Experiments with the VHF Magnetic Loop

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Credit Line: Igor Grigorov: Practical Antenna Design. Moscow, DMK, 2000 (in Russian)

Some experiments on use of "printed" VHF magloop (i.e., magloop made on a PCB) were made at the 2-meters band. Loop has square shape and wide of printed wire in 5 millimeter. 50-Ohm coax was matched with the magloop by a coupling loop. **Figure 1** shows the design.

Design of the Magloop: Coupling loop (item 1) is located in the corner of the magloop (item 2). Rigid coax (item 3) has 8 centimeters length and fastened to the PCB by a clamp (item 6). Treads (that hold the coupling loop) (item 5) go through holes (item 4) in the PCB.

Matching: The magloop is connected directly to a VHF hand- held turned on to Low Power (100 mW). Firstly the perimeter of the coupling loop consists of 1/3 from perimeter of the magloop. Do matching of the magloop by decreasing of the perimeter of the coupling loop. Do tuning of the magloop capacitor every time when you decreased the perimeter of the coupling loop. Field Strength Meter shows you how coupling loop work. I used FSM described at **Reference 1**.

Passband of the Magloop. Passband of the magloop was near 2.0 -MHz at the 2- meters. The passband was determined by FSM by decreasing of the RF level in twice compare to central frequency.

Theory and Practice. MMANA (see **Reference 2**) allows to suggest that the magloop has gain minus 5…- 7 dBi. Practical test of this magloop have shown that on the open area the antenna was equal to hand-held helical antenna in 14 centimeter length. However the magloop do the same job as a lambda/4 vertical (50 cm at 144 MHz) when communication was inside and from concrete buildings.

Caution: Sometimes (at some cheap hand- helds) the magloop (working at transmitting mode) could be seriously worsen the quality of the signal because of the strong magnetic inducing to the transmitter.

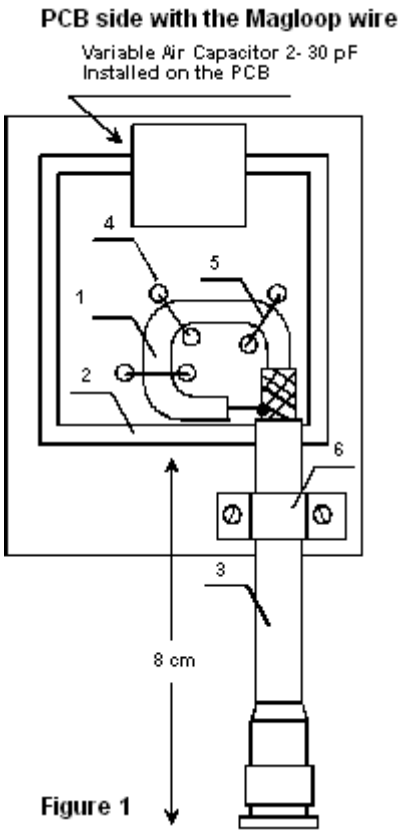

Figure 1 Printed VHF Magnetic Loop

Experimenters with the VHF Magloop

For further experimenters were simulated (with help of MMANA) a chart of Resonant Frequency (and Amplification) Vs. capacitor capacity (suggested the capacitor has Q= 1000) for squre magloop (5x5 cm made of wire in diameter of 2 mm or 12 AWG).The magloop is shown on **Figure 2**. **Figure 3** shows the chart. Certainly the chart is only estimate because MMANA can not take all parameters for simulation. Anyway the chart gives some ideas what is possible to get from the magloop.

The chart shows that such magloop may work from 70 up to 190 MHz (it depends on the capacitor). Experimenters made with the magloop prove the suggestion. The magloop works not bad at receiving of FM broadcasting. A coupling loop was used for the magloop.

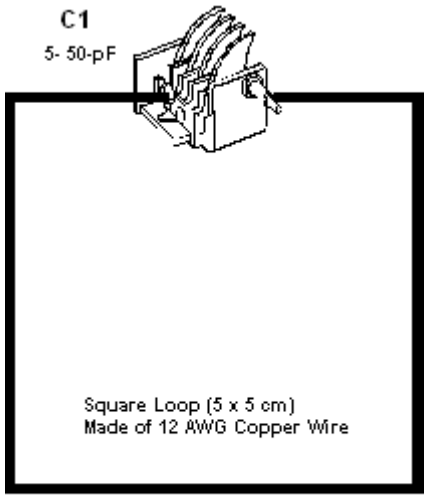

Figure 2

Figure 2 Wire VHF Magloop

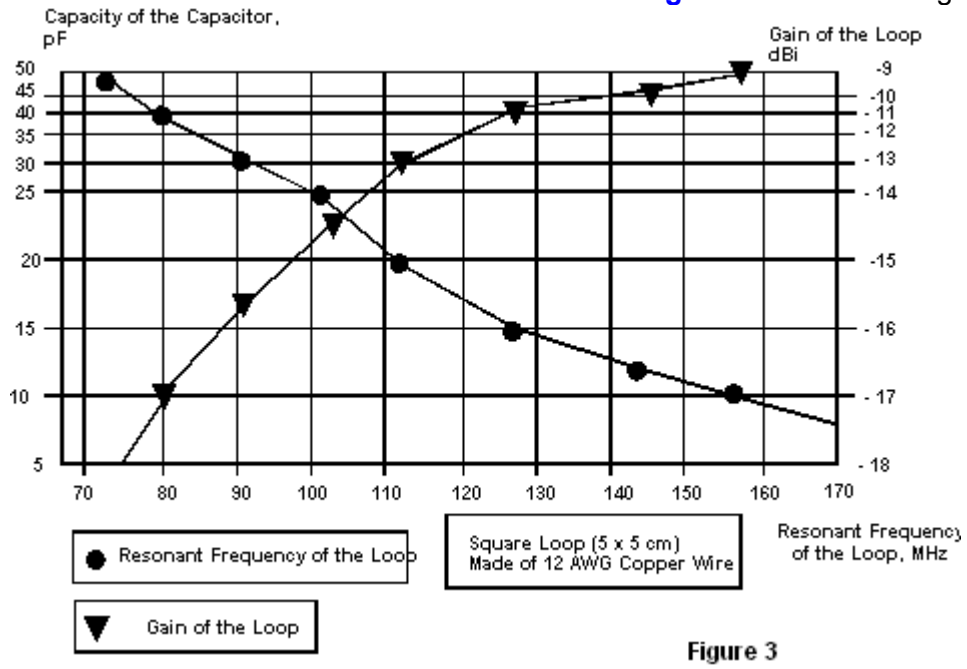

Figure 3

Figure 3 Chart Resonant Frequency (and Amplification) Vs. capacitor capacity

References:

1. Igor Grigorov. Antennas. Tuning and Adjusting. Moscow, RadioSoft, 2002 (in Russian)

2. Free Program MMANA (about MMANA see, for example, Antentop – 01, 2005)

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Igor Grigorov: Practical Antenna Design. Moscow, DMK, 2000 (in Russian)