Electric Motor Laboratory

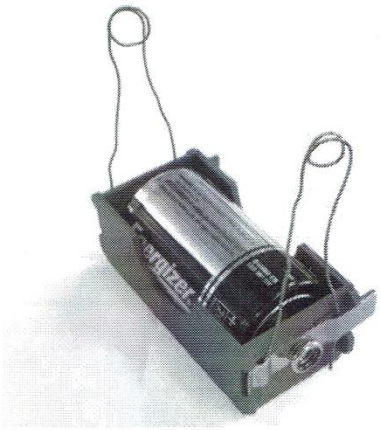
Materials

- battery holder
- 2 ring magnets
- 60-cm piece of #28 enameled wire
- metric ruler
- "D" cell battery
- 2 20 cm pieces of #20 bare copper wire
- sandpaper square
- lengths of prepared hook-up wire (optional)

Protocol

1. To make a loop in the center of each of the two bare copper wires, wrap the wire around a pencil or pen then slide the loop off.

2. Insert both ends of one of the bare wires behind the terminal clips, leaving the loop vertically above each terminal. Repeat with the other wire at the other end of the battery. Your setup should look like the photo at the right. You may have to pull the horizontal terminal away from the case to allow for the wire insertion.



Battery and wires on terminal clips

3. Make a tight coil of the #28 enameled wire by winding it tightly around the battery, leaving about 9 cm free at each end. Then, slide the coil off the battery.

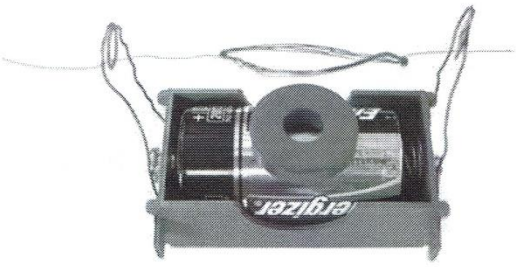
4. Twist the ends of the enameled wire around each side of the coil a few times to hold it tightly together. This should leave about 8 cm of straight wire on the left and right sides.

Wire loop

5. Sand the enamel from 2 cm of wire at each end.

6. Place the battery into the battery holder.

7. After sanding the two ends down to bare copper, carefully place the left end of the coil wire through the left copper loop and the right end through the right copper loop. Make sure the wire loop ends are straight and that the supporting bare copper posts are level. The wire loop should be above the center of the battery.



Motor assembly

8. Place one ring magnet in the center of the battery beneath the wire loop. Give the wire loop a nudge in the direction that it seems to be trying to turn. It should then turn over and over without any assistance. You now have a working electric motor. Note the direction that it is turning.

9. Predict what will happen to the spinning coil if you turn the permanent magnet over. Test this and see if your hypothesis is correct.

10. Think of ways to make the coil go faster. You may need to work with another group or groups so that you can share materials. Test your ideas and see if they work.

Electric Motor Laboratory **Name: _____**

Questions

1. What did your wire coil become when it was placed in the loops of the bare copper wire?

2. Explain how the wire loop, which is known as an armature in an electric motor, was induced to spin by the placement of a permanent magnet beneath it.

3. Explain why the coil moved in the opposite direction when you turned over the permanent magnet.

4. Describe what you did that made your coil go faster. Explain why it worked.

5. List some electric motors that may be found around your house.