

Ref_OHMsLaw.rtf
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Reference information: Ohms Law and DC Circuit Fundamentals

Supplies

1. A two AA battery pack with leads.
2. A 100 ohm 1/4 watt resistor.
3. A 1k ohm variable resistor (also called a potentiometer).
4. A T1 or T1 3/4 RED LED.
5. A Multimeter to measure voltage and DC amperage.

Optional

1. Prototyping board to mount the components on.
2. A toggle or slide switch to connect and disconnect the circuit path to save you from having to pull the battery wires to stop the electricity flow.

NOTE: Once you understand the material, you will see that other values and types of components can be used.

Terminology - These are some of the terms used in electronics. It is important that you understand them and memorize them.

Voltage: The amount of force available to push electricity through a wire. Measured in VOLTS [V or v]. Also known as E, the electromotive force.

Current: The amount of electricity moving through a wire. Measured in AMPERS [A or a] or AMPS.

Resistance: The amount the wire or other electrical component resists the flow (i.e Current) of electricity. Measured in OHMS [Ω].

Wattage: The amount of POWER a component can handle. Power is equal to the Voltage across the component times the Current going through the component. Power = Current x Voltage and is measured in Watts. Usually seen as $P = IE$.

Each of these can be scaled using prefixes of Mega[M] (x1000000), Kilo[k] (x1000), Milli[m] (/1000), and Micro[μ] (/1000000). So 1.5k ohms is 1500 ohms and 10 ma is 0.01 amps.

Battery: An electricity storage device rated in Volts (the level of electricity it stores) and Amp/Hours, the rate at which it can supply electricity. An average AA battery is 1.5 volts at 2000 ma/hr (milliamps per hour).

Series: When things are connected in SERIES, the electricity flows in one side and out the other of the first thing and then flows into one side and out the other of the next thing. If there are more than two, the process repeats for each item.

Parallel: When things are connected in PARALLEL, the electricity flows into one side of each item at the same time and out the other side of each item at the same time.

Circuit: A continuous path through all of the components being used. It usually starts at the positive terminal of a voltage source (i.e. battery), passes through all of the components connected in serial and/or parallel, then ending at the negative terminal of the voltage source. It then passes through the voltage source to finally end at the positive terminal where it started.

Schematic: A drawing of the circuit that shows what components are being used and how they are connected to each other. From it, you can figure out what the circuit is doing.

Laws - These are some of the laws used in electronics. As with the terminology, understanding and memorization is essential. After using them for awhile, they will seem obvious.

Ohms Law: V (voltage) = I (current) \times R (resistance).

Also seen as E (electromotive force) = I (current) \times R (resistance)

Kirchhoff's Current Law: The sum of all currents flowing into a connection (or node) must equal the sum of all currents flowing out of that connection.

Kirchhoff's Voltage Law: The sum of all voltage changes in a circuit must add up to zero.