CHEVROLET
2027
Low Cab Forward
6.7L Diesel Engine
6500 XD/7500 XD
Owner's Manual

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Introduction

California Proposition 65 Warning

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Introduction

The names, logos, emblems, slogans, vehicle model names, and vehicle body designs appearing in this manual including, but not limited to, GM, the GM logo, CHEVROLET, and the CHEVROLET Emblem are trademarks and/or service marks of General Motors LLC, its subsidiaries, affiliates, or licensors.

This manual has been prepared to acquaint you with the operation and maintenance of your vehicle, and to provide important safety information. It includes a Maintenance Schedule and is supplemented with a Warranty and Owner Assistance Information booklet. We urge you to read these publications carefully. The following recommendations will help ensure the most enjoyable, safe, and trouble-free operation of your vehicle. When it comes to service, keep in mind that your commercial truck dealer knows your vehicle best and is interested in your complete satisfaction. Your dealer invites you to return for all of your service needs both during and after the warranty period. Remember, if you have a concern that has not been handled to your satisfaction, follow the steps in the separate Warranty and Owner Assistance Information booklet. We thank you for choosing our product, and want to assure you of our continuing interest in your motoring pleasure and satisfaction.

This manual describes features that may or may not be on the vehicle because of optional equipment that was not purchased on the vehicle, model variants, country specifications, features/applications that may not be available in your region, or changes subsequent to the printing of this owner's manual, including changes in standard or optional content.

Model Reference

The models covered in this manual are 6500 XD and 7500 XD:

Single Cab:

- 6500 XD
- 7500 XD

Using this Manual

To quickly locate information about the vehicle, use the Index in the back of the manual. It is an alphabetical list of what is in the manual and the page number where it can be found.

Danger, Warning, and Caution

Warning messages found on vehicle labels and in this manual describe hazards and what to do to avoid or reduce them.

⚠ Danger

Danger indicates a hazard with a high level of risk which will result in serious injury or death.

⚠ Warning

Warning indicates a hazard that could result in injury or death.

Caution

Caution indicates a hazard that could result in property or vehicle damage.

A circle with a slash through it is a safety symbol which means “Do Not,” “Do not do this,” or “Do not let this happen.”

Cautions and Other Labels in Your Vehicle

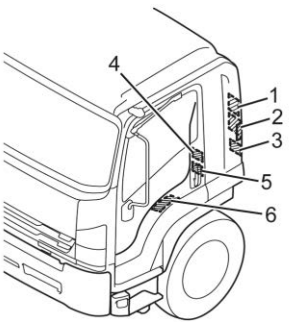
The warning/caution labels in your vehicle indicate very important instructions and information that you should respect to ensure safe and proper use of the vehicle. Be sure to read them before using the vehicle.

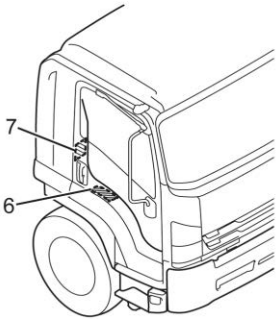
If any of these labels are peeling or illegible due to wear or scratches, please contact your dealer for a replacement.

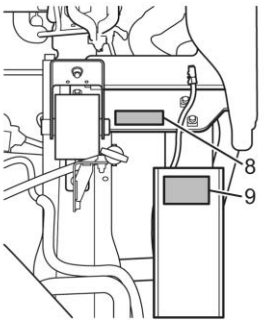
Some examples of warning/caution labels are indicated on the following pages, but there are many others not shown. Also, the contents of these labels may vary from model to model.

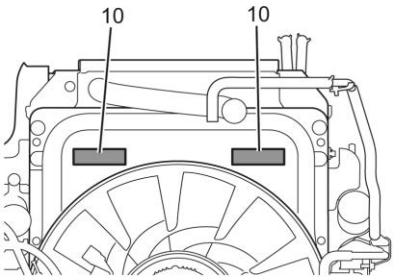
The warning/caution labels shown may be located differently in your vehicle.

Warning/Caution Labels



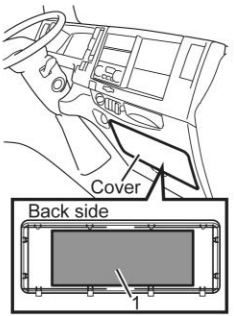


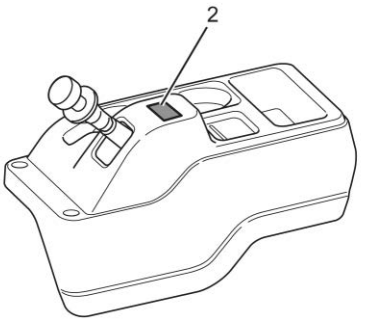


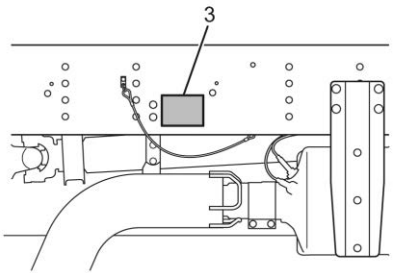


No.	Description
1	Cab tilt instruction
2	Cab tilt handle location
3	Automatic transmission fluid level
4	VIN, weight rating, and Greenhouse Gas (GHG) emissions
5	Towing
6	NO STEP instruction

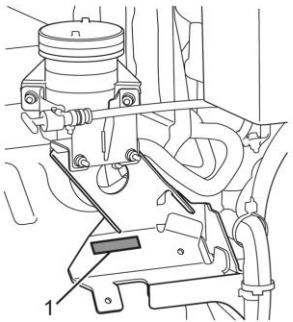
No.	Description
7	Vehicle noise emission control information
8	Engine cooling
9	Engine coolant
10	Fan blade

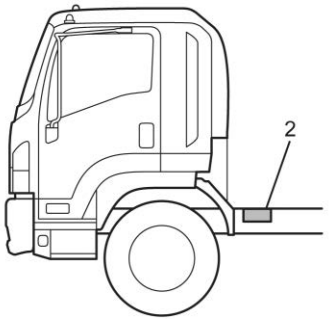


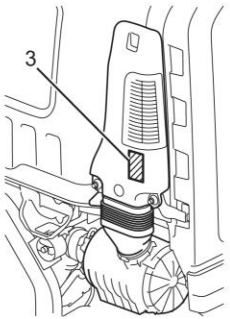


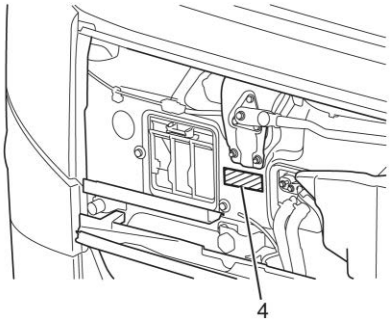


No.	Description
1	Fuse box
2	Parking brake
3	Exhaust heat warning



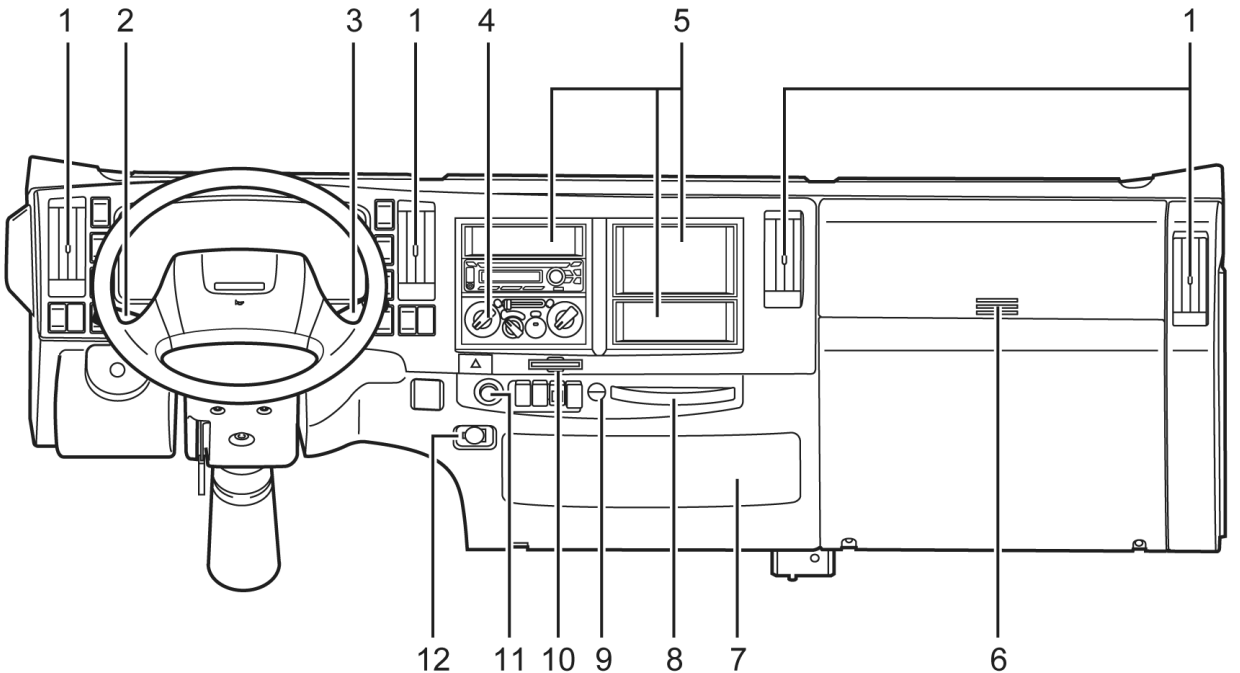






No.	Description
1	Power steering fluid
2	Body
3	Engine start
4	A/C refrigerant

Instrument Panel Overview

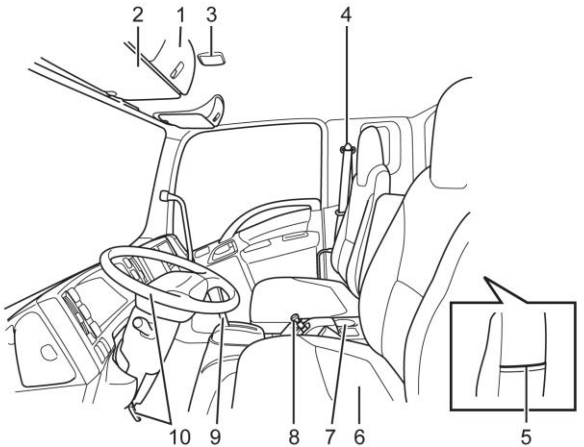


1. Air Flow Direction Control Lever. See *Air Vents* ⇨ *96*.
2. Exterior Lamp Controls. See *Exterior Lamp Controls* ⇨ *71*.

   Cruise Control Set Switch. See *Cruise Control* ⇨ *169*.
3. Windshield Wiper and Windshield Washer Switch. See *Windshield Wiper/Washer* ⇨ *48*.

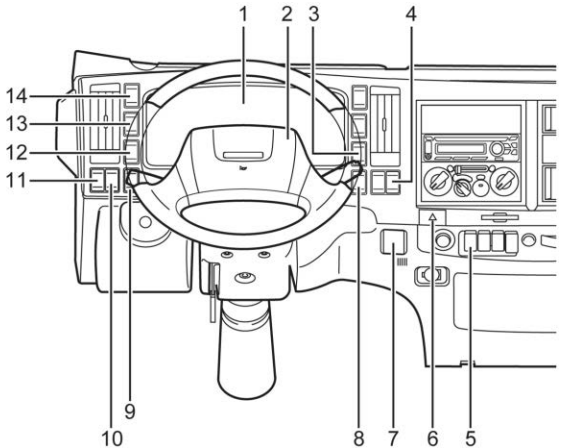
   Exhaust Brake Switch. See *Exhaust Brake* ⇨ *168*.
4. Heater and Manual Air Conditioner. See *Climate Control Systems* ⇨ *93*.
5. Small Article Storage Pockets. See *Instrument Panel Storage* ⇨ *39*.
6. Glove Box. See *Glove Box* ⇨ *39*.
7. Relay Box. See *Electrical System Overload* ⇨ *220*.
8. Cupholders. See *Cupholders* ⇨ *40*.
9. Hook. See *Shopping Bag Hooks* ⇨ *41*.
10. Card Holder. See *Instrument Panel Storage* ⇨ *39*.
11. Accessory Power Outlet. See *Power Outlets* ⇨ *49*.
12. Accessory Power Outlet. See *Power Outlets* ⇨ *49*.

Instrument Panel Overview (Vehicle Interior)



1. Overhead Tray. See *Storage Compartments* ⇨ *38*.
2. Sun Visor. See *Sun Visors* ⇨ *22*.
3. Dome Lamps. See *Dome Lamps* ⇨ *74*..
4. Seat Belt. See *Three-Point Seat Belt* ⇨ *29*.
5. Seat Back Pocket (Driver's Side). See *Storage Compartments* ⇨ *38*.
6. Seat. See *Seat Position* ⇨ *23*.
7. Cupholders. See *Cupholders* ⇨ *40*.
8. Parking Brake Lever. See *Parking Brake* ⇨ *166*.
9. Selector Lever. See *Selector Lever* ⇨ *160*.
10. Fully Adjustable Steering. See *Steering Wheel Adjustment* ⇨ *47*.

Instrument Panel Overview (Driver Side)



1. Instruments, Warning Lights and Indicator Lights. See *Instrument Cluster* ⇨ *52*.
2. Horn Button. See *Horn* ⇨ *48*.
3. Diesel Particulate Filter (DPF) Regeneration Start Switch. See *Diesel Particulate Filter* ⇨ *137*.
4. Cruise Control Main Switch. See *Cruise Control* ⇨ *169*.
5. Air Suspension Dump Switch. See *Air Suspension* ⇨ *132*.
6. Hazard Warning Flasher Switch. See *Hazard Warning Flashers* ⇨ *72*.
7. Remote Mirror Control Switch. See *Remote Control Mirrors* ⇨ *20*.
8. Outside Rearview Mirror Heater Switch. See *Heated Mirrors* ⇨ *20*.
9. Odometer Check Switch. See *Odometer* ⇨ *52*.
10. Door Lock Switch. See *Power Door Locks* ⇨ *18*.
11. Instrument Panel Light Level Control. See *Instrument Panel Illumination Control* ⇨ *74*.
12. Power Take Off (PTO) Main Switch. See *Power Take-Off (PTO)* ⇨ *178*.
13. Power Take Off (PTO) Engine Speed Control Switch. See *Power Take-Off (PTO)* ⇨ *178*.
14. Rear Body Interior Light Switch. See *Cargo Lamp* ⇨ *74*.

Keys, Doors, and Windows

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Power Door Locks 18

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Vehicle Security 18

Exterior Mirrors
Mirrors 18
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Heated Mirrors 20

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Power Windows 20
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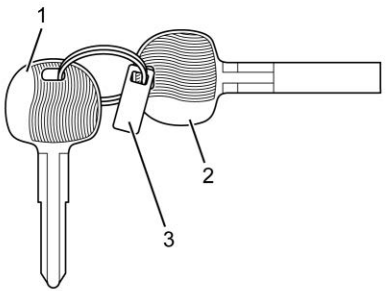
Keys and Locks

Keys



1. Main Key
2. Spare Key
3. Metal plate with key code

One key (1) can operate all the locks on the vehicle. Keep one of the two keys provided as a spare (2). Record the key code numbers.

Both sides of the key are identical, so you can insert the key in the engine control switch without worrying about which way you insert it.

The key code is indicated on a separate metal plate (3) in order to prevent it from being acquired by an unauthorized person.

Where is the Key Used?

Where	For What
Engine Control Switch	Starting and shutting down the engine
Front doors	Locking and unlocking the doors.

Wipe off the key to remove any dirt or dust, etc. before using it.

To prevent theft, store the metal plate with key code in a safe place other than the vehicle.

Should you lose the key, please give the key number to the nearest dealer. The dealer will be able to duplicate your key.

If you resell the vehicle, be sure to hand over the plate with key code to the new owner together with the vehicle.

⚠ Warning

If the key is unintentionally rotated while the vehicle is running, the ignition could be moved out of the RUN position. This could be caused by heavy items hanging from the key ring, or by large or long items attached to the key ring that could be contacted by the driver or steering wheel. If the ignition moves out of the RUN position, the engine will shut off, braking and steering power assist may be impacted, and airbags may not deploy. To reduce the risk of unintentional rotation of the ignition key,

(Continued)

Warning (Continued)

do not change the way the ignition key and Remote Keyless Entry (RKE) transmitter, if equipped, are connected to the provided key rings.

The ignition key and key rings, and RKE transmitter, if equipped, are designed to work together as a system to reduce the risk of unintentionally moving the key out of the RUN position. The ignition key has a small hole to allow attachment of the provided key ring. It is important that any replacement ignition keys have a small hole. See your dealer if a replacement key is required.

The combination and size of the rings that came with your keys were specifically selected for your vehicle. The rings are connected to the key like two links of a chain to reduce the risk of unintentionally moving the key out of the RUN position. Do not add any additional items to the ring attached to the ignition key. Attach additional items only to the second ring, and limit added items to a few essential keys or small, light items no larger than an RKE transmitter.

Remote Keyless Entry (RKE) System

See *Radio Frequency Statement* ⇨ *301*.

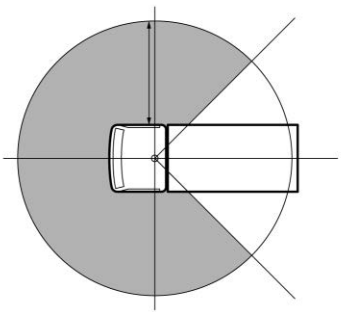
If there is a decrease in the Remote Keyless Entry operating range:

- Check the distance. The transmitter may be too far from the vehicle.
- Check the location. Other vehicles or objects may be blocking the signal.
- Check the transmitter's battery. See "Replacing the Battery in the Remote Control Unit" under *Remote Keyless Entry (RKE) System Operation* ⇨ *12*.

- If the transmitter is still not working correctly, see your dealer or a qualified technician for service.

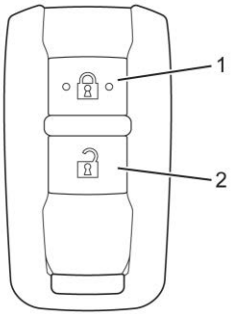
Remote Keyless Entry (RKE) System Operation

The keyless entry system allows you to lock/unlock the doors by simply pressing the remote control button rather than inserting the key into the lock.



The remote control unit works within a 10 m (33 ft) radius of the cab center as indicated in the figure. The actual distance over which the unit operates may vary depending on conditions.

Unlocking and Locking the Doors



Remote Control Unit

Unlocking

Press the unlock button (2) of the remote control unit for 1 second or longer. The vehicle's keyless entry system causes the right and left turn signal lights to simultaneously flash twice upon receiving the signals from the remote control unit.

Locking

Press the lock button (1) of the remote control unit for 1 second or longer. The vehicle's keyless entry system causes the right and left turn signal lights to simultaneously flash once upon receiving the signals from the remote control unit.

Should you lose the remote control unit, please contact your dealer.

After locking the doors using the remote control unit, be sure to check that they are locked by pulling the door handles.

Avoid getting water on the remote control unit, dropping it, hitting it against another object, or stepping on it; otherwise, the remote control unit could malfunction.

Do not leave the remote control unit on the dashboard or any other surface where the unit might be exposed to high temperatures (exceeding 60°C/140°F). Doing so may result in shorter battery life or malfunction of the remote control unit.

If the keyless entry system fails to operate normally, lock and unlock the doors using the key and have the system inspected by your dealer.

The lock or unlock buttons on the remote control unit must be fully pressed for more than 1 second to work.

If you do not open any doors within about 30 seconds after pressing the unlock button to unlock the doors, the automatic locking function of the system will lock the doors again to prevent theft.

In areas near a TV tower, electric power plant, radio station, etc. or under any conditions involving strong electrical disturbances, the remote control unit operating range might change or the keyless entry system might not work.

The keyless entry system does not operate in the following cases:

- The engine control switch is in the "ON" position.
- The key is inserted in the engine control switch.
- One of the doors is open.

Replacing the Battery in the Remote Control Unit

⚠ Warning

When changing the battery, use only a battery of the same type as the original battery, or an equivalent. Otherwise, there is a risk of explosion.

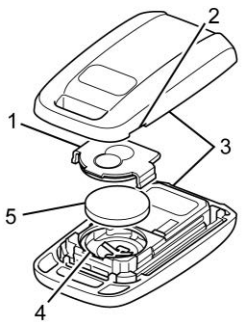
Do not place the battery in direct sunlight, or near a fire or other sources of heat.

Be sure to install the battery with the "+" and "-" sides correctly oriented. Incorrect installation will result in leakage of chemicals from inside the battery or other operational problems.

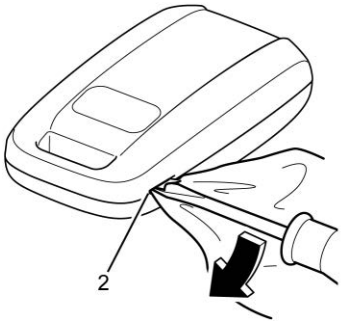
You and others could be seriously injured.

When the battery runs down, replace it. Battery life is approximately two years.

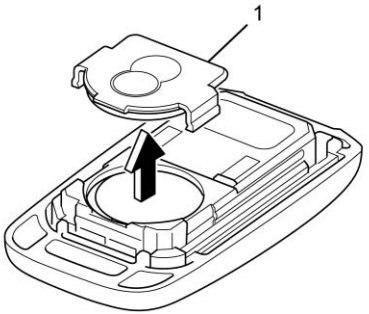
Battery Used	Number of Battery
Lithium battery	1
Model number: CR 2032	
Voltage: DC3V	



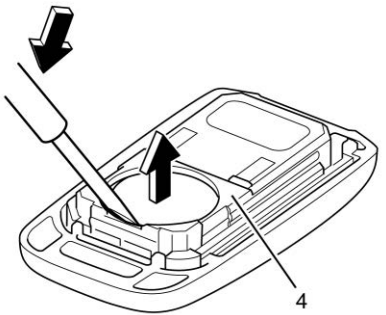
1. Battery Cover
2. Remote Control Cover Notch
3. Remote Control Unit Cover
4. Transmission Unit
5. Battery



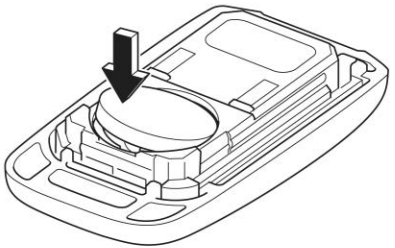
1. Pry open the remote control unit cover (3) by inserting a flat head screwdriver or similar tool into the notch of the remote control unit cover (2). Wrap a piece of cloth or tape around the tip of the screwdriver so as not to damage the remote control unit cover (3).



2. Remove the battery cover (1).



3. Insert a flat head screwdriver or similar tool into the recess of the transmission unit (4) to remove the old battery.



4. Insert the new battery into the transmission unit (4) with its positive side visible, and press the battery downward until fully seated.
5. Install the transmission unit (4), battery (5), and battery cover (1) in their original positions inside the remote control unit cover (3).
6. Close the remote control unit cover (3).

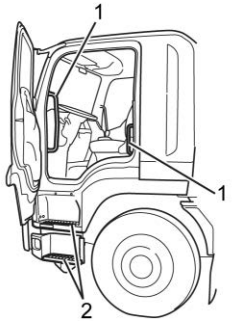
When closing the remote control unit cover (3), check that there is no dust, hair, or anything else caught underneath it. A poorly sealed remote control unit could become deteriorated.

Please comply with the collection system available in your country for the disposal of old batteries. In addition, take special care to prevent any danger to children.

The battery life varies depending on how the remote control unit is used.

The battery has reached its end of life when the remote control unit works intermittently or does not work at all. Replace the battery as soon as this happens.

Getting In and Out of the Vehicle



1. Grip
2. Step

Carefully check that the area around the vehicle is safe, hold the grip (1), and place your foot on the step (2) when getting in or out of the vehicle.

⚠ Warning

When getting in or out of the vehicle, make sure you use the step and grips to support yourself at 3 points. It is very dangerous to stand on the tire or wheel when getting in or out of the vehicle.

Furthermore, do not try to jump in or out of the vehicle, as doing so could cause unexpected accidents or injuries.

Getting in or out of the vehicle with oily or greasy hands or shoes could cause you to slip. Always thoroughly clean grease, etc. from your hands and shoes before getting in or out of the vehicle.

Rain and snow can cause the step to become very slippery. Therefore, always remove snow and ice from your shoes and the step, and be careful not to slip when getting in and out of the vehicle.

Exercise caution when opening or closing doors, as strong winds or steep slopes may cause doors to open or close suddenly.

(Continued)

Warning (Continued)

Do not hold parts other than the grip when getting in or out of the vehicle. Doing so may cause damage to the vehicle or injuries to yourself or others.

You and others could be seriously injured.

Door Locks

⚠ Warning

Be sure to do the following whenever you leave the vehicle:

1. Fully engage the parking brake.
2. Shut down the engine.
3. Lock the doors.

When you close the door after sitting behind the wheel, check that the door is fully closed. Driving with any door ajar is very dangerous.

Before opening the door when climbing into or out of the cab, carefully check all areas around the vehicle for safety,

(Continued)

Warning (Continued)

especially the area at the rear of the vehicle. If you suddenly open a door without checking the surrounding area, the door could be hit by a vehicle behind you or a pedestrian.

Never leave the key in the vehicle.

Tilt the cab only after fully closing the doors.

To help reduce the risk of personal injury in an accident, always lock the doors when driving. Along with using the seat belts properly, locking the doors helps prevent people from being thrown from the vehicle. It also helps prevent unintended opening of the doors and helps keep out intruders.

You and others could be seriously injured.

⚠ Warning

To protect the child from the danger of getting his/her hands and head trapped, an adult must open, close and lock the door for the child.

(Continued)

Warning (Continued)

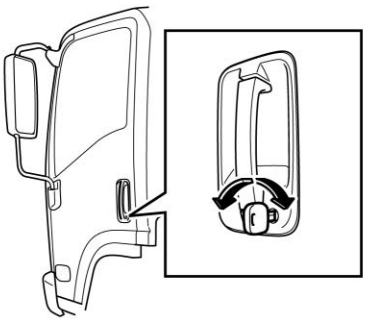
Be careful that the child does not interfere with the power window switches and get his/her hands or head trapped in the window. While a child is in the cab, be sure to control the power windows using the power window switches beside the driver's seat.

You and others could be seriously injured.

Overriding door locks are a standard safety feature. When the doors are locked, the inside handles will not open them. This is to prevent accidental opening of the doors.

Front Doors

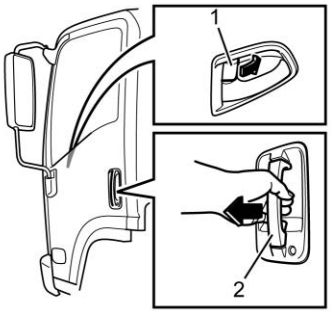
Locking and Unlocking the Door from Outside Using the Key



Turn the key toward the front of the vehicle to lock the door and turn it toward the rear of the vehicle to unlock it. The doors can be opened by pulling the outside door handle.

To close the door, push the outside door handle.

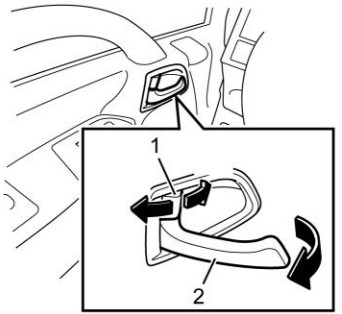
Locking the Door from Outside without Using the Key



First, push the lock button (1) on the inside door handle forward and then close the door while keeping the outside door handle (2) raised.

Before closing the door, be sure to check that you have the key with you.

Locking and Unlocking the Door from Inside



Push the lock button (1) forward to lock the door; pull the lock button backward to unlock it. After unlocking the door, open it by pulling the inside door handle (2). If the door is locked, the lock mechanism overrides operation of the door handle.

To close the door, pull the pull handle.

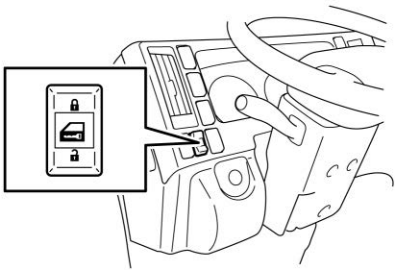
Power Door Locks

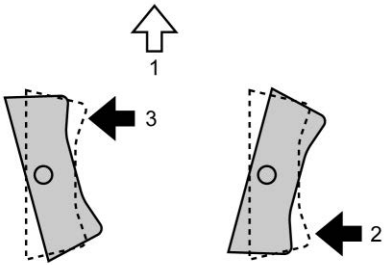
Power Door Lock (Central Door Lock)

How the Power Door Lock System Operates

When you lock the driver's door using the key or by operating the lock button, the power door lock system will automatically lock all doors simultaneously.

Door Lock Switch





1. Upper Side
2. Unlock
3. Lock

Both doors can be locked and unlocked by pressing the power door lock switch.

Vehicle Security

Guard Against Theft

Your new vehicle has many features to help prevent theft of the vehicle, its equipment and contents. But these anti-theft features depend upon you to work.

The time to be most on guard is when leaving the vehicle:

- Park in a lighted spot when you can.
- Turn the engine control switch to "LOCK" and remove the key. This locks the switch and the steering controls. The selector lever is not locked.
- Keep items that may appear to be of value out of sight and locked up when possible.
- Fully close all windows and lock all doors.

Exterior Mirrors

Mirrors

⚠ Warning

Before driving, be sure to adjust the seat and mirrors to positions that give you a correct driving posture.

Do not adjust the outside mirrors while operating the vehicle. Adjust the mirrors when the vehicle is stationary, not while the vehicle is in motion.

(Continued)

Warning (Continued)

When checking the rear of the vehicle with mirrors, be careful that this does not distract your attention from the traffic ahead.

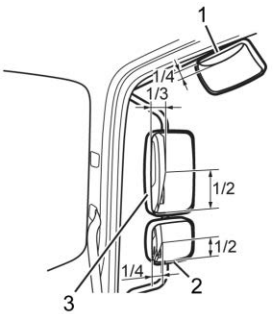
Outside mirrors may make the vehicle behind you appear farther away than it really is. Use these mirrors very carefully until you are able to correctly determine distances from the images.

Keep the mirrors in mind when passing another vehicle on a narrow road, moving the vehicle into a garage, or driving near pedestrians.

Do not drive with the mirrors folded.

You and others could be seriously injured.

Sit in the correct driving position with the seat adjusted properly. Then, check each mirror to ensure that a proper view of the rear and sides of the vehicle are provided. Make adjustments and clean mirrors if necessary.



1. Side Cross Mirror
2. Wide-angle Mirror
3. Outside Rearview Mirror

Outside Rearview Mirror

After properly adjusting your seat for proper driving position, adjust the mirrors indicated below so that they provide adequate views for checking the rear and the sides of the vehicle.

Adjust the outside rearview mirrors by hand (or using the remote mirror control switch, if equipped) before vehicle operation. This helps you determine the location of objects seen in the mirror.

Lateral-direction: Adjust the mirror so that you can see the vehicle's side including the cargo bed within the inner one-third of the mirror.

Vertical-direction: Adjust the mirror so that you see the rear bottom corner of the vehicle halfway up the height of the mirror.

Wide-angle Mirror

Lateral-direction: Adjust the mirror so that you can see the vehicle's side within the inner one-fourth of the mirror.

Vertical-direction: Adjust the mirror so that you see the rear bottom corner of the vehicle halfway up the height of the mirror.

Side Cross Mirror

Lateral-direction: Adjust the mirror so that you can see the cab's side in the mirror.

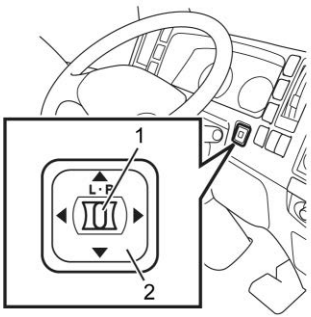
Vertical-direction: Adjust the mirror so that you see the cab within the upper one-fourth of the mirror.

Remote Control Mirrors

Caution
Do not try to forcefully move the surface of the outside rearview mirror by hand if your vehicle is equipped with a remote mirror control switch. Otherwise, the mirror motor may sustain damage.

If equipped, the remote mirror control switch is used to adjust the outside rearview mirrors remotely and is active only when the engine control switch is in the "ACC" or "ON" position.

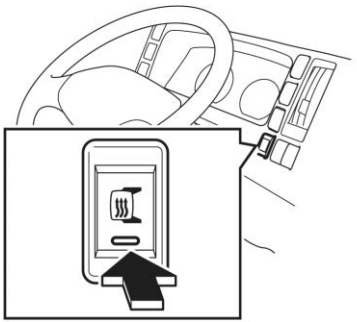
Adjustment



1. Left/Right Selector Switch
2. Angle Adjustment Switch

1. Press the left/right selector switch (1) on the "L" (Left) or "R" (Right) side to move the mirror to the desired position.
2. Press the angle adjustment switch (2) to adjust the mirror angle.

Heated Mirrors



If the outside mirrors fog up, press the outside rearview mirror heater switch to defog them. When the switch is pressed the indicating light will illuminate. If the switch is pressed once again, it will switch to “OFF”, and the operation indicating light will go out.

Do not use this switch while the engine is off. Due to high power consumption, the battery can be discharged.

Turn off the switch as soon as defogging is complete.

Windows

Power Windows

⚠ Warning

If you are traveling with a child, do not leave the child alone in the vehicle. If the child touches the controls or equipment, an accident could occur. (For example, the vehicle could move or a fire could start.) Also, the cab inside could become dangerously hot in hot weather.

⚠ Warning

Before closing the windows, make sure that there is no risk of a hand, head, or anything else being trapped in the moving window.

You and others could be seriously injured.

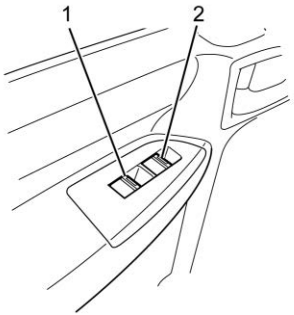
⚠ Warning

Regardless of whether the vehicle is moving or stationary, you must never allow a child to put his/her head, hands, or other body part out of the window. Allowing such behavior would be dangerous because the child could hit an obstacle.

You and others could be seriously injured.

The power windows operate only when the engine control switch is in the ON position. Open each door window by pressing the power window switch; close each one by raising the switch.

Window Switches on Driver's Door



The power window switch on the driver's door can operate both driver's (2) and passenger's (1) power windows.

To Open the Driver's Window

Lightly pressing the driver-side window switch will lower the driver's window until the switch is released (manual mode operation). When the switch is firmly pressed, the window will lower completely without the need to press the switch continuously (automatic mode operation). If you want to stop the automatic movement of the window before it lowers completely, raise the switch lightly.

To Close the Driver's Window

Lightly raising the driver-side window switch will cause the driver's window to move up until the switch is released.

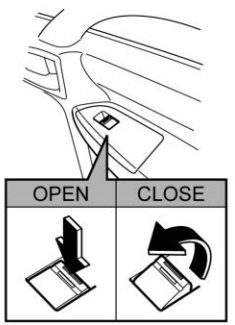
To Open the Passenger's Window

The passenger's window continues to lower while the passenger-side switch on the driver's door is being pressed.

To Close the Passenger's Window

The passenger's window continues to move up while the passenger-side switch on the driver's door is being raised.

Window Switches on Passenger's Door



The power window switch on the passenger's door can raise and lower the passenger's side window.

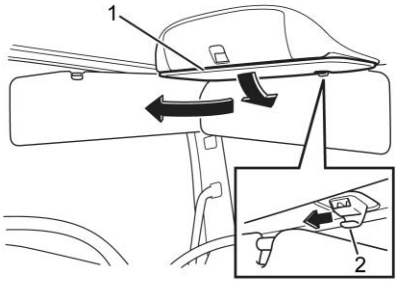
⚠ Warning

Be sure to warn passengers not to let any part of the body become trapped or caught in a moving window.

You and others could be seriously injured.

The window continues to lower while the window switch is being pressed and continues to rise while the switch is being raised. It will stop moving at any position when the switch is released.

Sun Visors



The sun visor (1) protects your eyes in strong sunlight. Use it when sunlight is too bright. To reduce side glare, unhook (2) the sun visor (1) and swing it around to the side.

Make sure to fold up the sun visor after use.

Seats and Restraints

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Front Seats

Seat Position

⚠ Warning

Use caution when adjusting the seat, as failure to do so could cause injury. You and others could be seriously injured.

⚠ Warning

Never allow children to adjust their seats themselves; an adult should adjust the seat for occupants who are children. You and others could be seriously injured.

⚠ Warning

Adjust the seat only before you start driving. Adjusting the seat while the vehicle is in motion must be avoided not only because the unlocked seat will move back and forth unstably, preventing you from taking the correct position, but might also

(Continued)

Warning (Continued)

cause you to lose control of the vehicle, possibly resulting in an accident. You and others could be seriously injured.

⚠ Warning

Try to move the seat without unlatching it after making adjustments to check that it is completely locked. A loosely locked seat may move unexpectedly and your position might then become unstable; this could lead to an accident. Take the vehicle to your dealer for service if you find that your seat adjusters do not latch. In addition, the seat belt will not operate properly if the seatback is not completely locked. You and others could be seriously injured.

⚠ Warning

Do not place a cushion or similar object between your back and the seatback. Doing so not only affects the stability of your

(Continued)

Warning (Continued)

driving position but also prevents the seat belt from working effectively in the event of a collision. You and others could be seriously injured.

⚠ Warning

Do not place any objects under the seat. If there are any objects under the seat, the seat could be locked in an improper position. You and others could be seriously injured.

⚠ Warning

Before making adjustments, check that the seat rails are free of anything that could obstruct the locking of the seat. Be careful that your hand or foot does not become trapped in the seat or rails when adjusting the seat. You and others could be seriously injured.

⚠ Warning

When adjusting the seat, be careful that the seat does not hit passengers or objects. Doing so could cause injury to passengers, or damage objects. You and others could be seriously injured.

⚠ Warning

When adjusting the seat, or when getting up from the seat, do not put your hand or objects under the seat or near moving parts. Doing so could cause injury or damage objects.

⚠ Warning

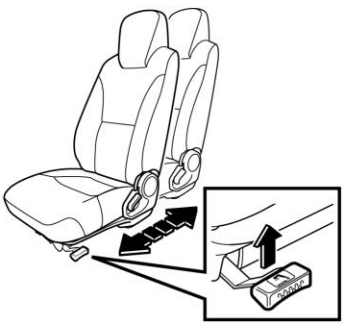
For models with air suspension seats, the suspension may move the seat up or down when you sit down on, or get up from, the seat. Keep your hands away from the moving parts or from under the seat. Otherwise, injury may result.

Driver Seat

The driver seat must be adjusted so that when you sit well back in the seat, you can fully press the pedals without moving your back from the seatback, and you can operate the steering wheel easily and freely. After making adjustments, check that the seat is completely locked.

Adjusting the seat for a correct driving posture is a fundamental part of safe driving.

Forward/Backward Adjustment



While raising the unlock lever, move the seat forward or backward. Release the lever when the seat is in the desired position. After making adjustments, try to move the seat back and forth to check that it is fully locked.

Reclining Adjustment

⚠ Warning

Driving with the seat excessively reclined could be very dangerous in the event of a collision or sudden stop. Raise the seatback, and apply the seat belt correctly while sitting straight in the seat. You and others could be seriously injured.

⚠ Warning

To reduce the risk of sliding under the lap belt during a collision, an occupied reclining seat should not be reclined any more than needed for comfort. The seatback and seat belts provide best restraint only when the rider is sitting well back and straight up in the seat. (The lap belt is designed to spread the force of a collision over the hipbone.

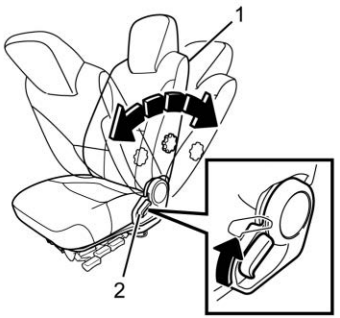
(Continued)

Warning (Continued)

If you are reclined, the lap belt may slide past your hips and apply restraint forces directly to the abdomen. Therefore, in the event of a collision, the risk of personal injury will increase with increasing recline of the seatback). You and others could be seriously injured.

⚠ Warning

Do not adjust the reclining seatback on the driver's seat while the vehicle is moving. The seatback could jerk and cause a loss of control. You and others could be seriously injured.

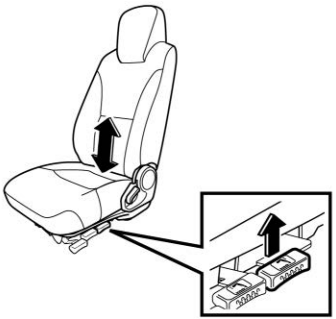


1. Seatback
2. Seatback Tilt Lever

To recline the seatback, raise the seatback tilt lever and gently lean back to the desired position.

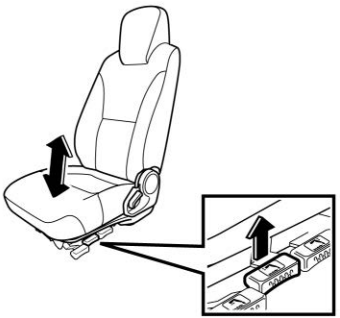
To move the seatback forward, lean forward with your back slightly clear of the seatback and raise the lever. After making adjustments, check that the seatback is fully locked.

Rear Tilt Adjustment



The height of the rear of the cushion can be adjusted by raising the rear cushion tilt lever.

Front Tilt Adjustment



The height of the front of the cushion can be adjusted by raising the front cushion tilt lever.

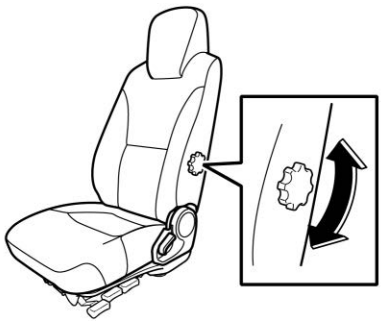
Suspension Lock (Air Suspension Seat)

⚠ Warning

Operating the lever while seated may result in your fingers or hands becoming unexpectedly caught and injured.

Turn the lever up to lock the seat at the fixed height. Operate the lever after getting down from the seat.

Lumbar Support



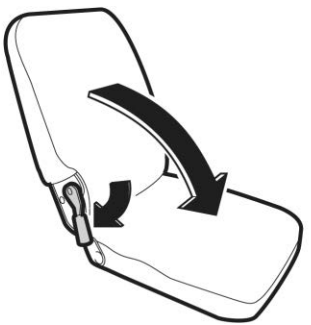
Turning the knob to select the desired lumbar support firmness. The appropriate setting will help alleviate fatigue during long-haul driving.

Passenger Seat/Center Seat

⚠ Warning

Baggage must not be placed on the center seat. If the baggage falls on the floor when braking, it may prevent the driver from operating the pedals. You and others could be seriously injured.

Passenger Seat



Center Seat

You can tip the seatback forward if you pull forward the lever at the side of the seatback. Normally, you should keep the seatback in the raised position.

Seat Belts

⚠ Warning

To help reduce the risk of personal injury in collisions or sudden maneuvers, use the seat belts following these instructions on their proper use, maintenance, and use with child restraint systems.

Seat belts must always be fastened BEFORE starting to drive.

Seat belts provide full protection only when the driver and passenger(s) fasten them while sitting upright and fully back on the seat.

Wearing a seat belt with the seatback excessively reclined could be very dangerous in a collision or sudden stop since the occupant may slide under the belt

(Continued)

Warning (Continued)

and be seriously injured. Seat belts work best only when the occupant is sitting well back and straight up in the seat.

Be sure to insert the latch plate into the buckle until a click is heard. An incompletely inserted latch plate is dangerous in the event of a collision or sudden stop.

Do not run the seat belt over your face, chin or neck.

Wear the seat belt as low as possible around the hips, not around the waist. A seat belt running over the waist would press the abdomen with a strong force and could increase the likelihood of injuries in a collision or sudden stop.

Do not use a seat belt for a small child if the belt is on or very close to the child's neck or chin. Also, do not use a seat belt if it does not fit snugly over the child's hips because restraining the child under those conditions could be dangerous in the event of a collision or sudden stop. Instead,

(Continued)

Warning (Continued)

use an appropriate child restraint system available on the market. For further details, please contact your dealer.

Use a child restraint system that fits the size of the infant or child. Install the system according to the manufacturer's instructions.

Children who have outgrown child restraint systems should use the vehicle's seat belts.

Remove any twists in the seat belt before fastening it. A seat belt with twists will not provide full protection because it cannot disperse shocks efficiently in the event of a collision or sudden stop.

Too much slack could increase the amount of injury because the belt would not be able to properly restrain you in an accident.

Do not put the lap portion of a seat belt over any armrest.

Do not wear a shoulder belt under your arm nearest the door.

Do not let a buckle release button face downward or inward.

(Continued)

Warning (Continued)

Expectant mothers or people suffering from chest or abdominal conditions should check with their doctor for specific recommendations about wearing seat belts.

Do not use one seat belt for more than one person. If worn by more than one person, the seat belt would not work effectively in a collision or sudden stop.

Have seat belts inspected and, if necessary, replaced by the nearest dealer when the webbing becomes frayed or worn and/or when the buckle or other mechanical parts fail to work properly.

If your vehicle has been involved in a collision, the seat belts worn at the time may have lost their original strength due to impact even if they appear intact. These seat belts must be inspected and, if necessary, replaced by the nearest dealer.

Be careful to keep the buckles and retractors free of dust and foreign matter. (This may jam the retractor or damage the belt.)

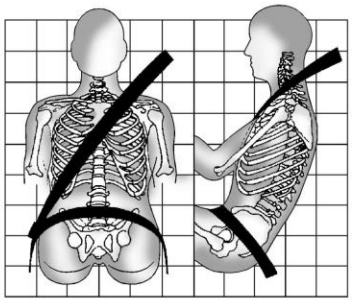
(Continued)

Warning (Continued)

Do not let the belt system become damaged by the door or seat.

Do not let the belt twist while it is rewinding: it may cause the retractor to jam so it will not rewind further. If it is not fully rewound, the belt cannot be pulled out. Should the belt jam, you may be able to release it by working the belt in and out until the belt rewinds far enough to unlock. However, if the belt remains jammed or other parts of the restraint system do not work properly, have your dealer service it.

Wearing seat belts is a legal requirement. All other passengers must wear seat belts. The driver is responsible not only for wearing a seat belt himself/herself but also for prompting all passengers to wear their seat belts. It is necessary, however, to check with a doctor about the appropriateness of a seat belt for an expectant mother or a passenger with a chest/abdominal condition.

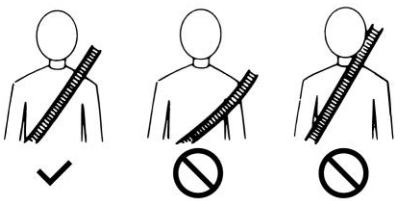


The protection provided by seat belts might be significantly reduced if they are not fastened properly; in certain cases, improperly fastened seat belts can even play a role in causing injury to the wearer. Seat belts must be worn not only by the driver but also by the passenger(s) before the vehicle starts moving. You should be fully acquainted with the proper use of seat belts and important points to be respected as described in the following pages. Familiarizing yourself with the correct use of seat belts is essential for your safety.

Three-Point Seat Belt

⚠ Warning

The shoulder belt should be adequately positioned on your shoulder but should not touch your neck and/or face. The shoulder belt could harm you in a collision or sudden stop if it is in contact with your neck and/or face.

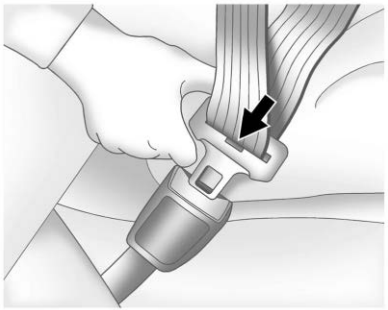


Every seat except the center seat on your vehicle is equipped with a three-point seat belt. The seat belt extends or retracts freely if the

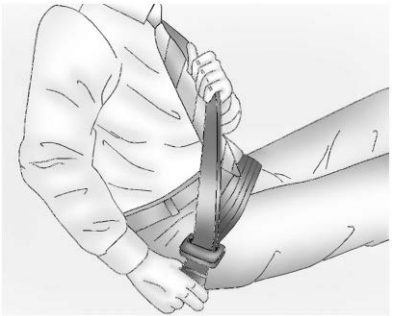
wearer moves slowly, but it locks and restrains the occupant during forward force caused by the occupant's body following a strong shock.

To Fasten:

1. Sit on the seat in the correct driving position.



2. Pull out the seat belt holding the latch plate. After checking that there are no twists in the belt, insert the latch plate into the buckle until it clicks. If the retractor locks before the latch plate reaches the buckle, let the belt retract slightly, then withdraw it slower than before.

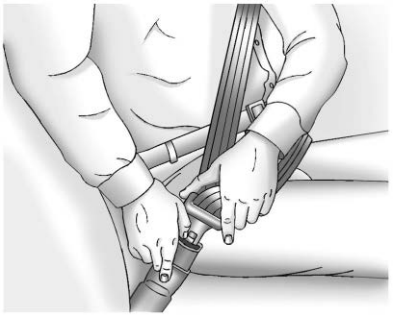


3. To reduce the risk of sliding under the belt during a collision, position the belt across your lap as low on your hips as possible and adjust it to a snug fit by pulling the "shoulder" portion upward through the latch plate.

   The lap-shoulder belt is designed to lock during a sudden stop or impact. At other times it should move freely.

   If you cannot pull out the seat belt, let it go loose, and then slowly pull it out again. If you still cannot pull it out, give the seat belt one strong pull, let it go loose, and then slowly pull it out again.

To Unfasten:



Push the button on the buckle. As the belt automatically retracts, let it be taken up slowly by holding on to the latch plate until the belt is fully retracted.

While being automatically retracted, the seat belt could damage a nearby window or interior trim unless the latch plate is properly held. Hold the latch plate to ensure that the belt is taken up slowly.

Before closing the door, check that the retracted seat belt is taut. A slack belt could become trapped in the door or seat rail.

When the passenger's seat belt is fully taken up (or not pulled out), check that the stopper is holding the belt in a fully taut state.

Emergency Locking Retractor (ELR) Function

The three-point seat belts are provided with an Emergency Locking Retractor (ELR) function.

The ELR normally allows the seat belt to move in and out freely as the occupant moves. However, it locks the seat belt to restrain the occupant when a forward force resulting from a collision or sudden stop acts on the occupant.

The ELR also locks the seat belt when the belt is pulled out quickly. If this happens, allow it to retract once and then pull it out slowly.

Seat Belt Use During Pregnancy

⚠ Warning

Unless the seat belt is correctly worn, it may dig into the abdomen in the event of hard braking or a collision, harming not only the expectant mother but also the unborn child, putting them both in danger of serious injuries or death.

An expectant mother or a person who is ill riding in the vehicle must also wear a seat belt. In light of the risk that the seat belt will apply pressure to the abdomen, chest and shoulders in the event of a collision, however, an expectant mother or person who is ill should get advice from a physician beforehand.

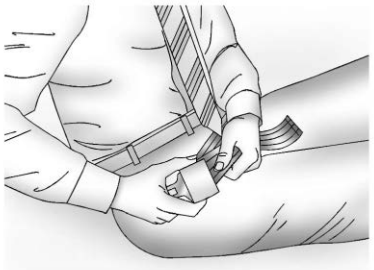
- An expectant mother should use a three-point seat belt.
- An expectant mother should position the lap belt snugly as low as possible on the hips (not across the abdomen). Also, she should fasten the shoulder belt so it rests on her chest, not on her abdomen.

Lap Belt

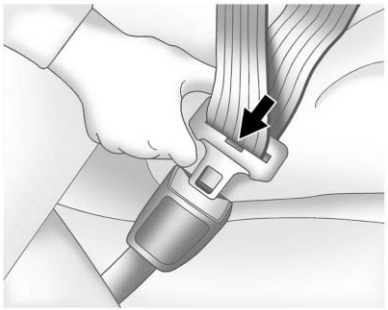
The center seat lap belt has no retractor, but should be positioned, worn, and released as described below.

To Fasten:

1. Sit on the seat in the correct position.



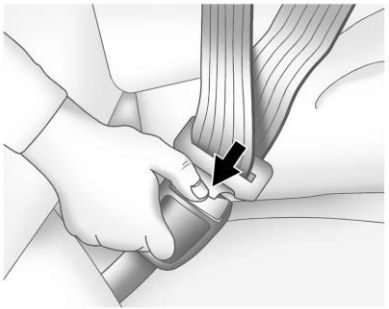
2. Pull out the latch plate side of the belt a little longer than necessary. Placing the latch plate at right angles with the belt makes this easier.



3. After checking that there are no twists in the belt, insert the latch plate into the buckle until it clicks.

4. Position the seat belt across the lap as low as possible on the hips. Pull the fold-back end of the belt (upper side) until the belt is adjusted to a snug fit.

To Unfasten:



Push the button on the buckle to unfasten the belt.

The center seat belt (length-adjustable two-point belt) is designed so that it cannot be connected with any of the windowside seat belts (three-point seat belts with ELR).

Seat Belt Extender

⚠ Warning

Using a seat belt extender incorrectly can affect certain vehicle safety alerts and systems, potentially leading to unexpected vehicle movement. Always unfasten the seat belt by pushing on the vehicle-mounted buckle release button. Only use the extender-mounted release button to remove the extender after you are done using it. Follow all instructions that come with the seat belt extender.

If the vehicle's seat belt will fasten around you, you should use it. But if a seat belt is not long enough, your dealer will order you an extender. Only a GM dealer issued extender should be used. When you go in to order it, take the heaviest coat you will wear, so the extender will be long enough for you. To help avoid personal injury, do not let someone else use it, and use it only for the seat it is made to fit. The extender has been designed for adults. Never use it for securing child restraints. For more

information on the proper use and fit of seat belt extenders see the instruction sheet that comes with the extender.

Safety System Check

Now and then check that the belts, buckles, latch plates, retractors, anchorages and guide loops work properly; look for loose parts or damage (without disassembly) that could keep the restraint system from doing its job. Have a belt assembly replaced if the webbing has been cut or otherwise damaged. Replace belts, retractors, and hardware used in all but a minor collision. Also, restraint systems should be replaced and anchorages properly repaired if they were in areas damaged by a collision, whether the belt was in use or not. If there is any question, replace the belt system. Damage, whether visible or not, could result in a serious personal injury in the event of an accident.

Seat Belt Care

⚠ Warning

Keep belts clean and dry.

(Continued)

Warning (Continued)

Clean seat belts only with mild soaps and lukewarm water.

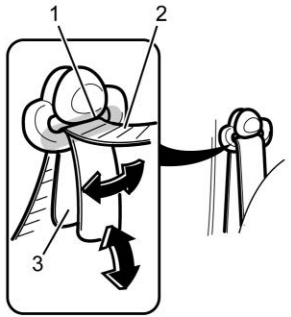
Do not bleach or dye belts since this may severely weaken them.

Seat belt webbing can lose its strength when bleached or redyed, or when cleaned using gasoline, paint thinners or other volatile substances.

Do not disassemble the seat belt mechanism in order to remove any foreign material or objects that may have entered the buckle. Instead, arrange for inspection and maintenance to be carried out by your dealer. You and others could be seriously injured.

A dirty seat belt can develop retracting problems, and for this reason, regular inspection and upkeep are required.

Cleaning a Seat Belt Fold-Back Fitting Portion



1. Seat belt fold-back fitting portion
2. Seat belt
3. Cloth

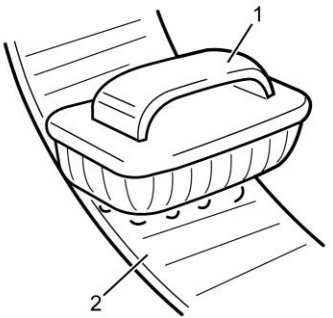
Cleaning a Seat Belt Fold-Back Fitting Portion:

1. Fold a piece of cotton cloth, absorbent gauze, or the like of approximately 50 mm (2 in) in width into a rectangle.
2. Mix one part neutral detergent into approximately twenty parts warm water.

3. Wet the cloth in the detergent mixture, pass it through the fold-back fitting portion of the belt, and slide it back and forth and laterally until dirt can no longer be seen.
4. Remove the cloth, remove moisture from the fitting portion of the belt using a dry cloth, and then allow it to dry naturally out of direct sunlight.
5. Check to be sure the seat belt retracts and pulls out correctly.

Avoid using anything like a tool to pass the cloth through the fold-back fitting portion or try to remove stubborn dirt. Using such an object can result in damage to plastic parts or seat belt webbing.

Cleaning Seat Belt Webbing



1. Brush
2. Seat belt

Cleaning Seat Belt Webbing:

1. Fully extract the belt and examine for any difference in color between the front and back surfaces.
2. Mix one part neutral detergent into approximately twenty parts warm water.
3. Wet a nail brush or another similar brush having soft bristles (of nylon or the like) in warm water, and use this to clean away dirt.
4. Wipe the seat belt dry using a dry cloth, and then allow it to dry naturally out of direct sunlight.
5. Check to be sure the seat belt retracts and pulls out correctly.

If the above-described upkeep operations do not improve the operation of the seat belt through the retractor, there is a possibility that the belt is making contact with the door pillar trim. In this case, arrange for inspection and maintenance to be carried out by your dealer.

If the belt is not winding and unwinding correctly, or if inspection reveals problems such as loose mountings, metal parts deformation, webbing damage, fraying or discoloration, arrange for replacement to be carried out by your dealer.

Child Restraints

Child Restraint Systems

⚠ Warning

Children small enough for child restraints (as indicated on the label of such restraints), including booster seats, should always be transported in them. Children who have outgrown child restraint systems should wear seat belts. The lap belt should be snug and positioned low on the abdomen so that it is below the top of the hipbone. Otherwise, the belt could intrude into the child's abdomen during an accident and cause personal injury. When a child has grown enough so that the shoulder belt can be worn, a seating position with a shoulder belt should be chosen whenever possible.

Any unrestrained child could be injured by striking the vehicle's interior or by ejection from the vehicle during an accident or driving maneuver. Never allow a child to be held by another occupant instead of being properly restrained. If not properly

(Continued)

Warning (Continued)

restrained, the child could strike the vehicle interior or be crushed by the person holding the child, or by other occupants.

Be sure to follow all installation and use instructions that come with any child restraint system.

Child restraint systems are designed to be secured in vehicle seats either by the lap belt, or the lap portion of the lap-shoulder belt at that seating position. The child must also be secured within the restraint by the means provided by the child restraint manufacturer. If the child or the child restraint is not properly secured, the child risks personal injury in the event of a collision.

Using a Lap Belt That Has No Retractor

When securing a child restraint with the center seat lap belt, pull the excess webbing through the belt's adjustment feature, then take these steps:

- Once installed, push and pull the child restraint in all directions to be sure it is secure. If it comes loose, flip the end of the belt with the adjustment feature over before rebuckling.
- If the child restraint is still not secure, use the outboard seating position in the vehicle and contact your dealer and the child restraint manufacturer for help.
- Secure the child in the restraint in accordance with the child restraint manufacturer's instructions.

Installation on Outboard Seat

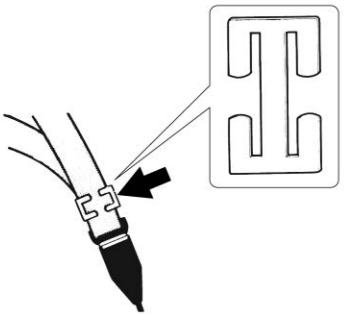
⚠ Warning

To help avoid personal injury or death during a collision or sudden maneuver, always thread both the lap and shoulder belt through the locking clip when securing

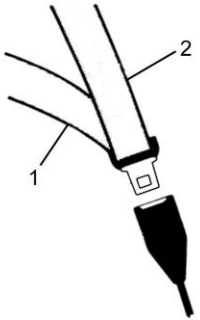
(Continued)

Warning (Continued)

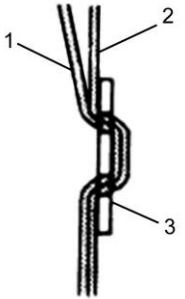
a child restraint on the outboard seat. If the clip is not used or installed properly, the child restraint may move or tip over when your vehicle turns or stops abruptly.



A seat belt locking clip is required for installation of a child restraint system on the outboard seat of this vehicle. A locking clip may usually be obtained where child restraints are sold, or by contacting your dealer for assistance. Make sure the locking clip is identical to the one shown on this page. Until you have the clip, use the child restraint system only in the center seat.



Secure the child restraint with the lap belt portion (1) of the seat belt in accordance with the restraint manufacturer's instructions. Then thread both the lap (1) and shoulder belt (2) portions through the locking clip. Push and pull the child restraint in all directions to be sure it is secure.



Locking Clip Attached to Seat Belt – Side View

1. Lap Belt
2. Shoulder Belt
3. Locking Clip

When your child restraint is not installed, remove the locking clip to permit normal use of the lap-shoulder belt. Keep the locking clip in the glove box to help prevent its loss.

Child Restraint with Top Tether

⚠ Warning

We do not recommend using a child restraint that requires the use of a top tether. There is no appropriate place to attach a top tether anchor behind the seat in this vehicle.

Storage

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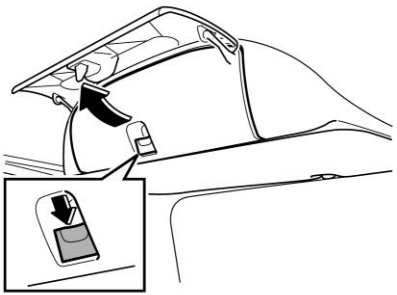
Storage Compartments

Overhead Compartment

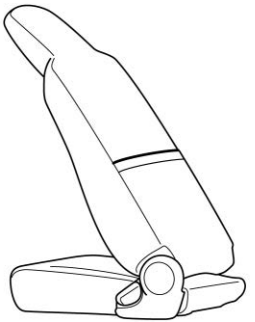


Warning

Do not use the overhead compartment to hold an object weighing more than 2 kg (4 lb) or an object that may fly out or fall down during vehicle operation. Doing so would be dangerous. Items may fly out or fall down when the cab is lowered after being tilted.

You and others could be seriously injured.

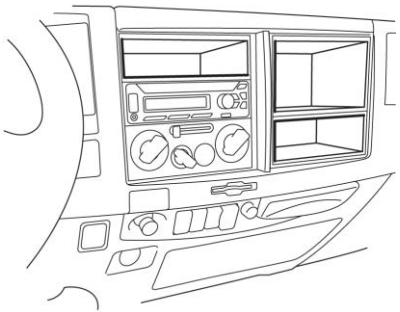
Seat Back Pocket



Use the seat back pocket for storing items such as vehicle registration documents or owner manuals.

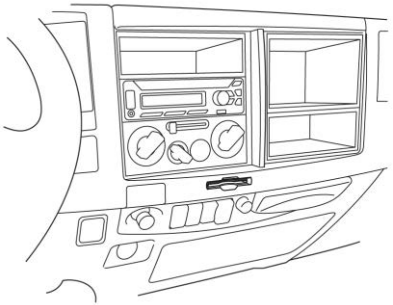
Instrument Panel Storage

Small Article Storage Pockets



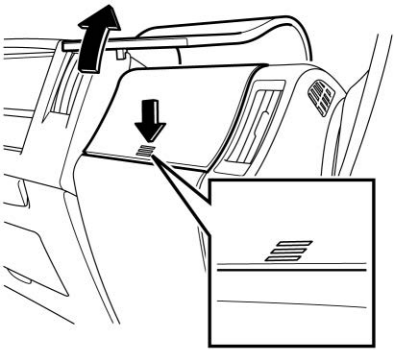
Use the storage pockets for storing small articles.

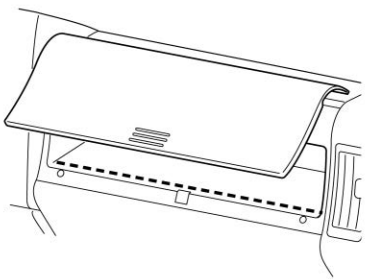
Card Holder



Use this to hold your cards.

Glove Box





Press on the central mark to lock and unlock the lid.

⚠ Warning

For safety, close the glove box during driving. There is a risk of injury from the open lid or items stored in the glove box.

You and others could be seriously injured.

The glove box lid will automatically spring open when it is unlocked. Do not put your face or head near the lid.

⚠ Warning

Do not leave eyeglasses or a lighter in the vehicle. Lighters may explode and plastic lenses or frames may deform or crack if the interior temperature becomes very hot.

You and others could be seriously injured.

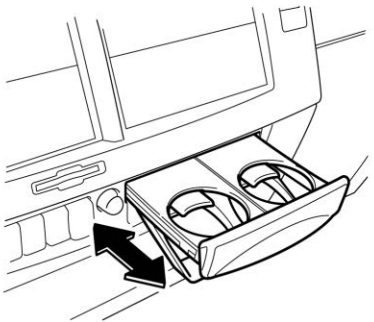
Caution

When closing the glove box lid, do not allow stored items to pass the line shown in the illustration. The glove box lid may break if it is closed when items inside have passed the line and are sticking out from the box.

Do not place items such as vehicle registration documents or owner manuals in the glove box, but store them in the seat back pocket located on the back side of the driver seat.

Refer to *Storage Compartments* ⇨ *38*.

Cupholders



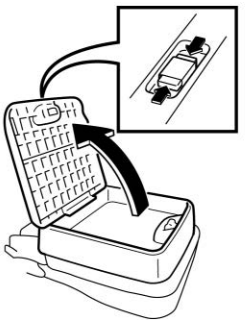
Pull the cupholder towards you to open it.

Do not place a cup that is too full in the cupholder. Spillages could cause damage to the radio and other electrical circuits. If there is a spill, wipe it up immediately with a dry cloth.

Do not tilt the cab with a filled cup in the cupholder. There may be a danger of the cupholder breaking if the weight on each holder exceeds 0.75 kg (1.65 lbs). Doing so may also result in damage to the radio or other electronic components.

Use the cupholders for storing small articles or cups.

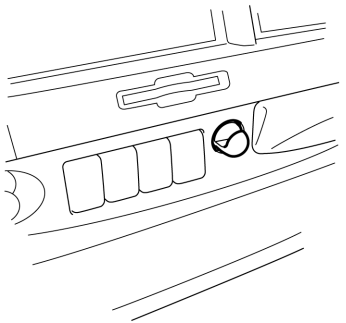
Center Console Storage



Squeeze the knobs on the lid to open. Use it for storing small articles.

Additional Storage Features

Shopping Bag Hooks



This can be used to hold plastic shopping bags.

Caution
Do not hang anything that weighs over 3 kg (6.6 lbs) on the hook; otherwise it will break.

Information on Loading the Vehicle

Overloading

⚠ Warning
Overloading can result in loss of vehicle control and personal injury or death, either by causing component failures or by affecting vehicle handling. It can also shorten the service life of your vehicle.

The components of your truck are designed to provide satisfactory service if the vehicle is not loaded in excess of either the gross vehicle weight rating (GVWR) or the maximum front and rear gross axle weight ratings (GAWRs). These ratings are listed on the VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate, which is located on the left side rear pillar panel below the striker.

Gross vehicle weight (GVW) is the weight of the originally equipped vehicle and all items added to it after it has left the factory. This would include bodies, liftgates, refrigeration systems, winches, booms, etc., the driver and all occupants, and the load the vehicle is carrying. The GVW must not exceed the GVWR. Also, gross weight on each of the front and rear axles must not exceed the front and rear GAWRs respectively.

Your dealer can advise you of the proper loading conditions for your vehicle. Using selected heavier suspension components for added durability may not increase any of the weight ratings shown on the VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate.

Tire Size	Maximum GVWR kg (lb.)	Front GAWR Capacity kg (lb.)	Rear GAWR Capacity kg (lb.)
255/70R22.5	11 770 (25,950)	4 989 (11,000)	8 618 (19,000)
11R22.5	11 770 (25,950)	5 443 (12,000)	8 618 (19,000)
	14 968 (33,000)	5 443 (12,000)	9 525 (21,000)

Maximum Front and Rear Axle Weights

The weight of the cargo load must be properly distributed over both the front and rear axles. The "VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate" shows the maximum weight that the front axle can carry (front GAWR). It also shows the maximum weight that the rear axle can carry (rear GAWR). The GVWR is the maximum permissible loaded weight of the vehicle and takes into account the capabilities of the engine, transmission, frame, springs, brakes, axles and tires. Actual loads at the front and the rear axles can only be determined by weighing the vehicle. This can be done at highway weigh stations or other such places. See your dealer for help. The cargo load should be distributed on both sides of the center line as equally as possible.

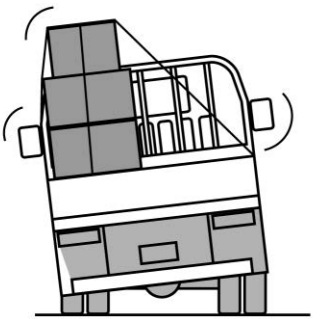
Tires

The tires on your truck must be of the proper size and properly inflated for the load that you are carrying. The "VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate" shows the originally equipped tire size and recommended inflation pressures.

For the vehicle plate location, see *Vehicle Identification Number (VIN)* ⇨ *282*.

See "Tire Load and Inflation Table" under *Tire Pressure* ⇨ *238*.

Load Cargo Correctly



⚠ Warning

Overloading can result in a crash because it places too much strain on the wheel studs with the result that they break and the wheels come off.

(Continued)

Warning (Continued)

The weight of the payload must be limited within the gross vehicle weight (GVW) rating and distributed over the front and rear axles so as not to exceed the axle capacities.

(Continued)

Warning (Continued)

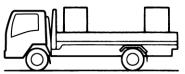
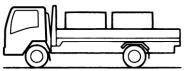
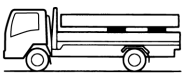
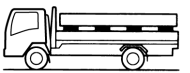
It is extremely dangerous to overload the vehicle or to load the vehicle with the cargo positioned on one side. Load the vehicle correctly, observing the maximum loading capacity.

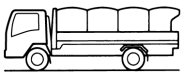
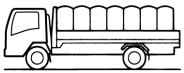
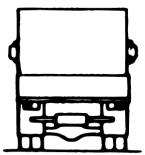
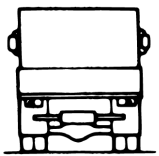
Incorrect loading can make the cargo unstable. It can also cause an overload condition confined to a small area, resulting in damage to the cargo bed and frame.

(Continued)

Warning (Continued)

Overloading places undue strain on vehicle parts. It can shorten the vehicle's service life and cause a crash. You and others could be seriously injured.

Cargo loading caution	Incorrect	Correct
Do not place cargo only at the front or only at the rear. Distribute it evenly.		
When using supports under cargo, position them uniformly along the cargo.		
To the greatest extent possible, do not allow long cargo to protrude beyond the rear edge of the cargo bed. Rather, use supports to raise it at an angle. Avoid supporting it using just the front guard frame and the rear edge of the cargo bed.		

Cargo loading caution	Incorrect	Correct
Use ropes and tarpaulins to secure the cargo so it does not fall off the cargo bed. Use rubber bands or bungee cords to prevent the tarpaulins from flapping in the wind.		
Avoid loading cargo too high. It can cause the vehicle to tip sideways when it catches side winds and when turning the vehicle.		

Loading Equipment

Do not load equipment from the rear of the cargo bed. The frame may become deformed when equipment is loaded from the rear of the cargo bed. In addition, the frame may become deformed even when loading equipment that has a weight under the maximum loading capacity.

When loading equipment, a device for securing the cargo bed is required. Use a car carrier or attach a rear support stand. If you have any questions, contact your dealer.

Make Sure There is No Flammable Material between the Cab and Cargo Bed

Caution
Be careful not to allow a sheet, canvas top, or the ends of ropes or rubber straps to touch or come close to the engine or exhaust pipe. During vehicle operation, the engine's heat could set them on fire. Carefully secure the sheet, canvas top, or the ends of ropes or rubber straps.

Do not Carry Fuel and Spray Cans in the Cab

⚠ Danger
It is extremely dangerous to carry fuel and spray cans in the cab. If such a container were to ignite or rupture, it could cause a fire or explosion. You and others could be seriously injured.

Instruments and Controls

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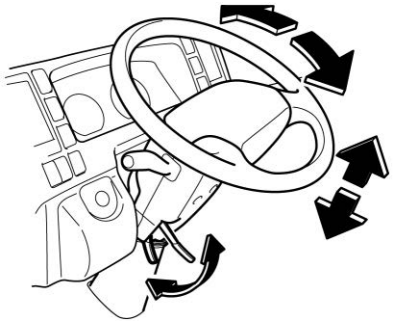
Steering Wheel Adjustment

⚠ Warning

- Adjust the position of the steering wheel before you start driving.
- To reduce the risk of personal injury, apply force to the steering wheel to make certain the steering column is firmly locked before driving. Also, do not try to tilt or adjust the steering wheel while the vehicle is moving. If these steps are not followed, the steering column could move suddenly while the vehicle is in motion which could cause a temporary loss of steering control which may result in personal injury or death.

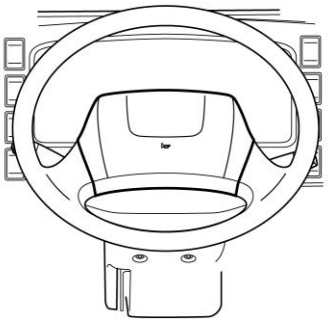


The steering wheel is adjustable up and down as well as forward and backward.

Before adjusting, position the seat as desired.

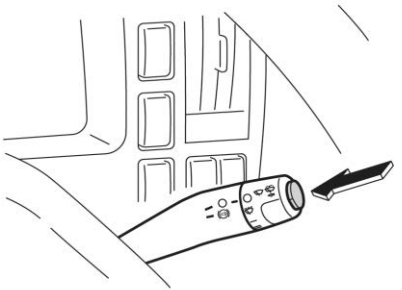
1. Lift the lock lever toward you to unlock the steering column.
2. Sit in the correct driving position, and then move the steering wheel up and down and forward and backward to select the optimum steering wheel position.
3. Firmly lock the steering wheel at the selected position by moving the lock lever to the lock position.

Horn



To sound the horn, press the pad with a horn symbol on the steering wheel.

Windshield Wiper/Washer



To use the windshield wiper and washer switches, the engine control switch must be in the ON position.

The windshield wiper switch has the following positions, which correspond to the states of the wiper.

◯ **:** Stopped.

: Intermittent, light rain.

Low Speed: Low speed, moderate rain.

High Speed: High speed, heavy rain.

If the wiper frequently stops during operation, contact your nearest Dealer.

Clear snow and ice from the wiper blades and windshield before using them. If frozen to the windshield, carefully loosen or thaw them. Damaged blades should be replaced. See *Wiper Blade Replacement* ⇨ *211*.

Do not operate the wiper on a dry windshield surface. Otherwise, the windshield surface may sustain damage.

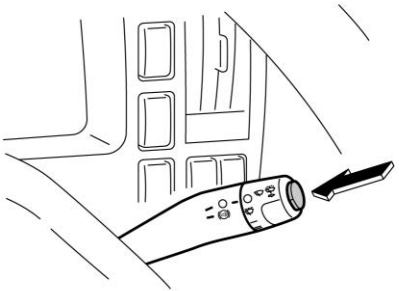
Windshield Washer

⚠ Warning

In freezing weather, do not use the washer until the windshield is warmed. Otherwise the washer fluid can form ice on the windshield, blocking your vision.

⚠ Warning

Before driving the vehicle, always clear snow and ice from the hood, windshield, washer nozzles, roof, and rear of the vehicle, including all lights and windows. Reduced visibility from snow and ice buildup could lead to a crash.



Windshield washer fluid is sprayed over the windshield when this switch is pressed. At the same time, the windshield wiper operates.

To spray washer fluid on the windshield, push the button on the end of the combination switch lever. The spray will continue as long as you hold in the button.

If windshield washer fluid does not come out in sufficient quantity, immediately release the switch. Otherwise, the windshield surface may sustain damage.

If windshield washer fluid does not come out, release the windshield washer switch immediately. Otherwise the motor may seize up.

Do not hold the switch pressed for more than 30 seconds. Otherwise, the washer pump may sustain damage.

Check the washer fluid level regularly. Do it often when the weather is bad.

See *Washer Fluid* ⇨ *201* for information on filling the windshield washer fluid resevoir.

Power Outlets

⚠ Warning

- The maximum allowable load of the accessory power outlet is 120W (10A). If you subject the accessory power outlet to more than the allowable load, the wiring may overheat and cause a fire. Use the accessory power outlet within the allowable load.
- The power source for the accessory power outlet is 12V. If electrical equipment other than 12V are connected, a malfunction due to overheating or fire may occur.

(Continued)

Warning (Continued)

- Be sure to insert the plug of the electrical appliance all the way into the accessory power outlet. Using an appliance when the plug is not completely inserted could cause abnormal heat generation and may result in the vehicle's fuses blowing.

⚠ Warning

- If foreign matter enters the accessory power outlet, or if water or drinks contact it, it could be damaged. Also, do not insert fingers or any metallic objects into the accessory power outlet.
- As the internal part of the accessory power outlet may become deformed depending on the size of the plug used, do not attempt to force the plug into the accessory power outlet. In this case, replace the accessory power outlet.

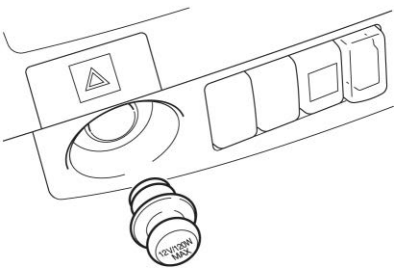
Using the accessory power outlet for a long period of time while the engine is stopped will drain the battery.

When not in use, be sure to attach the cap.

When inserting or removing the plug of an electrical appliance, turn the electrical appliance off or place the engine control switch in the "LOCK" position.

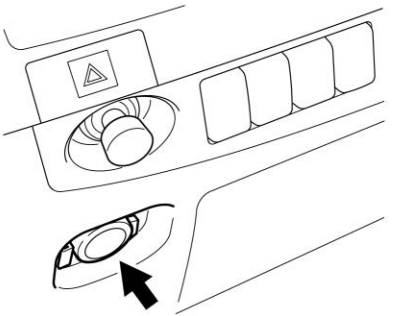
When using accessory power outlets, total maximum electrical load must not exceed 120W (10A). Always turn off any electrical equipment when not in use.

Type 1



The accessory power outlet can be used when the engine control switch is on or in ACC/ ACCESSORY. Use the accessory power outlet to supply power to commercially available vehicle accessories, etc. Remove the cap to use.

Type 2



You can plug in auxiliary electrical equipment. Just flip the outlet cover open from the left edge of the cover and follow the proper installation instructions that are included with any electrical equipment you install. These circuits are protected by a fuse and have maximum current loads.

When using accessory power outlets, total maximum electrical load must not exceed 120W. Always turn off any electrical equipment when not in use.

Leaving electrical equipment on for extended periods will drain your battery.

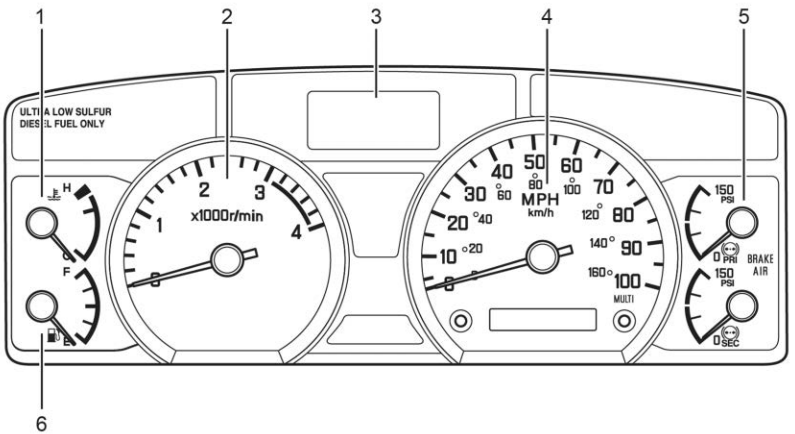
Warning Lights, Gauges, and Indicators

Warning lights and gauges can signal that something is wrong before it becomes serious enough to cause an expensive repair or replacement. Paying attention to the warning lights and gauges could prevent injury.

Some warning lights come on briefly when the engine is started to indicate they are working. When one of the warning lights comes on and stays on while driving, or when one of the gauges shows there may be a problem, check the section that explains what to do. Waiting to do repairs can be costly and even dangerous.

For safety reasons, do not place packages, tools, or other items in the driver's area that may restrict access to the controls or sight of the gauges.

Instrument Cluster



1. *Engine Coolant Temperature Gauge* ⇨ *54*
2. *Tachometer* ⇨ *53*
3. *Driver Information Center (DIC)* ⇨ *63*
4. *Speedometer* ⇨ *52*
5. *Brake Air Pressure Gauge* ⇨ *54*
6. *Fuel Gauge* ⇨ *53*

Speedometer

The speedometer shows the vehicle speed in either kilometers per hour (km/h) or miles per hour (mph).

Odometer

ODO

The odometer shows how far the vehicle has been driven, in either kilometers or miles.

Each time the reset knob is pressed with the engine control switch in the ON position, the odometer/trip meter shows ODO, TRIP A, and TRIP B in this sequence. With the key removed, the odometer and trip meter continue to indicate for about five minutes.

Odometer Check Switch

Press the Odometer Check switch to display the odometer and trip meter mileage after the key is turned off. The fuel gauge will also operate when this switch is pressed. The DIC and some lights will illuminate on the instrument panel.

Trip Odometer

TRIP

The trip odometer shows how far the vehicle has been driven since the trip odometer was last reset. Press the trip odometer reset stem next to the odometer to switch between the odometer and trip odometer.

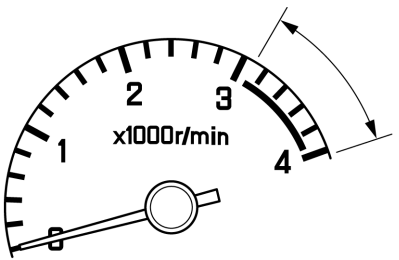
To reset the trip odometer to zero, press and hold the trip odometer reset stem while TRIP A or TRIP B is displayed. The engine control switch should be in the ON position.

When the battery is disconnected, TRIP A and TRIP B will be reset to zero. The per trip fuel economy is also reset by the TRIP B reset. See *Driver Information Center (DIC)* ⇨ *63*.

When you turn the engine control switch to the ON position, the odometer/trip odometer shows what was displayed the last time the engine control switch was turned to LOCK or ACC.

To set the odometer to display each time you turn the engine control switch to the ON position, turn the engine control switch to LOCK or ACC while the odometer is displayed. With the reset stem pressed, turn the engine control switch to the ON position and then within three seconds, turn the engine control switch back to the LOCK or ACC position. Follow the same procedure to cancel the setting.

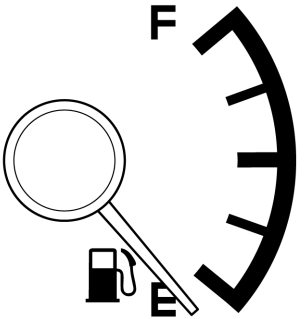
Tachometer



The tachometer displays the engine speed in revolutions per minute (rpm). The red zone indicates a range of dangerous engine speeds beyond permissible levels. Do not drive your vehicle with the needle in the red zone.

Caution
Exercise extreme care when shifting down on a steep downslope. The engine speed may exceed the critical speed, which can damage the vehicle.

Fuel Gauge



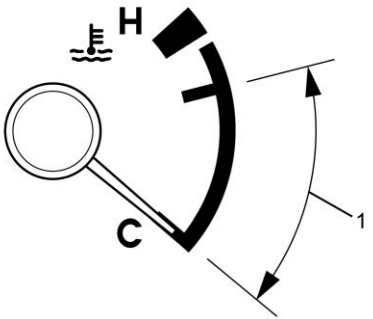
With the engine control switch in the ON position, the fuel gauge indicates about how much fuel is left in the tank.

To check the fuel level with the engine control switch in the LOCK position, press the Odometer Check switch.

Fill the tank well before it approaches empty. After filling up the fuel tank, it takes awhile for the fuel gauge needle to stabilize after the engine control switch is turned to the ON position. If the fuel tank is filled while the engine is off, but the engine control switch is in the ON position, the fuel gauge needle takes awhile to show the correct reading.

See "Low Fuel Warning Light" in *Driver Information Center (DIC)* ⇨ *63* and *Running Out of Fuel* ⇨ *176*.

Engine Coolant Temperature Gauge



1. Safety Zone

With the engine control switch in the ON position, this gauge indicates the temperature of the engine coolant. "C" means cold while "H" means hot. During operation, the needle should stay in the safety zone. See *Engine Overheating* ⇨ *198*.

⚠ Warning

If the engine coolant temperature gauge shows an overheat condition or you have any other reason to suspect the engine may be overheating, continued operation of the engine, even for a short time, may result in a fire and the risk of personal injury and severe vehicle damage. Take immediate action as outlined in Engine Overheating. See *Engine Overheating* ⇨ *198*.

Caution

If the needle goes up above the upper limit and enters the H zone, the engine is likely to overheat. Immediately pull safely off the road out of the way of traffic and take the necessary actions to deal with

(Continued)

Caution (Continued)

engine overheating. If the needle nears the H zone but does not cross into it, this is not a problem, but check the engine coolant level in the reservoir. Add engine coolant as necessary.

See "Engine Overheat Warning Light" under *Driver Information Center (DIC)* ⇨ *63* and *Engine Coolant* ⇨ *195*.

Brake Air Pressure Gauge

This gauge indicates the pressure of the compressed air in the air tank. If the needle enters the red zone, the brake air pressure warning light comes on and the warning buzzer sounds. To stop the buzzer, pull up the parking brake lever when the vehicle has come to a complete stop in a safe area.

If the brake air pressure warning light comes on, immediately look for a safe place to pull off the road and stop. Engage the parking brake after stopping.

Place the selector lever in the N position and firmly press the brake pedal. Then, run the engine at idle to increase air pressure.

If air pressure will not increase, or there is a great difference between the readings of the two gauges, or it takes time for the needles to go up, see your dealer.

⚠ Warning

Do not place the vehicle in D (Drive) or attempt to drive the vehicle if the brake air pressure gauge needles are in the red zone or the brake air pressure warning light is on. The brakes are not fully functional and it is

(Continued)

Warning (Continued)

dangerous to operate the vehicle. Set the parking brake by moving the lever to the up position, and do not disengage the parking brake or shift the vehicle to D (Drive) until air pressure levels have returned to normal.

Diesel Exhaust Fluid (DEF) Gauge

The DEF gauge is part of the Driver Information Center (DIC). See *Driver Information Center (DIC)* ⇨ *63*.

Seat Belt Reminders

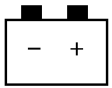
Driver Seat Belt Reminder Light

There is a seat belt reminder light on the instrument cluster.

When the vehicle is started, this light flashes and a chime may come on to remind the driver to fasten their seat belt. Then the light stays on solid until the belt is buckled. This cycle may continue several times if the driver remains or becomes unbuckled while the vehicle is moving.

If the driver seat belt is buckled, neither the light nor the chime comes on.

Battery Warning Light



This light comes on briefly when the ignition is turned on, but the engine is not running, as a check to show the light is working. It should go out when the engine is started.

If the light stays on, or comes on while driving, there may be a problem with the electrical charging system (such as a loose or broken fan belt). Pull off to a safe place well clear of traffic and perform the check and corrective action. Driving while this light is on could drain the battery.

Check and Corrective Action

1. Check to see if the fan belt is broken or loose.
2. If the fan belt is loose, adjust the tension.
3. If the fan belt is broken or there is no abnormality in the fan belt, see your dealer for service.

See *Battery - North America* ⇨ *206*, *Jump Starting - North America* ⇨ *241* , and *Engine Drive Belt Routing* ⇨ *292*.

Malfunction Indicator Lamp (Check Engine Light)

This light should come on to show that it is working when the engine control switch is turned to the ON position, and then should go out after the engine is started.

If this light stays on or comes on while the engine is running, it indicates a malfunction with the engine electronic emission control system. Avoid driving at high speeds and have the vehicle inspected by your dealer.

If this light comes on when the fuel tank is empty, you do not need to have your vehicle serviced. See *Running Out of Fuel* ⇨ *176*.

If this light comes on intermittently or continuously while driving, service is required. Even if the vehicle is drivable and does not require towing, see your dealer as soon as possible. Continued driving without having the system serviced could cause damage to the emission control system. It could also affect fuel economy and drivability.

Engine Check Warning Light

This light should come on to show that it is working when the engine control switch is turned to the ON position, and then should go out after the engine is started.

Under certain conditions, when the engine control switch is turned ON, this indicator light may flash to notify the driver of the following potential conditions.

- Maintenance is required
- Water is detected in the fuel
- Coolant level is low
- Diesel exhaust fluid (DEF) tank level is low
- Engine mounted fuel filter requires maintenance
- Crankcase breather element requires maintenance
- DPF requires maintenance

If the optional Idle Shutdown feature is enabled, this light may also begin flashing when the Idle Shutdown timer is activated. This light will flash for the length of time that programmed in the Idle Shutdown Period parameter to indicate to the driver that the engine is about to shut down. Cycle the engine control switch to restart the vehicle when needed or appropriate.

See *Idle Shutdown* ⇨ *129*.

Brake System Warning Light

Brake Air Pressure Warning Light

This light should come on briefly when the engine control switch is turned to the ON position, and then should go out after the engine has started.

This warning light comes on and a buzzer sounds if the brake air pressure drops below the specified level. Immediately pull off to a safe place, check the vehicle and take necessary actions. Set the parking brake by moving the lever to the up position, and do not disengage the parking brake or shift the vehicle to D (Drive) until air pressure levels have returned to normal.

See *Brakes* ⇨ *202*.

Parking Brake Light

This light comes on when the parking brake lever is in the wheel locked position with the engine control switch ON. To serve as a reminder, the light should stay on when the parking brake is applied and the engine control switch is on. Have the system repaired if the light does not come on when it should. Do not drive the vehicle with the parking brake lever still in the wheel locked position.

Antilock Brake System (ABS) Warning Light

This light comes on briefly when the engine control switch is turned to the ON position, and then should go out after approximately three seconds. If the light does not come on, have it fixed so it will be ready to warn if there is a problem.

If this warning light stays on more than three seconds or comes on while driving, the ABS has a problem. In this case, the ABS stops working but the brakes still function as ordinary service brakes.

⚠ Warning

If this warning light comes on while driving, immediately stop your vehicle at a safe place well clear of traffic and take the following actions.

1. Stop the engine.
2. Restart the engine. Check if the ABS warning light comes on and then goes out. If it does, there is no problem. The ABS operates normally.

(Continued)

Warning (Continued)

3. Move the vehicle slowly forward. Gradually increase the speed to 15 km/h (9 mph). If the light goes off, the ABS is normal.

If the light does not come on or go out, or comes on frequently, contact your dealer immediately and have the system repaired.

Even if a problem has occurred in the ABS, the brakes will still work as normal brakes. In this case, the ABS has no influence on the operation of the brake system.

See *Antilock Brake System (ABS)* ⇨ *163*.

Exhaust Brake Light

This light comes on when the exhaust switch is pulled and the engine is running. See *Exhaust Brake* ⇨ *168*.

Service Transmission Warning Light

For diesel vehicles, this light comes on briefly when the engine control switch is in the ON position, as a check

to show the light is working. It should go out when the engine is started.

If the warning light starts to blink while driving, it indicates that there is a malfunction in the automatic transmission's electronic control system. If the warning light is blinking, see your dealer for service.

Automatic Transmission Fluid Temperature Warning Light

For diesel vehicles, this light comes on briefly when the engine control switch is in the ON position, but the engine is not running, as a check to show the light is working. It should go out when the engine is started.

The Automatic Transmission Fluid (ATF) Temperature warning light comes on if the ATF temperature is high. This usually occurs when the transmission is overfilled and may be accompanied by leakage of fluid from the transmission breather hose.

If the light stays on, or comes on while driving, slow down and pull off the road. Stop the vehicle at a safe place and put the vehicle in P (Park) for models with P-range, and N (Neutral) for models without P-range. With the engine idling, wait until the light goes off. If the light goes off, you can drive the

vehicle again. If the light does not go off, have the automatic transmission lubricating system checked by your dealer.

Caution
Driving with the ATF warning light constantly on can cause serious mechanical damage to the automatic transmission.

See *Automatic Transmission* ⇨ *153*.

Range Inhibit Warning Light

If the driver attempts to move the selector lever from N to OD while the engine is running at a high speed such that there is a danger of sudden vehicle start, the control system inhibits such a shift and turns on this warning light. You must start the vehicle moving only when the engine speed is not higher than 1,000 rpm.

This warning light comes on when attempting to shift from N to another gear under any of the following conditions:

- The engine is running at a speed higher than 1,000 rpm.
- The accelerator pedal is substantially pressed.
- The vehicle is in motion.
- The transmission electronic control system detects a fault and permits only limited shifts.

Overdrive Off Light

When the engine control switch is turned on, the indicator light comes on for approximately 2 seconds and then goes off automatically.

The indicator light comes on when the overdrive off switch on the selector lever is turned on. Overdrive will not operate even when the automatic transmission is in the "OD" position, unless engine speed is excessive.

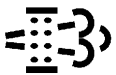
Wait-to-Start Light

This light comes on when the engine control switch is turned to the ON position and goes out when preheating is complete.

Under cold conditions, this indicator light comes on when the engine control switch is turned to the ON position, and then should go out.

See *Starting and Stopping the Vehicle* ⇨ *124*.

Diesel Particulate Filter Light



This light should come on briefly when the engine control switch is turned to the ON position, and go off when the engine has started.

This light comes on when Diesel Particulate Filter (DPF) regeneration is required. When this light comes on, perform DPF regeneration soon. When regeneration starts, this warning light will go off and the High Exhaust System Temperature Indicator Light will come on.

If equipped with a power take-off (PTO), monitor the instrument panel for DPF-related indicators. PTO and other slow speed applications may require more attention.

See *Diesel Particulate Filter* ⇨ *137*.

High Exhaust System Temperature Indicator Light

This light should come on briefly when the engine control switch is turned to the ON position, and go off when the engine has started.

This indicator light comes on when Diesel Particulate Filter (DPF) regeneration is in progress. When the vehicle is stationary, the exhaust sound changes as the engine speed increases. Also, operating sounds of the exhaust throttle may be heard. When regeneration is completed, the light goes off automatically.

⚠ Warning

- Exhaust parts and gases become very hot when the DPF is being regenerated. In order to avoid being burned, do not touch the exhaust parts or DPF or get too close to the exhaust gases.
- Do not leave the vehicle during the regeneration.
- Parking over flammable items could allow them to touch hot exhaust parts under your vehicle and cause them to ignite. Do not park over papers, leaves, grass or other things that can burn.
- Make sure there is no flammable material (for example, grass, waste paper, oil or old tires) on or near the DPF or exhaust system.

See *Diesel Particulate Filter* ⇨ *137*.

Engine Oil Pressure Light

This light should come on briefly when the engine control switch is turned to the ON position, and then should go out after the engine is started.

This light comes on when the engine oil pressure has fallen below the normal level while the engine is running or the oil pressure across the oil filter rises above the normal level while the engine is running.

If the warning light comes on while driving, immediately pull off to a safe place and stop the engine. Check the oil level in the engine crankcase. If the oil level is normal, restrictions are in the oil filter or within the lubricating system. Have the vehicle inspected at your dealer.

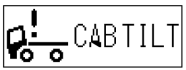
Do not run the engine with this light on. It could damage the engine. When this light comes on while driving, a warning tone also sounds.

The oil level varies while the engine is running right after it has stopped or if the vehicle is on uneven ground. As a result, the red engine oil pressure warning light may light up.

When this warning light comes on, and the oil level is correct, the lubrication system may be faulty. See your dealer for service.

See *Engine Oil* ⇨ *189*.

Cab Tilt Warning Light



This warning light appears on the display and a buzzer sounds when the engine control switch is turned to the "ON" position and if the cab is not fully locked into place.

⚠ Warning

If you drive while the cab tilt warning light is illuminated, the cab may tilt forward while the vehicle is in motion. This is extremely dangerous and could result in serious injury or death. Ensure that the cab is securely locked into place before driving the vehicle.

See *Cab Tilting* ⇨ *182*.

Parking Brake Not Set Warning Light

This warning light appears on the display and a buzzer sounds when any of the doors are opened while the parking brake is not applied.

The warning light will go out and the buzzer will stop when the door is closed or the parking brake is applied.

Diesel Exhaust Fluid (DEF) Warning Light

This light should come on briefly when the engine control switch is turned to the ON position, and go off when the engine has started.

This light comes on as a warning related to the selective catalytic reduction (SCR) system. If this light comes on, check the DEF gauge. Add DEF if necessary. If DEF level is OK, have your vehicle serviced by your dealer.

Also see *Diesel Exhaust Fluid* ⇨ *143*.

Engine Shutdown Warning Light

The Engine Stop Warning light comes on briefly when the engine control switch is turned to the ON position, as a check to show the light is working. The light turns off when the engine is started.

If this light stays on or comes on while the engine is running, it indicates the engine control module has detected a critical problem and the engine will shut down. Pull off to a safe place well clear of traffic and stop the engine. Contact your dealer or nearest Cummins Dealer. However, if the engine shuts down when you are still in traffic, you can restart the engine and get another 30 seconds of operation. Do this only if you have to, since there is a problem that can harm the engine if it is not fixed. The engine must remain shut down until the engine can be repaired.

See *Engine Alarm and Automatic Shutdown* ⇨ *129*.

Air Suspension Dump Warning Light

This warning light comes on when the air suspension dump switch is pressed and placed in the dump position when the parking brake is applied.

See *Air Suspension* ⇨ *132*.

High-Beam On Light

This light comes on when the high-beam headlamps are in use or the headlamps are cycled between high and low beams (passing signal).

See *Headlamp High/Low-Beam Changer* ⇨ *72*.

Daytime Running Lamps (DRL) Indicator Light

This light comes on when the DRL are on. If the vehicle is started during the daytime with the lighting switch off and the parking brake released, the low beam headlamps will come on at a reduced brightness. The light will go out when the lighting switch is turned on.

See *Exterior Lamp Controls* ⇨ *71*.

Cruise Control Light

This light should come on briefly when the engine control switch is turned to the ON position, and then should go out after the engine is started.

For vehicles with cruise control, this light comes on when cruise control is turned on.

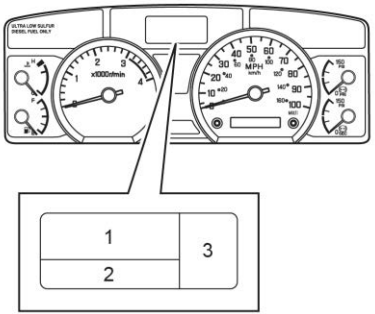
This light should come on briefly when the engine control switch is turned to the ON position, and then should go out after the engine is started.

This light comes on when the vehicle enters the cruise control mode after the cruise control set switch is operated to set the vehicle speed.

See *Cruise Control* ⇨ *169*.

Information Displays

Driver Information Center (DIC)



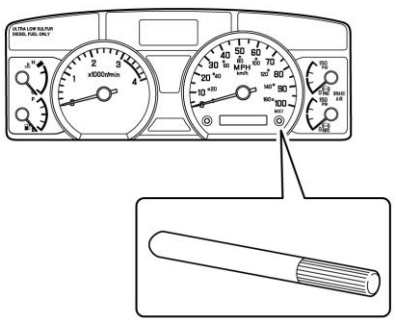
The DIC display is in the center of the instrument cluster. The displays show the status of many vehicle systems. There are three parts to the DIC display:

1. DIC menu items and warning lights and messages (includes operation related information, diesel particulate filter (DPF) status, maintenance data, and errors)
2. Automatic transmission shift indicator
3. Diesel Exhaust Fluid (DEF) gauge

⚠ Warning

Warning or indicator lights indicated on the DIC can be temporarily cleared (for 60 seconds) by pressing the DIC selector once. However, if the warning light you have cleared is an engine overheat warning or other critical circumstance, never continue driving without taking the necessary actions. Otherwise, you will be in danger of vehicle breakdown or accident. Should any of the critical warning lights come on, immediately contact the nearest dealer.

DIC Menu Items



Use the DIC selector to access the following menu items.

Language

Select English, French, or Spanish by turning the DIC selector clockwise or counterclockwise.

Fuel Economy

The system calculates and stores the distance traveled and fuel consumption while driving to encourage the operator to drive the vehicle economically. Press the DIC selector once or more to select fuel economy. Turn the selector clockwise or counterclockwise to toggle through the items: average fuel economy, per trip fuel economy, and instantaneous fuel economy.

- Average Fuel Economy: Indicates the average fuel economy over the total distance traveled.
- Per Trip Fuel Economy: Indicates the per trip fuel economy based on the mileage in the TRIP B.
- Instantaneous Fuel Economy: Indicates the fuel economy at a given moment while driving.

How to Reset the Per Trip Fuel Economy

Per trip fuel economy is also cleared when you reset the TRIP B to zero.

Voltmeter

The voltmeter shows the current status of the charge of the battery.

Green indicates the current status of the charge of the battery.

Red means the battery voltage is too low or too high. If the voltmeter sign appears in red, have the vehicle checked and serviced at your dealer. During or immediately after the engine is started, a red abnormal L voltage may display on the DIC. If the warning disappears after the engine has started, there is no problem with the battery voltage.

Calendar and Clock

⚠ Warning

The calendar and clock can be set only while the vehicle is stationary. When setting the calendar or clock, park your vehicle in a safe place where stopping or parking is permitted and that is well clear of traffic.

Press the DIC selector once or more to select the calendar. Press and hold the DIC selector to enter the clock setting screen. The year segment will flash. Turn the DIC selector clockwise or counterclockwise to increase or decrease the year. While in the year setting screen, press the DIC selector once to switch to the month setting screen. The month segment will flash. Use the same method to set the month. While in the month setting screen, press the DIC selector again to switch to the day setting mode. Adjust the day using the selector.

Press and hold the DIC selector to complete the calendar setting. When complete, the normal calendar display will resume. Use this same method to set the hour and minute when in the clock setting screen.

Dimmer

The brightness of the DIC can be adjusted while the light control switch is off. Select this screen and turn the DIC selector clockwise or counterclockwise to brighten or dim the illumination. The brightness is linked to the adjustment of the instrument panel light level control while the light control switch is on. See *Instrument Panel Illumination Control* ⇨ *74*.

Warning Lights and Messages

- Engine Overheat Warning Light
- Low Coolant Warning Light
- Water Separator Warning Light
- Air Cleaner Light
- Low Fuel Warning Light
- Regeneration Warning Lights
- Exhaust System Warning Light
- Refill DEF Warning Light
- DIC Errors
- Maintenance Data
- Hour Meter

See *Vehicle Messages* ⇨ *66*.

Maintenance Data Functions

Display/Not Display the Maintenance Data Function

Maintenance Light: On the DIC, go to the Maintenance Indicator Light. Switch the display by pressing and holding the DIC selector for more than two seconds. Turn the DIC selector clockwise or counterclockwise to switch the display. Complete the resetting by pressing and holding the DIC selector for more than two seconds.

To cancel the setting procedure, press the DIC selector once. The display will go back to the previous screen.

Resetting/Setting the Change Interval (Odometer Reading)

Engine Oil and Filter Light: On the DIC, go to the engine oil and filter light. Enter the resetting screen by pressing and holding the DIC selector for more than two seconds. Complete the resetting by pressing and holding the DIC selector for more than two seconds.

Transmission and Differential Gear Oil Light, Fuel Filter Light, Power Steering Fluid Light, and Tire Rotation Light: On the DIC, go to the particular maintenance item to reset/adjust. Enter the setting change screen by pressing and holding the DIC selector. Set the change interval by turning the DIC selector. (Transmission and Differential Oil, Steering Fluid, and Tire Rotation Only). Turn clockwise to increase distance and counterclockwise to decrease distance. The distance increases and

decreases by 4,000 km (2,500 mi) increments. Complete the resetting by pressing and holding the DIC selector.

Transmission Oil: Initial value: 240,000 km (150,000 mi). Adjustable minimum value: 80,000 km (50,000 mi). Adjustable maximum value: 240,000 km (150,000 mi).

Differential Gear Oil: Initial value: 288,000 km (180,000 mi). Adjustable minimum value: 48,000 km (30,000 mi). Adjustable maximum value: 288,000 km (180,000 mi).

Power Steering Fluid: Initial value: 80,000 km (50,000 mi). Adjustable minimum value: 48,000 km (30,000 mi). Adjustable maximum value: 80,000 km (50,000 mi).

Tire Rotation: Initial value: OFF. Adjustable minimum value: 8,000 km (5,000 mi). Adjustable maximum value: 32,000 km (20,000 mi).

Starter Indicator Light: On the DIC, go to the starter indicator light. Enter the resetting screen by pressing and holding the DIC selector for more than ten seconds. Complete the resetting by pressing and holding the DIC selector for more than ten seconds.

If you want to cancel the setting procedure, press the DIC selector once. The display will go back to the previous screen.

Diesel Exhaust Fluid (DEF) Gauge

With the engine control switch in the ON position, this gauge indicates the approximate quantity of DEF remaining in the DEF tank. F means the tank is full and E means the tank is almost empty. When only one green bar is showing, the DEF tank is almost empty and should be refilled soon. If the vehicle is driven too long with only one bar, the green will change to amber and additional warnings and indicators will display.

Vehicle speed will be severely limited when the DEF tank is empty. Be sure to add DEF in advance of the empty status. See *Diesel Exhaust Fluid* ⇨ *143*.

Vehicle Messages

The Driver Information Center (DIC) will display warnings, messages, and other operation-related information to alert of system failures or other necessary checks that should be performed. Use the DIC selector to choose the desired screen page or function.

Engine Overheat Warning Light

OVERHEAT

This message displays and a warning light appears when the engine has overheated and the engine coolant temperature gauge needle reaches the red zone. At the same time a buzzer sounds. Immediately pull off to a safe place to take the necessary actions and check the vehicle. Do not shut down an overheating engine immediately. Otherwise, the engine may seize up. Take appropriate actions for engine overheating.

This light will also activate the engine alarm and automatic shutdown system, if equipped.

See *Engine Alarm and Automatic Shutdown* ⇨ *129*, *Engine Overheating* ⇨ *198*, *Engine Coolant* ⇨ *195*, and *Engine Coolant Temperature Gauge* ⇨ *54*.

⚠ Warning

When the engine coolant is still hot, do not remove the sub tank pressure cap. Hot vapor will come out and you may be scalded. Add engine coolant only when the engine coolant temperature has dropped.

If this light comes on and stays on while you are driving, your engine coolant might have overheated and your engine may be too hot. You should pull off the road, stop your vehicle and take appropriate actions for engine overheating.

Low Coolant Warning Light

LOW COOLANT

If this message and light come on, the system is low on engine coolant and the engine may overheat. A warning tone also sounds. If this light comes on while driving, stop the vehicle immediately and check the cooling system for leaks. See *Engine Coolant* ⇨ *195* and have the vehicle serviced by your dealer. This light will also activate the engine alarm and automatic shutdown system. See *Engine Alarm and Automatic Shutdown* ⇨ *129* and *Engine Shutdown Warning Light* ⇨ *62*.

Water Separator (Pre-Fuel Filter) Warning Light

WATER SEPARATOR

This message displays and a warning light appears when the level in the water separator on the fuel line is beyond the specified level. Drain water following the instructions in the Water in Fuel section and make sure the warning light goes out. See *Water in Fuel* ⇨ *173*.

If you continue driving with the message displayed, the fuel injection system may fail. See *Water in Fuel* ⇨ *173*.

Air Cleaner Light

CHECK AIR FILTER

This message displays and a warning light appears when the next air cleaner element service interval is near or has already been reached.

Replace the air cleaner element. See *Engine Air Cleaner/Filter* ⇨ *194*.

Low Fuel Warning Light

LOW FUEL

This message displays and a warning light appears when the fuel level in the tank becomes too low while the engine is running. Add fuel at the earliest possible time. If the vehicle runs out of fuel, air bleeding procedure must be performed.

See *Fuel for Diesel Engines* ⇨ *172*, *Fuel Gauge* ⇨ *53*, and *Running Out of Fuel* ⇨ *176*.

Parking Brake Not Set Warning Light

PARK BRAKE NOT SET

This warning light appears on the display and a buzzer sounds when any of the doors are opened while the parking brake is not applied.

The warning light will go out and the buzzer will stop when the door is closed or the parking brake is applied.

Regeneration Required Warning Light

REGEN. REQUIRED

This light (amber) comes on when Running regeneration or Switch regeneration is required. When this light comes on, perform DPF regeneration soon. If the engine continues

to run without performing DPF regeneration, this light will change color from amber to red. If this light turns red, perform DPF regeneration immediately. If you do not perform DPF regeneration, the check engine malfunction indicator light and reduced engine power indicator light will come on, imposing performance restriction on the vehicle. If this happens, the vehicle must be serviced at your dealer. See *Diesel Particulate Filter* ⇨ *137*.

If your vehicle is equipped with a power take-off (PTO), monitor the DIC for DPF related indicators. PTO and other slow speed applications may require more attention.

Selectable (Switch) Regeneration Required Warning Light

SEL REGEN. REQUIRED

Performing the “Selectable” regeneration: After the Checking PM Level Light is shown, this light comes on in amber when “Selectable” regeneration is possible. When the DPF switch is pressed with this light ON, "Selectable" regeneration starts.

When the selectable regeneration or switch regeneration is interrupted: This light (amber) comes on when the "Selectable" regeneration or "Switch" regeneration is interrupted. When this light comes on, perform DPF regeneration promptly by following the procedure for the "Switch" regeneration. If you continue to operate the vehicle without performing DPF regeneration, the color of this light changes to red from amber. When this light comes on in red, perform DPF regeneration immediately by following the procedure for the switch regeneration. If you do not perform DPF regeneration, the check engine malfunction indicator light and reduced engine power indicator light will come on, imposing performance restriction on the vehicle. If this situation happens, the vehicle must be serviced. See *Diesel Particulate Filter* ⇨ *137*.

If your vehicle is equipped with a power take-off (PTO), monitor the DIC for DPF related indicators. PTO and other slow speed applications may require more attention.

Regeneration in Progress Light

REGEN. IN PROGRESS

When this light is ON, DPF regeneration is in progress. When the vehicle is stationary, the exhaust sound changes as the engine speed increases. Also, operating sounds of the exhaust throttle may be heard. Keep people and flammable objects away from the exhaust pipe, because the exhaust temperature becomes high during regeneration. When regeneration is completed, the light goes out automatically. See *Diesel Particulate Filter* ⇨ *137*.

During extended engine idling, this light may appear on the DIC and the DPF may be automatically regenerated.

Checking PM Level Light

CHECKING PM LEVEL

In the case of performing the "Selectable" regeneration, this light comes on when the DPF switch is kept held down. While this light is ON, the system is checking whether or not the "Selectable" regeneration is possible. If the "Selectable" regeneration is possible, the light changes to the selectable (switch) regeneration required warning light. If the indication does not change to the selectable (switch) regeneration required warning light, the "Selectable" regeneration is not possible.

Exhaust System Warning Light

EXH. SYSTEM

This light comes on when the SCR system detects a malfunction or incorrect DEF. SCR system will turn on other indicator lights and

reduce engine power in progressive stages to encourage you to have the malfunction corrected. Continuing to drive for too long after this light turns on will eventually result in a severe vehicle speed limitation. If this light turns on, promptly have the vehicle inspected and serviced at your dealer. See *Diesel Exhaust Fluid* ⇨ *143*.

Refill Diesel Exhaust Fluid (DEF) Warning Light

REFILL DEF

This message displays and a warning light appears when the DEF tank is almost empty. Add DEF as soon as possible.

Engine power will be reduced and vehicle speed will be limited when this light is activated. Failure to promptly refill the DEF tank will result in a severe vehicle speed limitation. See *Diesel Exhaust Fluid* ⇨ *143*.

When DIC ERROR is Displayed

ERROR

If the system has not yet been able to access maintenance data, ERROR is shown on the DIC. If ERROR does not change automatically to a distance or other maintenance indication, have your vehicle serviced at your dealer.

Maintenance Data Indicator Lights

Maintenance data indicator lights appear on the DIC when each maintenance item is selected or when the next change or service interval of the item is near or has been reached.

The distance or time shown is the remaining or excess of them to / from the change or service timing. The positive distance or time shows the remaining of that and the negative distance or time shows the excess of that. For the items listed below, the displayed color will change from green to amber when remaining distance is below 1 600 km (1,000 mi) and the screen is selected.

These screens are also displayed when the engine control switch turns to the ON position after above notification timing. The message remains on the display until the DIC selector is pressed once or the vehicle is started.

The maintenance data function indicates the distance remaining before the next scheduled maintenance. Scheduled maintenance time is approaching when the display turns from green to amber. Have the vehicle checked and serviced at your dealer as soon as possible.

The vehicle needs to be maintained more often if it is driven in severe conditions.

MAINTENANCE ON or MAINTENANCE OFF

This indicator displays and hides maintenance items. When MAINTENANCE ON is displayed, maintenance items will be displayed. When MAINTENANCE OFF is displayed, maintenance items will not be displayed.

When MAINTENANCE OFF is displayed, there will be no display of maintenance items such as rotation intervals or replacement intervals even when such intervals arrive.

T/M & DIFF OIL

When this message and light display green, it shows the distance remaining until the next transmission oil and differential oil change. When this message displays amber, the next change of transmission oil and differential oil is near or has been reached.

STEERING OIL

When this message and light display green, it shows the distance remaining until the next power steering fluid change. When this message displays amber, the next change of power steering fluid is near or has been reached.

TIRE ROTATION

When this message and light show green with OFF, it means the vehicle has been shipped from the factory with no tire rotation interval set. When this message displays green it has the distance until the next tire rotation displayed. When this message displays amber the next tire rotation is near or has already been reached.

STARTER

When this message and light is green, it displays the number of engine starts remaining until a starter motor is replaced. When this message and light is amber, it displays when the time for a starter motor replacement is near or has already been reached.

For the starter indicator light, the displayed color will change from green to amber when the display reaches zero and the screen is selected.

For resetting or setting maintenance data intervals, see *Driver Information Center (DIC)* ⇨ *63*.

Hour Meter

HOUR METER

This message and light indicate how many hours the engine has been run. The figure(s) on the left side of the decimal point indicate hours while the figure on the right side indicates 1/10 of an hour.

Warning Buzzers

A warning buzzer may not sound if there is a problem with the buzzer system. If this occurs, the system needs to be inspected. See your dealer.

A warning buzzer sounds under the following conditions:

- Seat Belt — continuous beep. See *Seat Belt Reminders* ⇨ *55*.
- Brake air pressure problem — continuous beep. See *Brake System Warning Light* ⇨ *57*
- Engine overheat — continuous beep
- Parking brake ON — continuous beep
- Parking brake not set — continuous beep. See *Parking Brake Not Set Warning Light* ⇨ *61*.
- Low engine coolant — beep
- Cab tilt — continuous beep. See *Cab Tilting* ⇨ *182*.

See *Diesel Exhaust Fluid* ⇨ *143* and *Engine Alarm and Automatic Shutdown* ⇨ *129*.

Lighting

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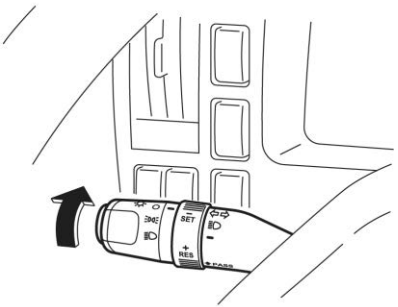
Exterior Lighting

Exterior Lamp Controls



Turning the light control switch to the following positions will cause the relevant lights to illuminate.

The light control switch can be used when the engine control switch is placed in the LOCK or ACC position. Do not operate the combination lights for an extended time period with the engine off. Otherwise, the battery may go dead, making it impossible to restart the engine.

◯ : Turns off all exterior lights.

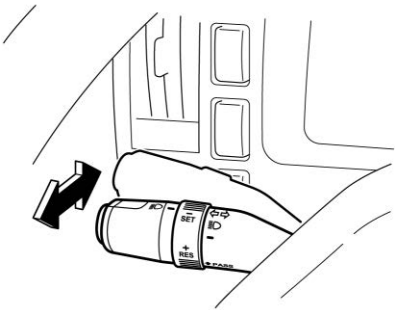
: Turns on the parking lights including all exterior lights, except the headlights.

: Turns on the headlights together with the parking lights, sidemarker lights, roofmarker lights, taillights, license plate light, and instrument panel lights.

When you start the engine in daytime, with the lighting switch off, and release the parking brake, the daytime running lights will come on.

See *Daytime Running Lamps (DRL) Indicator Light* ⇨ *63* and *Turn and Lane-Change Signals* ⇨ *73*.

Headlamp High/Low-Beam Changer



With the headlights on, move the lever forward and backward to switch between the high beam and low beam.

Moving the lever forward selects high beam; moving the lever backward selects low beam.

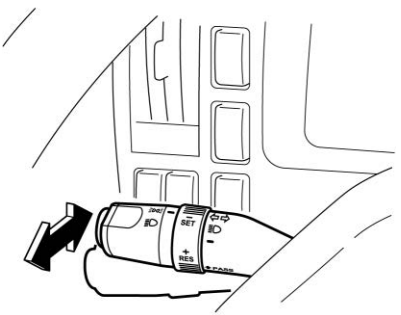
While the headlights are on high beam, the headlights high beam indicator light on the instrument panel remains on.

This indicator light comes on when high beam is selected or the headlights are cycled between high and low beams.

Use low beam whenever there are vehicles ahead in the same lane or oncoming vehicles in the opposite lane.

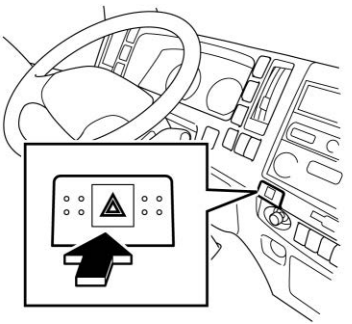
See *Bulb Replacement* ⇨ *213*.

Flash-to-Pass



By lightly pulling the light control switch lever and releasing it, the high beam comes on and off. At the same time, the headlights high beam indicator light on the instrument panel comes on and off. Use this function as a signal for flash-to-pass a vehicle or other purposes.

Hazard Warning Flashers



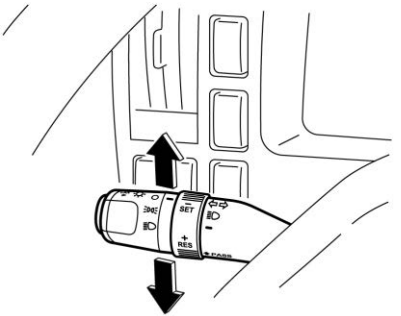
Use the hazard warning light flasher to warn other drivers any time your vehicle becomes a traffic hazard, day or night. With the engine control switch in any position or the key removed, when this switch is pressed, all of the turn signal lights and the turn signal indicator lights flash to signal an emergency. To turn off the hazard lights, press the switch again.

Do not leave the hazard warning light flasher operating for an extended time period with the engine off. Otherwise, the battery may go dead, making it impossible to restart the engine.

Both indicator lights flash when the hazard warning flasher switch is operated irrespective of the position of the engine control switch.

The individual turn signals do not work when the hazard flasher is turned on.

Turn and Lane-Change Signals



An arrow on the instrument cluster flashes in the direction of the turn or lane change.

Move the turn signal lever all the way up or down to signal a turn.

Raise or lower the lever for less than one second until the arrow starts to flash to signal a lane change. This causes the turn signals to automatically flash three times. It will flash six times if Tow/Haul Mode is active. Holding the turn signal lever for more than one second will cause the turn signals to flash until the lever is released.

The lever returns to its starting position whenever it is released.

If after signaling a turn or a lane change the arrows flash rapidly or do not come on, a signal bulb could be burned out. If equipped with LED turn signals, see your dealer.

Replace any burned out bulbs. If a bulb is not burned out, check the fuse. See *Electrical System Overload* ⇨ *220*.

Turn Signal On Chime

If the turn signal is left on for more than 1.2 km (0.75 mi), a chime sounds at each flash of the turn signal. The message TURN SIGNAL ON will also appear in the Driver Information Center (DIC). To turn the chime and message off, move the turn signal lever to the off position.

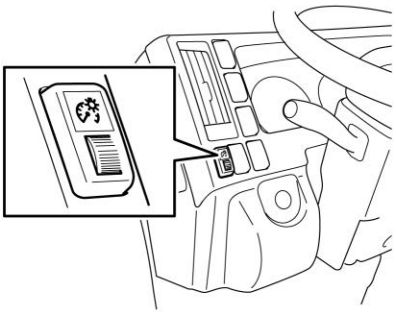
Cornering Lamps

The cornering light illuminates the area to which the vehicle is turning. With the headlights or marker lights on, the cornering lights come on in coordination with the turn signal lights.

See *Exterior Lamp Controls* ⇨ *71* and *Bulb Replacement* ⇨ *213*.

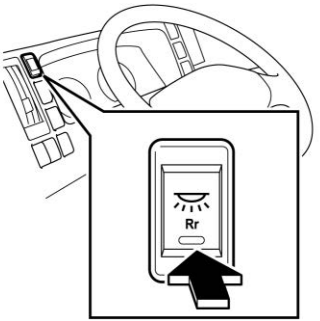
Interior Lighting

Instrument Panel Illumination Control



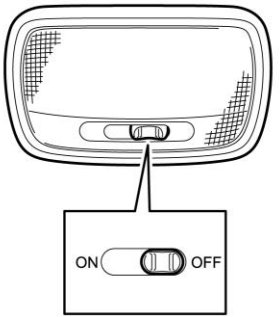
The control will change the light level of the instrument panel.

Cargo Lamp



When this switch is pressed, the rear body interior light comes on and the indicator light on the switch comes on. Confirm the operation with the body builder.

Dome Lamps



The dome light operates regardless of the engine control switch position. The switch has three positions.

ON: The light stays on regardless of the doors being open or closed.

OFF: The light stays off regardless of the doors being open or closed.

Between ON and OFF, the light comes on when the driver's door is opened.

Infotainment System

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Introduction

⚠ Warning

- Do not adjust the radio while the vehicle is in motion. Adjusting the radio while the vehicle is moving could cause an accident.
- Keep the volume low enough that sounds outside of the vehicle can be heard. If outside sound cannot be heard, accidents may be harder to avoid.

Caution

Do not use the radio or audio player for a long time when the engine is off. This may cause the battery to discharge.

Take care not to spill liquids, etc. on the radio or audio player.

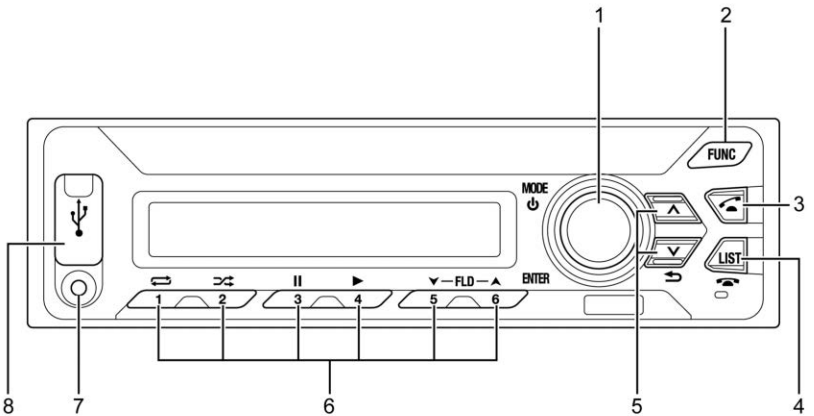
Do not disassemble or apply oil to radio or audio player.

Do not install a radio equipment antenna near the vehicle's radio antenna. This could cause unwanted noise on the radio.

Overview

Control Panel

The radio can be used when the engine control switch is in the "ACC" or "ON" position.



(1) MODE switch Power/Enter button Volume adjust knob
(2) FUNC button
(3) Off hook button
(4) LIST or on hook button
(5) Tune/Track or level adjust button
(6) Preset buttons
(7) Mini jack
(8) USB terminal

Radio

AM-FM Radio

⚠ Warning

Turning the power on or off with the volume set to maximum will damage the equipment and your hearing. Set the volume to a moderate level.

Turning the Power On or Off

Press MODE/⏻/ENTER to turn the power on. Press and hold it for one second or more to turn the power off.

If the MODE/⏻/ENTER is pressed while listening to music in the audio mode, the power is turned off. When MODE/⏻/ENTER is pressed again, the audio system returns to the mode it was in just before it was turned off.

Switching the Audio Modes

1. Press MODE/⏻/ENTER.

2. Turn MODE/⏻/ENTER to select the audio mode of your choice and press ENTER. The audio mode changes in the following order: FM1 ↔ FM2 ↔ FM3 ↔ USB*1 ↔ BTAUDIO ↔ AUX*2 ↔ AM1 ↔ AM2 ↔ FM1.

   *1 These modes are skipped when the USB is not connected.

   *2 This mode is skipped when an auxiliary player is not connected.

Adjusting the Volume

Turn the MODE/⏻/ENTER knob clockwise or counterclockwise to increase or decrease the volume.

Turning the power on or off with the volume set to maximum will damage the equipment and your hearing. Set the volume to a moderate level.

The MODE/⏻/ENTER knob keeps on turning until you stop. However, the volume itself is limited, and even if you keep on turning the MODE/⏻/ENTER knob clockwise or counterclockwise, the volume is kept to a certain degree.

When the gear lever is moved to the reverse (R) position, the system will automatically mute the sound.

Function Setting Mode

Sound modes may be fine-tuned by following the procedures below.

Adjusting Bass

1. Press FUNC.
2. Turn MODE/⏻/ENTER to select SOUND, and then press ENTER.
3. Turn MODE/⏻/ENTER to select BASS, and then press ENTER.
4. Turn MODE/⏻/ENTER clockwise or counterclockwise to adjust the level, and then press ENTER.

Adjusting Treble

1. Press FUNC.
2. Turn MODE/⏻/ENTER to select SOUND, and then press ENTER.
3. Turn MODE/⏻/ENTER to select TREBLE, and then press ENTER.
4. Turn MODE/⏻/ENTER clockwise or counterclockwise to adjust the level, and then press ENTER.

Adjusting Fader

1. Press FUNC.
2. Turn MODE/⏻/ENTER to select SOUND, and then press ENTER.
3. Turn MODE/⏻/ENTER to select FADER, and then press ENTER.
4. Turn MODE/⏻/ENTER clockwise or counterclockwise to adjust the front or rear speakers, and then press ENTER.

Adjustment of rear speaker volume is not possible if there are no rear speakers installed.

Adjusting Balance

1. Press FUNC.
2. Turn MODE/⏻/ENTER to select SOUND, and then press ENTER.
3. Turn MODE/⏻/ENTER to select BALANCE, and then press ENTER.
4. Turn MODE/⏻/ENTER clockwise or counterclockwise to adjust the right or left speakers, and then press ENTER.

Switching the Clock Display Modes

1. Press FUNC.

2. Turn MODE/⏻/ENTER to select CLOCK, and then press ENTER.
3. Turn MODE/⏻/ENTER clockwise or counterclockwise to select OFF (clock display off), ON (clock display on) or SET (time settings), and then press ENTER.

Time is not reset when clock mode is turned off.

Setting the Time

1. Turn MODE/⏻/ENTER to select CLOCK, and then press ENTER.
2. Turn MODE/⏻/ENTER clockwise or counterclockwise to select SET, and then press ENTER.
3. Turn MODE/⏻/ENTER to set the clock time (hour), and then press ENTER. Turn clockwise or counterclockwise to move one hour forward or one hour backward.
4. Turn MODE/⏻/ENTER to set the clock time (minute), and then press ENTER. Turn clockwise or counterclockwise to move one minute forward or one minute backward.

To return to the clock time (hour) setting mode, press ⮌ while setting the clock time (minute).

Tuner Mode Operation

Selecting FM or AM

1. Press MODE/⏻/ENTER.
2. Turn MODE/⏻/ENTER to select "FM1", "FM2", "FM3", "AM1" or "AM2", and then press the "ENTER" button.

Manual Tuning

Press ⋀ or ⋁ on the radio for less than one second.

Each time ⋀ or ⋁ on the radio is pressed, the frequency steps up or down to select the station of your choice.

Automatic Tuning

Press ⋀ or ⋁ on the radio for less than two seconds but more than one second. The radio starts searching for stations, and stops when it finds a station.

Press and hold down ⋀ or ⋁ on the radio for more than 2 seconds. The radio keeps searching for stations within its available frequency band. To cancel, press the button again.

When ⋀ or ⏭ is pressed, the radio is tuned to the higher frequency range (step up), and to the lower frequency range (step down) when pressing ⋁ or ⏮.

In both cases, if the radio cannot find stations, it continues searching.

Storing the Stations (PRESET)

Favorite stations can be tuned by one touch operation if they are stored in the Preset buttons.

A maximum of 30 stations can be memorized and stored. 12 in AM (six each for AM1 and AM2.), and 18 in FM (six each for FM1, FM2 and FM3.)

1. Select the radio mode to be stored from FM1, FM2, FM3, AM1 or AM2.
2. Tune in the station of your choice.
3. Press and hold down the Preset buttons you want to store in, for more than two seconds. When the station is stored, the Preset button number and station frequency appear on the display window.

Radio Reception

Usually, a problem with radio reception does not mean there is a problem with your radio. It is just the normal result of conditions outside the vehicle. For example, nearby buildings and terrain can interfere with FM reception. Power lines or telephone wires can interfere with AM signals.

And of course, radio signals have a limited range. The farther you are from a station, the weaker its signal will be. In addition, reception conditions change constantly as your vehicle moves.

Here are some common reception problems that probably do not indicate a problem with your radio.

FM Transmissions

Fading and drifting stations – Generally, the effective range of FM is about 40 km (25 mi). Once outside this range, you may notice fading and drifting, which increase with the distance from the radio transmitter. They are often accompanied by distortion.

Multi-path – FM signals are reflective, making it possible for two signals to reach your antenna at the same time. If this happens, the signals will cancel each other out, causing a momentary flutter or loss of reception.

Static and fluttering – These occur when signals are blocked by buildings, trees, or other large objects. Increasing the bass level may reduce static and fluttering.

Station swapping – If the FM signal you are listening to is interrupted or weakened, and there is another strong station nearby on the FM band, your radio may tune in the second station until the original signal can be picked up again.

AM Transmissions

Fading – AM broadcasts are reflected by the upper atmosphere, especially at night. These reflected signals can interfere with those received directly from the radio station, causing the radio station to sound alternately strong and weak.

Station interference – When a reflected signal and a signal received directly from a radio station are very nearly the same frequency, they can interfere with each other, making it difficult to hear the broadcast.

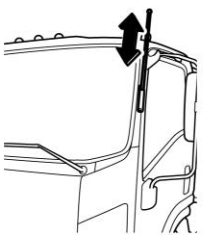
Static – AM is easily affected by external sources of electrical noise, such as high tension power lines, lightning, or electrical motors. This results in static.

Certification

For Federal Communications Commission (FCC) compliance information for this device, see *Radio Frequency Statement* ⇨ *301*.

Fixed Mast Antenna

Caution
To prevent breaking the antenna, shorten it when passing through areas with low clearance or through a car wash.



Pull the antenna out to its full length when using it.

Audio Players

USB Port

USB Operation

⚠ Warning

Do not connect, adjust or remove the USB Memory while driving.

Playing Music Files in the USB Memory (When the USB Memory is not Connected)

When the USB Memory is connected to the USB terminal users can listen to music in the USB Memory.

1. Connect the USB Memory to the USB terminal.
2. Press MODE/⏻/ENTER.
3. Turn MODE/⏻/ENTER to select USB, and then press ENTER.

   The music file starts playing.

Playing Music Files in the USB Memory (When the USB Memory is Connected)

1. Press MODE/⏻/ENTER.
2. Turn MODE/⏻/ENTER to select USB, and then press ENTER.

   The music file starts playing.

Do not remove the USB Memory or turn the ignition off or to ACC/ACCESSORY when the USB Memory is being accessed (playback). This may damage the data. We recommend making a backup of your data in case you accidentally delete it.

Depending on the USB Memory used (non-brand products, USB Memories which have been damaged due to external factors), there may be cases where connection is not possible, or where the operation is unstable.

When the USB mode is switched to other modes and then switched back again, the main unit returns to the music file played last.

File Selection

Press (∧ ∨) or (⏭|⏮) to select the music file of your choice.

- Press ∧ or ⏭ to advance to the next file.
- Press ∨ or ⏮ to return to the beginning of the file being played. Press again to return to the previous file.

Selecting the Folder

Press 5 or 6 to select the MP3/WMA folder.

- Press ▲ to advance to the next folder.
- Press ▼ to return to the previous folder.

Fast Forwarding/Fast Reversing

Press and hold (∧ ∨) or (⏭|⏮) to fast forward or fast reverse the music file.

- Press ∧ or ⏭ to fast forward.
- Press ∨ or ⏮ to fast reverse.

Release to stop.

Repeat Playback

Press 1 to repeat the same file being played. 🔁 appears on the display window.

To cancel, press 1 twice. 🔁 disappears.

Press 1 twice to repeat the same folder being played. After the player has played the last file, it starts playing the first file of the same folder.

FLD appears on the display window. To cancel, press the button again. FLD disappears.

Random Playback

- Press 2 to play all files in the USB Memory in random order. appears on the display window. To cancel, press the button twice. disappears.
- Press 2 twice to play the files from the folder being played in the USB Memory in random order.

After the player has played the last file, it starts playing the first file of the same folder.

FLD appears on the display window.

To cancel, press 2 again. FLD disappears.

Selecting a Music File from the Category List

1. Press LIST for less than one second. LIST is appears on the display window.

   To cancel the category selection mode, press LIST again or press .

2. Turn MODE/⏻/ENTER to select the category of your choice, and then press ENTER. The category changes in the following order:

   PLAYING ↔ FOLDER ↔ FILE ↔ PLAYING...

3. Turn MODE/⏻/ENTER to select the folder or file of your choice from the list, and then press ENTER.

   When a file is selected, the player starts playing the file.

   When FOLDER is selected, select a file in the folder to start playback. To return to the list selection or category selection mode, press for less than one second.

   To cancel the category selection mode, press and hold down for more than one second.

Go Back to the First Position (Home Jump)

You can go back to the first file of the first folder on the USB Memory being played from any position of it. This function is called Home Jump.

For example: If Home Jump is used when playing File 5 in Folder 4, it goes back to File 1 in Folder 1 and starts playing.

Press and hold down 5 for more than one second.

Display Text Information

1. Press and hold down LIST for more than one second.
2. Turn MODE/⏻/ENTER to select the display item of your choice, and then press ENTER.

   The display item changes in the following order.

   FL/TR NO (Folder number/File number) ↔ TIME (Playback time) ↔ FOLDER (Folder name) ↔ FILE (File name) ↔ ALBUM (Album title)* ↔ TRACK (Track title) ↔ ARTIST (Artist name) ↔ FL/TR NO...

   * It is not displayed during the WMA file playback.

If the text information is too long to fit into the display window, press and hold down FUNC for more than one second to switch to the next page.

Texts recorded with characters other than alphanumeric characters and symbols will appear as "*" (asterisks).

If there is no text information stored in a music file, NO TITLE is displayed.

If an Error Appears in the Display

The following messages are displayed (blink) according to the status.

READING: This message is displayed when reading the file format of the USB devices.

USB ERROR 1: This message is displayed when the player cannot operate for some reason. Disconnect the USB device from the audio system.

USB ERROR 2: This message is displayed when the connected USB device is disabled. Connect another USB device.

USB ERROR 3: This message is displayed when the USB hub is connected. Remove the USB hub from the audio system.

NO MUSIC: This message is displayed when a blank USB device or the USB device that does not contain files with playback extensions is connected.

READ ERROR: This message is displayed if a problem is detected in the USB device. Disconnect the USB device, and check the USB device itself.

NO SUPPORT: This message is displayed when the USB device contains no MP3/WMA data (including MP3/WMA extension files) or contains only SKIP FILEs.

USB Devices

USB Memory Standards

- Compatible file system : FAT16/32
- Audio format that is playable : MP3/WMA
- Compatibility : USB2.0 (Full speed)
- Compatible Device: USB mass storage class

This system is not compatible with external hard drive units (pocket hard disk drives). Connections using HUB, etc. are not supported.

Playable MP3 File Standards

- Supported standards:
  - MPEG-1 Audio Layer III
  - MPEG-2 Audio Layer III
- Supported sampling frequencies:
  - MPEG-1: 32, 44.1, 48 (kHz)
  - MPEG-2: 16, 22.05, 24 (kHz)
- Supported bit rate:
  - MPEG1: 32, 40, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 (kbps)
  - MPEG2: 8, 16, 24, 32, 40, 48, 56, 64, 80, 96, 112, 128, 160 (kbps)
- Variable bit rate (VBR) is supported.
- Does not support free format.
- Digital Rights Management (DRM) is not supported.
- Supported channel modes: stereo, joint stereo, dual channel, monaural

Playable WMA File Standards

- Supported standards: WMA Ver. 7, WMA Ver. 8, WMA Ver. 9
- Supported sampling frequencies: 32, 44.1, 48 (kHz)
- Supported bit rates: Ver. 7, 8: CBR 48, 64, 80, 96, 128, 160, 192 (kbps)
- Ver. 9 (9.1/9.2): CBR 48, 64, 80, 96, 128, 160, 192, 256, 320 (kbps)

  Only compatible with 2-channel playback
- Variable bit rate (VBR) is supported.
- Lossless compression is not supported.

ID3 Tag/WMA Tag

MP3/WMA files have an ID3 Tag/WMA Tag that allows the input of information so that data such as song title and artist can be saved.

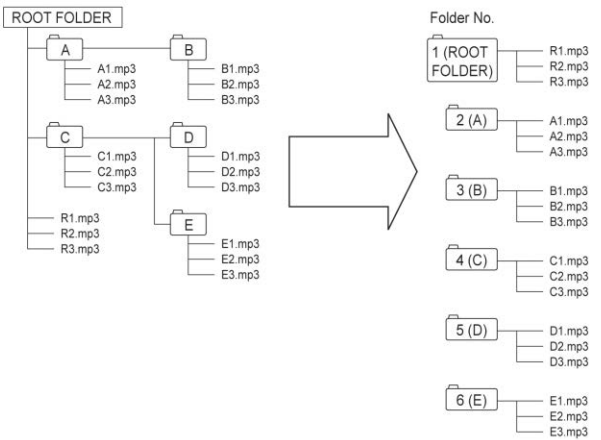
This deck supports ID3 Ver. 1.0, 1.1, 2.2, 2.3 and WMA tags.

Display Order of MP3/WMA File/Folder Names

Names of MP3/WMA folders and files within the same level are displayed in the following order.

1. MP3/WMA folders displayed first, by ascending order of numbers, letters. The files stored just below the root of the USB device will be stored in the ROOT FOLDER.
2. Files displayed next, by ascending order of numbers, letters. It is assumed here that a USB device has already been loaded into the unit.

This unit reconfigures the folders created by a user as shown below.



The following operations are based on the sample MP3/WMA file structure given above.

Normally, tracks in ROOT FOLDER will be played in order from the first file.

Auxiliary Devices

AUX Operation

By connecting the 3.5 mm headphone jack of your own portable audio device to the Mini jack, you can listen to your own music through this unit.

1. Use a mini plug cable, and connect the portable audio device to the Mini jack.
2. Press MODE/⏻/ENTER.
3. Turn MODE/⏻/ENTER to select AUX, and then press ENTER.

Connecting a mini plug cable to the Mini jack also establishes the AUX mode and enables you to use the portable audio device.

When the mini plug cable is disconnected from the main unit, the AUX mode is cancelled.

Adjusting the Volume

Turn the Volume adjust knob clockwise or counterclockwise to adjust the volume.

Turn clockwise to increase the volume. Turn counterclockwise to decrease the volume.

Press the VOL-UP button to increase the volume. Press the VOL-DOWN button to decrease the volume.

⚠ Warning

- Either place the portable audio device and mini plug cable somewhere where they do not interfere with driving or temporarily secure them at a location where they are not in the way. They could impede driving and cause a crash.
- Make sure not to touch the terminals of the mini plug cable.
- Do not connect, adjust or remove the portable audio device while driving.

Caution

Reduce the AUX volume to prevent speaker damage.

The volume set by adjustment in the AUX mode is effective in the AUX mode only.

To power the portable audio device, use the battery or other power source supplied with the device.

The AUX device cannot be controlled from the main unit.

Bluetooth Audio

Bluetooth Audio Operation

⚠ Warning

Do not connect the portable device while driving.

Caution

Do not leave the portable device inside the vehicle. The interior of the vehicle may become too hot under extreme hot weather.

Do not set the portable device too close to this unit. When the device and the unit are too close to each other, sound quality may deteriorate and connection problems may arise.

Connecting a Bluetooth compatible audio player or mobile phone to this unit allows you to operate them from the system and listen to music.

In addition, as the connection between the unit and the portable device is wireless, users will not face problems associated with cable connections.

This unit supports Bluetooth. Bluetooth is a wireless data system which allows users to listen to music without the need to connect the portable device with wires.

If the portable device is not Bluetooth-compatible, this function is not available.

Playing Music

1. Press MODE/⏻/ENTER.
2. Turn MODE/⏻/ENTER to select BT-AUDIO, and then press ENTER.

   The music on the Bluetooth compatible portable device that is connected will start.

   When the registered device is not connected, NO CONNECT is displayed.

First connect the portable device to the unit before performing the following operation. See “Registering a Bluetooth Device” in *Bluetooth* ⇨ *87*.

Bluetooth audio operation is subject to portable device compatibility.

Operation of the portable device via this unit differs depending on the specifications of the portable device.

When the player is connected to an Audio Video Remote Control Profile (AVRCP) Version 1.0 compatible portable device, STREAMING displays and the functions of your devices may be partially limited.

Stop Playback

Switch to another audio mode.

Pausing the Music

Press 3 to pause the music.

Press 4 to resume.

Track Selection

Press ∧ ∨ on the radio to select the track of your choice.

∧ or ⏭: Advance to the next track.

∨ or ⏮: Return to the beginning of the track being played. To return to the previous track, press the ∨ on the radio.

Operation of the portable device via this unit differs depending on the specifications of the portable device.

Fast Forwarding/Fast Reversing

Press and hold ∧ ∨ on the radio to fast forward or fast reverse the track.

∧ or ⏭: Fast forward.

∨ or ⏮: Fast reverse.

To stop fast forward or fast reverse, release the button.

Operation of the portable device via this unit differs depending on the specifications of the portable device.

Selecting the Album

Press 5 or 6 to select an album.

▲: Advance to the next album.

▼: Return to previous album.

Operation of the portable device via this unit differs depending on the specifications of the portable device.

Repeat Playback

Press 1 to repeat the same track being played. 🔁 appears on the display. To cancel, press 1 twice.

Press 1 twice to repeat the same album being played.

After the player has played the last file, it starts playing the first file of the same album. FLD 🔁 appears on the display.

Operation of the portable device via this unit differs depending on the specifications of the portable device.

Random Playback

Press 2 to play all tracks in the Bluetooth Audio in random order.

🔀 is displayed.

To cancel, press 2 twice.

Press 2 twice to playback tracks on the album being played in random order. After the player has played the last track, it starts playing the first track of the same album.

FLD 🔀 is displayed.

To cancel, press 2 again.

Operation of the portable device via this unit differs depending on the specifications of the portable device.

Display Text Information

1. Press and hold LIST for more than one second.

2. Turn MODE/⏻/ENTER to select the display item of your choice, and then press enter.

The display item changes in the following order.

- TR NO/TIME: Track number/Playback time
- ALBUM: Album title
- TRACK: Track title
- ARTIST: Artist name

If the text information is too long to fit into the display window, press and hold down FUNC for more than one second to switch to the next page.

Texts recorded with characters other than alphanumeric characters and symbols will appear as "*" (asterisks).

If there is no text information stored in a music file, NO TITLE is displayed.

Displaying the Registered Portable Device

1. Press FUNC.
2. Turn MODE/⏻/ENTER to select BLUETOOTH, and then press ENTER.
3. Turn MODE/⏻/ENTER to select LIST AUDIO, and then press ENTER.
4. Turn MODE/⏻/ENTER to select device name, and then press ENTER.
5. Turn MODE/⏻/ENTER to select the display item of your choice, and then press ENTER.

   SELECT: Connect the registered portable device. SEARCHING is displayed.

   DISCONNECT: Disconnect the registered portable device. DISCONNECT? is displayed, press ENTER.

   DELETE: Delete the registered portable device. When DELETE? is displayed, press ENTER.

   METHOD: Change the connection method. Select FROM VEHICLE, to connect the portable device by operating from the unit. Select FROM AUDIO, to connect the unit from the portable device.

If ERROR Appears in the Display

The following message appears in the display window according to the status.

NO CONNECT: This message appears when the unit is not connected to the portable device.

Phone

Bluetooth

See *Radio Frequency Statement* ⇨ *301*.

This unit supports Bluetooth. Bluetooth is a wireless data system by which you can call without your mobile phone being connected with a cable or placed on a cable. If your mobile phone does not support Bluetooth, this unit cannot function.

Registering a Bluetooth Device

⚠ Warning

Do not register the Bluetooth device while driving. Park the vehicle in a secure location before carrying out the registration.

Connecting a Bluetooth device (mobile phone or Bluetooth compatible audio player) to this unit allows you to operate it from the unit and talk in handsfree mode or listen to music. When a Bluetooth connection is established, ᛒ is displayed.

1. Press FUNC.

2. Turn MODE/⏻/ENTER to select BLUETOOTH, and then press ENTER.
3. When PAIRING is displayed, press ENTER.

   If the Bluetooth device has already been registered in this unit, turn MODE/⏻/ENTER to select PAIRING.
4. After "CAR AUDIO" and a 4-digit passkey appear in the display window, operate the Bluetooth device to enter the passkey.

   See the instruction manual enclosed with your portable device.
5. When the registration of the Bluetooth device in this unit is completed, CONNECTED is displayed.

   If FAILED is displayed, after the passkey is entered, try registering again.

Up to five Bluetooth devices can be registered on the unit. If it exceeds the limit of registrations and DEL DEVICE? is displayed, you must delete the registered Bluetooth device.

Connect to the Bluetooth Device Automatically

1. Press FUNC.
2. Turn MODE/⏻/ENTER to select BLUETOOTH, and then press ENTER.
3. Turn MODE/⏻/ENTER to select A.CONNECT, and then press ENTER.
4. Turn MODE/⏻/ENTER to select ON/OFF, and then press ENTER.

   CONNECT ON: Turn on the automatic connection.

   CONNECT OFF: Turn off the automatic connection.

Initializing the Bluetooth Settings

⚠ Warning

Driving while distracted could result in a crash. Do not initialize Bluetooth settings while driving. Park your vehicle in a secure location, and then initialize them.

To initialize the Bluetooth, follow these steps:

1. Press FUNC.
2. Turn MODE/⏻/ENTER to select BLUETOOTH, and then press ENTER.
3. Turn MODE/⏻/ENTER to select RESET DATA, and then press ENTER.
4. When RESET DATA? is displayed, press ENTER.

   When the initialization process begins, PLEASE WAIT is displayed. When the initialization is completed, COMPLETED is displayed.

The initialized Bluetooth settings or histories are unrecoverable once the RESET DATA function has been completed. Be careful when initializing them.

When disposing your vehicle, make sure to delete all personal data that are registered in your audio system. You should delete the following Handsfree/ Bluetooth Audio data from the system:

- History of outgoing/incoming/missed calls
- Handsfree setting
- Bluetooth phone data
- Portable device data
- Portable device connection setting

Operating the Handsfree System

Caution

Phones can be damaged by extreme temperature. Do not leave your mobile phone inside the vehicle. Extreme temperatures may cause permanent damage to the screen, battery, SIM card, or other phone components.

This unit supports Bluetooth. Bluetooth is a wireless data system by which you can call without your mobile phone being connected with a cable or placed on a cable. If your mobile phone does not support Bluetooth, this unit cannot function.

First connect the mobile phone to the unit before performing the following operation. See “Registering a Bluetooth Device" previously.

In the following conditions, the system may not function:

- The mobile phone is turned off.
- The current position is outside the communication area.
- The mobile phone is not connected.
- The mobile phone has a low battery.

Making a Phone Call by Entering a Phone Number

⚠ Warning

Do not enter a phone number while driving. Park your vehicle in a secure location and then enter the phone number.

1. Press the Off Hook button on the radio.
2. Turn MODE/⏻/ENTER to select ENTER NUMBER, and then press ENTER.

   INPUT NUMBER is displayed.
3. Turn MODE/⏻/ENTER to select a phone number.

   You can enter phone numbers by one digit at a time.

   Numeric character (0-9) and symbols (*, #, +) are available. You can use the symbols (+) only for the first digit.

   ∧: Advance to the next digit.

   ∨: Delete the entered digit and return to the previous digit.
4. After entering the phone number, press Off Hook or ENTER.

   CALLING is displayed and a call is made to the selected phone number.

   When the person receives the call, you can talk in handsfree mode.

Making a Phone Call Using Missed Call History

1. Press the Off Hook button on the radio.
2. Turn MODE/⏻/ENTER to select MISSED, and then press ENTER.

   The phone number of the previous missed call appears on the display window.
3. Turn MODE/⏻/ENTER to select the phone number of your choice, and then press ENTER.

   CALLING is displayed and a call is made to the selected phone number.

You can also make a call by pressing the Off Hook button.

When the person receives the call, you can talk in handsfree mode.

Making a Phone Call Using Incoming Call History

1. Press the Off Hook button.
2. Turn MODE/⏻/ENTER to select INCOMING, and then press ENTER.

The phone number of the person who made the previous incoming call appears.

3. Turn MODE/⏻/ENTER to select the phone number of your choice, and then press ENTER.

   CALLING is displayed and a call is made to the selected phone number.

You can also make a call by pressing the Off Hook button.

When the person receives the call, you can talk in handsfree mode.

Making a Phone Call Using Outgoing Call History

1. Press the Off Hook button.
2. Turn MODE/⏻/ENTER to select OUTGOING, and then press ENTER.

   The phone number you called appears.

3. Turn MODE/⏻/ENTER to select the phone number of your choice, and then press ENTER.

   CALLING is displayed and a call is made to the selected phone number.

You can also make a call by pressing the Off Hook button.

When the person receives the call, you can talk in handsfree mode.

Answering a Call

When your phone set receives a call, INCOMING, followed by the phone number is displayed.

- Only the number appears on the display.
- If there is a private call, UNAVAILABLE is displayed.
- You can refuse a call by pressing On Hook button when a call is incoming.
- This unit supports the in-band ring tone (transfers the ring tone from your phone to the main unit). If the in-band ring tone is not supported your phone, the unit use the built-in ring tone.

1. Press the Off Hook button and use handsfree to talk.
2. When you have finished the call, press On Hook button.

Setting the Volume

Call Volume: Turn MODE/⏻/ENTER during a call.

- Turn clockwise: Increase the volume.
- Turn counterclockwise: Decrease the volume. The adjusted volume value is saved.

Ringtone Volume: Turn MODE/⏻/ENTER during an incoming call.

- Turn clockwise: Increase the volume.
- Turn counterclockwise: Decrease the volume. The adjusted volume value is saved.

The volume and microphone gain setting of each mobile phone is different according to its specification.

Setting the Sensitivity of the Built-In Microphone

If your voice is too low or difficult to hear for the person you are talking to, or there is an echo or howling, you can adjust the microphone sensitivity.

Press the Level Adjust during a call.

∧: Increase the sensitivity. (The sound transmission is more effective.)

∨: Decrease the sensitivity. (The sound transmission is less effective.)

The setting can be adjusted within the range of zero to MAX (10). (Default: five).

MIC LEVEL is displayed while the buttons are operated. MIC LEVEL disappears in two seconds after the operation is completed, and the display returns to its original state.

Talking on the Mobile Phone (Private Mode)

You can switch phone calls from this unit (handsfree mode) to the mobile phone.

Press and hold down the Off Hook button for more than one second during a call.

Entering Tone Numbers

You can transmit tone numbers during a call.

1. Press FUNC during a call.
2. Turn MODE/⏻/ENTER to select the tone number. You can enter phone numbers by one digit at a time.

   Numeric character (0-9) and symbols (*, #, +) are available. You can use the symbols (+) only for the first digit.
3. Press ⋀. The selected tone numbers are transmitted. You will move on to the next step and select the tone numbers again if necessary.

Talking During Call Waiting

When the display window indicates the phone call in progress, the Call Waiting feature enables you to receive and answer a second phone call while placing the first call on hold.

Press the Off Hook button when the ring tone starts during a call.

- While placing the phone call in progress on hold, you will be connected to the second caller.
- Press the On Hook button when you wish to turn off the Call Waiting feature.
- When the Call Waiting feature is turned off, you will be connected to the first caller on hold.
- Pressing the Off Hook button again enables you to switch between callers on Call Waiting.

This function is available only when your phone is compatible with the Call Waiting feature.

Displaying the Registered Mobile Phone

1. Press FUNC.
2. Turn MODE/⏻/ENTER to select BLUETOOTH, and then press ENTER.
3. Turn MODE/⏻/ENTER to select LIST PHONE, and then press ENTER.
4. Turn MODE/⏻/ENTER to select mobile phone name, and then press ENTER.
5. Turn MODE/⏻/ENTER to select the display item of your choice, and then press ENTER.

   SELECT: Connect the registered mobile phone. SEARCHING is displayed.

   DISCONNECT: Disconnect the registered mobile phone. When DISCONNECT? is displayed, press ENTER.

   DELETE: Delete the registered mobile phone. When DELETE? is displayed, press ENTER.

Adjusting the Handsfree Volume

1. Press FUNC.
2. Turn MODE/⏻/ENTER to select BLUETOOTH, and then press ENTER.
3. Turn MODE/⏻/ENTER to select HF SOUND, and then press ENTER.
4. Turn MODE/⏻/ENTER to select an adjustment item, and then press ENTER.

   CALL VOLUME: Adjust the call volume.

RINGTONE: Adjust the ringtone volume.

5. Turn MODE/⏻/ENTER.

   Turn clockwise: Increase the volume.

   Turn counterclockwise: Decrease the volume. The adjusted volume value is saved.

   To adjust the volume during an incoming call or during a call, see “Setting the Volume" previously in this section.

Trademarks and License Agreements

FCC Information

See *Radio Frequency Statement* ⇨ *301*.

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Bluetooth

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Compatible Bluetooth Specifications: Bluetooth Specification Ver.5.1 + EDR Hands Free Profile (HFP) Ver.1.7.2 Advanced Audio Distribution Profile (A2DP) Ver.1.3.2 Audio/Video Remote Control Profile (AVRCP) Ver.1.6.2

Bluetooth Handsfree/Audio operation is subject to mobile phone compatibility.

Bluetooth Handsfree performance can be influenced by mobile phone network, handset and driving condition.

The functions of the system may be partially limited depending on the model of your mobile phone.

Operation of the portable device via this unit differs depending on the specifications of the portable device.

Climate Controls

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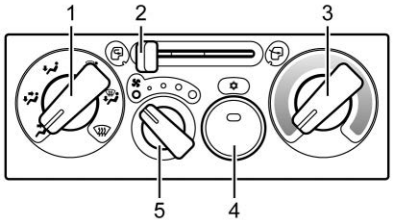
Climate Control Systems

The heating, cooling, and ventilation for the vehicle can be controlled with this system.



1. Outlet Selector Knob
2. Air Selector Lever
3. Temperature Control Knob
4. Air Conditioning (A/C) Switch
5. Fan Speed Control Knob

Outlet Selector Knob: The Air Selector Knob regulates air flow from the upper, floor, and defroster outlets.

: Air flows through the upper outlets.

: Air flows through the upper and floor outlets.

: Air flows through the floor outlets.

: Air flows through the floor outlets, with some air coming from the door window and windshield outlets.

: Air flows through the floor outlets, with an increased amount of air coming from the door window and windshield outlets.

: Air flows through the door window and windshield outlets.

Air Selector Lever: The intake of outside air and the circulation of inside air is controlled by sliding this lever right or left.

: Use this position to ventilate the interior of the cab. This position should be normally selected.

: Use this position to prevent dusty or otherwise contaminated outside air from entering the cab, such as in a tunnel or in congested traffic.

Extended use of the inside air recirculation position causes the windshield and windows to fog up easily, making visibility poor. For good ventilation, switch to outside air as soon as possible.

Temperature Control Knob: Use this knob to select the preferred cab interior temperature. Turn the knob counterclockwise to lower the outlet air temperature and clockwise to raise it.

Fan Speed Control Knob: The fan speed can be adjusted to any of the four speeds available.

Air Conditioning (A/C) Switch: Press this switch to use the air conditioning system. The indicator light inside the switch will come on to show that the air conditioning system is in operation. The air conditioning system can also be used for dehumidifying while the heater is being used. To turn off the air conditioning, push this switch in again.

When the defrost mode is selected, the air conditioner compressor will be on.

Even if the A/C switch is turned on, the air conditioning system will not operate when the fan speed control knob is placed in the stop position. Make sure that the fan speed control knob is in a position other than the stop position.

Even in seasons when the air conditioning system is not used, occasionally operate the system for a few minutes with the engine running at a low speed in order to keep the system's components lubricated.

Ventilation

Outside Air Ventilation: Press the A/C switch to the off position. Turn the outlet selector knob to the preferred position. Move the air selector lever to the position.

Set the temperature control knob to the desired position. Adjust the fan speed control knob to the preferred speed.

How to Use the Heater

Normal Heating: Set the outlet selector knob to the or position. Use the position for warming your feet while defogging the windshield.

Set the air selector lever to the position. Adjust the temperature control knob and the fan speed control knob to the desired positions.

To dehumidify the cab interior while heating, press the A/C switch to the on position.

As the heater uses the heat from the engine coolant, its heating effect is weak when the engine coolant temperature is low.

Maximum Heating: Turn the outlet selector knob to the position, set the air selector lever to the position, and turn the temperature control knob fully towards the high temperature direction.

Set the fan speed control knob to the maximum speed position.

Bi-Level Heating: Set the outlet selector knob to the position. Set the air selector lever to the position. Set the temperature control knob to the middle position.

Adjust the fan speed control knob as desired. The air from the floor outlets is warmer than the air from the upper outlets in this position.

However, when the temperature control knob is moved to either the full hot or the full cold position, the air from the floor outlets and the air from the upper outlets will be the same temperature. This position can give cool upper level air and warm floor level air when the temperature control is adjusted in between cold and hot. This is useful in cool weather with bright sunlight conditions.

Defogging and Defrosting the Windshield

Defogging: Set the outlet selector knob to the position. Set the air selector lever to the position.

Turn the temperature control knob to a high-temperature position according to your preference. For defogging in the summer months, set the temperature control knob to any desired position.

Set the fan speed control knob to any speed position, except the off position. The A/C compressor automatically operates when the position is selected. Defogging is performed very effectively with the dehumidifying effect.

Defrosting: Set the outlet selector knob to the position. Set the air selector lever to the position.

Turn the temperature control knob fully towards the high-temperature direction. Set the fan speed control knob to the maximum speed position.

After defrosting, be certain to return the air selector lever to the position. Failure to do so will cause the windshield to fog up, impeding forward visibility.

Cooling

Normal/Moderate Cooling: This setting is suitable for extended periods of cooling or moderate cooling. Press the A/C switch to the on position.

Set the outlet selector knob to the position for normal cooling or set it to the position for moderate cooling. Adjust the temperature control knob to the desired position. Adjust the fan speed control knob as desired

Maximum Cooling: Set the outlet selector knob to the position. Press the A/C switch to the on position. Move the air selector lever to the position

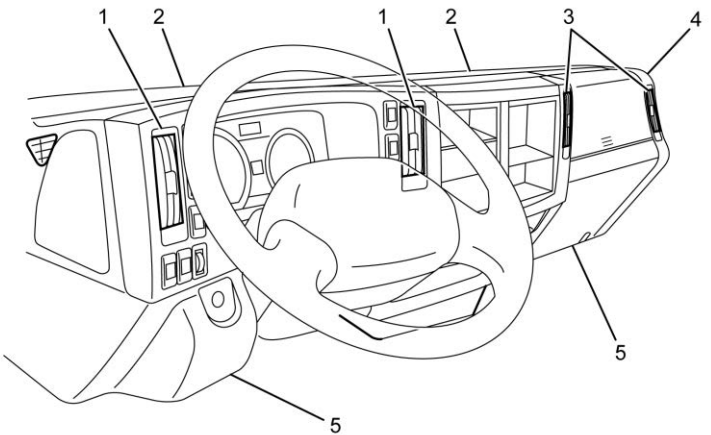
Turn the temperature control knob fully towards the low-temperature direction. Set the fan speed control knob to the maximum speed position.

After prolonged parking in direct sunlight, open the windows or doors to ventilate the interior of the cab and release the heat.

During cooling operation, mist may come out of the air outlets. This results from quick cooling of humid air, and does not indicate any problem.

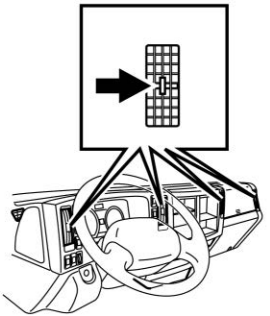
After maximum cooling, be certain to return the air selector lever to the position. Failure to do so will cause the windshield to fog up, impeding forward visibility.

Air Vents



1. Driver Side Outlets. Airflow direction is adjustable.
2. Windshield Outlets. Air is delivered towards the windshield.
3. Passenger Side Outlets. Airflow direction is adjustable.
4. Door Windows Outlet. Air is delivered towards the door windows
5. Foot Outlets. Air is delivered towards the feet.

Air Flow Direction Control Lever



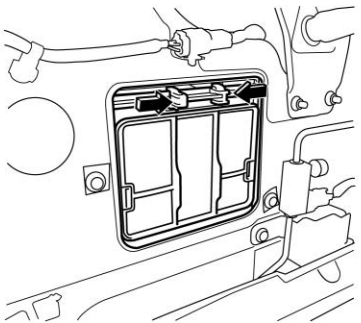
Use the tab to adjust the airflow direction from the outlet. To close the outlet, move the tab fully down.

Maintenance

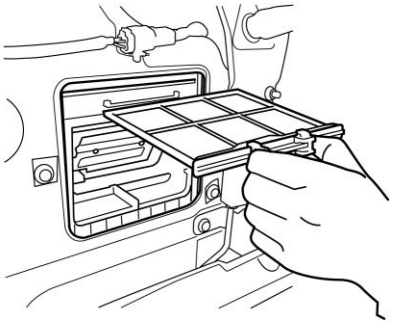
Passenger Compartment Air Filter

Removing the Inside Air Filter

1. Open the front lid. See *Front Lid* ⇨ *187*.



2. While pressing in on both sides of the filter lock, pull out the filter.



3. Fully remove the filter. Use a vacuum cleaner or the like to clean dust and dirt from its surface.

In order to avoid filter damage, hard brushes should not be used for filter cleaning.

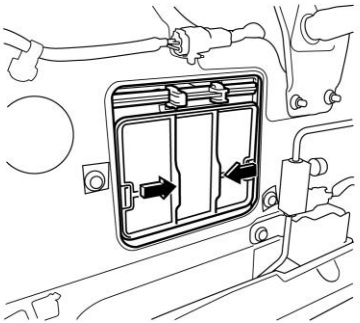
Installing the Inside Air Filter

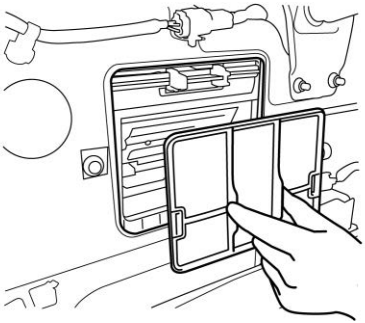
Install the filter in the reverse order to removal.

Ensure that the filter is returned securely to its original position. Failure to observe this precaution can lead to rattling during travel.

The vehicle must not be used with the filter removed or incorrectly installed. Failure to observe this precaution can lead to air conditioning system damage as a result of dust, dirt and the like entering the system.

Removing the Outside Air Filter





1. While pressing in on both sides of the filter lock, pull out the filter.
2. Use a vacuum cleaner or the like to clean dust and dirt from its surface.

In order to avoid filter damage, hard brushes should not be used for filter cleaning.

Installing the Outside Air Filter

Install the filter in the reverse order to removal.

Ensure that the filter is returned securely to its original position. Failure to observe this precaution can lead to rattling during travel.

The vehicle must not be used with the filter removed or incorrectly installed. Failure to observe this precaution can lead to air conditioning system damage as a result of dust, dirt, water, snow, and the like entering the system.

Service

The air conditioning system will not be able to cool the cab interior effectively if the refrigerant level is low. Accordingly, the refrigerant level must be topped up whenever necessary.

Please contact your dealer whenever refrigerant must be added.

Operation Tips

Operating the air conditioning while the refrigerant level is too low leads not only to poor cooling performance but also to air conditioning system damage.

This vehicle uses the new refrigerant HFC134a (R134a) in the air conditioning system. No other type of refrigerant can be used. In order to protect the environment, care must be taken to ensure that refrigerant gas is never released into open air. When refrigerant must be replaced, therefore, please contact your dealer or other service facility equipped with a gas recovery installation system.

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Driving Information

Driver Behavior

Napping in the Vehicle

⚠ Warning

Before taking a nap in the vehicle, be sure to shut off the engine and place the ignition in the LOCK position. Otherwise, any unintended contact with the accelerator pedal while you are asleep could cause the vehicle to move, resulting in an accident.

- If you leave the engine running and unintentionally keep the accelerator pedal pressed while asleep, the engine and exhaust pipe could become abnormally hot, resulting in a fire.
- If you leave the engine running while taking a nap with the vehicle parked in a place where exhaust gases could get into the cab (for example, a place that is poorly ventilated), you could suffer carbon monoxide poisoning.
- You and others could be seriously injured.

Driving for Better Fuel Economy

Economical Driving

How you drive, where you drive, and when you drive all affect fuel economy.

For diesel vehicles, driving too fast, driving so slowly that the engine knocks, driving with the exhaust brake switched on all the time, and frequently using the exhaust brake to adjust your speed can lead to poor fuel economy.

Drive at a constant speed as much as possible. When accelerating, increase your speed gently and slowly, and up-shift early.

Maintain a constant cruising speed, as traffic allows, and avoid sudden stops.

Frequent short trips, excessive idling and use of the air conditioner in cool weather when "Vent" would provide adequate comfort, can all lead to decreased fuel economy.

Warming up the engine for longer than necessary, driving with the vehicle overloaded, and revving the engine are a waste of fuel.

The careful attention you give your vehicle, as far as maintenance is concerned, will also help fuel economy.

Protection of Engine against Overcooling

Overcooling of the engine not only accelerates wear of the vital engine parts but also hurts fuel economy.

Distracted Driving

Do Not Use a Mobile Phone While Driving

⚠ Warning

- Drivers should never use a mobile phone or car phones in any mode other than Hands Free while driving. Doing so is dangerous and also illegal in many states.
- Using a mobile phone in any way (e.g., talking, texting, reading, etc.) while driving could result in an accident because you would not be paying full attention to your surroundings.
- If you are driving and you wish to use a mobile phone, first stop the vehicle in a safe place.

Control of a Vehicle

Warnings for Driving

⚠ Warning

- Concentrate on driving safely, obeying all legally designated speed limits, road signs and traffic signals.
- If you notice any abnormal noise, abnormal smell or abnormal vibration from any part of the vehicle, immediately stop the vehicle in a safe place and perform checks.
- If a warning light comes on or a buzzer sounds while you are driving, immediately stop the vehicle in a safe place and perform checks.
- Slow down sufficiently when approaching a curve. Applying the brakes or sharply turning the steering wheel while turning the curve could cause the cargo to shift, the tires to slip and the vehicle to tip onto its side.

(Continued)

Warning (Continued)

- Avoid scraping the tire sidewalls against curbstones or driving over dips and protrusions in the road surface. You could damage the tires, resulting in a blowout or flat tire.
- You and others could be seriously injured.

Pulling Away After Stopping and Parking

Before pulling away, perform a thorough safety check, making sure there are no children or obstructions around the vehicle. Confirm the parking brake is securely applied and remove wheel chocks.

If you cannot see the area behind your vehicle well enough to confirm it is safe to back up, get out of the vehicle and check behind it.

If the Windshield Fogs Up

Use the heater to blow hot air on the windshield or dehumidify the cabin using the air conditioner, and place the outlet selector knob in the or position. Place the air selector lever in the outside air position. See *Climate Control Systems* ➪ *93*.

Nighttime Visibility

If there is an oil film on the windshield, the lights of oncoming traffic will be reflected in many directions, making it hard for you to see ahead. Use glass cleaner to clean the glass and the wiper blades.

Worn wiper blades cannot wipe the windshield clean and thus cannot maintain visibility. When the wiper blades become worn, replace them with new ones. See *Wiper Blade Replacement* ➪ *211*.

Do Not Attach Accessories to the Windshield or Windows

⚠ Warning

Do not attach ornaments, films or other accessories to the windshield or windows. They would impair visibility. Also, any plastic suction cups used to attach accessories could cause a fire or other accident by acting as lenses.

You and others could be seriously injured.

Never Stop the Engine While Driving

⚠ Warning

While driving, do not turn the engine control switch from the "ON" position.

- This action will turn the engine off, causing the power steering to stop working (making the vehicle difficult to steer) and the brake performance to decrease (reducing your ability to stop the vehicle).
- If the switch is turned completely to the LOCK position, all electrical control circuits (including warning lights and indicators) will cease operating and the steering may become locked (if the key is removed).
- Turning the engine control switch from the ON position may result in serious injury or death.
- You and others could be seriously injured.

Avoid Unnecessary Idling of the Engine

If the engine idles too long, the engine coolant temperature will fall below the operating range. Low engine operating temperature causes several conditions that are harmful to engine operation and life. Incomplete combustion of fuel in an engine that is not fully warmed up causes crankcase dilution and forms lacquer and gummy deposits on valves, pistons, and rings. It also causes rapid accumulation of sludge within the engine.

Driving at Night

Nighttime driving is more dangerous than daytime driving because the field of view is narrower. Keep your speed down, and maintain an ample headway distance.

Metallic Plinking Sound from the Muffler

Immediately after stopping the engine, you may hear a metallic plinking sound from the muffler. This sound occurs as the muffler cools down and contracts. It does not indicate an abnormality or breakdown.

When the Silencer and Exhaust Pipe are Hot

⚠ Warning

When the engine is running and immediately after vehicle operation, the DPF, silencer, and exhaust pipe are extremely hot. Be careful not to inadvertently touch them when working near them (for example, tilting the cab or operating an attachment). You and others could be seriously injured.

Driving in Summer and in Hot Regions

The engine is more likely to overheat in an environment where the ambient temperature is high. To prevent the engine from overheating, pay attention to the following points:

- If the engine does not contain the appropriate concentration of engine coolant, overheating is likely to occur.

  Refer to *Engine Coolant* ⇨ *195*.

- Do not put well water, river water, or other hard water in the engine cooling system. It would hasten the formation of rust and scale.
- If foreign matter (insects, mud, etc.) gets stuck in the radiator's air passages, the cooling system's performance will deteriorate. Check the air passages for clogging, and remove any foreign matter using water under low pressure.

  Refer to *Exterior Care* ⇨ *246*.

When Turning, the Rear Wheels will Follow Tighter Curves than the Front Wheels

Use the mirrors to ensure the rear of the vehicle will complete the turn safely.

Sidewinds

If the vehicle catches a sidewind and drifts sideways, firmly grip the steering wheel, decelerate to a speed that allows you to stay completely in control, and make a directional correction. The vehicle may catch strong sidewinds in the following situations:

- Emerging from a tunnel
- Driving over a bridge
- Driving on an embankment
- Driving through a mountain pass
- Being overtaken by a large truck or bus
- Overtaking a large truck or bus

Flat Tire

⚠ Warning

If a blowout or flat tire occurs while you are driving, calmly grip the steering wheel and gradually apply the brakes to decelerate. Hard braking would be dangerous because it could cause the steering wheel to be pulled to one side.

Stop the vehicle in a safe place, and change the tire.

Hard Bump Under Vehicle

If the underside of the vehicle receives a hard bump, stop in a safe place where the vehicle will not obstruct traffic and check for brake fluid leakage, fuel leakage, and component damage. If any part of the vehicle is damaged or broken, promptly have the vehicle inspected and repaired.

Highways

Preparing the Vehicle

When performing the "Recommended Daily (Pre-operation) Inspections" as listed on *Owner Checks and Services* ⇨ *270*, ensure you check the following items with particularly great care:

- Tires
  - Check that there is ample tread depth.
  - Check tire pressure.
- Engine
  - Check that engine coolant is not leaking from the radiator and other parts of the cooling system.
  - Check that the engine coolant level is high enough.
  - Check that the fan belt is properly tensioned and free of damage.
  - Check that the engine oil level is correct.
- Fuel tank
  - Check that the fuel level is high enough.

- Diesel Exhaust Fluid (DEF) tank
  - Check that the DEF level is high enough.

Highway Driving Guidelines

- Speeds on highways are higher than those on regular roads, so there is more danger. Also, a breakdown on a highway represents a hazard to other vehicles and can cause an accident. Concentrate on safe driving. Remember to perform daily pre-operation inspections and use highway driving techniques.

  Refer to *Owner Checks and Services* ⇨ *270*.

- When merging with traffic on a highway, use the turn signal lights to indicate your intentions ahead of time. Speed up sufficiently when you are in the acceleration lane. Pay attention to vehicles behind you and to conditions in the lane you are joining. Merge in such a way that you do not obstruct vehicles in the lane.
- Your sense of how fast you are traveling becomes distorted on long highway drives. Constantly keep an eye on the speedometer, and maintain a suitable headway distance.
- During high-speed driving, even a little turn of the steering wheel causes a big movement of the vehicle. Turn the steering wheel slowly.
- Excessive use of the brake pedal is extremely dangerous because it rapidly wears the brake linings and causes brake fade. Make effective use of engine braking and the exhaust brake when you want to decelerate.
- When you want to turn off a highway, use the turn signal lights to indicate your intentions ahead of time. Paying attention to vehicles behind you, turn off the highway smoothly so as not to obstruct other vehicles.

Brake Fade: Frequent use of the brakes can cause the brakes to overheat so that the frictional force of the brake linings decreases and the brakes become less effective than normal. This phenomenon is called brake fade.

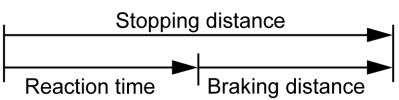
Braking

Brake Operation

The brakes give strong braking force with only light pressure on the pedal. Do not press the brake pedal hard except in the event of an emergency.

Actual stopping distances vary greatly. Your ability to stop safely will be greatly affected by the surface of the road, whether it is pavement or gravel; the condition of the road, whether it is wet, dry or icy; tire tread; the condition of the brakes; the weight of the vehicle; the weight of the load; and the amount of brake force applied. Please allow for realistic stopping distances to avoid unnecessary heavy braking. That means better braking, longer brake life and safer driving.

Stopping Distance



The stopping distance of a vehicle involves reaction time and braking distance. Deciding to push the brake pedal is reaction time. Applying the brake pedal until the vehicle comes to a complete stop is braking distance. Average reaction time is about three-fourths of a second. But that is only an average. It might be less with one driver and as long as two or three seconds or more with another. Age, physical condition, alertness, coordination and eyesight all play a part. Braking distance will vary based on reaction time, the amount of force applied to the brake pedal and the speed of the vehicle.

When driving, bear the stopping distance in mind. Maintain a speed and headway distance that allow you to stop safely even if a hazard occurs.

Overriding Accelerator with Brakes

In the unlikely event the accelerator pedal becomes stuck, apply the brakes firmly and steadily to reduce engine power and bring your vehicle to a safe stop. Turn the engine off, move the selector lever to the “P” (only models with P-range) or “N” (Neutral) position, and apply the parking brake. In a safe location, inspect the accelerator pedal for any interference and remove the item causing the interference, if any is found. If none is found and the condition persists, have your vehicle towed.

Braking Techniques

For the most effective braking and for maximum life from brake system components, follow these suggestions when possible:

- Apply the brakes gradually as road and load conditions permit. Reduce pedal pressure as speed drops so that a very light pressure is used at the end of the stop.
- To get maximum braking while maintaining vehicle control, use a "squeeze" braking technique. Do this by pushing on the brake pedal with steadily increasing pressure. If possible, steer around obstacles when there is not enough room to stop.

Brake System Warning Light

Refer to *Warning Lights, Gauges, and Indicators* ⇨ *51*.

When the Brakes Do Not Work

⚠ Warning

It is very dangerous to suddenly apply the parking brake while moving at high speed. Reduce speed first by shifting down and then apply the parking brake lever.

You and others could be seriously injured.

The exhaust brake should be turned on as soon as service brake malfunction is detected. This will slow the engine speed. With the engine speed under control and providing the grade conditions permit, the transmission can be progressively downshifted using the exhaust brake in each gear. Eventually the exhaust brake should slow the vehicle to a controllable “crawl.” Apply the parking brake lever while firmly holding on to the steering wheel. Stop the vehicle on the side of the road. The vehicle should not be driven further until corrective measures are taken.

See *Exhaust Brake* ⇨ *168* and *Parking Brake* ⇨ *166*.

Riding the Brake

⚠ Warning

"Riding the brake" by resting your foot on the pedal, when you do not intend to brake, can overheat the brakes and wear out the brake linings faster. This may also damage the brakes and will waste fuel. It can also result in reduced braking performance.

You and others could be seriously injured.

Applying the Parking Brake

Except in an emergency, do not apply the parking brake until the vehicle has come to a complete stop. Applying the parking brake before the vehicle has stopped can cause a breakdown.

Refer to *Parking Brake* ⇨ *166*.

Parking Safely on a Slope

Whenever possible, avoid parking your vehicle on a slope and choose a level and flat place. If you must park your vehicle on a slope, be sure to set the parking brake fully. Make sure that the vehicle does not move, and block the wheels with chocks for added safety. If the vehicle is equipped with a selector lever with P-range, shift the selector lever into the "P" position to further ensure that it will not move. Leave the steering wheel turned such that the vehicle will be stopped by an obstruction (for example, the curb) in the unlikely event that it moves.

Stopping and Parking with the Engine Running

⚠ Warning

When parking with the engine running, first come to a complete stop, firmly apply the parking brake, then move the selector lever to the "P" position (models with P-range) or "N" position (models without P-range). Unless you take these steps, any unintended pressure on the accelerator pedal could cause a crash.

To reduce the chance of personal injury and/or vehicle damage due to engine overheating, never leave the engine idling without an alert driver present. If the engine should overheat, as indicated by the engine coolant temperature gauge, immediate action is required to correct

(Continued)

Warning (Continued)

the condition. Continued operation of the engine, even for a short time, may result in a fire. Do not engage the exhaust brake while the engine is idling as this may cause engine overheating.

The diesel particulate filter (DPF) may automatically start regeneration when the vehicle is stopped and parked with the engine running. To prevent a fire, make sure there is no flammable material near the muffler, DPF, and exhaust pipe. Be careful not to get burned by hot exhaust gases.

You and others could be seriously injured.

Do Not Forget to Release the Parking Brake

Pulling away with the parking brake still applied can damage the brake system.

Before pulling away, make sure the parking brake is not set by checking that the parking brake indicator light is not on.

Be Sure to Have the Engine Running When the Vehicle is Moving

⚠ Warning

When the engine is not running, the power steering system does not work so the steering wheel is hard to turn. If you coast down a slope without the engine running, you would not be able to properly control the vehicle and could crash.

Parking, or Leaving Driver's Seat

⚠ Danger

It can be dangerous to get out of your vehicle if the selector lever is not fully in "P" (only models with P-range) or the parking brake is not applied all the way. Your vehicle can roll or move suddenly.

To be sure your vehicle will not move, even when you are parking on level ground, follow the steps below. If you have to park on a hill, also turn your front wheels so the vehicle will roll away from traffic.

You and others could be seriously injured or killed.

1. Hold the regular brake pedal down with your right foot and apply the parking brake all the way before shifting the transmission. Follow the Parking Brake instructions in this manual for your vehicle.
2. If the vehicle is equipped with a selector lever with P-range, hold in the button on the selector lever and push the lever all the way toward the front of the vehicle to move the lever to "P" (Park). If the vehicle is equipped with a selector lever without P-range, move the selector lever into “N” (Neutral).
3. Turn the key to "LOCK".
4. Remove the key and take it with you.
5. Before leaving the driver's seat, be sure the vehicle is not moving. If the vehicle is equipped with a selector lever with P-range, confirm the vehicle is in “P” (Park) by pulling the selector lever toward you without pushing the button. If you can do this, it means that the selector lever was not fully locked into "P" (Park).

Driving Down a Long Slope

When driving down a long slope, use the exhaust brake together with the foot brakes. Using the exhaust brake and low-gears reduces the work load on the foot brakes and yields greater braking force. Even so, use the foot brakes appropriately to prevent the engine over-revving.

Frequent use of the foot brakes can cause brake fade, resulting in reduced brake effectiveness.

Brake Fade: Frequent use of the brakes can cause the brakes to overheat so that the frictional force of the brake linings decreases and the brakes become less effective than normal. This phenomenon is called brake fade.

Even so, you should be very careful when using engine braking in a low gear because the engine is likely to over-rev. See *Exhaust Brake* ⇨ *168* and *Selector Lever* ⇨ *160*.

Do not adjust the exhaust brake valve.

The engine should never be allowed to exceed the governed speed. Supplement the exhaust brake with vehicle service brakes intermittently and/or shift to higher transmission gear to prevent engine overspeed. A rule of thumb for gear selection is that the vehicle should be driven down a grade in the same gear that would be used to climb that grade.

⚠ Warning

To reduce the risk of personal injury, before going down a steep or long grade, reduce speed, turn on the exhaust brake and shift the transmission to the next lower gear. This will help control your speed. 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 get hot and not to work as well. As a result, the truck will not slow down at the usual rate. Failure to take these steps could result in loss of vehicle control.

You and others could be seriously injured.

Brake Effectiveness When the Vehicle Has Been Driven on a Flooded Road or Washed

⚠ Warning

When the vehicle is driven on a flooded road, parked on a flooded road or washed, water can get into the brakes and reduce their effectiveness. If the brakes do not work well afterward, drive slowly and

(Continued)

Warning (Continued)

gently press the brake pedal several times until the brakes dry out and start working normally. Always do this after driving through water or washing the vehicle to help reduce the risk of personal injury. Before parking the vehicle in winter, press the brake pedal several times in the same way to get rid of moisture in the brakes. Otherwise, the moisture in the brakes may freeze and make the vehicle immovable.

You and others could be seriously injured.

If the vehicle must be driven on a flooded road or is parked in an area that becomes flooded, promptly perform a check for the following points:

- Effectiveness of the brakes
- Water-ingress or damage to drum brakes, disc brakes
- Engine damage due to water-ingress
- Shorting of electrical components
- Oil level and degradation (cloudiness) of the engine, transmission, differential
- Greasing of each components (lubrication)

Steering

Do Not Leave the Steering Wheel Fully Turned for a Long Time

⚠ Warning

If you leave the steering wheel fully turned for a long time while the engine is running, the oil in the power steering oil pump will become extremely hot. This would cause poor lubrication, oil tank damage and seal deterioration, leading to power steering oil pump damage, power steering unit damage and power steering hose damage. As a result the steering wheel could become extremely hard to turn and a fire or a crash could occur.

You and others could be seriously injured.

Steering Wheel

If the steering parts have excess play or looseness or if any abnormal condition is noted, have the steering system checked immediately.

Driving on Wet Roads

Driving on Slippery Surface or Driving in Bad Weather (Rain, Icy Roads, Snowy Roads, etc.)

In bad weather, visibility is reduced and slippery road surfaces increase stopping distances. Drive more slowly than you would in good weather. Also, avoid sharp turns of the steering wheel and hard braking when possible. Use engine braking together with the foot brakes to decelerate. Using the exhaust brake on a slippery road surface could cause the tires to slip.

You may not realize the surface is slippery until the vehicle is skidding. Learn to recognize warning clues—such as enough water or ice on the road to make a "mirrored surface"—and slow down when there is any doubt.

There is a risk of hydroplaning, particularly where water tends to collect on the road surface. Drive at speeds that allow you to stay in complete control.

If you cannot avoid driving on a flooded road, first check the depth of the water and then drive through the water at a slow, constant speed. There is a risk that water will get into the engine's cylinders and cause engine damage (water hammering). Keep your speed down, and drive with great care.

Hydroplaning: If a vehicle is driven at high speed on a road that is covered with water, a layer of water can form between the tires and road surface, causing the tires to lose their grip and slide across the water. This phenomenon is called hydroplaning. It is dangerous because while the vehicle is hydroplaning, the steering wheel and brakes are ineffective.

Refer to *Wheels and Tires* ⇨ *229*.

Hill and Mountain Roads

Narrow or Congested Roads

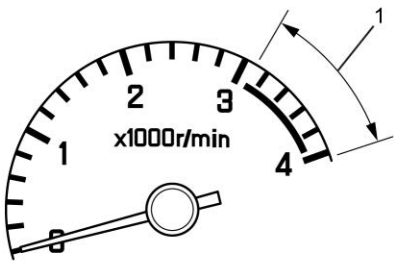
When passing or overtaking a vehicle on a narrow mountain road or on a narrow or congested urban road, pay careful attention to obstacles on either side and to the condition of the shoulder of the road.

When turning, the rear wheels will follow tighter curves than the front wheels. Use the mirrors to confirm safety.

Driving Uphill or Downhill

Downshifts are performed for two main purposes:

- For engine braking on a steep and/or long downward slope
- For responsiveness and economy on an uphill slope



1. Red Zone

Drive at a speed that does not cause the tachometer needle to enter the red zone.

Uphill

Shift down well ahead of time in order to avoid a heavy load to the engine.

Downhill

- Be careful not to drive too fast on a downhill road.
- Use the same gear(s) that you used to drive up the hill. Also, use the exhaust brake in order to avoid going too fast.
- Do not let the engine overrun.
- When going down on a steep slope, avoid driving the vehicle backward as much as possible. Drive it forward slowly on the down slope.
- Compared with forward movement, the braking distance of backward movement is longer, and the steering response of that is worse.
- If you must drive the vehicle backward, drive it very carefully and gradually by moving and stopping repeatedly in order to stop it any time.

Engine Brake: Engine brake is the braking effect that occurs when you release the accelerator pedal while driving. The lower the gear, the stronger the engine brake.

Exhaust Brake: The exhaust brake is a system that closes the exhaust pipe and uses the force of the exhaust emissions to enhance the effectiveness of engine brake.

Overrunning: An engine overrun is an engine-speed increase that causes the tachometer needle to enter the red zone. It is dangerous because it can cause engine failure.

Winter Driving

Caution
To avoid damage to the wheels and brake components, always clear snow and ice from inside the wheels and underneath the vehicle before driving.

Recommendations for Driving in Cold Regions

The following recommendations apply to snowbound regions and to mountainous regions, ski resorts and other areas of extreme cold and/or snowfall. Please follow them also for reference in winter in other regions.

For the sake of your vehicle, make the winter preparations described in the links below. Also have these preparations made before driving to a cold region.

See *Engine Oil* ⇨ *189*.

See *Engine Coolant* ⇨ *195*.

See *Washer Fluid* ⇨ *201*.

See *Battery - North America* ⇨ *206*.

When Ice Prevents You from Putting Your Key in the Door or Opening the Door

If you try to force the key into the door, you could bend it. And if you try to pull the door open with undue force, the rubber seal around the door could come unstuck or become damaged. Use warm water to melt the ice, then quickly wipe it away and open the door.

If the wipers, electric door mirrors, or power windows freeze up, also use warm water to melt the ice and then operate the system. Otherwise, you could damage the mechanism and drain the battery. After that, wipe the water away.

Before Driving in Cold Regions

Getting In and Out of the Vehicle

The step can get icy in cold regions. Be careful not to slip when getting in and out of the vehicle.

Before Sitting in the Driver's Seat

Remove snow and ice from your shoes when getting into the vehicle. If you try to drive with snow on your shoes, your shoes would slip on the pedals and you would not be able to press the pedals properly, meaning that your driving would be inconsistent. Also, the cabin could become more humid, causing the glass to fog up.

Check Fuel Level

Fuel consumption increases when tire chains are used. Determine how much fuel you need to reach your destination and fill up the tank in advance.

Removing Snow from Glass and Underbody

Do not use a sharp implement to remove snow. Sharp edges could damage rubber parts.

To maintain an adequate field of view, use a plastic scraper to remove snow and frost from the glass surfaces. By using a plastic scraper, you can remove the snow and frost without scratching the glass. In addition, check whether the wiper blades are frozen onto the glass.

Also, look under the vehicle and remove any lumps of ice that are stuck to the underbody. Be careful not to damage components.

Driving on Snowy or Frozen Roads

On slippery roads, whenever possible, do not accelerate rapidly, brake hard, decelerate rapidly or make sharp turns of the steering wheel.

There is a risk of reduced grip between the tires and road surface and of increased braking distances. The danger of icy road surfaces is particularly great on bridges, in shady places and where there are puddles.

Keep your speed down and be sure to use tire chains or winter tires on snowy or frozen road surfaces.

Use engine brakes together with the foot brakes to decelerate. Using the exhaust brake on a slippery road surface could cause the tires to slip.

Pay Attention to the Way the Steering Wheel Turns and Feels

On snowy roads, water and snow splashed up by the tires can freeze and accumulate inside the fenders, making the steering wheel hard to turn. From time to time, get out of the vehicle and remove any accumulated snow.

Check the Brakes from Time to Time

When the vehicle is driven or parked on a snowy surface, ice can form on the brakes, decreasing their effectiveness. From time to time while you are driving, press the brake pedal lightly and check the effectiveness of the brakes. Pay attention to vehicles both ahead of and behind you when checking the brakes in this way.

Also, check the effectiveness of the brakes as soon as possible when starting to drive the vehicle after it has been parked. If the brakes do not work well, drive slowly and gently press the brake pedal several times until the brakes dry out and start working normally.

Parking in Cold Regions

When snow collects around the wheels and the lights, try to remove it before night falls.

Do not apply the parking brake in extremely cold weather, such as in temperatures or at below 0°C (32°F). If you leave the parking brake applied, the wires and brake shoes could freeze up, making it impossible for you to release the parking brake.

Be sure to put chocks against the tires.

Whenever possible, park in a garage to help prevent parts from freezing up and to help make the engine easy to start.

⚠ Warning

If you park in a place where there is a lot of snowfall, snow accumulating around the vehicle could limit ventilation. Running the engine with the vehicle in these conditions could cause exhaust gases to enter the cabin, resulting in carbon monoxide poisoning. Take preventive action by, for example, clearing the snow around the vehicle.

You and others could be seriously injured.

Do not park under trees or under the eaves of a building. Chunks of ice could fall on the vehicle if you park in such a place.

Cleaning the Vehicle after Driving on Snowy Roads

- The vehicle speed sensors are fitted on the wheels. When removing snow, ice, and other incrustation, take great care not to damage the components.
- Do not use a sharp implement to remove snow. Sharp edges could damage rubber parts. Refer to *Antilock Brake System (ABS)* ⇨ *163*.

Remove snow that has stuck to the inside of the fenders and to the brake hoses. Otherwise, it may damage components. After driving on a salted road, wash the underside of the vehicle as soon as possible to prevent the salt from causing rust. Spraying water under high pressure is an effective way to get the salt off.

After washing the vehicle, wipe the door openings dry.

If the Vehicle Is Stuck

When Driving on Bad Roads

Freeing the Vehicle from Sand, Mud, Snow and Ice

If your vehicle gets stuck in sand, mud, snow or ice, move the selector lever from "Second" to "Reverse". Apply a light pressure to the accelerator pedal while the transmission is in gear. Remove your foot from the accelerator and press the brake pedal while shifting. Do not race the engine. For best traction, avoid spinning the wheels.

When you cannot avoid driving through deep mud, using tire chains is an effective way to avoid getting stuck.

Preventing Damage

Caution

Do not spin wheels faster than 32 km/h (20 mph). Damage may result from excessive wheel spinning, including tire, transmission, and/or rear axle malfunction.

- Do not allow wheels to spin freely in mud, sand, snow, ice or other poor road conditions. This free spinning will damage the rear axle.
- When driving in sand or mud, avoid hard braking, sudden acceleration, and sharp turns of the steering wheel except in emergency situations. Such actions could get the vehicle stuck and make it difficult to get out.
- After driving through deep mud: any mud stuck to the vehicle can harm the steering, brakes and powertrain. Wash the vehicle and remove all mud and other incrustation. Refer to *Exterior Care* ⇨ *246*.
- The vehicle speed sensors are fitted on the wheels. When removing mud and other incrustation, take great care not to damage the components. Refer to *Antilock Brake System (ABS)* ⇨ *163*.
- Do not use a sharp implement to remove mud. Sharp edges could damage rubber parts.

Emergencies (Troubleshooting)

Troubleshooting

Performing regular inspections and maintenance prevents damage. Be sure to perform inspections and maintenance at regular intervals. Also, quickly rectify any fault in the vehicle (even a small fault) to prevent it from becoming more serious. If a symptom shown in the following table occurs, perform inspections and take corrective action in accordance with the table. If you are unable to perform a repair, the corrective action shown in the table does not eliminate a symptom or you cannot locate a fault, contact the nearest dealer.

Any item for which there is a ◎ in the "Corrective Action" column requires repairs and adjustments. Contact the nearest dealer.

Symptom		Cause	Corrective Action	Reference
Engine does not start	Starter does not turn over, or weak	Discharged batteries	Recharge or replace	See *Battery - North America* ⇨ *206*
		Battery terminals detached, loose, or corroded	After repairing corroded section, connect the terminals firmly	—
		Starter ground wire terminal detached, loose, or corroded	After repairing corroded section, connect the terminals firmly	—
		Engine oil viscosity too high	Change to an oil with proper viscosity	See *Engine Oil* ⇨ *189*
		Starter or electrical system is faulty	◎	—
Engine does not start	Starter turns over	No fuel	Make sure there are no fuel leaks, and then add fuel	—
		Air in the fuel system	Bleed fuel system	See *Running Out of Fuel* ⇨ *176*
		Fuel filter clogged	◎	—
		Fuel is frozen	Warm fuel pipe with hot water or wait until it gets warmer	—
		Preheating system is faulty	◎	—

Symptom	Cause	Corrective Action	Reference
Engine starts, but immediately stops	Idling speed too low	◎	—
	Fuel filter is clogged	◎	—
	Air cleaner is clogged	◎	—
Unsteady engine speed	There is water or air in the fuel system	Drain water from fuel filter or bleed the system	See *Running Out of Fuel* ⇨ *176* or *Water in Fuel* ⇨ *173*
	Fuel system is faulty	◎	—
White exhaust smoke	Engine not sufficiently warming up	Allow the engine to warm up	—
	Too much engine oil	Correct the oil level	See *Engine Oil* ⇨ *189*
	Engine Control system faulty	◎	—
	Fuel system faulty	◎	—
	Continuous idling for a long period (more than two hours)	With the vehicle stationary in a place where it will not obstruct traffic, hold down the accelerator pedal and check that white smoke is not emitted	—

Symptom	Cause	Corrective Action	Reference
Black exhaust smoke	Engine Control system faulty	◎	—
	Air cleaner clogged	◎	—
	Fuel system faulty	◎	—
	Exhaust system clogged	◎	—
	Diesel particulate filter (DPF) faulty	◎	—

Symptom	Cause	Corrective Action	Reference
Engine is overheating	No engine coolant	Add engine coolant	See *Engine Coolant* ⇨ *195*
	Front of radiator is clogged with dirt	Wash clean with tap water	See *Exterior Care* ⇨ *246*
	Sub tank pressure cap not sufficiently tightened	Make sure it is firmly tightened or replace the sub tank pressure cap	—
	Fan belt loose	Adjust the tension or replace the belt	See *Engine Drive Belt Routing* ⇨ *292*
	Engine coolant dirty	◎	—
	Fan clutch faulty	◎	—
	Sub tank pressure cap dirty or faulty	Clean or replace	—

Symptom	Cause	Corrective Action	Reference
Oil pressure is low	Improper engine oil viscosity	Change to an oil with proper viscosity	See *Engine Oil* ⇨ *189*
	Engine oil level too low	Add engine oil	See *Engine Oil* ⇨ *189*
	Engine inner components faulty	◎	—
	Meter, indicator/warning lights, or switches faulty	◎	—
Air pressure is low	Air compressor faulty	◎	—
	Air leaking from pipes and hoses	◎	—
	Air governor faulty	◎	—

Symptom	Cause	Corrective Action	Reference
Not enough engine power	Parking brake not fully released	Make sure it is fully released	—
	Brake dragging	◎	—
	Air cleaner clogged	◎	—
	Fuel filter clogged	◎	—
	Engine control system faulty	◎	—
	Engine faulty	◎	—
	DPF clogged	◎	—
Brakes not effective	Drum-to-lining gap too large	◎	—
	Low air pressure	Raise engine speed to supply air	—
	Brake system failure	◎	—
	Brake slack adjuster stroke too long	Make sure automatic slack adjuster is functioning	See “Brakes” in the *Maintenance Schedule* ⇨ *255*

Symptom	Cause	Corrective Action	Reference
Uneven braking	Unbalanced air pressure in tires	Adjust to proper air pressure	See *Wheels and Tires* ⇨ *229*
	Tire unevenly worn	Replace tire	See *Wheels and Tires* ⇨ *229*
	Drum brakes out of adjustment	◎	—
	Poor wheel alignment	◎	—
Exhaust brake not working	Electrical system faulty	◎	—
Steering wheel hard to turn	Loaded too far forward	Load properly	—
	Power steering fluid level too low	Add fluid	See *Power Steering Fluid* ⇨ *201*
	Insufficient air in front tires	Adjust to proper inflation pressure	See *Wheels and Tires* ⇨ *229*
Excessive play in the steering wheel	Wheel studs and nuts loose	Tighten to the specified torque	See *Wheels and Tires* ⇨ *229*
	Unbalanced inflation pressure in the tires	Adjust to proper inflation pressure	See *Wheels and Tires* ⇨ *229*
	Unbalanced tires	◎	—
	Excessive steering wheel free play	◎	—

Symptom		Cause	Corrective Action	Reference
Poor steering wheel return		Poor lubrication in the steering mechanisms	Lubricate the mechanism	—
		Poor wheel alignment	◎	—
Loud or abnormal noises	From the transmission	Insufficient transmission oil	Add oil	See *Automatic Transmission Fluid* ⇨ *194*
		Transmission inner components faulty	◎	—
	From differential	Insufficient differential gear oil	Add oil	See *Rear Axle (Gear Oil Viscosity Chart)* ⇨ *207 Rear Axle (Oil Level Check)* ⇨ *208*
		Differential inner components faulty	◎	—
	From the suspension	Spring pins, shackles, or stoppers worn	◎	—
	From the driveshaft	Poor lubrication in each component	Lubricate them	See *Owner Checks and Services* ⇨ *270*
		Splines or bearings worn	◎	—

Emergencies (Disabled Vehicle)

When the Vehicle Breaks Down

When the Engine is Shut Down While Driving

If the engine cannot be started, promptly have the vehicle inspected and repaired.

If the engine is shut down because the vehicle ran out of fuel while driving, refueling alone will not be enough to restart the engine. Bleed the fuel system after refueling the vehicle.

Caution

If the engine shuts down while driving, immediately find a safe place to stop with the following in mind:

- The power steering system will stop working but the vehicle can still be steered. However, greater effort will be required to turn the steering wheel, especially in sharp turns and at low speeds.

When the Fuel Tank is Empty

See *Running Out of Fuel* ⇨ *176*.

When the Engine Stalls and Cannot Be Restarted

Move the selector lever to the "N" position and push the vehicle to a safe place.

⚠ Warning

Vehicle operations will change, so stop the vehicle in a safe place with the following in mind.

The power steering system will not work so the steering wheel will be hard to turn. It will require more strength than during normal operation.

If the power assist steering system goes out because the engine has been shut down or the assist system has malfunctioned, the vehicle can still be steered. However, much greater effort is needed, especially in sharp turns or at low speeds.

You and others could be seriously injured.

When the Vehicle Breaks Down During Driving

1. Use the hazard warning flasher any time to warn other drivers, day or night, and pull the vehicle immediately over to a safe place that does not impede traffic (shoulder). Place triangle reflectors to alert other traffic to the presence of your vehicle.
2. If the vehicle can be exited safely, have the other passengers get out and wait in a safe place.
3. If the vehicle can be exited safely, walk to a safe place and take appropriate measures by using the closest telephone, etc.

See *Hazard Warning Flashers* ⇨ *72*.

If There is a Fuel Leak

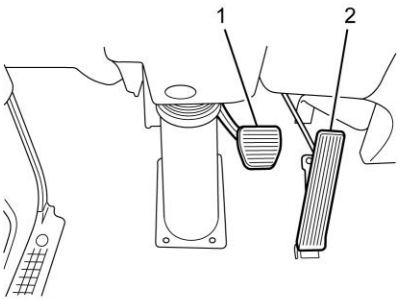
⚠ Danger

Leaking fuel from the vehicle is dangerous due to possible combustion or explosion. Shut down the engine immediately.

You and others could be seriously injured or killed.

Starting and Operating

Pedals



Sit in a correct driving position on the seat and operate the brake pedal (1) and accelerator pedal (2) with your right foot. To avoid accidentally pressing the wrong pedal, check the pedal positions and practice putting your foot on the desired pedal.

⚠ Warning

A can or bottle rolling on the floor may prevent brake pedal operation if it is caught under the pedal. This is very dangerous. A floor mat must be placed correctly. An incorrectly installed floor mat may hinder the free movement of each pedal. You and others could be seriously injured.

Ignition Positions

Engine Control Switch

⚠ Warning

While driving, never turn the engine control switch to the LOCK position. The key could be removed from the switch, which then locks the steering wheel. This is extremely dangerous.

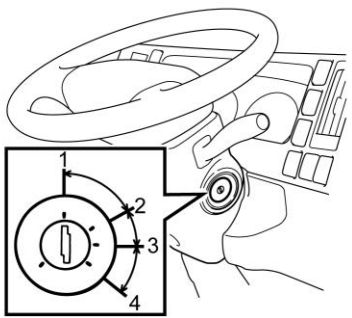
You and others could be seriously injured.

Caution

After starting the engine, do not turn the engine control switch to the START position. Otherwise, the starter motor may be damaged.

Using electrical devices such as the audio system for an extended time period with the engine stopped can completely discharge the battery.

The starting circuit, engine alarm circuits and accessory circuits are all controlled by the engine control switch.



1 LOCK: Lock is in the position fully counterclockwise. In this position, the key can be inserted or removed. To place the engine control switch in the LOCK position, press and hold the key in the ACC position and then turn it to the LOCK position. If you will leave the vehicle, remove the key and turn the steering wheel until it locks. The steering wheel will be locked to help prevent theft.

2 ACC: Accessory is in the first position clockwise. In this position, the audio and other accessories can be used with the engine stopped.

3 ON: This ON position is in the second position clockwise. The key stays in this position while the engine is running. Engine control, warning circuits, gauge circuits, and accessory circuits are energized.

The engine cylinder heater or grid heater is also turned on when the switch is in the ON position. The wait to start indicator light will come on and stay on until the grid heater is heated enough. When this light goes off, turn the switch to the START position.

4 START: Start is in the position furthest clockwise. The engine is started in this position. Turn the key against spring pressure to energize the starter. When key is released, spring pressure returns it to the ON position. Release the key as soon as the engine has started.

If the key cannot be turned from the LOCK position to the ON position, lightly move the steering wheel clockwise and counterclockwise while trying to turn the key.

Starting and Stopping the Vehicle

Check around the Vehicle before Starting the Engine

Proper care and operation will not only extend the service life of your vehicle but also improve fuel economy.

Before pulling away, perform a thorough safety check, making sure there are no children or obstructions around the vehicle. Take off the chocks after confirming that the parking brake is securely applied.

Sit behind the wheel, adjust the seat position, and buckle up the seat belt. The passengers are also required to buckle up the seat belts.

Adjust the positions of the steering wheel and mirrors. Lock the doors. Turn the power of the dome light or accessories OFF before starting the engine. See *Seat Position* ⇨ *23*, *Seat Belts* ⇨ *27*, *Steering Wheel Adjustment* ⇨ *47*, and *Mirrors* ⇨ *18*.

Keep the Floor Around the Driver's Seat Clean and Tidy

⚠ Warning

It is extremely dangerous to have empty cans, empty bottles or other items rolling around on the floor because they could get trapped under the brake pedal and prevent brake application. For proper pedal operation, it is also essential to lay floor mats properly. Incorrectly installed floor mats would hinder free movement of the pedals.

Do not use the dashboard pocket or the top of the dashboard as a place to put items that could roll, which could interfere with your driving. You and others could be seriously injured.

Choose Your Footwear Suitable for Driving

⚠ Warning

Choose footwear that ensures proper operation of pedals when driving the vehicle. Use of footwear unsuitable for driving may cause an accident.

Starting the Engine

Do not keep the engine control switch in the START position for more than about 10 seconds. Operating the starter for too long might cause starter and battery failure or may result in overheating.

When the engine does not start, wait for 20 to 30 seconds and then turn the engine control switch again.

If your vehicle is equipped with a selector lever with P-range, before starting the engine, sit in the driver's seat, check that parking brake is engaged, the selector lever is in the "P" or "N" ("P" is preferred) position and the shift indicator also shows "P" or "N", and firmly press the brake pedal to start the engine.

If your vehicle is equipped with a selector lever without P-range, before starting the engine, sit in the driver's seat, check that parking brake is engaged, the selector lever is in the "N" position and the shift indicator also shows "N", and firmly press the brake pedal to start the engine.

For models with P-range, start the engine with the selector lever in the "P" position when stopped on a slope.

When stopped on a slope, start the engine with the selector lever in the P position. See *Ignition Positions* ⇨ *123*.

1. Make sure that the selector lever is in the "P" (only models with P-range) or "N" position and firmly press the brake pedal.

2. When the engine control switch is turned to the ON position, the wait to start light comes on and then goes out between 1 and 30 seconds later depending on whether the engine is warm or cold.
3. After confirming that the wait to start light has gone out, turn the engine control switch to the START position to start the engine. Release the engine control switch as soon as the engine starts.
4. Do not crank the engine for more than 10 seconds at a time. If the engine does not start, wait 20 to 30 seconds with the engine control switch in the LOCK or ACC position before trying to start again.

After the engine has started, check to be sure the selector lever is still in the "P" position (models with P-range) or "N" position (models without P-range).

This engine has an automatic warm-up system that increases engine idle speed and applies the exhaust brake. Allow sufficient time to let the engine circulate lubricant oil before driving. This usually requires 30 seconds to 2 minutes depending on ambient conditions.

The turbocharged engine should be started in a way which ensures the bearings supporting the rotating parts of the turbocharger are sufficiently lubricated. Do not race a cold engine.

At low ambient temperatures, a cold engine may emit more smoke than usual.

Do not drive the truck until the engine has had sufficient time to circulate the lubricant oil. This usually requires 30 seconds to 2 minutes depending on ambient conditions. This will help reduce white start-up smoke.

Preheating: Diesel engines are compression ignited, which makes them difficult to start when they are cold because the compression alone cannot create a temperature high enough for fuel to ignite.

Preheating means warming the compressed air inside the combustion chambers to facilitate engine starting. Be sure to start the engine after the wait-to-start light has gone out.

Start: Do not press the accelerator pedal at the engine start. The accelerator opening degree at the engine start is electronically controlled.

Warm-up: Do not race the engine to speed warm-up.

Cold Weather Starting

If you plan ahead for cold weather, starting and driving your vehicle should be no problem. The following tips will help ensure good starting in cold weather.

Oil gets thicker as it gets colder, which slows down the engine cranking speed. For diesel vehicles, the diesel engine functions by the heat of compression (and grid heater when cold), rather than through the use of spark plugs as in a gasoline engine. So, your engine must crank faster than a gasoline engine before it will start.

To be sure the engine can turn fast enough to start, use SAE 10W-40 viscosity engine oil when prevailing temperatures drop below 0 °C (32 °F). See the oil quality and oil viscosity recommendations. Using the proper viscosity oil will make starting easier down to -23 °C (-10 °F). When prevailing temperatures drop below -23 °C (-10 °F), the optional engine block heater may be needed for starting.

Maintenance Items to Aid Cold Weather Starting

Since the basic principle of diesel engine ignition is based on compression, the diesel engine is somewhat harder to start than a gasoline engine when the temperature is below freezing.

To help prevent hard starting problems, special attention should be given to following normal maintenance items:

1. Neglecting to have the fuel filter and water separator serviced can be one of the major contributors to hard starting. If water is permitted to accumulate in the primary filter, it will freeze and make starting the engine impossible.
2. Make sure the fuel tank vent is open.
3. Always refuel at the end of a day's operation. Moisture will condense in an empty tank; therefore, the tank should be filled before leaving the vehicle standing for an extended period.

Do not use starting aids in the air intake system. Such aids can cause immediate engine damage. See *Fuel for Diesel Engines* ⇨ *172*.

Stopping the Engine

When stopping the diesel engine, take the following steps:

1. Bring the vehicle to a complete stop.
2. Firmly apply the parking brake.
3. Move the selector lever to the "P" position (models with P-range) or "N" position (models without P-range) and make sure that the shift indicator shows "P" (models with P-range) or "N" (models without P-range).
4. Allow the engine to idle for approximately 3 minutes.
5. Turn the engine control switch to the ACC or LOCK position.

Do not shut down the engine immediately after driving the vehicle. Otherwise, a seizure or other failures may result.

To prevent the battery from going dead, turn the engine control switch to the ACC or LOCK position after stopping the engine. If you leave the vehicle for an extended period of time, place the engine control switch in the LOCK position.

Let the engine idle for 3 minutes before shutting off the engine. This allows the turbocharger to slow down while keeping the bearings lubricated.

If the Vehicle Has Not Been Used for a Long Period

If a diesel vehicle has been standing for an extended period of time, the turbocharger bearings should be pre-lubricated prior to starting. See your authorized dealer for more detailed information.

Before using a vehicle that has not been driven for a long period, check the engine and transmission for oil leakage, and make sure the oil is at the required levels. If there is insufficient oil, it will not adequately reach and lubricate components, and a breakdown will result.

Start the engine and allow it to idle for at least five minutes. Check for abnormal noises.

For instructions on warming up the engine, refer to “Starting the Engine” previously in this section.

If 1 year has passed since the diesel exhaust fluid (DEF) in the DEF tank was added, the DEF in the tank should be replaced. Be careful not to inhale the ammonia odor when replacing the DEF. Also, please contact your nearest dealer about the replacement work.

Operating Temperature

Recommendations for Warming Up the Engine

The engine is sufficiently warmed up when the needle of the engine coolant temperature gauge starts to move.

Do not race the engine or quickly accelerate before the engine has sufficiently warmed up. Oil would not have adequately reached and lubricated components, and a breakdown may result.

The exhaust pipe becomes extremely hot while the engine is idling. Before warming up the engine, make sure there is no flammable material, such as grass, waste paper, oil, or old tires on or near the DPF or exhaust system.

Engine Warm-up System

During cold ambient conditions, the automatic engine warm-up system operates to reduce engine warm-up time during idling.

Automatic Engine Warm-up: This feature will increase the idle speed of the engine in cold ambient conditions so the engine is warmed more quickly. When the idle speed is increased, the engine noise may change. This is normal. Warm-up is cancelled when the accelerator pedal is depressed, and resumed when the pedal is released.

Winter Cover

- Do not cover the front of the radiator with newspapers, cardboard or any other flammable material to raise the engine coolant temperature.
- If you allow the engine to warm up but the engine coolant temperature does not rise, have the nearest dealer inspect the thermostat.

Radiator Grille Covers

⚠ Warning

Radiator shutters, winter fronts, or grille covers are not to be used and may cause the engine's radiator cooling fan to fatigue

(Continued)

Warning (Continued)

from the alternate unloading and loading of the blades as they pass by the masked area followed by the unmasked area. After the fan has been fatigued, it may suddenly break apart while rotating, possibly causing personal injury to anyone standing nearby, and equipment damage. You and others could be seriously injured.

Engine Heater

Engine Block and Oil Pan Heater

If the vehicle is parked in a garage, the block and pan heaters should not be needed until the garage temperature drops below −23°C (−10°F) regardless of outside temperature.

The engine block and oil pan heaters are designed to warm the block and oil pan areas that will let the engine run faster. To use the heaters:

1. On single cab vehicles, tilt the cab. See *Cab Tilting* ⇨ *182*.
2. Unwrap the electrical cord and remove the protective cap.
3. Plug the cord into any three-prong 110 volt outlet (normal household current). It may require several hours to sufficiently heat the engine. Outside temperature, oil viscosity, etc., will affect how long the block and oil pan heater should remain plugged in. Contact your dealer for the conditions in your area.
4. After using the heater(s), be sure to restore the cord properly, to help keep it away from moving engine parts.

If the cord is too short, use a heavy duty, three-prong extension cord. Do not use an extension cord such as you would use for a lamp, because the cord may overheat.

The engine should go through a warm-up period to warm up the engine oil before placing engine under load. This will ensure proper lubrication of the engine.

Engine Alarm and Automatic Shutdown

(Red)

(Red)

(Red)

(Red)

If the optional Automatic Engine Shutdown feature is enabled, the shutdown feature will activate if the engine control module detects one of the following conditions.

- Engine overheat
- Low engine oil pressure
- Low engine coolant

The corresponding warning light will be illuminated first.

When the shutdown feature activates, the engine stop warning light will also begin to flash indicating to the driver that the engine will shutdown in 30 seconds. When this warning light begins flashing, driver should immediately find a safe place to pull over and park the vehicle.

Do not restart the engine until the cause of the problem is known, and the problem is fixed. However, if the engine shuts down when you are still in traffic, you can restart the engine and get another 30 seconds of operation. Do this only if you have to, since there is a problem that can harm the engine if it is not fixed.

See *Engine Shutdown Warning Light* ⇨ *62*.

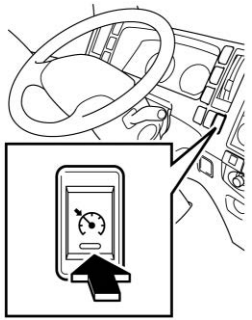
Idle Shutdown

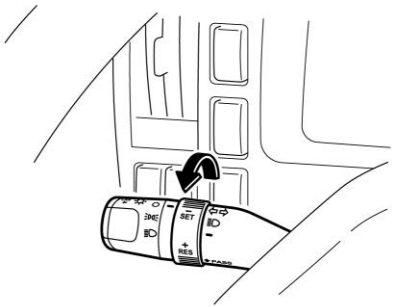
Idle Stop is a dealer programmable function which will automatically turn off the engine, at idle, when specific programmed conditions are met. See your dealer for details.

If the idling stop function does not initiate, a transmission related problem may have occurred. Please contact your dealer. (There is a Diagnostic Trouble Code (DTC) that inhibits the idling stop function when the Check Trans warning light is not illuminated).

High Idle System

Use high idle mode to increase engine idle speed to 1,200 r/min when the vehicle is stationary.





Activating High Idle Mode

Follow the below procedure to activate the high idle mode:

1. Set the parking brake.
2. Set the selector lever in P (Park) or N (Neutral) position.
3. Do not press the brake pedal.
4. Press the cruise control main switch to set it to ON. At this time, the operation indicating light will turn to green.
5. Turn and hold the cruise control set switch in the SET position. After approximately 3 seconds the cruise control set indicator light will begin to flash slowly and the engine idle will increase to 1,200 r/min.

Canceling High Idle Mode

Any of the following actions will cancel high idle mode.

- The cruise control main switch is set to OFF.
- The brake pedal is pressed.
- The parking brake is released.
- The selector lever is moved from P (Park) or N (Neutral) position.
- The accelerator pedal is pressed, accelerating the engine beyond the engine speed threshold.

The cruise set indicator light will stop flashing and the engine speed will return to normal.

When the engine control switch is turned on, the indicator light comes on for approximately 2 seconds and then goes off automatically.

The indicator light comes on when the overdrive off switch on the selector lever is turned on. Overdrive will not operate even when the automatic transmission is in the "OD" position, unless engine speed is excessive.

Engine Checks Before Operating

Checks Before Operating

Allow the engine to warm up before placing the engine under heavy load driving. While the engine is warming up under light load, the following checks should be made:

1. Observe the red engine oil pressure warning light. The light should go out when the engine is running. If it stays on, shut the engine off and find the cause.

2. Look at the engine coolant temperature gauge. If the gauge reaches the H (HOT) area, stop the engine and find the cause of the overheating.
3. Check that the battery warning light has gone out. The light should go off and stay off at normal idle speeds. If the light does not go out or comes on during normal operation, have the charging system checked.

⚠ Warning

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

Do not engage the exhaust brake while the engine is idling as this may cause engine overheating. You and others could be seriously injured.

Avoid Unnecessary Idling of the Diesel Engine

If the diesel engine idles too long, the engine coolant temperature will fall below the operating range. Low engine operating temperature causes several conditions that are harmful to engine operation and life.

Incomplete combustion of fuel in an engine that is not fully warmed-up causes crankcase dilution and forms lacquer and gummy deposits on valves, pistons, and rings. It also causes rapid accumulation of sludge within the engine.

Parking over Things That Burn

⚠ Warning

Exhaust parts and gases become very hot when the DPF is being regenerated.

Parking over flammable items could allow them to touch hot exhaust parts under your vehicle and cause them to ignite. Do not park over papers, leaves, grass or other things that can burn. Make sure there is not flammable material (for example, grass,

(Continued)

Warning (Continued)

waste paper, oil or old tires) on or near the DPF or exhaust system. You and others could be seriously injured.

Keep Flammable Material Away from the Vehicle

The exhaust pipe is extremely hot immediately after vehicle operation. Before parking, make sure the area is free of flammable material (for example, grass, falling debris like leaves, waste paper, oil or old tires). Take particular care when parking in a garage.

Use caution concerning exhaust gases while the engine is idling. For diesel vehicles, be particularly careful when the power take-off (PTO) is operating (if your vehicle is equipped with a PTO) or the DPF is regenerating while the engine is idling. See *Diesel Particulate Filter* ⇨ *137*.

⚠ Warning

It is not recommended that this vehicle be parked, idled or operated over combustible materials such as grass or leaves. They could touch the hot exhaust system and start a fire. This is particularly important if the exhaust system has not been properly maintained. Combustible materials could catch fire from hot exhaust gases, soot, or sparks that could escape through corrosion holes or cracks. You and others could be seriously injured.

If operating, parking or idling your vehicle off-road is unavoidable, such as in farming, lumbering, commercial or recreational use:

– The driver should be aware that combustible materials could catch fire from the vehicle's hot exhaust system.

– Carry a fire extinguisher with the vehicle at these times.

(Continued)

Warning (Continued)

– Avoid driving your vehicle through or over combustible materials such as leaves, grass vegetation or stubble high enough to touch, catch or collect on its hot exhaust system.

– Parking or idling should be done only in an area where there are no combustible materials under the vehicle. Failure to follow these instructions could damage your vehicle or nearby property.

Air Suspension

Vehicle Height Control System

⚠ Warning

- Firmly apply the parking brake to prevent the vehicle from moving while the vehicle height is being changed.
- Make sure that there is nothing that can caught between the cargo bed and wheels.

(Continued)

Warning (Continued)

- Changing the vehicle height while driving is very dangerous. As such, the vehicle will not allow adjustment of the height while driving
- Do not change the vehicle height on a slope. The vehicle may move down.
- For adjusting the vehicle height, be sure to rest the vehicle on a flat surface and apply chocks under the wheels.
- When the engine control switch is turned to the "LOCK" position while the vehicle height is being changed, the air suspension will maintain its current state. When the engine control switch is turned to the "ON" position and the parking brake is released, the vehicle height will return to the normal position. Pay attention to the space above the cargo bed.

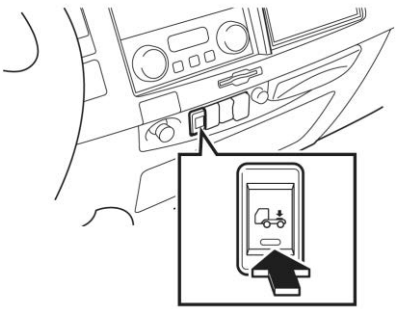
The vehicle height control system allows for the decreasing of the vehicle height by switch operation when loading/unloading cargo to improve work efficiency.

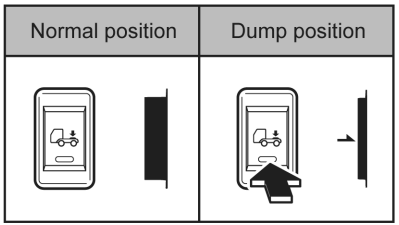
This system works when the engine control switch is placed in the "ON" position and the parking brake is applied.

When the vehicle height is changed, the system will not operate unless the air pressure (539 kPa (5.5 kgf/cm²/78 psi)) in the air tank is secured.

The vehicle height will decrease 6.35 to 8.89 cm (2.5 to 3.5 in).

Air Suspension Dump Switch





Air suspension dump warning light

When the parking brake is applied and the air suspension dump switch is pressed, the vehicle height will decrease. The air suspension dump warning light in the instrument panel inside the cab and the switch indicator light (amber) will come on at the same time.

To return the vehicle height to the normal position, press the air suspension dump switch again. The air suspension dump warning light and the switch indicator light will go out.

⚠ Warning

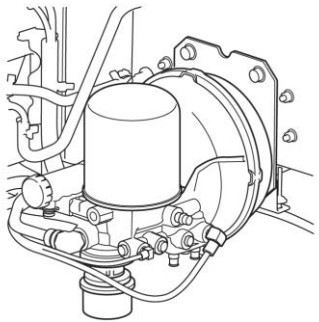
When the parking brake is applied while the air suspension dump switch is in the dump position, the vehicle height will decrease. Since it is very dangerous, be sure to check that the parking brake is applied before pressing the air suspension dump switch.

If the air pressure in the air tank decreases, changing to the dump position or the normal position may not be possible. If this occurs, start the engine to increase the air tank pressure.

When the air suspension dump switch is pressed while the parking brake is not applied, the switch indicator light will come on but the air suspension dump warning light in the instrument panel will not come on as the system has not dumped any air.

Air Suspension System Service and Maintenance

Air Dryer



Change the desiccant and the filter's rubber parts of the air dryer at the intervals specified by the Maintenance Schedule. Take care to ensure that the drain port is not blocked or obstructed by foreign material.

The air dryer removes moisture and oil that is present in the vehicle's air piping by means of an inside desiccant.

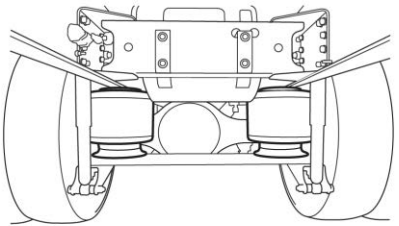
If water and oil is discharged when the drain tap on the air tank is opened for checking, the desiccant has deteriorated and needs be changed. Desiccant replacement requires disassembling of the relevant components, so you should have it done by the nearest dealer.

Air Suspension

Check the air spring bellows for cracks, loose installation and connection and damage at the intervals specified by the Maintenance Schedule. Check also the leveling valve levers and rods. Any leveling valve levers and/or rods in an abnormal condition must be replaced with new ones; have the replacement performed by the nearest dealer.

Driving with insufficient air pressure in air suspension or broken air springs is very dangerous because the vehicle height will not be stable.

Checking Air Springs



Check the air springs for any damage and for mud/sand/gravel trapped underneath. Remove mud/sand/gravel being careful not to damage the air spring. Also check each air spring for loose installation or connection and for contamination by grease splashed from the driveshaft. Wipe off any grease if present on an air spring.

Caution

- Mud/sand/gravel trapped under air springs may cause damage to air springs.
- Grease on the air spring surface causes the air spring to swell and affects its durability.

Checking for Air Leaks

Check the air piping, air tank and air springs for air leaks.

If air springs get wrinkles on their surfaces, the system may be insufficiently charged with air or leaky.

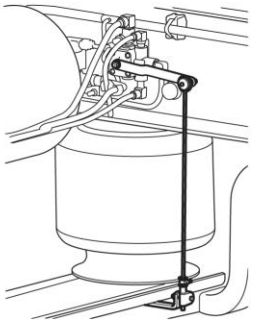
Checking Vehicle Position

Check if the cargo bed goes down once when it is loaded with cargo and then rises in a few seconds to almost the same height as it was before being loaded with the cargo.

If the height of the cargo bed fails to return to the empty height, leveling valves and/or air springs may be faulty. Please contact the nearest dealer.

The air springs may not be able to restore the original vehicle height (vehicle position) if you load the vehicle excessively or in a lopsided manner.

Leveling Valve Check



Check the lever and rod of each leveling valve. A lever and rod in any abnormal condition must be replaced with new ones. Have this replacement performed by the nearest dealer.

Engine Exhaust

Engine Exhaust Emissions Caution (Carbon Monoxide)

⚠ Warning

Do not breathe exhaust gas because it contains carbon monoxide, which by itself has no color or odor. Carbon monoxide is a dangerous gas. It can cause unconsciousness and can be lethal.

Do not keep the engine running for any length of time in a place that is poorly ventilated. It is particularly dangerous to run the engine in a garage or other indoor place that could easily fill with exhaust gases because you could suffer carbon monoxide poisoning.

Inspect the exhaust pipe from time to time. If you notice any defect (for example, a damaged joint, or a hole or crack caused by corrosion), have checks and maintenance performed by the nearest dealer. Continuing to use the vehicle without having the defect repaired would

(Continued)

Warning (Continued)

be dangerous because exhaust gases could get into the cab and cause carbon monoxide poisoning.

If at any time you think exhaust fumes are entering the cab, have the cause determined and corrected as soon as possible. If you must drive under these conditions, drive only with all windows fully open. Prevent carbon monoxide from entering the cab. The best way is to keep the engine exhaust system, cab and cab ventilation system properly maintained.

We recommend that the exhaust system and cab be inspected by a competent technician:

- Each time the vehicle has an oil change.
- Whenever a change is noticed in the sound of the exhaust system.
- Whenever the exhaust system, underbody or cab is damaged or becomes corroded.

To allow proper operation of your vehicle's ventilation system, keep the air inlet grille clear of snow, leaves or other obstructions

(Continued)

Warning (Continued)

at all times. Do not park with the engine running or idle this vehicle for more than 10 minutes with the ventilation system control switch in the OFF position. Even with the ventilation system on, running the engine while parked or stopped for longer periods of time is not recommended. Entry of carbon monoxide into the cab is possible with a poorly repaired, damaged, or corroded exhaust system or cab. Do not run the engine in confined areas (such as garages, next to a building or near another stopped vehicles with engine running) any more than needed to move the vehicle.

When the vehicle has to be stopped in an unconfined area with the engine running for any more than a few minutes, take the following steps:

- Adjust the heating or cooling system to force outside air into the cab.
- With temperature and outlet selector knob in any position:
  - Set the air selector lever to the fresh air position.

(Continued)

Warning (Continued)

- Set the fan speed control knob to the maximum speed position.
- Keep the exhaust tailpipe area clear of snow and other material to help reduce the buildup of exhaust gases under the vehicle.

This is particularly important when parked in blizzard conditions. You and others could be seriously injured.

See *Climate Control Systems* ⇨ *93* and *Maintenance Schedule* ⇨ *255*.

⚠ Warning

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.

(Continued)

Warning (Continued)

- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary. For more information go to www.P65warnings.ca.gov/diesel.

See *Battery - North America* ⇨ *206*, *Jump Starting - North America* ⇨ *241*, and *California Proposition 65 Warning* ⇨ *1*.

Running the Vehicle While Parked

Caution

To reduce the chance of personal injury and/or vehicle damage due to engine overheating, never leave the engine idling without an alert driver present. If the engine should overheat, as indicated by the engine coolant temperature gauge, immediate action is required to correct the condition. Continued operation of the engine, even for a short time, may result

(Continued)

Caution (Continued)

in a fire. Do not engage the exhaust brake while the engine is idling as this may cause engine overheating.

Avoid Unnecessary Idling of the Diesel Engine

If the engine idles too long, the engine coolant temperature will fall below the operating range. Low engine operating temperature causes several conditions that are harmful to engine operation and life. Incomplete combustion of fuel in an engine that is not fully warmed-up causes crankcase dilution and forms lacquer and gummy deposits on valves, pistons, and rings. It also causes rapid accumulation of sludge within the engine.

Diesel Particulate Filter

The DPF purifies diesel exhaust gases of particulate matter (PM). PM is filtered from the exhaust gas and collected in the DPF. When PM is collected to the predetermined level by the engine control module, the DPF automatically burns the PM in a process called regeneration.

Regeneration may not be completed under certain driving conditions. If this occurs, the warning/indicator lights will provide prompts to properly complete DPF regeneration.

Follow the prompts carefully to keep the DPF in good working order. See the Cummins owner's manual for additional details. See *Driver Information Center (DIC)* ⇨ *63*, *Recommended Fluids and Lubricants* ⇨ *278*, and *Engine Oil* ⇨ *189*.

⚠ Warning

- During regeneration, exhaust parts and gases become very hot and can reach as high as 816 °C (1,500 °F). In order to avoid being burned, do not touch the exhaust parts or DPF or get too close to the exhaust gases.
- Do not leave the vehicle during the regeneration.

(Continued)

Warning (Continued)

- Parking over flammable items could allow them to touch hot exhaust parts under your vehicle and cause them to ignite. Do not park over papers, leaves, grass or other things that can burn.
- Make sure there is no flammable material (for example, grass, waste paper, oil or old tires) on or near the DPF or exhaust system.
- Avoid parking over surfaces that could melt (such as asphalt) during manual regeneration.

This content is to restore the function of the DPF and it is not a malfunction. However, the check engine malfunction indicator light may come on and the power output may be limited if driving or power take-off (PTO) operation is continued for a long time with the DPF warning light on.

This is to prevent the DPF from being damaged. When operating PTO during parking, check to ensure that the DPF warning light does not come on.

Do not modify the DPF or exhaust pipe. Changing the alignment, length or diameter of the exhaust pipe would adversely affect the exhaust system's exhaust emission reduction function. If any modification is necessary to install a component to the rear of the vehicle, consult your dealer.

Although the DPF filter automatically undergoes regeneration (burning of the accumulated PM) when a certain amount of PM has accumulated, driving conditions can prevent completion of regeneration.

The DPF warning light will come on when regeneration cannot be completed automatically. Perform Running or Switch regeneration in accordance with the proper procedure. This is to restore DPF function and is normal.

The exhaust pipe mixes air with the exhaust gas to lower its temperature before it leaves the exhaust pipe.

The frequency of regeneration increases especially under the following environments:

- Midwinter.
- Continuous low-speed driving for long hours (The frequency of regeneration increases particularly with special equipment vehicles such as sweeper vehicles which mainly travel at low speed. The frequency of regeneration is higher as compared to delivery vehicles which mainly travel at standard high speed).

Under normal driving conditions DPF regeneration is automatic. However, you should perform the Switch regeneration procedure when the DPF warning light comes on. The DPF warning light may be displayed under the following driving conditions

- During continuous driving at or under 15 km/h (9 MPH).
- When frequent engine start and stop are performed.
- When the engine stops every time before the engine is warmed up.
- When continuous idling (over 1 hour) is frequently performed.

If the vehicle is stationary with the engine idling during DPF regeneration, the exhaust brake or exhaust throttle operates. Operating sounds will be heard when the exhaust brake or exhaust throttle is activated or deactivated. The sounds do not indicate a fault.

White smoke could be emitted briefly from the exhaust pipe in the following situations, but it is not indicating a fault.

- Combustion of PM during DPF regeneration.
- During DPF regeneration of a new vehicle which has been driven a certain distance. The vehicle may not emit white smoke during its initial operation when new.
- Long continuous idling.

The exhaust brake may automatically be activated in order to prevent emission of white smoke if the engine idles continuously over an extended period of time.

White smoke may be produced during switch regeneration; do not perform switch regeneration in any poorly ventilated indoor place.

White smoke may be produced during DPF regeneration when a new vehicle has been driven a certain distance, but this is not a malfunction. The vehicle may not emit white smoke immediately after purchase.

Automatic Regeneration of DPF

The DPF will regenerate itself as part of normal operation.

The Engine Control Module (ECM) controls this function based on several factors including hours of operation and mileage. When automatic regeneration starts, the high exhaust system temperature indicator light comes on.

During regeneration the engine idle speed will increase and the exhaust brake may activate when the vehicle is idling while stopped or parked. Regeneration is normally completed in about 20 minutes. See *Driver Information Center (DIC)* ⇨ *63*.

⚠ Warning

- Exhaust parts and gases become very hot when the DPF is being regenerated. In order to avoid being burned, do not touch the exhaust parts or DPF or get too close to the exhaust gases.
- Do not leave the vehicle during the regeneration.
- Parking over flammable items could allow them to touch hot exhaust parts under your vehicle and cause them to ignite. Do not park over papers, leaves, grass or other things that can burn.
- Make sure there is no flammable material (for example, grass, waste paper, oil or old tires) on or near the DPF or exhaust system.

The DPF performs regeneration automatically when a certain quantity of PM accumulates in the filter.

Depending upon running conditions, however, the regeneration may sometimes not be completed. In this case, the diesel particulate filter (DPF) warning light will

come on, so promptly activate DPF regeneration by performing the "Switch Regeneration Procedure".

This operation recovers the function of the DPF. It does not mean that a breakdown has occurred.

The engine speed may increase and the exhaust brake may activate while the vehicle is stopped with the engine idling. When this occurs, the DPF is automatically regenerated. This does not indicate a failure.

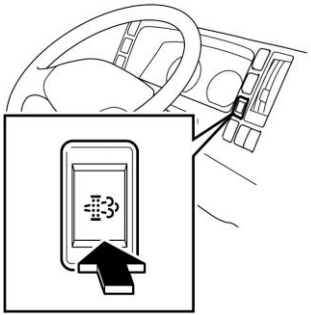
The system generates a sound during the automatic regeneration and its cancellation. This does not indicate a failure.

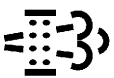
Automatic regeneration will normally occur under the following driving conditions:

- Vehicle speed is consistently above 48 km/h (30 MPH)
- Engine coolant is warmed up to normal operating temperatures
- Exhaust temperature is hot and other factors are met

During Automatic regeneration, when the vehicle comes to a stop, the engine idle RPMs may increase.

DPF Regeneration Start Switch





The DPF regeneration start switch is used to initiate DPF regeneration to burn Particulate Matter (PM).

Depressing this switch will only initiate DPF regeneration if the DPF warning light has come on. See “Switch Regeneration Procedure” later in this section.

Continued driving without performing required regeneration will cause the engine check warning light and engine stop warning light to come on. The DPF then must be repaired at the nearest Cummins Dealer.

When to Perform DPF Switch Regeneration

If the DPF warning light comes on, the DPF could not satisfactorily complete automatic regeneration and driver action is required. When the DPF warning light is turned on, it means you must perform the "Switch" regeneration procedure soon. If you continue driving too long with the DPF warning light on or flashing, without performing the DPF regeneration, the engine check warning light will also come on. If both lights are on at the same time, find a safe place to pull over and park the vehicle as soon as possible, and perform the Switch regeneration procedure immediately. Continuing to drive, without performing DPF regeneration, will cause the engine stop warning light to come on, engine power may be reduced and may damage the DPF filter.

See *Driver Information Center (DIC)* ⇨ *63*, *Malfunction Indicator Lamp (Check Engine Light)* ⇨ *56*, and *Engine Shutdown Warning Light* ⇨ *62*.

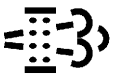
Switch Regeneration Procedure

Select this option if "Automatic" regeneration is not possible or when the DPF warning light is displayed.

⚠ Warning

- During regeneration, exhaust parts and gases become very hot and can reach as high as 816 °C (1,500 °F). In order to avoid being burned, do not touch the exhaust parts or DPF or get too close to the exhaust gases.
- Do not leave the vehicle during the regeneration.
- Parking over flammable items could allow them to touch hot exhaust parts under your vehicle and cause them to ignite. Do not park over papers, leaves, grass or other things that can burn.
- Make sure there is no flammable material (for example, grass, waste paper, oil or old tires) on or near the DPF or exhaust system.
- Avoid parking over surfaces that could melt (such as asphalt) during manual regeneration.

1. Move the selector lever into the "P" position (models with P-range) or "N" position (models without P-range) and engage the parking brake.
2. Let the engine idle. Be sure the accelerator pedal is not depressed and the PTO switch (if equipped) is "OFF".
3. Press and release the DPF regeneration start switch.



DPF Warning Light

High Exhaust System Temperature Indicator Light

4. The DPF warning light will go out and the high exhaust system temperature indicator light will appear.

5. Do not leave the vehicle during the regeneration. Regeneration normally completes in about 45 to 90 minutes.
6. When the high exhaust system temperature indicator light goes out, regeneration is completed. Normal driving is then possible.

When operating the PTO for a long time, be sure to monitor the DPF warning light. If the warning light comes on, stop the PTO and perform "Switch" DPF regeneration.

Once the "Automatic" regeneration is started, it cannot be switched to the "Running" regeneration if interrupted.

When the "Switch" regeneration is selected, complete regeneration in a single operation if possible.

During DPF regeneration, the engine speed may vary, causing the exhaust brake valve to be deactivated. However, while the high exhaust system temperature indicator light appears, regeneration is still taking place, so continue to allow regeneration until the indicator light goes off.

The time needed to complete regeneration differs depending on the outside temperature.

The exhaust brake or exhaust throttle is activated during DPF regeneration. The exhaust brake or exhaust throttle starting to operate or being disengaged will produce a sound, but this does not indicate a failure.

During regeneration, white smoke may be temporarily produced from the exhaust pipe. This results from combustion of PM, it does not indicate a failure.

"Switch" regeneration will complete earlier immediately after driving than when the engine is cold.

The engine coolant temperature may rise during switch regeneration.

Interruption of Switch Regeneration

If you must interrupt regeneration, the high exhaust system temperature indicator light will go out and the DPF warning light will turn on. If you interrupt Switch regeneration, the regeneration must be completed again using Switch regeneration. Perform the Switch regeneration procedure as soon as possible.

"Switch" regeneration will be interrupted in the following circumstances.

- Accelerator pedal is pressed
- Selector lever is moved to a driving range (R, OD, 3, 2, or 1) position
- Vehicle speed is above 0 km/h (0 MPH)
- Engine speed increases

Operation noise caused by interruption is louder when depressing the accelerator pedal than other operations. This is not a failure.

DPF Regeneration during Prolonged Idling

Automatic DPF regeneration may be initiated during prolonged idling. If this occurs, the high exhaust system temperature indicator light will come on. This is normal and does not indicate a failure.

If Automatic regeneration that is started as a result of prolonged idling is interrupted (by either driving the vehicle or activating a PTO), the high exhaust system temperature indicator light will go out and the DPF warning light will come on. Perform "Switch" regeneration soon in order to complete the DPF regeneration.

Prolonged idling may require more frequent DPF regeneration.

See *Driver Information Center (DIC)* ⇨ *63* and *Diesel Particulate Filter Light* ⇨ *60*.

Diesel Exhaust Fluid

Diesel exhaust fluid (DEF) is used exclusively for the selective catalytic reduction (SCR) system. Be sure to use only API certified DEF. When the SCR system detects DEF level is nearly empty or incorrect fluids (such as water or low concentrated DEF.) are added, the SCR system will turn on warning and indicator lights and reduce engine power in progressive stages to encourage you to have the condition corrected. Continuing to drive for too long after these lights come on will eventually result in a severe vehicle speed limitation. See *Vehicle Messages* ⇨ *66*

The DEF freezes below −11 °C (12 °F). The SCR system is equipped with a heating function which utilizes the engine coolant, so the engine can be started even when DEF is frozen.

Handling of DEF

Use only API certified DEF (or ISO: AUS 32). DEF is a colorless, transparent solution. It may smell depending on the conditions, but this is not abnormal.

DEF is available from your local authorized dealer. In addition, the U.S. Department of Energy has created an on-line DEF locator that can be accessed at https://www.afdc.energy.gov/afdc/locator/def/. The American Petroleum Institute (API) also maintains a list of API-certified distributors of DEF on its web page at https://dieselexhaust.api.org/Directory/DefSearch.

⚠ Warning

Avoid getting Diesel Exhaust Fluid (DEF) on your skin or in your eyes as it could cause irritation. For more safety, handling, and storage information, see the Diesel Exhaust Fluid container label.

See *Winter Driving* ⇨ *110*, and *Recommended Fluids and Lubricants* ⇨ *278*.

Adding DEF Before Driving the Vehicle

Add DEF regularly to maintain an adequate supply. If the DEF level becomes too low the DEF low level warning system may activate. The vehicle speed will be severely limited when the DEF tank is empty.

Be sure to follow these instructions when refilling the DEF tank.

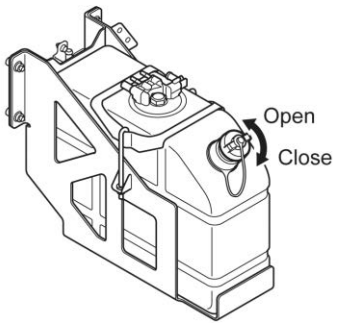
- Shut down the engine before adding DEF.
- When filling, place the nozzle deeply into the DEF tank. If you try to fill more DEF by pulling out the nozzle from the DEF tank, DEF may spill out. Do not allow the fill level to come within 25 mm (1 in) of the fill port. This will cause an overfill condition.
- Follow all cautions posted in filling stations.
- If DEF is spilled, wash it away with water and wipe the area clean.
- Add API certified DEF only (or ISO: AUS 32). Do not fill the DEF tank with any substance other than the DEF.
- Any substance other than the DEF may cause a breakdown to the SCR system.
- Use the DEF handling equipment made of correct materials (Polyethylene or Stainless-steel).
- Avoid contamination from using dirty funnel for filling.
- If a fluid other than the specified DEF is mistakenly added, incorrect fluid may cause a failure. Have it inspected and serviced at a dealer immediately.
- Ammonia odor may be generated when the DEF is exposed to high temperature.

- Do not overfill the DEF tank. If the DEF tank is overfilled, DEF may leak from the breather hose while driving. Also, if you overfill the DEF tank in cold weather, the DEF may freeze and damage the DEF tank and/or its sensors.
- Do not put your feet on or stand on the DEF tank. The tank, pipe or sensors may be damaged.
- After stopping the engine, a flow sound may be heard from the DEF tank or DEF supply pump. This sound occurs as the DEF in the piping is returning to the tank, and does not indicate an abnormality.

See “Selective Catalytic Reduction (SCR) System”, “Adding DEF in Cold Weather”, When DEF Freezes”, and “When the Diesel Exhaust Fluid (DEF) Tank is Empty” later in this section.

See *Winter Driving* ⇨ *110*.

Adding DEF



1. Turn the engine control switch to the ACC or LOCK position and make sure to stop the engine.
2. Wipe off dust or dirt from around the filler port of the DEF tank.
3. Turn and remove the filler cap.
4. Insert the DEF nozzle into the tank and refill until the DEF nozzle automatically shuts off. If the nozzle shut off is not functional, stop refilling when the DEF is approximately 25 mm (1 in) below bottom of the filler port.
5. Tighten the cap after refilling is completed.
6. Wipe off DEF that is spilled at refilling.

⚠ Warning

On occasion, you may notice an odor when the DEF tank is opened. Do not sniff the filler port, etc.

When refilling the DEF tank: Failure to follow the above instructions could result in a fire or a breakdown of the selective catalytic reduction (SCR) system.

Do not dilute DEF with water.

Do not add substances such as gasoline or diesel fuel to the DEF tank. You and others could be seriously injured.

Caution

When opening the DEF tank cap, be careful not to let dirt or other foreign matter enter inside the DEF tank. Intrusion of foreign matter can cause a clogging of the filter or affect the quality of DEF, which may result in a SCR system failure.

If DEF is spilled on the body or frame, it may cause generation of rust, so wipe it off and then rinse it away with water.

The DEF nozzle used to fill the DEF tank automatically stops pumping DEF once the fluid reaches the end of the nozzle.

When DEF dries it will leave a crystalline residue, this condition is normal. Wash with water or wipe away the residue to prevent it from entering the DEF tank.

Adding DEF in Cold Weather

In cold weather, do not park the vehicle for long periods of time if the DEF indicator light is on. The DEF gauge will not register correctly should the DEF freeze in this condition causing the DEF low level warning system not to reset when DEF is added. Take the following actions to avoid this condition in cold weather.

1. Refill the DEF as soon as possible after parking the vehicle.
2. Turn the engine control switch to the ON position from the LOCK position.
3. Wait for the warning buzzers and warning lights to turn off.
4. If the buzzer does not stop, return the engine control switch back to the LOCK position and add more DEF, and then start over from step (2) above.
5. Turn the engine control switch to the LOCK position.

The DEF freezes at approximately −11 °C (12 °F).

In cold weather, when the vehicle is left without performing these actions and the DEF tank freezes, the low DEF level warnings and indicators may not turn off when DEF is added until after the tank defrosts.

Make sure to stop the engine before adding the DEF. See "Selective Catalytic Reduction (SCR) System" and "When the Diesel Exhaust Fluid (DEF) Tank is Empty" later in this section. See *Diesel Exhaust Fluid (DEF) Warning Light* ⇨ *62*.

When DEF Freezes

DEF freezes at low temperature but the engine coolant circulates to thaw the DEF tank and to prevent DEF from freezing. The vehicle can be driven normally when DEF is frozen.

If the DEF indicator light is on and the remaining DEF in the DEF tank is frozen, the warning lights, indicator lights and engine restrictions will not be canceled until the DEF thaws even if the DEF tank is refilled. To avoid this condition, follow the instructions for "Adding DEF in Cold Weather" in this section.

⚠ Warning

Do not warm up the DEF tank using a burner, heater, etc. You and others could be seriously injured.

DEF Storage

Seal the container and store it in an indoor place with good ventilation avoiding direct sunlight.

When storing DEF, the shelf life varies depending on the room temperature of the storage place. For details, please contact the distributor of the DEF.

For storage of DEF, seal the container to prevent the moisture from evaporating.

Even when DEF has been frozen, its quality is maintained when it is thawed. It can be used as it is.

To store or carry DEF, use the original container in which the DEF was kept at the time of purchase. Also, if other containers are used, prepare a clean container for exclusive use, which can be a polyethylene resin tank (PE) or stainless steel container, and do not introduce foreign matter such as water or contamination.

DEF Disposal

Do not dispose of DEF and the empty container into lakes, marine areas, rivers, etc. DEF must be disposed of in a method conforming to the regulatory requirements in your state.

Selective Catalytic Reduction (SCR) System

The Selective Catalytic Reduction (SCR) system reduces nitrogen oxide (NOx) emissions emitted from a diesel engine. The SCR system reduces NOx by adding (injecting) Diesel Exhaust Fluid (DEF) into the exhaust system and inducing a reaction converting NOx into water vapor and nitrogen. The SCR system consists of the ECM, DEF tank, DEF Supply Pump and Injector, and the SCR Catalyst. It is important to keep a good supply of DEF in the DEF tank at all times. Monitor the DEF gauge to be sure the DEF tank level does not become too low. If the DEF level becomes too low or incorrect fluid is added to the DEF tank, warning and indicator lights will come on and engine power will be reduced. If you see these warning and indicator lights, add DEF as soon as possible or have your vehicle serviced as soon as possible. Continuing to drive for too long after these lights come on will result in additional warnings, more engine power reduction and eventually in a severe vehicle speed limitation.

⚠ Warning

Do not touch the water that comes out from the muffler. The water is mildly acidified due to the action of oxidation catalyst inside the muffler. In the event that the fluid does come into contact with your skin, completely wash it off with water. You and others could be seriously injured.

Do not relocate or modify the exhaust pipe, muffler, DPF, SCR, or DEF tank, which may affect the exhaust gas cleaning performance. If any relocation or modification is necessary, consult your dealer.

The SCR system continues to operate for approximately 3 minutes after the engine control switch is turned to the "LOCK" position. It is normal to hear a buzzing type noise from the DEF supply pump (mounted on the left side frame rail behind the cab) during the shutdown process.

Diesel Exhaust Fluid (DEF) Low Level Warning

Diesel Exhaust Fluid (DEF) is a required fluid for the operation of your diesel engine just as diesel fuel is required. To avoid running out of DEF your vehicle will turn on warning and indicator lights and reduce engine power in progressive stages to encourage adding DEF.

The following is a summary of the diesel exhaust fluid (DEF) low level warning lights, indicator lights and engine power reductions. Continuing to drive for too long after these lights come on will eventually result in a severe vehicle speed limitation.

These warning and indicator lights will go out automatically and engine power will be restored to normal after the SCR system detects that the DEF tank is refilled with DEF.

DEF Tank Level is Low/Empty

Stage	Stage 1	Stage 2	Stage 3	Stage 4
DEF gauge (MID sub display 2)	Solid (amber)	Solid (amber)	Solid (amber)	Solid (amber)

Stage	Stage 1	Stage 2	Stage 3	Stage 4
Indicator light(s)	Solid	Solid	Blinking	Blinking

Stage	Stage 1	Stage 2	Stage 3	Stage 4
Restrictions	None	- Engine torque is reduced by 25%	- Engine torque is reduced by an additional 1% per minute up to a maximum reduction of 40% of specified torque	Vehicle speed is limited to 8 km/h (5 MPH)
				Vehicle speed is limited to 8 km/h (5 MPH)
Required action	Refill DEF as soon as possible *1	Refill DEF immediately *1	Refill DEF immediately *1	Refill DEF immediately *1

Remarks:

*1 – See Adding DEF earlier in this section.

Stage 1: When the remaining level of DEF becomes excessively low the DEF gauge will change color from green to amber. In addition, the DEF indicator light will come on as shown in the table.

Stage 2: If driving is continued without adding DEF, engine torque will be reduced by 25%.

Stage 3: If driving is continued after the DEF tank is empty, the DEF indicator light will begin blinking and the engine check warning light will come on. Engine torque will be reduced by an additional 1% per minute up to a maximum reduction of 40% of specified torque.

Stage 4: After reaching Stage 3, if any of the following triggers is met, engine torque will remain reduced by 40% and the vehicle speed will be limited to 8 km/h (5 MPH).

- The engine is restarted
- The engine idles for over 1 hour
- The fuel tank is refilled

See "Adding DEF in Cold Weather" and "When the Diesel Exhaust Fluid (DEF) Tank is Empty" earlier in this section. See *Diesel Exhaust Fluid (DEF) Warning Light* ⇨ *62*.

Incorrect Diesel Exhaust Fluid (DEF)/SCR System Malfunction Warnings

The SCR system continuously monitors emissions reduction performance and SCR system malfunction. When a malfunction or incorrect fluid (such as water or low concentrated DEF, etc.) is detected, the SCR system will turn on warning and indicator lights to encourage you to have the condition corrected.

In the case of incorrect fluid or if an SCR system malfunction is detected, continuing to drive for too long after these lights come on may eventually result in a severe vehicle speed limitation. The following is a summary of the warning lights, indicator lights and restrictions. When these warning and indicator lights come on, promptly have the vehicle inspected and serviced at your dealer.

Incorrect DEF/SCR System Malfunction Warnings

Stage	Stage 1	Stage 2	Stage 3	Stage 4
DEF gauge (MID sub display 2)	Various	Various	Various	Various

Stage	Stage 1	Stage 2	Stage 3	Stage 4
Indicator light(s)	Solid	Solid	Blinking	Blinking

Stage	Stage 1	Stage 2	Stage 3	Stage 4
Restriction	None	- Engine torque is reduced by 25%	- Engine torque is reduced by an additional 1% per minute up to a maximum reduction of 40% of specified torque	Engine torque remains reduced by 40% of specified torque
				Vehicle speed is limited to 8 km/h (5 MPH)

Stage 1: When incorrect DEF or an SCR system malfunction is detected, the DEF indicator light and the engine check warning light will come on as shown in the "Incorrect DEF/SCR System Malfunction Warnings" table.

Stage 2: If driving is continued for approximately another 1 hour, engine torque will be reduced by 25%.

Stage 3: If driving is continued for approximately another 3 hours, the DEF indicator light will begin blinking and the engine check warning light will remain on. Engine torque will be reduced by an additional 1% per minute up to a maximum reduction of 40% of specified torque.

Stage 4: After reaching Stage 3, if any of the following triggers is met, engine torque will remain reduced by 40% and the vehicle speed will be limited to 8 km/h (5 MPH):

- The engine is restarted
- The engine idles for over 1 hour
- The fuel tank is refilled

See "Handling of DEF" and "Adding DEF" earlier in this section. See *Diesel Exhaust Fluid (DEF) Warning Light* ⇨ *62*, *Engine Shutdown Warning Light* ⇨ *62*, and *Malfunction Indicator Lamp (Check Engine Light)* ⇨ *56*.

When the Diesel Exhaust Fluid (DEF) Tank is Empty

If the DEF tank is empty and warning and indicator lights are on, you must follow below procedure to cancel the vehicle restriction:

1. Turn the engine control switch to the LOCK or ACC position, and add DEF.
2. After adding DEF, turn the engine control switch to ON position.
3. Wait until buzzer stops, warnings and indicators are turned off.

   It may take a while until the warning lights and indicators turn off and the buzzer stops after turning the engine control switch to the "ON" position.

It is desirable to fill up the tank with DEF to keep the DEF remaining level warning from reappearing.

When the outside temperature is low, refer to "Adding DEF in Cold Weather" earlier in this section.

4. If the buzzer does not stop, return the engine control switch back to the LOCK position and add more DEF, and then start over from step 2 above.
5. Restart the engine.

See *Driver Information Center (DIC)* ⇨ *63*, *Warning Lights, Gauges, and Indicators* ⇨ *51*, *Warning Buzzers* ⇨ *70*, and *Winter Driving* ⇨ *110*.

Automatic Transmission

On an automatic transmission vehicle, the driver does not use a clutch pedal when pulling away, changing gears, or stopping; he/she uses only the selector lever, accelerator pedal, and brake pedal. Also, selector lever operation methods differ for models with P-range and models without P-range. Practice learning the characteristics of the automatic transmission vehicle and how to correctly operate it. When the vehicle is stationary, remember to keep the brake pedal firmly pressed, and if necessary, move the selector lever into the "P" or "N" position (models with P-range) or "N" position (models without P-range) and apply the parking brake.

Creep: With the engine running and a gear position other than P or N selected with the selector lever, power reaches the wheels even when the accelerator pedal is not pressed, causing the vehicle to tend to move.

Furthermore, the higher the engine speed, the stronger the creep and the greater the vehicle's tendency to move.

Starting

If your vehicle is equipped with a selector lever with P-range, start the engine in either the "P" or the "N" position. If your vehicle is equipped with a selector lever without P-range, start the engine in the "N" position. The engine should not start in any other selector position. If it does, something is wrong. Have your truck checked by your dealer as soon as possible.

Always apply either the foot brake or the parking brake before shifting into any driving position. This will prevent creeping.

The engine should be running at idle when shifting from "P" or "N" (models with P-range) or "N" (models without P-range) to one of the driving positions. See *Selector Lever* ⇨ *160*.

Caution

Do not apply water from a high-pressure washer nozzle directly to the electric connectors. Failure to observe this precaution can lead to faulty operation of the electrical system.

Caution

For models with P-range, never move the selector into the "P" position while the vehicle is in motion. This will damage the automatic transmission.

Firmly press the brake pedal to prevent the vehicle from moving even if it is stopped on a level road, and move the selector lever into "P" (models with P-range) or "N" (models without P-range) and apply the parking brake.

The engine speed rises and creeping will be stronger than usual during the conditions noted below. Keep the brake pedal firmly pressed:

- Immediately after engine start up.
- While the air conditioner is running.
- During the diesel particulate filter (DPF) regeneration.

How to Use the Automatic Transmission

⚠ Warning

- If your vehicle is equipped with a selector lever with P-range, before starting the engine, move the selector lever into "P" or "N" ("P" is preferred), make sure the shift indicator indicates "P" or "N", pull up the parking brake lever and firmly press the brake pedal.
- If your vehicle is equipped with a selector lever without P-range, before starting the engine, move the selector lever into "N", make sure the shift

(Continued)

Warning (Continued)

indicator indicates "N", pull up the parking brake lever and firmly press the brake pedal.

- When stationary and moving the selector lever to any position other than "P" (models with P-range) or "N" (models without P-range), be sure to press the brake pedal.
- Never leave the driver's seat with the selector lever placed in "OD", "3", "2", "1" or "R". The vehicle may start moving. When leaving the driver's seat, be sure to move the selector lever into "P" (models with P-range) or "N" (models without P-range) and securely set the parking brake.
- When you move the selector lever into "OD", "3", "2", "1" or "R", creep will cause the vehicle to move.
- When pulling away from a standstill, you must control the speed using only the accelerator pedal. Operate the accelerator pedal carefully.

(Continued)

Warning (Continued)

- Do not operate the selector lever while depressing the accelerator pedal. The vehicle may make a sudden start, possibly causing an accident.

When pulling away, visually check the position of the selector lever. If you always press the push button while operating the selector lever, the lever may occasionally move to the "P" (only models with P-range), "R", "3", "2", or "1" position against your intentions.

Practice operating the selector lever between the N and D without pressing the push button.

Do not operate the selector lever while pressing the accelerator pedal. Doing so is dangerous because the vehicle would suddenly move.

Do not operate the automatic transmission at or near stall condition for more than five seconds. Stall condition is when the transmission is in one of the driving ranges, the engine is running at high speed, but the drive wheels are unable to move. This condition might occur if the vehicle is stuck in deep sand

or is pushing against a fixed barrier. Operating the transmission at stall condition will result in overheating and damage.

Do not hold your vehicle on an upgrade with the accelerator pedal. Doing so will result in automatic transmission overheating and damage. Use the parking brake or foot brake to hold the vehicle on an upgrade.

Even if you plan to move only a short distance, sit in the correct driving position and make sure you can firmly press the brake and accelerator pedals.

When you reverse, you twist to look rearward so pedal operation becomes difficult. Firmly press the brake pedal. Also, practice returning the selector lever immediately to the N position after reversing. When pulling away, visually check the selector lever position and the shift indicator.

When the vehicle is stopped, do not keep pressing the accelerator pedal with the selector lever in a forward gear or R position while pressing the brake pedal. Doing so may cause a breakdown.

Sit in the correct driving position, and use your right foot to operate the brake and accelerator pedals. To avoid accidentally pressing the wrong pedal, check the pedal positions and practice putting your foot on the desired pedal.

To start your vehicle:

1. Firmly press the brake pedal. After making sure the selector lever is placed into "P" (only models with P-range) or "N", that "P" (only models with P-range) or "N" is shown in the shift indicator and that the parking brake is applied, place the engine control switch into the "ON" position.
2. Start the engine and move the selector lever into OD for forward movement, or R for backward movement while firmly pressing the brake pedal with your right foot.
3. Make sure that the shift indicator indicates the correct gear for forward movement, or R for backward movement, release the parking brake, release the brake pedal, and then gradually press the accelerator pedal. The vehicle starts moving as you press the accelerator pedal further.

On a steep slope:

Make sure that the shift indicator indicates the correct gear OD for forward movement, or R for backward movement, check the area around the vehicle is clear, press the brake pedal with your left foot and release the parking brake. With your left foot pressing the brake pedal, slowly press the accelerator with your right foot.

When you feel the vehicle try to move release the brake pedal with your left foot, continue to press the accellerator pedal with your right foot, and start driving the vehicle.

If your vehicle is equipped with a selector lever with P-range, the shift lock system operates and the selector lever cannot be shifted from "P" to any other position when the brake pedal is not pressed.

See *Driver Information Center (DIC)* ⇨ *63*, *Starting and Stopping the Vehicle* ⇨ *124*, and *Selector Lever* ⇨ *160*.

Normal Driving

When you move the selector lever from "P" (models with P-range) or "N" (models without P-range) into "OD", shifting takes place in the automatic mode. Check that "OD" is displayed in the shift indicator.

If the automatic transmission fluid temperature is too low, the transmission may not initially make automatic shift to the 4th, 5th, and 6th gear. This condition is normal and will be resolved as the fluid temperature rises.

To Accelerate

To accelerate when the accelerator pedal is pressed further, kickdown operates and the speed increases. The transmission will downshift at speeds below 88 km/h (55 MPH), to provide greater acceleration.

Kickdown

If you press the accelerator pedal fully while driving, in accordance with the current speed the gear automatically shifts down and the engine speed rises, enabling sufficient acceleration. This is called kickdown.

You can easily accelerate to the required speed when overtaking other vehicles or when joining traffic on a highway. In order to maintain speed when driving on an uphill road, as you gradually press the accelerator pedal the transmission may automatically shift down in accordance to the current speed (shifts to a lower speed gear), increasing the engine speed and increasing vehicle speed.

Driving Uphill or Downhill

Uphill driving:

With the selector lever in OD, if you press down on the accelerator pedal, kickdown (change to a low speed gear) may operate causing the engine revolutions to suddenly increase (increasing the speed).

Driving for a prolonged duration on an uphill road with the selector lever in OD may cause the automatic transmission fluid to overheat.

Drive with the overdrive off switch ON to keep the engine revolutions constant to enable smoother driving with fewer changes in engine revolutions.

Drive with the selector lever in the 3 position to keep the engine revolutions constant to enable smoother driving with fewer changes in engine revolutions.

Driving conditions	Selector lever position
Normal uphill road	OD (overdrive off switch ON)
Steep uphill, steep slope, mountain road with many sharp curves	2 or 1
Long uphill road	2

Downhill driving:

Do not overuse the foot brake. This will cause the brakes to overheat, reducing their effectiveness. On long downward slopes or sharp downhill sections of road, use the engine brake together with the foot brakes to control the speed.

When the selector lever is in the OD position, you can drive with the overdrive off switch ON to allow a gentle engine brake to be applied.

Push the overdrive off switch to the ON position at speeds below 101 km/h (63 MPH) to increase engine braking action when traveling downgrade.

You can increase engine braking by driving with the selector lever in the 2 position.

To apply a stronger engine brake on sharp downhill sections, shift the selector lever to the 1 position when required.

See *Control of a Vehicle* ⇨ *101*.

Driving at Low Speeds for Sustained Periods

Any low speed applications such as sweeper, road marking machinery, trash collectors, highway striping or moving, etc. require the following treatment to prevent the automatic transmission fluid (ATF) from overheating:

Select 1 position during low speed operation under 18 km/h (11 MPH).

Select 2 position during low speed operation under 36 km/h (22 MPH).

See *Automatic Transmission Fluid Temperature Warning Light* ⇨ *58*.

To Stop Your Vehicle

1. To temporarily stop the vehicle, press the brake pedal firmly while the selector lever is in OD.
2. Use the parking brake as required. Press the brake pedal firmly, and firmly apply the parking brake.

   If the vehicle is stationary for a long time, move the selector lever into the "P" or "N" position (models with P-range) or "N" position (models without P-range). If the selector lever is kept in the "OD" position, the temperature of the automatic transmission fluid increases due to heat from the torque converter.

To ensure reliable brake application, be sure to use your right foot to press the brake pedal.

When leaving the driver's seat, follow the When Parking Your Vehicle procedure.

To Start After Stopping

To start again after stopping your vehicle, visually check that the selector lever is in OD, and gradually press the accelerator pedal to pull away.

When Parking Your Vehicle

Caution

Do not leave your vehicle while the engine is still running. Do not park with the selector lever in a position other than "P" (only models with P-range) or "N"; the vehicle may begin moving by itself due to creeping. You may accidentally press the accelerator pedal when getting into the vehicle causing it to start moving suddenly.

- When parking the vehicle, always apply the parking brake and move the selector lever to the "P" position (models with P-range) or "N" position (models without P-range).
- When parking on a slope, move the selector lever into the "P" position (models with P-range) or "N" position (models without P-range) and block the wheels with chocks.

1. Keep pressing the brake pedal firmly with your right foot, then apply the parking brake.
2. Move the selector lever in the "P" position (models with P-range) or "N" position (models without P-range), check that the shift indicator is indicating "P" (models with P-range) or "N" (models without P-range), and slowly ease your right foot off the brake pedal.
3. Shut down the engine, and remove the key. When the selector lever is not placed in the "P" position, the shift lock system operates and the key cannot be removed (only models with P-range).

See *Starting and Stopping the Vehicle* ⇨ *124*, and *Parking Brake* ⇨ *166*.

If you cannot move the selector lever from the P position after starting the engine, perform the following necessary checks:

- Check that you are firmly pressing the brake pedal.
- Check if the area where your vehicle is parked is not a slope.
- If your vehicle is parked on a downhill slope, the push operation of the selector lever may become heavy to move. In this case, you can operate the selector lever more smoothly by pushing the selector lever towards the front of the vehicle while pushing the button.

Shift Lock System - Models with ALLISON2550RDS Model Transmission

When Starting Your Vehicle

The selector lever cannot be operated from the P position to any other position without the brake pedal being pressed. Be sure to operate the lever while pressing the brake pedal.

When Parking Your Vehicle

The key cannot be removed unless the selector lever is securely placed in the P position (key interlock system). Be sure to place the selector lever in the P position when parking the vehicle.

The shift lock system is a system for safety to prevent incorrect operation of the automatic transmission. Use it correctly and drive safely.

If You Cannot Move the Selector Lever from the "P" Position

If you cannot move the selector lever from the "P" position after the engine is started while firmly depressing the brake pedal and the brake air pressure is sufficient, do the following:

- Verify that the brake air pressure warning light is not illuminated and the buzzer is not sounding.
- The selector lever button may be difficult to depress if your vehicle is parked on a slope. In this case, push the selector lever towards the front of the vehicle before pushing the selector lever button.

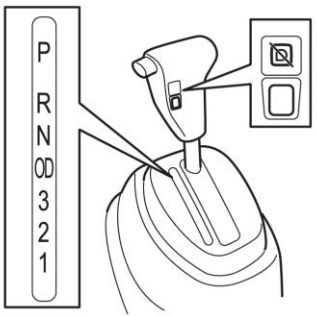
If the selector lever could not be moved from the "P" position to any other position after following the above repeatedly have your vehicle inspected at the nearest dealer.

Actions that Can Lead to a Breakdown with an Automatic Transmission

Actions that can lead to a breakdown	Breakdown symptoms
Stopping the vehicle on an uphill road with the selector lever in a position other than N or P, the accelerator pedal pressed, and the brakes not applied.	The transmission fluid overheats.
Pressing the accelerator pedal and brake pedal at the same time while the vehicle is in a gear other than N or P.	
Placing the selector lever into any gear with the accelerator pedal pressed and the engine speed high.	The transmission gears are overloaded.
Placing the selector lever into P before the vehicle has completely stopped.	The parking mechanism will be damaged.
Turning off the engine control switch while driving.	The transmission is not properly lubricated.
Driving with the selector lever in the N position on a long downward slope (this is dangerous due to the lack of engine brake).	

Selector Lever

Models with ALLISON2550RDS Model Transmission



Move the selector lever to make a shift into each gear position.

P (Parking): Used when the vehicle is parked or when starting the engine. The P position is to be used with the parking brake. The P and N positions are the two positions in which the engine can be started.

R (Reverse): Used when backing up the vehicle. Bring the truck to a complete stop before moving the selector to the R position.

N (Neutral): Can be used when starting the engine, but for safety, get in the habit of starting the engine in the P position. See *Transporting a Disabled Vehicle* ⇨ *244*.

OD (Normal Driving): The OD position is for all normal forward driving. The system automatically selects the gear according to the vehicle speed. Press the overdrive off switch to switch to the overdrive "ON" position for greater fuel economy.

3 (Third): Used when driving on urban roads with heavy traffic. Return the selector to the OD position for normal driving.

2 (Second): May be used when driving on downhill roads or when the engine brake is required. Select the 2 position at speeds below 40 km/h (25 MPH) when traveling down a moderate grade. Return the selector to the OD position for normal driving.

1 (Low): Used on steep downhill roads or when strong engine braking is required. Return the selector to the OD position for normal driving.

⚠ Warning

When pulling away, always visually check the position of the selector lever for safety.

Only push the button for gear selection when necessary. Pushing the button unnecessarily may result in unintended gear selection.

Never move the selector to the P position when the truck is in motion.

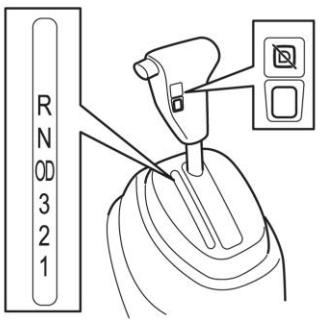
Do not run the vehicle with the transmission in neutral. Not only will the engine brake not function, but the transmission will also be damaged. You and others could be seriously injured.

When repeatedly shifting between forward and reverse gears for a multiple-point turn, firmly press the brake pedal and confirm that the vehicle is completely stopped before operating the selector lever.

The selector lever cannot be moved from the "P" position unless the engine control switch is in the "ON" position, the brake pedal is depressed and the air tanks have air pressure sufficient to activate brake lights. Before pulling away, be sure to keep the brake pedal depressed as you

operate the selector lever. When 3rd or a lower gear is selected, the transmission will not shift to a gear above the selected gear position. See *Driver Information Center (DIC)* ⇨ *63*, *Overdrive Off* ⇨ *162*, and *Automatic Transmission* ⇨ *153*.

Models with ALLISON2500RDS Model Transmission



Move the selector lever to make a shift into each gear position.

R (Reverse): Used when backing up the vehicle. Bring the truck to a complete stop before moving the selector to the R position.

N (Neutral): Used when the vehicle is parked or when starting the engine. Be sure to set the parking brake when parking. See *Transporting a Disabled Vehicle* ⇨ *244*.

OD (Normal Driving): The OD position is for all normal forward driving. The system automatically selects the gear according to the vehicle speed. Press the overdrive off switch to switch to the overdrive "ON" position for greater fuel economy.

3 (Third): Used when driving on urban roads with heavy traffic. Return the selector to the OD position for normal driving.

2 (Second): May be used when driving on downhill roads or when the engine brake is required. Select the 2 position at speeds below 40 km/h (25 MPH) when traveling down a moderate grade. Return the selector to the OD position for normal driving.

1 (Low): Used on steep downhill roads or when strong engine braking is required. Return the selector to the OD position for normal driving.

Caution

When pulling away, always visually check the position of the selector lever for safety.

- Only push the button for gear selection when necessary. Pushing the button unnecessarily may result in unintended gear selection.
- Do not run the vehicle with the transmission in neutral. Not only will engine braking not function, but the transmission will also be damaged.

When repeatedly shifting between forward and reverse gears for a multiple-point turn, firmly press the brake pedal and confirm that the vehicle is completely stopped before operating the selector lever.

The selector lever cannot be moved unless the engine control switch is in the "ON" position. Before pulling away, be sure to keep the brake pedal depressed as you operate the selector lever. When 3rd or a lower gear is selected, the transmission will not shift to a gear above the selected gear position. See *Driver Information Center (DIC)* ⇨ *63*, *Overdrive Off* ⇨ *162*, and *Automatic Transmission* ⇨ *153*.

Overdrive Off

Overdrive

Vehicles equipped with automatic transmission have two overdrive gears (5th and 6th). These 2 high speed gears provide increased road speed, low running noise and outstanding fuel efficiency.

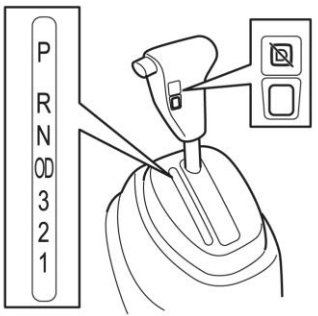
Take advantage of overdrive whenever possible.

Use the overdrive during normal driving. When driving down long downhill roads that require engine braking, or when driving on mountain roads or through city centers, release the overdrive. Doing so will reduce the number of gear changes making the ride smoother.

If your vehicle is traveling at a speed exceeding 109 km/h (68 MPH), it is not possible to downshift from 6th gear to 5th gear (exhaust brake on).

If your vehicle is traveling at a speed exceeding 92 km/h (57 MPH), it is not possible to downshift from 5th gear to 4th gear (exhaust brake on).

If your vehicle is traveling at a speed exceeding 66 km/h (41 MPH), it is not possible to downshift from 4th gear to 3rd gear (exhaust brake on).



Overdrive Off Switch

Overdrive Off Indicator Light

Under normal circumstances, press the overdrive off switch to turn the overdrive "OFF" (the overdrive off indicator light comes on).

Press the switch again to release the overdrive off (the overdrive off indicator light goes off).

Indicator Light on	Function	Usage conditions
"Goes Off"	6-Speed (4-speed + overdrive) automatic change. (Overdrive "ON")	Use under normal driving conditions.
"Comes On"	4-speed automatic change, but no change to overdrive. (Overdrive "OFF")	Used when a light engine brake is required. Doing so will reduce the number of gear changes making the ride smoother on roads that have many hills.

- When the automatic transmission fluid is cold

  During cold weather, the transmission may not shift to the 5th or 6th gear (overdrive) until the engine or transmission warms up.
- Even if the engine is off with the overdrive "OFF", the overdrive will be "ON" the next time the engine is started.

Brakes

Antilock Brake System (ABS)

Wheels may be locked and slip during sudden braking or braking on a slippery road surface such as a snowy road. ABS is a device to prevent the wheels from locking by detecting a slippery condition during braking and securing the directional stability and handling stability of the vehicle. ABS only assists in limited road conditions and will not prevent a crash if you exceed safe driving speeds for road conditions. Always drive safely.

⚠ Warning

The braking distance on slippery road surfaces is longer than that on a normal dry paved road even with an ABS-equipped vehicle. The braking distance can become even slightly longer in deep snow and on a gravel road when the ABS is operating than when it is not. Therefore, always be aware of the road and tire conditions (tire

(Continued)

Warning (Continued)

type and wear condition), observe safe driving habits, and drive while keeping a safe following distance.

ABS does not prevent accidents if you do not drive safely with current road conditions in mind. Drive the vehicle at a safe speed.

Install tires of the specified size, same brand and same tread design (including winter tires) on all wheels. If different tires are installed, the braking distance becomes longer and directional control stability of the vehicle decreases. This is very dangerous.

The steering wheel during sudden braking (when the ABS is working) gives you a feeling slightly different than it does when the brakes are not applied. Operate the steering wheel carefully keeping this in mind.

ABS operation consumes the brake system air. When the air pressure drops and the brake air pressure warning light and the buzzer are activated, immediately stop the

(Continued)

Warning (Continued)

vehicle at a safe place and wait for the required air pressure to be recovered before resuming driving.

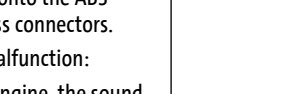
Driving in sand or on a muddy road may adversely affect the brakes and ABS sensors. Wash the vehicle to remove sand and mud after operating the vehicle in sandy or muddy conditions.

Before washing the vehicle, provide necessary protection to prevent water from being splashed on the ABS components (sensors and actuators). Especially when using high-pressure washing, be careful not to allow water to be directly sprayed onto the ABS components and their harness connectors.

These are not signs of ABS malfunction:

- Soon after you start the engine, the sound of valves working may be heard from the rear of the vehicle or underside of the cab. This sound is from a self-check by the ABS system and is normal.
- When ABS is properly operating, vibration is felt on the steering wheel and/or a mechanical operating sound is heard.
- When ABS is activated while the exhaust brake is in operation, the exhaust brake may disengage.
- ABS is more likely to activate when the brakes are applied during cornering or driving over a bump. This is because wheels that have gone over a bump would tend to lock due to loss of contact with the ground.
- ABS is not activated immediately after starting the vehicle. It is activated only when the vehicle speed reaches approx. 4 MPH (7 km/h). ABS operation is inactive when the vehicle speed reduces to approx. 4 MPH (7 km/h).

ABS Operation Indications and Signs



ABS warning light

Operation Indications of ABS

When the engine control switch is placed into the "ON" position, the ABS warning light comes on and then goes out in approx. 2 seconds. The ABS is normal if the warning light goes out.

Operation Signs of ABS

When ABS is activated, a slight vibration is transmitted to the steering wheel and an operating sound can be heard from the ABS components.

If the ABS warning light does any of the following, the ABS may be faulty. Please contact the nearest dealer.

– The ABS warning light comes on during driving.

– The light does not come on when the engine control switch is placed into the "ON" position or does not go out after a few seconds. See *Antilock Brake System (ABS) Warning Light* ⇨ 57.

Even if a problem has occurred with the ABS, the regular brakes will still work normally. However, ABS will not operate.

Precautions for Driving an ABS-Equipped Vehicle

ABS is not a device that enables driving and stopping under conditions exceeding safe driving limits. Always drive safely.

⚠ Warning

The braking distance on slippery road surfaces is longer than that on a normal dry paved road even with an ABS-equipped vehicle. When ABS is activated in the following road surface conditions, the braking distance may be slightly longer compared to that of vehicles not equipped with an ABS. Therefore, always be aware of the road and tire condition (tire type and wear condition), observe safe driving habits, and drive the vehicle while keeping a safe following distance.

Follow the above guidelines especially in these conditions:

- When driving on a gravel road and deep snow-covered road.
- When tire chains are used.

(Continued)

Warning (Continued)

- When driving over road joints or bumps such as light reflectors on the road.
- When driving on a bumpy road, stone-paved road or track.
- When driving over an iron plate or manhole lid.

ABS does not work for wheel skidding during a standing start, acceleration and cornering that does not involve braking. On a very slippery icy road, tires may lose their grip and the steering wheel operation may not be able to control the vehicle's direction, resulting in very unstable driving. Always drive the vehicle observing a safe speed well matched with both road surface and tire conditions, and avoid sudden braking if possible.

If powerful engine braking is applied on a very slippery icy road, the drive wheels may be locked (the ABS then does not work), resulting in loss of vehicle control.

(Continued)

Warning (Continued)

ABS operation consumes the brake system air. When the air pressure drops and the brake air pressure warning light and the chime are activated, immediately stop the vehicle at a safe place and wait for the required air pressure to be recovered before resuming driving.

When ABS is activated, slight vibration and pull to one side may be felt on the steering wheel, especially when the road surface condition is different between the right and left wheels. In addition, an operating sound is produced from the ABS actuators. This does not indicate any abnormal condition. Stay calm and operate the steering wheel properly.

Parking Brake

⚠ Warning

The parking brake system is designed to engage automatically when there is a loss of air pressure in the air brake system.

(Continued)

Warning (Continued)

This can occur even with the parking brake handle in the off position. When air pressure returns to a normal operating level, the parking brake will slowly disengage automatically, even when the parking brake handle is off. This can take up to four minutes. Do not put the vehicle in D (Drive) or N (Neutral) and do not exit the vehicle until the air pressure has returned to normal operating levels.

You and others could be seriously injured.

Damage to the vehicle may occur.

Parking Brake Lever

When parking or stopping your vehicle, engage the parking brake and make sure that the vehicle does not start moving. Avoid parking your vehicle on a slope as much as possible and choose a level and flat place. If parking on a slope is unavoidable, be sure to set the parking brake, make sure that the vehicle does not move, and block the wheels with chocks for added safety.

Illumination of the parking brake warning light does not mean that the parking brake is fully applied. The parking brake lever must be fully engaged.

When you engage the parking brake lever, air pressure is reduced and all four wheel brakes are applied.

⚠ Warning

Although the parking brake indicator light will come on if the parking brake is engaged while the engine control switch is in the ON position, this does not mean the parking brake is fully engaged, so always make sure the lever is fully pulled up.

Never drive the vehicle with the parking brake set as this will cause excessive wear, reduce parking brake effectiveness and increase fuel consumption.

Choose a flat place where stopping and parking are permitted and where the vehicle will not obstruct traffic.

Remove all dirt from the vehicle's light lenses and reflectors to ensure that the vehicle can be seen from other vehicles. You and others could be seriously injured.

Avoid parking for long periods with cargo on the vehicle.

⚠ Warning

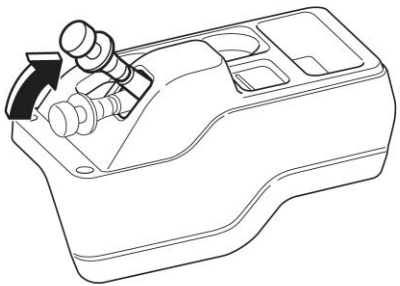
Do not use the parking brake while the vehicle is in motion except in an emergency. Applying the parking brake before the vehicle has stopped can cause the tires to lock or the vehicle to spin, possibly causing an accident. Unless the parking brake is fully released during driving, a fault and/or a fire may result.

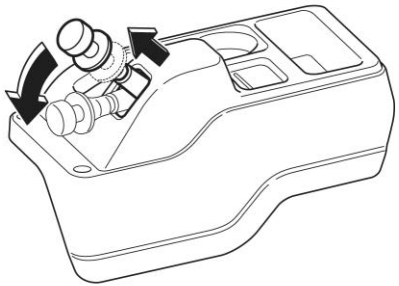
Do not drive the vehicle until the brake air pressure is above 73 psi. When brake air pressure is below 73 psi in both primary and secondary air pressure gauges the parking brake will not fully release, causing the rear brakes to drag. Driving under this condition may damage the brake system or cause overheating which may result in a fire.

If it was necessary to use the parking brake during driving, be sure to check afterwards to determine if any fault or failure has resulted.

When you engage the parking brake lever, brake air pressure is reduced at the rear drive axle spring brake chambers to apply the brakes.

Operation of Parking Brake





To set the parking brake, raise the parking brake lever. The parking brake warning light will then come on. Make sure that you hear the air being released from the system. To release the parking brake, lower the parking brake lever while raising the release knob. The parking brake warning light will then go out.

The parking brake indicator light is designed to remind you if the parking brake is not released when the engine control switch is on.

Caution

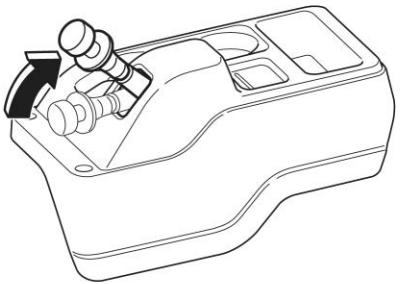
If the parking brake warning light remains on when the parking brake lever is lowered, a brake failure or a drop in air pressure may be the cause.

Check the brake air pressure for correct level. If the brake air pressure is low, contact your local dealer.

Parking Brake Warning Light **Parking Brake Not Set Warning Light**

When any of the doors are opened while the parking brake is not applied, the parking brake not set warning light will appear on the display, and the warning buzzer will sound.

Checking the Parking Brake Lever Stroke



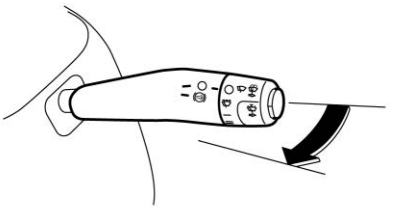
Pull the parking brake lever from the fully released position to the wheel locked position to check that the air exhaust sound is heard and the lever stays in position.

See *Maintenance Schedule* ⇨ *255* and *Additional Maintenance and Care* ⇨ *277*.

Exhaust Brake

Exhaust Brake Switch

When turned on, the system increases the amount of power absorbed by the engine while coasting in gear. Whenever slowing down the vehicle, such as on down grades, in city traffic or approaching stop signals, this brake system may be used.



To turn on the exhaust brake system while driving, pull the lever backward. The exhaust brake indicator light comes on. The exhaust brake will engage automatically when the accelerator pedal is released and vehicle speed is above 16 km/h (10 MPH).

The exhaust brake will disengage when the accelerator pedal is depressed. Releasing the pedal reengages the exhaust brake, however there is a 0.5 second delay in engagement. Push the lever forward to turn the exhaust brake off during idling.

Exhaust brake activation results in an automatic downshift to the lowest permissible gear for the given vehicle speed. For information regarding your Cummins engine, see the Cummins owner manual.

⚠ Warning

It is extremely dangerous to apply the exhaust brake on slippery roads as the tires can skid.

You and others could be seriously injured.

Even if the selector lever is placed in the N position, the exhaust brake does not disengage until the engine is warmed up if the warm-up system is on.

Conditions for Inoperable Exhaust Brake

Under the following conditions, the exhaust brake does not engage even if the exhaust brake indicator light comes on:

- The accelerator pedal is depressed.
- The vehicle is traveling at 16 km/h (10 MPH) or lower speeds.

If your vehicle is equipped with an anti-lock brake system (ABS), the exhaust brake may disengage during ABS operation even when the exhaust brake switch is in the ON position and the exhaust brake indicator light is on. The exhaust brake may disengage temporarily as the vehicle passes over a bump even when the brake pedal is not depressed.

It is advisable to operate the exhaust brake when descending a slope or when stop and go driving is involved.

The selection of transmission gears and engine speed when operating the brake system is important. The exhaust brake is more effective in the lower gears and at the higher engine speeds. See *Exhaust Brake Light* ⇨ *58*.

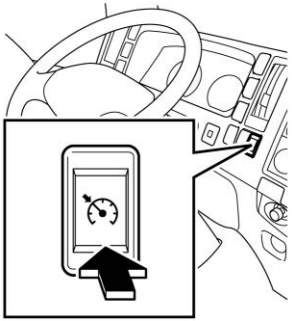
Cruise Control

The cruise control function allows you to drive the vehicle at a constant speed without operating the accelerator pedal. Use this function when the vehicle speed is between 40 to 160 km/h (25 to 100 MPH). This function should only be used when driving without frequent starts and stops.

⚠ Warning

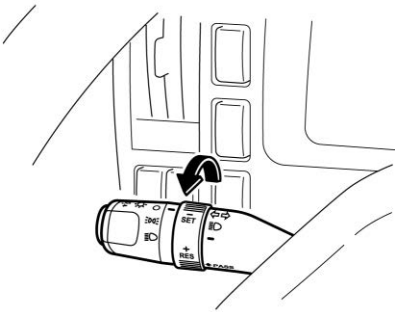
Cruise control can be dangerous where you cannot drive safely at a steady speed. Do not use cruise control on winding roads or in heavy traffic. You and others could be seriously injured.

Cruise control can be dangerous on slippery roads. On such roads, fast changes in tire traction can cause needless wheel spinning, and you could lose control. Do not use cruise control on slippery roads. You and others could be seriously injured.



1. Press the cruise control main switch to turn it on.

At this time, the cruise main indicator light comes on simultaneously.



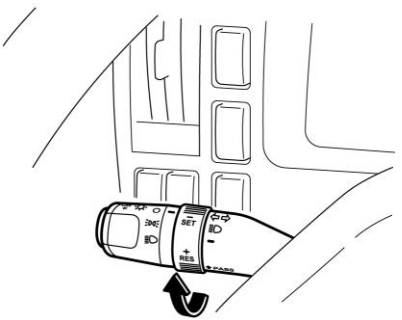
2. Use the accelerator pedal to adjust the vehicle to the desired speed. Upon reaching the desired speed, turn the cruise control set switch. The vehicle speed at the moment you operate the switch is set in the system, enabling you to drive with the set speed automatically maintained without using the accelerator pedal.

At the same time the cruise set indicator light comes on.

Accelerating During Cruise Control Driving

If you want to accelerate temporarily to pass another vehicle while driving using the cruise control, press the accelerator pedal. When you release the accelerator pedal, the speed returns to the original set vehicle speed.

When Increasing Vehicle Speed



When the cruise control resume switch is operated, the speed increases while the switch is held.

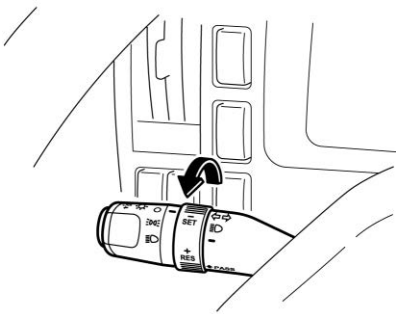
After the speed is increased to the desired vehicle speed, and the switch is released, the speed is set at the increased vehicle speed. If you want to increase the speed quickly, press

the accelerator pedal and accelerate to the desired vehicle speed. Then, operate the cruise control set switch.

When Increasing Vehicle Speed Slightly

If the cruise control resume switch is operated and released immediately, the set vehicle speed increases 1.6 km/h (1MPH) per operation. This operation can be performed 10 times consecutively.

When Decreasing Vehicle Speed



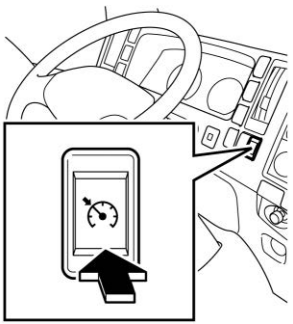
When the cruise control set switch is operated, the speed decreases while the switch is held.

After the speed is decreased to the desired vehicle speed, and the switch is released, the speed is set at the decreased vehicle speed. If you want to decrease the speed quickly, press the brake pedal to cancel cruise control and decelerate to the desired vehicle speed. Then, operate the cruise control set switch

When Decreasing Vehicle Speed Slightly

If the cruise control set switch is operated and released immediately, the set vehicle speed decreases 1.6 km/h (1 MPH) per operation. This operation can be performed 10 times consecutively.

When Canceling Cruise Control



Press the cruise control main switch again to turn the cruise control system off. The cruise control main indicator light will go out.

The cruise control set speed is canceled in the following cases:

- When the brake pedal is pressed.
- When the selector lever is shifted to the N position.
- When cruising speed is approximately 27 km/h (17 MPH) or lower. *
- When the vehicle speed decreases more than 20% below your set speed.
- When the cruise control main switch is turned off. *
- When the engine control switch is turned to the LOCK position. *
- When trouble develops in the system. *

Memory speed is eliminated. *

When you do not use the cruise control, be sure to place the cruise control main switch into off.

When you place the engine control switch into ACC, place the cruise control main switch into off, then reset the cruise control if you want to use the cruise control again.

Using Cruise Control on Hills

How well your cruise control will work on hills depends upon your speed, load and the steepness of the hills. When going up steep hills, you may want to step on the accelerator pedal to maintain your speed. When going downhill, you may have to brake or shift to a lower gear to keep your speed down. Of course, applying the brake takes you out of cruise control. Many drivers find this to be too much trouble and do not use cruise control on steep hills.

When Returning to Cruise Control Driving

If you have canceled cruise control under the following conditions, you can return to the cruise control driving condition before cancellation when you operate and release the cruise control resume switch. The moment the resume switch is released, the cruise set indicator light comes on.

- When pressing the brake pedal.
- When the selector lever is shifted to the N position.

When the vehicle speed decreases to 40 km/h (25 MPH) or less, it is not possible to return to the cruise control driving. You must reset the cruise control.

If the cruise control is turned back on while the vehicle speed exceeds what is set prior to the cancellation of cruise control, the set vehicle speed cannot be changed until the vehicle reaches to the set speed. Also, the vehicle speed must be 1 MPH below the previously set vehicle speed.

If you hold the switch at the +RES position, the vehicle will keep going faster until you release the switch or apply the brake. So unless you want to go faster, do not hold the switch at the +RES position.

Exhaust Brake Function

Diesel Vehicles Equipped with Exhaust Brake-interlocked Cruise

Automatic activation of the exhaust brake during cruise control driving suppresses an increase in the speed on a downhill slope, decreasing the need for the driver to apply the regular brake pedal. The exhaust brake does not activate when the exhaust brake switch is turn off.

The maximum slope angle at which the system can control the vehicle speed increase is different depending on the load the vehicle is carrying.

Automatic Activation and Automatic Release of Exhaust Brake

The exhaust brake is engaged when the vehicle speed exceeds the set speed on a downhill slope.

The exhaust brake is disengaged when the vehicle slows down close to the set.

Fuel

Fuel for Diesel Engines

Diesel Fuel Requirement and Fuel System

Fuel Requirements

In order to meet emission regulations, ultra-low-sulfur diesel fuel is required for correct operation of the aftertreatment system. If ultra-low-sulfur diesel fuel is not used, the aftertreatment system could possibly be damaged.

The fuel supply pump, injector or other parts of the fuel system and engine can be damaged if you use any fuel or fuel additive other than those specifically recommended by GM and Cummins.

To help avoid fuel system or engine damage, pay attention to the following:

- Some service stations mix used engine oil with diesel fuel. Some manufacturers of large diesel engines allow this. However, for your diesel engine, do not use diesel fuel which has been contaminated with engine oil. Besides causing engine damage, such fuel can also affect emission control. Before using any diesel fuel, check with the service station operator to see if the fuel has been mixed with engine oil.
- Take care not to run out of diesel fuel. If you do run out of fuel, you may need to bleed air out of the supply pump to re-start the engine after fuel has been filled.

Your vehicle is designed to use either Number 1-D or Number 2-D diesel fuel. See the Cummins owner's manual for additional details.

Biodiesel

See the Cummins owner's manual for additional details about using Biodiesel.

Cold Weather Operation

Diesel fuel is sensitive to temperature. All diesel fuel has a certain amount of paraffin components, which are high in energy value and help improve fuel economy. But, when temperatures are below -7 °C (20 °F), the paraffin components begin turning into wax flakes. If temperatures are low enough, these flakes can obstruct the fuel filters and stop fuel from reaching the engine.

At low temperatures, wax flakes are more likely to form in Number 2-D fuel than in Number 1-D (or "winterized" Number 2-D) fuel. For best operation at temperatures below 32° F (0° C), use Number 1-D or Number 2-D which has been blended with Number 1-D for winter use. For additional details about cold weather fuel requirements, see the Cummins owner's manual. However, Number 1-D fuel will form wax flakes when temperatures are extremely low.

Do not use home heating oil or gasoline in your diesel engine; either may cause engine damage.

The addition of kerosene will not unplug a filter plugged with wax. Warming a "waxed" filter to a temperature of 0 °C to 10 °C (32 °F to 50 °F) will return the wax to solution. Filter replacement is not normally required.

Water in Fuel

During refueling, it is possible for water (and other contaminants) to be pumped into your fuel tank along with the diesel fuel. This can occur if a service station does not regularly inspect and clean its fuel tanks, or if a service station receives contaminated fuel from its supplier(s).

To protect your engine from contaminated fuel, there is a water separator system on the engine which allows you to drain excess water from the fuel.

⚠ Warning

The drained water/diesel fuel mixture is flammable, and could be hot. To help avoid personal injury or death and/or property damage, do not touch the fuel coming from the water separator drain valve, and do not expose the fuel to open flames or sparks.

Be sure you do not overfill the drain pan. Heat (such as from the engine) can cause the fuel to expand. If the container is too full, fuel could be forced out of the pan. This could lead to a fire and the risk of personal injury and/or vehicle damage.

Biocides

In warm or humid weather, fungus, and/or bacteria may form in diesel fuel if there is water in the fuel.

Fungus or bacteria can cause fuel system damage by plugging the fuel lines, fuel filters or injector. They can also cause fuel system corrosion.

If fungus or bacteria has caused fuel system problems, you should have your Cummins dealer correct these problems. Then, use a diesel fuel biocide to sterilize the fuel system (follow the biocide manufacturer's instructions). Biocides are available from your dealer, service stations, parts stores and other automotive places. See your Cummins dealer for advice on using biocides in your area and for recommendations on which biocides you should use. For additional details about Biocides and other additives for your vehicle's Cummins diesel engine, see the Cummins owner's manual or contact your local dealer.

Smoke Suppressants

Because of extensive testing of treated fuel versus untreated fuel, the use of a smoke suppressant additive is not recommended because of the greater possibility of stuck rings and guttered valves, resulting from excessive ash deposits.

Water Separator

The purpose of the water separator is to separate any water from the fuel that may have formed in the fuel tank due to condensation.

The water separator is located on the bottom of the chassis side fuel filter.

Caution

Remaining water that is not discharged from the water separator could freeze and damage the vehicle.

If the warning light comes on while the engine is in operation, promptly drain the water from the water separator (fuel filter). Continuing to drive with the light remaining on could damage the fuel injection system. If this happens, have the vehicle checked and serviced by the nearest dealer.

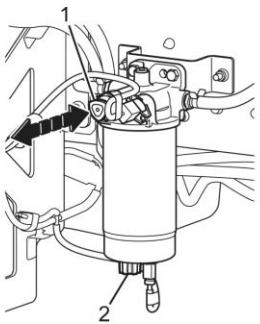
Draining Water from the Fuel Filter

Clean off any fuel that has adhered to the vehicle body.

Starting the engine immediately after draining the water from the pre–fuel filter requires a little more time than usual. If the engine does not start in 10 seconds, wait for a while and try again.

Fuel will be mixed in the drained water. Dispose of it in a method conforming to the regulatory requirements in your state.

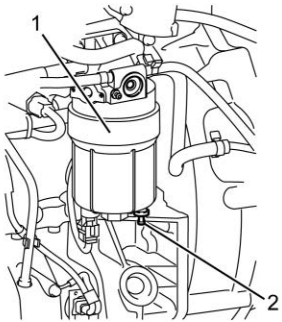
If the water separator (pre–fuel filter) requires frequent draining, have the fuel system inspected at your dealer.



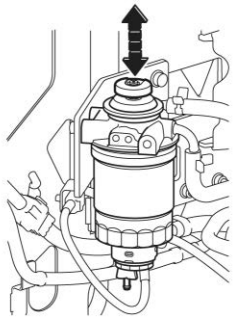
Pre–Fuel Filter

1. Put a container beneath the drain plug (2) to receive fuel.
2. Loosen the drain plug (2) at the bottom of the pre-fuel filter to drain out water.
3. Fully tighten the drain plug (2) and move the priming pump (1) back and forth several times.

Fuel Filter (Engine-side)



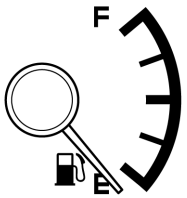
1. Attach a plastic hose to the drain plug (2) on the bottom of the engine-side fuel filter (1) and put the other end of the hose in a container placed beneath the filter.



2. Loosen the drain plug and move the priming pump up and down by hand between 10 and 20 times.
3. Fully tighten the drain plug and move the priming pump several more times.
4. Test run the engine and check that there are no fuel leaks from the drain plug of the engine-side fuel filter. Also check to confirm that the water separator (fuel filter) warning light stays off.

Running Out of Fuel

When the Fuel Tank is Empty



When the fuel tank is empty, air will enter the fuel system, so refueling alone will not be enough to restart the engine. Use the following methods to bleed the fuel system.

Bleeding the Fuel System

Steps for Refueling

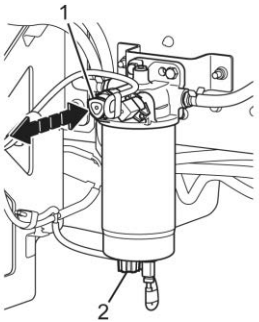
1. Follow the directions in "Parking Brake Lever" under *Parking Brake* ⇨ *166*.
2. Select the correct fuel (See "Diesel Fuel Requirement and Fuel System"). Follow any posted safety rules. Stand to the side, never above or opposite the filler opening.
3. Check that the fuel cap is tight, and see to it that engine oil, engine coolant in the reservoir, and washer fluid, etc. are at proper levels. Then do the Driver Daily Checklist.

   See *Owner Checks and Services* ⇨ *270*.

Driving your vehicle until the fuel tank is empty may activate the check engine malfunction indicator light. You do not need to have your vehicle checked. After refueling, perform the following:

- Bleed the fuel system.
- Start, turn off, and restart the engine three or four times.
- The check engine malfunction indicator light will be cancelled.

Before Starting the Engine



1. The priming pump (1) is located on the outboard side of the left frame rail, behind the diesel exhaust fluid (DEF) tank. Place a container beneath the drain plug to receive fuel, and then fully loosen the drain plug (2) to drain out water.
2. Fully retighten the drain plug (2) and wipe off any fuel that may have adhered to the plug or surrounding area.
3. Pump the priming pump (1) back and forth approximately 290 to 340 times until resistance is felt and the handle cannot be pumped anymore.
4. Start the engine.

5. If the engine does not start, repeat steps 3 and 4 as necessary until it does start.

After Starting the Engine

1. Without pressing the accelerator pedal, start the engine.
2. After the engine has started, allow it to idle for about 5 seconds.
3. Fully press the accelerator pedal and increase the engine speed to the maximum speed for 10 seconds. (Repeat this operation several times.)

Insufficient air bleeding can result in faulty engine operation. Be sure, therefore, to always carry out the procedure described in "After Starting the Engine".

Filling the Tank

Be sure to obey the following instructions when refueling the vehicle:

- Stop the engine and close the vehicle's doors and windows.
- Keep cigarettes and other flames away from the vehicle.
- Before opening the fuel tank filler cap, touch a metallic object to discharge static electricity from your body.
- When filling, place the nozzle deeply into the fuel tank. If you try to fill more fuel by pulling out the nozzle from the fuel tank, the fuel may spill out, thus causing danger.
- Be sure to wipe off the fuel that is spilled at refueling.

⚠ Warning

Fuel vapor is highly flammable.

Be careful not to inhale fuel vapor when refueling the vehicle.

If you have a static charge buildup on your body while refueling the vehicle, a spark caused by its discharge could ignite the fuel, resulting in burns.

All parts of the refueling procedure (from opening the fuel tank filler cap to completing the refueling and closing the fuel tank filler cap) must be performed by the same person.

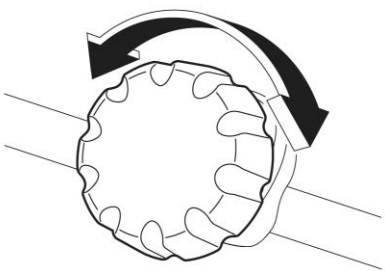
(Continued)

Warning (Continued)

Other people may be carrying static electricity. Do not allow them to approach the fuel filler.

The person performing the refueling procedure must not return to the seat in the cab part-way through the procedure. He/she could pick up another charge of static electricity by doing so.

Obey all cautions posted in filling stations.



After refueling, make sure that the fuel tank filler cap is tightly closed.

Do not use any fuel tank filler cap that is not a genuine GM part.

The use of an improper fuel tank filler cap could cause fuel spillage in the event of a crash. The use of an improper fuel tank filler cap could also affect the fuel system and the emission control system.

Be sure to wipe off the fuel that is spilled at refueling.

⚠ Warning

Fuel may be under pressure. Be sure to slowly open the fuel tank filler cap. If you open it quickly, fuel may spurt out. You and others could be seriously injured.

Caution

Care must be taken when filling the fuel tank to prevent entry of dirt and water.

Conversions and Add-Ons

Add-On Electrical Equipment

Installing Electrical Equipment

⚠ Warning

Inappropriate installation or removal of audio, radio or other electrical equipment can adversely affect other electrical equipment and cause a breakdown or fire. Be sure to have electrical equipment installed or removed by your dealer. You and others could be seriously injured.

Do not install any unauthorized radio set, or any radio set or antenna that does not comply with relevant standards. Noise from the radio set could cause electromagnetic interference with the vehicle's electronic equipment and other systems, resulting in a vehicle breakdown or in a malfunction of electronic equipment. Consult your dealer if you wish to install radio equipment.

Power Take-Off (PTO)

If equipped, the PTO is a device that is used to provide engine power to special equipment directly from the engine or through the transmission. For details about the PTO operation, refer to the separate instruction manual provided by its maker.

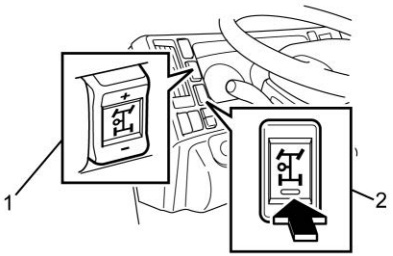
If the optional PTO function is used for long periods of time, make sure to regularly check the diesel particulate filter (DPF) indicator. Automatic DPF regeneration will not take place while the PTO function is active.

PTO Switch

The optional PTO main switch and PTO engine speed control switch are available to support easy integration of special equipment.

When the PTO main switch is pressed, the small light in the switch will illuminate indicating the switch is in the ON position. When the switch is pressed again, the small light will turn off indicating the switch is in the OFF position.

The PTO engine speed control switch is activated when the PTO main switch is ON and will increase the engine RPM when pressed up (+) or decrease engine RPM when pressed down (-).



1. PTO Engine Speed Control Switch
2. PTO Main Switch

⚠ Warning

In PTO mode, Cruise Set/Resume Switch can be used exactly the same as PTO Engine Speed Control Switch. Improper operation of these switches may cause personal injury or damage.

Be sure to review the special equipment maker's manual to understand how the installed equipment will operate along with these optional switches.

When Operating the PTO

For operation of special equipment, see the separate Instruction Manual for Special Equipment.

Installations, or alterations to the original equipment vehicle or chassis, as manufactured and assembled by General Motors, are not covered by this warranty. The body company, assembler, or equipment installer is solely responsible for warranties on the body or equipment and any alterations to any of the parts, components, systems, or assemblies installed by GM. Examples include, but are not limited to, special body installation, such as recreational vehicles, the installation of any non-GM part, cutting, welding, or the disconnecting of original equipment vehicle or chassis parts and components, extension of the wheelbase, suspension, and driveline modifications, and axle additions.

The engine control module (ECM) has the ability to accommodate one of three different PTO modes. Each mode can be programmed to accommodate many PTO devices. Optional PTO switches are available from your dealer to ease installation of a PTO.

The optional PTO main switch and PTO engine speed control switch can be used to increase the engine idle r/min without additional programming. Pressing the PTO main switch once will activate the PTO mode and raise the idle speed up to the preset 800 r/min. Once in PTO mode, the PTO engine speed control switch can be used to adjust the idle speeds between the preset 1,300 and 1,700 r/min. Moving the selector lever from park or neutral, applying the brake pedal or releasing the parking brake will cancel PTO mode and return the engine idle speed to normal. For additional details about PTO programming, contact your dealer.

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General Information

Your authorized dealer has trained technicians and genuine parts to service your vehicle properly. For expert advice and quality service, see your authorized dealer.

California Perchlorate Materials Requirements

Certain types of automotive applications, such as airbag initiators, seat belt pretensioners, and lithium batteries contained in remote keyless transmitters, may contain perchlorate materials. Special handling may be necessary. For additional information, see www.dtsc.ca.gov/hazardouswaste/perchlorate.

Accessories and Modifications

Factory-Approved Accessories

Your dealer can furnish a wide range of comfort, convenience, and safety accessories, especially designed for you and your new truck. They can install all of the safety accessories you will need to comply with local, state and D.O.T. regulations and advise you how to comply with these regulations.

Be sure to ask your authorized dealer about the accessories.

Vehicle Checks

Doing Your Own Service Work

Precautions for Checking and Adjustments

Your authorized dealer has trained technicians and genuine parts to service your vehicle properly. For expert advice and quality service, see your authorized dealer.

⚠ Warning

To help avoid personal injury, take care when doing any maintenance or making any check or repair. Follow manufacturer's instructions for all materials used during service and maintenance of this vehicle. If used or handled improperly, they may be hazardous. Improper or incomplete service can also affect the vehicle and result in personal injury, or damage to the vehicle or its equipment. If you have any questions about carrying out some service, have the work done by a skilled technician.

(Continued)

Warning (Continued)

To prevent personal injury, keep hands, tools and clothing clear of the engine cooling fan when the engine is running.

The engine, exhaust pipe and radiator will be hot immediately after the vehicle is driven. Be careful around these parts to prevent burns. Perform all checks when the engine is cold.

Do not perform work near an open flame or other heat sources.

Do not let the engine run in poorly ventilated garages or sheds. This could cause carbon monoxide poisoning.

Performing maintenance work on a truck or chassis can be dangerous. In trying to do some jobs, you can be seriously injured. Do your own maintenance work only if you have the required know-how and the proper tools and equipment for the job. If you have any doubts, contact your dealer.

You and others could be seriously injured.

Move the parking brake lever to the wheel locked position and move the selector to “P” (models with P-range) or “N” (models without

P-range) and make sure the shift indicator displays “P” (models with P-range) or “N” (models without P-range).

Make sure to turn off the engine and remove the key from the engine control switch before performing any checks.

Select a place with a solid and level surface to perform the checking and maintenance work. Make sure to chock the wheels. It would be very dangerous if the vehicle started to move.

When performing work on the electrical system, begin by turning the engine control switch to the "LOCK" position, wait at least 3 minutes, and then disconnect the negative cable from the negative terminal on battery. If the negative cable is disconnected within 3 minutes, the engine control module may malfunction.

When working on the fuel line or fuel filter, remove the fuel tank filler cap. The fuel system is under pressure and the fuel will overspill unless the pressure is relieved, possibly leading to combustion or a fire.

Do not make engine adjustments yourself. Be sure to consult your dealer.

Use only appropriate tools.

Oils and engine coolant have lubrication, cooling and rust prevention functions. If these liquids deteriorate through loss or contamination, it will cause a decline in the performance of the parts and such problems as seizure or malfunctioning. Replenish or change these liquids when performing the checks (daily and periodic checks) as required by the relevant regulations or in accordance with the Maintenance Schedule (when either the specified driving distance or period of time, whichever comes first, has expired).

Confirm that all systems and components are normal after performing the work.

Do not leave the removed parts or tools in the engine compartment. They could damage the equipment if caught in the belts or other moving components.

Dirty water, dirt and other impurities seriously impair the effectiveness of the oil, grease and fluids, and damage the parts. Exercise all due caution to prevent waste or other refuse from coming in contact with parts or materials that have been removed when changing or replenishing them.

Do not step on the engine or climb onto it. You could cause an engine failure by, for example, damaging the cylinder head cover or various connectors.

Electric Welding

Careless electric welding of vehicle parts can cause welding current to flow back through the vehicle’s ground circuit and damage electrical and electronic parts so that they do not function normally. Whenever electric welding is necessary, consult your dealer.

Cab Tilting

Before Tilting the Cab

⚠ Warning

To help avoid personal injury and property damage:

- Park the vehicle on level ground and check that there is enough space in front of and above the cab.
- Set the parking brake firmly and block the front wheels.

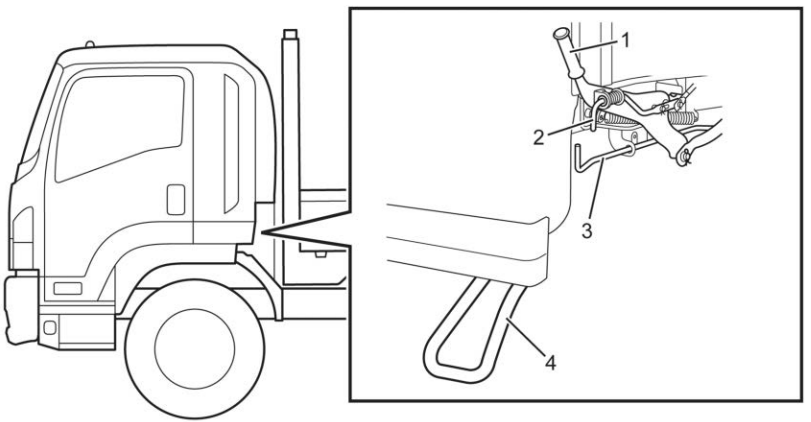
(Continued)

Warning (Continued)

- Move the selector lever in the "P" position (models with P-range) or “N” position (models without P-range).
- Secure loose articles in the cab.
- Stop the engine.
- Close the cab door.
- Keep the area surrounding the cab clear.

You and others could be seriously injured.

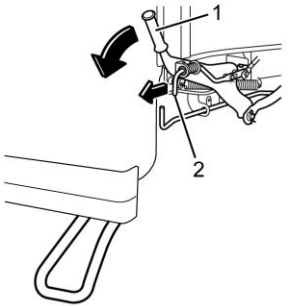
Cab Tilt Levers and Grip



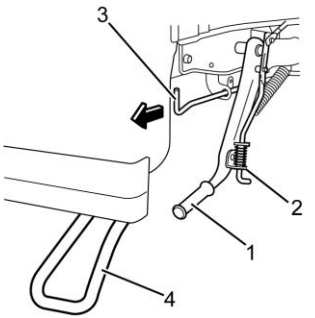
1. Handle
2. Lever
3. Lever
4. Grip

Tilting the Cab

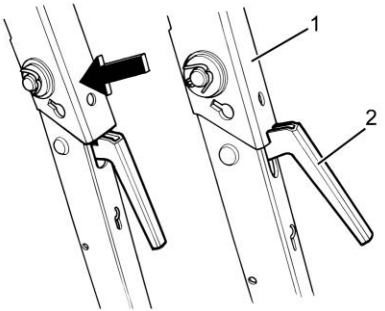
1. Apply the parking brake and make sure the transmission is in the “P” position (models with P-range) or “N” position (models without P-range). Close the doors completely.



2. Pull the lever (2) and pull down the handle (1) to release the cab lock. The cab will rise slightly at this time.



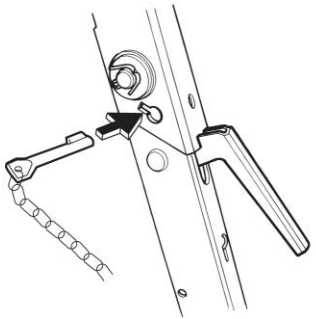
3. While holding the grip (4), pull the lever (3) and slowly lift the cab.



4. Fully lift up the cab and lock the cab support (1) while holding the part indicated by the arrow. When it is locked, it makes a “click” sound. Confirm that the lock (2) of cab support (1) is securely engaged.

⚠ Warning

Do not touch the lock on the tilt support while the cab is tilted. If you touch it, the lock will release and the cab will lower.



5. Insert the lock pin in the hole in the cab support.

⚠ Warning

To help avoid personal injury or death, be sure the tilt cab is securely locked in the tilted position. When performing work with the cab tilted, securely insert the lock pin in the hole first.

⚠ Warning

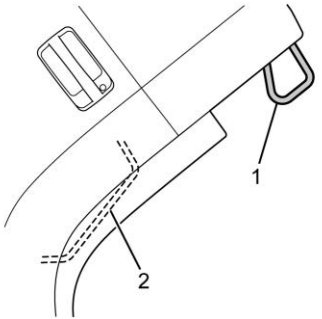
To help avoid personal injury or death, keep hands, tools, and clothing clear of the engine cooling fan when the engine is running.

You and others could be seriously injured.

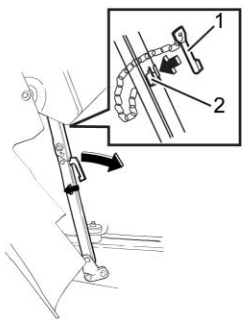
Lowering the Cab

⚠ Warning

- After lowering the cab, make sure the cab is securely locked.
- If the engine control switch is turned to “ON” position when the lock is not completely engaged, the cab tilt warning light will be displayed. See *Cab Tilt Warning Light* ⇨ *61*.



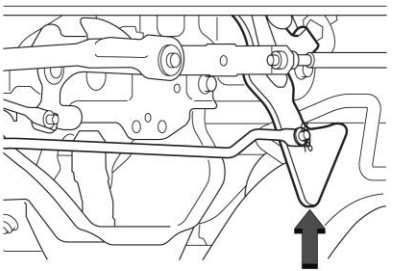
1. Support the cab while holding the grip (1). The vehicle may have a center grip (2).



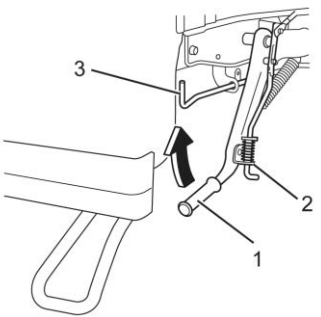
2. Remove the lock pin (1) from the cab support and place it in the holder (2).
3. Pulling the cab support while pressing the lock will cause the cab support to bend, lowering the cab. After the cab support has bent, hold the grip (1) and lower the cab completely.

⚠ Warning

- Do not operate the tilt lock lever while the cab is being lowered.
- When a load is attached to the outside or inside of the cab, or the cab is loaded, be advised that the cab will lower faster.
- Keep body clear of the cab while the cab is being lowered.



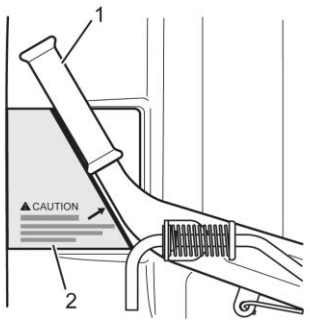
4. Confirm that the lock portion of the lever indicated by the arrow is securely engaged after the cab has been lowered.



5. After the cab is in its lowest position, lift the handle (1) until the lever (2) is fully locked. After operating the handle (1), pull the lever (3) and make sure that the cab cannot be lifted up.
6. Place the engine control switch in the "ON" position and make sure that the cab tilt warning light is not displayed. See *Cab Tilt Warning Light* ⇨ *61*.

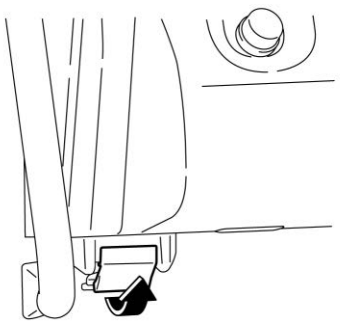
⚠ Warning

To help avoid personal injury or death, confirm the handle (1) is located in locked position as indicated on the cab tilt handle location label (2).

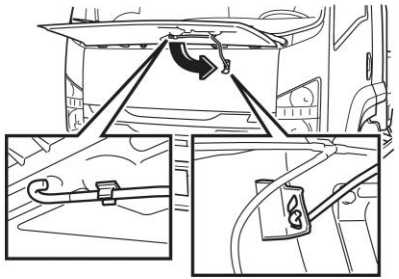


Front Lid

To Open



1. Pull the lever at the bottom left of the instrument panel.



2. To hold the front lid open, take the end of the support rod and fit it securely into the bottom of the hole in the bracket.

⚠ Warning

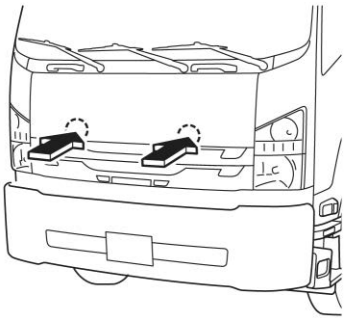
- Do not pull the lever while driving. This is extremely dangerous, because opening the front lid while driving blocks your view.

(Continued)

Warning (Continued)

- When opening the front lid, make sure to place the engine control switch in the LOCK position. Otherwise, your hand could be caught in the windshield wiper link and injured.
- Do not use high pressure cleaning methods for the brake valve and surrounding area inside the front lid. It could damage the brake system.

Do not apply water directly to the air conditioning filter, or the connections for the air conditioning pipe or heater hose inside the front lid. This could cause water to enter the cab.



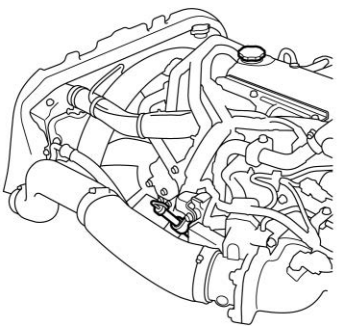
To Close

1. Return the support rod to its original position and close the front lid.
2. Press on the lock locations at the lower portion of the front lid with the palm of your hand to securely lock the lid.
3. Confirm that the front lid is firmly locked.

⚠ Warning

- Confirm that the front lid is firmly locked. A dangerous condition could result if it is not locked. For example, the front lid could fly open while driving, blocking your view.
- Do not use excessive force to close the front lid. Doing so might warp or otherwise damage the lid.

Engine Compartment Overview



Engine Oil

Engine oil is an important factor determining engine performance and longevity. Be sure to use only the specified oil and oil filters. The engine oil level must be checked and the oil should be changed regularly according to the Maintenance Schedule.

The engine oil performs the following important functions:

- It prevents engine parts from becoming worn.
- It cools engine parts.
- It cleans engine parts.
- It seals the combustion chambers and prevents rust.

  Replace the engine oil at regular intervals.

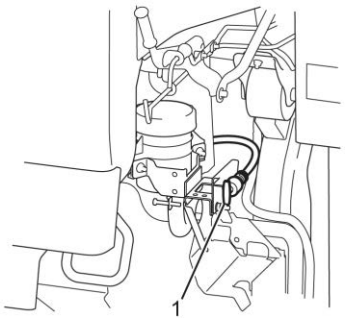
When particulate matter (PM) has accumulated to a preset level in the diesel particulate filter (DPF), the filter is automatically regenerated through combustion. To make this regeneration (combustion) possible, a small amount of fuel is injected into the engine combustion chamber after firing. This causes fuel to gradually become mixed with the engine oil, and the engine oil level may rise beyond the original level. This does not indicate a malfunction of the engine.

Access to the Engine

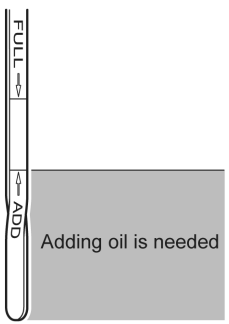
Access to the engine oil dipstick is located on the engine left side after tilting the cab. See *Cab Tilting* ⇨ *182*.

Checking the Engine Oil Level

The engine oil level must be kept at the right level to help assure proper lubrication of your vehicle's engine. It is the owner's responsibility to check the oil level at regular intervals (such as every fuel stop), according to the following instructions. Park the vehicle on a level surface and check the engine oil level before starting or at least 30 minutes after turning off the engine.



1. Remove the oil dipstick (1) and wipe off any oil on the oil dipstick.



2. Reinsert the oil dipstick fully and then gently remove it.

   The oil is at the correct level if the oil level is between the "FULL" and "ADD" marks.

3. If the oil level is too low, add oil to the "FULL" mark.
4. Reinstall the oil dipstick into position after checking the oil level.

Any oil level above the "FULL" mark on the oil dipstick may cause damage to the engine and the aftertreatment system.

The oil level cannot be checked correctly when the engine is running.

If the engine has been running, wait at least 30 minutes before checking.

Adding the Engine Oil

⚠ Warning

When adding oil, be careful not to spill any, but keep a workshop rag handy just in case there are any spills. If any oil should spill

(Continued)

Warning (Continued)

onto the engine, carefully wipe it away. If this precaution is not taken, the spilled oil could ignite and a fire could spread.

Do not leave flammable items, such as rags or gloves, in the engine compartment. They could cause a fire. You and others could be seriously injured.

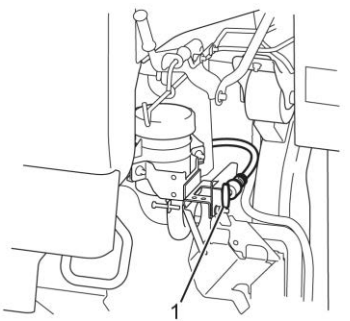
Caution

- Engine oil lubricates and cools the engine's internal components. The quality of the oil is degraded and the quantity of oil is reduced by evaporation, discharge, and combustion during the operation of the engine. Continually using the same oil without checking the level, or without replenishing and changing it could cause seizure or damage to the engine.

(Continued)

Caution (Continued)

- Prevent dirt from entering the filler port when adding the oil. If foreign matter mixes with the oil, it could damage the engine.
- Adding oil above the "FULL" mark on the oil dipstick could result in faulty engine operation. Be sure to check the oil level by using the oil dipstick.
- Failure to use Cummins-recommended engine oil could result in engine or DPF breakdown, or in poor fuel efficiency.



When the engine oil level is near or below the "ADD" mark on the oil dipstick (1), remove the oil filler cap and add oil. Remove the oil dipstick (1) at this time. Use only the specified engine oil.

Engine oil lubricates and cools the engine's internal components. The quality of the oil is degraded and the quantity of oil is reduced by evaporation, discharge and combustion during the operation of the engine. Continually using the same oil without checking the level, or without replenishing and changing it could cause seizure or damage to the engine.

Prevent dirt from entering the filler port when adding the oil. If foreign matter mixes with the oil, it could damage the engine.

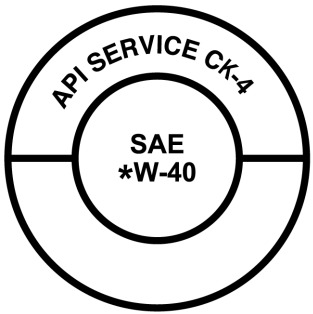
Adding oil above the "FULL" mark on the oil dipstick could result in faulty engine operation. Be sure to check the oil level by using the oil dipstick.

Failure to use Cummins-recommended engine oil could result in engine or DPF breakdown, or in poor fuel efficiency.

Choosing the Right Quality Oil

If you do not use the oil intended for a vehicle equipped with a Diesel Particulate Filter (DPF), both the engine and the DPF may break down and fuel economy may decrease. Be sure, therefore, to use the oil intended for vehicles equipped with DPF.

Oil Identification Logo



A logo (symbol) is used on most oil containers to help you select the oil you should use. The top portion of the logo shows the oil quality by API designations such as CK-4. The center portion of the logo shows the SAE viscosity grade, such as SAE *W-40 (* indicates viscosity on the low temperature side). To determine the viscosity required for your vehicle's diesel engine, see "Engine Oil Viscosity Chart" in this section.

Change Intervals

The oil and oil filter change intervals for your engine are based on the use of recommended oil quality and viscosity, as well as high-quality filters such as Cummins genuine oil filters. Using oil other than recommended, or oil and filter change intervals longer than recommended, could reduce engine life. Damage to engines due to improper maintenance or use of incorrect oil quality and/or viscosity is not covered by warranty. See the Cummins Owner's Manual for warranty details. For information regarding your Cummins Engine, see the Cummins Owner's Manual.

Your engine was filled with a high-quality engine oil when it was built. You do not have to change this oil before the first recommended change interval. Oil and filter change intervals depend on how you use your vehicle. For information on the proper oil and filter change intervals. See *Maintenance Schedule* ⇨ *255*.

Engine Oil Additives

Engine oils contain a variety of additives. Your engine should not need any extra additives if you use the recommended oil quality and change intervals.

⚠ Warning

Used engine oil contains harmful contaminants that have caused skin cancer in laboratory animals. Avoid prolonged skin contact. Clean skin and nails thoroughly using soap and water–not mineral oil, fuels or solvents. Launder or discard clothing, shoes or rags containing used engine oil.

Engine Oil Viscosity Chart

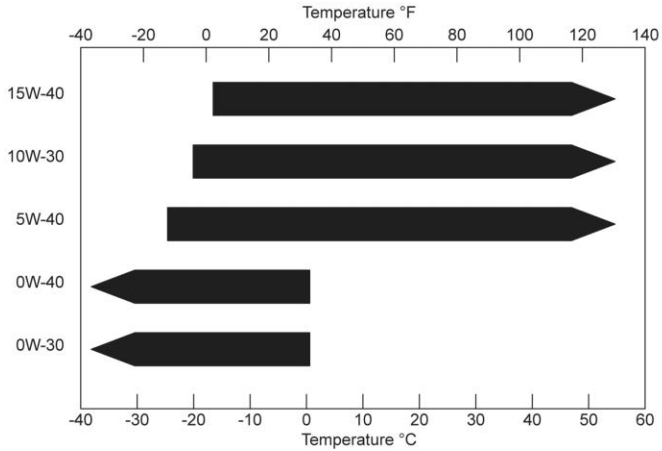
Select appropriate engine oil in accordance with the table below. It is also important to select the viscosity appropriate for the temperature at which your vehicle operates. Use the following table for making correct selections.

Engine oil viscosity (thickness) has an effect on fuel economy and cold-weather starting. Lower viscosity engine oils can provide better fuel economy; however, higher temperature weather conditions require higher viscosity engine oils for satisfactory lubrication.

When choosing an oil, consider the range of temperature your vehicle will be operated in before the next oil change. Then, select the recommended oil viscosity from the chart.

Do not use any viscosity of oil not recommended. Such oils could cause engine damage.

Recommended SAE Oil Viscosity Grades vs Low Ambient Temperatures



This Engine Oil Viscosity Grade Chart shows general information.

For this vehicle, oil with *W-40 viscosity is recommended.

Changing the Engine Oil and Oil Filter

Engine oil and the oil filter are important factors in engine performance and lifespan. Be sure to use only the specified oil and oil filters. The engine oil level must be checked and the oil should be changed regularly according to the Maintenance Schedule.

Use the oil quantities indicated below only as guidelines when changing the engine oil. After changing the oil, make sure the oil is at the required level.

Failure to use Cummins-recommended engine oil could result in engine or DPF breakdown, or in poor fuel efficiency.

Engine oil change precaution:

- When adding oil, remove the dipstick.
- After adding oil, wait for at least 5 minutes before starting the engine. Be sure to reinstall the dipstick.

Discarded Parts, Oils and Other Liquids

When changing oils, filters, engine coolant or other liquids, be sure to have a container ready in advance for their disposal.

Use methods conforming to legal requirements for discarding or disposing of parts, oils, filters or engine coolant after change or replacement.

Do not dispose of used engine oil, fuel or any other oil in a careless manner such as pouring it on the ground, into sewers, or into streams or bodies of water. Instead, recycle it by taking it to a used oil collection facility which may be found in your community.

Automatic Transmission Fluid

⚠ Warning

Overfilling of the automatic transmission can cause the fluid to be "PURGED" out of the breather hose onto the hot engine parts and can cause a fire.

You and others could be seriously injured.

Both quality and quantity of fluid are important factors that have a significant influence on the performance and durability of the automatic transmission. Be sure to use only the dealer recommended fluid for replenishment, and observe the specified fluid level.

Too much or too little transmission oil could damage your transmission. Too much could cause your transmission to overheat and fluid to spill out from the breather hose. Be sure to get an accurate reading if you check your transmission fluid.

When cleaning around the dipstick and guide tube, make sure that you thoroughly wipe away all of the dirt and dust etc. Failure to do so may cause a fault in the transmission.

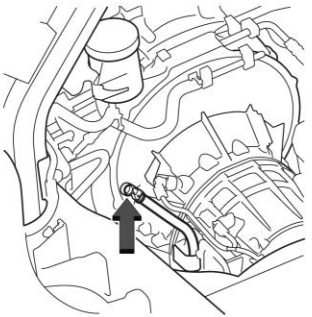
Do not let coolants (ethylene glycol type), water based substances, or other fluids etc., mix with the fluid. Otherwise, degraded performance and faulty operation of the system will result.

Checking the Automatic Transmission Oil level

This operation could be difficult and you may choose to have this done at your dealer.

If you choose to do it yourself, then be sure to follow all the instructions below or you could get a false reading on the dipstick.

Position of the Dipstick



The dipstick is located to the left side of the automatic transmission at the rear of the engine. Tilt the cab up to inspect it.

How to Check and What to Use

The Allison Automatic Transmission® Operator's Manual shows how to check the automatic transmission fluid and what fluid to use. For information regarding your Allison Transmission, see Owners>Owner Manuals>Manuals and Guides on www.chevrolet.com.

Engine Air Cleaner/Filter

Air Cleaner

Use of clogged air cleaner element not only reduces engine output but also causes increased fuel consumption and an increased Diesel Particulate Filter (DPF) regeneration frequency.

Be sure to use a genuine air cleaner element. If other air cleaner element is used, it may cause the sensor to output a wrong signal.

See *Maintenance Schedule* ⇨ *255*.

Air Cleaner Indicator Light

When the air cleaner indicator light comes on, check the air cleaner element. If the air cleaner element is clogged, replace the air cleaner element.

See *Vehicle Messages* ⇨ *66*.

See *Maintenance Schedule* ⇨ *255*.

Engine Coolant

⚠ Warning

If your engine cooling system overheats, see *Engine Overheating* ⇨ *198*. Continued operation of the engine even for a short time may result in a fire and the possibility of personal injury and/or severe vehicle damage.

You and others could be seriously injured.

Your vehicle has an engine coolant recovery system, expansion bottle and/or an engine coolant reserve tank system. Engine coolant in the system expands with heat and overflows into the reserve tank. When the system cools, engine coolant is drawn back into the radiator.

The engine cooling system has been filled at the factory with a quality engine coolant. It is important to use the proper 50/50 mixture high quality water and coolant (rather than plain water) to prevent damage to engine cooling system components. See *Recommended Fluids and Lubricants* ⇨ *278*.

See the Maintenance Schedule to find out when the engine coolant must be replaced. Note that changing the engine coolant is necessary to replenish the rust inhibitors to make certain that all parts of the engine cooling system work well.

⚠ Warning

Check, replenish or change the engine coolant only after the engine has sufficiently cooled down.

Do not loosen or remove the sub tank pressure cap or reserve tank cap when the engine coolant is still hot. Hot vapor or boiling water may burst out and cause a burn.

(Continued)

Warning (Continued)

When removing the sub tank pressure cap or reserve tank cap, use a thick cloth to cover the cap and turn it slowly.

Engine coolant is toxic and must not be ingested. If the engine coolant is mistakenly ingested, seek prompt medical attention.

If the engine coolant gets in your eyes, rinse your eyes immediately with a large amount of water for 15 minutes or longer. Also, if your eyes are still irritated or otherwise feel abnormal, seek immediate medical attention.

If the engine coolant gets on your skin, rinse it off using a soap with a large amount of water. Also, if abnormality is seen, seek medical attention.

Engine coolant is flammable, and therefore, it must be kept away from flames and other heat sources. Engine coolant also could ignite if it comes in contact with a hot surface, such as the exhaust manifold. Exercise caution to prevent this from happening.

(Continued)

Warning (Continued)

You and others could be seriously injured.

Preparing Engine Coolant

To prevent engine damage due to freezing of the engine coolant and to protect the cooling system from corrosion, use the proper 50/50 mixture high quality water and coolant, rather than plain water. If the engine of the vehicle is at −30 °C (−22 °F) or above, the coolant concentration should be 50%. Direct use of "50/50 Pre-diluted" product which is already diluted to 50% concentration is recommended. If the engine or vehicle is used at −30 °C (−22 °F) or below, coolant concentration of 50% is recommended.

Use only the recommended coolant. See *Recommended Fluids and Lubricants* ⇨ *278*.

It is the owner's responsibility to:

- If the engine or vehicle is used at -32 °C (-25 °F) or below, see the Cummins Owner's Manual.
- Maintain the engine cooling system freeze protection to ensure protection against corrosion and loss of engine coolant from boiling. Periodic replacement of engine coolant is needed to replenish the anticorrosion additives that wear out with use. Engine coolant that has become dark in color shows that it needs to be changed.
- Do not use methanol-base antifreeze, alcohol or plain water alone in your vehicle at any time. They will boil at a lower point than that at which the engine coolant temperature gauge will warn of overheating, and they do not provide proper protection against corrosion.

Engine Coolant Quantity

For the quantity of engine coolant, see *Capacities and Specifications* ⇨ *286*. After changing the engine coolant, check that the engine coolant is up to the specified level.

⚠ Warning

For storage, close the cap of coolant container securely and keep it in a place inaccessible to children.

You and others could be seriously injured.

Using any coolant other than recommended above and in the Cummins Owner's Manual could cause damage to the engine, radiator or heater core. In particular, use of coolants containing borate salts or silicates may result in engine or radiator corrosion, causing engine coolant leaks and other problems.

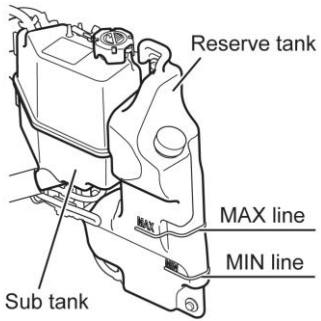
To dilute the coolant, use distilled water or deionized water.

Do not use the coolant at any coolant concentration other than that specified. If the coolant concentration is 60% or higher, overheating is likely to occur, while if it is 40% or lower, anti-corrosion function is not provided sufficiently.

Using coolant at any coolant concentration other than that specified may reduce anti-freezing performance, and engine coolant may freeze.

If the engine coolant decreases rapidly, stop the vehicle in a safe place and contact your dealer.

Checking the Engine Coolant Level



The engine coolant reserve tank is located behind the cab.

When the engine has cooled down, check to see the fluid level in the engine coolant reserve tank is between the MAX and MIN lines.

If the fluid level is lower than the MIN line, add the coolant to the MAX line. See "Adding Engine Coolant" later in this section.

Check the radiator and the radiator hose for water leakage.

Check to see if there is any trace of water or coolant leakage on the ground where the vehicle was parked. If you find water or coolant leakage, contact the nearest dealer.

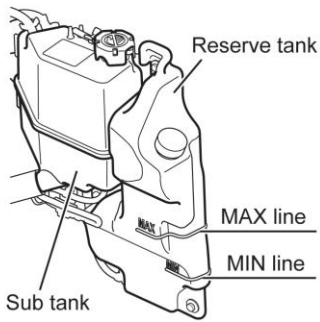
⚠ Warning

If your engine cooling system overheats, see *Engine Overheating* ⇨ *198*. Continued operation of the engine even for a short time may result in a fire and the possibility of personal injury and/or severe vehicle damage.

You and others could be seriously injured.

The sub tank pressure cap does not need to be removed.

Adding Engine Coolant



When the engine coolant level in the engine coolant reserve tank is below the MIN line, open the reserve tank cap and fill to near the MAX line with engine coolant. Tighten the cap securely after the engine coolant has been replenished. Then take the following steps:

1. Check that the engine is sufficiently cooled.
2. Check that the coolant drain cocks of the radiator and the engine are closed.
3. Remove the sub tank pressure cap by turning the cap slowly and allowing any pressure to be relieved before completely lifting the cap.
4. Add coolant with the appropriate concentration to the top of the sub tank opening.

   If the sub tank was empty when opened, then after adding the coolant, squeeze the upper radiator hose several time to remove any trapped air.
5. Install and tighten the sub tank pressure cap.
6. Run the engine until the engine coolant temperature rises to normal level and idle the engine for 10 minutes.

7. Turn off the engine. Allow the engine to cool. Remove the sub tank pressure cap and check the coolant level. Add coolant again, if needed.
8. Install and tighten the sub tank pressure cap.

Check, replenish or change the engine coolant only after the engine has sufficiently cooled down.

When the engine is still hot, take care to prevent engine coolant from contact with the exhaust manifold. Any such contact could result in exhaust manifold damage.

If you use the proper quality engine coolant, there is no need to add extra inhibitors or additives which claim to improve the system. They may be harmful to the proper operation of the system.

Do not overfill the engine coolant reserve tank.

If the level of engine coolant changes rapidly, have your vehicle inspected at your dealer.

Thermostat

The engine coolant temperature is controlled by thermostat(s). The thermostats stop engine coolant flow through the radiator until a preset temperature is reached. The thermostats are installed in the engine coolant outlet on the engine block. The same thermostats are used in both winter and summer.

Sub Tank Pressure Cap

The sub tank pressure cap, a 108 kPa (15.7 psi) pressure type, must be installed tightly, otherwise engine coolant may be lost and damage to the engine may result from overheating. The sub tank pressure cap should be checked periodically for proper operation. If a replacement is required, a genuine GM part is recommended.

Engine Overheating

When the Engine Overheats

The engine cooling system may overheat if the engine coolant level is too low, if there is a sudden loss of engine coolant (such as radiator hose failure), or if other problems occur. It may also temporarily overheat during severe operating conditions such as:

- Climbing a long hill on a hot day.
- Stopping after high-speed driving.
- Idling for long periods in traffic.

If engine power drops and the needle on the engine coolant temperature gauge goes up above the upper limit of the safety zone and enters the "H" zone, the engine is overheating. The engine overheat warning light will come on and the warning buzzer will sound. Either steam or boiling engine coolant will squirt out of the radiator. The vehicle will also have an “OVER HEAT” message displayed. Take the following corrective actions immediately.

⚠ Warning

To help avoid being burned:

Do not tilt the cab or open the engine access cover if you see or hear steam or engine coolant escaping from the engine compartment. Wait until no steam or engine coolant can be seen or heard before tilting the cab or opening the engine cover.

Do not remove the sub tank pressure cap or reserve tank cap if the engine coolant in the tank is boiling. Also do not remove the sub tank pressure cap while the engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if either cap is taken off too soon.

You and others could be seriously injured.

If Steam Is Coming from the Engine Compartment

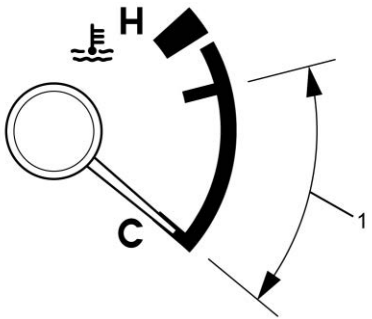
⚠ Warning

If the engine coolant temperature gauge shows an overheat condition or you have other reasons to suspect the engine may be overheating, continued operation of the engine (other than as described here) even for a short period of time may cause a fire and the result in personal injury and severe vehicle damage. Take immediate action as outlined.

You and others could be seriously injured.

If you see or hear escaping steam or have any other reason to suspect there is a serious overheat condition, stop and park the vehicle as soon as it is safe to do so, turn on the hazard warning flasher and then turn off the engine immediately and safely exit the vehicle.

If Steam Is Not Coming from the Engine Compartment



1. Safety Zone

If the engine coolant temperature gauge shows an overheat condition, or you have reason to suspect the engine may be overheating, take the following steps:

1. Operate the hazard warning flasher and pull the vehicle immediately over to a safe place that does not impede traffic and park it.
2. Idle the engine and wait until the engine coolant temperature drops to safety zone. If your air conditioner is on, turn it off. And turn on the heater to help the engine expel heat.
3. When the needle of the engine coolant temperature gauge returns to the middle of the safety zone, stop the engine. If the needle of engine coolant temperature gauge does not drop inside into the safety zone, turn the engine off and have your vehicle serviced at the nearest dealer.

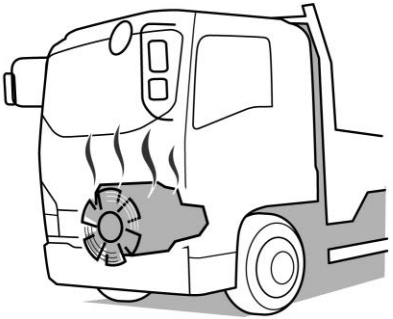
   When the cooling fan for the radiator is not turning, turn off the engine immediately.

⚠ Warning

Even when the engine has been stopped, the engine coolant in the radiator remains under pressure. Immediately removing the radiator cap could cause steam or hot water to blow out, and you could be scalded as a result. The engine coolant in the reserve tank may also be hot. Immediately removing the cap could cause hot water to blow out, and possibly scald you. Perform inspection, refilling, and replacement of coolant only when its temperature has cooled.

When removing the radiator cap and reserve tank cap, use a thick cloth to cover the cap and turn it little by little.

You and others could be seriously injured.



4. If no steam or engine coolant can be seen or heard from the engine compartment:
   - Tilt the cab.
     - If the engine coolant is boiling, wait until it stops before proceeding.
     - Look at the see-through reserve tank. The engine coolant level should be between the "MAX" and "MIN" lines on the reserve tank.
     - If necessary, pour engine coolant (See *Engine Coolant* ⇨ *195* for the proper coolant and water mixture) into the reserve tank only, not directly into the sub tank. Also, do not check engine coolant level at the radiator.
   - Make sure the fan belts are not broken, or off the pulleys, and that the fan turns when the engine is started. Make sure the fan blade and pulleys are not broken.
   - Check the radiator hoses and connections, heater hoses and connections, radiator, water pump, EGR cooler, and SCR system and hoses for leakage.

     If you do not find a leak or other problem, carefully add engine coolant to the reserve tank.

     If the engine coolant level in the reserve tank is at the correct level but there is still an indication on the instrument panel of an overheat condition:

     You must let the engine cool first. You may then add engine coolant directly to the sub tank. See “Adding Engine Coolant” under *Engine Coolant* ⇨ *195*.

5. Inspect to see if there is any dirt, etc. attached to the front surface of the radiator. Also, inspect to see if there is anything blocking the core. If there is anything attached, clean and remove it.
6. After the inspection, regardless of the vehicle condition, please contact the nearest dealer.

Once the engine coolant temperature gauge no longer signals an overheat condition, you can resume driving at a reduced speed. Return to normal driving after about 10 minutes if the gauge pointer does not again show an overheat condition.

When tap water only has been used for engine coolant in an emergency, change the engine coolant as soon as possible.

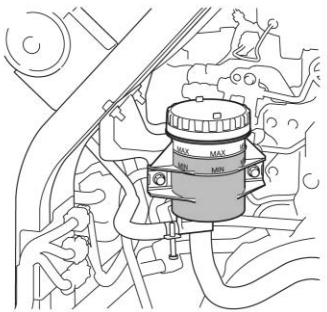
Engine damage may be caused if an overheating engine is suddenly refilled with water. Instead, refill slowly.

Power Steering Fluid

The power steering fluid level must be checked and it must be changed according to the Maintenance Schedule. See *Maintenance Schedule ⇨ 255*.

When replenishing power steering fluid or flushing the power steering system, always use ATF (Dexron®-VI). Failure to use the proper fluid may damage the power steering system seals and hoses, leading to fluid leakage.

Checking the Power Steering Fluid Level



The fluid level is correct if it is between the "MAX" and "MIN" lines on the reserve tank. If the level is lower that the "MIN" line, add fluid up to the "MAX" line.

The reserve tank is located at the rear of the engine compartment on the left. When you have finished checking the fluid level, securely install the cap and cover.

When you have finished checking the fluid level, securely install the cap.

⚠ Warning

Before adding fluid, clean the area around the cap and pour fluid from a clean jug or filler. Foreign matter getting in the tank may cause power steering system failure.

Do not mix the recommended power steering fluid with fluids of other brands. Due to chemical reactions, any mixture of differently branded fluids may cause failure of the system.

You and others could be seriously injured.

Washer Fluid

Windshield Washer Fluid

The windshield washer is located on the windshield wiper arm.

Check the level of fluid in the windshield washer fluid tank. In addition, spray windshield washer fluid and operate the windshield wipers to check for any areas not properly wiped. At this time, also check the spraying condition of the windshield washer.

Inspect the washer fluid level regularly, especially during bad weather conditions.

Use a high quality premixed solvent available at most dealers or service stations.

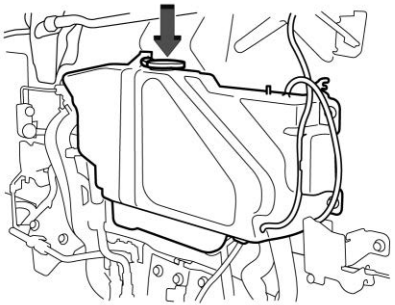
Avoid hard water when mixing windshield washer solvents. Hard water contaminants may plug openings in the washer system and reduce performance.

Do not use radiator antifreeze in the windshield washer; it could cause cab paint damage.

In cold weather, warm the windshield with the defrosters before using the washer, to help prevent icing that may block the driver's vision.

Refilling Windshield Washer Fluid

1. Open the front lid. See *Maintenance Schedule* ⇨ *255*.



2. Open the cap (black) and fill the washer tank with windshield washer fluid up to the opening of the tank. The capacity of the tank is approximately 5 Liters (1.32 US Gal/1.1 Imp Gal.).

Upon factory shipment, new vehicles contain only tap water in the washer fluid tank. Adjust the concentration of the fluid to suit your own usage.

Follow the instructions provided with the windshield washer fluid regarding the ratio for mixing with tap water.

Poor quality products, engine coolant, and soapy water must not be used. Failure to observe this precaution can result in nozzle blockage or damage to painted surfaces.

The washer should never be used while the tank is empty. Operating the washer with the tank empty can result in motor damage.

Brakes

For the most effective braking and for maximum life from brake system components, follow these suggestions:

- Keep any obstructions from interfering with brake pedal travel.
- Keep tires properly inflated. Improperly inflated tires can reduce the efficiency of the brakes.

Follow the recommendations for brake checks in the Maintenance Schedule.

GM replacement brake lining material is recommended for this vehicle to maintain the balance between front and rear brake performance. GM replacement brake parts have been carefully selected to provide the proper brake balance for purposes of both stopping distance and controllability over the full range of operating conditions.

Installation of front or rear brake lining material with performance different from that of the replacement parts recommended for this vehicle can change the intended brake balance of this vehicle.

Air Tanks

There are two air tanks on your vehicle. One is behind the rear axle and the other is between the front and rear axles near the exhaust pipe. These tanks, over time, may accumulate water. You must drain them by pulling the lanyard attached to the drain tap at the bottom of the air tank to discharge the water.

After discharging water, check that air is not leaking from the drain tap.

If a large volume of water drains from an air tank, the desiccant replacement is necessary, have it performed by the nearest GM dealer.

⚠ Warning

- Exhaust components may be hot and cause burns, so, use extreme caution near hot exhaust components.

(Continued)

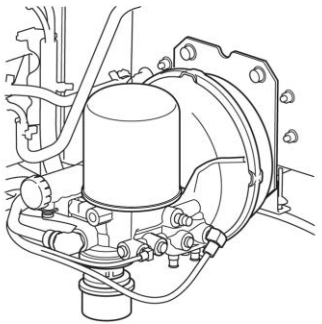
Warning (Continued)

- Avoid touching hot exhaust components.
- Do not leave the drain tap of the air tank open for an extended period of time if your vehicle is equipped with an air suspension. Doing so is dangerous since the vehicle lowers.
- Water collecting in the air tank may cause moisture to freeze inside the air piping in winter. This is very dangerous because the air compressor may fail and as a result, sufficient braking forces may no longer be available.
- The lanyard for air tank located between the front and rear axles is very close to the exhaust system. Exhaust components may be hot and cause burns, so, use extreme caution near hot exhaust components
- Avoid touching the hot exhaust components when reaching for and pulling the air tank drain tap lanyard.

For air tanks installed at other locations, perform the water draining procedure described above.

There are three air tanks that should be checked for moisture. The primary, the secondary, and the air dryer purge tanks all have drain valves.

Air Dryer

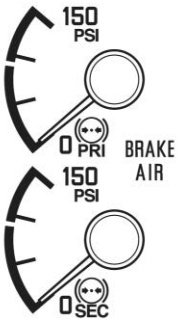


Change the desiccant and the filter's rubber parts of the air dryer at the intervals specified by the Maintenance Schedule. Take care to ensure that the drain port is not blocked or obstructed by foreign material.

The air dryer removes moisture and oil that is present in the vehicle's air piping by means of an inside desiccant.

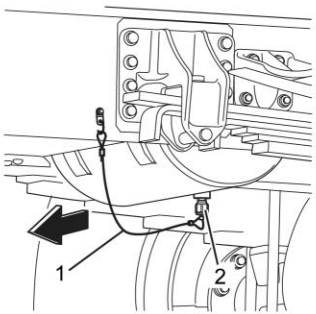
If water and oil is discharged when the drain tap on the air tank is opened for checking, the desiccant has deteriorated and needs to be changed. Desiccant replacement requires disassembling of the relevant components, so you should have it done by the nearest GM dealer.

Brake Air Pressure



1. Check the brake air pressure gauges to see that the primary and secondary air systems are charged with air to proper pressures.

Typical brake air pressure
690 - 896 kPa (7.0 - 9.1 kgf/cm²/**100 - 130 psi**)



2. Confirm the parking brake is fully engaged. There are two air tanks on your vehicle. One is behind the rear axle and the other is between the front and rear axles. Pull the lanyard attached to the drain tap at the bottom of each air tank. Allow the air in each tank to be dischared.

BRAKE AIR

Brake Air Pressure Warning Light

3. Start and run the engine at idle. The brake air systems are in order if the brake air pressure increases to the typical air brake pressure shown above, the Air Dryer discharge valve opens and the brake air pressure warning light goes out.

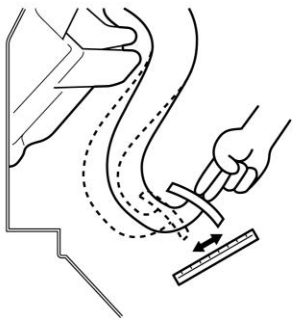
The amount of time before the brake air pressure warning light goes out may vary depending on the temperature and other environmental conditions. However, you should contact the nearest dealer if air pressure does not increase at all or the brake air pressure gauges show different pressures after the Air Dryer discharge valve opens.

⚠ Warning

Do not operate the vehicle while any of the pressure gauge needles are in the red zone or the brake air pressure warning light is on. Brakes are then not fully functional, and it is dangerous to operate the vehicle.

Brake Pedal

Free Play



Press the brake pedal with two fingers to check that the pedal free play is proper and the pedal moves smoothly without abnormal interference.

Free play (measured at the tip of pedal)
10 - 18 mm (0.39 - 0.71 in)

Brake Valve Operation

Release the brake pedal after stepping on it to check that an air release sound comes from the exhaust hole at the brake valve and the pedal fully returns to the released position.

Brake Performance

Drive the vehicle slowly on a dry road and apply the brakes. Check that the brakes are working fully and does not pull on one side.

A brake performance check should be performed on a wide road with good visibility while paying adequate attention to the traffic behind your vehicle and the overall surroundings.

A small amount of brake squeak is normal.

Drum brakes do not have a brake lining wear indicator to cause a squeak or squeal.

Brake Lines and Pipes

Inspection

With the steering wheel turned fully to the left, check the left front brake line and pipe visually and by touch, making sure that they are free of scratches, cracks and bulging. Also make sure that the line and pipe do not interfere with any chassis part or wheel, and that their joints are not leaking and are free of any type of damage. Check the right front brake line and pipe in the same way. The rear left and right brake lines and pipes should also be checked in the same manner.

Drum Brakes

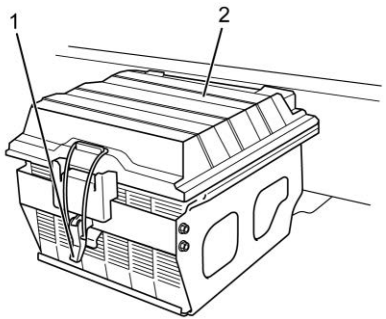
If the brake shoe linings wear out beyond their usable limit, not only will the brake performance be impaired, but brake components could also fail.

⚠ Warning

Do not drive with brake shoe linings worn out. Excessively worn brake shoe linings may cause breakdown of brake components and poor braking performance and may result in a crash.

Battery - North America

Working Near Battery



The batteries are located on the outboard side of the right frame rail, behind the cab. The batteries are in a carrier with the cover (2) retained by spring clips (1).

⚠ Danger

Follow the precautions listed in the jump starting Danger (see "When the Battery is Discharged") when working on or near the battery. Personal injury (particularly to

(Continued)

Danger (Continued)

eyes) or property damage may result from battery explosion, battery fluid or electrical (short circuit) burns. You and others could be seriously injured or killed.

Do not disconnect either battery for at least 15 minutes after turning the engine control switch to the "LOCK" position. Otherwise, the Diesel Exhaust Fluid (DEF) system may be damaged.

Checking the Battery

Your new vehicle is equipped with maintenance free batteries. They need no periodic electrolyte level maintenance. Its top is permanently sealed (except for two small vent holes) and has no filler caps. You will never have to add water. Remember to check and recharge the battery as necessary, as well as keep connection clean.

The hydrometer (green-eye test indicator) in the top of each battery (if equipped) provides information for testing purposes only.

If the vehicle is not going to be driven for 30 days or longer, disconnect the ground cable from the negative (–) terminal of the batteries to prevent discharge.

For full power needs at replacement time, a battery with the same specifications, as shown on the original battery's label, is recommended.

⚠ Warning

WARNING: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Batteries also contain other chemicals known to the State of California to cause cancer. **WASH HANDS AFTER HANDLING.** For more information go to www.P65Warnings.ca.gov/passenger-vehicle.

See *California Proposition 65 Warning* ➪ *1*.

Fuel Filter

Change the fuel filter in accordance with the Maintenance Schedule or when the fuel filter indicator light (amber) comes on.

Drain the water when the water separator (fuel filter) warning light comes on. (Drain the water from the chassis-side fuel filter and engine-side fuel filter.)

Failure to replace the fuel filter when needed may lead to fuel system damage. Your authorized dealer can inspect your fuel filter and replace your fuel filter, if needed.

Water Separator

The purpose of the water separator is to separate any water that may have formed in the fuel tank due to condensation.

The water separator is located on the bottom of the chassis side fuel filter.

Water Separator (Fuel Filter) Warning Light

When a certain amount of water has collected in the water separator, the water separator (fuel filter) warning light comes on.

When this happens, drain the water and make sure that the warning light has gone out.

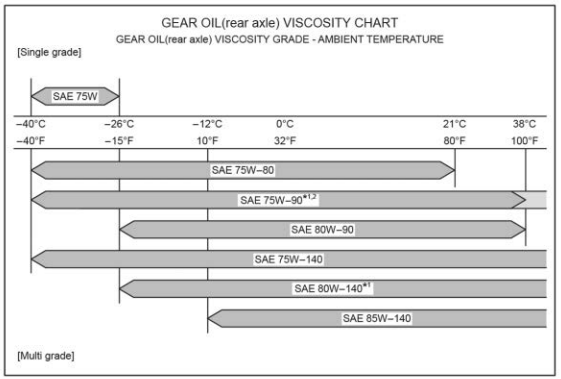
Remaining water that is not discharged from the water separator could freeze and damage the vehicle.

If the warning light comes on while the engine is in operation, promptly drain the water from the water separator (fuel filter). Continuing to drive with the light remaining on could damage the fuel injection system. If this happens, have the vehicle checked and serviced by the nearest dealer.

Rear Axle (Gear Oil Viscosity Chart)

Gear Oil Viscosity Chart

Select appropriate gear oil in accordance with the table below. It is important to select the viscosity appropriate for the temperature at which your vehicle operates. Use the following table for making correct selections.



*1: Use is available in the axles of synthetic gear lubricants.
*2: Use is possible at ambient temperatures of up to 120°F (49°C) in the case of BASF oils.

This Gear Oil Viscosity Grade Chart shows general information.

Rear Axle (Oil Level Check)

Rear Axle Differential Gear Oil

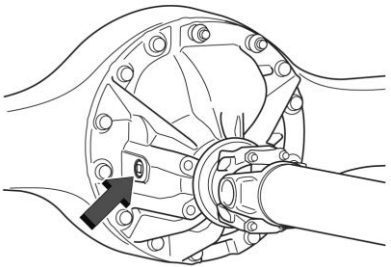
The rear axle differential gear oil level must be checked and it must be changed according to the Maintenance Schedule. See *Maintenance Schedule* ⇨ *255*.

Use the oil quantities indicated later in this section only as guidelines when changing the rear axle differential gear oil.

For axles without drain plugs, a carrier bolt is used to drain the oil. There is a carrier bolt on the lower section of the front of the axle with “Drain” stamped next to it. Remove this carrier bolt and drain the oil. Tighten the carrier bolt to the specified torque. Carrier bolt tightening torque is 193–214 Nm (19.7–21.8 kgFm/142–158 lb ft).

After changing the oil, ensure that it is at the correct level.

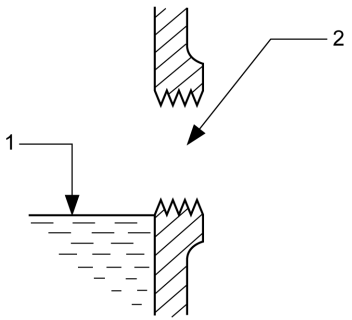
Drained oil must be disposed of in a method conforming to the regulatory requirements in your state.



Checking the Oil Level

1. Clean the filler plug area before removal.

2. Remove the filler plug.



3. Check that the oil level (1) is up to the lower edge of the filler plug hole (2). If the oil level is too low, add oil through the filler plug hole.
4. Fasten the filler plug to the specified torque. Plug tightening torque is 54 – 82 Nm (5.5 – 8.3 kgf-m/40 – 60 lb ft).

Wipe off any dirt on the plug before reinstalling it.

Noise Control System

NOISE EMISSIONS WARRANTY

General Motors LLC, warrants to the first person who purchases this vehicle for purposes other than resale and to each subsequent purchaser that this vehicle as manufactured by General Motors LLC, was designed, built and equipped to conform at the time it left General Motors LLC's control with all applicable U.S. EPA Noise Control Regulations. This warranty covers this vehicle as designed, built and equipped by General Motors LLC, and is not limited to any particular part, component or system of the vehicle manufactured by General Motors LLC. Defects in design, assembly or in any part, component or system of the vehicle as manufactured by General Motors LLC, which, at the time it left General Motors LLC's control, caused noise emissions to exceed Federal standards, are covered by this warranty for the life of the vehicle.

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof:

1. The removal or rendering inoperative by any person, other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use; or
2. the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below.

Insulation:

Removal of the noise shields or any undercab insulation.

Engine:

Removal or rendering engine speed governor, if so equipped, inoperative so as to allow engine speed to exceed manufacturer specifications.

Modification of the engine control system or calibration.

Fan and Drive:

- Removal of fan clutch or rendering clutch inoperative.
- Removal of the fan shroud.

Air Intake:

- Removal of air cleaner silencer.
- Reversing air cleaner cover.

Exhaust:

- Removal of muffler, catalytic converter, and/or resonator.
- Removal of exhaust pipes and exhaust pipe clamps.
- Removal or modification of Diesel Particulate Filter (DPF).
- Removal or modification of Selective Catalytic Reduction (SCR) Catalyst.

Automatic Transmission Shift Lock Control Function Check

When Starting Your Vehicle

The selector lever can only be moved from the "P" position when sufficient brake air pressure exists and the brake pedal is pressed. Always firmly press the brake pedal before attempting to move the selector lever from "P" to any other position.

When Parking Your Vehicle

The key cannot be removed unless the selector lever is securely placed in the "P" position (key interlock system). Be sure to place the selector lever in the "P" position when parking the vehicle.

The shift lock system is a system for safety to prevent incorrect operation of the automatic transmission model. Use it correctly and drive safely.

If You Cannot Move the Selector Lever from the “P” Position

(Models with ALLISON2550RDS Model Transmission)

If you cannot move the selector lever from the "P" position after the engine is started and the brake air pressure is increased, follow the section below to perform the necessary checks.

Caution
When the selector cannot be operated from the P position to any other position even after performing the operation below repeatedly, the shift lock system may have a failure. Have the vehicle inspected at your dealer.

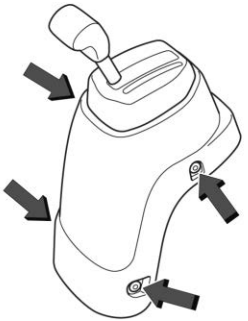
Check that you are firmly pressing the brake pedal. Also, check that the brake air pressure warning light and buzzer are not operated. When the brake pedal is not pressed or there is insufficient brake air pressure to apply the service brakes, the shift lock system operates and the selector lever cannot be shifted from "P" to any other position.

If your vehicle is parked on a downhill slope, the push operation of the selector lever may become heavy to move. In this case, you can operate the selector lever more smoothly by pushing the selector lever toward the front of the vehicle while pushing the button.

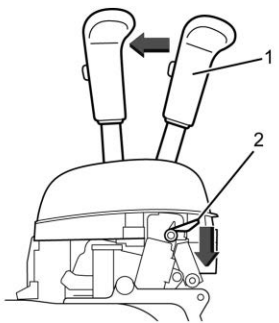
If the selector lever cannot be moved from "P" to other positions after performing the instructions given above a number of times, it is likely that the shift lock function is faulty. Immediately contact the nearest dealer for inspection. Only in the event of an emergency, carry out the procedure below.

When performing the below operations, make sure the parking brake is applied and wheels are blocked with chocks.

1. Apply the parking brake lever. Make sure to shut down the engine and block the wheels with chocks.



2. Remove the selector lever cover by removing the four push rivets and lifting it up.

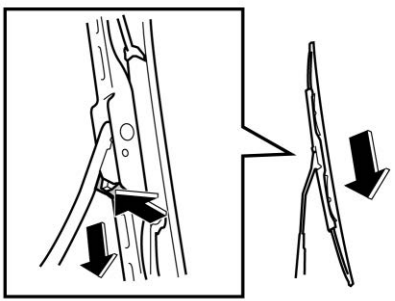


3. Move the selector lever (1) to the "N" position while pressing the release lever (2).

When reinstalling the selector lever cover, perform the procedure above in reverse order.

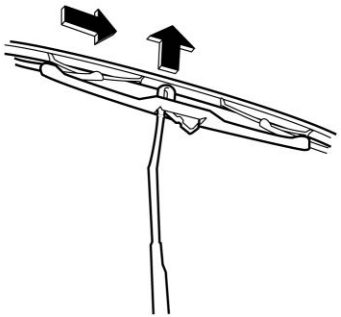
Wiper Blade Replacement

Caution
Allowing the wiper arm to touch the windshield when no wiper blade is installed could damage the windshield. Any damage that occurs would not be covered by the vehicle warranty. Do not allow the wiper arm to touch the windshield.

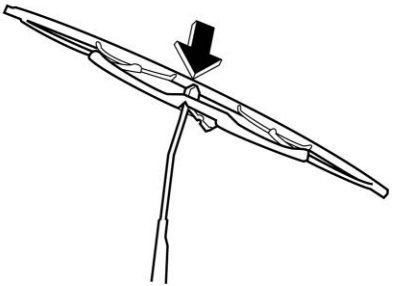


Removal

1. Pull the wiper arm up to the vertical position.
2. While pressing the wiper-blade hook toward the arm, slide the blade downward toward the base of the arm.

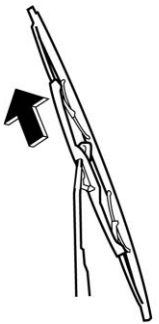


3. With the blade and arm almost perpendicular, remove the blade from the arm.



Installation

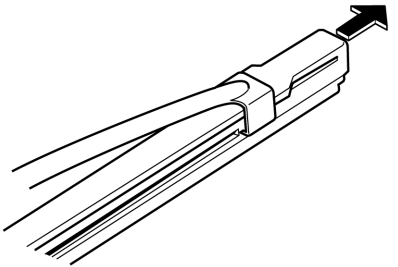
1. Insert the blade while holding it almost perpendicular to the arm.



2. With the blade and arm oriented in the same direction, push up the blade until it locks into place on the arm.

Whenever a wiper blade has been attached, ensure that it is locked into place. Failure to observe this precaution can result in the wiper blade becoming dislocated when the windshield wiper switch is turned on.

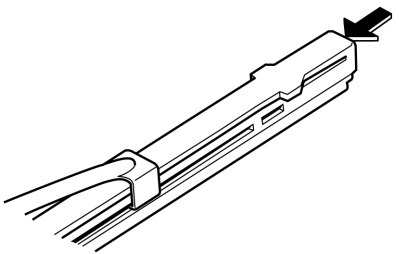
Replacement of Wiper Rubber Insert



Removal

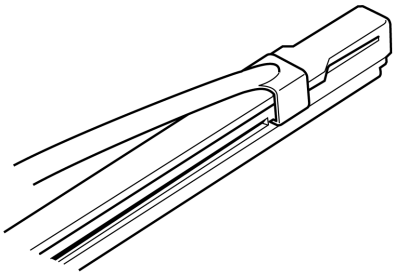
1. Remove the wiper blade from the wiper arm.

2. Pull the wiper rubber insert in the direction indicated by the arrow and extract it from the wiper blade.



Installation

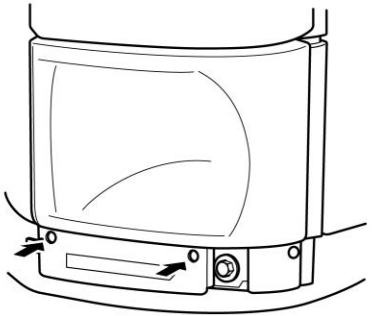
1. Insert a new wiper rubber insert into the wiper blade.



2. Continue pushing in the wiper rubber insert until the wiper blade's hook engages with the hole in it, and then confirm that the rubber insert is securely held in place.
3. Attach the wiper blade to the wiper arm.

Headlamp Aiming

Front Headlamp Aiming



For vertical aiming, turn the two screws indicated by arrows in the diagram.

1. Remove the rubber beneath the headlight.
2. Two screws should be turned in the same direction at the same time to adjust aiming.
3. When the headlamp aiming is out of position, contact your dealer.

Bulb Replacement

Bulbs

1. Check each bulb for blowout.

2. If a bulb has blown out, replace it. Always place the engine control switch in the "LOCK" position and place all the other switches in the "OFF" position before replacing the blown bulbs.
3. If you need assistance replacing any bulbs, contact your dealer.

Turn Signals

The flasher unit activates both the turn signal circuits and the hazard circuit. Should a lamp burn out, the flasher unit will continue to operate. Check the turn signal lamps visually before the vehicle is used.

Bulb Wattage

⚠ Warning

Using bulbs with a wattage other than that specified could cause the bulb or the wiring to become hot. This could result in the warping of the lens and case, and it could also lead to the outbreak of fire.

(Continued)

Warning (Continued)

Bulbs are hot immediately after they go out. When replacing the bulbs, avoid being burned by making sure they are fully cooled.

Never drive the vehicle with the bulbs not working. This could result in an accident.

You and others could be seriously injured.

When one bulb of a pair of lamps, such as a front turn signal lamp blows out, the other bulb is approaching the end of its useful life. We recommend that both be changed at the same time.

The LED lights do not need to be replaced. However, if you find anything abnormal with the LED lights, see your dealer.

For the lamps (lighting equipment) such as headlamps, inside of the lens can mist up momentarily when driving in the rain or during the car wash. Also, the temperature difference between inside and outside of the lamps can sometimes cause the water condensation inside the lens. This is not abnormal because this is the same phenomenon as the windshield or door glass fogs up when it rains. If the mist goes away minutes after the lamp is turned on, things are normal.

Bulb Wattage

Position	Lights	Bulb Wattage (12V)	Qty.
Front	Headlight Highbeam/Lowbeam	LED	2
	Front Turn Signal Lamp	21W (Amber)	2
	Parking Lamp	LED	2
	Daytime Running Lamp	LED	8
	Cornering Lamp	27W	2
	Side Turn Signal Lamp	5W (Amber)	2
	Sidemarker Lamp	5W (Amber)	2
Rear	Taillamp and Stoplamp	8/27W	2
	Turn Signal Lamp	27W	2
	Back-Up Lamp	27W	2
	License Plate Lamp	7.5W	1

Position	Lights	Bulb Wattage (12V)	Qty.
Roof	Roofmarker Lamp (Identification/Clearance Lamp)	5W	5
Interior	Dome Light	10W	1
	Speedometer and Gauge Lights	3.4W	5
	Warning/Indicator Lights	LED	20

Contact your dealer when replacing lights that are not listed here.

Have the LED lights inspected/serviced at your dealer. Reckless disassembly or repair of the LED lights may lead to malfunctions of the parts or electric shock.

Headlamps and Front Turn Signal

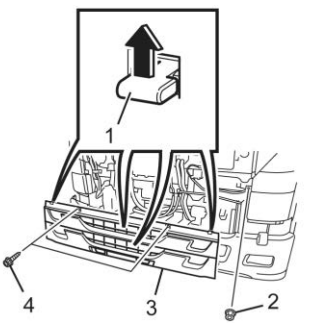
Replacing the Headlamps and Parking Lamps

If replacement is necessary, see your dealer.

Replacing a Front Turn Signal Lamp

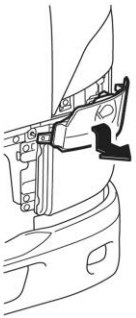
Do not replace a bulb with other than the specified wattage. This will cause abnormal flashing, particularly for turn signal lamps.

When replacing a bulb, make sure the light switch is OFF.

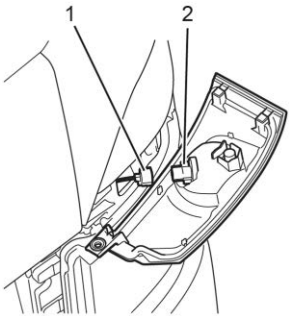


1. Open the front lid. Remove the two screws (4) from the upper side of the radiator grille(3). Push up on the tabs of the four clips

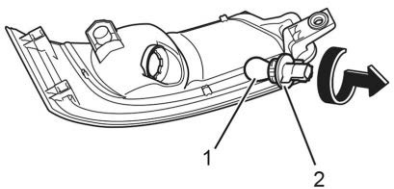
(1) on the upper side of the radiator grille and pull it toward you to remove the grille. Loosen the nuts (2) for the turn signal light.



2. Tilt the turn signal lamp unit down toward the front of the vehicle and remove it.



3. Disconnect the connector (1) for the turn signal lamp (2) and then remove the socket.

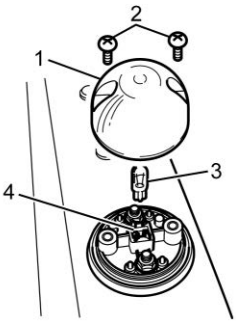


4. Pull out the bulb (1) from the socket (2) and replace it with a new one.

5. To install the lights, perform the same sequence of operations in reverse order, keeping in mind to turn the socket clockwise to securely lock it.

If the socket is not locked securely, water could get inside the light and lead to a breakdown.

Roofmarker Lamps



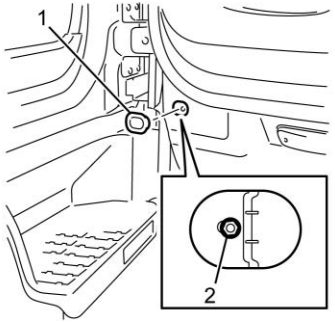
1. Loosen the screws (2) and remove the lens (1).
2. Remove the bulb (3) from the socket (4) and replace it with a new one.
3. To install the lights, follow the removal procedure in reverse.

If the screwing procedure is inadequate, water may infiltrate into the lamp unit.

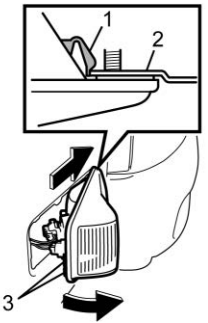
Sidemarker Lamps (Including Turn Signal and Cornering Lamps)

Do not replace a bulb with other than the specified wattage. This will cause abnormal flashing, particularly for turn signal lamps.

When replacing a bulb, make sure the light switch is "OFF".

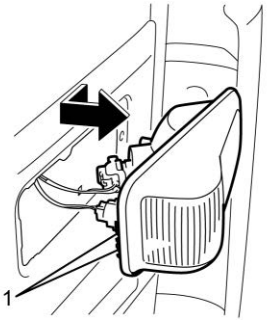


1. Open the front door, remove the rubber cap (1) in the lower part of the door, and loosen the nut (2).

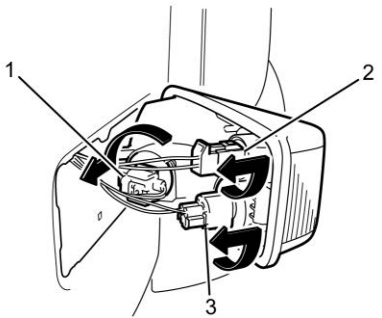


2. Slide the cornering lamp (3) and the side turn signal lamp forward relative to the vehicle. Disconnect the clip (1) on the lamp's rear side from the door panel (2) and pull out the lamp.

   If you pull out the light rear section by too much when removing the clip on the rear side, the clip on the lamp front side may be damaged.

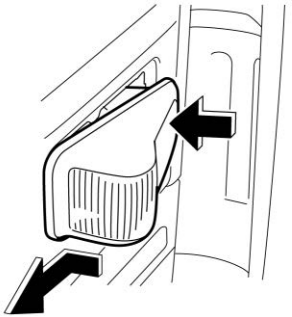


3. When the clip (1) has been removed, pull the lamp out while sliding it out toward the rear of the vehicle.
4. Loosen the socket by turning it counterclockwise.

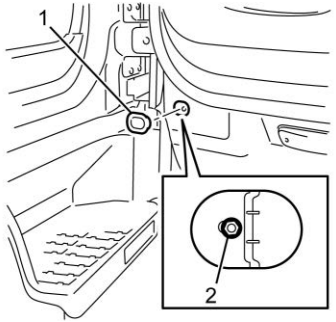


5. Pull the bulb out from the socket and replace it with a new one (cornering light (1), sidemarker light (2), side turn signal light (3)).
6. To install the lights, perform the same sequence of operations in reverse taking care of the following points:
   A. Turn the socket clockwise to lock securely.

      If the socket is not locked securely, water could get inside the light and lead to a breakdown.

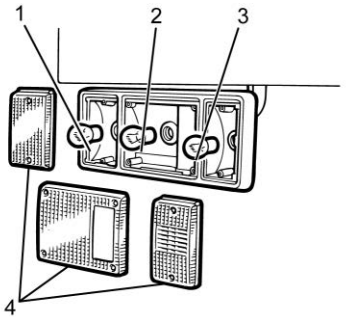


   B. Insert the clip on the back of the rear part of the light into the door panel.
   C. Push the front part of the light into the door panel, and insert the clip on the back of the front part of the light in the door panel.



   D. Open the front door, tighten the nut (2) from the inside of the door, and install the rubber cap (1).

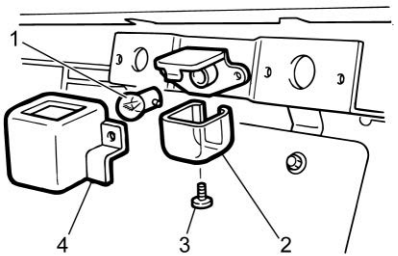
Taillamps, Turn Signal, Stoplamps, and Back-Up Lamps



1. Turn Signal Lamp
2. Taillamp/Stoplamp
3. Back-Up Lamp
4. Lens

1. Loosen the screws and remove the lens.
2. Loosen the bulb by turning it counterclockwise while pressing on it.
3. To install the lights, follow the removal procedure in reverse.

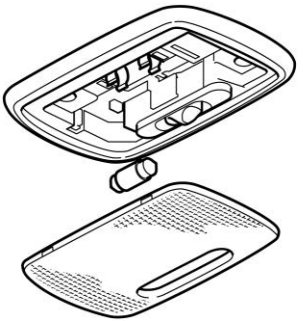
License Plate Lamp



1. Bulb
2. Lens
3. Screw
4. Cover

1. Loosen the screws and remove the cover.
2. Remove the lens.
3. Loosen the bulb by turning it counterclockwise while pressing on it.
4. To install the lights, follow the removal procedure in reverse.

Interior Lamps



1. Remove the lens and pull out the bulb.
2. To install the lights, follow the removal procedure in reverse.

Electrical System

Electrical System Overload

Electrical System

Following the after-delivery service, it is the owner's responsibility to check all wiring periodically for cracked, chafed or oil-soaked

insulation and maintain it in a clean and tight condition to ensure satisfactory operation of the electrical system.

Replacing the Fuses and Relays

Your vehicle is equipped with fuses and fusible links to protect your electrical wiring and equipment in case of electrical overload.

When the lights do not come on or flash, or the equipment in the electrical system does not operate, check to see if a fuse has blown.

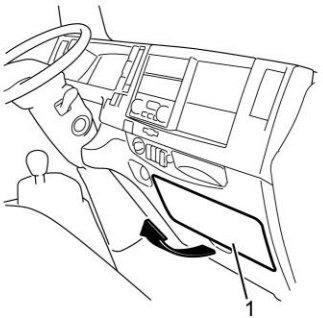
Fuses: In case of an electrical overload, the fuse will blow and stop the flow of current in the circuit before electrical components become damaged.

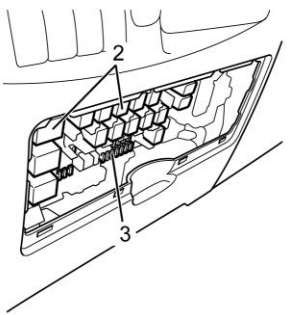
The cause of the circuit overload must be identified and corrected before the blown fuse is replaced, or else the new fuse will also blow. Since different circuits handle different amounts of current, fuses of various ampere ratings are used. Be sure to replace a blown fuse with a fuse of the correct rating.

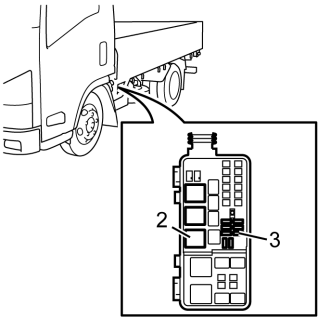
To know if a fuse is blown or not, remove the suspected fuse and look at the wire for a break. If the wire is broken, replace the fuse with one of equal amperage rating. The amperage rating of each fuse is molded in its head.

Fuses are installed in the fuse panel.

The Location of Fuses and Relays







The fuses (3) and relays (2) are located in the lower part of the instrument panel in the center and in the left rear of the cab.

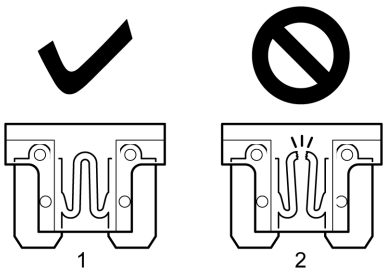
The cover (1) must be opened in order to carry out inspection and replacement. In addition, the cover (1) of the relay box at the left rear of the cab must also be opened at this time.

If you should spill water or a beverage on the cover, wipe it off before opening the cover.

The area around the cover may get warm when the vehicle is being driven, but this is not abnormal.

Replacing Fuses

1. Before replacing fuses, apply the parking brake, move the selector lever to the P (Park) position (models with P-range) or N (Neutral) position (models without P-range), and turn the engine control switch to the LOCK position.
2. The fuse puller is stored in the fuse box inside the cab. Place the fuse puller on the fuse and pull it out.



3. If the fuse appears as shown (2), the fuse is blown. Replace with a spare fuse (1). Spare fuses are stored in the fuse box inside the cab.

⚠ Warning

Always use fuses specified for the vehicle. Using fuses with a rating other than that specified, or using wire or tin foil, etc., could result in fire or damage.

If the new fuses blow right away and the cause is unknown, contact your dealer.

Do not inspect or replace fuses when the starter switch is in the ON position. Doing so may lead to an accident.

When inspecting fuses, be sure to park the vehicle on flat, level ground and apply chocks to the wheels.

Replacing Relays

Before replacing the relays, contact the nearest dealer.

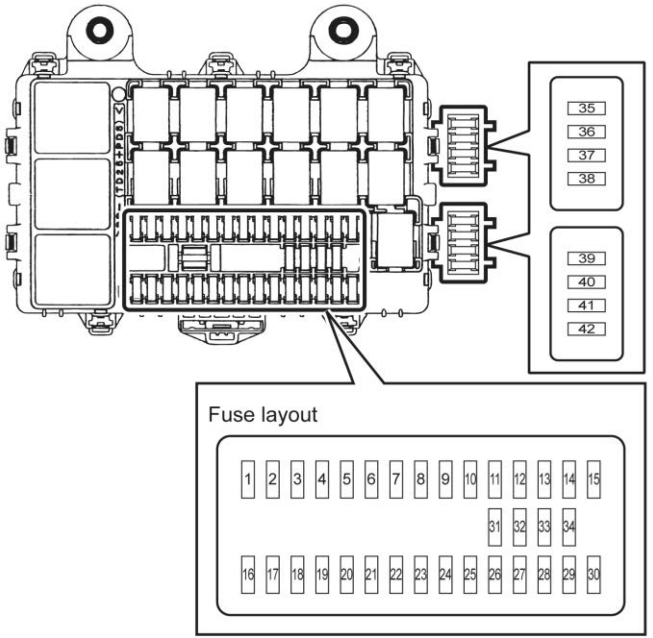
The vehicle may not be equipped with all of the fuses, relays, and features shown.

It is not necessary to open or close the cover unless trouble is found.

The relay box structure makes it difficult for water to enter. If you should spill water or a beverage of the cover, however, wipe it off before opening the cover.

The area around the cover will get warm when the vehicle is being driven, but this is not abnormal.

Fuse and Relay Location – Cab Interior

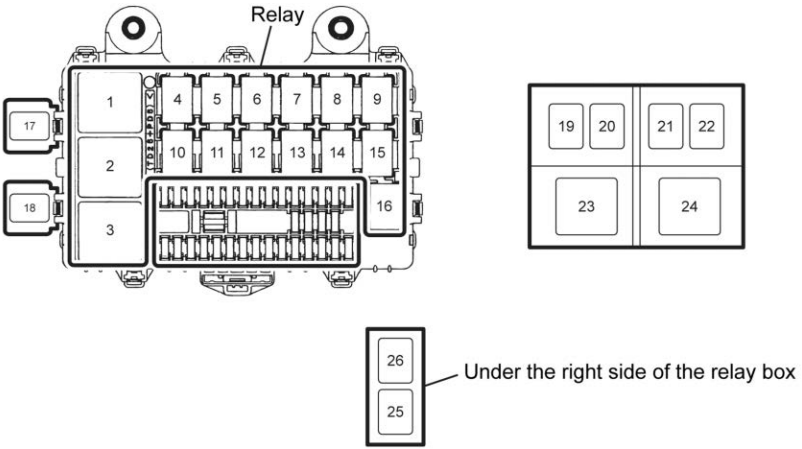


Fuse locations:

No.	Description	Rating
1	–	25A
2	SPARE	5A
3	ROOM LAMP, AUDIO	10A
4	DOOR LOCK	15A
5	–	15A
6	P/ WINDOW	25A
7	ABS	10A
8	WIPER	25A
9	H / LAMP LO (LH)	10A
10	LAMPS (BATT)	10A
11	H / LAMP LO (RH)	10A
12	BRAKE LAMPS	10A
13	STARTER	10A
14	H / LAMP HI (LH)	10A
15	H / LAMP HI (RH)	10A

No.	Description	Rating
16	MIRROR HEATER	15A
17	IGNITION 2	10A
18	IGNITION 1	10A
19	–	–
20	ECM	10A
21	METER	10A
22	ECU (BATT)	10A
23	MIRROR	10A
24	ACC	15A
25	HORN	15A
26	TURN, HAZARD	15A
27	TAIL LAMPS	10A
28	ILLUMINATIONS	10A
29	CORNERING LAMPS	10A
30	AIR CONDITIONER	10A
31	SPARE	–
32	SPARE	–
33	SPARE	–
34	SPARE	–
35	CIGAR	20A
36	ACCESSORIES SOCKET	15A
37	POWER SOURCE	20A
38	REVERSE LAMPS	10A
39	MIRROR HEATER DR	20A
40	SERVICE, REVERSE	10A
41	AUDIO, REVERSE	10A
42	MIRROR HEATER AS	20A

Engine Relay Locations

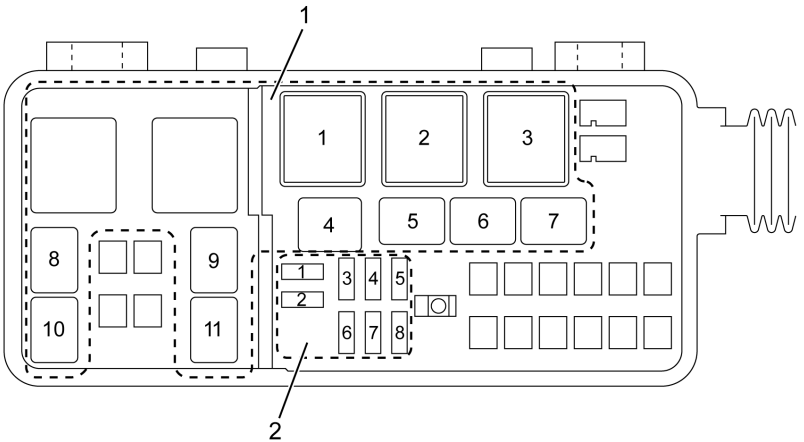


Relay locations:

No.	Description
1	STOP LAMP
2	DAYTIME RUNNING LAMP
3	KEY ON
4	DAYTIME RUNNING LAMP CUT
5	CORNERING LAMP
6	WIPER MAIN
7	HORN
8	WIPER HI LO
9	–
10	–
11	DOOR SWITCH (ALLISON2500RDS MODEL)
12	POWER WINDOW
13	HEAD LAMP LO
14	AIR DUMP (AIR SUSPENSION VEHICLE)
15	HEAD LAMP HI
16	TAIL LAMP
17	POWER ACC
18	BLOWER MOTOR
19	BRAKE LAMP SWITCH
20	CONDENSER FAN
21	REVERSE LAMP
22	CIGAR LIGHTER

No.	Description
23	MIRROR HEATER AS
24	MIRROR HEATER DR
25	–
26	COOLANT LEVEL SWITCH

Fuse and Relay Location – Cab Exterior



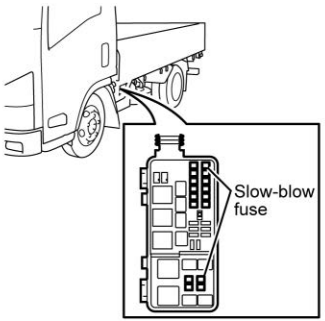
Fuse locations (2):

No.	Description	Rating
1	MARKER LIGHT	20A
2	TAIL LIGHT	20A
3	ECM MAIN	15A
4	SCR	20A
5	TCM	15A
6	POWER SOURCE	15A
7	CONDENSER FAN	20A
8	A/C	10A

Relay locations (1):

No.	Description
1	STARTER
2	ECM MAIN
3	NOX & DEF SENSOR
4	A/C COMPRESSOR
5	–
6	RR DOME LIGHT
7	SCR HEATER VALVE
8	MARKER LIGHT
9	–
10	–
11	FUEL HEATER

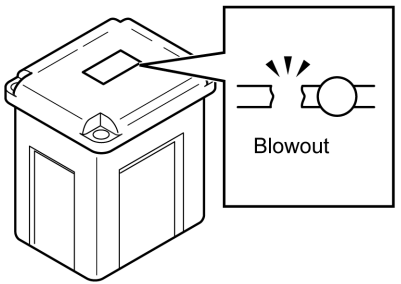
When Slow-blow Fuses Blow Out



Slow-blow fuses protect the electrical circuits, and they are installed so that they can be quickly replaced if there is a malfunction.

If an overload exists in the circuit from the battery, the slow-blow fuse will blow out before the wiring harness is damaged to protect the electrical circuitry.

Inspection



When the headlights and other devices in the electrical system do not work, but there is no problem with the fuses, check the slow-blow fuse.

The slow-blow fuse is blown if it looks like the illustration. Immediately contact the nearest dealer.

⚠ Warning

Always use fuses specified by the dealer when replacing the slow-blow fuse. Using fuses with a rating other than that specified, or using wire or tin foil, etc., could result in fire or damage.

If the new fuses blow right away and the cause is unknown, contact your dealer.

Do not inspect or replace fuses when the starter switch is in the ON position. Doing so may lead to an accident.

When inspecting fuses, be sure to park the vehicle on flat, level ground and apply chocks to the wheels.

It is not necessary to open or close the cover unless trouble is found.

The relay box structure makes it difficult for water to enter. If you should spill water or a beverage of the cover, however, wipe it off before opening the cover.

The area around the cover will get warm when the vehicle is being driven, but this is not abnormal.

Wheels and Tires

The operating load and cold inflation pressure on the rim and wheel must not exceed the rim and wheel manufacturer's recommendations even though the tire may be approved for a higher load or inflation. Rim and wheel may be identified (stamped) with maximum load and maximum cold inflation rating. For rims and wheels not so identified or for service conditions exceeding the rate capacities, consult the rim and wheel manufacturer to determine rim and wheel capacities for the intended service. The factory-installed tires on this vehicle were selected to provide the best all-around tire performance for normal operation. When inflated, as shown on the vehicle, they have the load carrying capacity to operate satisfactorily at all loads up to and including the full rated load specified for the vehicle. For more information concerning the differences in capacities of tires and rims, refer to the "Tire and Rim Association Inc. Yearbook," or your authorized dealer or tire dealer.

Tire Inflation

⚠ Warning

To reduce the risk of loss of vehicle control and personal injury:

Tires must be properly inflated, and your vehicle must not be overloaded (see the information on *Information on Loading the Vehicle* ⇨ *41* and "Tire Load and Inflation Table" under *Tire Pressure* ⇨ *238*).

Be sure to keep tires properly inflated. A tire that is run while seriously underinflated may overheat to the point where the tire may lose air suddenly and/or catch fire, possibly resulting in personal injury and/or property damage.

See "Tire Load and Inflation Table" under *Tire Pressure* ⇨ *238*.

In no case should the front or rear tire load exceed the maximum recommended gross axle weight rating (front GAWR or rear GAWR).

The efficiency of the vehicle will be upset if air pressure in the tires are not equal. Balanced inflation results when the tires on the same axle carry the same air pressure.

A difference in pressure between the front and rear tires may be permissible within certain limitations, however, there should not be a difference in pressures between the right and left tires on the same axle.

Always use a truck tire pressure gauge (a pocket-type gauge is not advised) when checking inflation pressures. Visual inspection of tires for inflation pressures is not enough, especially in the case of radial tires. Underinflated radial tires may look similar to correctly inflated radial tires. If the inflation pressure on a tire is found to be low frequently, have your dealer correct the cause.

Be sure to install the tire inflation valve caps to prevent dirt and moisture from getting into the valve core, which could cause air leakage. An underinflated tire in a dual wheel assembly is harder to notice than one in a single wheel assembly. The properly inflated dual tire carries its own load plus that of the underinflated tire. Both tires can overheat, which may result in property damage and/or personal injury (see previous WARNING).

Tires Used or Stored for a Long Period of Time

Tires are a rubber product and degrade over time, even if they are not being used. If any of your tires is 5 to 7 years old or more, please have them inspected for safe driving. For further information, please check with the tire manufacturer.

Dual Tire Operation

The outer tire of a pair on dual wheel installations generally wears faster than the inner tire. If this occurs, reverse the position of the tires to equalize wear and get better tire life.

In addition, when trucks are driven continuously on high-crown roads, an increase in air pressure of 35 kPa (5 psi) in the outer tire of a dual tire operation will prolong outer tire life. Be sure not to exceed the inflation pressure limits shown on the “VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate.” See *Vehicle Identification Number (VIN)* ⇨ *282*.

Wheel and Tire Balancing

Proper tire balancing provides the best riding comfort and helps to reduce tire tread wear. Out-of-balance tires can cause annoying vehicle vibration and uneven tire wear, such as cupping and flat spots. See your authorized dealer for wheel balancing.

Front End Alignment

Proper front end alignment improves tire tread mileage. Your vehicle's front end suspension parts should be inspected often and aligned when needed. (See the Maintenance Schedule for more information.) Improper alignment will not cause the vehicle to vibrate; however, improper toe-in alignment will cause front tires to roll at an angle that will result in faster tire wear. Incorrect caster or camber alignment will cause your front tires to wear unevenly, and may cause the vehicle to "pull" to the left or right.

Tire Traction

A decrease in driving, cornering and braking traction occurs when water, snow, ice, gravel or other material is on the road surface. Driving practices and vehicle speed should be adjusted to the road conditions. When driving on wet or slushy roads, it is possible for a wedge of water to build up between the tire and road surface. This is known as hydroplaning, and may cause partial or complete loss of traction, vehicle control and stopping ability; this condition is also more likely with worn tires.

To reduce the chance of traction loss, follow these tips:

- Slow down during rainstorms or when roads are slushy.
- Slow down if the road has standing water or puddles.
- Replace tires when front tread depth is 3.2 mm (4/32 in.) and rear tread depth is 1.6 mm (2/32 in.).
- Keep tires properly inflated.

Tire Replacement Recommendations

⚠ Warning

Do not mix different construction types of tires on your vehicle such as radial, bias and bias-belted tires except in emergencies, because vehicle handling could be affected and may result in loss of vehicle control, or personal injury or death.

(Continued)

Warning (Continued)

Consult your dealer before replacing wheels. Never use wheels that are not designed for the vehicle. Doing so would impede safe vehicle operation.

You should replace your tires when:

- Your tires are worn to a point where 3.2 mm (4/32 in.) (front) and 1.6 mm (2/32 in.) (rear) or the cord or fabric is exposed.
- Your tire tread or sidewall is cracked, cut or snagged deeply enough to expose the core, fabric or steel components.
- Your tire has a hump, bulge or split.
- Your tire sustains a puncture, cut or other damage that cannot be correctly repaired because of the size or location of the damage.

When replacing tires, you should use the same size, load range and construction type (bias or radial) as the original tires on your vehicle. Use of any other size or type tire may affect load carrying capacity, ride, handling, speedometer/odometer calibration, vehicle ground clearance and tire clearance to the chassis. If replacing only a single tire, it should be put on the same axle with other tires of equal diameter.

When replacing or rotating tires, all tires on an axle should be of the same tread design and should have the same outside diameter within certain limitations. Consult your authorized dealer or tire dealer.

Recommended replacement tire for Greenhouse Gas (GHG) emissions

Position	Tire size	Tire maker	Tire name	Rolling resistance
Front/Steer	255/70R22.5	Yokohama Tire Corporation	RY023	LRRA
	11R22.5	Bridgestone Corporation	Ecopia R268	LRRA
	11R22.5	Continental Tire	HSR2	LRRA
Rear/Traction	255/70R22.5	Yokohama Tire Corporation	TY303	LRRA
	11R22.5	Bridgestone Corporation	Ecopia M760	LRRA
	11R22.5	Continental Tire	HDR2+	LRRA

If the original equipment tires are low rolling tires, it is recommended to use the LRRA tires shown in the above table.

Refer to the emission control identifiers on Greenhouse Gas (GHG) emission plate for your original equipment tires. Also, please refer to "VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate" for the location of the Greenhouse Gas (GHG) emission plate. See *Vehicle Identification Number (VIN)* ⇨ *282*.

Wheel Replacement Recommendations

Wheels must be replaced if they become damaged (for example: bent, heavily rusted, leak air) or if wheel nuts often become loose. Do not use bent wheels that have been straightened and do not use inner tubes in leaking wheels which are designed for tubeless tires. Such wheels may have structural damage and could fail without warning.

When replacing wheels for any reason, the new wheels should be equal in load capacity, diameter, width, offset and mounting types to those originally installed in your vehicle.

A wheel of the wrong size or type may adversely affect wheel and bearing life, brake cooling, speedometer/odometer calibration, stopping ability, headlight aim, bumper height, vehicle ground clearance and tire or tire chain clearance on the body and chassis. Replacement with "used" wheels is not advised. They may have been subjected to harsh treatment or very high mileage and could fail without warning.

⚠ Warning

Consult your dealer before replacing wheels. Never use wheels that are not designed for the vehicle. Doing so would impede safe vehicle operation.

The use of wheels and/or tires with higher load carrying limits than originally equipped on your vehicle does not in itself increase the GAWR or the GVWR of the vehicle.

Replacement wheels can be obtained from the authorized dealer or tire dealer.

Aluminum Wheels

1. Use only genuine aluminum wheels from the authorized dealer or tire dealer.
2. After driving on a road where road chemicals are applied or on a coastal road, thoroughly wash the wheels with water and then apply wax to prevent corrosion.
3. Aluminum wheels get scratched easily, so do not use a detergent containing abrasive powder or a wire brush.
4. You must use a spare tire carrier specially designed for aluminum wheels.

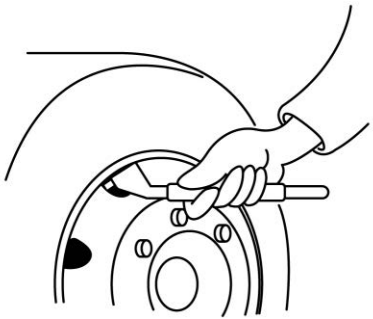
- Aluminum wheels get damaged if you tighten the wheel bolts and nuts to a torque greater than the specified torque.
- When installing the aluminum wheels again, do not retighten the stud with its threaded portion left as rusted.

Wheel Spacers

- The wheel spacer is a nylon separator plate, approximately 0.89 mm (0.035 in) thick. It is placed between the drum and wheel. If the rear inner wheels are steel, the spacer is placed between the steel and aluminum wheels. Wheel spacers are to be replaced every 16 000 km (10,000 mi) or tire rotation.

Checking Tires

Air Pressure



Too low or too high a tire air pressure not only affects the ride or causes damage to the cargo but also can cause abnormal heat buildup, premature wear, a tire puncture, or may even cause the tire to burst.

- Use an appropriate tire air pressure gauge when measuring the air pressure of a tire. Tire air pressure should be measured when the tire is cold, or before the vehicle is driven. (After driving, tire air pressure increases by about 10%.)

- As the tire air pressure varies depending on the vehicle model and tire size, refer to the “VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate” on the driver's door opening frame or the tire air pressure information on the following table.

Tire size		Tire air pressure kPa (kgf/cm²/psi)	
Front	Rear	Front	Rear
255/70R22.5	255/70R22.5	830 (8.44/120)	830 (8.44/120)
11.00-22.5-14PR	11.00-22.5-14PR	720 (7.34/105)	720 (7.34/105)

See “VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate” under *Vehicle Identification Number (VIN)* ⇨ *282*.

See “Tire Load and Inflation Table” under *Tire Pressure* ⇨ *238*.

⚠ Warning

Insufficiently inflated or worn-out tires are highly dangerous as they easily skid and can even burst. Should they burst, the tires may burn and this could cause a fire in the vehicle.

(Continued)

Warning (Continued)

If you drive on under-inflated or flat tires, the wheel studs will be placed under excessive stress. Under such conditions, the bolts may break and the wheel may detach from the vehicle, possibly causing a crash.

Over-inflated tires result in a harsh ride and are likely to cause damage to the cargo. Under-inflated tires build up heat and could burst. Always keep the tires of your vehicle adjusted at the standard air pressures.

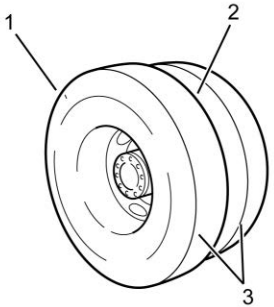
You and others could be seriously injured.

There should not be a difference in air pressure between the inside and outside tires on a dual-tire wheel.

It is not easy to visually identify an under-inflated dual-wheel tire or low aspect ratio tire (aspect ratio at 70%). Always use an appropriate tire air pressure gauge to check the air pressure of any tire.

If your vehicle is equipped with aluminum wheels, use an extension attached to the inner tire valve together with a standard tire air pressure gauge or use a special air pressure gauge when checking the air pressure of a dual-wheel's inner tire.

Cracks and Other Damage

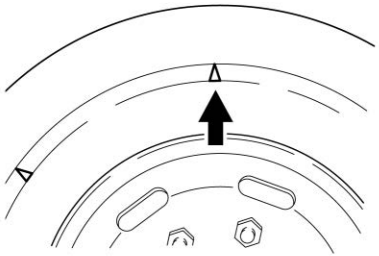


1. Sidewall surface
2. Gap between inner and outer tires
3. Tread

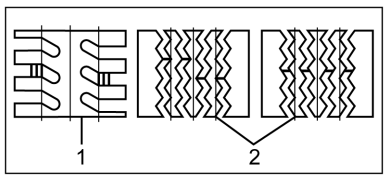
Check the tread and sidewall surfaces of each tire for cracks or other damage. Especially check the tread for nails or other metal pieces embedded in grooves and also the gap between the inner and outer tires of a dual-tire wheel for pebbles lodged in it.

When checking tires, pay special attention to: low air pressure; pebbles or nails in tread grooves; cracks or other damage on tire surfaces; uneven wear; and pebbles lodged in the gap between tires of dual-wheel tires.

Tread Depth and Abnormal Wear



Tread wear indicator position mark (Example)



Tread wear indicator (Example)

1. Lug pattern
2. Rib pattern

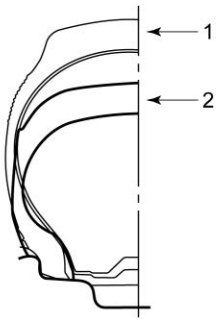
Using worn-out tires is dangerous because they might have an increased chance of getting punctured or bursting while driving. Check all tires to see if tread wear indicators appear on their treads and also check their entire tread for its depth with a depth gauge to make sure that the grooves are deeper than the specified depth. A tire with tread wear indicators appearing must be changed. Also, check the tires for uneven or otherwise abnormal wear.

⚠ Warning

Tires with excessively shallow tread grooves will increase the chance of skidding and hydroplaning and may result in a crash.

Hydroplaning occurs when a vehicle is running at high speeds on a wet road and a layer of water forms between the road surface and tires causing the tires to float on it. Hydroplaning prevents the driver from steering correctly and from slowing down the vehicle with the brake pedal.

Use of Low Aspect Ratio Tires



1. Standard tire
2. Low aspect ratio tire

Low aspect ratio tires for truck applications (aspect ratio at 70%) have an air volume 20% to 30% smaller than that of standard tires. When air begins to leak, therefore, low aspect ratio tires adversely affect vehicle operation much faster than standard tires. Check air pressure of low aspect ratio tires more often than standard tires using a tire air pressure gauge.

Damaged Tires

⚠ Danger

- It is dangerous to mount the wrong size tire on a wheel. If you do so, the tire/wheel can explode as air is being added. This explosion may result in severe personal injury or death. To learn which wheels and tires are correct, look at the "VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate" on the left side rear pillar panel below the striker. Wheel size is also stamped on the side of each wheel.
- To help avoid personal injury and property damage if a wheel must be changed, seek expert tire services. Taking off and mounting tires on wheels requires proper tools, safety equipment and special training. A person can be severely injured or killed and damage can result from using the wrong service methods. Truck tires and wheels should be serviced only by trained people using the proper equipment.

(Continued)

Danger (Continued)

- Do not put air back in a tire that has been run flat, or is seriously low on air, without first having the tire taken off the wheel and the tire checked for damage.
- Never add air to your tires unless an accurate pressure gauge is also used. When putting air in a tire on the vehicle, stand to the side and use a clip-on check and hose extension. In choosing the right tire pressure, be careful not to exceed the maximum pressure capability shown on the tire; see the tire pressure charts in this manual.
- Tire mounting or repair can result in serious personal injury or death, if not performed correctly. This section has detailed instructions for proper wheel and tire replacement, so be sure to read and follow them. Truck fleet owners and operators: You can get written instructions on truck tire demounting, repair and mounting from U.S. Tire Manufacturers Association, 1400 K Street N.W., Washington, D.C. 20005, and also from many tire stores.

Wheel Nut Torque

⚠ Warning

Never use oil or grease on studs or nuts. Use the torque specified for the type of wheels on the vehicle. Snug all wheel nuts and then tighten to the specified torque in the numerical sequence shown. Improperly tightened wheel nuts could eventually allow the wheel to come off while the vehicle is moving, possibly causing loss of control and personal injury and property damage.

When the vehicle, wheel or fasteners are new, have a technician tighten wheel stud nuts and rim clamp nuts with a torque wrench at 160 km (100 mi) and at 1 600 km (1,000 mi). This is necessary because the clamping system used on the wheels must seat before the fastener will hold a uniform clamp load and remain fully tightened. Also have a technician tighten wheel stud nuts and rim clamp nuts with a torque wrench after installing any wheel.

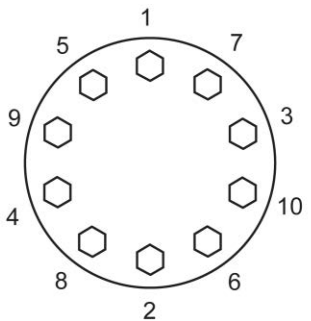
In addition, nut tightness on all wheels should be set with a torque wrench every 16 000 km (10,000 mi).

Tightening torque
644 N·m (475 lb·ft)

Wheel Tightening Sequence

Install valve stems of dual wheels 180 degrees opposite each other.

1. Finger-tighten the nuts.
2. Tighten all nuts to specified torque in order as shown.



⚠ Warning

To help reduce the risk of losing vehicle control and personal injury or death, if any stud has been damaged as a result of a loose running wheel, all studs for that wheel should be replaced. A loose running wheel may cause only one stud to break but damage to other studs may not be noticeable. If stud holes in a wheel have become elongated or distorted, replace the wheel.

Tire Pressure

Tire Load and Inflation Table

Tire Load and Inflation Table

TIRES FOR VEHICLES IN HIGHWAY SERVICE TIRE LOAD LIMITS AT VARIOUS COLD INFLATION PRESSURES											
Tire Size Designation		Cold Inflation Pressure (psi)									
				105			110			120	
255/70R22.5H	Dual Single	(lbs)								5070 5510	
295/75R22.5	Dual Single	(lbs)					5675 6175				
11R22.5G	Dual Single	(lbs)		5840 6175							

See *Wheels and Tires* ⇨ *229*.

Tire Rotation

⚠ Warning

Be sure to check the wheel studs, wheel nuts and disc wheel for any abnormality whenever the disc wheel is removed.

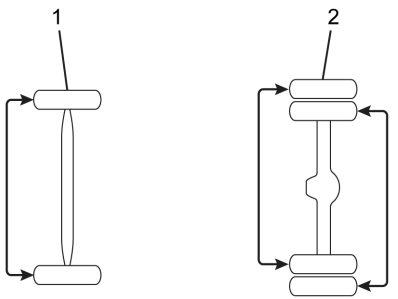
If you find any abnormal condition on the wheel studs, wheel nuts or disc wheel, do not continue to use the wheel. Contact the nearest dealer as soon as possible

Tires at different locations wear differently. For uniform tire wear and longer tire life, you should rotate the tires on your vehicle regularly. Make sure to use tires of the same type on the same axle. If you install tires of different types on the same axle, the vehicle may drift right or left when you apply the brakes.

New tires are more likely to build up heat and wear faster than old tires, so they should be installed on the front axle where the load is smaller.

If there is a difference in diameter between the inner and outer tires of a dual-tire wheel, install the smaller diameter tire inside.

The difference in diameter of the tires for a dual-tire wheel should be within the limit specified in the table below. If the limit is exceeded, the tires wear more rapidly than they should.



1. Front Wheels
2. Rear Wheels

⚠ Warning

If differently sized tires are used between the front and rear axles, do not exchange tires between the front and rear axles; otherwise, the tires get loaded beyond their

(Continued)

Warning (Continued)

limits. This is highly dangerous because the tires and disc wheels could break down under an excessive load. You and others could be seriously injured.

Permissible diameter difference	
Radial tire	Within 8 mm (0.31 in)

Vehicles equipped with nylon wheel spacers need to have the wheel spacers replaced every time the tires are rotated.

Retightening Wheel Nuts

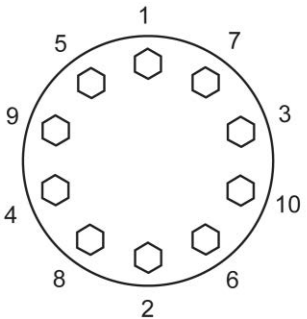
Check the wheel nuts to make sure they are tightened to the specific torque by using a torque wrench.

Use the following methods to check loose wheel nuts. The tightening torque of the wheel nuts may decrease after a tire change or rotation due to their initial settlement. After driving 160 km (100 mi) and after 1 600 km (1,000 mi) , be sure to retighten the wheel nuts to the specified torque.

Repeat whenever a wheel, wheel bolt, or wheel nut is removed.

Tighten the wheel nuts in a diagonal sequence to the specified torque.

Wheel nut tightening torque
644 N·m (475 lb·ft)



Wheel nut tightening sequence

⚠ Warning

If you find any abnormal conditions with the wheel nuts such as frequent loosening of retightened nuts, have your vehicle checked or serviced at the nearest dealer as soon as possible.

Fully engage the wheel bolt wrench on a wheel nut to be able to tighten the nut to the specified torque. However, do not use a pipe as a handle extension or your foot to apply force to the wrench. This could tighten the nut more than necessary and damage the components.

Both under-tightening and over-tightening the wheel nuts might cause broken wheel bolts or a cracked disc wheel and could lead to wheel detachment. Adhere to the specified tightening torque.

Tire Chains

Selecting Tire Chains

Chain size is determined by tire size. Use the correct tire chain size when mounting the tire chains.

Regulations on the use of tire chains vary according to location and type of road. Always check the local regulations before installing tire chains.

Tire Chain Installation

Observe the following precautions when installing and removing tire chains:

- Pull completely out of the roadway when installing, servicing, and removing tire chains.
- Install chains on the rear wheels only. Do not install chains on the front wheels.
- Install chains securely with no slack. Verify that the chains do not touch any wiring, brake lines or fuel lines.

Driving Information

When driving, accelerate the vehicle slowly and drive at a speed suitable for road conditions – generally 30 to 50 km/h (20 to 30 mph).

⚠ Warning

- Refer to the instructions supplied with the chains.

(Continued)

Warning (Continued)

- Do not drive with a broken chain. If there is chain failure stop immediately and repair or remove.
- Avoid driving on bumpy road surfaces or over potholes.
- Avoid sudden turns and braking.
- Drive cautiously and lower speed to that recommended by the chain manufacturer.
- If you hear the chains rub or bang against your vehicle, stop and retighten the chains. If this does not work, remove the chains.
- Remove the tire chains when they are no longer needed.

Caution

Avoid driving on a dry road with chains installed to avoid possible chain, vehicle, and road surface damage.

If a Tire Goes Flat

When the tire goes flat while driving, ease off the accelerator pedal, avoid hard braking, hold on to the steering wheel firmly, and stop the vehicle. The tire should be changed in a safe, open location to prevent obstructing other vehicles or pedestrians.

⚠ Warning

If you continue to drive on a flat tire, undue force will be applied to the wheel studs, possibly causing the studs to break and the wheel to come off. You and others could be seriously injured.

See "Tire Replacement Recommendations" under *Wheels and Tires* ⇨ *229*.

Jump Starting

Jump Starting - North America

When the Battery is Discharged

Use a jumper cable (sold separately) and the battery of another vehicle to start the engine in the following sequence.

⚠ Danger

Follow the precautions listed in the jump starting instructions when working on or near the battery. Personal injury (particularly to eyes) or property damage may result from battery explosion, battery fluid or electrical (short circuit) burns.

If battery fluid should come in contact with an eye, immediately wash away using a large amount of water and continue washing for at least 5 minutes. Following this, you should seek medical assistance.

When using tools or other metal objects in the vicinity of the battery, take care to prevent them from coming into contact with the positive terminal. As the vehicle itself will conduct electricity, any such contact can result in a short-circuit and a highly dangerous electric shock.

A vehicle battery generates extremely flammable hydrogen gas. For this reason, operations producing sparks or requiring the usage of an open flame must never be carried out near a vehicle battery. Failure to observe this precaution can result in

(Continued)

Danger (Continued)

explosion if the hydrogen gas ignites. Whenever wiping up battery fluid, a damp cloth should be used.

Batteries produce explosive gases, contain corrosive acid, and supply levels of electrical current high enough to cause burns. Therefore, to reduce the risk of personal injury when working near a battery:

- Always shield your eyes and avoid leaning over a battery whenever possible.
- Do not expose a battery to open flames or sparks.
- Do not allow battery acid to contact eyes or skin. Flush any contacted area with water immediately and thoroughly, and get medical help.
- Follow each step in the jump starting instructions.

Always stop the engine whenever the battery is to be inspected.

(Continued)

Danger (Continued)

Dilute sulfuric acid is used as the battery fluid. Special care must be taken to ensure that this fluid does not come into contact with skin, clothing, or metal surfaces.

When disconnecting the cables from the terminals, start with the negative terminal. When connecting them, the negative terminal should be reconnected last.

You and others could be seriously injured.

⚠ Warning

For safety and the protection of the vehicle, do not push-start the vehicle.

Never tow the vehicle to start because a surge forward when the engine starts could cause a collision with the tow vehicle.

Also, this vehicle has a 12-volt battery, 12-volt starting system and a negative ground electrical system; be sure the vehicle or equipment used to jump start

(Continued)

Warning (Continued)

your engine is also 12-volt. Use of any other system may damage the vehicle's electrical components.

Under no circumstances should the battery's positive and negative terminals be put in contact with one another.

When connecting the cables, under no circumstances should the clips be allowed to touch each other.

Do not disconnect a battery terminal with the engine running. It could cause a breakdown in the electrical system.

You and others could be seriously injured.

⚠ Warning

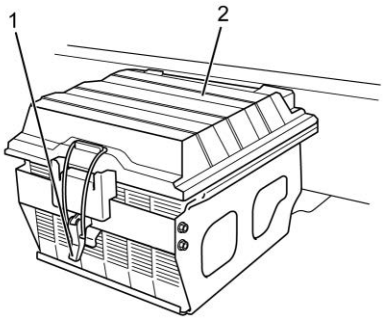
WARNING: Battery posts, terminals and related accessories can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling. For more information go to www.P65Warnings.ca.gov.

See *California Proposition 65 Warning* ⇨ *1*.

If you notice battery fluid leaking, have an inspection carried out immediately by the nearest dealer.

Diesel engine vehicles have more than one battery because of the higher torque required to start a diesel engine. This procedure can be used to start a single-battery vehicle from any of the diesel vehicle's batteries. However, at low temperatures, it may not be possible to start a diesel engine from a single battery from another vehicle.

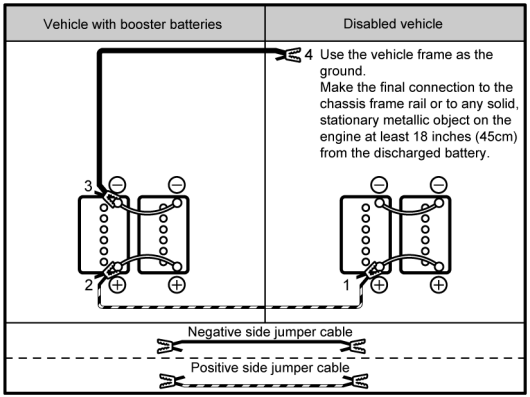
1. Use a vehicle that has a charged battery with the same voltage. Make sure that the other vehicle also has a 12-volt starting system, and that it is the negative (–) terminal which is grounded (attached to the engine block, or frame rail).
2. Position the vehicle with the good (charged) battery so that the booster (jumper) cables will reach. But never let the vehicles touch. Also, be sure the booster cables to be used do not have loose or missing insulation.
3. In both vehicles, turn off the ignition (engine control) switch and all lights and accessories except the hazard flasher or any lights needed for the work area. In both vehicles, apply the parking brake firmly and move the selector lever to the "P" position (models with P-range) or “N” position (models without P-range).



4. Unlatch the latches (1) and remove the battery cover (2) and connect the jumper cables in the numbered sequence in the drawing below. Make sure the cable clamps do not touch any other metal parts.

   Make sure the cables are not on or near pulleys, fans or other parts that will move when the engine is started.

When it is difficult to start the engine in a cold area, first start the engine of the vehicle with the booster battery or batteries and a few minutes after that start the engine of the disabled vehicle.



5. After connecting the cables, start the engine of the vehicle with the booster battery.
6. Slightly rev up the engine of the vehicle with the booster battery and start the engine of the disabled vehicle.
7. If the engine in the disabled vehicle starts, remove the jumper cables in the reverse sequence as they were connected.

Towing the Vehicle

Transporting a Disabled Vehicle

Caution
If the vehicle cannot be shifted into Neutral (N), do not use the tow eye to tow the vehicle. Vehicle damage may occur.

Consult your dealer or a professional towing service if your vehicle must be towed.

Proper equipment must be used to prevent damage to vehicles during any towing. State and local laws which apply to vehicles in tow must be followed. Vehicles should not be towed at speeds in excess of 88 km/h (55 mph).

Use only equipment designed for this purpose. Follow the instructions of the wrecker manufacturer.

A safety chain system must be used.

Do not try to start the engine by towing or pushing the vehicle.

The procedures below must be followed when towing to prevent possible damage.

⚠ Warning
Be sure to chock the wheels when disconnecting the axle shafts. Failure to do so could allow the vehicle to roll away and cause a serious accident resulting in personal injury, death and/or property damage.
(Continued)

Warning (Continued)

- Place the selector lever in the N (Neutral) position, and tow for a maximum distance of 6.2 miles (10 km) at speeds less than 25 MPH (40 km/h).
- Disconnect the axle shafts when towing to avoid damage to the transmission.
- If at all possible, the engine should be running if the vehicle is towed with all four wheels on the ground.
- If the engine is not running:
  - The brakes will not work when air tanks are depleted, and if the brake air pressure falls below 73 psi (503 kPa), the parking brakes will start to apply;
  - The steering wheel will be hard to turn;
  - The steering wheel could lock, making it impossible to move.

(Continued)

Warning (Continued)

- If you apply the parking brake while the vehicle is moving, both vehicles could stop suddenly. If you are not ready for this, you or others could be injured. Do not apply the parking brake while you are driving, unless you have to make an emergency stop.

⚠ Warning

Be sure to block the wheels with chocks before disconnecting the axle shafts. Failure to do so could cause a serious crash. The vehicle will start moving upon disconnecting the axle shafts.

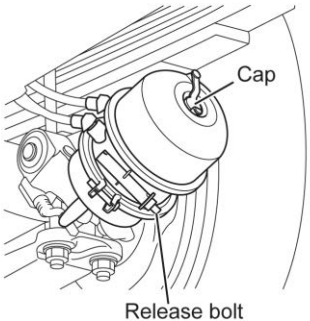
- When towing, disconnect the axle shafts of the rear axle to ensure the transmission is not damaged.
- Remove the rear axles shafts to avoid damaging the transmission and differential. Whenever axles shafts are removed, the hub openings need to be plugged to prevent gear oil from leaking out and dirt or foreign objects from entering the axle.
- If no brake air pressure is available, manually release the spring brake chambers. This will allow the wheels to rotate.
- Use a vehicle of equal or greater weight to pull the vehicle.
- Use a tow bar between the towing vehicle and the disabled vehicle.

If the Parking Brake Cannot be Released

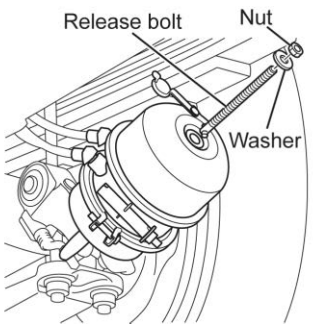
⚠ Warning

Do not manually release the rear spring brake chambers if the vehicle is parked on a slope. Releasing the rear spring chambers would disengage the parking brake and allow the vehicle to roll away, which could result in serious personal injury, death and/or property damage.

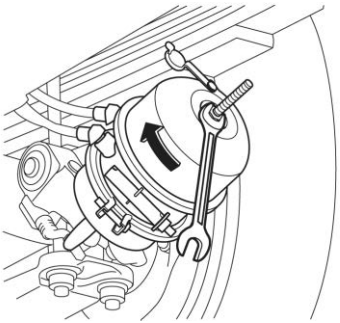
Releasing a Spring Brake Chamber



1. Firmly chock the wheels.



2. Remove the cap and insert the release bolt (a tool normally stored attached to the brake chamber) as far as it goes. Rotate it 90° clockwise and lock.



3. Pull on the release bolt to make sure that it is secure, attach the washer and nut, and tighten them to 3.87 in (98.4 mm).
4. To remove the release bolt, perform the same sequence of operations in reverse. Close the cap securely.

Appearance Care

Exterior Care

Exterior Finish

The paint finish on your vehicle provides beauty, depth of color, gloss retention and durability.

In order to prevent damage or leakage, do not grip the roof marker lights to prevent damage or water leakage.

Washing

The best way to preserve your vehicle's finish is to keep it clean by washing it often.

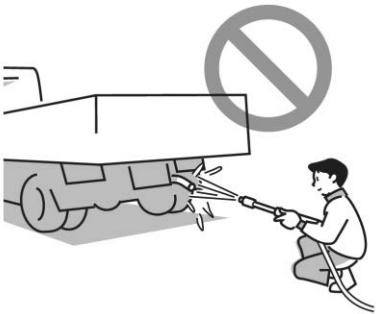
Wash the vehicle in lukewarm or cold water. Do not use hot water or wash your vehicle in the direct rays of the sun. Do not use strong soap or chemical detergents. All cleaning agents should be flushed promptly from the surface and not allowed to dry on the finish.

These vehicles are designed to operate under normal environmental conditions to withstand natural elements. However, unusual conditions such as high-pressure car washers may cause water to enter inside the vehicle. If the vehicle is operated with foreign material adhering to the exterior, this material may

react chemically with paint, resulting in staining, discoloration, rusting or corrosion of components. Also, the material may become trapped within mechanical components, adversely affecting their functions or forming an aerodynamic resistance. In the following cases, therefore, the vehicle must be washed and all foreign matter removed.

- When soot, iron powder, dead bugs, bird droppings, tree sap or oily matter from coal tar and smoke has adhered to painted surfaces.
- When the vehicle has been driven in coastal areas.
- When the vehicle has been driven on roads where road chemicals have been applied.
- When a large amount of mud or dirt has adhered to the exterior.

To wash the vehicle:



Do not apply water to the tail end of the exhaust pipe. Failure to observe this precaution can lead to fault exhaust gas measurement sensors by getting wet.

1. Fully turn on the tap, and wash out the undercarriage and suspension.
2. Close all openings and wash the cab and cargo body panels using a neutral detergent.
3. Clean wheels and tires using a brush and detergent.
4. After washing away all remaining detergent, use a shammy or other clean cloth to fully remove all moisture and water droplets

⚠ Warning

Follow the manufacturer's advice whenever cleaning agents or other chemicals are used, inside or outside the vehicle. Some cleaners may be poisonous or flammable, and improper use may cause personal injury or damage. When cleaning the inside or outside of the vehicle, do not use volatile cleaning solvents, such as acetone, lacquer thinners, enamel reducers, nail polish removers; or such cleaning materials as laundry soaps, bleaches or reducing agents, except as noted in the following fabric cleaning advice on stain removal.

Never use carbon tetrachloride, gasoline, benzene or naphtha for any cleaning purpose. Open all vehicle doors for ventilation when ANY cleaning agents or other chemicals are used in the interior. Overexposure to some vapors may result in a health problem that is more likely to occur in small, unventilated spaces.

You and others could be seriously injured.

Do not apply water directly in order to clean the cab interior. Failure to follow this advice can cause a malfunction of electronic control units and electrical components and result in rusting of the cab floor.

Do not apply water from a high-pressure washer nozzle directly to the electric connectors. Failure to follow can lead to faulty operation of the electrical system.

Do not direct a large amount of water at the air inlet openings.

Do not apply water to the engine compartment or at electrical components. Failure to follow this advice can lead to a poorly starting and operating engine and problems in the electrical system.

Ensure that mirrors and the antenna are retracted before washing the vehicle.

Do not spray water on the exhaust or after treatment system while the engine is running. Doing so may cause incorrect exhaust gas sensor readings resulting in the illumination of the check engine light.

If an automatic car or truck-wash must be used, avoid a high-temperature, high-pressure type machine. Failure to follow this can lead to heat deformation and breakage of plastic components, or water to leak into the cab.

When using an automatic car or truck-wash, ensure that a distance of at least 15.75 in (0.4 m) is maintained between the nozzle and the vehicle, and when washing door windows that the spray is perpendicular to the surface of the glass.

If an automatic car or truck-wash is used with vehicles having dark or metallic coating, the painted surfaces can be damaged by the brushes, lose their luster or be very noticeably scratched.

Ensure that all detergent is fully washed and wiped away. Particularly in the case of strong alkaline detergents, typically those for industrial uses, there is a danger that hairline cracks can develop in lighting-cluster lenses if the vehicle is operated without detergent being fully wiped away. Always read the detergent manufacturer's instructions carefully before use.

Vehicle Storage

In order to maintain your vehicle's attractive appearance as long as possible, special consideration must be given to its storage location.

If the vehicle is stored or kept for an extended period of time in any of the following locations, a chemical change may occur in the paint work, resulting in staining, discoloration, rusting, and corrosion of components.

- Locations where a large amount of oily matter, soot, heavy smoke or metal powder can adhere to the vehicle.
- Areas around pharmaceutical plants and other facilities that discharge chemical matter.
- Coastal areas
- Locations where a large amount of dead bugs, bird droppings or tree sap can adhere to the vehicle.

Polishing and Waxing

Periodic polishing and waxing is recommended to remove built-up residue and eliminate any "weathered" appearance.

Your authorized dealer offers several polishes and cleaners which have proven value in maintaining original finish appearance and durability.

Painted and chrome-plated surfaces should be waxed once or twice a month, or whenever water is being poorly repelled on the surfaces. Ensure that wax is not applied in direct sunlight, and that the temperature of the painted surface is no more than 40 °C (104 °F).

Always follow the instructions provided with your wax product.

Do not use wax containing abrasive material. Failure to observe this precaution can lead to scratching of painted surfaces or plastic components.

The application of wax to rubber component surfaces can result in permanent whitening.

⚠ Warning

Wax must not be applied to the windshield. If applied, it can result in an irregular reflection of light, impairing your view.

Protecting Exterior Bright Metal Parts

Bright metal parts should be cleaned regularly to keep their luster. Washing with water is all that is usually needed.

Use special care with aluminum trim. To avoid damaging protective trim, never use auto or chrome polish, steam or caustic soap to clean aluminum. A coating of wax, rubbed to a high polish, is recommended for all bright metal parts.

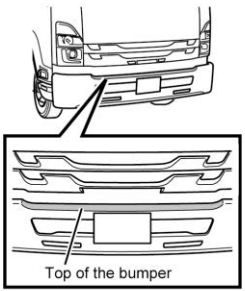
Weatherstrip Lubrication

All weatherstrips should be periodically lubricated (minimum of every 6 months) with a weatherstrip lubricant. A thin film of weatherstrip lubricant should be applied using a clean cloth. Weatherstrip lubricant application will lengthen weatherstrip life, help sealing, and assist in eliminating squeaks.

Windshield Care

⚠ Warning

When cleaning the windshield, do not place your feet or stand on top of the bumper if it does not have a step. The top of the bumper is slippery and stepping on it could cause you to fall and suffer serious injury.



Wax must not be applied to the windshield. A layer of wax can impair your view in rainy weather and can also lead to rough movements of the windshield wiper. If engine oil or

grease comes into contact with the windshield, staining or discoloration may result. It must be immediately cleaned away.

If not fully cleaned by the windshield wipers, the windshield should be cleaned using glass cleaner. If your windshield is not clear after using the windshield washer, or if the wiper blade chatters when running, wax or other material may be on the blade or windshield.

The windshield wipers on your truck can be pulled out from the windshield to provide easier access for cleaning.

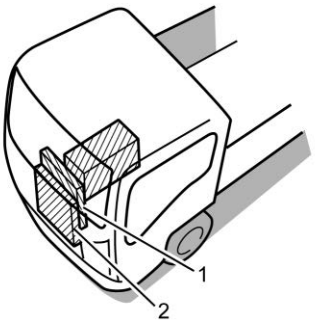
Clean the outside of the windshield with a non-abrasive cleaner. Your windshield is clean if beads do not form when rinsing with water. Clean the blade by wiping with a cloth soaked in a solution of one-half water and one-half methanol alcohol. Then rinse the blade with water.

The windshield wiper arms may be swung out, away from the glass, to provide easy access for cleaning.

In order to prevent damage or water leakage, do not grip the roof marker lights while cleaning the windshield.

Handling the Radiator and Charge Air Cooler

Cleaning the Radiator Core and Charge Air Cooler Core



1. Radiator
2. Intercooler

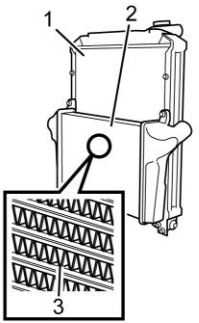
Cooling efficiency is compromised when there is dirt or dust plugging air passages in the radiator core and charge air cooler core (diesel). This can also cause corrosion of these cores. Wash the radiator core with tap water every 24 months.

Make sure to turn the engine off and remove the key from the engine control switch before cleaning cores.

The engine, exhaust pipe, and radiator will be hot immediately after the vehicle is driven. Be careful around these parts to prevent burns.

Clean the engine when it is cold.

Do not clean the radiator, charge air cooler (diesel) and their surrounding areas using water that is supplied under high pressure. Doing so may cause damage.



1. Radiator Core
2. Charge Air Cooler Core
3. Fin

When cleaning the radiator core (1) and charge air cooler core (2) , do not crush or damage the fins (3). The fins are very fragile so be

careful not to bend them out of shape. If they become deformed, their cooling efficiency will be impaired. Before cleaning, take steps to ensure that no water will splash onto the surrounding electrical components and wires. If stubborn dirt still remains even after the radiator core and charge air cooler core (diesel) have been cleaned, have the vehicle inspected and serviced.

Corrosion Protection

Your vehicle has been designed and built to resist corrosion. Special materials and protective finishes were used on most parts of your vehicle when it was built to help maintain good appearance, strength, and reliable operation. However, some parts which normally are not visible (such as those under the vehicle and under the hood) are such that surface rust will not affect their reliability. So corrosion protection is not needed or used on these parts.

Sheet Metal Damage

If your vehicle is damaged and requires sheet metal repair or replacement, make sure the body repair shop applies anti-corrosion material to the parts repaired or replaced so that corrosion protection is restored. (Also see "Finish Damage" which follows.)

Foreign Material Deposits

Calcium chloride and other salts, ice-melting agents, road oil and tar, tree sap, bird droppings, chemicals from industrial chimneys and other foreign matter may damage vehicle finishes if left on painted surfaces. Prompt washing may not completely remove all of these deposits. Other cleaners may be needed. When using chemical cleaners, be sure they are safe for use on painted surfaces.

Finish Damage

Any stone chips, fractures or deep scratches in the finish should be repaired promptly. Bare metal will corrode quickly and may develop into major repair expense. Minor chips and scratches can be repaired with touch up materials available from your authorized dealer or other service outlets. Larger areas of finish damage can be corrected in your dealer's body and paint shop.

Underbody Maintenance

Corrosive materials used for ice and snow removal, and dust control can collect on the underbody. If these materials are not removed, accelerated corrosion (rust) can occur on underbody parts such as fuel lines, frames, floor pan and exhaust system even though they have been provided with corrosion protection.

At least every spring, flush these materials from the underbody with plain water. Take care to clean well any areas where mud and other debris can collect. Sediment packed in closed areas of the frame should be loosened before being flushed. If desired, your authorized dealer can do this for you.

Interior Care

General

Remove dust and dirt from the interior of the cab using an automotive cleaner or vacuum cleaner, and gently wipe surfaces clean using a cloth wet with warm or cold water.

⚠ Warning

Water should never be sprayed directly into the interior of the cab when cleaning. Failure to observe this precaution can lead to vehicle malfunction and possibly to fire if water should enter the audio system or other electrical components located underneath the floor carpet.

Petroleum ether, gasoline and other organic solvents should not be used to clean safety belts. In addition, safety belt webbing should be neither bleached nor redyed. Failure to observe these precautions can lead to the performance or strength of the safety belts being impaired. In the case of a collision, therefore, the safety belts could be insufficiently effective, and serious life-threatening injuries could result. When cleaning, use warm water in which a small amount of neutral detergent has been dissolved to gently wipe the safety belts.

Follow the manufacturer's advice whenever cleaning agents or other chemicals are used, inside or outside the

(Continued)

Warning (Continued)

vehicle. Some cleaners may be poisonous or flammable, and improper use may cause personal injury or damage. When cleaning the inside or outside of the vehicle, do not use volatile cleaning solvents, such as acetone, lacquer thinners, enamel reducers, nail polish removers; or such cleaning materials as laundry soaps, bleaches or reducing agents, except as noted in the following fabric cleaning advice on stain removal. Never use carbon tetrachloride, gasoline, benzene or naphtha for any cleaning purpose.

Open all vehicle doors for ventilation when ANY cleaning agents or other chemicals are used in the interior. Overexposure to some vapors may result in a health problem that is more likely to occur in small, unventilated spaces.

You and others could be seriously injured.

The interior of the vehicle must never be cleaned using acidic or alkaline solvents, or petroleum ether, gasoline, and other organic solvents. Failure to observe this precaution can result in discoloration and staining. It should be noted that certain types of cleaning products contain these compounds. Be sure to read cleaning product labels carefully.

Air fresheners (liquid, solid, gel, or plate types) must not come into direct contact with, or spill onto, interior components such as the air conditioning or audio system. Compounds contained in these products can cause discoloration, staining, or peeling of paint.

Glass cleaners that contain these compounds must not be used to clean the inside of the windshield or window glass. To clean the glass, wipe it using a cloth wet with warm or cold water.

To avoid possible permanent discoloration of light colored seats, Do not let materials with non-fast colors come into contact with seat trim materials until these materials are totally dry. This includes certain types of casual clothing, such as colored denims, corduroys, leathers, and suedes, as well as decorative paper.

With the use of modern trim materials, it is very important that you use proper cleaning techniques and cleaners. Failing to do this on the first cleaning may result in water spots,

spot rings, or setting of stains or soilage — all of which are more difficult to remove in a second cleaning.

Dust and loose dirt that collect on interior fabric should be removed often with a vacuum cleaner or soft bristle brush. Wipe vinyl or leather trim regularly with a clean, damp cloth. Normal trim soils, spots, or stains can be cleaned with these cleaners.

Remember these basic steps before cleaning:

- Remove stains as quickly as possible before they set.
- Use a clean cloth or sponge, and change to a clean area of the cloth or sponge often. A soft brush maybe used if stains persist.
- Use solvent-type cleaners only in a well ventilated area: also, do not saturate the stained area.
- If a ring forms after spot cleaning, clean the entire area immediately.
- Follow specific instructions on cleaner labels.

General Cleaning of Soiled or Water Spotted Fabric Type Trim with Foam Type Cleaner

Vacuum the area thoroughly to remove any loose dirt.

Always clean a whole trim panel or section. Mask surrounding trim along stitch or welt lines.

Use suds on a clean sponge. Do not brush wet suede. Do not saturate the material or rub it harshly. Immediately after cleaning, remove suds with a sponge and rinse with a clean wet sponge. Wipe off remaining residue with a slightly damp absorbent towel or cloth.

Immediately after wiping, force-dry the fabric with an air hose. A heat dryer or heat lamp may be used. Use caution with a heat dryer or lamp to help prevent damage.

When trim materials with a sheen or luster finish are dry, wipe the fabric lightly with a soft, dry, clean cloth to restore its sheen or luster. For suede, raise nap with a dry scrub brush and vacuum to remove any final traces of residue.

Spot Cleaning Fabric Type Trim with Solvent Type Cleaner

Before trying to remove a spot or stain from fabric, try to find out the type and age of the spot or stain. Some spots or stains can be removed with water or a mild soap solution. Spots or stains should always be removed as soon as possible.

Some types of stains or soilage, such as lipstick, inks, and grease, are very difficult (sometimes impossible) to remove completely. When cleaning this type of stain or soilage, be sure not to enlarge the soiled area.

- Gently scrape excess stain from the trim material with a clean, dull knife or scraper. Use very little cleaner, light pressure, and clean cloths, preferably cheesecloth. Cleaning should start at the outside of the stain feathering towards the center. Keep changing to a clean section of cloth.
- When you clean a stain from fabric, immediately dry the area with an air hose, heat dryer, or heat lamp to help prevent a cleaning ring. Use caution with heat dryer or lamp to help prevent fabric damage.

- If a ring forms, immediately repeat the cleaning operation over a slightly larger area with emphasis on feathering towards its center. If a ring still remains, mask off surrounding trim sections and clean the entire soiled area with a foam type cleaner.

  See “Removal of Specific Stains.”

Removal of Specific Stains

Greasy or Oily Stains – Includes grease, oil, butter, margarine, shoe polish, coffee with cream, chewing gum, cosmetic creams, vegetable oils, wax crayon, tar, and asphalts.

- Carefully scrape off excess stain; then use solvent type cleaner.
- Shoe polish, wax crayons, tar, and asphalts will stain if left on trim; they should be removed as soon as possible. Use care as cleaner will dissolve them and may cause them to bleed.

Non-Greasy Stains – Includes catsup, coffee (black), egg, fruit, fruit juice, milk, soft drinks, wine, vomit, and blood.

- Carefully scrape off excess stain; then sponge the stain with cool water.
- If a stain remains, use Multi-Purpose Powdered Cleaner (Foam type) as previously described.
- If an odor lingers after cleaning vomit or urine, treat the area with a water-baking soda solution: 5 milliliters (1 teaspoon) of baking soda to 250 milliliters (1 cup) of lukewarm water.
- Finally, if needed, clean lightly with Fabric Cleaner (Solvent type).

Combination Stains – Includes candy, ice cream, mayonnaise, chili sauce, and unknown stains.

- Carefully scrape off excess stain; then clean with cool water and allow to dry.
- If stain remains, clean it with Fabric Cleaner (Solvent type).

Cleaning Vinyl Trim

Ordinary soilage can be removed from vinyl or leather with warm water and mild soap, such as saddle soap or oil soap, or an equivalent.

- Apply a small amount of soap solution and let it soak for a few minutes to loosen dirt; then, rub briskly with a clean, damp cloth to remove dirt and traces of soap. This may be done several times, if needed.
- Soilage such as tars, asphalts, shoe polish, etc., will stain if left on trim. They should be wiped off as quickly as possible and the area cleaned with a clean cloth dampened with solvent type vinyl leather cleaner.

Fabric Seat Covering and Carpet Care

Remove dirt and dust using a home-use electric vacuum cleaner.

Do not remove the carpet. Use standard household cleaning products and methods to remove stains from food, drink, and the like.

Be sure to use neutral detergents or cleaning products indicated as higher alcohol based detergents.

Glass Surfaces

Glass surfaces should be cleaned on a regular basis. Use of glass cleaner or a liquid household glass cleaner will remove normal tobacco smoke and dust films sometimes caused by ingredients used in vinyls and interior plastics.

Service and Maintenance

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Maintenance Schedule

Maintenance information, in this manual, related to the Cummins engine and Allison transmission is provided for reference only. For information regarding your Allison Transmission, see Owners>Owner Manuals>Manuals and Guides on www.chevrolet.com. For information regarding your Cummins Engine, see the Cummins owner's manual.

Caution

Damage caused by improper maintenance can lead to costly repairs and may not be covered by the vehicle warranty. Maintenance intervals, checks, inspections, recommended fluids, and lubricants are important to keep the vehicle in good working condition.

Do not have chemical flushes that are not approved by GM performed on the vehicle. The use of flushes, solvents, cleaners, or lubricants that are not approved by GM could damage the vehicle, requiring expensive repairs that are not covered by the vehicle warranty.

Make sure the vehicle is inspected at regular intervals. Inspections and maintenance enable you to use the vehicle with peace of mind. They also extend the vehicle's service life.

For safe and economical driving, we recommend that you have your vehicle inspected and serviced regularly according to the schedule indicated in this chapter.

To drive your vehicle safely and at minimum cost, it is essential to have your vehicle regularly inspected and serviced at your dealer as per the specified maintenance schedule.

Contact your dealer for inspection that requires disassembly and/or special equipment.

The Maintenance Schedule in this manual and a Warranty Information Booklet are supplied with your vehicle. Read all publications for a full understanding of your vehicle's maintenance needs.

The quality of maintenance your new vehicle receives is as important as the regularity with which it is serviced. Authorized dealers provide nationwide quality in customer service. The program includes the training of dealer technicians throughout the country and is supported with a continuous follow-up of publications and other service information.

The use of genuine parts and accessories, which have the same high quality standards as original equipment parts, and the use of factory approved tools developed and tested for use by the authorized dealer also contribute to the high quality of service.

If you have any questions on how to keep your truck or chassis in good condition, see your authorized dealer, the place many truck owners choose to have their maintenance work done. Your authorized dealer can be relied upon to use proper parts and practices.

Some of these services can be complex, so unless you are technically qualified and have the necessary equipment, you should let your authorized dealer's service department or another qualified service center do these jobs.

The schedule includes general maintenance which you or a qualified technician should perform periodically.

Explanation of Vehicle Maintenance and Log

The following is a brief explanation of normal vehicle use.

NORMAL VEHICLE USE—The maintenance instructions contained in this section are based on the assumption that your vehicle will be used as designed:

- To carry passengers and cargo with the limitations indicated on the "VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate".
- On reasonable road surfaces within legal operating limits.
- On a daily basis, as a general rule, for at least several miles/kilometers.

Unusual operating conditions, such as driving in dusty areas (sweeper, agricultural or off-road vehicles), extended idling (refrigeration vehicles), or vehicles operated for frequent short trips, will require more frequent vehicle maintenance.

The log groups items according to mile/ kilometer service intervals. Use the item codes (letter and number) to find the description of the maintenance and the time intervals.

Follow whichever interval comes first, time or miles/kilometers.

After the maintenance services are performed, insert the month, day and mileage/ kilometers in the area provided next to the serviced item.

The services shown up to 176 000 km (110,000 miles) are to be repeated after the initial 176 000 km (110,000 miles) at the same intervals.

Preventive Maintenance

As any mechanical device operates, a certain amount of wear occurs. The amount of wear depends on certain variables – type and method of operation and the schedule of maintenance. These variables may be emphasized as critical to malfunction but each is dependent upon the other. For example, if a vehicle is repeatedly overloaded, driven at excessive speed or improperly shifted, no schedule of maintenance can prevent malfunction. Also, if a preventive maintenance schedule is not followed, or is improperly carried out, no amount of correct vehicle operation will prevent malfunction.

If vehicle application, operation and preventive maintenance schedules and procedures are followed and properly carried out, the life of the vehicle will be greatly extended.

For example, regular attention to the engine oil is essential. The oil level must be periodically checked and oil added whenever needed. Also, the oil should be changed at the intervals specified with the proper quality and viscosity

of oil. If your engine should run excessively low on oil or if the oil has lost its lubricating qualities because of old age, serious engine damage could occur.

Power Take Off (PTO) and Extended Idle Use

When the vehicle is used with the PTO equipment or used in a way that requires extended idle time, one hour of use shall be deemed the same as 53 km (33 mi). See *Driver Information Center (DIC)* ⇨ *63* for hourmeter.

Maintenance Schedule Table

Letters Used to Indicate Maintenance Service Types

A: Adjust

C: Clean

I: Inspect then clean, repair or replace as necessary

L: Lubricate

R: Replace

T: Tighten to the specified torque

No.	Service Interval	x1,000 km x1,000 miles	16 10	32 20	48 30	64 40	80 50	96 60	112 70	128 80	144 90	160 100	176 110	Service intervals months or kilometers (miles) whichever occurs first (1)
1	Engine noise check		I	I	I	I	I	I	I	I	I	I	I	
2	Overhead set (10)		Every 240 000 km (150,000 mi) or 5,000 hours: A											
3	Engine oil and oil filter (2) (6)		See “Maintenance Schedule for Engine Oil & Filter”											
4	Oil catch cup		I	I	I	I	I	I	I	I	I	I	I	or every 12 months or 300 hours

No.	Service Interval	x1,000 km x1,000 miles	16 10	32 20	48 30	64 40	80 50	96 60	112 70	128 80	144 90	160 100	176 110	Service intervals months or kilometers (miles) whichever occurs first [1]
5	Fuel filter [6]		-	-	-	-	-	R	-	-	-	-	-	or every 18 months or 2,000 hours
6	Pre-fuel filter/water separator		Every 1,000 hours: R											
7	Air cleaner filter		-	-	-	-	-	-	-	-	-	-	-	Replace per indicator [5]
8	Damage to air intake ducts and hoses		I	I	I	I	I	I	I	I	I	I	I	or every 12 months
9	Drive belt, cooling fan		-	-	I	-	-	I	-	-	I	-	-	or every 12 months
10	Cooling fan belt tensioner		-	-	-	-	-	I	-	-	I	-	-	or every 12 months
11	Engine Cleaning [6]		-	-	-	-	-	C	-	-	-	-	-	
12	Rotate tires [3]		A	A	A	A	A	A	A	A	A	A	A	
13	Engine cooling system		I	I	I	I	I	I	I	I	I	I	I	or every 12 months
14	Engine coolant		Every 500 hours: I Every 6,000 hours: R (when dealer recommended coolant is used)											

No.	Service Interval	x1,000 km x1,000 miles	16 10	32 20	48 30	64 40	80 50	96 60	112 70	128 80	144 90	160 100	176 110	Service intervals months or kilometers (miles) whichever occurs first [1]
15	Exhaust system [6]		I	I	I	I	I	I	I	I	I	I	I	
16	Diesel Particle Filter (DPF) (clean filter) [6]		Every 320 000 km miles (200,000) or 6,500 hours: R											
17	Fuel line system		I	I	I	I	I	I	I	I	I	I	I	or every 12 months
18	Brake lining for wear		I	I	I	I	I	I	I	I	I	I	I	
19	Brake drum for wear and damage		-	-	I	-	-	I	-	-	I	-	-	or every 12 months
20	Brake line and hoses		-	I	-	I	-	I	-	I	-	I	-	or every 12 months
21	Automatic transmission fluid [4]		I	I	I	I	I	I	I	I	I	I	I	240 000 km (150,000 mi): R
22	Automatic transmission filter [4]		-	-	-	-	R	-	-	-	-	R	-	or every 24 months or 2,000 hours
23	Differential gear oil		Every 16 000 km (10,000 mi): I Every 288 000 km (180,000 mi) or 36 months: R											

No.	Service Interval	x1,000 km x1,000 miles	16 10	32 20	48 30	64 40	80 50	96 60	112 70	128 80	144 90	160 100	176 110	Service intervals months or kilometers (miles) whichever occurs first [1]
24	Power steering fluid		I	I	I	I	R	I	I	I	I	R	I	or every 24 months: R
25	Power steering oil hoses		I	I	I	I	I	I	I	I	I	I	I	or every 24 months
26	Steering wheel free play [10]		I	I	I	I	I	I	I	I	I	I	I	
27	Steering gear box torque		-	-	-	-	A	-	-	-	-	A	-	or every 12 months
28	Drive shaft flange torque		T	-	-	-	-	-	-	-	-	-	-	
29	Drive shaft lubrication		-	L	-	L	-	L	-	L	-	L	-	or every 6 months
30	Steering shaft		Every 5 000 km (3,000 miles): L											
31	Leaf spring U-bolt torque [7]		T	T	T	T	T	T	T	T	T	T	T	
32	Air suspension's main support member nuts/ U-bolt nuts[8]		T	T	T	T	T	T	T	T	T	T	T	or every 6 months
33	Rear shock absorber pin nuts[8]		-	T	-	T	-	T	-	T	-	T	-	or every 6 months
34	Loose or damaged air suspension main support member		-	I	-	I	-	I	-	I	-	I	-	or every 6 months

No.	Service Interval	x1,000 km x1,000 miles	16 10	32 20	48 30	64 40	80 50	96 60	112 70	128 80	144 90	160 100	176 110	Service intervals months or kilometers (miles) whichever occurs first [1]
35	Damaged air spring		-	I	-	I	-	I	-	I	-	I	-	or every 6 months
36	Air leaks from air suspension		-	I	-	I	-	I	-	I	-	I	-	or every 6 months
37	Loose or damaged air suspension mounting [8]		-	I	-	I	-	I	-	I	-	I	-	or every 6 months
38	Air spring height		-	I	-	I	-	I	-	I	-	I	-	or every 6 months
39	Function of leveling valve		-	I	-	I	-	I	-	I	-	I	-	or every 6 months
40	Loose or damaged torque rod [8]		-	I	-	I	-	I	-	I	-	I	-	or every 6 months
41	Loose or damaged traverse rod [8]		-	I	-	I	-	I	-	I	-	I	-	or every 6 months
42	Wheel nut torque [9]		T	T	T	T	T	T	T	T	T	T	T	
43	King pin		-	L	-	L	-	L	-	L	-	L	-	or every 6 months
44	Wheel hub bearing oil - Front		I	I	R	I	I	R	I	I	R	I	I	or every time hubs are removed
45	Air conditioner blower filter		Cleaned once a month											

No.	Service Interval	x1,000 km x1,000 miles	16 10	32 20	48 30	64 40	80 50	96 60	112 70	128 80	144 90	160 100	176 110	Service intervals months or kilometers (miles) whichever occurs first [1]
46	Exhaust injector		-	-	-	-	-	-	-	-	-	-	I	or every time hubs are removed
47	DEF tank filter element		-	-	R	-	-	R	-	-	R	-	-	or every 3 years
48	DEF quality sensor		-	R	-	R	-	R	-	R	-	R	-	or every 2 years
49	DEF tank cap		Every 48 000 km (30,000 mi) or 3 years: C or R											
50	Starter		When the starter indicator light (amber) comes on: R											
51	Rear spring slip pad		Cleaned every 8 000 km (5,000 miles)											or every 12 months
52	Function of brake valves		I	I	I	I	I	I	I	I	I	I	I	or every 12 months
53	Function of parking brake valve		Every 12 months: I Every 24 months: R											
54	Rubber parts of brake valve		Every 24 months: R											
55	Air brake system inspection		I	I	I	I	I	I	I	I	I	I	I	or every 6 months
56	Slack adjuster lube		L	L	L	L	L	L	L	L	L	L	L	or every 6 months

No.	Service Interval	x1,000 km x1,000 miles	16 10	32 20	48 30	64 40	80 50	96 60	112 70	128 80	144 90	160 100	176 110	Service intervals months or kilometers (miles) whichever occurs first [1]
57	Slack adjuster service inspection		I	I	I	I	I	I	I	I	I	I	I	or every 6 months
58	Air brake chamber		I	I	I	I	I	I	I	I	I	I	I	or every 12 months
59	Air dryer		-	-	-	-	-	-	-	-	-	R	-	or every 3 years
60	Air compressor, governor and unloader valve functions		-	-	I	-	-	I	-	-	I	-	-	or every 12 months

Remarks

(1) In case this column is blank, follow kilometers (miles).

(2) Use of oils other than CK-4 may require shorter maintenance intervals and may cause nonconformity to regulations. Use of oils with other viscosity than *W-40 may also require shorter maintenance intervals and may cause a problem with engine durability.

(3) See *Tire Rotation* ⇨ *239*.

(4) See the Allison Automatic Transmission Operator's Manual to confirm maintenance interval by customer vocation. For information regarding your Allison Transmission, see Owners>Owner Manuals>Manuals and Guides on www.chevrolet.com.

(5) Refer to "Air Cleaner Indicator Light." See *Engine Air Cleaner/Filter* ⇨ *194*.

(6) Initial check at 1 040 km (650 mi) is required.

(7) Initial check at 8 000 km (5,000 mi) is required.

(8) Initial check at 1 600 km (1,000 mi) is required.

(9) Initial check at 160 km (100 mi) and at 1 600 km (1,000 mi) with tire rotation is required.

(10) See the Cummins Owner's Manual for additional details and to confirm the maintenance interval.

Explanation of Complete Vehicle Maintenance Schedule

The following is a brief explanation of each of the services listed in the preceding Complete Vehicle Maintenance Schedule.

1. Engine Noise: These components have an effect on the control of noise emissions.

Service Interval	Maintenance procedure
Engine Every 16 000 km (10,000 miles)	Inspect sound absorption materials for tears, broken out sections or attachment. Repair or replace as necessary.
Cooling System Every 16 000 km (10,000 miles)	Inspect fan, shroud and radiator for attachment, tears or cleanliness. Replace as necessary.
Air intake system Every 16 000 km (10,000 miles)	Inspect all ducts, hoses and intake silencers for leaks or chafing. Repair or replace as necessary.
Exhaust system Every 16 000 km (10,000 miles)	Inspect silencer, pipes, gaskets, clamps and mounting for exhaust gas leaks or looseness. Repair or replace as necessary.
Cab Every 16 000 km (10,000 miles)	Inspect sound absorption materials for tears, broken out sections or attachment. Repair or replace as necessary.

2. Overhead Set: Incorrect valve clearance will result in increased engine noise and lower engine output, thereby adversely affecting engine performance. Retorque rocker shaft bracket nuts before checking and adjusting valve clearance.

Check and adjust valve clearance every 240 000 km (150,000 miles) or 5,000 hours whichever occurs first.

3. Engine Oil and Oil Filter: See “Maintenance Schedule for Engine Oil and Filter” below.

4. Oil Catch Cup: Check engine blow–by oil level in the oil catch cup every 16 000 km (10,000 miles). Make sure that the oil accumulate level in the oil catch cup does not exceed 10mm (0.4 in). If the level exceeds 10mm (0.4 in), clean the cup.

When washing around the engine, remove the oil catch cup or omit the step of washing around the cup to reduce effort.

Check the engine blow-by oil level after it has rained, snowed, mud has splashed against it, etc.

Clean up besides maintenance when any fluid drips from the cup to the flywheel housing or to the ground.

5. Fuel Filter: Replace the fuel filter every 96 000 km (60,000 miles) or 18 months or 2,000 hours or more frequently if clogged or replace when the fuel filter indicator light comes on.

6. Pre-Fuel Filter/Water separator: Replace the fuel filter every 1,000 hours or more frequently if clogged or replace when the fuel filter indicator light comes on.

7. Air Cleaner Filter: The level of dirt in the air cleaner element can be checked against the indicator.

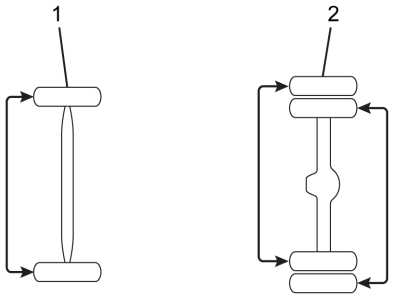
Replace the air cleaner filter when the Driver Information Center (DIC) shows "CHECK AIR FILTER".

8. Damage to Air Intake Ducts and Hoses: Check for damage of air intake ducts and hoses and that those are correctly installed every 16 000 km (10,000 miles) or 12 months. Replace or adjust those if necessary.

9. Drive Belt, Cooling Fan: Check belt driving the fan, generator or A/C compressor every 48 000 km (30,000 miles). Look for cracks, fraying, wear, and proper tension.

10. Cooling Fan Belt Tensioner: Check cooling fan belt tensioner every 48 000 km (30,000 miles) or 12 months.

11. Engine Cleaning: Clean the engine every 96 000 km (60,000 miles). See Cummins Owner's Manual for details.



1. Front Wheels
2. Rear Wheels

12. Rotate Tires: To equalize wear, rotate tires as shown in the figure and adjust tire pressures every 16 000 km (10,000 miles).

Wheel spacers should be replaced at the same time the tires are rotated for vehicles with aluminum wheels.

13. Engine Cooling System: At 12 months or 16 000 km (10,000 miles) intervals, wash sub tank pressure cap and filler neck with clean water, pressure test system and sub tank pressure cap for proper pressure holding capacity, tighten hose clamps and inspect condition of all cooling and heater hoses. Replace hoses if cracked, swollen or otherwise deteriorated. Have the hoses replaced by your authorized dealer.

Also each 24 months, clean exterior of radiator core and charge air cooler.

14. Engine Coolant: Inspect the engine coolant every 500 hours. Replace the engine coolant every 6,000 hours. When the recommended coolant is used, drain the engine coolant by opening the drain plug at the bottom of the radiator core, flush and refill the engine cooling system with new engine coolant. Refer to "Preparing Engine Coolant" in *Engine Coolant* ⇨ *195*. Have the Engine Coolant replaced by your authorized dealer.

15. Exhaust System: Check the complete exhaust system every 16 000 km (10,000 miles). Check body areas near the exhaust system. Look for broken, damaged, missing, or out-of-position parts. Also inspect for open seams, holes, loose connections, or other conditions which could cause heat build-up at the rear body floor pan, or could let exhaust fumes seep into the passenger compartment. Dust or water in the cabin may indicate a leak in that area. Required repairs should be made at once.

16. Diesel Particulate Filters (DPF) (Clean Filter): Clean the filter every 320 000 km (200,000 mi) or 6,500 hours whichever occurs first.

17. Fuel Line System: Inspect the fuel tank, cap and lines for damage which could cause leakage every 16 000 km (10,000 miles). Inspect fuel cap for correct sealing ability and indications of physical damage. Replace any damaged or malfunctioning parts.

18. Brake Lining for Wear: Check drum brake lining and disc brake pad for wear or cracks every 16 000 km (10,000 miles). Check brakes more often if operating conditions or driving habits result in frequent braking. Minimum thickness is 6.3 mm (0.25 in).

19. Brake Drum for Wear and Damage: Check brake drums (front and rear) for wear or damage every 48 000 km (30,000 miles) or 12 months whichever occurs first.

20. Brake Line and Hoses: Check lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. every 32 000 km (20,000 miles). Any questionable parts should be replaced or repaired at once. When rubbing or wear is noted on lines or hoses, the cause must be corrected at once.

21. Automatic Transmission Fluid: Check the automatic transmission fluid level at each engine oil change and replace fluid every 240 000 km (150,000 miles). See the Allison Automatic Transmisslon Operator's Manual. It shows how to check the automatic transmission fluid and what fluid to use. For information regarding your Allison Transmission, see Owners>Owner Manuals>Manuals and Guides on www.chevrolet.com.

22. Automatic Transmission Filter: Replace the filter every 80 000 km (50,000 miles) or every 24 months or 2,000 hours whichever occurs first.

23. Differential Gear Oil: Replace lubricant every 36 months or 288 000 km (180,000 mi). Check lubricant level every 16 000 km (10,000 mi) and add lubricant to within 0 to 10 mm (0 to 0.4 inch) of the bottom edge of the filler hole if necessary.

24. Power Steering Fluid: Replace power steering fluid every 12 months or 80 000 km (50,000 miles), whichever occurs first.

25. Power Steering Oil Hoses: Inspect every 16 000 km (10,000 miles), and replace as necessary.

26. Steering Wheel Free Play: Check steering wheel free play after the first 1 040 km (650 miles) and then every 16 000 km (10,000 miles).

Steering wheel free play
10-60 mm (0.39-2.36 in)

27. Steering Gear Box Torque: Retighten the attaching bolts of the steering gear box to the specified torque every 12 months or every 80 000 km (50,000 miles) whichever occurs first.

Steering gear box tightening torque
197 - 240 N•m (20.1 - 24.5 kgf·m/145.3 - 177.0 lb·ft)

28. Driveshaft Flange Torque: Check the center bolt of driveshaft flange at the transmission for looseness or damage after the first 16 000 km (10,000 miles).

Driveshaft flange center bolt tightening torque
122 N•m (12.5 kgf·m/90 lb·ft)

29. Driveshaft Lubrication: Lubricate the universal joint and spline coupling every 6 months or 32 000 km (20,000 miles) whichever occurs first.

30. Steering Shaft: Lubricate the steering column shaft grease fitting (above the steering gear) every 5 000 km (3,000 miles).

31. Leaf Spring U-bolt Torque: Tighten the U-Bolt nuts to the specified torque after the first 8 000 km (5000 miles), thereafter every 16 000 km (10,000 miles).

Leaf spring U-bolt nut tightening torque	
Front	Rear
220 N•m (162 lb·ft)	380 N•m (280.3 lb·ft)

32. Air Suspension's Main Support Member Nuts/U-bolt Nuts: Tighten the air suspension's main support members nuts and u-bolt nuts to the specified torque after the first 1 600 km (1,000 miles), thereafter every 16 000 km (10,000 miles), or 6 months whichever occurs first.

Air suspension's main support member nut tightening torque	Air suspension's U-bolt nut tightening torque
352 - 433 N•m (35.9 - 44.2 kgf·m/260 - 320 lb·ft)	542 - 610 N•m (55.3 - 62.2 kgf·m/400 - 450 lb·ft)

33. Rear Shock Absorber Pin Nuts: Tighten the rear shock absorber pin nuts to the specified torque after the first 1 600 km (1,000 miles), thereafter every 20 000 km (32,000 miles), or 6 months whichever occurs first.

Rear shock absorber pin nut (upper and lower) tightening torque
70 - 100 N•m (7.14 - 10.2 kgf·m/52 - 74 lb·ft)

34. Loose or Damaged Air Suspension Main Support Member: Check the air suspension main support member every 32 000 km (20,000 miles) or 6 months whichever occurs first.

35. Damaged Air Spring: Check the air spring every 32 000 km (20,000 miles), or 6 months whichever occurs first.

36. Air Leaks from Air Suspension: Check air leaks from the air suspension every 32 000 km (20,000 miles), or 6 months whichever occurs first.

37. Loose or Damaged Air Suspension Mounting: Check the air suspension mounting after the first 1 600 km (1,000 miles), thereafter every 32 000 km (20,000 miles), or 6 months whichever occurs first.

38. Air Spring Height: Check the air spring height every 32 000 km (20,000 miles), or 6 months whichever occurs first.

39. Function of Leveling Valve: Check the function of leveling valve every 32 000 km (20,000 miles), or 6 months whichever occurs first.

40. Loose or Damaged Torque Rod: Check the torque rod after the first 1 600 km (1,000 miles), thereafter every 32 000 km (20,000 miles), or 6 months whichever occurs first.

41. Loose or Damaged Traverse Rod: Check the traverse rod after the first 1 600 km (1,000 miles), thereafter every 32 000 km (20,000 miles), or 6 months whichever occurs first.

42. Wheel Nut Torque: Check tires for excessive or abnormal wear, or damage. Also check tire inflation pressures and adjust.

Be sure wheels are not bent or cracked and that wheel nuts have been tightened to the specified torque after the first 160 km (100 miles) and then every 16 000 km (10,000 miles).

Wheel nut tightening torque
644 N•m (475 lb·ft)

43. King Pin: Lubricate the grease fitting on the king pins every 6 months or 32 000 km (20,000 miles) whichever occurs first.

44. Front Wheel Bearing Oil: Drain and refill front wheel bearing oil every 12 months or 48,000 km (30,000 miles) whichever occurs first. Inspect oil level and take oil sample every 16,000 km (10,000 miles). Check oil sample for water or metal shavings.

Wheel bearings should last for the entire life of the vehicle.

45. Air Conditioner Blower Filter: The air conditioner blower filter should be removed and cleaned once a month.

46. Exhaust Injector: Clean the exhaust injector every 176,000 km (110,000 miles).

47. DEF Tank Filter Element: Replace the DEF in-tank filter every 48 000 km (30,000 miles) or three years whichever occurs first.

48. DEF Quality Sensor: Replace the DEF in-tank sensor unit every 32 000 km (20,000 miles) or two years whichever occurs first.

49. DEF Tank Cap: Clean or replace the DEF tank cap every 48 000 km (30,000 miles) or 36 months whichever occurs first.

50. Starter: The color displayed by the starter indicator light will change from green to amber when the number of times remaining is 0 or below and the screen is selected.

When the indicator light (amber) comes on, have the vehicle inspected/serviced at the nearest dealer.

51. Rear Spring Slip Pad: Lubricate the grease fitting on the leaf springs every 8 000 km (5,000 miles) or 12 months whichever occurs first.

52. Function of Brake Valves: Inspect the brake valve function every 16 000 km (10,000 miles) or 12 months. Check for movement, cracks, damage, and corrosion. Also, check for air leaks. Repair or replace as necessary.

53. Function of Parking Brake Valve: Inspect the paring brake valve for function every 12 months. Replace the parking brake valve every 24 months.

54. Rubber Parts of Brake Valve: Service the brake application valve by replacing the internal rubber seals and replace the parking brake valve every 24 months.

55. Air Brake System Inspection: Visually check for physical damage, such as broken air lines and broken or missing parts every 16 000 km (10,000 miles) or 6 months, whichever occurs first.

56. Slack adjuster Lube: Lubricate the slack adjusters and brake camshafts using at the grease fittings. Apply lubricant until clean lubricant flows from the grease relief opening. Lubricate the clevis pins with grease by hand or a spray lubricant and check to see the pins are not seized. Perform this maintenance every 16 000 km (10,000 miles) or 6 months whichever comes first.

57. Slack Adjuster Service Inspection: Inspect the slack adjusters for damage, smooth operation, and that the brake actuator push rod stroke does not exceed the allowable limit. Perform this maintenance every 16 000 km (10,000 miles) or 6 months whichever comes first. Repair as necessary.

58. Air Brake Chamber: Inspect the air brake chamber on each wheel every 16 000 km (10,000 miles). Check for cracks, damage, and corrosion. Make sure that the chamber and caging bolt are securely tightened. Make sure that the dust cover is collectly installed in place. Repair as necessary.

59. Air Dryer: Replace the desiccant cartridge every 3 years or 160 000 km (100,000 miles). If excessive moisture is found when inspecting the air tank drain valve, replace the dryer filter cartridge sooner.

60. Air Compressor, Governor and Unloader Valve Functions: Inspect air compressor, governor and unloader valve functions. Start the engine and let it idle. When the brake air pressure gauges reach 125 psi ± 5 psi, check to see that the unloader valve has opened. Press the brake pedal several times. The unloader valve should close when the brake air pressure drops below 105 psi ± 5 psi.

Maintenance Schedule for Engine Oil andFilter

Maintaining the correct lubricating oil and filter change interval is a vital factor in preserving the integrity of an engine. See the following table to determine the maximum recommended lubricating oil change and lubricating oil filter change intervals. Lubricating oil and lubricating oil filter drain intervals are based on lubricating oil capacity and fuel economy. Drain the lubricating oil and change the lubricating oil filter according to engine distance or engine run time from the table below or 18 months, whichever comes first.

Fuel Economy			
Engine Distance or Run Time	Severe < 6 mpg (<2.6 km/liter)	Normal 6 to 10 mpg (2.6 to 4.3 km/liter)	Light > 10 mpg (>4.3 km/liter)
Miles	10,000	20,000	25,000
Kilometers	16 000	32 000	40 000
Hours	650	750	850

Owner Checks and Services

Before Driving

Proper care and driving is important not only for extended service life of your vehicle, but also for improved fuel and oil economy. Drive carefully and defensively. Be sure you know how to use your truck and its equipment before operating it.

Starting and Operating

Proper care and operation will not only extend the service life of your vehicle but also improve fuel economy.

Check Around the Vehicle Before Starting the Engine

Before pulling away, perform a thorough safety check, making sure there are no children or obstructions around the vehicle.

Take off the chocks after confirming that the parking brake is securely applied. Sit behind the wheel, adjust the seat position, and buckle up the seat belt. The passengers are also required to buckle up the seat belts. Adjust the positions of the steering wheel and mirrors. Lock the doors. Turn the power of the dome light or accessories OFF before starting the engine.

Engine Conditions

Checking the Engine for Startability and Abnormal Noises

1. Make sure the parking brake is securely engaged. Step firmly on the brake pedal.
2. Make sure the selector lever is in "P" (only models with P-range) or "N" position.

   For safety, firmly press the brake pedal before starting the engine.
3. Turn the engine control switch to start the engine.

   Check that the engine starts quickly with no abnormal noises.

Checking Condition of the Engine at Low Speeds and during Acceleration

1. Make sure the transmission is in the "P" (only models with P-range) or "N" position and the parking brake is securely engaged.
2. Turn the engine control switch to start the engine, and run it to warm up.
3. Check that the engine is running at a speed within the standard idle speed range.

   During regeneration of the diesel particulate filter (DPF), the engine idle speed may increase.
4. Drive the vehicle, making sure the accelerator pedal does not stick when gradually accelerating, the engine speed rises smoothly and it does not knock.

Recommended Daily (Pre-operation) Inspections

These checks are in addition to, not instead of, any legally required daily inspections. See related topics under "Maintenance Schedule", especially if problems are found.

⚠ Warning

For safe and comfortable driving, keep record of the distances driven and the condition of the vehicle during operation. Perform inspections at appropriate intervals, and perform maintenance in accordance with the findings of the inspections. If an inspection reveals an abnormality or there was an abnormality the previous time the vehicle was driven, have the vehicle repaired by the nearest dealer before it is driven again.

1. Components that showed abnormalities during the previous operation
   - Check components that showed abnormalities during the previous operation
2. Checks performed at the engine
   - Fan belt looseness and damage
   - Engine oil level
   - Engine coolant level
   - Power steering fluid level
3. Checks performed from the driver's seat
   - Slack adjuster stroke check
   - Exhaust sound from brake valve
   - Operation of meters, gauges and warning/indicator lights
   - Engine startability, abnormal noise and color of exhaust gases
   - Parking brake lever stroke
   - Windshield washer fluid spray condition and windshield wiper effectiveness
   - Windshield washer fluid level
   - Steering wheel position and free play
   - Operation of horn and turn signal lights

- Door lock operation

4. Checks performed during a walk around the vehicle
   - Illumination, flashing, contamination, damage and obstruction of lights
   - Contamination, damage and obstruction of windows, mirrors, and reflectors
   - Leaf spring damage
   - Oil, engine coolant, fuel, and power steering fluid leaks
   - Water separator
   - Drain moisture from air tank
5. Checking wheels and tires
   - Air pressure
   - Cracks and other damage
   - Abnormal wear
   - Tread depth
   - Mounting condition of all wheel nuts
6. Checks performed after the engine startup
   - Oil, engine coolant, fuel, and power steering fluid leaks
   - Inspect the exhaust system, checking that the tailpipe is clear
7. Checks performed while driving the vehicle
   - Brake effectiveness
   - Engine abnormal noises

Keep the Floor Around the Driver Seat Clean and Tidy

⚠ Warning

It is extremely dangerous to have empty cans, empty bottles, or other items rolling around on the floor because they could get trapped under the brake pedal and prevent brake application. For proper pedal operation, it is also essential to lay floor mats properly. Incorrectly installed floor mats would hinder free movement of the pedals.

Do not use the dashboard pocket or the top of the dashboard as a place to put items that could roll, which could interfere with your driving. You and others could be seriously injured.

Choose Your Footwear Suitable for Driving

⚠ Warning

Choose footwear that ensures proper operation of pedals when driving the vehicle. Use of footwear unsuitable for driving may cause an accident. The driver could be seriously injured when not wearing the proper footwear.

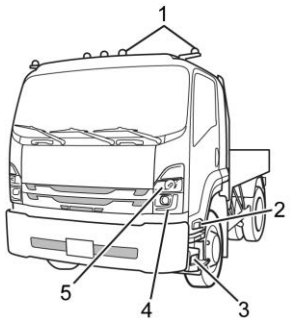
Electrical System

Following the after-delivery service, it is the owner's responsibility to check all wiring periodically for cracked, chafed or oil-soaked insulation and maintain it in a clean and tight condition to ensure satisfactory operation of the electrical system.

Headlights and Turn Signal Lights

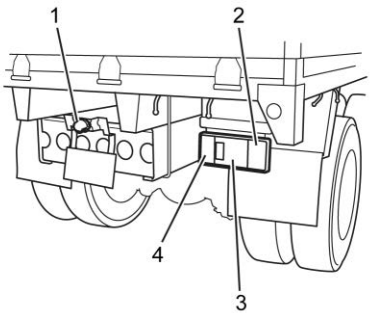
Turn the engine control switch to the "ON" position, and then check the way in which the headlights, turn signal lights, and other exterior lights come on and flash. In addition, press the brake pedal to confirm whether the stop lights come on, and shift the transmission

to "R" position to confirm whether the back up lights come on. Also examine the lights for discoloration, damage, and looseness.



Front

1. Roofmarker Lamp (Identification/ Clearance Lamp)
2. Side Turn Signal Lamp/Sidemarker Lamp
3. Cornering Lamp
4. Headlight/Parking Light/Daytime Running Light
5. Front Turn Signal Lamp



Rear

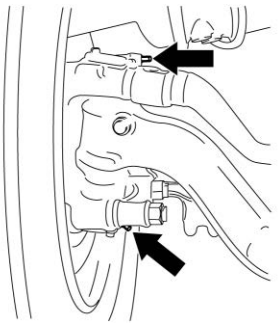
1. License Plate Lamp
2. Rear Turn Signal Lamp
3. Taillamp/Stoplamp
4. Back-up Lamp

Lubrication

One of the most important items of good vehicle care is the lubrication of all necessary points with the Right Lubricant, at the Right Time and in the Right Way. It is the owner's responsibility to maintain proper lubrication practices as recommended in the following pages.

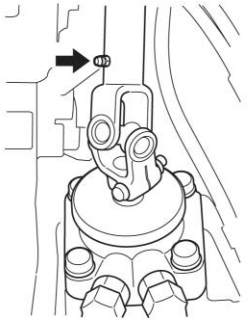
Greasing Chassis Components

The type (characteristics) of the grease specified for use with a chassis component differs from that of the grease specified for use with another component. Be sure to use only the specified grease for each component and perform greasing according to the Maintenance Schedule.



King pins (left and right)

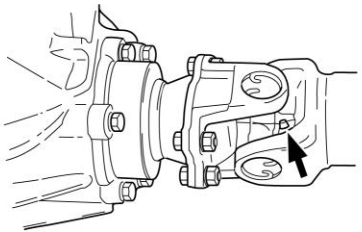
2 points each



Steering Column Shaft

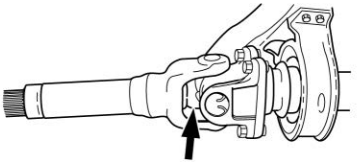
1 point beneath cab

Place the steering wheel in the straight-ahead position and tilt the cab



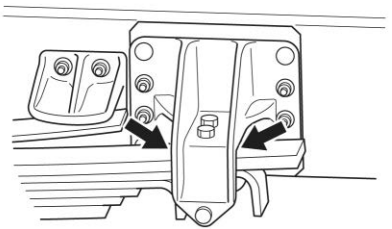
Driveshaft universal joint (Two-piece shaft)

Two-piece driveshaft: 3 points



Driveshaft universal joint (Three-piece shaft)

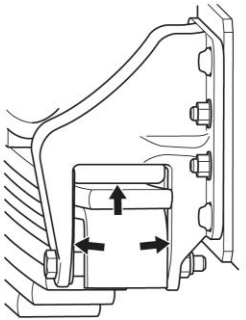
Three-piece driveshaft: 4 points



Rear spring sliding shackles (left and right)

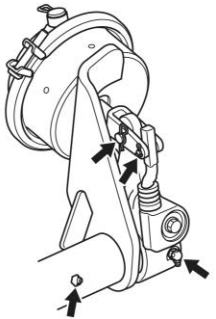
1 point each

Apply sufficiently on the sliding surfaces of the spring



Rear spring rear bracket slip pad (left and right)

Lubricate so that the 3 locations on the rear spring rear bracket slip pad are covered

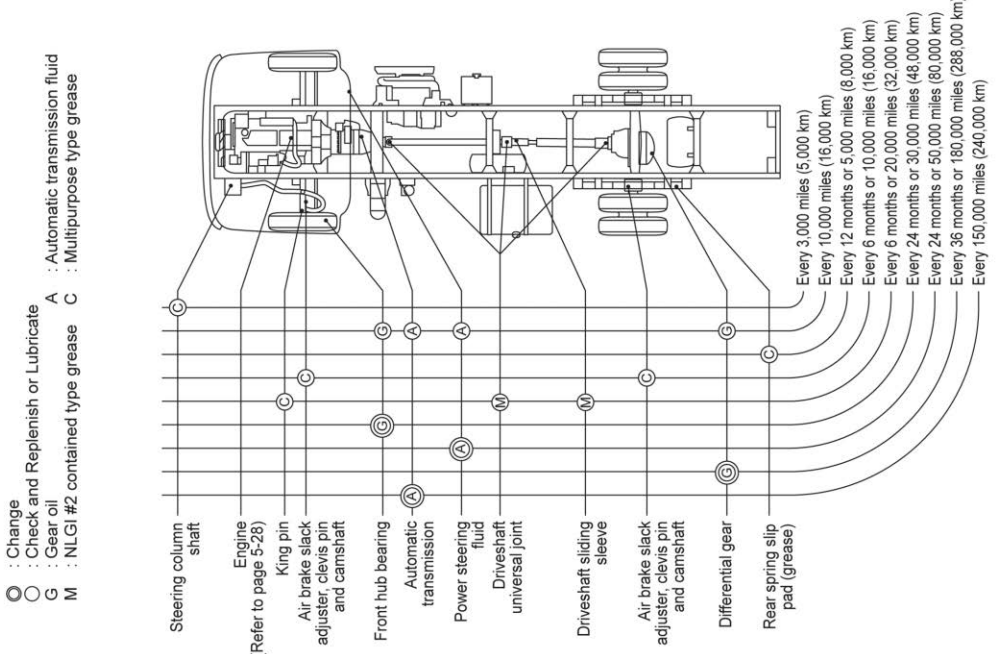


Air brake slack adjuster, clevis pin, and camshaft

4 points each

Each driveshaft universal joint must be greased heavily until grease oozes at the 4 needle bearing oil seal locations. After greasing, wipe off excess grease.

Lubrication Chart



Additional Maintenance and Care

Owner Safety and Routine Maintenance

Listed below are vehicle checks which should be made periodically by either the owner or a qualified technician to ensure proper performance and safety of your vehicle. Take any problems promptly to a technician for service advice.

For your safety and that of others, any of the safety-related components that may have been damaged in a crash should be checked and necessary repairs performed before operating your vehicle.

At a minimum, these routine checks should be made every 6 months or 16,000 km (10,000 miles), whichever comes first. Whenever repairs are necessary, have them completed before operating the vehicle.

A: Parking Brake: Park on a fairly steep hill and hold the vehicle with the parking brake only. This checks holding ability.

Before checking item (B) below, be sure to have enough room around the vehicle. Then firmly apply both the parking brake see *Parking Brake* ⇨ *166* and the regular brakes. Do not use the accelerator pedal. If the engine starts, be ready to turn off the engine control switch at once. Take these precautions because the vehicle could move without warning and possibly cause injury or property damage.

B: Starter Safety Switch: Check by trying to start the engine in each gear. The starter should crank only at selector position "P" (only models with P-range) or "N".

C: Transmission Shift Indicator: Check that the indicator points to the gear chosen.

D: Steering: Be alert for any changes in steering action. An inspection or service is needed when: the steering wheel is harder to turn or has too much free play, or when there are strange sounds when turning or parking.

E: Wheel Alignment, Balance, and Tires: Check tires for abnormal wear or damage. Also, check for damaged wheels. A pull right or left on a straight and level road may show the need for a wheel alignment. A vibration of the steering wheel or seat at normal highway speeds may mean a wheel balancing is needed. Check tire pressure when the tires are "cold," at least monthly, and whenever the vehicle is serviced. Check the pressure more often if daily checks show it's needed. (Refer to "Recommended Daily (Pre-operation) Inspections" under *Owner Checks and Services* ⇨ *270*). Change tire pressure as needed when changing loads.

F: Brakes: Be alert to illumination of the brake air pressure warning light or the buzzer, or changes in braking action, such as repeated pulling to one side, unusual sounds when braking, increased brake pedal travel or a harder pedal. The front and rear brakes are attached to an auto adjuster mechanism. If there are no defects, and the brake stroke is properly maintained, adjustments are not necessary.

The automatic slack adjuster should maintain the brake chamber stroke at 2 inches or less. Brake chamber stroke is the distance the push rod travels from brakes off to brakes applied. If the orange brake chamber stroke indicator on the push rod is visible outside the brake chamber, the stroke is greater than 2 inches and the brakes should be Inspected. Have your dealer inspect the automatic slack adjuster for correct operation and set up.

G: Exhaust System: Be alert for any changes in the sound of the exhaust system or any smell of fumes. These are signs the system may

be leaking. Have it checked and/or repaired at once. (Refer to "Engine Exhaust Emissions Caution (Carbon Monoxide)" under *Engine Exhaust* ⇨ *135*).

H: Windshield Wipers and Washers: Check operation and condition of the wiper blades. Check the flow of the washer spray.

I: Defroster: Turn the outlet selector knob to "Defroster" and the fan speed control knob to the fully clockwise position. Then check the airflow from the ducts at the inside base of the windshield.

J: Rearview Mirrors and Sun Visors: Check that friction joints hold mirrors and sun visors in place.

K: Horn: Sound the horn, now and then, to be sure it works.

L: Lap-Shoulder Belts: Check the seat belt system (including webbing, buckles, latch plates and anchors) for proper operation, and for damage.

M: Seat Adjusters: When adjusting the driver's manual seat, be sure the seat adjusters latch by pushing the seat forward and backward. Do not attempt to adjust the seat when the vehicle is in motion.

N: Lamps: Check panel lighting, warning lamps, indicator lamps and interior lamps. On the outside, check: license plate lamps, side marker lamps, reflectors on outside mirrors, headlamps, parking lamps, identification and clearance lamps, taillights, brake lamps, turn signals, cornering lamps, backup lamps and hazard warning flashers. Have headlamp aim checked immediately if beams seem improperly aimed.

O: Glass, Mirrors, Lights and/or Reflectors Condition: Look for broken, scratched, dirty or damaged glass, mirrors, lamps or reflectors that could reduce the view or visibility, or cause injury. Replace, clean or repair promptly.

P: Door Latches: Check that doors close, latch and lock tightly. Check for broken, damaged or missing parts that might prevent tight latching.

Q :Tilt Cab (Driving Position): Be sure the tilt lever is pulled up and locked.

R: Fluid Leaks: Check for fuel, water, oil or other fluid leaks by looking at the surface beneath the vehicle after it has been parked for a while. If you notice diesel fumes or fluid at any time, have the cause found and corrected at once.

S: Underbody: Corrosive materials used for ice removal, snow removal and dust control can collect on the underbody. If these materials are not removed, accelerated corrosion (rust) can occur on underbody parts such as fuel lines, frame, floor pan and exhaust system. At least every spring, flush these materials from the underbody with plain water. Take care to clean well any areas where mud and other debris can collect. Sediment packed in closed areas of the frame should be loosened before being flushed.

Checking Components that Showed Abnormalities during Previous Operation

Check the components that showed abnormalities during the previous operation. Have any abnormalities repaired by your dealer before using the vehicle.

Recommended Fluids, Lubricants, and Parts

Recommended Fluids and Lubricants

Fluids and lubricants identified below by name or specification, including fluids or lubricants not listed here, can be obtained from your dealer.

Usage	Fluid/Lubricant
Automatic Transmission	TransSynd TES-668 or equivalent
Battery Terminals	Petroleum Jelly (outer surfaces)
Cab-Door Hinges and Latches Lubricant	Multi-Purpose Lubricant, Superlube or equivalent containing zinc oxide. See your dealer.
Chassis Lubricant	Multi-purpose grease with high temperature, good quality, lithium soap, extreme pressure grease.
Diesel Exhaust Fluid (DEF)	Use DEF that is certified by the American Petroleum Institute (API).
Engine Coolant	50/50 mixture of clean, drinkable water and GM extended life coolant. See *Engine Coolant* ⇨ *195*.
Engine Oil	Use oils (such as CK-4 (API)) that meet the applicable Cummins CES 20086 standards. To determine the preferred viscosity for your vehicle's diesel engine, see *Engine Oil* ⇨ *189*.
Front axle, Driveshaft, Universal Joints and Sliding Sleeve Lubricant	NLGI #2 multi-purpose type grease
Front Wheel Hub Bearing Oil	SAE 50W
Power Steering Fluid	TransSynd TES-668 or equivalent
Rear Axle	BASF Emgard FE 75W-90 Synthetic To determine the viscosity required for your vehicle's rear axle, see *Rear Axle (Gear Oil Viscosity Chart)* ⇨ *207 Rear Axle (Oil Level Check)* ⇨ *208*.

Usage	Fluid/Lubricant
Rear Spring Slip Pad, Steering Shaft	NLGI #1 or #2 multi-purpose type grease
Windshield Washer Solvent	Automotive windshield washer fluid that meets regional freeze protection requirements.

Maintenance Replacement Parts

Replacement Parts

Please contact your dealer for genuine GM parts.

⚠ Warning

If part replacement is necessary, the part must be replaced with one of the same part number or with an equivalent part.

(Continued)

Warning (Continued)

Use of a replacement part of lesser quality may result in personal injury or damage to the vehicle.

Part	GM Part Number
Engine Air Cleaner Filter	98071423
Engine Oil Filter	Cummins 3937736
Fuel Filter: Engine Side	Cummins 5526400
Fuel Filter: Chassis Side	97689918

Replacement Fasteners

During vehicle maintenance, any fasteners used to replace older ones must have the same measurements and strength as those removed, whether metric or customary. Fasteners taken from the vehicle should be saved for reuse in the same location when possible. Where a fastener cannot be used again, take care to choose a replacement that matches the old one. For information and help, see your dealer.

⚠ Warning

This vehicle is primarily dimensioned in the metric system. Most fasteners are metric and many are very close in dimension to well-known customary fasteners in the inch system. Mismatched or incorrect fasteners can result in damage to the vehicle or possibly personal injury.

Technical Data

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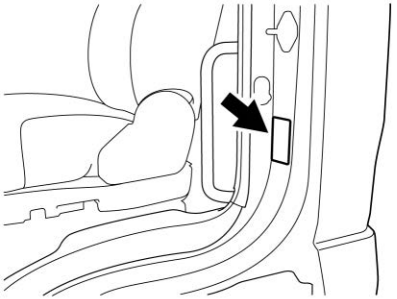
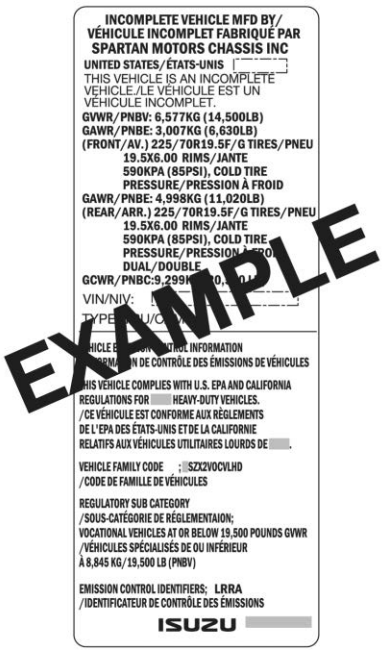
Vehicle Identification

Vehicle Identification Number (VIN)

The Vehicle Identification Number (VIN) and engine number are necessary for registering your vehicle. They are also necessary when your vehicle undergoes official inspections. Provide your dealer with these numbers when you are having the vehicle repaired or when ordering replacement parts. The Dealer will be able to do the requested jobs more competently and quickly.

Vehicle Identification Number (VIN) and Weight Rating Plate





The "Vehicle Identification Number (VIN), Weight Rating, and Greenhouse Gas (GHG) Emissions Plate" shows the manufacturer's gross vehicle weight rating (GVWR), the front and rear gross axle weight ratings (GAWRs), as well as the Vehicle Identification Number (VIN) and emissions information for your vehicle.

This plate is located on the left side rear pillar panel below the striker.

The Vehicle Identification Number (VIN) is a legal identifier of your vehicle. It not only appears on the Vehicle Identification Number (VIN) , Weight Rating, and Greenhouse Gas (GHG) Emissions plate; but also on the vehicle title and registration. The Vehicle Identification Number (VIN) specifically identifies a vehicle by code.

See “Overloading” under *Information on Loading the Vehicle* ⇨ *41*.

The Vehicle Identification Number (VIN) contains multiple pieces of information including the vehicle and engine model codes as shown below.

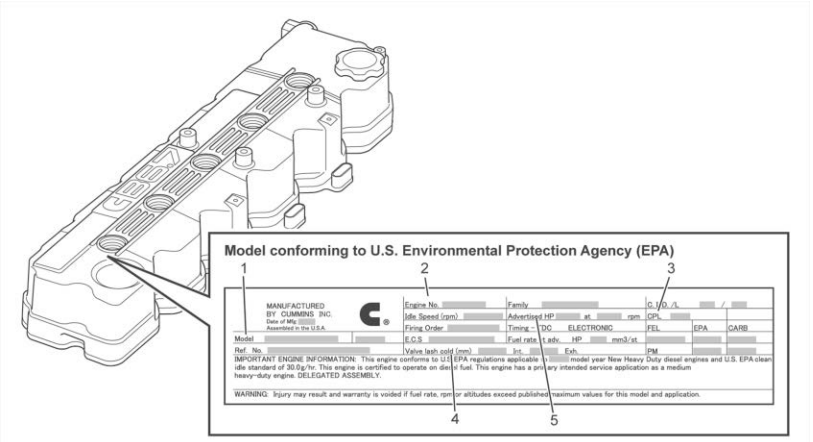
5	4	D	K	6	S	1	F	*	V	S	A	0	0	0	0	1
	1		2	3	4	5	6	7	8	9	10			11		

Section	Description
1	World Manufacturer Identifier (WMI)
2	GVWR and Brake System K: 23,501 - 26,000 lb full-air brake system M: 26,001 - 33,000 lb full-air brake system
3	Series Code 6: ISUZU 6500XD and 7500XD
4	Cab Type Code S: Wide cab, 81 inch bumper to back of cab (BBC)
5	Chassis Type Code 1: 4 x 2
6	Engine Code F: Cummins B6.7

Section	Description
7	Check Digit
8	Model Year Code V: 2027
9	Plant Code S: The Shfyt Group/BUILTMORE
10	Model Code A: 6500XD B: 7500XD
11	Sequence Numbers

Interpretation of the VIN may differ depending on the vehicle. For further details, please ask your dealer.

Engine Dataplate

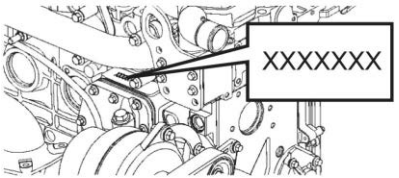


1. Engine model information
2. Engine serial number
3. Control parts list (CPL)
4. Valve lash (overhead) setting
5. Horsepower and rpm rating

The engine dataplate shows specific facts about an engine. The dataplate is typically located on the engine rocker lever cover, but may also be located on the side of the gear housing. The engine serial number and Control Parts List (CPL) provide data for ordering parts and service.

Have the following engine data available when communicating with a Cummins Authorized Repair Location. The information on the dataplate is mandatory when sourcing service parts.

Engine Number



If the engine dataplate is not legible, the number will be stamped on the engine block on top of the lubricating oil cooler housing.

Vehicle Data

Capacities and Specifications

These specifications are given here for information only. Before using them, see the Cautions and other instructions throughout this manual – the index may help you locate such items. For more information, see the Service Manual covering the chassis or body part in question. Your dealer may also be able to help.

Engine Specifications	
Description	Water-cooled, overhead camshaft, direct injection engine with a charge air cooled turbocharger.
Manufacturer	Cummins
Model	6.7L Diesel Engine
Engine type	Inline 6, Six Cycle
Induction	Turbocharged W/Charge Air Cooler
Bore	107 mm
Stroke	124 mm
Displacement	6.686 L (407 CID)
Full load RPM	2,400 r/min
Compression ratio	17.3 to 1
Firing order	1-5-3-6-2-4
Fuel injection timing (static) degree	0°
Valve lash — mm (in)	0.0254 (0.001)
Idling speed	750 r/min
Fan belt tension	Automatic tensioner

Oil filter		Cartridge (spin on) type
Engine oil capacity		When changing oil and filter: 15.1 L (16.0 qt)*1
Engine coolant capacity		31.2 L (33.0 qt)*2
Preheating system		Grid heater
Transmission Specifications		
Model		ALLISON2550RDS, ALLISON2500RDS Models Six-speed automatic transmission (overdrive gear for 5th and 6th), lock-up clutch for 2nd to 6th
Gear ratio	1st	3.512
	2nd	1.896
	3rd	1.439
	4th	1.000
	5th	0.737
	6th	0.643
Reverse		5.090
Transmission oil capacity		14.0 L (14.8 qt)*3

Weights	
Axle weight rating: Front	Tire size 11R22.5: 5,443 kg (12,000 lb) Tire size 255/70R22.5: 4,989 kg (11,000 lb)
Engine Cooling System	
Thermostat: Starts to open	82-95 °C (180-203 °F)
Radiator pressure	103 kPa (15 psi)
Transmission	
Model	6500 XD: ALLISON2550RDS 7500 XD: ALLISON2500RDS
Transmission oil capacity	14.0 L (14.8 qt)[*3]
Rear Axle	
Differential gear oil capacity	6500 XD: 11.3L (24.0 pints) [*4] 7500 XD: 12.1L (25.6 pints) [*4]
Fuel	
Fuel tank capacity[*5]	201 L (50.0 gal) 380 L (100.0 gal)

Diesel Exhaust Fluid (DEF)	
DEF tank capacity	37.8 L (80.0 pt)
Steering	
Steering wheel free play	10 - 60 mm (0.39 - 2.36 in)
Power steering fluid capacity	3.0 L (3.2 qt)
Wheel	
Wheel alignment	
Toe-in	0.05° (± 0,03°)
Camber	LH -0.19 to 0.69, RH -0.44 to 0.44
Caster	3 to 5°
King pin	LH 4.775°, RH 5.25°
Wheel hub bearing oil capacity	0.55 L (0.58 qt)
Wheel stud nut torque: Front and rear	644 N•m (475 lb ft)
Brakes	
Brake size (Diameter x Width)	Front 419.1 x 127 mm (16.5 x 5 in) Rear 419.1 x 178 mm (16.5 x 7 in)

Drum diameter (Standard value)	419.1 mm (16.5 in)
(Usable limit)	422.4 mm (16.63 in)
Shoe thickness (Usable limit)	6.35 mm (0.25 in)
Service Brakes	
Brake pedal free play	Refer to *Brakes* ⇨ *202*.
Electrical System	
Battery type [BCI size] (RC-CCA) x No. of units	31T (160 - 750) x 2[*6]
Starter	12 V - 3.0 kw
Generator	12 V - 160 amp
Tightening Torque	

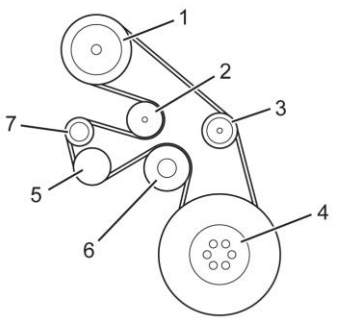
Oil pan drain plug	60.0 N•m (6.1 kgf m/44 lb ft)

Remarks:[*1] see *Engine Oil* ⇨ *189*.
Remarks:[*2] see *Engine Coolant* ⇨ *195*.
Remarks:[*3] see *Automatic Transmission Fluid* ⇨ *194*.
Remarks:[*4] see *Rear Axle (Gear Oil Viscosity Chart)* ⇨ *207 Rear Axle (Oil Level Check)* ⇨ *208*.
Remarks:[*5] The fuel tank capacity is stated on a metal plate attached to the fuel tank body. Only fill the tank to 95 percent of its capacity; this allows room for the expansion of the fuel.
Remarks:[*6] Larger capacity batteries 31T (180-930) × 2 can also be used. However, do not mix batteries of different types and from different makers.

Engine Drive Belt Routing

Fan Belt and Air Conditioning Compressor Belt

See the *Maintenance Schedule* ⇨ *255*.



No.	Name
1	A/C Compressor
2	Pulley
3	Pulley
4	Crank Pulley
5	Tension Pulley
6	Water Pump Pulley
7	Generator

If your air conditioning system is functioning properly, it is not necessary to remove and replace the refrigerant or compressor oil.

- A V-ribbed belt is used for the fan belt. This type of belt requires the tension to be adjusted more accurately than is required with the conventional V belt. Inappropriate tension could cause the belt to make noise or break. When the fan belt is damaged, electricity is not properly generated or becomes a cause of engine overheating. You must check the tension of the fan belt carefully.
- Use dealer-certified genuine parts when changing the fan belt.
- Have the vehicle inspected and serviced at your dealer.

Customer Information

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Customer Satisfaction Procedure

Your satisfaction and goodwill are important to your dealer and to Chevrolet. Normally, any concerns with the sales transaction or the operation of the Chevrolet chassis, or upfitted rear body will be resolved by your dealer's sales or service departments. Sometimes, however, despite the best intentions of all concerned, misunderstandings can occur. If your concern has not been resolved to your satisfaction, the following steps should be taken:

STEP ONE: Discuss your concern with a member of dealership management. Normally, concerns can be quickly resolved at that level. If the matter has already been reviewed with the sales, service, or parts manager, contact the owner of your dealership or the general manager.

STEP TWO: If after contacting a member of dealership management, it appears your concern cannot be resolved by your dealership without further help call the Chevrolet Customer Assistance Center at 1-800-862-4389.

We encourage you to call the toll-free number in order to give your inquiry prompt attention. Have the following information available to give the Customer Assistance representative:

- Your name, address, and daytime phone number.
- Vehicle Identification Number (VIN). This is available from the vehicle registration or title, and on the VIN plate or the Vehicle Certification and Greenhouse Gas (GHG) Emissions Plate in the cab of the vehicle.
- Dealership name and location.
- Vehicle delivery date and present mileage.
- Nature of the problem.

When contacting Chevrolet, remember that your concern will likely be resolved at a dealer's facility. That is why we suggest following Step One first.

STEP THREE — U.S. Owners: Both GM and your GM dealer are committed to making sure you are completely satisfied with your new vehicle. However, if you continue to remain unsatisfied after following the procedure outlined in Steps One and Two, you can file with the Better Business Bureau (BBB) AUTO LINE Program to enforce any additional rights you may have.

The BBB AUTO LINE Program is an out-of-court program administered by BBB National Programs, Inc. to settle automotive disputes regarding vehicle repairs or the interpretation

of the New Vehicle Limited Warranty. Although you may be required to resort to this informal dispute resolution program prior to filing a court action, use of the program is free of charge and your case will generally be heard within 40 days. If you do not agree with the decision given in your case, you may reject it and proceed with any other venue for relief available to you. When contacting the BBB AUTO LINE, you will need to provide the following information: Owner's name and address, Vehicle identification number (VIN), the Year, Make, Model, mileage of the vehicle and provide a description of the concern.

Contact the BBB AUTO LINE Program using the toll-free telephone number or write them at the following address:

BBB AUTO LINE Program
BBB National Programs, Inc.
1676 International Drive
Suite 550
McLean, VA 22102

Telephone: 1-800-955-5100
www.bbbautoline.org

This program is available in all 50 states and the District of Columbia. Eligibility is limited by vehicle age, mileage, and other factors. General Motors reserves the right to change eligibility limitations and/or discontinue its participation in this program.

California Warranty Information

The Song-Beverly Consumer Warranty Act provides consumers who purchase or lease a new motor vehicle in California with certain rights if their vehicle has nonconformities that GM or its authorized repair facilities (e.g., GM dealers) are unable to repair after a reasonable number of attempts.

Applied to your vehicle, California Civil Code Section 1793.2(d) requires that, if GM or its authorized repair facilities are unable to repair a new motor vehicle to conform to the vehicle's applicable express warranties after a reasonable number of attempts, GM shall either replace the new motor vehicle or provide restitution in accordance with a statutory formula.

California Civil Code Section 1793.22(b) creates a presumption that GM has had a reasonable number of attempts to conform the vehicle to its applicable express warranties if, within 18 months from delivery to the buyer or 18,000 miles on the vehicle's odometer, whichever occurs first, one or more of the following occurs:

- The same nonconformity results in a condition that is likely to cause death or serious bodily injury if the vehicle is driven AND the nonconformity has been subject to repair two or more times by GM or its authorized repair facilities (e.g., dealers) AND the buyer or lessee has at least once directly notified GM of the need for the repair of the nonconformity by mailing such notification to the address listed below.
- The same nonconformity has been subject to repair four or more times by GM or its authorized repair facilities AND the buyer has at least once directly notified GM of the need for the repair of the nonconformity by mailing such notification to the address listed below.
- The vehicle is out of service by reason of repair nonconformities by GM or its authorized repair facilities for a cumulative total of more than 30 calendar days after delivery of the vehicle to the buyer.

If you purchased or leased a new motor vehicle in California and GM or its authorized repair facilities have been unable to repair the vehicle to conform it to applicable express warranties within a reasonable number of attempts, you may be eligible for relief under the Song-Beverly Consumer Warranty Act. You can submit a claim with the BBB AUTO LINE Program (see *Customer Satisfaction Procedure* ⇨ *294*) or you can request in writing that GM replace or repurchase your vehicle.

Notice to General Motors regarding warranty issues must be sent either by email to californiawarrantynotice@gm.com or by certified or registered mail, return receipt requested, to the following address:

California Repurchase Notice
P.O. Box 33173
Detroit, MI 48232-5173

Any repurchase request must include your name, the accurate Vehicle Identification Number ("VIN") of your vehicle, a brief summary of the repair history and problems with the vehicle.

Información de garantía de California

La Ley de Garantía del Consumidor Song-Beverly brinda a los consumidores que compran o alquilan un vehículo automotor nuevo en California ciertos derechos si su vehículo presenta inconformidades que GM o sus talleres de reparación autorizadas (por ejemplo, los distribuidores de GM) no pueden reparar después de una cantidad razonable de intentos.

Aplicado a su vehículo, la Sección 1793.2(d) del Código Civil de California requiere que, si GM o sus talleres de reparación autorizadas no pueden reparar un vehículo automotor nuevo para cumplir con las garantías expresas aplicables del vehículo después de una cantidad razonable de intentos, GM deberá reemplazar el vehículo automotor nuevo o proporcionar una restitución de acuerdo con una fórmula legal.

La Sección 1793.22(b) del Código Civil de California crea una presunción de que GM ha realizado un número razonable de intentos para adaptar el vehículo a sus garantías expresas aplicables si, dentro de los 18 meses desde la entrega al comprador o 18,000 millas en el odómetro del vehículo, lo que ocurra primero, ocurre uno o más de los siguientes:

- La misma inconformidad da como resultado una condición que probablemente cause la muerte o lesiones corporales graves si se conduce el vehículo Y la inconformidad ha sido objeto de reparación dos o más veces por GM o sus talleres de reparación autorizadas (por ejemplo, distribuidores) Y el comprador o arrendatario ha notificado directamente por lo menos una vez a GM sobre la necesidad de reparar la inconformidad enviando dicha notificación por correo a la dirección que se indica a continuación.
- La misma inconformidad ha sido objeto de reparación cuatro o más veces por GM o sus talleres de reparación autorizadas Y el comprador ha notificado directamente por lo menos una vez a GM sobre la necesidad de la reparación de la inconformidad enviando dicha notificación a la dirección que se indica a continuación.
- El vehículo está fuera de servicio debido a inconformidades de reparación por parte de GM o sus talleres de reparación autorizadas por un total acumulado de más de 30 días calendario después de la entrega del vehículo al comprador.

Si compró o alquiló un vehículo automotor nuevo en California y GM o sus talleres de reparación autorizados no han podido reparar el vehículo para cumplir con las garantías expresas aplicables dentro de una cantidad razonable de intentos, puede ser elegible para recibir ayuda bajo la Ley de Garantía del Consumidor Song-Beverly. Puede presentar un reclamo ante el Programa BBB AUTO LINE (consulte el Procedimiento de satisfacción del cliente) o puede solicitar por escrito que GM reemplace o recompre su vehículo.

El aviso a General Motors sobre problemas de garantía debe enviarse por correo electrónico a californiawarrantynotice@gm.com o por correo certificado o registrado, con acuse de recibo solicitado, a la siguiente dirección:

Aviso de recompra de California
P.O. Box 33173
Detroit, MI 48232-5173

La solicitud para reemplazo o recompra debe incluir su nombre, el Número de identificación del vehículo ("NIV") preciso de su vehículo, un breve resumen del historial de reparación y problemas con el vehículo.

Customer Assistance Offices

Chevrolet is committed to assisting customers. Visit us online at www.chevrolet.com/support (U.S.) to chat with us or find answers to commonly asked questions, tips, vehicle how-to instructions, and available support.

Need more help? Use the telephone numbers or mailing addresses below for additional assistance.

United States

Chevrolet Motor Division
Chevrolet Customer Assistance Center
P.O. Box 33170
Detroit, MI 48232-5170

1-800-222-1020

TTY: Dial 711 relay service and contact 1-800-833-2438

Roadside Assistance: 1-888-899-1327

Customer Assistance for Text Telephone (TTY) Users

To assist customers who are deaf, hard of hearing, or speech-impaired and/or who use Text Telephones (TTYs), Chevrolet is able to assist. Please dial the national 711 relay service and contact 1-800-833-2438.

Online Account and Customer Support

Create a Chevrolet Account (U.S.) at chevrolet.com

Learn more about your vehicle features and access diagnostic information specific to your vehicle. Visit chevrolet.com and create an account today.

Membership Benefits

: Download owner's manuals and view vehicle-specific how-to videos.

: View maintenance schedules, alerts, and Vehicle Diagnostic Information. Schedule service appointments.

: View service records from your dealership and add your own.

: Select a preferred dealer and view locations, maps, phone numbers, and hours.

: Track your vehicle warranty information.

: View active recalls by Vehicle Identification Number. See *Vehicle Identification Number (VIN)* ⇨ *282*.

: Manage your profile and payment information. View your GM Rewards Card earnings and My Chevrolet Rewards points.

: Chat with online help representatives.

GM Mobility Reimbursement Program

GM MOBILITY℠

This program is available to qualified applicants for cost reimbursement of eligible aftermarket adaptive equipment required for the vehicle, such as hand controls or a wheelchair/scooter lift for the vehicle.

For more information on the limited offer, call the GM Mobility Assistance Center at 1-800-323-9935. Text Telephone (TTY) users, please dial the national 711 relay service and contact 1-800-323-9935.

Roadside Assistance Program

From the U.S., call 1-888-899-1327. Text Telephone (TTY) Users: Contact 711 relay service and provide 1-888-899-1327.

Service is available 24 hours a day, 365 days a year.

Calling for Assistance

When calling Roadside Assistance, have the following information ready:

- Your name, home address, and home telephone number.
- Telephone number of your location or the telephone number of your current location.
- Location of the vehicle.
- Model, year, color, and license plate number of the vehicle.
- Odometer reading and Vehicle Identification Number (VIN).
- Description of the problem.

Coverage

Services are provided for the duration of the vehicle's Powertrain Warranty.

Anyone driving the vehicle is covered.

Roadside Assistance is not a part of the New Vehicle Limited Warranty. General Motors North America and Chevrolet reserve the right to make any changes or discontinue the Roadside Assistance program at any time without notification.

General Motors North America and Chevrolet reserve the right to limit services or payment to an owner or driver if they decide the claims are made too often, or the same type of claim is made too frequently.

Services Provided

- **Emergency Fuel Delivery:** Delivery of enough fuel for the vehicle to get to the nearest service station. Fuel will not be delivered to vehicles at a service station.
- **Lock-Out Service:** Service to unlock the vehicle if you are locked out. For security reasons, the driver must present identification before this service is given.

- **Emergency Tow from a Public Road or Highway:** Tow to the nearest Chevrolet dealer for warranty service, or if the vehicle was in a crash and cannot be driven. Assistance is not given when the vehicle is stuck in the sand, mud, or snow.
- **Flat Tire Change:** Service to change a flat tire with the spare tire. The spare tire, if equipped, must be in good condition and properly inflated. It is the owner's responsibility for the repair or replacement of the tire if it is not covered by the warranty.
- **Battery Jump Start:** Service to jump start a dead battery.

Services Not Included in Roadside Assistance

- Delivery of fuel to vehicles at a service station.
- Impound towing caused by violation of any laws
- Reimbursement of legal fines
- Reimbursement of police mandated tows
- Mounting, dismounting, or changing of snow tires, chains, or other traction devices
- Towing of anything attached to the vehicle like boats, campers, trailers, cargo boxes, etc.
- Vehicles stranded due to off-road driving

Service is not provided if a vehicle is in an area that is not accessible to the service vehicle or is not a regularly traveled or maintained public road, which includes ice and winter roads. Service is not provided on restricted roadways which can include and is not limited to, some highways, tunnels, toll roads, toll bridges, turnpikes, and service roads.

Scheduling Service Appointments

If your vehicle requires service, contact your dealer and request an appointment. By scheduling a service appointment and advising the service consultant of your transportation needs, your dealer can help minimize your inconvenience. Be sure to notify your dealer of any safety-related concerns when requesting the appointment.

If you cannot schedule service immediately, keep driving the vehicle until your scheduled appointment, unless the problem is safety related.

If you are seeking a same-day repair, schedule your appointment as early in the day as possible.

If a Crash Occurs

If there has been an injury, call emergency services for help. Do not leave the scene of a crash until all parties address the matter. Move the vehicle only if its position puts you in danger, or a police officer tells you to move it.

Give only the necessary information to police and other parties involved in the crash.

For emergency towing see *Roadside Assistance Program* ⇨ *298*.

Gather the following information:

- Driver name, address, and telephone number
- Driver license number
- Owner name, address, and telephone number
- Vehicle license plate number
- Vehicle make, model, and model year
- Vehicle Identification Number (VIN)
- Insurance company and policy number

- General description of the damage to the other vehicle

Choose a reputable repair facility that uses quality replacement parts. See “Collision Parts” in *Collision Damage Repair* ⇨ *300*.

Collision Damage Repair

If the vehicle is damaged in a collision, have it repaired by a qualified technician using the proper equipment and Genuine GM Collision replacement parts. Poorly performed collision repairs diminish the vehicle resale value and safety performance.

Managing the Vehicle Damage Repair Process

Repair Facility

Taking an active role in the vehicle repair process is important. Choose a collision repair facility that meets your needs before you ever need collision repairs. Your dealer may have a collision repair center with GM-trained technicians and state-of-the-art equipment or be able to recommend a collision repair center that has GM-trained technicians and comparable equipment.

If you have a preferred repair facility, take the vehicle there, or have it towed there. Specify to the facility that any required replacement collision parts be original equipment parts. Remember, only Genuine GM parts are covered by the GM vehicle warranty. See “Collision Parts” later in this section.

Collision Parts

Genuine GM Collision parts are new parts made with the same materials and construction methods as factory installed parts. Genuine GM Collision parts ensure that the vehicle's designed appearance, durability, and safety features are preserved. The use of Genuine GM parts can help maintain the GM New Vehicle Limited Warranty.

Recycled original equipment parts may be an acceptable choice to maintain the vehicle's appearance and safety performance; however, the history of these parts may not be known. Such parts are not covered by the GM New Vehicle Limited Warranty, and any related failures are not covered by that warranty.

Aftermarket collision parts made by companies other than GM may fit poorly, exhibit premature durability/corrosion problems, and may not perform properly in subsequent collisions. Aftermarket parts are not covered by the GM New Vehicle Limited Warranty, and any vehicle failure related to such parts is not covered by that warranty.

Insuring the Vehicle

Protect your GM vehicle with comprehensive and collision insurance coverage. There are significant differences in the quality of coverage afforded by various insurance policy terms. If the vehicle is repaired with any parts that are not GM original equipment collision parts, they will not be covered or under warranty. If such insurance coverage is not available from your current insurance carrier, consider switching to another insurance carrier.

If you are leasing your vehicle, the leasing company may require you to have insurance that ensures repairs with Genuine GM Original Equipment Manufacturer parts or Genuine Manufacturer replacement parts. Read the lease carefully, as you may be charged at the end of the lease for poor quality repairs.

Depending on your policy limits, your insurance company may initially value the repair using aftermarket parts. Discuss this with the repair professional and insist on

Genuine GM parts. Remember, if the vehicle is leased, you may be obligated to have the vehicle repaired with Genuine GM parts, even if your insurance coverage does not pay the full cost.

If another party's insurance company is paying for the repairs, you are not obligated to accept a repair valuation based on that insurance company's collision policy repair limits, as you have no contractual limits with that company. In such cases, you can have control of the repair and parts choices if the cost stays within reasonable limits.

Publication Ordering Information

Service Manuals

Service manuals have the diagnosis and repair information on the engine/propulsion, transmission, axle, suspension, brakes, electrical system, steering system, body, etc.

Customer Literature

Owner's manuals are written specifically for owners and are intended to provide basic operational information about the vehicle. The owner's manual includes the Maintenance Schedule for all models.

Customer literature publications available for purchase include owner's manuals, warranty manuals, and portfolios. Portfolios include an owner's manual, warranty manual, if applicable, and zip lock bag or pouch.

Current and Past Models

Service manuals and customer literature are available for many GM vehicles.

To check availability and to order, call 1-800-551-4123 Monday–Friday, 8:00 a.m.–6:00 p.m. Eastern Time

For credit card orders only (VISA, MasterCard, or Discover), see Helm, Inc. at: www.helminc.com.

To order by mail, write to:

Helm, Incorporated
Attention: Customer Service
47911 Halyard Drive
Plymouth, MI 48170

Make checks payable in U.S. funds.

Radio Frequency Statement

This vehicle uses license-exempt transmitters / receivers / systems that operate on a radio frequency that complies with Part 15/Part 18 of the Federal Communications Commission (FCC) rules and with Innovation, Science and Economic Development (ISED) Canada's license-exempt RSS(s) / RSP-100 / ICES-GEN.

Operation is subject to the following two conditions:

1. The device may not cause harmful interference.
2. The device must accept any interference received, including interference that may cause undesired operation of the device.

Changes or modifications to any of these systems by other than an authorized service facility could void authorization to use this equipment.

Reporting Safety Defects

Reporting Safety Defects to the United States Government

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying General Motors.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or General Motors.

To contact NHTSA, you may call the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 888-275-9171); go to *https://www.safercar.gov;* or write to:

Administrator, NHTSA
1200 New Jersey Avenue, S.E.,
Washington, D.C. , 20590

You can also obtain other information about motor vehicle safety from *https://www.safercar.gov*.

Reporting Safety Defects to General Motors

In addition to notifying NHTSA in a situation like this, notify General Motors.

Call 1-800-862-4389, or write:

Chevrolet Motor Division
Chevrolet Customer Assistance Center
P.O. Box 33170
Detroit, MI 48232-5170

Vehicle Data Recording and Privacy

The vehicle has a number of computers that record information about the vehicle's performance and how it is driven or used. For example, the vehicle uses computer modules to monitor and control engine and transmission performance, to monitor the conditions for airbag deployment and deploy them in a crash, and, if equipped, to provide antilock braking to help the driver control the vehicle. These modules may store data to help the dealer technician service the vehicle or to help GM improve safety or features. Some modules may also store data about how the vehicle is operated, such as rate of fuel consumption or average speed. These modules may retain personal preferences, such as radio presets, seat positions, and temperature settings.

Caution
The OBD 2 diagnostic Port or Data Link Connector (DLC) is an access to diagnostic data. Connection of a full time aftermarket device may cause driveability issues and in some cases cause the check engine malfunction indicator light to illuminate.

Cybersecurity

GM collects information about the use of your vehicle including operational and safety related information. We collect this information to provide, evaluate, improve, and troubleshoot our products and services and to develop new products and services. The protection of vehicle electronics systems and customer data from unauthorized outside electronic access or control is important to GM. GM maintains appropriate security standards, practices, guidelines and controls aimed at defending the vehicle and the vehicle service ecosystem against unauthorized electronic access, detecting possible malicious activity in related networks, and responding to suspected cybersecurity incidents in a timely, coordinated and effective manner. Security

incidents could impact your safety or compromise your private data. To minimize security risks, please do not connect your vehicle electronic systems to unauthorized devices or connect your vehicle to any unknown or untrusted networks (such as Bluetooth, Wi-Fi, or similar technology). In the event you suspect any security incident impacting your data or the safe operation of your vehicle, please stop operating your vehicle and contact your dealer.

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Scan to Access

Scan to Access

Owner's Manuals
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Reference Guides
Links to GM Brand Websites
Many Additional Resources

WARNING

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. *Always start and operate the engine in a well-ventilated area. *If in an enclosed area, vent the exhaust to the outside. *Do not modify or tamper with the exhaust system. *Do not idle the engine except as necessary. For more information go to www.P65warnings.ca.gov/diesel.

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