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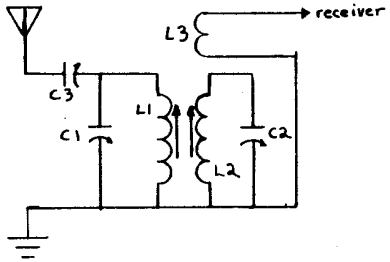
A High Performance Preselector for MW

by Don Moman

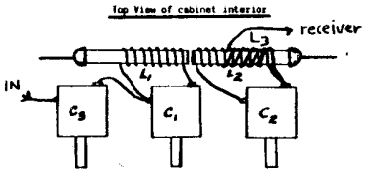
(In recent years, relatively inexpensive shortwave receivers have come on the market with some good features--digital readout, reasonable selectivity, ease of use etc. Although such receivers as the FRG-7700 and the R-1000 tune medium wave, they are not ideal MW DX machines in any but the most rural areas when using a random wire antenna, due to problems with front end overloading. A few random wire tuners are on the market, but only the McKay Dymek DP-40 uses two tuned circuits of preselection, and two seem necessary when strong stations are nearby. Don Moman of Shortwave Horizons has devised a random wire tuner for MW which will help out a good many receivers with MW overload problems. The following article is from the CIDX Messenger. --ed.)



Components:
C1, C2, C3 are 365 pF variable capacitors
L1 and L2 are variable loopstick antenna coils. J.W. Miller #2007 or #6300 should do the job
L3 is wound on L2 and consists of 12 turns of #22 gauge insulated wire.

Construction:
The unit should be built in a suitably sized metal cabinet for shielding purposes. Parts layout is up to the builder but should follow the basic plan at the left.

L1 and L2 are simply mounted end-to-end. A ¼ inch round piece of wood can be inserted in each coil to keep them in alignment. This is important as the coupling between L1 and L2 provides the means of signal transfer.



The cases of C1 and C2 should be connected to ground as in the schematic. C3 must not touch the case. It may be mounted using rubber Silastic RTV type adhesive--sold in many hardwares as a Silicone Rubber product. It provides a strong but flexible bond that is electrically non-conductive. You may want to use a plastic extension shaft on C3 and mount it back farther in the cabinet to prevent undesired pickup from your hand.

Operation and Initial Set-up

L1 and L2 have adjustable cores so coverage of the MW band is made easy. Just set C2 at maximum capacity (plates meshed) and adjust L2 so you get a signal peak at 540 kHz. L1 can be set so the core is in the same position as L2. In use, the setting of C2 will be quite predictable, i.e. the dial can be roughly calibrated. C1 and C3 interact greatly and will vary somewhat depending on what antenna you are using. Adusting them simultaneously you will find there are many positions of signal peaking but the maximum peak will only occur at one setting. This is harder to explain than it is to actually perform!

Performance

The RF selectivity provided by this device will greatly increase the MW capability of modern broadband sets like the Yaesu FRG-7700 and others, in areas of high signal density. In fact the 7700 and tuner will outperform, by a large margin, a "lone" Drake R-7. I have noted, on hundreds of comparisons, that a weak signal on the R-7 (covered by intermod products) is free from such products on the 7700 using the tuner. This is not to infer that the 7700 is the ultimate MW set, just that a simple set of tuned circuits can allow it to outperform a set costing twice as much. When the tuner is used with the R-7 the resulting system is capable of operating under extremely high signal levels. Now if we could just get rid of those w-i-d-e local AM'ers--or at least convince them to reduce modulation levels to less than 100%--we might even be able to do some DX'ing from our urban locations.

Further Performance Notes (NHP)

Tune-up procedure:

1) Tune radio to desired channel with tuner bypassed and tune C3 to minimum capacity (plates unmeshed)

2) Switch in tuner. If no signal noted, increase C3's capacity until some signal is heard. Tune C2 to peak; tune C1 to peak. Reduce C3's capacity if attenuation (for better signal handling in radio) is required; retune C1 for peak.

My homebrew toy radio has reasonable signal handling ability in the city using a loop, but a 50' random wire makes it useless without some sort of tuner. Don's tuner really makes a worthwhile addition to the radio in this case. Before sunset at this location, CKDA-1220 can make mincemeat of KFBK-1530 (2x1220 - 2x455 = 1530) using a random wire straight to the receiver. With the tuner, there's just the slightest birdie on KFBK. My own homebrew preselector (described in DX Monitor Jan 27, 1979) can eliminate the last remnants of the birdie, but in general, there's little to choose between the two circuits.

Another good examplw was Belize-834 which was inaudible one evening when using the random wire directly--all that could be heard was intermodulation distortion (IMD) from locals. With the tuner, the IMD was gone and Belize was heard at fair strength using the same wire. Even using a 1000' Beverage out in the sticks with this tuner made my radio handle signals a lot better.

Are there any drawbacks to the preselector? Other than adding a few more knobs to turn, there is some loss of signal on some parts of the band when using the tuner. In general, this shouldn't be a problem as most modern radios have plenty of sensitivity to spare on MW. If the loss worries you, try adding a "loading coil"--another loopstick will do--between the antenna and the input of the preselector. C3 will then peak a signal as do C1 and C2, though it will still interact with C1. Different adjustments of this loopstick slug may be needed when using different antennas, but in general there will now be no loss of signal through the tuner. Also, the loading coil/C3 combination will provide another stage of tuning between the antenna and receiver which will reduce overload problems further.

If constructing such a preselector looks too challenging to you, write SW Horizons, 6815 12th Ave., Edmonton, Alberta T6K 3J6 for a price on making one up for you.

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