A Simple and Very Sensitive RF Current Sensor

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A differential RF current sensor is shown on Fig.1 and Fig.2. It is sensitive only to magnetic field component. The differential schematics minimizes the electric field common mode leakage. The balun transformer is wound on toroidal core 12 turns to 1+1 turns. The sensor is connected to 50 ohms power meter described in [1]. This power meter is very sensitive and very low currents can be detected. The sensor is not calibrated and must be used for comparative measurements. Its frequency response is not very flat but it has quite wideband useful range. The measurement loop must be oriented in a way the magnetic field vector is normal to the loop plane e.g. the loop plane and the wire must line in one plane.

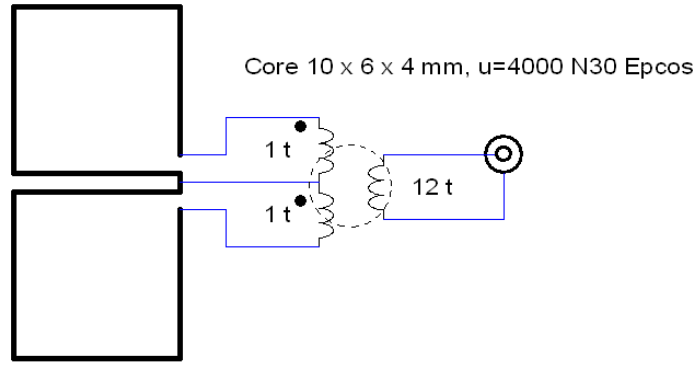

Fig.1

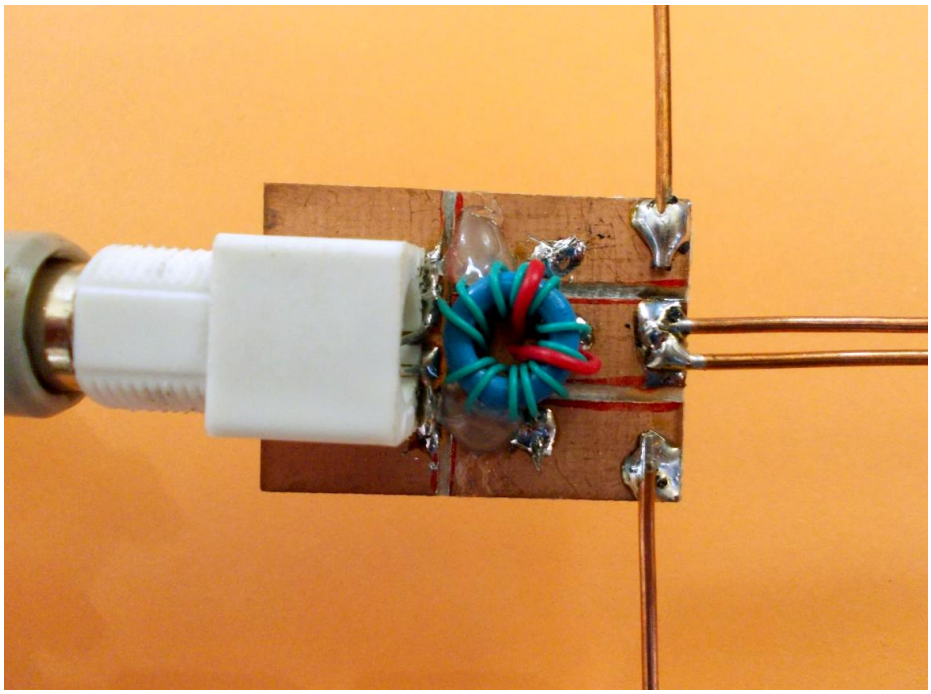

Fig.2

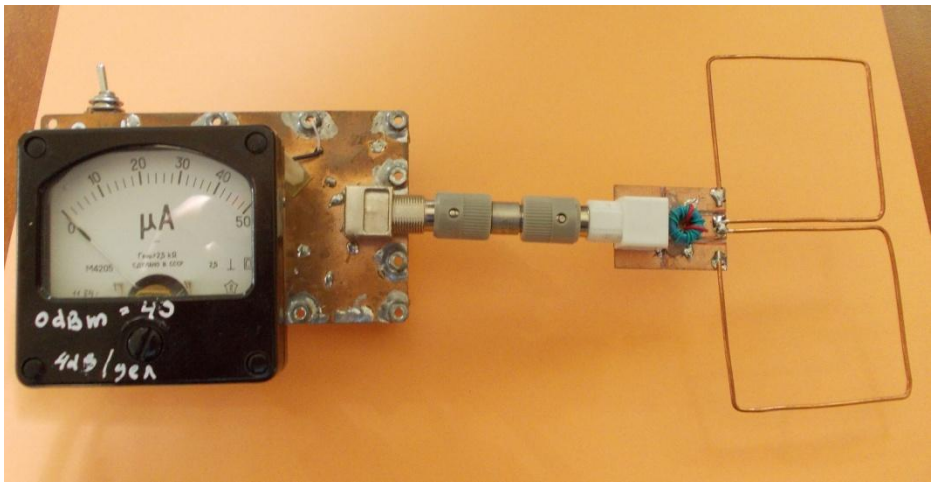

Fig.3

Applications:

- I used this device to compare the currents in antenna wires. I have successively measured the equality of the currents in the very short elevated radials of my 80 m GP. The GP was fed by a VFO with only 0 dBm signal.
- I was able to detect the conducting noise current from the shack propagating along the antenna feeders and to test the effectiveness of the baluns.
- To detect the noise generated by switching power supplies.

[1] Wes Hayward, W7ZOI, and Bob Larkin, W7PUA, Simple RF-Power Measurement, QST June 2001 p.39