CALLING ALL HAMS

Tips On Dipoles

THE DIPOLE REMAINS AN EFFECTIVE low-cost antenna for all radio bands 6 through 160 meters. Its broad figure-eight pattern means that it is essentially omnidirectional, especially on bands 40, 80, and 160 meters. On the higher-frequency bands there can be a serious drop-off (nulls) at narrow angles near the two bearings in line with the antenna wire. In setting up the dipole you can usually position the lay of the antenna wire to have those nulls in a least-important direction. Also give thought to the fact that the inverted dipole is more nearly omnidirectional than the straight dipole.

Dipoles are found in three common forms, as in Fig. 1. The classic dipole (A) is a straight horizontal half-wave length antenna separated into two quarter-wave segments and fed at the center. Another version (B) is called a *sloper*, because of its slant from a high mounting position toward the ground. If a metal mast is used, that style has some directivity in the direction of the slope as shown. The third form (C) is the popular inverted dipole (often called an inverted-V).

The inverted dipole requires but a single high mast and a couple of short poles,

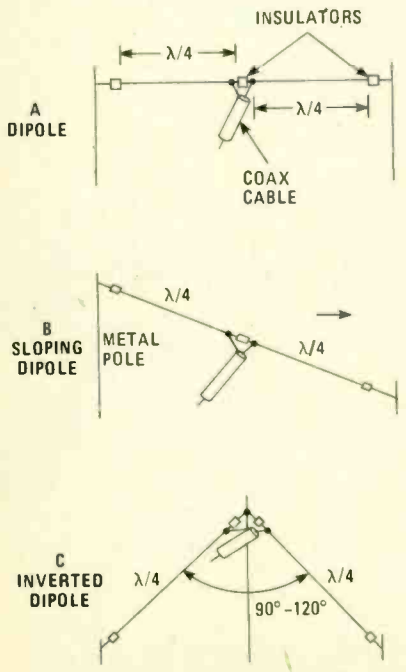

FIG. 1—TYPES OF DIPOLES

or metal fence posts, at ground level. Inverted dipole ends are near ground level and are easily accessible for trimming to obtain a minimum standing-wave ratio (SWR) on a specific frequency.

Making It

All three of those dipole styles can be built using the quarter-wavelength dimensions given in Table 1. Nearness of ground and other obstacles may require a bit of trimming to set the SWR to a very minimum on a specific frequency. Remember: the lengths given are for just *one* quarter-wave segment of the two sections that comprise a half-wavelength dipole. Dimensions are given for various frequency spectra of each band, such as code (CW) and phone (P) segments. Values are also given for the four novice bands (N).

Dipoles can be built economically, especially if you do a little wire shopping at flea markets and hamfests. Recently, I bought 2500 feet of 16-gauge stranded plastic-covered hook-up wire for $12.95 at a military surplus outlet. The fact that the wire is insulated has little or nothing to do with antenna performance. In fact, it provides additional strength, and safety, and can be routed through trees without loss. Certainly there is no problem in handling 200 watts or more. Dipole leg dimensions are given in feet/inches; cut frequency in megaHertz.

Another step toward cost saving, convenience, and versatility is to use telescoping sections of PVC piping as your mast, as I have advocated in the past. Two 10-foot telescoping sections, as in Fig. 2, can give you a height of approximately 20 feet for your inverted dipole. PVC ID diameters are 2 inch and 1.5 inch. Three telescoping sections and appropriate guying can provide additional height. Twenty-foot sections of PVC piping are also available.

In the arrangement of Fig. 2, the top section is telescoped 1.5 feet into the bottom section. The mast is supported by a metal fence post that is driven into the ground to the top of its wedge as shown. At the base of the bottom section of the mast a thru-bolt is inserted about two feet from the bottom. The serves as a resting bolt and rests against the top of the metal fence post. That arrangement supplies additional maximum height to compensate for the 1.5 foot of the top section that is telescoped into the bottom section of the mast. Additional details on using PVC piping in antenna construction was given in the previous column. Put that informa-

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TABLE 1
¼ Leg Dimensions for Dipole Antennas

MHz	Ft-In
160 Meters	
1.825	128-0
1.850	126-6
1.875	124-9
1.900	123-0
1.925	121-6
1.975	118-6
80-meters	
3.60 CW	65-0
3.72 N	62-10
3.90 P60-0	
40 Meters	
7.05 CW	33-2
7.12 N	32-10
7.20 P	32-6
30 Meters	
10.10 CWx	3-2
20 Meters	
14.10 CW	16-7
14.25 P	16-5
15 Meters	
21.05 CW	11-2
21.15 N	11-1
21.35 P	10-11
10 Meters	
28.15 N	8-4
28.25 CW	8-3
28.60 P	8-2
29.30 P	8-0
6 Meters	
50.05 CW	4-8
51.00 P	4-7
53.00 PR	4-5

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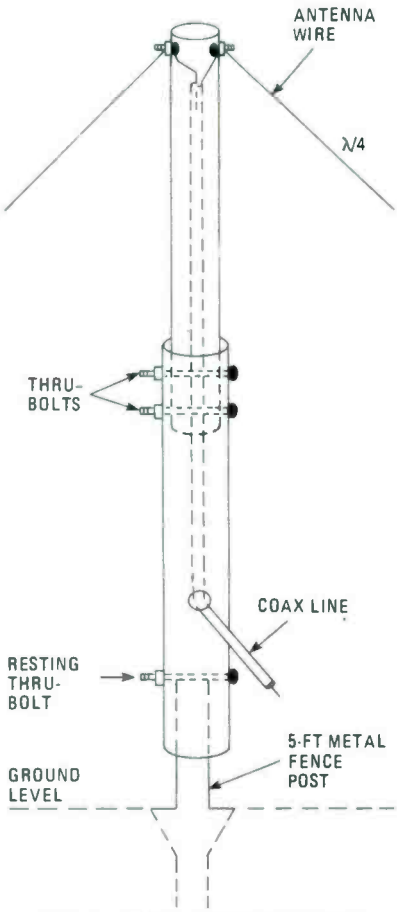

FIG. 2—MAST CONSTRUCTION

tion in your file, because there will be additional antennas described in this column that will use PVC piping masts.

Hookup

The manner of connecting antenna wire to a transmission line is unique. A short length of coaxial cable is cut to extend from the top of the upper PVC section down to a hole drilled in the bottom section at chest level. Two holes are also drilled in the PVC piping at the very top. Bolt and nut combinations are used as two terminals. Solder two eye-rings to the inner and outer conductors of the coaxial line. A standard PL-259 plug is connected to the other end. Before erection, the coaxial line is fed through the hole in the bottom section and up through the center of the PVC piping to the upper section. Here the two eye-rings are looped over bolts inside the piping and the two bolts are fed through the two top holes. Fasten firmly with outer nut and lock-washers. You now have a completed mast, and antenna wires can be connected externally to the top screw terminals by using another pair of nuts.

The photograph of Fig. 3 looks into the top of the mast, and shows the two leads from the coaxial line connected to the terminal bolts. Caps are available for the PVC piping. As shown in Fig. 4, such a cap has been pushed over the top to provide weather protection for the internal connections between the coaxial line and the bolt terminals.

FIG. 3—COAXIAL LINE termination to two points inside PVC piping. Solder eye-rings to ends of leads.

At the bottom section of the mast, tape the exiting coaxial line to the mast. Epoxy can be used over the hole to provide an additional weather seal. The exiting line can be seen in Fig. 5. Transmission line to the radio shack can be connected to the exiting line by using a PL-258 coupler (Radio Shack 278-1369). Here you have

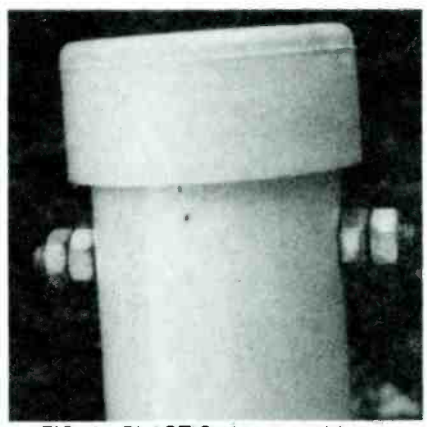

FIG. 4—PLASTIC pipe cap at top of antenna mast protects coaxial cable inside pipe from the weather.

the best lightning protection. When a storm is coming, or you are to be away from the house for a considerable time, disconnect the coaxial line that runs back to the shack from the coupler. If you wish to leave things connected, use a coaxial lightning protector at the coupler. Establish a good ground by driving a copper-plated metal rod into the ground; obtain a commercial type. I prefer the complete disconnect.

To complete the antenna, cut two quarter-wave antenna wires for the desired

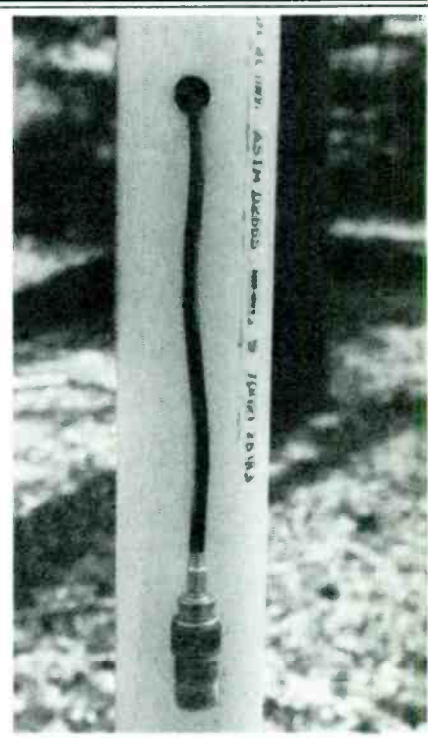

FIG. 5—EXITING coaxial cable and connector appear at bottom of the mast.

frequency. Solder an eye-ring to one end of each of the two antenna wires. Connect to terminals, Fig. 6. Appropriate insulators should be fastened to the other end of each antenna wire. There is no need to remove the insulation. Feed it through the insulator hole, loop tightly, and tape. Feed strong rope through the opposite hole of each insulator and make an appropriate tie-down to each of the two stakes that will hold out your inverted dipole.

A pair of wires can be prepared for each band, or as many bands as you wish. Those not used can be rolled up and stored. As a result, you can put up a dipole for any band you wish at a moment's notice. All you need, do is lift off the mast, lay it down, and make the appropri-

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FIG. 6—ANTENNA quarter-wave wires attached to mast before installation.

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ate dipole wire change. Such is an excellent plan for making sure that an emergency antenna is available. It can also be used as a standard on almost any band on which you would like to check another antenna. Of course, you can put up any number of such dipoles. All you need to do is to drive in additional metal fence posts at the appropriate mounting side.

Two Banders

That construction style is especially useful when erecting cross-dipoles to permit two-band operation from a single transmission line. For example to operate 20- and 40-meter dipoles from the same line, simply connect one 20/40-meter pair to one mast terminal and a second 20/40-meter pair to the other mast terminal. Now stretch out your two inverted dipoles at right angles to each other. The arrangement of Fig. 7 did very well on the sideband segments of the 20 and 40 meter bands. *—Ed Noll W3FQJ*

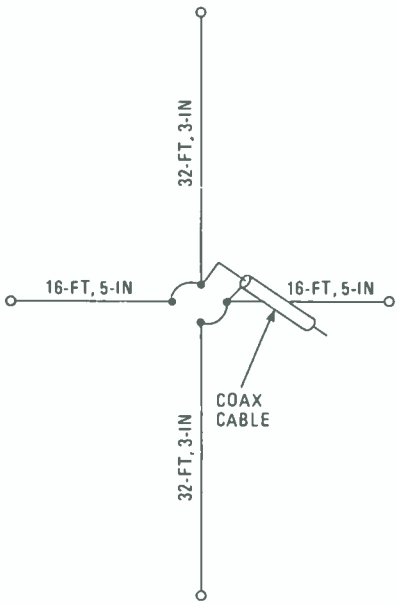

FIG. 7—CROSSED DIPOLE arrangement is diagrammed here for coverage of the amateur 20- and 40-meter bands.