

Laboratory Application Assignment

In this lab application assignment you will examine three different series-parallel circuits. You will also troubleshoot a series-parallel circuit containing both shorts and opens.

Equipment: Obtain the following items from your instructor:

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

Series-Parallel Circuit Characteristics

Examine the series-parallel circuit in Fig. 6–50. Calculate and record the following values:

$$R_T = \underline{\hspace{2cm}}, I_T = \underline{\hspace{2cm}}, V_1 = \underline{\hspace{2cm}}, V_2 = \underline{\hspace{2cm}},$$

$$V_3 = \underline{\hspace{2cm}}, V_4 = \underline{\hspace{2cm}},$$

$$V_{AB} = \underline{\hspace{2cm}}, I_2 = \underline{\hspace{2cm}}, I_3 = \underline{\hspace{2cm}}$$

Construct the series-parallel circuit in Fig. 6–50. Measure and record the following values. (Note that the power supply connections must be removed to measure R_T .)

$$R_T = \underline{\hspace{2cm}}, I_T = \underline{\hspace{2cm}}, V_1 = \underline{\hspace{2cm}}, V_2 = \underline{\hspace{2cm}},$$

$$V_3 = \underline{\hspace{2cm}}, V_4 = \underline{\hspace{2cm}},$$

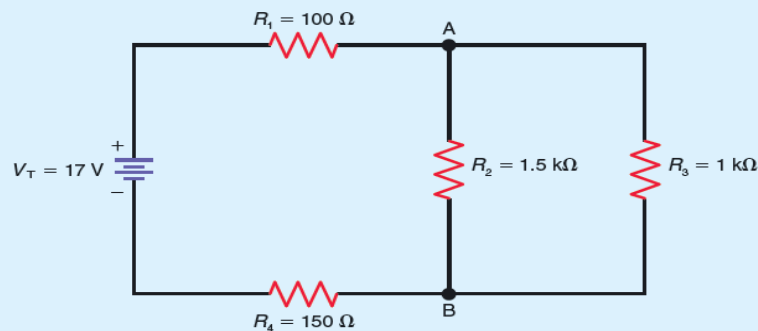
$$V_{AB} = \underline{\hspace{2cm}}, I_2 = \underline{\hspace{2cm}}, I_3 = \underline{\hspace{2cm}}$$

In Fig. 6–50, identify which components are in series and which components are in parallel. _____

Do your measured values of voltage and current support your answers? _____

Does the current entering point B equal the current leaving point A? _____

Figure 6–50



Add the measured values of V_1 , V_{AB} , and V_4 . Record your answer.

How does this value compare to the value of V_T ? Does the sum of these voltages satisfy KVL?

Laboratory Application Assignment

Examine the series-parallel circuit in Fig. 6-51. Calculate and record the branch currents, I_1 and I_2 and the total current, I_T .

$I_1 = \underline{\hspace{2cm}}$ $I_2 = \underline{\hspace{2cm}}$ $I_T = \underline{\hspace{2cm}}$ Next, calculate and record the individual resistor voltage drops V_1 , V_2 , V_3 and V_4 . $V_1 = \underline{\hspace{2cm}}$, $V_2 = \underline{\hspace{2cm}}$, $V_3 = \underline{\hspace{2cm}}$, $V_4 = \underline{\hspace{2cm}}$. And finally, calculate and record the total resistance, R_T . $R_T = \underline{\hspace{2cm}}$

Construct the circuit in Fig. 6-51. Measure and record the branch currents, I_1 and I_2 and the total current, I_T . $I_1 = \underline{\hspace{2cm}}$ $I_2 = \underline{\hspace{2cm}}$ $I_T = \underline{\hspace{2cm}}$ Next, measure and record the individual resistor voltage drops V_1 , V_2 , V_3 and V_4 .

$V_1 = \underline{\hspace{2cm}}$, $V_2 = \underline{\hspace{2cm}}$, $V_3 = \underline{\hspace{2cm}}$, $V_4 = \underline{\hspace{2cm}}$ Finally, measure and record the total resistance R_T . (Note that the power supply connections must be removed to measure R_T) $R_T = \underline{\hspace{2cm}}$

Do the measured values of V_1 and V_2 add to equal the applied voltage, V_T ? _____ Do the measured values of V_3 and V_4 add to equal V_T ? _____ Do the measured values of I_1 and I_2 add to equal the total current, I_T ? _____

Examine the series-parallel circuit in Fig. 6-52. Calculate and record the following values:

$$R_T = \underline{\hspace{2cm}} I_T = \underline{\hspace{2cm}} V_1 = \underline{\hspace{2cm}} V_{AB} = \underline{\hspace{2cm}}$$

$$I_2 = \underline{\hspace{2cm}} I_3 = \underline{\hspace{2cm}}$$

Construct the circuit in Fig. 6-52. Measure and record the branch currents, I_2 and I_3 , and the total current, I_T . $I_2 = \underline{\hspace{2cm}}$ $I_3 = \underline{\hspace{2cm}}$ $I_T = \underline{\hspace{2cm}}$ Next, measure and record the voltages V_1 , and V_{AB} . $V_1 = \underline{\hspace{2cm}}$, $V_{AB} = \underline{\hspace{2cm}}$ Finally,

measure and record the total resistance R_T . (Note that the power supply connections must be removed to measure R_T .) $R_T = \underline{\hspace{2cm}}$

Do the measured values of I_2 and I_3 add to equal the total current, I_T ? _____ Do the measured values of V_1 and V_{AB} add to equal V_T ? _____

Series-Parallel Circuit Troubleshooting

In this troubleshooting assignment, you will insert faults into the series-parallel circuit of Fig. 6–50. However, you will not be asked to calculate every voltage and current for every possible defect. All you will be asked to do is to insert the fault specified in Table 6–2 and record the measured values for V_1 , V_{AB} , V_4 , I_T , I_2 , and I_3 . To simulate a short, replace the original resistor with a 1- Ω resistor. To simulate an open, replace the original resistor with a 1-M Ω resistor. Although you already know which component is defective, this exercise gives you practical

Figure 6-51

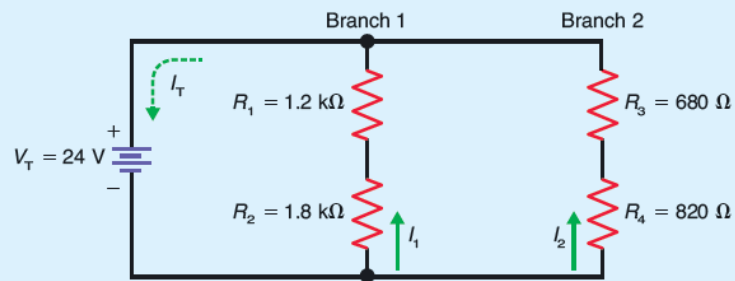


Figure 6-52

