

Programming

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>

Connections

1. You can connect a DIN keyboard using the TRS jack. You will need a MIDI/TRS Type A cable or a MIDI/TRS Type B cable depending on how you have configured the jumpers in the MIDI-CV8.



2. You can connect a USB keyboard. The device will operate as a USB host and power the keyboard on its USB bus while receiving MIDI data from the keyboard.
3. You can connect the Auto-Midi as a USB device using a computer or other host connected to the Auto-Midi's USB-B type socket. This connection will be used for connecting your DAW, such as Ableton Live, to the Auto-Midi.
4. The CV and GATE outputs go to each of the 4 voices in your modular.
5. The SIG IN jacks are for connecting a pulse output from each VCO that is to be auto tuned.

Playing modes

- a. Mode 0: Omni On/POLYPHONIC. Standard mode. It receives channel messages sent on any channel and plays notes polyphonically. The device will play 4 polyphonic voices. The device responds on ALL midi channels.
- b. Mode 1: Omni On/MONOPHONIC. It receives channel messages sent on any channel and plays notes monophonically. The device will play monophonically with the same note playing on all 4 outputs. The device responds on ALL midi channels.
- c. Mode 2: SPLIT-LOW-POLY MODE. The device will play 3 polyphonic voices on outputs 2-4 for keys on and below the split and monophonically on output 1 for keys above the split. The device responds on ALL midi channels.
- d. Mode 3: SPLIT-HIGH-POLY MODE. The device will play 3 polyphonic voices on outputs 2-4 for keys on and above the split and monophonically on output 1 for keys below the split. The device responds on ALL midi channels.
- e. Mode 4: SPLIT-POLY-POLY MODE. The device will play 2 polyphonic voices on outputs 1-2 for keys on and below the split and 2 polyphonic voices on outputs 3-4 for keys above the split. The device responds on ALL midi channels.
- f. Mode 5: Omni Off/POLYPHONIC. It receives channel messages sent on ONE specified channel and plays notes polyphonically. Now the device will play 4 polyphonic voices but the device responds only to the selected midi channel.
- g. Mode 6: Omni Off/MONOPHONIC. It receives channel messages sent on a set of specified channels and plays notes monophonically. Now the device will play monophonically, with each input midi channel mapped to one output channel. The initial midi channel sets the midi channel that will output from the device on channel 1. The remaining 3 outputs will be assigned consecutively starting with initial midi channel +1 etc.

Use with a DAW

1. You can use the DAW to send midi sync and start/stop signals to the device and use these from output jacks CLOCK and START. These jacks will send a 10V signal from these jacks.
2. Ensure that the DAW Sync output is switched on before starting the track otherwise no midi-start messages will be sent on the clock track and the cock will begin randomly part way through the track and will not be in sync with the track beats.
3. The Start/Stop signal is gated by default. When the midi-start signal is received, the output from START remains high until the stop signal is received.

4. If using Ableton LIVE, set the sync to Pattern Mode for the start and stop signal. The device does not recognize the Song Position Pointer or "Continue" messages.

Commands

1. There are several commands that can be sent from the keyboard to modify the program of the Auto-Midi. An understanding of the command mode is required to calibrate the DACs on the module.
2. Playing modes are maintained after power off and the most recent settings will be available when you power on the module again.
3. The various playing modes are maintained when the power is switched off.
4. To enter command mode
 - a. Send "All Notes Off" message to the Auto-Midi. Or, on a keyboard, you can move the Main Volume control to 0. If the control is already at 0, move it away from 0 and then back to 0.
 - b. Next, you will need access to midi notes 0 to 20. Either by shifting octaves and transpose controls until the lowest notes of the keyboard are accessible or using a virtual "piano roll" interface on a DAW.
 - c. For MidiPlus AKM320:
 - i. Move the octave shift to its lowest setting by centering it and then pressing octave down (-) 5 TIMES
 - ii. Move the transpose to its lowest setting by centering it and then pressing transpose down (-) 5 TIMES
 - d. For M-Audio Keystation 49:
 - i. 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.
 - e. For M-Audio Keystation 61:
 - i. Press the "Advanced" button
 - ii. Press the key on the key on the keyboard marked "OCT"
 - iii. Press the "-" button multiple times until the "-" LED is red (two clicks)
 - iv. Press the "Advanced" button

- v. Press the key on the keyboard marked "TRANS"
- vi. Press the "-" button multiple times until the "-" LED is "brighter" green (12 clicks)
- vii. You are now in COMMAND MODE

5. 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. Mode 0: Omni On/POLYPHONIC. Enter command mode. Play MIDI note 0 (usually the first white key on the left). Now the device will play 4 polyphonic voices. The device responds on ALL midi channels.
- d. Mode 1: Omni On/MONOPHONIC. 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 4 outputs. The device responds on ALL midi channels.
- e. Mode 2: 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 3 polyphonic voices on outputs 2-4 for keys on and below the split and monophonically on output 1 for keys above the split. The device responds on ALL midi channels.
- f. Mode 3: 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 3 polyphonic voices on outputs 2-3 for keys on and above the split and monophonically on output 1 for keys below the split. The device responds on ALL midi channels.
- g. Mode 4: SPLIT-POLY-POLY 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 where the keyboard should be split. The device will play 2 polyphonic voices on outputs 1-2 for keys on and below the split and 2 polyphonic voices on outputs 3-4 for keys above the split. The device responds on ALL midi channels.
- h. Mode 5: Omni Off/POLYPHONIC. Play MIDI note 5. Now set the Midi Channel that the device should respond to by pressing the corresponding key (Valid keys are 1 - 16). Now the device will play 4 polyphonic voices but the device responds only to the selected midi channel.
- i. Mode 6: Omni Off/MONOPHONIC. Play MIDI note 6. Now set the Initial Midi Channel that the device should respond to by pressing the corresponding key (Valid keys are 1 -

- 13). Now the device will play monophonically, with each input midi channel mapped to one output channel. The initial midi channel sets the midi channel that will output from the device on channel 1. The remaining 3 outputs will be assigned consecutively starting with initial midi channel +1 etc.
- j. TUNE. Enter command mode. Play MIDI note 10. 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).
 - k. AUTOTUNE. Enter command mode. Play MIDI note 11. See the detailed section below for the Auto tune procedure.
 - l. CLEAR AUTOTUNE. This will reset the Auto-Midi to output exactly 1/12V increments without compensating for VCO errors. Enter command mode. Play MIDI note 12.
 - m. 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

The device does not respond to the built in commands OMNI-ON or OMNI-OFF since there is not enough information sent to fully program the MIDI-CV8. You will need to use the command mode settings described earlier to set these modes.

Calibrating the Auto-Midi

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. Plug in the MIDI keyboard to the USB jack on the front panel or a standard MIDI keyboard with a DIN cable and the correct A or B TRS adapter.
2. Power up the device and allow it to warm up for a few minutes
3. Send "All Notes Off" message. Or, on a keyboard, you can move the Main Volume control to 0. If the control is already at 0, move it away from 0 and then back to 0.

4. Next, you will need a method to send midi notes 0 to 20. Either by shifting octaves and transpose controls until the lowest notes of the keyboard are accessible or using a virtual "piano roll" interface on a DAW.
5. 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 4 outputs.
6. Connect the -VE probe of a multimeter set to the 20V range to your power ground.
7. Plug in a patch cord to CV socket 1
8. Connect the +VE probe of the multimeter to the patch cord.
9. Play and hold C3 (MIDI note 48) and read the voltage. This is a C note octave 3
10. Adjust the trimmer for channel 1 (corner of the board) until exactly 4.00V is displayed on the multimeter
11. 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
12. Repeat the adjustments until you have the tracking as close as possible to 1V per octave.
13. 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 10. 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 MIDI NOTE 60, equivalent to +5.000V from the CV out jack for that voice and you should hear the tone on your synthesizer. This is a C note octave 4
6. Use the synth VCO frequency controls to obtain the note C4. (Approx 262Hz)
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 Auto-Midi for tuning.
9. You can tune the synth to other frequencies if you know what you are doing!

Auto Tuning

Plug the pulse output of each VCO to be auto tuned into the corresponding SIG IN jack. Plug the corresponding CV of the Auto-Midi into the CV input of each VCO to be auto tuned. Plug the corresponding GATE of the Auto-Midi into the GATE input of each EG in the voice to be auto tuned.

Tune the VCOs as close as possible using the Tuning procedure above.

VCOs must be tuned so that they have sufficient headroom for the MIDI notes that will be sent to them. If a VCO is tuned to a resting frequency that is too low, when the highest MIDI note is sent, the Auto-Midi will not be able to raise the CV into the VCO enough to generate the required high frequencies. For example, if 8V is needed to play middle C on the VCO, then C6 will be impossible since this would require 11V!

Start the auto tuning as follows:

Enter command mode. Play MIDI note 11.

The auto tune process begins and will take 10-30 minutes.

The gate LED of the Auto-Midi will remain lit until the end of the process. As each VCO is undergoing tuning, the gate LED of the EG corresponding to that voice will remain lit. The auto tune process will move through each of four voices until complete. If a SIG IN is not present for a voice the auto tune will skip that voice after a few seconds.

Do not change any VCO controls while the auto tuning is in process.

