Q181EB Expression Block Controller

Feb 2014

The Expression Block controller produces a voltage as you press the block, similar to the Ondes Martenot and other instruments. Perfect for controlling amplitude as you play notes on the keyboard, to control filter frequency, or other parameters in the synthesizer system.

The Expression Block controller uses our standardized Q181 single-channel Controller Interface module providing an Auto Gate, Switch Gate and a voltage output range switch.

The module can be mounted in a Box-style cabinet next to your keyboard controller, or in a synthesizer cabinet just like any other module.

An Auto Gate signal is automatically created as the block is pressed. This gate can be used to trigger sequencers and envelope generators.

A switch at the bottom of the block's travel activates the Switch Gate signal for triggering devices also.

A 3-color LED illuminates the acrylic block and may be programmed to change colors as it moves or as the Auto Gate is activated.

Q181EB

Expression Block Sub-Module

Q181EB Expression Block Specifications

Panel Size: 2.125"w x 8.75"h. (single-space)
Block: Acrylic. .75"w x .75" high, 2.625" long
Block Travel: .75", 15 degrees
Voltage Output: Selectable range - 5V, 2V, 4/12V
Auto Gate Output: 5V, adjustable position activation
Switch Gate Output: 5V, activated at full-down
LED Colors: 3 primary colors (Red, Green, Blue)
LED Control: Forward, Reverse, Power, or Auto Gate - user-configurable
Power: +15V@50ma, -15V@50ma, +5V@50ma

Q181EB Expression Block Controller

Feb 2014

Output range. Set to 4/12V for +/- 2 semitone range

Auto Gate trigger point. Activates based on the block's position

Expression block controller

Voltage output based on the block's position

Auto Gate output (5V positive)

Switch Gate Activated at bottom of block travel

Pivot point

Press down here

Q181EB Expression Block Controller

Feb 2014

Features and Operation

Expression Block mounted in a Box1

The Q181EB produces signals as the block is pressed down. The Expression Block controller operates through the Q181 Controller Interface module to produce voltages and gate signals. These signals can be used to control parameters in a synthesizer system.

Voltage Output

The main output of the Expression Block Controller is a voltage that varies as the block is pressed down. The range of this voltage is controlled by the output range switch to select 5 volts, 2 volts or 4/12ths volt. Use the 4/12ths volt position for 4 semitones which works well for pitch bending. For modulation, use the 5 volt position then attenuate or invert the signal at the destination module.

Auto Gate

A gate signal is produced automatically when the controller changes position. The position that triggers this gate signal is set by the variable control. An LED shows status of the Auto Gate. This Auto Gate signal can be used to trigger envelopes, start sequencers or change other module parameters depending on the controller's position. Auto Gate may also be used to transpose oscillators or alter filter parameters at certain block positions. The Expression Block controller can be used for this Auto Gate feature alone, ignoring the voltage output if desired. Use a Q125 Signal Processor module to Invert, offset or attenuate this gate signal as needed.

Switch Gate

The Expression Block controller has a switch at the bottom of travel. This switch activates the Switch Gate signal which can be used to control envelope generators, sequencers, etc. The Switch Gate can also be activated manually using the panel button. The controller can be used solely for this Switch Gate feature if desired.

LED Colors

A programmable 3-color LED illuminates the block and responds to the block's position. The LED can be programmed to change colors as the block moves. It can also stay a solid color, or change color as the Auto Gate triggers. These settings are made using a jumper array on the circuit board.

Calibration

Calibration is done at the factory and not required under normal circumstances. Only attempt these procedures if you have the skills and a good digital voltmeter. We can perform this procedure for you.

Two trimmers provide Scale and Offset adjustments so the block's motion produces the correct voltage output. The trimmer nearest the front panel is Scale, and the other trimmer is the Offset.

The potentiometer for the Expression Block controller is 50K linear but only part of the travel is used. The block bracket must be attached to the pot so the resistance is about 5k when fully down.

Attach a voltmeter to the Output jack of the Q181 Controller Interface.
Set the Output range switch to 5V.
Set the Mode jumper on the Q181 PCB to unipolar (pins 2-3).
With the block fully up, adjust the Offset trimmer to get 0 volts.
Move the block between up and down,
and adjust the Scale trimmer for 5.00 volts of change.
This may take many cycles.
Then with the block fully up, adjust the Offset trimmer to 0 volts.
Now the block should produce 0 to 5 volts output.

End Travel Switch

A small circuit board with a tiny switch is mounted on the frame to activate when the block is at full-down. This activates the Switch Gate signal. If the switch does not activate, adjust the switch bracket so the switch fully engages when the block is fully down. Tighten the bracket.

LED Colors

The acrylic block is illuminated with a 3-color LED. The LED can stay on constantly with any of the 3 colors, change colors based on the block's position, or change color based on the Auto Gate signal.

A 9-pin jumper array is provided to program the LED's operation. Move the jumpers according to the chart to get the effect you want. Letters in the chart represent LED colors and signals that can control them.

COLORS	SIGNALS
R = Red	U = Up
G = Green	D = Down
B = Blue	P = Power
	A = Auto Gate

LED Jumpers

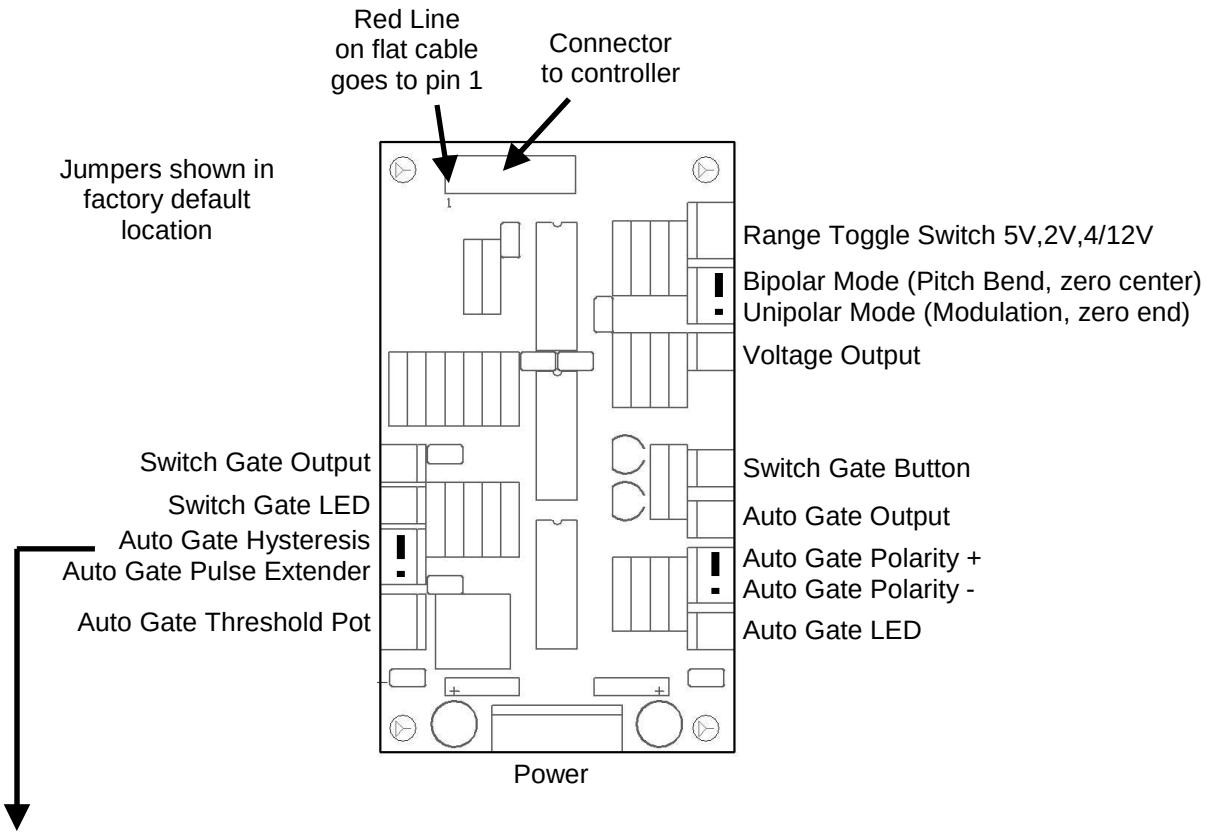
G	**D**	**B**
A	**R**	**U**
B	**P**	**G**

Examples,
To make the LED change from blue to red, jumper B to D (blue to down), and jumper R to U (red to up).

To have the LED blue all the time but switch to purple when the Auto Gate activates, jumper B to P (blue to power), and jumper R to A (red to Auto Gate). Blue and red together makes purple.

If you do not want LED illumination, simply hang the jumpers off to one side of the pins.

Q181 Controller Interface PCB



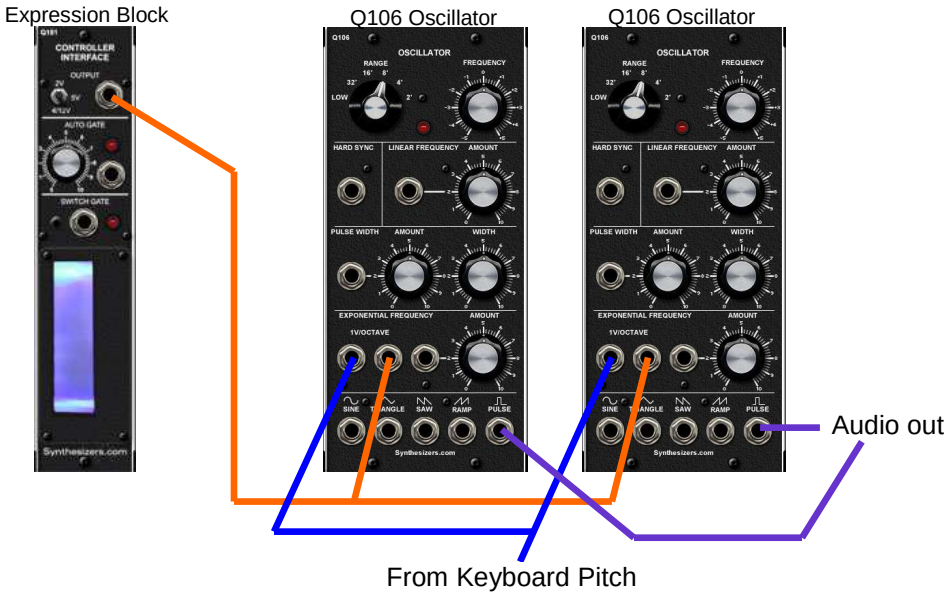
Hysteresis limits Auto Gate oscillation at the threshold. Pulse Extender is used for piezo sensors such as drums to lengthen the Auto Gate pulse.

14-Pin Controller Connector

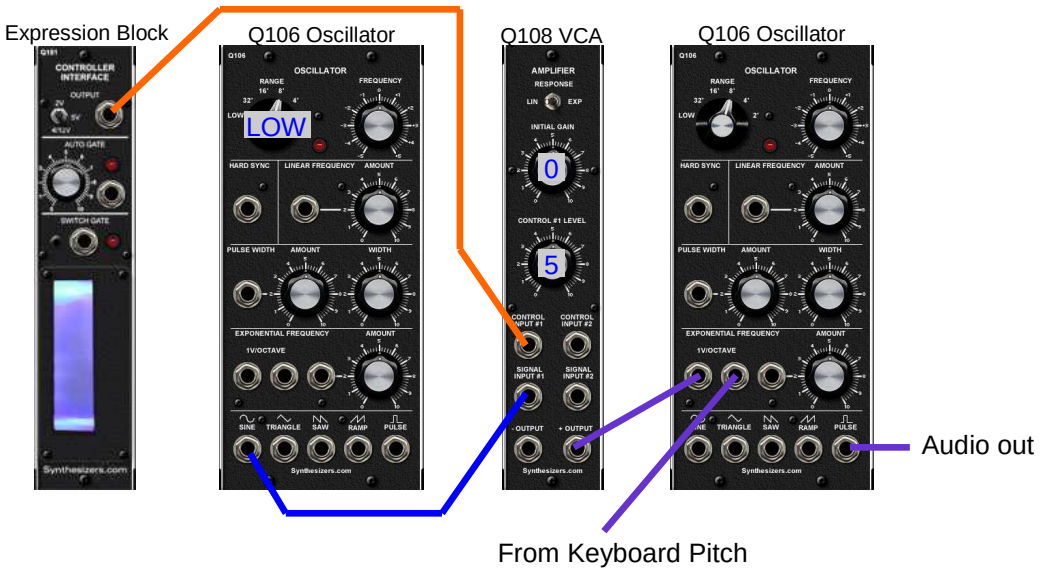
1 Ground	8 Range pot
2 +15V	9 Auto Gate
3 Key	10 +5V
4 -15V	11 Up LED
5 Offset pot wiper	12 Down LED
6 Sensor	13 Switch Gate
7 Range pot wiper	14 LED ground

Patch Ideas

This is a common patch where the Expression Block controller is used to pitch bend two oscillators. Voltage from the Expression Block is added to the keyboard's pitch voltage at each oscillator. Pitch bend can also be accomplished by using the Q174 MIDI Interface's ADD-IN input.



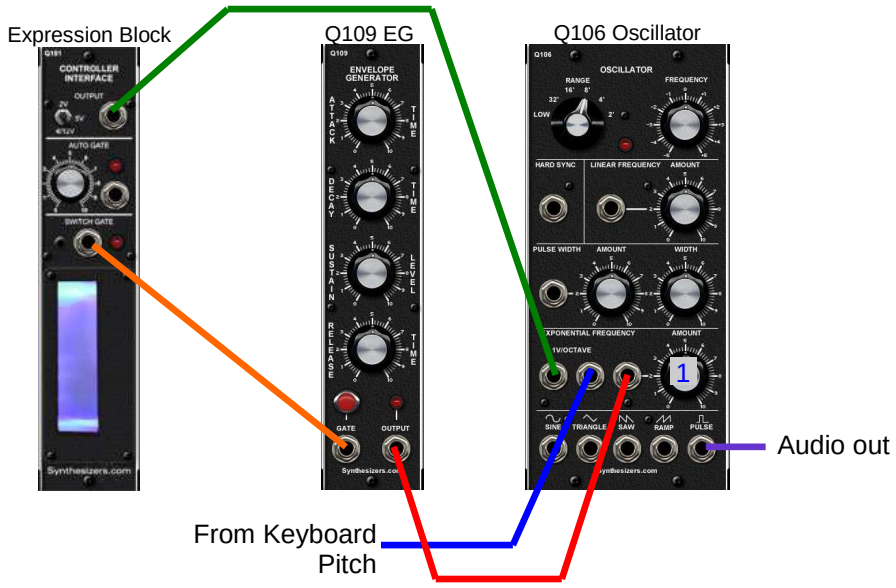
This patch shows the Expression Block using a Q108 Amplifier (VCA) to control the modulation depth of an oscillator. The first oscillator is used as an LFO to create vibrato on the second oscillator. The second oscillator produces the waveform for the synthesizer voice.



Q181EB Expression Block Controller

Feb 2014

In this patch, the Expression Block is used as a pitch bender and the Switch Gate triggers an envelope generator for a special effect. When the block is pushed down, the envelope will trigger.

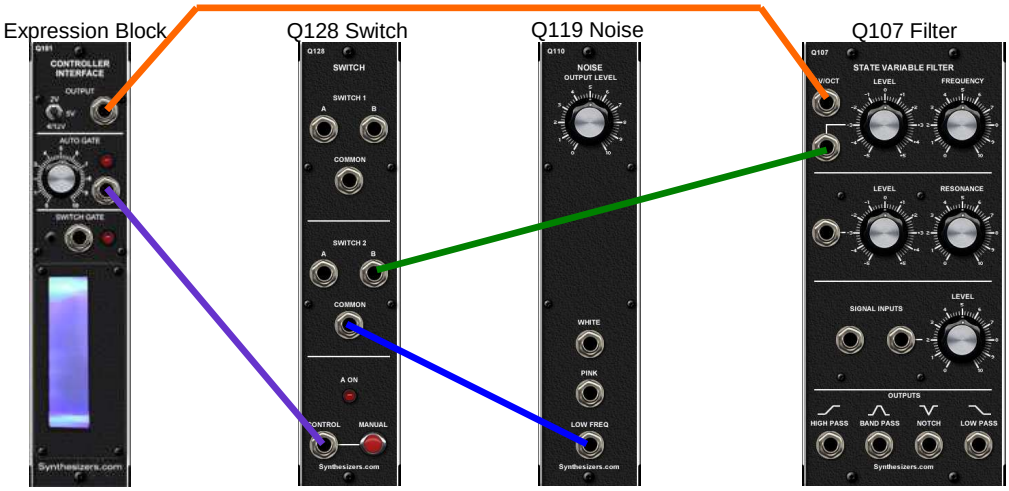


This patch shows the Expression Block starting a Q960 or Q119 sequencer using the Auto Gate.

Q181EB Expression Block Controller

Feb 2014

This patch shows the block controlling a filter and the Auto Gate turning on noise modulation. As the block is pressed, the Auto Gate turns on according to the knob's position. That gate is then used to switch on a noise signal using a Q128 Switch. A Q108 Amplifier could be used as the switch.



Auto Gate and Switch Gate can be used for more than on/off functions. In this patch, the Auto Gate is used to transpose an oscillator by one octave. Auto Gate provides 5 volts to the variable input on the oscillator and adjusted to produce a 1-volt (1-octave) change.