

FUN WITH ELECTRICITY AND MAGNETISM

When a complete circuit is connected to a power supply, electric current, made up of extremely tiny particles (or waves, but that is another very long story) called electrons, flows through the wire and other circuit elements and transfer electric potential energy. This energy may be used to produce light, generate heat, and/or cause motion that we use in many products every day.

Connect the circuit, throw the switch, and make the light bulb glow.

Over 100 years ago, scientists discovered that when electric current flows through a wire, a magnetic field is produced around the wire.

Open the switch, place a compass under the wire so that the wire lines up with the compass needle, and then close the switch. What do you notice?

The deflection of the compass needle indicates the presence of a magnetic field around the current bearing wire. This knowledge soon led to practical applications of this phenomenon, including the construction of strong electromagnets that can be turned on and off at will, motors for converting electric energy into mechanical energy, and generators for converting mechanical energy into electric energy.

A simple electric motor can be constructed in a very short time using common and inexpensive materials. To do this, a current-bearing loop of wire is constructed in a manner that causes the magnetic field from a nearby ceramic magnet to interact with the magnetic field surrounding the current-bearing wire loop and cause the loop of wire to spin.

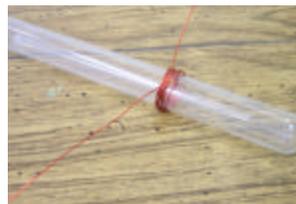
MAKE YOUR OWN DC ELECTRIC MOTOR

Materials:

dry cell, small disk magnet, rubber band, 2 large paperclips,
about 2 feet thin wire, nail, test tube or thick marker, scissors

Procedure:

1. Take the 2 foot piece of thin wire and wrap it around the test tube (or thick marker). The number of wraps depends on the gauge ("thickness") of the wire.

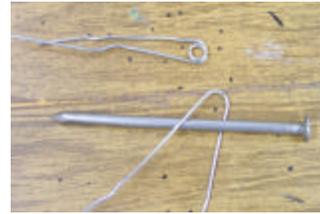


- 2.



"Tie" the ends of the wire through the loops so that the loop of wire will remain in place when you let go.

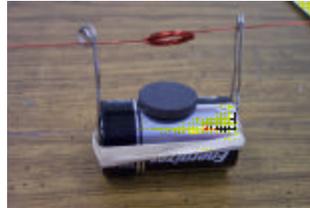
- Bend the paper clips in order to form loops on their ends, which will be used for holding the wire loop.



- Secure these to the dry cell with the rubber band.



- Place the magnet on the dry cell and place the wire loop in its holders. Observe what happens.



- Disappointed that nothing happened? The reason is that the wire is insulated with paint, which must be scraped off. This is the trickiest part. Whether or not the ends of the wire loop are scraped correctly will determine the success of your motor.

- Hold the wire loop vertically between your thumb and index finger of one hand near the edge of the table (desk) so that the wire end lies on the table.



- Use the other hand and the scissors to scrape the insulation off the top half of the wire.

- Turn the wire loop around and scrape the top half of the other end.

- Place the wire loop into its holders and move the loop so that it lies just above the magnet. The motor should now begin spinning. If not, you may need to give it a little push to get it going.

Other instructions and pictures of electric motors made in similar ways may be found on the World Wide Web at:
<http://fly.hiwaay.net/~palmer/motor.html>
http://www.exploratorium.edu/snacks/stripped_down_motor.html
<http://www.scitoys.com/scitoys/scitoys/electro/electro.html#motor>
