

How to Measure THE RESISTANCE OF HOT ELEMENTS

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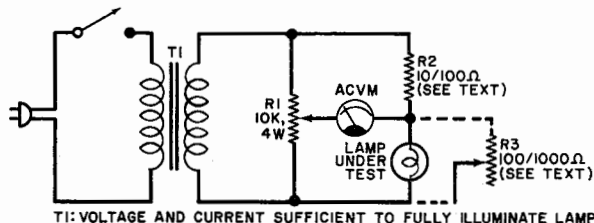
A CONVENIENT means of measuring the hot resistance of lamp filaments, or other elements whose resistance changes with operating temperature is a highly desirable item for the electronics experimenter. This is especially true in cases where these elements are used in circuits requiring close voltage tolerances.

Although there are several ways to measure hot resistance, excellent results can be obtained from the simple circuit shown here.

Using conventional components, the circuit has a range from one or two ohms, up to several thousands.

The transformer should have a secondary voltage and current sufficient to fully illuminate the lamp under test. In the case of a 117-volt lamp, $T1$ should be a 1:1 isolation type whose secondary can handle the required lamp current.

The range of the bridge is about 100:1 and depends on the value of $R2$. A 10-ohm value of $R2$ enables measurement between one and 100 ohms, while an $R2$ value of 100 ohms, produces a 10-to-1000-ohm range. The lower the resistance of $R2$, the more accurate the measurement. This is due to the low voltage drop across $R2$. The wattage of $R2$ should be such that it can handle the necessary load.



T1: VOLTAGE AND CURRENT SUFFICIENT TO FULLY ILLUMINATE LAMP

This circuit can be used to measure resistances up to several kilohms.

If the lamp must be measured at full operating voltage, measure the voltage across the lamp. Then increase the input voltage to overcome the voltage drop across $R2$.

With the circuit connected as shown in the schematic ($R3$ not installed), adjust $R1$ until the ac voltmeter indication is at a minimum. Switch to a lower voltmeter range as the minimum is approached. Record the value indicated on the ac voltmeter.

Without disturbing the setting of $R1$, remove the lamp under test, and substitute potentiometer $R3$ for the lamp. This potentiometer can have a value between 100 and 1000 ohms.

Adjust $R3$ until the ac voltmeter indicates the same value as that previously recorded. Remove $R3$ from the circuit and measure its resistance. This will be the hot resistance of the lamp. \diamond