

Langenbrettach, May 8th 2010  
Matthias Bopp DD1US

## **Comparison of active magnetic loop antennas**

Hello,

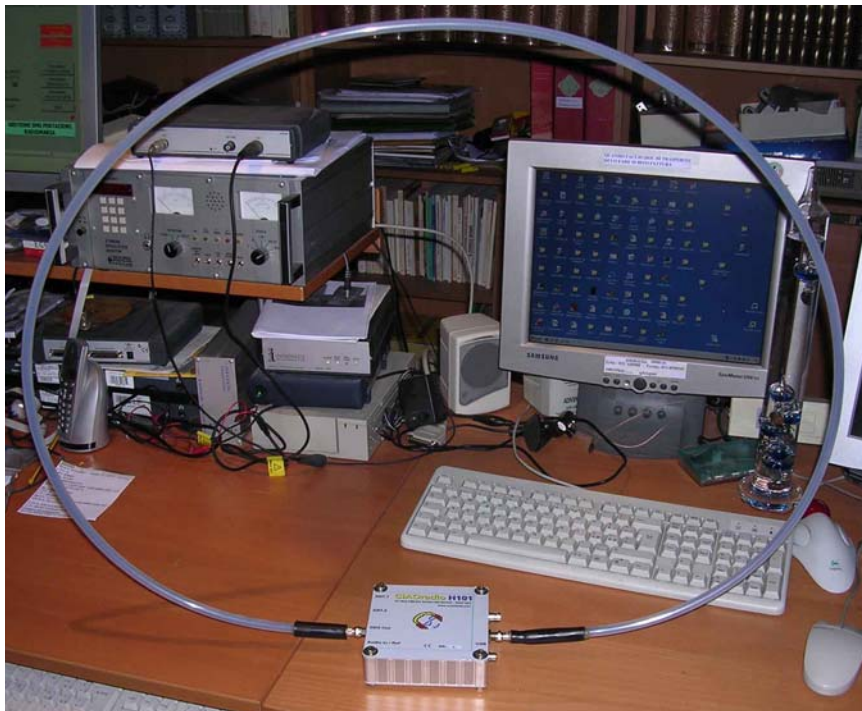
looking for an appropriate antenna for my Perseus software defined receiver I was especially interested in an antenna which could be used inside a building and would not need any tuning over the HF bands. Therefore I decided to look for an active magnetic loop antenna and started to gather data and compare them. Here is what I found:

- 1.) CIAO L-101 active wideband loop antenna**
- 2.) SSB-Elektronik ALA1530-SSB Magnetic Antenna Active  
(Wellbrook Communications)**
- 3.) Hagg Product Designs WL1030 Wideband Magnetic Loop**
- 4.) AOR LA-390 Desktop Active Loop Aerial**

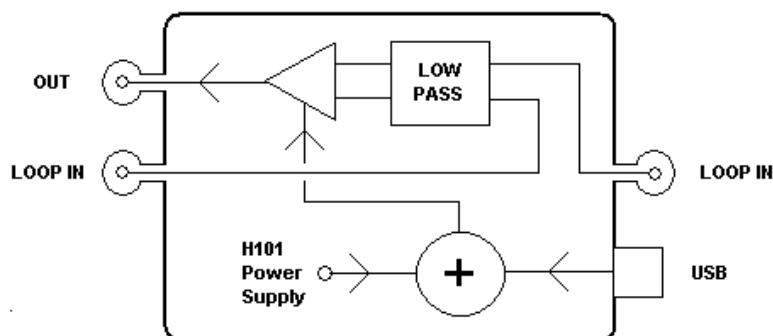
## 1.) CIAO L-101 active wideband loop antenna:

This antenna is a product of [www.comsistel.com](http://www.comsistel.com). The specifications are:

- Gain Flatness : +/- 3dB 100Khz–30 Mhz
- OIP3 : +42 dBm @ 10 Mhz,  $V_s = 12$  V
- FM Suppression/Attenuation: >40dB @ 87.5-108 Mhz
- Power Supply : 12 V / <50mA (quiescent current <20mA)
- Case Dimensions: 12 x 12 x 3.5cm
- Antenna Loop Diameter : 60cm
- Weight: 250 g
- Operating temperature: 10-40 °C

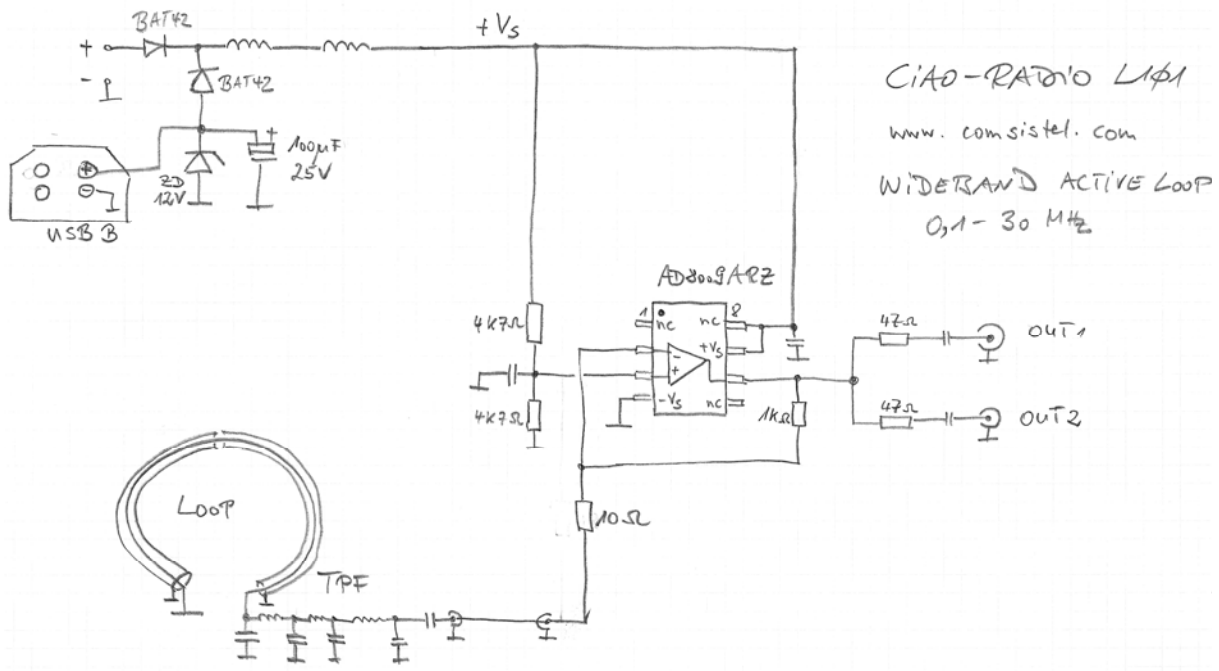


A nice thing about this antenna is, that it is quite small when disassembled. The loop is connected to the box, which houses the amplifier, by two coaxial connectors (F or N) and can thus easily be removed and rolled up with a min. diameter of 25cm. When stacked with the H101 SDR from Ciaoradio it can be directly powered from this SDR. Alternatively the amplifier can be powered through the USB connection. The typical +5V supply of an USB port can be used or the large signal performance of the amplifier can be improved by using a regulated +12V DC power supply.



L101 100Khz- 30Mhz ACTIVE LOOP

Here is a schematic of the L101 circuit. Please note that this might not be based on the latest version and might also contain errors.



## 2.) SSB-Elektronik ALA1530-SSB Magnetic Active Antenna (from Wellbrook Communications)

This Loop antenna consists of a rigid aluminium loop with a diameter of 93cm and a balanced gain optimised broadband amplifier using low noise RF power transistors. The amplifier is encapsulated in resin and housed in a PVC box. This ensures reliable operation in all weather conditions. The antenna provides excellent low noise performance and large signal handling ability. Rejection of mains borne noise is accomplished by using a balanced amplifier so that the feeder does form part of the antenna return path. RG58C 50 ohm coaxial feeder cable is recommended for the antenna. The maximum feeder length between the antenna and the DC injector (antenna interface) is 100m. A 1m coaxial cable connects the Antenna Interface to the receiver.

You can find more information at [www.ssb.de](http://www.ssb.de)

Specifications:

Frequency range 40kHz to 30 MHz

OIP2: +75dBm

OIP3: +41dBm

Typ. Intermodulation for 2 signals of 32mV each:

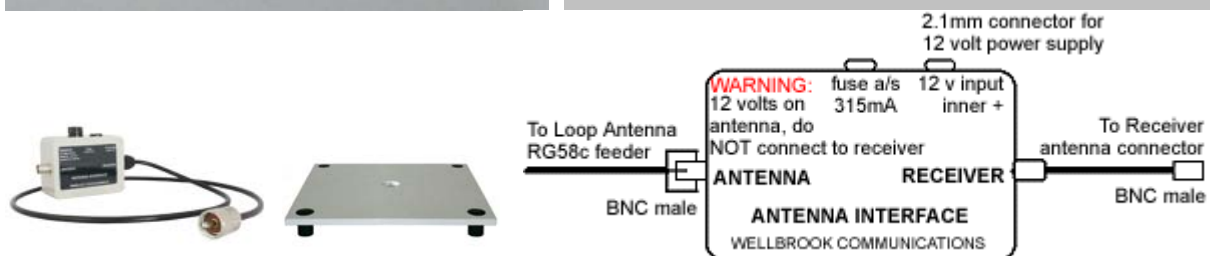
2<sup>nd</sup> order -110dB

3<sup>rd</sup> order -133dB

P1dB: +25dBm

Zout: 50 Ohms

PSU: 12Vdc / 160mA



### 3.) Hagg Product Designs WL1030 Wideband Magnetic Loop

This design is in memoriam to Mr. Maarten Hagg who developed this concept and intended to make it commercially available. Unfortunately he died before he could finish his work. Thus the WL1030 is not commercially available but if you are interested you can find further information on <http://wl1030.com>. Please note that the draft schematic below might contain errors.

Specifications:

OIP2: +70dBm

OIP3: +40dBm

P1dB: +23dBm

CMRR: >50dB

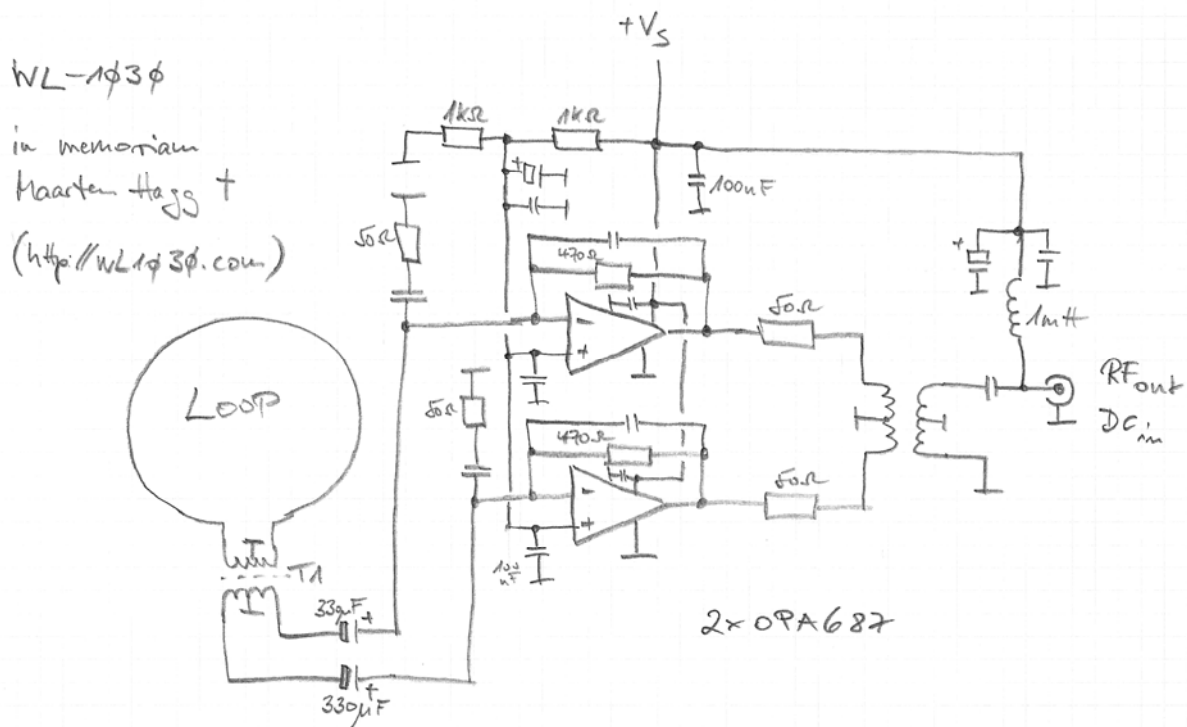
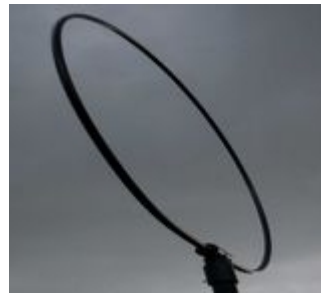
Noise floor: -123dBm (0.17uV) in 2.2 kHz

BW

Ant factor: 1

Zout: 50 Ohms

PSU: 12Vdc – 15Vdc / 100mA



#### 4.) AOR LA-390 Desktop Active Loop Aerial

This antenna does not really fit my requirement to have a no-tune indoor antenna for HF. However for comparison reason I added it to the list. It actually covers 10 MHz to 30 Mhz in one range. Unfortunately no specifications on sensitivity and large signal capabilities are available. The AOR LA-390 is the successor of the LA-380 with a slightly extended frequency range (down to 10 kHz) and better large signal capabilities.

Specifications:

Frequency: 10kHz – 500 MHz in 5 bands

Sensitivity: not specified

Large Signal Capabilities: not specified

Loop dimension: 305 x 365 mm (6mm thick)

Control box size: 120 x 55 x 85 mm

Weight loop: 250 g

Weight control box: 230 g

Power supply: 12V (9-15V) / approx. 80 mA

Impedance: 50 Ohms



AOR LA-390  
(10 kHz – 500 MHz)



AOR LA-380  
(40 kHz – 500 MHz)



## LA390 Desktop active loop aerial 10kHz - 500MHz

The LA390 is a high performance active loop aerial, ideally suited for internal or desk top use where larger external aerials are not possible. The single loop is approximately 30.5cm across with 5 selectable bands having excellent directivity for nulling interference. The aerial is powered from 12V (power supply provided) and comes complete with a 1 metre BNC to BNC coax lead.

### ■ Directivity

A rotating loop antenna is very directional. Depending on the loop's orientation, you can peak an incoming signal depending on its direction, or decrease an interfering signal.

For example the nulling feature will allow you to remove a station on a frequency and pick up another (transmitting from a different direction) on the same frequency. Of course the directional characteristics when listening to distant sky-wave signals will not be as pronounced as local ground-wave propagation.

Thanks to its directivity, it is also ideal for minimizing the effects of unwanted interfering local terrestrial signals and noise.



### ■ Band switch selection

The loop has 5 switchable bands making it not only an excellent HF aerial but also makes it a highly practical solution for wider band receivers working up to UHF frequencies.

Switch position	Frequencies	Comments
1	150kHz-800kHz	Longwave (148.5kHz-283.5kHz)
2	700kHz-3MHz	Mediumwave (520kHz-1710kHz)
3	3MHz-10MHz	Shortwave bands 100 to 30 Meters
4	10MHz-30MHz	Shortwave bands 30 to 7.5 Meters
5	Others	Between 10kHz and 500MHz, antenna acts as an amplified whip.

### ■ LA390 vs. LA380

With similar performances, the LA390 offers in addition preselection for L.W and M.W bands, but not for the 40kHz and 60kHz time signals. Preselection sharpness has also been improved.

### ■ Specifications

Frequency range	10kHz-500MHz, 5 bands selectable
Impedance	50 $\Omega$
Typical gain	150kHz: 23dB 25MHz: 20dB 30MHz: 20dB 50MHz: 20dB 250MHz: 17dB 500MHz: 10dB
Connector	BNC
Loop element size	305(W)x365(H)x60(D)mm
Control box size	120(W)x55(H)x85(D)mm
Weight	Loop: 250g, control box: 230g
Cable	1m RG58A/U (BNC plugs)
Power	External DC 12V (9-15V), approx. 80mA. DC connector 1.3mm centre positive
Supplied acc.	LA390 Control box with loop AC power supply BNC-BNC Coaxial patch lead (1m)

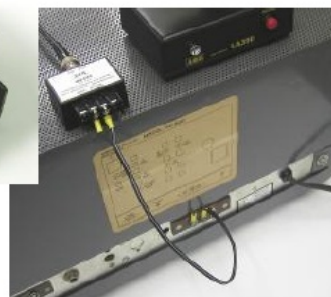
### ■ Options

#### MC-600 IMPEDANCE MATCHING TRANSFORMER

Even your antique radio can benefit from the power of the LA390 loop antenna!



Operation range:  
10kHz – 30MHz



MC-600 is an optional interface between the 600  $\Omega$  antenna socket of your antique radio, and the 50  $\Omega$  input of the LA390 (or LA380) loop antenna. Supplied with a 30cm lead terminated with solderless terminals.

Sometime in summer I am planning to make some practical 1:1 comparisons of different magnetic antennas and will report on the results of the experiments once available.

Best regards

Matthias Bopp

Email: [dd1us@amsat.org](mailto:dd1us@amsat.org)

Homepage: [www.dd1us.de](http://www.dd1us.de)