a top-loaded 80-meter vertical

This efficient antenna can be built for under twenty dollars—it's one answer to restricted space

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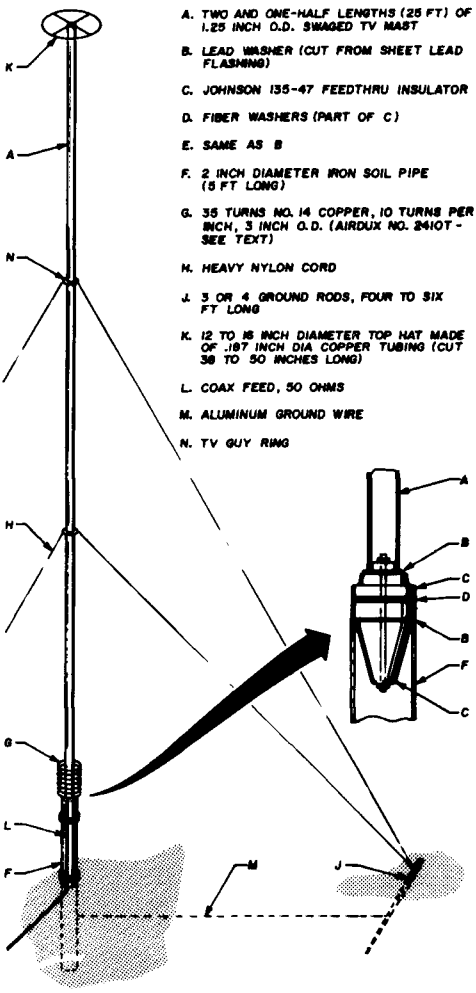
The search for an efficient, low-cost antenna for 80 meters often takes on strange forms, mostly because of the fairly considerable space necessary to get any sort of decent performance. Limited lot sizes often prevent erection of anything like a proper horizontal dipole, and even a long wire becomes a problem. However, a convenient answer to the problem may appear in the form of a vertical.

Many thousands of hams operate 80-meter mobile with small whips, using their car bodies as ground planes. Many attempts have been made to use these whips in home installations, with limited success. I believe the best answer is a happy compromise between whip and full-sized antenna.

The array described here is just such a compromise, but quite an efficient one, which should find ready appeal because of its low cost, small size and ease of installation. It's constructed of readily available materials, and can be built and installed in less than a day with no strain whatsoever. This antenna was designed and built by Wilbur (Bill) Hills,

VE1KK, a well-known 80-meter man here in the Maritime Provinces. Reference to **fig. 1** will provide clear construction details.

fig. 1. Construction of the low-cost vertical antenna for 80 meters.



construction

The radiating section is made from two and one-half ten-foot lengths of tv mast, approximately 1¼ inches in diameter. When purchasing the mast, pick up a couple of tv guy rings at the same time. The base support is made from a length of two-inch iron soil pipe (a five-foot length will be adequate). The pipe will be eventually buried in a hole where the antenna will be positioned, but don't dig the hole until you finish this article so you have an idea of just where to dig it.

Also remember that the soil pipe must be set truly vertical, or the antenna will have a drunken lean to one side or the other. To insulate the antenna from the mount, a Johnson number 135-47 feed-through insulator is used. The insulator is inverted and its longest section is placed inside the pipe. The antenna is then placed on the insulator's base. To protect the porcelain from contact with the metal pipe, two washers cut from a sheet of lead flashing separate the insulator from the metal.

The heart of the antenna is the loading coil at its base and the capacitance hat at the top. Both are easy to construct. The coil is made from a section of commercial Air Dux number 2401T, or home-made using 35 turns of number 14 copper wire, wound ten turns per inch three inches long. Small plastic strips, similar to the commercial stock, should be cemented to the wire for support. Alternately, the coil can be wound on an insulated form.

The capacitance hat is 12 to 16 inches in diameter, using 3/16 diameter copper tubing or a close equivalent. If the outer ring is soldered to the radials, and the inner ends of the radials soldered to a metal ring clamp, the hat will be rigid and can then be clamped or even soldered to the top of the mast.

final assembly

Because the efficiency of a vertical antenna depends greatly upon its ground system, provision will have to be made to lay out as many ground radial wires as possible. The radials can be buried in the ground a few inches, although laying them on top of the earth will be all right. With this in mind, as well as remembering that the antenna must be guyed, proceed to lay out the position of the antenna and its guy stakes.

Dig the hole and set in the soil pipe. Next place the insulator, with the bottom lead washer, into the pipe. Slip the loading coil over the pipe and let it slide down onto the ground for the moment. The antenna element can now be assembled, and the guy rings installed. Because the element is very light weight, heavy nylon cord can be used for guys, and these should now be fastened to the rings. Two sets of three guys should be quite sufficient.

Before raising the mast, mark out the position of the guy stakes, and install them in a triangular pattern around the base. Ground rods a few feet long will be fine. Now the mast can be stood up, with its base near the soil pipe. When it's vertical, carefully lift it straight up and set it on top of the insulator. (Don't forget the lead washer.)

At this point I'll assume you have a friendly helper, and that he, or she, can run around and snub the guys while you hold the antenna upright. This will have to be done again later, to get the mast perfectly vertical, but at least it won't come down around your ears!

Now, slide the loading coil up the pipe and fasten its top end to the bottom of the mast. Slip a couple of small plastic strips between the coil and the pipe to hold it in place and prevent it from shorting against the metal. Connect the other end of the coil to the center conductor of the 52-ohm coaxial feedline, either RG 8/U or RG 58/U, depending upon the power you plan to run. The RG 58/U will be fine for up to a half kilowatt at least.

Bond the coax outer conductor to the junction of the ground radials, which can be made from copper or aluminum wire. Although they should be laid out radially, fanning out from the base in all directions, in practice this will probably be impossible. Follow the simple rule of "the more, the better," and lay them out in any pattern allowable. If the guy stakes are made of standard four- to six-foot ground rods, three of the radials could be also connected to these rods to give just a little bit better efficiency.

**"Oh yes . . .
I'll need a quart bottle
for the base insulator . . ."**

tune-up

Tune-up is simply a matter of matching the feedline to the vertical element. Use a clip-lead and tap the feedline along the loading coil until the best match (lowest swr) is obtained. It should be possible to obtain an swr under 1.5:1 for approximately a 300-kHz section of the band. However, like all shortened antennas, the swr won't be this low across the whole band, and some provision will have to be made for retuning if you make a radical change in operating frequency, such as shifting from the low CW section to the higher part of the phone allocation.

performance

Although the vertical antenna seems to be more useful for DX work because of its lower angle of radiation, this shortened version has good efficiency at the higher angles and has proved to be an excellent antenna for all-around work on this band. My thanks to my good friend VE1KK for passing along the design information and operational results that formed the basis for this article.

ham radio