

 Roland

MicroComposer

MC-202

Synthesizer

## Introduction

The functions for sound synthesizing of the MC-202 is the same as that of the usual Monophonic

synthesizer(1V/Oct). So we do not explain synthesizer basics here.



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## A. Functions for Sound Synthesizing

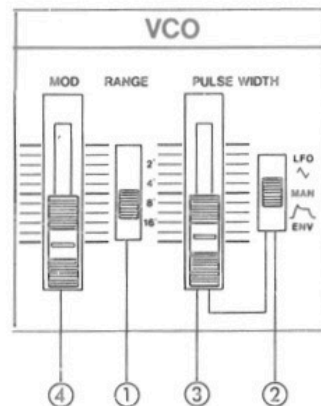
It is better for you to set the MC-202 to the Play mode and actually play the keyboard as you read this manual for more tangible understanding.  
(Please do not play the data here.)

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### VCO (Voltage Controlled Oscillator)

The VCO is the Voltage Controlled Oscillator that controls the pitch, and generates three types of

waveforms which are the sound source of the synthesizer.



#### ① RANGE selector knob

This is to change the pitch of the VCO in exact one octave steps from 2' to 16' (2', 4', 8', 16'). 8' is the standard, and when the knob is set to 8', the note shown as "3C" in the Display Window corresponds to the Middle C of the Piano keyboard. (When you use the Transpose function, the compass will be shifted even more.)

#### ② PWM Mode selector switch

When this switch is set to MAN, the pulse width can be controlled with the PWM knob ③. When it is set to LFO or ENV, the intensity of the modulation is controlled with the same knob ③, i.e. the pulse width is controlled by the corresponding signal from the LFO or the Envelope Generator.

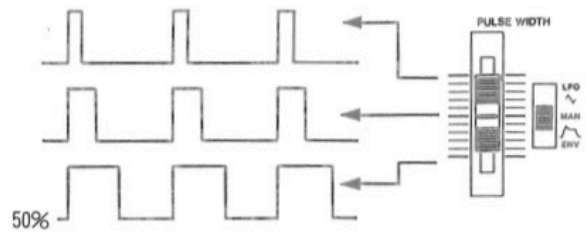
#### ③ PWM • Pulse Width Modulation knob

#### ④ MOD • Modulation Depth knob

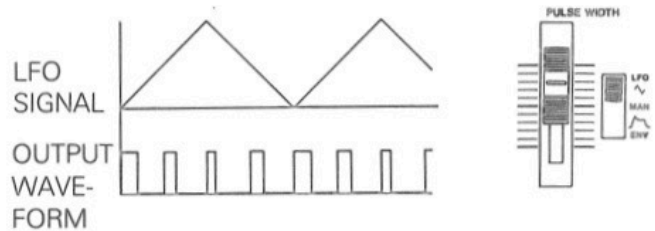
When the Modulator signal is controlling the pitch of the VCO, this knob adjusts the amount of the signal (depth of the modulation). How it affects the depth of the modulation varies depending on the waveforms of the MODULATOR.

## Pulse Width

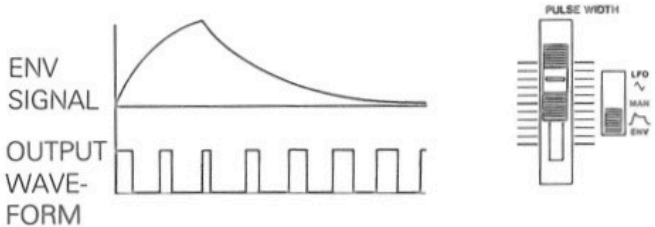
- ▶ Manual PWM  
 PWM MODE SWITCH ② → MAN  
 PULSE WIDTH ③ → Determines the Pulse width.



- ▶ PWM by LFO  
 PWM MODE SWITCH ② → LFO PULSE WIDTH MODULATION ③ → Adjusts the intensity of modulation.



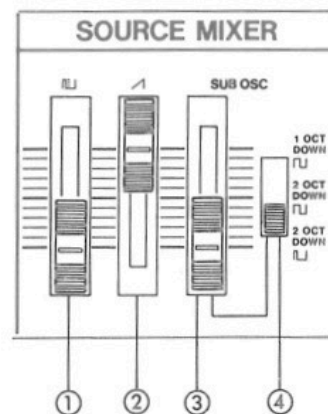
- ▶ PWM by ENV  
 PWM MODE SWITCH ② → ENV PULSE WIDTH MODULATION ③ → Adjusts the intensity of modulation.



## SOURCE MIXER

The SOURCE MIXER mixes the VCO (□ or /) and SUB Oscillator in various proportions, before sending them to the VCF.

- ① □ Level knob
- ② / Level knob
- ③ SUB Oscillator level knob
- ④ SUB Oscillator Waveform selector switch  
 This selects the pitch range and the waveform of the SUB Oscillator.



<Pulse Wave>

When the top and bottom portions of the square wave are unequal, the result is what is called a pulse wave. The harmonic content of the pulse wave will depend greatly on the width of the pulses. It is possible to modulate, or change the pulse width by means of the LFO or the Envelope Generator.

<Waveforms>


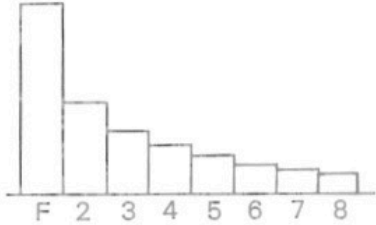

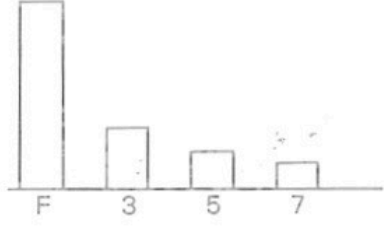

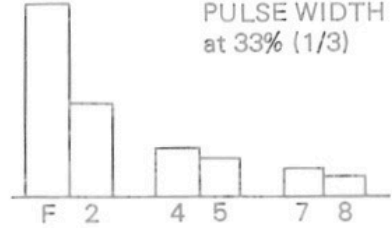
There are 2 types of waveforms from the VCO (  $\square$  and  $\sloperight$  ) which are sent to the SOURCE MIXER and mixed at any portion you like.

<Other Sound Sources>

- SUB Oscillator

This is the VCO's subordinate Oscillator which generates the output signal one octave or two lower than the VCO's. The output waveform of this Oscillator is Pulse Wave.

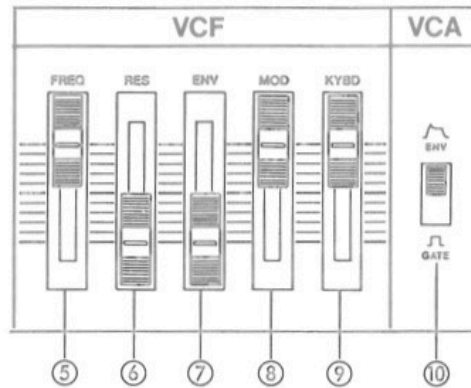
Waveform

Waveform	Description	Harmonic Content
 <p>Sawtooth</p>	<p>The sawtooth wave contains a fundamental sine wave and its integral harmonic sine waves at a fixed ratio. The level of each harmonic is as shown on the right. When fundamental content is 1, the content of <math>n</math>th harmonic is <math>1/n</math>.</p>	
 <p>Square</p>	<p>The square wave contains a fundamental sine wave and its odd numbered harmonics at a fixed ratio. The level of each harmonic is the same as sawtooth wave: the content of <math>n</math>th harmonic is <math>1/n</math>; except that there are no even numbered harmonics.</p>	
 <p>Pulse</p>	<p>With pulse wave, the harmonic content greatly varies depending on the pulse width. It is characterized by a lack of the <math>n</math>th harmonic series when the pulse width is <math>1/n</math>. The example on the left lacks 3rd, 6th, and 9th harmonics because the pulse width is <math>1/3</math> (33%).</p>	

## VCF (Voltage Controlled Filter)

The VCF is used to alter the tone color of the SOURCE MIXER output by cutting or boosting harmonics in that sound. The VCF is a LOW

PASS filter which passes low frequencies and blocks high frequencies, and the Cutoff Point is controlled by the voltage.



### ⑤ FREQ • Cutoff Frequency knob

This knob determines the Cutoff Point of the VCF. In its highest position, the sound will pass unchanged. As you lower the knob, the frequencies in the higher pitch range will be cut, thereby the sound fades out in its lowest position.

### ⑥ RES • Resonance knob

This knob is to emphasize the frequency at the point set with the Cutoff Frequency knob ⑤. As you raise the knob, certain harmonics are boosted and sound will be more unusual, more electronic in nature. If setting the Resonance knob to the high position and move the Cutoff Frequency knob, you can obtain a type of sound that is impossible to be produced by any other musical instrument. At its highest level, self-oscillation will begin (at the Cutoff Point).

### ⑦ ENV • ENV Depth knob

When Cutoff Point of the VCF is controlled by the output signal from the Envelope Generator,

this knob adjusts the depth of the modulation. You can change the Cutoff Point of the VCF in each note with the ADSR pattern previously set. So the tone color of each note can be changed quite drastically.

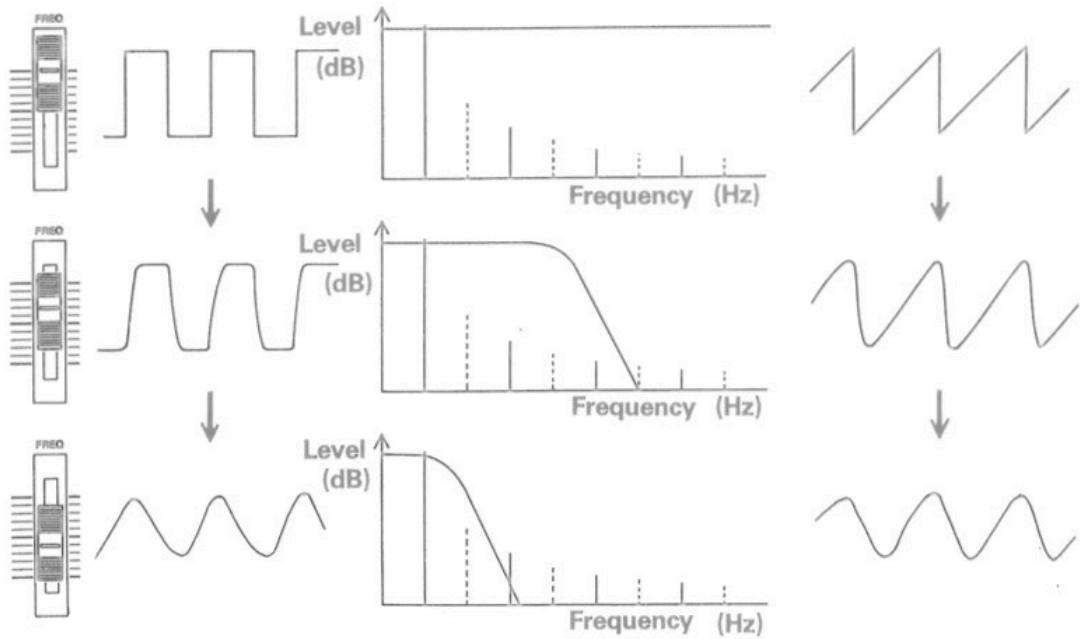
### ⑧ MOD • Modulation Depth knob

When the Cutoff Point of the VCF is controlled by the output signal from the Modulator, this knob is used to adjust the intensity of the modulation. How it works varies depending on the waveform of the Modulator.

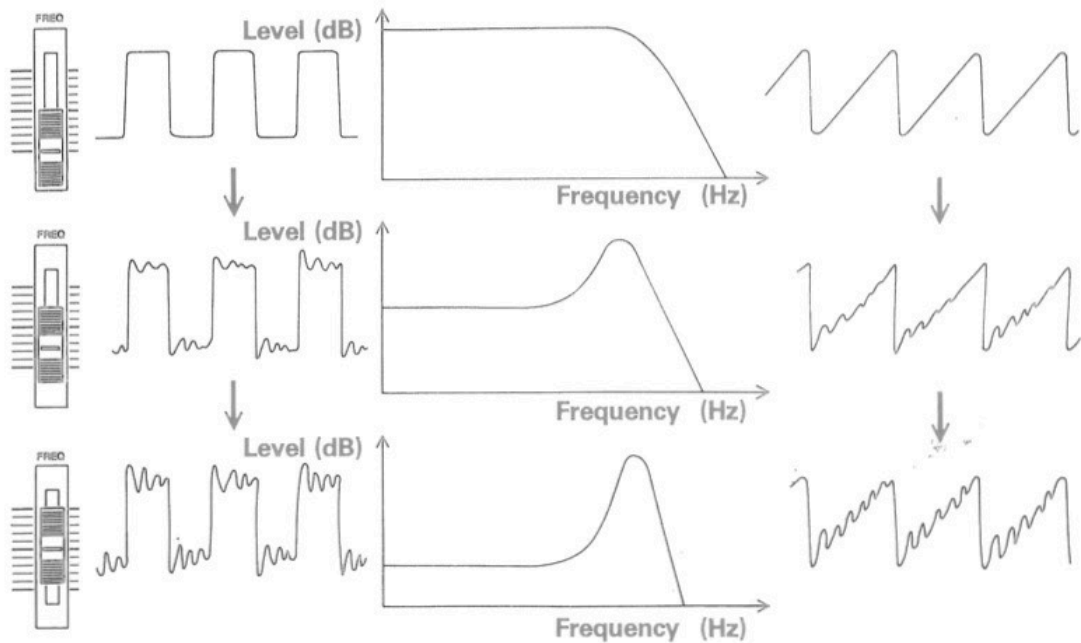
### ⑨ KYBD • Key Follow knob

When the Cutoff Point of the VCF is controlled by the KYBD CV (Keyboard Control Voltage), this knob adjusts the intensity of the modulation. It prevents any inconsistency in the harmonic content caused by pitch alteration. Consequently this knob is usually set to the maximum on such a long keyboard, but can be set to your taste.

## Cutoff Frequency



## Resonance



## VCA (Voltage Controlled Amplifier)

This is to control the volume (amplitude) of the sound, and is normally controlled by the output voltage from the Envelope Generator.

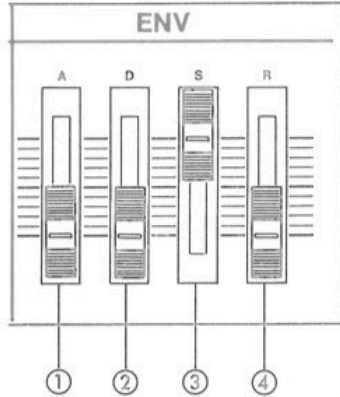
### ⑩ Selector switch for the control signal

This switch enables you to select whether to control the VCA by the signal from the Envelope Generator or by the Gate signal.

## ENV (Envelope Generator)

This generates the Control Voltage applied to the VCF and the VCA, thereby controlling the volume and the tone color of each note.

This output voltage is generated whenever you press a key (in the Play mode, each time a note is played).



### ① A (Attack time) knob

This sets the time required for the voltage to reach its maximum from the moment the key is pressed down (from the beginning of the Gate Time when in the Play mode).

### ② D (Decay time) knob

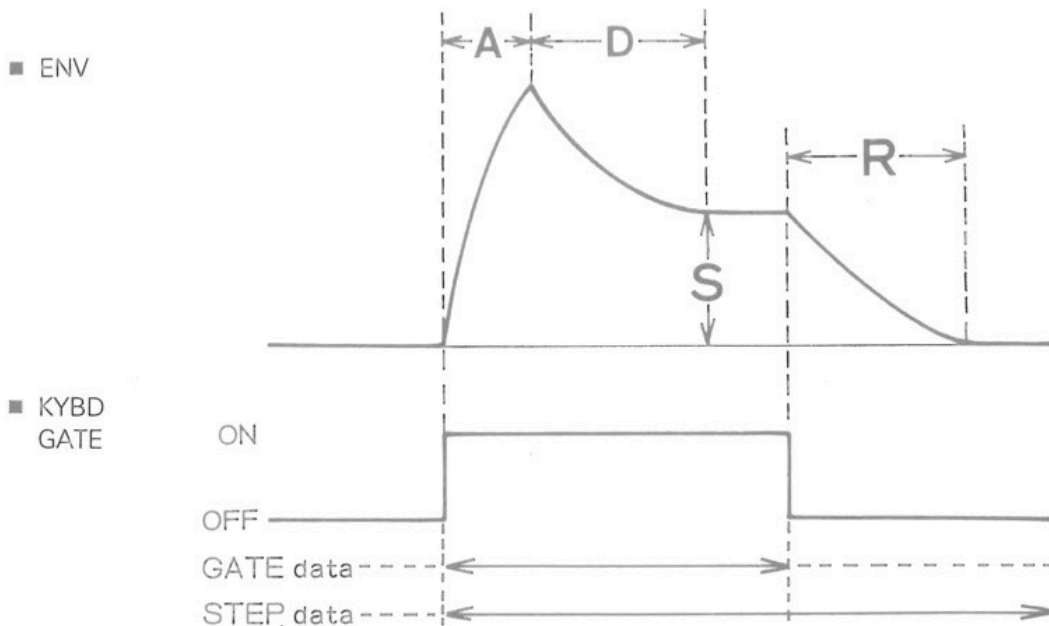
This determines the time required for the voltage to drop from the maximum to the sustain level. When the sustain level is high, the envelope curve does not change by adjusting the Decay Time.

### ③ S (Sustain level) knob

This knob determines the Sustain Level to which the voltage falls at the end of the Decay Time.

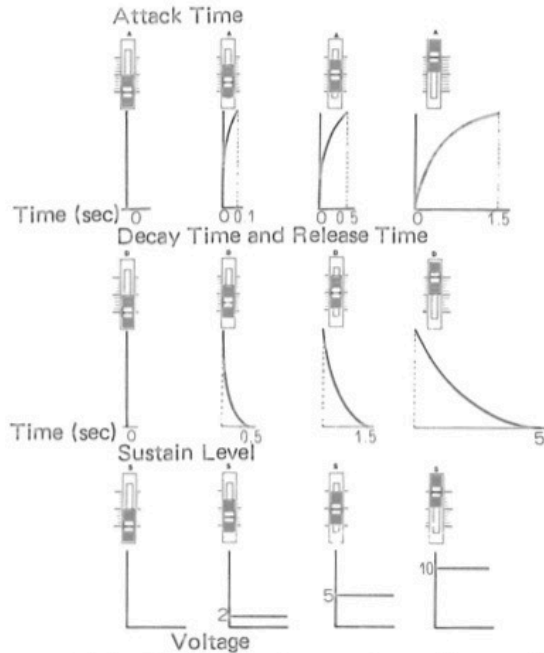
### ④ R (Release time) knob

This sets the time needed for the voltage to reach zero.



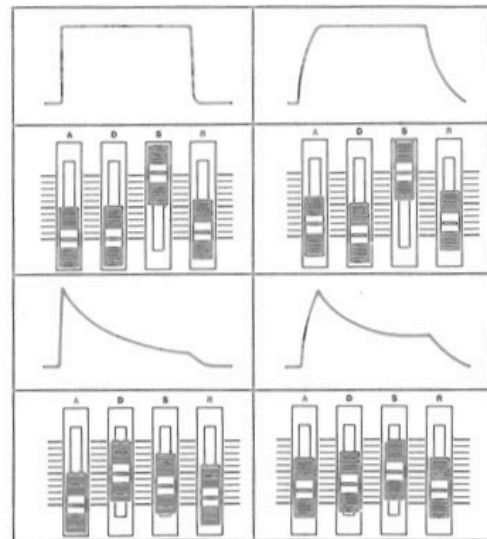


- The variation of each knob.



\* In the figure shown above, the positions of the knobs are not meant to be exactly correct, so the knob position does not necessarily correspond with the time and the voltage.

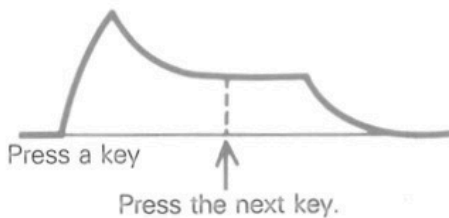
- Setting of ADSR and Envelope Curve.



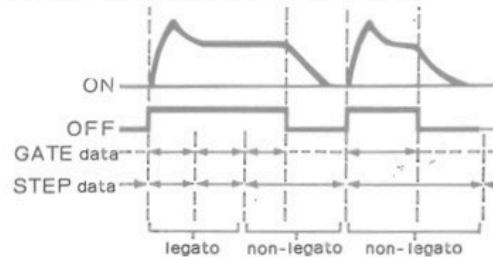
\*\*When all of the ADSR knobs are set at "0", the waveform will be an extremely short Pulse wave, and only a short "click" is heard. **Please be careful.**

### Envelope Curve

A new note you are pressing does not have a complete envelope curve, unless you release the previously pressed key before pressing a new key. Therefore, a non-legato touch will be required to alter the tone color and the volume of



each new note. If you enter the same value into the Step and the Gate Time (i.e. if you play in legato manner), each new key you press will not have a complete envelope curve and it is impossible to alter its tone color or volume.



### LFO (Low Frequency Oscillator)

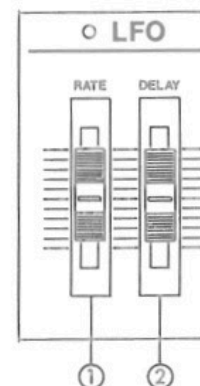
This oscillator generates the signal that controls the VCO and the VCF. Its output waveforms are  $\sim$  and  $\sim$

#### ① RATE knob

This adjusts the rate (frequency) of the LFO.

#### ② DELAY knob

This sets the time needed for the LFO to start to function.



## PORTAMENTO

Portamento is the effect obtained by carrying the sound in a continuous glide from one note to the next.

\*This knob will only function while the music data is being played and where the Portamento is entered.

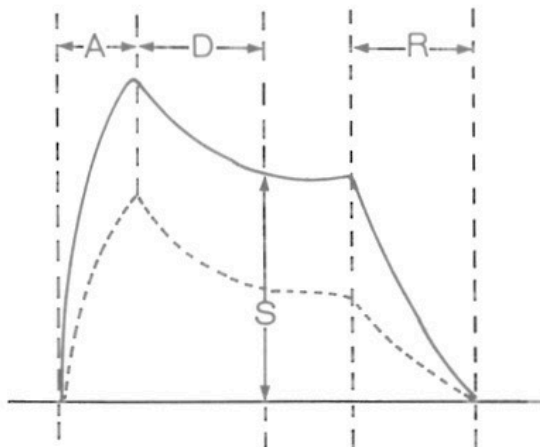


## ACCENT

This knob sets the intensity of the Accent.

\*This knob will only function when the data is being played and where the Accent is entered.

The envelope curve of the note in which Accent is entered will be as shown in the figure below. This envelope signal controls the VCA (or both the VCF and VCA).



### NOTE

1. The control signal selector switch of the VCA is set to the GATE position, the Accent will not be applied to either the VCA.
2. This signal will affect the Cutoff point of the VCF just like ENV modulation. This modulation is independent of the setting of the ENV knob of the VCF on the Front Panel.

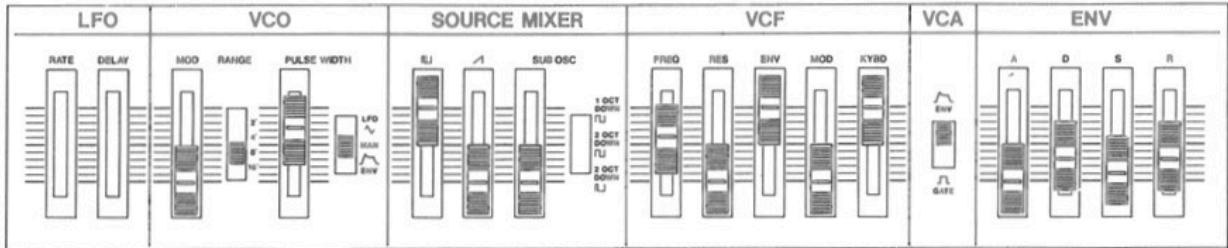
## B. Sample Sound

The position of each knob in the diagram is not meant to be exact, and the sound can differ drastically with any slight change of the knob positions. It also varies depending on the type of the speaker and the amplifier connected to the

MC-202. Please adjust the settings while actually playing. The "missing" knobs in the diagrams are irrelevant to the sound, and can be set to any position.

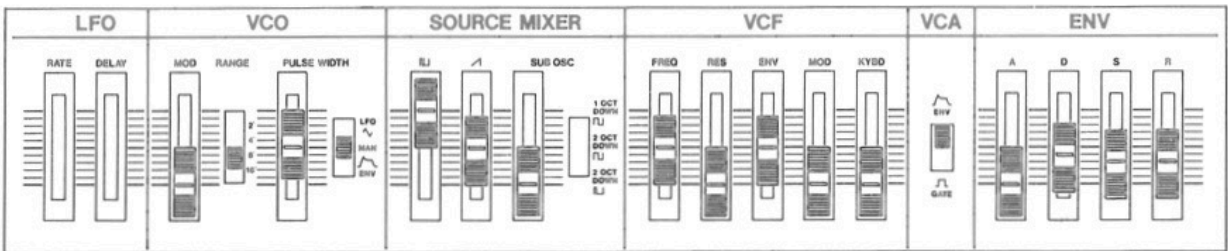
### (1) HARPSICHORD

The tone color alters drastically depending how you set the PULSE WIDTH in the VCO. Please try the LFO and the ENV modes as well.



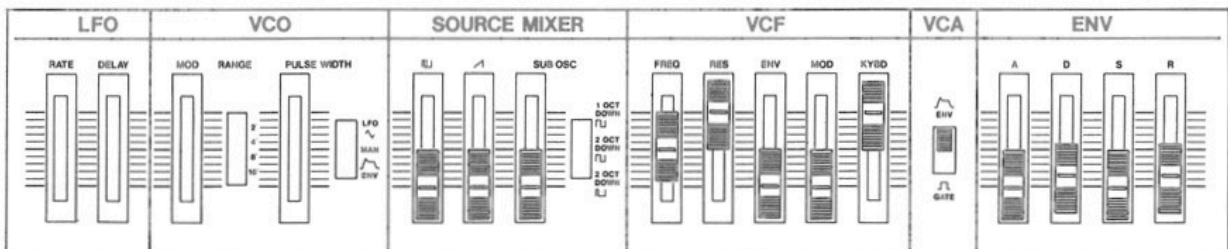
### (2) ELECTRIC PIANO

The tone color is determined by the setting of the FREQ and the ENV knobs in the VCF.



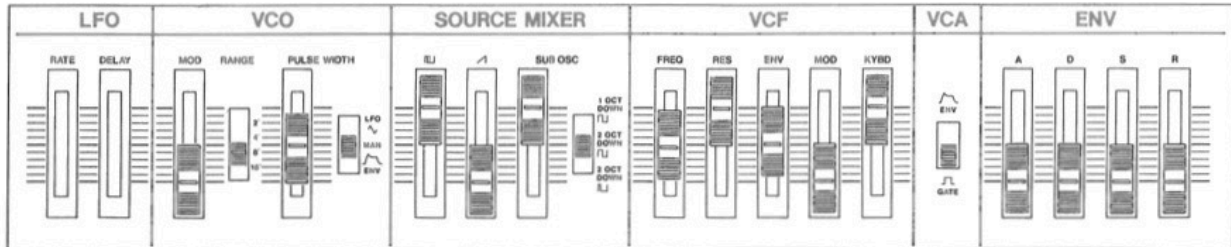
### (3) GLOCKENSPIEL

Pay a special attention to the setting of the FREQ and the RES knobs in the VCF. This will sound most realistic within the highest octave of the keyboard.



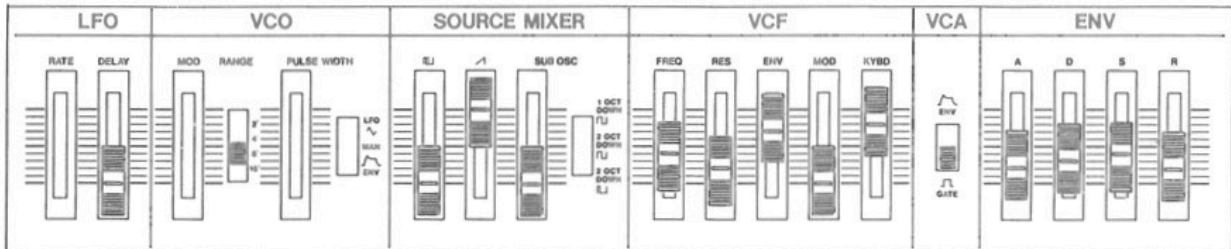
(4) JAZZ ORGAN

The self-oscillation of the **VCF** is the sound source as well as the **VCO** and the **SUB** Oscillator. The self-oscillation sound of the **VCF** should differ from the **VCO**'s by an octave, a third or a fifth.



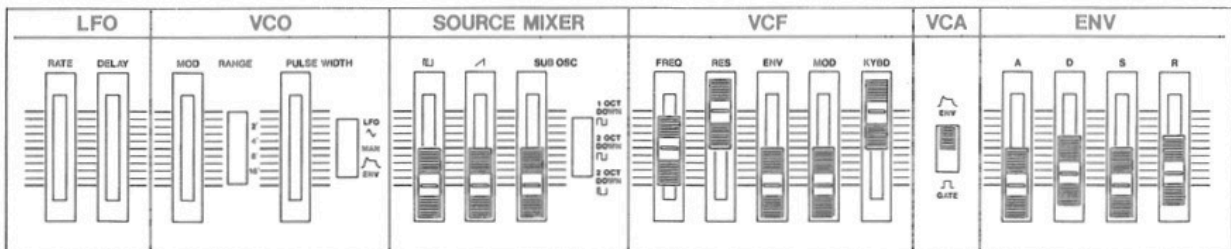
(5) TRUMPET

There will be a delicate change of the tone color by slightly adjusting the **ENV** knob in the **VCF**. Also, you can obtain the Trumpet sound you prefer by controlling the **ENV** and the **FREQ** in the **VCF**.



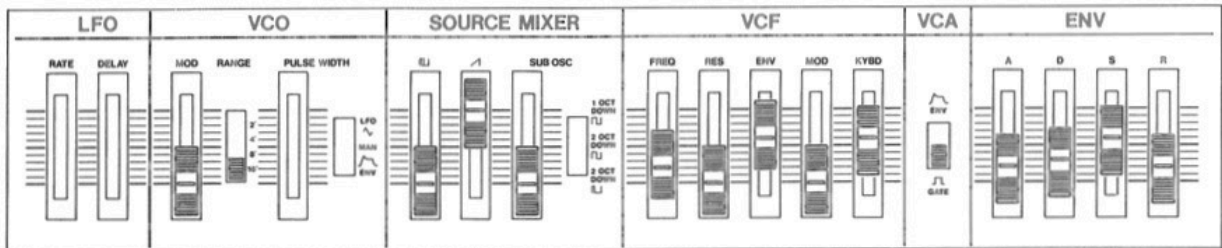
(6) CLAVES

Pay attention to the setting of the **FREQ** in the **VCF**, and the **Decay Time** and the **Release Time** of the **ENV**.



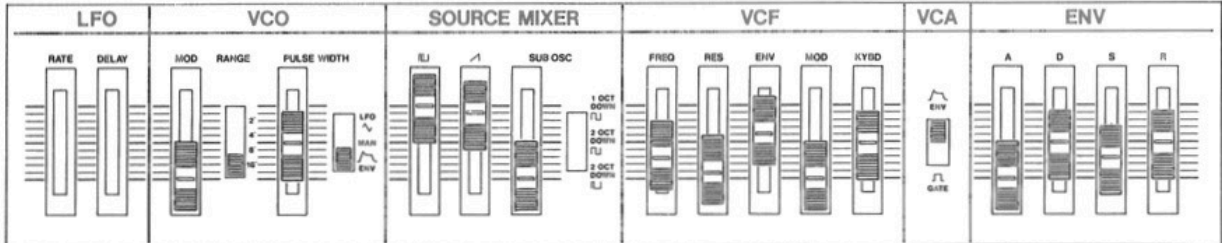
[ 7 ] HORN

As controlling the FREQ in the VCF is a delicate task, it should be done while you are actually listening to the sound. Regarding any Brass sound, its tone color subtly alters by adjusting the ENV in the VCF.



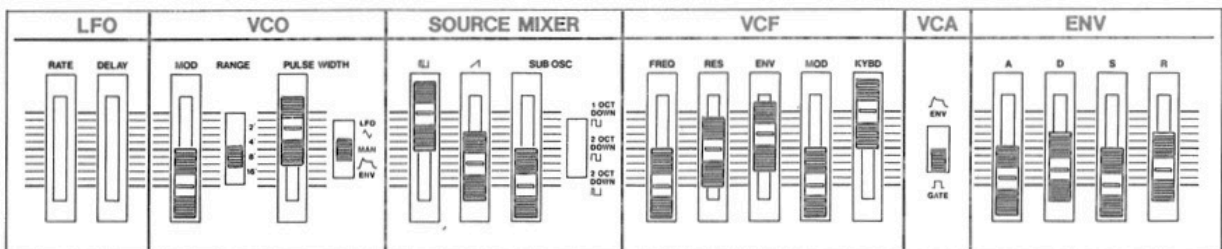
[ 8 ] ELECTRIC BASS  
GUITAR

Play with the TRANSPOSE switch set to down. The impression of the sound varies depending how you set the FREQ and the ENV knobs in the VCF.



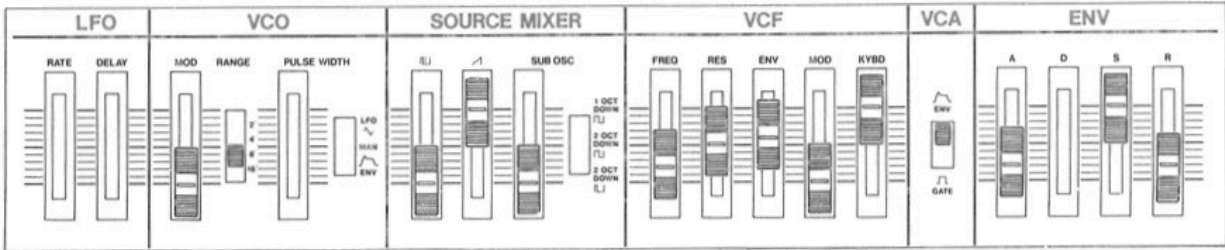
[ 9 ] FUNKY

The tone color widely alters by adjusting the FREQ and the ENV knobs in the VCF.



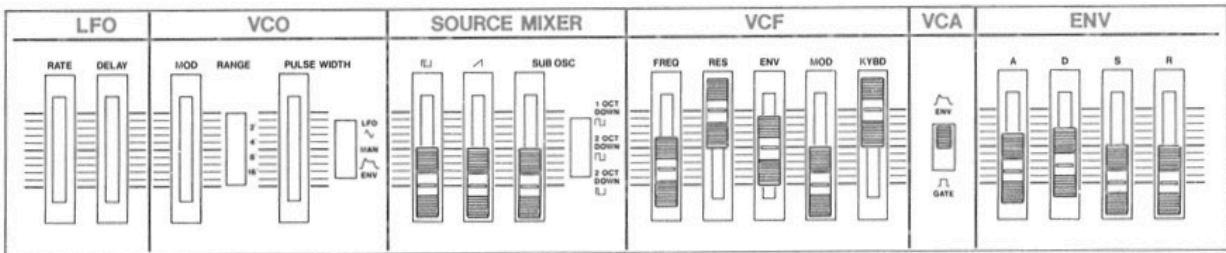
[10] FUNNY CAT

It is most desirable to play in a non-legato manner. Set the Decay Time in the ENV to 3 and the Sustain Level to 2, and the impression of the sound will change.



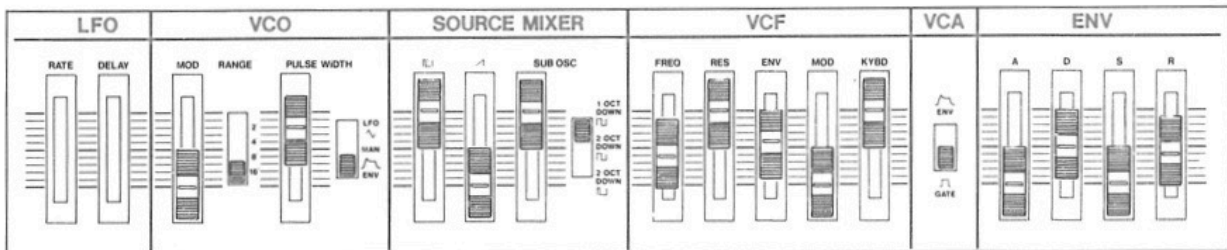
[11] BARKING

If setting the Sustain Level in the ENV to around 7, you can obtain a howling sound.



[12] EFFECT SOUND

Adjust the Decay Time and the Release Time in the ENV.



# C. Sound Synthesis Memo

