End Fed 6- meter Zepp Antenna with Resonance at 2- meter Band

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The September 2020 ARRL VHF Contest was coming and for this party I decided to make an antenna for the 6 meters band. Of course, it is not wise for me to install only single-band antenna for the 6- meter band, therefore, using the my lovely simulating antenna program MMANA I did simulation for antenna that could operate at 6 and 20 meters, and even at 15 meters with a slightly high SWR. It was a dipole with two loading coils and additional wires for 15 meters.

I only need to go to Home Depot to buy tubes for loading coils and some hardware stuff for installation of the antenna. But before the trip a hurricane is happened… Storm wind and 200- mm rain with hails run through Niagara Falls. This hurricane destroyed my cucumber and tomatoes and pelted backyard with branches of the trees.

It is not so bad anyway the branches were prepared for fireplace for winter time. Then, two weeks later, one more almost the same hurricane (but not so much rain and no hails) run across the city. During the hurricane I went to backyard and realize that the new antenna will be in the center of the hurricane wind. Winter is going ahead with other strong wind and ice rain. So I decided install something simple and wind- resistant. Most simple antenna it is a Zeppelin antenna in form of one line. However it is one band antenna. So I decided install a Zeppelin antenna for the 6- meter band.

Figure 1 shows design of classical Zeppelin antenna for the 6- meter band. It is half wave antenna that matched with 50- Ohm coaxial cable through a quarter- wave length of two wire line. RF- choke is installed at the feeding terminals of the antenna. Most simple design of the RF- choke it is several ferrite rings on the coaxial cable.

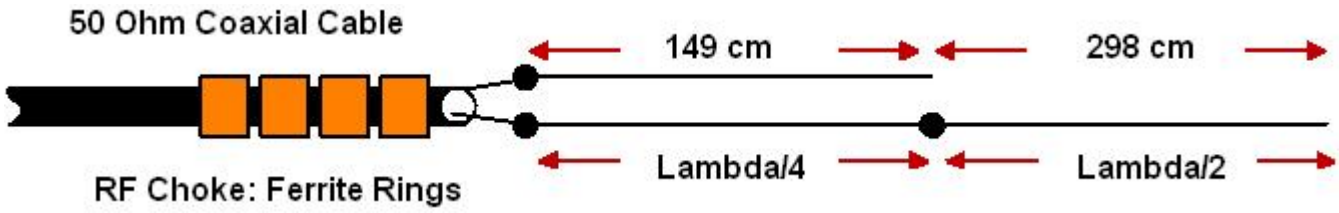

Figure 1 Classical Zeppelin Antenna for the 6- meter Band

Before installation of the Zepp antenna in the backyard I decided to test the antenna inside my house. Below there is shown several steps for doing of the antenna. I start with RF- choke. RF choke for the antenna consist of seven ferrite tubes in 35-mm length and 17- mm OD. I do not know parameters of the ferrite tubes I bought it at a ham flea market several years ago. **Photo 1** shows the tubes on the coaxial cable. Then the ferrite tubes were wrapped with electrical tape. **Photo 2** shows the RF- choke.

The quarter- wave transformer was made from 450- Om ladder line that I bought at MFJ website. For antenna wire I have used a green wire (this wire used for GROUND in electrical connection). Copper core of the wire had 1.5- mm diameter and OD of the wire was 2.2- mm.

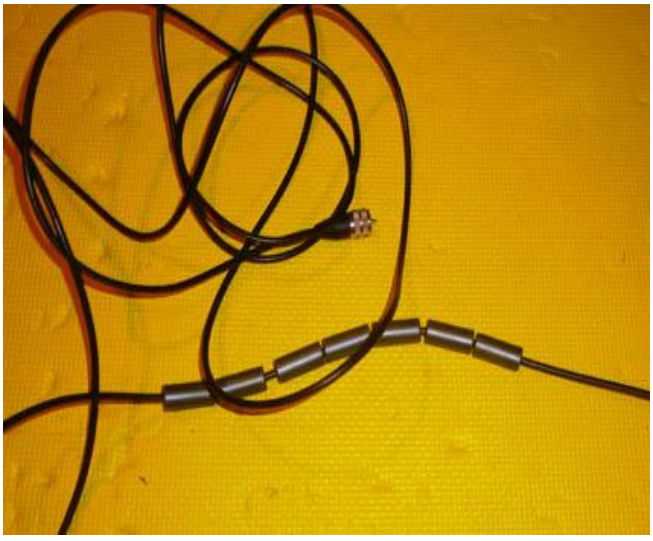

Photo 1 Ferrite Tubes on the Coaxial Cable

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Two wire line and wire in plastic insulation both has the own velocity factor (or shortening factor). It means that physical length of the quarter wave transformer and the half wave antenna should be less the shown in the **Figure 1**. I do not know the velocity factor not for wire neither for two wire line it should be find in my experiment with the antenna.

So I made antenna according the **Figure 1**. The antenna was hanged up to the ceiling of the room in my house. Antenna feed through 50- Ohm coaxial cable in 3 meter length. I begin tune the antenna to 50.1- MHz (because I work CW on the 6 meter band) by shortening antenna wire and quarter- wave transformer. For tuning the antenna I used MFJ- 259. **Figure 2** shows final variant of the antenna with 1.0:1.0 SWR at 50.1- MHz.

Photo 2 RF- Choke

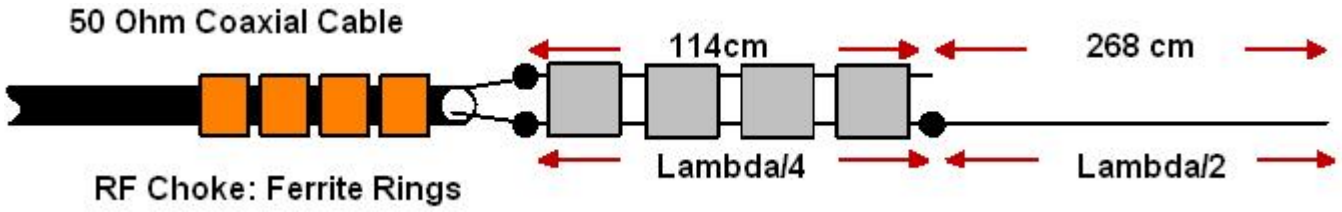

Figure 2 Final Variant of the Antenna with 1.0:1.0 SWR at 50.1- MHz

Practical found velocity factor for the 450-Ohm MFJ Two Wire Line is 0.765 and practical found velocity factor for the electrical green wire is 0.89. It is quite close to the supposed theoretical value. **Figure 3** shows real design of the 6- meter Zepp antenna. I used two porcelain dog bone ribbed insulators at the ends of the quarter wave line. A porcelain egg insulator was installed at the end of the half-wave antenna.

Photo 3 shows the antenna wire connection to the two wire line. **Photo 4** shows the coaxial cable connection to the two wire line. This antenna was again hanged up to ceiling and antenna parameters were measured with the help of MFJ- 259. The antenna requires some small tuning. To achieve the resonance at 50.1 MHz and a resistance of 50 ohms at this frequency, the antenna wire was shortened by 2 cm, and three small ferrite clips were installed on the two wire line (see **Photo 3**).

Photo 3 Antenna Wire Connection to the Two Wire Line

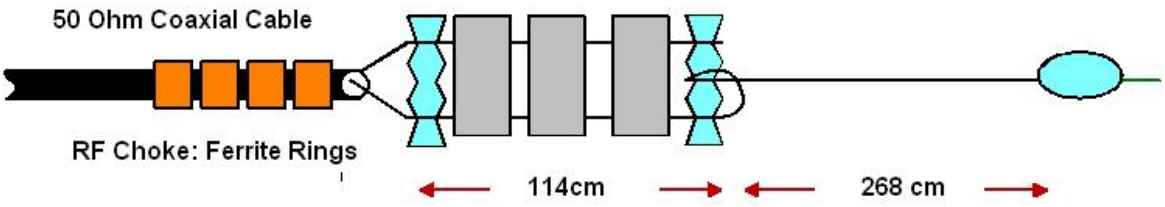

Figure 3 Real Design of the 6- meter Zepp Antenna

Antenna was installed at 3.5- meters above the ground at the backyard. **Photo 5** shows 6- meter Zepp antenna at the backyard. The antenna fed through 50 Ohm coaxial cable that has near 15 meter length from my shack to the 3- meter length coaxial cable connected to the quarter wave transformer. Coaxial cable going from my shack to the coaxial cable of the 6- meter Zepp antenna was checked with MFJ- 259 when the coaxial cable was loaded to a 50- Ohm dummy load. It was 1.0:1.0 SWR at 1- 150- MHz. As it mentioned early, the antenna with coaxial cable was tested at home and the antenna has 1.0:1.0 SWR at 50.1- MHz.

Photo 4 Coaxial Cable Connection to the Two Wire Line

Photo 5 6- meter Zepp Antenna at the Backyard.

So I supposed that the antenna should have 1.0:1.0 SWR at 50.1- MHz. With help of MFJ- 259 I measured the antenna parameters. **Table 1** shows the antenna parameters. The resonance frequency of the antenna was 51.627-MHz that is up to 1.527- kHz from the 50.1-MHz. It was very surprised me.

Of course, the ambient conditions are influenced to the antenna resonance but should not be in so much level. Then I measured the SWR with help of usual SWR meter- it was an old Handic, made in Japan. **Photo 6** shows the SWR meter at the antenna cable. The SWR meter was verified by me with several loads- 25, 50, 100, 125-Ohm. **Table 2** shows data measured with the Handic SWR meter, ICOM, IC-7410 transceiver send 50-W into the antenna.

So, Handic SWR meter provided exactly the same SWR that was measured by me during the initial testing of the 6- meter band antenna hanged up to the ceiling. The differences in SWR measured with MFJ- 259 and Handic SWR meter I may only explained by RF interferences near the antenna. The additional RF current influenced to the MFJ- 259. When I measured the antenna parameters at 50- W power the RF interferences do not hinder the Handic SWR meter. For the 6- meter Zepp antenna the MFJ- 259 as well found resonance at 142- MHz, but I cannot verify the reading with VHF transmitter. **Table 3** shows data for the 2- meter band.

Photo 6 SWR Meter at the Antenna Cable

Table 1 Antenna Parameters of the 6- meter Zepp Antenna Installed at 3.5- meter Height at the Backyard Measured with the MFJ- 259

F, MHz	47.0	47.5	48.0	48.5	49.0	49.5	50.0
R +X	51+31	32+14	30+4	41+20	66+23	89+0	65+20
SWR	2.0	1.7	1.6	1.6	1.6	1.6	1.5

F, MHz	50.1	50.5	51.0	51.627	52.0	52.5	53.0
R +X	61+20	47+16	45+8	50+0	50+10	39+14	28+5
SWR	1.5	1.4	1.2	1.0	1.2	1.5	1.8

Table 2 Data of the 6- meter Zepp Antenna Installed at 3.5- meter Height at the Backyard Measured with the Handic SWR Meter

F, MHz	50.0	50.1	50.5	51.0	51.5	52.0	52.5
SWR	1.1	1.1	1.2	1.4	1.5	1.7	2.0

Table 3 Antenna Parameters of the 6- meter Zepp Antenna Installed at 3.5- meter Height at the Backyard at the 2- meter Band Measured with the MFJ- 259

F, MHz	140	141	142	143	144	145	146
R +X	30+8	55+13	41+7	36+14	71+27	93+4	104+4
SWR	1.8	1.3	1.2	1.6	1.8	1.8	1.99

Antenna was tested in the Air. Straight away it was received very laud VE3UBL/B beacon. The beacon is placed near 90-km from me, it has 8-W and works with omnidirectional Turnstile antenna. At the time I received several beacons from the USA.

However the ARRL VHF Contest was disappointed for me. No any propagation, no one QSO. I monitored 50.098- 50.100- MHz and VE3UBL/B. Beacon was strong but no any station on the band. QRZ.COM as well showed table- ***No Propagation on the 6-meter Band***.

Sometimes I received a burst of signals at the 50.098- MHz but it was several seconds burst where I cannot recognize the callsigns…

OK, will wait for Sun activity and for propagation on the 6- meter band.

73! de VA3ZNW