CrOwBX Calibration for Four-Voice rev.2.0 – Voice Card w/Slot Adapter

Tools needed: digital voltmeter, trimpot adjustment tool (or small flat blade screwdriver). Oscilloscope recommended but not necessary.

Voice card installation

It is recommended that each voice card be installed and calibrated one at a time, starting with the card that occupies carrier board slot #1 (closest to pitch CV/gate header, audio outputs, etc.) For a rev2 voice card, the use of a slot adapter is required. The voice card and slot adapter mate in a similar manner as the host board and carrier board, or in the case of a single-voice system the voice card mates directly to the host board. A 1/4" #6 nylon spacer is used between the boards as each mounting hole position. If mating a slot adapter to a voice card use a 1/2" 6-32 machine screw, a #6 split-ring lockwasher, the nylon spacer and a 6-32 nut. A second lockwasher can optionally be used between the nut and board. Use this hardware for the 3 slot adapter mounting holes.

Host and Panel Redux

If mating the voice card directly to the host board, the host board is first mounted to its front panel using six 5/16" #6-32 screws, six #6 split-ring lockwashers and six 1/2" #6 threaded pillars. The screws go through a lockwasher and then each panel hole from front, with a pillar on the back. Mounting of the host board is a bit tricky as there are also the 18 switches to deal with. Note there are no screws anchoring the host board to the panel-mounted pillars just yet. That is next.

Single-Voice Card Mounting

Attach the voice board to the calibrated host board/panel. Use six 1/4" nylon standoffs (#6 hole), six 1/2" #6-32 screws and six #6 split-ring lockwashers. The seating of the Molex connectors is a bit stiff, but using an even, firm pressure they will engage easily enough. Once the connectors are mated the nylon standoffs and lockwashers+screws can be mounted: a screw goes through a lockwasher, then the carrier board, a nylon standoff between the carrier and host boards (pliers help here to hold a standoff in position) finally securing into the free end of each threaded 1/2" pillar.

Voice Card Calibration

First off is the EG calibration. Part of this can be done with no power applied. Using a digital ohmmeter measure the resistance between pin 1 of TL072 op-amp IC4 and the junction of R126 and R128. Adjust trimmer R150 for a reading of 61Kohms. Next, measure the resistance between pin 7 of IC4 and the junction of R144 and R145 and adjust trimmer R151 for a reading of 61Kohms. These two trimmers set the attack, decay and release time rates to ~10 seconds. Trimmers were used here to allow for shorter or longer overall max. rates as per user preference.

For the VCF EG, a similar pair of adjustments are done. Using the digital ohmmeter to measure the resistance between between pin 1 of TL072 op-amp IC9 and the junction of R166 and R167, adjust trimmer R176 to obtain a reading of 61Kohms. Now measure the resistance between pin 7 of IC9 and the junction of R170 and R171 and adjust trimmer R177 to obtain a reading of 61Kohms. This completes the unpowered EG adjustments.

With the voice card installed as above, apply +/-19VDC power to the carrier board (4-voice) or host board (1-voice) power header. While voltage checks are usually done during board assembly, check for +/-15VDC on say an op-amp pin 8 to common (+15v) and pin 4 to common (-15v) before proceeding.

Set the host controls for both EGs: minimum attack, minimum decay, **maximum** sustain and minimum release. VCO and noise can be set to OFF. Using a digital voltmeter, observe the voltage value on pin 14 of TL074 op-amp IC1 to common. Apply a gate voltage (+5v) to the gate input to operate the EGs. This puts both EGs in maximum sustain mode. Adjust trimmer R198 until a reading of 5.00v is observed. Now checking the voltage reading from pin 14 of TL074 op-amp IC5 to common and adjust R199 for a reading of 5.00v. This completes the calibration for both EGs.

Note: the following procedure is excerpted from the Oberheim OBX service manual as the crOwBX voice card uses the same reference designators as a vintage OBX voice. The procedure assumes a MIDI-CV unit or CV/gate keyboard are connected to the crOwBX.

VCO1 Calibration

Initial Frequency Adjustment

Set host switches and controls as follows:

VCO1:	ON
VCO2:	OFF
VCO1 Waveform:	PULSE
VCO2 Waveform:	PULSE
VCO2 Detune:	Centered
Filter Frequency:	Maximum
Loudness Sustain:	50% to 100% (clockwise)
All other parameters:	Full CCW or OFF
(Octave select set to N)	

Using a reference tone set to C3, hold C3 on the keyboard and adjust trimmer T4 until the frequency of the VCO is beatless with the reference tone.

Volt/Octave Adjustment

Set the reference tone to C0, then hold C0 (lowest C) on the keyboard and adjust trimmer T8 until the VCO is beatless with the reference. Then set the reference to C3 and play C3 on the keyboard, if not still beatless repeat the initial frequency adjustment. It is sometimes necessary to repeat the initial frequency and volt/octave adjustments a few times in order to obtain proper tracking of the voice card to the keyboard.

High-Track Adjustment

Set the reference tone to a C5 and hold note C5 on the keyboard and adjust trimmer T5 until beatless. Recheck the initial frequency and volt/octave adjustment and repeat if necessary.

Pulse Width Adjustment

Set the pulse width control on the host panel to full CCW, play a C1 on the keyboard and adjust trimmer T6 for a 50% duty cycle. If an oscilloscope is available, the voice output can be monitored at the center pin of connector GG. If the adjustment is being made by ear, adjust T6 for the most "hollow" sound.

VCO2 Calibration

Initial Frequency Adjustment

Set host switches and controls as indicated above except as follows:

VCO1:	OFF
VCO2:	ON

Using a reference tone set to C3, hold C3 on the keyboard and adjust trimmer T1 until the frequency of the VCO is beatless with the reference tone.

Volt/Octave Adjustment

Set the reference tone to C0, then hold C0 (lowest C) on the keyboard and adjust trimmer T7 until the VCO is beatless with the reference. Then set the reference to C3 and play C3 on the keyboard, if not still beatless repeat the initial frequency adjustment. It is sometimes necessary to repeat the initial frequency and volt/octave adjustments a few times in order to obtain proper tracking of the voice card to the keyboard.

High-Track Adjustment

Set the reference tone to a C5 and hold note C5 on the keyboard and adjust trimmer T2 until beatless. Recheck the initial frequency and volt/octave adjustment and repeat if necessary.

Pulse Width Adjustment

Set the pulse width control on the host panel to full CCW, play a C1 on the keyboard and adjust trimmer T3 for a 50% duty cycle. If an oscilloscope is available, the voice output can be monitored at the center pin of connector GG. If the adjustment is being made by ear, adjust T6 for the most "hollow" sound.

FILTER CALIBRATION

Set the host panel controls as follows:

VCO1:	OFF
VCO2:	OFF
Noise:	FULL
KBD Track:	ON
Filter Frequency:	Minimum
Filter Modulation:	Minimum
Filter Resonance:	Maximum

Initial Frequency Adjustment

Using a reference tone set to C3, play C3 on the keyboard and adjust trimmer T9 to tune the filter's resonant peak pitch to the reference.

Volt/Octave Adjustment

Set reference tone to C2 and hold C2 on the keyboard. Adjust trimmer T10 until the voice is the same pitch as the reference. Then, hold C3 and check the initial frequency adjustment; repeat these adjustments as necessary. Hold C4 on the keyboard and again adjust trimmer T10 until the pitch matches the reference. Recheck the initial frequency at C3 and re-adjust as necessary. Note that the filter will only track the keyboard over an approximate 3-octave range.

VCA Offset

With both VCOs and noise set to OFF, press a key and measure the voltage at pin 1 of TL072 op-amp A16. Adjust trimmer T11 so as to obtain a reading of 0.00v (as close to zero as possible).

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Voices 2 through 4 are calibrated in the same manner as voice 1. Leaving voice 1 installed, install voice card #2 and repeat the calibrations. Same for voices 3 and 4. The EG trimmers set for resistance can all be done at once before installing cards.