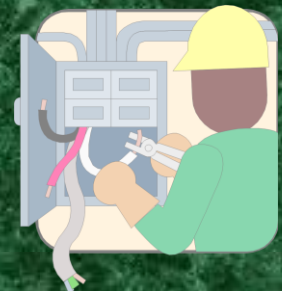


Basic Electrical Safety

- ✓ Course not designed to teach you to work on electrical equipment.
- ✓ You will not be qualified to work on electrical equipment.
- ✓ If you spot problems with electrical equipment you should report it to your supervisor.



Objectives

- Be familiar with the fundamental concepts of electricity.
- Be familiar with the effects of electricity on the human body.
- Be able to recognize common electrical hazards.



Objectives

- Be familiar with electrical protective devices.

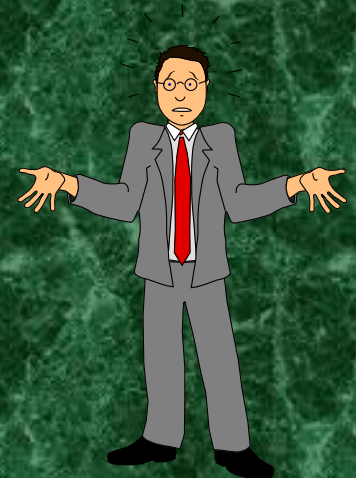
Fundamentals of Electrical Hazards

- To flow electricity must have a complete path.
- Electricity flows through *conductors*
 - water, metal, the human body
- Insulators are non-conductors
- The human body is a conductor.

Fundamentals of Electrical Hazards

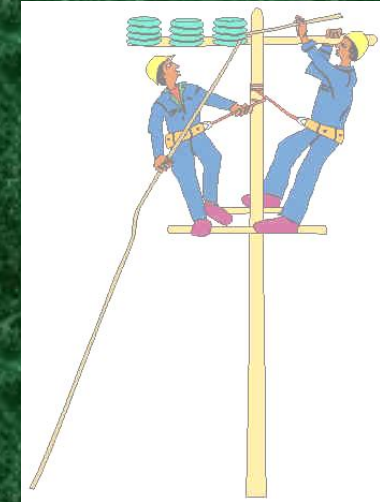
Have You Ever Been Shocked?

THE BASICS



Fundamentals of Electrical Hazards

- ✓ **More than 3 ma**
painful shock
- ✓ **More than 10 ma**
muscle contraction “no-let-go” danger
- ✓ **More than 30 ma**
lung paralysis- usually temporary
- ✓ **More than 50 ma**
possible ventricular fib. (heart dysfunction, usually fatal)
- ✓ **100 ma to 4 amps**
certain ventricular fibrillation, fatal
- ✓ **Over 4 amps**
heart paralysis; severe burns. Usually caused by >600 volts



Fundamentals of Electrical Hazards

- Hazards of Electricity
 - Electrocution/Shock/Burns/Death
- Minimum distance from overhead lines 10 ft.
- Inspect all electrical tools and equipment

Frayed, cut, broken wires
grounding prong missing
Improper use of cube taps
improperly applied or missing strain relief

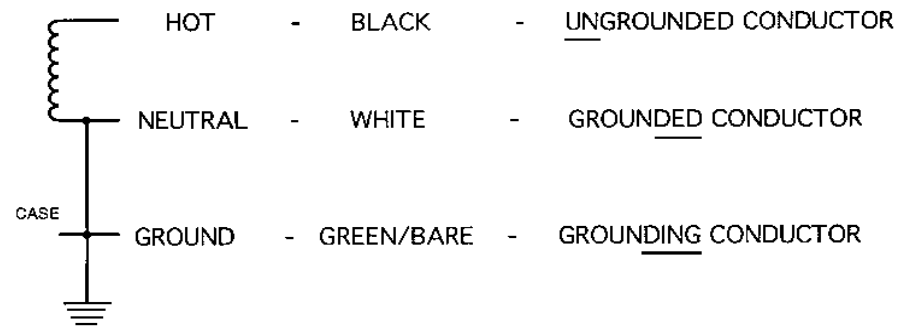
Electrical Protection

- **Circuit Breakers**
 - Provided to protect EQUIPMENT not people
 - Do not reset breakers with a line voltage higher than 120V and only reset if you know why it tripped
- **GFCI's**
 - Provided to protect people
 - Trip range 4-6ma
 - Monthly test

Electrical Protection

- **Distance**
 - If you sense the presence of an electrical hazard or exposed conductors that may be energized, keep your distance and STAY AWAY

Terminology



Electrical Grounding

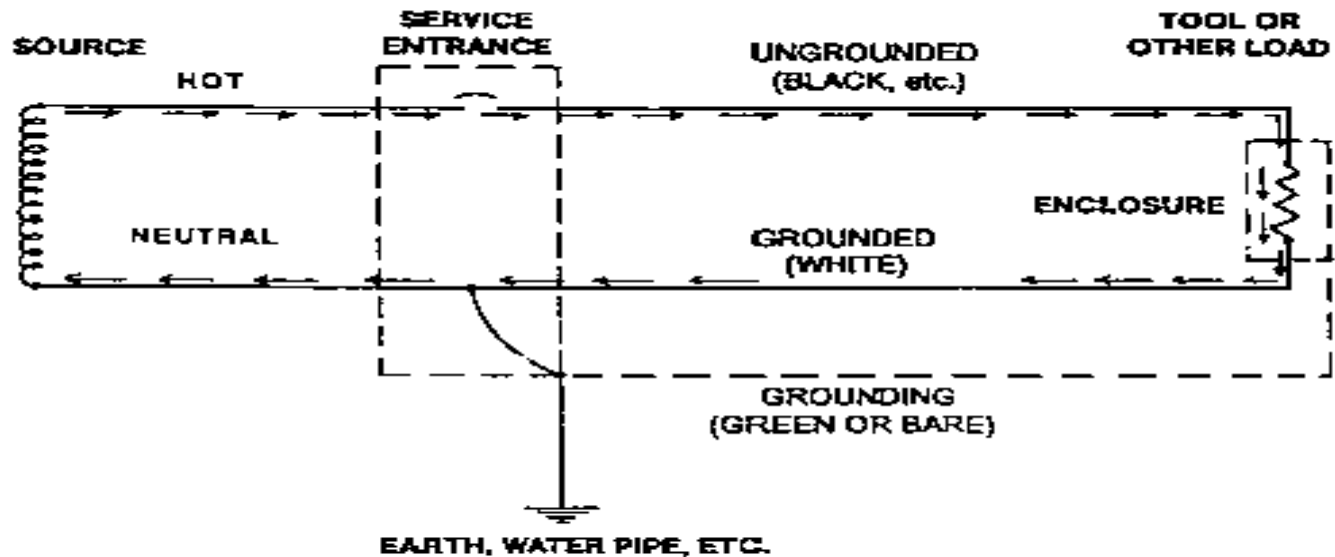
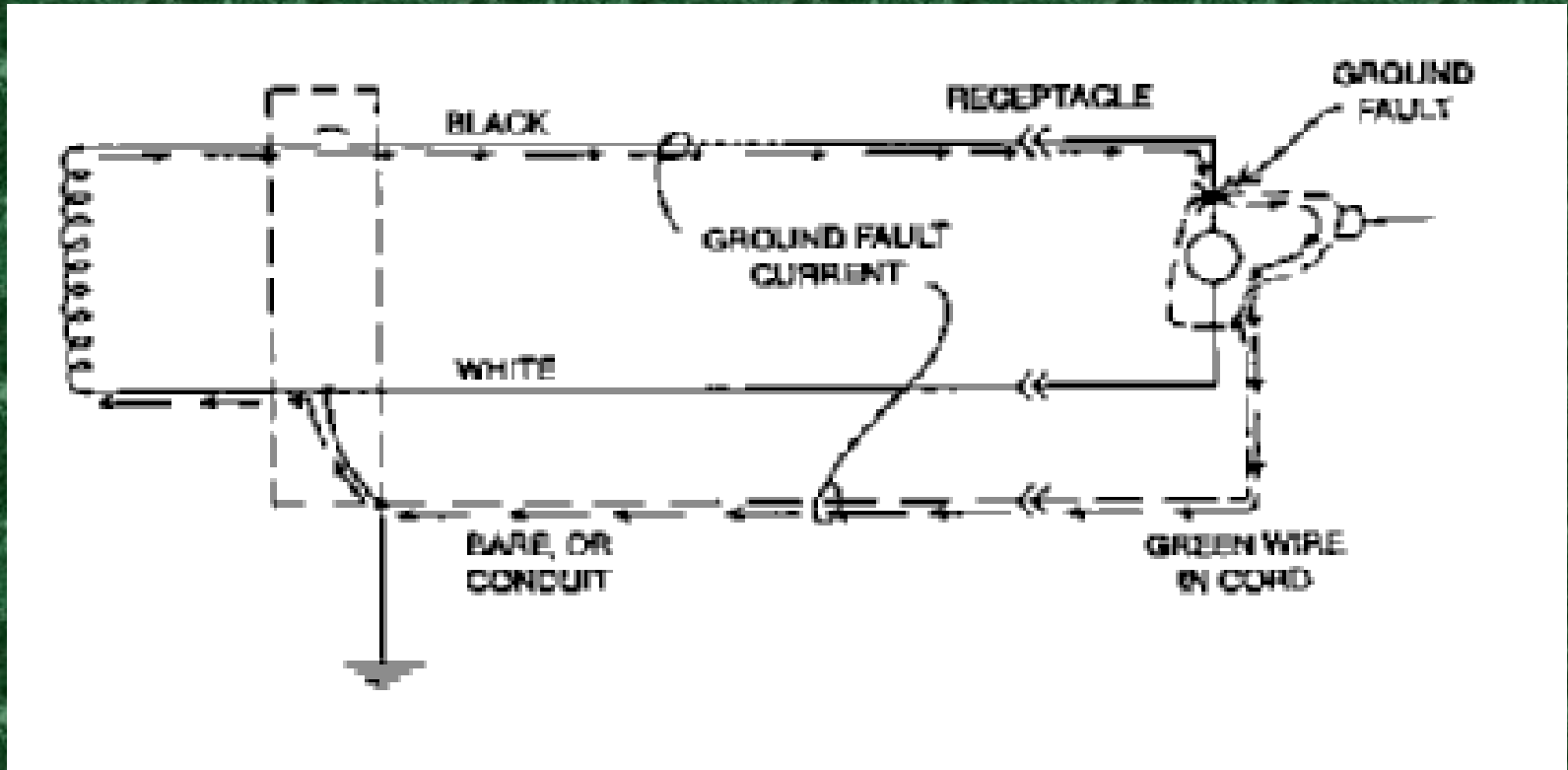


Figure 12: CURRENT FLOW IN A PROPERLY GROUNDING CIRCUIT



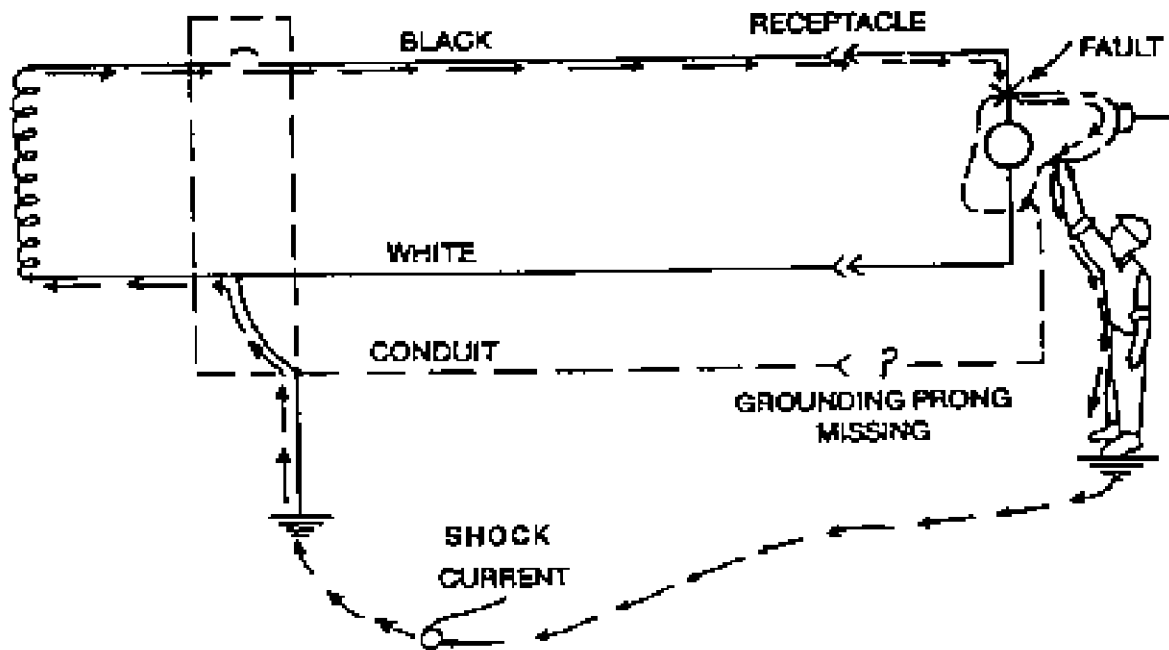


Figure 14: SHOCK FROM IMPROPERLY GROUNDED TOOL

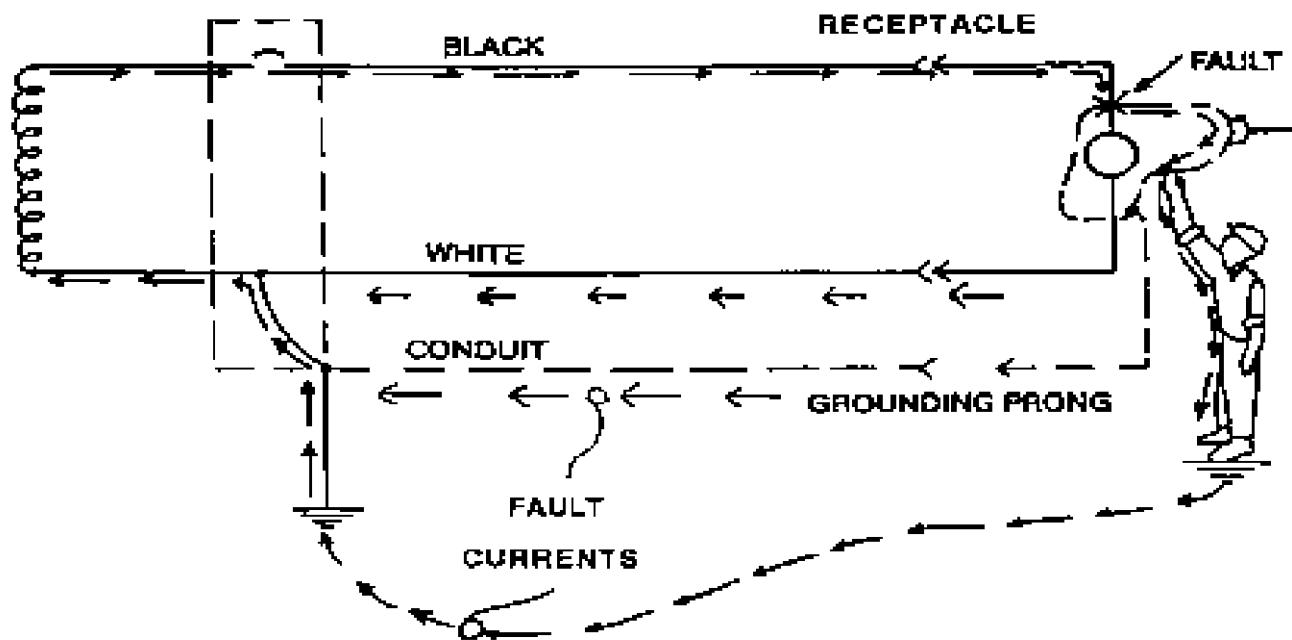


Figure 15: FAULT CONDITIONS SENSED BY A GFCI

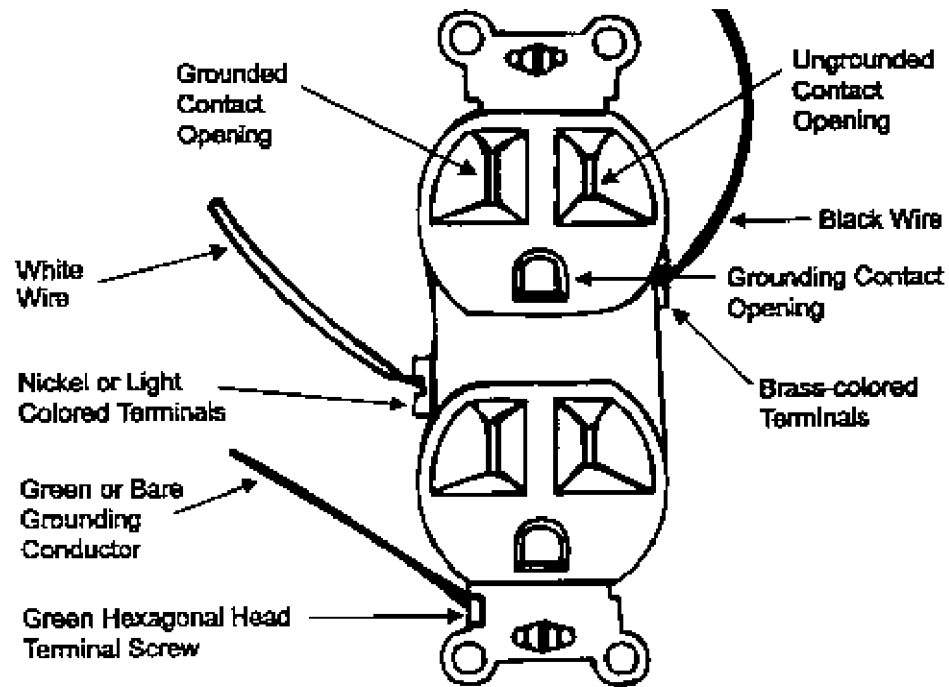


Figure 16: CORRECTLY WIRED DUPLEX RECEPTACLE

Fundamentals of Electrical Hazards

- Voltage
 - electrical pressure (water pressure)
- Amperage
 - electrical flow rate (gallons/min)
- Impedance
 - restriction to electrical flow (pipe friction)

Fundamentals of Electrical Hazards

- Circuit
 - path of flow of electricity
- Circuit Element
 - objects which are part of a circuit and through which current flows.
- Fault
 - current flow through an unintended path.

Fundamentals of Electrical Hazards

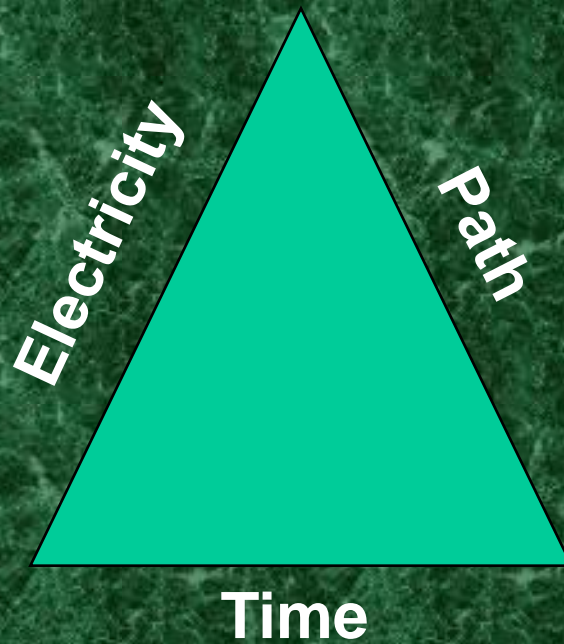
- What is Grounding?
 - Protection from electric shock
 - normally a secondary protection measure
- A ground is a conductive connection
 - between electrical circuit or equipment and earth or ground plane
 - creates a low resistance to the earth.

Basic Rules of Electrical Action

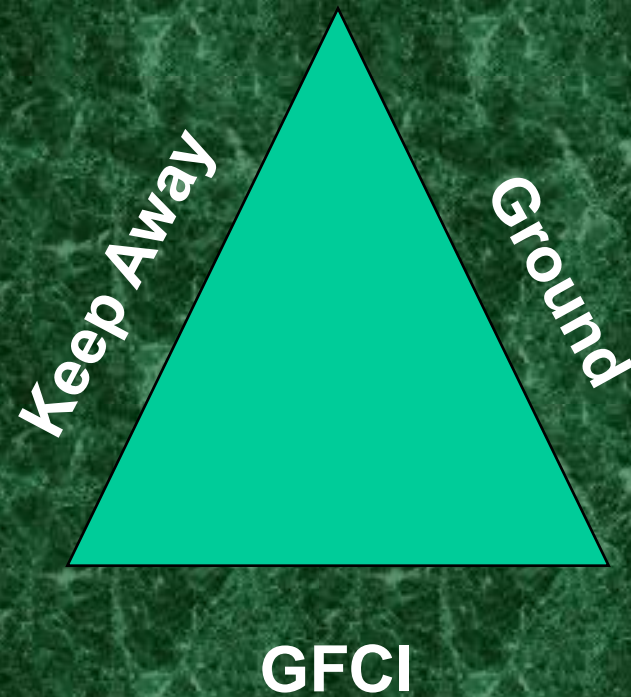
- Electricity isn't live until current flows
- Electrical current won't flow until there is a complete loop, out from and back to the power source.

Preventing Accidental Electrical Contact

Electrocution



Prevention



Do's and Don'ts

- **Do** plug power equipment into wall receptacles with power switches in the Off position.
- **Do** unplug electrical equipment by grasping the plug and pulling. Do not pull or jerk the cord to unplug the equipment.
- **Do not** drape power cords over hot pipes, radiators or sharp objects.

Do's and Don'ts

- **Do** check the receptacle for missing or damaged parts.
- **Do not** plug equipment into defective receptacles.
- **Do** check for frayed, cracked, or exposed wiring on equipment cords.

Do's and Don'ts

- **Do** check for defective cords clamps at locations where the power cord enters the equipment or the attachment plug.
- Extension cords should not be used in office areas. Generally, extension cords should be limited to use by maintenance personnel

Do's and Don'ts

- “Cheater plugs”, extension cords with junction box receptacle ends or other jury-rigged equipment **should not** be used.

Do's and Don'ts

- Consumer electrical equipment or appliances **should not** be used if not properly grounded. (Look for the UL Label)

Do's and Don'ts

- Employees **should know** the location of electrical circuit breaker panels that control equipment and lighting in their respective areas. Circuits and equipment disconnects must be identified

Do's and Don'ts

- Temporary or permanent storage of any materials **must not** be allowed within 3 feet of any electrical panel or electrical equipment.
- Any electrical equipment causing shocks or with high leakage potential must be tagged with a Danger tag or equivalent.

Myths and Misconceptions

- Electricity takes the path of least resistance.
- Electricity wants to go to ground.
- If an electric tools falls into a sink or tub of water, the item will short out.

Myths and Misconceptions

- AC reverse polarity is not hazardous.
- It takes high voltage to kill; 120 volts is not dangerous.
- Double insulated power tools are doubly safe and can be used in wet and damp locations.

**SAFETY
FIRST**

**THE SAFE WAY IS
THE BEST WAY**