Two Helical Antennas for 160 meter Band

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First Design of the Helical Antenna

Helical vertical antenna at its relatively small height may provide a good operation in the Air. It is possible to find the statement at lots ham publications in the internet and in paper magazines. So I decided to make my own helical antenna originally for 160 meter band and prove if the helical antenna works so well. Design of my helical antenna was based on source from internet and magazines that I had at my hand. What I have made in reality is shown in **Figure 1**.

Some words why the antenna looks so. Mast of the antenna was made from Fiberglass tubes in 103 cm length and 5 cm in outer diameter. It was surplus tubes from a military mask net. In Canada those tubes very often are sold in some auto (for example, Princess Auto) and hobby shop. EBAY as well has wide range of selection of the tubes- just type “Fiberglass Round Tube.” The design of the tubes allows connect one tube to another one and that results easy create antenna mast in any length. At first I planned to use 12 such tubes to create my helical antenna. On the top of the mast I planned to install a fishing rod in 6 meter length. I planned wound 77 meters of the 14- AWG wire around of the mast. The Helical Antenna intended to be installed at my backyard.

So step-by-step I wound the wire along the fishing rod then along the first section from the Fiberglass tube then erect the design that was lean on to wall and then later on to roof of my house, then install the next section of the Fiberglass tube, wound the wire around the section, made next step, next, next and.. Alas! The gigantic mast fall dawn because the base of Fiberglass tubes could not stand such mechanical force that caused upper tubes from the mast. My plan was corrected and the complete design of my Helical Antenna is shown in the **Figure 1**. The mast contained just 8 Fiberglass sections with broken fishing rod in 4 meter length. Overall length of the antenna was near 12 meters with near 60 meter wire wound around of the mast.

It was good looking high Helical Antenna but… it was a little problem. With help of my transceiver internal Antenna Tuner I may match the antenna on all amateurs HF bands but not on the 160 meter. I decided to add to the antenna a loading coil. The coil was wound on a water pipe that has diameter 5- cm and in 120 cm length. Coil contained 54 turns (it was near 15 meter) of 14- AWG wire.

With this coil my Helical Antenna could match on all HF amateur bands and of course on the 160 meter. The coil was sitting on a plastic garbage can near base of the antenna. **Figure 2** shows the coil near antenna base.

Figure 2
Loading Coil near Antenna Base

Feeding circuit of the antenna looks like a little complicated but it is logically clear. At first to the antenna was connected a 100 feet of 450- Ohm two wire line. The line was going from the antenna to my basement. Then the line was connected to Balun 9/1. It was allowed to me use a 15 feet of coaxial cable that was going from basement to my shack. RF- Choke was created near the Balun. It was the coaxial cable wound on a ferrite core- yoke from old TV. The choke may contain 10- 15 turns that is not a critical.

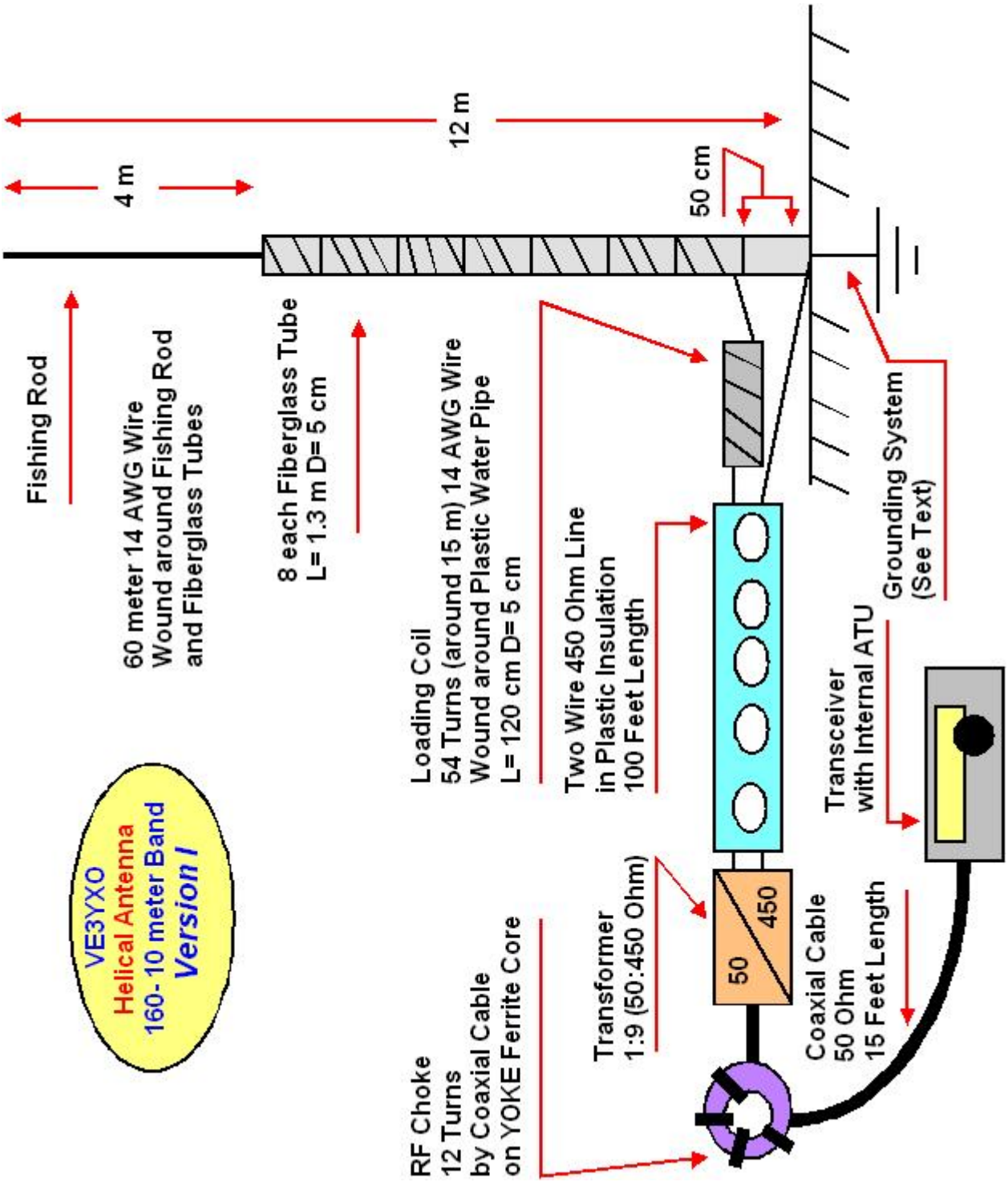

Figure 1
Design of the Helical Antenna for the 160 meter Band

Figure 3 shows Balun with RF- Choke in my basement. Coaxial cable was connected directly to my transceiver that had internal ATU.

The Helical antenna had serious ground.

Copper rod in three meter length was hammered near base of the antenna. Near 10 radials in 40 meter length was placed near base of the antenna on the ground of my back yard. Also for antenna ground it was used backyard metal fence.

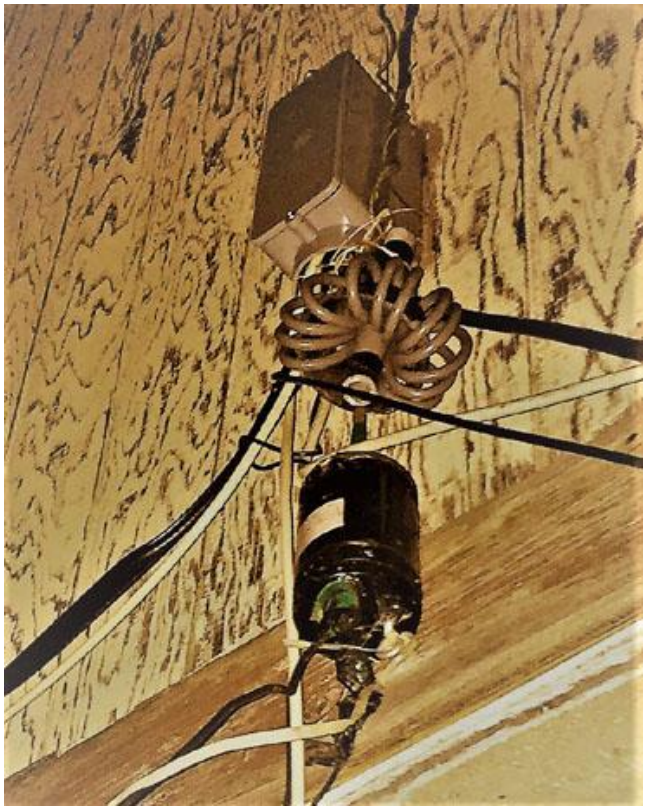

Figure 3
Balun and RF- Choke of the Helical Antenna

Antenna was tested in the Air. I found that SWR began to float through some times at 100 W going to antenna. However at 50 W going to antenna everything was OK. So I used to only 50 W with the helical antenna. I was very satisfied with the antenna. I did the SSB QSO on 160 and 80 meter (without the antenna I may work on the bands only CW or digital) with Europe and Hawaii. 40 and 30 meter bands as well were excellent.

Second Design of the Helical Antenna
Why was the second design coming? Was the first design of the Helical Antenna work bad? No, the first design was great. However a strong Canadian wind in March 2017 broke the antenna. I decided restore this one. **Figure 4** shows the second version.

The second version of the Helical Antenna was a little differs from the first one. It was used new fishing rod in 6 meter length. I used four sections of the Fiberglass tubes for the antenna mast. Along the mast it was wound 40 meters wire. It was used the same wire in diameter of 14-AWG. Gap between the turns on the mast was roughly equal to diameter of the fishing rod/mast where the wire was wound. Antenna was installed on the front yard of my house. Metal net in 240 square feet (24 square meters) was used for the ground of the antenna.

Feeding of the antenna was the same as for the First Design. **Figure 5** shows the antenna on the front yard. **Figure 6** shows how the two wire line is going from antenna to the wall of my house. **Figure 7** shows the two wire line on the wall of my house together with Balun and RF Choke.

Figure 5
Second Version of the Helical Antenna on the Front Yard

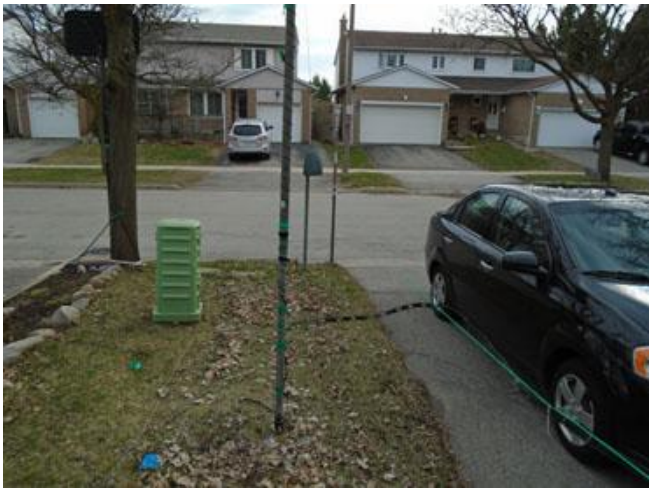

Figure 6
Two Wire Line going from Helical Antenna to the Wall of my House

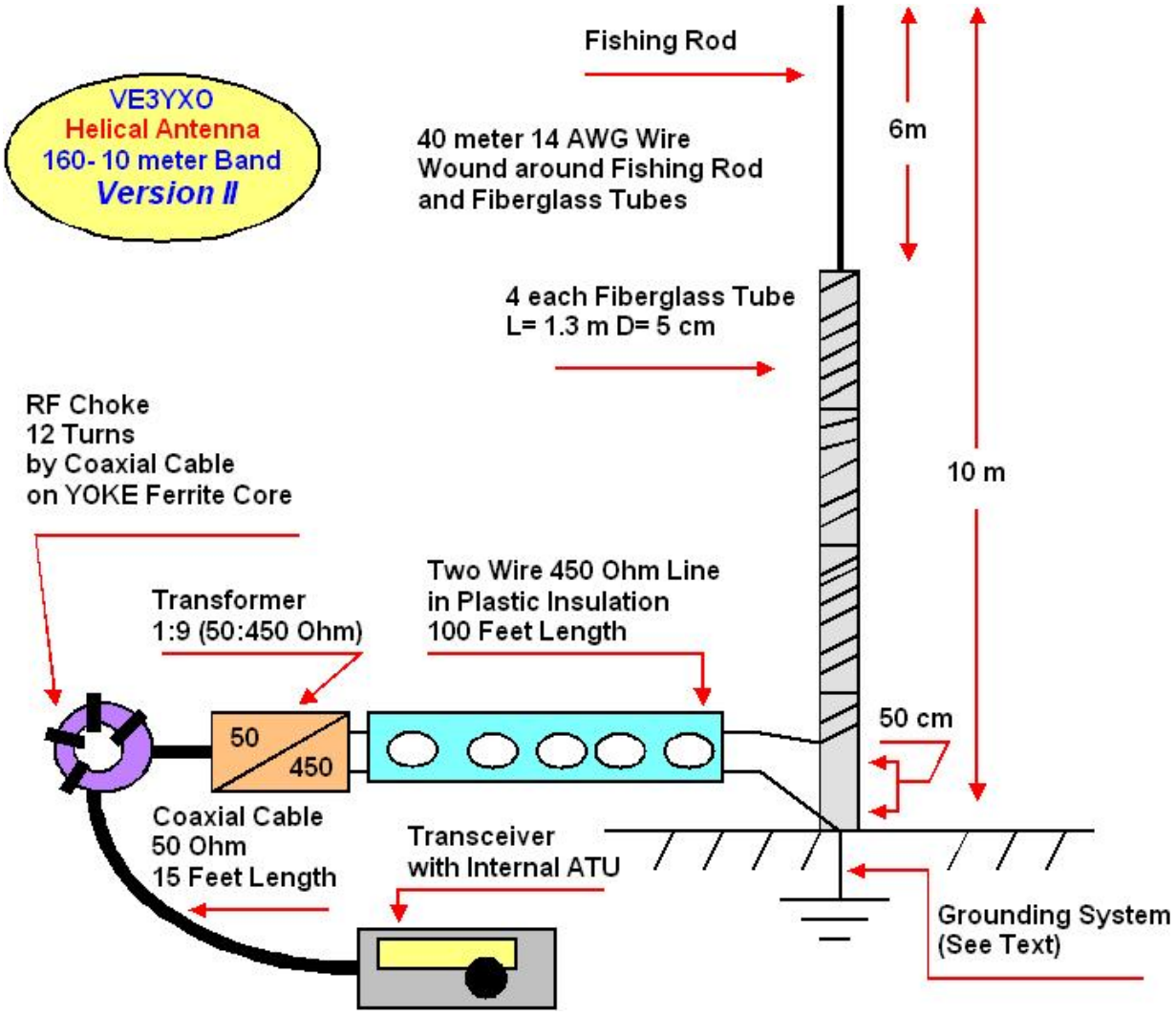

Figure 4
Design of the Second Version of the Helical Antenna

Antenna was tested in the Air. Transceiver with internal ATU may match the antenna on all of the HF bands. However the antenna was unstable for match on the 160 meter. Tuner Palstar AT1500CV (roller inductor) solved the problem. With this ATU the antenna worked stable on the 160 meter with SWR at transceiver's SWR – Meter 1.9:1. I found that the antenna had diagram directivity that differs from the old one. I could hear and work with some new countries with this antenna but some areas that I could operate with the old antenna were disappeared. However on 80 meter the antenna provided good operation with all states of USA, all Europe and European parts of Russia. The antenna worked well on the amateurs bands higher the 80 meter.

73!
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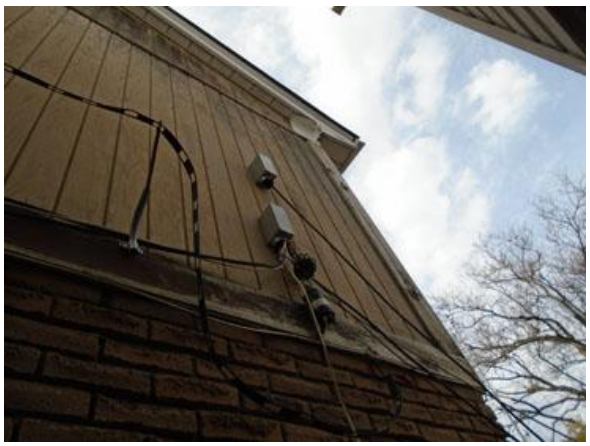

Figure 7
Two Wire Line on the Wall of my House Together with Balun and RF Choke