DL7JV

Self's building of a HF2V, vertical antenna for 40 and 80m

After different attempts with vertical 1/4 Lambda mono band antennas the desire for a vertical multiple antenna was responsible for 40 and 80m with me. However a Groundplane presupposes a good radial net, otherwise it does not work well. I have some fence mats and 10m around the toe am enough wires laid out.

First I regarded the antiresonant circuit Groundplane. There the antiresonant circuit comes to a 1/4 wavelength, related to the higher operating frequency (7 MHz). Afterwards the extension comes for the deeper operating frequency (3.5 MHz). That is, after approximately 10m aluminum pipe or wire is added the antiresonant circuit for 40m, then still another times 10m aluminum pipe or wire for 80m. Overall height is nearly 20m! By the overall height from 20m to brought in in the top (over the 40m antiresonant circuit) a loding coil will reduce. The length reduces substantially, in addition, the range. I rejected the idea an antiresonant circuit antenna to build, since she appeared too long to me. Also build the antiresonant circuit was too tricky, since these achievements up to 750 Watts should stand. Attempts with a coaxial cable antiresonant circuit from RG-58 resulted in that it already warmed up with achievements by 250 Watts and increased then the SWR.

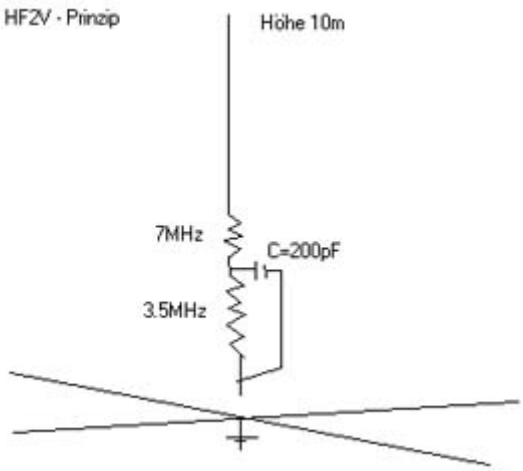
Then I regarded the two-volume Groundplane with multi-volume antiresonant circuits of VK2AZN in the "Rothammel" antenna book. The size and function seemed to me ideally, however I, up to the data in the "Rothammel", did not find concrete building guidances.

My search in the InterNet brought me on the side of EI7BA. He operates a HF2V-reproduction for many years. Also with one great "L" solution for 160m.

The "Butternut HF2V" is a 2 Band vertical antenna for 40 and 80m. With optional extension, also for 30 and 160m, thus the 4 deep Bands. The Butternut is 10m long and stands for instance 1kW transmitting power. The price in Germany amounts to approx.. 350 Euro.

Operational principle HF2V

With the HF2V, simplified, the loading coil for 3.5 MHz on one is described approx. A length of 10m is enough for emitter computed, and measured and over a 200pF condenser uncoupled the resonant frequency of 7 MHz, at the coil.



The condenser sits with a contact directly at the coil. The other contact short circuits the lower part of the coil with an aluminum handle during excitation with 7MHz. During excitation with 3.5 MHz the condenser is high impedance, the jumper is ineffective.

Choice of materials and procurement

Thus I caught to the suitable **aluminum pipes** to procure. That still to some extent could be done. I had still junk and supplemented this with pipes from the building market. For the top one can use also GFK rods or telescopes.

With **the condenser** the concerns began. It must have a capacity of 200pF, be current celebration, and exhibit a tension strain of approx. 12kV. There is it in Germany for the "Butternut HF2V" as original spare part of Bencher via Wimo for over 30 Euro. Otherwise I found suitable "Doorknob capacitor" only via the USA import. There postage is more expensive than the part.

But I had good luck. In an InterNet auction I arose (for 6 Euro) 4 new Russian 100pF/16kV condensers. On a ham- flea market lasts perhaps also still another possibility been.

I soldered 2 pieces of these condensers parallel. then 200pF results in 2 x 100pF.

Around the 2 large **air coil** windings to be able I needed 4 to 5mm to thicken, 15m long aluminum wire. I could not find this aluminum wire until today. There is apparent only 3mm flower wire from aluminum.

First I wound the coil with 1 mm silver wire on 70mm PVC pipe. The silver wire was however too thin and warmed up the top of the coil with 400 Watts of transmitting power rather strongly. Later I exchanged then the silver wire against thicker 6 mm copper wire. With the wire strength applies: The more thickly, the better.

The insulator between the lower and the upper coil is the weak point of the system. PVC is bent in the test due to the coil heating up. Because no suitable insulator from ceramic(s), glass or ev. Teflon was present, decided I for hardwood. That gives the mechanical structure also more stop. The wood should be water resistantly sealed.

Structure

The aluminum pipes plug together telescope-like. The 4 thinner bars of the upper 4000mm are pre-drilled and with 2 tapping screws each per junction point bolted.

3 the thicker pipes within the middle range is slit and with pipe clamps blocked with the circular saw. They result in a length of 3500mm.

The lower part of the antenna is 2500mm long, carries the multi-volume circle and has the feed.

At the feed, which takes place with 50 ohms of coaxial cables, is a coil with 17 turns on 20mm with an approximate length of 140mm. It derives static loadings. The wire should be rigid because of stability. Copper wire with 1 to 2mm is OK. At the lower part of the feed the radial net is attached. Here is to be paid attention to particularly good contacting with a broad ground strap.

The two coils of the multi-volume circle are described above. The capacity is installed

weatherproof into a box. The mechanical attachment and contacting take place with screws and nuts/mothers on suitable aluminum strips.

Alignment

First, a good SWR does not state anything over the efficiency of the antenna. On the efficiency decide transition resistances, radial net and losses in the coils.

The alignment of the antenna is only hearing accomplished moderately and with the Transceiver built in SWR- meter.

At the beginning I recommend to measure the two coils 3 to 4 turns longer than necessary. One should make 2 small short circuiting bridges with alligator clips. Thus one can bridge the coil and stop the resonance forwards.

The Transceiver stands directly at the foot of the antenna, attached with a 50 ohm of coaxial cables, on receipt. Its loudspeaker is untwisted strongly and one hears it noise.

First the antenna is adjusted to 7 MHz. Since during excitation with 7 MHz the condenser is low impedance, short circuit and ineffective the lower coil is electrically over the aluminum handle.

On **7 MHz** only the upper coil is effective. The upper coil is adjusted with a short circuiting bridge hearing moderately to maximum volume. If the resonance is too deep against 6 MHz, the coil is too long.

On **3.5 MHz** both coils are effective. Since the upper coil is already adjusted, it is not changed. The lower coil is adjusted with the second short circuiting bridge hearing moderately to maximum volume. If the resonance is too deep against 3.0 MHz, the coil is too long.

After the hearing moderate adjusting, mutually on both volumes, the SWR with small

achievement is examined. With one turns by the standing wave process a tendency at the VFO recognizes. First one adjusts the SWR to 7 MHz, then on 3.5 MHz finely with the short circuiting bridges.

If one changes the upper coil for 7 MHz, also the SWR to 3.5 MHz changes.

If one changes the lower coil for 3.5 MHz, the SWR to 7 MHz does not change .

Now one notes the effective numbers of turns of the two coils. The surplus turns are removed.

With my PVC pipe abt. 70mm diameter I have approx. 10 turns with the upper coil by 210mm length and with the lower 16 turns with 320 mm length.

The renewed fine alignment happens also pushes together or pulls apart the turns on the pipe.

To 7 MHz the resonance characteristic reacts through changes to the coil situation quite slowly-acting, comes from the high range of over 500kHz.

On 3.5 MHz the range is only approx. 50kHz. small changes in the coil changes the point of resonance substantially.

Operational experiences

Still during the alligator clips at the coils hung, I worked in the afternoon on 80m in CW two QSO with German OM's. They confirmed a loud signal. My receipt was excellent. Because I built another antenna on the same day still another, I came only against midnight with the finished selfmade HF2V back on 80m. The old IC-701 sizzled quite loud, a thunderstorm lay in air. On 7005kHz then VK6HD. A call with 100 Watts and the QSO came off. It gave 599 and it was with me also 589. My dear man. I saw later, at the computer , which was VK on 80m for me new country, and which also over 23000 QSO in the log.

On weekend after I went through with the HF2V in the IARU Contest. In the evening hours and at the night I made 336 connections there on 40 and 80m into all continents with 400 Watts.

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Left about "HF2V":

http://www.bencher.com/hf2v2.html

http://www.bencher.com/pdfs/00156IZV.pdf

http://www.thebrowns.fsnet.co.uk/butternu.htm

http://www.qsl.net/ei7ba/80&40mVertic.htm

Christian DL7JV, 2007

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