Q170 MIDI Gates

The Q170 MIDI Gates module produces gate signals from a stream of MIDI messages, either from a keyboard, a DAW or any MIDI source. Each of the 8 outputs can be programmed for one or more MIDI note messages or Continuous Controller messages.

Gate outputs can be used to select steps on a Q960 sequencer, trigger envelopes, change filter settings and many other things.

A MIDI Thru output allows daisy-chaining of many modules.

The MIDI output is a version of the incoming MIDI signals but with the programmed notes filtered out. This allows you to set aside certain notes on a keyboard for controlling things via an independent gate signal.

To program an output, simply press the Set button and send MIDI note or CC messages. MIDI channel numbers are recognized. Notes sent once cause the output to follow the note on/off messages and operate like a simple keyboard gate signal. Notes sent twice cause the output to toggle On then Off as note On messages are received.

A special mode allows gate outputs to be programmed to respond to MIDI real-time messages, sometimes called sync - start, stop, continue, clock. The clock output can be programmed with a division
of /1, /2, /3, /4, /6, /8, /12, /16, /24, /32, /48, /96, /192.

Programming is preserved through power cycling.

Q170 MIDI Gates Specifications

Panel Size: Single Width 2.125"w x 8.75" (Moog Unit Format).
Gate Outputs: 5V positive.
Trigger Width: 5ms.
Power Requirement: +15V@30ma, -15V@30ma, +5V@50ma. Synthesizers.com standard.
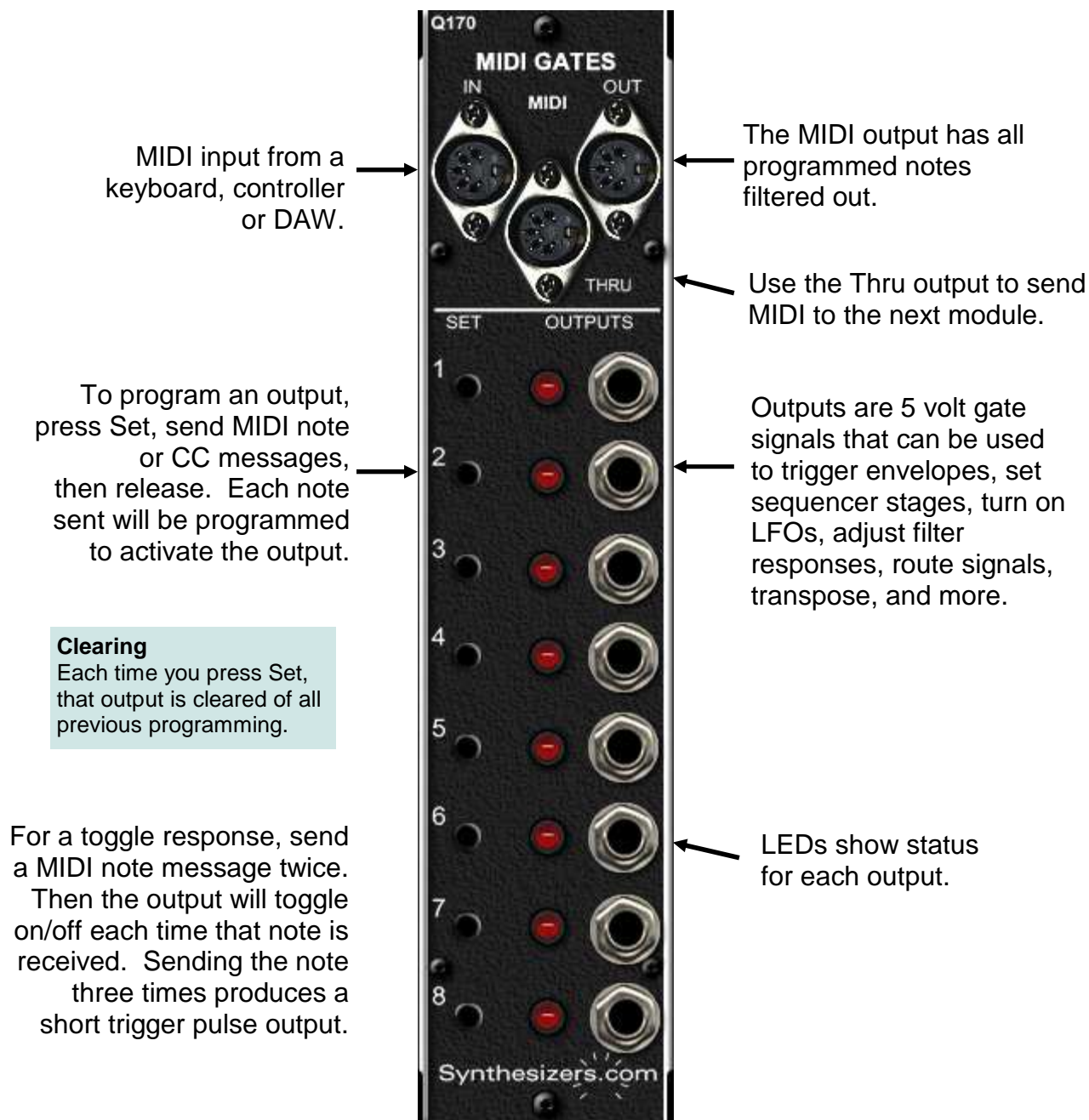**MIDI Messages Recognized:** Notes, Continuous Controllers, Clock, Start, Stop, Continue.
Clock Division Options: /1,/2,/3,/4,/6,/8,/12,/16,/24,/32, /48, /96, /192.
Total Messages Programmable: 100 per gate, 800 total.

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Panel Overview

The Q170 MIDI Gates module creates gate signals for specific keys of a MIDI keyboard or MIDI signal source. Each of the 8 outputs can be programmed for any key or CC. Gates can be used to select steps on a Q960 sequencer, trigger envelopes, change filter settings and many other things. A MIDI Thru output allows daisy-chaining of many modules and a MIDI output has the programmed notes filtered out.

MIDI input from a keyboard, controller or DAW.

The MIDI output has all programmed notes filtered out.

Use the Thru output to send MIDI to the next module.

To program an output, press Set, send MIDI note or CC messages, then release. Each note sent will be programmed to activate the output.

Outputs are 5 volt gate signals that can be used to trigger envelopes, set sequencer stages, turn on LFOs, adjust filter responses, route signals, transpose, and more.

Clearing
Each time you press Set, that output is cleared of all previous programming.

For a toggle response, send a MIDI note message twice. Then the output will toggle on/off each time that note is received. Sending the note three times produces a short trigger pulse output.

LEDs show status for each output.

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MIDI Message Interpretation

In these examples, a keyboard is assumed to be the source of MIDI messages to the Q170 MIDI Gates module. The source could be any other controller or a computer (DAW). Every message, without exception, is sent to the MIDI Thru output. MIDI messages are also sent to the MIDI output but with the programmed messages filtered out.

Note On/Off Messages
Programming gates to follow MIDI Note messages is the primary function of the Q170. Any note number can be assigned to any Gate output, and many notes can be assigned to each Gate output.

There are three different modes for responding to Note On/Off messages.

Follow Mode
In Follow mode, programmed Gate outputs simply follow note messages. A Gate output will turn On when a Note On message is received and turn Off when a Note Off message is received. Activate Follow mode by simply pressing and releasing a key while the Set button is pressed.

Toggle Mode
In toggle mode, the programmed Gate outputs toggle between On and Off as Note On messages are received. The first Note On will turn the Gate output On, then the second will turn it Off. Note Off messages are ignored. This mode is useful for turning effects or settings On and Off without requiring a key being pressed. Activate Toggle mode by pressing and releasing the key twice while the Set button is pressed.

Trigger Mode
In Trigger mode, the programmed Gate outputs turn on for a short duration (5ms) then turn Off. You'll see the LED flash briefly. Note Off messages are ignored. This mode is useful for triggering sequencers or AR envelopes. Activate Trigger mode by pressing and releasing the key three times while the Set button is pressed.

When multiple notes are programmed to a single Gate output, the last message received will override others that are currently active. One key can toggle a note On and another can turn it Off.

Continuous Controller (CC) Messages
Gates can be programmed to CC messages. These are programmed the same way as Note messages - press the Set button for the desired Gate output, send the message, then release the Set button.

There are 128 possible CC's. Some are typically assigned to volume, modulation and other common functions so select thoughtfully. Each CC message contains a value of 0-127.

CC messages from a slider or knob transmit a stream of messages as the controller is moved. CC messages from a button just send a single message. If the Q170 receives more than one CC message from a CC number while Set is being pressed, it will be programmed as a knob or slider and the value of the controller determines the Gate output. Values of 0-63 are Off and 64-127 are On.

If the Q170 receives only one CC message from a CC number while Set is pressed, it will be programmed as a button and the Gate output will Toggle between On/Off as the button is pressed.

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MIDI Message Interpretation

Other MIDI Messages
The following MIDI messages are not programmable and are passed through to the Thru and Output connectors - aftertouch, program change, channel pressure, pitch wheel, system common messages. There is no compelling reason to add the complexity and processing time required for programming these messages since note and CC messages provide an abundant source.

System Real Time Messages
System Active Sensing messages are ignored and not passed to the MIDI output.

System Reset clears all outputs and resets internal clock dividing counters.

System real time messages Clock, Start, Continue and Stop can be programmed by pressing specific Set buttons multiple times without sending MIDI data. When one of these messages is programmed to a Gate output, no note or CC message can be programmed to that output.

Press Set #1 twice without sending MIDI data to program it for MIDI Start. When a MIDI Start message is received, output #1 will produce a short trigger pulse. This can be used to start analog sequencers.

Press Set #2 twice without sending MIDI data to program it for MIDI Continue. When a MIDI Continue message is received, output #2 will produce a short trigger pulse.

Press Set #3 twice without sending MIDI data to program it for MIDI Stop. When a MIDI Stop message is received, output #3 will produce a short trigger pulse.

Outputs 4-8 can be programmed to respond to MIDI clock with a division of your choice. Press the Set button multiple times without sending MIDI data to program that output for clock with a certain division.

Press Set	Division	Press Set	Division
2 times	/1	9 times	/16
3 times	/2	10 times	/24
4 times	/3	11 times	/32
5 times	/4	12 times	/48
6 times	/6	13 times	/96
7 times	/8	14 times	/192
8 times	/12		

Programmed System messages are removed from the filtered MIDI output as expected.

Every message, without exception, is sent to the MIDI Thru output.

Factory Defaults
Press Set #1 during power-up to reset the Q170 and clear all programming.

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Q170 MIDI Gates

Basic Usage

Here's a basic patch with a keyboard producing MIDI messages. The Q170 MIDI Gates module creates gates according to its programming and the MIDI signal is sent on to the Q174 MIDI interface module to produce pitch and gate for a synth voice. The gates from the Q170 can be used to start sequencers, trigger additional envelope generators, or provide voltages to adjust parameters in filters and other modules.

Q170
MIDI Gates

Q174
MIDI Interface

MIDI

MIDI

Gate
Outputs

Pitch

Gate

QKB37 Keyboard Controller
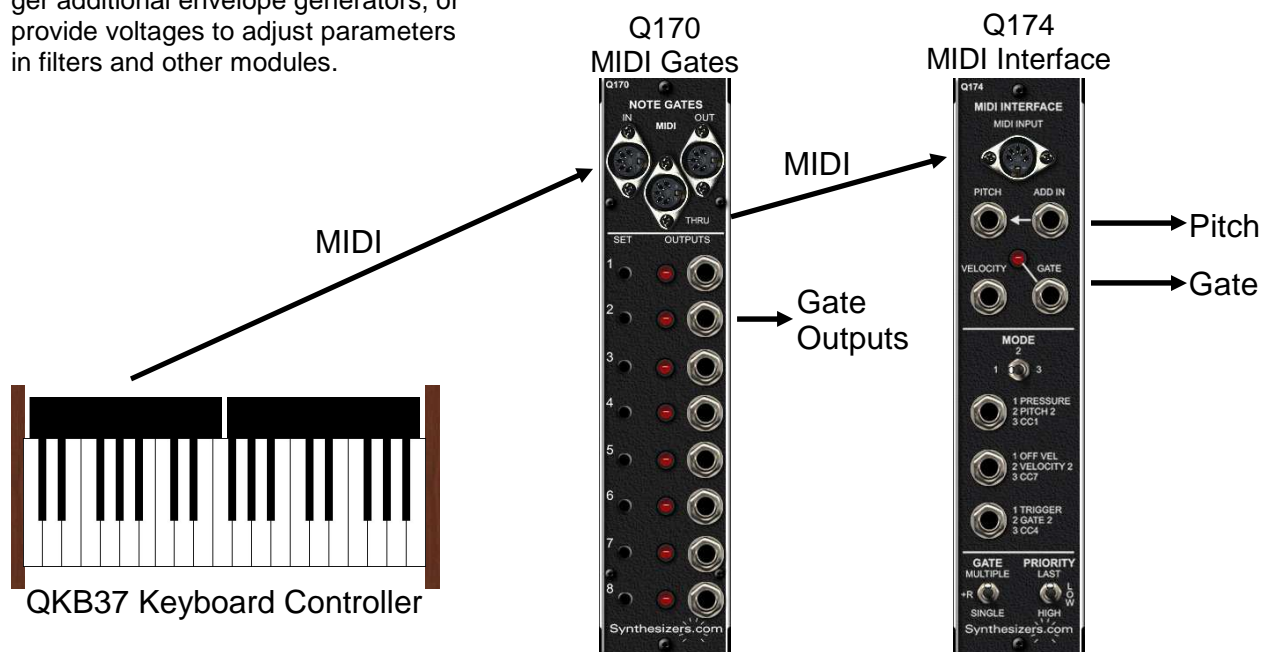
This example shows a gate output controlling a filter setting.

Q170
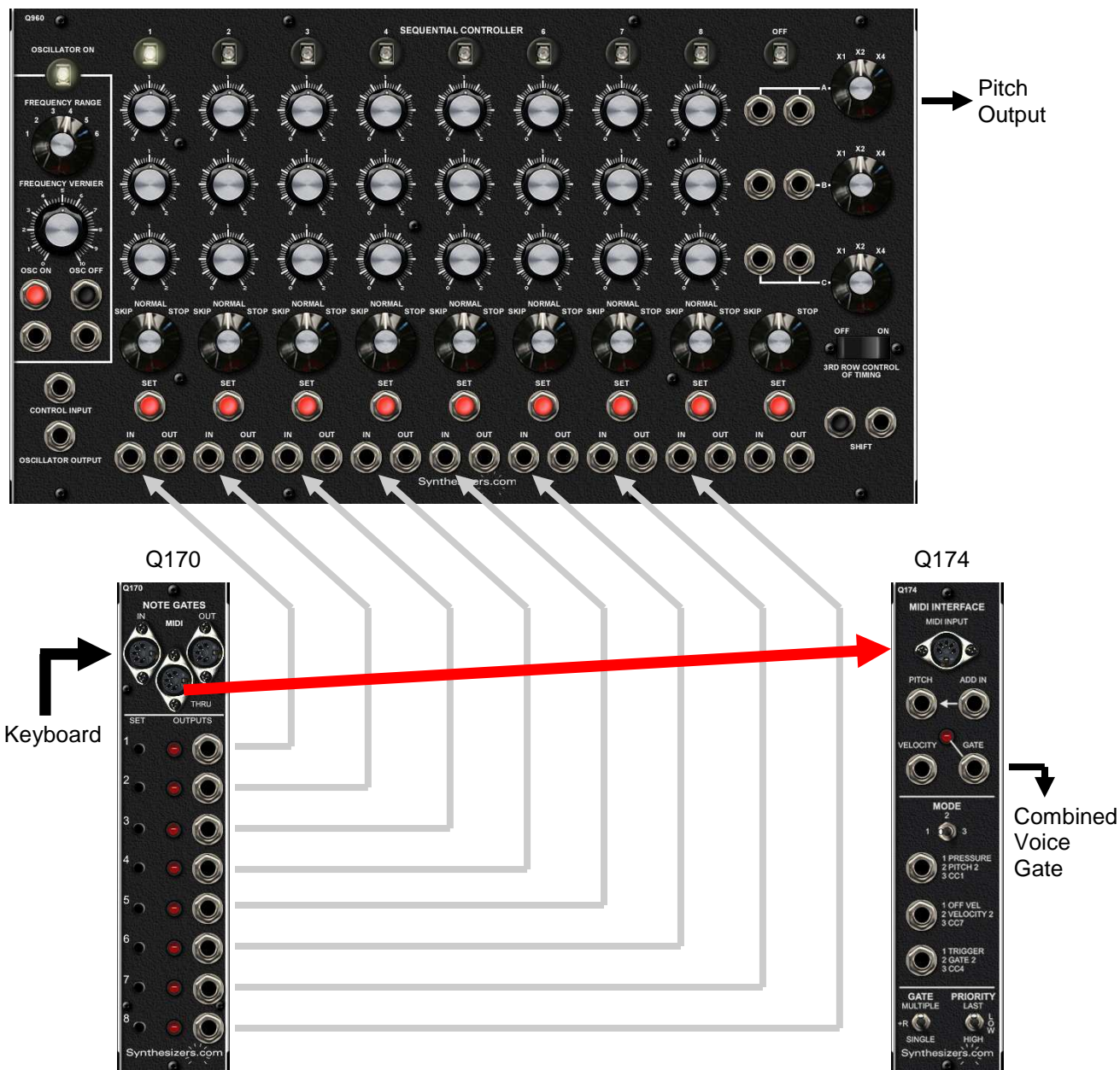MIDI Gates

Q107 Filter

The Level control on the filter allows the 5 volt gate signal to control the filter frequency.

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Q170 MIDI Gates

Sequencer Step Selection Patch

This patch lets the user select specific steps on a Q960 sequencer. Program the Q170 MIDI Gate module to respond to an array of keys, then set the sequencer knobs to voltages that correspond to any note you wish. This allows a keyboard to produce arbitrary notes, or allows programmed keys to select a set of control voltages to adjust a patch at will. Patch the Thru output to a Q174 to produce a combined gate.

Pitch Output

Q170

Q174

Keyboard

Combined Voice Gate

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Q170 MIDI Gates

Transposing

This example uses a gate output to transpose specific notes. The 5V gate signal is patched into the Q106 VCO's variable 1V/Octave CV jack. Adjust the knob for the transposition you want. With this patch, certain keys on a keyboard could be transposed, possibly an octave higher or some other musically useful amount.

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MIDI Gates

Q106 Oscillator

The Amount control sets the amount of transposing.

Vibrato Control

This example turns vibrato on and off for specific keys on a keyboard, or under control of a CC. The gate from the Q170 controls the LFO's built-in amplifier which adds vibrato to an oscillator being used in a normal synth voice patch. Program the gate for the keys you want to have vibrato.

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MIDI Gates

Q167 LFO

Q106 Oscillator

Pitch CV
From Q174
MIDI Interface

Audio
to the rest
of the
patch

Q170 MIDI Gates

Sequencer Clock Control

In this patch, gate outputs from the Q170 are used to clock a Q960 sequencer and to restart it for syncing to other gear or a DAW. Patch MIDI Thru on to the Q174 MIDI Interface for normal pitch/gate creation. The unused gate outputs can be used for other things if you want.

Pitch Output

Q170

DAW

Press Set #1 twice without sending any MIDI data and it will be programmed to respond to the MIDI Start message.

Press Set #4 twice without sending any MIDI data and it will be programmed to respond to the MIDI Clock message.

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Q170 MIDI Gates

MIDI Time Delays

The time between MIDI input data and Thru output data is ~0s since it's a hardware connection.

The time between the start of MIDI input data and the start of filtered data output is 0.65ms. That increases to 0.75ms if there are 10 notes programmed for each of the 8 channels. This is due to the software having to read the entire MIDI message before resending to the filtered output, and the search for programmed notes.

The time between the start of MIDI clock data and the start of a rising clock edge is between 0.4ms and 1.4ms.

Troubleshooting

Remove the AC cable from the system before opening a system.
Never install or remove the power connector on a module with power on.

If no operation, check the power connection, possibly trying another one. Also inspect the circuit board for loose cables.

Perform a reset to factory defaults by pressing Set button #1 during power-up.

There are no jumpers on the Q170.

After releasing a Set button, the programmed data is saved internally and this takes a second or two. Be slow and methodical when programming.

There is a delay between the time MIDI data is received at the input and MIDI data is sent at the filtered output since an entire message must be analyzed before resending. Under normal playing conditions this delay is unnoticeable. MIDI thru has no delay and is a direct copy of the MIDI Input.

To clear a channel, simply press its Set button once without sending any MIDI data.
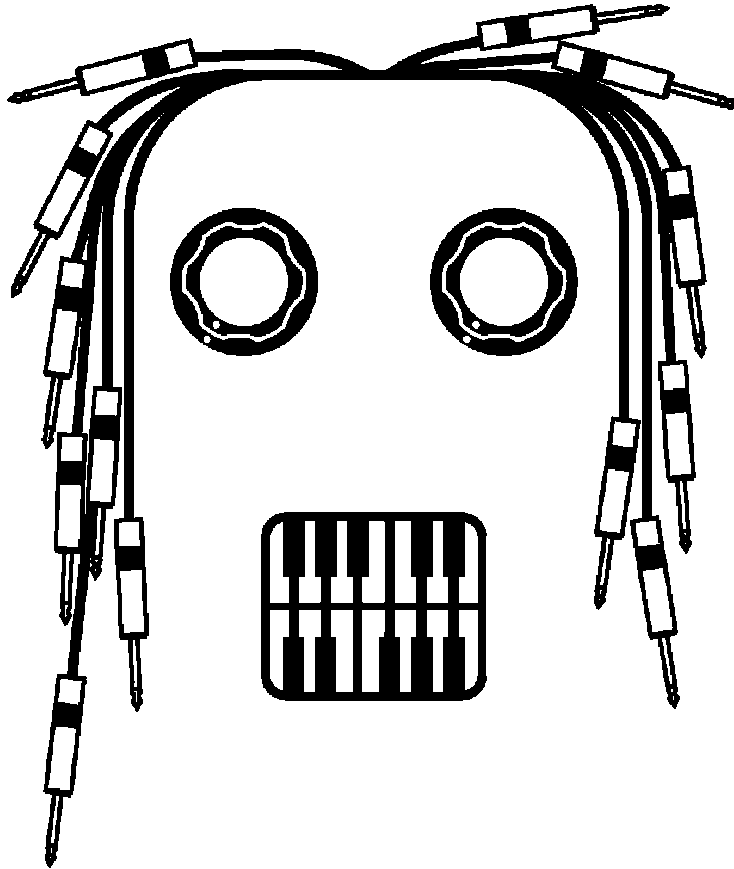
Remember that pressing a Set button more than once without sending data programs special features which can cause confusing behavior. MIDI Clock is one example.

Remember that sending a note button more than once while the Set button is pressed activates the Toggle on/off and short triggering options.

The gate outputs should not be patched to other outputs in the system, only inputs.

Sometimes continuous controller knobs and sliders send data without being moved because they are dirty or are sitting on a threshold. If this happens, programming will be erratic because while the Set button is pressed, undesired CC messages are being sent and programmed. When the Set button is released, the gate output will fire as the undesired CC messages continue. Often, turning the knobs or moving the sliders will solve this, especially on older gear.

Patcher Jack

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