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RECEIVER OFFSET TUNING FOR THE HW 100

Want transceiver offset tuning without costing a cent? Without altering your rig? Give this a try:

The introduction of the transceiver to ham radio has brought many advantages. But the one disadvantage that will force a fellow *not* to select a transceiver is its inability to follow the drift of a CW signal without altering the output frequency. This separation of frequencies was realized by a very simple method which can be employed in many other rigs. It has two good things going for it: no modification and no money required.

Theory

The theory behind this method of offset tuning is simple when you recall some of the laws we all knew to get our ticket (and then promptly forgot as they were of no *practical* value). Inductive coupling is the first order. This is the method by which we will get the change into the rig without altering or soldering. This method will allow you to introduce a change in the frequency of the main vfo. You'll also want to be able to remove the change at will, as on transmit. Figure 1 shows that the inductive coupling links the main vfo with the added tuned circuit. It is with this outboard tuned circuit that we can change the received frequency. The capacitance of the variable capacitor should be *low*. Try and keep it in the area of the tuning capacitor of the vfo. In my rig, the HW-100, this is 63 pF, so anything near that will do. The vfo coil in my rig is 5 μH so I kept the inductor of the remote circuit as near to this as possible. None of the values are too critical as to demand adherence to strict values. By keeping close to the values of your rig you will have better tracking and zero beating of the received CW signal. And you'll know that when the remote tuner is switched out of the circuit you are still near enough to be hearing the same signal you were listening to on the offset tuning. The greater the change in the offset tuning circuit values, then the greater the coverage up and down frequency from the zero beat. I felt that in CW a great range of offset tuning was not of any use and it also would make tuning more difficult. I just about use the full rotation of my capacitor and keep within the passband of my rig, the tuning rate is slow enough that I can move it around in the 400 Hz CW filter I have added to my HW-100. It is this simple remote tunable circuit that allows the offset tuning.

Construction and Circuit

The variable capacitor I used is a BC tuning variable with only the rear section in use. If you have any old variable in the

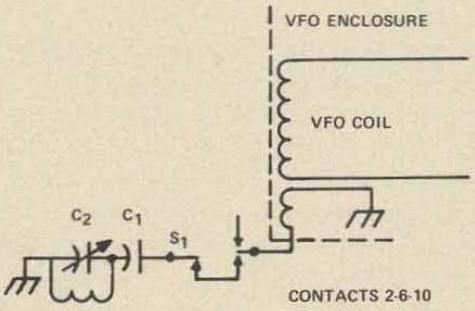

Fig. 1

junkbox, then that's the one you use. I reduced the high capacitance of this section by putting a 100 pF Mylar capacitor in series with it. (You can fool around with values until you get what goes best with your rig.)

The coil for the remote tuner was made after looking in the ARRL handbook; I found that a 1½ in. long coil by ½ in. wide (36 turns per inch) would give me close to 5 μH, which is good enough. The coil was made by winding 24-gage magnet wire, enameled, around one of those fat pencils used for advertising gags. The size of the wire is not important just so you can get about 36 turns to the inch on a half-inch diameter.

If you have spent any money up to this point you need a new junkbox. Now for the hookup.

The vfo of the HW-100 is removed according to the Heath manual instructions. Reference will be made to my HW-100, but any transceiver that allows you to get at the vfo and its coil can be used with this offset tuner. The vfo is turned bottom-side-up so the inside of the enclosure is accessible. Be careful not to damage the screened dial. One end of the pickup wire has its insulation scraped away and it is soldered to ground on the inside of the vfo, as close to the coil as you can manage. This is the only soldering and modification to the rig. In my rig, the ground for the coax feedthrough into the vfo was used as ground. With tension on the ground connection, make one full turn around the vfo coil and while still keeping tension bring the wire to the nearest spade bolt. Wrap the hookup wire around the bolt 2 or 3 times, just for anchorage. Make these turns just at the base of the spade bolt where it meets the edge of the vfo enclosure and tuck the turns down into the little space between the shaft portion of the spade bolt and the edge of the enclosure.

By tucking the turns of wire into these spaces you will keep them from being cut or grounded by compression from the edge of the vfo enclosure when it is remounted and the nuts tightened. It is most important that the turn of wire around the vfo coil stay in place without the least movement. Movement of any kind no matter how slight, even from vibration, can alter your received signal a few hertz up or down the band. A drop of some kind of glue will do the job of keeping the wire turn in place.

Remount the vfo as directed in the Heath manual. Make sure the remaining free end of wire is not caught under the edge of the vfo and is outside the vfo enclosure. The wire is now fed to S1, from S1 to C1, to rotor of C2, then to ground from C2.

If automatic switching is desired, place RL1 contacts 2-6-10 before S1. The homebrew coil is placed across the variable capacitor to ground, placing it in parallel with C2. Keep all leads as short as possible. This completes the wiring of the remote offset tuner.

Alignment

The transceiver must now be adjusted only because the loop of wire around the vfo coil has moved the vfo frequency and it will not be the same as the readout frequency of the dial. This alignment is simple because the *vfo is not adjusted*. This is the part that can be frustrating at first because you do not know where the frequency has shifted to. I found the turn of wire dropped my vfo down 30 kHz. This meant nothing had changed as far as function of my vfo except that there now was a 30 kHz shift down the band. This was corrected by "slipping" the dial on the rig until the frequency coming from my vfo and the readout frequency on my dial were the same. I used CHU, 7335 kHz, as my locating frequency. I used this instead of my signal generator only because my transceiver receives CHU (and besides, I was too lazy to set up my signal generator). Any method of obtaining a locating frequency is fine.

For alignment with the offset tuner in the circuit, tune in a CW signal on any band with the offset tuner out of the circuit. I found RTTY signals to be of longer duration and more dependable. Adjust the vfo for the highest meter reading of the locator signal. Place the

variable capacitor of the offset tuner in the fully unmeshed position. Put the offset tuner into operation by closing S1. When S1 is closed you should still receive the same locator signal if your capacitor and coil values are close to the values in your rig. One thing you may notice is a change in pitch of the locator signal due to a slight frequency shift (but don't worry about it). I am only interested in following the drift of a CW signal – not in how much frequency spectrum my offset tuner ranges over or in how many hertz the CW signal drifts. (Though this can be done if you care to take the time to calibrate for it.)

Adjust the variable capacitor so that when the remote tuner is removed from the circuit by S1, the pitch (frequency) will be close to the pitch of the signal from the rig alone. What you will be doing here is getting a zero beat for the offset tuner against the rig. Try to get this position of the offset tuner as close as you can to the rig's signal. Mark this zero beat position on the variable so you can return to it at any time. Now when you're receiving and the offset is placed at zero beat you can tune up or down frequency as a CW signal drifts. I found that my zero beat on the offset did not change from band to band. It would appear that alignment for one band takes care of all the bands. This completes the adjustment and alignment of offset tuner and the transceiver.

Placement

My offset tuner at present is outboard. It can be mounted in the HW-100 without making holes in the front panel. The screws in the upper right and left corners of the front panel are replaced by the variable capacitor and the on–off switch (S1). The components in this case will have to be of the miniature type to use the holes as they are now. To use what comes out of the junkbox, in my case, meant enlarging the holes. But I think this is one case where modification will add to the worth of a rig and should not be a deterring factor. The shame of it all would be spending money for miniature parts after having come this far for free.

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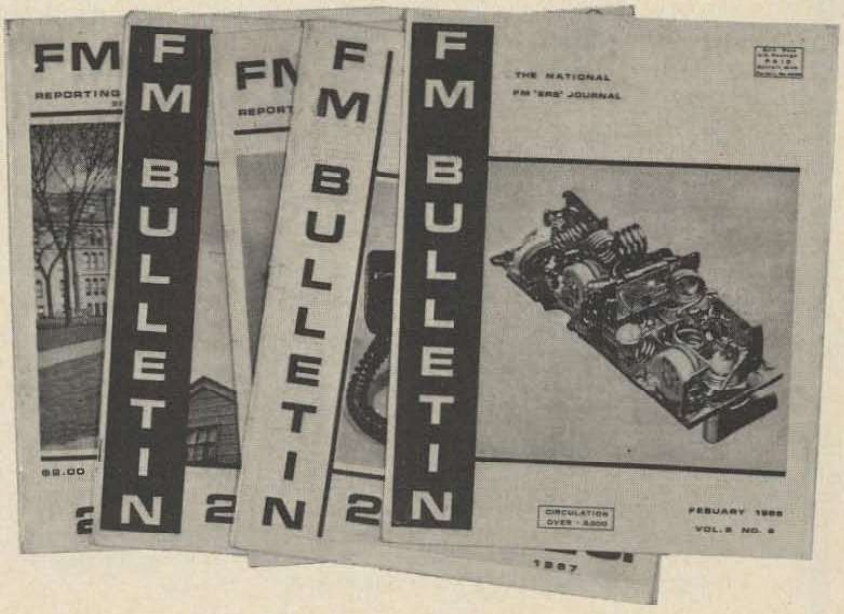

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