

Medium Wave Magnetic DF Loop

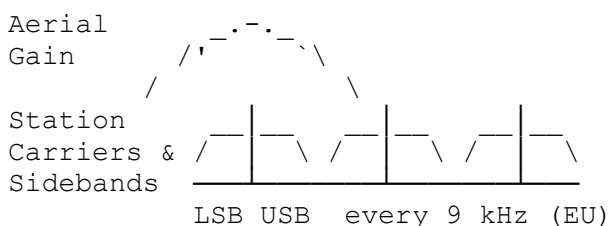
By G8MNY

(Updated Apr 15)

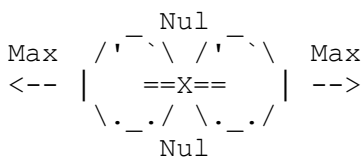
(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

The antenna is the same as the old valve radio frame aerials that used to be built into the wooden case & because of its signal capture ability. Large ones are commonly used as an external aerial for DXing MW station & reducing QRM etc

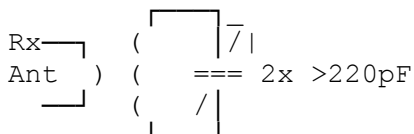
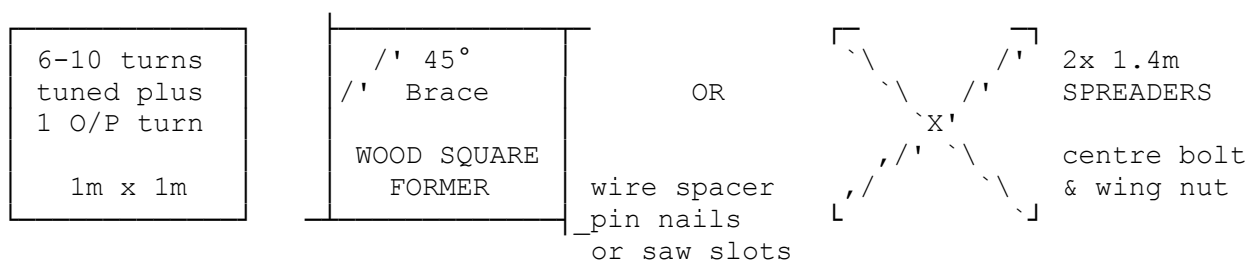
Like the modern ferrite rod aerial, it has very high Q. Using one over just a loop aerial will improve the signal by the Q factor & also reduce the Rx bandwidth by the the same factor. So most of a strong broadband wideband QRM pulses (like spike mains QRM) can't get in to the non linear mixer in the Rx & cause the common coherent out of band overload), At RF the aerial "seems" to be much bigger than it really is!



Unlike short wire aerials it can also be used to null out QRM from a specific direction as the aerial polar diagram has deep nulls, & usually leaves plenty of wanted signal for the Rx.



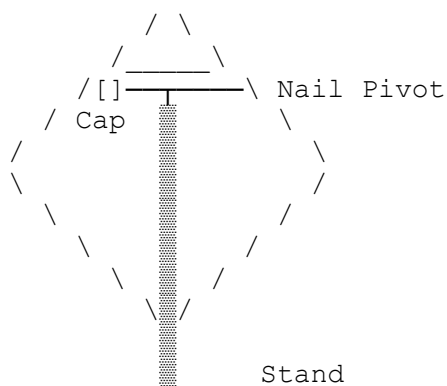
The dimensions to make one are not strict & any large area loop will do.



The exact number of turns depends on the L you end up with, its inter-winding capacitance, the frequency wanted & the tuning C used. An alternate to more turns for LF end (LW) is a switchable 1000pF cap teed across the tuning C.

The tuning C can be any of the old AM radio types mounted with a slow motion drive on the frame if you can arrange that. Some people even use remote tuning & loop rotation (e.g. in loft) with servo from shack PC etc.

My one was a bit smaller than 1M square, made from 4 wood strips 1x 4x 82cm but nailed together into a diamond shape with a small horizontal brace at the top. That has a nail pivot that engages into a tube of a stand. The cap was a geared MW + VHF (4 C sections + presets paralleled up).



The turns used was 8 + 1 secondary. I did not use a taped coil as this unbalances the tuned circuit making it more susceptible to near body interaction. I started with 7 turns, but could not tune 531kHz so I added 1 more turn to just about tune the whole of MW.

LOW Z RX

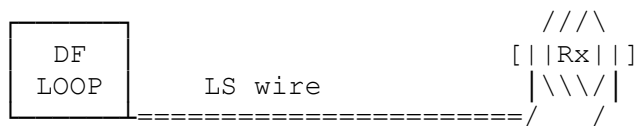
One turn provides a good drive for 50-75Ω on MW. The lead to the Rx can just be balance Bell/LS wire etc.

HIGH Z RX

Generally there is so much signal, that 1 turn is also OK, but try 1-3 turns for a car radio Rx high Z input for MAX Rx signal.

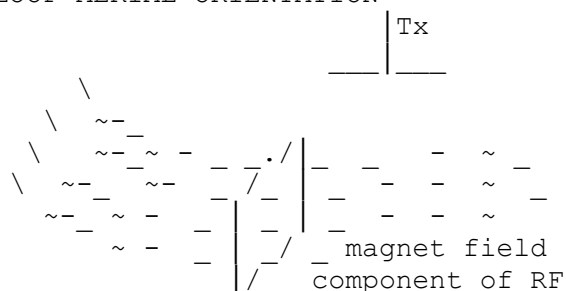
FERRITE ROD RX

With a ferrite rod Rx, no output turn is need, just place the Rx in/near the loop for signal improvements of around 20dB. Note it greatly reduces image signals on small Rx if tuned to the correct frequency.



If remote ferrite rod Rx needed (e.g. Rx in shack near QRM) use 1 turn & bell wire feeder, to drive a few turns around the Rx (Rx ferrite in line).

LOOP AERIAL ORIENTATION



As MW Tx are all vertically polarized ground wave, loop orientation needs to be in the vertical plane with one edge pointing at the Tx for the maximum Rx signal. The very sharp null point is ± 90° to this when none of the magnetic component goes through the coil. With a vertical wire whip aerial coupled in to the Rx as well it is possible to "Sense" the direction of the signal as well as just the line it is on.

QRM SOURCES

Do not put loop aerial too near mains wires running vertically in walls. TVs & computer screens, have strong high frequency AC magnetic fields & can cause problems. SMPSU in computers, economy lamps & even remote controls, can all cause QRM but normally only to weak signals.

Do not use it beside metal framed windows/doors/tin foil backed board walls, as these can effectively be a shorted loop & de-tune the loop as well as reduce the Rx signal.

#### DEMOS

As well as a practical Rx tool, it makes a very good demonstration of some hands on radio principles for public & ham students alike.

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73 De John, G8MNY @ GB7CIP