Oct. 2005

Pressman's Toolbox

Measuring resistance

By Frank Bourlon

Editor's note: In the July issue of Newspapers & Technology, columnist Frank Bourlon discussed the basics of volt/ohm meters. In this installment, Bourlon writes about the many devices that can be tested by these meters.

Measuring resistance is done by setting a volt/ohm meter to the resistance scale, which is indicated on the analog meter by RX1, RX100 or RX10,000 (see Figure 1) or on a digital meter by setting the knob to the Omega symbol (see Figure 2).

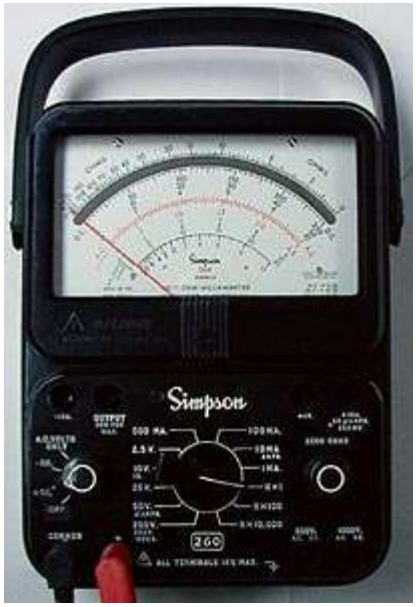

Fig. 1: An analog volt/ohm meter.
Photos: Frank Bourlon

Fig. 2: A digital volt/ohm meter.

The ohm meter indicates how well an object can conduct electricity. Fuses, for example, have a very low resistance - less than 1 ohm (see Figure 3). The lower the resistance the better a device will conduct. In this case, we would expect the fuse to have a low resistance value. If the resistance measured was very high, the fuse would need to be discarded.

Fig. 3: Working fuses yield a resistance of less than 1 ohm.

Relay coils can also be tested by measuring their resistance. Figure 4 shows a coil being tested. Since most coils have a high resistance, a higher resistance scale on the meter is used. In the case of this coil, the resistance is 1,600 ohms (the scale reads 16 and the knob on the meter is set on RX100, which is 16X100 or 1,600 ohms). If the coil is good it

will show some resistance. The relay coil is bad if the resistance is so high it can't be measured with the meter (a resistance that can't be measured is referred to as infinity).

Fig. 4: How to test a coil.

Switches can easily be tested by measuring the resistance at terminal ends of the switch (see Figure 5).

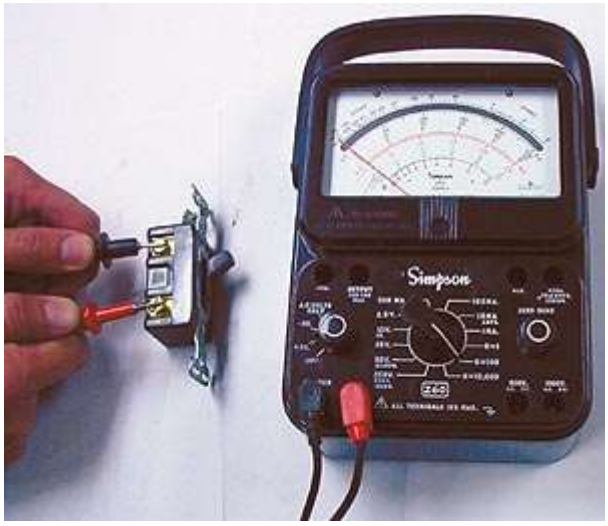

Fig. 5: Test a switch by measuring the terminal ends.

When the switch is in the on position the resistance will read less than 1 ohm. When the switch is off, the meter will read infinity. (Note: If the meter doesn't indicate any resistance when the switch is on or if the resistance of the switch is low and doesn't change when the switch is on or off, then the switch is bad.)

Identifying wires

The ohm meter can also be used to identify a specific wire within a large bundle of wires, once you ground the intended wire on one end. To find the other end, attach one of the meter leads to the ground; use the other lead to hunt for the wire you are trying to find. You'll know you're successful if the meter indicates a very low resistance. Once you find the wire, mark it so you don't have to search for it again. (Note: This technique is only used when the wires have not been terminated. If the wires are terminated in an existing circuit it is still possible to find the wire by performing the steps listed above by removing each wire from the circuit for the test (with power off; otherwise the meter can be damaged). A third technique to find wires using resistance measurement is beyond the scope of this article.)

Meters are often commonly used to measure diodes and bridge rectifiers. To measure diodes, place one lead of the ohm meter on each of the diode's two leads. Note the resistance. Then, swap the meter leads and note the resistance.

Good diode

If the diode is good it will measure a high resistance when the meter leads are in one position but will read a low resistance in the other position. If the meter reads high in both directions or very low in both directions the diode is bad. Bridge rectifiers, which actually are four diodes in one package, can be measured similarly. In this case, the leads are swapped between:

The positive terminal and one of the AC terminals and then do the same for the other AC terminal.

The negative terminal and one of the AC terminals and then do the same for the other AC terminal.

I have only mentioned a few of the many devices that the ohm meter can measure. If you have any questions about other specific devices that can be tested using the resistance scale, please feel free to contact me. Next month, I'll discuss how to test circuits.s

Frank Bourlon has more than 30 years' experience in the newspaper industry. He is the executive and training director for the Newspaper Production & Research Center. He can be reached at 405.524.7774 or via e-mail at nprc@flash.net.