

Safety First!

Technician Exam Preparation Class
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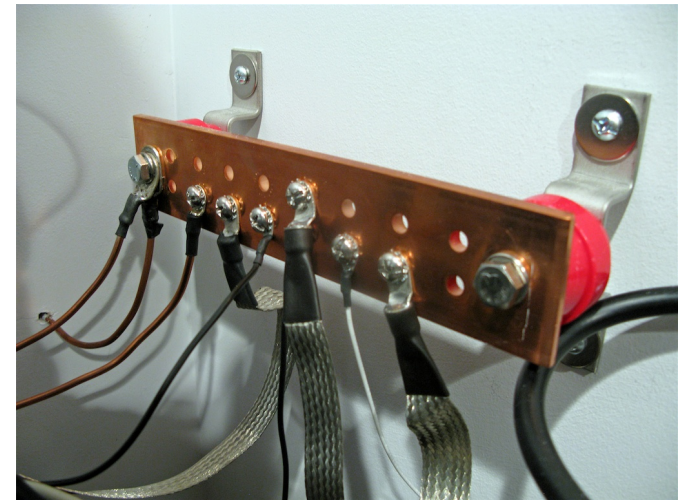
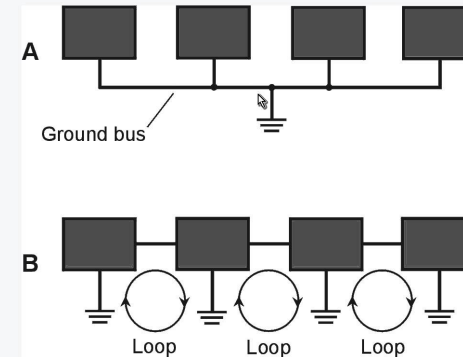
Important Grounding Info

- Grounding protects against electrical shock!!
 - Use 3-way cords and plugs on all AC powered equipment
 - Use a circuit protected by a ground-fault interrupter
 - Connect all AC powered station equipment to a common safety ground
 - Prevents different equipment from having “floating grounds”
- The GREEN WIRE in a 3-wire AC plug is always connected to the equipment ground

Connect all grounds to a common point. No “daisy chains”! Will cause ground loops instead of having all equipment at the same ground.

Ground bus bars are a good choice. One side is connected to the house ground (where the green wire is attached) and the other side goes to a good earth ground (wire as short as possible).

Flat copper strap provides the lowest impedance to RF signals. Braided strap is almost as good.



Fuses

- A fuse of the proper value will protect you and your equipment in case of an overload
- A fuse should always be included in home-built equipment
- Never replace a blown fuse with one of a higher amperage value
- Electrical current flowing through the human body may
 - Cause injury by heating tissue
 - Disrupt electrical function of cells
 - Cause involuntary muscle contractions



Battery Safety

If a lead-acid battery is discharged too quickly (as in a short circuit) the battery could overheat, discharge flammable hydrogen gas, or explode



Tower Safety

- Keep towers a safe distance from a power line!!!!
 - Far enough so that if the tower falls, no part of it can come closer than 10 feet to the power lines
- Never attach to a utility pole (they carry high-voltage power lines)
- When climbing, always use a climbing harness (fall arrester) and safety glasses
- Never, ever climb without a helper or observer
- Everyone around the tower should wear a hard hat
- Crank-up towers should not be climbed unless safety-locking devices are installed



T0B01, T0B02, T0B03, T0B04, T0B06, T0B07, T0B09

More on Towers

- A “gin pole” is used to lift tower sections or antennas safely
- Use safety wires on turnbuckles to prevent them from loosening from vibration
- Local electrical codes govern tower grounding requirements
 - Generally separate eight-foot long ground rods for each tower leg, bonded to the tower and each other
 - Use copper strap (lowest impedance to RF) for bonding
 - Keep connections short and direct (no sharp corners)

So, What Is A Gin Pole (You Might Ask)?



Lightning Protection

- Lightning protection devices short the static electricity charges to ground
- Mount on a metal plate which is connected to the external ground
- Not much will protect against a direct lightning strike!
 - Unplugging equipment from power and antennas is a good practice during thunderstorm



Touching an antenna while transmitting can cause a serious RF burn!

RF Exposure

- The amount of RF energy the human body will absorb varies with the frequency
 - The body is most susceptible at 50 MHz (6 meters)
 - This is the frequency with the lowest “maximum permissible exposure”
- RF Exposure Evaluation is required when the maximum power output is 50 watts or more
 - The evaluation is done based on the FCC OET Bulletin 65 using computer models and actual field measurements



- Relocate antennas if necessary to avoid excessive RF exposure (particularly mobile antennas)
- Whenever station equipment changes you must re-evaluate for RF exposure limits

T0A02, T0C01, T0C02, T0C03, T0C04, T0C05, T0C06, T0C07, T0C08, T0C09, T0C12

More on RF Exposure

- When antennas are where people may accidentally touch them (such as at a shelter or an outdoor activity), they need to be guarded and well marked
- RF energy is **non-ionizing** radiation (as opposed to nuclear radiation). RF energy doesn't have sufficient energy to cause genetic damage.
- RF energy can result in:
 - injury by heating the tissue
 - disrupting electrical function of cells (heart attack)
 - involuntary muscle contractions

Managing RF Exposure

- The “Duty Cycle” of the RF emitter is an important component of RF exposure
 - Duty Cycle is the percentage of the time that the transmitter is transmitting vs the time it is not
- “Power Density” is the average amount of RF power exposure over a period of time
 - Duty Cycle directly affects power density
 - 3 minutes on and 3 minutes off vs 6 minutes on would double the power density allowed over a 6 minute period

BE SAFE!