GMS-742a MIDI to CV CONVERTER

PRELIMINARY OPERATION MANUAL

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Grove Audio LLC

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INTRODUCTION

The MIDI to CV Converter module is designed to convert MIDI note commands into corresponding analog voltage level outputs to be used by devices such as voltage controlled oscillators in analog synthesizers. In addition to a changing analog voltage on one channel, the module can also supply a second analog voltage corresponding to the MIDI velocity information. This analog voltage can be used to vary the response of an envelope generator to allow the channels dynamics to be controlled by keyboard velocity information.

BASIC FUNCTIONS

The GMS-742 MIDI to CV converter contains two complete converter channels, each channel capable of producing two analog outputs and two gate outputs. When a two channel mode is selected, one analog channel will produce the voltage equivalant of the input MIDI note value, one analog channel will produce the voltage equivalant of the MIDI velocity value, one gate channel will produce a gate signal for the duration of the MIDI note on to note off time, and one gate channel will produce a 25 millisecond trigger pulse.

MULTIVOICE OPERATING MODES

- Two channel with gate and trigger
- Three or four channels with gate
- Two channels with seperate sequential MIDI channel numbers
- Four channels with seperate sequential MIDI channel numbers
- Split keyboard with C0-B1 on ch. 1 and C2-C5 on ch. 2

ADDITIONAL FEATURES

A front panel selector allows setting the base MIDI channel on which the module listens. If the setting is not modified by system commands received on the port, the channel also serves as the default analog output channel. Depending on the selected operating mode, additional channels are assigned following the channel selected on the front panel switch.

The MIDI clock on the input channel is divided internally and output on the MIDI CLOCK output jack. Divisor ratio set by turning mode switch to the desired ratio and pressing the front panel set divisor pushbutton.

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OPERATING MODE TABLE

Operating mode is selected by a front panel 16 position rotary switch.

MODE	FUNCTION
1	2 Ch. Independent Note CV, Velocity CV, Gate, Trigger Successive MIDI Channels
2	2 Ch. Polyphonic Note CV, Velocity CV, Gate, Trigger Common MIDI Channel
3	4 Ch. Polyphonic Note CV, Gate Common MIDI Channel
4	4 Ch. Polyphonic Note CV, Common Gate Common MIDI Channel
5	4 Ch. Independent Note CV, Gate Succesive MIDI Channels
6	2 Ch. Independent - Legato On Note CV, Velocity CV, Gate, Trigger Successive MIDI Channels
7	1 Ch. with Pitchbend, Mod Wheel Note CV, Velocity CV, Pitchbend CV, Mod Wheel CV, Gate, Trigger
8	1 Ch., Legato On with Pitchbend, Mod Wheel Note CV, Velocity CV, Pitchbend CV, Mod Wheel CV, Gate, Trigger
9	2 Ch. Independent - Split Keyboard Ch. 1 (C0-B1) Note CV, Gate; Ch. 2 (C2-C5) Note CV, Gate Common MIDI Channel
10	2 Ch. Independent, Legato On - Split Keyboard Ch. 1 (C0-B1) Note CV, Gate; Ch. 2 (C2-C5) Note CV, Gate Common MIDI Channel
16	Test/Tuning Common Note CV and common Gate on all outputs Current MIDI Channel

MIDI CLOCK OUTPUT

If the input MIDI stream contains the MIDI clock (24ppqn clock), the module can be used to output the clock to external devices, divided by a preset factor. The clock is output through the front panel MIDI CLK jack. This is a stereo jack with the clock appearing as a 0-5V square wave on the tip connection. On the ring of the jack is a run/stop signal which can be configured to use the MIDI run/stop/reset realtime commands or a note message controlled run/stop command.

The division factor is controlled by the module programming grid Group 1. There is also a toggle bit to enable the MIDI clock note control. The factory default is a division ratio of 12 (1:8) which will give one clock per eighth note.

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TECHNICAL SPECIFICATIONS GMS-742

Each Channel

Voltage Scale	1 Volt/Octave - .0833 Volts/Semitone Note number 0 - 127 produces -4.0 V to +6.0 V
MIDI Note Range	0 V = MIDI Note #48 = C4 (starting note for zero volts is presettable)
D/A Converter Output	16 Bits; full-scale range +-10 V
Gate/Trigger Output	0 - +5 V Gate width: duration of note Trigger width: 25 msec.
Module Power	+15 Volts 25 mA., -15 Volts 25 mA., +5 Volts 100 mA
Module Size	Panel height - 8.75 inches (222 mm); Panel width - 2.125 inches (54 mm); Depth (behind panel) 3.75 inches (96 mm)

MODULE PROGRAMMING OPTIONS

Certain module functions can be programmed by using the mode selector switch and a front panel toggle switch. To enter the programming mode, press and hold the toggle switch to the right (PGM) position for approximately two seconds until the Gate 1 LED starts to flash. This indicates that the module is in the programming mode. By briefly pressing the toggle switch to the right and releasing it, the program group can be selected. The Gate 2, Trig 1, and Trig 2 LEDs will successively flash, indicating that the corresponding program group is selected. There are four program groups with 16 options per group. The table below describes the functions controlled by this arrangement.

Once the option is programmed, its current state is stored in a non-volatile memory and will be restored the next time the module is powered. One of the program options can be selected to return all settings to the factory defaults.

Within a group, to select the option to be programmed, turn the mode selector switch to the appropriate number and then press the toggle switch to the right (PGM) position for approximately two seconds or until the LED stops flashing and remains lit. Then release the toggle switch. The LED will go off after

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approximately one second indicating successful programming of the option. Rotate the Mode selector switch back to the operation mode that was being used.

PROGRAMMABLE CONTROLS GRID

POS	FUNCTION	GROUP 1 Gate1	POS	FUNCTION	GROUP 2 Gate2
1	1/96 24ppqn rate (not implemented)		1	Pitchbend range +- ½ semitone	
2	1/48 clock div		2	Pitchbend range +- 1 semitone	
3	1/48 dotted clock div (not implemented)		3	**Pitchbend range +- 2 semitone (default)**	
4	1/32 clock div		4	Zero volts at C4	
5	1/16 clock div		5	Zero volts at C3	
6	1/16 dotted clock div		6	Zero volts at C2	
7	**1/8 clock div (default)**		7	**Zero volts at C1 (default – Q104 mode)**	
8	1/8 dotted clock div		8	**Disable Pitchbend for mode 7&8 (default)**	
9	1/4 clock div		9	Enable Pitchbend for mode 7&8	
10	1/4 dotted clock div		10	**Disable continuous MIDI clock (default)**	
11	1/2 clock div		11	Enable continuous MIDI clock	
12	1/2 dotted clock div		12	**Disable RUN/STOP pulse mode (default)**	
13	1/1 clock div		13	Enable RUN/STOP pulse mode	
14	Not used		14	**Auxiliary gate outputs disabled (default)**	
15	Disable MIDI clock note control		15	Auxiliary gate outputs enabled	
16	Enable MIDI clock note control		16	Reset system defaults	
POS	FUNCTION	GROUP 3 Trig1	POS	FUNCTION	GROUP 4 Trig2
1	Legato Mode disabled			Coming soon	
2	**Legato Mode enabled (default)**				

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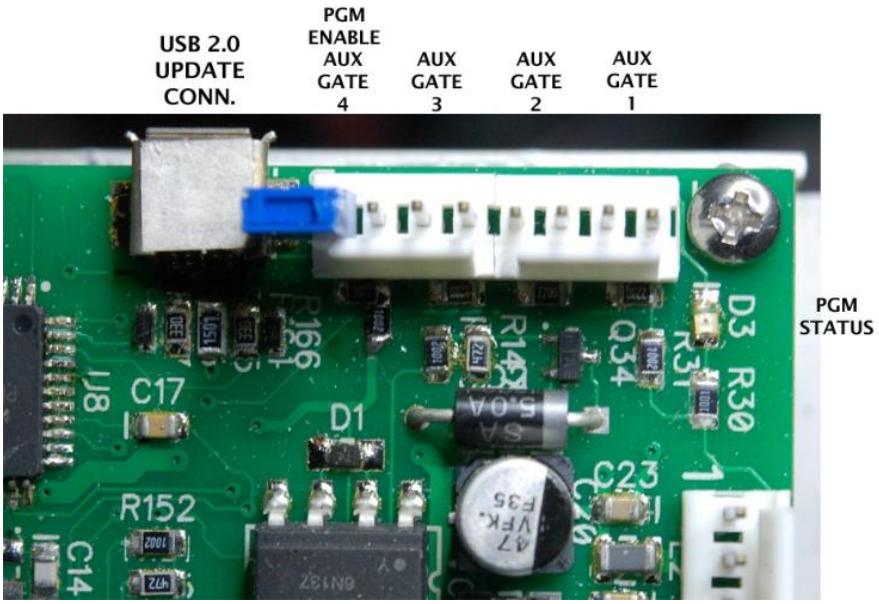
INTERNAL GATE CONNECTIONS

There are four internal gate output connections that can be used as gates or triggers depending on the current operating mode setting. This picture shows their location:



As an example of the use of these outputs, in the four independent channel with common gate and trigger mode, these outputs could be used to gate each voice through a VCA corresponding to it. Then the VCA outputs could be mixed and fed through a common VCA controlled by an envelop generator gated and triggered by the common gate and trigger outputs on the front panel.

RUN/STOP REALTIME MESSAGES AND MIDI NOTE CONTROL

An external control line on the ring of the MIDI CLK connector supplies a 0-5 V pulse or level waveform that can be used to gate an external clock or sequencer. The line can be set by programmable switch to be high from the time the RUN realtime message or MIDI note command is received until the STOP realtime message or MIDI note command is received. The output can be set to be either a level or pulse depending on the needs of the controlled device. By using this line and the MIDI clock signal on the tip of the same connector, the external device can be synchronized with software sequencers.

When using the MIDI note command to control the external control line, the internal logic will only respond to MIDI note messages sent on the MIDI channel which is one channel above the highest MIDI channel used by the current mode. For example, if Mode 1 is selected, the module responds to MIDI channels one and two to produce the CV and velocity signals and to MIDI channel 2 channels higher than the value set on the front panel MIDI channel selector switch for the RUN/STOP note commands. If mode 5 is selected, the RUN/STOP note commands should be sent on a MIDI channel 4 channels higher than the value set on the front panel MIDI channel selector switch.

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INSTALLING PROGRAM UPDATES

The process for installing program files in the GMS-742a MIDI to CV module using the Microchip HID bootloader client is described below:

1. Move the entire folder called "usb_bootloader_client_win" to the host machine. It is not necessary to install the bootloader client.

2. The module must be powered and the miniB USB connector on the module main board must be accessible.

3. Move the jumper block on pin 8 of the 8pin MTA-100 connector in the upper left corner of the main board so that pins 7 and 8 are connected. This enables the on-board programming mode.

4. Power up the module. The LED D3 should light steadily to indicate the module is ready to communicate with the HID bootloader client.

5. Open the bootloader client folder and find the file HIDBootloader. Double click this file to run it.

6. Connect a USB type A cable from the host computer and plug the miniB end of the cable into the USB connector on the module. There may be some preliminary communication and installation of drivers. Eventually, a message should appear on the status window of the bootloader client indicating that a device has been detected and is ready to install files. The LED D3 on the module will flash periodically to indicate that it is ready.

7. Click on the file menu tab and select Import Hex file option.

8. When a file dialog window opens, navigate to the location of the module hex file to be loaded.

9. Once the file is successfully imported, click on the Program tab and select the Erase, Program, Verify option.

10. Status messages indicating the progress of the transfer should appear.

11. Once the transfer is completed, power down the module.

12. Move the jumper from pins 7 and 8 to pin 8.

13. Power up the module and the new program version should start running.

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