Receiving Antennas for LW and MW Band

Amateur radio already has got LW bands- it is 2200- m (136- kHz) and 630- m (473- kHz). These interesting bands need not only transmitting but receiving antennas. The article is described several designs of receiving antennas for LW band.

At first I would like to introduce old but very useful article in Radio- Electronics magazine. It was published in the issue of June 1983 and described very interesting variant of the loop antenna for VLF- LF. It was article ***Loop Antennas for VLF- LF***: R.W. Burhans, pp/: 83- 87, the full article you may found at https://archive.org/details/radio_electronics_1983-06/mode/2up

Inside of the article it was part that described very interesting design of the receiving loop antenna made on a ferrite rod. The quota from the article described the ferrite loop antenna is below.

Balanced Loops

As discussed previously, to obtain the best null performance, loop antennas should be operate so that the capacitance between the antenna and electrostatic shield is the same at all points along the loop. With single winding that's a problem, since one end of the winding has to be grounded in some way. A loop with a center-tapped winding is often used together with a preamp with a balanced input, but there is a better way of winding loops on long ferrite- rods that also reduces the inductance of the whole winding and result in a single – ended terminal for the loop.

The technique, developed by the U.S. Army Signal Corps many years ago, involves right- hand – and left- hand-sense windings starting at the center of the core. The resulting loop, shown in **Fig.9**, still has opposite- phase nulls of opposite ends, but now has excellent electrostatic symmetry with respect to the trough shield. The sensitivity of this coil the same as that of a coil wound in a single direction from one end to the other, but the inductance is reduced, resulting in a higher self- resonant frequency. The termination point in the center of the core practically eliminates induction- field noise- pickup, even with a single – ended preamplifier system.

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June- 1983

When winding a coil with a relatively large number of turns, it is advisable to check the winding for inductive balance because the ferrite core material may not be uniform from end to end. Another factor contributing to non-uniformity is that it is difficult to wind a perfectly spaced coil by hand. That is why the figures indicating the number of turns on each side described in **Table 1** are different.

To tune the balanced- loop coil arrangement shown in **Fig. 9** to resonant at 60- kHz, a fixed capacitor to about 500 pF can be placed in parallel with a small variable capacitor of up to 350 pF (and the 330- pF distributed capacitance of the coils).

Ferrite rod antennas, almost similar to described above, were tested by the Russian amateurs. Results were pasted at forum at radioscanner.ru. I would like stopped by several designs of the antenna.

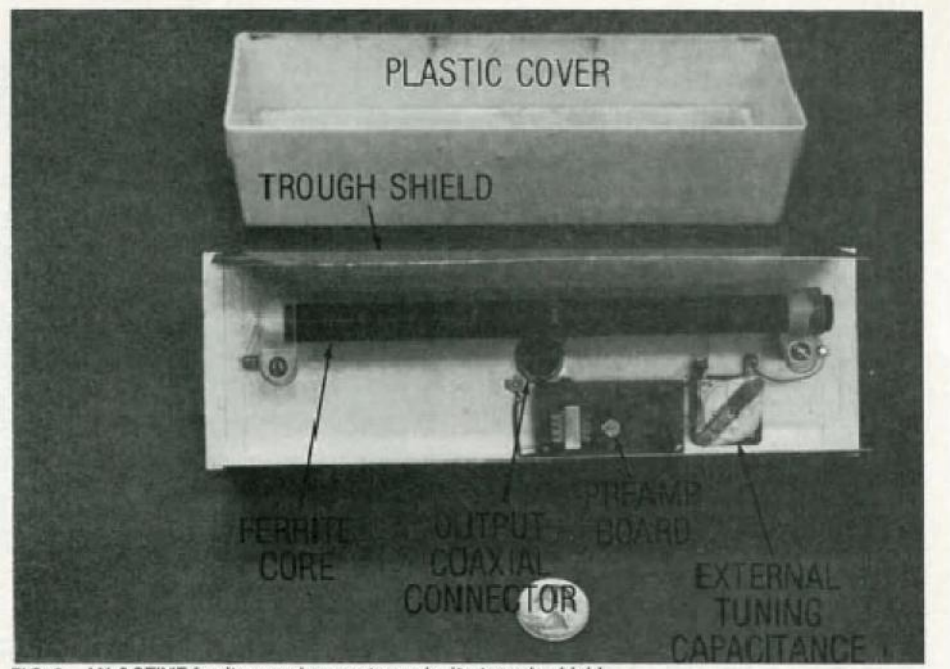

FIG. 8—AN ACTIVE ferrite-core loop antenna in its trough shield.

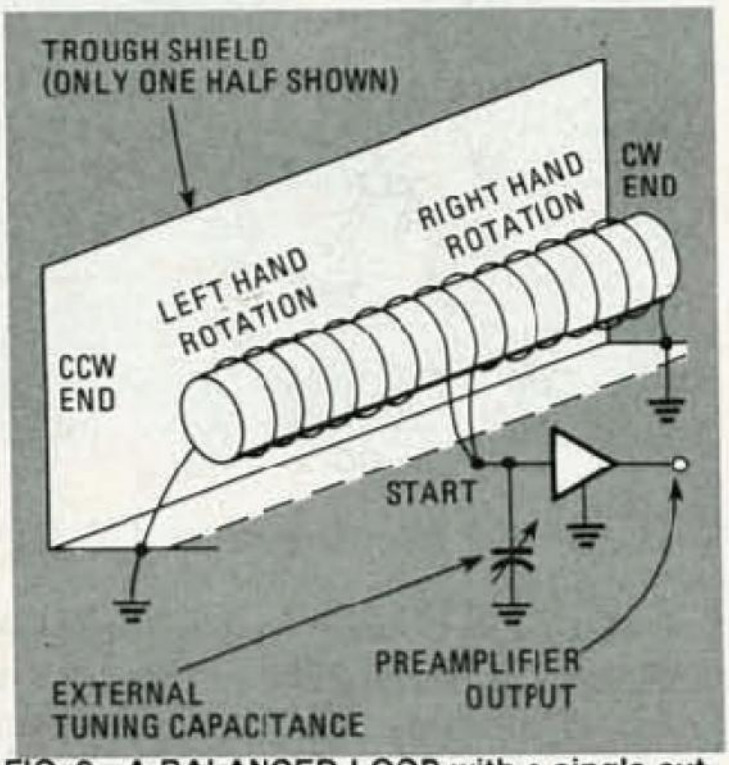

FIG. 9—A BALANCED LOOP with a single output can be made by using the left-right winding technique shown here.

TABLE 1—Loop Antenna Comparisons

Antenna	Square air frame	Square air frame	Small ferrite rod	Small ferrite rod	Small ferrite rod	Small ferrite rod
Materials	Aluminum channel 6 feet × ½ × ½ inch	Aluminum channel 6 feet × ½ × ¾ inch	Amidon 800 μ rod with trough shield	Amidon 800 μ rod with trough shield	Amidon 800 μ rod with trough shield	Amidon 800 μ rod with trough shield
Coil size	13½ × 18½ inches multiple layer	18½ × 18½ inches single layer	7½ × ½-inch solenoid	7½ × ½-inch solenoid	7½ × ½-inch solenoid	7½ × ½-inch solenoid
Turns wire	45, No. 28 stranded Teflon insulated	43, No. 28 enamel	555—270 left-hand 285 right-hand, No. 30 enamel	555—270 left-hand 285 right-hand, No. 30 enamel	555—270 left-hand 285 right-hand, No. 30 enamel	555—270 left-hand 285 right-hand, No. 30 enamel
Inductance	2.6 mH	2.5 mH	6.9 mH	6.9 mH	6.9 mH	6.9 mH
Capacitance	290 pF (distributed capacitance)	145 pF (distributed capacitance)	330 pF (distributed capacitance)	330 pF + 27 pF (distributed + external capitances)	330 pF + 680 pF (distributed + external capitances)	330 pF + 39000 pF (distributed + external capacitances)
Resonance	180 kHz	275 kHz	107 kHz	100 kHz	60 kHz	11 kHz
Effective Height	2.5 cm	2.5 cm	1 cm	1.4 cm	88 cm	16 cm

Figure 1 shows antenna made by participant of the forum with nickname XMAN. Antenna was wound on a ferrite rod from old transistor receiver. Above the rod it was placed copper foil. Foil has insulated Teflon film inside that prevented the foil to be closed. As XMAN wrote, the antenna gives very good receiving on LW and MW bands. The antenna was used as non- resonant, without tuning capacitor as it shown on **Figure 7**.

Other non- resonant ferrite loop antenna was described by participant with nickname 1428. Design of the antenna is shown on the **Figure 2**. Antenna was wound on a ferrite rod, it was Russian made ferrite rod marked as 3B1. As 1428 wrote, the antenna gives very good receiving on LW and MW bands. The antenna was used as non- resonant, without tuning capacitor as it shown on Figure 7.

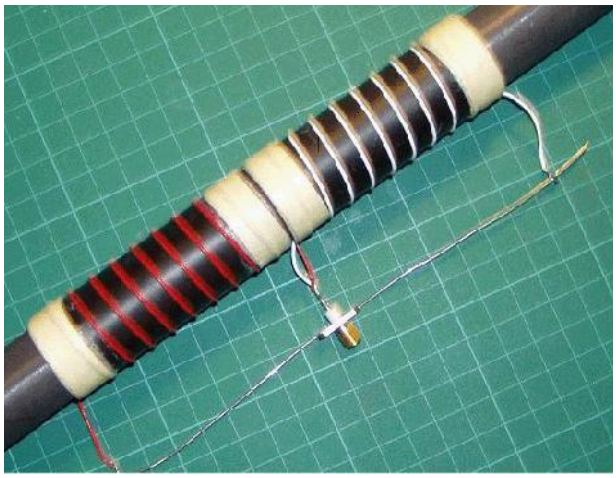

Figure 2 Antenna Made by Participant of the Forum with Nickname 1428

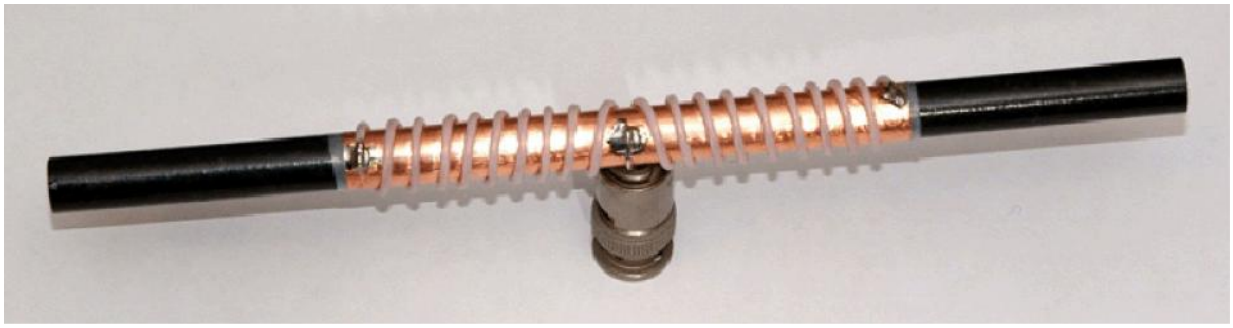

Figure 1 Antenna Made by Participant of the Forum with Nickname XMAN

Credit Line: http://www.radioscanner.ru/forum/topic22514-17.html

http://www.radioscanner.ru/forum/topic22514-16.html#msg956524