

## The Parameters of the 510

The 510 is a three-in-one module with three functions: VCO, VCF, and VCA.  
Several of the jacks are internally patched, allowing you to create sounds with minimal patching.  
You can defeat the internal patching by inserting plugs into the jacks.

### VCO

#### VCO OUT

These jacks output the signal from each VCO (pulse wave, triangle wave, sawtooth wave).

#### PW (Pulse width control)

Specifies the pulse width (the ratio between the upper and lower portions of the pulse wave).

- \* For a symmetrical square wave, set the slider to the "50%" position.

#### PW MOD (Pulse width modulation control)

Adjusts the depth of pulse width modulation based on the voltage that is input from the PW IN jack.

#### RANGE

Switches the pitch range of the VCO.

You can switch the range up or down in one-octave steps in a five-octave range from 32' to 2'.

- \* If you set this to the 8' position and apply a voltage of 2V to MOD IN KEY, the middle C pitch is produced.

#### TUNE

Makes fine adjustments to the VCO range.

#### Attenuator for CV input 2

Adjusts the level of the voltage that is input from the MOD IN 2 jack.

#### MOD IN KEY/2

These jacks input voltages that control the VCO.

### ● About pulse width

A pulse wave in which the upper and lower portions of the waveform have unequal width is called an asymmetrical pulse wave, and the numerical ratio of the upper and lower widths (to be precise, the portion of one cycle occupied by the upper portion) is called the pulse width. The pulse width value significantly changes the overtone structure, modifying the tonal character of the sound.

- \* If the pulse width is  $1/n$ , the harmonics at multiples of 'n' are missing. For example, if the pulse width is  $1/3$  (33%), the 3rd, 6th, 9th, ... harmonics are missing. The technique of using a control voltage (such as LFO or ENV) to control the pulse width is called pulse width modulation (PWM).



### VCF

#### SIG IN 1/2

These jacks input audio signals.

#### SIG IN level controls

These sliders adjust the level of the signals that are input from the SIG IN jacks.

#### FREQ (Cutoff frequency)

Adjusts the cutoff frequency of the filter (Low Pass Filter).

- \* Setting this to a low value lowers the cutoff frequency, so that the high-frequency portion of the signal does not pass through. Setting this to a high value raises the cutoff frequency, so that the input signal is output without change.

#### RES (Resonance)

Boosts the frequency components in the region of the cutoff frequency.

- \* By raising the resonance you can make the VCF oscillate. You can use this as an audio source for sound effects, or use KYBD CV to control the VCF and play pitches from the keyboard.

#### HPF (High pass filter)

Adjusts the cutoff frequency of the HPF (High Pass Filter).

- \* At the OFF setting, the original waveform passes through without change. As you raise the setting to 1 or 2, the cutoff frequency rises, allowing only the high-frequency portion of the signal to pass through.

#### OUT

These are output jacks. These jacks output the signal from the VCF.

#### Attenuator for CV input

This slider adjusts the gain of the voltage that is input from the MOD IN KEY/2 jacks.

#### MOD IN KEY/2

These jacks input a voltage that controls the VCF color.

### VCA

#### SIG IN 1/2

These jacks input audio signals.

#### SIG IN level controls

These sliders adjust the level of the signals that are input from the SIG IN jacks.

#### Indicators

These indicate the state of the output signal (load: green, overload: red).

#### LIN/EXP control mode

Specifies whether the control voltage and setting of the INITIAL knob affects the audio signal linearly or exponentially.

#### INITIAL (Initial gain)

Adjusts the VCA's initial gain (the gain when there is no control voltage at all).

- \* If you are using only a control voltage to control the VCA, use this knob to specify the initial gain appropriately for the LIN/EXP control mode setting: 0 (for LIN) or in the region of 1 (for EXP).

#### OUT LOW/HIGH

These are output jacks. These jacks output the signal from each VCA.

The OUT LOW jack outputs a lower-level signal than the OUT HIGH jack.

#### Attenuator for CV input

These sliders adjust the gain of the voltages that are input from the MOD IN 1/2 jacks.

#### MOD IN 1/2

These jacks input voltages that control the VCA.

## Square wave & VCF SIG IN 1

If no plug is inserted in VCF SIG IN 1, it is patched to a square wave.

## VCF OUT & VCA SIG IN 1

If no plug is inserted in VCA SIG IN 1, it is patched to VCF OUT.

\* If a plug is inserted in VCF OUT, it is not patched to VCA SIG IN 1.

## VCF MOD IN 2 & VCA MOD IN 1

If no plug is inserted in VCA MOD IN 1, it is patched to VCF MOD IN 2.



# Block Diagram

