Vertex VX-4000 and VX-6000 modification

– K2WD

The VX-4000 series mobile FM transceivers have been manufactured for the commercial market by Vertex Standard Co. Ltd. from around 2001. As older radios are replaced with more modern equipment, previous sets can be purchased at reasonable prices through eBay and other outlets.

These FM radios are quite suitable for conversion from commercial frequencies to the amateur bands. The VX-4000 front panel has two rotary controls for volume/ channel, a forward-facing loud-

Vertex Standard VX-4000 transceiver

speaker and a backlit LCD display. The 250 channel memories can each be programmed with frequency details plus 8-character channel name using a personal computer with appropriate software and cables. The front panel has a power on/off button plus seven backlit programmable function buttons.

The VX-4000**L** covers "low-band", either 29.7-37 MHz (A-band) or 37-50 MHz (B-band) with 70 watts output (max). The VX-4000**V** covers VHF frequencies, 134-160 MHz (A-band) or 148-174 MHz (C-band) with 50 watts output while the VX-4000**U** covers 450-490 MHz (D-band) with 40 watts output.

The VX-6000 series has similar specifications, but higher power, 100 - 120 watts out.

Modification

These instructions will modify your Vertex VX-4000, VX-5000 or VX-6000 high- or low-band radio for use in the Amateur Bands. For example, VX-4/5/6000**L** B-band covering 37-49 MHz will work from 50 to 54 MHz and the A-band of these radios will work in the 29.0 to 29.7 MHz band — all FM of course.

This modification requires micro-circuit work, the Vertex FIF-8 Firmware Writer (Flash ROM Adapter) with cables to connect to PC and radio, Vertex CE49 software and a knowledge of hexadecimal editing.

It is recommended that one should be skilled in SMT component mounting techniques and printed circuit board repair before engaging in this project.

Instructions

Begin by making sure your radio is working prop-erly. Check transmit (on dummy load) and receive; then check deviation and sensitivity to be sure. Assuming you have done this, let's start.

Step 1: Upgrade firmware

Carry out this step only if needed (most radios won't need it), to flash the radio with new firmware. Using FIF-8 firmware writer and CT-47 cable:

(a) First upgrade the control head to version 3.04 Aug-12-2011 (using right port).

(b) Next upgrade the RF Deck to version 4.40 Nov-22-2011 (using left port/microphone jack).

(c) Check that all radio functions work.

Step 2: Read radio settings

Read your radio's settings using the CE49 Windows software, I use version 5.15. Save the file for hexadecimal editing.

Vertex Standard CE49 programming disc.

Step 3: Hex Editing your file.

Open your saved .c49 file in a hex editor then find and replace the 50.000000 upper band limit — it will be **02FAF080** hex. Change it to (let's say) 54.000000, this is hex **0337F980**. If you have modified it correctly, you can now re-open the file in your CE49 software and start editing the channels.

Step 4: Program Radio

Program your radio with your newly created file. Restart radio and you should see your display flashing. This is great because it means you are right on track. Now you need to re-tune the TX and RX VCO.

Step 5: VCO Mod

(a) Carefully unsolder the silver VCO cover in the center front of the main circuit board and remove it. See picture below.


VCO cover is in the center front of the main circuit board. (Pics by K2WD).

(b) You will need to drill two holes in the cover so you have access to the tuning slugs underneath, then clean all debris from the holes. See picture below.

The cover for the VCO has been removed and two holes drilled for access to tuning slugs located beneath the cover.

(c) Now replace the cover and solder it to the board, it should look like the picture below.
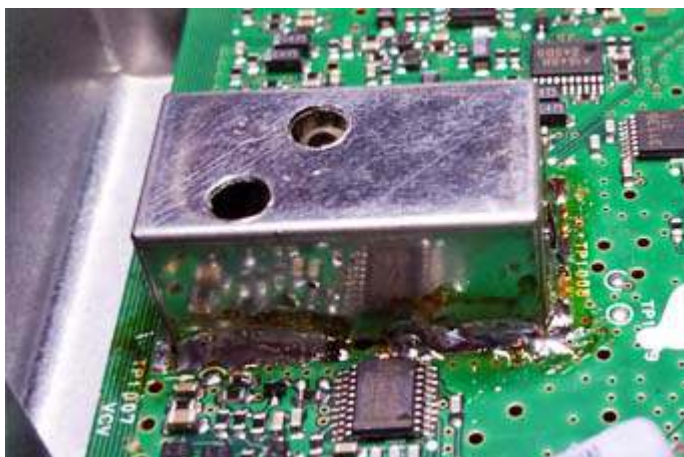
After drilling the two holes, the VCO cover is soldered back into place.

Step 6: Tune VCO

Connect 13.8V DC power to your radio, verify that it powers up correctly (no smoke) and that you have a display — which is probably flashing. If so, then you are ready to set the RX VCO.

Connect the positive lead of your DC voltmeter to test point TP1007 (VCV) on the main circuit board, with the negative lead to chassis ground. TP1007 is the small solder blob near the VCO cover indicated by a silk-screen arrow on the circuit board. See the next picture for the location.

With the radio front facing you, the right-side hole in the metal cover is the RX VCO adjustment. Place a small flat tool in and adjust to about 5.0 volts. The display should stop flashing, indicating a RX lock.

The TX VCO adjustment is below the left hand hole. Adjust the slug while in transmit for 6.5 volts. At this point, you should have transmit and receive, but remember you still need to tune the receiver to get good sensitivity.

Close-up showing location of test point TP1007 (VCV).

Step 7: RX tune up

Using your FIF-8 Firmware Writer and the CT-47 cable, read tuning data with the SVC-49 alignment software and adjust the last three sliders up by a factor of 10 each. On the TX power, slide last three sliders up to full. Hit apply to radio and you're done!

You should see around 50 to 60 watts RF output on transmit and a sensitivity of 0.28 to 0.35 μvolts for 12 dB S/N. You can play with the tuning to get the best results.

WARNING! Any time you want to change **anything** in the software, **read values from the radio first**, store this data in a disk file, change your values then save in a **new** file. This keeps the tuning data from getting messed up.

- Warren K2WD

[These notes on modifying the Vertex VX-4000 series are necessarily brief in order to fit the format of the newsletter. If you need further details, please contact Warren, K2WD –Ed.]