

# Vertical UN7CI for 7, 14 and 21-MHz

By: **Boris Popov (UN7CI)**  
 Petropavlovsk, Kazakhstan

Credit Line: [www.cqham.ru](http://www.cqham.ru)

The antenna was designed for amateur's bands' 7, 14 and 21-MHz. Antenna fed through 50-Ohm coax. The antenna has SWR less than 1.5:1.0 at any band. Antenna has good efficiency and low angle of radiation at vertical plane (that is good for DX-ing). Only one power relay is used to switch a working band.

**Operation:**

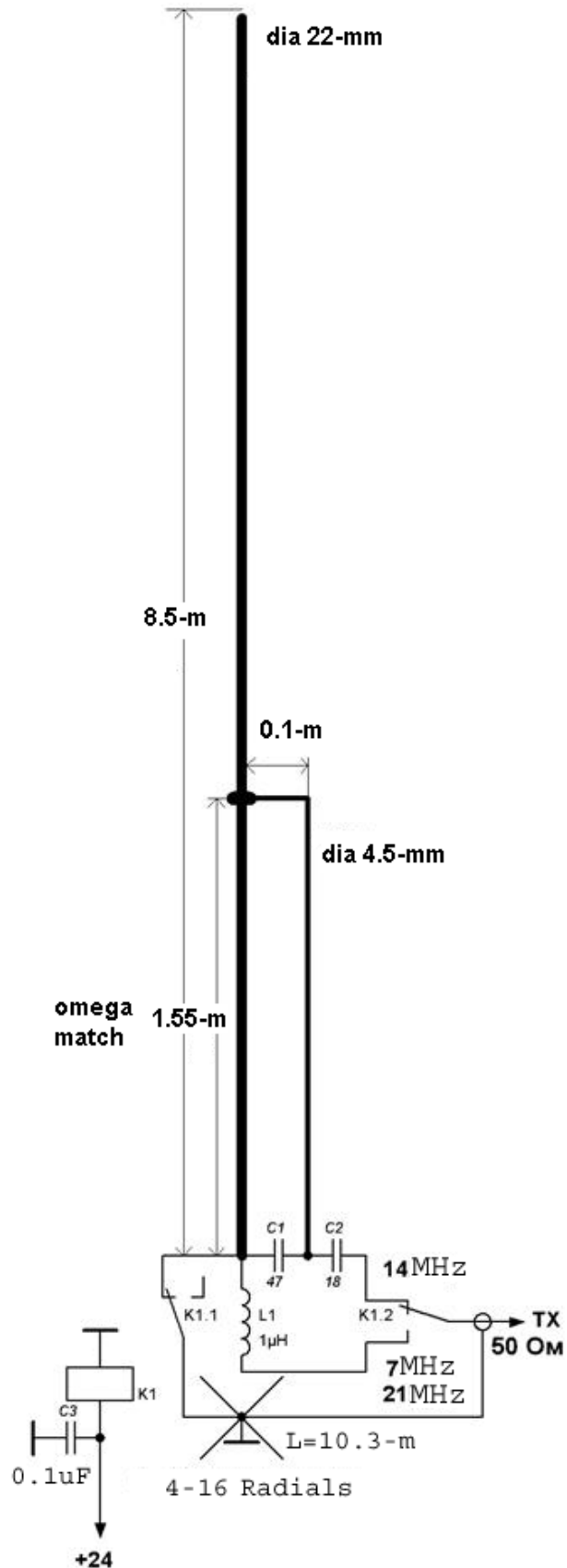
The antenna is made of on a base a vertical tube that has diameter of 22-mm and length 8.5-meters. With help of matching networks this vertical is tuned to each used band. At the 7-MHz band the vertical (with the lengthen inductor) is a  $\lambda/4$  one, at 14-MHz the vertical is a  $5\lambda/8$  one, at 21-MHz band the vertical (with the lengthen inductor) is a  $\lambda/2$  one. **Figure 1** shows the antenna with matching circuits.

**Band 7 and 21-MHz:** When D.C. voltage of 24-V is across the relay its contacts switch on the vertical through the lengthen inductor to 50-Ohm coaxial cable.

**Band 14-MHz:** If the 24-V cut off from the relay the vertical is working at 14-MHz. In the situation one relay's contact is grounded the vertical. Second relay's contact turns on the omega- matching network to 50-Ohm coaxial.

**Design**

Vertical may be made from aluminum tube in diameter 22- 30 millimeters. The vertical is installed onto a home-made insulator. The omega matching may be made from aluminum wire in diameter 4.5- 8- millimeters. Lengthen inductor has 5 coils of silvered copper wire in diameter of 2.5- mm (10-AWG). The inductor has length of 30- mm and coiled diameter 45- mm (air-wound inductor). It was used a Russian power relay REN-33. However, it is possible to use any power relay that will work at RF-power going to the antenna.



**Figure 1** Vertical with matching circuits

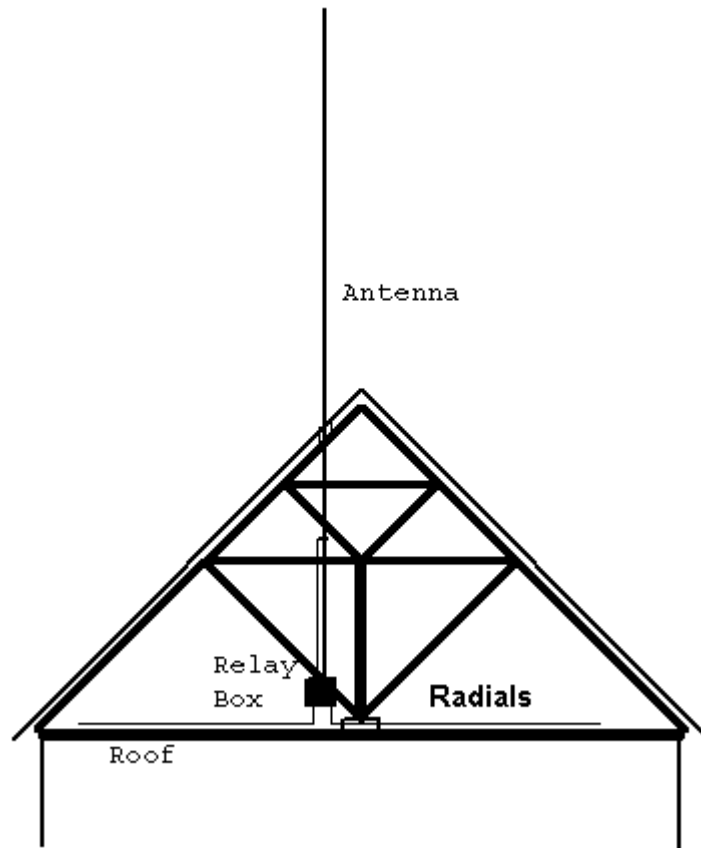


Figure 2 Design of the Vertical

Omega matching network is tuned to the resonance with help of C1 and C2. At power up to 100-Wtts capacitors C1 and C2 may be used ceramic ones. For high power (more the 100-Wtts) it should be used high quality capacitors. There are: air variable capacitors with gap more the 1-mm, lengths of a coaxial cable having the needed capacity or just fixed high voltage capacitors having high reactive power.

Parts of the matching networks (L and C) were placed inside a plastic box. Radials are placed above the heat insulation of the roof. Radials should have a plastic insulation (with good insulation of the ends) if these ones would be contacted with stuff of the roof. **Figure 2** shows the design of the antenna.

My vertical was fixed to the roof beams. No guys were used for the fixing of the vertical. Hole through the roof (where the vertical is going on) was water proofed. However, conditions for the installation of the vertical at another roof may differ from mine. So, guys for the fixing of the vertical and hard waterproofing of the hole may be needed.

**Tuning:**

Tuning of the antenna made to minimum SWR at the center of the working band. At the 14-MHz the tuning is made by C1-C2. At the 21-MHz the tuning is made by the lengthen inductor. It needs to choose numbers of coils or by changing of the physical dimension of the inductor. Since the antenna is tuned to 21-MHz no additional tuning needed at 7-MHz.

The antenna was compared with I.V. No difference at local (up to 2000-kms) contact. The vertical beat an I.V. at DX- at distance more the 5000-kms. At the distance the vertical gave 1-1.5- points at S-Scale at reception and 1.5- 2 points at scale "S" at transmitting.

**73! de UN7CI**



[www.cqham.ru](http://www.cqham.ru)