Q182TS ThumbStick Controller

The ThumbStick controller is a dual-axis game-style controller that pro-
duces voltages as the stick is moved up/down, left/right, and pressed.
Perfect for pitch bending or controlling filter frequency and resonance as
you play notes on the keyboard. The outputs can be used to control any
parameter in the synthesizer system.

The ThumbStick controller uses our standardized Q182 dual-channel
Controller Interface module providing an Auto Gate, Switch Gate and a
voltage output range switch for each axis. The left side of the panel han-
dles the X axis (left/right) and the right side handles the Y axis (up/down).

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 for each axis as the Thumb-
Stick is moved. This gate can be used to trigger sequencers and enve-
lope generators.

A switch activates as you press the ThumbStick to generate a Switch
Gate signal for triggering devices also.

Q182TS

ThumbStick Sub-Module

Q182TS ThumbStick Controller Specifications

Panel Size: 4.25"w x 8.75"h. (double-space)
Stick: XBox 360-style, spring return to center.
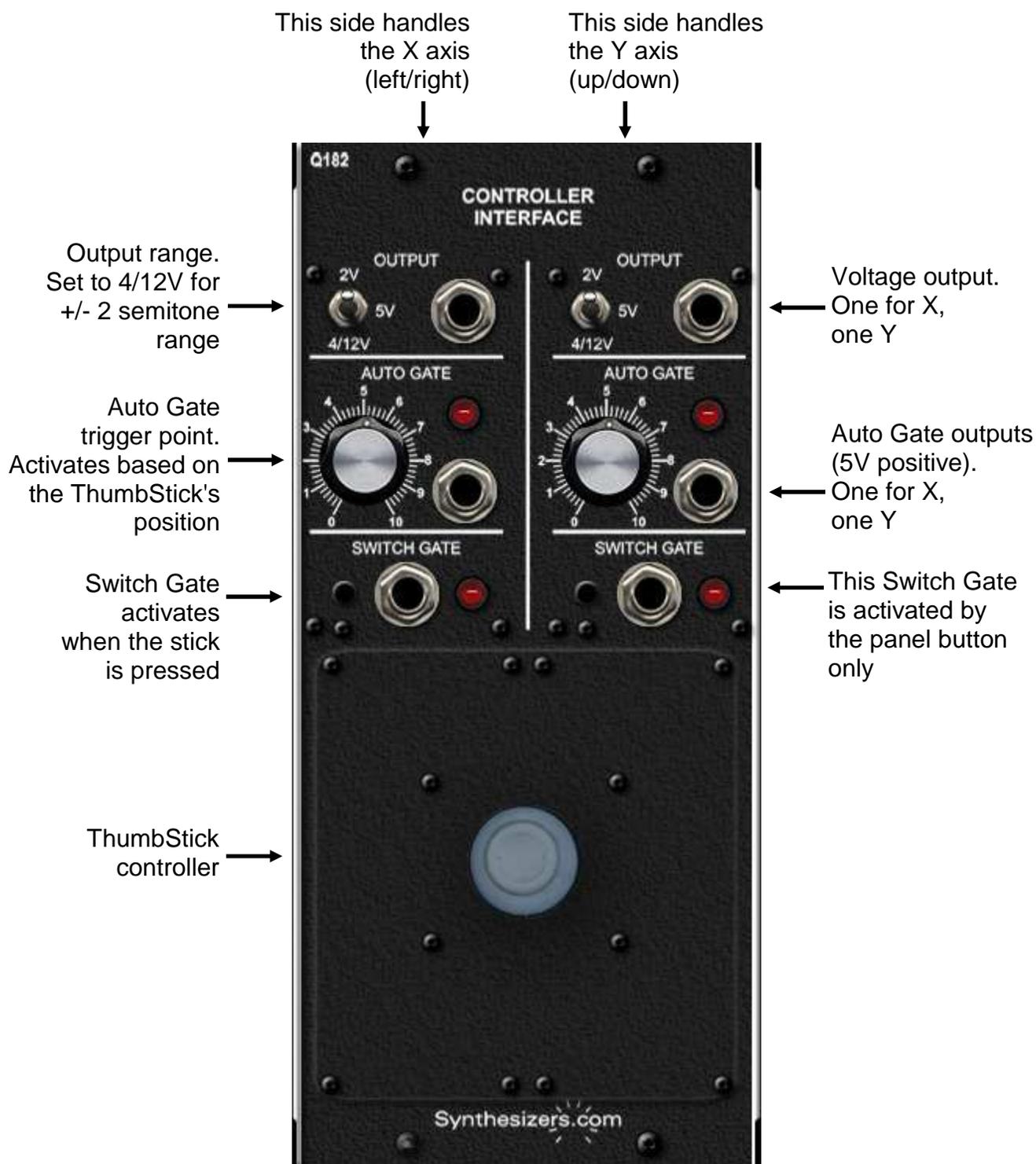**Voltage Output:** Selectable range - 5V, 2V, 4/12V
Auto Gate Output: 5V, adjustable position activation
Switch Gate Output: 5V, activated at knob end travel
Power: +15V@100ma, -15V@100ma, +5V@100ma

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This side handles
the X axis
(left/right)

This side handles
the Y axis
(up/down)

Q182

CONTROLLER
INTERFACE

OUTPUT

2V
5V
4/12V

OUTPUT

2V
5V
4/12V

AUTO GATE

AUTO GATE

SWITCH GATE

SWITCH GATE

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

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

Switch Gate
activates
when the stick
is pressed

ThumbStick
controller

Voltage output.
One for X,
one Y

Auto Gate outputs
(5V positive).
One for X,
one Y

This Switch Gate
is activated by
the panel button
only

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Q182TS ThumbStick Controller

Features and Operation

**ThumbStick controller
mounted in a Box2**

The Q182TS produces signals as the stick is moved up/down, left/right, and as it is pressed down. The controller operates through the Q182 Controller Interface module to produce voltages and gate signals - one set for X axis movement, another set for Y axis movement. These signals can be used to control parameters in a synthesizer system.

Voltage Output
The main outputs of the Thumbstick Controller are voltages that vary as the stick 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 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. One for the X axis, one for the Y axis. 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 stick positions. The ThumbStick 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 ThumbStick controller has a switch that activates upon pressing. 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. The Switch Gate signal on the right side of the panel is activated by the panel button only.

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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 stick's motion produces the correct voltage output. Two pair of trimmers are used for each axis.

X Axis motion calibration (left side of module):
Attach a voltmeter to the Output jack of the Q182 Controller Interface.
Set the Output range switch to 5V.
Set the Mode jumper on the Q181 PCB to bipolar (pins 1-2).
With the stick fully left, adjust the Offset trimmer to get 0 volts.
Move the stick between full left and full right
and adjust the Scale trimmer for 5.00 volts of change.
This may take many cycles.
Then with the stick centered, adjust the Offset trimmer to 0 volts.
Now the X axis should produce -2.5 to +2.5 volts output.

Y Axis motion calibration (right side of module):
Attach a voltmeter to the Output jack of the Q182 Controller Interface.
Set the Output range switch to 5V.
Set the Mode jumper on the Q181 PCB to bipolar (pins 1-2).
With the stick fully down, adjust the Offset trimmer to get 0 volts.
Move the stick between full down and full up,
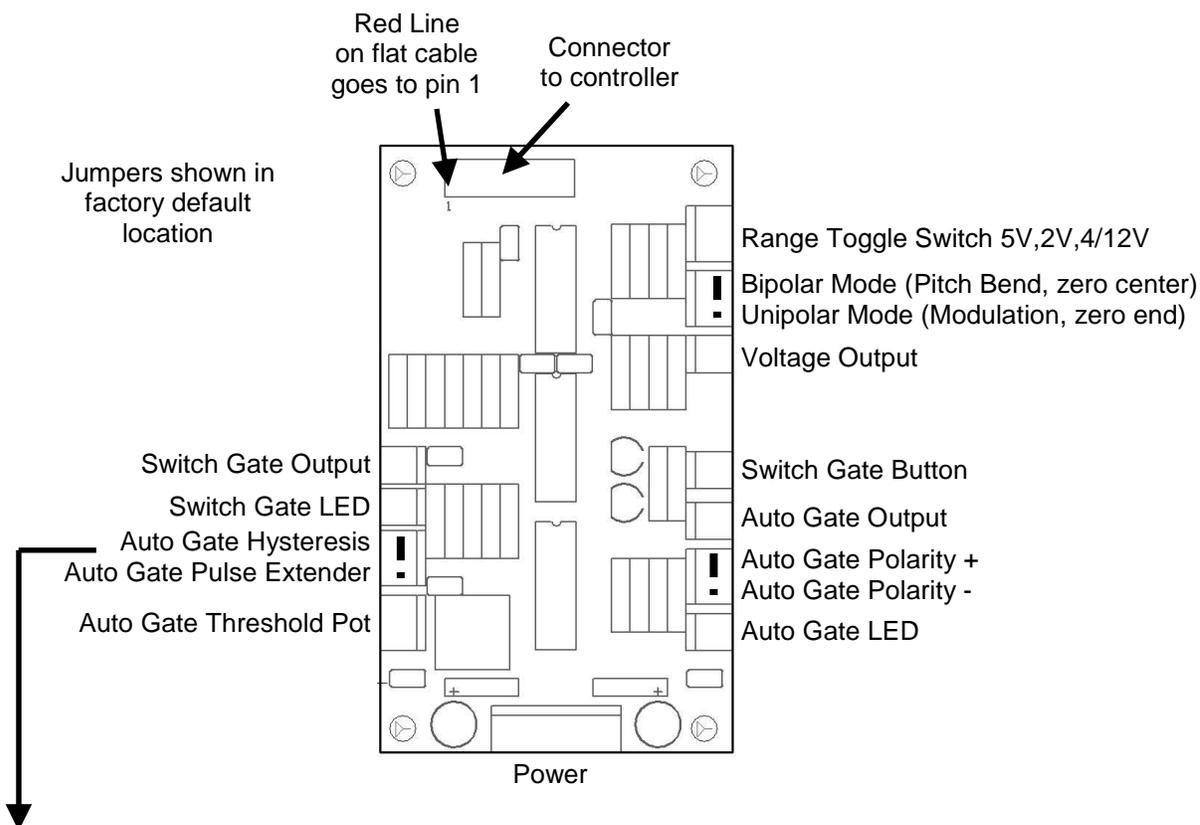and adjust the Scale trimmer for 5.00 volts of change.
This may take many cycles.
Then with the stick centered, adjust the Offset trimmer to 0 volts.
Now the Y axis should produce -2.5 to +2.5 volts output.

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Q181 Controller Interface PCB

Red Line
on flat cable
goes to pin 1

Connector
to controller

Jumpers shown in
factory default
location

Range Toggle Switch 5V,2V,4/12V

Bipolar Mode (Pitch Bend, zero center)
Unipolar Mode (Modulation, zero end)

Voltage Output

Switch Gate Output

Switch Gate Button

Switch Gate LED

Auto Gate Output

Auto Gate Hysteresis
Auto Gate Pulse Extender

Auto Gate Polarity +
Auto Gate Polarity -

Auto Gate Threshold Pot

Auto Gate LED

Power

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 ThumbStick controller is used to pitch bend two oscillators. Voltage from the stick's X axis 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.
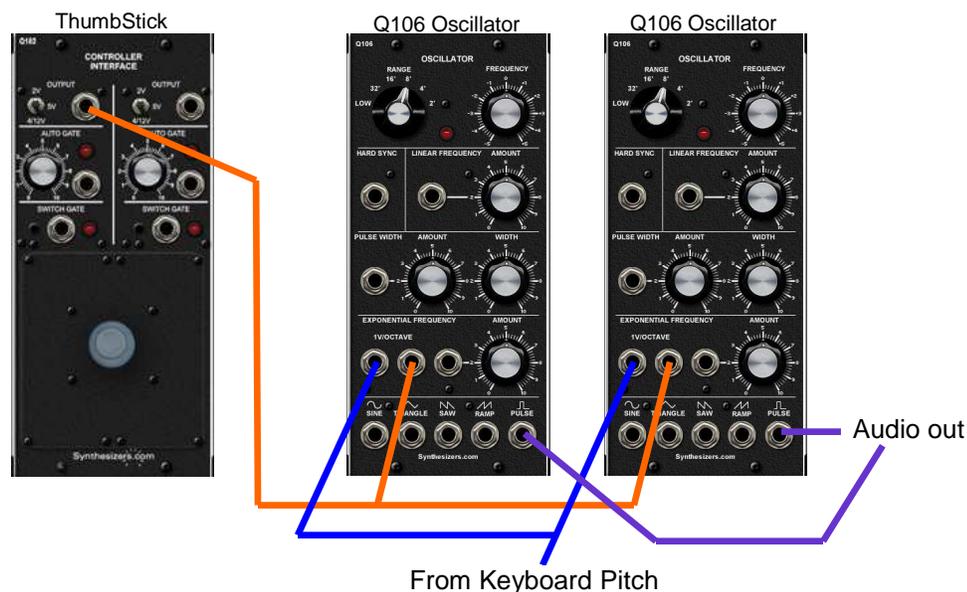

This patch shows the Y axis output and a Q108 Amplifier (VCA) controlling the modulation depth of an oscillator. The first oscillator is used as an LFO to create vibrato on the second oscillator. The second oscillator produces the waveform for the synthesizer voice.

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In this patch, the ThumbStick controller is used as a pitch bender and the Switch Gate triggers an envelope generator for a special effect. When the stick is pressed, the envelope will trigger.

ThumbStick   Q109 EG   Q106 Oscillator

Audio out

From Keyboard
Pitch
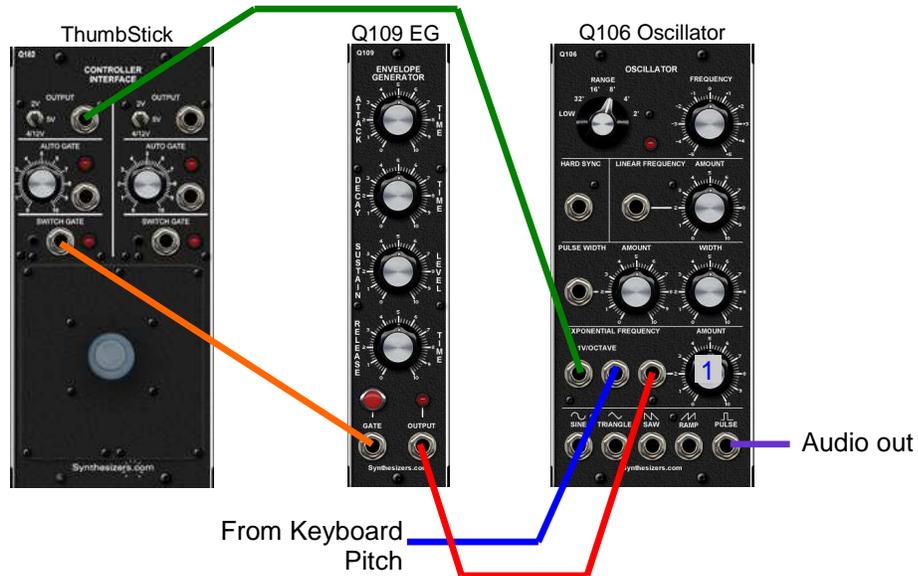
This patch shows the ThumbStick controller starting a Q960 or Q119 sequencer using the Auto Gate signal. The stick location which activates the Auto Gate is set by the panel control.

ThumbStick   Q119 Sequencer   Q960 Sequencer

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This patch shows the ThumbStick controlling a filter and the Auto Gate turning on noise modulation. As the stick is moved, 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.

ThumbStick   Q128 Switch   Q119 Noise   Q107 Filter
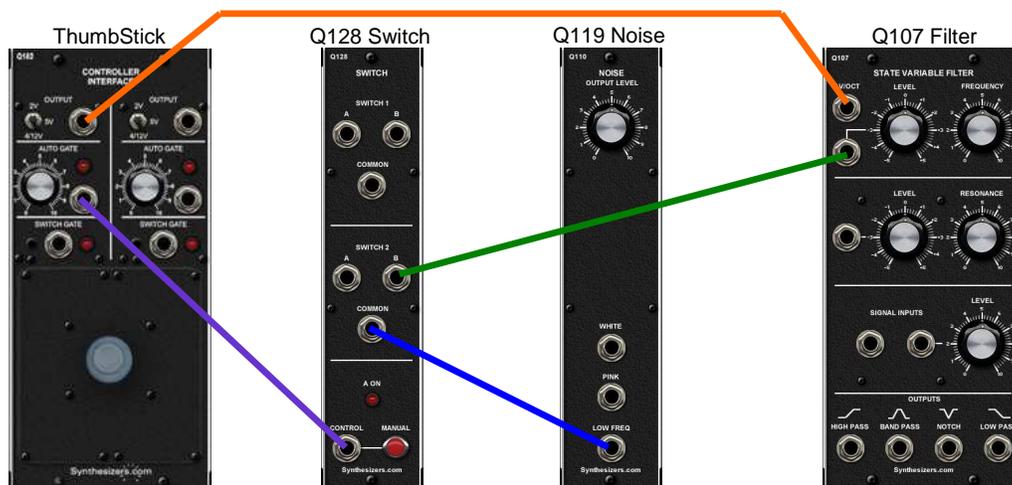
Auto Gate and Switch Gate can be used for more than on/off functions. In this patch, Auto Gate from the Y Axis is used to transpose an oscillator by one octave. Auto Gate provides 5 volts to the variable input on the oscillator and adjusted to produce a 1-volt (1-octave) change.

ThumbStick   Q106 Oscillator

Adjust for
1 octave change

Audio out

From Keyboard Pitch

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