A Helically Wound Vertical Antenna for the 75-Meter Band

BY GARY L. ELLINGSON,* WAØWHE

IN ORDER to provide the reader with the complete story behind my helical antenna, some background information may be useful. I live at a QTH, similar to that of many other hams, where there is little room for a full-size dipole antenna for the lower frequencies. After some research, and ruling out buying a commercial antenna, a vertical radiator system was chosen.

In order to have a vertical antenna for the 75-meter band, however, the antenna would have to be around 65 feet tall. That, alone, would require guying, or some other means of support which would result in a structure with no aesthetic appeal to any hams (who comprise almost 100 percent of my neighborhood). By using a helical configuration, the overall antenna height is reduced, thus eliminating the need for guying. With the helically wound antenna, more equal current and voltage distribution is accomplished (as compared with a lumped impedance from a loading coil). As a result, a better radiation pattern is produced. With this system very little reactance has to be cancelled out, eliminating the need for an overly large "top hat."[1] This antenna will easily take the full legal power limit.

Construction details for the antenna are shown in Fig. 1. The following is a list of parts I used in constructing the antenna system.

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[1] [EDITOR'S NOTE: Some form of metal top hat should be connected to the last turn of the driven element at the high-impedance end of the radiator. Extremely high levels of rf voltage can develop at the end of the helix, sometimes causing the tip of the antenna to burn. The top hat tends to lower the *Q* of the antenna, thus reducing the voltage level at the far end. An aluminum pie tin mounted on a ceramic cone insulator works well in this application.]

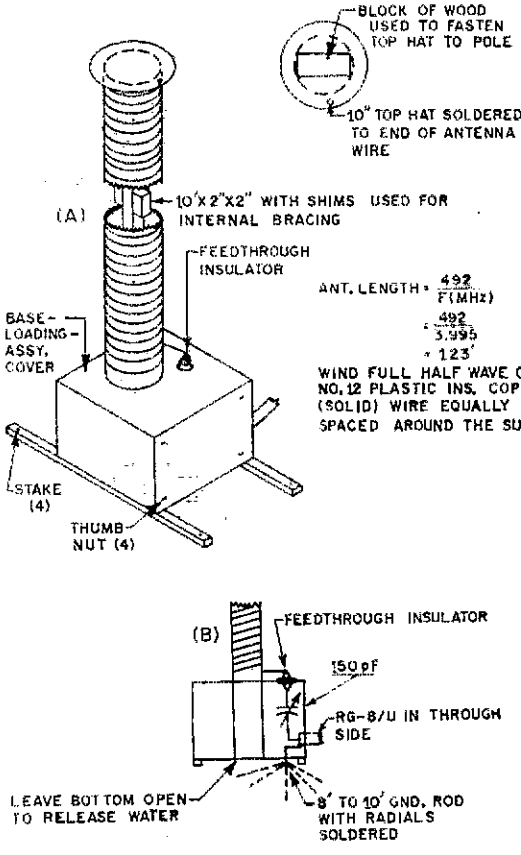

Fig. 1 — Construction details of the helically wound antenna.

Antenna:

20-ft section of 4-in. OD plastic pipe (obtained at a local plumber) $25.00
130 ft of No. 12 plastic-insulated solid copper wire (allow a little extra, about 2 ft) $3.49
10-in. disk of sheet metal (top hat: stop at a sheet metal or furnace repairman – I got this free)
260 ft No. 14 solid bare copper wire (I used only four radials in this system; use as many as you have room or money for) $7.50
20 sq. ft of marine plywood for base $3.00
2 2 × 2 10-ft sections, for internal bracing $2.00
1 8-ft copper ground rod (for radial junction) $4.00

Total cost $44.99

The cost can be reduced considerably if all materials are readily located or already owned.

Fig. 2 shows the results of SWR measurements. The SWR indicator used to make the measurements was a Midland model. The antenna was adjusted for minimum SWR at resonant frequency with the tuning capacitor at the base. The frequency for this antenna is 3995 kHz with 123 feet of wire wound on the support and one 8-ft ground rod and four 65-ft radials. There are numerous configurations possible with this system including a broadcasting favorite such as phasing two or more structures. I forgot to mention . . . give the entire structure one or two coats of marine varnish to seal the turns. QST

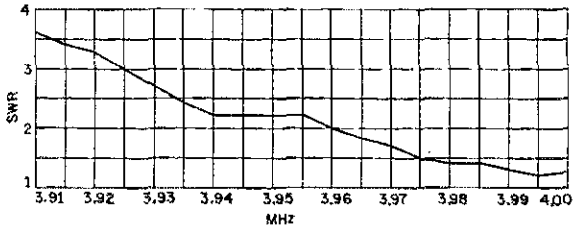

Fig. 2 – Measured SWR of the vertical antenna.

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From the Museum of Amateur Radio

Perched on top of one of our display cases is the radio-controlled sailplane built in 1937 by the late Ross Hull, then *QST* Editor, and the undersigned. It was quite successful although lacking present-day refinements. Control, through a reversable dc motor, was achieved up to distances of about a mile. It was flown at the international meet in Elmira, N.Y. Incidentally, it was covered by liability insurance, the first such policy ever issued – Ross and I just couldn't see this 18-pound ship crashing into a passing automobile without coverage. We successfully demonstrated the control to the insurance people, landing it within five feet of the agent. He was impressed! But so were we! – *WIANA*