

## **The *pa0rdt-Mini-Whip*©**

Roelof Bakker, pa0rdt

### **History.**

After several fruitless attempts to make an active loop work in a city environment, it was found that the electric field from local noise sources was contained within the house. The magnetic field of local noise sources was not contained inside the house, making weak signal reception at LF impossible.

Hence an electric field antenna was called for. Tests were performed using an active whip antenna, designed by G4COL. Results were encouraging and the whip length could be reduced from 100 cm to 30 cm without loss of performance. It became clear that at LF an active whip is a capacitance coupled to the electric field.

### **The *pa0rdt-Mini-Whip*©.**

If it is accepted that a whip is a capacitance coupled to the electric field, shape becomes irrelevant, as long as the required capacitance is available. In practice the “whip” can be e.g. a small piece of copper clad printed circuit board. A small die-cast aluminium box can also be used, with the buffer amplifier mounted inside.

Following this line of thought, tests have been performed to find the optimum dimension for the *pa0rdt-Mini-Whip*©. To prevent receiver overload, maximum output has been set to about – 20 dBm. The buffer amplifier has been optimised for good strong signal handling performance.

*Acknowledgment goes to Steve Ratzlaff, AA7U, who was so kind to conduct IMD measurements on the buffer amplifier and suggested circuit modifications to improve strong signal handling performance.*

### **Specifications:**

Frequency range: 10 kHz – 20 MHz

Power: 12 – 15 volts at 50 mA.

Second order output intercept point: > + 50 dBm.

Third order output intercept point: > + 30 dBm.

Maximum output power: in excess of – 15 dBm

Dimensions:

Length: 80 mm, diameter: 32 mm

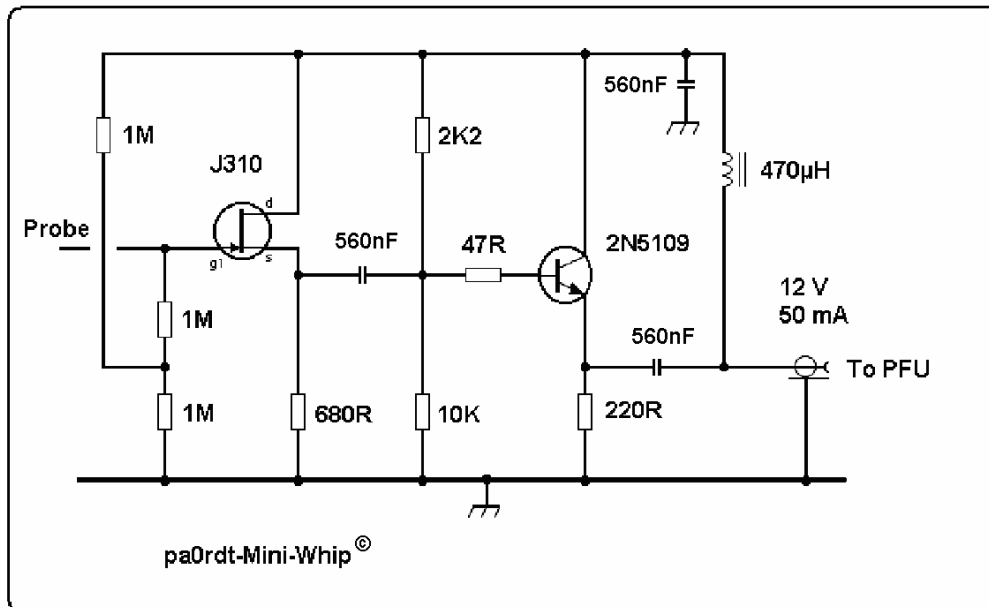
Connectors:

RF: BNC

Power: Cinch, centre pin is V+

Feed line: 50 – 100 ohm coaxial cable up to 100 metre long.

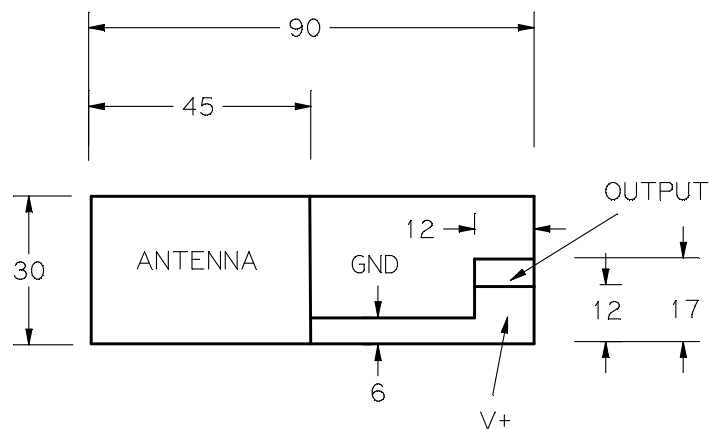
### Circuit diagram of the *pa0rdt-Mini-Whip*®.



### Construction.

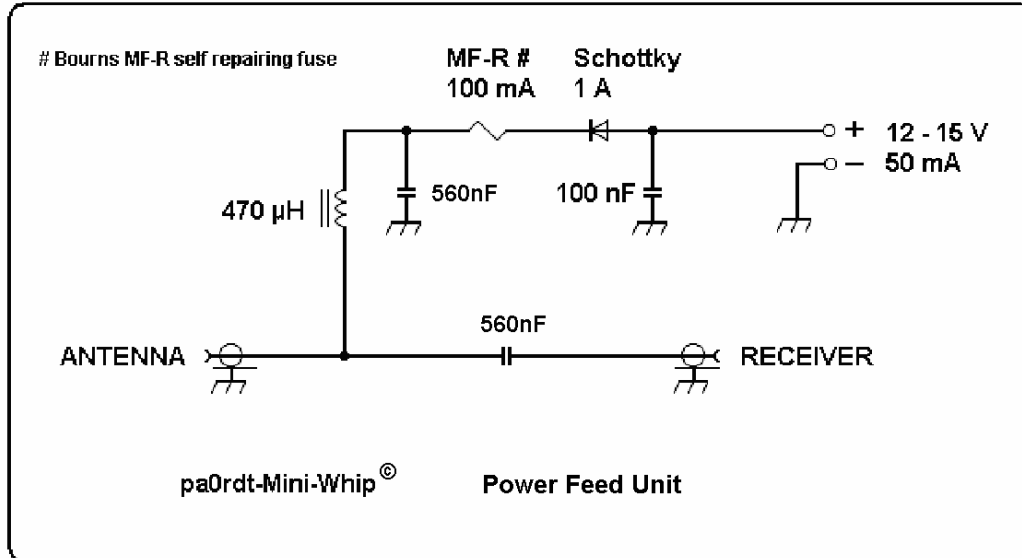
The *pa0rdt-Mini-Whip*® uses commonly available materials. A single sided printed circuit board is mounted inside a 10 cm long piece of 40 mm drain pipe (white), using end-caps. One of the end-caps carries an insulated BNC connector onto which the PCB is soldered. Half of the PCB is the actual antenna; the other half contains the buffer-amplifier, using "Amateur Surface Mounted Construction".

### PCB-layout.



The traces are cut using a Dremel tool.

## Power Feed Unit circuit diagram.



Power is fed to the **pa0rdt-Mini-Whip**<sup>®</sup> via the coaxial feed line. A Power Feed unit couples the power through the coaxial feed line to the **pa0rdt-Mini-Whip**<sup>®</sup>. A second coaxial cable couples the signal to the receiver.

Installation is straightforward:

