Laboratory Application Assignment

In this lab application assignment you will examine the characteristics of a simple series circuit. You will also troubleshoot a series with open and shorted resistors.

Equipment: Obtain the following items from your instructor.

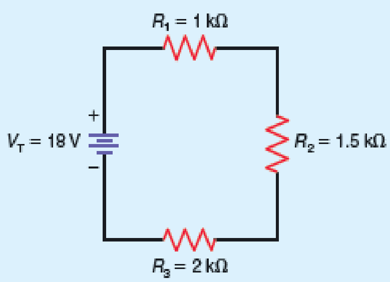
- Variable DC power supply
- Assortment of carbon-film resistors
- DMM

Series Circuit Characteristics

Examine the series circuit in Fig. 4–51. Calculate and record the following values:

R_T = ______, I = ______, V_1 = ______, V_2 = ______, V_3 = ______

Figure 4–51



Construct the series circuit in Fig. 4–51. Measure and record the following values.

(Note that the power supply connections must be removed to measure R_T.)

R_T = ______, I = ______, V_1 = ______, V_2 = ______, V_3 = ______

How does the ratio V_2/V_1 compare to the ratio R_2/R_1? ______

How does the ratio V_3/V_1 compare to the ratio R_3/R_1? ______

Add the measured voltages V_1, V_2, and V_3. Record your answer.

______

How does this value compare to the value of V_T? ______

Does the sum of the resistor voltage drops satisfy KVL? ______

Using measured values, prove that the current, I, is the same in all parts of a series circuit. Show your calculations. ______

______

In Fig. 4–51, which series resistor dissipates the most amount of power? ______

Which resistor dissipates the least amount of power? ______

Troubleshooting a Series Circuit

In the following troubleshooting exercise, a 1 **Ω** resistor will be used to simulate a short circuit whereas a 1 M**Ω** resistor will be used to simulate an open circuit.

In Fig. 4-51, replace resistor R_2 with a 1 **Ω** resistor. Next, measure and record the current, I and the voltages V_1, V_2 and V_3.

I = ______, V_1 = ______, V_2 = ______, V_3 = ______

Did the current, I, increase or decrease with R_2 shorted? ______ Explain why. ______

______

______

Did the voltage drops across R_1 and R_3 increase or decrease with R_2 shorted? ______

Explain why. ______

______

Did the voltage drop across R_2 increase or decrease with R_2 shorted? ______ Explain why. ______

______

______

Next, change R_2 to a 1 M**Ω** resistor. Measure and record the current, I and the voltages V_1, V_2 and V_3.

I = ______, V_1 = ______, V_2 = ______, V_3 = ______

Did the current, I increase or decrease with R_2 open? ______

Explain why. ______

______

______

Did the voltage drops across R_1 and R_3 increase or decrease with R_2 open? ______

Explain why. ______

______

______

Did the voltage drop across R_2 increase or decrease with R_2 open? ______ Explain why.

______

______