

Home Electrical Wiring

Types of Receptacles and Wiring
them for 120v – 15Amp/20Amp

Understanding the wires

- You have 3 wires in a home electrical system;
 - Hot (Black wire) - dangerous one
 - Neutral (White wire)
 - Ground (bare copper or green wire).
- To make things work you need to have the **hot wire** and the **neutral wire** connected to the appliance (load).
- The neutral wire and the ground wire are actually one in the same. If you trace back to the breaker panel you will find that the two are connected together.
- The ground wire is used as a safety on loads where the enclosure is made of metal and the potential for electrical shock is present. If the hot wire shorts out some how, the ground wire which is attached to the metal will prevent you from getting electrocuted as electricity takes the path of least resistance.



Wiring Size for Standard Circuits

(Bedroom, bathrooms, living room, etc)

- 14 gauge wire is the standard for 15amp circuits and 12 gauge is the standard for 20amp circuits.
- Wiring comes packaged in different sizes and number of conductors. The most common in a house are;

- 14/2 (black, white, bare)

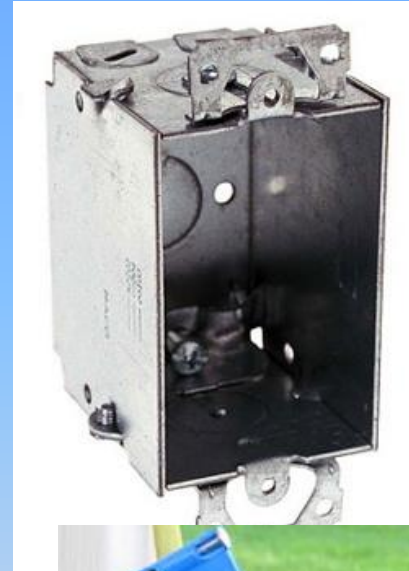


- 14/3 (black, white, red, bare)



Types of Receptacle Boxes

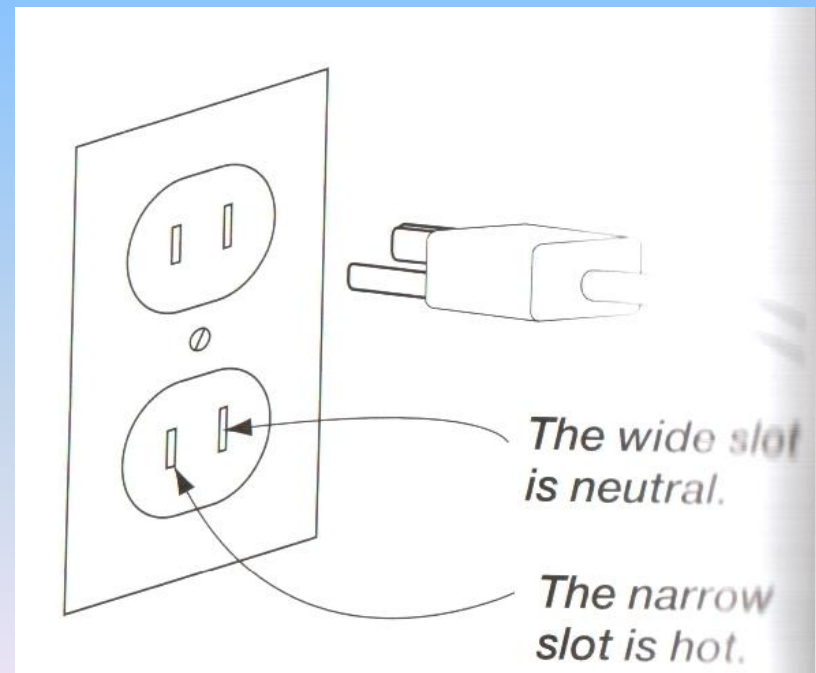
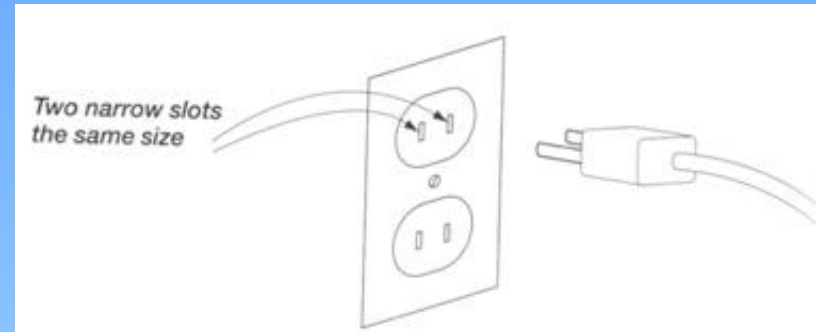
- Metal vs Nonmetallic, that is the question.
- Nonmetallic is cheaper, non conductive, faster to install. Hit them too hard and they can crack or damage.
- Metal are stronger, can be added to, more designs.
- Regardless of type, they need to be grounded. There will be a screw located on the inside that the ground wire **MUST** always be attached to.



Polarity of Receptacles

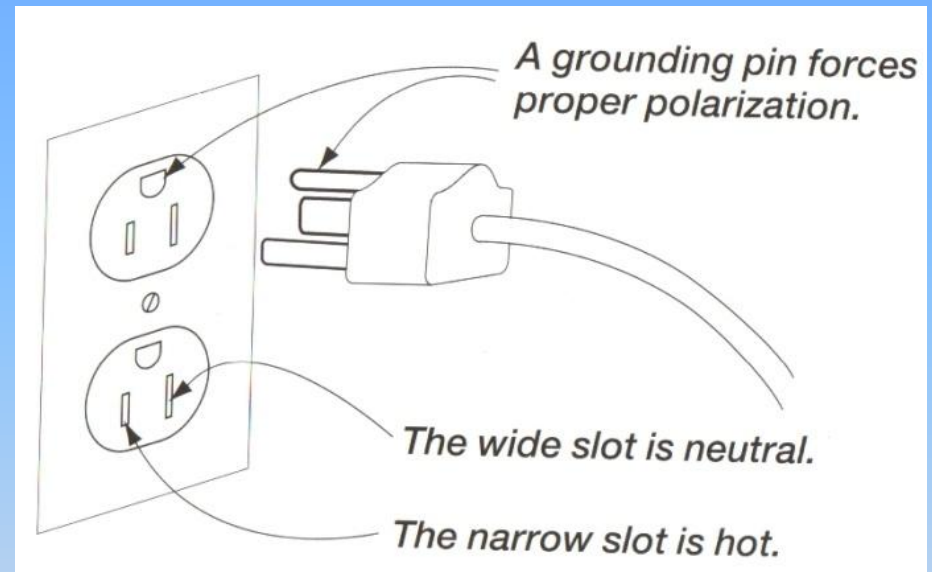
Very old style – Non-polarized, ungrounded, hot and neutral could be reversed. Potential of electrocution if hot wire is exposed or you touch it.

Older Style – Polarized but Ungrounded The wider slot is neutral, the narrow slot is the hot



Modern Receptacles

- **Modern Style – Polarized and Grounded.** The wider slot is neutral, the narrow slot is the hot. The ground pin forces proper polarity.
- ****Proper installation of a receptacle is with the Ground facing up.**



Types of Receptacles



Standard 15amp Receptacle

- Different quality, you get what you pay for.
- Cheap receptacles have plastic that breaks easily and have little metal.



20amp Receptacle

- A 20 Amp receptacle can be used for heavy duty appliances
- The additional horizontal slot ensures a 20Amp appliance can only be put into this receptacle
- A 20 amp circuit breaker will be installed in the service panel.
- Other appliances can still use this receptacle



Ground-Fault Circuit Interrupt

- A GFCI compares the current running to the load (eg power tool) with the current coming from the load. They should be equal. If the 2 are different it will trip the circuit with as little as .006Amp.
- It trips in 1/25 to 1/30 of a second. You will still feel a mild shock (pin prick)
- Should be installed in kitchen, bathroom, decks, porches, garages, crawlspace, job site. Required in Bathroom or on kitchen counter tops near sink.

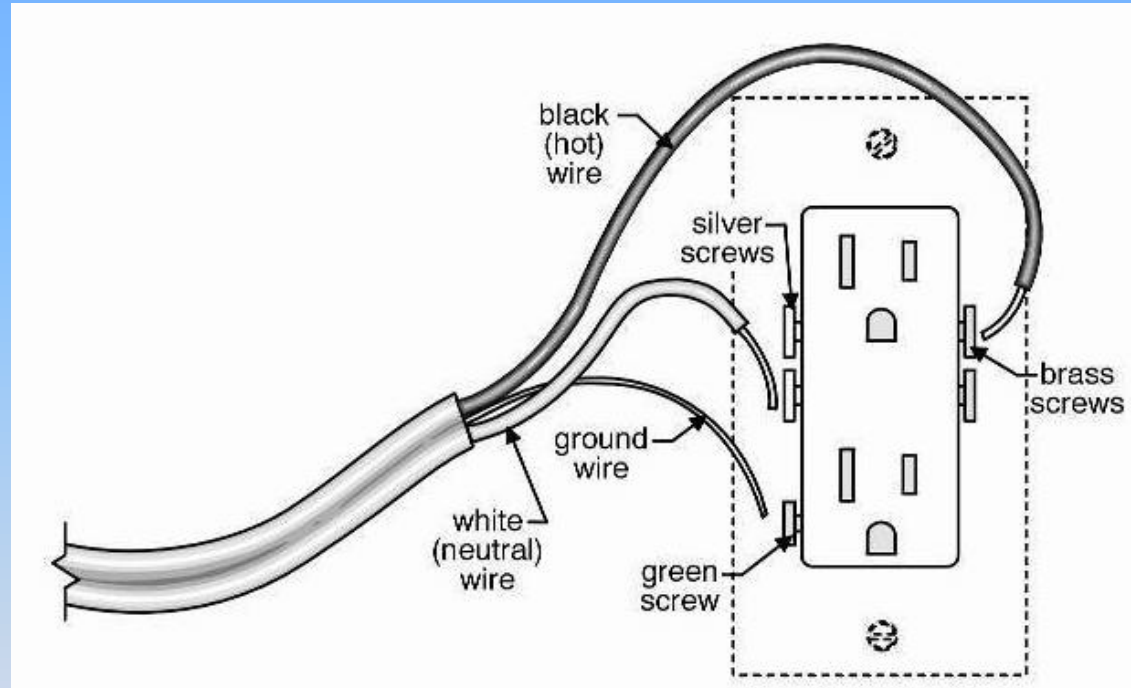


Installing wires on a Receptacle

Hot (Black) is Brass screw

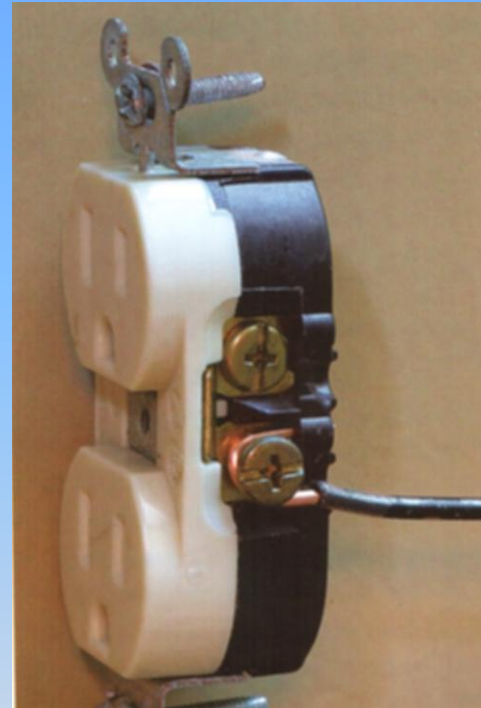
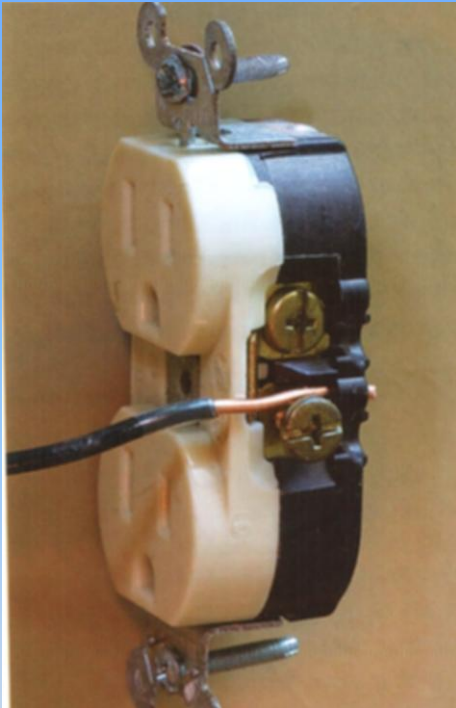
Neutral (White) is silver screw

Ground (Bare) is green screw



*****This drawing does NOT show the grounding wire attached to the receptacle box*****

Installing wires on a Receptacle



- Strip approximately 1" off the hot and neutral wires.
- Insert the wire from the front of the receptacle then bend it around the screw and out the back. Tighten the screw. Make sure there isn't any bare wire sticking out past the back of the receptacle.

Connectors

- There are many different types of connectors. They are used to connect wires together in outlet boxes. In some cases you may have to use several in one box.
- The most common are twist on. You simply bare the wires you will be joining, twist them clockwise, then twist on a connector. Just make sure the plastic covers the exposed bare wire.



Lab #2

(Installing a receptacle)

1. Ensure you have a wire running into the RIGHT receptacle box. There should be 6" of loose wire sticking out. Find a receptacle in the drawers at the back that DOES NOT have the tab broken on the brass screw side (Hot) of the receptacle.
2. Strip approximately 1" off the hot and neutral wires.
3. Insert the Hot wire (black) in from the front of the receptacle on the brass screw side (narrow slot), then bend it around the screw and out the back. Tighten the screw. Make sure there isn't any bare wire sticking out past the back of the receptacle.
4. Insert the Neutral wire (white) in from the front of the receptacle on the silver screw side (wide slot), then bend it around the screw and out the back. Tighten the screw. Make sure there isn't any bare wire sticking out past the back of the receptacle.
5. Attach the ground wire. There are a couple of ways to do this.
 1. Attach the ground wire to the grounding screw on the receptacle, then attach a short piece from the grounding screw to the receptacle.
 2. If there enough extra wire, wrap the ground wire around the grounding screw in the box, then wire it to the receptacle
6. Finally, carefully push the wires back into the box – Ground 1st, Neutral 2nd, Hot Last. Now, screw the receptacle to the receptacle box.
7. Use a multi-meter to check to see if you have the correct polarity or it will short circuit.
8. Have the teacher check your receptacle and put power to it.

Lab #3

(Installing a second receptacle)

1. From Lab #1, make sure you have the second wire running out of the receptacle box on the right down and along the bottom of your frame and up into the left receptacle box. Both ends should have between 6-8 inches of wire sticking out. Strip approximately 1" off the hot and neutral wires at both receptacle boxes if it is not already done.
2. Remove the first receptacle from the box. Attach the three loose wires that are not connected to the receptacle; hot to hot, neutral to neutral and ground to ground.
3. In the LEFT receptacle box now connect another receptacle. Hot wire (black) onto the brass screw, neutral wire (white) onto the silver screw and ground wire to the green screw and the box.
4. Carefully push the wires back into the boxes – Ground 1st, Neutral 2nd, Hot Last. Finally, screw the receptacles to the receptacle box.
5. Use a multi-meter to check to see if you have the correct polarity on both receptacles. Hot is the small blade, neutral is the longer blade and the grounds are connected.
6. Have the teacher check your receptacles and put power to it.

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