

Q104 MIDI Interface

Oct 2001

The Q104 MIDI Interface will accept a MIDI signal from a keyboard or other MIDI device and creates a control voltage for pitch, a control voltage for velocity, a gate signal, and a trigger signal. These signals can be used to control oscillators, filters, and to trigger envelope generators and sequencers.

Controls and Connectors

MIDI In Connector

Receives MIDI channel 1 commands.

Gate Output Connector & LED

Gate Output signal. Stays on (5V) as long as a note is on.

Trigger Output Connector & LED

Short pulse at the beginning of a note on.

Pitch Output Connector

Pitch control voltage. 1V/Octave.

Velocity Output Connector

Velocity control voltage. 0-5 volts

Specifications

Panel Size: Single width 2.125"w x 8.75"h.

Pitch Output: 0-5V, 1V/Octave response (12 bit D/A).

Velocity Output: 0-5V.

Gate Output: 0-5V, active high.

Trigger Output: 0-5V, 10ms, active high.

MIDI Channel #: 1

Power: +15V@50ma, +5V@50ma.



Tracking Accuracy

The following tracking accuracy chart was taken from a QKB15S Keyboard Controller taken right off the production line. No special calibration, parts, procedures, or modifications were used.

Test Equipment Used (with recent calibration): HP 3455a 6.5 Digit Voltmeter

Q104 Tracking Accuracy		
Desired	Actual	% Error
0V	0V	0
1V	0.9995V	-0.05%
2V	1.9998V	-0.01%
3V	3.0012V	+0.03%
4V	4.0027V	+0.07%
5V	5.0008V	+0.02%

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Usage and Patch Tips

Basics

Start with a simple patch to familiarize yourself with the module. Start by patching the pitch output to an oscillator's exponential control jack. Patch a waveform from the oscillator to an amplifier signal input. Now patch the gate output to the gate input on an envelope generator and patch its output to the control input on the amplifier. Use a MIDI keyboard for testing. When you press a key, a gate signal will start the envelope generator which will turn on your amplifier. At the same time the pitch control voltage for the key you pressed will tell the oscillator which pitch to create. When you release the key, the gate signal will go away and the envelope generator will release according to the release control. The pitch control voltage will stay at the voltage of the last key pressed.

Routing signals to multiple modules

Normally you route the pitch signal to more than one oscillator, the filter, and possibly other modules. The best way to do this is to use a Q124 Multiple Module. Using the top section of the Q124 allows the pitch signal to go to 7 other modules. That leaves the bottom section of the Q124 to route the gate signals which usually go to envelope generators and sequencers.

Portamento

Portamento is the gradual gliding between notes. This is sometimes called slew-limiting. This function is provided by the Q105 Slew Limiter. Simply route your pitch signal into the Q105 and send the output to wherever you want – usually to a multiple.

Using the velocity signal

A velocity signal is created from the MIDI information. This signal is 0 to 5 volts depending on the speed at which you press a key. You can use the velocity signal to control almost any parameter in your system such as oscillator frequency, filter resonance, or amplitude. Not all MIDI devices will generate a velocity signal.

When an oscillator is used to modulate a filter, another oscillator (vibrato), or an amplifier (tremolo), you can have the speed of this modulation controlled by velocity. Simply take the velocity signal and route it to the linear frequency connector on the oscillator and adjust the amount. The faster you press keys the faster the modulation will be.

Control amplitude with velocity by routing the output of an envelope generator to an amplifier which is controlled by the velocity signal. Now your envelope size depends on velocity. Take this new envelope signal and control your final output amplifier.

Syncing an oscillator to the keyboard

When using an oscillator at a low frequency for modulation you can synchronize it to each keypress by patching the gate signal to the hard sync input on the oscillator. Each time a key is pressed, the oscillator will be reset. You may have to invert the gate signal with a Q125 Signal Processor to reset on the correct edge of the signal.

Gates and Triggers

Gate signals stay on as long as a key is pressed. Unlike gate signals, triggers are a very short pulse. Triggers are mainly for compatibility with other equipment. Trigger signals can be used to start an envelope generator but there will be no sustain level, and they can be used to start sequencers. Normally you will only need gate signals.

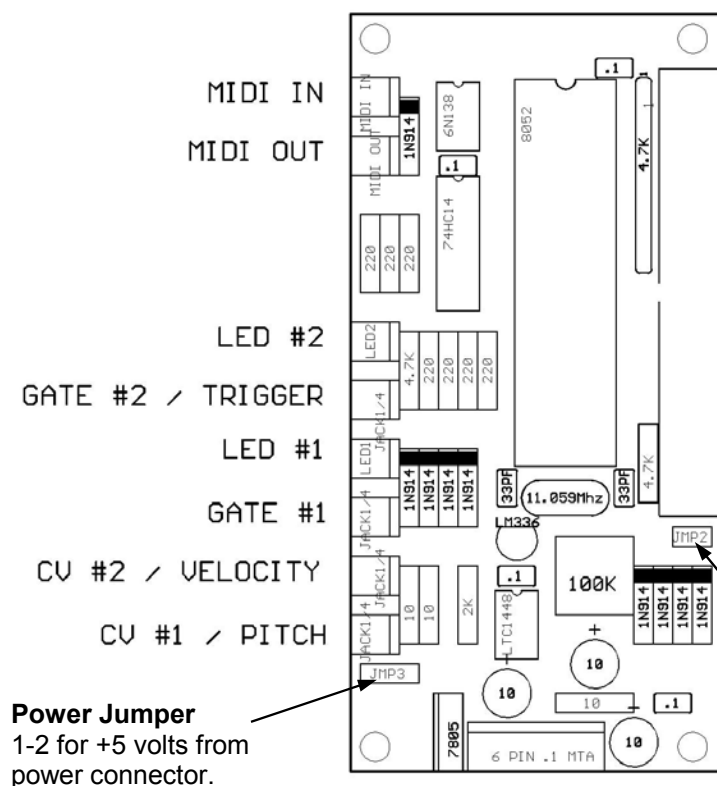
Patching problems

The module's outputs are designed to drive many inputs but it is possible to draw too much current. When this happens you'll notice that the module does not produce the correct voltages and your oscillator's will not produce the right tones. This can also happen if you accidentally connect one of the outputs to another output. Shorting or overloading one of the control voltage outputs will affect both.

Calibration and Testing

1. Use a MIDI keyboard on channel 1 to provide commands for testing.
2. LED for Gate should stay on as long as a key is pressed. LED for Trigger should flash shortly at the beginning of each keypress.
3. Attach a voltmeter to the Pitch output. Press a 'C' key to obtain 4 volts. Adjust the trim pot to achieve exactly 4.000 volts.
4. Check the 'C' key for each octave which should produce 0, 1, 2, 3, 4, and 5 volts.
4. Measure the Velocity output with a digital voltmeter and check that slow keypresses create low voltages and quick keypresses create high voltages. Range should be approximately 0 to 5 volts.

PC Board Layout



Power Connector

6 pin .1" MTA type connector made by AMP. Available from Mouser Electronics or Digi-Key. Modules have a male PCB mount connector and cable harnesses have a female.

Part Numbers:

Female cable mount: #6404416
Male PCB mount: #6404566

Pinout:

- 1 = +15v
- 2 = key (pin removed)
- 3 = +5v
- 4 = gnd
- 5 = -15v

Not all voltages are used on all modules.

