

Vertical ZL- Beam Antenna for 430- MHz

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I would like to make a simple directional antenna. After I had observed lots variants I stopped at ZL- beam with two elements with active feeding. The antenna looked very attractive for me. This one at its small sizes (only $\lambda/8 \dots \lambda/10$ in length) was practically the same parameters as 3- element YAGI.

Figure 1 shows a simple design of the ZL- beam. Points X-X is the feeding terminal of the antenna. ZL- beam consists of two dipoles (simple or folded) that connected together by crossed wires. Depending on the length of the wires the dipoles fed by some phase shift that helps form the diagram of directivity. (**Note by I.G.:** More about ZL-Beam see **References 1 and 2**)

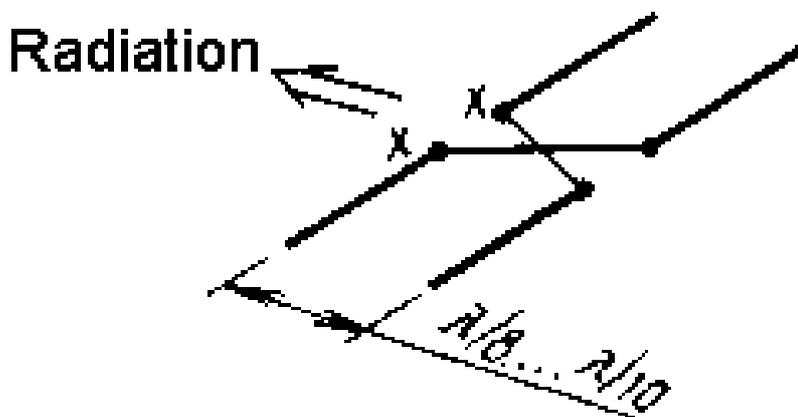


Figure 1 ZL- Beam

Required phase shift between the antenna's elements are obtained by two ways. At first, it needs change the length of the crossed line. The second, (it is fine tuning) by changing of the length of the dipoles. If the tuning may be made then no matter at which points at the crossed line would be connected feeder of the antenna.

Usually ZL-beam is used as antenna with horizontal polarization i.e. the dipoles are placed in parallel to ground. That is because of the simplicity of that antenna design.

I decided to make antenna with vertical placement of the dipoles to ground. For the antenna's element should be suitable J- Antenna. (Note by I.G.: More about J- Antenna see **References 3 and 4**). **Figure 2** shows two version of that J- Antenna. Version of the antenna with the grounded stub (right at the **Figure 2**) is mostly suitable for my design. It is possible to connect the lower point of the grounded stub with any ground- roof of the car, metal mast and so on. It is possible to match the antenna with any coaxial cable by choosing the feeding points.



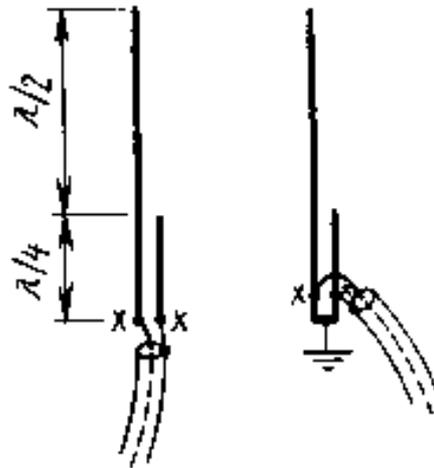


Figure 2 J- Antenna

Stub provides two antiphased RF voltages at its ends. Dipoles at the ZL- beam fed by antiphased RF voltages. So, it is possible to connect vertical dipoles to the ends of the stub. Phase shift between dipoles should be got by shortening left one and lengthening right one.

To obtain space between the dipoles $\lambda/8$ it needs just bend each dipole. Figure 3 shows the ready Vertical ZL- Beam Antenna for 430- MHz. Antenna was made from one length of a copper wire in diameter 1.7- mm (14- AWG).

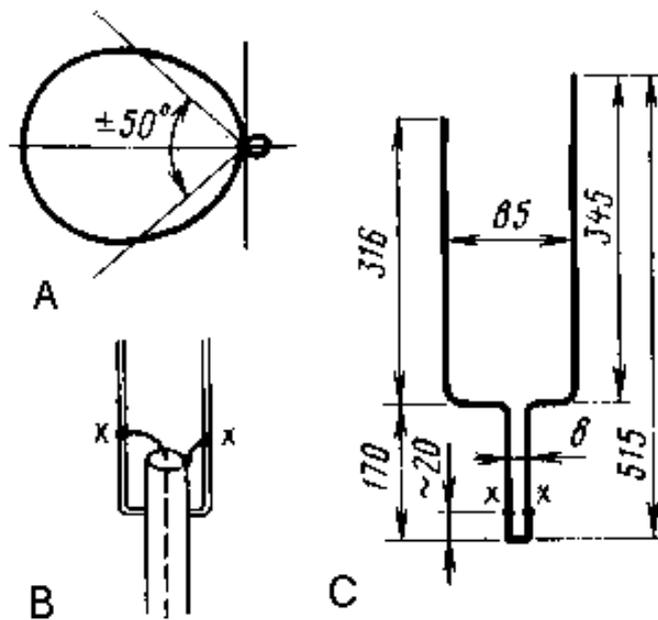


Figure 3 Vertical ZL- Beam Antenna for 430- MHz

A Diagram of Directivity

B Feeding Points

C Dimensions of the Antenna

My practical measurement showed that the antenna had one sided lobe (Figure 3, A) and 4- dB gain over a usual half – wave dipole.

References

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4. http://en.wikipedia.org/wiki/J-pole_antenna