

PLC121 LAB 2.2: OVERLOAD AND SHORT-CIRCUIT A CIRCUIT BREAKER

Student Name: _____

Student ID: _____

LAB OUTCOMES:

Upon completion of this lab procedure, the student should be able to:

1. Identify the 120VAC portion of the ACDC training unit.
2. Measure AC current with the DMM.
3. Explain how a circuit breaker responds to an overload condition.
4. Explain how a circuit breaker responds to a short-circuit condition.
5. Explain the correlation between the amount of overload current and trip time.

LAB PROCESS:

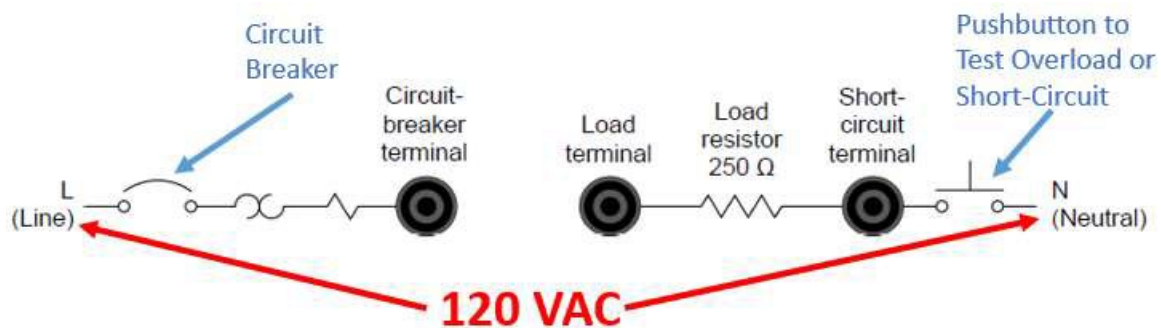
Open the AC/DC Training Unit. Setup the unit on its base, or lay flat on the work table.

Make sure all fault switches are in the 0 position.

Connect the power cord and turn off the power input switch to make sure the unit is not powered.

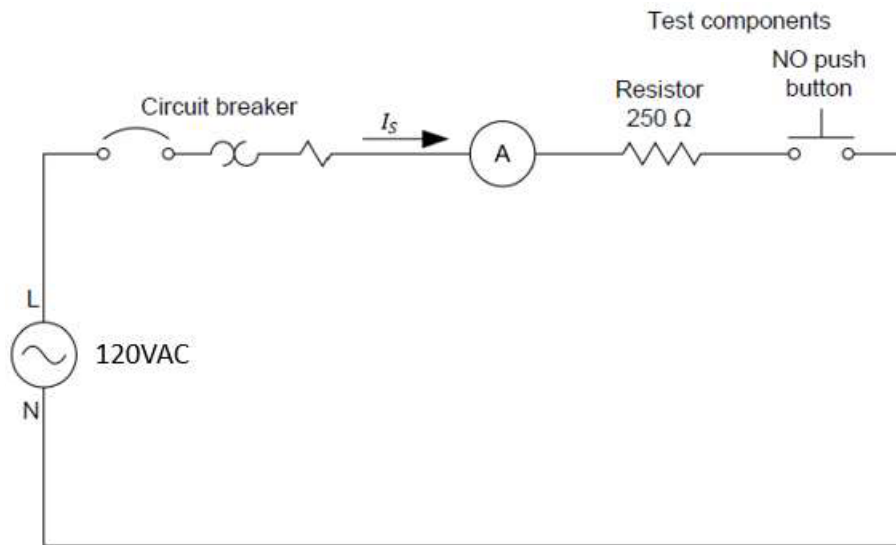
Part 1

On the bottom left portion of the AC/DC training unit, there is a 120VAC section as shown below. The 120VAC terminals are not directly accessible. Notice that L1 (what we term as the Hot line on a 120 system) is wired to a breaker. The other side of the breaker is wired to a terminal. This terminal is much bigger than the others used in the course thus far. It is a yellow connector that will also plug into the DMM.



Part 2

Wire the following circuit on the AC/DC training system:



Put the DMM on the 10A DC-AC scale. Make sure the 10A connector on the meter is used.

1. Power on the “Power Input” switch (lower right) to power the training unit.
2. Calculate the current that should flow in the circuit.

Calculated value= _____

Note that the resistor is probably a wire wound resistor that has inductive characteristics, thus the calculation and measured values may not directly align.

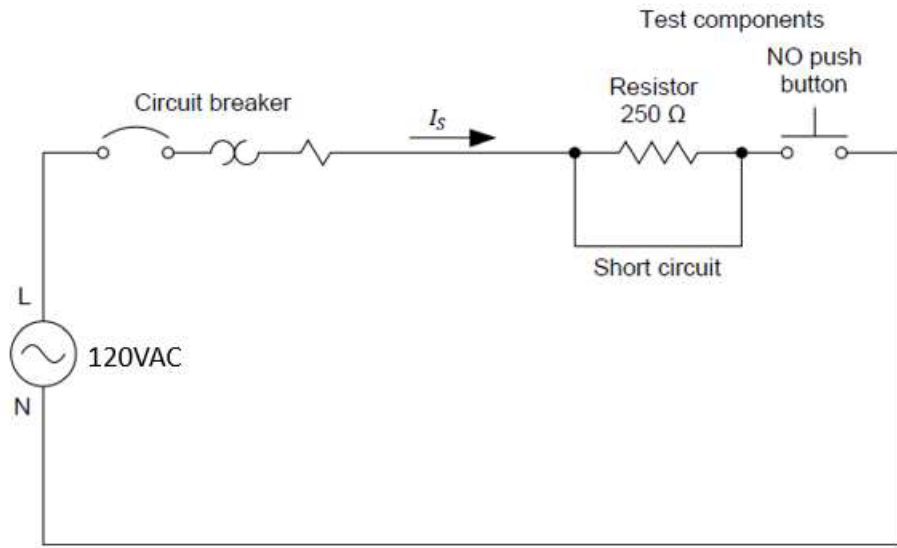
3. Push and hold the “Test” pushbutton. You may hear a slight buzzing.
4. What current does the DMM for AC Amps read?

Does the measured value exceed the current rating of the circuit breaker?

5. Does the circuit breaker trip?
6. How long does it take for the circuit breaker to trip out?
7. Power off the “Power Input” switch to power off the training unit

Part 3

Wire the following circuit on the AC/DC training system:



1. Power on the "Power Input" switch (lower right) to power the training unit.
2. Explain the correlation between the amount of overload current and the amount of time it takes to trip a circuit breaker.
3. Notice that the one yellow wire shorts out the 250 ohm resistor, thus there will be 0 ohms in the circuit to limit the current.
4. Press the "Test" pushbutton.

Does the circuit breaker trip out?

How long did it take for the circuit breaker to trip out?

Why did the circuit breaker trip sooner in this circuit than in the circuit in Part 2?

5. Power off the “Power Input” switch to power off the training unit.

Questions

1. True or False: A short circuit condition should trip a circuit breaker immediately.
2. In a short circuit condition, what is the amount of resistance in the circuit?
 - a. 0 ohms
 - b. Infinity ohms
 - c. 10 ohms
 - d. 10 M ohms
3. Why are larger wires used in this lab as compared to previous labs on this training unit?
4. True or False: A slight overload in a circuit will trip a circuit breaker immediately.
5. Why is the 10A range used on the meter, versus the mA setting to measure current?

The outcomes of this exercise (listed on page 1) specifies the skills that the Student must demonstrate to the Instructor. Once the Instructor is satisfied with the demonstration of Knowledge & Skills by the individual student, they will sign this document (for the student), then enter a 100% into the Hands-On Lab grade in Sakai.

I verify that this student has completed all of the requirements of this Hands-On Assessment:

Student Name: _____

Faculty Signature: _____ Date: _____

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