Pa0nhc ”Magnetic Field” Strength Indicator (20171220) 20230320.

Why i developed this instrument :

The resistive, inductive and capacitive parts of the impedance of a capacitively tuned "small" loop, vary sharply beside the real resonance frequency of the loop. How sharply is depending on the ratio : loop circumference / wave length. In practice, tuning a capacitively tuned "MAGNETIC" loop antenna to resonance, is more critical than tuning low Q resonating antenna systems.

A capacitive tuned (magnetic) loop antenna will only *radiate* optimal at the *resonance* frequency of the loop.
Not necessarily at the *frequency of best match* at the feeder.

The VSWR indicator at the transmitter site can suggest optimal VSWR, while a "Magnetic" loop is NOT tuned for maximal radiation (resonance). A part of the RF energy is then dissipated into the transmission line and/or the matching system

If the coupling circuit (coupling loop / capacitances/ transformer) not only shows magnetic coupling, but some parasitic capacitve coupling to the loop too, then it will cause capacitive asymmetry into the loop. A gamma match (*asymmetrica*l capacitve coupling network) also results in an capacive asymmetrical loop.
All causing a difference between the loop best VSWR frequency, and the loop resonance frequency. When then tuned to best VSWR, the loop *efficiency is not maximal,* as the loop is not resonating.

Example of wrong tuning.
A perfectly symmetrical loop is de-tuned until its VSWR = 1 : 3.
Without re-tuning te loop, the VSWR is “corrected” to 1:1 using an ATU.
The loop is still NOT resonating, but shows “good VSWR”.
The efficiency of the loop is now bad.
Much energy is dissipated into the feeder and the coupling network.
Only the *remaining* energy is fed to the loop.

Conclusion :
Tuning a loop to show lowest VSWR is no guarantee it is radiating maximal.
The magnetic near-field-strength of the loop should be monitored.
.Using this “Loop tester”, the loop can be tuned for *maximal field strength*
(= loop resonance).
If the VSWR should then not be optimal, it can be corrected to 1:1 using an ATU.
OR
You can alter the coupling to the loop until boht max. radiation and best VSWR occur at exact the same frequency..