Senna

SSM v4

Sampler · Synthesizer · Mixer

User Guide

Version 4.0 — April 2026

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CHAPTER 1

Introduction

Thank you for choosing the Senna SSM v4. The SSM v4 is a professional-grade virtual instrument that combines a deeply programmable sampler engine, a full analog-modeled synthesizer, and a complete mixing console into a single, unified environment. Whether you are crafting intricate sound designs, producing beats, processing vocals, or mastering final mixes, the SSM v4 provides every tool you need in one window.

The SSM v4 draws inspiration from legendary hardware: professional-grade console processing, the warmth of classic analog synthesizers, and the creative flexibility of the finest hardware samplers. Every parameter has been carefully designed to be immediately accessible while offering deep control for advanced users.

Key Features

- 16-pad velocity-sensitive grid with 4 banks (64 pads total) and per-pad dual filtering
- Full oscillator section with 11 waveform types including SuperSaw, Wavetable, FM, PWM, and Sync
- Dual A/B filter system with 6 filter models including Senna Warm, Senna Cream, and Senna Drive
- Unified quick-access control bar with 7 tabbed sections: Dual Filter, MOD, EQ, DYN, FX, CLR, MSTR
- Real-time waveform display with interactive EQ, compressor, and filter overlays
- Senna Meter 7-mode metering system: Phase, VU, RTA, Loudness, True Peak, LRA, Oscilloscope
- 11 sidebar processing tabs: MOD, ENV, FX, EQ, DYN, CLR, MSTR, SAMP, VO, and more
- MPE (Multidimensional Polyphonic Expression) support for expressive performance
- Comprehensive preset system with favorites, A/B comparison, undo/redo, and save/browse
- 10 visual skins including Carbon Fiber, Wood Grain, and Chrome finishes
- Factory content system with support for user expansion packs

CHAPTER 2

System Requirements

Minimum System Requirements

Component	Minimum	Recommended
Operating System	macOS 11+ / Windows 10+	macOS 13+ / Windows 11
CPU	Intel i5 / Apple M1	Intel i7 / Apple M1 Pro+
RAM	8 GB	16 GB+
Disk Space	500 MB	2 GB (with sample library)
Display	1280 x 800	1920 x 1080+ / Retina
Host	VST3 / AU compatible DAW	Any major DAW
Audio Interface	Any Core Audio / ASIO device	Low-latency interface

Supported Plugin Formats

The Senna SSM v4 is available as a VST3 plugin for Windows and macOS, and as an Audio Unit (AU) plugin for macOS. The plugin supports sample rates from 44.1 kHz to 192 kHz and buffer sizes from 32 to 4096 samples.

CHAPTER 3

Installation & Setup

macOS Installation

1. Download the Senna SSM v4 installer from your account at senna.audio.

2. Open the .dmg file and drag the Senna SSM v4 application to your Applications folder.

3. The installer places the AU component in ~/Library/Audio/Plug-Ins/Components/ and the VST3 in ~/Library/Audio/Plug-Ins/VST3/.

4. Launch your DAW and scan for new plugins. Senna SSM v4 will appear under the Senna Audio manufacturer.

Windows Installation

1. Download and run the Senna SSM v4 installer (.exe) from your account.

2. Follow the installation wizard. The default VST3 path is C:\Program Files\Common Files\VST3\.

3. Launch your DAW and rescan plugins. Senna SSM v4 will appear in the instrument category.

First Launch

On first launch, the SSM v4 will initialize with the "Init Pad" preset. The default sample library includes factory kits and wavetables. You can load additional samples via the SAMP tab or by dragging audio files directly onto the pad grid.

Factory Content Location

Factory samples and presets are installed alongside the plugin binary. User content is stored in:

- **macOS:** ~/Documents/Senna/Expansions/
- **Windows:** C:\Users\[username]\Documents\Senna\Expansions\

CHAPTER 4

Console Overview

The Senna SSM v4 interface is organized as a unified console with five main regions, designed for efficient workflow in a single window. The layout follows the signal flow from top to bottom.

Top Bar

The chrome-finished top bar displays the Senna logo, plugin name (SSM v4), version indicator, skin selector, global bypass button, and a gear icon for system options.

System Options

Click the gear icon (■) in the top bar to open the System Options popup. Available settings:

- **Remember Last Patch:** When enabled, the plugin will recall the last loaded patch on startup. Off by default.
- **Black Keys Default:** When enabled, the keyboard displays in all-black-keys mode on startup. On by default.

Preset Bar

Positioned directly below the top bar, the preset bar provides instant access to patch management: favorite star, previous/next arrows, preset selector dropdown, unsaved indicator dot, Save and Browse buttons, undo/redo controls, A/B comparison toggle, CPU meter, sample rate display, and version number.

Signal Chain Bar

Below the preset bar, a persistent horizontal chain bar displays the current signal processing chain order. This chain-style view shows each active module as a node, letting you see the complete signal path at a glance. Click any module to jump to its tab.

Main Area

The central workspace is divided into three columns: the left sidebar (tab navigation with bypass indicators), the main content area (oscillators, waveform, parameter strips, and tab-specific content), and the right metering panel.

Left Sidebar

The sidebar contains draggable, reorderable tabs for each processing section. Each tab has a bypass indicator (green dot = active, red = bypassed). Tabs include: MAIN, MOD, ENV, FX, EQ, DYN, CLR, MSTR, SAMP, and VO. Click a tab to view its controls; click the bypass dot to toggle that section.

Bottom Section

Below the main area: the parameter strip, unified quick-access control bar (Dual Filter + MOD + EQ + DYN + FX + CLR + MSTR), and collapsible panels for the 16-pad grid and piano keyboard.

CHAPTER 5

Oscillator Section

The main oscillator is the primary sound source of the SSM v4. Located at the top of the main content area, it provides 11 waveform types covering classic analog shapes, complex digital synthesis, and noise generators.

Waveform Types

Waveform	Description
Sine	Pure fundamental tone. Ideal for sub bass, FM carrier, and clean tones.
Saw	Classic sawtooth rich in harmonics. Foundation of pads, leads, and brass.
Square	Hollow square wave with odd harmonics. Woody tones and sub reinforcement.
Triangle	Soft, rounded tone between sine and square. Flutes and soft leads.
SuperSaw	7 detuned sawtooth oscillators stacked for massive unison. Iconic for trance.
Wavetable	Morphable wavetable position for evolving timbres.
FM	2-operator FM synthesis. Metallic bells, electric pianos, and plucked tones.
PWM	Pulse Width Modulation. Variable duty cycle from thin nasal to full square.
Sync	Hard sync between master and slave oscillators. Aggressive harmonic sweeps.
Noise W	White noise with equal energy per frequency.
Noise P	Pink noise with equal energy per octave.

Oscillator Controls

Parameter	Range	Description
Waveform	11 types	Selects the oscillator waveform type.
Pitch	-24 to +24 st	Coarse pitch tuning in semitones.
Fine	-100 to +100 ct	Fine pitch tuning in cents.
Level	0–100%	Output level of the main oscillator.
Pan	L100–C–R100	Stereo position. Console-style display: C = center, L1–L100 = left, R1–R100 = right.

CHAPTER 6

Sub Oscillator

The sub oscillator provides a secondary sound source one or two octaves below the main oscillator, adding weight and body to the sound. It operates independently with its own waveform selector.

Sub Oscillator Controls

Parameter	Range	Description
Waveform	6 types	Sine, Square, Triangle, Saw, SuperSaw, Noise W
Octave	-2 to 0	Octave offset relative to main oscillator.
Level	0–100%	Mix level of the sub oscillator.
Pan	L100–C–R100	Independent stereo position. Console-style L/R display.

CHAPTER 7

Filter Section

The SSM v4 features a sophisticated filter section with 6 filter models, ranging from clean digital filters to meticulously modeled analog circuits from legendary hardware synthesizers.

Filter Models

Model	Character	Inspired By
High Pass (HP)	Clean digital HP filter with adjustable slope	Utility filter
Low Pass (LP)	Clean digital LP filter with smooth rolloff	Utility filter
Band Pass (BP)	Resonant band pass for vowel and wah effects	Utility filter
Senna Warm	Warm, musical, slightly dark with smooth resonance	Analog-modeled warm filter circuit
Senna Cream	Rich, creamy with distinctive resonance character	Analog-modeled creamy filter circuit
Senna Drive	Aggressive, overdriven, high-gain distortion filtering	Senna Drive

Filter Controls

Parameter	Range	Description
Type	6 models	Selects filter model.
Cutoff	20 Hz–20 kHz	Filter cutoff frequency.
Resonance	0–1.0	Resonance/Q factor. Self-oscillates near 1.0 on analog models.
Drive	0–100%	Pre-filter saturation. Especially effective on Senna Drive model.
Mix	0–100%	Dry/wet blend. 100% = fully filtered.

CHAPTER 8

Dual A/B Filter System

The dual filter system provides two independent filter stages (A and B) that can be routed in serial, parallel, or split configurations. Each filter has its own model, cutoff, resonance, drive, and mix controls, color-coded for quick identification (A = green, B = lavender/purple).

Routing Modes

Mode	Signal Flow	Use Case
A → B (Serial)	Input → Filter A → Filter B → Output	Stacking: LP into HP for band pass, or adding character
A ■ B (Parallel)	Input splits to both filters, outputs summed	Blending two filter characters simultaneously
A | B (Split)	Input splits by frequency, each path filtered independently	Crossover-style processing

Link Mode

The LINK button locks Filter B's cutoff to Filter A's, maintaining a fixed offset. This is useful for creating consistent band-pass shapes or tracking dual cutoff sweeps with a single gesture.

CHAPTER 9

Modulation (MOD)

The modulation section provides dual LFOs and advanced modulation sources. Accessible from the sidebar MOD tab or the quick-access control bar.

LFO 1 & LFO 2

Each LFO operates independently with its own shape, rate, depth, and target. LFO 1 and LFO 2 are displayed side by side in the quick-access control bar, following the dual A/B layout pattern.

Parameter	Range	Description
Shape	Sine/Tri/Saw/Square/S&H; /Random	LFO waveform shape.
Rate	0.01–20 Hz	LFO speed. Sync to host tempo available.
Depth	0–100%	Modulation intensity.
Delay	0–5 s	Fade-in time before modulation begins.
Fade	0–5 s	Duration over which modulation ramps to full depth.

Modulation Sources

The type selector provides additional modulation sources: LFO, Envelope Follower, Step Sequencer, Random, and Matrix. Each source type reconfigures the available controls.

CHAPTER 10

Envelope Section

The envelope section provides ADSR envelopes for amplitude and filter modulation.

Amplitude Envelope

Parameter	Range	Description
Attack	0–5000 ms	Time from note-on to peak level.
Decay	0–5000 ms	Time from peak to sustain level.
Sustain	0–100%	Level held while note is pressed.
Release	0–5000 ms	Time from note-off to silence.

Filter Envelope

A dedicated filter envelope modulates the cutoff frequency of both filters. The Depth control sets the range of modulation from subtle movement to dramatic sweeps.

CHAPTER 11

Effects (FX)

The FX section provides a comprehensive effects suite. The sidebar FX tab shows all effects with detailed controls. The quick-access bar shows FX A and FX B side by side with the most-used parameters.

FX A / FX B Dual Architecture

Effects are organized into two independent chains (A and B), routable in Serial (A→B) or Parallel (A■B) configurations. Each chain has its own type selector, mix, and parameter controls. The LINK button locks parameters together.

Available Effects

Effect	Key Parameters	Description
Delay	Time, Feedback, Mix, Sync	Stereo delay with tempo sync and ping-pong mode.
Reverb	Decay, Size, Mix, Damping	Algorithmic reverb from tight rooms to infinite halls.
Chorus	Rate, Depth, Mix, Voices	Lush stereo chorus with adjustable voice count.
Phaser	Rate, Depth, Mix, Stages	Classic phaser with variable stage count.
Flanger	Rate, Depth, Mix, Feedback	Jet-engine flanging with resonant feedback.
BitCrusher	Bits, Rate, Mix	Lo-fi bit reduction and sample rate decimation.
Granular	Size, Density, Pitch, Mix	Granular time-stretching and textural effects.
IR Convolution	Impulse, Mix, Pre-Delay	Convolution reverb using real impulse responses.
Limiter	Threshold, Ceiling, Release	Brick-wall limiter for dynamic control.

CHAPTER 12

Equalizer (EQ)

The EQ section provides five selectable modes accessible from the sidebar EQ tab or the quick-access control bar. The parametric EQ's frequency curve is overlaid in real-time on the waveform display.

EQ Modes

Mode	Description
Parametric	4-band fully parametric EQ with adjustable frequency, gain, and Q per band.
Graphic	8-band graphic EQ with visual frequency curve display and interactive band dots.
Tilt	Single-control tilt EQ: positive values brighten, negative values darken.
Dynamic	Frequency-dependent compression/expansion for transparent tonal shaping.
Linear Phase	Zero-phase-shift EQ for mastering applications.

Parametric EQ Controls

Parameter	Range	Description
Low	-12 to +12 dB	Low shelf gain at 100 Hz.
Low-Mid	-12 to +12 dB	Parametric band centered at 500 Hz.
High-Mid	-12 to +12 dB	Parametric band centered at 3 kHz.
High	-12 to +12 dB	High shelf gain at 8 kHz.

Graphic EQ

When Graphic mode is selected, an interactive 8-band visual EQ appears with bands at 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, and 8 kHz. Each band has ±12 dB range. The canvas displays a smooth frequency response curve with filled area below.

CHAPTER 13

Dynamics (DYN)

The dynamics section provides five processing modes. The compressor's gain reduction is visualized as a purple overlay on the waveform display in real time.

DYN Modes

Mode	Key Parameters	Description
Compressor	Threshold, Ratio, Atk, Rel	Classic downward compression with variable knee.
Multiband	Threshold, Ratio per band	3-band compression for frequency-specific dynamics.
Gate	Threshold, Range, Atk, Rel	Noise gate to eliminate bleed and background noise.
Expander	Threshold, Ratio, Atk, Rel	Downward expansion for gentle noise reduction.
De-Esser	Frequency, Threshold, Range	Sibilance reduction targeting 4–9 kHz range.

CHAPTER 14

Coloring (CLR)

The CLR section adds analog character and harmonic richness. Six coloring processors are arranged in a fixed signal order, each with its own unique color. The quick-access bar shows CLR A and CLR B side by side for A/B workflow.

CLR Processors (Signal Order)

Processor	Key Parameters	Character
Console	Drive, Tone, Mix	Console-style analog saturation. Subtle harmonic thickening.
Transformer	Drive, Iron, Mix	Transformer coloration with iron core saturation.
Vinyl	Crackle, Wow, Flutter, Age	Vinyl record character with surface noise and pitch drift.
Tube	Drive, Bias, Mix	Tube warmth with even-harmonic saturation.
Tape	Drive, Speed, Hiss, Mix	Tape machine saturation with speed-dependent frequency response.
Exciter	Amount, Frequency, Mix	Harmonic excitement for presence and air.

CHAPTER 15

Master Section (MSTR)

The master section is the final processing stage before output metering. It provides bus processing for the entire mix, with its own bypass toggle in the sidebar.

Master Controls

Parameter	Range	Description
Type	5 modes	Limiter, Maximizer, Soft Clip, Stereo Width, M/S
Topology	5 modes	Stereo, M/S, Dual Mono, Mid, Side — sets processing topology
Gain	-24 to +24 dB	Master input gain.
Ceiling	-6 to 0 dB	Limiter output ceiling for streaming/broadcast targets.
Width	0–200%	Stereo width. 0% = mono, 100% = normal, 200% = widened.

Master Signal Chain

The master bus processes signal in this fixed order: Input Gain → M/S EQ → Multiband Dynamics → Stereo Width → Soft Clipper → Limiter → Output Metering.

CHAPTER 16

Vocal Production (VO)

The VO tab provides AI-assisted vocal production tools for analyzing and processing vocal recordings. Load a vocal sample and the VO engine analyzes pitch, dynamics, formants, and sibilance to suggest optimal processing settings.

VO Features

- **Pitch Analysis:** Detects pitch center, range, and stability.
- **Dynamics Analysis:** Measures dynamic range and suggests compression settings.
- **Formant Detection:** Identifies vowel formants for targeted EQ.
- **De-Ess Suggestion:** Locates sibilant frequencies and proposes de-esser settings.
- **One-Click Processing:** Apply all suggested settings to the signal chain simultaneously.

CHAPTER 17

Sampler Tools (SAMP)

The SAMP tab provides professional sample editing, slicing, and multi-sample zone management.

Sample Editing

- **Slice/Chop:** Automatic transient detection with adjustable sensitivity. Slices map to pads.
- **Multi-Sample Zones:** Map multiple samples across the keyboard with crossfade and velocity layers.
- **Loop Editing:** Set loop start/end points with crossfade for seamless looping.
- **Time Stretch:** Independent pitch and time control using granular or phase-vocoder algorithms.
- **Resample:** Bounce the current output (with all processing) to a new sample.

CHAPTER 18

Quick-Access Control Bar

The unified control bar sits below the parameter strip and provides tabbed access to the most important parameters from seven processing sections. All seven tabs sit on the same horizontal bar: **DUAL FILTER › MOD › EQ › DYN › FX › CLR › MSTR**.

Tab Behavior

Click any tab to switch to its content area. Click the active tab again to collapse the panel, freeing screen space. Each tab has a power dot (green = active, red = bypassed) for quick enable/disable. Only one tab's content is visible at a time. Each tab is color-coded to match its section.

Tab Contents

Tab	Color	Layout	Key Controls
Dual Filter	Purple	A/B side-by-side	Type, Cutoff, Reso, Drive, Mix per side + routing
MOD	Green / Gold	LFO 1 / LFO 2 side-by-side	Shape, Rate, Depth, Delay, Fade per LFO
EQ	Orange	Parametric or Graphic view	4-band parametric or 8-band graphic EQ
DYN	Purple	Single panel	Threshold, Ratio, Attack, Release + type selector
FX	Cyan / Coral	FX A / FX B side-by-side	Type, Mix, Time, Feedback per side + routing
CLR	Pink / Teal	CLR A / CLR B side-by-side	Type, Drive, Tone, Mix per side + routing
MSTR	Silver	Single panel	Type, Topology, Gain, Ceiling, Width

Overlay Integration

The EQ and DYN quick-access tabs are directly wired to the waveform display overlays. Adjusting EQ knobs updates the orange parametric curve in real time; DYN knobs control the purple gain reduction visualization.

CHAPTER 19

Waveform Display & Overlays

The waveform display is the visual centerpiece, providing a high-resolution interactive view with real-time processing overlays. Rendered at 2x DPR for retina clarity, it remains sticky at the top when scrolling.

Waveform Interaction

Click to set playback position. Zoom up to 8x with +/– buttons. When zoomed, a mini-map overview appears. Drag loop points to adjust start/end positions.

Toolbar Buttons

Button	Function
LOAD	Open file browser to load a sample.
LOOP	Toggle loop mode and edit loop points.
RSMP	Resample current output with all processing applied.
STCH	Time-stretch without changing pitch.

Processing Overlays

- **Filter A (Purple):** Filled magnitude response curve with cutoff indicator.
- **Filter B (Lavender):** Dashed magnitude response. Visible when B is not OFF.
- **EQ (Orange/Gold):** Interactive parametric curve with filled area and glow.
- **Compressor (Purple):** Animated gain reduction envelope with GR bar and dB readout.

CHAPTER 20

Senna Meter System

The right panel houses the Senna Meter system — a 7-mode professional metering suite with two main meter views (dBFS and Pro) and 7 specialized analysis modes.

Main Meter Views

- **dBFS:** Standard digital peak metering with bold scale markers, peak hold lines, and numeric readouts.
- **Pro:** Dual peak + RMS metering per channel with peak hold, RMS hold, and crest factor display.

Analysis Modes

Mode	Description
PHASE	Lissajous/goniometer. Vertical = mono, circle = uncorrelated stereo.
VU	Dual VU meters with analog needle ballistics (~300ms). Warm amber finish.
RTA	Real-time spectrum analyzer. Color-coded green/yellow/red by frequency.
LOUD	LUFS loudness per EBU R128. Momentary, short-term, and integrated readings.
TP	True Peak meter with 4x oversampling for streaming/broadcast delivery.
LRA	Loudness Range measurement in LU with visual range indicator.
SCOPE	Oscilloscope showing raw output waveform for transient and clipping analysis.

CHAPTER 21

Pad Grid & Banks

The SSM v4 features a 16-pad velocity-sensitive grid with 4 banks (A–D) providing 64 total pads. Each pad displays its assigned sample name, velocity-responsive hit animation, and colored filter ring. Pads are drag-droppable for reordering. MIDI notes: Bank A 36–51, B 52–67, C 68–83, D 84–99.

Per-Pad Filters

Each pad has its own independent dual HP/LP filter accessible via right-click or long-press. The filter popup shows cutoff and resonance controls for quick per-pad tonal shaping.

Bank Switching

Four bank buttons (A–D) below the grid. Each bank maintains independent state including samples, filters, and pad order. Bank display shows the current bank letter and MIDI note range.

CHAPTER 22

Keyboard & MPE

The collapsible piano keyboard provides a visual, clickable interface with root note and scale selection.

MPE Support

When MPE is active, each voice responds independently to per-note pitch bend, pressure (aftertouch), and slide (CC74). Compatible with any MPE-capable controller.

Black Keys Mode

The BLK button toggles all-black-key mode . This is purely visual and does not affect MIDI or playback behavior.

CHAPTER 23

Preset System

The SSM v4 includes comprehensive preset management in the preset bar at the top of the interface.

Control	Description
Preset Selector	Dropdown with left/right arrow navigation.
Favorite Star	Toggle favorite status. Gold = favorited.
Save	Save dialog for current parameter state.
Browse	Full preset browser modal with category filtering and search.
Undo / Redo	Parameter change history. Unlimited undo depth.
A/B Compare	Toggle between two parameter states for instant comparison.
Unsaved Dot	Orange indicator when parameters have changed since last save.
CPU Meter	Real-time CPU usage percentage.
SR Display	Current sample rate (e.g., 44.1 kHz).

CHAPTER 24

Signal Flow & Block Diagram

Understanding the signal flow is essential for getting the most out of the SSM v4:

1. Sample Playback / Oscillator (main + sub mixed)
2. Per-Pad HP/LP Quick Filter
3. Dual A/B Filter (serial / parallel / split)
4. Amplitude Envelope (ADSR)
5. Modulation (LFO 1 + LFO 2)
6. Effects (FX A + FX B) — Sound-level
7. EQ — Sound-level
8. Dynamics (DYN) — Sound-level
9. Coloring (CLR A + CLR B) — Console → Transformer → Vinyl → Tube → Tape → Exciter
10. Master Bus Input
11. Master EQ (M/S capable)
12. Master Dynamics (multiband)
13. Master Stereo Width / Topology
14. Master Soft Clipper
15. Master Limiter
16. Output Metering (Senna Meter)

CHAPTER 25

Factory Content & Expansion Packs

The SSM v4 ships with a curated factory library of multi-sampled instruments and preset kits. You can also create your own content from hardware synthesizers, field recordings, or any audio source.

Creating Factory Sounds from Hardware Synths

To capture your hardware synthesizers as playable instruments within the SSM v4, follow this multi-sampling workflow:

Step 1: Plan Your Sampling Session

- **Note intervals:** Record every 3–5 semitones across the keyboard (C, Eb, G in each octave). Tighter intervals (every semitone) yield more accurate results but larger file sizes.
- **Velocity layers:** Capture 3–5 velocity levels per note (pp, mp, mf, f, ff). This gives the sampled instrument realistic dynamic response.
- **Round robins:** Record 2–3 takes of each note/velocity combination. The SSM v4 alternates between them to avoid the "machine gun" effect on repeated notes.
- **Format:** Record as 24-bit WAV or AIFF at 44.1 kHz or 48 kHz. Trim silence from the start of each sample.

Step 2: Organize Your Samples

Create a folder structure for each instrument:

```
MyBassStation/
■■ C1_v1_rr1.wav, C1_v1_rr2.wav, ...
■■ Eb1_v2_rr1.wav, ...
■■ preset.json
```

Use a consistent naming convention: Note_VelocityLayer_RoundRobin. The preset.json file stores all parameter settings (oscillator, filter, FX, etc.) along with the sample mapping.

Step 3: Embed in the Plugin

For factory content that ships with the plugin, you have two options:

- **Binary Data (recommended for small sets <50 MB):** Add samples to your JUCE CMakeLists.txt using `juce_add_binary_data()`. Samples are compiled directly into the plugin binary. Zero external dependencies — the plugin is fully self-contained.
- **Content Folder (for larger libraries):** Ship a content folder alongside the plugin. The plugin locates it at runtime using `File::getSpecialLocation(commonDocumentsDirectory)`. Better for libraries over 50 MB where binary embedding would bloat compile times.

Step 4: Create the Preset File

Each preset is a JSON file that defines the complete instrument state: oscillator settings, filter configuration, effects chain, modulation routings, and the sample map (which samples are assigned to which key zones, velocity ranges, and round robin groups). The SSM v4 reads these at startup and

populates the preset browser.

Adding Kits and Expansion Packs Later

After the initial release, you can add new content without rebuilding the plugin:

User Content Directory

The SSM v4 scans a user content directory on startup and whenever the Browse button is clicked:

- **macOS:** ~/Documents/Senna/Expansions/
- **Windows:** C:\Users\[username]\Documents\Senna\Expansions\

Each expansion is a subfolder containing samples and preset JSON files. Drop a new folder here and click Browse → Refresh to make it available immediately.

Expansion Pack Format (.senna-pack)

For distributing expansion packs to users, create a .senna-pack file (a renamed ZIP archive) containing:

- A `manifest.json` with pack name, author, version, and description
- A `samples/` folder with all audio files
- A `presets/` folder with preset JSON files

Users can drag a .senna-pack file onto the SSM v4 window or double-click it to auto-install. The plugin extracts the contents to the Expansions directory and refreshes the preset browser.

Recommended Recording Setup

- **Interface:** Use a high-quality audio interface with clean preamps (e.g., RME, UAD, Apogee).
- **Signal path:** Synth line out → DI or line input. Avoid unnecessary coloration unless intentional.
- **Monitoring:** Record dry; add processing later in the SSM v4's own FX/CLR chains.
- **Level:** Peak around -6 dBFS to leave headroom. Normalize after trimming if needed.
- **Loop points:** For sustained sounds, set loop points in the SAMP tab with crossfade to eliminate clicks.

CHAPTER 26

Application Examples

Example 1: Warm Lo-Fi Beat

Load a drum break onto Pad 1. Slice it using SAMP › Slice/Chop with sensitivity at 60%. Map slices to pads 1–8. Set Filter A to LP with cutoff 6 kHz, resonance 0.4. In CLR, enable Tape (drive 40%) and Vinyl (crackle 25%). Add Console at 30%. Master limiter ceiling at -1 dB.

Example 2: Massive SuperSaw Pad

Main oscillator to SuperSaw, Fine +7 cents. Sub Sine at -1 octave, 55%. Filter A: Senna Warm, cutoff 4.5 kHz, reso 0.35, drive 20%. MOD: LFO 1 Triangle 0.3 Hz, cutoff depth 0.4. FX: Chorus 40%, Reverb 35% with 3.5s decay. CLR: Tube 15%. Amp env: A 200ms, D 500ms, S 80%, R 1500ms.

Example 3: Vocal Processing Chain

Load vocal sample. Open VO tab for AI analysis. Typical chain: EQ HP 80 Hz, presence +3dB at 3 kHz, air +2dB at 10 kHz. DYN: threshold -18dB, ratio 3:1, attack 15ms, release 100ms. FX: plate reverb 20%, delay 15%.

Example 4: Hardware Synth Capture

Connect your analog synth to your interface. In the SSM v4, load the dry recording onto a pad. Use Filter A: Senna Cream, cutoff 3.2 kHz, reso 0.5 for rich analog-style filtering. CLR: Console 20%, Tape 30% for warmth. MOD: LFO 1 Sine 0.8 Hz → Filter cutoff, depth 25%. Save as a new preset for instant recall.

CHAPTER 27

Troubleshooting

No sound output

Check plugin is not bypassed (top bar and sidebar tab bypass dots). Verify a sample is loaded or oscillator level > 0%. Check master output level. Ensure DAW audio engine is running.

High CPU usage

Reduce active effects. Disable unused CLR processors via bypass dots. Increase audio buffer size. Disable unused quick-access sections.

Crackling or dropouts

Increase buffer size in your DAW. Close CPU-intensive applications. Update audio interface drivers. Use ASIO on Windows.

Filter overlay not visible

Verify filter type is not OFF. For EQ/Comp overlays, ensure the quick-access power button is active (green dot).

MPE not responding

Enable MPE button on keyboard bar. Ensure controller sends MPE data. Check DAW MPE pass-through settings.

Pads not triggering

Check correct bank (A–D). Verify MIDI note range matches your controller. Check pad velocity mapping.

Expansion pack not appearing

Verify the .senna-pack was extracted to the Expansions directory. Click Browse → Refresh. Check file permissions.

Preset changes lost

Look for the orange unsaved dot in the preset bar. Click Save before switching presets to preserve changes.

CHAPTER 28

Step Sequencer

The Senna SSM v4 Step Sequencer is a 64-step hybrid sequencer with motion recording, inspired by the deep sequencing capabilities of the Moog One and Sub 37. It lives in the SEQ/ARP bar between the Quick-Access bar and the Pads section. Click the STEP SEQ tab to expand it.

Overview

The sequencer provides up to 64 steps with 8 independent parameter lanes, per-step probability and ratchet controls, motion recording, and multiple playback directions. It can drive both internal sound generation and modulation targets simultaneously.

Step Grid

The grid displays all steps as clickable cells. Each cell shows a vertical fill bar representing the current lane's value for that step. Active steps appear lit; inactive steps are dimmed. Click any step to select it and edit its parameters below the grid. The current playback position is highlighted during playback.

- **Step Count:** Choose 4, 8, 16, 32, or 64 steps from the STEPS selector in the toolbar.
- **Active/Inactive:** Each step can be toggled on or off. Inactive steps are skipped during playback.

Parameter Lanes

Eight parameter lanes let you program different values per step. Switch lanes using the tabs above the grid. The grid's fill bars update to reflect the selected lane's data.

- **PITCH:** Semitone offset per step (–24 to +24 semitones). Displayed as note values relative to the root.
- **VEL:** Velocity per step (0–127). Controls note loudness and can modulate filter, amplitude, or other targets.
- **GATE:** Gate length as a percentage of step duration (1–100%). Short gates produce staccato; 100% is legato.
- **CUTOFF:** Filter cutoff modulation per step (0–100%). Applied as an offset to the current filter cutoff setting.
- **RES:** Filter resonance modulation per step (0–100%). Applied as an offset to the current resonance.
- **MOD:** General modulation lane (0–100%). Can be routed to any assignable destination in the MOD matrix.
- **PAN:** Stereo pan position per step (L100–C–R100). Console-style display: C = center, L1–L100 = left, R1–R100 = right.
- **MOTION:** Records and plays back real-time knob movements. Arm the Motion Record button, press Play, and move any knob to capture automation per step.

Per-Step Controls

When a step is selected, the parameter panel below the grid shows editable controls for that step:

- **Pitch:** Semitone offset slider with numeric display.
- **Velocity:** 0–127 slider.
- **Gate:** 1–100% slider controlling note duration.
- **Glide:** Portamento time for smooth pitch transitions to this step (0–100%).
- **Ratchet:** Number of rapid retriggers within the step (1–4). 1 = normal single trigger; 2–4 create rolls.
- **Probability:** Chance the step will trigger (0–100%). At 50%, the step fires roughly half the time, adding organic variation.

Toolbar

The toolbar above the grid contains global sequencer settings:

- **STEPS:** Total step count (4/8/16/32/64).
- **RATE:** Playback speed relative to DAW tempo. Options: 1/32, 1/16T, 1/16, 1/8T, 1/8, 1/4T, 1/4, 1/2, 1/1.
- **SWING:** Timing offset for even-numbered steps (0–100%). 50% is straight; higher values push even steps later for groove.
- **DIR (Direction):** Playback order — FWD (forward), REV (reverse), PONG (ping-pong), RND (random).
- **LOOP:** Loop mode — LOOP (continuous repeat), ONE-SHOT (play once and stop), PEND (pendulum, reverses at each end).

Transport

Transport controls below the toolbar:

- **Play (■):** Start sequencer playback. Syncs to DAW transport when host sync is enabled.
- **Stop (■):** Stop playback and reset to step 1.
- **REC (●):** Arm motion recording. While armed and playing, any knob movement is captured into the MOTION lane for each step as it passes.
- **CLR:** Clear all step data in the current lane, resetting to default values.

Tips

- Use low probability values (20–40%) on select steps for generative, evolving patterns.
- Combine ratchet with short gate lengths for crisp drum rolls.
- Motion record filter cutoff sweeps for classic acid-style sequences.
- Use the PAN lane with different values per step to create spatial movement.
- Set direction to RND for non-repeating, aleatoric compositions.

CHAPTER 29

Arpeggiator

The Senna SSM v4 Arpeggiator combines the comprehensive mode set of the Roland Jupiter X with the generative pattern engine inspired by Korg's KARMA system. Access it by clicking the ARP tab in the SEQ/ARP bar.

Overview

The arpeggiator takes held notes (from your keyboard, pads, or MIDI input) and plays them in a rhythmic pattern defined by the selected mode, rate, and phrase settings. It includes 16 arpeggio modes, a 16-step phrase editor, velocity control, and four algorithmic pattern generators.

Arpeggio Modes

Select a mode from the 16-button grid. Modes determine the order in which held notes are played:

- **UP:** Ascending pitch order.
- **DOWN:** Descending pitch order.
- **UP-DN:** Ascending then descending (top and bottom notes played once).
- **DN-UP:** Descending then ascending.
- **CONVERGE:** Alternates between the lowest and highest held notes, moving inward.
- **DIVERGE:** Starts from the middle and alternates outward to lowest and highest.
- **RANDOM:** Random note order from held notes.
- **ORDER:** Notes play in the order they were pressed.
- **CHORD:** All held notes trigger simultaneously on each step.
- **STRUM:** Rapid cascading trigger of all held notes, simulating a guitar strum.
- **KARMA 1:** Generated groove pattern using KARMA algorithm — syncopated rhythm with accent variation.
- **KARMA 2:** KARMA pattern variant with different syncopation and velocity contour.
- **KARMA 3:** KARMA pattern with triplet feel and ghost notes.
- **KARMA 4:** KARMA pattern emphasizing off-beat accents and swing.
- **EUCLID:** Euclidean rhythm distribution. Notes are spread as evenly as possible across the phrase length using the Bjorklund algorithm.
- **SKIP:** Plays notes in order but skips every other step, creating a gapped pattern.

Phrase Editor

The 16-step phrase grid defines the rhythm and velocity pattern of the arpeggio. Each step shows a vertical velocity bar. Click steps to toggle them on/off. Active steps trigger a note; inactive steps create rests.

- **Velocity Bars:** The height of each step's bar represents its velocity (0–127). Higher bars = louder notes.

- **Tie:** When a step is tied to the next, its note sustains through without retriggering, creating legato phrases.

Controls

The controls section provides global arpeggiator parameters:

- **OCTAVES:** Range of octave transposition (1–4). At 1, notes play in their original octave. At 4, the pattern spans four octaves.
- **RATE:** Arp speed relative to DAW tempo. Options: 1/32, 1/16T, 1/16, 1/8T, 1/8, 1/4T, 1/4, 1/2, 1/1.
- **GATE:** Note length as percentage of step duration (1–100%).
- **SWING:** Timing offset for even steps (0–100%). Adds groove and shuffle feel.
- **LATCH:** When enabled, the arp continues playing after keys are released. New notes replace the latched pattern.
- **KEY SYNC:** When enabled, the arp resets to step 1 each time a new note is pressed.
- **VEL CURVE:** Velocity response curve — FIXED (constant velocity), LINEAR, EXPO (exponential), or SOFT (logarithmic).
- **VELOCITY:** Base velocity (0–127) used when VEL CURVE is set to FIXED.
- **HUMANIZE:** Random timing and velocity variation (0–100%). Adds natural feel to mechanical patterns.
- **PHRASE LEN:** Active phrase length (1–16 steps). Steps beyond this value are ignored.

Transport

- **Play (■):** Start arpeggiator. Syncs to DAW transport.
- **Stop (■):** Stop arpeggiator.
- **Hold (■):** Toggle latch on/off. When lit, held notes remain active after release.

Pattern Generators

Five generator buttons create or modify phrase patterns algorithmically:

- **RANDOMIZE:** Generates a random phrase with random velocities and step on/off states. Useful for instant inspiration.
- **EUCLIDEAN:** Distributes active steps evenly across the phrase length using the Bjorklund algorithm. For example, 5 hits in 16 steps produces the pattern [x..x..x..x..x...], a classic Afro-Cuban clave rhythm.
- **KARMA GEN:** Generates groove patterns inspired by Korg’s KARMA engine. Produces musically coherent rhythms with accent patterns, syncopation, and velocity curves drawn from a library of groove templates.
- **MUTATE:** Randomly alters the existing phrase. Each step has a probability-based chance of changing its velocity, on/off state, or tie status. Repeated mutations evolve the pattern gradually.
- **CLEAR:** Resets all 16 steps to active with velocity 100 and no ties. Returns to a blank slate.

Tips

- Combine KARMA modes with the HUMANIZE control for patterns that feel live-performed.
- Use EUCLIDEAN mode with odd phrase lengths (7, 11, 13 steps) for polyrhythmic effects.
- Layer the arpeggiator with the step sequencer: run the arp for melodic movement while the sequencer handles filter and modulation automation.
- Set OCTAVES to 3–4 and use CONVERGE mode for dramatic sweeping arpeggios.
- Use MUTATE repeatedly on a pattern you like to explore variations without losing the core feel.

APPENDIX A

Technical Specifications

Parameter	Value
Plugin Formats	VST3, Audio Unit (AU)
Sample Rate	44.1 kHz – 192 kHz
Bit Depth	32-bit float internal
Latency	0 samples
Oscillator Waveforms	11 (Sine, Saw, Square, Triangle, SuperSaw, Wavetable, FM, PWM, Sync, Noise W, Noise P)
Sub Oscillator Waveforms	6 (Sine, Square, Triangle, Saw, SuperSaw, Noise W)
Filter Models	6 (HP, LP, BP, Senna Warm, Senna Cream, Senna Drive)
Filter Stages	2 (Dual A/B with serial/parallel/split routing)
LFO Count	2 independent
Pad Grid	16 pads × 4 banks = 64 total
Per-Pad Filters	Dual HP/LP per pad
Effects	Delay, Reverb, Chorus, Phaser, Flanger, BitCrusher, Granular, IR Conv, Limiter
EQ	4-band parametric, 8-band graphic, Tilt, Dynamic, Linear Phase
Dynamics	Compressor, Multiband, Gate, Expander, De-Esser
Coloring	Console, Transformer, Vinyl, Tube, Tape, Exciter
Master	Input Gain, M/S EQ, Multiband Dyn, Width, Topology, Soft Clip, Limiter
Metering	Senna Meter: dBFS, Pro, Phase, VU, RTA, LUFS, TP, LRA, Scope
Skins	10
MPE	Yes
Step Sequencer	64 steps, 8 lanes, per-step ratchet/probability/glide, motion recording
Arpeggiator	16 modes (incl. KARMA, Euclidean), 16-step phrase editor, 5 generators
Preset System	Save/Load, Browse, Favorites, A/B, Undo/Redo

APPENDIX B

MIDI Implementation

Function	MIDI Message	Range
Note On/Off	Note On/Off	0–127
Velocity	Note On velocity	1–127
Pitch Bend	Pitch Bend	±2 semitones
Mod Wheel	CC 1	0–127
Filter Cutoff	CC 74	0–127
Resonance	CC 71	0–127
Volume	CC 7	0–127
Pan	CC 10	0–127 (64 = center)
Sustain	CC 64	0/127
Bank Select	CC 0	0–3 (Banks A–D)
MPE Pressure	Channel Aftertouch	0–127
MPE Slide	CC 74 (per-note)	0–127
All Notes Off	CC 123	—

APPENDIX C

Keyboard Shortcuts

Shortcut	Action
Ctrl/Cmd + S	Save preset
Ctrl/Cmd + Z	Undo
Ctrl/Cmd + Shift + Z	Redo
Tab	Cycle sidebar tabs
1–9	Select tab by index
Ctrl/Cmd + Click knob	Reset to default value
Shift + Drag knob	Fine adjustment (0.1x sensitivity)
Double-click knob	Enter value numerically
Ctrl/Cmd + B	Toggle bypass
Ctrl/Cmd + A	A/B compare
+/–	Zoom waveform in/out

APPENDIX D

Recall Sheet

Use this sheet to document your settings for session recall.

Oscillator

Waveform: _____

Pitch: _____st Fine: _____ct

Level: _____%

Sub Oscillator

Waveform: _____

Octave: _____

Level: _____%

Filter A

Type: _____

Cutoff: _____Hz Reso: _____

Drive: _____% Mix: _____%

Filter B

Type: _____

Cutoff: _____Hz Reso: _____

Drive: _____% Mix: _____%

Amp Envelope

A: _____ms D: _____ms S: _____% R: _____ms

Filter Envelope

A: _____ms D: _____ms S: _____% R: _____ms Depth: _____%

MOD

Type: _____

LFO 1 Rate: _____Hz Depth: _____%

LFO 2 Rate: _____Hz Depth: _____%

EQ

Mode: _____

Low: _____dB L-Mid: _____dB H-Mid: _____dB High: _____dB

DYN

Type: _____

Thr: _____dB Ratio: _____:1 Atk: _____ms Rel: _____ms

FX

FX A Type: _____ Mix: _____%

FX B Type: _____ Mix: _____%

Routing: Serial / Parallel

CLR

```
CLR A Type: _____________ Drive: _____%
CLR B Type: _____________ Drive: _____%
```

MSTR

```
Type: _____________ Topology: _____________
Gain: _____dB Ceiling: _____dB Width: _____%
```

Preset

```
Name: ____________________________
Date: ____ / ____ / ______
```

End of User Guide

senna.audio

Addendum: Skin System Update

Senna SSM v4 — User Guide — April 2026 Update

The Senna SSM v4 now includes 10 visual skins, selectable via the skin picker dropdown in the top bar. The complete skin list:

1. Gunmetal	Default — warm gray with green accent
2. Carbon Fiber	Dark carbon weave with cyan accent
3. Obsidian	Ultra-dark with electric cyan accent
4. Phantom Red	Deep black with crimson accent
5. Arctic	Light mode with ice blue accent
6. Neon Noir	Dark with hot magenta accent
7. Sandstorm	Desert tones with burnt orange accent
8. Silver & Black	Pure monochrome with silver accent
9. Fiesta	Hot pink and teal, fiesta-era inspired
10. Chicago	Flat black, white text, flat red accent

Waveform Color Picker

The waveform display color can be customized via the System Options panel (gear icon). Choose from 10 colors: Green (default), Cyan, Red, Amber, Purple, Pink, Yellow, White, Neon Green, or Hot Red.

When a custom color is selected, it takes priority over automatic FX color tinting (Tape/Tube/Vinyl effects). Selecting "Green (Default)" restores automatic tinting behavior.

Help Desk

The Senna Help Desk (Senna-HelpDesk.html) provides integrated support:

- Support Chat: AI-powered chatbot for instant troubleshooting
- Submit Bug: Bug report form that emails the development team
- My Tickets: Track submitted bug reports and their status
- FAQ: Answers to common questions about Senna SSM features
- System Status: Real-time operational status of all Senna products