

Spreading Antennas of Stationary Radio Communication Base

Spreading and Underground Antennas are widely used at Stationary Radio Communication Bases of Russian military. Some of such old antennas were described at Reference 1.

The article is described another Russian military Spreading Antennas- BAZA- 500D and BAZA- 1500D. The antennas are used until recent days. Article is published with unimportant cutting.

73! I.G.

References: I. Grigorov. Antenny. Gorodskie Konstrukcii. M.: RadioSoft, 2003. ISBN: 5-93037- 109-1. In Russian

Practice shows that after both or nature disasters (hurricane, snowstorm, etc.) either just a planned turn off of stationary antennas (repair work or preventive inspection) it is possible very fast restore the radio communication using Spreading Antennas (SA). The antennas can provide communication coverage near and far distances.

Here it is necessary to note here, that design for SA used for ionosphere radio communication is defined by the necessary frequencies band and distance. The longer is the distance the lower should be antenna lobe. For close distances (up to 500-600 km) use NVI (Near Vertical Incident) which is radiated at 65- 90°. Interesting, that the antennas may have low G (gain).

Antennas radiated at 20- 65° are suitable for middle distances up to 2000 km. Far distances (more the 2000 km) require antennas radiated at 5- 20°. However, the more is distance the more gain should be antenna have to compensate losses at propagation. Receiving SA should have good directivity and gain (although the requirements for gain are not so tie as to transmitting SA).

Practice shows that SA intended for ionosphere communication should be made broadband (low directivity at 1,5- 12 MHz (**i.e. NVI, I. G.**), high directivity at 3- 30 MHz) and the SA should have good match with feeder and good efficiency (travelling-wave factor must be lower the 0.3).



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Such SA can provide communication at day and night on any period solar activity (high and low).

Russian SA BAZA- 500D, BAZA 1500D, BAZA – MD (several phasing BAZA 1500D) meet the above writing requirements. The SA has been working for years at Soviet Radio Bases and these ones are very reliable in operation. These SA are described below. Spreading Antenna BAZA 500D is a low directivity one. It is NVI antenna for 2- 10 MHz. The antenna described at Voennyj Vestnik # 9, 1993 (Russian military magazine). Design of the SA is shown at **Figure 1**.

BAZA – 500D: SA implemented from four in pairs reciprocally orthogonal flat shunt radiators (so called Square Radiated Vibrator (SRV) **item 1**). Each SRV has sides equal to 3 meters. SRV made from metal tape having 1 mm thickness and 20 mm wide. SRV connected each other by shunt **item 2**.

One pair parallel vibrators of the module is fed at points a- a by lengths of a 75- Ohm coaxial **item 3**, the lengths connected to main feeder **item 7** (hts eats in points and - and " with the help of distributive pieces 3 кабеля РК- 75, which incorporate with фидером 7 (75- Ohm coaxial) through a matching length of 50- Ohm coaxial, **item 5**. Other pair SRV is feed at point b- b with help **items 4, 6, 8** (similar to 3, 5, 7).

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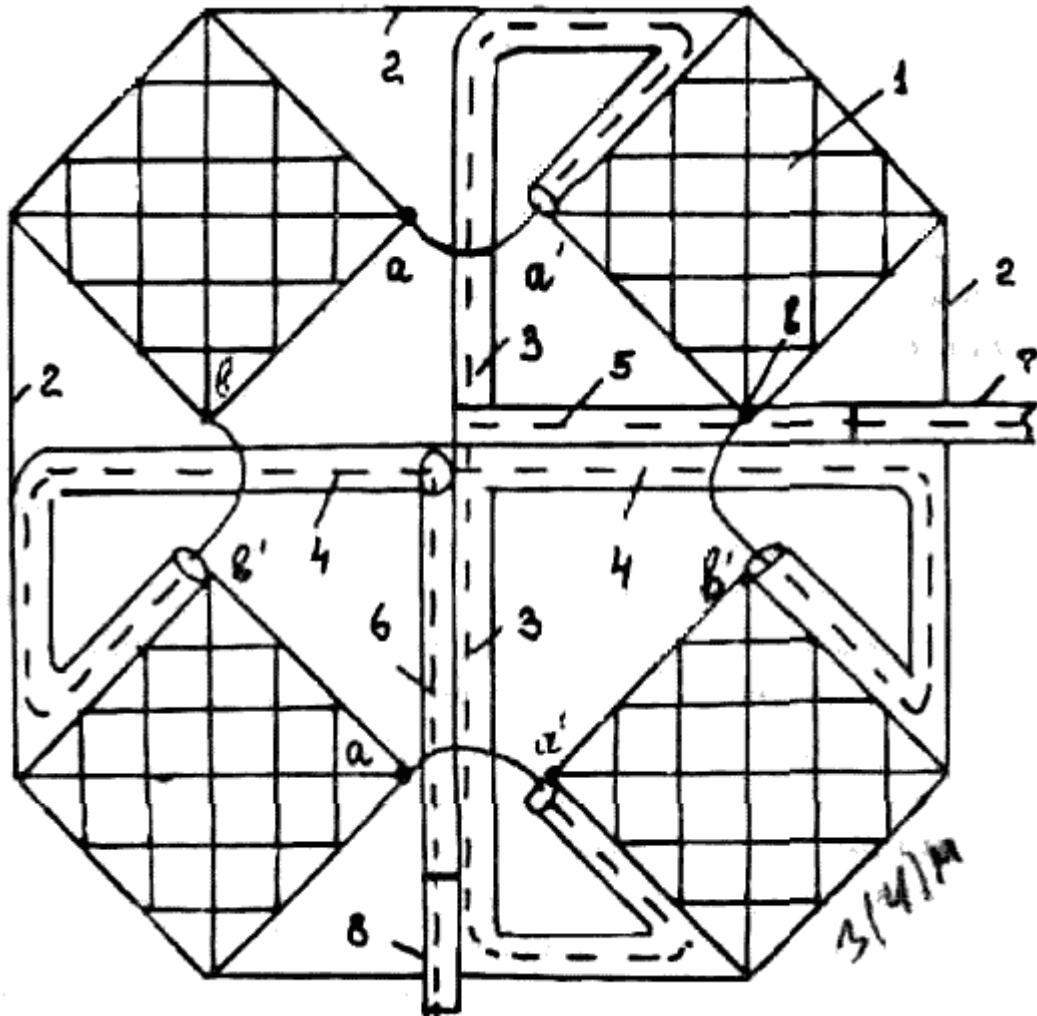


Рис. 1. Антенна «База-500Д» (несимметричный вариант).

Figure 1 Spreading Antenna BAZA – 500D

Length for items 4, 6, 8 is 8 meter. It takes no more the 5 minutes to install the BAZA – 500D. Isolation between points a- a and b- b is near 20 dB. So it is possible point a- a use for receiving and b- b use for transmitting equipment (or visa versa). Gain of the SA is 0.05 travelling-wave factor lower the 0.4. Antenna can be used both as for NVI as well for far communication up to 1000 km.

BAZA 1500D: The SA consists of for antennas BAZA – 500D. The SA works at on 2.5- 15 MHz at communication to a middle distance. **Figure 2** shows the design of BAZA 1500D. Coaxial cable is shown as a line.

For simultaneously communication in two opposite sectors BAZA 1500D has two independent feeders (*item 7 and 8*). Gain of the SA is 0.2 travelling- wave factor lower the 0.4.



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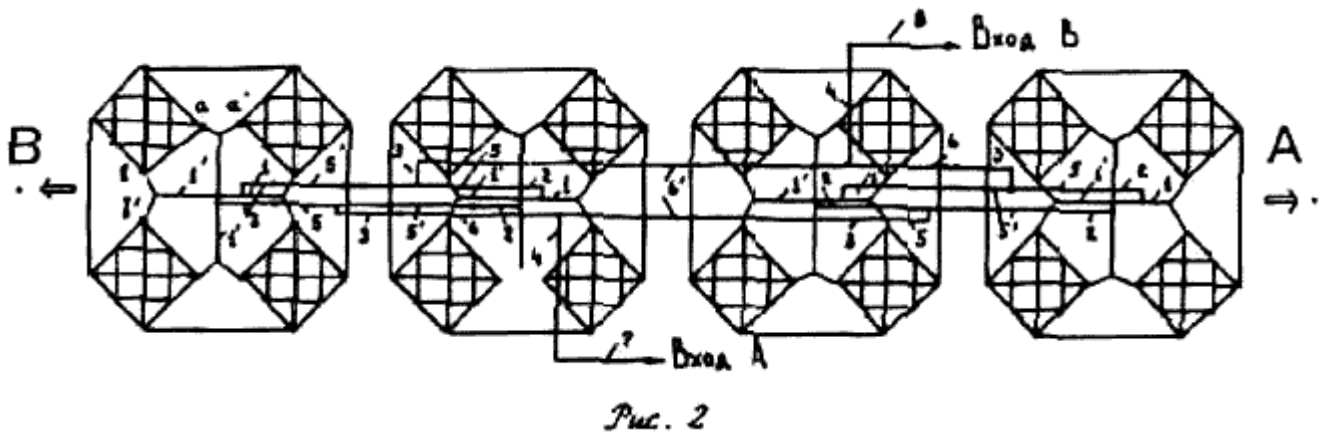


Figure 2 Spreading Antenna BAZA – 1500D

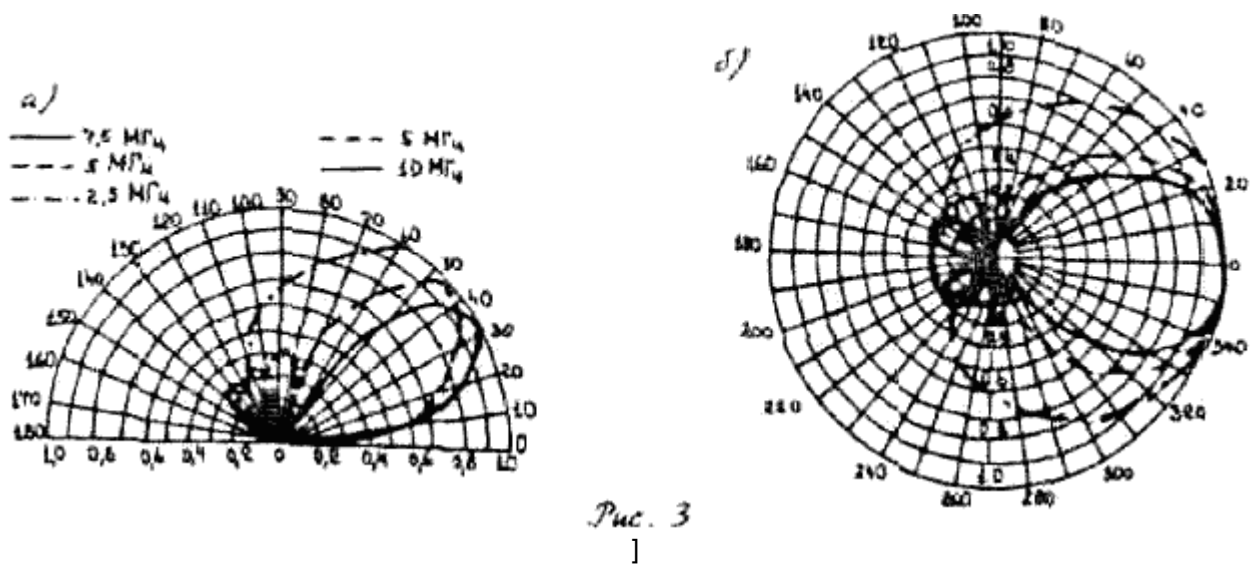


Figure 3 Diagram directivity for BAZA 1500D

SA is flat phasing array consisting of 2 x 4 flat radiators when it works in the side 'A.' Vertical polarized waves are radiated in the side. SA is lineal array when it works in the side 'B.' Horizon polarized waves are radiated in the side.

Diagram directivity for BAZA 1500D is shown in Fig. 3. Antenna has maximum of radiation at 25 – 60 that needs for communication at a middle distance. It takes 25 minutes to install antenna BAZA 1500D.

So, BAZA 1500D can provide communication in two different sides.

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