

## ELECTRICAL DEVICES AND COMPONENTS OF ELECTRICAL CIRCUITS

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A galvanometer is a device with a rotating indicator that will rotate from its equilibrium position when a current passes through it. A galvanometer has a negligible resistance.

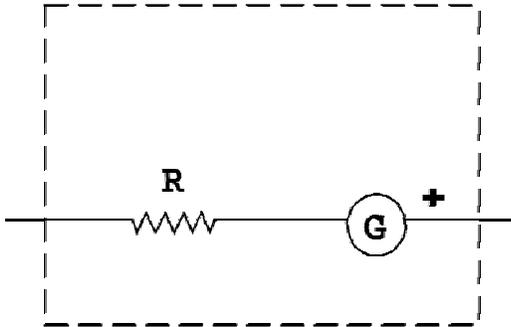


Figure 1. Ampermeter

An ampermeter (ammeter) is a galvanometer with a calibrated current scale for its indicator and a bypass resistor (called a shunt) for a fixed fraction of the current, shown in Figure 1. Many ammeters have several selectable shunts which provide their corresponding current meter ranges. Typically, ammeters can be found with calibrated ranges of 1 micro-A for full scale deflection up to 1000 A for full scale deflection, and in multiples of 10 between these extremes.

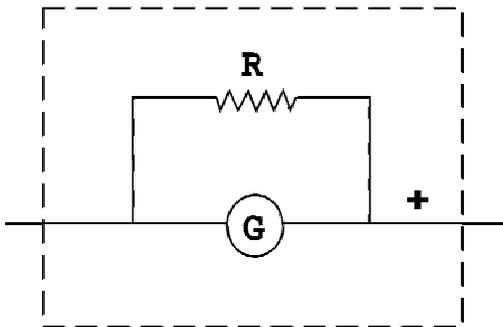


Figure 2. Voltmeter

A voltmeter, shown in Figure 2, is just a calibrated galvanometer with a series resistor so that the total resistance of the path is increased. The galvanometer range is calibrated for the current  $I_g$  passing through it. This scale is adjusted to display the potential difference between points A and B, (voltage) by substituting  $V_g$  values for  $I_g$  on the scale where  $V_g = I_g R_g$  and  $R_g$  is the total resistance of the voltmeter. Voltmeters may have more than one calibrated scale which can be selected by changing the resistance  $R_g$ .

Current in a circuit is the flow of the positive charge from a high potential (+) to a low potential (-). Meters are labeled to indicate the proper direction of current flow through them. A reverse flow of DC current may destroy a meter.

Electrical charge will not move through a conducting path unless there is a potential difference between the ends of the conductors. All materials resist the flow of current through them, requiring work to be done to move the charge through the material. The source of energy in a circuit which provides the energy to move the charge through the circuit can be a battery, photocell, or some other power supply.

An electrical circuit is a circuitous path of wire and devices. A schematic drawing of a real circuit utilizes the symbols shown in Figure 3.

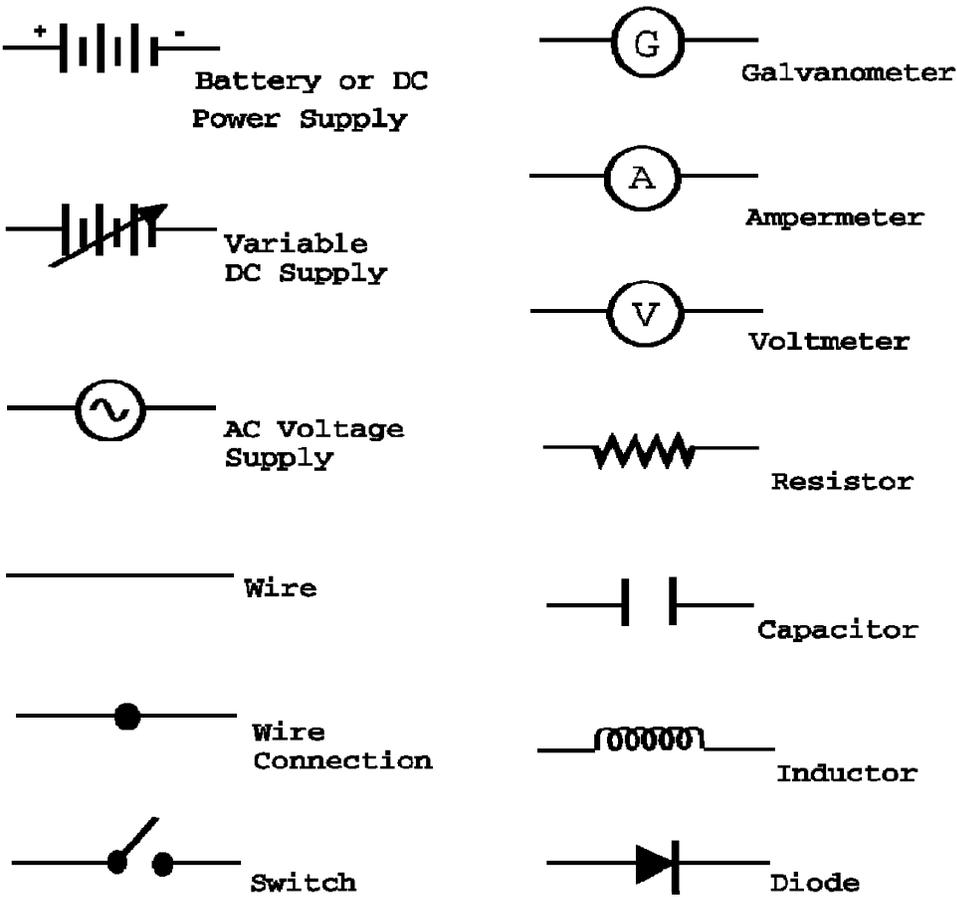


Figure 3. Circuit Symbols

An example, Figure 4, shows a circuit with a DC. power supply in a series with a resistor, a parallel branch with a resistor and voltmeter, and an ammeter.

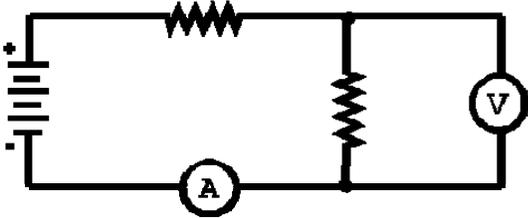


Figure 4. Example of an Electric Circuit