


Experiment  <b>0</b>	<b>The University of Texas at Tyler</b> Department of Electrical Engineering <b>Electric Power Systems Lab (EENG 4110)</b>	
----------------------------	--	---

# Equipment Familiarization

## The Student Guide

This student guide was conceived to help the lab student to keep a safe working environment during the lab sessions. If followed, these guidelines given here will help you to get the most out of the Electric Machines Laboratory.

### Part A: Safety in the Laboratory

There are three main types of risk the student could be exposed to when working in the electrical machinery laboratory, which are electric shock, mechanical injury and burn risk. These are, however, avoidable risks and do usually happen when the student fails to follow the instructions given by the laboratory manual by the lab instructor. Caution: High voltages are present in these laboratory experiments! In order to make safety a priority in the laboratory, the following are the rules every laboratory instructor must enforce:

- 1) Drinking, eating and smoking are prohibited in the lab.
- 2) You must wear clothes that can protect you against scratches and falling objects.
- 3) You must not talk to students of other groups during the lab experiments.
- 4) Check your circuit before energizing (your instructor must always check the connections after you).
- 5) If any device or instrumentation equipment is burning or smells like it, turn off the power supply immediately and DO NOT touch anything, some equipment or cables could be burning hot. Call your instructor to check the circuit again.
- 6) Don't ever allow yourself to be distracted while performing an experiment.
- 7) Be careful when moving around your experiment workbench.
- 8) Prior and after the circuit is energized work only with one hand at a time. A current between two hands crosses your heart and can be more lethal than any other electric shock your body may be subjected to.
- 9) After using passive loads (especially resistance modules) do not touch them inside while moving them because they could be burning hot.
- 10) If you don't know or don't remember a procedure, ASK YOUR INSTRUCTOR.
- 11) Always check that the power is off when making connections in the circuit.
- 12) The power should be turned off right after completing each individual measurement.

To maximize the safety and the instructor's time in checking your circuits you MUST ALWAYS follow these guidelines:

1. The circuit will be connected with NO instrumentation first. This will give you the certainty that your circuit has been connected correctly.
2. You will choose the line in which current will be measured and then substitute that line with the ammeter with the necessary connection leads. This will prevent you from causing short-circuits which could challenge your safety or could damage the equipment.

## Part B: Resistance Measurements

Ensure that no voltage is present in the circuit or component under test before taking resistance measurements. Low voltage applied to a meter set to measure resistance causes inaccurate readings. High voltage applied to a meter set to measure resistance causes meter damage. Check first how to use DC and AC voltmeters. To measure resistance using an ohmmeter, apply the procedure (see Figure 1):

1. Check that all power is OFF in the circuit or component under test.
2. Set the function switch to the resistance position, which is marked as  $\Omega$ .
3. Plug the black test lead into the common jack.
4. Plug the red test lead into the resistance jack.
5. Ensure that the meter batteries are in good condition. A battery symbol is displayed when the batteries are low.
6. Connect the meter leads across the component under test. Ensure that the contact between the test leads and the circuit is good.
7. Read the resistance displayed on the meter. Check the circuit schematic for parallel paths. Parallel paths with the resistance under test cause reading errors. Do not touch exposed metal parts of the test leads during the test. Resistance of your body can cause reading errors.
8. Turn the meter off after measurements are taken to save battery life.
9. Voltmeters will be connected last. This will simplify the connections for you since voltmeters are always connected in parallel to measurement points.
10. The wattmeter is to be connected between the circuit and the power supply.

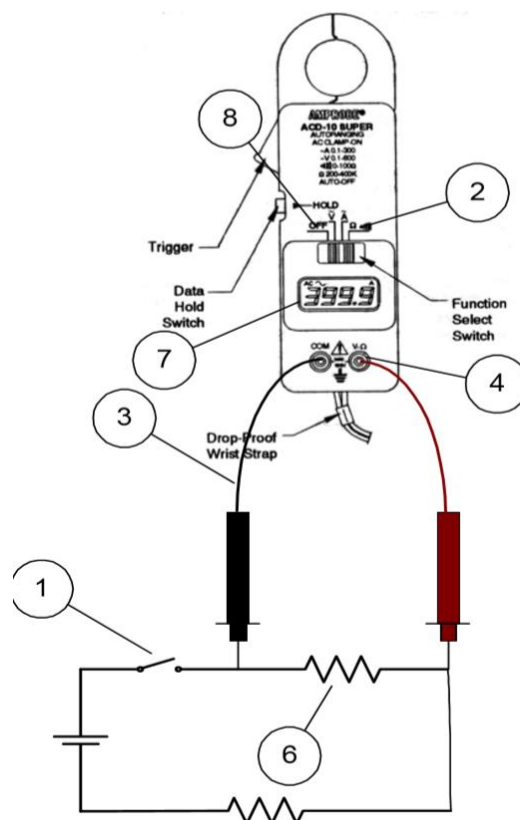


Figure 1: Resistance Measurement.

## Part C: Equipment Familiarization (see Figure 2)

**CAUTION!** – High voltages are present in this Experiment. DO NOT make any connections with the power supply ON. Get in the habit of turning OFF the power supply right after every measurement.

### 1. Familiarize yourself with the single-phase transformer

- 1.1 Read and record the name-plate data of the single phase transformer in your power lab
- 1.2 Inspect the primary circuit of the transformer and record the voltage and current ratings
- 1.3 Inspect the secondary circuit of the transformer and record the voltage and current ratings
- 1.4 Calculate the transformer voltage ratio

### 2. Familiarize yourself with the DC machine

- 2.1 Read and record the name-plate data of the DC generator/motor
- 2.2 Inspect the different excitation circuits and ratings of these circuits
- 2.3 With a digital multi meter measure and record the DC resistance of the different excitation circuits.
- 2.4 Inspect the armature circuit of the DC machine and record the current and voltage ratings

### 3. Familiarize yourself with the three-phase induction motor

- 3.1 Read and record the name-plate data of the three-phase induction motor
- 3.2 Inspect the type of motor we have in the lab (refer to the rotor circuit, if any!)
- 3.3 Inspect the type of stator connection (Y/D!)
- 3.4 With a hand-held digital multi-meter, measure the stator-winding DC resistance per phase
- 3.5 Do you think the motor speed is controllable?

### 4. Familiarize yourself with the synchronous machine

- 4.1 Read and record the name-plate data of the synchronous machine
- 4.2 Inspect and record the ratings of the excitation circuit
- 4.3 Inspect and record the ratings of the armature circuit
- 4.4 What is the number of poles

### 5. Familiarize yourself with the single-phase ac motor

- 5.1 Read and record the name-plate data of the single-phase induction motor
- 5.2 Inspect the starting and running circuitry of the machine

## Report requirements

1. Write a paragraph about each device/machine in your report.
2. Write down the name-plate data of each device/machine in the laboratory
3. Unless otherwise, requested by the instructor, all the lab results have to be compiled and edited on computer.
4. Even though students will work in groups, each student will submit his/her own lab report.



Figure 2: Labvolt Equipment.