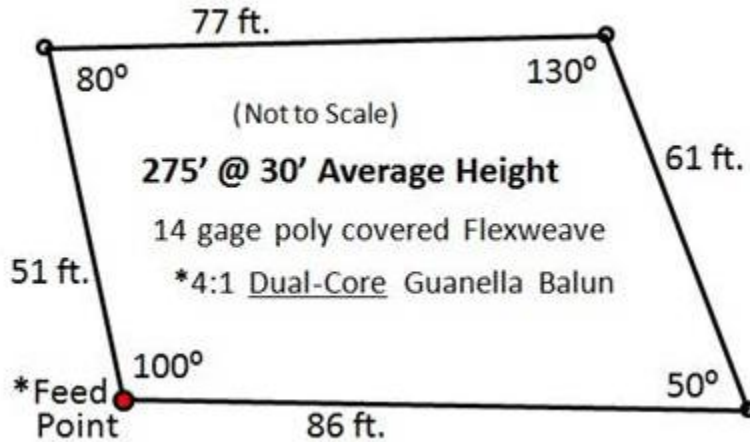


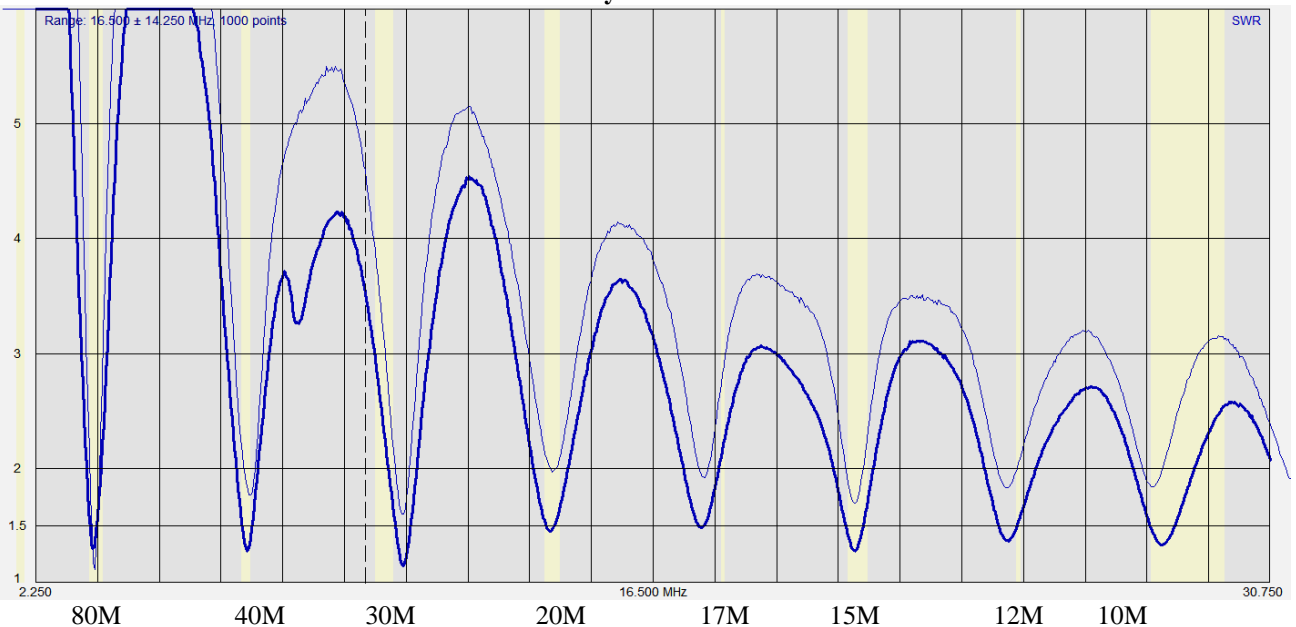
Experimenting with different Baluns on a 275' Horizontal Multi-Band Loop Antenna 80/40/30/20/17/15/12/10/6m

Everett Sharp N8CNP everettsharp@aol.com 6/07/15

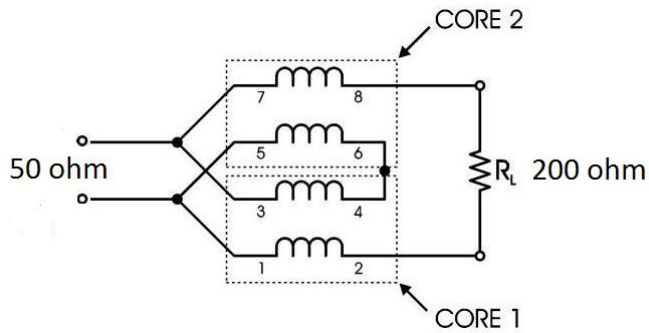
I recently installed a 275' loop antenna that has an average height of above the ground of about 30' and is feed it in one corner. The original plan was to use a Balun Designs 2.5:1 (125/50 ohms) balun, however, as it turned out, a 4:1 Dual-Core Guanella balun worked out to be the best option for my loop.



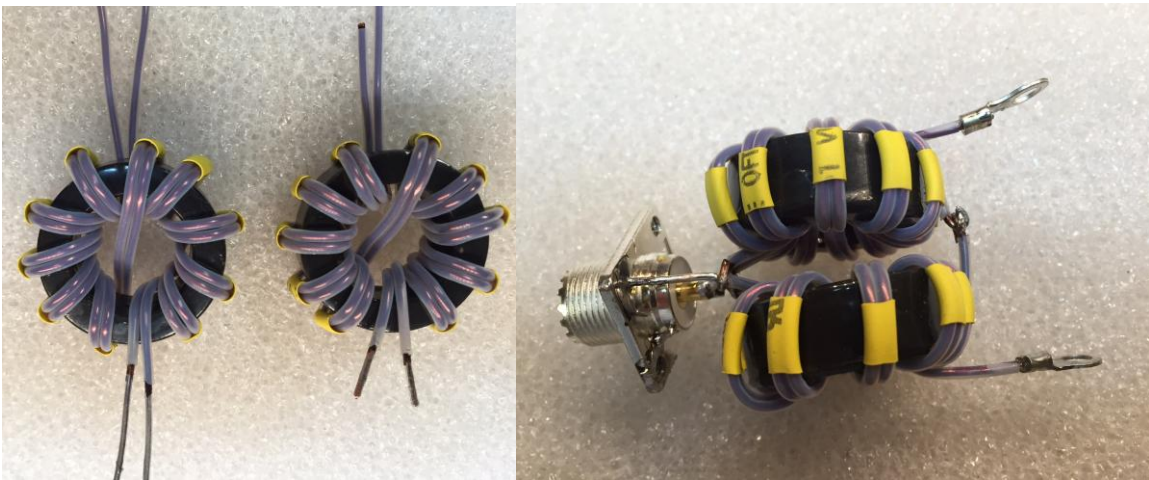
The light blue line is the sweep with the Balun Design's 2.5:1 balun, the Dark Blue line is the sweep with a DIY 4:1 Dual-Core Guanella balun. All of these sweeps in the graph below were taken in the ham shack. **As can be seen the 4:1 Dual-Core Guanella balun is by far the best of the two.**



The 4:1 Dual-Core Guanella, current balun (200/50 ohms) was a DIY project, as shown in the diagram and pictures below:



Each of the FT140-61 cores are wound with 10 bifilar turns of #16 magnet wire and are covered with 1.68mm ID Teflon tubing that was purchased on eBay. I used heat shrink tubing to hold the wire pairs together.

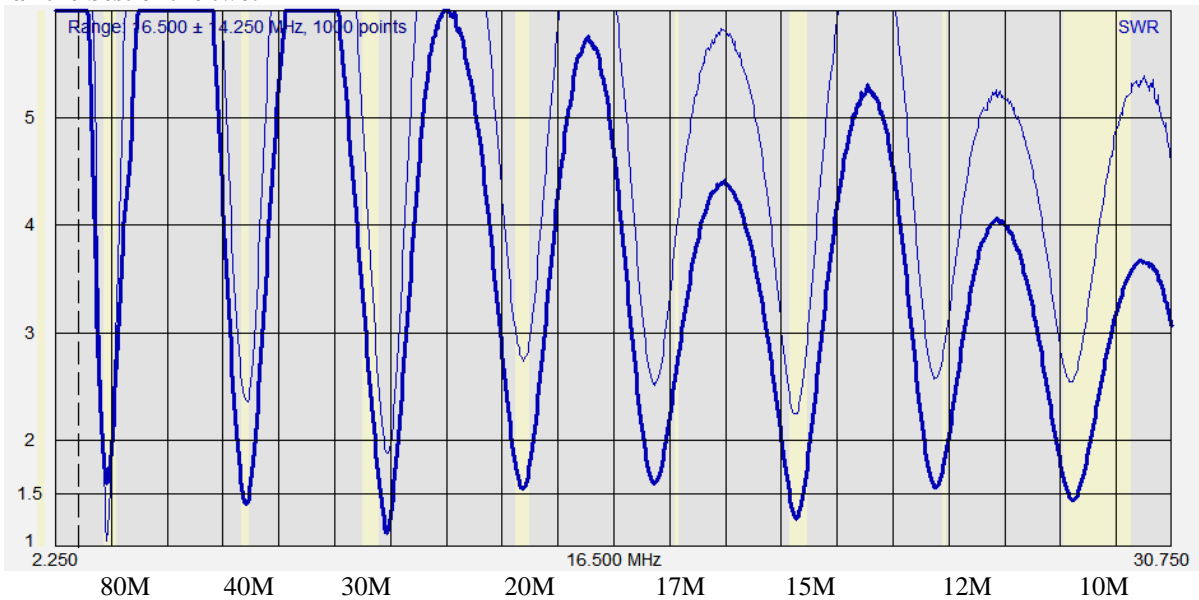


The finished balun is enclosed inside a 2" PVC pipe cap and a 2" plug for the bottom.

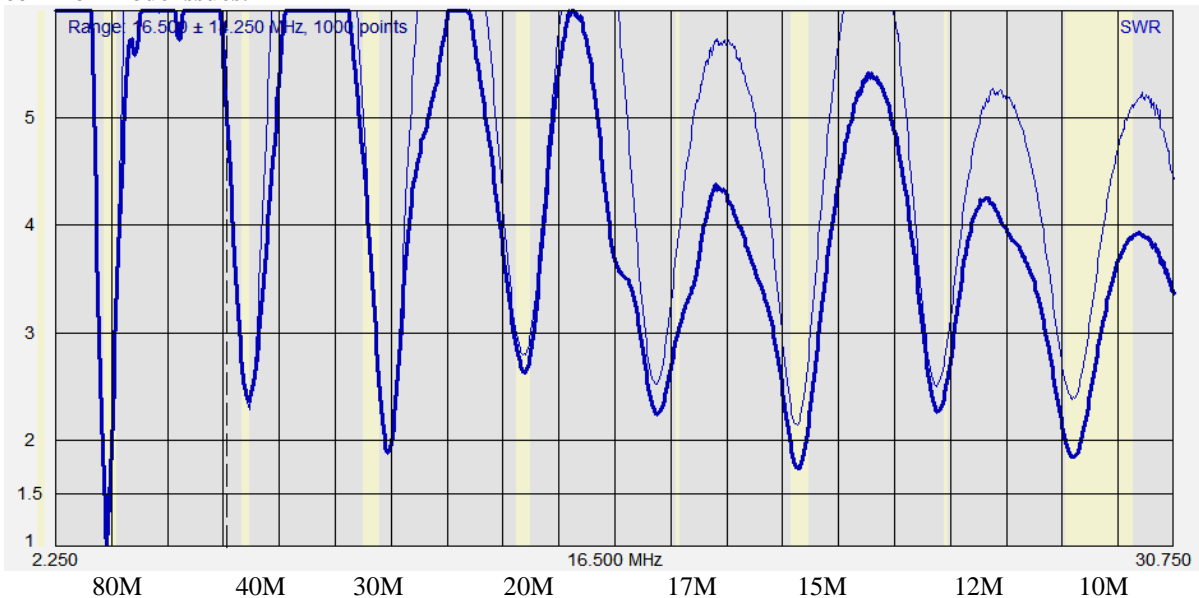


I wanted to eliminate any of the variables that could cause distortions, that might exist in the feed line to my shack. So for this group of experiments I used a 50' length of RG8X from the balun to the RigExpert-AA170 to evaluate the different balun configurations in this experiment.

The dark blue line is a 4:1 Dual-Core Guanella, balun and the light blue line is a Balun Design's 2.5:1 balun, both with 50' of RG8X coax. **As can be seen the 4:1 Dual-Core Guanella, Current balun was by far the best of the two.**

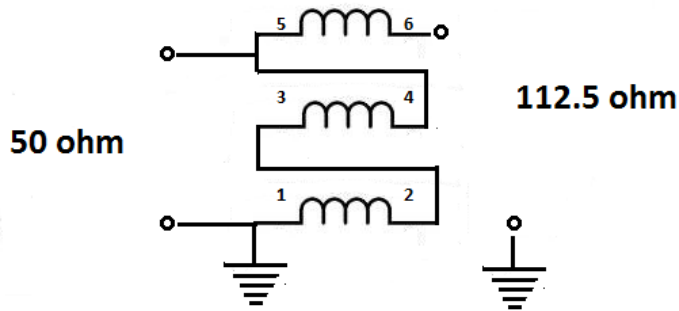


The dark blue line is with a DIY Sevick UNUN 2.25:1 balun, light blue line is with the Balun Design's 2.5:1 balun, with 50' RG8X of coax. **The simple 2.25:1 UNUN balun looks better than the more complex Balun Design's 2.5:1 balun. The only thing that I don't know is if it could cause some common mode issues.**

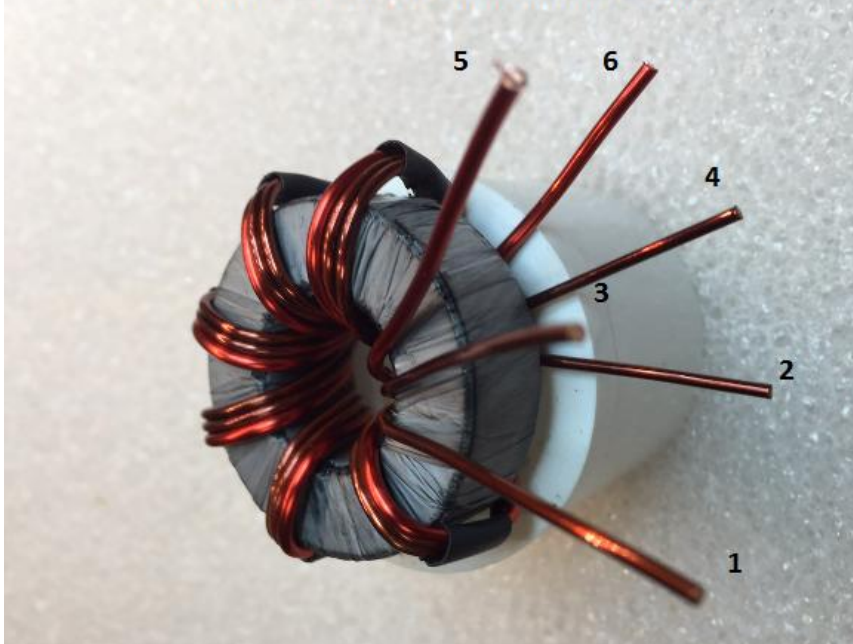


Below is the Sevvick design 2.25:1 UNUN Balun that was used in the prior sweep. This was made by winding 7 trifilar turns on a FT150A-K core. Two of the wires are #16 and the wire at 5 and 6 is a #14 magnet wire. I covered the core with Teflon plumbers tape.

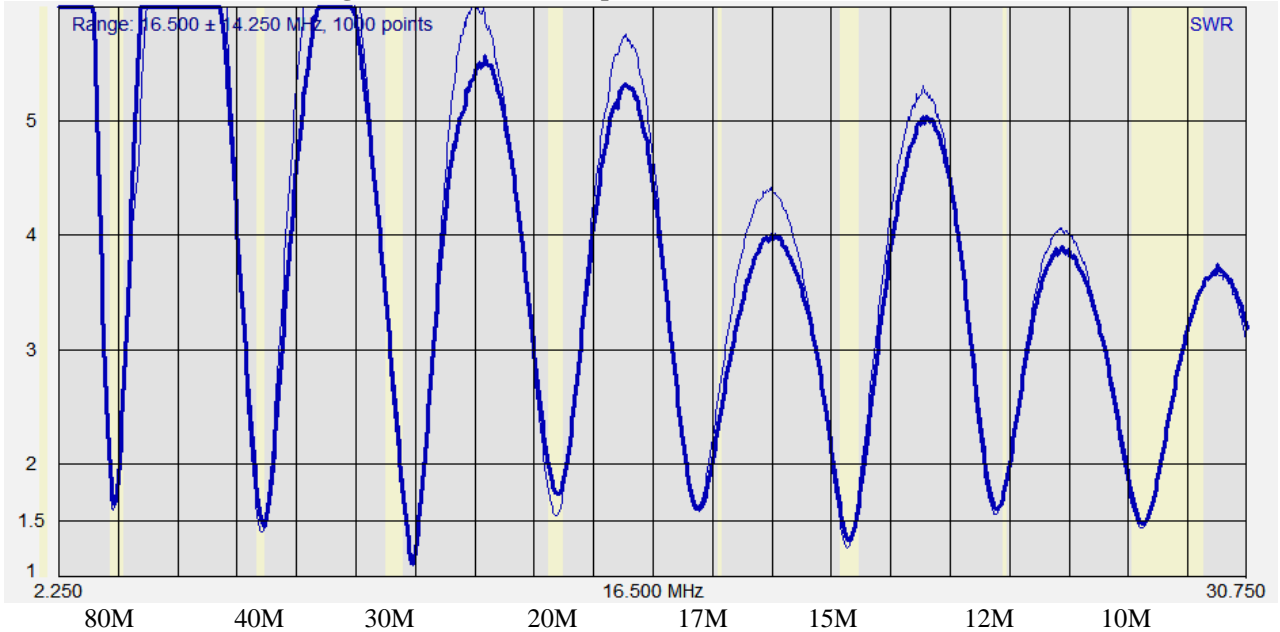
2.25:1 UNUN Balun



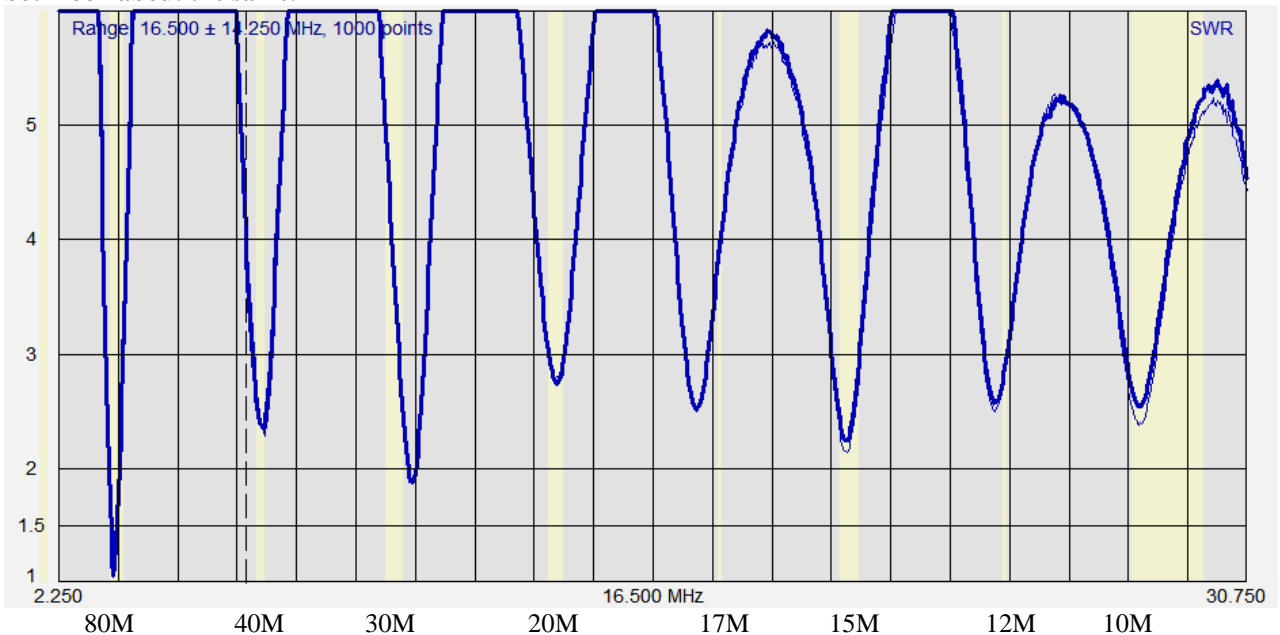
Note: 5 & 6 are the ends of the #14 wire



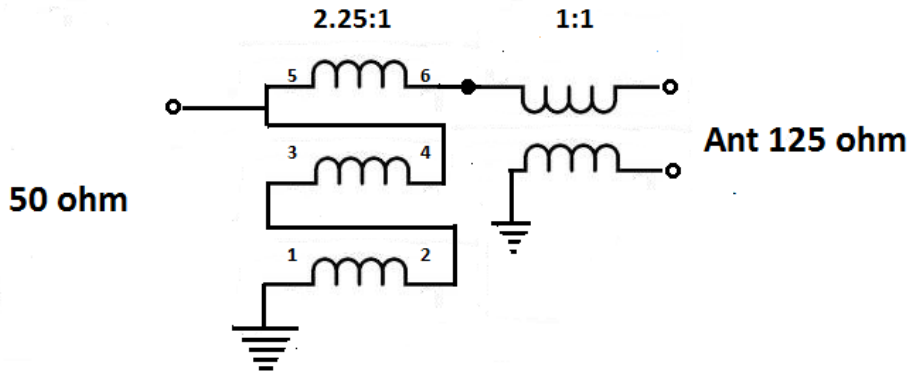
The dark blue line is a 4:1 balun using two FT150-61 cores, with each having 10 bifilar turns, the light blue line is two FT140-61 cores, with each wound with 10 bifilar turns, with 50' of RG8X coax. The FT150-61 cores were purchased from BuxComm, I am not sure that they are 61 material, as advertised, because the inductance was 500 uH, with 10 turns and the balun that was wound with FT140-61 had a inductance of 17 uH, with 10 turns. **However, the balun looked very good sweeping it with a 200 ohm resistor load and it also looks good in the below sweep.**



The dark blue line is a Balun designs 2.5:1 and light blue is a DIY copy of the Balun Design's balun. **They both look about the same.**



By doing some experimenting it looks like the Balun Design's 2.5:1 balun uses a FT150A-K core wound with 7 trifilar turns, two of which are #16 and one with #14 magnet wire. **It is a copy of the Sevick 2.25:1 UNUN design.** It has another core which is a FT240-K (52) and it has 10 bifilar turns of #14 magnet wire, with a Teflon tube covering. It is a 1:1 current balun, which is connected between the antenna terminals and the 2.25:1 UNUN balun. I made a diagram of it below.



Balun Design's calls this a 2.5:1 balun, but after sweeping it looks more like it is 2.25:1.

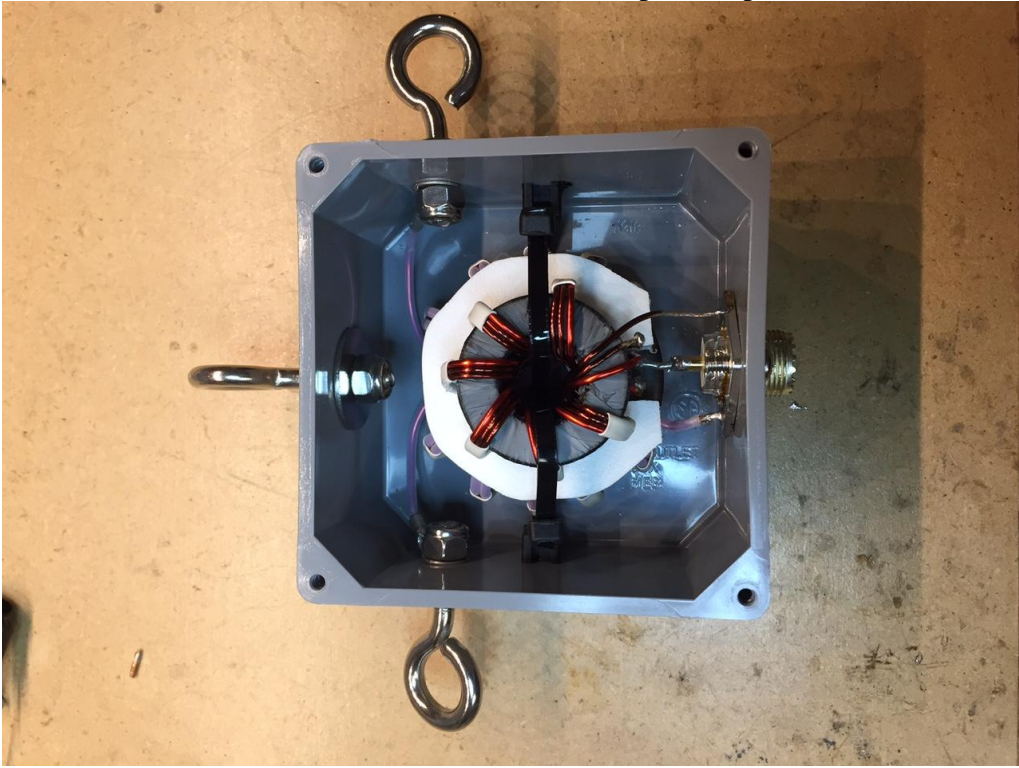
Balun Design's 2.5:1

DIY copy 2.5:1 Balun

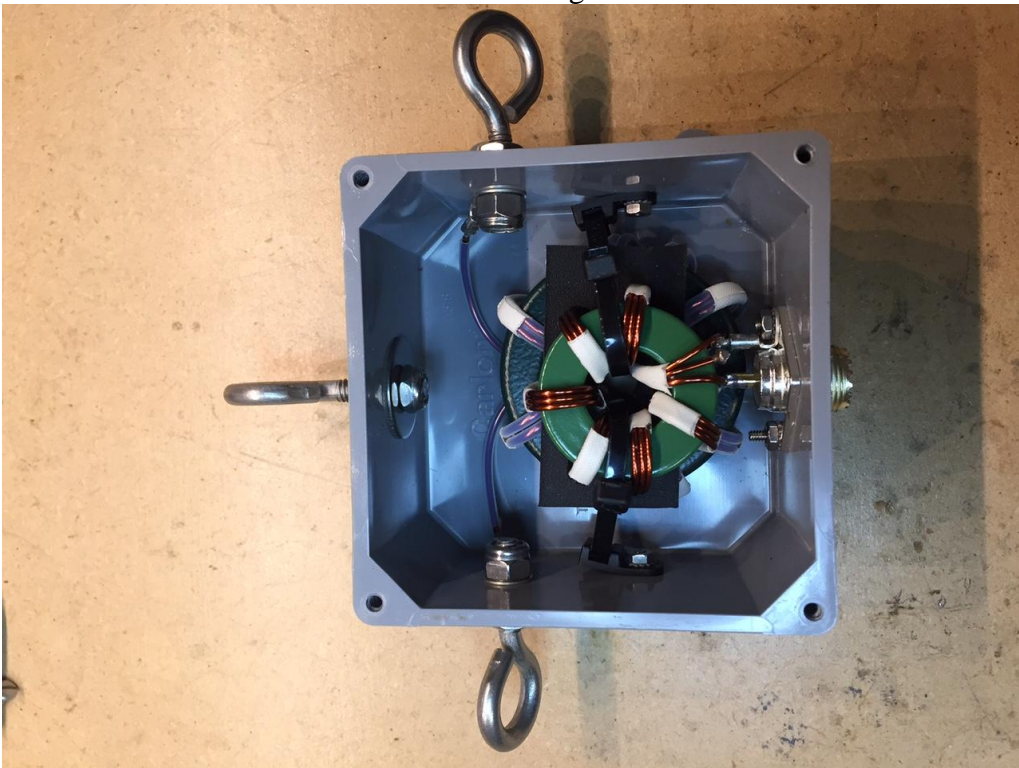
MHz	SWR		MHz	SWR	
	125 ohm	112 ohm		125 ohm	112 ohm
5	1.1	1.0	5	1.1	1.0
10	1.1	1.0	10	1.1	1.0
20	1.2	1.1	20	1.2	1.1
30	1.2	1.2	30	1.3	1.2
50	1.6	1.5	50	1.6	1.4



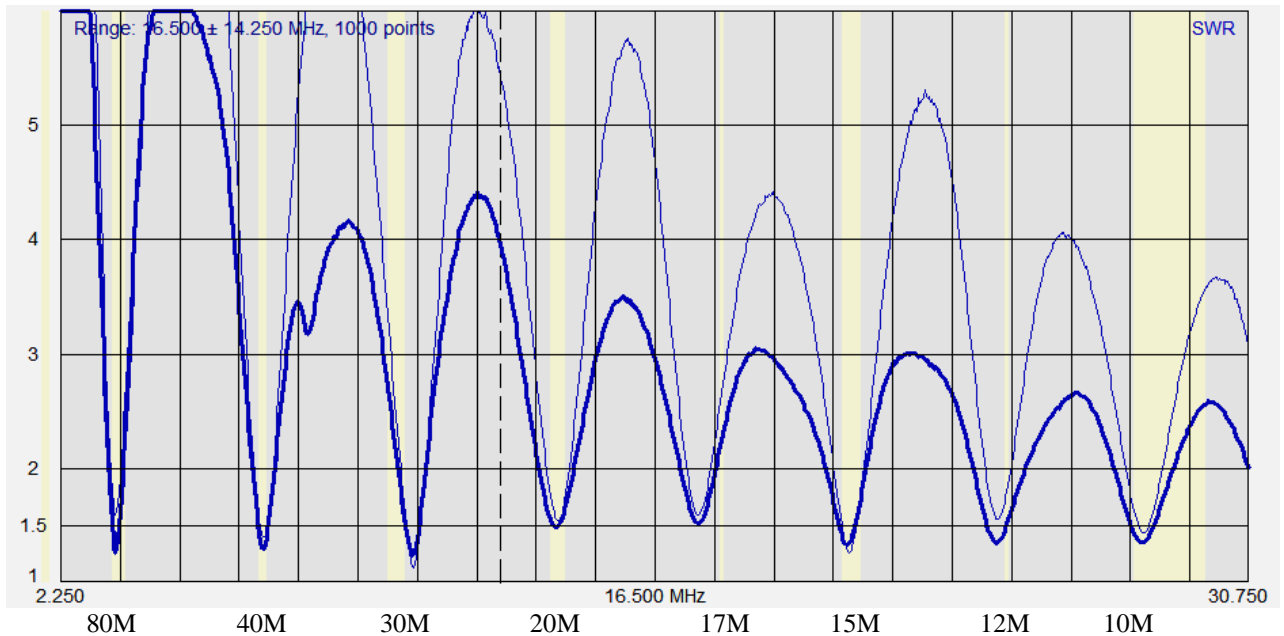
This is the DIY 2.5:1 balun, both use a 1/4" thick plastic spacer between the two cores.



Below is the Balun Design's 2.5:1 Balun



The dark blue line is a sweep in the ham shack and the light blue is a sweep with 50' RG8X coax, with both using the same 4:1 DIY Dual-Core Guanella balun. The longer run to the shack with a earth ground, before it enters the house and a common mode choke between the earth ground and the ham shack flattens out the high lobes, but there is little change in the resonate points, or the SWR.



I don't know why the 4:1 balun worked out better than the 2.5:1 balun on my loop. I am feeding the loop in a corner, which should be 100 ohms, more, or less. On another insulation the results might be quite different.

A few weeks ago we set up a 40 meter vertical Delta loop and the 2.5:1 balun was, by far, better than the DIY 4:1 balun for that loop. So my advice is try both types of baluns with your loop antenna, you might be surprised.

I will have to investigate the 2.25:1 UNUN Sevick design balun and will try it out on Field Day when we again will set up the 40 meter Delta loop. The Sevick 2.25:1 balun looks good on all sweeps and the SWR is just about flat up through 55 MHz, when using a 112 ohm load resistor.