

ICOM High-Band Modifications

One of the least expensive ways to obtain VHF high-band coverage is to modify an ICOM Amateur Radio 2 meter handheld. The ICOM 02AT series offers expanded frequency coverage between 143 MHz all the way through 165 MHz! The modification takes about an hour, and you end up with a powerful communications scanner/receiver for any VHF channel. This modification also leaves full transmit capabilities on the Amateur Radio 2 meter band, and also gives you emergency transmit capabilities throughout your newly acquired 143-165 MHz range.

WARNING: Even though you may possess a valid Amateur Radio license, it would be illegal to transmit on frequencies outside of your Ham radio 2 meter band limits. Even though you may possess a business radio or special emergency license for VHF operation, the modified ICOM 02AT does not meet FCC type acceptance, and could not be used for legal transmitting. However, in a real emergency, *anything* goes.

The Delicate Procedure

The modification procedure requires advanced skills in micro-circuit soldering. If you have never soldered tiny chips before, let someone else do this modification.

The only parts you will need are three silicon diodes, 1N914, 1N4148, or any equivalent. Radio Shack has them by the bundles. You might also pick up a 15-watt soldering iron plus some solder wick in case you make a mistake.

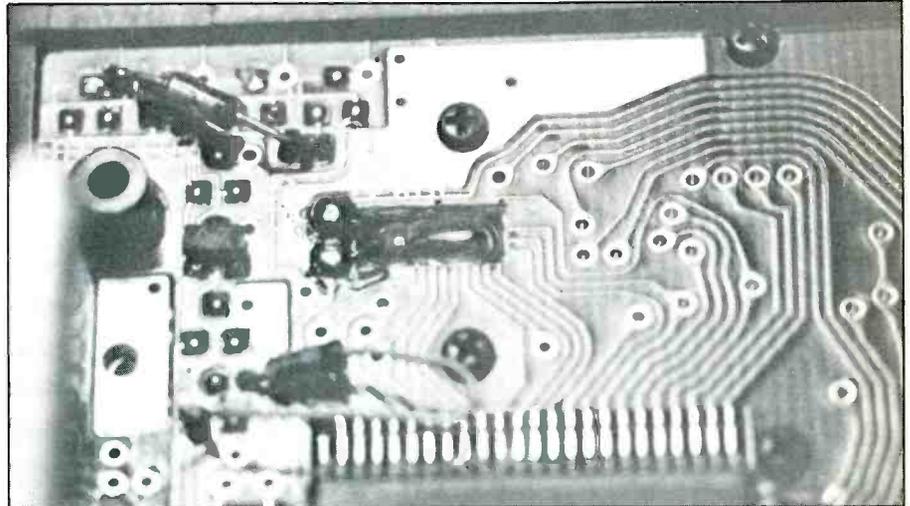
STEP A. Remove the battery, and unscrew four screws holding on the silver battery plate. Let the plate assembly and plastic battery lock tab fall clear. Remember how they come apart.

STEP B. Remove the back cover by unscrewing four long screws plus one small screw. Don't forget that one small screw—it is attached to the final amplifier and must be removed before opening up the back.

STEP C. Gently lift off the back, and then separate the front from the inside electronics. A ribbon cable interconnects the two, so be careful not to nick the cable.

STEP D. Looking down on the inside of the key pad, locate a sub-circuit board and remove it by unscrewing the two tiny, shiny, retaining screws and pulling back the silver retaining plate. This also is attached with a cable, and should be placed to the left of the handheld.

STEP E. Now locate the diode matrix external initialization pads at the very top of the exposed inside-front. Those little black



To modify an ICOM 02, add the diode as pictured in upper left corner.

things that look like ants are the diodes we will be working with and replacing.

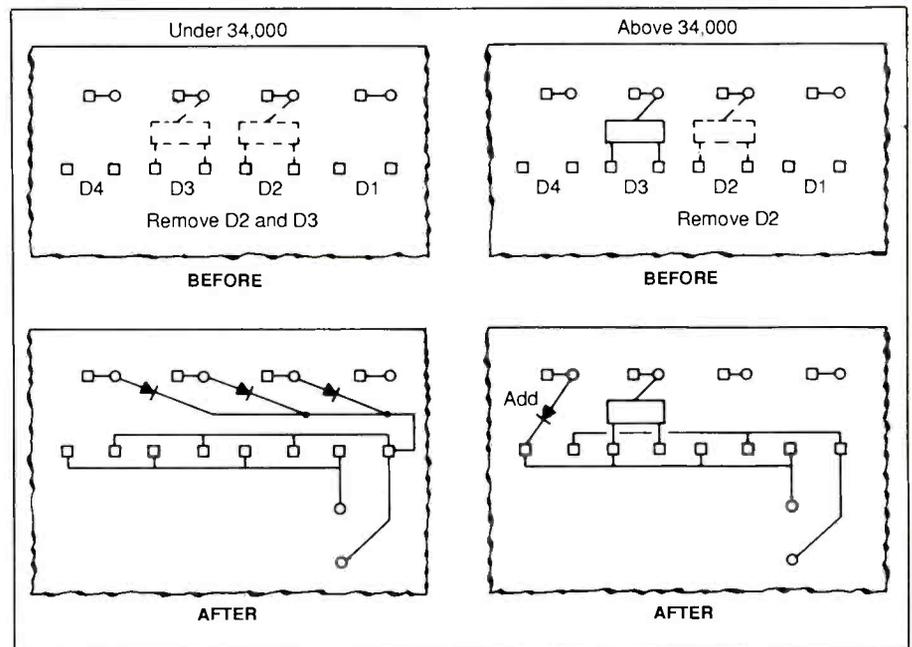
STEP F. For ICOM 02AT's with serial numbers below 33,999, remove diodes D2 and D3 by unsoldering them or crushing them. For newer ICOM 02AT units, 34,000 and above, remove only diode D2.

STEP G. Now insert the diode(s) into the tiny holes at the top of the diode matrix. Insert the anode end, with the cathode sticking up. Look closely at the attached drawings and photos to make sure you get the di-

odes in the proper location. Use only one diode for newer sets, and three diodes for older sets.

STEP H. Solder the anode ends into place without overheating the diode or hole junctions. Then follow the drawing and photos to solder the cathode end into place. These pads are small, and delicate. This board costs over \$100 to be replaced by ICOM in case you foul it up, so be careful!

Now doublecheck your work. Make sure your external diode programming agrees



with the serial number set that you have. Also doublecheck that you have the right polarity on the diodes.

STEP I. Carefully replace the sub-circuit board assembly, and then reassemble the front cover onto the inside electronics. Now reassemble the battery place, but leave the back cover off for the next step.

STEP J. Turn your unit on, and the frequency display should be exactly where you left it. On some of the very older ICOMs, it may be necessary to reset the microprocessor. You then must "step" the unit back up to 146 MHz. If your frequency readout looks good, chances are you got the diodes in place properly.

Take a simple volt/ohm meter and clip the black lead to the handheld chassis ground. Set your scale on 1 volt and attach the red lead to R-253, a test point just below the shiny VCO can. It's the only resistor standing on end near the can with a bare lead.

STEP K. You now need to bring this off-scale voltage down to .5 volts by adjusting the coil L-218 in the VCO can. The coil is the lower access hole. Don't adjust the capacitor. Turn the coil counter-clockwise until your voltage reads about .5 volts near 146 MHz.

STEP L. Now let's check and see if we have unlocked the set. Key-enter the frequency 149.995 MHz. Step up to the 150 MHz band by pushing the "up" button. This advances the frequency electronically into 150 MHz. Now direct enter any 150 MHz

frequency, such as 155.160. If you can dial it in, your modification was a success. Now let's try the weather frequency. Dial in 159.995 MHz, hit the "up" button for 160 MHz, and then dial in 162.550 MHz or 162.400 MHz. If you adjusted the VCO properly, the weather channels should just barely lock in. If they do lock in, it is another verification that your modification was done correctly.

Before reassembling the back, you may wish to peak the receiver to favor either the 2 meter band where it already is, or somewhere near 155 MHz. Carefully adjust the three coils to the upper right of the VCO can for improved receiver sensitivity on a desired 150 MHz frequency. Make only a small adjustment—peaking the receiver at 150 MHz will decrease performance at 146 MHz, the Ham band.

WARNING: Do not attempt to transmit out of band. This set is not type-accepted. It will work, but should only be operated out of band on transmit in an emergency. Also, it may be illegal to tune into certain communications covered by the Electronic Communications Privacy Act.

Reassemble the cover, memorize those out-of-band frequencies for instant recall, and enjoy your new capabilities with any ICOM 02AT 2 meter handheld transceiver.

REPEAT: This modification should only be undertaken by those with advanced soldering skills and the dexterity of a pygmy when dealing with these tiny circuit diodes and pads. **PC**

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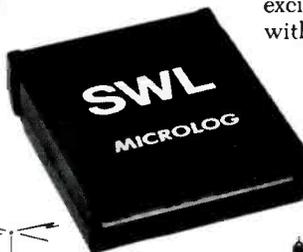
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