

Conserve Fuel

Non-commercial vehicles in the United States consume close to 90 billion gallons of gasoline each year — that's 661 gallons per car. While many of the tips in this booklet will help increase your vehicle's fuel mileage, there is even more you can do to maximize fuel efficiency:

- Avoid high speeds, as fuel efficiency decreases significantly at speeds in excess of 55 miles per hour.

Reducing your speed from 62 mph to 55 mph reduces fuel consumption by 10 percent.

- Avoid excessive idling. If you must warm up the engine, one to three minutes should be sufficient.



- Don't rev the engine; it wastes gas and may cause engine damage.
- Drive smoothly and avoid sudden braking and starting.
- Minimize drag by keeping your car clean, driving with windows and sunroofs closed and removing roof and rear racks. Having a clean car can reduce drag by as much as 12 percent.
- Be sure to replace the gas cap tightly to prevent gasoline from evaporating.

- During the summer, fuel your car early in the morning or late in the evening. Heat expands gasoline, so you'll spend more money for less gasoline if you refuel during the afternoon.

While the tips in the booklet will help lengthen the life of your vehicle and enhance the safety of its occupants, they are not a substitute for the recommendations of a qualified auto technician or your vehicle's owner's manual. Though preventive maintenance will minimize the chance for breakdowns, it is important to be prepared by traveling with an emergency kit that includes water, jumper cables, flashlight, flares and basic tools — and a cell phone.

This booklet was written with assistance from the National Highway Traffic Safety Administration (NHTSA), the National Institute for Automotive Service Excellence (ASE), the Rubber Manufacturers Association and the AAA Foundation for Traffic Safety. For further information, visit the following Web sites: www.nhtsa.dot.gov, www.asecert.org, www.rma.org and www.aaafoundation.org.

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#9 IN A SERIES

SMART CAR CARE

Tips for keeping your vehicle safe and on the road.



Count on ShellSM



Proper car maintenance could prevent 5 million breakdowns each year. Each one of these breakdowns costs consumers an average of \$400 annually in motor vehicle damage and other expenses, totaling more than \$2 billion a year due to car neglect.

Stick to Your Routine (Maintenance)

Next to a home, a vehicle is probably the most expensive purchase people make. That's why it makes good economic sense for owners to take proper care of their vehicles through preventive and routine maintenance.

Following the quick and simple procedures outlined in this booklet will not only add years to the life of your vehicle, but will help keep it operating in a safe and cost-efficient manner.



Plus, finding and fixing a smaller problem before it turns into a major problem can help save you a bundle.

Note: This booklet is intended to provide a general overview of routine maintenance.

Because there are so many different makes and models of vehicles and auto parts and accessories, recommended procedures may vary. Please consult your owner's manual or the product manufacturer for recommendations.

Keep Your Vehicle a Well-Oiled Machine

A regular oil change is the service most likely to prolong the life of your vehicle; yet, recent nationwide vehicle inspections found that 22 percent of vehicles have low or dirty engine oil, indicating that many motorists fail to perform this important task. Not changing your oil for lengthy periods of time will cause additives in the oil to break down, leading to increased wear and tear on your engine.

To keep your vehicle running smoothly:

- Check the oil level regularly.
- Change the oil every 3,000 miles or every three months, whichever comes first, unless your manufac-

turer recommends otherwise. Some newer vehicles need less frequent oil changes.

- Replace the oil filter with every change.

For an accurate reading of your oil level, shut off the engine, remove the dipstick, wipe it with a clean cloth or paper towel and then reinsert it. Remove the dipstick again to “read” the oil level.

Go with the Flow: Your Vehicle’s Fluids

Engine oil is not the only fluid your vehicle needs to run properly. Other vital fluids include brake fluid, power steering fluid, transmission fluid and coolant. Checking them on a regular basis can prevent breakdowns and costly repairs.

Your owner’s manual can show you where fluids are contained, exactly how to check them, the type your vehicle uses and how much should be in each “reservoir.” The chart in this booklet also offers basic tips and suggested frequency of fluid checks.



Recognizing Fluid Leaks

If you see drops of fluid under your vehicle, you should be able to identify them by color or consistency. A few small drops are probably not a cause for concern, but you should take note of small puddles.

- If the fluid is **yellow-green, blue** or **fluorescent orange**, it could indicate a cooling system leak or an overheating problem.
- If the fluid is **dark brown** or **black**, it is most likely engine oil. The engine could have a bad seal or gasket or a loose oil filter.
- A **red** oily spot means you probably have a transmission or power steering fluid leak.
- A **puddle of water** is usually normal and is simply condensation from the air conditioning system or the defroster.

Know the Positives and Negatives of Your Battery

Cars run on three components: fuel, air and electricity. Many people never think of vehicles as being “electronic,” but they are complex machines with many electronic components, ranging from the radio to on-board computers. The battery is the primary source of power for these electronic components, so it is important to make sure it is working properly.

Batteries can fail for a number of reasons, including insecure mounting, frequent “deep cycling” (the recharging of a dead battery) and dirty or poor connections. Here are some ways to help prevent your battery from failing and leaving you stranded:

- Have the battery checked with every oil change.
- Cables should be securely attached and free of corrosion. You can clean the battery terminals and case with a mixture of baking soda and water.
- Don’t wait until your battery fails before you replace it. Vehicles that are three years old or older are most likely to experience battery failure.



Corrosion on battery terminals or connections (top picture) can result in poor battery performance. Be sure cables are securely attached and corrosion-free (bottom picture). Felt rings positioned around the battery post under the clamp can help protect against corrosion.

Know Your Car

The Ten-Minute Checklist

+Air Filter



- Check every two to three months.
- A dirty air filter reduces gas mileage and the lifespan of your motor.
- Replace it when it is dirty or during your annual engine performance check.
- If you drive in very dusty conditions, you may need to check your air filter more frequently.

Battery



- Have the battery checked with every oil change and periodically check cables for corrosion.
- Use of felt rings, available at any auto parts store, will reduce corrosion (see photo on page 3).
- Consider replacing your battery if it is three years old or older.

Belts and Hoses



- Check monthly.
- If your belts or hoses look or feel hard, spongy, cracked or shiny, they should be replaced right away.
- It's best to leave the replacement to an expert.
- Also, be on the lookout for loose, cracked or missing clamps.

Brake Fluid



- Check monthly.
- First, wipe any dirt from the master brake cylinder cover. Then remove the cover.
- If you need fluid, add the proper type (refer to your owner's manual) and check for possible leaks. Don't overfill.

Brake System



- Experts recommend having your brake system thoroughly inspected once a year or every 12,000 miles, whichever comes first.

Coolant/ Antifreeze



- Check frequently.
- You should be able to see the level of coolant in the reservoir.
- Follow the manufacturer's instructions to determine if the level is low.
- If necessary, add coolant to the reservoir — NOT the radiator — and fill to the proper level.

Engine Oil



- Check oil level regularly (twice a month is ideal).
- Have the oil (and oil filter) changed every three months or every 3,000 miles, whichever comes first, unless your vehicle's manufacturer specifies otherwise.

Lights



- Check regularly to ensure they are clean and in good working order.
- Remember to check:
 - ✓ Headlights
 - ✓ Taillights
 - ✓ Brake lights
 - ✓ Turn signals

Power Steering Fluid



- Check monthly using the reservoir dipstick.
- If low, add the proper type of fluid (refer to your owner's manual).
- Inspect the pump and hoses for leaks.

Shock Absorbers



- Test once every two to three months by bouncing your car up and down; when you step away, the car should stop bouncing.
- Always replace shock absorbers in pairs.

Tire Pressure



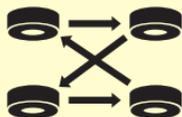
- Check monthly when tires are cold — that is, when they have not been used for at least three hours — using a tire gauge.
- For proper tire inflation, refer to your owner's manual or the label on the driver's side door edge or in the glove compartment of your vehicle.
- The number molded into the sidewall of your tires is the maximum, not the recommended, tire pressure.

Wheel Alignment



- Have the alignment checked immediately if the vehicle feels “loose,” “pulls” to one side or if there is uneven tire wear.

Tire Rotation



- Have your tires rotated approximately every 6,000 miles or with every other oil change.

Tire Tread



- Look for uneven wear, separation or excessive smoothness.
- Replace tires immediately if the tread has worn down to 1/16 of an inch or less.
- Use a measuring device or the “penny test” described in this booklet to measure.

Transmission Fluid



- Automatic:
 - ✓ Check your owner’s manual for the exact procedure.
 - ✓ Most vehicles should be running at normal operating temperature with the parking brake firmly set.
 - ✓ Then shift the transmission into park or neutral (refer to the owner’s manual or look on the dipstick), remove the dipstick, wipe it clean, fully reinsert it and remove it again.
 - ✓ Read the fluid level and add fluid of the recommended type as needed.
- Manual:
 - ✓ Checking the fluid on a manual transmission is better left to a service professional, as the car must often be raised.

Washer Fluid



- Check the washer fluid reservoir regularly and add fluid as needed.

Wiper Blades



- Check at least twice each year for signs of wear.
- Replace if wipers streak or smear.
- Don’t wait until the rubber is brittle or worn.

Changing a Tire – Yourself!

It is very likely that someday you will find yourself with a flat tire no matter how careful you are. These simple steps will assist you in changing your tire the right way.

1. After pulling off the road and stopping in a safe place, put the car in park and apply the parking brake. If your car has standard transmission, place the gear shift in reverse or first gear. Park on level ground if possible.
2. Retrieve the spare tire, jack and lug wrench. Remove any hub cap with the lug wrench.
3. Before lifting the car with the jack, first loosen each lug nut one turn counterclockwise while the car is still on the ground.
4. Place the jack under the reinforced section of the car's body. The location of these sections is listed in your owner's manual. Jack up the car until the flat tire is several inches off the ground. **WARNING:** Never place your hands or feet under the vehicle or tire once it has been raised.
5. Remove the lug nuts and remove the wheel.
6. Place the spare tire on the axle and align the holes. Replace the lug nuts and tighten each lightly.
7. Lower the car, and remove the jack. Then use the wrench to firmly tighten each lug nut.
8. Have the flat tire repaired or replaced and reinstalled right away.



Check Wipers & Washer Fluid Intermittently

Like other components, windshield wipers also wear out and need to be replaced. Not being able to see clearly while driving is very dangerous. In fact, 90 percent of all driving decisions made are based solely on visual cues. That's why car care experts recommend wipers be changed once a year for cars that are parked inside and two to three times a year for cars that are parked outside. A good rule of thumb to follow is: "change your clocks, change your wipers." Here are some other tips:

- You can tell when a blade is becoming worn out if it just streaks and smears the water rather than wiping it away.
- Inspect the wiper blades whenever you clean your windshield. Do not wait until the rubber is worn or brittle to replace them.
- Most of the time, only the rubber squeegee, usually called the "refill," needs to be replaced.
- When buying a blade, take the old rubber squeegee with you to the store so you can compare sizes.
- When refilling the windshield washer fluid, use some of the fluid to clean the wiper blades.



Light the Way to Safer Driving

Lights are one of your vehicle's most important safety features. They help you and other drivers make decisions based on visual cues. However, recent statistics indicate that 20 percent of vehicles tested are operating with at least one external light not functioning. Therefore, it is important to check your lights often to make sure they are clean and in good working order. This includes your headlights (both low and high beams),

parking lights, blinkers, taillights and brake lights.

- If any of these lights is not in working order, you can be ticketed.
- Typically, if any of these lights is not working, all you will need is an inexpensive bulb or fuse.

Help Your Tires Tread Lightly

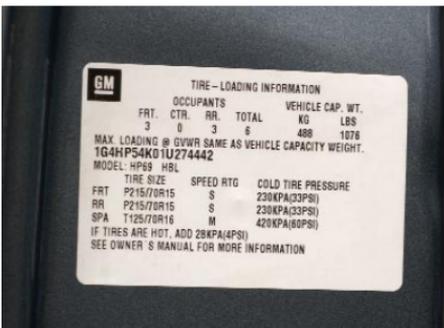
There are many factors that affect the life of your tires: weather, usage, inflation, vehicle alignment and wheel balance. Perhaps the easiest factor to control is your driving behavior. Simply following these good driving habits will help extend the life of your tires:

- Obey posted speed limits.
- Avoid fast starts, stops and turns.
- Avoid potholes and other objects on the road.
- Do not run over curbs or hit your tires against the curb when parking.
- Do not overload your vehicle. Refer to your vehicle's tire information or owner's manual for the maximum recommended load.



You also should check your tires — including the spare — at least once a month for proper inflation and tread wear. A tire can deflate about one pound per square inch (psi) for every 10 degrees Fahrenheit drop in temperature. When the temperature rises, pressure may increase. Be sure to check your tires when they are cold — that is, when your vehicle has not been used for at least three hours.

For proper tire inflation, refer to your owner's manual or the label on the driver's side door edge or in the glove compartment of your vehicle. Don't be confused by the number molded into the sidewall of your tire; it is the tire's maximum, not recommended, inflation.



Your manufacturer's recommended tire inflation is often indicated on a label on the driver's side door edge.

Remember this checklist to help your tires last longer

- **Pressure** — One-fourth of all cars and one-third of all light trucks have at least one substantially underinflated tire. Underinflated tires can cause blowouts and tire failure, which can lead to serious accidents. And appearances can be deceiving — a tire can lose up to half of its air pressure and not appear to be flat. Overinflation, on the other hand, puts unnecessary stress on tires, which can result in irregular tread wear. Check tire inflation with an accurate gauge. They can be found in any auto parts store and most service stations.

- **Alignment** — Improper alignment of your car's steering mechanisms — including the front and rear tires and the steering wheel — can reduce the lifespan of your tires by thousands of miles. Have a tire dealer check the alignment if you notice:

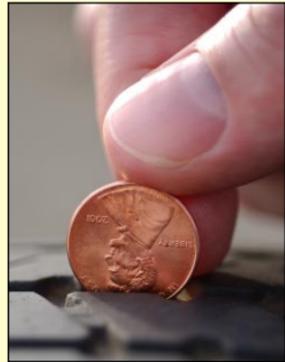
- Excessive or uneven tire wear;
- The steering wheel “pulling” to the right or the left;
- A feeling of “looseness” or “wandering”;
- Steering wheel vibration;
- The steering wheel is not centered when the car is moving straight ahead.

- **Rotation** — If you fail to rotate your tires, the front tires may last only 10,000 – 20,000 miles, while the rear tires will last 50,000 – 80,000 miles. Therefore, to achieve more uniform wear, experts recommend that you have your tires rotated every 6,000 miles. Refer to your vehicle's owner's manual for correct pattern rotation. Common patterns include

straight forward and straight back or crisscrossed.

- **Tread** — Advanced and unusual wear can reduce the ability of tread to grip the road in adverse conditions — especially on wet roads. When checking tires, look for uneven wear, high and low areas, bubbling or excessively smooth areas, as well as cuts or foreign objects in your tires.

- Tires must be replaced when tread has worn down to 1/16 of an inch. Quick tip: If you don't have a measurement device handy, you can simply use a penny to check tread depth. Insert a penny with the head pointed down into the tread groove. If you can see all of Lincoln's head, your tires need to be replaced.



Checking tread wear is a simple but important part of keeping safe on the road. Use a measuring device (left) or the “penny test” (right) to check for worn tread.

- When shopping for new tires, it is usually best to replace all four at the same time — if you have been rotating your tires as recommended. You also should think about the type of driving you do most often and choose tires that are right for you.