

Experiment 6 Variable Resistor

Name	Group	Grade
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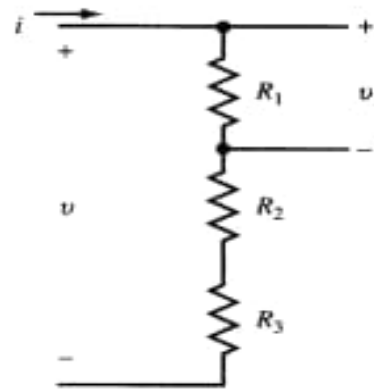
Objectives:

To learn about variable resistors

Pre-Lab

In the circuit shown, with $v=10$ V, R_1 is $1.5\text{ k}\Omega$, R_2 is $4.7\text{ k}\Omega$ and R_3 is a $5\text{ k}\Omega$ variable resistor. Find the current i and the voltage v_1 if the potentiometer is set to:

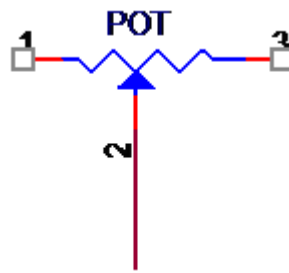
- 1) 10% its value,
- 2) 50% its value and
- 3) 75% its value.

Solution:

The experiment

Part 1

The potentiometer (variable resistor) is an element that has three terminals. Identify the three terminals.

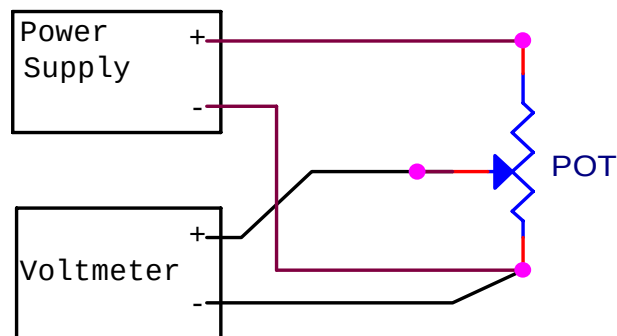


1. Connect terminals 1 and 3 (the outmost) to the multimeter and measure the resistance.

What is the reading of the multimeter.....

2. Connect now terminals 1 and 2 to the multimeter and rotate the potentiometer clockwise to the end. What is the reading of the multimeter.
3. Repeat with the counterclockwise direction.
4. Connect now terminals 3 and 2 to the multimeter and rotate the potentiometer clockwise to the end. What is the reading of the multimeter.
5. Repeat with the counterclockwise direction.....
6. What do you conclude on how to connect the potentiometer?
7. Apply 5 volts across the potentiometer as shown below. Rotate the potentiometer clockwise or counterclockwise from end to end and measure the voltage between one of the end terminals and the central terminal (2). Write down the range of voltage you observed?

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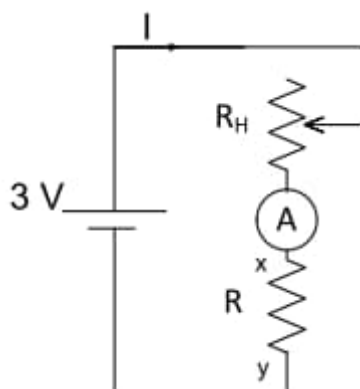


Part II

1. In the circuit below, find the expression of R as a function of R_H , I and the supply voltage.

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2. You are given an unknown resistance R . Connect the circuit below and vary the potentiometer resistance until the current is 1 mA. Disconnect the potentiometer and measure its resistance.
3. Deduce the value of R and verify by measuring its value



Part III

In the circuit below, find the expression of E as a function of V , R_1 and R_2 .

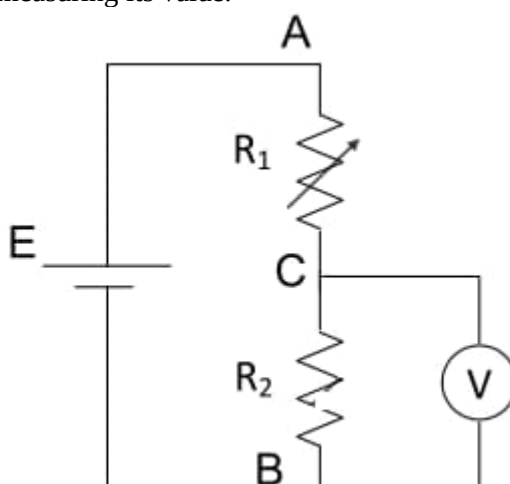
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Connect the circuit (set R_2 to $470\ \Omega$) and set the supply at a given level you do not know. Vary the potentiometer resistance until the voltmeter indicates a value of 2 V. Deduce the value of E and check by measuring its value.



Conclusions:

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