Pa0nhc Magnetic Field Strength Indicator 20171220

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 it. 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 radiate optimal at his real *resonance* frequency.
Not necessarily at the frequency of best match.

Unwanted capacitive coupling between a small loop and a :
- coupling loop,
- gamma match
- ring core transformer
are of prominent influence to the tuning behavior of a loop.

Resulting in :

1. A not purely magnetic coupling between the transmission line and the loop radiator
and / or
2. A not perfectly balanced loop radiator.

A coax feeder will act as a transmission line transformer if mismatch occurs between antenna and feeder.
It is therefore of influence to the reported antenna VSWR at the transmitter location.

Possibly resulting in a frequency difference between :

- The *resonating* of the loop frequency (max. field strength)
and
the "best VSWR" frequency observed at the transmitter location.

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.

Example :
A loop is perfectly matched.
It is de-tuned until VSWR = 1 : 3 .
With an ATU the VSWR is made 1:1 again.
Resulting in a non-resonating loop with very bad efficiency.

Conclusion :
Tuning a loop to VSWR 1:1 is no guarantee it is radiating maximal.
The near field **magnetic** field strength of the loop should be monitored
to tune a loop for maximal efficiency (resonance).
The VSWR should be 1:1, but if not, could now safely be corrected using a ATU,
without re-tuning the loop.