Budget 7-Mc. Vertical Antenna

Simple Construction with Available Materials

BY W. PETE CZERWINSKI,* W2JTJ

• If you are interested in 7-Mc. DX and wish to "break through the economic barrier," this article is for you. The author shows considerable ingenuity in utilizing readily-available materials for the construction of the antenna.

After looking around at the available antenna information, the author decided he must have a ground-plane antenna. Being partial to 40-meter c.w., 7050 kc. was selected for the design frequency, which works out to be a length of 32 feet. To give a fair amount of broad-band performance, a diameter of 2 inches or more was considered desirable.

While searching for material that would meet the target dimensions and limited budget, the

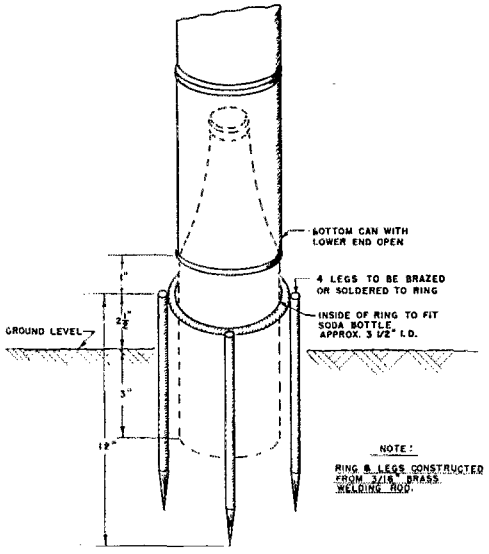

Fig. 1 — Details of the base support for the 7-Mc. vertical antenna.

author discovered that standard size beer cans are approximately 2½ inches in diameter and the supply available, especially during the summer months, is veritably inexhaustible.

Further investigation showed that they take solder readily and have a protective coating of lacquer both inside and out, besides being very light and strong. Furthermore, they are made perfectly symmetrical and do not require any jigs to insure alignment. The author simply sat one can on top of another, turned the cans so the vertical seams were staggered 180 degrees apart, aligned the top of one can so that it sat uniformly over the bottom can and spot soldered them together at three points. Then, laying the two cans over on their sides and using a 135-watt iron, the writer rotated them while applying solder to the two joined edges. It is recommended that not too much heat be applied to the solder because the tin content may be burned, leaving the soldered joint brittle. This performance is repeated by adding one can at a time to the growing mast until a length of approximately five feet is reached. After a sufficient number of "lengths" is made up to total 32 feet, they can be joined together to complete the mast. This step, however, requires outdoor space and some fairly level ground. The author had no difficulty in shimming the lengths so they were aligned for soldering.

The can ends were left intact to act as baffles and provide rigidity to the mast. Some desiccant such as "Dry-Rite" or silica-gel crystals, found in little sacks packed around surplus equipment, was dropped into each can. These crystals will remove all moisture trapped within the soldered cans and prevent rust action there. The bottom can should have the lower end removed with a can opener so as to fit over the base insulator.

It was found that a quart-size soda bottle makes a jim-dandy base insulator. The tapered neck provides a certain amount of pivoting freedom to the mast when adjusting the guy lines. For the radial ground wires the author constructed a junction ring, which also serves as a supporting bracket for the soda bottle base insulator. See Fig. 1.

The 52-ohm coax feeder line and the four radial ground wires (32-foot lengths of ⅛-inch aluminum wire) can be buried below the surface of the earth. The only items that remain visible are the vertical radiator and its supporting guy lines. Where possible, as in the author's case, the guy lines can be tied to existing structures so as not to provide an additional obstacle for the children playing in the back yard.

Before erecting the mast, the author soldered four wires, 90 degrees apart, around the lower edge of the bottom beer can. These four wires were brought to a junction and serve as a feed point for the mast — the point where the center conductor of the coax is attached. In addition to this, the guy-line rings also must be installed. See Fig. 2.

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[1] Although the author calls this antenna a "ground plane," it is more correctly a "quarter-wave vertical." A ground-plane antenna doesn't become effective as such until the radials are a quarter wavelength or more above the ground. — Ed.

The guy-line rings are made from ⅛-inch diameter aluminum wire. The wire is shaped by twisting loops every 1½ inches until three such loops are made, and then wrapping it around the can. These loops can be twisted tighter once the ring is located properly. The ridge made at the junction of two cans is sufficient to keep the guy ring from sliding down. Although the guys are nonconductors, the upper set was fastened through egg-type insulators to insure no loss at this high-voltage point of the radiator. The guys are 5/32-inch diameter plastic covered clothesline, the type containing no metal core.

The following breakdown will show total expense if a constructor had to purchase all material needed for this project:

82 beer cans	0
200 ft. plastic covered clothesline	$1.80
3 guy-line insulators	.36
1 soda bottle	.05
1 hank of solder	.25
130 ft. ⅛-inch diameter aluminum clothesline or ground wire (solid)	2.50
4 pieces of 3/16-inch diameter brass welding rod	.50
1 can of pressurized aluminum paint (for spray application)	1.39
Total	$6.85

Installation

The completed mast, glistening with the new coat of aluminum paint, is now ready for installation. The author suggests that four men be used on this job. The first step: While two men support the mast at its center section, a third man should climb a stepladder and place the top end on a near-by first-story roof or other structure of approximately the same height. Second step: One man foots the base of the mast while two men, one on either side of the mast, hold one top and one bottom guy line apiece. The fourth man then takes the remaining set of guys and climbs up the stepladder, now located at the far side of the mast. This fourth man pulls up the mast, keeping each guy at equal tension so the mast doesn't get a chance to bow. The two side men also keep equal tension but locate themselves so the fourth man doesn't pull the mast over on himself after it passes through dead center. Now that the mast is up, the man who had footed it can lift it up and place it on the soda-bottle base insulator. The mast is very light so this step is no problem. The final step is to tie the guy lines down to the selected points, while adjusting proper tension so the mast remains straight.

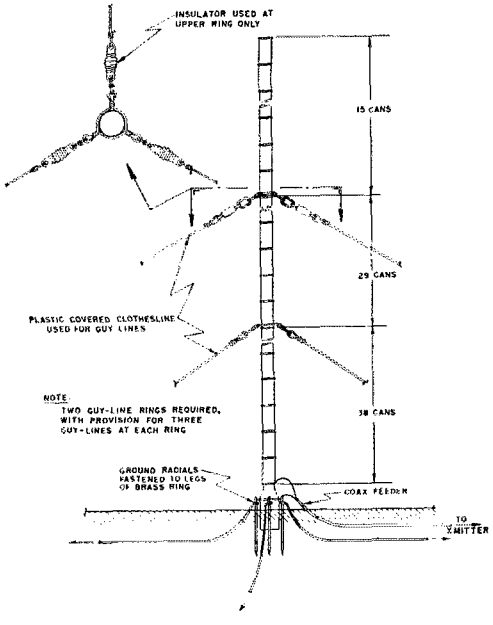

Fig. 2 — Guy-rope details of the antenna. The four radials form a cross under the base of the antenna.

Here W2JTJ is touching up a spot on his antenna he missed with the aluminum paint the first time around. A lot of thought and libation went into the construction of this vertical.

The author accomplished these steps with the help of his XYL and his two young sons, experiencing no difficulty whatever. The XYL did comment on the neat appearance of my new antenna, although she confessed that there were times, as I was soldering the beer cans together, when she thought I had finally lost my marbles.

Electrically, the vertical turned out even better than expected. In addition to receiving fine reports from foreign countries on transmitting, my receiver showed an improvement of at least 10 db. to all signals. Last but not least, I have finally licked ITV. This is probably due to the vertical polarization of the ground plane as compared to the horizontal polarization of television antennas. Gone forever and good riddance to that 15-kc. TV howl.