More on Antenna Topics

BY JOSEPH J. CARR, K4IPV

Low-frequency antennas remain a problem for most amateurs. Unless you own a huge amount of real estate, then it's unlikely that you will be able to put up an optimum antenna for the low-frequency bands. For example, in the middle of the 75/80-meter (3.5-4.0 MHz) band, a half-wavelength dipole is 125 to 133 feet long. On 160-meters (1.8 MHz), the same antenna runs down the block a good distance—260 feet or more! Similarly, have you noticed that verticals get tall on those frequencies? It takes more than 60-feet on 75/80-meters, and 130-feet for 160-meters, to make a quarter-wavelength vertical.

Figure 1 shows one option for the "low-end" of our HF spectrum, although it is not problem free. That antenna is called the "coaxial-tee" antenna. There are two ways to make it. One way uses a half-wavelength dipole cut to the next higher harmonically related band. For example, as a Novice class ham in 1959, I used a 40-meter dipole on 80-meters CW by tying the inner conductor and the outer conductor of the coaxial cable together (as in Fig. 1), and then connecting it to the output of an antenna tuner. In that case, dimension "A" is half wavelength on the higher band (*e.g.* make A = 66 feet for 40 meters, and then operate on 75/80), and dimension "B" is ignored.

The trouble with that arrangement is that harmonics of your transmitter look into a resonant antenna that is just aching to radiate their energy into other people's territory! Be sure to use a resonant antenna tuner (not a "line-flattener" type that's actually a kind of high-pass filter), and use a low-pass filter that has a cut-off frequency between the two bands.

The other approach is to use the coaxial cable as part of the antenna system (Fig. 1 still applies). In that case, "A" is still a half wavelength, but so is dimension "B" (keeping in mind the foreshortening due to the velocity factor (V) of the coax (*e.g.* $L_{FEET} = 492V/f_{MHz}$)).

Another option is shown in Fig. 2. That antenna is made of either 300-ohm or 450-ohm twin-lead. It consists of a horizontal section ("A") and a vertical section ("B"). The vertical section should be as vertical as possible, consistent with installation realities. That antenna will work on two bands, either 160 and 75/80 meters, or 75/80 and 40 meters. The dimensions for the antenna are given in the Table 1.

Those antennas don't work as well as a real dipole placed high and away from everything else, but when the issue is getting on the air or watching *Geraldo*, then they are more than good enough.

MORE ON ANTENNA ZONING

In a past column, I discussed zoning problems and mentioned the preeminence of the Federal Communications Commission's PRB-1 (erroneously called PRC-1 by me) rule in which it takes sole jurisdiction for antennas of licensed stations, except for reasonable and proper mechanical and electrical requirements. In other words, the existence of the tower or antenna is the business of the FCC, while local and state authorities may place certain reasonable engineering requirements on the installation in order to assure safety (lightning grounding, guys, height restrictions, etc.). A lawyer wrote to me informing me that some recent court decisions have weakened PRB-1 to some extent, and warned that amateur-radio operators need to be perpetually alert to problems in their local government. Or, alternatively, one could opt for the Massachusetts solution. According to a source, Massachusetts Governor

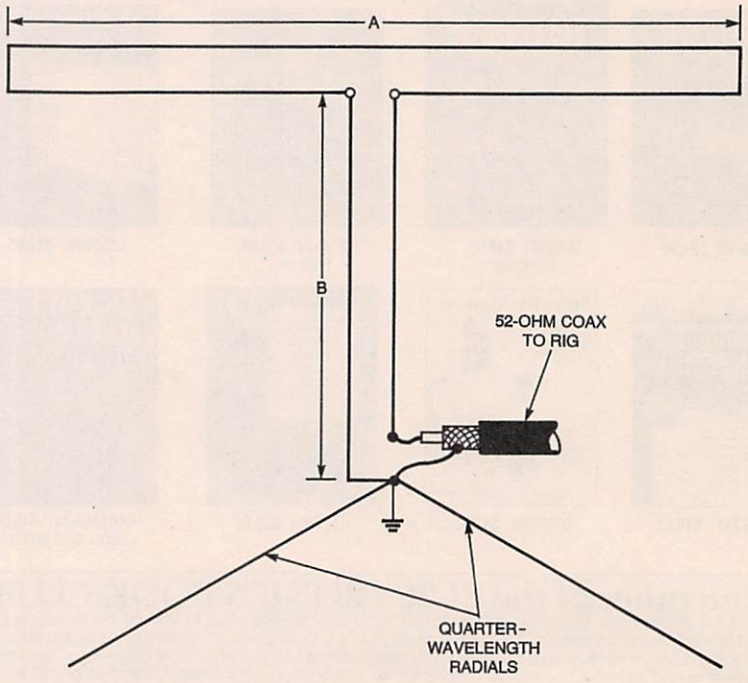

Fig. 1. This coaxial-tee antenna can be used in a couple of different ways . . . just watch out for harmonics!

TABLE 1

BAND (Meters)	DIMENSION A	DIMENSION B
160 and 75/80	70 feet	52 feet
75/80 and 40	35 feet	26 feet

Weld signed bill H-2782 into law. It states that no zoning ordinance or bylaw may prohibit antennas of federally licensed amateur-radio stations. The law allows local ordinances and bylaws to regulate the antenna structure for purposes of health and safety, provided that the regulation is ". . . the minimum practical regulation necessary to accomplish the legitimate purpose of the city of town enacting the legislation." The law also provides that the regulation must allow sufficient height ". . . to effectively accommodate federally licensed amateur radio operators . . . ."

practical" are golden opportunities for lawyers to litigate. Also, what does "health" and "safety" mean? Do reports in the popular media distorting the scientific data on the effects of electrical and magnetic fields on humans constitute a reasonable threat to health and safety, and therefore make it legal to restrict ham-radio operations?

Although some progress has been made with respect to homeowners associations in townhouse and condo developments, those rules still nettle many ham operators. If you can't afford to sue the pants off the home-

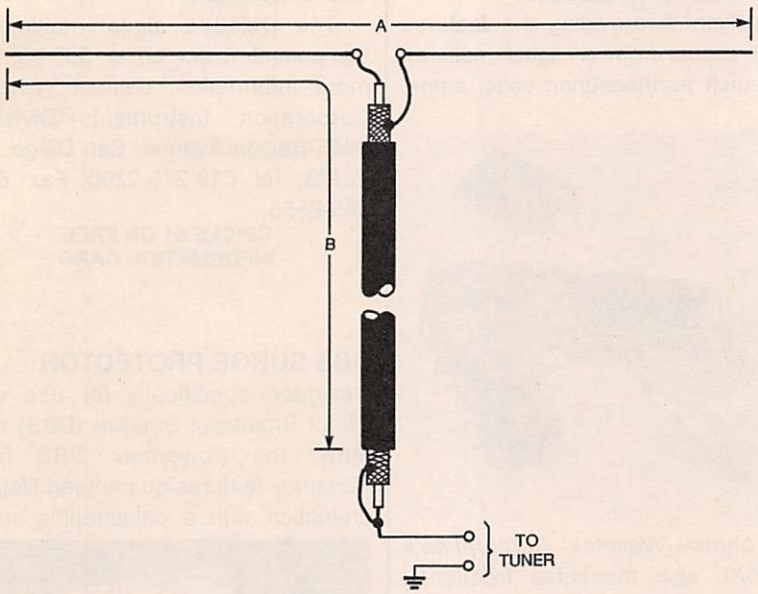

Fig. 2. The twin-lead, low-frequency tee antenna will work on two bands. The dimensions can be found in Table 1.

Sounds pretty good, huh? Well, maybe . . . and that's a big maybe once you learn how politicians and lawyers (not to mention neighbors who want you off the air) think. There are enough weasel words in the law to keep you in court for years if you run afoul of some local problems.

I talked to a friend of mine who is both a ham and a lawyer. He pointed out several problems. Ambiguous words like "sufficient" and "minimum

owners association, and make yourself a pariah, then try running for office in the association and lobby to get some of the rules changed. The ham-radio lesson in this little diatribe is that you could conceivably run into difficulties with your antenna, despite your FCC license. Either your neighbors or the local government could wreak havoc with your hobby and your wealth . . . so keep the peace as best you can . . . and be politically active. ■