Experimental Loop HF Antenna

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So, at my new QTH I will need to install a balcony antenna. I have read a lot of pages in the internet and decided make a Loop Balcony Antenna- Loop with perimeter 10- meter. However before to install the antenna on my balcony I am going to test the antenna on a field, in my cottage.

I made the antenna from aluminum profile. It is a rectangular loop with sides 3.35 x 1.5- meter. Antenna is installed on a dry wood bar. Low horizontal side of the antenna is at the height 1.6- meter above the ground.

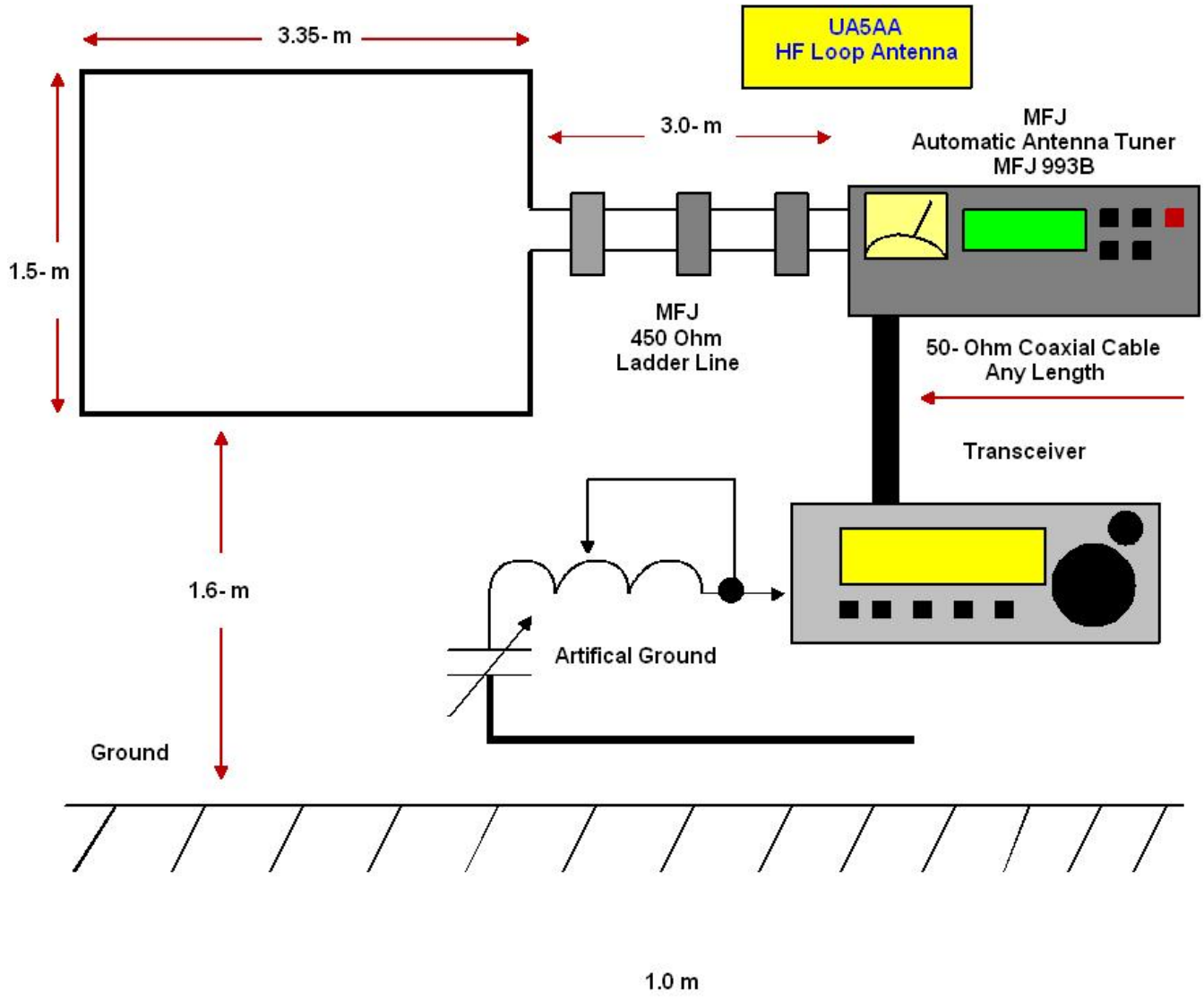
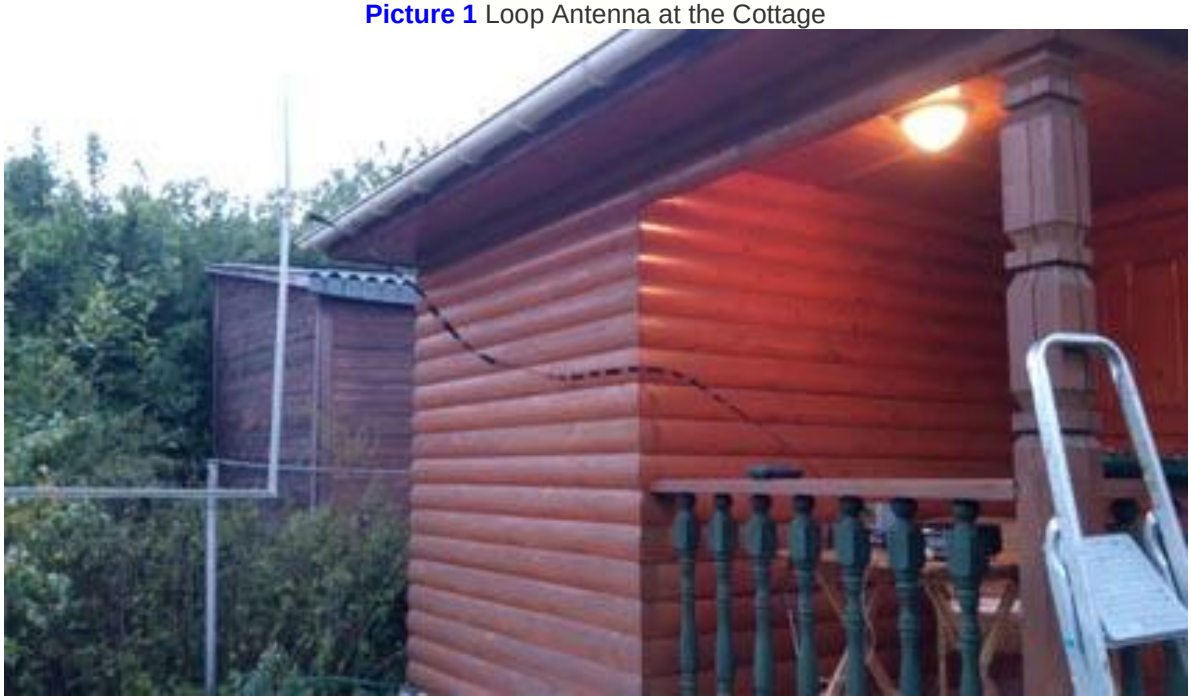


Figure 1 Design of the Loop Antenna

Antenna was fed in the middle of a vertical side by two wire line MFJ- 450- Ohm in 3- meter length. The line is hook up to automatic antenna tuner MFJ- 993B. **Figure 1** shows design of the antenna. **Picture 1** shows the antenna at the cottage. **Picture 2** shows feeding of the antenna.

MFJ- 993B provided tuning of the antenna with SWR 1.0:1.0 on all HF Bands (as well as on the WARC). **Picture 3** shows reading of the MFJ- 993B on 20-meter band. Antenna works well on receiving. I tried the antenna on transmitting and found that my transceiver could bite me at some bands.

Picture 1 Loop Antenna at the Cottage



Picture 2 Feeding of the Loop Antenna

Picture 3 Reading of the MFJ- 993B on 20- meter Band

However, artificial ground, it was variable inductor with variable capacitor and thick wire in several meter length connected in serial, cancelled the biting. I decided find the impedance of the antenna at the antenna tuner. The tuner can shows value of the capacitor and inductor that is used for matching of the antenna. In the tuner it is used simple L- circuit, so it is possible to find impedance of the antenna based on the value of the L and C in matching circuit. **Picture 4** shows value of the matching L- circuit on the 10- meter band. **Table 1** shows antenna impedance on the HF bands calculated on the base of the values.

Antenna has very low active resistance on the 20- meter bands. I found that connection of the artificial ground increase the antenna input impedance, so it is improve the antenna efficiency.

However it does inconvenience- you need tune the artificial ground on the each band. **Table 2** shows antenna impedance on the HF bands with artificial ground.

Antenna was tested in transmitting mode. Antenna works well on the 20- 10 meter Bands. As well it works satisfactory on the 40 and 30 meters. On the 80 meter Band the antenna works poor however I could be on the Air as on receiving and sometimes on transmitting chat with local hams. My opinion is that the antenna works and I will install it on my balcony.
73! de UA5AA

Table 1 Antenna Impedance on the HF Bands

Band, MHz	3.5	7	10	14	21	24	10
RA, Ohm	15.45-j157	616-j213	13+j90	0.4+j10	12.2-j21	50+j152	38+j173

Picture 4 Value of the Matching L- Circuit on the 10- meter Band

Table 2 Antenna Impedance on the HF Bands with artificial ground

Band, MHz	3.5	7	10	14	21	24	10
RA, Ohm	22-j138	91+99	14+j99	10+j26	93-j149	50+j152	30.32+j152