

Ohhhhhmmmm ... Ohhhhhmmmm

Part 2: DVOM

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IN PART 1 OF THIS series (October 2018), I revealed that the electrical system of a motorcycle can kill a person, especially if he or she is working on

the ignition system. With this column, I'm going to look at how you can safely test the various electrical components of your motorcycle using a digital volt-ohm meter (DVOM), also referred to as a multimeter.

There are really only three things you're going to do with your DVOM: measure voltage, measure resistance and test for continuity. That may baffle you a bit if you look at the front panel of a typical DVOM simply due to the array of knobs, buttons, connectors and symbols on most of them. It's okay though, because that's why you read articles like this.

First let's look at the different levels of DVOM. The average DIY motorcycle tech like you or me can easily get away with a \$25 unit. An electrical engineer might need a mid-range unit like a Fluke 87V costing \$400 or more, but you don't. A calibrated professional unit doesn't do much the cheapest unit can't, it just does it more accurately and will have built-in things like circuit protection (to prevent damage to the DVOM) and automatic range selection to make your life easier by preventing you from having to spin knobs and push buttons.

You know how when you were a kid you tested nine-volt batteries for your hand-held video games with



On an F 800 ST, the battery is easy to access. Remove the seat, take out the eight fairing screws holding the center panel in place, and there it is under the center panel.



To test your battery, plug the leads into your multimeter. The Common socket on the meter (marked "COM") is for the negative (black) lead. For the positive (red) lead, you may have a single socket choice, which makes it easy, or you may have to choose between two possible sockets. Consult your multimeter's instructions to be sure which to use. Then hold the metal tips of the leads—called "probes" for obvious reasons—against the appropriate terminals of the battery.

your tongue? The sizzle meant you still had power! With a DVOM, you don't need your tongue any more, and you can test any of the batteries you find in the junk drawer in the kitchen. You can also check your old, neglected extension cords and that box of light bulbs you keep in the basement for some reason.

Start simple. Grab a motorcycle battery, preferably one that isn't already installed in a bike. It's not dangerous to test the battery that's in your bike, though, so grab your DVOM. Disconnect the negative cable from the battery, then connect the leads to your meter. Hold the black lead against the negative terminal of the battery and touch the positive terminal with the red lead. If you've chosen the proper settings on your DVOM (DCV, 20V), you should get a reading between zero and 13 volts telling you the resting charge of your battery. Reconnect the negative cable and test it again to see if—with the bike's ignition turned off—you get the same reading. If you don't, there could be a problem.

If you have a helper (or a functioning third arm) you can also test "voltage drop" on the battery. This tells you how far below its resting voltage the battery falls when the starter button gets pressed. Many late-model motorcycles briefly disconnect the headlight when the starter is engaged, so voltage drop shouldn't be severe under normal conditions. If it is, that indicates a problem somewhere in the circuit and could indicate a bad starter, starter solenoid, ignition switch, starter button, etc.

As a side note, some folks may have heard of a battery load tester. These are only useful if you have to test a lot of batteries, so are generally overkill for the home mechanic. All they do is tell you if a battery is any good when a load is applied to it; they don't tell you what the drop caused by the load is. Useful in the context of a busy shop environment, but not so useful at home.

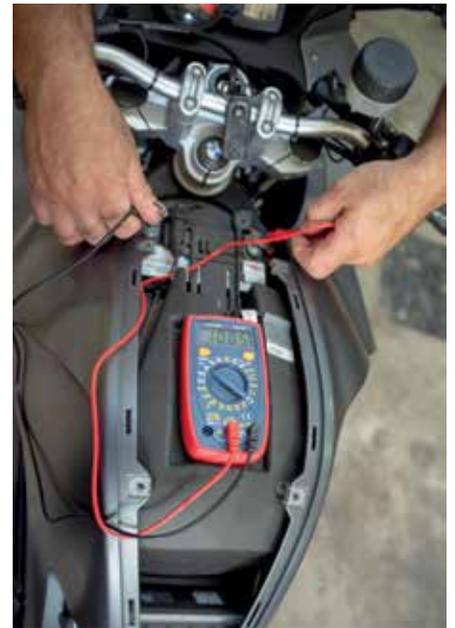
Once you've got the basics of testing a motorcycle battery down, you're set to start learning more about the electrical systems of your motorcycle. ☺



Testing the F 800's battery at rest gave a reading of 12.52 volts, which is adequate for a battery with the ignition off. This is the standing, or resting voltage, and for a 12-volt battery, you want to see it above 12 volts. This DVOM is an AstroAI AM33D Digital Multimeter and costs less than \$10. It can measure AC and DC voltage up to 500 volts, DC current, resistance (ohms) and continuity, as well as check diodes. It has an internal fuse, a backlight and a hold button that will leave the display on the last test point.



Analog multimeters (AVOM) are more difficult to read quickly and generally bulkier than digital meters, so they're often best suited for home or garage use, rather than sticking them in your road tool kit. This GB Instruments GMT-319 features seven functions including a good/bad battery tester and can handle up to 1,000 volts.



With the starter button pressed, the voltage of the battery drops to 10.85 volts, showing the voltage when the battery is under a load. A drop of two or three volts is expected; more than that likely indicates a problem with your battery, especially if you're already having trouble starting the bike in the first place.



The Fluke 10 is out of production, but still available through places like pawn shops and eBay. Fluke is the king of DVOMs, and the prices reflect that status. The least expensive unit, the Fluke 101, costs about \$50 and is only slightly more complex than the model 10. A top-of-the-line, NIST-certified Fluke 789 will set you back \$1,000 and is absolutely beyond the needs of the average motorcycle owner. Note here that the reading is below the other meters, possibly because the leads are old and age can degrade wires; degraded wires provide more resistance to electric current.