Indoor Helical Antenna for the 20 and 17 meters for K1

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So, my K-1 with 40, 30, 20 and 17 meters bands was successfully assembled and tuned. This one requires an antenna to go to the Air. Certainly, an antenna is a simple thing if… if you live in a private house. But I live in a multistorey apartment building (made from concrete) with huge large restrictions on installation of antennas. The result of these restrictions is those, that I can install an antenna only at a window. Good sign is that in mine apartment the windows are big sized- 150 to 210 centimeters.

Helical Antenna at the Window

My experience on the Air from such premises shows that in this case a magnetic loop antenna is the most effective one. My first choice was the antenna installed at the window. I already have bought a hula-hoop (for antenna itself) and a small stool (for the base of the antenna). However, after I have shown to my YL how the antenna would be looked at its installation place a top of the conditioner (buddy, it looks great!), my permission to antenna installation inside room was rejected by my wife. No one of my arguments to advocate the magnetic loop was accepted.

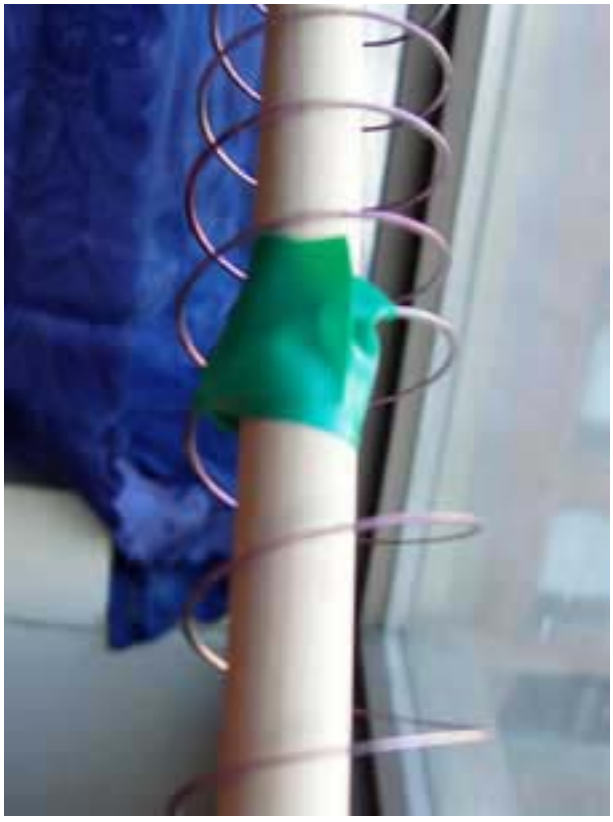
Other type of an antenna, which can effectively work in my limited conditions, is a helical antenna. Some information on manufacturing and adjustment of the antenna you can find in **Reference 1**.

So, I began search for stuff for the antenna. Some days back I have bought to my son a Magic Spring Spiral (DOLLARAMA, $1). This Spiral contains 96 coils, each coil has length of 11 centimeters, total length of the wire is 1056 cm. Such length is perfect for helical antenna for the 20 meters band. A wooden stick for open/close curtains (DOLLARAMA, $1) was very suitable for form of the antenna. The stick has diameter in ½" and length in 170 centimeters.

Magic Spring Spirale

Design of the Helical Antenna: Photo shows the helical at the window. At first three holes were drilled (one at up and two down) in the stick. Copper wire in diameter of 18 AWG and 15 cm in length was attached to the stick through the holes. Helical antenna was hung up with the help of the wire to an eave. Down part of the antenna was fastened by the wire to a hook. Spiral wire was gone through another hole. Antenna ground was connected to aluminum window frame. My window frame was connected (it was prove by measurement) to the main "ground" (green wire in the main).

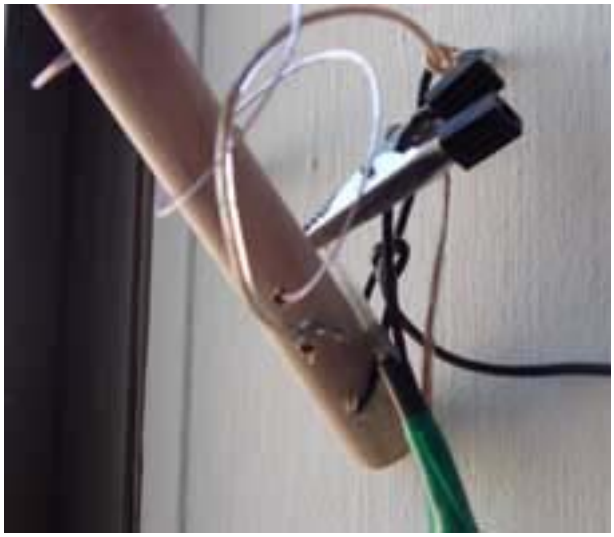
Antenna Adjustment at 20 meters Band: Above all, stay your K-1 to 2W. Antenna (spiral at first it is not spreading by the stick) is connected to K1 by a small (50- 70 cm) length of a coax. A small bulb is connected in serial with the spiral. I have used a bulb from a toy gun feeding from 3V. Turn on K1 to receiving mode to the 20 meters. With help of a dielectric stick (I used a length of a plastic water pipe) in 1 meter length lift upwards the spiral. Find off the spiral length when you have the best reception. Do a hole in the stick at the length and pass through the hole the end of the spiral. After that once again with the help of the dielectric stick, approximately on the length of 2/3 (from spiral length) from the antenna bottom, lift or lower coils of the spiral by the best reception. Coils are fastened by Scotch at the proper place. After that you may turn on K1 to transmitting mode (for a short time) and to make final adjustment of the spiral (by max glow of the bulb) at the length of 1/3 (from spiral length) from the bottom. Coils are fastened by Scotch at the proper place.



Fastened coils

Antenna Adjustment at 17 meters Band: Prepare a 60 cm length insulated wire (18 AWG) with crocodile clips at the both ends. Connect to K1 the antenna and turn on it to RX. Short different parts of the spiral by the best reception.

Antenna hung up to eave



Fastened the Spiral to the Form

Turn on K1 in TX and check the antenna by glow of the bulb. Put marks by marker at the shortened coils. You can turn on the wire to the marked coils when work at 17 meters band.

Figure 1 shows a final design of the helical antenna. Short the bulb by a crocodile clip when you want work to transmit or you lose RF power in the glow bulb.

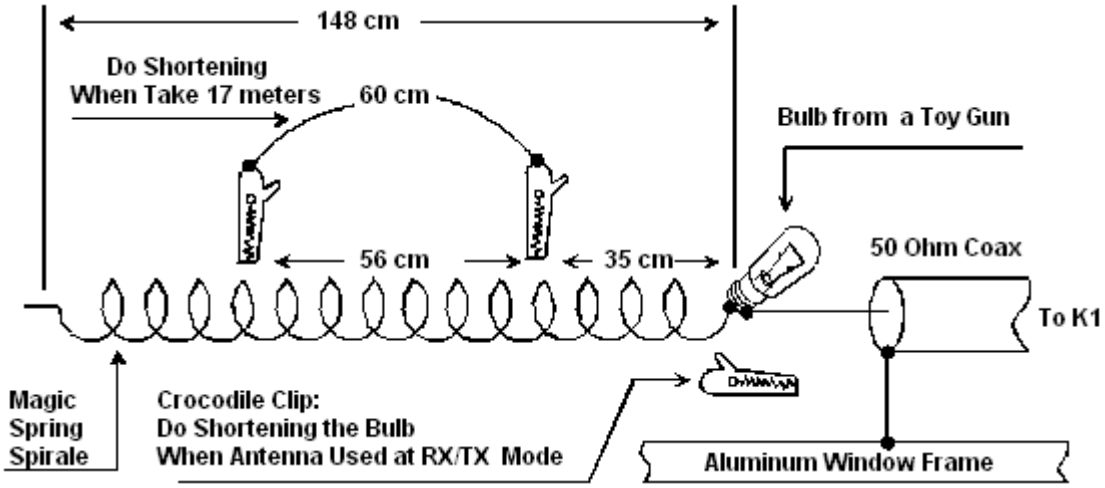
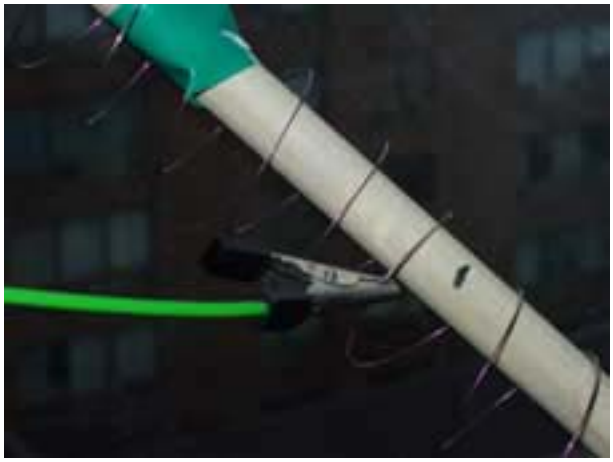


Figure 1 Helical Antenna



Bridge for The 17 meters

Practical Measurement Parameters of the Helical Antenna: I used a home made RF bridge (see **Reference 2**) for metering of the helical. My Helical has input impedance 35 Ohms at the 20 meters and 46 Ohms at the 17 meters.

Theoretical parameters of the Helical: The theoretical parameters of the helical were simulated with the Helical3 (a special program for helical antennas) designed by R.J. Edwards, G4FGQ. On the basis of these calculation I ***could assume*** that the efficiency of my helical is near 15- 12% (in comparison with quarter wave vertical antenna with good grounding). I.e. my helical lose up to 9 decibels or up to 1,5 balls on scale S in comparison with the quarter wave vertical.

Helical Antenna for 17 meters

References:

1. Igor Grigorov. Antennas. Practice of Radioamateur. – Moscow, RadioSoft (in printing)
2. Igor Grigorov. Antennas. Tuning and Adjustment. – Moscow, RadioSoft, 2002 (In Russian)