Pa0nhc improved version of Pa0rdt **"Miniwhip"** active wideband receiving antenna.
PCB 20180316-23 S 2080415

Installation. 20181217

The antenna PCB must be installed **vertically,** in a non-screening, fully closed, rain resist, non-metal housing. For instance in a 50cm long, 50mm dia. gray PVC or white PPC pipe. Top and bottom closed with plastic end caps. Seal caps drip-water-tight with tape or Vaseline.

Screw hole "GND" of the antenna PCB must be connected to a dedicated noise free ground, or to the noise free grounded metal antenna mast

The total antenna PCB-surface must be well ABOVE the top of a metal antenna mast. Received signals are generated by differences in RF potentials between the PCB antenna surface and the PCB electronics surface.

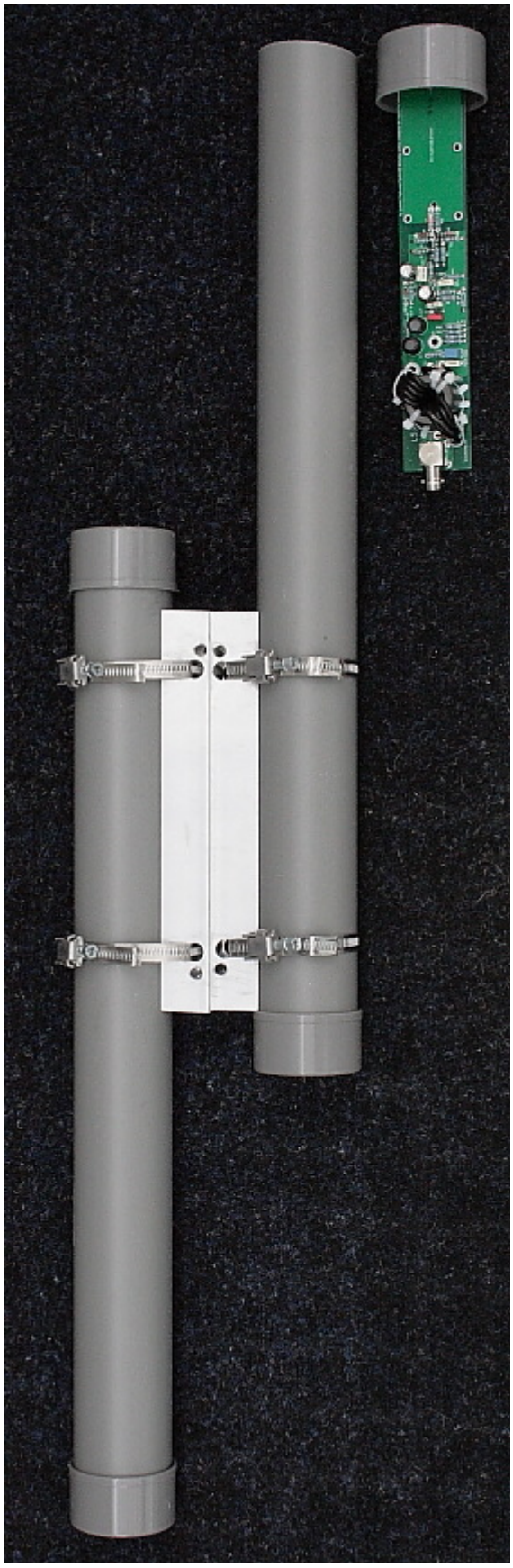
A simple, stable and sturdy system for mechanically coupling the antenna pipe to a antenna mast, using 20cm of **H-shaped** Alu profile, and four steel hose clamps, is shown here ==>
If noise free grounded mast is used, the antenna ground wire can be connected to the ALU profile. Keep 60cm extra coax length under the antenna connection.

The antenna PCB top can be glued into a **PVC** end top-cap **(see photo below).** The shape of the top of the antenna PCB is designed for it.

Thus installed makes installation and maintenance easiest, as the coax can be connected easy, before the antenna PCB is lowered downwards into its housing. Later it can be lifted upwards out of the housing for maintenance.

Holes h1 and h4 can be used to connect a whip with a length up to 1.5 m. A longer whip will generate stronger signals due to its higher source capactitance, especially at VLF. But the connected receiver also will likely earlier be overloaded by strong signals, and the use of an attenuator could be needed.

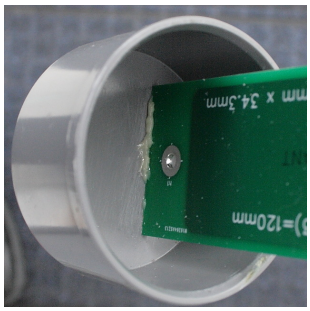
Highly recommended : Leave 10-14 Vdc power supply always switched ON. The small internally generated heath will help to prevent condensation.



For good sensitivity and best noise free reception:

Install the antenna unit :

- far away from noise sources
- as high as possible
- as free as possible from metal structures
- noise free grounded
- with the antenna surface FULLY above the top of the antenna mast.



Grounding:

Before going on, be sure you are protected by an automatic ground-current-leak-switch in the mains power supply line.

The complete Miniwhip_antenna + splitter + power_supply must only be grounded to ONE POINT : the grounded antenna mast.

Disconnect all safety ground wires at :

- the receiver
- the DC power supply
- all other connected equipment.

At the antenna site, do NOT connect the antenna BNC nor the coax screening to ground.
Leave the coax and antenna BNC floating.

Only screw hole "GND" on the antenna PCB must be connected to the *noise free* grounded antenna mast, or to a dedicated ground.

Mantle current choke L5 on the antenna PCB then can and will effectively block noises on the outside of the coax screening.

Coax :

- Use THIN coax (2.8 mm double shielded PTFE) as this can be wound more times through ferrite cores, and cable noises wil better be damped..
- Install hi-Ui (>=5000) ferrite material on the beginning and the end of every cable.
- Wind these cables several times through the ferrite hole for far more effectiveness.

3 times through a ferrite core hole = 9 times more effective than 1 time straight through the ferrite core hole!

ONLY use Fair-Rite cores with material MIX#31 (available at ARROW.COM)
- or -
Ferroxcube material 4S3 (DX-WIRE.DE)

First : to give the best Signal-to-Noise-Ratio, experiences read from other E-field active antenna users, suggest a Miniwhip installation :

- as FREE as possible from other metal objects
- up to 6m above surroundings
- when installed at low height, directly on top of a roof, the use of a “Ground-surface” made of chicken-mesh, connected to the “GND” hole on the PCB (NOT to the coax).

How to test the need(lessness) of more signal :

- Tune the receiver to a frequency without any man-made signal of abt. 7 MHz.
- Switch the receivers antenna input between the Miniwhip and a 50 Ohms dummy load.

If the noise level received by the Miniwhip is ***3dB or more*** stronger than the receivers own back ground noise, a higher received signal level is useless.

Longer whip ?

A longer whip increases the antenna's source capacitance: for instance from the 2pF of the PCB antenna surface alone, to 20 pF. This source capacitance forms a High Pass Filter with the very high input resistance (7 MEGohms) of the electronics of -3dB@15 kHz.

Adding a whip shifts the -3dB low frequency corner down from 15 kHz to for instance 4 kHz. When adding a whip, signals will be stronger not only above 100 kHz, but especially at very low frequencies below 15 kHz.

BUT : with a longer whip, *all signals* will become stronger in the *whole frequency range* of the Miniwhip : all wanted signals, *and* all received noises. With a whip added, **on frequencies above 300 kHz, the Signal to Noise ratio probably will *not* be improved.** It only will result in *12 dB less head room in the connected receiver.* (local AM, FM and TV broadcast, HF and VHF radio amateurs, taxi communications).

In certain cases *a longer whip could therefore cause Inter Modulation Distortion in the connected receiver,* causing “reception” of non existing signals and annoying back ground noises. Which then only can be overcome by inserting a 12dB attenuator. Senseless.

A longer whip only makes sense for those who are interested in signals below 20 kHz.

In general : Free and high installation is the best solution.

S meter readings.

Signals from a vertical polarized Miniwhip antenna can show definitive less S-meter deviations compared with signals from horizontal full size dipole antennas.

Do not worry as long as the intelligibility of the received signal is good.

The Signal To Noise Ratio is the most important issue.

Keep these signal strength differences in mind when giving signal strength reports.
Correct your report as like it was received by a dipole antenna. Add dBs to the meter indication.
