

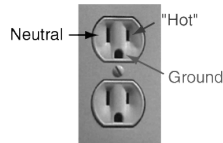
## Starting to Understand Electricity

1. amperes (amps) = current (rate of flow)  
volts = force (pressure of flow)  
watts = power (work)
2. Wiring is rated to support a maximum rate of flow, measured in amps
  - Circuits are designed to carry 85% of their rated load.
  - If a circuit is required to support its maximum rated load for a period of time, it will become hot, and fuses will blow or circuit breakers will switch off.
  - It is important not to exceed the maximum amperage rating of the wiring
  - Overloading circuits can result in fire or electrocution
3. The relationship between amps, volts and watts can be illustrated with this equation:  
**amps = Watts/Volts (W=Va)**
  - In the US, standard household current is 120 volts
  - If you are using a 1000watt lamp, the total amps would be  $1000/120=8.33\text{amps}$
  - For speed and safety reasons, we calculate “paper amps”. A 1000watt lamp has 10 “paper amps” This provides the safety margin so that we will not overload a circuit.  $650\text{w} = 6.5 \text{ paper amps}$  and  $200\text{w} = 2 \text{ paper amps}$  (divide the watts by 100 to calculate paper amps)
  - In other words, each 100 watts draws 1 amp (paper amp)
4. Scouting your location
  - Prior to your shoot, locate the fuse box at your location and check to see if there are circuit breakers or fuses. If there are fuses, be sure to buy some extras in case you “blow a fuse”.
  - If you must replace a fuse, always replace it with one of the same amperage rating. **Never replace a 15amp fuse with a 20amp fuse!**
  - Never overload an electrical circuit.
  - Whenever possible use a ground fault circuit interrupter (GFCI).
  - Circuits are typically either 15 amps or 20 amps
  - Look on the circuit breakers or fuses to see the maximum limit of the circuits you are using.
  - Household wiring is designed (normally) so that adjoining walls share an electrical circuit. When plugging in your lighting, be sure to distribute the load throughout your location so as not to risk an electrical overload. Overloaded wiring can become hot and dangerous.
  - Test your outlets to make sure that they are properly grounded.
  - Always keep safety at the forefront of your mind. While the right equipment is important, it is no substitute for common sense.

## Working with Lighting Instruments

### Safety Procedures

- confirm that your electrical outlets are properly grounded
- check your fuse box to ensure that you will not be overloading a circuit
- calculate your paper amps and keep your power draw distributed across several circuits
- Always wear gloves
- Always wear rubber soled shoes
- Only use grounded lamps with grounded extension cords with grounded outlets. (three prong)



- Always place a sand bag on the stand once the lamp has been set so that it cannot fall over
- Always keep plenty of space around the burning lamp so that curtains, walls, ceilings, etc. are not in danger of catching fire
- Never throw water onto an electrical fire
- Always keep a fully charged chemical fire extinguisher available when filming
- Never touch a Quartz light bulb with your bare hands--ever. The oils from your fingers will bubble on the surface when the lamp gets hot and the bulb can explode.

### **Changing an Halogen Light Bulb**

Never touch the bulb with your bare hands. The oils from your hands (fingers) can severely reduce the life of the bulb, and can result in a dangerous explosion of hot glass. Never touch a hot bulb which could result in severe burns. Never replace the bulb in a lamp without first unplugging it.

Each new bulb comes wrapped in plastic or paper. You should use this material as a barrier between your fingers and the bulb until it is installed. Then you can remove the material having never touched the surface of the bulb with your fingers.

If you accidentally touch a halogen bulb with your fingers, clean it thoroughly with 90% isopropyl alcohol and allow it to dry completely before using it.

If a lamp burns out on set, it is best to unplug it, replace the head with another similar unit and wait for the bulb to cool until it can be replaced safely. It is also important to place a piece of paper tape across the front of the fresnel with the initials B.O. written on it with a black sharpie. (B.O. stands for burned out) This will prevent the lamp from being brought to set only to learn again that it does not work.

If you suspect that the bulb is fine, but the switch is not working – then place your B.O. tape on the switch.