Both ferrite loops follow the same principle: a passive LC circuit but large diameter (same lenght but bigger cross section)

The antennas useful for MW/LW reception, are ferrite rod antennas. These antennas have always a bi directional receiving behaviour like a classical dipole antenna and also, an air coil antenna.

Considering they are very easy to use, and give excellent results considering it's dimensions, it is one of my best bets for MW dxing everywhere.

This successful antenna is based on the article "Loop Experiments: The Super Booster Bar, by Gerry Thomas", published on National Radio Club.

This antenna has been tested and improved for almost ten years by Rene Gustav Passold, a Brazilian Dxer who masters ferrite loop techniques. DX Club of Brazil has the mission to produce it and make it available for purchase to local MW and also SW enthusiasts.

Imagine a small antenna capable of enhancing the desired signal by just coupling it magnetically with the internal ferrite bar of a good quality portable receiver. Just approach the loop antenna to the receiver and you now can listen to new stations and also null the local one with some level – depending of course of the direction of local stations and the desired signal and so on.

This antenna is well known in Brazil as RGP3 (initials of ithe name of the pioneer and the number "3" refers to the presently version in production).

But, dxing is not only catch distant stations … It looks like a state of mind.

After some research in my old (not so old…) books related to engineering (math's, physics, and electromagnetism) and after proven calculations

over the "original" RGP3 antenna, including some lab measurements, I decided to try something new. Of course, all physical laws applied, no new theory, nothing new, but I was really decided to try new materials, new dimensions and new components.

What's the goal to be achieved?

More gain and directivity, I mean, better nulling capacity.

A friend of mine, one of the coordinators of DXCB has sent me a very interesting article written by Bill Bowers and John Bryan about an experiment of very large loop antennas using ferrite.

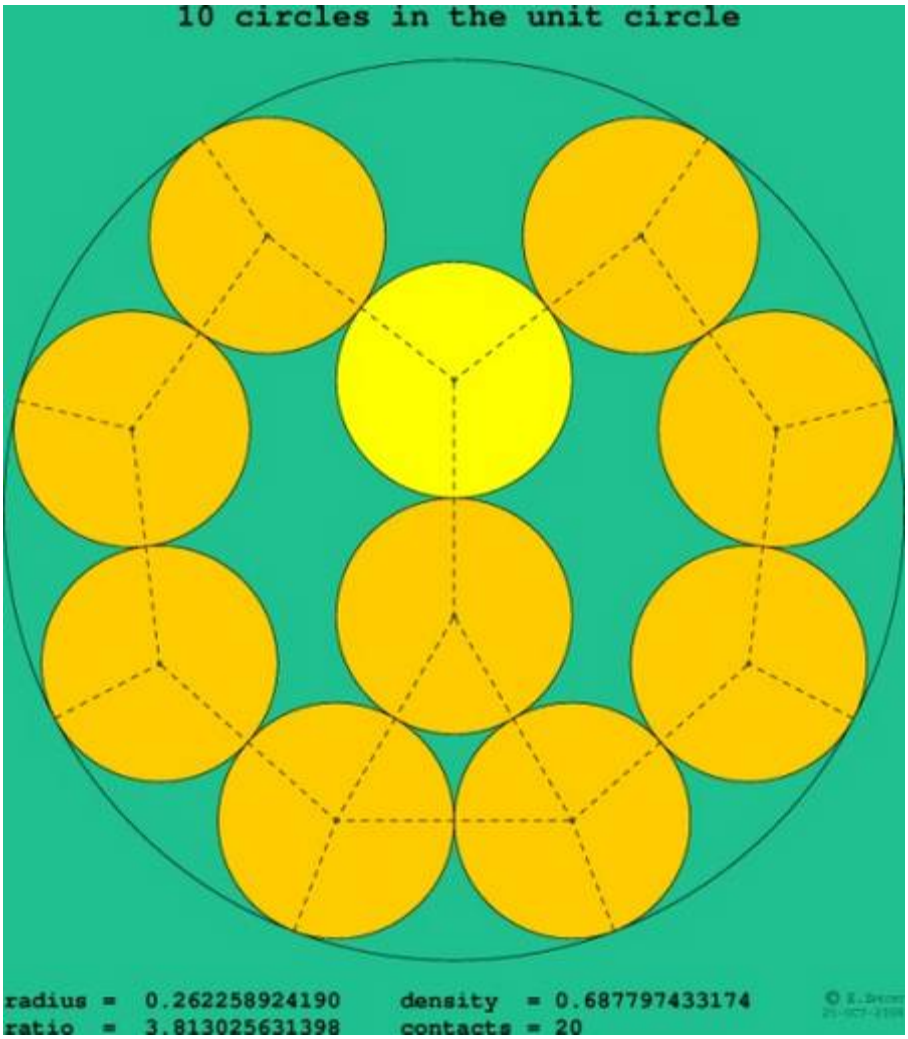
And that was the trigger of my experiment.

According to the article, the bigger is not the better, but the rate "Dimension x Cross section" is supposed to be the key to a balance in gain and nulling skills of this kind of antenna. Gerry Thomas, for sure has initially tested this behavior, as Rene Passold did more recently.

But why not make something better but really efficient, considering mechanical assembly, portability, and practical results to achieve far away distance MW stations?

First, I have started doubling the number of ferrite rods using same type of wire – enameled wire – and same variable capacitor of the original RGP3. Some cross section 40 mm and same number of rods multiplied by 2 (its axial dimension). Doubling the "bazooka" length should by suffice for the first experiment. But the results were disappointing. Nothing more than better null, it is a fact. Same gain, but the practical results are the same then the original RGP3. Just wasting time as I could checked it …

Using 40 mm pvc pipe cross section can accomodate 10 ferrite rods (10 mm diameter each)



Circle calculation shows ferrite density using a perfect unit circle - Density of 0.687 which gives certain unused space

But when I studied a bit more the equations evolved, and also, the mechanical features of the pvc pipe, I have came up with a very relevant issue.

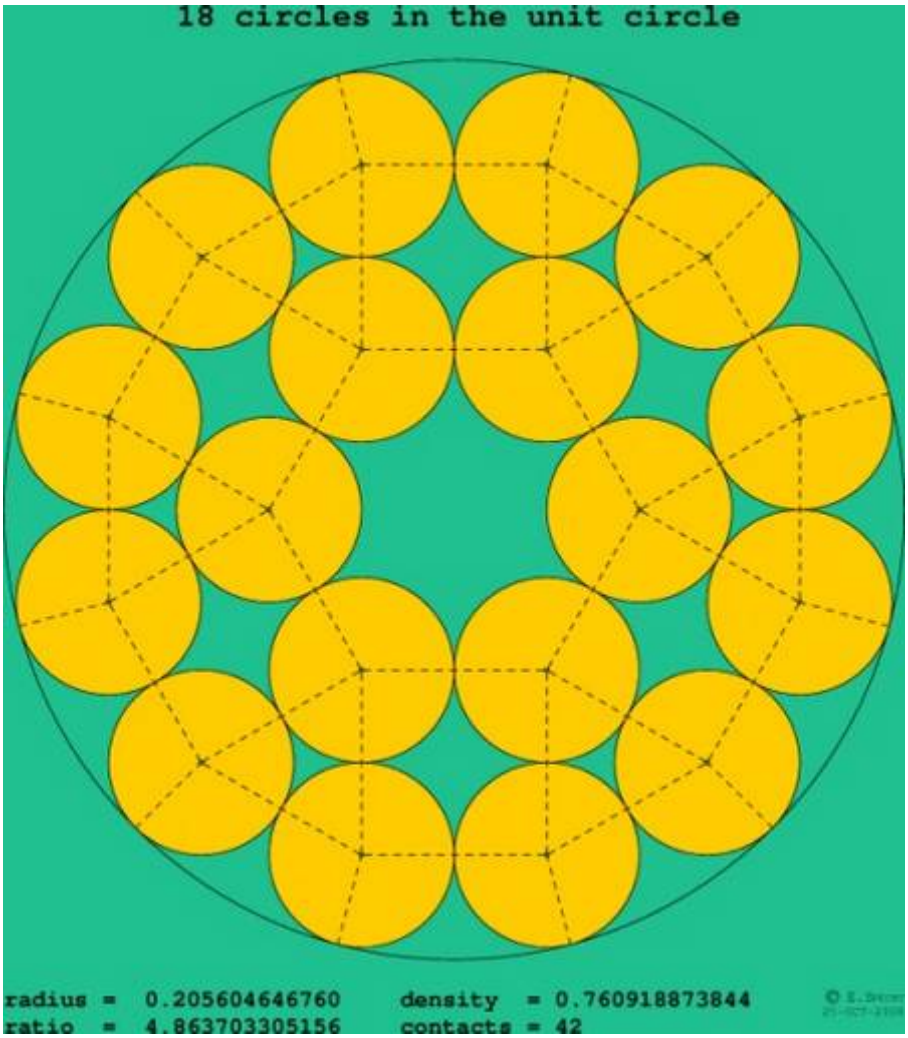
And the math's exploration has sent me to look at efficiency of "circle inside circle". I mean, and of the most important feature of ferrite loop antennas, in spite of its inductance equation that points to the magnetic permeability of the ferrite rod, are the phenomena of magnetic lines leakage travelling axially the antenna.

Now, it the help of all tables available at www.packomania.com that provides not only the density of the assembly of a pcv type filled with ferrite rods, but also provides the number of contacts of the rods itself!

And at this moment of my research, I have established a target: better gain through better mechanical assembly, and better nulling than a regular ferrite loop antenna.

And using commercial available pipes, I have found out that a 50 mm cross section pipe would enhance the ferrite density by 12 %. Also, the rate "length x cross section" would be better than the regular loop which is

supposed to give better nulling capacity. To enhance the assembly, a new variable capacitor, this was supposed to provide better Q factor to the LC circuit. And Litz wire, aiming the half of MW band to complete the experiment.



Now inside a 50 mm cross section pipe, better ferrite rod dendity : 0.760 and more contacts

Two gang capacitor with larger capacitance range : 20 pF - 520 pF

After some calculations, coil done, and inductance measures indicated values next to the estimated using permeability values provided by the ferrite supplier.

All assembly ready, and let's test it out soon!

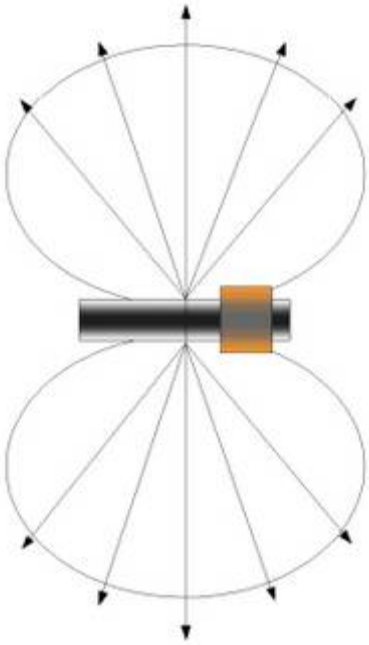
The practical results are amazing, not only more signal gain but the ability to attenuate local power stations makes a difference. Although it is large and heavy weight – imagine 36 ferrite rods perfectly aligned in a pipe with 2 groups of 18 rods 10 x 200 mm – it is practical to use and keeps the portable feature of the original "bazooka" antenna.

The gain was dramatically increased comparing to the regular RGP3 and it is easy to excite the receiver's front end with signals very eligible not received by the original antenna. Even day time experimentation, proved that some channels that up that time were quiet, now, signals from almost 450 km away could be heard on 840 kHz (Radio Bandeirantes, São Paulo).

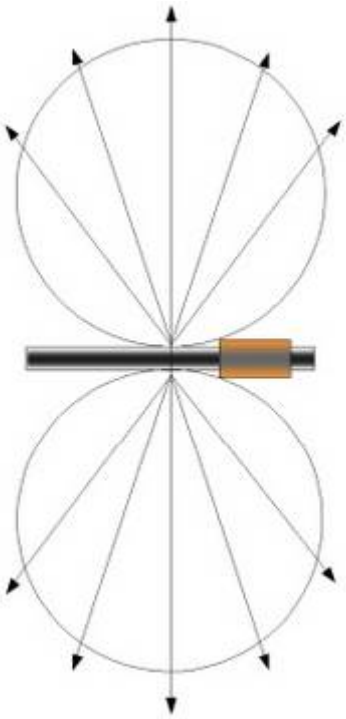
Thanks a lot to Rene Passold who has taught me a lot about ferrite loop antennas, and to the pathfinders that made a really very large ferrite loop antenna to show us theory and practical results.

By changing the diameter and the length of the rod, the characteristic of the reception behaviour can be influenced. A bigger diameter and a shorter

length leads to a less strong bi-directional reception. This information was taken into consideration by planing the antenna assembly.



Antenna with short length and bigger diameter



Antenna with long length and thin diameter

Better gain or better null? Why not both?

The total cost of this experience was about US$ 250,00 and some months of research and assembly time and adjustments. Not to talk about lots of different pvc pipes destroyed and my wife's complaints about all the mess during the hard work!

But is it really worth the time and effort?

Yes!

Comparing the 3 antennas, the original RGP3 and both extended loops, showed improvements only in the larger one