USER MANUAL

_SEM V

ARTURIA

_The sound explorers

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Product version: 3.0.0

Revision date: 14 April 2025

Thank you for purchasing SEM V!

This manual covers the features and operation of Arturia's **SEM V**, an emulation of the Oberheim SEM synthesizer module.

Be sure to register your software as soon as possible! When you purchased SEM V, a serial number and an unlock code were sent to you by e-mail. These are required during the online registration process.

Special Messages

Specifications Subject to Change:

The information contained in this manual is believed to be correct at the time of printing. However, Arturia reserves the right to change or modify any of the specifications without notice or obligation to update the hardware or software that has been purchased.

IMPORTANT:

The software, when used in combination with an amplifier, headphones or speakers, may be able to produce sound levels that could cause permanent hearing loss. DO NOT operate for long periods of time at a high level or at a level that is uncomfortable.

If you encounter any hearing loss or ringing in the ears, you should consult an audiologist.

EPILEPSY WARNING – please read before using SEM V

Some people are susceptible to epileptic seizures or loss of consciousness when exposed to certain flashing lights or light patterns in everyday life. This may happen even if the person has no medical history of epilepsy or has never had any epileptic seizures. If you or anyone in your family has ever had symptoms related to epilepsy (seizures or loss of consciousness) when exposed to flashing lights, consult your doctor prior to using this software.

Discontinue use and consult your doctor *immediately* if you experience any of the following symptoms while using this software: dizziness, blurred vision, eye or muscle twitches, loss of consciousness, disorientation, or any involuntary movement or convulsion.

Precautions to take during use

- Do not stand too close to the screen
- Sit a good distance away from the screen
- Avoid using if you are tired or have not had much sleep
- Make sure that the room is well lit
- Rest for at least 10 to 15 minutes per hour of use

Introduction

Congratulations on your purchase of Arturia SEM V!

As with all of our products, we believe in offering the best of both worlds in a single package and letting you choose how you want to use it. SEM V offers all of the sound and features of the Oberheim SEM, a complete monophonic synth-in-a-box that can be thought of as the first desktop synthesizer module, and was a direct ancestor of Oberheim's sought-after polyphonic synths.

SEM V provides you with all of the sound and features of the original, with added benefits such as DAW integration and polyphony. We can't wait to hear the sonic adventures you will take with it!

Peace, love, and music,

The Arturia team

Be sure to visit the www.arturia.com website for information about all of our other great hardware and software instruments. They have become indispensable, inspiring tools for musicians around the world.

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1. WELCOME TO SEM V!



Thank you for purchasing Arturia SEM V, a faithful software reproduction of the Oberheim Synthesizer Expander Module. SEM V aims to capture the sound of the original hardware with complete accuracy and its spirit with focused passion. As with all software instruments in the Arturia V Collection, those goals are the beginning of our sonic journey, not the end. That is why SEM V, while staying reverently true to the original, goes beyond a "knob for knob" emulation of the hardware and adds features that speed up your workflow, enhance creativity, and simply make sense in a modern, DAW-based music production context.

Introduced in 1974, the original SEM is arguably the first "desktop synth module." Meaning, it was a complete, end-to-end, monophonic synthesizer voice offering everything needed to make music except a keyboard or sequencer. Thanks to a number of design choices and features we'll explore in a moment, it sounded different from the modular synthesizers developed by the most famous synth manufacturer of the time (and arguably ever). It was warm, huge, and required no patch cables for musicians to create sound – well, other than the cables connecting it to the keyboard or sequencer.

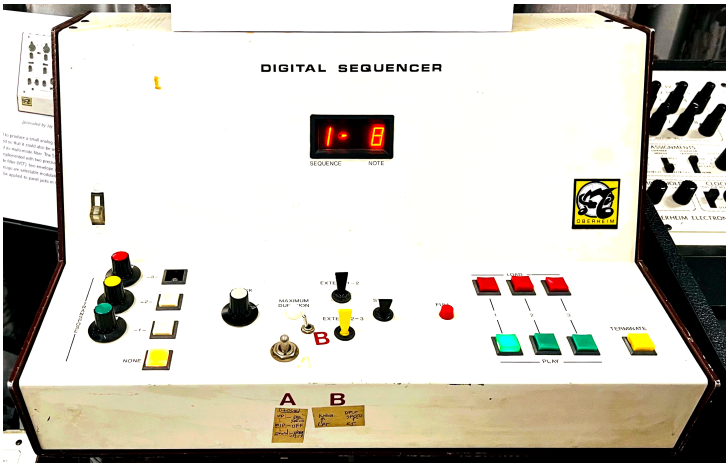
1.1. The hardware SEM



Photo courtesy of Sam Mims, Syntaur.com

SEM inventor Tom Oberheim was both a digital systems engineer and a former synthesizer dealer. He had had previous successes with ring modulator and phaser effects units, and in 1973 introduced a digital sequencer, the DS-2A.

The DS-2A allowed musicians to enter notes and step lengths directly from a keyboard, memorizing them as digital information. Though the process was labor-intensive compared to today's real-time sequencing, the fact that keyboardists could input data with the instrument most familiar to them was a huge leap forward. Because the DS-2A took over whatever synthesizer it was playing, the musician could not play from the keyboard at the same time it was running. Tom Oberheim thought it would be ideal to add a keyboardless synthesizer as a companion sound source for the sequencer.



DS-2A sequencer owned by Steve Porcaro of Toto; photo by Alison Cassidy via Wikimedia Commons

Thus, the "E" in SEM stood for *expanding* the DS-2A. The SEM also expanded the functionality of other manufacturers' synthesizers because it had an audio input for processing external signals through the filter, and an LFO output for modulating external destinations.

1.1.1. The SEM sound

When the SEM debuted in 1974, the two most popular stand-alone synthesizers were the "Mini" and the ARP 2600 and Odyssey. The SEM didn't sound like any of them. It sounded different enough, in fact, that some synth enthusiasts could identify it by ear. There are a handful of reasons why this is so.

Mixable waveforms: The voltage-controlled oscillators on the SEM could produce sawtooth or pulse/square waves, the latter with variable pulse width. Modulating the pulse width (PWM) produced harmonically rich tones, especially when used in conjunction with hard sync – which the SEM also offered.

The filter: The SEM employed a 12-dB-per-octave (two-pole) resonant filter, as contrasted with the 24-dB-per-octave ladder filter made famous by the "Mini." While this meant the SEM's cutoff slope was more gradual, the filter had a very smooth, buttery, and big sound some musicians preferred.

The filter again: The SEM filter was also multi-mode and *state-variable*. This meant it could smoothly morph from lowpass to highpass behavior with the turn of a knob. Directly in the middle, it became a notch (band-reject) filter. Practically speaking, you could achieve a combination of lowpass and notch with the knob in the counterclockwise half of its range, or notch and highpass with the knob in the clockwise half. A knob position outside these ranges changed the mode to bandpass, which was not part of the smooth progression but useful nonetheless.

1.1.2. SEM descendants



Lyle Mays with his Oberheim Four-Voice

What's better than a fat-sounding SEM? Multiple SEMs integrated as one instrument! The first of these was the Four-Voice, which combined four SEM units with a scanning keyboard and a programmer that could edit their settings and even do a form of patch save and recall. Beyond the obvious polyphony, each voice could have different settings, marking the beginning of what Tom Oberheim once called "synthetic orchestral arranging." In other words, it was the predecessor of modern multi-timbral capability. The Four-Voice was introduced in 1975, with two- and eight-voice systems following shortly after. Geddy Lee of Rush and Lyle Mays of the Pat Metheny Group were famous fans of multi-SEM systems.



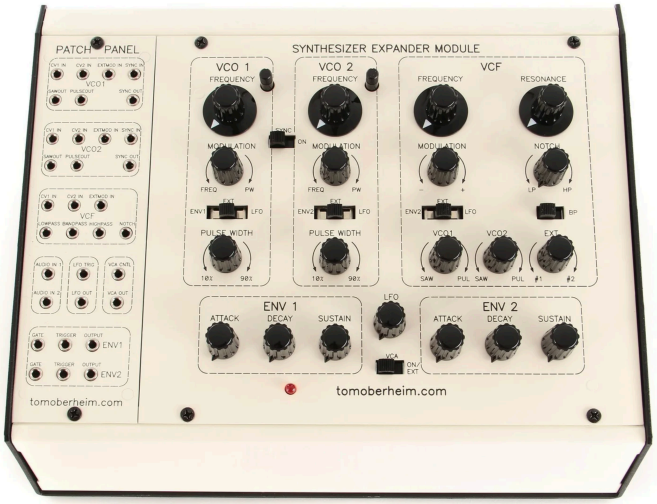
Oberheim OB-X



Oberheim OB-8

Self-contained "slab" synths were to follow in the late 197Os and early '8Os. The OB-1 (1977) was essentially an SEM enhanced with a selectable 12/24dB filter, noise source, and patch recall. The OB-X (1979) packaged similar circuitry into a four-, six-, or eight-voice programmable polysynth. The OB-Xa (1981) further refined this design, adding bi-timbral split and layer capability and notably switching from discrete components to Curtis integrated circuit chips. It also introduced the Oberheim brand's signature "blue lines" industrial design. The OB-8 (1983) looked very similar to the OB-Xa, but offered a whole second page of functions accessed from the front panel controls as well as a polyphonic arpeggiator.

1.1.3. Return of the King



2010's SEM Pro, patch panel version

Tom Oberheim released a limited-edition reissue/update of the SEM in 2010, called the SEM Pro, to applause that echoed across the synth industry. It came in two versions: one with a MIDI-to-CV interface for playing from modern MIDI hardware, the other with a panel (shown) that provided patching access to almost every juncture in its signal chain – the latter ostensibly aimed at synthesists with Eurorack modular setups. Rarer still than the SEM Pro was a modern version of the Two-Voice, dubbed the TVS Pro.

The SEM Pro bore the brand name "Tom Oberheim" because guitar giant Gibson had owned the Oberheim brand and intellectual property since 1988. In 2019, Gibson's incoming CEO returned all rights to Tom, who was then free to develop and sell synths simply branded *Oberheim* – right down to the iconic logo of tied 8th-notes with cartoon arms gesturing a thumbs-up. His modern flagship, the OB-X8, inherits the SEM legacy, and is made in conjunction with Sequential – a brand Yamaha returned to the late, great Dave Smith a few years before Gibson followed suit.

1.2. Why SEM V?



SEM V Advanced view, showing the Multi-Arp

Why any software version of a classic synthesizer? The usual reasons include polyphony, stability, affordability, and seamless integration with DAWs and the MIDI world. But this is Arturia, and we always strive to give you advanced musical features while maintaining respect for the original. We like to think of it as what the original designers might have done if it were practical or even possible at the time. In SEM V, such features include the Voice modulator, which sends a new modulation value each time the synth engine plays a voice – this can get remarkably close to the variations between SEM units in a 4- or 8-voice setup. There's also our Multi-Arp, a 4-part arpeggiator with unprecedented pattern and rhythmic control. Drag-and-drop modulation assignment draws on sophisticated sources such as our flexible Functions, Random value generator, the aforementioned Voice Modulator, and a precisely programmable Mod Sequencer with one-click pattern generation. A suite of 18 studio-quality effects includes the new Trance Gate for chopping and stutter FX.

1.2.1. SEM V feature summary

- Authentic and accurate analog modeling of the SEM sound
- Two VCOs with mixable saw/pulse waveforms
- Multi-mode, state-variable filter (VCF) with smooth morphing from lowpass to notch to highpass
- Filter bandpass mode
- Sub Oscillator can play one or two octaves below VCO 1, or at same pitch
- Up to 8-voice polyphony, user selectable
- Unison mode with stereo spread and detuning for massively thick monophonic sounds
- Dispersion controls adjust per-voice variation in key sonic aspects such as pitch and filter cutoff
- Vintage knob acts as a macro for all the Dispersion adjustments
- Main panel modulation sources: LFO, Envelope 1, Envelope 2
- Main panel sources assignable to VCO pitch or pulse width as well as VCF frequency
- Programmable four-part Multi-Arpeggiator with tons of patterns and step-based rhythmic control
- Full ADSR envelopes in Modulators section, in addition to the main panel envelopes
- Functions create complex modulation shapes with multiple breakpoints
- Random value modulation source
- Voice Modulator sends a different value each time SEM V triggers a synth voice
- Assignable MIDI modulation sources: wheel, keyboard track, velocity, release velocity, aftertouch, and slide
- Full MPE support for polyphonic expression with compatible controller
- Nearly all functions can be MIDI-learned to physical controls
- Macros control multiple parameters with a single knob twist
- 170 Presets from the industry's most talented sound designers

2. ACTIVATION AND FIRST START

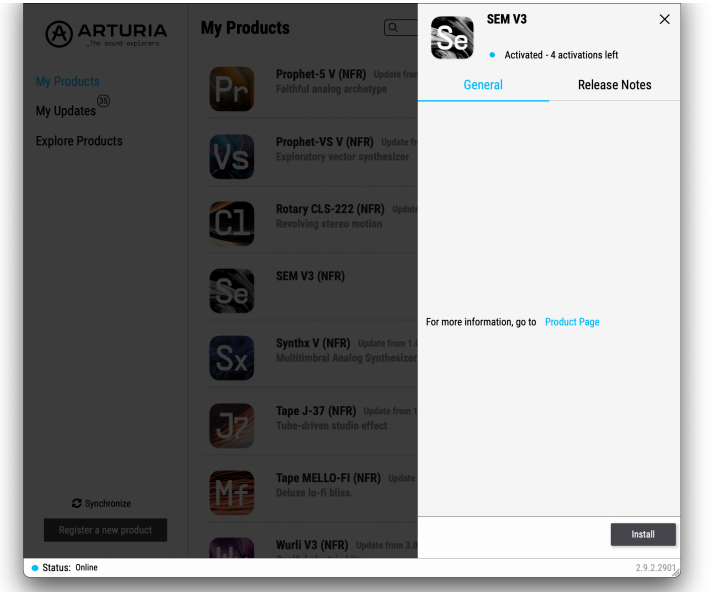
2.1. Register, activate, and install SEM V

SEM V works on computers equipped with Windows 10 or later and macOS 11 or later. You can use it as a stand-alone instrument or as a plug-in for your favorite DAW (Digital Audio Workstation) in Audio Units, AAX, VST2, or VST3 format.

Before you install or register the software, you'll need to create a My Arturia account here, using an email address and password of your choice: https://www.arturia.com/createanaccount/

While it's possible to handle registration, activation, and other tasks manually online, it's far simpler to download and use the Arturia Software Center app, which can be found here: https://www.arturia.com/support/downloads&manuals

You'll enter your email address and password to set up Arturia Software Center, which acts as a central location for all of your Arturia software registrations and activations. It also helps you install and update your software by keeping track of current versions.



You can register, activate, and install your product inside Arturia Software Center by pressing the **Register a new product** button, and clicking the boxes to **Activate** and then **Install** your software. The registration process will require you to enter the serial number and the unlock code you received when you bought your software.

You can also do this online by logging into your account and then following the instructions here: http://www.arturia.com/register

Once you've registered, activated, and installed SEM V, it's time to get it to talk to your computer.

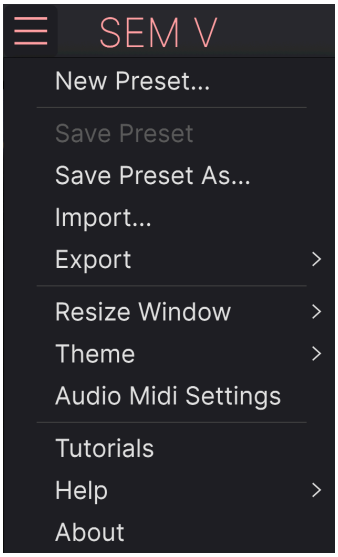
2.2. Initial setup for stand-alone use

If you would like to use SEM V in standalone mode, you will need to ensure that its MIDI input/output and audio outputs are being routed properly to and from the software. You'll generally only need to do this once, unless you change your MIDI controller or audio/MIDI interface. The setup process is the same on both Windows and macOS.

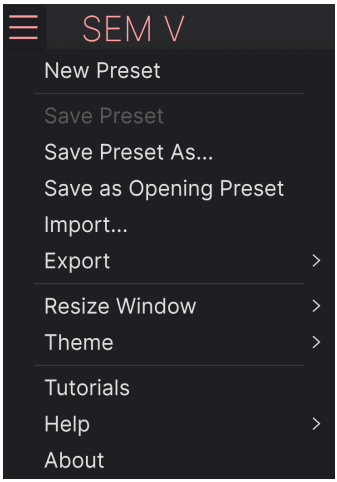
> ! This section only applies to those of you who plan to use SEM V in stand-alone mode. If you are only going to use SEM V as a plug-in inside a host DAW or other music software, you can safely ignore this section – your host music software handles these settings.

2.2.1. Audio and MIDI settings: Windows

At the top left of the SEM V application is a pull-down menu. It contains various setup options.

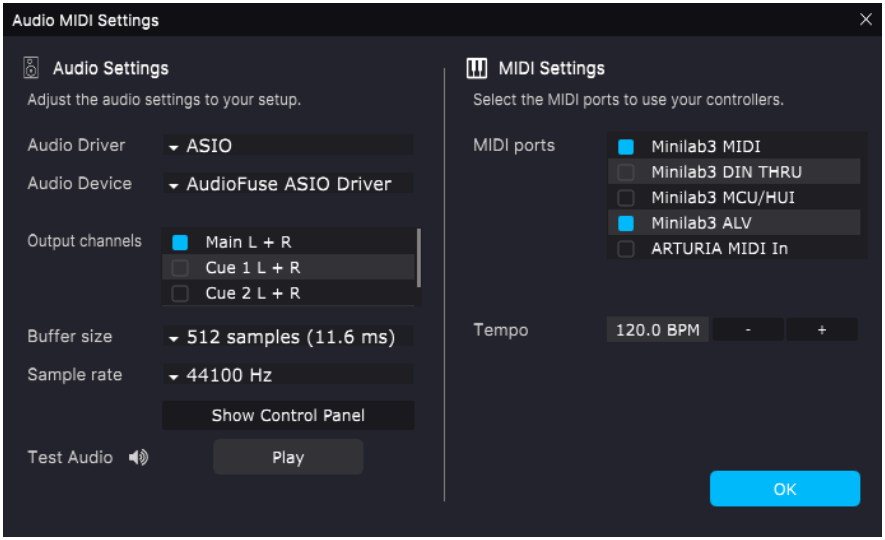


The main menu when SEM V is in stand-alone mode



The main menu when SEM V is run as a plug-in

Click on **Audio Midi Settings** to open the following window. This works in the same way on both Windows and macOS, although the names of the devices available to you will depend on the hardware you are using. Remember, this menu option is only available (and needed) when running SEM V in stand-alone mode.



Audio and MIDI settings for Windows

Starting from the top, you have the following options:

- **Driver:** Selects which audio driver will handle playback of SEM V. This can be your computer's internal driver, a generic ASIO driver, or an external soundcard or interface driver. The name of your hardware interface(s) may appear in the field below, depending on your selection.
- **Device** Selects the audio hardware through which you will hear SEM V.
- **Output Channels** lets you select which of the available outputs will be used to route audio out. If you only have two outputs, this selection box will not be shown. If you have more than two, you can select a specific pair of outputs.
- The **Buffer Size** menu lets you select the size of the audio buffer your computer uses to calculate sound. The latency in milliseconds is displayed after the buffer size setting.

! A smaller buffer means lower latency, i.e. a shorter delay between pressing a key and hearing the note, but loads your CPU more heavily and can cause pops or clicks. A larger buffer means a lower CPU load, as the computer has more time to think, but can result in a noticeable delay between playing a note and hearing it. A fast, modern computer should easily be able to operate at a buffer size of 256 or even 128 samples without clicks. If you still hear clicks, enlarge the buffer size until they stop.

- The **Sample Rate** menu lets you set the sample rate at which audio is sent out of the instrument.

! The options here will depend on what your audio device can support; nearly every device can operate at 44.1 kHz or 48 kHz, which will be perfectly fine for most applications. If you have a specific need to use a higher sample rate, up to 96 kHz, SEM V will happily support that.

- The **Show Control Panel** button will jump to the system control panel for whatever audio device is selected.

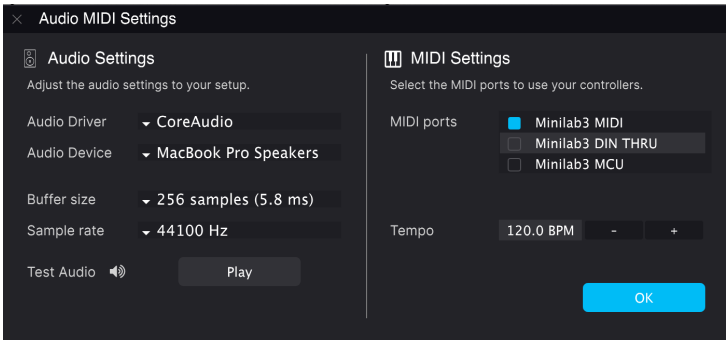
! Note that this button is only available in the Windows version.

- **Test Tone** sends a short test tone when you click the **Play** button, to help you troubleshoot audio issues. You can use this feature to confirm that the instrument is routed correctly through your audio interface and that audio is playing back where you expect to hear it (your speakers or headphones, for example).
- The **MIDI Devices** area will display any MIDI devices you have connected to your computer (if any). Click the check box to accept MIDI from the device(s) you want to use to control the instrument. You can select multiple MIDI devices at once with the checkboxes.

! In stand-alone mode, SEM V listens for all MIDI channels, so there's no need to specify a channel.

- **Tempo** sets a base tempo for features inside SEM V such as LFO and effects sync. When using SEM V as a plug-in, the instrument gets tempo information from your host software.

2.2.2. Audio and MIDI settings: macOS



Audio MIDI Settings for macOS

The menu for setting up audio and MIDI devices for macOS is accessed in the same way as for Windows, and the setup process is nearly identical. All options work the same way as described above in the Windows section. The only difference is that all macOS devices, including external audio interfaces, use the CoreAudio driver built into macOS to handle routing. In the second drop-down menu under **Device**, choose the audio device you wish to use.

2.2.3. Using SEM V as a plug-in



Here, SEM V is shown running as an AU plug-in within Apple Logic Pro

SEM V comes in VST2, VST3, Audio Unit (AU), and AAX plug-in formats, for use in all major DAW software such as Ableton Live, Cubase, Logic, Pro Tools, Studio One, and more.

When using SEM V as a plug-in, all audio and MIDI device settings are handled by your host music software. Please refer to your host music software's documentation if you have any questions about loading or using plug-ins.

Note that when you load SEM V as a plug-in instrument inside your host software, its interface and settings work the same way as in standalone mode (see below), with a few small differences:

- SEM V will synchronize to your DAW's host tempo/BPM when sync is required
- You can automate numerous parameters using your DAW's automation system
- You can use more than one instance of SEM V in a DAW project
- You can run the outputs of SEM V through any additional audio effects available in your DAW, such as delay, chorus, filters, etc.
- You can route SEM V's audio outputs creatively inside your DAW, using the DAW's own audio routing system.

2.3. Playing SEM V for the first time

Now that you have SEM V up and running, let's take it for a quick test drive!

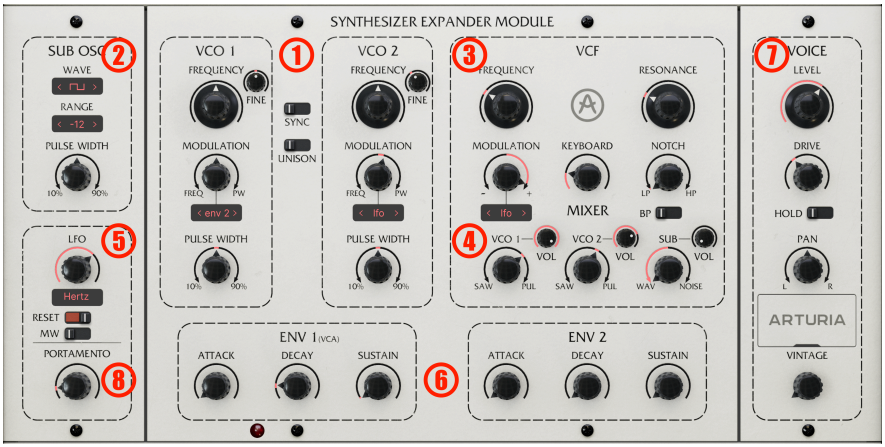
If you haven't done so already, launch SEM V as a plug-in or as a stand-alone instrument. If you have a MIDI controller set up, use it to play some notes on SEM V. You can also use your mouse to play the on-screen keyboard or use the keys of your computer keyboard [p.32].

The up and down arrows at the top of the instrument let you step through all of SEM V's available presets. Try playing a few, and when you find one that you like, try adjusting some of the other on-screen controls to see how they affect the sound.

Play with the controls, and don't worry – nothing is saved unless you specifically save a preset (described later in this User Guide), so there is no risk you'll mess up any of SEM V's factory presets.

We hope this chapter has gotten you off to a smooth start. Now that you're up and running, the rest of this guide will help you work your way through all of SEM V's features on a section-by-section basis. By the time you reach the end, you'll understand all of SEM V's capabilities - and will be using this fantastic instrument to create equally fantastic music!

3. MAIN PANEL

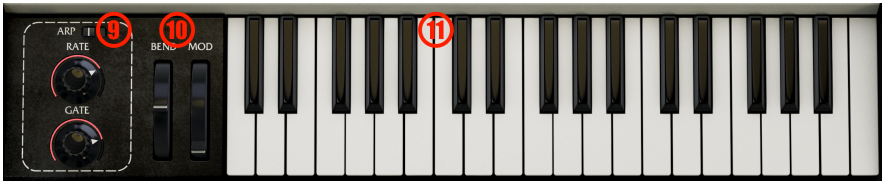


This chapter covers the controls numbered in red above

In this chapter we will cover the core controls and synthesizer functions of SEM V, which are as follows:

Number	Area	Description
1.	Oscillators [p.18]	Adjusts the sound of the two VCOs
2.	Sub Oscillator [p.21]	Controls a sub-oscillator that may be mixed in
3.	VCF [p.23]	Adjusts the multimode resonant filter
4.	Mixer [p.25]	Mixes VCOs and sub-osc into the VCF; adjusts VCO 1 and 2 waveform shapes
5.	LFO [p.26]	LFO that can modulate pitch or pulse width of VCOs as well as VCF frequency
6.	Envelopes [p.27]	Two ADSR envelopes with shared value for decay and release
7.	Voice Controls [p.28]	Settings that affect the sound per voice, including Dispersion [p.30]
8.	Portamento [p.31]	Adjusts SEM V's portamento time

The bottom (keyboard) area of the plug-in window is home to these controls:

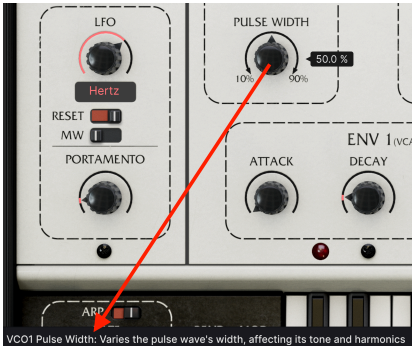


Number	Area	Description
9.	Multi-Arp Controls [p.31]	Quick rate and gate knobs for the Multi-Arp [p.33]
10.	Wheels [p.32]	Pitch-bend and modulation wheels
11.	Keyboard [p.32]	Onscreen keyboard for playing with mouse or QWERTY keys

3.1. Common behaviors

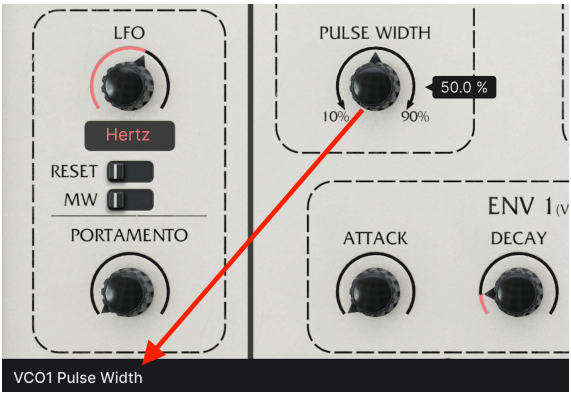
All Arturia virtual instruments share some common control behaviors to make editing sounds easier. These behaviors are common to every control in SEM V.

3.1.1. Value pop-ups



Move or hover on any control and a pop-up banner or "tool tip" will display its value.

3.1.2. Parameter descriptions



Operating or hovering on any control displays its name and a brief description of its function in the left corner of the lower toolbar [p.110].

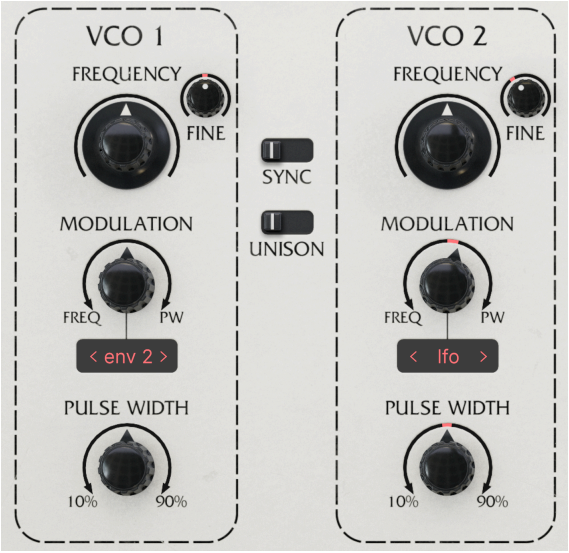
3.1.3. Fine adjustment

Hold the right mouse button or Control key while dragging on any knob to adjust it more slowly. This helps when you want to dial in precise values.

3.1.4. Double-click for default

Double-click on any knob to return it to its factory default setting.

3.2. Oscillators



VCOs 1 and 2 function identically

The hardware SEM had two voltage-controlled oscillators (VCOs), which provided the same features.

3.2.1. Frequency

On the original SEM, concentric knobs controlled the pitch of the VCOs – the outer collar knob for coarse pitch and the inner knob for fine pitch. This is known as a *Vernier* design, and when you moved the inner or outer knob, its companion moved proportionally. On SEM V (and on the 2010 hardware reissue from Tom Oberheim), two separate controls are used.

- **Coarse:** Adjusts the VCO pitch in semitones and fractions of a semitone
- **Fine:** Adjusts the pitch in cents

In practice, you can dial in pretty precise tunings using the Coarse knob alone, but we included both knobs to duplicate the behavior of the hardware.

3.2.2. Modulation

This section adjusts the modulation depth of the oscillator from three sources on the main panel. These sources are independent from the Modulators [p.72] available when you click the Advanced button. Clicking on the red field opens a menu of sources (or you can step through them with the arrows to either side), like so:



Main panel modulation sources include both envelopes and the LFO

The choices are Envelope 1, Envelope 2, and the LFO (as well as Off). Then, turning the **Modulation** knob counter-clockwise applies increasing modulation depth to the VCO pitch. Turning it clockwise modulates pulse width *if* a pulse wave is used.

3.2.3. Pulse Width knob

Pulse width refers to the ratio between the negative and positive cycles of a waveform that would otherwise be square. In other words, the positive pulses become wider (at lower ratios) or narrower (at higher ratios) relative to the negative ones. A perfect square wave has a ratio of 50 percent. The **Pulse Width** knob sets this ratio when the Pulse wave is selected. Modulating the pulse width can produce pleasing harmonic shifts.

3.2.4. Where are the waveforms?



Don't oscillators on synths usually have a waveform selector? Like the original hardware, SEM V locates these in the Mixer [p.25] section, which visually is part of the VCF [p.23] area. This is because the waveforms are mixed on their way into the VCF, so the design choice was logical enough. Each VCO can crossfade between sawtooth and pulse waves, containing both at once. If any level of pulse wave is in the mix, modulating or adjusting that VCO's pulse width will have an audible effect. We'll cover these controls in detail in the Mixer section, below.

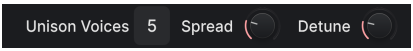
3.2.5. Hard Sync



VCO 2 may be hard-synced to VCO 1 by toggling the **Sync** switch. This locks the starting phase of VCO 2 to the frequency of VCO 1, such that both phases start at the same time even if the two oscillators' pitches are set differently. This has the effect of forcing VCO 2 to have the same base frequency. Audibly, the oscillators will never sound out of tune regardless of their Frequency settings.

♪ Musically, hard sync can produce edgy and interesting results. The most famous of these is the "quacking" synth sound that enhances the bass line of the song "Let's Go!" by The Cars.

3.2.6. Unison



Turning on Unison causes these controls to appear in the lower toolbar

Just below the Sync toggle is the **Unison** switch. This causes SEM V to play monophonically, stacking all its voices for a very thick sound. You can choose the number of unison voices, spread them across the stereo field, and detune them using the Unison controls [p.111] in the lower toolbar [p.110].

3.3. Sub Oscillator



The Sub Oscillator is an addition to SEM V that was not part of the original hardware. It can add extra beef to the bass range, or simply act as a third oscillator.

3.3.1. Wave



Click the **Wave** field (or use the arrows) for three choices of waveform: sine, sawtooth, and square/pulse.

3.3.2. Range



Likewise, the **Range** field selects whether the Sub Oscillator plays at the same pitch as VCO 1, or one (-12) or two (-24) octaves below it.

> ♪ The Sub Oscillator tracks the pitch of VCO 1 *only*, leaving VCO 2 free to play musical intervals or dissonant pitches if desired. To demonstrate this, turn VCO 1's volume all the way down in the Mixer section, but ensure both VCO 2 and the Sub Oscillator can be heard. Now, if you turn VCO 1's coarse Frequency knob, you will hear the pitch of the Sub Oscillator change relative to VCO 2.

3.3.3. Sub Osc Pulse Width



Finally, the Sub Oscillator has adjustable pulse width for when the pulse/square wave is selected.

3.4. VCF



The voltage-controlled filter on the original SEM stood out for a couple of reasons. First, its smoother 12dB-per-octave slope had a sound that was distinct from the 24dB-per-octave ladder filter a famous then-competitor used in its synths. More significantly, it was a true *state-variable* filter. This meant it could smoothly morph from full lowpass to full highpass, with notch behavior in the middle. There was also a separate bandpass mode.

> ♪ What does "per octave" mean? When a filter blocks frequencies outside the permitted range, it doesn't cut them off all at once like a cliff. It has a slope. With a slope of 12dB per octave, the level is reduced by 12dB for every octave the signal strays outside of the permitted frequency range. An audio term for this range is "passband," i.e. those frequencies that are allowed to pass.

Here are the basic controls, except for the Modulation section:

- **Frequency:** Sets the cutoff frequency (lowpass/highpass) or center frequency (notch/bandpass) of the filter
- **Resonance:** Emphasizes a peak of frequencies around the cutoff/center; varies bandwidth in notch or bandpass modes
- **Keyboard:** Adjusts the amount of keyboard tracking
- **Filter Type:** Morphs from lowpass (counter-clockwise) through pure notch (12 o'clock) to highpass (clockwise) modes
- **BP:** This toggle switch activates bandpass mode; when engaged, the Type knob has no effect

> ♪ The higher the keyboard tracking value, the more the cutoff/center frequency will shift upward as you play higher notes. This is commonly used with lowpass filtering to compensate for our ears' natural rolloff curve and ensure that synth leads or acoustic instruments don't sound unnaturally dull in higher pitch ranges.

3.4.1. VCF modulation



Modulate the VCF with the LFO or either Envelope

Like with the VCOs, you can modulate the VCF Frequency from one of three sources on the main panel: either Envelope as well as the LFO. Again, these are independent from the sources in the Advanced view's Modulators [p.72]. Click on the field below the **Modulation** knob to see the source menu, or use the arrows.

Then, use the knob to apply positive (clockwise) or negative (counter-clockwise) modulation value to the Frequency.

3.4.2. Mixer



The Mixer includes controls for oscillator waveforms

Visually, the Mixer is located in the VCF section because it mixes three sound sources into the VCF: VCO 1, VCO 2, and the Sub Oscillator. It also mixes the oscillator waveforms relative to each other. Each of the three sources has a **Volume** control (the smaller knob) to set its level.

3.4.2.1. VCO waveform mix

For either VCO, the larger knob crossfades between sawtooth and pulse/square waveforms. At 12 o'clock, there are equal levels of both. To hear only a saw or pulse/square wave, turn the knob all the way in either direction.

3.4.2.2. Sub Oscillator wave/noise mix

The Sub Oscillator can crossfade between its selected waveform [p.21] and white noise via the large knob in the Mixer section. (The original hardware did not have an onboard noise source.)

> ♪ Filtering noise, then modulating the filter cutoff frequency with a slow LFO, was a common way to imitate the sound of wind or ocean waves before the era of digital sampling.

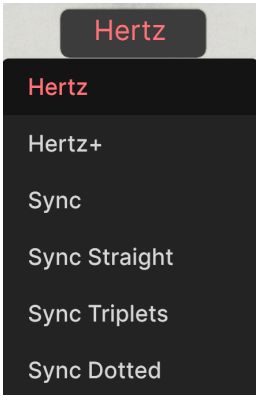
3.5. LFO



A LFO (low-frequency oscillator) is most commonly used to create vibrato effects (pitch modulation), but can modulate other things such as filter frequency and oscillator pulse width, causing musically pleasing variations in the tone. The LFO in the original SEM used a simple sine wave and its only control was a rate knob. SEM V gives you a little more.

- **Rate:** The main knob controls the LFO speed
- **Reset:** When engaged, the LFO waveform will start from the beginning of its phase on each new note
- **MW:** When engaged, the modulation wheel controls LFO depth for any destination assigned in the VCO (frequency, pulse width) or VCF (cutoff frequency) sections

3.5.1. LFO rate and tempo sync



Clicking the data field below the Rate knob brings up options for free-running the LFO or syncing it to divisions or multiples of musical bars relative to your project tempo:

- *Hertz:* Free-running with no tempo sync
- *Hertz+* Like Hertz, but with audio-rate modulation up to 3,000 Hz
- *Sync:* Straight, triplet, and dotted ratios are all present serially when you turn the knob
- *Sync Straight:* Only even rhythmic values are represented
- *Sync Triplets:* Tempo is synced with a triplet feel; a quarter-note = three 8th-notes played in the space of two
- *Sync Dotted:* Tempo is synced with a dotted feel; a quarter-note = a dotted 8th-note followed by a 16th-note

♪ If you're wondering "Does Hertz+ mean I can do FM?" The answer is yes! It's basic, but by modulating the pitch of either or both VCOs with an audio-rate signal, you can create some non-linear harmonics and aggressive tones that are not possible via subtractive synthesis alone. Try it in conjunction with oscillator sync [p.20] to get even more wild!

3.6. Envelopes



The envelope generators of the SEM effectively had four stages – attack, decay, sustain, and release – but only three knobs. This is because the decay and release times shared a common control, labeled **Decay**.

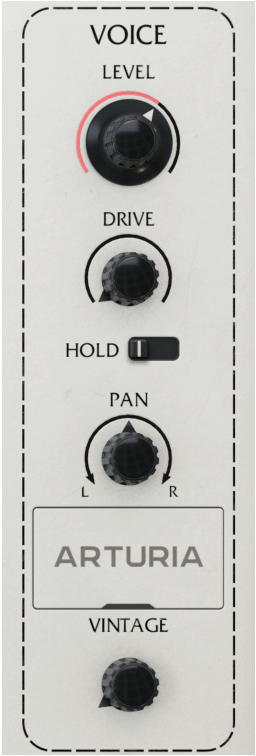
- **Attack:** Sets the time it takes for the envelope to rise to peak level once a note is played
- **Decay:** Sets the times it takes for the envelope to fall from peak level to the sustain level *and* for the envelope to fade out from the sustain level when a note is released
- **Sustain:** Adjusts the sustain level at which the envelope falls to after the attack phase, remaining there as long as a note is held

In other words, when a note is held, **Decay** the knob = the decay phase. When a note is released, Decay = the release phase.

Envelope 1 is "hard-wired" to modulate the VCA, i.e., volume. It can also be assigned to the usual main-panel destinations (VCO frequency or pulse width; VCF frequency). Envelope 2 is a "free agent" you can assign to one or more of these destinations.

♪ The shared decay/release time was not a major limitation for most musicians. In practice, many synth sounds employ a volume envelope with the sustain level set to maximum, which means there is no decay phase and the knob may be used to set whatever release time is desired. On the other hand, sounds where the sustain level is significantly below peak volume often use a quick decay phase to emulate a transient – a plucked string, for example – and these types of sounds also tend to have a quick release once the key is let up.

3.7. Voice Controls



The right section of the panel contains controls that affect the sound at a per-voice level. Even though adjusting the controls affects all voices in use at the same time, subtle (and sometimes not-so-subtle) differences can come out when the Dispersion [p.30] trimmers are turned up, and in conjunction with the Voice Steal [p.116] setting in the side panel.

3.7.1. Level

It might seem like the **Level** knob is redundant with the main Volume knob in the upper toolbar [p.104], but there are important differences. The Level knob can be a modulation destination; the main Volume knob cannot. Also, the Voice Level knob is pre-effects and per-voice, which means you could change it via the Voice Modulator [p.89] or various retriggered functions.

3.7.2. Drive

Drive introduces overdrive into the filter circuit, as though the VCOs (and Sub Oscillator) are coming into it "hot." It is volume-compensated so that turning it up does not increase SEM V's final output level. The effect adds warmth and saturation but is not meant for more aggressive distortion – we have the Distortion [p.59] in the Effects [p.45] section for that!

Adjustable drive of this kind was not a feature of the hardware SEM.

3.7.3. Hold

This toggle switch simply acts like a latched sustain pedal. It is particularly useful for working with the Multi-Arp [p.33], because you can adjust the settings there without needing to hold keys or a pedal.

3.7.4. Pan

Use this knob to pan the voices left or right in the stereo field. It is eligible to be a modulation destination.

3.7.4.1. Modulation suggestions

Stereo panning is one of the most audible things to modulate, so here are a few cool ideas for sources.

- Use keyboard tracking (one of the MIDI Modulators [p.97]) to spread the voices from one side to the other as you ascend pitch on the keyboard
- Use a Function [p.80] to plot a precise course through the stereo field for each voice
- With the Voice Modulator [p.89], each new note played can come from a new position in the stereo picture

3.7.5. Dispersion



Reveal the Dispersion trimmers by clicking on the Arturia label

Click the rectangle with the ARTURIA label on it to reveal a "secret" panel of six trimmers. These introduce variation in certain parameters across the voices when SEM V is played polyphonically, and randomness to the parameters when it is in monophonic mode. This adds a degree of non-linear character that's associated with classic analog synths and sometimes called "warmth."

- **Pitch:** Pitch of both VCOs
- **Cutoff:** Frequency of VCF
- **Res:** Resonance of VCF
- **Kbd:** Oscillator drift from tracking keyboard notes (3-position switch)
- **Env:** Time parameters (attack, decay) of Envelopes 1 and 2
- **Drive:** Filter overdrive [p.28] parameter described above

3.7.5.1. Vintage knob

The **Vintage** knob below the Dispersion area adjusts all Dispersion parameters at once, while preserving the proportional differences between them.

Turning all the Dispersion trimmers to maximum can approximate the sound of an old analog synth in need of some repair or calibration. Nothing you can do here, however, will do this as dramatically as turning up unison detuning [p.111].

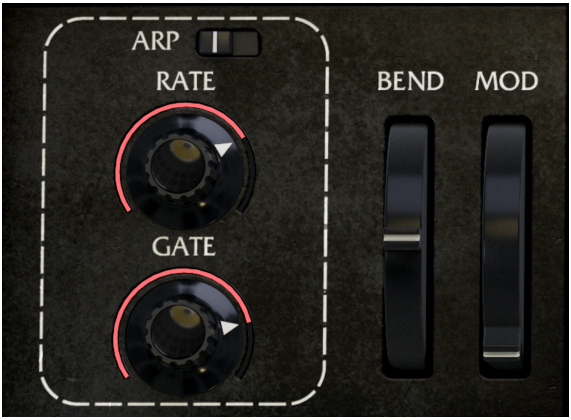
3.8. Portamento



SEM V has basic portamento, which causes the pitch of new note(s) played to bend up or down from previous notes. The time it takes to reach the destination note is expressed in milliseconds and goes up to 3.5 seconds. Portamento behavior varies depending on the Portamento Mode [p.117] setting (per voice or per note) in the side panel. Per-voice portamento is generally subtly more random than per-note, but this varies depending on how you cause the sound engine to call for voices.

For an example, assign the Voice Modulator [p.89] to the **Portamento** knob. Now, play an arpeggior or riff that spans two or more octaves. You'll hear the portamento time vary in a way that's not *solely* locked to the distance between keys on your controller i.e. MIDI notes.

3.9. Multi-Arp controls



To the left of the onscreen keyboard are two quick-access knobs for the four-part Multi-Arp [p.33], which debuted in our Synthx V virtual instrument. They simply mirror the Rate and Gate time knobs in the Multi-Arp's full view, accessed by clicking the Advanced [p.109] button.

- **Rate:** Adjusts the arpeggiator rate (tempo sync settings are in the full view)
- **Gate:** Sets the arpeggiator gate time

3.10. Wheels

The pitch-bend wheel is great for expressive playing, especially on synth solos. Bend range is symmetrical in the up and down directions, and is set in the side panel [p.115].

The modulation wheel controls the overall modulation depth of the LFO [p.26] when the **MW** switch in the LFO section is turned on. For the effect to be heard, the LFO must be assigned to at least one of the three main panel settings that can use it: the pitch or pulse width [p.19] of VCO 1 or 2, and the VCF frequency [p.24],

You can also assign the modulation wheel to just about any parameter by dragging and dropping a mod wheel icon, which we cover in the Modulators [p.72] chapter.

3.11. Onscreen keyboard

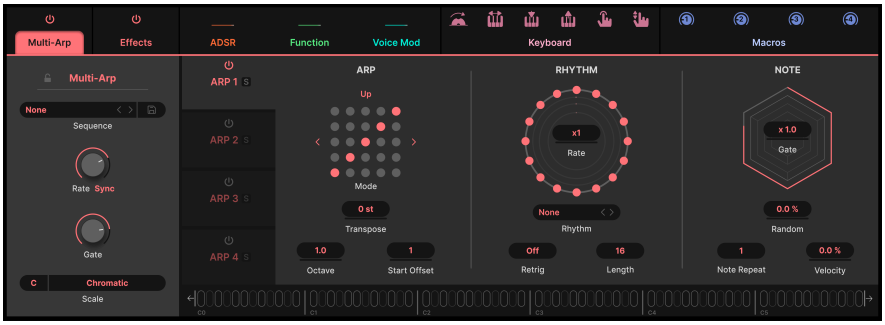
The onscreen keyboard is handy for working on a laptop without any other MIDI input device. Clicking on a key closer to its front edge increases the MIDI velocity of the note.

3.11.1. Playing from a computer keyboard



You can play an octave plus a ninth in the key of *C* using a standard QWERTY keyboard, according to the diagram above. In addition, the **Z** key shifts the pitch range an octave down and the **X** key shifts it an octave up.

4. MULTI-ARP



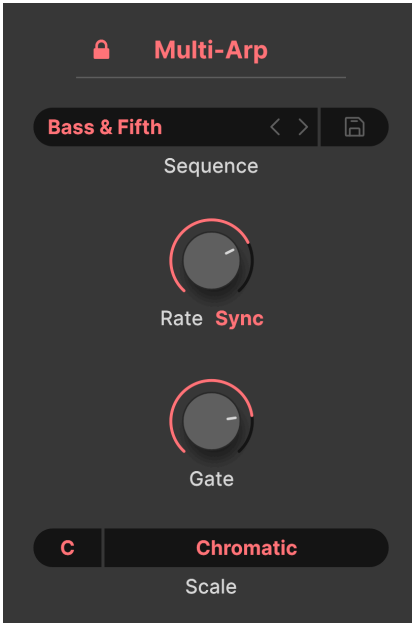
SEM V's fabulous Multi-Arp

The Multi-Arp is a four-track arpeggiator capable of some dazzling polyrhythms, since each track can have different pattern and rhythmic settings. Unlike a sequencer, an Arpeggiator plays only as long as notes are held, and transforms chords into repeating note patterns.

To access it, press the Advanced button [p.109] at the top right of the SEM V window to open the Advanced views, then click the tab labeled "Multi-Arp" all the way on the left.

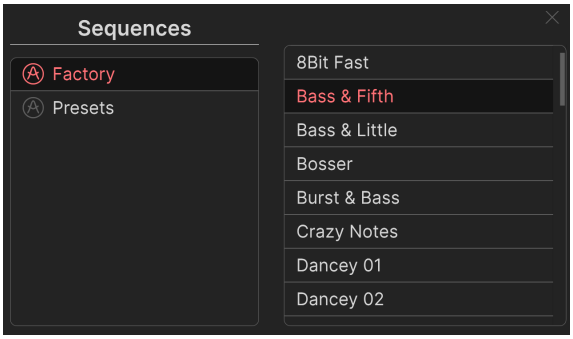
> The Multi-Arp can also output MIDI data to play other instruments [p.44].

4.1. Global settings



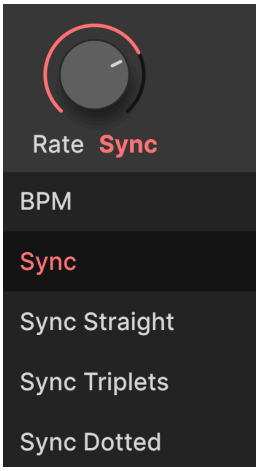
Certain settings are common to all four tracks of the Multi-Arp, so let's begin there.

4.1.1. Multi-Arp presets



A variety of setups for the Multi-Arp are available by clicking on the Sequence menu. You can also use the arrows to step through them one at a time. Click the disk icon to save all the current Multi-Arp settings as a user preset. You will be prompted to name it, then you can recall it at any time from the user bank.

4.1.2. Rate and tempo sync



The Multi-Arp's rate can run free or be synced to project tempo via a drop-down menu accessed by clicking below the **Rate** knob. The options are:

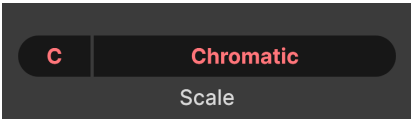
- *BPM:* Free-running in beats per minute
- *Sync:* Straight, triplet, and dotted ratios are all present serially when you turn the knob
- *Sync Straight:* Only even rhythmic values are represented
- *Sync Triplets:* Tempo is synced with a triplet feel; a quarter-note = three eighth-notes played in the space of two
- *Sync Dotted:* Tempo is synced with a dotted feel; a quarter-note = a dotted eighth-note followed by a 16th-note

4.1.3. Global Gate time

Gate time shortens or lengthens the duration each note is played by the Multi-Arp. In musical terms, this leads to a more sustained sound at longer gate times and a clipped sound at shorter ones.

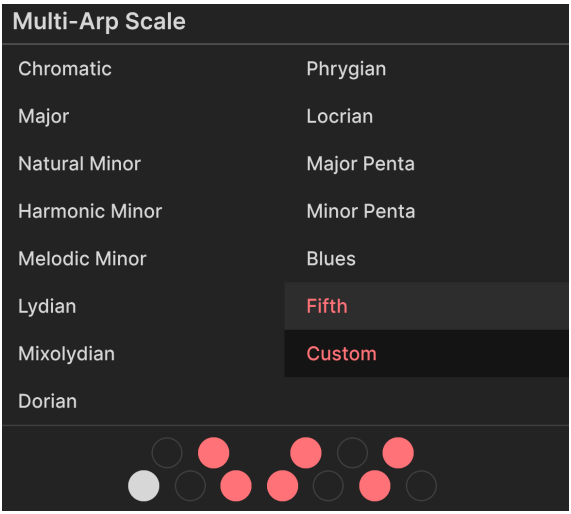
Thanks to a gate multiplier [p.43] per Multi-Arp track, each track can have a different effective gate time.

4.1.4. Scales



The field on the left selects the root note

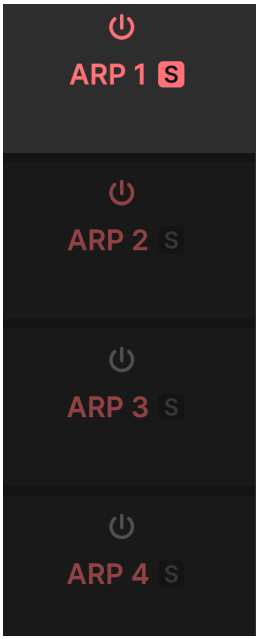
The Multi-Arp can play chromatically (all notes are fair game) or be confined to a number of scales and modes from traditional music theory. Click on the note field to the left to set the root note of the scale. Then click on the scale name to bring up the following menu:



Notice the *Custom* option. This sets a scale that you define by clicking on the pink circles at the bottom of the menu, which are arranged as a piano octave. Blue indicates an allowed note.

4.2. Settings per part

From here on, the other settings are independent per track/part, but all four parts have the same options.

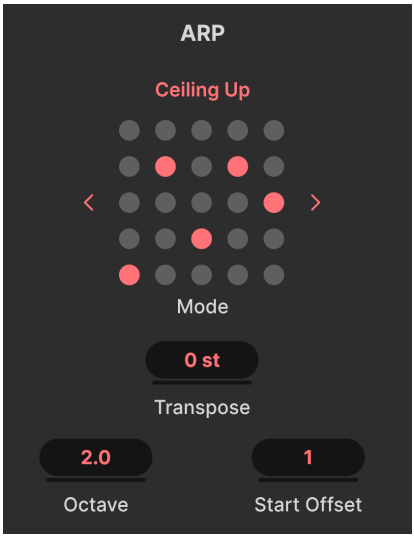


Click one of the tabs in this column to select a part to work on.

Each tab includes the following pair of utility settings:

- **On/off button:** Turns the part on or off while retaining its settings
- **Solo:** Solos the part (i.e. mutes playback of the others) so you can work on it by itself

4.2.1. Arp Section

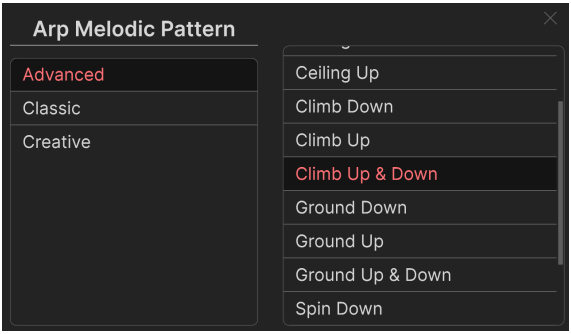


Many vintage synth arpeggiators had simple up, down, up/down, and random modes that controlled the order in which the synth played notes in a held chord. The Multi-Arp gives you so much more.

4.2.1.1. Pattern

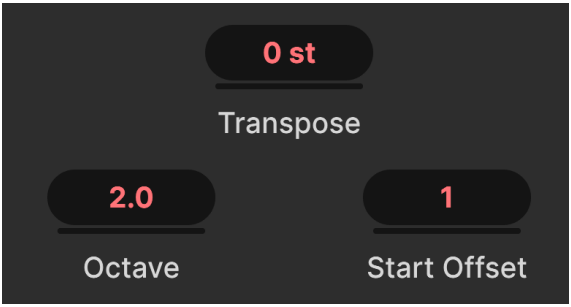


The 5 x 5 matrix of dots illustrates the current pattern. This doesn't necessarily mean the pattern has five notes; it's simply a visual reference for the up and down directions the pattern takes. You can audition the patterns using the arrows, or click on the matrix to display the full menu, with categories on the left and patterns on the right:



- *Classic:* Traditional modes like those found on most analog synth arpeggiators
- *Advanced:* Patterns that follow more complex rules while still keeping a strong sense of repetition
- *Creative:* Fun, unconventional patterns that experiment with different melodic and rhythmic phrasing

4.2.1.2. Arp settings



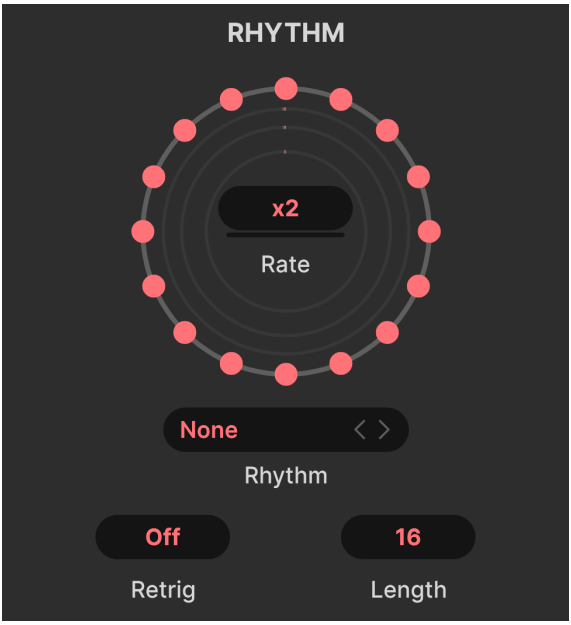
Three further settings govern the pattern behavior.

- **Transpose:** Changes the pitch of all notes in the pattern in semitones
- **Octave:** Determines the range of the pattern in octaves, including partial octaves
- **Start offset:** Defines which step in the pattern is the first step played

Drag up or down on any of the fields to edit them.

> ♪ Values for Octave range are expressed as "X.Y" and are decimal. Given that a chromatic scale has 12 notes, a range of 3.5 octaves would therefore split the octave at the tritone – i.e. F# assuming a root note of C.

4.2.2. Rhythm section



In the Multi-Arp, patterns are not restricted to playing evenly-spaced series of notes. The Rhythm section allows you to determine the rhythm of the pattern.

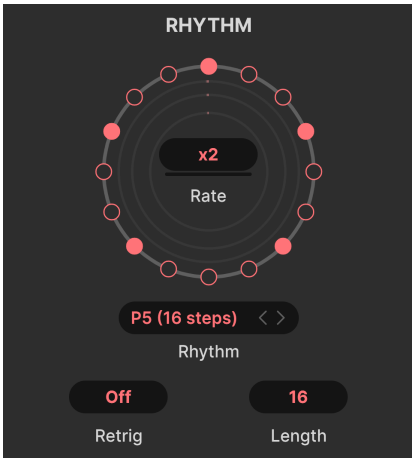
Notice the concentric circles ringed with 16 blue dots.

- Each dot represents a note. When all dots are active (blue), the pattern plays like on a conventional arpeggiator: evenly. This is also the case if active dots are evenly spaced.
- When dots are deactivated (by clicking on one), this represents a rest or rhythmic gap before the next note plays.
- In terms of pitch, the next note played is *still* the next note in the pattern according to the set scale [p.36] – no notes are skipped – but that note will not play until the rest period has elapsed.
- The four circles correspond to the four Multi-Arp parts, from the outermost (part 1) proceeding inward. When you switch parts, the corresponding circle is populated with dots.

4.2.2.1. Rhythm rate

The **Rate** setting in the center of the circles is a multiplier/divider. It causes the individual Multi-Arp part to run at a fraction or multiple of the global Rate [p.35]. Experiment with this across more than one part for some wild avant-garde polyrhythms!

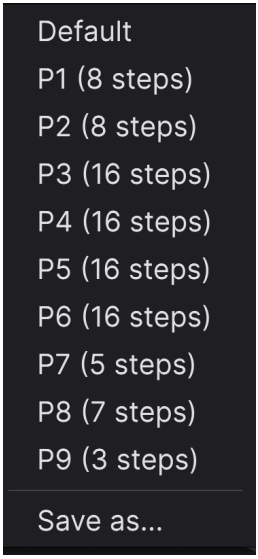
4.2.2.2. Rhythm presets



Brubeck might have liked this rhythm preset

The Multi-Arp comes with nine factory presets (plus the default of all 16 steps active) for rhythms.

Step through them with the arrows, or click on the name field to bring up the menu:



Notice that some of the presets support odd or unusual step lengths. Once you have set up the dots, you can also save your own by clicking "Save as..." and naming it in the prompt that pops up. It will then be available in the menu.

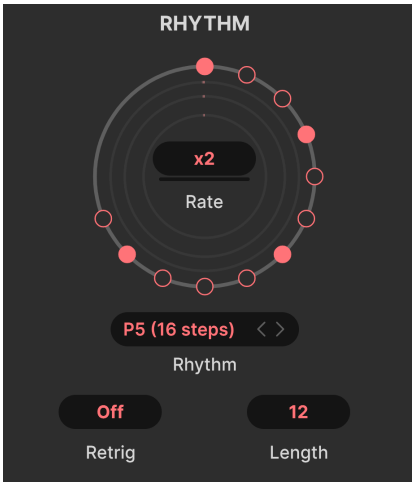
4.2.2.3. Retrigger



Retrig is a draggable field which causes the Multi-Arp pattern to restart from the beginning. It has quite a lot of options, which you just drag through – there is no pop-up menu.

- *Off:* Pattern loops normally
- *Note:* Pattern restarts when a MIDI note is received
- *Whole number values:* Pattern restarts every so many musical bars
- *Fraction values:* Pattern restarts at subdivisions of a bar, e.g. 1/8

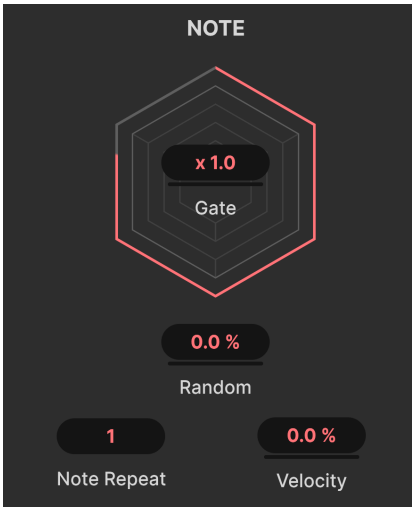
4.2.2.4. Length



A pattern with 12 steps, 5 of which are speaking

Length simply sets the overall pattern length. The default is 16 steps, but you can set odd or untraditional lengths. In the above example, when the pattern completes step 12, it returns to step 1 and starts working through the steps all over again.

4.2.3. Note section



The hexagon graphic visualizes gate time

The final section of the Multi-Arp governs how individual notes behave.

4.2.3.1. Gate multiplier

In the center of the hexagon graphic – a visualizer for the individual Multi-Arp part's gate time – is a multiplier/divider field. This makes the selected part's gate time a multiple or division of the global Gate time [p.35], allowing the different parts to "speak" with a more sustained or shortened note duration.

4.2.3.2. Note parameters

The final parameters for individual notes in the Multi-Arp part are as follows:

Random introduces randomness to the part's gate time, octave, and velocity. Octave randomness is subject to the range set by the Octave parameter, which must be set to a value greater than 1.0 for randomness to be heard.

Note Repeat adjusts how many times a note is repeated at each step before the pattern moves on to the next step, from one to four times.

Velocity is an offset for MIDI velocity as played by the Multi-Arp part, and expressed as a percentage. In terms of what you can hear, it makes arpeggiated notes louder or softer.

4.3. Global Visualizer



Across the bottom of the Multi-Arp is a visualizer in which all notes played by all active parts (remember, there are four) illuminate the ovals, which you may notice correspond to piano keys. Brighter ovals correspond to notes in the currently selected part while the slightly dimmer ones indicate notes from the other parts. Click the arrows on either end to move through the entire possible note range, as the visualizer has screen space to show six octaves.

4.4. Using the Multi-Arp externally

In addition to playing SEM V, the Multi-Arp can transmit its MIDI note data to an external destination such as another virtual instrument or even a MIDI interface. This allows you to use its sophisticated patterns and rhythmic options to play other synths!

SEM V does not contain settings or controls for this. Most DAWs, as well as plug-in host programs geared for live performance, can route MIDI from a given virtual instrument track to another instrument track MIDI track, or port and channel on a connected MIDI interface. If the track in which SEM V resides is configured to transmit MIDI, and the instrument on the other end is configured to receive it, that instrument should play the Multi-Arp's output.

Consult your DAW or host program's documentation for the exact MIDI routing settings to make.

5. EFFECTS



SEM V includes a suite of powerful stereo effects curated from our latest V Collection of virtual instruments. You can use up to four effects at once, and each of the four effects slots offers a choice of 18 pedal-style effects.

Click the **Advanced** button at the top right of the Upper Toolbar [p.104] to open the Advanced Panel. Then select the **Effects** tab, second from the left. Notice the on/off button above the tab? It bypasses *all* effects while retaining their settings.

Depending on the size [p.106] of the SEM V window, you may need to scroll down to see the effects.

5.1. Effects routing

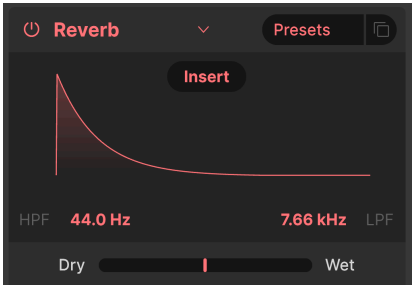


SEM V effects are routed serially left to right

By Default, effects routing is "hard-wired" as serial. The signal is first processed by the effect in the slot at far left, then moves from left to right. This keeps things simple. Just set up the effects chain you want, like a guitar pedalboard.

5.1.1. Send/Insert toggle in Spatial FX

The *Spatial* effects (Reverb, Delay, Tape Echo, and PS Delay) also offer send-based parallel routing. Most often, you'll encounter the effects in Insert mode, which follows the serial scheme we just described:



The Reverb in Insert mode

Click the **Insert** button, and it will change to **Send**, like so:

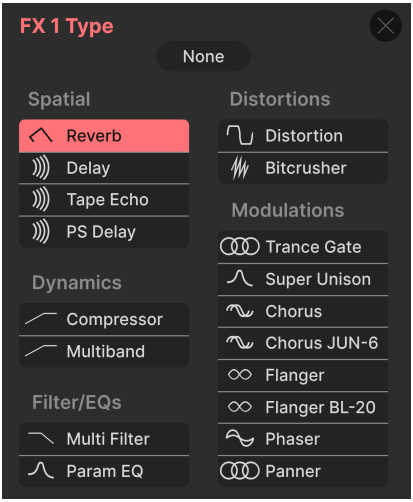


The Reverb in Send mode

Notice that the Dry/Wet slider [p.49] has now changed to a **Level** slider. When an effect is in Send mode, it sits in parallel with whatever effects are still Inserts. The Insert effects still follow left-to-right serial routing. So, let's say you have a Parametric EQ, Distortion, and Compressor in an insert chain, in that order. If the fourth effect is Reverb, raising the **Level** slider applies Reverb to the output of Pure LoFi independently of the other three effects.

> In practice, this can make a big difference. Reverb, for example, is often the final effect in a chain. If the chain is entirely serial, *all* the post-FX sound is inside the reverb space. You may or may not want that result. If you prefer the reverb only affect the pre-FX instrument sound, switch to Send routing.

5.2. Selecting an effect



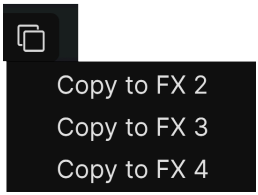
The effects in SEM V offer 18 types in five categories

Click the name field at the top of any of the effects slots (you can also click any empty square that says "none" above it) to bring up the effects selection menu. The effects are divided into five categories to make choosing a little easier.

- *Spatial:* Reverb, delays, and tape echo
- *Dynamics:* Compressor
- *Filter/EQs:* Multi-mode synth-like filter and parametric equalizer
- *Distortion:* Distortion effect with 16 different algorithms; Bitcrusher
- *Modulations:* Super Unison, choruses, flangers, phaser, and stereo panner

The full list of effect types [p.49] with descriptions of all their parameters is further below.

5.2.1. Effects copy



An effect in one slot can be copied to any of the other three

You can copy any effect, with its settings, to another slot. Click the double-document (overlapping squares) icon, then select a slot from the above pop-up menu. The effect in the original slot is not changed or swapped.

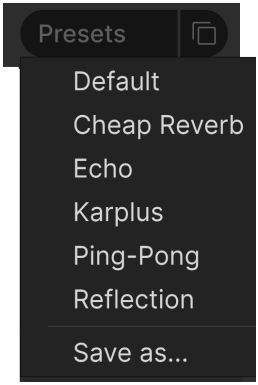
5.2.2. Effects swap



Grab the six-dot icon to drag the effect to another slot

When your cursor is in an effect's area, notice the six-dot icon that appears in the title bar. Click and hold on it to drag the effect to a different slot. The effect in the destination slot will swap positions with the one you are dragging. (In fact, you can drag anywhere in the effect that's not a parameter or the visualizer, but the six-dot icon is always available as a handle.)

5.3. Effect presets



The factory presets for the Delay effect in SEM V

Each effect type in SEM V comes with a handful of presets, accessed by clicking on "Presets" at the top right of the name bar within an effects slot.

The presets can be great starting places, not to mention convenient for when you want to grab a sound quickly, so please do explore them all. Notice the "Save as" option, which will bring up a dialogue box that prompts you to name and save any settings you like as your own FX preset. This is then saved within the overall SEM V Preset. "Save" is available only when working on a user preset, i.e. one you've already copied with a "Save As" operation.

5.4. Effect types

It's almost time to explore each effect individually. To start out, though, we will cover a handful of features common to all of them.

5.4.1. On/Off

Each effects slot has an on/off button at its upper left. This lets you bypass the individual effect without losing its settings. This is useful for soloing a slot as you build and adjust your effects rack.

5.4.2. Dry/Wet mix

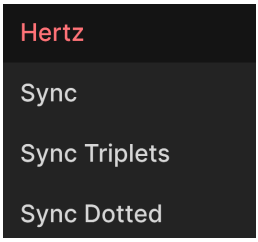


Most of the effects have a slider for **Dry/Wet mix**, i.e. how much pre-effect vs. post-effect signal you hear. There are three exceptions:

- The **Multiband** effect has an *Amount* slider
- The **Parametric EQ** has a *Scale* slider
- The **Stereo Pan** effect has an *Amount* slider

♪ Remember that due to the serial routing, a sound that's relatively dry with respect to one effect may still be carrying a lot of the previous one in the chain.

5.4.3. Effects tempo sync



Engaging Sync makes tempo-division options available for the time setting in the Delay

Some effects offer tempo-sync options for their time or rate parameter in addition to running freely in absolute units such as Hz or fractions of a second. The mode is chosen by clicking on the blue label adjacent to a Time or Rate knob, then choosing from the pop-up menu shown above. The bright pink word may read "Seconds," "Hertz," "Sync," or some variant thereof depending on the current sync setting.

Then, adjusting the related parameter will display a pop-up that shows the current division or multiple of your project tempo. A *t* suffix after the value indicates a triplet value, *d* denotes a dotted value, and no suffix means a "straight" rhythmic feel.

The effects with tempo sync in SEM V are:

- Delay
- Tape Echo
- PS Delay
- Trance Gate
- Chorus JUN-6
- Flanger
- BL-20 Flanger
- Phaser
- Stereo Pan

Now, let's visit the effects in the order in which they appear on the menu. In general, you can adjust two of the parameters that also have knobs by clicking and dragging inside the effect's graphic visualizer. In the charts below, we mark *(H)* for those you can drag horizontally and *(V)* for those you can drag vertically.

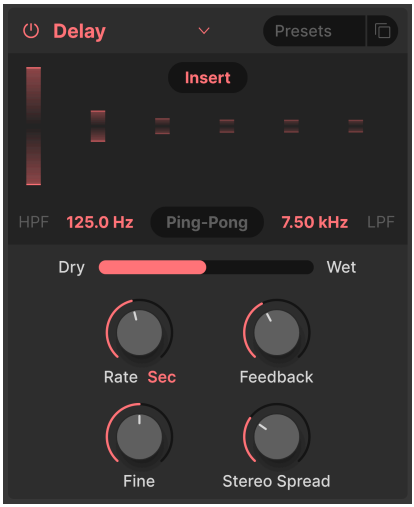
5.4.4. Reverb



Reverb is the sound of a space – a recording studio, concert hall, stairwell, tiled bathroom, you name it. Reverb is often used as the final effect in a chain to put everything else that's going on into the same acoustic space, lending cohesiveness to the sound.

Control	Description
HPF	Reduces the high-frequency content before processing
LPF	Scoops out the low-frequency content before processing
Predelay	Sets the amount of time before the input signal is affected by the reverb
Decay (V)	Determines the length of time the reverb effect will last
Size (H)	Adjusts the size of the room: counter-clockwise is smaller, clockwise is larger
Damping	Controls the rate at which the high frequencies decay
Stereo Width	Adjusts the reverb from mono to an increasingly wide stereo space

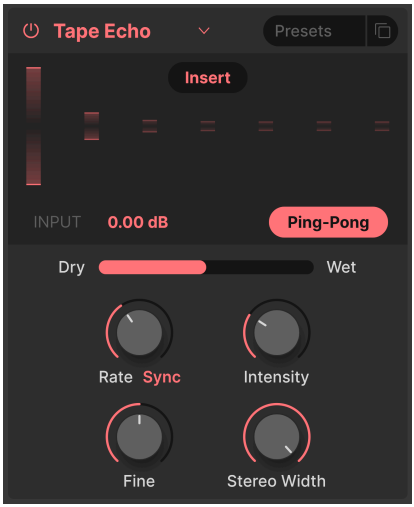
5.4.5. Delay



Delay is a generic term for any effect that makes a copy of an input sound and repeats it later, one or more times. There are three delay effects in SEM V, and this first one sounds good all around.

Control	Description
HPF	Higher values reduce low-frequency content with each echo
LPF	Higher values reduce high-frequency content with each echo
Time (H)	Changes the length of the delay, with unsynced and tempo-sync options (sync, triplets, dotted)
Fine	Fine-tunes the delay time using an offset in milliseconds
Feedback (V)	Adjusts how many times the delay will repeat
Stereo Spread/ Width	Higher values increase the distance between the left and right sides of the delayed signal
Ping Pong	Toggles alternating left/right echoes with exact rhythmic spacing; Stereo Spread parameter becomes Stereo Width

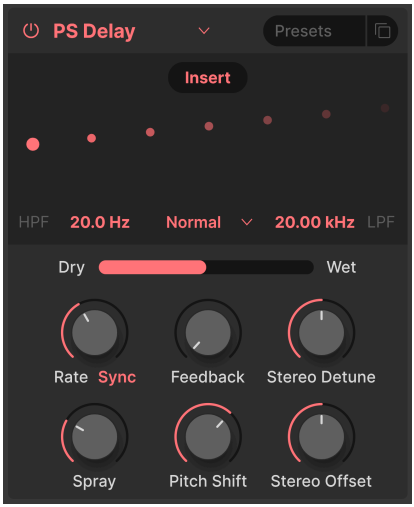
5.4.6. Tape Echo



Tape Echo is a characteristic of early tape-based delay machines such as the Maestro Echoplex and Roland Space Echo. Input sounds are recorded to a loop of tape with one or more playback heads to create the echoes. Because tape loops can be unstable and shift in pitch and timbre, they produce an effect that is warmer and less precise than a digital delay.

Control	Description
Input	Adjusts the incoming signal to achieve varying amounts of analog saturation
Time (H)	Changes the length of the delay, with unsynced and tempo-sync options
Intensity (V)	Sets the feedback amount of the delayed signal
Fine	Fine-tunes the delay time using an offset in milliseconds
Stereo Spread/ Width	Higher values increase the distance between the left and right sides of the delayed signal
Ping-Pong	Toggles alternating left/right echoes with exact rhythmic spacing; Stereo Spread parameter becomes Stereo Width

5.4.7. PS Delay



PS stands for **pitch-shifting** delay, a classic effect popularized by the Eventide Harmonizer. It works like a conventional delay, but in addition to being fed back to create echoes, the delayed audio signals are subjected to a pitch shift, either up or down.

Control	Description
HPF	Controls the cutoff of a highpass filter that affects the delayed signal only
LPF	Controls the cutoff of a lowpass filter that affects the delayed signal only
Time (H)	Sets delay time, with unsynced and tempo-sync options
Feedback	Controls how much of the delayed signal feeds back into the effect to be delayed again
Stereo Detune	Detunes the delayed signal relative to the incoming signal
Spray	Adds a scattering effect across the sound for each successive echo with slightly randomized echo times
Pitch Shift (V)	Adjusts the amount that the delayed signal is pitch-shifted relative to the incoming signal
Stereo Offset	Offsets the delayed signal in the stereo picture

5.4.8. Compressor



A **Compressor** is used to control the dynamic range of a sound: it reduces the difference between the softest and loudest levels a sound can have. It does this based on reducing a gain by a certain amount (the ratio) once the audio releases a certain level (the threshold).

Control	Description
Threshold (H)	Sets the level where compression will begin
Ratio (V)	Determines the amount of compression to be applied once the threshold is reached
Attack	Adjusts the speed with which the compression will be applied once the threshold is reached
Release	Sets the release time of the compressor
Output Gain	Use this to compensate for changes in volume if compression settings lower the output gain
Makeup	Enables control of the output level to compensate for the gain reduction of the input

♪ There's an old joke that's great for understanding compressors. Threshold is how loud your music has to be before your parents tell you turn it down. Ratio is how much you turn it down. Attack is how fast your parents react once it's too loud. Release is how soon you turn it back up once they're gone.

5.4.9. Multiband



A multiband compressor works like a series of regular compressors, but each one works on a separate range of frequencies (*band*). First used by mastering engineers to squeeze the maximum level out of recordings, these compressors are now used for subtle sculpting, sound design, special effects, and much more.

The multiband compressor is probably the most complex effect type in SEM V, first of all because there are things you can *only* adjust by dragging inside the effect's graphic visualizer. It can work on up to three frequency bands, and you can use the two on/off under the low and high bands to turn them on and off. You can also drag up or down on the numbers below the visualizer to set the frequency crossover between the low and mid bands (left number) and mid and high bands (right number).

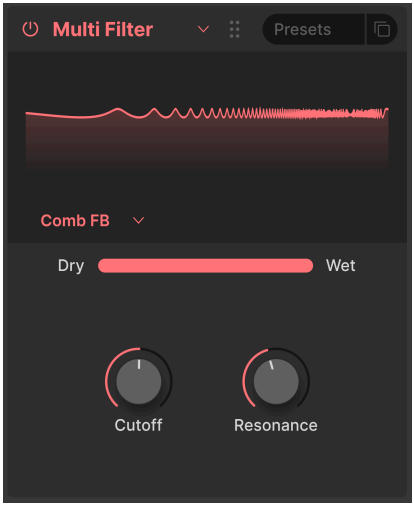
On top of all that, it's also an *expander*, which means it can boost soft signals. The blue bars with horizontal lines inside on the top are for compression; those below are for expansion.

With all this in mind, here is the parameter rundown:

Control	Description
Threshold (V)	Drag the border of a blue bar to adjust the point at which the compression (or expansion) starts working
Ratio (V)	Drag *inside* of a bar to adjust the amount of compression or expansion for that band. Increasing ratios are depicted by denser horizontal lines, until the inside bar turns solid blue at maximum
Band On/ Off Icons	The high and/or low bands may be switched off, resulting in a 2- or 1-band compressor/ expander
Low-Mid Crossover	Drag on this field, located at the lower left of the visualizer, to change the crossover point between the low and mid bands
Mid-High Crossover	Drag on this field, located at the lower right of the visualizer, to change the crossover point between the mid and high bands

Control	Description
Out Low	Independent output level control for low band
Out Mid	Independent output level control for mid band
Out High	Independent output level control for high band
Input	Sets the overall input gain
Attack	Sets the time it takes for the compressor/expander to "grab" the signal once a threshold is reached
Release	Sets the time it takes for the compressor/expander to "let go" of the signal once the signal falls beneath the threshold
Output	Governs the overall makeup gain while preserving the difference in output between the bands

5.4.10. Multi Filter



Sometimes it's nice to have an extra filter handy for further sculpting your tone without needing to tie up SEM V's main filter. The Multi Filter has five modes: lowpass, highpass, bandpass, feedback comb, and feed-forward comb . The comb filters simulate the behavior of a flanger with two different tonal qualities – CombFB produces a series of evenly spaced peaks, and CombFF produces evenly-spaced notches.

Control	Description
Filter type	Drag up or down on the letters to the lower left of the visualizer to choose the filter type
Slope	Click a selection at the lower right of the visualizer to choose the filter steepness; these do not apply to the comb filters
Cutoff (H)	Adjusts the cutoff frequency of the filter
Resonance (V)	Sets the resonance of the filter, which is a peak of frequencies clustering near the cutoff

5.4.11. Parametric EQ

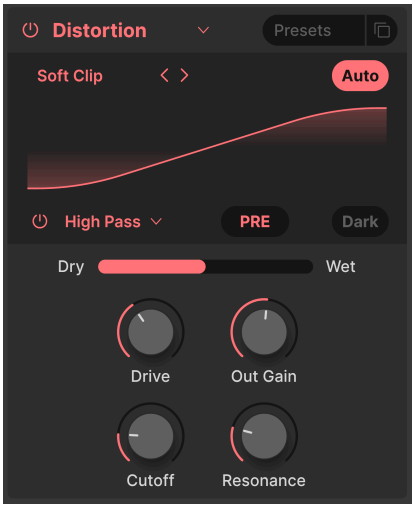


The Parametric Equalizer lets you sculpt tone precisely, as opposed to the broad tonal strokes you get from a synth filter or tone controls. It can be used to boost or cut certain frequencies gently or surgically, to alter the overall sound or remove problem frequencies.

The EQ in SEM V has five bands, and you can adjust the frequency, gain (boost or cut), and Q (how wide the band is around the selected frequency) for each. In fact, the ability to tweak the frequency and bandwidth is just what "parametric" means.

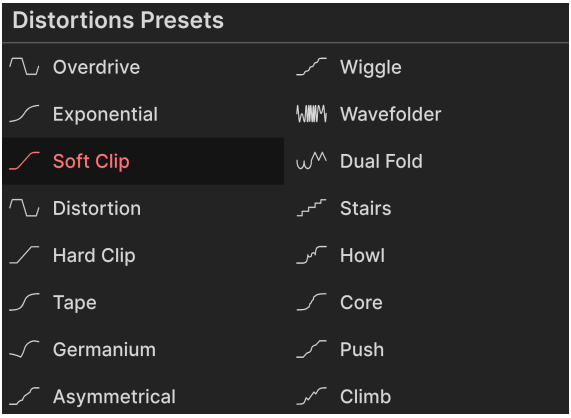
Control	Description
Band select	Click one of the points in the visualizer or one of the five buttons below to select the band the next controls listed will affect
Scale	Adjusts the overall impact of the EQ curve on your sound
Frequency (H)	Selects the center frequency of the current band
Gain (V)	Adjusts the boost or cut to the level of the current band
Q	Adjusts the width of the spectrum around the Frequency that is affected by the boost or cut

5.4.12. Distortion



Distortion in SEM V offers 16 different algorithms derived from our flagship distortion effect, Dist COLDFIRE. Each has its unique sonic signature – and they can transform sounds in ways ranging from subtle warmth to all-out devastation.

5.4.12.1. Distortion algorithms



The 16 distortion types

Select the type of distortion by clicking on the left and right arrows at the top left of the effect's visualizer area, or bring up the pop-up menu shown above by clicking on the distortion type name between the arrows.

What do the algorithms sound like? Some come from familiar types of analog distortion – examples include gradually increasing amounts of gain (*Overdrive*, *Exponential*, *Soft Clip*, *Distortion*, *Hard Clip*), *Tape* saturation, and *Germanium* transistor preamp tone.

Other distortions are more digital in character – in addition to *Wavefolder* and *Dual Fold* which fold the peaks of waveforms to create more harmonics, there are unusual types such as **Asymmetrical**, **Wiggle**, **Stairs**, **Howl**, **Core**, **Push**, and **Climb**.

Rather than offering lengthy technical descriptions of what each algorithm is doing "under the hood," we encourage you to click through them and explore their sound for yourself.

5.4.12.2. Common distortion controls

The distortion algorithms mostly share the same parameters, as well as an integrated lowpass/bandpass/highpass filter, as shown on this chart:

Control	Description
Drive (H)	Sets the amount of distortion via driving the input
Out Gain	Use this to compensate for increased output gain caused by the Drive setting
Auto (button)	Applies automatic volume compensation to the post-effect output
Filter on/off (button)	Toggles the integrated multi-mode filter
Filter pre/post (drag on text)	Places the integrated filter before or after the distortion process
Filter mode (pop-up)	Selects lowpass, bandpass, or highpass
Cutoff	Adjusts integrated filter cutoff frequency
Resonance	Adjusts integrated filter resonance
Dark	Applies high-frequency dampening to the output signal

Exceptions/additions to the above are:

- **Overdrive** is the only algorithm that also has a **Tone** control, which adjusts the brightness of the distorted portion of the output.
- The **Wavefolder** algorithm features a sine/sawtooth toggle for the folding in place of the filter pre/post setting.

5.4.13. Bitcrusher



A **bitcrusher** does exactly what it sounds like: it crushes bits! Technically, it can reduce both the bit depth and the sample rate of the signal. Bit depth (e.g. 16-bit vs. 8-bit) deals with differences in volume; sample rate (e.g. 44,100 kHz, like a CD) deals with frequency response. When musicians talk about the "lo-fi" sound of vintage samplers, game consoles, or computers, they're talking about bitcrushing.

Control	Description
Bit Depth (V)	Reduces the number of bits used to render increments of amplitude
Downsample (H)	Divides the sample rate used to represent the signal

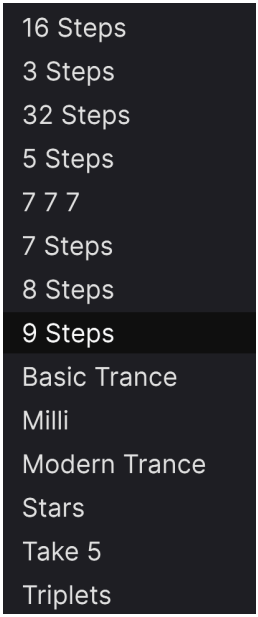
5.4.14. Trance Gate



Trance Gate creates chopping, gating, and stutter effects known from trance music, but it's useful in any application where you might want sequenced breaks in the sound. It loops a sequence of gates, from 2 to 32 steps, and you can select and adjust the envelope shape of each step. The moving circular display shows the sequence in real time. The envelope shape of the step is shown in the center of the circle. The parameters in the upper half of the interface work as follows:

Control	Description	Values
Length	Sets the length of the gate sequence	2 to 32 steps
Shape	Sets the basic envelope shape of the gate	Classic (square), Decay (saw), Rise (ramp), Trapezoid, Triangle
Rotate	Rotates the entire sequence clockwise or counterclockwise	Mouse click = 1 step
x2	Doubles the number of steps in the sequence	Up to 32 steps

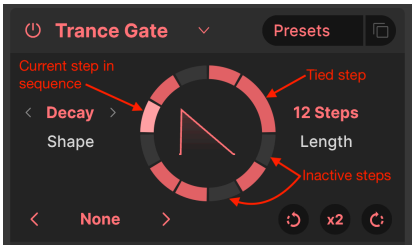
You can also select from 14 starter sequences using the menu to the lower left of the circle display. As this shows, gate sequences can have odd or unusual numbers of steps, and steps do not need to be of equal duration.



Then, the controls in the lower half of the effect perform these actions:

Control	Description	Values
Rate	Sequence rate, with unsynced and tempo-synced options	Sync, Sync Straight, Sync Triplets, Sync Dotted
Morph	Further adjusts the shape of the chosen Envelope Type	Shape shown in graphic visualizer
Ratchet	Subdivides the steps of the sequence to create roll effects	1, 2, 3, 4
Reset	Causes the sequence to start from step 1 after the specified number of bars have elapsed	Off; 2, 4, 8, 16 bars
Retrig	Causes the sequence to start from step 1 when a MIDI note is received	On/off

5.4.14.1. Gate sequence editing

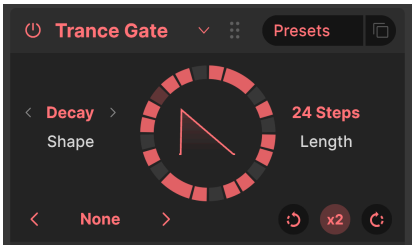


Editing a Trance Gate sequence; notice the inactive steps and longer tied step

You can also visually edit the sequence on the circle graphic.

Action	Description	Result
Click on active step	Turns step off	Sound is muted during that step
Click on inactive step	Turns step on	Sound is heard during that step
Click-drag on active steps	Ties steps together	Separate steps become one longer step
Click-drag on inactive steps	Activates steps without tying them	Sound is now heard during activated steps
Hover on tied step	Previews untying the step	Step is displayed as two discrete steps
Click on tied step	Unties the step	Step audibly becomes two discrete steps
Right-click on active step	Turns step off	Sound is muted during that step
Right-click-drag on active steps	Turns dragged steps off	Sound is muted during those steps

Note that clicking **x2** preserves the proportion of active to inactive steps, as well as the ties:

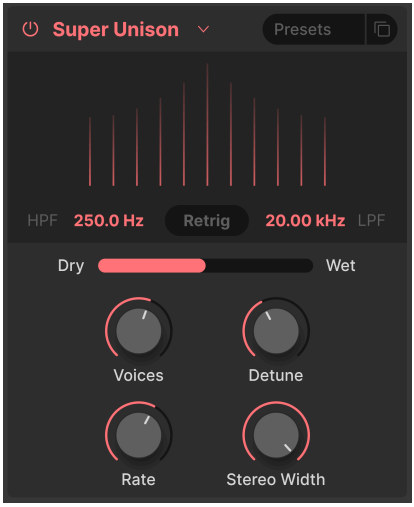


The "Pulsating" preset after clicking the x2 multiplier

If you click **x2** on the "Pulsating" preset we've been using as an example, the result is the above sequence.

Editing gate sequences takes some practice on the circular interface. Remember to reach for the Undo [p.112] button in the lower toolbar to back out of any undesired changes. When you get a sequence you like, use the *Save as* operation in the effect presets menu.

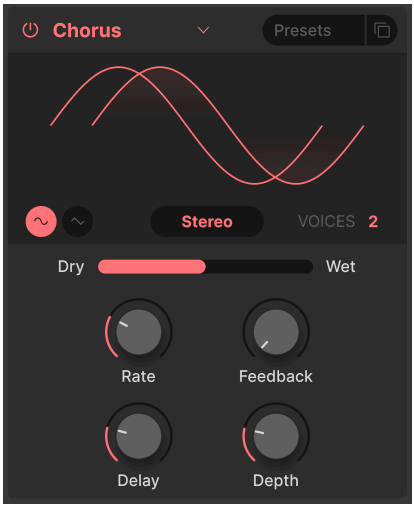
5.4.15. Super Unison



Not unlike a synth's Unison mode, this effect adds duplicates of the input signal to itself, with the option to detune them. The graphic indicates the amount of detuning between the voices horizontally and volume of detuned voices vertically. The original signal is the tallest line in the center.

Control	Description
HPF	Controls the cutoff of a highpass filter that affects the processed signal only
LPF	Controls the cutoff of a lowpass filter that affects the processed signal only
Voices (H)	Sets the number of unison voices
Detune (V)	Determines the detuning amount
Rate	Adjusts the speed of modulation of all voices
Stereo Width	Adjusts the spread of the voices across the stereo image

5.4.16. Chorus



Chorus is an effect first developed in the mid-1970s by Roland for the Jazz Chorus amplifier and CE-1 pedal. In a chorus, the dry signal is mixed with one or more slightly delayed copies of itself (called *voices*), whose amount of delay is gently varied by an LFO to create a sense of thickness.

Control	Description
Rate	Adjusts the speed of the chorus
Depth	Controls the intensity of the chorus
Feedback (V)	Adjusts the amount of chorused signal that is fed back into the effect
Delay (H)	Sets the amount of delay applied to the input signal
Stereo/ Mono	Toggles between mono or stereo operation
Voices	Selects the number of delay lines the chorus will use (1, 2, or 3), with a different starting phase for each voice
Shape	Selects sine or triangle as modulation waveform

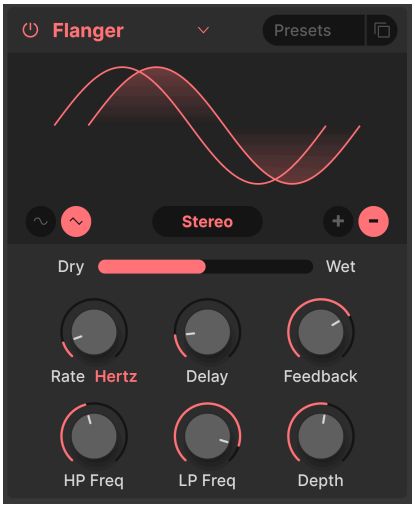
5.4.17. Chorus JUN-6



One of the most famous chorus effects is the one built into the Juno-6 synthesizer and its successors. This chorus is an accurate model of the original.

Control	Description
Rate (H)	The chorus rate, with unsynced and tempo-synced options
Depth (V)	The depth of the chorus effect in milliseconds
Phase	The phase of the chorused signal relative to the dry signal

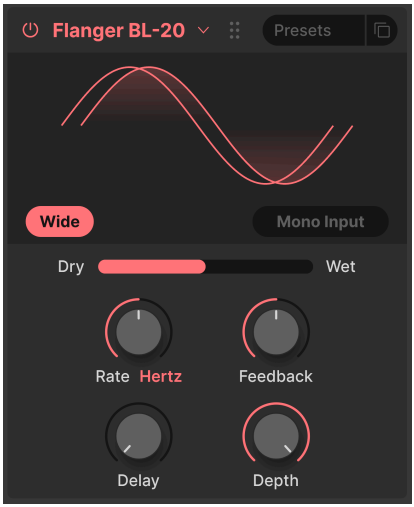
5.4.18. Flanger



The Flanger is an intense time/modulation effect. It originated from audio engineers pressing on the flange (rim) of a moving tape reel to slow down the playback a tiny bit. Combined with the original signal, this produces the signature "jet engine" effect.

Control	Description
Rate	Adjusts the rate of the LFO that controls the flanging speed, with tempo-synced options
Delay (H)	Changes the delay time between flanged and original signals, which affects the harmonic content
Feedback (V)	Adds feedback for a harsher or "ringing" sound. Maximum is 99% to avoid runaway feedback
Depth	Adjusts the depth of the delay that modulates the flanged signal
Mono/Stereo	Toggles between mono or stereo operation
+/-	toggles the Flanger's phase shifting between additive and subtractive
HP Frequency	Determines the amount of low-frequency content that will enter the flanger effect
LP Frequency	Determines the amount of high-frequency content that will enter the flanger effect

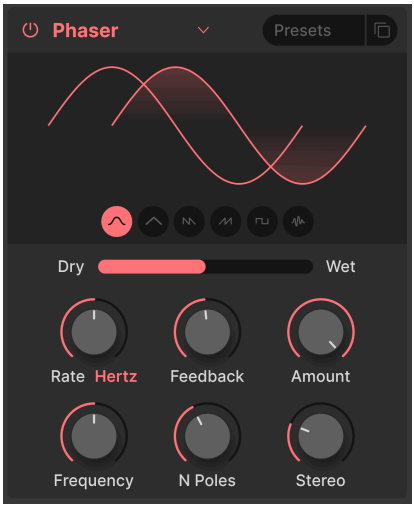
5.4.19. BL-20 Flanger



The **BL-20 Flanger** is based on the sound of Arturia's Flanger BL-20 plug-in, which is in turn based on the sound of the rare and beautiful-sounding Bel BF-20 hardware flanger from the 1970s.

Control	Description
Wide	Provides a wider stereo image by inverting the phase of the LFO modulating the right channel
Mono Input	When engaged, optimizes the flanger for processing a monaural signal
Rate	Adjusts the rate of the flanger, with unsynced and tempo-synced options
Delay (H)	Adjusts the audible depth of the flange effect
Feedback (V)	Adjusts the amount of effected signal feeding back into the flanger
Depth	Adjusts the depth of the LFO that modulates the delayed signal

5.4.20. Phaser

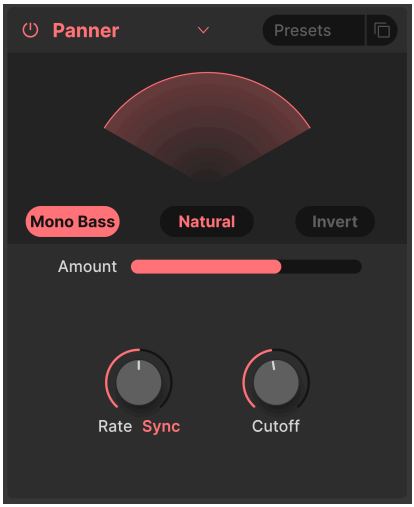


Phase shifting splits the incoming signal, changes the phase of one side, and recombines it with the unaffected signal. Modulation of this signal via an LFO results in a notch-comb filter that sweeps through the frequency spectrum, causing that familiar "whooshing" sound.

♪ Two iconic uses of the phaser are on analog strings by Gary Wright and Jean Michel Jarre, and on electric piano by Steely Dan.

Control	Description
Rate	Adjusts the rate of the phaser, with unsynced and tempo-synced options
Feedback (V)	Controls the amount of phased signal feeding back into the effect for a more resonant sound
Amount	Adjusts the intensity of the phasing effect
Frequency (H)	Sets the harmonic center of the phasing effect
N. Poles	Determines the steepness of the phaser's filter frequency response
Mono/Stereo	Toggles the phaser between mono and stereo output

5.4.21. Panner



The Panner automatically moves the stereo position of the SEM V sound, to provide motion and breadth.

Control	Description
Rate	Controls the speed of stereo panning, with tempo-synced and unsynced options
Natural/ Linear	Toggles whether the signal pans according to a linear volume relationship between the sides, or a gentler logarithmic curve
Invert	Flips the side-to-side panning
Mono Bass	When engaged, low frequencies will not be panned, which may be desirable for a solid bass sound with movement in the treble
Cutoff	When Mono Bass is active, this sets the point at which low frequencies (50-200Hz) will not be panned

6. MODULATORS



ADSR



Function



Random Generator



Voice Modulator

SEM V's all-new modulation section features easy drag-and-drop assignment of modulation sources. To access it, click the Advanced button [p.109] to open the Advanced view. The Multi-Arp [p.33] and Effects [p.45] tabs reside here too – and we already covered those in previous chapters.

6.1. Overview



Every tab to the right of the Effects tab is a Modulation source. These can further be divided into internal sources, MIDI sources [p.97], and Macros [p.100]. The first three tabs are for internal sources, and you have a choice of *five* source types for each of those three slots:

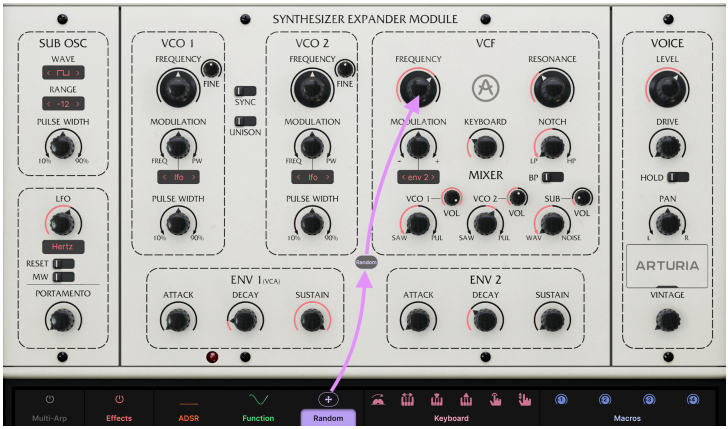
Source	Color Code	Description
ADSR [p.78]	Amber	ADSR envelope generator
Function [p.80]	Green	Hyper-flexible shape creator
Random [p.87]	Violet	Complex random value generator
Voice Modulator [p.89]	Teal	Sends a new modulation value each time SEM V triggers a voice
Mod Sequencer [p.92]	Magenta	Modulation sequencer for sending stepped values (not shown above)

To the right of these are the MIDI modulators [p.97]: performance gestures such as the mod wheel, keyboard note, key and release velocity, aftertouch, and MPE slide, which refers to the position of your finger along the Y-axis of a key on an MPE controller [p.118]. MIDI modulators are color-coded pale pink.

Finally, we have the four Macros [p.100]. These control multiple parameters with a single knob twist. Then you could MIDI learn each Macro to a physical knob or fader for powerful command over your performance. Macros are color-coded dark blue.

6.1.1. Assigning a modulation

SEM V features a new drag-and-drop approach designed to remove the guesswork and squinting from assigning modulation routings. Suppose we want to assign the Random generator to filter frequency to create a bubbling "1970s computer brain thinking" sound.



SEM V makes assigning modulations easy with drag-and-drop

- Step 1. Click-hold on the source's icon or animated thumbnail (not the text tab below it). The icon will turn into a 4-way arrow, as shown above.
- Step 2. As you begin to drag the source, a bubble with its name appears.
- Step 3. Drop the bubble on the destination, in this case the filter frequency, like so:



Dropping a source on a destination creates a Quick Edit knob

Notice the Quick Edit knob that appears below the destination, matching the color of the source. Turn it to adjust the modulation amount in a positive or negative direction. It reappears any time you hover over that destination.

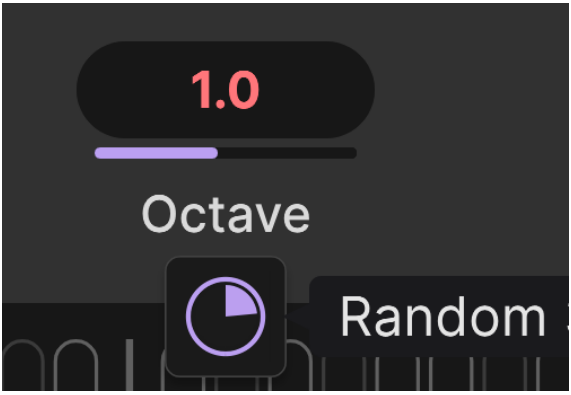


Hover over the Quick Edit knob to see the modulation amount around the source

If you hover over the quick edit knob, a "collar" around a knob or line adjacent to a slider appears in matching color to indicate the modulation amount. The collar/line appears in one of two ways:

- If the modulation source is bipolar, the collar extends in both directions from the destination control's position (as shown above).
- If the modulation source is unipolar, the collar extends in one direction from the destination control's position.

With parameters that appear as numerical fields, a black line underneath the field indicates it is an eligible modulation destination.



The Octave parameter of the Multi-Arp modulated by the Random generator

Assign a source, and the line will display a color-matching bar to show the modulation source type and amount, as shown above.

You can assign as many sources as you want to a destination, and Quick Edit knobs will appear under it. When a destination is receiving modulation, the standard collar that indicates its position animates to show the real-time effect on the destination value.

> Don't forget that you can assign modulation sources to parameters in the Multi-Arp, Effects, and even other modulation sources. Simply select the destination area using the text tabs, then drag on an icon/thumbnail to make the assignment.

6.1.1.1. Viewing sources at the destination



ADSR, Function, and Random sources all assigned to filter frequency

There are two ways to view modulation assignments once they're made. This first method is when you want to see which source(s) modulate a given destination. Simply hover over the destination (you may need to click in its general area first) to display as many Quick Edit knobs as there are sources. In turn, hovering over a Quick Edit knob will display a pop-up identifying the source and modulation amount.

6.1.1.2. Viewing destinations at the source



An ADSR assigned to both oscillators' pulse widths plus the frequency and mod amount of the filter

The second approach displays a list of which destinations are modulated by the chosen source. Click on the source's thumbnail/icon (not the text tab) to show the list. Here are its basics:

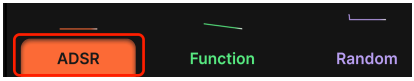
- Individual and global on/off buttons mute the modulation routing without deleting it
- Horizontal sliders control positive/negative amounts and correspond to the Quick Edit knobs at each destination
- Hover on the destination text and it scrolls so you can read the whole thing
- Move the mouse cursor out of the list area to hide it

6.1.2. Remove a modulation assignment

To remove an assignment, double-click on its Quick Edit knob underneath the destination. This first sets the value to zero. Then when your cursor leaves the area, the Quick Edit knob disappears. If you want to disable the modulation without removing it (so that you can hear other things better, for example), use the on/off buttons in the Source View lists. In any case, drag-and-drop makes it easy to redo any assignment deleted accidentally.

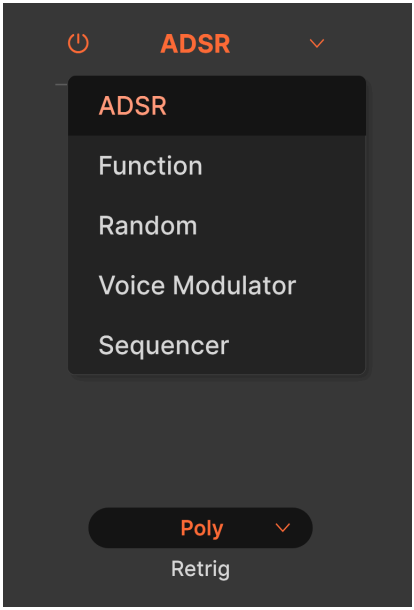
6.1.3. Selecting an internal source type

You can mix and match source types in the first three slots any way you like. Here's how you do it.



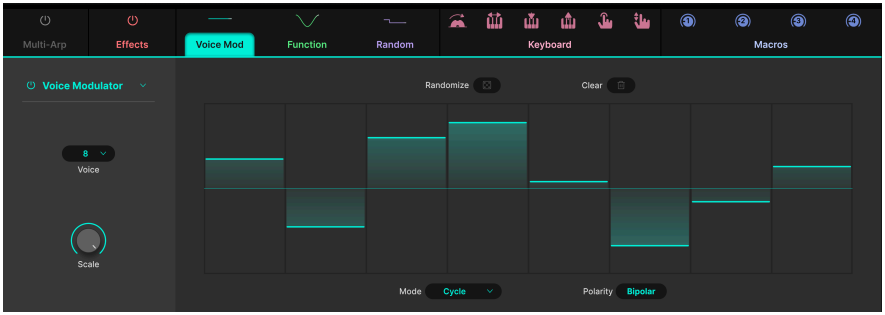
Click an internal slot's tab to select it

First, choose one of the three tabs. Here, we have picked the first, currently populated by an ADSR envelope.



The modulation source select menu

Now, go to the left side of the screen and click the drop-down menu. Suppose we want to change that ASDR to a Voice Modulator. Select it from the menu and presto:



Now, the Voice Modulator occupies the first modulation slot

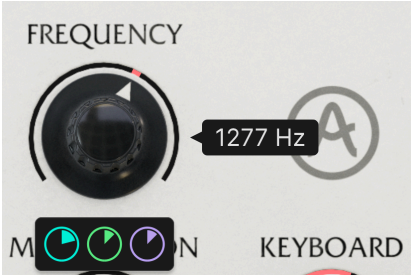
6.1.4. About modulation source assignment and order

Selecting a different modulation source for one of the three available slots does *not* change any of the assignments for that slot – a source assigned to multiple destinations will retain them all.

On the destination end, the Quick Edit knobs always reflect the order of modulation slots/sources from left to right in the modulation view. So, let's review what an ADSR (first slot), Function (second slot), and Random (third slot) all assigned to VCF frequency looks like when you hover over the Frequency knob:



If, for example, you change the ADSR to the Voice Modulator, that first Quick Edit knob changes color to reflect the choice, while the assignment itself remains in place:



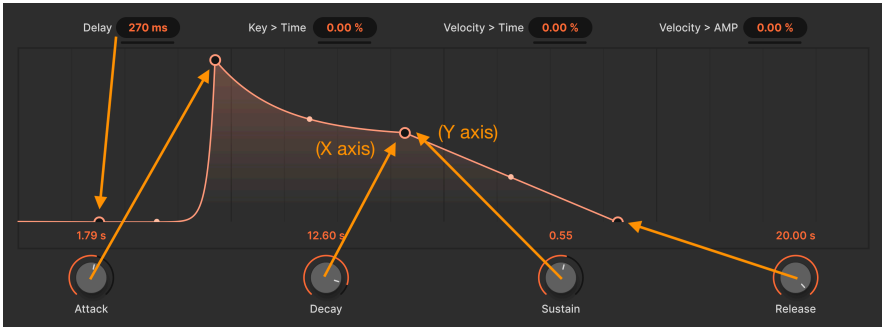
Now let's examine the modulation source types themselves!

6.2. ADSR



The ADSR modulation source

The ADSR source type is essentially a synth envelope generator, with the addition of an adjustable delay before the attack phase begins – so technically it's a DADSR. You can adjust its main settings with either the knobs or by moving the breakpoints in the graphic visualizer. Try it and you'll see their actions mirror each other.

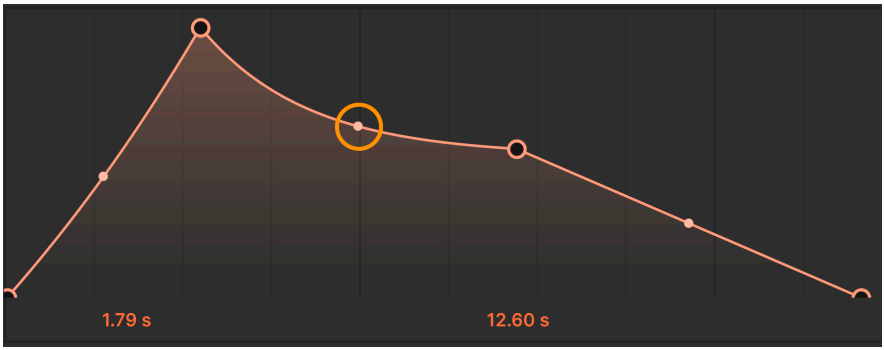


Each parameter mirrors the position of a breakpoint in the graphic envelope

6.2.1. ADSR Scale

The **Scale** knob at far left sets a ceiling on the overall modulation output of the envelope. You can think of it as determining the ADSR's peak level at the top of the attack phase.

6.2.2. ADSR curves



Grab the handle to adjust the shape of the envelope segment

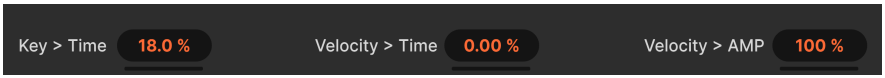
You can also adjust the shape of the envelope segment between each breakpoint. Hover over the small dot in the center of a segment. Up and down arrows will appear. Now, click and drag the segment into the desired shape.

6.2.3. Main envelope parameters

The main envelope parameters work as expected:

- **Delay:** Adds a time lag before the attack phase begins
- **Attack:** Sets the time it takes for the envelope to rise to peak level once a note is played
- **Decay:** Sets the time it takes for the envelope to fall from peak level to the sustain level
- **Sustain:** Adjusts the sustain level at which the envelope remains as along as a note is held
- **Release:** Sets the time it takes for the envelope to fall from the sustain level when a note is released

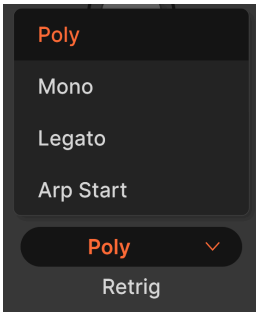
6.2.4. Envelope MIDI modulations



Three more parameters let MIDI notes and velocity affect the envelope for added expression.

- **Key > Time:** Envelope times (attack, decay, release) become more sensitive to keyboard note
- **Velocity > Time:** Envelope times (attack, decay, release) become more sensitive to MIDI velocity
- **Velocity > Amp:** Scale parameter becomes more sensitive to velocity

6.2.5. ADSR Retrigger

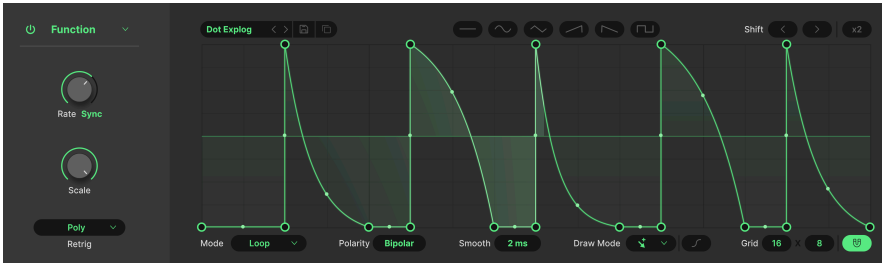


The retrigger settings determine what actions will start the envelope over from the beginning of its cycle, and how notes are affected.

- *Poly:* Each new note starts the cycle over only for that note, i.e. every note gets its own cycle
- *Mono* Each new note starts the cycle over for *all* currently held notes
- *Legato:* New notes played legato (before previous notes are released) will *not* retrigger the envelope
- *Arp Start:* Envelope retriggers at the beginning of any active Multi-Arp track

To get familiar with these, assign an ADSR to something quite audible, like a filter cutoff. Then play notes, listen, and watch the tracer puck glide along the envelope curve, looking for when it goes back to the beginning.

6.3. Function

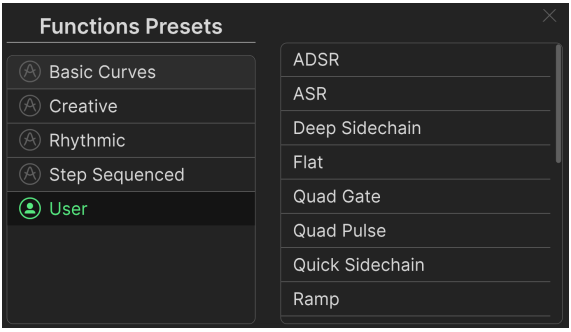


The Function generator can be thought of as a highly flexible envelope-meets-LFO – if the two were fused by a mad scientist. The concept is that you can create any kind of modulation shape you can imagine.

6.3.1. Function Scale

As with the ADSR, the leftmost knob sets the scale (overall output) of the function while preserving all of the time and level relationships within it.

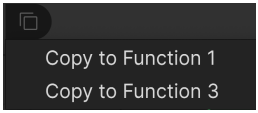
6.3.2. Function Presets



Function categories are on the left; individual presets on the right

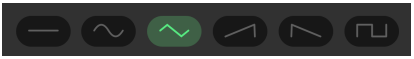
Before we create our own functions, click on the Presets field to see the factory selections and get an idea of just how many shapes a function can take. On the left are general categories of functions. Click the disk icon to save your own creations. A user category will then appear in the left column of the menu.

6.3.3. Function Copy



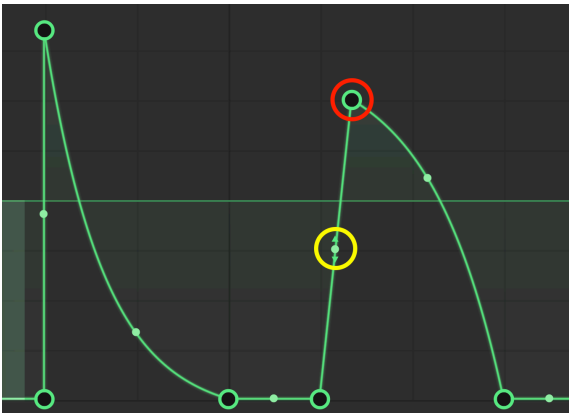
Click the double-document icon to copy the selected Function's settings to another Function occupying either of the other two slots. If a different modulation source (ADSR, Random, or Step Sequencer) is currently in the target slot, copying will *not* overwrite that setting. You first need to put a Function in that slot, then perform the copy operation.

6.3.4. Function LFO shapes



In addition to this preset library, there are six basic waveshapes intended for using the Function like an LFO or starting your own shape: flat, sine, triangle, ramp, aw, and square.

6.3.5. Breakpoints and grab handles



A breakpoint is circled in red; a grab handle in yellow

Functions let you create any curve or shape of modulation with two simple tools: *breakpoints* and *grab handles*. A *breakpoint* is a point in time at which the modulation changes direction. (It doesn't have to – you could use a breakpoint as a spot where, for example, the curve increases or decreases in steepness – but changing direction is usually what a breakpoint is for.)

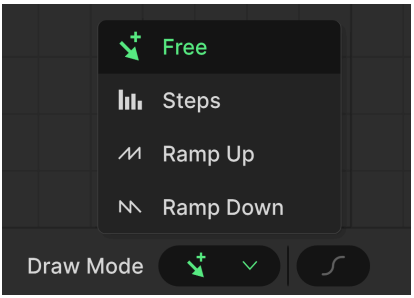
Left-click on the graph to add a breakpoint. Right-click on the point to delete it – a quick confirmation pop-up will appear.

Between any two breakpoints, there is a *grab handle* that you can drag to change the shape or intensity of the curve between those two points, much like with the ADSR. Leaving a handle in mid-position would create a more or less straight line between points. Dragging it as far as it will go in a direction generally creates a steep "knee" shape.

Between grab handles and breakpoints, any shape can be created, from a simple sine wave for an LFO to a conventional synth-style ADSR to extremely complex shapes.

6.3.6. Drawing Tools

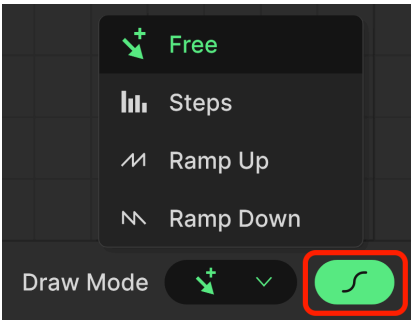
Click on **Draw Mode** to bring up the list of drawing tools. These can speed up your Function creation by letting you draw repeating shapes via click-dragging inside the visualizer.



- *Free:* Creates a single point
- *Steps:* Creates a repeating square wave-like pattern
- *Ramp Up:* Creates a rising sawtooth pattern
- *Ramp Down:* Creates a falling sawtooth pattern

Position the mouse in the visualizer so that your cursor becomes a pencil icon, then drag.

6.3.6.1. Curve



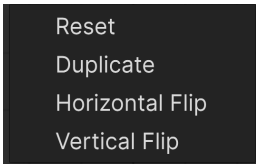
The S-shaped curve button to the right of the Draw Mode menu toggles a more curved shape for the Function's segments. The exact shape change is different from one Function to another; it is merely meant as another creative tool.

6.3.6.2. Grid and Magnetize



When the magnet button is lit, moving breakpoints around the display will "snap to grid," aiding you in creating rhythmic Functions or precise shapes. You can then drag up and down on the numerical fields to adjust the resolution of the grid in both the horizontal and vertical axes.

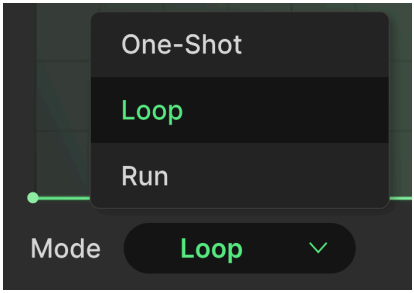
6.3.6.3. Additional editing tools



Right-click anywhere in the display *other* than on a breakpoint to bring up the above menu of editing options:

- *Reset:* Resets the function to "flatline" – be careful with this one!
- *Duplicate:* Performs a Duplicate [p.85] operation
- *Horizontal Flip:* Creates a mirror image of the function horizontally
- *Vertical Flip:* Creates a mirror image of the function vertically

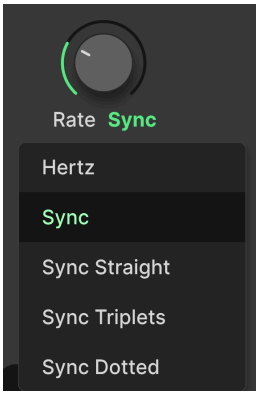
6.3.7. Function Mode



The **Mode** setting is an important one, because it selects whether the Function behaves more like an envelope or more like an LFO.

- *One-Shot:* The Function plays through once, i.e. more like an envelope
- *Loop:* The Function plays repeatedly and can retrigger from the start point based on a selectable event
- *Run:* The Function plays repeatedly and only returns to the start point when it reaches the end

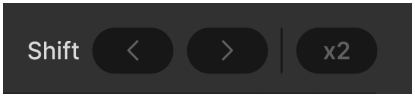
6.3.8. Function Rate and tempo sync



The rate of the Function can run free or be synced to project tempo via a drop-down menu accessed by clicking below the **Rate** knob. The options are:

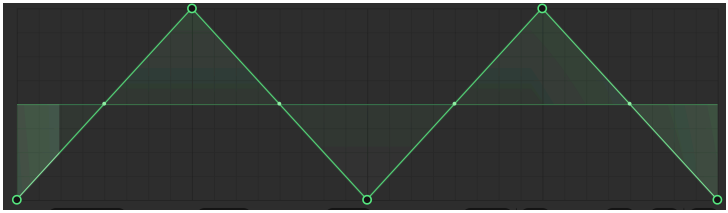
- *Hertz:* Free-running with no tempo sync
- *Sync:* Straight, triplet, and dotted ratios are all present serially when you turn the knob
- *Sync Straight:* Only even rhythmic values are represented
- *Sync Triplets:* Tempo is synced with a triplet feel; a quarter-note = three eighth-notes played in the space of two
- *Sync Dotted:* Tempo is synced with a dotted feel; a quarter-note = a dotted eighth-note followed by a 16th-note

6.3.9. Function Shift and Duplicate

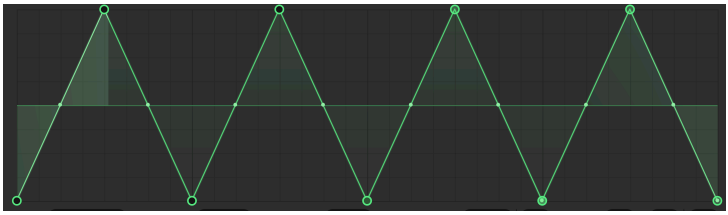


The **Shift** arrows will move the function forward or backward in time by one block along the horizontal axis of the grid.

Duplicate (the button labeled **x2**) doubles the pattern of the function over the same amount of time. For example, take a simple triangle wave that looks like this:



Click the **x2** button once, and it transforms into this:



You can repeat this operation.

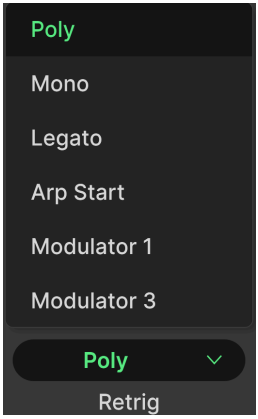
6.3.10. Function Polarity and Smooth



The **Polarity** field toggles whether the Function output sends positive values only (Unipolar) or positive and negative values (Bipolar).

Drag on the **Smooth** field to smooth out transitions at the breakpoints. This can help if you hear unwanted clicks in the sound as the Function plays.

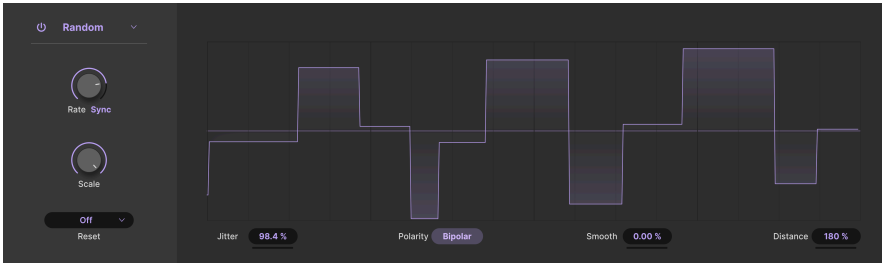
6.3.11. Function retrigger



Finally, you can decide which action restarts the Function from the beginning of its cycle, much like the ADSR.

- *Poly:* Each new note starts the cycle over only for that note, i.e. every note gets its own Function cycle
- *Mono* Each new note starts the cycle over for *all* currently held notes
- *Legato:* New notes played legato (before previous notes are released) will *not* retrigger the Function
- *Arp Start:* Function retriggers at the beginning of any active Multi-Arp track
- *Modulator:* Function restarts when either of the Modulators in the other two slots restarts (there are always two of these options)

6.4. Random



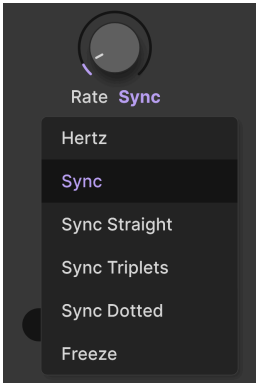
The Random modulator does exactly what its name implies: It generates a stream of random values that can then modulate any destination you assign. It's based on the similar modulation source in our flagship software synth Pigments, but streamlined to the most musically useful parameters.

- **Jitter:** Introduces further random variance in the timing when each new value is generated
- **Polarity:** Toggles whether positive and negative (Bipolar) or only positive (Unipolar) modulation output values are generated
- **Smooth:** Adds transition time between Random value changes, which can help smooth out unwanted clicks
- **Distance**: Sets the time between the current and upcoming value change; expressed as a percentage

6.4.1. Random Scale

The **Scale** button determines the maximum or "ceiling" modulation output generated by the Random engine (in both positive and negative directions if the Randomizer is set to Bipolar priority).

6.4.2. Random Rate and tempo sync

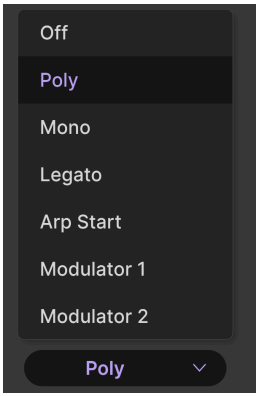


The rate of the Random generator can run free or be synced to project tempo via a drop-down menu accessed by clicking below the **Rate** knob.

The options are:

- *Hertz:* Free-running with no tempo sync
- *Sync:* Straight, triplet, and dotted ratios are all present serially when you turn the knob
- *Sync Straight:* Only even rhythmic values are represented
- *Sync Triplets:* Tempo is synced with a triplet feel; a quarter-note = three eight-notes played in the space of two
- *Sync Dotted:* Tempo is synced with a dotted feel; a quarter-note = a dotted eighth-note followed by a 16th-note
- *Freeze:* Stops Random value generation but preserves the current value

6.4.3. Random retrigger

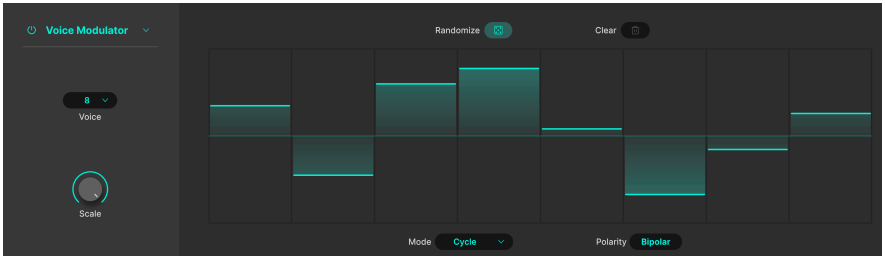


Finally, you can decide which action restarts Random value generation from the beginning of the cycle.

- *Off:* Random generator does not retrigger
- *Poly* Each new note starts the cycle over the current note only; i.e. each note gets its own cycle
- *Mono* Each new note starts the cycle over for *all* currently held notes
- *Legato:* New notes played legato (before previous notes are released) will *not* retrigger the Random generator
- *Arp Start:* Value generation retriggers at the beginning of any active Multi-Arp track
- *Modulator:* Value generation restarts when either of the Modulators in the other two slots restarts (there are always two of these options)

♪ Experiment with the *Freeze* tempo sync setting together with the different retrigger modes for some creative possibilities. For example, with the *Legato* setting and tempo sync frozen, the Random generator outputs a new value only upon receiving a non-legato MIDI note. Use *Arp Start* and the random value will change at the beginning of a Multi-Arp cycle. In this way, you can tie new modulation values to your playing, to musical phrases, and so on.

6.5. Voice Modulator



This very cool new modulation generator outputs a new value each time SEM V triggers a voice (usually because you, the sequencer/arpeggiator, or a DAW track plays a MIDI note). For example, you could assign it to filter cutoff to hear a different amount of brightness with each successive note, or to pan position to bounce a sound around the stereo field. You could also create "dispersion" or drift-like behavior of any destination parameter, mimicking the behavior of aged analog synths.

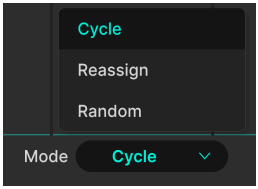
Drag the bar of a Modulator step up or down to set its value.

6.5.1. Voice Count and Mode

The **Voice** menu at the left chooses how many voices are used by the modulator, from 1 to 8. Select 2, for example, and you will see only two steps in the bar graph display.

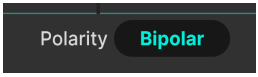


The **Mode** parameter determines how steps in the Voice Modulator call on Voices from the sound engine:



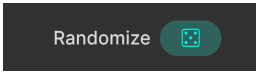
- *Cycle:* Each new voice advances the Voice Modulator one step
- *Reassign:* If a note has been played before, the Modulator uses the step already used for that note; if it has not, it advances to the next step
- *Random:* Each new note grabs a random step from the Modulator cycle

6.5.2. Voice Modulator Polarity



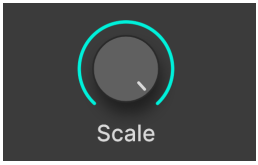
You can toggle the Voice modulator between unipolar and bipolar operation. When Unipolar, it will send only positive modulation values and you will be able to raise or lower the step bars relative to the bottom (zero). In Bipolar mode, both positive and negative values are sent, and you can move the step bars to either vertical side of the center line in the display.

6.5.3. Randomize



Clicking the icon that looks like a gaming die will set all active steps in the modulation sequence to random values. You can do this any number of times.

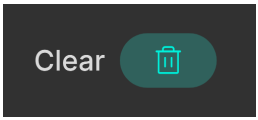
6.5.4. Voice Modulator Scale



Similar to other modulator types, the **Scale** knob adjusts the overall modulation amount while preserving the relative value differences between the steps.

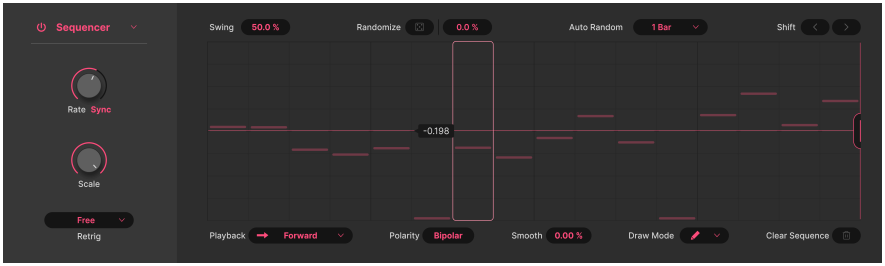
♪ Route the Voice Modualtor to the Pan knob on the main panel. Set it to Bipolar. Now, set odd steps all the way negative and even steps all the way positive. Each note played will now come from the opposite stereo side. On a fat synth brass sound, this gets very close to the ping-pong panning in "Who Are You" by The Who!

6.5.5. Clear



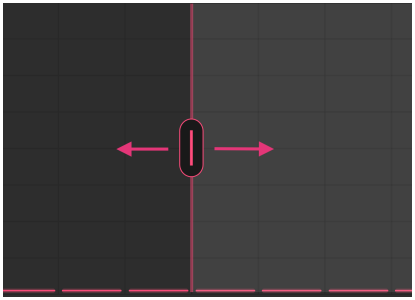
Clicking the Clear (trash can) icon simply sets all the modulation steps to zero, letting you start over. If you do this by accident, you can use the undo or history [p.112] functions to revert and get them back.

6.6. Mod Sequencer



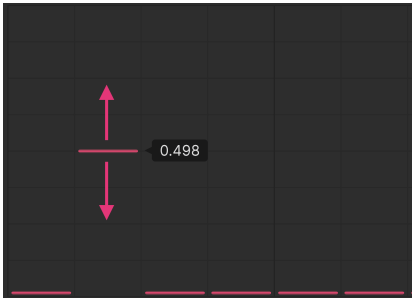
The Mod Sequencer in SEM V is much like one that could be used to play notes, only it's for sending modulation values to destinations. (You *could* play notes with it in a fashion – by assigning it to oscillator pitch!) It offers adjustable pattern lengths up to 16 steps, one-click random pattern generation, auto-randomization of pattern data, swing, four playback modes, and much more.

6.6.1. Setting the pattern length



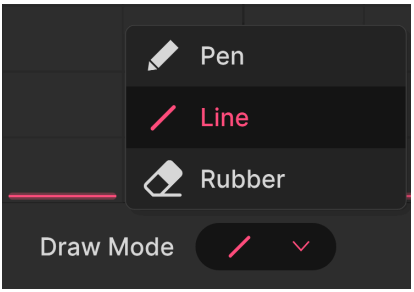
Grab the vertical magenta handle (usually found at the right side of the window) and slide it back and forth to adjust the overall length of the pattern.

6.6.2. Setting the value of a step



To enter data at any step, click anywhere within a step on the grid to position the horizontal bar. You can then drag the bar up and down to fine-tune its value.

6.6.3. Drawing modes

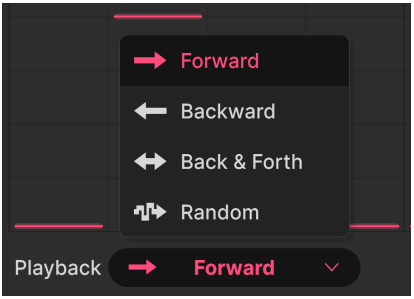


Similarly to the Functions, the Step Sequencer has drawing tools to speed up pattern creation. Click the **Draw Mode** icon to show the pop-up.

- *Pen:* Free-drawing; drag the cursor horizontally and vertically to enter a new value at each step
- *Line:* Creates an ascending or descending series of steps when you drag the cursor on the grid
- *Rubber:* Eraser tool; sets step values to zero as you drag

> To make successive slopes with the Line tool, release the mouse button once you are satisfied with your line. Then start at the next step and make a new line.

6.6.4. Sequencer Playback mode



In this pop-up menu, you can set how the sequencer runs through the pattern.

- *Forward:* Sequence only plays left to right
- *Backward:* Sequence only plays right to left
- *Back & Forth:* Sequence plays in one direction then reverses; first and last steps are repeated
- *Random:* Sequence jumps to random steps

6.6.5. Swing

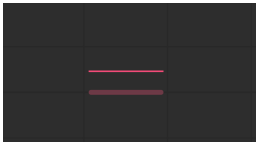


Swing is often described as a "behind the beat" rhythmic feel, and the Step Sequencer has a range of 50 to 75 percent, which you change by dragging up or down on the number. Fifty percent represents a "straight" feel, whereas 75 percent means that two eighth-notes are played as a dotted eighth plus a 16th-note. That is, the note durations between them are split 75/25.

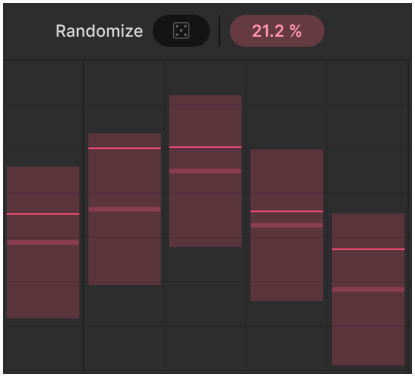
6.6.6. Randomize



Click the "dice" icon to generate a completely random set of values for all steps. In any given step, the dimmer, slightly thicker bar represents the original set step value and the thinner, brighter bar the random one, like so:

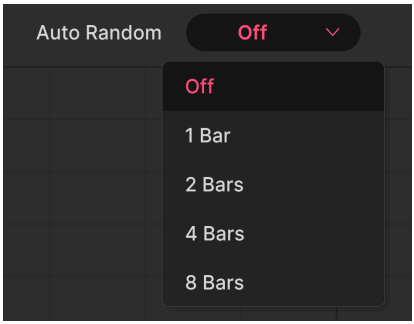


6.6.6.1. Random range



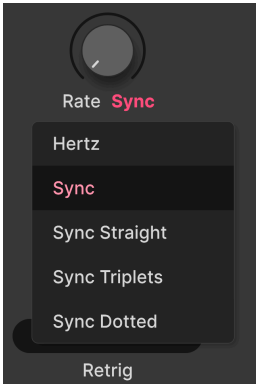
The percentage field to the right of the dice restricts the range within which a random value can be generated above and below the set value. Hover over it and the sequencer displays the ranges as vertical bars.

6.6.6.2. Auto-Random



You can also let the Step Sequencer generate a new set of random step values every bar or every two, four, or eight bars using the above menu.

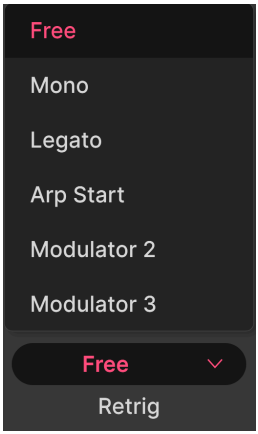
6.6.7. Sequencer Rate and tempo sync



Like the Functions and the Random generator, the sequencer can free-run or sync to project tempo. Access these options by clicking beneath the **Rate** knob:

- *Hertz:* Free-running with no tempo sync
- *Sync:* Straight, triplet, and dotted ratios are all present serially when you turn the knob
- *Sync Straight:* Only even rhythmic values are represented
- *Sync Triplets:* Tempo is synced with a triplet feel; a quarter-note = three eight-notes played in the space of two
- *Sync Dotted:* Tempo is synced with a dotted feel; a quarter-note = a dotted eighth-note followed by a 16th-note

6.6.8. Sequencer retrigger



As with the other modulators, you can determine which events will cause the sequencer to start over from the beginning of the pattern, via the menu at the lower left of the window.

- *Free:* Sequence pattern does not retrigger
- *Mono* Each new note starts the pattern over for *all* currently held notes
- *Legato:* New notes played legato (before previous notes are released) will *not* retrigger the pattern
- *Arp Start:* Sequence pattern retriggers at the beginning of any active Multi-Arp track
- *Modulator:* Pattern restarts when either of the Modulators in the other two slots restarts (there are always two of these options)

6.6.9. Other parameters

A handful of now-familiar parameters rounds out the Step Sequencer's utility.



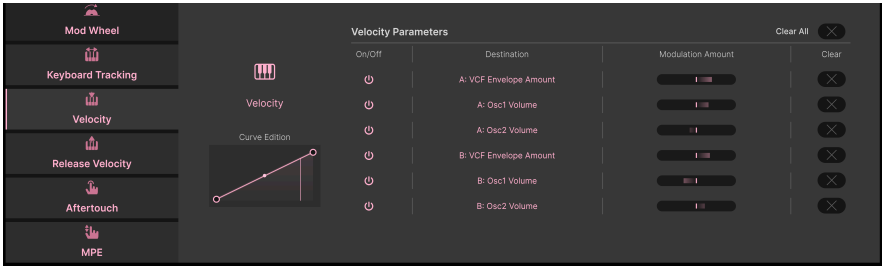
- **Polarity:** Determines whether the Sequencer sends positive values only (Unipolar) or positive and negative values (Bipolar).

- **Smooth:** The higher **Smooth** is set, the more gradual the transition between steps becomes. At zero, the output is simply star-stepped as it appears onscreen. At 100 percent, it becomes a completely smooth curve that passes through all the step values.

- **Shift:** The Shift arrows at upper right move the sequence forwards or backwards one step at a time. For example, when shifting forward, the value in step 1 moves to step 2, and so on, until the final step in the pattern becomes step 1.

- **Clear Sequence:** The trash can icon at the lower right sets all step values to zero. If you do this by accident, you can use the undo or history [p.112] functions to restore them.

6.7. MIDI modulators

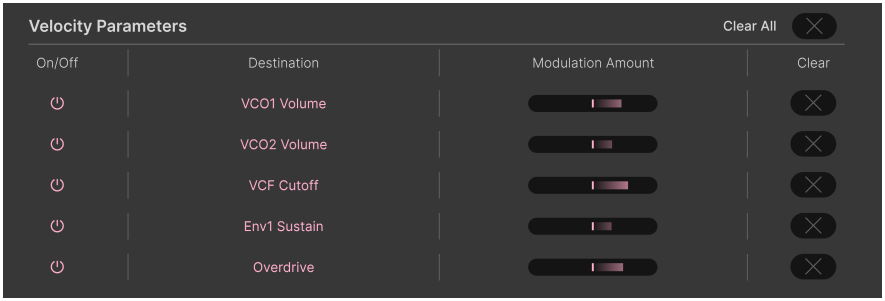


Color-coded pale pink, the MIDI modulators can all be found on the tab that displays the word "Keyboard" (when you hover on of the other icons in this section; "Keyboard" changes to the name of the selected modulator). This is because they all represent MIDI messages that come from a keyboard or other controller – and hence gestures that can make musical performance more expressive. There are six of them:

- **Mod Wheel:** Position of the modulation wheel
- **Keyboard Tracking:** MIDI note number
- **Velocity:** MIDI playing velocity assuming velocity-sensitive hardware
- **Release Velocity:** How quickly a note-off occurs assuming hardware that senses this
- **Aftertouch:** Channel after-pressure on supporting hardware
- **MPE Slide:** Finger position on the Y-axis of a key or other surface, on supporting MPE controllers [p.118]

All of these work more or less identically: They translate some form of kinetic motion (from a musical input device) into a MIDI continuous controller message that can in turn be applied as a modulation source. For that reason, we will take Velocity as the example for this section, because its parameters apply to all other MIDI modulators.

6.7.1. The parameter list



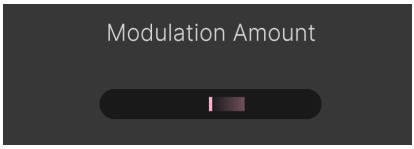
MIDI modulators can display all current destinations

Once you have assigned some modulation routings [p.73] using the convenient drag-and-drop method, the destinations for a MIDI modulator appear here.

6.7.1.1. On/Off buttons

Each destination has an on/off toggle that mutes the modulation without deleting the routing assignment.

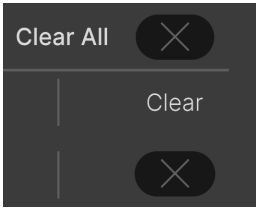
6.7.1.2. Modulation Amount



Horizontal mod amount sliders duplicate the Quick Edit knobs at the destinations

Each destination row also has a Modulation Amount slider. These mirror the actions of the Quick Edit knobs visible when hovering over [p.73] a destination. From here you can easily adjust the MIDI modulator's effect on all destinations.

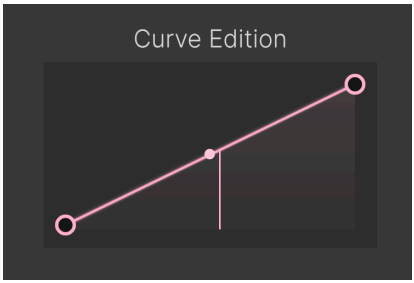
6.7.1.3. Clear buttons



You can quickly delete any modulation routing by clicking its X icon – or delete them all by clicking the **Clear All** X.

> Fear not! If you do this by accident, you can recover your routings with the Undo [p.112] button in the Lower Toolbar.

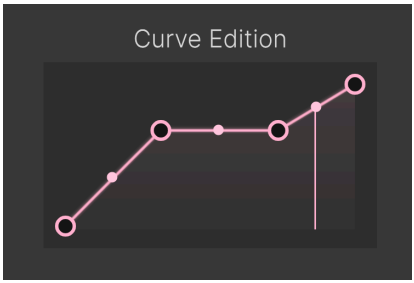
6.7.2. Control curves



A simple linear control curve; vertical line indicates last received value

You can also edit the controller curve for each MIDI modulator. That is, how it translates physical motion into MIDI. The default curve is shown above. The vertical line represents the last value received by the modulator: how hard you played a key in the case of velocity, what position the mod wheel was left in, and so on.

6.7.2.1. Custom curves

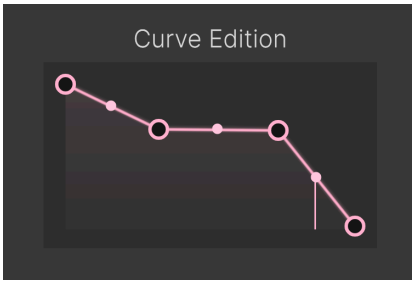


A custom control curve

You can edit the default curve for any MIDI modulator with a process very similar to editing Functions [p.82]: Click in the curve to add breakpoints, drag the grab handles to shape the curve segments, and right-click to remove breakpoints. The first and last breakpoints cannot be deleted.

Note: "Edition" in the above images, and throughout Arturia products, means "editing."

6.7.2.2. Inverse curves

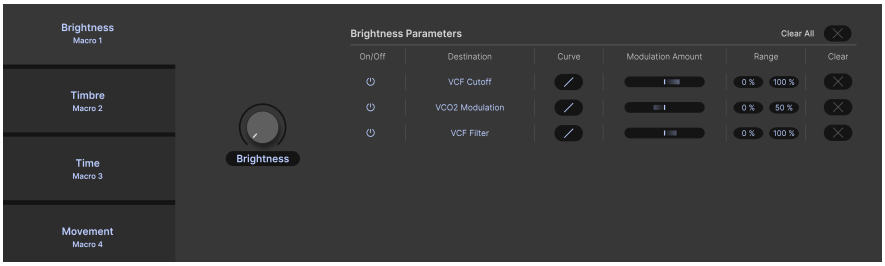


An inverse control curve

You can even program inverse curves! In the case of velocity, this would make the modulation value *lower* the harder you strike the keys.

> ♪ One application for inverse curves would be to crossfade two signals – such as the volumes of the two oscillators – by using a positive curve on one and an inverse curve from the same modulation source on the other.

6.8. Macros



Macros are a longtime staple of Arturia instruments. They let you assign a virtual knob to multiple other parameters. You can then MIDI-learn the Macro to a physical knob or fader. SEM V features four Macros, and they work a lot like the MIDI modulators, with a few small differences.

Macro knobs are mirrored in both the Lower Toolbar [p.110] and Preset Browser [p.138].

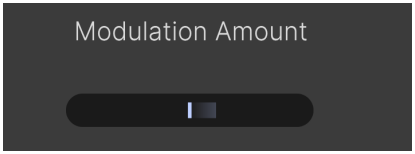
> Macros are called Brightness, Timbre, Time, and Movement by default. This does not restrict where you can assign them. They work identically, and can be freely renamed [p.102].

6.8.1. Macros parameter list



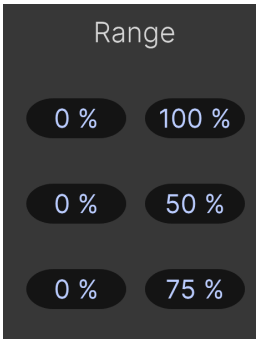
As with the MIDI modulators, the parameter list for any Macro shows all active destinations.

6.8.1.1. Macro modulation amounts



The horizontal sliders mirror the Quick Edit knobs at the various destinations [p.73], giving you a "mission control" center over all modulation amounts.

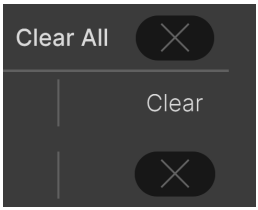
6.8.1.2. Macro ranges



Drag in the minimum and maximum number fields to adjust the macro's range

You can also adjust the range within which turning a Macro knob affects the destination, and you can do so independently for each assigned destination. This works by restricting the range of the *destination* control such that the Macro is only active there. It's useful because you may want a quick knob twist to affect some parameters more than others.

6.8.1.3. Clear icons



You can quickly delete any Macro routing by clicking its X icon – or delete them all by clicking the **Clear All** X.

> Fear not! If you do this by accident, you can recover your routings with the Undo [p.112] button in the Lower Toolbar.

6.8.1.4. Macro curves



You can change the shape of each Macro's curve by dragging on the small Curve icon. Unlike with MIDI modulators, there is no breakpoint editing or inverse capability here.

6.8.2. Macro master knob

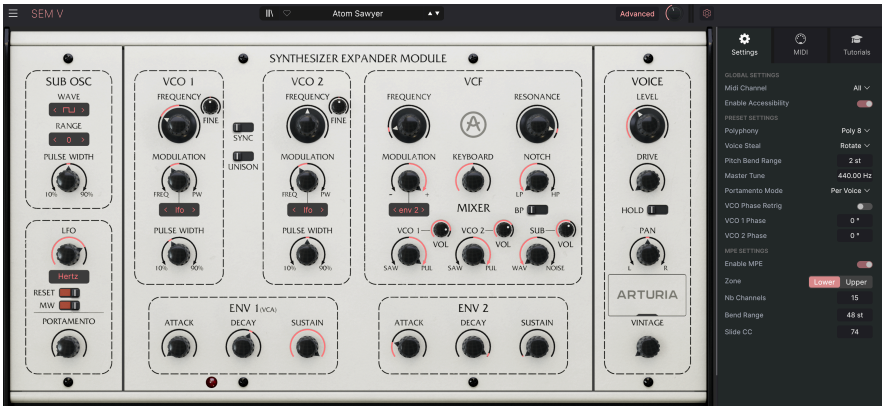


Finally, each Macro has a master knob for sending modulation values to all the Macro's destinations. This knob can be MIDI-learned, but it cannot be a modulation destination itself.

6.8.2.1. Renaming the Macro

Click in the name field below the knob to type in a new name for the Macro.

7. USER INTERFACE



This chapter covers everything that is not in the main panel and advanced views – all the utilitarian functions that make SEM V a pleasure to use in a modern music production environment.

The toolbars above and below the main panel [p.15] of SEM V contain a number of important functions for Preset selection, housekeeping, and other utility settings.

Then there's the side panel, where you make important global and MIDI settings, and explore SEM V via interactive tutorials.

The Upper Toolbar includes:

- The Main Menu [p.104]
- The Preset Name Pane and Preset Browser [p.125] access button
- The button to open the Advanced Views [p.109], which include the Multi-Arp [p.33], Effects [p.45], and Modulators [p.72]
- An overall output volume [p.109] knob
- A gear-shaped icon that opens the side panel [p.114]

The Lower Toolbar includes:

- The parameter description area [p.17] that shows info when you hover over any control
- The Polyphony [p.111] menu, which sets the maximum number of voices
- Poly Mode menu is replaced by Unison controls [p.111] when Unison [p.21] is active on the main panel
- Undo, Redo, and History [p.112]
- The CPU Meter [p.112] and Panic [p.113] functions
- Duplicate knobs for the Macros [p.113] found in the Modulation strip and Preset Browser

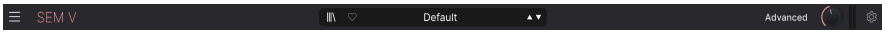
- A corner grab handle [p.113] for resizing the SEM V window

The side panel includes:

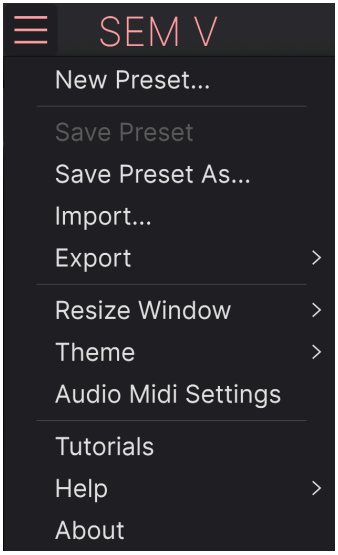
- Settings [p.115] tab for important global and preset-based settings
- MIDI [p.119] for assigning MIDI controllers
- Tutorials [p.107] to familiarize you with SEM V

7.1. Upper Toolbar

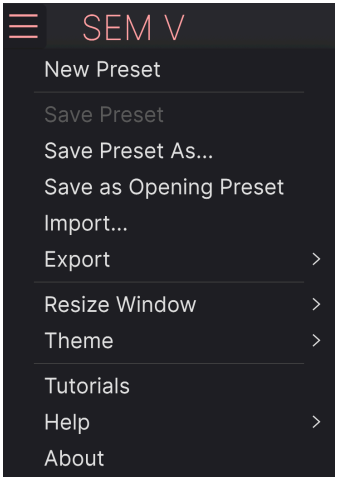
Let's start with the Upper Toolbar, covering its functions from left to right.



7.1.1. Main Menu



The main menu when SEM V is in stand-alone mode



The main menu when SEM V is run as a plug-in

Clicking the "hamburger" icon (three horizontal lines) in the top left corner of the upper toolbar opens the Main Menu, a drop-down menu that lets you access a number of useful functions related to Preset management and more.

7.1.1.1. New Preset

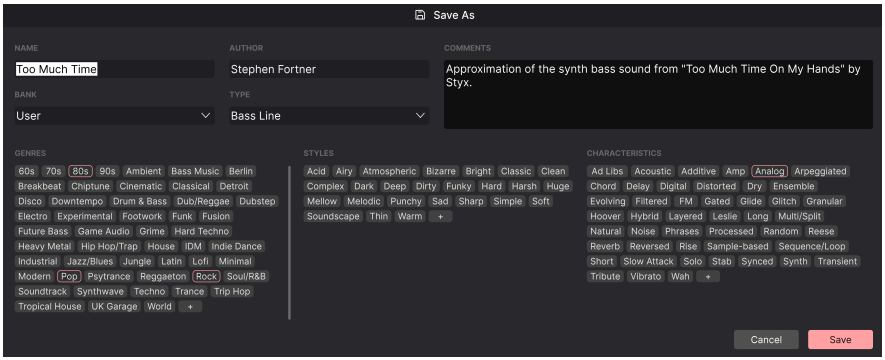
Creates a new Default Preset with initialized settings for all parameters.

7.1.1.2. Save Preset

Overwrites the current Preset with any changes you have made. This applies only to user presets, so this option is greyed-out for factory presets.

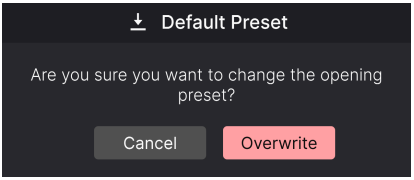
7.1.1.3. Save Preset As...

This option saves the current settings of SEM V under a new Preset name. Clicking this option reveals a window where you can name your Preset and enter more detailed information about it:



> ♪ The Bank, Author, and Type fields are all useful when searching for Presets in the Preset Browser [p.125]. All of the words in boxes you see below that are tags [p.127], which can further help refine searches in the Preset Browser.

7.1.1.4. Save as Opening Preset



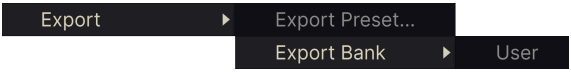
Available when SEM V is used as a plug-in, this option makes the current Preset the default with which SEM V opens whenever you create a new instance of it on a track.

7.1.1.5. Import ...

This command lets you import a Preset file or an entire Bank stored on your computer. It opens a navigation window in your computer's OS to find the proper files. Importing a Preset will place it into the User bank.

7.1.1.6. Export

You can export Presets to your computer in two ways: as a single Preset, or as a Bank. In either case, an OS-level navigation window lets you specify where to save the file(s). Both individual Presets and Banks have the filename extension *.sem3x*.



- **Export Preset:** Exporting a single Preset is handy for sharing a preset with someone else. The saved preset can be reloaded using the **Import** menu option.
- **Export Bank:** This option exports an entire Bank of Presets, which is useful for backing up or sharing many Presets at once. Saved Banks can be reloaded using the **Import** menu option.

7.1.1.7. Resize Window



SEM V can be resized from 50% to 200% of its default size (100%) without any visual artifacts. On a smaller screen, such as a laptop, you may want to reduce the interface size so it doesn't dominate the display. On a larger screen or a second monitor, you can increase the size to get a better view of the controls and graphics.

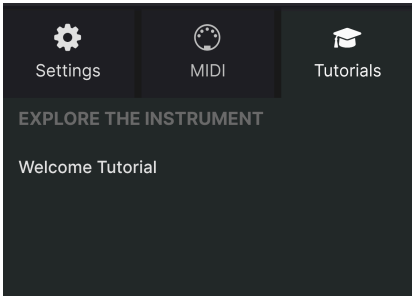
You can also do this using keyboard shortcuts: every time you press CTRL- (Windows) or CMD- (macOS), the window will shrink by one size increment, and every time you press CTRL+ (Windows) or CMD+ (macOS), the window will grow by one size increment.

In addition, you can click-drag the resize handle [p.113] at the right of the lower toolbar to make the SEM V window any size.

7.1.1.8. Audio MIDI Settings

These appear only if SEM V is working in stand-alone mode. Used as a plug-in, these are handled in the context of your DAW or host software. Refer to the chapter on Activation [p.9] for details on the settings for both Windows and macOS. They work in much the same way in stand-alone mode.

7.1.1.9. Tutorials



SEM V comes with interactive tutorials that walk you through different features of the plug-in. Clicking this option opens a pane on the right side of the window where the tutorials appear. Select one to access step-by-step descriptions that highlight the relevant controls and walk you through the process.

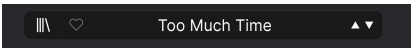
7.1.1.10. Help

Get more help by visiting links to this user manual and Frequently Asked Questions pages on Arturia's website. You will need an internet connection to access these pages.

7.1.1.11. About

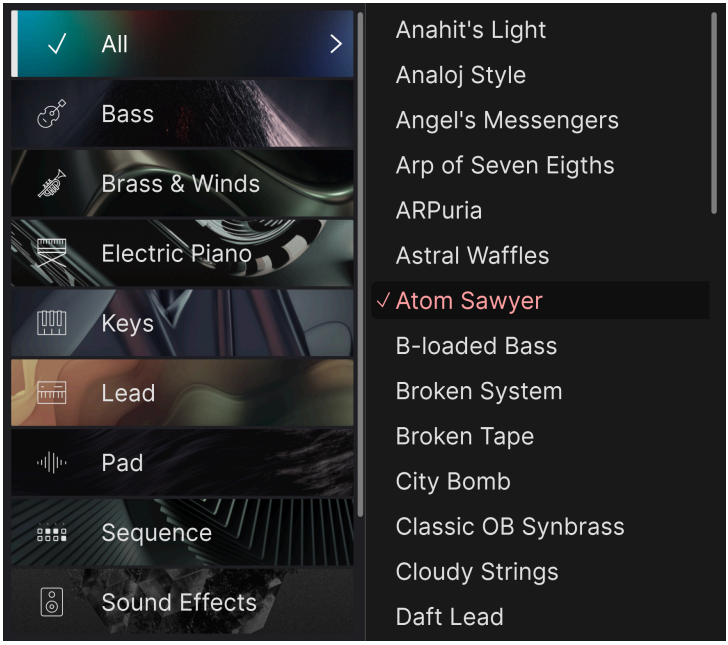
Here you can view the software version and developer credits. Click again anywhere on the screen (outside the About window but inside the plug-in) to make this pop-up window disappear.

7.1.2. Preset Browser access and Name Pane



The Preset Name Pane

Clicking the "books on a shelf" button opens the Preset Browser [p.125], which offers a myriad of ways to browse, sort, and organize Presets in SEM V.

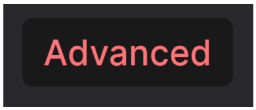


Clicking on the Preset name also opens up quick drop-down menus for selecting Presets outside of the Browser, as shown above. You can select to look at lists of Presets organized by Type, as shown above, or look at All Presets at once.

Everything you need to know about managing Presets is covered in detail in the next chapter [p.125]. This includes working with Favorites, which are tagged by clicking the heart icon.

> An asterisk just after the name in the Preset Name Pane (*) indicates that you've edited that Preset.

7.1.3. Advanced Button



Near the upper right corner of the top toolbar is the **Advanced Button**. This changes the lower area of the main panel (where the onscreen keyboard is usually seen) into the tabbed views for the Multi-Arp, Modulators, and Effects.

7.1.4. Output volume



This knob simply controls the main output level of SEM V.

7.1.5. Gear icon

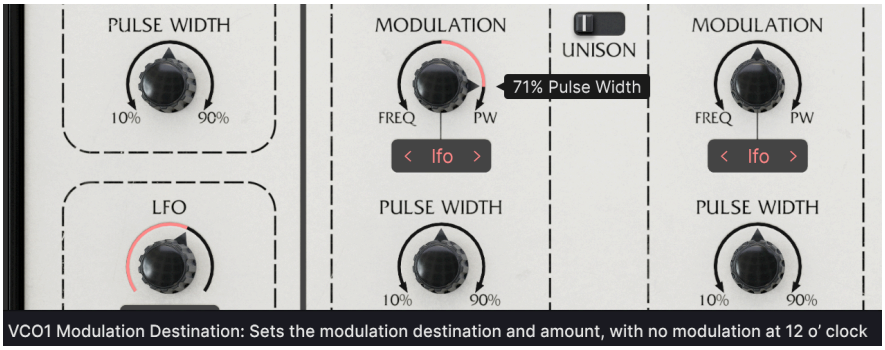


This opens the side panel [p.114] where settings, Macros, and tutorials reside.

7.2. Lower Toolbar

The Lower Toolbar of the SEM V interface can be thought of in terms of left and right halves. On the left is the parameter description display, and on the right are controls and pop-up menus for several useful utility functions.

7.2.1. Parameter descriptions



This Control Description pops up when you mouse over the Speed knob in the Main Panel

Operate or hover on any knob, button, icon, or other control, and a brief description of what it does appears in the lower left-hand corner. That is the only item on the left side.

If a description is too long to fit in the space, it will scroll horizontally after hovering on the control for three seconds.

7.2.2. Polyphony



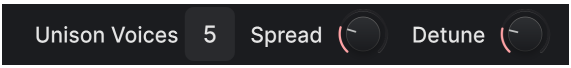
The Poly menu shows the maximum number of voices

Here you can choose the maximum number of notes SEM V plays, up to eight. You may wish to reduce polyphony to conserve CPU resources at times, such as in a project that's running a large number of plug-ins. There are also *Mono* and *Legato* modes.

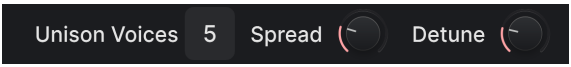
- *Legato*: Monophonic; envelopes do not retrigger when you play a new note before fully releasing the previous one
- *Mono*: Monophonic; envelopes always retrigger when notes are played

7.2.2.1. Unison controls

If Unison [p.21] is active on the main panel, the Polyphony menu is replaced by the following controls:



The first of these is a menu that determines how many voices (up to eight) are allocated to the monophonic unison sound.

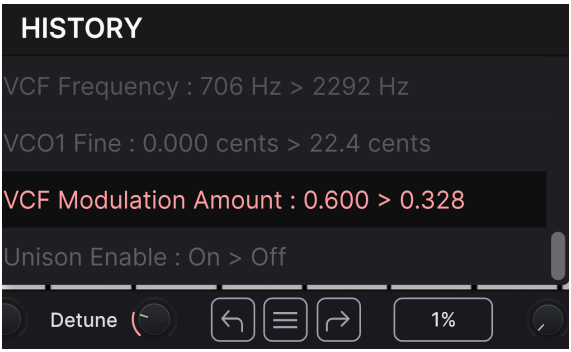


Then, the two knobs further sculpt the unison behavior:

- **Spread:** Adjusts the amount by which the unison voices are spread across the stereo field
- **Detune:** Detunes the unison voices relative to one another

Mild to moderate detuning can create a wonderfully thick sound, especially together with stereo spread. Extreme detuning will sound like a "broken" analog synthesizer!

7.2.3. Undo, Redo, and History



SEM V remembers every control move you have made

When editing a virtual instrument, it's all too easy to overshoot the sweet spot for one or more controls, and then wonder how to get back to where you were. Like all Arturia plug-ins, SEM V offers comprehensive Undo, Redo, and History functions so that you always have a safe way back.

7.2.3.1. Undo

Click the left arrow to revert to the state before the most recent edit you made. You may click repeatedly to undo several edits in reverse time order.

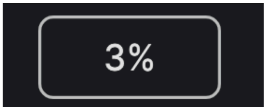
7.2.3.2. Redo

Click the right arrow to redo the most recent edit you undid. If you have undone several, you may click repeatedly to redo them in forward time order.

7.2.3.3. History

Click the center "hamburger" (three lines) button to open the History window, as shown above. This provides a step-by-step account of every move you have made in SEM V. Clicking on an item in the list not only re-executes that move – it returns the plug-in to the overall state it was in when you first made that move.

7.2.4. CPU Meter



At far right is the **CPU Meter**, which displays the overall load SEM V is placing on your computer CPU. Since it deals only with this plug-in, it is not a substitute for the resource metering tools in your DAW.

7.2.4.1. Panic



Mousing over the CPU Meter accesses the PANIC function

Mouse over the CPU Meter, and it will display the word PANIC. Click to send an all-sounds-off command that silences any sound processed through SEM V. This is a momentary command, so sound will resume if your DAW is still playing.

In the event of serious runaway audio (say, from an unrelated delay effect that has gone into a feedback loop), stop your DAW playback and disable the plug-in causing the problem.

7.2.5. Macro controls



These controls can affect multiple parameters by turning just one of them, and mirror the actions of the knobs found in the Preset Browser. What they do can be assigned in the Modulators [p.72] Advanced view. Factory Presets are pre-programmed with useful Macros.

7.2.6. Resize handle



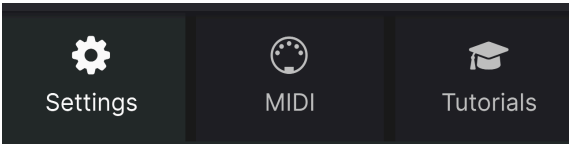
Grab and drag the diagonal lines to the right of the Macro controls to resize the SEM V window. When you let go, the window will snap to the nearest size available in the Resize Window [p.106] menu.

7.2.7. Max View button



Sometimes, you may see the above button with two diagonal arrows appear over the resize handle. This happens when, for some reason, the window size is not displaying all of the controls of SEM V. Click it to restore a full view of the open controls.

7.3. The Side Panel



The Side Panel's Settings tab

The gear-shaped icon at the top right of the Upper Toolbar opens the **Side Panel**, which in turn contains three tabs covering important subsystems that you won't have to access quickly when you're playing or editing sounds in SEM V:

• **Settings**: Global settings such as MIDI receive channels, splits, octave shift, and Poly mode

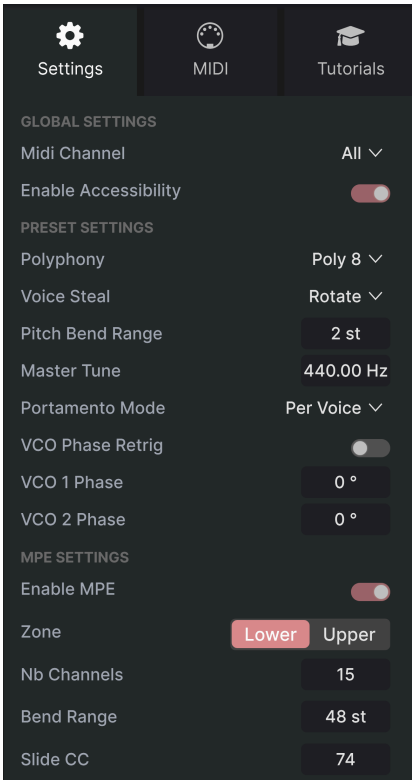
• **MIDI**: MIDI Learn functions for use with MIDI CC messages sent from a controller or DAW

• **Tutorials**: In-app interactive tutorials, also accessible from the main menu

Let's look at them from left to right.

7.3.1. Settings Tab

This tab covers settings to control how SEM V responds to incoming MIDI.



The Side Panel's Settings tab

7.3.1.1. MIDI Channel

Selects the MIDI channel(s) on which SEM V will receive MIDI input. You can select a particular channel, or choose "All" for Omni mode.

7.3.1.2. Enable Accessibility

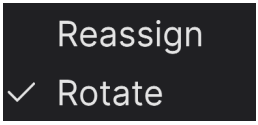
This grants SEM V access to your computer's system-level accessibility tools for differently abled persons.

7.3.1.3. Polyphony menu



This sets polyphony at the preset level. It is a mirror of the Polyphony [p.111] menu in the lower toolbar.

7.3.1.4. Voice Steal



This setting determines how voices are allocated once a new note is played.

- *Reassign*: When a voice is used to play a note once, that same voice will be reassigned each time you play that note again
- *Rotate*: New notes played will always use a new voice. If all voices are playing, an older voice will be stolen

7.3.1.5. Pitch Bend Range

This menu selects the range of SEM V's pitch-bend wheel, from 1 to 12 semitones. The bend amount is the same in both the up and down directions.

7.3.1.6. Master Tune

Sets the overall tuning of SEM V, with a default of the note middle *A* at 440Hz. The range is from 400-480Hz.

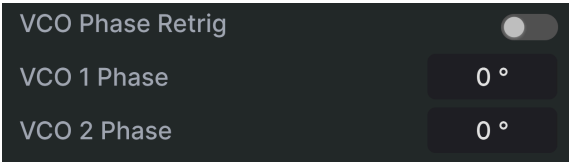
7.3.1.7. Portamento Mode

Portamento behavior varies depending on the Portamento Mode [p.117] setting (per voice or per note) in the side panel:

- *Per Voice*: Each new voice called for by the synth engine has independent portamento
- *Per Note*: Portamento is triggered by new MIDI notes

In practice, per-voice portamento is generally subtly more random than per-note, but this varies depending on how you cause the sound engine to call for voices. For an example, assign the Voice Modulator [p.89] to the **Portamento** knob. Now, play an arpeggior or riff that spans two or more octaves. You'll hear the portamento time vary in a way that's not *solely* locked to the distance between keys on your controller i.e. MIDI notes.

7.3.1.8. VCO Phase settings



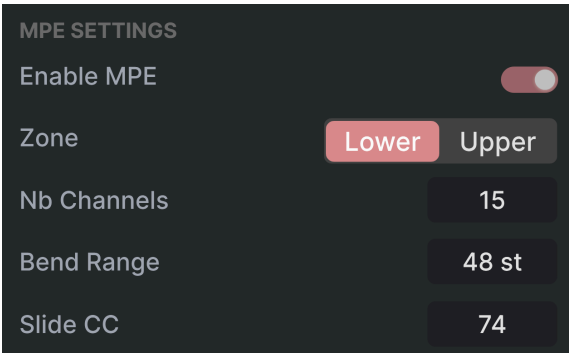
SEM V allows you to adjust the phase behavior of the oscillators, which can create subtle differences in the sound.

- **VCO Phase Retrigger:** When engaged, the oscillators will play from the beginning of their waveforms' phase every time a new MIDI note is received
- **VCO 1/2 Phase:** Adjusts the starting phase of each VCO (oscillator)

When either VCO's starting phase is set to a non-zero value, that value is the "beginning" for the purposes of retriggering.

7.3.1.9. MPE settings

SEM V supports MIDI Polyphonic Expression (MPE). This exciting application of the MIDI protocol allows a multi-dimensional controller to send polyphonic expressive controls (like pitch-bend, aftertouch, or your finger location on the Y axis of a key) on a per-note basis. This is done by using separate MIDI channels to carry each note's expressive data separately. This data is then interpreted by synthesizers like SEM V.

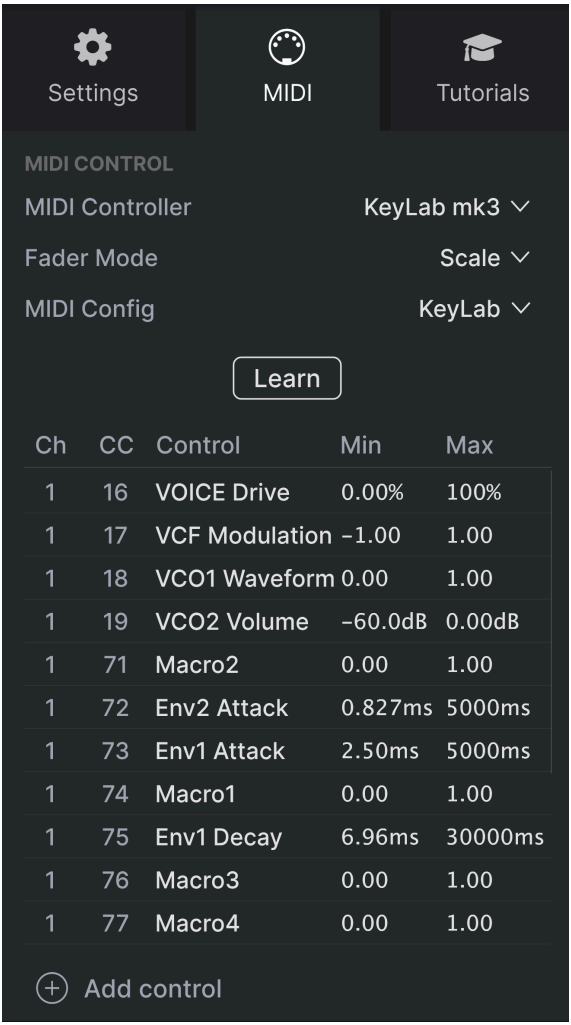


The MPE controls are:

- **Enable MPE:** Turns MIDI Polyphonic Expression mode on and off
- **Zone:** If an MPE-capable controller can be split into lower and upper zones, this selects which zone sends the MPE messages
- **No. Channels:** Sets the maximum number of MIDI channels (and therefore simultaneous notes) on which MPE messages may be sent
- **Bend Range:** Sets the maximum pitch bend range of each note, up to 96 semitones (48 by default). This should be set to the same value as on your hardware MPE controller
- **Slide CC:** Determines the MIDI continuous controller message that *slide* (moving your finger toward or away from you along the Y axis of a key) sends. The default is CC 74 (filter cutoff)

> ♪ Examples of MPE controllers include the Haken Continuum, ROLI Seaboard series, and Keith McMillen Instruments KBoard Pro.

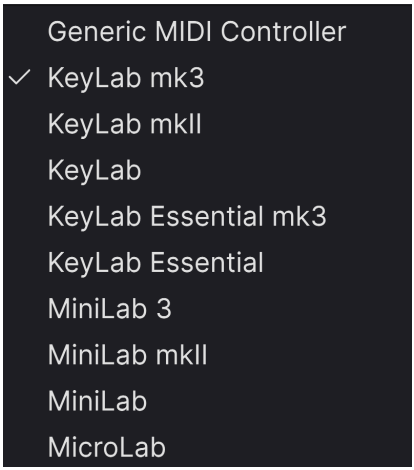
7.3.2. MIDI Tab



The Side Panel's MIDI tab

This is where SEM V may be placed in MIDI Learn mode. In this mode, all MIDI-assignable parameters on the Hardware Panel are highlighted and you can map physical controls on your MIDI controller to them. A typical example might be to map a real expression pedal to the Master Volume control, or a physical knob on the MIDI controller to the Frequency knob of the Filter section.

7.3.2.1. MIDI Controller menu



The MIDI Controller menu

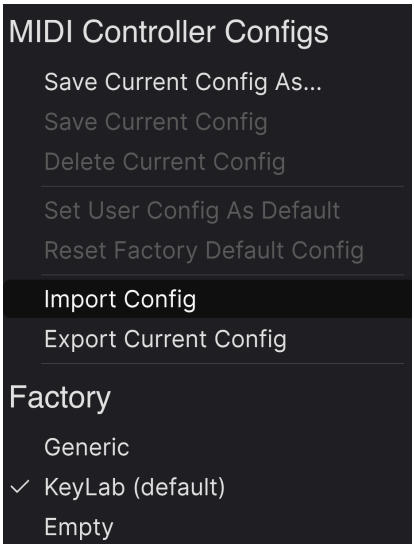
At the top right of the MIDI tab is the **MIDI Controller** drop-down menu, where you can select templates for many Arturia MIDI controllers. These map physical controls to many "most wanted" parameters in SEM V for a plug-and-play experience. A Generic template is also provided for third-party MIDI controllers.

7.3.2.2. Fader Mode

This menu sets how SEM V responds to fader movements received from your MIDI controller. (We did not include knobs, as most controllers have endless rotary encoders these days.)

- *None*: SEM V leaves it up to your hardware settings
- *Hook*: SEM V begins receiving the CC once the fader passes the stored value
- *Scale*: SEM V receives the CC as soon as you move the fader

7.3.2.3. MIDI Config menu



The MIDI Config menu

The **MIDI Config** drop-down lets you manage different sets of MIDI maps for controlling SEM V from MIDI hardware. You can Save/Save As the current MIDI assignment setup, Delete it, Import a configuration file, or Export the currently active one.

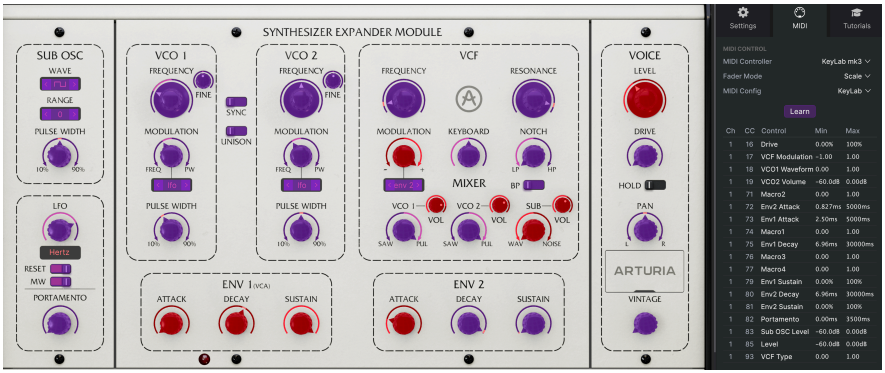
This is a quick way to set up different hardware MIDI keyboards or controllers with SEM V, without having to build all the assignments from scratch each time you swap hardware.

For example, if you have multiple hardware controllers (small live keyboard, large studio keyboard, pad controller, etc.), you can create a profile for each of them, save them, and then quickly load them here. This saves you from having to redo the MIDI mapping assignments from scratch each time you swap hardware.

The Factory area at the bottom has three useful options:

- *Generic*: Loads a "one size fits all" set of control assignments
- *Default*: The middle option tracks the controller selected in the MIDI Controller menu
- *Empty*: Removes the assignments of all controls

7.3.2.4. Assigning and unassigning controls



When MIDI Learn is active, available parameters are purple and already-assigned parameters are red.

Click the **Learn** button in the MIDI tab to put SEM V into Learn mode. Controls available for assignment are purple. Controls that are already assigned are red, but can be reassigned if desired. The screenshot above shows the assigned and unassigned controls for SEM V's Default configuration.

Click any purple control and its name will appear in the list. Now, move a control or operate a switch on your MIDI controller. The corresponding control onscreen will turn red and the assigned MIDI CC number will appear in the list to the left of the parameter name.

To unassign a control onscreen, control-click or right-click it. Alternative methods of assignment are available in the MIDI Parameter Menu [p.123] described below.

> Remember to look beyond the main panel: the Multi-Arp, Effects, and Modulators in the Advanced view all contain many parameters eligible for MIDI-learning!

7.3.2.5. MIDI channel, CC, and min and max values

The first two columns in every MIDI assignment list the MIDI Channel (**Ch**) and MIDI Continuous Control Change number (**CC**) for the assignment. Up to 16 Channels are available on any MIDI stream, and the 127 possible MIDI Control Change numbers, while freely assignable, follow certain conventions on most instruments. For example, Modulation Wheel is almost always MIDI CC 1, Master Volume is CC 7, and Sustain Pedal is CC 64.

You can click on any number in the channel column to change the value in a pop-up menu. You can click on a number in the CC column to type in a new CC directly.

The **Min** and **Max** value columns for each parameter in the list let you scale the amount by which a parameter in SEM V changes in response to a physical control movement. For example, you may wish to limit the range of a filter sweep, even though you're probably going to turn the knob all the way during a live performance.

Drag up or down on a value to change it. Setting the maximum lower than the minimum reverses the polarity of the physical controller, i.e. turning it *up* will turn the assigned parameter *down*.

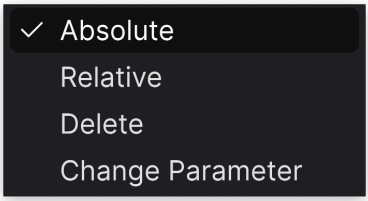
Switches that only have two positions (On/Off, etc.) would normally be assigned to buttons on your controller, but it's possible to toggle those with a fader or another control if you like.

> ♪ Don't forget that many settings in the Advanced views (Multi-Arp, Effects, and Modulators), not just settings on the main panel, may be MIDI Learned.

You can also add a destination parameter to the list manually by clicking the *Add control* (+ sign) at the bottom of the list. This will bring up a *huge* menu of literally every MIDI-addressable parameter in SEM V.

7.3.2.6. MIDI Parameter Menu

Control-clicking or right-clicking on any item in the list - only the list, not the main interface - of assigned parameters brings up a convenient menu with the following options, which can be different for each parameter.



Right-clicking a parameter gives you these options

- *Absolute*: The assigned parameter in SEM V tracks the literal value your physical controller is sending out.
- *Relative*: The assigned parameter in SEM V will go up or down from its current value in response to physical controller movements. This is often useful when using endless 360-degree encoders that don't have physical motion limits.
- *Delete*: Removes the assignment and turns the corresponding onscreen control purple again.
- *Change Parameter*: Brings up a large sub-menu of every assignable parameter in SEM V. This lets you change the assignment of the current CC/physical control manually, and is useful when you know exactly the destination you're looking for.

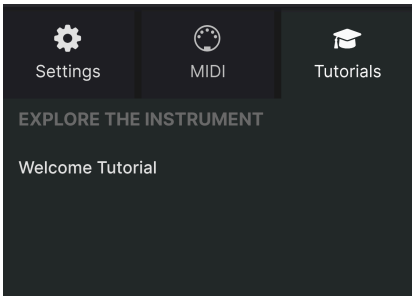
7.3.2.7. Reserved MIDI CC numbers

Certain MIDI Continuous Controller (CC) numbers are reserved and cannot be reassigned to other controls. These are:

- Pitch Bend
- Aftertouch (Channel Pressure)
- All Notes Off (CC #123)

All other MIDI CC numbers may be freely assigned to control any parameter in SEM V.

7.3.3. Tutorials



In this tab, which can also be opened by selecting **Tutorials** from the SEM V main menu [p.104], you can click on titles for the individual chapters, which in turn will take you through different areas of SEM V in steps. The parts of the panel to focus on are highlighted as you go.

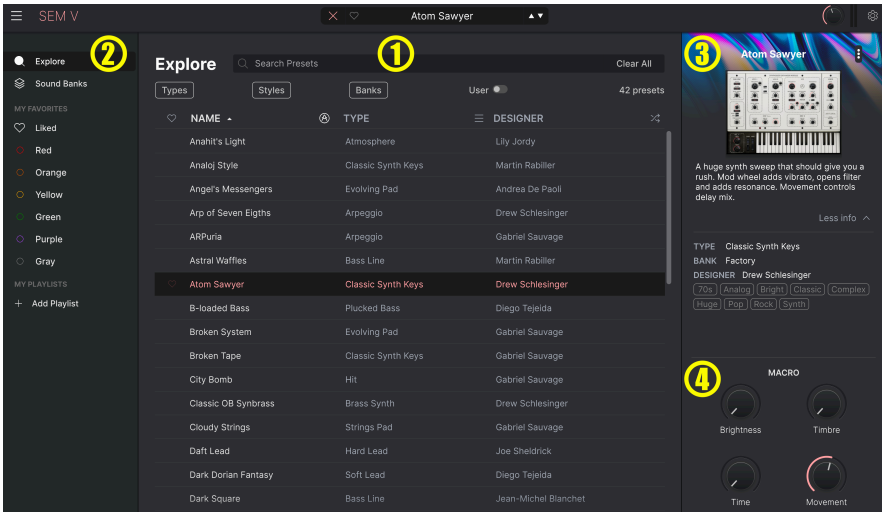
! If you're editing a Preset, make sure to save it before opening the Tutorials, because doing so will load a new Preset and overwrite your changes. The Tutorials also take over the Side Panel space when in use.

8. THE PRESET BROWSER

The Preset Browser is how you search, load, and manage sounds in SEM V. It can display different views but they all access the same Presets and subgroups of Presets.

To access the browser, click the browser button (the icon looks like books on a library shelf). To close the browser, click the **X** that appears in its place.

The browser has four main areas:

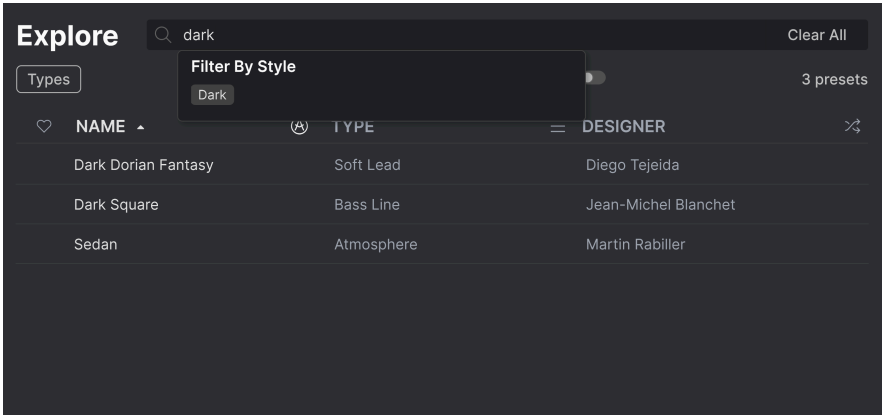


Number	Area	Description
1.	Search and Results [p.126]	Search Presets with text strings, and by tags for Type and Style.
2.	Sidebar [p.132]	Manage Banks, Favorites, and Playlists.
3.	Preset Info [p.134]	Summary of Bank and Tags, Designer name, and description info for current Preset.
4.	Macro Knobs [p.138]	Large size duplicates of Macro knobs in Lower Toolbar and the Macros tab.

8.1. Search and Results

Click on the Search field at the top and enter any search term. The browser will filter your search in two ways: First, by matching letters in the Preset name. Then, if your search term is close to that of a Type or Style [p.127] it will include results fitting those tags as well.

The Results list beneath shows all Presets that fit your search. Click the X icon at right to clear your search terms.



If search results include a tag pop-up, it means your search term corresponds to one or more tags

8.1.1. "Filter by" pop-up

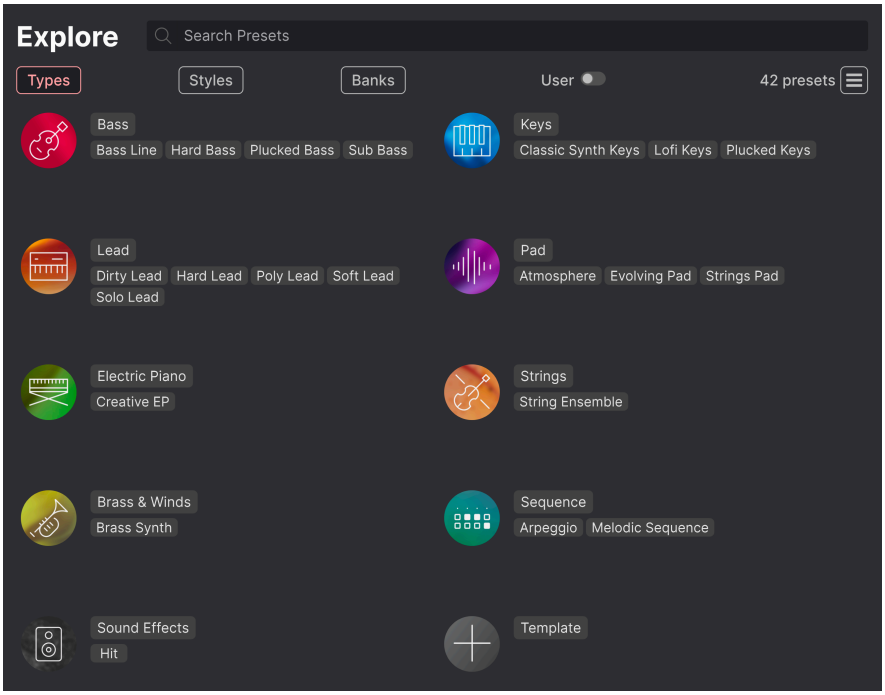
In the above image, note the pop-up beneath the search bar. This appears when your search text ("analog" in this example) corresponds to Presets' tags as well as to text in the preset name. One or more tag groups may appear. Click on any tag to limit your search results to Presets that have that tag.

8.2. Using tags as a filter

You can narrow (and sometimes expand) your search using different tags. There are two kinds of tags: *Types* and *Styles*. You can filter by one, the other, or both. Our extensive range of MIDI controller keyboards also allows you to browse sounds directly from the MIDI keyboard.

8.2.1. Types

Types are categories of instruments. In SEM V, Types include Bass, Keys, Lead, Pad, Strings, Organ, and more – most with subtypes that further define the kind of instrument or sound. The final Type is a Template Type for designing your own Presets. With a clear search bar, click the **Types** button to bring up this list.



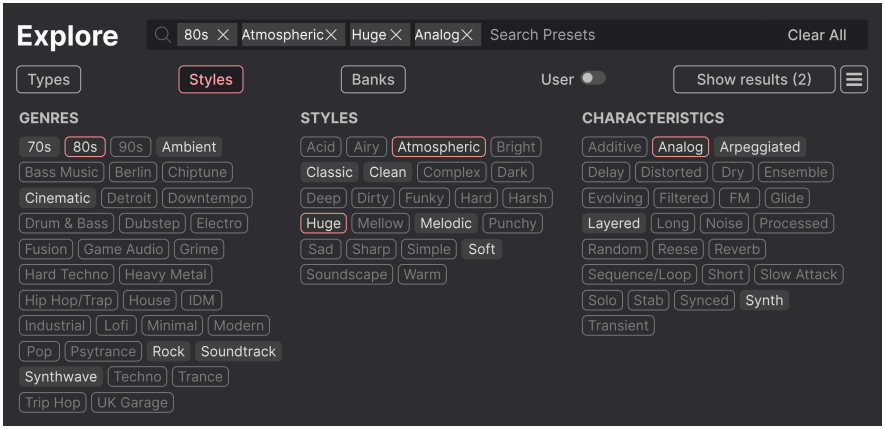
Click any one of them, and the results will show only Presets that match that tag. You can also select multiple Types using Cmd-click (macOS) or Ctrl-click (Windows). For example, if you aren't sure whether the Leads Preset you're looking for was tagged with the subtype "Poly Lead" or "Solo Lead", select both to broaden the search.

Results columns can be sorted and reverse-ordered by clicking the arrow buttons to the right of their titles (Name, Type, Designer).

8.2.2. Styles

Styles refine your search according to further musical attributes. Accessed by the **Styles** button, this area has three further subdivisions:

- *Genres*: Identifiable musical genres such as 80s, Cinematic, Fusion, Synthwave, etc.
- *Styles*: General "vibe" such as Atmospheric, Complex, Dark, Punchy, etc.
- *Characteristics*: Even more detailed sonic attributes such as Analog, Evolving, Layered, Transient, etc.



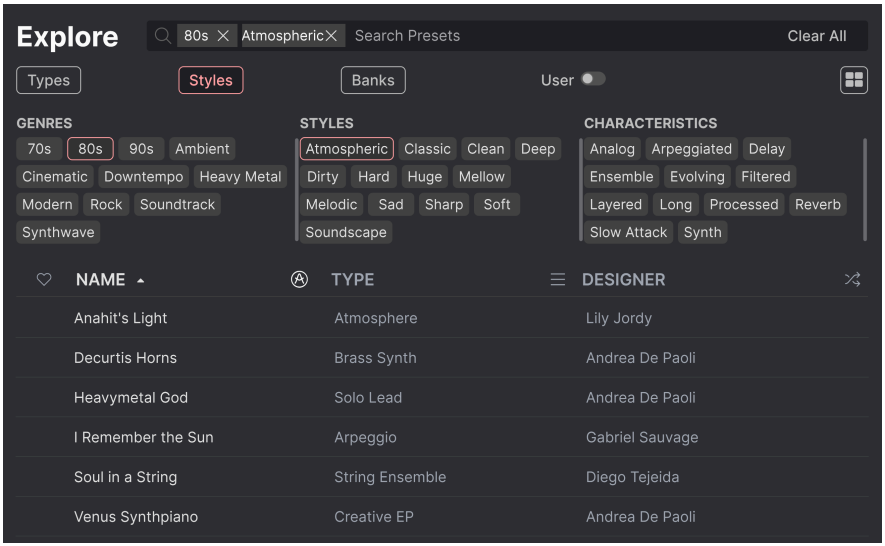
Click on any tag to select it. Click again (or right-click) on any selected tag to de-select it. Notice that when you select a tag, several other tags become unavailable. This is because the browser is narrowing your search by a process of elimination. De-select any tag to remove that criterion and widen the search without having to start all over again.

8.2.3. Banks

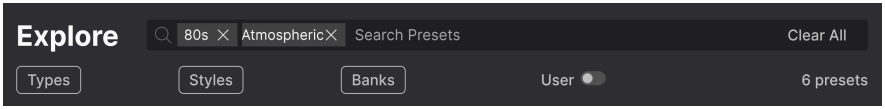
Next to the **Types** and **Styles** buttons is the **Banks** button, which lets you perform your search (using all the methods above) within the factory bank or user banks, as well as anything you've purchased from the Arturia Sound Store.

8.3. Search results window

Click the **Show Results** button if you cannot already see your list of results. Click the sort arrow to reverse the alphabetical order of any column. You can also click the "hamburger" (three lines) icon next to **Show Results**. The icon will change to four panes, and you will be able to see the Presets that fit your selected tags below groupings of Genre, Style, and Characteristic tags, like so:



8.3.1. Sorting the Preset order



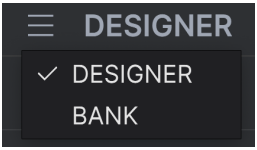
Click the **NAME** header in first column of the Results list to sort Presets in ascending or descending alphabetical order.

Click the **TYPE** header in the second column to do the same thing by Type.

Click the **Arturia logo** to the left of **TYPE** to bring factory-featured Presets to the top of the list. These will appear just under any Presets you have liked [p.131].

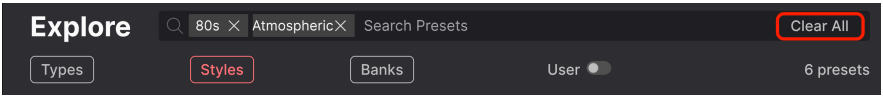
Click the **User** toggle switch to restrict your search to Presets in user banks.

The third column has two header options: **DESIGNER** and **BANK**. Click the icon with three lines to choose between the two. Then click either header name as with the other two columns to switch the alphabetical order.



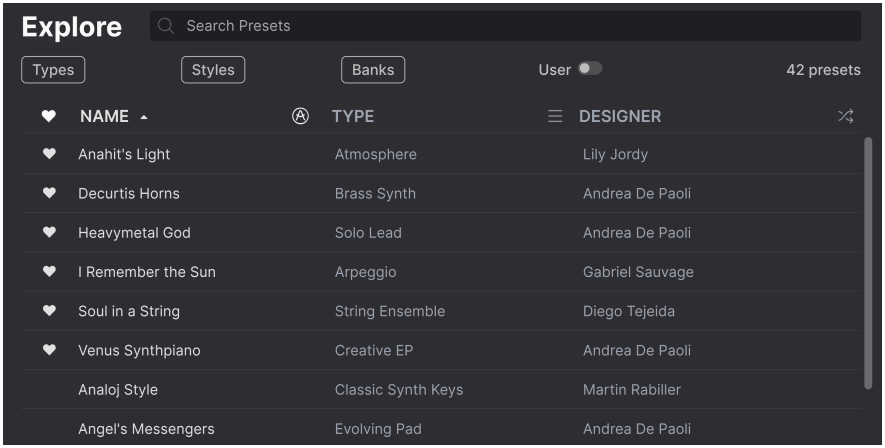
8.3.2. Clearing tags

Just above the Types, Styles, and Banks buttons, you will see labels for all the active tags in a search. Click the X next to any one to remove it (and thus broaden the results). Click **CLEAR ALL** to remove all tags.



8.3.3. Liking Presets

As you explore and create Presets you can mark them as Liked by clicking the **heart** that appears to the left when you hover the mouse over a preset name. Later, click on the heart icon at the top to put all of your favorites at the top of the Results list.



8.3.3.1. Shuffle Presets



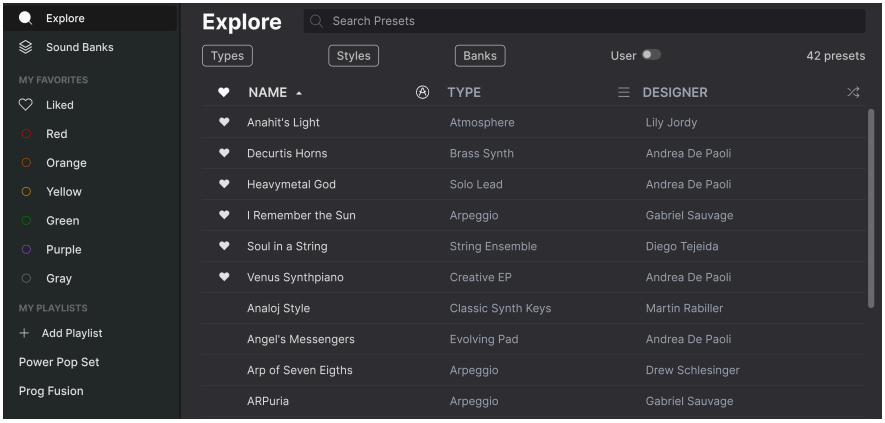
Clicking the "crossed arrows" button randomly reorders the Presets. This can be useful for finding something you like when your search results are a long list that takes time to scroll through – it might bring a killer Preset to the top. Shuffle mode is a toggle, so clicking it again will restore your search results to however they were previously sorted (by name, type, etc.).

Use as many of the sorting and filtering features as you need and you will find the exact sound you want every time.

8.4. Sidebar

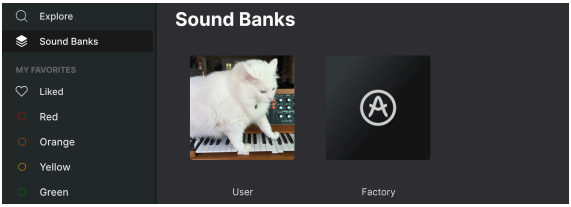
The leftmost section of the Preset Browser determines what is displayed in the Search and Results [p.126] section.

The topmost option is **Explore**:

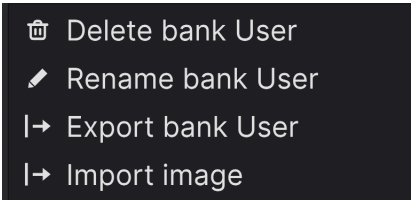


The **Explore** section is the default, letting you search the current bank of Presets loaded into SEM V as we did in the previous section.

8.4.1. Sound Banks



Clicking **Sound Banks** brings up a window with all of the currently available Sound Banks. Right click on the image or name of a User bank (anything but the Factory bank) to bring up this menu:



You can import a custom bank icon image in PNG format

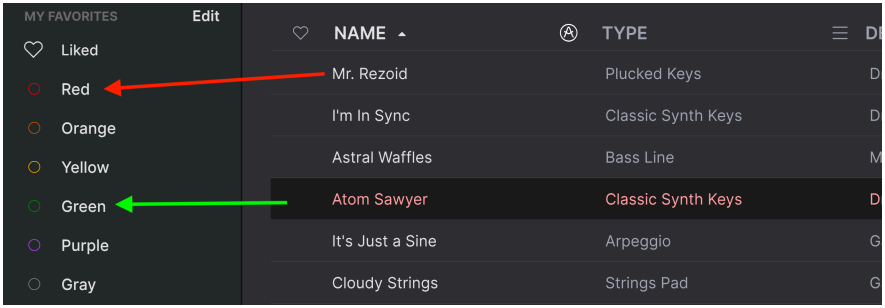
From here, you can delete, rename, or export the bank. You can also import custom user images in PNG format, as shown above.

8.4.2. My Favorites

The middle part of the Sidebar has a menu called **My Favorites**, which allows you to color-code certain groups of Presets for easy access. It also includes the **Liked** group, so you can quickly find Presets you've marked with the heart icon.

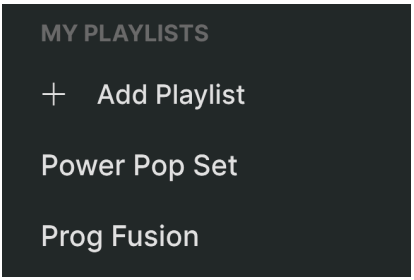
To decide which colors you'd like to display, hover over **My Favorites** and click **Edit**. Then use the toggle switches to select which colors you'd like to see or hide, and then click **Done**.

Please note that you can also rename these favorites as desired. Just right-click on the color name in the sidebar and enter a new name.



To add Presets to a particular set of Favorites, simply drag-and-drop them onto the appropriate color, or right-click the Preset name and select the color. Then click on the color itself to display your grouping.

8.4.3. My Playlists

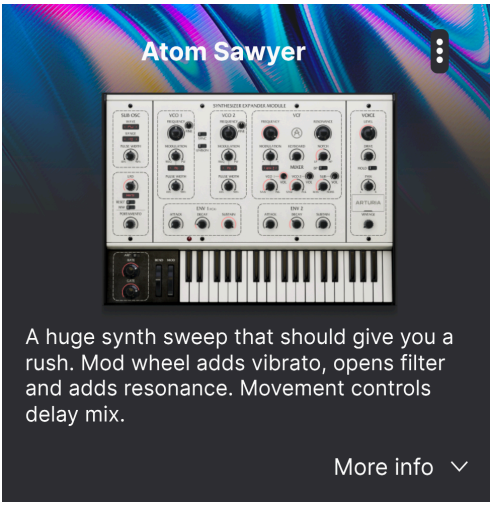


The bottom part of the sidebar displays any Playlists you have created or imported. Playlists are a very powerful management tool for set lists for gigs. Learn more about them in the Playlists section [p.138] below.

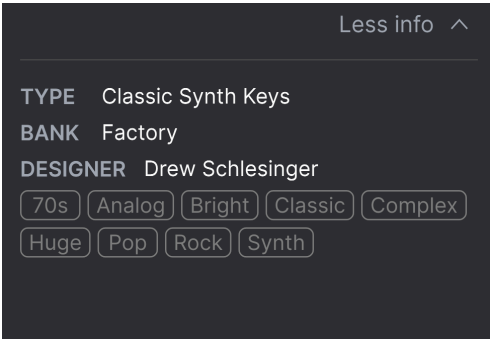
> If you don't see anything here, it is because you haven't created any Playlists yet. Head to the Playlists [p.138] section at the end of this chapter to find out how.

8.5. Preset Info section

The right side of the browser window gives a brief description of each Preset.



For user Presets (not factory Presets) you can edit this description by simply clicking in it and typing. Click "More info" at the bottom right of this pane to open up an area you can scroll down to:



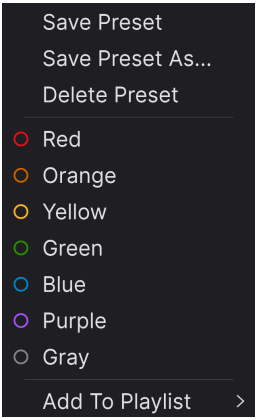
With User presets, you can also change the Type and Bank via pull-down menus, enter a Designer name, and click the + sign to add or delete Style tags. When you click this icon, the results area is occupied by an edit list in which you can select and deselect Styles, Genres, and Characteristics:



Notice that each group has its own + icon at the end. Clicking this lets you create your own Styles, Genres, or Characteristics. Click the **X** at upper right when finished editing.

Type and Style changes you make here are reflected in searches. For example, if you remove the "Complex" Style tag and then save that Preset, it will not show up in future searches for Complex sounds. Again, all of this is possible only with user Presets.

Clicking on the three-dots icon at the top right pops up a management menu for the Preset.

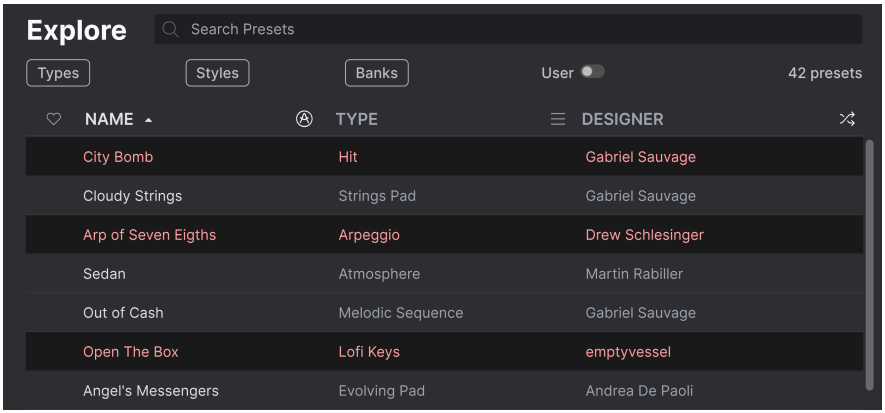


Options include *Save Preset*, *Save Preset As*, *Delete Preset*, and *Add to Playlist*, complete with an option to create a new Playlist [p.138]. (You cannot overwrite or delete factory Presets, so the Save and Delete options appear for user Presets only.)

The dots with color icons allow you to add the Preset to a particular group of color-coded Favorites, as described above [p.133].

8.5.1. Editing info for multiple presets

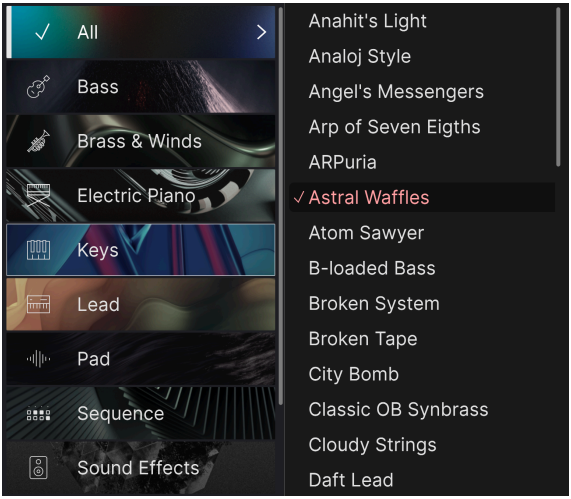
If you would like to move several Presets to a different bank while preparing for a performance, or enter a single comment for several Presets at the same time, it's easy to do. Simply hold command (macOS) or ctrl (Windows) and click the names of the Presets you want to change in the Results list. Then enter the comments, change the Bank or Type, etc., and save the Preset.



♪ If you want to alter the information for a Factory Preset you must first use the *Save As* command to re-save it as a User Preset.

8.6. Preset selection: other methods

Click on the Preset name in the center of the Upper Toolbar to bring up a drop-down menu. The first option in the left column of this menu is *All*, and it brings up a submenu of literally every Preset in the current bank, in alphabetical order.



Below this are categories that correspond to Types. Each of these brings up a submenu of all Presets of the selected Type.

If you have an active search by Type and/or Style, the up/down arrows to the right of the Preset name will step through only the results that conform to your search.

However, *All Presets* in the drop-down menu always ignores those criteria. Likewise for the Type choices below the line – they always include all Presets within that Type.

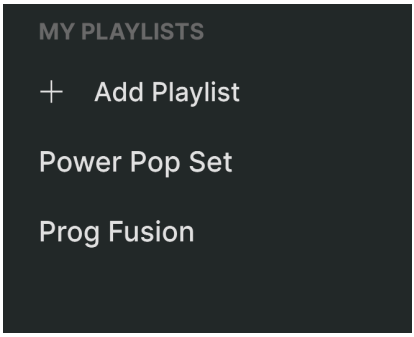
8.7. Macro knobs

These are simply larger duplicates of the Macro knobs in the Lower Toolbar and on the Macros tab. Macros let you control multiple other settings in SEM V with a single knob twist, and Arturia virtual instruments typically provide four of them.



You can assign Macros to parameters in the Modulators [p.72] section of the Advanced view. We describe how to do this, and how to rename the knobs themselves, in the Macros [p.100] portion of Chapter 6.

8.8. Playlists

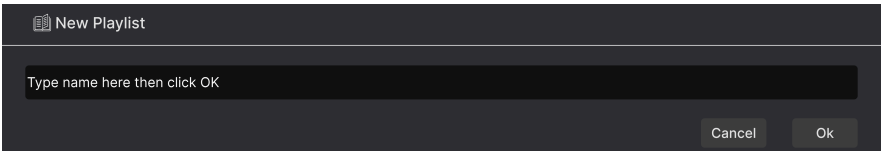


Playlists offer a powerful way to collect Presets into different groups for different purposes, such as a set list for a particular performance or a batch of Presets related to a particular studio project. Within a Playlist, Presets can be further grouped into Songs, a handy addition to a set list.

The subheading *My Playlists* appears under **My Favorites** towards the bottom of the Sidebar. When you first start using SEM V, you'll have no Playlists yet – but it's very easy to create one!

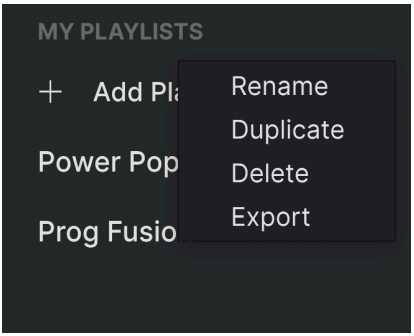
8.8.1. Create your first Playlist

To get started, click **Add Playlist**. The following pop-up will appear, prompting you to name your Playlist.



Once you've entered a name, that Playlist will now appear in the **My Playlists** section of the sidebar. You can create as many Playlists as you like.

Right-clicking on a Playlist name will pop up a set of options – you can *Rename*, *Duplicate*, *Delete*, or *Export* the Playlist to your computer, as a file with the extension *.aplst*.



8.8.2. Add a Preset

You can use all of the options in the Explore view to locate Presets for your Playlist. When you find a desired Preset, click-drag it onto the Playlist name.

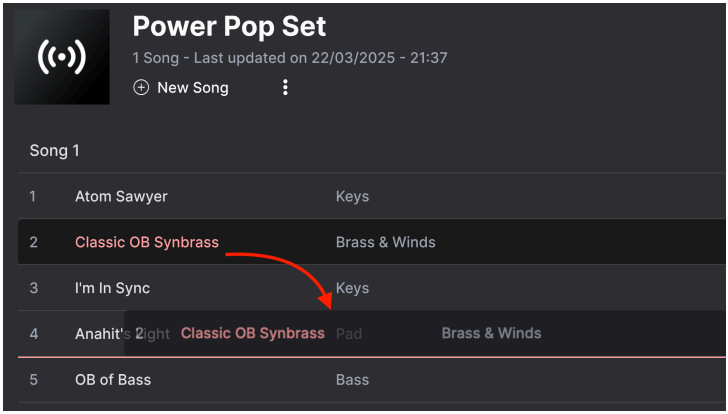


Dragging a preset to a Playlist

To view the contents of a Playlist, click on the Playlist name. By default, Presets dragged into a new Playlist will appear under "New Song" inside the Playlist. More about Songs [p.141] is below.

8.8.3. Re-order the Presets

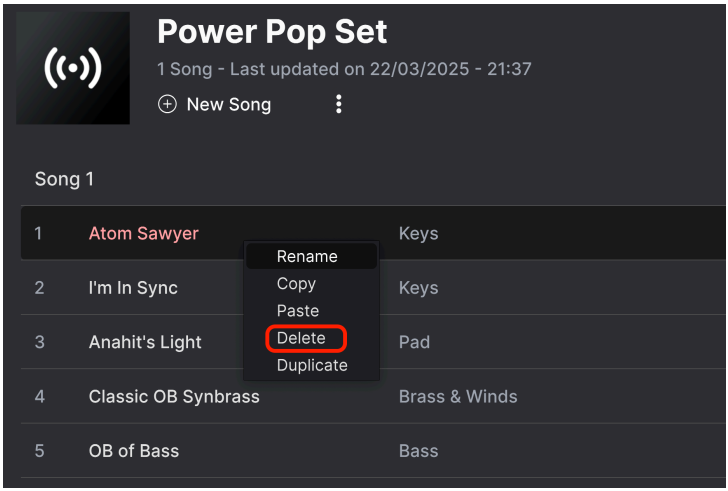
Presets may be reorganized within a Playlist. For example, to move a Preset from slot 1 to slot 4, drag and drop the Preset to the desired location.



This will move other Presets up in the list to accommodate the new location of the Preset you just moved. A light blue line will briefly appear at the "insert point."

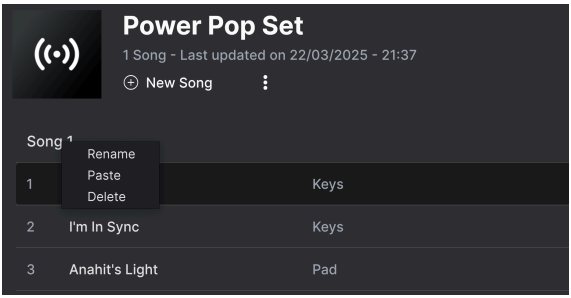
8.8.4. Remove a Preset

To delete a Preset from a playlist, select the Playlist, then right-click on the Preset's name in the Results Pane to bring up a pop-up menu. This will only delete the Preset *from the Playlist*, not delete the Preset from the SEM V browser!



This menu also includes **Rename**, **Copy**, **Paste**, and **Duplicate** options. More management options are described below.

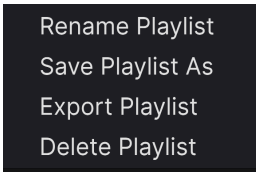
8.8.5. Song and Playlist management



Any Playlist can be further divided into *Songs*, an ideal tool for managing set lists for a live show. The **New Song** button creates a new Song at the bottom of the Playlist. You can name it (right-click on the song name), then click and drag it to position it in the Playlist and add Presets to it in the desired order. You can have multiple songs in each Playlist, and when dragging a song by its title, it brings all its Playlists with it, in order.

Song names don't have numbers by default (Preset names in a Playlist do), but of course you can begin a song name with a number.

To access other Playlist management options, click on the three-dots icon next to the **New Song** button. This brings up a pull-down menu:



- **Rename Playlist**: Renames the current Playlist without making a copy.
- **Save Playlist As**: Creates a duplicate of the playlist with "Copy" appended to the name. You can change the name before saving.
- **Export Playlist**: Exports your Playlist to a location on your computer, with the filename extension "aplst."
- **Delete Playlist**: Deletes the current Playlist but does *not* delete any of the Presets in it.

8.8.6. MIDI control of Playlists

Since Playlists are ideal for live performance, you do not need to mouse around on a screen to use them. Instead, you can select Playlists, Songs, and Presets by sending values on the following MIDI continuous controllers:

- *CC OO:* Selects a Playlist
- *CC 32:* Selects a Song within the current Playlist
- *MIDI Program Change:* Selects Presets within the current Song

Ideally, you could program buttons to send value-up and value-down increments on each of these CCs if your MIDI controller has this capability.

That's all there is to the Preset Browser! We hope you will enjoy many hours exploring the factory Presets and creating your own.

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