***W6XM comes through with a simple 160 meter vertical antenna that can be raised and lowered by one person.***

# A 160 Meter Vertical Antenna

BY ED MARRINER*, W6XM

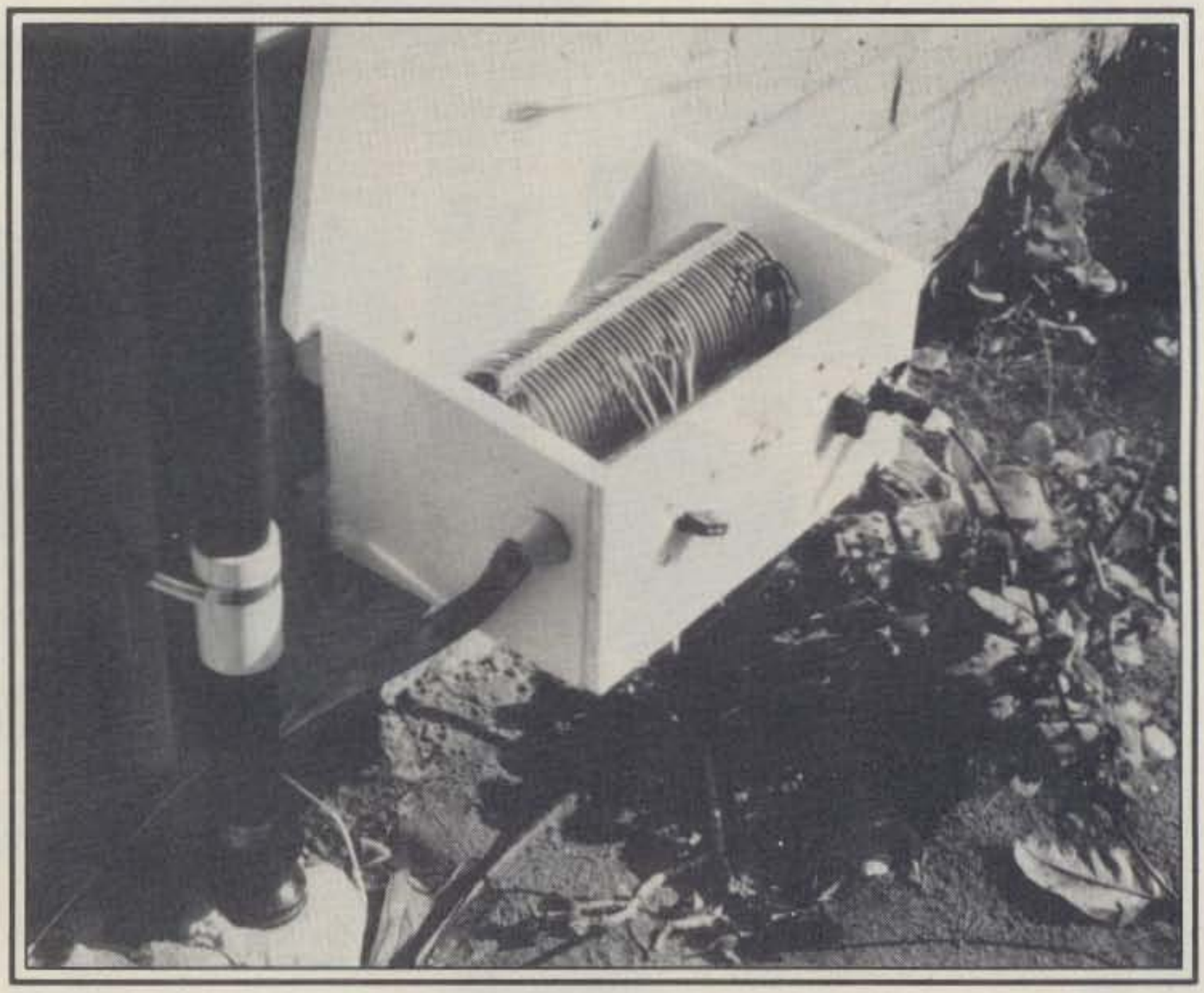
More manufacturers have added 160 meters to their transceivers as that band has become more popular. One of the most frustrating problems is what to do about an antenna?

A half-wave dipole would have to be 256 feet long. If you live in the city, this type of antenna is usually impractical. A 135 foot inverted "L" is difficult to put up on a city lot. If you bring the end into the shack, everything is hot with r.f. Also, the vertical portion should be 50 feet straight up; this requires a tall mast.

Many fellows getting on the band have a dipole on some band and just tie the coax feeder together and use it this way with an antenna tuner. They soon find out that they need something better. Those who have been on the 160 meter band a long time find that to work back east or west you need a vertical. Those who really get out have phased verticals and a good ground system. The book says the antenna should be 120 feet high and should have 120 radials, each 130 feet long. This is fine if you live on a farm. What to do?

My first vertical was a WA0RFF, which is no longer made. It was a 30 foot aluminum tube with a 260 uHy coil at the top using a tuned 8 foot rod. I made WAS. However, I could not handle it myself, and I had to guy it. I needed something I could handle by myself and made the one which I will describe.

It is a piece of 2 inch diameter, 20 foot long, aluminum irrigation tube bought from a sprinkler company for $20. If you cannot find this type of tube in your local area, all is not lost. Mr. Don Newcomb of Butternut Electronics, Route 2, Box 356E, San Marcos, Texas 78666, will sell tubing. (Send an s.a.s.e. for prices.) The 1½ inch tubing made of 6063-T832 alloy sells for $1.15 a foot. A 6 foot length is as long as he can ship due to UPS limitations, and freight is out of the question. I would use this all the way to the top and fit it together by inserting a small piece of tubing inside the larger tubing, riveting it with pop rivets. By doing this you would not have to guy the antenna, as it is rugged enough and will hold the coil at the top.



*The copper base loading coil is made of 40 turns of 3/16 tubing, 4½ inches in diameter. The coil is tapped at several points to cover the whole 160 meter band.*

My antenna resonates at 3600 kHz, and I had to bring it into the 160 meter band with a base loading coil.

## Construction

Here is how I constructed my antenna. Taking a 20 inch long piece of 1⅞ inch o.d. PVC (white type), I filed and fitted it into the top of my aluminum tube. Next I secured it with stainless steel 10-32 nuts and bolts. Then I cemented a PVC cap on the top end of the tube. A coil made of 100 feet of #12 enameled copper wire was close wound on this tube. Every 2 inches I secured it with electric tape. When I got the coil all wound, I heavily wrapped it with Scotch-type electric tape. The top of the coil was soldered to a lug and fixed between the two brass nuts on the threaded part of the brazing rod screwed into the cap. The bottom was secured to the aluminum tube with stainless bolts. All joints were coated with GE RTV rubber compound, which turns into rubber.

The antenna was set on sawhorses and grid-dipped to see if it came out on 3600 kHz. Three pieces of 4 inch long 2⅜ inch PVC o.d. were sawed half way down the middle, making a clamp. The antenna was wrapped with one layer of tape and the PVC clamps tapped into place. The antenna was set on an insulator such as a beer bottle and raised into place against a 9 foot high 2 × 4 held to a block fence by carriage bolts. Stainless-steel hose clamps slipped over the PVC clamps, compressed the slot, and held the anten-

*528 Colima St., La Jolla, CA 92037

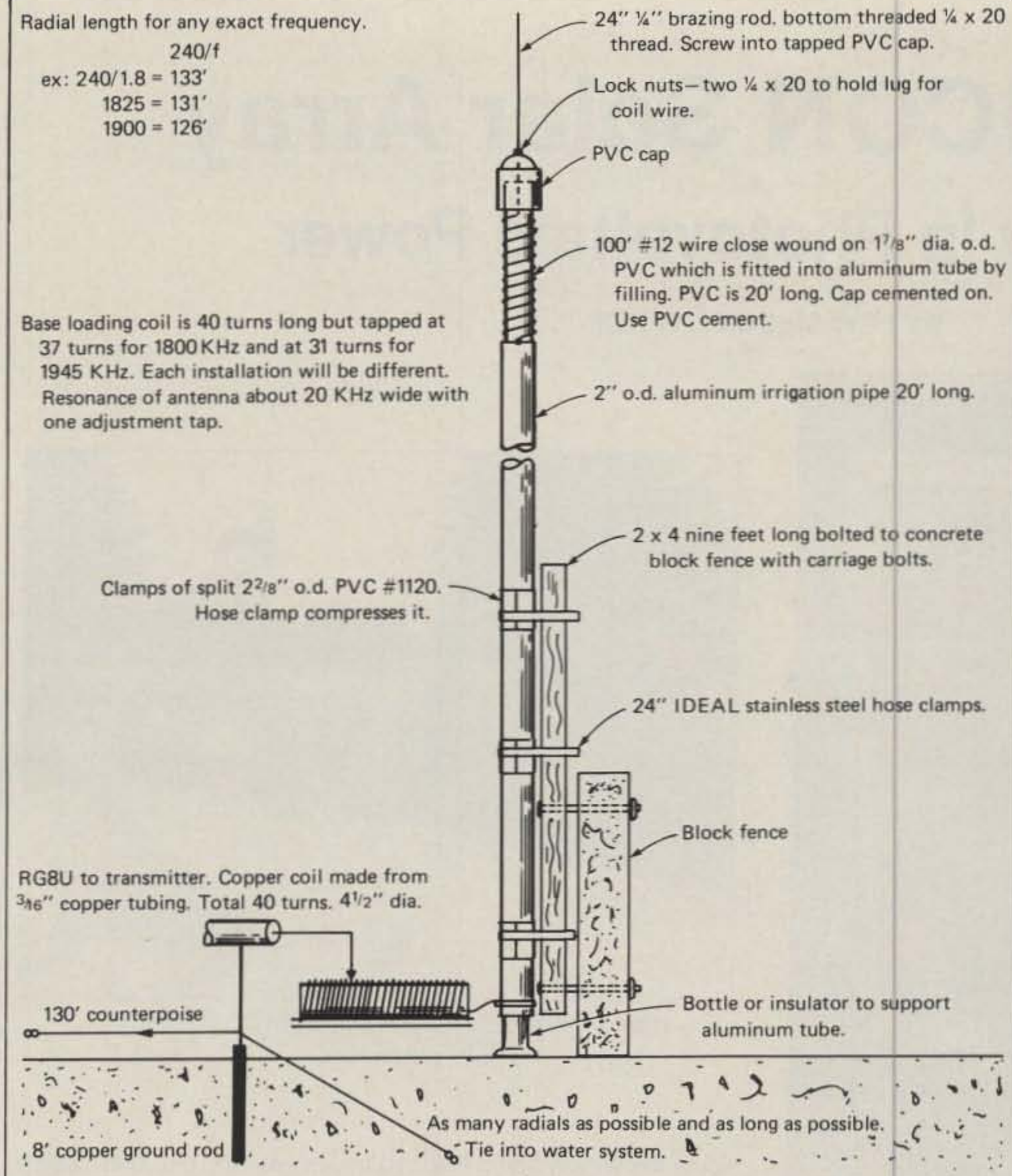



*Fig. 1– The simple mechanical details for the 160 meter vertical antenna.*

na securely. No guys were needed. I did the whole operation myself.

To tune the antenna I made a 40-turn coil of 3/16 copper spaced one turn diameter. I rolled mine on a tube 4½ inches in diameter, and then threaded it onto some plastic strips in which I drilled holes to keep the turns separate. My coil was supported on insulators and put in a big box at the base of the antenna. Next I drove an 8 foot copper rod into the ground and put out two radials 130 feet long and some shorter ones. It is important to get out as many radials as possible plus tie into your water-pipe system.

## Tuning

For tuning I set a field strength meter on the fence and adjusted the tap until I got maximum output. At that point my s.w.r. was minimum. In my case I used a switch from a BC375E surplus tuner unit that had six positions. By tapping the coil at various places I could tune the entire band from 1800 to 1950 kHz. I found this series tuning worked best for me. I first tried the Marconi system, using a capacitor in series with a coil to ground and link to the transmitter. I found various lengths of coax changed the coil tuning, which could be an error in the meter itself. It was not stable as the series tuning. I found no discussion in the handbooks as to which is the best method.

This is a compromise antenna. It will get out in the daytime at least 30 miles around with good signal strength, and I can QSO 350 miles at noon across or up the coast (as in my location), but not inland.

As far as DX is concerned, you will need a lot of radials because of the ground losses. A vertical is very inefficient, but on 160 meters you have no choice, since all the stations seem to come in on ground wave. The better the vertical radiation, the further you will get. You will soon find out that it is not like the 80 meter band. A wire antenna just does not do the job unless you have a long sloper which is directional.

I hope this helps someone who has little room get on 160 meters. I envy those on farms who can put up phased arrays or 120 foot verticals with 120 radials. However, the 20 footer does the job! CQ