Ham 87 – Evergreen Repeater Antenna

Dr. Marc & Brett © 230418 - 230901

The Evergreen repeater configuration consists of a triangular tower, a VHF antenna, and possibly an UHF antenna. The tower must pivot down to allow access to the antennas.

I. The following items, tasked for others.

1. The base and pivot will be similar to Universal Freestanding Aluminum tower #HD12-80. New specs attached.
   a. A tilt base is available with the tower. The tilt base mounts to concrete foundations.
2. The mast has seven segments. The weight is 320 lbs, considerably more than the 40' section.
   a. Unless welded, electrical bonds must be made across joints. Use aluminum straps with clamps.
3. A windlass is required to pivot the tower down. 120-Volt power receptacle is needed. A pulley near the tilt point is required to redirect the cable from the winch mounted near the base to tower. Weight 20 lbs.
4. A VHF antenna is set 20" to the side of the mast. The antenna will be similar to Telewave Ant150D6-9. Dimension: 195 x 33 in. Weight: 28 lb. Exposed area: 3.3 ft2. Lateral thrust at 100 mph: 134 lbs.
5. An UHF antenna is set 7" to the side of the mast. The antenna will be similar to Telewave Ant450D6-9.
6. Dimension: 71 x 12". Weight: 18 lbs. Exposed area: 1.4 ft2. Lateral thrust at 100 mph: 60 lbs.
7. Total weight is approximately 400 lbs.
8. Two Hardline coax with a grounding conductor (#4) will route down the antenna then from the antenna base to the equipment room. A 3" sweep elbow PVC conduit through the wall is acceptable. The cable is very stiff. A 30" square box is needed to bend the cable.
9. Three electrical ground rods are required for lightning dissipation and electrical bonding. Separate by 17'
   a. Connect each rod to the other two with AWG 6 or 4 solid copper.
   b. Connect one rod to the aluminum downcomer after transition to copper.
   c. Connect one rod to the tower. The tower base can be one point. It must be bonded across the tilt.
   d. Bond to structural steel. (#1/0)

II. The following items, tasked for others, are inside the equipment room.

1. A dedicated 120-Volt circuit with two duplex receptacles is needed.
2. Two wired ethernet connections are essential.
3. A mounting shelf for VHF duplexer should be elevated 7' or enclosed in a closet to protect the fragile metal sides.
4. A mounting shelf for UHF duplexer should be elevated 7' or enclosed in a closet to protect the fragile metal sides.
5. A mounting shelf for four (4) backup batteries, marine size, can be wherever space available.
6. Rack 19" x 72" for VHF radio, amplifier, and power supply; UHF radio and power supply; battery switch; and vents.

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

1. Offset brackets from mast to antenna for VHF. Install so top of antenna is 18" below mast top for lightning guard.
2. Offset brackets from mast to antenna for UHF. Install so top of antenna is below mast top for lightning guard.
3. Put an 18" lightning rod above the top of the mast with hemispherical shape lightning-attachment-point, to meet code.
4. Lightning conductor (#1/0 braided aluminum) down the mast. Bonded to rod at top, mast mid & bottom, and ground point. Strap. At bottom, dielectric connector to copper. Copper between rods and in contact with earth.
5. Lightning conductor (#1/0 braided) from mast near bottom to ground point. Strap conductors to mast like coax.
6. Single-point ground bus near base of antenna for bonding downcomers and electrical ground/bonding points.
7. Coax from antennas down the mast to the control room. Strap to mast with heavy, black zip-ties every 3'
8. VHF antenna & possibly UHF antenna
9. Radios, power supplies, amplifiers, duplexers, and coax cable in the equipment room.
10. Life is good. Enjoy!

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