

## CALIBRATION PROCEDURE

Some repairs performed on the Cat Synthesizer will necessitate recalibration of the unit. This is especially true if repairs have been performed on either the control voltage processors, the VCO exponential current converters, the 6.2 volt reference, or the power supply.

Calibration of the unit is accomplished by the adjustment of several trimmers accessible through holes in the front panel. In order to gain access to the calibration trimmers, the plastic plugs must first be removed from the holes. This is most easily accomplished by pushing the plugs out from the inside of the chassis with the circuit boards removed.. Removal of the plugs by prying them from the front panel is not recommended.

To properly calibrate the Cat Synthesizer a high impedance digital voltmeter of at least 3 1/2 digits is required, A digital frequency counter is helpful, but not required to calibrate the unit. A frequency standard such as a tuning fork, strobe tuner, or another calibrated synthesizer is necessary in order to perform calibration on a Cat Synthesizer.

Set the panel controls as shown in Fig. 1 and perform the calibration steps in the sequence listed,

### Step 1 KEYBOARD CURRENT ADJUSTMENT

- a. Set trimmer (11) under the keyboard fully CLOCKWISE so that the keyboard resistive divider chain reads a minimum resistance of 3.6K.
- b. Set the keyboard current trimmer (1) so that the voltage at the top of the keyboard resistive divider reads +3.000 volts with the highest C note depressed. This voltage should be measured with a high impedance DVM at the control voltage bus located on the keyboard connector. Consult the wiring harness layout for the pin location of the CV bus on the keyboard connector. When properly adjusted, the highest C note depressed will yield +3.000 volts, decreasing by exactly by 1.000 V per octave or 83 mV per half step.
- c. After adjustment of the keyboard current trimmer (1) for 1.000 V per octave response, readjust the keyboard trimmer (11) so that the voltage reads approximately +4,00, measured as in step b.. This will require turning the trimmer by about 2/3 of its range in a COUNTER-CLOCKWISE direction.

### Step 2 VCO 1 RANGE

- a, Turn down all or the audio sliders except for the VCO 1 sawtooth amplitude Set the FREQUENCY CONTROLS for VCO I to the 12 O"Clock position with the KEYBOARD CONTROL in the MONO position. Check that the PITCH BEND and OCTAVE PITCH are in the "0" position and that all modulation sources are fully off,
- b. Depress the A above middle C (i.e. the second A note from the bottom or the keyboard) and adjust the VCO 1 range trimmer (2) until the VCO 1 frequency is approximately 440 Hz.

Step 3: VCO 2 RANGE

- a. With the same set-up as in step 2, turn up the VCO 2 sawtooth slider so that both VCO 1 and VCO 2 are audible.
- b. Set the VCO 2 TUNE CONTROL to the 12 O'clock position and adjust the VCO 2 range trimmer (3) so that VCO 1 and VCO 2 are at zero beat with the middle A note depressed.

Step 4: VCO 2 VOLTS/OCTAVE

Using a frequency counter

- a. Turn up the VCO 2 sawtooth slider so that only the VCO 2 sawtooth is used,
- b. Tune VCO 2 to 1000 Hz with the highest C depressed.
- c. Depress the lowest C note and adjust the VCO 2 V/Oct. trimmer (4) until the counter reads 125 Hz (3 octaves below 1000Hz),
- d. Depress the high C again and readjust the TUNE CONTROL to 1000Hz,
- e. Repeat these steps until no adjustment of the Volts per Octave trimmer is necessary to obtain 1000 Hz on the high C note and 125 Hz on the low C note.

Without a frequency counter

- a. Turn up the VCO 2 sawtooth slider so that only the VCO 2 sawtooth is audible.
- b. Depress the highest C note and tune VCO 2 to approximately 1000Hz,
- c. Place the VCO 1 KEYBOARD CONTROL in the OFF position and turn up the VCO 1 sawtooth slider.
- d. Using the VCO 1 FREQUENCY CONTROLS tune VCO 1 to VCO 2 until zero beat occurs.
- e. Depress the low C and adjust the VCO 2 Volts/Octave trimmer (4) until zero beat is heard.
- f. Depress the high C again and retune VCO 1 to VCO 2 as in step d.
- g. Repeat steps d, e, and r until no further adjustment of the VCO 2 Volts/Octave trimmer is necessary.

Step 5: VCO 1 VOLTS/OCTAVE

Using a frequency counter

- a. Place the KEYBOARD CONTROL in the MONO position and bring up the VCO 1 sawtooth slider.
- b. Tune VCO 1 to 1000 Hz with the highest C depressed.
- c. Depress the lowest C note and adjust the VCO 1 Volts/Octave trimmer (5) until the counter reads 125 Hz (3 octaves below 1000 Hz).
- d. Depress the high C again and adjust the FINE TUNE control to 1000 Hz.
- e. Repeat these steps until no adjustment of the Volts per Octave trimmer is necessary

to obtain

1000 Hz on the high C note and 125 Hz on the low C note.

Without a frequency counter

- a. Assuming VCO 2 Volts/Octave has been calibrated, we can calibrate VCO 1 using VCO 2 as a reference. Place the KEYBOARD CONTROL in the MONO position and turn up both the VCO 1 and VCO 2 sawtooth sliders,
- b. Depress the high C and using the VCO 1 FREQUENCY CONTROLS tune VCO 1 to VCO 2 until zero beat is achieved.
- c. Depress the low C and adjust the VCO 1 Volts/Octave trimmer (5) until zero beat between VCO 1 and VCO 2 is heard.
- d. Repeat steps b and c until further adjustment of the VCO 1 Volts/Octave trimmer is no longer necessary.

#### Step 6: OCTAVE SHIFT ADJUSTMENT

Using a frequency counter

- a. Place the OCTAVE SWITCH in the '0' position and turn up only the VCO 1 sawtooth slider,
- b. Tune VCO 1 to 250 Hz using the COARSE and FINE CONTROLS.
- c. Place the OCTAVE SWITCH in the +2 position and adjust the octave trimmer (6) until VCO 1 has an output frequency of 1000 Hz (2 octaves above 250 Hz),

Without a frequency Counter

- a. Turn up the sawtooth sliders on both VCO 1 and VCO 2.
- b. Place the KEYBOARD CONTROL in the OFF position and tune VCO 1 to VCO 2 with the highest C note depressed using the FINE and COARSE controls.
- c. Place the OCTAVE SWITCH in the +2 position and depress the C note two octaves down from the highest C note on the keyboard.
- d. Adjust the octave trimmer (6) until VCO 1 and VCO 2 are at zero beat.

#### Step 7: POLY/MONO BALANCE

Using a frequency counter

- a. Set the KEYBOARD CONTROL to the POLY position with only the VCO 1 sawtooth slider turned up.
- b. Hold down the highest C note and tune VCO 1 to approximately 1000 Hz,
- c. Depress the lowest C note while still depressing the high C note and adjust the POLY/MONO BALANCE trimmer (7) so that there is little or no change in frequency when the high C note is depressed alone and when both the high and low C notes are depressed together.

Without a frequency counter

- a. Place the KEYBOARD CONTROL in the POLY position and tune VCO 1 to VCO 2 with the

high C depressed.

b. Simultaneously depress both the highest and lowest C notes on the keyboard and adjust the

POLY/MONO BALANCE trimmer (7) until zero beating is heard.

c. Repeat steps a and b until there is no beating between VCO 1 and VCO 2 with only the high C

depressed and with both the highest and lowest C notes depressed simultaneously.

#### Step 8: FINAL KEYBOARD TRIMMER ADJUSTMENT

a. Place the KEYBOARD CONTROL switch in the MONO position and tune VCO 1 and VCO 2 together at about 1000 Hz with the high C note depressed and the PITCH BEND slider and

OCTAVE SWITCH both in the '0' position.

b. Place the KEYBOARD CONTROL in the POLY position and adjust trimmer (11) until VCO 1 and VCO 2 are again in tune. There should be little or no pitch change in VCO 1 when the

KEYBOARD CONTROL switch is alternated between the MONO and POLY positions.

#### Step 9: NOISE LEVEL ADJUSTMENT

a. Connect an oscilloscope to the output and turn the noise level slider fully up.

b. Adjust noise level trimmer (8) for maximum noise output before clipping occurs.

#### Step 10: VCA d.c.. OFFSET ADJUSTMENT

a. Turn all audio sliders to the off position and turn the VCA volume knob fully clockwise.

b. Set the modulation switch on the VCA to the ADSR position.

c. Set thm ADSR REPEAT SWITCH to the AUTO position with the S slider of the ADSR fully up.

d. Set the LFO FREQUENCY slider to the MAXIMUM frequency position and adjust the VCA offset trimmer (9) for minimum thumping at the output.

#### Step 11: VCF VOLTS/OCTAVE

a, Turn up the "Q" control on the VCF so that the filter is in oscillation. Set the filter cutoff

frequency to about 1000 Hz with the KEYBOARD CONTROL VOLTAGE KNOB full up to the 1 V/Octave position and the highest C note depressed.

b. Alternately depress the highest C note and the C one octave below the highest C and turn the

Volts/Octave trimmer (10) until an octave interval is heard between these two notes.