

## Super Broad Band HF- VHF Antenna

*Introduction: I desperately need in RX/TX antenna that could be work at HF- VHF bands without any tuning. The antenna should be work at any conditional and should be simple in design. Below you find description of my design of such antenna.*

*Igor Lavrushov , UA6HJQ*

**Credit Line:**

<http://goryham.qrz.ru/ant/hf-wide.htm>

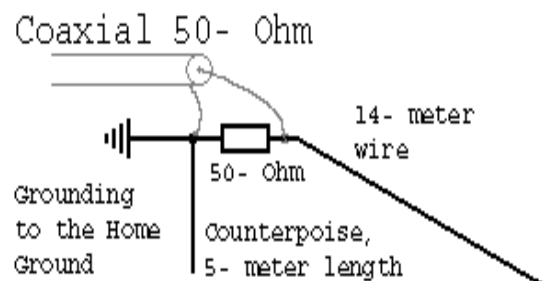
From some time I used to an FT857D. This transceiver has not an internal ATU, so, I have to use only matched antenna with this rig. At first I tried a length of a wire in 14 – meter going from a window of my balcony to the ground at angle of 50 degree. This wire was matched well at all HF- Bands and allowed me did operation in the Air.

However, soon I understood that the antenna had some disadvantages. Firstly, when band has changed I have to go to the next with the balcony room to tune up the antenna, secondly, the antenna was too noisy. **Figure 1** shows the antenna.



**Figure 1** Wire antenna for FT857D

So I decided to design antenna that do not require any tuning and that has no so much noise. It would be possible if the resonance antenna was converted to aperiodic antenna like a T2FD. However I have no place for original T2FD, and I already have installed the 14- meters length of wire, that is why conversation to be applied only to the wire. **Figure 2** shows schematic of the antenna. Resistor for 50- Ohm is old surplus dummy load. Counterpoise is a 5- meters length of wire that is placed around perimeter of my balcony. Coaxial cable 50- Ohm from the antenna to FT857D has the 7- meter length.



**Figure 2** Aperiodic antenna for FT857D

**Test of the antenna:** Noise was reduced to 3- 5 scale marks at the S- meter compare to resonance antenna (antenna that was matched with FT857D with the help of resonance ATU). Signals from ham stations also drop down when the aperiodic antenna was used but I could hear the signals better compare to noisy resonance antenna. SWR for the aperiodic antenna is 1.0:1.0 from 1.5- MHz to 450- MHz band. When I tested the aperiodic antenna I as usual could work with any ham station that I heard in the Air. Then I compared the aperiodic and resonance antenna at the 7- MHz band.

I tuned my 14- meters wire in the resonance at 7- MHz with help of a shortening capacitor. As a result I got a wire that could be with simple toggle switch turn on or to resonance antenna (shortening capacitor) or to aperiodic antenna (dummy load 50- Ohm in bridge with the wire). I heard the Air and compared receiving of the weak ham stations using resonance and aperiodic antenna. The reception was almost the same with the both antennas. However, with the aperiodic antenna the noise was low down that acted like improving of the performance of the aperiodic antenna.

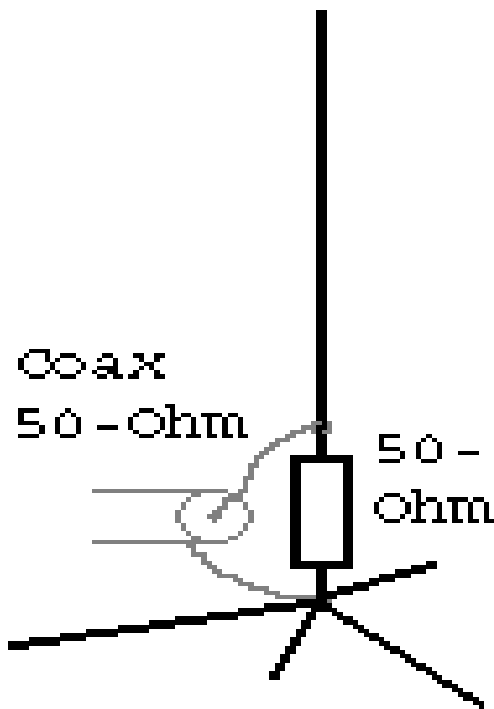


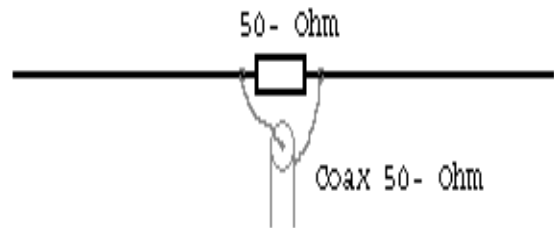
Figure 3 Aperiodic vertical antenna

Some data obtained from the test. I have got 59+5 from RW4CN (distance 1000 km) with the resonance antenna and 58- 59 with the aperiodic one. I have got 59+10 from RA6FC (distance 3 km) with the resonance antenna and 59 with the aperiodic one.

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The aperiodic antenna may be used as the main, RX or emergency antenna. You may convert any vertical or dipole antennas to the aperiodic ones. I believe that at good placement of the vertical or dipole antenna you should get good performance in the Air. Figure 3 shows aperiodic vertical antenna, Figure 4 shows aperiodic dipole antenna.



## HF- Wide Band Antenna with Transformer

I decided improve the performance of my aperiodic antenna at the HF- Bands. To get this improvement I added an RF transformer 1:9. Figure 5 shows the design of the improved antenna. Figure 6 shows the design of the transformer 1:9.

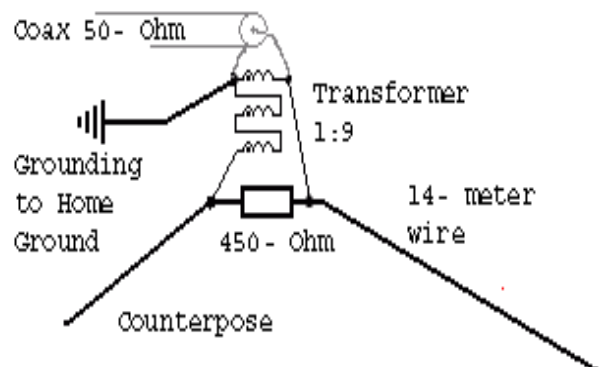


Figure 5 Design of the improved HF- Wide Band Antenna



**Figure 6** Design of the RF transformer 1:9

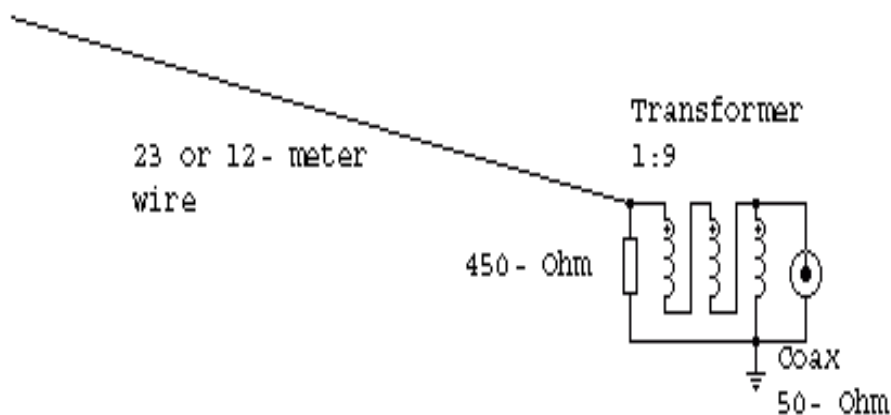
At the design of the wide band antenna an RF voltage through RF up- transformer 1:9 is going to the antenna. So efficiency of the antenna would be better (in theory) compare to the antenna from the **Figure 2** because RF- voltage across of the antenna wire should be higher compare to the simple wide band antenna. RF Transformer is wound by three wires twisted together. The winding is placed evenly around the ferrite core. For my ferrite ring I got best result with 5 turns around the ferrite core. Dummy Load for the antenna was made with 15 resistors of 6.8- kOhm/2- Watts that were bridged together. The load could stand up to 100- Watts CW/SSB for 15- minutes.

**Note from I.G.:** There are some limitations that could turn antenna from the **Figure 5** to losing antenna compared to **Figure 2**.

SWR of the antenna from **Figure 5** was almost 1.0:1.0 at the band from 1.8 to 14 MHz, then evenly increase to 2.0:1.0 at 28- MHz band. The antenna does not work at the UHF- Bands because of the limitations of the transformer.

**Figure 7** shows design of the wide band transformer antenna for field conditions. Wire should not have resonance at the amateur HF- bands. Such wire may have length 23 or 12- meters. Any length of wire (more the 5 meters) placed on the ground or metal rod hammered in the ground would be acted like a "ground" for the antenna.

Transformer with Load are placed inside a small box, Two terminals "Antenna" and "Ground" are placed at the one side of the box. RF socket of a PL- Type for coaxial cable is placed at another side of the box. The field antenna (**Figure 7**) works from 1.9- up to 31 – MHz band.



**Figure 7** Field Wide Band Transformer Antenna

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