The Voltage Drop Test

You're working on an electrical problem. You suspect you've got a bad wire somewhere, but you aren't looking forward to resistance testing half the wiring harness. Try a voltage drop test instead.

What's a voltage drop test? Well, what happens when you touch a multimeter's test probes to the battery's positive and negative terminals? You read battery voltage, of course. But why? Because that is how much difference in potential, or electrical pressure, exists between the two test probes. At one terminal (and probe) is 13-plus volts, and at the other is 0 volts. That is, 13 volts is dropped from one terminal to the other.

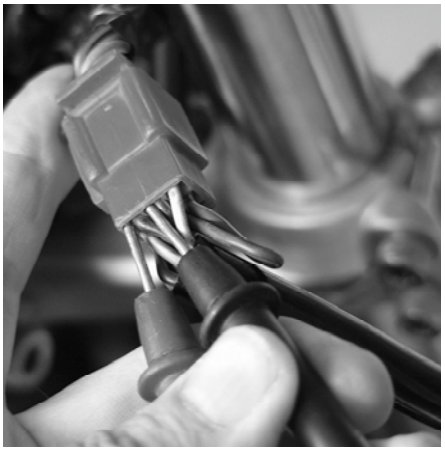
Now put both test probes on the same terminal. What do you get? You get zero volts, naturally. But why? Because there is no potential difference between your meter's two probes. No voltage is lost. Try looking at it this way, and you'll better understand the voltage drop test.

For a real test, move the test probes to a street bike's keyswitch, and touch the connector's input and output wires. Make sure the keyswitch is turned on, and note the reading. What should it be? In most cases it will be zero. There should be no difference in potential across a conductor.

However, sometimes you'll pick up one or two tenths of a volt. That is, just enough to indicate a slight loss due to a tiny bit of resistance. Though we really don't want any resistance, a small amount can be tolerated, because all conductors have some resistance.

To find the electrical problem, perform the voltage drop test in two steps. First, look at the big picture. Put your multimeter's positive test probe at the battery positive terminal and the negative probe at the suspect point in the circuit. Don't forget to turn the keyswitch on. Suppose the meter reads three volts. What does that mean? It means three volts are lost between the battery and this point, indicating major resistance somewhere in between. A bad wire, connector, or switch. In other words, this is just what was suspected.

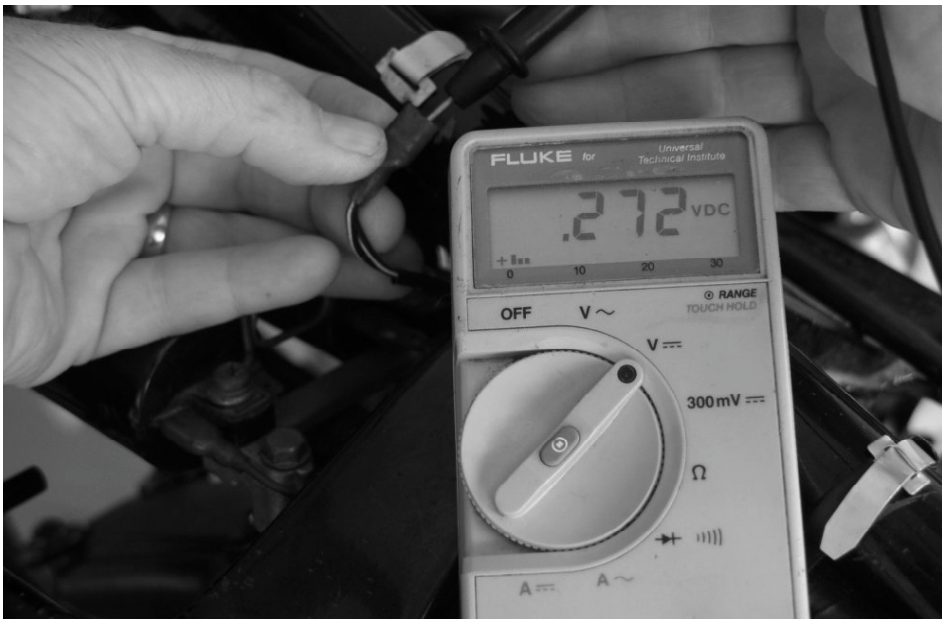
To narrow down the problem area, keep the positive meter probe at the battery, and move the negative probe onto the next connector in the system, toward the battery. Get the wiring diagram out and determine where that is, if necessary. If the reading is still way over 0.20 volts, move the test probe again, in the direction of the battery, on to the next connector in the line, and continue doing this until the reading is below 0.20 volts. That's the tip-off point. Somewhere between here and the last point tested will be the bad spot in the circuit.



Confirm the trouble spot by straddling it with the multimeter probes.

Now, the second step. To confirm the exact spot, straddle it with the multimeter. That is, put the meter's positive probe on one side of the suspect point and the negative probe on the other side, but as close to each other as possible. If the reading is still over 0.20 volts, you've located the exact spot. On the other hand, if the reading drops below 0.20 volts, you're slightly on the battery side of the exact point. Move up slightly in the circuit and try again.

The voltage drop test is one of the most powerful electrical troubleshooting techniques available. Focusing on a conductor's voltage instead of its resistance provides two benefits. First, it speeds up the job. Resistance tests require disconnecting the component, and even then the results are not always reliable. Second, the voltage drop test delivers more accurate values. It can even uncover resistances too small for an ohmmeter to measure. Just don't forget that the key switch must be turned on for each test, or you will get some misleadingly large readings. Happy troubleshooting!◆—*Mike Nixon*



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