

Safety in Amateur Radio



- Accidents Hurt
Safety Doesn't

Mechanical Safety

By David Casler KE0OG

Go to

<https://youtu.be/PH6bIOV88Jo>

to view the video

For more information go to

<http://dcasler.com/ham-radio/training/>

Safety Disclaimer

- Information in this presentation is intended to be a guide.
- Each site and situation is unique and not all safety procedures may apply.
- You are expected to research this subject before applying any information found here.
- Your safety and the safety of your equipment is your responsibility !

Mast Safety



By Ken Harker WM5R

Antenna Party

- If you are installing or dismantling your antenna for the first time, seek help. Contact the Elmers in our club and throw an antenna party. Appoint an experienced ham as a safety officer and follow his or her advice.



- Choose an installation site for safety as well as performance. All electric power lines, cable lines and telephone lines look alike. To be safe, assume ANY overhead line can kill you.

Antenna Safety Cont'd



- Do not place an antenna where it could potentially fall on to or blow into a power line. To determine the **SAFE DISTANCE** by following these steps:
(A) Determine the proposed height of your antenna by adding the antenna length and mast height.
(B) Double the figure.
- Your answer will be the minimum safe distance from the nearest power line that you should install your antenna.

Wire Antennas



- Install wire antennas high enough that they will not be "walked into" by people.
- Do not install wire antennas over *or* under utility lines
- Never climb and never use a utility pole as a support for an antenna or guy wire.

Ladder Safety



Don't let this happen to you

Go to https://youtu.be/Ap243_DAIjs to view the video

Ladder Safety

- Wear slip-resistant shoes with heavy soles to prevent foot fatigue
- Have everyone in the group wear a Hard Hat
- Use towlines, a tool belt or an assistant to convey materials so that the climber's hands are free when climbing;
- Climb slowly and deliberately while avoiding sudden movements;
- Use a ladder stabilizer
- Have a buddy hold the ladder for you



More Ladder Safety

- Never attempt to move a ladder while standing on it
- Keep the center of your belt buckle (stomach) between the ladder side rails when climbing and while working
- Do not overreach or lean while working so that you don't fall off the ladder sideways or pull the ladder over sideways while standing on it.

Lightning Protection and Grounding



Outdoor antennas should be grounded with an approved lightning arresting device. Local codes may apply. The radio should also be grounded to an earth ground to help protect both the radio and its user. Do not use hot water pipes or gas lines as a ground source

Grounding

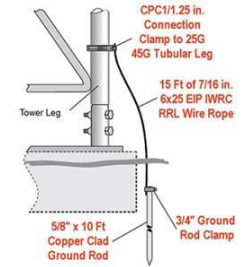
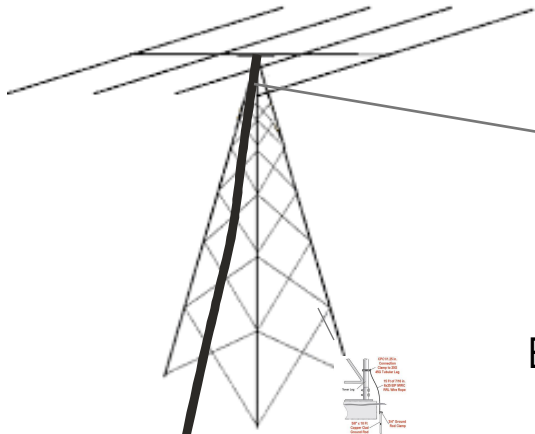


Single Point Ground Panel

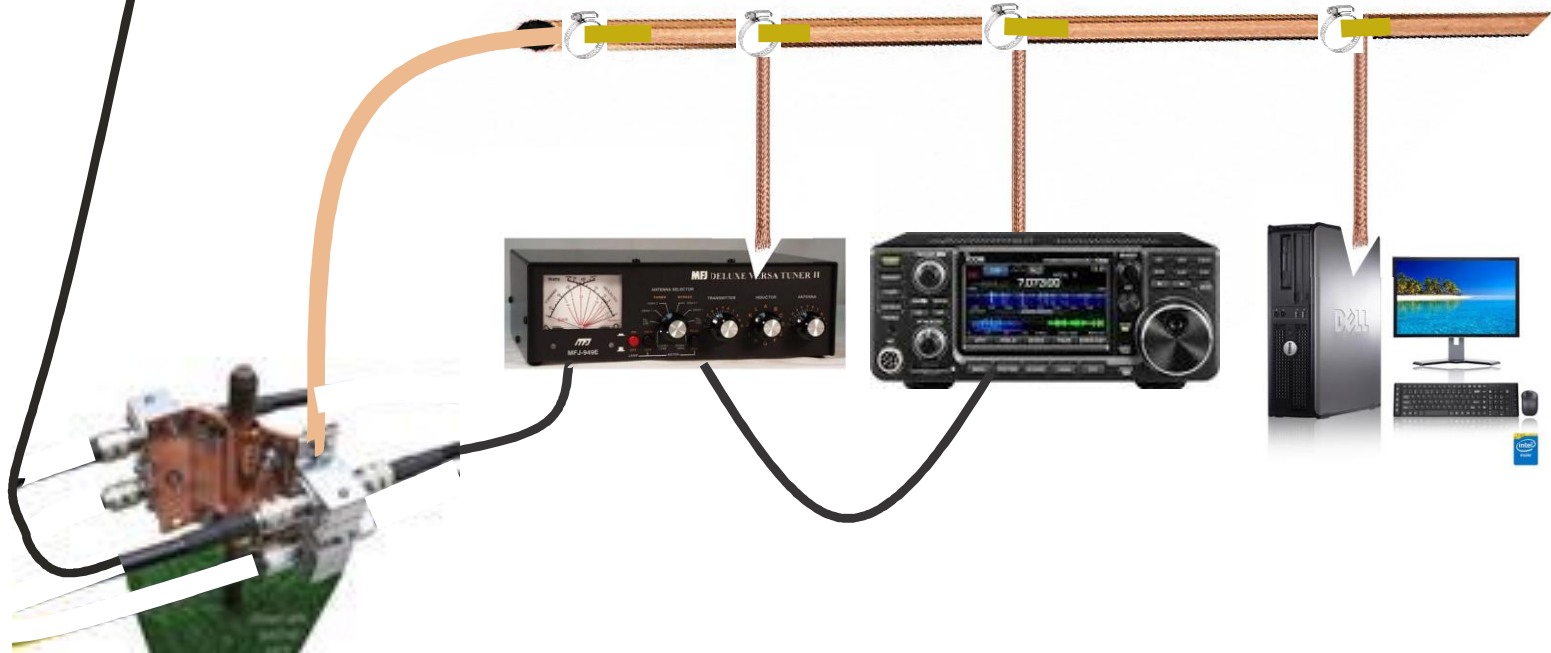


The coax **shield** works best when it is completely at **ground** potential. That means it should be **grounded at BOTH ends** (grounded at one end means the other end is similar to an antenna at some frequencies).

Station Grounding System



Exploded views of coax grounding kit and how to ground your tower



Field Day Safety



By Venzula Mathews KF5PJH



- Make sure wires and cables are taped and/or staked down
- Minimize risks and control hazards to ensure no injuries to the public
- **EVERYONE** wears a hard hat - be prepared for falling items

Field Day Safety

Electrocution



- Be aware of your surroundings
- Stay away from power lines
- Be aware of where you stick your stakes for guy wires
- **Red Tag** Transmitters when personnel are working on its coax or antenna
- Ensure all equipment is properly bonded or grounded

Field Day Safety Continued



- Use flagging tape on all guy wires



- Use barricade tape to keep out bystanders



- Use gaffer tape to prevent tripping

The Not So Little Things Continued



- Stay connected to the weather (NOAA)
- Have plenty of water to stay hydrated
- Got to have snacks
- Don't forget sunscreen and bug spray

By Venzula Mathews KF5PJH

RF Safety for the Radio Amateur



- Refresher on section ARRL 9.2
- History
- This Just In
- Definition of Terms
- Sample Survey

RF Safety

By David Casler KE0OG

Go to

<https://youtu.be/4nTOfWNWvK0>

to view the video

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Early History of RF Safety



- 1982: IEEE Standard C95.1-1982 describes appropriate limits for human exposure to RF energy.
- FCC adopts RF safety regulations based on this standard.
- Unlike other services, the FCC categorically exempted the ARS from any specific regulations regarding station evaluations.

Congress Gets Involved



- 1996: The Telecommunications Act passed by Congress instructed the FCC to complete overhaul RF safety regulations.
- 1996: FCC R&O Docket 96-326 included the Amateur Radio Service in the RF Safety Regulations, ending our categorical exemption.

This Just In

The FCC is amending its Part 97 Amateur Service rules relating to RF exposure safety.

The current amateur radio RF exposure safety limits will remain unchanged, but the amateur-specific exemption from having to conduct an RF exposure evaluation will be replaced.

ARRL has asked the FCC to make available on the internet a calculator to facilitate making the correct calculations.

Ionizing vs. Non-Ionizing Radiation



- Ionizing radiation is responsible for “radiation sickness.” RF is non-ionizing.
- Non-ionizing radiation may have both thermal effects and athermal effects.
- RF Safety regulations concern only the thermal effects of non-ionizing radiation.

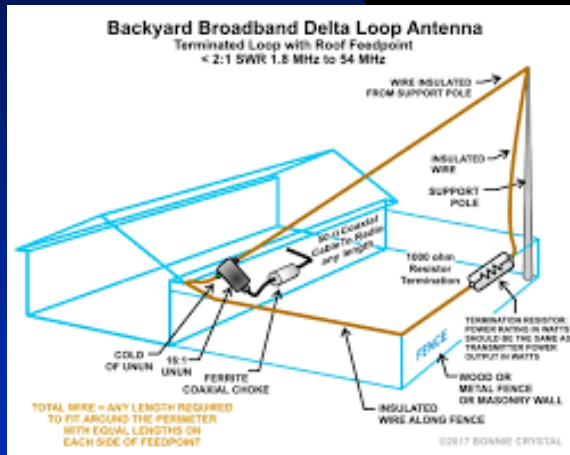
MPEs and SARs



- The Specific Absorption Rate (SAR) measures the rate at which tissue absorbs RF energy.
- The Maximum Permissible Exposure (MPE) is based upon the SAR, and differs at various frequency ranges.
- The most stringent requirements are at 30 MHz to 300 MHz.

Exposure Environments

- A “controlled” environment is one in which people are aware of the RF and can control their exposure.



- An “uncontrolled” environment is one in which people would not normally be aware of the RF exposure.
- FCC Regulations treat these two environments differently.

FCC Regulations



- All Amateur Service stations must comply with MPE levels.
- Regulations allow us to consider duty cycle and average power in the calculations.
- A routine station evaluation is required of most ARS stations.
- ARS stations are not required to file or record any paperwork.

FCC Regulations



- While they must continue to be in compliance with MPE levels, stations using less than specified levels of PEP output, and mobile or portable stations using PTT, are exempt from routine station evaluations.
- 1997: An amendment to [Docket 93-62](#) specifies a sliding scale of exempt power levels for fixed stations.

Controlled Environments



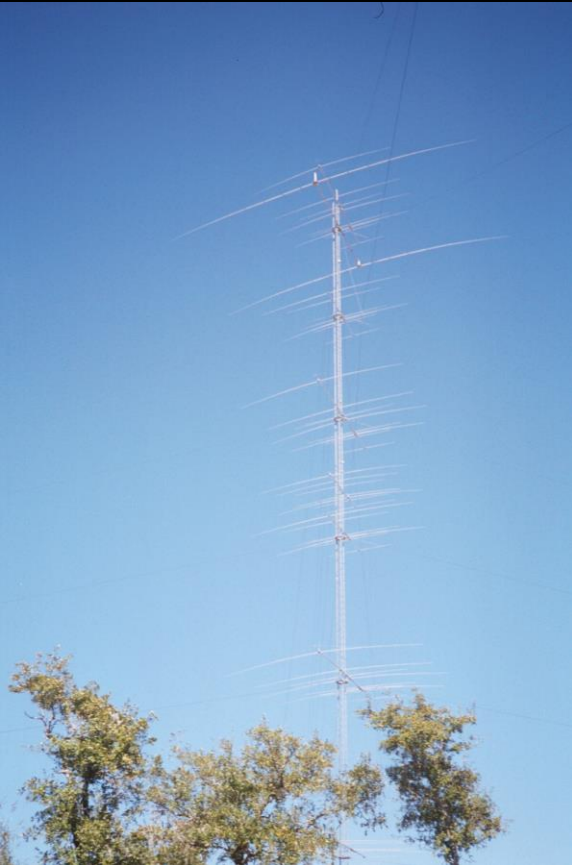
- Locked access within the exposure radius, with signage
- Your home, if you are responsible for the safety of everyone in it – don't operate when unaware visitors are present

Uncontrolled Environments



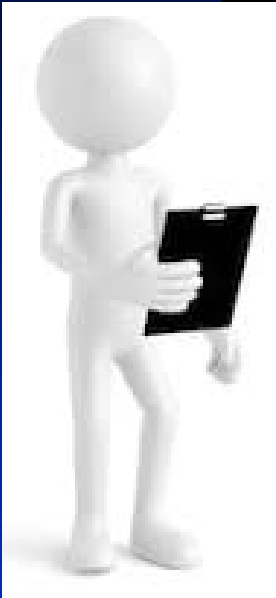
- Neighbor, if your antenna is close to their fence and they can walk within the danger radius
- Rooftop of a building if building workers can access it without knowing about the RF exposure hazard

Mobile Environments



- No regulation. However...
- Even at 50W a bystander can get a very painful RF burn
- Regulations didn't expect you would be running a full legal (1500W) amp in your car!
- So be careful

Sample RF Calculators



http://hintlink.com/power_density.htm

[RF Exposure Calculator \(Excel\)](#)

Questions



Contact Andy Parcel, KE5KOF