3ʳᵈ WAVE

ADVANCED WAVETABLE SYNTH

GROOVE
SYNTHESIS

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Version 1.1 September, 2022

GROOVE SYNTHESIS

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A WORD FROM THE GROOVE DUDES

Hello and thanks for purchasing the 3rd Wave!

We're a small group of synth/music geeks that got our start making synthesizers and music hardware and software for other companies. We created the 3rd Wave out of a love for the classic wavetable synths of the past and a desire to develop a worthy sucessor of our own.

We hope you love it. We sure do. To use a favorite phrase of ours, we think it's "Rippin' Action."

Your support means everything to us.

The Groove Synthesis Gang

Contact us at:
support@groovesynthesis.com

GROOVE
SYNTHESIS

Getting Started

The 3rd Wave is a 24-voice wavetable synthesizer with analog filters, versatile modulation, and advanced wave playback capabilities. The secret to its power lies in its numerous 64-position wavetables (both classic and new) and its 6-stage Wave Envelope, which allows you to sweep through these wavetables in variety of ways. Since each of the 3rd Wave's three oscillators can generate a different wavetable with a different wave envelope, the sonic possibilities are immense.

The good news is that this power is easy to access. The majority of the 3rd Wave's essential sound-shaping controls are within easy reach on its front panel.

So dive right in and start checking out presets. Don't hesitate to turn knobs, press buttons, and use the Mod Wheel to get a feel for how things sound and how the controls work. When you have time, read this User's Guide to learn essential tasks such as how to use the wave envelopes, how to save presets, and how to use the multi-part controls.
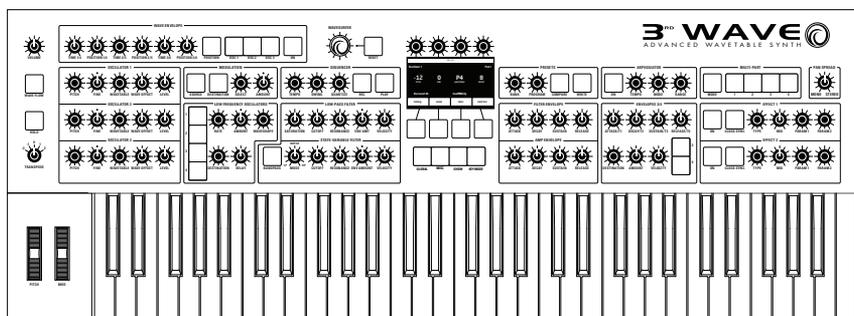
3rd Wave front panel

Sound Banks

The 3rd Wave has 500 presets divided into 5 banks of 100 presets each. You can edit and resave any of these sounds. Each preset has interesting things mapped to the Mod Wheel. Some presets also contain a sequence. Since the synth is 4-part multitimbral, many presets have additional sounds programmed into each of its 4 parts. This gives you a vast library of sounds to layer or copy from one preset to another.

What Is a Wavetable?

A wavetable is a collection of single-cycle waveforms. The 3rd Wave's wavetables have 64 waveforms arranged in a sequence that often harmonically relates one waveform to the next so that as you move from one waveform to another, the sound evolves smoothly. When enabled, the WAVE FLOW control enhances this smoothing effect. With WAVE FLOW off, the waveforms are not smoothed as they step from one to the next. This stepping is more obvious in some wavetables than in others.

You can sweep forward or backward through the waveforms in a wavetable using the various controls on the 3rd Wave. You can also choose to play just a single waveform within a wavetable without sweeping by turning off the Wave Envelope (which is the default way to control wave sweeping). With the Wave Envelope off, whatever waveshape you choose within a wavetable using the WAVE OFFSET knob is the static wave that you will hear (as long as no other mod sources are sweeping through the wavetable).

The image below shows the wavetable window, which is available on each of the 3 oscillators
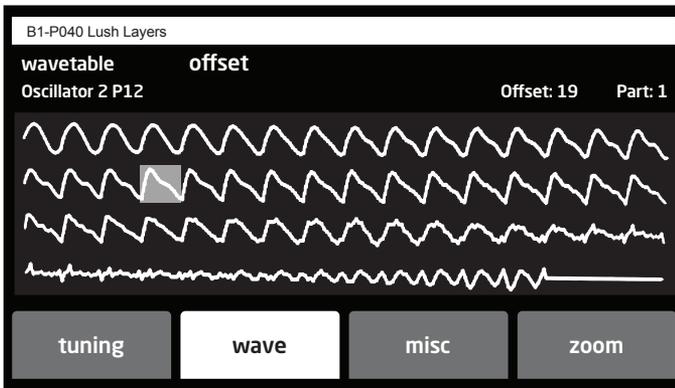
The 64 waves in wavetable P12 with waveshape 19 selected

Main Display

The front panel of the 3rd Wave has its most frequently used controls. There are additional controls (as well as numeric display of values) visible in its main display.

For example, adjusting a knob or switch in the Oscillator section reveals the Oscillator parameters in the display. The display also reveals additional parameters not found on the front panel. You can select and edit these additional parameters using the four soft buttons and soft knobs located above and below the display.

The soft knobs are detented encoders that are useful for dialing in values with precision. The soft buttons select between various menu tabs.
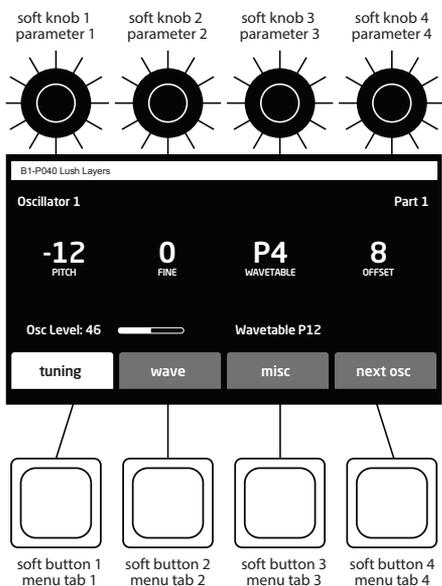
The Main Display

Selecting Programs

Use the BANK and PROGRAM knobs to select and recall programs.

To choose a program:

1. Turn the BANK knob to select the bank you want.

2. Turn the PROGRAM knob to select a program within that bank.
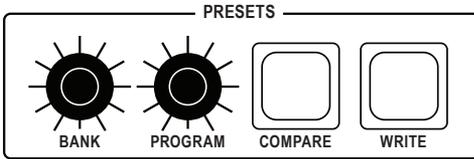
Presets Section

Editing Programs

Because the majority of the sound-shaping controls of the 3rd Wave appear on its front panel, editing an existing program is simple: just turn a knob and listen to its effect. Keep turning knobs and pressing buttons. If you like what you've created, save the program. (See "Saving a Program" on page 6.)

Comparing an Edited Program to its Original State

When editing a program, you can compare its edited state to its original state to evaluate your edits.

To compare an edited program to a saved version:

1. Edit a program.

2. Press the COMPARE button. It lights up, indicating compare mode.

3. Play the keyboard to hear the saved version of the sound.

4. To disable the compare function and return to the edited sound, press the COMPARE button again to turn it off. Programs can't be written while in compare mode.

Creating a Program from Scratch

An existing program can be very useful as a jumping off point for new sounds. But it's also useful (and educational) to create a new sound from scratch. The 3rd Wave makes this easy by providing a "basic preset" that you can quickly recall at any time. This preset is simple, with three "P" waves as its basis, a simple wave envelope, and filter and amplifier envelopes set to useful values.

The mod and pitch wheels are set to useful values as well, with the mod wheel routed to wave offset to sweep through the waveforms within the wavetables.

To recall the basic preset:

1. Use the BANK and PROGRAM knobs to choose any preset.

2. Press soft button 1 (INIT PROG). This resets the current sound to the basic preset.
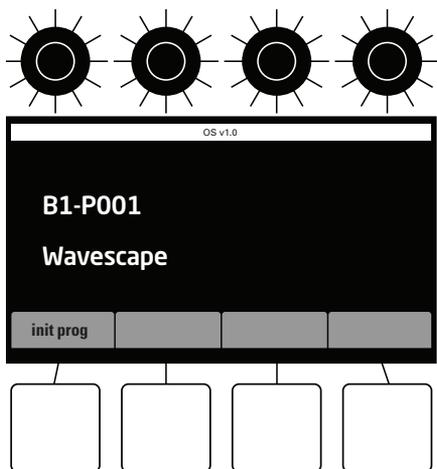
Resetting a program to the basic preset

Saving a Program

If you've created a sound that you like, you'll probably want to save it. Saving a program overwrites a previously saved program.

To save a program to the same preset location:

1. Press the WRITE button. It begins blinking.

2. Press the WRITE button again or press SOFT BUTTON 4 (OK). The program is saved.

To save a program to a different location:

1. Press the WRITE button. It begins blinking.

2. Turn SOFT KNOB 1 to select a different bank. Turn SOFT KNOB 2 to select a different program location.

3. Press the WRITE button again or press SOFT BUTTON 4. The program is saved.

Saving a program saves any edits to programs on multi-parts 1-4.
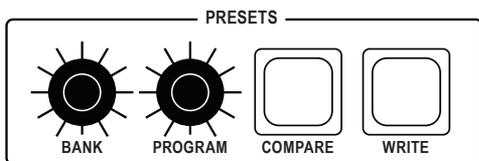
Presets Section

Canceling Save

Sometimes you may want to cancel saving a program before you commit.

To cancel saving:

• If the WRITE button is flashing, turn any parameter knob or press any parameter button. The WRITE LED stops flashing and saving is canceled. You can return to editing.

Naming a Program

You can rename a program when the WRITE command is active.

To rename a program:

1. Press the WRITE button. Its LED begins blinking.

2. Turn SOFT KNOB 3 to move the cursor forward or backward.

3. Turn SOFT KNOB 4 to select a character.

4. When you're done naming the program, press the WRITE button again. The program is saved.

bank	program	cursor	symbol

OS v1.0

Write to B1-P001

New Preset_

add	remove	clear	ok

Naming a program

Working with Multi-Parts

The 3rd Wave is 4-part multitimbral, meaning that it can produce four different sounds/programs at the same time. You can layer sounds together or assign different sounds to different sections of the keyboard.

When a multi-part button is lit, that part is active. Each part can have 2 different effects and if the part is left as a single patch, it will have its own sequence "track" for each pattern in the sequencer. Unison and the arpeggiator are global — that is, they affect all four parts at the same time. This allows for. some very interesting and powerful combinations of sounds.

Saving a program saves all multi-parts, miscellaneous settings, and sequences with the program.

Because the 3rd Wave has 24 voices of polyphony, multi-parts equally divide the 24 voices by the number of parts active:

- If 1 part is active, that part has 24 voices

- If 2 parts are active each part has 12 voices

- If 3 parts are active, each part has 8 voices

- If 4 parts are active each part has 6 voices

All factory programs have four parts, even if all parts aren't currently enabled.

Parts 1 and 2 are active
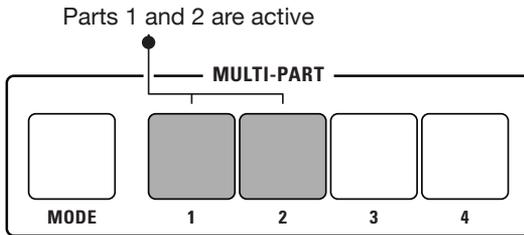
Multi-part buttons

To toggle Multi-parts on or off:

1. Press and hold the MODE button.

2. Press the button (1-4) of the part that you want to toggle on or off.

3. To toggle multiple parts on, press the buttons for those parts while continuing to hold down the MODE button.

4. To toggle a part off, press its button while continuing to hold down the MODE button.

5. If only one part is active that part's light will be solid. That is the part you are editing with the controls

6. If more than one part is on, the part that is being edited will be blinking. If you press one of the other parts that are lit and let go quickly that part will start to blink and that will now be the patch you are editing.

To select a specific part for editing:

1. Press the button (1-4) of the part that you want to edit.

2. If the part you want to edit isn't currently latched on (that is, its button isn't continuously lit) press and hold the MODE button and press the button of the part you want to activate and edit. It blinks to indicate that it is selected.

To edit multiple parts simultaneously:

1. Make sure the parts you want to edit are on (their buttons are lit). If not, press and hold the MODE button and press the button of each part you want to activate.

2. Next, simultaneously press and hold the buttons of all of the parts that you want to edit simultaneously. When selected, they will flash on and off.

3. Adjust any parameters on the front panel of the synth. The edits are made to all currently selected and blinking parts.

4. To turn off editing for a part in a multi-part section, press and hold the button for that part. When you release the button, the part stops blinking and is removed from the multi-part section. The button will still be lit, but it will no longer be blinking, which indicates it is active, (you can hear it), but it is not being edited.
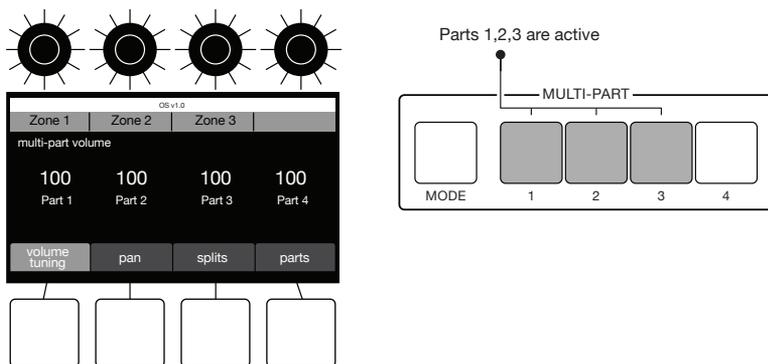
Editing Multi-parts

To adjust the volume level of each program in a Multi-part:

1. Press the MODE button. In the display, the Multi-part VOLUME/TUNING parameter is selected by default (Soft Button 1).

2. Use SOFT KNOBS 1-4 to adjust the volume for the individual parts.

To adjust the tuning of each program in a Multi-part:

1. Press the MODE button. In the display, the Multi-part VOLUME/TUNING parameter is selected by default (Soft Button 1).

2. Press SOFT BUTTON 1. This toggles the controls in the display to multi-part tuning.

3. Use SOFT KNOBS 1-4 to adjust the tuning -50 to +50 cents for the individual parts.

4. To toggle back to volume controls, press SOFT BUTTON 1 again.

To adjust the panning of each program in a Multi-part:

1. Press the MODE button.

2. Press SOFT BUTTON 2 (PAN).

3. Use SOFT KNOBS 1-4 to adjust the volume for the individual parts. A value of 0 (zero) is centered in the stereo field. A value of -50 is panned fully left. A value of +50 is panned fully right.

If Panning is set to 0 in the Multi-Part Panning menu, the front-panel PAN SPREAD knob controls program panning instead of this the Multi-part Panning menu. In other words, if panning is set to 0 in the Mutlti-part menu, the PAN SPREAD knob determines the panning for odd and even voices in a program. If the PAN SPREAD knob is fully clockwise, each new voice played is hard-panned fully left or fully right. If the PAN SPREAD knob is fully counter clockwise, all voices are centered in the stereo field. A setting in between these two extremes results in a smaller amount of left to right panning as new voices/notes are played.

To copy programs between parts:

1. Press the MODE button. The Multi-part parameters appear in the display.

2. Press Soft Button 4 (PARTS).

3. Use Soft Knobs 1-2 to select the BANK and PROGRAM that you want to copy from.

4. Use Soft Knob 3 to choose which part (1-4) you want to copy in the selected program.

5. Use Soft Knob 4 to select the Part in the currently active program that you want to copy the selected program/part to.

6. Once you've chosen the source program/part and which multi-part you want to copy it to in the current program, press Soft Button 4 (COPY).
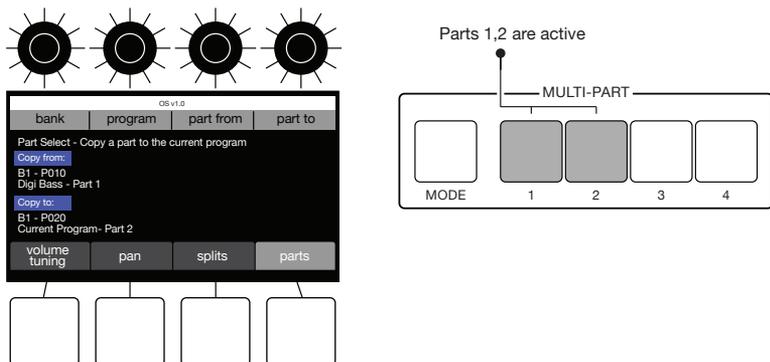
Copying Multi-parts

You can create huge-sounding stereo versions of a program by copying the same program to Parts 1 and 2, then panning part 1 hard left and part 2 hard right. To further widen the effect, vary the parameters slightly between the two parts. You can vary the envelope times, filter cutoff, tuning, or other parameters to create slight differences between the two parts.

To make a stereo program:

1. To create a stereo program, you will copy the same program to Part 1 and Part 2 and pan each Part fully right and fully left respectively.

2. Use the Bank and Program knobs to select a program that you want to make stereo.

3. Hold down the MODE button and activate Parts 1 and 2.

4. Release the MODE button. The Multi-part parameters should appear in the display.

5. Press Soft Button 4 (PARTS).

6. Use Soft Knobs 1-2 to select the BANK and PROGRAM that you want to copy from.

7. Use Soft Knob 3 to choose which part (1-4) you want to copy in the selected program.

8. Use Soft Knob 4 to select the Part in the currently active program that you want to copy the selected program/part to. In this case, select "Current Program - Part 1" as the destination.

9. Press Soft Button 4 (COPY).

10. Repeat steps 3-6 but this time, in Step 5, choose "Current Program - Part 2" as the destination. This duplicates Part 1 onto Part 2 in the current program.

11. Press the MODE button to return to the main Multi-part menu page.

12. Press Soft Button 2 (pan). Use Soft Knob 1 to set the panning of Part 1 to -50.

13. Use Soft Knob 2 to set the panning of Part 2 to +50.

14. Turn the front-panel PAN SPREAD knob fully counter-clockwise to MONO. (This forces the voices to have the same panning instead of ping-pong per voice.)

15. Play a chord on the keyboard. You will hear a true stereo version of the program.

16. To increase the stereo presence of the program, edit Part 1 or Part 2 filter cutoff, wave position, envelopes or other settings so that the two Parts are not completely identical.

To assign Multi-parts to individual rear-panel outputs:

1. Press the MISC button under the main display.

2. If it's not already selected, use Soft Knob 1 to select OUTPUT ROUTING from the menu.

3. Turn Soft Knob 2 (GO) to navigate to the OUTPUT ROUTING page.

4. By default, MAIN is selected in the OUTPUT ROUTING page. This is the main pair of stereo outputs.

5. Use the multi-part buttons to select the multi-part(s) that you want to route to the selected rear-panel output. By default all buttons are active, so press the Multi-part buttons to select/deselect the parts that you want to route.

6. Use Soft Knob 1 to select the next rear-panel output that you want to route a multi-part to.

7. As before, use the multi-part buttons to toggle on/off the multi-part(s) that you want to route to the selected rear-panel output. By default all buttons are active, so press the Multi-part buttons to select/deselect the parts that you want to route.

8. When you have finished, press the WRITE button twice to save the multi-part routing to the program.

Creating Splits

In additional to layering sounds, you can assign different sounds to different sections of the keyboard. This allows you to play a bass sound on the lower section of the keyboard, a pad in the middle section, and a lead in the upper section, for example.

The example below explains how to create a three-part split.

To create a split program:.

1. Using what you learned in "Working with Multi-Parts" on page 7, create a program with different sounds on Part 1, Part 2, and Part 3 (bass, pad, and lead, for example).

2. Before you save the program, activate Part 1 and de-activate Part 2 and Part 3. Then save the program.

3. In the Multi-part section, press the MODE button. The Multi-part menu appears.

4. Press Soft Button 3 (SPLITS). The Splits controls appear. Part 1 is automatically assigned to Split zone 1 (if Multi-part Button 1 is active/lit). (The Split function assigns all currently active parts to whatever Split part is selected.)

5. Press Soft Button 3 (ADD). Multi-part 2 is automatically assigned to Split zone 2.

6. Press Soft Button 3 again (ADD). Multi-part 3 is automatically assigned to Split zone 3.

7. To set the keyboard range for Split 1, use Soft Knob 1 to scroll to Split 2. Then hold down Soft Button 2 (split zone) and press a key on the 3rd Wave's keyboard to set the end of Split point 1/the beginning of Split point 2.

8. Save the program when you have finished.

Currently, in OS 1.0, because Unison and Arpeggiator settings are global, if one or more programs in a Split is a Unison or Arpeggiated program, all programs in the Split will be set to Unison or arpeggiated.

You can actually add more than one Multi-part to a Split zone. The explanation below explains how.

To assign more than one Part to a Split zone:

1. As before, create a program with different sounds on Part 1, Part 2, and Part 3.

2. Before you save the program, activate Part 1 and de-activate Part 2 and Part 3. Then save the program.

3. In the Multi-part section, press the MODE button. The Multi-part menu appears.

4. Press Soft Button 3 (SPLITS). The Splits controls appear. Part 1 is automatically assigned to Split zone 1 (if Multi-part Button 1 is active/lit).

5. To add additional Parts to Split zone 1, simply press the Multi-part button of that part. The Split function assigns all currently active parts to the currently selected split zone.

6. To add more Split zones, press Soft Button 3 (ADD). Any Multi-parts that are currently active are automatically assigned to Split zone 2.

7. If you want to remove or add a different Part to a specific Split zone, use Soft Knob 1 to scroll to the desired Split zone then activate only the desired Parts.

8. Save the program when you have finished.

With voice sharing off (set this with Soft Knob 4 in the Splits menu) you will not be able to add a part if it is already used in a different split zone.

About the Oscillators/Wavetables

There are three different wave types generated by the oscillators:

- Classic PPG-legacy waves (P00-P33)
- 3rd Wave custom waves (U00-U47)
- Analog-modeled waves (A00-A05)

PPG Legacy Waves ("P" waves)

There are 34 of these 64-waveshape wavetables. They are based on the original set of 8-bit wavetables from the PPG 2.2 and 2.3. There are also extra 8- bit wavetables, (P31, P32, and P33), that are not from the original PPG set. Use the "P" waves to create classic wavetable sounds like those heard on recordings from the 1980s and beyond.

Custom User Waves ("U" waves)

There are 48 pre-made 64-waveshape, harmonically-complex wavetables included with the 3rd Wave (plus an additional 16 blank user slots). These "U" wavetables were created specifically for the 3rd Wave by our team of sound designers using a variety of exotic and esoteric hardware and software devices using the technology included in the built-in Wave Maker tool. They differ from the "P" wave set in that they are high-resolution (96 kHz) and anti-aliased for greater fidelity with no audio artifacts at higher frequencies. In addition to these 48 wavetables, the built-in Wave Maker utility allows you to create and load an additional 16 of your own custom waves. Though there are 16 open slots by provided (U48 - U64) you can actually save your own wavetables into any of the 64 "U" wavetable locations. — but be aware that if you save to positions U00 to U47, you will overwrite a factory wavetable.

Analog-Modeled Waves ("A" waves)

There are 7 of these high-fidelity, high-resolution analog modeled wave-forms. They are useful for creating classic subtractive synthesis sounds and effects. Modeled waveforms include sawtooth, square/pulse, triangle, sine, supersaw, and two varieties of continuously variable noise: red-pink-white and white-blue-violet. The WAVE OFFSET knob controls pulse width, supersaw detuning, and noise color, depending on which waveform is selected. Although the wave envelope doesn't affect these analog-modeled waveshapes, you can use other modulation sources such as the LFOs or Envelopes 3/4 to modulate analog waveshapes by choosing WAVE OFFSET as a modulation destination.

Using The Wave Envelope

The Wave Envelope is a special-purpose 6-stage envelope generator dedicated to wave sequencing. The purpose of this envelope is to step though the waveforms in a wavetable. The Wave Envelope lets you choose a time and position (range of travel within the 64-waveshape wavetable) for each of its 6 stages.

By using the Wave Envelope to cycle through the 64 waveforms in a wavetable you can create continuously shifting timbres that evolve and move. Because you can create a different Wave Wave Envelope for each of the 3 oscillators at once, you have a very rich palette of sounds avail-able. Combined with the 3rd Wave's ability to layer up to 4 different sounds at once, you can create very complex, evolving sounds.

Be aware that if the Wave Envelope is turned off (if the ON button is not lit in the WAVE ENVELOPE section) the oscillator waveforms are not swept by the envelope. Instead the oscillators generate only the single-cycle waveform selected with the WAVETABLE and WAVE OFFSET controls with 64 waveforms in them, unless you have another modulation source chang-ing the wavetables, (ADSR envelope, LFO, etc).

The exception to the above rule is if you are using an LFO, Envelope 3/4, or some other modulation source to sweep through an oscillator's wavetable via the mod matrix.

Toggles knobs to control
envelope stages 1-3 or 4-6

Selects one or more
oscillator for wave
envelope editing

Turns all wave
envelopes on/off

WAVE ENVELOPE

TIME 1/4   POSITION 1/4   TIME 25   POSITION 2/5   TIME 3/6   POSITION 3/6   ENV 4-6   OSC 1   OSC 2   OSC 3   ON
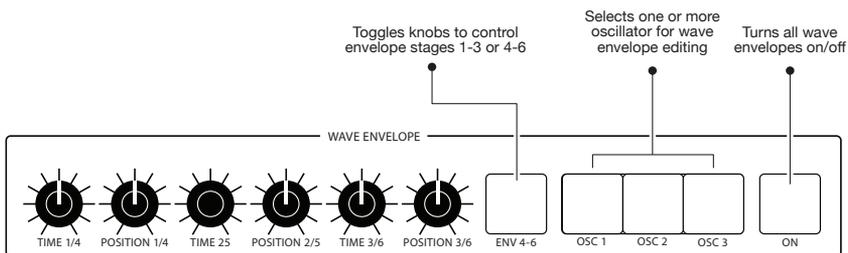
About Wave Flow

The WAVE FLOW button toggles smoothed wavetable sweeping on and off. When WAVE FLOW is on, the waveshapes within a wavetable morph smoothly into each other. When WAVE FLOW is off, waveshapes within a wavetable "step" from one to another in a more audible way. This effect is more obvious on certain wavetables than others.

Pressing the WAVE FLOW button also gives you access to the "Use Upper Wavetable" feature, which was unique to the PPG. Enabling this function gives you the ability to reach the last 4 waveforms in each of the P wavetables, and then to move into wavetable P30, the "upper wavetable." This was necessary on the original PPG in cases when modulation caused wave sweeping to extend beyond the final waveshapes in a wavetable.

Editing a Wave Envelope

Each of the three Wave Envelopes (one for each oscillator) has 6-stages. Each stage has a POSITION and TIME parameter.

POSITION sets which waveshape within the 64-waveshape wavetable a particular stage in the envelope reaches before moving to the next stage. In other words, it determines the range of travel from waveshape to waveshape as the envelope moves along from stage to stage.

TIME sets how quickly the oscillator sweeps through the wavetable to get to the next envelope stage/wave position.

WAVE ENVELOPE

TIME 1/4	POSITION 1/4	TIME 25	POSITION 2/5	TIME 3/6	POSITION 3/6	ENV 4-6

The Wave Envelope

To use the Wave Envelope:

1. In the Oscillator 1 section, turn up the level of Oscillator 1 to about 75. Set the levels of Oscillators 2 and 3 to zero for now.

2. In the Oscillator 1 section, use the Wavetable knob to choose the wavetable that you want on Oscillator 1. Note that the Wave Envelope only affects "P" and "U" wavetables and not "A" waves.

3. On the same oscillator, use the Wave Offset knob to choose a specific waveform within that wavetable. This will be the start point for wave cycling. (Or, if the Wave Envelope is off, it selects the static, single cyle wave produced by the oscillator.) By default, WAVE OFFSET is set to 0 and wavetable playback begins at wave position 1.

4. In the Wave Envelope section, press the On button. This enables wave sweeping.

5. In the Wave Envelope section, press the Osc 1 button. This actives editing for Oscillator 1's Wave Envelope.

6. In the Wave Envelope section, make sure that the ENV 1-3 button is enabled/lit. (When the ENV 4-6 button is enabled/lit, envelope stages 4-6 are active for editing.) At this point, you will edit stages 1-3.

7. Turn the Time 1/4 knob to set a length for stage 1 of the envelope. This determines how long it will take to cycle from the waveshape you chose with the Wave Offset knob through the range of waves you will set in the steps below.

8. Turn the Position 1/4 knob to choose a travel range within the wavetable. The higher the setting, the broader the range of the sweep within the wavetable.

9. Turn the Time 2/5 knob to set a length for stage 2 of the envelope. This determines how long it will take to cycle from the waveshape you chose with the Position 1/4 knob through the range of waves you will set with the Position 3/6 knob.

10. Turn the Position 2/5 knob to choose a travel range within the wavetable. The higher the setting, the broader the range of the sweep.

11. Repeat steps 7 and 8 for the remaining stages in the Wave Envelope.

12. To set the parameters for stages 4-6 in the Wave Envleope, press the ENV 4/6 button. This toggles the function of the knobs from stages 1-3 to 4-6.

13. Repeat this entire process for Oscillators 2 and 3 if you like. Make sure to activate each of these for editing by pressing/enabling their corresponding button (OSC 1, OSC 2, OSC 3) in the Wave Envelope. You can activate more than one oscillator for editing at the same time (which will apply the same envelope values to each) by simultaneously pressing/enabling multiple buttons.

14. Be sure to turn up the LEVEL of each oscillator so that you can hear it.

15. Finally, make sure that the Wave Envelope's ON button is enabled/lit so that the Wave Envelope is applied to the oscillators. If it's not on, the oscillator waveforms are not swept by the envelope. Instead they generate only the single-cycle waveform selected with the WAVETABLE and WAVE OFFSET controls.

Looping the Wave Envelope

In many cases you will want to make the wave envelope loop so that it repeatedly sweeps through the active wavetable(s) for as long as the sound sustains. You can enable looping for each oscillator's wavetable individually (since each has its own wave envelope).

To loop a Wave Envelope:

1. In the Wave Envelope section, press the On button. This enables wave sweeping.

2. In the Wave Envelope section, press the Osc 1, Osc 2, or Osc 3 button to enable wave envelope editing for the oscillator wavetable that you want to loop.

3. Go to the main Wave Envelope screen and Press Soft Button 4 (MISC). This will display the wave looping parameters.

4. Use Soft Knob 2 to turn LOOP on.

5. Use Soft Knob 1 to set the release point (wave position 1-6) for loop-ing. This determines the end point of the loop.

6. Use Soft Knob 3 to set the start point (wave position 1-6) for wave looping. This determines the start point of the loop. Make sure to set the start point to a position that is earlier than the release point.

7. Play and hold a note or chord as listen to how the wave envelope repeatedly loops using the start and end points you specified.

To create smooth-sounding loops, make sure that the waveform at the loop start point and loop release point are at the same position. To do this, you will need to adjust the POSITION parameter in the wave envelope for those two points. If the positions are not the same, as you go from the release point back to the start point, you will hear a "jump." The jump or discontinuity will depend on the particular wavetable and the size of the difference between the start and end
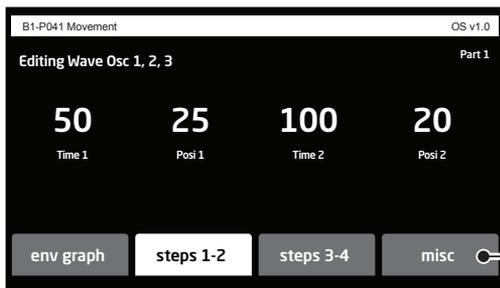
Wave Envelope Parameters
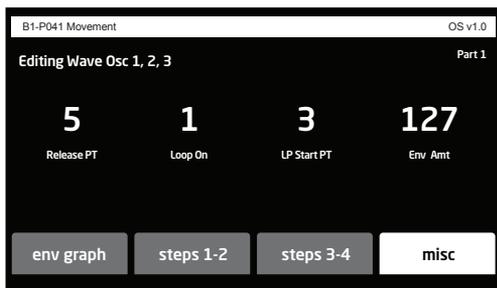
Wave Looping Parameters

Exploring More

This should give you an understanding of some of the 3rd Wave's most essential functions and how to perform some basic tasks. Now dig into Chapter 2 where you'll find explanations of the 3rd Wave's various controls and how to use them.

Connections
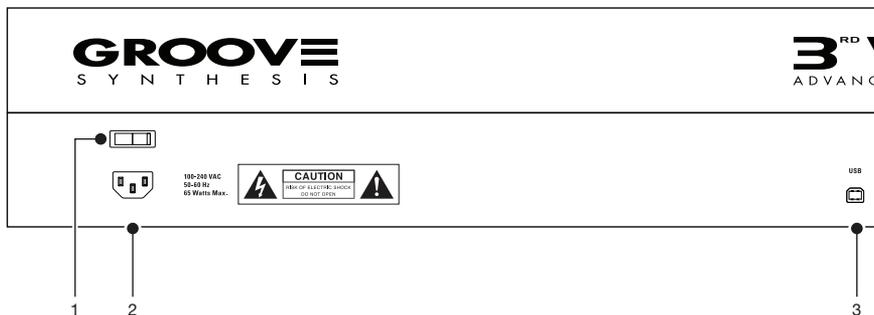
1. POWER ON/OFF—Turns the 3rd Wave on and off.

2. AC POWER CONNECTOR—Accepts a standard, grounded IEC power cord. Operates over a range of 100 to 240 volts and 50 to 60 Hz.

3. **USB**—For bidirectional MIDI communication with a computer. The 3rd Wave is a Class Compliant USB device. It doesn't require drivers when used with Mac OS or Windows.

4. MIDI IN, OUT, and THRU—Standard 5-pin MIDI DIN connectors.

5. SUSTAIN—Accepts a footswitch to control sustain. Use the Global menu's SUSTAIN FOOTSWTICH control to choose the correct behavior for your model of footswitch (PRESSED OPEN or PRESSED CLOSED).

6. VOLUME—Accepts a standard expression pedal that has a variable resistor on a TRS (tip-ring-sleeve) ¼ inch phone plug. Once connected, you can use the modulation matrix to route the pedal to control a variety of things such as volume or filter cutoff frequency to add expressiveness to live performance. Use the Global menu's VOLUME PEDAL POLARITY control to choose the correct polarity for your model of footswitch (POSITIVE or NEGATIVE).

7. PEDAL/CV—Accepts a second standard expression pedal that has a variable resistor on a TRS (tip-ring-sleeve) ¼ inch phone plug. Once connected, you can use the modulation matrix to route the pedal to control a variety of things.

MIDI IN · MIDI OUT · MIDI THRU · SUSTAIN · VOLUME · PEDAL/CV · AUDIO IN · OUTPUT 4 RIGHT · LEFT · OUTPUT 3 RIGHT · LEFT · OUTPUT 2 RIGHT · LEFT · MAIN STEREO OUT 1 RIGHT · LEFT · PHONES

| 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
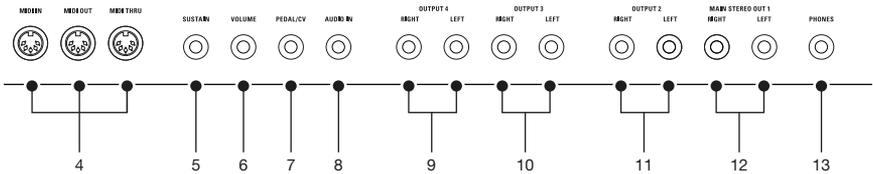
8. AUDIO IN—Accepts an unbalanced, ¼ inch audio input. Connect an audio cable to this jack to create a custom wavetables with the WAVE-MAKER tool. See "Creating Custom Wavetables" on page 62 for more details.

9. OUTPUTS 4—Unbalanced, ¼ inch audio outputs. Connect audio cables to these jacks if you want separate stereo outputs for Layer 4. If no cables are connected, Layer 4 is output on the Main A Outputs.

10. OUTPUTS 3—Unbalanced, ¼ inch audio outputs. Connect audio cables to these jacks if you want separate stereo outputs for Layer 3. If no cables are connected, Layer 3 is output on the Main A Outputs.

11. OUTPUTS 2—Unbalanced, ¼ inch audio outputs. Connect audio cables to these jacks if you want separate stereo outputs for Layer 2. If no cables are connected, Layer 2 is output on the Main A Outputs.

12. MAIN STEREO OUTPUTS—Unbalanced, ¼ inch audio outputs. These are the main stereo outputs for the synth. They carry all layers, 1-4, if no cables are connected to the other output jacks.

13. HEADPHONES—A ¼ inch stereo headphone jack. Headphone volume is controlled by the VOLUME knob on the front panel.

Main Display

The most frequently used controls on the 3rd Wave are on its front panel. But there are additional controls (as well as numeric display of values) visible in its main display.

For example, adjusting a knob or switch in the Oscillator section reveals the Oscillator parameters in the display. The display also reveals additional parameters not found on the front panel. You can select and edit these additional parameters using the four soft knobs soft buttons located above and below the display.

The soft knobs are detented encoders that are useful for dialing in values with precision. The soft buttons select between various menu tabs.

soft knob 1 parameter 1   soft knob 2 parameter 2   soft knob 3 parameter 3   soft knob 4 parameter 4

B1-P040 Lush Layers

Oscillator 1   Part 1

| -12 | 0 | P4 | 8 |
| PITCH | FINE | WAVETABLE | OFFSET |

Osc Level: 46   Wavetable P12

| tuning | wave | misc | next osc |

soft button 1 menu tab 1   soft button 2 menu tab 2   soft button 3 menu tab 3   soft button 4 menu tab 4
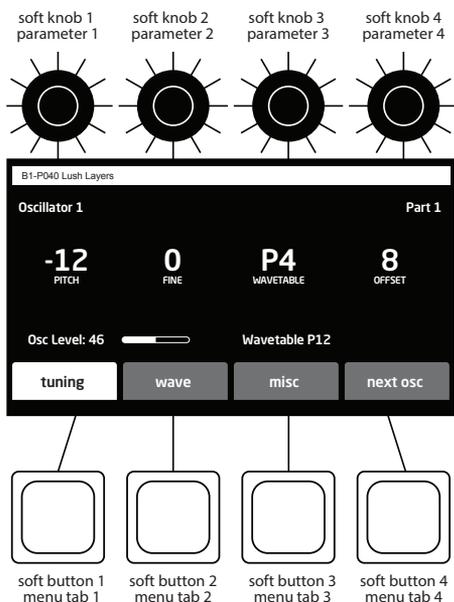
The Main Display

Oscillators

The 3rd Wave has three digital oscillators per voice. The oscillators generate the raw, unprocessed sound of the synth. All other controls on the synth modify or process the sound the oscillators make.

The 3rd Wave's oscillators generate three types of waveforms:

- Classic PPG-legacy waves (P00-P33)

- 3rd Wave custom waves (U00-U47)

- Analog-modeled waves (A00-A06)

PPG Legacy Waves ("P" waves)

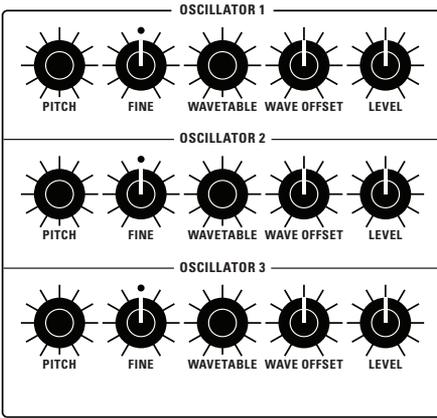There are 34 of these 64-waveshape wavetables. They are the original set of 8-bit wavetables from the PPG 2.2 and 2.3. Use them to create classic wavetable sounds like those heard on recordings from the 1980s and beyond.

Custom User Waves ("U" waves)

There are 48 of these 64-waveshape, harmonically-complex wavetables. They were created specifically for the 3rd Wave by our team of sound designers using a variety of exotic and esoteric hardware and software devices. They differ from the "P" wave set in that they are high-resolution (96 kHz) and anti-aliased for greater fidelity and no audio artifacts at higher frequencies. In addition to these 48 wavetables, the built-in WaveMaker utility allows you to create and load an additional 16 of your own custom waves. These will fill slots U48 - U64.

Analog-Modeled Waves ("A" waves)

There are 7 of these high-fidelity, high-resolution analog modeled waveforms. They are useful for creating classic subtractive synthesis sounds and effects. Modeled waveforms include sawtooth, square/pulse, triangle, sine, supersaw, and two varieties of continuously variable noise: red-pink-white and white-blue-violet. The WAVE OFFSET knob controls pulse width, supersaw detuning, and noise color, depending on which waveform is selected. Although the wave envelope doesn't affect these analog-modeled waveshapes, you can use other modulation sources such as the LFOs or Envelopes 3/4 to modulate analog waveshapes by choosing WAVE OFFSET as a modulation destination.

The Oscillators

About Oscillator Levels

Each oscillator has a range of 0-100 for its LEVEL parameter. If you are creating sounds using more than one oscillator, setting the levels of each oscillator too high could result in distortion — though this isn't always a bad thing depending on the type of sound you'd like to create. If you don't want distortion to occur, set the oscillator levels so that the sum of the three oscillator levels is no higher than 100.

The Init Program is set so that each oscillator is set to 33 for a sum of 99 before going out to the filter. On the other hand, if you don't mind some distortion, set the oscillator levels as you wish.

The other way to cause distortion into the filters is with the SATURATION control in the low-pass filter. Even if the sum of your oscillator levels is less than 100, you can still distort or "saturate" the filters by turning up the SATURATION control. At first this will only sound like the volume is increasing, but as you increase the amount of saturation, you will create more harmonic distortion.

Oscillator Controls

B1-P040 Lush Layers			OS v1.0
Oscillator 1			**Part 1**

-12	**0**	**P4**	**8**
PITCH	FINE	WAVETABLE	OFFSET

Osc Level: 46   Wavetable P12

tuning	wave	misc	next osc

Press Soft Button 4 to
switch between oscillators 1-3
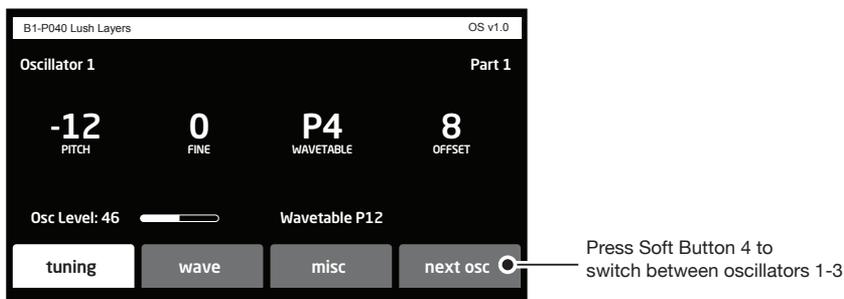
PITCH: (C0-C8) Sets the base frequency of the oscillator. Pitch range is from C0 to C8. You can also transpose the pitch of the keyboard up or down two octaves with the TRANSPOSE knob.

FINE: (-50 to +50) Adjusts tuning up or down in small increments. Steps are in cents (50 cents = 1/2 semitone). The 12 o'clock position is centered (no detuning).

WAVETABLE: (various within the P, U, and A wave sets) Selects one of the many wavetables on the 3rd Wave. Each wavetable in the "P" and "U" sets is a collection of 64 individual waveforms. You can sweep through the various waveforms for a shifting, evolving texture using the Wave Envelope, or if you turn off the Wave Envelope, you can set the oscillator to a fixed waveshape within a wavetable (or one of the analog waveshapes in the "A" set of waves).

WAVE OFFSET: (0-63) Selects one of the 64 waves within the chosen wavetable. If you sweep through the wavetable using the Wave Envelope, the specific wave you choose using the WAVE OFFSET will act as the start point. The oscillator will then sweep through the subsequent waveforms in the wavetable.

LEVEL: (0-100) Sets the output level of the oscillator.

Additional Controls

In addition to the front panel controls for the oscillators, there are also several parameters accessible through the Soft Buttons/tabs in the main display

Tab 2 - Wave
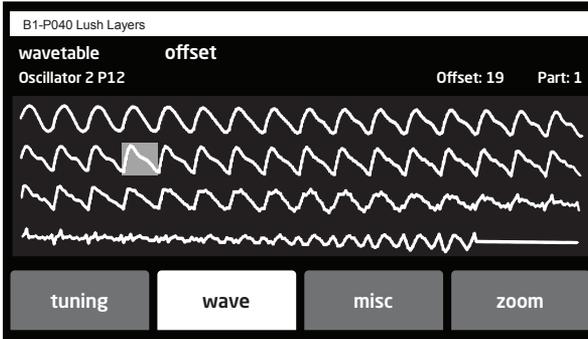
SOFT KNOB 1: Selects any wavetable in the P, U, and A wave sets.

SOFT KNOB 2: Sets the wave offset (1-64) within the selected wavetable.

Tab 3 - Misc
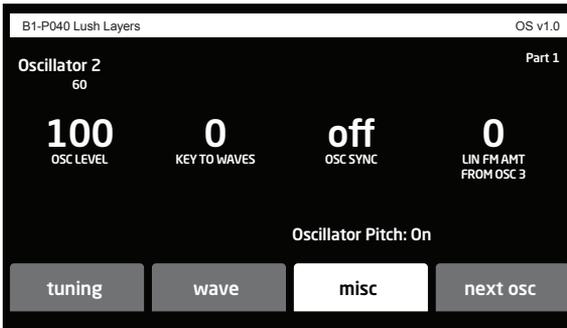
OSC LEVEL: (0-100) Sets the output level of the oscillator.

KEY TO WAVES: (0-127) Controls the Wave Offset using Note Number. In other words, as you play up or down the keyboard, the wave offset will change according to the key that you play. Higher values create a broader range of timbral change across the keyboard.

OSC SYNC: (On. Off) Turns on oscillator hard sync. Sync forces an Oscillator to restart its cycle every time the oscillator that is synced restarts its cycle. For example, turning on Sync for Oscillator 1, syncs it to Oscillator 2. Similarly, turning on Sync for Oscillator 2, syncs it to Oscillator 3. Turning on Sync for Oscillator 3, syncs it to Oscillator 1. This creates harmonically complex waveforms, especially when the frequency of Oscillator 1 is set to a higher or lower interval (pitch) than Oscillator 2. For dramatic effects, modulate the pitch of the synced oscillator using the Envelope 3 or 4.

 Oscillator Sync is not currently available on User wavetables ("U" waves).

LIN FM AMT FROM OSC (1,2, or 3): (0-127) Frequency modulation or *FM*, allows one oscillator (the *modulator* in FM synthesis terms) to modulate the frequency of another oscillator (the *carrier)*. This creates complex harmonics called *sidebands*. The 3rd Wave features linear FM like that found in classic DX-style synths. In such synths, sine waves are used for both the carrier and modulator. Although sine waves often produce more predictable harmonic results, the 3rd Wave allows you to use any wavetable/waveshape for even more complex timbres.

The following table shows the modulator/carrier relationship between the oscillators.

Carrier	Modulator
Oscillator 1	Oscillator 2
Oscillator 2	Oscillator 3
Oscillator 3	Oscillator 1

Turning up Lin Fm Amt FM for Oscillator 1 causes it to be modulated by oscillator 2, turning up FM for Oscillator 2 causes it to be modulated by Oscillator 3, and so on.

Wave Envelope

The Wave Envelope is a special-purpose 6-stage envelope generator dedicated to wave sequencing. The purpose of this envelope is to step though the waveforms in a wavetable. The envelope lets you choose a time and "position" (range of travel range within the wavetable) for each of its 6 stages.

By using the Wave Envelope to cycle through the waveforms in a wavetable you can create continuously shifting timbres that evolve and move. Because you can do this for each of the 3 oscillators at once, you have an amazingly rich palette of sounds at your fingertips. Add to this the 3rd Wave's ability to layer up to 4 different sounds at once and you can imagine the complexity of sounds you can create. This is the very heart and soul of the 3rd Wave.

To smoothly transition between waveshapes during wave cycling, turn on the Wave Flow button.
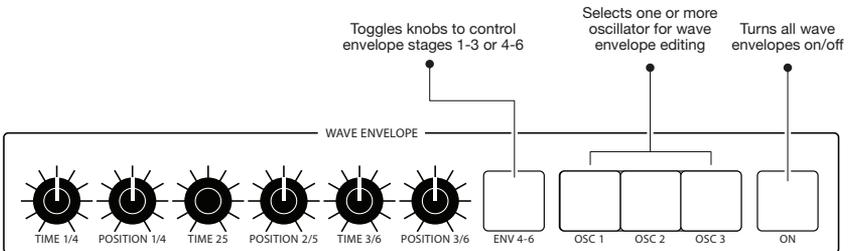
The Wave Envelope

Editing a Wave Envelope

Each of the three Wave Envelopes (one for each oscillator) has 6-stages. Each stage has a POSITION and TIME parameter.

POSITION sets which waveshape within the 64-waveshape wavetable a particular stage in the envelope reaches before moving to the next stage. In other words, it determines the range of travel from waveshape to waveshape as the envelope moves along from stage to stage.

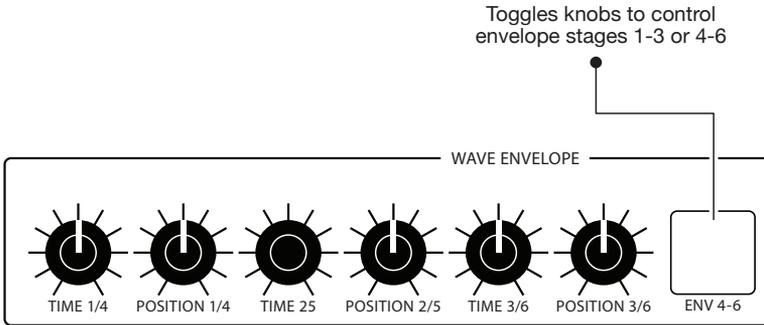TIME sets how quickly the oscillator sweeps through the wavetable to get to the next envelope stage/wave position.

Toggles knobs to control
envelope stages 1-3 or 4-6

WAVE ENVELOPE

TIME 1/4 POSITION 1/4 TIME 25 POSITION 2/5 TIME 3/6 POSITION 3/6 ENV 4-6

The Wave Envelope

To use the Wave Envelope:

1. In the Oscillator 1 section, turn up the level of Oscillator 1 to about 75.

2. In the Oscillator 1 section, use the Wavetable knob to choose the wavetable that you want on Oscillator 1. Note that the wave envelope only affects "P" and "U" wavetables and not "A" wavetables.

3. On the same oscillator, use the Wave Offset knob to choose a specific waveform within that wavetable. This will be the start point for wave cycling. By default, WAVE OFFSET is set to 0 and wavetable playback begins at wave position 1.

4. In the Wave Envelope section, press the On button. This enables wave sweeping.

5. In the Wave Envelope section, press the Osc 1 button. This actives editing for Oscillator 1's wave envelope.

6. In the Wave Envelope section, make sure that the ENV 4-6 button is not enabled/lit. When unlit, envelope stages 1-3 are active for editing. But if the ENV 4-6 button is enabled/lit, envelope stages 4-6 are active for editing. At this point, we want to begin editing stages 1-3.

7. Turn the Time 1/4 knob to set a length for stage 1 of the envelope. This determines how long it will take to cycle from the waveshape you chose with the Wave Offset knob through the range of waves you will set in the steps below.

8. Turn the Position 1/4 knob choose a travel range within the wavetable. The higher the setting, the broader the range of the sweep within the wavetable.

9. Turn the Time 2/5 knob to set a length for stage 2 of the envelope. This determines how long it will take to cycle from the waveshape you chose with the Position 1/4 knob through the range of waves you will set with the Position 3/6 knob.

10. Turn the Position 2/5 knob choose a travel range within the wavetable. The higher the setting, the broader the range of the sweep.

11. Repeat steps 7 and 8 for the remaining stages in the Wave Envelope.

12. To set the parameters for stages 4-6 in the Wave Envleope, press the ENV 4/6 button. This toggles the function of the knobs from stages 1-3 to 4-6.

13. Repeat this entire process for Oscillators 2 and 3 if you like.

14. Be sure to turn up the LEVEL of each oscillator so that you can hear it. Additionally, in the wave envelope section, enable the Osc 1, Osc 2, or Osc 3 button for the oscillator wave envelope that you want to edit.

15. And finally make sure that the on button is enabled/lit so that the wave envelope is applied to the oscillators. If it is not on, the oscillator waveforms are not swept by the envelope. Instead they generate only the single-cycle waveform selected with the WAVETABLE and WAVE OFFSET controls.

Wave Envelope Menu Parameters

ENV GRAPH: This toggles the display between a graphical representation of the Wave Envelope and the various controls associated with the Wave Envelope.

COPY TO ALL: Copies the Wave Envelope of the currently selected oscillator all oscillators.

LOOP ON: Enables wave envelope looping. When on, the wave envelope will repeatedly cycle through the current wavetable as long as a key is held down.

LP START PT: Selects the envelope stage at which wave envelope looping begins.

RELEASE PT: Selects the envelope stage at which wave envelope looping ends.

LEFT ARROW: On the graphic envelope display, pushing this soft button selects the Wave Position to the immediate left of the currently selection position. The wave position can then be edited with Soft Knob 3.

RIGHT ARROW: On the graphic envelope display, pushing this soft button selects the Wave Position to the immediate right of the currently selection position. The wave position can then be edited with Soft Knob 3.

Low Frequency Oscillators
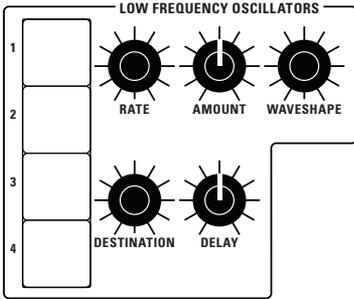
The Low Frequency Oscillators

The four LFOs are oscillators that generate frequencies below the range of human hearing (although you can send any of them into the audio range if you increase up their frequency enough). The LFOs generate a variety of waveshapes, including triangle, sawtooth, reverse sawtooth, square, pulse, and random ("sample & hold").

Use the LFOs to modulate parameters in the 3rd Wave and create many interesting effects. To create vibrato, for instance, send a triangle or sine wave to an oscillator. To create tremolo, send a triangle, sine, or square wave to the amplifier. To create an auto-wah effect, a triangle or sine wave to the filter cutoff.
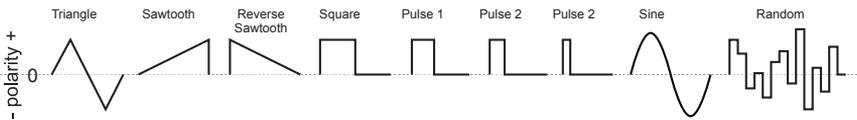
LFO waveshapes

LFO CONTROLS

RATE: (0-255) Sets the frequency of the selected LFO. If you want, you can sync the LFOs to the arpeggiator, sequencer, or MIDI clock for tempo-synced effects such as filter sweeps and so on.

AMOUNT: (-100 to +100) Sets the amount of LFO modulation routed to the selected destination. Setting an amount here applies the selected modulation continuously. You can also use the modulation matrix to route an LFO to additional destinations and use a different modulation amount if you want.

SHAPE: (Sine, Triangle, Reverse Saw, Saw, Square, Pulse 1, Pulse 2, Pulse 3, Random) This knob sets the waveshape of the selected LFO.

DESTINATION: Routes the selected LFO to one of the many modulatable destinations within the synthesizer. You can also use the modulation matrix to route an LFO to additional destinations.

DELAY: (0-100) Sets a variable amount of delay before the selected waveshape is applied. A simple use for this is to create a delayed vibrato effect.

SYNC: (on/off) (In the menus) When on, the LFO synchronizes with the master clock, which controls the arpeggiator, sequencer, and certain effects.

NOTE RESET: (on/off) (In the menus) Enabling Note Reset makes the LFO wave cycle reset each time you press a key. This is useful if you want to ensure that the full waveshape is applied each time you strike a key.

There are many ways to make creative use of the LFOs:

- Route the LFO to the PITCH parameter of the oscillators to create vibrato (TRIANGLE wave) or random pitches (S&H/RANDOM wave).

- Route the LFO's triangle wave to the filter's CUTOFF parameter and use a medium FREQ and AMOUNT setting to create a wah-wah effect, or use a slow FREQ setting and low AMOUNT setting to create subtle harmonic movement.

- Route the LFO's square wave to the amplifier's ENV AMOUNT parameter and use a medium LFO FREQ and AMOUNT setting to create a tremolo effect.

- Route an LFO to an oscillator's WAVE OFFSET parameter to make its timbre evolve.

- Route the LFO's triangle wave to the TIME parameter of the stereo delay and use a slow FREQ and low AMOUNT setting to create a chorus effect.

Any LFO can be routed to any destination (or multiple destinations) using the modulation matrix.

Filters
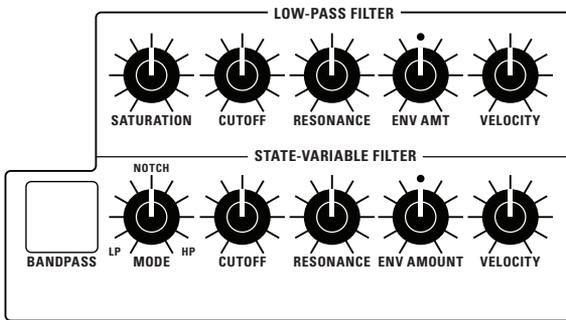
The Filters

If you recall, the oscillators produce the raw sound of the synthesizer. The filters do exactly what their name suggests: they take in this raw sound and filter something out — in this case, harmonic frequencies. This gives you the power to change the character of the raw sound.

The 3rd Wave has two separate filters: a 4-pole analog low-pass filter and a zero-delay, 2-pole digital state-variable filter.

Here's how they each work:

- LOW-PASS FILTER: This is a classic, 4-pole, 24db per-octave resonant filter that cuts out high frequencies and passes low frequencies.

- STATE-VARIABLE FILTER: This is a zero-delay, 2-pole, 12db per-octave resonant filter that can be continuously varied between low-pass, notch, and high-pass operation. It has a dedicated switch that enables band-pass mode. Each mode does what its name suggests. The State-Variable filter cannot self-oscillate. Another characteristic of the State-Variable filter is that increasing the amount of RESONANCE does not decrease the amount of low-frequencies (bass).

The best way to get a feel for what the filters do and how they sound is to give their Cutoff knob a good twist, with and without a bit of Resonance.

The two filters operate is series — the State-Variable Filter first, followed by the Low-Pass Filter. Using the two together, with different cutoff, resonance, and for the state-variable filter Mode settings creates a wide tonal variety. Try using the Mod Matrix to route a second envelope— Envelope 3 or 4—to the state variable filter in addition to the standard Filter Envelope for some interesting effects.

LOW-PASS FILTER CONTROLS
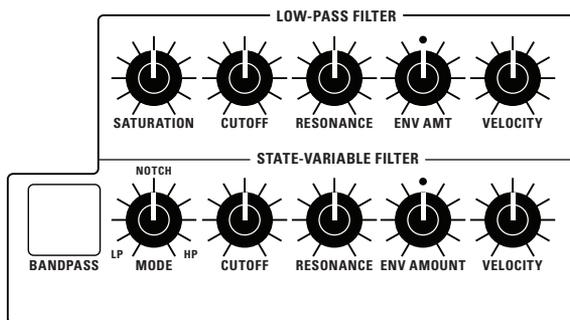
The Low-Pass FIlter

SATURATION: (0-127) This overdrives the output of the Low-Pass Filter, making it possible to add harmonic distortion and additional warmth.

CUTOFF: (0-127) Sets the filter's cutoff frequency. High frequencies are cut and low frequencies passed, hence the name "low-pass."

RESONANCE: (0-127) Emphasizes a band of frequencies around the cutoff frequency. High levels of resonance can cause the filter to self-oscillate and generate its own pitch.

RESONANCE COMPENSATION: (On. Off)) When On, increasing the Resonance setting does not decrease the amount of low-frequencies (bass response). When Off, increasing the Resonance setting decreases the amount of low-frequencies as is typical of a 24dB per octave resonant filter.

ENV AMOUNT: (-127 to +127) Sets the amount of modulation from the filter envelope to the filter's cutoff frequency. Any setting above zero means that each time you strike a key, the filter envelope controls how the filter opens and closes. Higher amounts more dramatically affect the cutoff frequency. This control is bipolar. Positive settings produce standard behavior. Negative settings invert the envelope.

VELOCITY: (0-127) Allows key velocity to influence filter frequency. When the VELO TO ENV parameter is set to ON in the Filter's MISC menu The harder you play, the more the filter will open and the brighter the sound will be. This control makes for more touch-sensitive sounds.

KEY AMOUNT: (0-127) (In the menus) Sets the amount of filter tracking from the keyboard to the filter's cutoff frequency. Any setting above zero means that the higher the note played on the keyboard, the more the filter opens. This adds brightness to higher notes. At zero, keyboard filter tracking is off and filter frequency is unaffected whether you play higher or lower on the keyboard.

STATE-VARIABLE-FILTER CONTROLS
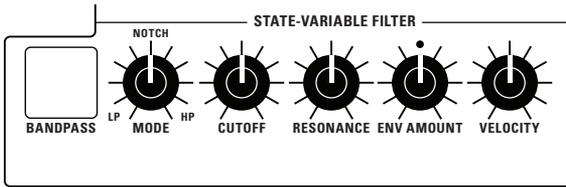
The State-Variable FIlter

BANDPASS: This switch turns on band-pass filter mode. In this mode only a narrow band of frequencies (set with the Cutoff knob) is passed by the filter, while high and low frequencies on either side of the band are cut.

MODE: (0-127) This knob selects the state-variable filter's mode. It changes smoothly from low-pass to notch to high-pass operation. Each filter mode has its own characteristic sound.

CUTOFF: (0-255) Sets the filter's cutoff frequency. Each filter mode has its own characteristic operation and sound:

- Low-pass: passes frequencies below the cutoff frequency
- Notch: removes frequencies in a notch centered around the cutoff frequency
- High-pass: passes frequencies above the cutoff frequency
- Bandpass: passes a band of frequencies centered around the cutoff frequency

RESONANCE: (0-127) Emphasizes a band of frequencies around the cutoff frequency. Unlike the analog low-pass filter, the state-variable filter doesn't self-oscillate if you set Resonance to maximum.

ENV AMOUNT: (-127 to +127) Sets the amount of modulation from the filter envelope to the filter's cutoff frequency. Any setting above zero means that each time you strike a key, the filter envelope controls how the filter opens and closes. Higher amounts more dramatically affect the cutoff frequency. This control is bipolar. Positive settings produce standard behavior. Negative settings invert the envelope.

VELOCITY: (0-127) Allows key velocity to influence filter frequency. When the VELO TO ENV parameter is set to ON in the Filter's MISC menu The harder you play, the more the filter will open and the brighter the sound will be. This control makes for more touch-sensitive sounds.

To hear the effect of the filter:

1. Recall the Basic Program by pressing the GLOBAL button and using Soft Knob 1 to navigate to the SET INIT PROGRAM command, then turn Soft Knob 2 (GO).

2. Hold down a note and rotate the filter's CUTOFF knob. Notice how it cuts the high frequencies as you rotate counter-clockwise, making the sound of the oscillator less bright. If you turn the CUTOFF knob fully counter-clockwise you'll filter out all frequencies and hear nothing.

3. Return the CUTOFF knob to its halfway position, hold down a note again then turn the RESONANCE knob about halfway up.

4. Rotate the filter's CUTOFF knob again and listen to the sound change as a band of frequencies near the cutoff is amplified. This how to create a classic resonant filter sweep.

In the previous example, you controlled the filter cutoff by hand. In most cases, you will use the Filter Envelope to do this. To learn more about the Filter Envelope, see "Filter Envelope" on page 40.

Exploring the State-Variable Filter

As its name suggests, the State-Variable filter can change its operational mode/state from low-pass, to notch, to high-pass, with a separate band-pass mode that you can activate using the BP (band-pass) button. This makes the State-Variable filter very versatile.

Exploring the State-Variable filter:

1. Recall the Basic Program by pressing the GLOBAL button and using Soft Knob 1 to navigate to the SET INIT PROGRAM command, then turn Soft Knob 2 (GO).

2. Turn the MODE knob all way to the left so that the filter is set to LP (low-pass mode).

3. Hold down a note and rotate the filter's CUTOFF knob. Notice how it cuts the high frequencies as you rotate counter-clockwise, making the sound less bright.

4. Turn the filter's STATE knob to NOTCH and rotate the CUTOFF knob again. Listen to the effect as the filter cuts a band of frequencies centered around the cutoff frequency.

5. Now turn the filter's STATE knob to HP (high-pass) and rotate the CUTOFF knob again. Listen to the effect as the filter removes the low-frequencies from the sound.

6. Now press the BANDPASS button and rotate the CUTOFF knob again. This time, the filter removes frequencies above and below the cutoff frequency.

7. Finally, turn the resonance knob to its center positions and repeat steps 3-6 to hear the effect.

There are many intermediate states between the LP, NOTCH, and HP settings. This is one of the reasons that the State-Variable filter is so versatile.

Filter Envelope

The 3rd Wave filter has a dedicated, 4-stage envelope generator (ADSR) with an additional DELAY parameter, which you can use to delay the onset of the envelope. The Filter Envelope is used to shape the harmonic characteristics of a sound by giving you filtering control over its attack, decay, sustain, and release stages.

Without an envelope, the filters would stay open or closed by the amount set by the Cutoff knob — and it wouldn't change over the duration of a sound. Sonically that would be pretty boring. It's also not how instruments behave in the real world. In general, sounds produced by an instrument are brighter at their beginning (the attack stage) and grow mellower as they die out (the decay and release stages). In other words, their harmonic content changes over time. This is what the filter envelope is designed to emulate.
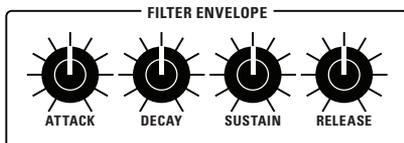
Filter Envelope
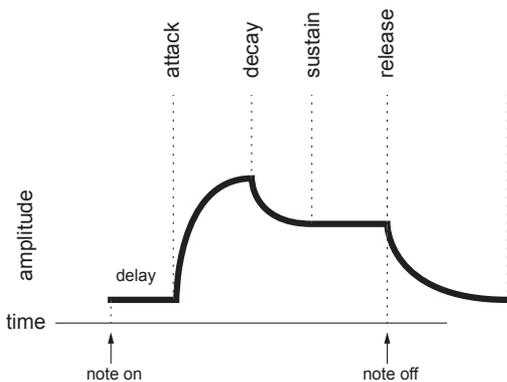
A typical 4-stage ADSR envelope

Filter Envelope Controls

ATTACK: (0-127) Sets the attack time of the envelope. The higher the setting, the slower the attack time and the longer it takes for the filter to open from the level set with the filter CUTOFF knob to the level set by the filter envelope amount. Percussive sounds typically have sharp (short) attacks.

DECAY: (0-127) Sets the decay time of the envelope. After a sound reaches the filter frequency set at its attack stage, DECAY controls how quickly the filter then transitions to the cutoff frequency set with the SUSTAIN knob. The higher the setting, the longer the decay. Percussive sounds, such as synth bass, typically have shorter decays (and some low-pass filter resonance).

SUSTAIN: (0-127) Sets the filter cutoff frequency for the sustained portion of the sound. The sound will stay at this filter frequency for as long as a note is held on the keyboard.

RELEASE: (0-127) Sets the release time of the envelope. This controls how quickly the filter closes after a note is released.

DELAY: (0-100) Sets a variable amount of delay before the envelope is triggered. This is particularly useful when creating multi-part sound if you want the onset of one the parts to be delayed in relation to the others.

SHAPE MODE: (Exponential, PPG) Sets the response of the envelope. You can choose between standard, exponential response, or "PPG" response. The PPG's envelope's were rather unique in their behavior. The best way to get a feel for their behavior is to try them with a variety of Attack, Decay, and Release settings.

Amplifier Envelope

After passing through the filters, a synthesized sound goes into an amplifier, which controls its overall volume. Like the Filter, the Amplifier has a dedicated 4-stage envelope generator (ADSR) with an additional DELAY parameter, which you can use to delay the onset of the envelope.

The Amplifier Envelope is used to shape the volume characteristics of a sound over time by giving you control over its attack, decay, sustain, and release stages Along with the filter envelope, this is one of the most important factors in designing a sound.

Without a volume envelope, the volume of a sound wouldn't change over the duration of a note. It would begin immediately, remain at its full volume for the duration of the note, then end immediately when the note was released. Again, not very interesting sonically and not typically how real instruments behave.

To give you a real-world example, the main difference between the sound of the wind and the sound of a snare drum is that they have very different volume envelopes. Otherwise, they are essentially both white noise. Wind has a relatively slow attack, a long sustain, and a long decay and release. A snare drum has a sharp attack, no sustain, and very little decay or release. But again, they are both fundamentally white noise.
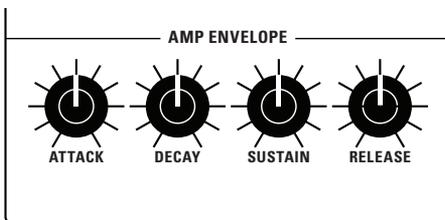
Amplifier Envelope
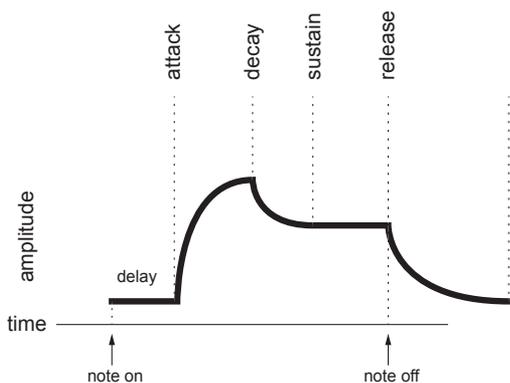
A typical 4-stage ADSR envelope

AMPLIFIER ENVELOPE CONTROLS

ATTACK: (0-127) Sets the attack time of the envelope. The higher the setting, the slower the attack time and the longer it takes for the filter to open from the level set with the filter CUTOFF knob to the level set by the filter envelope amount. Percussive sounds typically have sharp (short) attacks.

DECAY: (0-127) Sets the decay time of the envelope. After a sound reaches the filter frequency set at its attack stage, DECAY controls how quickly the filter then transitions to the cutoff frequency set with the SUSTAIN knob. The higher the setting, the longer the decay. Percussive sounds, such as synth bass, typically have shorter decays (and some low-pass filter resonance).

SUSTAIN: (0-127) Sets the filter cutoff frequency for the sustained portion of the sound. The sound will stay at this filter frequency for as long as a note is held on the keyboard.

RELEASE: (0-127) Sets the release time of the envelope. This controls how quickly the filter closes after a note is released.

ENV AMOUNT: (0-127) (In the menus) Sets the amount of modulation from the Envelope to the VCA. In most cases you will probably want to set this fully clockwise for maximum VCA volume. If you experience signal clipping, try reducing the ENV AMOUNT.

DELAY: (0-100) Sets a variable amount of delay before the envelope is triggered. This is particularly useful when creating multi-part sound if you want the onset of one the parts to be delayed in relation to the others.

SHAPE MODE: (Exponential, PPG) Sets the response of the envelope. You can choose between standard, exponential response, or "PPG" response. The PPG's envelope's were rather unique in their behavior. The best way to get a feel for their behavior is to try them with a variety of Attack, Decay, and Release settings.

Envelopes 3/4

The 3rd Wave has two additional 5-stage envelope generators (Delay+ADSR). These are useful modulating other 3rd parameters according to the shape of the envelope. Routing an envelope to an oscillator's frequency, for example, causes the oscillator's pitch to rise and fall according to the contour of the envelope.

The Auxiliary Envelope can be routed to any of the modulation destinations in the mod matrix. In addition, the Auxiliary Envelope can repeat (loop) using the ENV REPEAT function in the menu. This is useful for cyclical 4-stage modulation.
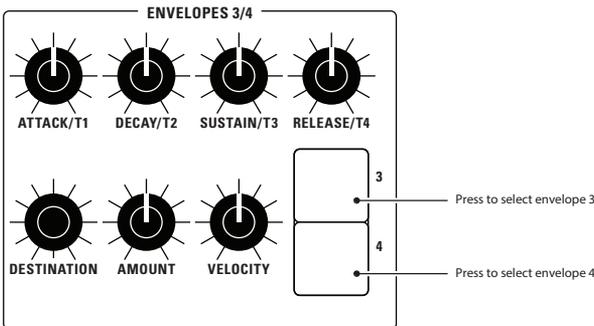
Envelopes 3/4

ENVELOPE 3/4 CONTROLS

ATTACK/T1: (0-127) Sets modulation time for the envelope attack/stage-1. The higher the setting, the longer it takes for the envelope to travel to decay/stage-2.

DECAY/T2: (0-127) Sets modulation time for the envelope decay/stage-2. The higher the setting, the longer it takes for the envelope to travel to sustain/stage-3.

SUSTAIN/T3: (0-127) Sets modulation level for the envelope sustain/stage-3. The mod level will stay at this setting for as long as a note is held on the keyboard.

RELEASE/T4: (0-127) Sets modulation level for the envelope release/stage-4. This controls how quickly the modulation reaches its zero value after a note is released.

DESTINATION: (various) Selects a modulation destination for the Envelope.

ENV AMOUNT: (-127 to +127) Sets the amount of modulation from the envelope to the chosen destination. The modulation amount can be positive or negative, allowing for inverted envelope control.

VELOCITY ON/OFF: (on/off) (In the menus) This enables keyboard velocity to modulate the Envelope Amount.

DELAY: (0-127) (In the menus) Sets a delay between the time the envelope is triggered (note on) and when the attack portion actually begins.

Modulation

Although the overall sound of the 3rd Wave is determined by its oscillators and filters, much of its power to make truly unique sounds comes from creative use of modulation. Modulation is the process of routing one parameter (i.e. a control voltage) to another in order to change the way the targeted parameter behaves.

The concept is simple:

1. Choose a source.
2. Choose a destination.
3. Set an amount. The amount can either be positive or negative.

You already understand and apply the concept of modulation whenever you use the filter envelope to control the filter's cutoff frequency. In this case, the modulation *source* is the filter envelope (or more precisely, any of its controls, such as attack, decay, sustain, or release). The modulation *destination*, is the filter's cutoff frequency. The modulation *amount* is set with the ENV AMOUNT knob.
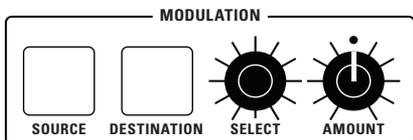
The Modulation section

MODULATION CONTROLS

SOURCE: Selects a modulation source as shown in the display menu.

DESTINATION: Selects a modulation destination as shown in the display menu.

SELECT: Selects among the 16 modulation slots as shown in the display menu.

AMOUNT: (0-127) Sets the modulation amount. Modulation can be either positive or negative.

Modulation Examples

Below are some modulation scenarios that illustrate how to use the modulation matrix. The examples provide full, step-by-step instructions for clarity.

To use the mod wheel to add vibrato:

1. In the LOW FREQUENCY OSCILLATORS section, set LFO 1 to TRIANGLE and set FREQUENCY to 130.

2. Set DESTINATION to OSC ALL FREQ. Set AMOUNT to 0. (You will control the amount with the mod wheel.)

3. In the MODULATION section, press the SOURCE button. Use SOFT KNOB 1 knob to scroll to Mod Slot 1 if it's not already displayed.

4. Use SOFT KNOB 2 to set modulation SOURCE to MOD WHEEL.

5. Use SOFT KNOB 3 to set the modulation DESTINATION to LFO 1 AMOUNT.

6. Use SOFT KNOB 4 to set the modulation AMOUNT to 40.

7. Hold down a note on the keyboard and turn the mod wheel. You should hear vibrato.

Use PRESSURE as the modulation source instead of the mod wheel in the previous example to add vibrato with key pressure/aftertouch.

To use the mod wheel to control the filter cutoff:

1. In the MODULATION section, press the SOURCE button. Use SOFT KNOB 1 next to the display to scroll to Mod Slot 1 if it's not already displayed.

2. Use SOFT KNOB 2 to set modulation SOURCE to MOD WHEEL.

3. Use SOFT KNOB 3 to set the modulation DESTINATION to LOWPASS CUTOFF.

4. Hold down a note on the keyboard (or press the HOLD button and play a note on the keyboard) and turn the mod wheel.

5. Use SOFT KNOB 1 to select the AMOUNT field. Use the soft knob 4 to set the amount to your preference. Higher AMOUNT settings cause the filter to open wider the further you push the mod wheel. A negative amount setting will close the filter the further you push the mod wheel.

Use PRESSURE as the modulation source instead of the mod wheel in the previous example to open the filter (positive AMOUNT) or close the filter (negative AMOUNT) with key pressure/aftertouch.

Other modulation ideas:

- Route ENV 3 to OSC ALL FREQ to create a rising or falling pitch effect each time your press a key. This technique is often used to create the "attack pitch blip" effect in classic synth brass sounds. The shape of the envelope controls the pitch rise and fall.

- Route an LFO to PAN POSITION to create an auto-panning effect. Panning width is controlled by the modulation amount. Panning speed is controlled by the LFO frequency. Add a second mod path to control the LFO speed with the Mod Wheel for a rotating speaker spin-up/spin-down effect. Enable the chorus effect and set up a third mod path to control EFFECT MIX with the mod wheel for even better results.

Effects

The 3rd Wave allows you to add two effects to any program. In stacked sounds, each layer can have its own effect.

Adding a touch of reverb or delay can add a subtle (or not so subtle) sense of ambience and depth. Other effects such as the chorus and phaser are useful for adding more obvious tonal enhancement and are also useful for emulating classic instruments such as string synthesizers.

Effects settings are saved individually with each program. Time-based effects such as the delays can be synchronized to the arpeggiator, sequencer, or MIDI clock to produce repeats that occur on the beat.
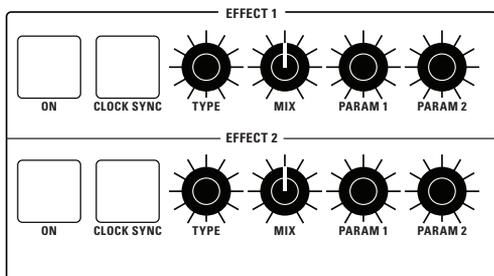
The Effect section

Effects

- BBD Delay - vintage bucket-brigade emulation

- Stereo Delay - classic stereo delay

- Tape Delay - classic tape delay

- Chorus - vintage chorus

- Phaser - vintage 6-stage phaser, high feedback

- Flanger - vintage through-zero flanger, high feedback

- Ring Mod - classic ring modulator

- Distortion - digital distortion (analog emulation)

- Room - classic digital reverb with adjustable size, pre-early reflections, and cutoff

- Hall - classic digital reverb with adjustable size, pre-early reflections, and cutoff

- Superplate - digital reverb with adjustable size, pre-delay and cutoff

Effects Limitations in Multi-Part Programs

All effect combinations are possible on the first two patches of a multi-part program. In other words, you can run any two effects that you want on Part 1 and Part 2.

However, some effects take much more processing power than others. As a result, there are a couple of effect combinations that could cause the 3rd Wave to exceed its processing limit and behave unpredictably. This is true in a 3-part or 4-part program.

Here are some guidelines:

- If you use the Tape Delay on both Part 1 and Part 3, (or both Part 2 and Part 4), only one of these parts can have a second effect.

- If you use the Room or Hall reverbs on both Part 1 and Part 3, (or both Part 2 and Part 4), you can't also use the Leslie Speaker or the Distortion effect in both of the other locations. (On other words, if Part 1 has the Leslie effect and the Hall effect, and Part 3 has the Hall effect, that is acceptable. But you can't use both Leslie and the Hall on both Part 1 and Part 3).

To use effects:

1. Press the ON/OFF switch to turn on effects.

2. Turn the TYPE knob to choose an effect, depending on which you want to apply and configure.

3. Turn the MIX knob to blend in a good amount of the processed signal. You'll want to be able to clearly hear the effect when you tweak its settings. You can dial it down afterward.

4. Use the PARAM 1 and PARAM 2 knobs to adjust the effect's parameters to your taste. See "EFFECTS PARAMETERS" on page 52 for details on the adjustable parameters of each effect type.

5. Finally, adjust the MIX knob again to optimize the amount of the effect. Full left is completely dry. Full right is completely wet (a 100% processed signal).

EFFECTS CONTROLS

ON/OFF: Turns the effect on or off.

CLOCK SYNC: (see table below) When a delay effect is chosen, this enables syncing of the timed delay repeats (feedback) to the arpeggiator, sequencer, or MIDI clock. When CLK SYNC is on, delay time (parameter 1) provides the following values:

Value	Delay Time
Whole	4 beats
Half dot	3 beats
Half	2 beats
Quarter dot	1 1/2 beats
Quarter	1 beat
Quarter triplet	1 1/3 beats
8th dot	3/4 of 1 beat
8th	1/2 of 1 beat
8th triplet	1/3 of 1 beat
16th dot	3/8 of 1 beat
16th	1/4 of 1 beat

Maximum delay time is 1 second. The combination of longer synced delay times with slower tempos can result in delay times that would be greater than 1 second. When that happens, the delay time is divided by 2 until it no longer exceeds the 1 second limit. For example, if the BPM is set to 60 and Delay Time (Parameter 1) is set to Half, the expected delay time would be 2 seconds. The actual delay time will be 1 second (i.e. 2 seconds divided by 2).

TYPE: Selects the effect type.

MIX: (0-127) Sets the balance between the processed (wet) signal and unprocessed (dry) signal. Full left is completely dry. Full right is completely wet.

PARAMETER 1: (0-127) Variable, depending on the effect—This knob adjusts parameter 1 for the chosen effect. Each effect has two adjustable parameters, which differ depending on the effect.

PARAMETER 2: (0-127) Variable, depending on the effect—This knob adjusts parameter 2 for the chosen effect. Each effect has two adjustable parameters, which differ depending on the effect.

EFFECTS PARAMETERS

Effect Type	Parameter 1	Parameter 2	Parameter 3
BBD Delay	delay time	feedback amount	cutoff
Stereo delay	delay time	feedback amount	cutoff
Tape Delay (Echoplex)	time	feedback	wow & flutter head align Rec level tape hiss
chorus	depth	rate	tone
phaser	depth	rate	feedback
flanger	depth	rate	feedback
distortion	gain	tone	output level
Leslie speaker	drive	speed	distance
ring mod	frequency	low-note pitch tracking on/off	carrier
Room Reverb	reverb time	cutoff	early reflection amount
Concert Hall Reverb	reverb time	cutoff	early reflection amount
Room Reverb	reverb time	cutoff	pre delay

Arpeggiator

When you turn on the arpeggiator and hold a chord, the synthesizer will play a pattern based on the individual notes you hold. Choose a mode (up, down, random, etc.), an octave range (1, 2, or 3), and a tempo, then pair it with an appropriate sound and explore.

While you hold down a chord, pressing any additional notes will add those notes to the arpeggio. You can change chords and notes and the arpeggio will continue to play as long as at least one note is always held. You can also use the HOLD feature with the arpeggiator. When you enable HOLD, you can release the notes on the keyboard and the arpeggio will continue to play — with any additional notes that you play added to the arpeggio.
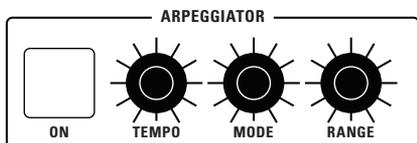
The Arpeggiator controls

To use the arpeggiator:

1. Press the arpeggiator ON/OFF switch to turn it on.

2. Hold down one or more notes on the keyboard. The arpeggiator plays them according to the settings you've chosen.

3. To latch arpeggiation on (so that you don't have to continuously hold down notes) press the HOLD button.

4. Adjust settings such as TEMPO, MODE, and RANGE.

ARPEGGIATOR CONTROLS

ON/OFF: Turns the arpeggiator on and off.

BPM: (20-210) Sets the tempo for the arpeggiator in BPM (beats per minute). The TAP TEMPO LED flashes at the BPM rate. When LFO SYNC is enabled on the low-frequency oscillator, or CLOCK SYNC is enabled in the Effects section, the BPM rate affects the LFO frequency and/or delay effect. When syncing to an external MIDI clock source, the BPM setting has no effect.

MODE: (up, down, up+down, random, assign) Selects among the various arpeggiator modes shown in the display. You can scroll through these and choose their settings with the soft knobs and soft buttons. See the table below for details on each mode.

Mode	Behavior
Up	Plays from lowest to highest note
Down	Plays from highest to lowest note
Up + Down	Plays from lowest to highest and back to lowest
Random	Plays notes in random order
Assign	Plays notes in the order the keys were pressed

RANGE: (1 oct, 2 oct, 3 oct) Set to 1, only the held notes are arpeggiated. Set to 2, the held notes and the notes one octave above them arpeggiate. Set to 3, the held notes and the notes one and two octaves above them arpeggiate. by that interval. Playing a note below middle C transposes the sequence lower by that interval.

NOTE VALUE: (see table below) Selects a basic note value relative to the Tempo/BPM. See the table.

Value	Delay Time
Whole (1)	4 beats
Half dot (2D)	3 beats
Half (2)	2 beats
Quarter dot (4D)	1 1/2 beats
Quarter (4)	1 beat
Quarter triplet (4T)	1 1/3 beats
8th dot (8D)	3/4 of 1 beat
8th (8)	1/2 of 1 beat
8th triplet (8T)	1/3 of 1 beat
16th dot (16D)	3/8 of 1 beat
16th (16)	1/4 of 1 beat

Sequencer

The 3rd Wave Sequencer is a pattern-based sequencer. It provides one sequence per multi-part. Each sequence has up 24 different patterns of up to 32 measures each.

You can also record parameter automation to have the Sequencer control the Filter's cutoff frequency or other controls as a sequence plays.

The 3rd Wave's sequencer also features Song mode. You can arrange any of the 24 patterns in a sequence into a song of up to 24 sections. Each section can repeat up to 64 times and the entire song can be looped to endlessly repeat.
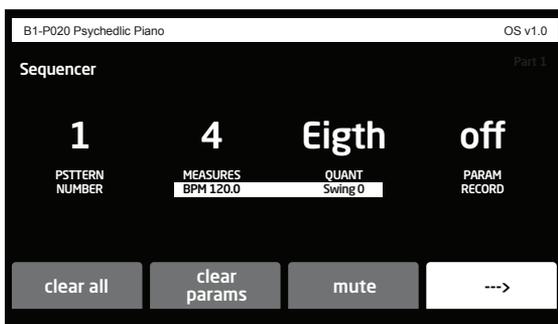
The Sequencer controls

Creating a Pattern

As explained above, a sequence can have up to 24 different patterns.

To record a pattern:

1. Select a program.

2. In the Sequencer section, turn any knob to show the Sequencer controls in the main display.

3. Pattern 1 is selected by default. If you want to record a different pattern, use Soft Knob 1 to select a different pattern to record.

4. Use Soft Knob 2 to set the number of measures in the pattern.

5. Use Soft Knob 3 to set a quantization value. This will force the notes that you play to align to the chosen value. You can also set quantization to OFF. When off, the Sequencer will record the notes exactly as you play them without correcting their timing.

You can change the Quantize setting even after you have recorded a pattern. The Sequencer records any notes you play exactly as you play them and applies quantization separately.

6. Press the RECORD button. It flashes indicating it is ready to record.

7. Press the PLAY button. The click track plays a 4-beat count in. Use the TEMPO knob in the Sequencer section to adjust the tempo as necessary.

8. When the click/sequence loops around to the beginning of measure 1, play a series of notes or chords on the keyboard. You can continue to add (overdub) notes to the sequence as it repeats.

9. If you make a mistake, press Soft Button 1 (CLEAR ALL) then repeat steps 6 - 8 to play the notes correctly.

10. To stop recording, press the RECORD button.

11. To stop playback, press the PLAY button.

12. To save the sequence, save the program by pressing the WRITE button twice.

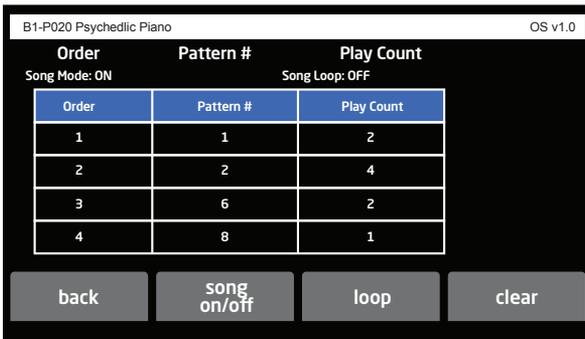### *To temporarily mute a pattern as it plays:*

- As the sequence plays, press and hold Soft Button 3 (MUTE) in the Sequencer's main menu. The Sequencer mutes playback as long as you hold down the button.

Creating a Song

After you have recorded several patterns, you can arrange them into a song. Each Song can contain up to 24 patterns and each pattern can repeat up to 64 times.

To create a song:

1. In the Sequencer section, turn the TEMPO knob to show the Sequencer controls in the main display.

2. In the sequencer menu in the main display, press Soft Button 4 (right arrow). Additional Sequencer parameters appear.

3. Press Soft Button 3 (SONG). The Song parameters appear. Here you will arrange the patterns that you have recorded and specify how many times each pattern repeats.

4. Press Soft Button 2 to turn Song Mode on.

5. Use Soft Knob 1 to select the song section (1-24). This control defaults to section 1.

6. Use Soft Knob 2 to select the song pattern number (1-24). This control defaults to Pattern 1.

7. Use Soft Knob 3 to set the Play Count (1-64). This is the number of times that pattern will repeat before moving to the next section/pattern.

8. If you want the song to loop, press Soft Button 3 (LOOP) and the song will loop as long as the Sequencer's PLAY button is on.

9. When you have finished arranging the patterns in the song, make sure Song Mode is on, then press the Sequencer's PLAY button to begin song playback. (If Song moe is off, the Sequencer will play a single pattern, since this is its default mode of operation.)

10. To save the sequence, save the program by pressing the WRITE button twice.

B1-P020 Psychedlic Piano		OS v1.0
Order	**Pattern #**	**Play Count**
Song Mode: ON		Song Loop: OFF

Order	Pattern #	Play Count
1	1	2
2	2	4
3	6	2
4	8	1

back	song on/off	loop	clear

The Song controls

To temporarily mute a song as it plays:

- As the song plays, press and hold Soft Button 3 (MUTE) in the Sequencer's main menu. The Sequencer mutes playback as long as you hold down the button.

Sequencing Parameter Changes

The Sequencer makes it easy to record parameter changes in real-time as part of any of 24 patterns. To do this, simply turn on PARAM RECORD in the Sequencer menu, then begin recording as you normally would. Then adjust front-panel controls such as filter cutoff, noise level, envelope settings, or other parameters.

As the sequence plays, the Sequencer records the changes to the parameter and incorporates them into the sequence. Be aware of where and when the sequence loops back around to its beginning since the Sequencer continues to record (and possibly overwrite) any parameter changes you make as it repeats.

To sequence parameter changes:

1. Start playback of an existing sequence by pressing the PLAY button in the Sequencer section.

2. Use Soft Knob 4 to set PARAM RECORD to ON.

3. Press the RECORD button in the Sequencer section.

4. As the sequence plays, adjust a parameter (such as filter cutoff).

5. If you want to clear parameter automation in the pattern, press Soft Button 2 (CLEAR PARAMS) all parameter sequencing is erased.

6. To stop recording, press the RECORD button.

7. To stop playback, press the PLAY button.

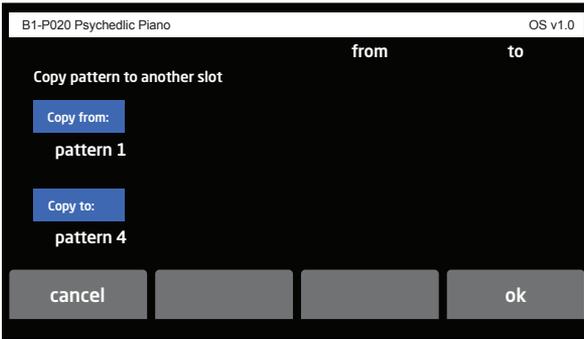8. To save the sequence, save the program by pressing the WRITE button twice.

The Sequencer continuously updates the changes you make as the sequence loops. As long as the sequence continues to play and record you can keep adjusting that parameter or additional parameters. If you stop moving a parameter knob, the Sequencer stops updating the automation and preserves whatever automation is already recorded.

Copying a Pattern

You can copy one pattern to another. Both the notes and any parameter automation in a pattern are copied.

To copy a pattern:

1. In the sequencer menu in the main display, press Soft Button 4 (right arrow). Additional Sequencer parameters appear.

2. Press Soft Button 2 (COPY). In the screen that appears, use Soft Knob 3 to choose the pattern you want to copy.

3. Use soft Knob 3 to choose the destination pattern.

4. Press Soft Button 4. The pattern is copied to the destination.

B1-P020 Psychedlic Piano   OS v1.0

from   **to**

Copy pattern to another slot

Copy from:

pattern 1

Copy to:

pattern 4

cancel   ok

Copying a pattern

The Wave Surfer Knob

The Wave Surfer is a control that moves through all three wavetables at the same time. As long as each oscillator has a wavetable selected and not an analog waveform (A00 to A06), then you will move through the wavetable as you turn the Wave Surfer knob.

WAVESURFER

RESET
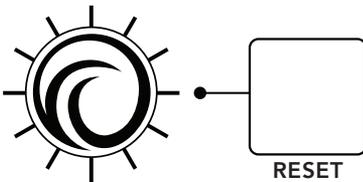
The Wave Surfer Knob

When you turn the Wave Surfer control you are actually changing the waveform position in each of the oscillators. Each increment of the Wave Surfer moves forward or backwards one position from the offset that you have selected for each of your three wavetables with the WAVE OFFSET parameter.

When you move the wave surfer the current position (and wave offset) of each of the oscillators appears in the main display. When you turn the Wave Surfer Knob, you will see the wave positions change according to the offset that the Wave Surfer applies.
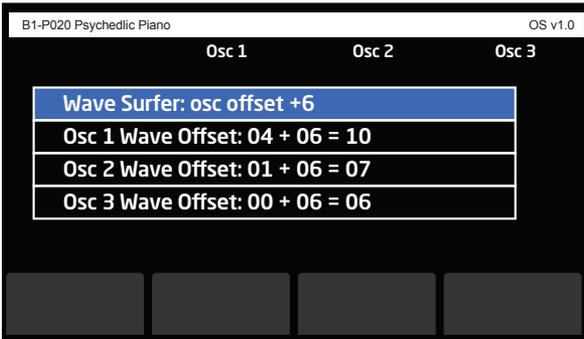
Wave Surfer controls

This page also gives you the option to change the base wave offset for each of the three oscillators independently. This is the same as changing the WAVE OFFSET parameter directly on each of the oscillators.

Turn the Wave Surfer quickly to go through the wavetables and "surf" the waves. Depending on the wavetables that you have chosen, you will hear either subtle or dramatic changes.

Pressing the RESET button sets the Wave Surfer back to zero. The Wave Surfer 's range is from 0 to 63. If you reach the end of any wavetable it will stop at 63 for that selection.

The only exception is with the P wavetables. If you have the UPPER WAVETABLE setting enabled in the WAVE FLOW menu (press the WAVE FLOW button). If you move the Wave Surfer knob beyond the 64th wave position, (position 63), you will hear the P wavetable move into the upper wavetable, which is table P30. (See the Wave Flow section for a further explanation of the Upper Wavetables).

Creating Custom Wavetables

The 3rd Wave has 48 User wavetables (the "U" set). These are 64-wave-shape, high-resolution (96 kHz) anti-aliased wavetables. They were created specifically for the 3rd Wave by our team of sound designers using the built-in Wave Maker tool.

In addition to these 48 wavetables, the built-in WaveMaker utility allows you to create and load an additional 16 of your own custom waves. These will fill slots U48 - U64.

To create your own custom User wavetables you will use the Wave Maker. First you need to import audio into the 3rd Wave. There are two ways to do this.

To import audio into the 3rd Wave:

- Connect an audio source to the rear-panel audio in using an unbalanced, ¼ inch audio cable.

OR

- Create a 96 kHz, 16-bit or 24-bit monophonic .wav format audio file and import it into the 3rd Wave using a USB cable.

Some Technical Details

Before you use the Wave Maker, it's useful to know how it works. As explained earlier, a wavetable has waveforms that are a single cycle. A single-cycle waveform contains a certain number of samples before it repeats. The number of samples in the cycle is called its *period length*. This number of samples between repeats corresponds to the note or the pitch produced by the 3rd Wave. The period length that the 3rd Wave uses is 1024 samples.

This is important because for the Wave Maker to analyze and convert audio into a wavetable with a 1024 sample period length, it is mathematically optimal to have an audio recording with a pitch of 93.75 Hz (MIDI note F#1).

When the 3rd Wave analyzes a recording, it will try to move the source audio's pitch to 93.75 Hertz or to 187.50 Hertz (one octave higher) in order to make the best wavetable it can. If the source audio has a single detectable pitch, the 3rd Wave's Wave Maker tool can shift that pitch to one of these two pitch frequencies.

The Wave Maker will look for areas in the source audio where the timbre changes and extract those to make the 64 waves that comprise the wavetable. If the timbre of the source audio changes only minimally, the extracted waveshapes will be very harmonically similar. If the timbre of the source audio changes dramatically over the length of the sample, the extracted waveshapes will be very harmonically different.

If you record noise or a sound that has either multiple pitches or no pitch at all, the 3rd Wave will still make a wavetable, but it may sound quite different than the source audio.

There are a few things you can do to get the best results with the Wave Maker.

For best results when making User wavetables:

- Avoid effects on the source audio sample (reverb, chorus, phasing, etc.)

- If possible, when using pitched audio material such as a sample of an instrument, create the sample at a pitch of F#1 (93.75 Hz) — F# below middle C.

- If you are using non-pitched source audio such as noise, turn on the NOISE INPUT parameter in the Wave Maker before creating the wavetable.

- The audio source to be analyzed should be no longer than 20 seconds. Shorter is better.
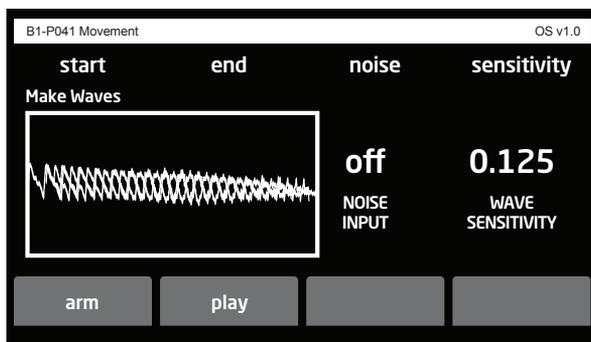
Creating a Wavetable via the Audio In Jack

It is quick and easy to create a wavetable by connecting an audio source to the AUDIO IN jack on the rear panel of the 3rd Wave.

To create a wavetable via the Audio In jack:

1. For simplicity, create a Basic Program by pressing the GLOBAL button and using Soft Knob 1 to scroll to the SET INPUT PROGRAM command. Then Turn Soft Knob 2 (GO) to initialize the program. (The Basic Program conveniently lets you turn the Mod Wheel to sweep through the waveshapes in the active wavetable, which you will do to audition the user wavetable you create.)

2. In the Oscillator section, use the LEVEL knob to turn down the levels of Oscillator 1 and Oscillator 2. It is best to only hear Oscillator 1 for this example.

3. With an unbalanced, ¼ inch audio cable, connect an audio source to the AUDIO IN jack on the rear panel of the 3rd Wave.

4. Make sure the audio source is at an acceptable volume without distorting.

5. Press the MAKE WAVES button below the main display. The Wave Maker controls appear in the display.

6. If you are sample non-pitched material such as noise or percussion, turn Soft Knob 3 (noise input) and set it to ON.

7. Press Soft Button 1 (ARM) then play the audio source. The maximum sample length is 20 seconds, but shorter audio samples will often result in better results. For best results, play the audio source/instrument's pitch at F#1.

8. When the source audio ends, the Wave Maker will display the sampled audio waveform.

9. Press Soft Button 2 (PLAY) to audition the sample and make sure it is what you intended. If its volume level is too low, adjust it on your audio source and repeat step 7.

10. If you want to adjust the start and end points in the sampled audio, use Soft Knob 1 and Soft Knob 2 to make these adjustments.

11. To adjust the sensitivity that determines where the Wave Maker looks for appropriate "waveform" points within the audio, adjust the Wave Sensitivity encoder with Soft Knob 4. The default setting of 0.125 is sensitive. Turning Soft Knob 4 clockwise results in less sensitivity and fewer timbral differences to extract waveforms (i.e. fewer dramatic timbral changes).

12. Press Soft Button 4 (MAKE TABLE). The Wave maker analyzes and creates a wavetable from the sampled audio.

13. To audition the new wavetable before saving it, go the Oscillator section and use the WAVETABLE knob to set Oscillator 1 to "WM" as its wavetable. This wavetable is the very last wavetable available (after the "A" set).

14. Hold down a note on the keyboard and move the Mod Wheel to sweep through the waves in the wavetable.

15. If you like what you hear, press the Make Waves button again to display the Wave Maker screen.

16. Press Soft Button 3 to save the wavetable.

17. In the screen that appears, use Soft Knob 3 and 4 to name the wavetable.

18. Use Soft Knob 2 to select a numbered location in the User set for the new wavetable.

19. Press Soft Button 4 (OK) to save the wavetable. The wavetable will now appear at the end of the "U" set along with the name you have given it. You can now use the Wave Envelope and other controls to sweep through the wavetable as you like.

Make Wave controls

Creating a Wavetable via USB

A second way to create a wavetable is to record a .wav file externally in advance and import it into the 3rd Wave over USB.

To import audio via USB:

1. For simplicity, create a Basic Program by pressing the GLOBAL button and using Soft Knob 1 to scroll to the SET INPUT PROGRAM command. Then Turn Soft Knob 2 (GO) to initialize the program. (The Basic Program conveniently lets you turn the Mod Wheel to sweep through the waveshapes in the active wavetable, which you will do to audition the user wavetable you create.)

2. With your computer and an audio recording application, create a monophonic, 96 kHz, 16-bit or 24-bit .wav file.

3. With a USB 2.0 cable, connect the 3rd Wave to your computer. The 3rd Wave will appear on your computer desktop. Double-slick the 3rd Wave icon to open it. You will see several folders.

4. Drag the .wav file from your computer into the 3rd Wave folder called "Audio."

5. On the 3rd Wave, press the GLOBAL button and use Soft Knob 1 to scroll to the READ WAVEMAKER WAVE FILE command.

6. Turn Soft Knob 2 (GO) clockwise. You will see the name of the .wav file.

7. Press Soft Button 4 (OK). The 3rd Wave imports the .WAV file.

8. The Wave Maker screen appears in the display. The Wave Maker displays the imported .wav audio.

9. Press Soft Button 2 (PLAY) to audition the sample and make sure it is what you intended.

10. If you want to adjust the start and end points in the sampled audio, use Soft Knob 1 and Soft Knob 2 to make these adjustments.

11. To adjust the sensitivity that determines where the Wave Maker looks for appropriate "waveform" points within the audio, adjust the Wave Sensitivity encoder with Soft Knob 4. The default setting of 0.125 is sensitive. Turning Soft Knob 4 clockwise results in less sensitivity and fewer timbral differences to extract waveforms (i.e. fewer dramatic timbral changes).

12. Press Soft Button 4 (MAKE TABLE). The Wave maker analyzes and creates a wavetable from the sampled audio.

13. To audition the new wavetable before saving it, go the Oscillator section and use the WAVETABLE knob to set Oscillator 1 to "WM" as its wavetable. This wavetable is the very last wavetable available (after the "A" set).

14. Hold down a note on the keyboard and move the Mod Wheel to sweep through the waves in the wavetable.

15. If you like what you hear, press the Make Waves button again to display the Wave Maker screen.

16. Press Soft Button 3 to save the wavetable.

17. In the screen that appears, use Soft Knob 3 and 4 to name the wavetable.

18. Use Soft Knob 2 to select a numbered location in the User set for the new wavetable.

19. Press Soft Button 4 (OK) to save the wavetable. The wavetable will now appear at the end of the "U" set along with the name you have given it. You can now use the Wave Envelope and other controls to sweep through the wavetable as you like.

Miscellaneous Settings

1. Output routing - The routing for the multi-parts to the 4 stereo output pairs on the back of the unit. See the section entitled "To assign Multi-parts to individual rear-panel outputs" for a further explanation

2. Envelope Type - Exponential or PPG Shape. The default is a modern exponential envelope shape. The PPG Shape is the shape and length as measured across two vintage PPG 2.2 and 2.3 units.The PPG envelope is still exponential in shape but more linear than a typical ADSR shape. It is also a lot longer for the same setting than a typical ADSR envelope.

3. Circuit Drift - The amount of random fluctuation that is sent to the envelope times, the filter cutoffs, and the pitch of each oscillator. Range = 0 to 255. A well calibrated vintage synthesizer will usually fall in the range of 33 to 72. Anything beyond this and the randomness will start to be noticeable all the way to bad at the 255 level.

4. Compressor - Limiter that protects against clipping in the synthesizer signal before going into the effect stage. If effects are off this is a final level limiter. The setting is either on or off, with a default to on.

5. Pitch Wheel Destination - Modulation destination for the Pitch Wheel as a source. The default is to the oscillator frequency for all three oscillators. This can be set to any other destination, but the range is always calculated in semitones.

6. Pitch Wheel Range Up - 0 to 2 octaves in semitone steps

7. Pitch Wheel Range Down - 0 to 2 octaves in semitone steps

8. Velocity Strength - Setting that determines the way the keyboard reacts to your playing velocity - 1. Velocity Off, 2. Light, 3. Medium, 4. Heavy, 5. Half 84, 6. Piano

9. Pressure Curve - Setting that determines the way the keyboard reacts to your after touch pressure on the keyboard - 1. Off, 2. Normal, 3. Sparse, 4. Hard 2, 5. Hard 3, 6. Sparse 2, 7. Light, 8. Light 2, 9. Fatar Default

10. Glide Mode - Fixed Rate or Fixed Time. Fixed Rate means that the speed at which the glide goes from note to note is the same. This rate is determined by the Glide Rate control. Since the speed is always the same, it will take less time to glide between two notes that are close to each other, and more time to travel the distance between two notes that are far from each other. Fixed Time means that it takes the same amount of time to glide between notes that are close to each other as it does for notes that are far from each other. This amount of time is also determined by the Glide Rate control, but in this case the 0 to 127 is setting the amount of time it takes to glide from note to note, and not the speed that is used to glide between notes.

12. Glide Rate - Speed of the glide or time to glide from note to note depending on the Glide Mode setting - Range 0-127

13. Audio In Level - the level of the audio from the input jack that is being fed into to the low pass filter. The range is from 0-127. This is not a recording level for the Wave Maker.

14. Metronome - The sound you will hear as a metronome when recording with the sequencer - 1. Off, 2. Pulse - Not Pitched, 3. Block, (wood block) - Pitched, 4. Noise - Non-Pitched pink noise

15. Metronome Volume - Level of the metronome that you hear when you are recording with the sequencer - Range 0-127

Global Settings

The GLOBAL menu is where you'll find settings that apply to the synthesizer as a whole — in other words, settings that apply to the overall behavior of the synth. These include such things as master tuning, keyboard velocity curves, MIDI settings, Pitch and Mod wheel calibration, and more.
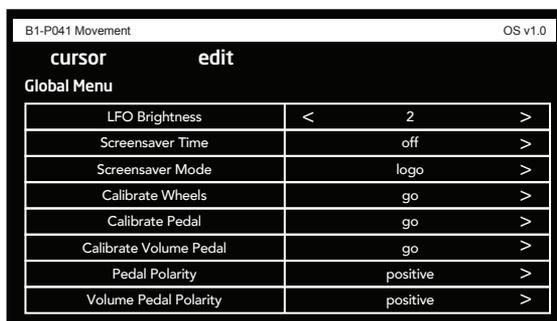
B1-P041 Movement		OS v1.0
cursor	**edit**	
Global Menu		
LFO Brightness	< 2	>
Screensaver Time	off	>
Screensaver Mode	logo	>
Calibrate Wheels	go	>
Calibrate Pedal	go	>
Calibrate Volume Pedal	go	>
Pedal Polarity	positive	>
Volume Pedal Polarity	positive	>

The Global Menu

To use the GLOBAL menu:

1. Press the GLOBAL button.

2. Use Soft Knob 1 to scroll through the list of parameters.

3. To set a selected parameter, turn Soft Knob 2, as necessary.

Here are descriptions of all of the GLOBAL menu parameters.

1. LED Brightness: 1…4—Controls brightness of the main display.

2. Screensaver Time: Off…5 minutes, 1 minutes, 30 seconds—Dims the main display after the specified time. This can help prolong the life of the display over time.

3. Screensaver Mode: Logo, Blank—When the display is dimmed this selects what is shown on screen.

4. Calibrate Wheels—Calibrates the Pitch and Mod wheels. Execute this command and follow the on-screen directions.

5. Calibrate Pedal—Calibrates an expression pedal connected to the rear-panel PEDAL/IN 2 jack. Execute this command and follow the on-screen directions.

6. Calibrate Volume Pedal—Calibrates an sustain pedal connected to the rear-panel VOLUME jack. Execute this command and follow the on-screen directions.

7. Pedal Polarity: Positive, Negative—There are two types of pedals, normally open and normally closed. Either type can be used with the Sustain switch input. This setting allows you to accommodate both models in case yours behaves in a way that is the opposite of what you expect due to its polarity. Connect your pedal to the rear-panel PEDAL/IN 2 jack and choose the appropriate setting based on its behavior.

8. Volume Pedal Polarity: Positive, Negative—There are two types of pedals, normally open and normally closed. Either type can be used with the Sustain switch input. This setting allows you to accommodate both models in case yours behaves in a way that is the opposite of what you expect due to its polarity. Connect your pedal the rear-panel VOLUME jack and choose the appropriate setting based on its behavior.

9. Sustain Footswitch: Pressed Closed, Pressed Open—There are two types of momentary footswitches, normally open and normally closed. Either type can be used with the real-panel SUSTAIN pedal input. This setting allows you to accommodate both models in case yours behaves in a way that is the opposite of what you expect due to its polarity. (Sustain is on until the footswitch is pressed and then it turns off, which is the opposite of the expected behavior.) Connect your pedal and choose the appropriate setting based on its behavior.

10. MIDI In Channel: All, 1…16—Selects which MIDI channel receives MIDI data, 1 to 16. Choosing ALL receives on all 16 channels.

11. MIDI Out Channel: All, 1…16—Selects which MIDI channel sends MIDI data, 1 to 16. Choosing ALL sends on all 16 channels.

12. MIDI Local Control: On, Off—When on (the default), the keyboard and front panel controls directly affect the 3rd Wave. When off, the controls are transmitted via MIDI but do not directly affect the "local" synth (that is, the 3rd Wave). This is primarily useful for avoiding MIDI data loops that can occur with some external Sequencers.

13. MIDI In Cable: usb+midi, usb, midi—Sets the port (MIDI or USB) by which MIDI and MIDI clock are received.

14. MIDI Out Cable: usb+midi, usb, midi—Sets the port (MIDI or USB) by which MIDI and MIDI clock are sent.

15. MIDI Sysex Enable: On, Off—Sets whether MIDI System Exclusive data is received or ignored.

16. MIDI Param Send: Off, CC, NRPN—Changes to the values of front panel controls are transmitted via MIDI as Non-registered Parameter Number (NRPN) controllers or as Continuous Controllers (CC). Transmission of parameters can also be turned off.

17. MIDI Param Receive: Off, CC, NRPN—Sets the method by which parameter changes are received via MIDI. As with transmission, NRPNs are the preferred method.

18. MIDI Clock Mode: Sets the 3rd Wave's mode of sending and receiving MIDI clock messages:

- OFF: MIDI Clock is neither sent nor received
- OUT: MIDI Clock is sent, but not received.
- IN: MIDI Clock is received, but not sent.

19. MIDI Start/Stop Sequence: On, Off—When on, the 3rd Wave's Sequencer will be triggered to play and stop via external MIDI command. The external MIDI must be connected to the rear-panel MIDI or USB ports and MIDI Channel set appropriately.

20. Set Init Program: Turn Soft Knob 2 to reset the current program to a basic program. Press the WRITE button to save it to memory.

21. Export Program—Exports the current program to the PROGRAM directory (folder) on the 3rd Wave. Connect the 3rd Wave to a computer, then click on the 3rd Wave icon on your desktop to access this folder. You can then copy any exported programs to your computer to archive them.

22. Import Program—Imports a program from the 3rd Wave's PROGRAM directory (folder) into the currently selected program slot. To place a program in this directory, connect the 3rd Wave to a computer, then click on the 3rd Wave icon on your desktop and locate the PROGRAM folder. You can then copy any 3rd Wave program that you have saved or archived into the PROGRAM folder. After you have copied a program file, press the GLOBAL button. Then use Soft Knob 1 to scroll to the IMPORT PROGRAM command and use Soft Knob 2 (GO) to execute the command and import the program. Press the WRITE button twice to save the program on the 3rd Wave.

23. Bulk Program Export—Exports all 500 programs to the PROGRAM directory (folder) on the 3rd Wave. Connect the 3rd Wave to a computer, then click on the 3rd Wave icon on your desktop to access this folder. You can then copy any exported programs to your computer to archive them.

24. Bulk Program Import—Imports all programs currently in the PROGRAM directory (folder) on the 3rd Wave. Connect the 3rd Wave to a computer, then click on the 3rd Wave icon on your desktop to access this folder. You can then copy any 3rd Wave programs that you have saved or archived into the PROGRAM folder. After you have copied any program files press the GLOBAL button. Then use the Soft Knobs to select the destination (the starting point in the banks and programs for the import). Use Soft Knob 2 (GO) to execute the command and import the programs. The imported programs will overwrite any previous programs in those locations.

25. Export Wavetable—Exports the wavetable of the currently selected program to the WAVES directory (folder) on the 3rd Wave. Connect the 3rd Wave to a computer, then click on the 3rd Wave icon on your desktop to access this folder. You can then copy any exported wavetables to your computer to archive them.

26. Import Wavetable—Imports a wavetable from the WAVES directory (folder) into the 3rd Wave. Connect the 3rd Wave to a computer, then click on the 3rd Wave icon on your desktop to access this folder. You can then copy any 3rd Wave-compatible wavetable (96 kHz, 16-bit or 24-bit, mono .wav file) from your computer into the WAVES folder. After you have copied a wavetable press the GLOBAL button. Then use the Soft Knobs to select the destination. Execute the command and import the wavetable.

27. Bulk Wavetable Import—Imports all wavetables currently in the WAVES directory (folder) on the 3rd Wave. Connect the 3rd Wave to a computer, then click on the 3rd Wave icon on your desktop to access this folder. You can then copy any 3rd Wave-compatible wavetables (96 kHz, 16-bit or 24-bit, mono .wav files) from your computer into the WAVES folder. After you have copied the wavetables, press the GLOBAL button. Then use the Soft Knobs to select the destination (the starting point in the "P" and "U" wavetable sets). Execute the command and import the wavetables. The imported wavetables will overwrite any wavetables in those locations. For this reason you should back up your factory wavetables first, using the EXPORT WAVETABLE command.

28. Edit Wavetable Names—Use this command to rename any wavetables in the "P" or "U" wavetable sets.

29. Tune Filters—Tunes and recalibrates the analog low-pass filters. You shouldn't have to do this in most circumstances since the filters are pre-calibrated and generally don't require re-calibration or re-tuning.

30. Firmware Update—Allows you to update the 3rd Wave's OS if necessary by importing a new OS from the 3rd Wave's FIRMWARE directory (folder). To install an OS update, download the update from the Groove Synthesis website, then connect the 3rd Wave to your computer. Next, click on the 3rd Wave icon on your desktop and locate the FIRMWARE folder. You can then copy the new OS firmware into the FIRMWARE folder. After you have copied a program file, press the GLOBAL button. Then use Soft Knob 1 to scroll to the FIRMWARE UPDATE command and use Soft Knob 2 (GO) to execute the command and update the OS. Follow the on-screen instructions, and when finished restart the synthesizer.

31. Analog Filter Bypass—Bypasses the analog filters when set to "on" (i.e. bypass is on). In this mode, the digital State-Variable filter is still active.

32. Export Device Image—This command is used to archive the current state of the 3rd Wave and all of its data. You shouldn't need to use it under normal circumstances.

33. Import Device Image—This command is used to restore the 3rd Wave to a previously archived state, if necessary. You shouldn't need to use it under normal circumstances.

34. Read WaveMaker WAV file—This command is used to import a 3rd Wave-compatible .wav file (96 kHz, 16-bit or 24-bit, mono .wav format) into the Wave Maker tool. See "Creating Custom Wavetables" on page 62 for detailed instructions on how to use this.

35. Functions Test—This command is used for internal testing and development. You shouldn't need to use it under normal circumstances.

36. Controls Test—This command is used for internal testing and development. You shouldn't need to use it under normal circumstance

37. Bootloader Update—This command is used for technical support. You shouldn't need to use it under normal circumstances.

How to Sound Like a Vintage PPG

The original PPG 2.2 and 2.3 both used 8 bit wavetables that had 64 symmetric single cycle waves in them. These 31 wavetables are the wavetables that run from P00 to to P30 in the 3rd Wave. The wavetables above P30 that have a P in front of the name are also 8 bit tables, but not tables that were in the PPG.

So, are having these wavetables enough to make it sound like a PPG?. No, there are several other things that are needed. Some of it is built in. For example, the PPGs ran at a high sample rate that was a division of the clock rate that the processor ran at. Your 3rd Wave runs at that same rate when you select a P wavetable. But you also need the waveforms to get "calculated" a certain way without smoothing or any reconstruction filter. To do this, you will also need to look at the 3 items in the Wave-Flow display.

To operate like a PPG, push the WAVE FLOW button and turn on "Use Upper Wavetable", turn off "Waveform Smoothing", and turn off "Wavetable Smoothing". For a complete explanation of what these three buttons do, refer to the Waveflow section. But, to put it in a nutshell, the PPG did not have interpolation when changing from one waveform in a wavetable to another, and it also did not have interpolation when changing from one pitch or note to another. Finally, it would not stop at the highest waveform in a given wavetable if you modulated past the last position in the wavetable, but rather it kept going into wavetable P30 which is the "upper wavetable". With these three settings, you are most of the way to being able to make a PPG sound.

The next thing you will need to do is switch to the envelope shapes that were used in the PPG. You can do this by pushing the "Misc" button in the center section. This miscellaneous section holds parameters that can be saved and changed per patch. The one that you need for PPG is the second parameter, "Envelope Type". Change this from "Exponential" to "PPG Shape". The general shape of the PPG envelopes is less exponentially curved than new synthesizers and they were also set up to go for a longer time than the large majority of hardware synthesizers.

Now you are ready to make PPG sounds, but there are some other things that you need to know about certain controls that could get used in PPG patches. The PPG also had controls that allowed things to change as you moved from the bottom to the top of the keyboard range. First is the KW control. This abbreviation stood for Key to Waves, and determined which note on the keyboard played which waveform in the wavetable. The PPG gave you 8 settings for KW that ran from 0 to 7. Since there are 64 waveforms and 61 notes on the keyboard, you can make the keyboard play a different waveform offset in the wavetable on each note.

On the PPG that meant setting this control to a value of 4. If you go above this on the PPG you could actually skip more than one waveform per note. On the 3rd Wave, all three oscillators have this setting as "Key To Waves". The main difference is the control has 128 settings from 0 to 127. But if you divide up the range the same way, it does the same things as the PPG, just with more choices in between.

So, if you want a different waveform per note starting with 0 in the wavetable and have the next offset in the wavetable play with each higher note, then, just like the PPG, you set this control to half way, or 64 out of 127 in this case. Many PPG Patches used this feature instead of having the waveforms move in a wavetable. There was also a KF and a KL control that also had 8 settings each. KF was Key to Filter, and this is a control that changes the filter cutoff depending on the key hit. This is more common to many synthesizers. On the 3rd Wave, this is the Key Amount control that is present in both of the filters. 0 does nothing. 3 on the PPG meant the filter cutoff changed by an octave as you go an octave higher on the keyboard. On the 3rd Wave this corresponds to 63 out of 127. 7 on the PPG was two octaves of change to the cutoff for each octave on the keyboard. On the 3rd Wave that is the 127 setting. Again, the 3rd Wave has more possibilities in between.

The KL control was Key to Loudness. This would change the volume that you heard depending on the note on the keyboard, but it was usually subtle. For the 3rd Wave this is controlled by letting the Note Number be your modulation source, and letting the Oscillators Level All be your modulation destination. Dial up +64 out of 127 to make the high notes louder, and dial up -64 to make the low notes louder than the high notes.

The other factor is the Upper Wavetable. The PPG had a UW control for Upper Wavetable. This had a different meaning than on the 3rd Wave. We use it so you can decide whether you want to spill over into the upper wavetable if you modulate past the end of a P wavetable, but on the PPG that was always like this.

With this setting off on the 3rd Wave, you will always stop at offset 59 for the P wavetables or offset 63 for the user wavetables. So, what did the UW on/off switch do on the PPG? Well on the PPG you could make a stack patch by making two different patches between what was called Group A and Group B. Any patch could have hold two different patches, one in A and one in B. The problem was that you had to use the same wavetable for both patches. So if you selected wavetable 04, it was going to use 04 for both Group A and Group B. Your stack would be two different patches, but both using the same wavetable. The UW control let you get around this by assigning wavetable 30, the upper wavetable, to the A patch, and whatever wavetable you selected on the display, (say wavetable 04), to the B patch. This was the only way to create a stack with patches that used two different wavetables. Group B could be any wavetable you selected, but Group A would always be wavetable 30. On the 3rd Wave you have 4 different patches/parts available to you at all times. So if you want to re-create a PPG Patch that had UW on, make the patch in part 1 that is re-creating Group A use P30 as the wavetable for both oscillators. The second patch in part 2 will be doing Group B, so make that whatever P wavetable was in the PPG original patch.

The last thing to remember is that a PPG patch only uses 2 oscillators, since that is the total is had for each note. And… you need to use the same wavetable on both the oscillators. In the example above, if UW is on, then the Group A patch would use P30 for both oscillators, and the Group B patch would use the selected wavetable in the display for both of its oscillators. Single PPG Patches also had to have the same wavetable for both oscillators.

Even though the 3rd wave gives you the choice of a different wavetable for each of its three oscillators, make your PPG patches use only two oscillators per part and make both oscillators use the same wavetable. And remember, even if this sounds limiting, you can change the offset for the wavetable between the two oscillators. For instance, oscillator 1 can have an offset of 2 into a given wavetable and oscillator 2 can have an offset of 14. This is what allowed the PPG patches to have more variety even though they had to use the same wavetable.

And one more tip: Make the detuning between your two oscillators correct to sound authentic. Look at some of the factory patches in the 3rd Wave that are PPG patches. A common detune between the two oscillators amounts to -3 and 3 for the fine tune on the 3rd Wave. Also, don't forget to use at least 64 for the Circuit Drift control in the Miscellaneous section. This makes the oscillator pitch, envelope times, cutoff frequencies, and other parameters move randomly by a small amount.