Q182-RP20 Ribbon Controller

June 2015

The RP20 is a position and pressure-sensitive ribbon controller capable of replacing or augmenting a traditional keyboard in an analog synthesizer system. The RP20 can be held like a guitar, played from the desktop, or mounted to our modular keyboard controllers above or below the keys.

The RP20's sensor is 20" long and produces a voltage for the position of your finger and a voltage for the pressure you're applying. These voltages are produced using analog circuitry and change smoothly and naturally as you play.

Both position and pressure signals have adjustable ranges using our Q182 dual controller interface module. When the position sensor is set to the 2 volt range, the ribbon can be played like a keyboard, complete with a template showing white and black keys. The 4/12th volt range is useful for pitch bending of +/-2 semitones, and the 5 volt range can be used for wide filter or pitch sweeps.

A gate signal can be produced from either sensor and used to control other modules to activate vibrato or to trigger an arpeggiation from a sequencer.

In addition to the touch sensors, there is a small gate button on the controller's housing. This button creates an additional gate signal on the Q182 that can be used to activate various effects or modes by controlling modules in the system.

Q182-RP20 Ribbon Controller Specifications

Panel Size: 4.25"w x 8.75"h. (double-space)
Position Sensor Length: ~20"
Pressure Sensor Length: ~20"
Position Voltage Output Range: Selectable - 5v, 2v, 4/12v
Pressure Voltage Output Range: Selectable - 5v, 2v, 4/12v
Auto Gate Output: 5V positive, adjustable activation
Switch Gate Output: 5V positive.
Cable: 24". 72" and 180" extension cables available.
Power Requirement: +15V@100ma, -15V@100ma, +5V@100ma
Length With Base: 27.5"
Width with Base: 1.5"
Height with Base: 1.75"
Mounting Hole Spacing: 26"

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Output range. Use 4/12V for +/-2 semitone pitch bending. Set to 2V for keyboard-like operation.

Auto Gate trigger point adjust. Activates based on position and pressure.

Switch Gate activated with the button on the ribbon controller.

Switch reverses operation of the position sensor.

Voltage output. One for position, one for pressure.

Auto Gate outputs (5V positive). One for position, one for pressure.

This Switch Gate is activated by the panel button only.

LEDs change color as the sensor condition changes.

Controller cable. Use extension for up to 15'.

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Features and Operation

Q182-RP20

The Q182-RP20 produces signals as the ribbon controller is pressed. The controller operates through the Q182 Controller Interface module to produce voltages and gate signals - one set for the position of the touch point, and another for the amount of pressure applied. These signals can be used to control parameters in a synthesizer system such as oscillators and filters.

Voltage Output

The main outputs of the ribbon Controller are voltages that vary depending upon where you touch the sensor and how hard you press. 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 setting for 4 semitones (+/-2 semitons) which works well for pitch bending. For wide-sweeping modulation, use the 5 volt position then attenuate the signal at the destination module if needed.

To operate the position sensor like a keyboard, use the 2 volt setting. Adjust range and frequency on oscillators for the desired pitch output.

The pressure sensor is most useful at the 5 volt setting for amplitude control and other purposes. On the end of the sensor is a small area where only pressure is sensed without affecting position.

Auto Gate

A gate signal is produced automatically as the controller sensors change. One for position, one for pressure. 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 sensor readings. The ribbon 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 ribbon controller provides a small button on the controller itself. This switch activates the Switch Gate signal on the left side of the module and can be used to turn on vibrato, trigger 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 pressure side of the panel is activated by the panel button only.

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The RP20 ribbon controller can be mounted to the shelves of our 61-key modular keyboard system using the included thumb screws. These screws are 6-32 threads.

The RP20 ribbon controller can also be mounted under the keys on our 61-key modular keyboard system using the included thumb screws. This mounting hole pattern is the same as the shelves. 6-32 threads.

The RP20 has a 24" cable to connect to the module. Extension cables are available.

The RP20 module can be mounted in a Box1,2,4 cabinet next to your keyboard or in a system along with other modules. It uses the same Synthesizers.com power connectors as other modules. This module has 2 power connections.

Synthesizers.com

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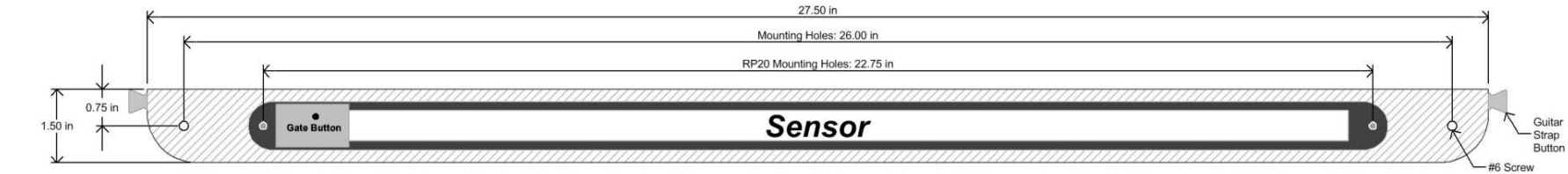


Calibration

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 position sensor produces the correct voltage output. The trimmer nearest the edge of the PCB is Scale, and the other trimmer is the Offset. Another set of trimmers handles the pressure sensor.

Position calibration (left side of module):
Attach a voltmeter to the Output jack of the Q182 Controller Interface.
Set the Output range switch to 2V.
Set the Mode jumper on the Q181 PCB to bipolar (pins 1-2).
Touch the sensor at the far left, adjust the Offset trimmer to get -1.04 volts.
Touch the sensor at the far right, adjust the Scale trimmer for +1.04.
This may take many cycles.
When finished, the center should be approximately 0 volts.

Pressure 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 unipolar (pins 2-3).
With no pressure on the ribbon, adjust the Offset trimmer to get 0 volts.
Press the the ribbon with 3# of force
and adjust the Scale trimmer for 5.00 volts of change.
This may take many cycles.
Then with no pressure, adjust the Offset trimmer to 0 volts.
Now pressure should produce 0 to 5 volts output.

LED Colors

The panel LEDs can change colors based on the sensor, stay on constantly with any of the 3 colors, 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

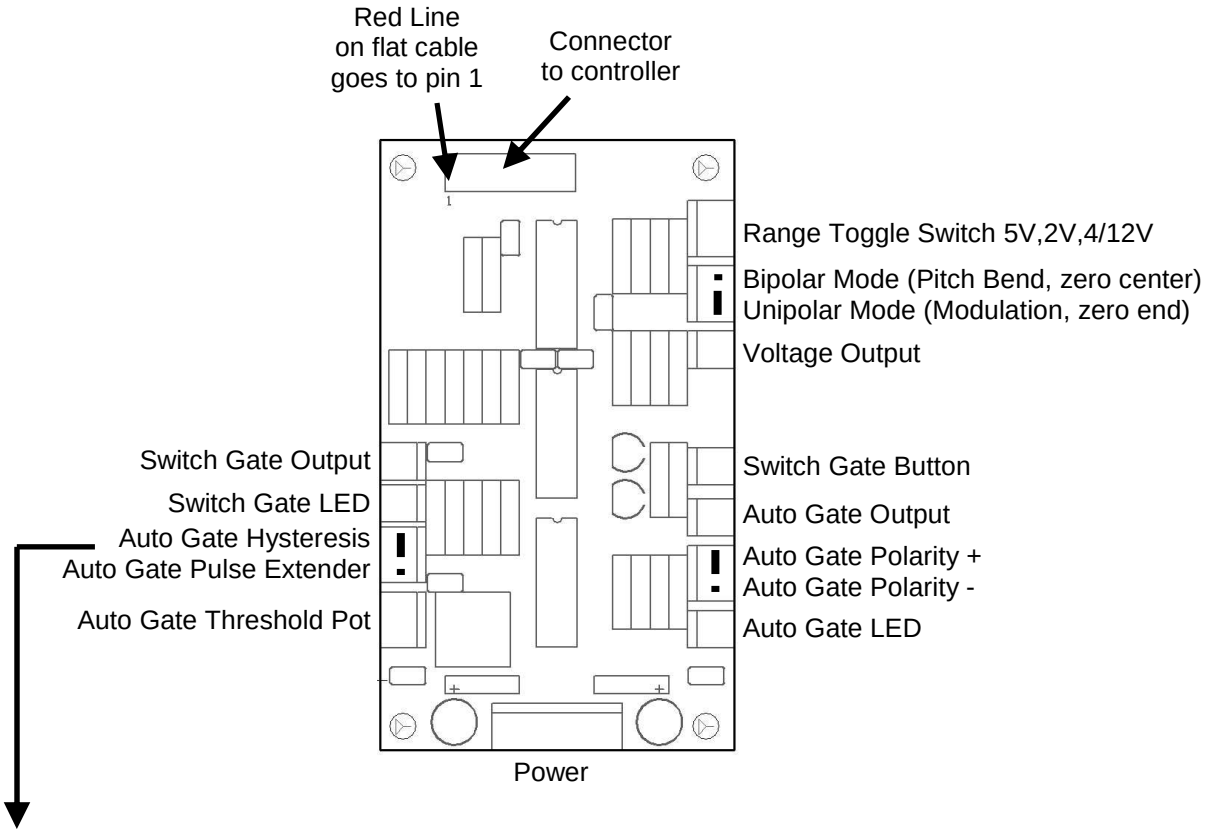
G	D	B
A	R	U
B	P	G

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.

Q181 Controller Interface PCB

Under most circumstances, the user need not be concerned with this technical information.



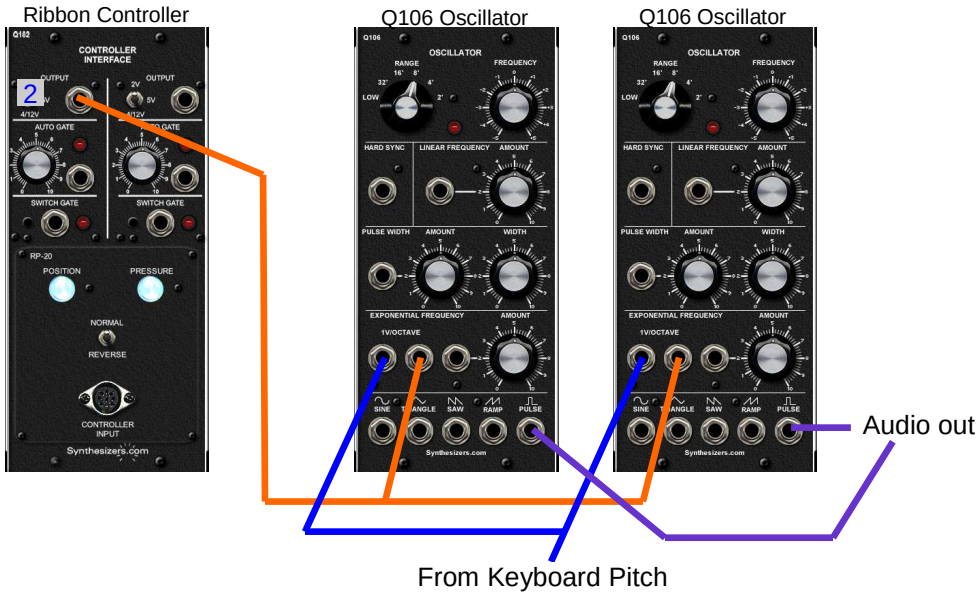
Hysteresis limits Auto Gate oscillation at the threshold. Pulse Extender is used for piezo sensors such as drums to lengthen the Auto Gate pulse.

14-Pin Controller Connector

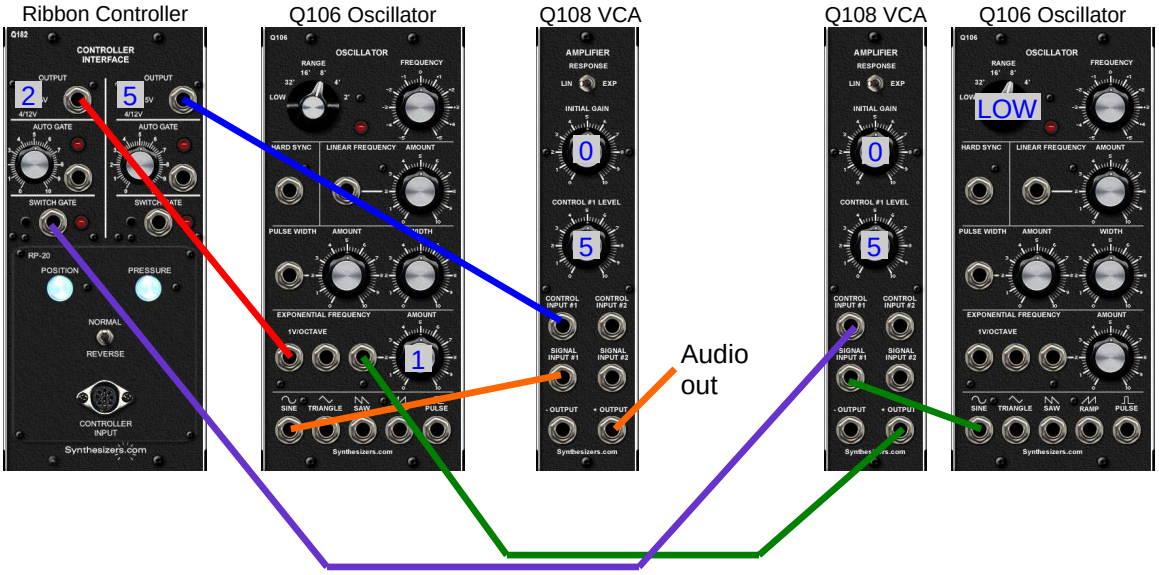
1 Ground	8 Range pot
2 +15V	9 Auto Gate
3 Key	10 +5V
4 -15V	11 Up LED
5 Offset pot wiper	12 Down LED
6 Sensor	13 Switch Gate
7 Range pot wiper	14 LED ground

Patch Ideas

This is a common patch where position bends pitch of two oscillators. Voltage from the position sensor is added to the keyboard's pitch voltage at each oscillator. Use the 4/12v range for +/-2 semitones of bend. Pitch bend can also be accomplished by using the Q174 MIDI Interface's ADD-IN input.



This patch shows position controlling pitch and pressure controlling amplitude. This lets you play the ribbon like a keyboard. Set the position range to 2v and the pressure range to 5v. The button on the ribbon activates vibrato. The Q106 oscillator on the right sets vibrato speed.



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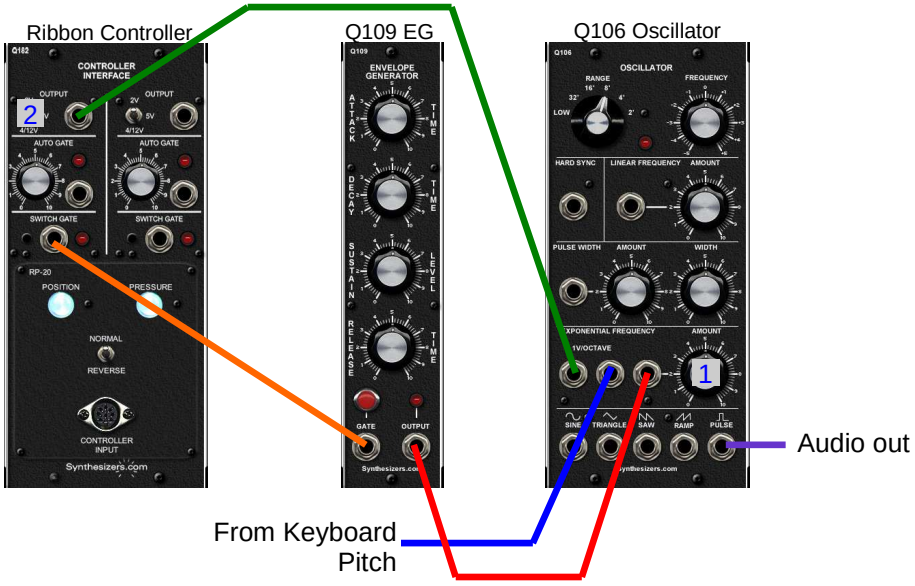
In this patch, the ribbon controller is used as a pitch bender and the button triggers an envelope generator for a special effect set by the envelope generator controls. Set the range to 4/12 volt for +/-2 semitones of bend.



This patch shows the ribbon controller starting a Q960 or Q119 sequencer using the Auto Gate signal. Pressure activates the Auto Gate at a certain threshold set by the knob.

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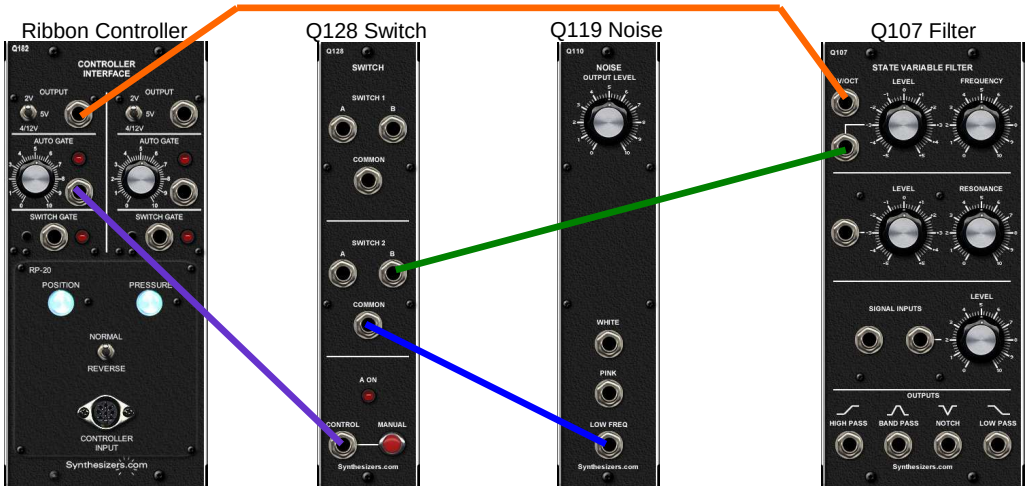
This patch shows the ribbon's position controlling a filter and the Auto Gate turning on noise modulation. As the position moves to a certain point set by the knob, the Auto Gate turns on. That gate is then used to switch on a noise signal using a Q128 Switch. A Q108 Amplifier could be used as the switch.



Auto Gate and Switch Gate can be used for more than on/off functions. In this patch, Auto Gate from the pressure sensor 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 change to create a 1-octave transpose.