

Antenna type

Half Rhombic antenna (or End Fed V) is a non-resonant traveling wave type wide band antenna with resistor termination. Antenna type is rather immune to local wide band noise and is extremely quiet RX antenna with high S/N ratio. It has rather low SWR over the full designed frequency range: it works well without antenna tuner. The antenna is assembled as vertical loop, feed point and the resistor side grounded and the middle point 6-12 meters above ground. Like inverted V with end-feed. This shape is optimal for NVIS working. It gives some gain on the high side but the poor efficiency on low side limits its use as QRP/DX antenna. Antenna is fast to build on the field and suits best for temporary installations.

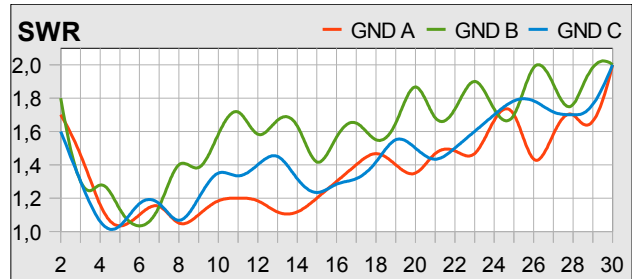
Test antenna

With this test antenna we used 44m radiation element to get it working also on 3.5MHz. Element wire was 1.5 mm² PVC insulated stranded equipment copper wire. Antenna was tested with heights of 6/8/10/12 meters above ground. Also a 44m counterpoise wire was used with dry ground conditions. Antenna wire was fed with 1:9 unun and terminated with 470R 140W zero inductance resistor. We measured the antenna SWR with three various ground types and some QSO's were made on 3.5MHz with 5W QRP rig.

Grounding

Normally both ends of the antenna must be grounded. With high antenna impedance (450 ohms) short (<1m) grounding rods seems to work well. On dry ground we use also the counterpoise wire, directly below the radiation element on the ground surface. This has effects on the SWR and the vertical radiation pattern.

SWR



GND A (orange)
GND B (green)
GND C (blue)

Wet ground, marsh, without counterpoise wire
Dry ground, sandy ridge
Average ground, field with clay

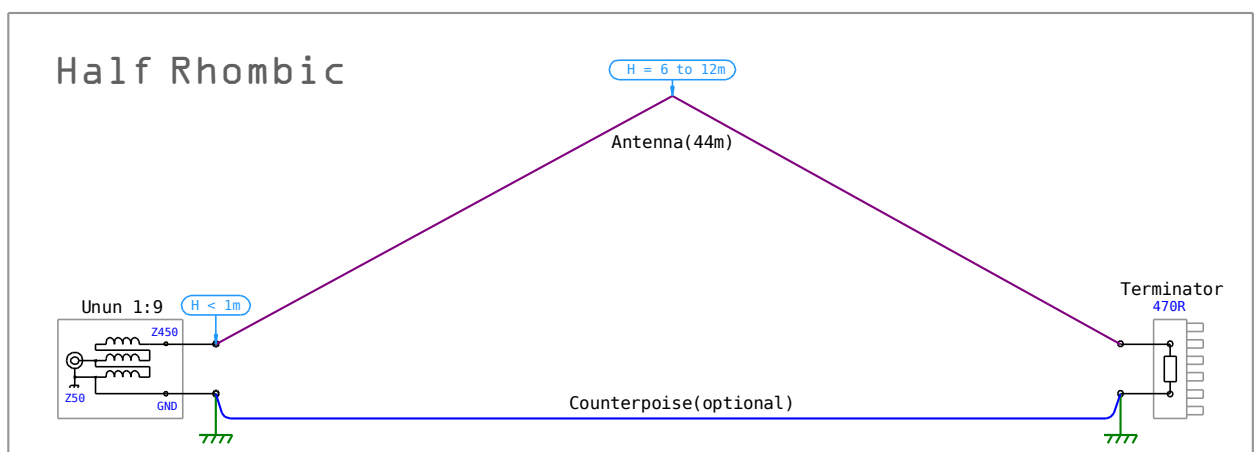
Efficiency

The antenna has simulated (NEC2) total efficiency (%) as follows:

MHz	H=6m	H=10m	H=12m
4	32%	32%	32%
7	35%	34%	35%
14	53%	53%	58%
21	60%	64%	73%
28	69%	75%	85%

Radiation patterns

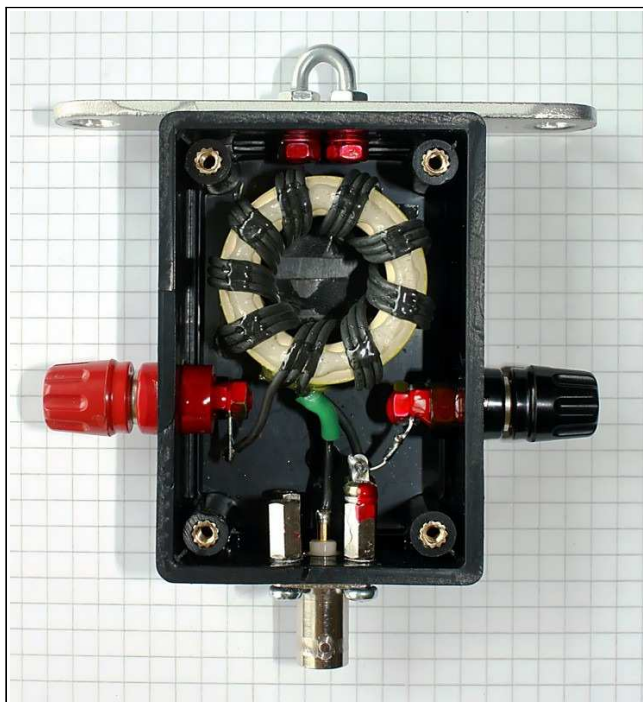
There are some NEC2 simulated radiation patterns on the appendix. This antenna shows some directivity from feed point towards the load. On 3.5/7MHz bands the antenna has rather circular horizontal pattern, gain -5 to -9dBi. Vertical radiation peaks at elevations 30 to 90. With higher frequencies the vertical peak drops; elevation on 14MHz 15 to 75cdr and on 21MHz 15 to 60cdr. Also the horizontal pattern shows gain near the wire direction: on 14MHz +0dBi on +/- 40cdr and on 21MHz +2dBi on +/- 30cdr.



Matching

The antenna is fed with 1:9 unun. More details on the appendix. The antenna impedance is about 450 ohms. Also 1:12 (600 ohms) unun or balun might work.

Details of the unun, before potting:



Load

This antenna needs a 470 ohms non-inductive high power load resistor. With this antenna we used BI's **MHP-140 470R** zero inductance resistor (supplier www.elfa.se); power handling capacity 140W with proper heatsink and silicone HTS.

The antenna termination resistor was assembled into the die cast aluminum enclosure. This enclosure was fitted into a heatsink with thermal resistance about 1.5 K/W. This should handle about 50 to 70W of continuous carrier power.

Details of the load, before potting:



Unun connected into the antenna, ground and the feed cable:



Load connected into the antenna and ground:



