

# Roland SH-09

*owner's manual*



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The SH-09 is a single VCO monophonic analog synthesizer with a 2 1/2 octave, 32-note (F-C) keyboard. The VCO is switchable between 5 octaves. Available waveforms are sawtooth, square, pulse (with pulse width modulation), or white noise. It is possible to select the noise source at your oscillator and still have the sub-oscillator as a waveform. The VCF is self-oscillating and can be modulated by the envelope follower which is wired to the external input. The envelope generator is an ADSR (attack, decay, sustain, release) with a slider for each stage. On the control panel to the left of the keyboard is a horizontal pitch-bend/modulation lever, with pressure up and down controlling modulation amount. There are also two sliders controlling amount of modulation routed to the VCO and VCF, as well as a slider adjusting portamento amount. On the back panel there is a main output, and the CV/gate inputs and outputs.



Information from *The A-Z of Analogue Synthesizers*, by Peter Forrest, published by Susurreal Publishing, Devon, England, copyright 1994 Peter Forrest.

## INDEX

[basic connections](#)

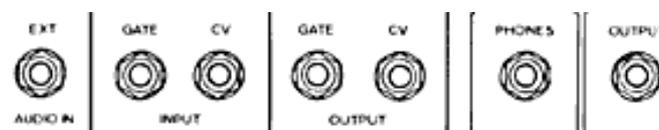
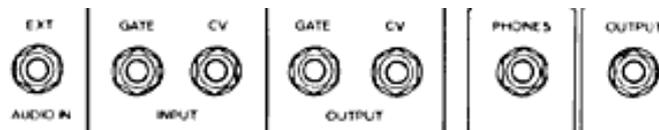
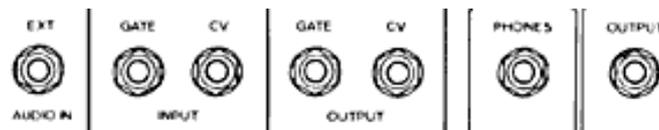
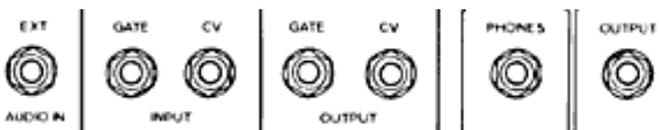
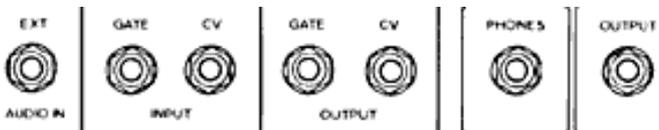
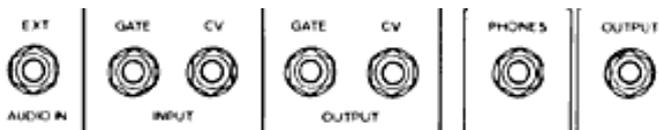
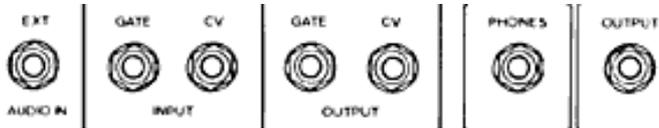
[modulator/controllers](#)

[vco](#)

[sub-oscillator / vcf](#)

[vca/envelope generator](#)

[block diagram](#)



**Output**

Connect to guitar amplifier, mixer, or audio amplifier. If you use an effects unit like an echo chamber, connect it between the output jack and the amplifier. When using audio amplifiers such as those in home stereo systems, use caution with the volume control because the synthesizer is capable of generating sound levels high enough to destroy the speakers.

**Phones**

Connect headphones to this jack. Use headphones designed for normal home stereo systems. Roland RH-2 headphones are suited for this purpose.

**CV Output**

This jack outputs the control voltage from the SH-09 keyboard. Connect to the CV input for an external synthesizer or the MC-8 MicroComposer to control such devices with the SH-09.

**Gate Output**

The gate output from the SH-09 keyboard can be taken from this jack. Connect to the gate input of an external synthesizer or the MC-8 MicroComposer for control of such devices with the SH-09 keyboard.

**CV Input**

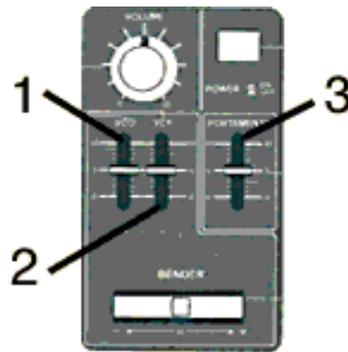
This jack receives control voltage inputs from sources such as the VK-6 or VK-9 organ, the model 104 (System 100) or model 717A (System 700) Analog sequencer, the MC-8 MicroComposer, the RS-09 String synthesizer, etc.

**Gate Input**

In the same way as the CV input, gate pulses from external sources can be connected to this jack.

**Ext. Audio in**

Connect external sources such as microphone, electric guitar, electric piano, or strings to this jack. As the SH-09 incorporates an envelope follower, the VCF can be controlled by the level of the signal from the external source to use the SH-09 as a kind of effects unit like automatic wah. When connecting the strings such as the Roland RS-09, connect the gate output also to make it possible to control the envelope generator of the SH-09 from the strings keyboard. With this arrangement, the VCF can be activated on brass chords producing sounds like a polyphonic synthesizer.



### 1. Sensitivity slider (VCO)

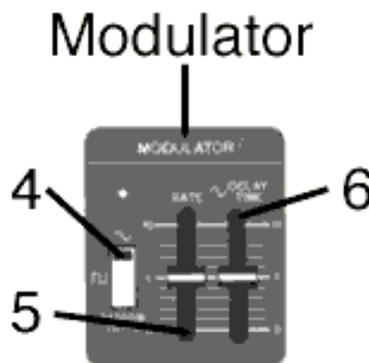
This slider controls the pitch variation range induced by the bender. At maximum, it is possible to get a one octave variation. Set at around "2" for normal bending.

### 2. Sensitivity slider (VCF)

This slider controls the tone color variation range induced by the bender. At the upper position, wah pedal effects are imitated by moving the bender lever. If the VCF CUTOFF frequency is set high, however, the tone color variation may be poor.

### 3. Portamento

Portamento is the sliding of a note from one pitch to another. This controls the time required for the change of pitch.



### 4. Mode switch

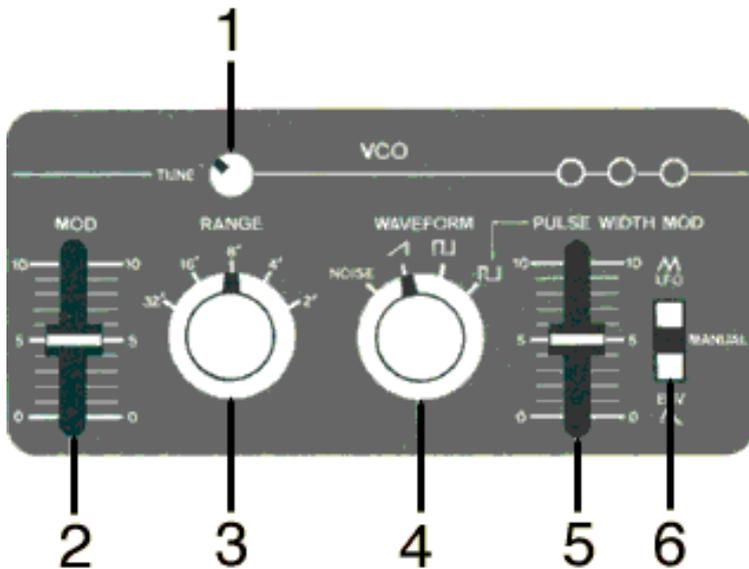
This switch determines which waveform will be used for VCO and VCF modulation. Controlling the VCO, it produces vibrato effects, or pitches which waver or sweep up and down. Controlling the VCF, it produces growl effects (with faster LFO rates) or tone color vibrato, which occurs in some instruments in conjunction with pitch vibrato. The other position are more often used for special effects. For example, using the square wave to modulate the VCO pitch will produce thrills.

### 5. Rate control

The RATE slider controls the frequency of the modulator output. Raising the control increases the frequency. The frequency can be visually checked by means of the LED. For vibrato-like effects, this control is normally set at about "0".

### 6. Modulator

The modulator includes an LFO (Low frequency oscillator) and an S/H (Sample and hold) as shown above. The LFO is an oscillator which generates waveforms of a low frequency. The range is from about 0.2 Hz to about 25 Hz. The output of the LFO can be used for modulating the VCO of VCF, and for triggering the envelope generator. The S/H produces random signals by sampling the output from the noise generator at a rate determined by the LFO.



## VCO

The VCO is the primary sound source of the synthesizer and generates the basic waveforms.

### 1. Tuning

This control the overall pitch of the SH-09. The tunable range is 65 cents.

### 2. MOD (Modulator)

With the mod slider high, the VCO is modulated by the output signals of modulaor (LFO).

### 3. Range switch

This switch changes the VCO range in one octave jumps from 2' to 32', for a total range of four octaves.

### 4. Waveform switch

This switch selects the VCO output waveforms.

#### The sawtooth waveform

is particularly suitable for brass and string sounds, and for sounds which only the synthesizer can produce.

#### Square wave

The pure square wave has a sound quality very much like a clarinet. The clarinet and xylophone are common sounds synthesized with this waveform.

#### Pulse wave.

When the top and bottom portions of the square wave are unequal, the result is what is called a pulse wave.

#### Noise

Noise is the hissing sound produced by the random combination of all frequencies.

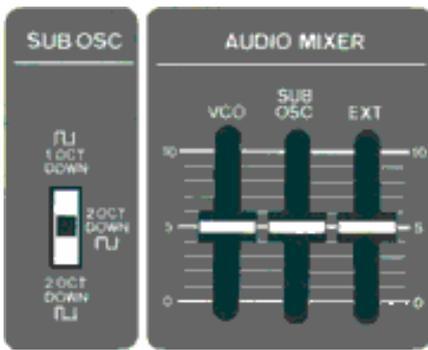
### 5. Pulse width and pulse width modulation

Pulse width refers to the ratio of the widths of the top and bottom portions of the pulse wave. 10% pulse width produces a sound very rich in harmonics and is often used for synthesizing sounds as the oboe, bassoon and human voice.

Using the LFO to modulate the pulse width produces chorus-like sounds. The output of the envelope generator can be used to modulate the pulse width to produce sounds very much like those of pizzicato strings.

### 6.PWM Mode mode switch

With this switch at MANUAL, the pulse widths may be set manually by means of the PULSE WIDTH MOD slider. In LFO, the pulse width will be modulated by the LFO output, and in ENV, by the output of ENVELOPE GENERATOR.



### Sub-Oscillator / Audio mixer

is actually a part of the VCO and generates a pitch one- or two-octaves lower than that of the VCO. Three types of waves are available: a one-octave lower square wave, a two-octave lower square wave and a two-octave lower square wave and a two-octave lower pulse wave. Mixing the sub-oscillator output with the VCO output will give new dimensions to your sound, as if two VCO's were used. The audio mixer mixes outputs of the VCO, Sub-oscillator and the external input signal.

#### 1. Cutoff Freq Control

This control determines the frequencies which will be removed by the VCF. At its highest position, all sound passes through the VCF without change, thus this may be considered its normal position. If the control is slowly lowered, it will begin to shave off the upper harmonics of the sound passing through the VCF.

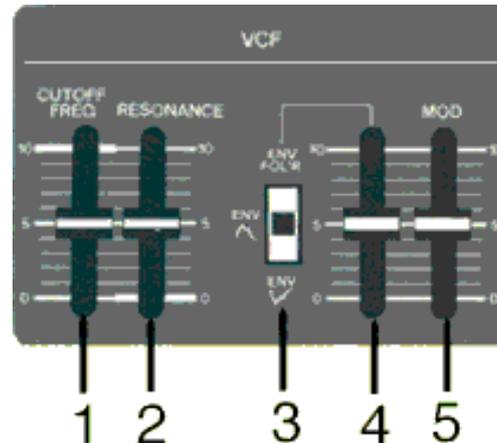
#### 3. Envelope

This switch determines the source of envelope control for the VCF. In the center position, the VCF cutoff frequency point will rise, following the shape of the envelope, each time the envelope generator is triggered. In the lower position, the cutoff of the VCF will fall, following the envelope pattern. In the upper position, the VCF cutoff point will follow the envelope of any audio signal appearing at the EXT AUDIO IN jack on the rear panel.

The LFO is an oscillator which generates waveforms of a low frequency. The range is from about 0.2 Hz to about 25 Hz. The output of the LFO can be used for modulating the VCO of VCF, and for triggering the envelope generator. The S/H produces random signals by sampling the output from the noise generator at a rate determined by the LFO.

### VCF (Voltage Controlled Filter)

is a low pass filter whose cutoff frequency can be controlled by means of a control voltage. The VCF is used to alter tone colors by cutting or boosting harmonics in the signals sent from the VCO.



#### 2. Resonance Control

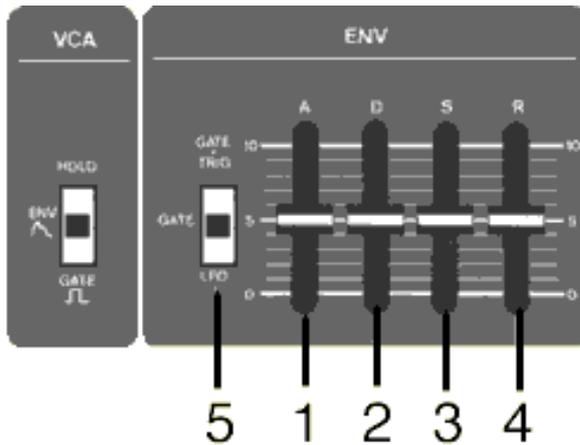
This control accents the frequencies at the cutoff point of the VCF. At "0", this control has no effect. The effect will become stronger, the higher the control is raised. With the control at a high position, moving the CUTOFF FREQ slider will produce sounds peculiar to the synthesizer.

#### 4. Envelope Control

With this control raised, the cutoff point of the VCF will change during the production of each note. This type of VCF modulation is very often used with brass sounds.

#### 5. MOD Control

This control allows the VCF cutoff point to be controlled by the MODULATOR (LFO) section. Using the sine wave output of the MODULATOR produces growl effects. This control is also effective for processing of external input signals. Continuous wah wah effects can be added to electric guitar or other keyboards.



### VCA

The VCA is an amplifier whose gain is controlled by a control voltage. In other words, the varying control voltage acts much like a volume control to any sound passing through the VCA. Setting the VCA switch at HOLD will hold the VCA open so that the synthesizer produces sound continuously. At GATE, the output sound will be turned on and off directly by depressing keys on the keyboard. At ENV, the output sound will be shaped by the envelope generator.

### Envelope Generator

Depressing a key on the keyboard triggers the envelope generator into action. The envelope generator generates a control voltage which varies with time according to the control settings. This control voltage is used to control the VCF cutoff frequency point so as to vary the tone color during the production of a note, and/or it is used to control the VCA to give the output sound its loudness contour.

### 1. A (Attack time)

This slider controls the amount of time which is required for the voltage to reach its maximum level after a key is depressed.

### 2. D (Decay time)

This slider controls the amount of time required for the voltage to fall to the level set by the SUSTAIN control.

### 3. S (Sustain level)

This slider determines the level to which the voltage will fall at the end of decay time. Once this level is reached (at the end of decay time) it will be held until the key is released. Note that if the SUSTAIN control is set at maximum, there will be no decay time since the voltage level cannot fall to maximum. With the SUSTAIN control at maximum, then, the DECAY control has no effect.

### 4. R (Release time)

This slider determines the amount of time required for the voltage to fall to minimum level after the release of the key.

### 5. Gate selector switch

This switch determines the source which will trigger the envelope generator into action. At GATE + TRIG, the envelope generator will be triggered each time there is a change in pitch. At GATE, the envelope generator will not be re-triggered for changes in pitches which are played legato. In the LFO position, depressing a key will cause the envelope generator to be triggered by the LFO. This is useful for producing rapidly repeating notes such as those sometimes used in mandolin playing. The speed of the repetitions will be determined by the MODULATOR section RATE control

