

ELECTRICAL SAFETY POINTERS

- Cover electrical outlets with child-proof covers if they are within reach of small children
- Don't use devices that have a frayed or exposed power cord
- Always unplug an electrical device before disassembling it
- Don't put anything into an electrical outlet - except a proper plug for an electrical device
- Don't overload an electrical circuit, by trying to operate too many devices at once
- Don't bypass safety precautions when you are in a hurry
- Pull on the plug, not the wire
- Never remove the third prong from a 3 prong plug

The third prong of a 3 prong plug is a **ground wire**, connected to the ground wire of the building, in case of a short circuit. Fuses and circuit breakers interrupt a circuit when there is too much current flowing through it. Fuses contain a thin piece of metal designed to melt if the current is too high. Circuit breakers, on the other hand, trip a spring mechanism, which shuts off the flow of electricity through the circuit, when there is too much current. It can be reused over and over (provided the cause of the increased flow is corrected).

- Never handle electrical devices if you are wet or near water

Home Electric Safety



Protect yourself from electrical shock by using only  approved electrical devices.

The **Underwriters Laboratory** issues labels to identify the amount of voltage required to operate electrical devices and the maximum current they use.

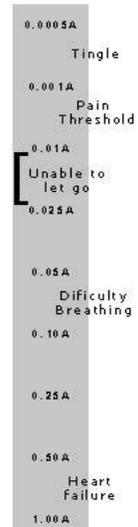
Electric Safety Outdoors

A lightning strike can have 30,000A - more than enough to kill you. Avoid being the target of a lightning strike, by staying low to the ground (horizon) and away from trees. Lightning can also do a lot of damage to a building. Metal lightning rods connected to the ground with a grounding wire are fixed on the roof of many buildings to prevent damage to the building during an electrical storm.

High voltage power lines carry 50,000V of electricity. However, amperage is more important to consider. 0.001A will likely not be felt at all, 0.015A to 0.020A will cause a painful shock and loss of muscle control (which means you will not be able to let go of the line). A current can be fatal as low as 0.1A.

Electrical dangers vary, depending on the situation. When the current can flow easily, it is more dangerous. Insulators (such as wood, rubber and air) hamper the flow of electricity. Moisture is a good conductor of electricity, so avoid water when working with electricity.

- Never allow yourself to come into contact with anything that is touching live electrical wires.
- Never use ungrounded or frayed 2 prong electrical cords outdoors
- Do not operate electrical equipments outdoors in the rain
- Check before you dig – you could end up digging into electrical cables or wires for communication causing injury and disruption.



CIRCUITS

Circuit Elements and Diagrams

A circuit is a pathway that allows the flow of electricity. Most electrical circuits use wires (as conductors), although others may use gases, other fluids or materials.

All circuit diagrams have four basic parts:

- source - provides energy and a supply of electrons for the circuit ... **Battery**
- conductor - provides a path for the current ... **Wires**
- switching mechanism - controls the current flow, turning it off and on, or directing it to different parts of the circuit ... **Switch**
- load - converts electrical energy into another form of energy ... **Bulb**

Basic circuit symbols

| | |
|--|---|
|  WIRE |  LAMP INCANDESCENT |
| CONDUCTORS  CONNECTED |  FUSE |
|  CONNECTED | RESISTORS  FIXED |
|  HOT CONNECTED |  VARIABLE (POTENTIOMETER) |
|  GROUND |  RHEOSTAT |
|  CELL |  SWITCH |
|  BATTERY |  VOLTMETER |
|  OR |  AMMETER |

A drawing made with these symbols is called a schematic or schematic diagram.

The rules to follow when making schematic diagrams:

- Use a pencil and ruler on graph or unlined paper
- Place the components in a rectangular or square arrangement
- Conducting lines should be straight with 'right-angled' corners
- Do not cross conductors
- Be neat and make the sizes of the symbols consistent and easy to see

Types of Circuits

http://www.autoshop101.com/trainmodules/elec_circuits/circ101.html

A **series circuit** provides only one path for the current to flow.

A **parallel circuit** provides multiple pathways.

House Wiring

Practical wiring in the home uses parallel circuits. The voltage across each load is the same, and by turning on one appliance in the circuit, the energy will not be reduce to the other devices. Caution – current through wires connected to the source increases whenever another branch in the circuit is closed.

Factors affecting the Resistance of Wire

| Factor | Effect |
|----------------------|--|
| Length - | Resistance increases with length |
| Cross-section area - | Resistance decreases with area (gauge – AWG #) |
| Temperature - | As temperature increases, resistance increases |
| Material - | Determined by the structure of the atoms in the material |

Power cables are composed of many thin copper stands, separated in groups by paper insulation, and covered by a rubber insulation material, which reduces resistance and heating in the cable, while still making it flexible enough to handle.