

Q181V Whammy Bar Controller

Feb 2014

This document covers our Whammy Bar controllers in these configurations:

Q181V1 Single-axis Whammy Bar in a single-channel Q181 panel

Q182V2 Dual-axis Whammy Bar in a dual-channel Q182 panel

The Whammy Bar Controller produces voltage and gate signals as you move the guitar-style bar. Great for pitch bending and modulation control. The Whammy Bar controller comes in both single and dual-axis versions.

A gate signal is automatically created as the bar is moved. This gate can be used to trigger sequencers and envelope generators.

Switches at each end of the bar's travel activate the Switch Gate signal for triggering devices also.

A 3-color programmable LED indicates the bar's position.

The Whammy Bar module may be mounted in a Box-style cabinet next to your keyboard controller or in a synthesizer cabinet just as any other module.

The Q181V1 Whammy Bar controller uses our standardized Q181 single-channel Controller Interface module providing an Auto Gate, Switch Gate and an output range switch. The Q182V2 Dual-Axis Whammy Bar controller uses our Q182 dual-channel Controller Interface module.

Q181V1 Single-Axis Whammy Bar Specifications

Panel Size: 2.125"w x 8.75"h. (single-space)

Bar Travel: Up/Down = +/-15 degrees

Voltage Output: Selectable range - 5V, 2V, 4/12V

Auto Gate Output: 5V, adjustable position activation

Switch Gate Output: 5V, activated at full-forward and full-reverse

LED Colors: Red, Green, Blue -- Up, Down, On, Auto Gate

LED Control: Forward, Reverse, Power, or Auto Gate - user-configurable

Power Requirement: +15V@50ma, -15V@50ma, +5V@50ma

Q182V2 Dual-Axis Whammy Bar Specifications

Panel Size: 4.250"w x 8.75"h. (double-space)

Bar Travel: Up/Down = +/-15 degrees, Forward/Reverse = +/-10 degrees

Voltage Output: Selectable range - 5V, 2V, 4/12V

Auto Gate Output: 5V, adjustable position activation

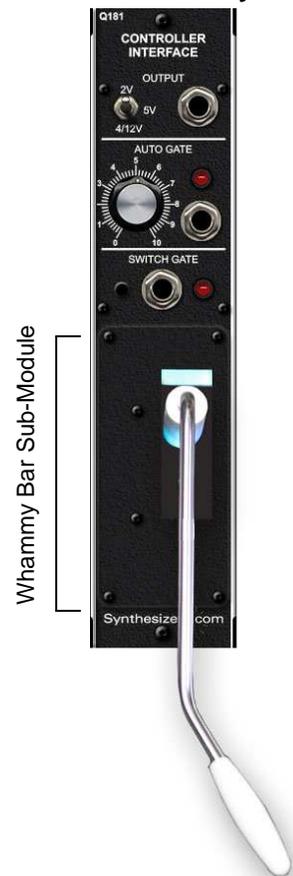
Switch Gate Output: 5V, activated at end of travel on both axes

LED Colors: Red, Green, Blue -- Up, Down, On, Auto Gate

LED Control: Forward, Reverse, Power, or Auto Gate - user-configurable

Power Requirement: +15V@100ma, -15V@100ma, +5V@100ma

Q181V1 Whammy Bar

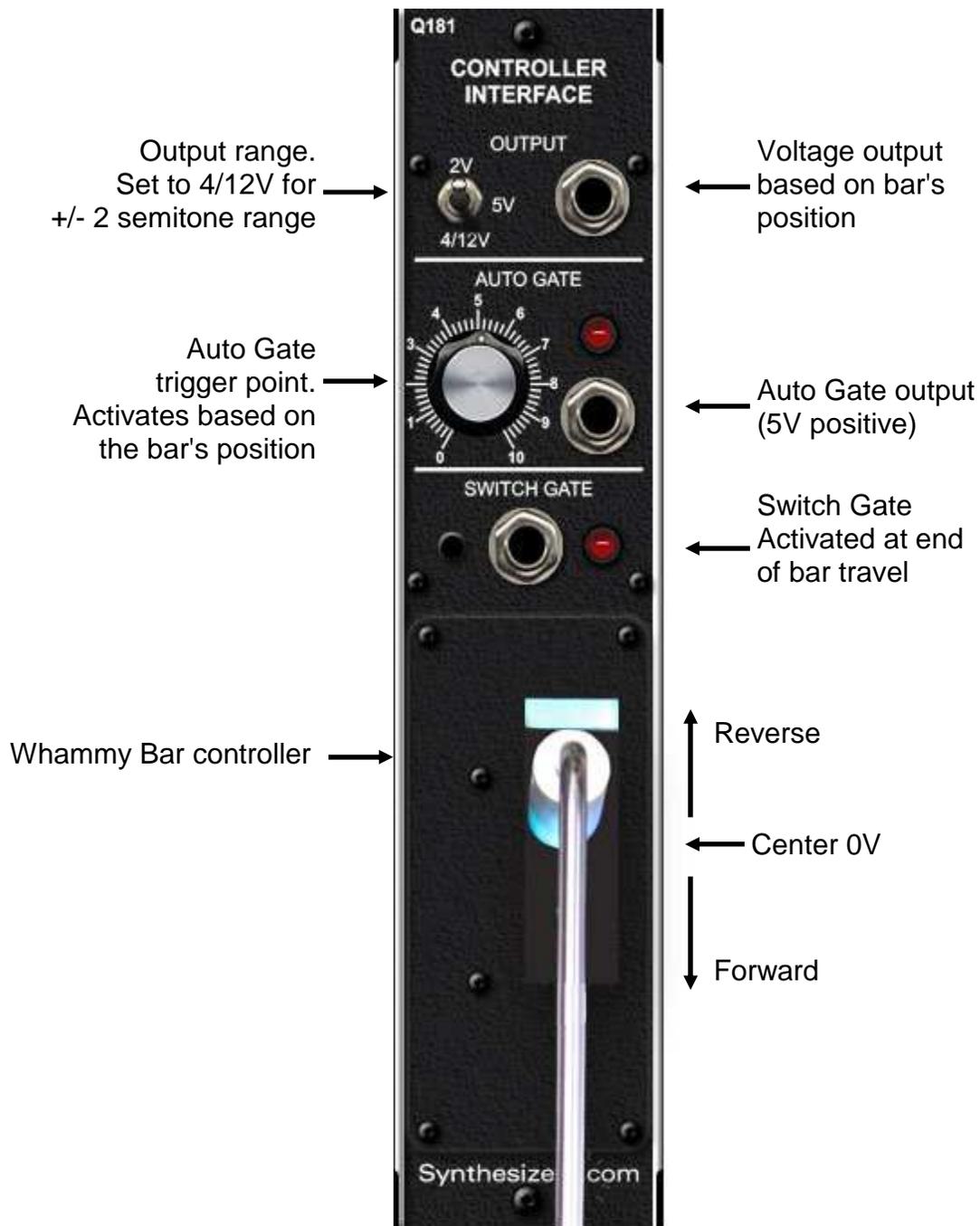


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Features and Operation

The Whammy Bar controller operates through the Q181 or Q182 Controller Interface module to produce voltages and gate signals. These signals can be used to control parameters in a synthesizer system.

The single-axis Q181V1 produces signals as the bar is pressed down or pulled up. The dual-axis Q182V2 additionally produces signals as the bar is moved forward and reverse. Each axis has its own voltage output, Auto Gate, and Switch Gate outputs.

Voltage Output

The main output of the Whammy Bar controller is a voltage that varies as the bar is moved. 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 +/-2 semitones of pitch bend. 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 signal. This Auto Gate 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 controller positions. The Whammy Bar 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 Whammy Bar controller has a switch at each end of travel. These switches activate the Switch Gate signal which can be used 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 shines through a slot in the panel and responds to the bar's position. The LED can be programmed to change colors as the bar 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.

Q182V2 Whammy Bar



Whammy Bar Mounted in a Box1



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 bar's motion produces the correct voltage output. The trimmer nearest the edge of the PCB is Scale, and the other trimmer is Offset.

The potentiometer for the Whammy Bar controller is 50K linear but only part of the travel is used. The bar bracket must be attached to the pot so the resistance is about 7k when fully forward.

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 bipolar (pins 1-2).

Move the bar full reverse.

Adjust the Offset trimmer to get 0 volts.

Move the bar between full-forward and full-reverse, and adjust the Scale trimmer for 5.00 volts of change.

This may take many cycles.

Move the bar to center and adjust the Offset trimmer to 0 volts.

Now the bar should produce -2.5v to +2.5 volts.

End Travel Switch

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

LED Colors

An 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 bar'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

R = Red

G = Green

B = Blue

SIGNALS

U = Up

D = Down

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).

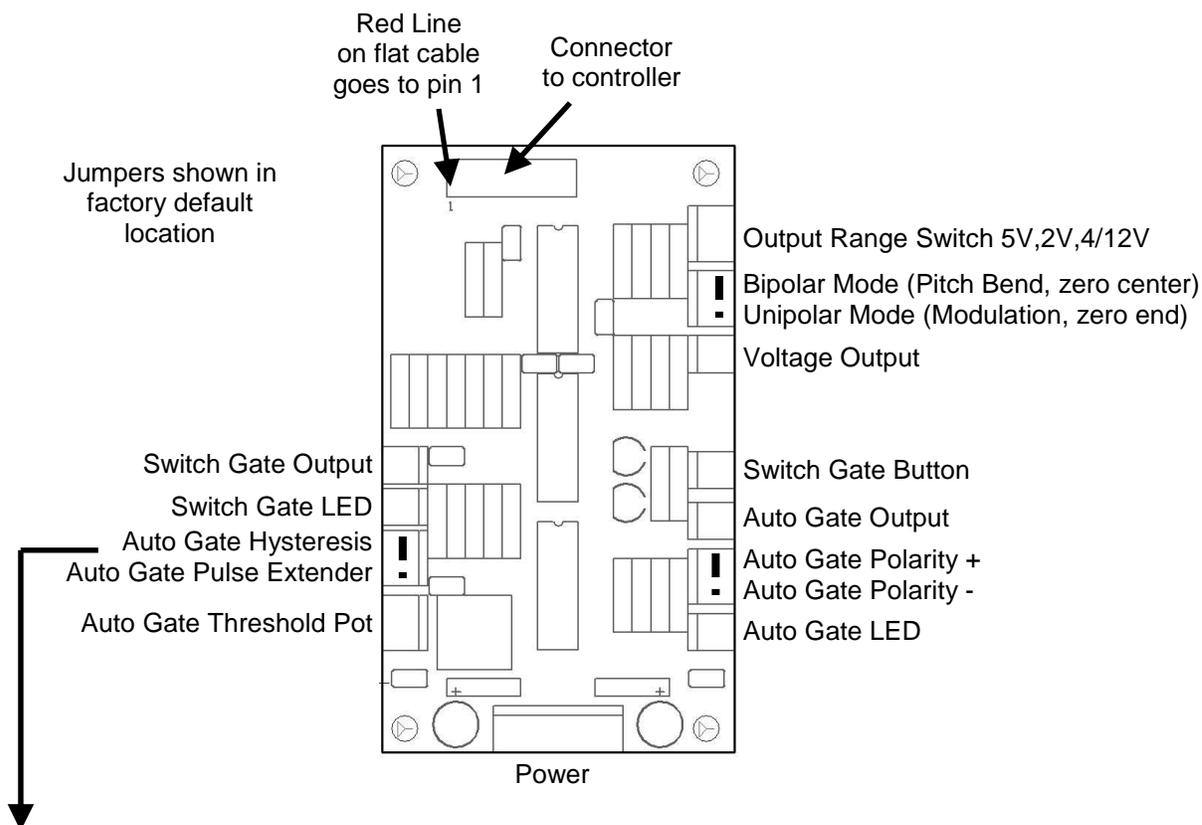
To have the LED blue all the time but switch to purple when the Auto Gate activates, jumper B to P (blue to power), and jumper R to A (red to Auto Gate). Blue and red together makes purple.

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

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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

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Patch Ideas

This is a common patch where the Whammy Bar controller is used to pitch bend two oscillators. Voltage from the Whammy Bar 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.



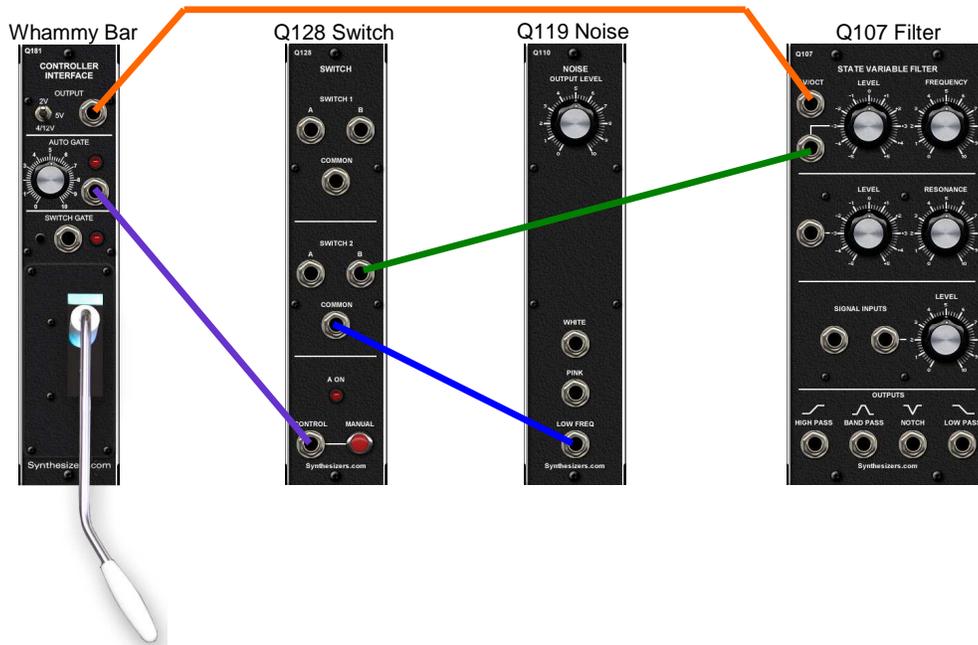
This patch shows the Whammy Bar using a Q108 Amplifier (VCA) to control the modulation depth of an oscillator. The first oscillator is used as an LFO to create vibrato on the second oscillator. The second oscillator produces the waveform for the synthesizer voice.



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This patch shows the Bar controlling a filter and the Auto Gate turning on noise modulation. As the bar is pushed down, the Auto Gate turns on according to the knob's position. That gate signal is then used to switch on a noise signal using a Q128 Switch module. 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. The gate signal provides 5 volts to the variable input on the oscillator and adjusted to produce a 1-volt (1-octave) change.

