



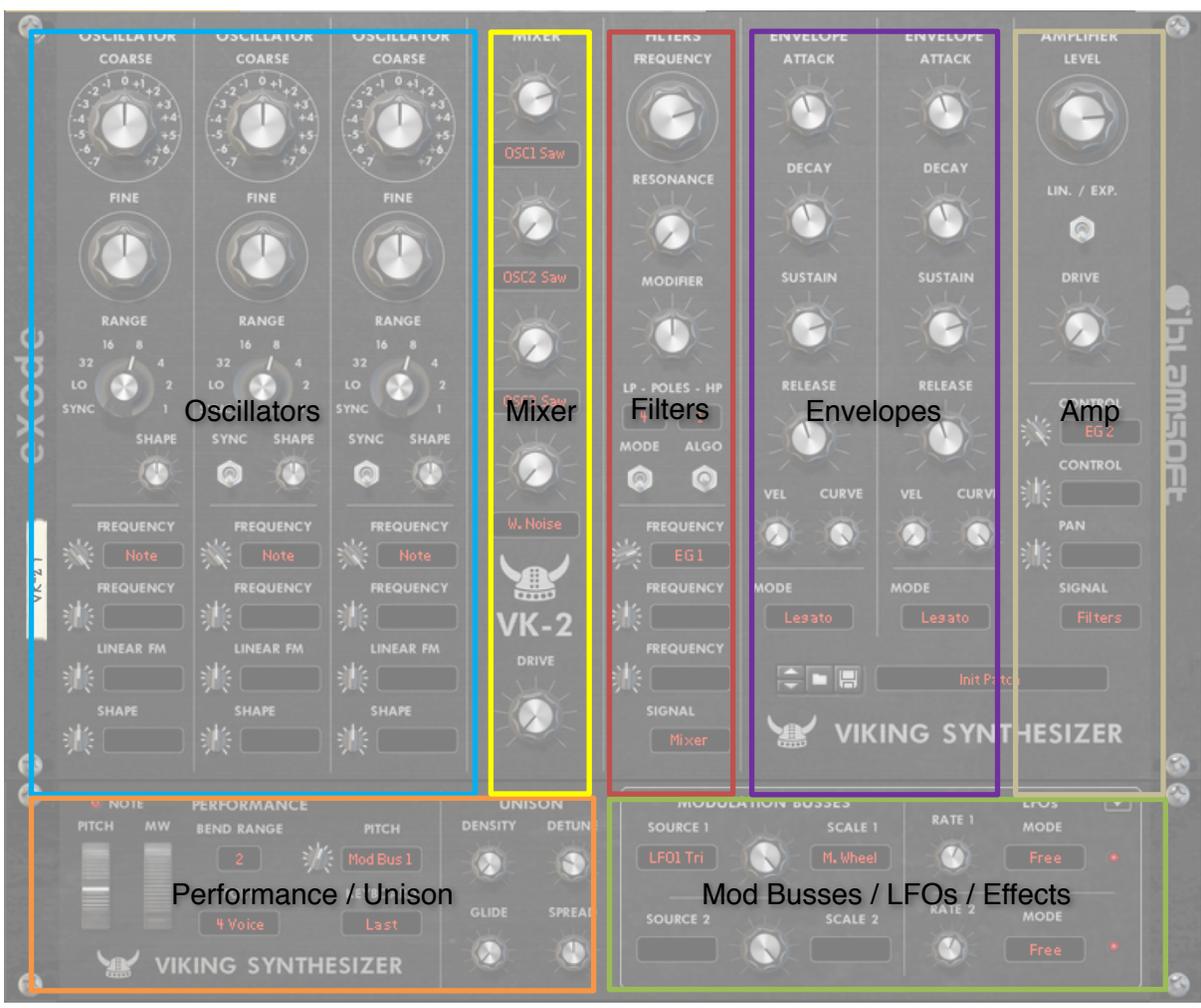
## VK-2 VIKING SYNTHESIZER

# Overview

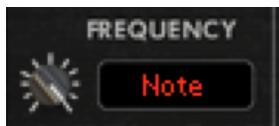
VK-2 brings you the power of a modular synthesizer without the hassle of cables. All of the individual synthesis components can be freely routed giving you ultimate power and flexibility. You can just as easily use VK-2 as a mean sounding hardwired analog synth in the default configuration. At the heart of VK-2 are three analog modeled oscillators with waveforms from famous modules. Throughout the device there are DSP enhancements that add analog realism to the sound, from the modeled CP-3 mixer clipping to the Zero Delay Feedback filter section. Pristine effects polish your sounds to perfection. You'll soon be creating modular patches like a pro without leaving the comforts of your own computer.

# Sections

Getting familiar with the overall layout is a very import first step to learning VK-2.



# Modulation Connections



There are many LCD displays on VK-2 that allow you to connect modulation sources to a target destination. Each display, located in the modular sections, represents a parameter that can be modulated, for example oscillator frequency. You can think of the parameter displays as control jacks on a hardware module.

Shift-drag from any parameter display to a source hot-spot on the panel to make a connection. For example, you can shift-drag from one of Oscillator 1's frequency to an LFO. This connects the source (from the hot-spot) to the destination (the display). Alternatively, you can select modulation sources from the menu available with a simple click.

The modulation amount knobs allow you to adjust the amount of modulation, and invert it when the knob is to the left of center.

Note that there are two parameters labeled "Signal". Instead of being for modulation, these select the input for that section's signal path. These typically are connected to audio outputs from another section.

There is a common list of sources available at each parameter display.

Note, Velocity, Aftertouch, Mod Wheel, Pitch Wheel	MIDI control values
Constant	A constant maximum positive value
Random	A random value for each note played
Oscillator waveforms	Waveforms of various shapes for each oscillator
Mixer	Output of the mixer section
Filters	Output of the filters section
Amp	Output of the amplifier section
Pink noise, White noise	Two types of audio noise
LFO waveforms	Waveforms of various shapes for each LFO. Note: SH 1 is a sample and hold, SH 2 is a smoothed sample and hold
EG1, EG2	Envelope signals
Mod Busses	Outputs from the two mod busses
CV Inputs	CV inputs are located on the back panel
Audio Inputs	Audio inputs are located on the back panel

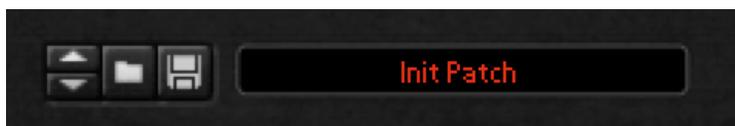
# Performance/Polyphony



This lower left section includes performance controls, pitch modulation, and polyphony.

- Pitch Wheel – Controls the pitch during performance.
- Mod Wheel – Performance control that is selectable as a modulation source.
- Pitch Bend Range – Adjusts the range of the pitch wheel effect in semitones. You can set the pitch bend range to 0 and use the pitch wheel as a performance parameter.
- Polyphony – Adjusts how many simultaneous notes can be played by setting the number of synth voices. In the monophonic and n-voice modes, a synth voice is active when its envelopes are running. In the modular mode, a single voice is always on, it does not shut off with the envelopes.
- Pitch Modulation – The source and amount of pitch modulation of all three oscillators simultaneously can be set.
- Keyboard Mode – The keyboard mode determines how notes are played in monophonic polyphony modes (Mono or Modular):
  - Last – The last key pressed sets the pitch.
  - Lowest – The lowest key pressed sets the pitch
  - Highest – The highest key pressed sets the pitch
  - Single – A key will set the pitch as long as it is held regardless of other key presses

# Patches



You can browse the factory sound bank, or save and load your own patches in the middle right Patches section.

# Oscillators



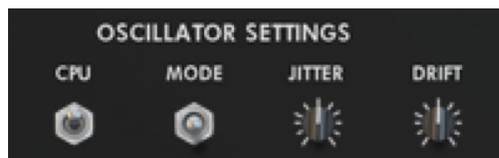
The upper left Oscillators section provides control over the three main oscillators. These oscillators have basic shapes, as well as a variable shape from VK-1.

- **Coarse** - Normally, this controls a semitone offset from the keyboard pitch. In Sync mode, this controls the beat division. In Low mode, this controls the octave.
- **Fine** - Normally, this controls the fine tuning of the oscillator in cents. In Sync and Low modes, the fine tuning is in semitones.
- **Range** - The range switch sets the octave of the oscillator, or puts the oscillator in Sync or Low modes. Sync mode is low frequency mode with beat divisions as the frequency. Low mode is also low frequency, with a frequency four octaves below the 32' setting. Note: 8' is at the same octave as the keyboard.
- **Shape** - The shape knob controls the pulse width of the rectangular shape and the variable waveform shape of the VK-1 waveform. The shape knob only affects those two waveform sources, not the base shapes.

- **Sync** - Sync allows you to sync an oscillator to Oscillator 1's output using either a hard sync or a reverse sync algorithm.
- **Modulation Inputs**

Frequency 1	Pitch in semitones (typically keyboard Note)
Frequency 2	Pitch in semitones
Linear FM	Linear pitch, useful for audio rate FM
Shape	Shape of rectangular and VK-1 waveforms, useful for pulse width modulation

## Oscillator Tweaks



On the back of the devices there are a few settings to subtly tweak the oscillators.

- CPU - Can save CPU at the cost of less accurate Linear FM and some loss of clarity on very low notes
- Mode - Allows you to choose waveforms from two hardware modular oscillators, the 921 or the Mini, or use clean waveforms.
- Jitter - Controls the amount of jitter in the oscillator's frequency
- Drift - Controls the amount of slow frequency drift
- Tracking - There is a knob located in each oscillator column for subtly tweaking the keyboard tracking for results like an uncalibrated analog synth.

## Waveforms

There are several waveforms generated simultaneously for each oscillator. They can be chosen in the modulation parameter (or signal) displays.

Sine	Classic sine wave, has noticeable warmth in the 921 and Mini modes
Triangular	This waveform can sound noticeably different in the 921 and Mini modes
Sawtooth	The sawtooth from the different modes are almost identical
Rectangular	A pulse with its width set by the shape knob, slightly less harsh for 921 and Mini
VK-1	This oscillator has become a modern classic, variable shape is determined by the shape knob

# Mixer



The middle Mixer section provides a mixer with four inputs and a drive control.

- Input and Amount - The input can be chosen from any of the common modulation sources. Typically, you would use one of the oscillator waveforms. A gain control is provided to control the source level.
- Drive - The drive algorithm provides saturation, soft clipping, or analog modeled hard clipping from the CP-3 mixer. Note: The mode is selected on the back.

# Filters



The middle right Filters section provides a dual filter module. The filters are Zero Delay Feedback with accurate analog saturation.

- Frequency - This knob controls the cutoff frequency of the filter.
- Resonance - This knob controls the amount of resonance (or peaking at the cutoff frequency).
- Modifier – When the filter is in Dual LP mode, this controls the difference in frequency between individual filters for the left and right channels. When the filter is in HP / LP mode, this controls the difference in frequency between two series filters that create a band pass effect. In Notch mode, this cross-fades between lowpass and highness filters to create the notch response.
- Poles - Poles determine the cutoff slope of the filter. You can think of more poles as stronger filtering.
- Mode - You can choose between Dual Lowpass (stereo lowpass), Highpass / Lowpass (effective bandpass), and Notch
- Algorithm - This switch lets you choose between less CPU usage or higher quality processing and saturation.
- Drive - This knob adjusts the gain into the filter for subtle warmth and grit. Note: this is located on the back of the device.
- Compensation - This knob adjusts the gain of the filter output compared to the resonance knob. High compensation will result in more output gain when resonance is turned up. Note: this is located on the back of the device.

- Modulation/Signal Inputs

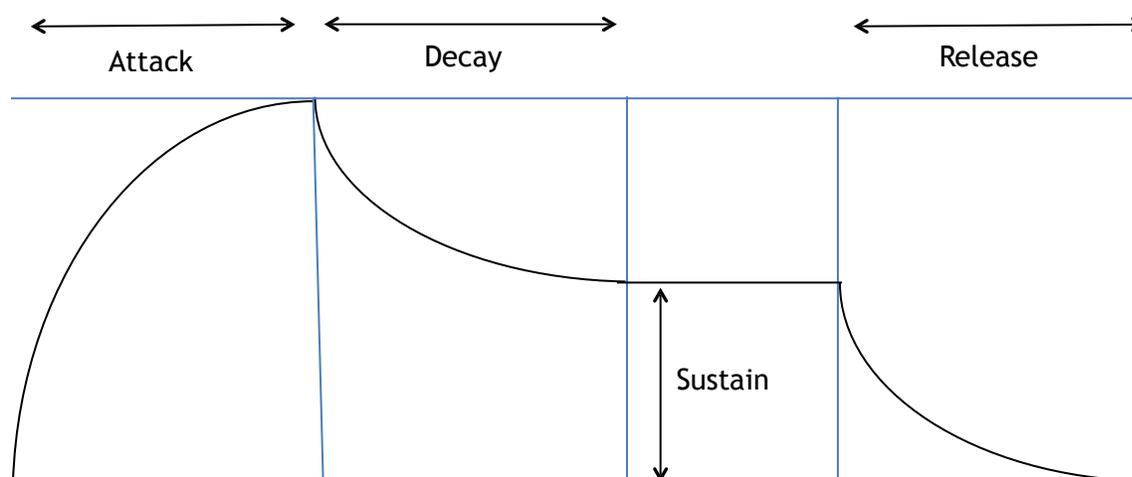
Frequency 1	Cutoff frequency (typically an envelope)
Frequency 2	Cutoff frequency
Frequency 3	Cutoff frequency
Signal	Input signal to the filters (typically the mixer output)

# Envelopes



The two envelopes provide a modulation signal that typically would be used to shape filter cutoff or volume. In VK-2, the envelopes can shape anything that has a modulation input. The envelopes are typical ADSR analog-style envelopes common in many synthesizers.

- Attack - Adjusts the attack time of the envelope
- Decay - Adjusts the decay time of the envelope
- Sustain - Adjusts the sustain level of the envelope
- Release - Adjusts the release time of the envelope
- Velocity - You can add velocity sensitivity to the envelope, this will makes its amplitude depend on velocity.
- Curve - Curve allows you to adjust the curvature of the envelope stages. Note: 100% curvature models an analog envelope.



- Mode - You can choose one of several modes for the envelope operation
  - Legato - If with no other notes are held, the Envelopes trigger when a note is played. If other notes are held, the envelopes do not trigger.
  - Retrigger - Envelopes trigger any time a note is played
  - Loop AD - The attack and decay portions loop while a key is held, then the release stage happens as usual
  - Loop ADR - The attack, decay, and release stages all loop continuously
  - Loop S - The attack, decay, and release stages all loop continuously with times controlled in beat divisions
  - CV Inputs - One of the CV inputs is used as a gate for the envelope

# Amp



The right Amplifier section provides a voltage controlled amplifier. It is typically used after the filters in the signal path as the output stage of the synth. Note, the effects are connected just prior to the Amp section output in the signal path.

- Level - Output level of the synth, pre-effects
- Mode - You can set the amp to operate on a linear scale or a dB scale. Typically, you would use a linear scale.
- Drive - The drive algorithm provides saturation, soft clipping, or analog modeled hard clipping from the CP-3 mixer. Note: The mode is selected on the back.

- Modulation/Signal Inputs

Control 1	Amplifier level (typically an envelope)
Control 2	Amplifier level
Pan	Left/right panning
Signal	Input signal to the amp (typically the filters output)

# Mod Busses / LFOs



The two Mod Busses and two LFOs provide low frequency modulation signals for use in destinations throughout the synth.

## Mod Busses

Mod Busses are like VCAs (voltage controlled amplifiers) with the scale signal acting as the control input. Each Mod Bus has a source, scale, and scale amount. The bus's input signal (source) is scaled by the scale value. The amount of scaling is controlled by the scale amount. Note: This is not like a mod matrix, the destination is not chosen here, it is instead chosen in a modulation parameter display elsewhere on the synth.

- Source - Input signal
- Scale - Amplitude control
- Amount - Scale amount

## LFOs

Each LFO has multiple waveforms that can be chosen at the destination.

- Rate - Adjusts the rate in hertz, or allows you to select a beat division in synced mode.
- Mode - This lets you select one of four operating modes for the LFO.
  - Free – The LFO is free running with frequency in hertz.
  - Reset – The LFO resets to the beginning of its waveform when a key is pressed.
  - One Shot – When a key is pressed, the LFO goes one time through its waveform and stops
  - Sync – The LFO runs continuously, synced to the transport, with its frequency set to a beat division

There are several waveforms generated simultaneously for each LFO. They can be chosen in the modulation parameter (or signal) displays.

Sine	Classic sine wave
Triangle	Classic triangle
Ramp	Upward sawtooth
Sawtooth	Downward sawtooth
SH 1	Classic sample and hold
SH 2	Smoothed sample and hold

# Effects



VK-2 has five on-board effects that allow you to add depth and interest to your patch. The effects are connected to the Amp section. The effects are enabled and re-ordered using the display. Click to enable/disable. Drag to reorder them in any order. The included effects are chorus, equalizer, phaser, distortion, delay, and reverb.

- Chorus – Adds thickness by mimicking the sound of unison
- Phaser – Offers the distinct phasing effect with a wide range of options
- Distortion – Allows you to create grit or bit crushing effects.
- Delay – Provides various echo effects
- Reverb – Adds a hall-like space to the sound

## Chorus



The Chorus unit provides a Roland Dimension D influenced chorus effect that can add stereo width and richness to your patch. It offers an additional feedback control.

- Delay – Adjusts the mid-point for the delay taps
- Rate – Adjusts how fast the delay taps move
- Depth – Adjusts how far the delay taps move
- Feedback – Adjusts feedback in the delay lines
- Mix – Sets the wet/dry mix for the effect

## Phaser



The phaser offers up to 6 notches, with configurable notch width and feedback, for a wide range of phasing sounds.

- Notches - Number of notches in the frequency response, more create a thicker sound
- Notch width - Bandwidth of the notches
- Frequency - Frequency range of the effect, controlling the low end frequency of the LFO
- Mod Amount - Adjusts the LFO strength
- Feedback - Amount of feedback present in the effect
- Rate - Rate of the LFO that controls the frequency of the all-pass filters
- Offset - LFO offset between the left and right panned effects
- Mix - Sets the wet/dry mix for the effect

## Distortion



The Distortion effect can add anything from warmth, to grit, to crushing mayhem.

- Drive - Gain into the distortion algorithm that results in more distortion
- High Cut - Lowpass filter
- Low Cut - Highpass filter
- Type - Chooses between several distortion algorithms
- Level - A post-distortion gain setting
- Mix - Sets the wet/dry mix for the effect

## Delay



The delay unit offers a repeating echo. It has quite a few additional parameters that can spice up the effect.

- Delay Mode – At the lowest setting, the delay is in normal mode, otherwise it is in ping pong mode
  - Normal - Input signal is delayed with no panning effect

- Ping Pong – Echoes bounce between left and right channels starting with left, spread controls panning amount
- Time – Adjusts the delay time in beat divisions
- Rate – Adjusts the delay time for the right channel
- Tone – Adjusts filtering inside the feedback path. Turning the knob to the left of center creates lowpass filtering. Turning the knob to the right of center creates highpass filtering.
- Drive – Adjusts a subtle distortion effect on the delayed signal
- Feedback – Controls how fast the echoes decay
- Mod Amount – Turning up the Mod Amount creates a changing delay time with a slight offset between left and right delay times
- Mod Rate – Adjusts the rate of the modulation set by Mod Amount
- Mix – Sets the wet/dry mix for the effect

## Reverb



The reverb effect adds a hall-like spatialization effect to the sound.

- Low Time – Adjusts the T60 decay time for the low-range frequencies
- Mid Time – Adjusts the T60 decay time for the mid-range frequencies
- Crossover – Adjusts the cross-over frequency between mid and low range
- Damping – Sets the frequency of high frequency damping
- Delay – Adds a delay to the signal to simulate a larger space
- Mod Amount – Adds subtle variation in the decay times
- Mod Rate – Adjusts the modulation rate of the decay times
- Mix – Sets the wet/dry mix for the effect

# Connections



## Oscillator Connections

- Outputs are available for each of the oscillator waveform shapes.
- Individual inputs are available for the same parameters that can be modulated using displays on the front panel.

## Mixer Outputs

Connections are available from the mixer in both audio and CV format.

## Filter Connections

- Audio outputs are available for the filtered signal.
- Filter frequency and resonance have individual modulation inputs.
- The audio input signal should be connected to the Signal inputs.

## Envelope Outputs

A CV output is available for each envelope.

## LFO Outputs

The individual waveforms from the LFOs are available as CV outputs.

## Amp Connections

- Audio and CV outputs are available for the amplified signal.
- Control (gain) and pan have individual modulation inputs.
- The audio or CV input signal should be connected to the Signal inputs.

## Performance CV Inputs

The Performance CV Input group lets you control VK-2 with an external triggering device such as the Matrix Pattern Sequencer. VK-2 supports the PolyCV protocol for polyphonic triggering.

- Gate – Controls triggering velocity
- Note – Controls triggering note
- PW – Pitch Wheel input
- MW – Mod Wheel input
- AT – Aftertouch input
- Sust – Sustain pedal input

## Global Inputs

The Global CV and Audio Inputs located at the bottom let you route inputs to any of the modulation parameters using their destination displays.

## Modulation Bus Outputs

Outputs from the Mod Busses are available in both audio and CV format.

# CPU Usage

VK-2 has three switches that directly control CPU usage.

- **Oscillator CPU** – Lowering this setting can help when using Linear FM or oscillator sync in a patch. Note, lowering this setting can make very low notes sound dull and can also result in aliasing for high FM sounds. This setting should be increased for monophonic bass sounds or high pitched FM sounds.
- **Filter Algorithm** – Lowering this setting can improve CPU usage. Note that some “air” and clarity may be lost from the filter sound when in lower modes.
- **Drive CPU** – This setting adjusts the CPU usage of the mixer, amp, distortion effect, and delay effect drive algorithms. Note, the distortion effect may sound harsher with noticeable aliasing at lower CPU settings.

There are two other ways to reduce CPU usage.

- **Reduce Polyphony** – This can help with sounds that have long release tails
- **Use fewer unison voices** – Unison can increase CPU usage

# Credits

- Andrew Best – Design, DSP, Programming, Graphic Design
- Daniel Thiel – Concept, Design, Graphic Design

## Sound Design

The initials in the preset name let you know who designed it:

- EX - Daniel Thiel (eXode)
- AZ - Sami Rabia (Aiyin Zahev)
- TP – Tom Pritchard
- NR - Navi Retlav
- ND - Nicolas Delmotte (odharmonix)
- AP - Ariel Proksa
- QS - Quixotic Sound Design

You can search for presets in Reason's browser using the initials with a dash in front. For example, "-EX".

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**Fastapprox**

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