NOTES for
ECE 3600 Lab 2
Model of a Power Transformer

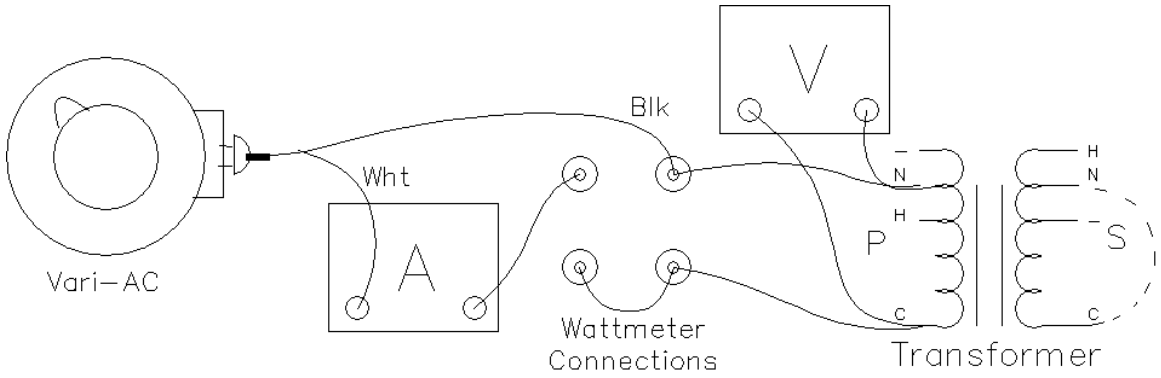
Do experiment 1 the first day in the lab.

Don't start experiments 2 and 3 until you have a block of time long enough to finish all the following measurements. Otherwise you will waste too much time making and remaking circuits. If you are in a hurry, just take the measurements now using the guide below.

Experiment 2 (Equivalent circuit of an iron-core inductor)

Measurements needed

Use the following hookup, WITHOUT the secondary shorted (dashed-line connection). Use one of the multimeters as the ammeter in one of the normal AC ranges.



1. Turn down the vari-AC, switch it on and turn it up to 115 V (measured).

2. Measure P, V, and I. If you have problems getting a voltmeter reading, check the fuses. You can probably find the problem if you move the left voltmeter lead (normally hooked to transformer connection "C") back to all the connections in the neutral path, one-at-a-time. The ammeter fuse can also be checked by measuring its continuity of the meter with another meter.

3. Turn down the vari-AC and switch it off.

Experiment 3 (Model of a Power Transformer)

Measurements needed

Short-Circuit Test

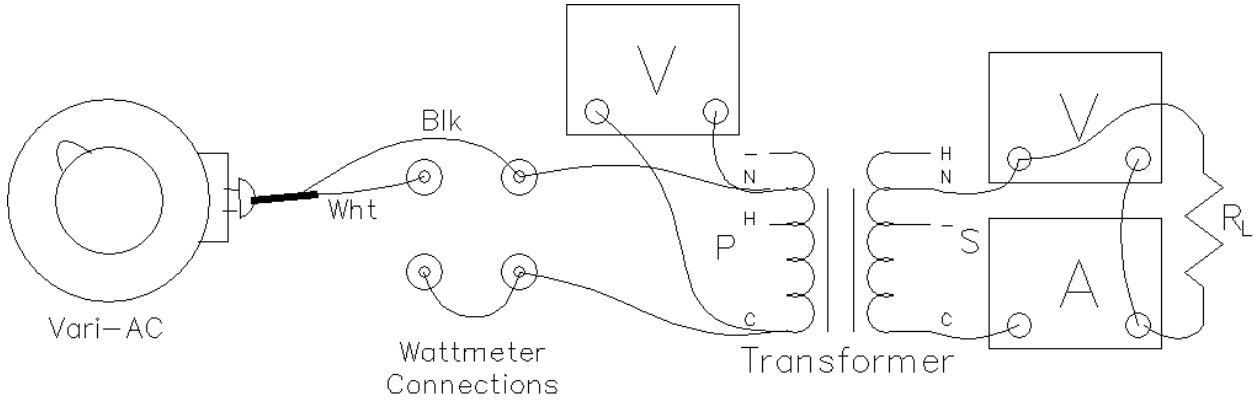
1. Use the same circuit as above, WITH the secondary shorted (dashed-line connection). Also change the ammeter to its "10A" or "20A" connections and setting.

2. With the vari-AC turned down to zero, short the secondary winding. **Slowly** and **carefully** turn up the Vari-AC until 2.17A flows in the primary. Measure P, V, and I.

3. Turn vari-AC down and switch it off.

Voltage Regulation and Power Efficiency

Change to the following hookup, without R_L. Leave the ammeter in the high-current



setting.

1. Turn down the vari-AC, switch it on and turn it up to 115 V (measured).

2. Measure P_{in} and V_2 , P_{out} is obviously zero (the 0 W measurement). V_2 is your no-load voltage (V_{NL}).

3. Turn down the vari-AC.

4. Get one of the big resistors from your TA– be careful, it may be HOT! Hook it up as R_L.

5. **Slowly** and **carefully** turn up the Vari-AC until 2.2A flows in the secondary OR the primary voltage is 115 V (measured), whichever is first. If you reached the current first, turn the vari-AC down again– something is wrong.

6. Measure P_{in} , I_2 , and V_2 quickly and turn down the vari-AC before the resistor gets too hot. As a check that everything is OK, calculate, P_{out} and make sure it's less than P_{in} .

7. Remove the HOT resistor and repeat steps 4 through 5 for two more resistors so that you end up with measurements for 4 different loads, approximately; 0 W, 50 W, 150 W, and 250 W.

You are now done with the lab measurements, assuming they were made correctly. If you need to leave the lab, you can check-off now and do the calculations and plots later. Either way, you will need to go back to the regular lab handout at Experiment 2 and finish up.