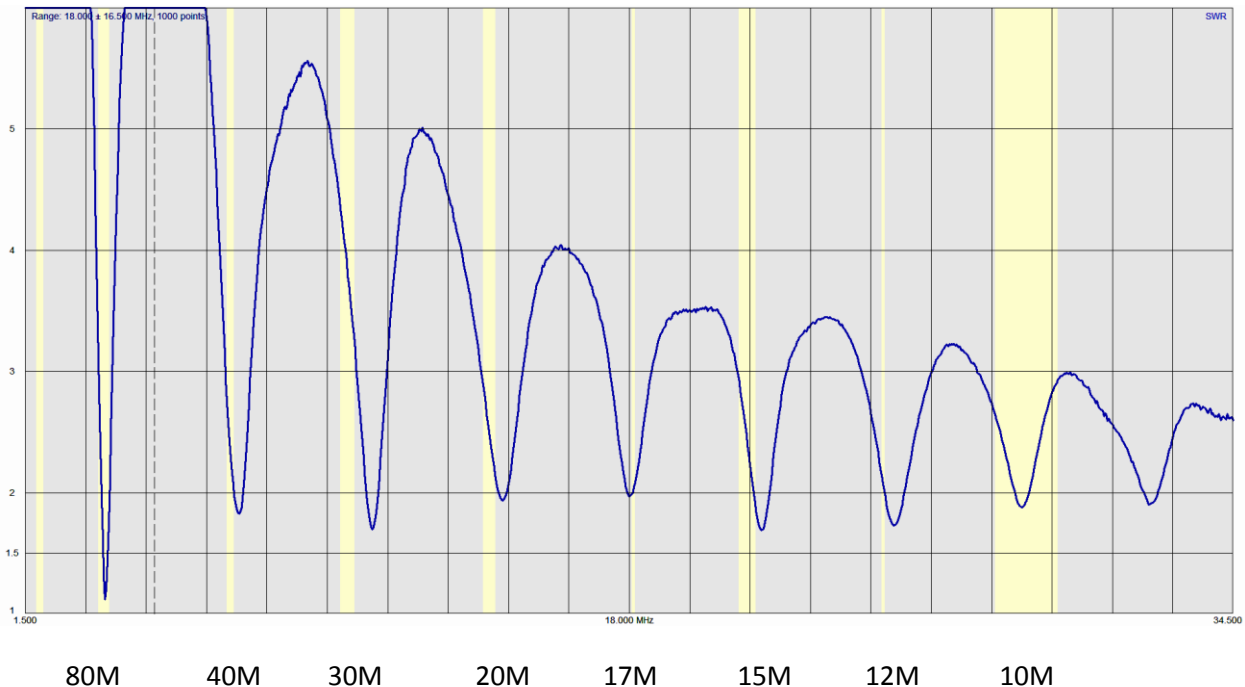


## 80 Meter Horizontal Loop Antenna, Everett Sharp N8CNP

Yesterday, 3/21/15, I installed a 80 Meter Horizontal Loop that is 264' long, with a average height of 30', it is roughly in a rectangle of 50' X 82', with the feed point in one corner, using a Balun Design's, Model 25112 - 2.5:1 Balun 1.5 - 54 MHz - 2kW. The wire used was 14 gage Flexweave with a polyethylene covering. The coax is RG8X, with a 80' run to the shack.

The Balun Design's website recommends using 247' to 251', height dependent. However, this is for a triangle, Delta configuration, however, as can be seen from above, I had to use 264' for my rectangle configuration. I used a Rigexpert AA-170 antenna analyzer for the tuning process. The antenna works on all bands with the exception of 30 meters. The only disappointing result was how narrow the band width is on 80 meters, with a 3:1 SWR window of 3.5 to 3.876 MHz (376 KHz). The lowest SWR was on the 80 meter band, which was 1.12:1 on 3.678 MHz. One of the very noticeable things about the antenna, is how quiet it is versus the Windom antenna that I was using. Also I now have a lot more bands available to me with this antenna, than I had with the Windom.

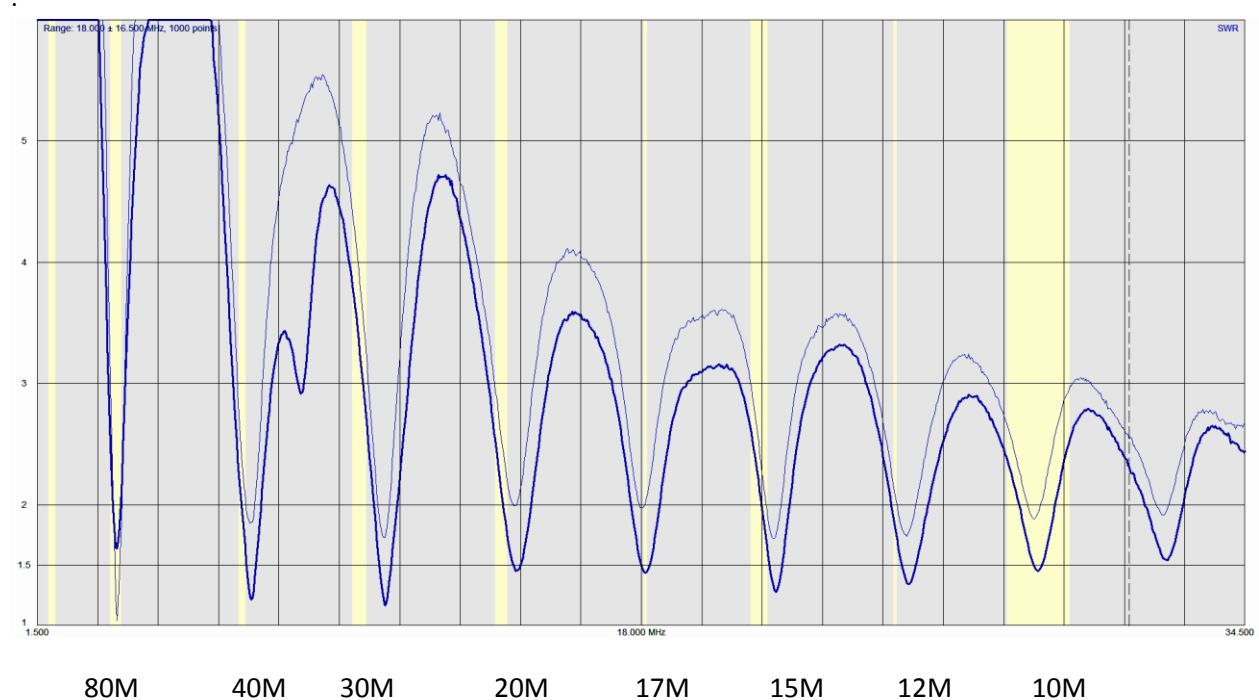
Band	Bandwidth window@ 2:1	Bandwidth window@ 3:1	Lowest SWR	Impedance in ohms
80M	3.579-3810	3.5-3.876	3.678	1.12:1 49.8
40M	7.176-7.44	6.978-7638	7.341	1.83:1 28.8
20M	14,463-14.667	13.941-15.063	14.535	1.93:1 83.6
17M	17.934-18.165	17.472-18.627	18.0	1.97:1 34.4
15M	21.366-21.828	20.937-22.290	21.597	1.69:1 30.3
10M	28.527-28.932	27.5-30.045	28.725	1.88:1 88.8



On 3/31/15 I decided to try a 4:1 balun, in place of the 2.5:1 balun. Everything remained the same with the exception of changing the balun to a home brewed 4:1 current balun. The balun is constructed with two FT140-61 ferrite cores covered with two layers of teflon plumbers tape, with each toroid having 8 bifilar windings of #16 magnet wire and connected in a series/parallel to form a 4:1 (200 to 50 ohm) balun.

Band	Bandwidth window@ 2:1	Bandwidth window@ 3:1	Lowest SWR	Impedance in ohms
80M	3.546-3.777	3.447-3.900	<b>3.678</b>	1.64:1 58.8
40M	7.077-7.610	6.846-7.902	7.341	1.21:1 42.0
30M	10.674-11.631	10.410-11.334	10.971	1.19 54.4
20M	14.238-14.667	13.832-15.063	14.502	1.52:1 68.7
17M	17.736-18.495	17.208-19.254	<b>18.132</b>	1.44:1 43.9
15M	21.300-22.095	20.637-22.620	21.696	1.28:1 39.3
12M	24.831-25.821	24.171-Open Ended	25.293	1.35:1 54.7
10M	28.329-29.319	Open Ended	<b>28.82</b>	1.45:1 72.0

The graph below shows the sweep with the 2.5:1 Balun in (Dark blue) and (Light blue) shows the 4:1 Balun. Based on this experiment it looks like the 4:1 balun is a much better match to the loop, with every band improved with the exception of 80 meters. Looks like making the antenna longer would improve the upper bands. Later I plan to extend the loop length to 275'. Increasing the length should bring 30 meters into a usable SWR.



Today, 4/3/15 I increased the length of the loop from 264' to 275'. Based on the data there is no longer any need to do any further experimenting with this loop. **This is the closest thing I have seen to a true multi-band antenna.**

Band	Bandwidth window@ 2:1	Bandwidth window@ 3:1	Lowest SWR	Impedance in ohms
80M	3.480-3.711	3.350-3.843	3.579	1.57:1 45.7
40M	6.930-7.440	6.681-7.737	7.176	1.31:1 38.3
30M	10.443-11.103	10.179-11.400	10.773	1.21 51.3
20M	13.975-14.700	13.545-15.100	14.304	1.43:1 72.4
17M	17.373-18.132	16.830-18.795	17.703	1.44:1 56.9
15M	20.850-21.630	19.980-22.191	21.300	1.32:1 39.6
12M	24.402-25.390	23.709-26.514	24.864	1.35:1 40.9
10M	27.900-28.956	26.811-Open Ended	28.428	1.43:1 65.0

To summarize the results, lengthening the loop brought all of the conventional HF bands into resonance within the allocated frequencies and there is full band coverage at, or below 2:1 SWR. The only exception to this is 80 meters, which will require a tuner to operate in the upper part of the phone band. With the WARC bands, 12 and 17 meters are within, or below a 2:1 SWR and 30 meters will be slightly over 3:1 and may require a tuner. 60 meters has a SWR of 6.5:1 and probably is not workable using a 4:1 balun and coax to the shack.

In the below graph the (dark blue lines) are a 275' loop length and a 4:1 balun. The (light blue lines) are 265' with the 4:1 balun.

