Chroma Voice Board Tester Instructions for Use

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Note: You must supply **regulated** +/12 volts DC to the tester, as these voltages are also used by the board under test. The tester generates regulated +5VDC for the logic, but the other voltages are applied directly to the voice board. It is strongly suggested that you use some sort of lab power supply with adjustable current limiting to power the tester. The total +12V current requirement is less than 150 mA. The -12V supply uses less than 100 mA. I will not be responsible for any damage to the tester or a voice board for incorrectly applied voltages. The tester does not have protection against reversed voltage input. One power supply that seems like a good choice would be the Heathkit IP-2718. This is a linear bench power supply with nice voltage and current metering. It does not have adjustable current limiting, but the +/- 0 to 20V outputs can only deliver 0.5A anyway, which is plenty for this application. In the USA, used examples of this supply are available on ebay for about $65-75.

The tester has an 1/8" stereo audio output jack. The signal is mono, and should be fed to a suitable amplifier for listening. Tests 1-3 do not produce any sound. The S&H tests were not designed to be listened to and require the use of an oscilloscope. Even the sweep tests may provide useful information if an oscilloscope is also used to monitor the output waveform.

There are two menus. One lists a number of tests which the PIC can perform, while the other menu is used to manually set voice board parameters using the encoder. Sw 1 and 2 are used to move up and down in the menu, while sw3 is used to select a menu item or switch to the other oscillator or filter. In general, the encoder is used to change a value. When the encoder direction reverses, it is normal for the first click to do nothing.

Test Menu

The following tests are available:

1) Tunability test. This test was developed with help from David Clarke, and is meant to test whether the board will pass tuning in Chroma. For each oscillator and filter, two pairs of voltages are applied. The first oscillator pair should produce two frequencies that are closer than (Narrower than) 6 octaves apart. The second pair should be more than (Wider than) 6 octaves apart. If the two results are different (one Narrow and one Wide) then the Chroma should be able to scale the oscillator correctly. The filter pairs are similar, but the frequencies should be about three octaves apart instead of 6. Each test measures a higher frequency and then a lower frequency. If the measurement times out during the high frequency measurement, the display will show "TH". If it times out during the lower frequency measurement, the display will show "TL". So if the oscillator is not running at all, or if the frequency is much lower than it should be, you will see "THTLTHTL" as all four tests will time out. This could also mean that the output signal is simply not reaching the comparator on the tester board.

2) Oscillator volts/octave test. This test measures the voltage needed by each oscillator to tune to six specific C notes, which are spaced one octave apart. The voltage difference between each pair is measured and the minimum and maximum differences are displayed. So these would be the minimum and maximum volts/octave values in the measured range. Probably the best way to use these numbers is to get a feel for what is typical, and watch for a value that is out of the ordinary. Pressing sw3 will repeat the test with the other oscillator.
3) Filter volts/octave test. Same as the oscillator v/o test, but the filters are tested. It's normal for the minimum and maximum values to be further apart here, in my experience. Pressing sw3 will repeat the test with the other filter.

4) Sweep saw A, control cutoff. Oscillator A is set to saw wave, and the pitch voltage is swept to cause the frequency to increase for about 1 second, then it repeats. While the test is running, the LP filter cutoff frequency can be changed using the encoder. If you press sw3 to switch to the other oscillator, the cutoff value is copied to the other filter

5) Sweep LP A, control resonance, saw waveform. The selected filter is configured for LP, and the cutoff frequency is swept up, then resets to a low value and repeats. The encoder can be used to set the resonance value to 0-7 with the oscillator enabled, and you can also select resonance=7 with the oscillator disabled, to hear just the filter self-oscillating. If you press sw3 to switch to the other filter, the resonance setting is copied to the other filter.

6) Sweep HP A, control resonance, saw waveform. Same exact test as above, but the filter is put in HP mode.

7) Sweep PW A, pulse. The pulse width control voltage as swept in a ramp, and the encoder can be used to select either pulse or saw waveform. Sw3 switches to the other oscillator.

8) Sweep VCA A, saw. The VCA control voltage is swept in a ramp to make the amplitude decrease. I don't think the encoder is used here. Sw3 selects the other oscillator.

9) Oscillator sync, control oscillator B. Sync is enabled, osc A frequency is fixed. Osc B frequency can be adjusted using the encoder.

10) Ring mod, control oscillator B. Ring modulation is enabled, osc A frequency is fixed. Osc B frequency can be adjusted using the encoder.

11) Filter FM mod is enabled, osc A frequency is fixed. Osc B frequency can be adjusted using the encoder.

12) S & H 2 second drift. All control voltages are set to the same level, then the normal refreshing that takes place is stopped. This test can be used to check for drift of each of the S&H voltages. You would connect a scope probe to each op amp output. A trigger pulse is provided at the start of the test, and should be used to trigger the oscilloscope. Op amp leakage or a leaky S&H capacitor would be the cause of a problem found with this test.

13) S & H update speed. There are two S&H update muxes. One will update the selected CV very quickly, and the other takes more time, so it offers smoothing of the CV to avoid stepping of the voltage. This test changes all of the CV's four times, alternating between slow and fast modes. A trigger pulse is provided at the start of the test.

14) Select manual mode. Pressing sw3 here will enter the manual mode.

Manual Mode:

The manual mode menu allows varying specific voice board parameters for testing. The encoder is used when a particular parameter is selected with the > to change its value. sw3 can be used to switch between A and B. Turning the encoder clockwise increases the oscillator pitch, but the actual pitch CV will decrease to accomplish this. The filter cutoff CV is similar.

Entering manual mode sets the parameters to some standard values which should make sound. Two "patches" are provided which store all of the parameters for later recall. Storage is in EEPROM inside the PIC chip, so the values are retained when power is removed.

The last menu item will return to the Test menu.

The voice board output can be routed to any of four channels. The tester has an analog mux that can select any of these four channels. If you change to a different channel, the voice board is changed, and also the mux on the tester board, so you should hear no difference.

Patch Parameter Settings:

Patch 1 signal	Patch 0 signal	Mode
0	0	Independent
0	1	Shared VCO
1	0	Series VCF
1	1	Parallel VCF