Radio Tips: The Monoband HF Dipole Antenna

If you're looking for an easy antenna for your favorite HF band, you can't go wrong with a half-wavelength dipole! All you need are three insulators (one is used as your center connector) and some wire. Strong, multistranded copper wire will withstand the elements best, but I've used everything from speaker wire to ac-line cords with great success!

The only trick to making a dipole is cutting it to the right length. A dipole antenna is made of two *equal* lengths of wire with the total length adding up to a half wavelength at the desired frequency. Here are the required dipole lengths for each of the Novice/Technician HF subbands:

80 meters: 126' 6"
40 meters: 65' 7"
15 meters: 22' 1"
10 meters: 16' 6"

For example, if you're making a dipole for the 10-meter band, you'll need two lengths of wire 8' 3" long (8' 3" × 2 = 16' 6") plus enough extra so the wire can be looped through the insulator and secured tightly. Attach the wires to the insulators and center connector as shown in Fig 1. Attach your coax feed line at the center connector. Solder the shield braid of the coax to one side of your dipole. Solder the center conductor of the coax to the other side. Be careful not to melt the coax while you're soldering it to the antenna. You can also purchase center connectors that feature built-in SO-239 jacks. With a matching PL-259 plug on your feed line, you can easily disconnect your feed line from your antenna whenever necessary for portable operation, for example. Whatever way you connect the coax to the antenna, be sure to waterproof the connection if it will be outdoors. If water gets inside the cable its loss will increase in a hurry!

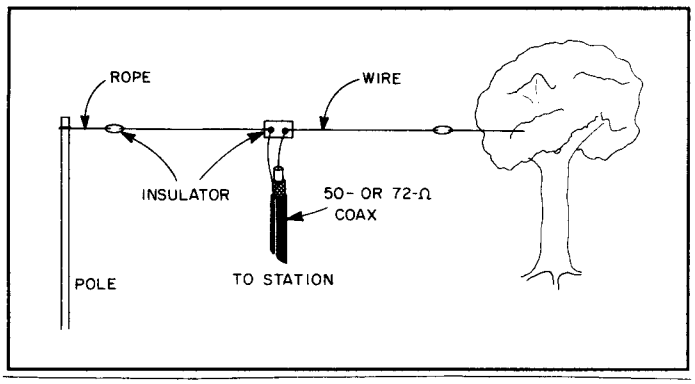

Fig 1—Dipole antennas for the HF bands are easy to make... and they perform well, too!

So, what type of coaxial cable should you use? If the distance from your transceiver to your dipole is less than 50 feet or so, RG-58 is fine. For longer runs, I'd strongly recommend a low-loss cable such as RG-8, RG-213 or Belden 8214. If you own an antenna tuner, you can try feeding your dipole with 450-Ω *ladder line*. This type of open-wire feed line exhibits very low loss at HF. The only disadvantage of using ladder line is that you must keep it away from metal objects.

Choose your antenna supports: trees, flagpoles, chimneys or whatever stirs your imagination. You can even install your dipole in an attic. If you decide to mount it outdoors, invest in enough high-strength rope or cord to do the job. You want to be sure your antenna will survive storms, ice loading and so on.

Mount your dipole as high off the ground as possible. How high is "high?" Conventional wisdom states that your dipole should be mounted at least a quarter wavelength above the earth at the frequency you choose to operate. Getting an 80-meter dipole 60 feet off the ground could present a challenge! If you can't raise your dipole to this altitude, don't worry about it! Your performance may suffer a bit, but the antenna *will* work. Watch out for nearby gutters, pipes, aluminum siding, window screens and other large pieces of metal. They'll *detune* your dipole and increase the SWR if they're too close. And, of course, *never* place your antenna near power lines!

If you've cut your dipole to the proper length, your SWR should be reasonably low (less than 2:1). Don't worry if the SWR seems to rise as you move in frequency toward the band edges—this is normal. Of course, the dipole you've just designed is good for only one band, right? Well. . . not necessarily!

If you own an antenna tuner, try using it to load your transmitter on other bands. The SWR will be very high, but your tuner may be able to adjust it down to a flat 1:1 match. This won't do a thing for the actual SWR on the feed line, but if you've invested in low-loss cable or ladder line, *it doesn't matter*!

Are you surprised to hear this? Many hams, even veterans, are slaves to the idea that only a 1:1 feed line SWR is acceptable. If your feed line is very "lossy," this is true. If you invest in low-loss feed line, however, only a small portion of your signal is actually lost due to high SWR. The rest of it is radiated by your antenna.

So if you've designed your antenna for, say, the 40-meter band, try it on other bands as well. You may find that your monoband dipole is really a multiband antenna!—*Steve Ford, WB8IMY*