

Elecraft BALUN Test

by Bill nr4c

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Today, I assembled my new Elecraft BL2 BALUN. This is a very simple kit from Elecraft. It consists of two stacked binocular cores and two bi-filer windings with 3 turns each (see fig 1).

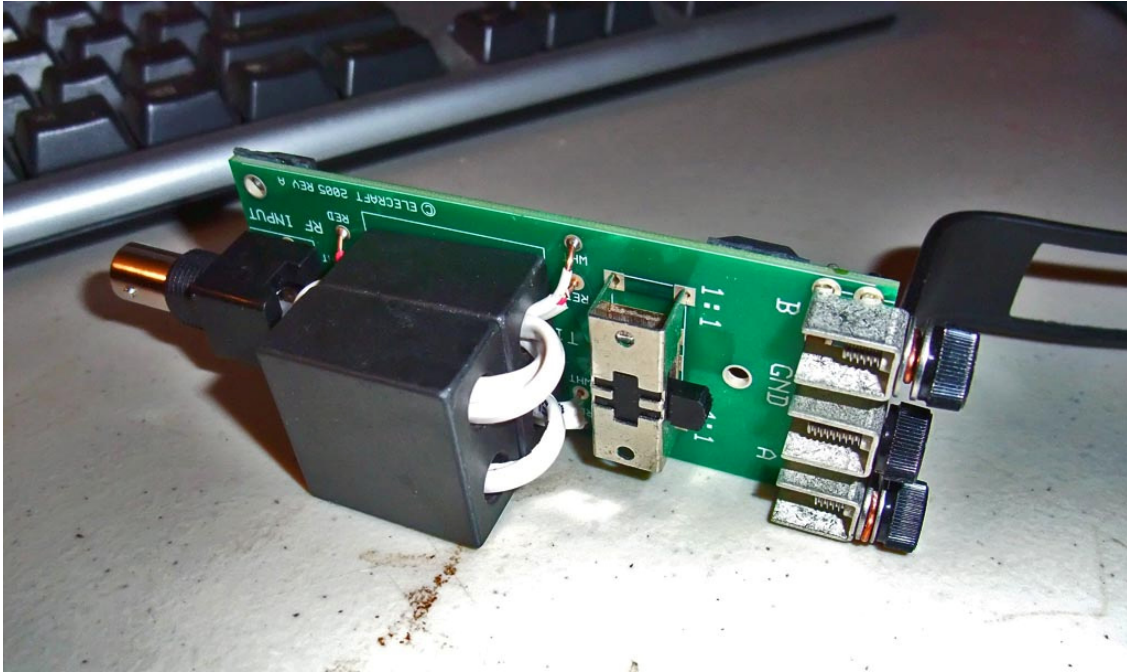
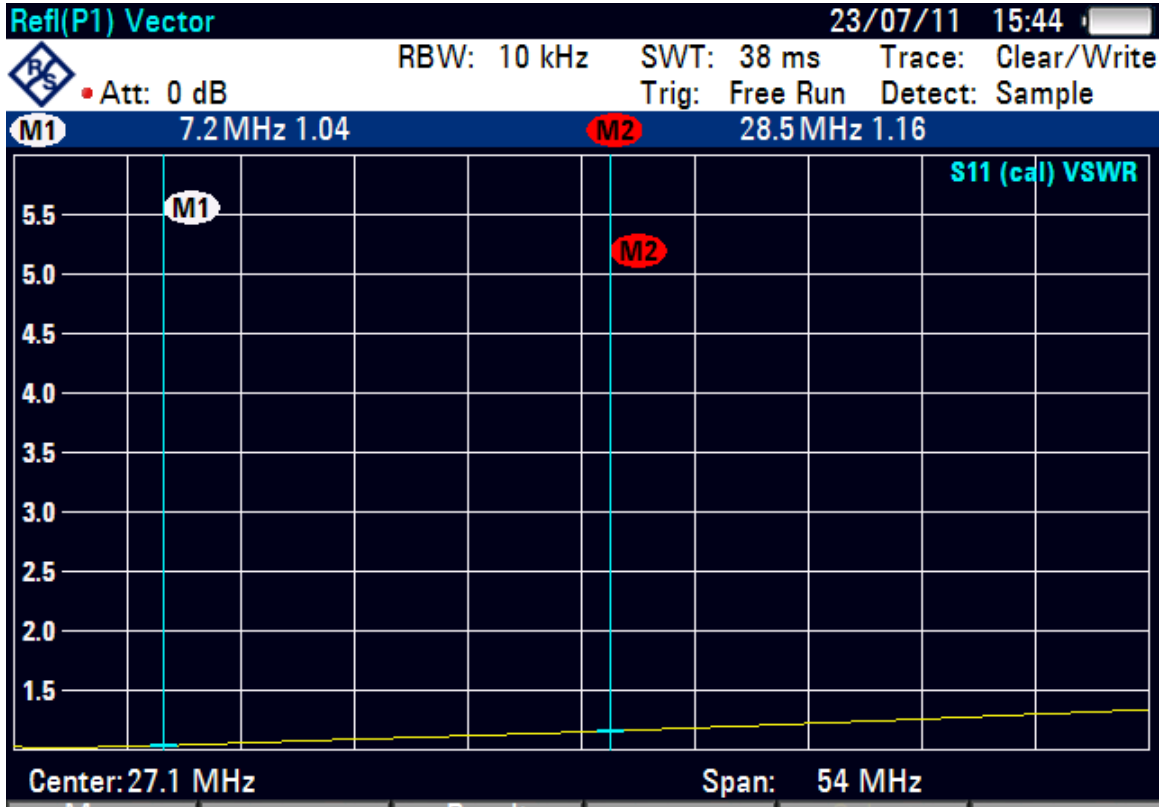


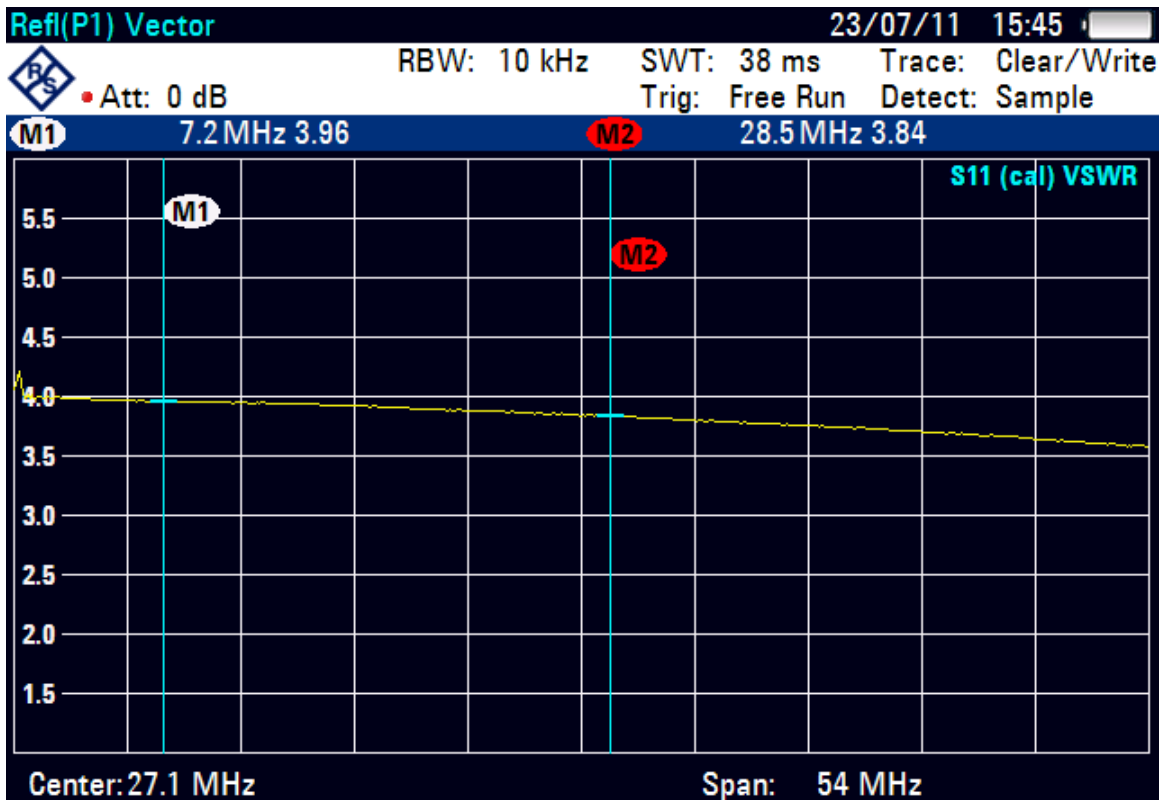
Figure 1> Elecraft BL2 BALUN

After assembly, I decided to check out the new BALUN with the R&S FSH4 Spectrum Analyzer. I set up the analyzer for a frequency range that covers the HF and low VHF ham bands. The center was set to 27 MHz with a 54 MHz bandwidth. All tests were made with a 50 Ohm load.



.Figure 2> The VSWR graph is shown in Figure 2 (left). Note the markers at 7.2 and 28.5 MHz. This BALUN should be usable all the way to 6 meters

Figure 3> The next picture is with the switch in the 4:1 position. This is a mirror image of the 1:1 graph. Again, a 50 Ohm load was used.



Next. I decided to compare this new BALUN with some older ones I had been using.

Figure 4> This is a kit from the WireMan and is one I have used at home for a long time. As you can see, it is not as good as the BL2. This BALUN is a fixed ratio of 4:1, on a single toroid core and is listed as a "Current" BALUN, but is probably really a "Voltage" BALUN.

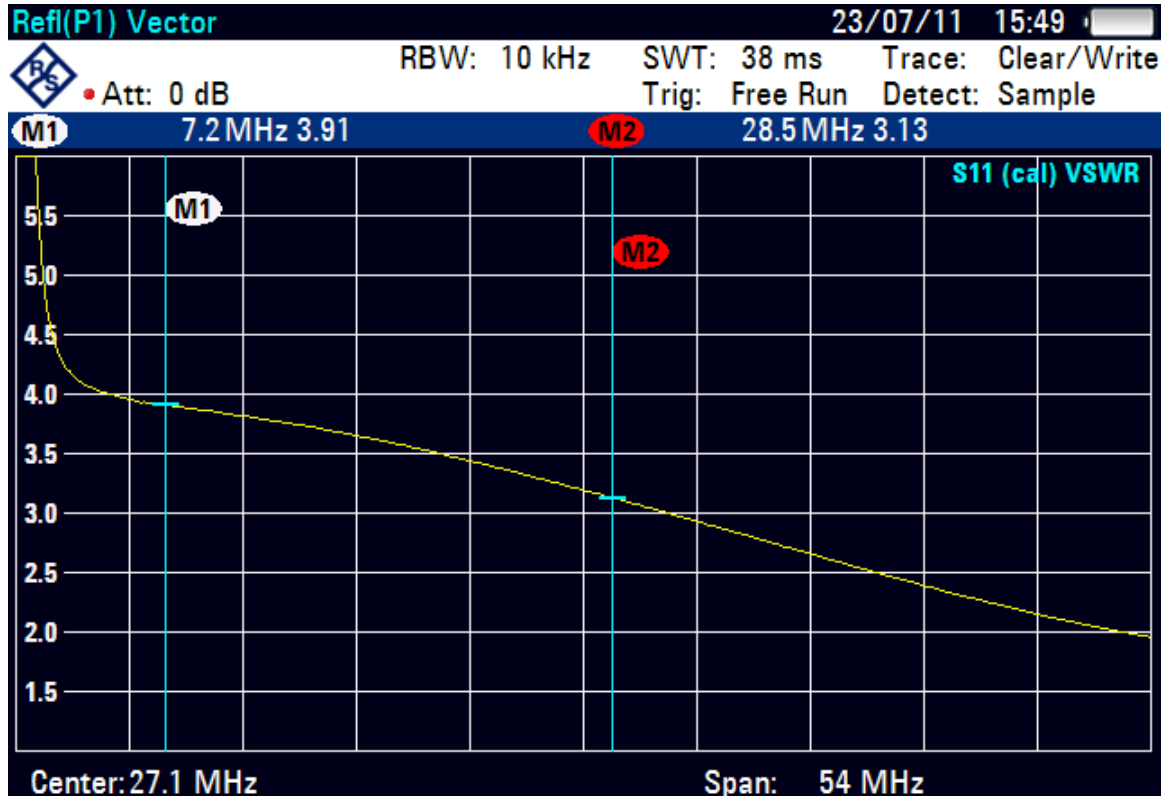


Figure 5> The Wireman BALUN in all it's splendor....



The next device in this experiment is the NILO Switchable BALUN kit from Mark Lowell, NILO.

Figure 6>This is the view we are all familiar with. Note the switch for changing ratios and the binding posts which also accept Banana plugs. A SO-239 is on the far end.



Figure 7>Here is the 'inside story' on the NILO BALUN. It uses two toroid cores and is basically two Wireman BALUNs in the same box, the switch at left connects there inputs in series or parallel for the different ratios.

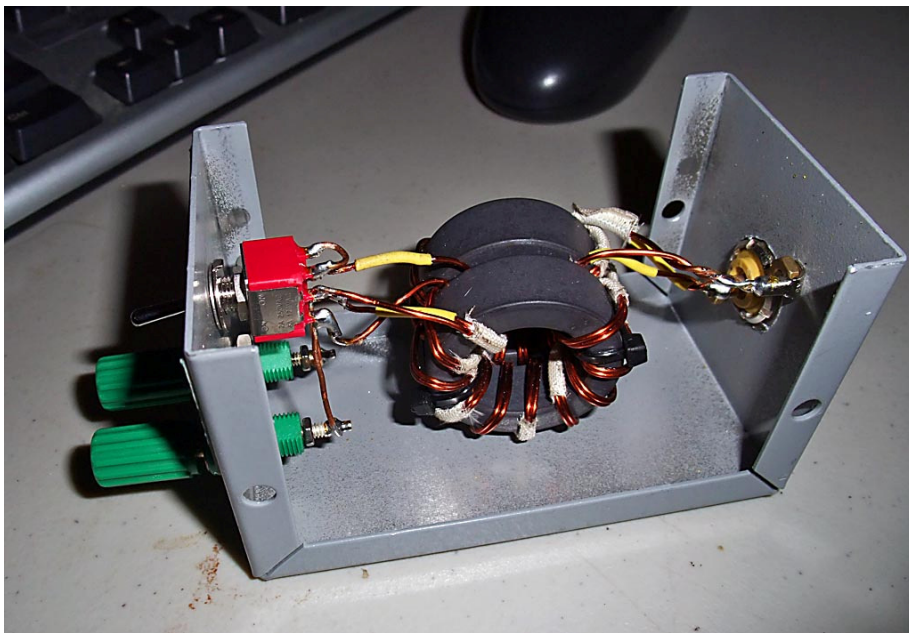


Figure 8>Here we see the VSWR plots for the N1LO BALUN. First at 1:1...

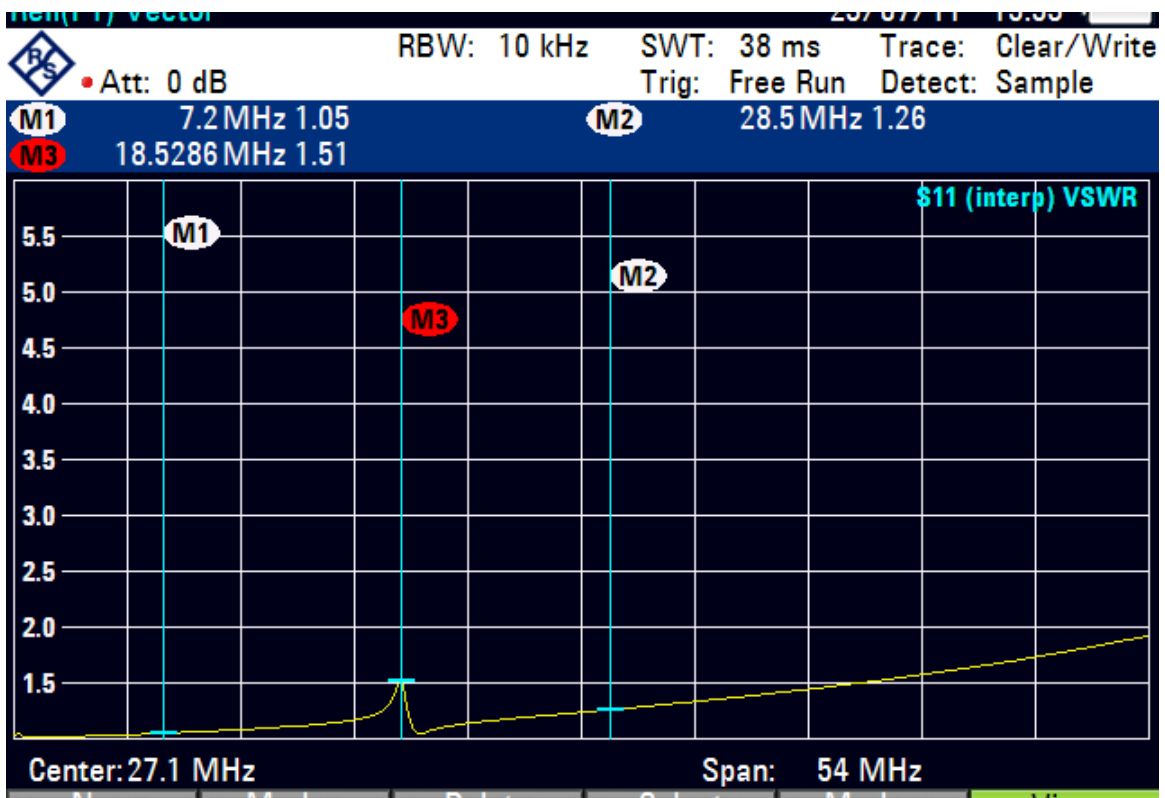
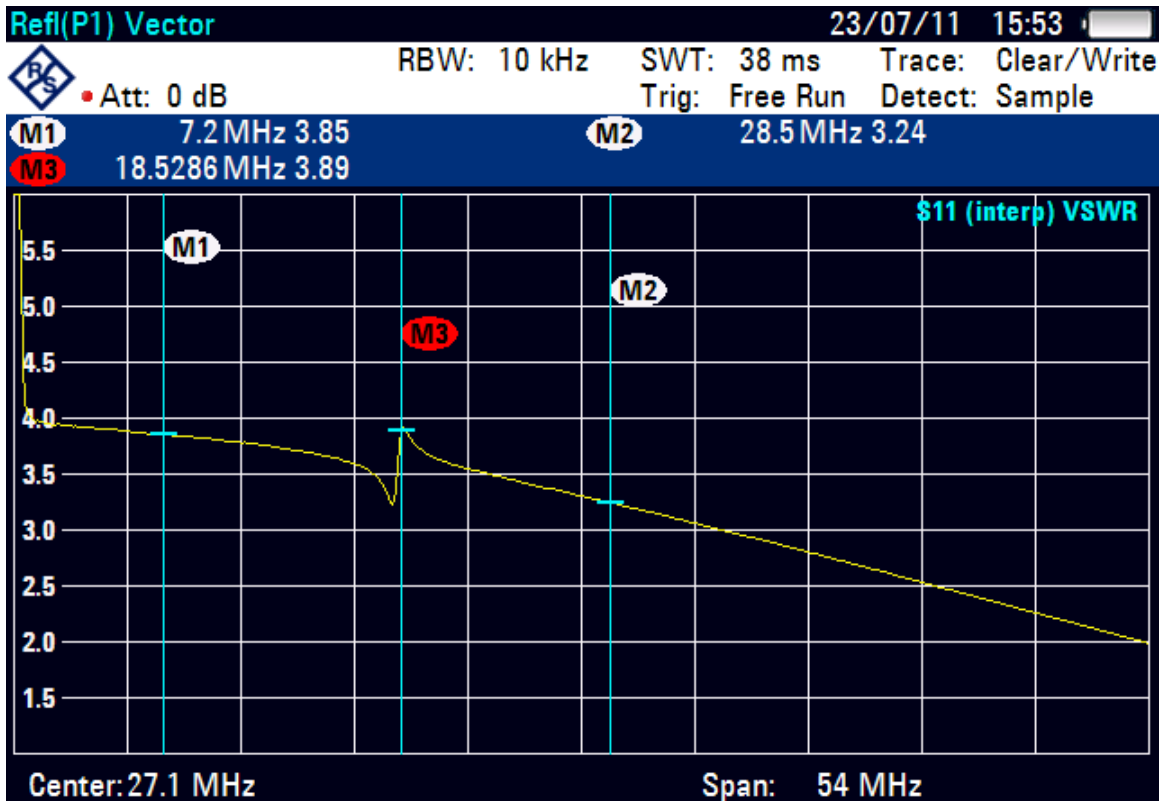
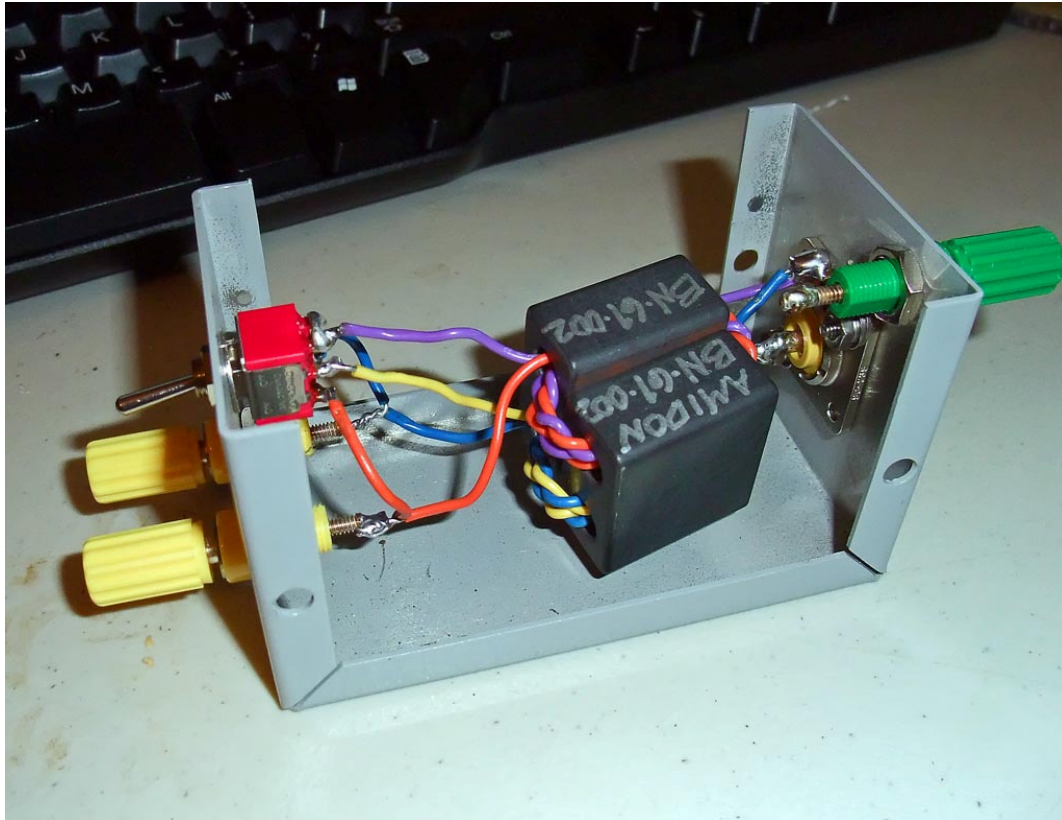


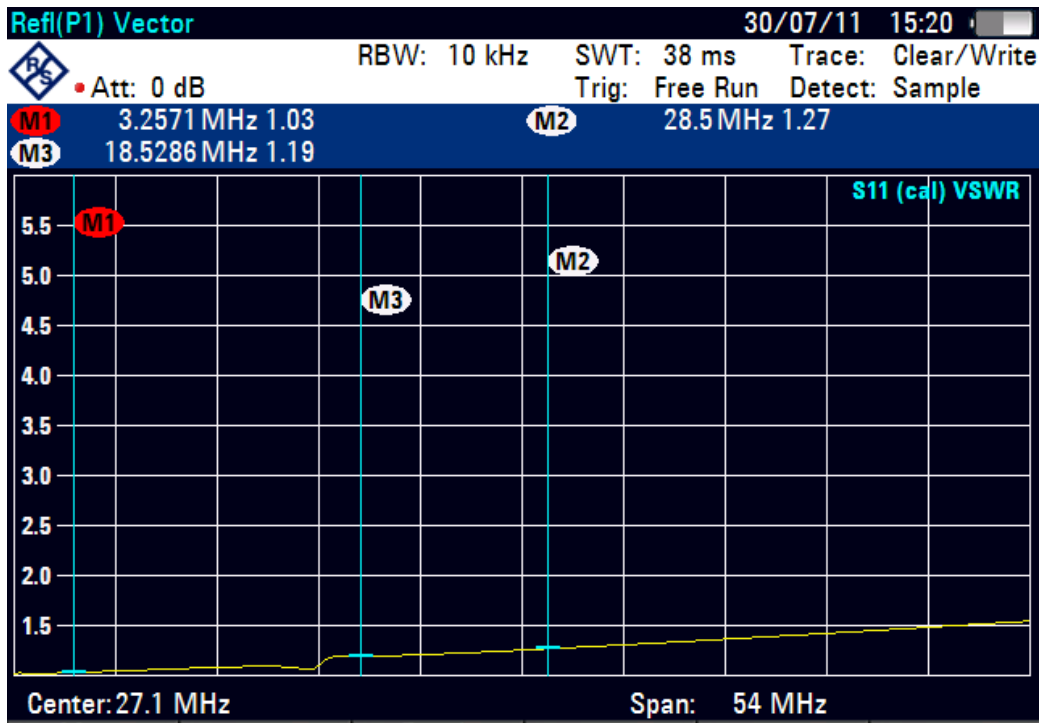
Figure 9>And then at 4:1. Note the added marker at 18.5MHz and the anomaly there.



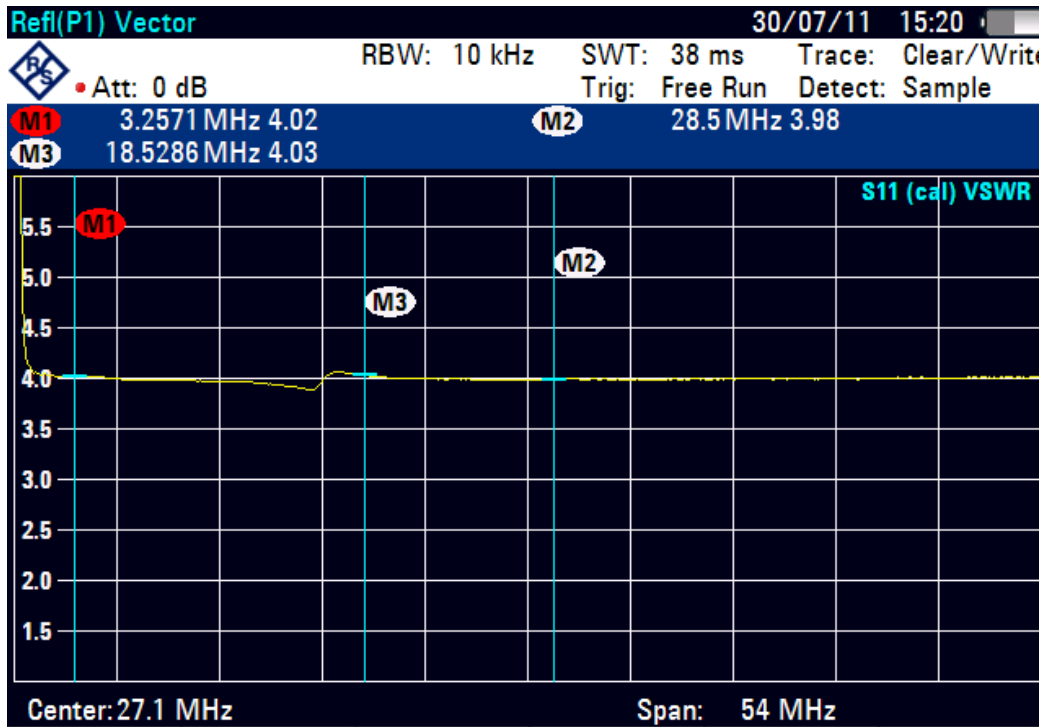
Now, let's look at a variant of this BALUN.; Jerry (K4SKD), having looked at the Elecraft BL-2 two ratio BALUN, acquired a couple of AMIDON binocular ferrite cores similar to the ones used by Elecraft and re-built one of his N1LO BALUNS. Here is a photo of the modified BALUN.



Below is the resulting VSWR plot at 1:1.



Now the same BALUN switched to the 4:1 ratio.

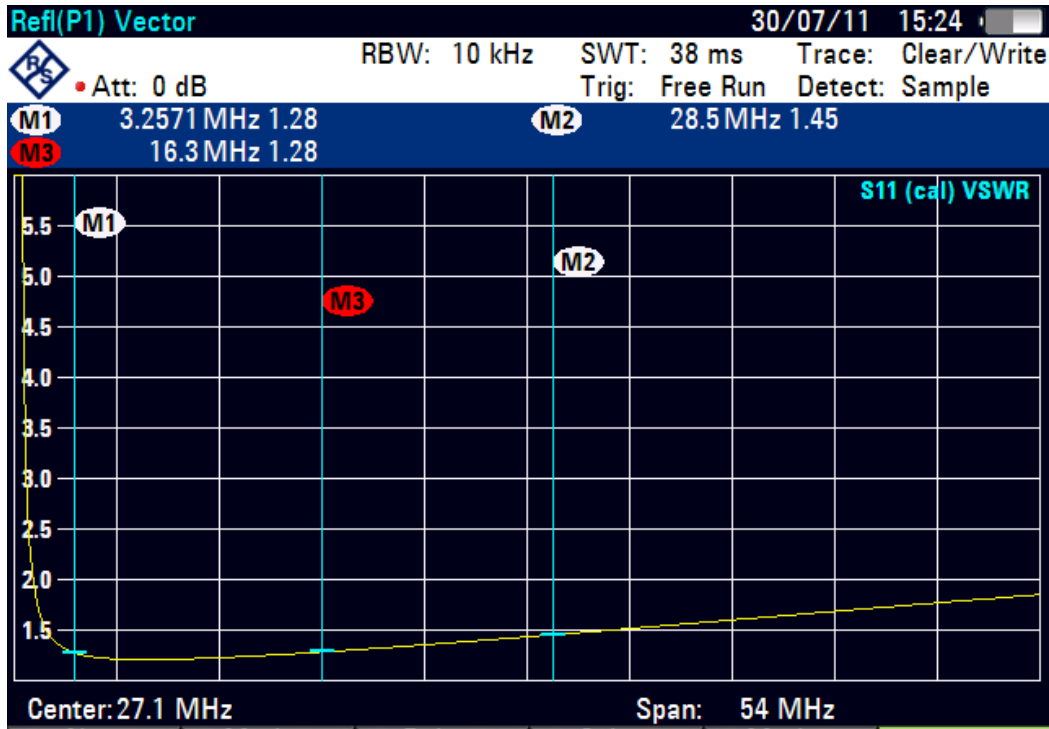


Note that there is still an anomaly at around 16.3 MHz.

I was approached by Joe Imburgia about a BALUN he had acquired through MARS, I believe. This is apparently a military issue from the markings on it, but Joe was unable to determine its properties.



Joe was unsure what the frequency range was, the ratio or the power rating. I set it up with the normal 50 ohm load and got the following plot..



As you can see from the plot above, it's not real flat or low, but with a 50 ohm load, it's not too bad. At least up to about 39 MHz it's below 1.5:1.

Now, let's look at what this all means. If we look at the VSWR plot for my antenna from the radio end of the coax, we get a nasty sight....

Figure 10> This is my loop antenna with the BL2 BALUN set to 1:1 ratio. The first dip is at around 3.2 MHz and they follow approximately every 3 MHz.

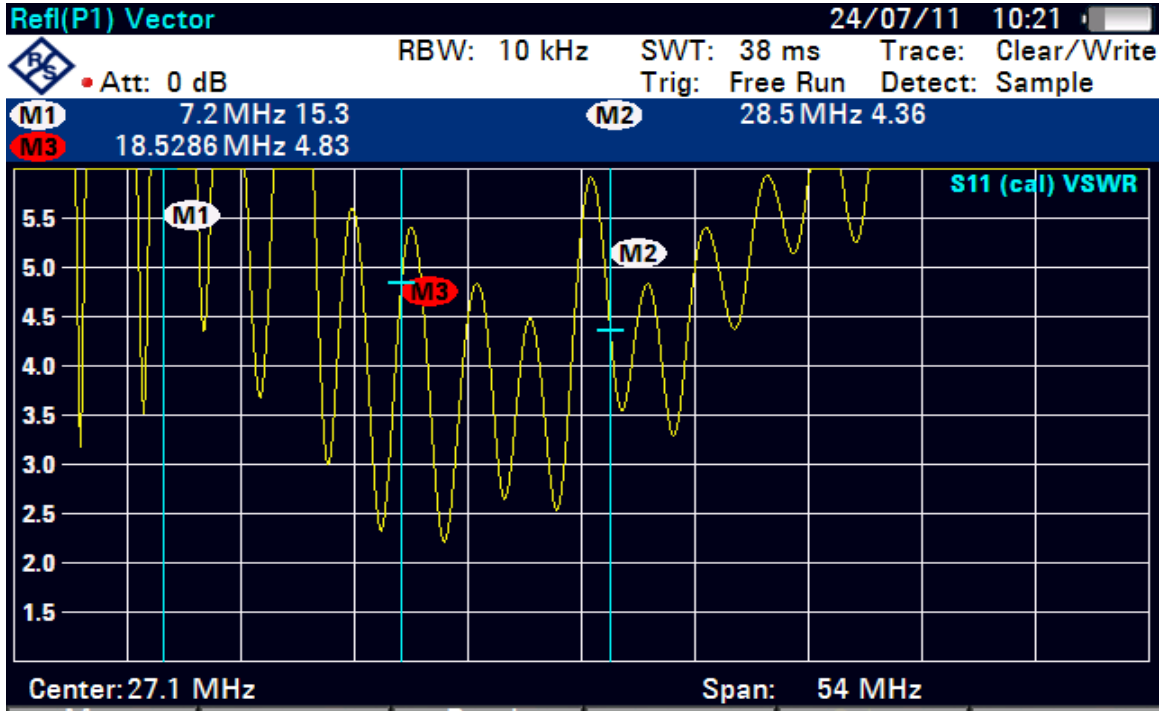
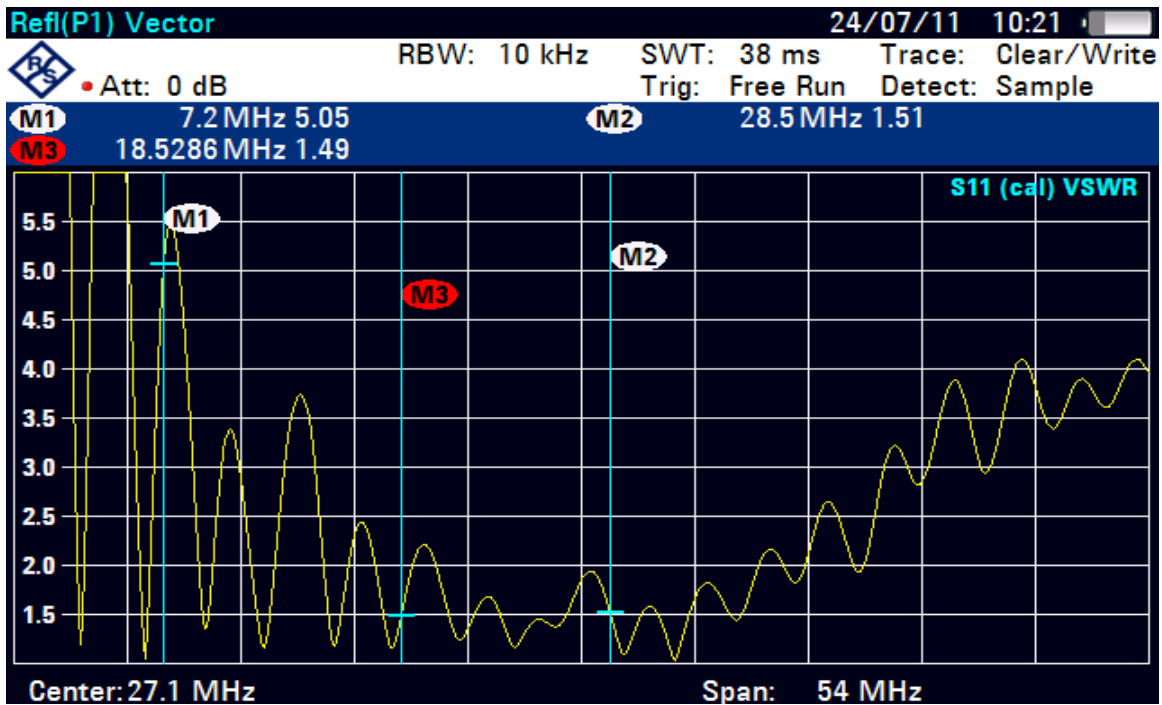


Figure 11> Note how much better things look when we switch to 4:1 ratio. The dips are in the same frequency relationship but the values are much lower and more consistent.



This was a very enlightening experiment. The new BALUN works well with my antenna and the built-in ATU in my K3.