QKB15S Keyboard Controller

Jan 2000

The QKB15S 5-octave keyboard controller generates precise control voltages and gate signals for use by oscillators, filters, envelope generators and other modules. Four modes of operation allow keyboard splits and dual voices. Additionally, MIDI signals are generated for each key press which can be used to control other devices. Incoming MIDI signals are converted to control voltages and gate signals allowing other MIDI devices to control the analog synthesizer. Responds correctly to MIDI pitch bend signals too. Solid walnut cabinet matches our studio systems.

Operating Modes

There are 4 modes which determine how the keyboard operates:

MODE #1 – Single Voice Mode
Creates a pitch control voltage, gate, velocity control voltage, and a trigger pulse. The keyboard acts monophonically - only one key can be pressed at a time. The most recent key takes priority. The pitch control voltage is normally used to control oscillators or filters. The gate signal is normally used to trigger envelope generators. The velocity control voltage can be used to control an amplifier, filter or other module. The trigger pulse can be used to trigger sequencers or envelope generators.

MODE #2 – Dual Voice Mode
Creates 2 pitch control voltages and 2 gate signals. In this mode 2 keys can be pressed at a time to create 2 sets of signals.

MODE #3 – Split Keyboard at Octave 1
In this mode the keyboard is split at the first octave creating 2 keyboards. Each section of the keyboard will generate it's own pitch control voltage and gate signal. Useful when you need to control 2 separate voices at the same time.

MODE #4 – Split Keyboard at Octave 2
In this mode the keyboard is split at the second octave creating 2 keyboards. Each section of the keyboard will generate it's own pitch control voltage and gate signal. Useful when you need to control 2 separate voices at the same time.

Scanning Method

The keyboard is scanned by a microprocessor which constantly looks for pressed keys. When a key is pressed, outputs are generated. If another key is pressed before the first is released, the newest key will take priority. If the second key is released, the first key will retake priority. When generating MIDI, the keyboard will respond to as many as 8 keys at a time.

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Controls and Connectors

Read about operating modes for more information about output signals.

Mode Selector Switch
Selects one of the 4 possible modes.

CV #1 Output
Control Voltage output # 1. In all modes this is a pitch output at 1 volt per octave.

Gate #1 Output
Active high gate output. Stays high (5 volts) as long as a key is pressed.

Gate #1 LED
Shows the status of Gate # 1 Output. On = 5 volts, Off = 0 volts.

CV #2 Output
Control Voltage output # 2. In mode 1 this is the velocity voltage output. Range is 0-5 volts. In mode 2, 3 and 4 this is a pitch output at 1 volt per octave.

Gate #2 Output
Active high gate output. In mode 1 this is a short active high trigger pulse that occurs at the Beginning of a keypress. In other modes it is an active high gate output which stays high (5 volts) as long as a key is pressed.

Gate #2 LED
Shows the status of Gate # 2 Output. On = 5 volts, Off = 0 volts.

MIDI In Connector
MIDI input signal. Responds to MIDI channel 1 note on, note off, and pitch bend commands.

MIDI Out Connector
MIDI signal outputs in response to keypresses. Outputs MIDI channel 1 note on and note off commands. Velocity information is also encoded.

Specifications

Physical Size: 41" wide, 3.75" tall, 9.5" deep.
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: 12VDC@200ma External wall transformer (110VAC), center +.
User must supply 220VAC model if needed.

Calibration and Testing

No calibration is required for this product.

1. Select Mode #1.
2. LED for Gate #1 should stay on as long as a key is pressed. LED for Gate #2 should flash shortly at the beginning of each keypress. Verify that each key turns on Gate #2.
3. Measure the CV #1 output with a digital voltmeter and check the 'c' key for each octave which should produce 0, 1, 2, 3, 4, and 5 volts.
4. Measure the CV #2 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.
5. Attach an external MIDI keyboard (channel 1) into the MIDI In connector and verify that the MIDI keyboard will control CV #1.
6. Attach an external MIDI keyboard (channel 1) to the MIDI Out connector and verify that the QKB15S will control it.
7. Switch to Mode #2 and verify that pressing one key causes one gate LED to come on, and pressing two keys causes both gate LEDs to come on.
8. Switch to Mode #3 and verify that pressing a key within the first octave causes gate LED #1 to come on, and pressing a key within the last 4 octaves causes gate LED #2 to come on.
9. Switch to Mode #4 and verify that pressing a key within the first two octaves causes gate LED #1 to come on, and pressing a key within the last 3 octaves causes gate LED #2 to come on.

Usage and Patch Tips

Basics

Start with a simple patch to familiarize yourself with the keyboard. Select mode one on the keyboard. Patch CV #1 (control voltage #1) to an oscillator's 1V/Octave jack. Patch a waveform from the oscillator to an amplifier signal input. Now patch Gate #1 from the keyboard to the gate input on an envelope generator and patch it's output to the control input on the amplifier. 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 let up on 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 patch the pitch signal from the keyboard 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 keyboard pitch signal into the Q105 and send the output to wherever you want. A jack is provided for pedal control of portamento.

Using the velocity signal

In mode one a velocity signal is generated. 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.

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 patching 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 routing the gate signal to the hard sync input on the oscillator. Each time a key is pressed, the oscillator will be reset. It may be necessary to invert this signal with a Q125 Signal Processor to reset on the correct edge of the gate signal.

Gates and Triggers
Gate signals stay on as long as a key is pressed. In mode one there is also a trigger signal produced. 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.

Using keyboard splits
Modes 3 and 4 basically gives you 2 monophonic keyboards. These 2 separate sets of signals (pitch and gate) can be routed to 2 separate patches - possibly one for bass and one for lead. But you can also use one of the sections of the keyboard to control some module's parameter. For example, use the left section of the keyboard to control the filter frequency, and the right section to control the pitch. This gives you precise control not possible with a pitch bend wheel.

Using MIDI and the keyboard at the same time
Yes, the keyboard can accept MIDI signals and also respond to your keypresses. This could be used to ad-lib on top of an automated sequence. But remember that the keyboard is monophonic. Also, the keyboard can be used to control both your synthesizer and send MIDI messages to another instrument at the same time. The keyboard is polyphonic (8 notes maximum) when sending out MIDI messages. You can also use the pitch bend wheel of another MIDI controller to pitch bend the control voltage from the keyboard at the same time you're playing.

Controlling keyboard power
There is not a power switch for the keyboard but you can control the power by using the 'switched output' of a Q102 Power Interface Module. When you turn power off to your synthesizer system, power will be turned off of the keyboard too. You'll need a cable with an IEC male connector on one end and a regular outlet on the other.

Patching problems
The keyboard'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 keyboard 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.

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