Title: **Potentiometers** Lab: 8

Course: Electrical Applications Unit: Electrical Lab CLO: 2, 3, 4

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Grade \_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall differentiate between a rheostat and a potentiometer.
2. Student shall explain the operation of a rheostat and a potentiometer.
3. Student shall build a circuit using either a rheostat or a potentiometer

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Lab. Grading shall be based on instructor evaluation.

**Materials**

|  |  |
| --- | --- |
| Student Provided Materials | Department Provided |
| Proto-Board | Power Supply |
| Multimeter |  |
| 10kΩ Potentiometer |  |
| Calculator |  |

**Theory**

So far, we have used what is termed *fixed* resistors. A fixed resistors ohm value cannot be changed. A potentiometer is a *variable* resistor whose ohm value *can* be changed. A fixed resistor has just two leads where a potentiometer has three. There are the two terminal ends just like that of a fixed resistor plus and a *wiper* terminal (see the figure below). The potentiometer is a voltage divider, dividing the resistance on each side of the wiper. The wiper is moveable allowing a change in the resistance on either side. A potentiometer can be converted to a rheostat by jumping the wiper terminal to one of the resistor end terminals (see the figure below). A rheostat is an adjustable resistor, thereby having a minimum and a maximum resistance.

|  |  |  |
| --- | --- | --- |
| Potentiometer | Rheostat | Variable Resistor |
|  |  |  |



**Instructions**

Using the figure below, answer the following problems.



Where;

Measurements

1. Measure the resistance between points A and B. RAB = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Adjust the wiper to mid-position. Measure and record the following values:

RAC = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ RBC = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Add and record the two values measured above to obtain the total resistance. \_\_\_\_\_\_\_\_\_\_\_
2. Does the recorded value in step 1 match that of step 3? Yes / No

**NOTE**: If you answered “No” above, get instructor assistance.

**Instructions**

Build the following circuit. R1 is a variable resistor. You shall use the potentiometer set up as a rheostat to represent this component.



Where;

1. Adjust the rheostat for 1kΩ.
2. What is the measured circuit current? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Adjust the rheostat to different positions. What is the result of moving the rheostat?
4. Build the circuit below using a 10kΩ potentiometer and place two multimeters in this orientation.



Where;

1. Adjust the wiper to the mid-position then measure and record E1 and E2.

E1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ E2 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Adjust the wiper to the left 15˚ (11 o’clock) then measure and record E1 and E2.

E1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ E2 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Adjust the wiper to the right 30˚ (1 o’clock) then measure and record E1 and E2.

E1 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ E2 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Evaluations

1. Does the sum of the measured voltages in the three previous steps equal the supply voltage? Yes / No
2. Can this circuit be used as a voltage divider? Yes / No
3. What application can you image a potentiometer would be useful? Explain.