

Ham 89 – UHF Repeater Configuration

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The UHF distributed system is designed for minimum installation.

- Installation is expected to be adjacent to a barn or similar structure.
- The repeater consists of mast, antenna, lightning protection, grounding, coax, radios, and connections.

I. Mast mechanical.

- If necessary for weight, concrete foundation supports the mast.
 - Pivot/tilt base mounted to foundation allows the mast to rotate.
- Mast is monopole which should not rise over 10' above support or may be triangular, free-standing tower.
 - Unless welded, electrical bonds must be made across joints.
 - Mast must be high enough the top of the antenna is above the building.
 - Mast should support 100 mph wind loading with the antenna attached.
 - Building should not block the antenna from seeing control repeater.
 - An UHF antenna is set 7" to the side of the mast. Antenna is similar to Telewave Ant450D6-9. Dimension: 71 x 12". Weight: 18 lbs. Exposed area: 1.4 ft². Lateral thrust at 100 mph: 60 lbs.
- Winch to pivot the mast down to access the antenna is required, if too heavy for two people to raise.
 - Pulley is required to redirect the cable from the winch mounted near the base to tower.
 - Mast attachment for connection of the winch cable.
 - Lock-in-place building latch holds the tower rigidly in place, but must release for tilting.
- If not mechanical winch, a 120-Volt power receptacle, weather proof, in-service. cover

II. Mast grounding.

- Put single-point ground bus near base of antenna for bonding downcomers and grounding conductors.
- Electrical ground system must be bonded to the single point ground bus. (#4)
- Use three (3) ground rods, spaced >17' apart, with ground wire bonding between each.
 - If adequate depth is not available for bonding wire, encase in concrete.
 - Connect lightning rod to closest, mast to one, building metal to one. Bond all to the single point.
- If the building is steel, frame is electrically bonded, and to rebar, grid connections may be used.
 - Two connections are bonded to the steel, at least 20' apart for energy dissipation.
 - One driven 8' ground rod near the base provides the reference.

III. Inside structure.

- A dedicated 120-Volt circuit with a duplex receptacle is needed.
- A wired ethernet connection is essential.
- Make building penetration for coax and ground. Use a 2" sweep elbow or similar PVC conduit.
- A mounting shelf for two (2) backup batteries, marine size, can be wherever space available.
- Rack 19" x 32" (18U) for 100-W UHF radio, power supply, battery charger, vents, and duplexers.

IV. Our engineers and technicians will install the following items.

- Place a 18" lightning rod above the top of mast with hemispherical shape lightning-attachment-point.
- Run lightning conductor (#1/0) down the mast. Bonded to rod at top, mast mid & bottom, and ground point.
- Run lightning conductor (#1/0) from mast near bottom to ground point. Strap conductors to mast like coax.
- Install offset brackets from mast to antenna, so top of antenna is 18" below rod top for lightning guard.
- UHF antenna uses multi-bay phasing harness similar to www.JagRf.com.
- Strap coax from antenna down the mast to control room radio with heavy, black zip-ties every 3'.
- Use lightning protector with five ferrite beads at top and protector before enter building.
- Run ground wire from common bus to inside rack.
- Control with Raspberry Pi, interface board, case, software, and ethernet cable.
- Arrange radios, power supply, battery charger, duplexers, coax and batteries.

