



Install a 120V Grounded Branch Circuit

Program: Electrician Technician

Course: EL120 – Introduction to Electrical Theory:

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

- Explain the purpose of grounding and bonding and the scope of NEC Article 250.
- Distinguish between a short circuit and a ground fault.
- Define the National Electrical Code® (NEC®) requirements relating to bonding and Grounding.
- Distinguish between grounded systems and equipment grounding.
- Explain the importance of bonding equipment in clearing ground faults in a system.
- Explain the purposes of the grounded conductor (neutral) in the operation of overcurrent devices.

Lab Equipment:

- One wood project board (plywood sheet or equivalent), or lab bay
- One 120V pigtail with cap (plug)
- Two metal switch boxes with internal cable clamps
- Two 120V duplex receptacles
- Two duplex receptacle cover plates

Required Tools:

- Flat head screwdriver
- Phillips head screwdriver
- Tape measure
- Wire Strippers
- Wire cutters
- Needle-nose pliers
- Lineman Pliers
- Multimeter

Material:

- 2 – Ground clips
- 6 sheet metal or weed screws for mounting boxes.
- 12' -14/2 AWG NM cable
- 3 wire nuts

Safety (PPE):

- Safety glasses
- Hard hats if working in lab bays.



Required Time: 120 Minutes

Shop Maintenance:

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

Resources: N/A

Procedures:

1. Secure two metal device boxes to the board as illustrated in Figure 1.
2. Install a short piece of 14/2 AWG NM cable between box A and box B as shown, securing the cable in each box with the internal cable clamps and leaving a minimal 6" of wire past the top of the box.
3. Strip the NM cable in Box B and pigtail the grounding conductor in the NM cable with two other 9" pieces of bare ground.
4. Connect one of the grounds to the grounding screw on the receptacle and the other to the grounding clip on the device box as shown in Figure 2
5. Terminate the circuit conductors (black and white wires) to the proper screws on receptacle.
6. Have your instructor check your connections before securing the receptacle to the box and installing the cover.
7. Secure the receptacle to the box with its two mounting screws (6/32) and install the receptacle cover.
8. Install the wire end of the 120V pigtail into Box A, securing it in place with the cable clamp. Splice the grounding conductor in the pigtail to the grounding conductor in the NM cable coming from Box B and to two prepared grounding jumper wires. Connect one grounding jumper to the grounding screw of the receptacle and the other to the grounding clip installed on the device box.
9. Terminate both sets of circuit conductors (black and white wires) to the proper terminal screws on the receptacle.
10. Have your instructor check your connections before securing the receptacle to the box and installing the cover.
11. Secure the receptacle to the box and install the receptacle cover.
12. Energize the circuit (plug in the pigtail) only under the direction of your instructor.
13. Under the direct supervision of your instructor, use the multimeter to check voltage between the shorter slot on the receptacle and the metal box. The meter should read approximately 120 volts. This receptacle terminal is connected to the ungrounded current-carrying conductor.
14. Under the direct supervision of your instructor, check the voltage between the longer slot on the receptacle and the metal box. The meter should read zero volts. (Digital meters may read an insignificant level of transient voltage). This receptacle terminal is connected to the grounded current-carrying conductor.



15. Finally, check the voltage from the grounding slot on the receptacle and the metal box. The reading should be like the previous reading, approximately zero volts. This is the equipment grounding terminal. 16. De-energize the circuit and follow the instructions of your instructor.



