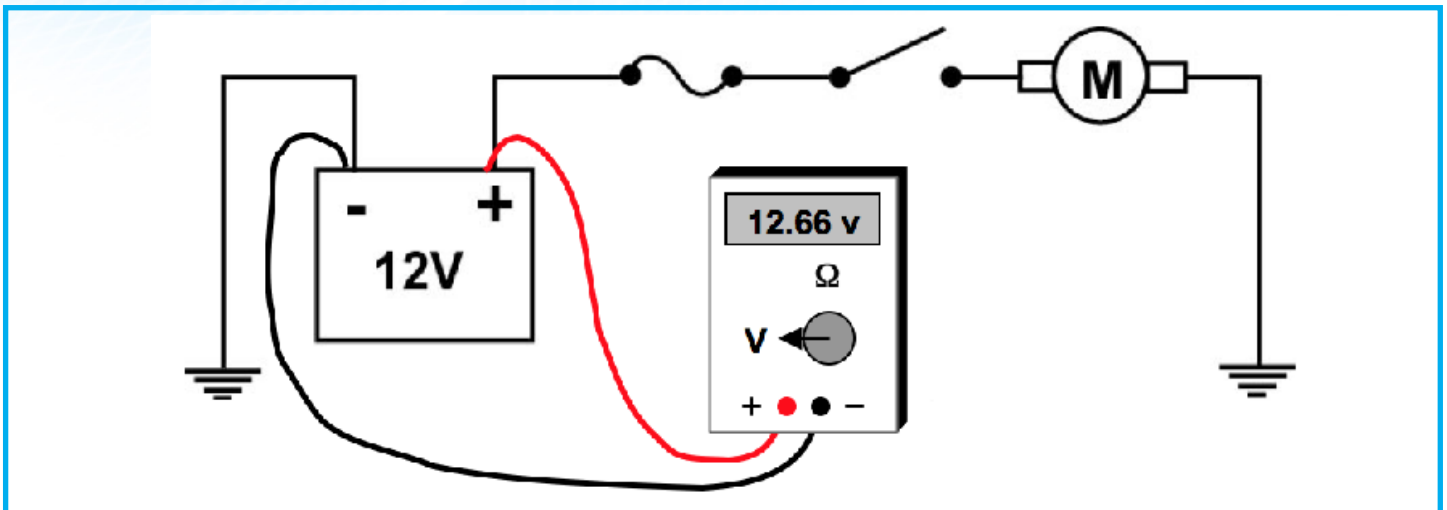
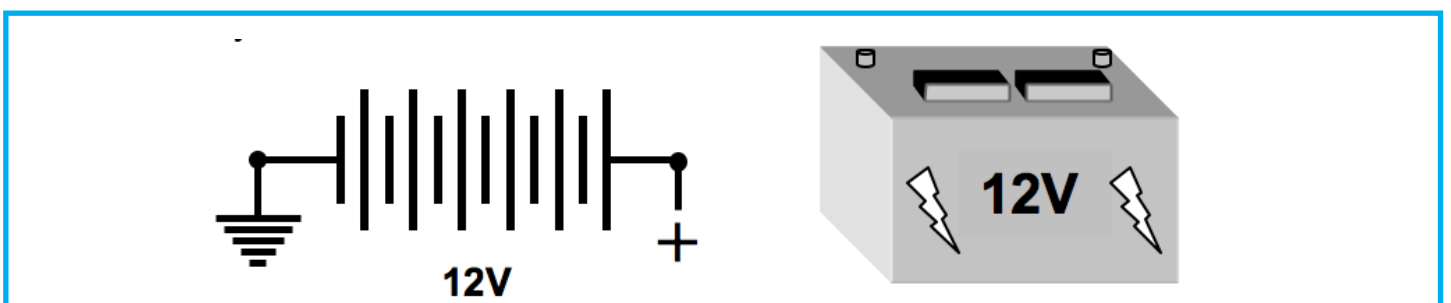


BASIC ELECTRICAL TESTING

Servicing an electrical system does not have to be a nightmare even if the vehicle seems haunted by amp imps and grounding gremlins. Testing is as easy as 1, 2, 3, and 4. For any circuit to operate four items must be present: 1) voltage; 2) load; 3) ground; 4) continuity. All that is needed for basic electrical testing is a DVOM (digital-volt-ohm-meter) and a wiring diagram. Avoid the use of a test light as they can harm electronic circuits and are insufficient when checking for available voltage.

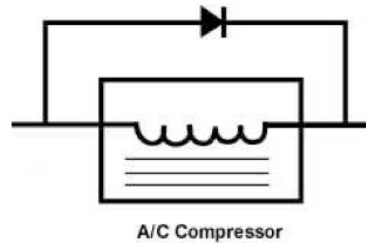
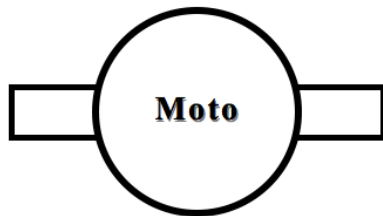


- 1) VOLTAGE:** The standard rule for testing a circuit is to check the fuse(s) first. Verify there is battery voltage at both ends of the fuse. But don't stop there. Pull the fuse out and visually check it. Even though it's very rare, blade fuses have been known to break in the blade instead of the fuse link. Sometimes it's easier to go directly to the component that is not functioning and check for the required voltage. If you unplug the component, the wire harness will normally show supply voltage, however this proves nothing. The integrity of the voltage and circuit must be tested under a load. So it is best to leave the component plugged in. If the test shows proper voltage then everything in the circuit from the battery to the test point (i.e. fuse, switch, relay, wiring, etc.) can be considered good and the problem is either a bad component or ground. Should the DVOM show less than the required amount of voltage, a problem exists between the battery and test point. A check of the wiring diagram will show what will have to be tested next, such as a relay or switch.

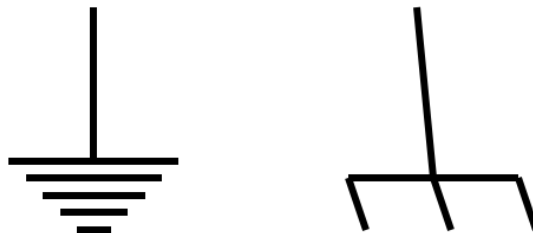


BASIC ELECTRICAL TESTING

- 2) LOAD:** A load is a device that uses the voltage to do work such as a blower motor or clutch coil. Testing of a load device usually means checking its resistance and/or its amperage draw. These two tests will determine the quality of the component. A common procedure for checking operation of these devices is to run jumper leads from the battery. This may allow the unit to work but shows nothing of its ability to work within the specifications of its circuit. A component that draws two or three amps above specification could cause several comebacks for blown fuses or burnt relays and switches.



- 3) GROUND:** A commonly over looked portion of a circuit is its ground. A wire attached to a ground point doesn't mean there is a ground or that it is good; most circuit wiring problems occur on the ground side. Using a test light from battery positive to the ground wire may allow the light to glow but not allow the circuit to work properly. The ground side of any circuit should be tested for resistance. One method is an ohms check of the ground, resistance should be zero. A better method is to do a voltage drop test. With the circuit switched on, measure voltage from the ground point of the load to the negative post of the battery. Maximum voltage reading is normally below 200mv (.2v) for common electrical circuits such as those for blower motors, compressor clutches etc. Computer circuits are normally less than 100mv (.100v) and in recent years less than 60mv (.06v). Any readings higher than this indicates a poor ground and the need for repair.



- 4) CONTINUITY:** No circuit will work unless there is a complete path from power, through all relays and switches, to the load and finally to ground. Most continuity failures occur in harness connectors and wire splices. Never assume that two wires plugged together are making good contact. Disconnect them and visually inspect the terminals for burning, corrosion, bent/broken leads or pushed back within the socket. Poor connections create high resistance that use up circuit voltage to overcome them. This leaves the load device without enough voltage to operate properly, if at all.