

Adjusting End Fed Half Wave Antenna -250 Watt version - PAOSNY

Years ago I acquired an EFHW antenna from HyEndFed Company. This antenna has been used on several vacations in France, with good results. It is a 40m EFHW, with extension coil and wire for 80m operation. This is the current (March 2021) HF antenna used by me for HF in the centre of the city of Haarlem.

I needed a second EFHW, with a similar construction, to be used for holiday trips. For this purpose I acquired a DIY-kit for such antenna from [HF-kits](#). I prepared the 250W version, HAM friend Carlo, PE1MWL the 100W version. As the results are obviously quite similar, I will only publish my direct results.

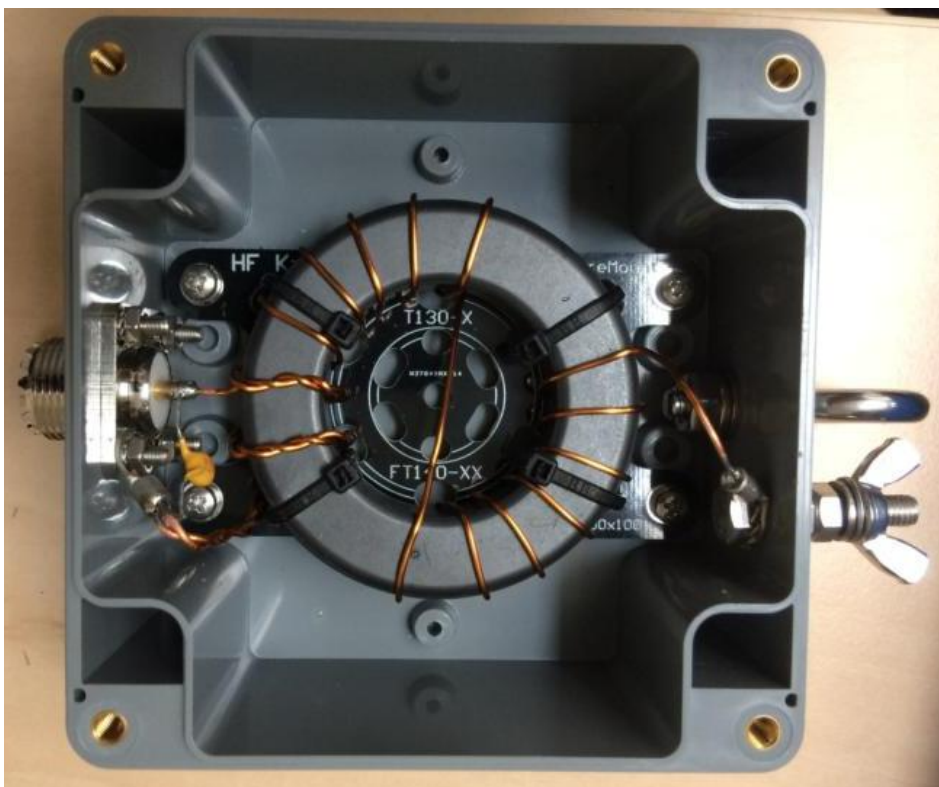
The antenna was built according instruction (documents and video on the HF-kits website). However, I could not generate sufficient heat, so no heat shrink sleeve was used for the coil. Instead I used self vulcanizing tape. I believe that that may even give better protection.

Construction of the coil for the 80m extension (calculated to be 110 μ H):



The coil for 80m has 170 turns on 19mm PVC. I measured 111 μ H! (please note that the protection is not yet in place)

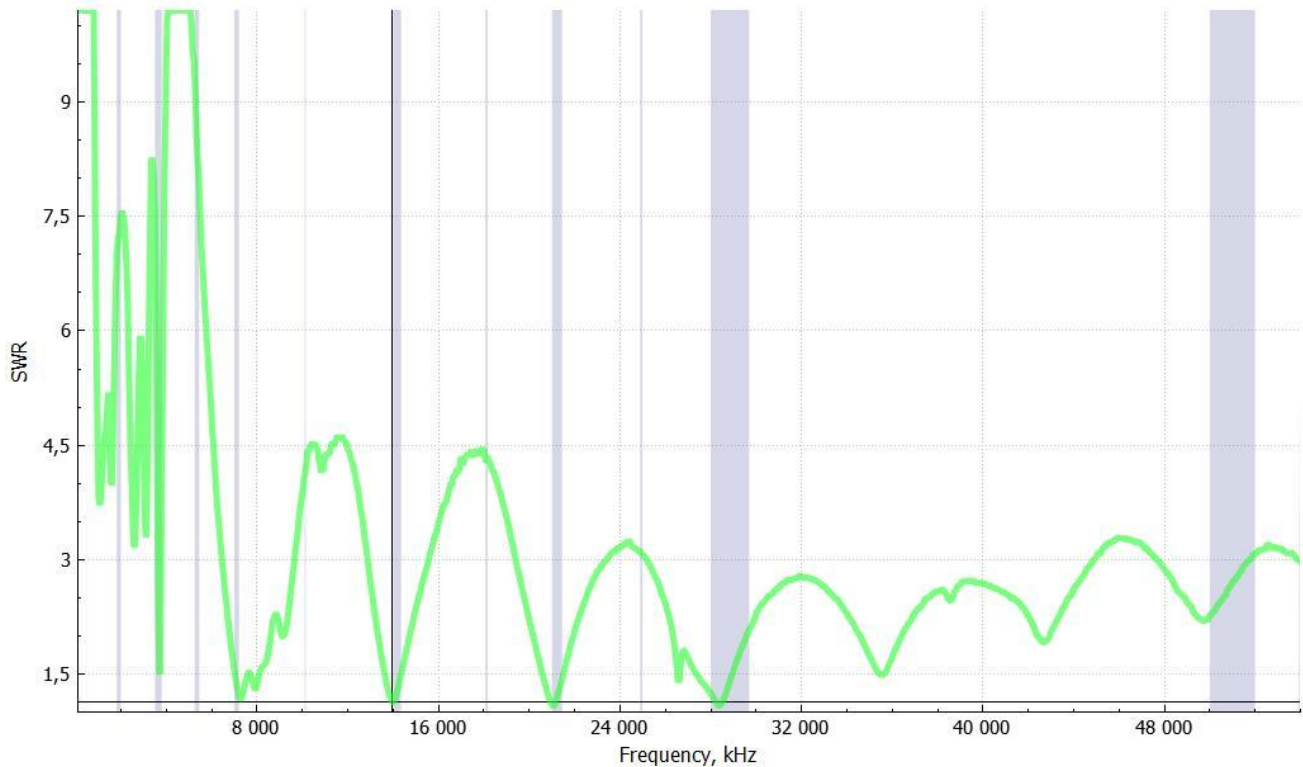
The kit also comes with everything that is required to build the 1:49 UN-UN. Also this part of the antenna has been documented clearly.



So: I closed this box, took the complete antenna to the open field, and started the measuring and adjustment process.

The measurements were done at the PG.540 facilities in Zandvoort (see that web page for details) on a sunny June 22, 2020. We can use two poles there, about 40 meters apart, and we can lift antennas up to 10 meters above ground level (the sandy dunes of Holland's coastal landscape).

The complete overview:



A run in the analyser's complete spectrum, after completion of all adjustments

The full range of the RigExpert AA-54 Antenna Analyser is from 0 – 54 MHz. That was fully used in this run (made after completing the adjustments). We were namely curious about the behaviour on higher frequencies as well. The grey stripes are the Amateur Bands. The above picture indicates clearly how the antenna gives good dips there. For closer details, I made runs per band

Adjusting and Measuring:

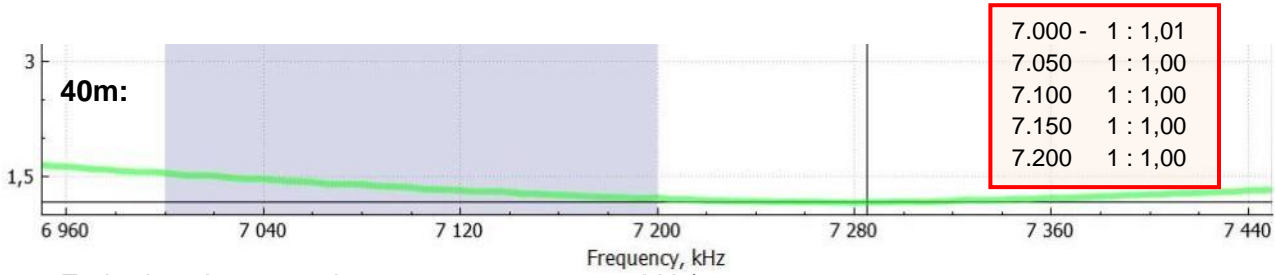
The first measurement done for 40/20/15 and 10m showed resonance slightly under the specific bands, except for 40 m, where it was slightly *above* it. However, in spite of that, the SWR is very low over the entire 40m, so we started to cut the length for optimum result on the four bands.

Tip: make sure the lowest SWR for 10m is at the desired band segment for 10m. Then 40, 20 and 15m may not have their lowest SWR inside these bands, but show very acceptable SWR levels. After obtaining these satisfactory results, the 80m wire downstream of the coil was shortened to satisfaction. Here we left the last part bent back and parallel to the wire, to be able to shift the lowest SWR from lower to higher frequencies at later use.

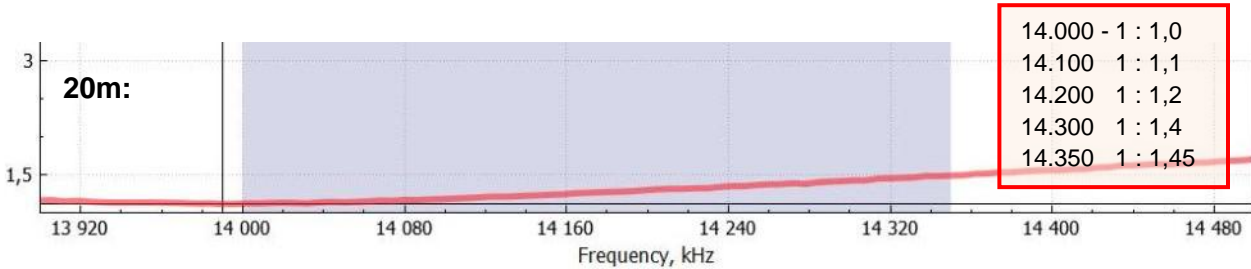
The next pages show the final results (graphs), using that borrowed AA-54 Antenna Analyser (thanks to Peter, PA0PCV) and the program RigExpert AntScope2.

In addition, I give the measured SWR-values in tables at the right, using my FT-897D and a Zetagi HP500 SWR-meter. No antenna tuner was used. *You find these values are in the red frames.*

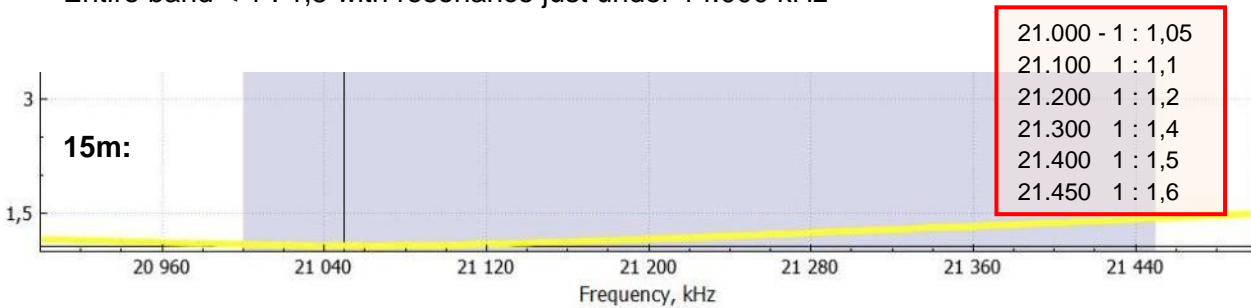
Final results of the recorded graphs (Analyzer) and measurements (SWR-meter)



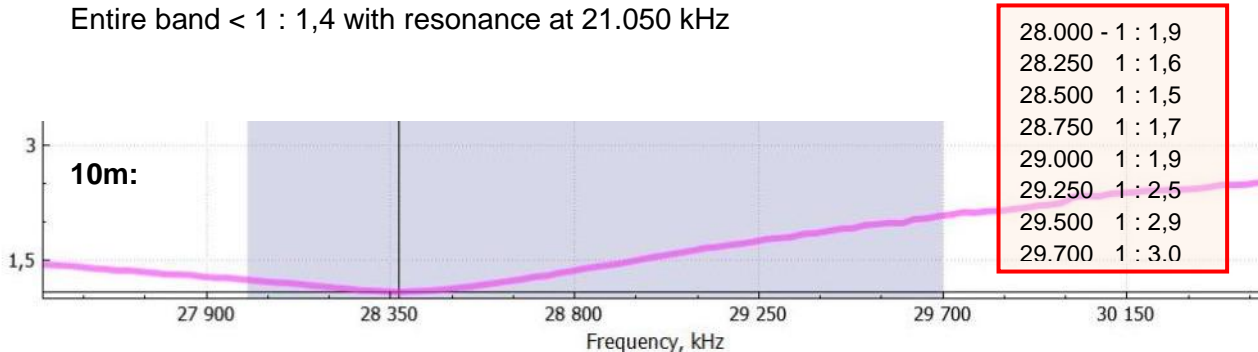
Entire band < 1 : 1,5 but resonance at 7.285 kHz)



Entire band < 1 : 1,5 with resonance just under 14.000 kHz

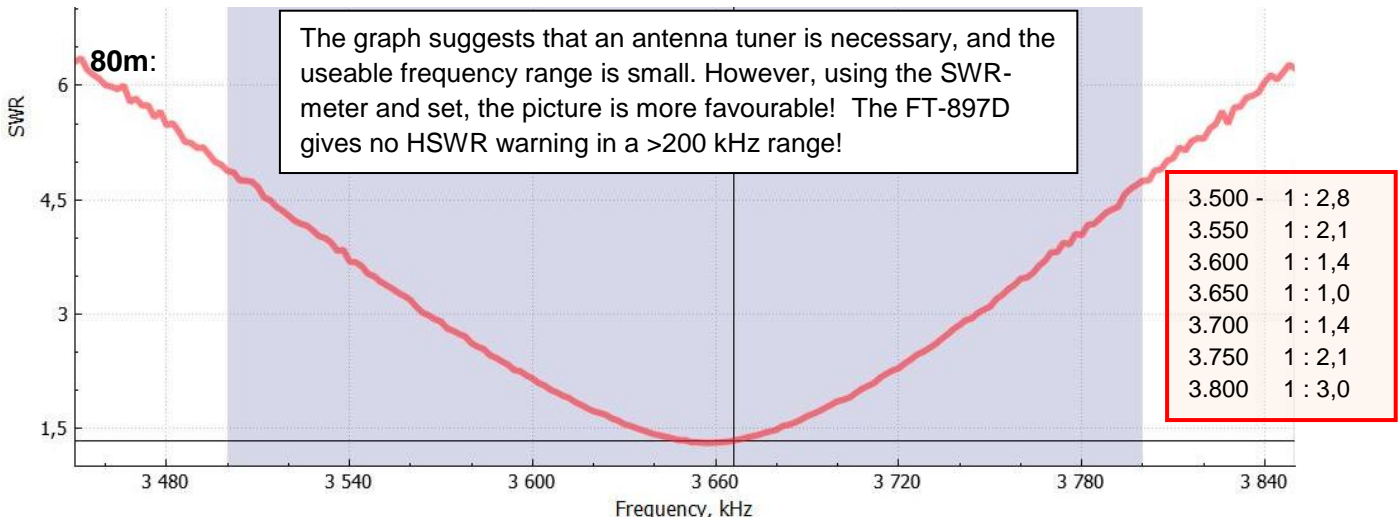


Entire band < 1 : 1,4 with resonance at 21.050 kHz



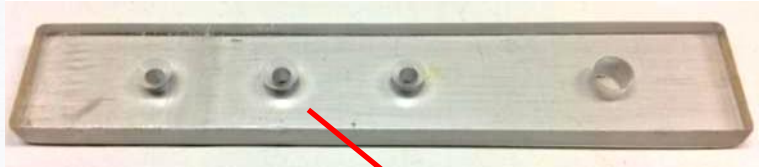
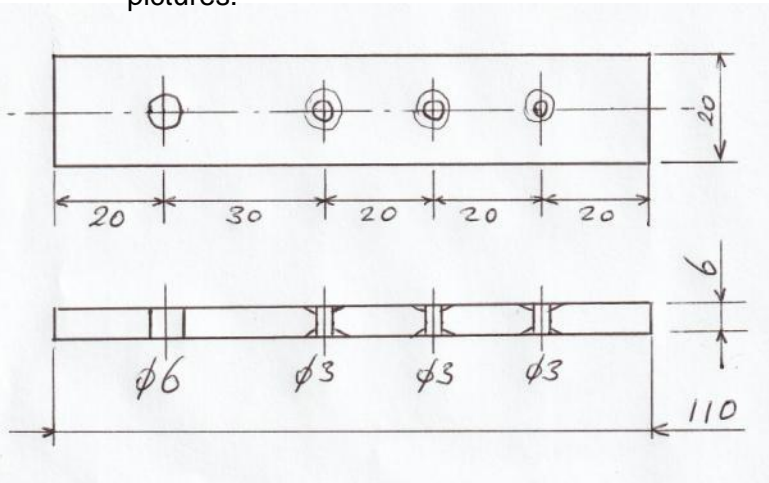
Here the SSB-part of the band looks great with up to 29.000 kHz an SWR of < 1 : 2,0. The last 700 kHz (FM / repeaters) are over 1 : 2,0. A tuner may be required to play safe.

With this "cut to perfection" for these bands, 80m was folded to the red location for phone band.

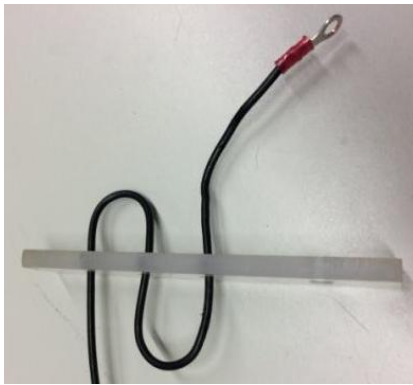
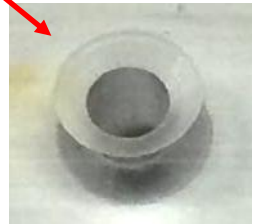


Strain Relief for the Wire Antenna

The intention of the producer of this DIY-kit is to use the eye for strain relief of the antenna wire. I chose another solution. To prevent excessive forces on the connection of the wire to 1:49 box, this simple strain relief was constructed, using a (junk part) polyester strip. Here are some supporting pictures:



dimensions are not critical. thickness of this part is 6mm. other sizes 110 x 20 mm



Summery

After a good preparation it was relatively simple to make the antenna from the components in the (HF-kits)-kit. The adjustment (cutting to perfection) was easier when we did the second (PE1MWL) antenna, with all experience gained on my End Fed Half Wave.

Because the antenna appears not critical on 40/20 and 15 meters (check the figures and tables), the first (long) length is in fact determined **by the segment in the 10 meter band where you want the best SWR**. If you have that fixed, the antenna will be simply useable on 40, 20 and 15 meters. I don't need a tuner for it!

Adjusting the short wire on the other side of the 110 μ H coil requires some patience. After we had cut the first piece, and saw the results in the "shift to the right", we got the proper feel about the next cut.

After a tip from Ed, PA0ECV, we stopped cutting, and folded back the last part. This has the same effect as cutting, but we now have the opportunity to readjust this part to shift the ideal point on 80 meters up (longer fold back) or down (shorter fold back). Make sure that the folded wire runs parallel and as close as possible to the antenna →



In a picture:



20 m 35



2 m 15

First Time in use

The antenna behaved perfectly.

The results of the SWR measurements that I made during the first real use (small vacation, antenna free from objects, about 5 meters above ground) are in the red tables on page 3.

One finding that already got proper attention, was that the tie wraps as provided in the kit to fix the toroid to the mounting plate are too weak. Unpacking the antenna after the vacation, I noticed some sound of 'loose' parts coming from the box: the two tie wraps close to the top were both sheared. I replaced them with a stronger variant (3.5 mm nylon).

Frank (HF-Kits) advised me that for new kits these tie wraps have already been replaced with better quality types.

Epilogue

My conclusion:

This was a satisfying project. The kit is complete, and since June 2020 with better tie wraps for the fixation of the toroid. Instruction on HF-kits website are clear, and making the complete antenna myself did not reveal any problems. The change I made to the strain relief for the antenna wire is optional and not required normally. For the ease of adjusting and measuring, the use of an Antenna Analyser is an advantage for quick results. SWR measurements were used to check the correlation with the Analyser results, and that gave even lower SWR results than expected.

A nice project for a nice price! Based on this I can recommend [HF-kits](#), if you want to construct such an End Fed Half Wave Antenna!

Hans, PA0SNY, in cooperation with Carlo, PE1MWL.

Publication: Hans, PA0SNY

PA0SNY – 20200630 / HyEndFed HF-kits
PA0SNY – 20200713 / rev 1
PA0SNY – 20210405 / full rewrite

(rev 1 adds the strain relief details and pictures of the folded back wire end). The Antenna name was changed to End Fed Halve Wave, as previous wording was related to a protected domain)

(The full rewrite was done during the total make over of my website in the first months of 2021.)