

Batteries

- Select a battery with the same Group Number as the original equipment (OE) battery. This will ensure a secure fit, proper clearance, and no cable/terminal issues.
- If your vehicle uses a non-standard battery (one without a Group Number), use an OE replacement or take special care to ensure a non-OE battery will not create problems.
- If your car's OE battery is equipped with a protective heat shield, make sure the shield will fit properly over the replacement battery.
- Never install a battery with a CCA rating lower than that recommended by the vehicle manufacturer. A higher-rated battery will work effectively if it fits properly, but a lower-rated battery may cause electrical system problems.
- Purchase your battery from a high-volume seller with fresh stock no more than 90 days old. Most batteries have a three- to five-year life from their date of activation. You don't want a battery that has already lost a good portion of its service life sitting on a shelf.
- Look for a battery with an extended full-replacement warranty. Top quality batteries offer this type of coverage for two or more years. Battery warranties that are pro-rated after a short time provide significantly less protection.

Jump-Starting

When a battery has been discharged to the point where it will no longer crank the engine, a battery boost, or "jump start," can get you back on the go.

Jump-Starting Precautions

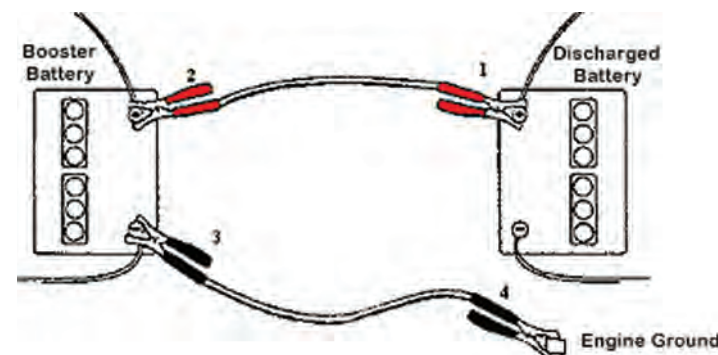
While jump-starting may appear to be a simple procedure, special care must be taken to ensure the safety of the people and vehicles involved. Before you begin, review the "Battery Safety" information earlier in this brochure. In addition:

- Inspect the battery for low electrolyte level and top up with distilled water as necessary. If the electrolyte loss was caused by leakage from a cracked case, replace the battery.
- In low temperatures, look for a bulging case or ice in the cells that indicate the battery has frozen. If necessary, remove the battery and allow it to thaw in a warm location before proceeding.
- *Never attempt to charge or jump-start a battery that is frozen or low on electrolyte. The battery may rupture or explode!*

Jump-Starting Your Vehicle

The jump-start procedure below is generic in nature. Always check your owner's manual for vehicle-specific instructions and precautions before attempting a jump-start.

1. Position the two vehicles so their batteries are within jumper cable distance of one another, but do not allow the vehicles to touch.
2. On each vehicle:
 - a. Remove the key from the ignition. If either vehicle is equipped with a keyless ignition system, make sure the "smart fob" is at least 10 feet away from the vehicle before connecting the jumper cables.
 - b. Set the parking brake.
 - c. Turn off all factory electrical systems such as the lights, heater fan, radio, etc.
 - d. Disconnect any aftermarket electrical accessories such as cell phones, radar detectors, stereo amplifiers, etc.
3. Identify the positive and negative terminals on the discharged battery and the booster battery.
4. Refer to the diagram below and connect the jumper cables in the following order to the specified locations:
 - a. Install one end of the positive jumper cable (red clamp) to the positive terminal of the discharged battery.
 - b. Install the other end of the positive jumper cable (red clamp) to the positive terminal of the booster battery.
 - c. Install one end of the negative jumper cable (black clamp) to the negative terminal of the booster battery.
 - d. Connect the other end of the negative jumper cable (black clamp) to a ground point on the vehicle with the discharged battery, such as the engine block or an accessory bracket, as far from the battery as possible. To prevent damage from sparks, never connect the negative jumper cable to the discharged battery.



5. Try to start the vehicle with the discharged battery. If the engine seems to be turning too slowly, stop cranking and start the other vehicle to avoid draining both batteries. Try to start the discharged vehicle again.
6. Once the vehicle starts:
 - a. Allow it to run at a high idle for 30 seconds or more
 - b. Turn on the headlights and heater blower motor to provide an electrical path for any voltage spikes that may occur when disconnecting the jumper cables.
 - c. Remove the jumper cables in the reverse order of installation.
 - d. Turn off the headlights and heater blower motor.



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.



MAKE SENSE OF CAR CARE!



Today's high-tech vehicles make more electrical demands than ever before, and your car's battery helps meet those demands in a variety of ways. The battery supplies electrical current for the starter motor to crank the engine, and it provides power to electrical accessories when the engine is off. During vehicle operation, when electrical loads exceed charging system capacity, the battery steps in to provide any needed extra current. And throughout all this, the battery acts as a voltage stabilizer for the entire electrical system.

Do-it-yourself preventive maintenance can play an important role in maximizing the life of your battery. It is also important to have an automotive service professional, such as those found at AAA Approved Auto Repair facilities, test your vehicle's battery, starting and charging systems annually. Early detection of weak components can save you time, money and inconvenience.

Battery Safety

Although batteries seem uncomplicated, they can be hazardous to service if you are not careful. Batteries, and the corrosion that forms on their terminals, contain sulfuric acid that will cause chemical burns and can damage most surfaces it contacts. To avoid injuries, observe any warnings on the battery and in your owner's manual, then follow these additional precautions:

- Always wear eye protection, gloves, and old or protective clothing.
- Avoid squeezing or tipping the battery in any manner that could cause acid to spill out. In the event of a spill, flush the area immediately with water.
- Take special care not to drop the battery. Batteries are heavy and can cause personal injury. In addition, the battery case may crack, creating an acid spill.
- Never smoke when servicing a battery, or expose the battery to a spark or open flame. Charging batteries produce hydrogen gas that can ignite and cause an explosion.
- Remove all jewelry. A ring, watch or other metal object that creates a short between the positive battery terminal and ground can cause explosive sparks or serious burns. For the same reason, never place metal tools near, or on top of, the battery. Always wash your hands thoroughly with soap and water after handling a battery. This will dilute and neutralize any acid with which you may have come in contact.

Battery Inspection and Service

Whether you have a battery with removable vent-caps or a sealed "maintenance-free" battery, regular inspection and service are required to ensure the battery works safely and effectively. Note that some "maintenance free" batteries do have vent caps that can be removed for service.

Clean/Inspect The Case

The simplest battery maintenance procedure is keeping the case clean. Dirt and oil residue on the case can cause a current drain on the battery. Clean the case by wiping it with paper towels moistened in a mild detergent solution. Once the case is clean and dry, inspect it for cracks and bulging that indicate the battery needs further testing or replacement.

Check The Electrolyte Level

The electrolyte solution in your battery is a mixture of sulfuric acid and water. If the battery has removable vent caps, check the electrolyte level monthly. The level in each cell should be above the top of the battery plates and even with the bottom of the "well" beneath the vent cap. If the level is low, add distilled water as needed, being careful not to overfill the cells. Tap water is not recommended as it contains mineral deposits that will shorten the life of your battery.

Inspect/Clean The Terminals

Inspect the battery posts, terminals and hold-down hardware for corrosion buildup and loose or cracked connections. If corrosion is present, clean it away using a 50/50 solution of baking soda and water applied with a small, stiff brush. After removing corrosion, rinse the battery thoroughly with clean water. Catch the used water in a suitable container – a plastic drain pan works well – and dispose of it properly.



Remove/Install The Battery

If the battery terminals or hold-down hardware are severely corroded, it may be necessary to disconnect the cables and remove the battery to properly clean the components. Loosen each battery cable clamp and spread its ends to remove the cable from the battery. If the

clamps are frozen in place, use a suitable puller to remove them from the terminal posts. Never pry a cable clamp off the terminal post as this can damage the battery's case and internal connections.

Always remove the cable from the negative battery terminal first, then the positive terminal. Reinstall them in the opposite order, positive cable first, then negative. There are three basic ways to distinguish the positive and negative terminals:

- **Color-code:** red for positive and black for negative (not all cables match this code).
- **Symbol:** + for positive and – for negative (usually molded into the battery case).
- **Size:** on post-type terminals, the positive post is usually slightly larger.



Disconnecting the battery on a modern vehicle will erase various on-board computer memories. This makes it necessary to reprogram features such as radio station presets, and it may also result in minor drivability glitches until the powertrain control module can "relearn" the vehicle's operating characteristics. On a few cars, disconnecting the battery will require a dealer visit to reprogram certain functions. To avoid these issues, consult your owner's manual before disconnecting the battery, and connect an alternate "memory keep alive" power source to the electrical system before you disconnect the battery. Most auto parts stores sell an inexpensive device of this type that is powered by a 9-volt battery and plugs into a cigarette lighter socket.

Causes of Battery Failure

Underhood heat increases the rate of chemical degradation in the battery. To combat this heat, some cars have a heat shield that fits over the battery. If your vehicle came with a heat shield, make sure it is properly reinstalled following battery service or replacement.

Vibration causes physical breakdown of internal battery parts. To minimize the effect of vibration make sure the battery fits properly in your vehicle, the hold-down hardware is installed correctly and the battery is secured firmly in place.

A malfunctioning charging system, whether over- or under-charging, will shorten battery life. Have your car's battery, starting and charging systems tested annually to make sure they are operating at peak performance.

Warning Signs of a Weak Battery

You may be experiencing battery problems if you notice any of the following:

- The starter motor cranks the engine slowly
- The headlamps are dim, particularly at idle
- The Battery/Charging warning lamp is illuminated

Battery Replacement

Eventually, every car needs a new battery. Unfortunately, there is no "one-size-fits-all" battery that is suitable for every vehicle. Physical size, terminal location, and cranking power are all important factors in ensuring the proper fit and function of your battery. In fact, choosing the wrong battery can adversely affect the entire electrical system of your vehicle. For maximum convenience, AAA's Battery Service (available in most areas) can install a proper replacement battery in your vehicle at home or at work.

Battery Selection Tips

Replacement batteries are usually selected based on "Group Number" and "Cold Cranking Amps" (CCA) rating. The Group Number (for example, Group 24) is an industry standard that defines the battery's physical size, its hold-down configuration, and the type and location of its terminals. Cold Cranking Amps (for example 650 CCA) is an electrical measure of how much current the battery can provide for 30 seconds at a temperature of 0 degrees Fahrenheit.

