

Technician License Course
Chapter 9
Lesson Module 20:
Electrical Safety



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AMATEUR RADIO

Electrical Injuries

- Shocks.
- Burns.
- Even small currents can cause problems.

Table 7-1

Effects of Electric Current Through the Body of an Average Person

<i>Current (1 Second Contact)</i>	<i>Effect</i>
1 mA	Just Perceptible.
5 mA	Maximum harmless current.
10 - 20 mA	Lower limit for sustained muscular contractions.
30 - 50 mA	Pain
50 mA	Pain, possible fainting. "Can't let go" current.
100 - 300 mA	Normal heart rhythm disrupted. Electrocutation if sustained current.
6 A	Sustained heart contractions. Burns if current density is high.



Electrical Safety

- Avoiding contact is the most effective way of practicing electrical safety.
- Most modern radio equipment uses currents that are not as dangerous as older equipment but precautions still must be taken.

Mitigating Electrical Hazards

- Turn off power when working inside equipment!
- Make sure equipment is properly grounded and circuit protected!
- Keep one hand in pocket when working around high voltage circuits.



Mitigating Electrical Hazards

- If power is required:
 - Remove jewelry.
 - Avoid unintentional touching of circuitry.
 - Never bypass safety interlocks.
 - Capacitors hold a charge even when power is off.
 - Storage batteries are dangerous when shorted.



Responding to Electrical Injury

- REMOVE POWER!
 - Have ON/OFF switches and circuit breakers clearly marked.
- Call for help.
- Learn CPR and first aid.



Electrical Grounding and Circuit Protection (in the home)

- Make sure your home is “up to code.”
- Most ham equipment does not require special wiring or circuits.
 - Use 3-wire power cords.
 - Use circuit breakers, circuit breaker outlets, or Ground Fault Circuit Interrupter (GFCI) circuit breakers or outlets
 - Use proper fuse or circuit breaker size.
 - Don’t overload single outlets.



Lightning Safety

- Antennas are not struck any more frequently than trees or tall structures.
- Ground all antennas.
- Use lightning arrestors.
- Disconnect antenna cables and power cords during storms.
- Disconnect telephone lines from computer modems.



What is a commonly accepted value for the lowest voltage that can cause a dangerous electric shock? (T0A01)

- A. 12 volts
- B. 30 volts
- C. 120 volts
- D. 300 volts

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- B. It disrupts the electrical functions of cells
- C. It causes involuntary muscle contractions
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- B. Hot
- C. Safety ground
- D. The white wire

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What is a good way to guard against electrical shock at your station? (T0A06)

- A. Use three-wire cords and plugs for all AC powered equipment
- B. Connect all AC powered station equipment to a common safety ground
- C. Use a circuit protected by a ground-fault interrupter
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What is a good way to guard against electrical shock at your station? (T0A06)

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Which of these precautions should be taken when installing devices for lightning protection in a coaxial cable feedline? (T0A07)

- A. Include a parallel bypass switch for each protector so that it can be switched out of the circuit when running high power
- B. Include a series switch in the ground line of each protector to prevent RF overload from inadvertently damaging the protector
- C. Keep the ground wires from each protector separate and connected to station ground
- D. Ground all of the protectors to a common plate which is in turn connected to an external ground

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Which of the following is good practice when installing ground wires on a tower for lightning protection? (T0A11)

- A. Put a loop in the ground connection to prevent water damage to the ground system
- B. Make sure that all bends in the ground wires are clean, right angle bends
- C. Ensure that connections are short and direct
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What kind of hazard might exist in a power supply when it is turned off and disconnected? (T0A12)

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- B. Circulating currents inside the transformer might cause damage
- C. The fuse might blow if you remove the cover
- D. You might receive an electric shock from stored charge in large capacitors



What kind of hazard might exist in a power supply when it is turned off and disconnected? (T0A12)

- A. Static electricity could damage the grounding system
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What safety equipment should always be included in home-built equipment that is powered by 120V AC power circuits? (T0A13)

- A. A fuse or circuit breaker in series with the AC “hot” conductor
- B. An AC voltmeter across the incoming power source
- C. An inductor in series with the AC power source
- D. A capacitor across the AC power source



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Which of the following is true concerning grounding conductors used for lightning protection? (T0B10)

- A. Only non-insulated wire must be used
- B. Wires must be carefully routed with precise right-angle bends
- C. Sharp bends must be avoided
- D. Common grounds must be avoided



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Which of the following establishes grounding requirements for an amateur radio tower or antenna? (T0B11)

- A. FCC Part 97 Rules
- B. Local electrical codes
- C. FAA tower lighting regulations
- D. Underwriters Laboratories' recommended practices

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