Name _____ Date _____ Partners_____

Simple Electric Motor

Stephen T. Thornton
Univ. Virginia Physics Dept.

Materials:

- D cell battery (not provided to take home)
- 36” of 24 or 25 gauge magnet wire (Radio Shack #278-1345 will work)
- two 6” pieces of #12 bare solid copper wire
- a reasonably strong ceramic magnet (1” x 3/4”, Radio Shack #64-1875 or similar)
- 2 rubber bands
- stand for battery (molding)
- 3” long wooden dowels of 1” diameter and 1/4” diameter.

1) Make the rotor by winding the 24 gauge insulated wire about 8 turns around the 1” wood dowel. Wrap the ends of the wire a couple of times around the 8 turns to hold them securely and leave about 1.5” of the wire on each end (see Figure 1). Scrape the varnish insulation off one end of the wire, but scrape only the top half of the varnish off the other end (see Figure 2). Use the sand paper to eliminate the varnish. It is important to remove all the varnish in the areas affected and all along the length of the straight wire down to the coil. This is the single biggest problem in motors not working properly.
2) The rotor supports and current leads are made from #12 bare (no insulation) copper wire. Wind the wire two turns around the 3/8” diameter wood dowel and leave the ends about 2 ¼” long (see Figure 3).
3) Place the rotor supports across the ends of the D cell battery and use a wide, heavy rubber band to hold the vertical rotor supports in place. Place the ceramic magnet on top of the battery and place the battery on the stand.
4) Slide the rotor in place by placing one end all the way through the loop in the rotor support and then pulling the other end in place. Rotate the rotor by hand and make sure it barely clears the ceramic magnet. If it doesn’t, move the rotor supports up higher.
5) Give the rotor a twirl, and it should turn for hours.

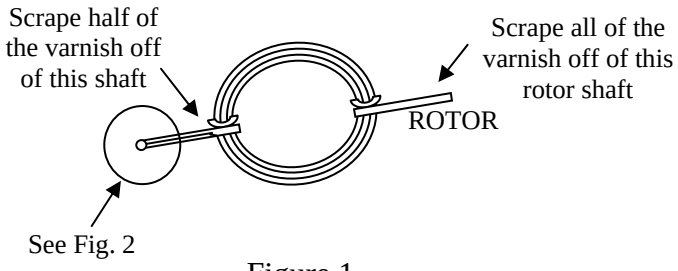

Figure 1

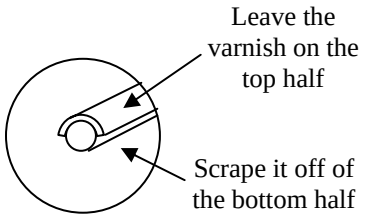

Figure 2

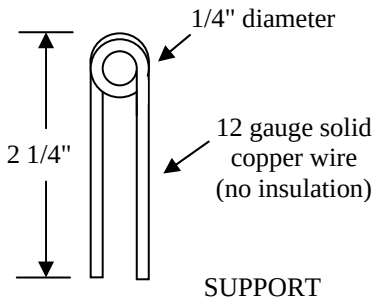

Figure 3

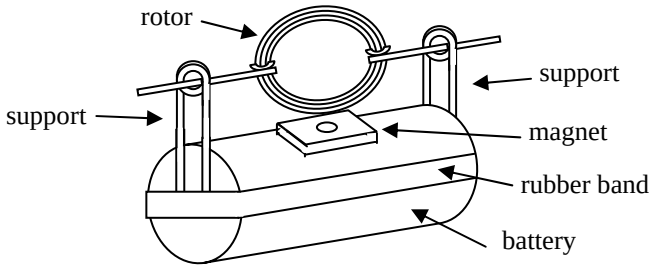

Figure 4

QUESTIONS/CONCLUSIONS

1. Why do we remove all the insulation off one end of the rotor wire, but only off one side of the wire on the other end?

2. What would happen if we removed the insulation off both ends? If you have a spare wire, you might try this.

3. What do you think would happen if you used heavier wire of gauge #22, #20, or #18?

4. What purpose does the battery serve? Why?

5. What purpose does the ceramic magnet serve? Why?