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Eight Mods for the IC-730

Customize your ICOM! Snip here, solder there, and enjoy perfection.

I have owned my ICOM 730 for over two years now, and I am still continually impressed with the high performance of this fine example of modern technology! However, I am a perfectionist, and I honestly don't think it is very likely that any manufacturer will ever create a rig that would be "perfect" for my tastes. They all seem to overlook one or two things, but they are getting closer all the time!

I have always found that the best way to obtain the perfect ham rig (or anything else) when it is not readily available is to take the closest available thing and adapt it to suit my individual requirements. With that thought in mind, I proceeded to design and install several easy modifications for the IC-730 that I feel have enhanced its "proximity to perfection." I will describe each modification separately to give you the opportunity to consider each on its own merits. You then can determine whether to add any of these enhancements to your own IC-730. None of the modifications is difficult to accomplish, and some are almost no work at all!

Sidetone-Pitch Control

The IC-730 does not include a control to adjust the pitch of the internal CW sidetone oscillator. I consider this an essential feature because in my home station I frequently use narrow active audio filters for enhanced CW reception. If the pitch of the sidetone oscillator in the 730 does not just happen to match the center frequency of any external audio filter you are using, the sidetone will be lost forever in passing through the audio filter, requiring you to switch the filter in and out each time you change between transmit and receive!

An extremely simple modification will allow you to add a convenient sidetone-pitch control that can be adjusted by turning a control inside the hatch cover on the top which allows access to the auxiliary controls. Adjusting this new control will allow you to match the sidetone pitch easily to any external filter you are using.

To create this new sidetone-pitch control, simply remove the fixed resistor, R109, on the main circuit board (refer to the ICOM 730 operating manual) and replace it with a 20k subminiature trimmer. Component spacing is a bit tight, so this will require a very small trimmer.

The new tone-adjust control is not only useful if you are using external audio filters; it is also very convenient to be able to vary the audio pitch to suit individual operator preferences. Changing the pitch from time to time can help reduce operator fatigue during long periods of CW operation.

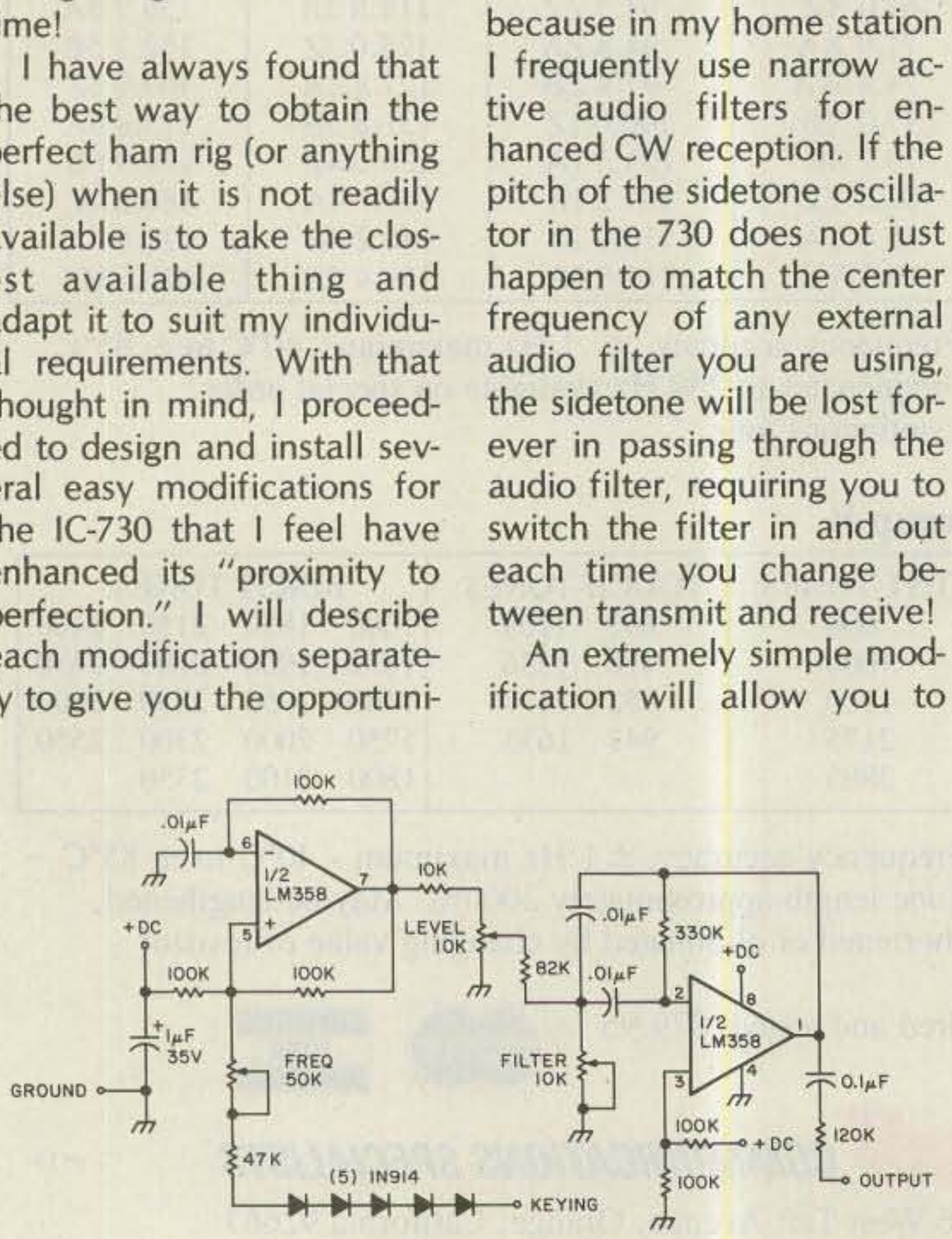

Fig. 1. Improved sidetone oscillator for the ICOM 730.

Improved Sidetone Oscillator

Although the sidetone-pitch control described above does solve the problem of adjusting the sidetone-oscillator pitch, there is another characteristic of the IC-730 sidetone oscillator that bugged me: The stock sidetone-oscillator circuit produces an irritating click on make-and-break during CW keying. This apparently is caused by the clamping action of transistor Q16 in the sidetone circuit.

After several unsuccessful attempts to modify the oscillator circuit to correct this, I came to the conclusion that perhaps the best approach would be to abandon ICOM's oscillator circuit completely and design a new circuit that would produce the desired clean-sounding sidetone with no annoying clicks. To create this circuit, I borrowed on one of my earlier efforts, a code-practice oscillator circuit (see "The Penultimate CPO," *73*, September, 1980), and modified it to be controlled by the ICOM 730 keying circuits.

Fig. 1 is a schematic diagram of the improved sidetone-oscillator circuit. It requires that only four connections be made to the 730. I constructed this audio-oscillator circuit on a small piece of perfboard and installed it under the hatch cover on the rig's top. This location allows you to adjust the circuit's pitch and output volume easily.

The procedure for installing the new oscillator is as follows: First, locate green jumper wire F on the main circuit board and cut it near the end that is near transistor Q16. Tape over the Q16 end and tuck it aside. The

four connections for the new circuit may now be made:

- The +dc power connection goes to control line CW8, available at pin 4 of J13 on the main circuit board.
- The ground connection goes to SPE, the speaker ground, available at pin 2 of J18 on the main circuit board.
- The keying connection goes to KEY line, available at pin 3 of J18 on the main circuit board.
- The output connection goes to either end of resistor R114 on the main circuit board.

To adjust the new sidetone oscillator, proceed as follows: Key down (dummy load, please!) and adjust the FREQ control to 750 Hz or your preferred pitch. Then adjust the FILTER control to the same frequency by adjusting it for the loudest and clearest-sounding output tone. Last, adjust the LEVEL control for the desired output volume.

Although the improved sidetone-oscillator circuit is a bit more work than the other modifications in this article, I'm sure that if CW operation is one of your main interests, you will agree that the beautiful clean-keyed sine wave that this oscillator circuit produces is worth the extra work!

Improved CW-Filter Switching

When both the FL-45 CW crystal filter (500 Hz) and the EX-203 active audio filter options are installed, the stock filter-switching arrangement that ICOM designed seems backwards: It works out so that when you are in either CW mode (CW or CW-n, the narrow position), the 150-Hz-wide EX-203 audio filter is switched in, but the 500-Hz-wide FL-45 filter is switched in only in the CW-n position.

If you stop and think about this, I'm quite sure you will agree that it doesn't seem to make much sense to leave a 150-Hz-wide filter in the circuit and switch a 500-Hz filter in and out; the exact opposite makes much more sense: Leave the 500-Hz filter in the circuit in both CW mode positions and add the 150-Hz active audio filter into the circuit only in the narrow CW position.

Fortunately, the 730 is "cold switched." This means that rather than actually re-routing signals directly through front-panel switch contacts, most 730 panel switches actually switch a dc control voltage which controls signal routing on the boards. To rewire the 730 to allow for the improved CW-filter switching, proceed as follows:

- Remove the green wire from pin 1 of plug P-1 which "hangs" off the EX-203 filter board and carefully fish it out of the short cable into which it is harnessed. Let this green wire hang free for now, and mount the EX-203 as per ICOM installation instructions.
- Locate the two wires, green and blue, coming from P-6, plugged into J4 on the second i-f board. Cut both these wires at the point where they pass behind the center of the S-meter. The short end of the blue wire may be taped at the end and discarded. (Tuck into nearby wiring.) The short green wire should be connected via a length of insulated wire (preferably green) to the green wire which you pulled out. Tape over all connections to prevent possible shorts.
- Two wires are left to connect: the long blue and the long green. Splice the long green to the white wire coming from pin 1 of J1 on the detector board.
- Splice the long blue to the red wire coming from pin 4 of J1 on the detector board. Again, tape over all spliced connections.

Improved Audio-Filter Operation

My EX-203 active audio CW filter, as supplied, rings and adds audio distortion. To tame it down, I replaced both resistors R2 and R9 (originally 560k) with 270k resistors. This cleaned things up nicely and provided nearly equal audio-output level from a centered signal whether the filter is switched in or out.

After the resistors have been changed, re-peak the two filter stages by adjusting R7 and R14 trimmer potentiometers on the EX-203 board for maximum output with a 750-Hz audio note, with the rig in the narrow CW mode and a medium-strength carrier received.

I believe that optimum adjustment of an audio filter is somewhat a matter of individual taste. If you wish to experiment with the characteristics of the EX-203 audio filter, you will find that (1) overall gain can be adjusted by changing the value of resistors R1 and R8, (2) bandwidth can be adjusted by changing the value of resistors R2 and R9, and (3) center frequency may be adjusted by varying the value of resistors R7 and R14. All these values interact somewhat, so you may have to play with resistor values awhile to get exactly the characteristics you prefer.

Panel-Lamp Brilliance

The panel-meter illumination from the S-meter on the 730 is very bright, and I found that to be distracting during mobile operation. It was so bright that it made me squint when I looked at it, and it seemed to disturb my night vision. Fortunately, there is an extremely simple fix for this problem: Simply break the path of the source wire that feeds dc to the S-meter lamp and insert a 24-Ohm, 1/2-Watt resistor in series with it. Tape over any exposed connections to avoid potential shorts later.

The S-meter lamp will now glow a mellow yellow color, much dimmer than the stock configuration but still plenty bright enough to read the meter very easily. A bonus is the much-prolonged bulb life you may now expect due to the lower bulb current.

Auto Memory Hold

The 730 has two vfo frequency memories plus a memory for each band. Unfortunately, whenever you turn the power off, all memories are lost. During mobile operation, this means that if you turn the rig off when you leave the car, you will have to reprogram all the memories when you return. A simple modification will allow the 730 to keep its memories alive even when the rig's power switch is off, so long as the rig remains connected to a source of +12-volt-dc power. To implement this change, proceed as follows:

- Remove the red wire plugged into jack J8 on the logic unit.
- Cut the plug off this red wire and set it aside. Tape over the end of the red wire so that it cannot short to anything and hide it away in a group of nearby wires.
- Solder a 10-inch wire to the top-rear terminal of the power switch. Route this wire along any convenient cable bundle to jack J8 on the logic unit.
- Solder the plug that was cut from the red wire to the free end of the new power-switch wire (discarding any excess length) and plug it into J8 on the logic unit.

Both vfo frequencies and all band memories will now be held in memory as long as dc power remains supplied to the rig's main power connector. Current drain when the rig is turned off will be about 18 mA—not a significant drain on your car battery, and a small price to pay to avoid the nuisance of having to reprogram memories every time you return to your car!

This modification comes

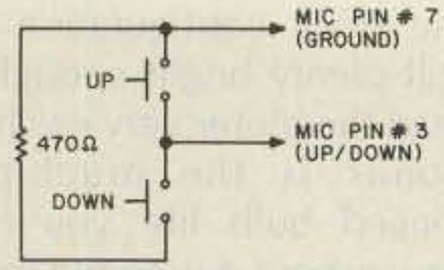

Fig. 2. Adding up/down tuning to the ICOM 730.

with a free bonus: The memory jack on the rear of the rig now connects to nothing, so you may feel free to use it for any desired spare function via the taped red wire that was cut from the J8 plug.

Up/Down-Tuning Microphone

I must admit it: I have tried ICOM's own optional up/down-tuning mobile microphone for the 730 and I didn't like it for two important reasons. First, it has a very uncomfortable box shape, the feel of which I did not care for, and second, the push-buttons are too hard to push—and especially to hold down for the prolonged period of time required to scan across a band.

I solved this problem by carefully removing the microphone cartridge and preamplifier from the hand-held microphone supplied and carefully repackaging them into a microphone I liked better (that had the necessary push-buttons for up/down tuning). This preserved the exact audio characteristics of the original stock microphone yet allowed for up/down tuning from the microphone—a great convenience for mobile operation.

The up/down-tuning function is actually already implemented in the 730. To use it, you must wire up your microphone switches as shown in Fig. 2, adding a 470-Ohm resistor for up/down control.

Cooling-Fan Control

The 730's cooling-fan circuit has two modes of operation. First, the fan runs at low speed at all times when in the transmit mode (push-to-talk operated, key down, or transmit switch depressed). Second, high-speed fan operation occurs when the heat-sink temperature exceeds approximately 75 degrees Celsius, a condition which triggers a thermal switch, causing the fan to run at high speed during both transmit and receive until the heat sink cools back down.

There really are times, however, when it is not necessary to have the fan running at all, such as during periods of QRP operation or whenever the transmit power or duty cycle is low. A switch can be installed that will allow you to bypass the fan in its low-speed mode. This will save battery power, eliminate unnecessary fan noise, and prolong fan life.

To provide a switch selection of fan operation on transmit but still leave the emergency mode of fan operation on overheat, simply lift one end of resistor R24 on the power-amplifier board and insert an SPST switch in series. A common mini-toggle switch will fit perfectly in the hole left in the rear-chassis panel if J5 (the memory backup jack) is removed. (This jack is not used anyway if you have done the Auto Memory Hold modification in this article.) My new switch is labeled "Fan Normal/QRP."

All of the modifications described in this article have been in my 730 for at least one year now, with absolutely no ill effects observed. I feel that they have significantly enhanced the capabilities of my mobile and CW operations. I hope you will find some of them to be useful improvements to your own 730 operations. Perhaps they will even help you get a step or two closer to having your own ultimately perfect rig for your own style of operation. ■