

Two Meter Coat Hanger Antenna

Hams are inventive creatures, especially when it comes to antennas. We seem to have an innate ability to build antennas with the least amount of parts, cost and radiate on the frequency it was designed for.

Being part of this fraternity I have built many HF dipole antennas from 10 to 80 Meters and they have always worked very well and with stood nature's wrath without falling and returning to the ground. However, I have never made a $\frac{1}{4}$ wave antenna for 2 meters. So to correct this oversight, I decided to approach this new venture.

Design

The design of this antenna would be make a 2 meter $\frac{1}{4}$ wave antenna out of parts that I had on hand, making it flexible, aerodynamic efficient so it could with stand a strong winds and not be bent out of shape from weather events. The radiating element & radials would be attached to a five-hole SO-238, and hopefully with a low SWR.

Frequency & Parts

Frequency: 144 to 148.

Parts would consist of a stiff wire, bendable when stressed, and returns to its original position. Stainless steel hardware (4-40) consisting of bolts, washers, lock washers and nuts, one five-hole SO-238 new or used, a good weather sealant to seal up the hardware and the bottom of the radiating element.

Construction

I did a little searching on GOOGLE for "2 meter quarter wave antennas" and found a pleather of information, styles and construction methods. Some were using Romex house wire, 14 gauge copper weld antenna wire, welding wire; aluminum TV tubing, ECT. None of them seem to work for my construction application.

Then the light bulb went off in my brain. ***Iron coat hangers!***

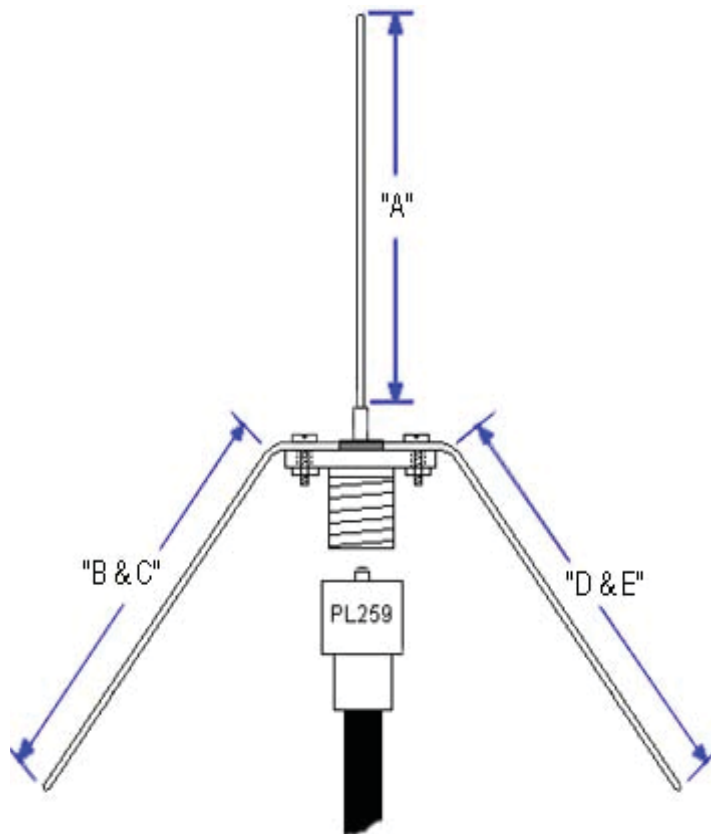
I found 6 that were just hanging around in my closet (pardon the pun; that was just to obvious to pass up). One was the old iron style heavier, larger gauge; the other five were smaller gauge, the newer variety; with white coatings on them. After gathering all of them, I cut off the "hook" of each of them and then straighten them out. The smaller diameter ones were easier to bend and some of the coating chipped off as I bent them straight. The old iron one was tougher; it

required a vise grip and a pair of plyers to get it straightened out. I did notice the older iron hanger had a slight coating on the metal, I guess this was on there to prevent rusting.

Doing the Math & Measuring Twice, Cutting Once

As with all antenna projects determining the length of your antenna to the frequency you want it to resonate is most important. So to figure out the length of the antenna's vertical and radial elements, I use the following formula below.

Length in inches: $2808 \div 146.00 \text{ MHz}$. The vertical "A" calculated out to 19.232876, so I measured the vertical to 19.25". I added 5% to the radials "B&C, D&E" they calculated out to 20.194519, I measured them to 20.25".



After I measured them, I marked them with a black pen and cut them. I made a hook on one of the ends of the 4 radials, it kind of looks like a "?". This is where the 4-40 screws will go through the SO-238.

I discovered the larger wire diameter would not fit in the solder pin on the back of the SO-238, so it was used for one on the radials. Before I soldered the vertical wire to solder pin, I removed

the coating from one end of the wire and tinned it, and also tinned the post on the SO-238 and soldered it on.

Putting it All Together

Before I did anything to start to put the antenna together, I neutered the bite of the radials tips. I removed the black tape I had put on the ends and replace them with clear beads on each of ends of the radials, the radiating element got one also. A dab of clear hot glue on the ends and backside of the beads took the teeth out of these little pokers.

In order to have continuity between the radials and the SO-238 I had to scrape all the coatings from all the wires that were going to be in contact with the SO-238. This was easily accomplished by some sand paper and elbow grease. The last step to do to complete radials before mounting them is to bend them to a 45° angle. Having a protractor was a necessity of getting the angle correct at 45°.

By bending the radials down to a 45° angle, you are changing the impedance of the antenna. At 45° the antennas impedance matches that of the coax cable at about 50 Ohms.

The next part of this construction was to attach the radials to the SO-238. It is important that I kept a 90° angle between the four radials and 180° opposed, directly in line with each other for the best pattern. I sealed the top of the SO-238 with marine sealant and all the areas where the coatings had come off when bending. It worked very well for this application.

Sweeping the Antenna

This last step of this build is to sweep the antenna to see if resonate at the desired frequency between 144 and 148 MHz and check the SWR. My calculations were very close to my SWR goal. My antenna analyzer told me the SWR was no higher than 1.5.

Placement

This antenna will be for my IC-8000 in the garage and it will be placed on my fence using a 12' PVC.

A little sweat & blood, this has been an interesting project. Taking parts of what I could find in my junk boxes, closet, and some old PVC plastic pipe and at a minimal cost and making a working 2 meter antenna.

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