AS2-2-1

We've had some discussion of large-area air-core loops in this column (June 25/83 and Mar 20/82 DXM). A major problem with large-area loops is that they often show poor nulls and are difficult to move about in order to make use of these nulls. The following article shows one way to get good nulls with stationary large-area loops.

Nulling with Two Wall-Mounted Loops by Ben Peters

I have been experimenting with two large vertical loops mounted at 90° to each other on the walls of my room. Results were so interesting that I would like to relate my experiences and give instructions for building this system with a full recommendation to try it out. It is cheap and easy to construct, easy on the eyes, and easy to work with; only two capacitor knobs to be adjusted, with no physical tilting or rotation needed to give nulls which are consistently superior to the Radio West 22" loop or my dual Martens loop system described in Jan. 2, 1982 DX Monitor. Signal strengths from the pair of loops are quite good, but could perhaps be improved with more turns or larger dimensions.

Parts needed:

- 2--walls meeting at 90° convenient to your listening area. My walls were able to accommodate a loop of 2.5 meters on each side.
- 2--variable capacitors, each with total capacity of 1000 pf. I used dual-gang 500 pf variables connected in parallel. (Ed. note: these aren't common in North America.)
- 4--fixed capacitors of 470 pf to extend loop tuning range to the low end of the MW band.
- 4--SPST switches to be used with above capacitors.
- 20 meters of twinlead (300 ohm TV lead-in). Each loop uses 10 meters as they are 2.5 meters on a side. The twinlead is used as a two-turn loop.
- --some pins or nails to get the loops on the walls.
- --about an hour for experimental set-up, more if satisfied and a more permanent model is built.

More signal strength might be obtained by large dimensions or more turns on the loop. These options would involve experimentation with values of the resonating capacitors of course, and with the position of the taps (#1 and #6 in the diagram). The position of the tap is not critical (mine is about 2.5 meters fron the "floating" end of the loop), but the tap itself is very important as it allows the loops to be coupled to a receiver without loading down the loops too much. (Ed. note: The length of wire from the tap to the loop's floating end seems to correspond with the link coil of smaller loops, i.e., it picks up signal from the tuned circuit formed by the rest of the loop and the capacitors. A good way to make a large-area tuned loop work better).

Procedure: Start with connections #1 and #6 to receiver ground, and #2 and #5 connected together and running to the receiver antenna terminal. Peak the signal on loop #1, using its capacitor and switching in additional capacitance if necessary. Peaking may be easier with loop #2 initially disconnected. Then peak loop #2, disconnecting loop #1 if necessary. Reconnect loop #1 if it has been disconnected; near the peak on loop #2 one will usually find a dip in strength; touch up loop #1 for a deeper null. If a null is not found, then start the tuning procedure with loop #2. Other possibilities would be to connect #1 and #6 to receiver antenna and 2 and 5 to its ground terminal, or connect 1 and 5 to antenna and 2 and 6 to ground, etc. There are a number of variations in connecting the loops' terminals to the receiver, particularly if you also use connections #3 and #4 (the points where the twinlead connects back on itself.) For starters, these can be connected to receiver ground, while #1 and 5 and #2 and 6 are connected to the receiver antenna terminal. It is now possible to select among 3 stations on a channel, just by playing with the two variable capacitors. Do not forget to experiment with different connections of the loop to the receiver, although the first set-up mentioned above gives good results most of the time.

Examples of nulls:

a) 675 kHz--wall loops: France Inter under Hilversum III.
--R. West loop: France unreadable
--dual Martens loops: France unreadable

b) 873 kHz--wall loops: England (weak), Spain and USSR noted with AFN nulled.
--R. West loop: USSR good, Spain poor.
--dual Martens loops: USSR only.

A conventional box loop in the field of these larger loops will be affected by them of course; if the smaller loop is connected to the receiver and adjustments made to the wall loops, some interesting nulls can result. (Ed. note: When using the wall loop system with my receiver, I found that adjusting my 3' box loop's tuning or position also influenced nulls on the wall loops, even though the 3' loop wasn't hooked up to anything.) My present system uses a Martens loop connected to my receiver in the usual manner. Points #1 and #6 of the wall loops are connected to receiver ground, but no other connections are made. Nulls are produced by adjustment of the variable capacitors on all three loops, plus some adjustments of the position of the Martens loop.

News from Europe

Ben Peters sends more information on using his wall-mounted loops. For daytime and top-band nulling, try connecting terminal 3 (or 4) to receiver chassis (via shield of coax if you're using it), and terminal 4 (or 3) to the receiver antenna terminal. Nulls may be harder to find, but DX signal strengths may also be much better. Try connecting terminals 1 and 6 together in this mode as well.

Another nulling trick for those who don't like to have to tilt a big loop for a deep null, is to construct a ceiling loop. This is a two-turn "box" loop wound near the ceiling (horizontally) and resonated with a suitable value variable capacitor. Null the unwanted signal as best you can with the regular loop, then tune the ceiling loop for a deeper null. (This system would not be a good idea if you wanted to make accurate direction-finding measurements with your loop). This is a similar idea to Mike Levintow's "Using Two Loops to Generate Asymmetrical Receiving Patterns (IRCA Reprint A12).

-- A West German amateur has been experimenting for several years with loop antennas which can be used for transmitting on the 80 and 40 meter ham bands, and in the process has found them very effective for receiving as well. His best version appeared in the German amateur radio magazine CQ-DL, and the device is available commercially in Germany. The design might be of interest to those who favor the possibility of large sensitive loop antennas.

U1 is 10.5 meters circumference, and is formed of 20 mm diameter copper pipe. C_A is about 160 pf and is tuned remotely using a small barbecue (rotisserie?) motor. The pick-up turn U2 is formed of 2.1 meters of RG-213/U coax connected as shown. The ratio of U1 to U2 length is apparently best at 5:1. The whole device is rotated by a TV rotor. This has also been used against a vertical and two radials for a cardioid pattern. U1 and U2 can be more than one turn according to the designer. (The mind boggles at applying something like this at MW!)

-- If you know enough of the language to read a simple German novel, and have a German-English technical dictionary, Die Deutsche Funkpeil-und-Horch-verfahren bis 1945 by Fritz Trenkle (ISBN 3-87087-129-6) may be of interest to the dedicated loop builder, as it covers radio direction-finding techniques in Germany up to 1945--a subject of some interest to the military, so a fair bit of research went into it. Gives lots of practical info on air-core loops, "cross-loops", goniometers, etc. Cost is in the US$20 range; info from AEG-Telefunken AG/Anlagentechnik, Geschaftsbereich Hochfrequenztechnik, Sedanstrasse 10, 7900 ULM, West Germany.

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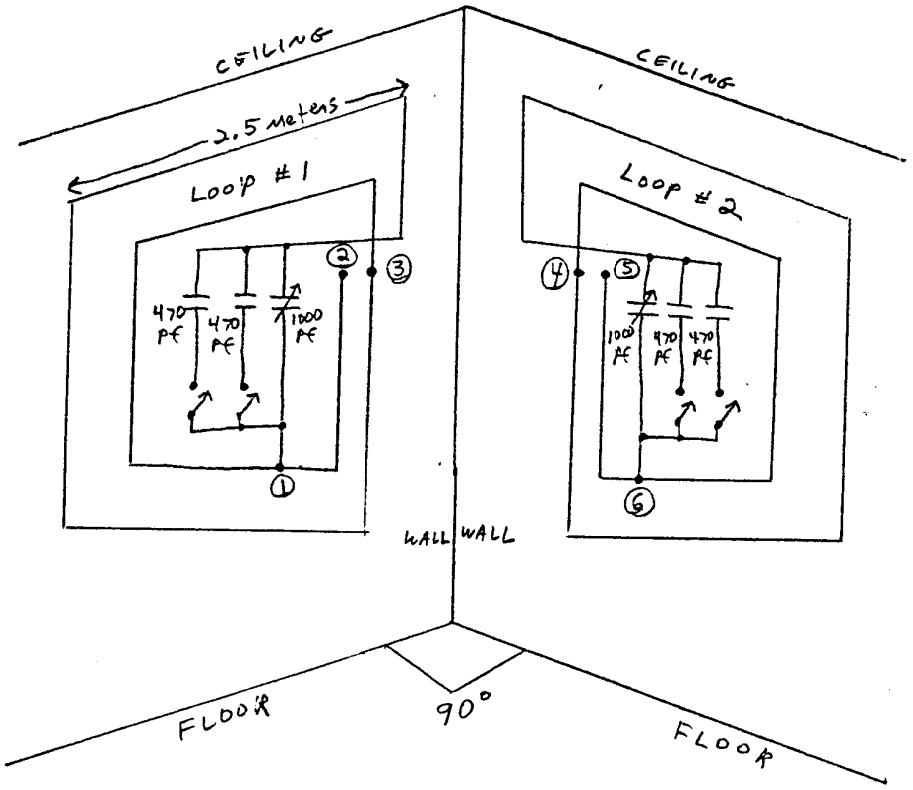
WALL-MOUNTED LOOPS



WEST GERMAN AMATEUR LOOP