

Experiment to verify that resistors obey Ohm's law and to verify the formulae for calculating the effective resistance of resistors connected in Series and in Parallel

1. **Preparation:**
 - a) Learn Ohm's law.
 - b) Note that Ohm's law applies to metals. Most resistors used in electronic circuits are *not* made of metal. What are they made of? How does their behaviour differ from that of resistors made of metal ?
 - c) Learn the “series and parallel resistors formulae”. Try to “prove” these formulae, starting from Ohm's law and the law of conservation of charge (Kirchhoff's current law) and the law of conservation of energy (Kirchhoff's voltage law).

2. Obtain results from which you could plot graphs of voltage (horizontal) against current for (at least) two resistors separately and then for the *same two resistors* connected i) in series and ii) in parallel with each other. Plot the graphs and use them to calculate the resistances, R_1 , R_2 and R_e (series) and R_e (parallel).

A graph of voltage against current for a component is called the *characteristic* of the component. To obtain the electrical characteristics of a component we need a variable voltage supply. The simplest way to produce a variable voltage supply from a fixed voltage supply is by using a rheostat (variable resistance) as a *variable potential divider*.

The circuit for obtaining the characteristics of a component is shown in the circuit diagram below (figure 1). Before starting the experiment, complete figure 2.

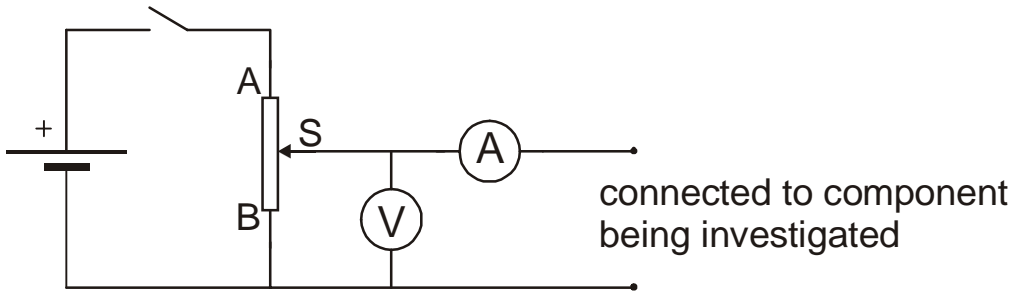


figure 1

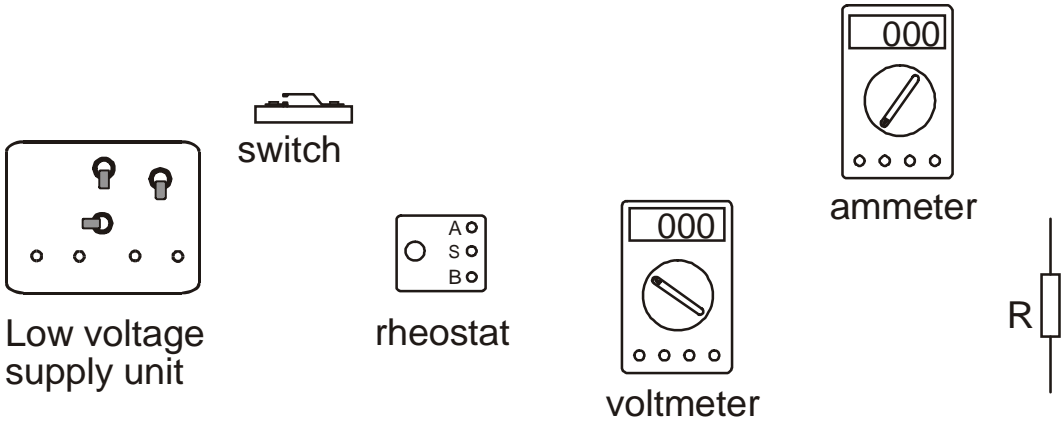


figure 2

A variable potential divider circuit is useful in this and many other similar experiments but it should be noted that it is NOT a very stable voltage source. To see this, try setting the sliding contact S to give a voltage of 3V *with the resistor, R, removed from the circuit*. Now connect the resistor back in the circuit; what happens to the reading of the voltmeter? Can you explain this change?