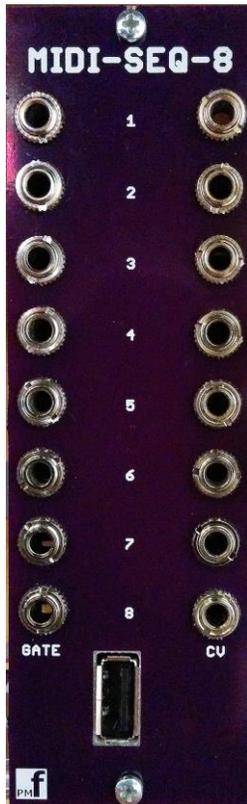# Midi-CV-8 v1.2 – User Guide

This is the setup and user guide. The unit is designed for a monophonic Analog synthesizer and a MIDI-USB music keyboard. (Some early front panels are designated MID-SEQ-8. Later front panels are designated MIDI-CV-8).

The module is designed and sized for **Eurorack** systems. You will need a 16 pin **Eurorack** power ribbon connector with –12/0/+12 and +5V which is connected to a synth power supply.

The following MIDI-USB Keyboards are supported:

MidiPlus AKM 320

M-Audio Keystation 49

Others may work also.

Programming the MIDI-CV-8

1. If the PIC24 chip is preprogrammed there is nothing else to do.
2. If you intend to program the chip yourself with our .HEX file, use your favorite method to program the chip. If using the ICSP port on the GATES board and MPLAB-X IDE , you can follow this tutorial to set up a pre-built project with our HEX file:

   http://microchip.wikidot.com/mplabx:projects-prebuilt

Commands

1. There are several commands that can be sent from the keyboard to modify the program of the MID-CV-8.   An understanding of the command mode is required to calibrate the DACs on the module.
2. To enter command mode
   a. For MidiPlus AKM320:
      i. Move the Main Volume control to 0. If the control is already at 0, move it away from 0 and then back to 0.
      ii. Move the octave shift to its lowest setting by centering it and then pressing octave down (-) 5 TIMES
      iii. Move the transpose to its lowest setting by centering it and then pressing transpose down (-) 5 TIMES
   b. For M-Audio Keystation 49:
      i. Move the Main Volume control to 0. If the control is already at 0, move it away from 0 and then back to 0.
      ii. Move the octave shift to its lowest setting by centering it and then pressing octave down (-) 4 TIMES (The red LED over the (-) button will be bright red and not flashing.
3. The commands are as follows:
   a. ALL NOTES OFF. This is triggered as soon as the Main Volume is set to 0.
   b. READY TO PLAY. Move the Main Volume from 0 to any value greater than 0.
   c. POLYPHONIC PLAYING MODE. Enter command mode. Play MIDI note 0. (usually the first white key on the left). Now the device will play 8 polyphonic voices.
   d. MONOPHONIC PLAYING MODE. Enter command mode. Play MIDI note 1 (usually the 1st black key on the left). Now the device will play monophonically with the same note playing on all 8 outputs.
   e. SPLIT-LOW-POLY MODE. Enter command mode. Play MIDI note 2 (usually the 2nd white key on the left). Now set the octave shift to the desired playing range and play the note where the keyboard should be split. The device will play 7 polyphonic voices on outputs 2-8 for keys on and below the split and monophonically on output 1 for keys above the split.

f. SPLIT-HIGH-POLY MODE. Play MIDI note 3 (usually the 2nd black key on the left). Now set the octave shift to the desired playing range and play the note where the keyboard should be split. The device will play 7 polyphonic voices on outputs 2-8 for keys on and above the split and monophonically on output 1 for keys below the split.

g. TUNE. Enter command mode. Play MIDI note 4 (usually the 3rd white key on the left). Now set the octave shift to the desired playing range and play the note to be tuned. The device will play this note continuously from all outputs until the ALL NOTES OFF command is sent. See (a).

h. The device also responds directly to these built in commands if your keyboard sends them:

      1. ALL NOTES OFF
      2. POLYPHONIC ON
      3. MONOPHONIC ON

Calibrating the MIDI-CV-8

If you bought PCBs or a kit, you should only need to calibrate the unit once. If you bought a pre-built and tested unit, you can skip this section.

1. Power up the device and allow it to warm up for a few minutes
2. Enter command mode (see above). Play MIDI note 1 (usually the 1st BLACK key on the left). Now the device will play monophonically with the same note playing on all 8 outputs.
3. Connect the –VE probe of a multimeter set to the 20V range to the ICSP pin 4 marked GND with a rectangle around the pin.
4. Plug in a patch cord to CV socket 1
5. Connect the +VE probe of the multimeter to the patch cord.
6. Plug in the MIDI keyboard to the USB jack on the front panel.
7. Play and hold C3 (MIDI note 48) and read the voltage. This is a C note octave 3
8. Adjust the trimmer for channel 1 (corner of the board) until exactly 4.00V is displayed on the multimeter
9. Play C1 (MIDI note 24) and make minor adjustments to the trimmer for channel 1 until exactly 2.00V is displayed on the multimeter. Try the following also:
    a. C2 (MIDI note 36) = 3V
    b. C3 (MIDI note 48) = 4V
    c. C4 (MIDI note 60) = 5V
    d. C5 (MIDI note 72) = 6V
    e. C6 (MIDI note 84) = 7V
10. Repeat the adjustments until you have the tracking as close as possible to 1V per octave.

11. Now do steps 4-9 for each of the remaining channels 2-8 by moving the patch cord into the relevant jack socket and testing the voltages.

Tuning your Synthesizer

1. Power up the device and the synth and allow them to warm up for a few minutes
2. Produce a tone from your synthesizer using a selected VCO and chosen ADSR, VCA, filters etc. Set the VCA so that it has 0 initial gain and is waiting for a gated envelope shaper to run the VCA.
3. Connect the CV and gate jacks of Channel 1 to your synth VCO CV input and envelope shaper GATE input respectively.
4. Enter command mode (see above). Play MIDI note 4 (usually the 3rd WHITE key on the left). Now set the octave shift to the desired playing range and play the note to be tuned. The device will play this note continuously from all outputs until the ALL NOTES OFF command is sent. See "Commands" above.
5. Play C3 and you should hear the tone on your synthesizer. This is a C note octave 3
6. Use the synth VCO frequency controls to obtain the note C3. (Approx 131Hz)
7. Tune C1 to C7 to hear all the C notes from Octave 1 to 7 using step and 5 again.
8. Repeat steps 3-7 for each VCO to be tuned. You can use any of the channels on the MIDI-CV-8 for tuning.
9. You can tune the synth to other frequencies if you know what you are doing!