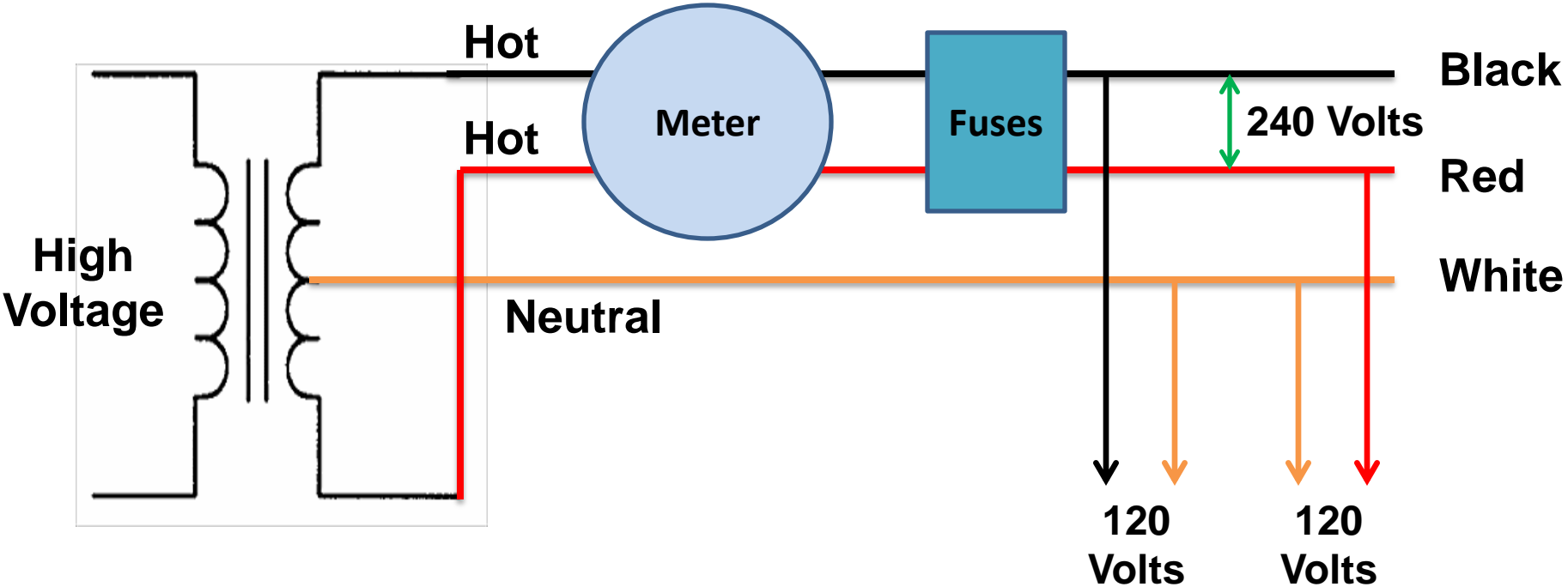


Safety



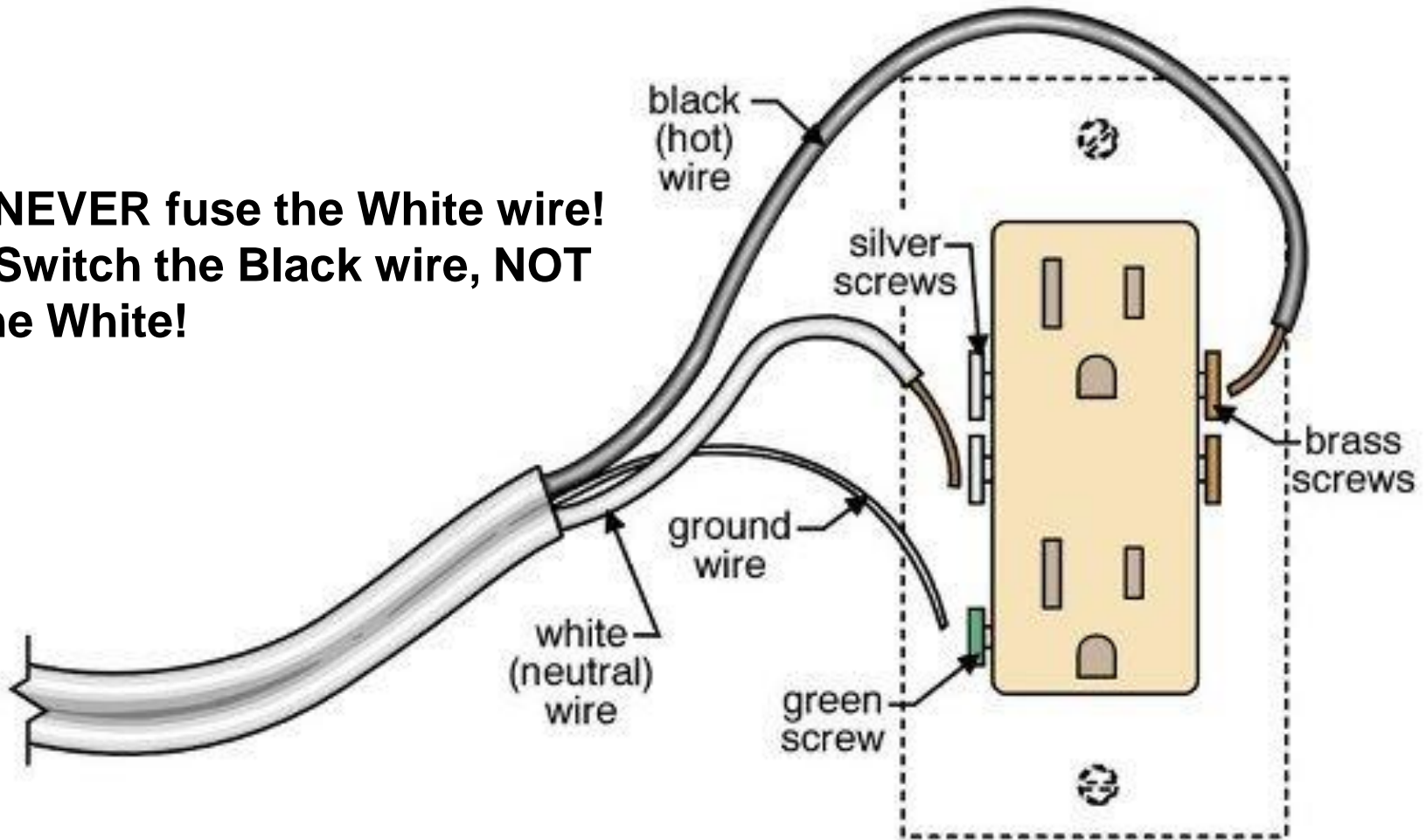
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Typical Home Electrical Service



Color coding for typical 120 volt circuit

- NEVER fuse the White wire!
- Switch the Black wire, NOT the White!



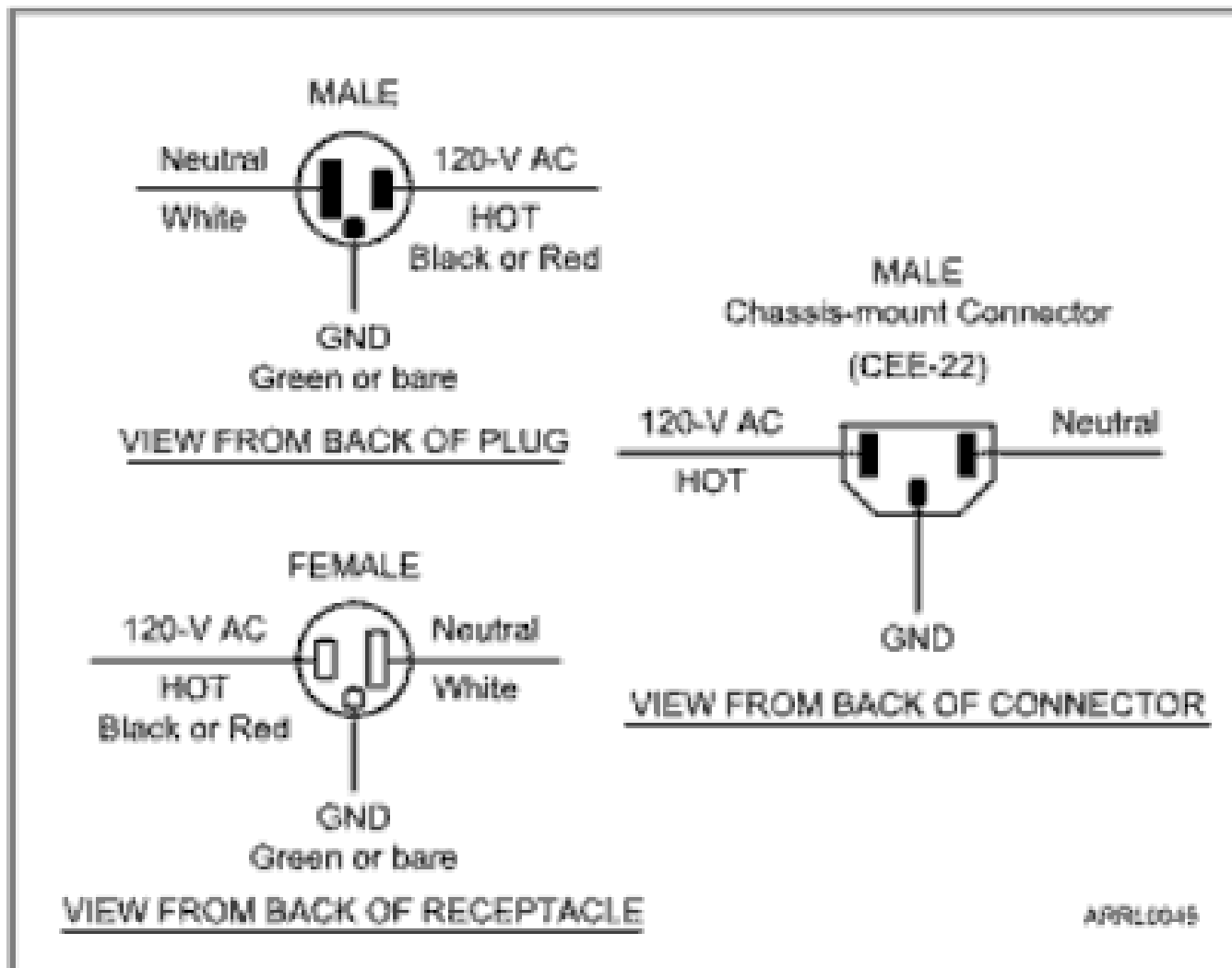
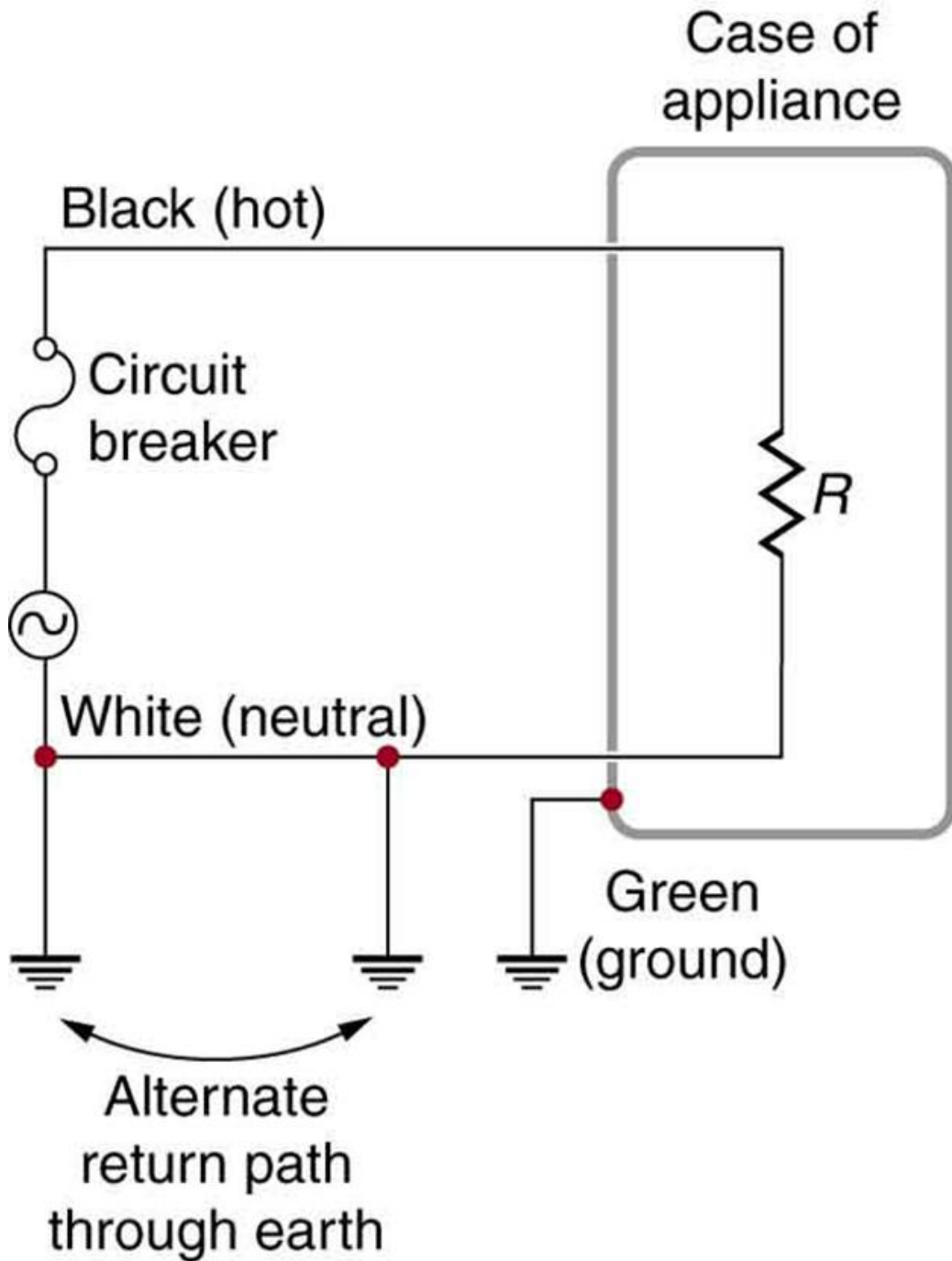
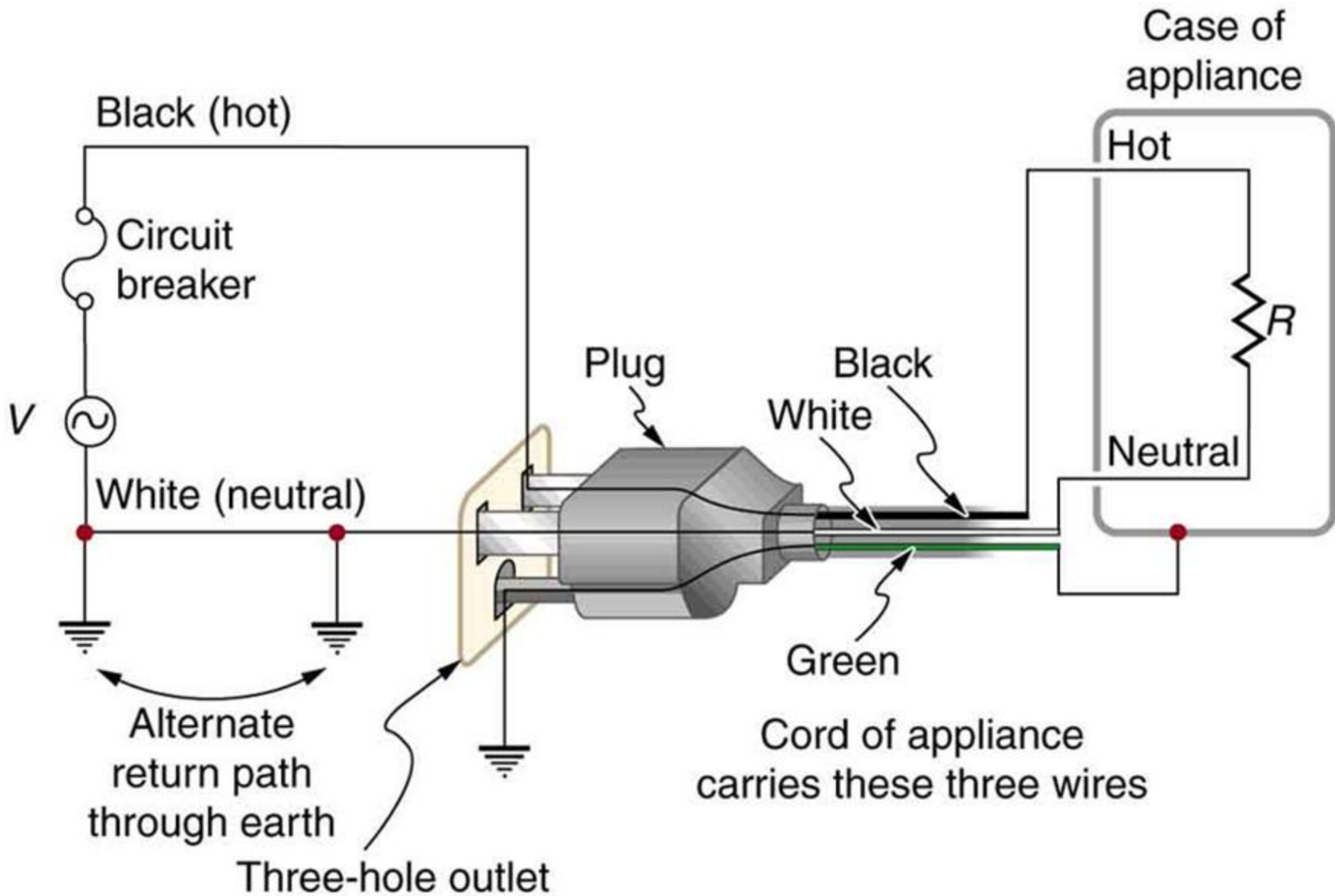


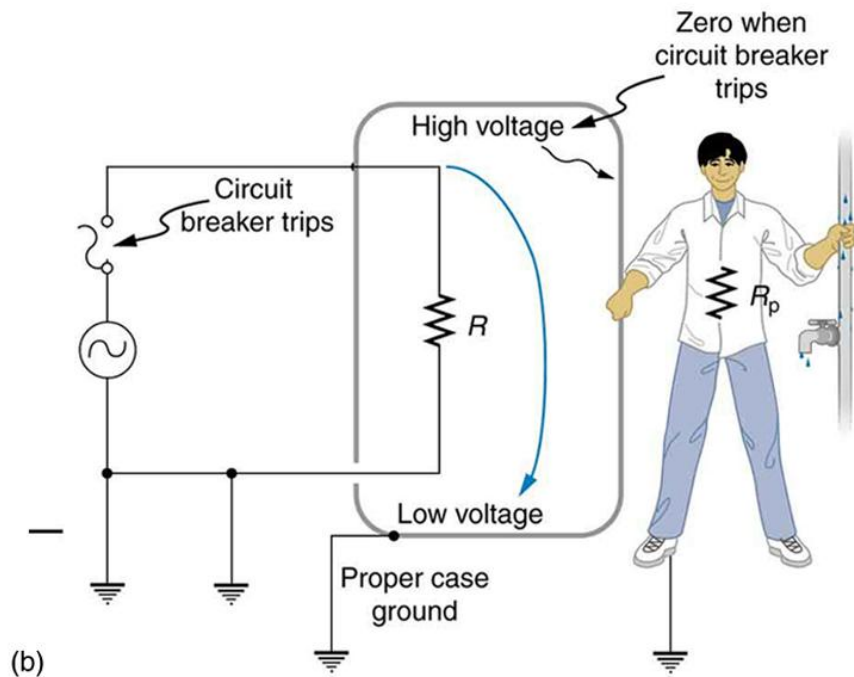
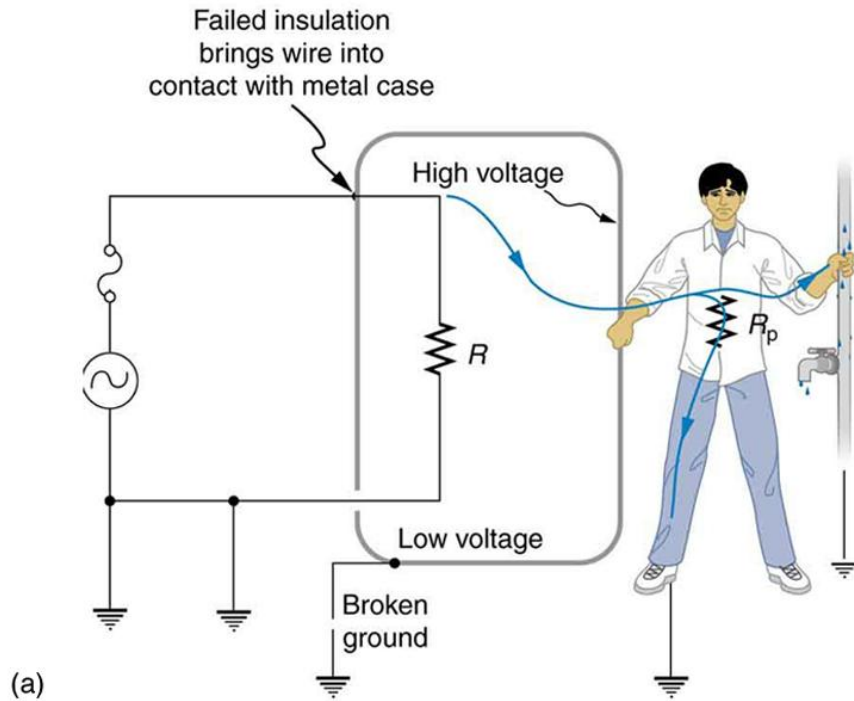
Figure 7-1 — The correct wiring technique for 120 V ac power cords and receptacles. The white wire is neutral and the green wire is the safety ground. The hot wire can be either black or red. These receptacles are shown from the back, or wiring side.

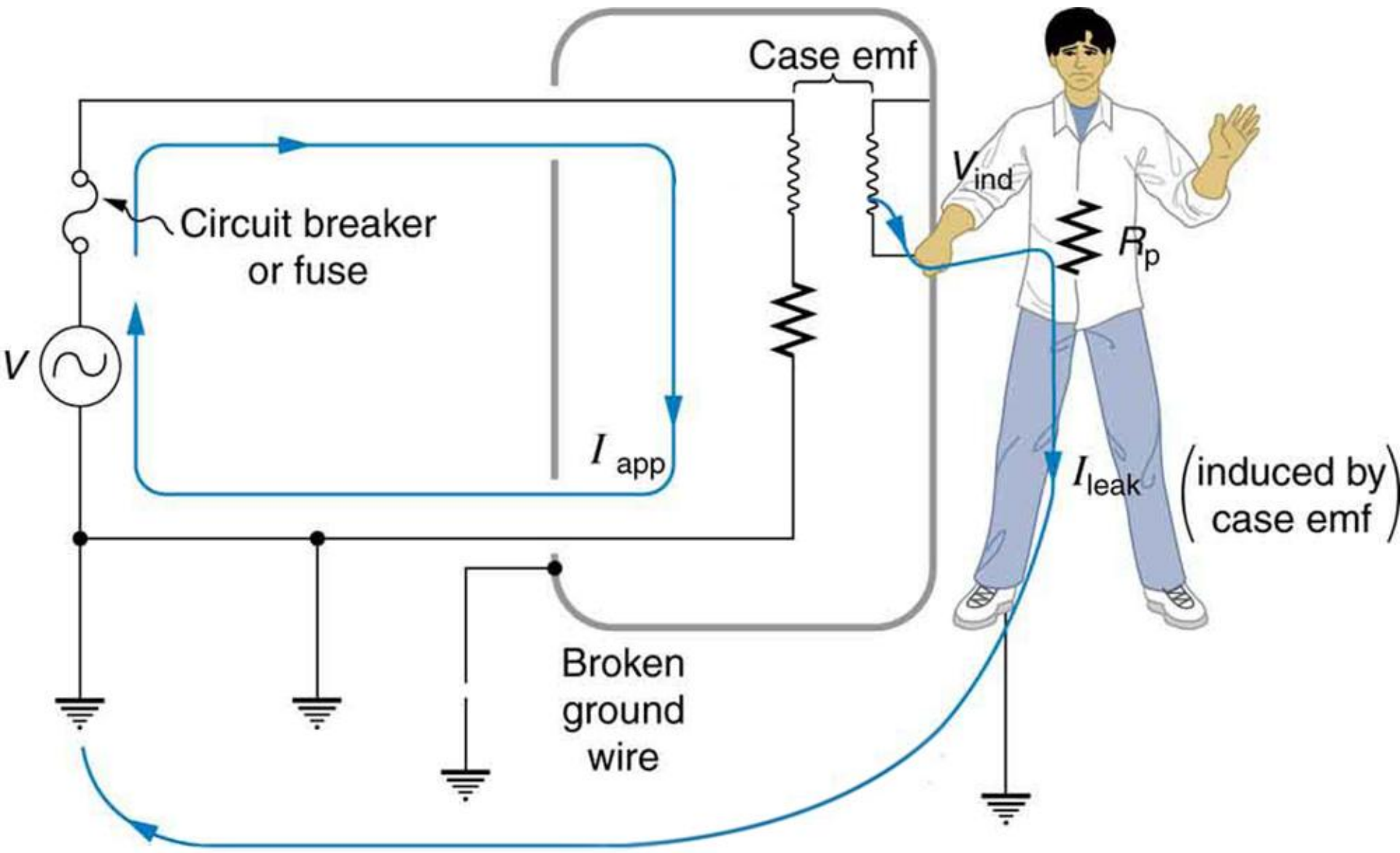


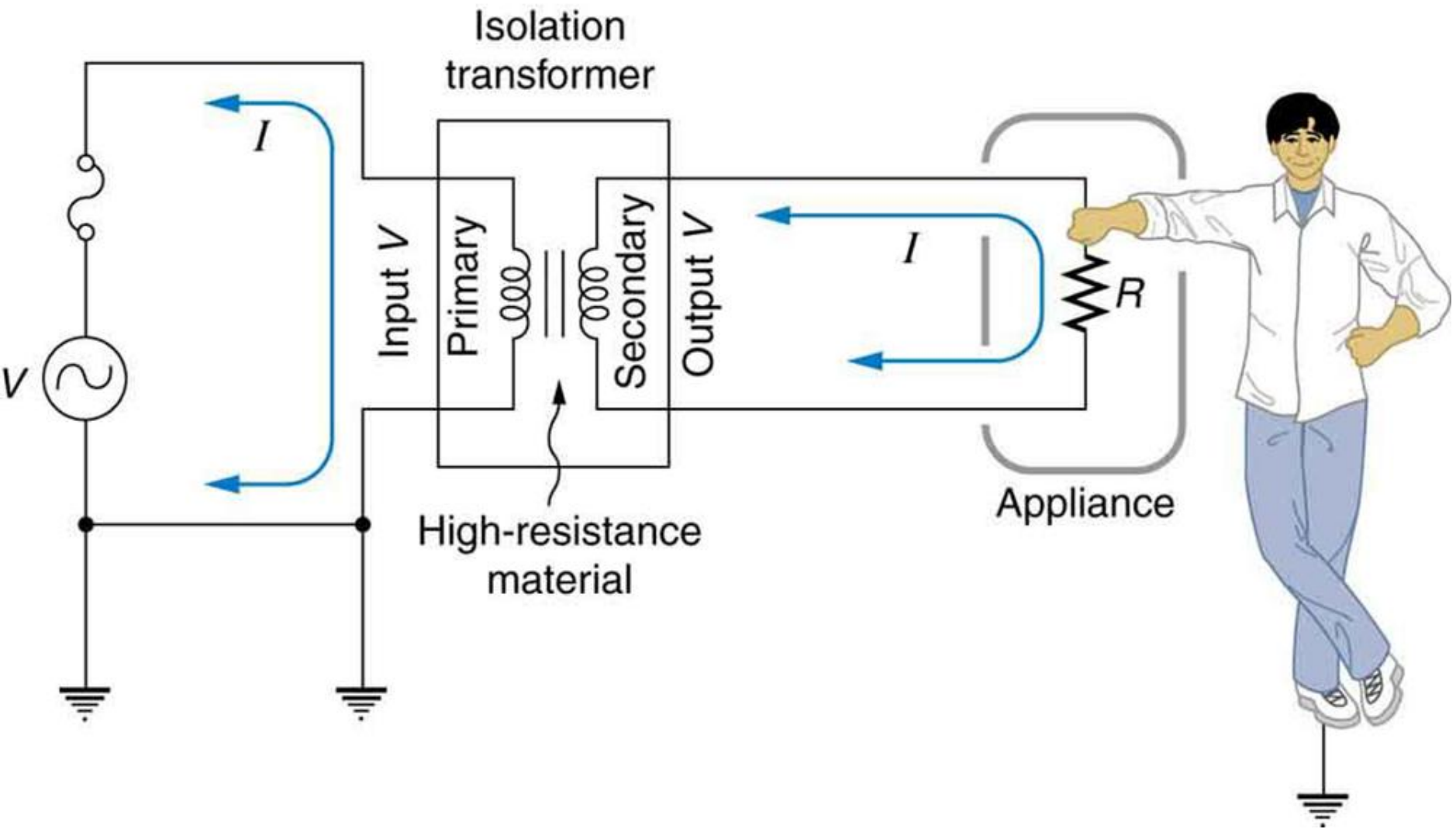
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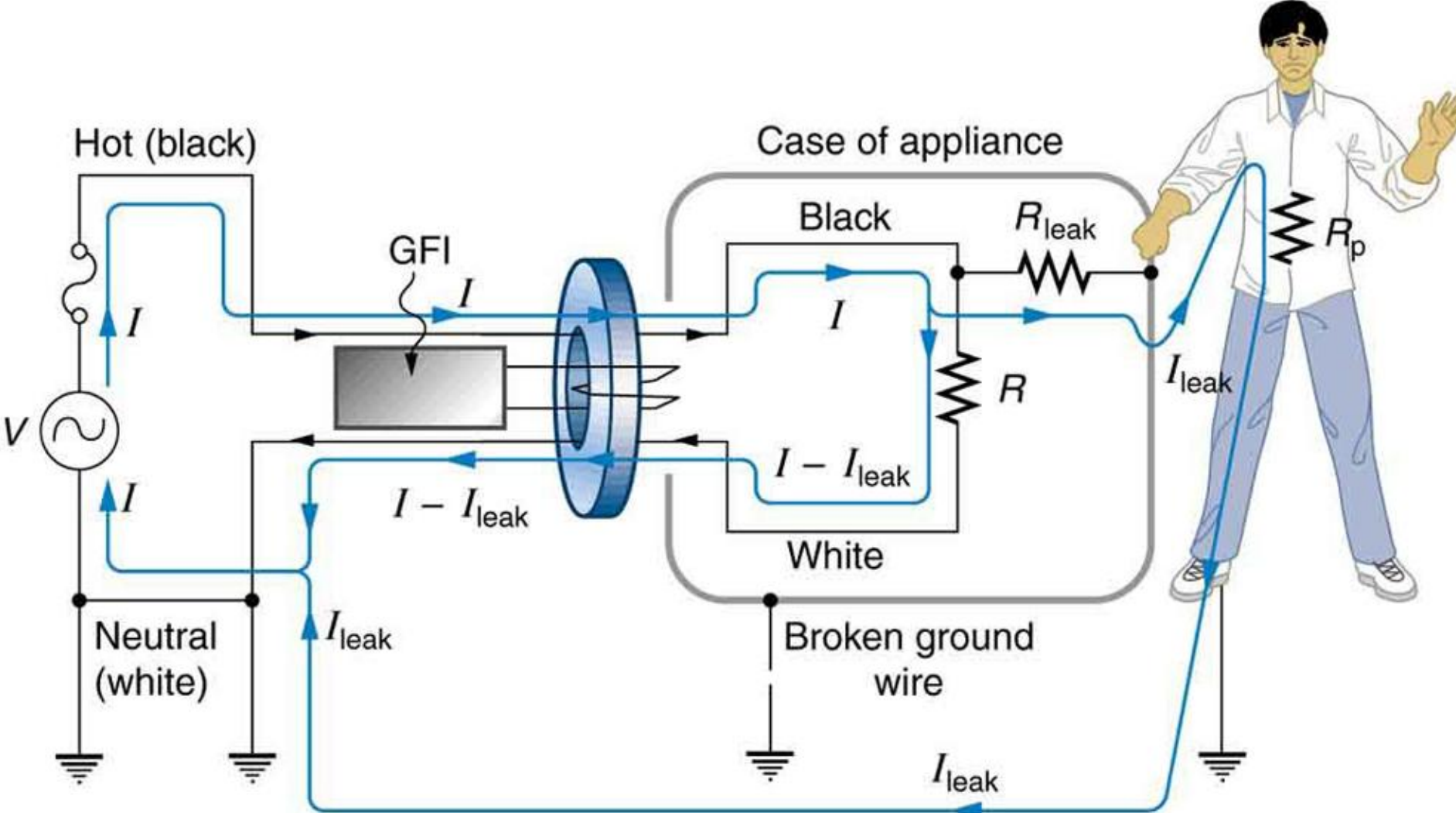













Effects of Electric Shock

| <i>Bodily effect</i> | <i>Gender</i> | <i>DC</i> | <i>60 Hz AC</i> | <i>10 kHz AC</i> |
|---|---------------|-----------|-----------------|---|
| Slight sensation at point(s) of contact | Men | 1 mA | 0.4 mA | 7 mA |
| | Women | 0.6 mA | 0.3 mA | 5 mA |
| Threshold of bodily perception | Men | 5.2 mA | 1.1 mA | 12 mA |
| | Women | 3.5 mA | 0.7 mA | 8 mA |
| Pain, with voluntary muscle control maintained | Men | 62 mA | 9 mA | 55 mA |
| | Women | 41 mA | 6 mA | 37 mA |
| Pain, with loss of voluntary muscle control | Men | 76 mA | 16 mA | 75 mA |
| | Women | 51 mA | 10.5 mA | 50 mA |
| Severe pain, difficulty breathing | Men | 90 mA | 23 mA | 94 mA |
| | Women | 60 mA | 15 mA | 63 mA |
| Possible heart fibrillation after three seconds | Men | 500 mA | 100 mA |  |
| | Women | 500 mA | 100 mA | |

Heartsaver® Adult CPR AED



Tap and shout

Yell for help. Send someone to phone 911 and get an AED



Look for no breathing or only gasping

*Push hard and fast.
Give 30 compressions*



Open the airway and give 2 breaths

Repeat sets of 30 compressions and 2 breaths



When the AED arrives, turn it ON and follow the prompts



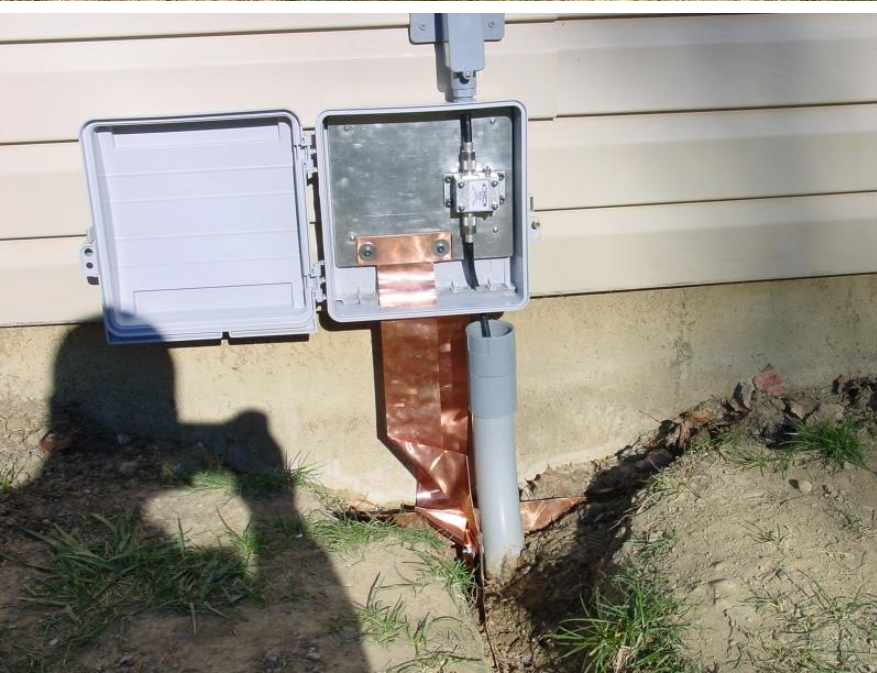
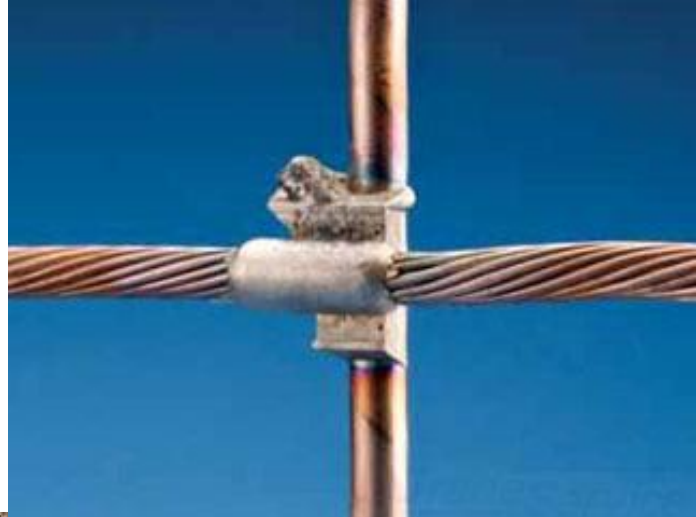
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Ground Rods

- Copper-clad steel
- Longer is better – electrical codes often recommend 10 feet (3 meters).
- Ground plate can be used where soil is shallow. Copper clad steel plate, 30 cm per side, buried to depth of 45 cm.
- Use heavy copper wire, securely attached.



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Station Ground

- Keep grounding cables as short as possible.
- Some lengths will be resonant on your transmit frequencies, allowing RF to float around in your shack.
- Single Point Ground to avoid ground loops.
- Can use metallic cold-water pipes as a ground.
- NEVER use natural gas or propane pipes!
- Proper grounding is a complicated topic – review the expert literature to assist you when it comes time to install your station!

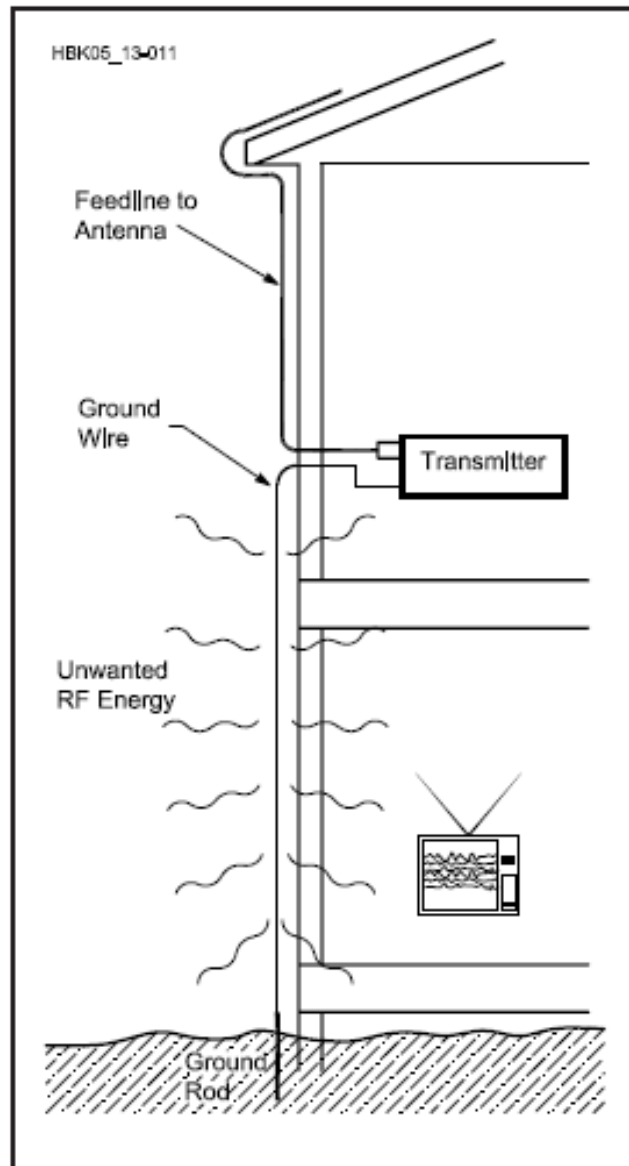


Fig 13.11 — When a transmitter is located on an upper floor, the ground lead may act as an antenna for VHF/ UHF energy. It may be better to not use a normal ground.

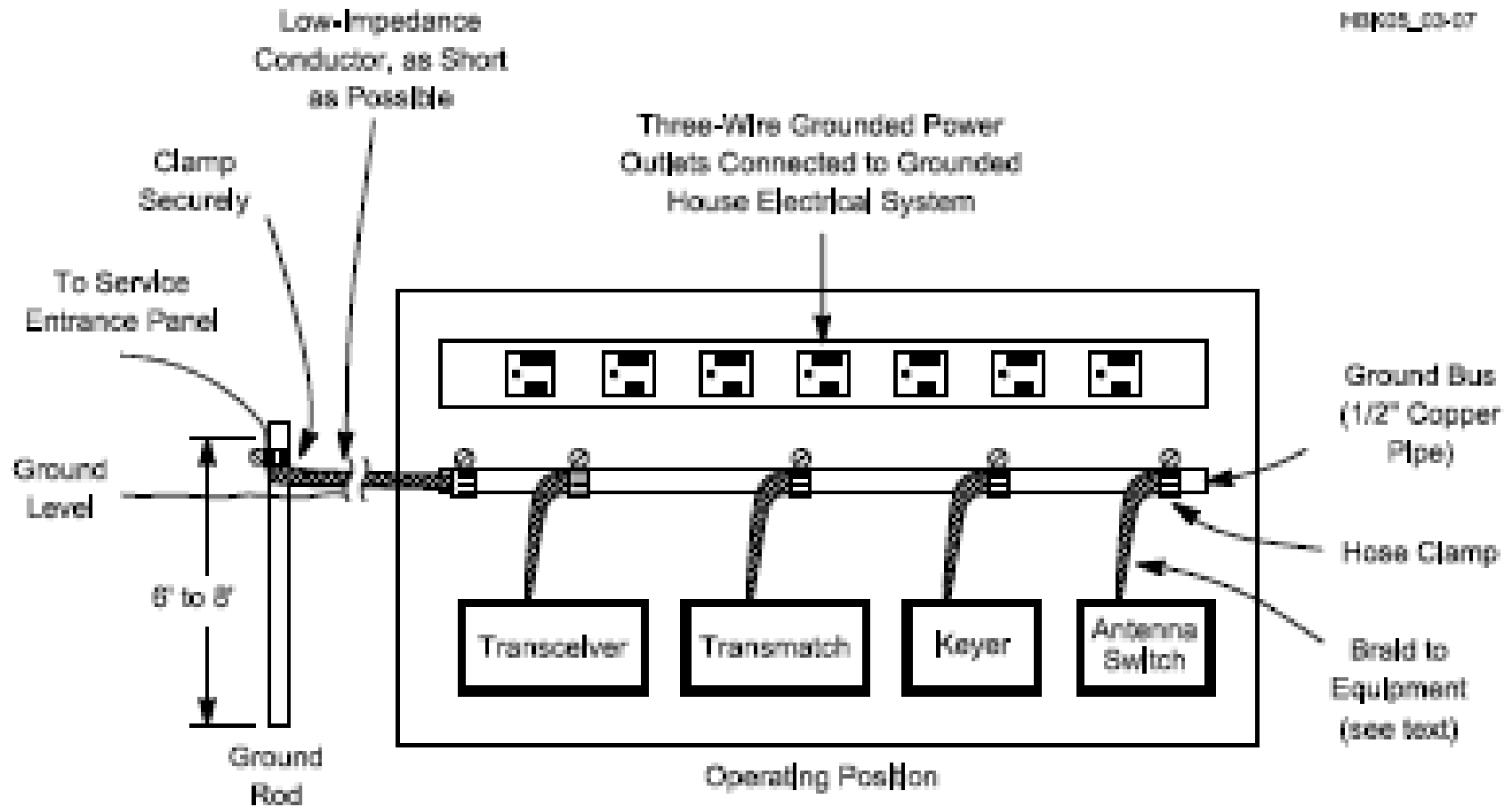


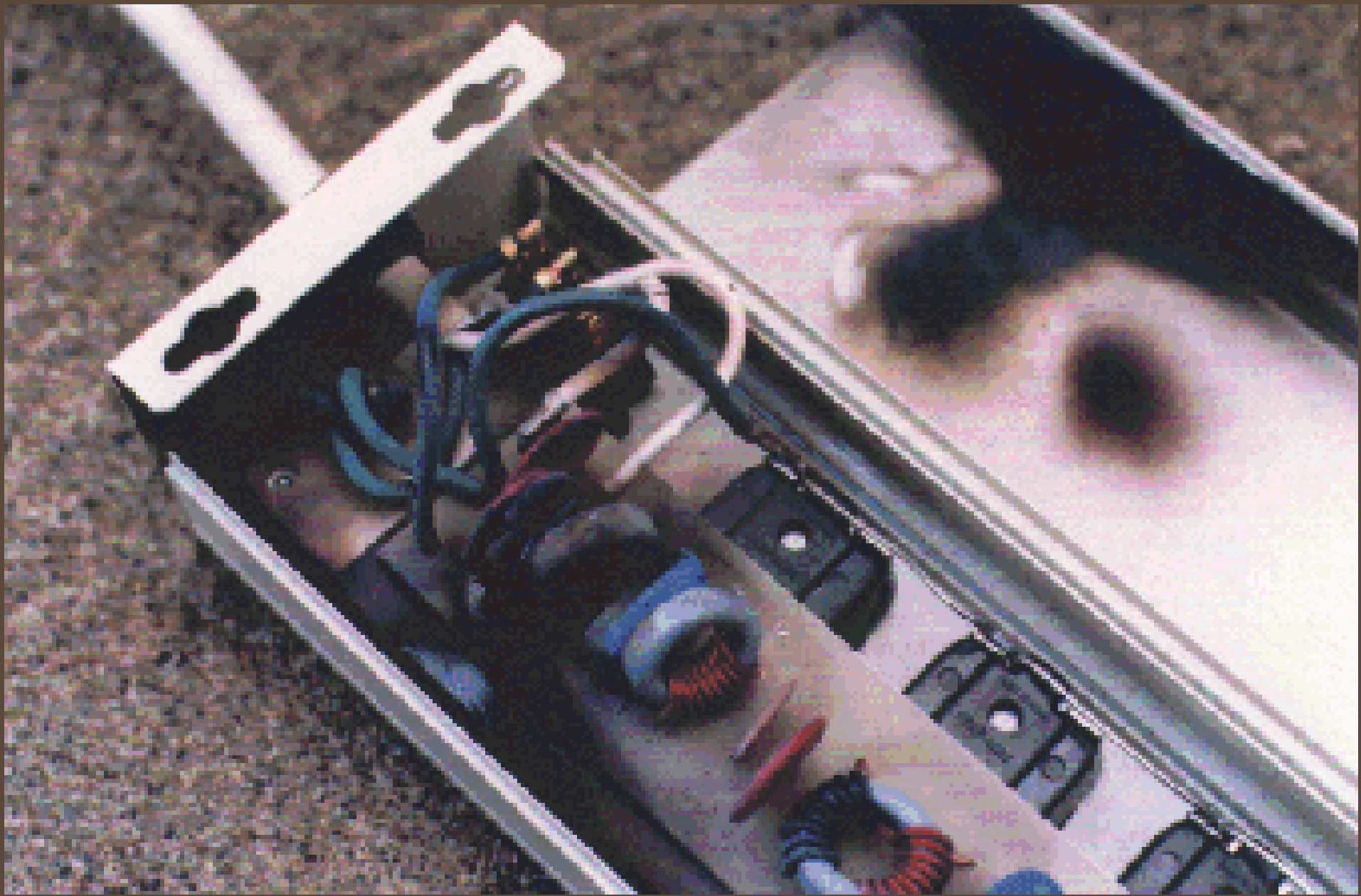
Fig 3.7 — An effective station ground bonds the chassis of all equipment together with low-impedance conductors and ties into a good earth ground. Note that the ground bus is in turn bonded to the service entrance panel. This connection should be made by a licensed electrician with #6 AWG (minimum size) copper wire.

Station Power Requirements

- Simple station – single 12 VDC power supply – one circuit will suffice.
- Larger station – 100 Watt HF rig, rotator, 2M rig – two circuits recommended.
- Big station – several rigs, HF amplifiers – 2 or more 120 VAC plus a 240 VAC circuit recommended.
- Ideal situation is a single switch near door that controls all power EXCEPT lights.

Fusing

- NEVER fuse the neutral line!
- Never replace a blown fuse/circuit breaker with a higher capacity replacement!
- Good idea to have a CO2 or Dry Chemical fire extinguisher in the station as well.



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Electrical Safety

- If working on equipment:
 - Unplug the equipment.
 - Wait 3 minutes for capacitors to discharge.
 - Remove cover, and use a Shorting Stick to ensure capacitors are discharged.
 - If you **MUST** have power applied, stand on a rubber mat and keep one hand in pocket.
 - **NEVER** work alone if working on live equipment.
 - Never wear headphones when working.

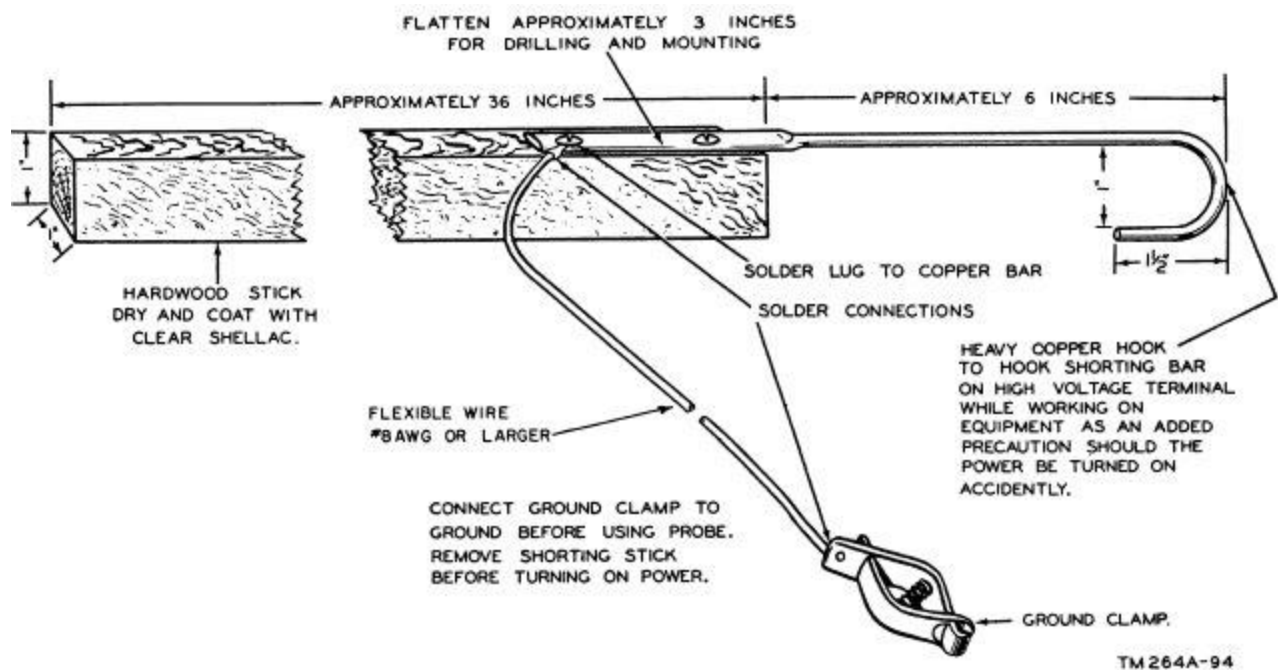
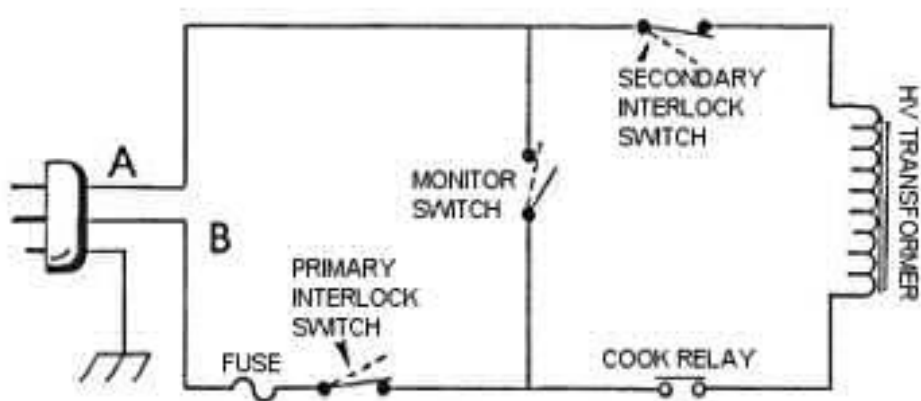


Figure 21. Construction of shorting stick.

Safety Interlock

- A switch that turns power off automatically when a cabinet is opened.
- Do NOT defeat their purpose!
- They DO NOT mean that you can be complacent!



Simplified Interlock Monitor (Sensing) Circuit
(Shown with oven door closed)





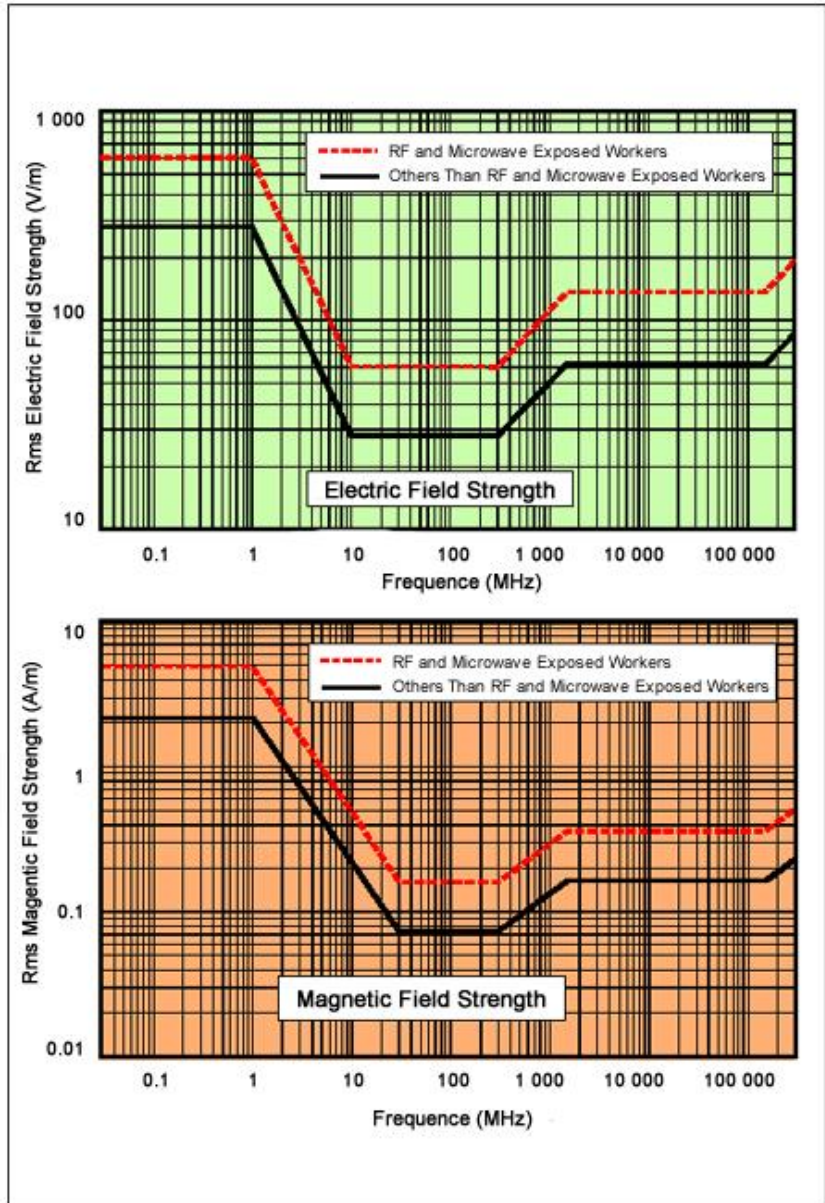
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Safety Code 6

- **Safety Guidelines** for the maximum **limit of RF energy exposure** to the human body
- Published by **Health Canada**
- Concerned with devices that transmit
- Portable transmitters (HTs, walkie-talkies etc.) used to be exempt from the regulations, but this **was changed in 1999**

Exposure Limits

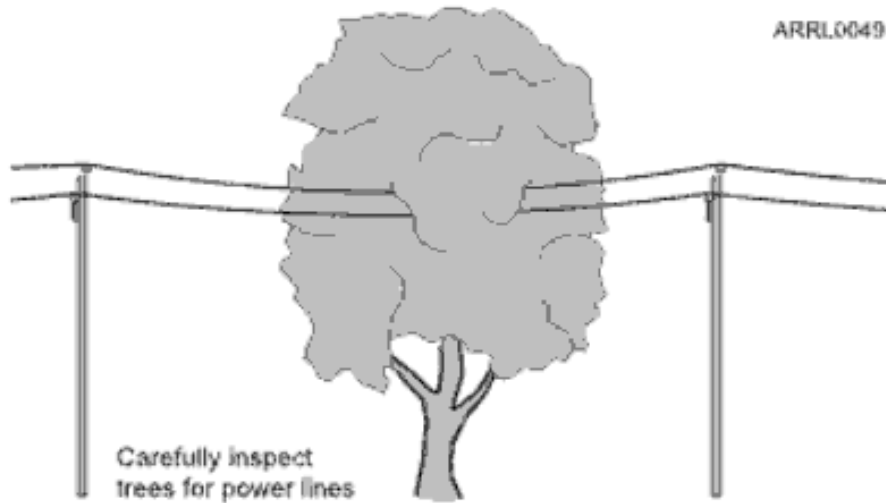
- Electric Field measured in Volts/meter (V/m), sometimes designated as VRMS/m
- **Frequencies from 30 to 300 MHz form the greatest risk because human body absorbs most energy in this range**
- **Max exposure in this range is 28 V/m (E Field)**



DANGER



You can be
KILLED
If this product comes
near electric power
lines.
READ
INSTRUCTIONS



Use safety equipment

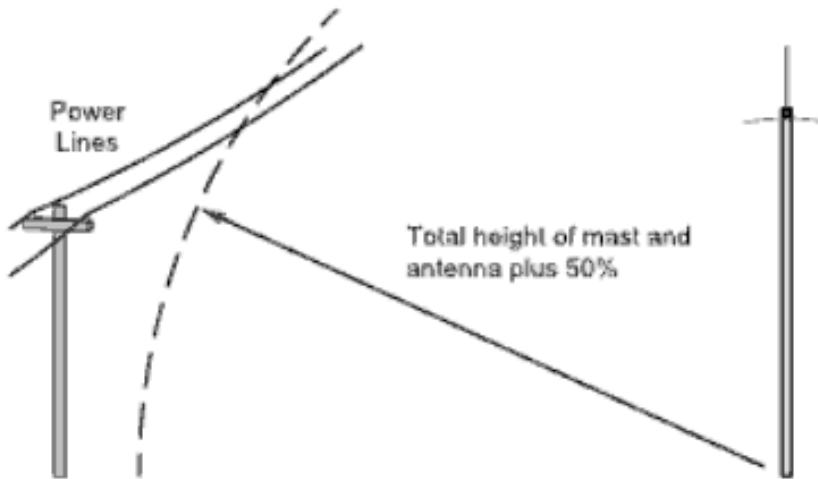
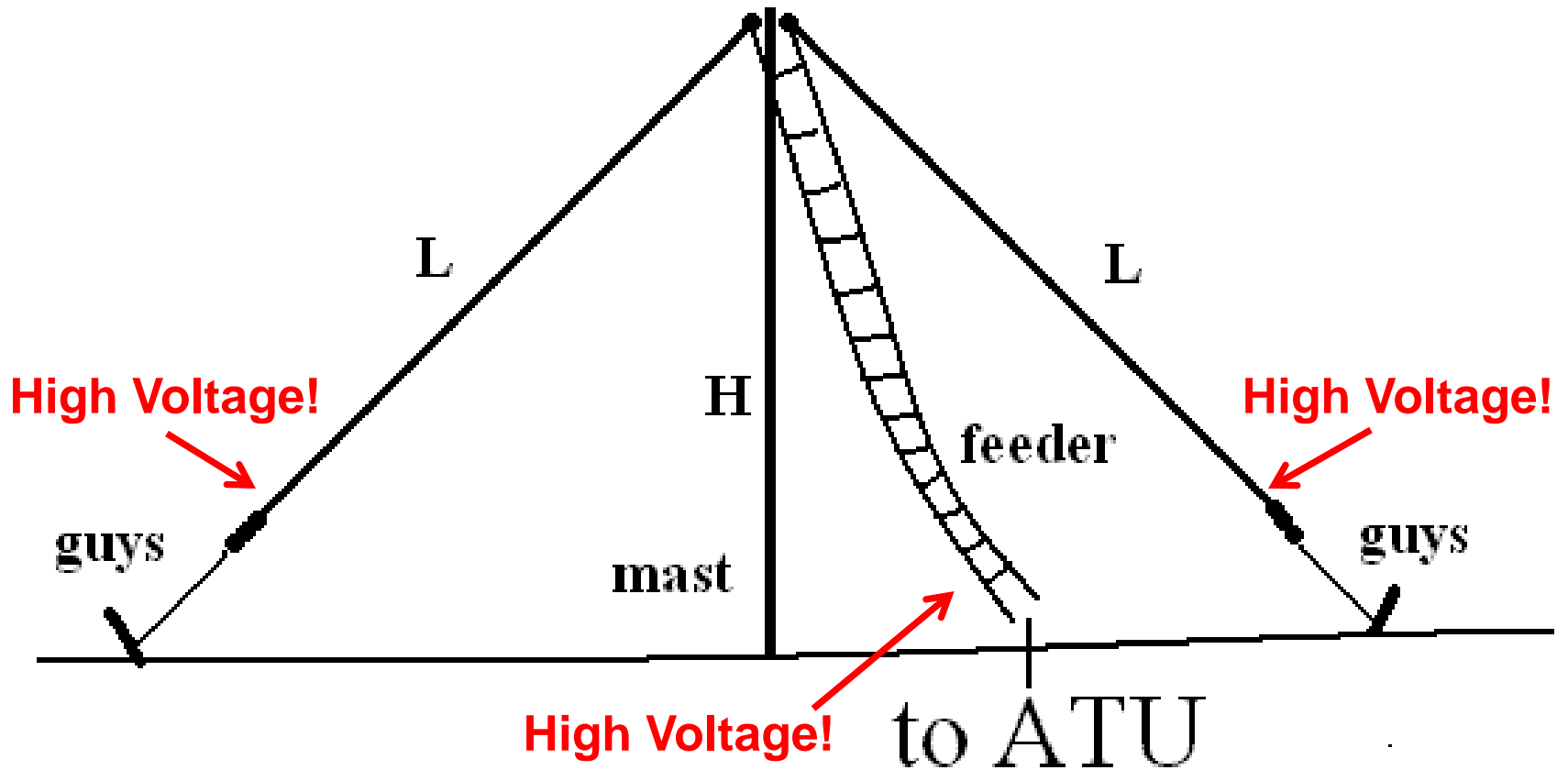


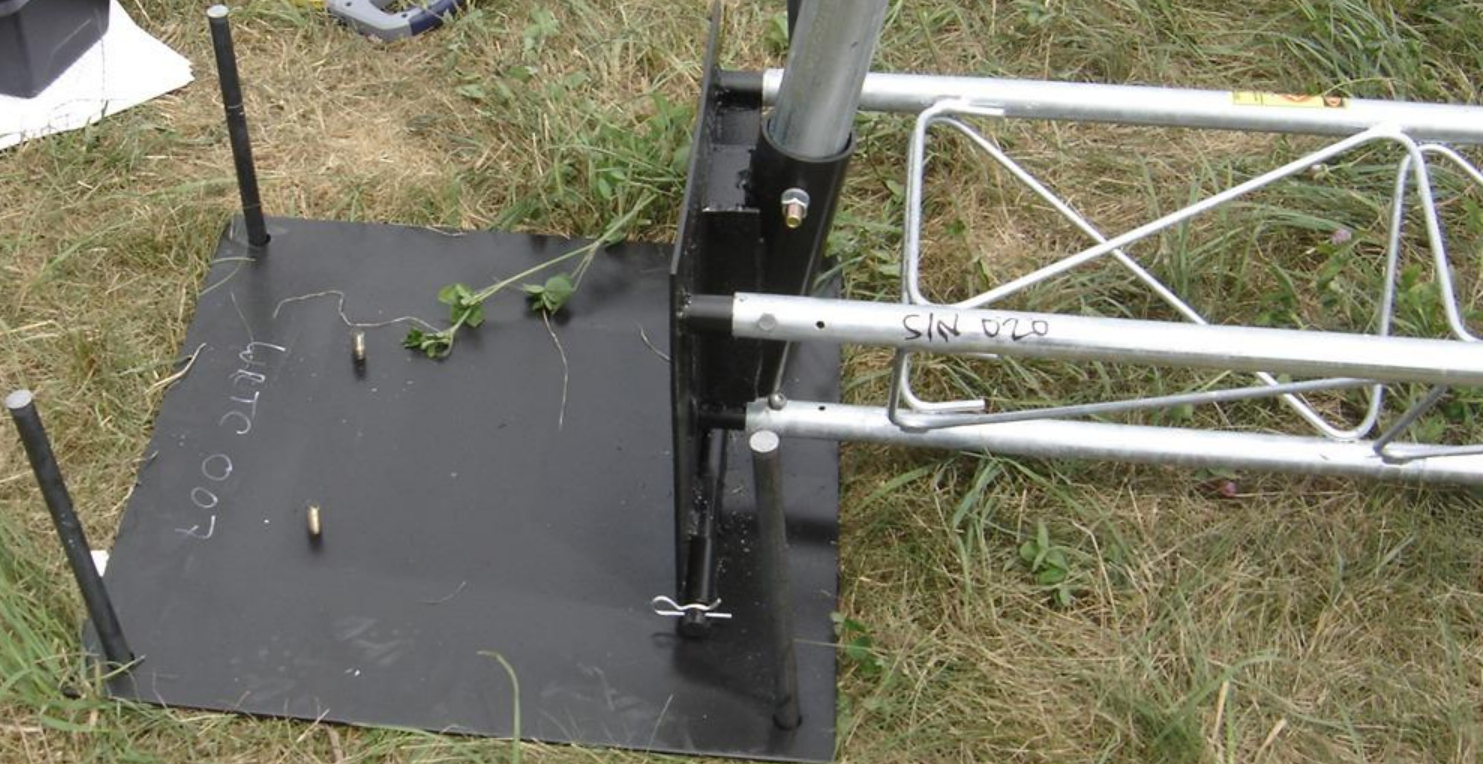
Figure 7-6 — Antennas or supports falling onto a power line can result in electrocution. Take extra care in siting and erecting your antenna to avoid a deadly accident!

INVERTED V





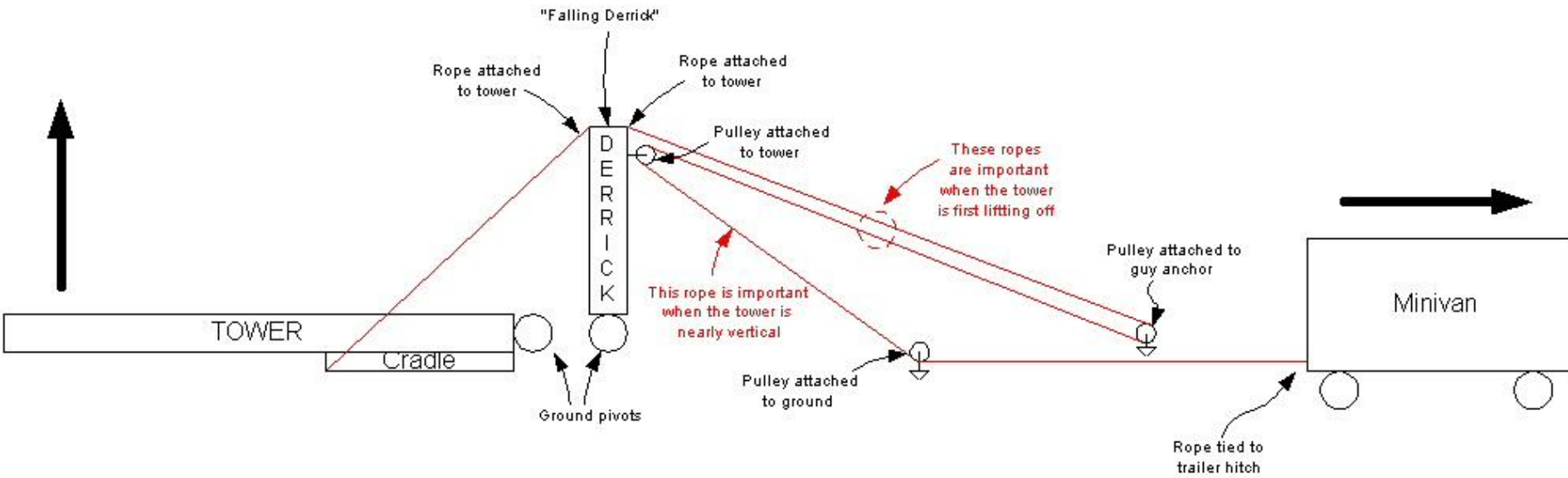
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Pulley schematic for falling derrick method

N6RK, March 28, 2004





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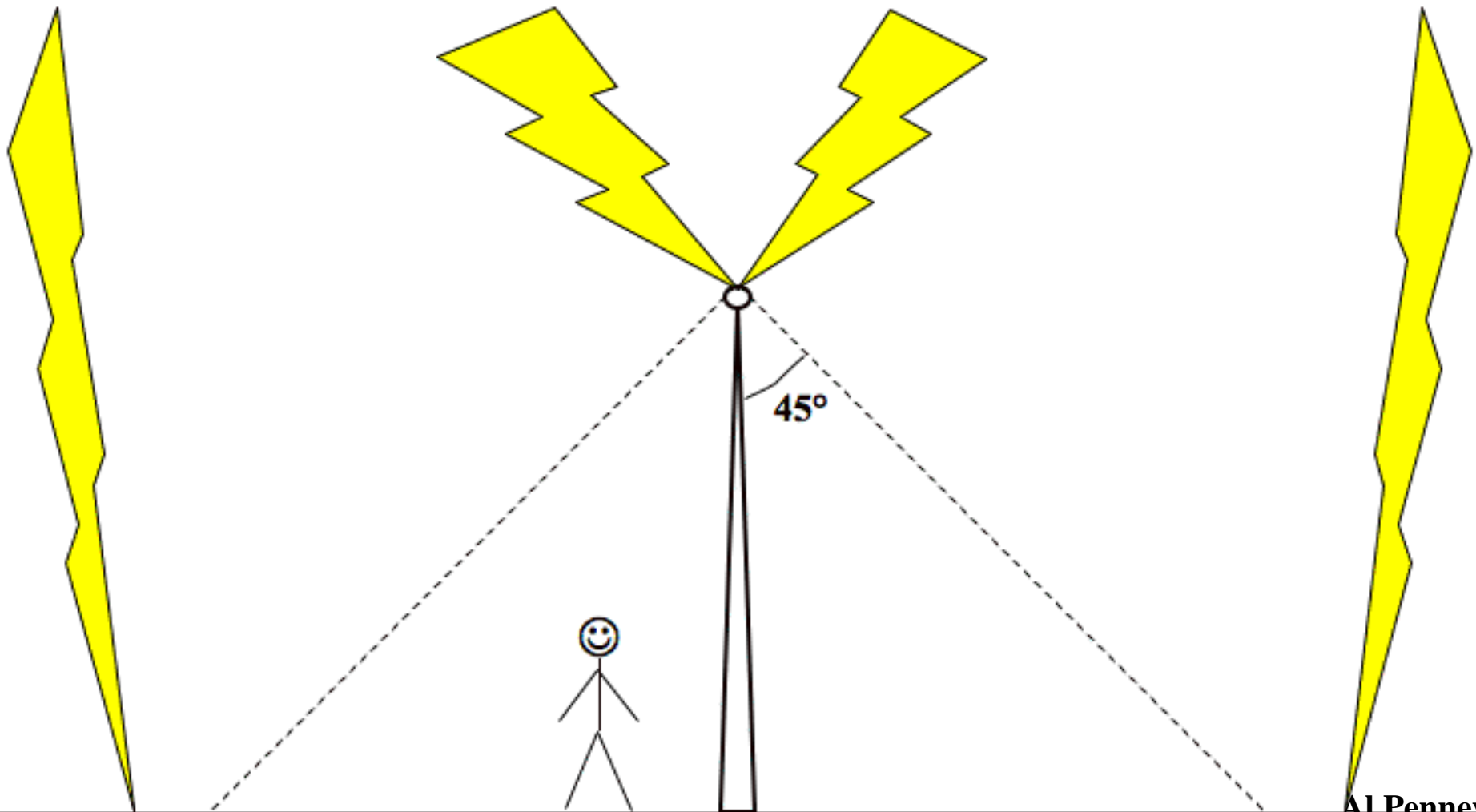
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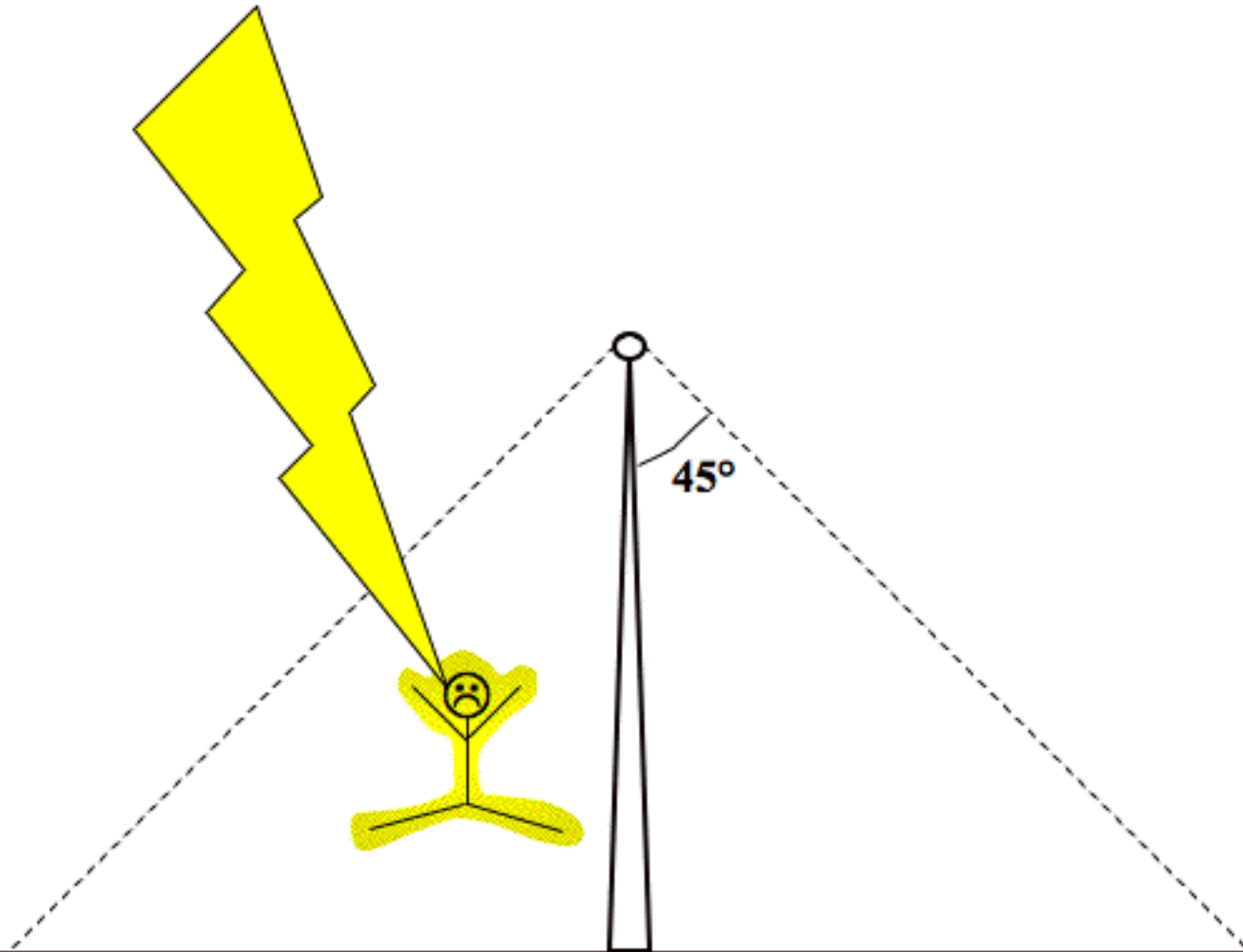
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MYTH: Cone Of Protection

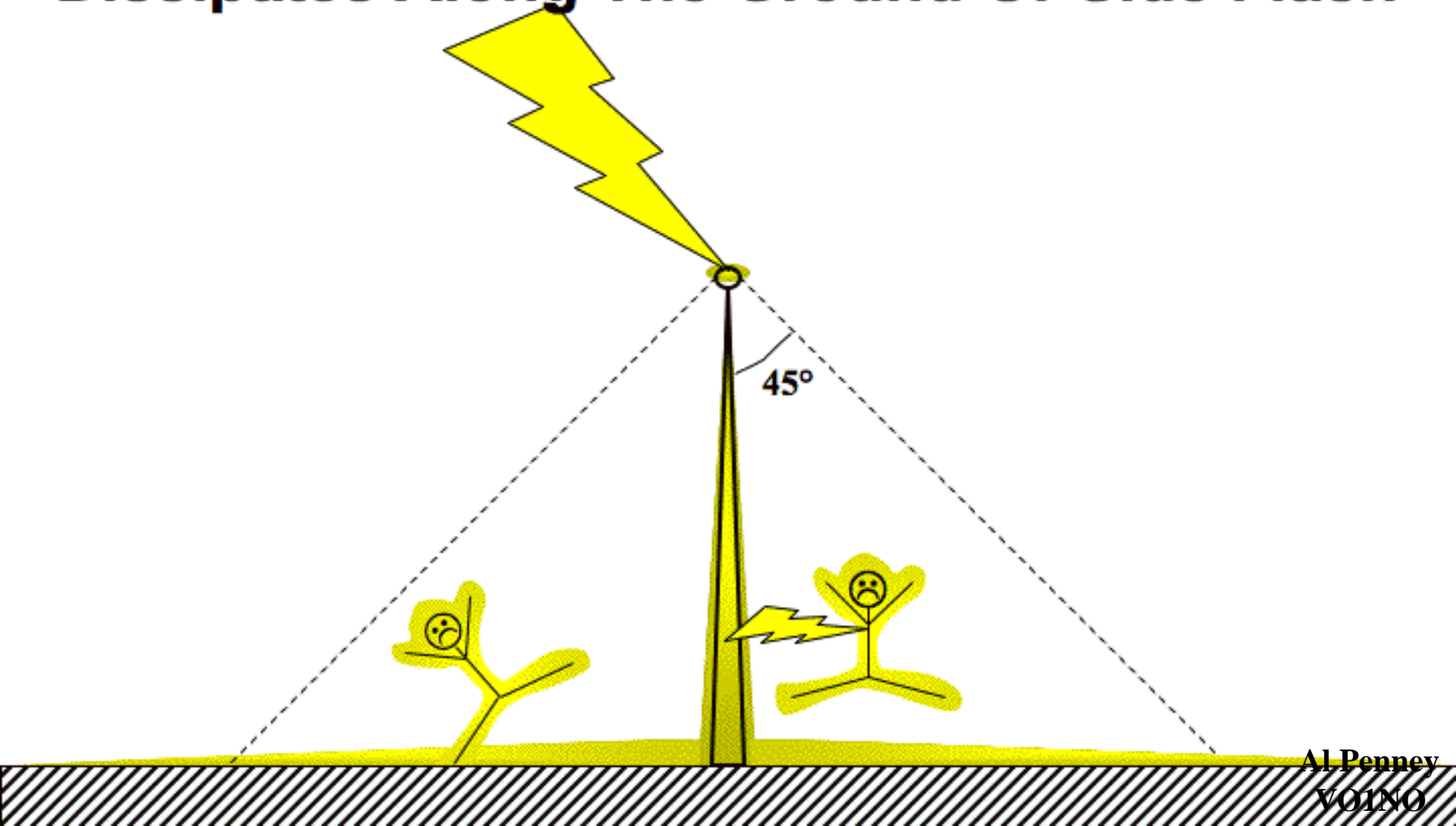
- Lightning won't strike within a cone within 45° of a tall isolated object, since it will attract lightning that close



REALITY: Lightning Can Easily Strike Inside The So-Called “Cone Of Protection”



REALITY (continued): **Even If Lightning Strikes The Object, You're Still In Danger As It Dissipates Along The Ground Or Side Flash**





LIGHTNING KILLS

Play It Safe !



Lightning Facts...

- ✓ No place outside is safe during a thunderstorm.
- ✓ Lightning kills more people annually than tornadoes or hurricanes.
- ✓ If you hear thunder, you're likely within striking distance of the storm.

Outdoors...

- ✓ Plan outdoor activities to avoid thunderstorms.
- ✓ Monitor weather conditions. If you hear thunder, get inside a substantial building immediately.
- ✓ If a substantial building is not available, get inside a hard-topped metal vehicle.
- ✓ Avoid open areas and stay away from isolated tall objects.

Indoors...

- ✓ Avoid contact with any equipment connected to electrical power, such as computers or appliances.
- ✓ Avoid contact with water or plumbing.
- ✓ Stay off corded phones.
- ✓ Stay away from windows and doors.
- ✓ Remain inside for 30 minutes after the last rumble of thunder is heard.

If Someone Is Struck...

- ✓ Victims do not carry an electrical charge and may need immediate medical attention.
- ✓ Call 911 for help.
- ✓ Monitor the victim and begin CPR or AED, if necessary.



For more information, visit:
www.lightningsafety.noaa.gov



Lightning Safety

- Seek Shelter inside a home, building, or automobile.
- When inside, stay off the telephone (except for emergencies) and away from electrical appliances and running water (i.e. shower, bathtub, or running faucet).
- If outside, stay away from large, isolated trees and telephone poles, which will tend to be struck first.
- If within a forest or group of trees, seek shelter in a low area under a thick growth of small trees.
- Get off and away from boats, open water, tractors, and metal equipment or vehicles, such as motorcycles, bicycles, golf carts, wire fences, wire clotheslines, etc.
- Put down golf clubs and take off metal-spiked golf shoes.
- If on level ground away from shelter, kneel down and bend forward, do NOT lie flat on the ground.



Questions?