**Transformer Project**

You can make a transformer from magnet wire and an iron rod. Remember that magnet wire, although it looks bare, actually has an enamel coating on the outside that serves as insulation. Enamel is used on magnet wire so that the insulation is very thin and the coil of wire can be compacted into a smaller space, thus enhancing the inductive phenomenon.

Wrap the wire around the iron (or steel) bar. Make two separate coils, each with a different number of turns of the wire. One of these will be the secondary and the other the primary. The inductive transfer will be greatest if the coils of wire are as close together as possible.

Warning! You will need to use a very low voltage AC power supply for this project. Too much current flow will heat up the small gauge wire and cause it to melt, which is a very good example of how a fuse works, but could cause you to get an electrical shock, or perhaps be burned!

A low voltage AC power source is required for this project. Use a variable power supply such as a Variac at 3 volts, or if one is not available, try two 12 volt transformers in series with one another.

A longer wire in the primary will present more resistance than a short one, since the resistance of the wire is determined by its diameter and its length. According to Ohm’s Law, current is a function of resistance and current in the formula \( I = \frac{E}{R} \), so a lower value of \( E \), and a higher value of \( R \) will result in less current flow. The heating of the transformer coil and its
possible failure results from a high current (larger number of electrons flowing) so limiting the current flow is important to making the project safe.

A transformer with at least 50 turns of #20 gauge magnet wire in the primary, and 30 turns in the secondary should work well.

First, try the transformer with a D cell battery. Use some jumper wires to connect the secondary leads to a VOM set to the lowest AC voltage setting. The battery is of course a DC power source, which transformers will not pass, so you would not expect to see any reaction on the meter, although you may see a momentary jump as the magnetic field from the DC current establishes itself.

Finally, connect the same AC power supply to the shorter wire that was the secondary (which is will now be the primary) and see what voltage is present at the output of the newly created secondary. You would expect the voltage here to be higher than at the input, as you have now created a step up transformer.

Next, connect a safe AC power supply to the longer wire that is the primary and see what voltage is created at the secondary. Measure the voltage across the leads going into the primary to see what the difference is in the two voltages. You have created a step down transformer.