CHEVROLET
2025
Low Cab Forward
5.2L Diesel Engine
4500 HD/4500 XD
and 5500 XD
Owner's Manual

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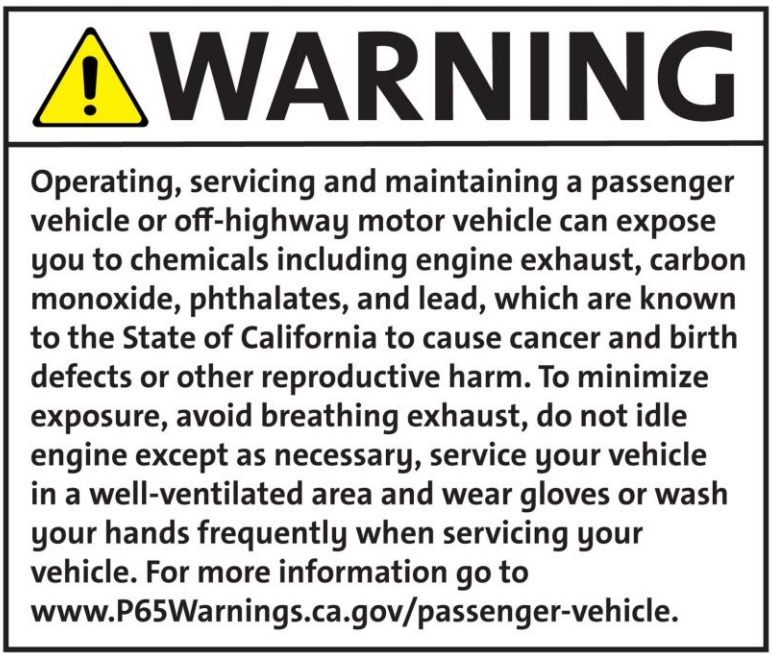
# Introduction

## 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 this publication's release, including changes in standard or optional content.

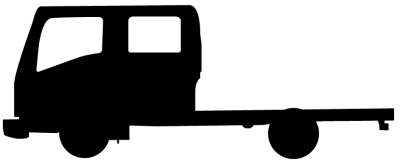
**Model Reference**

The models covered in this manual are:

Single Cab:

- 4500 HD
- 4500 XD
- 5500 XD

Crew Cab:



- 4500 HD
- 4500 XD
- 5500 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.”

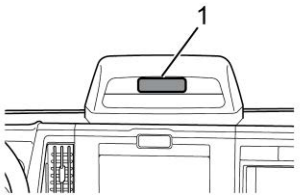
### Labels on Your Vehicle

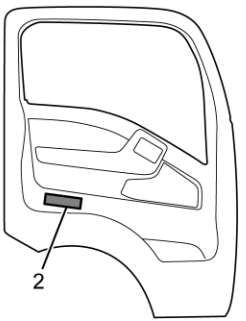
The warning/caution labels in your vehicle indicate very important instructions and information that you should respect to ensure safe and proper use of the vehicle. Be sure to read them before using the vehicle.

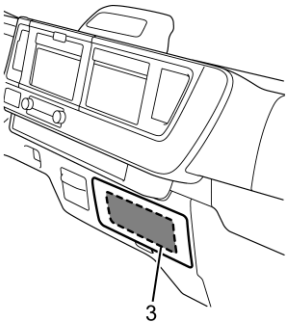
If any of these labels are peeling or illegible due to wear or scratches, please contact your dealer for a replacement.

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.



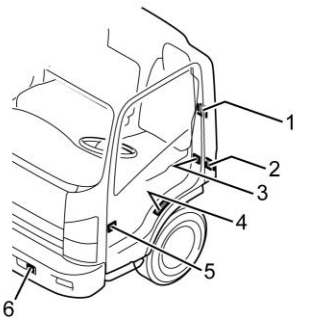



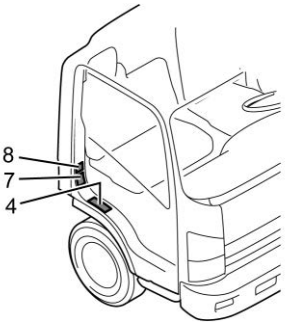


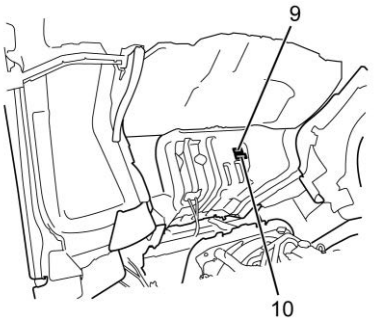
| No. | Description |
|---|---|
| 1 | Camera |
| 2 | Engine shutdown instruction |
| 3 | Fuse |
| 4 | Exhaust gas |
| 5 | SRS Frontal airbags |

**Warning/Caution Labels**

**Single cab model**

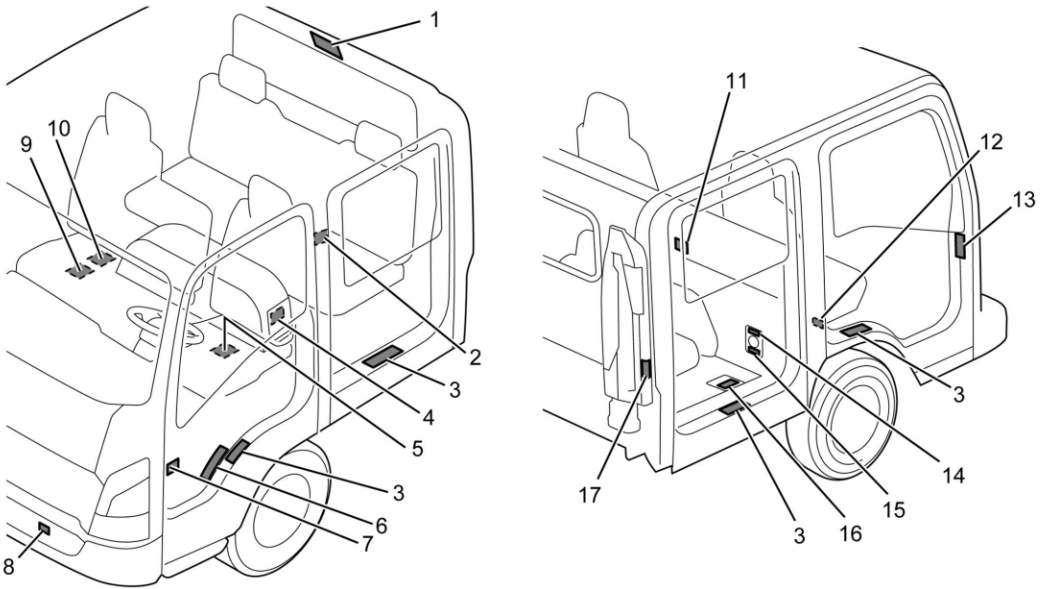


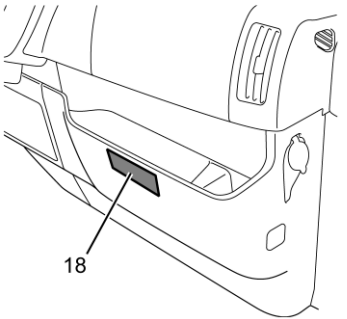



| No. | Description |
|---|---|
| 1 | Cab tilt instruction |
| 2 | Automatic transmission fluid level |
| 3 | VIN, weight rating, and Greenhouse Gas (GHG) emissions |
| 4 | NO STEP instruction |
| 5 | Certified clean idle label |
| 6 | Towing |
| 7 | Vehicle noise emission control information |
| 8 | ID plate |
| 9 | Engine cooling |
| 10 | Fan blade |

**Crew cab model**

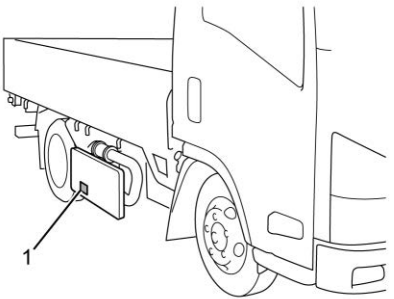


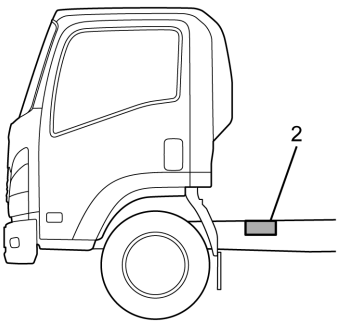


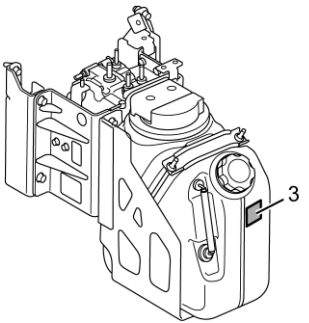

| No. | Description |
|---|---|
| 1 | Vehicle noise emission control information |
| 2 | VIN, weight rating, and Greenhouse Gas (GHG) emissions |
| 3 | NO STEP instruction |
| 4 | Generation of white smoke |
| 5 | Engine oil level |
| 6 | Engine oil level notice |

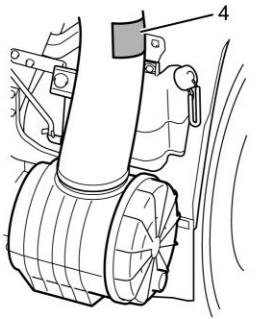
| No. | Description |
|---|---|
| 7 | Certified clean idle label |
| 8 | Towing |
| 9 | Fan Blade |
| 10 | Engine Cooling |
| 11 | Automatic transmission fluid level |
| 12 | ID plate |
| 13 | Cab Number |
| 14 | Power steering fluid |
| 15 | Power steering fluid |
| 16 | Engine coolant level |
| 17 | Starting aids |
| 18 | Engine Cover Notice |

**All models**

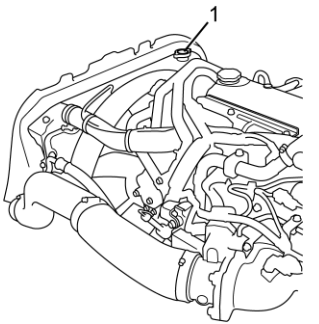




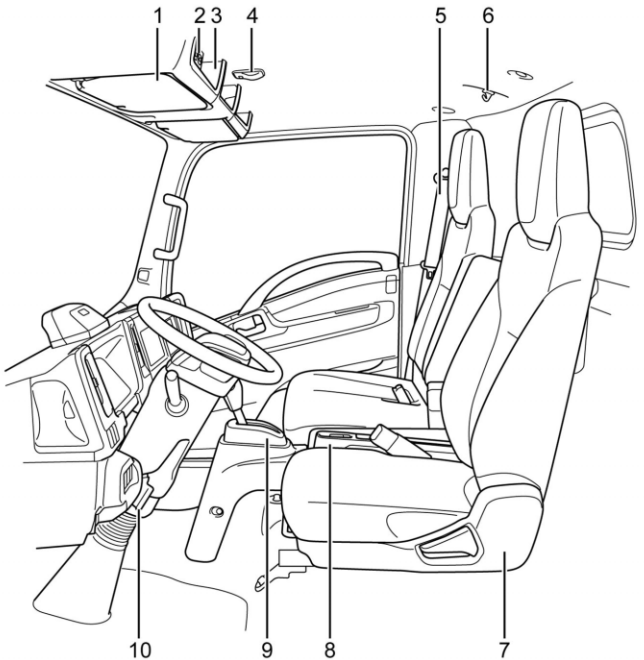




| No. | Description |
|---|---|
| 1 | Heat caution |
| 2 | Rear body |
| 3 | Diesel exhaust fluid (DEF) |
| 4 | Starting aids (Single cab) |




| No. | Description |
|---|---|
| 1 | Radiator cap |

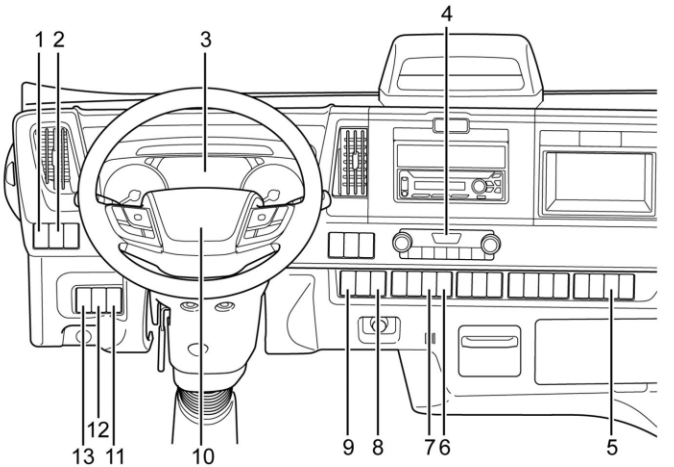
## Instrument Panel Overview (Vehicle Interior)




1. Sun Visor. See *Sun Visors* ⇨ *26*.
2. Remote Control Mirror Switch. See *Mirrors* ⇨ *22*.
3. Overhead Tray. See *Storage Compartments* ⇨ *52*.
4. *Dome Lamps* ⇨ *101*.
5. Seat Belt. See *Three-Point Seat Belt (Outboard Seats)* ⇨ *35*.
6. Coat Hook. See *Shopping Bag Hooks* ⇨ *55*.
7. Seat. See *Seat Position* ⇨ *27*.
8. Parking Brake Lever. See *Parking Brake* ⇨ *208*.

   Electric Parking Brake. See *Parking Brake* ⇨ *208*.
9. *Selector Lever* ⇨ *202*.
10. Fully Adjustable Steering. See *Steering Wheel Adjustment* ⇨ *63*.

## Instrument Panel Overview (Driver Side)

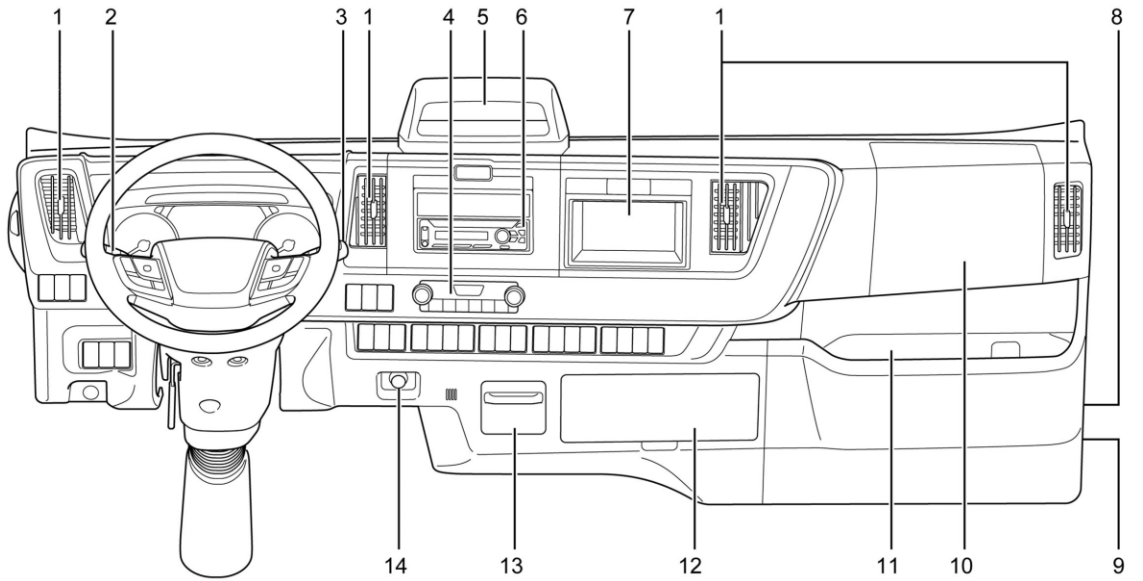



1. Front Fog Lamp. See *Front Fog Lamps* ⇨ *100*.
2. Rear Body Interior Light Switch. See *Cargo Lamp* ⇨ *101*.
3. Instruments, Warning Lights and Indicator Lights. See *Instrument Cluster* ⇨ *68*.
4. Hazard Warning Flasher Switch. See *Hazard Warning Flashers* ⇨ *99*.
5. USB Power Outlet. See *USB Port* ⇨ *109*.
6. LDWS Switch. See *Lane Departure Warning (LDW)* ⇨ *254*.
7. ESC OFF Switch. See *Traction Control/ Electronic Stability Control* ⇨ *217*.
8. Outside Rearview Mirror Heater Switch. See *Heated Mirrors* ⇨ *23*.
9. DPF Switch. See *Diesel Particulate Filter* ⇨ *167*.
10. Horn Button. See *Horn* ⇨ *63*.

    Driver Frontal Airbag. See *Airbag System* ⇨ *41*.
11. Instrument Panel Light Level Control.

    See *Instrument Panel Illumination Control* ⇨ *101*.
12. Power Take Off (PTO) Main Switch. See *Power Take-Off (PTO)* ⇨ *267*.
13. Power Take Off (PTO) Engine Speed Control Switch. See *Power Take-Off (PTO)* ⇨ *267*.

## Instrument Panel Overview




1. Air Flow Direction Control Lever. See *Air Vents* ⇨ *127*.
2. Combination Light Control Switch. See *Exterior Lamp Controls* ⇨ *97*.

Turn Signal Switch. See *Turn and Lane-Change Signals* ⇨ *100*.

3. Exhaust Brake Switch. See *Exhaust Brake* ⇨ *213*.

   Windshield Wiper and Windshield Washer Switch. See *Windshield Wiper/Washer* ⇨ *64*.

   Headlight Washer Switch. See *Windshield Wiper/Washer* ⇨ *64*.
4. Heater/Air Conditioner. See *Climate Control Systems* ⇨ *123*.
5. Small Article Storage Pocket in Camera Cover. See *Instrument Panel Storage* ⇨ *53*.
6. Radio with CD/USB/Bluetooth. See *AM-FM Radio* ⇨ *105*.
7. Small Article Storage Pocket. See *Instrument Panel Storage* ⇨ *53*.
8. Windshield Washer Fluid Tank. See *Washer Fluid* ⇨ *297*.
9. Passenger Airbag on-off Switch. See *Airbag On-Off Switch* ⇨ *45*.
10. Outboard Passenger SRS Frontal Airbag. See *Airbag System* ⇨ *41*.
11. Passenger Side Cup Holder and Storage Pocket. See *Cupholders* ⇨ *53*.
12. Relay Box. See *Electrical System Overload* ⇨ *318*.
13. *Cupholders* ⇨ *53*.
14. Accessory Power Outlet. See *Power Outlets* ⇨ *65*.

# Keys, Doors, and Windows

**Keys and Locks**
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## Keys and Locks

### Keys

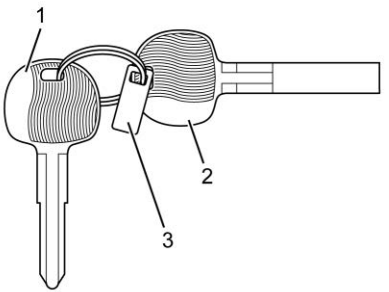
**⚠ Warning**

If the key is unintentionally rotated while the vehicle is running, the ignition could be moved out of the ON 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 ON 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, 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 ON 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 ON 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.




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 stopping the engine |
| Front doors | Locking and unlocking the doors |
| Passenger Airbag on-off switch | Switching the passenger side SRS Frontal Airbag to enabled or disabled |

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.

## Remote Keyless Entry (RKE) System

See *Radio Frequency Statement* ⇨ *397*.

If equipped with a Remote Keyless Entry (RKE) system, and there is a decrease in the Remote Keyless Entry (RKE) operating range:

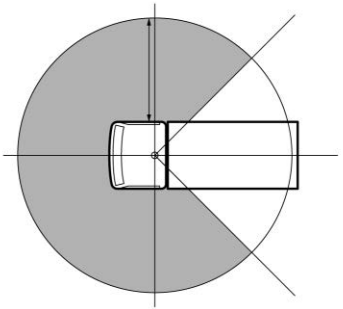
- Check the distance. The transmitter may be too far from the vehicle.
- Check the location. Other vehicles or objects may be blocking the signal.
- Check the transmitter's battery. See “Replacing the Battery in the Remote Control Unit” later in this section.
- If the transmitter is still not working correctly, see your dealer or a qualified technician for service.

## Remote Keyless Entry (RKE) System Operation

| Caution |
| --- |
| 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. |

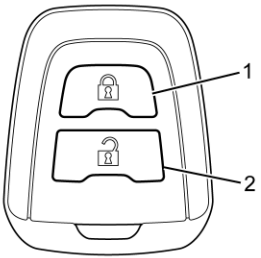
| Caution |
| --- |
| Do not leave the remote control unit on the dashboard or any other surface where the unit might be exposed to high temperatures (exceeding 60*C/140*F). Doing so may result in shorter battery life or malfunction of the remote control unit. |

If equipped, 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 once to unlock the driver side door. Press the unlock button twice within 3 seconds to unlock all doors. 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 to lock all doors. 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.

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 at least 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**

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.

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

(Continued)

**Warning (Continued)**

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

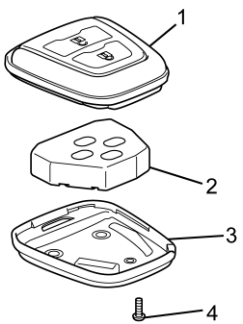
Be sure to install the battery with the "+" and "-" sides correctly oriented. Incorrect installation will result in leakage of chemicals from inside the battery or other operational problems.

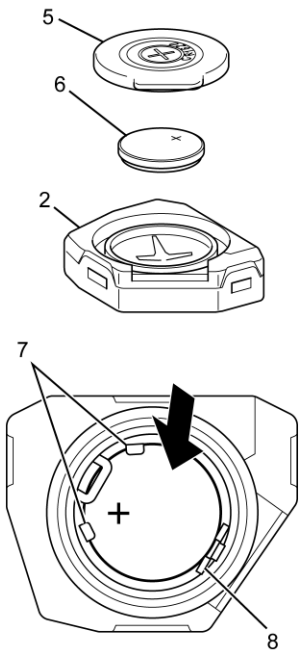
**Caution**

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

When the remote control unit battery is reaching the end of its useful life, the remote control unit may start functioning only intermittently. Replace the battery soon or the remote may stop working completely.

| Battery Used | Number of Battery |
|---|---|
| Lithium battery | 1 |
| Model number: CR1620 | |
| Voltage: DC3V | |




1. Key
2. Transmitter
3. Cover
4. Screw
5. Battery cover
6. Battery
7. Hooks of electrode
8. Hook of case

1. Loosen the screw (4) with a precision screwdriver and open the cover (3).
2. Remove the transmitter (2).
3. Open the battery cover (5) and remove the battery (6).
4. Install the new battery (6). With its positive side up, place it with the edge under the hooks of the electrode (7). Press the battery (6) downward until it is fully seated in the housing so that the other edge fastens under the hook of the case (8).
5. Close the battery cover (5).
6. Fit the transmitter (2) into the key (1) and attached the cover (3) with the screw (4).

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

### Car Finder

Press the lock button of the remote control unit twice within 3 seconds to activate the car finder. The horn blows briefly and the right and left turn signal lights flash simultaneously, if you are within the operating range (10 m (33 ft)) of the remote.

## Getting In and Out of the Vehicle

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. Place the selector level in the Park “P” position.
3. Stop the engine.
4. Lock the doors.

After getting in the vehicle and closing the door, check that the door is fully closed. Driving with any door ajar is very dangerous.

(Continued)

**Warning (Continued)**

Now and then check for broken, damaged, or missing parts that might prevent the door from latching completely.

Before opening the door to enter or exit the vehicle, carefully check all areas around the vehicle for safety, especially the area at the rear of the vehicle. If you suddenly open a door without checking the surrounding area, the door could hit a pedestrian or be hit by a passing vehicle.

Do not pull on the door levers while the vehicle is moving.

To help reduce the risk of personal injury in an accident, always ensure the doors are locked when the vehicle is in operation. Along with using the seat belts properly, locking the doors helps prevent people from being ejected from the vehicle. It also helps prevent unintentional opening of the doors and helps keep out intruders.

**⚠ 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. 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.

We recommend that children sit in the rear seat (only for crew cab model) to avoid contact with the selector lever, wiper switch, etc.

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

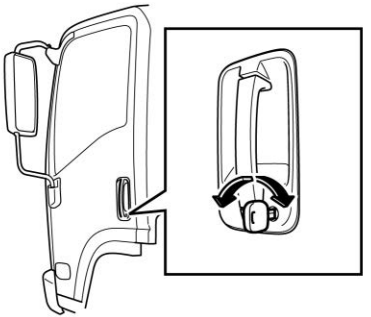
**Caution**

When opening and closing the doors, operate them slowly without applying excessive force. Applying excessive force may result in damage to the door components.

**Caution**

When a door is open, do not hang from it and do not hang heavy objects from it. Doing so may result in damage to the door components.

### Locking and Unlocking the Door from Outside Using the Key

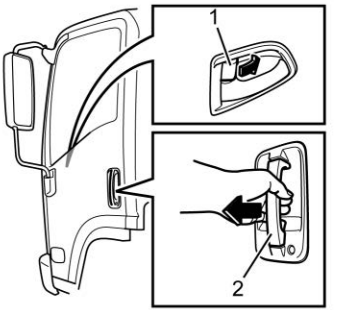


Turn the key toward the front of the vehicle to lock the door and turn it toward the rear of the vehicle to unlock it. The doors can be opened by pulling the outside door handle.

When unlocked in this way, only the door you are trying to unlock is unlocked.

When locking in this way, all doors of the vehicle will be locked.

### Locking the Door from Outside without Using the Key



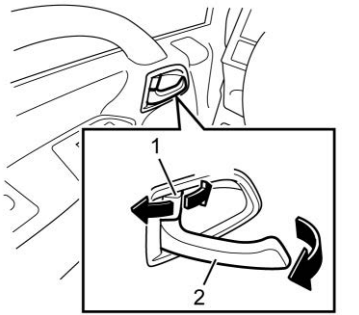

First, push the lock button (1) on the inside door handle forward and then close the door while keeping the outside door handle (2) raised.

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

#### Key Left Inserted Warning

When the driver side door is opened with the key left inserted and the engine control switch in the ACC or LOCK position, warning chimes will continue to sound to alert the driver that the key has been left inserted. The warning chimes stop sounding when the key is removed.

### 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). When the doors are locked, the inside door handles will not open them.

When unlocked in this way, only the door you are trying to unlock is unlocked.

## Rear Doors

### Outside Door Handles

A handle for opening each cab door from outside the cab is located at the rear edge of the door's outer panel. To open the door from outside the vehicle, pull up on the handle.

### Locking the Door from the Outside

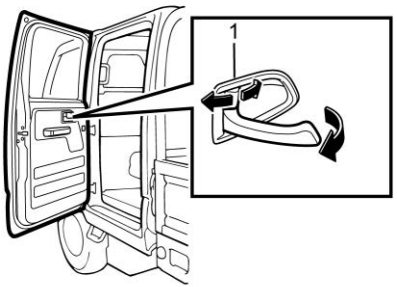
Push the door lock button forward and then close the door; the door will be locked.

### Inside Door Handles

An inside handle for opening each cab door is located in the recessed area at the front of the door. To open the door, pull the inside door handle. To close the door, pull the pull handle. If the door is locked, the lock mechanism overrides operation of the door handle. The door must first be unlocked before the handle can be used to open the door.

Before leaving the vehicle, be sure to stop the engine and lock the doors. Never leave the key behind the door.

### Locking and Unlocking Doors from the Inside




Push the door lock button (1) forward to lock the door and pull the lock button backward to unlock it.

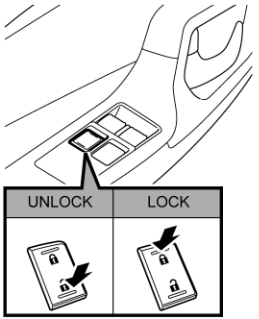
## Power Door Locks

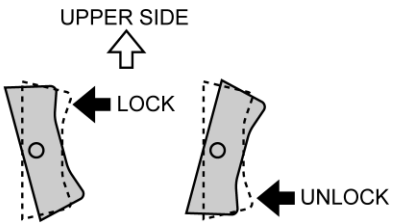
### Power Door Lock (Central Door Lock)

#### 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




All front doors and rear doors (crew cab model only) 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.
- 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.

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.

(Continued)

**Warning (Continued)**

Do not drive with the mirrors folded.

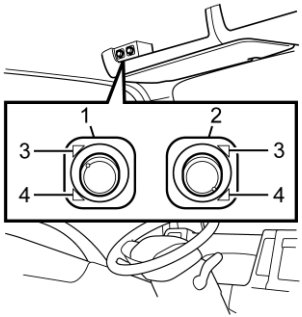
You and others could be seriously injured.

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.

**Remote Control Mirror Switch**

**Caution**

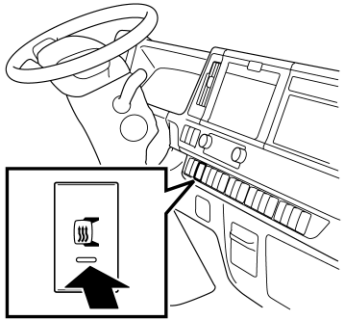
Do not try to forcefully move the mirror surface by hand. Otherwise, the mirror motor may sustain damage.




The remote control mirror switch is active only when the engine control switch in the "ON" position. Operate the switch to adjust the angle of the mirror.

1. Left Mirror Switch
2. Right Mirror Switch
3. Upper Adjustment Controls
4. Lower Adjustment Controls

## Heated Mirrors



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

Do not use this switch while the engine is shut down. 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.

**⚠ Warning**

When you leave the vehicle, take the child with you. If you leave the child alone in the cab, the child could interfere with things, causing vehicle movement, a fire, or some other accident. Also, the cab inside could become dangerously hot when heated by the sun.

**⚠ Warning**

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

(Continued)

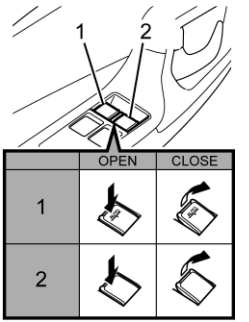
**Warning (Continued)**

door for the child. 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.

We recommend that children sit in the rear seat (only for crew cab model) to avoid contact with the selector lever, wiper switch, etc.

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 Door




The power window switch on the driver door can operate both driver and passenger power windows.

#### To Open the Driver Window

Lightly pressing the driver-side window switch (1) 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 Window**

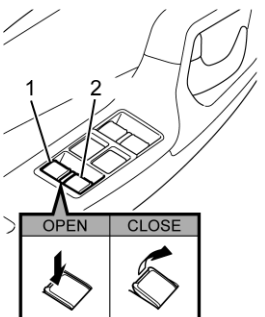
Lightly raising the driver side window switch (1) will cause the driver window to move up until the switch is released.

**To Open the Passenger Window**

The passenger window continues to lower while the passenger side switch (2) on the driver door is being pressed.

**To Close the Passenger Window**

The passenger window continues to move up while the passenger side switch (2) on the driver door is being raised.




**Crew Cab Model**

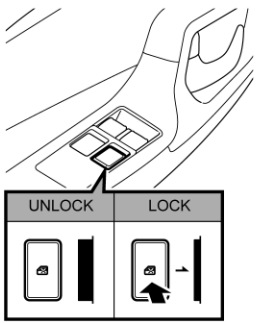
**To Open a Rear Window**

Press the driver side (1) or passenger side (2) switch to lower either rear window.

**To Close a Rear Window**

Lift the driver side (1) or passenger side (2) switch to raise either rear window.

**To Lock Passenger and Rear Power Windows**



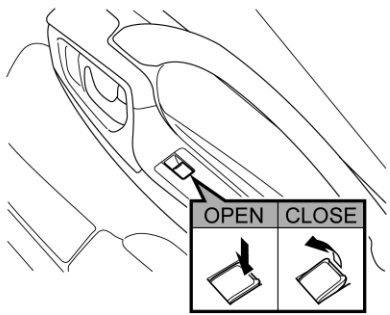

If you push the power window lock switch, only the driver's window will open. To cancel the power window lock, push the switch again. Use the power window lock switch to lock the passenger power window and rear power windows (crew cab model only). You can prevent passengers from operating the power windows.

## Window Switches on Passenger Door and Rear Doors

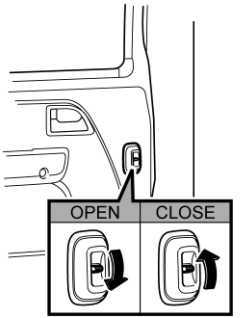
**⚠ Warning**

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.




**Passenger side**

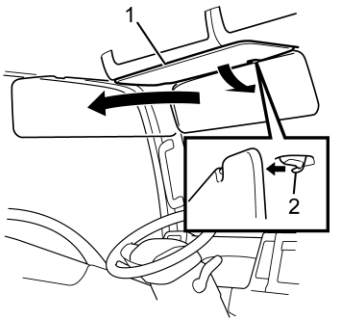



**Window Switch on Rear Doors (Crew Cab Model)**

The power window switch on the passenger door can raise and lower the passenger side window, while the rear power window switches can raise and lower the rear door windows.

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




**Driver Side**

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 adjust the seat or seatback while the vehicle is in motion. Adjusting the seat or seatback while the vehicle is moving could cause the seat to move suddenly and result in you losing control of the vehicle and being seriously injured or killed.

**⚠ 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

(Continued)

**Warning (Continued)**

lead to an accident. See a dealer as soon as possible if your seat or seatback will not remain latched. In addition, the seat belt will not operate properly if the seatback is not completely locked.

**⚠ Warning**

Driving with the seat excessively reclined could be very dangerous in the event of a collision or sudden stop. When the vehicle is not in motion, adjust the seatback so that you are sitting upright, put your seat belt on and position it properly.

**⚠ Warning**

Do not place a cushion or similar object between your back and the seatback. Doing so not only affects the stability of your 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, or when getting up from the seat, do not put your hand or other objects under the seat or near moving parts. Doing so could cause injury or damage to objects.

## Driver's Seat

The only seat in the vehicle that is adjustable is the driver's seat.

The driver's 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 adjustment 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.

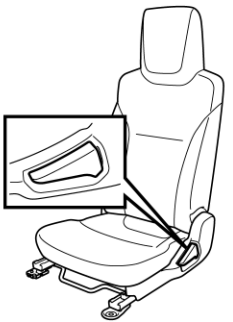
**Reclining Adjustment**

**⚠ Warning**

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. 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.



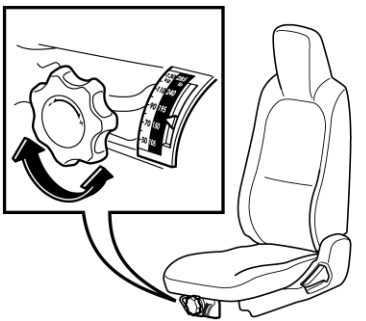
To recline the seatback, raise the seatback tilt lever and gently lean back to the desired position.

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.

**Suspension Adjustment**

**Caution**

Avoid making any kind of contact with the pointer on the scale. Doing so may result in damage to the pointer, preventing appropriate weight adjustments from being possible.



To adjust the suspension seat, if equipped:

Before sitting on the seat, use the knob to adjust the suspension to suit your weight. Turn the knob clockwise to move the pointer down

the scale and counterclockwise to move it up the scale. The pointer should be alongside your weight on the scale.

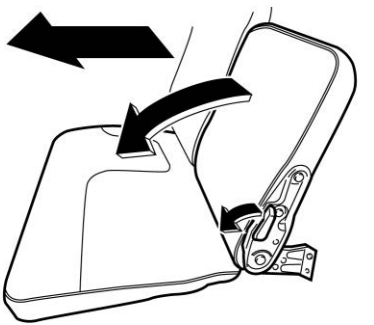
The range of adjustment is 50-130 kg (105–285 lbs). If your weight is outside this range, the suspension may not be fully effective. However, you will be able to sit in the correct position for driving.

### Front Passenger's Seat/Center Seat

**⚠ Warning**

- Avoid placing baggage or other loose items on the center seat while the vehicle is in motion. Otherwise those loose items may fall and interfere with the drivers ability to properly use the brake and accelerator pedals.
- Be careful that the seat belt is not pinched when tipping the seat or returning it to the upright position.

**Passenger's Seat**

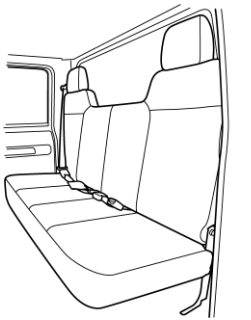


**Center Seat**

The front passenger seat is not adjustable. The only seat in this vehicle that is adjustable is the driver's seat. You can tip the front passenger seatback forward to access the storage behind the seat by pulling the lever at the side of the seatback forward. Be sure to raise the seatback to the fully upright position before driving.

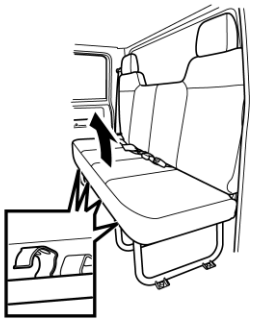
## Rear Seats

### Rear Seats (Crew Cab Model)



The rear bench seat, seatback and headrests are not adjustable, but the rear bench seat itself (cushion) can be removed for cleaning and to access storage area under the seat.

**How to Remove the Rear Seat Cushion**

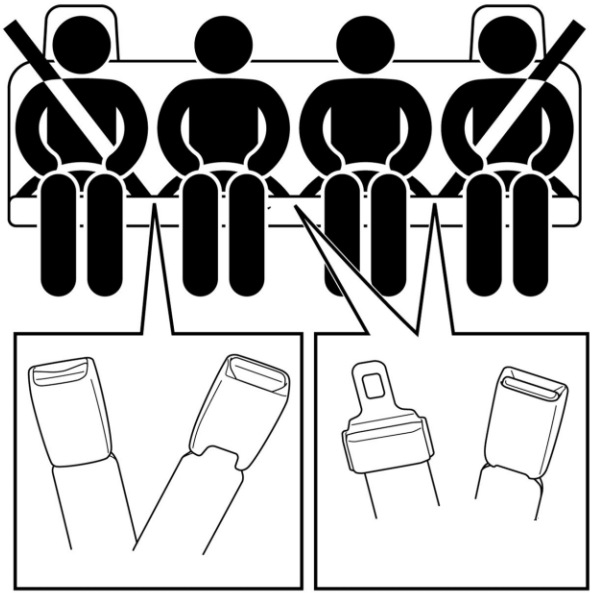


To remove the rear seat cushion, pull up the front side of the cushion and it will come out.

**How to Reinstall the Rear Seat Cushion**

**⚠ Warning**

All four buckles and latch plates must be routed through the appropriate bands, in the correct positions, and visible after the cushion is installed. Missing or incorrectly positioned seat belt buckles and latch plates can not be latched properly which could result in serious injury or death of rear seat occupants.



1. Be sure the four rear seat belt buckles and latch plates are routed through the appropriate bands and in the correct positions at the bottom of the seatback.
2. Place the seat cushion into its original position and make sure the seat belt buckles and latch plates are resting on top of the cushion.
3. Press down firmly on the front side of the cushion to secure it in place. (There are clips under the front of the seat cushion that engage the seat frame.)

The center seat buckles have "CENTER" printed on them.

## 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 and be seriously injured.

(Continued)

**Warning (Continued)**

- Be sure to insert the latch plate into the buckle until a click is heard. If it is not correctly inserted, there is a risk that the seat belt may come unfastened and result in an injury.
- 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. If it is fastened over the abdomen, it could result in extreme pressure being applied to the abdomen in the event of a crash and result in serious injury.
- 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, use an appropriate

(Continued)

**Warning (Continued)**

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.

(Continued)

**Warning (Continued)**

- Do not wear a shoulder belt under your arm nearest the door.
- Do not let a buckle release button face downward or inward.
- People who are pregnant or have a medical condition, chest or abdomen, should also wear a seat belt. However, depending on how it is used, there is a possibility of injury due to extreme pressure on the chest or abdomen, so check with your doctor regarding precautions.
- Seat belts are for one person. Do not use one seat belt for two or more people, even if they are children.
- Regularly inspect the seat belt system for cuts, fraying, or looseness. Do not use a damaged seat belt until it has been replaced. A damaged seat belt cannot properly protect vehicle occupants from death or serious injury.

(Continued)

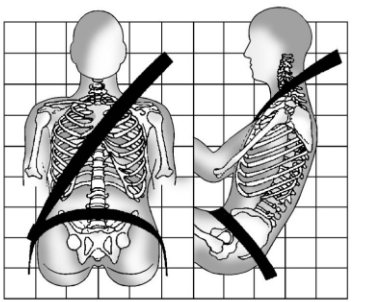
**Warning (Continued)**

- Seat belts that have been subject to extreme forces, such as while being worn when an accident occurs, should be inspected, even if they appear normal, and replaced by a dealer if needed.
- Be careful to keep the buckles and retractors free of dust and foreign matter, which this may jam the retractor or damage the belt.
- 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.

(Continued)

**Warning (Continued)**

- Drivers are obligated to have their fellow passengers wear seat belts as well. Emergency vehicles and other special vehicles are exempted from the obligation to wear seat belts, but we recommend that seat belts be worn as much as possible.



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.

**Precautions for Wearing Seat Belts**

**Q: Position the lap belt as low on your hips as possible. Position the shoulder belt so it is on your shoulder, not touching your neck, chin, or face. Why?**

**A:** The pressure applied by the seat belt in a collision would be dangerous if the belt is positioned incorrectly.

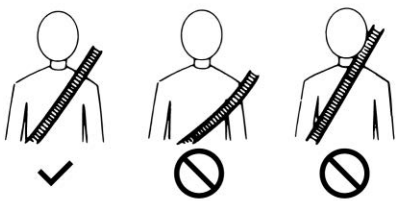
**Q: Make sure the seat belt is not twisted when you put it on. Why?**

**A:** To ensure that the seat belt is fully effective.

## Three-Point Seat Belt (Outboard Seats)

**⚠ Warning**

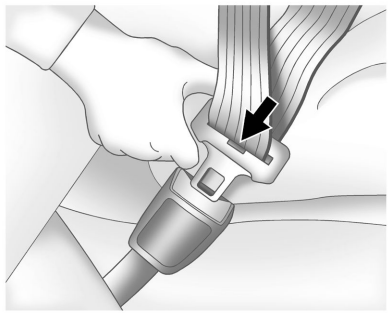
The shoulder belt should be adequately positioned on your shoulder but should not touch your neck and/or face. The shoulder belt could harm you in a collision or sudden stop if it is in contact with your neck and/or face.



The driver and outboard seating positions in your vehicle are equipped with three-point seat belts. The seat belt extends or retracts freely if the wearer moves slowly, but it locks and restrains the occupant when the belt is pulled to quickly or during sudden stops or collisions.

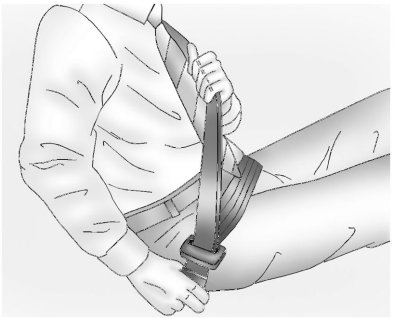
**To Fasten**

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



2. Grab the latch plate and pull out the seat belt towards the buckle. Ensure the belt is not twisted and insert the latch plate into the buckle until it clicks. Pull on the belt to confirm the latch plate is fastened. If the retractor locks before the latch plate reaches the buckle, let the belt retract slightly, then withdraw it more slowly than before.

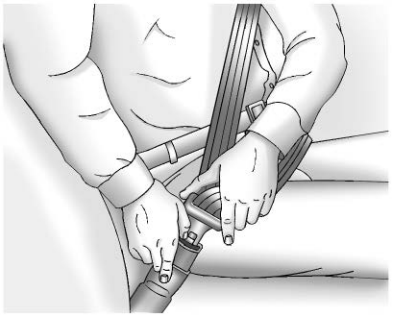
If you cannot pull out the seat belt, let the seat belt go loose, and then slowly pull it out again. If you still cannot pull it out, give the seat belt one strong pull, let it go loose, and then slowly pull it out again.



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 without lifting the lap portion.

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

**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.

| Caution |
| --- |
| Hold the seat belt latch plate while the belt is retracting in order to prevent the latch plate from damaging the side windows or interior trim. Before closing the door, check that the retracted seat belt is taut. A slack belt could become trapped in the door or seat rail. |

**Emergency Locking Retractor (ELR) Function**

The driver's and front outboard passenger's seat belts are equipped with an emergency locking retractor (ELR), pretensioner, and load limiter.

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 during sudden stops and collisions.

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.

**Load Limiter Function**

The load limiter allows the seat belt to extend under certain conditions while maintaining the load working on the belt at a constant level. This helps alleviate the shock applied on the occupant's body.

**Seat Belt Pretensioners**

**⚠ Warning**

Contact your dealer before making repairs to your vehicle or installing custom equipment in the instrument panel, like a radio or telematic devices. Improper vehicle repair or installation of custom equipment could lead to a malfunction of the airbags and pretensioners, such as unintentional deployment or non-deployment, and result in serious injury or death.

**⚠ Warning**

- Do not remove or disassemble the seat belts with pretensioners. Accidental activation of the system may cause parts to fly off and result in serious injury to you.
- The driver and front outboard passenger must wear their seat belts properly to gain the full benefit provided by the pretensioners in a crash. Because

(Continued)

**Warning (Continued)**

the pretensioner acts quickly to take up slack in the seat belt, you may suffer a slight bruise or burn due to heat generated by rubbing when the pretensioner deploys.

- Once the pretensioner is activated, the seat belt cannot be reused. The seat belt must be replaced as soon as possible. Otherwise the seat belt will no longer provide adequate protection and the pretensioner will not function at all. Contact your nearest dealer for service.
- Improper vehicle repair or installation of custom equipment could lead to a malfunction of the pretensioners and result in serious injury or death.

This vehicle is equipped with seat belts with pretensioners for the driver's seat and front outboard passenger seat only.

The front outboard seat belt pretensioners are designed to help reduce the risk of serious injury to belted occupants should the vehicle be involved in a certain type of crash. When the vehicle is involved in a frontal or near frontal collision exceeding a specific deployment threshold, the pretensioner will deploy and cause the seat belt to retract, removing slack from the seat belt and helping restrain the occupant in the seat.

Even if the pretensioner function fails, the seat belt still operate as a regular seat belt with ELR.

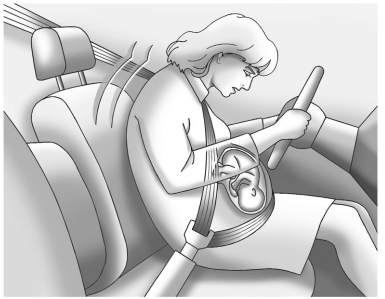
The pretensioner generates a sound at the moment it retracts the seat belt.

When the seat belt with pretensioner and frontal airbag system is activated by an impact, the warning light comes on.

## 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.

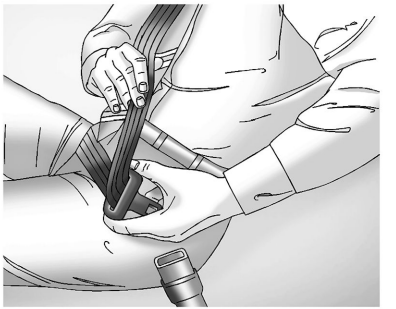
- An expectant mother should use a three-point seat belt.
- An expectant mother should position the lap belt snugly as low as possible on the hips (not across the abdomen). Also, she should fasten the shoulder belt so it rests on her chest, not on her abdomen.

## Lap Belt (Center Seats)

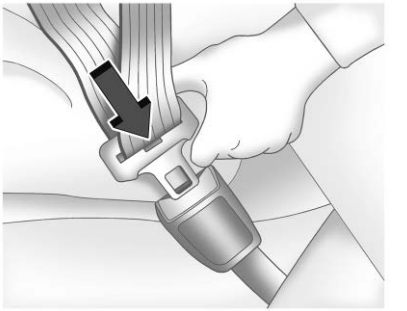
The center seating position(s) are equipped with a lap-only belt and no retractor.

**To Fasten**

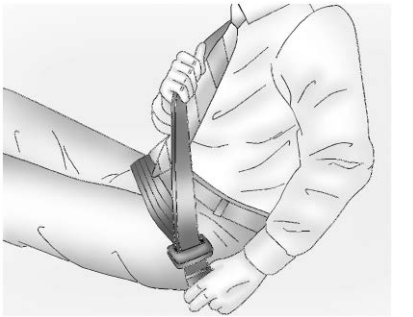
1. Sit on the seat in the correct position.



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. Ensure the belt is not twisted and 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 is designed so that its latch plate cannot be latched into any of the outboard seat belt buckles.

## Seat Belt Extender

**⚠ Warning**

When using a seatbelt extender, take the following precautions during emergency braking, sudden turning, or during an accident. Failure to do so may result in death or serious injury.

- Do not wear a seat belt extender if you can fasten your seat belt without a seat belt extender.
- Do not use a seat belt extender to install a child restraint system because that seat belt cannot hold the infant restraint system securely, which increases the risk of death or serious injury in the event of an accident.
- Personalized extenders may not be safe for use in a different vehicle, by a different person, or in a different seating position than originally intended.

(Continued)

**Warning (Continued)**

- To release the seat belt when using a seat belt extender, press the button on the buckle of the extender, not on the seat belt. This prevents damage to the interior of the vehicle and the extender itself.
- When a seat belt extender is connected to the driver or front outboard passenger seat belt buckle, the frontal airbag system recognizes the extender as if the seat belt itself is latched, even if the seat belt itself is not connected to the extender. In this situation, the frontal airbag system will operate as if the seat belt is in use, even when it is not. Always fasten your seat belt when using a 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 seatbelt extenders see the instruction sheet that comes with the extender.

## Safety System Check

**⚠ Warning**

A crash can damage the seat belt system in the vehicle. A damaged seat belt system may not properly protect the person using it, resulting in serious injury or even death in a crash. To help make sure the seat belt systems are working properly after a crash, have them inspected and any necessary replacements made as soon as possible.

Now and then check that the belts, buckles, latch plates, retractors and anchorages 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 is cut, torn, frayed or otherwise damaged. If a problem is found, have the seat belt assembly replaced by your dealer.

Seat belt assemblies that were in use during a collision should be replaced. In addition, seat belt assemblies should be replaced and anchorages properly repaired if they were in areas damaged by a collision, whether or not the belt was in use. If there is any question, replace the belt system. If there is any question have the seat belt assemblies checked by a GM dealer.

## Seat Belt Care

**⚠ Warning**

Keep belts clean and dry.

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

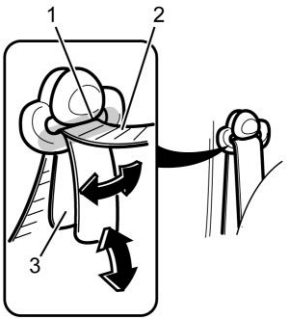
(Continued)

**Warning (Continued)**

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

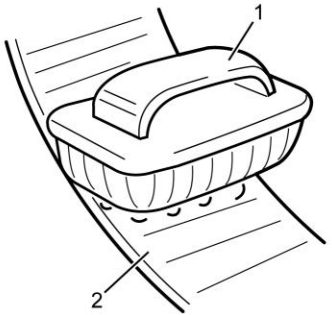
3. Cloth

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 plastic parts or seat belt webbing damage.

**Cleaning a Belt Webbing**




1. Brush
2. Seat belt

Cleaning a 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.

## Airbag System

The vehicle has the following airbags:

- A frontal airbag for the driver
- A frontal airbag for the front outboard passenger

**⚠ Warning**

Before driving the vehicle, adjust your seat for the proper driving position and wear the seat belt correctly. Do not sit closer than the steering wheel than necessary and do not lean over it. Be sure the passengers do not put their hands or feet on the instrument panel or sit with their face or chest close to it. Sitting to close to the airbags can result in serious injury or death when the airbags deploy.

The National Highway Traffic Safety Administration (NHTSA) of the U.S. Department of Transportation recommends a minimum distance of 25 cm (10 in) between vehicle occupants' chest and the airbag modules. To be the proper distance away from the airbag, the driver should maintain an upright seating position and move the seat back as far as possible while still being able to reach the steering wheel and pedals comfortably. It is very important that all vehicle occupants, fasten their seat belts, and sit properly. Passengers are properly seated when they

(Continued)

**Warning (Continued)**

are sitting in the center of the seat cushion with their legs comfortably stretching out to the floor, and so their back is straight and leaning against the seatback. Sitting improperly increases the likelihood of injury in a collision. For example, if vehicle occupants are bent forward, lying down, sitting forward, or have both legs raised, then they are much more likely to be injured in the event of a crash.

Do not apply excessive force to the steering wheel cover or the upper part of the instrument panel, such as by strongly hitting them. Doing so could impair the normal operation of the airbags.

Do not place anything on your lap or between you and an airbag while the vehicle is in motion. Doing so could interfere with the proper deployment of the airbags and cause serious injury.

If you make unauthorized modifications to the vehicle or install an unauthorized accessory, the seat belt pretensioners and airbags may not operate correctly.

(Continued)

**Warning (Continued)**

If the steering wheel is changed to a non-standard one or a sticker is attached to the steering wheel cover, there could be a danger of system malfunction or the sticker flying off in the event of system activation. Do not attach anything to the steering wheel cover or place accessories or objects, such as air fresheners or umbrellas, on or against the instrument panel. Doing so could interfere with the proper deployment of the airbags and cause serious injury.

These systems are designed to help protect the driver and front outboard passenger in frontal and near frontal collisions exceeding a specific deployment threshold. However, these systems can themselves cause injury if you are not seated in the proper position or wearing the seat belt properly. Be sure to observe the following warnings and instructions to help protect the driver and front outboard passenger from being injured by the airbags and/or seatbelts.

## Where Are the Airbags?

The driver frontal airbag is in the center of the steering wheel.

The front outboard passenger frontal airbag is in the passenger side instrument panel.

## When Should an Airbag Inflate?

The seat belts with pretensioners and frontal airbag system is designed to activate when the vehicle is involved in a frontal or near frontal collision exceeding a specific deployment threshold. Because the vehicles or other objects in the crash may absorb part of the impact energy, and depending on the intensity, direction or mass of the object or other vehicle involved in the crash, the system may not deploy. Even if the front of your vehicle is significantly damaged in a crash, the airbags and/or pretensioners may not deploy if the parameters of the collision do not meet the deployment threshold.

In frontal and near frontal collisions of sufficient force, the seat belt pretensioners and frontal airbags are likely to deploy. The threshold level of impact required to cause the seat belt pretensioners and airbags to deploy is affected by the type of collision. In the event of a frontal collision straight into a fixed barrier, such as a strong wall that does not move or deform, the airbags and pretensioners will deploy at a lower speed compared to the deployment speed required for a vehicle in a frontal collision with an object that will move or deform on impact, such as a guardrail or a small parked car. In any particular crash, the determination of whether the pretensioners and airbags should have deployed cannot be based solely on the level of damage on the vehicle(s). For instance, if the frame or suspension strikes hard against a pothole in the roadway while the vehicle is moving forward, the impact energy may be sufficient to deploy the seat belt pretensioners and airbags. Deployment is determined by the angle of the impact and the vehicle's deceleration, of which vehicle damage is only one indication. Repair cost, therefore, is not a good indicator of whether the pretensioners or frontal airbags should have deployed.

In certain types of accidents, the pretensioners and frontal airbags may not deploy, even though the accident was quite severe and/or your vehicle may appear severely damaged. This does not mean there is a problem with the pretensioners and airbags, but rather the forces of the collision in the frontal direction were insufficient to meet the deployment threshold.

If the pretensioners and frontal airbags fail to deploy in a moderate to severe frontal or near frontal collision, have the seat belt with pretensioner and frontal airbag system inspected by a GM dealer as soon as possible. In the following examples of accidents or crashes, the seat belt pretensioners and frontal airbags may not deploy even though the system is working properly:

- When the vehicle collides with a pole or tree.
- If your vehicle gets under an obstacle or vehicle.
- If your vehicle has an offset collision, one-sided collision.
- A front angled collision.
- If your vehicle collides with a smaller vehicle.
- An impact caused by dropping into a large pothole or depression in the roadway.
- When the vehicle is hit from the rear.
- When the vehicle is hit from the side.
- When the vehicle is forced onto its side or upside down.

## What Will You See After an Airbag Inflates?

**⚠ Warning**

- The airbags are designed to supplement the protection provided by the front outboard seat belts in frontal and near frontal crashes exceeding a certain deployment threshold and are not by any means a replacement for wearing the seat belts provided. ALL vehicle occupants should ALWAYS wear their seat belt. Because the airbags must deploy with considerable force to protect against serious injury, they may cause minor injuries when they inflate. Therefore, be sure not to sit any closer to the airbag(s) than necessary.
- If you have breathing trouble or eye or skin irritation after one or both of the airbags inflate, open a door or window to get fresh air in, or, if it is safe, get out of the vehicle, and/or rinse

(Continued)

**Warning (Continued)**

your eyes/skin with water as soon as possible. Seek medical attention if your symptoms persists.

- If an airbag inflates it can no longer function and must be replaced. Have your dealer inspect all of the airbag system components and replace them as necessary. If the system is not repaired it will not function properly. Failure to follow this warning may result in serious injury or death in the event of a future crash.
- Do not remove or disassemble any airbag. Doing so may cause a malfunction or unintended activation.
- Never rest your head, arms or legs on the steering wheel or outboard passenger side instrument panel.
- If the vehicle is stopped with the engine control switch in the ON position and is involved in a frontal or near frontal impact that exceeds the deployment

(Continued)

**Warning (Continued)**

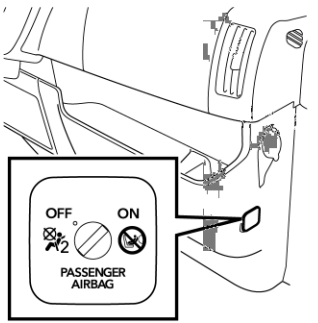
threshold, the frontal airbags will deploy and injure you even if the crash itself does not.

The airbags are designed to help reduce the risk of serious injury to the driver and front outboard passenger should the vehicle be involved in a certain type of crash. When the vehicle is involved in a frontal or near frontal collision exceeding a specific deployment threshold, the airbag(s) will deploy. The airbag(s) will inflate almost instantly and then quickly deflate.

There will be a sound and white smoke, when the airbag inflates. The white smoke is not harmful to your health. However, if any residue from the airbag comes in contact with your eyes or skin, rinse them with water as soon as possible. Although it is rare, a person with delicate sking may suffer from irritation.

## Airbag On-Off Switch

The outboard passenger frontal airbag can be disabled, turned off, if you need to transport a passenger that belongs to a recognized passenger risk group. The passenger airbag on-off switch is located on the passenger side of the instrument panel and is visible only when the passenger front door is open.




This switch should be turned to the off position only if the passenger belongs to a passenger risk group specified by the government. Passenger risk groups are defined as follows:

**Infants Under One Year Old**

If no vehicle with an open rear seat in which to secure the infant in a rear-facing child restraint is available, infants under one year old should ride in the front seat under the following circumstances:

- If there is no rear seat.
- If a rear-facing infant seat cannot be installed in the rear seat.
- If the infant has a medical condition that a physician has determined requires the infant to be placed in the front seat so the driver can monitor the infant's condition at all times.

**Children Between the Ages of One and 12 Years Old**

Children between the ages of one and 12 must ride in the front seat under the following circumstances:

- If there is no rear seat.
- Children between the ages of one and 12 should ride in the rear seat whenever possible, but if there is no room in the rear seat then the child must ride in the front seat.
- If the child has a medical condition that a physician has determined requires the child to be placed in the front seat so the driver can monitor the child's condition at all times.

**⚠ Warning**

- Do not disable the outboard passenger frontal airbag unless the person that is sitting in that seat belongs to a risk group. If the passenger airbag on-off switch is inadvertently left in the OFF position, and another passenger who does not belong to a risk group occupies that seat during a crash, the airbag will not deploy to help protect that passenger.
- Never use a rearward-facing child restraint in a front passenger seat when the passenger airbag on-off switch in the ON position. A child in a rear-facing child restraint can be seriously injured or killed if the outboard front passenger airbag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating airbag.

Turning the passenger airbag on-off switch to the OFF position does not disable the seat belt pretensioners.

### To Disable the Passenger Side Frontal Airbag

The engine control switch must be in the LOCK position before disabling the airbag.

1. Insert the key into the passenger airbag on-off switch and turn it to the OFF position.
2. Leave it in the OFF position and remove the key.

   If the key is left inserted, the switch returns to the ON position.

3. When the engine control switch is turned to the ON position, ensure that the outboard passenger frontal airbag OFF indicator light comes on. While the switch is in the OFF position, the outboard passenger frontal airbag OFF indicator light stays lit.

### To Enable the Passenger Side Frontal Airbag

The engine control switch must be in the LOCK position before enabling, turning on, the airbag.

1. Insert the key into the passenger airbag on-off switch and turn it to the ON position.
2. Leave it in the ON position and remove the key.

3. When the engine control switch is turned to the ON position, ensure that the outboard passenger frontal airbag ON indicator light comes on. While the switch is in the ON position, the outboard passenger frontal airbag ON indicator light stays lit.

## Servicing the Airbag-Equipped Vehicle

**⚠ Warning**

Contact your dealer before making repairs to your vehicle or installing custom equipment in the instrument panel, like a radio or telematic devices. Improper vehicle repair or installation of custom equipment could lead to a malfunction of the airbags and pretensioners, such as unintentional deployment or non-deployment, and result in serious injury or death.

Contact your dealer before making repairs to your vehicle, or before installing custom equipment in the instrument panel, like radio or telematic devices. Do not do any of the following yourself; instead, GM recommends having the following services performed by a GM dealer:

- Repair or replace the steering wheel, instrument panel, center console, dashboard and parts around the brake pedal.
- Repair, replace or dispose of the seat belts with pretensioner and the airbags.
- Scrap the vehicle.
- Modify the vehicle front bumper, mounting equipment, snowplow, or frame, or change the vehicle height.
- Repaint the vehicle front and cab panels.

Have your vehicle inspected at the nearest dealer promptly if you encounter any of the following conditions:

- Any seat belt pretensioner or airbag has deployed.
- Your vehicle has been involved in a crash or collision, even if neither of your seat belt pretensioners or airbags did not deploy.

  Do not touch the components of an airbag after it has deployed, because they may be extremely hot.
- The airbag warning light does not go out or frequently flashes.
- The steering pad surface is cracked or otherwise damaged, or it receives a significant level of impact.
- The instrument panel surface is cracked or otherwise damaged, or it receives a significant level of impact.

## Adding Equipment to the Airbag-Equipped Vehicle

**⚠ Warning**

Contact your dealer before making repairs to your vehicle or installing custom equipment in the instrument panel, like a radio or telematic devices. Improper vehicle repair or installation of custom equipment could lead to a malfunction of the airbags and pretensioners, such as unintentional deployment or non-deployment, and result in serious injury or death.

# 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

(Continued)

**Warning (Continued)**

allow a child to be held by another occupant instead of being properly restrained. If not properly restrained, the child could strike the vehicle interior or be crushed by the person holding the child, or by other occupants.

- Do not place a rear-facing child seat in the front unless you have absolutely no alternative. If a rear seat is not available, use a another vehicle, with an available rear seat, to transport the infant. If you must place the infant, and the rear-facing child restraint, in the front seat be sure to turn the passenger airbag on-off switch to the OFF position. The back of the rear facing child seat and thus infant's head, would be too close to the inflating airbag and the infant could be seriously injured or killed if the airbag deploys.
- If the child restraint system is not properly secured in its designated position, there is a risk of serious

(Continued)

**Warning (Continued)**

injury or death to the child and other passengers if the vehicle stops suddenly, turns quickly, or is in an accident.

- If the vehicle is subjected to a severe impact, such as in an accident, the child restraint system may be damaged in ways that are not visible. Under such circumstances, do not use the restraint system again.
- Even if a child restraint system is not being used, secure it properly to a seat. Do not keep an unsecured child restraint system in a vehicle.
- Observe the following precautions when using a child restraint system. Failure to do so can result in death or serious injury:
  - When installing a booster seat, always be sure that the shoulder belt is positioned across the middle of the child's shoulder. Keep the belt away from the child's neck. However, do not let it fall from the child's shoulder.

(Continued)

**Warning (Continued)**

- Use a child restraint system that fits the age and body size of the child.
- Do not let children play with seat belts. Serious injury leading to suffocation or death is possible if the seat belt becomes wrapped around a child's neck. If this problem occurs and the buckle cannot be removed, then the belt must be cut.
- Make sure that the seat belt is not twisted, and that the belt and plate are securely locked.
- Shake the child restraint system side to side and back and forth to confirm that it is firmly installed.
- Never adjust the seat after you have installed the child restraint system.
- Do not use seat belt extenders when installing a child seat. If you do, the seat belt will not be able to hold the child restraint system if the vehicle stops suddenly, turns quickly, has an accident, or quickly turns sharply.

(Continued)

**Warning (Continued)**

- When some types of child restraint systems are installed in the rear seat, you may not be able to properly use the seat belt for the seat adjacent to the child restraint system due to interference with the child restraint system. Make sure that the seat belt fits snugly over the shoulders and low on the hips. If it does not, or if the child seat interferes with it, then move to a different seat. Failure to do so can result in death or serious injury.
- Whenever possible, install the child restraint in the center of the rear seat. The rear seat is safer for infants and children than the front passenger seat.

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.

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

## Where to Put the Restraint

**⚠ Warning**

- Do not drive with a child standing in the front or held on any front seat occupant's lap.
- Whenever a child restraint is installed in the front, always place the passenger airbag on-off switch in the OFF position.
- Never place a rear facing child seat in the front, even if the Passenger Airbag on-off switch in the OFF position. The rear facing child seat would be too close to the inflating airbag in the highly unlikely event that the airbag were to deploy, even with the outboard passenger frontal airbag on-off switch in the OFF position. If a rear seat is not available, consider using another vehicle to transport the child.

(Continued)

**Warning (Continued)**

Failure to follow these warnings may result in serious injury or death to the child in the event of a crash.

If the vehicle is equipped with a rear seat, children should always be secured in the rear in an age-appropriate child restraint. If the vehicle does not have rear seats and a child restraints installed in the front seat always place the passenger airbag on-off switch in the OFF position. See *Airbag On-Off Switch* ⇨ *45*.

Never place a rear facing child seat in the front.

## Lower Anchors and Tethers for Children (LATCH System)

**⚠ Warning**

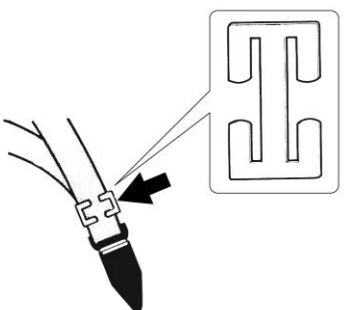
There is no appropriate place to attach a top tether anchor or an ISOFIX connector in the seating positions in this vehicle. Therefore, even if your child restraint is equipped with a LATCH system (with a top tether and/or

(Continued)

**Warning (Continued)**

an ISOFIX connector), you must use the vehicle's seat belts with a locking clip to secure the child restraint.

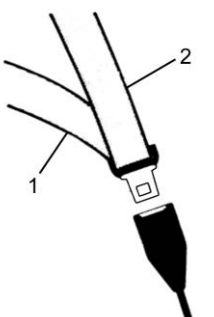
## Securing Child Restraints (Using a Three-Point Seat Belt on the Outboard Passenger Seats)



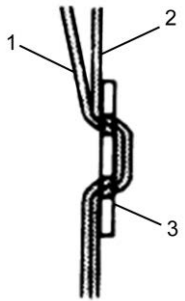
A seat belt locking clip is required for installation of a child restraint system on the outboard passenger seats of this vehicle. A locking clip may usually be obtained where child restraints are sold. Make sure the locking clip is identical to the one shown on the next page. Secure the child in the restraint in accordance with the child restraint manufacturer's instructions.

**⚠ Warning**

Always thread both the lap belt portion and the shoulder belt portion of the outboard passenger seat belt through the locking clip when securing a child restraint in an outboard seat position. If the clip is not used or installed properly, the child restraint may move or tip over when your vehicle turns, stops abruptly or is in an accident, and result in serious injury or death.



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 the child restraint is not installed in the vehicle, remove the locking clip to permit normal use of the lap-shoulder belt.

## Securing Child Restraints (Using a Lap Belt in the Center Seats Without a 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:

- Check the child restraint manufacturer's instructions for important details.
- Run the seat belt through the appropriate slots of the child seat.
- Press down firmly on the child seat and adjust the length of the seat belt to within approximately 12 mm (1/2 in) of the outstretched center buckle.
- Twist the latch plate over a half-turn and fasten it into the buckle.
- Make sure that the child seat is secured properly by rocking it forward, backward and side to side. If the child seat is easily tipped over or inches forward, repeat this entire procedure or contact your dealer or the child restraint manufacturer for help.

# Storage

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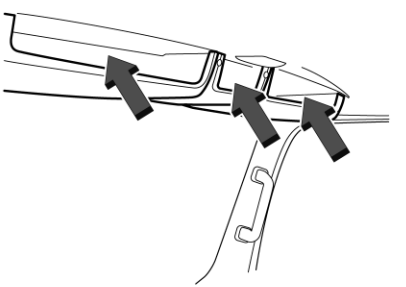
## Storage Compartments

### Overhead Tray

**⚠ Warning**

Do not use the overhead tray 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.

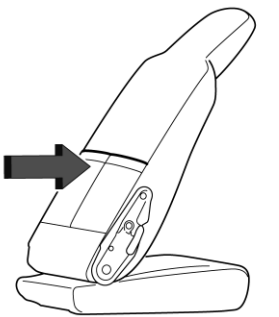


Use the overhead trays as shelves.

### Seatback Pocket

**Caution**

Do not put multiple books or manuals, or sharp objects into the seatback pocket. If you do, the pocket could be damaged.



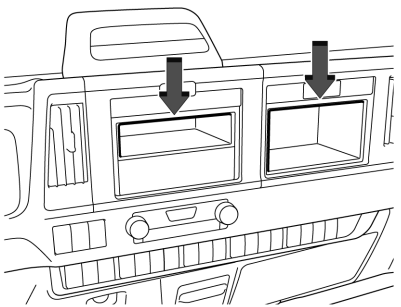
The seatback pocket is located on the back side of the passenger's seatback. Use it for storing items such as vehicle registration documents or owner's manuals.

## Instrument Panel Storage

### Small Article Storage Pockets

**⚠ Warning**

Do not leave lighters in the vehicle. Interior temperatures can become very hot and may cause lighters to explode.

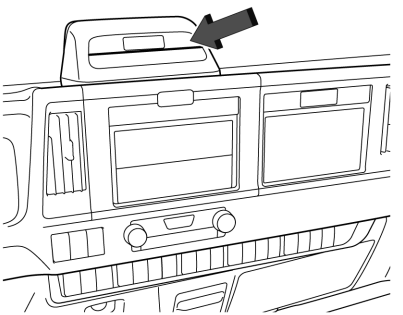


Use the storage pockets for storing small articles.

### Small Article Storage Pocket in Camera Cover [V]

**⚠ Warning**

Do not put anything in the camera cover pocket while driving. There is a risk of the things flying out if there is a sudden shock, such as abrupt braking.



Use this storage pocket for small items only when the vehicle is parked.

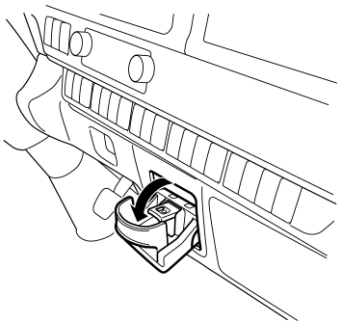
## Cupholders

**Caution**

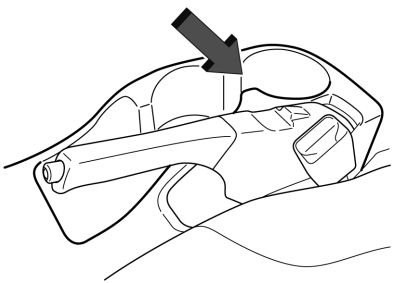
Do not place a drink that is too full in the cup holder. Spillages could cause damage to the radio and other electrical circuits. If there is a spill, wipe it up immediately with a dry cloth.

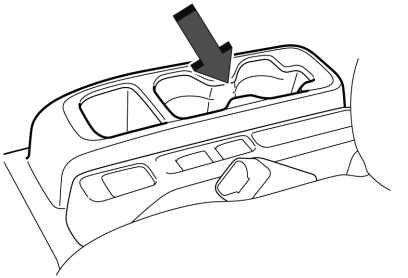
Do not tilt the cab with a drink in the cup holder. Doing so may result in damage to the radio or other electronic components.

Do not place more than 1.5 lb (0.68 kg) of weight in the instrument panel cup holder. Exceeding this weight may break the cup holder.



Pull the instrument panel cup holder towards you to open it.

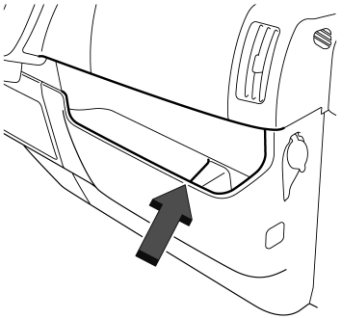




Additional cup holders are available in the seat side tray.

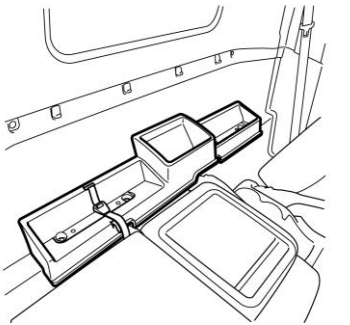
### Passenger Side Cup Holder and Storage Pocket

| Caution |
| --- |
| Do not leave eyeglasses or sunglasses in the vehicle. Interior temperatures can become very hot causing plastic lenses or frames to deform or crack. |



Use the storage pockets for storing small articles and as a cup holder.

## Rear Storage



**Single Cab Model Only**

**⚠ Warning**

Do not use the back panel tray to hold any object that may fly or fall out during vehicle operation. Doing so would be dangerous.

Items may fly or fall out when the cab is tilted.

You and others could be seriously injured.

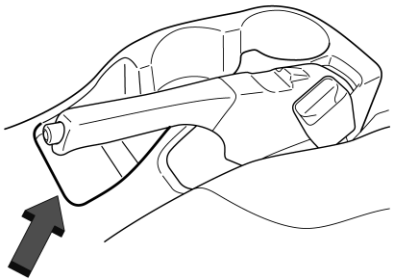
The center area of the back panel tray can be used as a storage receptacle. The warning triangle and fire extinguisher can be carried in both sides.

## Floor Console Storage

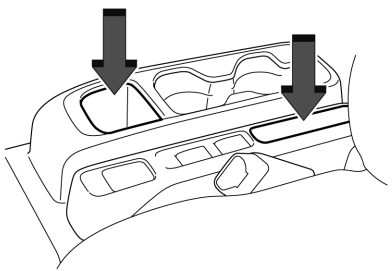
**Seat Side Tray**

**Caution**

Do not leave eyeglasses or sunglasses in the vehicle. Interior temperatures can become very hot causing plastic lenses or frames to deform or crack.



**Model with Parking Brake Lever**



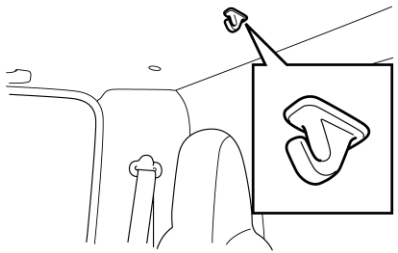
**Model with Electric Parking Brake**

Use the tray for storing small articles.

# Additional Storage Features

## Shopping Bag Hooks

**Coat Hook**



**Single Cab Model**

Use this to hang clothing.

## Folding Tray

### Seatback Tray

**Caution**

Be careful that the seat belt is not pinched when moving the seatback. The seat belt could be damaged.

If you pull forward the lever and tilt the seatback of the center seat forward, you can use the seatback as a tray.

## 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 (single cab) or on the left center pillar panel beside the shoulder seat belt anchor (crew cab).

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, lift gates, 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.

| Model | Maximum GVWR kg (lb.) | Front GAWR Capacity kg (lb.) | Rear GAWR Capacity kg (lb.) |
|---|---|---|---|
| 4500 HD | 6 577 (14,500) | 2 431 (5,360) | 4 482 (9,880) |
| 4500 XD | 7 258 (16,000) | 3 007 (6,630) | 4 998 (11,020) |
| 5500 XD | 8 845 (19,500) | 3 300 (7,275) | 6 196 (13,660) |

### 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.

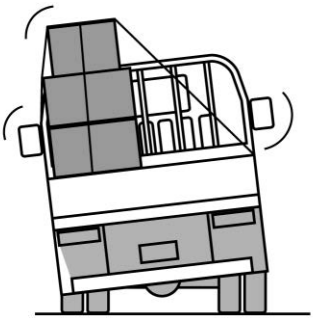
### Tires

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. The tire inflation tables show the load limits for various size tires at various inflation pressures.

For the vehicle plate location, see *Vehicle Identification Number (VIN)* ⇨ *379*.

See "Tire Load and Inflation Table" under *Tire Pressure* ⇨ *339*.

### 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.

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)**

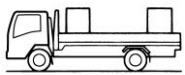
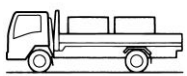
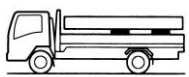
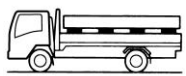
It is extremely dangerous to overload the vehicle or to load the vehicle with the cargo positioned on one side. Load the vehicle correctly, observing the maximum loading capacity.

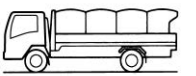
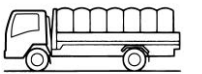
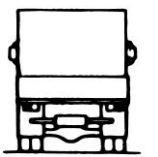
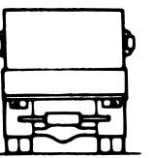
Incorrect loading can make the cargo unstable. It can also cause an overload condition confined to a small area, resulting in damage to the cargo bed and frame.

(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 Heavy Equipment**

**⚠ Warning**

When the cargo is heavy, take steps to prevent it from slipping and secure it with wire cables.

**Loading Farm Equipment**

**Caution**

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

When loading farming 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**

**⚠ Warning**

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


## Controls

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# Controls

## 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.

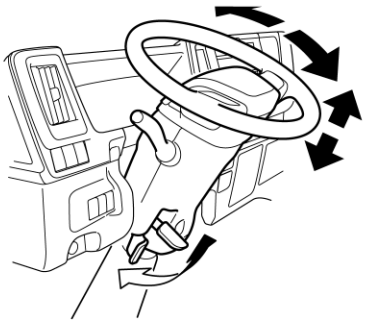
**⚠ Warning**

To be the proper distance from the driver's SRS Frontal Airbag, the driver should maintain an upright seating position and

(Continued)

**Warning (Continued)**

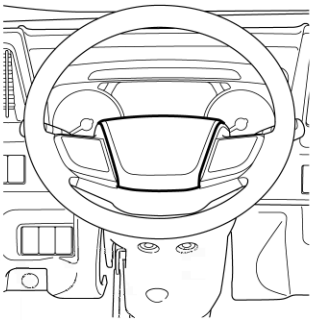
move the seat back as far as possible while still being able to reach the steering wheel and pedals comfortably. Sitting too close to the airbags can result in serious injury or death when the airbags deploy.



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.

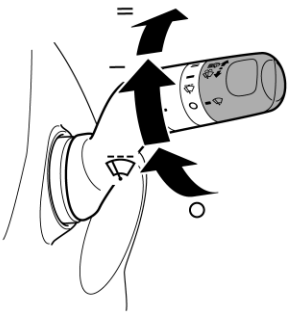
## Windshield Wiper/Washer

**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 lamps and windows. Reduced visibility from snow and ice buildup could lead to a crash.



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, moderate rain.

: High speed, heavy rain.

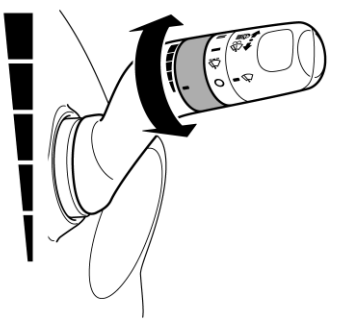
If the wiper stops during operation, see your dealer.

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

Before operating the wiper, ensure that the wiper rubber is not stuck on to the windshield. If the wiper rubber is stuck to the windshield and you still operate the wiper, the wiper may break or the wiper motor may fail.

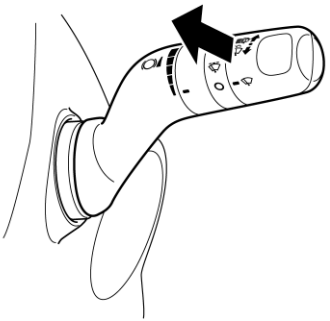
Clear snow and ice from the wiper blades and windshield before using them. If frozen to the windshield, carefully loosen or thaw them. Damaged blades should be replaced. See *Wiper Blade Replacement* ⇨ *310*.

### Windshield Wiper Adjustment



This switch is used to adjust the operation intervals when the windshield wiper switch is in the (Intermittent) position.

### Windshield Washer Switch



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

The windshield washer is used when wiping the windshield clean.

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

Use a good quality windshield antifreeze to help prevent freezing damage, and for better cleaning.

When the vehicle is used in a cold-climate region or during the winter, use washer fluid with appropriate concentration for the season to prevent frozen fluid. Additionally, fill the washer fluid reservoir only 3/4 full to allow for expansion if the temperature should fall low enough to freeze the solution

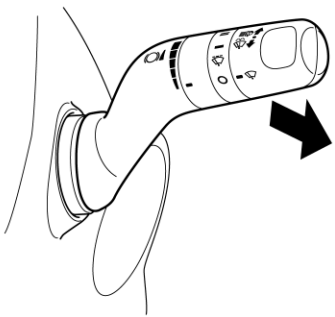
If windshield washer fluid does not come out in sufficient quantity, immediately release the switch. Otherwise, the windshield surface may sustain damage.

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.

See *Washer Fluid* ⇨ *297* for information on filling the windshield washer fluid reservoir.

### Headlight Washer Switch

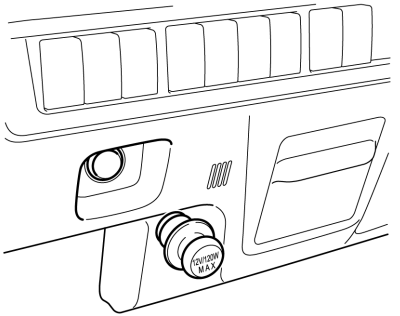


With the headlights ON, when the windshield wiper switch is pushed down, the headlight washer operates. Washer fluid comes out the nozzles on the front bumper and is sprayed against the headlights.

## Power Outlets

**⚠ Warning**

Do not spill liquids on the power outlet, nor attempt to insert metals or other foreign objects. Doing so may result in an electric shock or damage.




The accessory power outlet can be used when the engine control switch is in the "ACC" or "ON" position. To plug into the outlet, remove the cap and follow the proper installation instructions that came with the electrical equipment you install. These circuits are protected by a fuse and have maximum current loads.

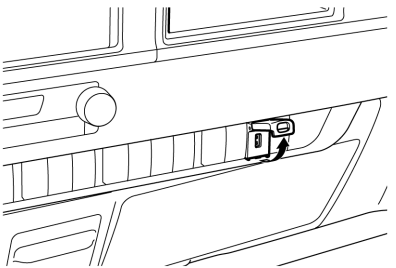
When using accessory power outlets, total maximum electrical load must not exceed 120W. Always turn off any electrical equipment when not in use.

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

**USB Power Outlet**

| Caution |
| --- |
| Do not connect USB hubs. Doing so could result in damage. |

| Caution |
| --- |
| Using this outlet for extended periods with the engine "off" will drain the battery. Take care not to completely discharge the battery. This may permanently damage the battery or may cause the vehicle to not start. |



The USB power outlet can be used when the engine control switch is in the "ACC" or "ON" position. The power outlet is to be used for operating or charging compatible mobile devices or electronics. Refer to the owner's manuals of those products before using. Open the cover to use. Close the cover when not in use.

- A-Type USB terminals can be used with the power outlet. Do not attempt to insert other types of USB terminals.
- The maximum rating for power outlet is 5.0 V/2.4 A. Before using, check that the equipment to be used is compatible by referring to its owner's manual, etc.
- After charging is complete, promptly disconnect all mobile devices and electronics.
- Do not connect damaged equipment or products.
- When using USB cables, make sure that your legs do not get caught by the cables.
- It can only be used as a power output and not for transmitting data (including video and music data).

- Damage to connected equipment or products, as well as any damage of or loss of data are not covered by warranty.
- Make sure that the connected USB cables, mobile devices, and electronics do not interfere with vehicle operation.

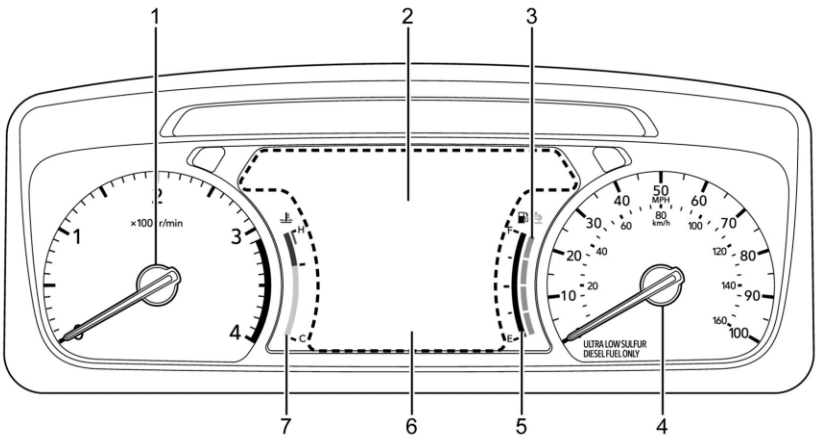
## Warning Lights, Gauges, and Indicators

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. *Tachometer* ⇨ *69*
2. *Driver Information Center (DIC)* ⇨ *83*
3. *Diesel Exhaust Fluid (DEF) Gauge* ⇨ *70*
4. *Speedometer* ⇨ *68*
5. *Fuel Gauge* ⇨ *69*
6. *Odometer* ⇨ *68*
7. *Engine Coolant Temperature Gauge* ⇨ *69*

## 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.

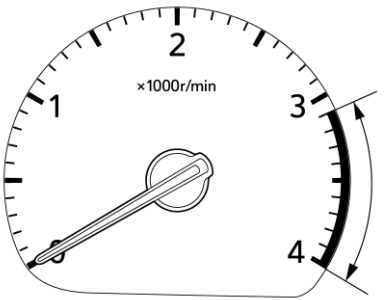
## Trip Odometer

TRIP

The trip odometer shows how far the vehicle has been driven since the trip odometer was last reset.

The trip odometer is accessed and reset through the Driver Information Center (DIC). See *Driver Information Center (DIC)* ⇨ *83*.

## Tachometer




The tachometer displays the engine speed in revolutions per minute (rpm). The red zone indicates a range of dangerous engine speeds beyond permissable 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. |

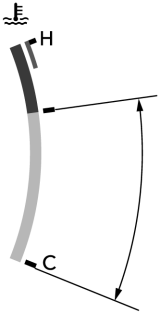
## Fuel Gauge

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

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)* ⇨ *83* and *Running Out of Fuel* ⇨ *264*.

## Engine Coolant Temperature Gauge




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* ⇨ *293*.

**⚠ 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* ⇨ *293*.

**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 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)* ⇨ *83* and *Engine Coolant* ⇨ *287*.

## 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 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, 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* ⇨ *177*.

## Seat Belt Reminders

### Seat Belt Warning Light

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

This warning light comes on and a warning buzzer sounds when the driver, outboard passenger, or center front passenger is not wearing the seat belt while the engine control switch is in the ON position.

When the vehicle speed exceeds 20 km/h (12 mph) with the seat belt unbuckled, the warning light will flash and the buzzer will continue to sound. The warning light will go out and the warning buzzer will stop when the driver, outboard, or center front passenger buckles the seat belt.

This warning light may come on if baggage or something is placed on the seat, even though no one is sitting there.

## Airbag Readiness Light

**Warning**

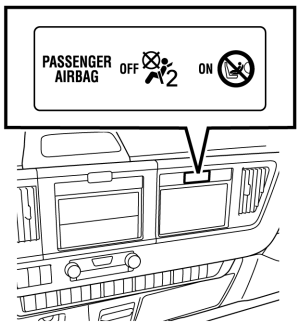
When the frontal airbag warning light is on, the airbag may not inflate in the event of a collision or may inflate even though there is no collision. To avoid injury, immediately contact the nearest GM dealer.

If the frontal airbag readiness warning light comes on, the driver's and front outboard passenger's seat belts pretensioners and airbags may not function properly in the event of a collision.

## Airbag On-Off Light

**Warning**

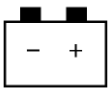
If the outboard passenger frontal airbag indicator lights do not operate properly, immediately contact the nearest dealer. The airbag could still inflate, even though the passenger airbag on-off switch is turned off. Have your vehicle serviced immediately to avoid injury to yourself or others.




The outboard passenger frontal airbag ON indicator light and the outboard passenger frontal airbag OFF indicator light are positioned in the center of the instrument panel. When the engine control switch is turned to the ON position, both lights come on. The indicator lights are on for approximately four seconds, and then go out. Approximately two seconds after they go out, one of the indicator lights comes on depending on the position of the passenger airbag on-off switch. See *Airbag On-Off Switch* ⇨ *45*.

The status of the outboard passenger frontal airbag can be checked by looking at which indicator light 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* ⇨ *302*, *Jump Starting - North America* ⇨ *343* , and *Engine Drive Belt Routing* ⇨ *391*.

## 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 the light comes on when continuing to drive without performing a DPF regeneration, see 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* ⇨ *264*.

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.

## Service Vehicle Soon Light

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.

If the light stays on, or comes on while driving, the vehicle control system may be malfunctioning. Take the vehicle to your dealer for service as soon as possible.

## Master Warning Light

**⚠ Warning**

When the Malfunction Indicator Lamp (Check Engine Light) comes on at the same time, the engine output may be restricted and changing gears may be impossible. The vehicle system may be malfunctioning, immediately see your dealer.

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.

The light comes on when the Advanced Driver Assistance Systems or auxiliary brake control is abnormal. If the light comes on, see your dealer.

## Brake System Warning Light

**⚠ Warning**

If this warning light comes on while the engine is running, immediately stop the vehicle at a safe place well clear of traffic and contact your dealer for inspection. When the brake system warning light is illuminated, brake effectiveness may be decreased. When this happens, strongly press the brake pedal.

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. If the light remains on after engine start up or comes on during operation of the vehicle, it means that there is something wrong with part of the brake system.

The brake system warning light comes on while the engine is running (after startup) in the following situations:

- Drop in the level of brake fluid (due to brake pad wear or fluid leakage).
- Abnormality in the charging system (such as an alternator malfunction or loose or split fan belt).
- When an abnormality has occurred in the braking assist function (vehicles equipped with braking assist function).
- Abnormality in the anti-lock brake system (ABS) and Electronic Braking force Distribution (EBD) functions. (The ABS warning light and brake system warning light will illuminate at the same time.) See *Antilock Brake System (ABS) Warning Light* ⇨ 75.

Have the system repaired if the light does not come on when it should. If this warning light does not go away, brake inspection and maintenance should be performed.

**Check and Corrective Action**

1. Check to see that the parking brake has been fully released. If it has, check the following:
2. Turn on the exhaust brake to help slow the vehicle.
3. Pull off the road and stop carefully. Remember that stopping distances may be longer, the pedal may be harder to push, and the pedal may go down farther than normal.
4. Check the brake fluid reservoir on the left side of the instrument panel. If low, add fluid as needed.
5. If the brake fluid is not low: Try out the brakes by starting and stopping on the shoulder of the road, then either drive cautiously at a safe speed to the nearest dealer for repair, if you judge driving to be safe; or have the vehicle towed to the nearest dealer for repair. Continued driving without the necessary repairs could be dangerous.

If this warning light stays on, see your dealer.

The regular braking system is a split system designed so that one part will provide some braking if there is a loss of hydraulic pressure in the other part of the system.

See *Brakes* ⇨ *298*.

### Brake Low Vacuum Warning Light

**⚠ Warning**

- Do not drive while the buzzer sounds as the brakes are not operating to their full capacity. You and others could be seriously injured.
- When the warning light comes and the buzzer sounds while using the exhaust brakes, immediately stop the vehicle in a safe place out of the way of traffic, and take the following actions:

(Continued)

**Warning (Continued)**

– While the engine is running, turn off the exhaust brakes, and if the warning light turns off after a few seconds, then the exhaust brake system is abnormal.

– If the warning light does not turn off, then the brake booster of the foot brake (main brake) is abnormal. Immediately see your dealer for inspection.

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. The warning light and buzzer will come on simultaneously on in the following conditions:

- When the brake booster's vacuum or pressure becomes insufficient either during driving or when the engine control switch is in the ON position.
- When there is an abnormality in the charging system, such as an alternator malfunction or loosening or splitting of the fan belt.
- When there is an abnormality in the exhaust brakes while the exhaust brakes are being used.

The warning buzzer will stop sounding when the parking brake is engaged.

If this happens while driving:

- Do not pump the brakes. The system is designed to stop the truck with reserve power assist if the pedal is held down. This reserve is greatly reduced each time you apply and release the brakes.
- Stopping distance may be longer.
- You may have to push much harder on the brake pedal.
- Have the vehicle repaired before you continue driving.

The buzzer stops when the selector lever is shifted to the P (Park) position.

### Parking Brake Light

**⚠ Warning**

- If the parking brake warning light flashes, or if the electric parking brake warning light comes on, or if ELEC PARKING BRAKE FAILIURE appears on the DIC, then there is an abnormality in the electric parking brake system. Stop the vehicle in a safe location and immediately see your dealer. Also, if you must park, avoid slopes, choose a level place, and park. Put the selector lever in P (Park) and check the wheels.
- If this warning light comes on when the engine control switch is turned to the, ON position, and goes out after approximately three seconds, the parking brake has been released. Either engage the parking brake or depress the foot brake.
- If the parking brake warning light does not come on or turns off when the electric parking brake switch is operated, then there is an abnormality in the electric parking brake system. Immediately contact your dealer.

This light comes on when the parking brake is applied while the engine control switch is ON. Have the system repaired if the light does not come on when it should.

When the engine control switch is in the ACC or LOCK position, the light comes on by pulling the electric parking brake switch or pressing it for about 35 seconds. Also, the light flashes when there is an abnormality in the electric parking brake system. Stop the vehicle in a safe location and immediately see your dealer.

## Service Electric Parking Brake 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 there is an abnormality in the electric parking brake system. If it comes on, see your dealer.

If the electric parking brake switch is repeatedly and continuously operated for more than 20 seconds, a notification is issued that the protective circuit is activated. The light flashes when the parking brake is applied, but goes out after a short while.

## 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, there is a problem in the Anti-lock Brake System (ABS). 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.
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 *Brake System Warning Light* ⇨ *73* and *Antilock Brake System (ABS)* ⇨ *205*.

## Exhaust Brake Light

| Caution |
| --- |
| If the exhaust brake light comes on in amber, immediately see your dealer |

This light comes on green while operating and comes on white while not operating. The light comes on amber when there is an abnormality in either the exhaust brake system, or the exhaust throttle system.See *Exhaust Brake* ⇨ *213*.

## Service Transmission Warning Light

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

## Automatic Transmission Fluid Temperature Warning Light

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

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.

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). With the engine idling, wait until the light goes off. If the light goes off, you can drive the vehicle again. Continuing to drive while this light is on may damage the transmission. While this light is on, the transmission cannot operate in all gears. If you attempt to shift gears, the vehicle may not continue to move. If you cannot drive to a dealer immediately, have the vehicle towed.

See *Automatic Transmission* ⇨ *195*.

## Overdrive Off 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 overdrive off switch on the selector lever is turned on.

## Automatic Vehicle Hold (AVH) Light

If equipped, 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.

When AVH is activated, the light comes on amber if, the driver's door is opened, the vehicle starts to move or the AVH system malfunctions. If there is a problem with AVH, turn off AVH and immediately see your dealer. See “Automatic Vehicle Hold (AVH) Warning Displays” under *Vehicle Messages* ⇨ *86*.

The light comes on green when AVH is operating, and turns off when AVH is released.

## Lane Departure Warning (LDW) Light

**Lane Departure Warning (LDW) Off Light**

If equipped, 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 will come on when the Lane Departure Warning (LDW) function is turned off or when there is an LDW malfunction.

If the light does not turn off, stays illuminated even though the LDW has not been turned off, or does not illuminate when the engine control switch is turned to the ON position, see your dealer.

See *Lane Departure Warning (LDW)* ⇨ *254*.

**Lane Departure Warning Indicator**

If equipped, this indicator will come on when the Lane Departure Warning (LDW) is on and ready to operate.

This indicator flashes to indicate that the lane marking has been crossed without using a turn signal in that direction.

See *Lane Departure Warning (LDW)* ⇨ *254*.

## Automatic Emergency Braking (AEB) Disabled 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.

The light comes on when Automatic Emergency Braking (AEB) has been turned off or is currently unavailable due to malfunction.

After the engine stops due to engine stalling, the light may come on briefly when the engine restarts.

See *Automatic Emergency Braking (AEB)* ⇨ *248*.

## Vehicle Ahead Indicator

If equipped, this indicator comes on when a vehicle is detected ahead.

See *Forward Collision Alert (FCA) System* ⇨ *239*.

**FCA/ACC Following Gap Light**

If equipped, this light indicates the following gap setting for FCA, and, if equipped, Adaptive Cruise Control (ACC).

## Traction Off Light (ASR Off Light)

This light comes on briefly when the engine control switch is turned to the ON position. If it does not, have the vehicle serviced by your dealer. If the system is working normally, the indicator light then turns off.

When the Traction Off light comes on during driving (when the TCS is not canceled), the TCS function may be faulty. See your dealer.

The traction off light comes on when the Traction Control System (TCS) has been turned off. If Electronic Stability Control (ESC) is turned off, TCS is also turned off. To turn TCS and ESC off and on, see *Traction Control/Electronic Stability Control* ⇨ *217*.

If TCS is off, wheel spin is not limited unless necessary to help protect the driveline from damage. Adjust driving accordingly.

## Traction Control System (TCS)/ Electronic Stability Control Light

**⚠ Warning**

- When the ESC warning light is flashing, the road surface is slippery, or acceleration is too fast. Ease up on the accelerator pedal and drive conservatively.
- The ESC warning light may turn on when driving on roads with extreme inclines (the banks seen on racetracks, etc.). In such cases, the ESC may not function properly, so do not drive on such roads.

This light comes on briefly when the engine control switch is turned to the ON position.

If the light does not come on, have the vehicle serviced by your dealer. If the system is working normally, the indicator light turns off.

If the light is on and not flashing, the TCS and potentially the ESC system are not fully operational and may not assist in maintaining control. Adjust driving accordingly. If the condition persists, see your dealer as soon as possible.

The light flashes when the TCS and/or the ESC system is actively working.

See *Traction Control/Electronic Stability Control* ⇨ *217*.

## Electronic Stability Control (ESC) Off Light

This light comes on briefly when the engine control switch is turned to the ON position. If the light does not come on, have the vehicle serviced by your dealer. If the system is working normally, the indicator light then turns off.

When the ESC OFF light comes on during driving (when the ESC is not canceled), the ESC function may be faulty. See your dealer.

This light comes on when the Electronic Stability Control (ESC) system is turned off. If ESC is off, the Traction Control System (TCS) is also off. To turn ESC off and on, see *Traction Control/Electronic Stability Control* ⇨ *217*.

If ESC and TCS are off, the systems do not assist in controlling the vehicle. Adjust driving accordingly.

## 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.

See *Starting and Stopping the Vehicle* ⇨ *157*.

## Warm-up System Light

This light comes on when the automatic engine warm-up system is operating.

See *Operating Temperature* ⇨ *160*.

## 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. See "Checks and take Corrective Action" below. 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.

While driving, this light will also activate the engine alarm and automatic shutdown system.

**Check and Corrective Action**

1. Check the engine oil level.
2. If the engine oil level is too low, check for leaks and add oil.

3. If the oil level is normal and there are no oil leaks, the oil filter may be clogged. See your dealer for service.

See *Engine Oil* ⇨ *277*.

## 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* ⇨ *177*.

## Engine Shutdown Warning Light

The Engine Shutdown 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.

This light will come on when the engine alarm and automatic shutdown system is active. See *Engine Alarm and Automatic Shutdown* ⇨ *162*.

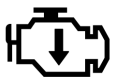
## Idle Shutdown Light

This light comes on briefly when the engine control switch is in the ON position and then should go out when the engine has started.

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.

This light comes on as an alert that programmed conditions have been met and the engine is about to shut down. This light stays on after the engine has stopped. See *Idle Shutdown* ⇨ *163*.

## Reduced Engine Power 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.

If the light comes on while the engine is running, it indicates power is being reduced due to one or more of the following conditions:

- Malfunction of the engine or exhaust electronic control system.
- DEF level is too low or empty.

If this light comes on with the malfunction indicator lamp, see your dealer immediately.

If this light comes on with the Refill Diesel Exhaust Fluid (DEF) warning light and the DEF warning light, refill DEF as soon as possible.

See "Refill Diesel Exhaust Fluid (DEF) Warning Light" under *Driver Information Center (DIC)* ⇨ *83* and *Diesel Exhaust Fluid* ⇨ *177*. See *Malfunction Indicator Lamp (Check Engine Light)* ⇨ *72* and *Diesel Exhaust Fluid (DEF) Warning Light* ⇨ *81*.

## 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* ⇨ *98*.

## 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* ⇨ *97*.

## Front Fog Lamp Light

This light stays on while the fog lights are on. See *Front Fog Lamps* ⇨ *100*.

## Lamps On Reminder

This light comes on when the light control switch is turned to the or position and when the tail light is illuminated with the light control switch in the AUTO position. See *Exterior Lamp Controls* ⇨ *97*.

If the engine control switch is in the LOCK position and a door is opened while the this light is illuminated, the CAUTION! TURN OFF THE LIGHT message will appear on the DIC and short repeated beeps will sound.

## Cruise Control Light

If equipped, the cruise control light is white when the cruise control is on and ready, and turns green when the cruise control is set and active.

The light turns off when the cruise control is turned off. See *Cruise Control* ⇨ *223*.

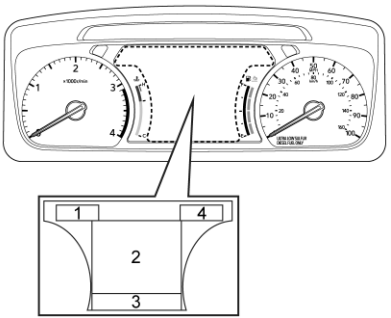
## Adaptive Cruise Control Light

If equipped, this light is white when the Adaptive Cruise Control (ACC) is on and ready, and turns green when the ACC is set and active.

See *Adaptive Cruise Control* ⇨ *227*.

# Information Displays

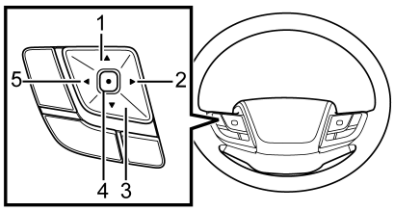
## Driver Information Center (DIC)




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

1. **Sub Display 1:** Automatic transmission shift indicator
2. **Main Display:** DIC menu items and warning lights and messages (includes operation related information, diesel particulate filter (DPF) status, maintenance data, and errors)
3. **Sub Display 2:** Date, Time, Outside Temperature, and Odometer
4. **Sub Display 3:**
   - Lane Departure Warning (LDW), if equipped
   - Adaptive Cruise Control (ACC), if equipped
   - Cruise Control, if equipped
   - Vehicle Ahead Indicator
   - Following Distance Indicator

Use the left steering wheel control to access the following menu items.




(1) Up button
(2) Right button
(3) Down button
(4) Select button
(5) Left button

◁ **or** ▷ **:** Press to move left or right between the interactive display zones in the instrument cluster. Press the Select button to select.

△ **or** ▽ **:** Press to move up or down in a list. Press the Select button to open a menu or select a menu item. Press and hold to reset values on certain screens.

### DIC Menu Items

When the engine control switch is turned to the ON position, SYSTEM CHECK is displayed on the DIC display. While present, various vehicle systems are performing operational checks. After these checks are completed, this screen will be return to the normal screen.

There are interactive display areas in the Main Display.

- Settings
- ECO Status/Trip
- Vehicle Information. This is where the selected Driver Information Center (DIC) displays can be viewed.
- Advanced Driver Assistance Systems Display
- Warning Display Storage

#### Settings

Use the left steering wheel control to scroll through items in the Settings menu.

**Vehicle Settings:** Displays settings for driver assist functions in front and for side, driver monitoring, and brake.

**ECO/Driving Information:** Displays the driving conditions for the TRIP A or TRIP B in numerical values.

**Date and Time:** Allows you to set the date and time. The date and time will reset to the default values whenever the battery is disconnected.

**Display Setting:** Allows you to set the brightness of the DIC for each lighting position, and to select units used in the DIC.

**Select Language:** Allows you to select the language used in the DIC.

**Maintenance Alert:** Allows you to check and set maintenance periods.

Each maintenance item shows the distance remaining to or the distance exceeded from the maintenance period. When a maintenance period is exceeded, the message changes from UNTIL REPLACEMENT to REPLACEMENT, and the distance until maintenance shows - (MINUS) (DISTANCE EXCEEDED). See your dealer as soon as possible.

Press and hold the Select button to reset the distance until maintenance. Do not reset at any time other than when the maintenance is completed. It cannot be reset accurately

until the next maintenance. After setting the replacement time, reset the distance until maintenance. See *Maintenance Schedule* ⇨ *359*

**ECO Status/Trip**

Use the left steering wheel control to scroll through items in the in the ECO status/ TRIP menu.

The trip meter is used to know the distance between designated points or the driving distance for within a certain period. You can also check the average fuel consumption for that section.

You can check either of two types of trip meters, which are TRIP A and TRIP B. Switch which one to use according to your plans.

Press and hold the Select button to reset. Also, if the count exceeds 9999.9 miles, it is automatically reset to 0.

**Vehicle Information**

Use the left steering wheel control to scroll through items in the Vehicle Information menu.

**Vehicle Status:** Displays Trip A or Trip B.

**DPF Accumulation Level:** Displays the state of the accumulated PM (particulate matter) that has collected inside the DPF.

**Volt Meter/Hour Meter:** Displays voltmeter or hour meter.

Voltmeter shows the current state of the battery.

When the battery voltage is low or excessive, VOLTAGE DROP or OVERVOLTAGE appears on the DIC. The cause could be over-discharge of the battery or poor power generation by the generator. See your dealer. Even if the voltmeter display is not selected, VOLTAGE DROP or OVERVOLTAGE is shown when the battery voltage is at either end.

Hour meter shows the operation time of the engine, and it cannot be reset.

**Advanced Driver Assistance Systems Display**

The operating conditions and warnings for the Advanced Driver Assistance Systems are checked. See *Lane Departure Warning (LDW)* ⇨ *254* and *Adaptive Cruise Control* ⇨ *227*.

**Warning Display Storage**

Warning, indicator or maintenance messages, it can be hidden by pressing the Select button and the screen will return to normal. Warning messages can be viewed again using the left steering wheel control.

If there are hidden messages, the warning display storage icon in the lower part of the main display area that is displayed by pressing left or right on the normal screen will turn orange.

After returning to the normal screen, maintenance displays cannot be checked in the Warning display storage. They are displayed when the engine control switch is turned to ON.

## Warning Lights and Messages

- Engine Overheat Warning Light
- Low Coolant Warning Light
- Water Separator (Pre-Fuel Filter) Warning Light
- Air Cleaner Light
- Change Fuel Filter Light
- Low Fuel Warning Light
- Regeneration Warning Lights

- Exhaust System Warning Light
- Refill DEF Warning Light
- System Failure Warning Light
- Camera Blocked Warning Light
- DIC Errors
- Maintenance Data
- Hour Meter
- Cab Tilt

See *Vehicle Messages* ⇨ *86*.

# 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 left steering wheel control to choose the desired screen page or function. Warning, indicator, or maintenance messages can be hidden by pressing the ENTER button and the screen will return to normal. Warning messages can be viewed again using the DIC switches.

If there are hidden messages, the warning display storage icon in the lower part of the main display area that is displayed by pressing the right or left switch on the normal screen will turn orange. After returning to the normal screen, maintenance displays cannot be checked in the WARNING DISPLAY STORAGE. They are displayed when the engine control switch is turned to ON.

The operating state and abnormalities of each system are displayed in messages.

## Engine Overheat Warning Light

**OVERHEAT**

**⚠ Warning**

When the engine coolant is still hot, do not remove the radiator 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.

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 or continue driving when the overheat warning light is on. 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* ⇨ *162*, *Engine Overheating* ⇨ *293*, *Engine Coolant* ⇨ *287*, and *Engine Coolant Temperature Gauge* ⇨ *69*.

## 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* ⇨ *287* 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* ⇨ *162* and *Engine Shutdown Warning Light* ⇨ *81*.

### 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* ⇨ *262*.

If you continue driving with the message displayed, the fuel injection system may fail. See *Water in Fuel* ⇨ *262*.

### Air Cleaner Light

**AIR CLEANER INSPECTION**

This message displays when the next air cleaner element service interval is near.

Replace the air cleaner element. See *Engine Air Cleaner/Filter* ⇨ *286*.

### Low Fuel Warning Light

**FUEL LEVEL LOW**

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* ⇨ *257*, *Fuel Gauge* ⇨ *69*, and *Running Out of Fuel* ⇨ *264*.

### Regeneration Required Warning Light

**REGENERATION 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* ⇨ *167*.

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

**SELECTABLE REGEN. REQUIRED**

**Caution**

If you continue driving too long with the SELECTABLE REGEN. REQUIRED (switch regeneration) warning light (amber) displayed on the DIC, the message will change to red. It indicates the DPF filter is nearly full of PM, a condition which may be damaging to the filter. Continued driving without performing DPF regeneration will cause the check engine malfunction indicator light and reduced engine power indicator light to come on, an engine power reduction, and may damage the DPF filter.

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* ⇨ *167*.

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

**REGENERATION 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* ⇨ *167*.

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.

## Cab Tilt Warning Light

**Cab Tilt**

**⚠ Warning**

If you continue driving with the cab tilt warning light displayed, the cab may tilt from vibration. This is extremely dangerous. You or others could be injured. Ensure that the cab is securely locked.

This message displays, a buzzer sounds, and a warning light appears when the engine control switch is turned to the “ON” position and the cab is not fully locked in place. If the warning light and alarm sound do not turn off even after you have checked that the cab is locked, do not drive the vehicle, have it inspected at a dealer. See *Warning Buzzers* ⇨ *93* and *Cab Tilting* ⇨ *272*.

## Exhaust System Warning Light

**EXHAUST SYSTEM ERROR**

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* ⇨ *177*.

## Refill Diesel Exhaust Fluid (DEF) Warning Light

**ADD 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* ⇨ *177*.

## Engine Oil Pressure Abnormal

**HYDRAULIC PRESSURE FAILURE**

This message is displayed and at the same time a warning sounds if the engine oil pressure falls abnormally. The buzzer stops while the parking brake is applied. If it appears on the DIC, stop the vehicle at a safe place immediately and perform inspection and take corrective action.

If the warning message comes on while the engine is running, immediately pull the vehicle over in a safe place out of the way of traffic. There is a risk of a malfunction in the lubrication system, so immediately contact the nearest dealer for inspection.

## Automatic Vehicle Hold (AVH) Warning Displays

**CAUTION! DRIVER NOT SEATED**

Door open warning: When the door is opened without applying the parking brake while AVH is engaged, only when AUTOMATIC KEY OFF of ELECTRIC PARKING BRAKE is set to OFF or LINK OFF WHEN DRIVER NOT SEATED in Vehicle settings, the AVH warning light comes on and the buzzer sounds long, repeated beeps. Apply the parking brake and then open the door.

**VEHICLE ROLLING FORWARD**

AVH movement warning: When the vehicle is stopped and then starts moving while AVH is engaged, the AVH warning light comes on and the buzzer sounds a continuous beep. Either engage the parking brake to stop or depress the brake pedal more.

**DEPRESS BRAKE PEDAL**

Forgot to depress brake pedal warning: When the AVH switch is pressed without depressing the brake pedal while AVH is operating, the AVH warning light is off and the buzzer sounds one beep. Depress the brake pedal.

**BRAKE HOLD ERROR**

**⚠ Warning**

When the BRAKE HOLD ERROR message appears in the DIC do the following:

- Immediately find a safe place to pull over and park
- Apply the parking brake

(Continued)

**Warning (Continued)**

- Depress the brake pedal and press the Automatic Vehicle Hold switch to turn the Automatic Vehicle Hold system off.
- Turn the engine control switch to the LOCK position
- Turn the engine control switch ON and start the vehicle

If the BRAKE HOLD ERROR message appears in the DIC again, contact the nearest dealer for inspection.

Failure warning: When the AVH warning light or buzzer is activated for reasons other than those above, the AVH warning light comes on and the buzzer does not sound if AVH is not operating or the buzzer sounds long, repeated beeps if AVH is operating. Stop in a safe place, then release AVH.

### Driver Attention Alert (AEB/ACC)

**BRAKE!**

Obstacles located in the forward direction are detected, and the driver is encouraged to operate the brakes.

See *Automatic Emergency Braking (AEB)* ⇨ *248*.

### Brake Operation Warning (AEB)

**BRAKE!**

Obstacles located in the forward direction are detected, and the AEBS autonomously operates the brakes.

See *Automatic Emergency Braking (AEB)* ⇨ *248*.

### Front Camera Unavailable Warning Light

**FRONT CAMERA UNAVAILABLE**

This message displays and the camera temporarily stops functioning if:

- The camera lenses and/or the windshield (inside and/or outside) are dirty
- The front side of the camera is blocked by an object
- The camera is hot or cold
- The power supply voltage of the dual camera system is low

If the camera lens is dirty or if the message does not disappear, have the vehicle inspected/serviced at the nearest dealer as soon as possible.

If this warning light and messages appear do the following:

- Clean the windshield (inside and/or outside)
- Remove the object blocking the camera view
- Wait until the camera reaches its operating temperature
- Wait until the dual camera's power supply voltage reaches the level that allows the camera to operate

If the warning light and messages continue to appear after you have taken these measures, promptly have the vehicle inspected/serviced at the nearest dealer.

Under circumstances where it is difficult for the camera to obtain parallax images (e.g. in the dark, backlight, strong sunlight, rain, snow, fog), the "FRONT CAMERA UNAVAILABLE" warning message may be displayed.

Under the following conditions, the "FRONT CAMERA UNAVAILABLE" message may not appear even if the camera stops functioning:

- The vehicle speed is 15 km/h (9 MPH) or less
- The movement of the target cannot be recognized during a turn

- It is hard to recognize the target due to poor visibility caused by rain, snow, or other similar reasons at a vehicle speed of 15 km/h (9 MPH) or more

If equipped, the camera is located on top of the dashboard.

See *Lane Departure Warning (LDW)* ⇨ *254*.

See *Automatic Emergency Braking (AEB)* ⇨ *248*.

### Front Camera Failure Warning Light

**FRONT CAMERA FAILURE**

If this warning light and message appear on your DIC, your ADAS dual camera has malfunctioned. Promptly contact your nearest dealer.

### Cruise Control Canceled (ACC)

**CRUISE CONTROL CANCELED**

Cruise control (with AEB) or Adaptive cruise control is canceled.

See *Adaptive Cruise Control* ⇨ *227*.

### 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 Alert Indicator Lights

Maintenance alert 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 maintenance periods can be checked and set. Select the item whose maintenance period you want to check by using "UP" and "DOWN", then press "ENTER."

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. When a maintenance period is exceeded, the message changes from "UNTIL REPLACEMENT" to "REPLACEMENT." Have the vehicle inspected/serviced at the nearest dealer as soon as possible.

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 left steering wheel control is pressed once or the vehicle is started.

The maintenance alert function indicates the distance remaining before the next scheduled maintenance. 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.

**ENGINE OIL AND FILTER**

When this message and light display amber, it shows the distance remaining until the next engine oil and filter change. When this message displays a negative distance, the next change of engine oil and filter has been reached. When the time for maintenance is approaching, the message is displayed in amber when the engine control switch is turned to the ON position. It remains on the display until ENTER in the DIC switch is pressed once or the vehicle is started. When this message comes on, have the vehicle inspected/serviced at your dealer.

**TRANSMISSION OIL**

When this message and light display amber, it shows the distance remaining until the next transmission oil change. When this message displays a negative distance, the next change of transmission oil has been reached. When the time for maintenance is approaching, the message is displayed in amber when the engine control switch is turned to the ON position. It remains on the display until ENTER in the DIC switch is pressed once or the vehicle is started. When this message comes on, have the vehicle inspected/serviced at your dealer.

**DIFFERENTIAL OIL**

When this message and light display amber, it shows the distance remaining until the next differential oil change. When this message displays a negative distance, the next change of differential oil has been reached. When the time for maintenance is approaching, the message is displayed in amber when the engine control switch is turned to the ON position. It remains on the display until ENTER in the DIC switch is pressed once or the vehicle is started. When this message comes on, have the vehicle inspected/serviced at your dealer.

**FUEL FILTER**

When this message and light display amber, it shows the distance remaining until the next fuel filter change. When this message displays a negative distance, the next change of fuel filter has been reached. When the time for maintenance is approaching, the warning light is displayed in amber when the engine control switch is turned to the ON position. It remains on the display until ENTER in the DIC switch is pressed once or the vehicle is started. When this message comes on, have the vehicle inspected/serviced at your dealer.

**REPLACE THE ENGINE MOUNTED FUEL FILTER**

**Caution**

Failure to replace the engine mounted fuel filter when needed may lead to fuel system damage. Your authorized dealer can replace your fuel filter, if needed. As preventive maintenance, it is recommended to add diesel fuel system cleaner (FSC) to the fuel tank every time the fuel filters are replaced. FSC removes fuel deposits from the fuel system and injection system. Use genuine FSC only. Otherwise, degradation of the rubber parts and excessive wear of the metal parts may occur.

This message will appear when the engine control module determines the engine mounted fuel filter needs to be replaced. Replace the fuel filter element and the pre-fuel filter at the same time.

**POWER STEERING FLUID**

When this message and light display amber, it shows the distance remaining until the next power steering fluid change. When this message displays a negative distance, the next change of power steering fluid has been

reached. When the time for maintenance is approaching, the message is displayed in amber when the engine control switch is turned to the ON position. It remains on the display until ENTER in the DIC switch is pressed once or the vehicle is started. When this message comes on, have the vehicle inspected/serviced at your dealer.

**TIRE ROTATION**

When this message displays amber it has the distance until the next tire rotation displayed. When this message displays a negative distance the next tire rotation has already been reached. When the time for maintenance is approaching, the message is displayed in amber when the engine control switch is turned to the ON position. It remains on the display until ENTER in the DIC switch is pressed once or the vehicle is started. When this message comes on, have the vehicle inspected/serviced at your dealer.

**STARTER**

When this message and light is amber, it displays when the time for a starter motor replacement has already been reached.

For resetting or setting maintenance data intervals, see *Driver Information Center (DIC)* ⇨ *83*.

## Warning Buzzers

**⚠ Warning**

If the buzzer does not stop sounding, even if you do the repairs, contact the nearest dealer.

The warning buzzers sound to notify the driver of the vehicle's condition and the operating status of various functions. Check the following list and do the repairs described in the referenced sections as necessary.

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:

- Engine alarm and automatic shutdown warning: The engine alarm and automatic shutdown activates — continuous beep
- Brake booster warning: The brake booster's vacuum becomes insufficient either during driving or when the engine control switch is in the ON position. There is an abnormality in the charging system (such as an alternator malfunction or either loosening or splitting of the fan belt, etc.) There is an abnormality in the exhaust brakes while the exhaust brakes are being used — continuous beep. See *Brake System Warning Light* ⇨ *73*.
- Engine overheat warning: Engine has overheated — continuous beep
- Engine oil pressure warning: The engine oil pressure is abnormal — continuous beep
- Parking brake on warning (when driving): Electric parking brake switch is pulled up while driving. Stop the vehicle and disengage the parking brake before driving the vehicle again — continuous beep
- Parking brake on warning: Vehicle is driven with the parking brake engaged. Stop the vehicle and put the lever back before resuming driving — continuous beep
- DEF low level warning (Stage 4): The DEF tank is empty — continuous beep

- Incorrect DEF warning/Selective catalytic reduction (SCR) system malfunction (Type A) warning (Stage 4): An SCR system malfunction or incorrect fluid in the DEF tank is detected — continuous beep
- Insufficient engine coolant warning: Your system is low on engine coolant and the engine may overheat — continuous beep
- Automatic Emergency Braking system (AEB) warning (Autonomous brake operation): Obstacles located in the forward direction are detected, and the AEB system autonomously operates the brakes — rapidly repeated beeps
- Mis-Acceleration Mitigation system warning: The Mis-Acceleration Mitigation system has operated — rapidly repeated beeps
- Lane Departure Warning (LDW): The Lane Departure Warning system senses that the vehicle is departing its lane when the vehicle tire comes close to or contacts the right or left lane marker — rapidly repeated beeps
- LDW: The vehicle tire contacts or crosses over the right or left lane marker — repeated beeps
- Attention Assist: The Attention Assist has operated — rapidly repeated beeps
- Seat belt warning: The vehicle speed exceeds 20 km/h (12 MPH) while a seatbelt is unfastened in the driver seat, passenger seat, or the center seat when the engine control switch is ON — repeated beeps. See *Seat Belt Reminders* ⇨ *70*.
- ESC warning: ESC is operating — repeated beeps
- Automatic Emergency Braking System warning (Driver attention alert): Obstacles located in the forward direction are detected, and the driver is encouraged to operate the brakes — repeated beeps
- Diesel particulate filter (DPF) switch regeneration warning: Continuing to drive without doing switch regeneration procedure — three long beeps
- DEF low level warning (Stage 3): The DEF tank is empty — three quick beeps (every 5 min.)
- Incorrect DEF warning/SCR system malfunction (Type A) warning (Stage 3): An SCR system malfunction or incorrect fluid in the DEF tank is detected — three quick beeps (every 5 min.)
- Following distance warning: The vehicle is approaching a preceding vehicle and the driver needs to operate the brakes — three short beeps
- Following distance warning: Operation refusal sound, requested operation could not be made — two short beeps
- Following distance warning: Operation sound, requested operation was made — one short beep
- Following distance warning: Failure sound, a device abnormality was detected — two short beeps
- DEF low level warning (Stage 2): The remaining level of DEF becomes excessively low — three quick beeps (every 5 min.)
- DPF switch regeneration warning: Switch regeneration procedure is necessary — three short beeps

- DEF low level warning (Stage 1): The remaining level of DEF becomes excessively low — one short beep
- Incorrect DEF warning/SCR system malfunction (Type A) warning (Stage 1): An SCR system malfunction or incorrect fluid in the DEF tank is detected — one short beep
- SCR system malfunction (Type B) warning: A malfunction is detected in the SCR system — one short beep
- Forward Vehicle Start Notification Function warning: The driver does not start driving the vehicle even though the preceding vehicle starts and pulls away more than about 5 m (16 ft) — one short beep
- Automatic Vehicle Hold (AVH) movement warning: The vehicle is stopped and then starts moving while AVH is engaged. Either engage the parking brake to stop or depress the brake pedal more — continuous beep
- Cab tilt warning : The engine control switch is turned to the "ON" position without the cab being securely locked — continuous beep
- Vehicle movement warning: The vehicle starts moving while the electric parking brake is operating. Firmly depress the brake pedal to stop the vehicle — long, repeated beeps
- AVH door open warning: The door is opened without applying the parking brake while AVH is engaged (Only when the key-off automatic activation of electric parking brake is set to automatic activation OFF or to driver not seated conjunction OFF.) Apply the parking brake and then open the door — long, repeated beeps
- AVH malfunction warning: AVH malfunctions (while AVH is operating). Stop in a safe place, then release AVH — long, repeated beeps
- Parking brake operating warning (driver not seated conjunction): The electric parking brake operates automatically because the driver is not seated if the driver side seat belt is unbuckled and the driver side door is opened (The driver not seated conjunction does not operate if the selector lever is in the "R" position.) — long, repeated beeps (approx. 6 seconds)
- Caution! turn off the light: When the door is opened while the engine control switch is in the LOCK position and the lights on indicator light is lit — short, repeated beeps
- Forgot to depress brake pedal warning: The AVH switch is turned off without depressing the brake pedal while AVH is operating. Depress the brake pedal — one beep
- Parking brake not applied: When engine control switch turned to ACC or LOCK position without applying the parking brake. Apply the parking brake — continuous beep
- Back up warning: Selector lever is placed in R position — long, repeated beeps
- Key left inserted warning: The driver side door is opened with the key left inserted when the engine control switch in the ACC or LOCK position — short, repeated beeps
- Adaptive Cruise Control (ACC): Operation refusal sound, requested operation could not be made — two short beeps
- ACC: Operation sound, requested operation was made — one short beep

- ACC: Failure sound, a device abnormality was detected — two short beeps
- ACC: Following Distance Warning sound (Only when Full-Range ACC is operating), a following distance warning was issued— three short beeps
- ACC: Canceling sound, deactivating the cruise control — two short beeps
- Cruise Control: Operation refusal sound, requested operation could not be made — two short beeps
- Cruise Control: Operation sound, requested operation was made — one short beep
- Cruise Control: Failure sound, a device abnormality was detected — two short beeps
- Cruise Control: Canceling sound, deactivating the cruise control — two short beeps

See *Diesel Exhaust Fluid* ⇨ *177* and *Engine Alarm and Automatic Shutdown* ⇨ *162*.

# Lighting

**Exterior Lighting**
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**Interior Lighting**
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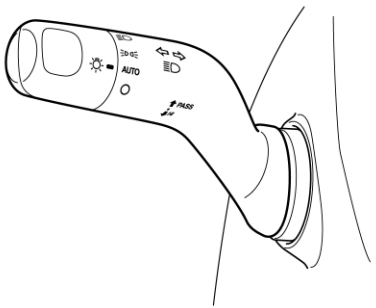
# Exterior Lighting

## Exterior Lamp Controls




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

- 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.
- Even if the engine control switch is in the OFF position, rotating the knob to ≡D or ≡00≡ makes the headlight or taillight come on.

**◯ (Off):** Turns off all exterior lights. The daytime running lights (DRL) may still activate. See *Daytime Running Lamps (DRL)* ⇨ *99*.

**AUTO:** Turns exterior lights on or off automatically depending on the brightness outside the vehicle. See *Automatic Light Control* ⇨ *98*.

In this position, the exterior lights go out automatically when the engine is stopped.

**≡00≡ :** Turns on the parking lights, which including all exterior lights except the headlights.

**≡D :** Turns on the headlights together with the parking lights, side marker lights, roof marker lights, taillights, license plate light, and instrument panel lights.

### Turning the Headlights Off

When driving at night, the headlights cannot be turned off even if you turn the light control switch to ◯ (Off). If you want to turn off the headlights, stop the vehicle in a safe place and turn the light control switch from AUTO to ◯. Or, if you want to turn off all the lights while the vehicle is stopped, turn the switch from AUTO to ◯ and hold it for one second or

longer. However, when you resume driving, the lights that were turned off will be turned on again.

## Automatic Light Control

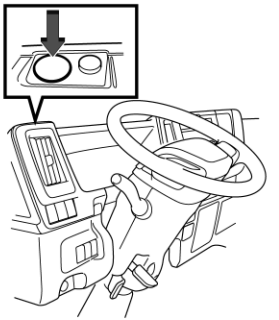
This feature will turn the following exterior lights on or off automatically depending on the brightness outside the vehicle: headlights, parking light, side marker light, roof marker light, taillights, license plate light, instrument panel lights, and daytime running lights.

### Operating Conditions

When the light control switch is in AUTO, the lights come on whenever the outside of the vehicle becomes dark (such as inside a long tunnel or in indoor parking lot, etc.). Then, the lights may not go out immediately after the outside of the vehicle becomes bright again. In this case, the lights will go out when the light control switch is turned to ◯ (off).

Even when the visibility is poor due to fog, snow, etc., if the outside of the vehicle is bright with the daylight or due to other conditions, the lights may not come on even when the light control switch is in AUTO. If the lights do not come on, turn on the lights manually for safety.

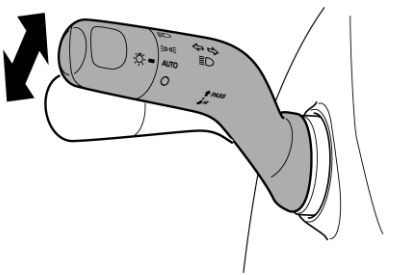
### Sensor Location



Do not cover the illuminance sensor. If the illuminance sensor is covered, the lights may not come on properly when the light control switch is in AUTO.

If an abnormality occurs in the illuminance sensor when the light control switch is set to AUTO, the headlights will automatically come on regardless of the brightness of the outside. In this case, see your dealer.

## Headlamp High/Low-Beam Changer



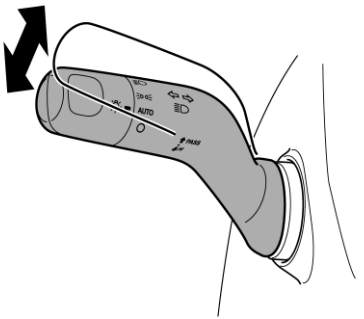

With the headlights on, move the lever forward and backward to switch between the high beam and low beam.

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.

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

## 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.

## Daytime Running Lamps (DRL)

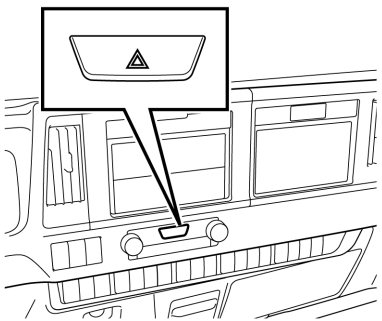
DRL can make it easier for others to see the front of the vehicle during the day.

The DRL, which are the low-beam headlamps at a reduced power, automatically come on when the following conditions are met:

- The vehicle is on, or the engine control switch is in the ON position.
- The light control switch is either in the ◯ (Off) position or in the AUTO position but the headlights are not on.
- The parking brake has been released.

When the DRL are on, the DRL indicator light is illuminated on the instrument panel.

## Hazard Warning Flashers



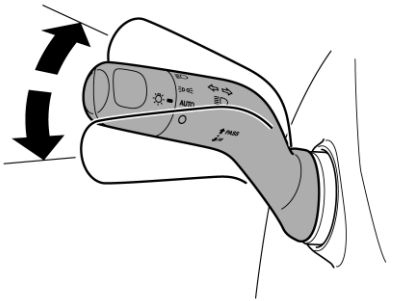
Use the hazard warning light flasher to warn other drivers any time your vehicle becomes a traffic hazard, day or night.

With the engine control switch in any position or with 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.

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

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

## Turn and Lane-Change Signals



When turning left or right, move the lever up or down to flash the turn signal light.

Either the left or right indicator light on the instrument panel flashes green when the turn signal switch is operated.

When the turn is completed, the signal will cancel and the lever will return to horizontal. If the turn signal lights do not light correctly, have them inspected at your dealer.

If the steering wheel is only turned a small amount, turn off the signal manually. Lightly press and hold the lever up or down when overtaking or changing lanes. The turn signal light continues flashing as long as the lever is held up or down. The lever moves back to neutral as soon as it is released.

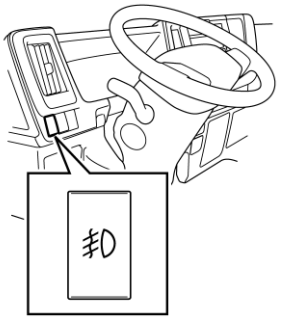
**Trouble Indicators**

The indicator lights on the instrument panel will not flash if the turn signal lights are blown, or may flash abnormally if bulbs of incorrect wattage are used.

The green indicators on the instrument panel are designed to flash to tell you that the front and rear turn signal lights are working. If the light stays on, but does not flash, check for a burned-out turn signal bulb. If the green light does not come on when you move the lever, check the fuse and indicator bulb.

Refer to *Electrical System Overload* ⇨ *318* and *Taillamps, Turn Signal, Stoplamps, and Back-Up Lamps* ⇨ *317*.

## Front Fog Lamps



If equipped, use this switch on the instrument panel to turn on the fog lights.

When the fog lamps are on, this indicator displays on the instrument cluster.

## Cornering Lamps

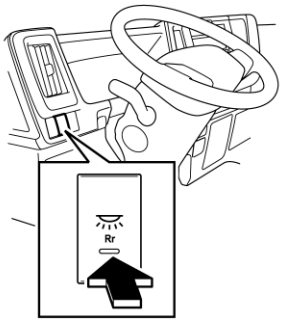
The cornering light illuminates the area to which the vehicle is turning. With the headlights or marker lights on, the cornering lights come on in coordination with the turn signal lights.

# Interior Lighting

## Instrument Panel Illumination Control

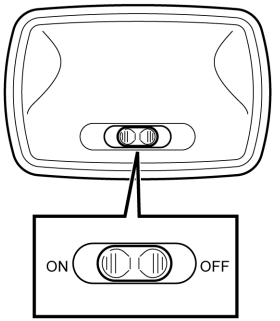
The control will change the light level of the instrument panel.

## Cargo Lamp




When the switch is pressed and the indicator light on the switch comes on, 12 volts will be provided to power rear body interior lights. Confirm actual operation with the body builder.

## Dome Lamps




Now and then, check that the light comes on properly.

### Front Light

The front 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.

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

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

**Rear Light (Crew Cab Model)**

If equipped, the rear 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.

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

**OFF:** The light stays off.

# 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.

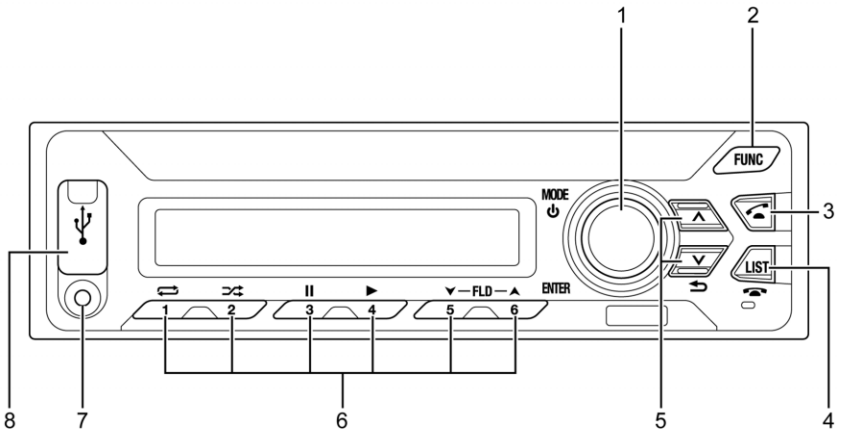
Do not disassemble or apply oil to radio or audio player.

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

## Overview

### Control Panel

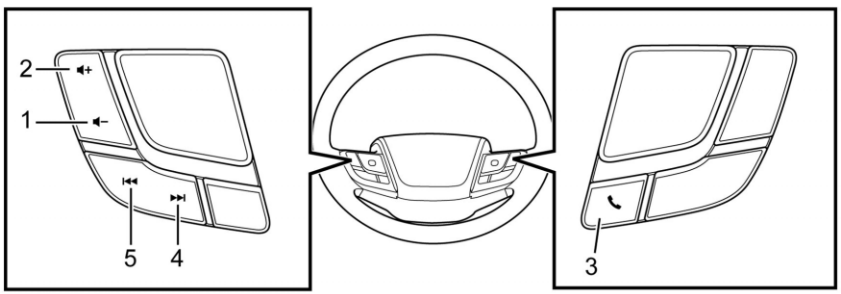
The radio can be used when the engine control switch is in the "ACC" or "ON" position.




(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

## Steering Wheel Controls

Some audio functions can be operated with the buttons on the left and right of the steering wheel.




(1) VOL-DOWN button
(2) VOL-UP button
(3) Off /On hook button
(4) Tune/Track button forward
(5) Tune/Track button back

# 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.

If you want to adjust the volume of music playing from a connected external device, you can do so by using the "VOL-UP" or "VOL-DOWN" buttons on the steering wheel.

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 or ⏭ or ⏮ on the steering wheel for less than one second.

Each time ∧ or ∨ on the radio or ⏭ or ⏮ on the steering wheel is pressed, the frequency steps up or down to select the station of your choice.

**Automatic Tuning**

Press ∧ or ∨ on the radio or ⏭ or ⏮ on the steering wheel 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 or ⏭ or ⏮ on the steering wheel 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.

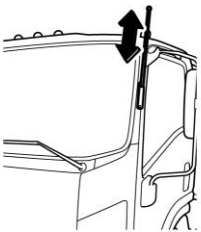
Static – AM is easily affected by external sources of electrical noise, such as high tension power lines, lightning, or electrical motors. This results in static.

### Certification

For Federal Communications Commission (FCC) compliance information for this device, see *Radio Frequency Statement* ⇨ *397*.

## 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.

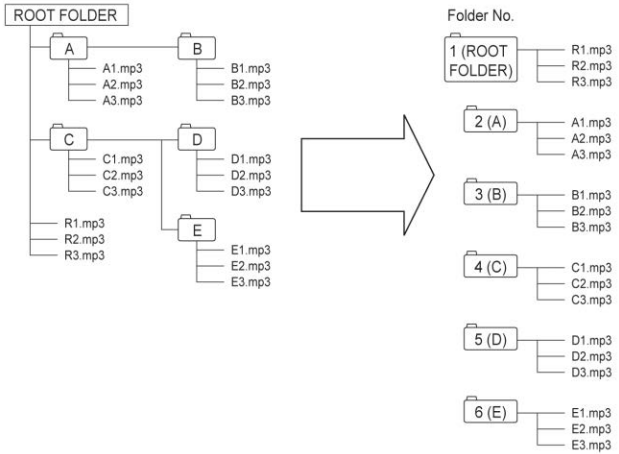
This deck supports ID3 Ver. 1.0, 1.1, 2.2, 2.3 and WMA tags.

**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.

You can also use the "VOL-UP" or "VOL-DOWN" buttons on the steering wheel.

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* ⇨ *116*.

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.

Depending on the Bluetooth-compatible portable device that is connected to this unit, the music will not start and may be paused.

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 or ⏭|⏮ on the steering wheel 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 or ⏮ on the steering wheel again.

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 or ⏭|⏮ on the steering wheel 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* ⇨ *397*.

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, a 4-digit passkey is displayed, operate the Bluetooth device to enter the passkey.

   See the instruction manual enclosed with your portable device on how to operate it.
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**

You can initialize the Bluetooth settings or histories stored in this unit.

Do not initialize the settings while driving. Park your vehicle in a secure location and then initialize them.

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

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.

Do not leave your mobile phone in the vehicle. The temperature inside the vehicle may be high and damage the phone.

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 or steering wheel controls.
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 or steering wheel.
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.

If you want to adjust the volume of a phone while sending, talking, or receiving, you can do so for call volume and ring volume by using the 🔊+ and 🔉– buttons on the steering wheel.

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* ⇨ *397*.

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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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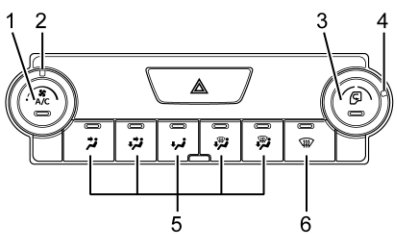
## Climate Control Systems

**⚠ Warning**

Extended use of the inside air recirculation, or use of the inside air recirculation in conjunction with the air conditioner, may cause the windshield and windows to fog up easily, making visibility poor.

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




**Climate Control System w/Air Conditioning**

1. Air Conditioning (A/C) Switch
2. Fan Speed Control Knob
3. Inside/outside Air Selector Switch
4. Temperature Control Knob
5. Outlet Selector Switches
6. Defroster Switch

**Air Conditioning (A/C) Switch:** Press this switch to use the air conditioning. The pilot lamp of the switch will come on to show that the air conditioning system is activated. The air conditioner also performs dehumidification while heating.

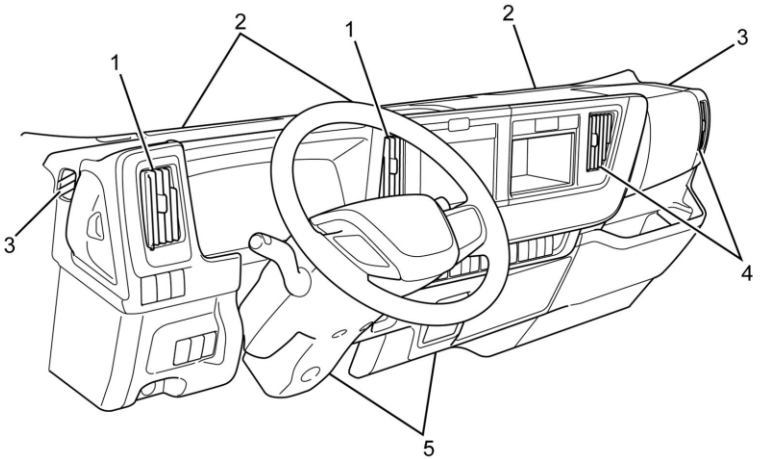
The air conditioner will not operate when the fan speed control knob is set to the "off" position, even if the air conditioning (A/C) switch is set to "on". Ensure that the fan speed control knob is set to the "on" position.

Periodically operate the air conditioner for a few minutes with the engine running at a low rotational speed, even when you do not use the air conditioner daily. This is done in order to keep the oil in each part of the equipment from running out.

**Fan Speed Control Knob:** Use this knob to adjust the fan speed to increase or decrease airflow.

**Inside/Outside Air Selector Switch:** With outside air selected, will allow external (fresh) air to enter the cab. With inside air recirculation selected, will recirculate in-cab air to prevent outside air that may be of dirty or poor quality from entering.

**Temperature Control Knob:** Use this knob to adjust the cab interior temperature according to your preference. Turning the adjustment knob counterclockwise lowers the outlet air temperature, and turning the knob clockwise raises the temperature.




**Outlet Selector Switches:** The Air Selector Switches regulate air flow from the upper, floor and defroster outlets.

**:** Air only flows through outlets 1 and 2.

**:** Air only flows through outlets 1, 2 and 5.

**:** Air only flows through outlet 5.

**:** First position allows air flow through outlet 5 and a small amount of air flows through outlets 3 and 4.

**:** Second position allows air flow through outlet 5, with some air coming from the door and windshield outlets at a greater volume than the first position.

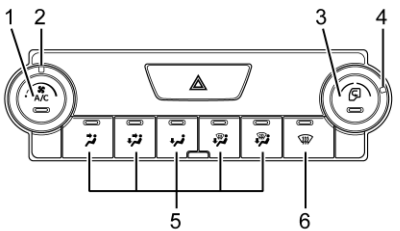
**:** Air flows through the door window and windshield outlets.

### Ventilation

**Outside Air Ventilation:** Set air conditioning (A/C) switch to "off". Select any one of the positions on outlet selector switch (5) according to your preference. Set inside/outside air selector switch (3) to "off". Adjust temperature control knob (4) to the preferred position depending on the season and climate.

Use fan speed control knob to select the preferred airflow.

### How to Use the Heater




Press the appropriate outlet selector switch for the preferred outlet airflow and set the inside/outside air selector switch to "off". Turn the temperature control knob (4) clockwise to increase the air temperature and adjust the airflow speed using fan speed control knob (2) until a comfortable setting is reached. For maximum heat output, turn the inside/outside

air selector switch "on" to recirculate the cab air. This may increase the humidity inside the cab, if used for an extended period of time. Turn the A/C switch (1) "on" to dehumidify the air in the cab. You can also defog the windshield by choosing an outlet airflow that includes defrosting

The heater uses the engine coolant, and so will be less effective if the coolant temperature is low.

**Defogging and Defrosting the Windshield**

**⚠ Warning**

When using the air conditioner with defroster switch 6 set "on", do not set the temperature control knob close to the maximum cooling position. Doing so may cause the outside of the windshield to fog up, making visibility poor.

To remove fog from the inside of the windshield, press the defroster switch (6) to "on" and turn the inside/outside air selector switch (3) "on". Turn the temperature control knob (4) clockwise to increase the air temperature and adjust the airflow speed using fan speed control knob (2) until a comfortable setting is reached.

To remove frost from the outside of the windshield, press the defroster switch (6) to "on" and turn the inside/outside air selector switch (3) "off". Turn the temperature control knob 4 clockwise to maximum heating and adjust the airflow speed adjust the fan speed control knob to the maximum speed.

When the defroster switch is pressed the A/C will automatically turn "on" to help dehumidify the air in the cab.

**How to Use the Air Conditioning (A/C)**

Press the appropriate outlet selector switch for the preferred outlet airflow and set the inside/outside air selector switch to "off". Press the A/C switch (1) to turn "on" the A/C. Turn the temperature control knob (4) counterclockwise to reduce the air temperature and adjust the airflow speed using fan speed control knob (2) until a comfortable setting is reached.

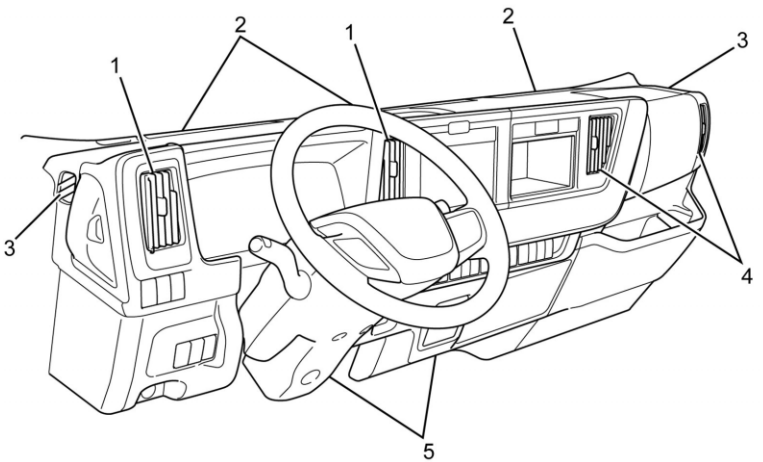
For maximum cooling, turn the inside/outside air selector switch "on" to recirculate the cab air, turn the temperature control knob (4) fully counter-clockwise to maximum cooling and adjust the airflow speed using fan speed control knob (2) to maximum speed.

If the vehicle has been parked in direct sunlight for a long time, open the windows or doors to ventilate the interior of the cab and release the heat before operating the air conditioner (A/C).

Extended use of maximum cooling in cold or damp conditions may cause the windows to fog. Open a window, or switch to outside air ventilation, occasionally to prevent this from occurring.

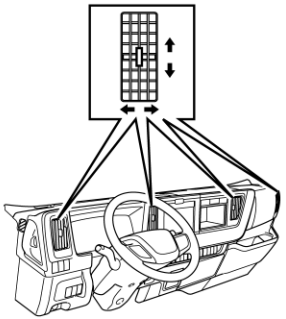
During cooling operation, mist may come out of the air outlets due to the quick cooling of humid air. This does not indicate a problem.

## Air Vents




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

**Air Flow Direction Control Lever**

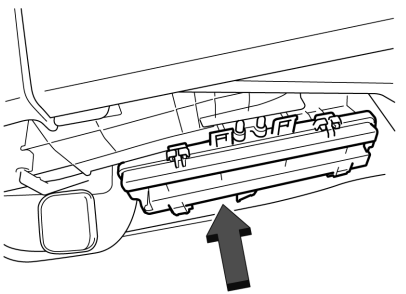


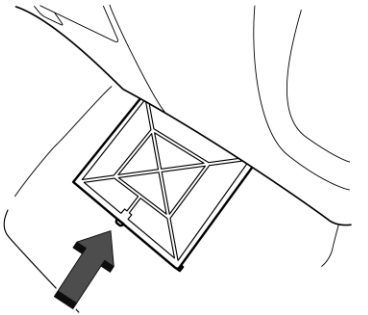
Use the tab to adjust the airflow direction from the outlet. To close the outlet, move the tab fully down.

# Maintenance

## Passenger Compartment Air Filter

**Removing the Filter**





1. Remove the filter cover from the lower part of the passenger side instrument panel.
2. Pull out the filter.
3. Clean dust and dirt from the surface of the filter using a vacuum cleaner or other tools.

| Caution |
| --- |
| To avoid filter damage, hard brushes should not be used for filter cleaning. |

**Installing the Filter**

| Caution |
| --- |
| 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. |

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.

## Service

**Refrigerant**

| Caution |
| --- |
| 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. |

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 HFC-134a (R-134a) in the air conditioning system. No other type of refrigerant can be used. If your air conditioning system is functioning properly, it is not necessary to remove and replace the refrigerant or compressor oil. For the air conditioning system refrigerant charge amount, contact your dealer.

| Caution |
| --- |
| 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, please contact your dealer or other service facility equipped with a gas recovery installation system. |

# Driving and Operating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# Driving Information

## Driver Behavior

### Napping in the Vehicle

**⚠ Warning**

Before taking a nap in the vehicle, be sure to stop the engine and place the engine control switch 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.

### Do Not Spill Liquids on the Instrument Panel

**Caution**

Do not spill any liquids on the dashboard. They will drip onto the electrical components, such as the vehicle control units or the radio, causing a malfunction.

## 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* ⇨ *123*.

### 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* ⇨ *310*.

### 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* ⇨ *287*.

- 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* ⇨ *349*.

### 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* ⇨ *369*, 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* ⇨ *369*.
- 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.

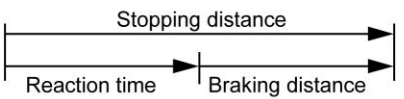
# Braking

## 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 P (Park) 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 to the nearest authorized dealer.

## 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.
- Do not pump the brake pedal as this will only deplete the vacuum reserve.
- 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**

**Caution**

If brake low vacuum warning light or brake system warning light comes on during operation, have brake system checked immediately.

Refer to *Warning Lights, Gauges, and Indicators* ⇨ *67*.

**When the Brakes Do Not Work**

**⚠ Warning**

It is very dangerous to suddenly pull the parking brake lever all the way while moving at high speed. Reduce speed first by shifting down and then gradually pull 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." Gradually pull the parking brake lever (model with parking brake lever) or keep pulling up the electric parking brake (EPB) switch (if equipped) 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* ⇨ *213*, *Parking Brake* ⇨ *208*, *Electric Parking Brake* ⇨ *210*.

**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 pads and rotors faster. This may also damage the brakes and will waste fuel. It can also result in reduced braking performance.

## 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* ⇨ *208* or *Electric Parking Brake* ⇨ *210*.

## 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. Also, shift the selector lever into P (Park) 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, then firmly apply the parking brake, then move the selector lever to the "P" (Park) position. 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 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.

(Continued)

**Warning (Continued)**

- 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**

**⚠ Warning**

Driving with the parking brake still applied can damage the brake system or cause a fire. You or others could be seriously injured.

Before pulling away, check that the parking brake warning light is not illuminated. If equipped with electric parking brake, also check that "Manually release parking brake" does not appear in the multi-information display.

**If equipped with electric parking brake (EPB):**

- The EPB switch must be pressed for about 1 second with the engine control switch in the ON position to release the parking brake. If you release the switch too fast the parking brake remains applied, which may result in damage to your vehicle.
- When the engine control switch is in the ACC or LOCK position, the parking brake does not release even if the EPB switch is pressed. Put the engine control switch in the ON position to release the parking brake.

### 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" (Park) or the parking brake is not applied all the way. Your vehicle can roll or move suddenly. You and others could be seriously injured or killed.

To be sure your vehicle will not move, even when you are parking on level ground, follow the steps below.

1. Hold the brake pedal down with your right foot and apply the parking brake. See *Parking Brake* ⇨ *208* or *Electric Parking Brake* ⇨ *210*.
2. To move the selector lever to P (Park), hold in the button on the lever and push the lever all the way toward the front of your vehicle.
3. Turn the engine control switch to the LOCK position.
4. Remove the key and take it with you.
5. Before you leave the driver's seat, be sure the vehicle is not moving, or confirm that your vehicle is in P (Park) by trying to pull the selector lever out of 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.

See *Exhaust Brake* ⇨ *213* and *Selector Lever* ⇨ *202*.

**Brake Fade:** Frequent use of the brakes can cause the brakes to overheat so that the frictional force between the brake pads and rotors decreases and the brakes become less effective than normal. This phenomenon is called brake fade.

**Vapor Lock:** If the brakes overheat due to frequent use, the heat can cause the brake fluid to boil so that air bubbles are created in the brake fluid. Pressing the brake pedal simply compresses the air bubbles; pressure is not transmitted to the wheel cylinders, so the brakes' effectiveness sharply deteriorates. This phenomenon is called vapor lock.

Do not adjust the exhaust brake valve. Doing so will cause the exhaust brake and aftertreatment system to malfunction.

The needle of the tachometer should never be allowed to enter the red zone. Supplement the exhaust brake by applying the brake pedal intermittently and/or shift to a higher transmission gear to engine over speed which will damage to the engine. 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 drive up the 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 After Driving on Flooded Roads and After Washing the Vehicle

**⚠ 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

(Continued)

**Warning (Continued)**

work well afterward, drive slowly and 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 see your dealer to check for the following points:

- Effectiveness of the brakes
- Water-ingress or damage to disc brakes
- Engine damage due to water-ingress
- Shorting of electrical components
- Oil level and degradation (cloudiness) of the engine oil, transmission oil, differential oil
- Chassis component lubrication points (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

### When Weather Conditions Are Bad

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.

Refer to *Wheels and Tires* ⇨ *327*.

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.

## 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.

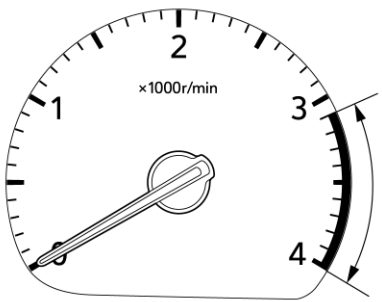
### Driving Uphill or Downhill

When driving uphill or downhill, be sure to shift gears appropriately. Refer to *Selector Lever* ⇨ *202*.

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

Select a gear that does not allow the tachometer to enter the red zone, which can cause serious damage to the engine. Refer to *Tachometer* ⇨ *69*.




**Red zone (r/min) is 3,100 and above**

**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. Using the exhaust brake and low-gears reduces the work load on the brakes and yields greater braking force. Refer to *Exhaust Brake* ⇨ *213*.
- 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, backward movement involves longer braking distances and slower steering response rates.
- If you must drive the vehicle backward, drive it very carefully and gradually, and stop frequently.

**⚠ Warning**

- Applying the brake pedal frequently can cause the brakes to overheat causing vapor lock and/or brake fade, resulting in reduced brake effectiveness.
- Do not adjust the exhaust brake valve. Doing so will cause the exhaust brake and aftertreatment system to malfunction.
- 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.

**Engine Braking:** Engine braking is the braking effect that occurs when you release the accelerator pedal while driving. The lower the gear, the stronger the engine braking.

**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 braking.

**Overspeed (Overrun):** An engine overspeed (or 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.

### Driving in Winter and 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 *Tire Chains* ⇨ *342*.

See *Engine Oil* ⇨ *277*.

See *Engine Coolant* ⇨ *287*.

See *Washer Fluid* ⇨ *297*.

See *Battery - North America* ⇨ *302*.

### 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 Winter and 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. Refer to *Getting In and Out of the Vehicle* ⇨ *18*.

### 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 could slip on (or off) the pedals and you would not be able to press the pedals properly, meaning that you might not be able to brake properly and your driving could 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. Refer to *Cold Weather Operation* ⇨ *262*, *Fuel for Diesel Engines* ⇨ *257*, and *Filling the Tank* ⇨ *265*.

## Removing Snow from Glass and Underbody

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.

Do not use a sharp implement to remove snow. Sharp edges could damage rubber parts.

## Driving on Snowy or Frozen Roads

On slippery roads, whenever possible, never 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. Refer to *Tire Chains* ⇨ *342*.

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.

### 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.

Do not use a sharp implement to remove snow. Sharp edges could damage rubber parts.

### 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 Winter and in Cold Regions

**⚠ 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.

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 park the vehicle in gear.

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.

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

Remove snow that has stuck to the inside of the fenders and to the brake hoses. Otherwise, it may damage components.

- The vehicle speed sensors are fitted on the wheels. When removing snow, ice, and other incrustation, take great care not to damage the components. Refer to *Antilock Brake System (ABS)* ⇨ *205*.
- Do not use a sharp implement to remove snow. Sharp edges could damage rubber parts.

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

### Driving on Bad Roads

If the vehicle gets stuck in sand, mud, snow or ice, move the selector lever from D2 (Second gear) to R (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.

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.

When you want to free the vehicle from mud where the tires may slip slightly by increasing the engine speed, you can press the ESC OFF switch to disable just the anti-slip regulation (ASR), also known as the Traction Control System (TCS). Refer to *Traction Control/ Electronic Stability Control* ⇨ *217*.

### Preventing Damage

| Caution |
| --- |
| Do not spin wheels faster than 32 km/h (20 mph) in mud, sand, snow, ice, or other poor road conditions. Damage may result from excessive wheel spinning, including tire, transmission, and/or rear axle malfunction.<br>If the vehicle gets stuck and it is difficult to get out, immediately stop driving and have the vehicle towed. |

- 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.
- 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* ⇨ *349*.
- The vehicle speed sensors are fitted on the wheels. When removing mud and other debris, take great care not to damage the components. Refer to *Antilock Brake System (ABS)* ⇨ *205*.
- Do not use a sharp implement to remove mud. Sharp edges could damage rubber parts.

## Emergencies (Disabled Vehicle)

### 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. See *Hazard Warning Flashers* ⇨ *99*.
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.

#### If There is a Fuel Leak

| ⚠ Danger |
| --- |
| Leaking fuel from the vehicle is dangerous due to possible combustion or explosion. Stop the engine immediately.<br>You and others could be seriously injured or killed. |

### When the Engine Shuts Down While Driving

**⚠ 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.

As the brake booster will no longer be functional, brake effectiveness will be greatly reduced. Be sure to apply more pressure than usual to the brake pedal.

If the power assist steering system goes out because the engine has stopped 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.

(Continued)

**Warning (Continued)**

You and others could be seriously injured.

The brake booster will no longer operate and brake effectiveness will be reduced. If the engine cannot be started, promptly have the vehicle inspected and repaired.

#### When the Fuel Tank is Empty

If the engine stopped 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. Refer to *Running Out of Fuel* ⇨ *264*.

#### When the Engine Stalls and Cannot Be Restarted

Move the selector lever to N (Neutral) and push the vehicle to a safe place. Refer to *Transporting a Disabled Vehicle* ⇨ *347*.

## Emergencies (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 your 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* ⇨ *302* |
| | | 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* ⇨ *277* |
| | | Starter or electrical system is faulty | ◎ | — |

| Symptom | | Cause | Corrective Action | Reference |
|---|---|---|---|---|
| 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* ⇨ *264* |
| | | Fuel filter clogged | ◎ | — |
| | | Fuel is frozen | Warm fuel pipe with hot water or wait until it gets warmer | — |
| | | Common rail system is faulty | ◎ | — |
| | | Preheating system is faulty | ◎ | — |
| Engine starts, but immediately stops | | Idling speed too low | ◎ | — |
| | | Fuel filter is clogged | ◎ | — |
| | | Air cleaner is clogged | ◎ | — |
| | | Common rail system is faulty | ◎ | — |
| 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* ⇨ *264* or *Water in Fuel* ⇨ *262* |
| | | Fuel system is faulty | ◎ | — |

| Symptom | Cause | Corrective Action | Reference |
|---|---|---|---|
| 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* ⇨ 277 |
| | Engine Control system faulty | ◎ | — |
| | Fuel system faulty | ◎ | — |
| | Exhaust injector | ◎ | — |
| | 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 | ◎ | — |
| | The air cleaner clogged | ◎ | — |
| | Fuel system faulty | ◎ | — |
| | Exhaust system clogged | ◎ | — |
| | Exhaust injector | ◎ | — |
| | Diesel particulate filter (DPF) faulty | ◎ | — |

| Symptom | Cause | Corrective Action | Reference |
|---|---|---|---|
| Engine is overheating | No engine coolant | Add engine coolant | See *Engine Coolant* ⇨ *287* |
| | Front of radiator is clogged with dirt | Wash clean with tap water | See *Exterior Care* ⇨ *349* |
| | Radiator cap not sufficiently tightened | Make sure it is firmly tightened or replace the radiator cap | — |
| | Fan belt loose | Adjust the tension or replace the belt | See *Engine Drive Belt Routing* ⇨ *391* |
| | Engine coolant dirty | ◎ | — |
| | Fan clutch is faulty | ◎ | — |
| | Radiator cap dirty or faulty | Clean or replace | — |
| Oil pressure is low | Improper engine oil viscosity | Change to an oil with proper viscosity | See *Engine Oil* ⇨ *277* |
| | Engine oil level too low | Add engine oil | See *Engine Oil* ⇨ *277* |
| | Engine inner components are faulty | ◎ | — |
| | Meter, indicator/warning lights or switches 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 | ◎ | — |
| | Common rail system faulty | ◎ | — |
| | Engine faulty | ◎ | — |
| | DPF clogged | ◎ | — |
| Brakes not effective | Air in brake fluid | ◎ | — |
| | Brake system failure | ◎ | — |
| Uneven braking | Unbalanced air pressure in tires | Adjust to proper air pressure | See *Wheels and Tires*➪*327* |
| | Tire unevenly worn | Replace tire | See *Wheels and Tires*➪*327* |
| | Poor wheel alignment | ◎ | — |
| Exhaust brake not working | The electrical system is faulty | ◎ | — |

| Symptom | Cause | Corrective Action | Reference |
|---|---|---|---|
| Steering wheel hard to turn | Loaded too far forward | Load properly | — |
| | Power steering fluid level too low | Add fluid | See *Power Steering Fluid* ⇨ *296* |
| | Insufficient air in front tires | Adjust to proper inflation pressure | See *Wheels and Tires* ⇨ *327* |
| Excessive play in the steering wheel | Wheel studs and nuts loose | Tighten to the specified torque | See *Wheels and Tires* ⇨ *327* |
| | Unbalanced inflation pressure in the tires | Adjust to proper inflation pressure | See *Wheels and Tires* ⇨ *327* |
| | Unbalanced tires | ◎ | — |
| | Excessive steering wheel free play | ◎ | — |
| Poor steering wheel return | Poor lubrication in the steering mechanisms | Lubricate the mechanism | — |
| | Poor wheel alignment | ◎ | — |

| Symptom | | Cause | Corrective Action | Reference |
|---|---|---|---|---|
| Loud or abnormal noises | From the transmission | Insufficient automatic transmission fluid | Add fluid | See *Automatic Transmission Fluid* ⇨ *283* |
| | | Transmission inner components faulty | ◎ | — |
| | From differential | Insufficient differential gear oil | Add oil | See *Rear Axle (Gear Oil Viscosity)* ⇨ *304* *Rear Axle (Oil Level Check)* ⇨ *304* |
| | | 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* ⇨ *369* |
| | | Splines or bearings worn | ◎ | — |

# Starting and Operating

## New Vehicle Break-In

Good vehicle care begins with proper break-in. While every new vehicle goes through rigid factory and dealer inspection and tests before delivery, the care you give your vehicle during the initial break-in period can pay off in longer life, better performance and more economical operation.

It is therefore always recommended that during the initial 1 000 km (600 mile) break-in period, the following few simple precautions are carefully observed.

Follow the recommendations listed below:

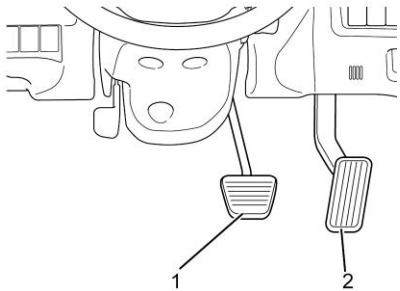
- Warm up the engine by driving easily for the first few minutes before placing it under load.
- Do not drive for extended periods at any one constant speed, either fast or slow, during the first 800 km (500 miles).
- Use the correct gear to maintain the desired road speed without lugging the engine.
- Avoid racing the engine, full-throttle starts and aggressive application of brakes when stopping.
- Keep tires properly inflated for the load carried.
- Check lubricant levels in the engine and transmission weekly.
- Keep speeds below 80 km/h (50 MPH) for the first 800 km (500 miles).
- Use the lowest gear ratio available when starting a loaded vehicle and when climbing slopes to avoid lugging the engine.
- It is recommended that the engine speed is restricted to 2,300 r/min.

**Mechanical Driveshaft Brake Burnish Procedure**

It is recommended that the driveshaft mounted parking brake be burnished as part of the new vehicle break-in procedure. Increased parking brake performance will result when the parking brake is burnished as specified below:

- Make 10 moderate stops, using the hand brake, from 16 km/h (10 MPH) while spacing the stops a minimum of 4 km (2.5 miles) apart.
- Operate the vehicle at 32 km/h (20 MPH) between stops.

## 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

(Continued)

**Warning (Continued)**

incorrectly installed floor mat may hinder the free movement of each pedal. You and others could be seriously injured.

**Caution**

"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 pads and rotors faster. This may also damage the brakes and will waste fuel. It can also result in reduced braking performance.

**Overriding Accelerator with Brakes**

Depressing the accelerator pedal and brake pedal at the same time may suppress engine output.

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 into the P 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 to the nearest dealer.

## 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**

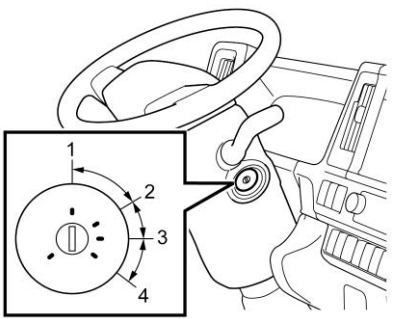
After starting the engine, do not turn the engine control switch to the START position. Otherwise, the starter motor may be damaged.

(Continued)

**Caution (Continued)**

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

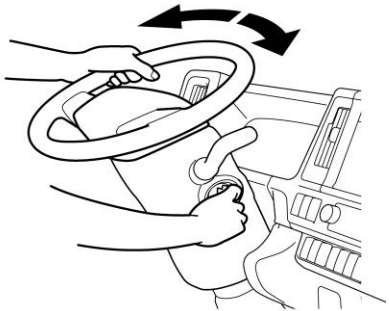
it to the LOCK position. If you will leave the vehicle, remove the key and turn the steering wheel until it locks. The steering wheel will be locked to help prevent theft.

**2 ACC:** Accessory is in the first position clockwise. In this position, the audio and other accessories can be used with the engine off.

**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 heaters or glow plugs are also turned on when the switch is in the ON position. The glow plug indicator light will come on and stay on until the glow plugs are 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* ⇨ *27*, *Seat Belts* ⇨ *33*, *Steering Wheel Adjustment* ⇨ *63*, and *Mirrors* ⇨ *22*.

### 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

(Continued)

**Warning (Continued)**

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**

**⚠ Warning**

Do not keep the engine control switch in the "START" position for more than 10 seconds. Operating the starter for too long may cause the starter or battery to fail or overheat, which could result in a fire and increase the risk of serious injury and severe vehicle damage.

When the engine does not start, wait for 20 to 30 seconds and then turn the engine control switch again.

Before starting the engine sit in the driver seat, check that the parking brake is firmly 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.

When stopped on a slope, start the engine with the selector lever in the P position. See *Ignition Positions* ⇨ *156*.

1. Make sure that the selector lever is in the P 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 it goes out in about 1 second when the engine is warm, to about 10 seconds when the engine is 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.

It is normal for the vacuum warning buzzer to sound for a few seconds after the engine has started.

After the engine has started, check to be sure the selector lever is still in the P position.

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. See *Brake System Warning Light* ⇨ *73*.

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. The diesel engine functions by the heat of compression (and glow plugs 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 engine block heater may be needed for starting. See *Engine Heater* ⇨ *161*.

### 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* ⇨ *257*.

**Stopping the Engine**

When stopping the 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 and make sure that the shift indicator shows P.
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 one 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.

**⚠ Warning**

The exhaust pipe becomes extremely hot while the engine is idling. Before warming up the engine, make sure there is no flammable material (for example, grass, leaves, waste paper, oil or old tires) on top of or near the exhaust pipe or exhaust aftertreatment system.

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 near the exhaust pipe.

**Engine Warm-up System**

During cold ambient conditions, the automatic engine warm-up system operates to reduce engine warm-up time during idling.

**⚠ 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.

**Warm-up System Indicator Light**

**Automatic Engine Warm-up:** When the engine is idling with the engine coolant temperature below 62 °C (144 °F), the engine warm-up system automatically closes the exhaust brake and increases engine idle speed so that the engine is warmed more quickly. Warm-up is cancelled when the accelerator pedal is pressed, and resumed when the pedal is released. Warm-up is automatically cancelled entirely after the engine coolant temperature rises above 65 °C (149 °F).

## 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**

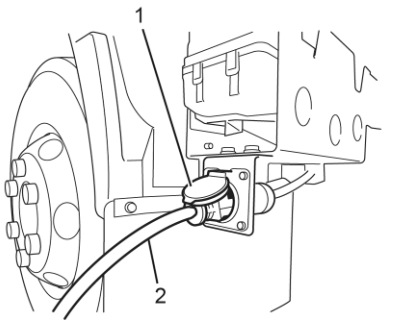
Radiator shutters, winter fronts, or grille covers are not to be used and may cause the engine's radiator cooling fan to fatigue from the alternate unloading and loading of the blades as they pass by the masked area followed by the unmasked area. After the fan has been fatigued, it may suddenly break 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. Locate the heater receptacle behind the left front tire under the fuse box.
2. Lift the heater receptacle cover (1).
3. Using a heavy duty, three-prong extension cord (2), connect the heater receptacle to 110 volt outlet (normal household current). It may require several hours to heat the engine sufficiently. 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 disconnect the extension cord (2) and lower the heater receptacle cover (1).

**⚠ Warning**

Only use a heavy duty, three-prong extension cord. Do not use an extension cord such as you would use for a light, because the cord may overheat and cause a fire.

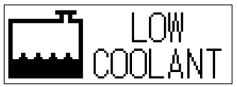
The engine should go through a warm-up period to warm up the engine oil before placing engine under load. This will ensure proper lubrication of the engine.

## Engine Alarm and Automatic Shutdown

**Engine Alarm (Shutdown) Warning Light**

If the optional engine alarm and automatic 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
- Insufficient engine coolant



The corresponding warning light will be illuminated or message will be displayed in the multi-information display first.

When the shutdown feature activates, the engine alarm (shutdown) warning light will also come on indicating to the driver that the engine will shutdown in 30 seconds. At this time, you will also hear a tone alarm. When this warning light comes on, 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.

## 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. When the Idle Stop light comes on, it alerts you that programmed conditions have been met and the engine is about to shut down. This light stays on after the engine has stopped. This indicator light will come on when the engine control switch is turned to the ON position and then should go out when the engine has started.

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 Service Transmission Warning Light is not illuminated.

## 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:

- Check whether the following warning lights turn on during operation check. If they do not turn off after starting the engine or turn on while the engine is running, stop the engine and check for the cause.
    - Engine oil pressure warning light
    - Battery discharge warning light
    - Brake low vacuum warning light
- 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.
- Look at the brake system warning light. It should be out when the parking brake is released and the engine is running. If it stays on, it could mean that the brake fluid level is low. Check the brake fluid reservoir. This condition must be corrected before moving the vehicle.

- During the operation check, the buzzer for the brake low vacuum warning light sounds for a few seconds, but that is not abnormal. If the buzzer remains on, do not drive the vehicle until the cause has been found and corrected.
- During normal operation, vapor could be emitted from the open PCV hose.

**⚠ 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, 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, waste paper, oil or old tires). Take particular care when parking in a garage.

Use caution concerning exhaust gases while the engine is idling. 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* ⇨ *167*.

**⚠ 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.

(Continued)

**Warning (Continued)**

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.
- 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.
- Avoid parking under trees with falling leaves or in areas where flammable debris (like grass, leaves, saw dust) may collect on top of the DPF and 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 cause a fire and lead to death, injury and/or damage to your vehicle or nearby property.

# 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.

(Continued)

**Warning (Continued)**

To allow proper operation of your vehicle's ventilation system, keep the air inlet grille clear of snow, leaves or other obstructions 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:

(Continued)

**Warning (Continued)**

- Set the air selector lever to the fresh air position.
- 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* ⇨ *123* and *Maintenance Schedule* ⇨ *359*.

**⚠ 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.

(Continued)

**Warning (Continued)**

- 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.

See Battery, Jump Starting, 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

(Continued)

**Caution (Continued)**

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.

**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 Driver Information Center (DIC) will provide prompts to properly complete DPF regeneration.

The following sections will provide details on DPF regeneration. Follow the steps carefully to keep the DPF in good working order. See *Driver Information Center (DIC)* ⇨ *83*, *Recommended Fluids and Lubricants* ⇨ *376*, and *Engine Oil* ⇨ *277*.

**⚠ Warning**

Exhaust parts and gases become very hot when the DPF is being regenerated. Be careful not to inadvertently touch them. Otherwise, you could be burned.

- Do not park under trees or in areas where flammable items (like paper, leaves, grass or other things that can burn) may fall or land on top of or blow onto the hot exhaust parts of your vehicle and ignite.

(Continued)

**Warning (Continued)**

- Before doing maintenance work on the vehicle, stop the engine and allow it to cool down. Otherwise, you could be burned.
- 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.
- White smoke may be produced during "switch" regeneration; do not perform the switch regeneration in any poorly ventilated indoor place. There is a risk of carbon monoxide poisoning.

The check engine malfunction indicator light and reduced engine power indicator light may come on and the power output may be limited if driving with the regeneration required warning light or "Selectable regen. required" (switch regeneration) warning light (amber/red) on. This is to prevent the DPF from being damaged.

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.

Chevrolet recommends engine oil that supports DPF (low ash oil). If low ash oil is not used, ash may accumulate in the DPF and shorten the maintenance interval of the filter or shorten the DPF regeneration interval, which may adversely affect fuel efficiency.

The frequency of regeneration varies depending on the season and climate. The frequency of regeneration increases especially under the following environments.

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 speeds.)

The exhaust pipe mixes air with the exhaust gas to lower its temperature before it leaves the exhaust pipe.

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 "Selectable regen. required" (switch regeneration) warning light (amber) will turn on when regeneration cannot be completed automatically. Perform "running" or "switch" regeneration in accordance with the proper procedure. This is to help you restore the DPF function and is not to indicate a malfunction.

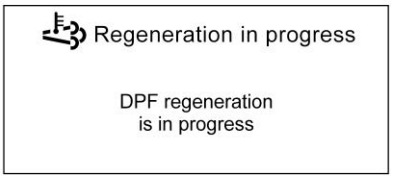
If the vehicle is stationary with the engine idling during DPF regeneration, the exhaust brake or exhaust throttle operates. Operating sounds will be heard when the exhaust brake or exhaust throttle is activated or deactivated. The sounds do not indicate a fault. The exhaust brake may automatically be 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 DPF regeneration, but this is not a malfunction.

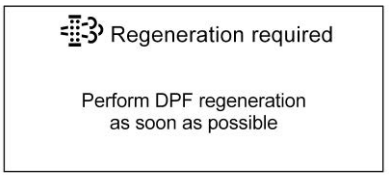
White smoke could be emitted briefly from the exhaust pipe in below situations. But it is not indicating a fault.

- Combustion of PM during DPF regeneration.
- During DPF regeneration of a new vehicle.
- Long continuous idling.

### DPF Warnings/Indicators

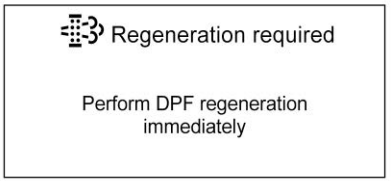



**Regeneration in Progress Indicator Light - Amber**



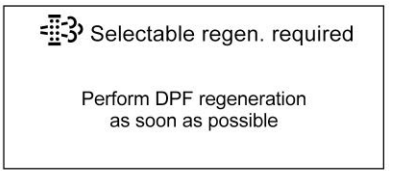

**Regeneration Required Warning Light - Amber**

This light (amber) comes on when "running" regeneration or "switch" regeneration is required. When this light comes on, perform DPF regeneration soon. See “Running Regeneration Procedure” and “Switch Regeneration Procedure” later in this section.




**Regeneration Required Warning Light - Red**

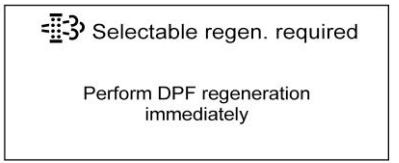
If the engine continues to run without performing DPF regeneration, this light will change color from amber to red. If this light turns red, perform DPF regeneration immediately.




**Selectable Regen. Required (Switch Regeneration) Warning Light - Amber**

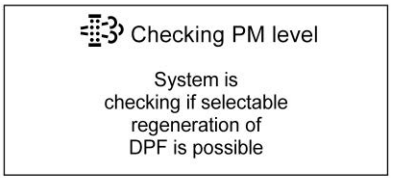
This light (amber) comes on when the "selectable" regeneration or "switch" regeneration is interrupted. When this light comes on, perform DPF regeneration promptly by following the procedure for the "switch" regeneration. See “Switch Regeneration Procedure” and “Selectable Regeneration Procedure” later in this section.

After the checking PM level indicator 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.




**Selectable Regen. Required (Switch Regeneration) Warning Light - Red**

If you continue to operate the vehicle without performing DPF regeneration, the color of this light changes from amber to red. When this light comes on in red, perform DPF regeneration immediately by following the procedure for the "switch" regeneration.




**Checking PM Level Indicator Light**

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 regen. required" (switch regeneration) warning light. If the indication does not change to the "Selectable regen. required" (switch regeneration) warning light, the "selectable" regeneration is not possible. See “Selectable Regeneration Procedure” later in this section.

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 an authorized dealer. See *Malfunction Indicator Lamp (Check Engine Light)* ⇨ *72* and *Reduced Engine Power Light* ⇨ *81*.

**Clean DPF Warning Light/Clean DPF Indicator Light**

This indicator light appears on the multi-information display when "CLEAN DPF" in the maintenance data function is selected or when the next cleaning interval for the DPF filter is

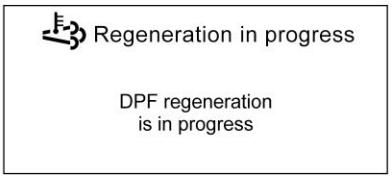
near or has already been reached. A positive number indicates the distance remaining until the cleaning timing. A negative number indicates the distance exceeded after the cleaning timing. The displayed color changes from green to amber when the remaining distance is below 1,000 miles (1,600 km). The warning light (amber) is also displayed when the engine control switch is turned to the "ON" position after the above notification occurs. It remains on the display until the vehicle is started. When this warning light (amber) comes on, have the vehicle inspected/serviced at your dealer. See *Vehicle Messages* ⇨ *86*.

### DPF Warning Buzzers

In the following cases, the buzzer sounds a DPF switch regeneration warning alert. Immediately do a regeneration operation according to the "switch" regeneration procedure for the DPF.

- Three Short Beeps - When "switch" regeneration procedure is necessary
- Three Long Beeps - When continuing to drive without doing switch" regeneration procedure

### Automatic Regeneration of DPF




**Regeneration in Progress Indicator Light - Amber**

The DPF will regenerate itself as part of normal operation. If the "Regeneration in progress" indicator light comes on while driving, there is no fault. Continue normal driving.

The Engine Control Module (ECM) controls this function based on several factors including hours of operation and mileage. When automatic regeneration starts, the "Regeneration in progress" (amber) indicator light is displayed on the multi-information display. 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.

**⚠ Warning**

To prevent fire, ensure that there is no combustible material near the muffler, the DPF or the exhaust pipe. Also, be careful not to burn yourself on the hot exhaust gas. You and others could be seriously injured.

The DPF regenerates automatically when a certain quantity of PM accumulates in the filter.

Depending on driving conditions, however, the regeneration may sometimes not be completed. In this case, the regeneration required warning light (amber) will come on, so promptly do a "running" regeneration or "switch" regeneration to complete the DPF regeneration. 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.

During extended engine idling, the regeneration in progress indicator light may appear on the multi-information display and the DPF may be automatically regenerated.

Automatic regeneration is performed under normal driving conditions (DPF soot accumulation status level 5, and in rare cases, may be performed at continuously low-speeds for long hours, except PM level 5); however, the regeneration required warning light (amber) may be displayed in the multi-information display under the following driving conditions:

- When only low-speed driving at/under vehicle speed of 9 MPH (15 km/h) is performed.
- When frequent engine start and stop are performed.
- When the engine is stopped frequently before the engine is warmed up.
- When continuous idling (over 1 hour) is frequently performed.

See “Running Regeneration Procedure” and “Switch Regeneration Procedure” later in this section.

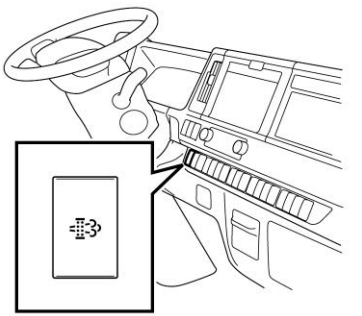
### Running Regeneration Procedure

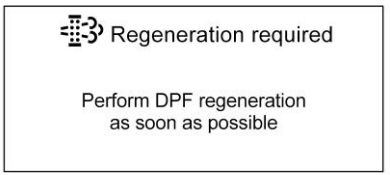
Use this option for completing DPF regeneration, if driving conditions and traffic allow you to maintain a relatively constant speed above 48 km/h (30 mph) for about 20 minutes. Follow the steps below to use "running" regeneration.

1. Determine if road and traffic conditions allow for relatively constant speeds above 48 km/h (30 mph).
2. Increase the vehicle speed above 48 km/h (30 mph) and keep a constant speed.
3. When vehicle speed, engine coolant temperature and other factors are met the ECM will begin DPF regeneration and the regeneration in progress indicator light (amber) will appear on the multi-information display.
4. Continue driving until the regeneration in progress indicator light (amber) goes off. When this indicator light goes off the DPF regeneration is complete.

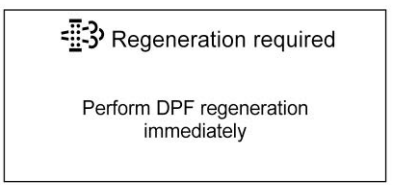
While the vehicle is at a stop with engine idling, the engine speed increases.

### DPF Switch






**Regeneration Required Warning Light - Amber**




**Regeneration Required Warning Light - Red**

The DPF switch is used to burn PM (regenerate the filter). You can initiate regeneration when the "Regeneration required" or "Selectable regen. required" (switch regeneration) warning light appears in the multi-information display with short repeated beeps.

Continuing driving without performing required regeneration will cause the check engine malfunction indicator light and reduced engine power indicator light to come on. The DPF then must be repaired at a dealer.

### Switch Regeneration Procedure

Select this option if "running" regeneration is not possible or if the "Selectable regen. required" (switch regeneration) warning light (amber or red) appears in the multi-information display.

Once the "switch" 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.

"Switch" regeneration will be interrupted in the following circumstances. Be sure to avoid them.

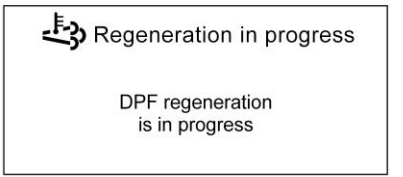
- Accelerator pedal is pressed
- Selector lever is moved out of the "P" position
- Vehicle speed is above 0 km/h (0 mph)
- Engine speed increases

1. Stop the vehicle at a safe place free of flammable material such as dead grass, leaves, or waste paper.

**⚠ Warning**

To prevent a fire, make sure that there is no flammable material on or near the muffler, DPF or exhaust pipe. When possible, remove any flammable debris from the DPF and exhaust pipe before performing a switch regeneration. Remember that the temperature of exhaust gases is high enough to burn you.

2. Move the selector lever into the "P" position and engage the parking brake.
3. Let the engine idle. Be sure the accelerator pedal is not depressed.
4. Press and release the DPF switch. See “DPF Switch” earlier in this section.




5. The "Regeneration Required" warning light (amber or red) or the "Selectable regen. required" warning light (amber or red) will turn off and the "Regeneration in progress" indicator light will appear.
6. Do not leave the vehicle during the regeneration. Regeneration normally completes in about 20 minutes.
7. When the "Regeneration in progress" indicator light (amber) turns off, regeneration is completed. Normal driving is then possible.

During the regeneration, the engine speed may vary, causing the exhaust brake valve to be deactivated. However, while the "Regeneration in progress" (amber) indicator light is displayed, regeneration is still taking place, so continue to perform 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, but this does not indicate a malfunction.

**Interruption of Switch Regeneration**

If you must interrupt regeneration for an unavoidable reason, press the DPF switch again.

The "Regeneration in progress" indicator light (amber) changes to the "Selectable regeneration required" (switch regeneration) warning light (amber). Then, you can drive the vehicle.

If you interrupt regeneration, you must complete the DPF regeneration by performing the "switch" regeneration once again as soon as possible.

**Caution**

If you continue driving too long with the "Selectable regen. required" (switch regeneration) warning light (amber) displayed on the multi-information display, the message will change to red. It indicates the DPF filter is nearly full of PM, a condition which may be damaging to the filter. Continued driving without performing DPF regeneration will cause the check engine malfunction indicator light and reduced engine power indicator light to come on, an engine power reduction, and may damage the DPF filter.

See “Switch Regeneration Procedure” earlier in this section.

Operation noise caused by interruption is louder when depressing the accelerator pedal than other operations. This is not a failure.

### Selectable Regeneration Procedure

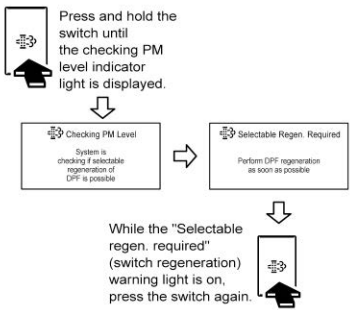
This procedure is designed for vehicles that do not normally operate in conditions that make automatic regeneration possible. This function allows the driver to check the status of the PM level and, when available, perform "switch" regeneration at a convenient time for the driver. "Selectable" regeneration may only be performed when no other DPF message is present on the multi-information display. Be sure to follow any DPF messages present on the multi-information display to properly complete a DPF regeneration.

It is recommended to use the procedure during breaks in low speed applications.

**⚠ Warning**

To prevent a fire, make sure that there is no flammable material near the muffler, DPF and exhaust pipe. Remember that the temperature of exhaust gases is high enough to burn you. You and others could be seriously injured.

1. Stop the vehicle at a safe place free of flammable material such as dead grass, leaves or waste paper.
2. Move the selector lever into the "P" position and engage the parking brake.
3. Run the engine at idle. Be sure the accelerator pedal is not depressed.




4. Press and hold the DPF switch until the amber checking PM level indicator light appears on the multi-information display. See “DPF Switch” earlier in this section.
5. If "selectable" regeneration is available, the "Selectable regen. required" (switch regeneration) warning light (amber) will appear on the multi-information display. If

this indicator light does not appear on the multi-information display, the PM level in the DPF filter is "OK" and DPF regeneration is not needed at this time.

6. Press and release the DPF switch to begin regeneration.
7. The "Selectable regen. required" (switch regeneration) warning light (amber) will change to the Regeneration in progress indicator light.
8. Do not leave the vehicle during the regeneration. Regeneration normally completes in about 20 minutes, if the engine is at operating temperature. Regeneration may take longer if the engine is cold.
9. When the Regeneration in progress indicator light goes out, the "selectable" regeneration is complete.

**Caution**

If the "selectable" regeneration is interrupted, a "Selectable regen. required" (switch regeneration) warning light

(Continued)

**Caution (Continued)**

(amber) will appear on the multi-information display. You must complete the DPF regeneration by performing the "switch" regeneration as soon as possible when "selectable" regeneration is interrupted. If you continue driving too long with the "Selectable regen. required" (switch regeneration) warning light (amber) displayed on the multi-information display, the warning light will change to red. It indicates the DPF filter is nearly full of PM, a condition which may be damaging to the filter. Continued driving without performing DPF regeneration will cause the check engine malfunction indicator light and reduced engine power indicator light to come on, an engine power reduction, and may cause damage to the DPF filter.

See “Switch Regeneration Procedure” earlier in this section.

The time needed to complete regeneration differs depending on the outside temperature.

The exhaust brake is activated during DPF regeneration. The exhaust brake 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.

Regeneration is finished earlier immediately after driving than when the engine is cold.

The engine coolant temperature may rise during regeneration.

### DPF Regeneration during Prolonged Idling

The check engine malfunction indicator light and reduced engine power indicator light may come on and the power output may be limited if driving for a long time with the regeneration required warning light or "Selectable regen. required" (switch regeneration) warning light (amber/red) on. This is to prevent the DPF from being damaged.

DPF regeneration may be initiated automatically during prolonged idling.

If regeneration is initiated, the Regeneration in progress indicator light (amber) comes on but this is normal and does not indicate a failure.

If driving is started during DPF regeneration by prolonged idling, the "Selectable regen. required" (switch regeneration) warning light (amber) comes on and regeneration is suspended. Perform "Switch Regeneration Procedure" in order to complete the DPF regeneration.

Prolonged idling may require more frequent DPF regeneration.

## Diesel Exhaust Fluid

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.

**⚠ 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

(Continued)

**Warning (Continued)**

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 could affect the exhaust gas cleaning performance. If any relocation or modification is necessary, consult your dealer.

The SCR system consists of the DEF tank, DEF Control Unit, DEF Supply Pump and Injector, and the SCR Catalyst.

If the refill diesel exhaust fluid (DEF) warning light is on and the remaining DEF in the DEF tank is frozen, the warning lights, indicator lights and restriction 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".

Diesel exhaust fluid (DEF) is used exclusively for the selective catalytic reduction (SCR) system.

The DEF freezes at 12°F (-11°C). The SCR system is equipped with a heating function that circulates the engine coolant to thaw the DEF tank and to prevent DEF from freezing. The engine can be started even when DEF is frozen.

### Handling of DEF

DEF is a colorless, transparent solution. It may smell depending on the conditions, but this is not abnormal.

**⚠ 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.

Ammonia odor may be generated when the DEF is exposed to high temperature.

### Is a Certified DEF Being Used?

Use only API certified DEF (or ISO: AUS 32).

DEF is available from your local authorized dealer. In addition, you can find DEF locations near you or along your route at www.discoverdef.com/retail-def-search.

Discover Def is a free service and partners with the leading companies of DEF. See *Recommended Fluids and Lubricants* ⇨ *376*.

### DEF Storage

For storage of DEF, seal the container to prevent the moisture from evaporating 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.

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 Gauge

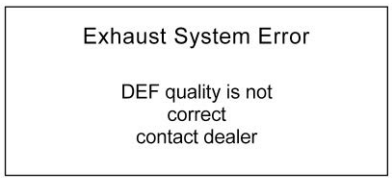
It is important to keep a good supply of DEF in the DEF tank at all times. Monitor the DEF gauge to be sure the DEF tank level does not become too low. See *Diesel Exhaust Fluid (DEF) Gauge* ⇨ *70*.

### SCR System Warnings/Indicators

**Diesel Exhaust Fluid (DEF) Indicator Light**

This light comes on to indicate a warning related to the SCR system. If this light comes on, check the DEF gauge. Add DEF if necessary. If DEF level is "OK", have your vehicle serviced/ repaired by the nearest dealer. See "Diesel Exhaust Fluid (DEF) Low Level Warning", "Incorrect Diesel Exhaust Fluid (DEF)/SCR System Malfunction Warnings", and "Adding DEF" later in this section.

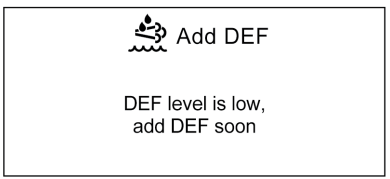
**Exhaust System Warning Light**




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 a dealer. See "Incorrect Diesel Exhaust Fluid (DEF)/SCR System Malfunction Warnings".

**Refill Diesel Exhaust Fluid (DEF) Warning Light**




This light comes on 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 “Adding DEF” later in this section.

### Warning Stage and Vehicle Limitations When SCR System or DEF Is Abnormal

When the SCR system detects that the DEF level has become too low or incorrect fluids (such as water or low concentrated DEF, etc.) have been added, the warning buzzer sounds, the corresponding warning and indicator lights come on and the engine power is reduced in progressive stages to encourage you to have the condition corrected. Take the required action according to the stage.

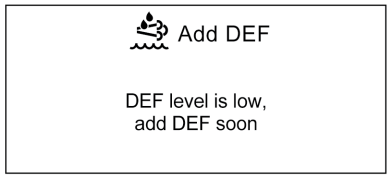
**Diesel Exhaust Fluid (DEF) Low Level Warning**

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 has been refilled with DEF.

## DEF Tank Level is Low/Empty

| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Trigger | The remaining level of DEF becomes excessively low | Driving is continued without adding DEF (approximately 200 miles (320 km)) after stage 1 | Driving is continued until the DEF tank is empty after stage 2 | The vehicle is stopped after driving farther on (approximately 8 km (5 miles)) or the engine is restarted after stage 3 |

| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Main display | and |  | | |
| | | | | |

| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| DEF gauge | Solid (Amber) | Blinking (Amber) | Solid (Red) | Solid (Red) |
| Indicator light(s) | Solid | Slow blinking | Fast blinking | Fast blinking |

| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Indicator light(s) | | | | |
| Warning buzzer | 1 short beep | 3 short beeps *1 | 3 quick beeps *2 | Continuous beep |

| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Restrictions | Vehicle speed is limited to 89 km/h (55 MPH) | Vehicle speed is limited to 56 km/h (35 MPH) | Vehicle speed is limited to 56 km/h (35 MPH) | Vehicle speed is limited to 8 km/h (5 MPH) |
| Required action | Refill DEF as soon as possible *3 | Refill DEF tank immediately *3 | Refill DEF tank immediately *3 | Refill DEF tank immediately *3 |

**Remarks:**

1. The warning buzzer continues to sound every 5 minutes.
2. The warning buzzer continues to sound every 5 minutes and when driving 5 miles (8 km) or more, the buzzer changes its sound to continuous beeping.
3. Refer to "Adding DEF" later in this section.

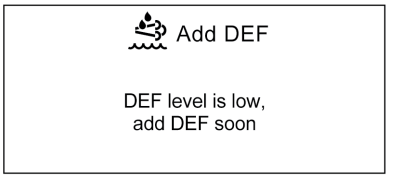
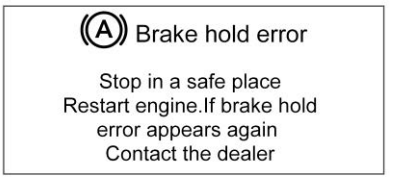
**Incorrect Diesel Exhaust Fluid (DEF)/SCR System Malfunction Warnings**

The SCR system continuously monitors emissions reduction performance and SCR system malfunction (Type A or Type B). 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 (Type A) is detected, continuing to drive for too long after these lights come on may eventually result in a severe vehicle speed limitation.

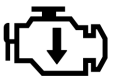
The following is a summary of the warning lights, indicator lights and restrictions. When these warning and indicator lights come on the MID, promptly have the vehicle inspected and serviced at a dealer. In the case of an SCR system malfunction (Type B), have the vehicle inspected and serviced at a dealer. See “Adding DEF” later in this section.

## Incorrect DEF/SCR System Malfunction (type A) Warnings

| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Trigger | Incorrect DEF or an SCR system Type A malfunction is detected | Driving is continued for approximately another 160 km (100 miles) after stage 1 | Driving is continued for approximately 105 km (65 miles) after stage 2 | The vehicle is stopped after driving farther on (approximately 8 km (5 miles)) or the engine is restarted after stage 3 |

| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Main display | and |  | | |
| | |  | | |

| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| DEF gauge | Various | Various | Various | Various |
| Indicator light(s) | Solid | Slow blinking | Fast blinking | Fast blinking |

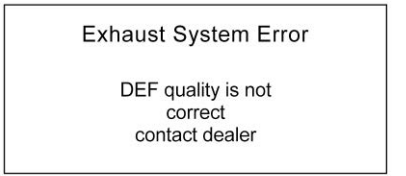
| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Indicator light(s) | |  <br> <br> | | |

| Stage | Stage 1 | Stage 2 | Stage 3 | Stage 4 |
|---|---|---|---|---|
| Indicator light(s) | or | | | |
| Warning buzzer | 1 short beep | 3 short beeps *1 | 3 quick beeps *2 | Continuous beeping |
| Restrictions | Vehicle speed is limited to 89 km/h (55 MPH) | Vehicle speed is limited to 56 km/h (35 MPH) | Vehicle speed is limited to 56 km/h (35 MPH) | Vehicle speed is limited to 8 km/h (5 MPH) |
| Required action | When the exhaust system warning light comes on multi-information display, promptly have the vehicle inspected and serviced at a dealer. | | | |

**Remarks:**

1. The warning buzzer continues to sound every 5 minutes.
2. The warning buzzer continues to sound every 5 minutes and when driving 8 km (5 miles) or more, the buzzer changes its sound to continuous beeping.

## SCR System Malfunction (Type B) Warning

| Stage | Stage 1 |
|---|---|
| Main display |  |
| Trigger | SCR system Type B malfunction is detected |
| DEF gauge | Various |

| Stage | Stage 1 |
| --- | --- |
| Indicator light(s) | <br>or<br> |
| | |
| Warning buzzer | 1 short beep |

| Stage | Stage 1 |
|---|---|
| Restriction | – |
| Required action | When the exhaust system warning light comes on multi-information display, promptly have the vehicle inspected and serviced at a dealer. |

### Adding DEF

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.

**⚠ 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.

(Continued)

**Warning (Continued)**

Do not add substances such as gasoline or diesel fuel to the DEF tank. You and others could be seriously injured.

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.

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.

Use DEF handling equipment made of correct materials (Polyethylene or Stainless- steel).

Avoid contamination from using a dirty funnel for filling.

Do not add DEF above the "F" position on the level gauge. DEF may leak from the breather hose while driving. Also, the sensor may be broken when DEF freezes.

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.

Do not put your feet on or stand on the DEF tank. The tank, pipe or sensors may be damaged.

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. If it is necessary to disconnect the batteries for any reason, be sure to wait at least 3 minutes after turning the

engine control switch to the "LOCK" position. This will allow the SCR system to properly complete its shutdown processes.

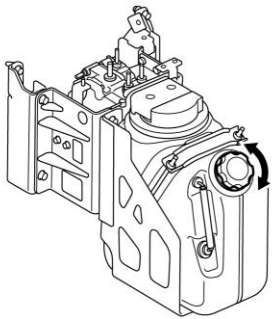
Obey all cautions posted in filling stations.

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.

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.

To refill DEF in cold weather, refer to "Adding DEF in Cold Weather" later in this section.

**How to Refill 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.

   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.
4. Refill the tank up to the "F" position in the level gauge on the front face of the tank. The DEF may overflow from the filler port if it is added in excess of the "F" position.

   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.
5. Tighten the cap after refilling is completed.
6. Wipe off DEF that is spilled at refilling.

**Adding DEF in Cold Weather**

Chevrolet does not recommend parking the vehicle for long periods with the refill DEF warning light on in cold weather. 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 buzzer and warning lights to turn off.

4. If the warning 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 low temperature (approx. -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.

**When DEF Freezes**

Engine coolant circulates through the DEF tank to thaw it when frozen and prevent it from freezing while the engine is running. The vehicle can be driven normally when DEF is frozen in the DEF tank.

**Frozen DEF When the Refill DEF Warning Light Is On**

**⚠ Warning**

Do not warm up the DEF tank using a burner, heater, etc. You and others could be seriously injured.

If the Refill DEF warning light is on and the remaining DEF in the DEF tank is frozen, the vehicle low level warning system cannot be reset by adding DEF. The DEF gauge will not register correctly should the remaining DEF freeze at this level. Move the vehicle to a location that will allow the DEF to thaw. Once the DEF is thawed the DEF gauge should read correctly allowing the low level warning system to reset. To avoid this condition follow the instructions for "Adding DEF in Cold Weather".

**DEF Storage**

For storage of DEF, seal the container to prevent the moisture from evaporating 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.

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.

## 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 the procedure below to cancel the vehicle restriction. See *Diesel Exhaust Fluid (DEF) Gauge* ⇨ *70* and *Diesel Exhaust Fluid (DEF) Warning Light* ⇨ *81*.

**Procedure to Recover from Engine Power Reductions**

1. Turn the engine control switch to LOCK or ACC and add DEF. See "Handling of DEF" and "Adding DEF" earlier in this section.
2. After adding DEF, turn the engine control switch to ON.
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 ON.

   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 LOCK and add more DEF, and then start over from step 2 above.
5. Restart the engine.

# Automatic Transmission

On an automatic transmission vehicle, the driver does not use a clutch pedal when pulling away, changing gears, or stopping. Only the selector lever, accelerator pedal, and brake pedal are used.

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 in the P or N position 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 depress, causing the vehicle to tend to move. This phenomenon is called creep.

**Starting**

Start the engine in either the P or 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 to one of the driving positions. See *Selector Lever* ⇨ *202*.

| Caution |
| --- |
| Never move the selector into the P position when 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 and firmly 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**

Before starting the engine, move the selector lever into "P" or "N" ("P" is preferred), make sure the shift indicator indicates "P" or "N", apply the parking brake and firmly press the brake pedal.

- When stationary and moving the selector lever to any position other than "P", be sure to press the brake pedal.

(Continued)

**Warning (Continued)**

- Never leave the driver's seat with the selector lever placed in "D", "2", "1", "R" or "N". The vehicle may start moving. When leaving the driver's seat, be sure to move the selector lever into "P" and securely set the parking brake.
- When you move the selector lever into "D", "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.
- Do not operate the selector lever while depressing the accelerator pedal. The vehicle may make a sudden start, possibly causing an accident.
- Practice operating the selector lever between the "N" and "D" positions without pressing the push button.
- When pulling away, visually check the position of the selector lever. Also, operate the push button on the selector

(Continued)

**Warning (Continued)**

lever at the appropriate time. If you are constantly pressing the push button while operating the selector lever, the lever may unintentionally move to the "P", "R", "2", or "1" position, which may lead to an unexpected 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 other gear position against your intentions.

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.

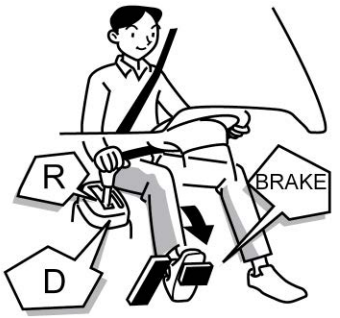
Do not hold your vehicle on an upgrade with the accelerator pedal. Doing so will result in automatic transmission overheating and damage. Use the parking brake or footbrake to hold the vehicle on an upgrade.

When the vehicle is stopped, do not keep depressing the accelerator pedal with the selector lever in the "D", "2", "1", or "R" position while pressing the brake pedal. Doing so may cause a breakdown.

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.

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 or N, that P or N is shown in the shift indicator and that the parking brake lever is fully pulled up, place the engine control switch into the ON position.
2. Start the engine and move the selector lever into D 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 (D 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 (D for forward movement, or R for backward movement), check the area around the vehicle is clear, release the brake pedal with your right foot, and then slowly press the accelerator pedal.

After you feel the vehicle start moving, gradually release the parking brake and start driving the vehicle.

When the brake pedal is not pressed, the shift lock system operates and the selector lever cannot be shifted from P to any other position.

See *Driver Information Center (DIC)* ⇨ *83*, *Starting and Stopping the Vehicle* ⇨ *157*, *Selector Lever* ⇨ *202*, and *Automatic Transmission Shift Lock Control Function Check* ⇨ *307*.

**Normal Driving**

When you move the selector lever from P into D, shifting takes place in the automatic mode. Check that D is displayed in the shift indicator.

When the transmission fluid is cold, the transmission will not automatically shift into the 4th, 5th and 6th gears. Once the fluid temperature increases above the minimum threshold, the transmission will automatically shift using all forward gears.

**To Accelerate**

When the accelerator pedal is depressed further, kickdown operates and the speed increases. The transmission will downshift at speeds below about 55 MPH (88 km/h) 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 engine 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 D, 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).

Drive with the overdrive off switch “on” to keep the engine revolutions constant to enable smoother driving.

Driving for a prolonged duration on an uphill road with the selector lever in D may cause the automatic transmission fluid to overheat.

| Driving conditions | Selector lever position |
|---|---|
| Normal uphill road | D (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 exhaust brake and brake pedal to control vehicle speed.

When the selector lever is in the "D" position, you can press the Overdrive off switch to "on" increasing engine braking.

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 *Hill and Mountain Roads* ⇨ *141*.

**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* ⇨ *76*.

**To Stop Your Vehicle**

1. To temporarily stop the vehicle, press the brake pedal firmly while the selector lever is in D.
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 N or P position. If the selector lever is kept in D, the temperature of the automatic transmission fluid increases due to heat from the torque converter.

**When Parking Your Vehicle**

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, check that the shift indicator is indicating P, and slowly ease your right foot off the brake pedal.
3. Stop 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.

**⚠ Warning**

Before parking and/or exiting your vehicle, always turn the engine control switch to the "LOCK" position, apply the parking brake and move the selector lever to the "P" position. If parking on a slope, also block the wheels with chocks. Failure to perform these steps may result in serious injury or cause an accident.

See *Starting and Stopping the Vehicle* ⇨ *157*, and "Shift Lock System" later in this section.

### 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 automatic transmission fluid overheats. |
| Pressing the accelerator pedal and brake pedal at the same time. | |
| Moving the selector lever with the accelerator pedal depressed and the engine speed high. | The transmission gears or clutch are overloaded. |
| Moving 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 causing internal damage. |
| Driving with the selector lever in the N position on a long downward slope. | |

## Shift Lock System

### When Starting Your Vehicle

When the brake pedal is not depressed, the selector lever cannot be moved from the P position to any other position. Always firmly depress 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.

### If You Cannot Move the Selector Lever from the P Position

**Caution**

When the selector cannot be operated from the P position to any other position even after performing the operation below

(Continued)

**Caution (Continued)**

repeatedly, the shift lock system may have a failure. Have the vehicle inspected at your dealer.

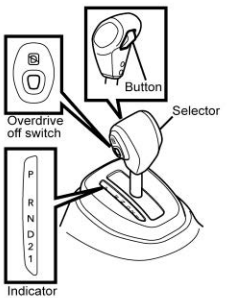
If you cannot move the selector lever from the P position after starting the engine, perform the following checks:

- Check that you are firmly pressing the brake pedal. When the brake pedal is not pressed, 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 slope, the push button operation on the selector lever may be difficult. 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.

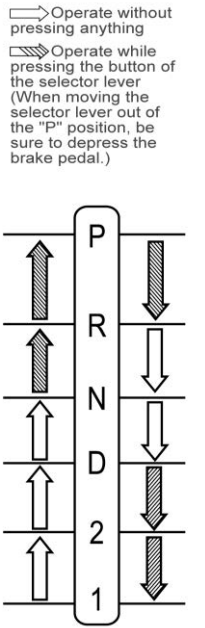
**Releasing the Shift Lock in an Emergency**

If moving of the selector lever from P to another position is still not possible even after performing the instructions given in the steps above, with the brake pedal fully pressed and the vehicle parked on a flat surface, carry out the procedure described in *Automatic Transmission Shift Lock Control Function Check* ⇨ *307*.

## Selector Lever




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 position is one of the two positions (the other is N) in which the engine can be started.

**R : Reverse:** Used when backing up the vehicle.

**N : Neutral:** Can be used when starting the engine, but for safety, get in the habit of starting the engine in the P position.

**D : Drive (Normal Driving):** The D 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.

**D2 : Second (2nd gear):** May be used when driving on downhill roads or when engine braking 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 D position for normal driving.

**D1 : Low (1st gear):** May be used when driving on steep downhill roads or when strong engine braking is required. Return the selector to the D 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 into the "P" position when the vehicle is in motion. Placing the selector in the "P" position while in motion will cause abnormal noises and vibrations, and could result in serious damage to the automatic transmission or a serious accident.
- Do not run the vehicle with the transmission in neutral. Not only will engine braking not function, but the transmission will also be damaged.

To prevent damage to the automatic transmission, follow the driving instructions below.

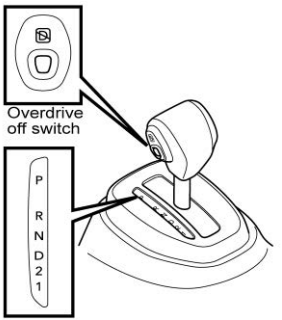
- When shifting to reverse gear, firmly press the brake pedal and confirm that the vehicle is completely stopped before operating the selector lever.
- When repeatedly shifting between forward and reverse gears for a multiple-point turn, firmly press the brake pedal and confirm that the vehicle is completely stopped before operating the selector lever.

Periodically check that the shift indicator points to the gear chosen.

The selector lever cannot be moved from the P position unless the engine control switch is in the ON position and the brake pedal is depressed. Before pulling away, be sure to keep the brake pedal depressed as you operate the selector lever. See *Driver Information Center (DIC)* ⇨ *83*, *Overdrive Off Light* ⇨ *77*, *Automatic Transmission* ⇨ *195*, and *Automatic Transmission Shift Lock Control Function Check* ⇨ *307*.

## Overdrive Off

### 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).

- Use the overdrive during normal driving. When driving down long downhill roads that require the engine brake, 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 101 km/h (63 MPH), it is not possible to downshift from 6th gear to 5th gear.
- If your vehicle is traveling at a speed exceeding 78 km/h (49 MPH), it is not possible to downshift from 5th gear to 4th gear.

**Overdrive Off Indicator Light**

| Indicator Light | Function | Usage Conditions |
|---|---|---|
| Goes Off. | 6-Speed (4-speed + overdrive) automatic change (Overdrive on). | Use under normal driving conditions. |
| | 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 transmission fluid is cold, the transmission will not automatically shift into the 5th and 6th gears. Once the fluid temperature increases above the minimum threshold, the transmission will automatically shifting using all forward gears.
- 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. In addition the braking distance can be slightly longer in deep snow and on a gravel road when ABS is activated. Therefore, always keep in mind the road condition and tire condition (type of tires

(Continued)

**Warning (Continued)**

and worn condition), observe safe driving habits and drive the vehicle while keeping a proper distance between vehicles.

ABS does not prevent crashes if you do not drive safely. 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.

Steering during sudden braking (when the ABS is working) will feel slightly different than it does when the brakes are not applied. Operate the steering wheel carefully keeping this in mind.

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 and the vehicle starts moving, the sound of motor or valve 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. In addition, you may also feel some vibration if the brake pedal is pressed at this time.
- When ABS is operating, vibration is felt on the brake pedal and steering wheel and you may hear the system operating. This is normal when ABS is properly operating.
- The exhaust brake may release when ABS is activated and the exhaust brake is in operation.
- ABS is more likely to be activated when the brake is applied during cornering or driving over a bump. This is because inside wheels or wheels that have gone over a bump tend to lock.
- ABS is not activated immediately after starting the vehicle. It is activated only when the vehicle speed reaches approx. 10 km/h (6 MPH). ABS operation is inactive when the vehicle speed reduces to approx. 5 km/h (3 MPH).

### 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. 3 seconds. The ABS is normal if the warning light goes out.

**Operation Signs of ABS**

When ABS is activated, slight vibration is generated on the brake pedal (hydraulic brake model) and steering wheel, and an operating sound can be heard from the ABS equipment.

If the ABS warning light does any of the following, the ABS may be faulty. Please contact the nearest dealer.

- If 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

See *Antilock Brake System (ABS) Warning Light* ⇨ *75*.

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**

When braking suddenly, continue pressing brake pedal hard so that the ABS can take effect.

When braking suddenly, do not pump the brakes (pushing and releasing the brake pedal little by little). Pumping brakes will increase the braking distance.

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.

- When driving on a gravel road, or a road with a deep snow covering.
- 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 skid during a standing start, acceleration and cornering which do not involve braking. On a very slippery icy road, tires may lose grip and 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 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.

When ABS is activated, a slight vibration (especially when the road surface is different between right and left wheels)

(Continued)

**Warning (Continued)**

and pulling may be felt on the brake pedal and steering wheel. 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.

### Electronic Braking force Distribution (EBD)

EBD is a function that uses the ABS to distribute braking force ideally between the front and rear wheels in order to compensate for changes in load conditions or any shift of the load due to acceleration or deceleration, thus preventing premature locking of the rear wheels.

**⚠ Warning**

If a problem should occur with the EBD function, the ABS warning light and the brake system warning light will come on simultaneously.

(Continued)

**Warning (Continued)**

The rear wheels will lock more easily if there is a problem with the EBD function. Have it checked and serviced at the nearest dealer as soon as possible. You and others could be seriously injured.

When the EBD operates, the brake pedal may push back slightly or you may hear a sound similar to that generated by the ABS when operational. Neither of them indicates any abnormal condition.

## Parking Brake

#### 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.

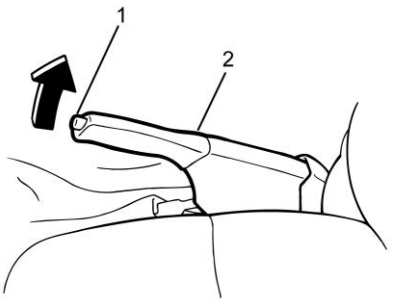
Avoid parking for long periods with cargo on the vehicle.

**⚠ 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.

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.

**Operation of Parking Brake**




# BRAKE

The parking brake lever is located to the right of the driver's seat.

To set the parking brake, completely stop the vehicle. Then, without pressing the release button (1), hold the brake pedal down while pulling the parking brake lever (2) all the way up.

**⚠ Warning**

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.

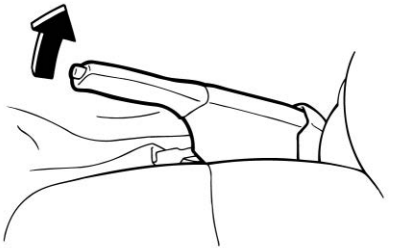
The parking brake indicator light in the instrument panel will come on when the lever is pulled up. Before you leave the driver's seat, follow the steps under “Parking, or Leaving Driver's Seat”. See *Braking* ⇨ *136*.

To release the parking brake, hold the brake pedal down while pushing the release button of the parking brake lever and lower the lever. The parking brake indicator light in the instrument panel will 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.

If you notice the parking brake lever travel has increased over time, this means the cable adjustment must be checked by a qualified technician. Adjustment may be required due to parking brake shoe wear. See *Control of a Vehicle* ⇨ *132*.

**Inspection**



Pull the parking brake lever slowly from the fully released position while counting the clicks produced as the lever engages ratchet plate notches to check that it can be raised the proper amount and the lever is held firmly.

If the number of notches is not within the standard value range below, adjust it to the standard value. Lever stroke is 6 to 8 notches.

Number of notches before parking brake is set when lever is pulled slowly from released position with pull force of about 147 N (15 kgf/33 lbs). See *Maintenance Schedule* ⇨ *359* and *Additional Maintenance and Care* ⇨ *373*.

## Electric Parking Brake

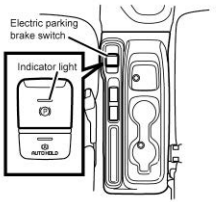
**⚠ Warning**

- If the parking brake warning light flashes, or if the electric parking brake warning light comes on, or if ELEC PARKING BRAKE FAILURE appears on the DIC, then there is an abnormality in the electric parking brake system. Stop the vehicle in a safe location and immediately contact the nearest dealer. Also, if you must park, avoid slopes, choose a level place, and park. Put the selector lever in P and lock the wheels.
- Do not use while driving, except for emergencies.
- Engaging the parking brake before the vehicle stops may cause the wheels to lock or spin possible causing an accident.
- If the vehicle is driven while parking brake is not fully released, the park brake can over heat causing damage to the vehicle and/or a fire.

(Continued)

**Warning (Continued)**

- If the parking brake was required to be used to stop the vehicle, have you inspected and repaired at the nearest dealer.



The optional system uses an electric motor to engage and release the parking brake. The parking brake can be operated using the parking brake switch regardless of the engine control switch position. In addition, the Electric Parking Brake (EPB) can be set to operate automatically under certain conditions such as; moving the selector lever to part or pressing the accelerator pedal.

Put the engine control switch in the ON position to release the parking brake. When the engine control switch is in the ACC or LOCK position, the parking brake does not release even if the EPB switch is pressed. At this time, the parking brake warning light comes on. The parking brake warning light turns off after about 35 seconds. See *Parking Brake Light* ⇨ *74* and *Service Electric Parking Brake Light* ⇨ *75*.

In the following cases, there may be a motor sound or rumbling sound, but this does not indicate an abnormality:

- When the EPB switch is operated
- When the parking brake is applied or released automatically

### How to Operate the EPB

When applying the parking brake, lifting up the EPB switch engages the parking brake. The EPB warning light on the instrument panel and the indicator light on the switch flash until the parking brake is applied. As the parking brake is applied, the warning light and indicator light stay on.

**⚠ Warning**

- If the electric parking brake does not engage or release even though the parking brake switch is operated, immediately contact the nearest dealer.
- Do not place objects near the electric parking brake switch or leave your hand on the switch. This may cause the parking brake to be applied or released unintentionally, or the system may determine that it is malfunctioning.

**Caution**

Check that the parking brake warning light is off before pulling away. The electric parking brake switch must be pressed for about 1 second to release the parking brake. Because of this, if you press the switch and immediately pull away, the parking brake remains engaged as you drive, which causes damage to the parking brake.

When releasing the parking brake, pressing the EPB switch while depressing the brake pedal releases the parking brake. The EPB warning light on the instrument panel and the indicator light on the switch flash until the parking brake is released. As the parking brake is released, the warning light and indicator turn off.

Repeatedly operating the EPB switch continuously for more than 20 seconds causes the EPB warning light to flash, and the parking brake remains engaged and cannot be released. This is caused by the motor's protective circuit and is not abnormal. After a short time, the EPB warning light goes off, and you can release the parking brake.

To release the parking brake, depress the brake pedal as you move the EPB switch to the release position. If you do not step on the brake pedal as you move the EPB switch to the release position, MANUALLY RELEASE PARKING BRAKE appears on the Driver Information Center (DIC) and the parking brake will not be released.

## Applying and Releasing the EPB Automatically

**⚠ Warning**

Never use the automatic function of the electric parking brake as a substitute for the daily parking brake operations. This function is designed to reduce accidents caused by the driver forgetting to apply the parking brake. Relying on functions for parking safety may result in serious injury or, in the worst case, death.

When the engine control switch is in the ON position, applying and releasing the EPB becomes automatic in conjunction with certain operations, such as of the selector lever.

### When the Parking Brake Operates Automatically

When stopped, the parking brake operates automatically in conjunction with the following operations. The EPB warning light on the instrument panel and the indicator light on the EPB switch flash until the parking brake is applied. As the parking brake is applied, the warning light and indicator light stay on.

**Engine control switch conjunction:** When the engine control switch is moved from the ON position to the ACC or LOCK position, the parking brake warning light and the EPB switch indicator are both on.

**Driver not seated conjunction:** If the driver side seat belt is unbuckled and the driver side door is opened, the buzzer sounds a long repeated beep for approximately 6 seconds and the parking brake is activated because driver is not detected in seat. The driver not seated conjunction does not operate if the selector lever is in the R position.

**Selector lever conjunction:** The selector lever is moved to the P position, the parking brake warning light and the EPB switch indicator are both on.

### When the Parking Brake Releases Automatically

When the following conditions are met when the vehicle starts moving, the parking brake is released in conjunction with depressing the accelerator pedal. The EPB warning light on the instrument panel and the indicator light on the EPB switch flash until the parking brake is released. As the parking brake is released, the warning light and indicator turn off.

- Driver side door is closed
- Driver side seat belt is buckled
- Engine is running
- Selector lever is in D or R position

### Settings for Automatic Operation of the EPB

From the Vehicle settings screen on the DIC, you can change the settings for automatic operation of the EPB.

1. Press left or right on the DIC switch to switch the screen and display the settings screen. If a message to the driver is displayed, press enter to return to the normal screen, and then switch to the settings screen.
2. In the setting screen, select in order, Vehicle setting > Brake > Electric parking brake > Automatic key off.
3. Press up or down to switch the automatic operation of the EPB through the following selections. Press enter to select. OFF turns the automatic operation function of the EPB off. ON turns the automatic operation function of the EPB on. Link OFF when driver not seated turns the automatic operation function of the EPB on, except for driver not seated conjunction.

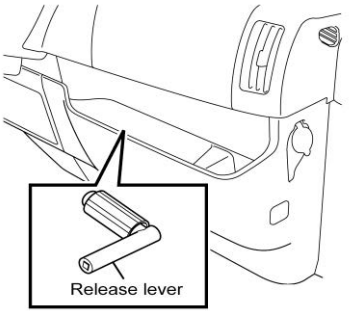
### When the EPB Cannot be Released

**⚠ Warning**

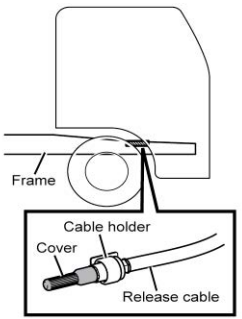
- Do not manually release the parking brake except when the vehicle is towed by a specialized tow truck or when temporarily moving the vehicle.
- Do not release the parking brake manually while on a slope.
- After manually releasing it, move the vehicle to a safe location and immediately contact the nearest dealer.

When the battery is discharged or the EPB fails, you can use the following procedure to release the parking brake.

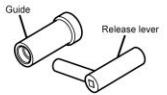
1. Put the selector lever in P position and securely chock the wheels.

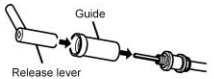



2. Take out the EPB release lever stored in the passenger side storage pocket.




3. Remove the cover from the tip of the release cable. The location of the release cable varies depending on vehicle specifications. It is located on the side or top of the right-front frame. Turn the steering wheel all the way, tilt the cab, or open the door to make the release cable easier to access.



4. Remove the guide from the EPB release lever.
5. Attach the guide and then the release lever to the release cable, the order shown.
6. Press in on the release lever as you turn it to the left 35 times. If the parking brake is not released, then turn the release lever an additional 5 turns at a time to the left until the parking brake is released.

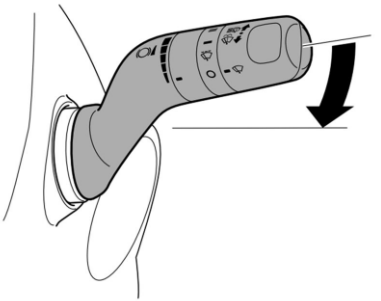
| Caution |
| --- |
| Do not let the cable holder be deformed. Doing so could prevent the release cable from being taken out, or excessive force could be applied and damage it. |

7. After the parking brake is released, attach the cover to the tip of the release cable.

## 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 white while not operating and comes on green while operating.

The exhaust brake will disengage when the accelerator pedal or brake pedal is pressed. Releasing the pedal reengages the exhaust brake. Push the lever forward to turn the exhaust brake off during idling.

**⚠ 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.

**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 pressed
- Immediately after starting when the outside air temperature is low
- The vehicle is traveling at 5 km/h (3 MPH) or lower speeds

The 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 pressed. When this happens, the exhaust brake indicator light changes from green to white temporarily.

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* ⇨ *76*.

## Automatic Vehicle Hold (AVH)

**⚠ Warning**

- Automatic Vehicle Hold is not a parking brake and will not apply the vehicle parking brake. The driver should always apply the parking brake when the vehicle is off and before exiting the vehicle.
- When the parking brake is applied, the Automatic Vehicle Hold is released.
- If the vehicle starts to move while the Automatic Vehicle Hold is operating, depress the brake pedal again and, if necessary, apply the parking brake.

(Continued)

**Warning (Continued)**

- If the vehicle will be stopped for a long time or on a gradient of 10% or greater, continue to depress the brake pedal or apply the parking brake.
- If you feel something abnormal while depressing the brake pedal when the Automatic Vehicle Hold feature is activated, press the Automatic Vehicle Hold switch to turn it OFF. Contact your nearest dealer for service.
- Do not use the Automatic Vehicle Hold function on slippery roads such as snowy or icy roads. If the tires lock up, the Automatic Vehicle Hold may apply and the tires may stay locked up.
- If there is a problem with the Automatic Vehicle Hold unit, release Automatic Vehicle Hold and immediately contact the nearest dealer for inspection.
- If you brake strongly or the tires lock when the vehicle is stopped, Automatic Vehicle Hold may temporarily not

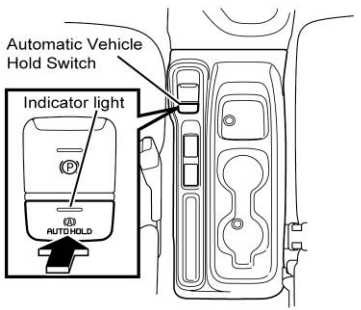
(Continued)

**Warning (Continued)**

operate. In this case, use the parking brake or continue to depress the brake pedal to keep the vehicle stopped.

**Caution**

Automatic Vehicle Hold is an optional function to stop the vehicle temporarily and cannot replace the parking brake. When parking, be sure to firmly apply the parking brake.




Normally, the driver must depress and hold the brake pedal to keep the vehicle from moving after coming to a stop. The Automatic Vehicle Hold (AVH) function, when activated, retains the braking force created from depressing the brake pedal and keeps the vehicle in a stopped state, even when the driver's foot is removed from the brake pedal.

**Turning AVH On and Off**

This switch turns the AVH system ON and OFF. To turn the AVH system off while it is operating, depress the brake pedal and then press the switch. When AVH turns off, the switch indicator light turns off. Pressing it again turns the AVH system on.

When the following conditions are met, AVH is operable, and the switch indicator light turns on:

- AVH system is on
- Vehicle doors are closed and driver side seat belt is buckled
- AVH warning light (amber) is not on

After the engine has been started, AVH will have the same settings as when the engine control switch was last set to the "LOCK" position.

AVH does not turn off if the AVH switch is pressed without depressing the brake pedal while AVH is operating. When this happens, DEPRESS BRAKE PEDAL appears on the DIC and a buzzer sounds.

See *Automatic Vehicle Hold (AVH) Light* ⇨ 77.

## How to Use AVH

### How to Check Operation

**⚠ Warning**

- If the Automatic Vehicle Hold indicator light (green) does not turn on when the Automatic Vehicle Hold function is operating, the Automatic Vehicle Hold unit may be malfunctioning. Turn the Automatic Vehicle Hold system off and contact the nearest dealer for inspection.

(Continued)

**Warning (Continued)**

- If the Automatic Vehicle Hold warning light (amber) turns on or the buzzer sounds continuously, the Automatic Vehicle Hold unit may be malfunctioning. Take action based on the warnings and messages that appear in the DIC.

1. Confirm that the indicator light of the AVH switch illuminates, indicating the AVH is ready to operate.
2. Move the selector lever from the P position to the D, 2, 1, or N position.
3. Release the parking brake and depress the brake pedal firmly for at least 1 second. At this time, confirm that the AVH is operating, and the AVH indicator light (green) turns on in the DIC.
4. Pull up the electric parking brake switch. At this time, confirm that the AVH is released, and the AVH indicator light (green) turns off in the DIC.

### How to Activate

1. Stop the vehicle. The AVH will only activate when the selector lever is in the D, 2, 1, or N position.
2. Depress the brake pedal firmly for at least 1 second. At this time, AVH is operating, and the AVH indicator light (green) turns on in the DIC.

When AVH is operating, the brake pedal may move and you may hear sounds as the brake force is adjusted to prevent the vehicle from moving.

### How to Release

The following actions will release the AVH and the brakes operation returns to normal:

- The parking brake switch is pulled up
- When starting by depressing the accelerator pedal
- When the brake pedal is depressed again
- When the AVH switch is pressed to off while the brake pedal is being depressed

The AVH and electric parking brake can be made to operate simultaneously (the AVH will release and the electric parking brake is

applied) in the following operating conditions only when the electric parking brake automatic function is turned on:

- If AVH continues for a long time PARKING BRAKE OPERATING is displayed in the DIC
- If the driver side seat belt is unbuckled and the door is opened (Electric parking brake automatic operation function)
- If the engine control switch is set to "ACC" or "LOCK" position (Electric parking brake automatic operation function)
- The selector lever is moved to the P position (Electric parking brake automatic operation function)

### Adjustment of AVH

The AVH brake release timing/speed can be adjusted for driver's preference by making changes in the Settings screen of the DIC.

#### Adjustment

1. Apply the parking brake, make sure the selector lever is placed in the N position and then start the vehicle. At this time make sure that the AVH switch indicator light turns on and that AVH is enabled.
2. Fully depress the brake pedal and release the parking brake. Check that the AVH indicator light (green) comes on and place the selector lever into a position other than N.
3. Press LEFT or RIGHT on the DIC switch until the Settings screen appears in the DIC.
4. On the setting screen, select in order, Vehicle settings > Brake > Automatic Vehicle Hold settings > Deactiv. timing settings to open the adjustment screen.

**⚠ Warning**

If the fine adjustment is made on either the FAST side or SLOW side excessively, the Automatic Vehicle Hold may not be activated or canceled properly. Adjust it to an appropriate release timing position for the braking force.

5. If the brakes release too slow and can be felt dragging, press the right DIC switch to increase the release speed. If the brakes release too quickly (vehicle starts to creep or roll backwards on a slope), press the left DIC switch to slow down the release speed. Every time the switch is pressed, a buzzer sounds. There are 5 levels of adjustment on each side. The higher the level, the faster or slower the brakes will release.
6. Confirm the setting by pressing the ENTER switch.

If there is significant discrepancy in the braking force release timing even after adjusting the speed to "Fast" or "Slow" phase 5 (level 5 on the adjustment bar), contact your dealer for inspection.

# Ride Control Systems

## Traction Control/Electronic Stability Control

### System Operation

The vehicle has a Anti-Slip Regulation (ASR), also known as Traction Control System (TCS), and Electronic Stability Control (ESC) system. These systems help limit wheel spin and assist the driver in maintaining control, especially on slippery road conditions.

Both systems come on automatically when the vehicle is started and begins to move.

The ESC warning light for both systems is in the instrument cluster. This light will flash when:

- ESC is activated.
- ASR is functioning.
- The road surface is slippery or acceleration is too fast. Ease up on the accelerator pedal and drive conservatively.
- When the driver fully depresses the accelerator pedal on roads that are not slippery such as dry asphalt roads. This is a normal condition.

**Anti-Slip Regulation (ASR)**

ASR is a function that helps prevent the wheels from spinning and improve vehicle motion stability when driving on snowy or slippery road surfaces. The ASR is automatically activated when the vehicle is started.

See "Turning the Systems Off and On" later on in this section for instructions on deactivating the ASR feature.

When using a speed tester or brake tester, press the ESC OFF switch to turn off ASR.

You may notice minimal vibrations or operating sound when starting and accelerating the vehicle on a slippery road. This sound is generated when ASR is operating.

The vehicle speed may suddenly decrease, but this is because the ASR device is operating normally.

**Caution**

- Even with the ASR-equipped model, when driving on a snowy or icy road, carefully drive the vehicle, installing tire chains or winter tires.
- ASR is not a device to drastically improve the vehicle starting performance.
- Carefully operate the accelerator pedal when moving on an icy slope.
- When tire chains are installed, it may be easier for you to start the vehicle to move on an icy slope if the ASR is turned OFF.

**Caution**

- On an icy or otherwise slippery road, the grip of the tires decreases, which also reduces steering control. ASR does not increase the road grip of tires but it does improve the vehicle's starting and accelerating performance on a slippery road surface when compared to a model without ASR.
- Especially when starting the vehicle on a slippery road, start up slowly as you would in a vehicle without ASR. Even with ASR operating, suddenly or erratically depressing the accelerator pedal or maneuvering the steering wheel can cause you to lose control of your vehicle. Always drive at a safe speed well matched to the road surface, environmental conditions, and the conditions of your vehicle's tires.

**Electronic Stability Control (ESC) System**

ESC helps maintain control of the vehicle during extreme steering maneuvers by keeping the vehicle headed in the driver's intended direction, even when the vehicle nears or exceeds the limits of road traction.

When attempting an extreme maneuver (for example, to avoid a crash or because a curve's severity has been misjudged), they may experience unfamiliar vehicle handling characteristics as the vehicle nears the limits of road traction.

ESC controls the engine power and applies the brakes to the wheels that need it in order to suppress wheelspin when starting or accelerating on slippery road surfaces, maintain drive power, and help prevent skidding to the side.

ESC has various sensors that detect rapid changes in the vehicle conditions while driving.

ASR is included in ESC. ESC is automatically activated when the engine is started.

See “Turning the Systems Off and On” later on in this section for instructions on deactivating the ESC system.

**Caution**

Remember that even advanced technology cannot defy the laws of physics. It's always possible to lose control of a vehicle due to inappropriate driver input for the

(Continued)

**Caution (Continued)**

conditions. Aggressive driving on any road condition can cause you to lose control of your vehicle increasing the risk of personal injury or property damage. Activation of the electronic stability control system is an indication that at least some of the tires have exceeded their ability to grip the road; this could reduce the operator's ability to control the vehicle, potentially resulting in a loss of vehicle control, vehicle rollover, personal injury and death. If your electronic stability control system activates, SLOW DOWN.

**Caution**

- When the ESC is activated, the ESC warning light flashes.
- The ESC warning light will also flash when only the ASR function is operating.

(Continued)

**Caution (Continued)**

- When the ESC warning light is flashing, the road surface is slippery or acceleration is too fast. Ease up on the accelerator pedal and drive conservatively.
- The ESC warning light may also flash when the driver fully depresses the accelerator pedal on roads that are not slippery such as dry asphalt roads. This is a normal condition.

**Caution**

When warning beeps sound, ESC is operating. Drive especially carefully because the vehicle is unstable.

**Caution**

- Even with ESC model, when driving on a snowy or icy road, install tire chains or winter tires, and drive the vehicle carefully.

(Continued)

**Caution (Continued)**

- Install tires of the specified size, same brand, same type and same tread design (including winter tires) on all wheels. In addition, do not install or use tires with significantly varying degrees of wear. If tires other than the specified size and type, or tires with significantly varying degrees of wear are used, the ESC may not operate properly.
- If the tire diameter is different such as when installing tire chains or a spare tire, the ESC may not operate properly.
- If suspension-related parts, brake-related parts, or engine-related parts are modified or replaced with other than GM genuine parts, ESC may not operate properly.
- Be sure to consult with your dealer for replacement or repair of the steering wheel or steering-related parts. There is a sensor inside the steering column that is part of the ESC system, and the ESC may not operate properly if the steering wheel center position is misaligned.

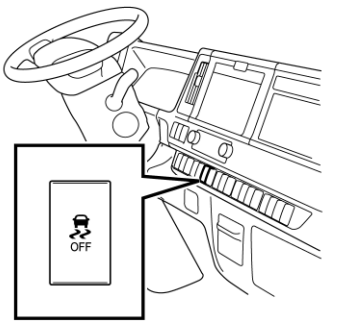
**Caution**

Do not tow the vehicle with the engine control switch turned to the "ON" position with just the front wheels or rear wheels raised. The ESC may operate and cause an accident.

The following do not indicate ESC malfunction:

- Immediately after the vehicle is started, a motor sound may be heard from the engine compartment. This sound is from a self-check by the ESC. In addition, you may also feel some vibration if you are depressing the brake pedal at the time.
- When the ESC is operating, the brake pedal may wiggle or feel tight. The vehicle body may vibrate or you may hear operating sounds. This is normal for ESC operation.
- The ESC will not operate until the vehicle reaches approximately 15 km/h (9 MPH).

### Turning the Systems Off and On




**⚠ Warning**

- If the ASR and/or ESC function is turned off, it will not be available to assist you in slippery driving conditions. Always use caution when driving on slippery roads.
- Be sure to enable ASR and/or ESC during normal driving.

**To Turn Off ASR Only**

**ASR OFF Indicator Light**

After the vehicle is started, press OFF for approximately one second to turn ASR off. This will cause the ASR OFF indicator light to turn on.

To turn the ASR function back on, press OFF again for approximately one second.

To climb a long slippery slope at high engine speeds, even with some tire slippage, or to escape from deep snow or muddy roads, press OFF to deactivate the ASR system.

Even when the ARS function is turned off, the brake control function is partially activated. The ESC warning light flashes while the brake is operating.

**To Turn Off ESC**

**ESC OFF Indicator Light**

By pressing the ESC OFF switch, you can turn off either the entire ESC system or only the ASR function.

If ASR and/or ESC is off when the vehicle is turned off, ASR and/or ESC will turn on automatically when the vehicle is restarted.

After the vehicle is started, press OFF for approximately five seconds to turn ECS off, which will also turn off ASR. This will cause the ESC OFF indicator light to turn on.

To turn the ESC function back on, press OFF again for approximately one second. This will also turn ASR on again.

**ESC Operation**

**⚠ Warning**

- ESC is not a device that enables driving under conditions exceeding safe limits. Always drive safely.
- Always concentrate on driving safely and do not be overconfident just because the vehicle is equipped with ESC, do not drive too fast or turn the steering wheel too sharply.
- On an icy or otherwise slippery road, the grip of the tires decreases, which also reduces steering control. ESC does not increase the road grip of tires, but it does improve the vehicle starting and accelerating performance on a slippery road surface when compared to a model without ESC. Especially when starting the vehicle on a slippery road, start up slowly as you would in a vehicle without ESC. Even with ESC operating, suddenly or erratically depressing the accelerator pedal or maneuvering the steering wheel can cause you to lose

(Continued)

**Warning (Continued)**

control of your vehicle. Always drive at a safe speed well matched to the road surface, environmental conditions, and the conditions of the vehicle tires.

- When the ESC warning light is flashing, the road surface is slippery, or acceleration is too fast. Ease up on the accelerator pedal and drive conservatively.
- The ESC warning light may also flash when the driver fully depresses the accelerator pedal on roads that are not slippery such as dry asphalt roads.
- Even with ESC model, when driving on a snowy or icy road, install tire chains or winter tires, and drive the vehicle carefully.
- When tire chains are installed, it may be easier for you to start the vehicle to move on an icy slope if just the ASR is canceled.

(Continued)

**Warning (Continued)**

- If there is significant wear or degradation on parts related to the suspension, tires, brakes, etc., the ESC warning light may turn on. In such cases, ESC may not function properly. Have your vehicle inspected/repaired at the dealer.
- The ESC warning light may turn on when driving on roads with extreme inclines (the banks seen on racetracks, etc.). In such cases, the ESC may not function properly, so do not drive on such roads.
- The ESC warning light may turn on after the battery cables are disconnected and reconnected or the battery voltage is low. If the ESC warning light remains on even after driving for a while, the ESC is not functioning properly. Contact the nearest dealer.

**ESC Warning Light**

When the engine control switch is turned to the ON position, the ESC warning light, ASR OFF indicator light, and ESC OFF indicator light turn on and then go out after approximately 3 seconds. This means that ESC is operating normally.

The ESC warning light will begin flashing and a buzzer will sound when ESC activates during vehicle operation. At the same time, motor noise is generated from ABS components.

When the ESC is operating, the brake pedal may wiggle or feel tight. In addition, the vehicle body may vibrate or you may hear operating sounds. This is normal for ESC operation.

This warning light turns on whenever there is a problem in the ESC or when the vacuum pressure decreases.

If the ESC warning light turns on when vacuum pressure decreases, there is no problem as long as the light goes out quickly or after the

engine has been restarted. If the warning light does not go out or comes on repeatedly, have the vehicle inspected/services at the nearest dealer as soon as possible.

When the ESC warning light turns on while driving (but is not flashing) the ESC/ASR will not operate, but this has no effect on normal driving.

When getting unstuck from mud or fresh snow with ESC and ARS operating, the engine output may not rise even when the accelerator pedal is depressed, making getting unstuck difficult. In times like this, pressing OFF will make getting unstuck easier. By pressing the OFF, you can turn off either the entire ESC system or only the ASR function.

**ESC Malfunction**

If any of the following occurs, the ESC system may be malfunctioning. Please contact the nearest dealer.

- The ESC warning light remains on while driving.
- The ASR OFF indicator light and/or the ESC OFF indicator light turn on and stay on while driving (even though OFF has not been pressed).
- The ESC warning light, ASR OFF indicator light, and ESC OFF indicator light do not turn on when the engine control switch is turned to the "ON" position.

If ESC is malfunctioning, it does not interfere with normal driving. However, ESC will not activate or operate.

## 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 above 30 km/h (20 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.

(Continued)

**Warning (Continued)**

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.

**Cruise Control Light**

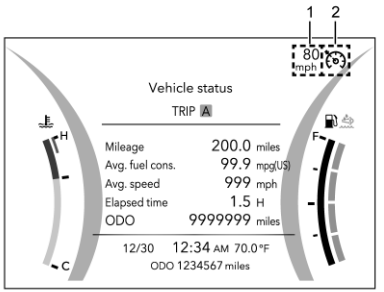
**Using Cruise Control on Hills**

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.

**Cruise Control Information on the Driver Information Center (DIC)**

When cruise control is set to ON, the following information will appear on the Driver Information Center (DIC):




1. This indicates the set speed and the maximum cruising speed of cruise control.
2. This displays the setting and operating state of cruise control.

The following cruise control information will be shown on the DIC depending on the condition:

**Cruise Control Mode:** The cruise control light and Driver assistance mode has changed displays when switching to cruise control mode.

**Cruise Control Mode Off:** The cruise control light is gray.

**Standby:** The cruise control light is white.

**Cruise Control Active:** The cruise control light is green.

**Cruise Control Temporarily Deactivated (Override):** The cruise control light is flashing green. This may occur when the system is overridden, such as when the accelerator pedal is pressed.

**Cruise Control Temporarily Deactivated:** The cruise control icon is white and Cruise control canceled displays when cruise control is operating and the cancel switch is pressed.

**Cruise Control Deactivated:** The cruise control icon is gray and Cruise control canceled displays when cruise control is fully deactivated.

**Buzzer Sounds During Cruise Control**

The cruise control system will sound the buzzer to alert the driver under the following conditions:

**Operation Refusal Sound:** Two short beeps will occur.

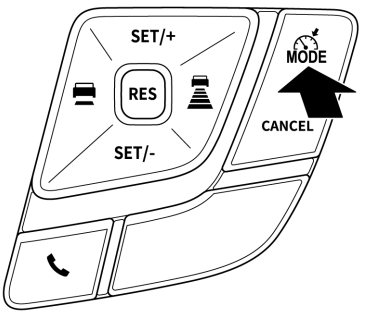
**Operation Sound:** One short beep will occur.

**Failure Sound:** Two short beeps will occur.

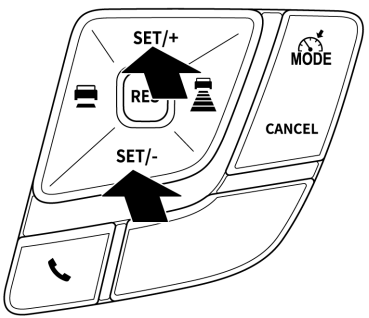
**Canceling Sound:** Two short beeps will occur.

## Starting Cruise Control

To start cruise control:



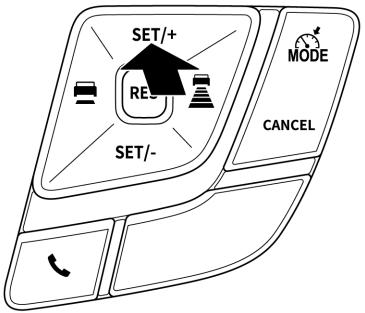
1. Press the mode switch and confirm cruise control information is appears on the DIC. If a set vehicle speed has been registered, then pressing the resume switch at this time starts cruise control driving.
2. Press the accelerator pedal to adjust to your desired speed. The cruise control icon will appear white on the DIC to confirm the system is ready and the speed can be set.




3. Press the + or – side of the set switch to set the vehicle speed and start cruise control. The set vehicle speed is displayed on the DIC.

## Changing the Set Vehicle Speed

### To Accelerate




Pressing the + side of the set switch increases the cruise control set speed on the DIC and increases the vehicle cruising speed.

By pressing and immediately releasing the switch, the set vehicle speed can be increased by 1 mph (1 km/h) per operation.

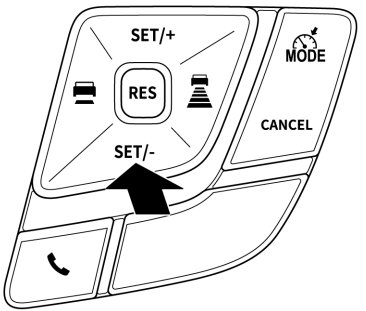
By holding down the switch, the set vehicle speed can be increased in increments of 5 mph (5 km/h).

When you want to increase the speed quickly, press the accelerator pedal, then after accelerating to the desired speed, press the set switch.

### Accelerating During Cruise Control Driving

If you want to accelerate temporarily to pass another vehicle while driving using cruise control, press the accelerator pedal. When you release the accelerator pedal, the speed returns to the original set vehicle speed.

### To Decelerate



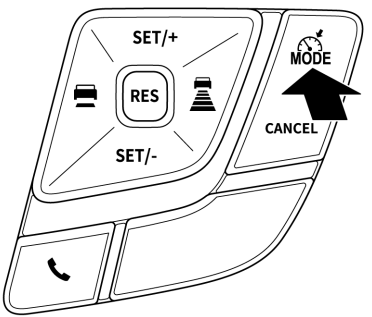

Pressing the – side of the set switch decreases the cruise control set speed on the DIC and decreases the vehicle cruising speed.

By pressing and immediately releasing the switch, the set vehicle speed can be decreased by 1 mph (1 km/h) per operation.

By holding down the switch, the set vehicle speed can be decreased in increments of 5 mph (5 km/h).

When you want to decrease the speed quickly, press the brake pedal to temporarily cancel cruise control, then after decelerating to the desired speed, press the set switch.

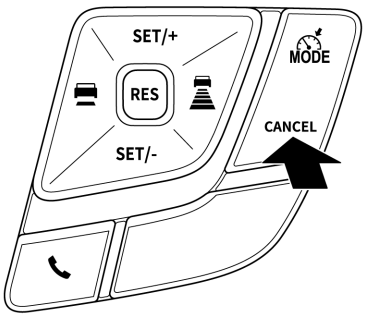
### Deactivating Cruise Control




Press the mode switch to deactivate the system. At this time, a warning buzzer sounds and the cruise control icon on the DIC display goes off.

Deactivate the cruise control, by pressing the mode switch, to prevent the cruise control function from activating unexpectedly while it is not being used.

### Temporarily Deactivating Cruise Control




If the cancel switch is pressed, cruise control will be temporarily deactivated. At this time, the cruise control icon comes on in white on the DIC and Cruise control canceled will be displayed for a few seconds. In addition, the function will also be deactivated in the following cases:

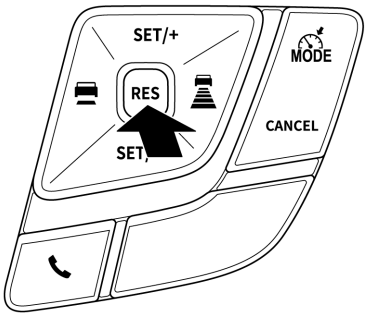
- When the brake pedal is pressed
- When the parking brake is applied
- When the exhaust brake is applied
- When either of the following warnings occur: Check engine malfunction indicator light. Check Brake system warning light
- When the select lever is placed in any position other than D (Drive)
- When entering into a steep uphill/downhill

When you want to overtake the preceding vehicle, press the accelerator pedal to temporarily cancel the cruise mode. At this time, the cruise icon flashes green.

If the engine or engine related equipment malfunctions, then cruise control is completely deactivated and the master warning light turns on. When the master warning light turns on then the cruise control mode cannot be selected and the equipment cannot be operated until the engine control switch is temporarily put in the "LOCK" position.

Deactivate the cruise control by pressing the mode switch when the function is not to be used.

### Resuming Cruise Control




If cruise control is deactivated, the cruise control setting used before the deactivation will be recovered by pressing and then releasing the resume switch. Once the resume switch is released, the cruise control icon will come on in green on the DIC.

Also, the system will return to cruise control driving when the temporary deactivation condition is no longer met.

### Exhaust Brake Function for Cruise Control

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.

#### Models with Automatic Emergency Braking (AEB)

The exhaust brake will activate even when the exhaust brake switch is in the off position.

#### Models without Automatic Emergency Braking (AEB)

The exhaust brake will not activate if the exhaust brake switch is in the off position.

#### Automatic Activation and Release of the 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 speed.

## Adaptive Cruise Control

This system assists driving operations by allowing the driver to drive, without pressing the accelerator pedal, at a fixed speed following a preceding vehicle. While it is operating, press and hold the mode switch to change between cruise control mode and Adaptive Cruise Control mode. See *Cruise Control* ⇨ *223*

This function allows the driver to cruise at a fixed speed between approximately 20–75 mph (30–120 km/h) and distance from a vehicle ahead, without pressing the accelerator pedal. The dual camera detects the distance and speed difference between your vehicle and the vehicle ahead and accelerates or decelerates your vehicle in order to maintain the set distance from the vehicle ahead. When no vehicle is detected, the vehicle speed is maintained at the set speed. Using this system on highways and roads that do not require frequent starts and stops may reduce the chances of a collision.

**⚠ Warning**

This is not an autonomous driving system and is not intended to prevent collisions without driver input. Do not rely entirely on this system. It is your responsibility to drive with due care and attention and to maintain an adequate following distance.

This system is limited due to the following mechanical restrictions. Do not overly rely on this system and always drive safely while maintaining an adequate following distance:

- Smaller objects, such as motorcycles, may not be detected.
- Depending on the curves in the road, steering wheel operation, or the location of the vehicle within the lane, vehicles in adjacent lanes or objects in the areas around the road may be momentarily detected.
- On uphill or downhill slopes, vehicles in the forward direction may not be detected under certain circumstances.

(Continued)

**Warning (Continued)**

- Vehicles in the forward direction may not be correctly detected when in tunnels or if there are obstacles on the road shoulder such as sound insulation walls
- When the vehicle ahead is stopping at a traffic light or at the end of a line of cars in a traffic jam, the vehicle may not be detected properly.

Do not use Adaptive Cruise Control in the following situations (doing so can be dangerous):

- On roads where there is heavy traffic, such as urban areas
- On sharp curves or steep slopes
- In slippery road conditions, such as when the road is frozen or covered with snow
- When it is necessary to frequently accelerate and decelerate due to traffic conditions
- When driving repeatedly up or down steep slopes

(Continued)

**Warning (Continued)**

- When merging onto or exiting highways or when driving through toll booths

When it is raining, foggy, snowy or in any adverse weather, the traffic conditions often change significantly. In such situations, we ask drivers to drive safely on their own. Do not use the Adaptive Cruise Control and cruise control.

## Adaptive Cruise Control Operations

Adaptive Cruise Control will operate differently when a vehicle ahead has or has not been detected.

### When a Vehicle has Not Been Detected

Without pressing the accelerator pedal, the automatic cruising is performed at the set speed.

**When a Vehicle is Detected**

The following distance from a detected vehicle will be maintained, according to the selection made by the driver, as described below:

- When the vehicle ahead is slower than the set cruise speed, your vehicle automatically decelerates to match the vehicle ahead.
- When the vehicle ahead stops, your vehicle also decelerates and stops to match the vehicle ahead.
- When the vehicle ahead pulls away, when the driver presses the accelerator pedal or presses the resume switch on the steering wheel, your vehicle will also start and resume the set cruising speed.

When the accelerator pedal is pressed to overtake, or shorten the following distance to, a vehicle ahead, the pedal operation overrides the system. When this happens, the cruise control icon will flash. If the pedal is released, the vehicle will resume the set cruising speed and the icon will stop flashing.

**Resuming Cruise Driving After Stopping Behind a Detected Vehicle**

If Adaptive Cruise Control brings your vehicle to a stop behind a detected vehicle, Brake Hold will appear on the Driver Information Center (DIC). Choosing either of the following options, after the vehicle ahead has pulled away, will resume the set cruising speed:

- Lightly press the accelerator pedal
- Press the resume switch on the steering wheel

**⚠ Warning**

Always check the surrounding are before resuming cruise. It is your responsibility to drive with due care and attention.

"Brake Hold" does not refer to the parking brake and the system will not apply the vehicle parking brake. Before exiting the vehicle, the driver should always apply the parking brake.

When Brake Hold is displayed on the DIC, the brake is applied and the brake lights illuminate. At this time, even if the driver presses the brake pedal, Adaptive Cruise Control will not be deactivated.

When starting off the vehicle again by operating the resume switch, the vehicle will not resume moving forward unless the vehicle ahead has moved a minimum distance.

When Adaptive Cruise Control is temporally deactivated while Brake Hold is displayed on the DIC, the vehicle will remain stopped, but it is not possible to start off with the resume switch. Press the accelerator pedal continue driving. In addition, when any of the following operations are performed the Brake Hold function will be cancelled:

- Pressing the accelerator pedal to start off the vehicle
- Applying the parking brake
- Pressing the brake pedal
- Moving the selector lever to a different gear
- Pressing the Mode switch
- Pressing the Cancel switch

If Adaptive Cruise Control brings your vehicle to a stop behind a detected vehicle and that vehicle pulls away within three seconds after stopping, your vehicle will resume cruise automatically.

**When a Vehicle is No Longer Detected**

When a detected forward vehicle is no longer detected, your vehicle will accelerate up to the set speed and resume cruising.

### Example of Operation When Driving with Adaptive Cruise Control

1. The vehicle is constantly travelling at a set speed 47 mph (75 km/h).
2. When the system detects a vehicle ahead, the speed reduces from the set vehicle speed 47 mph (75 km/h) to the preceding vehicle's speed: 37 mph (60 km/h).
3. The system now maintains the following distance and follows the vehicle according to its speed.
4. When the preceding vehicle is no longer detected, the system will resume the set vehicle speed 47 mph (75 km/h) and travels at the speed constantly.

Other possible interactions with the vehicle ahead:

- The accelerator pedal can be used to override the system and increase vehicle speed, such as to pass a vehicle ahead. When the accelerator pedal is released, and no vehicle is detected ahead, the system resumes traveling at the set vehicle speed.
- When a preceding vehicle stops, the vehicle decelerates and stops – following the detected vehicle.
- After a detected vehicle has departed, your vehicle will also start moving when the accelerator pedal is pressed or the resume switch is operated, and resumes traveling following the detected vehicle.

### Systems Operating with Adaptive Cruise Control

**Forward Collision Alert**

The Forward Collision Alert operates simultaneously with Adaptive Cruise Control. Take the necessary action when a Forward Collision Alert appears. If a Forward Collision Alert sounds while the vehicle is in Adaptive Cruise Control Mode, that warning will be at the "High" volume setting, regardless of the actual setting shown in the DIC.

**⚠ Warning**

If "Keep distance from Preceding Vehicle" is displayed while driving with Adaptive Cruise Control activated, your vehicle may have gotten too close to the vehicle ahead. Press the brake pedal to increase the following distance and reduce the risk of a collision.

While using Adaptive Cruise Control, Forward Collision Alert will not operate in the following situations:

- When a vehicle is not detected
- When driving on sharp curve
- When the detected vehicle is driving at you

**Automatic Brake Control Function**

This function will apply the vehicle brakes or exhaust brake, respectively, while Adaptive Cruise Control is active to main the following distance selected by the driver.

**⚠ Warning**

Depending on the vehicle's loaded condition this function may not provide enough braking force to slow the vehicle and maintain the selected following distance. This function is designed to be an aid and does not relieve you of your responsibility to maintain a safe distance from the vehicle in front of you. You are responsible for controlling and stopping your vehicle at all times.

### Lane Departure Warning While Adaptive Cruise Control

The vehicle's Lane Departure Warning system (LDW) automatically turns "ON" when Adaptive Cruise Control is activated, even if LDW was set to "OFF".

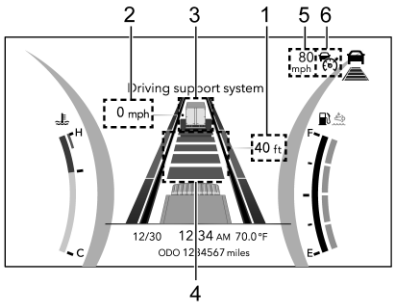
### Automatic Emergency Braking While Adaptive Cruise Control is Active

The vehicle's Automatic Emergency Braking system (AEB) automatically turns "ON" when the Adaptive Cruise Control is activated, even if AEB was set to "OFF".

When driving in Adaptive Cruise Control, if AEB is turned "OFF" in the setting menu on the DIC then the Adaptive Cruise Control is deactivated.

### Details of Adaptive Cruise Control Driver Information Center Displays

You can view the status of Adaptive Cruise Control by selecting the "Driving support system" screen in the DIC.




1. Indicates the distance between your vehicle and a detected vehicle in front of you.
2. Indicates the speed of the detected vehicle in front of you.
3. Indicates when a vehicle has or has not been detected. Indicates when Adaptive Cruise Control is active by illuminating a green frame.
4. Indicates the selected following distance, when ACC, Forward Collision Alert, or Automatic Emergency Braking are operating.
5. Indicates the set cruising speed.
6. Displays system settings and operation status for Full- Range Adaptive Cruise Control.

The detected vehicle's speed and your vehicle's speedometer may show different speeds based on system operating conditions.

When Adaptive Cruise Control is operating, the following information will appear on the Driver Information Center when the below conditions occur:

**Adaptive Cruise Control mode:** The Adaptive Cruise Control light and Driver assistance mode has changed displays when switching to Adaptive Cruise Control mode.

**Adaptive Cruise Control Mode Off:** The Adaptive Cruise Control light is gray.

**Standby:** The Adaptive Cruise Control light is white.

**Adaptive Cruise Control Active:** The Adaptive Cruise Control light is green.

**Cruise Control Temporarily Deactivated (Override):** The Adaptive Cruise Control light is flashing green. This may occur when the system is overridden, such as when the accelerator pedal is pressed.

**Cruise Control Temporarily Deactivated:** The Adaptive Cruise Control icon is white and Cruise control canceled displays when cruise control is operating and the cancel switch is pressed.

**Forward Collision Alert Display:** Attention. Keep distance from preceding vehicle will display when the following distance to the preceding vehicle is too short.

**Brake Hold:** Brake Hold will display when the vehicle stops following the preceding vehicle while ACC is active.

**Detected Vehicle Start Alert:** Preceding vehicle start will display when the vehicle stops following the preceding vehicle, then the detected vehicle starts again while ACC is active.

**Cruise Control Deactivated:** The Adaptive Cruise Control icon is gray and Cruise control canceled displays when cruise control is fully deactivated.

### Buzzer Sounds During Cruise Control

The Adaptive Cruise Control system will sound the buzzer to alert the driver under the following conditions:

**Operation Refusal Sound:** Two short beeps will occur.

**Operation Sound:** One short beep will occur.

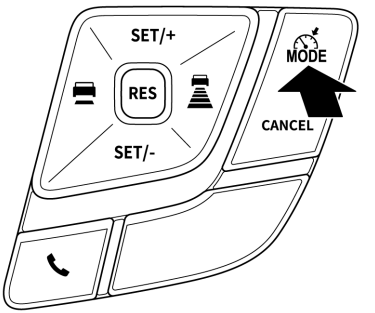
**Failure Sound:** Two short beeps will occur.

**Forward Collision Alert Warning Sound:** Three short beeps will occur.

**Canceling Sound:** Two short beeps will occur.

## Starting Adaptive Cruise Control

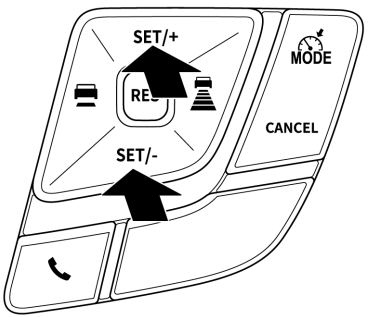
To start cruise control:




1. Press the mode switch and confirm Adaptive Cruise Control information appears on the DIC. If a set vehicle speed has been registered, then pressing the resume switch at this time starts cruise control driving.

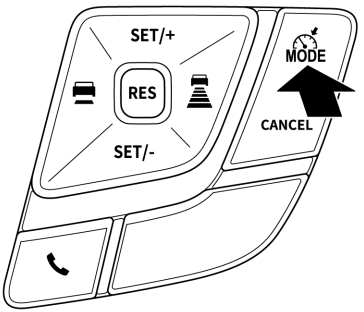
   Press and hold the mode switch to change between Adaptive Cruise Control and cruise control. There is a buzzer sound when they are switched. The cruise control mode cannot be switched while cruise control driving.

2. Press the accelerator pedal to adjust to your desired speed. The cruise control icon will appear white on the DIC to confirm the system is ready and the speed can be set.

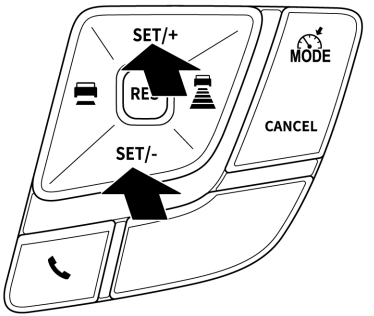


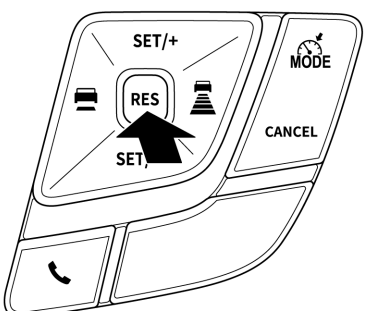

3. Press the + or − side of the set switch to set the vehicle speed and start cruise control. The set vehicle speed is displayed on the DIC.

### Setting Adaptive Cruise Control While Stopped




1. Press the mode switch and confirm that "Adaptive cruise control" appears in the Driver Information Center.
2. While a vehicle is detected, press the brake pedal and the cruise control icon will appear in white on the Driver Information Center.




3. Either press + or − to set the desired speed, or press resume to select the previously set speed.

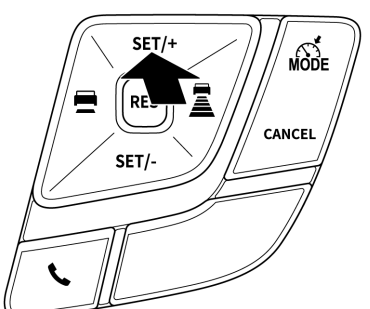
Once the vehicle speed is set, "Brake Hold" appears in the Driver Information Center, and Adaptive Cruise Control starts.

4. When Adaptive Cruise Control is operating, after the preceding vehicle pulls away, press the resume switch or press the accelerator pedal to pull away and start following the preceding vehicle.

Unlike Adaptive Cruise Control, it is not possible to start/set "Cruise Control" while the vehicle is stopped.

## Changing the Set Vehicle Speed

### To Accelerate



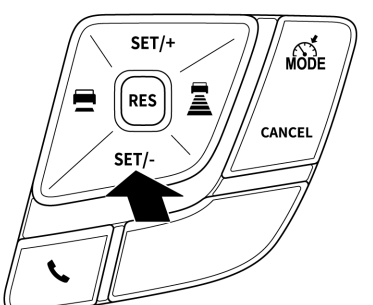

Pressing the + side of the set switch increases the cruise control set speed in the Driver Information Center and increases the vehicle cruising speed.

By pressing and immediately releasing the switch, the set vehicle speed can be increased by 1 mph (1 km/h) per operation.

By holding down the switch, the set vehicle speed can be increased in increments of 5 mph (5 km/h).

When you want to increase the speed quickly, press the accelerator pedal, then after accelerating to the desired speed, press the set switch.

### To Decelerate



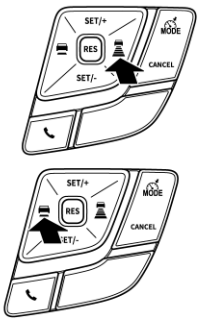

Pressing the – side of the set switch decreases the cruise control set speed in the Driver Information Center and decreases the vehicle cruising speed.

By pressing and immediately releasing the switch, the set vehicle speed can be decreased by 1 mph (1 km/h) per operation.

By holding down the switch, the set vehicle speed can be decreased in increments of 5 mph (5 km/h).

When you want to decrease the speed quickly, press the brake pedal to temporarily cancel cruise control, then after decelerating to the desired speed, press the set switch.

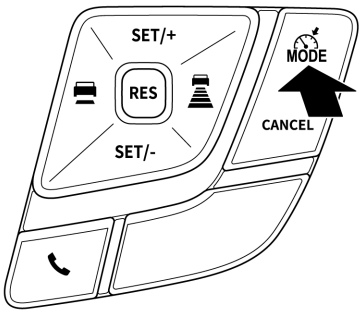
### When Setting the Desired Following Distance for Adaptive Cruise Control




The following distance can be increased by pressing the switch on the right, and decreased by pressing the switch on the left.

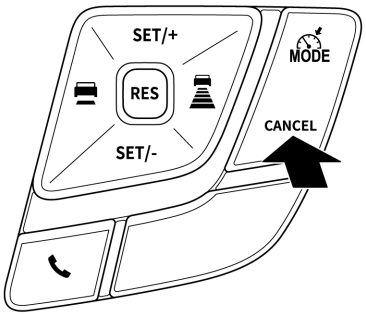
The following distance status is shown in 5 steps on the top right of the instrument cluster. The fewer bars highlighted, the closer the preceding vehicle or Forward Collision Alert setting.

### To Deactivate Adaptive Cruise Control




Press the mode switch to deactivate the system. At this time, a warning buzzer sounds and the cruise control icon on the Driver Information Center disappears.

### Temporarily Deactivating Adaptive Cruise Control



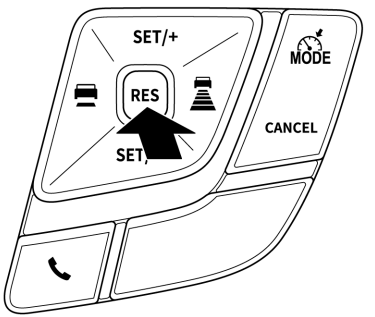

If the cancel switch is pressed, the Full- Range Adaptive Cruise Control will be temporarily deactivated. At this time, the Adaptive Cruise Control icon comes on in white on the Driver Information Center and Cruise control canceled will appear on the Driver Information Center for a few seconds. In addition, the function will also be deactivated in the following cases:

- When the brake pedal is pressed (except when the vehicle is stationary while following a detected vehicle)
- When the parking brake is applied
- When the exhaust brake is applied

- When any of the following warnings illuminate: front camera warning, check engine malfunction indicator light, brake system warning light.
- When the detected vehicle in front of you disappears from the dual camera's view (only while the vehicle is stationary while following a detected vehicle)
- When the driver side door is opened (only while the vehicle is stationary while following a detected vehicle)
- When the driver side seat belt is unfastened (only while the vehicle is stationary following a detected vehicle)
- When the select lever is placed in any position other than the D (Drive)
- When both the turn signal switch and the steering wheel are operated while traveling at a low speed (such as when turning right or left) (Only while Adaptive Cruise Control is active)
- When entering into a steep uphill/downhill

If there is an engine related malfunction, the Adaptive Cruise Control system will deactivate and the Master Warning Light will appear on the Driver Information Center. Promptly contact your nearest dealer for inspection.

**Resuming Adaptive Cruise Control**




If the Adaptive Cruise Control is temporarily deactivated, you may return to the speed/distance setting in place before the deactivation by pressing the Resume switch. Once the Resume switch is released, the Adaptive Cruise Control icon will come on in green on the Driver Information Center.

Also, the system will return to cruise control driving when the temporary deactivation condition is no longer met.

### When Adaptive Cruise Control Does Not Operate Properly

The Adaptive Cruise Control is one of the Advanced Driver Assistance Systems. It does not operate normally if there is a system abnormality.

- Depending on the vehicle's load conditions, or on the degree of the slope of a road, sufficient deceleration may not be achieved through use of the Adaptive Cruise Control system alone. If the following distance is shortened, press the brake pedal to maintain the safe following distance.
- Sufficient deceleration may not be possible through use of the Adaptive Cruise Control system alone when the vehicle ahead of you decelerates too quickly, or when another vehicle cuts in front of the vehicle. Do not rely entirely on the system. Always keep sufficient following distance appropriate for the traffic conditions and drive safely.

- The system may not detect the vehicle ahead of you if that vehicle is extremely tilted to one side (front to back or side to side) due to an uneven load.

## Advanced Driver Assistance Systems

The Advanced Driver Assistance System (ADAS) is a driving support system with multiple functions that can assist drivers in avoiding crashes and in some cases reducing the severity of, or damage in certain collisions.

**⚠ Warning**

The ADAS is not an autonomous driving/ collision avoidance system. When driving, always pay attention to your surroundings and drive safely.

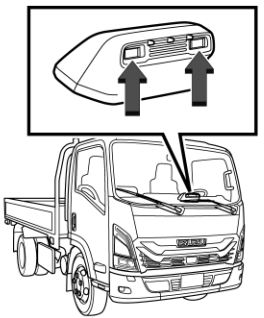
You are responsible for controlling your vehicle at all times. The system is designed to be an aid and does not relieve you of your responsibility to drive with due care and attention.

(Continued)

**Warning (Continued)**

Failure to follow the instructions in this Warning and in this section of the Owner's Manual could result in serious injury or death.

**Dual camera installation position**



The ADAS camera in this vehicle has two lenses and is located on top of the dashboard.

### Precautions for ADAS

In order to maximize the safety benefits provided by ADAS, pay close attention to the following warnings regarding how to ensure proper functioning of and avoid damaging the ADAS dual camera.

**⚠ Warning**

Keep the windshield clean. Excessive dirt, snow, ice or water build-up, and scratches or cracks, on the windshield may interfere with the proper functioning of ADAS.

When cleaning the inside of the windshield, cover the camera with a sheet of paper, a plastic bag, or other similar means. When doing so, be careful that the covering material does not touch the lens of the camera's lenses.

Use the heater and A/C to defog your windshield whenever necessary.

Inspect your windshield wipers regularly to ensure they wipe the windshield completely. If the wipers leave portions of the windshield unwiped or dirty, the

(Continued)

**Warning (Continued)**

camera system may not be able to properly detect objects in front of the vehicle and thus may not function properly.

Do not subject the camera to strong impacts.

Do not change the mounting position of, remove, or disassemble the camera. If the camera is removed or disassembled, have it inspected/repaired at your dealer.

If you need to change the size of your tires or replace the vehicle's leaf springs, consult your dealer. Failure to do so could result in the camera being off-center and the vehicle's ADAS not functioning properly.

Do not cover the heat vent at the bottom of the camera.

Do not place any objects on the top of the dashboard, in front of or on the camera. They may cause damage to the camera, stop the camera operation, or reflect off the windshield and be erroneously recognized as objects in the road.

Do not apply stickers, etc., to the area of the windshield in front of the camera lenses.

(Continued)

**Warning (Continued)**

Do not make the camera dirty or damage it.

Ensure that no liquids spill on the camera.

Do not clean or touch the camera lenses.

Do not use any glass coating agents on the windshield.

Do not replace the windshield with anything other than a genuine GM windshield. Replacing the windshield with anything other than a genuine GM part may prevent the system from operating normally. Please note that GM cannot guarantee the performance of any non-genuine windshield glass.

To repair or replace the windshield or if you have any concerns with the functioning of your ADAS dual camera, contact your nearest dealer.

### When There Is a Problem in the ADAS

The following ADAS functions stop operating if the dual camera has a problem or stops working:

- Automatic Emergency Braking (AEB)
- Forward Collision Alert (FCA)
- Forward Vehicle Start Notication
- Mis-Acceleration Mitigation System
- Adaptive Cruise Control (ACC)
- Lane Departure Warning (LDW)
- Driver Attention Assist

If the camera has a problem or stops working, the following warning lights and messages will appear on the Driver Information Center:

**Front Camera Unavailable Warning Light**

This message appears on the Driver Information Center and the camera temporarily stops functioning if:

- The camera lenses are dirty.
- The windshield (inside and/or outside) is dirty.
- The front side of the camera is blocked by an object.
- The camera is too hot or too cold.
- The dual camera's power supply voltage is low.

If the above warning light and messages appear on the Driver Information Center do the following:

- If the camera lenses are dirty, contact your nearest dealer. Do not attempt to clean the camera lenses yourself.
- Clean the windshield (inside and/or outside).
- Remove the object blocking the camera view.
- Wait until the camera reaches its operating temperature.
- Wait until the dual camera's power supply voltage reaches the level that allows the camera to operate.

If the above warning light and messages continue to appear on the Driver Information Center after you have taken the above measures, promptly have the vehicle inspected/ serviced at the nearest dealer.

Under circumstances where it is difficult for the camera to obtain parallax images (e.g. in the dark, backlight, strong sunlight, rain, snow, fog), the "Front camera unavailable" warning message may be displayed.

Under the following conditions, the "Front camera unavailable" message may not appear even if the camera stops functioning:

- The vehicle speed is 9 mph (15 km/h) or less
- The movement of the target cannot be recognized during a turn
- It is hard to recognize the target due to poor visibility caused by rain, snow, or other similar reasons at a vehicle speed of 9 mph (15 km/h) or more

**Front Camera Failure Warning Light**

If this warning light and messages appear on your Driver Information Center, your ADAS dual camera has malfunctioned. Promptly contact your nearest dealer.

**Master Warning Light**

See *Master Warning Light* ⇨ 72.

## Forward Collision Alert (FCA) System

The system's dual camera measures the distance between your vehicle and the vehicle in front of you and in the same lane, and uses messages in the Driver Information Center and audible warnings to alert the driver when you are excessively close to the other vehicle.

**Forward Collision Alert Operation**

The Forward Collision Alert function starts and continues operating at the previously set buzzer volume and following distance.

When the vehicle approaches a vehicle in front of it that is detected by the dual camera and the following distance is to close, the driver needs to operate the brakes, the Driver Information Center shows the Forward Collision Alert and the buzzer sounds.

**⚠ Warning**

A warning buzzer may sound if you are too close to the vehicle in front of you. If you do not increase your distance from the vehicle before passing, AEB may automatically apply the brakes.

The Forward Collision Alert is not displayed and the warning buzzer does not sound in the following situations:

- When the brake pedal is pressed

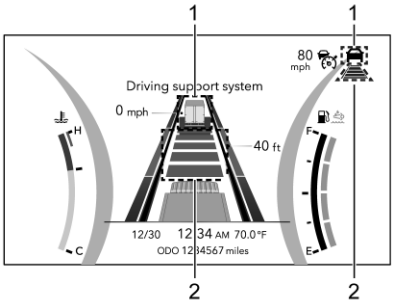
(Continued)

**Warning (Continued)**

- While your own vehicle is stopped
- When there is a vehicle driving towards the front of your vehicle
- When the distance between your vehicle and the vehicle in front of you in the same lane is far enough that the system's dual camera is unable to measure
- When driving on sharp curves
- When your vehicle is in reverse

### Forward Collision Alert Warnings/Indicators

From the Driving support system screen on the main display you can view the following distance setting and detected vehicle status.




1. This indicator alerts the driver when a vehicle has or has not been detected.
2. This displays the Following Distanced selected vehicle

See *Vehicle Ahead Indicator* ⇨ *78*.

When the Forward Collision Alert System is operating, the following information will appear on the Driver Information Center when the below conditions occur:

**When a vehicle ahead is detected:** The Vehicle Ahead Indicator is white.

**When there is no detected vehicle ahead:** The Vehicle Ahead Indicator is black.

**Forward Collision Alert:** The following distance to the vehicle ahead is too short. The Vehicle Ahead Indicator is white and Attention. Keep distance from Preceding Vehicle is displayed.

#### Forward Collision Alert Buzzers

When the following conditions occur the buzzer will sound an alert:

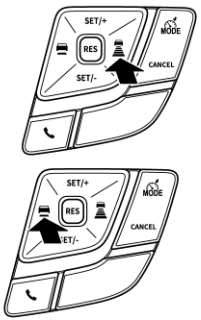
**Operation Refusal Sound:** Two short beeps will occur.

**Operation Sound:** One short beep will occur.

**Failure Sound:** Two short beeps will occur.

**Forward Collision Alert Warning Sound:** Three short beeps will occur.

### Setting the Following Distance




The following distance can be increased by pressing the switch on the right, and decreased by pressing the switch on the left.

When the following distance setting switch is operated, a short beep sound can be heard.

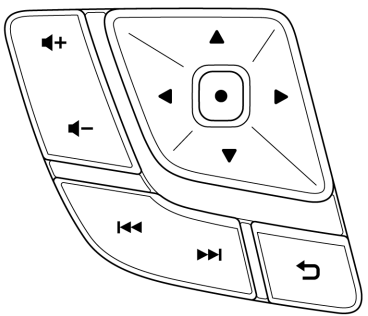
If the following distance setting is at the minimum and you operate the left side, or if the following distance setting is at the maximum and you operate the right side, rather than the normal switch operation sound, the operation rejected buzzer sounds.

Following distance at which the warning sounds may vary depending on differences in speed with the vehicle in the forward direction.

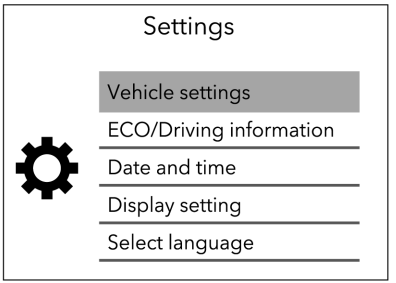
After the engine has been started, Forward Collision Alert has the same settings as when the engine control switch was last set to the "LOCK" position.

### Adjusting the Forward Collision Alert Volume

From the "Vehicle settings" screen on the Driver Information Center, you can adjust the volume of the Forward Collision Alert buzzer:



1. Press "LEFT" or "RIGHT" on the Driver Information Center switch until the "Settings" screen appears in the Driver Information Center.




2. On the setting screen, select in order, Vehicle settings > Driver assist functions in front > Forward Collision Alert > Volume settings.
3. Press either "UP" or "DOWN" on the Driver Information Center switch to select the volume preference ("Mute" (no sound), "Low", "Medium" or "High") and then confirm your selection by pressing "ENTER".

When the warning volume is set to "Mute" and the cruise control or Adaptive Cruise Control is activated, the warning volume changes to "High".

### When the Forward Collision Alert Does Not Operate Properly

The Forward Collision Alert function is one of the Advanced Driver Assistance Systems. It does not operate normally if there is a system abnormality.

### Forward Vehicle Start Notification

The Forward Vehicle Start Notification Function alerts the driver with a warning sound an indication on the Driver Information Center if your vehicle remains stopped for a while after a detected vehicle directly (within 45 ft (14 m)) ahead of you has departed.

**⚠ Warning**

Do not rely entirely on the Forward Vehicle Start Notification alerts. Always confirm the vehicle and area ahead is clear and it is safe to move your vehicle.

The Forward Vehicle Start Notification function does not have the ability to check traffic lights or road signs. It is your responsibility to drive with due care and attention.

#### Forward Vehicle Start Notification Operations

When not driving with Adaptive Cruise Control, When the preceding vehicle starts and your vehicle does not start within about 16 ft (5 m), the Driver Information Center shows Preceding vehicle start. At this time, a buzzer sounds.

When Adaptive Cruise Control is activated and has stopped you behind a detected vehicle, and that vehicle begins to drive away, the Preceding vehicle start message will appear in the Driver Information Center and a warning buzzer will sound. After confirming the area ahead is clear, press the Resume Switch or press the accelerator pedal to return to Full-Range Cruising.

#### Forward Vehicle Start Notification Warnings/Indicators

When the Forward Vehicle Start Notification is operating, the following is shown on the Driver Information Center:

**When there is no detected vehicle ahead:** The Vehicle Ahead Indicator is black.

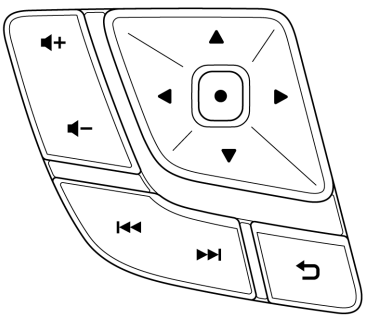
**When a vehicle ahead is detected:** The Vehicle Ahead Indicator is white.

**Forward Collision Alert:** Your vehicle has not moved after the detected vehicle ahead has started to drive away. The Vehicle Ahead Indicator is white and Preceding vehicle start is displayed.

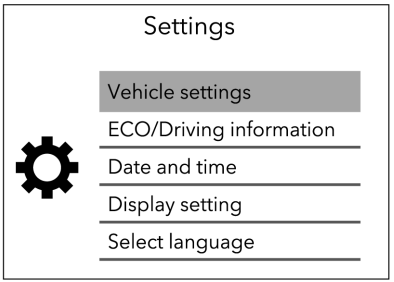
A buzzer will sound when a vehicle ahead is detected and then again when not detected. This sound can be turned off in the "Vehicle settings" of the Driver Information Center.

#### Turning the Forward Vehicle Start Notification Function On and Off

The Forward Vehicle Start Notification Function can be turned ON and OFF using the Driver Information Center switch:



1. Press "LEFT" or "RIGHT" on the Driver Information Center switch until the "Settings" screen appears in the Driver Information Center.

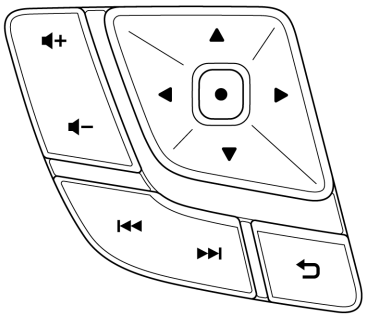



2. On the setting screen, select in order, Vehicle settings > Driver assist functions in front > Preceding vehicle information > Vehicle start information.
3. Press either "UP" or "DOWN" on the Driver Information Center switch to select "ON" or "OFF" and then confirm your selection by pressing "ENTER".

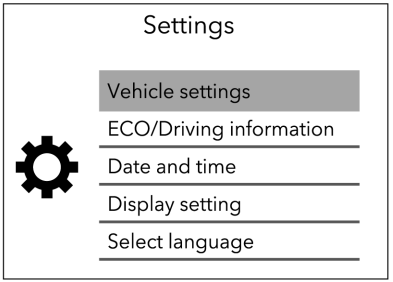
This selection will be saved even after the engine control switch is turned to the "LOCK" position.

**Adjusting the Vehicle Detection Sound**

You can adjust the vehicle detection sound using the Driver Information Center switch:



1. Press "LEFT" or "RIGHT" on the Driver Information Center switch until the "Settings" screen appears in the Driver Information Center.




2. On the setting screen, select in order, Vehicle settings > Driver assist functions in front > Preceding vehicle information > Vehicle detection sound.
3. Press either "UP" or "DOWN" on the Driver Information Center switch to select "OFF", "detected" or "detected & lost" and then confirm your selection by pressing "ENTER".

**Automatic Deactivation of the Forward Vehicle Start Notification Function**

The Forward Vehicle Start Notification Function is automatically deactivated under the following conditions. The system will not operate even if the detected vehicle ahead drives away:

- When the selector lever is moved to the R (Reverse) position
- When the parking brake is engaged
- When the driver presses the accelerator pedal or shifts into gear to pull away

**When the Forward Vehicle Start Notification Function Does Not Operate Normally**

The Forward Vehicle Start Notification Function is one of the Advanced Driver Assistance Systems. It does not operate normally if there is a system abnormality.

In the following situations, this function may activate when the detected vehicle ahead does not pull away, or this function may not activate when the detected vehicle ahead pulls away:

- When a motorcycle cuts between your vehicle and the detected vehicle ahead
- When the vehicle ahead is difficult to detected due to bad weather (such as rainstorms, blizzards, or snow)
- When stopped on sharp curves or undulating roads
- When the dual camera no longer detects the vehicle ahead

**Mis-Acceleration Mitigation System**

The Mis-Acceleration Mitigation system restricts engine output and alerts the driver if the system determines the accelerator pedal is pressed more than needed (such as by accident, while the vehicle is stopped and the dual camera detects an obstacle) in an attempt to mitigate collision damage.

**⚠ Warning**

Do not rely entirely on the Mis-Acceleration Mitigation system. Always check the selector lever position, pedals and the area around your vehicle before driving. It is your responsibility to drive with due care and attention.

The Mis-Acceleration Mitigation system does not keep the vehicle stopped.

The Mis-Acceleration Mitigation system does not enable the vehicle to start moving slowly in all situations. Also, it is not intended to be used for avoiding collisions.

(Continued)

**Warning (Continued)**

The Mis-Acceleration Mitigation system only operates when the dual camera has detected an object. It cannot operate when an object is not detected.

Do not intentionally press the accelerator pedal farther or for longer than needed. A collision may still occur.

If you need to move the vehicle while an object is detected, continue pressing the accelerator pedal or press the cancel switch to temporarily deactivate the Mis-Acceleration Mitigation system.

Do not attempt to cause the Mis-Acceleration Mitigation system reduce engine power. The system may not operate, depending on the conditions, resulting in a collision.

Be sure to set the Mis-Acceleration Mitigation system to off in the following cases:

- When the vehicle is being towed
- When the vehicle is transported by a car carrier

- When the vehicle passes through a vinyl curtain, etc.
- When the vehicle drives on a riverbed, in overgrown bushes or woods

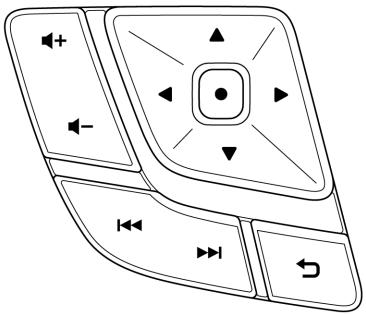
**Mis-Acceleration Mitigation System Operations**

When the system determines the accelerator pedal is pressed more than necessary to move the stopped or slow moving (less than 6 MPH (10km/h)) vehicle while the dual camera has detected an object, the engine output is restricted, the warning buzzer will sound and Pedal misapplication! will appear on the Driver Information Center.

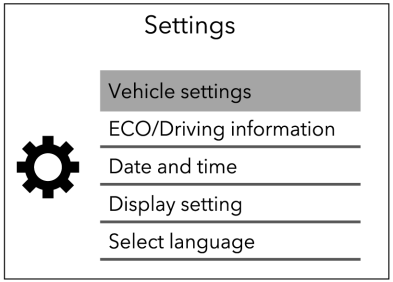
To cancel the Mis-Acceleration Mitigation system while it is operating, press the cancel switch.

**Turning the Mis-Acceleration Mitigation System On and Off**

The Mis-Acceleration Mitigation system can be turned On and Off using the Driver Information Center switch:



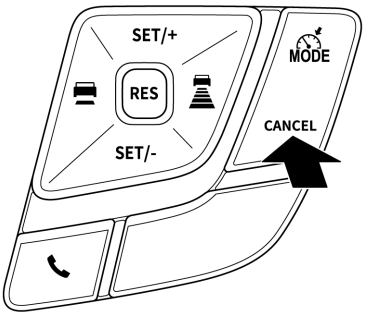
1. Press "LEFT" or "RIGHT" on the Driver Information Center switch until the "Settings" screen appears in the Driver Information Center.




2. On the setting screen, select in order, Vehicle settings > Driver assist functions in front > Misacceleration Mitigation.
3. Press either "UP" or "DOWN" on the Driver Information Center switch to select "ON" or "OFF" and then confirm your selection by pressing "ENTER".

Even if it is turned off in the vehicle settings, the Mis-Acceleration Mitigation system is turned on again when the engine is restarted.

**Temporarily Deactivating the Mis-Acceleration Mitigation System**




Pressing the Cancel switch while the Mis-Acceleration Mitigation system is operating will temporarily deactivate the system. Once you fully release the accelerator pedal the system automatically resumes normal operation.

The Cancel switch will turn "OFF" the Mis-Acceleration Mitigation system only temporarily. To keep the system "OFF", change the settings for the system in the Driver Information Center.

**Automatic Deactivation of the Mis-Acceleration Mitigation System**

The Mis-Acceleration Mitigation system is automatically deactivated under the following conditions. The system will not operate even when there is a possibility of a collision:

- When the cancel switch has been pressed to cancel the Mis-Acceleration Mitigation system
- When the accelerator pedal is released
- When the turn signal switch is operated
- When the steering wheel is operated suddenly or violently
- Approximately 10 seconds after starting the engine
- When starting or driving slowly on a steep uphill or downhill slope
- When the system has malfunctioned
- When the gear position is P (Park), R (Reverse), or N (Neutral)

**When "Acceleration suppressed" Appears in the Driver Information Center**

In the following cases, when the Mis-Acceleration Mitigation function is automatically canceled, the vehicle may start suddenly. To prevent this, the engine power is temporarily limited, but is gradually restored. When this happens, "Acceleration suppressed" appears on the Driver Information Center.

- When the system has temporarily malfunctioned
- When the accelerator pedal is pressed for 3 seconds or more
- When your vehicle speed exceeds approximately 12 mph (20 km/h) while the function is operating
- When the preceding vehicle separates from your own vehicle
- When the preceding vehicle is gone
- When the preceding vehicle is replaced by a new preceding vehicle

**When the Mis-Acceleration Mitigation System Does Not Operate Normally**

The Mis-Acceleration Mitigation System is one of the Advanced Driver Assistance Systems. It does not operate normally if there is a system abnormality.

The Mis-Acceleration Mitigation system may not operate in the following situations:

- When obstacles located in the forward direction are difficult to detect due to bad weather (such as rainstorms, blizzards, or snow)
- When visibility is not adequate due to sand or smoke
- When approaching an obstacle in the dim light of early evening or morning, or at night
- When approaching an obstacle in a dark place, such as an indoor parking lot
- When there is an obstacle outside the range of the headlights' illumination
- When the vehicle is subject to strong light from the forward direction (backlight from sunlight, high beam, etc.)
- When the windshield is foggy, or when snow, frost, dust, and/or other similar substances are on the windshield
- When there is an abnormal condition with the windshield, such as scratches or cracks
- When the windshield is not sufficiently wiped during or after using the windshield washer
- When the stereo camera cannot properly recognize an obstacle because it is blocked by raindrops, water drops from the windshield washer, or wiper blades
- When a load on the roof, such as a ladder or other long objects, blocks the stereo camera's field of view
- When the height of an obstacle is low (low walls, low guardrails, low-height vehicles, small animals, small children, etc.)
- When an obstacle is smaller than the stereo camera recognition limits for size
- A pedestrian crouching or lying down, etc.
- When the nearest surface or rear surface of an obstacle or vehicle ahead is small
- When the vehicle gets too close to an obstacle
- When the vehicle is 13 ft (4 m) or more away from an obstacle
- When the obstacle is a fence, or a wall with a uniform pattern (such as a striped pattern or bricks) or wall or shutter with no pattern, etc.
- When the obstacle is a glass/mirror wall or door, etc.
- When the obstacle, such as a vehicle, a motorcycle, a bicycle, or a pedestrian, suddenly cuts in front of your vehicle or jumps out from the side
- When you pull away and change lanes at the same time too close to an object in front of your vehicle.
- When driving on sharp curves or steep slopes
- When the vehicle is tilted due to a heavy load
- When the obstacle is shaped like a pole, such as a road sign, street light, utility pole, or tree
- When only a part of the obstacle is within the detection range of the stereo camera

- When the system determines that the driver has performed operations to avoid a collision based on the state of steering wheel operations

In the following situations, the Mis-Acceleration Mitigation may operate even when there is no possibility of collisions:

- Before a parking lot or railway crossing barrier is completely raised up
- When passing through a cloud of water vapor or smoke
- In bad weather (such as rainstorms, blizzards, or snow)
- When there is an obstacle or vehicle at a curve or in an intersection

## Automatic Emergency Braking (AEB)

This system automatically applies the brakes when the dual camera detects an object in front of you with which your vehicle could possibly collide. This may help the driver avoid or limit the severity of the collision.

In order to maximize the safety benefits provided by AEB, pay close attention to the following warnings.

**⚠ Warning**

You are responsible for controlling and stopping your vehicle at all times. AEB is designed to be an aid and does not relieve you of your responsibility to drive with due care and attention.

Do not overly rely on AEB. When driving, always pay attention to your surroundings and drive safely.

In order to maximize the performance of AEB, always load your cargo evenly from side to side and front to rear. If the cargo is not evenly loaded or the vehicle is tilting excessively, AEB performance may be adversely affected.

In the following situations, be sure to turn off AEB:

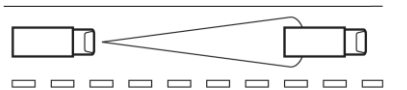
- When the vehicle is going to be towed or loaded onto carrier
- When using a speed tester or brake tester
- If the tire pressure in one or more of the vehicle's tires is too high or too low

(Continued)

**Warning (Continued)**

- If one or more of the vehicle's tires are extremely worn or not the correct (specified) size
- If an object that blocks the camera's field of view is installed on the windshield or vehicle
- If tire chains are installed
- If your vehicle has been in an accident that may have affected or damaged the AEB system

### AEB Operation



1. Obstacles located in the forward direction are detected, and the driver notified to apply the brakes. The Driver Information Center (DIC) will Display Warning. Brake!. Short repeated beeps will sound.

2. Obstacles are located so close to your vehicle in the forward direction that there is a strong possibility of a collision, and AEB automatically applies the brakes. The DIC will display Brake!. Beeps will sounds rapidly and continuously. The rear brake lights will come on.

**⚠ Warning**

The AEB warning buzzer may sound if you are to close to the vehicle in front of you when you attempt to pass it. If you do not increase your distance from the vehicle before passing, AEB may automatically apply the brakes.

You may hear a noise while AEB is operating. This is caused by AEB controller and does not indicate a malfunction.

### AEB Operating Conditions

All of the following conditions must be met for AEB to operate:

- The engine control switch is in the "ON" position.
- The vehicle is moving the forward direction at a speed of approximately 6 mph (10 km/h) or higher.
- Neither Front camera failure nor Front camera unavailable is shown in the Driver Information Center.
- AEB OFF indicator light is not on.

#### Recognizing Pedestrians and Bicycles

AEB recognizes pedestrians based on their size, form, and movement. Recognition is only possible when the contours of the pedestrian's head and shoulders are clear, and the right-left balance is symmetrical.

**⚠ Warning**

AEB may not recognize pedestrians, bicycles or bicycle riders:

- When a pedestrian is walking in a group.
- When a pedestrian/bicycle rider is near a wall or another obstacle.
- When a pedestrian/bicycle rider is holding an umbrella or something similar.

(Continued)

**Warning (Continued)**

- When the color of the pedestrian's/ bicycle rider's clothes is similar to the background and they blend into the landscape.
- When a pedestrian is carrying large luggage.
- When a pedestrian is slouching, crouching, or lying down.
- When a pedestrian/bicycle rider is in a dark place.
- When a pedestrian runs out suddenly from the side.
- When the bicycle is a special shape, such as a child's bicycle, is carrying a large load, or is carrying multiple people
- When the pedestrian's/bicycle's height is less than 1 m (approximately 3.3 ft) or more than 2 m (approximately 6.6 ft)
- When the outline of a pedestrian's/ bicycle rider's body is vague, such as when the pedestrian/rider is wearing a raincoat or long skirt

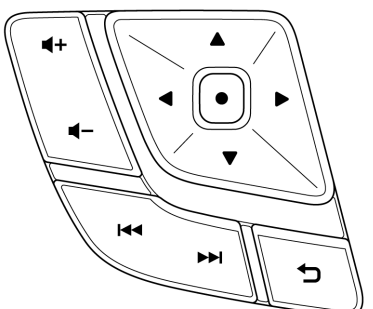
(Continued)

**Warning (Continued)**

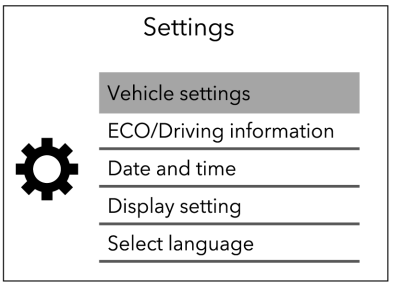
- When a pedestrian/bicycle rider is moving very fast
- When a pedestrian is pushing a stroller, wheelchair, bicycle, etc.

### Turning AEB ON and OFF

AEB can be turned OFF and ON by following these steps:



1. Press "LEFT" or "RIGHT" on the Driver Information Center switch until the "Settings" screen appears in the Driver Information Center.




2. On the setting screen, select in order, Vehicle settings > Driver assist functions in front > Advanced Emergency Brake.
3. Press either "UP" or "DOWN" on the Driver Information Center switch to select "ON" or "OFF" and then confirm your selection by pressing "ENTER."

AEB always turns "ON" after the engine is started.

### AEB OFF Indicator Light

The indicator light comes on when AEB is set to "OFF." Also, it comes on if AEB stops due to an AEB malfunction.

After the engine stops due to engine stalling, it is not abnormal if AEB OFF indicator light comes on momentarily when the engine is restarted.

### AEB Deactivation

AEB will not operate or will be automatically deactivated under the following conditions:

- When you have turned manually off AEB and/or AEB OFF indicator light is illuminated.
- When a turn signal is on (except when AEB is applying the brakes)
- When the accelerator pedal is released and then pressed forcefully
- When an occupant presses the brake pedal (except when AEB is applying the brakes)

- When AEB detects an abnormality in the system
- For approximately 10 seconds after the engine is started
- After AEB has operated (automatically applied the brakes) 3 times during a single trip, (i.e. between the time the engine control switch is turned on and off), AEB and all other Advanced Driver Assistance Systems that require the dual camera to operate will automatically deactivate.

**⚠ Warning**

After AEB has operated (applied the brakes) 3 times during a single trip (i.e. between the time the engine control switch is turned on and turned off), AEB and Lane Departure Warning (LDW) will automatically deactivate. "Front camera unavailable" will appear on the instrument display, and the AEB OFF indicator light and the LDW OFF indicator light will illuminate. To reactivate AEB and LDW, you must turn off the engine and then restart it.

### When AEB May Not Operate Normally

AEB is one of the Advanced Driver Assistance Systems. It may not operate correctly if the system has a problem.

In the following situations, AEB may not operate normally:

- When driving on sharp curves or undulating roads
- When driving on slippery roads (e.g., icy or snow-covered)
- When pedestrians suddenly run out into the street
- When other vehicles suddenly cut in front of your vehicle
- When obstacles located in the forward direction are difficult to detect due to bad weather (rainstorms, blizzards, snow, fog)
- When vehicle movement is irregular (skidding, hydroplaning, etc.)
- When the steering wheel is turned sharply
- When the suspension has been modified
- If the headlights are not on (or not functioning) at night or in a tunnel
- If the taillights of the vehicle in front of your are not on at night or in a tunnel
- When a vehicle or pedestrian is outside of illumination range of the headlights at night or in a tunnel
- When the dual camera receives a strong light from the forward direction (such as a bright reflection of sunlight or high beams from an oncoming vehicle)
- When the camera cannot recognize the rear of the vehicle in front of you (e.g., flat bed body with no load or no side or rear gates, a load sticking out, an extremely low vehicle height, etc.)
- When the vehicle's tires are worn or have a significant difference in wear
- When tire chains are installed

In the following situations, AEB may operate even when there is no possibility of collision:

- When the vehicle suddenly comes in close proximity to another vehicle in the forward direction
- When a detected pedestrian quickly moves out of the vehicles path

- When a vehicle traveling in a straight line comes to a curve or turn in which an obstacle is located in the forward direction
- When the vehicle is turning in an intersection, etc., and comes in close proximity with an opposing vehicle
- When the road has a very narrow or no shoulder and the vehicle is driven in close proximity to structures such as a guard rail or windbreak wall
- When driving through tunnels, under railway bridges or overpasses, or when going through highway toll booths
- When the suspension has been modified
- When driving on a road with extreme changes in grade or incline
- When driving in a blizzard or in a heavy snow fall
- When passing through vapor, smoke or exhaust gases from a vehicle in front of you
- When the vehicle passes through an area where it comes in contact with hanging banners/flags, drooping branches, or bushes, etc.
- When tires that are not the designated size are installed

- When exhaust gas of the vehicle in front of you blocks the dual cameras view of that vehicle

In the following situations, sufficient braking power may not be possible and the system may not be fully effective:

- When braking force is insufficient because the brake parts are extremely cold, hot, wet, etc.
- When the maintenance conditions of the vehicle are not good, such as worn brake parts and/or tires, and low tire air pressure
- When driving on slippery road surfaces or gravel roads
- When the intersection has a special shape

## Driver Attention Assist

Driver Attention Assist is a function intended to increase the driver's awareness that their ability to concentrate on driving may be impaired. If this system determines that the vehicle is weaving inside the lane, a buzzer will sound and the message shown on the Driver Information Center will encourage the driver to "Take a break".

**⚠ Warning**

You are responsible for controlling your vehicle at all times. The system is designed to be an aid and does not relieve you of your responsibility to drive with due care and attention.

Driver Attention Assist does not correct the vehicle's weaving. Expecting Driver Attention Assist to do the driving for you may result in you having an accident.

(Continued)

**Warning (Continued)**

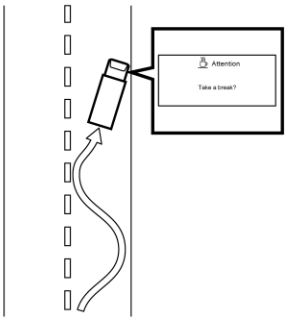
If the dual camera cannot detect the lane, temporarily stops working (i.e. the camera is blocked) or malfunctions, Driver Attention Assist will not operate.

Weaving cannot be detected immediately. The system requires a few minutes of driving time (data) to recognize the vehicle is weaving.

The buzzer and instrument disply may continue briefly after the weaving condition has stopped.

If your ability to concentrate on driving is impaired, because you are tired or cannot focus, we recommend taking a rest.

## When Driver Attention Assist Is Operating

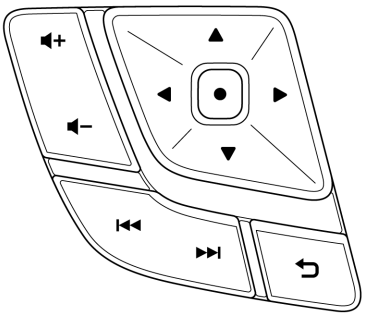



**Driver Attention Assist warning**

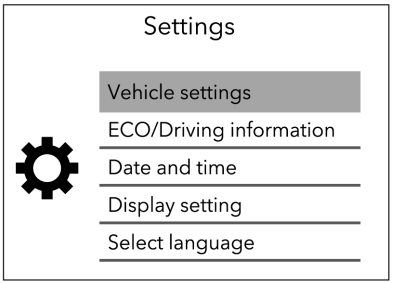
This function operates when the vehicle is moving at least 43 mph (70 km/h) and the lane of the road is detected. When a weaving condition is detected, a warning message appears on the instrument display and a buzzer will sound.

## Turning ON and OFF the Driver Attention Assist

The Driver Attention Assist function can be turned On and Off using the Driver Information Center switch:



1. Press "LEFT" or "RIGHT" on the Driver Information Center switch until the "Settings" screen appears in the Driver Information Center.




2. On the setting screen, select in order, Vehicle settings > Driver monitoring> Attention assist.
3. Press either "UP" or "DOWN" on the Driver Information Center switch to select "Fast" or "Standard" and then confirm your selection by pressing "ENTER".

The Driver Attention Assist function will reset to "ON" whenever the vehicle is restarted after being turned off.

### When Driver Attention Assist Does Not Operate Properly

The Driver Attention Assist function is one of the Advanced Driver Assistance Systems. It does not operate normally if there is a system abnormality.

In the following situations, the Driver Attention Assist function may not operate normally:

- When driving on continuous curves
- When the vehicle speed fluctuates extremely
- Immediately after changing lanes

## Lane Departure Warning (LDW)

The Lane Departure Warning System uses the dual camera to detect the vehicle's position with respect to a lane. When the vehicle is about to deviate or has departed from its lane (depending on the setting selected), a warning buzzer will sound and indicators will appear on the Driver Information Center (DIC) to reduce the risk of an accident. This system operates only at speeds of approximately 37 mph (60 km/h) and above.

**⚠ Warning**

LDW is designed to support driving within the lanes, and is not meant as a substitute for paying attention to the road or keeping your hands on the wheel. Always keep your hands on the steering wheel and drive safely.

### LDW Operating Conditions

All of the following conditions must be met for LDW to operate:

- LDW OFF indicator light is not on.
- Neither Front camera failure nor Front camera unavailable is shown in the DIC.
- The vehicle speed is above approximately 37 mph (60 km/h).
- Lane markers can be recognized by the dual camera.

LDW will not operate for approximately the first 10 seconds after the engine is started.

If the vehicle is parked in the sun for an extended period of time, LDW may not operate immediately after the vehicle is started, but

this is normal. The dual camera will resume operation once the temperature around it has returned to a normal level.

LDW warnings will be temporarily disabled in the following situations:

- One of the turn signals is on
- The steering wheel is turned with a force necessary to make a lane change
- When driving on sharp curves
- The vehicle speed is above approximately 37 mph (60 km/h).
- The lane markers cannot be detected while driving

### LDW OFF Indicator Light

The light will come on when LDW function is turned off or when there is an LDW malfunction.

If the light does not turn off, stays illuminated even though LDW has not been turned off, or does not illuminate when the engine control switch is turned to the "ON" position, contact your nearest dealer.

### Details of LDW Driver Information Center Displays

See *Lane Departure Warning (LDW) Light* ⇨ 77.

Depending on LDW status, the following will be shown on the DIC:

**LDW OFF:** When LDW is turned of using LDW switch, the Lane Departure Warning Indicator is not present in the DIC.

**LDW ON:** When LDW is operating, the Lane Departure Warning Indicator is present in the DIC.

**Warning display:** When LDW senses that the vehicle is departing its lane, flashes, and issues a warning sound from the side of the lane departure.

**Vehicle lane cannot be detected:** When the camera cannot detect the vehicle lane or the vehicle speed is below approximately 37 mph (60 km/h), the Lane Departure Warning Indicator is not present in the DIC.

#### LDW Warning

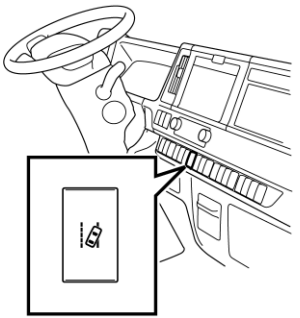
When LDW detects the vehicle is about to deviate or has departed from the lane (depending on the settings), it sounds warning buzzers and displays indicators under the following conditions:

**Fast Warning Timing:** A warning buzzer sounds when the vehicle tire comes close to or contacts the lane marker. There is a repeated beep in the direction of the lane departure, and the Lane Departure Warning Indicator flashes in the direction of the lane departure.

**Standard Warning Timing:** A warning buzzer sounds when the vehicle tire contacts or crosses over the lane marker. There is a repeated beep in the direction of the lane departure, and the Lane Departure Warning Indicator flashes in the direction of the lane departure.

LDW warning will sound if the driver changes lanes without operating the turn signal switch.

### Turning ON and OFF LDW System



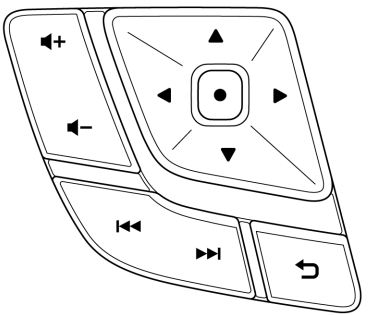
**LDW OFF indicator light**

Use LDW switch to turn LDW off. Pressing and holding LDW switch switches the lane departure warning between "ON" and "OFF." When the Lane Departure Warning System is stopped, LDW OFF indicator light comes on.

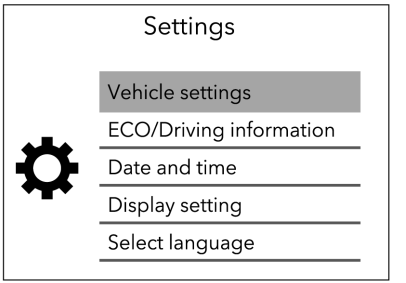
If the engine is turned off when LDW is also off, LDW will automatically turn "ON" at the last selected setting when the engine is restarted.

### Changing the Warning Timing of LDW

From the "Vehicle settings" screen on the DIC, you can change the timing for the lane departure warning:



1. Press left or right on the DIC switch until the "Settings" screen appears in the DIC.




2. On the setting screen, select in order, Vehicle settings > Driver assist functions for side > Lane departure warning > Warning timing.
3. Press either up or down on the DIC switch to select "Fast" or "Standard" and then confirm your selection by pressing "ENTER."

This selection will be saved even after the engine control switch is turned to the "LOCK" position.

### When LDW May Not Operate Correctly

LDW is one of the Advanced Driver Assistance Systems. It may not operate correctly if the system has a problem.

The system may not be able to recognize lanes and therefore may not function properly under the following conditions:

- Lane markers are blurred or dirty
- Lane markers are hard to detect due to rain, snow, fog, reflective light, etc.
- Lane markers cannot be easily recognized due to being faded from road construction, or due to shadows, snow, puddles, etc.
- Lane markers are drawn close to each other
- Lane markers are excessively narrow or wide
- Driving on forked roads, on-ramps/off-ramps, or sharp curves
- When driving in or across lanes using temporary lane markers such as during road construction or when there are temporary lane restrictions in place.
- Driving on twisting or rough roads
- Driving outside of main highway lanes such as when in the cruising or passing lanes (e.g., on the shoulder, etc.)
- The speed to cross the road lane markers is low
- Headlight illumination is weak or unfocused due to dirty headlight lenses, etc.
- Sudden or continuous changes in brightness occur
- The vehicle is tilted significantly due to unevenly loaded cargo, incorrectly adjusted tire pressure, etc.

# Fuel

## Fuel for Diesel Engines

### Diesel Fuel Requirement and Fuel System

#### Fuel Requirements

Use of fuels other than ultra low-sulfur fuel may not conform to emission regulations.

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 the dealer.

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. However, for better fuel economy, use Number 2-D diesel fuel whenever possible. At temperatures below -7 °C (20 °F), Number 2-D fuel may pose operating problems (see *Cold Weather Operation* ⇨ *262*). At colder temperatures, use Number 1-D fuel (if available) or use a "winterized" Number 2-D (a blend of Number 1-D and Number 2-D). This blended fuel is usually called Number 2-D also, but can be used in colder temperatures than Number 2-D fuel which has not been

"winterized". Check with the service station operator to be sure you get the properly blended fuel.

| DIESEL FUEL/APPLICABLE STANDARD (Sulfur content below 15ppm) | |
|---|---|
| JIS (JAPANESE INDUSTRIAL STANDARDS) | Based on K2204 Diesel Fuel Type 2 or Type 3 (SPL) |
| DIN (DEUTSCHE INDUSTRIE NORMEN) | Based on EN590 |
| ASTM (AMERICAN SOCIETY FOR TESTING and MATERIALS) | Based on D975 Number 1-D S15 or Number 2-D S15 (below 15 ppm) |
| BS (BRITISH STANDARDS) | Based on EN590 |

## Biodiesel

### Introduction

The manufacturer recognizes the importance of using Biodiesel Fuels as an alternative and renewable fuel based on global trends and requirements such as energy security and reducing contributions to global warming. Based on current circumstances, the manufacturer supports the utilization of B20 (20% Fatty Acid Methyl Ester (FAME) Blended Diesel Fuel) in our diesel trucks with some requirements/restrictions, since B20 has unique properties and is different from conventional (distilled) diesel fuels. This manual describes requirements and precautions for users/operators in regard to B20. Users/ Operators must carefully read, understand, and follow the instructions to prevent any unexpected problems during truck operation.

Please note that the manufacturer has obtained the certification of diesel engines using fuels certified by the government. The manufacturer does not certify any other fuels, and it is users'/ operators' responsibility to use the fuels recommended by the manufacturer and allowed by the government.

### Biodiesel Fuel

In this manual, all information on biodiesel is based on FAME (Fatty Acid Methyl Ester). FAME is produced from various feedstock such as vegetable oil, animal oil, used food oil, and so forth. The feedstock undergoes the esterification process to be used as automobile fuel for diesel engines, but the composition of FAME is still different from conventional diesel fuels. Also, the properties of FAME vary according to the feedstock. Raw oils, fats, and used cooking oils are not biodiesel fuels. Do not use these oils as fuel in order to avoid doing serious damage to the fuel system, engine, and aftertreatment system.

More useful information about Biodiesel can be found at the Department of Energy website, afdc.energy.gov or at www.biodiesel.org.

### Properties of FAME

FAME-based biodiesel is one of the alternative fuels for compression ignition engines (diesel engines), and it can be made from various sources such as vegetable oil, animal fat, and used food oil. To be used as automobile fuel, these oils need to undergo a chemical process known as esterification. The properties of FAME are unique and different from conventional diesel fuels, and these characteristics are not constant because of the variety of potential sources (feedstock). The most typical characteristics compared to conventional diesel fuels are as follows:

- Easily degradable
- Poor cold flow

- Unique distillation characteristics

In the field, certain concentrations of FAME are blended with conventional diesel fuel in order to create the finished fuel, but the characteristics of each finished fuel vary depending on the feedstock used. The variance in the characteristics of the finished fuel are negligible in the case of B5, but are more significant with higher concentrations of FAME. In fact, special handling and unique maintenance procedures that are not required with conventional diesel fuels are required for concentrations of FAME blended diesel fuel between 5% and 20% in order to avoid any unexpected problems.

### Biodiesel Blends

Usually, FAME is blended with conventional diesel fuel and given a label between B5 and B20 based on the blending ratio. For example, B20 consists of a blend of 20% FAME and 80% conventional diesel fuel. As of now, in many countries including the United States, the diesel fuel standards for automobile diesel fuel specify that FAME can be blended at concentrations up to 5% (B5).

However, biodiesel blends, especially those concentrations that exceed B5, have unique properties and need to be handled differently than conventional diesel fuel. Because of the unique composition and properties of FAME, during normal vehicle operation, users/operators may experience unexpected problems that do not occur with conventional diesel fuels.

In addition, the use of B20 (B6 - B20) may not be appropriate under all operating conditions.

### Biodiesel Quality Requirements

Biodiesel blends containing more than 5% and up to 20% biodiesel must meet the latest version of ASTM Specification D7467 (biodiesel blends B6 - B20). Also, the FAME (B100) to be blended with conventional diesel fuel must meet the latest version of ASTM D6751, regardless of concentration. We recommend that biodiesel users purchase biodiesel blends from a BQ-9000 certified vendor.

**Caution**

Do not use blends containing more than 20% biodiesel. Any engine, fuel system, or exhaust after-treatment system damage would not be covered by the vehicle warranty.

### Biodiesel Quality

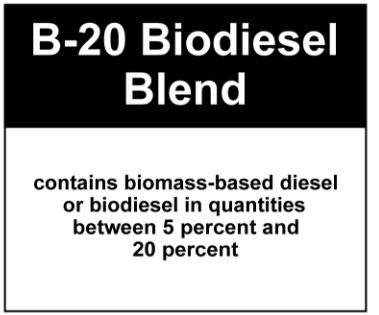
Blends containing more than 6% to 20% biodiesel must meet the latest version of ASTM Specification D7467 (biodiesel blends B6 - B20). Biodiesel is an emerging product, and its quality can vary widely. To reduce the risk of poor-quality fuel, we recommend that biodiesel users purchase blends from BQ-9000 certified vendors. A listing of certified vendors can be found at www.bq-9000.org. If there are questions about the biodiesel-containing fuels you are using, contact your fuel supplier.

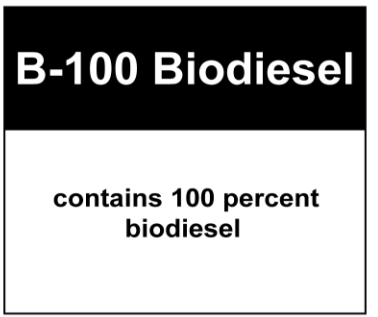
### Pump Labeling (Mandate by Federal Law)

Retail pumps dispensing blends containing up to 5% biodiesel (B5) are not required to be labeled with the concentration of biodiesel. Blends up to B5 must meet ASTM D975 (Grades Number 2-D or Number 1-D S15 commonly known as Ultra Low Sulfur Diesel). Retail pumps

dispensing from 6% to 20% biodiesel blends are required by federal law to be labeled with the concentration of biodiesel.

When refueling with a biodiesel blend above B5, ensure one of the following labels appears on the dispenser.




When users/operators use B20 (B6 - B20), the unique inspections and maintenance procedures described below are necessary to prevent unexpected problems from occurring during the operation of your vehicle even though these fuels are certified.

**Refueling with B20 (B6 - B20)**

- Make sure the right label is on the dispenser before refueling at the fuel station.
- Do not refuel biodiesel exceed B20 even though labeled with B50, B99, and, so forth.
- Purchase B20 (B6 - B20) from a BQ9000-certified supplier/vendor.
- Do not refuel with home-made biodiesel, raw oil, fats, and used cooking oil.

**Driving Patterns**

Certain driving patterns are not compatible with biodiesel use.

Biodiesel fuel quality degrades (due to acid/sludge accumulation and microbial growth) with time and exposure to high temperatures much more quickly than conventional diesel fuel. More frequent refueling is the best way to keep the supply of fuel fresh. Owners who have very low fuel usage should avoid the use of B20 (B6 - B20).

Because of the high solubility of FAME, vehicles operated for extended periods of time on conventional diesel fuel and then switched to biodiesel blends may experience premature fuel filter clogging and require more frequent fuel filter service.

Water can dissolve in the biodiesel easily. In fact, biodiesel reduces the effectiveness of the vehicle's water separator, and in the event of water contamination of the fuel, increases the risk of damage to the fuel system (such as through rust).

The engine oil level has to be inspected more frequently with B20 (B6 - B20) than with conventional diesel. During various driving conditions, some amount of fuel usually gets into the engine oil, and FAME remains in the engine oil longer than conventional diesel fuel. When a significant increase in engine oil is observed with a dipstick, both engine oil and filter service are needed.

**Storage Patterns (Vehicle and Fuel)**

Certain storage patterns are not compatible with biodiesel use.

Storage of vehicles during hot ambient temperatures will accelerate biodiesel degradation. Owners who store vehicles under these conditions should avoid the use of biodiesel.

Storage of vehicles for an extended period of time (greater than one month) will require that the biodiesel fuel level be lowered to below 1/4 full tank capacity. The vehicle must then be refueled with conventional Ultra Low Sulfur Diesel fuel and driven several miles before storage. Owners who store vehicles under these conditions should avoid the use of biodiesel.

FAME-blended biodiesel fuel will degrade during storage in the storage tank/ container. FAME-blended biodiesel fuel should be kept in the enclosed tank/container to avoid water intrusion and other contamination, as well as hot/cold conditions. Do not use it to refuel the vehicle if it has been stored for more than 6 months from the manufacturing date.

**Climate Patterns**

FAME gels sooner than conventional diesel fuel at mildly cold temperatures, and this becomes more significant the higher the blending ratio. B20 (B6 - B20) may plug fuel filters and degrade vehicle performance. Your vehicle may be equipped with a fuel heating system to provide a level of protection against filter plugging due to gelling (waxing) of conventional diesel fuel and biodiesel blends. The system will not prevent all cases of plugged filters if the operating temperature is far below the temperature at which gelling (waxing) of the fuel occurs (cloud point). Owners who use vehicles under these conditions should avoid the use of B20 (B6 - B20).

## Warranty

The manufacturer covers failures that are results of defects in material or factory workmanship. Any damage caused by the use of raw oils, fats, used cooking oils, or home-made biodiesel will not be covered by the manufacturer warranty. Also, any damage caused by biodiesel-blended fuels in which the blend ratio exceeds 20% will not be covered by the manufacturer warranty.

Damage, service issues, and/or performance issues determined by the manufacturer to be caused by the use of biodiesel fuel not meeting the specifications and requirements

described in this manual are not considered to be defects in material or workmanship and are not covered under the manufacturer warranty.

## 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 -7 °C (20 °F), use Number 1-D, or Number 2-D which has been blended with Number 1-D for winter use. When temperatures are consistently below (or near) -18 °C (0 °F), use Number 1-D if at all possible. Bear in mind, however, that even 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

### Fuel Contamination

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

(Continued)

**Warning (Continued)**

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.

See *Vehicle Messages* ⇨ *86* and “Draining Water from the Fuel Filter” later in this section.

#### Using 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 authorized 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 authorized dealer for advice on using biocides in your area and for recommendations on which biocides you should use.

**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 pre-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 (pre-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.

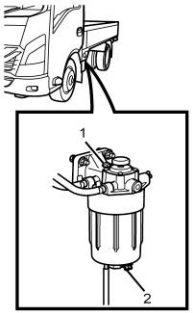
### Draining Water from the Pre-Fuel Filter

Clean off any fuel that has adhered to the vehicle body.

If the water separator (pre-fuel filter) requires frequent draining, have the fuel system inspected at your dealer.

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.




1. Attach a plastic hose to the drain plug (2) on the bottom of the chassis-side fuel filter and put the other end of the hose in a container placed beneath the filter.
2. Loosen the drain plug (2) and the air plug (1) to drain the water.
3. Drain the water until some fuel starts to come out with the water. Then tighten the drain plug and the air plug (air supply).
4. Bleed air from the fuel system. See “Bleeding the Fuel System” in *Running Out of Fuel* ⇨ 264.

## 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.

See *Fuel Gauge* ⇨ *69* and "Low Fuel Warning Light" in*Driver Information Center (DIC)* ⇨ *83*.

### Bleeding the Fuel System

#### Steps for Refueling

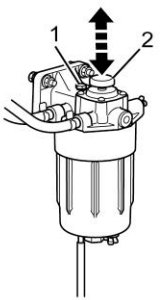
1. Apply the parking brake. See *Parking Brake* ⇨ *208* and *Electric Parking Brake* ⇨ *210*.
2. Select the correct fuel. See *Fuel for Diesel Engines* ⇨ *257*. Follow any posted safety rules.
3. Stand to the side, never above or opposite the filler opening.
4. Check that the fuel cap is tight, and see 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* ⇨ *369*.

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 (2) is located on the outboard side of the left frame rail, in front of the DEF tank. Place a container beneath the air plug (air supply) (1) to receive fuel, and then fully loosen the plug.
2. Attach a clear hose onto the air plug (air supply), direct the clear hose into a catch pan.
3. Pump the priming pump up/down 90 times to get most of the air bubbles out. Note fuel was drawn into the filter bowl at around 70 - 80 times.
4. Fully retighten the air plug (air supply) and wipe off any fuel that may have adhered to the plug or surrounding area.
5. Continue to operate the pump an additional 50 times.
6. Start the engine.
7. If the engine does not start, repeat steps 5 and 6 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 previous steps under "After starting the engine".

## Filling the Tank

**⚠ Warning**

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. If you have a static charge buildup on your

(Continued)

**Warning (Continued)**

body while refueling the vehicle, a spark caused by its discharge could ignite the resulting in burns.

- When filling, place the nozzle deeply into the fuel tank. If you try to fill more by pulling out the nozzle from the fuel tank, the fuel may spill out, thus causing danger.
- 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. 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.

Precautions when refueling:

(Continued)

**Warning (Continued)**

- Be careful not to inhale fuel vapor when refueling the vehicle.

**How to Refuel**

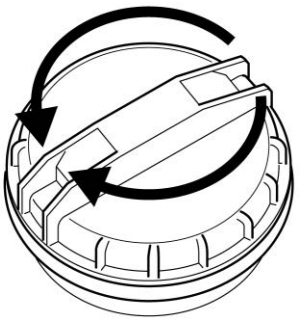
See *Fuel for Diesel Engines* ⇨ *257*.

**⚠ Warning**

Be sure to place the engine control switch in the "ACC" or "LOCK" position to stop the engine before refueling the vehicle. Refueling while the engine is running could cause a fire in your vehicle.

- When refueling, never smoke or place any ignition source nearby. There is a risk of fire.
- Do not use any fuel tank filler cap that is not a Chevrolet genuine part. The use of an improper fuel tank filler cap could cause fuel spillage in the event of an accident. The use of an improper fuel tank filler cap could also affect the fuel system and the emission control system.

1. Eliminate static from your body before opening the fuel tank filler cap.



**⚠ 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.

2. Slowly turn the cap counterclockwise to open it.

   Grip the tab of the fuel tank filler cap when turning the cap to open or close.

**Caution**

Care must be taken when filling the fuel tank to prevent entry of dirt and water.

3. Refuel the tank.
4. Align the grooves on the cap and tank and turn the cap clockwise to close it.
5. Check that the cap is tightly closed.

**⚠ Warning**

If the fuel tank filler cap is not tightly closed, leaking fuel could start a fire while driving. Be sure to wipe off the fuel that is spilled at refueling.

# 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.

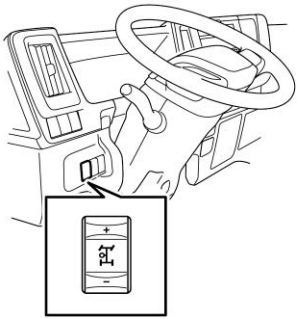
## Power Take-Off (PTO)

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 Main Switch**

Pressing the PTO main switch once will activate the PTO mode and raise the idle up speed.



**PTO Engine Speed Control Switch**

Once in PTO mode the PTO engine speed control switch can be used to adjust the idle speeds.

### When Operating the PTO

For operation of special equipment, see the manufacturer's instructions.

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 increases the idle up speed to the preset 800 r/min, and pressing either +/ - on the PTO engine speed control switch once activates the PTO mode. 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.

# Vehicle Care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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 electronic keys, may contain perchlorate materials. Perchlorate Material – special handling may apply. 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

**⚠ 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.

Apply the parking brake and move the selector lever to "P" and make sure the shift indicator displays "P".

(Continued)

**Warning (Continued)**

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.

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.

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.

(Continued)

**Warning (Continued)**

Do not let the engine run in enclosed or poorly ventilated areas. 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.

**Caution**

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 before 3 minutes have passed, the engine control module may malfunction.

Use only appropriate tools.

(Continued)

**Caution (Continued)**

Oils, brake fluid 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 vehicle 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

(Continued)

**Caution (Continued)**

other refuse from coming in contact with parts or materials that have been removed when changing or replenishing them.

Your authorized dealer has trained technicians and genuine parts to service your vehicle properly. For expert advice and quality service, see your authorized dealer.

### 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

## Cab Tilt (Single Cab Model)

### Before Tilting the Cab

**⚠ Warning**

Before tilting the cab:

- Park the vehicle on level ground and check that there is enough space in front of and above the cab (additional space is required if the vehicle is equipped with an air deflector).
- Move the selector lever in the "P" position.
- Set the parking brake firmly and block the front wheels.
- Shut down the engine.
- Check cup holders, seats, seat side tray and the inside of the cab for loose articles and secure them.
- Close both cab doors.
- Keep the area surrounding the cab clear.

(Continued)

**Warning (Continued)**

- If equipped with a roof rack, make sure everything has been removed.
- Confirm that people are not near the front of or still inside the vehicle.
- Remove anything on the bumper surface (including ice and snow) before tilting the cab. Otherwise, the bumper, lights, and other parts may be damaged.
- Check the handle and lever temperature. They may be hot immediately after driving.

During the cab tilting operation, be very careful that your hands, legs, or other body parts are not caught.

Confirm that the lock lever for the tilt support is fully engaged in the lock position after the cab is tilted.

When you must unavoidably open or close a tilted cab's door, securely support the weight of the door while opening or closing it. It is dangerous to release the door from your hand when it is being opened or closed. The door could hit you or someone

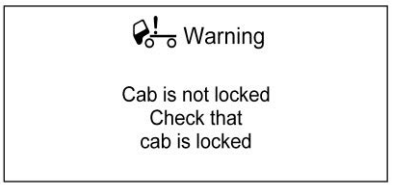
(Continued)

**Warning (Continued)**

and cause an injury, or the door could be damaged. Confirm that the door is completely closed after closing it.

After lowering the cab, make sure the cab is securely locked.

### Cab Tilt Warnings/Indicators




This warning light appears on the multi-information display and a buzzer sounds when the engine control switch is turned to the "ON" position and the cab is not fully locked into place. If the warning light and alarm sound do

not turn off even after you have checked that the cab is locked, do not drive the vehicle, have it inspected at a dealer.

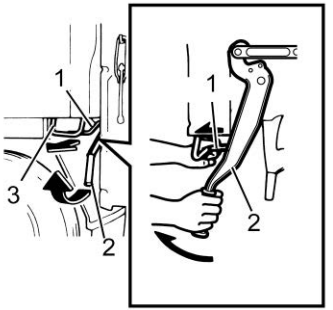
**⚠ Warning**

Ensure that the cab is securely locked into place before driving the vehicle. 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.

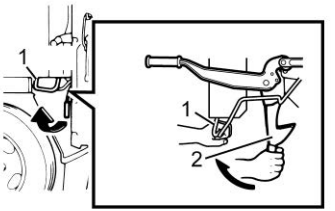
### Tilting the Cab

**⚠ Warning**

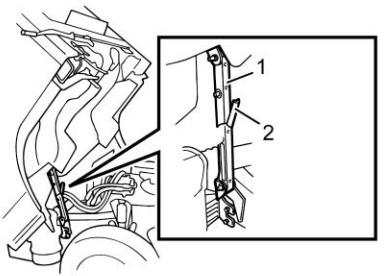
When the cab is tilted, be careful not to release the locks by touching the locks on the tilt support.




1. Apply the parking brake firmly and make sure that the selector lever is in the "P" position. Close all doors fully. Check that all personnel are clear of the cab.
2. Holding the assist handle (3), pull the lever (1) toward you, and then raise the handle (2).




3. Holding the assist handle (1), pull the lever (2) toward you to raise the cab.



4. Raise the cab fully and be sure the tilt support (1) is locked by the lock (2).

**⚠ Warning**

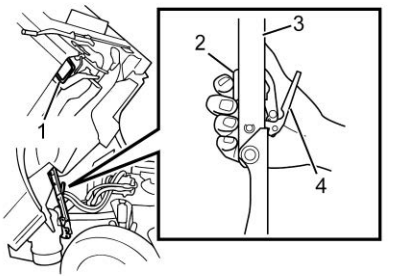
To avoid personal injury or death, keep hands, tools, and clothing clear of the engine cooling fan when the engine is running.

If the lock (2) has not been fully engaged, there is a danger that the cab may accidentally fall.

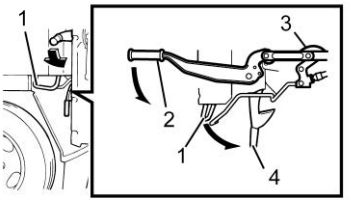
### Lowering the Cab

**⚠ Warning**

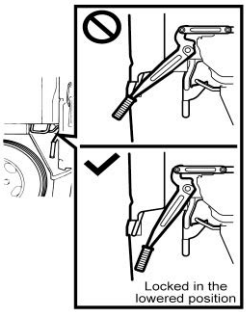
After lowering the cab, make sure the cab is securely locked. Note that when a load is present inside or outside the cab, it will lower faster.




1. Have all personnel stand clear of the cab.
2. Hold assist handle (1), and while supporting the cab, squeeze in on lock (4) and lock (2) at the same time and pull the tilt support (3) toward the back of the vehicle and fold it.



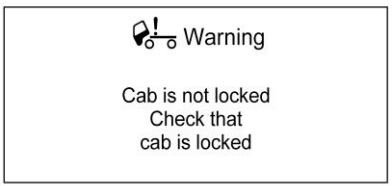

3. Holding the assist handle (1), drop the cab with enough force to ensure that the lever (4) engages, and then confirm that this lever has engaged securely.
4. Pull down the handle (2) until the lock section of the lever (3) is securely locked.
5. Perform both of the following procedures (steps 6 and 7), and then confirm that the cab is securely locked.
6. After operating the handle (2), pull the lever (4) and raise the assist handle (1) and make sure that the cab cannot be lifted up.




**⚠ Warning**

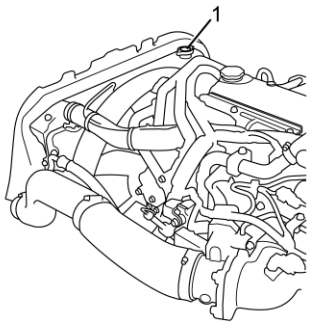
To help avoid personal injury or death, be sure the tilt cab is securely locked in the lowered position before operating the vehicle.

You and others could be seriously injured.




7. Place the engine control switch in the "ON" position and make sure that the cab tilt warning light is not displayed and a warning buzzer does not sound.

## Engine Compartment Overview




**Caution**

Do not climb onto the engine.

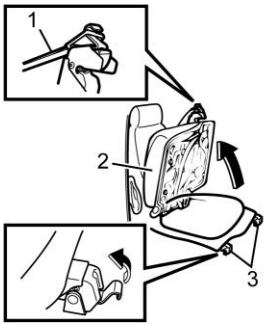
- Do not step on the engine or climb onto it. You could cause an engine failure by, for example, damaging the cylinder head cover or various connectors.

1. Radiator Cap

## Engine Cover

### Engine Inspection Cover

**Opening**

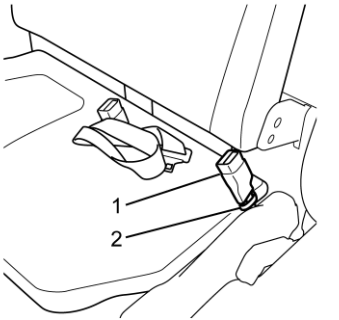



1. Lift the catch levers (3) located at the front of the passenger's seat cushion to release the lock.
2. Lift up the seat cushion (2) and attach the belt extending from behind the seatback to the left catch lever to hold the cushion in the raised position.

**⚠ Warning**

When opening the inspection cover, be careful that the seat belt does not fall into the inspection cover.

When opening the inspection cover, make sure that the seat belt buckle of the center seat is in the normal use position. If the inspection cover is opened while the buckle is caught behind the seat, etc., the band may be cut and the buckle may be pinched in the inspection cover and damaged.




**Normal Use Position**

(1) Center seat buckle
(2) Band

**Closing**

**⚠ Warning**

Take care to avoid jamming fingers, hands or any other part of your body when returning the seat cushion to its original position. In addition, confirm that the seat cushion is firmly locked. A seat with

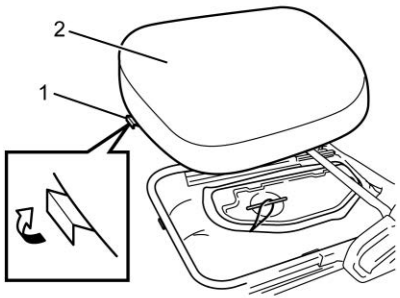
(Continued)

**Warning (Continued)**

an improperly locked cushion will be unstable during driving, possibly causing an accident.

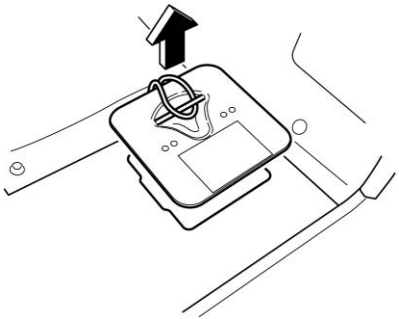
1. Detach the belt from the catch level and lower the seat cushion to a point approximately 12 in (30 cm) above its original position. Allow the seat cushion to drop into place, and then secure it using the catch levers.
2. Gently push and pull the seat cushion to make sure that it has been securely locked in place.

### Engine Inspection Sub Cover




To gain access to the engine compartment, pull the lock lever (red) (1) on the driver's seat cushion (2) to unlock it, raise the driver's seat cushion and remove the sub cover.

### Engine Coolant Reserve Tank Inspection Cover



To gain access to the engine coolant reserve tank, remove the inspection cover located under the rear right seat.

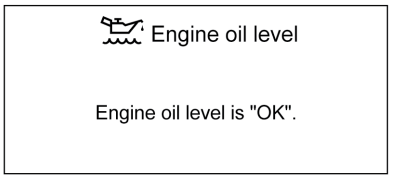
## Engine Oil

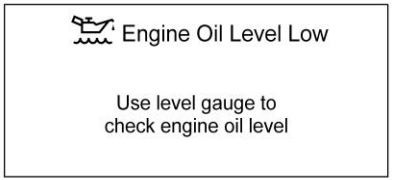
Engine oil acts to cool engine parts, clean and flush dirt from inside the engine, seal the combustion chamber, prevent rust and prevent engine parts from becoming worn. Engine oil is an important factor determining engine performance and longevity. Be sure to use only the specified oil and oil filters. The

engine oil level must be checked and the oil should be changed regularly according to the Maintenance Schedule.

## Engine Oil Level Warnings/Indicators

### Engine Oil Level Indicator Light



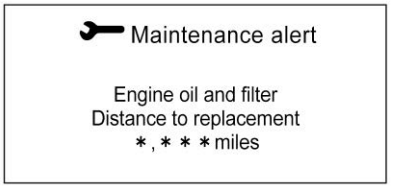

Opening the door will activate the multi-information display and the engine oil level indicator light comes on.

The message disappears when engine control switch is turned to the "ON" position and the door is closed.

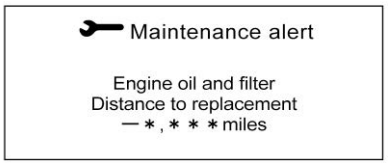
For approximately 10 minutes after the engine control switch is turned to the "OFF" position, the message will not appear even if you open the door.

The oil level varies right after the engine is stopped and while on sloping ground. To obtain correct results, check the message when the engine is on level ground and while the engine is cool.

### Engine Oil and Filter Maintenance Alerts




**Remaining Distance**




**Excess Distance**

This message appears on the multi-information display when the next replacement interval for the engine oil and filter is near or has already been reached. When the time for maintenance is approaching, the message is displayed in amber when the engine control switch is turned to the "ON" position. It remains on the display until "ENTER" in the multi-information display switch is pressed once or the vehicle is started. When this message comes on, have the vehicle inspected/serviced at an authorized dealer.

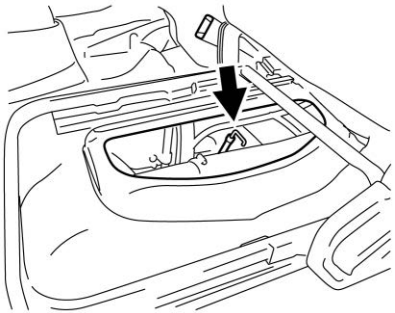
## Checking the Engine Oil

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 daily or 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.

### Single Cab Model

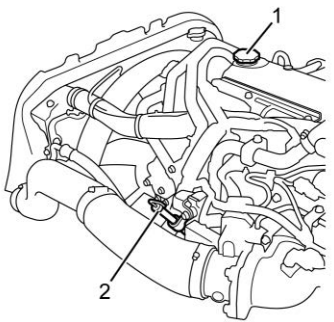
Access to the engine oil dipstick is located on the engine left side after tilting the cab. See *Cab Tilting* ⇨ *272*.

### Crew Cab Model

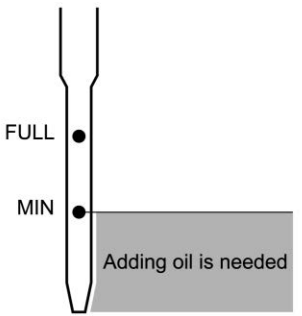


The engine oil dipstick is under the engine inspection sub cover located beneath the driver's seat.

### Checking the Engine Oil Level




1. Remove the oil dipstick (2) 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 "MIN" 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.

| Caution |
| --- |
| Any oil level above the "FULL" mark on the oil dipstick may cause engine malfunctions. |

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.

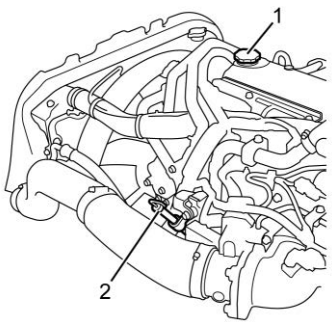
### Adding the Engine Oil

| 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.<br>• Prevent dirt from entering the filler port when adding the oil. If foreign matter mixes with the oil, it could damage the engine.<br>• 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.<br>• Failure to use the recommended engine oil could result in engine or DPF breakdown, or in poor fuel efficiency. Be sure to use the recommended engine oil. |

**Caution**

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 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.




When the engine oil level is near or below the "MIN" mark on the oil dipstick, remove the oil filler cap (1) and add the oil. Remove the oil dipstick (2) at this time. Use only the specified engine oil.

### Choosing the Right Quality Oil

**Caution**

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.

GM recommends engine oil that supports DPF (Low ash oil). Use of engine oil that does not support low ash will increase the PM produced by engine combustion. Consequently, the maintenance interval of the DPF filter will be reduced.

**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 CK4 or others. The center portion of the logo shows the SAE viscosity grade, such as SAE *W-40 (* indicates viscosity on the low temperature side). You should look for this logo on the oil container, and use ONLY oil containing the logo.

**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 genuine GM 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 the new vehicle warranty.

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* ⇨ *359*.

**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

(Continued)

**Warning (Continued)**

using soap and water–not mineral oil, fuels or solvents. Launder or discard clothing, shoes or rags containing used engine oil.

## Engine Oil and Gear Oil Viscosity Charts

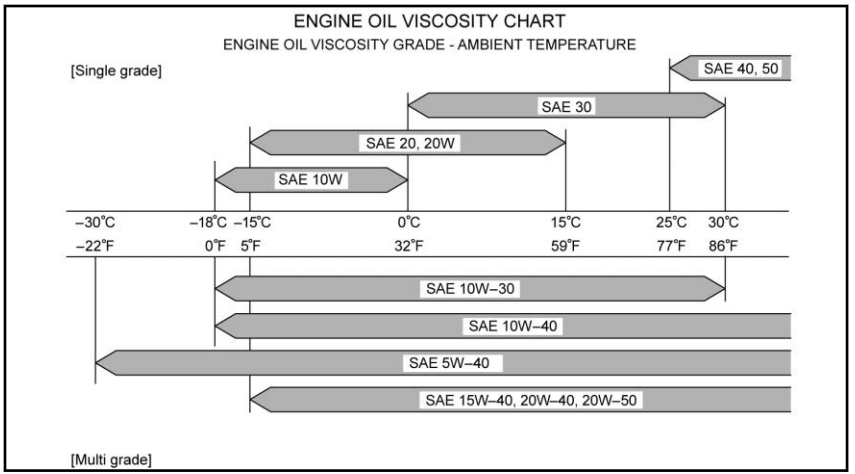
Select appropriate engine oil in accordance with the table below. It is also important to select the viscosity appropriate for the temperature at which your vehicle operates. Use the following table for making correct selections.

**Engine Oil**

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.




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. Have the engine oil and oil filter replaced by an authorized dealer.

### 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

The transmission is the mechanism that transmits the drive force of the engine. Automatic transmission fluid lubricates the inside of the transmission and protects the gears inside it. It also prevents the gears from wearing or seizing.

**⚠ 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

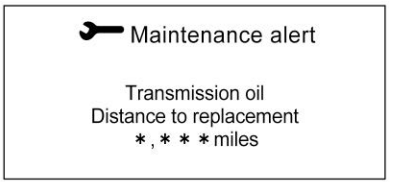
use only the dealer recommended fluid for replenishment, and observe the specified fluid level.

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.

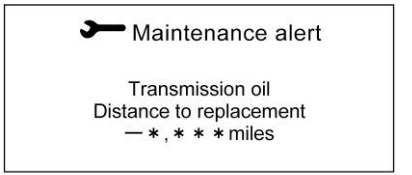
When cleaning around the dipstick and guide tube, make sure that you thoroughly wipe away all of the dirt and dust etc. Failure to do so may cause a fault in the transmission.

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.

## Automatic Transmission Fluid Maintenance Alerts




**Distance Remaining**




**Distance Exceeded**

This message appears on the multi-information display when the next replacement interval for the automatic transmission fluid is near, and the distance remaining until the replacement timing or the distance exceeded after the replacement timing is displayed.

When the time for maintenance is approaching, the message is displayed in amber when the engine control switch is turned to the "ON" position. It remains on the display until "ENTER" in the multi-information display switch is pressed once or the vehicle is started.

When this message comes on, have the vehicle inspected/serviced at your dealer.

### 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.

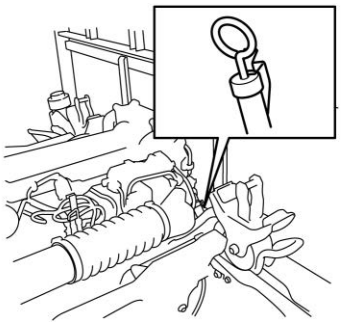
**⚠ Warning**

Be extremely careful not to burn yourself when checking the oil level if the engine temperature is high. Protect yourself with gloves etc.

You and others could be seriously injured.

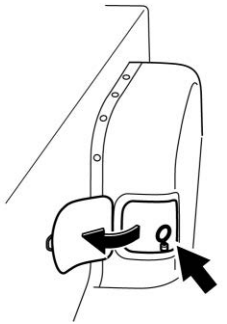
The fluid must be hot to ensure an accurate check. The fluid level rises as temperature increases.

Discarded parts, oil, grease and fluids could have an adverse effect on the environment. It is difficult to dispose of these, so have your dealer handle all checks and replacements.



**Single Cab**

Single cab: 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. See *Cab Tilting* ⇨ *272*.



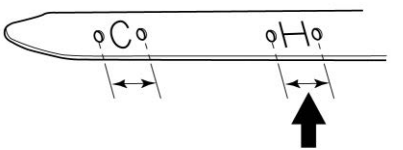
**Crew Cab**

For the crew cab vehicle, the dipstick is located beneath the rear-of-engine inspection panel. After unlatching the A/T fluid inspection cover, the dipstick will be visible.

**Inspection**

Wait at least 30 minutes before checking the transmission fluid if you have been driving at high speed for a long period of time, in city/heavy traffic or while pulling a trailer.

1. Start the engine, and drive the vehicle for approximately 10 minutes to warm up the engine. During 10 minutes, the automatic transmission fluid should reach a temperature of approximately 70 - 80 °C (158 - 176 °F). During the winter when temperatures are low, adjust the amount of driving time according to the actual conditions.
2. Park the vehicle on level ground, and firmly apply the parking brake.
3. With the engine idling, move the selector lever from the "P" position to the "1" position while pressing the brake pedal, and then return the lever from the "1" position to the "P" position.
4. With the engine still idling, pull out the dipstick and wipe it with a clean cloth.




**Transmission Dipstick**

5. Reinsert the dipstick into position, pull out the dipstick slowly, and check whether the fluid level is within the "H" marked range. Always check the fluid level at least twice. Consistently is important in maintaining accuracy. If inconsistent readings persist, check the transmission breather to ensure that it is clean and free of debris.
   - Dipstick C (COLD) — Transmission fluid temperature Approx. 20 - 30 °C (68 - 86 °F).
   - Dipstick H (HOT) — Transmission fluid temperature Approx. 70 - 80 °C (158 - 176 °F).
   - The "C (COLD)" range on the dipstick is a guide used by your dealer for specialized equipment used to replace or service the automatic transmission fluid. When performing your own inspections, always use the "H (HOT)" range after warming up the vehicle.
6. If the fluid level is too low, add the specified fluid through the dipstick guide tube. Also, check whether there are no fluid leaks.
7. Insert the dipstick securely into position.

Discarded parts, oil, grease and fluids could have an adverse effect on the environment. It is difficult to dispose of these, so have your dealer handle all checks and replacements.

## Engine Air Cleaner/Filter

### Air Cleaner

| Caution |
| --- |
| Be sure to use a Chevrolet genuine air cleaner element. If a different air cleaner element is used, it may cause the sensor to output a wrong signal. |

The air cleaner cleans and removes dirt from the air delivered to the engine. Using a clogged air cleaner element not only reduces engine output but also causes increased fuel consumption and an increased DPF regeneration frequency.

Have the air cleaner element replaced by your dealer according to the Maintenance Schedule.

See *Maintenance Schedule* ⇨ *359*.

### Air Cleaner Indicator Light

Air cleaner inspection
Clean or replace it

This message appears on the Driver Information Center (DIC) when the next air cleaner element service interval is near. Replace the air cleaner element.

See *Vehicle Messages* ⇨ *86*.

See *Maintenance Schedule* ⇨ *359*.

## Engine Coolant

**⚠ Warning**

If your engine cooling system overheats, see *Engine Overheating* ⇨ *293*. 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.

**⚠ Warning**

Check, replenish or change the engine coolant only after the engine has sufficiently cooled down.

Do not loosen or remove the cap of the radiator or engine coolant reserve tank cap when the engine coolant is still hot. Hot vapor or boiling water may burst out and cause a burn.

When removing the radiator cap or engine coolant reserve tank cap, use a thick cloth to cover the cap and turn it slowly.

(Continued)

**Warning (Continued)**

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.

You and others could be seriously injured.

Coolant is not simply water, it is water mixed with long-life coolant to an appropriate density. It acts to cool the heat generated by friction and combustion inside the engine.

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.

Replace rubber hoses whenever they crack or are damaged; even minor cracks allow engine coolant solution to leak.

The engine cooling system has been filled at the factory with a quality engine coolant. It is important to use proper engine coolant to prevent damage to engine cooling system components. The engine cooling system is designed to use engine coolant rather than plain water. See *Recommended Fluids and Lubricants* ⇨ *376*.

Changing the engine coolant is needed to replenish the rust inhibitors to make certain that all parts of the engine cooling system work well. To find out when the engine coolant must be replaced, see *Maintenance Schedule* ⇨ *359*.

## Engine Coolant Warnings/Indicators

### Insufficient Coolant Warning Message

**⚠ Warning**

If the warning light comes on while driving, pull off the road, stop the vehicle, turn off the engine to allow it to cool, and then check the engine coolant level.

**Caution**

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

The Insufficient Coolant Warning message reads, "Insufficient coolant. Check for coolant leaks and fill. As there is a risk of burns, do not remove sub-tank cap while it is hot."

If this appears on the Driver's Information Center (DIC), your system is low on engine coolant and the engine may overheat. When it comes on, you will also hear a warning tone. See *Warning Buzzers* ⇨ *93* and *Engine Alarm and Automatic Shutdown* ⇨ *162*.

## Protection of Engine Against Overcooling

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

## Engine Coolant in Cold Weather

### Preparing Engine Coolant

**⚠ 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.

**Caution**

If the engine or vehicle is used at -22 °F (-30 °C) or below, coolant concentration of 55% is recommended.

Using any coolant other than that recommended by GM could cause damage to the engine, radiator or heater core. In particular, use of coolants containing

(Continued)

**Caution (Continued)**

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 50% or lower, anti-corrosion function is not provided sufficiently.

Using coolant at any coolant concentration other than that specified may reduce antifreezing performance, and engine coolant may freeze.

If the engine coolant decreases rapidly, stop the vehicle in a safe place and contact your dealer for advice and repair.

To prevent engine damage due to freezing of the engine coolant and to protect the cooling system from corrosion, use a mixture of the recommended type antifreeze and 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 outside temperature engine or vehicle is used at −30 °C (−22 °F) or below, coolant concentration of 55% is recommended.

It is the owner's responsibility to:

- Maintain the engine cooling system freeze protection at or above −30 °C (−22 °F) (at or below −30 °C (−22 °F) in colder climates) to ensure protection against corrosion and loss of engine coolant from boiling. A 50/50 (55/45 for colder climates) mixture of the recommended type antifreeze and water will provide freeze protection to at or above −30 °C (−22 °F), (at or below −30 °C (−22 °F) in colder climates) and boil protection to 128 °C (262 °F). 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.
- Use only the recommended coolant. See *Recommended Fluids and Lubricants* ⇨ *376*.

**Caution**

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* ⇨ *384*. After changing the engine coolant, check that the engine coolant is up to the specified level.

### Changing Engine Coolant

Drain the engine coolant by opening the drain plug at the bottom of the radiator core, flush and refill the engine cooling system with a new engine coolant. Refer to "Preparing Engine Coolant" in this section.

### Checking the Engine Coolant Level

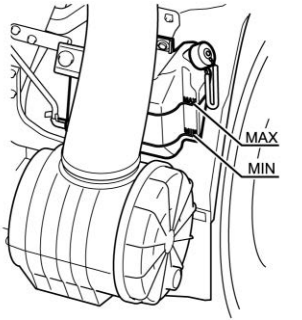
**Caution**

Do not drive the vehicle if there is a coolant leak as it could cause the engine to overheat.

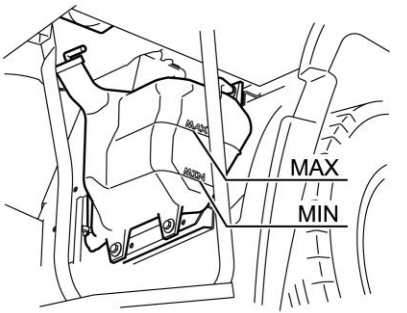
**Caution**

The radiator cap opens and closes in double action. When removing the radiator cap, take caution not to damage the cap and the filler neck.

- Turn the cap slowly to the left until it reaches a "stop". Do not press down while turning the cap.
- Wait until any remaining pressure (indicated by a hissing sound) is relieved, then press down on the cap and continue turning it to the left.

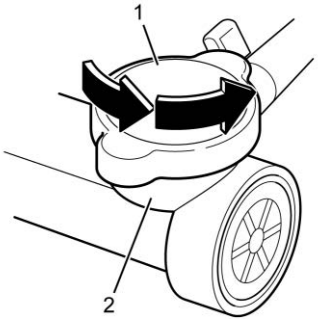



For the single cab model, the engine coolant reserve tank is located behind the front-right wheel. See *Cab Tilting* ⇨ *272*.




For the crew cab model, the engine coolant reserve tank is under the access panel beneath the right rear seat. See *Engine Cover* ⇨ *276*.

When the engine has cooled down, make sure that the fluid level in the engine coolant reserve tank is no lower than the "MIN" line. In addition, carefully remove the radiator cap and check to see if it is damaged. Check that the engine coolant is full to the filler neck. Check the engine coolant level only when it is cold.




The radiator cap (1) opens and closes in double action. When removing the radiator cap, take caution not to damage the cap and the filler neck (2).

Turn the cap slowly to the left until it reaches a “stop”. Do not press down while turning the cap.

Wait until any remaining pressure (indicated by a hissing sound) is relieved, then press down on the cap and continue turning it to the left.

Also, check to make sure there are no leaks from the radiator or radiator hose. Check for fluid or stains on the ground showing leaks where the vehicle is parked. Contact your dealer if you discover leaks. See “Radiator Pressure Cap” at the end of this section.

### Adding Engine Coolant

**⚠ Warning**

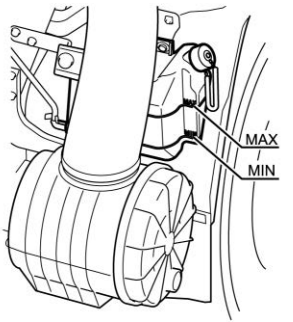
Check, replenish or change the engine coolant only after the engine has sufficiently cooled down. Do not loosen or remove the cap of the radiator or engine coolant reserve tank cap when the engine coolant is still hot. Hot vapor or boiling water may burst out and cause a burn. You and others could be seriously injured.

**Caution**

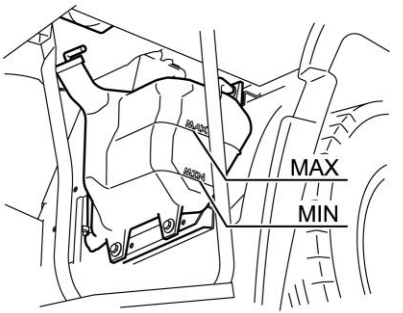
When the engine is still hot, take care to prevent engine coolant from contact with the exhaust manifold. Any such contact could result in exhaust manifold damage.

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.

If the level of engine coolant changes rapidly, have your vehicle inspected at your dealer.

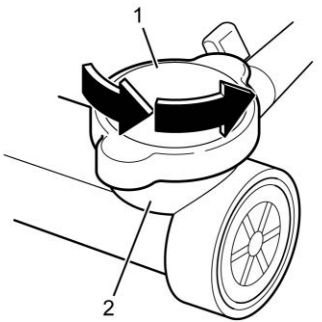



**Single Cab Model**




**Crew Cab Model**

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. Wash the reserve tank cap and filler neck with clean water. Tighten the cap securely after the engine coolant has been replenished.




1. When the engine is cool, remove the radiator cap (1).
   - Turn the cap slowly to the left until it reaches a “stop”. Do not press down while turning the cap.
   - Wait until any remaining pressure (indicated by a hissing sound) is relieved, then press down on the cap and continue turning it to the left.
2. Fill the radiator to the base of the filler neck (2) and install the radiator cap. Add enough engine coolant to provide for required cooling, freezing, and corrosion protection.
3. Run the engine until the engine coolant temperature rises to normal level, and idle the engine for 10 minutes.
4. Turn off the engine. Make sure that the engine is cool. Remove the radiator cap and add engine coolant to the radiator until it reaches the base of the filler neck.
5. Install the radiator cap.

Do not overfill the engine coolant reserve tank.

### 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. When a replacement is needed, genuine GM parts are recommended.

### Radiator Pressure Cap

The radiator cap, a 108 kPa (16 psi) pressure type, must be installed tightly, otherwise engine coolant may be lost and damage to the engine may result from overheating. The radiator pressure cap should be checked periodically for proper operation. If a replacement is required, a genuine GM part is recommended.

## Engine Cooling System

### Checking the Engine Cooling System

Wash radiator cap and filler neck with clean water, pressure test system and radiator 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. Inspect and replace according to the *Maintenance Schedule* ⇨ *359*. Have the hoses replaced by your dealer.

## Engine Overheating

### When the Engine Overheats

**Warning**

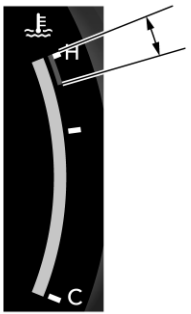
If the engine overheat warning light comes on and stays on while you are driving, your engine coolant might have overheated and your engine may be too hot. You should pull off the road, stop your vehicle and take appropriate actions for engine overheating. Do not continue driving while the engine overheat warning light is on. Otherwise, the engine may seize up.

**Caution**

The engine overheat warning light will also activate the engine alarm and automatic shutdown system.

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 "Overheating" message displayed that reads, "Stop in a safe place. Cool engine while idling." Take the corrective actions immediately.

### Inspection and Repairs for Overheating

**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 radiator cap or engine coolant reserve tank cap if the engine coolant in the tank is boiling. Also do not remove the radiator 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.

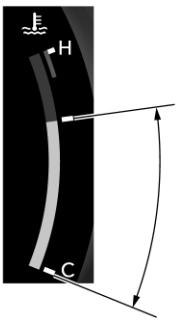
**If Steam Is Not Coming from the Engine Compartment**

**Caution**

Do not stop an overheating engine immediately. Otherwise, the engine may seize up.

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.




2. Idle the engine and wait until the engine coolant temperature drops to the safety zone. If your air conditioner (if equipped) 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. Turn on the heater to help the engine expel heat. If the needle of the 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.

**⚠ Warning**

Do not loosen or remove the radiator cap or reserve tank cap while the engine coolant is still hot. Scalding fluid and steam can be blown out under pressure if either cap is taken off too soon, and cause burns. Perform inspection, refilling, and replacement of coolant only when it has cooled.

(Continued)

**Warning (Continued)**

When removing the radiator cap and reserve tank cap, use a thick cloth to cover the cap and turn it little by little.

Engine coolant is toxic and must not be ingested. If the engine coolant gets in your eyes, rinse your eyes immediately.

Engine coolant is flammable, and therefore, it must be kept away from flames and other heat sources.

**Caution**

When the cooling fan for the radiator is not turning, turn off the engine immediately.

4. If no steam or engine coolant can be seen or heard from the engine compartment, tilt the cab or open the engine access cover and check the following:
   - Check the engine coolant level in the reserve tank to be between the "MAX" and "MIN" lines. 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 the level is insufficient and you do not find a leak or other problem, carefully add engine coolant to the reserve tank only, not directly into the radiator.

**⚠ Warning**

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, make sure that the engine has cooled down and you may then add engine coolant directly to the radiator.

**Caution**

When 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.

See *Recommended Fluids and Lubricants* ⇨ *376* for the proper coolant and water mixture.

See *Engine Cover* ⇨ *276*, *Cab Tilting* ⇨ *272*, *Engine Coolant* ⇨ *287*, and *Engine Drive Belt Routing* ⇨ *391*.

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. See *Exterior Care* ⇨ *349*
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.

## Power Steering Fluid

**⚠ Warning**

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.

**Caution**

When replenishing power steering fluid or flushing the power steering system, always use ATF (Dexron®-III). Failure to use the proper fluid may damage the power steering system seals and hoses, leading to fluid leakage.

Power steering fluid is an oil that allows steering to operate smoothly. The power steering fluid level must be checked and it must be changed according to the Maintenance Schedule. See *Maintenance Schedule* ⇨ *359* and *Recommended Fluids and Lubricants* ⇨ *376*.

### Power Steering Fluid Maintenance Alerts

**Distance Remaining**

Power steering fluid
Distance to replacement
*,*** miles

The Distance Remaining Maintenance Alert will read, “Power steering fluid. Distance to replacement *,*** miles.”

This message appears on the Driver’s Information Center (DIC) when the next replacement interval for the power steering fluid is near, and the distance remaining until the replacement timing or the distance exceeded after the replacement timing is displayed.

**Distance Exceeded**

Power steering fluid
Distance to replacement
—*,*** miles

The Distance Exceeded Maintenance Alert will read, “Power steering fluid. Distance to replacement —*,*** miles.

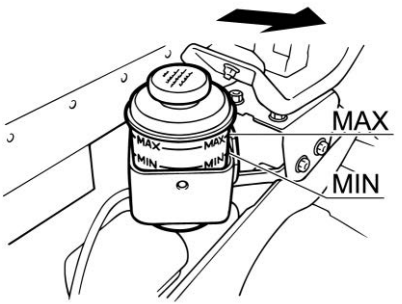
When the time for maintenance is approaching, the message is displayed in amber when the engine control switch is turned to the "ON" position. It remains on the display until "ENTER" in the Driver’s Information Center (DIC) switch is pressed once or the vehicle is started. When this message comes on, have the vehicle inspected/serviced at your dealer. See *Vehicle Messages* ⇨ *86*

### Checking the Power Steering Fluid Level

**⚠ Warning**

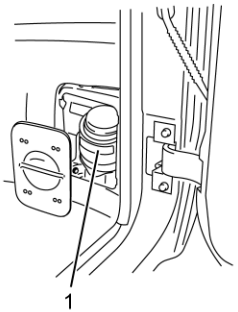
Before adding fluid, clean the area around the cap and pour fluid from a clean jug or filler. Foreign matter getting in the tank may cause power steering system failure.

**Single Cab Model**




Located in the right rear of the cab.

**Crew Cab Model**




Located in the right rear door area.

The fluid level is correct if it is between the "MAX" and "MIN" lines on the power steering fluid 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 right. When you have finished checking the fluid level, securely reinstall the cap and cover.

## Washer Fluid

### Windshield Washer Fluid

**Caution**

Upon factory shipment, new vehicles contain only 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 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.

Use a high quality premixed solvent available at most dealers or service stations. Avoid hard water when mixing Optikleen or other windshield washer

(Continued)

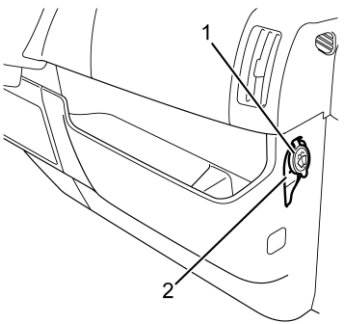
**Caution (Continued)**

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.

The windshield washer fluid acts to remove dirt. The windshield washer is located on the windshield wiper arm. See *Recommended Fluids and Lubricants* ⇨ *376*.

### Refilling Windshield Washer Fluid




1. The windshield washer fluid tank (1) is located under the instrument panel on the passenger side.
2. Open the cap (2) and fill the tank with windshield washer fluid.

## Brakes

Check brakes (including the parking brake) more often if operating conditions or driving habits result in frequent braking.

For the most effective braking and for maximum life from the brake system components, follow these suggestions:

- 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.
- Do not pump the brake pedal as this will only deplete the vacuum reserve.
- 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.

Follow the recommendations for brake checks in the Maintenance Schedule. See *Maintenance Schedule* ⇨ *359*.

### Brake Pedal Operation and Effectiveness

**⚠ Warning**

Conduct driving inspections on wide roads with good visibility and pay close attention to other vehicles and surrounding objects.

**Caution**

If, after continued pressing of the brake pedal, the clearance slowly decreases or the pedal action feels spongy, air may be trapped in the brake hydraulic circuit. Have your vehicle inspected at the nearest Chevrolet Dealer as soon as possible.

If your vehicle's brakes squeak during normal driving or braking, the cause may be one of the following:

(Continued)

**Caution (Continued)**

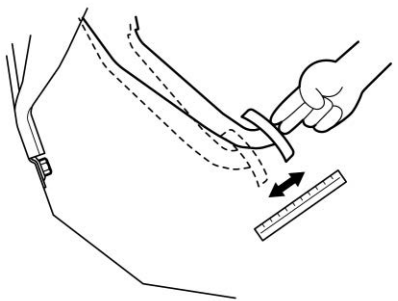
- Brake pad wear: Brake pads are about to wear out. If this happens, have your vehicle inspected at the nearest Chevrolet Dealer as soon as possible.
- Adherence of sand, grit or mud: If sand, grit or mud adheres to the brakes, a screeching sound may be emitted upon contact with rotating components. If this happens, wash the vehicle to remove all such adhering matter. If cleaning alone does not eliminate the squeaking sound, have your vehicle inspected at the nearest Chevrolet Dealer.

When the brake pedal is fully pressed, inspect the clearance from the floorboard (remaining space) to the brake pedal, as well as whether it reacts properly when pressed. Drive slowly on a dry road and step on the brake to check that it works well and does not pull to either side.

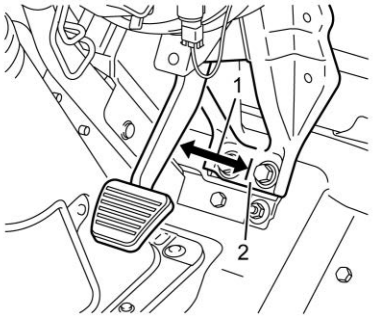
To inspect the clearance to the floorboard, start the engine, rev it several times, then inspect the clearance the first time you depress the brake pedal. Repeatedly depressing it 2 or 3 times will result in an incorrect inspection.

### Checking the Brake Pedal Movement (Free Play)

Before checking the free play of the brake pedal, stop the engine and press the pedal 4 or 5 times in succession.



| Free play |
| --- |
| 3 - 7 mm (0.12 - 0.28 in) |




1. Clearance from the floor.
2. Brake pedal bracket.

To inspect the amount of free play, press the brake pedal lightly with your hand until you feel resistance. Next, start the engine and inspect the clearance from the floorboard to the brake pedal when the brake pedal is pressed forcefully (approximately 490 N {50 kg/110 lbs}).

| Clearance between the brake pedal and the brake pedal bracket |
| --- |
| 45 mm (1.77 in) or more |

## Checking the Brake Hoses and Pipes

### Inspection

The brake lines and hoses must be checked for proper hook-up, binding, leaks, cracks, chafing, etc. 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. Inspect brake hoses and pipes according to the Maintenance Schedule. Have them replaced or repaired by your dealer.

See *Maintenance Schedule* ⇨ *359*

To check the brake hoses and pipes, follow these steps:

1. Turn the steering wheel fully to the left.
2. Check the left front brake hose and pipe visually and by touch, making sure that they are free of scratches, cracks and bulging. Also make sure that the hose 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.
3. Turn the steering wheel fully to the right.
4. Check the right front brake hose and pipe in the same way as step 2.
5. The rear left and right brake hoses and pipes should also be checked in the same manner.

## Disc Brakes

**⚠ Warning**

Do not drive with brake pads worn out beyond the limit. Excessively worn brake pads and shoe linings may cause breakdown of brake components and poor braking performance. You and others could be seriously injured.

**Caution**

The brake pads have embedded wear indicators which are designed to make a high pitched squeal or cricket-like warning sound when the brake pads are worn to the point where new pads are needed. When the truck is in motion, the sound may be constant or it may come and go. Pressing the brake pedal firmly may cause the sound to stop. If the squeaking noise from the indicator can be heard, contact the nearest dealer for inspection or replacement as soon as possible after the warning first becomes evident.

(Continued)

**Caution (Continued)**

GM replacement brake pad 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 pad material with performance different from that of the GM replacement parts recommended for this vehicle can change the intended brake balance of this vehicle.

The front and rear brakes are attached to an auto adjuster mechanism. If there are no defects, as the pedal travel is properly maintained, adjustments are not necessary. If the brake pads wear out beyond their usable limit, not only will the brake performance be impaired, but brake components could also fail. Have disc brake pads checked for wear or cracks at the nearest dealer.

Check brakes (including parking brake) more often if operating conditions or driving habits result in frequent braking. See *Maintenance Schedule* ⇨ *359*.

### Hydraulic Brake Assist Function

This function boosts hydraulic pressure to provide the necessary braking force during sudden braking or when strong braking force exceeding the boost limit of the brake booster unit is required. It also provides braking assistance when the performance of the brake servo unit is decreased. The hydraulic brake assist device is not a device for enabling unsafe driving and stopping practices. It is the driver's responsibility to drive safely.

## Brake Fluid

**⚠ Warning**

If the brake fluid level decreases rapidly, there may be a problem in the brake system or brake pads may have worn out. Have your vehicle inspected by the nearest dealer immediately.

(Continued)

**Warning (Continued)**

Brake fluid readily absorbs moisture. Therefore, it is necessary to close the brake fluid container tightly for storage. Contamination with water reduces the boiling point of the brake fluid, which could cause vapor lock, resulting in poor brake performance, which is extremely dangerous.

Never mix the specified brake fluid with fluids of another brand. Doing so can lower braking function and damage mechanisms, which are extremely dangerous.

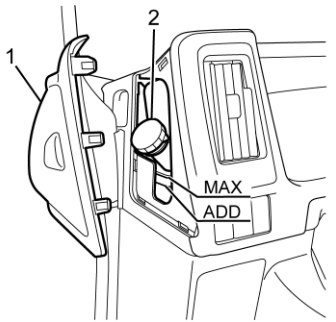
Be careful not to spill brake fluid onto painted surfaces or to let it come in contact with skin. If fluid is spilled onto a painted surface or comes in contact with skin, wash away the fluid with water and immediately wipe the area clean.

**⚠ Warning**

When adding brake fluid to the reservoir, take care to prevent dirt and water from entering it. Any dirt or water in the system could cause the vehicle to lose braking functions. You and others could be seriously injured.

Brake fluid is an oil that allows brakes to operate smoothly. Use the recommended brake fluid when adding brake fluid. The brake fluid must be inspected and changed according to the Maintenance Schedule. Have the brake fluid replaced by your dealer. See *Maintenance Schedule* ⇨ *359* and *Recommended Fluids and Lubricants* ⇨ *376*.

### Checking the Brake Fluid Level




Remove the inspection cover (1) on the left-hand side of the instrument panel by turning it with your fingers. Check that the fluid level in the reservoir is between the "MAX" and "ADD" lines.

If the fluid surface cannot easily be seen, rock the vehicle gently.

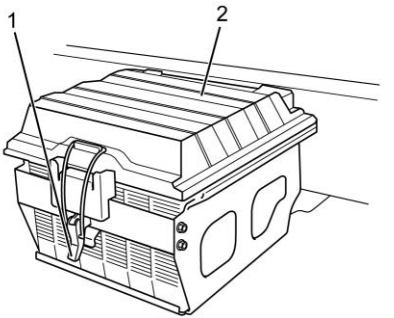
### Adding Brake Fluid

If the level of brake fluid has dropped below the "ADD" line, remove the cap (2) and add fluid. Take care to avoid filling beyond the "MAX" line.

Tighten the cap securely after the fluid has been added.

## Battery - North America

### Working Near Battery




The batteries are located on the outboard side of the left 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 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.

If the negative cable is disconnected from the negative terminal on the battery within 3 minutes after turning the engine control switch to the "LOCK" position, the engine control module may malfunction.

### 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 the 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.

The date and time will reset to the default values whenever the vehicle's battery is disconnected.

**⚠ 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*.

The Electronic Stability Control (ESC) warning light may turn on after the battery cables are disconnected and reconnected, or the battery voltage is low. If the ESC warning light remains on even after driving for a while, the ESC is not functioning properly. See your dealer.

## Fuel Filter

Change the fuel filter (both the engine mounted fuel filter element and pre-fuel filter) in accordance with the Maintenance Schedule or when the message "Replace the engine mounted fuel filter" appears on instrument display. Have the fuel filter replaced by an authorized dealer.

Drain the water when the water separator (pre-fuel filter) warning light comes on

**Caution**

Failure to replace the engine mounted fuel filter when needed may lead to fuel system damage. Your authorized dealer can replace your fuel filter, if needed.

(Continued)

**Caution (Continued)**

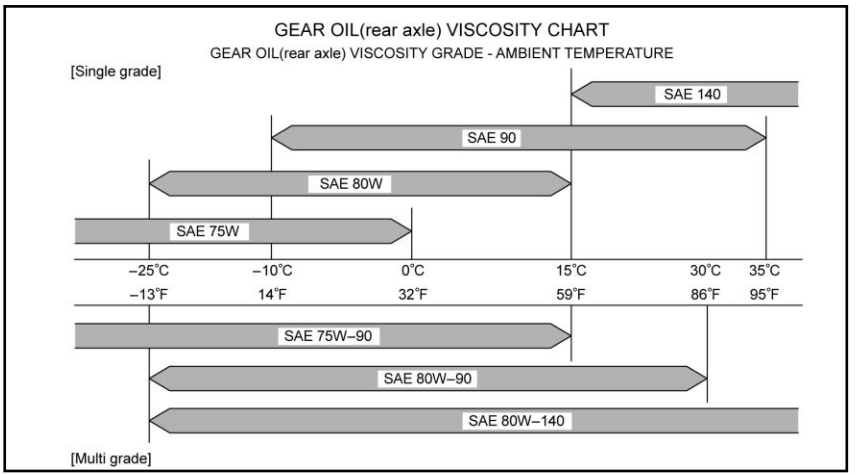
As preventive maintenance, it is recommended to add GM-approved diesel fuel system cleaner (FSC) to the fuel tank every time the fuel filters are replaced. FSC removes fuel deposits from the fuel system and injection system.

Use GM-approved FSC only. Otherwise, degradation of the rubber parts and excessive wear of the metal parts may occur.

## Rear Axle (Gear Oil Viscosity)

### 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.




## Rear Axle (Oil Level Check)

### Rear Axle Differential Gear Oil

| Caution |
| --- |
| After changing the oil, ensure that it is at the correct level.<br>Drained oil must be disposed of in a method conforming to the regulatory requirements in your state. |

The differential is the mechanism that transmits drive force to the wheels. Differential gear oil lubricates the inside of the differential and protects the gears inside it. It prevents the gears from wearing or seizing.

The rear axle differential gear oil level must be checked for its level and it must be changed according to the Maintenance Schedule. Have the oil changed at your dealer. See *Maintenance Schedule* ⇨ *359*.

Use the oil quantities indicated later in this section only as guidelines when changing the rear axle differential gear oil.

## Differential Gear Oil Maintenance Alerts

### Distance Remaining

Maintenance alert

Differential oil
Distance to replacement
*,*** miles

The Distance Remaining Maintenance Alert will read, “Differential Oil. Distance to replacement *,*** miles.”

This message appears on the Driver’s Information Center (DIC) when the next replacement interval for the differential gear oil is near, and the distance remaining until the replacement timing or the distance exceeded after the replacement timing is displayed.

### Distance Exceeded

Maintenance alert

Differential oil
Distance to replacement
—*,*** miles

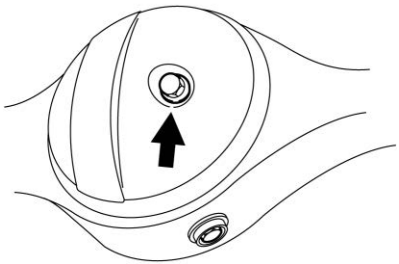
The Distance Exceeded Maintenance Alert will read, “Differential Oil. Distance to replacement —*,*** miles.

When the time for maintenance is approaching, the message is displayed in amber when the engine control switch is turned to the "ON" position. It remains on the display until the "ENTER" in the Driver’s Information Center (DIC) switch is pressed once or the vehicle is started. When this message comes on, have the vehicle inspected/serviced at your dealer. See *Vehicle Messages* ⇨ *86*.

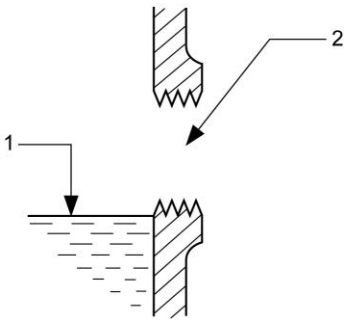
## Checking the Rear Axle Differential Gear Oil Level

### Checking the Oil Level

1. Clean the drain plug area before removal.



2. Remove the oil plug.



3. Check that the oil level (1) is up to the lower edge of the oil level plug hole (2). If the oil level is too low, add oil through the oil level plug hole.
4. Fasten the oil level plug to the specified torque. Plug tightening torque is 78.4 Nm (8.0 kgFm/57.8 lb ft).

Any dirt on the plug should be wiped off before installing it.

## Noise Control System

### Noise Emissions Warranty

General Motors 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, was designed, built and equipped to conform at the time it left General Motors's control with all applicable U.S. EPA Noise Control Regulations. This warranty covers this vehicle as designed, built and equipped by General Motors, and is not limited to any particular part, component or system of the vehicle manufactured by General Motors. Defects in design, assembly or in any part, component or system of the vehicle as manufactured by General Motors, which, at the time it left General Motors's control, caused noise emissions to exceed Federal standards, are covered by this warranty for the life of the vehicle.

The following information relates to compliance with federal noise emission standards for vehicles with a Gross Vehicle Weight Rating (GVWR) of more than 4 536 kg (10,000 lb). The Maintenance Schedule provides information on maintaining the noise control system to minimize degradation of the noise emission control system during the life of the vehicle. The noise control system warranty is given in the warranty manual.

These standards apply only to vehicles sold in the United States.

### 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 underhood insulation.

**Engine:**

Removal or rendering the engine speed governor, if equipped, inoperative so as to allow engine speed to exceed manufacturer specifications.

**Fan and Drive:**

- Removal of the fan clutch, if equipped, or rendering the clutch inoperative.
- Removal of the fan shroud, if equipped.

**Air Intake:**

- Removal of the air cleaner silencer.
- Modification of the air cleaner.

**Exhaust:**

- Removal of the muffler and/or resonator.
- Removal of the 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 the Selector Lever Cannot be Moved From the "P" Position

If the selector lever cannot be moved from "P" to other positions after performing the instructions in "If You Cannot Move the Selector Lever from the P Position" (see *Automatic Transmission ⇨ 195*), it is likely that the shift lock function is faulty. Immediately contact the nearest authorized dealer for inspection. Only in the event of an emergency, carry out the procedure below.

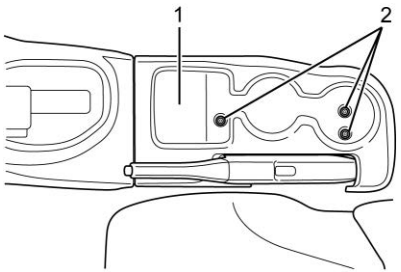
**Caution**

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.

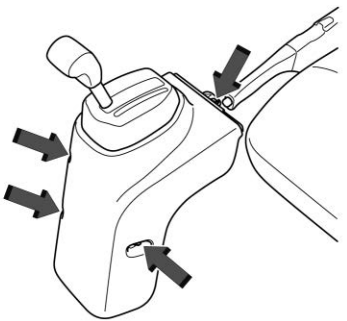
**⚠ Warning**

When performing the below operations, make sure the parking brake is securely engaged and wheels are blocked with chocks.

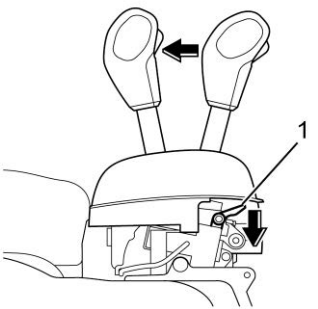
2. Securely apply the parking brake. Make sure to stop the engine and block the wheels with chocks.




3. For models with a parking brake lever, remove the cup holder (1) by removing the three Torx® bolts (2).



4. Remove the selector lever cover by removing the four clips (models with a parking brake lever) or three clips (models with an electric parking brake) and lifting it up.



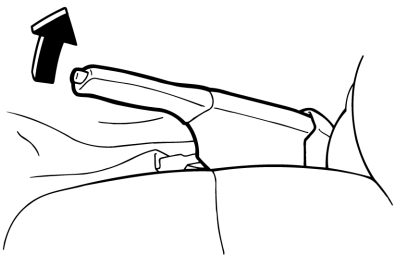

5. Move the selector lever to the "N" position while pressing the release lever (1).

When reinstalling the selector lever cover and cup holder, perform the procedure above in reverse order. In that case, tighten the Torx® bolts to 4 N·m (0.4 kgf·m/35 lb·in).

## Park Brake and P (Park) Mechanism Check

**⚠ Warning**

When you check holding ability, be sure to have enough room around the vehicle. Then firmly apply both the parking brake and the regular brakes. Ensure the engine is off when checking the holding ability. Take these precautions because the vehicle could move without warning and possibly cause injury or property damage.



If equipped with a parking brake lever, while pulling up on the parking brake lever, from the fully released position, count the number of clicks produced as the lever engages the ratchet plate notches. The parking brake should apply and hold the vehicle within 6 to 8 notches. This is the number of notches before parking brake is set when lever is pulled slowly from released position with pull force of about 147 N (15 kgf/33 lbs). If the parking brake does not apply sufficiently within this range, the parking brake lever needs adjustment. Contact your dealer for service. Park on a fairly steep hill and hold the vehicle with the parking brake only. This checks holding ability.

If you notice the parking brake lever travel has increased over time, this means the parking brake shoes may be worn. Contact the nearest dealer for inspection or replacement.

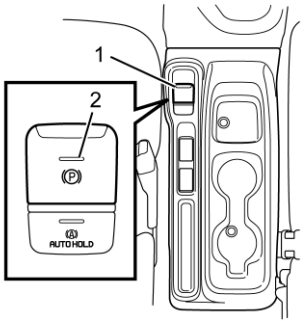
**⚠ Warning**

- When checking the effectiveness of the parking brake, be careful that the vehicle does not suddenly move while doing so. Sudden vehicle movement could lead to an accident.

(Continued)

**Warning (Continued)**

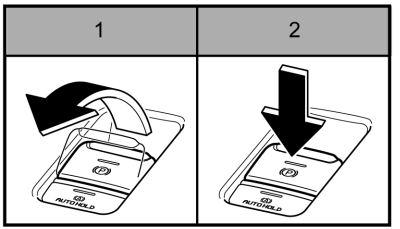
- The electric parking brake has an automatic release function, so do not depress the accelerator pedal during the inspection. Depressing the accelerator pedal activates the automatic release function. Unintentionally releasing the brake could lead to an accident.




(1) Electric Parking Brake Switch
(2) Indicator Light

If equipped with an Electric Parking Brake (EPB), follow these steps to test the parking brake.

1. Stop the vehicle in a place with flat and firm ground, and chock the wheels so the vehicle cannot move.




2. Lift up the EPB switch to apply (1) the parking brake. Listen for the parking brake actuator to make sounds at the same time. Press the EPB switch (2) to release the parking brake.

PARK

**Parking brake warning light (red)**

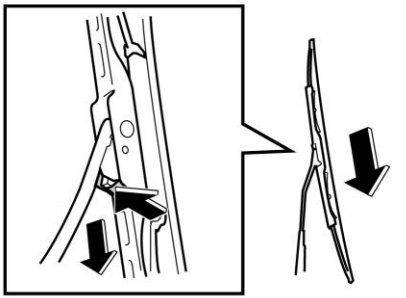
**Electric parking brake warning light (amber)**

3. When the parking brake is applied, check that the parking brake warning light comes on and that the electric parking brake warning light is off.
4. Park on a fairly steep hill and hold the vehicle with the parking brake only. This checks holding ability. If the parking

brake does not apply sufficiently to hold the vehicle, the parking brake needs adjustment. Contact your dealer for service.

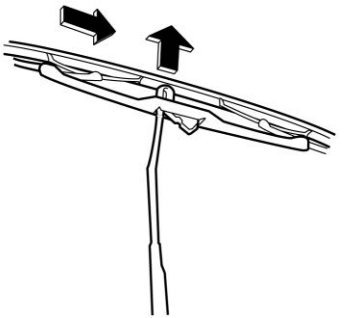
## Wiper Blade Replacement

| Caution |
| --- |
| Do not lower the wiper arm with its blade removed; the windshield glass may be scratched.<br>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. |

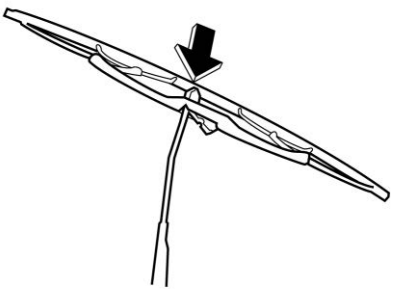


**Removal**

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.



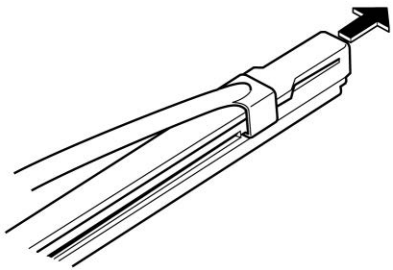
**Installation**

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.

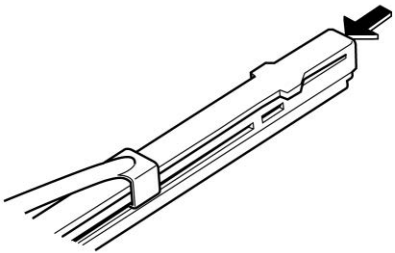
Whenever a wiper blade has been attached, ensure that it is locked into place. Failure to observe this precaution can result in the wiper blade becoming dislocated when the windshield wiper switch is turned on.

## Replacement of Wiper Rubber Insert



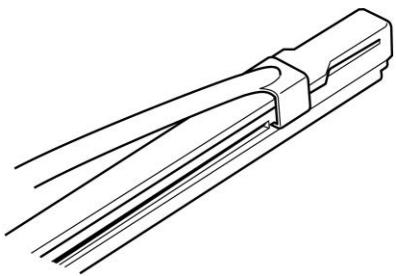
**Removal**

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**

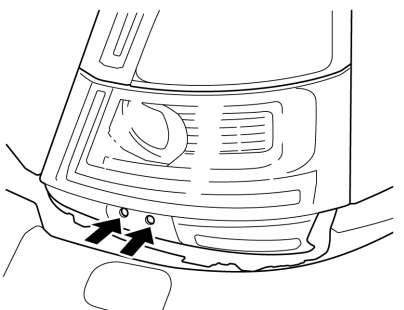
1. Insert a new wiper rubber insert into the wiper blade.



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



Have headlight aim checked immediately if beams seem improperly aimed.

For vertical aiming, turn the two screws indicated by arrows in the diagram.

1. Two screws should be turned in the same direction at the same time to adjust aiming.
2. When the “headlamp aiming” is out of position, have it adjusted by your dealer.

# Bulb Replacement

| Caution |
| --- |
| Do not replace incandescent bulbs with aftermarket LED replacement bulbs. This can cause damage to the vehicle electrical system. |

### 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.<br>Bulbs are hot immediately after they go out. When replacing the bulbs, avoid being burned by making sure they are fully cooled.<br>Never drive the vehicle with the bulbs not working. This could result in an accident.<br>You and others could be seriously injured. |

When one bulb of a pair of lamps, such as a headlamp blows out, the other bulb is approaching the end of its useful life. We recommend that both be changed at the same time.

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.

If the bulb is an LED specification, see your dealer.

## Bulb Wattage

| Position | Lights | Bulb Wattage (12V) | Qty. |
|---|---|---|---|
| Front | Headlight Highbeam/Lowbeam | LED | 2 |
| | Front Turn Signal Light | LED | 2 |
| | Parking Light | LED | 2 |
| | Cornering Light | LED | 2 |
| | Side Turn Signal Light | LED | 2 |
| | Side marker Light | LED | 2 |
| | Fog Light (V) | LED | 2 |
| Rear | Taillight and Brake light | 8/27W | 2 |
| | Turn Signal Light | 27W | 2 |
| | Back-Up Light | 27W | 2 |
| | License Plate Light | 7.5W | 1 |
| Roof | Roofmarker Light (Identification/Clearance Lamp) | LED | 5 |

| Position | Lights | Bulb Wattage (12V) | Qty. |
|---|---|---|---|
| Interior | Dome Light | LED | 1 |
| | Speedometer and Gauge Lights | 3.4W | 5 |
| | Warning/Indicator Lights | LED | 20 |

Contact your dealer when replacing lights that are not listed here.

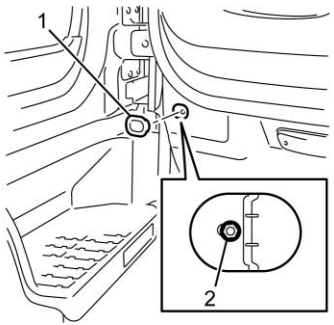
## LED Lighting

This vehicle may be equipped with several LED lamps. For replacement of any LED lighting assembly, contact your dealer.

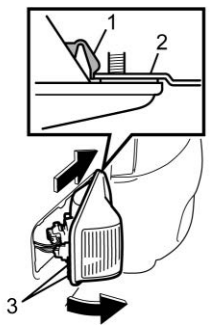
## Sidemarker Lamps (Including Turn Signal and Cornering Lamps)

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".

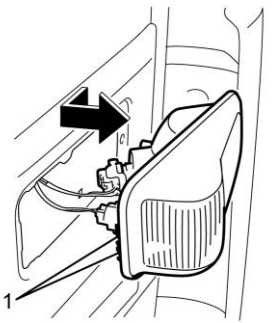



1. Open the front door, remove the rubber cap (1) in the lower part of the door, and loosen the nut (2).

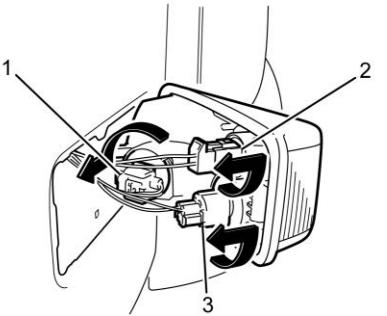


2. Slide the cornering lamp (3) and the side turn signal lamp forward relative to the vehicle. Disconnect the clip (1) on the lamp's rear side from the door panel (2) and pull out the lamp.

   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.

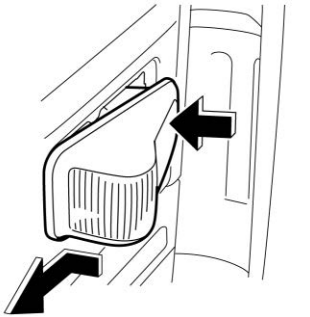



3. When the clip (1) has been removed, pull the lamp out while sliding it out toward the rear of the vehicle.
4. Loosen the socket by turning it counterclockwise.

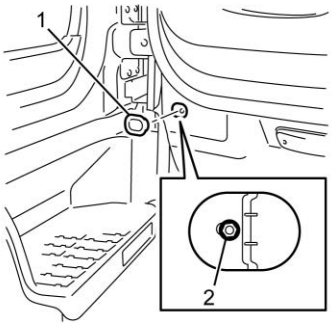



5. Pull the bulb out from the socket and replace it with a new one.
6. To install the lights, perform the same sequence of operations in reverse taking care of the following points:
   A. Turn the socket clockwise to lock securely.

      If the socket is not locked securely, water could get inside the light and lead to a breakdown.

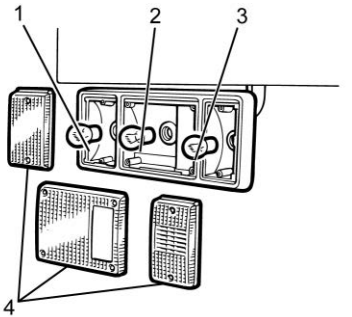


   B. Insert the clip on the back of the rear part of the light into the door panel.
   C. Push the front part of the light into the door panel, and insert the clip on the back of the front part of the light in the door panel.




D. Open the front door, tighten the nut from the inside of the door, and install the rubber cap.

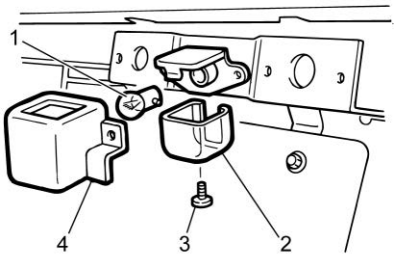
## Taillamps, Turn Signal, Stoplamps, and Back-Up Lamps




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.

# 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.

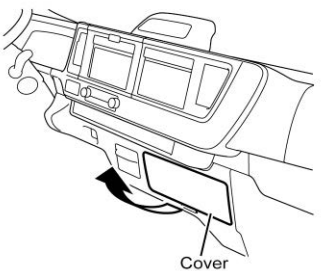
**Fuses:** In case of an electrical overload, the fuse will blow and stop the flow of current in the circuit before electrical components become damaged.

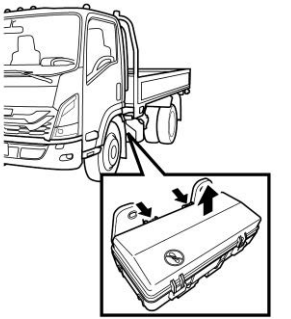
The cause of the circuit overload must be identified and corrected before the blown fuse is replaced, or else the new fuse will also blow. Since different circuits handle different amounts of current, fuses of various ampere ratings are used. Be sure to replace a blown fuse with a fuse of the correct 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

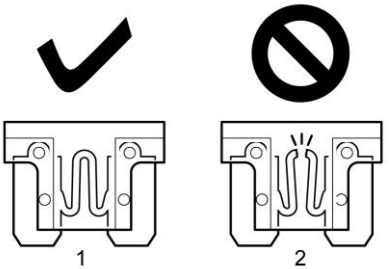


The fuses and relays are located in the lower part of the instrument panel in the center and at the left rear of the cab. Open the cover to carry out inspection and replacement. Also, open the cover of the relay box behind the cab to do inspection and replacement.

### Replacing Fuses

1. Before replacing fuses, firmly apply the parking brake, move the selector lever to the P (Park) position, and turn the engine control switch to the LOCK position.
2. Place the fuse puller on the fuse and pull it out. (The fuse puller is stored in the fuse box inside the cab.)




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**

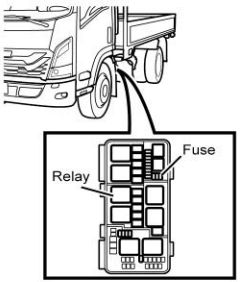
- Always use fuses specified for the vehicle. Using fuses with a rating other than that specified, or using wire or tin foil, etc., could result in fire or damage.
- If the new fuses blow right away and the cause is unknown, contact your dealer.

(Continued)

**Warning (Continued)**

- Do not inspect or replace fuses when the starter switch is in the ON position when parking or stopping the vehicle while the Auto Brake Hold is in operation. Doing so may lead to an accident. 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.

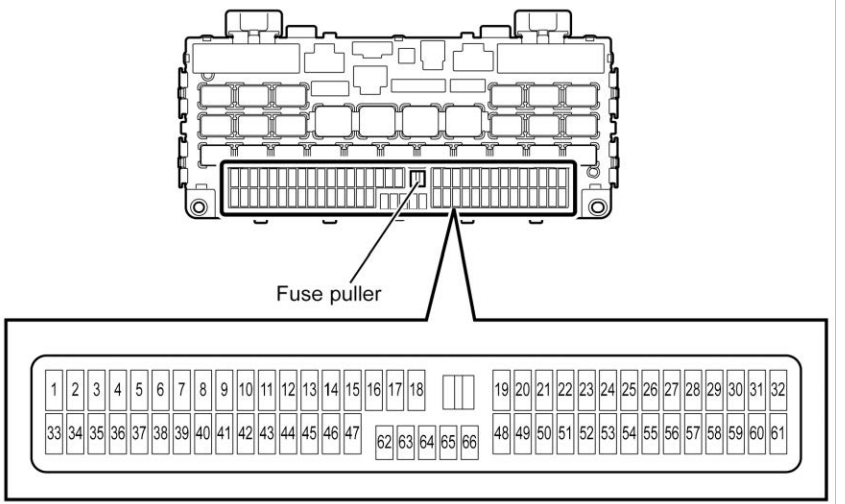
The vehicle may not be equipped with all of the fuses, relays, and features shown.

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**

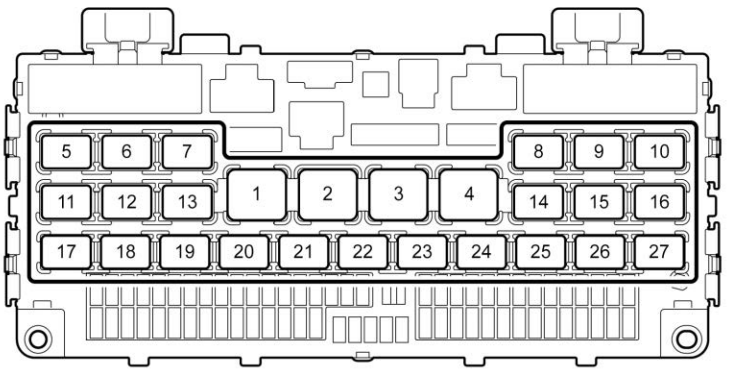



| No. | Description | Rating |
|---|---|---|
| 1 | HEAD LIGHT HI (RH) | 10A |
| 2 | AUDIO REVERSE MUTE | 10A |
| 3 | HEAD LIGHT HI (LH) | 10A |
| 4 | HEAD LIGHT LO (RH) | 10A |
| 5 | HEAD LIGHT LO (LH) | 10A |
| 6 | SRS | 5A |
| 7 | CONTROLLER (ACC) | 15A |
| 8 | – | 5A |
| 9 | TRAILER BRAKE | 25A |
| 10 | – | 10A |
| 11 | ACC. SOCKET, AUDIO, USB | 15A |
| 12 | – | 10A |
| 13 | – | 10A |
| 14 | METER (IGN) | 5A |
| 15 | TRANSMISSION (IGN) | 10A |

| No. | Description | Rating |
|---|---|---|
| 16 | POWER SOURCE (ACC) | 20A |
| 17 | CENTRAL GATEWAY (IGN) | 5A |
| 18 | – | 15A |
| 19 | BLOWER | 25A |
| 20 | TURN, HAZARD | 15A |
| 21 | – | 10A |
| 22 | MIRROR HEATER | 15A |
| 23 | WIPER | 25A |
| 24 | TRANSMISSION (BATT) | 10A |
| 25 | BACK UP LIGHTS | 10A |
| 26 | AIR CONDITIONER (BATT) | 15A |
| 27 | – | 10A |
| 28 | BODY CONTROL (BATT) | 10A |
| 29 | ELECTRIC PARKING BRAKE(IGN) | 10A |
| 30 | ABS, STEREO CAMERA (IGN) | 5A |
| 31 | I/O CONTROLLER (BATT) | 15A |
| 32 | FOG LIGHTS | 10A |
| 33 | DRL | 10A |
| 34 | BRAKE LIGHTS | 10A |
| 35 | TRAILER BRAKE | 15A |
| 36 | BRAKE LIGHTS SWITCH | 10A |
| 37 | ILLUMINATIONS | 10A |
| 38 | TAIL LIGHTS | 10A |
| 39 | KEYLESS ENTRY (IGN) | 5A |
| 40 | AUDIO (BATT) | 10A |
| 41 | I/O CONTROLLER (IGN) | 10A |
| 42 | MARKER LIGHTS | 10A |
| 43 | – | 10A |
| 44 | ENGINE CONTROL SWITCH | 10A |
| 45 | POWER TAKE OFF, HSA | 10A |
| 46 | CONTROLLER (IGN) | 10A |
| 47 | MOBILEYE | 10A |
| 48 | AIR CONDITIONER (IGN) | 10A |
| 49 | HEAD LIGHTS WASHER | 25A |
| 50 | BODY CONTROL (IGN) | 10A |
| 51 | HORN | 15A |
| 52 | – | 5A |
| 53 | CONTROLLER (BATT) | 15A |
| 54 | METER (BATT) | 10A |
| 55 | KEYLESS ENTRY (BATT) | 10A |
| 56 | – | 10A |
| 57 | – | 10A |
| 58 | STARTER | 10A |

| No. | Description | Rating |
|---|---|---|
| 59 | CORNERING LIGHTS | 5A |
| 60 | CENTRAL GATEWAY (BATT) | 5A |
| 61 | STEREO CAMERA (BATT） | 10A |
| 62 | Spare | – |
| 63 | Spare | – |
| 64 | Spare | – |
| 65 | Spare | – |
| 66 | Spare | – |

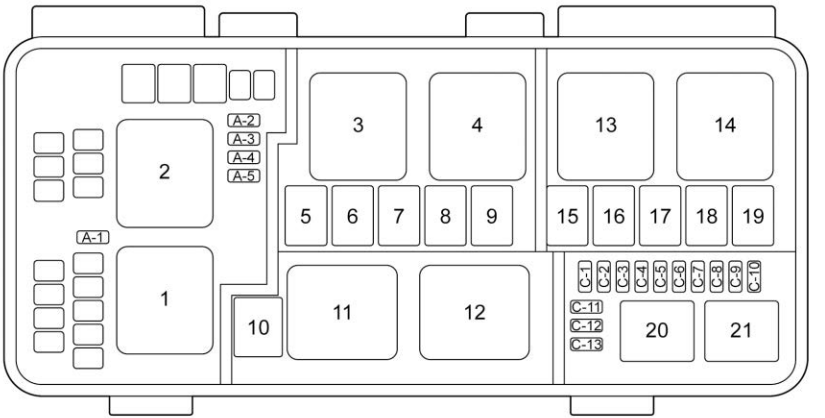
**Relay Locations – Cab Interior**




| No. | Description |
|---|---|
| 1 | Accessory |
| 2 | Ignition main |
| 3 | Blower motor |
| 4 | Wiper key on |
| 5 | – |
| 6 | DRL |
| 7 | Power window (rear) (crew cab model) |
| 8 | – |
| 9 | – |
| 10 | – |
| 11 | DRL |
| 12 | – |
| 13 | – |
| 14 | Tail lights |
| 15 | – |

| No. | Description |
|---|---|
| 16 | Headlights high |
| 17 | DRL |
| 18 | Headlights low |
| 19 | Trailer brake (model with trailer) |
| 20 | Power window |
| 21 | Headlights washer |
| 22 | Back up lights |
| 23 | Washer motor |
| 24 | Horn |
| 25 | – |
| 26 | – |
| 27 | Fog lights (model with fog lights) |

**Fuse and Relay Location – Cab Exterior**



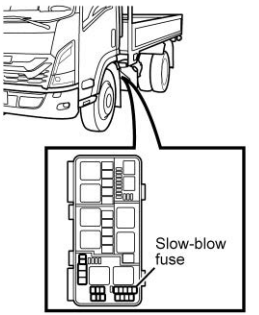

| No. | Description |
|---|---|
| 1 | STARTER |
| 2 | – |
| 3 | – |
| 4 | – |
| 5 | – |
| 6 | – |
| 7 | Fuel heater |
| 8 | – |
| 9 | – |
| 10 | Rear dome light |
| 11 | – |
| 12 | NOx & Urea |
| 13 | ECM main |
| 14 | Ignition chassis |
| 15 | Marker lights |
| 16 | – |

| No. | Description |
|---|---|
| 17 | Heater valve |
| 18 | – |
| 19 | Condenser fan |
| 20 | A/C compressor |
| 21 | Starter cut |

| No. | Description | Rating |
|---|---|---|
| A-1 | Air conditioner | 20A |
| A-2 | ECM (battery) | 10A |
| A-3 | – | – |
| A-4 | – | – |
| A-5 | – | – |
| C-1 | SCR | 20A |
| C-2 | Power source | 15A |
| C-3 | Marker lights | 20A |
| C-4 | Chassis ignition | 15A |

| No. | Description | Rating |
|---|---|---|
| C-5 | SCR ignition | 10A |
| C-6 | ECM ignition | 15A |
| C-7 | ECM main | 20A |
| C-8 | PM sensor | 15A |
| C-9 | PTO | 10A |
| C-10 | – | – |
| C-11 | Chassis (battery) | 10A |
| C-12 | – | – |
| C-13 | – | – |

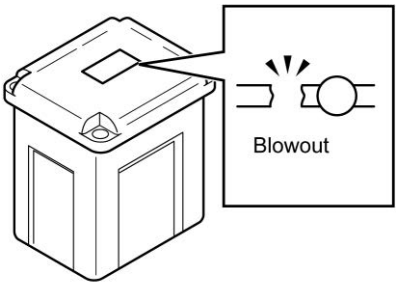
**When Slow-blow Fuses Blow Out**




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 VIN plate in the driver door jamb,, 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 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* ⇨ *56* and "Tire Load and Inflation Table" under *Tire Pressure* ⇨ *339*).

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* ⇨ *339*.

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)* ⇨ *379*.

**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. 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. (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

| Tire size | Tire maker | Tire name | Rolling resistance |
|---|---|---|---|
| LT215/85R16E | BRIDGESTONE CORPORATION | M779AZ | LRRA |
| | BRIDGESTONE CORPORATION | R250TZ | LRRA |
| | THE YOKOHAMA RUBBER CO., LTD. | TY213B | LRRA |
| 225/70R19.5F | BRIDGESTONE CORPORATION | M89511 | LRRA |
| | SUMITOMO RUBBER INDUSTRIES, LTD. (DUNLOP) | SP688 | LRRA |
| | THE YOKOHAMA RUBBER CO., LTD. | 133R | 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)* ⇨ *379*.

**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**

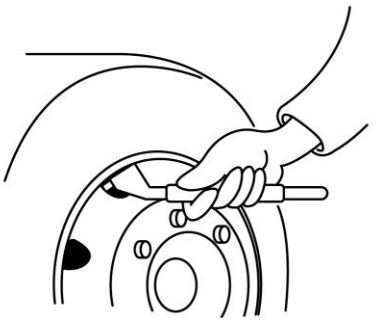
Consult your dealer before replacing wheels. Never use wheels that are not designed for the vehicle. Doing so would impede safe vehicle operation.

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.

## 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 causes 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 (psi) | | GVW kg (lb.) |
|---|---|---|---|---|
| Front | Rear | Front | Rear | |
| LT215/85R16E | LT215/85R16E | 550 (80) | 550 (80) | 6 577 (14,500) |
| 225/70R19.5F | 225/70R19.5F | 590 (85) | 590 (85) | 7 258 (16,000) |
| 225/70R19.5F | 225/70R19.5F | 660 (95) | 660 (95) | 8 142 (17,950) |
| | | | | 8 845 (19,500) |

See “VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate” under *Vehicle Identification Number (VIN)* ⇨ *379*.

See “Tire Load and Inflation Table” under *Tire Pressure* ⇨ *339*.

**⚠ 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.

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.

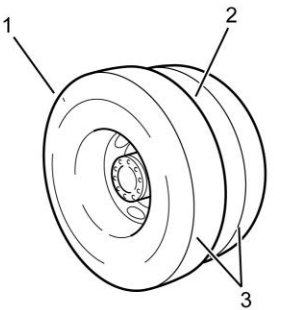
Over-inflated tires result in a harsh ride and are likely to cause damage to the cargo. Under-inflated tires build up heat and could burst. Always keep the tires of your vehicle adjusted at the standard air pressures.

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.

**Cracks and Other Damage**

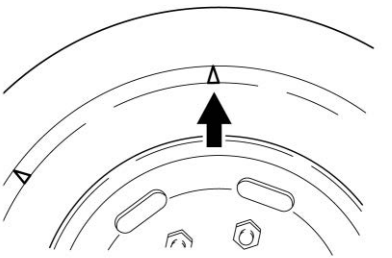



1. Sidewall surface
2. Gap between inner and outer tires
3. Tread

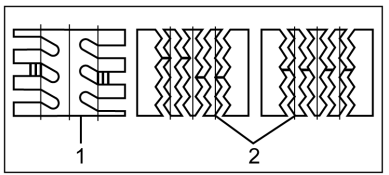
Check the tread and sidewall surfaces of each tire for cracks or other damage. Especially check the tread for nails or other metal pieces embedded in grooves and also the gap between the inner and outer tires of a dual-tire wheel for pebbles lodged in it.

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, when driving at high speeds, hydroplaning. You and others could be seriously injured.

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.

**Visual Checking of Wheel Installation Condition**

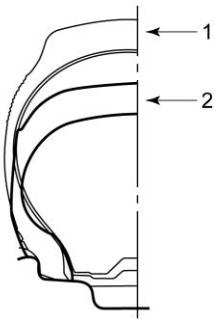
**⚠ Warning**

Any abnormality in wheel installation is likely to lead to loose or missing wheel nuts and/or broken wheel bolts.

Visually check the condition of installation of each wheel:

1. Check that there are no missing wheel bolts and wheel nuts.
2. Check each wheel to see if there is any rust seepage from wheel bolts or nuts. Also check the wheel for cracks or other damage.
3. Check the end of each wheel bolt for proper length of protrusion from the wheel nut. The protrusion should be uniform among all bolts on a wheel and among all wheels.

**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. Therefore, if air begins to leak, 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 (single cab) or on the left center pillar panel beside the shoulder seat belt anchor (crew cab). Wheel size is also stamped on the side of each wheel.

(Continued)

**Danger (Continued)**

To help avoid personal injury and property damage if a wheel must be changed, seek expert tire services if you can. If you must remove the wheel without any such help, do the following:

- If the tire looks as if it may be underinflated, stand to the side and check whether the wheel assembly appears normal by comparing it to another wheel assembly on the vehicle.
- Let the air out of the tire by taking out the valve core. If you have a way to put air back in a tire, note that it is good safety practice to let the air out of both tires of a dual assembly before taking off the damaged tire and rim assembly from the vehicle. After letting out the air, take off the tire and rim assembly and install a spare tire and rim assembly.

  If your vehicle is equipped with a differential lock system, it might start moving when the engine power is transmitted to the rear axle even when

(Continued)

**Danger (Continued)**

one of the wheels on the axle is raised clear of the ground. Do not start the engine with any rear wheel in contact with the ground.

If you are not fully experienced on the procedures to follow, and/or are not equipped with the proper tools and equipment, again, do not attempt to raise the vehicle, or remove or install the tire and wheel assembly—seek expert tire services.

- 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.
- Note that 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

(Continued)

**Danger (Continued)**

tires and wheels should be serviced only by trained people using the proper equipment.

- 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 chuck 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 Rubber Manufacturers Association (RMA), 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 1 040 km (650 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 10 400 km (6,500 mi).

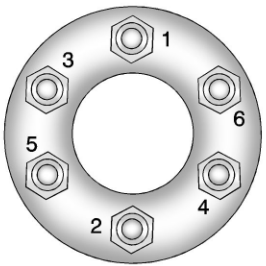
| Tightening torque |
| --- |
| 500 N·m (362 lb·ft) |

**Wheel Tightening Sequence**

Some studs and nuts have left-hand threads. Those studs are marked on their ends with the letter "L".

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. Never use oil or grease on the studs or nuts.

3. If a wheel stud and nut has been replaced, stake the stud and nut.

**⚠ 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<br>TIRE LOAD LIMITS AT VARIOUS COLD INFLATION PRESSURES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tire Size Designation | | Cold Inflation Pressure (psi) | | | | | | | | | |
| | | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
| LT215/85R16E | Dual<br>Single | (lbs) | | | | | | 2470<br>2680 | | | |
| 225/70R19.5F | Dual<br>Single | (lbs) | | | | | | | 3115<br>3315 | 3245<br>3450 | 3415<br>3640 |

See *Wheels and Tires* ⇨ *327*.

## Tire Rotation

**⚠ Warning**

Be sure to check the wheel studs, wheel nuts and disc wheel for any abnormality whenever the disc wheel is removed.

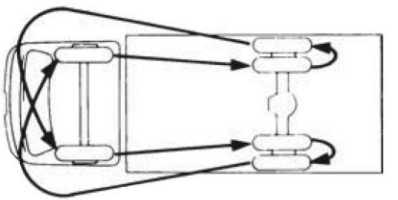
If you find any abnormal condition on the wheel studs, wheel nuts or disc wheel, do not continue to use the wheel. Contact the nearest dealer as soon as possible

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.



Use this rotation pattern when rotating the tires.

When installing dual wheels, check that the vent holes in the inner and outer wheels on each side are lined up.

**⚠ Warning**

If tires of different sizes, load ranges, constructions, or tread designs are used between the front and rear axles, do not exchange tires between the front and rear axles; otherwise, the tires may get loaded beyond their limits. This will also affect vehicle handling, brake performance, and ride comfort. 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) |

The tightening torque of the wheel nuts may decrease after a tire change due to their initial settlement. Upon driving 50 to 100 km (31 to 62 mi) after a tire change, retighten the wheel nuts to the specified torques according to the instructions in "Retightening Wheel Nuts" following.

See *Maintenance Schedule* ⇨ *359*.

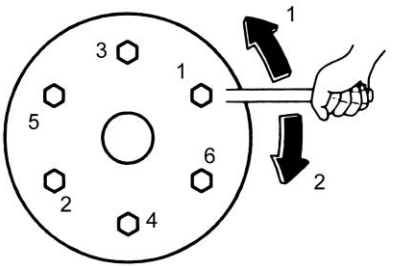
### Retightening Wheel Nuts

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. Be sure wheels are not bent or cracked and retighten the wheel nuts to the specified torque according to the Maintenance Schedule. After driving 1 040 km (650 mi) and after 10 400 km (6,500 mi), be sure to retighten the wheel nuts to the specified torque.

Repeat whenever a wheel, wheel bolt, or wheel nut is removed.

| Tightening torque |
| --- |
| 500 N·m (362 lb·ft) |



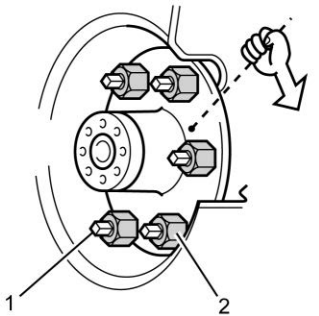

**Single Tire**

1. Left side tire
2. Right side tire

Turn the wheel nuts in the tightening direction to the specified torque.

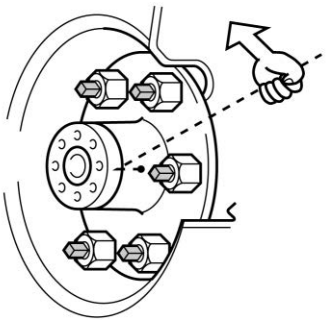
### Retightening of Nuts on Left Rear Dual-Tire Wheel

**Dual Tire**

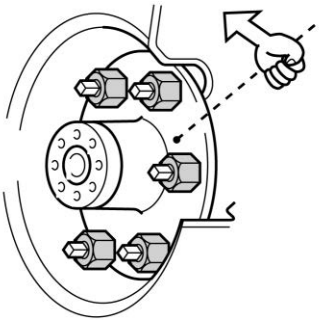



1. Inner Nut
2. Outer Nut

1. Loosen the outer wheel nuts on the wheel studs.



2. Tighten the inner wheel nuts of the same wheel to the specified torque.



3. Next, tighten the outer wheel nuts to the specified torque.

**⚠ 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 wrench on a wheel nut in order to tighten the nut to the specified torque. However, do not use a pipe as a handle extension or your foot to apply force on the wrench. This would tighten the nut more than required and might damage components.

Both under-tightening and over-tightening of wheel nuts may cause broken wheel studs or cracked disc wheels and could lead to wheel detachment. Adhere to the specified tightening torques.

When replacing a tire with a new one, use only a tire of the same type and size as the replaced tire; otherwise, driving safety could be affected. Avoid mixed use of different types or different size tires at all costs.

## 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.
- Do not drive with a broken chain. If there is chain failure stop immediately and repair or remove. Continuing to drive

(Continued)

**Warning (Continued)**

could lead to an unexpected crash if the chain falls off or interferes with other parts.

- 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* ⇨ *327*.

# 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.

**⚠ 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*.

**⚠ 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.

(Continued)

**Danger (Continued)**

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 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.

(Continued)

**Danger (Continued)**

- 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.

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 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.

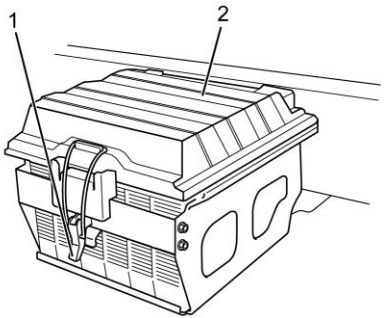
Do not disconnect a battery terminal with the engine running. It could cause a breakdown in the electrical system.

You and others could be seriously injured.

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.

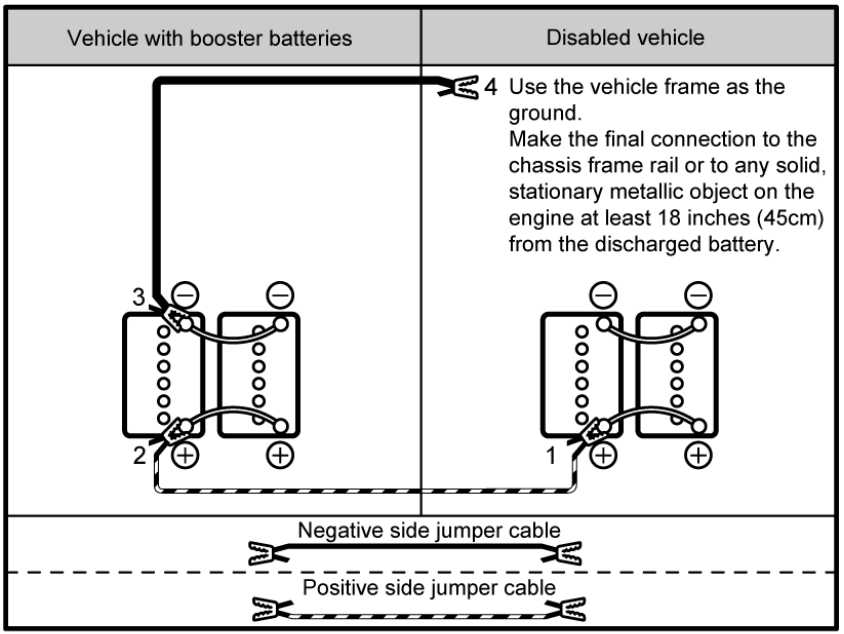
1. Use a vehicle that has a charged battery with the same voltage. Make sure that the other vehicle also has a 12-volt starting system, and that it is the negative (–) terminal which is grounded (attached to the engine block, or frame rail).
2. Position the vehicle with the good (charged) battery so 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.




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

**⚠ Warning**

Do not tow the vehicle with the engine control switch turned to the ON position with just the front wheels or rear wheels raised. The Electronic Stability Control (ESC) may operate and cause an accident resulting in damage to the vehicle or bodily injury.

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).

Connect to the main structural parts of the vehicle. Do not attach to bumpers, tow hooks or brackets. Use only equipment designed for this purpose. Follow the instructions of the wrecker manufacturer.

A safety chain system must be used.

The procedures below must be followed when towing to prevent possible damage.

**Front End Towing (Front Wheels Off Ground)**

To prepare a disabled vehicle for front end towing with front wheels raised off the ground, the following steps are necessary:

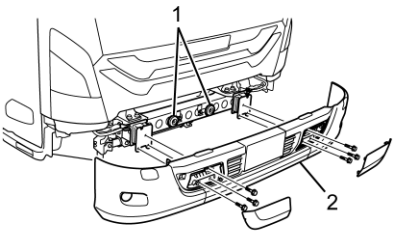
- Block the rear wheels of the disabled vehicle.
- Disconnect the driveshaft at the rear axle. Secure the driveshaft to the frame or crossmember.

| Caution |
| --- |
| When towing, disconnect the driveshaft at the rear axle to ensure the transmission is not damaged. |

If there is damage or suspected damage to the rear axle, remove the axle shafts. Cover the hub openings to prevent the loss of lubricant or entry of dirt or foreign objects.

Place a 10 cm (4 in) wood beam against the towing guide behind the bumper, if no 10 cm (4 in) is available, then remove the bumper.

Ensure towing chains do not come into contact with the horns or the bumper, if towing chains contact the bumper, then remove the bumper.




1. Horns
2. Bumper

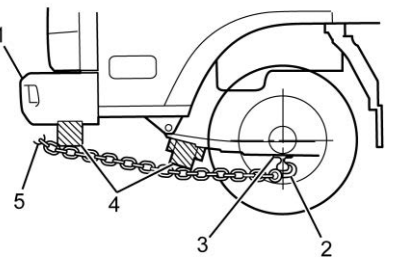
**After Towing**

After towing the vehicle, block the rear wheels and install axle shafts or driveshaft.

Apply the parking brake before disconnecting from the towing vehicle.

**Front End Towing (All Wheels On the Ground)**

Your vehicle may be towed on all wheels provided the steering is operable. Remember that power steering and brakes will not have power assist. There must be a tow bar installed between the tow vehicle and the disabled vehicle.




**Towing With All Wheels on the Ground**

1. Bumper
2. Tow Hook
3. Front Axle
4. Towing Guide
5. Towing Chain

To prepare a disabled vehicle for front end towing with all wheels on the ground, the following steps are necessary:

- Block the rear wheels of the disabled vehicle.
- Disconnect the driveshaft at the rear axle. Secure the driveshaft to the frame or crossmember.

| Caution |
| --- |
| When towing, disconnect the driveshaft at the rear axle to ensure the transmission is not damaged. |

Provide wood blocking to prevent towing chains and bar from coming into contact with the bumper.

If there is damage or suspected damage to the rear axle, remove the axle shafts.

Cover the hub openings to prevent the loss of lubricant or entry of dirt or foreign objects.

#### After Towing

After towing the vehicle, block the rear wheels and install axle shafts or driveshaft.

Apply the parking brake before disconnecting from the towing vehicle. Check and fill rear axle with oil, if required.

#### Rear End Towing

When towing a vehicle with rear wheels raised, secure the steering wheel to maintain straight-ahead position. Make certain that the front axle is not loaded beyond the front axle gross axle weight rating (GAWR) as indicated on the vehicle's vehicle identification number (VIN), weight rating, and greenhouse gas (GHG) emissions plate.

#### Special Towing Instructions

- All state and local laws regarding such items as warning signals, night illumination, speed, etc., must be followed.
- Safety chains must be used.
- No vehicle should ever be towed over 88 km/h (55 mph).
- Loose or protruding parts of damaged vehicles should be secured prior to moving.
- A safety chain system completely independent of the primary lifting and towing attachment must be used.
- Operators should refrain from going under a vehicle which is being lifted by the towing equipment unless the vehicle is adequately supported by safety stands.
- No towing operation which for any reason jeopardizes the safety of the wrecker operator or any bystanders or other motorists should be attempted.

# Appearance Care

## Exterior Care

### Exterior Finish

The paint finish on your vehicle provides beauty, depth of color, gloss retention and durability.

While cleaning the vehicle, do not grip the roof marker lights to prevent damage or water leakage.

**Washing**

**⚠ 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.

**Caution**

Do not apply water directly in order to clean the cab interior. Failure to observe this precaution can result in malfunction or breakdown of electronic control units and electrical components, or in rusting of the cab floor.

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.

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.

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 observe this precaution can lead to a poorly starting and operating engine and problems in the electrical system.

(Continued)

**Caution (Continued)**

Ensure that mirrors and the antenna are retracted before washing the vehicle.

If an automatic car or truck-wash must be used, avoid a high-temperature, high-pressure type machine. Failure to observe this precaution can lead to heat deformation and breakage of plastic components, or to water leaks into the cab.

When using an automatic car or truck-wash, ensure that a distance of at least 0.4 m (15.75 inches) is maintained between the nozzle and the vehicle, and when washing door windows, that the spray is perpendicular to the surface of the glass.

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.

(Continued)

**Caution (Continued)**

Airborne dirt that adheres to plastic front bumpers as a result of rain, for example, can be difficult to remove.

In such a case, use a commercially-available cleaner to clean away the dirt, and then apply a wax for use with plastic components.

Do not apply water to the tail end of the exhaust pipe. Failure to observe this precaution can cause exhaust sensors to malfunction or fail.

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:

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

## 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

**⚠ Warning**

Wax must not be applied to the windshield. If applied, it can result in an irregular reflection of light, impairing your view.

**Caution**

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.

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.

### 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.

### Weather-strip Lubrication

All weather-strips should be periodically lubricated (minimum of every 6 months) with a silicone grease lubricant. A thin film of silicone grease lubricant should be applied using a clean cloth. Silicone grease application will lengthen weather-strip life, help sealing, and assist in eliminating squeaks.

## Windshield Care

**Caution**

In order to prevent damage or water leakage, do not grip the roof marker lights while cleaning the windshield.

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.

Look for broken, scratched, dirty or damaged glass that could reduce the view or visibility, or cause injury.

### External Diesel Engine Cleaning

The diesel engine does not need periodic cleaning, nor is it recommended.

**Caution**

If you insist on cleaning the engine, clean it only when it is cold, never when it is warm or hot, and never when the engine is running. Spraying or pouring water or other fluids on your engine when it is warm or hot, or when it is running, can cause serious damage to the engine and its components, particularly the fuel supply pump.

(Continued)

**Caution (Continued)**

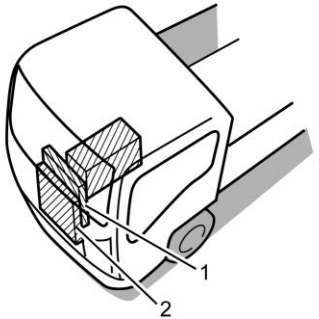
Do not high pressure wash the engine. Doing so may cause water intrusion in electrical connections and cause compartment malfunctions.

### Handling the Radiator Core and Charge Air Cooler Core

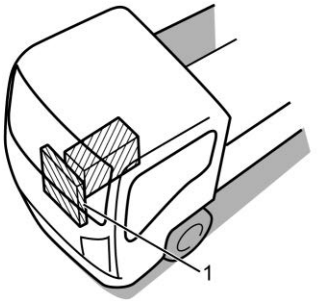
**⚠ Warning**

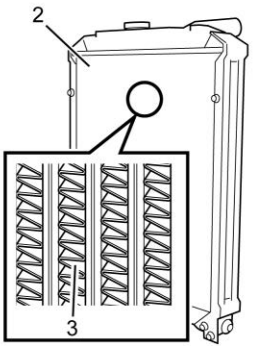
Make sure to turn the engine off, remove the key from the engine control switch and the engine is cold, before cleaning cores.

The engine, exhaust pipe and radiator will be hot immediately after the vehicle is driven. Be careful around these parts to prevent burns.




Cooling efficiency is compromised when there is dirt or dust plugging air passages in the radiator core (1) and charge air cooler core (2). This can also cause corrosion of these cores. Wash the radiator core with tap water every 24 months.




**Caution**

Do not clean the radiator (1), charge air cooler (2)or their surrounding areas using water that is supplied under high pressure. Doing so may cause damage.

When cleaning the radiator core and charge air cooler core, 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 have been cleaned, have the vehicle inspected and serviced at your dealer.

Clean the engine when it is cold.

## 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.

The underbody should be checked and cleaned on a regular basis as needed. 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

**⚠ Warning**

Do not use a water hose on, or pressure wash, the interior of the cab (including the steering wheel or column and instrument panel). The SRS Frontal Airbags, airbag sensors, seat belt pretensioners and other electronic devices are located in these areas, and if they get wet they may unintentionally deploy or not function properly in a crash, resulting in a serious injury or death.

**⚠ 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

(Continued)

**Warning (Continued)**

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 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

(Continued)

**Warning (Continued)**

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.

**Caution**

The interior of the vehicle must never be cleaned using acidic or alkaline solvents, or petroleum ether, gasoline, or other organic solvents. Failure to observe this

(Continued)

**Caution (Continued)**

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; also decorative paper, etc.

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.

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:

1. Remove stains as quickly as possible before they set.
2. Use a clean cloth or sponge, and change to a clean area often. A soft brush maybe used if stains persist.
3. Use solvent-type cleaners only in a well ventilated area: also, do not saturate the stained area.

4. If a ring forms after spot cleaning, clean the entire area immediately.
5. 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

**Caution**

When cleaning the inside of the windshield, cover the camera with a sheet of paper, a plastic bag, masking tape, or by other means. When doing so, be careful that the covering material does not touch the lens of the camera.

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

| 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.<br>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 section.

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 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.

**NORMAL VEHICLE USE**

Usual operating conditions are considered to be carrying passengers and cargo within the limitations indicated on the "VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate", on reasonable paved road surfaces within legal operating limits for at least several miles/kilometers on a daily basis. See *Vehicle Identification Number (VIN)* ⇨ *379*.

**SEVERE VEHICLE USE**

Unusual operating conditions, such as driving in dusty areas (sweeper, agricultural or off-road vehicles), extended idling (PTO equipped vehicles), frequently overloaded, driven at excessive speeds, or vehicles operated for frequent short trips, will require more frequent vehicle maintenance for certain.

## 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.

## 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 | 16 000 km/10,000 mi | 32 000 km/20,000 mi | 48 000 km/30,000 mi | 64 000 km/40,000 mi | 80 000 km/50,000 mi | 96 000 km/60,000 mi | 112 000 km/70,000 mi | 128 000 km/80,000 mi | 144 000 km/90,000 mi | 160 000 km/100,000 mi | 176 000 km/110,000 mi | 194 000 km/120,000 mi | Service intervals months or kilometers (miles) whichever occurs first |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Engine noise check | I | I | I | I | I | I | I | I | I | I | I | I | — |
| 2 | Valve lash | - | - | - | - | A | - | - | - | - | A | - | - | or every 12 months |
| 3 | Engine oil and oil filter | R | R | R | R | R | R | R | R | R | R | R | R | or every 12 months<br>or every 300 hours |
| 4 | Oil catch cup | I | I | I | I | I | I | I | I | I | I | I | I | or every 12 months<br>or every 300 hours |
| 5 | Fuel filter* | - | R | - | R | - | R | - | R | - | R | - | R | or every 24 months |
| 6 | Pre-fuel filter/water separator* | - | R | - | R | - | R | - | R | - | R | - | R | or every 24 months |
| 7 | Air cleaner filter | - | - | - | - | - | - | - | - | - | - | - | - | indicator |

| No. | Service Interval | 16 000 km/10,000 mi | 32 000 km/20,000 mi | 48 000 km/30,000 mi | 64 000 km/40,000 mi | 80 000 km/50,000 mi | 96 000 km/60,000 mi | 112 000 km/70,000 mi | 128 000 km/80,000 mi | 144 000 km/90,000 mi | 160 000 km/100,000 mi | 176 000 km/110,000 mi | 194 000 km/120,000 mi | Service intervals months or kilometers (miles) whichever occurs first |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | Drive belts | I | I | I | I | I | I | I | I | I | I | I | I | or every 12 months |
| 9 | Engine bolt torques | - | - | - | - | I | - | - | - | - | I | - | - | — |
| 10 | Rotate tires | R | R | R | R | R | R | R | R | R | R | R | R | — |
| 11 | Engine cooling system | I | I | I | I | I | I | I | I | I | I | I | I | or every 12 months |
| 12 | Engine coolant | Every 12 months: I<br>Every 24 months: R (when dealer recommended coolant is used) | | | | | | | | | | | | |
| 13 | Exhaust system | I | I | I | I | I | I | I | I | I | I | I | I | — |
| 14 | DPF (clean filter) | - | - | - | - | - | - | - | - | - | C | - | - | or every 3,000 hours |
| 15 | DPF (pressure difference sensor 0 point adjustment) | - | - | - | - | - | - | - | - | - | A | - | - | or every 3,000 hours |

| No. | Service Interval | 16 000 km/10,000 mi | 32 000 km/20,000 mi | 48 000 km/30,000 mi | 64 000 km/40,000 mi | 80 000 km/50,000 mi | 96 000 km/60,000 mi | 112 000 km/70,000 mi | 128 000 km/80,000 mi | 144 000 km/90,000 mi | 160 000 km/100,000 mi | 176 000 km/110,000 mi | 194 000 km/120,000 mi | Service intervals months or kilometers (miles) whichever occurs first |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | DPF (pressure difference sensor hose) | - | - | - | - | - | - | - | - | - | I | - | - | or every 3,000 hours |
| 17 | Fuel line system | I | I | I | I | I | I | I | I | I | I | I | I | or every 12 months |
| 18 | Brake pads for wear | I | I | I | I | I | I | I | I | I | I | I | I | — |
| 19 | Brake rotors for wear and damage | - | I | - | I | - | I | - | I | - | I | - | I | or every 12 months |
| 20 | Brake fluid | I | I | R | I | I | R | I | I | R | I | I | R | or every 12 months: I<br>or every 24 months: R |
| 21 | Fluid leak in brake system | I | I | I | I | I | I | I | I | I | I | I | I | or every 12 months |
| 22 | Parking brake cable | I | I | I | I | I | I | I | I | I | I | I | I | or every 12 months |
| 23 | Automatic transmission fluid | I | I | I | I | I | R | I | I | I | I | I | R | or every 24 months: R |
| 24 | Differential gear oil | I | I | R | I | I | R | I | I | R | I | I | R | or every 24 months |

| No. | Service Interval | 16 000 km/10,000 mi | 32 000 km/20,000 mi | 48 000 km/30,000 mi | 64 000 km/40,000 mi | 80 000 km/50,000 mi | 96 000 km/60,000 mi | 112 000 km/70,000 mi | 128 000 km/80,000 mi | 144 000 km/90,000 mi | 160 000 km/100,000 mi | 176 000 km/110,000 mi | 194 000 km/120,000 mi | Service intervals months or kilometers (miles) whichever occurs first |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | Power steering fluid | - | - | R | - | - | R | - | - | R | - | - | R | or every 24 months |
| 26 | Power steering oil hoses | - | - | - | - | - | R | - | - | - | - | - | R | or every 24 months |
| 27 | Steering wheel free play | I | I | I | I | I | I | I | I | I | I | I | I | or every 24 months |
| 28 | Steering gear box torque | - | T | - | T | - | T | - | T | - | T | - | T | or every 12 months |
| 29 | Drive shaft flange torque | T | T | T | T | T | T | T | T | T | T | T | T | or every 12 months |
| 30 | Drive shaft lubrication | L | L | L | L | L | L | L | L | L | L | L | L | or every 12 months |
| 31 | Leaf spring U-bolt torque | T | T | T | T | T | T | T | T | T | T | T | T | or every 12 months |
| 32 | Wheel nut torque | T | T | T | T | T | T | T | T | T | T | T | T | — |
| 33 | King pin (model with rigid front suspension) | L | L | L | L | L | L | L | L | L | L | L | L | or every 12 months |

| No. | Service Interval | 16 000 km/10,000 mi | 32 000 km/20,000 mi | 48 000 km/30,000 mi | 64 000 km/40,000 mi | 80 000 km/50,000 mi | 96 000 km/60,000 mi | 112 000 km/70,000 mi | 128 000 km/80,000 mi | 144 000 km/90,000 mi | 160 000 km/100,000 mi | 176 000 km/110,000 mi | 194 000 km/120,000 mi | Service intervals months or kilometers (miles) whichever occurs first |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | Air conditioner blower filter | Cleaned once a month | | | | | | | | | | | | |
| 35 | Exhaust injector | - | - | - | - | - | - | - | - | - | - | I | - | — |
| 36 | DEF supply pump filter element | - | - | - | - | - | - | - | - | - | - | - | R | or every 24 months |
| 37 | Starter | When the starter indicator light (amber) comes on: R | | | | | | | | | | | | |
| 38 | PM Sensor | Every 250 000 km (150,000 miles): R | | | | | | | | | | | | |
| 39 | Radiator core and charge air cooler | Every 24 months: C | | | | | | | | | | | | |

**Remarks**

* Replace filters when the message "Replace the engine mounted fuel filter" appears on the Driver Information Center (DIC).

**1. Engine Noise Check:** These components have an effect on the control of noise emissions.

| Service Interval | Maintenance procedure |
|---|---|
| Engine<br>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<br>Every 16 000 km (10,000 miles) | Inspect fan, shroud and radiator for attachment, tears or cleanliness. Replace as necessary. |
| Air intake system<br>Every 24 000 km (1,500 miles) | Inspect all ducts, hoses and intake silencers for leaks or chafing. Repair or replace as necessary. |
| Exhaust system<br>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<br>Every 16 000 km (10,000 miles) | Inspect sound absorption materials for tears, broken out sections or attachment. Repair or replace as necessary. |

**2. Valve Lash:** 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 80 000 km (50,000 miles) or 12 months whichever occurs first.

**3. Engine Oil and Oil Filter:** Change at interval noted below depending upon driving conditions.

• Normal Service — Change every 16 000 km (10,000 miles) or 12 months whichever occurs first.

• Severe Service — Change every 8 000 km (5,000 miles) or 3 months if you often drive under one or more of these conditions: (a) driving in dusty areas, (b) frequent idling or idling for long periods, (c) driving 6 km (4 miles) or less in freezing weather, or other short trips in cold weather, where the engine does not thoroughly warm up.

Change oil and filter as soon as you can after driving in a dust storm. When recommended oil is used, it conforms to this maintenance schedule. (Recommended oil: CK-4 (API designations))

**4. Oil Catch Cup:** Check engine blow-by oil level in the oil catch cup every 16 000 km (10,000 mi). Make sure that the accumulated oil level in the oil catch cup does not exceed 10 mm (0.4 inch). If the level exceeds 10 mm (0.4 inch), 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, or mud has splashed against the oil catch up.

Clean up any fluid that drips from the cup to the flywheel housing or to the ground.

**5. Fuel Filter:** Replace the fuel filter every 32 000 km (20,000 miles) or more frequently if clogged or replace when filter message appears.

**6. Pre-Fuel Filter/Water separator:** Replace the fuel filter every 32 000 km (20,000 miles) or more frequently if clogged or replace when when filter message appears.

**7. Air Cleaner Filter:** Replace the air cleaner inspection message appears.

**8. Drive Belts:** Check belt driving the fan, alternator or A/C compressor every 16 000 km (10,000 miles). Look for cracks, fraying, wear, and proper tension.

**9. Engine Bolt Torques:** Loosened bolts result in lower engine output. Check and adjust manifold mounting, and injectors to correct torque every 80 000 km (50,000 miles).

**10. Rotate Tires:** To equalize wear, rotate tires and adjust tire pressures every 16 000 km (10,000 miles). See *Tire Rotation* ⇨ *340*.

**11. Engine Cooling System:** At 12 months or 16 000 km (10,000 miles) intervals, wash radiator cap and filler neck with clean water, pressure test system and radiator 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.

**12. Engine Coolant:** Inspect the engine coolant every 12 months. Replace the engine coolant every 24 months, drain the engine coolant by opening the drain plug at the bottom of the radiator core, flush and refill the engine cooling system with a new engine coolant. Refer to "Preparing Engine Coolant" in *Engine Coolant* ⇨ *287*. Have the Engine Coolant replaced by your authorized dealer.

**13. 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.

**14. DPF (Clean Filter):** Clean the filter every 160 000 km (100,000 miles) or 3,000 hours whichever occurs first.

**15. DPF (Pressure Difference Sensor 0 Point Adjustment):** Adjust the sensor every 160 000 km (100,000 miles) or 3,000 hours whichever occurs first.

**16. DPF (Pressure Difference Sensor Hose):** Inspect the sensor hose every 160 000 km (100,000 miles) or 3,000 hours whichever occurs first. Replace the sensor hose every 400 000 km (250,000 miles).

**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 Pads for Wear:** Check disc brake pads for wear or cracks every 16 000 km (10,000 miles). Check brakes (including parking brake) more often if operating conditions or driving habits result in frequent braking.

Disc brakes have built-in wear noise indicators which are designed to make a high pitched squeal or cricket-like warning sound when the brake pads are worn to the point where new pads are needed.

When the truck is in motion, the sound may be constant or it may come and go. Pressing the brake pedal firmly may cause the sound to stop.

Have the brake pads replaced by your authorized dealer as soon as possible after the warning first becomes evident. Failure to do so can result in expensive damage to the brake system or a serious crash.

**19. Brake Rotors for Wear and Damage:** Check brake rotors for wear or damage every 32 000 km (20,000 miles) or 12 months whichever occurs first.

**20. Brake Fluid:** Check the fluid in the brake fluid reservoir every 16 000 km (10,000 miles). Replace the fluid every 48 000 km (30,000 miles).

**21. Fluid Leak in Brake System:** 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.

**22. Parking Brake Cable:** Check the parking brake cable every 16 000 km (10,000 miles) or 12 months whichever occurs first.

**23. Automatic Transmission Fluid:** Check the automatic transmission fluid level at each engine oil change and replace fluid every 96 000 km (60,000 miles). Do not overfill. See *Automatic Transmission Fluid ⇨ 283*.

**24. Differential Gear Oil:** Replace lubricant every 48 000 km (30,000 miles). Check lubricant level every 16,000 km (10,000 miles) or every 12 months, and add lubricant to within 0 to 10 mm (0 to 0.4 inch) of the bottom edge of the filler hole if necessary. See *Rear Axle (Gear Oil Viscosity) ⇨ 304 Rear Axle (Oil Level Check) ⇨ 304*.

**25. Power Steering Fluid:** Replace power steering fluid every 24 months or 48 000 km (30,000 miles), whichever occurs first.

**26. Power Steering Oil Hoses:** Replace power steering oil hoses every 24 months or 96 000 km (60,000 miles), whichever occurs first.

**27. Steering Wheel Free Play:** Check steering wheel free play after the first 8 000 km (5,000 miles) and then every 16 000 km (10,000 miles).

| Steering wheel free play |
| --- |
| 10-50 mm (0.39-1.97 in) |

**28. Steering Gear Box Torque:** Retighten the attaching bolts of the steering gear box to the specified torque every 12 months or every 32 000 km (20,000 miles) whichever occurs first.

| Steering gear box tightening torque |
| --- |
| 103 N•m (76 lb·ft) |

**29. Driveshaft Flange Torque:** Check the fixing bolts of driveshaft flange for looseness or damage after the first 16 000 km (10,000 miles).

| Driveshaft flange tightening torque |
| --- |
| 103 N•m (76 lb·ft) |

**30. Driveshaft Lubrication:** Lubricate the grease fitting on the center bearing, as well as each universal joint and spline coupling every 12 months or 16 000 km (10,000 miles) whichever occurs first.

**31. Leaf Spring U-bolt Torque:** Tighten the U-Bolt nuts to the specified torque after the first 1 040 km (650 miles), thereafter every 16 000 km (10,000 miles).

| Model | Leaf spring U-bolt nut tightening torque | |
|---|---|---|
| | Front | Rear |
| 4500HD | 127 N•m (94 lb·ft) | 177 N•m (131 lb·ft) |
| 4500XD | 196 N•m (145lb·ft) | 177 N•m (131 lb·ft) |
| 5500XD | 196 N•m (145lb·ft) | 284 N•m (209 lb·ft) |

**32. 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 8,000 km (5,000 miles) and then every 16 000 km (10,000 miles). Note that there are left and right hand threads.

| Wheel nut tightening torque |
|---|
| 500 N•m (362 lb·ft) |

**33. King Pin:** Lubricate the grease fitting on the king pins every 12 months or 16 000 km (10,000 miles) whichever occurs first.

**34. Air Conditioner Blower Filter:** The air conditioner blower filter should be removed and cleaned once a month.

**35. Exhaust Injector:** Clean the exhaust injector every 176,000 km (110,000 miles).

**36. DEF Supply Pump Filter Element:** Replace the DEF supply pump filter element every 192 000 km (120,000 miles) or 24 months whichever occurs first.

**37. 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.

**38. PM Sensor:** Replace the PM Sensor every 250 000 km (150,000 miles).

# Owner Checks and Services

## 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" 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. Also, make sure that there is no abnormal exhaust gases. See *Starting and Stopping the Vehicle* ⇨ *157*.

**Checking Condition of the Engine at Low Speeds and during Acceleration**

1. Make sure the transmission is in the "P" 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. See *Starting and Stopping the Vehicle* ⇨ *157*.
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. If the pedal sticks, the engine stumbles or is not smooth or knocking noise can be heard, contact an authorized dealer for inspection, repair, or replacement.

## 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.

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 during a walk around the vehicle
   - Engine coolant level
   - Illumination, flashing, contamination, damage and obstruction of lights
   - Contamination, damage ad obstruction of windows, mirrors and reflectors
   - Power steering fluid level
   - Windshield washer fluid level
   - Oil, engine coolant, fuel, brake fluid, and power steering fluid leaks
   - Fan belt looseness and damage
   - Cab is lowered and cab tilt handle is locked
   - Air pressure of tires
   - Tire cracks and other damage
   - Abnormal tire wear
   - Tire tread depth

- Disc wheel mounting condition
- Leaf spring damage and mounting
- Inspect the exhaust system, checking that the tailpipe is clear.
- Brake fluid level
- Water separator
- Oil catch cup

3. Checks performed after the engine startup
   - Engine startability, abnormal noise and color of exhaust gases
   - Steering wheel free play
   - Windshield washer fluid spray condition and windshield wiper effectiveness
   - Parking brake lever stroke
4. Checks performed while driving the vehicle
   - Brake pedal operation and effectiveness
   - Condition of the engine at low speeds and during acceleration

**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

(Continued)

**Warning (Continued)**

driving may cause an accident. The driver could be seriously injured when not wearing the proper footwear.

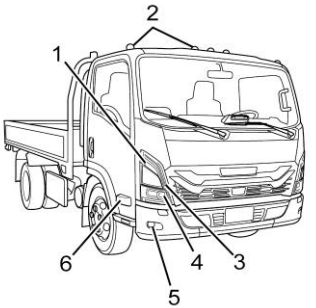
## Electrical System

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

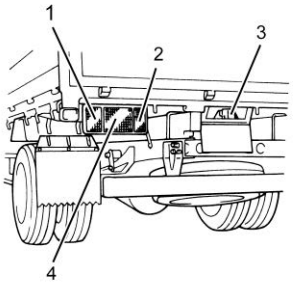
Turn the engine control switch to the "ON" position, and then check the way in which the headlights, turn signal lights, and other exterior lights come on and flash. In addition, press the brake pedal to confirm whether the stop lights come on, and shift the transmission to "R" position to confirm whether the back up lights come on. See *Exterior Lamp Controls* ⇨ *97*.

Also examine the lights for discoloration, damage, and looseness.




**Front**

1. Front Turn Signal Light
2. Roofmarker Light (Identification/ Clearance Lamp)
3. Parking Light
4. Headlight
5. Fog Light
6. Side Turn Signal Light/Cornering Light/ Side Marker Light




**Rear**

1. Rear Turn Signal Light
2. Back-up Light
3. License Plate Light
4. Tail and Brake Light

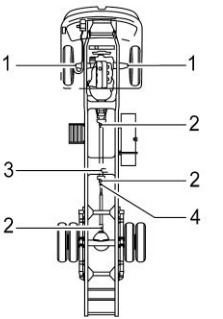
## Lubrication

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.

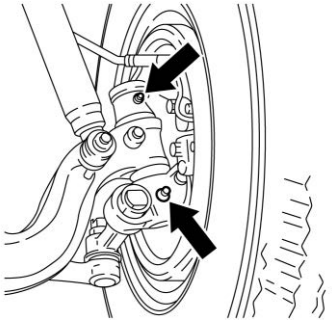
### Greasing Chassis Components

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.

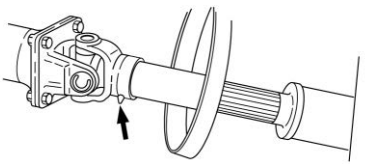
### Overview



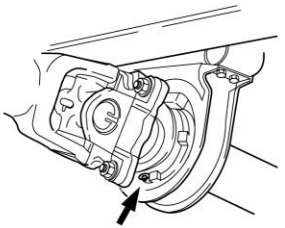

1. Kingpins
2. Driveshaft Universal Joints
3. Driveshaft Center Bearing
4. Driveshaft Sliding Sleeve



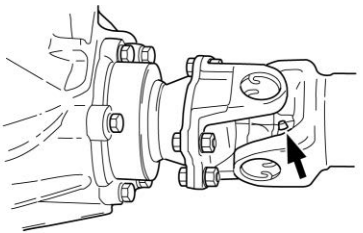
Kingpins (left and right)



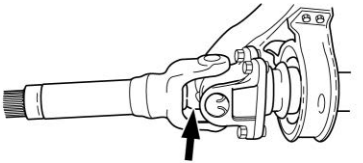
Driveshaft splines (4500/5500)



Center bearing (4500/5500)



Driveshaft universal joint (Single-piece shaft)



Driveshaft universal joint (Two-piece shaft)

Single-piece driveshaft: 2 points; Two-piece driveshaft: 3 points

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.

## 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 the 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 ⇨ 208* 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" 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 ⇨ 369*). Change tire pressure as needed when changing loads.

**F: Brakes:** Be alert to illumination of the brake system warning light or brake low vacuum warning light (4500HD, 4500XD models) or the tone alarm, or changes in braking action, such as repeated pulling to one side, unusual sounds when braking, increased brake pedal travel or harder pedal. The front and rear brakes are attached to an auto adjuster mechanism. If there are no defects, as the pedal travel is properly maintained, adjustments are not necessary. Check regularly that the brake fluid reservoir (left-hand side of the instrument panel) is properly filled and check for fluid leaks. Any of these conditions could indicate the need for brake system inspection and/or service.

**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 ⇨ 165*).

**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 down 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, part number, or specification can be obtained from your dealer.

| Usage | Fluid/Lubricant |
|---|---|
| Automatic Transmission | Automatic Transmission Fluid (Do not use Dexron-III) |
| Battery Terminals | Petroleum Jelly (outer surfaces) |
| Brake Fluid | DOT 3 Hydraulic Brake Fluid |
| Cab-Door Hinges and Latches Lubricant | Multi-Purpose Lubricant, Superlube or equivalent containing zinc oxide. |
| Chassis Lubricant | Chassis Lubricant or high temperature equivalent |
| Diesel Exhaust Fluid (DEF) | Diesel Exhaust Fluid that meets ISO 22241-1 or displays the API Diesel Exhaust Fluid Certification Mark |
| Driveshaft Center Bearing Lubricant | NLGI #2 or #3 |
| Driveshaft, Universal Joints and Sliding Sleeve Lubricant | NLGI #1 or #2 multi-purpose type grease |
| Engine Coolant | 50/50 mixture of clean, drinkable water and GM extended life coolant (GENERAL MOTORS ENGINEERING STANDARD GM6277M). See *Engine Coolant* ⇨ *287*. |
| Engine Oil | Quality recommended CK4 (API designation). To determine the viscosity required *W-40 for your vehicle's diesel engine, see *Engine Oil* ⇨ *277*. |

| Usage | Fluid/Lubricant |
|---|---|
| Power Steering Fluid | DEXRON-III Automatic Transmission Fluid |
| Rear Axle | Multi purpose gear oil SAE80W-90 GL-5, SAE90 GL-5 |
| 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.

### 5.2L Diesel

| Part | GM Part Number |
|---|---|
| Engine Air Cleaner | 97780479 |
| Engine Oil Filter | 97780497 |
| Fuel Filter: Engine Side | 97542539 |
| Fuel Filter: Chassis Side | 98147525 |

### 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

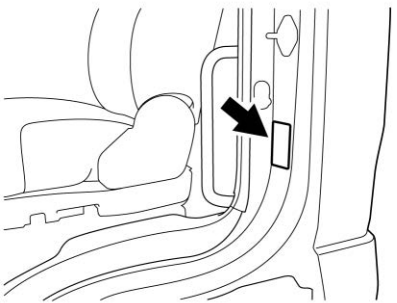
**Vehicle Identification**
Vehicle Identification Number (VIN) .....379
**Vehicle Data**
Capacities and Specifications .....384
Engine Drive Belt Routing .....391

# Vehicle Identification

## Vehicle Identification Number (VIN)

The 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.

### VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions Plate



The "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 VIN and emissions information for your vehicle. See *Information on Loading the Vehicle* ⇨ *56*.

This plate is located on the left side rear pillar panel below the striker (single cab) or on the left center pillar panel beside the shoulder seat belt anchor (crew cab).

The VIN is a legal identifier of your vehicle. It not only appears on the VIN, Weight Rating, and Greenhouse Gas (GHG) Emissions plate; but also on the vehicle title and registration. The VIN specifically identifies a vehicle by code.

### Interpreting the VIN

The VIN contains multiple pieces of information including the vehicle and engine model codes as shown below.

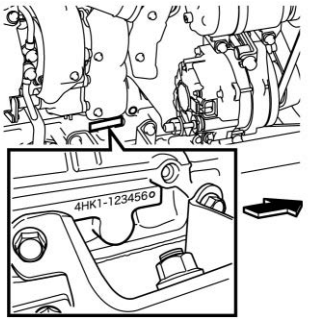
| J | A | L | C | 4 | W | 1 | 6 | * | S | 7 | K | 0 | 0 | 0 | 0 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | 11 | | |

| Section | Description |
|---|---|
| 1 | World Manufacturer Identifier (WMI) |
| 2 | GVWR and Brake System<br>C: 14,001-16,000 lbs. hydraulic brake system<br>E: 16,001-19,500 lbs. hydraulic brake system |
| 3 | Series Code<br>4: 4500HD/4500XD<br>5: 5500 XD |
| 4 | Cab Type Code<br>W: Steel tilt single cab, 71 inch bumper to back of cab (BBC)<br>J: Non-tilt crew cab, 110 inch bumper to back of cab (BBC) |
| 5 | Chassis Type Code<br>1: 4 x 2 |

| Section | Description |
|---|---|
| 6 | Engine Code<br>6: 4HK1 |
| 7 | Check Digit |
| 8 | Model Year Code<br>S: 2025 |
| 9 | Plant Code<br>7: Fujisawa |
| 10 | Model Code and GVW<br>0: 4500 HD — 14,500 lbs<br>K: 4500 XD — 16,000 lbs<br>P: 5500 XD — 19,500 lbs |
| 11 | Sequence Numbers |

Interpretation of the VIN may differ depending on the vehicle. For further details, please ask your dealer.

## Engine Number




The engine number is stamped on the right side front part of the engine block.

# 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** | Isuzu |
| **Model** | 4HK1 – 5.2L Diesel Engine |
| **Engine type** | Inline 4, Four Cycle |
| **Induction** | Turbocharged W/Charge Air Cooler |
| **Bore** | 115 mm |
| **Stroke** | 125 mm |
| **Displacement** | 5.193 L (317 CID) |
| **Full load RPM** | 2,500 rpm |
| **Compression ratio** | 16.5 to 1 |
| **Firing order** | 1-3-4-2 |

| | |
|---|---|
| **Fuel injection timing (static) degree** | 0° |
| **Valve clearance** | Both intake and exhaust valves:<br>0.6 mm (0.024 in) in cold engine |
| **Idling speed** | 625–675 r/min |
| **Fan belt tension** | New belt: 5–7 mm (0.20–0.28 in)/184–206 Hz<br>When used: 8–9 mm (0.31–0.35 in)/158–170 Hz |
| **Oil filter** | Cartridge (spin on) type |
| **Engine oil capacity** | When changing oil and filter: 11.0 L (11.6 qt) *1 |
| **Engine coolant capacity** | 19.6 L (20.7 qt) *2 |
| **Preheating system** | Glow plugs |
| **Transmission Specifications** | |
| A465ID Model – Six-speed automatic transmission (overdrive gear for 5th and 6th), lock-up clutch for 2nd to 6th | |
| Gear Ratio | |
| 1st | 3.742 to 1 |
| 2nd | 2.003 to 1 |
| 3rd | 1.343 to 1 |

| | |
|---|---|
| 4th | 1.000 to 1 |
| 5th | 0.773 to 1 |
| 6th | 0.634 to 1 |
| Reverse | 3.539 to 1 |
| Transmission fluid capacity | 13.7 L (14.5 qt) |
| **Service Specifications** | |
| **Weights** | |
| Axle weight rating : Front | 4500HD: 2431 kg (5,360 lb)<br>4500XD: 3007 kg (6,630 lb)<br>5500XD: 3300 kg (7,275 lb) |
| **Engine Oil** | |
| Engine oil capacity | When changing oil and filter: 11.0 L (11.6 qt) *1 |
| **Engine Cooling System** | |
| Capacity | 19.6 L (20.7 qt) |
| Engine oil Thermostat: Starts to open | 82–85 °C (180–185 °F) |

| | |
|---|---|
| Radiator pressure | 108 kPa (16 psi) |
| **Transmission** | |
| Transmission fluid capacity | 13.7 L (14.5 qt) [*3] |
| **Rear Axle** | |
| Differential gear oil capacity | 4500HD/4500XD:<br>3.0 L (3.17 qt) [*4]<br>5500XD:<br>4.3 L (4.5 qt) [*4] |
| **Fuel** | |
| Fuel tank capacity [*6] | 105.5 L (27.8 gal) |
| **Diesel Exhaust Fluid (DEF)** | |
| DEF tank capacity | 16.0 L (4.23 gal) |
| **Steering** | |
| Steering wheel free play | 10–50 mm (0.39–1.97 in) |
| Power steering fluid capacity | 1.5 L (1.6 qt) |
| **Wheel** | |

| | | |
|---|---|---|
| Wheel alignment | | |
| Toe-in | | –2 to 2 mm (–0.08 to 0.08 in) |
| Camber | | 0°15’ |
| Caster | | LH 2°50’, RH 3°40’ |
| King pin | | 12° |
| Wheel stud nut torque: Front and rear | | 500 N•m (50 kgf m/362 lb ft) |
| **Disc Brakes** | | |
| Model | 4500HD | 4500XD//5500XD |
| Brake size (Diameter x Thickness) | ϕ293 x 40 mm (ϕ11.54 x 1.57 in) | Front; ϕ363 x 42 mm (ϕ14.29 x 1.65 in)<br>Rear; ϕ348 x 42 mm (ϕ13.70 x 1.65 in) |
| Rotor thickness | | |
| [Standard Value] | 40.0 mm (1.575 in) | 42.0 mm (1.654 in) |
| [Usable Limit] | 37.0 mm (1.457 in) | 39.0 mm (1.535 in) |
| Pad thickness | | |
| [Standard Value] | 13.0 mm (0.512 in) | 13.0 mm (0.512 in) |
| [Usable Limit] | 1.0 mm (0.04 in) | 3.0 mm (0.12 in) |

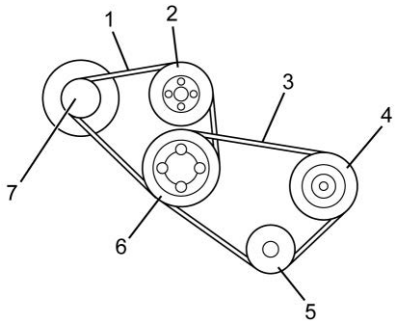
| | |
|---|---|
| **Service Brakes** | |
| Brake pedal free play | |
| 4500HD/4500XD/5500XD | 3–7 mm (0.12–0.28 in) |
| Clearance between the brake pedal and the brake pedal bracket with a pressure of 490 N•m (50 kgf/110 lb ft) applied to the brake pedal | |
| 4500HD/4500XD/5500XD models | 45 mm (1.77 in) or more |
| **Parking Brake** | |
| Lever effective stroke<br>(Under pull force of approx. 147 N (15 kg/33 lb) | 6–8 notches |
| **Electrical System** | |
| Battery type [BCI size]<br>(RC-CCA) x No. of units | 31T (160–750) x 2 [*5] |
| Starter | 12 V/3.0 kw |
| Alternator | 12 V/140 amp |
| **Tightening Torque** | |
| Oil pan drain plug | 83.3 N•m (8.5 kgf m/61.0 lb ft) |
| Oil filter drain plug | — |

<table>
<tr><td>Oil filter</td><td colspan="3">—</td></tr>
<tr><td>Oil filter cartridge</td><td colspan="3">63.7 N•m (6.5 kgf m/47.0 lb ft)</td></tr>
<tr><td colspan="4">Fastener Torques</td></tr>
<tr><td rowspan="4">Leaf Spring U-Bolt Nuts</td><td>Model</td><td>Front</td><td>Rear</td></tr>
<tr><td>4500HD*</td><td>127 N•m (94 lb ft)</td><td rowspan="2">177 N•m (131 lb ft)</td></tr>
<tr><td>4500XD</td><td rowspan="2">196 N•m (145 lb ft)</td></tr>
<tr><td>5500XD</td><td>284 N•m (209 lb ft)</td></tr>
<tr><td>Wheel Nuts</td><td colspan="3">500 N•m (362 lb ft)</td></tr>
<tr><td colspan="4">*Apply oil to the threaded portion of the U-bolt.</td></tr>
<tr><td colspan="4">Remarks: *1 see Engine Oil ⇨ 277.<br>Remarks: *2 see Engine Coolant ⇨ 287.<br>Remarks: *3 see Automatic Transmission Fluid ⇨ 283.<br>Remarks: *4 see Rear Axle (Gear Oil Viscosity) ⇨ 304 Rear Axle (Oil Level Check) ⇨ 304.<br>Remarks: *5 Larger capacity batteries 31T (180 - 930) x 2 can also be used. However, do not mix batteries of different types and from different makers.<br>Remarks: *6 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.</td></tr>
</table>

## Engine Drive Belt Routing

### Fan Belt and Air Conditioning Compressor Belt

See the *Maintenance Schedule* ⇨ *359*.




| No. | Name |
|---|---|
| 1 | Fan belt |
| 2 | Fan pulley |
| 3 | A/C belt |
| 4 | A/C compressor |

| No. | Name |
|---|---|
| 5 | Tension pulley |
| 6 | Crank pulley |
| 7 | Alternator |

- 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.
- The air conditioning drive belt, if equipped, must be adjusted after fan belt adjustment. If the belt is not adjusted properly, the A/C belt may experience excessive tension, and possible premature failure.

# Customer Information

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# Customer Information

## 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.

## 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 phone 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), please dial the national 711 relay service and contact 1-800-833-2438. TTY users in Canada can dial 1-800-263-3830.

## 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.

**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's warranty information.

**:** View active recalls by Vehicle Identification Number (VIN). See *Vehicle Identification Number (VIN)* ⇨ *379*.

**:** Manage your profile and payment information. View your GM Rewards Card earnings and My Chevrolet Rewards points.

**:** Chat with online help representatives.

Visit chevrolet.com and create an account today.

## GM Mobility Reimbursement Program

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

Call 1-888-899-1327. (Text Telephone (TTY): 1-888-889-2438.)

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.
- 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 many times.

### Services Provided

- **Emergency Fuel Delivery:** Delivery of enough fuel for the vehicle to get to the nearest 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

- 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

When the vehicle requires warranty 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.

If the vehicle cannot be scheduled into the service department immediately, keep driving it until it can be scheduled for service, unless, of course, the problem is safety related. If it is, please call your dealership, let them know this, and ask for instructions.

If your dealer requests you to bring the vehicle for service, you are urged to do so as early in the work day as possible to allow for same-day repair.

## Collision Damage Repair

If the vehicle is involved in a collision and it is damaged, have the damage repaired by a qualified technician using the proper equipment and quality replacement parts. Poorly performed collision repairs diminish the vehicle resale value, and safety performance can be compromised in subsequent collisions.

### Collision Parts

Genuine GM Collision parts are new parts made with the same materials and construction methods as the parts with which the vehicle was originally built. Genuine GM Collision parts are the best choice to ensure that the vehicle's designed appearance, durability, and safety are preserved. The use of Genuine GM parts can help maintain the GM New Vehicle Limited Warranty.

Recycled original equipment parts may also be used for repair. These parts are typically removed from vehicles that were total losses in prior crashes. In most cases, the parts being recycled are from undamaged sections of the vehicle. A recycled original equipment GM part may be an acceptable choice to maintain the vehicle's originally designed appearance and safety performance; however, the history of these parts is not 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 are also available. These are made by companies other than GM and may not have been tested for the vehicle. As a result, these parts 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.

### Repair Facility

GM also recommends that you 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.

### Insuring the Vehicle

Protect your investment in the GM vehicle with comprehensive and collision insurance coverage. There are significant differences in the quality of coverage afforded by various insurance policy terms. Many insurance policies provide reduced protection to the GM vehicle by limiting compensation for

damage repairs through the use of aftermarket collision parts. Some insurance companies will not specify aftermarket collision parts. When purchasing insurance, we recommend that you ensure that the vehicle will be repaired with GM original equipment collision parts. If such insurance coverage is not available from your current insurance carrier, consider switching to another insurance carrier.

If the vehicle is leased, the leasing company may require you to have insurance that ensures repairs with Genuine GM Original Equipment Manufacturer (OEM) 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.

### 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 matters have been taken care of. Move the vehicle only if its position puts you in danger, or you are instructed to move it by a police officer.

Give only the necessary information to police and other parties involved in the crash.

For emergency towing see *Roadside Assistance Program* ⇨ *394*.

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" earlier in this section.

### Managing the Vehicle Damage Repair Process

In the event that the vehicle requires damage repairs, GM recommends that you take an active role in its repair. If you have a pre-determined repair facility of choice, take the vehicle there, or have it towed there. Specify to the facility that any required replacement collision parts be original equipment parts, either new Genuine GM parts or recycled original GM parts. Remember, recycled parts will not be covered by the GM vehicle warranty.

Insurance pays the bill for the repair, but you must live with the repair. 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 as long as 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: 1-877-561-7439); 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

(Continued)

**Caution (Continued)**

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.

## Event Data Recorders

This vehicle is equipped with an Event Data Recorder (EDR). The main purpose of an EDR is to record, in certain crash or near crash-like situations, such as an air bag deployment or hitting a road obstacle, data that will assist in understanding how a vehicle's systems performed. The EDR is designed to record data related to vehicle dynamics and safety systems for a short period of time, typically 30 seconds or less. The EDR in this vehicle is designed to record such data as:

- How various systems in your vehicle were operating;
- Whether or not the driver and passenger safety belts were buckled/fastened;
- How far (if at all) the driver was depressing the accelerator and/or brake pedal; and,
- How fast the vehicle was traveling.

These data can help provide a better understanding of the circumstances in which crashes and injuries occur.

**Note**
EDR data are recorded by your vehicle only if a non-trivial crash situation occurs; no data are recorded by the EDR under normal driving conditions and no personal data (e.g., name, gender, age, and crash location) are recorded. However, other parties, such as law enforcement, could combine the EDR data with the type of personally identifying data routinely acquired during a crash investigation.

To read data recorded by an EDR, special equipment is required, and access to the vehicle or the EDR is needed. In addition to the vehicle manufacturer, other parties, such as law enforcement, that have the special equipment, can read the information if they have access to the vehicle or the EDR.

GM will not access these data or share it with others except: with the consent of the vehicle owner or, if the vehicle is leased, with the consent of the lessee; in response to an official request by police or similar government office; as part of GM's defense of litigation through the discovery process; or, as permitted by law. Data that GM collects or receives may also be used for GM research needs or may be made available to others for research purposes, where a need is shown and the data is not tied to a specific vehicle or vehicle owner.

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# 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.

**Customer Assistance**
1-800-222-1020

**Roadside Assistance**
1-888-899-1327

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