**Lab #1 - Voltage Regulation of a Single Phase Transformer**

**ECE 325 - Electric Energy System Components**

**Instructor: Dr. Kai Sun**

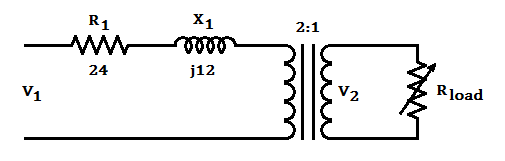
**Lab TA’s: Denis Osipov and Wenyun Ju**

**Objective:**

The objective of this lab is to correlate the calculated voltage regulation of a single phase transformer with the regulation observed in the laboratory, and also to make general observations about transformers.

**Pre-lab:**

The laboratory transformer is to be used as a 220/110 volt transformer (see Figure 1). The series impedance, referred to the 220 volt side, is approximately (24+j12) Ω.



**Figure 1**

1. State the voltage and current relationships of an ideal transformer.
2. List some reasons why real world transformers are not ideal.
3. Define voltage regulation.
4. Assuming a purely resistive load, calculate and plot the relationship between secondary terminal voltage (V2) and secondary current (I2) for a 220 volt primary voltage (V1) and a maximum secondary current (I2) of 2 amps.
5. Draw a circuit diagram showing how the relationship between secondary voltage and current can be measured in the laboratory. Indicate sources, variable load, voltmeters, and ammeters.

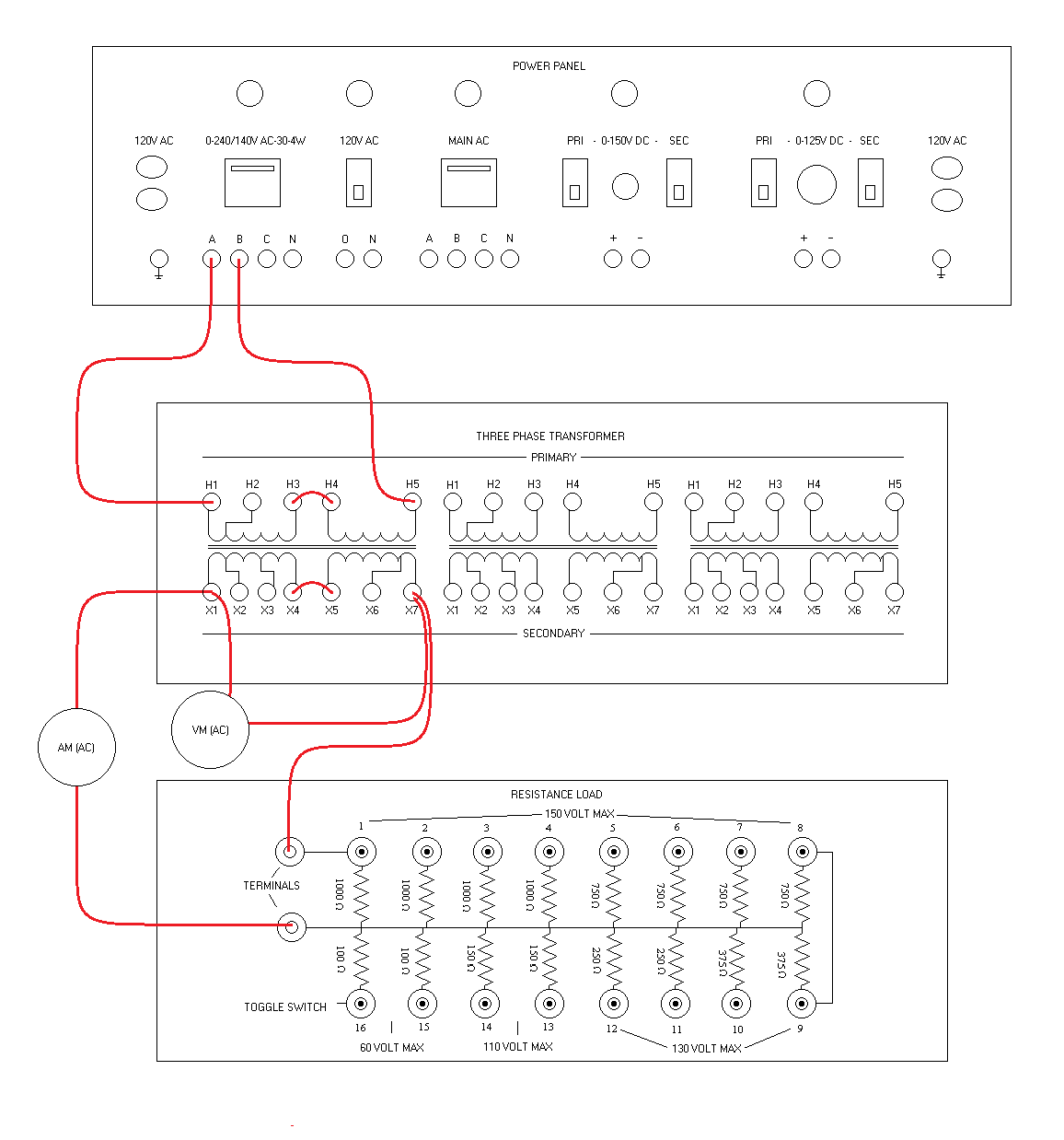
**Lab Exercise:**

1. Connect the circuit from the Lab # 1 Wiring Diagram.
2. Record enough readings of V2 and I2 to compare with calculated values.

**Calculations and Comparisons:**

1. Compare the experimental and calculated results.
2. Calculate the voltage regulation.
3. Why was the excitation branch not included in the calculations? Did neglecting this excitation branch cause any problems?

**Lab #1 Wiring Diagram:**

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