

Simple Broadband Antenna for the 40- meter Band

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The Simple Broadband Antenna was designed on base of my local environment and taking into account the ease/cheap to do. **Figure 1** shows the antenna. Three points there are need to install the antenna. There is one point at right fence second point at left fence and third point at a window on the second floor of my house. For antenna wire it was used electrical copper wire in diameter 18- AWG in strong black insulation (33-cent/m, Home Depot is supplier).

Antenna is simple to do. A 10- meters length of the wire is fastened by the ends to both fences. Leave 50- 80 cm free wire length at both sides at initial installation.

Figure 2 shows the wires. The length, from one side, should be used for tuning antenna in to the resonance, at second side should connect with feed line. Center of the wire is heightened and attached to the window frame.

Ground of the antenna included a wire going on to the fence down to the earth. Near the earth the wire was connected to an earth wire. The earth wire was made of three wires. One wire was galvanized bare wire in 18 AWG. Two wires (similar to the antenna wire) were attached to the stranded wire by ties. The triple wire had length near 3.5 meter.

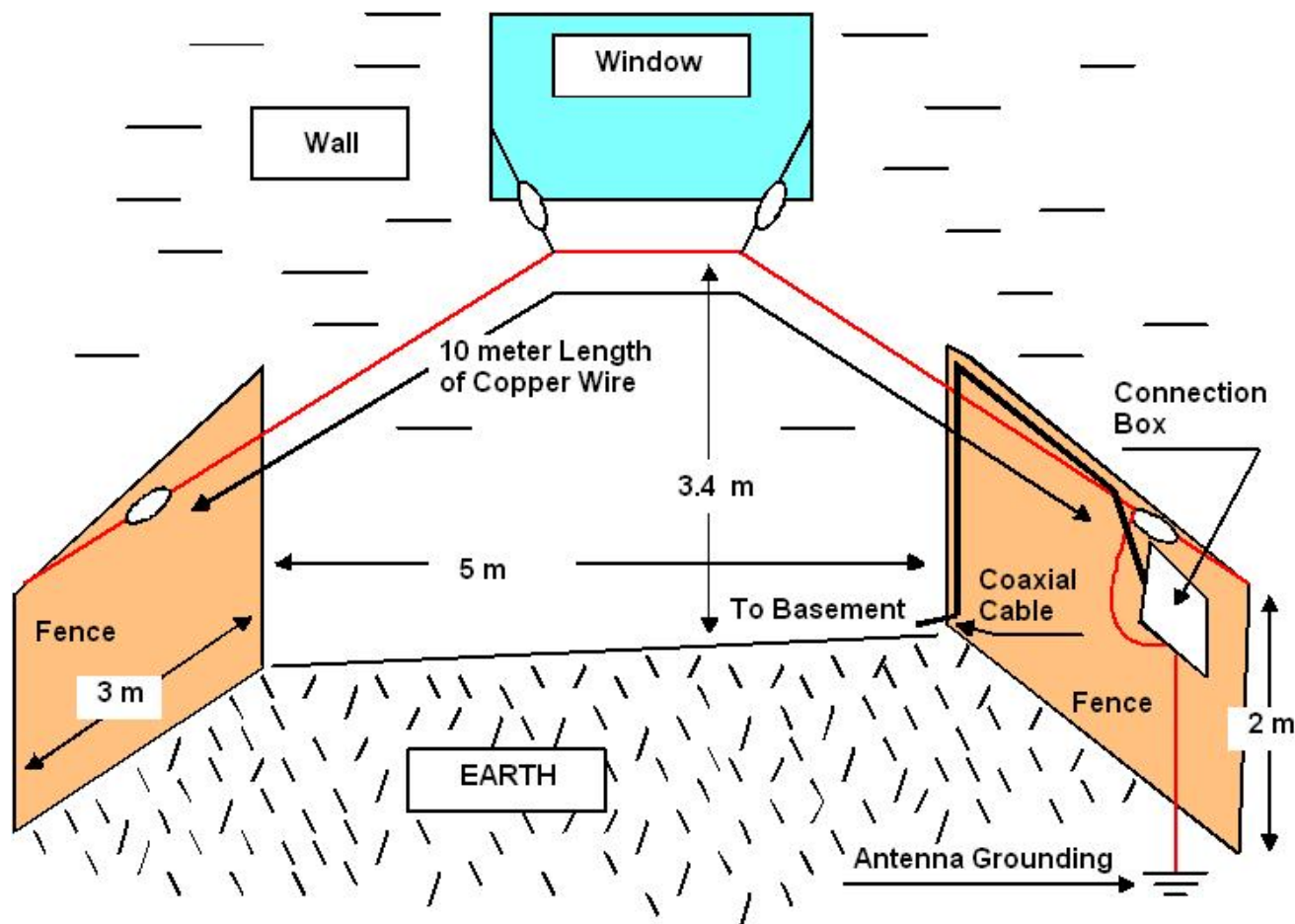


Figure 1 Simple Broadband Antenna for the 40- meter Band

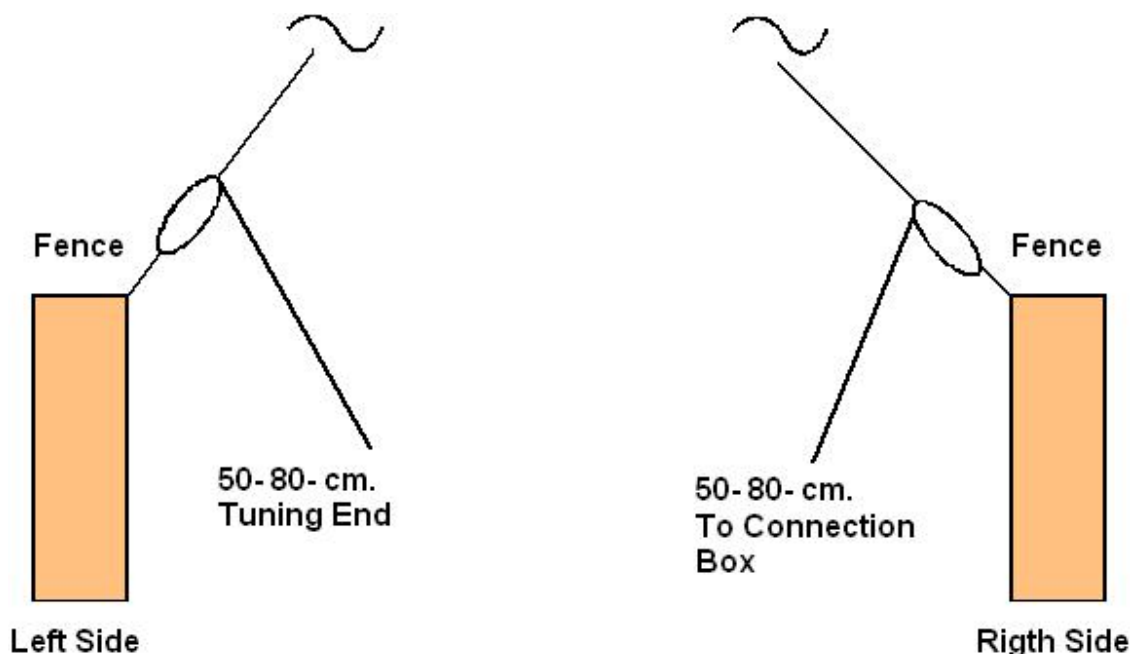


Figure 2 Free wires at initial installation of the antenna

The wire was dug in the earth at depth near 10 centimeters. The wire was connected to the Artificial Earth of the Helical Antenna (Reference 1). The antenna fed by a 50-Ohm coaxial cable. The cable was attached at upper side of the fence then went down to the ground and lead in to the basement through a ventilation hole. Figure 3 shows schematic of the antenna.

Picture 1 shows Feed Point of the Simple Broadband Antenna for the 40- meter Band. Picture 2 shows Center of the Simple Broadband Antenna for the 40- meter Band.

Picture 3 shows Tuning End of the Simple Broadband Antenna for the 40- meter Band. Picture 4 shows Coaxial Cable going along the Fence. Picture 5 shows Coaxial Cable going into my Basement. Take attention, there are three cables are going into the basement. One coaxial cable fed Helical Antenna (Reference 1) second coaxial cable fed the Simple Broadband Antenna for the 40- meter Band and the third coaxial cable used to for my experimental with antennas (in free from experimental time a 144/430- MHz antenna is connected to the cable).



Picture 1 Feed Point of the Simple Broadband Antenna for the 40- meter Band



Picture 2 Center of the Simple Broadband Antenna for the 40- meter Band

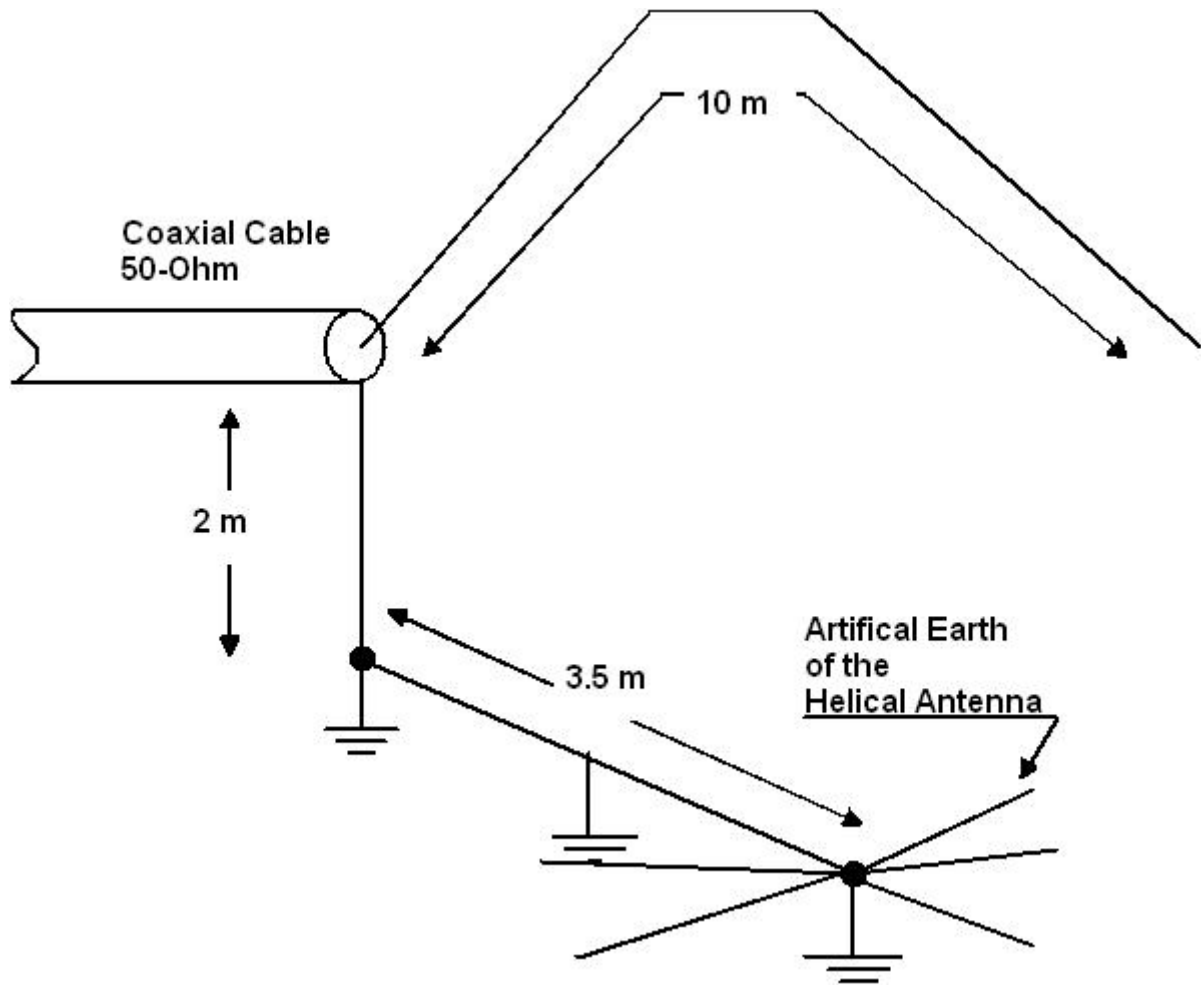
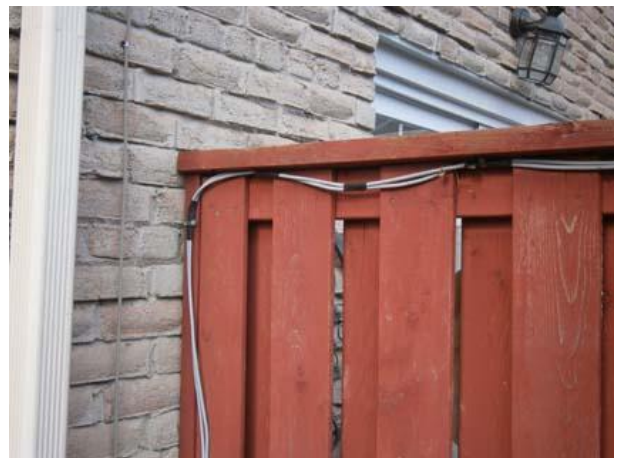


Figure 3 Schematic of the Simple Broadband Antenna for the 40- meter Band



Picture 3 Tuning End of the Simple Broadband Antenna for the 40- meter Band



Picture 4 Coaxial Cable going along the Fence

A connection box was installed at the feed point of the antenna. Figure 4 shows drawing of the box. Box made of the base a plastic food container. An RF socket SO-239 was installed at the box.

Feeding coaxial cable was connected to the socket. Arrestor resistor 4k7/5-Wtt was soldered to the bridge of the socket.

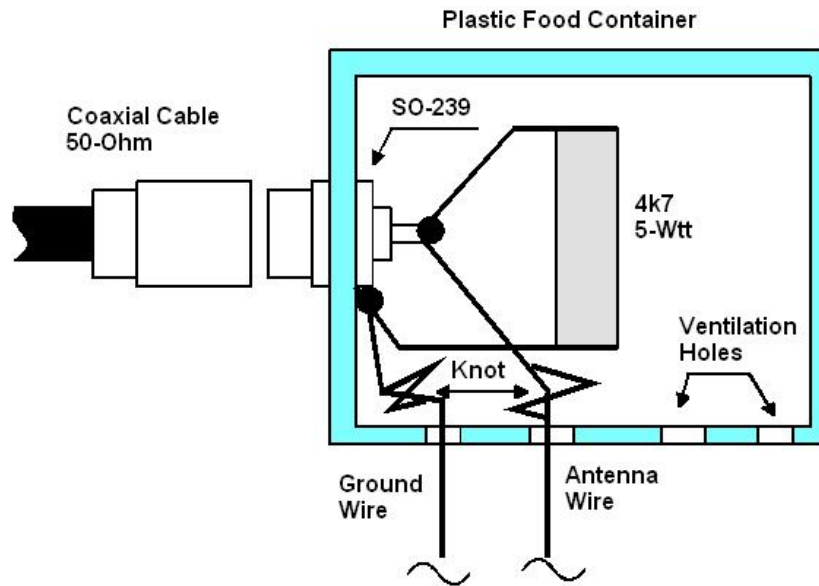


Figure 4 Connection box

The resistor leaks the static from antenna wire to the ground. Antenna and ground wire went into the box from the down side. The wires had knot on it inside the box. The knot did allow the wires go off the box. Two ventilation holes (for removing condensed water) were drilled at the down side of the box.

Connection Box was placed on the fence at South – East side. So the most part of the day the box was shined by the Sun. At the autumn I discovered that tabs at the cover had cracks at the bending. The tags went away from the cover when this one was opened. **Picture 6** shows the cover with cracked retaining tags. Take attention that one retaining tag had cutoff (the cutoff is near antenna socket). It was happened in 1.5 years from the antenna installation. However I had a spare cover to fix the box.



Picture 5 Coaxial Cable going into my Basement



Picture 6 Cover with cracked retaining tags

Tuning the antenna to resonance is a simple matter. Connect an antenna analyzer (I use to a MFJ- 259B) to the antenna terminal (ground of the coaxial cable should be connected with antenna) or (that is better) to end of the coaxial cable going from the antenna. Measure the resonance frequency. The frequency would be lower the 7.0- MHz. Then do shortening of the antenna wire from the left side. I do not recommend cut the wire, just fold it like it is shown at **Figure 5**.

I got antenna impedance 75- 85- Ohm (at zero reactance) at 7.0- 7.350- kHz. The data is practically matched with data obtained from Antenna Simulator EZNEC for MMANA. The antenna should be simulated by this software. In spite of the antenna impedance is not strictly 50- Ohm at the 40- meter Band the antenna could match with my IC- 718 and K-1 without any ATU.

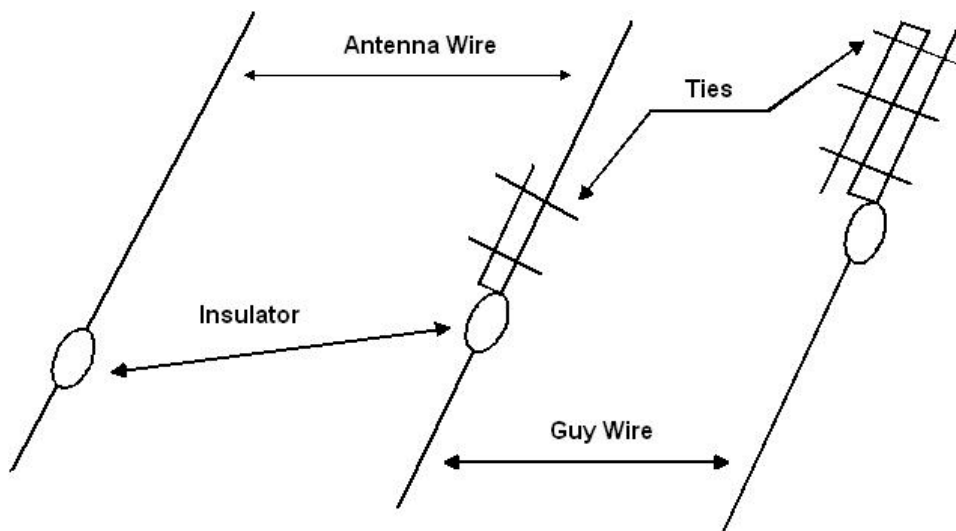


Figure 5 Folding Antenna Wire

At the 30- 10- meter Bands the antenna could match with transceiver with help of MFJ VERSA TUNER II or LDG Z-11 PRO. It is possible to install a simple ATU inside the connection box to get SWR 1.0: 1.0 at the 40- meter Band. However the 30- 10- meter band would be suffered at this case. It is possible to feed the antenna with TV- 75- Ohm coaxial cable. It is possible to buy very cheap such cable (ever intended for underground placement) at the E-Bay.

Antenna impedance and the resonance frequency of the antenna depend on the ground conditions. At wet ground the resonance goes down and input impedance goes down. At the dry (or frosty) ground the resonance goes down and input impedance goes up. So it is useful take control on the antenna at the season changes. However it is possible to adjust antenna length that the season changes do not hindered to the antenna resonance.

The input impedance of the antenna and the resonant frequency depends on the state of the earth. When moist earth resonance frequency of the antenna is reduced, the input impedance of the antenna is reduced. When dry land (or frozen), the resonant frequency of the antenna increases, and also increases its input impedance. This should be considered when setting up the antenna to resonance. It is useful from time to time, for example in rainy or very dry weather to control the resonant frequency of the antenna. This will adjust the antenna so that the Changes in the weather will not affect significantly changes its resonant frequency.



Photo 7 Antenna at Winter Time

Reference

1. http://www.antentop.org/017/va3znw_017.htm

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