

DIY CAROLINA WINDOM



I have wanted to build a multi-band wire antenna for some time now and this past Field Day I had an opportunity to use a very good one. The Carolina Windom is essentially an off-center fed dipole (OCFD) that uses a portion of its feed line as a vertical radiator. I used one to make about a 100 PSK31 contacts on 20, 40, and 80 meters during Field Day.

The key to an OCFD's operation is the fact that there is a point on the antenna where the input impedance is approximately 200 Ohms at multiple frequencies. When fed with a 4:1 balun this provides a reasonable match to the standard 50 Ohm load that my coaxial cable and radio like to see. Even if the antenna doesn't provide a perfect 1:1 SWR over all bands, it keeps it low enough that a simple antenna tuner can compensate for any mismatch. The problem with OCFDs is that since the two legs of the antenna are of different lengths, the currents in each leg are out of phase.

This means that in order to avoid feed line radiation, you should use a 4:1 current balun to compensate for this current imbalance. These are not readily available for sale, but can be constructed from kits. Here's a great article which describes how to wind your own current balun using this kit from Amidon. You can also buy an equivalent balun from DX Engineering.

The Carolina Windom, however, wants the feed line to radiate (at least a portion of it) in order to gain the vertical radiation and some performance. To achieve this the Windom uses a 4:1 voltage balun, which matches the antenna's leg voltages and then uses a separate 1:1 choke balun to isolate the feed line from the vertical radiator. Both of these baluns are readily available and relatively inexpensive.

The first step in constructing my Carolina Windom was to cut the antenna wire to length for an 80 meter version. I used these measurements from Radioworks, who sell pre-assembled Windoms, but other sites also show measurements and formulas for cutting a Windom for any band. My Windom has the same 133ft overall length of a traditional dipole, but is divided into 50ft and 83ft legs instead of equal lengths. Since this antenna will be used for temporary setups such as Field Day and the PA QSO Party, I didn't make it out of heavy duty wire, instead I used insulated #14 stranded copper wire. This wire is a good compromise between strength and weight.

Construction of the Windom is very straightforward; simply solder one end of each wire to opposite sides of the 4:1 balun and attach insulators to the other ends. For the 4:1 voltage balun I used the W2AU 4:1 and for the 1:1 choke balun I used the W2DU inline-HF, both of which are available from Unadilla. These are well constructed commercial baluns that work well for these purposes. In the picture I do not have the choke balun connected since I did not have it at the time, so in its place I created a poor man's choke balun by coiling about 10 turns of my RG-58 feed line.

In order to test the antenna I set up my new fiberglass mast to about 25 feet with the Windom on top. While this isn't an ideal height, it was fine for a test. I connected the feed line to my radio and tested the SWR. I was able to get a match using my Icom IC-703's internal tuner on all of the HF bands. Since the 703's internal tuner can only deal with SWRs of less than 3:1, this means the antenna is performing as expected, providing a decent match to the radio on all the HF bands. For a further test I tuned around the 20 meter band. Hearing a special event station in Maine, I gave him a call and he came right back to me. Not a bad first test, getting into Maine with 10 watts. This is exactly what I was hoping for, a solid performing multi-band antenna that I can use for temporary operations. Wire antennas are very simple and cheap to build, and this one is a great project for any type of station.

Source: <http://www.highonsolder.com/blog/2009/7/7/diy-carolina-windom.html>