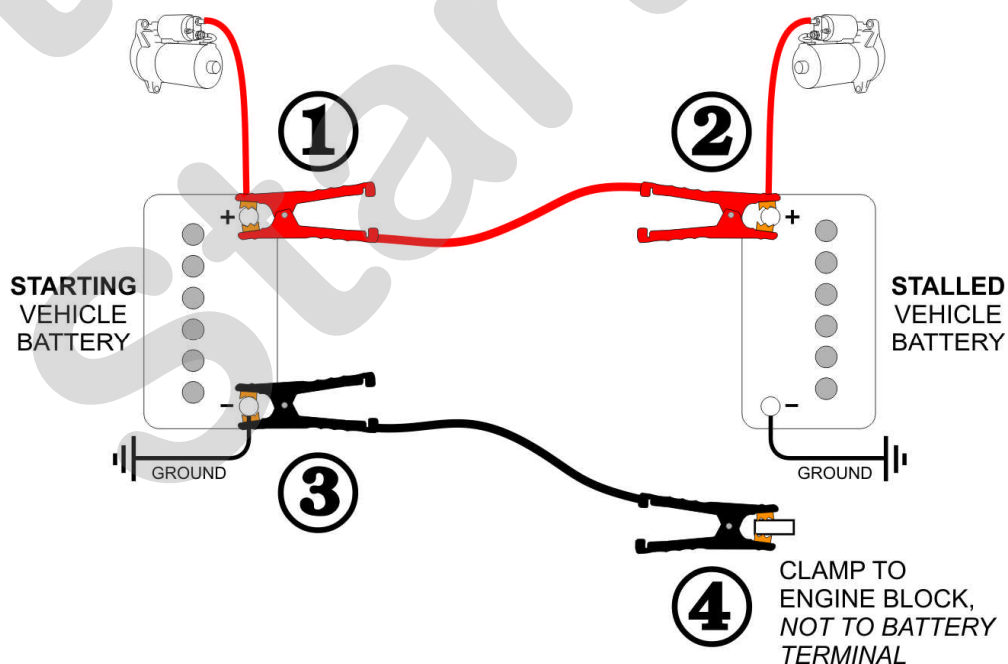


How To Safely Jump-Start a Vehicle



WARNING: Jump-start only in emergencies. It is always best and safest to recharge a battery with a battery charger. Batteries contain acid and produce explosive gases. These instructions are designed to minimize the explosion hazard. Keep sparks, flames and cigarettes away from batteries at all times. Wear safety glasses and protect the eyes at all times. Do not lean over the batteries during this operation. Never attempt to boost a battery with frozen electrolyte. If possible, remove the vent caps to check liquid levels before jump-starting. If liquid is not visible or appears to be frozen, do not attempt to jump-start. Never jump-start a cracked or leaking battery.

- **Caution:** Hooking up the jumper-cables in reverse will damage the vehicle's electronic control module and other electronic devices. Identify the **POSITIVE (+)** and **NEGATIVE (-)** terminals of **both** batteries before proceeding.
- Make certain vehicles are not touching and the ignition switches are off.
- When working with jumper-cables, be sure they do not dangle into the engine compartment where they can touch hot or moving parts.
- Connect adequately-sized jumper-cables in the order show in the diagram. **1-2-3-4**
 1. Connect both batteries' **POSITIVE (+)** terminals together using the red jumper-cable.
 2. Connect the **NEGATIVE (-)** terminal from the charged battery to a good ground on the engine block of the vehicle with the discharged battery using the black jumper-cable.
- Start the engine of the vehicle with the charged battery and increase engine speed to approximately 2000 RPM for 5 minutes to allow the discharged battery time to charge.
- Start the vehicle with the discharged battery.
- Remove the jumper-cables in the reverse order that they were connected. **4-3-2-1**
- **Remember – an alternator is designed to keep a good battery charged and not to recharge a discharged battery. Using an alternator to charge a discharged battery may cause it to overheat and damage internal components. Recharge the discharged battery using a battery charger at the earliest opportunity.**



Testing Safety and Warnings

- Never disconnect the battery while the engine is running.
- Alternators are designed to maintain batteries, not recharge them from dead.
- Keep hands and test-leads away from belts, fans and other moving parts.
- Be sure belts are not worn and are adjusted properly.
- Start all tests with a fully charged battery.
- Clean and inspect all wires and connections.
- Be sure that all grounding surfaces are cleaned to bare metal.
- Verify that alternator amperage is adequate for the vehicle loads.
- Be sure all mounting fasteners are tight.
- Do not over tighten alternator or battery cable connections.
- Ensure automatic tensioners operate properly. The tension spring should not bind, and the pulley bearing should operate smoothly without excessive free play.
- Ensure the transmission is in park or neutral during all tests, and the parking brake is set.
- Disconnect the battery before removing the starter or alternator.
- When removing the alternator, always disconnect the voltage-regulator plug first and reconnect it last.
- Always disconnect battery negative before battery positive and install in reverse order.
- Never use a battery charger as a power supply to test a starter motor.
- When replacing a starter motor, always inspect the ring gear for worn or damaged teeth.
- Always clean the starter mounting-surface to ensure the starter mounts properly.
- Always ensure all starter or alternator mounting bolts are properly torqued.
- Clean and inspect all connections to the starter, solenoid, alternator and battery when removing and replacing cables.
- Use dielectric gel in all plug connections to avoid future corrosion and water penetration.
- Be sure to replace all original brackets, air ducts, etc to ensure proper support and cooling.
- Some applications require the electronic control module codes to be cleared and reset before a replacement alternator will operate properly. If the proper scan-tool is not available, this will require a trip to either the dealer or a well-equipped electrical shop.
- Always test and charge batteries in a well ventilated area. The gasses emitted by batteries are highly explosive.
- Always wear eye protection when working with a battery, and avoid getting the electrolyte on skin and clothing. The electrolyte is sulfuric acid and is highly corrosive.
- When working with active circuits, be careful to avoid accidentally grounding circuits or contacting wires and terminals with rings, watches or other jewelry. For example, contact from the battery terminal to a wrench and a ring on the hand could cause a short if the ring came into contact with the frame or fender.

Special Note

- The electronic control module may need to be reset using a scan-tool if the “Check Engine” light remains on after any repair.
- Be sure to supply the Vehicle Identification Number (VIN) and Accessory Number before replacing a starter or alternator.