Electrical Test Equipment Lab

Program: Electrician Technician

Course: EL120 Introduction to Electrical Theory

Objectives: Under the supervision of your instructor, you should be able to do the following:

- Measure the voltage in your lab from line to neutral, neutral to ground, and line to ground using an analog meter.
- Measure the voltage in lab from line to neutral, neutral to ground and line to ground using a digital meter.
- Properly use an ohmmeter to test continuity.
- Properly read a plug-in receptacle tester.
- Properly use a non-contact tester.
- Explain safety hazards of measuring.

Lab Equipment:

- Motor

Required Tools:

- 1 – Analog multi-meter
- 1 – Digital multi-meter
- 1 – Ammeter
- 1 - Megohmmeter
- 1 – Non-contact voltage tester
- 1 – Plug-in receptacle tester

Materials:

- 6’ piece of wire (Romex or THHN)
- 9 Volt battery (*any size battery will work*) **Safety (PPE):**
- Safety glasses/goggles

NOTE: Prior to beginning this lab assignment NFPA 70E, "Safety Standard Levels of Risk," categorized 0,1,2 3 and 4 shall be reviewed. Instructors and students MUST comply with these safety standards by wearing appropriate PPE.

Reference NFPA 70E, Article 130.

Resources:

- 2017 NFPA 70, National Electrical Code

Shop Maintenance:

- All work will cease 20 minutes prior to the end of class.
- All work areas must be cleaned.
- Tools and equipment must be cleaned and returned to the designated areas (cage, tool room, cabinets etc.)
- Any broken or missing tools must be reported immediately.
- Tools and equipment are students' responsibility

Required Time: 180 minutes.

Procedures: (Eye protection must always be worn)

Analog multimeter

1. Turn the dial of the meter to AC 200Ṽ.
2. Measure a receptacle by doing the following:
    a. Measure the amount of voltage from line to neutral.
    b. Measure the amount of voltage from line to ground.
    c. Measure the amount of voltage from neutral to ground.
3. Turn the dial to DC 200V or the 9V battery position.
4. Verify that the black lead is on the "com" and the red lead is on the multi- meter setting.
5. Test a 9V battery and verify the voltage.
6. Reverse the leads and test the 9v battery again (should get negative reading).
7. When completed turn the dial back to the "off" position.

Digital multimeter

1. Turn the dial of the meter to AC 200Ṽ.
2. Measure a receptacle by doing the following:
    a. Measure the amount of voltage from line to neutral.
    b. Measure the amount of voltage from line to ground.
    c. Measure the amount of voltage from neutral to ground.
3. Turn the dial to DC 200V or the 9V battery position.
4. Verify that the black lead is on the “com” and the red lead is on the multi- meter setting.
5. Test a 9V battery and verify the voltage.
6. Reverse the leads and test the 9v battery again (should get negative reading).
7. When completed turn the dial back to the “off” position.

Ohmmeter/continuity

1. Turn the multi-meter dial to ohms, continuity or a symbol representing either.
2. Put one lead on end of a piece of wire, and then place the other lead on the opposite end of the same piece of wire and check for continuity.

Ammeter

1. Turn the dial of the meter to the “A- AC/DC” setting.

2. Measure the amps being used by opening the clamp and closing it around one single wire that is carrying a load.
3. Make sure the clamps close securely.
4. Read the measurement on the ammeter.

Megohmmeter

1. Connect the red lead (coming from “V” on the meter) to the lead of a motor.
2. Connect the black lead (coming from “G” on the meter) to the chassis or body of motor.
3. Turn the dial on the meter to 2000Ω (continuity symbol) setting.
4. Have instructor verify reading.

Non-contact tester

1. Test the right side of a receptacle and check for voltage.
2. Test the left side of a receptacle and check for voltage.
3. Test the bottom hole of a receptacle and check for voltage,
4. Hold the non-contact tester next to a live Romex, cord, or MC cable and check for voltage.

Plug-in receptacle tester

1. Plug in the tester to a receptacle in the lab, read the results.