

True “Home” Brew – Ultra Simple 2m Antenna

Ideal for the new ham or for a club “build-it” meeting. Very low cost and easy-to-build, this remarkably simple base-station vertical is the equal of a J-pole, but much smaller.

By John Portune W6NBC

What sets ham radio apart from other radio services? Simple – home brew. Police, fire, broadcasting – even the FBI – must use commercially-built, type-accepted radios on fixed channels. We hams can “roll our own” from bits and pieces found around the house. And, we have thousands of frequencies, in SSB, FM, CW and digital, from flea power to the legal limit. Other radio service can only dream of these. Besides, there are still WWII ARC-5’s out there making radio waves.

A good ham buddy, Ernie W6ND, adores home brew. Discarded plastic bottles, old curtain rods, old swap-meet wire, and of course PVC pipe are his joy. He says, “The ham who dies with the most PVC, wins.” We both believe that the gods on Mt. Spectrum decree PVC fittings for home brew. Build it yourself embodies ham radio. It let radio amateurs lead the way in the early days.

At a recent coffee klatch, I, Ernie and several other OM’s were debating, “What’s the archetypal ham home brew project?” It must work, be easy to make and cost nearly nothing. Hams also love to save a penny.

Several good ones came up, but one was the winner, a 2m wire-coat-hanger base-station antenna. Two hangers, a short piece of PVC pipe, four 8-32 screws and two ring terminals – that’s it. And of course, some RG-58 – what else would a home brewer use?



Figure 1: Our archetypal ultra-simple home-brew ham project, a coat hanger 2m base-station vertical

Performance

Despite its small size and junk-box origin, this little beauty can hold up its head alongside anybody's J-pole. See Figure 2. Both are omni-directional, vertically polarized and have the same gain. Height wise, though, there is no comparison: 57 in. for the J-pole, 16 in. for the coat hanger special. You tell me which one the neighbors won't notice.

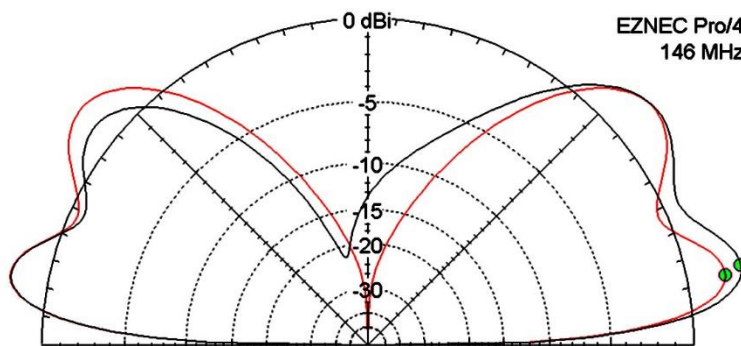


Figure 2: Coat hanger vertical (red),
J-pole (black), 5 ft. above average soil.

The antenna has an SWR of roughly 1.8:1 at resonance, Figure 3. However, notice the bandwidth. The SWR stays close to 2:1 across the entire 2m band. Modern 2m rigs are completely happy here, and truthfully the losses are actually quite small at 2:1 SWR. In the true spirit of homebrew simplicity, matching is not called for. Do it if you wish, however. A small L-match or a gamma match will work fine.

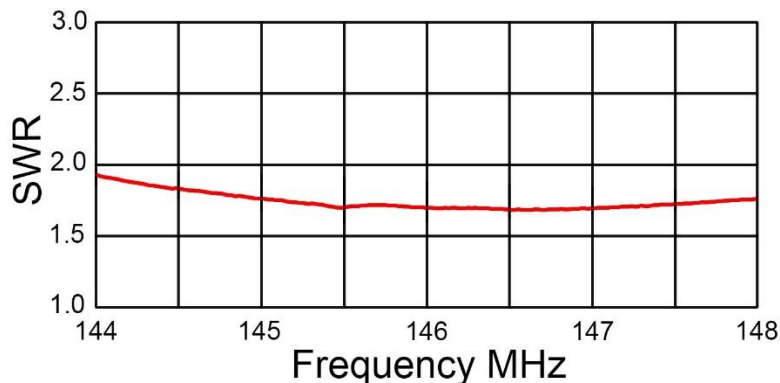


Figure 3: SWR curve. Note the wide bandwidth

How to Make the Antenna

Start by rummaging through your closet for two “ordinary” wire coat hangers. Don’t be an engineer, this is a fun project, not rocket science. Look for the cheap kind you get from the dry cleaners.

Find ones that are 16 in. wide, not 18 in. The bigger ones won’t reach 2m. The wire finish is not important, neither is the wire gauge. The one shown is 13 gauge (0.075 in. 2.0 mm), white powder coated. For indoor use, steel hangers and hardware are fine. Outdoors, weather proofing and brass/stainless hardware are recommended.

Begin with the PVC mast, Figure 4. I used $\frac{3}{4}$ in., but $\frac{1}{2}$ in. is okay too.

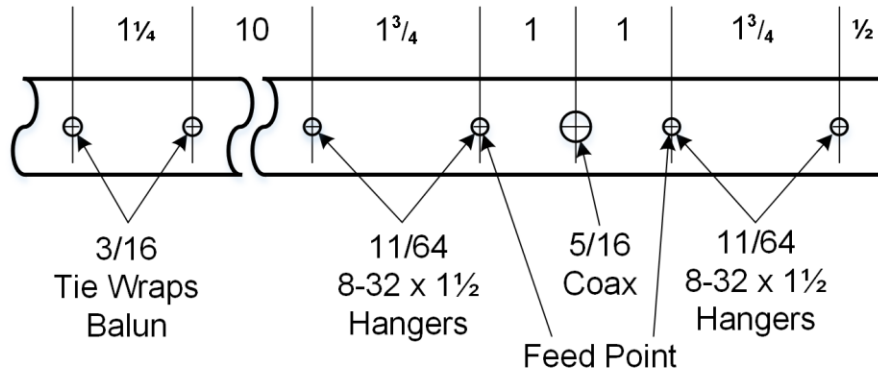


Figure 4: Drilling guide for PVC pipe. Holes, both sides.

Next, remove an inch of the coax jacket, unweave the braid and twist the individual wires together. Then if you wish, add heat-shrink tubing for weather proofing. DO NOT, however, put the ring terminals on yet. They won't fit through the holes in the mast.

Straighten out the hooked ends of the hangers and bend small loops parallel to the hangers in the ends to accept 8-32 screws. Start with the wire uncut. After assembly, you will shorten the wires to set the operating frequency of the antenna.

Install the four 8-32 x 1 1/2 screws. Pass the coax through the 5/16 in. holes in the mast, from the back. NOW add the ring terminals. Loop the coax down to where the balun goes. The coax should be an inch away from the lower hanger. Make five wraps around the pipe and secure them with a long tie wrap through the 3/16 in. holes. The coax wraps form a choke current balun. Finally, attach the coat hangers.

Tuning the Antenna

With the antenna completely assembled, begin shortening the wire ends in short increments until the antenna resonates at the desired frequency. Cut off roughly an inch each time and bend a new loop. My wires ended up roughly 2 in. long; yours may vary. If you can't reach the 2m band, your hangers are not the right size. The antenna can be fine-tuned by bending the horizontal portions of the hangers inward or outward.

Final Considerations

A horizontally-polarized version of this antenna is quite practicable. Just add a PVC "T" fitting at the top to mount the hangers. A multi-element beam antenna is also possible with additional coat hangers, pipe and fittings.

This closet wonder was for me largely to demonstrate home brew, and to make Ernie happy, but it really works. It's inexpensive and easy to build, a good first project for new hams. Simple do-it-yourself projects like this can be very motivational to a new ham. It makes their new hobby feel real. It is also great for a radio club group make-it project. Provide attendees with partly-pre-cut materials, for a materials-only charge, and let them "roll their own." Home brew rules – newbies will love it.

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