

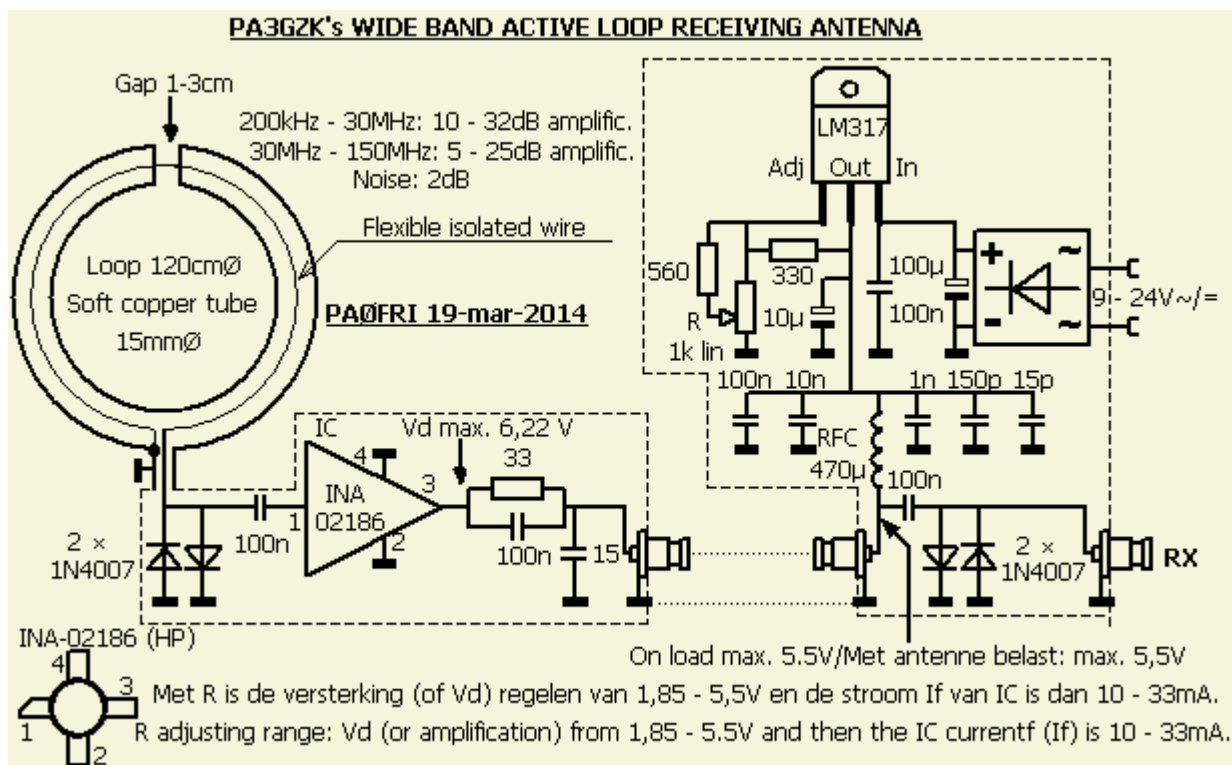
# PA3GZK's WIDE BAND ACTIVE LOOP RECEIVING ANTENNA

**UPDATED** 25-jan-2015 Cut trace on PCB and ground 15pF capacitor.



**Left my green coloured loop as distinctive "bush" in my garden and on the right in PA3GZK's garden his trial model as described in this article.**

# INTRODUCTION



If one has no place for an antenna of sufficient length for receiving radio signals, a small active antenna may be the solution and you may find on the Internet a lot of related publications. If you want a system that is able to reduce or suppress interfering signals, most articles are not appropriate! The following design has that noise cancelling quality, [you can confirm it by listen to MP3 files later in this article!](#)

PA3GZK has built quite a number of active antennas in various forms and he experimented extensively. The antenna described here (fig ») gave by far the best performance and it was the final result of many tests with various circuits and systems. For a properly functioning antenna, and a substantial symmetry of the system, it is recommendable to follow the mechanical construction as well as possible.

For me, the reception decreased the interfering noise especially in reduced interference on the 160 and 80 m bands. Other hams have also found favour with the system. Someone about 16 kilometres away could not listen on 80 m, but he was a returned SWL with an antenna made PA3GZK.

## GENERAL DESCRIPTION

The proposed shielded broadband ( $\pm 200$  MHz) active loop antenna offers more quiet and relatively less interference reception. It is known that an

antenna for transmit also works well as a receiver antenna, one only forget that all interference signals are proportional strong. Therefore PA3GZK believe that you actually have to use two antennas, one for transmit and one for receive. The latter is most needed at the lower frequency bands.

This antenna is much less affected by fading (QSB) as a dipole or other similar antennas. The E-field in the near field that causes the most interference is very well suppressed, because the antenna within this field will primarily responsive to the H field. By turning the antenna the interference can be almost zero suppressed without losing the desired NVIS signal. With DX signals, there is a directional sensitivity established. Compared with a reference antenna the loop has a one S point decreased reception on average. A classic 80 meters Zepp antenna was used as reference at a height of 20 meters, while the loop was mounted on a 2 meters pipe. With active antenna the signal to noise ratio or signal to interference ratio was much better, listen to MP3 files in this article.

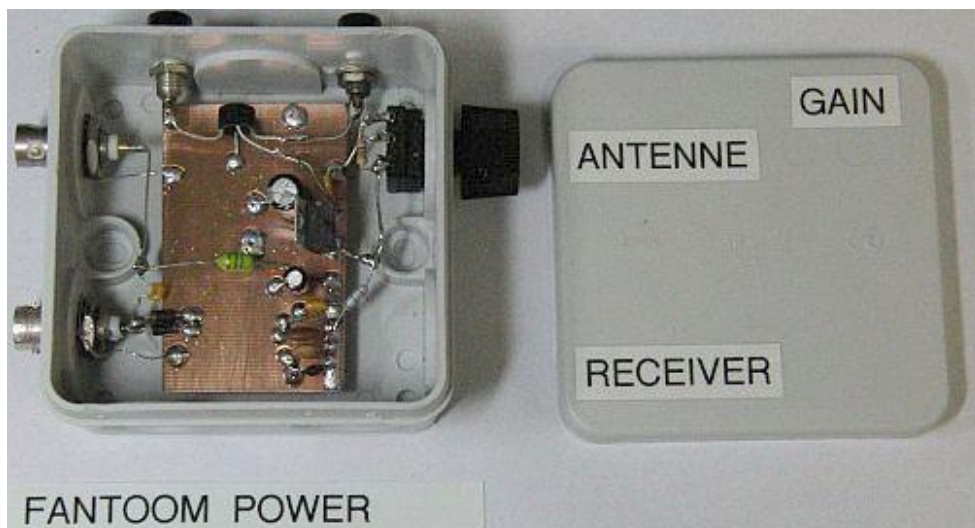
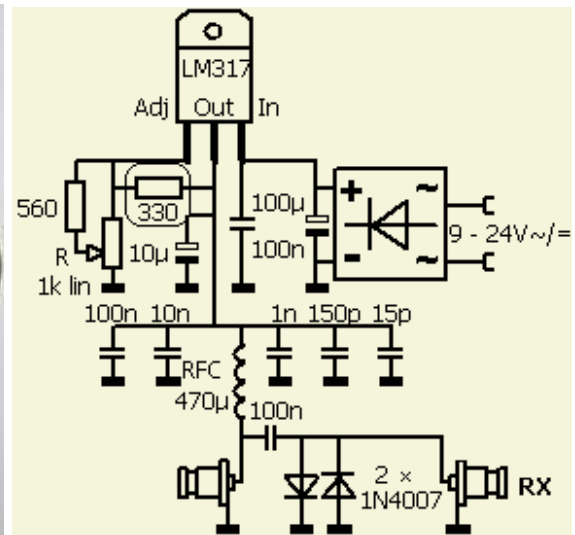
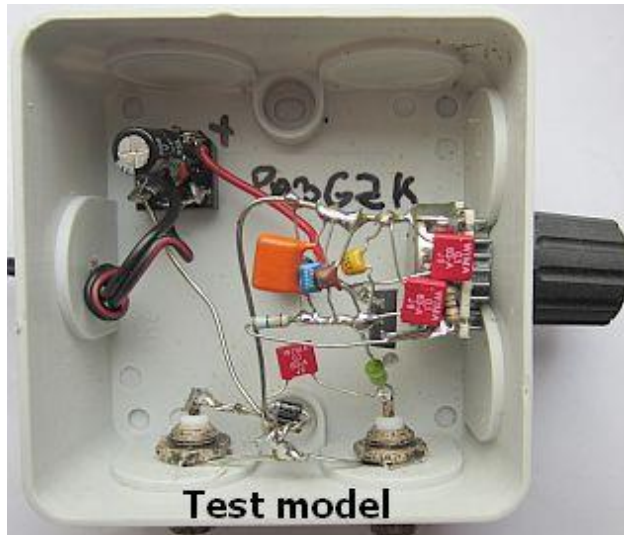
The 120-cm diameter is in practice a proven compromise between desired signal and reduced interference. A larger or smaller model is disadvantageous for reception or the extent to which the strength of interference decreases. I have not encountered the recommended maximum size in other publications. Further showed that leaf touching the antenna has no appreciable negative impact on the operation, so hang or camouflage in a tree is not a problem.

The antenna is built with 15 mm soft copper tube and is designed as shielded symmetrical loop. This was done in order to minimise the disturbing influence of the surrounding conductive objects such as, trees, fences and gates, as far as possible. During testing with previous structures and models, it occurs that a slight disturbance of symmetrical construction affects the degree of noise suppression.

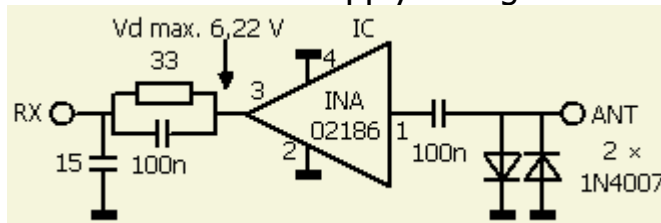
The active loop antenna can be installed close to a transmitting antenna without a problem. PA3GZK use the transmitting antenna 4 meter away from the receiving antenna, which is still intact despite sometimes 1 KW transmitter power.

## **ASSEMBLING**

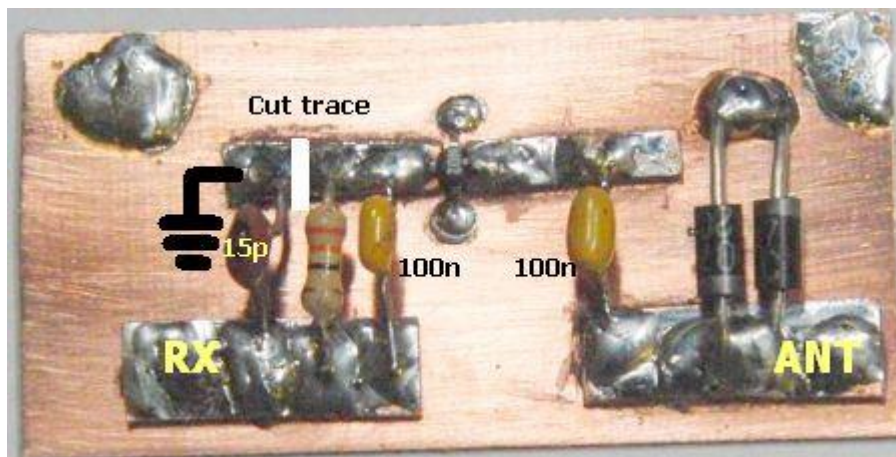
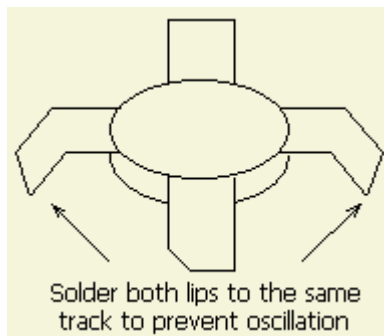
The components are installed with the Manhattan system, ie the solder islands are glued PCB strips.



In previous schematic 330 ohm resistor was 240 ohm. Sometimes the IC was oscillating with short coaxial cable, therefore the resistance was increased and IC's supply voltage was reduced to 5.5 volts.







The INA 02186 has a high gain and a good connection to ground is essential. Some home brewers had to deal with an oscillating amplifier. To prevent instability ensure that both lips have direct contact with each other via one track. Do not separated by a machined groove, but solder on the same "island" or track.

## MECHANICAL CONSTRUCTION

### "HARDWARE"

**Soft copper tube 15 mm in length 4 meters.**

**Brass T piece 15 × 22 × 15 cm compression fitting.**

**Brass end cap 22 mm compression fitting.**

**Copper tube 22 mm length 15 cm.**

**Plastic T piece 15 × 15 × 15mm.**

**PVC or polyester tube 32 mm length 160 cm.**

**Trespa board 6 mm × 13 6 cm.**

**Stainless steel threaded rod M6 4 nuts and washers.**

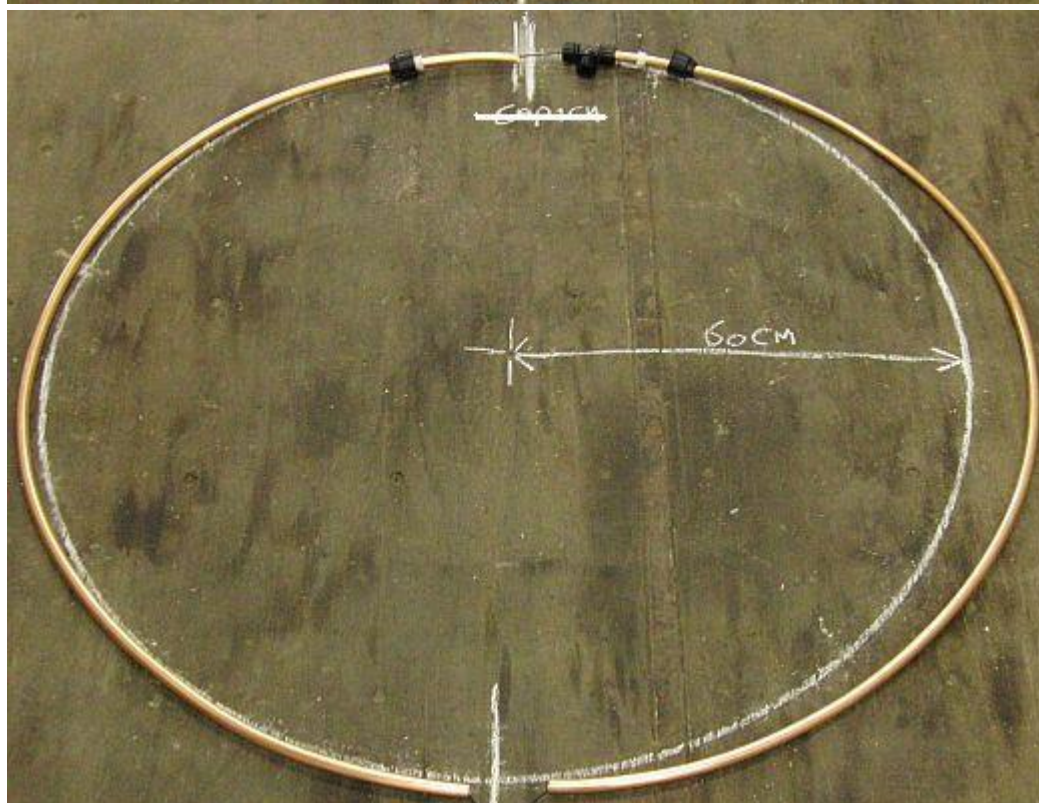
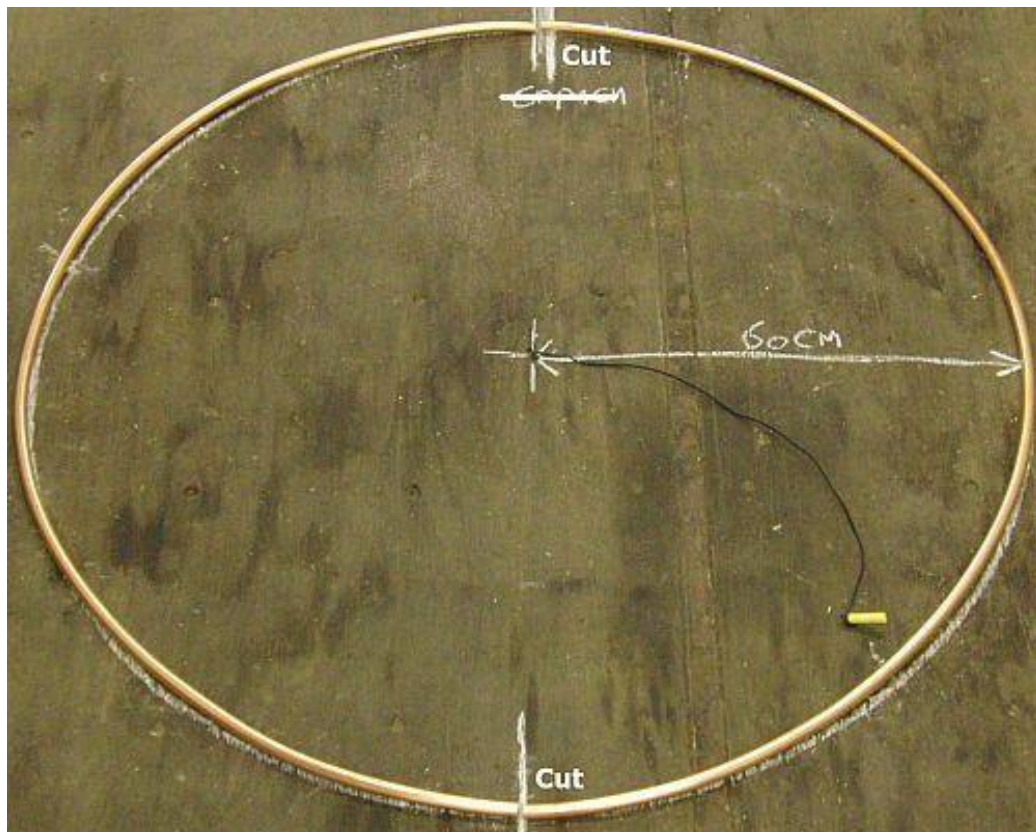
**PL femail chassis connector**

**The IC 02-186 INA is for sale at [eBay.com](https://www.eBay.com)**

**The datasheet can be found at [Alldatasheet.com](https://www.alldatasheet.com)**

**Except IC and PL chassis one can obtain the other items in a regular hardware store.**

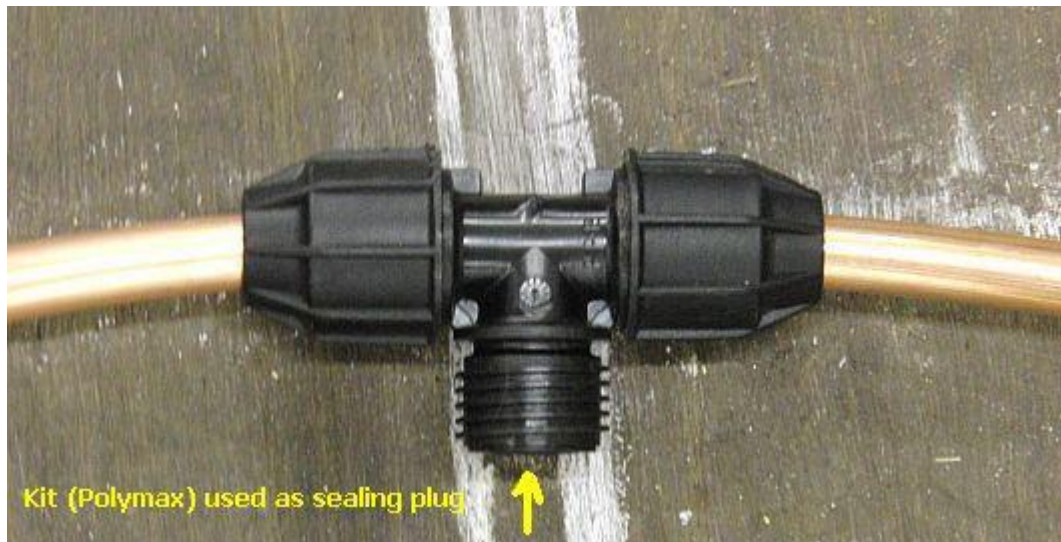
For keen DIY's the following pictures will be clear enough to construct the antenna successfully. The former design was build with a thick coaxial cable, but the present construction is easier to assemble, and the various mechanical components are standard



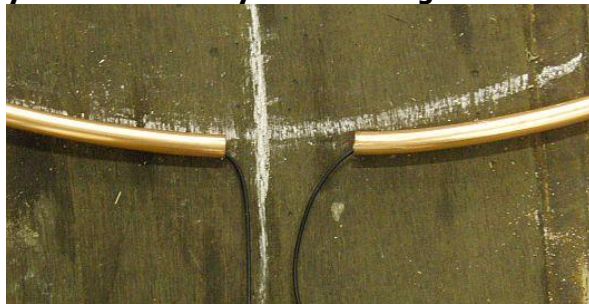
**The 15 mm diameter soft copper tubing (from a hardware store) is 4 meters long, actually there are two easy to bend pieces of 2 meters.**

**The "bending track" is marked with a crayon and a piece of rope..**





The plastic T connector, who is mounted on the standpipe, is sealed with suitable kit such as Polymax to avoid any water leakage or

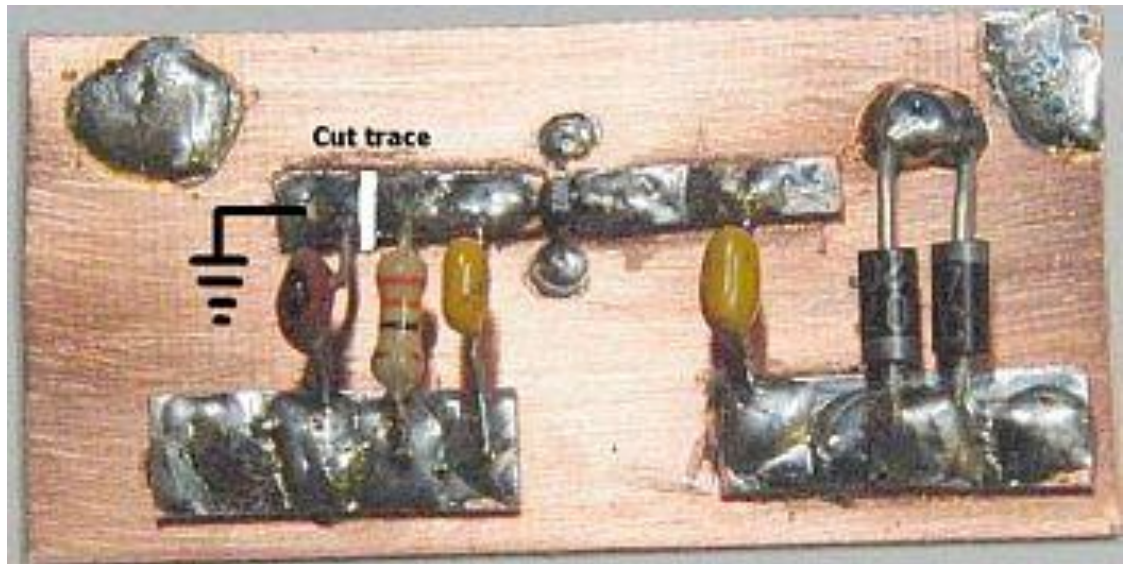


condensation.

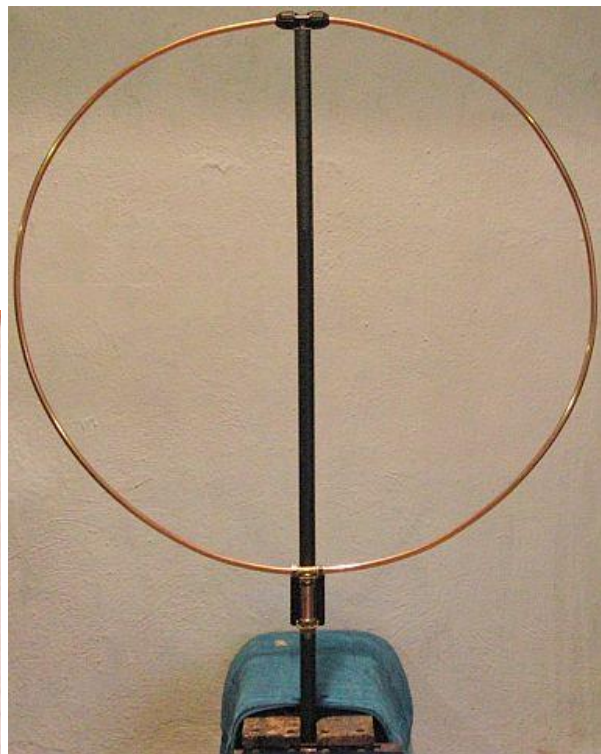
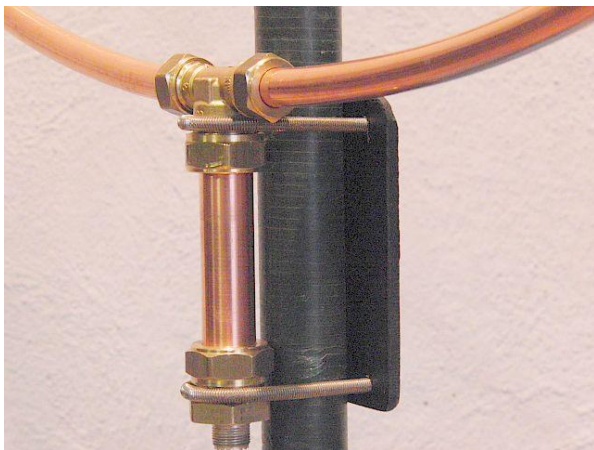




**The flexible insulated wire does not need to be concentric.**

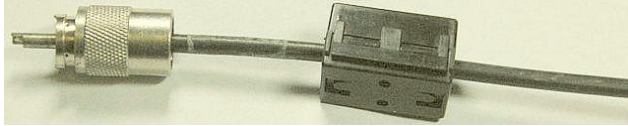


Slide the amplifier in the 22 mm-copper tube. Solder the mass of the PCB with a suitable soldering iron on the inside of the tube. Also use that point for one side of the flexible wire. Solder the other side of the wire to the input of the amplifier.



**You may paint the antenna but oxidised copper does not affect the operation of the antenna**

## **EMI/RFI**



In previous models more components of plastics were used. The outer jacket of the coaxial cable worked as antenna for the transmitted signal and thereby upset the operation of the IC amplifier. In order to suppress a choke balun was installed. In the here presented model the choke is not been necessary. However if any instability occurs a cable suppressor may be used.

## **PA3GZK**

If you want more detailed information, contacts PA3GZK via email:  
[pa3gzk@amsat.org](mailto:pa3gzk@amsat.org).