OPERATOR'S MANUAL

Peterbilt

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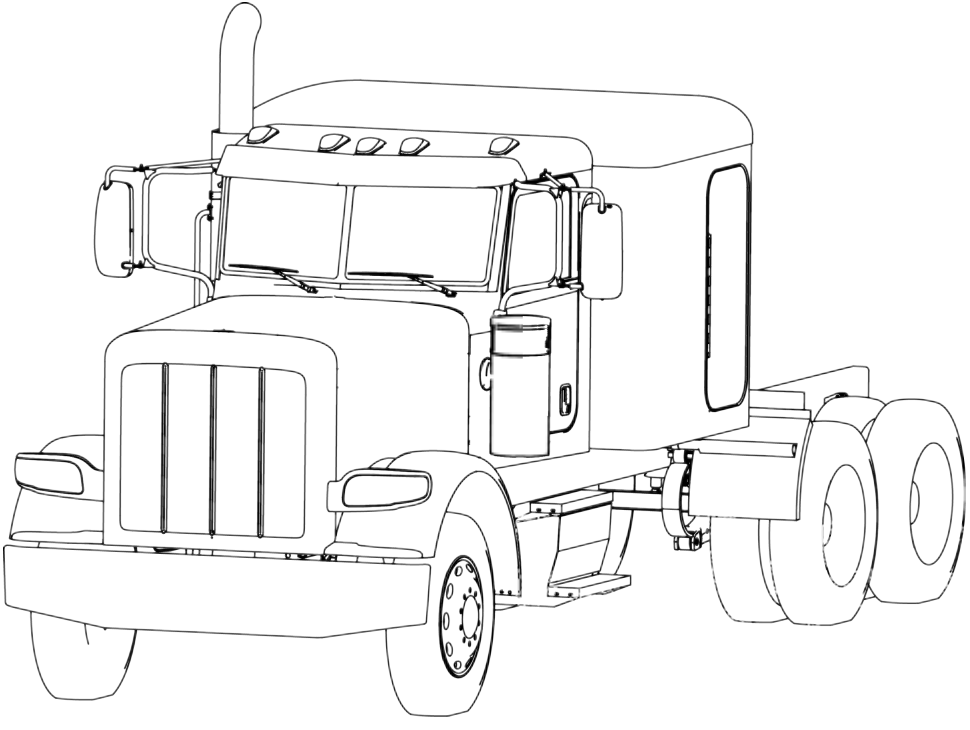

INTRODUCTION

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INTRODUCTION

How to use this Manual

This manual contains useful information for the safe and efficient operation of your Peterbilt vehicle. It also provides information on maintaining your vehicle in the best condition, with an outline for performing safety checks and basic preventive maintenance inspections.

We have tried to present the information you'll need to learn about your vehicle's functions, controls, and operation—and to present it as clearly as possible. We hope you'll find this manual easy to use.

There will be times when you need to take this manual out of your Peterbilt. When you do, please be sure to return it to the cab when you are finished using it. That way it will be there when you need it the next time or when you pass the vehicle on to the next user.

How to Find What You Want

There are several tools built into this manual to help you find what you need quickly and easily.

First is the **Quick Table of Contents**. Located at the front of the manual, this lists the main subjects covered and gives section numbers where you can find these subjects. Use the Quick Table of Contents to find information on a large subject like "Maintenance."

Cross-referenced citations also help you get the information you need. If some other part of the manual contains further information on the subject you are reading about, we'll indicate that in a cross-reference like this: (See Driver's Check List on page 1-34). You won't have to go searching for more information.

Finally you'll find a helpful **Subject Index**. It's in the back of the manual

and alphabetically lists the subjects covered. So if you want information on brakes, for example, just look under Brake in the Subject Index. You'll find all the pages listed where brakes or braking are discussed.

Safety Alerts

Please read and follow all of the safety alerts contained in this manual. They are there for your protection and information. These alerts can help you avoid injury to yourself, your passengers, and help prevent costly damage to the vehicle. Safety alerts are highlighted by safety alert symbols and signal words such as "WARNING", "CAUTION", or "NOTE". Please do not ignore any of these alerts.

WARNING

⚠	**WARNING!**

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

Example:

⚠ WARNING!
Do not carry additional fuel containers in your vehicle. Fuel containers, either full or empty, may leak, explode, and cause or feed a fire. Do not carry extra fuel containers. Even empty ones are dangerous. Failure to comply may result in death or personal injury.

CAUTION

⚠ CAUTION

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

Example:

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

NOTE

i NOTE

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

Example:

i NOTE
Pumping the accelerator will not assist in starting the engine.

Vehicle Safety

⚠ WARNING!

Do not drink alcohol and drive. Your reflexes, perceptions, and judgment can be affected by even a small amount of alcohol. You could have a serious or even fatal accident, if you drive after drinking. Please do not drink and drive or ride with a driver who has been drinking. Failure to comply may result in death, personal injury, equipment 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 or property damage.

Make sure your vehicle is in top working condition before heading out on the road, it is the responsible driver's duty to do so. Inspect the vehicle according to the Driver's Check List beginning on page 1-34.

Every new vehicle is designed to conform to all Federal Motor Vehicle Safety Standards applicable at the time of manufacture. Even with these safety features, continued safe and reliable operation depends greatly upon regular vehicle maintenance. Follow the maintenance recommendations found in the *Maintenance and Consumer Information Manual*. This will help preserve your investment.

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.

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

Be aware of local regulations that may prohibit the use of cellular telephones while driving. In addition to being an unsafe practice, it may be against local or federal ordinances to use cellular devices while operating the vehicle.

This manual is not a training manual. It cannot tell you everything you need to know about driving your vehicle. For that you need a good 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.

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.
- 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.

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
  – or –
- www.dmv.ca.gov

Environmental Protection

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. 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.

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. Contact your local government agency for information concerning proper disposal.

A Special Word About Repairs

WARNING!

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

Your dealer's service center is the best place to have your vehicle repaired. You can find dealers all over the country with the equipment and trained personnel to get you back on the road quickly—and keep you there.

Your vehicle is a complex machine. Anyone attempting repairs on it needs good mechanical training and the proper tools. If you are sure you have these requirements, then you can probably perform some repairs yourself. However, all warranty repairs

must be performed by an authorized service facility. If you aren't an experienced mechanic, or don't have the right equipment, please leave all repairs to an authorized service facility. They are the ones equipped to do the job safely and correctly.

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

Final Chassis Bill of Material. A complete, non-illustrated computer printout listing of the parts used to custom-build your vehicle is available through the dealer from whom you purchased your vehicle.

WARNING!

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

Additional Sources of Information

Installed Equipment - Operator's Manuals

Major component suppliers also supply operation manuals specific to their products. Additional manuals and other pieces of literature are included in the glove box literature package. Look for information on products such as the engine, driver's seat, transmission, axles, wheels, tires, ABS/ESC (if applicable), radio, 5th wheel, lane departure and adaptive cruise control. If you are missing these pieces of literature, ask your Dealer for copies.

Other Sources

Another place to learn more about trucking is from local truck driving schools. Contact one near you to learn about courses they offer.

Federal and state agencies such as the department of licensing also have information. The Interstate Commerce Commission can give you information about regulations governing transportation across state lines.

CAB AND FRAME ACCESS

Safety

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 or personal injury.

Be careful whenever you get into or out of your vehicle's cab. Always maintain at least three points of contact with your hands on the grab handles and your feet on the steps.

WARNING!

Jumping out of the cab or getting into the cab without proper caution is dangerous. You could slip and fall, which could lead to death or personal injury. Keep steps clean. Clean any fuel, oil, or grease off of the steps before entering the cab. Use the steps 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 vehicle when entering or exiting the cab and look where you are going.

The following picture shows the best way to enter and exit a Conventional Cab.

Door Lock and Keys

Door Lock

Doors can be locked from the inside by using the lock button. Close the door then push the button down to lock. Doors automatically unlock when you open them from inside, and can be locked from the outside with the key or the optional remote keyless entry key fob.

WARNING!

To reduce the chance of death or personal injury, always lock the doors while driving. Along with using the lap shoulder belts properly, locking the doors helps prevent doors from inadvertently opening and occupants from being ejected from the vehicle.

To lock or unlock the doors from outside the cab, insert the key in the lock. Turn the key toward the rear to lock; forward to unlock.

Keys

The same key fits your ignition, doors, and sleeper luggage compartment.

Frame-mounted tool box locks and locking fuel tank caps each have individual keys.

Remote Keyless Entry (RKE) (Optional)

This vehicle may be equipped with a Remote Keyless Entry (RKE) system that adds security and convenience to your vehicle. The system will lock or unlock the driver's door and passenger's door with the key fob and 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 expressively 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.

Operation
To Unlock the Driver's Door

Press the UNLOCK button once. The driver's door will unlock and the parking lights will come on for 40 seconds.

To Unlock the Passenger's Door

Press the UNLOCK button once and press again within 5 seconds. The passenger door will unlock.

To Lock All Doors

Press the LOCK button. The doors will lock and the parking lights will come on for 2 seconds. If the doors are open they will not lock. The range of the RKE system should be approximately 30 ft. This will be reduced if it is operated close to other RF sources such as TV/radio transmitters and cell towers.

Batteries

The key fob uses one CR2032, 3V battery. Batteries should last approximately three years, depending on use. Consistently reduced range is an indicator that the battery needs replacement. Batteries are available at most discount, hardware, and drug stores.

The battery can be accessed by removing the cover of the key fob. After a new battery is installed, the key fob must be synchronized with the vehicle.

Synchronization

The key fob may need to be synchronized to the truck when the battery is replaced or when the key fob has not been used for an extended period of time.

To Synchronize A Key Fob:

1. Hold the key fob near the receiver which is located behind the speedometer and tachometer.
2. Press and hold both the Lock and Unlock buttons at the same time for approximately 7 seconds.
3. When the key fob is resynchronized, the doors will lock then immediately unlock.
4. If the fob fails to synchronize, it could be programmed to a different truck or could have failed. Contact your dealer to re-program your key fob.

Climbing onto the Deck Plate

WARNING!

When you are climbing onto and off the deck plate, 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 or personal injury.

WARNING!

When stepping onto a surface to enter the cab or access the deck plate, only use the steps and grab handles installed and designed for that purpose. Failure to use the proper steps and grabhandles could cause a fall which may result in death or personal injury.

WARNING!

Keep steps clean. Clean any fuel, oil, or grease off the steps before entering the cab or accessing the deck plate. Stepping on a slippery surface can cause a fall which may result in death or personal injury.

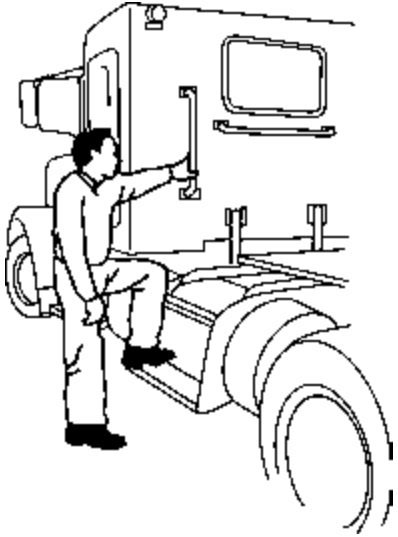
WARNING!

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 or personal injury.

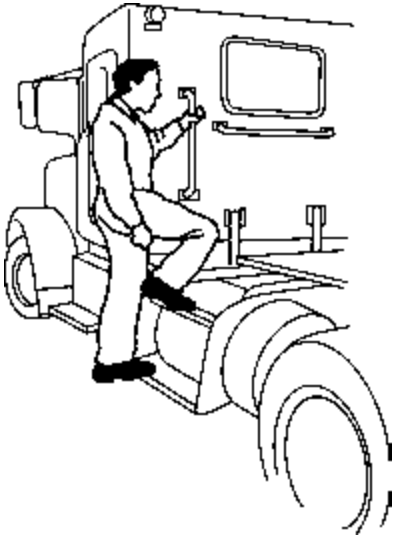
NOTE

Any alteration (adding bulkheads, headache racks, tool boxes, etc.) behind the cab that affects the utilization of installed grab handles, deck plates, or frame access steps should comply with Federal Motor Carrier Safety Regulation 399.

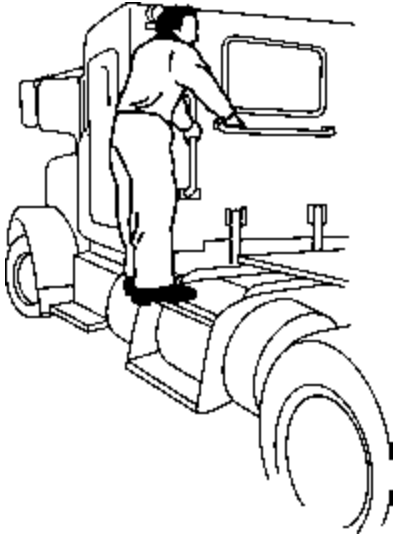
The following pictures show you the right way to get on and off the area behind your cab.



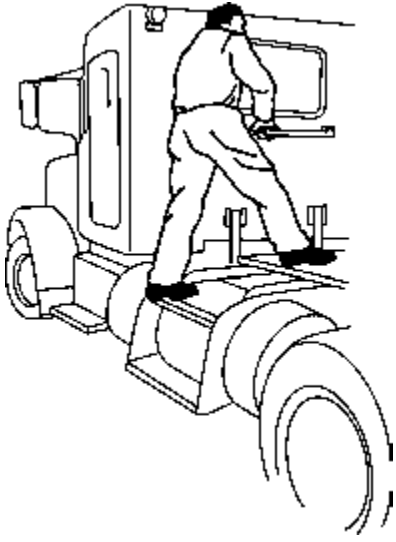
Hold handles as you step up.



Maintain three points of contact.



Maintain three points of contact as you reach the deck area.



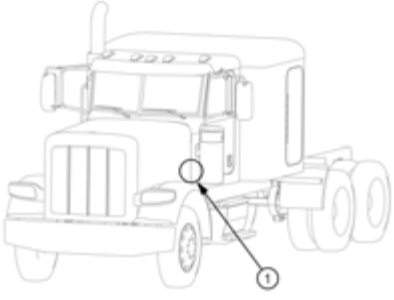
Maintain three points of contact as you step to deckplate.

GETTING TO YOUR ENGINE

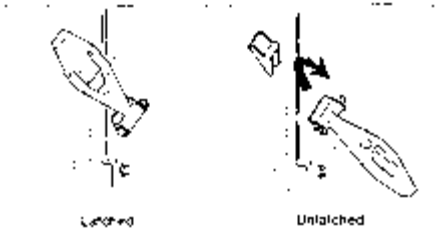
Hood Hold Downs

Hood hold downs keep a hood from opening unexpectedly.

CAUTION
A hood not latched securely could open during operation and cause vehicle damage. Be sure to latch the hood securely.



1. Hood hold down



Hood Tilt

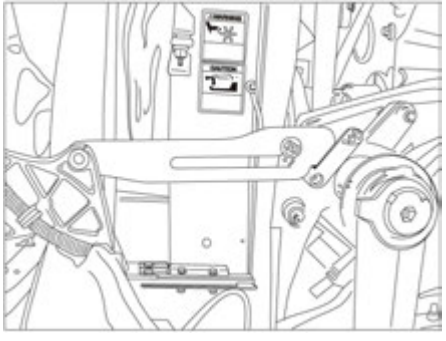
To open your hood, unlock the hood hold downs by unlatching them. Put one or both hands on the top of the hood front. Tilt the hood forward by pulling at the top of the hood keeping your feet on the ground for stability. Keep pulling on the hood until you are certain that the hood hold open device is engaged. 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.

WARNING!
A pivoting hood could hurt someone or be damaged itself. Before opening or closing the hood, be sure there are no people or objects in the way. Failure to stand in a position of safety can cause death or personal injury.

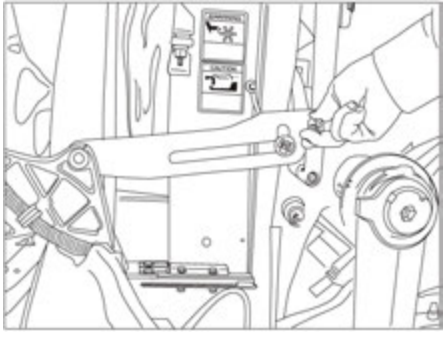
Pull with hand from here

Hood Hold-Open Device

The hood is equipped with a hood hold-open device. In order for the hood hold-open device to become engaged, the vehicle hood must be fully open. Once the vehicle hood is fully open, the hold-open latch will automatically engage and will need to be disengaged by the operator.



To disengage the latch for hood closure, rotate the release lever fully forward.



Press in to disengage

⚠ WARNING!

Before opening or closing the hood, make sure your footing is secure and stable. Failure to do so may cause the hood to close uncontrollably which may result in death or personal injury.

WARNING!

Always ensure the hood hold-open latch is engaged to keep the hood fully open any time anyone gets under the hood for any reason. Failure to do so may cause the hood to close uncontrollably which may result in death or personal injury.

WARNING!

Before closing the hood, be sure the area is clear—no people or objects are in the way. Failure to do so may result in death or personal injury.

1

SEATS AND RESTRAINTS

Introduction

For information on the features and adjustment of the seat, see the seat manufacturer's literature included with the vehicle.

Seat Adjustment

WARNING!

Do not adjust the driver's seat while the vehicle is moving. The seat could move suddenly and unexpectedly and can cause the driver to lose control of the vehicle. Make all adjustments to the seat while the vehicle is stopped. After adjusting the seat and before driving off, always check to ensure that the seat is firmly latched in position. Failure to comply may result in death, personal injury or property damage.

WARNING!

Before driving or riding in vehicle, ensure that there is adequate head clearance at maximum upward travel of seat. Injury may occur if head clearance is not adequate. Failure to comply may result in death or personal injury.

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 or personal injury.

Safety Restraint Belts

Safety belts have proven to be the single most effective means available for reducing the potential for either death or personal injury in motor vehicle accidents. Unbelted riders could be thrown into the windshield or other parts of the cab or could be thrown out of the cab. They could strike another person. Injuries can be much worse when riders are unbelted. Always fasten your seat belt and be sure anyone riding with you does the same. Therefore, read the following instructions and always observe user warnings pertaining to safety belts.

⚠ WARNING!

Do not drive vehicle without your seat belt and your riders belts fastened. Riding without a safety belt properly fastened can lead to death or personal injury in an emergency.

⚠ WARNING!

In vehicles equipped with passenger seat swivel function, the seat belts will only perform their intended function when the seat is facing forward. Failure to comply can lead to death or personal injury in an emergency.

Your vehicle is equipped with a seat belt indicator in the warning light display above the speedometer/tachometer (see “Seat Belt, Fasten” on page 3-27).

Lap/Shoulder Belt

The combination lap-shoulder belt is equipped with a locking mechanism. The system 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 will also lock when driving up or down a steep hill or in a sharp curve.

To fasten the belt:

1. Grasp the belt tongue.
2. Pull belt in a continuous slow motion across your chest and lap.
3. Insert belt tongue into buckle on inboard side of seat.
4. Push down until the tongue is securely locked with an audible click.
5. Pull belt to check for proper fastening and adjustment, as follows:

- Pull shoulder section to make sure belt fits snugly across the chest and pelvis.
- There should be less than 1 inch (25 mm) gap between the body and the belt.
- The shoulder belt must be positioned over the shoulder, it must never rest against the neck or be worn under the arm.
- Make sure any slack is wound up on the retractor and that the belt is not twisted.

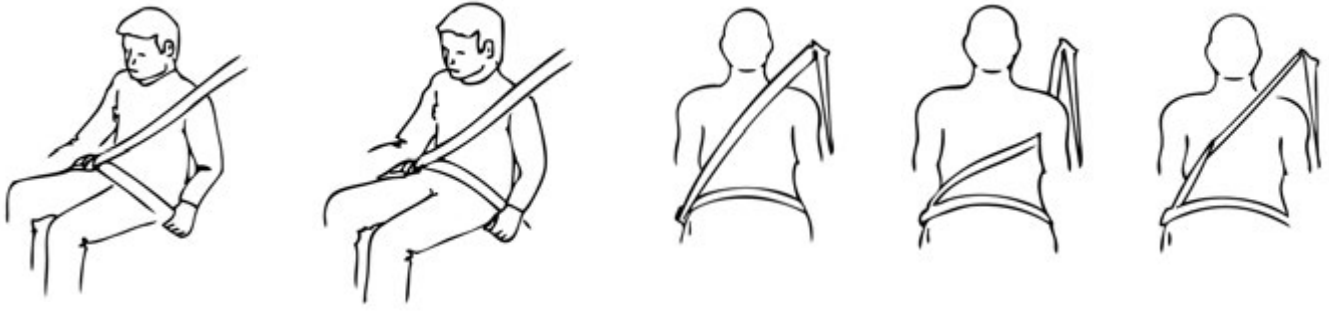
To unfasten the belt:

1. Push in the release button on the buckle.
2. The belt will spring out of the buckle.

If the belt is locked, lean the body back to remove any tension in the belt. After releasing the belt, allow the belt to retract completely by guiding the belt tongue until the belt comes to a stop.

Safety Restraint Belts

Lap Belt **Shoulder Belt**



Correct **Incorrect (too high on hips)** **Correct (over arm)** **Incorrect (under arm)** **Incorrect (twisted)**

WARNING!

Proper seat belt adjustment and use is important to maximize occupant safety. Failure to wear or adjust the safety belt properly may result in death or personal injury.

Tether Belts

This vehicle may have an external tether belt installed with a seat, instead of the internal tethering device. Tether belts are designed to restrain the seat in the event of a sudden stop or an accident.

Internal tether belts do not require adjustment.

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!

Failure to adjust tether belts properly can cause excessive movement of the seat in an accident. Tether belts should be adjusted so that they are taut when the seat is in its most upward and forward position. Failure to comply may result in death or personal injury.

To adjust an external tether belt:

- 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.
- To lengthen the tether, turn the buckle to a right angle to the webbing. Then pull the buckle. To shorten the tether, pull on the strap.

Komfort-Latch® Feature

Your vehicle includes a feature designed to eliminate cinching and provide improved safety and comfort. Cinching is the condition where a belt becomes continually tighter around you during a rough, bouncy ride. The need for this feature increases with rough road conditions, particularly over long distances.

To eliminate cinching, simply activate the Komfort-Latch® feature 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. Learn 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.

To disengage the mechanism:

1. Unbuckle the seat belt.
2. Press the “OFF” button of the Komfort-Latch® or tug on the shoulder strap.

Komfort-Latch®

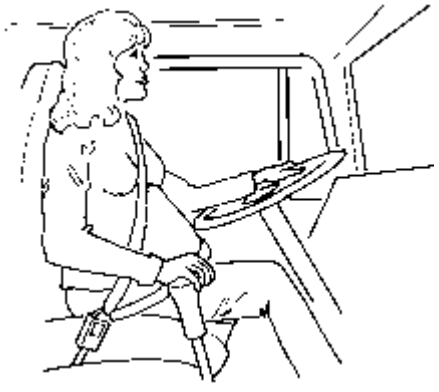
More information and video tutorials can be found at: www.clicktugsnug.com

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.

During Pregnancy

Pregnant women should always wear combination lap/shoulder belts. 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 may significantly reduce the risks to woman and baby in the event of a crash.



Pregnant Woman with Belt Properly Worn

Belt Damage and Repair

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

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

For further information on seat belts and seat belt maintenance, see Safety Restraint System - Inspection in the *Maintenance and Consumer Information Manual*.

Sleeper Bunks and Restraints

For cabs equipped with a sleeper, be sure to use the restraint devices when the vehicle is in motion. Your vehicle may have belts and/or a net restraint system which are over the bunk or cover the opening.

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 room in the sleeper. Fold the upper bunk up and insert the metal end of the bunk retaining belts into the buckles.

WARNING!

Be sure the restraint system is used when anyone is occupying the sleeper while the vehicle is moving. In an accident, an unrestrained person lying in a sleeper bunk could be seriously injured. He or she could be thrown from the bunk. Failure to comply may result in death, personal injury, equipment or property damage.

Lower

WARNING!

Always keep the lower bunk in its down position while the vehicle is moving. If left in the up position, stored items could become loose during an accident and strike you, causing death or personal injury.

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

Upper

WARNING!

Be sure the latch that holds the upper bunk in the folded position is working properly so the bunk will not fall down. Pull on the bunk to be sure it is latched securely. If the bunk falls, you could be injured. Failure to comply may result in death, personal injury, equipment or property damage.

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

WARNING!

Any loose items on the upper or lower bunk should be moved to a secured place before driving the vehicle. Failure to comply may result in death, personal injury, equipment or property damage.

Upper Rear Sleeper Storage

Your vehicle may be equipped with an upper storage shelf that extends over the lower bunk and across the rear of the sleeper. The following warning applies:

WARNING!

Overhead compartments are not intended for items exceeding their designed weight limits. Exceeding the weight limits may cause the shelf to collapse and or items may fall out in a sudden stop which may lead to death or personal injury.

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 and the other overhead compartments (including those in

the optional sleeper) should hold a combined total not exceeding 5 lbs (2.2 kg) per compartment.

Safety Restraint Tips

- Do not wear a belt over rigid or breakable objects in or on your clothing, such as eye glasses, pens, keys, etc., as these may cause injury in an accident.
- Any authorized person sleeping in your vehicle while it is moving should use the bunk restraint.
- Any authorized person sitting in the sleeper area on the sofa bed (if equipped) while it is moving should wear a seat belt.
- A responsible operator sees to it that everyone in the vehicle rides or sleeps safely. The operator is responsible to inform any passengers or co-drivers how to properly use the seat belts and bunk restraint in the vehicle.
- Do not strap in more than one person with each belt.
- Keep seat belt and bunk restraint buckles free of any obstruction that may prevent secure locking.
- Damaged or worn belts in the cab or sleeper, subjected to excessive stretch forces from normal wear, must be replaced. They may not protect you if you have an accident.
- Any belts or restraints that have been subjected to an accident should be inspected for any loose (attaching) hardware or damaged buckles.
- If belts show damage to any part of assembly, such as webbing, bindings, buckles or retractors, they must be replaced.
- Do not allow safety belts (seat or bunk) to become damaged by getting caught in door, bunk or seat hardware, or rubbing against sharp objects.

- All belts must be kept clean or the retractors may not work properly.
- Never bleach or dye seat or bunk restraint belts: chemicals can weaken them. Do, however, keep them clean by following the care label on the belts. Let them dry completely before allowing them to retract or be stowed away.
- Make sure the seat belts and bunk restraint of the unoccupied passenger seat or bunk is fully wound up on its retractor or is stowed, so that the belt or restraint tongue is in its properly stowed position. This reduces the possibility of the tongue becoming a striking object in case of a sudden stop.
- Do not modify or disassemble the seat belts or bunk restraint in your vehicle. They will not be available to keep you and your passengers safe.
- If any seat belt or bunk restraint is not working properly, see an authorized dealer for repair or replacement.

START-UP

Introduction

The following section covers start-up procedures for getting your vehicle ready for the road.

Safe Vehicle Operation

For your safety, as well as those around you, be a responsible driver:

- 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 distraction to a minimum to improve your concentration. Examples of distractions may include radio controls, GPS navigation controls, cellular telephone calls, cellular text messages, reading or reaching for something on the floor. Minimizing your distractions will improve safe driving and will help avoid an accident involving death or personal injury.

Be aware of local regulations that may prohibit the use of cellular telephones while driving. In addition to being an unsafe practice, it may be against local or federal ordinances to use cellular devices while operating the vehicle.

Much has gone into the manufacturing of your vehicle including advanced engineering techniques, rigid quality control, and demanding inspections. These manufacturing processes will be enhanced by you, the safe driver, who observes the following:

- Knows and understands how to operate the vehicle and all its controls.
- Maintains the vehicle properly.
- Uses driving skills wisely.

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.

WARNING!

The use of alcohol, drugs, and certain medications will seriously 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 or property damage.

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

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 or property damage.

Vehicle Loading

Compare your vehicle's load capacity with the total load you are carrying. If adjustments need to be made, make them, do not drive an overloaded vehicle. If you are overloaded or your load has shifted, your vehicle may be unsafe to drive.

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 or personal injury.

The gross vehicle weight rating (GVWR), or the maximum front and rear gross axle weight ratings (GAWRs) are determined by the

components installed from the factory on to the vehicle and their designed specifications. (Axle weight ratings are listed on the driver's door edge.)

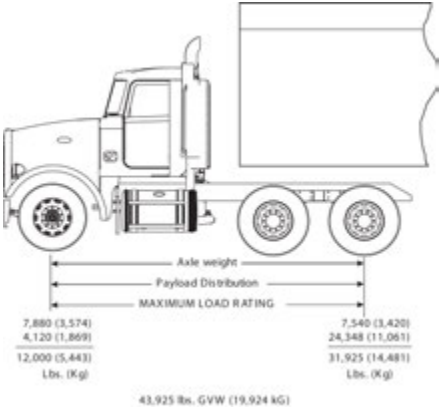
The following are some definitions of weight you should know:

GVWR: is the Gross Vehicle Weight Rating. This is the MAXIMUM WEIGHT your vehicle is allowed to carry, including the weight of the empty vehicle, loading platform, occupants, fuel, and any load. Never exceed the GVWR of your vehicle.

GCW: is the actual combined weight, or Gross Combination Weight (GCW), of your vehicle and its load: vehicle, plus trailer(s), plus cargo.

GAWR: is the Gross Axle Weight Rating. This is the total weight that one axle is designed to transmit to the ground. You will find this number listed on the driver's door edge.

Load Distribution: be sure any load you carry is distributed so that no axle has to support more than its GAWR.



WARNING!

An unevenly distributed load or a load too heavy over one axle can affect the braking and handling of your vehicle, which could result in an accident. 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 or property damage.

Emergency Equipment

It is good practice to carry an emergency equipment kit in your vehicle. One day, if you have a roadside emergency, you will be glad the following items are with you:

- 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 (see Vehicle Recovery Guidelines on page 2-15 for details).

Driver's Check List

To keep your vehicle in top shape and maintain a high level of safety for you, your passengers, and your load, make a thorough inspection every day before you drive. You will save maintenance time later, and the safety checks could help prevent a serious accident. Please remember, too, that Federal Motor Carrier Safety Regulation 392.7 requires a pre-trip inspection and so do commercial trucking companies.

You are not expected to become a professional mechanic. The purpose of your inspections is to find anything that might interfere with the safe and efficient transportation of yourself, any passengers, and your load. If you do find something wrong and cannot fix it yourself, have an authorized dealer or qualified mechanic repair your vehicle right away.

The following operations are to be performed by the driver. Performing these checks and following the maintenance procedures in the Maintenance and Consumer Information manual will help keep your vehicle running properly.

Approaching Your Vehicle

- Check the overall appearance and condition. Are windows, mirrors, and lights clean and unobstructed?
- Check beneath the vehicle. Are there signs of fuel, oil, or water leaks?
- Check for damaged, loose, or missing parts. Are there parts showing signs of excessive wear or lack of lubrication? Have a qualified mechanic examine any questionable items and repair them without delay.
- Check your load. Is it secured properly?

Daily Checks

Engine Compartment Checks - Daily

1. Engine Fluid Levels - add more if necessary.
   a. Engine oil
   b. Coolant (check while engine is cold)
   c. Power steering fluid level
2. Engine Belt - check tension and condition of belts.
   a. See the Accessory Drive Belts topic in the Maintenance Manual for further information on checking belt tension.
   b. Replace belts that are cracked torn or broken.
3. Fuel Filter/Water Separator Draining - check and drain. Depending on the fuel storage facility, more frequent draining may be required.
4. Windshield washer reservoir fluid level - fill if necessary.
5. 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.
6. Hood closed before entering cab. Is it latched properly?
7. Check brake lines and hoses.
8. Check the steering components (pitman arm, draglink, power steering hoses, etc.).

Chassis and Cab Checks - Daily

Before entering the cab and operating the vehicle, check the following equipment for proper maintenance:

1. Lights - are any exterior lights cracked or damaged?

Perform an exterior light test using the dash mounted switch next to the steering wheel. See Exterior Lighting Self-Test on page 3-60.

2. Windows and Mirrors - are they clean and adjusted properly?
3. Tires and Wheels - are they inflated properly? Are all wheel cap nuts in place and torqued properly - tighten if necessary. Check front wheel bearing oil levels. Inspect all tires and wheels for damage - correct if found.
4. Suspension - check for loose or missing fasteners. Check damage to springs or other suspension parts such as cracks, gouges, distortions, bulges or chafing.
5. Brake Components - check lines, linkages, chambers, parking and service brake operation.
6. Air System - are there leaks?

   Air Tanks - drain water from all air tanks. Make sure the drain cocks are closed. This procedure is also required for air suspension tanks equipped with automatic drain valves.
7. Steps and Handholds - check for worn surfaces and loose or missing fasteners (which includes any fuel tank steps).
8. Fluid Tanks (Fuel, DEF, etc.) - check underneath the vehicle for signs of fluid leaks. If any are found, correct before operating the vehicle.
9. Fuel Tank Hardware - is the tank fill cap secure? Are the tank straps tight? Is the strap webbing in place?

⚠ WARNING!

Diesel fuel in the presence of an ignition source (such as a cigarette) could cause an explosion. Do not remove a fuel tank cap near an open flame. Use only the fuel and/or additives recommended for your engine. A mixture of gasoline or alcohol with diesel fuel increases this risk of explosion. Failure to comply may result in death, personal injury, equipment or property damage. See Refueling on page 4-51, for more information.

10. Trailer Connections - are they secure and the lines clear? If they are not being used, are they stored properly?
    a. Is the trailer spare wheel secure and inflated?
    b. Is the landing gear up and the handle secured?

11. Check the fifth wheel. Is the kingpin locked?
    a. Is the sliding fifth wheel locked?

Cab Interior - Daily

1. Seat - adjust the seat for easy reach of controls and visibility.
2. Seat Belts - fasten and adjust safety restraint belts (which may include restraints in the sleeper).
3. Steering Column - adjust for easy reach and visibility.
4. Mirrors - check and readjust mirrors if necessary.
5. Lights - turn ignition key to the ON position and check for warning lights and buzzer. Check operation of turn signals and emergency lights.
6. Instruments - check all instruments.
7. Windshield - check operation of windshield wipers and washers.
8. Horn - check operation of horn.
9. Fuel - check fuel. Is there enough fuel?
10. Diesel Exhaust Fluid (DEF) - check level. Is there enough fluid?
11. Sleeper Air Conditioning Air Filter - check the condition of the sleeper air conditioning air filter. Keep the sleeper floor area behind the passenger front seat clear of debris and pet hair. The sleeper air conditioner draws air from this area and excessive dirt or pet hair may shorten the service life of the sleeper air conditioning air filter.

The above items should be checked daily, as a minimum. They 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

Washington, DC 20401

Weekly Operations

1. Battery - check battery and terminals.
2. Wheel Cap Nuts - are they all in place and torqued properly? Tighten if necessary.
3. Other Controls and Wiring - check for condition and adjustment
4. Steering Components - check pitman arm, draglink, and power steering hoses, etc., for loose, broken, or missing parts.
5. Other Engine Compartment Checks:
   a. Check condition and fastening of engine belt, hoses, clamps, and radiator.
   b. Check the air cleaner, muffler, and exhaust pipes. Are they tight and secure?
   c. Automatic Transmission Fluid (when applicable) - Check level, after the engine has warmed up to operating temperature.

WHAT TO DO IF...

JUMP STARTING VEHICLES

VEHICLE RECOVERY AND SPRING BRAKES

WHAT TO DO IF...

You Need Roadside Assistance

Call toll-FREE 1-800-4-PETERBILT (1-800-473-8372) to talk to someone at the PACCAR Customer Center.

- Open 24-7-365 days a year
- They can help you get roadside assistance.
- They have a custom mapping system which locates Peterbilt dealers and Independent Service Providers (ISPs) near you and lists types of services offered, hours of operation and contact information.
- They can assist with jump and pull starts, tires, trailers, fines and permits, chains, towing, hazardous clean-up, out of fuel (roadside), mechanical repairs and preventive maintenance services.
- They have bilingual agents and access to a translation service to ensure quality assistance for customers who speak any language.
- They can't answer your warranty questions but can get you in contact with a Peterbilt dealer who can.
- The PACCAR Customer Center service is FREE even if you don't drive a Peterbilt.

Low Air Alarm Turns On

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) and set the parking brake. (Refer to Parking Brake on page 4-34 and Operating the Transmission on page 4-18, for transmission shifting and parking brake information.)
4. Turn OFF the engine.
5. Turn ON the emergency flasher and use other warning devices to alert other motorists.

WARNING!

If the air pressure falls below 60 psi (414 kPa) the spring brakes may stop the vehicle abruptly, which could cause an accident resulting in death or personal injury. Observe the red warning lamps on the gauges. If one comes on, do not continue to drive the vehicle until it has been properly repaired or serviced.

If the light and alarm do not turn off at startup, do not try to drive the vehicle until the problem is found and fixed. (Refer to Operating the Brake System on page 4-21, for more brake information.)

Stop Engine Lamp Turns On

Stop Engine Lamp - If the Stop Engine warning lamp illuminates, it means you have a serious engine system problem.

WARNING!

This should be considered an emergency. You should stop the vehicle as safely as possible and turn OFF the ignition. The vehicle must be serviced and the problem corrected before driving again. Failure to do so may cause severe engine or DPF damage, or cause an accident which may result in death or personal injury.

Engine Oil Pressure Lamp Turns On

Engine Oil Pressure Lamp - If the oil pressure suddenly drops, or the audible alarm and engine oil pressure warning light come on while driving, do the following:

1. Slow down carefully.
2. Move a safe distance off the road and stop.
3. Place the transmission in park and set the parking brake. (See Parking Brake on page 4-34 and Operating the Transmission on page 4-18, for transmission shifting and parking brake information.)
4. Turn OFF the engine.
5. Turn ON the emergency flasher and use other warning devices to alert other motorists.

6. Wait a few minutes to allow oil to drain into the engine oil pan, and then check the oil level. (See Inspection of the Engine Oil on page 4-54.
7. Add oil if necessary. If the problem persists, contact an authorized dealer as soon as possible.

⚠ CAUTION
Continuing to operate your vehicle with insufficient oil pressure may cause severe engine damage or cause an accident which 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 (kPa) a Red Warning Lamp on the oil pressure gauge will illuminate and the Stop Engine Lamp will come ON.

Engine is Overheating

The cooling system may overheat if the coolant level is below normal or if there is sudden loss of coolant, such as a split hose. The system may also temporarily overheat during severe operating conditions such as:

- Climbing a long hill on a hot day
- Stopping after high-speed driving

If either one of the above occurs, **DO NOT TURN OFF THE ENGINE** unless: **a**) the Low Water warning device indicates a loss of coolant, **b**) the Red Warning lamp (on the gauge) and Check Engine lamp comes ON, **c**) the Buzzer sounds showing an overheat condition, or **d**) if you have any other reason to suspect the engine may be overheating - follow these steps:

1. Reduce engine speed and stop. When stopped, place the transmission in Neutral and set the parking brake. Keep the engine running.
2. Check to ensure the Oil Pressure Gauge reads normal. (See Engine Oil Pressure Gauge on page 3-11, for further information.)
3. Make sure the engine fan is turning by switching the Engine Fan Switch from AUTO to MAN (Manual).
4. Increase the engine speed to about one-half of full operating speed, or 1,100 to 1,200 rpm, maximum.
5. Return the engine speed to normal idle after 2 or 3 minutes.
6. Monitor the engine temperature. After the temperature returns to normal, allow the engine to idle 3 to 5 minutes before shutting it off. This allows the engine to cool gradually and uniformly.

7. If overheating came from severe operating conditions, the temperature should have cooled by this time. If it has not, stop the engine and let it cool before checking to see if the coolant is low.

Check the coolant level after each trip when the engine has cooled. The coolant level should be visible within the surge tank—add coolant if necessary. See Topping Off on page 4-57 in , for instructions on checking and filling the coolant expansion tank.

WARNING!

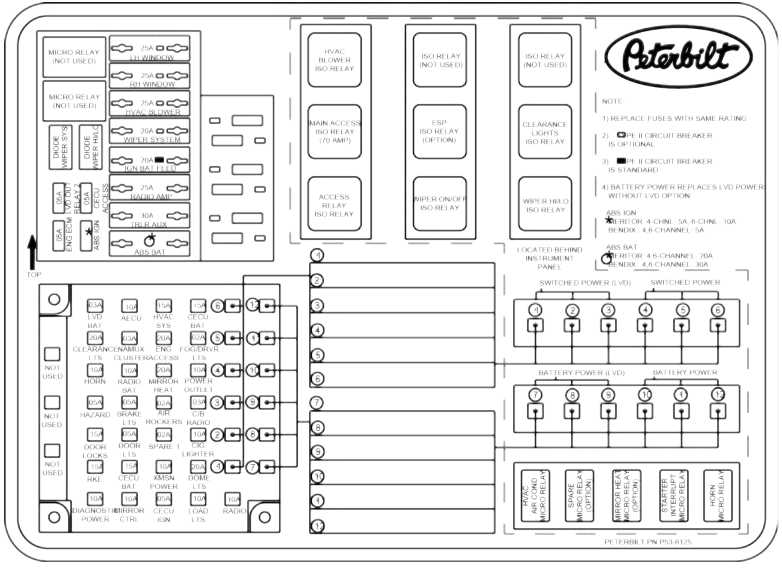
To reduce the chance of death, personal injury, fire and/or vehicle damage from overheated engines, never leave the engine idling without an alert driver present. If the engine should overheat, as indicated by the engine coolant temperature light, immediate action is required to correct the condition. Continued unattended operation of the engine, even for a short time, may result in serious engine damage or a fire. Failure to comply may result in personal injury, death, equipment or property damage.

WARNING!

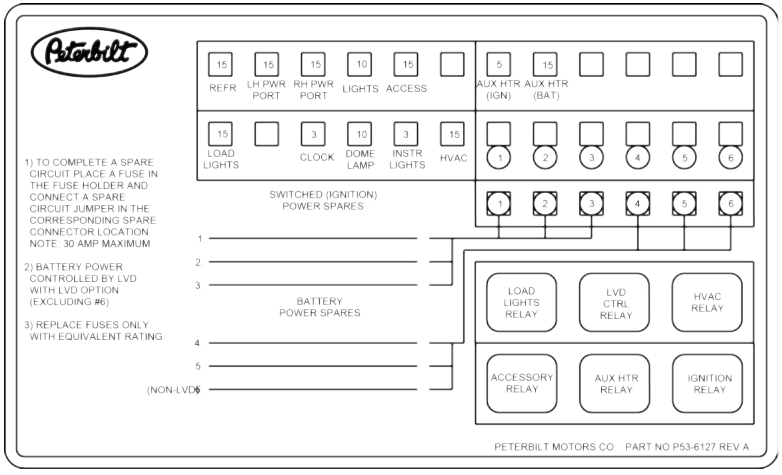
Do not remove the radiator fill cap while the engine is hot. Scalding steam and fluid under pressure may escape. You could be badly burned. Failure to comply may result in death or personal injury.

Fuse or Relay Blows

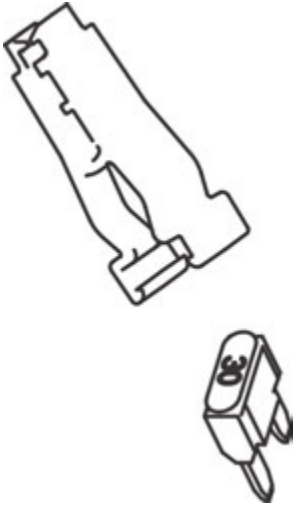
Fuses, circuit breakers, and relays are located in the Power Distribution Box to the left of the steering column behind the clutch pedal. Additional fuses are located in the engine compartment (drivers side bulkhead) and also in the sleeper under bunk storage compartment.



In-Cab Fuse Label



Sleeper Fuse Label



Fuse Puller

WARNING!

Do not replace a fuse with a fuse of a higher rating. Doing so may damage the electrical system and cause a fire. Failure to comply may result in death, personal injury, equipment or property damage.

CAUTION

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

CAUTION

Never patch fuses with tin foil or wire. This may cause serious damage elsewhere in the electrical circuit, and it may cause a fire.

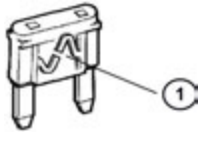
CAUTION

If a circuit keeps blowing fuses, have the electrical system inspected for a short circuit or overload by an authorized dealer as soon as possible. Failure to do so could cause serious damage to the electrical system and/or vehicle.

Fuse Inspection and Replacement

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

1. Turn OFF all lights and accessories and remove the ignition key to avoid damaging the electrical system.
2. Determine from the chart on the fuse panel which fuse controls that component.
3. Remove that fuse and see if it is blown.



1 Blown

If it is blown, replace it with a fuse of the same rating.

If a fuse of the same rating is not available, a fuse of a lower rating may be temporarily substituted. You can also use a fuse from a circuit you can do temporarily without (for example an accessory circuit or radio).

CAUTION

When replacing a failed circuit breaker, always use an approved circuit breaker with a current rating equal to or less than the circuit breaker being replaced. Only use the approved Type II modified reset circuit breakers. NEVER use a Type I (automatic reset) or Type III (manual reset) circuit breaker. A fuse with a current rating equal to or less than the circuit breaker being replaced can also be used.

JUMP STARTING VEHICLES

Introduction

Jump starting a vehicle is not a recommended practice due to the various battery installations and electrical options.

However, if your battery is discharged (dead), you may be able to start it by using energy from a good battery in another vehicle. This is termed jump starting. Be sure to follow the precautions and instructions below.

⚠ WARNING!

Batteries contain acid that can burn and gasses that can explode. Ignoring safety procedures may result in death, personal injury, equipment or property damage.

⚠ WARNING!

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

⚠ WARNING!

Never remove or tamper with battery caps. Ignoring this could allow battery acid to contact eyes, skin, fabrics, or painted surfaces. Failure to comply may result in death, personal injury, equipment or property damage.

Be careful that metal tools (or any metal in contact with the positive terminal) do not contact the positive battery terminal and any other metal on the vehicle at the same time. Remove metal jewelry and avoid leaning over the battery.

To Jump Start your Vehicle

WARNING!

When jump starting using a battery booster, it is best to jump start with an equivalently powered vehicle. Verify that the booster battery has the same volt and CCA specifications as the dead battery before attempting to jump start. Failure to comply may cause an explosion resulting in death, personal injury, equipment or property damage.

CAUTION

Applying a higher voltage booster battery may cause expensive damage to sensitive electronic components, such as relays, Electronic Control units or electronics in general. Failure to comply may result in equipment damage.

CAUTION

Improper hook-up of jumper cables or not following these procedures can damage the alternator or cause serious damage to both vehicles.

WARNING!

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

Preparing the vehicles:

1. Remove any personal jewelry that may come in contact with the battery terminals.
2. Select a jumper cable that is long enough to attach to both vehicles in a way that ensures 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 brakes: pull out the Yellow button located on the dash.
6. Shift the transmission into park position or neutral for manual transmissions. (See Operating the Transmission on page 4-18 and Parking Brake on page 4-34, for transmission shifting and parking brake information.)

7. If either vehicle is equipped with battery disconnects ensure they are in the **"OFF"** position prior to connecting the two vehicles.

Connect the batteries:

1. Attach one end of a jumper cable to the **positive (+)** terminal of the discharged (dead) battery. This will have a large **red +** or **P** on the battery case, post, or clamp.
2. Attach the other end of the same cable to the **positive (+)** terminal of the good (booster) battery.
3. Attach the remaining jumper cable **FIRST** to the **negative (-)** terminal **(black or N)** of the good battery.
4. Attach the other end of the negative cable to a bare metal part not bolted to the engine block.

NOTE
Always connect positive (+) to positive (+) and negative (-) to negative (-).

5. If either vehicle is equipped with battery disconnects, ensure that they are in the **"ON"** position.
6. Start the vehicle that has the good battery first. Let it run for 5 minutes.
7. Start the vehicle that has the discharged (dead) battery.

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

Remove jumper cables:

⚠ 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 engine running, disconnect jumper cables from both vehicles in the exact reverse order, making sure to first remove the negative cable from the vehicle with the discharged battery.

VEHICLE RECOVERY AND SPRING BRAKES

Vehicle Recovery Guidelines

Your vehicle is equipped with removable Recovery Hitches, designed for short distance recovery purposes only. Use only the provided hitches, according the following instructions. When using this connection, do not transport your vehicle over long distances. (If your vehicle does not have the proper hitches, contact your dealer.)

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. Worse, when vehicles are towed, either by wrecker or piggyback, the lubricant in the top front of the drive axle will drain to the rear. This will leave the top components dry. The resulting friction may damage them. Always remove the main drive axle shafts before towing your vehicle.

CAUTION

Remove the drive axle shafts or lift the driving wheels off the ground before towing the vehicle. Towing the vehicle with either the wheels on the ground or the axle shafts in the axles will cause damage to the axle gears.

CAUTION

If your vehicle has a Meritor axle with a driver-controlled main differential lock, install the caging bolt before removing the axles for towing, see Driver Controlled Main Differential on page 2-18. Installing the caging bolt prevents damage by locking internal axle components in position.

CAUTION

Connect only to the Recovery Hitches, see Vehicle Recovery Guidelines on page 2-15. Connections to other structural parts could damage the vehicle. Do not attach to bumpers or brackets. Use only equipment designed for this purpose. Failure to comply may result in equipment damage.

Recovery Procedure

1. Review and understand all the cautions and warnings of this section, see Vehicle Recovery Guidelines on page 2-15.
2. Install the recovery hitches, see Recovery Hitch Installation on page 2-18.
3. Disconnect the drive axle shafts and cover the open hubs. This is necessary because if the transmission is driven by the driveshaft (rear wheels on the ground), no lubricant will reach the gears and bearings, causing damage to the transmission.
4. Install the recovery rigging using a safety chain system, see Recovery Rigging on page 2-21.
5. Make sure the recovered vehicle's parking brakes are released.
6. If you desire to use the recovered vehicle's brakes, 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 don't desire to use the recovered vehicle's brakes, ensure that you cage the spring brakes before attempting to move the vehicle, see Driver Controlled Main Differential on page 2-18.

WARNING!

Before towing a vehicle, test your air brakes to ensure that you have properly connected and inspected the recovery vehicle's brake system. Failure to do so could lead to a loss of vehicle control which may result in an accident involving death or personal injury.

7. Follow state/provincial and local laws that apply to vehicles in tow.
8. Do not tow vehicles at speeds in excess of 55 mph (90 km/h).

For additional information concerning heavy duty truck recovery, refer to the following Technology and 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 these can be obtained from the following address:

Technology and Maintenance Council
950 N. Glebe Road
(703) 838-1763
Arlington, VA 22203
Email: tmc@trucking.org
tmc.truckline.com

Recovery Hitch Connection

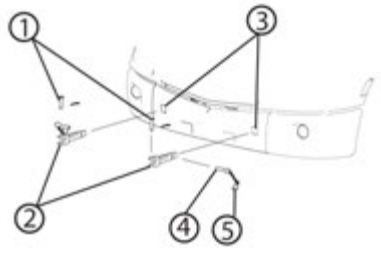
Specially designed hitches are required to recover your vehicle. The recovery hitches attach to the frame.

Two hitch assemblies, made up of the following parts, are recommended for the proper recovery of your vehicle.

⚠ WARNING!

Do not use parts from other trucks or materials from other sources to repair a hitch or to replace a missing hitch. The parts provided for recovery are made of high strength still specifically designed for vehicle recovery. Failure to use the correct factory equipment may result in an accident involving death or personal injury.

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



Recovery Hitch Assembly

1 Tow Pin
2 Tow Hitch
3 Square Hitch Socket
4 Lock Pin
5 Lock Tab

Recovery Hitch Installation

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

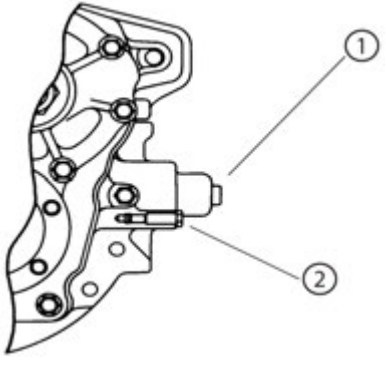
1. Check square sockets behind lower bumper for obstructions, clear if necessary.
2. With lock pins removed, insert hitches through bumper and into the square hitch socket.
3. Align the hole in the tow hitch with the square hitch socket hole.
4. Insert the lock pin into the square hitch socket hole and through the hole in the tow hitch until the lock tab is within the square hitch socket.
5. Rotate the lock pin 90 degrees to secure the pin in place.
6. Remove the hitches and store all parts after recovering the vehicle.

Driver Controlled Main Differential

Follow these steps to lock a driver-controlled main differential.

⚠ WARNING!

An open air line on the recovered vehicle will cause a leak in the air system of the recovery vehicle if both vehicles' brake systems are connected. This could cause a loss of system air, which can cause the service brakes not to function, resulting in the sudden application of the spring brakes causing wheel lock-up, loss of control, or overtake by following vehicles. You could be in an accident involving death or personal injury. 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.



Driver Controlled Main Differential Lock

1	Air Line (remove to install Caging Bolt)
2	Caging Bolt (in storage location)

1. Lift driving wheels off the ground or remove the driveline and axle shafts before towing the vehicle.

CAUTION

Failure to lift the driving wheels off the ground or remove the driveline and axle shafts before towing the vehicle could seriously damage your 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. This will leave the top components dry, resulting in friction that will seriously damage these components.

2. Cover open hubs when removing drive axle shafts.

CAUTION

Water, dirt and other material can enter an open hub or axle. This can contaminate the axle fluid and cause possible damage to components. Ensure that the hubs are covered with plastic whenever a drive axle shaft is removed.

3. For vehicles with driver-controlled main differential lock, install the caging bolt before removing the axle shafts for towing.
   a. Remove the air line and firmly cap.
   b. Remove the caging bolt from its storage hole.
   c. Screw the caging bolt into the air line hole. 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.

CAUTION

Failure to install the caging bolt when towing vehicles with driver-control main differential lock can result in damage by failing to lock internal components in position.

WARNING!

Ensure there are no open air lines on the recovered vehicle if the recovery vehicle and recovered vehicle brake systems are connected. An open air line on the recovered vehicle will cause a leak in the air brake system of the recovery vehicle possibly causing death, personal injury, equipment or property damage.

CAUTION

A recovered vehicle will have no operational brake system. Additionally, the rear axle spring brakes will probably be applied.

- If you desire to use the recovered vehicle's brakes, ensure that the vehicles air system is connected to that of the recovery vehicle. Also 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 you don't desire to use the recovered vehicle's brakes, ensure that you cage the spring brakes before attempting to move the vehicle.

4. Install recovery hitches and rigging.

CAUTION

Connect recovery rigging only to hitches intended for that purpose. Do not attach to bumpers or brackets. Connections to other structural parts could damage the vehicle.

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.

Hitch Capacities

DIRECTION OF PULL	MAXIMUM CAPACITY (Lb) *
Directly Forward	80,000
Directly Vertical or Horizontally to the Side	14,600
45º in any Direction	20,000

* Both hitches pulled simultaneously.

CAUTION

Recovery pull maximums assume the tow rigging evenly distributes the load between both recovery hitches. See examples in Recovery Rigging on page 2-21 for details. Serious damage to the vehicle may occur if rigging is not connected properly.

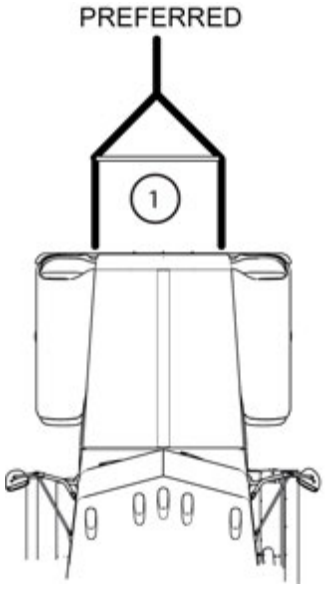
CAUTION

When recovering ditched or bogged vehicles, stay well below Maximum Capacities. Even at loads below maximum, the physical strain of recovering a vehicle could damage axles, suspensions, fifth wheels, etc.

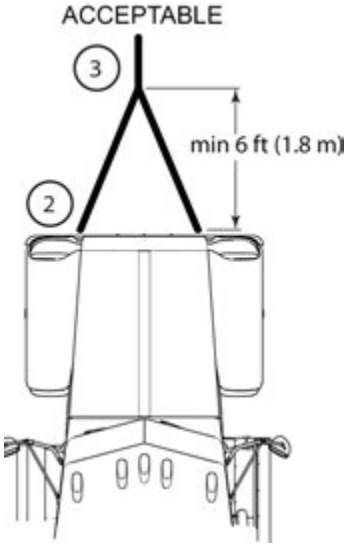
Recovery Rigging

To connect to the vehicle, follow the suggested rigging methods below.

- Use a double chain or cable setup that distributes the load equally to both hitches.
- Never loop a single chain or cable through both hitches.
- Use a spreader or equalizer bar to distribute the load on both hitches.
- If no spreader bar is available, connect the main tow chain or cable no closer than 6 ft. from the vehicle.



1. Spreader Bar or Equalizer



2. Connection to bumper via tow pin or hook
3. 2 or 3 piece tow device

Returning Vehicle to Service

You will have to add lubricant to prevent damage after your vehicle has been towed.

1. Into the pinion cage, add 1 pint (.47 liter) of lubricant or into the interaxle differential, add 2 pints (.94 liter) of approved lubricant.
2. After adding the specified type and amount of lubricant, drive the vehicle. It should be unloaded. Drive 1 to 2 miles (1.5 to 3 km) at a speed lower than 25 mph (40 km/h). This will thoroughly circulate the lubricant through the assembly.

Spring Brakes—Manual Release

Recovering a vehicle requires that you release the parking brakes. There may be times when there is not enough air pressure to release the parking brakes. In such cases, the parking brakes (or Spring Brakes) can be manually released.

WARNING!

Do not drive vehicle with malfunctioning brakes. If one of the brake circuits should become inoperative, braking distances will increase substantially and handling characteristics while braking will be affected. You could lose control of your vehicle or cause an accident. Have it towed to the nearest dealer or qualified repair facility for repair. Failure to comply may result in death, personal injury, equipment or property damage.

The brakes can be released in this manner should the pressure in the air system not be enough to release them. This may occur in instances where the engine's air compressor is not able to get the system up to operating pressure.

WARNING!

Do not disassemble a spring brake chamber. These chambers contain a powerful spring that is compressed. Sudden release of this spring may result in death or personal injury.

⚠ 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!

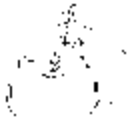
Always secure the vehicle with wheel chocks, chains, or other safe means to prevent rolling before manually releasing the spring brakes. Releasing the spring brakes on an unsecured vehicle could lead to an accident. The vehicle could roll, which may result in death, personal injury, equipment or property damage.

To move a vehicle immobilized by the spring brakes due to loss of air pressure in the brake system, perform the following procedure:

1. Remove the cap from the spring chamber.

2. Remove the release stud assembly from the side pocket, and 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 secures the cross pin into the cross pin area of the pressure plate and 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 doing this, check to make sure the push rod (adapter push rod or service push rod) is retracting. Do not over-torque the release stud assembly. (S-Cam type maximum: 50 lb-ft, Wedge type maximum: 30 lb-ft). The spring brake is now mechanically released.

Sand, Mud, Snow and Ice

If the vehicle gets stuck in sand, mud, snow, or ice:

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

⚠ WARNING!

Do not spin the wheels faster than 35 mph (55 km/h). Spinning a tire at speedometer readings faster than 35 mph (55 km/h) can be dangerous. Tires can explode from spinning too fast. Under some conditions, a tire may be spinning at a speed twice that shown on the speedometer. Any resulting tire explosion could cause death or personal injury to a bystander or passenger, as well as extensive vehicle damage: including tire, transmission and/or rear axle malfunction.

Comply with the following instructions to avoid transmission damage:

- Always start vehicle in motion with the shift lever in first gear.

- Be sure that transmission is fully engaged in gear before releasing the clutch pedal (manual only).
- Do not shift into reverse while the vehicle is moving.
- If the vehicle needs to be recovered from being stuck, do not permit the vehicle to be towed for long distances without removing the driveshaft.

Tire Chains

If you need tire chains, install them on both sides of the driving axle.

CAUTION
Chains on the tires of only one tandem axle can damage the driveline U-joints and the interaxle differential. Repairs could be costly and time-consuming. Failure to comply may result in equipment damage.

Towing the Vehicle

Towing the vehicle should be done by either an authorized dealer or a commercial vehicle towing service. The dealer or commercial towing service will have the necessary equipment to safely tow the vehicle and should be able to make arrangements to limit any damage to the vehicle. The towing service and the dealer should be aware of towing regulations and safety precautions.

The towing service will ensure that the following precautions are taken:

- Use of a safety chain system.
- Abide by all local towing regulations.
- Ensure that the towing device does not contact any surfaces that could be damaged while in transit.
- If towing from the front, ensure that the rear axles are prepared for towing.
- If towing from the rear, ensure that all body components such as roof, side and chassis fairings are secured properly to avoid damage while in transit.

WARNING!
Secure the roof, side and chassis fairings while towing from the rear. An unsecured fairing may come off of the vehicle during transit. Failure to secure the fairings while towing may cause an injury accident resulting in death or personal injury.

INSTRUMENT PANEL

WARNING SYMBOLS

STANDARD GAUGES

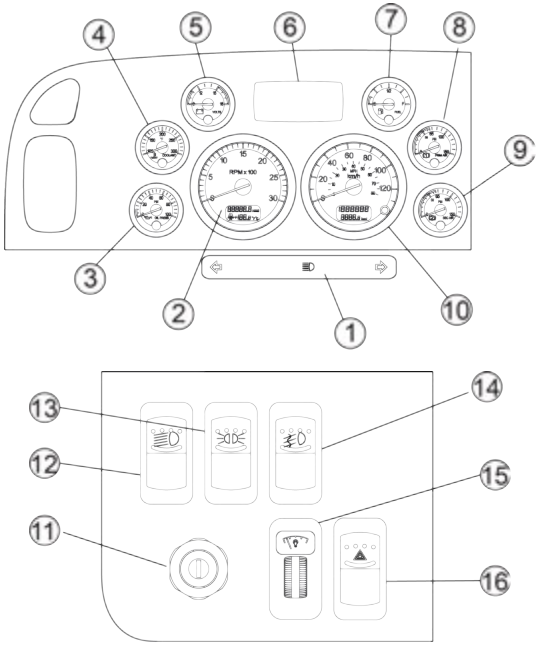
OPTIONAL GAUGES

INSTRUMENT PANEL

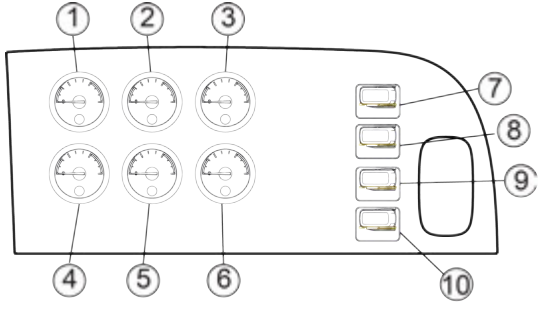
Getting To Know Your Instrument Panel

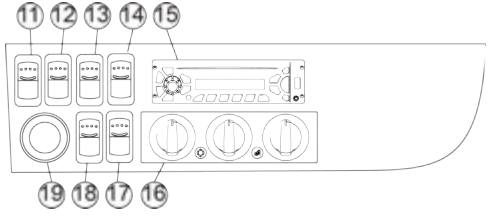
This part explains the location of the various features on your vehicle and describes their function. For information on using these features in driving, see the paragraphs that follow. Please remember that each vehicle is custom-made. Your instrument panel may not look exactly like the one in the pictures that follow. We have tried to describe the most common features and controls available. You can pick out the parts that apply to you and read them to be fully informed on how your particular vehicle operates.

LEFT SIDE



1. Directional Signal and High Beam Indicators (standard) (Note: Custom warning lights are added in this area.)
2. Tachometer
3. Oil Pressure
4. Coolant Temperature
5. Voltmeter
6. Driver Information Display
7. Fuel Level
8. Primary Air Pressure
9. Secondary Air Pressure
10. Speedometer
11. Ignition Key Switch
12. Headlamps
13. Clearance Lamps
14. Fog Lights
15. Panel Light Dimmer
16. Hazard Flasher





RIGHT SIDE

1. Oil Temperature
2. Transmission Oil Temperature
3. Front Driver Oil Temperature
4. Brake Application Pressure
5. Air Cleaner Restriction
6. Rear Driver Oil Temperature
7. Air Suspension Deflate
8. Fifth Wheel Lock
9. Interaxle Differential Lock
10. Exhaust Regeneration Display
11. Engine Fan
12. Fuel Tank Selector
13. Engine Brake On/Off
14. Engine Brake Selector
15. Radio
16. HVAC Control Panel
17. Cruise Control Select
18. Cruise Control On/Off
19. Menu Control Switch (MCS)

Instrument Cluster Description

Instrument System Self-Test

When the ignition switch is turned on the instrumentation system will undergo a Self-Test. This test will verify the operation of the gauges and warnings.

During the Instrumentation System Self-Test, multiple warning icons will be displayed in a sequence. The total sequence should only take no more than 10 seconds to complete.

Refer to Warning Light/Indicator Symbols on page 3-16 for information on each symbol.

Completing this sequence will indicate a successful Self-Test. Have your instrumentation system checked by a qualified service technician if does not successfully complete.

Audible Alarm

The audible alarm will sound during the Instrumentation System Self-Test. The audible alarm will also 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. These will be included in the Instrument System Self-Test.

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

Check Messages

Check messages are provided to give the operator additional information regarding systems that require attention due to a system malfunction and/or operating conditions that may hinder safe and proper performance for the vehicle. Some messages can be managed by the operator while others may require an authorized dealer repair.

1. Speedometer

The Speedometer indicates the vehicle speed in miles per hour (mph) and in kilometers per hour (km/h). The Speedometer cluster also includes several warning and indicator lamps (see Warning Symbols on page 3-15).

2. Tachometer

The Tachometer measures the engine speed in revolutions per minute (RPM).

The RPM Detail is also available as a viewable screen in the instrumentation cluster. Viewing the RPM detail is accomplished by using the MCS dial to rotate to the [VIRTUAL GAUGES].

The tachometer is a useful gauge when attempting to drive efficiently. It will let you match driving speed and gear selection to the operating range of your engine. If the engine speed gets too high, you can select a higher gear to lower the RPM's. If the engine speed drops too low, you can select a lower gear to raise the RPM's. (Refer to Driving Tips and Techniques on page 4-44 for further instructions on driving techniques and using the tachometer.) To avoid engine damage, do not let the pointer exceed maximum governed speed. (See your *Engine*

Operation and Maintenance Manual for RPM recommendations.)

3. Engine, Coolant Temperature

The water temperature gauge shows the temperature of the engine coolant. Under normal operating conditions the water temperature gauge should register between 165° and 205°F (74° and 90°C). Under certain conditions, somewhat higher temperatures may be acceptable. But the maximum allowable temperature is 210°F (99°C), except for certain special engines. Check your engine manual to be sure.

Please refer to Engine is Overheating on page 2-5 for instructions on what to do if the engine is overheating.

4. Fuel Level, Primary

The Primary Fuel gauge indicates the total (approximate) amount of fuel in the fuel tank. In addition to indicating empty and full, the gauge(s) also indicate the fuel level in graduated increments. When the fuel level for the tank is below 1/4 full, a red warning light in the gauge will come on.

Primary

Secondary

NOTE

For Export vehicles, the fuel gauges will not state: ULTRA LOW SULFUR DIESEL FUEL ONLY.

NOTE

This vehicle may be manufactured with different fuel systems and different draw tube locations. Because of this and the amount of road crown, it is recommended that you do not operate your vehicle with less than one-quarter of your truck's fuel capacity. Allowing the fuel level to go below one-quarter of capacity could result in the lack of fuel to keep the engine running. In addition, you will want to keep the fuel tanks at least half-full to reduce condensation of moisture in the tanks. This moisture can damage the engine.

WARNING!

Do not carry fuel containers or any container used to store combustible liquids. Failure to comply may result in death, personal injury, equipment or property damage.

WARNING!

Do not remove a fuel tank cap near an open flame. Fuel vapors may be hot and combustible and can cause an explosion or fire. Failure to comply may result in death, personal injury, equipment or property damage.

Refer to Refueling on page 4-51 for more information.

5. Engine, Oil Pressure

It is important to maintain oil pressure within acceptable limits. If oil pressure drops below the minimum psi a red warning light in the gauge will turn on, the Stop Engine light will come on and an audible alarm tone will sound.

For further information on engine oil and normal operating pressures, see the *Engine Operation and Maintenance Manual*.

CAUTION

Operating your vehicle with insufficient oil pressure will cause serious engine damage.

If the oil pressure fails to rise within 10 seconds after the engine starts, stop the engine and determine the cause.

Check the engine manufacturer's manual for the correct oil pressure ranges for your vehicle's engine.

If the oil pressure suddenly drops, or the audible alarm and engine oil pressure warning light come on while driving, please refer to Engine Oil Pressure Lamp Turns On on page 2-4 regarding what to do if oil pressure is insufficient.

6. Diesel Exhaust Fluid (DEF)

The diesel exhaust fluid gauge shows the approximate amount of DEF fluid in the DEF tank. 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. Do not allow your DEF tank to remain empty. Please refer to your emission supplemental manual for more details about DEF fluid.

CAUTION
Use Diesel Exhaust Fluid only. Failure to do so may damage components of the Diesel Particulate Filter (DPF).

7 and 8. Primary and Secondary Air Pressure

Primary Air Pressure

Secondary Air Pressure

The Primary Air Pressure gauge indicates pressure in the rear braking system. The Secondary gauge indicates pressure in the front braking system. Each gauge indicates the amount of air pressure in each system in pounds per square inch (psi).

On vehicles equipped with metric air pressure gauges, the gauge face plate includes a kPa (major) scale and psi (minor) scale.

Please refer to Low Air Alarm Turns On on page 2-3 for instructions on what to do if the air system becomes inoperative.

NOTE

Be sure the air pressure registers more than 100 psi (690 kPa) in both service systems before you move the vehicle.

NOTE

If the pressure in either or both circuits falls below 65 psi (448 kPa), a red warning light in the gauge will turn on and an audible alarm tone will sound when the engine is running.

WARNING!

If the air pressure falls below 60 psi (414 kPa), the spring brakes may stop the vehicle abruptly which could cause an accident resulting in death or personal injury. Observe the red warning lamps on the gauges. If one comes on, do not continue to drive the vehicle until it has been properly repaired or serviced. If the light and alarm do not turn off at start-up, do not try to drive the vehicle until the problem is found and fixed.

WARNING!

The air pressure warning light and the audible alarm tone indicate a dangerous situation: there is not enough air pressure in the air tanks for repeated braking and the brake system has failed. Without the use of your service brakes your spring brakes could suddenly apply causing a wheel lock-up, loss of control, or over-take by following vehicles. This may cause an accident resulting in death or personal injury. Bring the vehicle to a safe stop right away, while you still have control of the vehicle.

9. Driver Information Display

The display can show multiple warning lights. Warning information will appear momentarily and then will minimize in the screen. Reviewing the warnings can be done by navigating the menu via the Menu Control Switch.

10. Trip Reset

The cluster mounted trip reset button is the only way to zero trip data. After toggling the trip ODO (short pushes to select Trip A, B, C, or D) to the desired trip, HOLD the trip reset button, that resets the displayed trip data.

WARNING SYMBOLS

Guide to the Warning Symbols

The warning lights and audible alarm may indicate a system malfunction. Check the lights frequently, and respond properly as soon as you see one go on. These lights could save you from a serious accident.

When multiple warning icons are shown on the instrument cluster, they will appear at first and then minimize. When minimized they will be represented in the active warnings area of the display (see Warning Light/Indicator Symbols on page 3-16 for details). A triangle represents a warning registered and a diamond represents a check message.

WARNING!

Do not ignore a warning light or audible alarm. These signals tell you something is wrong with your vehicle. It could be a failure in an important system, such as the brakes, which could lead to an accident causing death or injury. Have the appropriate system checked immediately.

Check messages are provided to give the operator additional information regarding systems that require attention due to a system malfunction and/or operating conditions that may hinder safe and proper performance for the vehicle. The system will emit a chime to alert the operator that a message is appearing on the cluster. Some messages can be managed by the operator while others may require an authorized dealer repair.

The following is a list of Warning Light/Indicator Symbols that appear in the instrument cluster.

- the Symbol Name
- the appearance of the Symbol
- the Symbol Color when it is illuminated
- whether the symbol is standard (Std) or optional (Opt)
- whether the symbol has an associated check message
- the Page Number reference for additional information

Symbols are listed by major component sections.

Example: Engine, and then in alphabetical order.

Warning Light/Indicator Symbols

Symbol Name	Symbol	Color	Std/ Opt	Msg	Page
1. Axle, Stability Control		Yellow	STD		on page 3-23
2. Axle, Traction Control		Yellow	STD		on page 3-23
3. Brakes, Anti-Lock Brake System (ABS)		Yellow	STD		on page 3-23
4. Brakes, Low Air		Red	STD		on page 2-3
5. Brake, Park Brake		Red	STD		on page 3-24

Symbol Name	Symbol	Color	Std/ Opt	Msg	Page
6. Brake, Service Brakes		Red	OPT		on page 3-24
7. Brakes, Trailer Anti-Lock Brake System (ABS)		Yellow	STD		on page 3-24
8. Differential, Inter Axle Diff Lock		Yellow	OPT		on page 3-24
9. Dump Truck, Body Up		Red	OPT		on page 3-24
10. Dump Truck, Gate		Yellow	OPT		on page 3-24
11. Dump Truck, Trailer Body Up		Red	OPT		on page 3-24

WARNING SYMBOLS

Symbol Name	Symbol	Color	Std/ Opt	Msg	Page
12. Emissions, Diesel Particulate Filter (DPF)		Yellow	STD		on page 3-25
13. Emissions, High Exhaust System Temperature (HEST)		Yellow	STD		on page 3-25
14. Emissions, Malfunction Indicator Lamp (MIL)		Yellow	STD		on page 3-25
15. Engine, Check Engine		Yellow	STD		on page 3-26
16. Engine, Engine Fan		Green	STD		on page 3-26
17. Engine, Heater		Yellow	OPT		on page 3-26

Symbol Name	Symbol	Color	Std/ Opt	Msg	Page
18. Engine, Low Coolant Level		Yellow	STD		on page 3-26
19. Engine, Overspeed Air Shutdown		Red	OPT		on page 3-26
20. Engine, Retarder (Brake)		Green	OPT		on page 3-26
21. Engine, Stop Engine		Red	STD		on page 3-26
22. Engine, Wait To Start		Yellow	OPT		on page 3-26
23. Fuel, Water In Fuel (WIF)		Yellow	OPT		on page 3-27

Symbol Name	Symbol	Color	Std/ Opt	Msg	Page
24. Lights, High Beam		Blue	STD		on page 3-27
25. Power Take-off (PTO)		Yellow	OPT		on page 3-27
26. Power Take-off (PTO), Pump Mode	PUMP MODE	Green	OPT		on page 3-27
27. Seat Belt, Fasten		Red	STD		on page 3-27
28. Suspension Dump		Yellow	STD		on page 3-27
29. Tire Inflation		Yellow	OPT		on page 3-27

Symbol Name	Symbol	Color	Std/ Opt	Msg	Page
30. Transmission, Auxiliary		Yellow	OPT		on page 3-27
31. Transmission, Check		Red	OPT		on page 3-28
32. Transmission, Oil Temperature High		Yellow	OPT		on page 3-28
33. Transmission, Retarder (may include BrakeSaver when applicable)		Yellow	OPT	•	on page 3-28
34. Transmission, Service Transmission (Allison only)		Yellow	OPT	•	on page 3-28

Symbol Name	Symbol	Color	Std/ Opt	Msg	Page
35. Turn Signal, Left		Green	STD		on page 3-28
36. Turn Signal, Right		Green	STD		on page 3-28

Description of Warning Symbols

1. Axle, Stability Control (ESC or Electronic Stability Control)

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.

- Illuminates during the power-on self-test when the ignition is turned ON. It turns off after a few seconds if no system problems are detected. If an ESC problem is detected, the ESC warning lamp will turn on and stay on.
- Illuminates when the ESC system is regulating individual wheel brakes to correct the vehicle's direction of travel.

2. Axle, Traction Control (ATC or Automatic Traction Control)

Watches vehicle's wheel speeds to detect slippage and may reduce engine power, or apply vehicle brakes, to help increase traction.

- Illuminates during the power-on self-test when the ignition is turned ON. It turns off after a few seconds if no system problems are detected. If an ATC problem is detected, the ATC warning lamp will turn on and stay on.
- Illuminates when the ATC is regulating wheel spin and turns off after the traction control event has ended.
- Flashes continuously when the ATC/Deep Snow & Mud switch is turned on, indicating that this feature is active.

3. Brakes, Anti-Lock Brake System (ABS)

Illuminates during the Instrumentation System Self-Test. 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. See Operating the Brake System on page 4-21 for more information.

Illuminates when a problem exists with the optional Wheel Spin Control feature. See Advanced ABS with Stability Control on page 4-25 for more information.

5. Brake, Park Brake

Illuminates in the status indicator when parking brakes are applied.

6. Brake, Service Brake

Indicates that a fault exists in the brake system. This should be checked by an authorized dealer as soon as possible.

7. Brakes, Trailer Anti-Lock Brake System (ABS)

Illuminates during the Instrumentation System Self-Test and the tractor/truck is connected with a ABS equipped trailer.

Illuminates during normal operating conditions to indicate a problem with the Trailer ABS System. This should be checked by an authorized dealer as soon as possible. See Operating the Brake System on page 4-21 for more information.

NOTE
Tractors/Trucks and trailers built after 3/1/01 must be able to turn on an In-Cab Trailer ABS Warning Lamp (per U.S. FMVSS121). The industry chose Power Line Communication (PLC) as the standard method to turn it on. See Operating the Brake System on page 4-21 for more information. On trailers built prior to 3/1/01 verify trailer ABS system status via the required external warning lamp mounted on the trailer. The indicator lamp on the trailer should be yellow and identified with the letters “ABS”.

8. Differential, Inter Axle Diff 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 4 drive tires based on the differential effect (mostly to the forward rear differential). This feature is standard on all tandem axles.

9. Dump Truck, Body Up

Illuminates when Truck Dump Body is up.

10. Dump Truck, Gate

Illuminates when Truck Dump gate is open.

11. Dump Truck, Trailer Body Up

Illuminates when Trailer Dump Body is up.

12. Emissions, Diesel Particulate Filter (DPF)

Illuminates when diesel particulate filter is plugged. This warning will also illuminate when regeneration operation is disabled.

13. Emissions, High Exhaust System Temperature (HEST)

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

Refer to the Engine Aftertreatment control operator manual for complete instructions and warnings.

WARNING!

If this light is on, do not park in an area of combustible vapors or materials. You must keep combustibles at least five (5) feet away from the exhaust (outlet) stream (as it exits the tail pipe) while the HEST lamp is illuminated. Always park your vehicle outside. Failure to do so could ignite an explosion or harm bystanders which could result in serious injury.

WARNING!

If this light is on, do not park in an area where people are close by. You must keep combustibles at least five (5) feet away from the exhaust outlet while the HEST lamp is illuminated. Failure to do so could result in serious injury.

WARNING!

If this light is on, temperature of the tail pipe, exhaust pipes, diesel particular filter (DPF), selective catalytic reduction (SCR) device and surrounding components including enclosures and steps becomes elevated during engine operation or any regeneration event and can cause serious burns to the skin. Allow adequate cooling time before approaching, working on or near any part of the exhaust system or surrounding components.

14. Emissions, 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 will activate in conjunction with the High Exhaust Temperature, Diesel Particulate Filter (DPF) and Diesel Emission Fluid (DEF) Warning Lights.

15. Engine, Check Engine

Illuminates when a non-emissions related 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.

16. Engine, Engine Fan

Illuminates when fan is active.

17. Engine, Heater

Illuminates when Engine Heater switch is on.

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.

19. Engine, Overspeed Air Shutdown (EOAS)

Illuminates when the Engine Overspeed Air Shutdown system is activated.

20. Engine, Retarder (Brake)

Illuminates when the engine retarder (compression brake or exhaust brake) switch is turned on. (Engine retarders are an option.)

21. Engine, Stop Engine

Illuminates and an audible alarm tone will sound when a major engine system problem exists.

WARNING!

This should be considered an emergency. You should stop the vehicle as safely as possible and turn OFF the ignition. The vehicle must be serviced and the problem corrected before driving again. Failure to do so may cause severe engine damage or cause an accident involving death or personal injury.

22. Engine, Wait To Start

Illuminates when engine grid heater is on. (PACCAR PX-6, PX-8, and Cummins ISL engines)

23. Fuel, Water In Fuel (WIF)

Illuminates when water has been detected in the fuel.

24. Lights, High Beam

Illuminates when the high beams are on. This icon will flash with audible alarm if the headlamps are left on when the door is open. In addition, this icon will flash, 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 will turn on at 50% normal brightness.

25. Power Take-off (PTO)

Illuminates when the PTO is engaged.

NOTE
Do not drive vehicle with PTO engaged.

26. Power Take-off (PTO), Pump Mode

Illuminates with remote throttle application. Indicates pump mode is active.

27. Seat Belt, Fasten

Illuminates when the ignition key is turned on as a reminder to fasten your seat belt.

28. Suspension Dump

Illuminates when suspension air bags are deflated.

29. Tire Inflation

Illuminates when tire pressures need to be checked. (Tire Pressure Monitoring System is an option.)

30. Transmission, Auxiliary

Illuminates to indicate auxiliary transmission is in neutral.

31. Transmission, Check

Illuminates when transmission has recorded a fault code. This icon may also appear in the Transmission Display menu of the Driver Performance Center. If the user is in this display menu, the icon does not indicate a fault code.

32. Transmission, Oil Temperature High

33. Transmission, Retarder (may include BrakeSaver when applicable)

Illuminates when BrakeSaver (export only) or Transmission Retarder is active.

34. Transmission, Service Transmission (Allison only)

Illuminates when Allison 1000/2000 transmission requires service.

35. Turn Signal, Left

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

36. Turn Signal, Right

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

STANDARD GAUGES

Introduction

On the pages that follow you will find descriptions of some of the gauges on your instrument panel. For more information about using them in driving, see “Starting and Operating the Vehicle” Also check the Index under the name of the gauge or function you want to know more about.

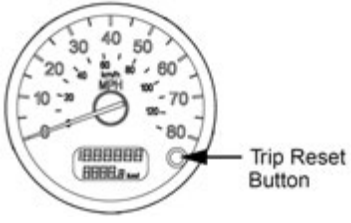
WARNING!

Do not ignore a warning light or audible alarm. These signals tell you something is wrong with your vehicle. It could be a failure in an important system, such as the brakes, which could lead to an accident. Have the appropriate system checked immediately.

Some gauges will display a red LED warning light, with some accompanied by an audible alarm, whenever the limits of the function being displayed are exceeded.

Speedometer

The speedometer indicates the vehicle speed in miles per hour (mph) and in kilometers per hour (km/h). The speedometer also includes an odometer, trip meter, and trip reset button.



Odometer / Trip Meter

The LCD display in the lower part of the speedometer contains the odometer and trip meter.

The odometer displays the total distance your vehicle has traveled. It will display in miles on an English speedometer or in kilometers on a metric speedometer. The maximum distance that can be shown on the odometer is “1 999 999” before it rolls over to zero.

The trip odometer displays how far the vehicle has gone on a particular trip. The trip odometer will display in miles on an English speedometer or in kilometers on a metric speedometer, in one tenth divisions. The maximum distance that can be shown on the trip odometer is “9999.9” before it rolls over to zero.

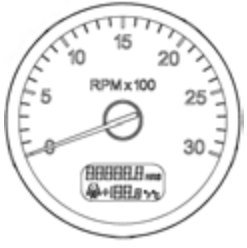
To reset the trip odometer, press and hold the trip reset button on the speedometer. The numbers will reset to 0 and begin to count new miles/km traveled. This also resets the trip values in the Driver Information Display.

The trip reset button also toggles all displays between English and Metric.

NOTE
The Odometer/Trip Meter comes on when the door is opened or the key is in the accessory or ignition position. The Odometer/Trip Meter will remain on for 3 seconds after the door is closed or the ignition switch is turned off. This allows driver and service personnel to read the odometer without ignition switch being turned on.

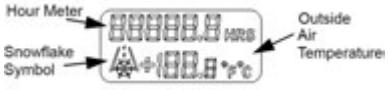
Tachometer

Your tachometer measures the engine speed in revolutions- per-minute (RPM). The tachometer also includes an engine hour meter and outside air temperature display.



Engine Hours / Outside Air Temperature

The LCD display in the lower part of the tachometer contains the engine hour meter and the outside air temperature display.



The engine hour meter will display the total number of hours the engine has been running. The maximum hours that can be shown are “99999.9” before the meter rolls over to zero.

The outside air temperature (OAT) will display the temperature outside the vehicle. The temperature can be displayed from -40° to 158° in Fahrenheit or -40° to 70° Celsius. The display will also alert the driver when the outside temperate approaches freezing (32°F or 0°C) by displaying a snowflake symbol. The symbol will turn on when the temperature drops below 34°F or 11°C and flash for the first 3 seconds, then stay on until the temperature goes above 37°F or 28°C

The temperature can display using Standard or Metric units. Press the trip reset button on the Speedometer 4 times within 4 seconds. This will also change the units shown by the Driver Information Display.

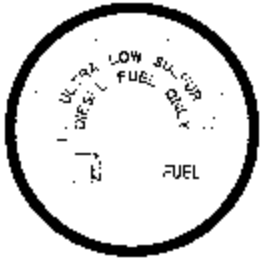
> NOTE
>
> The OAT will come on when the door is open and the key switch is in the accessory or ignition position. The OAT display will turn off when the ignition switch is turned off.

> NOTE
>
> The OAT uses a sensor (located at the bottom of the driver’s side mirror assembly) to measure outside air temperature only. It is not capable of displaying the temperature of the road surface on either the temperature display or the snowflake icon.

> NOTE
>
> The effects of direct sunlight, or the use of mirror heat, will increase the outside air temperature displayed while the vehicle is stationary.

3

Fuel Gauge



PB002

The fuel gauge shows the approximate amount of fuel in the fuel tanks. Besides empty and full, the gauge also indicates 1/4, 1/2, and 3/4 of total capacity. You will want to keep your fuel tanks at least half full to reduce condensation of moisture in the tanks. This moisture can damage your engine.

WARNING!

Do not remove a fuel tank cap near an open flame. Hot fuel vapors are combustible and can cause an explosion or fire resulting in injury or death.

CAUTION

Use Ultra Low Sulfur Diesel fuel only. Failure to do so may damage components of the Diesel Particulate Filter (DPF).

Primary (Secondary) Air Pressure Gauge (Air Reservoir)

The air pressure gauge indicates the amount of air pressure in the brake system in pounds per square inch (psi).

- The primary gauge shows rear reservoir air pressure.

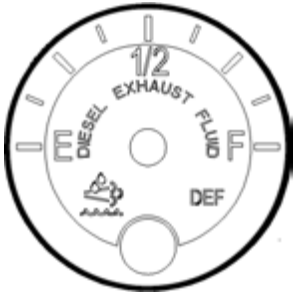
- The secondary gauge shows pressure in the front reservoir.

Ensure the air pressure registers more than 100 psi in both service systems before you move the vehicle. If the pressure in either circuit is too low for normal brake operation, the warning light will glow and the audible alarm will sound.

WARNING!

The air pressure warning light and the audible alarm indicate a dangerous situation. There is not enough air pressure in the reservoirs for repeated braking and the brake system has failed. If air pressure falls below 60 psi (414 kPa) the spring brakes could suddenly apply, causing a wheel lockup, loss of control, or your vehicle to be overtaken by following vehicles. You could be in an accident and severely injured. If these alarms come on while you are driving, bring your vehicle to a safe stop right away. If the light and alarm do not turn off at start-up, do not try to drive the vehicle until the problem is found and fixed.

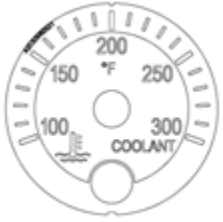
Diesel Exhaust Fluid (DEF) Gauge



The diesel exhaust fluid gauge shows the approximate amount of DEF fluid in the DEF tank. 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. Maintain an adequate amount of diesel exhaust fluid at all times, as provided in the aftertreatment system operator manual. Please refer to the aftertreatment operator manual for more details about DEF fluid.

CAUTION
Use Diesel Exhaust Fluid only. Failure to do so may damage components of the Diesel Particulate Filter (DPF).

Water Temperature Gauge

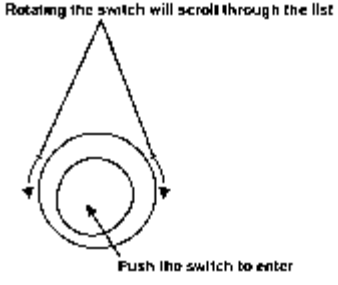


Under normal operating conditions the temperature gauge should register between 165° and 205°F (74° and 90°C). Under certain conditions, somewhat higher temperatures may be acceptable. But the maximum allowable temperature is 210°F (99°C) with the cooling system pressurized, except for certain special engines. Check your engine manual to be sure.

How To Navigate The Functions In The Instrument Cluster Display

Menu Control Switch (MCS)

The MCS is used to navigate the Driver Information Display unit. The Menu Control Switch is located on the D Panel as shown in the illustration below.



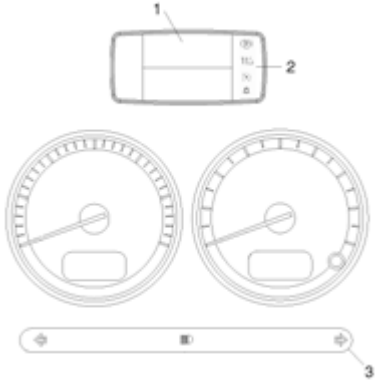
The MCS has the following functions:

- Rotating the MSC
  - Selecting display

- Setting values

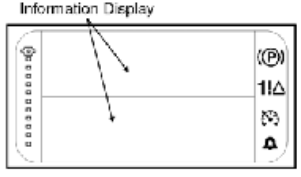
- Pushing the MSC
  - Confirming desired selection

Driver Information Display



1. Driver Information Display
2. Status Indicator
3. Lower Light Bar

Driver Information Display Description



WARNING!

Do not look at the Driver Information Display for prolonged periods while the vehicle is moving. Only glance at the monitor briefly while driving. Failure to do so can result in the driver not being attentive to the vehicle's road position, which could lead to an accident and possible personal injury or equipment damage.

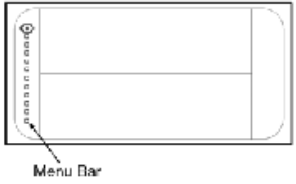
The Driver Information Display, located at the top of the instrument cluster, displays important vehicle information

through a constant monitoring of systems when any of the following conditions are met:

1. ignition key in ON or ACC positions
2. ignition timer is active
3. MCS button is pushed (independent of ignition key switch position)
4. clock alarm sounds
5. driver or passenger door is opened
6. hazard warning lamp switch is on

The various functions may be accessed by navigating through Menu Screens using the MCS. Refer to Menu Control Switch (MCS) on page 3-34 for more detail for the MCS.

The bullets in the Menu Bar allow access to each item by pushing the MCS when the desired bullet is highlighted.



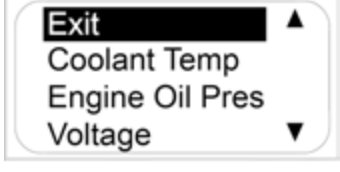
In addition to a blank screen, the following are menu items and the information available within each menu selections.

NOTE
Some Driver Information Display functions are only accessible when the vehicle is parked. Other functions are accessible while the vehicle is moving or when parked. Each function is identified in the following descriptions.

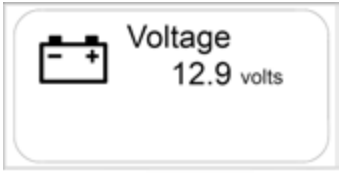
Virtual Gauges

The virtual gauges function is selected through the rotary MCS knob and is available in both parked and driving modes.

Dynamic vehicle status information is available when scrolling through this menu selection:

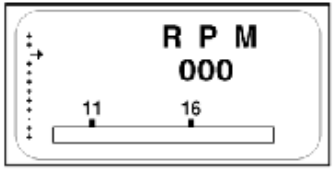


When selecting the virtual gauge, the screen will display the specific information for that gauge. The system voltage is shown for illustrative purposes.



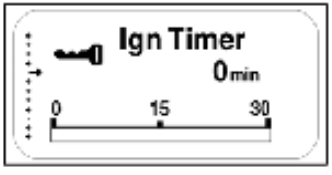
NOTE
Engine coolant temperature may not be a virtual gauge if it is already a mechanical gauge on the dashboard.

RPM Detail



RPM reading of actual engine RPM (Accessible while parked or driving). Engine RPM within the bar graph indicates the engine is operating in the most efficient RPM range. The display color will change if you are operating outside of this range.

Ignition Timer

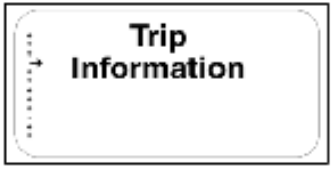


Ignition timer is set from this menu. The ignition timer may be set for up to 30 minutes. (Accessible while parked only)

3

Trip Information

> **NOTE**
>
> When accessing the trip information menu, push the MCS on this menu (bullet). To exit, push the MCS again. To reset the trip values, press the Trip Odometer Reset Button on the main gauge instrument cluster.

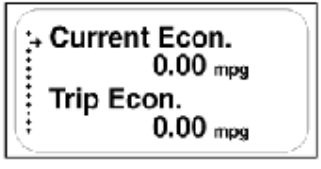


Trip Information functions area accessible when parked:

- Fuel Economy
- Average Speed
- Distance
- Engine Hours
- Idle Hours
- % Idle Hours
- PTO Hours
- % PTO Hours

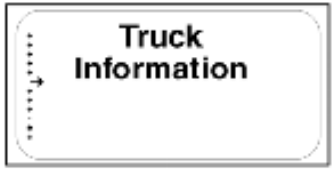
To reset the Trip Values, press the Trip Odometer Reset Button on the main gauge instrument cluster.

While moving, this menu will only display instantaneous fuel economy.



Truck Information

> **NOTE**
>
> When accessing the truck information menu, push the MCS on this menu (bullet). To exit, push the MCS again.



This information is available when the vehicle is parked.

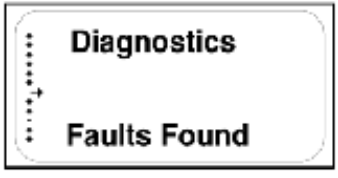
1. Chassis Information
   a. Chassis Number
   b. Fleet ID
   c. CECU Software Version #
2. Engine Information

a. Engine Make
b. Engine Model
c. Engine Software Version
d. Governed Speed Limit
e. Engine Power

3. Transmission Information
   a. Transmission Make
   b. Transmission Model
   c. Transmission Software Version #
4. ABS Information
   a. ABS Make
   b. ABS Model
   c. ABS Software Version #

Diagnostic Display

NOTE
"Faults Found" will only be active if a red or yellow warning lamp is illuminated.

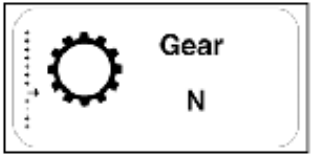


This information is available when the vehicle is parked.

The diagnostic display menu (bullet) will indicate a fault that is generated by the vehicle's Engine, ABS and/or Transmission systems. While on this menu item the display will either indicate "No Faults Found" or "Faults Found". If "Faults Found" is active, pushing the MCS will display new menus for more information.

Transmission Display

NOTE
Refer to the Automated Transmission Operator's Manual for additional information.



This information is available for Automated Transmissions and is accessible when the vehicle is parked or driving.

This menu will show gear number that coincides with the current transmission gear selected. The menu also displays the transmission icon to let the user

know what screen they are in. (Does not indicate a fault code.)

Active Warnings

This information is accessible when the vehicle is parked or driving.

This menu selection will display all active warning icons. The display will read “No Warnings” when there are no active warnings.

Clock

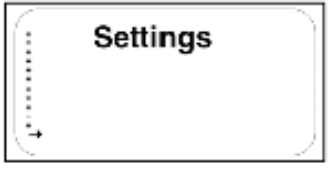
This information is accessible when the vehicle is parked or driving.

Settings Menu

This information is accessible only when the vehicle is parked.

The Settings menu screen allows the driver to view and/or change the following menu items:

- Display Format 12 Hour (AM/PM) or 24 Hour (military)
- Home/Local Time
- Alarm ON/OFF
- Alarm Time
- Units of measure
- Language (English, Spanish or French)



To set clock display format:

1. When in the Settings Menu, scroll through the list of menu items to “Format”.
2. Press the MCS to display either 12 hour (AM/PM) or 24 hour (military) time.

To set home, local or alarm time:

1. When in the Settings Menu, scroll through the list of menu items.
2. Press the MCS to select the item to change.
3. Rotate the MCS knob to change the hour. Press the MCS.
4. Rotate the MCS knob to change the minutes. Press the MCS.
5. Rotate the MCS to toggle AM/PM. Press the MCS.
6. Press the button above the MCS to Exit.

To turn alarm ON/OFF:

1. When in the Settings Menu, scroll through the list of menu items to “Alarm”. Press the MCS.
2. Press the MCS to turn the alarm ON or OFF.

To set units of measure:

1. When in the Settings Menu, scroll through the list of menu items to “Units”. Press the MCS.
2. Press the MCS to display either Standard or Metric units.

To set language:

1. When in the Settings Menu, scroll through the list of menu items to “Language”. Press the MCS.
2. Rotate the MCS to display either English, Spanish or French. Press the MCS knob to select the desired language.

OPTIONAL GAUGES

Introduction

Listed here are gauges that may or may not be on your dashboard or the center instrument cluster. 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.

Axle, Pusher Air Pressure

The Pusher Axle Air Pressure gauge(s) indicate the air pressure in the pusher axle(s) suspension air bags. This icon may have a numeral above the image of the wheel to indicate which pusher axle if there are multiple pusher axles on the vehicle.

Axle, Tag Air Pressure

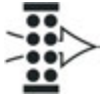
The Tag Axle Air Pressure gauge indicates the amount of air pressure in the tag axle suspension air bags. This icon may have a numeral above the image of the wheel to indicate which pusher axle if there are multiple pusher axles on the vehicle.

Fuel Filter Restriction

This gauge tells you the condition of the fuel filter by indicating the restriction from the fuel filter to the fuel pump. Check the engine manual for proper restriction. Replace the filter with an approved filter only. Do not substitute the wrong micron element.

NOTE
The maximum allowable restriction could vary according to the type or make of engine. Consult the engine manufacturer's manual or engine dealer for fuel restriction specifications.

Air Filter Restriction Indicator or Gauge



This gauge indicates the condition of the engine air cleaner.

CAUTION
Continued operation with the dirty air filter may cause damage to the engine. Inspect the filter and replace if necessary. Holes in the paper element render an air cleaner useless and may cause the Air Filter Restriction Gauge to give a false reading, even if the element is clogged. Replace the element if it is damaged.

Engine, Oil Pressure

It is important to maintain oil pressure within acceptable limits. If oil pressure drops below the minimum psi a red warning light in the gauge will turn on, the Stop Engine light will come on and an audible alarm tone will sound.

Engine, Oil Temperature

The Engine Oil Temperature gauge indicates the engine oil temperature. If the oil temperature exceeds the maximum limits, a red warning light in the gauge will turn on. Do not exceed maximum engine oil temperature recommended by the engine manufacturer. (See the *Engine Operation and Maintenance Manual* for details.)

Manifold Pressure Gauge

Your manifold pressure gauge indicates the power your engine is putting out by showing the amount of turbo boost. 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 person.

Fuel Pressure Gauge

Your vehicle may also have a fuel pressure gauge.

WARNING!

Do not carry additional fuel containers in your vehicle. Fuel containers, either full or empty, may leak, explode, and cause or feed a fire, possibly causing death or personal injury. Do not carry extra fuel containers, even empty ones are dangerous.

Transmission Temperature Gauge

Your Transmission Temperature Gauge indicates the temperature of the oil in your transmission. Watch this gauge to know when your transmission is overheating. If it is, have it checked by an authorized service representative.

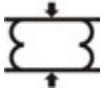
Maximum transmission temperature may vary, depending upon the transmission and type of lubricant. Check your transmission owner's manual.

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(s) lubrication checked.

CAUTION
Driving with very hot temperatures in your rear drive axles can cause serious damage to axle bearings and seals. Have your axle lubrication checked if you notice a sign of overheating.

Suspension Load Air Pressure, #1, #2



Suspension Load Air Pressure #1

Suspension Load Air Pressure #2

The Suspension Load Air Pressure gauge indicates the amount of air pressure in the air suspension air bags.

When the vehicle is equipped with dual leveling valves, the #1 gauge indicates the air pressure in the driver's side air bags. The #2 gauge indicates the air pressure in the passenger's side air bags.

Trailer Air Tank Air Pressure

The Trailer Air Tank Air Pressure gauge indicates the amount of air pressure in the trailer brake air tank.

Transmission Retarder Oil Temperature

The Transmission Retarder Oil Temperature gauge indicates the temperature of the oil in the transmission retarder.

NOTE
Watch this gauge to know when the transmission is overheating.

Do not exceed maximum oil temperature recommended by the manufacturer. See the *Transmission Operation and Maintenance Manual* for details.

SWITCHES

Dash Switches

This custom vehicle will have a wide variety of switch controlled equipment. However, this particular vehicle may not have every switch identified in this section of the operator manual.

Some air device switches on the dash may require that the vehicle either be at a specific speed, park brakes set or another device to be on or off for the air device to operate.

The instrument display will display information regarding what needs to change in order for the air device to operate as expected.

The following table provides a complete list of icons that may be found on the switch.

Dash Switches

Symbol Name	Symbol	Color	Standard	Option	Page
1. Axle, Automatic Traction Control		None	•		See Axle, Automatic Traction Control on page 3-57.
2. Axle, Diff-Lock - Dual		Amber		•	See Axle, Diff-Lock - Dual on page 3-57.
3. Axle, Diff-Lock - Forward Rear		Amber		•	See Axle, Diff-Lock - Forward Rear on page 3-57.
4. Axle, Diff-Lock - Steer		Amber		•	See Axle, Diff-Lock - Front on page 3-57.

Symbol Name	Symbol	Color	Standard	Option	Page
5. Axle, Diff-Lock - Rear Rear		Amber		•	See Axle, Diff-Lock - Rear Rear on page 3-57.
6. Axle, Diff-Lock - Single Rear		Amber		•	See Axle, Diff-Lock - Single Rear on page 3-57.
7. Axle, Inter-Axle Differential Locked (Tandem)		Amber		•	See Axle, Inter-Axle Differential Locked (Tandem) on page 3-57.
8. Axle, Two Speed		Green		•	See Axle, Two Speed on page 3-57.
9. Batteries, Low Voltage Disconnect (LVD)		None	•		See Batteries, Low Voltage Disconnect (LVD) on page 3-57.
10. Brakes, ABS Off-Road		Amber		•	See Brakes, ABS Off-Road on page 3-57.
11. Brakes, Parking Brake Valve		Red	•		See Brakes, Parking Brake Valve on page 3-57.

Symbol Name	Symbol	Color	Standard	Option	Page
12. Cab Dimmer Switch		None	•		See Cab Dimmer Switch on page 3-57.
13. Dump Truck Gate		Red		•	See Dump Truck Gate on page 3-57.
14. Engine, Brake Level		None		•	See Engine, Brake Level on page 3-57.
15. Engine, Brake On/Off		Green		•	See Engine, Brake On/Off on page 3-58.
16. Engine, Cruise Control On/Off		Green	•		See Engine, Cruise Control On/Off on page 3-58.
17. Engine, Cruise Control Set/Resume		None	•		See Engine, Cruise Control Set/Resume on page 3-58.
18. Engine, Fan Override		Green		•	See Engine, Fan Override on page 3-58.

Symbol Name	Symbol	Color	Standard	Option	Page
19. Engine, Heater		Green		•	See Engine, Heater on page 3-59.
20. Engine, Overspeed Air Shutdown (Manual)		None		•	See Engine, Overspeed Air Shutdown on page 3-59.
21. Engine, Overspeed Air Shutdown (Test)		Amber		•	See Engine, Overspeed Air Shutdown (Test) on page 3-59.
22. Engine, Remote Throttle		Amber		•	See Engine, Remote Throttle on page 3-59.
23. Exhaust, Diesel Particulate Filter (DPF) Regeneration		None	•		See Exhaust, Diesel Particulate Filter (DPF) Regeneration on page 3-59.
24. Fifth Wheel Slide		Red		•	See Fifth Wheel Slide on page 3-59.
25. Fuel Heater		Amber		•	See Fuel Heater on page 3-59.

Symbol Name	Symbol	Color	Standard	Option	Page
26. Generic Air, Accessory		Green		•	See Generic Air, Accessory on page 3-60.
27. Generic, Spare	**SPARE**	Green		•	See Generic, Spare on page 3-60.
28. Ignition Key Switch			•		See Ignition Key Switch on page 3-60.
29. Lights, Auxiliary		Green		•	See Lights, Auxiliary on page 3-60.
30. Lights, Beacon		Green		•	See Lights, Beacon on page 3-60.
31. Lights, Daytime Running (Override)		Green		•	See Lights, Daytime Running on page 3-60.
32. Lights, Dome		None	•		See Lights, Dome on page 3-60.

Symbol Name	Symbol	Color	Standard	Option	Page
33. Lights, Exterior Lights Self-Test		None	•		See Lights, Exterior Lights Self-Test on page 3-60.
34. Lights, Flood		Amber		•	See Lights, Flood on page 3-60.
35. Lights, Flood ISO 3732 Spare		Amber		•	See Lights, Flood ISO 3732 Spare on page 3-61.
36. Lights, Fog		Green		•	See Lights, Fog on page 3-61.
37. Lights, Hazard		Red	•		See Lights, Hazard on page 3-61.
38. Lights, Headlight		None	•		See Lights, Headlight on page 3-61.

Symbol Name	Symbol	Color	Standard	Option	Page
39. Lights, Marker/Clearance		None	•		See Lights, Marker/Clearance on page 3-61.
40. Lights, Marker/Clearance/Cab		None		•	See Lights, Marker/Clearance/Cab on page 3-62.
41. Lights, Marker/Clearance/Trailer		None		•	See Lights, Marker/Clearance/Trailer on page 3-62.
42. Lights, Park Light		None	•		See Lights, Park Light on page 3-62.
43. Lights, Spot		Green		•	See Lights, Spot on page 3-62.
44. Pintle Hook		Green		•	See Tow Hook on page 3-62.
45. Power Take-off (PTO)		Amber		•	See Power Take-off (PTO) on page 3-62.

Symbol Name	Symbol	Color	Standard	Option	Page
46. Power Take-off (PTO), Forward		Amber		•	See Power Take-off (PTO), Forward on page 3-62.
47. Power Take-off (PTO), Rear		Amber		•	See Power Take-off (PTO), Rear on page 3-62.
48. Suspension, Axle, Pusher		Green		•	See Suspension, Axle, Pusher on page 3-62.
49. Suspension, Axle, Tag		Green		•	See Suspension, Axle, Tag on page 3-62.
50. Suspension, Dump		Amber		•	See Suspension, Dump on page 3-62.
51. Suspension, Lift		Amber		•	See Suspension, Lift on page 3-63.
52. Suspension, Third Axle Lift		Green		•	See Suspension, Third Axle Lift on page 3-63.

Symbol Name	Symbol	Color	Standard	Option	Page
53. Trailer Air Supply		Red	•		See Trailer, Air Supply on page 3-63.
54. Trailer, Axle (3rd Axle) Lift		Green		•	See Trailer, Axle (3rd Axle) Lift on page 3-63.
55. Trailer, Axle Lift Forward		Green		•	See Trailer, Axle Lift Forward on page 3-63.
56. Trailer, Axle Lift Rear		Green		•	See Trailer, Axle Lift Rear on page 3-63.
57. Trailer, Belly Dump		Red		•	See Trailer, Belly Dump on page 3-63.
58. Trailer, Dump Gate		Red		•	See Trailer, Dump Gate on page 3-63.
59. Trailer, Dump Gate Center		Red		•	See Trailer, Dump Gate Center on page 3-63.

Symbol Name	Symbol	Color	Standard	Option	Page
60. Trailer, Dump Gate Front		Red		•	See Trailer, Dump Gate Front on page 3-63.
61. Trailer, Dump Gate Rear		Red		•	See Trailer, Dump Gate Rear on page 3-63.
62. Trailer, Hotline		Green		•	See Trailer, Hotline on page 3-63.
63. Trailer, Kingpin		Amber		•	See Trailer, Kingpin on page 3-63.
64. Trailer, Suspension Air Dump		Amber		•	See Trailer, Suspension Air Dump on page 3-63.
65. Transmission, Transfer Case		Amber		•	See Transmission, Transfer Case on page 3-64.
66. Transmission, Transfer Case 2 Speed		Amber		•	See Transmission, Transfer Case 2 Speed on page 3-64.
67. Winch Clutch		Green		•	See Winch Clutch on page 3-64.

1. Axle, Automatic Traction Control
Momentarily push switch in to engage Traction Control (TC).

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

3. Axle Diff-Lock - Forward Rear
Turn switch on to engage Forward Rear Axle Diff Lock.

4. Axle Diff Lock - Steer
Turn switch on to engage Front Axle Diff Lock.

5. Axle Diff-Lock Rear Rear
Turn switch on to engage Rear Rear Axle Diff Lock.

6. Axle Diff Lock - Single Rear
Turn switch on to engage Single Rear Axle Diff Lock.

7. Axle, Inter-Axle Differential Locked (Tandem)
Turn switch on to engage Inter-Axle Differential Lock.

8. 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.

9. 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.

10. Brakes, ABS Off-Road
Turn switch on to engage ABS Off-Road mode. See Operating the Brake System on page 4-21.

11. Brakes, Parking Brake Valve
Pull yellow knob to activate parking brakes. See Parking Brake on page 4-34.

12. Cab Dimmer Switch
This switch is used to alter the brightness of the instrument panel lights.

13. Dump Truck Gate
Turn switch on to open Dump Truck Gate.

14. Engine, Brake Level
In the up position there will be 100% engine retarding. In the middle position there will be 60% engine retarding. In the down position there will be 33% engine retarding.

For more information on when and how to use the engine brake in your vehicle, see the engine brake owner's manual for additional engine brake information.

3

15. Engine, Brake On/Off
Turn switch on to activate Engine Brake system.

For more information on when and how to use the engine brake in your vehicle, see the engine brake owner's manual for additional engine brake information.

16. Engine, Cruise Control On/Off
Turn switch on to activate Cruise Control System.

17. Engine, Cruise Control Set/Resume
The Cruise Control Set/Resume switch allows you to SET the desired speed or RESUME the desired speed after the cruise control function has been interrupted.

WARNING!

Do not operate the cruise control when operating on road surfaces with poor traction (wet, icy, or snow covered roads) or in heavy traffic. Accelerations caused by the normal operation of the cruise control could cause you to lose control of the vehicle resulting in an injury accident.

18. Engine Fan Override
The engine fan switch allows you to control the engine fan manually or automatically. Please refer to Engine Fan Control on page 4-11 for more information on how to operate this switch.

WARNING!

Do not work on or near the fan with the engine running. Anyone near the engine fan when it turns on could be seriously injured. If it is set at MANUAL, the fan will turn on any time the ignition key switch is turned to the ON position. In AUTO, it could engage suddenly without warning. Before turning on the ignition or switching from AUTO to MANUAL, be sure no workers are near the fan.

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.

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.

19. Engine Heater
Turn switch on to activate the Engine Heater.

20. Engine, Overspeed Air Shutdown (Manual)
Turn switch on to engage the Engine Overspeed Air Shutdown system. A system reset will be required before re-starting engine. See EOAS system manufacturer's instruction manual for details.

21. Engine, Overspeed Air Shutdown (Test)
Hold down switch and increase engine RPM to test that Engine Overspeed Air Shutdown system functions correctly. A system reset will be required before restarting engine. See EOAS system manufacturer's instruction manual for details.

22. Engine, Remote Throttle
Turn switch on to activate Remote Throttle Control.

23. Exhaust, Diesel Particulate Filter (DPF) Regeneration Switch
Manually controls the diesel particulate filter regeneration process. Refer to Engine After-treatment Controls Operator's Manual for additional information.

24. 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.

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.

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 or property damage.

25. Fuel Heater
Turn switch on to activate Fuel Heater.

26. Generic, Air, Accessory
Provides accessory air to the end of frame connection when switch is turned on.

SP-ARE

27. Generic, Spare
Turn switch on to power customer installed accessory.

28. Ignition Key Switch
The ignition key switch (located to the left of the steering column) has four positions: ACC (Accessories), OFF, ON, and START. For more information, see Ignition Key Switch on page 3-83.

29. Lights, Auxiliary
Turn switch on for Auxiliary Lights.

30. Lights, Beacon
Turn switch on for Beacon Light(s).

31. Lights, Daytime Running Lights (DRL) (with optional over-ride switch)
Three controls (or conditions) will affect whether the system is ON or OFF:

- headlight (master) switch
- engine cranking
- parking brake

If the headlight switch is turned OFF, the DRL system engages automatically after the engine starts and you release the parking brake. If the headlight switch is ON, the DRL system is overridden, and headlights operate normally. Also, during engine cranking the DRL is temporarily turned off.

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 or property damage.

32. Lights, Dome
Turn switch on for Cab Dome Lights.

33. Lights, Exterior Lights Self-Test
This switch will engage a program which will illuminate exterior light for the operator to verify functionality. Please refer to Exterior Lights Self-Test on page 3-71 for more detail on how to use the program.

34. Lights, Flood
Turn switch on for cab mounted Flood Lights.

35. Lights, Flood ISO 3732 Spare
Turn switch on for trailer mounted Flood Lights.

36. Lights, Fog
Turn switch on for Fog Lights.

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.

37. Lights, Hazard
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!

Use your Hazard Warning Light System any time you have to stop off the road or on the side of the road, day or night. A hard-to-see vehicle can result in an injury accident. Another vehicle could run into you if you do not set your flashers and follow the placement of emergency signals per FMCSR 392.22.

38. Lights, Headlight
Turn switch on for headlights. When the Headlights are ON, the dash lights, side, and tail lights are also on.

CAUTION

If you have confirmed there is a problem in the low beam wiring circuit, proceed with caution to the next available exit/turnoff and safely pull your vehicle completely off the road and call for assistance. Driving your vehicle with the headlamps on high beam (at reduced intensity) for a prolonged period could lead to an injury accident. Contact your nearest dealer to have the problem corrected as soon as possible.

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.

40. Lights, Marker/Clearance/ Cab
Turn switch on to control Cab Marker/Clearance lights separately from the trailer.

41. Lights, Marker/Clearance/ Trailer
Turn switch on to control Trailer Marker/Clearance lights separately from the vehicle marker/clearance lights.

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.

43. Lights, Spot
Turn switch on for Spot Light.

44. Pintle Hook
Turn switch on to remove the slack from the Tow Hook.

45. Power Take-off (PTO)
Turn switch on to engage PTO. Your 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 lamp (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 lamp (located on the switch) will go out immediately even though PTO disengagement may not have occurred.

NOTE

Actual PTO engagement/ disengagement may be delayed momentarily since it is controlled by the air system and mechanical movement.

CAUTION

Increasing engine RPM before the PTO is actually engaged could prevent the PTO from engaging and/or cause PTO damage.

46. Power Take-off (PTO), Forward
Turn switch on to engage forward PTO.

47. Power Take-off (PTO), Rear
Turn switch on to engage Rear PTO.

48. Suspension, Axle, Pusher
Turn switch on to lower Single or Forward Pusher Axle.

49. Suspension, Axle, Tag
Turn switch on to lower tag axle.

50. 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.

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).

51. Suspension, Lift
Turn switch on to over-inflate suspension air bags. Turn switch off for normal suspension height.

52. Suspension, Third Axle Lift
Turn switch on to raise Third Axle.

53. Trailer, Air Supply
The red octagon knob controls the air supply to the trailer.

54. Trailer, Axle (3rd Axle) Lift
Turn switch on to lift 3rd Trailer Axle.

55. Trailer, Axle Lift Forward
Turn switch on to lift Forward Trailer Axle.

56. Trailer, Axle Lift Rear
Turn switch on to lift Rear Trailer Axle.

57. Trailer, Belly Dump
Turn switch on to open Trailer Belly Dump.

58. Trailer, Dump Gate
Turn switch on to open Trailer Dump Gate.

59. Trailer, Dump Gate Center
Turn switch on to open Trailer Center Dump Gate.

60. Trailer, Dump Gate Front
Turn switch on to open Trailer Front Dump Gate.

61. Trailer, Dump Gate Rear
Turn switch on to open Trailer Rear Dump Gate.

62. Trailer, Hotline
Turn switch on to supply electrical power to trailer accessories.

63. Trailer, Kingpin Release/Unlock
Switch to control the lock mechanism on the kingpin.

64. Trailer, Suspension Air Dump
Turn switch on to deflate Trailer Air Suspension.

65. Transmission, Transfer Case
Turn switch on to shift the transfer case.

66. Transmission, Transfer Case 2 Speed
Turn switch on to shift the 2 speed transfer case.

67. Winch Clutch
Turn switch on to engage Winch Clutch.

Controls on the Steering Column

Introduction

NOTE
The ignition key must be turned to ON for the signal/switch to operate.

The turn signal lever is mounted on the left side of the steering column. The lever controls several functions: turn signal, high beam and windshield wiper control.

Tilt/Telescoping Steering Column

Depending on your vehicle's configuration, you may have either a Tilt/Telescoping or a fixed steering column.

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

To activate these features, locate the Tilt/Telescoping pedal.

WARNING!

Make all adjustments to the steering mechanism while the vehicle is stopped. Adjusting the Tilt-Telescoping Steering Wheel while the vehicle is in motion could cause loss of control. You wouldn't be able to steer properly and could have an accident resulting in death or personal injury.

To adjust the steering wheel, PUSH and HOLD the pedal down fully. Push or pull the wheel to the desired height and angle, then RELEASE the pedal to lock the wheel at the correct position.

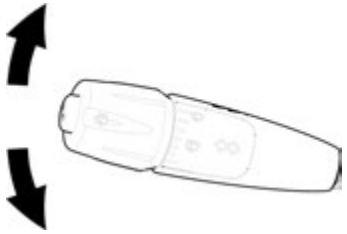
Turn Signal/High Beam Switch

NOTE

The ignition key must be turned to ON for the signal/switch to operate.

The lever-action turn signal/high beam switch is located on the left side of the steering column.. Each time a turn indicator is activated the buzzer emits a short beep.

Turn Signals



Turn Signal

- To signal a right turn, push the lever forward (clockwise).
- To signal a left turn, pull the lever back (counterclockwise).
- Each time the turn indicator is activated the audible warning emits a short beep.

NOTE

If the vehicle turn signals and turn signal indicators in the dash gauge cluster ever begin flashing at an accelerated rate (115 cycles per minute) when the turn signal lever is in the OFF (center) position, or when a Right/Left turn has been selected, the problem may be related to a failed turn signal switch or turn signal module. In either case, the problem is not a failed bulb. Contact your nearest authorized dealer to have the problem corrected as soon as possible.

WARNING!

After you complete a turn, shut the system 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 injury accident. An indicator light in the instrument panel will flash until the turn signal is turned off.

High Beam

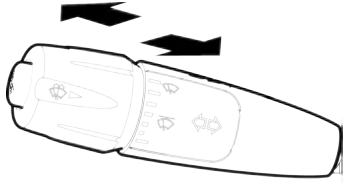
NOTE

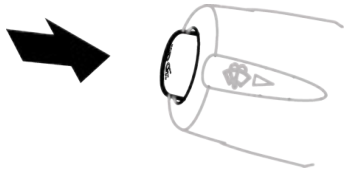
The headlights must be ON for the high beam switch to operate.

- To switch your headlights to lower or higher beam, gently pull the turn signal lever, toward the steering wheel, until you hear the switch click and the beam changes. The blue indicator light in the instrument panel will be ON when the high beam is being used.
- To return to previous beam: pull the lever towards the steering wheel again.
- The high beams can be momentarily flashed with or without the headlights being on. To flash the high beams, gently push the headlight lever away from the steering wheel to momentarily turn on the lights.

NOTE

Continued pressing of the high beam flash will not keep the high beams on.



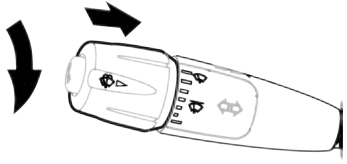


Marker and Clearance Lights Flash

Windshield Wipers/Washer

Your 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, turn the headlights on and then off again and the low beams will turn off. A seven-position rotary wiper switch (located on the turn signal lever) operates the windshield wipers and washer. Rotate the end of the turn signal lever to change the wiper mode.

NOTE
The ignition key must be turned to ON or ACC for the wiper/washer switches to operate.



Wiper/Washer

The first position after OFF is the intermittent #1 cycle. The next positions are intermittent #2, #3, and #4. The last two positions are wiper low speed and wiper high speed.

To Wash The Windshield

Push the rotary wash/wipe knob in (towards steering column), hold for more than 0.8 seconds and then release. Hold the knob in to extend the washing cycle. After the lever is released, the wipers will shut off automatically or resume the wiper's setting speed.

To activate the wipers for one swipe without activating the washer ("mist" function), push the turn signal lever in (towards the steering column) and release in less than 0.5 seconds. The wipers will perform a single swipe and then resume the wiper's setting speed.

WARNING!
Clean blades regularly with a damp cloth to remove road film and wax build-up. Do not drive with worn or dirty wiper blades. They can reduce visibility, making driving hazardous which may lead to an injury accident resulting in death or personal injury.

CAUTION
Do not use antifreeze or engine coolant in the windshield washer reservoir - damage to seals and other components will result.

CAUTION
If the electric pump is operated for a long period (more than 15 seconds) with a dry reservoir, the pump motor may be damaged.

Check the windshield washing fluid level daily. If necessary, fill to top.

Clean all inside and outside windows regularly. Use an alcohol-based cleaning solution and wipe dry with either a lint-free or a chamois cloth. Avoid running the wiper blades over a dry windshield to prevent scratching the glass. Spray on washer fluid first. A scratched windshield will reduce visibility.

Trailer Brake Hand Valve

This hand valve, mounted on the steering wheel column, provides air pressure to apply the trailer brakes only. It operates independently of the foot treadle valve. See Operating the Brake System on page 4-21, for more instructions on proper use of the Trailer Brake Hand Valve.

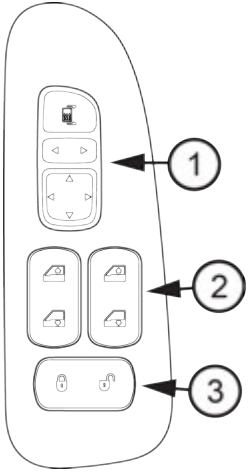
Horn

To use the electric horn, press the button in the center of the steering wheel, which is the standard location for electric horns. Your vehicle may be equipped with air horns. To operate, pull on the lanyard extending from the overhead header panel.

Door Mounted Controls

Introduction

If your vehicle is equipped with power mirrors, the mirror controls will be located on the driver side door pad. Mirrors can be adjusted in 4 directions.



1. Mirror Control
2. Power Window Switch
3. Power Door Lock Switch

WARNING!

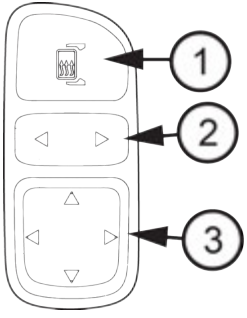
Adjust all mirrors before driving. Adjusting the mirrors while driving can cause you to take your eyes off the road, which could result in an accident. Failure to do so could lead to serious injury or equipment damage.

To provide good visibility, adjust the mirror so the side of your vehicle appears in the inboard part of the mirror.

WARNING!

Convex mirrors can distort images and make objects appear smaller and farther away than they really are. You could have an accident if you are too close to another vehicle or other object. Keep plenty of space between your vehicle and others when you turn or change lanes. Remember that other objects are closer than they may appear.

Mirror Controls



1. Mirror Heat Button
2. Mirror Selector Switch
3. Mirror Directional Control Pad

Mirror Heat Button

Your vehicle may be equipped with optional heated mirrors. Mirror heat is controlled by the mirror heat switch button, which is part of the mirror switch module located on the driver side door pad.

Adjusting the mirror

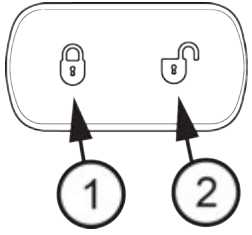
If your vehicle is equipped with power mirrors, the directional controls for both mirrors are located near the top of the driver side door trim pad.

1. Move the mirror selector switch to the right or left from the neutral center position to select the desired mirror for adjustment.
2. Depress the mirror directional control pad in one of its four arrow directions to adjust the mirror in/out or up/down.

NOTE
After mirror adjustments have been completed, return the mirror selector switch back to the center (neutral) position to prevent unintentional adjustments to the mirrors.

After mirror adjustments have been completed, return the mirror selector switch back to the center (neutral) position to prevent unintentional adjustments to the mirrors.

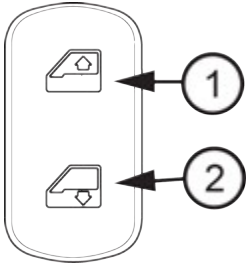
Power Door Lock Switch



1. Lock
2. Unlock

Power door lock rocker switches are located on the door pads. To lock or unlock both cab doors as well as a sleeper door, depress any door lock switch at the end that displays a closed or open padlock symbol, respectively, on the switch face.

Power Window Switch



1. UP
2. Down

Power window rocker switches are located on the door pads.

Exterior Lights Self-Test

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

1. Park the vehicle and set the parking brakes.
2. Insert the key into the ignition, start the engine and allow the vehicle to run through its own Power On Self-Test.
3. Press the momentary switch on the dash to start the ELST.

This feature allows the operator to verify and inspect exterior lighting operation typically performed during a pre-trip inspection. When the feature is engaged, via a switch on the dash, it will illuminate the:

- Park lights

- Side marker lights
- Hazard/turn signals
- Lo beam headlamps
- First set of fog/driving lights

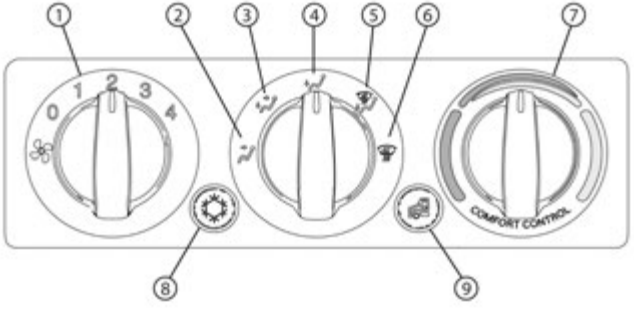
The test will turn those lights off and then illuminate the:

- Park lights
- Side marker lights
- Hi beam headlamps
- Stop/Brake lights

After turning these lights off, the system will resume testing the first set of lights. The light test will eventually stop on its own. The operator may interrupt the test by turning the vehicle off or pressing the switch a second time while the test is running. The operator can verify the light functionality by visibly watching the light from outside the vehicle during the test or can read the instrument cluster for any faults displayed that are lighting related.

HEATING AND AIR CONDITIONING

Air Conditioning Controls



1. Fan Control Dial
2. Dash
3. Dash & Floor
4. Floor
5. Floor & Defrost
6. Defrost
7. Temperature Control Dial
8. Air Conditioner Enable, Blue Light (On) Indicates A/C is Enabled
9. Fresh Air / Recirculate, Blue Light (On) Indicates Recirculated Air

Introduction

WARNING!

Do not drive with visibility reduced by fog, condensation, or frost on the windshield. Your view may be obscured, which may result in death, personal injury, equipment or property damage. For clear visibility and safe driving it is extremely important for you to follow the instructions pertaining to the function and use of the ventilation/heating and defogging/defrosting system. If in doubt, consult your dealer. Maximum heating output and fast defrosting can be obtained only after the engine has reached operating temperature.

WARNING!

Exhaust fumes from the engine contain carbon monoxide, a colorless and odorless gas. Do not breathe the engine exhaust gas. A poorly maintained, damaged or corroded exhaust system can allow carbon monoxide to enter the cab. Entry of carbon monoxide into the cab is also possible from other vehicles nearby. Failure to properly maintain your vehicle could cause carbon monoxide to enter the cab, resulting in death or personal injury.

WARNING!

Never idle your vehicle for prolonged periods of time if you sense that exhaust fumes are entering the cab. 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 repair the source of the exhaust fumes may result in death, personal injury, equipment or property damage.

NOTE

Keep the engine exhaust system and the vehicles cab ventilation system properly maintained. It is recommended that the vehicles exhaust system and cab be inspected:

- By a competent technician every 15,000 miles
- Whenever a change is noticed in the sound of the exhaust system
- Whenever the exhaust system, underbody, or cab is damaged

NOTE

To allow for proper operation of the vehicle ventilation system, keep the inlet grille at the base of the windshield clear of snow, ice, leaves and other obstructions at all times.

CAUTION

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

When idling for short periods of time:

- Set the heating or cooling system to Heat or A/C
- Set the fan to Medium or High speed
- Set the controls to FRESH AIR

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.

NOTE

If you are parked next to idling vehicles, move your vehicle or do not stay in your vehicle for prolonged periods of time.

Manual Controls

What Each Control Does

Fan Speed Adjustment

Turning this dial clockwise from the OFF position turns the fan ON and increases the fan speed.

Air Flow Control Dial

This dial directs the air flow through 5 primary sets of vents:

Instrument Panel and De-mister Vents

Instrument Panel, De-mister and Floor Vents

Floor and De-mister Vents

Air Flow Control Dial

Floor, De-mister Vents and *Defrost Vents

*Defrost and De-mister Vents

*Fresh air and air conditioning are automatically turned ON.

Temperature Control Dial

Turn this dial clockwise for heat, counterclockwise for cool.

Air Conditioner Switch

This button turns the A/C compressor on and off. When using the Max Def function the user will not be able to turn off the AC compressor with this button.

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.

Fresh Air/Recirculation Switch

This switch controls the source of the air flowing into the heater and air conditioner unit

Recirculated air may reduce the amount of time needed to cool down the interior of the vehicle (when used with A/C) and may also help reduce undesired outside odors from reaching the interior of the vehicle. This button can be engaged manually in any non-defrost modes.

NOTE
You may notice changes in sound between recirculated mode and other airflow modes.

Sleeper Override Switch (for vehicles with a sleeper)

Press this button if the user wants to control the on/off function of the sleeper heating and air conditioning unit.

Using this button does not allow this control unit to control sleeper blower speed or sleeper temperature. It only turns the sleeper heating and air conditioning unit on or off.

Tips for Efficient Cooling

An air conditioner can reduce fog build up on the windshield by setting it to the defrost or the floor/defrost air selection. To increase the effectiveness of the air conditioner, use the A/C button in the ON position, increase the air temperature setting and/or increase the fan speed.

If the cabin becomes humid or damp, use the air conditioner with the fan on, with fresh air (not in recirculate air mode) and the A/C in the ON position to dry the cabin air.

In situations where more cooling of the cab is required, make sure the system is in the recirculation mode. This setting will be more effective than using fresh air.

How To Use The System

The engine must be running for the heater and air conditioner to generate hot and cold air.

To Cool

Push the Fresh Air/Recirculation Switch to the Fresh Air mode (Blue indicator light off). Manually setting the system to recirculate air will increase the effectiveness and uses the least amount of fuel.

Turn ON the Fan Control Dial to the desired fan speed.

Turn Temperature Dial to Desired Setting.

Turn the Air Flow Control Dial to Dash Vents.

If the outside air is not cold enough to cool the cab, press to engage the compressor which will deliver colder air.

For more cooling effect, you may need to press the switch back to recirculation mode.

To Heat

Turn the Fan Control Dial ON to the desired fan speed.

Turn the Air Flow Control Dial to Floor Vents.

Adjust the Temperature Control Dial clockwise until the air temperature feels comfortable.

Using this function in "manual" mode will provide the maximum heating performance.

To Dehumidify

Push the Fresh Air/Recirculate Switch to the Fresh Air mode (Blue indicator light off).

Turn ON the Air Conditioning Switch (Blue indicator light on).

Turn ON the Fan Control Dial to the desired fan speed.

Adjust the Temperature Control Dial until the air temperature feels comfortable.

The air conditioner removes moisture from the air while the heater heats the air.

To Defog and Defrost the Windshield

Turn the Fan Control Dial clockwise to the highest fan speed.

Turn the Air Flow Control Dial to Defrost Vents.

Fresh air and air conditioning are automatically turned ON.

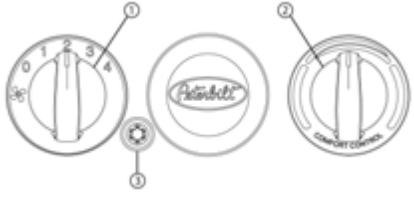
Adjust the Temperature Control Dial clockwise to full heat.

CAUTION
During extreme cold weather, do not blow hot defroster air onto cold windshields. This could crack the glass. Turn the Air Flow Control Dial to Defrost and adjust the fan speed accordingly while the engine warms. If the engine is already warm, move the Temperature Control Dial to cool, then gradually increase the temperature when you see that the windshield is starting to warm up. Failure to comply may result in equipment damage.

Sleeper Heater - A/C Controls (optional)

A separate switch on the dash HVAC unit will send power to the “bunk” or sleeper control unit The button on the cab HVAC unit must be pressed and in the on mode to use the sleeper controls. The sleeper control unit has three controls:

1. Air speed control
2. Air conditioner compressor on/off
3. Air temperature control



Unlike the cabin air temperature controls, the sleeper temperature control will alter the air temperature

based on the knob setting. The Temperature Control is not keyed to specific temperatures. Turning counterclockwise means cooler than it is now. Clockwise means warmer than it is now. Once the desired temperature is reached, the system will maintain it automatically.

NOTE

The sensor is located on the sleeper heater - A/C 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 (e.g. shirt, jacket, etc.) which could block the air flow to the sensor.

ACCESSORIES

Radio (Option)

As an option, your vehicle has either an AM/FM Stereo Receiver, which may or may not have a CD, or may have the stereo system integrated with your Navigation and telematics unit.

For instructions on how to operate your particular radio, see the supplemental operating manual for those units.

Cigarette Lighter and Ashtray (Option)

NOTE
The cigarette lighter will operate with the ignition key 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. This vehicle may have the optional ashtray insert (for the cupholder) and the optional cigarette lighter in a power port.

To operate, 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 volt, 15 ampere appliances, such as a hand spotlight or small vacuum cleaner.

WARNING!
Do not place paper or other combustible substances in an ashtray, it could cause a fire. Keep all burnable materials, besides smoking materials, out of the ashtray. Failure to comply may result in death, personal injury, equipment or property damage.

WARNING!
Do not exceed the voltage/amperage capacity of the cigarette lighter. It could result in a fire. Follow all warnings 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.

Cab Storage

Glove Box

A glove box is provided to store important documents, the vehicle literature set (including this Operator's Manual) and other related materials.

WARNING!

Do not drive with the glove box open, it can be dangerous. In an accident or sudden stop, you or a passenger could be thrown against the 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.

You can choose from a variety of other interior storage options to store your personal supplies or small tools:

- map pocket on the door

- overhead storage compartments

WARNING!

Do not carry loose objects in your cab, it can be dangerous. 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. You could be injured or even killed. Secure all loose objects in the cab before moving the vehicle. Carry any heavy objects such as luggage in the exterior storage compartment and close it securely.

Appliances

If your vehicle is equipped with a television, or other appliance, be sure they are compatible with your vehicle's electrical system. Secure them in the cab so they cannot come loose in a sudden stop.

WARNING!

In a sudden stop or collision a heavy object in your cab could strike you or anyone with you. You could be injured or even killed. Secure any appliance (such as a radio, or TV) you add to your sleeper or cab.

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)
- electric 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 (441 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. For complete engine starting procedures, see Starting & Operating on page 4-5.

Vehicle Telematic System

Your vehicle may 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 your vehicle. Read and understand the Supplemental Telematics and Navigation System Owner's Manual and 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. Failure to verify height restrictions could lead to causing death, personal injury or property damage. Failure to verify weight restrictions could result in a traffic infraction.

WARNING!

Only glance at the system monitor while driving. Prolonged periods of viewing while driving could result in an accident involving death or personal injury.

WARNING!

Do not program the telematic system while driving. Always stop your vehicle when programming or changing the settings on the telematic system. Programming the system while driving can cause you to take your eyes off the road, which could result in an accident involving death, personal injury or equipment damage.

WARNING!

Regardless of how and where the navigation system directs you, it is your 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.

CAUTION

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.

Care of the Display Screen

From time to time it may be necessary to clean the display screen. To clean the screen, dampen a clean, soft, lint-free cloth with water only. A mild glass cleaner **that does not contain alcohol or ammonia** may also be used. Cleaners that contain alcohol and/or ammonia will eventually dry-out, crack and "yellow" the screen. Wipe the screen gently back and forth. You can also use a commercial cleaner especially designed for LCD screens.

Screen Display On/Off

1. Press and hold the POWER/LIGHT button for approximately 1 second.

2. After the display has been turned on, the following Warning/Informational screen will appear:

Warning/Informational Screen

WARNING

Do not let this device distract you while driving. Always concentrate on your driving. Distractions could cause an accident resulting in injuries to you or others.

IMPORTANT

Disclaimer: Map data may be inaccurate and navigation routes may not be available for larger size vehicles.

Regardless of how and where the navigation system directs you, it is your responsibility to operate the vehicle in a safe and legal manner.

Note: Before using this system, read the Owner's Manual and learn how it operates. Some functions of this system will not operate when the truck is moving.

3. After reading the information, touch the **T** in the upper right corner of the screen with your finger indicating you acknowledge and understand the information. The MENU screen will automatically appear next.

4. To turn the system off, press and hold the POWER/LIGHT button for 3 seconds.

Disclaimer

The vehicle manufacturer is not responsible for erroneous map data, misrouting or any downtime or other damages associated with or arising out of the use of the Navigation System.

STARTING & OPERATING

OPERATING THE ENGINE

OPERATING THE TRANSMISSION

SLEEPER BUNKS

STOPPING THE ENGINE

STARTING & OPERATING

Introduction

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.

The following instructions are for both normal-temperature starting and cold-weather starting.

Normal Weather

When the outside temperature is above 50° F (10° C), you can use the following procedure.

1. Set the parking brake.
2. Put your main transmission in Neutral.
3. Disengage (depress) the clutch (with manual transmission).
4. Turn the key switch to ON.

CAUTION
Never operate the starter motor while the engine is running. The starter and flywheel gears could clash or jam, severely damaging them.

NOTE
Some starters are equipped with overcrank protection. Check the *Engine Operation and Maintenance Manual* for details.

5. Turn the ignition key to the START position. If the engine does not start within 30 seconds, release the ignition switch. To avoid overtaxing the starter motor or the batteries, don't use the starter for more than 30 seconds. Let the starter motor cool and the batteries recover for two minutes before trying again.
   If the engine still won't start after a couple of tries, check the fuel lines for possible fuel starvation or air leaks. Starting failure may mean fuel isn't reaching the injectors.
6. As soon as the engine starts, begin to watch the oil pressure gauge. Check your engine manufacturer's

manual for the right pressure for your engine. If the oil pressure doesn't 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 has started.
8. Wait for the oil pressure gauge to reach normal operating pressure before operating the vehicle or idling faster than 1000 rpm.

Cold Weather

In cold weather, fast engine starting helps relieve the loads on the electrical system and cranking motor. Using the special cold starting equipment will help starting. If you follow a few simple guidelines, you will extend the service life of your engine.

- Keep the electrical system in top condition.
- Use the best quality fuel of the recommended grade.
- Use recommended engine lubricating oil.
- Fully depress the accelerator pedal after engaging the starter.
- For manual transmissions and auxiliary transmissions, leave the transmission in neutral and allow the transmission lubricating oil to warm up (approximately 3-5 minutes) before operating 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!

Engine block heaters can cause fires which may result in death, injury and/or property damage if not properly maintained and operated. Regularly inspect the engine block heater wiring and connector for damaged or frayed wires. Do not use the heater if there are any signs of problems. Contact your authorized dealer or the manufacturer of the heater if you are in need of repairs or information.

CAUTION
Always unplug heater before starting the engine. Damage to the cooling system could occur if the heater is not turned OFF (unplugged).

Depending on engine make, when the temperature falls below -10° F (-24° C), the block heater is required.

- Use a solution of half ethylene glycol antifreeze and half water for best heater performance. Do not exceed 65 percent concentration of antifreeze, as a shortened heater life will result. See Cooling System Maintenance on page 4-56, for more information.
- After servicing the cooling system, operate the vehicle for a day or two before using the heater. Trapped air inside the engine needs time to escape.

Engine Warm-up

Engine

The purpose of engine warm-up is to allow oil film to be established between pistons and liners, shafts and bearings while your engine gradually reaches operating temperature.

Warm-up Procedure

1. After you've started your engine, idle it at approximately 600 RPM while you check:
   a. oil pressure
   b. air pressure
   c. alternator output
2. After a few minutes of idling at 600 RPM, increase your idle speed to 900 or 1000 RPM. Continue your warm-up. This procedure allows oil to warm and flow freely while pistons, liners, shafts, and bearings expand slowly and evenly. In extremely cold temperatures, you may have 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. 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.

WARNING!

Exhaust fumes from the engine contain carbon monoxide, a colorless and odorless gas. A poorly maintained, damaged, or corroded exhaust system can allow carbon monoxide to enter the cab or sleeper. Failure to properly maintain your vehicle could cause carbon monoxide to enter the cab and cause death or personal injury.

WARNING!

Never idle your vehicle for prolonged periods of time if you sense that exhaust fumes are entering the cab. 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 slightly open. Failure to repair the source of the exhaust fumes may lead to death or personal injury.

CAUTION

The use of a winterfront can result in excessive engine coolant, oil, and charge air (intake) temperatures, which can lead to overheating and possible engine damage. If you must use a winterfront:

- Refer to the *Engine Operation and Maintenance Manual* for operating restrictions and recommendations.
- Use only a winterfront available from your dealer that is compatible with an EPA-compliant engine cooling system. These winterfronts are specifically designed for use with new grill snap patterns.

NOTE

Keep the engine exhaust system and the vehicle's cab/sleeper ventilation system properly maintained. It is recommended that the vehicle's exhaust system and cab/sleeper be inspected:

- By a competent technician every 15,000 miles
- Whenever a change is noticed in the sound of the exhaust system
- Whenever the exhaust system, underbody, cab or sleeper is damaged

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.
- If other vehicles are parked next to you idling, move your vehicle or do not stay in your vehicle for prolonged periods of time.

Idling the Engine

Under most circumstances, idling your engine for long periods merely wastes fuel. In severe arctic weather conditions, however, you may need longer idling to be sure all parts of your engine are fully lubricated.

WARNING!

To reduce the chance of death or personal injury and/or vehicle damage from overheated engines, which can result in a fire, never leave the engine idling without an alert driver present. If the engine should overheat, as indicated by the engine coolant temperature light, immediate action is required to correct the condition. Continued unattended operation of the engine, even for a short time, may result in serious engine damage or a fire.

CAUTION

Do not allow your engine to idle, at low rpm's (400–600 rpm), longer than five minutes. Long periods of idling after the engine has reached operating temperatures can decrease engine temperature and cause gummed piston rings, clogged injectors, and possible engine damage from lack of lubrication. The normal torsional vibrations generated can also cause transmission wear.

Transmission

In cold weather (below 32° F (0° C), you may find shifting sluggish when you first start up. Transmission warm-up is especially important at this time, but it is always a good idea to warm-up your transmission before starting out on the road. To warm-up the transmission, follow these procedures.

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) and operate the transmission in neutral for 3 to 5 minutes prior to operating the transmission in either forward or reverse range.
3. If you have a two-transmission combination:
   a. Put the main transmission in gear.
   b. Put the auxiliary transmission in Neutral. This will allow the transmission countershaft to turn, agitating the oil and warming it.

OPERATING THE ENGINE

Stationary PTO Operation

The cruise control buttons for this vehicle may be used to control the engine rpm when the vehicle is stationary and the operator wants to use the PTO on the engine. Use the cruise control options in the same manner as with the vehicle in motion, but instead of setting vehicle speed, the engine speed (RPM) is set instead.

Setting Idle Speed

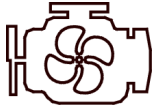
1. Ensure parking brakes are applied.
2. Ensure transmission is in Neutral.
3. Engage PTO per the manufacturer's operating instructions.
4. Move the ON/OFF switch to the "ON" position.
5. Toggle the SET/RESUME switch to obtain the desired engine rpm.

Cancelling Cruise Control

You can cancel cruise control in any of these ways:

- Tap the brake pedal.
- Tap the clutch pedal.
- Move the ON/OFF switch to the "OFF" position.

Engine Fan Control



The engine fan can be turned ON using a switch that is mounted on the accessory switch panel. This lets you set the fan to manual or automatic operation.

- With the ignition key turned 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 AUTO position, the engine fan will automatically turn ON when the engine computer sends a signal requiring the engine fan to be on.

WARNING!

Do not work on or near the fan with the engine running. Anyone near the engine fan when it turns on could be injured. If it is set at MANUAL, the fan will turn on any time the ignition key switch is turned to the ON position. In AUTO, it could engage suddenly without warning. Before turning on the ignition or switching from AUTO to MANUAL, be sure no workers are near the fan.

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.

NOTE

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.

Winterfronts

A winterfront or other air flow restriction device may be mounted in front of the radiator to increase cab heater temperature in cold climates.

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 life of cooling module components. Remove winterfront as soon as the ambient temp reaches 41°F (5°C). The use of a winterfront above 40°F (4°C) can result in excessive engine coolant, oil, and charge air (intake) temperatures, which can lead to overheating and possible engine or coolant module damage and emissions non-compliance.

CAUTION
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.

Engine Control Display

Your vehicle may come with an optional Engine and Driver Information Display. This instrument records information on engine diagnostics, scheduled maintenance, driving conditions, and general trip information. The specific features of your display may vary depending on engine make. For complete information on the display see the engine manufacturer's manual.

OPERATING THE TRANSMISSION

Operating Clutch (Manual Transmission)

Manual transmissions will also have a clutch pedal situated to the left of the brake pedal. Pressing down on the clutch pedal will disengage the clutch and will allow the transmission gears to be shifted.

At the beginning of the pedal stroke, there will be about 1 3/4 in. to 2 in. (34 to 51 mm) of movement before any resistance is felt. As the pedal is pressed further, the operator will feel increased resistance as the clutch is disengaged. After the clutch has been fully disengaged, there will be another 1-1 ½ inches (25-40 mm) of pedal travel which will engage the clutch brake. At this full stroke, the pedal will feel like it cannot be pressed anymore.

If the transmission is not shifting smoothly into gear while the clutch pedal is completely pressed to the floor, then it is time to have the clutch system inspected and serviced.

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 nonfunctioning clutch brake will make shifting very difficult when the vehicle is stationary.

If the clutch pedal is pressed completely to the floor and the transmission is not shifting, then it is time to have the clutch adjusted or serviced.

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 operating the vehicle.

Putting the Vehicle in Motion

After making sure the vehicle's oil and air pressure are correct and all other parts and systems are in proper working condition:

1. Fully depress the clutch pedal (for manual transmission) until the clutch brake makes contact.
   a. The total stroke of the clutch pedal is about 6 inches (152 mm). The first ½ inch (13 mm) is free travel. After the free travel comes the release stroke, which is the part that fully releases the clutch. The last ½ inch (13 mm) engages the clutch brake.
   b. Always start out in a low gear. Starting in higher gears, even with a light load, will cause a very jumpy start and excessive wear.

⚠ 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, other transmission components, and may cause damage.

2. Evaluate the road surface conditions and terrain your vehicle is on. Select a gear low enough to let your vehicle start forward with the throttle at idle.
3. Push the parking brake valve handle (Yellow) against the dash panel to release the brakes.
4. Release the clutch pedal (manual only), then gradually accelerate to permit smooth starting,
5. Do not allow your vehicle to roll (even a little) in the opposite direction during clutch engagement. If you need to start up on an incline, apply your service brakes before you release the parking brake. Then release your service brakes as you engage the clutch and apply throttle.

For further instructions on operating your transmission, see the transmission manufacturer's Driver/Operator's Instruction Manual.

If you have a misaligned gear condition in your vehicle's transmission 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. For further information, see

Driving Tips and Techniques on page 4-44.

Shifting Gears in a New Vehicle

Shift carefully in a new vehicle. The transmission may be a little stiff at first. Avoid gear clashing, by closely following these procedures.

When you are operating a new vehicle or one that has been exposed to cold weather, you want the transmission lubricant (fluid) to circulate and coat the contacting surfaces of the gears. Metal contacting metal in moving parts may seriously damage your transmission, do not drive in one gear for long periods of time until the transmission lubricant has a chance to coat all contacting surfaces.

Clutch Brake and Travel

The clutch brake is used for stopping transmission gears, allowing you to easily shift into first gear or reverse without grinding gears. Approximately the last ½ inch (13 mm) of clutch pedal travel activates the clutch brake.

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 nonfunctioning clutch brake will make shifting very difficult when the vehicle is stationary.

To apply the clutch brake (while the vehicle is stopped) fully depress the clutch pedal to stop the gears. With the throttle at idle, select first gear then release the clutch pedal to let the

vehicle start forward, until the clutch is fully engaged. See the manufacturer's Driver/Operator's Instruction Manual for further details.

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.

During Normal Driving

If you want to shift directly into any gear other than first or reverse, depress the clutch pedal only far enough to release the clutch. Fully pressing the pedal applies the clutch brake and could cause gear hang-up.

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 will render the clutch inoperative.

Double Clutching

Whether you are upshifting or down shifting, it is best to double clutch. Double clutching is easier on the transmission and on the engine, helping your vehicle match engine speed with driveline speed and achieving clash-free shifts.

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 mainshaft gears, allowing you to match the RPM of the mainshaft gears to those of the output shaft.
    a. Upshifts: let the engine and gears slow down to the RPM required for the next gear.

b. 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.

Automatic and Automated Transmissions

An automatic or automated transmission makes shifting much easier. It remains important to completely understand how to operate the transmission to optimize its efficiency. Please read the manual for your automatic or automated transmission included with your vehicle.

For automated transmissions, there is no “park” position. So, you will need to apply the parking brake before leaving the cab.

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.

WARNING!

Do not leave the cab of your vehicle without applying the parking brake. The truck could roll and cause an accident resulting in death or personal injury. Always apply the parking brake before you leave the cab.

WARNING!

If your vehicle has an automated transmission, be aware that it can roll backwards when stopped on a hill or grade, or when starting from a stop on a hill or grade. Failure to comply may result in death, personal injury, equipment or property damage. 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.

Auxiliary Transmission

If you have an auxiliary transmission, see your transmission manufacturer's manual for its proper operation.

More Transmission Tips

Riding the Clutch

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, and damage could result.

Release Bearing Wear

When you must idle your engine for any period of time, shift your transmission to neutral and disengage the clutch (take your foot OFF the pedal). This helps prevent unnecessary wear to your clutch release bearing, and it is less tiring for you, too.

Tips

- Always use the clutch when making upshifts or downshifts.
- 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.
- 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 your 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.

OPERATING THE BRAKE SYSTEM

Introduction

This vehicle's brake system functions with the use of compressed air generated from the engine's air compressor. The compressed air is stored in various air tanks to ensure that air pressure is available whenever the driver needs it.

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 100-130 psi (690-896 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, Anti-lock 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 braking performance. Refer to Retarders on page 4-32 and Descending a Grade on page 4-45 to avoid overheating the brakes.

This vehicle may be equipped with an anti-lock braking system (ABS). This ABS reduces the possibility of wheel lock-up. If a wheel is about to lock during braking, the ABS will automatically adjust air pressure to the brake chambers on the appropriate wheel(s) to prevent wheel lock-up. The ABS is automatically turned on when the ignition switch is turned on.

WARNING!

The Anti-Lock Brake System is a critical vehicle safety system. For the safety of you and others around you, have the vehicle submitted for periodic preventive maintenance checks as well as having any suspected problems immediately checked by an authorized dealer. Failure to properly maintain your brake system can lead to serious accidents. Failure to comply may result in death, personal injury, equipment or property damage.

WARNING!

Do not drive through water deep enough to wet brake components, as it may cause the brakes to work less efficiently than normal. The vehicle's stopping distance may be longer than expected, and the vehicle may pull to the left or right when brakes are applied, which could contribute to an accident involving death or personal injury.

WARNING!

Do not rely on an anti-lock brake system that is functioning improperly. You could lose control of the vehicle resulting in a severe accident, causing death or personal injury. If your ABS lamp goes on while you are driving or stays on after the self-check, your anti-lock system might not be working. The ABS may not function in an emergency. You will still have conventional brakes, but not anti-lock brakes. If the lamp indicates a problem, have the ABS checked.

Vehicles without anti-lock brake systems (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 anti-lock brake system (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 switchable 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.

CAUTION
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.

Vehicles and trailers built after 3/1/01 must be able to turn on an In-Cab Trailer ABS Warning Lamp (per Federal Motor Vehicle Safety Standards (FMVSS) 121). The industry chose Power Line Communication (PLC) as the standard method to turn it on.

NOTE
Trailers not equipped with PLC can not turn on the In-Cab Trailer ABS Warning Lamp.

NOTE

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.

NOTE

If you change the intended service in any way (i.e. number of axles, multiple trailers, add switchable trailer accessories, etc.) from the date the vehicle was manufactured, you should contact your trailer manufacturer and/or trailer anti-lock brake manufacturer 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.

CAUTION

The center pin of the 7-way trailer light line may be constantly powered for ABS. Make sure it will not accidently turn on trailer equipment.

Special Trailer ABS (Without PLC) Option

If a trailer does not have PLC, but it does have 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 3/1/01 have this option. Trailers built after 3/1/01 are built with PLC technology.

Advanced ABS with Stability Control

This vehicle may be equipped with an optional Electronic Stability Control (ESC). ESC is a feature for ABS-equipped vehicles that reduces the risk of rollovers, jackknifing and other loss of control situations. ESC features include Roll Stability Program (RSP) and Yaw Control.

During operation, the ECU of the Bendix® Advanced ABS system constantly compares performance models to the vehicle's actual movement, using the wheel speed sensors of the ABS system, as well as lateral, yaw, and steering angle sensors. If the vehicle shows a tendency to leave an appropriate travel path, or if critical threshold values are approached, the system will intervene to assist the driver.

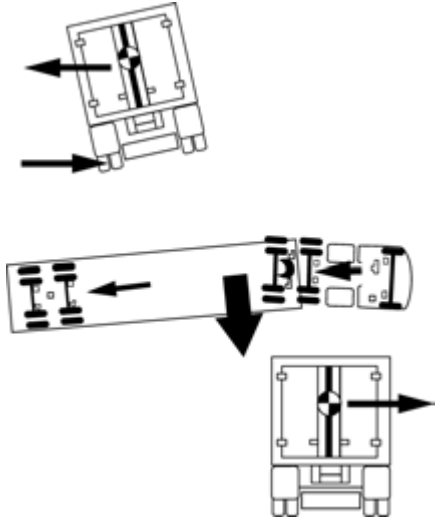
Roll Stability Program

Bendix® RSP, an element of the overall ESC system, addresses rollover conditions. In the case of a potential roll event, the ECU will override the throttle and quickly apply brake pressure at all wheel ends to slow the vehicle combination. The level of braking application during an RSP event will be proportional to roll risk.

A Real World Example of How the RSP System Operates

Excessive speed for road conditions creates forces that exceed the threshold at which a vehicle is likely to rollover 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.



RSP 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.

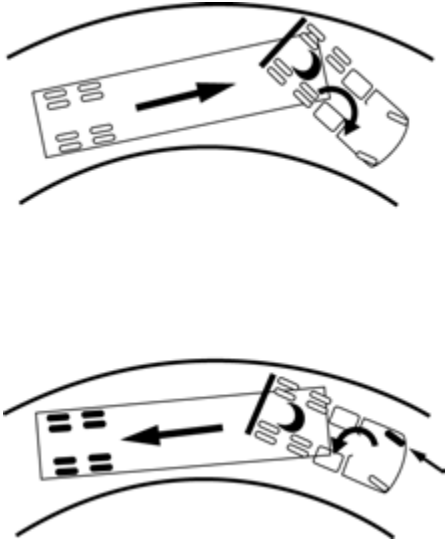
Yaw Control

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 understeer 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 jackknife.

The Bendix® Yaw Control system reduces engine throttle and selectively applies brakes to reduce the vehicle speed, thereby reducing the tendency to jackknife.



Yaw Control Example

ESC May 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 might 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.

Towing Doubles Or Triples May Reduce The Effectiveness Of Stability Systems

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. Excessive speed and aggressive maneuvers, such as sharp turns, sudden steering inputs or abrupt lane changes should be avoided because these maneuvers could cause loss of vehicle control possibly resulting in an accident involving death or personal injury.

Limitations Of Stability Systems

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 off-set 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,
- If 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:
  a. the vehicle hauls loads that could shift,
  b. the vehicle or load has a high or off-set center of gravity (CG) when loaded, or
  c. the vehicle tows doubles or triples.

Truck Chassis Modifications

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!

Failure to disable ESC "Electronic Stability Control" when modifying a vehicle could result in a loss of vehicle control possibly resulting in an accident involving death or personal injury.

WARNING!

For vehicles equipped with ESC "Electronic Stability Control" do not replace the vehicle's steering wheel with an aftermarket or different part number than originally supplied. Using a different steering wheel could cause ESC to malfunction causing a loss of vehicle control possibly resulting in an accident involving death or personal injury.

Steering Angle Sensor Re-Calibration

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!

If the Steering Angle Sensor is not re-calibrated, the Yaw Control system will not function properly. A uncalibrated sensor could result in a loss of control of your vehicle which can lead to an accident involving death or personal injury.

ATC Functions (standard)

Your truck/tractor ABS is equipped with an automatic traction control (ATC) feature. This feature is controlled by a switch as shown in the next illustration. This feature is monitored by a warning lamp located on the switch.

Automatic Traction Control Warning Lamp

The Traction Control warning lamp on page 3-23 will briefly illuminate and then go out when the ignition switch is first turned on. The traction control warning lamp will illuminate 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 (i.e. mud or snow) by reducing drive wheel overspin. Automatic traction control works in two different ways:

- If a drive wheel starts to spin, ATC applies air pressure to brake the wheel. This transfers engine torque to the wheels with better traction.
- If all drive wheels spin, ATC reduces engine torque to provide improved traction.

ATC turns itself on and off, you do not have to select this feature. If drive wheels spin during acceleration, the ATC Warning Lamp comes on, indicating wheel spin control is active.

Do not allow the ATC Warning Lamp to remain on continuously for an extended length of time. Extended, continuous use of the ATC can cause overheating of the drive wheel brakes.

Deep Snow and Mud Switch (option)

A deep snow and mud switch is included with Wheel Spin Control. 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 (option)

Your vehicle may be equipped with a separate switch to activate an Off-Road ABS function. This function is NOT to be used for On-Highway driving but is intended to be used to improve stopping performance in Off-Highway conditions (e.g. loose gravel and mud). The Off-Road ABS function is accomplished by allowing a “wedge” of material to build-up in front of momentarily locked wheels.

Features and Benefits

- 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 or on poor traction surfaces such as loose gravel, sand and dirt.
- Allows retarders to function independently of the ABS function.
- If your vehicle does not have an engine retarder, the Off-Road ABS switch will function the same.

CAUTION

Never drive your vehicle on improved roads/highways with the Off-Road ABS function turned on. When you drive your vehicle onto an improved road surface or highway, immediately turn off the Off-Road ABS switch. Failure to do so will cause the ABS system to not function properly in an ABS event under 25 mph and could result in an accident or personal injury.

WARNING!

While the off-road mode can improve vehicle control and shorten stopping distances, some steering ability may be reduced on certain surfaces resulting from the momentarily sliding tires. Always operate your vehicle at safe operating speeds. Failure to do so may cause you to lose control of the vehicle and could result in an accident or personal injury.

How The Off-Road ABS Function Works

- The ABS lamp flashes slowly during off-road mode engagement. This is done to alert you of a modification to the ABS control software.
- At speeds above 25 mph, the ABS controller operates in the normal on-highway mode.
- At speeds between 10 and 25 mph, the ABS control software is modified to allow short periods (0.25 seconds) of locked-wheel cycles.
- At speeds below 10 mph, the ABS control software is turned off to allow locked wheels.
- When the Off-Road ABS function is enabled, the Retarder Disable output is turned off; that is, the engine retarders are left to function without ABS intervention. For additional information, see the Off-Road ABS pamphlet in your vehicle's glove box.

Retarders

Various retarders are available which function against the engine, driveline, or transmission. These are devices that use your engine's power to slow down your vehicle. They save wear and tear on your service brakes and can be a safety feature, too, because they can keep your brakes from overheating.

Ideally, you should always slow your vehicle with your retarder (where permitted by law) and use your service brakes only for stopping completely. Operating this way will greatly prolong the life of your brakes.

WARNING!

Do not use any of the vehicle's retarders in any situation that requires an immediate stop and/or in situations of poor traction (such as wet, icy or snow covered roads). Trying to use the retarder instead of the service brakes may cause a loss of vehicle control which may result in an accident involving death or personal injury.

WARNING!

The service brakes must be used in an emergency. The retarder alone might not stop you fast enough to prevent an accident. Failure to comply may result in death, personal injury, equipment or property damage.

The retarder is NOT intended 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.

Driving Bobtail or with an Unloaded Trailer

We recommend that you do not use your engine retarder to slow down when you are bobtailing or pulling an empty trailer.

WARNING!

Using an engine retarder can cause a wheel lockup. The trailer is not loading the tires enough to give the traction you may need. When you are bobtail or unloaded, you can have a serious accident if your wheels lock suddenly during braking. You could be killed or injured. Don't use your retarder when you are driving bobtail or with an unloaded trailer.

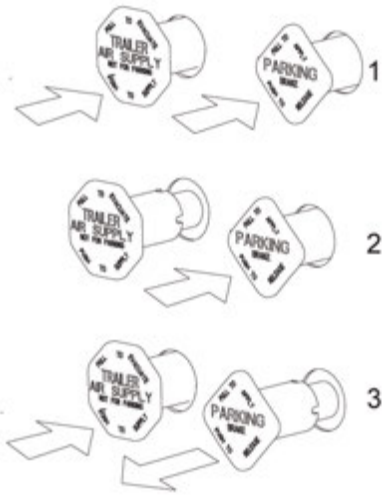
Transmission Retarder

If you have this option, it will act like a brake to slow your vehicle without using the brakes. Take your foot off the throttle and operate the retarder switch. When you do not need full retarder effect, you can apply it intermittently (off and on) to cause gradual or partial slowing. Continuous application of your retarder will cause your hydraulic fluid to get hotter. Intermittent application will help prevent overheating.

WARNING!

Do not rely on your automatic transmission hydraulic retarder to stop your vehicle. If your engine shuts down, the vehicle's retarder will cease to operate which may lead to an accident involving death or personal injury. Always be ready to suddenly apply the service brakes.

Parking Brake



1. Normal Run Position
2. Trailer Park With Vehicle Released
3. System Park or Trailer Charge With Vehicle Parked

Parking brakes work in reverse action of the regular brakes. When the parking brakes are engaged, air is exhausted from the spring chambers which allow the spring to engage the brakes. This design also provides for the safety function if a brake circuit has a leak and loses air. In such a scenario, the parking brakes will apply.

The vehicle's parking brake controls are the yellow diamond shaped knob on your dashboard. If the vehicle is equipped to tow a trailer, then there will be an additional red octagon shaped knob for the trailer parking brakes. Parking brakes 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 brakes. If you push in the yellow knob only, you will disengage the vehicle's parking brakes but will not disengage the trailer parking brakes (if applicable). Either knob will pop back out if the system pressure is not above 60 psi (414 kPa).

The instrument panel display will provide a message any time the parking brakes (vehicle or the trailer) are set and the vehicle is put into motion.

CRUISE CONTROL

Cruise Control Switch

This vehicle may have cruise control switches located on the steering wheel instead of the switches on the dashboard. The instructions are still the same.

- **To Turn On:**

Press the ON/OFF button.

- **To Turn Off:**

Press the ON/OFF button. Any previous speed settings are cleared.

Using Cruise Control While Driving

Setting Cruise Speed

1. Ensure that the vehicle speed is above the minimum cruise control speed (19 mph (30 km/h) for PACCAR MX engine and 30 mph (48 km/h) for the Cummins engines) and the engine speed is above 1100 rpm.
2. Press the "ON/OFF" button.
3. Accelerate the vehicle to the desired cruise speed.
4. Press the "SET" button to set the cruise speed.

NOTE
Cruise Control may not hold the set speed going down hills. If the speed increases going down a hill, use the brakes to slow down. This will cancel Cruise Control.

Changing the Cruise Set Speed

For vehicles with cruise control buttons on the steering wheel, the cruise speed may be changed by using the +/- button. The pressing and holding the + button will increase speed while pressing and holding the - button will decrease speed. For vehicles with dash mounted cruise control switches, changing the speed is done through the "Set/Resume" button. To increase the speed, press and hold the Set button. To decrease the speed, press and hold the "Resume" button.

Cancelling Cruise Control

You can cancel cruise control in any of these ways:

- Tap the brake pedal.
- Tap the clutch pedal.

- Press the ON/OFF button if the vehicle has dashboard-mounted cruise control switches or the CANCEL button if the vehicle has cruise control switches on the steering wheel.

Resuming Cruise Control

1. If you tapped the brake or clutch pedal, the cruise control remembered the previously set cruise speed. To resume that set speed, accelerate above the minimum cruise control speed and press the "RESUME" button.
2. If you pressed the "OFF" button (or the steering wheel mounted "CANCEL" button) or turned the ignition key OFF, this cleared the system memory and you will need to set a new cruise speed.

Using Cruise Control for Stationary PTO Operation

Setting Idle Speed

1. Ensure parking brakes are applied.
2. Ensure transmission is in Neutral.
3. Engage PTO per the manufacturer's operating instructions.
4. Press the "ON" button.
5. Press the "SET" button to obtain the desired engine rpm.

Cancelling Cruise Control

You can cancel cruise control in any of these ways:

- Tap the brake pedal.
- Tap the clutch pedal.
- Press the "OFF" button (or the steering wheel mounted "CANCEL" button).

NOTE
Cruise control functions and features may vary depending upon which engine you have. For specific explanation of your cruise control, see the cruise control or engine manual included with your vehicle.

This vehicles 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 instrument cluster will prompt you to press the service brake pedal if it has not been pressed since the vehicle has been started.

In vehicles with Eaton transmissions, the cruise control switches may be located on the shift control knob.

AXLE

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 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.

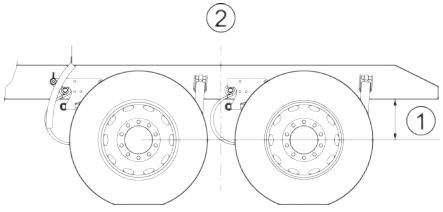
⚠ WARNING!

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 or property damage.

SUSPENSION

Setting Ride Height

Vehicles equipped with rear 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 pre-mature driveline wear and driveline vibration. If your vehicle is equipped with a Peterbilt rear air suspension, and 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 for a fully laden vehicle are shown in the following illustration and table.



Ride Height Measurement (Location for Tandem Axles Shown)

1. Ride height
2. Centerline of suspension

Fully Laden Vehicle		
Proprietary Rear	**Ride Height, inches (mm)**	
Air Suspension	**Single Drive**	**Tandem Drive**
Air Leaf	N/A	11.70 (297)
Air Trac	11.00 (279)	11.00 (279)
Low Air Leaf	6.50 (165)	8.50 (216)

Fully Laden Vehicle		
Proprietary Rear	**Ride Height, inches (mm)**	
Air Suspension	**Single Drive**	**Tandem Drive**
Low Low Air Leaf	N/A	6.50 (165)
FLEX Air	N/A	8.50 (216)

Unladen Vehicle		
Proprietary Rear	**Ride Height, inches (mm)**	
Air Suspension	**Single Drive**	**Tandem Drive**
Air Leaf	N/A	12.0 (305)
Air Trac	11.38 (289)	11.38 (289)
Low Air Leaf (Before April 2004)	8.75 (222)	8.75 (222)
Low Air Leaf (After April 2004)	6.75 (171)	8.75 (222)

Unladen Vehicle		
Proprietary Rear	Ride Height, inches (mm)	
Air Suspension	Single Drive	Tandem Drive
Low Low Air Leaf	N/A	6.75 (171)
FLEX Air	N/A	8.75 (222)

Follow this procedure to temporarily set ride height.

4

WARNING!

Ensure that a vehicle is parked and the wheels chocked before beginning this procedure.

CAUTION

Completing this procedure will enable you to safely reach the nearest authorized Peterbilt repair facility to have ride height and pinion angle reset using the proper equipment and technique. Do this as soon as possible to avoid potential driveline damage.

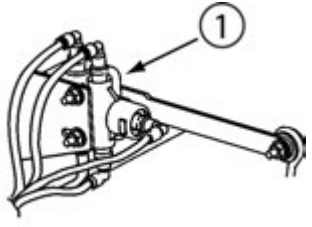
NOTE

Suitable wheel chocks are at a minimum an 18-inch (46 cm) long 4x4.

1. Ensure that the tractor is fully laden during this procedure. Do not use these procedures on a vehicle that is not laden (bobtail).

2. Ensure the air supply and delivery plumbing of the height control valve is consistent with the following illustrations.

Typical Height Control Valve (Location on Vehicle)



Typical Height Control Valve (Rear View Looking Forward)

1. Alignment Dowel

NOTE

- At least one of the mounting holes in the height control valve bracket will be slotted to permit rotating the valve.
- On dual-valve systems, begin with the LH valve on the next step.

3. Loosen the fasteners mounting a height control valve to its bracket.

WARNING!

- The rear of a vehicle will drop about 3 1/2 inches (88 mm) when the air springs are deflated. Ensure that no persons or objects that could be killed, injured or damaged are under the vehicle before deflating the air springs.
- To minimize risk of death, personal injury or property damage, do not use a dump valve to deflate the air springs. Rotate the height control valve(s) manually to ensure positive control of air spring deflation.
- To minimize risk of death or personal injury, keep away from air springs as they are being inflated.

4. 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 (see illustration on page 4-40).
- 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.

5. When at the correct ride height, ensure that the height control valve lever is in the neutral position, then install either the built-in alignment pin or a 1/8-inch (3-mm) dowel (see illustration on page 4-40).

6. Torque the mounting fasteners to 55-75 Lb. in. (6.2-8.5 Nm.).

7. Remove the alignment pin or dowel.

8. Repeat Steps 2 through 6 above for the RH valve on vehicles with a dual-valve system.

Driving with Deflated Air Springs

If an air spring is ruptured, there will be enough air pressure to drive the vehicle to a safe stop off the highway to investigate the problem.

WARNING!

Do not continue to drive with ruptured air springs. The air loss can cause the spring brakes to apply allowing your brakes to drag and burn up the linings, which could lead to an accident causing death or personal injury. Do not continue to operate the vehicle in this condition.

You can get to a repair facility if you do the following:

1. Remove 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.
2. The air system can then be pumped up to normal pressure for continued operation.

WARNING!

Do not drive the vehicle if the air pressure is less than 100 psi (690 kPa). Driving the vehicle with less than 100 psi (690 kPa) could make the brakes unsafe to use which could cause an accident involving death or personal injury.

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).

AFTER-TREATMENT SYSTEM

Introduction

This vehicle will has an exhaust After-Treatment System (ATS), to control vehicle exhaust emissions, which consist of a Diesel Particulate Filter (DPF), Selective Catalyst Reduction (SCR), Regeneration Switch and warning lights. The DPF will trap soot from the engine exhaust gases. The SCR uses Diesel Exhaust Fluid to reduce the levels of NOx in the engine exhaust. The ATS will periodically clean (regenerate) the DPF. Please refer to the Exhaust Aftertreatment System Supplement provided with the vehicle for more detailed description of functionality and warnings.

DRIVING TIPS AND TECHNIQUES

Introduction

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 result in damage to your drivetrain when you try to re-engage the transmission. You could lose control of the vehicle which can lead to an accident involving death or personal injury.

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 hold the brake pedal down too long or too often while going down a steep or long grade. This could cause the brakes to overheat and reduce their effectiveness. As a result, the vehicle will not slow down at the usual rate. To reduce the risk of an accident which could cause death or personal injury, before going down a steep or long grade, reduce speed and shift the transmission into a lower gear to help control your vehicle speed. Failure to follow procedures for proper downhill operation could result in loss of vehicle control.

Engine Overspeed

CAUTION

To avoid engine damage, do not let the engine rpm go beyond the maximum governed rpm—valve damage could result if overspeed conditions occur.

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's 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.

Use of Tachometer

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.

⚠ WARNING!

Do not look at the Instrument Cluster Display for prolonged periods or repeatedly in a short period of time while the vehicle is moving. Extended glance durations to instrument cluster and/or overly frequent glances inside the vehicle can cause a loss of attention to the situations on the roadway and vehicle's road position, which could lead to an accident and possible death or personal injury or equipment damage.

Use of Instrument Cluster Display

The Instrument cluster display provides information to help the driver optimize vehicle efficiency. Refer to Instrumentation Cluster Information on page 3-35 for details. A driver will find the section describing Trip Information and the RPM Detail useful.

Fuel - Excess 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.

Maintenance

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

Driving Habits

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 type of roads on which the vehicle operates. It is not always possible to choose the most adequate road, but it must be kept in mind that 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

SLEEPER BUNKS

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!

Be sure the restraint system is used when anyone is occupying the sleeper while the vehicle is moving. In an accident, an unrestrained person lying in a sleeper bunk could be injured. He or she could be thrown from the bunk.

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.

- **Before you move the vehicle, check to be sure the lower bunk is latched securely.**

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.

WARNING!

Be sure the latch that holds the upper bunk in the folded position is working properly so the bunk will not fall down. If the bunk falls, you could be injured.

WARNING!

Be sure to stow away all loose belongings before you move your vehicle. Do not store objects on the bunks, they could cause damage or injury in an accident. Failure to comply may result in death, personal injury, equipment or property damage.

WARNING!

Be sure the restraint system is used when anyone is occupying the sleeper while the vehicle is moving. In an accident, an unrestrained person lying in a sleeper bunk could be injured. He or she could be thrown from the bunk. Failure to comply may result in death or personal injury.

WARNING!

Be sure no one ever rides unsecured in the upper bunk. That person could be thrown out in an accident and could be injured. Do not use the upper bunk while you are moving. Failure to comply may result in death or personal injury.

Sleeper Occupant Restraint

The sleeper restraint is stored in a compartment on the rear sleeper cab wall.

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.

See Sleeper Bunks and Restraints on page 1-27, for more information on cab/seat restraint systems.

STOPPING THE ENGINE

Before Stopping the Engine

A hot engine stores a great amount of heat. It doesn't 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 1000 RPM for five minutes. Then low idle for thirty 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.

Turbochargers

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 inside the fuel tanks allows water to condense in the tank. To prevent this condensation while the vehicle is parked for extended periods of time, fill the tanks to 95 percent of capacity. Never fill to more than 95 percent capacity as this provides room for expansion resulting from temperature extremes. 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 full or empty, may leak, explode, and cause or feed a fire. Do not carry extra fuel containers, even empty ones are dangerous. Failure to comply may result in death, personal injury, equipment or property damage.

WARNING!

Diesel fuel in the presence of an ignition source (such as a cigarette) could cause an explosion. A mixture of gasoline or alcohol with diesel fuel increases this risk of explosion. Do not remove a fuel tank cap near an open flame. Use only the fuel and/or additives recommended for your engine. Failure to comply may result in death, personal injury, equipment or property damage.

Specification: Use only Ultra Low Sulfur Diesel (ULSD) Fuel, as recommended by engine manufacturers. If you need further information on fuel specifications, consult the *Engine Operation and Maintenance Manual*.

Location of Fuel Shut-Off Valves

If your vehicle is equipped with 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.

Refuel Before the Final Stop

Air space in your fuel tanks allows water to condense there. To prevent this condensation while you are stopped, fill your tanks to 95% of capacity.

Final Stop

To make sure your vehicle is ready to go after a long stop (such as over night), please follow the suggestions below. Your vehicle will be easier to get going when you are ready, and it will be safer for anyone who might be around it. Please remember, too, that in some states it is illegal to leave the engine running and the vehicle unattended.

Final Stopping Procedures

1. Set the parking brake before leaving the driver's seat. To hold your vehicle while it is parked, don't rely on:

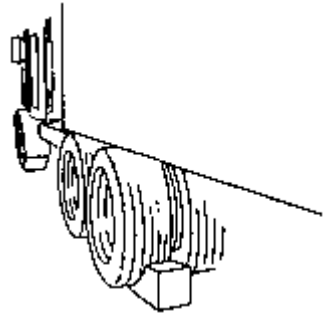
- Air Brakes
- Hand Control Valve for Trailer Brakes
- Engine Compression

WARNING!

Using the trailer hand brake or air brakes to hold a parked vehicle is dangerous. Because they work with air pressure, these brakes could come loose. Your vehicle could roll, causing an accident involving death or personal injury. Always set the parking brakes. Never rely on the trailer hand brake or truck air brakes to hold a parked vehicle.

2. If you are parked on a steep grade, block the wheels.

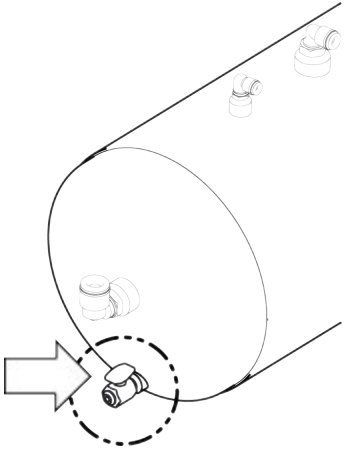
Suitable wheel chocks are at a minimum an 18-inch (46-cm) long 4x4.



Blocked Wheels

3. Drain water from the air reservoirs. While the engine and air supply system are still warm, drain moisture from the air reservoirs. Open the reservoir drains just enough to drain the moisture. Don't deplete the entire

air supply. Be sure to close the drains before leaving the vehicle.



Opening Drains

4. Secure the vehicle. Close all the windows and lock all the doors.

Common Maintenance Items

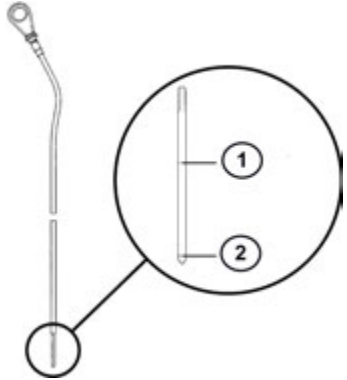
Accessory Drive Belts

You can extend the reliability and service life of your vehicle's drive belts with proper attention to installation, and maintenance. Neglect could cause belt failure. The result could be the loss of the electrical or air system as well as possible engine damage from overheating. So it's a very good idea to check your belts frequently and replace them as soon as you detect trouble.

Inspection of the Engine Oil Level

NOTE
It takes approximately 15 minutes for all the oil to run into the sump when the engine is 'warm.' If the level is checked immediately after switching off the engine, the dipstick will show a low oil level.

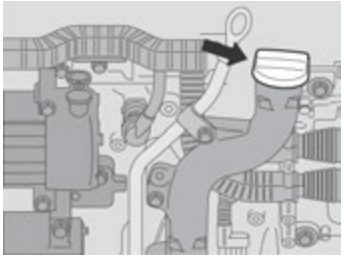
1. Make sure that the vehicle frame rail is standing on a flat and level surface.
2. Make sure that the vehicle is horizontal, both lengthwise and crosswise. Check this carefully on a vehicle with air suspension. Note that the engine may be inclined up to 4° depending on the vehicle model and wheelbase.
3. Twist the dipstick handle to unlock it, then pull the dipstick out of the holder.
4. Wipe the dipstick clean with a lint-free cloth.
5. Place the dipstick back into the holder.
6. Pull the dipstick out again and check the oil level. The oil level should always be between the 2 marks on the dipstick.
7. Reinstall the dipstick and twist to lock it in place.



1. Engine Oil High Level
2. Engine Oil Low Level

Topping Up the Engine Oil

1. Top up with oil, if necessary, via the filler opening. Use the correct grade in the correct quantity. For oil replacement, please see engine Operator's Manual included with this chassis.
2. After topping up, wait 1 minute and check the oil level again.
3. Reinstall the oil fill cap and twist to lock it in place.



Engine Air Intake Filter

This vehicle is equipped with an air inlet restriction indicator. Service the filter elements when the air inlet restriction indicator locks in the extreme Up position. Paper elements require care and proper handling because they are critical to engine service life. If your vehicle has an external air cleaner and cab-mounted mirrors, the mirror must be pivoted to provide access for servicing the filter element.

Cooling System Maintenance

Your engine's cooling system is standard with Extended Life Coolant (ELC). ELC consists of a mixture of ethylene glycol, water, and organic acid technology chemical inhibitors. ELC prevents corrosion and scale formation as well as provides freezing and boiling point protection.

CAUTION

The engine cooling system has very specific maintenance and inspection requirements. Failure to follow requirements can damage the engine. Engine damage can include but is not limited to:

- Freezing
- Boiling
- Corrosion
- Pitted cylinder liners

This information is found in the engine manufacturers owner's manual. It is the owner's responsibility to follow all requirements listed in the engine manufacturers owner's manual.

Proper Coolant Level

NOTE

Do not overfill a cooling system. Excess coolant may result in overflow, loss of antifreeze, and reduced corrosion protection.

- The minimum fluid level is determined by the line on the surge tank indicated by the letters “MIN”. This indicator is located below the fill cap.
- The cooling system will need fluid if the surge tank level does not rise to the “MIN” line regardless if the system is hot or cold.

Topping Off

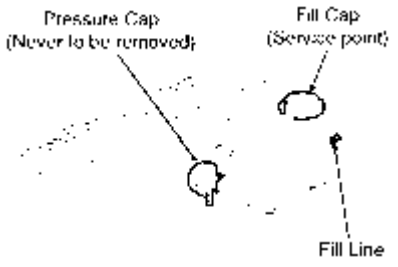
WARNING!

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

NOTE

If frequent topping off is necessary and there are no visible signs of coolant leaks when the engine is cold, check for leaks with the engine operating at normal temperature.

Top off the cooling system when coolant does not rise to the level indicated as ‘MIN’ on the surge tank. The surge tank is translucent which allows the coolant level to be seen. Add coolant through the surge tank fill cap. Do not remove the pressure cap to fill the cooling system.



Surge Tank

NOTE
Do not use the pressure cap to fill the surge tank with fluid.

Power Steering

Oil (under low pressure) provides the power to operate the steering gear. It also serves to lubricate moving parts and remove heat. A loss of steering efficiency will occur if too much heat builds up in the system.

WARNING!
Do not operate the vehicle if the steering system is not working properly. You could lose control of your vehicle if the steering system is not in good working condition, which could result in a serious accident. For driving safety, visually check the steering gear and components. Frequent checks are important for driving safety, especially after traveling over rough roads. Failure to comply may result in death, personal injury, equipment or property damage.

CAUTION
When adding fluid, be sure to use fluid of the same type. While many fluids have the same description and intended purpose, they should not be mixed due to incompatible additives. Mixing incompatible fluids may lead to equipment damage.

NOTE
Before removing reservoir cover, wipe outside of cover so that no dirt can fall into the reservoir.

- Maximum/Minimum level is indicated on the reservoir. These same levels are also indicated by two lines on the dipstick in the reservoir.
- There are two ways to check whether the power steering fluid is at its proper level. Both checks are with the engine NOT running.

1. If you check the fluid with the engine and steering system COLD, the fluid level should be at/or above the Minimum indicator level and should generally not exceed the middle point between Maximum and Minimum level indicators.
2. If you check the fluid with the engine and steering system WARM, the fluid should NOT exceed the Maximum level indicator and should generally not drop below the middle point between the Maximum and Minimum level indicators.

Automatic Transmission Oil Level

NOTE
The vehicle must be parked on level ground.

See the Transmission Operator's Manual for information on checking the transmission oil level.

Clutch Adjustment - Normal Wear

Clutch pedal free travel is usually 1 3/4 in. to 2 in. (34 to 51 mm). This should be your guide for determining whether your truck needs clutch adjustment. Also, if it becomes increasingly difficult to shift into gears, or the truck creeps with the clutch pedal depressed, your clutch needs adjustment. See the Maintenance Manual for the proper adjustment procedures.

Some vehicles have automatic clutch adjustment. If yours doesn't have this feature, adjustment will have to be done by a trained certified mechanic. Have the adjustment done before clutch pedal free travel is reduced to the minimum allowable 1/2 in. (13 mm).

Fuse Inspection and Replacement

If a fuse is blown, see What to do if fuse or relay blows on page 2-6 for more information.

Wheel Cap Nut Torque

After the vehicle travels about 50 to 100 miles (80 to 160 km), wheel mountings seat in and will lose some initial torque. Check hub/wheel mountings after this initial period and retighten, see the *Maintenance and Consumer Information Manual* for sequence and specifications.

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