The Story of the Crumar Spirit As Told by Andrea Agnoletto

Andrea Agnoletto is the current owner of Crumar, which he re-formed in 2008. Since then, Crumar has introduced an outstanding line of stage pianos and digital organs, including the popular Mojo tonewheel organ and the Crumar Seven digital piano.

Crumar S.P.A., based in Castelfidardo (AN), Italy, was a sizable enterprise in the ‘70s, much like other companies in the Marche region’s musical instrument sector. At its peak, Crumar employed up to 300 workers and produced home organs, string machines, digital pianos, and multi-sound keyboards, most built around “TOS” (Top Octave Synthesizer) chips. What set Crumar apart from other Italian competitors was its strong international focus, especially on the U.S. market.

A major turning point for Crumar came toward the end of the ’70s, thanks almost entirely to one person: Sante Crucianelli. Sante, the son of the company’s owner, had lived for a time in the U.S., giving him a broader understanding of the market at a time when exposure to international competition came mostly from trade shows like NAMM in Los Angeles and Musikmesse in Frankfurt, Germany.

Starting in 1977, Sante, then barely in his twenties, became the driving force behind Crumar’s design and strategic direction. He served as both commercial director and designer, bridging the gap between the product development labs and the business side. Once a project was complete, Crumar’s production team handled the schematics, models, and all steps required for manufacturing. After completion, each board underwent testing, with all components made in-house. Over 90% of the work was carried out within the company.

Another key figure during this period was Luciano Jura, a close friend of Sante’s, and a designer, musician, and freshly graduated programmer. Luciano played a critical role in the Spirit’s development and was Crumar’s point of contact with Bob Moog.

By the late ’70s, Crumar had evolved into a youthful, dynamic company with modern vision. A reliable account recalls that Crumar S.P.A.’s lab, unlike those of other companies, became a local reference point, often open 24/7—even to competitors who were invited to try out instruments and prototypes. This culture of sharing was exceptionally rare for that era.

How the Crumar Spirit Was Born

There are no official records of the Spirit’s origin, but two prevailing theories exist:

- At the 1980 or 1981 NAMM Show, Sante Crucianelli met Bob Moog, who proposed a collaboration to design a monophonic synthesizer that Crumar would manufacture.
- Bob Moog, then working independently, approached Crumar with a partially developed monophonic synthesizer project.

Unfortunately, the exact story is lost to time. Most of the key people involved have long since passed away. Crumar ceased operations in 1986, not suddenly, but through the gradual sale of projects and business units. With that dissolution, all official documentation was lost. Today, only oral histories and the memories of a few former employees remain.

Thankfully, the U.S. side of the Spirit’s development is well documented. The key figures in the project were Jim Scott, Tom Rhea, and Bob Moog. Needless to say, this “dream team” was among the very best in analog synthesizer design and engineering at the time.

For full biographies, see:

- Jim Scott: emeapp.org/2021/10/19/jim-scott-on-working-with-bob-moog-and-the-worlds-most-famous-synthesizers
- Tom Rhea: drtomrhea.com/about
- Bob Moog: moogfoundation.org/bob-moog-timeline

The Spirit project, codenamed “Little Synth,” dates back to at least October 1981, as confirmed by a “first class” mail shipment from Jim Scott to Tom Rhea on October 23, 1981. The project’s cover page read: “By: Jim Scott” and “Check: R. Moog.”

It’s reasonable to conclude that the project was in progress earlier, probably by a year or two. As often happens, the design, while innovative, shares many elements with other late ’70s projects by Jim Scott and Bob Moog.

Tom Rhea contributed some of the Spirit's most defining features: from the keyboard scanning setup to the panel layout, functional architecture, and technical documentation. In a letter dated May 25, 1981, he outlined the core specifications that would define the instrument.

In the end, the Spirit was the product of teamwork between Scott and Rhea. So what was Bob Moog's role? Though not directly involved in detailed design, Moog was instrumental in overseeing the circuitry and, more importantly, serving as a liaison between the American design team and Crumar's production crew in Italy. He visited Italy multiple times, not only to introduce the project in its early stages, but also to oversee key decisions during industrialization: component selection, testing, and manufacturing. This process likely stretched from 1982 to 1983, when the Spirit was officially released.

Why the Spirit Wasn't a Success

The Spirit's disappointing commercial performance can't be blamed on any single factor. It arrived late to market (Yamaha's DX7 launched in 1983) and musical trends and music had taken new directions—ones where monophonic synths were increasingly seen as dinosaurs. On top of this, the ensuing crisis in Italy's musical instrument industry dealt the final blow to what remains, on paper, one of the most versatile, complete, and forward-looking monophonic synthesizers of the past.

Andrea Agnoletto – August 3, 2025
www.crumarspirit.com

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Editor's Note
In a remarkable turn of events that echoes Crumar's resilient spirit, after the company's rebirth in the 2000s, it began reconnecting with its legacy, culminating in something truly special in 2023: a small, lovingly crafted reissue of the Crumar Spirit. Limited to just 100 units, this faithful recreation stayed true to the original analog design, while updating a few essentials like MIDI, an improved keyboard, and better tactile response of its faders and knobs. More than just a simple reissue, it was a tribute to a unique and underappreciated instrument.

Even more meaningful, a portion of the proceeds went to support the Museo Del Synth Marchigiano, an institution dedicated to preserving the region's

rich history of Italian synthesizer design. In a time when so much feels disposable or rushed, this story reminds us that great ideas and great instruments can return when guided by people who care deeply. With vision, craft, and reverence for the past, it’s possible to bring something beautiful back to life.

Getting Started

Every now and then, a synthesizer comes along that’s so unusual, so rare, and so defiantly brilliant, it becomes the stuff of cult legend. The Spirit is one of those synths.

Originally released in the early 1980s by Italian keyboard manufacturer Crumar, the Spirit was a bold, strange, wonderful instrument that dared to go where few synths of its time even dreamed. Designed in collaboration with Bob Moog (yes, that Bob Moog!), Jim Scott, Tom Rhea, and Sante Crucianelli, the Spirit felt like a science experiment. It was the kind of instrument that practically dared you to bend the rules of synthesis.

At first glance, the original Spirit may have looked like a humble two-oscillator monosynth. But pop the hood and it quickly revealed itself as a sound designer’s playground in disguise. The Spirit featured dual multi-mode filters that could be configured in a variety of useful and downright quirky ways, audio–frequency AM and FM, ring modulation and oscillator cross-modulation, a Shaper that could be user for (among other things) an AR envelope in addition to the main ADSRs, a simple and slightly oddball arpeggiator, and modulation. It was flexible and charmingly unpredictable,

capable of everything from buttery round basses to squealing chaos. In short, it was a little synth with a big, bad attitude.

Sadly, it was also a synth with very little commercial success. Crumar, primarily known for organs and string machines, never managed to get the Spirit into the hands of many players. Production numbers were low (some say as few as 300 units were ever made), and with its idiosyncratic layout, steep learning curve, and unapologetically experimental nature, the Spirit was destined for cult status rather than mainstream fame. And yet, among those who knew it, the Spirit became a revered secret, a kind of analog shaman's toolkit passed down from one adventurous sound designer to the next.

Now, in cooperation with Crumar, we've cracked open the time capsule and brought the Spirit back to life with no scratchy pots, no failing capacitors, and no bidding wars. **Crumar Spirit by Cherry Audio** is a lovingly detailed virtual recreation that captures every bizarre, beautiful quirk of the original. But we didn't stop at historical accuracy: we've added polyphony (because, let's face it, more notes is simply more fun), a comprehensive modulation matrix, patch memory, studio-grade effects, aftertouch control, polyphonic aftertouch, and an easy-to-navigate interface that makes this once-esoteric synth feel like an old friend—albeit a really weird one. Best of all, no maintenance or soldering skills are required.

So whether you're chasing raw, snarling unpredictability or just exploring warm analog expression, the Spirit is your passport to sonic mischief. It's not a polite instrument. Nor is it clean, safe, or obvious. But twist a few knobs and it will reward you with some of the most expressive sounds you've ever heard from a softsynth.

Technical Assistance

Cherry Audio's unique online store and automatic updating should make operation a smooth experience, but if you run into any issues or have questions, you can discuss issues online at the **Cherry Audio forums**.

... or you can communicate directly with one of our ~~surly and grumpy~~ outgoing and friendly tech support staff at:

https://cherryaudio.kayako.com/

Overview

Crumar Spirit by Cherry Audio is not your average analog throwback. It’s a digital reimagining of one of the most adventurous synth architectures of the early 1980s. It's full of character, clever modulation paths, and more than a few surprises. At its core, Spirit is a dual-oscillator, dual-filter, dual-envelope monosynth. But that barely scratches the surface.

Let’s take a bird’s-eye tour of how this beast is wired under the hood and what that means for your sound.

The *Spirit* architecture is split into two main signal paths:

Filter/ADSR Path
This is your primary voice path. It mixes Oscillators A & B and the Noise Generator, then routes the signal through:

- Two voltage-controlled filters (Upper and Lower)
- A VCA (Voltage-Controlled Amplifier)
- Controlled by the **Filter Envelope** (for filter cutoff) and **Loudness Envelope** (for amplitude)

You’ll use this path for most of your traditional subtractive sounds — basses, leads, plucks, sweeps, and so on. Its output is routed to the **Filter/ADSR Path** in the Audio Mixer.

Shaper Y Path
This is the secret weapon. The same oscillator and noise sources (plus Ring Mod) can be routed here via the Audio Mixer, bypassing the filter section entirely. Instead, they pass through:

- A simple fixed BRIGHTNESS filter (6 dB/oct)
- A dedicated VCA controlled by **Shaper Y** (a second modulation section with envelope and LFO modes)

The Shaper Y Path gives you clean, direct access to raw waveforms and modulated amplitude shaping. This makes it useful for percussive accents, bell tones via the ring modulator, bright pads, or layered textures. Its output is routed to the **Shaper Y Path** in the Audio Mixer.

Each signal path can operate independently or in tandem, allowing layering, parallel processing, or split-mod architecture, all within a single synth instance. In addition, each path has its own set of effects. More on this later.

Sound Sources

- **Two Analog-Style Oscillators**
  With selectable waveforms, octave ranges, detune, rectangle wave widths, and sync. Oscillator A handles the core pitch, while Oscillator B brings additional complexity.
- **Noise Generator**
  A choice of red, pink, or white noise, ideal for percussion, wind, or noisy textures.
- **Ring Modulation**
  A fixed connection between the triangle waves of Oscillators A and B. Creates metallic, bell-like, or atonal textures.

All sources can be blended and routed independently to either the Filter/ADSR Path or the Shaper Y Path using the mixer section.

Control and Modulation

- **Two Envelope Generators**
  - **Filter Envelope** controls filter cutoff (always routed to Upper Filter; optionally to Lower Filter depending on mode).
  - **Loudness Envelope** controls amplitude in the Filter/ADSR Path.
- **Two Modulation Sections**

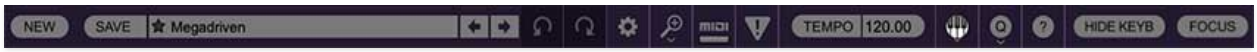
- **MOD X** is your primary LFO/clock source with selectable modulation destinations and rate control. It also drives the sample-and-hold generator and the arpeggiator.
- **SHAPER Y** doubles as a second modulation generator, with envelope-like or free-running shapes, adjustable symmetry (SHAPE), and rate control. It also acts as a dedicated VCA controller in the Shaper Y Path.

- **Wheel Modulation Routing**
  Three modulation wheels (Pitch, Mod X, and Shaper Y) let you assign sources and control depth, making these a powerful way to add complex timbral movement and expressive real-time performance.

Arpeggiator

- **Off** – No arpeggiation
- **Ripple** – Plays held notes from lowest to highest, in a loop
- **Arp** – Plays the same sequence across multiple octaves, up/down
- **Leap** – Each note jumps up, then down an octave in rhythmic cycles

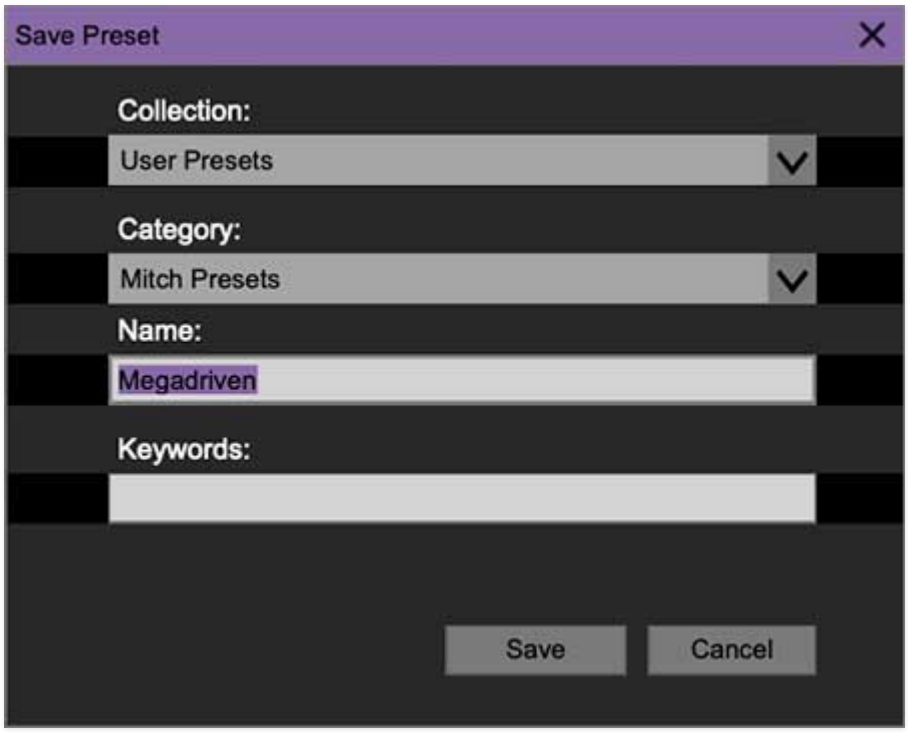
The arpeggiator is clocked by its own Speed control and can be synced to the master Tempo at the top of the instrument window. Its speed (and other parameters) can also be modulated by any Matrix Z modulation sources for surprisingly complex rhythmic patters.



Top Toolbar and Preset Browser

The purple strip at the top of the Spirit interface is where you'll load, save, and create sound presets. It also contains utility functions such as undo/redo, UI zoom and *Focus* controls, under-the-hood settings, and more. Let's go over them:

New- Opens a new blank patch preset. If an unsaved patch is currently open or you've modified an existing saved patch, a dialog asks if you'd like to save the patch in its current state. This greatly reduces the possibility of losing an edited unsaved patch.

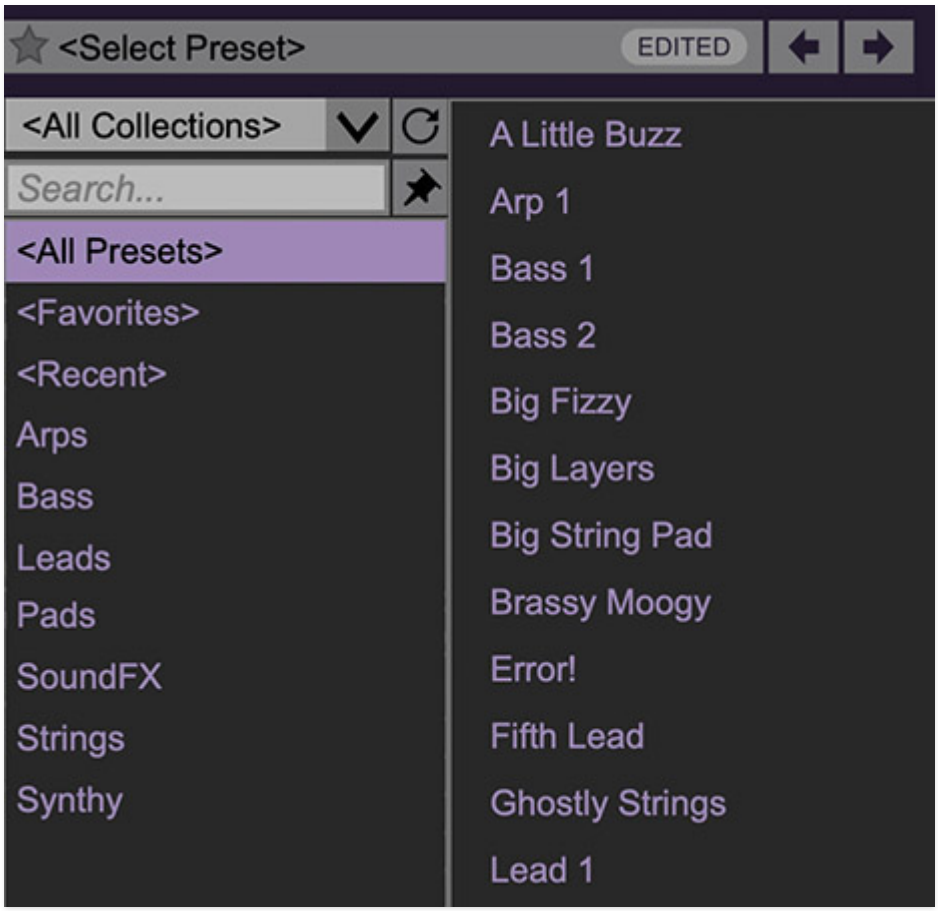


Save- Use this to save patches. There are a couple of levels of hierarchy:

- **Collection**- This is the top level of organization, and contains entire "sets" of presets. The *Spirit Presets* are the main included collection. We also include a *User Presets Collection* for storing your own presets, but you're free to create your own collections. To create a new collections, click in the *Collection* text field (where it says *User Presets* above) and

type a name. User-created sounds can be freely saved to any collection; we like to keep ‘em separated for organizational purposes.

- **Categories**- Within each *Collection* are a number of sound categories. As with collections, you’re free to create as many categories as you like. To create a category, click in the *Category* text field of the *Save* dialog window and type a new category name.
- **Patch**- A patch is an individual sound. To save a patch, simply type the name in the *Name* field and click *Save*.
- **Keywords**- You can add descriptive words such as “bass,” “lead,” “spaceship,” etc., to patches to make them appear when terms are typed in the *Search* field. Use commas to separate multiple keyword entries.

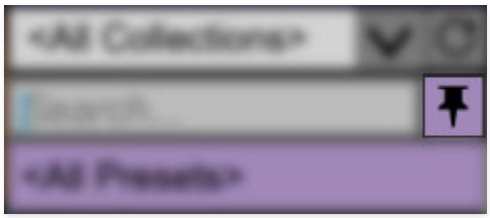


Browsing Patches- Patches can be browsed by clicking the *<Select Preset>* field. To select a preset collection, click in the area that says *<All Collections>* or on the downward-facing arrow next to it.

Clicking on the left-side categories narrows down which patches are displayed.

- **<All Presets>** will show presets from all collections and categories.

- **<Recent>** displays recently used presets.
- **Refresh**- This is the circular arrow button to the right of the downward arrow; clicking this checks the Cherry Audio server for new or updated presets.



Pin- Clicking the push-pin icon locks the patch selection list open, allowing fast and easy browsing and auditioning of patches. Click the icon again to disable pin mode. when in pin mode, the up and down arrow keys can be used to select patches.

Preset Step Back/Forward horizontal arrows- These step to the previous or next preset. macOS [⌘+left/right arrow key] or Windows [CTRL+left/right arrow key] will navigate through presets back and forth in the currently selected collection/category.

Undo/Redo circular arrows- These undo or redo the last action. It remembers many steps, so if you really mucked something up, keep on clickin'...

Settings- This is where user preferences for user interface, audio interfaces, user account, and more are configured. See the **Settings** section for full information.

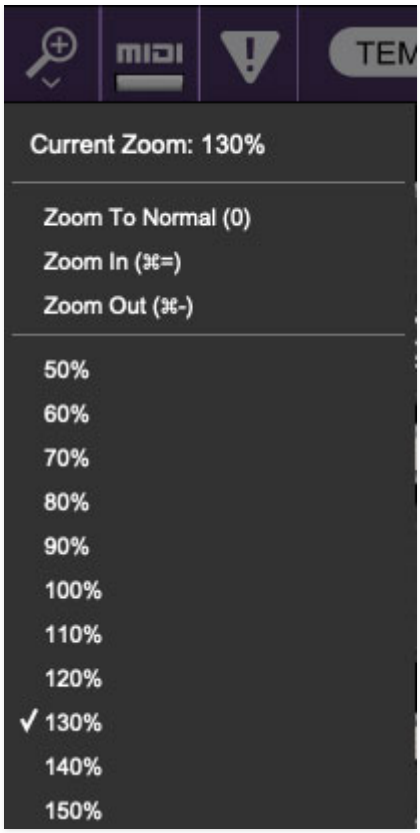
Importing Presets with drag-and-drop

Presets can be imported singly or en masse (as a single compressed ZIP file) simply by dragging and dropping from the desktop anywhere on the user interface.

If a single .*preset file is dragged and dropped, the sound is immediately loaded and the standard Save Preset dialog appears; this lets you save the sound to the instrument's preset browser. Note that you don't have to save the sound to preset browser; if you just want to hear and play the sound, click the Cancel button in the Save Preset dialog - the sound will still be loaded.

Compressed zip files containing multiple sounds can also be drag and dropped onto the UI. This works the same as with single sounds, but instead of the Save Preset dialog, you'll see the Import Preset Collection dialog. The

presets will be added as a new collection and available in the categories for which they were tagged.



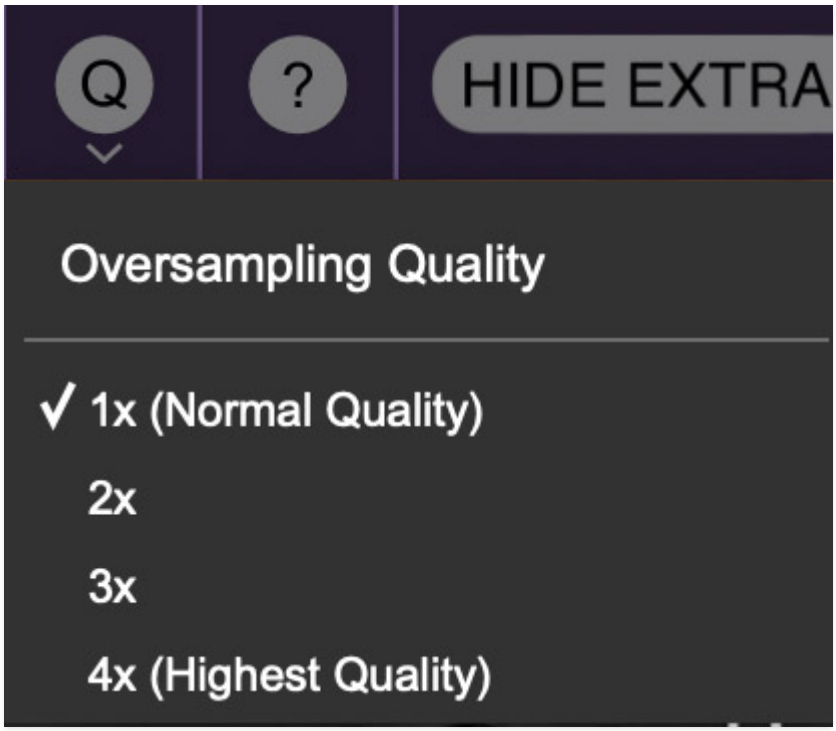
Zoom Magnifying Glass- Click to resize the *Spirit* interface. Selecting *100%* returns the user interface to native size.

MIDI Tab- Opens the MIDI controllers tab for configuring internal and hardware MIDI controls. See the **MIDI Controllers Setup and MIDI Tab** section for full information.

! (MIDI Panic) - Click to send an all-notes-off message in case of, "why won't this thing stop making noise?!?" stuck-note incidents.

QWERTY Musical Typing Keyboard- Opens an onscreen keyboard allowing a standard QWERTY computer keyboard to be used for playing music notes.

For more information, see **QWERTY Musical Typing Keyboard (MTK)** section.



Q (Oversampling Quality) - The Q button sets Spirit's internal oversampling rate; the higher the setting, the better audio fidelity will be, with the caveat that more computer processing power will be required.

Internal processing can be set to *1x* (same rate as the current sample rate of the host DAW or in the *Settings>Audio/MIDI* window for the standalone version) or to *2x*, *3x*, or *4x* the current sample rate. The sample rate is downsampled at the instrument output stage to match the current host sample rate.

For example, if the current DAW/instrument sample rate setting is 48 kHz, and oversampling is set to 2x, Spirit's internal processing runs at 96 kHz, and is then reduced back to 48kHz at the output stage.

If the current DAW/instrument sample rate setting is 192 kHz and oversampling is set to 4x, Spirit's internal processing will run at 768 kHz, and you will very briefly hear the most mind-blowing synthesizer sound quality ever experienced by mankind before your computer explodes instantaneously in a fiery, white-hot supernova blaze (or not).

? (Help)- Clicking this launches your web browser and opens this help document. (Confusing circular logic thing there, amirightpeople?)

Hide/Show Extras- This hides the lower "tray" of the user interface that contains the keyboard and its associated controls, and the expanded effects panel. It's handy for people who are working on laptops with overlapping windows and/or very small monitors. However, this will also hide Spirit's pitch and modulation wheels panel.

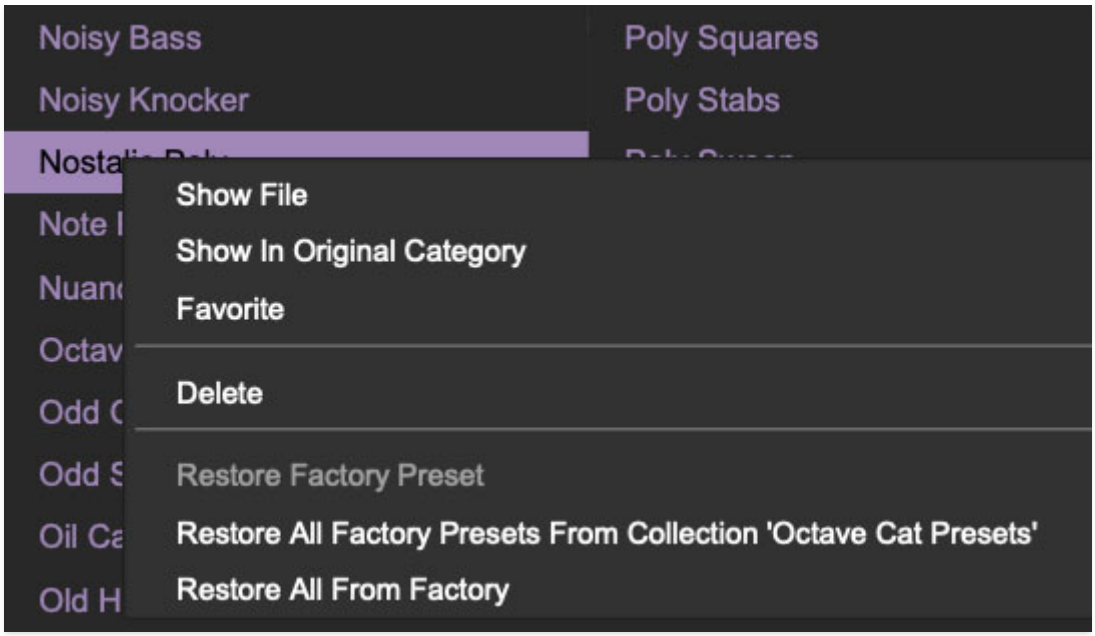
Focus Button

If you're using a laptop, the user interface can potentially be hard to see. With this in mind, the *Focus* button conveniently blows up Spirit's view to roughly twice its normal size within the current window size. Unlike the *Zoom* "magnifying glass" function, *Focus* doesn't affect the current window size. By default, the patch panel section fills the current window, but the view can be scrolled vertically and horizontally with a mouse wheel, track pad, or Apple Mighty Mouse finger-scrolling. Or if you're the last person on earth still using a single-button mouse, scroll bars will appear at the window edges when in *Focus* mode.

Using *Focus* mode couldn't be easier - just click the *Focus* button the top menu bar. To return to standard view, click *Reset*.

CRUMAR SPIRIT logo - Clicking this displays “about” information, and shows the version number and current registered user ID.

Preset List Right-Click Functions



Show File- This displays the selected preset in the Mac or Windows folder containing it. This is useful for backing up or sending a preset file to another user.

Show In Original Category- Selects the preset within its category, i.e. the category will highlight in the left preset menu. The *Show In Original Category* command only displays if the preset was selected within the <*All Presets*>, <*Favorites*>, or <*Recent*> categories.

Favorites- Favorited presets will show in when the <*Favorites*> category is selected. A star will display next to the preset name. Right-click on the preset and reselect *Favorite* to un-favorite it. (Or just ghost it if you don't do the confrontation thing.)

Delete- Deletes the selected preset.

Restore Factory Preset- If one of the factory (i.e. not user) patches is edited and saved, selecting this command restores the patch to its unaltered "factory" setting. This menu will be grayed-out for user bank patches.

Restore All Factory Presets From 'Spirit Presets'- If any patches from the "factory" Spirit bank are edited and saved, selecting this command restores *all* of them to their unaltered "factory" setting.

Restore All From Factory- If any patches from the "factory" banks are edited and saved, selecting this command restores *all* of them to their unaltered "factory" setting. At the time of writing, the Spirit bank mentioned above is the only factory bank, so this function and the *Restore All Factory Presets*

Master Controls

The **Master Controls** section houses global parameters that affect the entire active sound or preset. Think of it as Spirit's command center, where you set the overall behavior, performance feel, and output of the instrument as a whole.

Volume
Sets the overall output level of the synth. Spirit includes a built-in **Limiter** toggle, which can be engaged to tame peaks and prevent digital clipping. This is particularly handy when layering multiple voices or using aggressive modulation or filtering (i.e. extreme resonance). Turn it off if you prefer full dynamic range.

Tune
A global pitch offset for the entire instrument. Range is roughly ± 4 semitones. This control affects all oscillators equally and is useful when tuning Spirit to external gear.

Pan
Sets the stereo position of Spirit's entire output. Centered by default, but easily adjusted for spatial placement in a mix or for creative effects.

Unison Detune
This control becomes active when **Voice Mode** is set to **Unison**. It spreads the pitch of multiple stacked voices to create classic fat, chorused unison sounds. Crank it for wide and wobbly, or keep it subtle for just a touch of analog depth.

Voice Mode
Determines how Spirit allocates its voices when you play. The available modes are:

- **Mono** – Classic monophonic behavior. One note at a time. Great for leads and basses.

- **Unison** – Stacks all available voices on each note for massive sound. Controlled by the Unison Detune knob.
- **Poly** – Standard polyphonic mode for chords.
- **Cycle** – Rotates voice assignment with each new note, even in mono mode. Useful for round-robin effects and subtle voice variation.
- **Multi** – Each successive note uses a separate voice, with voice-to-voice variation controlled by the **Multi Voice** controls at the bottom of the instrument panel. This creates an "organic" analog feel to sounds reminiscent of vintage instruments with their micro instabilities in pitch, envelope response, and filtering characteristics from note to note.

Voice Amount
Sets the maximum number of simultaneous voices Spirit will use. Choose from **4**, **8**, or **16** voices depending on your CPU budget and patch complexity. Higher settings allow for more polyphony but may increase system load, especially in effects-heavy patches.

More About Voice Modes

Choosing the right Voice Mode in Spirit isn’t just a technical decision. It’s a creative one. The Voice Mode setting determines how notes are assigned across the synth’s architecture, dramatically affecting how a sound plays, feels, and fits in a mix. Whether you're designing a thundering mono bass, a lush polyphonic pad, or a kaleidoscopic special effect, the right mode helps the instrument behave exactly as you intend. Spirit offers a range of options — Mono, Unison, Poly, Cycle — each with a specific personality and musical strength. Understanding how they handle polyphony, note priority, and voice stealing is key to making sounds that work the way you want.

But there's one mode that deserves special attention: Multi. This mode adds subtle (or extreme) per-note variation across pitch, pan, filter, and envelope parameters. It's like handing each voice in a chord its own distinct personality. When used creatively, it unlocks an entire new dimension of animation and complexity. In the sections that follow, we’ll take a closer look at how Multi mode works, including how it combines with other voice assignment behaviors and how to use the offset controls to create everything from stereo-panned textures to one-finger chords. But don’t worry. It’s easier than it sounds and more powerful than it looks.

First, here's a recap of the various Voice Modes. Again, they determine the number of simultaneously playable notes and how they behave.

- **Mono**- One note sounds at a time with last-note priority mode, that is, the most recently played note always sounds. The *Voices* and *Detune* controls are dimmed and deactivated.

- **Unison**- Unison stacks multiple voices monophonically according to the current *Voices* setting. The *Detune* knob spreads out the tuning of the oscillators for fat sounds. Note priority is always last-note, just like Mono mode.

- **Poly**- Multiple keys can be played simultaneously with the maximum number of notes set by the *Voices* control. If the max number of voices is exceeded, the newest note gets stolen. When using the arpeggiator Poly mode, it will play the arp notes always from voice 1, which cuts off the release.
- **Cycle**- Multiple keys can be played simultaneously with the maximum number of notes set by the *Voices* control. Spirit sequentially plays through each voice as new notes are struck. If the max number of voices is exceeded, the newest note gets stolen. When using the arpeggiator Cycle mode, it steps through the voices, which allows the release to happen.

  You can clearly visualize what's going on with poly voice assignment by setting *Voices* to *8* or *16*, and observing the voice LEDs as you play in *Poly* and *Cycle* modes.
- **Multi**- The *Multi* voice modes let you add variation and color by altering parameters on a per-note basis. It may look a little scary initially, but we promise, it's super easy to use! See below.

Multi Voice Mode

When you choose Multi with the Voice Mode control in the Master section, the *Multi Voice* controls become active at the bottom of the panel. Here you will find a Voice Mode control (Unison, Poly, or Cycle) and three Voice Panel panels with "offset" knobs controls that add or subtract from several key sound parameters: Pitch, Pan, Filter Frequency, VCA Envelope Attack, and VCA Envelope Release.

These Voice Panels enhance the sound of the selected sound or preset with slight per-note/voice variations.

With each note played, Spirit cycles through notes in the following way: the first note that is played uses the normal, unaltered synth parameters, the second note's parameters are offset by the knob settings in the #2 offset box, the third note by the settings in the #3 offset box, and so forth. Note that the LEDs next to the offset box number light to indicate which Multi voice is sounding.

An easy way to understand Multi mode functionality is to set Mode to *Multi/Poly*, and Voices to *4* (i.e. the maximum number of voices that can sound). In the #2 offset controls box on the bottom left, use the trimmer to set *Pitch* to something odd, like *+9.* Now slowly play and hold four consecutive notes. Hear how the pitch of the second note played is offset?

You may be wondering how the offset knob controls function when the *Voices* control is set to 8 or 16. In this case, the sequential nature of Multi mode repeats. If you look closely, you'll see that when *Voices* is set to 8, the main voice controls and each offset parameter box now have *two* voice active LEDs each. When voices is set to 16, each offset parameter box gets *four* voice active LEDs. If you're in *Multi/Poly* mode and a 5th note is played, the main voice sounds, when a 6th note is sounds, multi voice 2 sounds, and so on until a maximum of 16 voices is sounding (i.e. four LEDs for each multi voice), at which point the cycle starts over.

Let's go over how each Multi voice mode operates, then we'll detail the available offset parameters in the Voice Panels:

VOICE MODE - These are essentially the same as the "normal" keyboard modes, with the addition of Multi Mode Voice Panel parameter cycling.

- **Unison**- Unison stacks multiple voices monophonically according to the current *Voices* setting. Since all voices play simultaneously in unison mode, they won't cycle through as with poly modes - they all play at once. The offset controls still work on individual voices, allowing super massive sounds. By retuning the Pitch trimmers of the synthesizer offsets to form triads, you can create one finger chords.

  Note that the *Detune* knob still does its random-ish oscillator detuning thing on top of the offset box *Pitch* controls, so it's easy get out in the weeds tuning-wise.

- **Poly**- Multiple keys can be played simultaneously with the maximum number of notes set by the *Voices* control. The first available voice sounds - in other words, held notes will never get stolen. When playing one note at a time, the note will always sound from voice 1 of the primary synth. However, when playing multiple notes together, notes play sequentially and step to the next multi voice group.

- **Cycle**- Multiple keys can be played simultaneously with the maximum number of notes set by the *Voices* control. In this mode, Spirit will always sequentially play through each voice and offset synth as new notes are

struck. If the max number of voices is exceeded, the newest note gets stolen.

NOTE ORDER - This determines the sequence in which the Spirit cycles through its available voices when playing multiple notes in Multi-Voice mode. This setting plays a subtle but important role in shaping the stereo image, perceived motion, and expressive behavior of multi-voice sounds.

Here’s what each mode does:

- **Loop**: This setting cycles through the available voices in a fixed, repeating order. The first note you play uses Voice 1, the next uses Voice 2, and so on, wrapping back to the first voice when it reaches the end. This creates a predictable, rotating pattern, often producing a consistent panning or modulation movement across repeated notes depending on the pan and modulation settings of the sound.
- **Ping-Pong**: As the name implies, this mode bounces back and forth through the voice order. For example, with four voices, it will move 1 → 2 → 3 → 4 → 3 → 2 → 1, and repeat. This back-and-forth can produce a more symmetrical stereo effect, useful for creating motion that feels less repetitive than loop mode but is still structured.
- **Random**: Each new note is assigned to a random voice, meaning there's no fixed pattern to the order. This results in a more dispersed stereo image depending on voice pan settings. This can be great for thick textures or more organic, unpredictable behavior in some patches.

These settings are especially impactful when combined with subtle variations between voices such as slight pitch detunes, panning offsets, or modulation differences, making the Note Order parameter a powerful tool for spatial animation and timbral variation.

Multi Mode Voice Panel Parameters

In Multi mode, three numbered Voice Panels are added to the interface, each representing an additional synth voice with an interface of five parameters. These settings have trimmers that can be adjusted to create an offset variation from Spirit's primary synth voice. Each also includes quick access to a set of Voice Panel presets for all three panels. Adjustments made to these trimmers can be subtle to simulate the slight variations one might expect between multiple chained synthesizers or voice components. You can also apply extreme settings to produce single-fingered chords or patterns, stereo effects, and more.

Pitch- Fine tuning of the pitch, offset from the primary synthesizer settings, for the synth voice in a range from -12 to +12 semitones. By retuning the Pitch trimmers of the individual panels to form triads, you can create one-finger chords, or use in conjunction with the arpeggiator to create a transposable one-finger four-note step sequence.

Pan- Sets the % offset of output placement for the synth voice from left to right in the stereo image.

Filt. Freq.- Sets the % offset of the Filter Frequency for the synth voice, from -100% to +100%.

VCA Att.- Sets the % offset of the VCA Envelope Attack for the synth voice, from -100% to +100%.

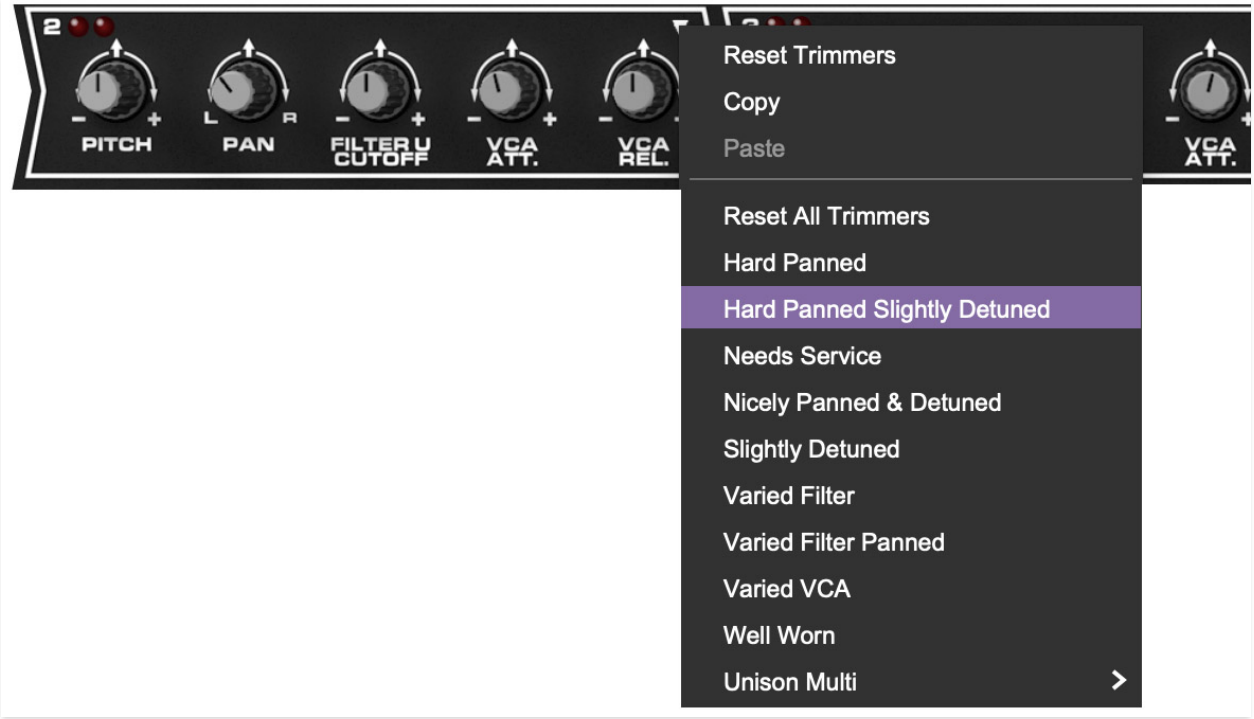
VCA Rel.- Sets the % offset of the VCA Envelope Release for the synth voice, from -100% to +100%.

Multi Voice Presets

Presets- The downward-pointing arrow ▼ accesses a set of panel configuration quick presets, such as *Hard Panned*, *Slightly Detuned*, *Well Worn*, and so on. Each preset applies pre-configured settings to all three voice panels at once to achieve the effect described.

Unison Multi is a collection of nine tuned panel sets primarily intended to be used when Keyboard mode is set to Multi / Unison mode, and includes individual tunings (*Major*, *Minor*, *Major 7*, etc.) and variations with hard panning. These are also useful for producing melodic sequences when used with the arpeggiator.

Also included are *Reset Trimmers, Copy,* and *Paste.* Unlike the presets detailed above, these commands are applied per single panel. For instance, selecting *Reset Trimmers* on synth panel 3 resets only that panel. Settings can also be copied from one panel and pasted to another without changing the third.


2
PITCH
PAN
L
R
FILTER U CUTOFF
VCA ATT.
VCA REL.
VCA ATT.
Reset Trimmers
Copy
Paste
Reset All Trimmers
Hard Panned
Hard Panned Slightly Detuned
Needs Service
Nicely Panned & Detuned
Slightly Detuned
Varied Filter
Varied Filter Panned
Varied VCA
Well Worn
Unison Multi

Oscillators

Oscillators are the beating heart of any synthesizer, and in Spirit, they deliver the raw, shapeable sound that fuels everything else. Spirit features two analog oscillators (A and B) plus a noise generator and ring modulator. These sources are always active and are routed to two separate signal paths: one path runs through the Filter and ADSR envelope, the other goes through the Shaper Y section. This dual-routing gives you enormous flexibility for creating layered textures, parallel modulations, or independent sonic behaviors from a single voice.

Oscillator A

WAVEFORM

Oscillator A provides three classic waveforms: triangle, sawtooth, and pulse. It's important to note that the Spirit refers to a pulse wave as a "rectangular wave" and pulse width modulation (PWM) as rectangular width modulation (RWM). The pulse/rectangular wave includes four selectable widths: 50, 30, 15, and 8 percent duty cycle, giving you options from square wave to progressively more narrow pulses for richer harmonic variation.

OCTAVE

The Octave Knob sets the frequency of Oscillator A in organ-style steps: 32', 16', 8', and 4'. The 8' setting is standard pitch (middle C plays as middle C).

SYNC

The SYNC switch hard-syncs Oscillator B to A. When enabled, Oscillator B restarts its wave cycle every time Oscillator A completes one, creating harmonically complex sync tones. This is especially effective when you sweep or modulate Oscillator B’s pitch: Osc B will glitch out in the most musically satisfying way. Use the *Octave* and *Interval* knobs to set the harmonic tone. The mod wheel (or any other continuous hardware control) can be assigned to the *Pitch* knob for real-time sweeps (right-click on the *Pitch* knob, select MIDI Learn, move the mod wheel, and that's it).

Oscillator B

Oscillator B mirrors A in basic functionality but goes a little rogue with more advanced pitch options for detuning, drone behavior, and modulation. It offers two special range settings, labeled “Bass” and “Wide,” that break Oscillator B free from the keyboard’s pitch control. In Bass mode, it ranges from 30Hz to 300Hz. In Wide, it stretches from 2Hz all the way to 10kHz. That means you can use it like an LFO or audio-rate modulator. When combined with features like oscillator sync you can create everything from locked-in harmonics to full-blown audio mayhem.

WAVEFORM

Oscillator B includes triangle, sawtooth, and pulse (rectangular) waveforms, with its own set of pulse/rectangular wave widths (40, 20, 10, 3) distinct from Oscillator A. This lets you mix harmonics and build more complex timbres easily.

OCTAVE/RANGE

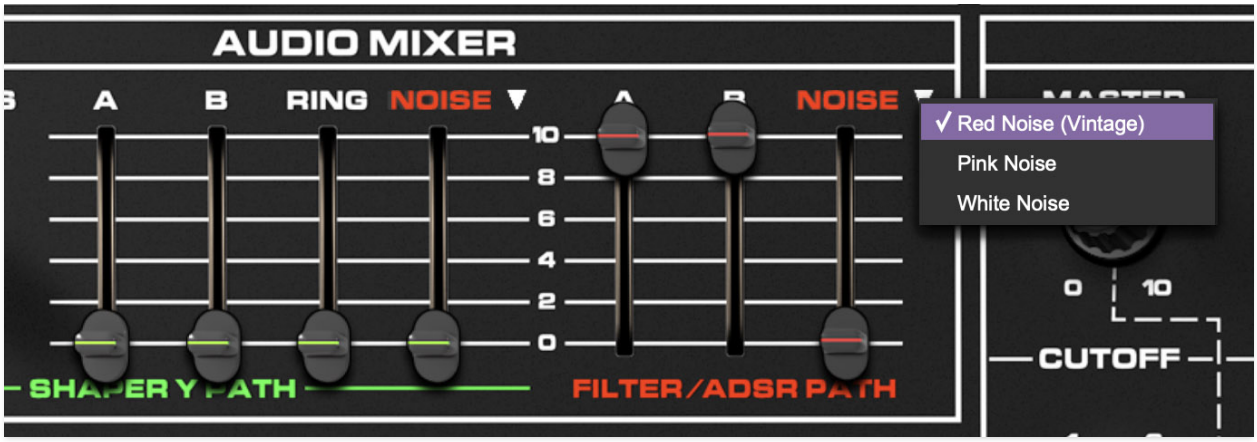
This switch determines how Oscillator B tracks pitch. The first four positions provide standard octave relationships relative to Oscillator A: -1, 0, +1, and +2. The remaining two positions, **BASS** and **WIDE**, disconnect Oscillator B from all global pitch controls (keyboard, pitch wheel, master tune). In these modes, Oscillator B becomes a freely tunable source:

- **BASS** range: 30 Hz to 300 Hz
- **WIDE** range: 2 Hz to 10,000 Hz

These two settings useful for drones, audio-rate modulation, or an additional LFO.

INTERVAL

This control detunes Oscillator B sharp or flat when the Octave/Range switch is set to one of the four octave step positions. It spans up to a little over a fifth in either direction. At center, there’s no transposition. Small deviations from center add gentle detuning. In BASS and WIDE modes, INTERVAL becomes a continuous frequency control with full-range sweep.



Noise Generator

The Spirit includes a versatile *Noise Generator* that offers three distinct types of noise: **White**, **Pink**, and **Red**. These can be used either as audio sources or as modulation sources. Use it to create everything from classic snare and hi-hat textures to chaotic filter sweeps or unstable pitch modulations. The different flavors of noise each have their own spectral characteristics: White noise is evenly distributed across the frequency spectrum, Pink noise rolls off slightly for a warmer, more natural tone, and Red noise... well, that one's a bit of a wild card.

The original Red noise circuit in the 1980s Spirit hardware was based on the infamous MM5837 chip, a pseudo-random sequence generator better known for its eccentric behavior than its precision. Rather than producing true randomness, it repeats a very long, irregular pattern that can lend a strange, twitchy character when used to modulate oscillator pitch, filter cutoff, or pulse width. Cherry Audio's virtual Red noise faithfully emulates this behavior, preserving its glitchy, semi-chaotic charm. It's unpredictable in all the right ways and can lead to some surprisingly musical happy accidents.

Ring Modulator

The Spirit's *Ring Modulator* is a classic dual-input amplitude modulator that multiplies two signals together to produce a new, often harmonically rich signal containing the sum and difference of the input frequencies. The result? Metallic clangs, robotic tones, and otherworldly textures that are impossible to achieve with traditional mixing or filtering. Spirit's ring modulator is particularly effective when combining a sine or triangle wave with a detuned oscillator, or when pairing an audio-rate oscillator with one of the built-in noise sources for more chaotic, percussive effects.

In keeping with the design philosophy of the original Spirit hardware, this ring modulator delivers a raw, analog-style character that rewards experimentation. Use it subtly to add a shimmering edge, or crank it for full-blown sci-fi dissonance.

Audio Mixer

The **Audio Mixer** is where all of Spirit's sound sources come together (or split apart). It's more than just a basic level mixer. It gives you per-source routing into two completely separate signal paths: the **Filter/ADSR Path** and the **Shaper Y Path**. You can treat each path like its own self-contained voice engine, letting you build layered textures, parallel-processing chains, or sonic mayhem.

Each of the following sound sources has its own pair of sliders:

- **Oscillator A**
- **Oscillator B**
- **Ring Modulator** (Shaper Y path only)
- **Noise**

Two Signal Paths

Each slider controls how much of that sound source goes to:

- **Filter/ADSR Path** - the traditional subtractive synth route, passing through dual filters (Lower and Upper) and an ADSR envelope-controlled VCA.
- **Shaper Y Path** - a more experimental path featuring a fixed 6 dB/octave lowpass **Brightness filter**, a VCA shaped by the Shaper Y envelope/LFO, with lots of potential for non-standard envelope behavior and audio-rate modulation. Envelope and gating behavior is controlled by the parameters in the **Shaper Y** section.

For example, you could send a clean triangle wave from Osc A to the Filter path for a classic lead, while routing a noisy, rectangular-width-modulated

Osc B to the Shaper Y path for a modulated, glitchy underlayer. Or send both to both paths and sculpt each independently.

Brightness Control

The **Brightness** knob applies only to the Shaper Y path. It’s a simple, non-resonant 6 dB-per octave lowpass filter that lets you roll off high-end frequencies before the signal hits the shaping stage. Use it to tame buzziness, smooth out aggressive harmonics, or warm up overly bright signals before sculpting them further.

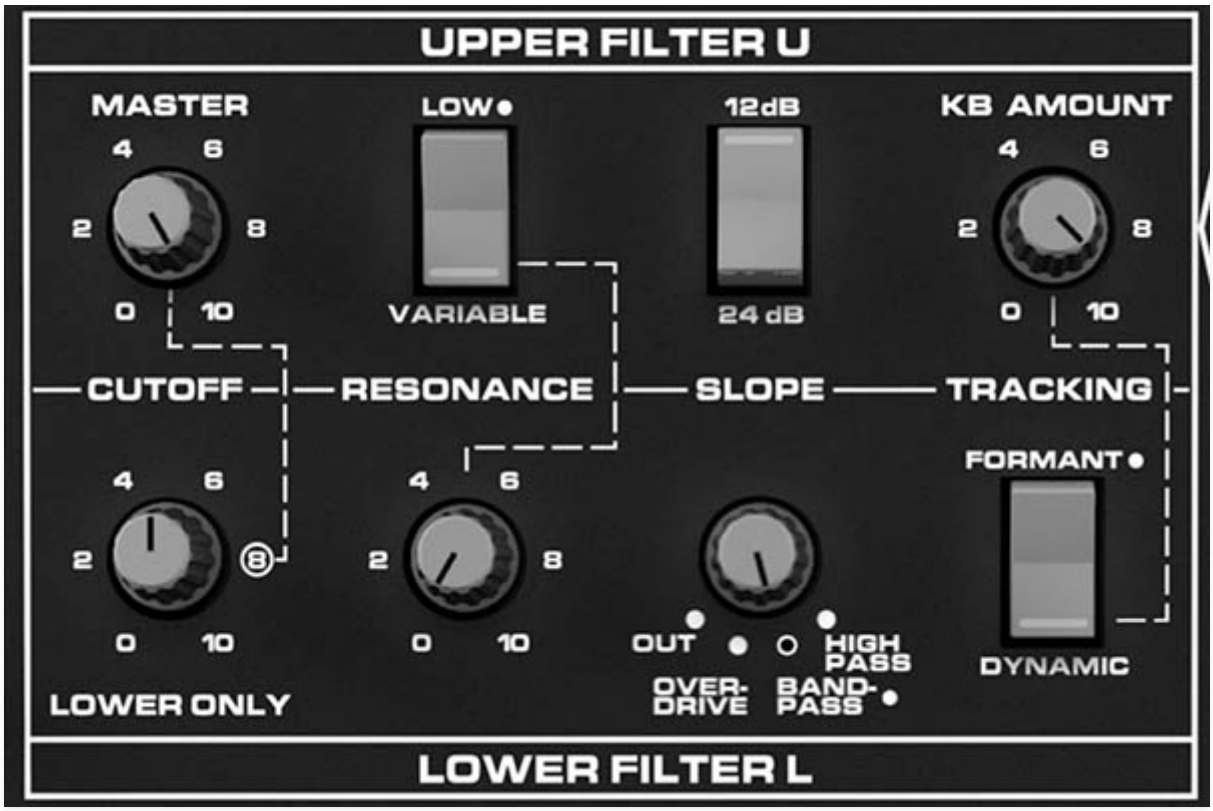
Want a chewy, rounded sound? Crank a saw wave into Shaper Y, then dial down Brightness. Prefer bright and buzzy? Just leave it wide open.

Ring Modulator

The **Ring Mod** section combines Oscillator A and B to generate a raw, metallic, sum-and-difference signal. It’s great for bell tones, sci-fi textures, or general-purpose harmonic adventures. It is only available in the Shaper Y path.

Noise

The **Noise** source generates pitchless signal from selectable types: red, pink, or white, switchable via a small triangle dropdown next to its label. This is your go-to for snares, wind, gritty mod content, and more. Like all sources, you can send it independently to either path with its dedicated sliders.



Filters

At the heart of any great synth is a great filter. It's the part that gives a sound its shape and its soul. Like a singer’s voice, a good filter can shape tone into something unique and powerful. The Spirit doesn’t just have one filter. It has two: Filter U and Filter L. And no, the “U” and “L” don’t stand for “upper” and “lower” frequencies. They’re just geographically named. One’s up top. One’s down low. That’s it. But don’t let the naming fool you: these two filters come from entirely different sides of the sonic gene pool. They’re not just powerful, they’re full of quirks and surprises.

Filter U is a classic low-pass with familiar trimmings: cutoff, resonance, keyboard tracking, and its own ADSR with adjustable depth and polarity. You can even flip between 12 dB and 24 dB slopes if you’re in the mood to swap your synth ancestry (think SEM vs. Moog). And yes, there’s resonance, with a switch that sets it to either a fixed “Low” amount or "Variable" to let you dial it in manually.

Filter L, on the other hand, is the wildcard. It has four modes, starting with “Out” (aka, skip me), and ramping up from there. “Overdrive” drops a gritty distortion stage in the path and transforms Filter L into a parametric EQ, which is useful for hyping the mids without shaving off the highs or lows. “Band-pass” works similarly, minus the grit. And “High-pass” does exactly

what it says, which means that Spirit is fully capable of true dual-filter voicing, one carving from the top, the other from below.

A Dynamic/Formant switch flips how Filter L behaves. In Dynamic mode, it’s fully modulatable: envelopes, tracking, LFOs, the works. But switch it to Formant mode, and modulation shuts off entirely. Filter L becomes static, a fixed resonant shape layered under the movement of Filter U. It’s a great trick for adding vocal-like color, or just giving your sounds a center that doesn’t shift with the rest.

One more twist: Filter L doesn’t use an absolute cutoff value. Instead, it’s relative to Filter U. When the cutoff knob is near 8 o’clock, the two filters align. Turn it clockwise or counterclockwise, and Filter L drifts above or below Filter U’s frequency. Depending on the mode, you can either make them work in unison, or push them apart for harmonics that speak with personality.

It’s a flexible, slightly eccentric system. And if you lean into the quirks, Spirit rewards you with textures most synths can't duplicate.

Upper Filter (U)
This is the classic analog low-pass filter. It’s responsible for the familiar “synth sweep” and can get mellow, aggressive, or anything in between.

- **CUTOFF**
  Sets the master cutoff frequency for the entire filter path. If **LOWER ONLY** is set to 8, both filters track this setting identically. Range: full audio spectrum.
- **RESONANCE**
  Adds emphasis at the cutoff frequency. Switchable between:
  - **LOW *** (Q ≈ 0.5): Fixed low resonance for sonic weight and subtle shaping.
  - **VARIABLE**: Lets the **RESONANCE** knob control Q from mild to self-oscillating.
- **SLOPE**
  Selects the filter slope:
  - **12 dB/oct**: Gentler slope, more SEM-style.
  - **24 dB/oct**: Steeper slope, more Moog-style.
- **TRACKING (KB AMOUNT)**
  Controls how much the cutoff follows keyboard pitch. Set it to 10 for near-perfect tracking (1V/oct), or dial it down for less tracking across the keyboard.

Lower Filter (L)
This is where things get interesting. The Lower Filter isn't just a second low-pass. It's a chameleon. Depending on the mode, it can act as a parametric EQ, a high-pass filter, or even disappear completely.

- **OUT**
  Bypasses the Lower Filter entirely. What you hear is just the Upper Filter.
- **OVERDRIVE**
  Adds a gritty distortion between the two filters and transforms the Lower Filter into a parametric boost. Great for midrange growl and character.
- **BAND-PASS** *
  Like Overdrive, but without the fuzz. Still gives a focused, double-peaked response centered around the cutoff.
- **HIGH-PASS**
  Attenuates frequencies *below* the cutoff. Used with the Upper Filter, this creates a dual-filter high/low-pass architecture. This is useful for adding sizzle and attenuating the low end.

Cutoff Controls:

- **LOWER ONLY (CUTOFF OFFSET)**
  Moves the Lower Filter's cutoff *relative* to the Upper Filter. At 8, both filters are aligned. Below 8, the Lower Filter sits beneath. This lets you:
  - Stack the filters for twin peaks
  - Carve a formant under the main filter
  - Create motion between filters using different tracking or envelopes (via Matrix Z)

Tracking Mode Switch:

- **FORMANT** *
  Freezes the Lower Filter's cutoff. It no longer responds to keyboard tracking, envelopes, or modulation. This is useful for creating fixed peaks or formant-like resonances that stay put as you play.
- **DYNAMIC**
  Reconnects the Lower Filter to keyboard tracking, filter envelope, and modulation.

RESONANCE
Always adjustable via the RESONANCE knob, regardless of mode. Controls

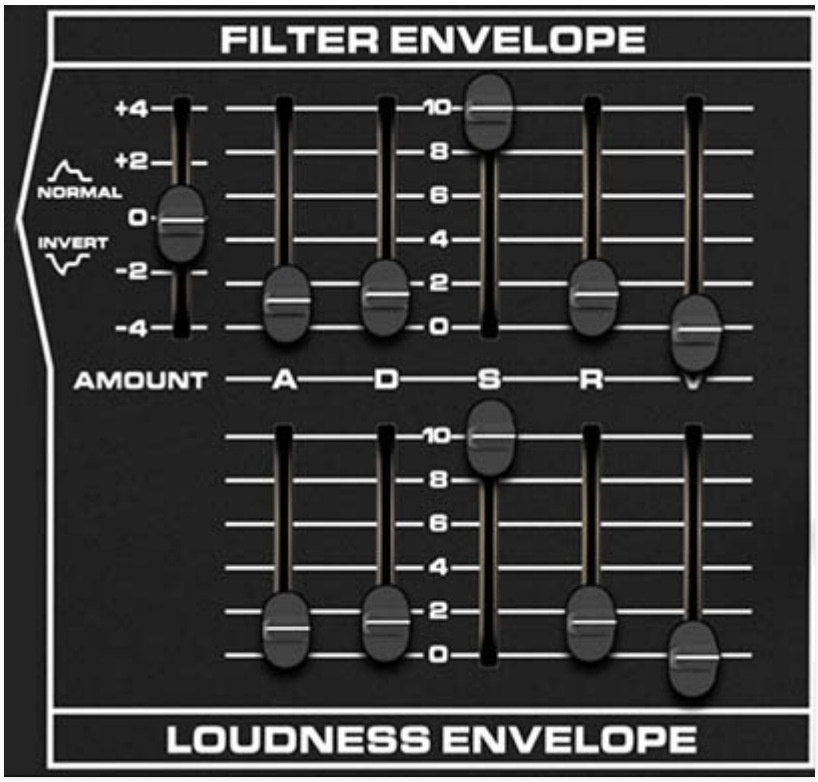
the intensity of the filter peak.

Filter Interplay

Because these filters are tied together, but also independently controllable, you can sculpt complex timbres. For example:

- Stack both filters with a narrow offset for rich, vocal peaks.
- Freeze the Lower Filter (by enabling Formant) while modulating the Upper Filter, to create evolving textures over a static tonal center.
- Combine high-pass and low-pass modes for a band-reject or twin-peak effect.
- Use Overdrive to inject harmonic grit into an otherwise clean sound.
- Combine Low resonance, band-pass, and Formant tracking to better emulate brass and woodwind timbres.

* **NOTE**: Three selections are marked with a dot to indicate their relationship in designing Formant sounds. These selections include the Low setting for the RESONANCE switch in the Upper Filter, the Band-Pass FILTER setting, and the Formant setting of the TRACKING MODE switch. When these settings are activated, you can adjust the Upper Filter using the Filter Envelope, modulations, and other controls without altering the resonant formant produced by the Lower Filter.



Envelope Generators

Envelopes don't make noise themselves, but they do something even better: they give your sounds shape. They control how things move, swell, bloom, or vanish. They're how you shape sound. And Spirit gives you two of them.

The Two Envelopes

Spirit includes two envelope generators:

- **Filter Envelope** – shapes the filter cutoff over time
- **Loudness Envelope** – controls overall signal level via the VCA

Both follow the classic **ADSR** structure:

- **A**ttack – how fast it rises
- **D**ecay – how fast it falls after the peak
- **S**ustain – the level it holds while the key is down
- **R**elease – how long it takes to fade out after you let go

Filter Envelope

The Filter Envelope is always connected to the Upper Filter's cutoff. It also affects the Lower Filter, but only when the Lower Filter's *Tracking* switch is

set to **Dynamic** (not Formant). That means you can sweep both filters together, or lock one in place for creative dual-filter effects.

Controls:

- **ADSR Sliders** – shape the timing of the envelope
- **Velocity Slider (V)** – sets how much key velocity affects the Filter Envelope. With higher values, playing keys with great velocity increases the effect of the envelope.
- **AMOUNT** – sets how strongly the envelope modulates the filter cutoff. Positive values create a normal, rising envelope. Negative values create a mirror-image of a normal envelope.

Use it for:

- Classic synth sweeps (slow Attack and Release stages)
- Percussive filter plucks (fast Attack, Decay, and Release stages)
- Long, evolving pads with filter motion (slow Attack, Decay and Release stages)
- Formant-style form shaping (specifically when paired with the Lower Filter in Formant mode)

Loudness Envelope

Thie Loudness Envelope controls the **VCA** (voltage-controlled amplifier) for the Filter/ADSR signal path. In other words, it shapes the volume of a sound over time.

Controls:

- **ADSR Sliders** – define the volume shape from attack to release
- **Velocity Slider (V)** – sets how much key velocity affects the Loudness Envelope. With higher values, playing keys with great velocity increases the effect of the envelope.
- **AMOUNT** – sets how strongly the envelope modulates the filter cutoff. Positive values create a rising envelope. Negative values create a mirror-image.

Use it for:

- Shaping dynamics and articulation
- Creating plucks, swells, stabs, fades, and pads

Not Just for Filter and Volume

Spirit’s envelopes are routable modulators in Matrix Z. Use them to:

- Modulate pulse width for evolving timbral changes
- Add pitch envelopes for divebombs or blips
- Modulate the speed of the Arpeggiator
- Modulate panning

Key Trigger Modes

While not technically part of the Envelope Generators, the **Trigger** switch determines how envelopes respond when you play overlapping notes, and it can subtly (or dramatically) change the feel of your performance.

In **Single** mode, the envelopes trigger only when the *first* key is pressed. As long as at least one note is held down, new notes won’t retrigger the envelopes, they’ll simply slip into the existing shape. This creates smooth, legato transitions between pitches, perfect for fluid leads, expressive glides, and sustained textures where you don’t want the sound to restart with every key.

In **Multiple** mode, every new note you press fires the envelopes from the top, even if you're still holding other keys. That means each note gets its own fresh attack and decay, giving you sharper articulation and more rhythmic precision.

Mod X

Mod X is one of Spirit’s two main modulation engines. Its purpose is to add motion, expression, and sometimes chaos to a sound. Whether you’re after classic vibrato, sample-and-hold weirdness, or something rhythmically complex and reactive, Mod X is where much of the action begins.

This section controls the **shape**, **rate**, **source**, and **routing** of the modulation signal controlled by the **Mod X Wheel**, which is routed to a destination set with the **X Wheel Destination** knob.

MOD SOURCE
Choose from six modulation types, each with its own character:

Triangle LFO – Smooth and cyclical. Good for vibrato, tremolo, or filter sweeps.

Square LFO – Instant up/down. Perfect for trills, on/off-like modulation, or rhythmic pulse effects.

S+H RANDOM – Sample-and-hold using red noise. Produces stepped voltages at a user-defined rate for glitchy or random modulation.

S+H Y – Sample-and-hold of the Shaper Y signal. This captures and holds segments of Shaper Y output, allowing complex, often unpredictable modulation shapes.

RED NOISE – Continuous, unfiltered noise. Use for intense, gritty modulation.

OSC B – Routes the triangle wave output from Oscillator B as a mod source. Useful for audio-rate modulation for FM (frequency modulation) and AM (amplitude modulation).

LFO / S+H RATE
Sets the rate of the modulation signal when using triangle, square, or sample-and-hold sources. Can go from ultra-slow to around 50 Hz. This control has no effect when using Red Noise or Osc B as the modulation source, since those are independent of the Mod X clock.

SHAPE X WITH Y
When enabled, the signal from Shaper Y is used to modulate the amplitude of the Mod X signal, essentially shaping how deep the modulation goes over time. It’s useful for creating “enveloped” vibrato, where the modulation depth grows or fades dynamically.

X WHEEL DESTINATION
Selects where the Mod X signal goes when you move the Mod X wheel (at the left of the keyboard). Destinations include:

- OFF (nowhere)
- OSC A + B pitch
- OSC A pitch
- OSC A RWM (rectangular wave width modulation)
- Filter cutoff (Upper + Lower or Upper only)

SYNC
Engage this switch to lock the Mod X LFO to the master tempo source (at the top of the plug-in window). Use this to create clock-synced modulation effects such as pulsing, tempo-synced filter sweeps, and S+H effects that stay in time.

RETRIG
When enabled, this retriggers the modulation waveform each time a note is played. It's useful for consistent attack behavior. When using Mod X for vibrato, for example, this ensures it always starts from the same phase.

Creative Applications

Sample-and-Hold Filter FX
Set MOD SOURCE to S+H RANDOM, RATE to mid or high, and route to Filter Cutoff. The result is a classic analog “burbling” filter effect that adds texture and motion to static sounds.

Enveloped Vibrato
Set MOD SOURCE to Triangle, SHAPE X WITH Y on, and use Shaper Y to create a slow, rising shape. Now when you modulate pitch with the Mod X wheel, you’ll get vibrato that blooms over time.

Audio-Rate FM
Set MOD SOURCE to OSC B and route Mod X to OSC A pitch. With Oscillator B in Wide mode, you can push into audio-rate frequency modulation territory for metallic, clangorous timbres.

Shaper Y

Shaper Y is Spirit’s second envelope generator (or third LFO, depending on how you look at it). In most modes, it functions like a traditional envelope, generating simple rise-and-fall shapes in response to a gate. But set it to

Free, and it transforms into a free-running low-frequency oscillator, making it a handy source for cyclic modulation with variable symmetry.

Think of it as your modulation wildcard. It's simple when you want it to be, and sneakily powerful when you don’t.

Its output shape is governed by the Shape knob, which doesn’t change how long the whole envelope takes, but does tilt the balance of time spent rising versus falling. Set it low (0) for snappy attacks and long fades, or crank it high (10) for the opposite. Right in the middle, you’ll get a symmetrical shape: a perfect triangle.

The Rate knob adjusts the overall time of each envelope cycle. In envelope modes, it sets how long the whole rise-and-fall event takes. In Free mode, it controls how fast the modulation cycles, anywhere from glacial sweeps to speedy warbles.

Modes of Operation

- **FREE** lets Shaper Y run continuously, like an LFO that doesn’t care whether a gate is present. Good for pitch modulation or other symmetrical effects.
- **RESET** restarts the shape from zero every time you play a note. It always completes a full rise-and-fall cycle, even if you release the key early.
- **KBD HOLD** sustains the envelope’s peak as long as the key is held, only falling when the gate ends.
- **RUN** ignores subsequent gates until the full cycle is finished. Once triggered, it completes its motion regardless of what you do.

It's worth noting that, when you engage the **SHAPE X WITH Y** switch in the Mid X section, the Shape Y envelope shapes the *depth* of the Mod X signal. This is great for dynamically expressive vibrato.

And with **SHAPER Y Wheel** selected as a Source in Matrix Z, you can send this output just about anywhere: oscillator pitch, oscillator pulse width, filter cutoff, arpeggiator speed, and many other modulation destinations.

- **SYNC** Synchronizes Shaper Y rate to the master Tempo control (at the top of the instrument window).
- **LOOP** Enabling this loops Shaper Y when you hold down a key in Run or Reset mode.

Shaper Y as Audio Path Controller

Remember the **Shaper Y audio path** from earlier? This is where Shaper Y acts like a gatekeeper, literally. It controls the amplitude of anything routed into the Shaper Y path, making it pulse, duck, or swell depending on how you shape it.

Want to design a throbbing drone that sounds like it’s breathing? Route Osc B to the Shaper Y path, set Shaper to FREE mode, and sculpt the shape to taste. Adjust Brightness and Rate to taste to create organic motion.

Shaper Y as a Mod Source

You can also use Shaper Y as the source for MOD X or MOD Y, letting it control:

- Oscillator A or A+B pitch (weird vibrato)
- Filter U or U+L cutoff (complex sweeps)
- Oscillator A rectangular wave width modulation (RWM) for unhinged pulse-width modulation effects
- Anything else that takes a mod input

Set MOD X to Shaper Y, and suddenly you have a looping waveform that can animate your synth like a puppet on voltage-controlled strings.

Real-World Uses

Evolving Texture

- FREE mode
- Slow Rate
- Route to filter cutoff
- Result: a tone that never quite stays still

Pulsing Drone

- SHAPER Y path only
- KBD HOLD mode
- Triangle wave through the Brightness filter
- Shaper shapes the volume like a built-in tremolo, independent of your envelope

Note-Synced LFO

- RESET mode
- Route to pitch or filter
- Every new keypress resets the modulation. Perfect for rhythmic sequences or synced warbles

Pseudo-Envelope FX

- RUN mode
- Shape with quick attack and decay
- Route to oscillator pitch
- One-shot “pitch blips” or dubstep-style wobbles with every note

Matrix Z

Want your sounds to move, evolve, or go completely off the rails in the best way? That’s where modulation comes in, and *Matrix Z* is your control center for making it happen. It’s a four-slot modulation matrix, which is just a fancy way of saying you get four independent pathways to send modulation from

one thing (a *source*) to another (a *destination*), each with its own amount knob to dial in exactly how much you want.

Each of the four knobs in Matrix Z controls the *amount* of modulation in its slot. Below each knob, you'll choose the *Source*, that is, where the modulation is coming from (like an LFO, envelope, or mod wheel). Above each knob, you'll choose the *Destination*, what you want to modulate (like pitch, filter cutoff, or rectangle wave width.

That's it: source → amount → destination. Multiply that by four, and you've got a surprisingly powerful modulation system that's quick to set up and endlessly creative to explore.

Mod Destination
Click the "*Destination*" label above the knob to choose the parameter you want to modulate. You can send modulation to almost anything: oscillator pitch, filter cutoff, panning, Mod X rate, and more.

Attenuator Knob
Turn the knob to the right to apply modulation in a positive direction. Turn it left to apply negative modulation. The center position is off. Since all knobs are bipolar, it's easy to invert mod sources with a quick knob twist.

Mod Source
Click the "Source" label below the attenuator knob to choose your modulation source. This is the thing doing the modulating. It might be an LFO, an envelope, velocity, aftertouch, or even another oscillator.

Modulation Routing Examples

Matrix Z isn't just for experimental sounds, though it's good for those, too. It's also your tool for classic synth sounds, expressive performance controls, and creating evocative textures.

Here are a few modulation routings to spark some ideas. Be aware that these are just starting points. Matrix Z is designed to encourage curiosity. Mix and match sources and destinations, try subtle and extreme amounts, and don't be afraid to modulate your modulators. The results can be extremely musical and expressive.

1. Velocity to Filter Cutoff

- **Source:** Keyboard Velocity
- **Destination:** Filter Cutoff

- **Why it’s useful:** This is a bread-and-butter mod for dynamic expression. Play harder, and the filter opens up. This is essential for making basses and leads feel alive without needing extra controllers.

2. Mod X Wheel to Oscillator B Pulse Width

- **Source:** Mod X Wheel
- **Destination:** Oscillator B Pulse Width
- **Why it’s useful:** Pulse width modulation adds harmonic movement to static waveforms. Routing it to a wheel gives you hands-on control over the timbre, perfect for expressive sweeps or animated textures in real time.

3. Filter Envelope to Oscillator A Pitch

- **Source:** Filter Envelope
- **Destination:** Oscillator A Pitch
- **Why it’s useful:** This creates a subtle pitch bend at the start of each note. Use it for analog-style “brass” or “pluck” sounds with just a bit of pitch dip or ramp to add character.

4. Mod X (S&H) to Filter Resonance

- **Source:** Mod X (Sample & Hold)
- **Destination:** Filter Resonance
- **Why it’s useful:** Randomized resonance modulation gives your sound a bubbling, lively edge. This is useful for generative-type patches, glitchy effects, or unpredictable sci-fi atmospheres.

5. Aftertouch to Arpeggiator Chance

- **Source:** Keyboard Aftertouch
- **Destination:** Arpeggiator Chance
- **Why it’s useful:** Use pressure to add variety to an arpeggio while you hold a note.

6. Red Noise to Upper Filter Cutoff

- **Source:** Red Noise
- **Destination:** Upper Filter Cutoff

- **Why it’s useful:** A touch of noise modulation applied to filter cutoff can add grit and edge to a sound. Dial it in subtly to add a bit of grunge.

7. Shaper Y to Mod X Rate

- **Source:** Shaper Y
- **Destination:** Mod X Rate
- **Why it’s useful:** This sets up nested modulation. Shaper Y gradually speeds up or slows down Mod X over time, allowing you to create rhythmic modulation that evolves and morphs as you play.

8. Mod X (Triangle) to Pan (VCA)

- **Source:** Mod X (Triangle)
- **Destination:** VCA Pan
- **Why it’s useful:** A slow triangle wave panning the signal left and right gives instant stereo movement akin to tremolo. This is useful for ambient patches, pads, and soundscapes that travel across the stereo field.

9. Oscillator B Pitch to Oscillator A Pitch

- **Source:** Oscillator B Pitch
- **Destination:** Oscillator A Pitch
- **Why it’s useful:** This creates FM (frequency modulation). While not as sophisticated as the flavor of FM found on certain Japanese synths from the 80's, experimenting with different frequency settings for Oscillator B (including WIDE or BASS mode) can yield some very interesting timbres. Try setting short Decay on the Filter or Loudness Envelope to create hard-edged plucked sounds.

10. Mod X (Random) to Arpeggiator Swing

- **Source:** Mod X (Random)
- **Destination:** Arpeggiator Swing
- **Why it’s useful:** Randomly varying swing gives your arpeggios a quirky, humanized feel that's less rigid and more alive. Especially fun for experimental or generative patches.

Modulation Sources and Destinations

MOD SOURCES	MOD DESTINATIONS
None	None
Keyboard Aftertouch	Master Volume
Keyboard Velocity	Unison Detune
Keyboard Keyboard CV	Filters Upper Cutoff
Pitch Wheel	Filters Lower Cutoff
Mod X Wheel	Filters Upper+Lower Cutoff
Shaper Y Wheel	Filters Upper Resonance
Expression Pedal	Filters Lower Resonance
Osc A	Filters Upper+Lower Resonance
Osc B	Osc A Pitch
Filter Envelope	Osc B Pitch
Amp Envelope	Osc A+B Pitch
Mod X	Osc A Pulse Width (RWM)
Mod X Triangle	Osc B Pulse Width (RWM)
Mod X S&H Random	Osc A+B Pulse Width (RWM)
Mod X S&H Shaper Y	Osc A Mixer Volume
Mod X Sine	Osc B Mixer Volume
Mod X Ramp	Osc A+B Mixer Volume
Mod X Sawtooth	Shaper Y Path Ring Mixer Volume
Shaper Y	Shaper Y Path Noise Mixer Volume
Signals +10V DC	Shaper Y Path Brightness
Mono Random DC	Filter/ADSR Path Osc A Mixer Volume
Poly Random DC	Filter/ADSR Path Osc B Mixer Volume
Red Noise (Vintage)	Filter/ADSR Path Osc A+B Mixer Volume
Pink Noise	Filter/ADSR Path Noise Mixer Volume

White Noise	Arpeggiator Speed
	Arpeggiator Swing
	Arpeggiator Chance
	Arpeggiator Feel
	Mod X Rate
	Shaper Y Shape
	Shaper Y Rate
	VCA Volume
	VCA Pan
	Filter Envelope Attack
	Filter Envelope Decay
	Filter Envelope Sustain
	Filter Envelope Release
	Amp Envelope Attack
	Amp Envelope Decay
	Amp Envelope Sustain
	Amp Envelope Release
	Mod Matrix 1 Amount
	Mod Matrix 2 Amount
	Mod Matrix 3 Amount
	Mod Matrix 4 Amount

Arpeggiator

The Spirit’s arpeggiator isn’t just a polite little note repeater. It turns chords into motion, motion into patterns, and patterns into music. It may look simple at first glance, but don’t be fooled. It can latch, leap, and ripple its way into complex sequencer-like territory.

The Arpeggiator Mode switch gives you four settings:

Off

As you'd expect, arpeggiation is disabled.

Ripple

In Ripple mode, the Spirit simply plays any keys you hold, one after another, from the lowest to the highest. This repeats continuously and seamlessly. There's no delay or pause after each full pass. Notes are scanned chromatically in order of pitch (not in order of playing). This is perfect for simple melodic figures and gentle loops.

Arp

This is Spirit’s full arpeggiator mode. It behaves similarly to Ripple, but with a twist: it adds octave-spanning variation. The Arp mode plays all held notes in order (low to high), then immediately repeats that same sequence again an octave higher, and again an octave lower. This pattern continues in a loop, creating a much wider and more dynamic arpeggio sequence, which can be especially expressive with complex chords.

It’s a great tool for building evolving sequences with just a few keys. Think Berlin School modular vibes with zero patch cords.

Leap

Leap is where things start to get weird, in the best possible way. Unique to Spirit, this mode takes the notes you’re holding and launches them across a three-step octave pattern. Play a simple triad like C3–E3–G3, and instead of arpeggiating them in order or up/down a scale, Leap catapults each note to a

different octave: C plays at the original pitch, E jumps up an octave, and G drops down. That gives you a repeating sequence like C3, E4, G2. And that’s just the beginning.

Add a fourth note—say, B3—and the whole thing starts to tumble forward in a beautifully tangled cascade. The pattern shifts out of sync, cycling through the octave steps in unexpected ways: C3, E4, G2, B3, C4, E2, G3, B4, C2, and so on. The results are often hypnotic, sometimes chaotic, and always inspiring. Leap is perfect for generating evolving, harmonically rich patterns that feel more composed than mechanical. Try it when you want your arpeggios to surprise you—and your music to move in directions you didn’t plan.

Arpeggiator controls:

Speed- Sets the pattern speed playback speed from 0.25 to 30 Hz. The LED in the top corner of the Arpeggiator panel flashes to indicate the current speed (and stops flashing when the Arpeggiator is turned off).

Sync- Engaging the *Sync* control locks arpeggio timing to master Tempo. When engaged, the *Speed* slider changes from a rate in Hz to note values ranging from 1/64th note triplet to 8 beats. When using Sync switch in the Spirit standalone version, the Arpeggiator uses the *Tempo* in the top toolbar. When it's used as a plug-in inside a DAW, it syncs to the DAW tempo.

Swing- Puts a swinging groove into your arpeggiations. When it's set to 0.0%, then the arpeggio plays back in a straight timing. As you turn up the *Swing*, every other note is delayed by a small amount, creating the swing effect. Try it at 67% for a triplet feel.

Chance- Sets the probability of a note sounding on a given step. The default is 100%, i.e. every note is always played. The *Chance* slider can be turned down to 30%, meaning that each note in the arpeggio only has a 30% chance of playing. This lets you create random rests, blank sections, and syncopations, depending on the *Chance* setting.

Feel- This slider adds randomness to the timing of the arpeggio. You can choose to *push* notes slightly ahead of the beat, or *pull* notes slightly behind the beat. It defaults to 0, but can be moved to ±100% push or pull. If you're recording the arpeggios into a DAW, you can automate the Feel parameter to gently alter the push/pull character of the arpeggio, "humanizing" it a bit.

Hold- Press this button to keep the arpeggio going even when all keys are released. You can clear the current arpeggiation and replace it with a new one simply by releasing all keys, then playing a new chord. The arpeggiation

will continue until *Hold* is turned off. This function, often called *Latch*, is a useful one to assign to a pedal or button for live use.

4 Oct- At first glance, the **4 Oct** switch might seem like a simple range extender, but it’s actually much more playful. What it really does is reshape how the arpeggiator travels through octaves, depending on which mode you’re in. It’s not just a range expansion. It’s a musical rollercoaster. Use it to add drama, motion, and wide harmonic spread to even the simplest chords.

In **Arp mode**, engaging the 4 Oct switch stretches the pattern across four octaves in a clever sequence: it plays your notes at the original octave, then one octave up, two octaves up, and finally one octave *down*. So a C3–E3–G3 pattern becomes: **C3, E4, G5, C2**, then repeats.

In **Leap mode**, that same zigzag applies—but now each note in your held chord leaps independently through the 0 / +1 / +2 / -1 octave cycle. So holding C3–E3–G3–B3 results in this delightful bit of octave gymnastics: **C3, E4, G5, B2**, then the pattern rolls on.

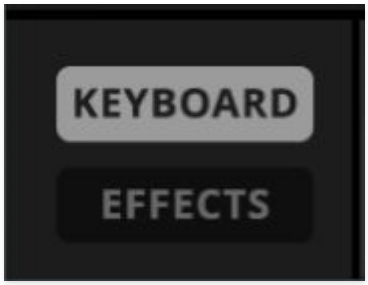
Down- Press this button to change the direction of arpeggiator playback from upward to downward.

Real-World Uses

- **Basic Arp Loops**
  Use Ripple mode with a slow rate and two or three notes. It’s simple, hypnotic, and perfect for pads or sequences that breathe.
- **Octave Spread Leads**
  Flip into Arp mode and crank the SPEED. Combine it with some oscillator detuning and Multi Voice stereo pan spread for punchy vintage-style melodic riffs.
- **Evolving Basslines or Ambient Patterns**
  Try Leap mode with a complex chord, then layer slow LFOs on the filter and pulse width. The octave shifts will create motion that feels generative even if it's just a held chord.

Keyboard and Effects Views

Spirit includes modulatable effects that enhance its core sound engine.To display the full set of controls for each effect, click the **EFFECTS** button in the lower-left corner of the instrument window



When this button is set to **KEYBOARD**, the familiar *Keyboard View* is displayed:

Keyboard Performance Section

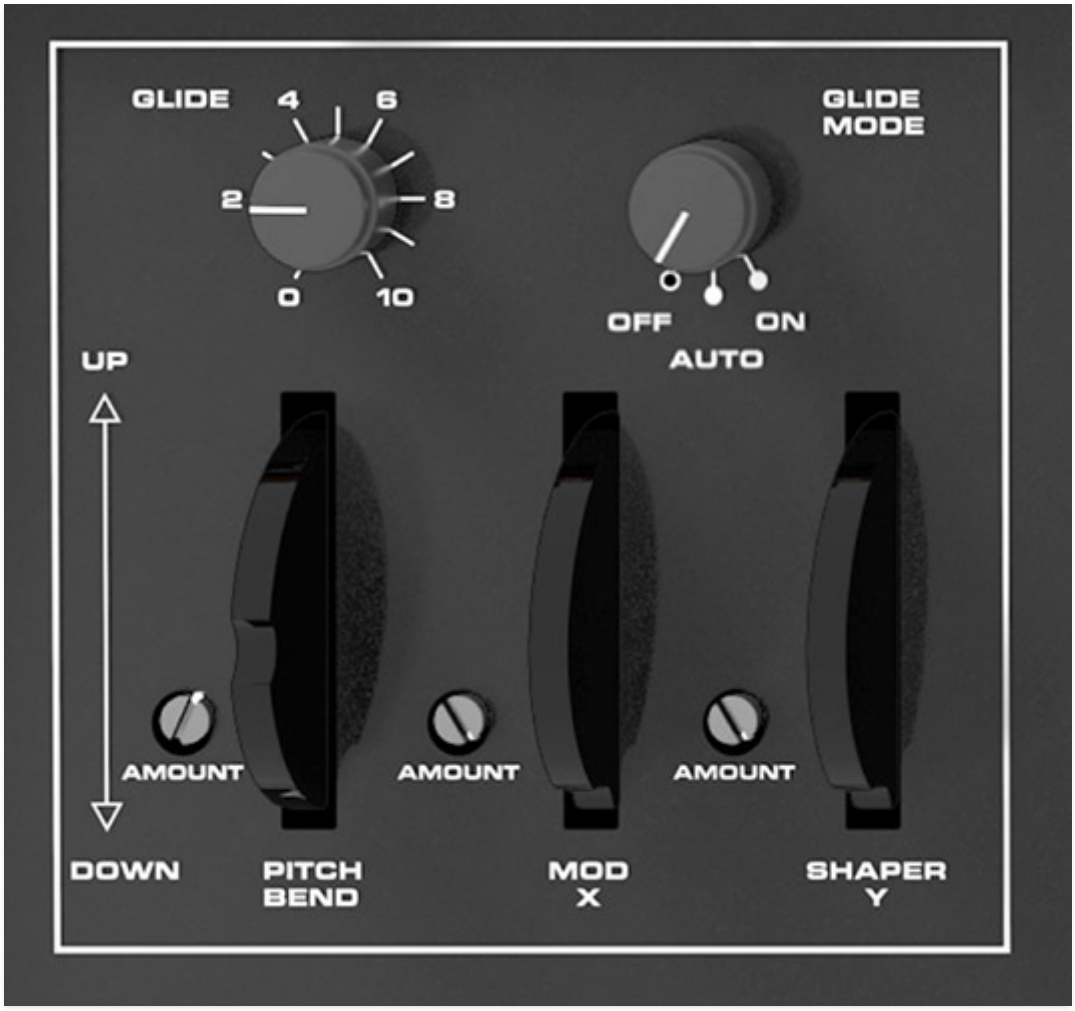
The Keyboard Performance section puts real-time expression at your fingertips, with four essential controls: **Pitch**, **Mod X**, **Mod Y**, and **Glide**. These are designed for on-the-fly musicality and nuanced performance.

Pitch, **Mod X**, and **Mod Y** are performance controls that transmit control data to their respective modulation destinations. Each features a tiny range trimmer tucked just to the side of the associated performance wheel, letting you fine-tune how dramatically that control influences its target. Want subtle vibrato or a wide filter sweep from Mod X? It’s all in how you set the range. These trimmers make the performance controls highly adaptable, gentle enough for delicate expression or wide enough for chaotic modulation.

The **Glide** section gives you that unmistakable portamento effect where one note slides fluidly into the next. The left knob adjusts **Glide Time**, setting how long it takes to slide between notes. The right knob selects the **Glide Mode**, with three options:

- **Off**: disables glide entirely.
- **On**: applies glide between all notes, whether legato or not.
- **Auto**: engages glide *only* when you play legato (i.e., overlapping notes), a classic mono-synth behavior.

Together, these controls let you sculpt performance feel just as much as sound, whether you're chasing vintage leads, evolving textures, or expressive realtime modulation.



Effects View

Setting the button to EFFECTS brings up the *Effects View*. This supplements the controls under the keyboard with detailed parameters for each of the **Effects** processors. It's important to note that there are actually two sets of Effects available: one for the Filter/ADSR path and a separate set for the Shaper Y path.

The Effects are your final stage for sonic polish and personality. They provide a powerful chain of studio-quality effects, ready to sweeten or completely transform your sound with lush choruses, shimmering phasers, space-enhancing reverbs and echoes, and more. Effects are the secret sauce that turns your sounds into polished, ear-catching textures.

Effects

There are four effects for each of the Spirit's two signal paths:

- The **Filter/ADSR** path features Distortion, Flanger & Chorus, Echo, and Reverb. To display this effects set, click the Red tab to the left of the effects chain. To display the full controls for the set, click the Effects button at the bottom left of the panel.
- The **Shaper Y** path features an Envelope Filter, Dual Phaser, Flanger & Chorus, and Echo. To display this effects set, click the Green tab to the left of the effects chain. To display the full controls for the set, click the Effects button at the bottom left of the panel.

You can easily tweak each effect to taste, bypass it, finely control its interaction with the synthesizer's audio path, and even modulate the entire chain with its own Effects Modulator.

First we're going to start at the bottom. Under each effect is a set of controls that are always accessible, even in Keyboard View. These are the controls most likely to be needed quickly while playing.

FX On/Off- Bypasses the entire Effects chain

Level- Adjusts the level of the entire Effects chain

Stereo- widens the stereo image of the sound after the Effects

Next, each of the Effects has the following controls:

- **On/Off**
- **Solo** (bypasses all other Effects)
- **Modulation Amount** (from the *Effect Modulator*)
- **Wet/Dry Mix**

When we open the Effects View, we are presented with detailed controls for the four Effects, which we'll go through in order. But first, as we look to the left:

Effect Modulator
Sometimes it's handy, or just plain cool, to have a way to mess with effects parameters without having to use up modulation sources from elsewhere. The **Effect Modulator** does just that for the Effects chain.

The Effect Modulator is essentially an independent LFO that can apply modulation to any or all of the Effects, one parameter per Effect.

Speed- The LFO cycle rate, either 0.01 Hz to 20 Hz, or 1/64th triplet to 8 beats when the **Sync** button is activated. The LED above the *Speed* knob flashes at the set rate, with its intensity changing based on the selected *Waveform*.

Waveform- Chooses between ramp, sawtooth, triangle, sine, square, and random.

Delay- How long it takes for the Modulation to take effect, ramping up from zero when a note is first played. It ranges from 0.0 ms to 5000 ms (5 seconds). Note that if you play legato, the Delay doesn't reset.

Mod Wheel- Assigns the Mod Wheel to control how much of the Effect Modulator signal is passed to the Effects. When this button is on, all of the Effects have zero modulation, and using the wheel brings modulation in until it reaches the amount set on the *Mod* slider.

Distortion

Because who *doesn't* like a little extra gnarl on their leads or basses?

The Distortion has four different modes:

- *Tube* (emulating an overdriven guitar amp)
- *Fuzz* (emulating a Germanium fuzz box circuit)
- *Sat* (tape saturation)
- *EQ* (the equalizer on its own)

The first three modes have controls for **Drive** and **Level**, and all four modes have ±15 dB gain for **Bass**, **Middle**, and **Treble**, with a sweepable **Mid Band** frequency.

In *Tube*, *Fuzz*, and *Sat* modes, *Drive* is the modulatable parameter. In *EQ* mode, *Mid Band* is modulatable.

Flanger & Chorus

These are two of the most popular effects making use of very short time delays, modulated by an LFO. Flanging mixes a dry signal with one delayed by (in this case) between 1.0 and 13 ms, creating a *comb filter* effect. Chorusing uses time delays in the 30 ms neighborhood to thicken a sound and simulate the sound of multiple sources rather than just one.

Flanger controls include:

- **Flanger Speed**- LFO sweep rate, from 0.01 Hz to 8 Hz, or 8 beats to 1/64th triplet when the **Sync** switch in the lower left corner is On
- **Depth**- Amount of the flanger effect
- **Delay**- The basic delay time that's modulated by the LFO, ranging from 1.0 to 13 ms. The smaller the *Delay*, the higher-frequency the notches will sound.
- **Resonance**- Turning this up creates the whooshing "jet" flanger sound.

Chorus controls include:

- **Chorus Speed**- LFO sweep rate, from 0.01 Hz to 8 Hz, or 8 beats to 1/64th triplet when **Sync** is On
- **Depth**- Amount of the chorus effect
- **Waveform**- The LFO waveform will drastically change the sound of the chorus effect. Choices include sine, triangle, sawtooth, and ramp.

The **Mix** knob controls the blend of the flanger and chorus; this can be controlled by the Effect Modulator.

Echo

Stompbox delay pedals and tape echo boxes were and are popular additions to keyboard rigs, so having one here is pretty much a given, right?

The Echo offers a choice of three modes:

- **Digital**- A clean digital delay that would have set you back a lot of money in the 1970s
- **Tape**- A rich tape-loop delay sound with plenty of saturation and no mangled tapes
- **Ping Pong**- A classic effect where echo taps alternate between left and right channels.

Controls include:

- **Delay Time**- Adjustable from 1.0 ms to 2000 ms (2 seconds), or 8 beats to 1/64th triplet when the **Sync** switch in the lower left corner is On. This can be controlled by the Effect Modulator.
- **Feedback**- How much of the delayed signal is fed back to the input for repeating echoes. Ranges from 0% (single slapback echo) to 100% (echoes that never die away). For certain settings of *Feedback* and *Delay Time*, the Tape mode can produce runaway echoes and "bathtub reverb" effects.
- **Spread**- Stereo width of the delay signal.
- **Damp**- High-frequency damping, to make echoes more soft and bassy than the dry signal.
- **Mod Rate** and **Mod Depth**- Controls for modulating the Delay Time for everything from mild chorusing to heavy pitch glitching. *Mod Rate* has a range of 0.2 Hz to 20 Hz and does not follow the *Sync* switch.

Reverb

Now *here's* an effect that wasn't available for any reasonable amount of money in the 1970s, and certainly wouldn't fit into a stompbox! In the 1970s, the only small and reasonably portable reverbs were the spring tanks in guitar amps and tape echoes like the **RE-201 Space Echo**. If you wanted a plate reverb, you had to go to a studio that had one built into a wall, and if you wanted room or hall ambience, you found a room or a hall. Digital reverbs were obscenely expensive, huge, delicate boxes only suitable for studio racks, and you couldn't hope for a nice huge outer-space ambience without one.

Well, guess what? Yep. This Reverb lets you choose between *Room*, *Hall*, *Plate*, *Spring*, and *Galactic*. (What's a "Galactic" reverb? Try it and see, young padawan.)

The Reverb has common controls for all five of its modes. They are:

- **Decay**- The "size" of the space, which can be controlled with the Effect Modulator
- **Highpass** and **Lowpass**- filters on the reverb input to limit high ringiness and low mud. Each has a cutoff frequency range of 20 Hz to 20 kHz.
- **Predelay**- The time before the onset of reverb, from 0.0 ms to 150 ms. Longer *Predelays* give the impression of larger spaces. Note that the *Spring* doesn't have a *Predelay* setting.

Envelope Filter

The Envelope Filter is a keyboard-gated modulation effect that shapes your sound using a triggered envelope to modulate a resonant filter. Unlike a traditional envelope follower, which responds dynamically to signal amplitude, this effect generates a consistent, pre-defined envelope each time you press a key (or a key is triggered). It’s useful for auto-wah sweeps, synth zaps, and animated textures that evolve based on note input.

The Envelope Filter consists of two main sections: an envelope generator and a resonant filter. In **POLY** mode, each voice has its own filter and envelope, allowing individual expression per note. In **PARA** mode, all voices share a single global filter and envelope for unified sweeps and simpler control.

Envelope Section

SHAPE

Selects the shape of the triggered envelope. Most shapes are one-shot contours (e.g., ramp up, ramp down, triangle) that fire once per keypress. The exception is the square wave, which functions like a repeating LFO (with its speed controlled by the master Tempo control). The envelope's curve determines how the filter modulation evolves over time.

PARA/POLY Switch

- **PARA (Paraphonic)-** One shared envelope and filter for all notes.
- **POLY (Polyphonic)**- Each note triggers its own envelope and filter, enabling more detailed, note-specific modulation.

LENGTH

Controls the duration of the envelope from start to finish. Longer settings stretch the contour for slower filter sweeps; shorter settings result in quick, snappy movement.

ENVELOPE AMOUNT

Sets how much the envelope modulates the filter's cutoff frequency. Higher values yield dramatic sweeps, while lower values create more subtle tonal motion.

Filter Section

CUTOFF

Defines the base cutoff frequency of the filter. The envelope adds or subtracts from this value depending on its shape and depth.

2-POLE/4-POLE Switch

Sets the filter slope:

- **2-POLE (12 dB/oct)**- Smoother filtering.
- **4-POLE (24 dB/oct)**- Steeper filtering.

RESONANCE

Accentuates frequencies near the cutoff point. Higher resonance settings create more pronounced peaks and more dramatic filter movement.

DRIVE

Adds gain before the filter input. Use this to fatten the signal or introduce harmonic saturation for more aggressive tones.

Other Controls

GAIN (Trim Screw)

Adjusts the final output level of the effect. Use it to match the Envelope Filter’s output with your dry or bypassed signal.

MOD/MIX/WET Sliders

- **MOD**- Adjusts the modulation amount applied to the envelope.
- **MIX**- Balances dry and processed signal.

Dual Phaser

One very popular (and very expensive!) effect from the same era as the Odyssey was the **Mu-Tron Biphase**, a dual phase shifter with a glorious sound. Here, have one for free. No, really, it's on us.

The two phase shifters are almost identical in their function sets and parameter ranges. Each one has controls for:

- **Speed**- phaser rate, from 0.01 Hz to 8 Hz, or 8 beats to 1/64th triplet when the **Sync** switch in the lower left corner is On

- A switch lets you choose between synchronizing both Speeds to Phaser 1, or letting the two *free run* independently.
- **Depth**- Amount of the phaser effect
- **Stages**- How many allpass filters are active in each phaser circuit. Each pair of stages creates one sweepable frequency notch, so fewer stages result in a gentler phasing, while more stages produce more aggressive phasing.
  - Phaser 1 can choose between 4 and 8 stages (2 or 4 notches)
  - Phaser 2 can choose between 6 and 12 stages (3 or 6 notches)
- **Resonance**- This adds resonance to give a sharper and more hollow sound.

There's also a **Mix** knob to balance the two phasers; this can be controlled by the Effect Modulator.

MIDI Controllers Setup and the MIDI Tab

Assigning Internal and External Hardware Controls

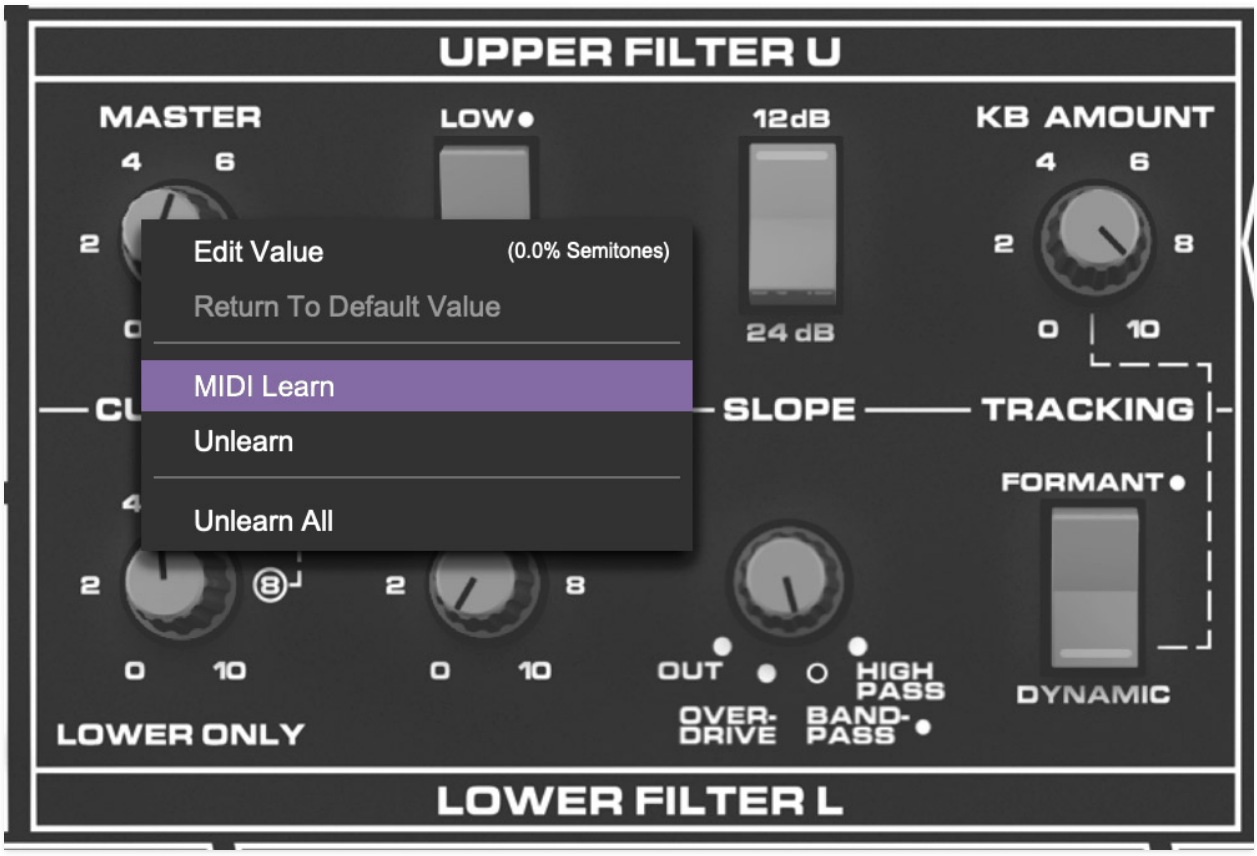
Assigning internal and external hardware controls adds a whole new dimension of control and musicality to patches, and it's really easy to do. The **MIDI Tab** is where all controller assignments can be viewed and tweaked, and we'll go through all of its parameters and functions. We recommend reading this whole section to best take advantage of Spirit's full array of MIDI control assignment possibilities.

First, though, we'll give you a quick look at how to assign an external hardware controller to an Spirit control using MIDI Learn, so you can get started with basic MIDI control while you're learning the fancy stuff.

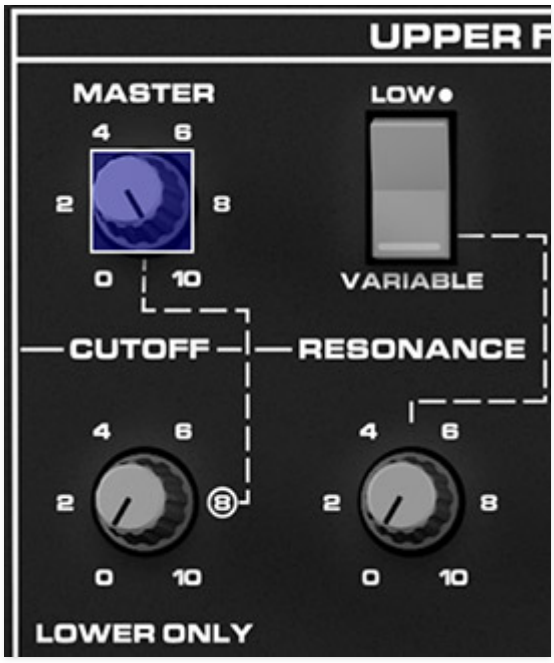
Quick and easy controller assignment

In this example, we'll assign a hardware slider/knob control to the *Upper Filter Master Cutoff*.

Begin by right-clicking on the *Master Cutoff Knob* and selecting *MIDI Learn,* as shown here:



A transparent purple overlay appears over the slider, indicating that it's in MIDI Learn mode:



Now move the desired hardware control device. The purple overlay disappears and the hardware control will move the onscreen knob. If you have second thoughts (or accidentally put the wrong control into learn mode), learn mode can be aborted by right-clicking and selecting *Stop Learning*.

If you later decide you don't like that mapping, right-click the control and select *Unlearn*.

When in MIDI Learn mode, any already-assigned controller numbers will show in squares. These indicate the MIDI continuous controller number for the assigned hardware control (these are also displayed in the MIDI Tab at left).

Once a MIDI controller has been assigned, in addition to real-time control of a Spirit parameter, you'll also be able to record and play back controller data from a DAW.

The MIDI Tab

This is command central for all MIDI controller assignments. Here you'll be able to see information about all currently assigned controllers and adjust control ranges.

To view or hide the MIDI Tab, click the *MIDI* button in the purple top toolbar:

Here's what a typical set of assignments in the MIDI Tab might look like. Let's take a tour around the MIDI Tab:

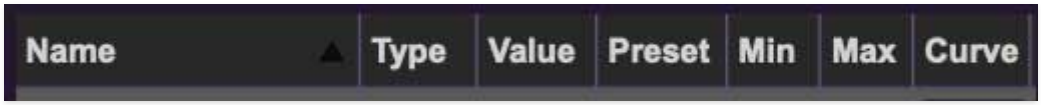
MIDI Learn button- This is almost exactly the same as enabling MIDI Learn mode by right-clicking a control. Click the *MIDI Learn* button to enter learn mode (all controls turn purple). Unlike right-clicking on specific knobs, where Spirit automatically exits controller assignment mode, clicking the *MIDI Learn* knob "stays on" to enable assignment of multiple hardware controls. This is handy for quickly assigning a bunch of sliders or the buttons of a grid-style controller.

To assign multiple controls, click *MIDI Learn*, click an on-screen control, move the desired hardware knob or slider, continue clicking and assigning on-screen controllers until all desired controls are assigned, then click *Stop Learning* to exit learn mode.

Remember that a single hardware knob/slider/button isn't limited to controlling just one parameter - a single hardware controller can simultaneously operate as many controls as you'd like.

New Mapping Type- This popup menu selects whether newly assigned MIDI mappings will be global (affects all sounds and doesn't change when different presets are selected) or saved with individual presets.

MIDI Tab Columns



Name- Displays the name of the parameter being controlled.

Type- There are five possible types of controller automation in Spirit:

- **Note**- Notes played on a MIDI keyboard controller, expressed as C-1 to G9
- **CC (MIDI Continuous Controller)**- The standard 128 MIDI controller numbers as defined in the MIDI spec. More specifically, these are the controllers transmitted by hardware knob and slider controls. MIDI CC's can be used to control parameters in real-time or recorded and played back within DAW software.
- **MMC (MIDI Machine Control)**- The MIDI control protocol for tape machine-style transport controls. Back in the dark ages, this was used to control old TASCAM and Fostex reel-to-reel monsters, but it's useful if your MIDI controller has tape-style transport control buttons.
- **Aftertouch**- Some keyboard controllers transmit controller data when keys are pressed and released as they're held down. The vast majority of keyboard controllers with aftertouch transmit "mono" aftertouch only; in other words, aftertouch data is the sum of all keys to one single data stream. Spirit responds to mono aftertouch as well as poly aftertouch, provided your USB/MIDI controller is poly AT capable.
- **Key**- This allows keys of the computer QWERTY keyboard to act as button controls for Spirit's onscreen controls.

Value- Displays the specific automation controller. In the case of a *Note* this would show a MIDI note number (C-1 to G9, for a MIDI CC, this would be the MIDI CC controller number, etc. Clicking on the value opens a pop-up menu where all values are displayed and can be selected.

Preset- This slider works in conjunction with the *New Mapping Type* menu. In the left position (gray background), the MIDI mapping is global (affects all sounds and doesn't change when different presets are selected), in the right position (lavender background), the MIDI mapping is saved with, and only affects the current sound preset.

The *Preset* switch is super nifty, because it means MIDI mappings can easily be set to global or per-preset status at any time. (A lot of folks asked us for this feature.)

Min- Sets a limit on the lowest value any automation control can set a mapped controller to. This actually recalibrates the range of the automation controller to the remaining parameter range.

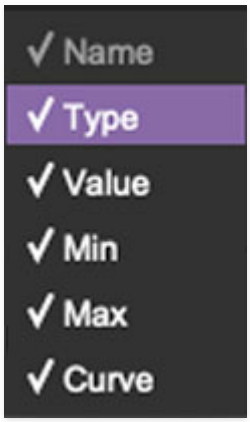
Max- Sets a limit on the highest value any automation control can set a mapped controller to. This actually recalibrates the range of the automation controller to the remaining parameter range.

Not only can parameter ranges be limited via the the *Min* and *Max* knobs, mapped control destinations can be *inverted* – just set the *Min* knob value higher than the *Max* knob value.

Limiting and inverting parameter ranges with the *Min/Max* controls is particularly useful when setting up a single hardware control to operate multiple parameters. Combined with the *Curve* control, these capabilities let you create powerful and finely tuned "macro" control combinations, all activated from one MIDI control.

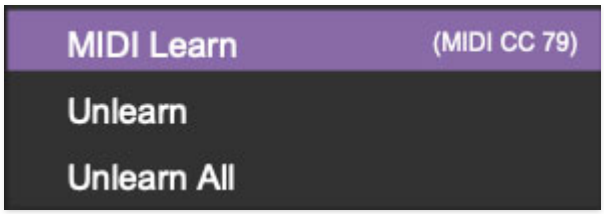
Curve- These allow the customization of how incoming MIDI CC controls affect the movement of Spirit's onscreen controls, ranging from exponential to linear to logarithmic curves.

MIDI Tab Column Configuration Right-Click Menus
Right-clicking anywhere in the top row (*Name*, *Type*, *Value*, etc.) displays the **Column Configuration Menu**:



Checking/unchecking these allows you to hide or display each column. This has no effect on control assignments, it just cleans up the view when you don't need to see certain things.

Right-clicking on an assigned parameter opens this pop-up menu:



It offers the following operations:

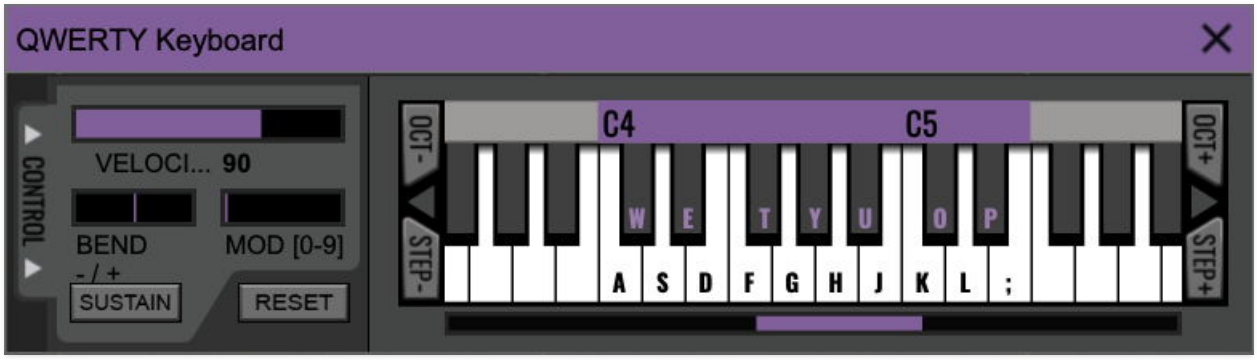
MIDI Learn- This is used to change the controller assigned to a particular parameter.

Unlearn- Deletes the selected automation parameter.

Unlearn All- Deletes all controller assignments for the patch. Spirit will display a warning dialog prior to deletion in order to thwart potential unlearn-related disasters.

QWERTY Musical Typing Keyboard (MTK)

Spirit can be played by clicking its onscreen keyboard with a mouse or trackpad, but if you don't have a MIDI keyboard attached to your computer, there's a better way - your computer's QWERTY computer keyboard can be used to play notes. We call this the **Musical Typing Keyboard** (**MTK**). Following is a list of MTK keyboard modifiers and functions:



Opening and Closing the MTK - Click the the circular keyboard icon in the top toolbar. To close the MTK, click the keyboard icon in the top toolbar, or click the *X* in the top right corner.

Play Notes- To trigger notes, press the corresponding computer keyboard key or mouse click the onscreen keys.

Adjust Currently Visible MTK Range- Slide the purple scroll bar horizontally to adjust the currently visible keyboard range.

Adjust Overall Visible Keyboard Range- Clicking and dragging the right edge of the MTK window allows the overall size of the window to be adjusted. This lets you view more or less of the onscreen keyboard. Note that the MTK window's borders cannot exceed the overall outside dimensions of the Spirit window.

Shift Range Up/Down Octave- Click the *OCT-* and *OCT+* buttons at the top left and right of the onscreen MTK. The current range is displayed above the keyboard.

Shift Range Up/Down Semitone- Click the *STEP-* and *STEP+* buttons at the bottom left and right of the onscreen MTK. The current range is displayed above the keyboard.

Hide/View Controllers- Clicking *CONTROL* at the far left hides and displays velocity, bender, mod, and sustain control parameters. Hiding the control view makes more space available for the keyboard.

Pitch Bend- To pitch a note or notes, press the + or - computer keyboard keys while playing a note. Bend depth is determined by the setting of the *Pitch Bend* slider above the keyboard in Spirit's UI. Notes can also be pitchbent by clicking the mouse in the *Bend* area.

Mod Wheel- To add mod wheel modulation, press the number keys from *0-9* (above the character keys) while playing a note. The modulation amount will vary from none (*0*) to full modulation (*9*). Note that modulation will "stick" at the selected number; to disable modulation, click the *0* key. Mod can also be engaged by clicking the mouse in the mod bar area.

Sustain- The *Sustain* button mimics the functionality of a standard sustain pedal. Click the [TAB] key to engage sustain, or [SHIFT]+[TAB] to lock it. The *Sustain* button can also be engaged by mouse clicking it.

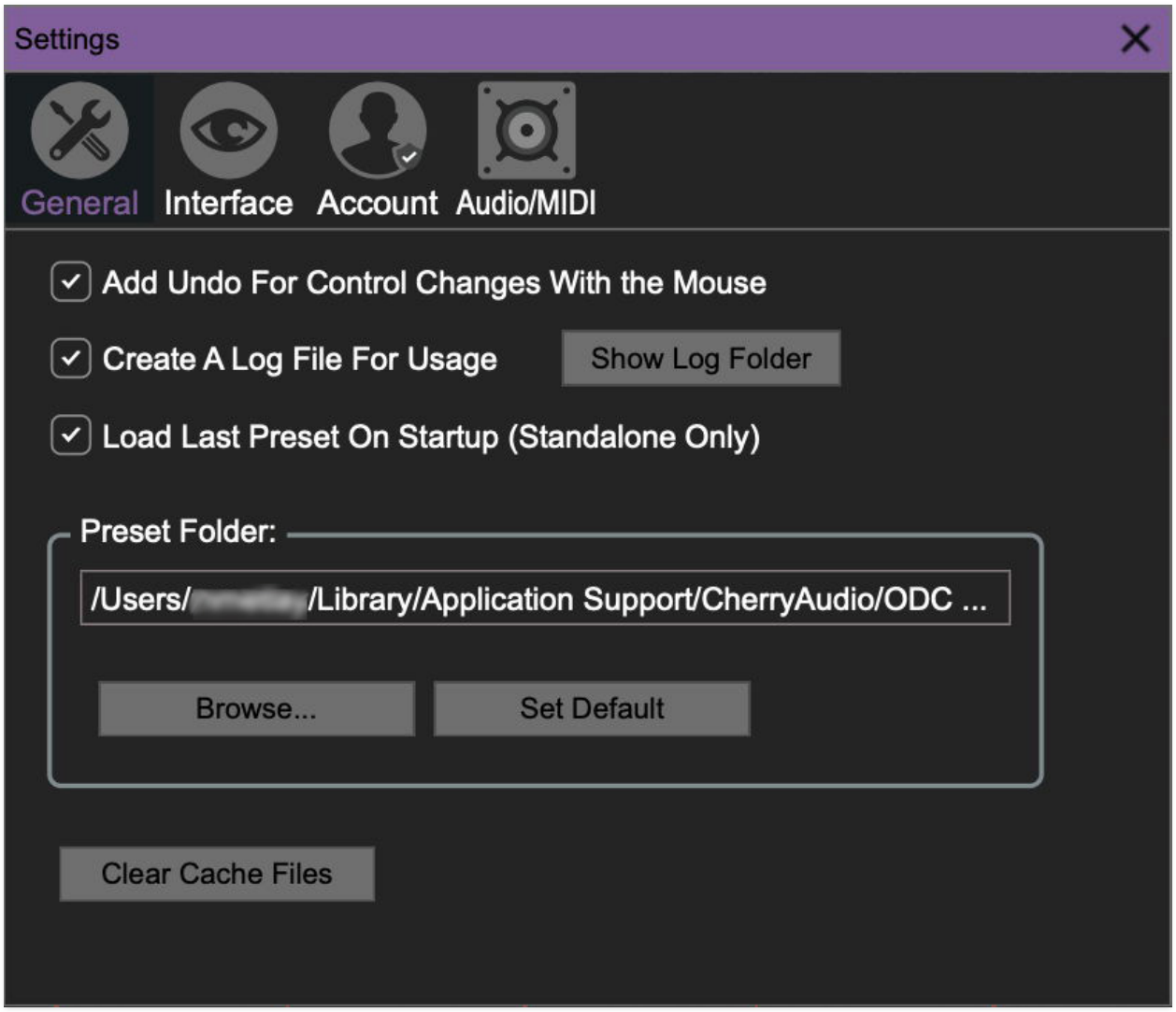
Reset- Initializes all MTK parameters including keyboard range and control parameters.

Settings

Clicking the **Settings** gear opens a window with multiple tabs for configuring various "under-the-hood" settings. These are mostly set-and-forget kind of parameters - all the stuff you'll want to tweak will be on the main display, as it should be!

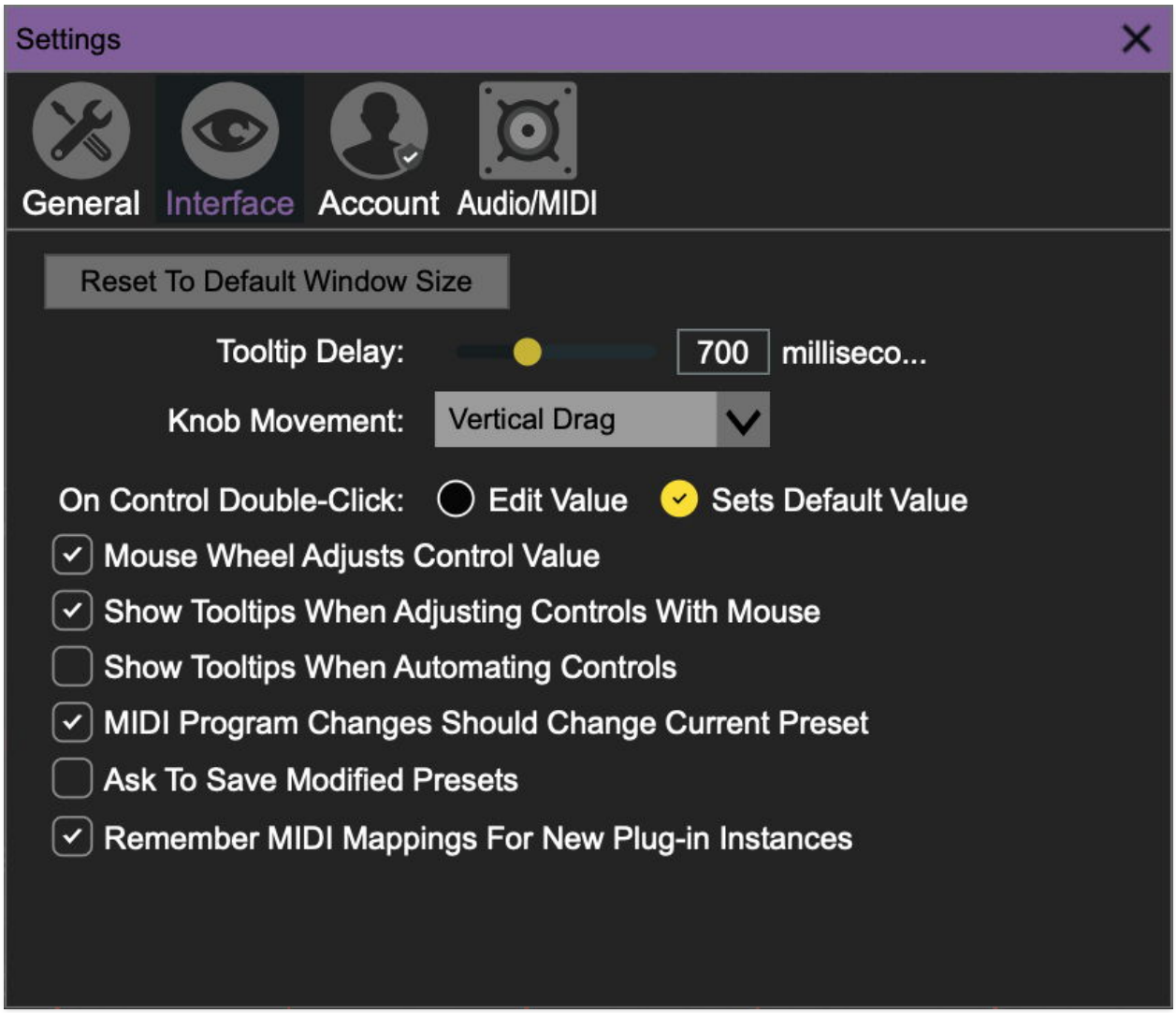
The Settings tabs are: General, Interface, Account, and (on the standalone version of Spirit) Audio/MIDI.

General



- **Add Undo For Control Changes With the Mouse**- Enabling this allows undo of knob/slider/button adjustments. You'll want this on if you want the ability to undo all aspects of patch editing and programming.
- **Create A Log File For Usage-** This creates a text doc of all of Spirit's internal and routines during use. It is mainly intended for our tech staff should you experience any issues. Clicking *Show Log Folder* opens the folder containing Spirit log file docs.
- **Load Last Preset On Startup (Standalone Only)**- Automatically loads the last preset used when Spirit standalone version is started.
- **Preset Folder-** Displays the current location of Spirit's sound presets. This can be changed by clicking and typing in the field.
  - **Browse...** - Displays the current location of preset folder in the file manager.
  - **Set Default-** Sets the current displayed *Preset Folder* path as the default location
- **Clear Cache Files-** Deletes all log files, temporary sounds, and the image cache.

Interface



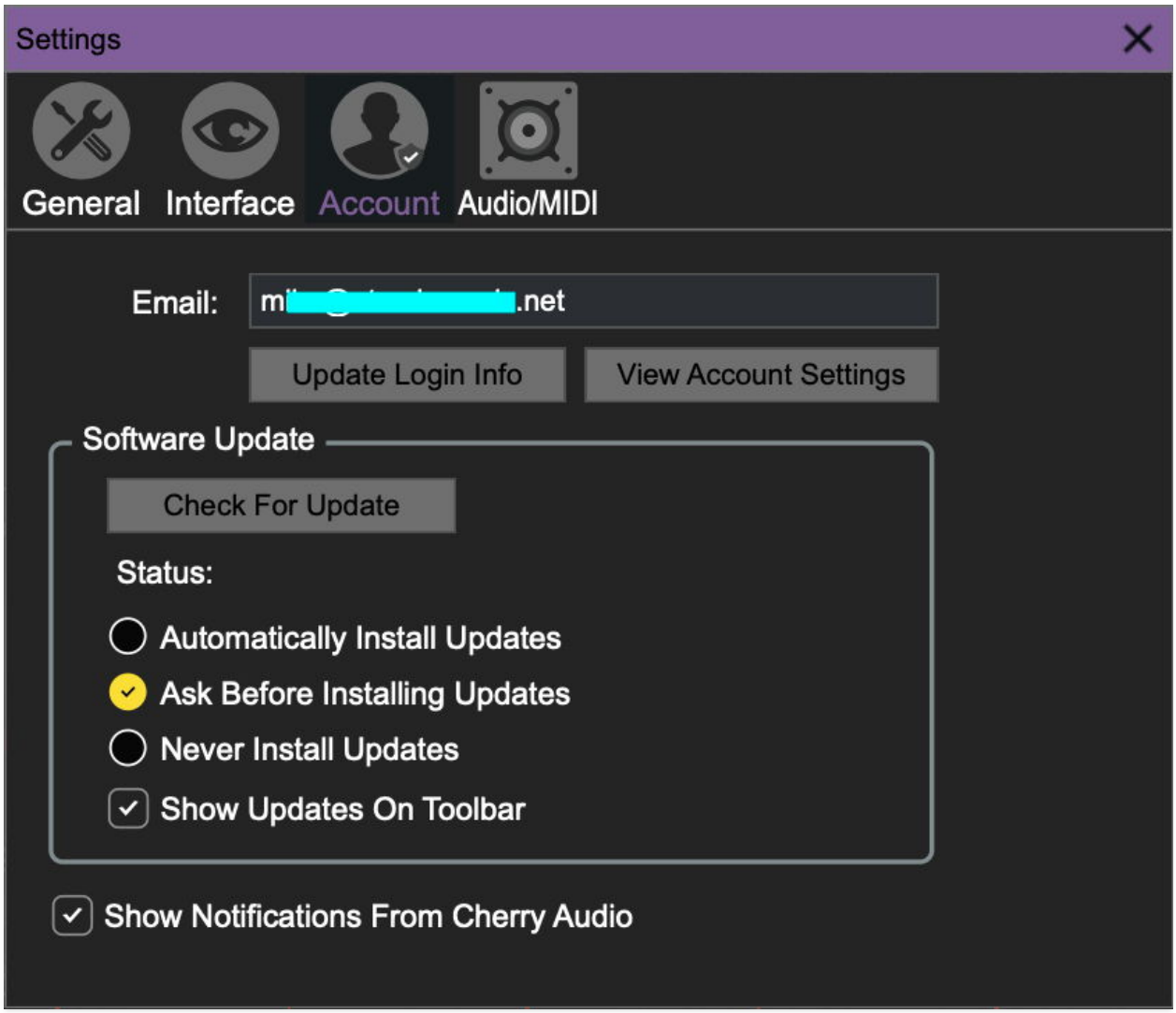
Allows customization of Spirit's user interface settings.

- **Reset To Default Window Size-** Resets the Spirit workspace to default size. Use this to reset the window size if the window somehow becomes too large for your display and can't be resized (pretty sure we fixed that bug a while back though!).
- **Tooltip Delay-** Tooltips are those informative bits of text that pop up when hovering over a control (go ahead and try it, we'll wait...). The *Tooltip Delay* setting defines how long you must hover before the tooltip pops up.
- **Knob Movement-** Defines how mouse movements relate to turning onscreen knobs. It defaults to *Vertical Drag*, but can be changed to *Horizontal Drag*, or *Rotary Drag* if you're one those folks that cut their teeth on the *Steinberg Model E* VST back in 2000.
- **On Control Double-Click**- Defines what happens when the mouse is double-clicked on a control. If *Edit Value* is selected, an exact number can

be entered by typing the number and hitting [ENTER] or [RETURN]. If *Sets Default Value* is selected, double-clicking a control resets it to its default value.

- **Mouse Wheel Adjusts Control Value-** Enabling this lets you adjust knob, slider, and switch values by moving the mouse wheel. This works great with a standard mouse wheel, but you'll want to disable it if you're using an Apple Magic Mouse (which will move the control AND scroll the window).
- **Show Tooltips When Adjusting Controls With Mouse-** Displays parameter tooltips/values when the mouse is hovered over a control or as a control is moved with mouse clicked.
- **Show Tooltips When Automating Controls-** Displays parameter tooltips/values next to controls any time a control is changed, i.e. if a control is moved via an assigned MIDI controller or a *Perform* panel knob, etc.
- **MIDI Program Changes Should Change Current Preset-** Allows MIDI program change messages to change Spirit patches.
- **Ask To Save Modified Presets-** This opens a dialog window asking if you'd like to save changes if a patch has been edited and a new patch is selected. If you're the type that likes to click through presets and tweak a control here and there, it can be annoying to have a window pop-up asking if you'd like to save every time you switch presets - if you're that person, keep this turned off.
- **Remember MIDI Mappings For New Plug-in Instances**- When enabled, Spirit remembers all global MIDI Tab controller settings.

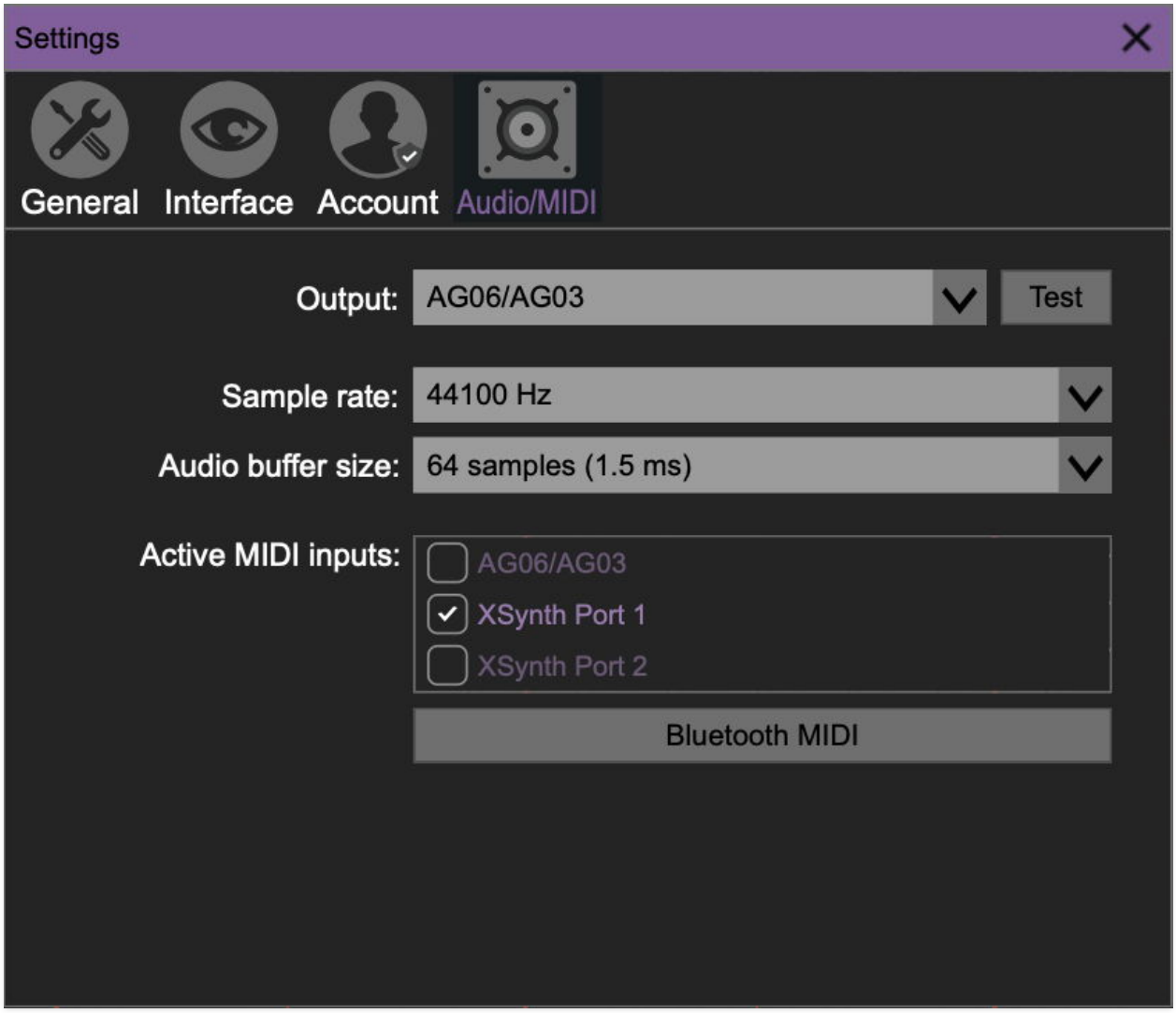
Account



Settings for your personal login information and account.

- **Email**- Displays the email address of the current login.
- **Update Login Info**- No, this isn't where you sign up to keep informed of news and tour dates for jazz/rock fusion superstar, and monumental Odyssey player, Herbie Hancock. (That would be **here**.) Clicking this opens the same email and password login screen you'll see when initially launching Spirit.
- **View Account Settings-** This takes you to the Cherry Audio website, where you can login and verify your settings or make changes. This won't work on a computer that's not connected to the Internet. (If it does, consult your local exorcist *immediately*.)
- **Software Update-** Here's where you can manually check for an update, and set up how much Spirit does on its own to keep you updated.
- **Show Notifications From Cherry Audio-** Because hey, we love you, and sometimes just reaching out is the right thing to do.

Audio/MIDI



These are settings for audio and MIDI hardware input and output.

This tab is only visible in the standalone version of Spirit.

- **Output**- Use this drop-down menu to choose a physical audio output source. This defaults to *Built-In Line Output*, i.e. your computer's onboard system audio, but you'll get better fidelity with an external professional audio interface. The biggest audible difference is usually reduced background noise or hum, but external audio hardware also offers greater flexibility in terms of number of inputs and outputs and built-in mic or low-level instruments pres (i.e. electric guitars). The *Test* button will produce a sine wave when clicked; this will help with troubleshooting. In other words, "Why can't I hear anything? Aargh!"
- **Sample Rate-** This sets the global sample rate. Lower sample rates offer better performance, but if you have a fast computer, high sample rates

may offer slightly improved fidelity – or at the very least, they'll give you something to argue about on audio online forums rather than writing and playing music.

- **Audio Buffer Size**- As with any digital audio app, this defines performance vs. note latency, and will largely depend upon computer CPU speed. A professional external audio interface will almost always exhibit better performance than “built-in” system audio. Lower settings will result in less latency (in the form of faster response to notes played), but will increase the chances of audio dropouts or crackling noises.
- **Active MIDI Inputs**- Enable MIDI input sources, i.e. MIDI/USB keyboards, pad controls, MIDI knob/fader control surfaces, etc. Check boxes to enable one or more devices. **If a MIDI/USB controller isn't working in standalone mode, make sure the appropriate box is checked here.** (We put this tip all the way at the end of this manual, to make it extra challenging to figure out why things aren't working. You're welcome!)