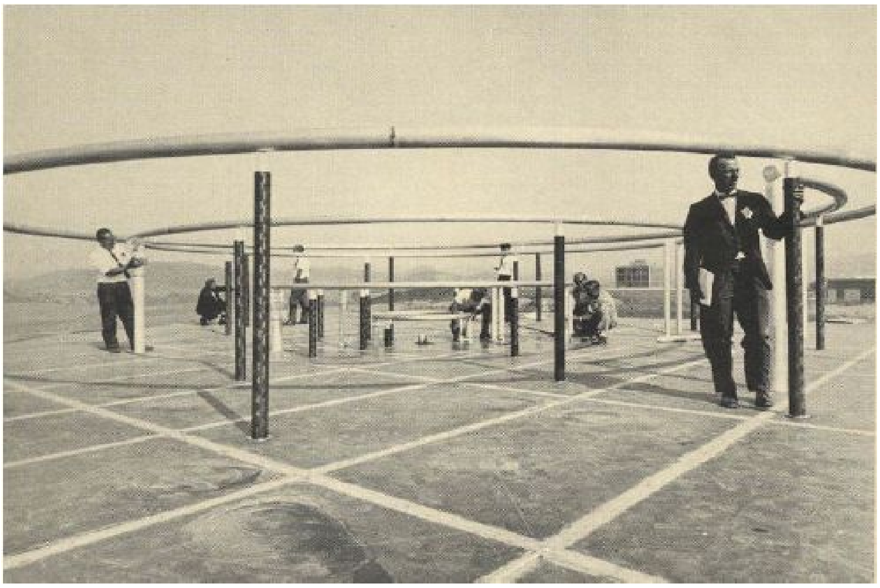
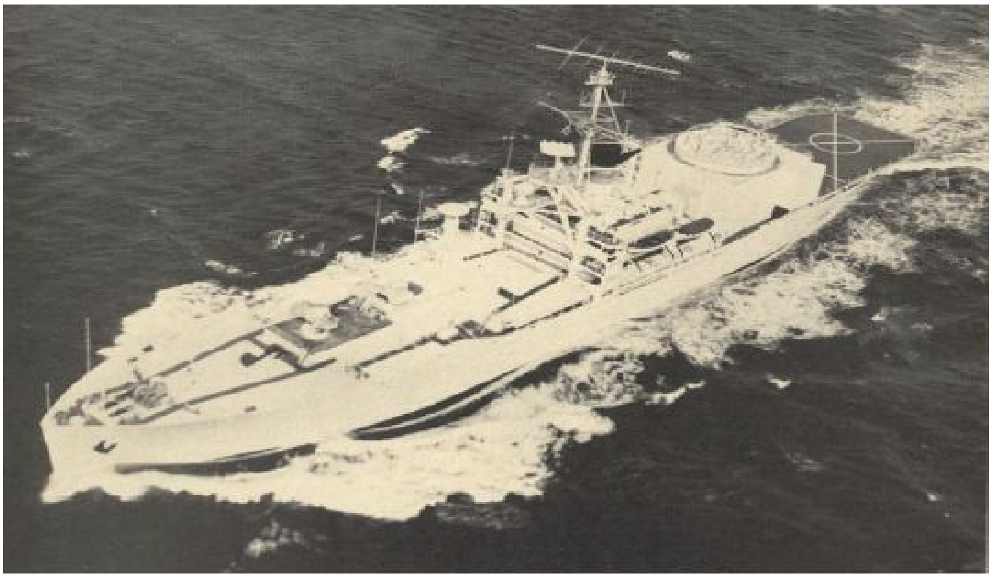
“DDRR” ANTENNA
(Mauro IK1WVQ – K1WVQ)

Francais - Deutsch (translated by IU5OMW Marco)



First trials - photo Northrop Corporation

In my ongoing research for ‘unconventional’ solutions for our hobby, I found this military-derived antenna, which can be interesting in certain current ‘environmental’ situations.
Although it is a military aerial, its name shouldn't mislead you: ‘DDRR’ has nothing to do with East Germany, Stasis or anything like that, but it simply stands for ‘Directional Discontinuity Ring Radiator’, the name under which its inventor, J.M. Boyer, registered the patent on behalf of Northrop Corporation in the 1950s.
After preliminary tests ashore (as shown in the photo above), the entire system was transferred to a military vessel (the USS Wheeling) for operational trials at sea.
The results were flattering, according to reports at that time.

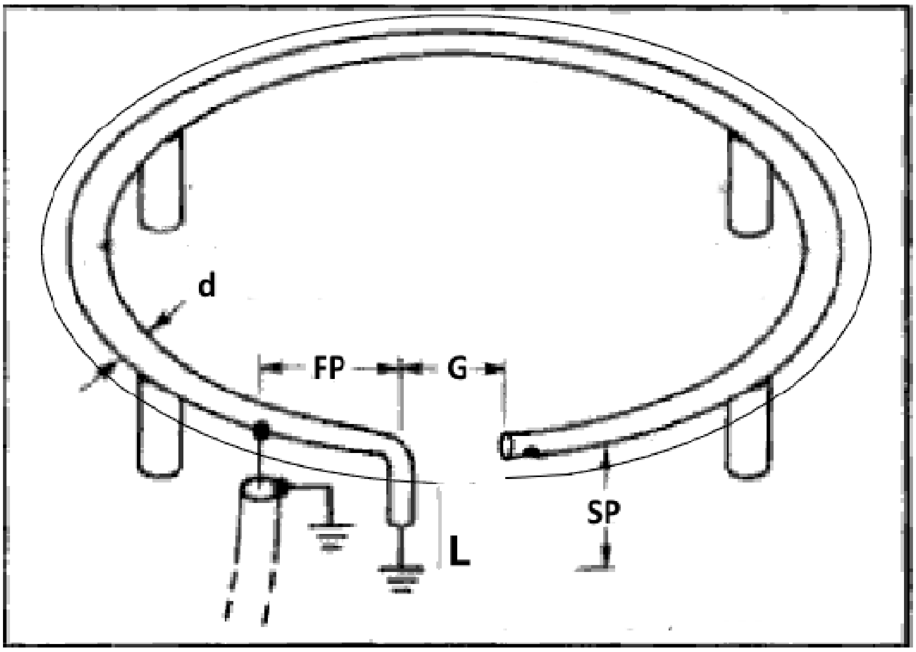


Motor vessel USS Wheeling. The antenna is next the helicopter landing area.

All this introduction just to say that the antenna wasn't the crazy idea of a mad radio amateur, but rather a well-designed and calculated antenna by professionals.

Our OM world quickly took up the idea, and there were numerous documented DIY constructions (the best known is "A 40-metre DDRR Antenna", W6WYQ, QST 12 1971). It is well described in the 1988 ARRL ANTENNA BOOK (I don't have any older editions).

So, let's get down the chase, and look at the amateur radio adaptation in detail.



DDRR diagram

As can be seen from the diagram, the antenna consists of a conductor (the RADIATOR) connected on one side to GND, with a vertical section and the rest arranged in a circle parallel to the GND plane.

As for the dimensions, I must warn you: on the internet you will find everything and its opposite, as usual, especially regarding the distance between the radiator and the ground plane!
My view is that the measurements to bear in mind are those indicated in the ARRL Antenna Book, i.e., referring to the diagram above:

L: 75 / F(MHz)
SP: 0.0069 * L
FP: 0.25 * SP
The other measurements must be determined experimentally.

The wire is APPROXIMATELY lambda/4 long, made of copper (preferably) or aluminium tubing, with the largest possible diameter (for tests from 10MHz upwards, RG213 is also suitable).

Power is supplied by connecting the centre conductor of the coaxial cable to the radiator and the shield to GND.

The position must be found experimentally for minimum SWR.

It is ESSENTIAL that the antenna is on a metal surface at least as large as the diameter of the circle.
Metal-clad attics, metal garage boxes, and electro-welded chicken wire placed on the ground are all suitable.
It is very important that the contacts between the metal parts (radiator, GND plane) are properly made: bolt or welded terminal for metal planes, while for the mesh a plate and counter-plate with the mesh clamped in between is required.

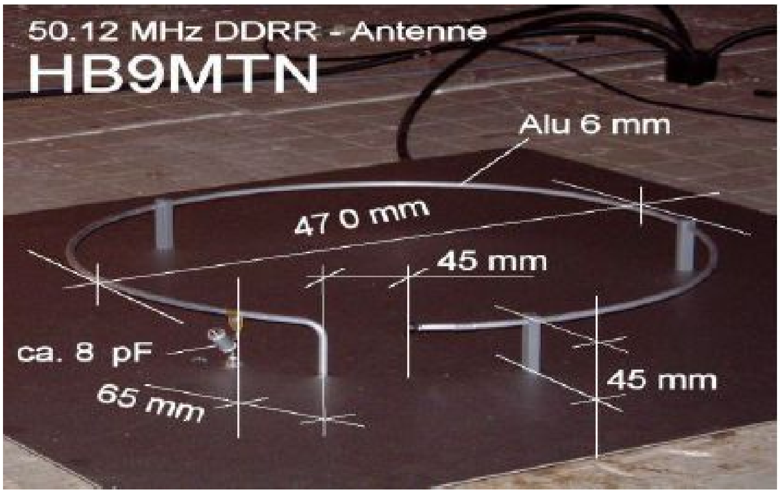
The spacers must be made of plastic or unfilled fibreglass, keeping in mind that the open side of the radiator is high impedance and therefore the voltages are in the order of thousands volts, even with powers as low as 50W. (RF burns are VERY painful......)

The DDRR has a high Q, and therefore the bandwidth is narrow, although not as narrow as a magnetic loop.
If you research online, you will find that in many implementations, a high-voltage variable capacitor is placed between the open side of the radiator and GND, with the capacitor moved by a motor controlled from inside the station. This allows the antenna to be tuned over a wide range of frequencies.

Now, if only a fixed part of the spectrum is needed, 20 or 30 kHz, for example the CW or WSPR or FT8 segment, the capacitor can be eliminated and the length of the radiator and its geometry can be adjusted (by widening or narrowing the coil). Otherwise, the variable capacitor is necessary.
It goes that the main advantage of this antenna is that it is practically invisible and very small in size when compared to a ¼ wave vertical with adequate radials, but it is comparable in terms of polarization (vertical), radiation pattern and gain. Furthermore, as the radiator is connected to GND, the noise it catches is low.

Feel free to TRY.
Good DX from Mauro IK1WVQ – K1WVQ

example of temporary setup (27MHz)



DDRR implementation for 50MHz