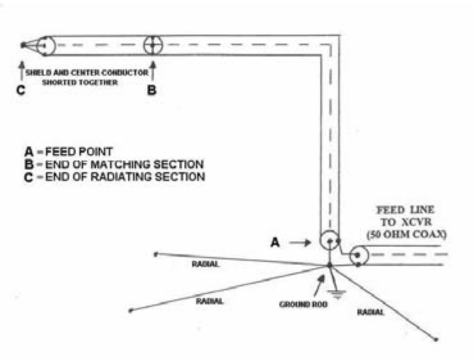

Figure 1

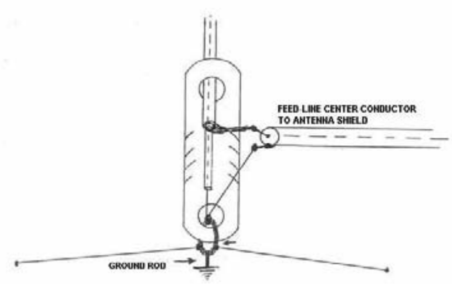

Figure 2

Figure 3

Coaxial Inverted L for 160 Meters

By John N9LYE

Few amateurs have room for full sized vertical antennas on 160 meters. Even fewer have room for a dipole up at least half a wavelength above ground. For many years, I used a simple wire inverted L and a tuner to get on Top Band, just like many others before me. In an instant, that all changed.

On the night of June 30, 2014, winds measuring in excess of 100 MPH tore through the area that knocked down trees and power lines. The branch that was holding up the wire came crashing down and was blown out onto the road, pulling my remote tuner along with it. Fortunately, that was the only damage I suffered, but it would be several months before I would have time to conduct any repairs to my station.

Fast-forward four months. Contest season was rapidly approaching, my remote tuner was lying in pieces on my shack floor and most of the wire I was using was nowhere to be found. I needed a solution, AND FAST! A late night of searching online yielded an idea that would suit my needs. An antenna broad banded enough to cover most of 160 meters without using a tuner. Perhaps not the best of ideas, but it works. All I needed was a piece of coax that was long enough.

Remember that simple equation that we all learned? 234 divided by the frequency equals length in feet. Forget about it for now. It's based on the use of insulated 12 to 14 gauge wire that has a velocity factor of 95 percent, which is fine for making dipole antennas. Since most of this antenna uses a coaxial matching section, the equation 246 divided by the frequency will be used instead. You can also use this equation to calculate overall length and not have to worry as much about trimming to resonance.

In Fig. 1, the section between points A and B is the coax type of your choice. The section between points B and C can be wire or whatever coax you have left over. Typically, the larger the diameter of coax used, the more broad banded the antenna becomes. The matching section can use almost any type of coax, even if it's 50 or 75 ohm, as long as you compensate for the velocity factor (Table 1). Most foam dielectric has a velocity factor of about 82 percent. Most solid dielectric is about 66 percent. Check the manufacturer's specifications of the type of coax to be used.

Since I had a bunch of foam RG-6 75 ohm lying around, the matching section length worked out to be 106.17 feet long. The end farthest from the feed point (B) is shorted together and at least 23.3 feet of wire is added to the end (B to C). When laid out, the overall length will be slightly over 129 feet

If you decide to use solid RG-58, the matching section length works out to be 84.45 feet and the end section will be 45.02 feet for a total of 129.47 feet.

After you get the main part of the antenna together, it's time to put a feed line to it. The feed point connections are reversed from normal. It may not seem like this would work, but it does. In Figures 2 and 3, you can see the shield of the matching section is connected to the center conductor of the feed line and the center is connected to the shield of the feed line. The use of a chassis connector mounted to some kind of enclosure will help keep out moisture and simplify installation but it is not mandatory. From there, a ground rod and at least one radial is required. Although I have noted that the antenna will tune up with only a single ground rod and no radials but efficiency due to ground losses will be much lower. Conversely, the more radials connected to the feed point will decrease ground losses but it will also narrow the 2.0:1 SWR bandwidth. It's a trade-off between bandwidth and efficiency. A mix of two 1/8 wave (65 Foot) radials and one ¼ wave (129 foot) radial tied to a ground rod at the feed point seems to be a good starting point. Your results may vary.

Now comes the time to haul the antenna up in the air. The vertical section going up from the feed point should be at least 30 feet. The longer the vertical section, the better for low angle take off, which seems to be true for most vertical antennas. And just like a typical inverted L, this also can be mounted using stand-offs from an existing tower or held up by a nearby tree limb. Keep in mind that other nearby antennas and metal objects will affect the overall length. Also, the added benefit of a wider bandwidth means that I could easily move up and down the band without having to retune when moving more than 50 kilohertz. This is very helpful when contesting and also reduces QRM to other nearby stations.

Hopefully this will inspire you to test the theory of this design and join the many others on Top Band. And in conclusion, this theory may also be scaled for other bands of interest.

Table 1:
Matching Section Length (A to B)
246 x .82 / 1.9 = 106.168 Feet (Foam)
246 x .66 / 1.9 = 85.45 Feet (Solid)
Overall Length (A to C)
246 / 1.9 = 129.473 Feet