

Combo Model  
*MASTERS*  
*ultra-functional for performance satisfaction*

# ROLAND SYNTHESIZER

# SH-5

OWNER'S GUIDE



## FEATURES OF THE SH-5

Functionally designed, the Roland 44 key Combo-type Synthesizer SH-5 is adaptable to your every demand. The main control panel is conveniently placed in an upright position with the keyboard control section placed separately at the left of the keyboard. The body is enclosed in a rugged case for safe, easy carrying and quick setting up on stage. Now you can thoroughly enjoy sound with revolutionary characteristics.

The following functions are all available with easy-to-follow instructions:

1. Two VCO's for broad heavy sounds . . .  
Both VCO's are equipped with pitch, range, wave form, modulation and pulse width controls.
2. Filters for various types of sound production . . . .  
The filters aid in creating a variety of tone colors. The VCF can be used as a low pass, high pass or band pass filter.
3. Stereo panning . . . . .  
In addition to standard functions, panning is possible with the two channel output.
4. ADSR and AR envelope generators . . . .  
The ADSR and AR envelope generators give the sound its final loudness pattern. Both generators have separate trigger switches.
5. Ring Modulator . . . . .  
The Ring Modulator is for making bell-like effects in addition to providing great depth in tone coloring.
6. Mixer . . . . .  
The outputs from Noise, VCO-1, VCO-2, Ring Modulator and External Input can be mixed and at

the same time the Mixer functions as a terminal to select signal destination.

7. Special sound capability based on other instruments . . . . .  
An External Input Jack is provided for processing sounds like voices or instruments by connecting with a microphone, electric guitar or an electronic organ.
8. Keyboard controller that performs ideally when improvising . . . . .  
The keyboard controller section comes equipped with a manual lever-type bender which gives maximum performance freedom while improvising.

### How to get the most effective use from your Combo-type SH-5 Synthesizer.

Like all electronic instruments the Synthesizer should be connected to an auxilliary amplifier.

The SH-5 can be connected directly to various other devices.

One of the most common accessory devices used with Synthesizers is the Echo Chamber (such as the ROLAND RE-201).

Phase Shifters are also commonly used (like the Roland AP-5, for example).

Synthesizers like this Combo model can be much more effectively used when used in connection with other devices.

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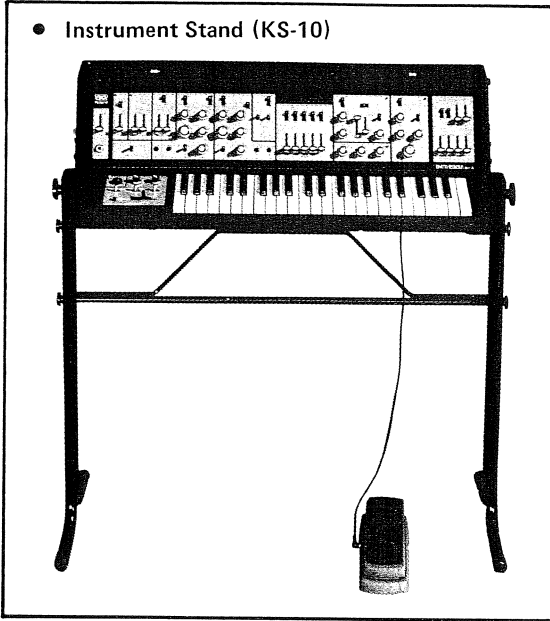
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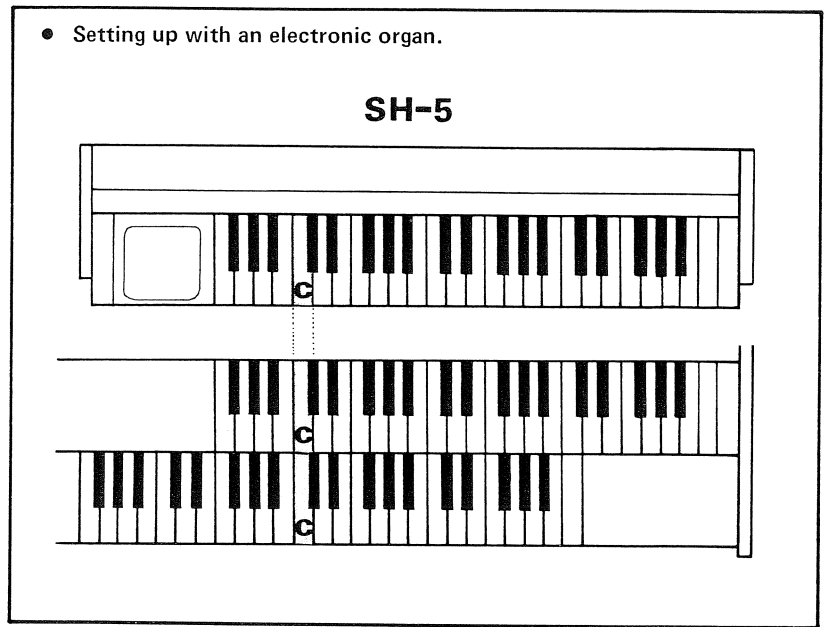
# Setting Up

- Instrument Stand (KS-10)



- For combo playing, the KS-10 instrument stand should be used (available separately).

- Setting up with an electronic organ.



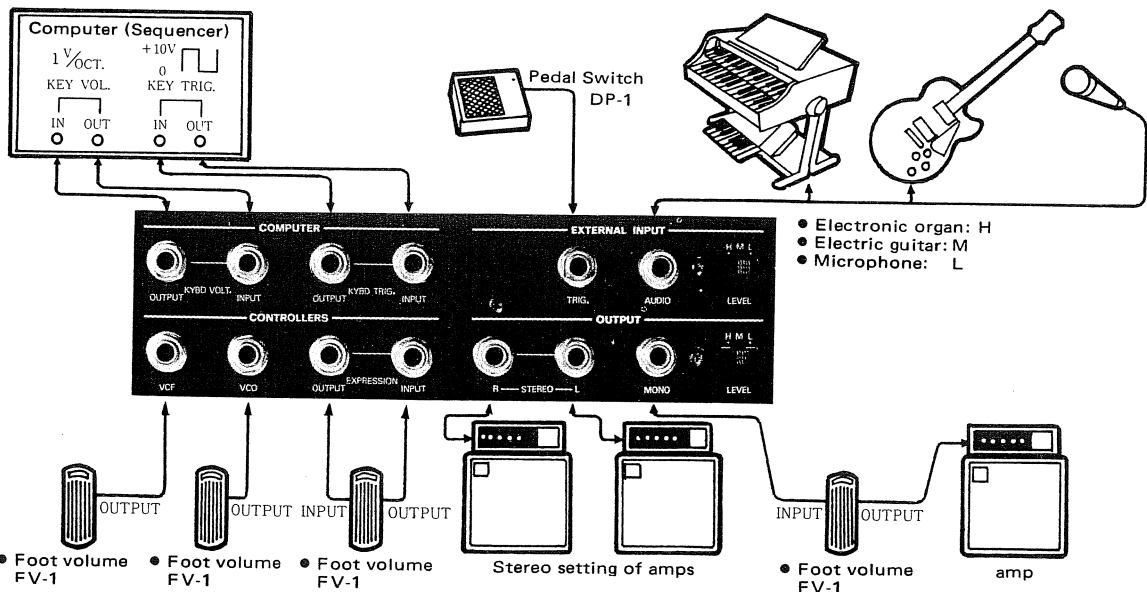
- When playing an electronic organ and SH-5 at the same time, the set-up should be as shown above for the most effective playing.

## Making Connections

- By connecting to a Digital Sequencer (as shown below), automatic performance is possible.

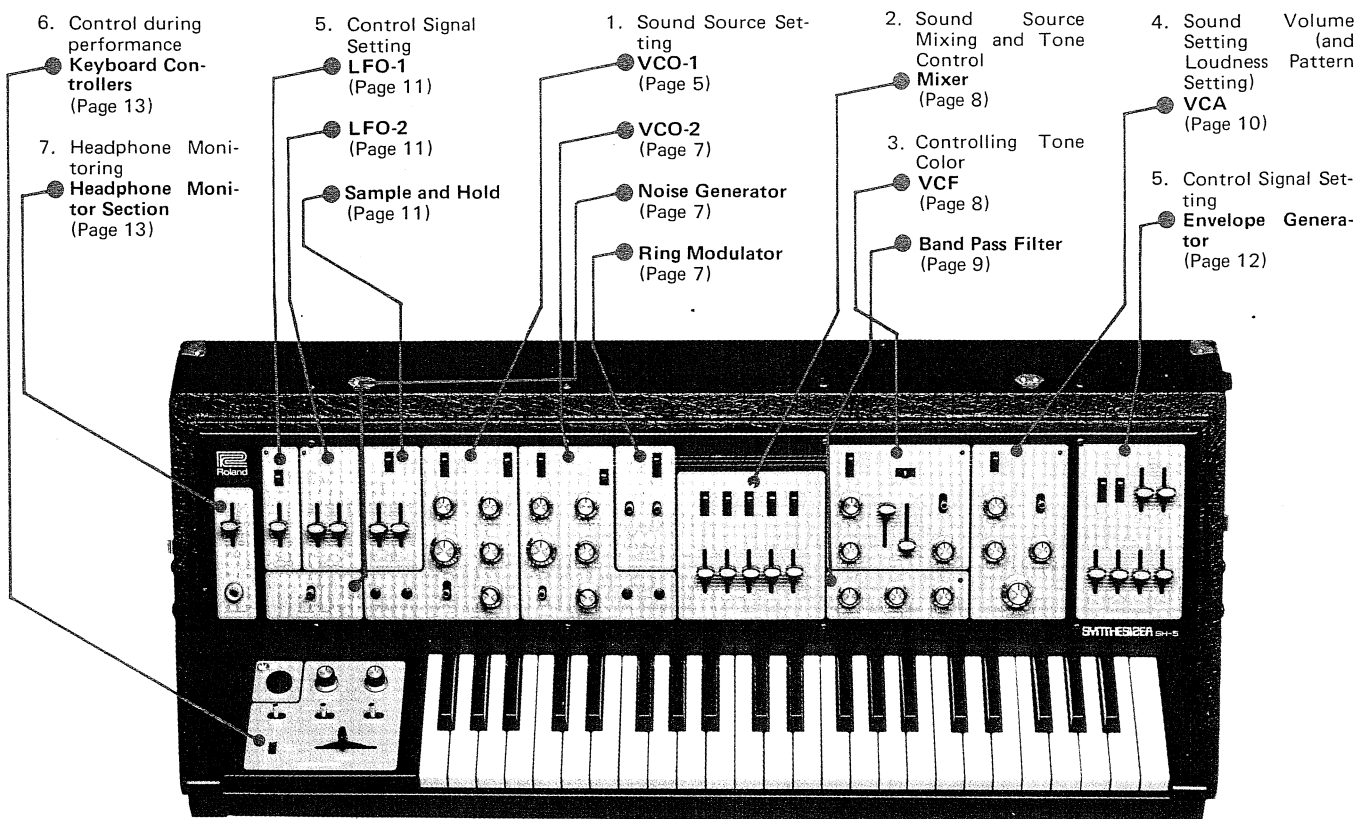
- By connecting an electronic organ, electric guitar, microphone and/or some other instrument to the Input, it is possible to alter their tone qualities at will. In this case, connect the pedal switch DP-1 (separately available) to the trigger terminal and set the trigger changeover switch of the envelope generator to EXT (External).
- Set the Input LEVEL changeover switch at "H" for an electronic organ, at "M" for an electric guitar, and at "L" for microphone.

- Terminals at Rear Panel



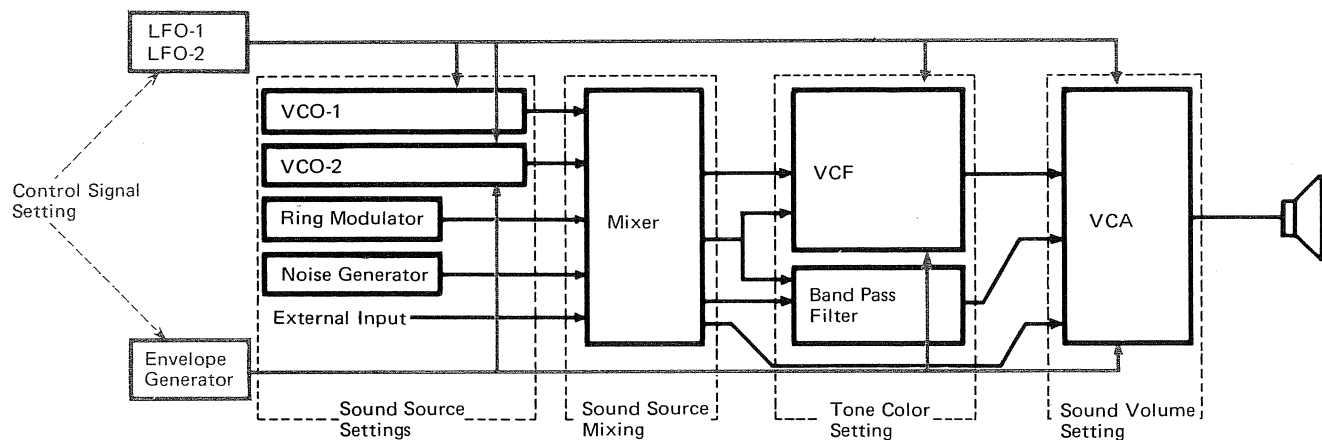
- External control of the filtering action of the VCF is possible by plugging the OUTPUT of the FV-1 Foot Volume into the VCF jack. Also, the FV-1 Foot Volume can be used to control the pitch of the VCO by plugging into the VCO jack.
- When connected to two amplifiers, sound transfer is possible with the VCA PANNING (see page 10). In this case foot volume operation is used with the EXPRESSION jacks.
- When using only one amplifier, control of the sound volume can be made by connecting the foot volume pedal between the amplifier and SH-5 output.
- The setting of the output LEVEL switch depends on the input sensitivity of the amplifier used.

# Names of Individual Controls



\* The functions are explained on the indicated pages.

# Classification of Individual Operational Controls



From the operating point of view, the Roland Synthesizer SH-5's individual controls can be divided as follows (see drawing above):

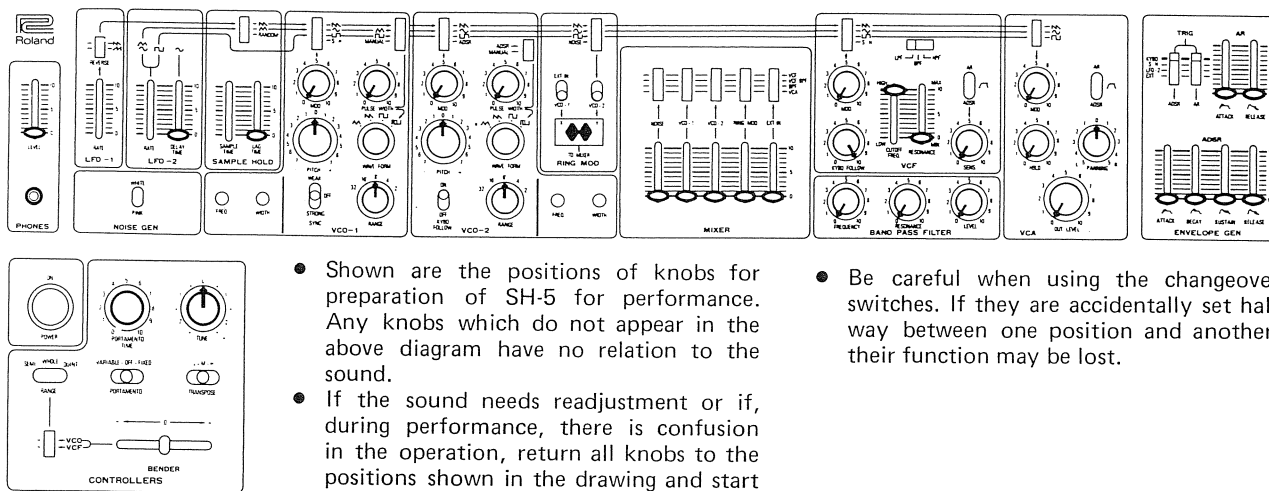
1. **SOUND SOURCE SETTINGS:** The locations from which SH-5 sound originates.
  - VCO-1
  - VCO-2
  - Noise Generator
  - Ring Modulator
2. **SOUND SOURCE MIXING:** Sound mixing and destination selecting.
  - Mixer
3. **TONE COLOR SETTING:** Control which is related to tone controls.
  - VCF
  - Band Pass Filter (BPF)

4. **SOUND VOLUME SETTING:** Control which is related to the rise and fall, or loudness pattern of sound.
  - VCA
5. **CONTROL SIGNAL SETTING:** Setting control signals.
  - LFO-1
  - LFO-2
  - Sample and hold
  - Envelope Generator
6. **CONTROL DURING PERFORMANCE:** Location where operational function is concentrated during performance.
  - Keyboard Controller
7. **HEADPHONE MONITORING**
  - Headphone Monitor Section



# Functions and Uses of Individual Controls

## • Standard Settings

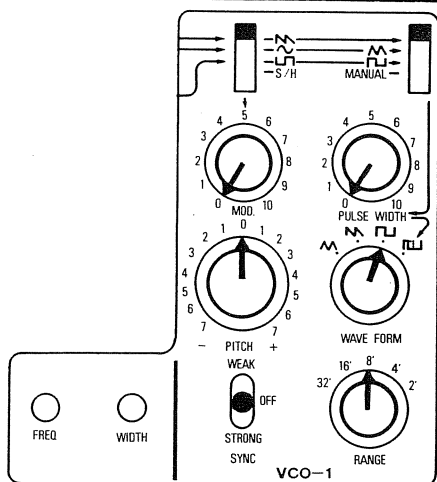


- Shown are the positions of knobs for preparation of SH-5 for performance. Any knobs which do not appear in the above diagram have no relation to the sound.
- If the sound needs readjustment or if, during performance, there is confusion in the operation, return all knobs to the positions shown in the drawing and start over from there.
- Be careful when using the changeover switches. If they are accidentally set half way between one position and another, their function may be lost.

## 1. SOUND SOURCE SETTINGS

\_\_\_\_\_ controls related to sound sources.

### VCO-1



- The FREQ and WIDTH controls have rubber covers and are not related to performance functions. They have been factory adjusted. Readjustment should not be attempted without the proper electronic instruments.

THE VCO is the most important sound source in the synthesizer. The SH-5 has two VCO's to regulate frequency (pitch) and sound source wave forms. This is the basis of all sound production.

### RANGE

- This knob is for selecting the basic frequency range of VCO-1, from the lowest (32') to the highest (2'), covering a range of five octaves.

### PITCH

- This knob for the fine adjustment of VCO-1's frequency (PITCH) offers control over a range of a perfect fifth above or below the center "0".
- The center "0" is a click stop so that rapid setting can be obtained.

### WAVE FORM Selector

- This knob is for selecting sound source

waves which are the basis for creating sound. The following four kinds of wave forms are available:

- ∧ (Triangular Wave): Clear sound which is close to a sine wave
- ∞ (Sawtooth Wave): Bright clear sounds like the violin
- (Square Wave): Deep sounds as in single reed woodwind instruments like the clarinet
- ▭ (Pulse Wave): Piercing sounds as in double reed woodwind instruments like the oboe, and brass instruments like the trumpet. It is possible to alter the length of the pulses by using PULSE WIDTH control.

### PULSE WIDTH

- The PULSE WIDTH control alters the pulse wave from 50% (▭: control at "0"), which is the same as the □ position of the WAVE FORM selector switch, to more than 98% (▭: control at "10"), which is the pure pulse wave.
- Changeover switch (∞ / ∆ / □ / MANUAL).

When the Changeover switch is set at MANUAL, the pulse width is directly controlled by the PULSE WIDTH control.

- In other positions, the pulse wave changes according to the ∞, ∆, or □ from the LFO's, and the PULSE WIDTH control then controls the depth of the effect, which makes possible chorus-like sound. The rate of speed of this effect is controlled by the related LFO controls. (Use Example 2, page 6, for reference)

### VCO Modulation (MOD Control)

- It is possible to create vibrato and other varying pitch effects by selecting one of the signals (∞, ∆, or □) from LFO-1 or LFO-2.

The signal is selected by using the changeover switch and the depth of the effect is set with the MOD Modulation knob.

The rate or speed of the effect is set at the LFO which produces each wave (Use Examples 3 and 4, Page 6, for reference).

- In the case of setting changeover switch at S/H, the VCO-1 sound comes out according to the signals which are indicated at individual controls and it is not related to the musical interval on keyboard. (Use Example 13, page 12, for reference).

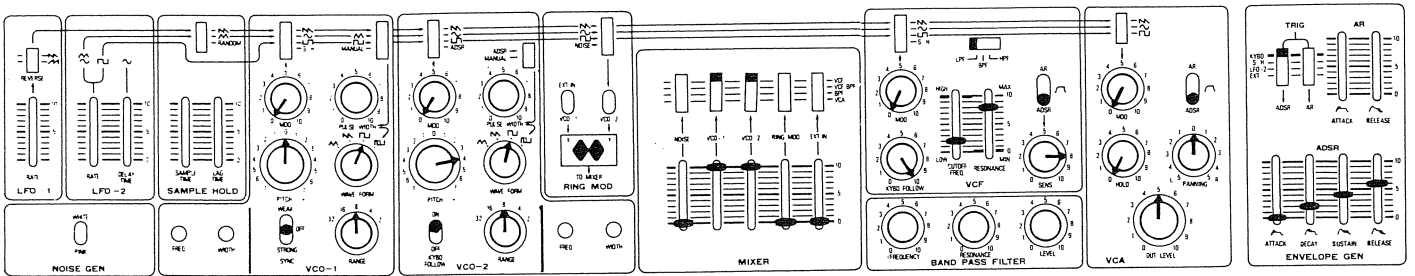
### Synchronizing two VCO's (SYNC switch)

- By using two synchronized VCO's it is possible to emphasize different harmonics which would be impossible with only one VCO.
- In the STRONG position, the frequency of VCO-2 will exactly follow the frequency of VCO-1 without the beat frequency produced by slight discrepancies in tuning. (Use Example 5, page 6, for reference)
- In the WEAK position, the two VCO's can be tuned to different intervals with the elimination of the beat frequency.

### Cautions in using the setting examples.

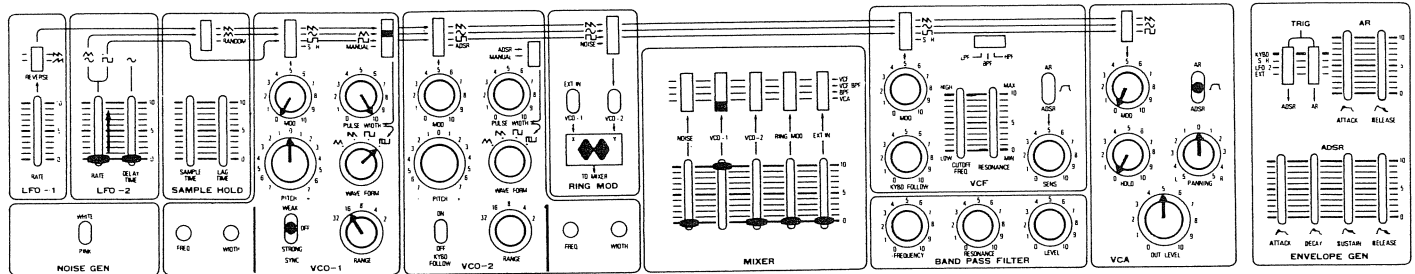
- Setting examples 1-15 for the SH-5 are only given as suggested settings, and should not be considered as being rigid. Feel free to experiment with them.
- Sometimes the tones can be quite different with different amplifiers or speakers, but this can be regulated at the amplifier's tone control section, or can be changed somewhat with the SH-5's individual controls.
- Each example only describes the position of the necessary knobs for sound production. The positions of the knobs which are not indicated are irrelevant to that sound. The sound volume can be set with the VCA's OUT LEVEL.

### Application Example < 1 >. 2 VCO's for heavy sound



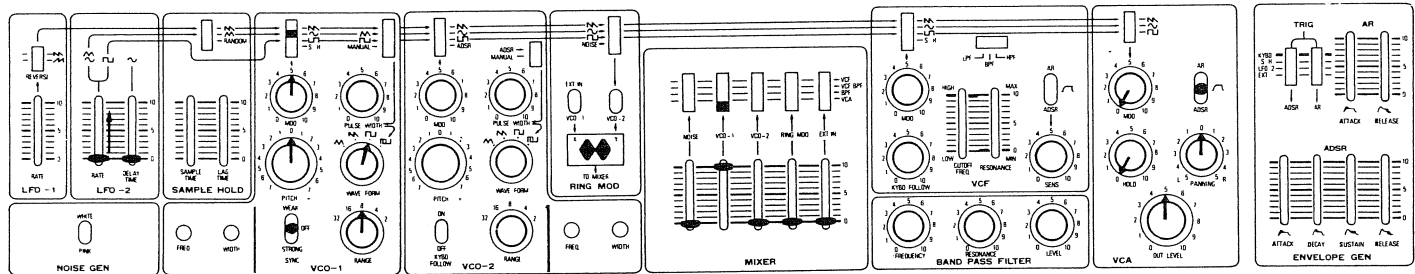
- Produces heavy sounds by tuning the two VCO's to the interval of a major third.

### Application Example < 2 >. Pulse width modulation



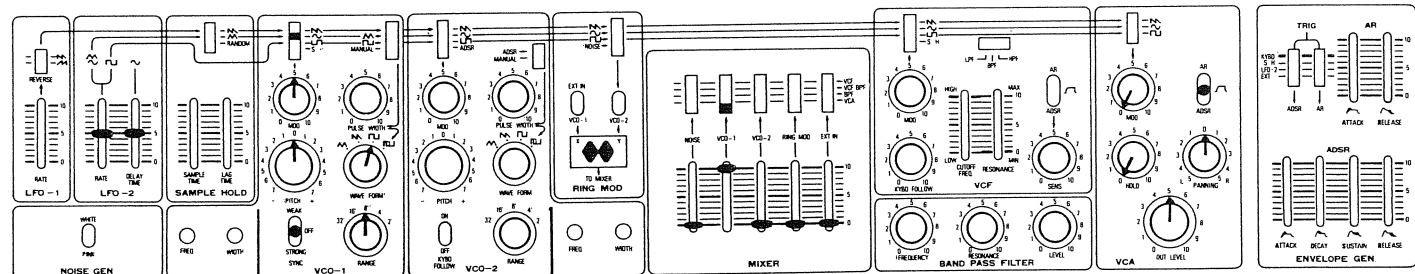
- Modulation by the LFO. Try moving the LFO RATE control up and down while holding down a key.

### Application Example < 3 >. Vibrato effect (VCO modulation).



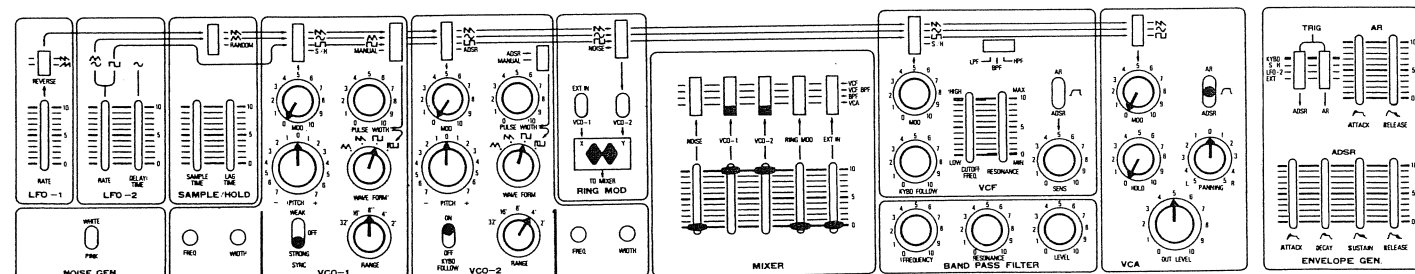
- Try moving the LFO RATE control up and down while holding down a key.

### Application Example < 4 >. Delayed vibrato effect.



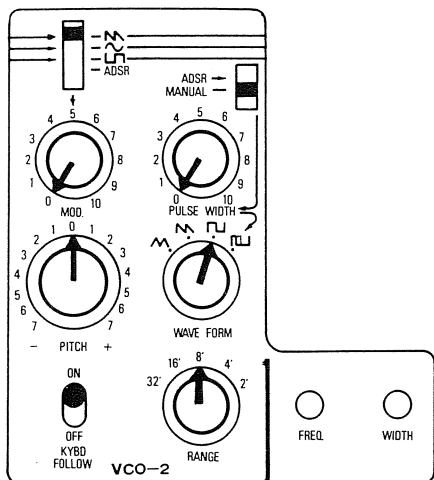
- By raising the LFO-2 DELAY control the vibrato effect is delayed slightly after the key is depressed.

### Application Example < 5 >. Using the VCO SYNC



- With the SYNC switch at STRONG, the VCO's can be tuned at unison or octaves (by means of the RANGE switch) without the beat caused by slight tuning discrepancies.

## VCO-2



- The FREQUENCY and WIDTH controls have rubber covers and are not related to performance functions. They have been factory adjusted. Readjustment should not be attempted without the proper electronic instruments.

## RANGE

- This knob is for selecting the basic range of VCO-2.

## PITCH

- This control knob fulfills the same function as the VCO-1 PITCH Control and is used for tuning VCO-2. VCO-2 can be tuned so as to form musical intervals with VCO-1 for producing heavy and full sounds. (Use Example 1, page 6, for reference.)

## WAVE FORM Selector

- This control knob fulfills the same function as the VCO-1 WAVE FORM Selector and is used for the selection of the VCO-2 sound source wave form.

## PULSE WIDTH

- This control knob fulfills the same function as the VCO-1 PULSE WIDTH Control. The changeover switch has both MANUAL and ADSR positions. When set at MANUAL, the pulse width ratio is fixed according to the PULSE WIDTH control. When set at ADSR, the

wave will automatically follow the contour of the Envelope Signal which comes from the ADSR envelope generator. (Use Example 8, page 9, for reference)

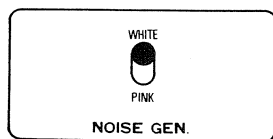
## MODULATION (MOD)

- This control knob fulfills the same function as the VCO-1 modulation control and gives the same vibrato effects. In addition to  $\infty$ ,  $\sim$ , and  $\square$ ; ADSR can be selected at the changeover switch so that the pitch will automatically follow the envelope signal from the ADSR envelope generator.

## KEYBOARD FOLLOW

- This is generally set at "ON" during performance but when set at "OFF", VCO-2 will produce the pitch indicated by the VCO-2 PITCH and RANGE controls no matter which key is pressed. It can be used for creating effective sounds with the Ring Modulator. (Use Example 7, page 8, for reference.)

## Noise Generator (NOISE GEN.)

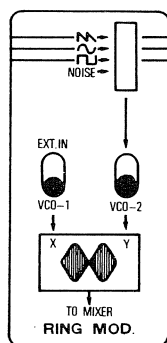


This is the location of the noise production circuits used for imitation sounds and sound effects. (Use Example 6, described below for reference). Noise level setting is done at the Mixer.

## CHANGEOVER SWITCH (WHITE/PINK)

- Both white and pink Noise can be produced.
- Pink noise is a hissing sound much like escaping air or steam.
- White noise is a rushing sound more like a water fall.

## Ring Modulator (RING MOD.)

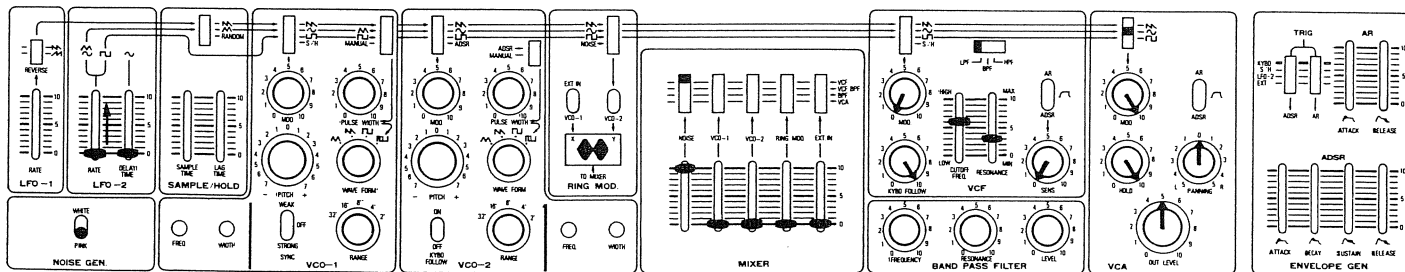


By combining two sound sources in a certain way, this device can produce sound effects impossible by other means, e.g. chiming sounds. It can also be used as an independent sound effect. Heavy sounds can be produced like those obtained when two VCO's are combined. (Use Example 7, page 8, for reference). Ring Modulator volume setting is done at the Mixer.

## Selector Switches. (EXT. IN, VCO-1; VCO-2/ $\infty$ / $\sim$ / $\square$ / NOISE.)

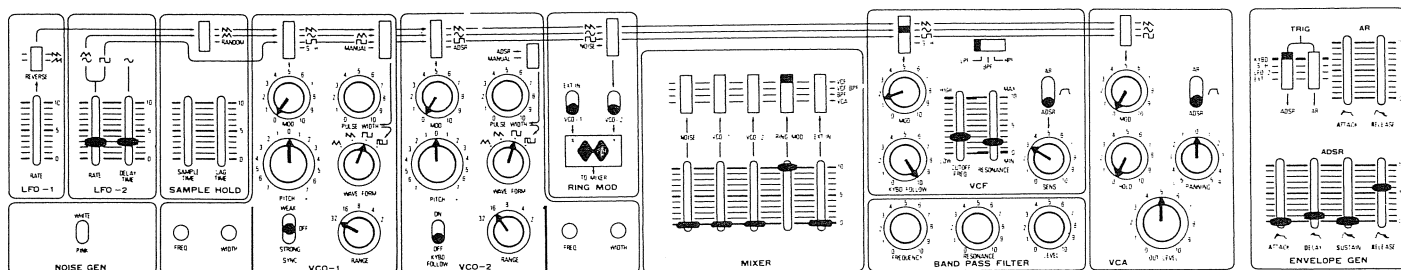
- The following combinations can be used for activating the ring modulator:
  - (1). VCO-1 + VCO-2.
  - (2). VCO-1 + LFO ( $\infty$ ,  $\sim$ ,  $\square$ ) or NOISE.
  - (3). EXT IN (external input) + VCO-2.
  - (4). EXT IN + LFO ( $\infty$ ,  $\sim$ ,  $\square$ ) or NOISE.

## Application Example < 6 >. Sound imitation using NOISE



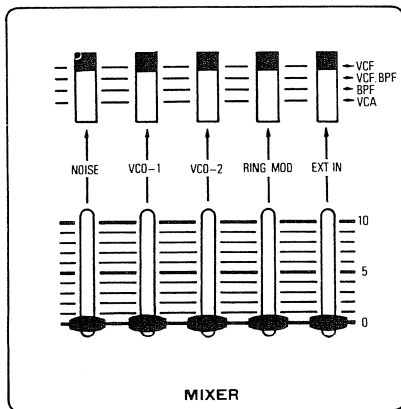
- Steam Locomotive Sound imitation using PINK NOISE as the Sound Source. Speed effect can be produced by slowly lifting the LFO-2 RATE Control Slider.

## Application Example < 7 >. Sound imitation using the Ring Modulator



- By tapping the keys, a bell-like sound can be produced using the Ring Modulator.

## 2. SOUND SOURCE MIXING AND TONE CONTROL



### MIXER

This is where the individual sound sources are mixed before being transferred to the VCF, Band Pass Filter (BPF), and VCA which set the Tone and Loudness Pattern.

### Level Controls (NOISE, VCO-1, VCO-2, RING MOD., EXT. IN)

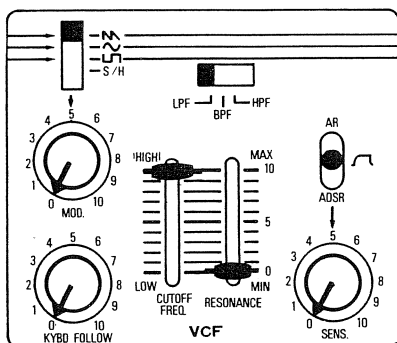
- These establish the Levels of the five Sound Sources: NOISE, VCO-1, VCO-2, Ring Modulator and External Input.

### Destination Changeover Switches (VCF, VCF + BPF, BPF, VCA)

- These Switches select one of four destinations for each of the sound sources (VCF, VCF + BPF, BPF, VCA).
- Send the sound source signal to the VCF in order to change the tone color, to the BPF to alter the upper and lower parts of the tone, and directly to the VCA for no alteration of tone.
- The VCF, BPF, and VCA each have lamps which light when the related section is receiving a signal.

## 3. CONTROLLING TONE COLOR

### VCF



The VCF is the main filter used for changing the tone colors of the sound source signals.

### Cutoff Frequency (CUTOFF FREQ.)

- This control changes the harmonic content of the source signal, depending on the position of the LPF/BPF/HPF switch.
- Low Pass Filter (LPF). With the CUTOFF FREQ. at HIGH, the sound source is unchanged. Moving the control down shaves off the upper harmonics until LOW is reached, where all sound is cut.
- Since moving the control down shaves off the upper harmonics, this means that moving the control down will also result in a lower sound volume output.
- High Pass Filter (HPF). With the CUTOFF FREQ. control at LOW, the filter passes the sound unchanged. Moving the CUTOFF FREQ. up shaves off the lower harmonics until HIGH is reached, where most of the lower harmonics are completely filtered out, creating a thin, sharp tone quality. (Use Example 8, page 9, for reference.)

### RESONANCE

- The RESONANCE control will stress those harmonics centered around the frequency chosen by the CUTOFF FREQ. control.
- Above "8", the filter begins to oscillate, and these oscillations can be used as a sound source for different tonal effects. (Use Example 8, page 9, for reference.)

### Keyboard Follow (KYBD FOLLOW)

- With this control, the cutoff point of the filter can be made to follow the pitches produced by the keyboard.
- With the control set at less than "10", the filter will give the same effect as acoustical instruments where tone color is different in the high and low ranges. (Use Example 9, page 9, for reference.)

### Envelope Generator Changeover Switch (ADSR/AR) and Sensitivity (SENS.)

- With these controls, the cutoff point of the filter can be made to follow the output of the envelope generator. (Use Example 10, page 9, for reference.)
- Three types of envelope signals are available: ADSR, AR, and AR.
- The sensitivity control adjusts the depth of the effect. At "0", the effect is completely cancelled.
- When the CUTOFF FREQ. is at or near the point where the filter passes all frequencies unchanged (HIGH for LPF; LOW for HPF), if the sensitivity control is turned too high, the envelope following effect will be lost. This is especially true of the Low Pass function. Try setting the SENS at just above "0".



## VCF modulation (MOD.)

- Different kinds of "growl" effects can be obtained by selecting  $\infty$ ,  $\sim$ , or  $\sqcap$  form the LFO's. The MOD control determines the depth of the effect, and the speed or rate is controlled at the LFO which produces the selected wave.
- When the changeover switch is at  $\sim$ , it

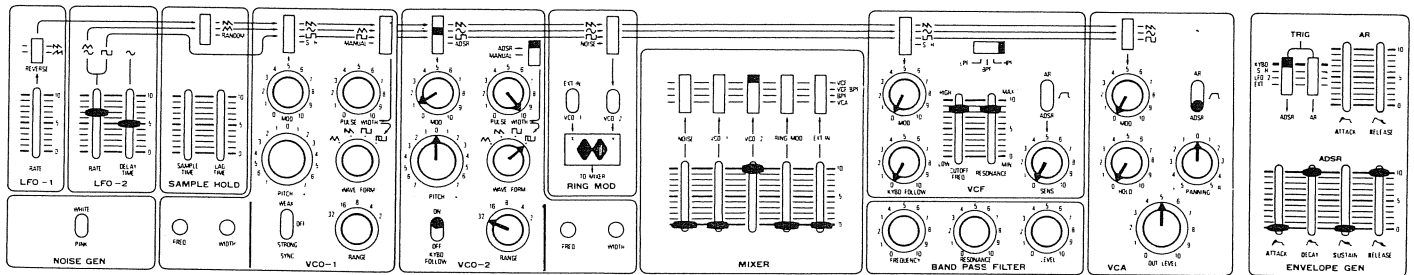
is possible to add a delay effect at the LFO-2 DELAY TIME control.

- When the changeover switch is at S/H, the harmonic content will change according to the signal coming from the S/H section. This creates special tonal effects. (See page 15 for a comical

bubbling effect.)

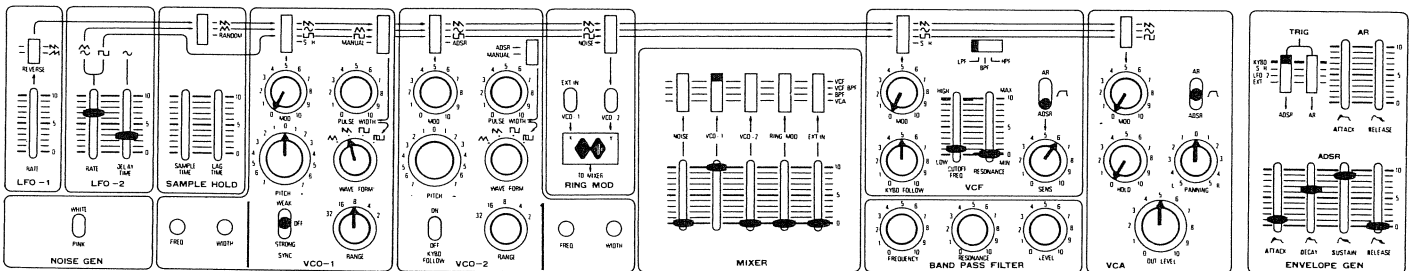
- When the CUTOFF FREQ. is at or near the point where the filter passes all frequencies unchanged (HIGH for LPF; LOW for HPF), if the MOD control is turned too high, the modulation effect will be lost.

## Application Example < 8 >. Control of Harmonics with the High Pass Filter



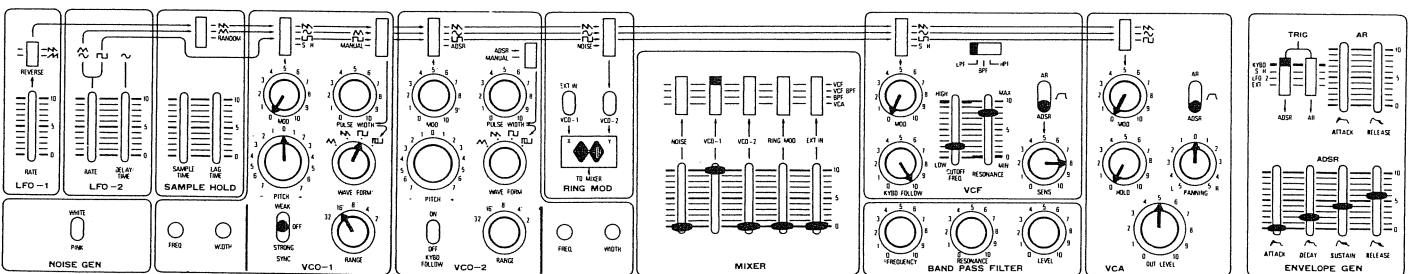
- By using the High Pass Filter, a sharp piercing tone can be constructed with the feeling of a FUZZ Guitar. Depth can be added to the sound by controlling the VCO-2 pulse width with the ADSR. With the KEYBOARD FOLLOW control set at "0" it is possible to get resonance and feed-back together.

## Application Example < 9 >. Natural sounding instruments can be obtained using the KEYBOARD FOLLOW control.



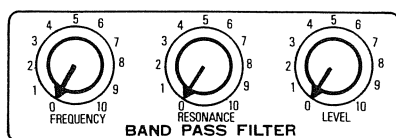
- The sound of the flute can be created with the KEYBOARD FOLLOW effect as well as other natural sounds whose volume and tone color are different for different pitches. Also, separate envelopes can be used to control the VCF and the VCA. (Use Example 12, page 11, for reference.)

## Application Example < 10 >. Tone-effects using the Envelope Signal.



- This tone effect is created by using the Envelope Signal at the VCF which causes an extremely strong effect in addition to the Resonance effect.

## Band Pass Filter



This filter passes a desired range of frequencies only. Using this, an effect which resembles resonance can be produced. Besides this it can be used in combination with the VCF or independently. (Use Example 11, page 10, for reference.)

### FREQUENCY

- The FREQUENCY Control establishes the center frequency of the desired band of frequencies to be passed through the filter.

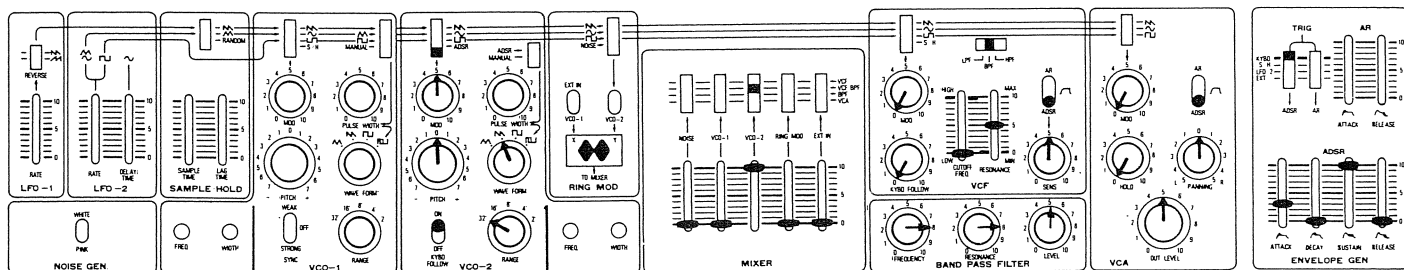
### RESONANCE

- This emphasizes the center of the band pass (established by the FREQUENCY control) by narrowing or widening the zone of frequencies passed by the filter.

### LEVEL Control

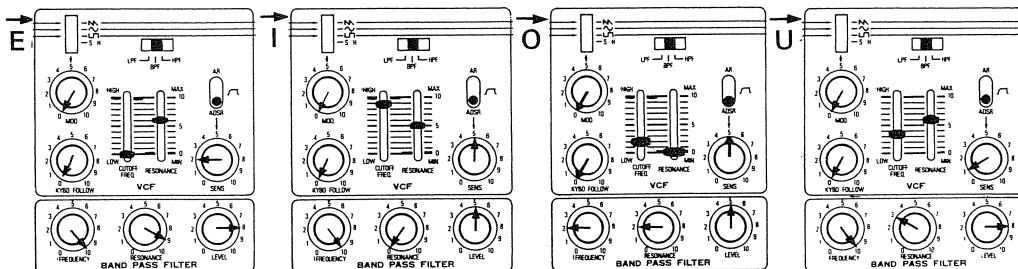
- This adjusts the output level of the Band Pass Filter and maintains the level balance when used in conjunction with the VCF.

Application Example < 11 >. Sound imitation (vowel: A, E, I, O, U) using the BPF.



↑ A

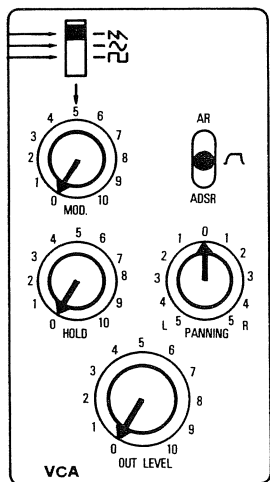
- The band pass filter establishes the resonance points of the human voice and creates the feeling of the vowel sounds: A ("ah"), E ("eh"), I ("ee"), O ("oh") and U ("oo"), in conjunction with the VCF. (Only the VCF and BPF controls are changed for each vowel sound.)




## 4. SOUND VOLUME SETTING

The controls for setting up the loudness patterns of sound.


### VCA







#### Envelope Changeover Switch

- This switch determines which of three types of envelope patterns will be used for the shaping of the swell and decay patterns of the sound. The positions are: AR,  (a fixed envelope), and ADSR.

#### HOLD Control

- This passes sound through the VCA even when no key is pressed. Turning the knob to the right increases the sound output. Doing this will weaken the modulation (tremolo effect) and the envelopes (AR, , ADSR) will also be weakened.
- When the VCF CUTOFF FREQ slider is raised to HIGH in the LPF or BPF mode, the sound will be cut off. If the VCA HOLD control is set at "10", sound will again appear according to the envelope established by the VCF Envelope Changeover switch. (Use example 12, page 11, for reference.)

#### VCA Modulation (MOD.)

- This produces an effect in which the volume changes automatically (Tremolo) according to the patterns set by the LFO's: , , or . The MOD knob controls the depth of the effect and the rate is controlled by RATE control of the LFO which produces each wave.
- With the changeover switch at , it is possible to obtain a delayed Tremolo effect with the LFO-2 DELAY TIME Control.
- VCA Modulation (tremolo effect) will be weakened when the HOLD Control is raised.

#### OUT LEVEL

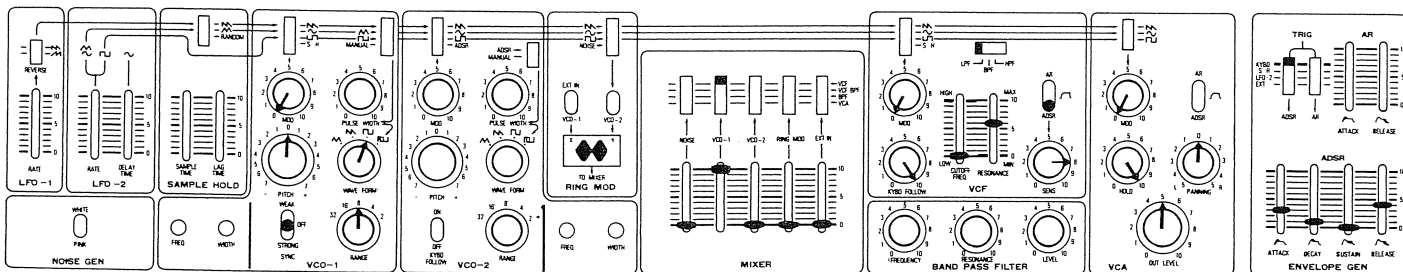
- This determines the total output level of the VCA.

#### PANNING

- This maintains horizontal balance. When using two amplifiers connected to the stereo output on the rear of the synthesizer, sound can be shifted horizontally.

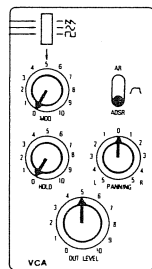
- The VCA amplifies signals from the VCF and the BPF. The controls are related to the swelling and fading of sound and the output volume control.

## Application Example < 12 >. Using the envelope at the VCF to control the sound output pattern.

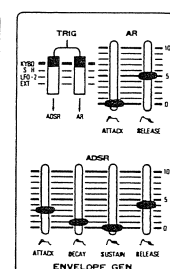
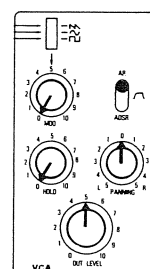


- Lower the VCF CUTOFF FREQUENCY control until the sound is cut off, then set the VCA HOLD control at "10". With the VCA HOLD control at "10", the VCA envelope will cease to function. With the VCF SENS control at about "8", sound will appear at the output according to the envelope selected by the VCF envelope change-over switch.

Compare the sound produced using the drawing above with the sound produced by the VCA settings at the right. The settings in the drawing above produce sounds which are richer in harmonics.

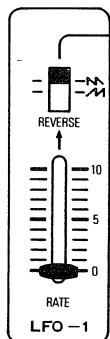


- Also, when using the AR as shown at the right, the VCF envelope function will be obtained in the same way as when HOLD is at "10".



## 5. CONTROL SIGNAL SETTING

### LFO-1



This is the low frequency oscillator used for modulating the VCO, VCF and VCA; and which provides a sample for the Sample and Hold section. The LFO can also be used for modulating the VCO-1 pulse wave, or as a signal source for the ring modulator. LFO-1 generates two wave forms:  $\sim$ , and its reverse,  $\sim$ .

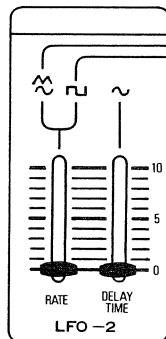
#### REVERSE Switch

- This switch is for inverting the  $\sim$  wave so as to produce the  $\sim$  wave.

#### RATE Control

- The RATE slider controls the frequency (or speed of vibrato, tremolo, etc.) output of the LFO.

### LFO-2



This is the same as LFO-1 except that it generates three wave forms:  $\sim$ ,  $\sim$ , and  $\square$ . With  $\sim$ , a delay effect is possible.

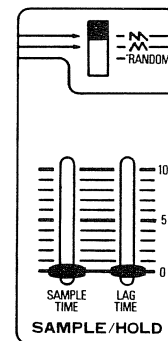
#### RATE Control

- Like LFO-1, this controls the frequency output of LFO-2.

#### DELAY TIME Control

- When using the  $\sim$  output of LFO-2, this slider controls the time interval between the depressing of a key and the actual generation of the wave. The delayed vibrato effect strongly enhances instrumental sounds. (Use Example 4, page 6, for reference.)

### SAMPLE AND HOLD



This section takes samples from the input signal, which is determined by the position of the changeover switch at the top of the section. The time between samples taken is determined by the SAMPLE TIME control. The value of each sample taken is remembered until the next sample comes along.

By putting the VCO-1 MOD changeover switch in the S/H position, the output of the SAMPLE and HOLD section can be used to control VCO-1 for producing many different kinds of musical patterns. (Use Example 14, page 12, for reference.)

#### Changeover Switch ( $\sim$ / $\sim$ / RANDOM)

- This switch allows the selection of three different wave forms from the LFO's:  $\sim$  (or its reverse:  $\sim$ ), or  $\sim$ ; or RANDOM, which is the signal from the Noise Generator. The LFO wave produces regular repeating patterns of notes, and RANDOM produces different notes all at random.

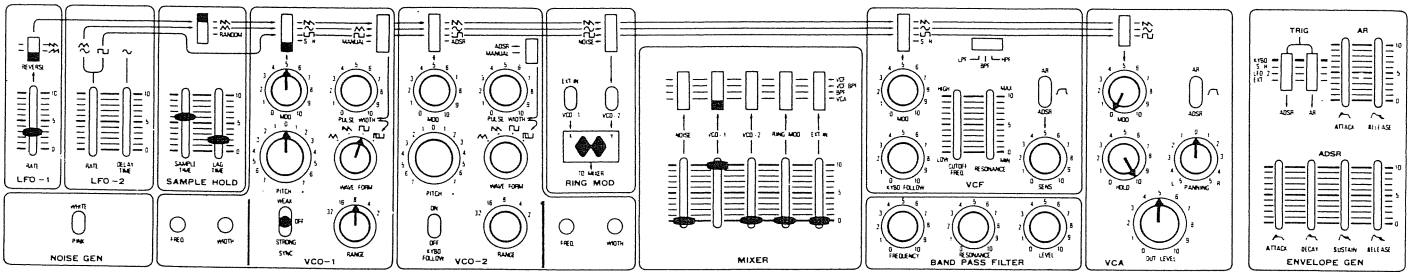
#### SAMPLE TIME

- This controls the rate of speed at which the patterns produced will repeat themselves.

#### LAG TIME

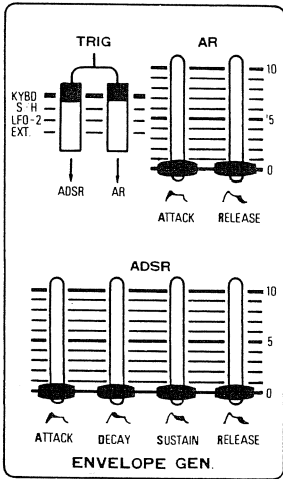
- This operates much like the PORTAMENTO control in the KEYBOARD CONTROL section. Using it will cause the notes in the produced patterns to slide from one pitch to the next, the speed of the slide depending on how high the control is.

## Application Example < 13 >. Sample and Hold effect



- The Sample and Hold section is being used to drive VCO-1 to produce musical patterns. Since the pitches of the patterns are not often related to the musical scale, these patterns produce their own special effect.

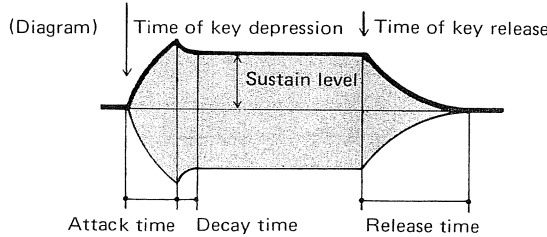
## Envelope Generator



- This is the section which usually controls the VCA in order to produce the swell and fade effects of sounds. Two types of envelopes are available: ADSR and AR. The envelope signal can be used to generate the envelope in the VCA, to create tone color changes in the VCF, and for modulation of VCO-2, as well as VCO-2 pulse width modulation. (Use Example 12, page 11, for reference.) Trigger signals for triggering both the ADSR and the AR envelope generators into operation are selected by the two trigger selector switches.

### ADSR

- Four controls are used for creating the swell and fade of sound. Besides conventional envelopes, the ADSR can create special envelopes.
- The four controls of the ADSR are:

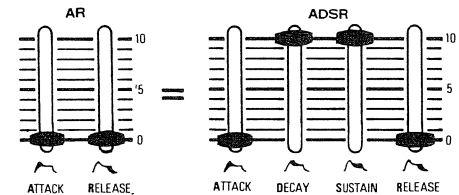


- A (Attack): The time lapse between the depression of a key and the point at which full peak volume is reached.
- D (Delay): The time lapse between the peak volume and the fall to normal volume.
- S (Sustain): This controls the level of the normal volume.
- R (Release): The time between the release of the key and the final fade out of sound.

Remember that attack, delay, and decay control time, but sustain controls sound level.

### AR

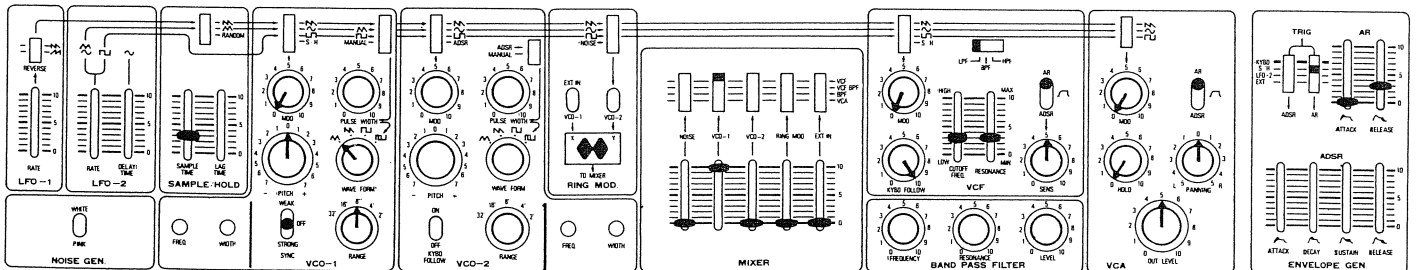
- This functions similarly to the ADSR, but is simpler. It has only two controls: A (Attack time) and R (release time). The sustain level is unchangeable and remains at maximum.
- The AR functions exactly like the ADSR when the ADSR DECAY time and SUSTAIN level are set at "10".



### Trigger select switches (TRIG)

- These switches select which signal will be used to trigger the envelope generators into action. The most common position of this switch is KEYBD (keyboard) where the envelope generators are triggered with each key depression.
- When set at S/H, the envelope generator will be triggered repeatedly, the repetition rate depending on the setting of the SAMPLE TIME control in the SAMPLE/HOLD section.
- When set at LFO-2, the envelope generator will be triggered repeatedly, the repetition rate depending on the setting of the LFO-2 RATE control. (Use Example 14, described below for reference.)
- When set at EXT (external), the envelope can be triggered by the DP-1 Pedal Switch. (Use the TRIG input jack on the rear panel.)

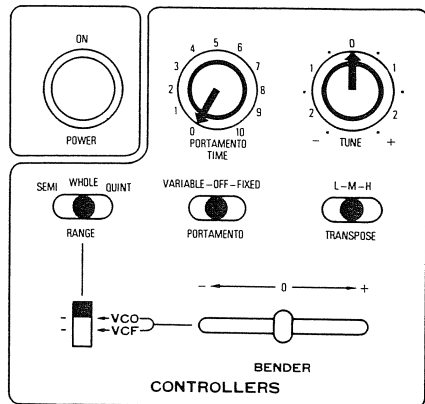
## Application Example < 14 >. Triggering with the Sample and Hold.



- The AR is being triggered by the Sample Time from the SAMPLE/HOLD section, and the envelope generator is in turn controlling the VCA and VCF, thus sound production is automatic. (The pitch of the sound is still controlled by the keyboard.)
- If the Release control is raised high enough so that the release time is longer than the time interval allowed by the SAMPLE/HOLD SAMPLE/TIME control, the envelopes will disappear and be replaced by a steady tone.
- By the same token, if the Attack time is longer than the time allowed by the S/H SAMPLE TIME control, there will be no sound.

# 6. CONTROL DURING PERFORMANCE

## KEYBOARD Controllers



This section is for integrated control and is mostly used during actual performance. The functions are basically related to the musical intervals produced by the VCO's.

### Tuning Control (TUNE)

- With this knob, the pitch of the instrument can be shifted up or down a minor third (three half steps) from center. This control affects both VCO's at the same time.

### TRANPOSE Switch

- This shifts the range of the synthesizer by octaves, and as with the TUNE control, affects both VCO's. L = low; M = medium; and H = high.

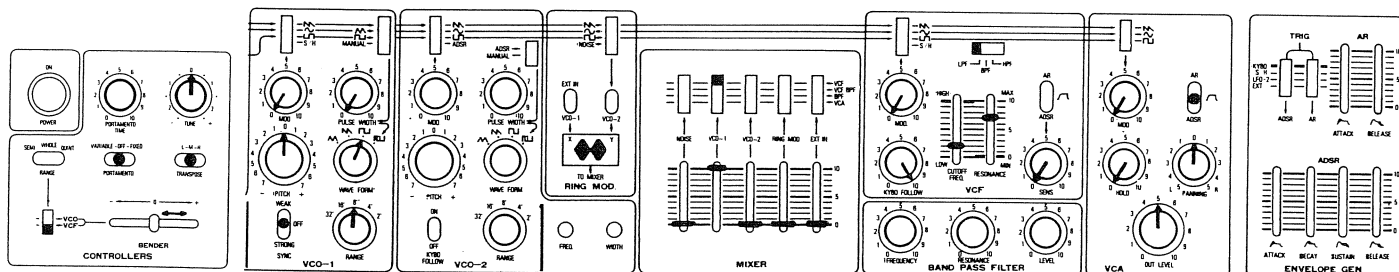
### PORTAMENTO Switch and PORTAMENTO TIME

- Portamento is the sliding of notes from one pitch to the next.
- With the PORTAMENTO switch at VARIABLE, the time taken to slide from one pitch to the next depends on the setting of the PORTAMENTO TIME control. At "0", there is no portamento; at "10", the portamento time is long.
- With the PORTAMENTO switch at FIXED, the portamento time is unvariable, and it is longer than the time available with the PORTAMENTO TIME control.

### BENDER VCO/VCF Changeover Switch Bender RANGE Switch

- Using the BENDER lever, the pitch of the VCO's can be shifted up or down, or the tone coloring can be altered.
- When the VCO/VCF changeover switch is at VCO, the BENDER control lever will slide the pitch. The RANGE switch decides how far the pitch will bend. SEMI = semi-tone (or half-tone); WHOLE = whole tone; and QUINT = perfect fifth.
- With the VCO/VCF changeover switch at VCF, the BENDER lever acts on the VCF the same way as the VCF CUTOFF FREQ. control. (The RANGE switch has no effect in this mode of operation.) (Use Example 15, described below for reference.)

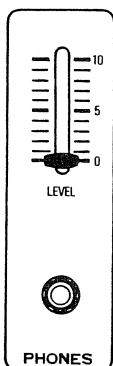
## Application Example < 15 >. Manual WOW effect with the VCF bender



- While holding down a key, try moving the BENDER to the right, then let it return to the center position.

# 7. HEADPHONE MONITOR

## Headphone Monitoring (PHONES)



### LEVEL Control

- This acts for the headphones exactly as the VCA OUT LEVEL acts for the connected speakers.
- If you fail to get correct sound with the controls set according to the diagrams, check the following points:

When desired sounds are not produced, inspect as follows again.

### Control section:

- Are you sure all the controls for the sound are set correctly? Be especially careful of the following: Envelope generator TRIG switch; VCA AR/ADSR switch; VCF CUTOFF FREQ. control; VCO, VCF, and VCA modulation controls; and the portamento controls. Also check that the correct Mixer Controls are raised.

### Other trouble points:

- Make sure that the main power switches for the SH-5 and the external amplifier-speaker system are on.
- Are the volume controls for the SH-5 or external amplifier turned up? Also, when using an expression pedal, is the pedal depressed?
- Are the connections to the external amplifier and speakers correct?
- Are the cords used to connect the system good? No internal breaks in the cords?

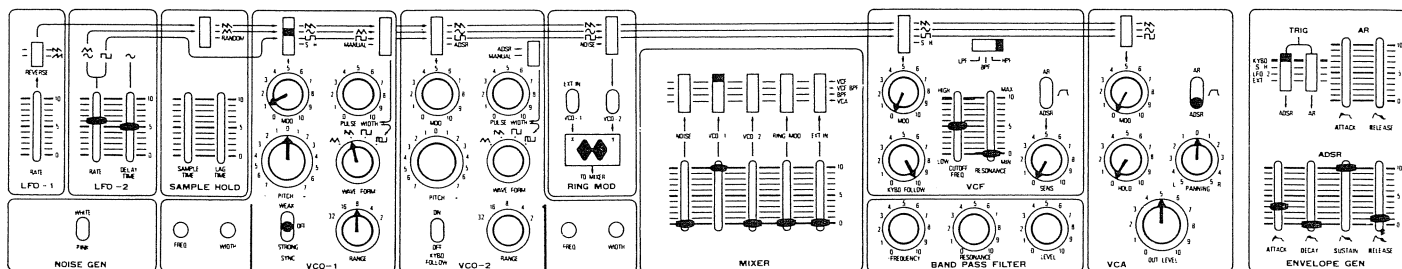


# SH-5 SAMPLE SOUNDS

- The Sample Sounds described here are only a very few of the great number of sounds the SH-5 can create.
- The tone sometimes changes depending on the external amplifier-speaker system used. Try changing the amplifier tone controls or try using slightly different settings of the SH-5 controls.

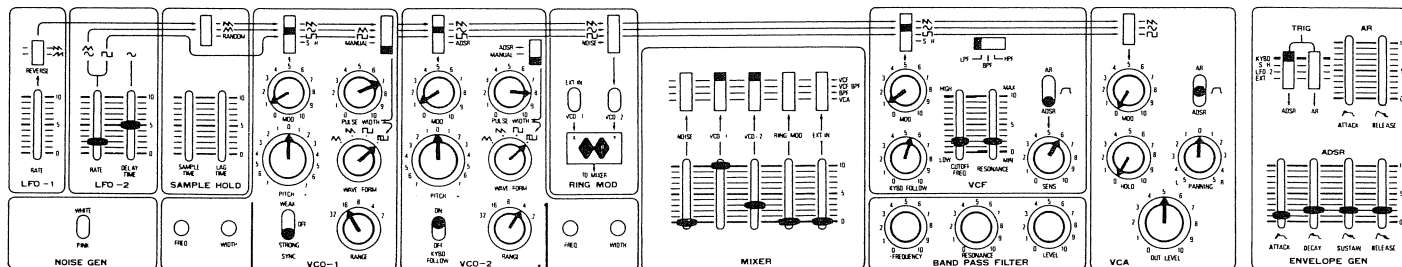
- Knobs not shown on the diagrams have no effect on the sound.
- The VCA OUT LEVEL should be adjusted to a comfortable listening level.

## • Violin



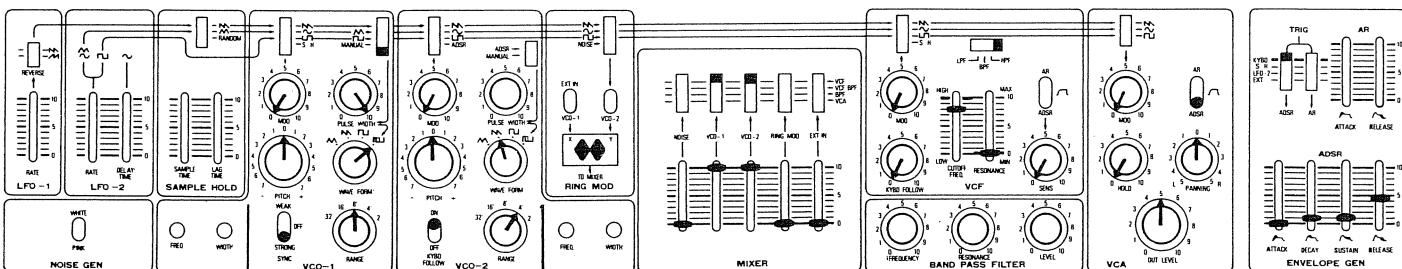
- When playing, set the PORTAMENTO switch at VARIABLE and the PORTAMENTO TIME at about "1".

## • Trombone



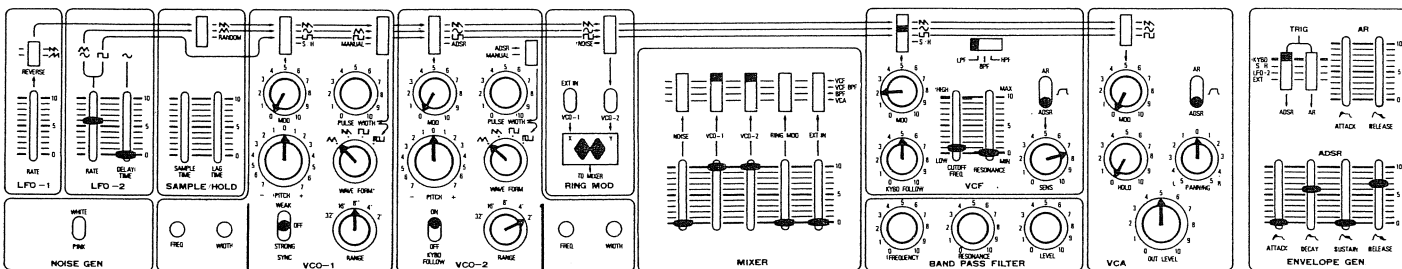
- The feeling of a Trombone can be obtained by setting the PORTAMENTO Switch at VARIABLE and setting the PORTAMENTO TIME at about "1".

## • Harpsichord



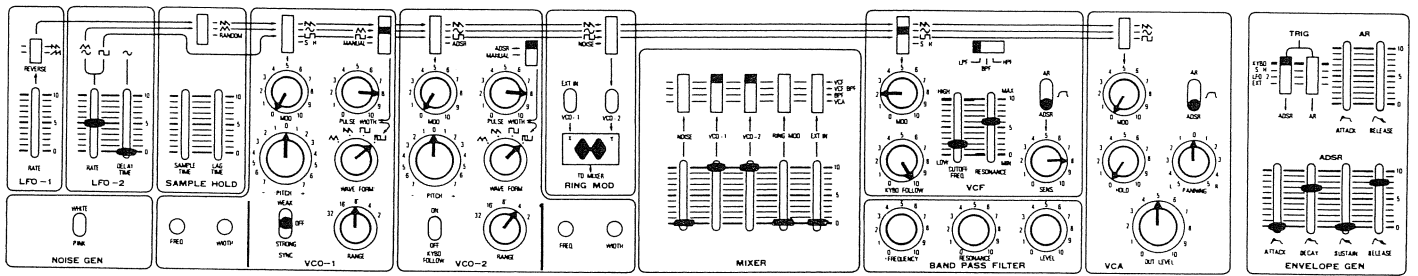
- PORTAMENTO on the Controller is "OFF". Use a STACCATO touch on the keyboard.

## • Vibraphone



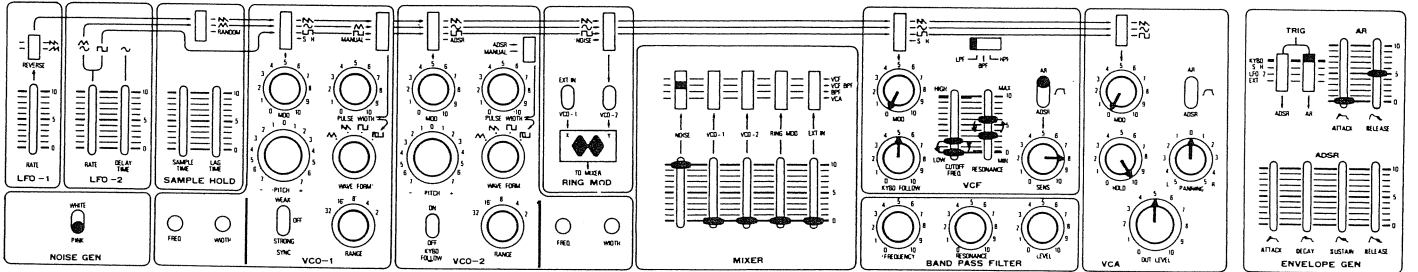
- PORTAMENTO on the Controller is OFF, and play STACCATO on the keyboard.

● Planet



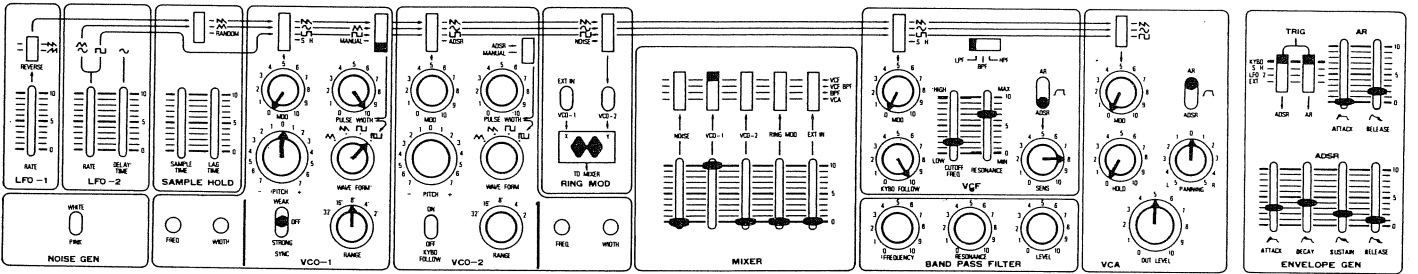
● When playing, add the effect of PORTAMENTO on the controller.

● Rifle Shot Sound



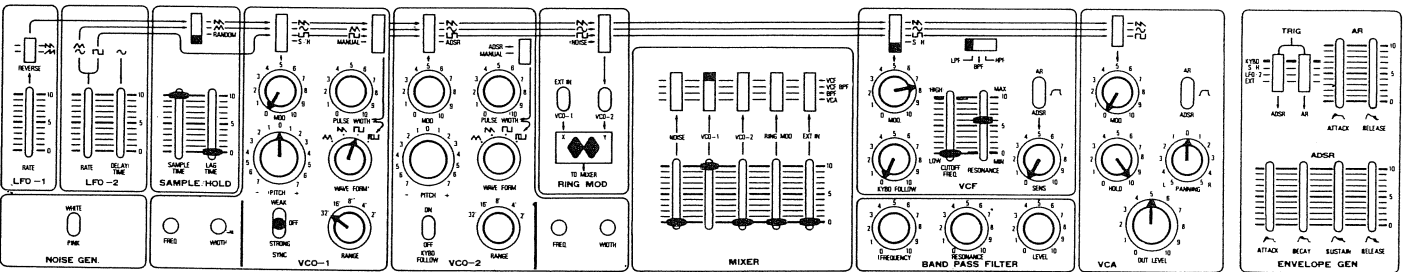
● When a key is depressed, the sound of a rifle shot is produced. The feeling of distance can be obtained by changing the positions of the VCF CUTOFF FREQUENCY and RESONANCE.

● Funny Cat



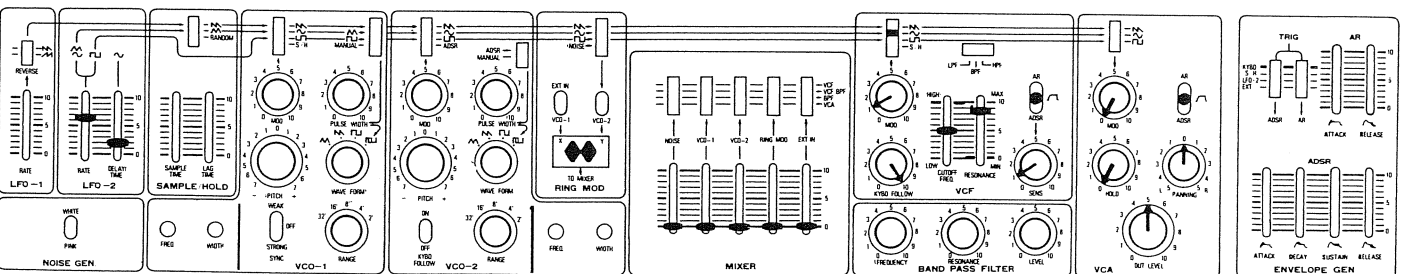
● Play rather STACCATO

● Comical bubble sound



● This is a sound effect using the S/H modulation of the VCF. This comical sound is like boiling water or gargling.

● Whistle



● This is an imitation sound which is obtained using the VCF oscillations as a sound source. When playing a melody, set the PORTAMENTO switch on controller at VARIABLE and PORTAMENTO TIME at about "1".

# Specifications

|                       |                           |                                  |                        |
|-----------------------|---------------------------|----------------------------------|------------------------|
| Key board             |                           | 44 Keys (F ~ C)                  |                        |
| Controller            | Tune Control              | ±1.5 note                        | 1                      |
|                       | Transpose Range           | L-M-H                            | 1                      |
|                       | Portamento Time Control   | 0 ~ 6 SEC                        | 1                      |
|                       | Portamento Range          | VARIABLE (OFF)<br>FIXED (20 SEC) | 1                      |
|                       | Bender Control            | —                                | 1                      |
|                       | Bender Range              | VCO-VCF                          | 1                      |
|                       | VCO Bender Range          | SEMI-WHOLE-QUINT                 | 1                      |
| LFO-1                 | Reverse Range             | ∞, ∞                             | 1                      |
|                       | Rate Control              | 0.1 ~ 20Hz                       | 1                      |
| LFO-2                 | Rate (∞, ∞, ∞, ∞)         | 0.1 ~ 20Hz                       | 1                      |
|                       | Delay Time Control        | 0 ~ 4 SEC                        | 1                      |
| Sample & Hold         | Mode Range                | ∞ (∞)-∞-RANDOM                   | 1                      |
|                       | Sample Time Control       | 2 ~ 15m SEC                      | 1                      |
|                       | Lag Time Control          | —                                | 1                      |
| Envelope Generator    | AR                        | Attack Time                      | 0 ~ 7 SEC              |
|                       |                           | Release Time                     | 0 ~ 15 SEC             |
|                       |                           | Trigger Range                    | KYBD-S/H-LFO-2-EXT. IN |
|                       | ADSR                      | Attack Time                      | 0 ~ 7 SEC              |
|                       |                           | Decay Time                       | —                      |
|                       |                           | Sustain Level                    | —                      |
|                       |                           | Release Time                     | 0 ~ 15 SEC             |
| Trigger Range         | KYBD-S/H-LFO-2-EXT. IN    |                                  |                        |
| Noise Generator Range |                           | WHITE-PINK                       | 1                      |
| VCO-1                 | Modulation Range          | ∞ (∞) - ∞ - ∞ - S/H              | 1                      |
|                       | Modulation Control        | —                                | 1                      |
|                       | Pitch (with center click) | ±5 degree                        | 1                      |
|                       | Synchro Range             | WEAK-OFF-STRONG                  | 1                      |
|                       | Pulse Width Range         | ∞ (∞)-∞-∞-MANUAL                 | 1                      |
|                       | Pulse Width Control       | 50%∞ ~ 98%∞                      | 1                      |
|                       | Wave Form Range           | ∞-∞-∞-∞                          | 1                      |
| VCO-2                 | VCO Range                 | 32'-16'-8'-4'-2'                 | 1                      |
|                       | Modulation Range          | ∞ (∞) - ∞ - ∞ - ADSR             | 1                      |
|                       | Modulation Control        | —                                | 1                      |
|                       | Pitch Control             | ±5 degree                        | 1                      |
|                       | Keyboard Follow Range     | ON-OFF                           | 1                      |
|                       | Pulse Width Range         | ADSR-MANUAL                      | 1                      |
|                       | Pulse Width Control       | 50%∞ ~ 98%∞                      | 1                      |
| Ring Modulator        | Wave Form Range           | ∞-∞-∞-∞                          | 1                      |
|                       | VCO Range                 | 32'-16'-8'-4'-2'                 | 1                      |
|                       | Input Range               | EXT. IN-VCO-1                    | 1                      |
| Ring Modulator        | Input Range               | LFO, NOISE-VCO                   | 1                      |
|                       | LFO, Noise Range          | ∞ (∞) - ∞ - ∞ - NOISE            | 1                      |
|                       | Noise Level Control       | —                                | 1                      |

|                    |  |                       |         |   |
|--------------------|--|-----------------------|---------|---|
| Mixer              | VCO-1 Level Control  | —                     | 1       |   |
|                    | VCO-2 Level Control  | —                     | 1       |   |
|                    | Ring Modulator Level Control                                       | —                     | 1       |   |
|                    | External Input Level Control                                       | —                     | 1       |   |
|                    | Determination Change Switch  | VCF-VCF + BPF-BPF-VCA | 5       |   |
| VCF                | Modulation Range   | ∞ (∞) - ∞ - ∞ - S/H   | 1       |   |
|                    | Modulation Control   | —                     | 1       |   |
|                    | Keyboard Follow Control  | —                     | 1       |   |
|                    | Filter Change Switch   | LPF-BPF-HPF           | 1       |   |
|                    | Cut-Off Frequency  | 20Hz ~ 20KHz          | 1       |   |
|                    | Resonance  | —                     | 1       |   |
|                    | Envelope Range   | AR-∞-ADSR             | 1       |   |
| Band Pass Filter   | Sensitivity  | —                     | 1       |   |
|                    | Frequency Control  | 100Hz ~ 10KHz         | 1       |   |
|                    | Resonance  | —                     | 1       |   |
| VCA                | Level Control  | —                     | 1       |   |
|                    | Modulation Range   | ∞ (∞) - ∞ - ∞         | 1       |   |
|                    | Modulation Control   | —                     | 1       |   |
|                    | Hold Control   | —                     | 1       |   |
|                    | Envelope Range   | —                     | 1       |   |
|                    | Panning Control  | —                     | 1       |   |
|                    | Out Level Control  | —                     | 1       |   |
| Head-phone Monitor | Level Control  | —                     | 1       |   |
|                    | Phone's Jack   | —                     | 1       |   |
| Terminals          | Computer   | For Keyboard Voltage  | OUT, IN | 2 |
|                    |  | For Keyboard Trigger  | OUT, IN | 2 |
|                    | Pedal Control  | For Expression        | OUT, IN | 2 |
|                    |  | For VCO Control       | —       | 1 |
|                    |  | For VCF Control       | —       | 1 |
|                    | External Input   | Audio Level Range     | L-M-H   | 1 |
|                    |  | For Audio Input       | L-M-H   | 1 |
|                    |  | For Trigger Input     | —       | 1 |
|                    | Output   | Level Range           | L-M-H   | 1 |
|                    |  | Stereo Output         | R, L    | 2 |
| Monoral Output     |  | —                     | 1       |   |
| Speed Lamp         | LFO-1, LFO-2   |                       | 2       |   |
| Signal Lamp        | VCF, BPF, VCA  |                       | 3       |   |
| Power Voltage      | AC 100 ~ 120V, or 220 ~ 250V, 50/60Hz                              |                       |         |   |
| Power Consumption  | 20W  |                       |         |   |
| Dimensions         | 864(W) x 270/335(D) x 257(H)mm<br>34.02 x 10.63/13.19 x 10.12 inch |                       |         |   |
| Weight             | 22kg (including case) or 48.4 lbs.                                 |                       |         |   |
| Accessory          | 2.5m connecting cord   |                       |         |   |



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