A DX Evaluation of the Radio West MW-1 vs. the Worcester SM-2 Ferrite Loop Antenna (from Mark Connelly, WATION)

This is a comparison of the new MW-1 loop against the popular, older design SM-2. Considerations of interest to the DXer are the following: 1. Sensitivity 2. Frequency range covered 3. Nulling 4. Tuning sharpness/ selectivity of the preamplifier 5. Ease of operation/ physical construction of loop.

Now on to the tests:

1. Sensitivity was checked using my R390A receiver and 5 selected local stations. The signal was peaked up on the SM-2 and receiver antenna trimmer. The RF gain was then set for a mid-scale (50 dB over zero, or an "S9" reading). Then the MW-1 was peaked (after removing the SM-2 and connecting the MW-1 of course) and the trimmer retweaked for peak level. The meter reading with the peaked MW-1 was noted against the normalised 50 dB level for the SM2. Here are the results:

WEEI-590 MW-1 3dB over SM2
WHDH-850 MW-1 3dB over SM2
WBZ-1030 outputs equal
WEZE-1260 SM2 5 dB over MW-1
WITS-1510 SM2 12 dB over MW-1

A useable-sensitivity test, taking into account desired signal versus noise & off-frequency splatter, was done by tuning in Italy on 1332 around 0530 GMT after local WHET had gone off. The signal was S9+10 on the SM2 on peaks and S9 on the MW-1, receiver RF gain up to full. The SM2 signal had slightly more hiss, also splatter seemed to be a little worse. The MW-1, overall, had a slight edge in desired-signal audio clarity.

2. The frequency range covered by the SM2 is the American broadcast band only. With the MW coil, my MW-1 could cover 360-540 on the "Low" frequency switch position and about 500-2000 kHz on the "High" position. I used a Westinghouse RBM3 LW receiver for this test.

3. On nulling it was hard to judge which was better. Both antennas could achieve nulls of considerable depth on groundwave and long-skip signals. Both were relatively ineffective on powerful high-angle short-skip stations like WPTR-1540 and CKLM-1570. The MW-1 seemed to null over a slightly wider position swing than the SM2. The MW1 should be held by the end of the ferrite rod when tilting in a vertical plane; a null may change when the hand is removed. This hand-effect is really no worse than that experienced when using the SM-2, however.

4.Tuning sharpness--a measure of how much adjacent stations will be down at a retune of the loop to the desired station. I used a Palomar Engineers crystal calibrator to inject signals every 5 kHz into the antenna. The calibrator was positioned in the lobe of antenna pickup, about a foot from the loop. The "desired station" was peaked at 50 dB with the R390A RF gain about mid-position. Then carriers on +5 kHz (a typical split) and ±20 kHz from the desired frequency were peaked up; then the strength of the centre frequency was re-measured. Numbers noted are the dB difference between the centre frequency signal when peaked on its own frequency versus its strength when peaked on the aforementioned adjacent carriers.

Frequency	DB differences -5 kHz	+5 kHz	-20 kHz	+20kHz	
600 kHz	15	17	38	42	MW-1
	13	15	38	40	SM2
800	10	12	37	40	MW-1
	6	9	29	30	SM2
1000	3	8	19	20	MW-1
	6	8	23	24	SM2
1200	2	3	10	8	MW-1
	10	9	23	24	SM2
1400	2	3	5	8	MW-1
	3	4	23	24	SM2
1600	1	1	3	3	MW-1
	5	2	18	19	SM2

The above figures give the SM2 the edge in sharpness from 1000 kHz up; below 1000 kHz. the MW-1 has a slight edge. Taking this result plus the sensitivity test into account, it is evident that the MW-1 is a better low-band performer and the SM2 does better above 1000 kHz.

5. Other considerations: The battery clip on the MW-1 may not always hold the battery in place--a bottom plate under the battery would remedy this. The MW-1's wooden base is convenient for mounting a good compass (Silva or other types). You might want to epoxy a pience of wood or G-10 epoxy glass to one end of the MW-1 ferrite rods so you can tilt the loop without touching the rods. SM2 owners may also find that if they epoxy wooden extensions on the shielded case, hand effects on nulling can be signaificantly reduced. Nulling ability of the SM2 is not greatly affected by the surface upon which it is placed; however, the MW-1 does not null well if it is placed on a metal surface--I found it necessary to use a wooden table for the SM2 versus MW-1 tests. Radio West makes it clear in their instructions that the MW-1 should be placed away from large metal objects.

In conclusion, the differences between the two loops are fairly subtle; each has its advantages and disadvantages. This analysis may help to sway DXers to one antenna or the other; which one is selected will be based on personal requirements. You pay a little more for the MW-1, but for this you get the capability to change coils and cover down to 150 kHz and up to 5 mHz. For another opinion on commercially-available ferrite loops, consult Mike Sapp's recent article in DX Monitor pp 517-518 (10 June 1978). Please keep the following in mind: these tests were done with just one MW-1 and one SM2. Characteristics of the antennas are not deemed to be held to such a tight military style consistency that tests run with other MW-1's and SM2's could be expected, a priori, to yield the same results. What is needed would be further testing by other DXers, so overall patterns could be discerned.