Directional Antenna UA6AGW V.7.00

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The antenna was born after numerous experiments that were made in past three years. Russian Patent # 125777 was obtained for the antenna. ***Prototype*** of the antenna is described in ***Reference 1, 2***. Some experimenters on the born of the antenna are described in ***Reference 3***. **Figure 1** shows the Directional Antenna. **Figure 1** shows all antenna dimension and placement of the antenna parts.

The antenna has some parts that are similar to the ***prototype***. Loop part of the antenna made of a coaxial cable and this one is placed vertically. There are two phase- shift capacitors- C1 and C2. However horizontal wires have some modifications. Two long wires are connected to one part of the loop. One of the long wires (that is placed in the direction of the maxima radiation) form the main lobe. Other one long wire suppresses back radiation. Two short wires provide symmetrical of the antenna.

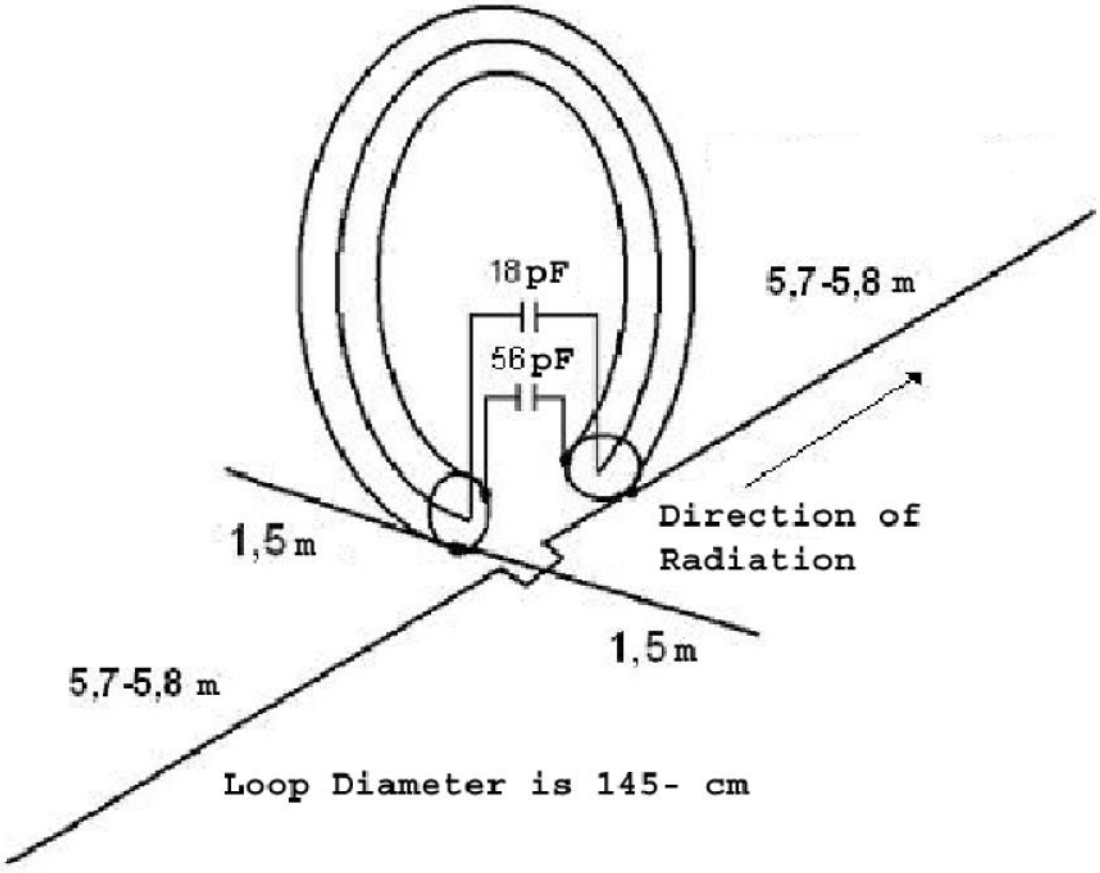
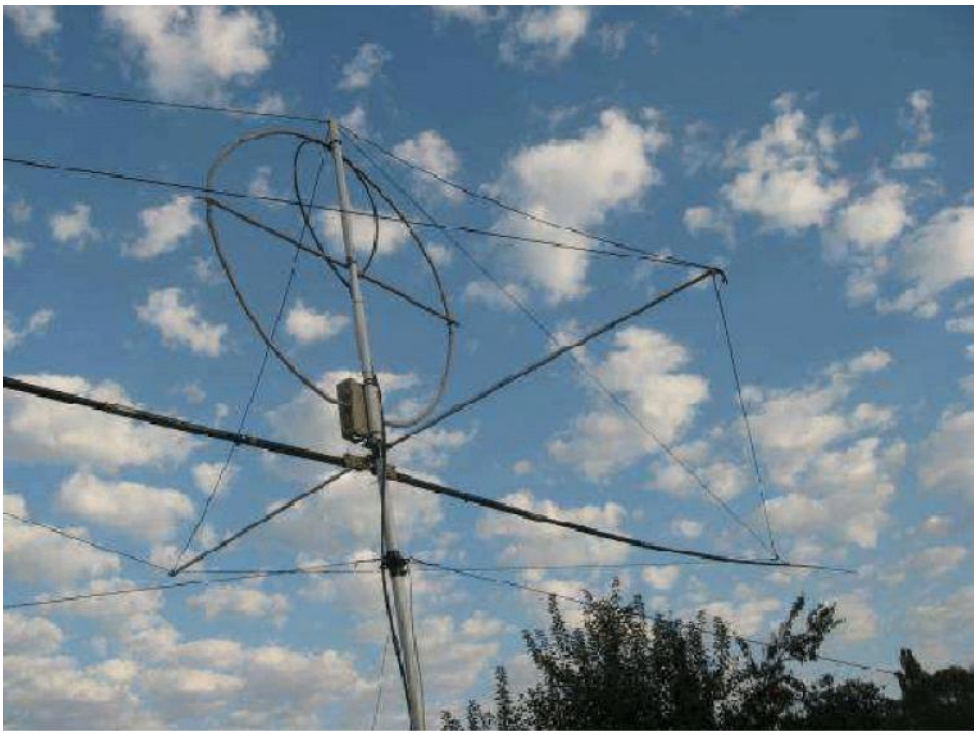


Figure 1 Directional Antenna UA6AGW V. 7.00

Design: Loop is made from so- called half- inch coaxial cable with crimped copper braid. The copper braid is covered by two layers of protection lacquer then covered by electrical protection plastic tube. It is made for weather – proof sustain. **Picture 1** shows the antenna. Usual plastic fishing poles are used for the form for long wires. Inside the fishing pole a multi-cored copper wire is going through. Thin ends of the fishing pole are changed by light aluminum wire in diameter 8- mm. The multi- cored wire is connected to the aluminum wire.

Short wires are placed along plastic tube in 14- mm diameter. The tube is not only support for the short wires. Rope guys going from the ends of the tube to ends of the fishing poles provided rigid of the antenna structure. **Picture 2** shows mounting of the plastic tube and wire montage of the horizontal wires.



Picture 1 Directional Antenna UA6AGW V. 7.00

Mast of the antenna has height in 8- meters. Two water tubes made the mast. First tube that is sitting on the ground is a metal tube in 48- mm OD. It is 5- meter long. The second one, that holds the antenna structure, is plastic tube in 42- mm OD. The plastic tube is 3- meter long. The plastic tube is inserted inside the metal tube that allows rotate the antenna. A simple home- made adaptor (made of from two pieces of metal water tubes in diameter 48- and 55- mm) is used for connection the mast's tubes. **Picture 3** shows jointing of the plastic and etal tube.

The antenna fed by a coupling loop. For simplicity of the design the coupling loop made from the feeding coaxial cable. **Figure 2** shows the coupling loop before it is circulated to loop. Length of the coaxial cable to be used for the coupling loop is 200- mm. Plastic from the length of the coaxial cable is removed on to 10- mm in the center and from two ends. Then braid of the coaxial cable is removed at the center. Inner conductor is soldered to the braid at the far (right) end of the length.

Направленная антенна UA6AGW v. 7.00

Александр Грачёв UA6AGW

Heading of the Article

Picture 2 Mounting of the Plastic Tube and Wire Montage of the Horizontal Wires

Picture 3 Jointing Mast's Tubes

Then the cable is turned to loop. Far end of the length is soldered to the first (left) side of the prepared cable. (In Russia the method of the making the coupling loop sometimes is named -method of the DF9IV-)

The coupling loop is fastened to the upper part of the antenna's loop with help of a Scotch and ties. Below there are several simple rules how to install the coupling loop.

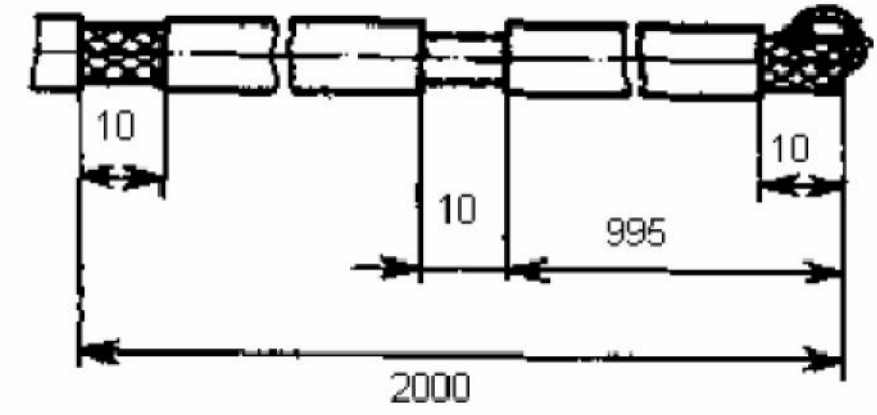


Figure 2 Preparation of the Coupling Loop for the Directional Antenna UA6AGW V. 7.00

At first, find on the antenna loop a point that is equidistance from left and right side of the C2. It is ***the point of symmetry*** of the antenna.

At second, find the point of symmetry of the coupling loop. The coupling loop is mounted in the top of the antenna loop. Point of symmetry of the coupling loop should concur with the point of symmetry of the antenna. **Picture 4** shows the coupling loop on the antenna.

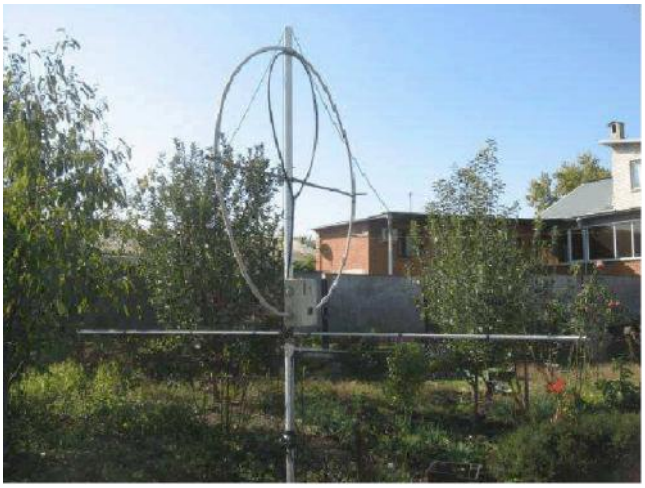
At third, to fasten with help of the cable ties the coupling loop to the antenna loop at the distance of 6-8- cm from the point of symmetry of the antenna loop.

Antenna was tuned (when it was placed on mast) in height 5- meters (it is from the ground to the top of the mast). Horizontal wires and matching box with capacitors was at 3.5- meters above the ground. A 2- meter ladder was used by me for tuning the antenna. Antenna works fine ever at the small height. F/B ratio was near 20-dB in this case. Antenna was tuned to 7080- kHz in mind that the resonance frequency move up (to 7100- kHz) at the height 8- meter. Antenna is simple to tune to the resonance. It may be tuned with help C2 (56- pF at **Figure 1**) to maximum RF- voltage at the long horizontal wire or with help receiver to maximum receiving signal.

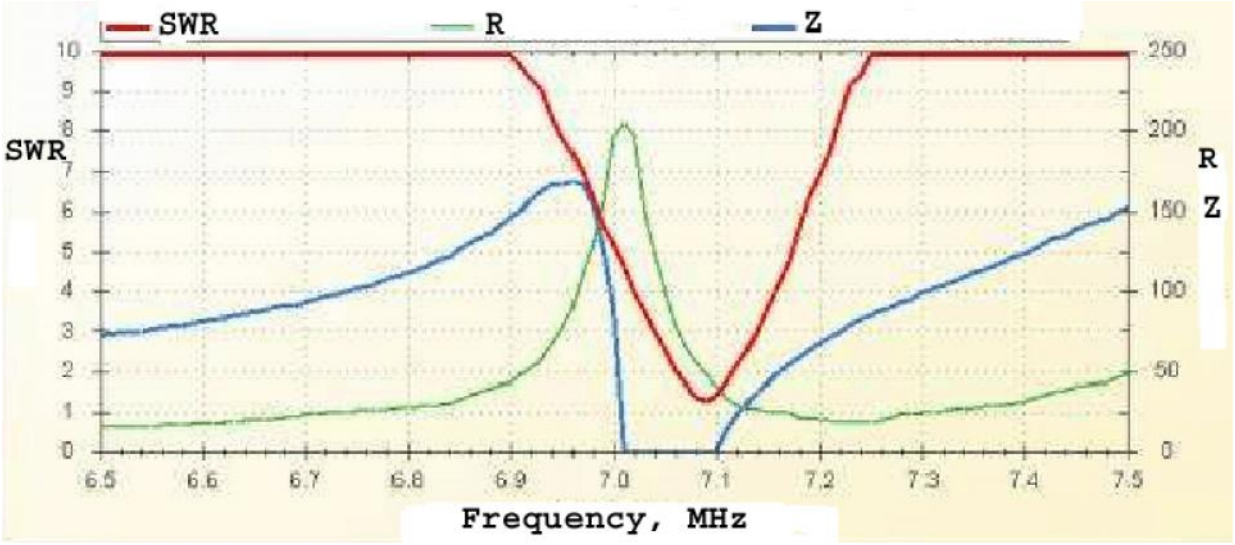
However I used fixed capacitors at my antenna. So I did tuning of the antenna by changing length of the horizontal wires.

Preliminary Summary: All good features of the prototype antennas (**References 1**, **2**) are not lost at the Antenna UA6AGW V. 7.00. The features are: small dimension, easy to do, interference immunity, ability to operate at small height. Antenna has input impedance 50-Ohm. Antenna bandwidth (at SWR 2.0:1.0, measured by an antenna analyzer) is near 150- kHz. **Picture 5** shows scan from the antenna analyzer.

Within ten month Antenna UA6AGW V. 7.00 was tested in the Air. The antenna was compared with Antenna UA6AGW V.40.02 (**Reference 4**). **Picture 6** shows screen shot a SDR –Transceiver. Left picture shows the transceiver with antenna UA6AGW V.40.02 right picture show screen shot with Antenna UA6AGW V. 7.00.



Picture 4 Coupling loop on the Directional Antenna UA6AGW V. 7.00



Picture 5 Data for the Antenna UA6AGW V. 7.00

Antennas were switched through small period of time. Antenna UA6AGW V. 7.00 has the same strength of the reception in main lobe (compare to Antenna UA6AGW V.40.02) however stations going not from main lobe are weak in reception.

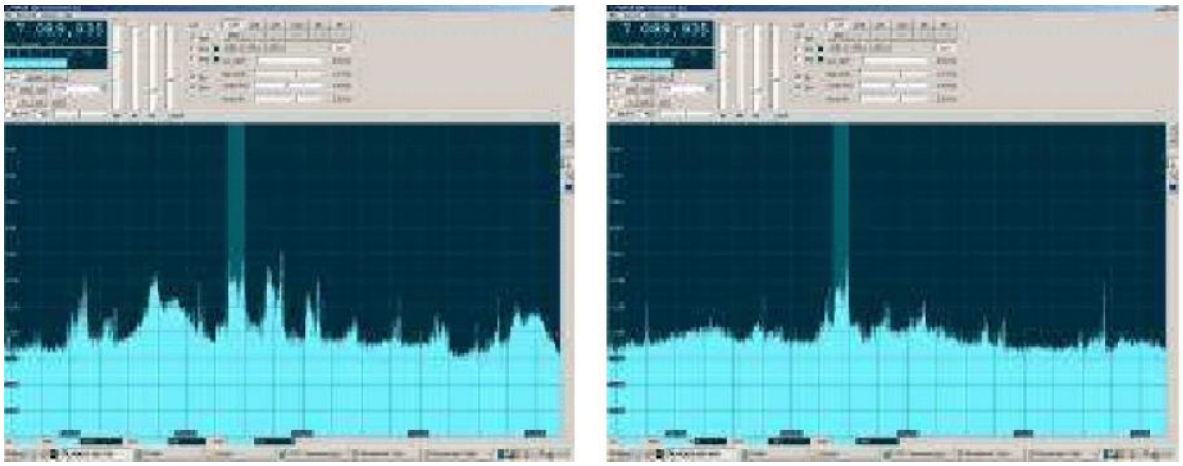
Figure 3 shows DD of the Antenna UA6AGW V. 7.00 in horizontal plane. The DD was obtained by measuring of the signal of control transmitter located at distance 1- km from the antenna.

Width of the DD in horizontal plane (at level 3- dB) is near 60 degree. Level F/B is not less 20- dB. Level F/S is near 15 dB. At day time the antenna suppresses local stations (in radius 300- 350- km) on to 20- 30- dB. So the main lobe in vertical plane should have angle in 35- 40 degree.

Antenna gain was estimated according to diagram and formulas from page 61 at **Reference 5**. Antenna gain for the antenna should be near 10- dB. **Figure 4** shows the diagram.

Summary:

1. Antenna UA6AGW V. 7.00 differs little from the prototype but turns to directional antenna.
2. Having small dimension the antenna compare to them has good F/B ratio in 20-dB.
3. F/B and F/S ratio for the antenna is constant at working range.
4. There is a real possibility to design small directional antenna for the 80- meter Band.
5. Antenna keeps all merits of the prototype.
6. Antenna is simple to design and easy to tune



Picture 6 Screen Shot from SDR Transceiver with Compared Antennas

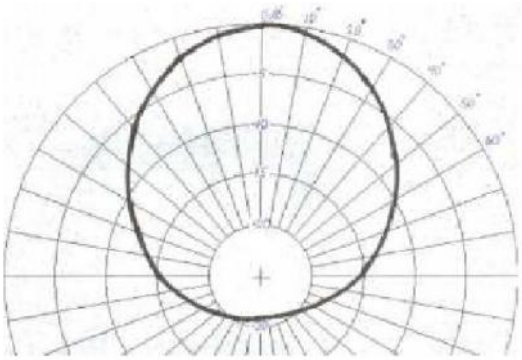


Figure 3 DD of the Antenna UA6AGW V. 7.00 in Horizontal Plane

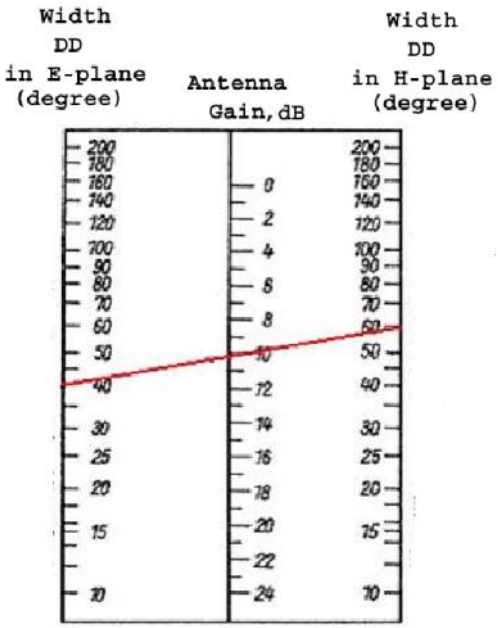


Figure 4 Diagram to Estimate Antenna Gain for the Antenna UA6AGW V. 7.00

References:

1. Antenna UA6AGW V.40, Aleksandr Grachev, Radio # 2, 2011, pp.: 59- 61
2. Antenna UA6AGW V. 80, Aleksandr Grachev, Radio 8, 2011, pp.: 60- 61.
3. Experimenters with Magnetic Loop Antennas, Aleksandr Grachev, CQ-QRP # 27, 2009, pp.: 9- 11.
4. http://www.antentop.org/017/ua6agw_md_017.htm
5. Antennas, Karl Rothammel, Nash Gorod, Minsk- 2001