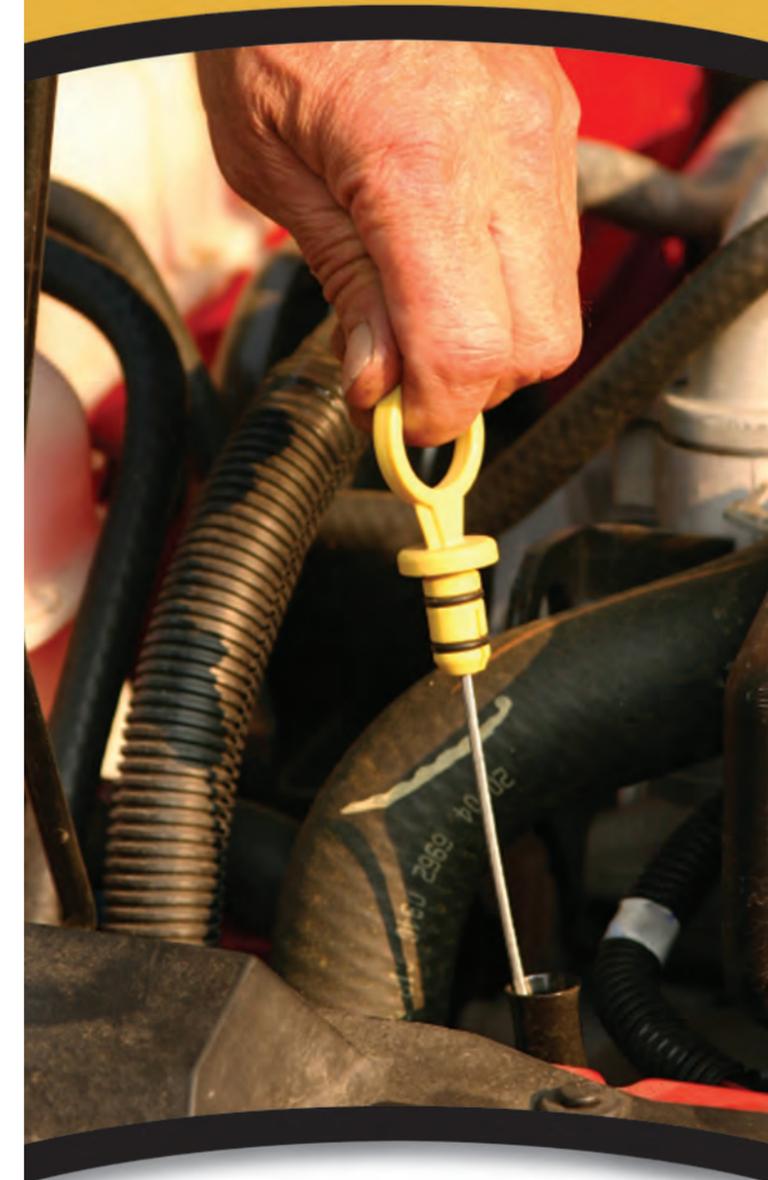


Oil, Fuel, Coolant & Fluids



MAKE SENSE
OF CAR CARE!



primarily in older collector cars and certain military/industrial applications. DOT 5 fluid is not recommended for modern vehicles with anti-lock braking systems.

Checking Brake Fluid Level

Brake fluid should be checked for level and condition. Modern brake systems have translucent plastic fluid reservoirs with molded-in MAX and MIN (or similar) markings that make it easy to visually check the fluid level. As long as the level is between the two marks, there is no need to top it up. A fluid level below the MIN marking indicates worn brakes or a leak in the system; take the vehicle to a repair facility as soon as possible for further diagnosis.



Checking Brake Fluid Condition

Brake fluid deteriorates over time from contaminants generated in the system and by absorbing moisture from the air, which lowers the fluid's boiling point. Color is one indicator of brake fluid condition. DOT 3 and DOT 4 fluids should be clear to amber, while DOT 5 silicone fluids usually have a light purple tint. Any fluid that is dark brown or black should be replaced. Brake fluid test strips, available at most auto parts stores, can also be used to test the fluid condition. Before removing the brake reservoir cap to use a test strip or add fluid, always clean away any dirt or debris to ensure it doesn't get into the master cylinder.

Power Steering Fluid

Power steering fluid contains special additives to help protect the rubber hoses and seals in the steering system. Although some vehicles use automatic transmission fluid in the power steering system, many manufacturers recommend the use of a specific type of power steering fluid. Refer to your owner's manual for the fluid type recommended for your vehicle.

A buzzing noise when turning the steering wheel at slow speeds can be a warning sign of low power steering fluid. You can check the power steering fluid level when the vehicle is cold, but a more accurate check is possible when the vehicle is warmed up. The fluid level should

change very little over time. A significant drop in fluid level, or the need to add fluid more than once a year, indicates a leak in the system that should be diagnosed by a qualified repair facility

Checking Power Steering Fluid

If your car has a remote power steering fluid reservoir of translucent plastic with molded-in level markings, make sure the level is between the MIN and MAX (or similar) markings. Top up with the appropriate fluid as necessary. If the fluid reservoir is integral with the power steering pump, the reservoir cap typically has a small dipstick attached. With the vehicle on a level surface and the engine off, remove the cap, wipe the dipstick clean, reinsert and remove the cap then check the fluid level on the dipstick. The level should be within the normal HOT or COLD operating range on the dipstick, depending on the system's temperature.

Automatic Transmission Fluid

Next to the engine, the automatic transmission is the most costly and complex mechanical component of your vehicle. What's more, automatic transmission fluid is called on to serve many functions. It operates hydraulic components, smoothes the transmission of power, provides lubrication, keeps seals soft, protects internal parts and acts as a coolant. To preserve these capabilities, the automatic transmission fluid should be serviced at the intervals specified by the vehicle manufacturer in your owner's manual.

Modern automatic transmission fluid is a carefully formulated chemical compound, often created with a specific transmission design in mind. While a number of companies market "universal" transmission fluids, many vehicle manufacturers specify unique and proprietary fluids for use in their automatic transmissions. Not using these fluids can affect shift quality and transmission life. AAA recommends that motorists consult their owner's manual and make sure any fluid used in servicing meets the requirements of the vehicle manufacturer.

Checking Automatic Transmission Fluid

The automatic transmission fluid level should be checked with the transmission at full operating temperature and the engine idling. Typically, at least 15 minutes of operation are required to fully warm up the transmission. NOTE: Some newer vehicles have sealed transmissions without a dipstick.

- Park the vehicle on a level surface, apply the emergency brake and place the transmission in park or neutral (check your owner's manual to determine which).
- Open the hood, then locate and remove the transmission dipstick, making sure to avoid any hot or moving engine parts.
- Wipe the end of the dipstick clean with a rag, and note the level markings. Some dipsticks have one mark for FULL and another for ADD. Other dipsticks may simply have small holes indicating the maximum and minimum oil levels, still others may have a cross-hatch area indicating the acceptable range.
- Insert the dipstick fully back into its tube, then remove it immediately and read the level.
- If the fluid level is at or below the ADD mark, then add enough fluid to bring the level up to the FULL mark. Do not overfill. Typically, the distance between the ADD and FULL marks is equal to one pint of fluid.



New automatic transmission fluid has a red or pink tint. Fluid that is red-dish-amber to medium brown has been in service for some time, but a minor color change of this type is considered normal and is not cause for fluid replacement. However, fluid that is dark brown or black does indicate a lack of maintenance and should be changed as soon as possible. Milky pink or brown fluid, or burnt-smelling fluid of any color, indicates major problems that should be checked out by a transmission expert as soon as possible.

Manual Transmission and Differential Fluids

On most vehicles, undercar access is necessary to check the manual transmission and differential fluid levels. It is recommended that a qualified technician perform service and inspection of these fluids. Refer to your owner's manual for specific service information.

Spending a few minutes checking your vehicle's vital fluids can help you extend the life of your vehicle and preserve your safety and the safety of your passengers.



For more information about Making Sense of Car Care, contact your local AAA club, a AAA Approved Auto Repair facility or visit AAA.com.

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Important safety information: Due to the complex nature of today's vehicles, it is essential that you use the utmost care when working on your car or truck. Before attempting any service or repair, consult your owner's manual. Be sure you understand the service procedure completely, have the proper tools, and adhere to all safety precautions, including handling instructions for any chemicals you are using. If you are unsure about any repair, consult a professional technician.

Understanding Your Vehicle's Fluids

Without the vital fluids discussed in this brochure, your car would not start. And, even if you did get it started, it would not run for long before the engine and transmission would self destruct. Even if the powertrain operated long enough to get you underway, you would soon discover there was no way to bring the vehicle to a stop!

Bottom line? The fuel, oil, coolant and other fluids used by your car play a crucial role in your personal safety and your vehicle's reliability. You should never neglect these liquids nor take them for granted. The best way to make sure vital fluids receive the attention they deserve is to educate yourself and perform some basic checks on a regular basis. When it comes to these liquids, incorrect products, improper maintenance, and inadequate levels can lead to serious problems.

Fuel

Every engine requires fuel to operate. Using the proper grade of gasoline or diesel fuel can have a significant impact on your vehicle's performance and reliability, and on your wallet.

Gasoline Grades

Gasoline is sold in three grades: regular, mid-grade and premium. The main difference between the grades is octane, which is the ability of the fuel to resist harmful detonation – also known as pinging, pre-ignition, or spark knock. As long as your engine does not detonate on a given grade of fuel, there is nothing to be gained by spending more for a higher grade. Contrary to popular belief, premium grade fuel does not contain more energy, burn cleaner or improve fuel economy in vehicles that do not require it.



Most cars today are engineered to run on regular grade fuel, though some models with more highly tuned engines call for premium. Modern engines are equipped with knock sensors that allow use of lower grade fuel if the required grade is unavailable. However, engine performance and fuel economy will suffer. Never use less than the recommended fuel grade when the vehicle is heavily loaded or being used for towing.

If your vehicle detonates on the recommended grade of fuel, try switching to another brand; octane ratings can vary slightly between brands. If this doesn't help, try going up one grade. If this cures the problem, its possible internal carbon deposits have raised the engine's octane requirement. If your engine knocks regardless of fuel grade, it has a problem that will require the diagnostic skills of a repair professional.

Engine Oil

Oil is the lifeblood of your engine. It lubricates rotating parts, and also cools, cleans and protects the internal engine surfaces. Modern engines make extreme demands on oil, so it is essential that the engine contain not only enough oil, but also the right type of oil. Using improper oil, or running low on oil, can cause serious and expensive engine damage.

To help consumers select the proper oils, the American Petroleum Institute (API) created two symbols. The first is the API Certification Mark, also known as the "Starburst." Oils that display the Starburst meet current engine protection and energy conserving requirements set by a joint committee of United States and Japanese automobile manufacturers. The second symbol is the API Service Symbol, also known as the "Donut." The Donut provides API service classification and Society of Automotive Engineers (SAE) viscosity grade information (see below), and indicates whether the oil is an energy conserving formulation.



Oil Change Intervals

Modern engines and lubricants are far superior to those of even ten years ago. As a result, most vehicle manufacturers now recommend engine oil changes every 5,000 or 7,500 miles under normal operating conditions. However, the auto service industry has long encouraged more frequent oil changes based on the belief that most drivers operate their vehicles under "severe service" conditions. But do they really?

Today, mileage-based oil change intervals are becoming a thing of the past. A growing number of new vehicles are equipped with maintenance reminder systems that determine the need for oil changes based on the owner's actual driving habits. In practice, most drivers find that these systems call for an oil change at around 7,500 miles and, on vehicles factory filled with synthetic oil, the change interval may be as high as 15,000 miles!

Another outdated belief is that oil color is a valid indicator of the need for a change. While new oil has a light gold to brown tint, the fact that oil in service turns dark brown (or black in diesel engines) does not mean it is "dirty" and needs replacement. It only indicates the detergents in the oil are doing their job of keeping tiny particulates in suspension, while any contaminants large enough to cause engine wear are trapped by the oil filter. In fact, because of their superior detergent packages, synthetic oils often turn darker faster than conventional oils.

AAA recommends that motorists carefully review the oil change interval recommendations in their vehicle owner's manual, including the definition of severe service use, and then change their car's engine oil only as often as really necessary. While over maintaining your vehicle won't hurt the engine, it costs more money and consumes additional natural resources.

Checking Engine Oil

It is easiest to check the oil level when your engine is cold. There is no possibility of burns, and cool oil stays on the dipstick better, making it easier to measure the level. If you have been driving, wait a few minutes before checking the level to allow oil to drain back into the oil pan.



- Park the vehicle on level ground with the engine off.
- Open the hood, then find and remove the engine oil dipstick.
- Wipe the end of the dipstick clean with a rag, and note the level markings. Some dipsticks have one mark for FULL and another for ADD. Other dipsticks may simply have small holes indicating the maximum and minimum oil levels, still others may have a cross-hatch area indicating the acceptable range.
- Insert the dipstick fully back into its tube, then remove it immediately and read the level.
- If the oil level is at or below the ADD mark, then add enough oil to bring the level up to the FULL mark. Do not overfill. Typically, the distance between the ADD and FULL marks is equal to one quart of oil.
- If the oil on the dipstick appears milky or thick, or is very thin with a strong fuel odor, there may be a mechanical problem. Have the engine checked by a qualified technician.

Engine Coolant

Engine coolant (sometimes called anti-freeze) prevents freeze-up in winter, fights overheating in summer, lubricates the water pump seals, and protects the cooling system from rust and corrosion year round. Today's vehicles employ three types of coolant technologies:

- Inorganic Additive Technology (IAT) is traditional green-colored coolant. This coolant provides fast-acting corrosion protection, but its additives deplete quickly so corrosion can result if the coolant is not changed regularly. IAT coolant is used in older vehicles and a declining number of newer vehicles.
- Organic Acid Technology (OAT) coolants are typically red or orange, but may also be purple or yellow. They offer long-life corrosion protection but are not compatible with other types of coolant. These coolants are used in newer General Motors vehicles and some imports.
- Hybrid Organic Acid Technology (HOAT) coolants are typically yellow or orange. They combine the benefits of IAT and OAT for a very protective and long-life coolant, and are used in newer Ford and Chrysler vehicles and some imports.

Using the proper coolant in your vehicle is vital to long engine life, but color is not an accurate indicator of coolant type. In fact, two models from the same year and manufacturer may require different coolants. Consult your owner's manual for details on the coolant type used in your car, and be sure to use that formulation when servicing the cooling system. Do not mix different types of coolants.

Coolant Change Intervals

Engine coolants never lose their "permanent" antifreeze capability, but their protective additives are depleted over time. This means the coolant must be changed periodically, but how often depends on the coolant type. Traditional IAT green coolants should be changed every two years or 24,000 miles, while OAT coolants only need to be replaced on an average of every five years or 50,000 miles. HOAT coolants are the longest lived, with some manufacturers not calling for replacement until 80,000 miles or more. Again, consult your owner's manual to determine the required service interval for your vehicle.

Checking Coolant

Cooling systems occasionally need topping up due to fluid loss from evaporation. However, having to add coolant frequently may indicate an

external leak in the cooling system or an internal leak in the engine that should to be investigated by a qualified technician.

- Check the engine coolant with the vehicle is parked on a level surface and the engine cold and not running.
- Most cars today have a translucent plastic coolant reservoir with molded-in HOT and COLD (or similar) markings that makes it easy to visually check the coolant level. With the engine cold, the level should be at or above the COLD (lower) mark on the tank. If not, top it up to that level with a 50/50 mixture of water and the proper coolant.



- A reservoir check is generally sufficient to ensure a proper level of coolant in the system. However, if the reservoir was dry or there have been recent indications of unusual engine temperatures, you should also check the coolant level in the radiator. NOTE: Never remove the radiator cap when the engine is hot; the system is under pressure, hot coolant will be expelled and severe burns could result!
- Remove the radiator cap and inspect the coolant level. In a modern sealed system the radiator should be completely filled. If it is not, top it up with a 50/50 mixture of water and the proper coolant. If the radiator level is low, but there was coolant in the reservoir, the radiator cap may be defective and should be tested by a qualified repair shop.

In a properly maintained cooling system, the coolant will retain most of its original color over time. Coolant that becomes dirty and discolored, or shows traces of rust, should be replaced. The most accurate indication of coolant condition is acid content, which can be checked using simple test strips available at most auto parts stores. At least once a year, preferably before the onset of winter, the coolant should be checked to determine its level of antifreeze protection.

Brake Fluid

Brakes are a critical system on your vehicle, yet the brake fluid is often neglected. Cars today use polyglycol-based brake fluid identified by the Department of Transportation as either DOT 3 or DOT 4 fluid. CAUTION: Do not spill polyglycol brake fluid on painted surfaces as it will cause damage. Silicone-based DOT 5 brake fluid is also available, but used