

a 40-meter bobtail curtain array

A modified
three-element vertical
broadside antenna
that will
more than double
your radiated power

Want to have a lot of puzzled hams throwing questions at you over the air? It's easy. Just say you're using a bobtail-curtain array for an antenna. This is guaranteed to keep you busy for an entire evening, especially if you're laying down a healthy signal. This is what happens to me when I use this antenna on 40 meters. Its name gets everyone so worked up that I've stopped being honest and just say I'm using a vertical.

Despite all the confusion, this is an antenna worth knowing more about. It has the advantages of simple construction and tuning, low cost, and gain at low radiation angles. It's an excellent antenna for any of the low-frequency bands, and performs especially well on 40 and 80 meters. The only major disadvantages are height and area requirements and the necessity for an antenna tuner.

description

Over-all dimensions are shown in **fig. 1**. It is an offshoot of the three-element vertical broadside array. In the classical version, three elements are fed in phase with equal currents, and the elements are spaced one-half wavelength apart. This arrangement theoretically has no radiation off the ends because of the phase relationship existing between elements. In the bobtail array, there is some high angle radiation off the ends. This occurs because of imperfect cancellation due to the flat top portion. So there's a small compromise. Compared with the three-element co-phased vertical array, the bobtail's front-to-side discrimination is somewhat degraded. But its broadside gain is still pretty good—7 to 10 dB over a reference dipole.

The height requirement for 80 meters will be about 70 feet, but for 40 meters it's only about 35 or 40 feet. The flat top portion of the 40-meter version is just an 80-meter dipole with no center insulator, so if you have room for this you can build the bobtail.

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construction

There are several ways to go about construction. If you can get the two ends supported about 40 feet or more above ground, there will be just about enough sag in the flat top to allow the center wire to hang straight down to the tuner. However, I didn't have quite enough height at the ends, so I used a different approach. My center element is actually a 40-meter ground plane, made of three 12-foot lengths of aluminum tubing, telescoped together and adjusted to approximately 34 feet over-all. The joints are split and clamped tightly with stainless-steel hose clamps well coated with zinc chromate

to prevent oxidation.

The element is mounted on an insulator originally used for whip antennas on tanks (bought through surplus channels). This insulator is mounted on top of an adjustable tripod mount (also surplus), and the whole element is guyed with three sets of three guys each, made of nylon cord. Bear in mind, when choosing the insulator, that rf voltage is high at this point.

The two half-wave phasing lines are soldered to heavy lugs and bolted to the top of the center element. At each end of the phasing wires, another vertical wire is connected, made of number 10 or num-

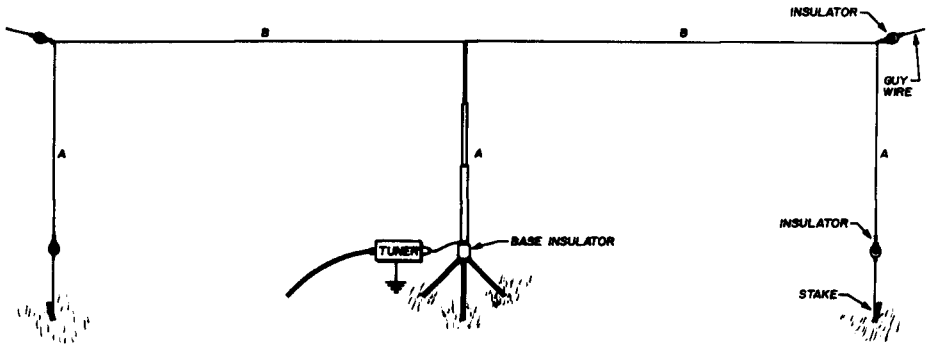


fig. 1. A bobtail-curtain antenna for the lower amateur bands; dimensions in the table are in feet.

Band	A	B
80	66	132
40	33	66
20	16.5	33

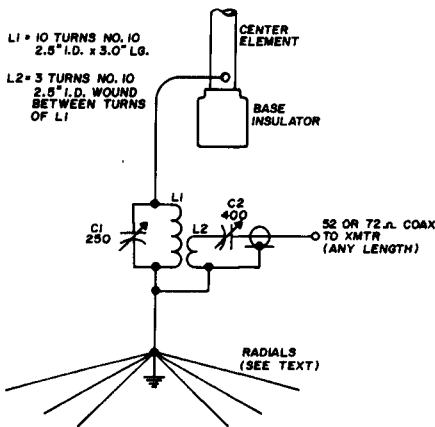


fig. 2. Tuning unit for the 40-meter array. For 20-meter operation, L1 and C1 should be approximately one-half the values shown here; C2 is the same.

ber 12 wire. The ends of the flat top are then pulled up to full height so the verticals hang straight down. A little compromise will do no harm. I've used the antenna with the two end elements almost 45 degrees with respect to ground, and results have been just as good.

antenna tuner and adjustments

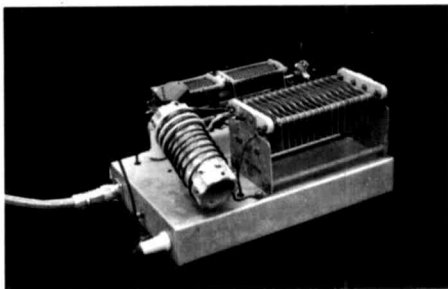
The antenna has a high input impedance, so an antenna tuner must be used. Fig. 2 shows the circuit, and the photos illustrate tuners used for 40- and 20-meter versions. The coil for the 20-meter tuner is a B&W BEL-150. For 40 meters, the coil and link are wound on the ceram-

ic form from a BC-375 tuning unit. The small capacitor tunes out reactance in the transmission line, which in my case is over 100 feet long.

Tuneup consists of adjusting both capacitors to obtain minimum standing-wave ratio. I made use of my ever-patient wife and my children's walkie-talkies to overcome the distance problem from tuner to shack. Only a few minutes were required to bring the standing-wave ratio to almost 1:1, and I have had equally easy tuneup with two other bobtails, which I built in the past for 40 and 20 meters.

To avoid hanging the antenna so the driven element would have to come into the shack to the tuner, I left the tuner at the antenna base and made it waterproof. After tuneup was completed, I enclosed the tuner in a box made from clear sheets of plexiglass. This makes an excel-

Tuner for the 40-meter bobtail.



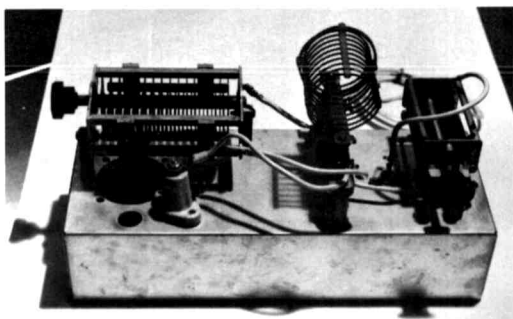
lent weatherproof container, and the components can be seen at a glance.

ground system

Undoubtedly if you researched enough antenna handbooks, you'd find a lot of information on the bobtail, but I have found very little. It appears that an elaborate ground is not necessary, and a 4- to 6-foot ground rod seems ample,¹ connected to the tuner through a flexible piece of braid or heavy wire.

I still had the eight radials used for the center element when it was just a ground plane, so I decided to bury the

radials directly under the center element. If I were to say this made a fantastic difference or even any difference for that matter, it wouldn't be true. However, it seems logical that a good radial ground system should be just as effective for this antenna as for any other vertical array, so I like to think that those fine reports on 40-meter DX contacts are just a bit better because of the radials. I've been tempted to install radials under the outer elements also, but so far I haven't done so.



Tuner for the 20-meter bobtail is similar to 40-meter unit but with smaller components.

results

The antenna tunes broadly, and the standing-wave ratio remains reasonable over the whole band. My broadside pattern is beamed northeast—southwest, and the antenna has produced many good comments from European, Near-East and Pacific stations. Results in North America aren't spectacular, because the radiation angle is low. It's a DX antenna, and doesn't really start to perform until the distance is greater than 2000 miles or so. After that, it's a great antenna! It would be interesting to hear from others who may be using this antenna so I could compare notes.

references

1. *The Radio Handbook*, Editors and Engineers, Santa Barbara, California, 1959 edition, pp. 472-473.

ham radio