Field Antenna for the 40- meters

Proved in mountains of Northern Caucasus, March 2006.

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Credit Line:
http://www.hamradio.cmw.ru/antenna/ant-hfp.htm

Before my QRP- pedition I have searched for an effective field antenna for 40 meters. I need antenna which can radiate both as vertical as horizon wave, which does not need antenna tuner and the same time which could be a resonant antenna. I have found such antenna. This one is designed by G3XAP. The antenna works well at my mountain QRP- pedition.

Figure 1 shows a design of the antenna. **Table 1** gives data for ranges 20, 40 and 80 meters.
The maximum gain of the antenna is directed to side opposite L2. The difference in gain forward/back is small it is only near 3-dB. Two counterpoises have length 0.25 lambda each. For improving antenna efficiency use as more counterpoises as you can. The maximum of radiation lays in sector of 30 - 70 degrees. I get SWR 1:1 (at SWR meter of my FT-817).

Tuning of the antenna is very simple. Reach minimum SWR with help of base capacitor C. I used a variable capacitor while tuning. Then change the variable to fixed one. The capacitor should be protected against atmospheric forcing.

UA6HJQ at a slope of the Elbrus,
Northern Caucasus

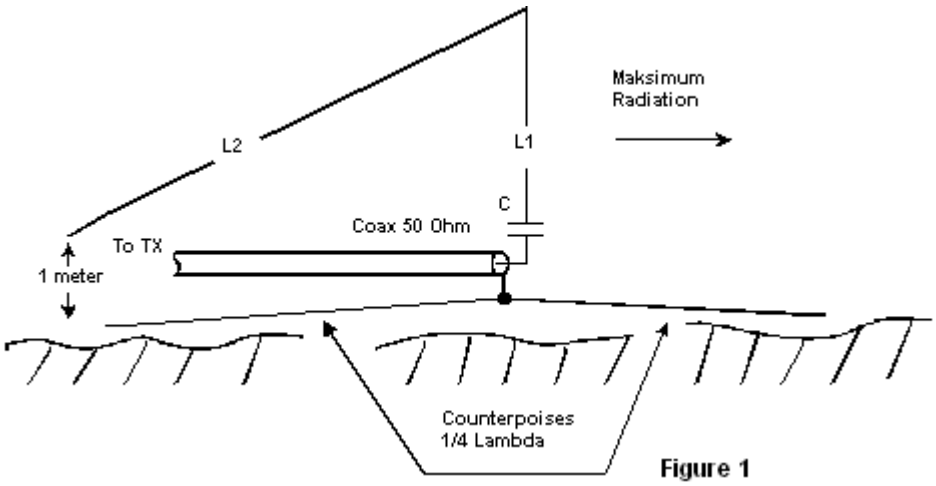

Figure 1

Table 1

Frequency, MHz	L1, meters	L2, meters	C, pF
14.15	1.8	3.8	314
7.07	4.4	8.4	115
3.67	6.6	17.8	287

For example, I put the capacitor into an empty film box. May be at antenna tuning you need change the length (in + or -) of the L2. Counterpoises are laid on the ground. Overall weight of the antenna with its mast (was used a telescopic plastic fishing rod) is a little more the 1000 gram (2.2 pound).

Figure 2 shows a diagram directivity with antenna data provided by free antenna simulator MMANA

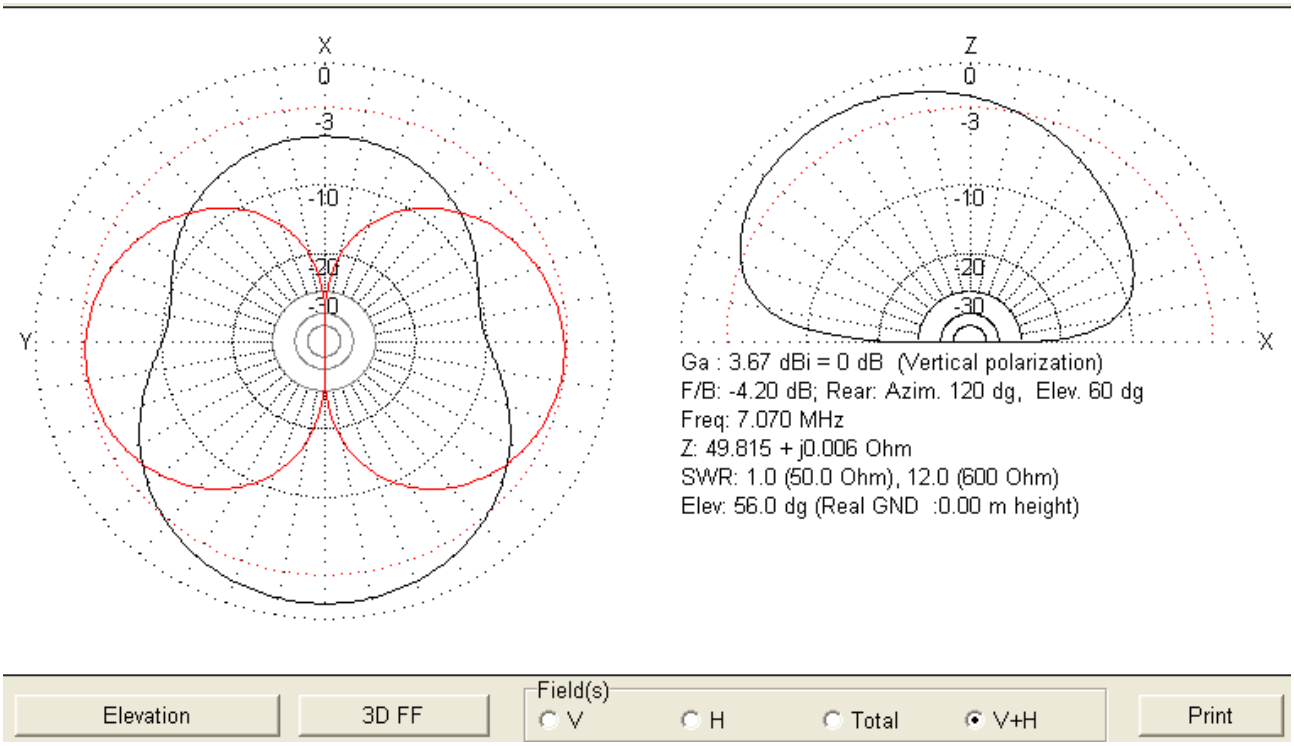

Figure 2

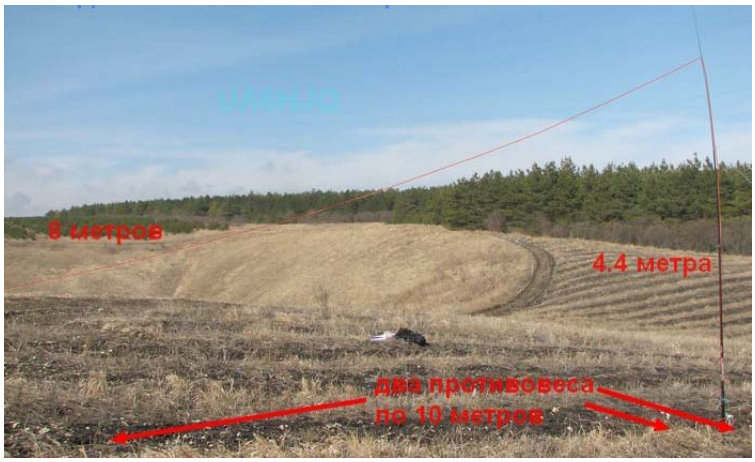

Figure 3 shows the antenna installed in Caucasus Mountains

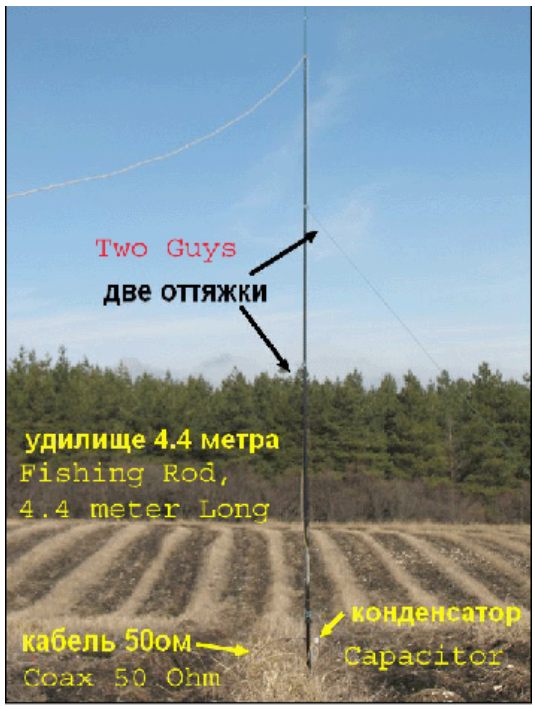

Figure 4
shows the mast of the antenna

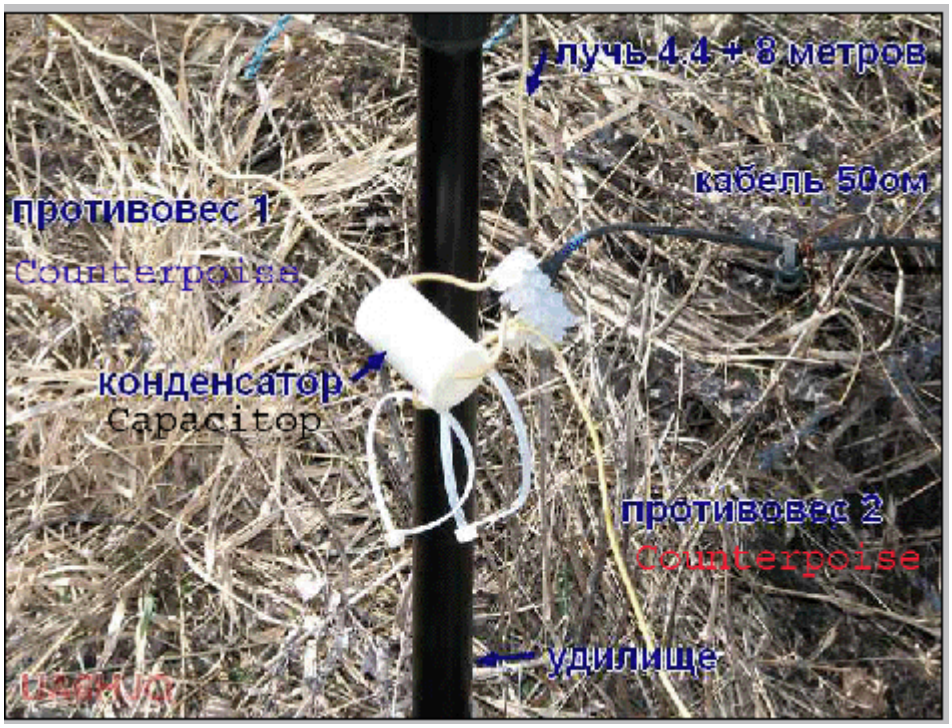

Figure 5 shows the base of the antenna

Note by VA3ZNW: MMANA does not provide correct simulation when elements of the antenna aerial are located close to the ground. **NEC- 2 for MMANA** should be used in the situation. So by me the antenna was simulated in NEC- 2 for MMANA.

Figure 7 shows the diagram directivity and data for the antenna. Input impedance is near 21 Ohm, capacitor should be had 132-pF. For matching the antenna with 50-Ohm coaxial cable an inductor 0.9 micro Henry should be turn on across antenna clips, and base capacitor C should be used on to 100-pF. Off course, the real capacity should be found at tuning of the antenna.

Figure 8 shows the circuit of this matching device.

Figure 9 shows parameters of the antenna depending on ground, above which the antenna is located. As you can see, the ground does not influence much to the parameters of the antenna. So, the antenna can be placed above any ground.

11. Average (Eps=13, Sigma=5)
12. Poor (Eps=13, Sigma=2)
13. Pastoral (Eps=13, Sigma=6)
14. Marshy land (Eps=12, Sigma=7.5)
15. Pastoral rich (Eps=14, Sigma=10)
16. Very good (Eps=20, Sigma=30)

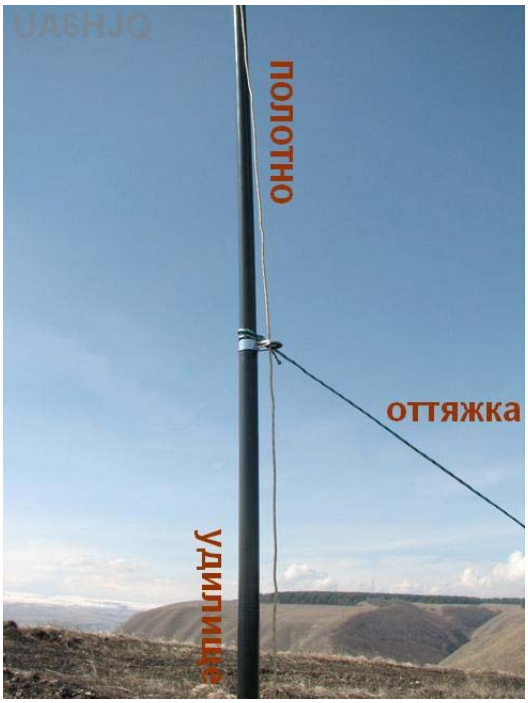

Figure 6 shows the wire and guys of the antenna at its mast

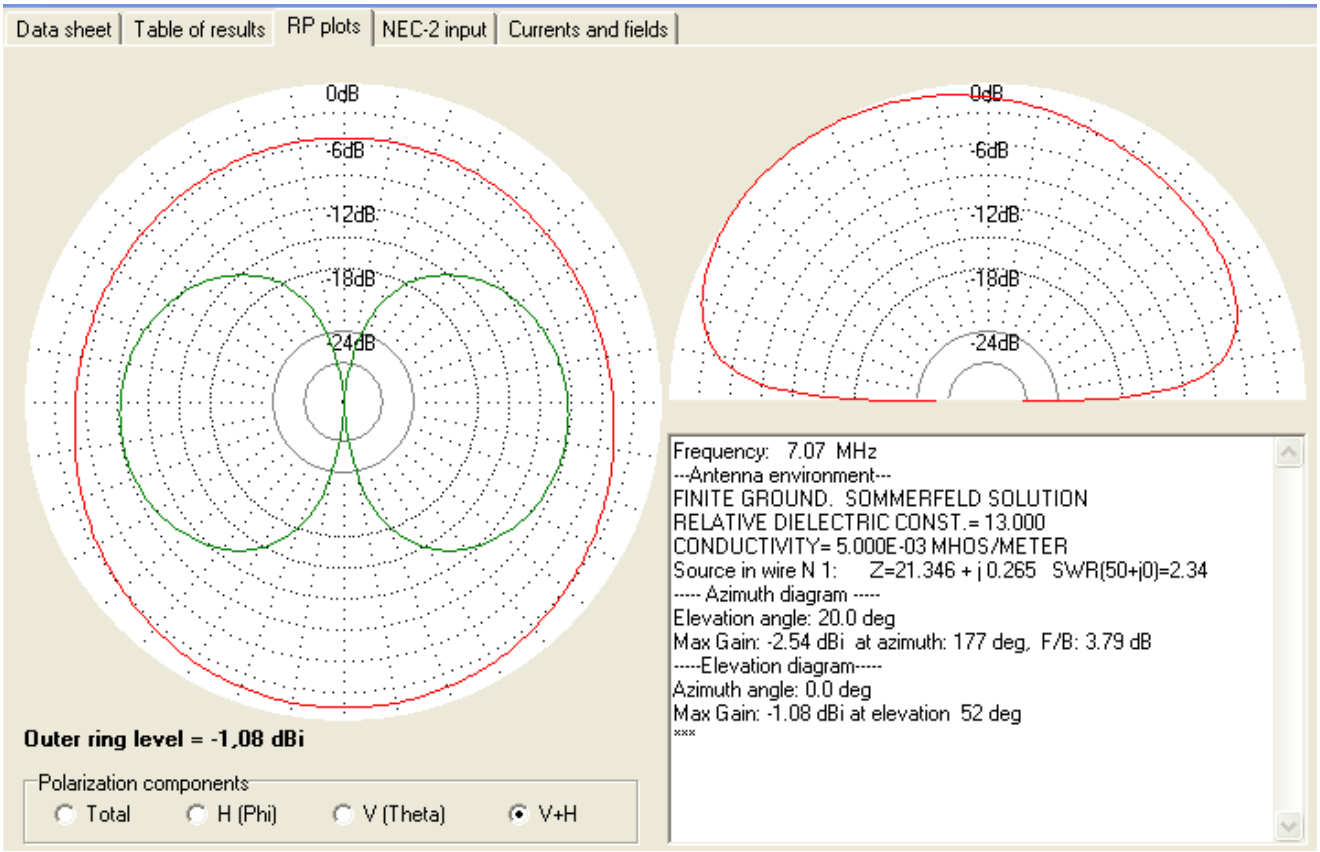

Figure 7

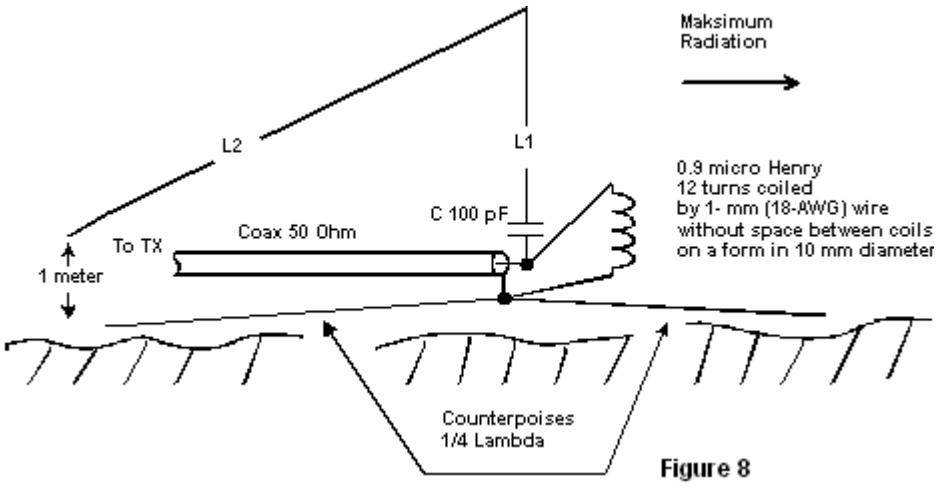

Figure 8

N	Wire No	F, MHz	R, Ohm	jX, Ohm	SWR	Gnd.	H, m.	El, deg	Gaz, dBi	at Az	Az, deg	Gel, dBi	at El
16	1	7.07	19.507	-j1.838	2.57	Som.	0	20.0	-1.02	177 deg	0.0	-0.54	40 deg
15	1	7.07	21.032	+j0.711	2.38	Som.	0	20.0	-2.14	177 deg	0.0	-1.02	47 deg
14	1	7.07	21.380	+j0.747	2.34	Som.	0	20.0	-2.44	176 deg	0.0	-1.12	51 deg
13	1	7.07	21.417	+j0.492	2.33	Som.	0	20.0	-2.50	178 deg	0.0	-1.10	49 deg
12	1	7.07	19.887	-j0.401	2.51	Som.	0	20.0	-2.26	178 deg	0.0	-0.66	51 deg
11	1	7.07	21.346	+j0.265	2.34	Som.	0	20.0	-2.54	177 deg	0.0	-1.08	52 deg

Figure 9