

Small Magnetic Loop

Using Phaser Digital Mode FT8 Transceiver
Larry Nelson - K5IJB

A small magnetic loop antenna is an easy and cheap antenna to build. It can be used indoors or outdoors with near equal results. Stateside and DX contacts have been made with an indoor small magnetic loop and this 17-meter QRP transceiver running 3-4 watts.

QRP Transceiver

The [Phaser Digital Mode transceiver kit](#) by David Benson K1SWL and produced by Midnight Design Solutions has a maximum output of 3-4 watts using FT8 mode. The 17-meter QRP transceiver kit was selected. It was easy to build and performs very well



Circuit Board



Enclosure

Connecting a transceiver to a small magnetic loop is shown below. I like placing the SWR meter as close to the antenna base as possible. That gives a more accurate reading of what is really happening with tuning. Do not stay too close to the loop when transmitting, even at 4 watts. That is a reminder to myself as well.



Loop Description

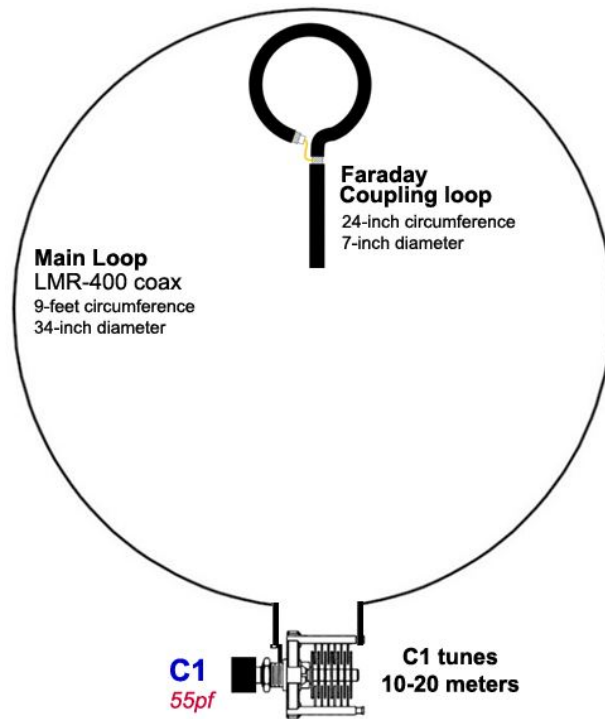
The basic configuration of an inductive-fed small magnetic loop consists of the main loop, coupling loop, and a capacitor - fixed or variable. This antenna requires no grounding or counterpoise since it is a resonant circuit. Performance is not limited by low height. My loop is used entirely indoors.

The main loop can be configured as an octagon, circle, or square. Circle configuration is the most efficient, but all three configurations will work.

Diameter of the loop conductor is generally 3/8 inches (.375 inches) or greater. RG-8 (model LMR-400) coaxial cable has a diameter of .405 inches. LMR-400 was chosen over copper tubing since (1) it is easy to work with, (2) requires no tools for bending into a circle, (3) has a solid center conductor for strength, and (4) the two-layer outer conductors (braid plus foil shield) insure less loss due to continual conductivity.

The fixed or variable capacitor tunes the loop antenna for lowest SWR. The capacitor can be located at either the top or bottom of the main loop, but always opposite the coupling loop. A manual or auto antenna tuner can also be used in addition to C1 for obtaining lowest SWR at the transceiver end.

A coupling loop is used for feeding the magnetic loop inductively. RG-8X coax is used for the coupling loop.



A full description article on the theory and building of a small magnetic loop can be read at [Small Magnetic Loops - K5IJB](#). The antenna stand shown is crude, but functional. I found it was easier to attach the main loop, coupling loop, and variable capacitor to wood supports rather than PVC using plastic cable ties.

Performance

The list of contacts is impressive for a 3-4 watt transceiver using an indoor loop antenna.

In the first 15 days after completing the **Phaser Digital Mode FT8 Transceiver** kit, I made 54 stateside contacts on 17 meters including two contacts with Hawaii. DX contacts included Canada, Cuba, Mexico, and Panama.

Using the distance measurement tool in WJST-X, contacts made by this QRP transceiver and loop have ranged from 640 miles to 3,200 miles. My QTH is El Paso, TX DM61.