Directional Helical Antennas

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The antenna intended for the 20-meter Band. **Figure 1** shows the design of the antenna. There are two Voltage Fed Helical Dipoles that fed with phase shift in 90 degree.

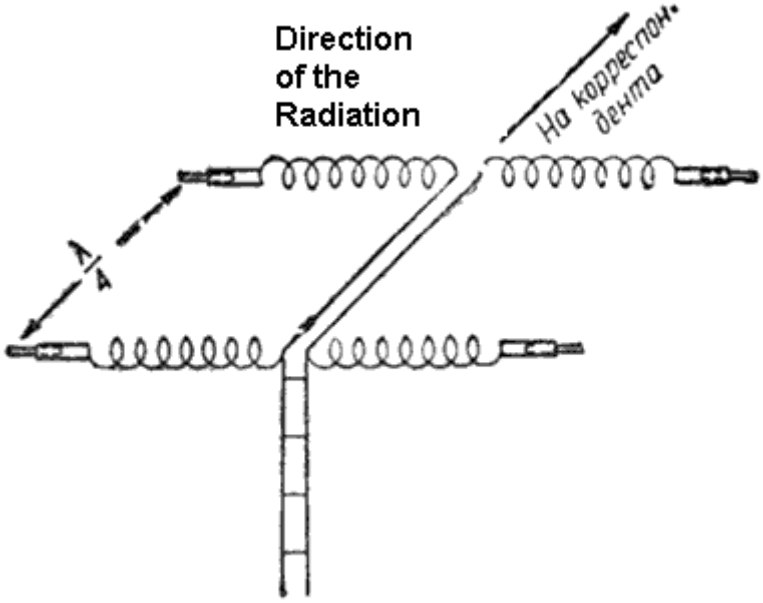

Figure 1 Directional Dipole Helical Antenna

The distance between the Helical Dipoles is Lambda/4. A Helical Dipole made of two plastic tubes in 3-cm diameter (it is possible to use wood rectangular 3x3 – cm) and 110-cm in length. Two spirals in 77 turns of wire cord in 3-mm (9-AWG) diameter are coiled above the each tube. Gap between near coils is 7.5-mm. Ends of the dipoles (made from tubes) are plugged by wood. In the plug a copper tube by length in 45-cm and 8-mm OD is inserted. Antenna wires are soldered to the copper tube near the plug. Bare wire (or tube) with OD that can fit inside the copper tube is inserted into. Antenna is tuned into resonant by moving the bare wire. **Figure 2** shows the design of the tube ending.

The Helical Dipoles are fastened to a traverse made from a strong square wood stick. The stick is fastened to an antenna mast. Open Wire Line made of copper cord wire (3- mm (9-AWG) OD), the distance between wires is 6-cm. The line is sitting on insulators under the strong square stick. Length of the line is 5.2- m. Design of the Directional Dipole Helical Antenna is shown on **Figure 3**.

Front Cover of Radio #7 1958

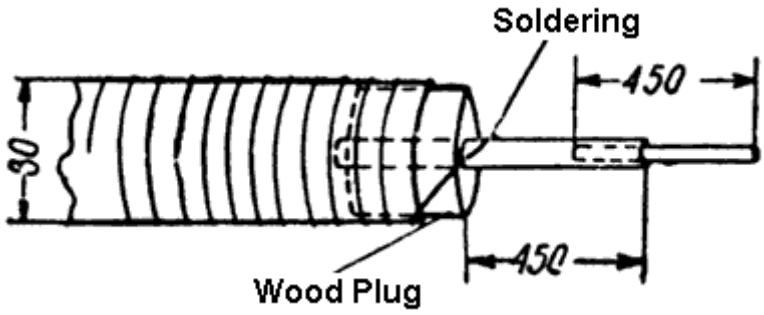

Figure 2 Ending of the Helical Dipole

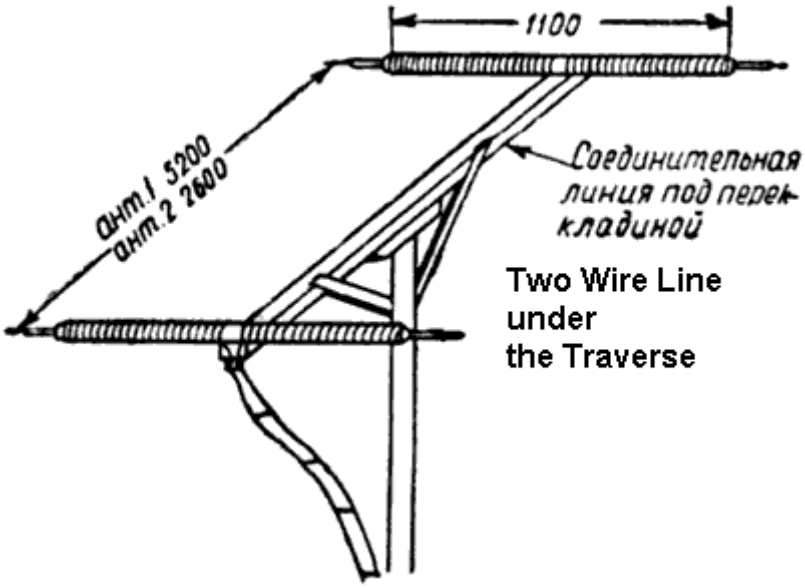

Figure 3 Design of the Directional Dipole Helical Antenna

Directional Dipole Helical Antenna was tested compare with WINDOM for the 20- meters Windom had overall length 10-m. The WINDOM had maxima radiation to the South.

At 1-km to the South from the tested antennas was installed a receiver with S-Meter. **Table 1** shows the Data obtained from the test.

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Table 1 Data for testing of the Helical Antenna

#	Direction of t he maxima Radiation Of the Helical Antenna	S- Meter
1	North	0,8
2	East	2,0
3	South	2,4
4	West	2,0

Column “S- Meter” shows normalized level – Helical Antenna/WINDOM. For example, digit “2” shows that level from the Helical Antenna is in 2 times more (according to the S- meter of the receiver) compare the level from the WINDOM

It was tested Directional Dipole Helical Antenna with reduced sizes. Length between the Helical Dipoles was lambda/8, or 2.6-m for the 20- Meters Band. However there was used Four –Wire Open Line between the Dipoles. **Figure 4** shows the design of the Small Directional Dipole Helical Antenna.

Figure 5 shows the design of the Four- Wire Line. The Four- Wire Line was placed onto insulators under the square wood stick. The Small Directional Dipole Helical The small sized Antenna at the test showed that this one worked similar to the helical antenna shown on the **Figure 1**.

However, the Small Directional Dipole Helical Antenna was more complicated in the tuning compare to Antenna from the **Figure 1**. The antennas were fed by 500- Ohm two- wire line with length 15.6-m (3/4- Lambda).

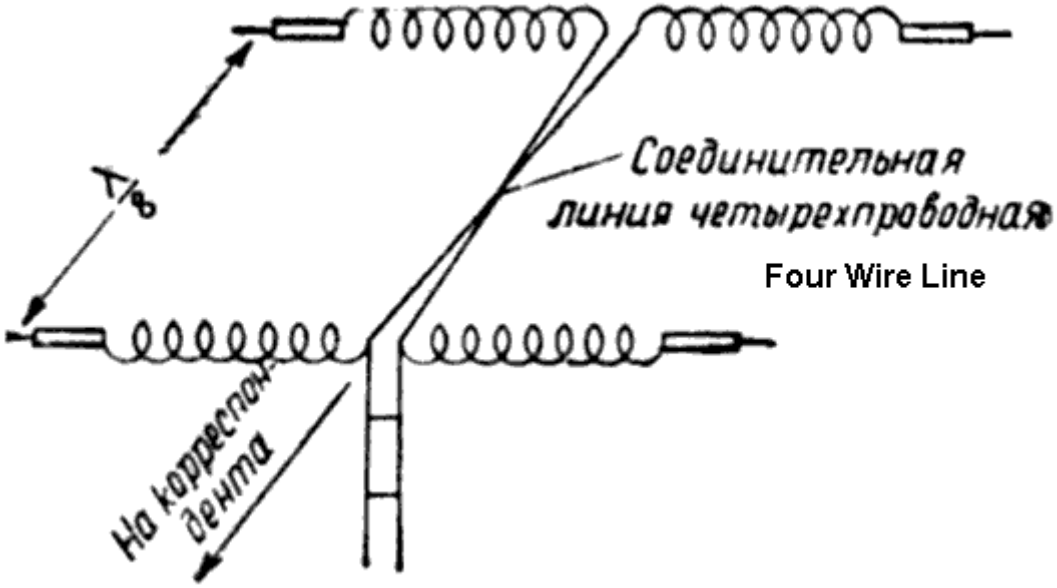

Figure 4 Design of the Small Directional Dipole Helical Antenna

The antennas were fed by 500- Ohm two- wire line with length 15.6-m (3/4- Lambda).

Tuning of the Directional Dipole Helical Antenna (for both antennas- **Figure 1** and **Figure 4**):

1. Two wire feeder line (with length 15.6-m) disconnected from the antenna and turn on to TX (CAREFUL: To a Tube TX! May be used semiconductor PA with ATU). (**Figure 6A**)
2. TX is tuned to the middle of the 20- meter Band and its PA is tuned to the resonant with the line.
3. First dipole is connected to the feeder. Tune the dipole to the resonant (using only the tuning strand wire at the dipole, do not change tuning at the PA). (**Figure 6B**)

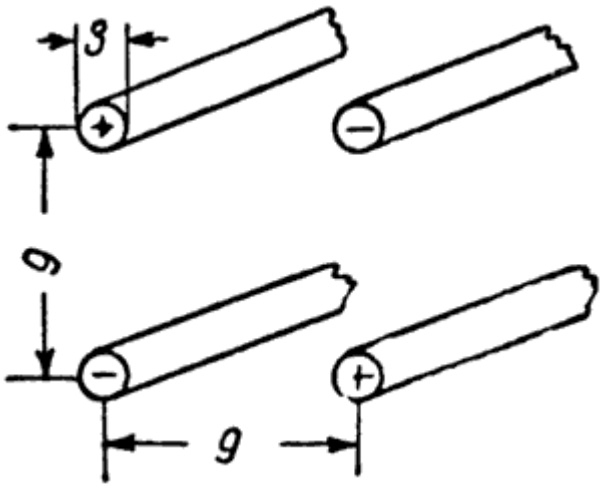

Figure 5 Design of the Four- Wire Line

4. If the dipole is loaded too much the feeder, change distance between wires of the Two-Wire Line.
5. Second dipole with the phase open wire line connected to the feeder. (First dipole is disconnected!) Tune the dipole to the resonant (using the tuning strand wire). (**Figure 6C**)
6. If the dipole is loaded too much the feeder, change distance between wires of the phase line.
7. Connect the antenna to the feeder. (Both dipoles, as shown on the **Figure 1** and **Figure 4**) (**Figure 6D**) Antenna should not detune the feeder. If it is, repeat tuning process from paragraph 1.

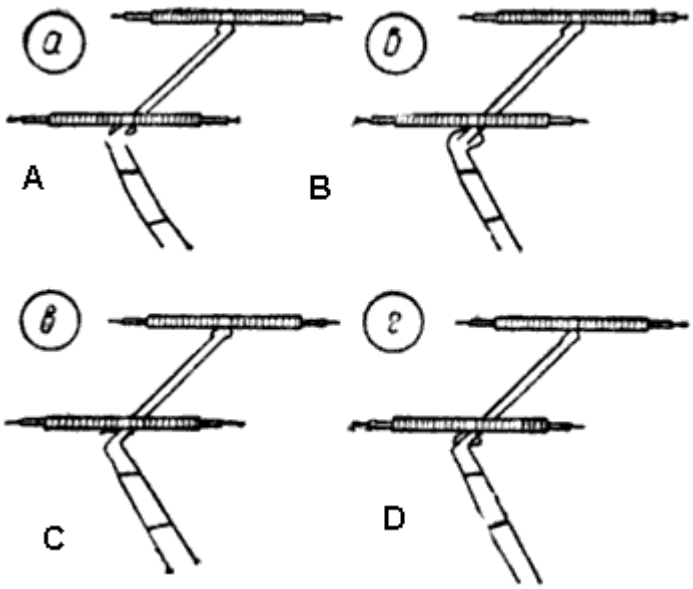

Figure 6 Steps for Tuning Directional Dipole Helical Antenna