The Bobtail Curtain: Round Three

—wherein this author turns two previous articles upside down

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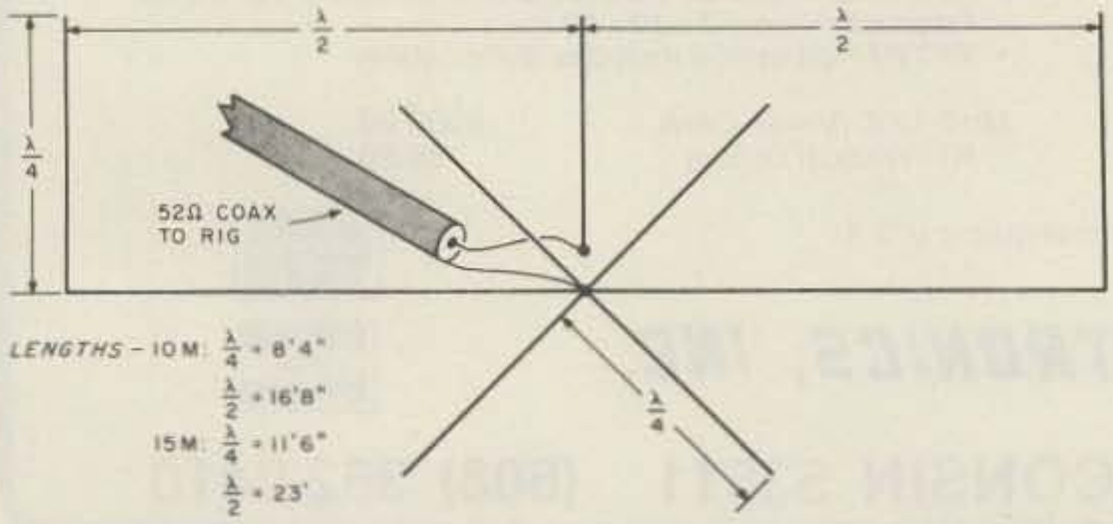

Fig. 1. The upside-down Bobtail curtain. Direction of radiation is broadside. The radials are each one-quarter wavelength long and spaced 90°.

The first time W8HXR wrote about the Bobtail curtain in *73 Magazine* (May, 1980, p. 44), I thought it sounded like an interesting antenna but the elaborate matching device was far too elaborate for me to build. The second time he wrote (*73 Magazine*, December, 1980, p. 110) I knew he had something that even I could handle, a top-phased, top-fed array.

The first article discussed voltage-feeding the antenna, that is, feeding the antenna at the bottom (at a voltage point), which required a tuning network. His second article suggested current feed (at the top at a current point which would be a good match for 52-Ohm coax).

The more I looked at the sketch of his design, the more I wondered why the antenna couldn't be turned upside down so it could be bottom fed. After I looked at it long enough, I decided to do just that. I decided on an antenna for 15 meters which would not use wire for the vertical sections, but tubing, so it would be self-supporting atop the roof. It works better than I expected. See Fig. 1.

I constructed the vertical elements out of 6' lengths of 0.058" wall aluminum tubing (Fig. 2). I used 3/4" o.d. pieces for the three base sections and 5/8" o.d. pieces for the tops. I chose 11'6" as my arbitrary starting point and slipped the smaller diameter tubing inside the larger to a depth of about 6", drilled through one wall of both tubes, and fixed them in place with a sheet-metal screw.

I mounted each of the verticals inside a piece of 3/4" i.d. PVC sprinkler pipe for an insulator and mounted each of those to the top of the house wall (it pays to have a flat roof) so the metal part of the antenna started about 9" above the roof and rose vertically from there. I spaced the three verticals 23' apart (it also pays to have a house 46-feet long on at least one

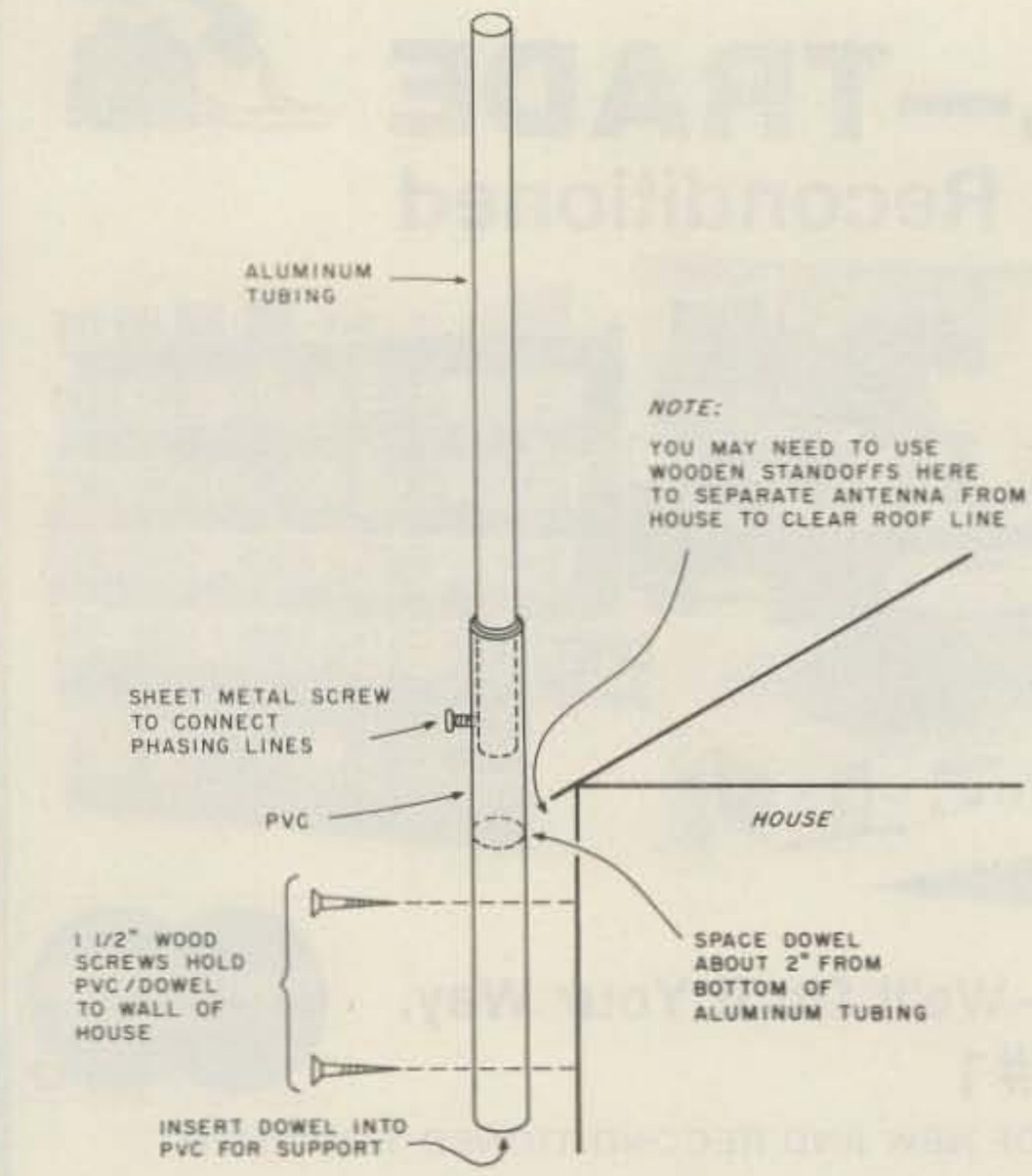

Fig. 2. Vertical element mounting details. Note that this mounting method is not strong enough to support vertical elements for 20 meters.

side). I drilled a hole in each vertical element about 1/2" from the bottom of the aluminum tubing (drill through one wall of the PVC and into one wall of the aluminum). I put a sheet-metal screw into each hole and prepared to attach the coax and the wire phasing lines. Since I made each vertical element 11'6" long and they were 1/4 wavelength long, I doubled the figure to get the half wavelength for spacing.

Since I needed two half-wave phasing lines, I decided to cut a single piece of wire a full wavelength long—46 feet. Each end of the wire attaches to the sheet-metal screws on the two outer verticals. The center conductor of a piece of 52-Ohm coax connects to the sheet-metal screw on the center vertical and the outer shield attaches to the center of the one-wavelength phasing wire. I used another sheet-metal screw through the center vertical PVC to hold the phasing line and ground shield away from the conductor.

Now, remember at this point that I was using the empirical method of antenna construction (cut and try). I knew 11'6" was close to a quarter wave (not taking time to use the formula, length = 243/f(MHz) and to calculate the Q of the tubing). So, for the smoke test I fired up the rig, loaded it up for CW with an swr bridge in the line, and was pleasantly surprised that the vswr was below 1.5 to 1 over the entire 15-meter band.

I tuned around, looking for DX, and I found two countries I had never heard before with the trap vertical I had been using. The two countries were Senegal and the Republic of Volta. Then I heard a lot of South American stations and decided to listen in the phone band. Call areas 4 and 5 sounded the loudest, and since the three verticals run in a line roughly northeast-southwest, I concluded that W8HXR was right, that the antenna radiates broadside the best.

Later that evening, with Steve AA6AA assisting, I found that his signals were about 15 dB stronger on the Bobtail than on the trap vertical using the S-meter on the TS-120S. He reported that my carrier was about 15 dB stronger on the TS-820 when I transmitted with the Bobtail. Two nights later, when 15 meters sounded dead at about 0230 GMT, I heard VU2USA in Bangalore coming through to answer my call (with about 160 Watts dc input to the TS-120S) and I knew the Bobtail curtain was the antenna for me. His longpath signal confirmed that the antenna worked better than I had ever hoped for.

What I didn't count on was making another discovery while trying to improve the signals on 10 and 20 meters on the trap vertical. I reasoned that if a three-element Bobtail works, a two-element Bobtail also must work. So, I decided to set off empirically (again!) in search of a two-element antenna which would use the Hy-Gain 14AVQ as one element and a vertical piece of wire running to a nearby tree as the other. If W8HXR were right and a 20-meter Bobtail would also work on 10 meters, then all I had to do was modify the 20-meter antenna to get two bands for the price of one.

Since the 14AVQ already had a coax feed at the base, I decided to run a half-wavelength radial on 20 meters (33') to a tie point on top of the roof. I mounted the end of the new radial (with an insulator) to a vent pipe. I then took a 16'6" piece of wire, soldered one end to the radial end and installed an insulator on the other. I climbed a nearby tree and pulled the new vertical up and affixed the insulator to a tree branch. The test showed the vswr was okay—not over 2 to 1 on the 10- and 20-meter frequencies that I normally operated. Wow! The thought at the time was that I would install a separate 10-meter Bobtail antenna. (I've never gotten around to it.)

But I did decide to make a change in the original 15-meter Bobtail. I concluded that since the two-element antenna worked well on 10 and 20 meters with four radials for each band, I at least ought to try installing radials on the 15-meter antenna. Since I was already on a streak with the 11'6" measurement, I cut four radials and spaced them 90 degrees apart and attached them to the coax shield at the base of the center vertical. The vswr got even better—no higher than 1.1 to 1 from 21.000 to 21.275 MHz and still below 1.3 to 1 at 21.450 MHz.

What a terrific surprise this whole experiment was. I expected to cut and try various lengths on 15 meters and somehow I lucked out on the first attempt. Then I expected I might run into trouble by adding a Bobtail radiator to the trap vertical—but I didn't. The vswr did go up a little, but nothing unmanageable. And I suspect that if I cut and tried a little harder, I'd be able to solve that, too. So, for an afternoon, a few bucks, and a little inverting of someone else's antenna design, I must say I'm pleased. If you want to write me about the antenna, please include an SASE. ■