



Use of Electricity

Circuits and Protective Devices

- In most uses, electricity flows in a pathway called a circuit. Circuits typically have a source of electric power, a conductor like copper wire, a load such as a motor or a light and a switch.
- A short-circuit is when electricity unexpectedly takes a new path with much less resistance and bypasses the load or switch in a circuit. This can produce a dangerous electrical surge with intense heat.
- Fuses and circuit breakers are protective devices that stop the flow of electricity when it reaches a dangerously high level. Circuit breakers and fuses help protect equipment and prevent fires, but they won't protect a person from getting shocked.
- Another important protective device is the ground fault circuit interrupter, which can be located in outlets or in a portable cord. Ground fault circuit interrupters, called GFCI's, detect very small changes in current and almost instantly stop the flow of electricity. Because they work so quickly and respond to small changes in current, they can protect a person from shock.

Other Terms

- **Ground** is an important electrical term. Objects are "grounded" if they are connected to the earth with a conductor. Grounded tools and equipment are connected to the earth via a "ground" prong on a cord. The ground prong is connected to a separate grounding wire inside the cord. If there were a short circuit, the surge of electricity would flow safely through the ground wire and into the earth rather than into a person or equipment.
- **Shock** is what happens to us when electric current passes through our bodies. Shocks can produce quite a range of effects, from mild tingling to severe burns, nerve damage, cardiac arrest and death.



- The two types of electrical current are **alternating current (called AC)** and **direct current (called DC)**. Alternating current is produced at electrical generating plants and is distributed to our homes, businesses and industrial settings. Alternating current is the most widely used type of electricity. It is called alternating current because the current rapidly alternates back and forth in a circuit. Direct current flows in only one direction and is the type of current produced by batteries. It's also used in precise electronic control devices. Direct current can create hazards. For example, vehicle and forklift batteries that are handled unsafely can produce dangerous sparks capable of igniting gases and causing an explosion.
- **Static electricity** is an electrical charge that builds up in objects, such as inside a storm cloud or in a person as they walk across carpet. Static electrical charges can range from a tiny spark with very little current to a bolt of lightning carrying several thousand amps of current and several million volts. Even a tiny spark can be dangerous near flammable liquids and in work settings with explosion hazards. For this reason, containers and tankers are first grounded with a bonding cable during the transfer of flammables and explosives. This helps prevent the buildup of static electricity and the release of dangerous sparks.

Remember: "No task is so important that it be done at the risk of safety."