Voltage Drop Testing

The ALLDATA Tech-Assist Team

Voltage drop testing is a simple but effective method of diagnosis to quickly locate high-resistance problems in a circuit. The DC voltage scale on your Digital Volt Ohm Meter (DVOM) or Digital Multi-meter can be used to measure the voltage drop across a load, device or conductor.

Voltage drop is defined as the loss of voltage caused by the flow of current through resistance. Increased in resistance equals increases the voltage drop. **IMPORTANT NOTE:** Whenever checking voltage drop, current must be flowing in the circuit.

Each load device (or component) must receive enough voltage to operate properly. The available voltage at a component should always be above that component's minimum required voltage specification. If not, a loose connection, corrosion, or faulty power source is the problem.

Open circuit problems such as broken or disconnected wires or connections can stop current flow. Even after fixing an open circuit, you should switch the circuit on again and check for voltage drop. You won't know if the entire circuit is healthy until you are sure there is the correct amount of current flowing.

Although resistance-free connections, wires and cables would be ideal, most of them will contain at least some voltage drop. If your service manual does not list acceptable voltage drop values, use the following specifications as ball-park maximum limits:

- 0.00 V across a connection
- 0.20 V across a wire or cable
- 0.30 V across a switch
- 0.10 V at a ground

Because most computer circuits operate way down in the milliamp range, they don't tolerate voltage drop as well as other circuits do. Note that a milliamp is one-thousandth (0.001) of an amp. For computer-related circuits, the recommended working limit is 0.10V-drop across low-current wires and switches.

To test the Power (+) side of a circuit for voltage drop (Figure 1), follow the steps:

1. Connect the positive (+) test lead of a digital volt meter to the power source.
2. Connect the negative (-) test lead to the other end of the wire of the component.
3. Operate the circuit and observe the meter voltage.
4. The DVOM will display the difference in voltage between the two points.

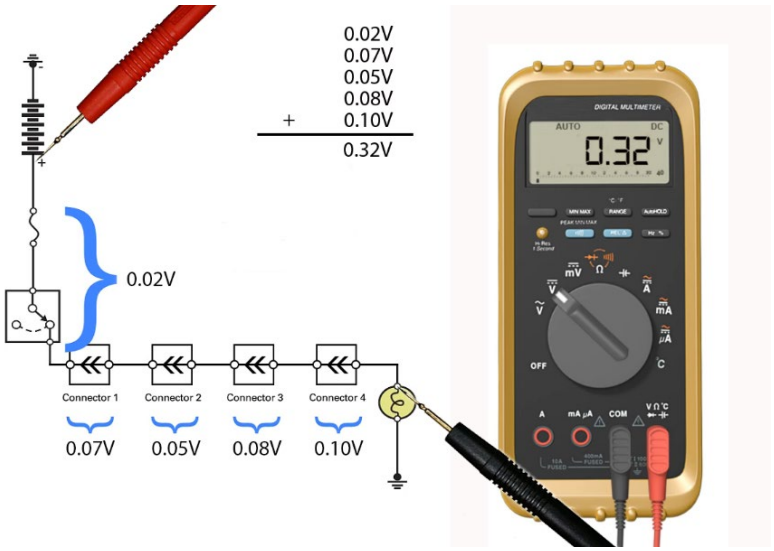

Figure 1

To pinpoint the component or connection responsible for the voltage drop, move the negative (-) test lead to the next component or connection in the circuit and retest at additional contact points as necessary. Changes in the voltage drop reading will indicate where an excessive voltage drop is located.

To test the Ground side of the circuit (Figure 2), follow the steps below.

1. Connect the negative (-) test lead to the negative battery terminal.
2. Connect the positive (+) test lead to the ground terminal or wire at the component being tested.
3. Operate the circuit and observe the meter voltage.
4. The DVOM will display the difference in voltage between the two points.

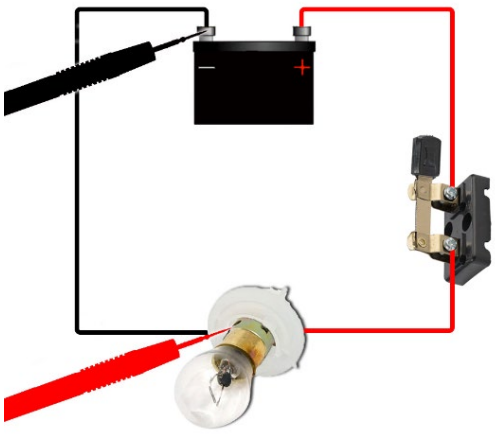

Figure 2

To pinpoint the component or connection responsible for the voltage drop, move the negative (-) test lead to the next component or connection in the circuit and retest at additional points as necessary. Changes in the voltage drop reading will indicate where an excessive voltage drop is located.

Remember, the voltage-drop test is one of the best ways to check for voltage being lost along a wire or through a connection, switch or relay. Similar results cannot be reliably obtained by continuity testing with an ohmmeter or logic probe. Multi-strand wires may test good for continuity (ohms) but, due to the rise in resistance when current flows, can have an excessive voltage drop.