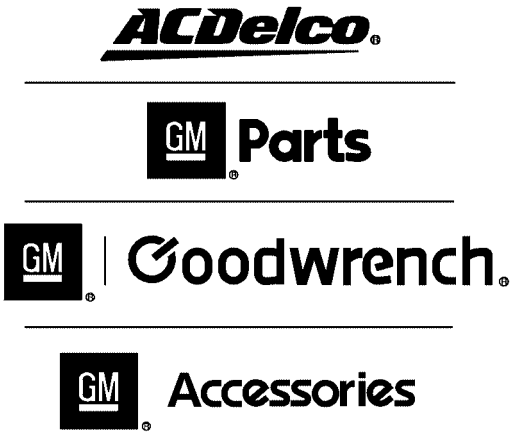
Section 5 Service and Appearance Care

Section 5 Service and Appearance Care

Service

For service and parts needs, visit your dealer/retailer. You will receive genuine GM parts and GM-trained and supported service people.

Genuine GM parts have one of these marks:



Accessories and Modifications

Adding non-dealer accessories to the vehicle can affect its performance and safety. Such things as airbags, braking, stability, ride and handling, emissions systems, aerodynamics, durability, and electronic systems like anti-lock brakes, traction control, and stability control could be affected. Some non-dealer accessories could even cause malfunction or damage to parts and systems and would not be covered by the vehicle warranty.

Damage to vehicle components resulting from the installation or use of non-GM certified parts, including control module modifications, are not covered under the terms of the vehicle warranty and may affect remaining warranty coverage for affected parts.

GM Accessories are designed to complement and function with other systems on the vehicle. Your GM dealer can accessorize the vehicle using genuine GM Accessories. When you go to your GM dealer and ask for GM Accessories, you will know that GM-trained and supported service technicians will perform the work using genuine GM Accessories.

Also, see *Adding Equipment to Your Airbag-Equipped Vehicle on page 1-61*.

Aftermarket Engine Performance Enhancement Products and Modifications

Some aftermarket engine performance products and modifications promise a way to increase the horsepower and torque levels of the vehicle's powertrain. You should be aware that these products could have harmful effects on the performance and life of the engine, exhaust emission system, transmission, and drivetrain. The engines, transmissions, and drivetrains have been designed and built to offer industry leading durability and performance in the most demanding applications. Engine power enhancement products may enable the engine to operate at horsepower and torque levels that could damage, create failure, or reduce the life of the engine, engine emission system, transmission, and drivetrain. Damage, failure, or reduced life of the engine, transmission, emission system, drivetrain, or other vehicle components caused by aftermarket engine performance enhancement products or modifications might not be covered under the vehicle warranty.

California Proposition 65 Warning

Most motor vehicles, including this one, contain and/or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Engine exhaust, many parts and systems (including some inside the vehicle), many fluids, and some component wear by-products contain and/or emit these chemicals.

California Perchlorate Materials Requirements

Certain types of automotive applications, such as airbag initiators, seat belt pretensioners, and lithium batteries contained in remote keyless transmitters, may contain perchlorate materials. Special handling may be necessary. For additional information, see www.dtsc.ca.gov/hazardouswaste/perchlorate.

Doing Your Own Service Work

⚠ CAUTION:

You can be injured and the vehicle could be damaged if you try to do service work on a vehicle without knowing enough about it.

- Be sure you have sufficient knowledge, experience, the proper replacement parts, and tools before attempting any vehicle maintenance task.
- Be sure to use the proper nuts, bolts, and other fasteners. English and metric fasteners can be easily confused. If the wrong fasteners are used, parts can later break or fall off. You could be hurt.

If doing some of your own service work, use the proper service manual. It tells you much more about how to service the vehicle than this manual can. To order the proper service manual, see *Service Publications Ordering Information on page 7-10*.

This vehicle has an airbag system. Before attempting to do your own service work, see *Servicing Your Airbag-Equipped Vehicle on page 1-60*.

Keep a record with all parts receipts and list the mileage and the date of any service work performed. See *Part D: Maintenance Record on page 6-34*.

Engine Fan Breakage

⚠ CAUTION:

Changing the Fan Drive Ratio or Engine Governed Speed:

If you change the fan drive ratio or increase the governed speed of the engine, you might increase stress and the fan could eventually fail. If the fan breaks apart while rotating, pieces can cause severe injury to anyone — such as a service technician — who is nearby. And, of course, the pieces can severely damage the vehicle. Do not change the fan drive ratio or increase the governed speed of the vehicle without getting the necessary information from your dealer/retailer.

CAUTION: (Continued)

CAUTION: (Continued)

Winter Fronts, Grille Covers, or Obstructions:

Winter Fronts, grille covers, or other add-on equipment causing obstructions in front of or behind the fan should not be used on this vehicle. If this causes the fan to eventually break apart while rotating, the pieces can cause severe injury to anyone nearby, such as a service technician working on the engine, and, of course, the pieces can severely damage the vehicle.

Fuel

For diesel engine vehicles, see *Diesel Engine Fuel on page 5-8*.

For vehicles with gasoline engines, please read this.

Use of the recommended fuel is an important part of the proper maintenance of this vehicle. To help keep the engine clean and maintain optimum vehicle performance, we recommend the use of gasoline advertised as TOP TIER Detergent Gasoline.

Gasoline Octane

Use regular unleaded gasoline with a posted octane rating of 87 or higher. If the octane rating is less than 87, you might notice an audible knocking noise when you drive, commonly referred to as spark knock. If this occurs, use a gasoline rated at 87 octane or higher as soon as possible. If you are using gasoline rated at 87 octane or higher and you hear heavy knocking, the engine needs service.

Gasoline Specifications

At a minimum, gasoline should meet ASTM specification D 4814 in the United States or CAN/CGSB-3.5 or 3.511 in Canada. Some gasolines contain an octane-enhancing additive called methylcyclopentadienyl manganese tricarbonyl (MMT). We recommend against the use of gasolines containing MMT. See *Additives on page 5-7* for additional information.

Additives

To provide cleaner air, all gasolines in the United States are now required to contain additives that help prevent engine and fuel system deposits from forming, allowing the emission control system to work properly. In most cases, you should not have to add anything to the fuel. However, some gasolines contain only the minimum amount of additive required to meet U.S. Environmental Protection Agency regulations. To help keep fuel injectors and intake valves clean, or if the vehicle experiences problems due to dirty injectors or valves, look for gasoline that is advertised as TOP TIER Detergent Gasoline.

For customers who do not use TOP TIER Detergent Gasoline regularly, one bottle of GM Fuel System Treatment PLUS, added to the fuel tank at every engine oil change, can help clean deposits from fuel injectors and intake valves. GM Fuel System Treatment PLUS is the only gasoline additive recommended by General Motors.

Also, your dealer/retailer has additives that will help correct and prevent most deposit-related problems.

Gasolines containing oxygenates, such as ethers and ethanol, and reformulated gasolines might be available in your area. We recommend that you use these gasolines, if they comply with the specifications described earlier. However, E85 (85% ethanol) and other fuels containing more than 10% ethanol must not be used in vehicles that were not designed for those fuels.

Notice: **This vehicle was not designed for fuel that contains methanol. Do not use fuel containing methanol. It can corrode metal parts in the fuel system and also damage plastic and rubber parts. That damage would not be covered under the vehicle warranty.**

Some gasolines that are not reformulated for low emissions can contain an octane-enhancing additive called methylcyclopentadienyl manganese tricarbonyl (MMT); ask the attendant where you buy gasoline whether the fuel contains MMT. We recommend against the use of such gasolines. Fuels containing MMT can reduce the life of spark plugs and the performance of the emission control system could be affected. The malfunction indicator lamp might turn on. If this occurs, return to your dealer/retailer for service.

Diesel Engine Fuel

For the Caterpillar® diesel, see the Caterpillar® Operation & Maintenance Manual for information concerning fuel usage.

Notice: **Diesel fuel or fuel additives not recommended in this manual could damage the fuel system and engine. Your warranty would not cover this damage. And:**

- **Diesel fuel that has been mixed with engine oil or automatic transmission fluid could damage the engine and emission controls.**
- **We do not test aftermarket diesel fuel additives. Some additives, particularly those which contain alcohol or water emulsifiers, could damage the fuel system. If you believe that unique circumstances call for a fuel additive to be used, consult your dealer/retailer for advice.**
- **If you ever run out of diesel fuel, it can be difficult to restart the engine. To avoid this, never let the tank get empty.**

If gasoline is ever accidentally added to the fuel tank, to avoid severe engine damage, do not run the engine until the fuel tank can be drained.

If you run out of fuel, *Running Out of Fuel on page 5-18* tells you how to restart the engine.

What Fuel to Use

Notice: **Use of diesel fuel other than Ultra Low Sulfur Diesel (15 ppm sulfur maximum) or engine oil other than low ash CJ-4 oil will cause permanent damage to the DPF and related components. This damage would not be covered by your warranty.**

The emission control system requires the use of diesel fuel with ultra low-sulfur (0.0015% by weight, or 15 ppm, maximum) content. Both Ultra Low Sulfur Diesel and Low Sulfur Diesel fuels are available in the United States and Ultra Low Sulfur Diesel fuel is available in Canada. In Mexico, Ultra Low Sulfur Diesel fuel is not available in all regions.

At a minimum, the diesel fuel you use should meet the latest version of ASTM specification D 975 (Grades No. 2-D or No. 1-D S15 commonly known as Ultra Low Sulfur diesel) in the United States. In addition, the Engine Manufacturers Association (EMA) has identified properties of an improved diesel fuel for better engine performance and durability. Diesel fuels corresponding to the EMA Recommended Guideline on Premium Diesel Fuel (FQP-1A) could provide better starting, less noise, and better vehicle performance. If there are questions about the fuel you are using, contact your fuel supplier.

In the United States, for best results use No. 2-D diesel fuel year-round (above and below freezing conditions) as oil companies blend No. 2-D fuel to address climate differences. No. 1-D diesel fuel can be used in very cold temperatures (when it stays below 0°F or –18°C); however, it will produce a power and fuel economy loss. Avoid the use of No. 1-D diesel fuel in warm or hot climates. It can result in stalling, poor starting when the engine is hot, and could damage the fuel injection system.

It is acceptable to use diesel fuel containing up to 5% biodiesel (B5), but the final blended fuel must meet the same specification, ASTM D 975 (Grades No. 2-D or No. 1-D S15 commonly known as Ultra Low Sulfur diesel), as other fuels used in your vehicle, and the biodiesel used for making this fuel must meet the latest version of ASTM specification D 6751. Biodiesel is produced from vegetable oils or animal fat that have been chemically modified to reduce the possibility of damage to the fuel system and engine. Higher concentration (i.e., greater than B5) biodiesel-containing fuels or the use of unmodified bio-oils blended into diesel fuel at any concentration is not recommended and could damage the fuel system and engine. Such damage would not be covered by your warranty. If there are questions about the biodiesel-containing fuels you are using, contact your fuel supplier.

Because of the cleansing properties of biodiesel, switching from straight diesel to a biodiesel blend can prematurely restrict the fuel filter with normal deposits in the fuel system. A fuel filter replacement might be required sooner than the recommended interval.

Diesel fuel can foam when you fill the tank. This can cause the automatic pump nozzle to shut off, even though the tank is not full. If this happens, just wait for the foaming to stop and then try filling the tank more slowly. See *Filling the Tank on page 5-20*.

⚠ CAUTION:

Heat coming from the engine can cause the fuel to expand and force the fuel out of the tank. If something ignites the fuel, a fire could start and people could be burned. To help avoid this, try filling the tank more slowly and fill the fuel tank only until the automatic nozzle shuts off. Do not try to top it off.

What Fuel to Use in Canada

Notice: **Use of diesel fuel other than Ultra Low Sulfur Diesel (15 ppm sulfur maximum) or engine oil other than low ash CJ-4 oil will cause permanent damage to the DPF and related components. This damage would not be covered by your warranty.**

The emission control system requires the use of diesel fuel with ultra low-sulfur (0.0015% by weight, or 15 ppm, maximum) content. Both Ultra Low Sulfur Diesel and Low Sulfur Diesel fuels are available in the United States and Ultra Low Sulfur Diesel fuel is available in Canada. In Mexico, Ultra Low Sulfur Diesel fuel is not available in all regions.

At a minimum, the diesel fuel you use should meet the latest version of specification CAN/CGSB-3.517 (ULS) in Canada. In addition, the Engine Manufacturers Association (EMA) has identified properties of an improved diesel fuel for better engine performance and durability (FQP-1A). Diesel fuels corresponding to the EMA description could provide better starting, less noise, and better vehicle performance. If there are questions about the fuel you are using, contact your fuel supplier.

Canadian fuels are blended for seasonal changes. Diesel Type “A” fuel is blended for better cold weather starting (below 0°F or –18°C); however, you might notice some power and fuel economy loss. If Type “A” fuel is used in warmer temperatures, stalling and hard starting may occur. Diesel Type “B” fuel is blended for temperatures above 0°F (–18°C).

It is acceptable to use diesel fuel containing up to 5% biodiesel (B5), but the final blended fuel must meet the same specification, CAN/CGSB-3.517 (ULS) in Canada, as other fuels used in your vehicle, and the biodiesel used for making this fuel must meet the latest version of ASTM specification D 6751. Biodiesel is produced from vegetable oils or animal fat that have been chemically modified to reduce the possibility of damage to the fuel system and engine. Higher concentration (i.e., greater than B5) biodiesel-containing fuels or the use of unmodified bio-oils blended into diesel fuel at any concentration is not recommended and could damage the fuel system and engine. Such damage would not be covered by your warranty. If there are questions about the biodiesel-containing fuels you are using, contact your fuel supplier.

Very Cold Weather Operation

Follow the instructions listed previously under the heading “What Fuel to Use.”

Notice: **Never use home heating oil or gasoline in your vehicle’s diesel engine. They can cause engine damage.**

In cold weather, the fuel filter could become clogged (waxed). To unclog it, move the vehicle to a warm garage area and warm the filter to between 32°F and 50°F (0°C to 10°C). You will not need to replace it. Additional information on the fuel filter follows.

Water in Fuel

⚠ CAUTION:

Diesel fuel containing water is still flammable. You could be burned. If you ever try to drain water from the fuel, keep sparks, flames, and smoking materials away from the mixture.

Notice: **If there is water in the diesel fuel and the weather is warm or humid, fungus and bacteria can grow in the fuel. They can damage the fuel system. A diesel fuel biocide can be used to sterilize the fuel system. However, the fuel system may still need to be cleaned. Your dealer/retailer can advise you of the appropriate solution.**

If the fuel tank needs to be purged to remove water, see your dealer/retailer or a qualified technician. Improper purging can damage the fuel system.

Sometimes, water can be pumped into the fuel tank along with the diesel fuel. This can happen if a service station does not regularly inspect and clean its fuel tanks, or if it gets contaminated fuel from its suppliers.

If this happens, the water-in-fuel light, if equipped, will come on in the instrument panel. If it does, the water must be drained. Your dealer/retailer can show you how to do this.

If the light comes on, use this chart to determine what action to take.

Water In Fuel Light

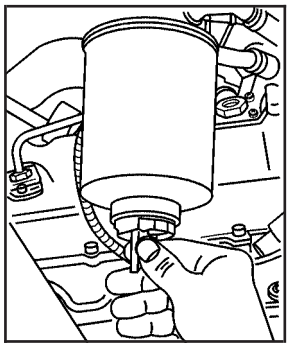
Problem	Recommended Action
Light comes on intermittently.	Drain water from the fuel filter.
Light stays on at temperatures above freezing.	Drain the fuel filter immediately. If no water can be drained and the light stays on, see your dealer/retailer for assistance.
Light stays on at temperatures below freezing.	Drain the fuel filter immediately. If no water can be drained, water may be frozen in the water drain system, or in the fuel lines. Move the vehicle to a warm location to thaw out, and then drain the filter system.
Light stays on immediately after refueling, and a large amount of water was possibly pumped into the fuel tank.	Fuel tank purging is required. See your dealer/retailer for assistance.

Notice: **Driving when this warning indicator is on, can damage the fuel injection system and the engine. If the indicator comes on right after a refuel, it means water was pumped into the fuel tank. Turn off the engine immediately. Then, have the water drained at once.**

To drain water, do the following:

1. Stop and park the vehicle in a safe place. Turn off the engine and apply the parking brake.
2. Remove the fuel cap.
3. Place a fuel-resistant container under the fuel filter. The filter drain valve is located on the bottom of the fuel filter.

   If the vehicle has the 6.6L engine, the fuel filter is located in the engine compartment on the driver side of the vehicle. If the vehicle has either the 7.2L or 7.8L engine, the fuel filters are located in the engine compartment on the driver side of the vehicle, and on the driver side frame rail in front of the fuel tank.



4. Open the drain valve by turning two to three turns. When fuel empties from the valve, all the water has been drained. Close the valve hand-tight.
5. Remove the fuel-resistant container and properly dispose of the contaminated fuel. To find out how to properly dispose of contaminated diesel fuel, see *Engine Oil (DURAMAX Diesel Engine) on page 5-23* or *Engine Oil (Caterpillar Diesel Engine) on page 5-26* or *Engine Oil (Isuzu Diesel Engine) on page 5-26* or *Engine Oil (Gasoline Engine) on page 5-30*.
6. Install the fuel cap.
7. Start the engine and let it run for a few minutes. If the engine stalls, the fuel system may need to be primed. While draining the water from the fuel filter, air may enter the fuel system. If air has entered the fuel system, the fuel system will need to be primed.

If the water-in-fuel light comes on again after driving a short distance or the engine runs rough or stalls, a large amount of water has probably been pumped into the fuel tank. The fuel tank should be purged.

Fuel Priming

If the vehicle has a Caterpillar® diesel engine, see the Caterpillar® Diesel Engine Operation and Maintenance Manual provided with the vehicle.

If the vehicle has a DURAMAX® diesel engine, in order for the fuel system to work properly, the fuel lines must be full of fuel and contain no air. If air gets into the fuel lines, it will be necessary to prime the fuel lines to eliminate air before operating the vehicle.

Air can get into the fuel lines if any of the following happen:

- The vehicle runs out of fuel.
- The fuel filter is removed for servicing or replacement.
- The fuel lines are removed or disconnected for servicing.
- The fuel filter water drain valve is opened while the engine is running.

If one or more of the above occurred, it is very likely that air has entered the fuel system and the fuel system needs to be primed before operating the vehicle.

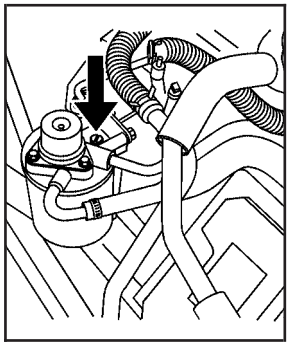
Air in the fuel lines will not harm the engine or the vehicle. However, the engine may not be able to start until the fuel system is primed and the air is removed.

Priming the 6.6L Duramax® Diesel Engine

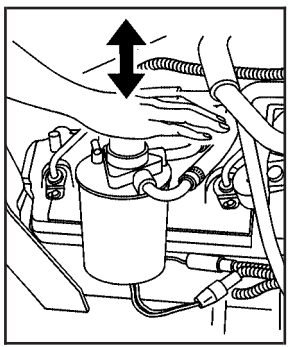
If the vehicle is equipped with the 6.6L Duramax® diesel engine, it has a priming pump which is part of the engine mounted fuel filter. The vent valve and the fuel filter primer pump are located on top of the fuel filter housing. The priming pump is hand operated and is designed to bring fuel to the engine to eliminate any air in the fuel lines.

To prime the 6.6L Duramax® diesel engine, do the following:

1. Make sure there is fuel in the tank.
2. Make sure the fuel filter had been installed and properly tightened.
3. Make sure the fuel lines are properly connected and the fuel filter is cool enough to touch.
4. Remove any dirt from the fuel filter head and vent valve by wiping with a cloth.



5. Open the fuel filter vent valve by turning the screw counterclockwise several full turns.

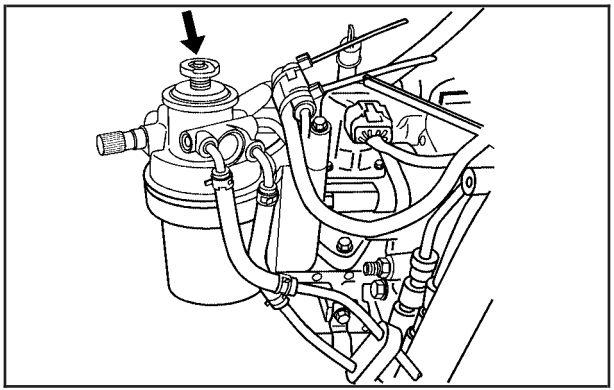


6. Repeatedly push down on the fuel filter primer pump with the palm of your hand. Let the pump return upward between pushes.

7. Operate the priming pump until a small amount of fuel seeps from the vent valve. When fuel is seen, the filter is full of fuel and the system should be primed.
8. Close the vent valve.
9. Clean any fuel that accumulated on the fuel filter.
10. Start the engine and let it idle for a few minutes.
11. Check the filter for leaks.

Priming the 7.8L Duramax® Diesel Engine

If the vehicle is equipped with the 7.8L Duramax® diesel engine, use the following procedure to prime the engine:



1. Make sure there is fuel in the fuel tank.
2. Make sure the specified fuel filter is properly installed.
3. Make sure the fuel lines are securely connected.
4. Make sure the fuel filter is cool to the touch.
5. Use a clean cloth to remove dirt and oil from the fuel filter head and breather valve.
6. Use the palm of your hand to repeatedly press and release the plunger at the top of the fuel filter priming pump. Continue until the plunger resistance becomes firm. This may take from 20 to 100 times, depending upon fuel tank location.
7. Turn the fuel filter breather valve screw counterclockwise several turns to open the breather valve.
8. Use the palm of your hand to repeatedly press and release the plunger at the top of the fuel filter priming pump until fuel begins to seep from the breather valve.
9. Tighten the fuel filter breather screw to the specified torque, 4.9 N•m (43 lbs. in.).
10. Use the palm of your hand to press and release the plunger at the top of the fuel filter priming pump about 20 more times. This sends fuel to the engine.
11. Use a clean cloth to remove any fuel from the fuel filter and surrounding area.
12. Start the engine and allow it to idle for a few minutes.
13. Check the fuel filter for leakage.

Running Out of Fuel

If the diesel engine stalls and you think that you have run out of fuel, do this to restart the engine:

⚠ CAUTION:

Diesel fuel is flammable. It could start a fire if it gets on hot engine parts. You could be burned. Do not let too much fuel flow from the air bleed valve, and wipe up any spilled fuel with a cloth.

1. If parked on a level surface, add at least 2 gallons (7.6 liters) of fuel. However, if parked on a slope, up to 5 gallons (18.9 liters) of fuel might need to be added.
2. Follow the fuel priming procedure earlier in this section to prime the fuel filter.
3. Close the air bleed valve.
4. Turn the ignition key to START for 10 to 15 seconds at a time until the engine starts. If the engine tries to run, but does not run smoothly, increase the rpm a little using the accelerator pedal. This will help force air through the system.

The service engine soon light may come on if the vehicle has run out of fuel. This light may stay on for a few drive cycles after the condition is corrected, but will eventually clear itself.

Fuel Filter Replacement

If you want to change the diesel engine fuel filter yourself, here is how to do it:

⚠ CAUTION:

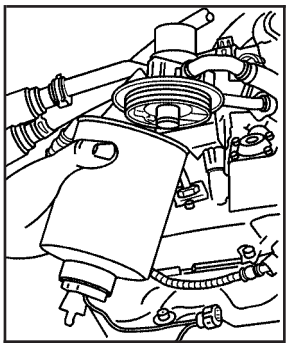
Diesel fuel is flammable. It could start a fire if something ignites it, and you could be burned. Do not let it get on hot engine parts, and keep matches or other ignition sources away.

First, drain any water from the filter by following the water draining procedure earlier in this section.

The vehicle's engine should be off until the end of this procedure.

If the vehicle has the 6.6L engine, the fuel filter is located in the engine compartment on the driver side of the vehicle. If the vehicle has either the 7.2L or 7.8L engine, the fuel filters are located in the engine compartment on the driver side of the vehicle, and on the driver side frame rail in front of the fuel tank.

1. Apply the parking brake.



2. Unplug the water sensor wire connected to the fuel filter and unscrew the filter element.
3. Remove the filter element. If there is any dirt on the filter sealing surface, clean it off. Remove and reuse the water sensor float switch located on the bottom of the fuel filter.
4. Install the new filter element.
5. Reinstall and tighten the filter container and reconnect the water sensor wire to the filter.
6. Use the fuel filter priming procedure earlier in this section to prime the fuel filter.
7. Tighten the air bleed valve by turning it clockwise until hand-tight.
8. Start the engine and let it idle for five minutes. Check the fuel filter and air bleed valve for leaks.

How to Reset Fuel Filter Change Light - DURAMAX 6.6L (LMM) Engine

The engine controller calculates when to change the fuel filter based on vehicle and fuel use. Whenever the fuel filter is changed, reset the fuel filter light so the engine controller can calculate when the next fuel filter change is required. If the fuel filter is ever changed prior to a change fuel filter light being turned on, reset the fuel filter change light.

To reset the Fuel Filter Change light:

1. Turn the ignition key to ON/RUN with the engine off
2. Fully press the accelerator and brake pedals at the same time for 10 seconds. If the Fuel Filter Change light flashes for 5 seconds, the system is resetting.
3. Turn the key to OFF.

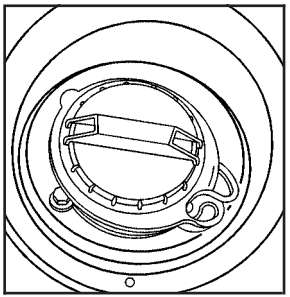
If the Fuel Filter Change light comes back on when you start the vehicle, the light has not been reset. Repeat the procedure. See *Change Fuel Filter Warning Light on page 3-46* for more information.

Fuels in Foreign Countries

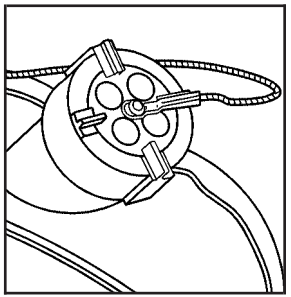
If you plan on driving in another country outside the United States or Canada, the proper fuel might be hard to find. Never use leaded gasoline or any other fuel not recommended in the previous text on fuel. Costly repairs caused by use of improper fuel would not be covered by the vehicle warranty.

To check the fuel availability, ask an auto club, or contact a major oil company that does business in the country where you will be driving.

Filling the Tank



Fuel caps for all gasoline applications, and all diesel between frame rail fuel tank applications



Fuel caps for all side mounted diesel applications

⚠ CAUTION:

Fuel vapor is highly flammable. It burns violently, and that can cause very bad injuries. Do not smoke if you are near fuel or refueling the vehicle. Keep sparks, flames and smoking materials away from fuel.

The fuel cap can be on either or both sides of the vehicle depending on option content.

To take off the cap, turn it slowly counterclockwise.

⚠ CAUTION:

If you get fuel on yourself and then something ignites it, you could be badly burned. Fuel can spray out on you if you open the fuel cap too quickly. This spray can happen if the tank is nearly full, and is more likely in hot weather. Open the fuel cap slowly and wait for any “hiss” noise to stop. Then unscrew the cap all the way.

When reinstalling the cap, turn it clockwise until it is tight.

Notice: **If you need a new fuel cap, be sure to get the right type. Your dealer/retailer can get one for you. If you get the wrong type, it may not fit properly. This may cause the malfunction indicator lamp to light and may damage the fuel tank and emissions system. See *Malfunction Indicator Lamp on page 3-36*.**

If the vehicle has dual tanks, fill the driver side tank, or forward tank, first. The fuel gage will give better readings this way. The gage will show the total fuel left in both tanks.

If the vehicle is a C4/C5 model and has dual tanks, the engine must be off when refueling or the fuel transfer system may become inoperable.

If the vehicle has a single tank with dual fillers, where there is a filler on each side of the vehicle, do not attempt to fill the tank through both fillers at the same time. Do not fill the tank with both caps removed or over-filling the tank and fuel spillage can result.

Filling a Portable Fuel Container

⚠ CAUTION:

Never fill a portable fuel container while it is in the vehicle. Static electricity discharge from the container can ignite the fuel vapor. You can be badly burned and the vehicle damaged if this occurs. To help avoid injury to you and others:

- Dispense fuel only into approved containers.
- Do not fill a container while it is inside a vehicle, in a vehicle's trunk, pickup bed, or on any surface other than the ground.

CAUTION: (Continued)

CAUTION: (Continued)

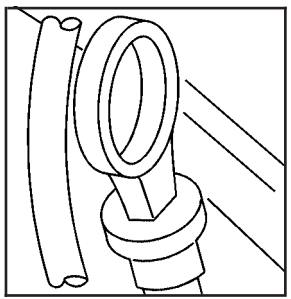
- Bring the fill nozzle in contact with the inside of the fill opening before operating the nozzle. Contact should be maintained until the filling is complete.
- Do not smoke while pumping fuel.
- Do not use a cellular phone while pumping fuel.

Checking Things Under the Hood

Engine Oil (DURAMAX Diesel Engine)

Checking Engine Oil

It is a good idea to check the engine oil level every time you get fuel.

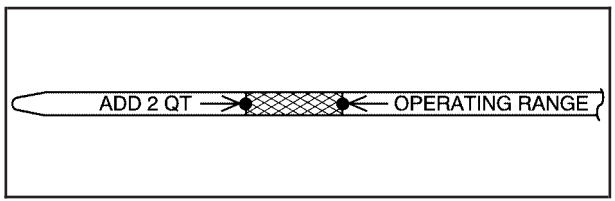


The engine oil dipstick is located in the engine compartment on the driver side of the vehicle.

In order to get an accurate reading, the engine should be at normal operating temperature, so that the oil is warm, and the vehicle must be on level ground.

1. If the engine is at normal operating temperature and the oil is warm, turn off the engine and allow at least five minutes for the oil to drain back into the oil pan. If you do not do this, the oil dipstick might not show the actual level.

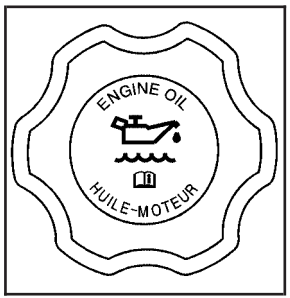
   If the engine has not been run long enough to bring it up to normal operating temperature and the oil is cool, turn off the engine and allow 30 minutes for the oil to drain back into the oil pan. If you do not do this, the oil dipstick might not show the actual level.
2. Pull out the dipstick and clean it with a paper towel or a cloth, then push it back in all the way.
3. Remove the dipstick again, keeping the tip down, and check the oil level.



When to Add Engine Oil

If the oil is below the cross-hatched area at the tip of the dipstick, add at least two quarts/liters of the recommended oil. This section explains what kind of oil to use. For engine oil crankcase capacity, see *Capacities and Specifications on page 5-103*.

Notice: **Do not add too much oil. If the engine has so much oil that the oil level gets above the cross-hatched area that shows the proper operating range, the engine could be damaged.**



Add oil at the engine oil fill cap in the engine compartment. Install and fully tighten the fill cap when you are through.

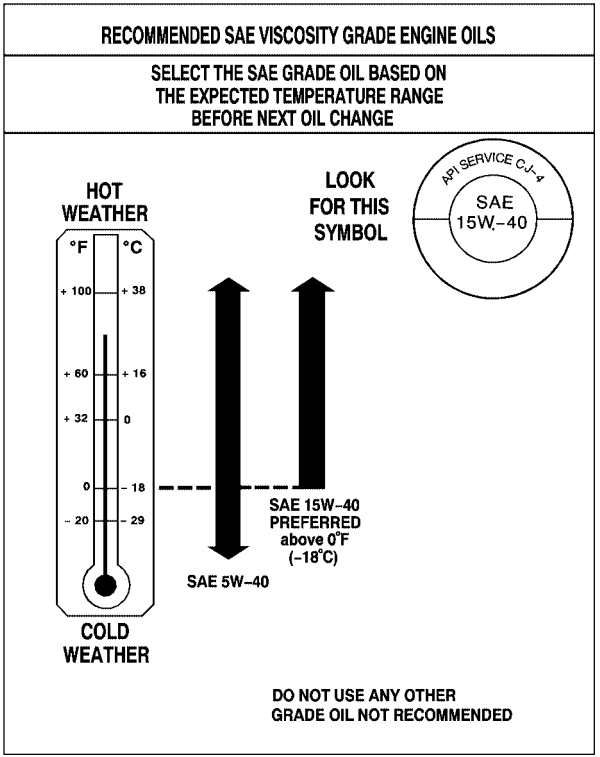
Add enough oil to put the level somewhere in the proper operating range. Push the dipstick all the way back in when you are through.

What Kind of Engine Oil to Use

Look for three things:

- CJ-4

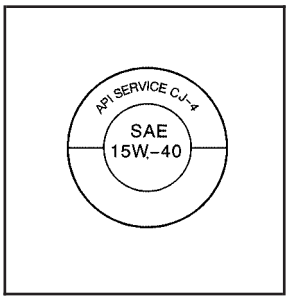
  Oils designated as API CJ-4 are required for the vehicle. The CJ-4 designation can appear either alone or in combination with other American Petroleum Institute (API) designations, such as API CJ-4/SL. These letters show API levels of quality.



- SAE 15W-40

  SAE 15W-40 is best for the vehicle. When it is very cold, below 0°F (–18°C), use SAE 5W-40 to improve cold starting. These numbers on the oil container show its viscosity, or thickness. Do not use other viscosity oils such as SAE 10W-30, SAE 10W-40, or SAE 20W-50.

- American Petroleum Institute (API) symbol



This doughnut-shaped logo (symbol) is used on most oil containers to help you select the correct oil. It means that the oil has been certified by the American Petroleum Institute.

Look for this on the oil container, and use only those oils that display this logo.

Notice: **Use only engine oils that have the designation CJ-4 for the diesel engine. Failure to use the recommended oil can result in engine damage not covered by the vehicle warranty.**

Engine Oil Additives

Do not add anything to the oil. The recommended oils with the API service symbol are all you need for good performance and engine protection.

When to Change Engine Oil (Vehicles Without the Engine Oil Life System)

Change the engine oil and filter every 15,000 miles (24 000 km), or every 12 months, or every 750 hours of engine operation, whichever occurs first. See *Scheduled Maintenance on page 6-5*.

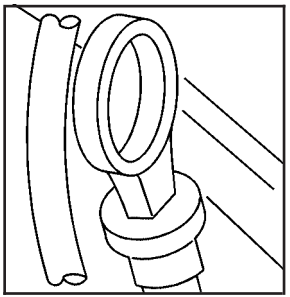
Engine Oil (Caterpillar Diesel Engine)

See the Caterpillar® Operation & Maintenance Manual for information on oil quality and viscosities as well as the temperature range chart.

Engine Oil (Isuzu Diesel Engine)

Checking Engine Oil

It is a good idea to check the engine oil level every time you get fuel.



The engine oil dipstick is located in the engine compartment on the driver side of the vehicle.

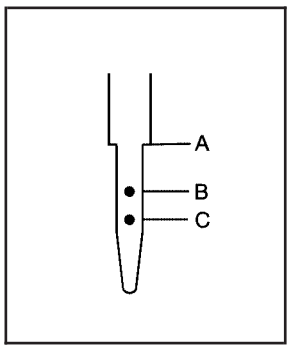
In order to get an accurate reading, the engine should be at normal operating temperature, so that the oil is warm, and the vehicle must be on level ground.

1. If the engine is at normal operating temperature and the oil is warm, turn off the engine and allow at least five minutes for the oil to drain back into the oil pan. If you do not do this, the oil dipstick might not show the actual level.

   If the engine has not been run long enough to bring it up to normal operating temperature and the oil is cool, turn off the engine and allow 30 minutes for the oil to drain back into the oil pan. If you do not do this, the oil dipstick might not show the actual level.
2. Pull out the dipstick and clean it with a paper towel or a cloth, then push it back in all the way.
3. Remove the dipstick again, keeping the tip down, and check the oil level.

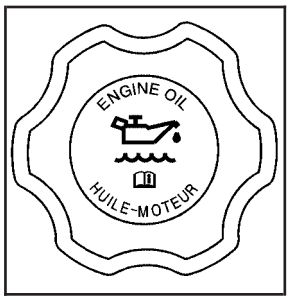
When to Add Engine Oil

Notice: **Do not add too much oil. Keep the oil level between the ADD (C) and FULL (B) marks on the dipstick. Under normal engine operation, the engine oil level can increase above the FULL (B) mark as a result of DPF regeneration. A small increase in the oil level is normal. If the engine has so much oil that the oil level reaches the wider portion (A) on the dipstick, the engine oil must be changed as soon as possible or the engine could be damaged.**



If the oil is below the ADD mark (C) on the dipstick, add at least one quart/liter of the recommended oil.

This section explains what kind of oil to use. For engine oil crankcase capacity, see *Capacities and Specifications on page 5-103*.



Add oil at the engine oil fill cap in the engine compartment. Install and fully tighten the fill cap when you are through.

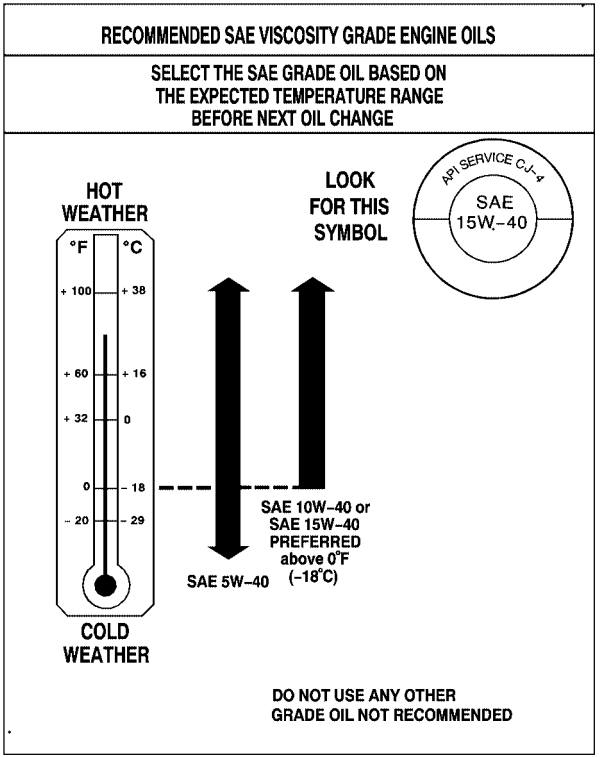
Add enough oil to put the level somewhere in the proper operating range. Push the dipstick all the way back in when you are through.

What Kind of Engine Oil to Use

Look for three things:

- CJ-4

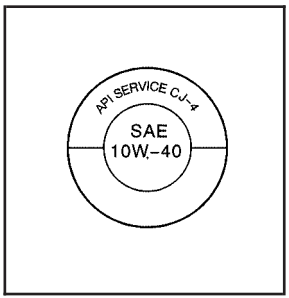
  Oils designated as API CJ-4 are required for the vehicle. The CJ-4 designation can appear either alone or in combination with other American Petroleum Institute (API) designations, such as API CJ-4/SL. These letters show API levels of quality.



- SAE 10W-40 or SAE 15W-40

  SAE 10W-40 or SAE 15W-40 is best for the vehicle. When it is very cold, below 0°F (–18°C), use SAE 5W-40 to improve cold starting. These numbers on the oil container show its viscosity, or thickness. Do not use other viscosity oils such as SAE 10W-30 or SAE 20W-50.

- American Petroleum Institute (API) symbol



This doughnut-shaped logo (symbol) is used on most oil containers to help you select the correct oil. It means that the oil has been certified by the American Petroleum Institute.

Look for this on the oil container, and use only those oils that display this logo.

Notice: **Use only engine oils that have the designation CJ-4 for the diesel engine. Failure to use the recommended oil can result in engine damage not covered by the vehicle warranty.**

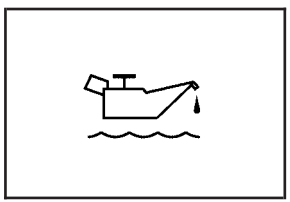
Engine Oil Additives

Do not add anything to the oil. The recommended oils with the API service symbol are all you need for good performance and engine protection.

When to Change Engine Oil (Vehicles Without the Engine Oil Life System)

Change the engine oil and filter every 15,000 miles (24 000 km), or every 12 months, or every 750 hours of engine operation, whichever occurs first. If the vehicle is used primarily for long trip, highway service, change the engine oil and filter every 18,000 miles (28 800 km), or every 12 months, or every 750 hours of engine operation, whichever occurs first. See *Scheduled Maintenance on page 6-5*.

Engine Oil (Gasoline Engine)

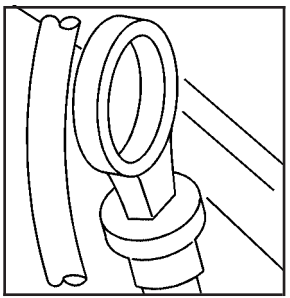


If the low oil light appears on the instrument cluster, check the engine oil level right away.

For more information, see *Low Oil Level Light on page 3-39*. You should check the engine oil level regularly; this is an added reminder.

Checking Engine Oil

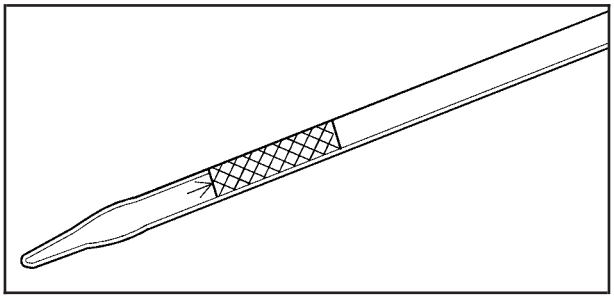
It is a good idea to check the engine oil every time you get fuel. In order to get an accurate reading, the oil must be warm and the vehicle must be on level ground.



The engine oil dipstick is located in the engine compartment on the driver's side of the vehicle.

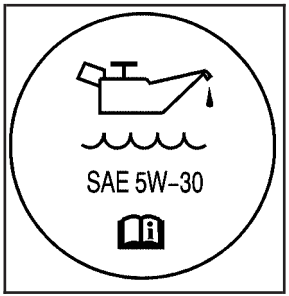
1. Turn off the engine and give the oil several minutes to drain back into the oil pan. If you do not do this, the oil dipstick might not show the actual level.
2. Pull out the dipstick and clean it with a paper towel or cloth, then push it back in all the way. Remove it again, keeping the tip down, and check the level.

When to Add Engine Oil



If the oil is below the cross-hatched area at the tip of the dipstick, add at least one quart/liter of the recommended oil. This section explains what kind of oil to use. For engine oil crankcase capacity, see *Capacities and Specifications on page 5-103*.

Notice: **Do not add too much oil. If the engine has so much oil that the oil level gets above the cross-hatched area that shows the proper operating range, the engine could be damaged.**

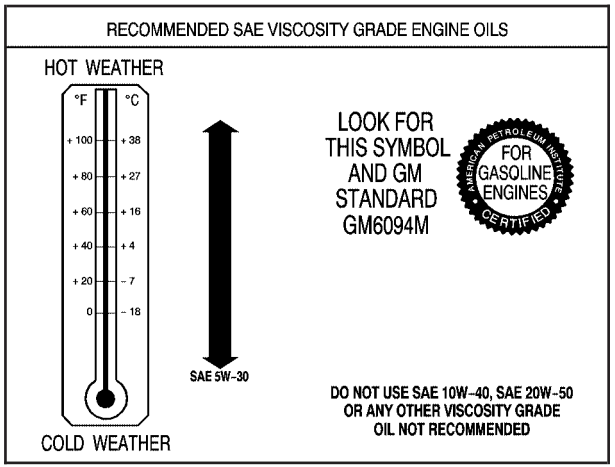


The engine oil fill cap is located near the engine oil dipstick in the engine compartment, on the driver side of the vehicle.

Add enough oil to put the level somewhere in the proper operating range in the cross-hatched area. Push the dipstick all the way back in when you are through.

What Kind of Engine Oil to Use

Look for three things:



- GM6094M

  Use only an oil that meets GM Standard GM6094M.

- SAE 5W-30

  SAE 5W-30 is best for the vehicle. These numbers on an oil container show its viscosity, or thickness. Do not use other viscosity oils such as SAE 20W-50.

- American Petroleum Institute (API) starburst symbol

Oils meeting these requirements should have the starburst symbol on the container. This symbol indicates that the oil has been certified by the American Petroleum Institute (API).

Notice: **Use only engine oil identified as meeting GM Standard GM6094M and showing the American Petroleum Institute Certified For Gasoline Engines starburst symbol. Failure to use the recommended oil can result in engine damage not covered by the vehicle warranty.**

Cold Temperature Operation

If in an area of extreme cold, where the temperature falls below –20°F (–29°C), use either an SAE 5W-30 synthetic oil or an SAE 0W-30 engine oil. Both provide easier cold starting for the engine at extremely low temperatures. Always use an oil that meets the required specification, GM6094M. See “What Kind of Engine Oil to Use” for more information.

Engine Oil Additives / Engine Oil Flushes

Do not add anything to the oil. The recommended oils with the API service symbol are all that is needed for good performance and engine protection.

Engine oil system flushes are not recommended and could cause engine damage not covered by the vehicle warranty.

Engine Oil Life System (Gasoline Engine)

When to Change Engine Oil

This vehicle has a computer system that indicates when to change the engine oil and filter. This is based on engine revolutions and engine temperature, and not on mileage. Based on driving conditions, the mileage at which an oil change is indicated can vary considerably. For the oil life system to work properly, the system must be reset every time the oil is changed.

When the system has calculated that oil life has been diminished, it indicates that an oil change is necessary. A change engine oil light comes on. See *Change Engine Oil Light on page 3-40*. Change the oil as soon as possible within the next 600 miles (1 000 km). It is possible that, if driving under the best conditions, the oil life system might not indicate that an oil change is necessary for over a year. However, the engine oil and filter must be changed at least once a year and at this time the system must be reset. Your dealer/retailer has trained service people who will perform this work using genuine parts and reset the system. It is also important to check the oil regularly and keep it at the proper level.

If the system is ever reset accidentally, the oil must be changed at 3,000 miles (5 000 km) since the last oil change. Remember to reset the oil life system whenever the oil is changed.

How to Reset the Engine Oil Life System

The Engine Oil Life System calculates when to change the engine oil and filter based on vehicle use. Whenever the oil is changed, reset the system so it can calculate when the next oil change is required. If a situation occurs where the oil is changed prior to a change engine oil light being turned on, reset the system.

To reset the change engine oil light:

1. Turn the ignition key to ON/RUN with the engine off.
2. Fully press and release the accelerator pedal slowly three times within 10 seconds.

   If the change engine oil light flashes for five seconds, the system is resetting.
3. Turn the key to OFF.

If the change engine oil light comes back on when the vehicle is started, the engine oil life system has not reset. Repeat the procedure.

What to Do with Used Oil

Used engine oil contains certain elements that can be unhealthy for your skin and could even cause cancer. Do not let used oil stay on your skin for very long. Clean your skin and nails with soap and water, or a good hand cleaner. Wash or properly dispose of clothing or rags containing used engine oil. See the manufacturer's warnings about the use and disposal of oil products.

Used oil can be a threat to the environment. If you change your own oil, be sure to drain all the oil from the filter before disposal. Never dispose of oil by putting it in the trash, pouring it on the ground, into sewers, or into streams or bodies of water. Recycle it by taking it to a place that collects used oil.

Engine Oil Life System (DURAMAX/Isuzu Diesel Engines)

When to Change Engine Oil

If the vehicle has the Engine Oil Life System, it has a computer system that indicates when to change the engine oil and filter. This is based on injection timing, engine load, and engine temperature, and not on mileage. Based on driving conditions, the mileage at which an oil change is indicated can vary considerably. For the oil life system to work properly, the system must be reset every time the oil is changed.

When the system has calculated that oil life has been diminished, it indicates that an oil change is necessary. A change engine oil light comes on. See *Change Engine Oil Light on page 3-40*. Change the oil as soon as possible within the next 600 miles (1 000 km) or 30 hours of engine operation, whichever occurs first. It is possible that, if driving under the best conditions, the oil life system might not indicate that an oil change is necessary for over a year. However, the engine oil and filter must be changed at least once a year and at this time the system must be reset. Your dealer/retailer has trained service people who will perform this work using genuine parts and reset the system. It is also important to check the oil regularly and keep it at the proper level.

If the system is ever reset accidentally, the oil must be changed at 15,000 miles (24 000 km), or 150 hours of engine operation, whichever occurs first, since the last oil change. Remember to reset the oil life system whenever the oil is changed.

How to Reset the Engine Oil Life System

The Engine Oil Life System calculates when to change the engine oil and filter based on vehicle use. Whenever the oil is changed, reset the system so it can calculate when the next oil change is required. If a situation occurs where oil is changed prior to a change engine oil light being turned on, reset the system.

To reset the Engine Oil Life System:

1. Turn the ignition key to ON/RUN with the engine off.
2. Fully press and release the accelerator pedal slowly three times within five seconds.

   If the change engine oil light is turned off, the system is resetting.
3. Turn the key to OFF.

If the change engine oil light comes back on when the vehicle is started, the Engine Oil Life System has not reset. Repeat the procedure.

What to Do with Used Oil

Used engine oil contains certain elements that can be unhealthy for your skin and could even cause cancer. Do not let used oil stay on your skin for very long. Clean your skin and nails with soap and water, or a good hand cleaner. Wash or properly dispose of clothing or rags containing used engine oil. See the manufacturer's warnings about the use and disposal of oil products.

Used oil can be a threat to the environment. If you change your own oil, be sure to drain all the oil from the filter before disposal. Never dispose of oil by putting it in the trash, pouring it on the ground, into sewers, or into streams or bodies of water. Recycle it by taking it to a place that collects used oil.

Engine Oil Life System (Caterpillar Diesel Engine)

How to Reset the Engine Oil Life System

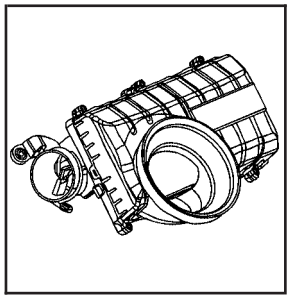
The Engine Oil Life System calculates when to change the engine oil and filter based on vehicle use. Whenever the oil is changed, reset the system so it can calculate when the next oil change is required. If a situation occurs where the oil is changed prior to a change engine oil light being turned on, reset the system.

To reset the Engine Oil Life System:

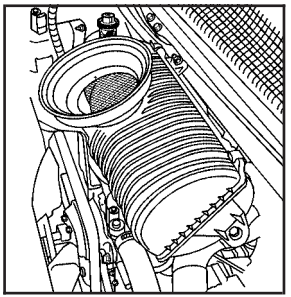
1. Turn the ignition key to ON/RUN with the engine off.
2. Fully apply and hold the brake pedal while fully pressing and releasing the accelerator pedal, pausing slightly at each press and each release, three times within five seconds.
3. Turn the key to OFF.

If the change engine oil light comes back on when the vehicle is started, the Engine Oil Life System has not reset. Repeat the procedure.

Engine Air Cleaner/Filter

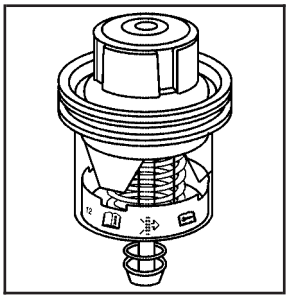


Duramax Diesel 6.6L Engine



V8 Gas, Caterpillar and Isuzu 6H Diesel Engines

When to Inspect the Engine Air Cleaner/Filters



For vehicle with this feature, the engine air filter life gage will be located in the engine compartment either on or near the air cleaner or above the switchbank in the center of the instrument panel. It monitors the engine air filter and indicates when the filter should be replaced. If driving in dusty/dirty conditions, inspect the filter each oil change.

As the filter gets dirty, the yellow indicator begins to rise. When it reaches the red/orange change area, replace the filter. Reset the indicator after each filter replacement, refer to *Air Filter Restriction Indicator on page 3-47*.

How to Inspect the Engine Air Cleaner/Filter (Duramax Diesel 6.6L Engine)

⚠ CAUTION:

Operating the engine with the air cleaner/filter off can cause you or others to be burned. The air cleaner not only cleans the air; it helps to stop flames if the engine backfires. If it is not there and the engine backfires, you could be burned. Do not drive with it off, and be careful working on the engine with the air cleaner/filter off.

Notice: **If the air cleaner/filter is off, a backfire can cause a damaging engine fire. And, dirt can easily get into the engine, which will damage it. Always have the air cleaner/filter in place when you are driving.**

The engine air cleaner/filter is located in the center of the engine compartment.

To inspect the engine air cleaner/filter, remove the filter from the vehicle and lightly shake the filter to release loose dust and dirt. If the filter remains caked with dirt, a new filter is required.

How to Inspect the Engine Air Cleaner/Filters (Gas V8 8.1L, Caterpillar 7.2L and Isuzu 7.8L Diesel Engines)

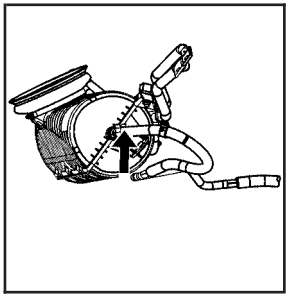
⚠ CAUTION:

Operating the engine with the air cleaner/filter off can cause you or others to be burned. The air cleaner not only cleans the air; it helps to stop flames if the engine backfires. If it is not there and the engine backfires, you could be burned. Do not drive with it off, and be careful working on the engine with the air cleaner/filter off.

Notice: **If the air cleaner/filter is off, a backfire can cause a damaging engine fire. And, dirt can easily get into the engine, which will damage it. Always have the air cleaner/filter in place when you are driving.**

The engine air cleaner/filter is located in the center of the engine compartment.

To inspect the engine air cleaner/filter:



1. Disconnect the air compressor hose by pinching the connector ring to release the connector lock.

Isuzu 7.8L Diesel Only

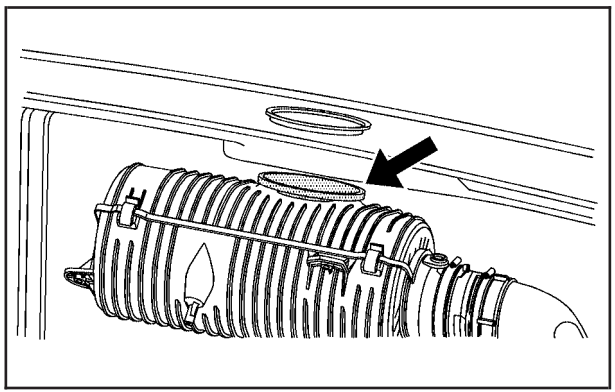
2. Unclip the four clips that hold the upper housing to the lower housing and remove the upper housing.
3. Remove the filter from the vehicle and lightly shake the filter to release loose dust and dirt. If the filter remains caked with dirt, a new filter is required.
4. Reinstall the upper housing and make sure that the air compressor hose is reconnected by pushing the connector back onto the port. Listen for the connector to click to be sure that the air compressor hose is securely locked and connected.

Hood Inlet Seal

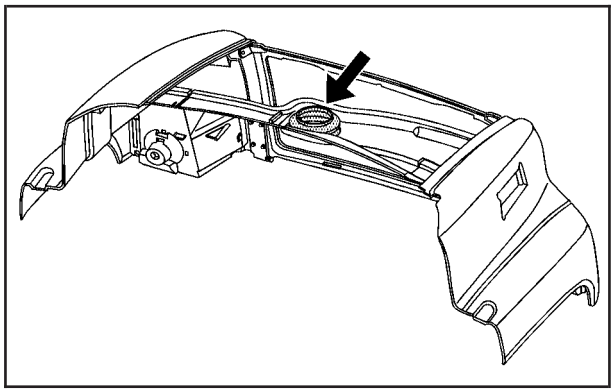
If the vehicle is being used in heavy snow conditions or for snow plowing, there is a possibility of snow and ice build up in the inlet to the air cleaner, which can block airflow to the engine and affect impacting engine performance.

To prevent this from happening, remove the hood inlet seal:

1. Loosen the clamp that holds the seal to the air cleaner.



2. Slide the seal off.



3. Store the seal in the inlet, located on the underside of the hood.
4. Store the air cleaner clamp on the coolant surge tank. Pull the overflow tube out of the white plastic retainer, slip the clamp over and reinstall the hose.

Replace the air cleaner seal during non-snow or non-icy conditions.

Automatic Transmission Fluid

When to Check

A good time to check your automatic transmission fluid level is when the engine oil is checked. See your Allison Automatic Transmission Operator's Manual to find out when to change your transmission fluid and filters.

How to Check and What to Use

The Allison Automatic Transmission Operator's Manual that came with the vehicle shows how to check the automatic transmission fluid and what fluid to use.

Automatic Transmission External Filter

Your automatic transmission filter requires periodic replacement.

Consult the Allison Automatic Transmission Operator's Manual that came with the vehicle for proper change intervals.

Manual Transmission Fluid

When to Check

A good time to have it checked is when the engine oil is checked. Refer to the Maintenance Schedule to find out when to check and change your manual transmission fluid. See *Scheduled Maintenance on page 6-5*.

How to Check and What to Use

Check the fluid level only when your engine is off, the vehicle is parked on a level place, and the transmission is cool enough for you to rest your fingers on the transmission case.

To check the transmission fluid level, do the following:

1. Remove the filler plug.
2. Check to be sure that the lubricant level is up to the bottom of the fill opening. On heavy duty transmissions, an inch of oil level equals about one gallon of fluid.
3. If the fluid level is good, reinstall the plug and be sure it is fully seated. If the fluid level is low, add more fluid as described in the next steps. Refer to the Maintenance Schedule to determine what kind of fluid to use. See *Part C: Recommended Fluids and Lubricants on page 6-32*.

How to Add Fluid

To add transmission fluid, do the following:

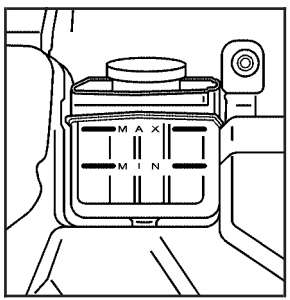
1. Remove the filler plug.
2. Add fluid at the filler plug hole. Add only enough fluid to bring the fluid level up to the bottom of the fill opening. Refer to the Maintenance Schedule to determine the proper fluid to use. See *Part C: Recommended Fluids and Lubricants on page 6-32*.
3. Reinstall the filler plug. Be sure the plug is fully seated.

Hydraulic Clutch

It is not necessary to regularly check clutch fluid unless you suspect there is a leak in the system. Adding fluid will not correct a leak.

A fluid loss in this system could indicate a problem. Have the system inspected and repaired.

When to Check and What to Use



The hydraulic clutch fluid reservoir is located behind the front panel on the driver's side of the vehicle.

Refer to the Maintenance Schedule to determine how often you should check the fluid level in your clutch master cylinder reservoir and for the proper fluid. See *Part B: Owner Checks and Services on page 6-26* and *Part C: Recommended Fluids and Lubricants on page 6-32* for more information.

How to Check and Add Fluid

The proper fluid should be added if the fluid level is not between the MAX (Maximum) and MIN (Minimum) marks.

Cooling System

⚠ CAUTION:

If your vehicle has air conditioning, the auxiliary electric fan under the hood can start up even when the engine is not running and can injure you. Keep hands, clothing and tools away from any underhood electric fan.

If the coolant inside the coolant surge tank is boiling, do not do anything else until it cools down. The vehicle should be parked on a level surface.

When the engine is cold, the coolant level should be at the COLD FULL mark. If it is not, you may have a leak at the pressure cap or in the radiator hoses, heater hoses, radiator, water pump, or somewhere else in the cooling system.

⚠ CAUTION:

Heater and radiator hoses, and other engine parts, can be very hot. Do not touch them. If you do, you can be burned.

Do not run the engine if there is a leak. If you run the engine, it could lose all coolant. That could cause an engine fire, and you could be burned. Get any leak fixed before you drive the vehicle.

If there seems to be no leak, start the engine again. The engine cooling fan speed should increase when idle speed is doubled by pushing the accelerator pedal down. If it does not, your vehicle needs service. Turn off the engine.

Notice: **Using coolant other than DEX-COOL® can cause premature engine, heater core, or radiator corrosion. In addition, the engine coolant could require changing sooner, at 30,000 miles (50 000 km) or 24 months, whichever occurs first. Any repairs would not be covered by the vehicle warranty. Always use DEX-COOL® (silicate-free) coolant in the vehicle.**

How to Add Coolant to the Coolant Surge Tank

If you have not found a problem yet, but the coolant level is not at the COLD FULL mark, add a 50/50 mixture of clean, drinkable water and DEX-COOL® coolant at the coolant surge tank, but be sure the cooling system, including the coolant surge tank pressure cap, is cool before you do it. See *Engine Coolant on page 5-46* for more information.

If no coolant is visible in the surge tank, add coolant as follows:

⚠ CAUTION:

Steam and scalding liquids from a hot cooling system can blow out and burn you badly. They are under pressure, and if you turn the coolant surge tank pressure cap — even a little — they can come out at high speed. Never turn the cap when the cooling system, including the coolant surge tank pressure cap, is hot. Wait for the cooling system and coolant surge tank pressure cap to cool if you ever have to turn the pressure cap.

⚠ CAUTION:

Adding only plain water to the cooling system can be dangerous. Plain water, or some other liquid such as alcohol, can boil before the proper coolant mixture will. The vehicle's coolant warning system is set for the proper coolant mixture. With plain water or the wrong mixture, the engine could get too hot but you would not get the overheat warning. The engine could catch fire and you or others could be burned. Use a 50/50 mixture of clean, drinkable water and DEX-COOL® coolant.

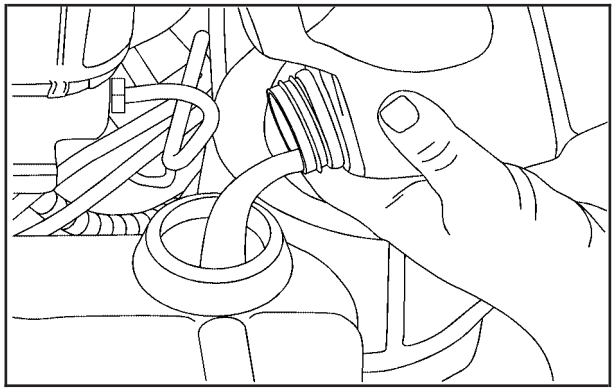
Notice: **In cold weather, water can freeze and crack the engine, radiator, heater core and other parts. Use the recommended coolant and the proper coolant mixture.**

⚠ CAUTION:

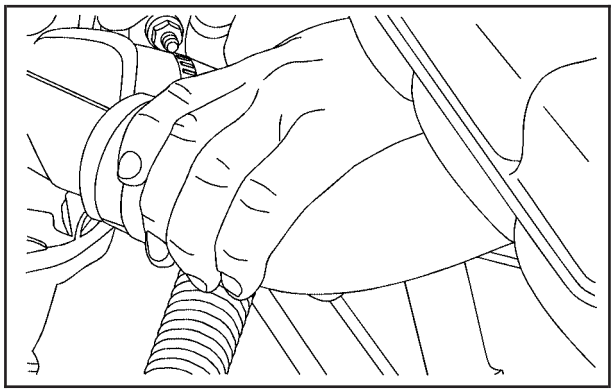
You can be burned if you spill coolant on hot engine parts. Coolant contains ethylene glycol and it will burn if the engine parts are hot enough. Do not spill coolant on a hot engine.

1. You can remove the coolant surge tank pressure cap when the cooling system, including the coolant surge tank pressure cap and upper radiator hose, is no longer hot. Turn the pressure cap slowly counterclockwise about one full turn.

   If you hear a hiss, wait for that to stop. A hiss means there is still some pressure left.
2. Then keep turning the pressure cap slowly, and remove it.



3. Fill the coolant surge tank with the proper mixture, to the COLD FULL mark.



4. With the coolant surge tank pressure cap off, start the engine and let it run until you can feel the upper radiator hose getting hot. Watch out for the engine cooling fan.

   By this time, the coolant level inside the coolant surge tank may be lower. If the level is lower, add more of the proper mixture to the coolant surge tank until the level reaches slightly above the COLD FULL mark.

5. Then replace the pressure cap. Be sure the pressure cap is hand-tight and fully seated.

Engine Coolant

The cooling system in your vehicle is filled with DEX-COOL® engine coolant. This coolant is designed to remain in your vehicle for five years or 150,000 miles (240 000 km), whichever occurs first, if you add only DEX-COOL® extended life coolant.

The following explains your cooling system and how to add coolant when it is low. If you have a problem with engine overheating, see *Engine Overheating on page 5-49*.

A 50/50 mixture of clean, drinkable water and DEX-COOL® coolant will:

- Give freezing protection down to –34°F (–37°C).
- Give boiling protection up to 265°F (129°C).
- Protect against rust and corrosion.
- Help keep the proper engine temperature.
- Let the warning lights and gages work as they should.

Notice: **Using coolant other than DEX-COOL can cause premature engine, heater core or radiator corrosion. In addition, the engine coolant may require changing sooner, at 30,000 miles (50 000 km) or 24 months, whichever occurs first. Any repairs would not be covered by the vehicle warranty. Always use DEX-COOL (silicate-free) coolant in your vehicle.**

What to Use

Use a mixture of one-half clean, drinkable water and one-half DEX-COOL® coolant which will not damage aluminum parts. If you use this coolant mixture, you do not need to add anything else.

⚠ CAUTION:

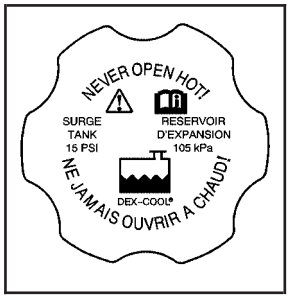
Adding only plain water to the cooling system can be dangerous. Plain water, or some other liquid such as alcohol, can boil before the proper coolant mixture will. The vehicle's coolant warning system is set for the proper coolant mixture. With plain water or the wrong mixture, the engine could get too hot but would not get the overheat warning. The engine could catch fire and you or others could be burned. Use a 50/50 mixture of clean, drinkable water and DEX-COOL® coolant.

Notice: **If an improper coolant mixture is used, the engine could overheat and be badly damaged. The repair cost would not be covered by the vehicle warranty. Too much water in the mixture can freeze and crack the engine, radiator, heater core, and other parts.**

If you have to add coolant more than four times a year, have your dealer/retailer check your cooling system.

Notice: **If you use extra inhibitors and/or additives in your vehicle's cooling system, you could damage your vehicle. Use only the proper mixture of the engine coolant listed in this manual for the cooling system. See *Part C: Recommended Fluids and Lubricants on page 6-32* for more information.**

Checking Coolant

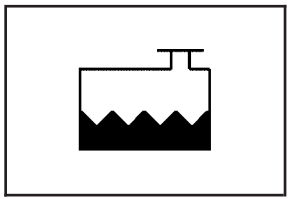


The coolant surge tank pressure cap can be accessed without tilting the cab. It is located behind the cab on the driver's side of the vehicle.

⚠ CAUTION:

Turning the surge tank pressure cap when the engine and radiator are hot can allow steam and scalding liquids to blow out and burn you badly. Never turn the surge tank pressure cap — even a little — when the engine and radiator are hot.

The vehicle must be on a level surface. When your engine is cold, the coolant level should be at the COLD FILL mark or higher.



If the low coolant light comes on in the instrument panel cluster and stays on, it means you are low on engine coolant.

See *Low Coolant Warning Light on page 3-35* for further information.

Adding Coolant

If you need more coolant, add the proper DEX-COOL® coolant mixture at the surge tank, but only when the engine is cool.

⚠ CAUTION:

You can be burned if you spill coolant on hot engine parts. Coolant contains ethylene glycol, and it will burn if the engine parts are hot enough. Do not spill coolant on a hot engine.

When replacing the pressure cap, make sure it is hand-tight and fully seated.

Coolant Surge Tank Pressure Cap

The surge tank pressure cap is located behind the cab on the driver's side of the vehicle.

Notice: **Your vehicle's surge tank pressure cap is designed for use with medium-duty cooling systems only. If the surge tank pressure cap is not tightly installed, coolant loss and possible engine damage may occur. Be sure the cap is properly and tightly secured.**

Engine Overheating

You will find an engine coolant temperature warning gage, as well as a low coolant warning light, on your vehicle's instrument panel. See *Engine Coolant Temperature Gage on page 3-35* and *Low Coolant Warning Light on page 3-35* for more information.

Your vehicle also has a check gages warning light on the instrument panel. See *Check Gages Warning Light on page 3-44* for more information.

If Steam Is Coming From Your Engine

⚠ CAUTION:

Steam from an overheated engine can burn you badly, even if you just open the hood. Stay away from the engine if you see or hear steam coming from it. Just turn it off and get everyone away from the vehicle until it cools down. Wait until there is no sign of steam or coolant before you open the hood.

If you keep driving when your engine is overheated, the liquids in it can catch fire. You or others could be badly burned. Stop your engine if it overheats, and get out of the vehicle until the engine is cool.

Notice: **If the engine catches fire because of being driven with no coolant, your vehicle can be badly damaged. The costly repairs would not be covered by the vehicle warranty.**

If No Steam Is Coming From Your Engine

An overheat warning, along with a low coolant light, can indicate a serious problem. See *Low Coolant Warning Light on page 3-35* for more information.

If you get an engine overheat warning with no low coolant light, but see or hear no steam, the problem may not be too serious. Sometimes the engine can get a little too hot when you:

- Climb a long hill on a hot day.
- Stop after high-speed driving.
- Idle for long periods in traffic.

If you get the overheat warning with no sign of steam, try this for a minute or so:

1. In heavy traffic, let the engine idle in N (Neutral) while stopped. If it is safe to do so, pull off the road, shift to P (Park) or N (Neutral) and let the engine idle.
2. Turn on your heater to full hot at the highest fan speed and open the windows as necessary.
3. If climbing a hill, downshift to raise engine and fan speeds.

If you no longer have the overheat warning, you can drive. Just to be safe, drive slower for about 10 minutes. If the warning does not come back on, you can drive normally.

If the warning continues and you have not stopped, pull over, stop, and park your vehicle right away.

If there is still no sign of steam, you can push down the accelerator until the engine speed is about twice as fast as normal idle speed for at least three minutes while you are parked. If you still have the warning, turn off the engine and get everyone out of the vehicle until it cools down.

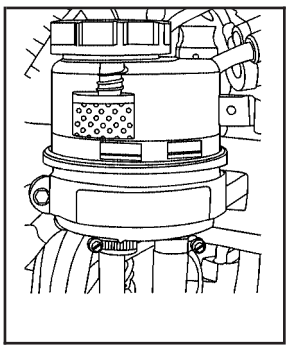
You may decide not to lift the hood but to get service help right away.

Power Steering Fluid

See *Scheduled Maintenance on page 6-5* to determine when to check your power steering fluid.

How To Check Power Steering Fluid

Check your power steering fluid only when the engine is warm. If the engine is not warm, you probably will not get an accurate reading.



If the fluid level is between the MIN (Minimum) and MAX (Maximum) marks, you have enough. If you need fluid, add only enough of the proper fluid to bring it into view in the sight glass.

If your power steering fluid level is low, this can cause the brake or service brake soon warning lights to come on. If either light remains on after you have added power steering fluid to the proper level, then shut off the engine for 10 seconds. This should reset the brake warning lights. If one or both lights stay on though, see “Hydraulic Brake System Warning Lights” under *Brake System Warning Light on page 3-31* for more information.

What to Use

To determine what kind of fluid to use, see *Part C: Recommended Fluids and Lubricants on page 6-32*.

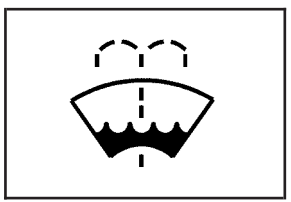
Notice: **When adding power steering fluid or making a complete fluid change, always use the proper fluid. Failure to use the proper fluid can cause leaks and damage hoses and seals.**

Windshield Washer Fluid

What to Use

When you need windshield washer fluid, be sure to read the manufacturer's instructions before use. If you will be operating your vehicle in an area where the temperature may fall below freezing, use a fluid that has sufficient protection against freezing.

Adding Washer Fluid



Open the cap with the washer symbol on it. Add washer fluid until the tank is full.

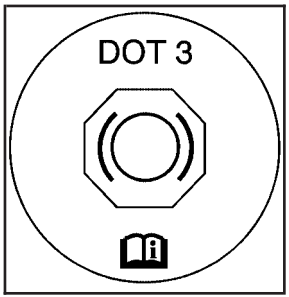
The reservoir is located behind the front panel on the driver's side of the vehicle.

Notice:

- **When using concentrated washer fluid, follow the manufacturer's instructions for adding water.**
- **Do not mix water with ready-to-use washer fluid. Water can cause the solution to freeze and damage your washer fluid tank and other parts of the washer system. Also, water does not clean as well as washer fluid.**
- **Fill the washer fluid tank only three-quarters full when it is very cold. This allows for fluid expansion if freezing occurs, which could damage the tank if it is completely full.**
- **Do not use engine coolant (antifreeze) in your windshield washer. It can damage the vehicle's windshield washer system and paint.**

Brakes

Brake Fluid



If the vehicle has hydraulic brakes, there is a brake master cylinder in the engine compartment on the driver side of the vehicle.

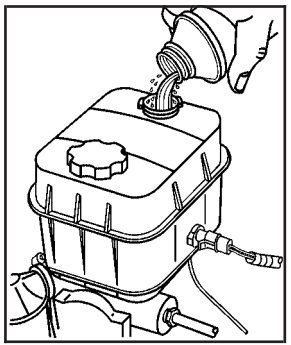
Refer to the Maintenance Schedule to determine when to check the brake fluid.

⚠ CAUTION:

Do not add brake fluid before checking the level or there could be too much brake fluid. Brake fluid could spill on the hot engine and it can catch fire. You could be burned and the vehicle could be damaged. See “Checking Brake Fluid” in this section.

Checking Brake Fluid

Apply the brake pedal several times with the ignition off. The brake fluid reservoir is in the engine compartment on the driver side of the vehicle. Clean one of the reservoir caps and the area around the cap, and remove it.



The fluid level should be even with the bottom ring of the filler opening. If it is low, add enough fluid to fill the reservoir to the proper level.

What to Add

Use the proper fluid listed in the Maintenance Schedule. Use new brake fluid from a sealed container only.

Always clean the brake fluid reservoir cap/cover and the area around the cap/cover before removing it. This helps keep dirt from entering the reservoir.

⚠ CAUTION:

With the wrong kind of fluid in the brake hydraulic system, the brakes might not work well. This could cause a crash. Always use the proper brake fluid.

Notice:

- **Using the wrong fluid can badly damage brake hydraulic system parts. For example, just a few drops of mineral-based oil, such as engine oil, in the brake hydraulic system can damage brake hydraulic system parts so badly that they will have to be replaced. Do not let someone put in the wrong kind of fluid, and do not use DOT-5 silicone brake fluid.**
- **If brake fluid is spilled on the vehicle's painted surfaces, the paint finish can be damaged. Be careful not to spill brake fluid on the vehicle. If you do, wash it off immediately. See *Washing Your Vehicle on page 5-92*.**

Four-Wheel Disc Brakes (Hydraulic Only)

The vehicle has four-wheel disc brakes.

Some driving conditions or climates can cause a brake squeal when the brakes are first applied or lightly applied. This does not mean something is wrong with the brakes.

Brake linings should always be replaced as complete axle sets.

Four-Wheel and Six-Wheel Drum Brakes (Air Only)

The brake drums should be removed and inspected each time the tires are removed for rotation or changing. When the front brakes are replaced, have the rear brakes inspected, too.

Brake linings should always be replaced as complete axle sets.

Brake Pedal Travel

See your dealer/retailer if the brake pedal does not return to normal height, or if there is a rapid increase in pedal travel. This could be a sign that brake service might be required.

Brake Adjustment

Every brake stop, the brakes adjust for wear.

Brake Adjustment on Air Braked Vehicles

The vehicle has automatic slack adjusters. Every brake stop, the brakes automatically adjust for wear. Slack adjusters should never be manually adjusted to correct excessive brake chamber pushrod stroke. Excessive brake chamber pushrod stroke means that the brake system needs to be serviced by a qualified service technician.

Notice: **Do not manually adjust automatic slack adjusters. Manual adjustment of the automatic slack adjusters can result in a degradation of the slack adjuster performance over time. If the brake chamber pushrod stroke is out of adjustment, the brake system needs to be serviced by a qualified service technician.**

Replacing Brake System Parts

The braking system on a vehicle is complex. Its many parts have to be of top quality and work well together if the vehicle is to have really good braking. The vehicle was designed and tested with top-quality brake parts. When parts of the braking system are replaced — for example, when the brake linings wear down and new ones are installed — be sure to get new approved replacement parts. If this is not done, the brakes might not work properly. For example, if someone puts in brake linings that are wrong for the vehicle, the balance between the front and rear brakes can change — for the worse. The braking performance expected can change in many other ways if the wrong replacement brake parts are installed.

Hydraulic Brake Pads

Brake pad lining life will vary depending on vehicle application, working environment, equipment maintenance, and style of driving. The brake pad lining wear rate has to be monitored for individual driving habits — original equipment linings have mechanical wear indicators to help with this. When down to the last 10% of the brake lining, the brake lining wear indicator rubs on the rotor, causing a scratching or chirping sound. When this sound is heard, service to the brake pads is needed. See *Scheduled Maintenance on page 6-5*.

Aftermarket brake linings might not meet the same stringent requirements as the original equipment linings. Using aftermarket brake linings can affect braking performance, pedal feel, noise, and lining wear.

Air Brake Systems

If the vehicle has air brakes, it is important to get rid of moisture in the system. Moisture will damage the system if it is not removed daily.

There are two ways to do this. One is automatic through the air brake vehicle's air dryer with integral automatic moisture ejector that purges air from the system through a self-contained reservoir. The other way to drain moisture from the air brake system is to manually activate drain valves at each reservoir. Drain the air reservoirs occasionally to be sure the air dryer is working properly.

Drain the air brakes at full system pressure. To be sure of full pressure, check the air pressure gage. It should read at least 100 psi (692 kPa).

Air Dryer

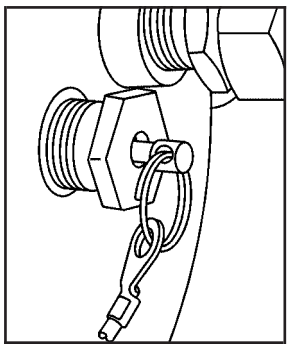
If the vehicle has air brakes, it has an air dryer mounted on the passenger side frame rail. This collects and removes dirt, moisture, or other foreign matter from the air prior to entering the brake system. The dryer also acts as a moisture ejector. It automatically ejects the moisture when the compressor cycles. The purge tank has a manual drain valve that must be drained every day. See "Air Brake Systems" for the manual drain procedure.

The dryer has a filter that needs changing at intervals. See *Scheduled Maintenance on page 6-5* for more about servicing this filter.

Electric Air Compressor

The vehicle might have an electric air compressor. This compressor is used to run options that require pressurized air, such as an air horn or air seat.

The air compressor is used when vehicles do not have an air brake system.



The air supply for this system must be maintained by releasing the drain valve to eject any moisture that could have built up in the system.

It is recommended that this system be drained on a weekly basis.

Clutch Pedal Free Travel

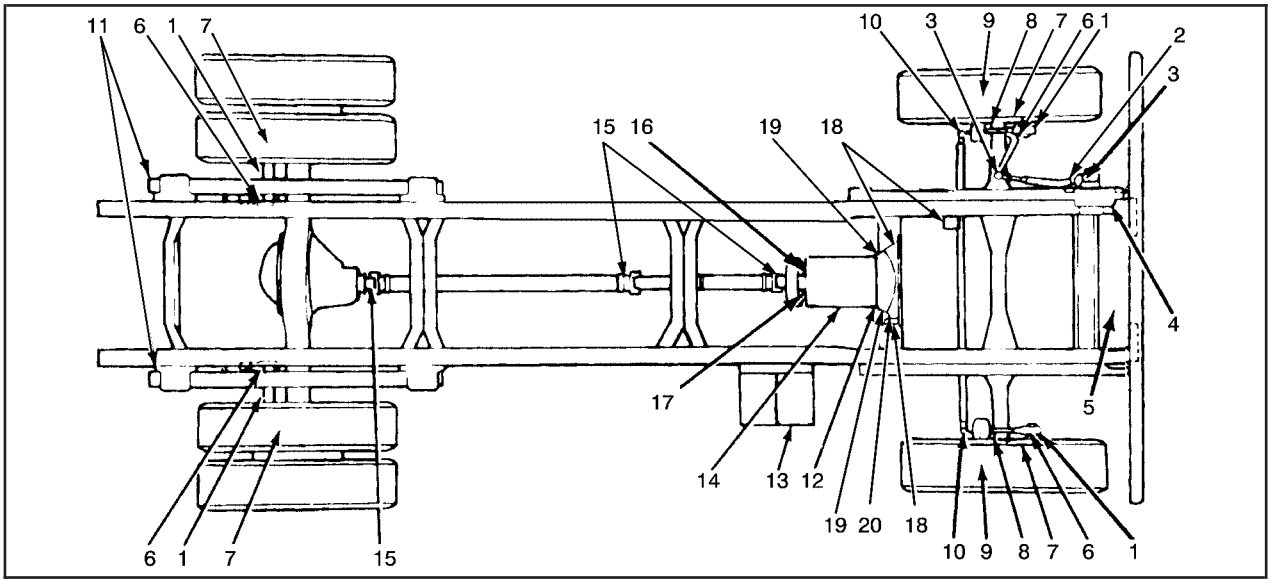
If the vehicle has a V8 engine and a manual transmission, the clutch needs adjustment when pedal free travel gets down to about 1/4 inch (6 mm), as measured at the clutch pedal pad. There should be 1 1/2 to 2 inches (38 to 51 mm) of clutch pedal free travel.

If the clutch ever needs service, be sure to use only approved clutch replacement parts.

Chassis Lubrication

The Maintenance Schedule provides all of the required chassis lubrication intervals and identifies proper lubricants to use. Be sure to see the Maintenance Schedule before performing any chassis lubrication service. To determine location of chassis lubrication items, use the following charts.

Single Axle Models

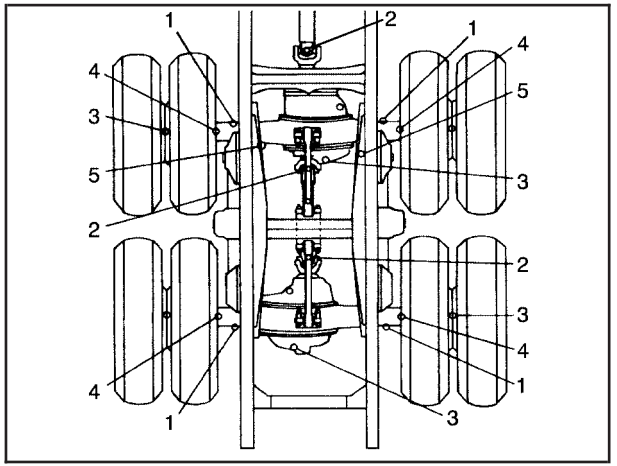


Item Number	Item	Remarks
1	Brake Camshaft**	One fitting each (apply sparingly).
2	Steering Column Slip Joint*	One fitting.
3	Steering Drag Link Ends	One fitting each end.

Item Number	Item	Remarks
4	Pivot Points and Hinges	Apply chassis lubricant.
5	Pivot Points and Hinges	Apply chassis lubricant.
6	Slack Adjuster**	One fitting.
7	Brake Cam Roller Pins at interface of pin and shoe**	Apply engine oil.
8	Front Steering Knuckles	One fitting each side, lower bushing. (Hand-operated grease gun only.) Hand-pack upper bearing.
9	Front Wheel Bearings	Hand-pack or lubricate.
10	Steering Tie Rod Ends	One fitting each end.
11	Spring Slip Pads* (Multi-Leaf Only)	Apply chassis lubricant.
12	Clutch Release Bearing*	Cup or fitting.
13	Battery Terminal (except “ST” type)	Keep coated with petroleum jelly.
14	Transmission	Fill to level of filler plug.
15	Propshaft U-Joints	Lubricate with GM Part No. 1051344 Wheel Bearing Lubricant.
16	Parking Brake Clevis Pin$	Apply chassis lubricant.
17	Parking Brake Lever Pivot*, $	Apply chassis lubricant.
18	Clutch Release Cross Shaft, Master Cylinder$	Apply chassis lubricant, fill to 1/4 inch (6 mm) below opening.
19	Release Bearing, Clutch Cross Shaft	Two fittings, apply chassis lubricant.
20	Clutch Release Fork	Two fittings.

* Applies to some vehicles.
** Applies to air brakes only.
$ Applies to hydraulic brakes only.

Tandem Axle Models



Item Number	Item	Remarks
1	Brake Camshafts	One fitting each.
2	Propshaft U-Joint	One fitting each joint. Lubricate with GM Part No. 1051344, Wheel Bearing Lubricant
3	Rear Axles	Fill to level of filler plug.
4	Brake Shoe Roller Pins	Apply engine oil at pin to shoe joint only.
5	Rear Spring Pin	One fitting each side.

Battery

This vehicle has two or more maintenance free batteries. When it is time for a new battery, see your dealer/retailer for one that has the replacement number shown on the original battery's label.

Warning: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Vehicle Storage

⚠ CAUTION:

Batteries have acid that can burn you and gas that can explode. You can be badly hurt if you are not careful. See *Jump Starting on page 5-62* for tips on working around a battery without getting hurt.

Infrequent Usage: If the vehicleis driven infrequently, remove the black, negative (–) cable from each battery. This helps keep the batteries from running down.

Extended Storage: For extended storage of the vehicle, remove the black, negative (–) cable from each battery or use a battery trickle charger. This helps maintain the charge of the batteries over an extended period of time.

When ready to use the vehicle again, refer to the engine starting procedure in the Index.

Jump Starting

If the vehicle's battery (or batteries) has run down, you may want to use another vehicle and some jumper cables to start your vehicle. Be sure to use the following steps to do it safely.

⚠ CAUTION:

Batteries can hurt you. They can be dangerous because:

- They contain acid that can burn you.
- They contain gas that can explode or ignite.
- They contain enough electricity to burn you.

If you do not follow these steps exactly, some or all of these things can hurt you.

Notice: **Ignoring these steps could result in costly damage to the vehicle that would not be covered by the warranty.**

Trying to start the vehicle by pushing or pulling it will not work, and it could damage the vehicle.

1. Check the other vehicle. It must have a 12-volt battery (or batteries) with a negative ground system.

Notice: **If the other vehicle's system is not a 12-volt system with a negative ground, both vehicles can be damaged. Only use vehicles with 12-volt systems with negative grounds to jump start your vehicle.**

If you have a diesel engine vehicle with two batteries (or more), you should know before you begin that, especially in cold weather, you may not be able to get enough power from a single battery in another vehicle to start your diesel engine.

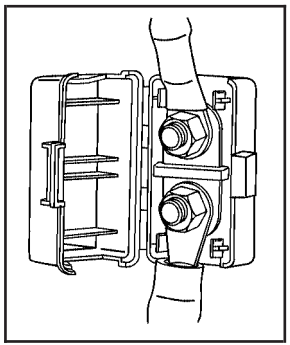
If your vehicle has more than one battery, use the one closest to the starter — this will reduce electrical resistance.

2. Get the vehicles close enough so the jumper cables can reach, but be sure the vehicles are not touching each other. If they are, it could cause a ground connection you do not want. You would not be able to start your vehicle, and the bad grounding could damage the electrical systems.

   To avoid the possibility of the vehicles rolling, set the parking brake firmly on both vehicles involved in the jump start procedure. Put an automatic transmission in P (PARK) or a manual transmission in N (Neutral) before setting the parking brake. If you have a four-wheel-drive vehicle, be sure the transfer case is in a drive gear, not in N (Neutral).

Notice: **If you leave the radio or other accessories on during the jump starting procedure, they could be damaged. The repairs would not be covered by the warranty. Always turn off the radio and other accessories when jump starting the vehicle.**

3. Turn off the ignition on both vehicles. Unplug unnecessary accessories plugged into the cigarette lighter or accessory power outlets. Turn off the radio and all lamps that are not needed. This will avoid sparks and help save both batteries, and it could save the radio!
4. Open the hood on the other vehicle and locate the positive (+) and the negative (–) terminal locations on that vehicle.



Open the hood on your vehicle and find the remote positive (+) terminal, located under a red plastic cover on the passenger's side of the vehicle. Squeeze the tab to open the cover and access the remote positive (+) terminal.

You will not see the battery (or batteries) of your vehicle under the hood. They are located in a frame mounted battery box, which is located on either the driver's or the passenger's side of the vehicle. You will not need to access your battery (or batteries) for jump starting. The remote positive (+) terminal is for that purpose.

⚠ CAUTION:

Using a match near a battery can cause battery gas to explode. People have been hurt doing this, and some have been blinded. Use a flashlight if you need more light.

Be sure the batteries have enough water. You do not need to add water to the ACDelco® battery (or batteries) installed in your new vehicle. But if a battery has filler caps, be sure the right amount of fluid is there. If it is low, add water to take care of that first. If you do not, explosive gas could be present.

Battery fluid contains acid that can burn you. Do not get it on you. If you accidentally get it in your eyes or on your skin, flush the place with water and get medical help immediately.

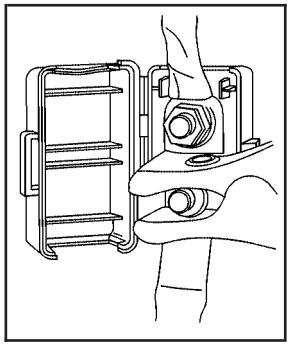
⚠ CAUTION:

Fans or other moving engine parts can injure you badly. Keep your hands away from moving parts once the engine is running.

5. Check that the jumper cables do not have loose or missing insulation. If they do, you could get a shock. The vehicles could be damaged too.

   Before you connect the cables, here are some basic things you should know. Positive (+) will go to positive (+) or to a remote positive (+) terminal if the vehicle has one. Negative (–) will go to a heavy, unpainted metal engine part or to a remote negative (–) terminal if the vehicle has one.

   Do not connect positive (+) to negative (–) or you will get a short that would damage the battery and maybe other parts too. And do not connect the negative (–) cable to the negative (–) terminal on the dead battery because this can cause sparks.

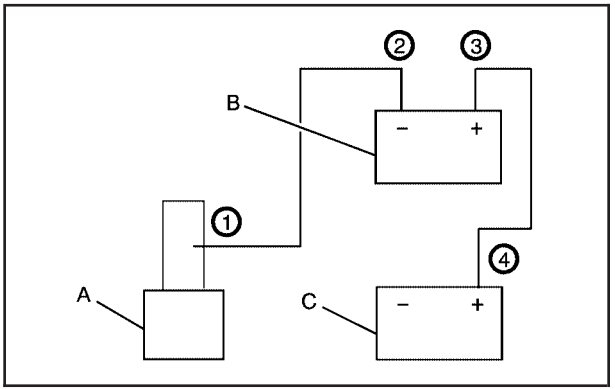


6. Connect the red positive (+) cable to the positive (+) terminal of the dead battery. Use a remote positive (+) terminal if the vehicle has one.
7. Do not let the other end touch metal. Connect it to the positive (+) terminal of the good battery. Use a remote positive (+) terminal if the vehicle has one.
8. Now connect the black negative (–) cable to the negative (–) terminal of the good battery. Use a remote negative (–) terminal if the vehicle has one.

   Do not let the other end touch anything until the next step. The other end of the negative (–) cable does not go to the dead battery. It goes to a heavy, unpainted metal engine part or to the remote negative (–) terminal on the vehicle with the dead battery.

9. Connect the other end of the negative (–) cable at least 18 inches (45 cm) away from the dead battery, but not near engine parts that move. The electrical connection is just as good there, and the chance of sparks getting back to the battery is much less.
10. Now start the vehicle with the good battery and run the engine for a while. Use the high idle option if your vehicle is equipped with it.
11. Try to start the vehicle that had the dead battery. If it will not start after a few tries, it probably needs service.

Notice: **If the jumper cables are connected or removed in the wrong order, electrical shorting may occur and damage the vehicle. The repairs would not be covered by your warranty. Always connect and remove the jumper cables in the correct order, making sure that the cables do not touch each other or other metal.**



Jumper Cable Removal

A. Heavy, Unpainted Metal Engine Part or Remote Negative (–) Terminal
B. Good Battery or Remote Positive (+) and Remote Negative (–) Terminals
C. Dead Battery or Remote Positive (+) Terminal

To disconnect the jumper cables from both vehicles, do the following:

1. Disconnect the black negative (–) cable from the vehicle that had the dead battery.
2. Disconnect the black negative (–) cable from the vehicle with the good battery.
3. Disconnect the red positive (+) cable from the vehicle with the good battery.
4. Disconnect the red positive (+) cable from the other vehicle.
5. Return the positive (+) remote terminal cover to its original position.

Rear Axle

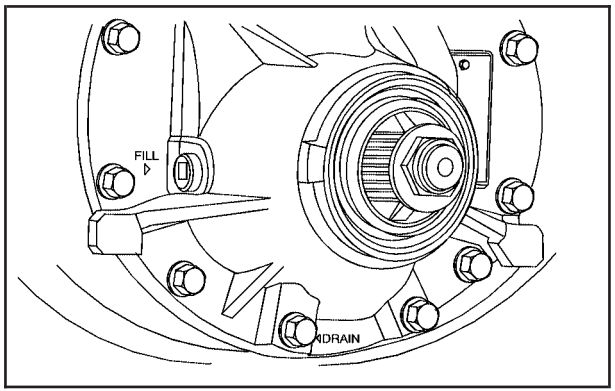
When to Check and Change Lubricant

Refer to the Maintenance Schedule to determine how often to check the lubricant and when to change it. See *Scheduled Maintenance on page 6-5*.

Notice: **If you drive your vehicle through deep water that is higher than the front or rear axle, water may enter the axle housing and cause the axle lubricant to break down. This could damage the gears inside. Avoid driving your vehicle through deep water.**

You should avoid driving your vehicle through deep puddles or standing water. If you must drive through water that is higher than the front or rear axle, see your dealer immediately afterward to have the condition of the axle lubricant checked.

How to Check Lubricant



HD2 Axle

To get an accurate reading, the vehicle should be on a level surface.

If the level is below the bottom of the filler plug hole, located on the rear axle, you'll need to add some lubricant. Add enough lubricant to raise the level to the bottom of the filler plug hole.

What to Use

Refer to the Maintenance Schedule to determine what kind of lubricant to use. See *Part C: Recommended Fluids and Lubricants on page 6-32*.

Rear Axle Shift Motor

When to Check and Change Fluid

If you have an optional air-shift two-speed, controlled traction, or locking differential type rear axle, a good time to check the fluid level in the axle shift motor is when the rear axle lubricant is checked.

How to Check Fluid

Remove the plug on the front plate of the axle shift motor, add enough fluid to raise the level to the bottom of the filler plug hole, then replace the plug.

What to Use

Refer to your Maintenance Schedule to determine what kind of lubricant to use. See *Part C: Recommended Fluids and Lubricants on page 6-32*.

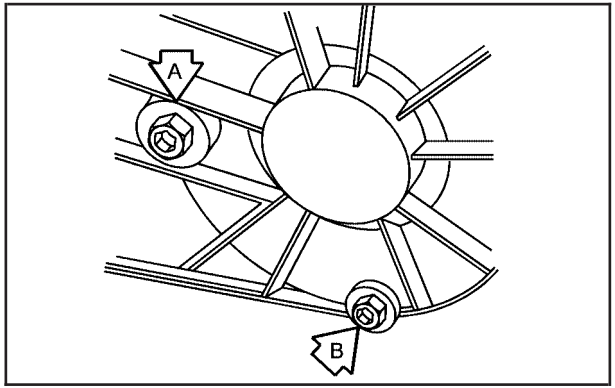
Four-Wheel Drive

Transfer Case

When to Check Lubricant

It is not necessary to regularly check transfer case fluid unless you suspect there is a leak or you hear an unusual noise. A fluid loss could indicate a problem. Have it inspected and repaired.

How to Check Lubricant



A. Fill Plug

B. Drain Plug

To get an accurate reading, the vehicle should be on a level surface.

If the level is below the bottom of the fill plug hole, located on the transfer case, you'll need to add some lubricant. Add enough lubricant to raise the level to the bottom of the fill plug hole. Use care not to overtighten the plug.

When to Change Lubricant

Refer to the Maintenance Schedule to determine how often to change the lubricant. See *Scheduled Maintenance on page 6-5*.

What to Use

Refer to the Maintenance Schedule to determine what kind of lubricant to use. See *Part C: Recommended Fluids and Lubricants on page 6-32*.

Front Axle

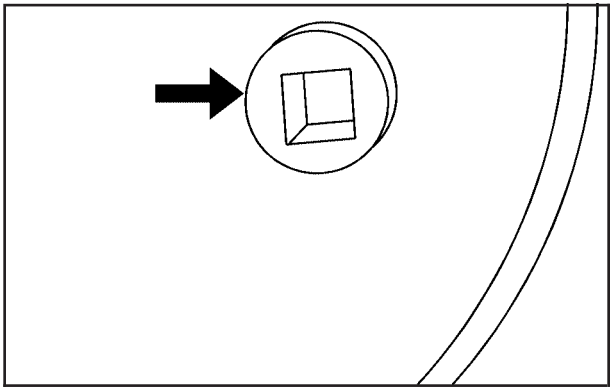
When to Check Lubricant

It is not necessary to regularly check front axle fluid unless you suspect there is a leak or you hear an unusual noise. A fluid loss could indicate a problem. Have it inspected and repaired.

Notice: **If you drive your vehicle through deep water that is higher than the front or rear axle, water may enter the axle housing and cause the axle lubricant to break down. This could damage the gears inside. Avoid driving your vehicle through deep water.**

You should avoid driving your vehicle through deep puddles or standing water. If you must drive through water that is higher than the front or rear axle, see your dealer immediately afterward to have the condition of the axle lubricant checked.

How to Check Lubricant



To get an accurate reading, the vehicle should be on a level surface.

If the level is below the bottom of the filler plug hole, you may need to add some lubricant.

Add enough lubricant to raise the level to the bottom of the filler plug hole.

What to Use

To determine what kind of lubricant to use see *Part C: Recommended Fluids and Lubricants on page 6-32*.

Noise Control System

Tampering with Noise Control System Prohibited

The following information relates to compliance with federal noise emission standards for vehicles with a Gross Vehicle Weight Rating (GVWR) of more than 10,000 lbs (4 536 kg). The Maintenance Schedule provides information on maintaining the noise control system to minimize degradation of the noise emission control system during the life of your vehicle. The noise control system warranty is given in your warranty booklet.

These standards apply only to vehicles sold in the United States.

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 engine speed governor, if the vehicle has one, inoperative so as to allow engine speed to exceed manufacturer specifications.

Fan and Drive:

- Removal of fan clutch, if the vehicle has one, or rendering clutch inoperative.
- Removal of the fan shroud, if the vehicle has one.

Air Intake:

- Removal of the air cleaner silencer.
- Modification of the air cleaner.

Exhaust:

- Removal of the muffler or resonator.
- Removal of the exhaust pipes and exhaust pipe clamps.
- Removal of the DOC converter, the Diesel Particulate Filter, or the diesel exhaust gas cooler device.

Bulb Replacement

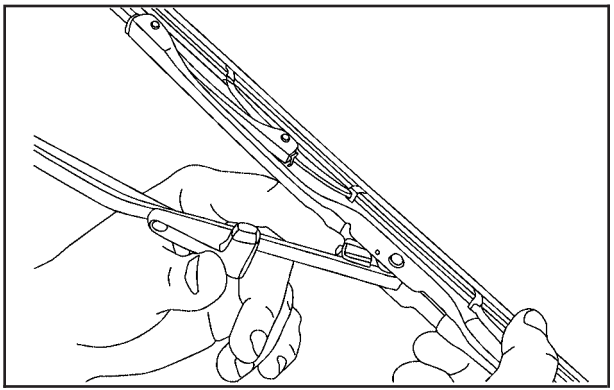
It is recommended that all bulbs be replaced by your dealer/retailer.

Windshield Wiper Blade Replacement

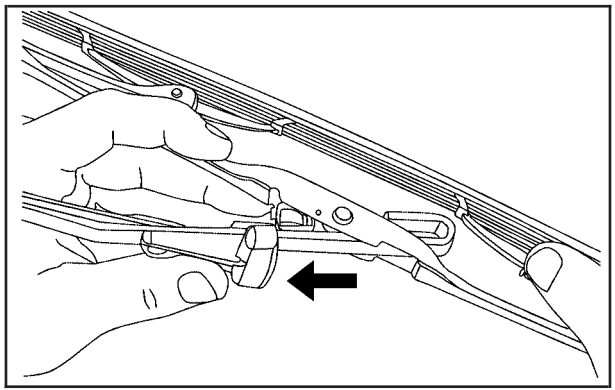
Windshield wiper blades should be inspected at least twice a year for wear or cracking. See “Wiper Blade Check” under *At Least Twice a Year on page 6-27* for more information.

Replacement blades come in different types and are removed in different ways.

Here’s how to remove the wiper blade:



1. Pull the windshield wiper arm away from the windshield.



2. Push the release lever and slide the wiper assembly toward the driver side of the vehicle.
3. Install a new blade by reversing Steps 1 and 2.

Other Service Items

Fuel Filter

Fuel Filter/Pressure Regulator (Gasoline Engines)

The steel fuel filter/pressure regulator is located near the engine compartment on the driver's side frame rail. If your vehicle has a rear steel fuel tank, the fuel filter/pressure regulator is located near the rear fuel tank, on the driver's side frame rail. See *Scheduled Maintenance on page 6-5* for recommended service intervals.

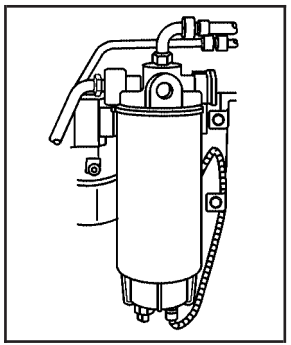
If your vehicle is equipped with the optional Davco spin-on type filter, it is located on the driver's side frame rail.

Fuel Filter (Diesel Engines)

If you have a diesel engine, your fuel filter is located in the engine compartment on the driver's side of the vehicle, or along the driver's side frame rail. See "Fuel Filter Replacement" earlier in this section for further information.

Also see *Scheduled Maintenance on page 6-5* for recommended service intervals.

Primary Fuel Filter and Water Separator



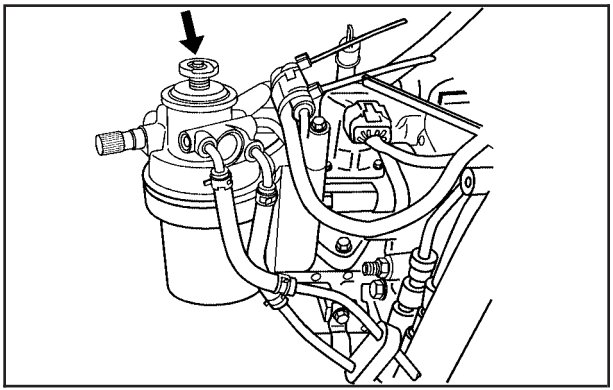
Your vehicle may have this spin-on filter. It is located on the driver's side frame rail.

It has a clear plastic drain bowl at the bottom. Check the drain bowl occasionally for any water or particles.

To drain the water or to replace the element, follow the water draining and element replacement procedure under *Water in Fuel on page 5-12*.

Secondary Fuel Filter and Heater

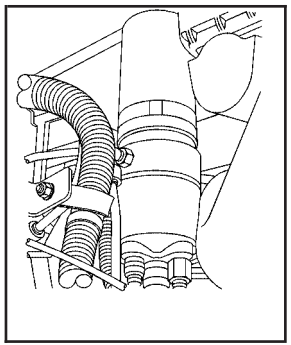
Your vehicle may have this fuel filter and fuel heater. It is mounted on the left side of the engine.



It has a metal drain bowl at the bottom. Occasionally, check the bowl for any water or particles. To check or drain the bowl, shut off the engine.

Then push up on the spring-loaded drain valve until clear fuel is flowing from the valve. The particles or water will drain out first.

Secondary Fuel Filter and Water Separator/Heater (Caterpillar Diesel)



If you have a Caterpillar® diesel engine, you may also have this spin-on filter and fuel separator/heater. It will be mounted in the engine compartment on the driver's side of the vehicle.

It has a metal drain bowl at the bottom. Occasionally, check the bowl for any water or particles.

To check or drain the bowl, do the following:

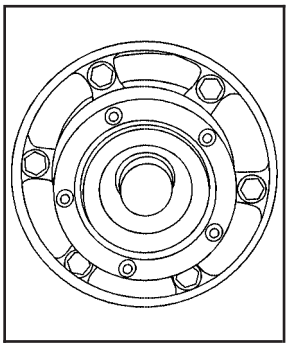
- Shut off the engine.
- Push up on the spring loaded drain valve until clear fuel is flowing from the valve.

The particles or water will drain out first. See *Engine Oil (DURAMAX Diesel Engine) on page 5-23* or *Engine Oil (Caterpillar Diesel Engine) on page 5-26* or *Engine Oil (Isuzu Diesel Engine) on page 5-26* or *Engine Oil (Gasoline Engine) on page 5-30* for proper disposal procedures.

Front Wheel Bearings with Oil-Filled Hubs

Notice: **If you drive your vehicle through deep water that is higher than the front or rear axle, water may enter the axle housing and cause the axle lubricant to break down. This could damage the gears inside. Avoid driving your vehicle through deep water.**

You should avoid driving your vehicle through deep puddles or standing water. If you must drive through water that is higher than the front or rear axle, see your dealer immediately afterward to have the condition of the axle lubricant checked.



If your vehicle has oil-filled hubs, occasionally check to see if they have enough oil. You can tell if there is oil there by using the circular gage on the sight glass.

If there isn't, clean the rubber fill plug in the center of the glass, and then remove it. Be careful not to allow any dirt or water to get into the oil. Add enough of the recommended oil to bring it up to the level mark that you'll see on the glass.

Refer to your Maintenance Schedule for the proper oil to use.

When you fill the hub, check the glass again after driving a short distance. It takes a while for the oil to flow through the system, and you may find that you have to add a little more to fill it to the proper level. Be sure not to overfill the hub.

Tires

Your new vehicle comes with high-quality tires made by a leading tire manufacturer. If you ever have questions about your tire warranty and where to obtain service, see your vehicle Warranty booklet for details. For additional information refer to the tire manufacturer.

⚠ CAUTION:

Poorly maintained and improperly used tires are dangerous.

- Overloading your vehicle's tires can cause overheating as a result of too much flexing. You could have an air-out and a serious accident. See *Loading the Vehicle on page 4-20*.
- Underinflated tires pose the same danger as overloaded tires. The resulting accident could cause serious injury. Check all tires frequently to maintain the recommended pressure. Tire pressure should be checked when your vehicle's tires are cold. See *Inflation - Tire Pressure on page 5-78*.
- Overinflated tires are more likely to be cut, punctured, or broken by a sudden impact — such as when you hit a pothole. Keep tires at the recommended pressure.
- Worn, old tires can cause accidents. If the tire's tread is badly worn, or if your vehicle's tires have been damaged, replace them.

Inflation - Tire Pressure

Tires need the correct amount of air pressure to operate effectively. The Certification or Tire Information label shows the correct inflation pressures for your tires when they are cold. Cold means your vehicle has been sitting for at least three hours or driven no more than 1 mile (1.6 km).

Notice: **Do not let anyone tell you that under-inflation or over-inflation is all right. It is not. If your tires do not have enough air (under-inflation), you can get the following:**

- **Too much flexing**
- **Too much heat**
- **Tire overloading**
- **Premature or irregular wear**
- **Poor handling**
- **Reduced fuel economy**

If your tires have too much air (over-inflation), you can get the following:

- **Unusual wear**
- **Poor handling**
- **Rough ride**
- **Needless damage from road hazards**

When to Check

Check your tires once a month or more.

Also, check the tire pressure of the spare tire if your vehicle has one.

How to Check

Use a good quality pocket-type gage to check tire pressure. You cannot tell if your vehicle's tires are properly inflated simply by looking at them. Radial tires may look properly inflated even when they are underinflated. Check the tire's inflation pressure when the tires are cold. Cold means your vehicle has been sitting for at least three hours or driven no more than 1 mile (1.6 km).

Remove the valve cap from the tire valve stem. Press the tire gage firmly onto the valve to get a pressure measurement. If the cold tire inflation pressure matches the recommended pressure on the Certification or Tire Information label, no further adjustment is necessary. If the inflation pressure is low, add air until you reach the recommended amount. If you overfill the tire, release air by pushing on the metal stem in the center of the tire valve. Re-check the tire pressure with the tire gage.

Be sure to put the valve caps back on the valve stems. They help prevent leaks by keeping out dirt and moisture.

Wheel Loading

Wheels are stamped with a maximum load and cold inflation rating. Be sure you do not exceed these limits.

Dual Tire Operation

When the vehicle is new, check the wheel nut tightness on all wheels with a torque wrench after your first 100 miles (160 km) and then 1,000 miles (1 600 km) after that. Whenever a wheel, wheel bolt or wheel nut is removed or serviced, repeat the 100 miles (160 km), and then 1,000 mile (1 600 km) wheel nut tightness check.

See *Tightening the Wheel Nuts on page 5-82* for wheel nut tightening information and proper torque values.

⚠ CAUTION:

If you operate your vehicle with a tire that is badly underinflated, the tire can overheat. An overheated tire can lose air suddenly or catch fire. You or others could be injured. Be sure all tires (including the spare, if any) are properly inflated.

See *Tires on page 5-77* and *Inflation - Tire Pressure on page 5-78* for more information on proper tire inflation.

When It Is Time for New Tires

Various factors, such as maintenance, temperatures, driving speeds, vehicle loading, and road conditions, influence when you need new tires.

Replace your tires when the tread depth is down to 1/8 of an inch (3.2 mm) for the front tires, or 1/16 of an inch (1.6 mm) for a rear tire. Also, you need a new tire if:

- You can see cord or fabric showing through the tire's rubber.
- The tread or sidewall is cracked, cut, or snagged deep enough to show cord or fabric.
- The tire has a bump, bulge, or split.
- The tire has a puncture, cut, or other damage that cannot be repaired well because of the size or location of the damage.

The rubber in tires degrades over time, even if they are not being used. This is also true for the spare tire, if your vehicle has one. Multiple conditions affect how fast this aging takes place, including temperatures, loading conditions, and inflation pressure maintenance. With proper care and maintenance tires will typically wear out before they degrade due to age. If you are unsure about the need to replace your tires as they get older, consult the tire manufacturer for more information.

If your vehicle has four-wheel drive, the axle differentials, propshafts, and transfer case may be damaged if tires of different sizes, brands or tread types are installed on the front and rear axles. That damage would not be covered under your warranty.

Buying New Tires

GM has developed and matched specific tires for your vehicle. If you need replacement tires, GM strongly recommends that you get tires that are the same size, brand, load range, speed rating, and construction type (radial and bias-belted tires) as your vehicle's original tires. This way, your vehicle will continue to have tires that are designed to give the same performance and vehicle safety, during normal use, as the original tires.

GM recommends replacing tires in sets of six or eight as applicable. This is because uniform tread depth on all tires will help keep your vehicle performing most like it did when the tires were new. Replacing less than a full set of tires can affect the braking and handling performance of your vehicle.

⚠ CAUTION:

Mixing tires could cause you to lose control while driving. If you mix tires of different sizes, brands, or types (radial and bias-belted tires) the vehicle may not handle properly, and you could have a crash. Using tires of different sizes, brands, or types may also cause damage to your vehicle. Be sure to use the correct size, brand, and type of tires on your vehicle's wheels.

⚠ CAUTION:

If you use bias-ply tires on the vehicle, the wheel rim flanges could develop cracks after many miles of driving. A tire and/or wheel could fail suddenly, causing a crash. Use only radial-ply tires with the wheels on the vehicle.

Wheel Alignment and Tire Balance

The wheels on your vehicle were aligned at the factory to give you the longest tire life and best overall performance.

Proper front wheel alignment must be maintained in order to ensure efficient steering, good directional stability, and prevent abnormal tire wear. If you notice unusual tire wear or your vehicle is pulling one way or the other, the alignment may need to be reset. If you notice your vehicle vibrating when driving on a smooth road, your wheels may need to be balanced.

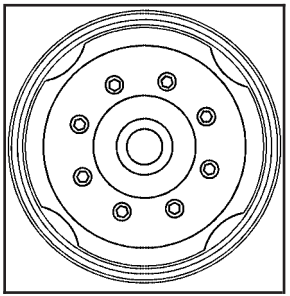
Tightening the Wheel Nuts

⚠ CAUTION:

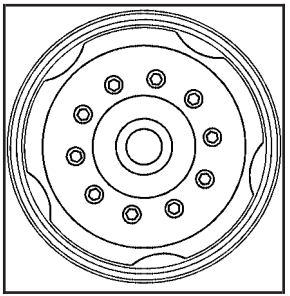
Wheel nuts that are not tight can work loose. If all the nuts on a wheel come off, the wheel can come off the vehicle, causing a crash. All wheel nuts must be properly tightened. Follow the rules in this section to be sure they are.

This section lets you know how often to check the tightness of the wheel nuts on your vehicle and how tight they must be.

First, use these pictures to decide what kind of wheels you have.



Hub-Piloted Type, 8-Hole



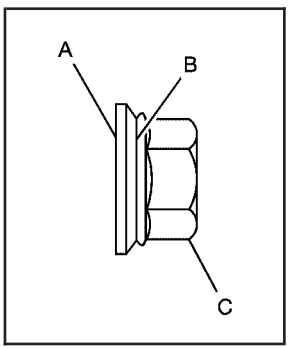
Hub-Piloted Type, 10-Hole

Then, refer to the following steps for the wheels you have.

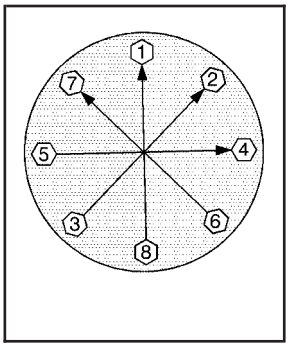
Hub-Piloted Wheels, 8-Hole or 10-Hole

The studs and nuts used with these wheels have right-hand threads.

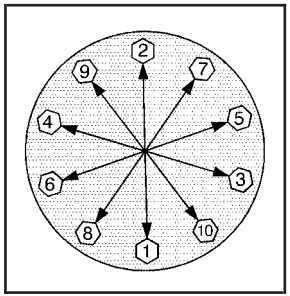
1. With intermittent pilot pads, position a pad at 12 o'clock to center the wheel and reduce run-out.
2. Put the tire and rim assembly on the axle hub. Install the outer rear tire and rim assembly so that its valve stem is exactly opposite the valve stem on the inner tire and rim assembly.
3. Put on the wheel nuts.
4. Finger-tighten the nuts.



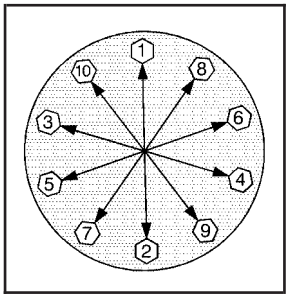
5. Oil the surfaces (B) between the nuts (C) and washers (A). Do not oil the studs or the threads of the nut.
6. Tighten the nuts to 400 lb ft (542 N•m) if an 8-hole stud or 480 lb ft (650 N•m) if a 10-hole stud, using the following diagrams.



8-Hole



10-Hole (Front)



10-Hole (Rear)

⚠ CAUTION:

Never use oil or grease on studs or the threads of the wheel nuts. If you do, the wheel nuts might come loose and the wheel could fall off, causing a crash.

⚠ CAUTION:

If wheel studs are damaged, they can break. If all the studs on a wheel broke, the wheel could come off and cause a crash. If any stud is damaged because of a loose-running wheel, it could be that all of the studs are damaged. To be sure, replace all studs on the wheel. If the stud holes in a wheel have become larger, the wheel could collapse in operation. Replace any wheel if its stud holes have become larger or distorted in any way. Inspect hubs and hub-piloted wheels for damage. Because of loose running wheels, piloting pad damage may occur and require replacement of the entire hub, for proper centering of the wheels. When replacing studs, hubs, wheel nuts or wheels, be sure to use GM original equipment parts.

> **⚠ CAUTION:**
>
> Rust or dirt on a wheel, or on the parts to which it is fastened, can make wheel nuts become loose after a time. The wheel could come off and cause a crash. When you change a wheel, remove any rust or dirt from places where the wheel attaches to the vehicle. In an emergency, you can use a cloth or a paper towel to do this; but be sure to use a scraper or wire brush later, if you need to, to get all the rust or dirt off.

How Often to Check

Wheel tightness is so important you should have a technician check nut tightness on all wheels with a torque wrench after your first 100 miles (160 km), and then 1,000 miles (1 600 km) after that. Be sure to repeat this service whenever you have a tire removed or serviced. See *Scheduled Maintenance on page 6-5* for further information.

Wheel Replacement

Replace any wheel that is bent, cracked, or badly rusted or corroded. If wheel nuts keep coming loose, replace the wheel, wheel bolts, and wheel nuts. If the wheel leaks air, replace it.

Your dealer will know the kind of wheel you need.

Each new wheel should have the same load-carrying capacity, diameter, width, offset and be mounted the same way as the one it replaces.

> **⚠ CAUTION:**
>
> Using the wrong replacement wheels, wheel bolts, or wheel nuts on your vehicle can be dangerous. It could affect the braking and handling of your vehicle, make your tires lose air and make you lose control. You could have a collision in which you or others could be injured. Always use the correct wheel, wheel bolts, and wheel nuts for replacement.

If you need to replace any of your wheels, wheel bolts or wheel nuts, replace them only with new GM original equipment parts. This way, you will be sure to have the right wheel, wheel bolts and wheel nuts for your vehicle.

⚠ CAUTION:

A leaking wheel could fail without warning. A wheel designed for tubeless tires could be leaking because it is damaged. Do not use an inner tube or some other thing to try to stop the leaking. Get a new wheel of the proper type.

⚠ CAUTION:

Without the correct wheel, wheel bolts or wheel nuts, you may not be able to stop properly, and you could have other problems like a tire air-out. You could have a collision. If you do not go to your dealer to get a new wheel, wheel bolts or wheel nuts, be sure you get the correct ones. Each new wheel should match the original wheel in load-carrying capacity, inflation pressure capacity, diameter, width, offset and mounting configuration.

Using wheels and tires with higher load-carrying limits than the original wheels and tires does not change the Gross Axle Weight Rating (GAWR) or the Gross Vehicle Weight Rating (GVWR) of your vehicle. See *Loading the Vehicle on page 4-20* for more information.

Notice: **The wrong wheel can cause trouble in bearing life, brake cooling, speedometer/odometer calibration, headlamp aim, bumper height, vehicle ground clearance, stopping distance and tire clearance to the body and chassis. You could also have other problems like a tire air-out.**

Used Replacement Wheels

⚠ CAUTION:

Putting a used wheel on the vehicle is dangerous. You cannot know how it has been used or how far it has been driven. It could fail suddenly and cause a crash. If you have to replace a wheel, use a new GM original equipment wheel.

If a Tire Goes Flat

It is unusual for a tire to blowout while you are driving, especially if you maintain your tires properly. If air goes out of a tire, it is much more likely to leak out slowly. But if you should ever have a blowout, here are a few tips about what to expect and what to do:

If a front tire fails, the flat tire will create a drag that pulls the vehicle toward that side. Take your foot off the accelerator pedal and grip the steering wheel firmly. Steer to maintain lane position, and then gently brake to a stop well out of the traffic lane.

A rear blowout, particularly on a curve, acts much like a skid and may require the same correction you would use in a skid. In any rear blowout, remove your foot from the accelerator pedal. Get the vehicle under control by steering the way you want the vehicle to go. It may be very bumpy and noisy, but you can still steer. Gently brake to a stop — well off the road if possible.

If a tire goes flat, avoid further tire and wheel damage by driving slowly to a level place and turn on your hazard warning flashers. See *Hazard Warning Flashers on page 3-6*.

⚠ CAUTION:

Your vehicle, when new, did not include tire changing equipment or a place to store a tire in the vehicle. Special tools and procedures are required if a tire needs to be serviced. If these tools and procedures are not used, you or others could be injured or killed while trying to change or service a truck tire.

Your truck, when new, did not include tire changing equipment or a place to store a tire in the vehicle. Few drivers of these vehicles have the necessary equipment aboard to be able to change a flat tire safely. For example, you would need a truck jack that can lift several thousand pounds and a torque wrench that can generate several hundred foot-pounds (N•m) of twisting force.

⚠ CAUTION:

If you try to put air back into a tire that has run flat, even a tire that was extremely low on air, the tire can have a sudden air-out. This could cause you to lose control of the vehicle and have a serious crash. Do not refill a flat or very low tire with air without first having the tire taken off the wheel and checked for damage.

So if you are stopped somewhere by a flat or damaged tire or wheel, you should get expert help. See *Roadside Assistance Program on page 7-5*.

Appearance Care

Interior Cleaning

The vehicle's interior will continue to look its best if it is cleaned often. Although not always visible, dust and dirt can accumulate on the upholstery. Dirt can damage carpet, fabric, leather, and plastic surfaces. Regular vacuuming is recommended to remove particles from the upholstery. It is important to keep the upholstery from becoming and remaining heavily soiled. Soils should be removed as quickly as possible. The vehicle's interior may experience extremes of heat that could cause stains to set rapidly.

Lighter colored interiors may require more frequent cleaning. Use care because newspapers and garments that transfer color to home furnishings may also transfer color to the vehicle's interior.

When cleaning the vehicle's interior, only use cleaners specifically designed for the surfaces being cleaned. Permanent damage may result from using cleaners on surfaces for which they were not intended. Use glass cleaner only on glass. Remove any accidental over-spray from other surfaces immediately. To prevent over-spray, apply cleaner directly to the cleaning cloth.

Notice: **Using abrasive cleaners when cleaning glass surfaces on the vehicle, could scratch the glass and/or cause damage to the rear window defogger. When cleaning the glass on the vehicle, use only a soft cloth and glass cleaner.**

Many cleaners contain solvents that may become concentrated in the vehicle's breathing space. Before using cleaners, read and adhere to all safety instructions on the label. While cleaning the vehicle's interior, maintain adequate ventilation by opening the vehicle's doors and windows.

Dust may be removed from small buttons and knobs using a small brush with soft bristles.

Products that remove odors from the vehicle's upholstery and clean the vehicle's glass can be obtained from your dealer/retailer.

Do not clean the vehicle using:

- A knife or any other sharp object to remove a soil from any interior surface.
- A stiff brush. It can cause damage to the vehicle's interior surfaces.
- Heavy pressure or aggressive rubbing with a cleaning cloth. Use of heavy pressure can damage the interior and does not improve the effectiveness of soil removal.

- Laundry detergents or dishwashing soaps with degreasers can leave residue that streaks and attracts dirt. For liquid cleaners, about 20 drops per gallon (3.78 L) of water is a good guide. Use only mild, neutral-pH soaps.
- Too much cleaner that saturates the upholstery.
- Organic solvents such as naptha, alcohol, etc. that can damage the vehicle's interior.

Fabric/Carpet

Use a vacuum cleaner with a soft brush attachment frequently to remove dust and loose dirt. A canister vacuum with a beater bar in the nozzle may only be used on floor carpet and carpeted floor mats. For any soil, always try to remove it first with plain water or club soda. Before cleaning, gently remove as much of the soil as possible using one of the following techniques:

- For liquids: gently blot the remaining soil with a paper towel. Allow the soil to absorb into the paper towel until no more can be removed.
- For solid dry soils: remove as much as possible and then vacuum.

To clean:

1. Saturate a lint-free, clean white cloth with water or club soda.
2. Wring the cloth to remove excess moisture.
3. Start on the outside edge of the soil and gently rub toward the center. Continue cleaning, using a clean area of the cloth each time it becomes soiled.
4. Continue to gently rub the soiled area until the cleaning cloth remains clean.
5. If the soil is not completely removed, use a mild soap solution and repeat the cleaning process that was used with plain water.

If any of the soil remains, a commercial fabric cleaner or spot lifter may be necessary. When a commercial upholstery cleaner or spot lifter is to be used, test a small hidden area for colorfastness first. If the locally cleaned area gives any impression that a ring formation may result, clean the entire surface.

After the cleaning process has been completed, a paper towel can be used to blot excess moisture from the fabric or carpet.

Instrument Panel, Vinyl, and Other Plastic Surfaces

A soft cloth dampened with water may be used to remove dust. If a more thorough cleaning is necessary, a clean soft cloth dampened with a mild soap solution can be used to gently remove dust and dirt. Never use spot lifters or removers on plastic surfaces. Many commercial cleaners and coatings that are sold to preserve and protect soft plastic surfaces may permanently change the appearance and feel of the interior and are not recommended. Do not use silicone or wax-based products, or those containing organic solvents to clean the vehicle's interior because they can alter the appearance by increasing the gloss in a non-uniform manner.

Some commercial products may increase gloss on the instrument panel. The increase in gloss may cause annoying reflections in the windshield and even make it difficult to see through the windshield under certain conditions.

Care of Safety Belts

Keep belts clean and dry.

⚠ CAUTION:

Do not bleach or dye safety belts. It may severely weaken them. In a crash, they might not be able to provide adequate protection. Clean safety belts only with mild soap and lukewarm water.

Weatherstrips

Silicone grease on weatherstrips will make them last longer, seal better, and not stick or squeak. Apply silicone grease with a clean cloth. During very cold, damp weather frequent application may be required. See *Part C: Recommended Fluids and Lubricants on page 6-32*.

Washing Your Vehicle

The best way to preserve the vehicle's finish is to keep it clean by washing it often.

Notice: **Certain cleaners contain chemicals that can damage the emblems or nameplates on the vehicle. Check the cleaning product label. If it states that it should not be used on plastic parts, do not use it on the vehicle or damage may occur and it would not be covered by the warranty.**

Do not wash the vehicle in direct sunlight. Use a car washing soap. Do not use cleaning agents that are petroleum based or that contain acid or abrasives, as they can damage the paint, metal or plastic on the vehicle. Approved cleaning products can be obtained from your dealer/retailer. Follow all manufacturers' directions regarding correct product usage, necessary safety precautions and appropriate disposal of any vehicle care product.

Rinse the vehicle well, before washing and after to remove all cleaning agents completely. If they are allowed to dry on the surface, they could stain.

Dry the finish with a soft, clean chamois or an all-cotton towel to avoid surface scratches and water spotting.

High pressure car washes may cause water to enter the vehicle. Avoid using high pressure washes closer than 12 inches (30 cm) to the surface of the vehicle. Use of power washers exceeding 1,200 psi (8 274 kPa) can result in damage or removal of paint and decals.

Cleaning Exterior Lamps/Lenses

Use only lukewarm or cold water, a soft cloth and a car washing soap to clean exterior lamps and lenses. Follow instructions under *Washing Your Vehicle on page 5-92*.

Finish Care

Occasional waxing or mild polishing of the vehicle by hand may be necessary to remove residue from the paint finish. Approved cleaning products can be obtained from your dealer/retailer.

If the vehicle has a basecoat/clearcoat paint finish, the clearcoat gives more depth and gloss to the colored basecoat. Always use waxes and polishes that are non-abrasive and made for a basecoat/clearcoat paint finish.

Notice: **Machine compounding or aggressive polishing on a basecoat/clearcoat paint finish may damage it. Use only non-abrasive waxes and polishes that are made for a basecoat/clearcoat paint finish on the vehicle.**

Foreign materials such as calcium chloride and other salts, ice melting agents, road oil and tar, tree sap, bird droppings, chemicals from industrial chimneys, etc., can damage the vehicle's finish if they remain on painted surfaces. Wash the vehicle as soon as possible. If necessary, use non-abrasive cleaners that are marked safe for painted surfaces to remove foreign matter.

Exterior painted surfaces are subject to aging, weather and chemical fallout that can take their toll over a period of years. To help keep the paint finish looking new, keep the vehicle garaged or covered whenever possible.

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. However, chrome polish may be used on chrome or stainless steel trim, if necessary.

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 high polish, is recommended for all bright metal parts.

Windshield and Wiper Blades

Clean the outside of the windshield with glass cleaner.

Clean the rubber blades using a lint free cloth or paper towel soaked with windshield washer fluid or a mild detergent. Wash the windshield thoroughly when cleaning the blades. Bugs, road grime, sap, and a buildup of vehicle wash/wax treatments may cause wiper streaking. Replace the wiper blades if they are worn or damaged.

Wipers can be damaged by:

- Extreme dusty conditions
- Sand and salt
- Heat and sun
- Snow and ice, without proper removal

Aluminum or Chrome-Plated Wheels and Trim

The vehicle may be equipped with either aluminum or chrome-plated wheels.

Keep the wheels clean using a soft clean cloth with mild soap and water. Rinse with clean water. After rinsing thoroughly, dry with a soft clean towel. A wax may then be applied.

Notice: **If you use strong soaps, chemicals, abrasive polishes, cleaners, brushes, or cleaners that contain acid on aluminum or chrome-plated wheels, you could damage the surface of the wheel(s). The repairs would not be covered by your warranty. Use only GM-approved cleaners on aluminum or chrome-plated wheels.**

The surface of these wheels is similar to the painted surface of your vehicle. Do not use strong soaps, chemicals, abrasive polishes, abrasive cleaners, cleaners with acid, or abrasive cleaning brushes on them because you could damage the surface. Do not use chrome polish on aluminum wheels.

Notice: **Using chrome polish on aluminum wheels could damage the wheels. The repairs would not be covered by the warranty. Use chrome polish on chrome wheels only.**

Use chrome polish only on chrome-plated wheels, but avoid any painted surface of the wheel, and buff off immediately after application.

Tires

To clean the tires, use a stiff brush with tire cleaner.

Notice: **Using petroleum-based tire dressing products on the vehicle may damage the paint finish and/or tires. When applying a tire dressing, always wipe off any overspray from all painted surfaces on the vehicle.**

Sheet Metal Damage

If the vehicle is damaged and requires sheet metal repair or replacement, make sure the body repair shop applies anti-corrosion material to parts repaired or replaced to restore corrosion protection.

Original manufacturer replacement parts will provide the corrosion protection while maintaining the vehicle warranty.

Finish Damage

Any stone chips, fractures or deep scratches in the finish should be repaired right away. 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 dealer/retailer. Larger areas of finish damage can be corrected in your dealer's/retailer's body and paint shop.

Underbody Maintenance

Chemicals used for ice and snow removal and dust control can collect on the underbody. If these are not removed, corrosion and rust can develop on the underbody parts such as fuel lines, frame, floor pan, and exhaust system even though they have corrosion protection.

At least every spring, flush these materials from the underbody with plain water. Clean any areas where mud and debris can collect. Dirt packed in close areas of the frame should be loosened before being flushed. Your dealer/retailer or an underbody car washing system can do this.

Chemical Paint Spotting

Some weather and atmospheric conditions can create a chemical fallout. Airborne pollutants can fall upon and attack painted surfaces on the vehicle. This damage can take two forms: blotchy, ring-shaped discolorations, and small, irregular dark spots etched into the paint surface.

Although no defect in the paint job causes this, we will repair, at no charge to the owner, the surfaces of new vehicles damaged by this fallout condition within 12 months or 12,000 miles (20 000 km) of purchase, whichever occurs first.

Vehicle Identification

Vehicle Identification Number (VIN)

This is the legal identifier for your vehicle. It appears on a plate in the front corner of the instrument panel, on the driver side. It can be seen through the windshield from outside the vehicle. The VIN also appears on the Certification/Tire and Service Parts labels and the certificates of title and registration.

Engine Identification

The eighth character in the VIN is the engine code. This code helps identify the vehicle's engine, specifications, and replacement parts. See "Engine Specifications" under *Capacities and Specifications on page 5-103* for your vehicle's engine code.

Service Parts Identification Label

This label is in a location determined by the body manufacturer. It is very helpful if you ever need to order parts. The label has the following information:

- Vehicle Identification Number (VIN)
- Model designation
- Paint information
- Production options and special equipment

Do not remove this label from the vehicle.

Electrical System

Add-On Electrical Equipment

Notice: **Do not add anything electrical to the vehicle unless you check with your dealer/retailer first. Some electrical equipment can damage the vehicle and the damage would not be covered by the vehicle's warranty. Some add-on electrical equipment can keep other components from working as they should.**

Add-on equipment can drain the vehicle battery, even if the vehicle is not operating.

The vehicle has an airbag system. Before attempting to add anything electrical to the vehicle, see *Servicing Your Airbag-Equipped Vehicle on page 1-60*.

Headlamp Wiring

The headlamp wiring is protected by a circuit breaker in the light switch. An electrical overload will cause the lights to go on and off, or in some cases to remain off. If this happens, have your headlamp wiring checked right away.

Windshield Wiper Fuses

The windshield wiper motor is protected by a circuit breaker inside the motor and a circuit breaker or fuse in the fuse block. If the motor overheats, the wipers will stop until the motor cools. If the overload is caused by an electrical problem, be sure to get it fixed.

Fusible Links

A fusible link is a short piece of wire several gauge sizes smaller than the circuit it protects. It will melt in an overload situation, opening the circuit.

The starter and other circuits have fusible links. The size is printed on the insulation. If the insulation is burned beyond recognition, consult your dealer/retailer for the proper size. Replace a fusible link with one of the same size and insulation type. Fusible link insulation is a special purpose high-temperature material.

Some examples of circuits with fusible links are the hydraulic brake booster motor feed circuit, the generator output circuit, and the intake heater feed circuit in vehicles with a diesel engine.

Power Windows and Other Power Options

Circuit breakers in the fuse panel protect the power windows and other power accessories. When the current load is too heavy, the circuit breaker opens. This protects the circuit until the current load returns to normal or the problem is fixed.

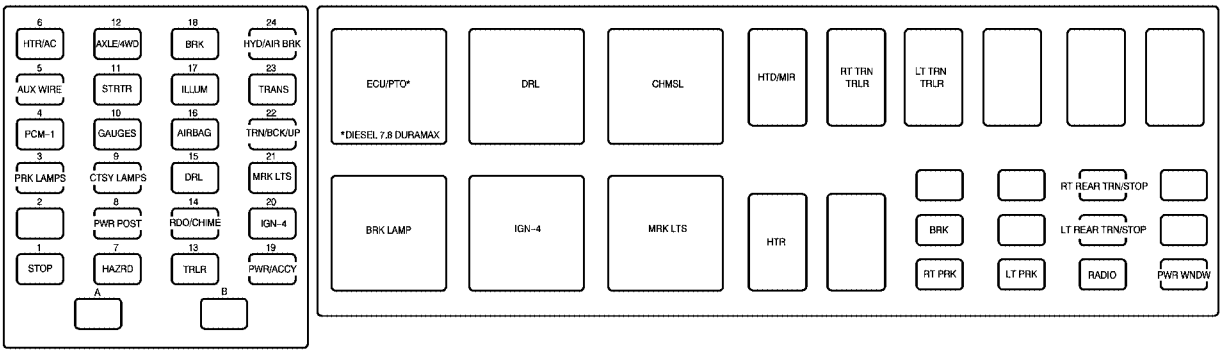
Fuses and Circuit Breakers

The wiring circuits in the vehicle are protected from short circuits by a combination of fuses, circuit breakers, maxi-fuses and fusible links. This greatly reduces the chance of a fire caused by an electrical problem. There may be a fuse taped to the wiring harness near the hydraulic brake booster.

Instrument Panel Fuse Block

There are two instrument panel fuse blocks located behind the instrument panel on the passenger side of the vehicle.

Be sure to replace fuses with fuses of the same rating. Do not use fuses of higher amperage than those indicated on the fuse block.



Fuse	Usage
1	Stoplamps
2	Not Used
3	Parking Lamps
4	Powertrain Control Module
5	Auxiliary Wiring

Fuse	Usage
6	Heater/Air Conditioning
7	Hazard Warning Flashers
8	Power Post
9	Courtesy Lamps
10	Warning Lights, Gages and Indicators

Fuse	Usage
11	Starter
12	Rear Axle/Four-Wheel-Drive
13	Trailer Turn Signals/Hazard Warning Flashers
14	Radio/Chime
15	Daytime Running Lamps
16	Airbag System
17	Exterior/Interior Lamps
18	Parking Brake
19	Accessory Power
20	Ignition 4
21	Sidemarker Lamps
22	Turn Signal/Backup Lamps
23	Transmission
24	Hydraulics/Air Brake
A	Spare
B	Spare

Fuse	Usage
Blank	Not Used
BRK	Brake Warning Lamp
RT PRK	Passenger Side Parking Lamps

Fuse	Usage
Blank	Not Used
Blank	Not Used
LT PARK	Driver Side Parking Lamps
RT REAR TRN/STOP	Passenger Side Rear Turn Signal/Stoplamp
LT REAR TRN/STOP	Driver Side Rear Turn Signal/Stoplamp
RADIO	Radio
Blank	Not Used
Blank	Not Used
PWR WNDW	Power Windows

Relay	Usage
ECU/PTO*	Engine Control Unit/Power Take-Off *Diesel 7.8 Duramax
BRK LAMP	C4/C5 Brake Lamps, C6/C7/C8 Tractor/Trailer Wiring
DRL	Daytime Running Lamps
IGN-4	Ignition
CHMSL	Center High Mounted Stoplamp
MRK LTS	Sidemarker and Clearance Lamps
HTD/MIRR	Heated Mirrors
HTR	Diesel Heated Fuel

Relay	Usage
RT TRN TRLR	Passenger Side Trailer Turn Signal
Blank	Not Used
LT TRN TRLR	Driver Side Trailer Turn Signal
Blank	Not Used
Blank	Not Used
Blank	Not Used

Underhood Fuse Block

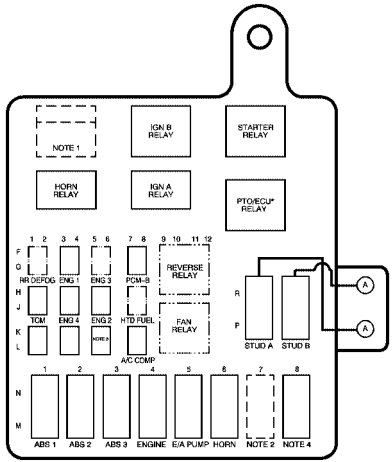
When a circuit goes out, the problem could be in either the primary or secondary underhood fuse blocks. These blocks use blade-type fuses.

Both underhood fuse blocks are located in the engine compartment, on the passenger side of the vehicle.

To access the fuse blocks, gently squeeze both sides of the cover to unlatch the tabs at the top. Then, unsnap both attachments at the bottom and remove the cover.

Notice: **Spilling liquid on any electrical components on the vehicle may damage it. Always keep the covers on any electrical component.**

Be sure to replace fuses with fuses of the same rating. Do not use fuses of higher amperage than those indicated on the fuse block.

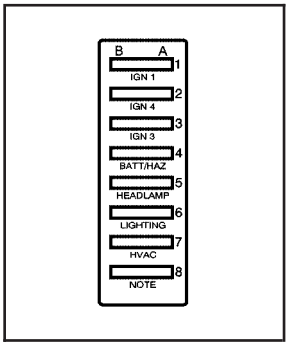


Primary Underhood Fuse Block

Fuse	Usage
RR DEFOG	Rear Defogger
ENG 1	Engine 1
ENG 3	Engine 3 (L18/LF6/LF8)
PCM-B	Powertrain Control Module
TCM	Transmissions (LF8)
ENG 4	Engine 4 (LMM/LF6/LF8)

Fuse	Usage
ENG 2	Engine 2 (L18/LMM)
HTD FUEL	Heated Fuel (LMM)
BLANK	Not Used
BLANK	Not Used
NOTE 3	Fan Relay (LMM), Emissions (L18)
A/C COMP	Air Conditioning Compressor
ABS 1	Antilock Brake System 1
ABS 2	Antilock Brake System 2
ABS 3	Antilock Brake System 3
ENGINE	Engine
E/A PUMP	Electronic/Automatic Pump
HORN	Horn
NOTE 2	Fuel (L18/LMM), Electronic Control Module (LF6)
NOTE 4	Electronic Control Module (LF6)
STUD A	Spare
STUD B	Spare

Relay	Usage
NOTE 1	LMM/L18 Fuel Pump Relay
IGN B RELAY	Ignition Relay
STARTER RELAY	Starter Relay
HORN RELAY	Horn Relay
IGN A RELAY	Ignition Relay
PTO/ECU* RELAY	Power Take-Off/Engine Control Unit (*Diesel 7.8L LF8)
REVERSE RELAY	Reverse Relay
FAN RELAY	Fan Relay (LMM)



Secondary Underhood Fuse Block

Fuse	Usage
IGN 1	Ignition 1
IGN 4	Ignition 4
IGN 3	Ignition 3
BATT/HAZ	Battery/Hazard Warning Flashers
HEADLAMP	Headlamps
LIGHTING	Interior/Exterior Lamps
HVAC	Climate Control System
NOTE	C4/C5 Electric Brake, C6/C7/C8 Brake Lamps

Capacities and Specifications

The following approximate capacities are given in English and metric conversions. See *Part C: Recommended Fluids and Lubricants on page 6-32* for more information.

Application	Capacities	
	English	Metric
Air Conditioning Refrigerant R134a	For the air conditioning system refrigerant charge amount, see the refrigerant caution label located under the hood. See your dealer/retailer for more information.	
Cooling System – C4/C5 Models		
6.6L V8 Automatic Transmission	27.9 qt	26.4 L
8.1L V8 Automatic Transmission	29.8 qt	28.2 L
8.1L V8 Manual Transmission	30.1 qt	28.5 L
Cooling System – C6/C7/C8 Automatic Transmission		
7.2L L6 Engine	32.0 qt	30.2 L
Isuzu 6H Engine (207 - 275 hp)	34.8 qt	32.9 L
Isuzu 6H Engine (300 hp)	33.9 qt	32.1 L
8.1L V8 Engine	32.5 qt	30.8 L

Application	Capacities	
	English	Metric
Cooling System – C6/C7/C8 Manual Transmission		
7.2L L6 Engine	30.4 qt	28.8 L
7.2L L6 Engine with A/C and Increased Cooling	33.9 qt	32.1 L
Isuzu 6H Engine (207–275 hp)	32.7 qt	31.0 L
Isuzu 6H Engine (207–275 hp) with A/C and Increased Cooling	35.9 qt	34.0 L
Isuzu 6H Engine (300 hp)	36.0 qt	34.1 L
Isuzu 6H Engine (300 hp) with A/C and Increased Cooling	36.0 qt	34.1 L
8.1L V8 Engine	33.3 qt	31.5 L
8.1L V8 Engine with A/C and Increased Cooling	34.9 qt	33.0 L
Engine Oil with Filter		
6.6L V8 Engine	14.6 qt	13.8 L
7.2L L6 Caterpillar® C7 Engine	30.0 qt	28.4 L
Isuzu 6H[1] Engine	23.8 qt	22.5 L
8.1L V8 Engine	10.0 qt	9.4 L
Check fill level on the oil indicator after initial fill to make sure it is actually full. Oil level may vary depending on vehicle option content. [1]Additional oil is required with auxiliary oil filter systems. Make sure to add enough extra oil to fill the auxiliary oil filter system. For vehicles equipped with the LUBERFINER 750-C, add 14 quarts (13.25 L).		

Application	Capacities	
	English	Metric
Fuel Capacity – C4/C5 Models		
Standard (Mid-Mounted)	25 gal	94.6 L
Optional[1] (Dual-Tank) (Mid-Mounted)	40 gal	151.4 L
Optional (Mid-Mounted)	32 gal	121.1 L
Optional (Side-Mounted)	35 gal	132.5 L
Optional (Mid-Mounted)	40 gal	151.4 L
Optional (Mid-Mounted)	60 gal	227.1 L
Optional (Mid-Mounted)	80 gal	302.8 L
[1]One 25-gallon (94.6 L) tank and one 15-gallon (56.8 L) tank		
Fuel Capacity – C6/C7/C8 Models		
Optional	35 gal	132.4 L
Standard	50 gal	189.2 L
Optional	50 gal	189.2 L
Optional[1] (Dual Tanks)	70 gal	264.8 L
Optional[2] (Dual Tanks)	75 gal	283.8 L
Optional[3] (Dual Tanks)	100 gal	378.5 L
[1]Two 35-gallon (132.4 L) tanks [2]One 25-gallon (94.6 L) tank and one 50-gallon (189.2 L) tank [3]Two 50-gallon (189.2 L) tanks		

Application	Capacities	
	English	Metric
Front 4WD Axle (G38)	7.0 pt	3.6 L
Rear Axle – Single Speed		
80 (GL4)	10.0 pt	4.7 L
19060D (HPM), 19060S (HPK), 21060D (HPN), 21060S (HPP), 22060S (HPG)	31.0 pt	14.7 L
23090S (HPT)	42.5 pt	20.1 L
23105D (HNB), 23105S (HNA)	51.0 pt	24.1 L
26105S (HPA)	51.0 pt	24.1 L
S110 (HD2) and S130 (HD1)	15.0 pt	7.1 L
Rear Axle – Tandem		
DS344 (front) (HPI)	34.0 pt	16.1 L
DS344 (rear) (HPI)	31.0 pt	14.7 L
DS404 (HPE), DS404P (HPJ) (front/rear unit)	32.0 pt	15.1 L
RSH44 (front/rear unit) (HP3)	29.0 pt	13.7 L
Rear Axle – Two-Speed		
19060T (HPL), 22060T (HPH)	38.0 pt	18.0 L
21060T (H15)	38.0 pt	18.0 L

Application	Capacities	
	English	Metric
23082T (H25)	44.0 pt	20.8 L
26080T (GJ4)	44.0 pt	20.8 L
Transfer Case (Four-Wheel Drive)	4.0 pt	1.9 L
Transmission Fluid, Automatic		
3000 RDS and EVS, and 3500 RDS and EVS with PTO Provision	59.0 pt	28.1 L
3000 RDS and EVS, and 3500 RDS and EVS without PTO Provision	52.0 pt	24.6 L
1000 HS, RDS, MH, PTS and EVS, 2200 HS, RDS, MH, PTS and EVS, 2500 HS and RDS, and 2300 HS and RDS	35.0 pt	16.5 L
Add 2 pints (1 L) when changing spin-on or remote filter. See the Allison® Automatic Transmission Operator's Manual for fluid check and maintenance information.		
Transmission Fluid, Manual		
ES052-7, ES066-7	22.0 pt	10.4 L
FS5205A	12.5 pt	5.9 L
FSO8406, FS6305A, FS6305B, FS6406, FS5406A	19.5 pt	9.2 L
FS4205A, FS4205B	11.5 pt	5.4 L
RT6609	12.0 pt	5.7 L

Application	Capacities	
	English	Metric
RT8709	26.0 pt	12.3 L
RT8908LL	28.0 pt	13.2 L
All capacities are approximate. When adding, be sure to fill to the approximate level, as recommended in this manual. Recheck the fluid level after filling.		

Engine Specifications

Engine	RPO	Type
6.6L V8 DURAMAX®	LMM	Common Rail Fuel System
7.2L L6 Caterpillar® C7	LF6	Hydraulic/Electronic Unit Injector Fuel System
7.8L L6 Isuzu 6H	LF8	Common Rail Fuel System
8.1L V8 VORTEC™	L18	Single Port Fuel Injector Fuel System

Normal Maintenance Replacement Parts

Maintenance Replacement Parts

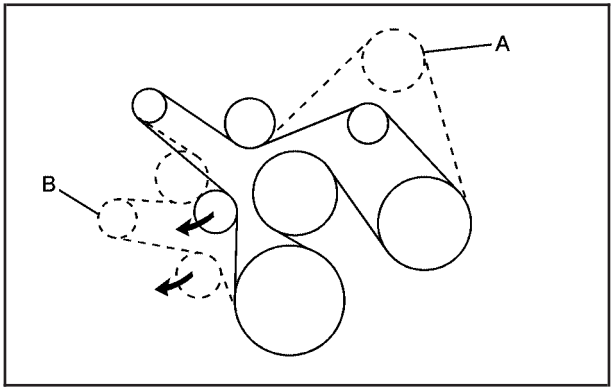
Replacement parts identified by name, part number, or specification can be obtained from your dealer.

Part	GM Part Number	ACDelco Part Number
Air Compressor Filter Haldex compressor (8.1L Engine Only)	88915425	A507CF
Engine Air Cleaner/Filter		
6.6L V8 (C4/C5 Models)	19152817	A3102C
7.2L L6; Isuzu 6H (C6/C7/C8 Models) with Standard Air Cleaner	88937525	A2031C
7.2L L6; Isuzu 6H (C6/C7/C8 Models) with Heavy Duty Air Cleaner	88937525[1]	A2031C
8.1L V8 (C4/C5 Models)	88937527	A2032C
8.1L V8 (C6/C7/C8 Models) with Heavy Duty Air Cleaner	88937525	A2031C
8.1L V8 (C6/C7/C8 Models) with Standard Air Cleaner	88937545	A2034C
Engine Oil Filter		
6.6L V8	88917036	PF2232
7.2L L6	—	1R-1807[2]
Isuzu 6H	94392475	—
8.1L V8	25324052	PF454

Part	GM Part Number	ACDelco Part Number
Fuel Filter		
6.6L V8	98017645	TP1298B
7.2L L6	—	1R-0751[2]
Isuzu 6H	98026037	—
8.1L V8 (C4/C5 with NG6/NK1 or U-Haul)	15807649	—
8.1L V8 (C4/C5 with all other fuel tanks)	10376257	—
8.1L V8 (All C6/C7/C8)	10370247	—
Power Steering Fluid Filter	88892858	—
Secondary Fuel Filter		
6.6L V8	—	—
7.2L L6 (NWB/KUR)	25982639	S3229[3]
Isuzu 6H (NWB)	15618921	S3202[3]
Isuzu 6H (KUK)	88983117	TP1519
8.1L V8 (K28 and standard U-Haul)	25014476	TP1247
Spark Plugs		
6.6L V8	—	—
7.2L L6	—	—
Isuzu 6H	—	—
8.1L V8	12578277	41-983

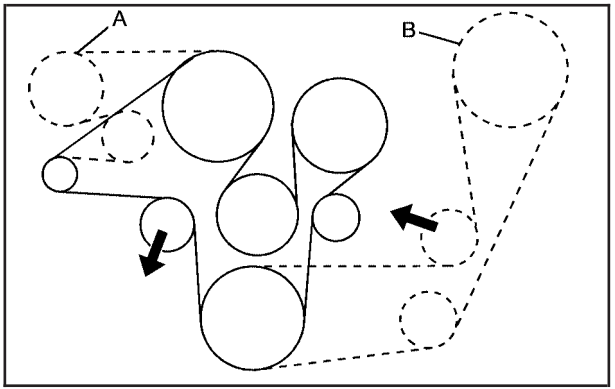
[1]Optional air filter (GM Part No. 88937548 AC Delco No. A2035C) for C6/C7/C8 Models. Fits inside standard size filter (GM Part No. 88937525 AC Delco No. A2031C) listed previously.
[2]Caterpillar® part number.
[3]Racor part number.
See the Allison Transmission Operator's Manual in your vehicle for external filter part numbers and information.

Engine Drive Belt Routing



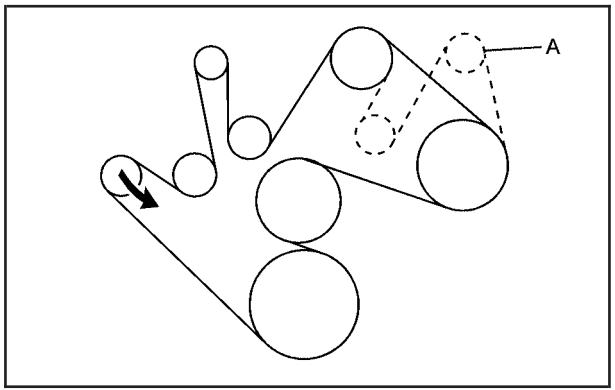
8.1L V8 Engine (C4, C5)

A. Air Conditioning Compressor.
B. Dual Generators.



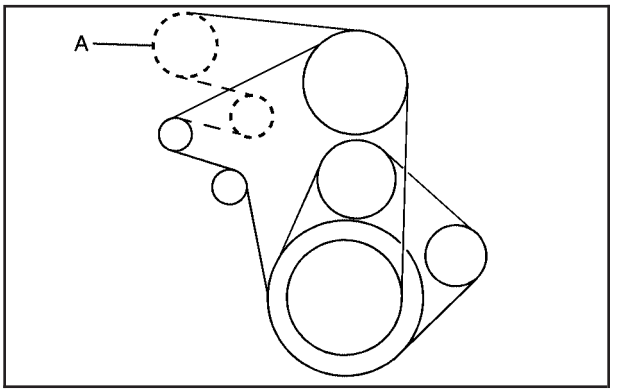
8.1L V8 Engine (C6,C7,C8)

A. Air Conditioning Compressor.
B. Air Brake Compressor.



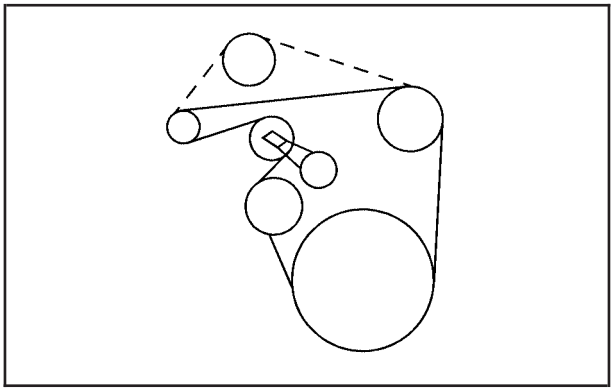
6.6L V8 Duramax Diesel Engine

A. Dual Generators.



Isuzu 6H Diesel Engine

A. Air Conditioning Compressor.



7.2L I6 Caterpillar Diesel Engine

A. Air Conditioning Compressor.

✍ NOTES