Laboratory Application Assignment

In this lab application assignment you will examine unloaded voltage dividers, current dividers, and loaded voltage dividers. You will also be presented with a challenging design problem involving loaded voltage dividers.

Equipment: Obtain the following items from your instructor.

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

Unloaded Voltage Divider

Examine the unloaded voltage divider in Fig. 7–39. Using Formula (7–1), calculate and record the following voltages:
V_{AG} = _____, V_{BG} = _____, V_{CG} = _____, V_{DG} = _____

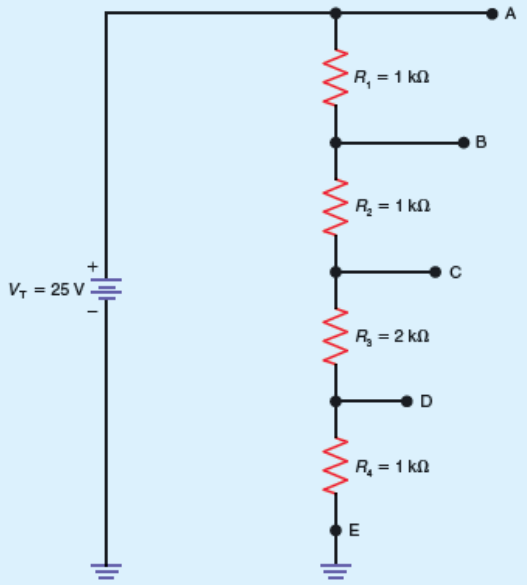
Construct the voltage divider in Fig. 7–39. Measure and record the following voltages:
V_{AG} = _____, V_{BG} = _____, V_{CG} = _____, V_{DG} = _____

How does the ratio R_4/R_T compare to the ratio V_{DG}/V_T?
_____

How does the ratio $(R_3 + R_4)/R_T$ compare to the ratio V_{CG}/V_T?
_____

How does the ratio $(R_2 + R_3 + R_4)/R_T$ compare to the ratio V_{BG}/V_T? _____

Figure 7–39



Current Divider

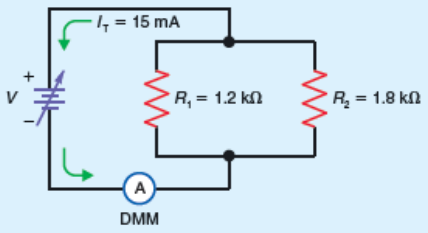
Examine the current divider in Fig. 7–40. Using Formula (7–2), calculate and record the currents, I_1 and I_2:
I_1 = _____, I_2 = _____

Construct the current divider in Fig. 7–40. Adjust the DC voltage source until the total current, I_T (as indicated by the DMM) measures exactly 15 mA. Now move the DMM to measure the individual branch currents, I_1 and I_2. Record your measured values.
I_1 = _____, I_2 = _____

How does the ratio I_1/I_2 compare to the ratio R_2/R_1? _____

What is unique about comparing these ratios? _____

Figure 7–40



Series Voltage Divider with Parallel Load Current

In Fig. 7-41, calculate I_1, I_2, I_L, V_{BG} and V_{AG} with S_1 open.

I_1 = _____ I_2 = _____ I_L = _____
V_{BG} = _____ V_{AG} = _____

Next, calculate I_1, I_2, I_L, V_{BG} and V_{AG} with S_1 closed.

I_1 = _____ I_2 = _____ I_L = _____
V_{BG} = _____ V_{AG} = _____

Construct the circuit in Fig. 7-41. With S_1 open, measure and record the following values: I_1, I_2, I_L, V_{BG} and V_{AG}.

I_1 = _____ I_2 = _____ I_L = _____
V_{BG} = _____ V_{AG} = _____

Next, close S_1 and re-measure I_1, I_2, I_L, V_{BG} and V_{AG}.

I_1 = _____ I_2 = _____ I_L = _____
V_{BG} = _____ V_{AG} = _____

Did the voltage V_{AG} increase, decrease, or stay the same when S_1 was closed? _____

Why? _____

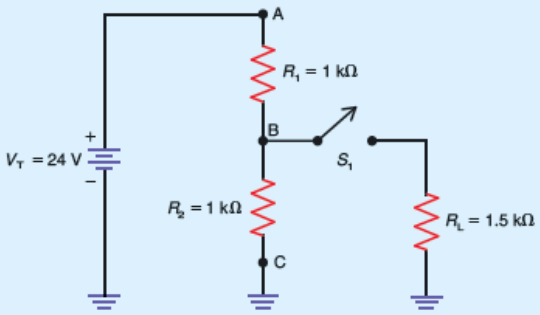
_____

Did the voltage V_{AG} increase, decrease, or stay the same when S_1 was closed? _____

Why? _____

_____

Figure 7–41



Design Challenge

Using a 24-V supply, design and build a loaded voltage divider to meet the following requirements:

Load A = 24 V @ 15 mA
Load B = 15 V @ 25 mA
Load C = 9 V @ 7.5 mA
I_B should equal approximately 10% of the total load current
Note: Use standard resistors for the actual loads.