle addition or removal, tractor to truck conversion or steering system change.

NOTE

If the vehicle configuration changes after purchase, the system calibration no longer applies. **The ESC system must be disabled immediately** by a qualified technician.

WARNING

Any modification to a vehicle with Electronic Stability Control (ESC) may result in a loss of vehicle control or non-compliance with Federal Motor Vehicle Safety Standards. Modifications include but are not limited to changes to the vehicle's axle weight ratings, number of axles, front and rear suspension, wheel-base length or frame, steering controls, or intended body type and size. A modified vehicle with ESC must be evaluated by a qualified technician before it

can be operated. Contact your authorized dealer for evaluations. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

For vehicles equipped with ESC (Electronic Stability Control) **DO NOT** replace the steering wheel with any model other than the one originally supplied. Use of an aftermarket wheel or wheel with a different part number could cause the ESC to malfunction, resulting in a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

When certain maintenance or repair work occurs, **the Steering Angle Sensor must be re calibrated**. Some maintenance actions that demand this are: adjustments of linkage, gear, or wheel track. Also when replacing the steering angle sensor, and when changing or re-centering the steering wheel.

**WARNING**

On chassis equipped with Electronic Stability Control (ESC), recalibrate the steering angle sensor when servicing, removing, or replacing any part of the steering system. The steering system includes, but is not limited to the wheels, steering column, tie rods, steering rack, and the steering angle sensor itself. The sensor should also be recalibrated in the event of airbag deployment. An uncalibrated steering angle sensor could result in a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

6.7 Retarders

Various retarders are available, which function against the engine, driveline, or transmission. These are devices that use the engine's power to slow down the vehicle. They reduce brake wear and tear and the need for continuous brake use, which can lead to the service brakes overheating. Ideally, you must always slow the vehicle with the retarder (where permitted by law)

and use the service brakes only for stopping completely. Operating this way prolongs the life of the brakes.

**WARNING**

The service brakes must be used in an emergency. Retarders alone (such as the engine brake, exhaust brake, transmission retarder, or regenerative braking) might not stop the vehicle fast enough to prevent an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

**WARNING**

DO NOT use a retarder (such as the engine brake, exhaust brake, transmission retarder, or regenerative braking) when operating on road surfaces with poor traction (such as wet, icy, or snow covered roads, or gravel). Retarders can cause the wheels to skid on a slippery surface. You could lose control of the vehicle or jackknife if the wheels begin to skid, resulting in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The intent of the retarder is NOT to use as the primary brake for the vehicle, nor is it an emergency brake. The retarder only helps the service brakes by using pressure to slow the drivetrain. Use the service brakes for quick stops. Do not use the retarder when operating on road surfaces with poor traction (such as wet, icy, or snow-covered roads or gravel). Retarders can cause the wheels to skid on a slippery surface.

PACCAR recommends not to use the engine retarder to slow down when you bobtail or pull an empty trailer.

**WARNING**

DO NOT use a retarder (such as the engine brake, exhaust brake, transmission retarder, or regenerative braking) when operating your vehicle bobtail or with an unloaded trailer. There may not be enough weight on the rear axle to provide traction, causing a loss of vehicle control, resulting in an accident. Make sure the engine brake is switched "OFF" when bobtailing or operating with an unloaded trailer. Failure to comply may result in death, personal injury, equipment damage, or property damage.

This vehicle can have a transmission retarder. Take your foot off the throttle. Then operate the retarder switch. When you do not need a full retarder effect, you can apply it intermittently (off and on) to cause gradual or partial slowing. Continuous application of the retarder causes the hydraulic fluid to get hotter. Intermittent application helps prevent overheating.



WARNING

DO NOT rely only on a retarder (such as the engine brake, exhaust brake, transmission retarder, or regenerative braking) to stop your vehicle. If your engine shuts down, the retarder will cease to operate. Always be ready to apply the service brakes. Failure to comply may result in death, personal injury, equipment damage, or property damage.

7 AXLE AND SUSPENSION

7.1 Differential Lock



The vehicle may be equipped with switches to lock the either of the rear axle differentials. Depending on how the vehicle is specified, a combination of individual switches may be available that can lock the interaxle driveline and/or any combination of the forward rear or rear-rear driving axles. The interaxle differential switch allows each axle to turn independently. In certain situations, engaging the interaxle differential lock relieves stress on the rear axles and reduces tire wear. Engaging this switch will also provide better traction in slippery or loose gravel conditions.

In the LOCK position, continuous operation on paved, dry surfaces, put stress on the axles, and can possibly damage the internal gears. The switch has a guard to prevent accidental operation of the switch.

Locking the differentials is typically used during ice or snow conditions and without tire chains, unpaved roads that have loose sand, mud or uneven surfaces. Look ahead

and predict when the differential needs to be locked. Stop the vehicle and lock the differentials before approaching.

While using the differential in the locked position, do not exceed 25 mph (40 km/h). When disengaging the differential lock, reduce the throttle to prevent drivetrain damage.

WARNING

DO NOT put the differential lock in the LOCK position while the wheels are spinning freely (slipping). You could lose control of the vehicle or cause axle damage. Switch to LOCK only when the wheels are not spinning. Failure to comply may result in death, personal injury, equipment damage, or property damage.

7.2 Dual Range (Two-Speed) Rear Axle

DUAL RANGE (TWO-SPEED) REAR AXLE



Your vehicle may be equipped with a two-speed or dual range axle (option). The low range provides maximum torque for hauling heavy loads or traveling over rough terrain. The high range is a faster ratio for highway speeds and general over-the-road conditions. A switch on the accessory switch panel controls the dual range rear axle. The switch has a guard to prevent accidental activation. Always park your vehicle with the range selector in LOW.

Important tips on operating a dual range axle with inter-axle differential:

- Shift the axle with the inter-axle differential in the unlocked position only.
- When you are driving with poor traction, lock the differential. When you have the differential locked, drive with the axle in LOW range only.

- When you are driving on a surface with good traction, keep the inter-axle differential unlocked. You can drive with the axle in the LOW or HIGH range.
- Always UNLOCK the inter-axle differential before shifting the axle speed range.

WARNING

DO NOT shift the axle when moving downhill. Engine driveline disengagement may occur, eliminating engine retardation and allowing the wheels to spin faster than the current speed of the engine. This may require severe braking to slow the vehicle down and can result in an accident. Failure to comply may result in death, personal injury, equipment or property damage.

CAUTION

Never shift the axle range with the differential locked. If you shift the axle range with the inter-axle differential in LOCK, you could seriously damage the axles. Failure to comply may result in equipment or property damage.

Proper shifting of the axle depends on the synchronization of engine/driveline and wheel speed. When you shift the axle, the connection between the engine and wheels is momentarily disengaged while the gearing is synchronized. Normally when the axle shifts the speed of the engine, axle, and wheels adjust, allowing for proper gear engagement.

When the vehicle is going downhill, the wheels tend to speed up, which makes gear synchronization almost impossible. As a result, the axle is neither in HIGH nor LOW range and all engine/driveline retardation is lost. Without engine retardation, it is more difficult to slow the vehicle down and greater stress is put on the brake system.

CAUTION

Shift the axle at slower travel speeds until you are used to driving with a dual range axle to avoid damaging your vehicle's axles. The inter-axle differential must be in the unlocked position before shifting the axle speed range. Failure to comply may result in equipment or property damage.

HOW TO OPERATE TWO-SPEED AXLE - LOW TO HIGH

These steps should be used if operating a two-speed axle in LOW range on rough terrain and preparing to drive on an improved surface.

When you go from rough terrain to highway driving, shift the axle to the HIGH range following this procedure:

1. Be sure the differential is UNLOCKED.
2. Maintain your vehicle speed (accelerator depressed) and move the Range Selector lever to HIGH.
3. Keep driving with the accelerator depressed until you want the axle to shift.
4. To make the axle shift, release the accelerator until the axle shifts. You are now in the HIGH axle range for highway speeds. Shift the transmission normally to reach your desired cruising speed.

HOW TO OPERATE TWO-SPEED AXLE - HIGH TO LOW

These steps should be used if operating a two-speed axle in HIGH range on improved

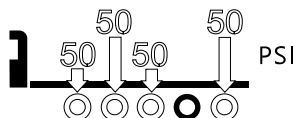
roads and preparing to drive on rough terrain.

When you go from highway driving to rough terrain, shift the axle to the LOW range following this procedure:

1. Maintain vehicle speed (accelerator depressed) and move the Range Selector lever to LOW.
2. Keep driving with the accelerator depressed until you want the axle to downshift.
3. To make the axle downshift, release and depress the accelerator quickly to increase the engine rpm. The axle will shift to LOW range.
4. You are now in the LOW axle range for rough terrain and heavy loads. Shift the transmission normally to maintain the desired speed.

7.3 Auxiliary Axle

AUXILIARY AXLE



Adjustable auxiliary axles (commonly known as Pusher or Tag axles) can add to the productivity of the vehicle by increasing the load capabilities of the vehicle when they are in the deployed (down) position. There are different configurations of axles with different functionality (liftable versus steerable). Some configurations are capable of showing a pressure and/or position graphic on the instrument cluster that looks like the picture above matched to the axles on the vehicle. Without the extra axle, the excessive weight can reduce the service life of vehicle components such as, but not limited to, the frame rail, axles, suspension and brakes.

Operation of the auxiliary axles includes the proper maintenance of the system and calibration of its controls. Operating the auxiliary axles will also require a firm understanding of the Gross Axle Weight Rating (GAWR) and the load that is being carried.

The vehicle will have switches on the dash to control the position of the auxiliary axles. In certain situations, however, the system will override the controls to protect the axle system. For Self Steering Lift Axles, the axle will raise when the park brakes are applied or if the vehicle is placed in reverse. For Non-Steer Lift Axles, the axle will only automatically raise if the park

brakes are applied and there are no park brakes on the lift axle. Non-Steer Lift Axles do not automatically raise when the vehicle is placed in reverse.

Operating the auxiliary liftable axles must be performed in a manner that does not exceed the axle creep rating. Axle creep ratings are weight and speed limits that are allowed while the vehicle is fully loaded (in excess of the vehicle's standard GAWR) and the axle is in its up position. Axle creep ratings are assigned by the axle manufacturer and are based on axle model and intended service of the vehicle. Contact an authorized dealership if you are unable to identify the axle creep rating of this vehicle.

- Liftable/steerable (axle lift calibration required)
- Liftable/non-steerable (axle lift calibration required)
- Non-liftable (some suspensions require dump valve calibration)



WARNING

If the vehicle is unladen or being unloaded, DO NOT operate or park the vehicle with its auxiliary axles in the down or loaded position unless those axles are equipped with (and are using)

parking brakes. This could result in a loss of vehicle control or roll-away. Raise auxiliary axles that lack park brakes prior to unloading the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

ADJUSTABLE LIFT AXLES

Vehicles with liftable AUX axles have knobs available to adjust the pressure in the AUX axle suspension. These knobs are in addition to the tag and pusher axle switches that control the axle position.

Adding more pressure to the AUX axle increases the pressure the (AUX) axle pushes down. Increasing pressure decreases load on the drive axles and decreases traction. Decreasing pressure transfers more weight to the drive axles and results in more traction from the drive axles.

Deflate the auxiliary (AUX) axle suspension before coupling or uncoupling a trailer. When initially coupled or uncoupled, increase pressure to balance traction and axle load requirements. Inflate air springs of the AUX axles to the desired pressure

after coupling to a loaded trailer. Make sure that you maintain proper traction of the drive-axles.

To obtain the desired traction, adjust the pressure regulator control knob to a lower pressure. By reducing air pressure at the pusher or tag axle, you can transfer the load to the drive axles. Do not overload drive axles.

Always deflate the air springs of the AUX axles before attempting to unload the vehicle. This action allows maximum traction of the driving axles to control the vehicle.

Calibrations can change depending on the suspension. Contact an authorized dealer or axle/suspension manufacturer for specific calibration procedures.

Some suspensions require dump valve calibration. For example, some dead axles do not lift. You can dump the air out of them to unload them when empty. You control air pressure via an adjustable regulator. Calibrate these axles for load.

Contact an authorized dealer or axle/suspension manufacturer for dump valve calibration procedures.

AXLE CREEP RATING

Vehicles outfitted with auxiliary axles and full truck configuration will have an axle creep rating which defines how much load

is allowed when the vehicle has a full load and maneuvering the vehicle, at very slow speeds, with auxiliary axles in the up position. In these situations, the load exceeds the gross axle weight rating of the axles.

Operators using vehicles equipped with liftable auxiliary axles must consider creep ratings when any liftable axle is unloaded or in the raised position. Liftable auxiliary axles should only be raised (or unloaded) to improve maneuverability in an off-road use or when vehicle is unloaded.

WARNING

Always calibrate lift axles to the correct pressure to carry the load. An incorrectly calibrated lift axle can result in an overloaded frame, increased braking distances, or a loss of traction and stability. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

DO NOT exceed Axle Creep ratings. Exceeding the creep ratings can damage the frame, suspension, and axles by overloading them. Failure to com-

ply may result in equipment or property damage.

CAUTION

Always lower the axles as soon as possible after receiving a load. Never exceed 5 mph (8 km/h) when driving with a load with the auxiliary axle(s) raised/unloaded. Not lowering the axle(s) can overload the frame and remaining axles. Failure to comply may result in equipment or property damage.

CAUTION

DO NOT modify the air system or control functionality on a factory installed auxiliary axle. Modifying the factory-intended operation of a pusher axle or tag axle will void the warranty and can cause damage. Failure to comply may result in equipment or property damage.

CAUTION

Repeat suspension calibration procedures when installing tires with a different loaded radius from tires on the other

drive, steer, or auxiliary axles. Installing tires with a different loaded radius can affect the load received by other axles. Failure to comply may result in equipment or property damage.

Contact your dealer or axle manufacturer to determine what the creep rating is for your particular axle(s) and configuration. Creep ratings are generally limited to the following:

- Tandem rear axles only
- Straight trucks only
- Maximum spring mount centers per axle manufacturers specifications
- Maximum tire static loaded radius (SLR) per axle manufacturers specifications

PUSHER OR TAG SUSPENSION CALIBRATION

Perform this procedure at or near a weight scale. Procedure can be performed while parked on the weight scale if scale is available. To obtain the desired axle load distribution, you must correlate the suspension air gauge pressure to the actual axle load by scaling the axle weight(s) and adjusting the pressure to obtain the desired load.

Once the desired load or load range is achieved, document the pressure-to-load ratio or setting for future use.

NOTE

This procedure must be performed prior to placing the vehicle into service.

Setting the Pressure-to-Load Ratio To obtain the desired axle load distribution, you must correlate the suspension air gauge pressure to the actual axle load by scaling the axle weight(s) and adjusting the pressure to obtain the desired load. Once the desired load or load range is achieved, document the pressure-to-load ratio or setting for future use.

These instructions are general in nature. For more specific instructions, review the pusher or tag suspension manufacturer's maintenance manual or contact the nearest authorized dealer.

1. Park the loaded vehicle on a level surface with the wheels blocked.
2. Release vehicles spring brakes. (Do not release for Lifiable/Non-Steerable pusher or tag axles)
3. Lower the pusher/tag axles with the **Axle Lift Control** flip valve. (For some non-lifiable axles, inflate air suspension)

4. Adjust the amount of load on each axle by turning the **Pressure Regulator** clockwise to increase the load, or counterclockwise to decrease the load. (The suspension manufacturer may publish pre-established Pressure-to-Load Ratio Pressure Settings to assist you in achieving an estimated ground load).
5. After setting the pressure to obtain the desired axle load, verify proper ground loading with the weight scale.

NOTE

Exceeding local, state, or federal weight limits may result in citations. Contact your local commercial weight enforcement office for limits in your area.

NOTE

Steerable-pusher and/or tag axle(s) will raise when the transmission is shifted into reverse or when the parking brake is applied.

7.4 Air Suspension Ride Height

AIR SUSPENSION RIDE HEIGHT

Vehicles equipped with rear or front air suspensions have their ride height and axle (pinion) angle(s) preset at the factory. These are precision settings and should not be altered. Incorrectly adjusted ride height may result in improper interaxle U-joint working angles. This can result in premature driveline wear and driveline vibration.

If it becomes necessary to reset the ride height, you may temporarily set it by following the next procedure. Proper ride height measurement and values are shown in the illustration and table below.

CAUTION

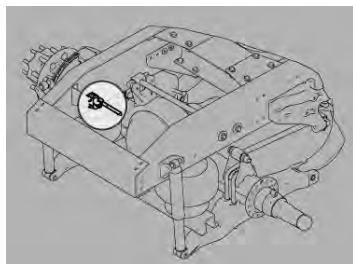
To avoid drive-line damage, adjust the suspension ride height only when improper inter-axle u-joint angles exist and immediately drive to the nearest authorized dealer or repair facility. The ride height and pinion angle should be reset using the proper technique and equipment. Failure to comply may result

in equipment damage or property damage.

i NOTE

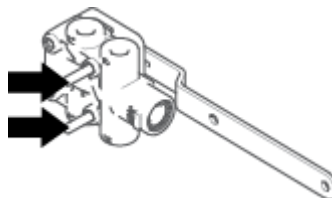
Suitable wheel chocks are at a minimum 18 in. (46 cm) long 4x4.

1. Park the vehicle, engage the parking brake and chock the wheels.
2. Locate the air suspension ride height valve.



3. Ensure that the tractor is fully laden during this procedure. Do not use these procedures on a vehicle that is not laden (bobtail).
4. Ensure the air supply and delivery plumbing of the height control valve is consistent with the following illustrations.

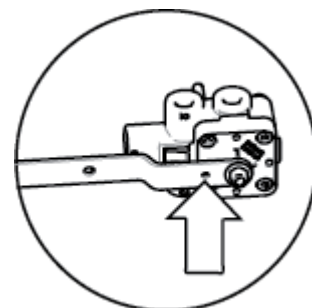
5. Loosen the fasteners mounting the height control valve to its bracket.



6. Rotate the valve either clockwise or counterclockwise until air pressure in the air springs provides the ride height specified for that suspension. Measure the ride height from the bottom of the frame rail to the approximate centerline of the rearmost drive axle hub:

- For tandem axles, make the vertical measurement at the centerline of the suspension.
- For a single axle, make the measurement in front of the axle, in the area forward of the tires but not past the suspension bracket.

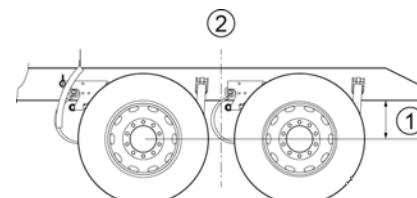
7. When at the correct ride height (Refer to Air Ride Height Data), place the height control valve lever in the neutral position, and install either the built-in alignment pin or a 1/8 in. (3 mm) dowel.



8. Torque the mounting fasteners to 55-75 lb-in. (6.2-8.5 N·m).
9. Remove the alignment pin or dowel.
10. Repeat Steps 2 through 6 above for the right-hand valve on vehicles with a dual-valve system.

AIR RIDE HEIGHT DATA

These are factory settings for ride height of the rear air suspension.



1. Ride height

2. Centerline of suspension

Single Axle	Laden Ride Height -in. (mm)
Air Trac	11.00 (279)
Low Air Leaf	6.50 (165)

Single Axle	Unladen Ride Height -in. (mm)
Air Trac	11.39 (289)
Low Air Leaf	6.75 (171)

Tandem Axle	Laden Ride Height -in. (mm)
Air Leaf	11.70 (297)
Air Trac	11.00 (279)
Low Air Leaf	8.50 (216)
Low Low Air Leaf	6.50 (165)
FLEX Air	8.50 (216)

Tandem Axle	Unladen Ride Height -in. (mm)
Air Leaf	12.0 (305)
Air Trac	11.38 (289)

Tandem Axle	Unladen Ride Height -in. (mm)
Low Air Leaf	8.75 (222)
Low Low Air Leaf	6.75 (171)
FLEX Air	8.75 (222)

7.5 What to do if an Air Spring Ruptures

If an air spring has ruptured, drive the vehicle to a safe stop off the highway to investigate the problem.



WARNING

DO NOT drive a vehicle with ruptured air springs. The air loss can cause the spring brakes to apply, dragging the brakes and burning up the linings. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT drive the vehicle if the air pressure is less than 100 psi (6.89 bar/689

kPa). Driving the vehicle with less than 100 psi (6.89 bar/689 kPa) could make the brakes unsafe to use which could result in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.



CAUTION

Operating a vehicle with air suspension bags either overinflated or underinflated may cause damage to driveline components. If a vehicle must be operated under such conditions, DO NOT exceed 5 mph (8 km/h). Failure to comply may result in equipment or property damage.

You can get to a repair facility by removing the height control link connected to the axle and to the suspension air valve control arm. This will cause the air valve control arm to center in the closed position. Removing the link will allow the air system of the vehicle to operate normally so that the vehicle can be driven to a service center.

7.6 Suspension Air Pressure Gauge & Switch



Your vehicle may have an air suspension and a deflation switch which allows the air in the suspension to be exhausted from a switch on the dash. The normal purpose of this feature is to lower the vehicle for loading. A guard on the switch prevents accidental deflation of the suspension.

The Suspension Air Pressure gauge (optional) indicates the amount of air pressure in the air suspension springs in pounds per square inch (psi). Air pressure in the spring is related to the rear axle load. The greater the rear axle load, the greater the air pressure in the air bags. Therefore, the air pressure displayed will vary, depending upon the rear axle load.

8 TRAILER OPERATIONS

8.1 How to Lock the Kingpin

Ensure that the fifth wheel lock is in the unlocked position.

WARNING

Always inspect the fifth wheel for proper locking after coupling the tractor to a trailer. Ensure the kingpin is engaged in a closed and locked jaw and that there is no gap between the fifth wheel top plate and the trailer upper-coupler plate. If these requirements are not met, the trailer may separate and cause an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

To lock the fifth wheel around the kingpin:

1. Ensure trailer brakes are locked and the landing gear is down.
2. Back the tractor fifth wheel into the trailer kingpin to engage and lock.

Figure 53: JOST Fifth Wheel Indication (Optional Indicator)



If equipped with JOST fifth wheel

3. Pull the tractor forward to ensure the kingpin has been locked in place.
4. Set the tractor parking brake.
5. Connect the tractor brake air and electric lines to the trailer.

Result:

Conduct a pre-trip inspection prior to releasing the brakes, raising the landing gear, and driving the vehicle.

8.2 Releasing the Kingpin Remotely (option)

CAUTION

DO NOT deflate the rear suspension before unlocking the fifth wheel. Deflating the rear suspension before unlocking the fifth wheel could cause difficulty during uncoupling and result in damage

to the fifth wheel and kingpin. Failure to comply may result in equipment or property damage.

1. Set both the vehicle and trailer parking brakes.
2. Lower the landing gear.
3. Disconnect the tractor brake air and electric lines from the trailer.
4. Flip up cover, then press and hold the **Kingpin Release** switch for 3 seconds. A countdown timer notification will appear on the display, and the unlock symbol on the **Kingpin Release** switch will illuminate.

The notification will inform the operator when to release the switch.

Figure 54: JOST Fifth Wheel Indication (option)



If equipped with JOST Fifth Wheel

NOTE

The fifth wheel will not unlock unless the vehicle is stopped and the parking brake is set. In this situation, a red-colored notification appears, informing the operator that kingpin release is not available and to set the parking brake. This will require restarting this procedure.

5. Release the switch.
The unlock symbol on the **Kingpin Release** switch will turn off.
6. Ease tractor forward enough for the kingpin to clear the fifth wheel (about 12 to 18 inches).

NOTE

DO NOT drive tractor free of trailer.

7. If the tractor has a rear air suspension, deflate (dump) the rear suspension enough so that the fifth wheel will smoothly separate from the trailer.

Figure 55: Suspension Dump Symbol



8. Ease tractor forward, clearing the trailer.
9. If the rear suspension was deflated, return rear suspension to its normal height.

8.3 Releasing the Kingpin Manually

CAUTION

DO NOT deflate the rear suspension before unlocking the fifth wheel. Deflating the rear suspension before unlocking the fifth wheel could cause difficulty during uncoupling and result in damage to the fifth wheel and kingpin. Failure to comply may result in equipment or property damage.

i NOTE

The specific method required to operate the fifth wheel release handle will depend on the fifth wheel manufacturer and model. The operator should be familiar with this method prior to attempting this procedure.

To release the kingpin and separate tractor from trailer

1. Position the tractor and trailer in a straight line on firm, level ground.
2. Set both the tractor and trailer parking brakes.
3. Exit cab and lower the trailer landing gear.
4. Disconnect brake air and electric lines from trailer, and secure lines.
5. Unlock the fifth wheel release handle if necessary, then unlock the fifth wheel.

i NOTE

Operating the release handle and unlocking the fifth wheel will depend on the fifth wheel manufacturer.

6. Return to cab and release tractor parking brake.
7. Ease tractor forward enough for the kingpin to clear the fifth wheel (about 12 to 18 inches).

i NOTE

DO NOT drive tractor free of trailer.

8. If the tractor has a rear air suspension, deflate (dump) the rear suspension enough so that the fifth wheel will smoothly separate from the trailer.

Figure 56: Suspension Dump Symbol



9. Ease tractor forward, clearing the trailer.
10. If the rear suspension was deflated, return rear suspension to its normal height.

8.4 Air-Controlled Sliding Fifth Wheel

AIR-CONTROLLED SLIDING FIFTH WHEEL



The Air-Controlled Sliding Fifth Wheel is an optional feature for these vehicles. These vehicles have a fifth wheel slider lock controlled by a switch on the accessory switch panel. To operate this type of lock, move the switch to the appropriate position. By placing the switch in the **UNLOCK** position, you can slide the fifth wheel to various positions to adjust weight distribution. There is a guard on this switch to protect you against accidentally activating or releasing the lock.

! WARNING

DO NOT move the fifth wheel while the tractor-trailer is in motion. Your load could shift suddenly, causing you to

lose control of the vehicle. Never operate the vehicle with the switch in the UNLOCK position. Always inspect the fifth wheel after you lock the switch to be sure the fifth wheel slide lock is engaged. Failure to comply may result in death, personal injury, equipment damage, or property damage.

HOW TO SLIDE THE FIFTH WHEEL



WARNING

DO NOT move the fifth wheel while the tractor-trailer is in motion. Your load could shift suddenly, causing you to lose control of the vehicle. Never operate the vehicle with the switch in the UNLOCK position. Always inspect the fifth wheel after you lock the switch to be sure the fifth wheel slide lock is engaged. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT attempt to slide the fifth wheel until all persons and obstacles are clear

of the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

This procedure assumes a connected trailer. The trailer kingpin must be locked within the fifth wheel when changing slide positions.

1. Position the tractor and trailer in a straight line on firm, level ground.
2. Place the tractor in neutral, and set the tractor and trailer parking brakes.
- 3.



CAUTION

Ensure the tractor and trailer brakes are engaged prior to sliding the fifth wheel. Not engaging the brakes could result in uncontrolled sliding of the fifth wheel and damage the tractor or trailer. Failure to comply may result in equipment or property damage.

Unlock the slide by repositioning the Fifth Wheel Slide switch.

Figure 57: Fifth Wheel Slide Symbol



4. Inspect and verify that locking plungers have fully withdrawn from the fifth wheel slide tracks.
 - a. If locking plungers did not fully withdraw, move tractor slightly to reposition plungers and reinspect.
 - b. If plungers are still not fully withdrawn, lower the landing gear and deflate the rear suspension (if available) to lessen pressure on the slide.

Figure 58: Suspension Dump Symbol



5. Release the tractor parking brake, but keep the trailer brake engaged.
6. Slowly ease tractor forward or backward, and stop at the desired position.

7. Lock the slide by returning the Fifth Wheel Slide switch to its previous position.
8. Inspect and verify that the locking plungers are fully inserted into the fifth wheel slide tracks.

a.



WARNING

DO NOT operate the vehicle unless the locking plungers are fully inserted into the fifth wheel slide track. Operating the vehicle while the plungers are not fully inserted could lead to the slide moving unexpectedly, resulting in a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

If the locking plungers are not fully inserted in the track, move the tractor slightly to reposition plungers and reinspect.

9. If the landing gear was lowered, raise the landing gear.
10. If the rear suspension was deflated, return rear suspension to its normal

height.

9 DRIVING TIPS AND TECHNIQUES

9.1 Driving Tips and Techniques

This section covers additional driving tips and techniques on how to drive your vehicle more efficiently.

Coasting



WARNING

DO NOT coast with the transmission in neutral or with the clutch pedal depressed, it is a dangerous practice. Coasting in neutral may damage your drivetrain when you try to re-engage the transmission and could result in a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Do not coast with the transmission in neutral or with the clutch pedal depressed. Besides being illegal and dangerous,

coasting is also expensive. It causes premature failure or damage to the clutch and transmission and overloads the brake system. Coasting with the transmission in neutral also prevents proper transmission component lubrication. During coasting the transmission is driven by the rear wheels, and the countershaft gear (which lubricates the transmission components by oil splash) will only be turning at idle speed.

Descending a Grade



WARNING

DO NOT frequently or continuously use the service brakes. Reduce speed before descending a long or steep grade, shift to a lower gear, and turn on the retarder. Frequent or continuous braking can overheat the brakes, reducing their effectiveness and increase vehicle stopping distance. This can lead to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Engine Overspeed**CAUTION**

DO NOT let the engine rpm operate beyond the maximum governing rpm. Operating the engine above the maximum governing rpm can result in engine damage. Failure to comply may result in equipment or property damage.

**NOTE**

Often these recommendations are secondary to maintaining an adequate and safe speed relative to the surrounding traffic and road conditions.

Operate the engine within the optimum engine rpm range and do not allow the rpm to exceed the maximum governed speed. See your Engine Operation and Maintenance manual for information regarding engine rpm. When the engine is used as a brake to control vehicle speed (e.g., while driving down a grade), do not allow the engine rpm to exceed maximum governed speed. Under normal load and road conditions operate the engine in the lower end of the range.

The tachometer is an instrument that aids in obtaining the best performance of the engine and manual transmission, serving as a guide for shifting gears. Refer to the Engine Operation and Maintenance manual for optimum engine rpm.

- If the engine rpm moves beyond the maximum governed speed, indicating an overspeed condition, apply the service brake or shift to a higher gear to bring engine rpm within the optimum speed range.
- When driving downhill: shift to a lower gear, use the engine brake (if so equipped), and use the service brake, keeping the engine speed below 2,100 rpm.

When the engine speed reaches its maximum governed speed, the injection pump governor cuts off fuel to the engine. However, the governor has no control over the engine rpm when it is being driven by the vehicle's transmission, for example, on steep downgrades. Apply service brakes or shift to a higher gear. Fuel economy and engine performance are also directly related to driving habits:

- The best results in trip time and fuel economy are obtained while driving the vehicle at a steady speed.

- Shift into higher or lower gears (or apply the service brake) to keep engine rpm near the lower end of the optimum operating range.
- Avoid rapid acceleration and braking.

Use of Digital Display**WARNING**

DO NOT look at a screen on the instrument cluster for long periods while driving. Vehicle screens should be referenced only briefly and should not be used as a substitute for observing actual road and traffic conditions. Failure to pay attention to the vehicle's road position or situation can lead to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The Digital Display provides information to help the driver optimize vehicle efficiency. See [Optimal Engine Speed Indicator](#) for more information. A driver will find the section describing Trip Information and the rpm detail useful.

Fuel Consumption

The vehicle's fuel consumption is connected to five important factors: maintenance, driving habits, general condition of the road, traffic conditions, and vehicle load.

Proper maintenance will keep the vehicle running like new even after long periods of use. The driver must perform the daily and weekly checks of the vehicle.

Maintenance factors affecting fuel consumption:

- Air and/or fuel filters partially clogged
- Engine valves out of adjustment
- Injection pump improperly synchronized
- Injection nozzles defective or uncalibrated
- Improperly inflated tires
- Wheel bearings improperly adjusted
- Clutch improperly adjusted or worn (slipping)
- Fuel leaks

Wrong driving habits must be corrected and the recommendations on economic driving should be followed. Driving factors affecting fuel consumption:

- Excessive speed and unnecessary fast

acceleration

- Long periods of idling
- Driving with foot resting on the (manual transmission) clutch pedal

General Condition

Other factors affecting fuel consumption are related to loads and the type of roads on which the vehicle operates. It is not always possible to choose the most adequate road, but the ideal road is the one that allows a steady speed in high gear, without requiring frequent braking and acceleration. The following general conditions can affect fuel consumption:

- Overload
- Unbalanced load
- Very high load
- Inadequate roads
- Traffic conditions

9.2 Optimal Engine Speed Indicator

The tachometer displays a green bar just below the most efficient engine speed for the vehicle.

The placement and size of this bar is dependent on the engine as installed at the factory. The driver's general goal should be to select a gear that keeps the tachometer needle positioned over the green light as much as possible during steady state driving. In addition to proper maintenance and good driving habits, this visual cue can help minimize the fuel consumption.

10 WHAT TO CONSIDER WHEN USING A SLEEPER BUNK

10.1 What to Consider when using a Sleeper Bunk

If your vehicle has an upper and lower bunk, the upper bunk can be folded up out of the way to provide you with more dressing area in the sleeper cab. The lower bunk has storage underneath it to stow your luggage and other belongings.

The upper bunk weight limit is 320 lb (145 kg).



WARNING

Always keep the lower bunk in its down (latched) position while the vehicle is moving. If left open, stored items could become loose during an accident and strike you. Before you move the vehicle, check to be sure the lower bunk is latched securely. Failure to comply may result in death or personal injury.



WARNING

Make sure the latch that holds the upper bunk in the folded position is working properly so the bunk will not fall open during vehicle operation. Pull on the bunk to make sure the bunk is latched securely. Failure to comply may result in death, personal injury, equipment or property damage.



WARNING

Always use the sleeper restraint when an individual is in the sleeper bunk while the vehicle is moving. In the event of an accident, an unrestrained occupant could be thrown from the bunk. Failure to comply may result in death,

personal injury, equipment damage, or property damage.



WARNING

Be sure no one ever rides in the upper bunk. That person could be thrown out in an accident and could be very seriously injured. DO NOT use the upper bunk while you are moving. Failure to comply may result in death, personal injury, equipment or property damage.

The sleeper restraint is stored in a compartment on the rear sleeper cab wall. Sleeper Bunks and Restraints, for more information on cab/seat restraint systems.



WARNING

Failure to properly use the sleeper restraint when an individual is located in the sleeper bunk and the vehicle is moving can result in death or personal injury.

To Lower Upper Bunk

Pull on the lanyard in the upper left corner of the bunk to release the bunk. This will free it from the anchored position and allow you to lower the bunk.

To Raise Upper Bunk

Fold the upper bunk up and push it against the retaining latch until you hear a click. Pull on the bunk to be sure it is latched securely.

10.2 Upper Bunk Ladder Considerations

If your vehicle is equipped with the upper bunk ladder, ensure that you follow the safety tips as detailed in How to Access the Upper Bunk.

11 STOPPING THE VEHICLE

11.1 Stopping the Vehicle

A hot engine stores a great amount of heat. It does not cool down immediately after you shut it off. Always cool your engine down before shutting it off. You will greatly increase its service life.

Idle the engine at 1,000 rpm for five minutes. Then low idle for 30 seconds before shutdown. This will allow circulating coolant and lubricating oil to carry away heat from the cylinder head, valves, pistons, cylinder liners, turbocharger, and bearings. This way you can prevent serious engine damage that may result from uneven cooling.

Turbocharger

This cooling-down practice is especially important on a turbocharged engine. The turbocharger contains bearings and seals that are subjected to hot exhaust gases. While the engine is operating, heat is carried away by circulating oil. If you stop the engine suddenly, the temperature of the turbocharger could rise as much as 100°F (55°C) above the temperature reached during operation. A sudden rise in temperature like this could cause the bearings to seize or the oil seals to loosen.

Refueling

Air space in your fuel tanks allows water to condense there. To prevent this condensation while you are stopped, fill your tanks to 95 percent of capacity. When refueling, add approximately the same amount to each fuel tank on vehicles with more than one tank.



WARNING

DO NOT carry additional fuel containers in your vehicle. Fuel containers, either empty or full, might leak, cause or feed a fire, or could possibly explode. Failure to comply may result in death, personal

injury, equipment damage, or property damage.



WARNING

DO NOT remove a fuel tank cap near sparks, flames, or smoking materials. Fuel in the presence of an ignition source could cause an explosion. A mixture of gasoline or alcohol with diesel fuel increases this risk of explosion. Use only the fuel or additives recommended for your engine. Failure to comply may result in death, personal injury, equipment damage, or property damage.



CAUTION

For diesel vehicles, use only Ultra Low Sulfur Diesel (ULSD) fuel as recommended by engine manufacturers. High-sulfur diesel fuel can damage the aftertreatment system and affect engine emissions, leading to non-compliance with emission regulations. Failure to comply may result in equipment or property damage.



NOTE

For more information on fuel specifications, consult the engine operator's manual.

If your vehicle is equipped with fuel shut off valves for the take-off and return lines, they are located on the fuel lines entering the top of the fuel tank. Fuel shut off valves for the fuel crossover line are on the bottom of the fuel tank, at the crossover line connection.

11.2 Long-Stop Parking



WARNING

When parking a vehicle, fully raise lift axles that are not equipped with a parking brake. If left in the down position, a lift axle not equipped with a parking brake could cause the parked vehicle to roll, resulting in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

When parking the vehicle for an extended stay at one location, observe the following

long-stop best practices to place the vehicle in a safe condition and keep the vehicle air system in good working order.

1.

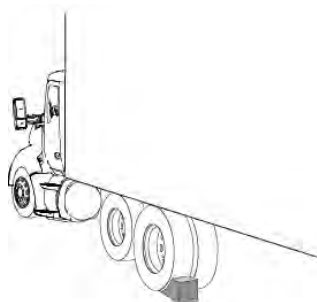


WARNING

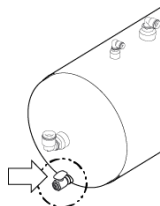
DO NOT rely on the service brake, trailer hand brake, or transmission gear to hold a parked vehicle. Loss of air pressure or engine compression may allow the vehicle to roll unexpectedly. Always set the parking brake to ensure the vehicle remains stationary. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Set the parking brake before leaving the driver's seat.

2. If you are parked on a steep grade, block the wheels.



3. Drain water from the air reservoirs. Open the reservoir drains just enough to drain the moisture. Do not deplete the entire air supply. Be sure to close the drains before leaving the vehicle.



4. Secure the vehicle. Close all the windows and lock all the doors.

CHAPTER 5: MAINTENANCE

1	New Vehicle Maintenance Schedule.....	236
2	Maintenance Schedule.....	240
3	Lubricants.....	271
4	Checking Oil Level.....	272
5	Air System.....	272
6	Brake System.....	279
7	Cab Maintenance.....	281
8	Cab Structure, Doors and Hoods.....	286
9	Safety Restraint System - Inspection.....	286
10	Cooling System Maintenance.....	289
11	Driver Assistance Maintenance.....	294
12	Electrical System.....	295
13	Engine Maintenance.....	303
14	Exterior Lighting.....	312
15	Frame.....	315
16	Fuel System.....	316
17	Front Axle and Suspension.....	317

18	Heater and Air Conditioner Maintenance.....	320
19	Noise and Emission Control.....	322
20	Rear Axle and Suspension.....	326
21	Steering System.....	328
22	Driveline.....	331
23	Tires.....	331
24	Wheels.....	334
25	Windshield Wiper/Washer.....	337
26	Transmission Maintenance.....	337
27	Hydraulic Clutch.....	337
28	Specification Reference Charts.....	338
29	Over-the-Air (OTA) Software Updates.....	347

1 NEW VEHICLE MAINTENANCE SCHEDULE

1.1 First Day

First Day
Perform a total vehicle alignment once a body is installed on the truck chassis.
Steering U-joint Pinch Bolt Refer to <u>Steering Shaft Bolt Torque Specifications</u> for maintenance instructions.
Front Suspension - U-bolts Check the general condition and the tightness of the nuts. Tighten the U-bolts using a calibrated torque wrench to the specified torque value. (Refer to <u>Suspension U-Bolts, Grade 8</u> for maintenance instructions.)
Front Suspension - SOFTEK™ NXT (Hendrickson) - Shock Absorbers Refer to the Hendrickson manual provided with your vehicle for more information.
Front Suspension - SOFTEK™ NXT (Hendrickson) - Spring Pins and Shackles Refer to the Hendrickson manual provided with your vehicle for more information.
Front Suspension - SOFTEK™ NXT (Hendrickson) - Ride Height Refer to the Hendrickson manual provided with your vehicle.
Front Axle - SOFTEK™ NXT (Hendrickson) - Axle Clamp Through Bolts Refer to the Hendrickson manual provided with your vehicle.

1.2 First 50-100 mi / 80-160 km

First 50-100 mi / 80-160 km ¹
Wheel Mounting Refer to <u>Wheels</u> for maintenance instructions.

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

1.3 First 500 mi / 800 km

First 500 mi / 800 km ¹
Front Axle U-Bolt Torque Refer to for maintenance instructions.
Charge Air Cooler and Air Intake Pipe Clamps Retorque fasteners. Refer to <u>Pipe and Hose Clamp Torque Values</u> for maintenance instructions.

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

1.4 First 2,000 mi / 3,218 km

First 2,000 mi / 3,218 km ¹
Rear Suspension Fasteners Refer to <u>Rear Axle and Suspension</u> for maintenance instructions.

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

1.5 First 3,000-5,000 mi / 4,800-8,000 km

First 3,000-5,000 mi / 4,800-8,000 km ¹
Transmission Lubrication
• Refer to Transmission Operator's Manual for maintenance instructions.
Axle Lubrication.
• For Meritor axle, refer to the Meritor manual provided with your vehicle for maintenance instructions. • For Eaton/Dana axle, refer to the Eaton/Dana manual provided with your vehicle for maintenance instructions.

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

2 MAINTENANCE SCHEDULE

2.1 Maintenance Schedule

Preventive maintenance program begins with the daily and weekly routine checks 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

Turn off the vehicle and allow it to cool before working near engine or exhaust components. Hot vehicle fluids and components can burn skin on contact. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

If the engine must be running to inspect, be alert and cautious around the engine at all times. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

If work must be done with the engine running, always:

- Ensure that the transmission is in neutral (**N**) or park (**P**)
- Set the parking brake
- Block the wheels

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

WARNING

DO NOT wear loose-fitting or torn clothing, jewelry or accessories, or loose hairstyles. Loose or dangling materials can get caught in fan blades or other moving parts. Failure to comply may

result in death, personal injury, equipment damage, or property damage.

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, personal injury, equipment damage, or property damage.

WARNING

When working underneath the vehicle with the wheels on the ground (not supported), make sure that:

- The vehicle is on hard, level ground.
- The parking brake is applied.
- All wheels are blocked (front and rear).
- The start switch key is removed to prevent the vehicle from starting.

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



WARNING

Never start or let the engine run in an enclosed, unventilated area. Engine exhaust fumes contain carbon monoxide, a colorless and odorless gas. Carbon monoxide can be fatal if inhaled. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Disconnect the battery ground cable whenever you work on the fuel system or the electrical system. When you work around fuel, DO NOT smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher near to you. Failure to comply may result in death, personal injury, equipment damage, 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.

- Engine lubricating oil change intervals are not listed here. Refer to your engine’s operating manual for recommendations. For specific information on maintenance procedures consult your vehicle maintenance manual.
- The initial fill of drive axle lubricant

must be changed before the end of the first scheduled maintenance interval. See the axle manufacturer’s operator’s manual for recommended lubrication specifications and service intervals.

- The initial fill of lubricant in manual transmissions must be changed before the end of the first maintenance interval. See the transmission manufacturer’s operator’s manual for recommended lubrication specifications and service intervals.
- If your vehicle is equipped with an automatic transmission, consult the owner’s manual for it that came with your vehicle to obtain lubricant check and change intervals.

2.2 At first 15,000 mi / 24,000 km or at first PM

At first 15,000 mi / 24,000 km or at first PM ¹
Front Suspension U-bolts • (ON HIGHWAY) Check the general condition and the tightness of the nuts. Tighten the nuts to the specified torque value as required; (Refer to <u>Suspension U-Bolts, Grade 8</u> for maintenance instructions.) • (VOCATIONAL) Check the general condition and the tightness of the nuts. Tighten the U- bolts after the first day or two of operation. Then tighten the nuts to the specified torque value as required; (Refer to <u>Suspension U-Bolts, Grade 8</u> for maintenance instructions.)
Drive Axle (SISU) - Axle Housing • Refer to the SISU manual provided with your vehicle.
Rear Suspension - U-bolts • Check the torque. Tighten to specified torque value as required.(Refer to <u>Suspension U-Bolts, Grade 8</u> for maintenance instructions.)
Rear Suspension - Mounting Brackets and Fasteners • Check the condition and the fastener torque. Tighten to the specified torque value as required; (Refer to <u>Rear Axle and Suspension</u> for maintenance instructions.)
Main and Auxiliary Transmission - Main and Auxiliary Transmission and Transfer Case • Inspect for visible damage, signs of overheating, and leaks. (Refer to <u>Transmission Maintenance</u> for maintenance instructions.)
Main and Auxiliary Transmission - Main and Auxiliary Transmission (OFF HIGHWAY) • Drain lubricant while warm. Flush each unit with clean flushing oil. (Refer to <u>Transmission Maintenance</u> for maintenance instructions.)

At first 15,000 mi / 24,000 km or at first PM ¹
Auxiliary Transmission - Cotta Transfer Case TR2205 Fabco Transfer Case TC142/TC143/ TC170/ TC270 Marmon-Harrington Transfer Case MVG2000/ MVG2000SD Refer to the Cotta, Fabco, or Marmon-Harrington manual provided with your vehicle.
Cooling - Hoses Check the radiator and heater hoses for leaks. (Refer to <u>Cooling System Maintenance</u> for maintenance instructions.)
Cooling - Fan Clutch Check for air leaks. Check the fan drive bearings (turn the sheave in both directions to check for worn hub bearings.)(Refer to <u>Engine Fan</u> for maintenance instructions.)
Cooling - Solenoid Valve Check the fan drive for proper engagement and disengagement. (Refer to <u>Engine Fan</u> for maintenance instructions.)
Power Steering - Reservoir (ON HIGHWAY) Drain, replace the filter, and refill; (Refer to <u>Check Power Steering Fluid Level</u> for maintenance instructions.)
Power Steering - Reservoir (OFF HIGHWAY) Drain, replace the filter, and refill. (Refer to <u>Check Power Steering Fluid Level</u> for maintenance instructions.)
Steering Components - Drag link Castle Nut and Ball Stud Check the torque: tighten to specified torque value as required. (Refer to <u>Steering System</u> for maintenance instructions.)
Steering Components - Pitman Arm Clamp Bolt and Nut Check the torque: tighten to specified torque value as required. (Refer to <u>Steering System</u> for maintenance instructions.)
Steering Components - Steering Intermediate Shaft Check the torque on the pinch bolt and nut. (Refer to <u>Steering Shaft Bolt Torque Specifications</u> for maintenance instructions.)

At first 15,000 mi / 24,000 km or at first PM ¹
Steering Components - Steering Intermediate Shaft U-joints (ON HIGHWAY)
Lubricate [Chevron Delo EP NLGI-2 grease or equivalent]. (Refer to Steering System for maintenance instructions.)
Steering Components - Steering Intermediate Shaft U-joints (OFF HIGHWAY or CITY DELIVERY)
Lubricate [Chevron Delo EP NLGI-2 grease or equivalent]. (Refer to Steering System for maintenance instructions.)
Steering Components - Drag Link and Tie Rod Arm Ball Sockets (ON HIGHWAY, OFF HIGHWAY or CITY DELIVERY)
Lubricate (Chevron Delo EP NLGI-2 grease or equivalent.) (Refer to Steering System for maintenance instructions.)
Fuel and Tanks - Fuel Tank Straps
Check the strap tightness: tighten to proper torque value as required; aluminum tank - 30 lb-ft (41 N·m) cylindrical steel tank - 8 lb-ft (11 N·m.) (Refer to Fuel Tank for maintenance instructions.)
Driveshafts - Models SPL-90, 1710 and 1810 Slip Member and U-joints
Lubricate*
Driveshafts - Models SPL- 140/140HD/170/170HD/250/250HD Slip Members and U- joints (OFF HIGHWAY)
Lubricate*
Electrical and Lights - Fuel and Diesel Exhaust Fluid Tank Sending Unit
Check the mounting screws and electrical connections for worn or damaged wires and connectors.

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

² Use only Spicer Driveshaft approved lubricants when greasing Spicer U-joints.

2.3 Component Specific Intervals

These maintenance tasks should be reviewed at each maintenance interval. They are not specific to one interval.

Component Specific Intervals¹
Drive Axle (Dana) - Axle Housing Refer to the Dana manual provided with your vehicle.
Drive Axle (Meritor Line Haul / ON HIGHWAY) Refer to the Meritor manual provided with your vehicle.
Drive Axle (Meritor City Delivery / OFF HIGHWAY) Refer to the Meritor manual provided with your vehicle.
Front Axle - Vocational (PACCAR) - Kingpin Bushings, Thrust Bearings, and Tie Rod Ball Ends (OFF-HIGHWAY) Lubricate with approved grease. Weekly regardless of mileage. (Refer to Front Axle and Suspension for maintenance instructions.)
Front Axle - Vocational (PACCAR) - Steering Knuckle Spindles, Thrust Bearings, Kingpins, Drawkeys, Tie Rod Ends, Steering Stops, and Bushings (OFF-HIGHWAY) Inspect for wear and damage and for endplay. Shim or replace as required. Weekly regardless of mileage. (Refer to Front Axle and Suspension for maintenance instructions.)
PACCAR TX-12/TX-18 transmission series (Only) - Lubrication (OFF-HIGHWAY) - Perform maintenance on the air dryer - (Refer to Air Dryer Maintenance for maintenance instructions.) - Drain lubricant while warm. Flush each unit with clean flushing oil. (Refer to Transmission Maintenance for maintenance instructions.)
Eaton Endurant Transmission (Only) - Lubrication (OFF-HIGHWAY) Refer to the Eaton manual provided with your vehicle.
Air Intake - Air filter Replace the engine intake air filter element. Every 12 months or when required by air restriction indicator or required by the engine manufacturers operator manual. (Refer to Air Intake System for maintenance instructions.)

Component Specific Intervals ¹
Clutch - Clutch Hydraulic Fluid Replace fluid and bleed system. 240,000 mi (384,000 km) or 2 years, whichever occurs first. (Refer to Hydraulic Clutch for maintenance instructions.)
Tires and Wheels - Tires Check inflation pressure. Weekly "cold" using calibrated gauge. (Refer to Tires for maintenance instructions.)
Driveshafts - Models SPL-90, 1710 and 1810 slip member and U-joints Inspect. U-joint inspections should be performed every time a vehicle comes in for scheduled maintenance.
Driveshafts - Models SPL-100 slip member and U-joints Inspect. U-joint inspections should be performed every time a vehicle comes in for scheduled maintenance.
Driveshafts - Models SPL-140/140HD/170/170HD/250/250HD slip members and U-joints (ON HIGHWAY and LINEHAUL) Inspect. U-joint inspections should be performed every time a vehicle comes in for scheduled maintenance.
Driveshafts - Models SPL-140XL/170XL/250XL slip members and U-joints (OFF HIGHWAY) Lubricate.² 350,000 mi (560,000 km) 1st interval and then every 100,000 mi (160,00 km) after that.
Driveshafts - Models SPL-140XL/170XL/250XL slip members and U-joints (ON HIGHWAY and LINE HAUL) Inspect. U-joint inspections should be performed every time a vehicle comes in for scheduled maintenance.
Driveshafts - Models SPL-140XL/170XL/ 250XL slip members and U-joints (OFF HIGHWAY and CITY) Inspect. U-joint inspections should be performed every time a vehicle comes in for scheduled maintenance.
Aftertreatment System - Diesel particulate filter Clean filter. Refer to the Engine Maintenance Manual.

Component Specific Intervals¹
Aftertreatment System - Diesel exhaust fluid supply module Replace filter. Refer to the Engine Maintenance Manual.
Air - Air dryer (ON HIGHWAY) 360,000 miles/576,000 km (Refer to Air Dryer Maintenance for maintenance instructions.)
Engine - Basic Engine Maintenance and service interval recommendations are detailed in the engine manufacturer's manual included with the vehicle. The engine manufacturer's recommendations vary depending engine model. Information is also available from authorized dealers, the engine manufacturer's authorized service centers, and the engine manufacturer's web site.
Safety - Three-point Seat Belt System Inspect. 20,000 miles/32,000km If the vehicle is exposed to severe environmental or working conditions, more frequent inspections may be necessary. (Refer to Safety Restraint System - Inspection for maintenance instructions.)

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

² Use only Spicer Driveshaft approved lubricants when greasing Spicer U-joints.

2.4 Every 15,000 mi / 24,000 km / Monthly

Every 15,000 mi / 24,000 km / Monthly¹
Frame - Fifth Wheel Check the kingpin lock and plate for wear and function: lubricate (NLGI #2 grease.) (Refer to Fifth Wheel Monthly Maintenance for maintenance instructions.)
Front Axle - SOFTEK™ NXT (Hendrickson) - Kingpin Bearings (OFF HIGHWAY or CITY DELIVERY) Refer to the Hendrickson manual provided with your vehicle.

Every 15,000 mi / 24,000 km / Monthly ¹
Front Suspension - Spring Pins Check for proper function. (Refer to <u>Front Axle and Suspension</u> for maintenance instructions.)
Front Suspension - U-bolts (OFF HIGHWAY) Check the general condition and the tightness of the nuts. Tighten the U- bolts after the first day or two of operation. Then tighten the nuts to the specified torque value as required. (Refer to <u>Suspension U-Bolts, Grade 8</u> for maintenance instructions.)
Front Suspension - SOFTEK™ NXT (Hendrickson) - Leaf Spring Bushing Threaded (optional) (LINE HAUL, CITY DELIVERY and OFF HIGHWAY) Refer to the Hendrickson manual provided with your vehicle.
Drive Axle - Vocational (PACCAR) - Axle Assembly - Check oil level - Visually inspect for damage or leaks.
Drive Axle - Vocational (PACCAR) - Breather Check the operation. If the cap doesn't rotate freely, replace.
Drive Axle (Meritor City Delivery / OFF HIGHWAY) - Axle Housing Refer to the Meritor manual provided with your vehicle.
Drive Axle (Meritor City Delivery / OFF HIGHWAY) - Breather Refer to the Meritor manual provided with your vehicle.
Drum Brakes (All) - Slack Adjusters - Check the push rod travel and check the control arm for cracks. Adjust at reline. (Refer to <u>Auto Slack Adjuster</u> for maintenance instructions.) - Lubricate (NLGI #2 grease.)