

# Homebrew Aluminum Angle Mini-Tower

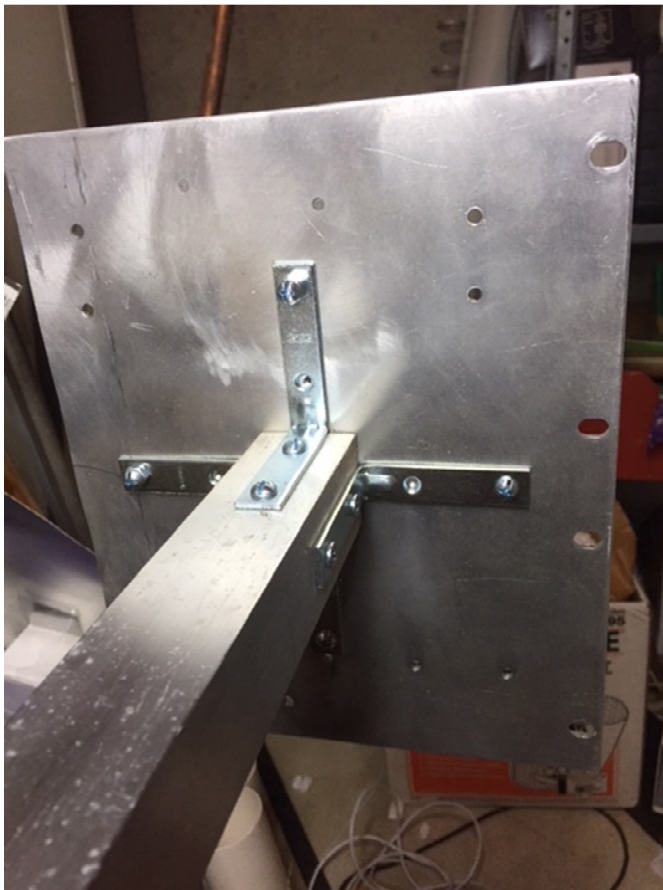
Rick Rosen K1DS

I needed a short tower/stand for my portable EME station. Since the Yagis I am using are quite long, it was necessary to have a broad base so it would not tip over. It would need to be strong enough to support a free-standing mast and rotor, yet lightweight enough to transport. The compromise was 6' tall square aluminum mast (that was already available in the shack) that was supported and stabilized with a 6' square aluminum base. I ordered 10 pieces of 6'-long aluminum angle to assemble a base and brackets. I also had on-hand a 1/8" thick aluminum plate on which I would mount my Yaesu G5400 azimuth/elevation rotor. Portability meant that I would be able to assemble and break down the unit in about 15 minutes, so I chose to use #10 machine screws and wing nuts for easy tool-free erection and removal. I retained the nice cardboard tube in which the aluminum angle was shipped, as this made storage of the dissembled unit very tidy.

The perimeter aluminum angle pieces were laid out in a square and holes were drilled at the corner overlap of the horizontal parts. Measurement of the holes away from the vertical angle needed to be careful to accommodate the wing nuts that would mate with the #10 hardware so that the wings would be able to turn and not hit the vertical angle. Next, a pair of aluminum angles were placed "back-to-back" at the center of the square, 1-1/2" apart. These would support the 1-1/2" square mast. Holes were drilled in the ends of these pieces and the holes went through to the middle of the angle pieces that were opposite each other. The square mast was placed in the center between these two central angles and two additional holes were drilled through the three pieces so that 2-1/2" screws could be inserted to hold that mast base in place. The next task was to make a set of 4 braces that would stabilize the mast. One end of the remaining 4 angle pieces was cut so that there was 1-1/2" section of one side of the angle that could be removed, leaving a 1-1/2" tongue of aluminum that could be bent to an approximate 45° angle. This tongue would also be drilled to accommodate the #10 screw and attach to the center of each of the horizontal part of the perimeter rails. The upper end of the angle would then mate with the mast, and a single hole was drilled through two of the brace angles and the mast to again be able to use a 2-1/2" #10 screw and wing nut. A level is used to assure that the positioning of the braces keeps the mast vertical at 90°. Once the four braces were attached, the unit should be quite stable and sturdy.

The aluminum plate was drilled to accommodate the bolt pattern for the Yaesu rotor. Yaesu uses metric bolts, and the proper length bolts to mate the rotor to the aluminum plate that was being attached to the top of the mast were found at a well-equipped hardware store. The top plate was secured to the square mast with small angle brackets and further stabilized with some smaller and lighter weight aluminum angle. To avoid a metallic boom for my VHF antennas that might interfere with their radiation pattern, I used schedule 80 PVC tubing of 1-1/2" diameter which conveniently has an outer diameter of 1.9" that fits the rotor perfectly. To stiffen the PVC, I added a dowel of 1-1/2" diameter through its entire length. I found that I could assemble the mini-tower and rotor in less than 15 minutes. Placing the rotor mast, antenna and coax took another 15 minutes with the use of a 4' ladder.

It was easy to align the antenna with the rotor setting by simply lifting the tower slightly and turning the entire assembly to the correct direction. Since I have a slope where I have to place the tower, I use various supports to place under the perimeter rails to level it. Most recently, those supports were a pair of gallon paint cans with a shim of a piece of 2X4. An additional bonus of using the Yaesu G5400 rotor is that the mounting holes also fit the other Yaesu rotors. It is simple to swap out the rotors to use a G450 azimuth rotor with another 10' aluminum vertical mast for general VHF activity. Considering the length of my 1296MHz Yagi, I may have to extend the mast another few feet. 73, Rick



Detail of the brackets for top aluminum plate for the rotor



Assuring the mast is vertical using a digital level



The completed mini-tower in the garage.



Here's the minitower in place with a single Yagi for EME.





432 EME



144 EME