The New Carolina Windom

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As with all ham stations QRO or QRP, ten percent of a station's success in quality QSOs is the equipment and the operator. Ninety percent is the antenna. This is especially true in QRP since with very low power, by comparison to the Power Mongers, we need to get more ERP per watt out into the ether to be heard.

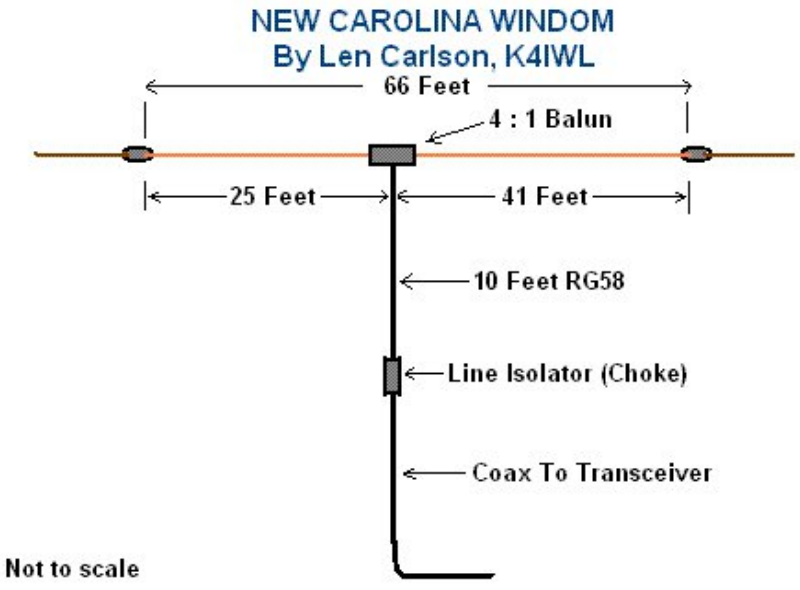
So when I got back into QRP a few years ago, I found the fascinating world of antennas and RF radiators to be an exciting challenge and a means to find the perfect antenna which I call the *New Carolina Windom*.

I don't have room for an 80-meter dipole or long wire so I have to restrict the length to 100 feet or less. Besides, my primary interests are working only CW on 40, 30, 20, and 15 meters.

Based upon these parameters, I have found what I consider to be the perfect antenna. The antenna I will show you how to build in this article evolved from a concept that had its beginning back in 1929 when Loren G. Windom described his invention in the September issue of QST, 1929, pages 19-22.

A few years ago, three hams, Jim Wilkie (WY4R), Edgar Lambert (WA4LVB), and Joe Wright (W4UEB), came up with an idea for an off-center fed dipole that carried Windom's single feed line antenna to the next level. It has since become known as the Carolina Windom. This is called the traditional Carolina Windom since it was the first attempt at creating this specific type of multi-band antenna based loosely on Windom's original concept.

The difference between the **new Carolina Windom** and the **original Windom** antenna is that the original Windom is not a dipole.



New Carolina Windom shown cut for 40, 20, 15 and 10 meters.
It will operate on 80, 30, and 17 meters but requires a tuner.

This more recent version has some very interesting characteristics as seen in the drawing above. The 4:1 Balun has been moved to the antenna radiator and is built into the center insulator.

The other interesting feature is that the 10 feet of coax from the balun is terminated in a choke or line isolator. I have fitted the 10 foot stub with PL-259 UHF connectors on each end. This allows the coax vertical radiator to be easily removed if desired. It is designed to hang vertically which is one reason why this antenna is so effective. The radiation pattern when using the vertical radiator combines both horizontal and vertical radiation components and lowers the effective angle of radiation getting more of your signal near the horizon.

This antenna is in use the world over by DX'ers and DX'peditions. In one Navassa DX'pedition, of the 33,000 QSOs made, more than 27,000 were accomplished with this antenna. The DX'pedition team also had a beam and verticals, but the *New Carolina Windom* was the antenna they used. Its reputation for excellent performance is so good that it served as one of the antennas in setting two 40 meter "mile-per-watt" world records of nearly 4,000,000 miles-per watt.

The antenna can be used without the vertical radiator but the radiation pattern will lose the low angle component and may make the antenna less effective. If the vertical radiator is removed then you should move the line isolator to the bottom of the balun.

This antenna should not need a tuner on the 40, 20, 15, and 10 meter bands, although you may use one if you feel the need to. It will operate on 80, 30, and 17 meters but a tuner is required.

Here is the math for designing the New Carolina Windom cut for your lowest band operation:

Holding true to original Windom formulas - use the ratio of 37.8% for short side and 62.2% for longest side after determining half wave length for lowest operating frequency.

Using 7.1 mhz as lowest frequency of operation:

- **Short side length = .378 x 65.92 = 24.92 feet = 25.00 feet 12% offset**
  Update = .33 x 66.00 = 21.78 feet = 21.75 feet **17%** offset

- **Long side length = .622 x 65.92 = 41.00 feet = 41.00 feet**
  Update = .67 x 66.00 = 44.22 feet = 44.25 feet

The new Windom can be designed for 160, 80/75, or any fundamental frequency you desire as the lowest band of operation. It should perform better on that fundamental frequency and still resonates on the harmonically related bands without a tuner. Keep the original ratios (33% and 67%) the same by using the formula.

You will have to adjust the balun to choke length of RG58 in the same ratio by doubling the length from 10 feet at 40 meters to 20 feet at 80 meters and 40 feet at 160 meters. The ratio is meters / 4 = length of vertical feeder.

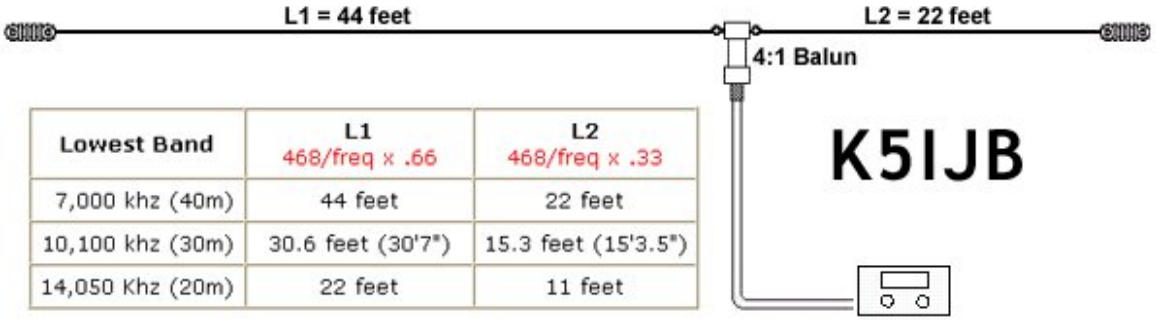
*The original OCF Windom built by **K5IJB** used 12% offset and 68-foot coax feedline with a 4:1 balun. Between the antenna and the line isolator was 25 feet - not 10 feet. The remaining 43 feet was used between the line isolator and radio.*

The coax feedline length between isolator and radio was orginally 30 feet. This length resulted in too much reactance for 10 and 17 meters which my ATU could not handle. The 68-foot coax feedline provided a better match on 40-6 meters.

*The most recent OCF dipoles built by **K5IJB** used 17% offset with (1) 450-ohm ladder line and (2) RG8X coax plus 4:1 balun.*

Windom Multiband Antenna

40 - 10 Meters



Lowest Band	L1 468/freq x .66	L2 468/freq x .33
7,000 khz (40m)	44 feet	22 feet
10,100 khz (30m)	30.6 feet (30'7")	15.3 feet (15'3.5")
14,050 Khz (20m)	22 feet	11 feet

17% offset

Lowest Band	L1 468/freq x .64	L2 468/freq x .36
7,100 khz	42.19 feet	23.73 feet
10,100 Khz	29.66 feet	16.68 feet
14,100 Khz	21.24 feet	11.95 feet

12% offset

Other offsets (D3) have also been used in search of better impedance matching. Windom-14% Carr-17.4% Formato-17.4%