

Vellum

SPECTRAL AUDIO PROCESSOR

Light filters through layers — sound through frequency

Version 1.4 — User Manual

by Apophenia

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1. Introduction

Vellum is a real-time spectral audio processor plugin (VST3) that transforms sound in the frequency domain using Short-Time Fourier Transform (STFT) analysis and resynthesis. Unlike traditional time-domain effects, Vellum decomposes audio into individual frequency bins and processes them independently, enabling sonic transformations that are impossible with conventional plugins.

Version 1.3 introduced a completely redesigned landscape interface built around an interactive spectrogram and a visual signal-chain strip; version 1.4 adds a full-screen preset browser with category filtering and search. Eighteen processing modules run in a fixed chain — seventeen spectral effects plus a final time-domain ring modulator — each with its own enable LED. A flexible modulation system (two LFOs, an envelope follower, a step sequencer, four macros and a mod matrix) can be routed to parameters by dragging, and 44 factory presets cover a wide range of creative applications.

Key Features

- 18 processing modules in a fixed chain, each independently switchable
- Interactive scrolling spectrogram: Output / Input / Difference modes, three color palettes, log or linear frequency axis, and a live analyzer curve
- Draggable filter handles directly on the spectrogram
- Signal-chain strip: five segment cards, click to focus a segment's controls
- Two LFOs (6 waveforms, tempo sync), envelope follower, 32-step sequencer, and four macros
- Drag-to-assign modulation: drop a source chip onto any moddable knob
- 4-slot modulation matrix with 8 sources and 27 destinations
- Sidechain processing: Cross-Synthesis and Spectral Ducker
- 44 factory presets across 12 categories, plus user preset saving
- A/B comparison, Undo/Redo, Randomize
- MIDI note-to-shift and note-triggered freeze
- Selectable FFT sizes: 1024, 2048, 4096
- Zoomable interface (70% – 150%)

How Spectral Processing Works

Vellum uses an overlap-add STFT pipeline. Incoming audio is windowed (Hann window) with 75% overlap, transformed to the frequency domain via FFT, processed as magnitude and phase arrays across individual frequency bins, then inverse-transformed back to the time domain. This approach enables frequency-selective operations that are fundamentally different from traditional audio effects.

2. Installation

System Requirements

- Windows 10 or later (64-bit)
- A VST3-compatible DAW (Bitwig, Ableton Live, FL Studio, Reaper, Cubase, etc.)
- Stereo audio track or bus

Installation Steps

1. Copy **Vellum.vst3** to your VST3 plugin folder (typically C:\Program Files\Common Files\VST3 or your custom VST3 path).
2. Rescan plugins in your DAW if needed.
3. Insert Vellum as an effect on an audio track or bus.
4. Activate your license (see the next section). Until you do, Vellum runs in demo mode.

NOTE

For sidechain features (Cross-Synthesis and the Spectral Ducker), your DAW must support VST3 sidechain inputs. Route a second audio source to Vellum's sidechain bus in your DAW's routing settings.

3. Activation & Demo Mode

Vellum runs in **demo mode** until it is activated. Demo mode is fully featured — every effect, preset and modulation option is available — but the audio output fades to silence for 5 seconds roughly every 45 seconds so you can evaluate the plugin before buying. A **DEMO** badge appears in the title bar while unlicensed.

Activating Your License

1. Purchase Vellum. Your license key is emailed to you.
2. Click the **DEMO** badge in the title bar, or open the menu (...) and choose **Activate License...**
3. Paste the license key from your purchase email and click **Activate**.
4. A one-time internet connection contacts the activation server, which returns a signed license file stored on your machine.

Once activated, the DEMO badge disappears, the silence interruptions stop, and the license is verified **locally on every launch** — no further internet connection is ever required. The license file is stored at:

%APPDATA%\Vellum\license.json

TIP

Open the menu (...) → **About Vellum** to confirm your status. When activated it reads "Registered to" followed by your email; otherwise it reads "Demo mode - not activated".

NOTE

Your purchase includes free updates within the major version you bought — a version 1 license unlocks any 1.x release. If activation ever fails, contact support@apophenia.audio.

4. Quick Start

1. **Load the plugin** on an audio track with audio playing.
2. **Activate your license** (Section 3) so the audio doesn't drop out, or continue in demo mode to explore.
3. **Select a preset** from the browser at the top, or click **RND** to randomize parameters for instant inspiration.
4. **Toggle modules** by clicking their LED in the chain strip. The LED glows in the module's category color when active.
5. **Click a segment card** in the chain strip to open its modules in the focus panel below, where you can tweak their knobs.
6. **Blend the sound** with the **Dry/Wet** knob in the bottom bar, and watch the spectrogram to see how each effect reshapes the frequency content.

TIP

Start with the “Shimmer Up” or “Spectral Echo” presets to hear dramatic spectral processing. Then toggle individual module LEDs on and off to understand what each one contributes.

5. Interface Overview

Vellum's window is a fixed 1150 × 720 landscape layout (scalable with the zoom control). It is organized top to bottom into five regions:

Title Bar

Running across the very top:

- **Vellum** wordmark and version number (left).
- **DEMO** badge — shown only when unlicensed; click it to start activation.
- **Preset browser** — < / > step buttons, the preset name (click it to open the full browser with categories and search), and **Save** to store a user preset.
- **RND** — randomize parameters within safe ranges.
- **A / Copy** — A/B comparison: toggle between two states, or copy the current state to the other slot.
- **?** — toggles the help overlay: the interface dims and every region is annotated with a short explanation. Click anywhere or press **Esc** to close it.
- **Undo / Redo** — step through recent state changes.
- ... menu — zoom levels, license activation, and About.

Spectrogram

The large scrolling frequency display sits directly beneath the title bar. It is fully interactive — you can drag filter cutoff handles right on it. See Section 6 for details.

Chain Strip

A single horizontal strip shows all 18 processing modules in their **true processing order**, grouped into five titled **segment cards**:

SEGMENT	MODULES (IN ORDER)
Capture & Pitch	Looper, Freeze, Shift, Harmonizer
Texture	Blur, Morph, Scramble, Filter
Delay & Reverb	Delay, Reverb
Dynamics & Color	Gate, Compress, Tilt, Formant
Stereo & Sidechain	Stereo, Ducker, Cross-Synth, Ring Mod

Each module has a small **LED dot**: it glows in the module's category color when enabled and shows dim grey when bypassed. **Click a module's LED to toggle it** on or off without changing which segment is

open. **Click anywhere else on a card** to select that segment — its modules then appear in the focus panel below. A small arrow between cards indicates signal flow from left to right.

Focus Panel

The focus panel shows the controls for whichever segment (or modulation group) is currently selected. The segment's modules appear side by side as sub-panels, each headed by its module name and a clickable dot that toggles the module on and off. Only one segment's controls are shown at a time, keeping the interface uncluttered while every module stays one click away in the chain strip.

Bottom Bar

The strip along the bottom holds modulation sources and master controls:

- **Modulation chips** — **LFO 1**, **LFO 2**, **ENV** (envelope follower) and **SEQ** (step sequencer). Click a chip to open its edit page in the focus panel; **drag** a chip onto a knob to create a modulation route. The **MATRIX** chip opens the mod-matrix page.
- **Macros 1–4** — assignable manual control knobs.
- **Dry/Wet** and **Output** — global mix and output level.
- **FFT size** selector.
- **MIDI** toggles — Note>Shift and Note>Freeze.

Color Coding

Modules and segments are tinted by category for quick visual identification:

COLOR	CATEGORY
Mint Green	Capture / Freeze (Looper, Freeze)
Cyan	Pitch (Shift, Harmonizer, Formant, Ring Mod)
Light Blue	Texture / Modulation (Morph, Scramble, Cross-Synth, LFOs, Sequencer, Matrix)
Purple	Time (Blur, Delay, Reverb)
Orange	Dynamics (Gate, Compress, Tilt, Ducker)
Pink	Stereo

Zoom

Open the menu (...) to pick a zoom level: 70%, 85%, 100%, 125% or 150%. You can also drag the resize grip at the bottom-right corner to scale the interface continuously.

6. The Spectrogram

The spectrogram is a real-time scrolling frequency display and the visual heart of Vellum. Time flows left to right, frequency runs bottom (low) to top (high), and brightness indicates magnitude. Three controls sit in its top-right corner.

Display Mode

- **Output** — the processed signal, after all effects.
- **Input** — the original signal, before effects.
- **Diff** — the difference between them: blue where energy is being cut, orange where it is being boosted.

Palette

Choose the color scheme used to map magnitude to color:

- **Classic** — blue → green → yellow → white.
- **Magma** — black → purple → red → orange → pale yellow.
- **Grayscale** — black to white.

Log / Lin

Toggle the frequency axis between **Linear** and **Logarithmic** scaling. Log spreads the low end out for detailed work on bass and low-mids; the frequency labels down the left edge update to match.

Analyzer Curve

In Output and Input modes, a translucent spectrum-analyzer curve is overlaid along the right edge, tracing the instantaneous magnitude of each frequency. (It is hidden in Diff mode.)

Draggable Filter Handles

Two dashed horizontal lines cross the spectrogram: a **Low Cut** handle and a **High Cut** handle. These are the pre-Delay/Reverb **Filter** module's cutoffs, shown in place.

- Hover near a line and the cursor becomes an up/down arrow; the handle highlights and shows a live **Hz / kHz readout**.
- **Drag** a handle up or down to set its cutoff frequency.
- Grabbing a handle while the Filter is bypassed **automatically switches the Filter on**.
- When the Filter is active, the rejected bands (below Low Cut and above High Cut) are shaded so you can see exactly what is being removed.

NOTE

If no audio is flowing through the plugin, the spectrogram shows a “waiting for audio” hint. Start playback in your DAW to feed it.

7. Knob Gestures & Value Entry

Vellum's knobs have no permanent text box, which keeps the panels clean. Instead, values and editing are available on demand:

- **Hover or drag** a knob and its current value appears in a small pop-up **bubble**.
- **Drag** vertically or horizontally to change the value.
- **Double-click** a knob to reset it to its default value.
- **Ctrl / Cmd + click** a knob to type an exact value.
- **Right-click** a knob for a menu: *Reset to default* or *Enter value...*

TIP

Every knob is also a drop target for modulation. Drag an **LFO 1**, **LFO 2**, **ENV** or **SEQ** chip from the bottom bar onto a knob to modulate that parameter (see Section 9).

8. Effects Reference

Signal Flow

All modules process in a fixed order. The first seventeen operate in the STFT frequency domain; the final Ring Mod is a time-domain effect applied to the resynthesized audio. The chain, grouped by segment, is:



Each module can be bypassed independently from its chain-strip LED or its focus-panel dot. Bypassed modules pass audio through unchanged.

8.1 Capture & Pitch

LOOPER CAPTURE

Records a ring buffer of FFT frames and plays them back at variable speed. Creates time-stretching, reversed spectral playback, and frozen drones when speed is set to zero.

PARAMETER	RANGE	DESCRIPTION
LOOP	On / Off	Enables the spectral loop.
Speed	-2.0 to +2.0	Playback speed. 1.0 = normal, 0.5 = half speed, -1.0 = reverse, 0.0 = frozen.

FREEZE CAPTURE

Captures a single FFT frame and sustains it indefinitely, creating infinite sustain from any sound. The frozen frame uses coherent phase advancement for a clean, tonal output rather than metallic artifacts.

PARAMETER	RANGE	DESCRIPTION
FREEZE	On / Off	Toggle freeze on/off. When off, the current frame is continuously captured as a reference.
Mode	4 modes	Determines how the frozen frame behaves over time (see below).

Freeze Modes

- **Static** — Holds the captured frame with no change. Clean, tonal sustain.
- **Accumulate** — Slowly blends incoming audio into the frozen frame, creating an evolving drone that absorbs new material.
- **Decay** — The frozen frame gradually fades out, creating a natural release tail.
- **Stochastic** — Adds random phase drift to the frozen frame per hop, producing an evolving, washy, pad-like texture.

SHIFT PITCH

Phase vocoder pitch shifter that transposes audio by the specified number of semitones. Uses instantaneous frequency tracking with peak locking and transient handling for accurate pitch shifting with minimal artifacts.

PARAMETER	RANGE	DESCRIPTION
Shift (st)	-24 to +24 semitones	Pitch shift amount. +12 = one octave up, -12 = one octave down.

TIP

Use with MIDI Note-to-Shift (in the modulation section) to play the pitch shift chromatically from a keyboard. C4 = center (no shift).

HARMONIZER PITCH

Adds a pitched harmony voice on top of the original signal. The input spectrum is transposed by the chosen interval and summed with the dry spectrum, so — unlike Shift, which replaces the pitch — Harmonizer *layers* a new voice over the source. The harmony voice uses phase-vocoder resynthesis for a smooth, non-metallic result.

PARAMETER	RANGE	DESCRIPTION
Interval	-24 to +24 semitones	Transposition of the harmony voice. Default +12 (one octave up).
Mix	0.0 to 1.0	Level of the harmony voice relative to the original.

8.2 Texture

BLUR SPECTRAL

Applies a running average (exponential decay) to the magnitude spectrum across successive frames, smearing transients and creating a washy, reverb-like effect in the frequency domain.

PARAMETER	RANGE	DESCRIPTION
Blur	0.0 to 0.99	Decay coefficient. Higher values = more smearing and longer tails. 0 = no blur.

MORPH CAPTURE

Crossfades between the live spectrum and a frozen reference frame. The reference is captured at the moment the effect is enabled, allowing you to morph between the current sound and a stored snapshot.

PARAMETER	RANGE	DESCRIPTION
Morph	0.0 to 1.0	Crossfade amount. 0.0 = live signal, 1.0 = fully morphed to reference.

SCRAMBLE SPECTRAL

Randomly rearranges frequency bins using a Fisher-Yates shuffle algorithm. The shuffle pattern is deterministic for a given seed, so the same seed always produces the same scramble pattern. The DC bin is always preserved.

PARAMETER	RANGE	DESCRIPTION
Amount	0.0 to 1.0	Controls the percentage of bins that get shuffled. 0 = no scramble, 1 = full scramble.
Seed	1 to 100	Determines the scramble pattern. Different seeds create different timbres.

FILTER SPECTRAL

A zero-phase high-pass + low-pass applied before Delay and Reverb. Because filtering in the spectral domain is just per-bin magnitude gain, phase is untouched — no transient smearing from filter group delay. Use it to shape what enters the time-based effects (e.g. darken reverb input while keeping the dry path bright). Its two cutoffs can be dragged directly on the spectrogram (Section 6).

PARAMETER	RANGE	DESCRIPTION
Low Cut	20 Hz to 1 kHz (log)	High-pass cutoff. At 20 Hz it's essentially transparent.
High Cut	500 Hz to 20 kHz (log)	Low-pass cutoff. At 20 kHz it's essentially transparent.

8.3 Delay & Reverb

DELAY TIME

A spectral delay that applies independent delay times to each frequency bin via circular buffers. The delay curve parameter controls whether low or high frequencies are delayed more, creating frequency-dispersed echo effects impossible with traditional delays.

PARAMETER	RANGE	DESCRIPTION
Time	0.0 to 1.0	Overall delay time. Displayed in ms / s — value depends on FFT size (shown in the value bubble).
Curve	-1.0 to 1.0	Frequency-dependent delay distribution. Positive = highs delayed more, negative = lows delayed more, 0 = flat.
Feedback	0.0 to 0.95	Feedback amount. Internally uses complex-domain summation so repeats phase-cancel and decay naturally even at high values — no magnitude pile-up.
SYNC	On / Off	Sync delay time to DAW tempo.
Division	10 options	Sync division: 1/1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/4T, 1/8T, 1/4D, 1/8D.
Mix	0.0 to 1.0	Per-effect dry/wet. 1.0 = fully wet (default), 0.0 = dry bypass.

REVERB TIME

A spectral reverb that applies per-bin RT60 decay with frequency-dependent characteristics. Each frequency bin decays independently, creating a reverb that can have dramatically different decay times across the spectrum. Uses energy-sum injection, cross-bin diffusion, and modulated decay per bin to prevent the metallic/self-sustaining ring common to simple spectral reverbs.

PARAMETER	RANGE	DESCRIPTION
Decay	0.3 s to 15 s RT60	Overall reverb decay time (linear in RT60 seconds). Shown in s/ms.
Diffusion	0.0 to 1.0	Phase diffusion amount. Higher = denser, more diffuse reverb.
Pre-Delay	0 to ~93 ms (@ 2048 FFT)	Delay before the reverb onset. Shown in ms.
Mix	0.0 to 1.0	Per-effect dry/wet. 1.0 = fully wet (default), 0.0 = dry bypass.

8.4 Dynamics & Color

GATE DYNAMICS

A spectral gate that silences frequency bins below a threshold. Uses per-bin gain envelope smoothing and hysteresis (different open/close thresholds) to avoid the "birdie" artifacts common in naive spectral gating.

PARAMETER	RANGE	DESCRIPTION
Gate (dB)	-80 to 0 dB	Threshold. Bins with magnitude below this are attenuated.

TIP

At moderate thresholds (-30 to -20 dB), the gate creates an "X-ray" effect, revealing only the loudest spectral components. Great for isolating tonal content from noise.

COMPRESS DYNAMICS

A spectral compressor that reduces the dynamic range of individual frequency bins. Uses normalized magnitudes with asymmetric attack/release smoothing for natural-sounding spectral compression.

PARAMETER	RANGE	DESCRIPTION
Thresh	-60 to 0 dB	Compression threshold. Bins above this level are compressed.
Ratio	1:1 to 20:1	Compression ratio. 1:1 = no compression, higher = more aggressive.

TILT DYNAMICS

A spectral tilt EQ that applies a logarithmic gain slope across the frequency spectrum, measured in dB/octave from a 1 kHz reference point. Positive values boost high frequencies and cut lows; negative values do the opposite.

PARAMETER	RANGE	DESCRIPTION
Tilt	-1.0 to +1.0	Tilt slope. Maps to -4 to +4 dB/octave (psychoacoustic sweet spot). Total gain is clamped to ± 12 dB so extreme settings still behave like a shelf, not a runaway. Center (0) = flat response.

FORMANT

PITCH

Shifts the spectral envelope (the formants) up or down *without* changing pitch. Cepstral liftering separates the coarse spectral envelope from the fine harmonic structure; the envelope is moved and recombined. This changes vocal character and timbre — the opposite trade-off from Shift, which changes pitch and carries the formants with it.

PARAMETER	RANGE	DESCRIPTION
Formant	-12 to +12 semitones	Formant shift amount. Positive = brighter/smaller character, negative = darker/larger. 0 = unchanged.

TIP

Pair a small negative Formant shift with a positive Shift to pitch a voice up while keeping it from sounding like a chipmunk, and vice versa.

8.5 Stereo & Sidechain

STEREO

STEREO

Spectral stereo processing with two modes for widening or narrowing the stereo image in the frequency domain.

PARAMETER	RANGE	DESCRIPTION
Width	0.0 to 1.0	Stereo width. 0.0 = mono, 0.5 = natural, 1.0 = maximum width.
Mode	Width / Scatter	Processing mode (see below).

Stereo Modes

- **Width** — Mid/Side processing with frequency-dependent phase offsets between L/R channels. Creates natural-sounding stereo widening.
- **Scatter** — Splits odd and even frequency bins between left and right channels, creating an unusual spatial effect.

DUCKER SIDECHAIN

A spectral ducker that attenuates the main signal per frequency bin wherever the sidechain has energy. Because ducking happens bin by bin, the main signal is pushed down only in the exact frequency regions the sidechain occupies — a cleaner, more surgical result than a broadband ducker. Requires a sidechain input (see below).

PARAMETER	RANGE	DESCRIPTION
Amount	0.0 to 1.0	Maximum ducking depth.
Threshold	-60 to 0 dB	Sidechain level above which ducking begins.
Release	0.01 to 1.0	How quickly the duck recovers after the sidechain falls back below threshold.

CROSS-SYNTH SIDECHAIN

Cross-synthesis combines the spectral characteristics of two signals: the main input and a sidechain source. This enables vocoder-like effects, spectral blending, and creative timbral transfers. Requires a sidechain input (see below).

PARAMETER	RANGE	DESCRIPTION
Blend	0.0 to 1.0	Cross-synthesis amount. 0.0 = dry, 1.0 = full cross-synthesis.
Mode	Mag from SC / Phase from SC	Which spectral component to take from the sidechain.

Cross-Synthesis Modes

- **Mag from SC** — Takes magnitudes from the sidechain, keeps phases from the main input. Classic vocoder behavior: the sidechain's spectral shape is imposed on the main signal.
- **Phase from SC** — Takes phases from the sidechain, keeps magnitudes from the main input. Experimental: imparts the temporal/spatial characteristics of the sidechain.

RING MOD

TIME

A time-domain ring modulator applied last, after the spectral chain is resynthesized. It multiplies the signal by a sine carrier, producing metallic, inharmonic, bell-like and robotic timbres. Because it works in the time domain, it responds instantly with no STFT latency of its own.

PARAMETER	RANGE	DESCRIPTION
Freq	20 Hz to 5 kHz	Carrier frequency. Low values add tremolo/growl; higher values add metallic overtones. Default 440 Hz.

Sidechain Setup

The Ducker and Cross-Synth modules read from Vellum's sidechain input, a standard VST3 second input bus that becomes active whenever either module is enabled. To use them:

1. Insert Vellum on your main audio track.
2. Route a second audio source to Vellum's sidechain input using your DAW's sidechain routing.
3. Enable the Ducker and/or Cross-Synth module (its LED in the Stereo & Sidechain card).
4. Open the segment and dial in Blend / Amount to taste.

NOTE

If your DAW doesn't show sidechain routing options, check its documentation for VST3 sidechain setup.

9. Modulation System

Vellum's modulation sources live as chips in the bottom bar. Any source can be routed to a moddable parameter either by dragging its chip onto a knob or by editing the mod matrix directly. There are four routing slots.

9.1 Modulation by Drag-and-Drop

The fastest way to modulate a parameter:

1. **Drag** a source chip — **LFO 1**, **LFO 2**, **ENV** or **SEQ** — from the bottom bar.
2. While dragging, **hover a segment card** in the chain strip to switch the focus panel to that segment — one drag can reach any knob in the plugin.
3. **Drop** it onto any moddable knob. The knob highlights while a valid chip hovers over it.
4. A matrix route is created automatically at a **25% depth** so the movement is immediately audible.

9.2 Editing Depth on the Knob

A modulated knob shows a **depth ring** around its arc (the range the source sweeps from the current value) and a small **dot at its top-right**:

- **Drag the dot vertically** to set the route's amount, from -100% to +100% (drag below zero to invert). Hold **Shift** for fine control.
- **Double-click the dot** to remove the route entirely.

Dropping the same source on the same knob again simply reuses that route (it won't reset the depth you've dialed in). With all four slots full, a further drop overwrites the last slot. Open the **MATRIX** page for fine control over source, destination and amount.

9.3 LFOs

Two independent LFOs provide cyclic modulation. Each LFO page shows a large live view of the waveform with a travelling position dot (the chip in the bottom bar shows a miniature of the same). Each LFO offers:

PARAMETER	RANGE	DESCRIPTION
Rate	0.01 - 20 Hz	LFO speed in free-running mode.
Phase	0 - 360°	Phase offset — shift this LFO's cycle against the other one for complementary motion.

PARAMETER	RANGE	DESCRIPTION
Shape	9 waveforms	Sine, Triangle, Saw, Square, Random (smooth), Sample & Hold, Ramp Down, Exp Decay (percussive), Drift (slow random wander).
SYNC	On / Off	Lock LFO rate to DAW tempo.
Division	13 options	Tempo division when synced: 4 bars, 2 bars, 1 bar, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/4T, 1/8T, 1/4D, 1/8D.
UNI	On / Off	Unipolar output: modulation pushes upward from the knob value (0..1) instead of swinging around it (-1..+1).
SONG	On / Off	Song lock: when synced, the cycle aligns to the host timeline while playing — "1 bar" means the arrangement's bar, phase-accurate on every pass.

9.4 Envelope Follower (ENV)

Tracks the amplitude of the input signal with attack/release smoothing. The ENV chip shows a live level bar. Use it as a modulation source to create dynamics-responsive effects (e.g., louder input = more pitch shift). ENV has no edit page of its own — drag it onto a knob to use it.

9.5 Step Sequencer (SEQ)

A tempo-synced step sequencer that outputs a stepped modulation pattern. Draw a value for each step, choose how many steps play, and set the clock division. The SEQ page highlights the current step as it runs.

PARAMETER	RANGE	DESCRIPTION
Steps	4 / 8 / 16 / 32	Number of active steps in the pattern.
Division	13 options	Clock division from 4 bars down to 1/8D (4bar, 2bar, 1bar, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/4T, 1/8T, 1/4D, 1/8D).
Step 1-32	0.0 to 1.0	Per-step value.

While the host transport is playing, the sequencer follows the arrangement timeline — step 1 always lands where the pattern starts on the grid, on every playback pass.

9.6 Macros

Four macro knobs (M1 - M4) serve as manual modulation sources. Each knob outputs 0.0 to 1.0, mapped to a bipolar range (-1 to +1) when used as a mod source. Macros are ideal for:

- Controlling multiple parameters simultaneously from a single knob
- DAW automation of complex parameter changes
- MIDI controller mapping for live performance

9.7 Modulation Matrix

The mod matrix (MATRIX page) provides 4 independent routing slots. Each slot has:

FIELD	OPTIONS
Source	None, LFO 1, LFO 2, Envelope, Macro 1, Macro 2, Macro 3, Macro 4, Step Seq
Destination	None, Shift, Gate Thresh, Tilt, Blur, Scramble, Morph, Comp Thresh, Delay Time, Delay FB, Reverb Decay, Reverb Diff, Dry/Wet, Loop Speed, Stereo W, Cross Bl, RingMod Hz, Formant
Amount	-1.0 to +1.0 (bipolar)

The amount slider controls how much the source affects the destination. Negative values invert the modulation direction. Routes created by dragging a chip appear here too.

9.8 MIDI Control

TOGGLE	DESCRIPTION
Note > Shift	Maps incoming MIDI notes to pitch shift. C4 (middle C) = no shift. Each semitone up/down shifts the pitch accordingly.
Note > Freeze	Activates freeze on MIDI note-on, deactivates on note-off. Useful for momentary freeze effects triggered by a keyboard or pad controller.

10. Presets

Preset Browser

Click the preset name in the title bar to open the full-screen preset browser:

- **Category rail** on the left — jump to any of the factory categories, your **User** presets, or **All**
- **Search box** — type to filter presets by name as you type
- **Click a preset to load it** — the browser stays open so you can audition down the list; the loaded preset is marked with an accent dot
- **SAVE...** — store current settings as a user preset (also available as the **Save** button in the title bar)
- Click the dimmed background or press `Esc` to close

The `< / >` buttons in the title bar step through presets in order without opening the browser.

User presets are saved as XML files in `%APPDATA%\Vellum\Presets\` with the extension `.sfxpreset`.

Factory Presets

Vellum ships with 44 factory presets across 12 categories.

PRESET	CATEGORY	DESCRIPTION
Init	Default	Clean slate, no effects enabled.
Static Hold	Freeze & Hold	Infinite sustain of captured frame.
Evolving Pad	Freeze & Hold	Stochastic freeze with reverb for lush pads.
Decay Drone	Freeze & Hold	Fading freeze with blur and dark tilt.
Accumulate Wash	Freeze & Hold	Accumulating freeze with spacious reverb.
Shimmer Up	Pitch Effects	Octave-up shimmer with reverb.
Sub Bass	Pitch Effects	Octave-down with dark tilt EQ.
Detune Chorus	Pitch Effects	Micro-detuning for chorus-like widening.
Fifth Harmony	Pitch Effects	Perfect fifth (+7 semitones) harmony.
Full Scramble	Glitch & Destroy	Maximum frequency bin randomization.
Gate Skeleton	Glitch & Destroy	Aggressive spectral gating, skeletal sound.
Extreme Shift	Glitch & Destroy	Extreme pitch shift + scramble.
Robot Voice	Glitch & Destroy	Pitch shift, gate, and compression combined.

PRESET	CATEGORY	DESCRIPTION
Gentle Tilt	Subtle & Mix	Mild high-frequency lift.
Soft Blur	Subtle & Mix	Gentle spectral smearing at 70% wet.
Light Compress	Subtle & Mix	Transparent spectral compression.
Warm Shelf	Subtle & Mix	Dark tilt with gentle blur.
LFO Gate Pulse	Rhythmic	Tempo-synced gate modulation.
Tremolo Blur	Rhythmic	LFO-modulated blur for rhythmic smearing.
Wobble Shift	Rhythmic	LFO-driven pitch wobble.
Spectral Echo	Space & Time	Frequency-dispersed echo.
Frequency Scatter	Space & Time	Highs echoing after lows.
Spectral Hall	Space & Time	Large spectral reverb hall.
Infinite Verb	Space & Time	Near-infinite reverb tail with dark character.
Time Stretch	Space & Time	Half-speed loop with blur for time-stretching.
Wide Open	Stereo	Maximum stereo width.
Mono Crush	Stereo	Collapse to mono.
Bin Scatter Wide	Stereo	Scatter mode stereo widening.
Shimmer Wide	Stereo	Octave-up shimmer with wide stereo.
Frozen Stereo Pad	Stereo	Stochastic freeze + scatter stereo + reverb.
Stereo Delay Space	Stereo	Stereo width with spectral delay and reverb.
Octave Shimmer	Harmonizer	Octave-up harmony voice layered with reverb.
Power Fifth	Harmonizer	Perfect-fifth harmony stacked over the source.
Sub Octave Layer	Harmonizer	Octave-down harmony for added weight.
Major Chord Stack	Harmonizer	Harmony interval building toward a chordal stack.
Bell Tone	Ring Mod	Ring modulation tuned for metallic, bell-like tones.
Low Growl	Ring Mod	Low carrier frequency for gritty growl and tremolo.
Metallic Swirl	Ring Mod	Modulated ring mod for moving metallic textures.
Chipmunk	Formant	Formants shifted up for a small, bright character.
Deep Voice	Formant	Formants shifted down for a large, dark character.
Vocal Morpher	Formant	Formant shifting for vowel and timbre morphing.

PRESET	CATEGORY	DESCRIPTION
Seq Gate Chop	Sequencer	Step sequencer driving rhythmic gating chops.
Seq Pitch Melody	Sequencer	Sequenced pitch-shift patterns for melodic movement.
Seq Ring Pulse	Sequencer	Sequenced ring-mod pulses for rhythmic timbre changes.

11. Global Controls

FFT Size

Controls the frequency resolution of the spectral analysis. Larger sizes provide finer frequency detail but introduce more latency.

FFT SIZE	FREQUENCY RESOLUTION	LATENCY (AT 44.1 KHZ)	BEST FOR
1024	~43 Hz per bin	~23 ms	Percussive material, low latency
2048	~21 Hz per bin	~46 ms	General purpose (default)
4096	~11 Hz per bin	~93 ms	Tonal material, precise pitch work

FFT size changes use a smooth fade-out/fade-in crossfade to avoid clicks.

Dry/Wet

Mixes between the unprocessed (dry) and processed (wet) signal. The dry path is latency-compensated to prevent comb filtering at intermediate mix positions. 0.0 = fully dry, 1.0 = fully wet.

Output

Master output level, from $-\infty$ to +12 dB (default 0 dB). Turning it fully to the left mutes the output. The knob's response is skewed so the useful range around 0 dB sits in the upper half of its travel.

A/B Comparison

Click **A** to switch between two independent parameter states. Click **Copy** to duplicate the current state to the other slot. Useful for comparing different effect settings on the same material.

Undo / Redo

Snapshot-based undo/redo for major actions (preset loads, randomizations, and edits).

- Ctrl + Z — Undo
- Ctrl + Y — Redo

Randomize (RND)

Randomizes effect parameters within safe, musical ranges, and randomly enables a subset of modules. FFT size is also randomized. LFOs, mod matrix, sequencer and MIDI settings are not affected.

Zoom

Choose 70%, 85%, 100%, 125% or 150% from the menu (...), or drag the resize grip at the bottom-right corner. Your zoom choice is remembered.

12. Tips & Tricks

Infinite Pad from Any Sound

Enable Freeze (Stochastic mode) on any audio, then add Blur (0.7+) and Reverb (long Decay). The result is a continuously evolving ambient pad derived from whatever was playing when you pressed Freeze.

Spectral Vocoder

Route a synthesizer to the main input and vocals to the sidechain. Enable Cross-Synth in Mag-from-SC mode with Blend at 0.8+. The synth takes on the spectral shape of the voice.

Surgical Sidechain Ducking

Send a kick or lead to the sidechain and enable the Ducker. Only the frequencies the sidechain actually occupies are pushed down in the main signal, so a pad can breathe around a vocal without the whole track pumping.

Harmony Without Losing the Source

Use the Harmonizer (not Shift) when you want to add a fifth or an octave *on top of* the original note. Set Interval to +7 or +12 and blend the Mix to taste.

Frequency-Dispersed Reverb

Use Delay with Curve at 0.8 and low Feedback (0.3). High frequencies echo later than lows, creating a shimmering tail that conventional reverbs cannot produce.

Rhythmic Spectral Gating

Drag the LFO 1 chip (Square, synced to 1/8) onto the Gate knob. The gate threshold is modulated rhythmically, creating pulsing spectral effects locked to tempo. Or use the SEQ chip for a custom pattern.

Timbral Exploration with Randomize

Click RND repeatedly to explore unexpected combinations. When you find something interesting, use A/B to hold it while you keep searching, and Undo (Ctrl+Z) to step back through your discoveries.

Use the Spectrogram Diff Mode

Switch the spectrogram to Diff mode to see exactly what Vellum is adding or removing. Blue shows where energy is cut; orange shows where it is boosted. Invaluable for understanding each module.

Appendix A: Full Parameter Reference

Global

PARAMETER	ID	RANGE	DEFAULT
FFT Size	fftSize	1024 / 2048 / 4096	2048
Dry/Wet	dryWet	0.0 - 1.0	1.0
Output Gain	outputGain	-60 to +12 dB (-60 = mute)	0 dB

Looper

PARAMETER	ID	RANGE	DEFAULT
Loop Active	looperActive	On / Off	Off
Speed	looperSpeed	-2.0 - +2.0	1.0

Freeze

PARAMETER	ID	RANGE	DEFAULT
Freeze Active	freezeActive	On / Off	Off
Freeze Mode	freezeMode	Static / Accumulate / Decay / Stochastic	Static

Shift

PARAMETER	ID	RANGE	DEFAULT
Shift (semitones)	shiftSemitones	-24.0 - +24.0	0.0
Enable	shiftEnable	On / Off	Off

Harmonizer

PARAMETER	ID	RANGE	DEFAULT
Interval (semitones)	harmonizerInterval	-24.0 - +24.0	+12.0
Mix	harmonizerMix	0.0 - 1.0	0.5
Enable	harmonizerEnable	On / Off	Off

Blur

PARAMETER	ID	RANGE	DEFAULT
Blur Decay	blurDecay	0.0 - 0.99	0.5
Enable	blurEnable	On / Off	Off

Morph

PARAMETER	ID	RANGE	DEFAULT
Morph Amount	morphAmount	0.0 - 1.0	0.0
Enable	morphEnable	On / Off	Off

Scramble

PARAMETER	ID	RANGE	DEFAULT
Amount	scrambleAmount	0.0 - 1.0	0.5
Seed	scrambleSeed	1 - 100	42
Enable	scrambleEnable	On / Off	Off

Filter (pre Delay/Reverb)

PARAMETER	ID	RANGE	DEFAULT
Low Cut (high-pass)	filterLowCut	20 Hz - 1 kHz (log)	20 Hz
High Cut (low-pass)	filterHighCut	500 Hz - 20 kHz (log)	20 kHz
Enable	filterEnable	On / Off (bypass)	Off

Delay

PARAMETER	ID	RANGE	DEFAULT
Time	delayTime	0.0 - 1.0	0.3
Curve	delayCurve	-1.0 - +1.0	0.5
Feedback	delayFeedback	0.0 - 0.95	0.3
Sync	delaySync	On / Off	Off
Division	delaySyncDiv	1/1 to 1/8D (10 options)	1/4

PARAMETER	ID	RANGE	DEFAULT
Mix	delayMix	0.0 - 1.0 (per-effect dry/wet)	1.0
Enable	delayEnable	On / Off	Off

Reverb

PARAMETER	ID	RANGE	DEFAULT
Decay	reverbDecay	0.0 - 1.0 (maps to 0.3–15 s RT60, linear)	0.5
Diffusion	reverbDiffusion	0.0 - 1.0	0.5
Pre-Delay	reverbPreDelay	0.0 - 1.0 (~0 to ~93 ms @ 2048 FFT)	0.0
Mix	reverbMix	0.0 - 1.0 (per-effect dry/wet)	1.0
Enable	reverbEnable	On / Off	Off

Gate

PARAMETER	ID	RANGE	DEFAULT
Threshold (dB)	gateThreshold	-80.0 - 0.0	-60.0
Enable	gateEnable	On / Off	Off

Compress

PARAMETER	ID	RANGE	DEFAULT
Threshold (dB)	compressThreshold	-60.0 - 0.0	-20.0
Ratio	compressRatio	1.0 - 20.0	4.0
Enable	compressEnable	On / Off	Off

Tilt

PARAMETER	ID	RANGE	DEFAULT
Tilt Amount	tiltAmount	-1.0 - +1.0 (maps to ± 4 dB/oct, clamped to ± 12 dB total)	0.0
Enable	tiltEnable	On / Off	Off

Formant Shift

PARAMETER	ID	RANGE	DEFAULT
Formant Shift (semitones)	formantShift	-12.0 - +12.0	0.0
Enable	formantEnable	On / Off	Off

Stereo

PARAMETER	ID	RANGE	DEFAULT
Width	stereoWidth	0.0 - 1.0	0.5
Mode	stereoMode	Width / Scatter	Width
Enable	stereoEnable	On / Off	Off

Spectral Ducker (sidechain)

PARAMETER	ID	RANGE	DEFAULT
Amount	duckerAmount	0.0 - 1.0	0.5
Threshold (dB)	duckerThreshold	-60.0 - 0.0	-30.0
Release	duckerRelease	0.01 - 1.0	0.3
Enable	duckerEnable	On / Off	Off

Cross-Synthesis (sidechain)

PARAMETER	ID	RANGE	DEFAULT
Blend	crossSynthBlend	0.0 - 1.0	0.5
Mode	crossSynthMode	Mag from SC / Phase from SC	Mag from SC
Enable	crossSynthEnable	On / Off	Off

Ring Mod (time domain)

PARAMETER	ID	RANGE	DEFAULT
Frequency (Hz)	ringModFreq	20 - 5000 Hz	440
Enable	ringModEnable	On / Off	Off

Modulation

PARAMETER	ID	RANGE	DEFAULT
LFO 1 Rate	lfo1Rate	0.01 - 20.0 Hz	1.0
LFO 1 Phase	lfo1Phase	0 - 360°	0
LFO 1 Shape	lfo1Shape	9 waveforms	Sine
LFO 1 Sync	lfo1Sync	On / Off	Off
LFO 1 Division	lfo1SyncDiv	4 bars to 1/8D (13 options)	1/4
LFO 1 Unipolar	lfo1Uni	On / Off	Off
LFO 1 Song Lock	lfo1Song	On / Off	Off
LFO 2 Rate	lfo2Rate	0.01 - 20.0 Hz	0.5
LFO 2 Phase	lfo2Phase	0 - 360°	0
LFO 2 Shape	lfo2Shape	9 waveforms	Sine
LFO 2 Sync	lfo2Sync	On / Off	Off
LFO 2 Division	lfo2SyncDiv	4 bars to 1/8D (13 options)	1/4
LFO 2 Unipolar	lfo2Uni	On / Off	Off
LFO 2 Song Lock	lfo2Song	On / Off	Off
Mod 1-4 Source	modSrc1-4	9 options (None, LFO 1/2, Envelope, Macro 1-4, Step Seq)	None
Mod 1-4 Dest	modDst1-4	28 options (None + 27 destinations)	None
Mod 1-4 Amount	modAmt1-4	-1.0 - +1.0	0.0
Macro 1-4	macro1-4	0.0 - 1.0	0.0

Step Sequencer

PARAMETER	ID	RANGE	DEFAULT
Steps	seqSteps	4 / 8 / 16 / 32	8
Division	seqDiv	4bar to 1/8D (13 options)	1/4
Step 1-32	seqStep1-32	0.0 - 1.0	0.0

MIDI

PARAMETER	ID	RANGE	DEFAULT
Note to Shift	midiNoteToShift	On / Off	Off
Note to Freeze	midiFreezeToggle	On / Off	Off