Getting Started

Welcome to the **Crumar DS-2**, Cherry Audio's revival of a wonderfully odd Italian synth from 1978. Never heard of it? Don't worry. You're not alone.

The DS-2 isn't one of those era-defining classics with presets you've heard on radio staples and retro playlists. Not even close. This is the kind of forgotten, half-mythical synth you discover by accident on a forum thread populated by sleep-deprived gear archaeologists. Get the picture? You see a blurry photo, someone posts a clip, and you think, "What is that thing?" Then you find a proper demo and realize the answer is… it's trouble.

Not the "my DAW crashed" kind of trouble, mind you. The kind that makes you start rationalizing why you need it and how you're going to find it. It's the kind of white whale instrument that synth nerds obsess over and argue about for no other reason than it exists, it's rare, and it doesn't sound like anything tidy, modern, or even remotely approved of by the internet.

And honestly, in many ways, it’s our favorite kind of synth. Cherry Audio lives for these moments, when some overlooked machine from a back corner of synth history turns out to have a voice that’s still weirdly relevant, inspiring, and capable of making tracks feel like they have a story. Sure, we love the big, famous instruments too, but the real thrill is rescuing the underdogs, the oddballs, the “wait, they actually built this?” designs that never got their proper due. Then we give them modern muscle, better manners, and enough creative options that you can take their original character somewhere new. DS-2 is exactly that kind of treasure: rare, eccentric, and ready to be used for something better than online arguments.

Why It Sounded Odd and Why That's a Good Thing.

The original Crumar DS-2 featured a monophonic synth engine alongside a 44-note fully polyphonic companion engine. This unique combination created a distinctive musical experience when both engines were used together. The unusual split personality of the instrument is a significant reason why it still stands out today.

The original DS-2 didn’t get overlooked because it was bland. It got overlooked because of historical timing and because it didn’t fit in. It arrived with “digital” on the label, but not the sparkly kind of digital that came later. Its Synth section produced tiny stair-stepped waveforms, with no interest in smoothing its edges. That’s why the tone feels jagged, harmonically edgy, and a little feral.

One of DS-2's neat party tricks is pulse-width modulation (PWM) that doesn’t glide, but hops. Instead of a smooth sweep, the pulse width shifts in little steps, which means slow modulation can feel like a pattern rather than a sweep. If you’ve ever wished your PWM movement had more character, DS-2 is your best new bad friend.

Paraphonic Poly

The Poly section is the other half of the story. It’s paraphonic, with a divide-down, saw-like flavor that can go from soft-string nostalgia to buzzy edge depending on how you shape it. And it doesn’t just sit behind the Synth section like a well-behaved pad generator. It has its own personality, and it’s capable of stealing the scene if you let it, especially with a bit of secret sauce we've added in the form of its dedicated 5-slot effects chain.

An Old Soul with New Tricks

And true to form, Cherry Audio preserves all that eccentric DS-2 character, then does what Cherry does best: makes the weird, rare, underappreciated stuff playable again, then hands you a bigger toolkit. You get modern

enhancements, more voices in the Synth section, expanded modulation, performance tools, splits and layers, and loads of effects. In other words, you get the fun parts of owning a strange vintage synth, without the less-fun parts of owning a strange vintage synth.

Technical Assistance

Cherry Audio's unique online store and automatic updating should make installation and 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/

Making the Most of the DS-2's Unique Voices

If the DS-2 were just another vintage-style synth, we'd begin with oscillators, filters, envelopes, and the usual section-by-section tour of the panel. But the DS-2 isn't really a usual anything. Its whole personality starts with a more interesting idea: it gives you a full-featured Synth engine alongside a companion Poly engine with its own set of Pitch, VCA Release, high- and low-pass filters (EQs, really), and Volume controls. If you treat the two engines as musical co-conspirators by combining and contrasting them in creative ways, you can make real synth magic happen. In the 1978 original, Crumar essentially combined a mono synth section with a 44-note polyphonic string section, and that unusual split personality is a huge part of why it still feels distinctive today.

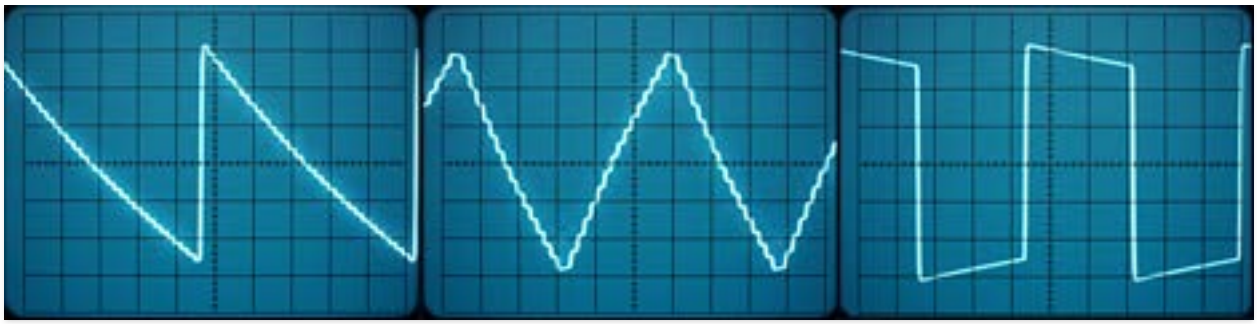
About the Two Engines

The first useful mindset shift is this: Don't approach the DS-2 like a one-voice instrument. Approach it like a layered sound machine with two different kinds of personality. The Synth side gives you the focused, shaped, animated voice you'd expect from a proper well-equipped performance synth. The Poly side gives you additional depth and atmosphere. Used on their own, each has its own charm. Used together, they can produce sounds that feel bigger, stranger, and more alive than either section would by itself. That's the secret here: both personalities working together in ways that let you blend edge and bite with body.

Oscillators That Sound Different

The other thing that makes the DS-2 special is the character of its oscillators. In an attempt to build a synthesizer that didn't have the tuning problems of traditional analog synthesizers, Crumar employed a cutting-edge concept to create oscillators that wouldn't drift.

For each DS-2 waveform in the Synth section, there are digital values. As the oscillator's clock advances, the next value is generated and a digital-to-analog chip (DAC) produces a voltage to match. You can think of this as a sort of primitive sample-playback, though this isn't how any modern sampler works. There's no attempt to smoothly transition from one sample to another. As a result, the waveforms produced have unique harmonics and are unmistakably stair-stepped, as you can see below:



In addition to the above, we've added a 32-sample sine wave to the second oscillator that's anything but pure. Despite the stair-stepped nature of these waveforms, these emulated waveforms are low-aliasing, so you can play very high octaves without hearing aliasing artifacts that you often find in sample-based virtual instruments. And, of course, we've expanded the original monophonic Synth section to 4, 8, or 16 polyphonic voices, added Unison, and a multi-voice mode to introduce per voice variations in pitch, panning, and more.

Similarly, the Poly section of the DS-2 had its own approach to tone generation. It used divide-down oscillators to create square waves and combined them in such a way as to create stair-stepped, pseudo-sawtooth waves. These, too, are harmonically complex, and they sound slightly different than a real sawtooth wave.

Cherry Audio DS-2 employs a similar approach, combining divide-down square waves through identical virtual resistors and using highpass filtering to produce the same "sawtooth" waveforms. We also expanded this section by adding a VCA Release control, so that individual notes can have their own release envelopes. By increasing the release time and adding chorusing and reverb, the Poly section becomes a very faithful reproduction of an analog string synth — and more.

Like the hardware, the Cherry Audio DS-2's Poly section is paraphonic, with a single filter, VCA envelope, and VCA. The same filter cutoff, resonance, and modulation settings that are applied to the Synth section also affect the paraphonic Poly filter. It's an unusual architecture, but very true to the original hardware despite the fact that we've made the synth section fully polyphonic.

Between the two sections, the resulting timbres are neither the glassy, polished sound of later digital synths nor the rounded, buttery sound we associate with classic analog designs. The DS-2's tone has a more jagged, harmonically edgy quality, with a gritty, slightly stepped character that gives it a sound all its own. There's a rawness to it, with rasp and bite.

That unique tone is part of what makes the DS-2 so rewarding to explore. It doesn’t always hand you a perfectly finished sound right out of the gate. Instead, it gives you something more interesting: a voice with personality, grain, and texture. That means the DS-2 often shines brightest when you play up what makes it distinctive instead of trying to force it into sounding like some other synth you already know.

How to Approach Sound Design on the DS-2

All of the above may change how you build patches. On the DS-2, it often pays to lean into contrast rather than trying to smooth everything flat. Let the Synth engine provide edge, motion, and articulation. Let the Poly engine add size and harmonic mass. Use the Synth side when you want presence. Bring in the Poly side when the sound needs to occupy more space. And if a patch starts feeling too tame, the answer usually isn’t more. It’s smarter layering. A little edge from one section and a little breadth from the other will usually get you further than piling on extra modulation (or effects) and hoping for the best.

So before you dive into the details, keep in mind that the DS-2’s greatest strength isn’t just that it has a Synth engine and a Poly engine. It’s that they complement each other. Start by exploring each side on its own, then combine them. That’s when the DS-2 shows its true sonic colors.

Choosing Synth, Poly, or Synth + Poly

The Routing knob at the far right of the front panel is the switchboard for the instrument’s overall voice architecture. It lets you choose among three operating modes: Synth, Poly, and Synth + Poly. When the Routing knob is set to Synth, you’ll hear only the Synth engine, and the Poly section is effectively out of the picture. When it’s set to Poly, the opposite is true: the

Poly engine becomes active, and the Synth oscillator section is bypassed. When it's set to Synth + Poly, both engines are active together, letting you blend the sharper, more focused voice of the Synth side with the broader, more spacious character of the Poly side.

Why the Routing Knob Matters So Much

This is an important navigation point on the panel, because it helps explain why certain controls seem active in one patch and not in another. If the Routing knob is set to Synth, the Poly engine controls won't contribute to the sound. If it's set to Poly, the main Synth engine controls won't define what you hear in the same way. And if it's set to Synth + Poly, both sections matter, which is where the DS-2 starts showing off a little. So anytime a sound isn't behaving the way you expect, this is one of the first places to check.

Three Ways to Think About the DS-2

In practical use, these three modes give you three different ways to think about the instrument. Synth mode is ideal when you want a more direct, focused sound and want to work primarily with the DS-2's main synth voice. Poly mode shifts attention to the poly side, which is useful for layered harmonic textures, and sounds that need more width or spread. Synth + Poly mode is where things get especially interesting, because it lets you treat the two engines like complementary layers. One can provide bite, articulation, and motion, while the other adds body, and harmonic weight.

Dedicated Effects for Each Voice

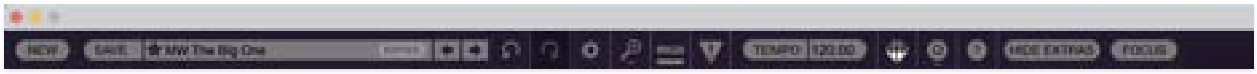
That contrast becomes even more powerful because the DS-2 doesn't just give you two sound engines. It gives each engine its own dedicated effects chain. That's a big deal. It means Synth and Poly don't have to differ only in oscillator character or envelope behavior. They can also live in different sonic spaces. You might keep the Synth side dry, sharp, and upfront for clarity and attack, while giving the Poly side chorus, delay, or reverb for width and atmosphere. Or you might do the opposite and turn the Synth engine into a smeared, animated texture while the Poly side stays focused and supportive.

Either way, the point is the same: effects on the DS-2 are more than polish. They're part of the sound design architecture.

A Good Workflow for Programming

A good rule of thumb is to decide on your Routing mode early, before getting too deep into editing. Ask yourself a simple question: Do you want this patch to be carried by the Synth engine, the Poly engine, or the interaction between both? Once you answer that, the rest of the panel becomes easier to navigate and the instrument starts to feel more intuitive. The DS-2 isn’t difficult, but it does reward this kind of top-down thinking. Choose the voice architecture first, then shape the sound inside it. Then use the dedicated effects chains to decide how close together, or how dramatically different, those two voices should feel. That approach will save time, reduce confusion, and get you to the fun part faster.

Tip: If a patch seems confusing, start by checking the Routing knob in the Poly section. It tells you which engine, or combination of engines, is actually in play. Then check which effects chain you’re hearing. On the DS-2, those two choices together can completely change how you should read the rest of the panel.

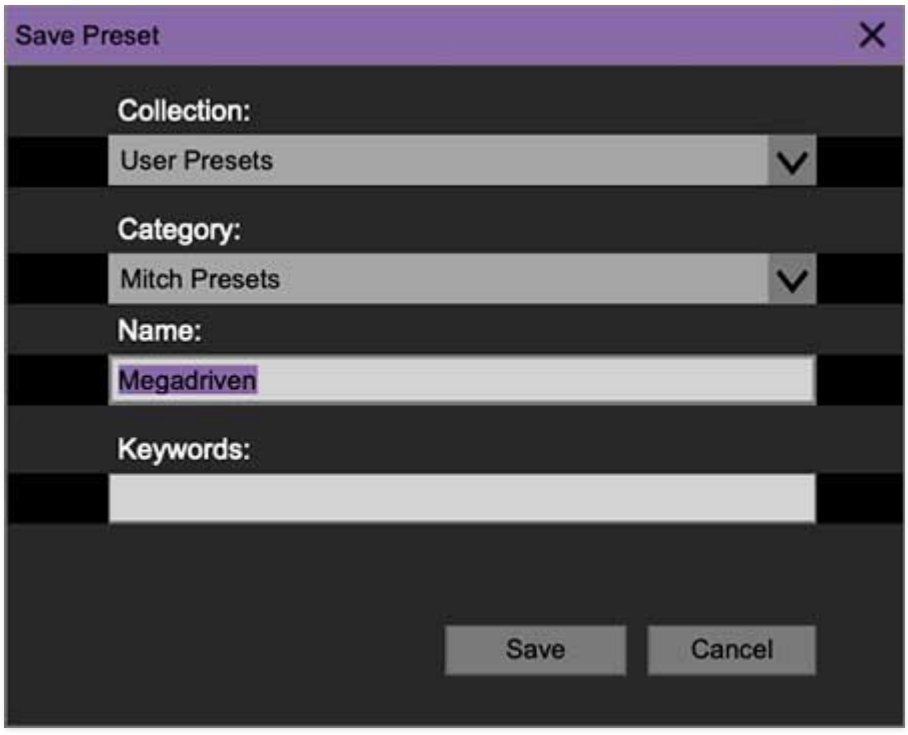


Top Toolbar and Preset Browser

Before we dig into the specifics of the synth, let's talk about some of the stuff that you'll be using every time you fire up this or any other Cherry Audio instrument plug-in: the Toolbar and Preset Browesr.

The purple strip at the top of the 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.

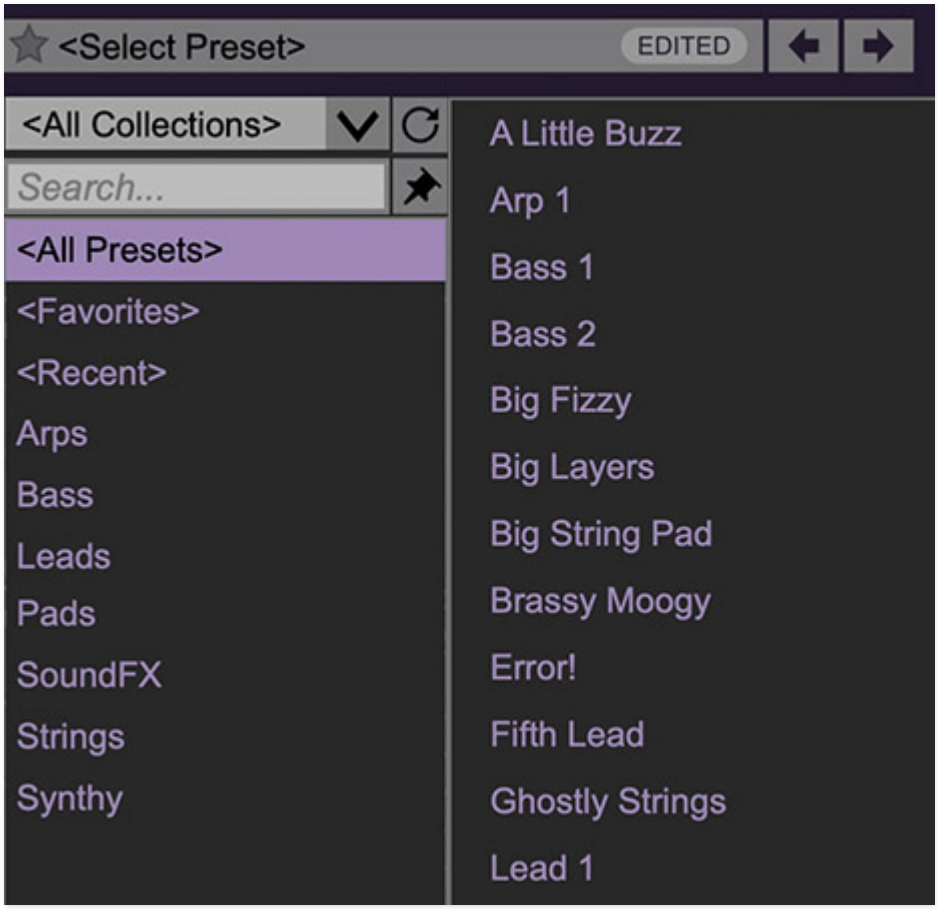


Save- Use this to save patches. There are a couple of levels of hierarchy:

- **Collection**- This is the top level of organization, and contains entire "sets" of presets. The DS-2 *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.

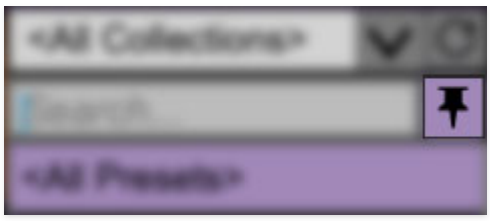
- **Categories**- Within each *Collection* are a number of sound categories. As with collections, you're free to create as many categories as you like. To create a category, click in the *Category* text field of the *Save* dialog window and type a new category name.
- **Patch**- A patch is an individual 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.

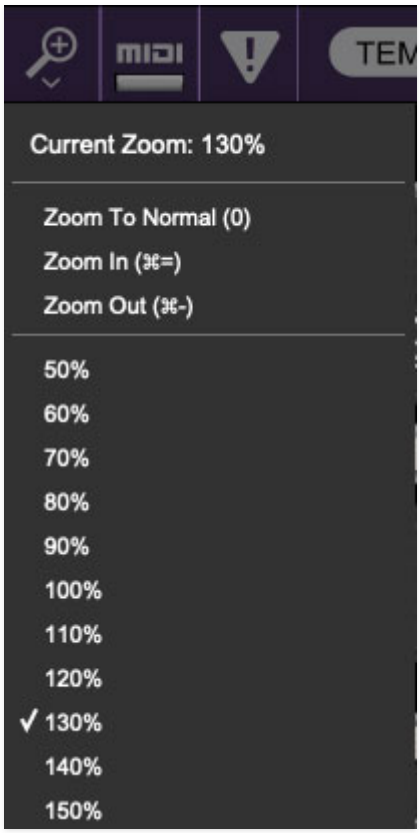
Importing Presets with drag-and-drop

Presets can be imported individually 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.

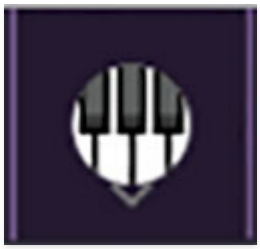
Compressed zip files containing multiple sounds can also be drag and dropped onto the UI. This works the same as with single sounds, but instead of the Save Preset dialog, you'll see the Import Preset Collection dialog. The presets will be added as a new collection and available in the categories for which they were tagged.



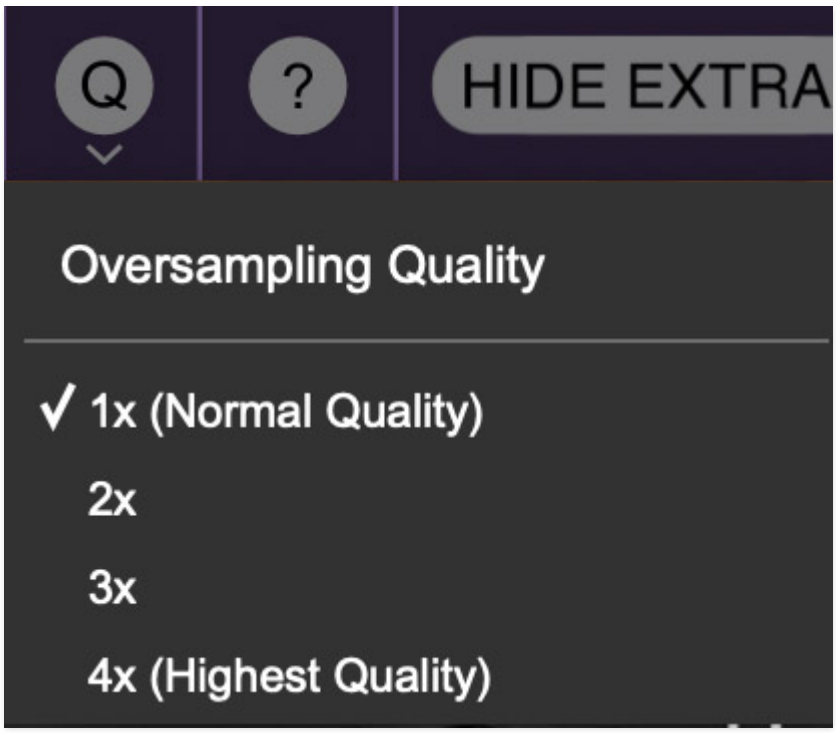
Zoom Magnifying Glass- Click to resize the interface. Selecting *100%* returns the user interface to native size.

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 DS-2'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, DS-2'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, DS-2'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 DS-2's pitch and modulation wheels panel.

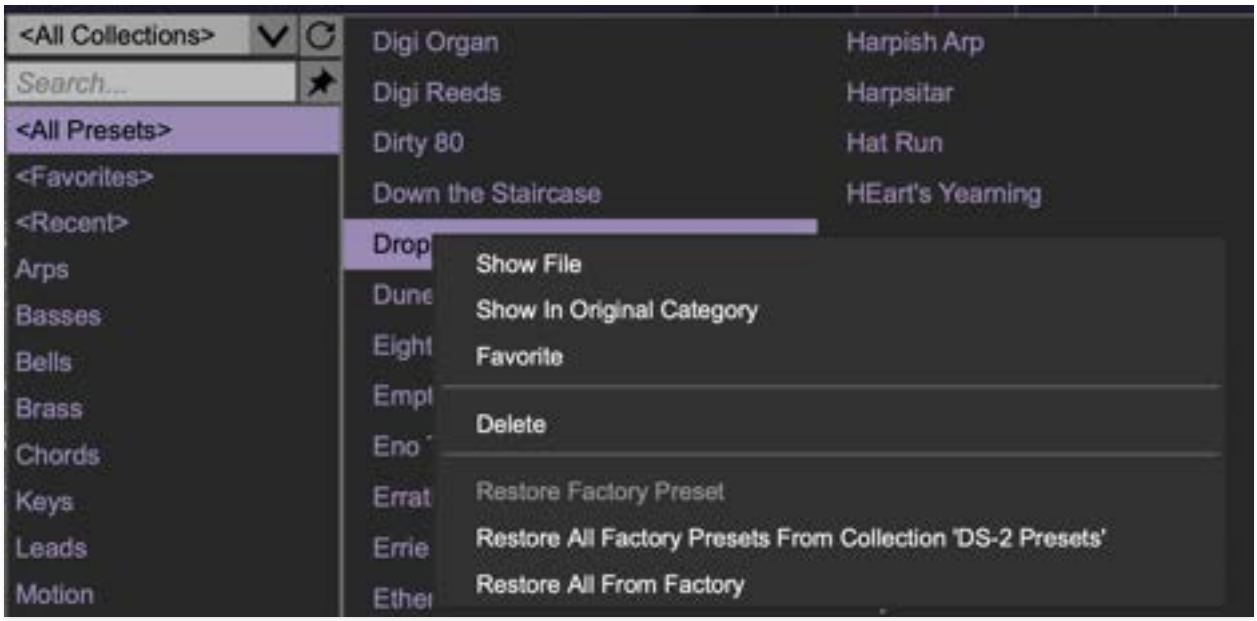
Focus Button

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 DS-2'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*.

DS-2 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 'DS-2 Presets' - If any patches from the "factory" DS-2 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 DS-2 bank mentioned above is the only factory bank, so this function and the *Restore All Factory Presets*

How the DS-2 Behaves as an Instrument

At this point, we've looked at the DS-2 in terms of tone and the way Synth and Poly can be layered together. This section is about something slightly different. It's about behavior. In other words, how the DS-2 plays, how it assigns voices, how it stacks them, and how it can be made to sound tight, wide, orderly, unstable, or half-broken on purpose.

This is one of the sections that makes the DS-2 feel especially modern and flexible. The controls here determine whether the synth behaves as a mono instrument, a stacked unison monster, a more conventional polyphonic synth, or organic per-voice warmth in **Multi** mode. Add in note priority, unison detune, voice count, output limiting, and Synth panning, and this area becomes a big part of how the instrument feels under your fingers.

Synth Modes

The **Synth Modes** knob selects one of four operating modes for the Synth engine: **Mono**, **Unison**, **Multi**, or **Poly**.

In **Mono** mode, the Synth engine plays one note at a time. This is the classic mode for basses, leads, sequences, and any sound that should feel focused and immediate. Mono mode is also where note-priority behavior matters most, because when you play overlapping notes, the synth has to decide which note wins.

In **Unison** mode, multiple voices are stacked together on a single note. The number of stacked voices is determined by the **Voices** selector, so if Voices is set to **4**, **8**, or **16**, that is how many voices are layered in the unison stack. This is where the DS-2 can become huge and dense.

In **Multi** mode, the synth still uses multiple voices, but instead of simply stacking them identically, it lets you introduce per-voice differences in pitch, pan, filter cutoff, VCA delay, and VCA release. This is one of the most distinctive features in the whole instrument. It lets the DS-2 behave less like a conventional polysynth and more like a collection of related but slightly different voices.

In **Poly** mode, the Synth engine behaves like a standard polyphonic instrument, with voices distributed across played notes in the usual way. This is the most straightforward mode for chords and more traditional multi-note playing.

Tip: Start with **Mono** when you want precision, **Unison** when you want size, **Poly** when you want normal chord behavior, and **Multi** when you want motion, spread, and note-to-note variation.

Routing

The **Routing** knob determines which engine architecture is active: **Synth**, **Synth + Poly**, or **Poly**.

In **Synth** mode, only the Synth engine is heard. In **Poly** mode, only the Poly engine is heard. In **Synth + Poly**, both engines are active together. We've covered the musical importance of this earlier, but it's worth restating here because it works hand in hand with the Synth Modes control.

The key thing to remember is that **Synth Modes** determines how the Synth engine behaves, while **Routing** determines whether you're hearing the Synth engine, the Poly engine, or both together.

Tip: If a patch seems confusing, check **Routing** first, then **Synth Modes**. Those two controls together explain a lot.

Voices

The **Voices** selector chooses the global voice count: **4**, **8**, or **16**.

This setting applies globally to the instrument's voice behavior. In **Poly** mode, it determines the maximum number of notes available. In **Unison** mode, it determines how many voices are stacked on each note. In **Multi** mode, it determines how many total voices are available for cycling, spreading, or per-voice variation.

The difference is not just about more notes. Higher voice counts can change how thick Unison feels, how elaborate Multi behavior becomes, and how much complexity the synth can sustain before notes begin stealing from one another.

Tip: Use **4 voices** when you want a tighter, more constrained feel or a smaller unison stack. Use **8** as a flexible middle ground. Use **16** when you want the widest unison spreads, the richest Multi behavior, or plenty of room for sustained playing.

Last Note / High Note

The **Last Note / High Note** switch sets note priority behavior for monophonic playing.

In **Last Note** mode, the most recently played key takes priority. This is the most common and generally most fluid choice for leads and expressive mono

playing, because it follows your hands naturally as you overlap notes.

In **High Note** mode, the highest note currently held takes priority. This can be useful for certain lead styles, especially when you want upper notes to cut through or you want a more vintage, performance-specific kind of response.

Tip: **Last Note** usually feels more natural for melodic playing. **High Note** can be great for aggressive solos, held drones with melodic top notes, or any part where you want the upper note total priority.

Unison Detune

The **Unison Detune** knob sets the amount of pitch spread between stacked voices in **Unison** mode.

At lower settings, the unison stack stays relatively tight and focused. As you increase the control, the stacked voices spread farther apart in pitch, producing a thicker, wider, more animated sound. Small amounts add subtle richness. Larger amounts create lush chorusing, orchestral thickness, or outright synth excess.

This control really comes alive when paired with higher voice counts. A small amount of detune across **8** or **16** stacked voices can sound impressively large. A big amount can turn the DS-2 into a wall of animated pitch smear, which can be wonderful or ridiculous depending on your intentions.

Tip: Start with less detune than you think you need. A little goes a long way once you’re stacking a lot of voices.

Tip: For wide unison sounds that still stay punchy, keep **Detune** moderate and let effects handle the extra width.

Multi Mode

Multi mode is where the DS-2 starts feeing organic and even unstable in a very appealing way. Instead of treating every voice as an identical copy, Multi mode lets you offset each voice in specific ways. You can introduce per-voice differences in **Pitch**, **Pan**, **Cutoff Filter**, **VCA Del**, and **VCA Rel**. This allows patches to feel more organic, more animated, more spatially distributed, or simply less uniform and static.

In plain English, Multi mode lets each voice of the Synth section have a bit of its own personality. That can be subtle, like slight detuning and panning differences that make a sound feel more alive. Or it can be dramatic, like intentionally offsetting pitch and filter settings so repeated notes cycle through clearly different tonal states.

Multi mode is one of the best ways to make the digital oscillators of the Synth section feel more organic, less locked-in, and less predictable.

The Multi Controls

The visible Multi panel provides four voice rows, labeled **1**, **2**, **3**, and **4**. Row 1 has red LED buttons that designate the Multi Voice Assignments (see below).

Rows 2, 3 and 4 include five "trimmer" controls that are for offsets for the settings reflected in the Synth section main panel:

- **Pitch -** offsets the pitch of that voice up or down relative to the base patch pitch
- **Pan -** places that voice left, center, or right in the stereo field
- **Cutoff Filter -** offsets the filter cutoff for that voice, making it brighter or darker relative to the main filter setting
- **VCA Del -** offsets the VCA delay for that voice, so some voices can begin slightly later than others
- **VCA Rel -** offsets the VCA release for that voice, so some voices can fade faster or linger longer

Again, note that that the trimmers of rows 2-4 are offset controls, not absolute replacements for the main panel settings, including **Synth Pan** in the panel at the bottom right.

These offsets can be used gently for realism or aggressively for stylized movement and voice differentiation.

Tip: Small **Pitch** and **Pan** offsets are often enough to make a patch feel wider and more alive without sounding obviously effected.

Tip: **Cutoff Filter** offsets are especially useful for giving repeated notes a subtle analog-style inconsistency.

Tip: **VCA Del** and **VCA Rel** are great for making notes start and end unevenly, which can create a more natural or more haunted feel depending on how far you push them.

Four Visible Rows, More Total Voices

When the global Voices setting is 8 or 16, the four visible rows do not represent all voices at once. Instead, they represent the currently selected block of four voices.

In other words, the panel always shows four voice rows at a time, but those rows can address different groups of voices depending on the current voice count and selection state. This lets you edit large voice sets in manageable groups of four rather than trying to cram sixteen sets of controls into one screen and ruin everyone’s afternoon.

So in 8-voice mode, the display cycles through two groups of four voices. In 16-voice mode, it cycles through four groups of four voices.

Tip: When editing Multi mode in 8 or 16 voices, keep track of which voice block you're changing. It's easy to think you're editing the sound when you're really editing just one group of four voices.

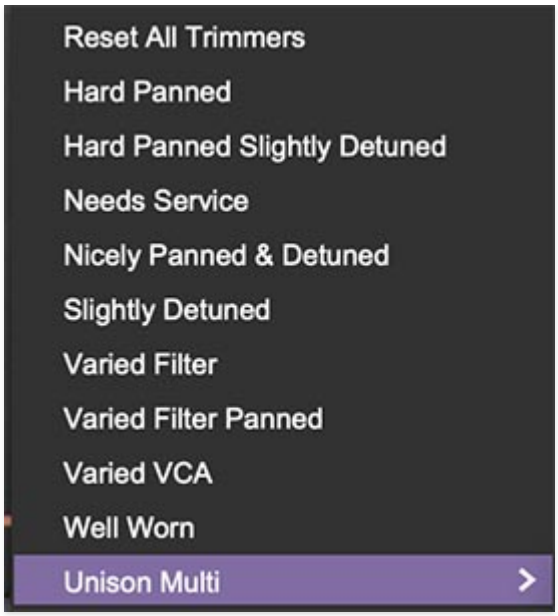
Multi Voice Assignment Buttons

At the bottom of the Multi section are five mode buttons:

- **Unison -** stacks voices together according to the current **Voices** setting. In this state, the synth behaves as a stacked voice instrument rather than cycling through separate voices.
- **Poly -** uses normal polyphonic voice assignment with no special cycling pattern.
- **Cycle Loop -** assigns voices in a round-robin loop, moving through them in order. This is useful when you want per-voice differences to repeat in a predictable sequence.
- **Cycle Ping-P -** moves through voices forward and backward in a ping-pong pattern. This creates a slightly more varied repeating behavior than a straight loop.
- **Cycle Rand -** assigns voices randomly, which makes per-voice differences feel less patterned and more unpredictable

These determine how the voices are assigned or cycled in Multi-related operation.

Tip: **Cycle Loop** is great when you want a repeating pattern of variation. **Cycle Rand.** is better when you want the patch to feel looser and less programmed.



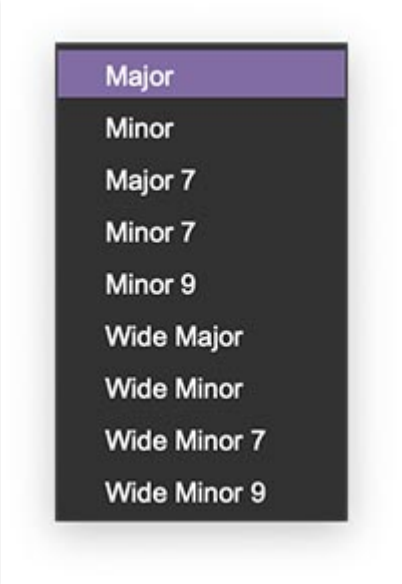
Multi Presets

The Multi section includes a preset menu, accessed by clicking the white triangle at the top right of the Multi controls.

This menu provides a number of useful preset configurations, including:

- **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**

These presets are excellent starting points because they immediately set up the kind of per-voice variation that makes Multi mode shine. Some are subtle. Some are more exaggerated. And at least one, **Needs Service**, is quite extreme.



The menu also includes a **Unison Multi** submenu with preset interval structures such as:

- **Major**
- **Minor**
- **Major 7**
- **Minor 7**
- **Minor 9**
- **Wide Major**
- **Wide Minor**
- **Wide Minor 7**
- **Wide Minor 9**

These are especially useful in stacked voice contexts, where Unison can become a harmonically structured chord stack rather than just a detuned pileup.

Tip: Don’t overlook the Multi presets. They’re one of the fastest ways to understand what this section can do.

Tip: **Well Worn** and **Needs Service** are perfect when a patch feels too pristine and needs some blatant instability.

Tip: The **Unison Multi** presets are great for instant chord stacks, cinematic intervals, and "one finger" patches.

Synth Pan, Limiter, and Master Volume

Synth Pan

The **Synth Pan** knob places the Synth engine only in the stereo field, from left to center to right. This does not pan the Poly engine. It affects only the Synth side of the instrument, which makes it especially useful when you are working in **Synth + Poly** mode and want the two layers to occupy different spatial roles.

Tip: A small amount of **Synth Pan** can create more separation between Synth and Poly layers without making the patch feel lopsided.

Tip: If the Poly layer is broad and stable, nudging the Synth slightly off-center can help it sit more clearly in a dense mix.

Limiter

The **Limiter** switch turns the output limiter on or off. Its job is to help control peaks and keep louder patches from getting too unruly at the final output stage. This is especially useful with stacked **Unison** sounds, heavily modulated patches, bold effects settings, or anything else likely to produce sudden level jumps.

The limiter can also help patches feel a little more solid and controlled, particularly when you’re pushing the synth into bigger, denser territory.

Tip: If a patch gets unexpectedly jumpy or peak-heavy, especially in **Unison** or with aggressive effects, try enabling the **Limiter** before you start tearing the patch apart.

Master Volume

The **Master Volume** knob sets the overall output level of the instrument. This is the final level control for the patch as a whole. Simple, necessary, and refreshingly free of mystery. The LED meter beside it gives you a visual indication of output level, helping you keep an eye on how hard the synth is hitting the output stage.

Tip: When comparing patches, try to level-match them with **Master Volume**. Louder often sounds “better” for about five seconds, which is one of the oldest scams in audio.

Practical Ways to Use This Section

- If you want a strong mono lead, start with **Mono** mode, **Last Note** priority, and **Synth** routing.
- If you want a huge stacked lead or bass, switch to **Unison**, raise the **Voices** count, and add a little **Unison Detune**.
- If you want animated repeated-note variation, use **Multi** mode with **Cycle Loop** or **Cycle Rand.**, then introduce small offsets in **Pitch**, **Pan**, and **Cutoff Filter**.
- If you want instant chord-stacked synth impact, explore the **Unison Multi** presets.
- If you’re layering **Synth + Poly**, use **Synth Pan** to separate the Synth engine slightly from the Poly layer.
- And if the whole thing starts sounding like it might take the roof off, that’s what the **Limiter** is for.

Sound Sources

Meet the DS-2’s Raw Material

Before you shape a sound with filters, envelopes, modulation, and effects, you need something worth shaping. On the DS-2, that starts with two main Synth oscillators, a dedicated Noise source, and the separate Poly section. And as with much else on this instrument, these sound sources don’t always behave quite like other synths.

Part of the DS-2’s distinctive tone comes from the nature of its digital oscillator design. These aren’t silky, ultra-clean modern digital oscillators, and they don’t behave like classic free-running analog VCOs either. Their waveforms have a slightly stepped, harmonically edgy quality (particularly on the triangle and sine waves) that gives the DS-2 its unmistakable bite. There’s a grain to the sound. It’s one reason the synth can sound bold and unusual even before you touch the filters. Instead of trying to disguise that character, the best patches usually make use of it.

Here's what the oscillator's waveforms look like:

The Synth section gives you two oscillators, each with its own level, tuning, octave range, and waveform selection, plus a few tricks that help the DS-2 move from straightforward to bold. The Noise source adds everything from subtle breath and grit to full-on hiss, and synthetic percussion. The Poly section works differently, but it plays an equally important role, especially when you want width, weight, or a contrasting layer that complements the voice of the main Synth engine.

Oscillator 1

Oscillator 1 is the more fully featured of the two main Synth oscillators, and in many patches it acts as the core identity of the sound.

The **Volume** knob sets the output level of Oscillator 1. This is the simplest control on the panel, but it matters more than you might think. Because the DS-2 has two Synth oscillators, Noise, and the Poly layer all contributing to the overall patch, level balance is a big part of patch design. Turning Oscillator 1 up makes it more dominant in the sound. Pulling it back can make room for Oscillator 2, Noise, or the Poly section to take on a larger role.

The **Pitch** knob adjusts Oscillator 1’s tuning over a wide range, up to one octave above or below its current octave setting. Use this for coarse detuning, interval-based tuning, or for pushing Oscillator 1 into a very different register from Oscillator 2. Small adjustments can add thickness and motion. Larger adjustments can create octave spreads or more obviously tuned intervals.

The **Octave** selector chooses the oscillator's base register: **32'**, **16'**, **8'**, or **4'**. Lower settings produce deeper pitches, while higher settings shift the oscillator upward. This is the first place to set the oscillator's general role in the sound. A lower setting is useful for bass foundations and heavier patches. Higher settings can add brightness, edge, or a more cutting lead character.

The **Waveform** selector chooses among **sawtooth**, **triangle**, **square**, and **pulse**. Each waveform has its own personality. Sawtooth is typically the boldest and richest, with plenty of upper harmonics for an assertive, harmonically busy sound. (It is interesting to note that although the original Crumar DS-2 hardware depicted a ramp icon for this waveshape, the synth actually generates a classic sawtooth wave. We have followed their precedent here with our DS-2.) The Triangle wave is softer and more restrained, making it useful when you want a rounder or less aggressive tone. (It also has some of the most noticeable harmonic artifacts.) Square has a hollow, woody quality that often feels a little more characterful and vocal. Pulse is where things get especially interesting, because its tone can change dramatically depending on pulse width.

The **Pulse Width** knob adjusts the width of the pulse waveform from **50%** down to **5%**. At wider settings, pulse sounds fuller and more square-like. As you narrow it, the tone becomes thinner, brighter, and more nasal, with a sharper, more animated edge. Narrow pulse widths can sound wonderfully wiry and strange on the DS-2, especially because of the synth's already distinctive digital character.

The **PW Mod.** knob controls pulse-width modulation. This lets you animate the pulse shape rather than leaving it fixed in one position. On the DS-2, this control can select **LFO 1**, **LFO 2**, **LFO 3**, or **Manual** operation by turning the knob itself. In practice, that means you can either set a fixed pulse-width value or have one of the LFOs continuously modulate it. Pulse-width modulation is one of the easiest ways to make a patch feel alive. Slow modulation adds gentle movement and width. Faster modulation can sound edgy, nervous, or delightfully unstable. And because the DS-2's oscillators already have such a distinctive texture, PWM here can sound especially vivid.

A good way to think about Oscillator 1 is as the sound source that defines the patch's center of gravity. Start by choosing its octave and waveform, then use pulse width or pulse-width modulation to add complexity if the sound needs more motion.

Tip: If a patch feels static but already has enough harmonic content, try pulse-width modulation before reaching for effects. It often adds movement in a more organic, part-of-the-sound way.

Tip: Experiment with the Pulse Width knob and wave shape of the LFO selected you have selected with the PW Mod switch — especially the stepped ramp wave on LFO 2 and LFO 3. You can create some wonderfully weird harmonic effects you won't find on any other synth..

Oscillator 2

Oscillator 2 complements Oscillator 1, but it also brings a few special tricks of its own.

The **Volume** knob sets the output level of Oscillator 2. As with Oscillator 1, this is a major tone-shaping decision, not just a gain control. A quieter Oscillator 2 can add subtle depth or harmonic support. A louder one can create obvious layering, beating, or interval color against Oscillator 1.

The **Pitch** knob adjusts Oscillator 2 up or down by as much as one octave relative to its octave setting. Used subtly, this is perfect for slight detuning and thickening. Used more dramatically, it lets Oscillator 2 become a harmonic partner rather than just a double. Tuning it an octave apart from Oscillator 1 can create broad, commanding sounds. Setting it to an interval can make the synth feel almost paraphonic in spirit, even when it’s doing one-note business.

The **Octave** selector chooses the base register: **32'**, **16'**, **8'**, or **4'**. As with Oscillator 1, this sets the oscillator’s general pitch range and role in the patch.

The **Waveform** selector chooses **sawtooth**, **triangle**, **square**, or **sine**. This gives Oscillator 2 a slightly different flavor palette from Oscillator 1. Our addition of a **sine** waveform here is especially useful, because it gives you a cleaner, more fundamental-heavy option that can either soften the overall sound or create stronger contrast with the more harmonically complex waveforms elsewhere. A sine mixed underneath a brighter Oscillator 1 waveform can reinforce pitch and low-end body without making the patch feel too busy. At the same time, like the triangle wave on Osc 1, the sine wave on Osc 2 has some pronounced harmonic artifacts that make it an interesting choice — especially when used with the Arpeggiator or OSC Sync when the octave-to-octave harmonic differences are easy to hear.

The **OSC Sync** switch has two positions: **Off** and **In**. When sync is enabled, Oscillator 2 is hard-synced to Oscillator 1. In practical terms, Oscillator 2 is forced to restart its waveform cycle in relation to Oscillator 1, which creates the bright, tearing, harmonically animated character associated with oscillator sync. This is classic synth trouble in the best sense. Once sync is engaged, changing Oscillator 2’s pitch no longer behaves like simple retuning. Instead, it changes the harmonic content of the synced sound, producing those sharp, expressive sync sweeps that can make leads and effects sound dramatic and alive. And again, the harmonic artifacts in Osc 2 produce some very interesting and unique sonics when its pitch is modulated with VCF Env to Pitch.

The **VCF Env to Pitch** knob routes the filter envelope to Oscillator 2 pitch. At modest settings, it can add a small pitch snap or attack transient at the start of a note. That’s useful for making basses, leads, and percussive sounds feel more immediate. At higher settings, it can create obvious pitch dives, blips, or synth-zap effects. Combined with oscillator sync, this can get nicely rude very quickly.

A useful way to think about Oscillator 2 is that it’s both a companion and a source of added character. Sometimes it supports Oscillator 1 with extra weight or detune. Sometimes it becomes the source of sync aggression, pitch-envelope attack, or harmonic complexity.

Using Oscillators 1 and 2 Together

If you want a thick, classic-style sound, start by choosing similar octave settings and slightly detuning one oscillator against the other. That creates gentle beating and width. If you want a brighter, more dramatic patch, try setting the oscillators an octave apart. If you want more edge, put a harmonically rich waveform like sawtooth or square on one oscillator and contrast it with a contrasting waveform on the other.

If a patch feels too static, try pulse-width modulation on Oscillator 1. If it feels too polite, try engaging sync on Oscillator 2 then using its Pitch control or VCF Env to Pitch amount to introduce movement and attack. And if the sound starts getting unruly, all the better.

Tip: One easy DS-2 trick is to let **Oscillator 1** establish the main tone, then use **Oscillator 2** for just a little detune, sync bite, or envelope-driven attack. It’s often more effective than making both oscillators equally busy.

Noise

Cherry Audio's DS-2 also adds a dedicated **Noise** source, and it’s more useful than you might realize. Noise isn’t just there for explosions and wind effects. It can add breath, attack, texture, dirt, and realism to an otherwise too-clean patch.

The **Volume** knob sets the level of the Noise source. At low settings, noise can add just a hint of air or grit behind the pitched elements. At higher settings, it becomes a more obvious part of the sound, useful for percussion, harsh effects, aggressive synth brass, or washed-out atmospheric textures.

The **Type** switch selects between **white noise** and **pink noise**. These are labeled **W** and **P**. **White noise** is brighter and more hissy, with a more even spread of high-frequency energy. It’s useful when you want crisp attack, sharper edge, or obvious sizzle. **Pink noise** is softer and more weighted toward the lower and midrange spectrum, so it tends to sound rounder, fuller, and less abrasive. It often blends more naturally into a patch when you want texture without a lot of top-end.

The creative value of Noise is in how it interacts with the rest of the synth. A small amount of white noise can sharpen the front edge of a bass or lead patch. Pink noise can make a layered sound feel fuller and more diffuse. Either one can help a patch feel less sterile and more alive, especially when the main oscillators are doing something tuned or harmonically precise.

Tip: If a patch sounds too clean or pure, add a little **Noise** before doing anything drastic.

Tip: Use white noise when you want bite, fizz, or attack. Use pink noise when you want body, softness, or a more blended wash of texture.

The Poly Section

The **Poly** section isn't just an afterthought or a simple pad layer on the side. It’s a crucial part of the DS-2’s personality. When used on its own, it gives you a different kind of voice from the main Synth engine. When layered with the Synth side, it adds complexity, texture, and contrast in a way that can make patches feel much more sonically interesting.

The **Octave** selector sets the Poly section’s register to **16'**, **8'**, or **4'**. This establishes the basic pitch range for the Poly sound. Lower settings are useful when you want the Poly layer to add body and support. Higher

settings can help it sit above the Synth engine and add definition or a brighter harmonic cushion.

The **Pitch** knob fine-tunes the Poly section by up to a fourth in either direction (five semitones). It allows small detuning for width and chorus-like spread, but it also makes it easy to tune the Poly layer to meaningful intervals against the Synth engine. You can keep it nearly centered for subtle thickening, or push it farther for more obviously layered harmonic relationships.

The **VCA Release** knob (which was not present in the original hardware) sets the release time for the Poly section’s amplifier. This is independent of the main Synth VCA or VCF release settings, and that independence is a big deal. It means the Poly layer can continue trailing off after the Synth sound has already stopped, which is useful for building layered patches with depth. You can keep the Synth side short and punchy while allowing the Poly section to linger behind it like a tail of harmony or atmosphere. That kind of contrast is one of the DS-2’s best tricks.

The **High Pass** and **Low Pass** knobs are best thought of more like simple EQ controls than classic resonant high-pass and low-pass filters. They let you shape the tonal balance of the Poly section by trimming or emphasizing different frequency areas, but they aren’t intended as dramatic synthesizer filter sweeps in the usual sense. The **High Pass** control adjusts the brightness or upper-edge emphasis of the Poly sound, while the **Low Pass** control shapes the lower or fuller part of the spectrum. Together, they let you sculpt the Poly layer so it either blends smoothly with the Synth engine or contrasts with it.

That's important because the Poly section often works best when it occupies a complementary frequency role. If the Synth side is already bright and cutting, you might shape the Poly layer to be softer and fuller. If the Synth sound is heavy and dense, you might trim the Poly layer so it adds air and dimension without getting in the way.

The **Volume** knob sets the overall level of the Poly section. As with the oscillator level controls, this is really a role-setting parameter. Turning the Poly level up makes it a major part of the patch. Pulling it back lets it function as subtle support that's felt more than its heard.

Tip: One of the DS-2’s best layering tricks is to keep the **Synth** sound relatively dry and punchy, then let the **Poly** layer be softer, wider, and longer. This allows you to create depth without making the patch feel crowded.

How to Use the Poly Section Well

If the Synth engine gives you attack, edge, and definition, the Poly section can give you width, softness, and sustain. If the Synth patch feels too dry or narrow, a little Poly can make it grow. If the Synth sound is already busy, the Poly section can be shaped into a simpler, steadier layer that fills out the sound without competing for attention.

Its independent release control is especially powerful. One of the easiest and most effective DS-2 patch-building strategies is to keep the Synth engine relatively short and immediate, then let the Poly section hang on longer. That creates a natural front-to-back sense of depth, with the Synth sound defining the attack and the Poly voice providing the lingering afterglow.

Practical Sound Design Ideas

A strong starting point for a bold DS-2 patch is to build a focused Synth sound first, then bring in the Poly section as support. Set Oscillator 1 to a strong waveform, add Oscillator 2 for detune or sync character, then use the Poly section to widen the sound and soften the edges around it.

For bass patches, keep the Poly section restrained or tuned carefully so it supports the fundamental rather than muddying it. For leads, the Poly section can add a haunting or cinematic tail behind the main Synth voice. For pads and layered textures, the interaction between the edgy Synth oscillators and the smoother, broader Poly section is where the instrument starts sounding especially distinctive.

Noise also plays an important role here. A touch of white noise can help a lead cut. A little pink noise can make a pad feel more atmospheric. And when combined with the DS-2’s distinctive oscillator tone, noise can help push sounds from merely vintage-inspired into genuinely characterful territory.

And if you want the DS-2 to sound most like itself, don’t try to make every part of the patch perfectly smooth and polite. Let the oscillators keep some of their bite. Let the layers contrast. Let the Poly section do a different job from the Synth engine. Let noise add a little breath or grime where needed.

VCF

The VCF is where the raw sound of DS-2 produced by its oscillators, noise, and poly section sound take on shape, contour, and personality. This is the section that controls brightness, focus, bite, and harmonic movement. It can soften the DS-2 into something rounder and more restrained, or emphasize its naturally edgy oscillator character for sounds that feel sharper and more intense.

The DS-2's filter section is unusually flexible because it doesn't just give you the expected **Cutoff** and **Resonance** controls. It also gives you a dedicated envelope with a **delay stage**, variable filter **slope**, selectable envelope **polarity**, **keyboard follow**, **velocity control**, and even a **Repeat** mode that can loop the envelope.

Keep in mind that the main VCF section affects both the Synth and Poly sound engines. Filter Cutoff, ADSR Range, and the VCF envelope controls don't apply only to the Synth side. They also shape the tonal character and envelope movement of the Poly engine.

This can be easy to miss, because the Poly section includes its own High Pass and Low Pass controls. But those controls are better thought of as tone-shaping filters, or EQ-style voicing tools, than as a completely separate voltage-controlled filter section. They're useful for trimming lows, softening highs, or helping the Poly sound sit differently in a layered patch, but the main VCF still provides the primary cutoff behavior and filter envelope motion for both engines.

In practical terms, that means if you adjust the main Filter Cutoff or increase the ADSR Range for a stronger envelope sweep, you'll hear those changes in both the Synth and Poly engines. The Poly High Pass and Low Pass controls can then be used to fine-tune the Poly section's color around that shared filter behavior.

Or, put a little more simply: the Poly controls can shape the flavor, but the main VCF still does the heavy lifting.

Filter Cutoff

The **Filter Cutoff** knob sets the filter's cutoff frequency, which determines how much of the upper harmonic content passes through. Turn it down, and the sound becomes darker, softer, and more restrained. Turn it up, and more upper harmonics come through, making the sound brighter, sharper, and more open.

This is often the first control you'll reach for when shaping the overall tone of a patch. With the DS-2's distinctive digital oscillators, lowering the cutoff can tame some of their wiry edge and produce a more rounded result. Raising it reveals more of that buzzy, stepped, harmonically restless character that makes the synth so distinctive.

Tip: If a patch feels too harsh, try lowering **Cutoff** before changing waveforms. If it feels too tame, open it up and let the oscillators show their teeth.

Again, be aware that the Filter Cutoff (as well as the Resonance, ADSR Range, and VCF envelope controls) affect both the Synth and Poly sound engines. While it's true that the Poly section has its own High Pass and Low Pass controls, these are more like EQs than true voltage controlled filters on their own.

Res.

The **Res.** knob sets **resonance**, which emphasizes frequencies around the cutoff point. At lower settings, resonance adds a little focus and contour. At higher settings, it can make the filter sound more pointed, nasal, or vocal. Push it far enough and the filter takes on a much stronger character of its own.

Resonance is especially useful when you want the filter movement to be obvious. A plain cutoff sweep can sound smooth and broad. A resonant sweep sounds more dramatic and expressive. On the DS-2, resonance can also help carve out a more pronounced tone from the synth's already distinctive oscillators, which can be a very good thing if you're after leads, animated basses, or anything that should sound a little brash.

Tip: A little **Resonance** goes a long way. Too much can dominate the sound quickly, which is great when you mean it and less great when you don't.

ADSR Range

The **ADSR Range** knob controls how much the filter envelope affects cutoff frequency. On many synths, this would be called **Envelope Amount**. Here, it determines the depth of the filter envelope's influence.

At low settings, the envelope has only a subtle effect on the filter. At higher settings, the filter contour becomes much more dramatic. This is what makes the start of a note sweep open, sweep or snap closed, or pulse repeatedly depending on the rest of the envelope settings.

A small amount of ADSR Range can add life and articulation without calling attention to itself. A larger amount can make the filter envelope the focal point of a patch.

Tip: If the filter envelope doesn’t seem to be doing much, look at Filter Cutoff and ADSR Range together. When Cutoff is already set high, the filter is mostly open, so the envelope has less room to sweep. Lower the Cutoff a bit, and the ADSR Range will usually become much more obvious.

Keyboard Follow

The **Keyboard Follow** knob controls how much the filter tracks note pitch across the keyboard. With more keyboard follow, higher notes open the filter more, helping them stay bright and clear as you play up the keyboard. With less keyboard follow, the filter remains more fixed, so high notes can sound darker and lower notes relatively brighter by comparison.

This is one of those controls that quietly makes patches feel more natural and playable. For leads, basses, and many traditional synth sounds, some keyboard follow helps maintain tonal consistency. For more artificial or dramatic effects, reducing it can create a more fixed, characterful filter response across the keyboard.

Tip: If upper notes sound dull or choked compared to lower ones, add some **Keyboard Follow**. If you want a patch to feel more static, or place more weight on the low end of things, back it off.

Slope: 2 or 4

The **Slope** switch selects the filter steepness: **2-pole** or **4-pole**. This is a very useful character switch. It doesn’t just change the type of filtering. It changes the way the filter sounds and feels.

- A **2-pole** setting has a gentler cutoff slope, so the filter sounds brighter in the way it removes harmonics.
- A **4-pole** setting has a steeper slope. It tends to sound rounder, tighter, and deeper, especially in bass patches or more aggressive sweeps.

Tip: Use **2-pole** when you want a somewhat brighter, more open filter response. Use **4-pole** when you want stronger tone shaping, weightier basses, or a more forceful classic synth feel.

Envelope Polarity

The **Polarity** switch selects whether the filter envelope moves cutoff in the **positive** or **negative** direction.

In the **positive** setting, the envelope pushes the cutoff upward from its starting point. This is the familiar behavior used for punchy basses, opening sweeps, plucky synth sounds, and many classic filter-envelope effects.

In the **negative** setting, the envelope moves the filter in the opposite direction. Instead of opening upward, it pulls downward relative to the cutoff setting. This can create more unusual filter shapes and is especially useful for reverse-feeling contours, hollow attacks, or patches where you want the note to begin brighter and then quickly become more restrained in a more dramatic way.

Tip: If the filter envelope feels backwards, that may be because it is. Check **Polarity** before looking elsewhere.

Tip: Negative polarity is excellent for strange percussive sounds, eerie pads, and patches that need to feel less predictable and more character-driven.

The DADSR Envelope

The filter uses a **DADSR** envelope, which adds a **Delay** stage before the usual Attack, Decay, Sustain, and Release stages. This gives you more control over how the filter motion unfolds over time.

The **D** slider at the far left sets the **Delay** time before the envelope begins. With the slider low, the envelope starts almost immediately. Raise it, and the filter waits before beginning its contour. This is useful for slower, staged sounds where you don’t want the filter movement to happen right at the start of the note.

The **A** slider sets **Attack** time, which controls how quickly the filter rises to its peak level once the envelope begins. Short attack times create immediate, punchy filter movement. Longer attack times create a softer, swelling onset.

The second **D** slider sets **Decay** time, which controls how long it takes the filter to fall from its peak down to the sustain level. Short decay gives you a sharp, percussive contour. Longer decay creates a slower, more gradual settling.

The **S** slider sets the **Sustain** level, which determines the level the envelope holds while a key remains pressed. A high sustain value keeps the filter relatively open after the initial movement. A low sustain value means the filter drops away more noticeably after the attack and decay stages.

The **R** slider sets **Release** time, which controls how long the filter takes to return to its resting state after you release the key. Short release produces a quick cutoff return. Longer release allows the filter to close more gradually, which can feel smoother or more atmospheric depending on the sound.

Together, these sliders define the shape of the filter movement. If **Cutoff** sets the starting tone and **ADSR Range** sets the range of the movement, the **DADSR** sliders determine the overall shape.

Tip: The **Delay** stage is especially useful for layered patches. You can let the sound begin one way, then have the filter sneak in later, which creates a more staged, evolving feel.

Tip: For punchy basses and synth brass, try fast Attack, medium-short Decay, low Sustain, and a modest ADSR Range.

V: Velocity Amount

The **V** slider controls **velocity amount** for the filter envelope. In other words, it determines how much your playing strength affects the filter response. With higher velocity amount, playing harder produces a stronger envelope effect or a brighter, more expressive response. With lower settings, the filter behaves more consistently regardless of how hard you strike the keys.

This control is a big part of making patches feel alive and playable. A static patch can sound fine. A velocity-responsive patch sounds like it wants to be performed.

Tip: If a patch sounds good but feels a little dead under the fingers, add some **Velocity**. It’s often the missing ingredient between a programmed sound and an instrument.

Repeat

The **Repeat** switch turns envelope looping off or on. When enabled, the filter envelope repeats rather than running only once per note. This can create pulsing, cycling, or rhythmic filter movement without needing an LFO to do the job. Depending on the DADSR settings, Repeat can produce anything from gentle repeated swells to sharp, mechanical patterns. Because the filter envelope includes a delay stage, the repeated contour can have a different feel from a typical repeating ADSR or a regular LFO sweep.

This is one of the more unusual and fun features in the VCF section. Used subtly, it can add motion. Used aggressively, it can turn the filter into a

repeating rhythmic effect generator.

Tip: Repeat works best when the envelope shape is clear. If nothing obvious seems to be happening, adjust the Attack, Decay, or ADSR Range settings so the repeated contour has something sharp to work on.

Tip: Try Repeat with negative polarity for stranger, less expected pulsing effects.

Practical Sound Design Ideas

- For a classic punchy synth voice, start with moderate Cutoff, a little Resonance, positive Polarity, 4-pole slope, and a filter envelope with fast attack, medium decay, low sustain, and a little release.
- For gentler pads or evolving layered sounds, try 2-pole slope, lower resonance, longer attack, a little Delay, and some Velocity so the patch responds more musically.
- For rhythmic or unusual textures, enable Repeat and experiment with the Delay and Decay sliders. Small changes can produce very different pulse shapes.
- For stranger effects, flip Polarity negative, add resonance, and let the filter move in ways your ears don’t quite expect.

Shaping the Volume of the Sound

In the same way that the VCF shapes the tone, the **VCA** of the Synth section shapes the contour of loudness, from sharp and percussive to slow and swelling to long and lingering. On the DS-2, the VCA section includes its own **DADSR** envelope, plus **ADSR Range**, **Velocity**, and a **Repeat** switch. That gives you a lot of control over amplitude movement, whether you want a bass that snaps, a lead that sustains, a pad that eases in gently, or a repeating pulse that drives the rhythm.

Remember:

- The **VCF** envelope shapes the movement of harmonic tone
- The **VCA** envelope shapes the movement of loudness

On the DS-2, both can be subtle or dramatic, both can repeat, and both can play a major role in the final character of a patch. If you start treating the

VCA as more than just a basic amp section, the synth becomes more expressive.

ADSR Range

The **ADSR Range** knob sets how strongly the VCA envelope affects amplitude. In practical terms, this determines how much of the envelope shape you actually hear in the volume contour of the sound. At higher settings, the envelope has a more obvious effect, making the Attack, Decay, Sustain, and Release stages more clearly defined. At lower settings, the envelope's influence is reduced, resulting is less overall volume.

Tip: If the amp envelope feels flat, check **ADSR Range** before assuming the sliders are the problem.

The DADSR Envelope

Like the filter section, the VCA uses a **DADSR** envelope, which adds a **Delay** stage before the usual Attack, Decay, Sustain, and Release stages. Together, these sliders define the volume shape of the patch. Whether a sound feels punchy, plucky, swelling, sustained, or spacious depends a lot on what happens here.

The **D** slider at the far left sets the **Delay** time before the envelope begins. With the slider low, the sound starts almost immediately when you play a note. Raise it, and the sound waits before fading in. This is useful for staggered textures, slow-building pads, and sounds that shouldn't appear the instant you press a key.

The **A** slider sets **Attack** time, which controls how quickly the sound rises to full level once the envelope begins. Short attack times produce an immediate, punchy onset. Longer attack times create a gentler fade-in, which works well for pads, swells, and less percussive sounds.

The second **D** slider sets **Decay** time, which controls how long it takes the sound to fall from its initial peak to the sustain level. A short decay gives you a tighter, more percussive contour. A longer decay creates a slower settling after the initial note onset.

The **S** slider sets the **Sustain** level, which determines how loud the sound remains while you continue holding a key. High sustain values keep the sound strong and steady. Lower sustain values make it drop away more after the initial attack and decay stages.

The **R** slider sets **Release** time, which controls how long the sound takes to fade out after you release the key. A short release gives you a quick stop. A longer release creates a smoother, more lingering tail.

Tip: For basses and synth brass, start with fast Attack, short-to-medium Decay, moderate Sustain, and short Release. For pads, do almost the opposite and let the sound gradually fade in and fade out.

V: Velocity Amount

The **V** slider controls **velocity amount** for the VCA envelope. This determines how much your playing strength affects the loudness response of the patch.

With higher velocity settings, harder playing produces a stronger amplitude response, making the sound feel more expressive and performance-sensitive. With lower settings, the volume remains more even no matter how hard or softly you play. This is one of the easiest ways to make a patch feel less static. Even a simple sound can become much more playable when it responds naturally to touch.

Tip: If a patch sounds good but feels stiff under the fingers, add some **Velocity**. It often makes the difference between just a preset and a truly expressive instrument.

Repeat

The **Repeat** switch turns amplitude-envelope looping **off** or **in**. When enabled, the VCA envelope repeats rather than running only once per note.

This creates repeating changes in loudness, from gentle pulsing to more obvious rhythmic gating, depending on the envelope settings. Because the DS-2 uses a DADSR envelope rather than a basic ADSR, the repeated contour can be more varied and expressive than a simple on-off tremolo.

Short settings can produce tight, choppy pulses. Longer settings can create rolling swells or repeating waves of volume. And because this happens in the amp section, the effect is often more dramatic and obvious than repeating filter movement alone.

Tip: If **Repeat** seems too subtle, exaggerate the **Attack**, **Decay**, or **Release** settings so the repeating contour is easier to hear.

Tip: Try using **VCA Repeat** together with a more stable filter setting for rhythmic volume pulsing, or combine it with VCF Repeat for more animated, sequencer-like patterns.

How to Use the VCA Envelope Musically

The VCA section is where you decide how the sound behaves as a performance.

For plucked or percussive sounds, use a fast attack, short decay, low-to-medium sustain, and short release. For leads, you'll often want a fast or moderately fast attack, solid sustain, and enough release to avoid abrupt cutoffs. For pads, slower attack and longer release will help the sound feel softer and more spacious.

The **Delay** stage is especially useful when layering the DS-2's engines. A delayed VCA onset can let one part of the patch speak immediately while another fades in a moment later. That can create a more staged, dimensional sound without needing effects to do all the work.

Tip: A little **Delay** on the amp envelope can be very effective in layered sounds. It lets the patch unfold instead of dropping everything at once.

VCA Release in the Poly Section

The **VCA Release** knob of the Poly section (not present in the original hardware) sets the release time for its amplifier. This is independent of the main Synth VCA or VCF release settings. It allows the Poly layer to continue trailing off after the Synth sound has already stopped. It is a relatively simply but surprisingly powerful tool for building layered patches with different articulations.

Practical Sound Design Ideas

For a punchy synth bass, keep **Delay** at minimum, set **Attack** fast, use a short **Decay**, moderate **Sustain**, and short **Release**. Add a little **Velocity** if you want the patch to feel more alive under your fingers.

For a slow pad or ambient texture, raise **Attack** and **Release**, experiment with a bit of **Delay**, and keep **Sustain** fairly high so the sound stays present once it arrives.

For rhythmic pulsing sounds, enable **Repeat** and set the envelope for a clear contour. Lower sustain and more pronounced attack and decay settings usually make the motion easier to hear.

For more expressive lead sounds, use enough **Sustain** to keep the note solid while held, enough **Release** to avoid a hard drop, and some **Velocity** so the patch responds dynamically as you play.

Modulation

By now, you know that the oscillators, filter, and amp give the DS-2 its raw voice and shape. The **Modulation** section is what gives that voice extra dimension and character. This is where the synth starts to pulse, bend, drift, and respond to performance in expressive ways. A good static patch can sound impressive for a few seconds seconds, but a good modulated patch reveals new life the longer you play it.

The DS-2 gives you three LFOs, one more than the original: a flexible **6-slot LFO’s Mixer**, and a **4-slot Touch** section for routing aftertouch to a wide range of destinations. Taken together, these make the synth far more capable than its vintage roots might suggest. You can create the expected vibrato, tremolo, and filter sweeps, of course, but you can also build rhythmic pulses, stepped motion, delayed animation, expressive pressure-based performance changes, and layered modulations that make a patch feel alive.

The easiest way to work with DS-2 modulation is to think in three layers:

First, choose an LFO with the right musical personality: smooth, stepped, random, or wheel-controlled.

Next, decide where it should go in the **LFO’s Mixer** by clicking the **Assign/Destination** label and choosing a destination.

Finally, use the **Touch** section for the things you want under your fingers rather than always running in the background. (To do this, click the **Assign** label and choose a destination.)

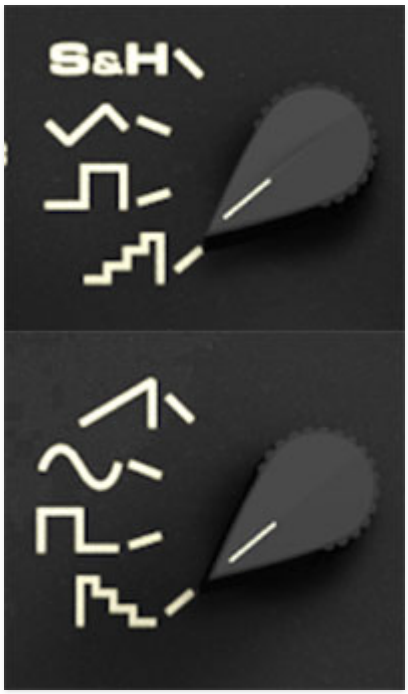
This approach avoids the classic trap of adding modulation everywhere just because you can. The DS-2 can do a lot of modulation, but the best patches usually don’t try to show all of it at once. A single well-chosen pitch movement, a little filter animation, and one expressive aftertouch

assignment will usually sound more musical than six unrelated modulations all fighting for attention.

The Three LFOs

The DS-2 includes **LFO 1**, **LFO 2**, and **LFO 3**. All three are low-frequency modulation sources, but they differ in waveform options and in one important performance feature.

It is important to note that unlike the main oscillators that produce the DS-2 characteristically edgy tone, the LFOs are *not* stepped. They are smooth — with the exception of the purposely stepped saw/ramp on LFO 2 and LFO 3. This gives the stepped saw/ramp waves on LFO 2 and LFO 3 a distinctive **stepped** character rather than a perfectly smooth rise or fall. This stepped quality is one of the synth's signature quirks. When used on pitch, it creates motion in discrete little steps rather than a seamless glide, which gives it a wonderfully mechanical, almost sequenced quality



Each LFO includes **Rate**, **Delay**, waveform selection, and four switches: **Sync**, **Retrig**, **One Shot**, and a fourth mode switch that differs slightly depending on the LFO. On **LFO 1** and **LFO 2**, that fourth switch is **Reverse Wave**. On **LFO 3**, it becomes **Wheel**.

A good way to think of the three LFOs is this: they share a common operating style, but they each have their own musical personality.

Common LFO Controls

The **Rate** knob sets the speed of the LFO. Lower settings produce slow, gradual modulation. Higher settings produce faster motion, ranging from animated tremolo and filter wobble to rapid pitch effects and buzzy modulation textures depending on the destination.

The **Delay** knob sets how long it takes for the LFO modulation to fade in after a note is played. At minimum, modulation begins immediately. As you raise the control, the modulation enters later, which is very useful for sounds that should begin cleanly and then gradually become more animated.

Tip: A little **Delay** is often the difference between an obvious effect and musical movement. Delayed vibrato, delayed filter motion, and delayed pulse-width animation tend to feel more natural and playable.

The **Sync** switch locks the LFO rate to the host tempo in a DAW, or to the internal tempo in standalone mode. This is especially useful when you want modulation to line up rhythmically with arpeggios, tempo-synced effects, or repeating envelope patterns.

The **Retrig** switch causes the LFO to restart its cycle each time a new note is played. With Retrig off, the LFO runs freely. With Retrig on, each note begins from the same point in the LFO cycle, which makes modulation more consistent and repeatable.

Tip: Use **Retrig** when you want each note to have the same modulation shape at the start. Leave it off when you want freer, less predictable motion across repeated notes.

The **One Shot** switch causes the LFO to run through its waveform once rather than cycling continuously. This turns the LFO into something closer to a simple modulation contour generator. Depending on the destination and waveform, One Shot can create pitch dips, filter blips, volume swells, and other single-movement gestures.

Tip: **One Shot** is great for creating movement without adding constant wobble. It’s especially effective for pitch attacks, and one-time swoops or

swells that feel more deliberate than a repeating LFO.

LFO 1

LFO 1 offers four waveform choices: **ramp/sawtooth**, **triangle**, **square**, and **sine**. It also includes a **Reverse Wave** switch.

The waveform selector chooses the shape of the modulation. The **triangle** wave creates smooth up-and-down motion, good for classic vibrato and gentle filter movement. The **square** wave jumps abruptly between two states, which is useful for trills, rhythmic level chopping, and stepped switching effects. The **sine** wave is the smoothest and most rounded of the bunch, making it ideal for subtle vibrato and natural-feeling motion.

The **ramp/sawtooth** wave is especially interesting on the DS-2, because it has a distinctive **stepped** character rather than a perfectly smooth rise or fall. That stepped quality is one of the synth's signature quirks. When used on pitch, it creates motion in discrete little steps rather than a seamless glide, which gives it a wonderfully mechanical, almost sequenced quality. It's one of those details that makes the DS-2 feel more characterful.

The **Reverse Wave** switch flips the selected waveform direction. Most obviously, this changes the direction of ramp-style movement, turning a rising shape into a falling one, or vice versa. That can make a big difference when the LFO is modulating pitch, filter cutoff, or volume.

Tip: The stepped ramp on **LFO 1** is fantastic for synthetic staircase pitch effects, clockwork filter motion, or anything that should sound a little robotic in a good way.

LFO 2

LFO 2 also includes **Rate**, **Delay**, **Sync**, **Retrig**, **One Shot**, and **Reverse Wave**, but its waveform set is slightly different: **sample-and-hold**, **triangle**, **square**, and the same unique **stepped ramp/sawtooth** wave.

The presence of **sample-and-hold** makes LFO 2 especially useful for random or semi-random stepped modulation. This is great for burbling filter motion, unpredictable pitch steps, twitchy volume movement, or anything that benefits from controlled instability.

Like LFO 1, the **stepped ramp/sawtooth** wave is a standout feature here. Because it moves in discrete steps, it can produce very distinctive modulation patterns that feel halfway between an LFO and a primitive sequencer.

Tip: If you want movement that feels electronic, try **LFO 2** first. Its stepped and sample-and-hold waveforms are perfect for patches that need unique motion with an almost sequenced feel.

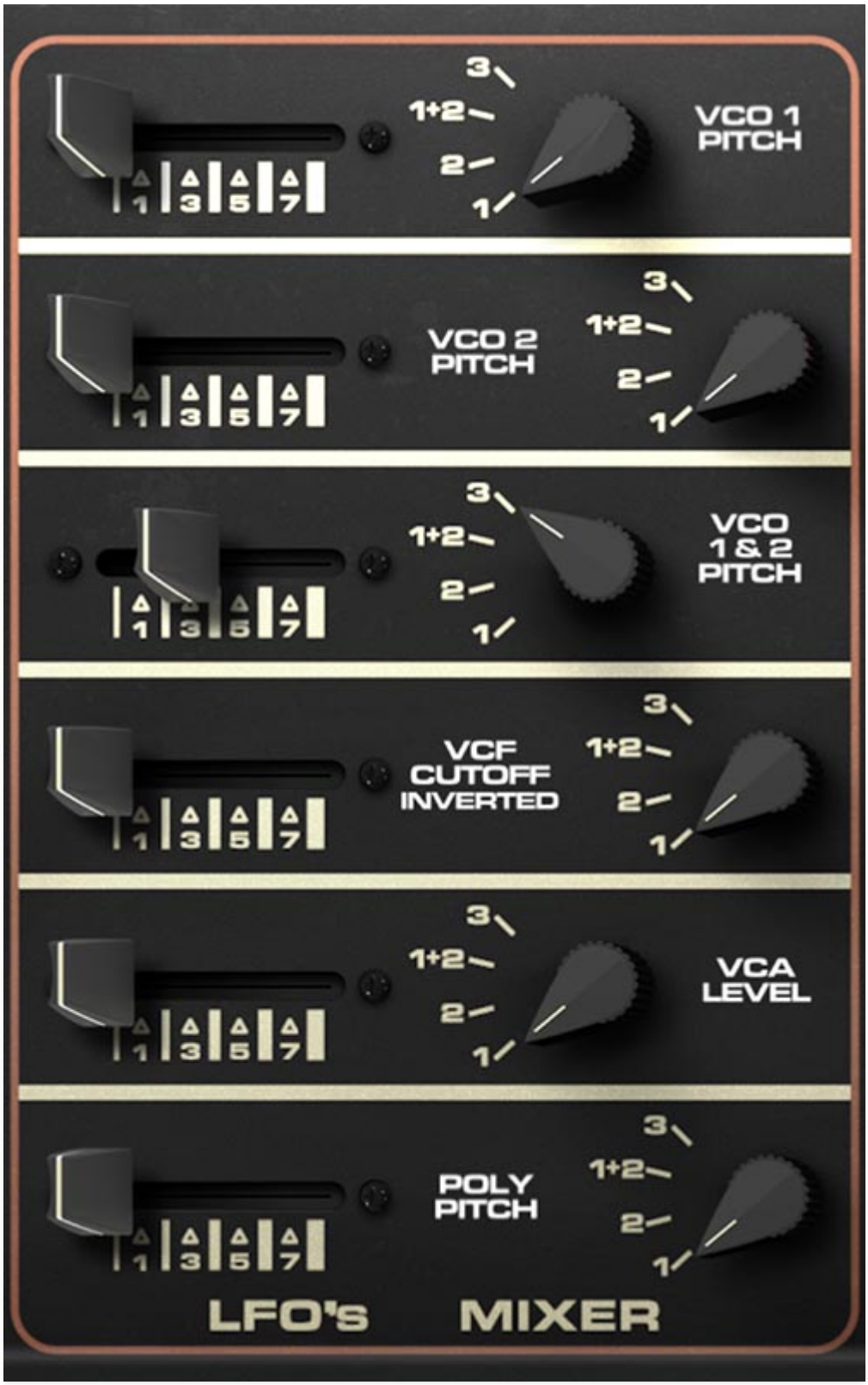
LFO 3

LFO 3 shares much of the same structure, with **Rate**, **Delay**, **Sync**, **Retrig**, and **One Shot**, but its fourth switch is **Wheel** rather than Reverse Wave. Its waveform choices are **sawtooth**, **sine**, **square**, and the same stepped-style waveform shown in the panel graphics.

The **Wheel** switch ties LFO 3 to the modulation wheel, letting you bring in its effect expressively as part of performance. That makes LFO 3 especially useful as a dedicated "performed" modulation source. For example, you might use it for vibrato, filter opening, or animated effects that only appear when you push the wheel.

This makes LFO 3 feel a little different from the others. Where LFO 1 and LFO 2 are often good candidates for always-on motion or programmed modulation, LFO 3 is particularly well suited for performance-based modulation that you want to introduce in real time.

Tip: A classic setup is to assign **LFO 3** to pitch and use the **Wheel** switch for manual vibrato control. It’s familiar, musical, and immediately playable. It's also a feature that wasn't available on the original DS-2, as it had no dedicated mod wheel (or a third LFO), only the LFO Mixer sliders!



LFO’s Mixer

To the left of the three LFOs is the **LFO’s Mixer**, which gives you six assignable modulation slots. Each slot lets you choose how much modulation is applied, where it goes, and which LFO source is driving it.

Each slot includes three controls arranged from left to right. First is the Modulation Amount slider, which sets the depth of modulation for that slot. In the middle is the destination label. Click this label to choose the modulation destination from the menu. Once selected, the label updates to show the current assignment. On the right is the source selector knob, which chooses which modulation source feeds that slot: LFO 1, LFO 2, LFO 3, or 1+2, which combines LFO 1 and LFO 2.

So the signal flow is simple once you know the layout: the slider sets how much, the center label chooses where, and the right-hand knob chooses which LFO gets sent there. This is also an important detail, because the destination is not selected with the knob. The knob only selects the modulation source. The destination is chosen by clicking the slot's text label.

The six slots can be assigned to a wide range of parameters across the instrument, letting you route modulation to oscillator pitch, filter behavior, amplifier level, Poly parameters, and plenty more. That makes it easy to build anything from subtle motion to full-tilt animated madness.

The same destination system is also used by the Touch section, which helps make DS-2's overall modulation architecture feel consistent once you get used to it.

Default LFO Mixer Routings

When you create a new sound, the six LFO Mixer slots default to a useful set of assignments rather than starting completely blank. That's a smart choice, because it gives you immediate access to some of the most musically useful routings without having to build the system from scratch each time.

The default assignments are:

VCO 1 Pitch

VCO 2 Pitch

VCO 1 & 2 Pitch

VCF Cutoff Inverted

VCA Level

Poly Pitch

That default set covers a lot of classic ground: vibrato, shared pitch motion, inverse filter movement, tremolo, and Poly animation. Even if you end up changing them, they make a solid starting point.

Tip: Before replacing all six default routings, spend a minute auditioning them. The defaults are a useful starter toolkit that you can change if you want.

What “1+2” Means

The **1+2** source setting in each LFO Mixer slot combines **LFO 1 and LFO 2**. This can create more complex modulation shapes than either LFO alone. For example, you might combine a slow triangle with a stepped ramp, or a sample-and-hold source with a smoother waveform, to get motion that feels irregular and less repetitive.

Tip: If a modulation feels too simple or predictable, try **1+2** before adding more slots. It’s an easy way to create complex movement without making the patch harder to understand.

Touch

The **Touch** section gives you four assignable aftertouch slots, each with a bipolar amount knob labeled **Assign**. Like the LFO Mixer, the destination is chosen by clicking the Assign label and selecting a destination from the same dropdown menu.

These knobs are **bipolar**, which means they can apply either positive or negative modulation depending on the direction and amount. That makes the Touch section especially expressive. Pressing harder can increase a parameter, decrease it, or do several different things at once across the four slots.

The DS-2 responds to both channel aftertouch and poly aftertouch, depending on what your controller provides. If your controller sends poly aftertouch, the synth can respond to pressure on individual notes rather than the entire keyboard at once, which opens the door to much more nuanced performance. This isn't just a convenience feature. It’s one of the most powerful expressive tools in DS-2.

Tip: Use **Touch** for changes you want to play, not changes you want running all the time. It’s perfect for pressure-controlled vibrato, filter opening, added noise, effect blooms, or bringing in Poly brightness as a note sustains.

Creative Ways to Use Touch
Because the knobs are bipolar and the destinations are flexible, the Touch section can do much more than just “press harder for more vibrato.” You can route pressure to **VCF Cutoff** for expressive brightness. You can use it on **VCO pitch** for subtle pressure vibrato. You can assign it to **Poly Volume** or **Poly Pitch** to let pressure bring in a second layer. You can assign it to **Effect Level** so a note grows more spacious or more processed as you lean into it. And because there are four slots, you can stack several of these moves at once.

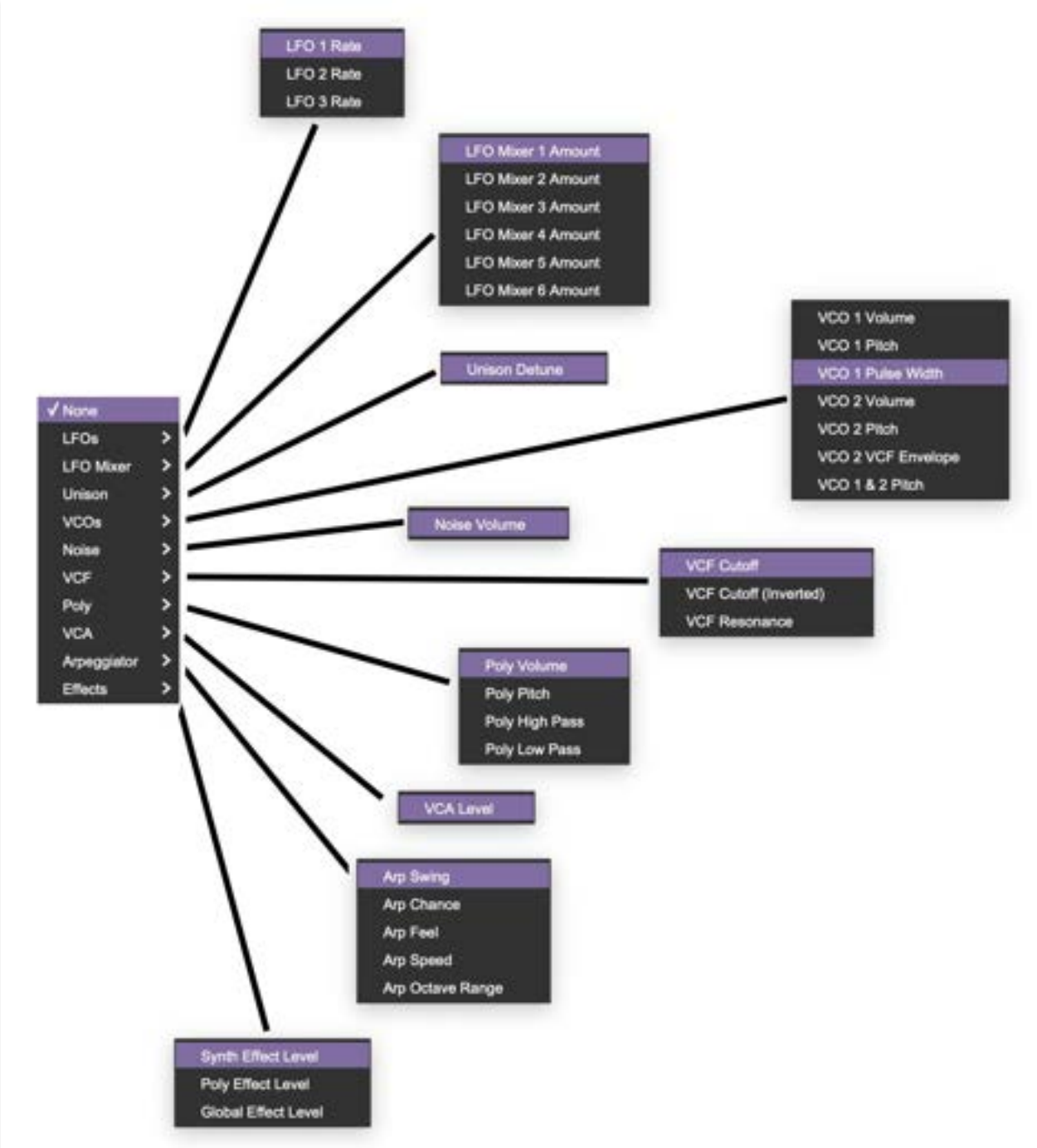
For example, one press could slightly open the filter, add vibrato, raise reverb level, and increase Poly volume all at the same time. That’s how a patch starts to feel less like a programmed preset and more like an instrument you can play.

Tip: One of the best uses of **Touch** is restraint. A small amount of pressure-controlled movement feels more expressive than a giant obvious sweep.

Modulation Ideas

- For classic synth vibrato, route **LFO 3** to **VCO 1 & 2 Pitch** and use the **Wheel** switch so vibrato comes in only when you raise the mod wheel.
- For clockwork or sequenced-feeling motion, use the **stepped ramp** on **LFO 1** or **LFO 2** and assign it to pitch or filter cutoff.
- For unstable, animated textures, assign **LFO 2 sample-and-hold** to **VCF Cutoff**, **Noise Volume**, or **Poly Pitch**.

- For pulsing movement, route an LFO to **VCA Level**. This can act like a tremolo, but with waveform choices and combinations that make it far more interesting than a basic tremolo effect.
- For evolving layered sounds, use one LFO on **Poly Pitch** or **Poly Volume** and another on **VCF Cutoff Inverted** so different parts of the patch move against one another.
- For expressive performance patches, use **Touch** to open the filter, raise an effect send, or add a little pitch movement as you increase pressure.



Arpeggiator

The DS-2's **Arpeggiator** is one of those tools that can either either be simply useful or hugely inspiring, depending on how far you push it. At its simplest, it takes the notes you hold and turns them into a repeating rhythmic pattern. But because the DS-2 lets you route the arpeggiator to the Synth layer, the Poly layer, or both, it can do more than just the standard hold a chord and get a pattern thing.

That routing flexibility is a big deal. You can run an arpeggio on the Synth engine while playing sustained Poly chords underneath it. Or flip that around and let the Poly layer do the rhythmic work while the Synth voice stays steady and direct. Or, of course, send the arpeggiator to both and let the whole instrument lock into motion together. It's one of the most musically interesting parts of the DS-2 because it encourages you to create a layered performance rather than just pattern playback.

A Good Starting Workflow

A simple way to build a strong DS-2 arp patch is this:

- Choose whether the arp should control **Synth**, **Poly**, or **both**.
- Pick a **Pattern** and **Direction** that fit the role.
- Set **Oct. Range** and **Speed** to define the basic contour.
- Add **Swing**, **Chance**, and **Feel** to make the rhythm more human or more unruly.
- Then shape the patch itself so the arpeggiated layer has a clear job in the sound.

That last part is key. A good arpeggiator patch usually isn't just an interesting arp setting. It's an interaction between arp motion and sound design.

Arp and Hold

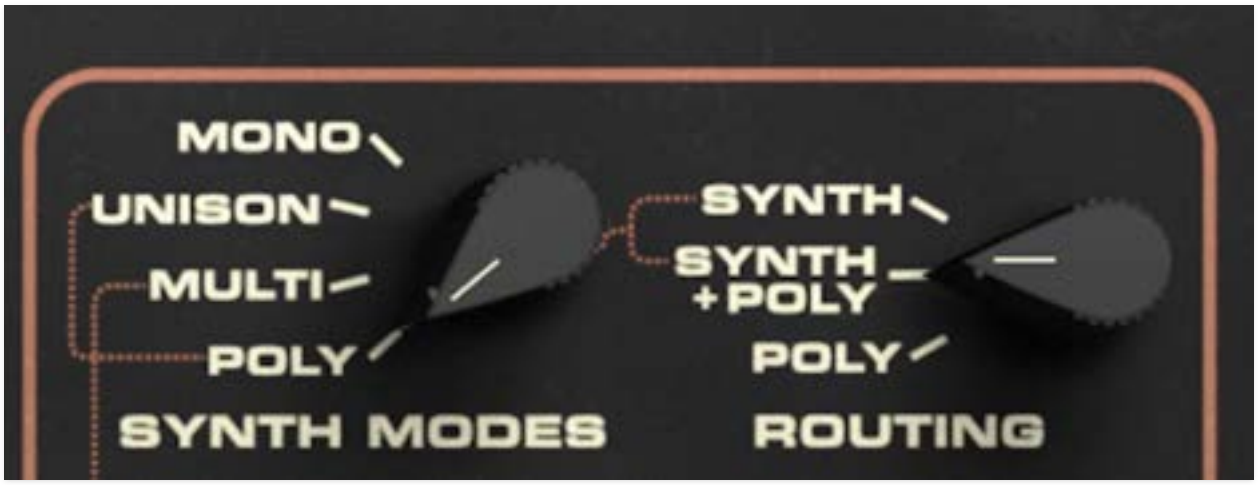
The **Arp** switch turns the arpeggiator on or off. Simple enough, but this is the master gate for the whole section.

The **Hold** switch keeps the arpeggio running after you release the keys. This is especially useful when you want both hands free to tweak filter, modulation, effects, or Multi settings while the pattern continues.

Tip: **Hold** is your friend when sound-designing with the arpeggiator. Turn it on, latch a pattern, then start shaping the sound in real time.

Routing

The **Routing** knob determines which sound engine the arpeggiator controls: **Synth**, **Synth + Poly**, or **Poly**. Be aware that this control is only available when the DS-2 is set to Synth + Poly Mode. If the DS-2 Routing is set to either Synth or Poly, this control is disabled.



This is one of the DS-2's smartest arpeggiator features, because it makes the arp feel like part of the instrument architecture rather than just a simple rhythm tool.

In **Synth** mode, only the Synth engine is arpeggiated. This is perfect when you want a rhythmic lead or sequenced line while the Poly layer stays free for pads, held chords, or atmospheric support.

In **Poly** mode, only the Poly engine is arpeggiated. This can create wider, more harmonically spread rhythmic textures while leaving the Synth voice available for a played lead or bass — especially in Split patches.

In **Synth + Poly** mode, both engines are arpeggiated together. This gives you the most unified and dramatic result, especially when both layers are contributing to the patch.

Tip: One of the best DS-2 tricks is to set Routing to Synth, hold a chord so the Synth engine arpeggiates it, and then play additional notes or chord textures on the Poly side. It’s a great way to make one patch feel like two performances working together.

Pattern
The **Pattern** buttons choose how the arpeggiator organizes the notes you hold. The available patterns are:

Arp
This is the classic arpeggiator behavior. It plays the held notes in a regular stepped pattern, ideal for traditional synth arpeggios and clean rhythmic lines.

Leap
This pattern adds octave jumping behavior, creating a more animated and tumbling motion. It’s great for patterns that should feel larger or a little more dramatic.

Ord.
Short for **Order**, this pattern plays the notes in the order you pressed them. This is especially useful when you want more control over the melodic shape of the pattern rather than leaving it to pitch order.

Rand.
Short for **Random**, this pattern plays the held notes in unpredictable order. It’s excellent for generative textures, unstable rhythmic figures, or any pattern that should feel less repetitive and more live.

Tip: **Order** is one of the most musical arp modes because it rewards deliberate playing. Instead of just holding a chord, you can compose the pattern by the order you enter notes.

Tip: **Random** works especially well when the patch has modulation or evolving effects, because the combination keeps the phrase from feeling mechanical.

Direction

The **Direction** buttons set the direction of motion through the arpeggiated notes:

- **Up** plays from lower to higher notes.
- **Dwn** plays from higher to lower notes.
- **Dwn Up** moves downward, then reverses direction.
- **Up Dwn** moves upward, then reverses direction.

These may sound like simple variations, but they can change the feel of a pattern quite a bit. **Up** and **Down** tend to sound clear and direct. The two alternating modes feel more flowing and cyclical. If a pattern feels too obvious or stiff, try switching from straight **Up** or **Down** to one of the alternating directions. It often makes the phrase feel more musical immediately.

Oct. Range

The **Oct. Range** buttons set how many octaves the arpeggio spans, from **1** to **4**.

At **1 octave**, the pattern stays compact and focused. As you increase the range, the arpeggio repeats the held notes across additional octaves, creating a broader, more dramatic contour.

Smaller ranges are often best for bass parts, tighter riffs, and patterns that need to stay rhythmically grounded. Larger ranges create more sweeping, expansive motion and are especially effective with **Leap** or alternating directions.

Tip: A wider octave range can make even a simple chord sound far more elaborate.

Swing

The **Swing** knob adds rhythmic shuffle by delaying every second step of the arpeggio. At lower settings, the pattern stays straight and grid-like. As you increase Swing, the rhythm develops more groove and lilt. This is one of the quickest ways to make an arpeggio feel less robotic. Even a small amount can make the pattern sit more musically.

Tip: If the arp feels too stiff, add a little **Swing** before changing anything else.

Chance

The **Chance** knob controls the probability that each step will sound. At higher settings, more notes play consistently. At lower settings, some notes are dropped, creating rests, syncopation, and a more unpredictable rhythmic shape. This is a very effective control for making a repeating arpeggio feel less repetitive. It can introduce just enough instability to keep a pattern moving without turning it into total randomness.

Tip: Moderate **Chance** settings are often the sweet spot. Too high and everything plays. Too low and the arp may feel broken.

Feel

The **Feel** knob adjusts the timing feel of the arpeggio. This is a more subtle groove control than Swing. While Swing changes the timing relationship between alternating steps, Feel shifts the overall rhythmic vibe, making the pattern feel either more relaxed or more urgent depending on the setting.

Tip: Use **Feel** after setting **Swing** and **Speed**. Think of it as the final nudge that makes the pattern sit right.

Speed

The **Speed** knob controls the playback rate of the arpeggiator. Slower settings create more spacious, deliberate patterns. Faster settings turn held notes into complex rhythmic streams. This control has an obvious technical function, but musically it changes the whole personality of the arpeggiator. A slow arpeggio can feel hypnotic or cinematic. A fast one can feel urgent and sequencer-like.

Tip: If a pattern isn’t working, don’t assume the notes are at fault. Sometimes it just wants a different **Speed**.

Sync

The **Sync** switch locks the arpeggiator to host tempo in a DAW, or to the internal clock in standalone mode. When Sync is enabled, the arpeggiator follows rhythmic note divisions rather than running freely. This is especially useful when the arpeggiator needs to sit tightly with a track, tempo-synced modulation, delay effects, or drum parts.

Creative Ways to Use the DS-2 Arpeggiator

One of the best uses of the DS-2 arpeggiator is layer contrast.

Set the arp **Routing** to **Synth**, then create a punchy Synth patch for the repeating pattern. Leave the Poly layer broader and more sustained so you can play chords around the moving line. This gives you a “motion in front, atmosphere behind” effect without needing two separate patches.

Or do the reverse. Route the arp to **Poly**, then let the Synth engine handle a stable voice while the Poly section creates movement.

When you want the whole instrument to move together, switch **Routing** to **Synth + Poly** and treat the DS-2 like a full layered arpeggiated machine. This is especially effective when Synth and Poly have clearly different tone roles, because the arp pattern becomes more dimensional.

Tip: Try **Order** pattern with **Routing** set to **Synth**, then play your held notes in a deliberate sequence instead of a block chord. You can get surprisingly melodic results without sounding like a step sequencer.

Tip: **Leap** plus a wider **Oct. Range** is excellent for animated Berlin-school style motion, especially with some **Swing** and filter movement.

Tip: **Random** plus moderate **Chance** can create generative textures, especially when the Poly layer has longer release or more atmospheric effects.

Tip: A small amount of **Swing**, a little **Feel**, and a touch of **Chance** will often do more for musicality than extreme settings on any one of them.

Performance Controls

Up to now, most of the controls we've covered shape the patch itself, its tone, and motion. The Performance Controls are different. These controls let you lean into a sound while you're playing it. They add expression, movement, and the sense that the patch is responding to your hands.

On the DS-2, this section includes Pitch Bending, Bending Range, Mod. Wheel, and Glide. These become more powerful tools once you combine them with the synth's modulation. A good patch can sound good on its own. A patch with well-set performance controls feels like an actual instrument.

Pitch Bending

The **Pitch Bending** paddle bends pitch downward or upward in real time. Move it to the left for downward bend, or to the right for upward bend. The amount of bend in either direction is determined by the **Bending Range** control.

This is the main real-time pitch expression control for the DS-2, and it can be used for everything from subtle note inflection to dramatic octave dives and swoops. Because the paddle is centered at zero, it returns to the original pitch after a bend.

Musically, pitch bend can do very different jobs depending on the patch. On leads, it adds vocal-like expression and phrasing. On basses, it can create slippery funk inflections. On effects patches, it can turn a stable sound into something more animated.

Bending Range

The **Bending Range** knob sets the maximum bend interval for the **Pitch Bending** paddle. The range goes from **0** up to **one octave** in either direction.

This control matters more than people sometimes realize, because it determines how playable the bend paddle feels. A bend range that’s too wide can make precise phrasing harder. A bend range that’s too narrow can make the control feel timid.

Tip: For classic lead playing, start with a modest bend range and work upward only if the line really needs more travel.

Tip: Wider **Bending Range** settings are especially effective for leads, aggressive monosynth lines, and effects patches that are meant to sound more unpredictable.

Mod Wheel

The **Mod Wheel** knob sets the amount of modulation applied from the **LFO’s Mixer** — specifically from LFO 3. The original Crumar DS-2 didn't feature a Mod Wheel, making it necessary for players to use the sliders in the LFO's Mixer to add vibrato. This approach wasn't particular performance friendly, so Cherry Audio added a purpose-designed Mod Wheel of our own — along with a third LFO, which can be used as the source of the modulation applied by the Mod Wheel by setting LFO 3 to Wheel In.

In other words, while the **LFO's Mixer** lets you route LFO 1, LFO 2, and LFO 3 to various destinations, routings that use LFO 3 are controlled by the Mod Wheel when **LFO 3** is set to **Wheel In**.

In this scenario, the Mod Wheel acts like a master modulation amount control for the LFO 3 routings you’ve created in the LFO’s Mixer. First, you

choose a destination in one or more of the six LFO Mixer slots. Then you set the mod source to (LFO) 3 in those slots. And finally, you set the modulation amount for those slots. (Make sure to set LFO 3 to **Wheel In**.) After that, the Mod. Wheel knob determines how much of that programmed modulation is actually brought in by the wheel.

So if you've routed LFO modulation to VCO pitch, VCF cutoff, VCA level, Poly pitch, or other destinations, the Mod Wheel can act as the performance control that fades those modulations in and out while you play.

That makes it much more flexible than a basic wheel equals vibrato setup. It can still do classic vibrato, of course, but it can also bring in filter movement, tremolo, Poly animation, stepped pitch motion, or several things at once depending on how you've configured the LFO Mixer.

Tip: Think of the **Mod Wheel** as a performance fade-in for movement. Use it for the things you want to introduce gradually, not the things that should always be active.

Tip: One of the most musical uses is to keep a patch stable at first, then use the Mod Wheel to bring in vibrato, filter motion, or animated texture as the note sustains.

How Mod Wheel and LFO's Mixer Work Together
The easiest way to think about it is this:

The **LFO's Mixer** decides **what** gets modulated, **which LFO** does it, and **how much** modulation is available.
The **Mod. Wheel** decides how much LFO 3 modulation is actually brought in during performance when LFO 3 is set to **Wheel In**.

That means the **LFO's Mixer** handles the programming, while the **Mod Wheel** handles the performance side of the same idea.

For example, you might:

- route a slot so that **LFO 3** controls **VCO 1 & 2 Pitch** for vibrato
- route another slot so that **LFO 3** controls **VCF Cutoff** for filter motion
- set useful amounts for both
- then use the Mod Wheel to introduce that motion gradually as you play

Or you might set up something stranger, like stepped LFO motion to pitch or VCA level, and only bring it in when the phrase needs to get unstable.

Tip: The Mod Wheel becomes much more interesting when it controls more than one thing at once. A little pitch vibrato plus a little filter motion often

feels far more interesting than either one alone.

Glide

The **Glide** section controls portamento, the smooth sliding transition from one note to the next. The **Glide IN** switch turns glide on or off for the patch. The **Glide Speed** slider sets how quickly the pitch slides between notes. Lower settings produce a faster, tighter glide. Higher settings create a slower, more obvious pitch transition.

This is one of the classic synth performance controls, but on the DS-2 it can do more than just the expected solo-synth slur. Glide can make mono leads sound fluid and vocal, basses sound greasy and elastic, and even more experimental patches take on an unstable, sliding quality.

The right glide setting depends a lot on the role of the patch. A tiny bit of glide can make a lead feel smoother and more expressive without calling attention to itself. A larger amount can become a defining part of the sound.

Tip: For lead sounds, start with just a little **Glide**. Enough to smooth note transitions, not so much that every phrase sounds seasick.

Tip: For basses, glide works best when it feels intentional. Too much can blur the groove.

Practical Ways to Use the Performance Controls

A strong DS-2 lead patch often benefits from all three performance controls working together.

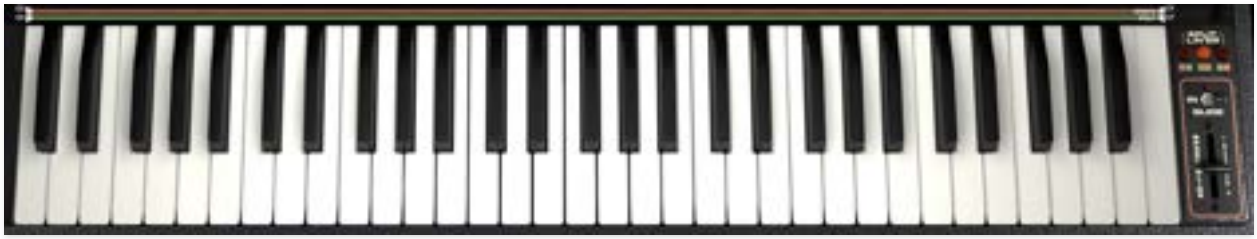
- Use **Pitch Bending** for note inflection and expressive phrasing.
- Use the **Mod Wheel** to bring in vibrato or filter motion via LFO 3 only when needed.
- Use a little **Glide** to smooth the connection between notes.

That combination gives you a patch that feels more playable and musical than one that just sits there at full intensity all the time. For more dramatic sounds, try increasing **Bending Range**, enabling **Glide**, and assigning the Mod Wheel to more animated LFO Mixer routings. For more restrained playing, keep bend range smaller, use subtle glide, and let the Mod Wheel bring in only a little movement. That approach often works better for melodic parts, chord textures, and patches that need to sit naturally in a mix.

Creative Performance Ideas
For classic synth lead playing, set a moderate **Bending Range**, add a little **Glide**, and use the **Mod Wheel** to bring in pitch vibrato from one of the LFO Mixer slots.

- For expressive bass patches, keep **Glide** fairly short, use a smaller bend range, and reserve the Mod Wheel for filter movement or subtle tremolo instead of obvious pitch modulation.
- For dramatic electronic effects, increase **Bending Range** toward the upper end, assign a stepped LFO in the **LFO’s Mixer**, and use the **Mod Wheel** to fade in unstable motion while performing.
- For layered **Synth + Poly** patches, use the Mod Wheel to animate the Synth side more aggressively while the Poly layer stays stable. That contrast can make a patch feel larger and more dimensional.
- Tip: One of the best DS-2 tricks is to let the patch begin in a controlled state, then use the **Mod Wheel** to push it into more animated territory. It feels more expressive, and it keeps the sound from revealing its full expression at once.

Tip: **Glide** and **Pitch Bend** together can be very effective, but they can also step on each other if overused. Usually one should handle the phrase shape, while the other adds emphasis.



Splits and Layers

DS-2 lets you divide the keyboard between the Synth and Poly engines, or stack them together across the same range for layered sounds. These controls live directly above the keyboard, where two color-coded bars show the current key ranges: red for Synth and green for Poly.

To set the playable range for either engine, drag the white handles at the left and right ends of the bars. The left handle sets the lower note limit, and the right handle sets the upper note limit. As you drag, the note names update on screen, so you can see exactly where each zone begins and ends. It’s a fast, visual way to build anything from bass-and-lead splits to layered composite patches.

Split/Layer Selector
To the right of the keyboard is the Split/Layer selector, with three mode buttons that determine how the two engines are arranged across the keyboard. The left setting places Synth on the lower part of the keyboard and Poly on the upper part. The center setting layers both engines together across the same range, so each note can trigger both sections at once. The right setting flips the arrangement, placing Poly on the lower part of the keyboard and Synth on the upper part.

This makes DS-2 unusually flexible as a performance instrument. You can create classic split setups with a solid Synth bass in the left hand and a brighter Poly part on top, or build rich layered sounds that combine the character of both engines into one larger, more animated patch.

A useful thing to remember is that the red and green bars are the map. If something seems to be missing, sounding only in one register, or not layering the way you expected, check those range bars first. They tell you exactly where Synth and Poly are allowed to play.

Tip: Split mode is great for practical stage-style patches, like bass below and chords above. Layer mode is where things get thick. Stack Synth and Poly together, then use their separate tone controls, envelopes, and effects to create sounds with more width, motion, and complexity than either engine can deliver on its own.

Effects

Processing Synth and Poly Separately

DS-2 doesn’t just give you two distinct sounds (Synth and Poly) that you can layer or split. It also gives you independent 5-slot effects chains for each. That's a big deal because most synths treat effects like a single coat of varnish smeared across everything at the end.

But in the DS-2, the Synth FX chain processes the Synth engine and the Poly FX chain processes the Poly engine. Each engine can occupy its own sonic space. And each of the five slots in a chain can host one of Cherry Audio’s built-in processors, from swirling choruses and lush reverbs to crunchy distortions and atmospheric delays. Each effect can be tweaked, bypassed, reordered, copied, soloed, duplicated, or saved for use in other presets. You can even modulate entire chains with a dedicated Effect Modulator.

You can make the two layers feel tightly fused, or deliberately contrast them so one acts almost like an effect-enhanced companion to the other. That’s why effects on the DS-2 are part of the design strategy of a patch.

Using Global Effects to Glue Things Together

After the individual Synth and Poly effects chains, the DS-2 also provides a Global FX chain. This acts as the shared final stage, processing the combined result.

This is where you can treat the whole patch as a finished instrument rather than as two separate layers. If the Synth and Poly chains define the personalities of the individual voices, the Global effects help glue the whole thing together. Think of them as the final “same room, same performance, same universe” stage.

That distinction is important. Dedicated effects help make the two engines different. Global effects help make them belong together.

How this Changes The Way You Design Patches

Instead of asking, “What effect should I put on the synth?” You should ask, “Which part of the synth deserves which effect treatment?” That’s a much more mix-friendly way to build patches, because you’re not forcing your entire sound through the same effects chain..

Tip: Start patches with no effects, then assign effects by role. Build the tone first. Then decide what needs movement, width, grit, or which should stay clean so the patch has definition.

Important Practical Note
Effects can change gain. They can also emphasize certain frequencies and create peaks. This is why DS-2 includes a limiter.

Tip: *The mini FX panel is always visible, but click the **Effects** tab at the bottom right for the full parameter view and deeper editing. Alternatively double-click the effects "footer" (the part with the always-visible mod and mix controls) to toggle the view from mini to full.*

Quick Controls (Always Available)

Even if you're in Keyboard View, the most essential FX controls are always within reach, sitting neatly under the chain:

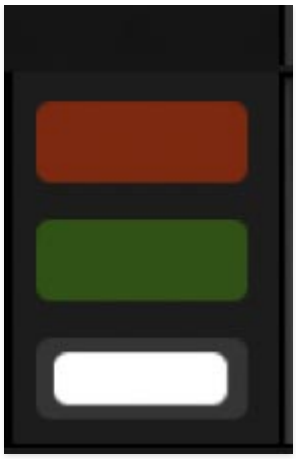
- **All FX On/Off** – Instantly bypasses the entire chain.
- **Level** – Adjusts the overall level of the chain.
- **Stereo** – Widens (or narrows) the stereo field after processing.

Section Selectors (Color-Coded)

At the bottom of the panel you'll see three colored squares. These pick which effects chain you're editing:

- **Red** – Synth
- **Green** – Poly
- **Gray** – Global (affects entire output signal path)

Click the color, build your chain, and get creative. Each chain is fully independent, so yes, you can have chorus and delay on the Synth layer and a Phaser and Envelope Filter on the Poly Layer.



Per-Effect Controls

Each effect block in a chain has its own set of mini-controls:

- **On/Off** – Toggle the effect.
- **Solo** – Bypass all other effects to hear just this one.
- **Remove** (X) – Delete the effect from the chain.
- **Menu** – Copy, paste, duplicate, move, swap, or save.
- **Modulation Amount** – From the Effect Modulator.
- **Wet/Dry Mix** – Blend processed vs. dry signal.

The Effect Modulator

Sometimes you may want to modulate a delay time or a phaser sweep for extra movement or a bit of weirdness. Enter the **Effect Modulator**. It's a dedicated LFO just for the effects. Used subtly, the Effect Modulator can add motion and depth. Push it harder, and things can get more dramatic and unstable. Either way, it’s one of the quickest ways to make an effect feel more varied and animated.

Each effect has one specific parameter that is permanently tied, or “hard-wired,” to the Effect Modulator. In other words, you don’t assign modulation

destinations manually. The destination is already chosen for you by the effect's design.

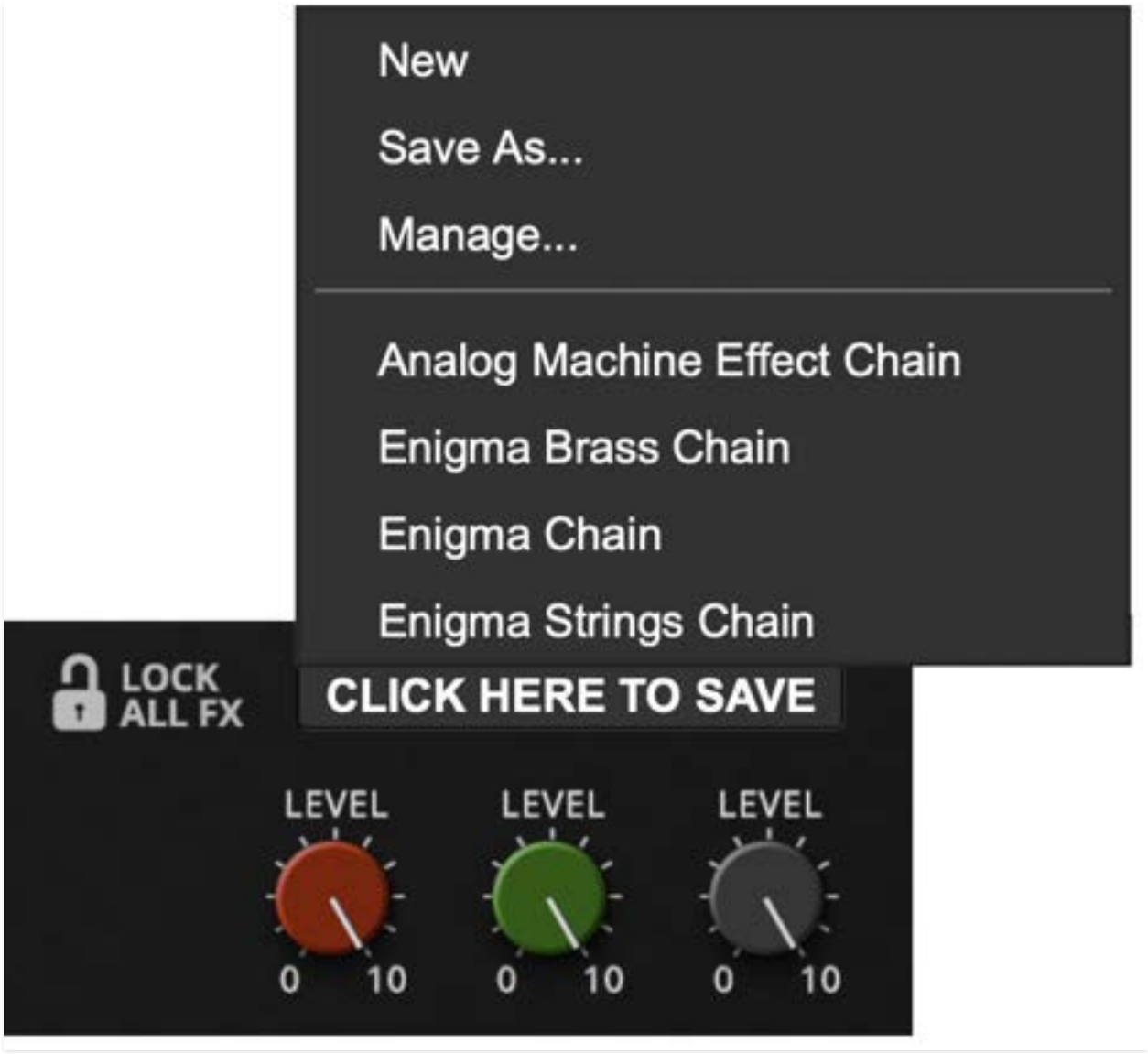
To see which parameter is being modulated, look for the arrow labeled "**Mod**" on the effect's panel. That graphic points from the affected control down toward the Effect Modulator, making it easy to spot the modulation target at a glance. If a control has that arrow, it's the one the Effect Modulator will affect.

This means every effect has its own built-in modulation relationship. On one effect, the Effect Modulator might animate delay time. On another, it might sweep a tonal or spatial parameter. The exact target depends on the effect, but the visual cue is always the same: Follow the "Mod" arrow.

Effect modulator controls include:

- **Speed** – 0.01 Hz to 20 Hz, or tempo-syncable from 1/64T to 8 beats. LED above flashes in time.
- **Waveform** – Ramp, sawtooth, triangle, sine, square, or random.
- **Delay** – Fade-in time for modulation (0–5000 ms).
- **Sync** – Locks modulation speed to host tempo.
- **Mod Wheel** – Lets your MIDI Mod Wheel scale the modulation depth in real time.
- **Key Reset** – Restarts the waveform with each key press.


GLOBAL EFFECTS MOD
0
10
SPEED
WAVEFORM
0
10
DELAY
SYNC
MOD
WHEEL
KEY
RESET



Managing Effects Chains

Building and wrangling effects and effect chains straightforward. Use the Effects menu dropdown (the triangle) to save and move effects and chains.

- **Add an Effect** – In the Effects View, select a section (VCF, BPF, VCA, Global.). Click the *Select Effect* dropdown to pick your effect, then tweak away.
- **Delete an Effect** – Click the “X” next to its name.
- **Save a Chain** – Display the Full Effects view → Use the *Click Here To Save* dropdown menu → Save As. Name it, reuse later.
- **Recall a Saved Chain** – Load from the same dropdown.
- **Solo an Effect** – Hit the “S” button; all others mute.
- **Reorder** – Drag the effect by its top “grip” edge to rearrange.

- **Numerical Edit** – Double-click a knob/slider, type a value, press Enter.
- **Copy Effect to Another Section** – Click the triangle dropdown → Copy To → choose the desired destination.
- **Copy or Move Entire Chain** – Click the triangle dropdown → Copy/Move Effect Chain To → choose the desired destination.
- **Duplicate an Effect** – Click the triangle dropdown → Duplicate (places a copy right next to it).
- **Swap an Effect** or chain – Click the triangle dropdown → Swap an Effect Chain with → choose the desired destination.
- **Align Effects** – Click the triangle dropdown → Align All Effects to automatically shift all effects to the left, closing any empty slots in between.
- **Lock All FX** – Click the padlock icon to keep the current effects chain in place when switching presets. Any new preset you load will use your locked chain instead of its own, making it easy to carry your favorite effect setup from sound to sound.

Practical Tips

- Don’t overlook the **Global chain**. A touch of reverb or EQ here can glue everything together.
- The **Effect Modulator + Mod Wheel** combo is excellent for live performance. Map it, and suddenly your phaser swoops in only when you push the wheel.
- Try saving a few **favorite chains** and re-using them across presets. Treat them like your personal pedalboards.
- Extreme stereo widening can be fun in headphones, but keep an ear on mono compatibility if you’re making tracks.
- The library of Effect Chains that you build over time is shared with other Cherry Audio instruments that utilize this same system, from Trident Mk III synthesizer (October 2025) onward.

Gain Staging and Troubleshooting

“I’m tweaking effects but nothing changes.”

You’re likely editing the wrong lane. Check the colored tab first, then confirm your Mixer routing is actually sending audio to that lane.

“Everything sounds washy.”

You probably put big space effects on Global effects. Use effects on Synth or Poly for character, and use Global effects lightly for cohesion.

The Effects

There are 20 effects in total to add potency to any sound. Whether you’re after subtle polish, full-throttle grit, or spacey atmospheres, these effects add even more character to any patch.

Digital Delay

Delay pedals and tape echoes have been a keyboardist’s sidekick for decades. The Digital Delay offers three classic flavors:

- **Digital** – Clean, pristine repeats.
- **Tape** – Warm, saturated echoes.
- **Ping Pong** – Echoes that bounce between left and right for stereo ambience.

Controls:

- **Delay Time** – Sets the gap between repeats (1 ms to 2000 ms). With Sync on, times follow the beat (1/64T to 8 bars). This can be controlled by the Effect Modulator.
- **Feedback** – Controls how many repeats you get. Low values = slapback echo; high values = infinite runaway.
- **Spread** – Adjusts the stereo width of the delayed signal.
- **Damp** – Softens repeats by filtering highs, making echoes darker and rounder.
- **Mod Rate / Mod Depth** – Adds modulation to delay time. Subtle settings = chorus shimmer; extreme = pitch warbles and glitching.

Tip: Try Digital mode with high feedback and a little modulation depth for a psychedelic wash that hovers on the edge of freak out.

Tape Echo

Few effects are as iconic as tape echo. Originally created with loops of magnetic tape and multiple playback heads, these machines defined the sound of countless dub records, psychedelic jams, and experimental soundscapes. the **Tape Echo** captures all that vintage character without the headaches of demagnetizing heads or replacing tape loops.

Controls:

- **Mode Selector** – Chooses which playback heads are active. Each mode offers different rhythmic subdivisions and textures, from simple single repeats to multi-head cascades.
- **Repeat Rate** – Sets the delay time. Lower values = slower, spaced-out repeats; higher values = rapid-fire echoes. With **Sync** engaged, rates lock to host tempo. Modulation can be applied here by the Effect modulator for even more vintage spaciness and psychedelic vibes.
- **Intensity** – Controls feedback (how much of the echo feeds back into itself). Low settings = quick fadeouts; higher values = dense, self-oscillating repeats and greater sonic mayhem.
- **Heads Indicators (1–3)** – Lights show which tape heads are active for the selected mode.

Practical Tip:
For classic dub-style echo, select multiple heads with **Intensity** cranked high, then ride the **Repeat Rate** knob during playback for wild pitch sweeps. For more subtle use, stick to a single head and moderate intensity to add depth without overwhelming the mix.

Digital Reverb

Back in the ’70s, reverb meant spring tanks or giant plates welded into studio walls. Digital reverbs were exotic, studio-only beasts. The Digital Reverb gives you a compact, modern reverb with three classic models:

- **Room** – Tight, natural ambience.
- **Hall** – Expansive, lush decay.
- **Plate** – Smooth, metallic sheen.

Controls:

- **Predelay** – Time before the reverb kicks in (0–150 ms). Longer predelays create a sense of bigger space. This can be controlled by the Effect Modulator.
- **Decay** – Length of the reverb tail, from short and snappy to cavernous. Modulation target. This can be controlled by the Effect Modulator.
- **Highpass / Lowpass Filters** – Shape the tone of the reverb by trimming boomy lows or harsh highs.
- **Mod Routing Switch** – Chooses whether modulation affects Predelay or Decay.

Tip: Use a short Room reverb on Strings to glue them into a mix, or a long Plate on Brass for cinematic atmosphere.

Galactic Reverb

When you need more than a room, hall, or plate to launch your sound into the stratosphere, reach for **Galactic Reverb**. Designed for cavernous, cosmic spaces, it excels at ambient washes, cinematic swells, or simply making your synth sound like it has left the building (and maybe the planet).

Controls:

- **Predelay** – Sets the time before the reverb begins (0–150 ms). Short settings keep things tight; longer values create separation between the dry attack and the wash of reverb. This can be controlled by the Effect Modulator.
- **Decay Time** – Determines how long the reverb tail lingers. Dial it short for manageable ambience, or long for infinite, space-drifting sustain.
- **High Freq** – Adjusts the tonal brightness of the reverb by shaping the high-frequency response. Higher settings yield shimmering, airy tails; lower settings make the reverb darker.
- **Low Freq** – Sets how much low end is preserved in the reverb. Keep it up for a massive, bass-heavy wash, or pull it back to avoid muddiness.
- **Damp Amount** – Controls the damping of reflections over time. Higher values cause the reverb tail to lose brightness as it decays, simulating natural absorption in real spaces.

Tip:
For lush pads, combine a long **Decay Time** with a rolled-back **Low Freq** and moderate **Damp Amount** to create a deep but clear ambient space. On leads, try adding a touch of **Predelay** so the note speaks with presence before the reverb bloom takes over.

Spring Reverb

Spring reverb is one of the most distinctive ambience effects in music history. From surf guitar twang to vintage organs to early synths patched through amps, its metallic, splashy character has a charm all its own. The **Spring Reverb** recreates the sound of physical springs housed in tanks, complete with extra controls that let you shape it far beyond the originals.

Controls:

- **Drive** – Pushes the input signal into the springs. Higher settings increase saturation and grit, adding vintage bite to the reverb.
- **Predelay** – Sets the time gap before the reverb begins (0–150 ms). Useful for keeping the dry attack clear before the spring kicks in.
- **Decay** – Adjusts how long the spring vibrations last. Low values yield short, splashy bursts; higher settings give longer, ringing tails. This can be controlled by the Effect Modulator.
- **Highpass / Lowpass** – Filters that trim unwanted lows or highs from the reverb signal. Use them to tame muddiness or harsh metallic overtones.
- **Tension** – Simulates the tightness of the springs. Looser adds a wobblier, more boingy character. Tighter adds a more controlled, refined response.

Tip:
For vintage organ vibes, set **Decay** short and **Tension** loose to get that splashy, percussive spring burst. For a more modern twist, roll back the **Lowpass**, tighten the **Tension**, and add a touch of **Drive** for a darker, thicker ambience.

Distortion & EQ

Sometimes clean just won't cut it. Distortion adds grit, attitude, and warmth. The Distortion & EQ effect offers four modes:

- **Tube** – Smooth overdrive like a cranked guitar amp.
- **Fuzz** – Aggressive, buzzy saturation modeled after germanium fuzz pedals.
- **Sat** – Tape-style saturation for warmth and compression.

- **EQ** – A standalone 3-band equalizer without added drive.

Controls:

- **Drive** – Amount of gain/saturation (active in Tube, Fuzz, and Sat modes). This can be controlled by the Effect Modulator.
- **Level** – Output volume to balance the effect.
- **Bass** / **Middle** / **Treble** – ±15 dB gain for tone shaping.
- **Mid Band Frequency** – Selects which frequencies the Middle control boosts/cuts.
- **Modulation Target** – In Tube, Fuzz, and Sat modes, Drive is modulatable. In EQ mode, the Mid Band frequency can be modulated.

Tip: A touch of tape saturation can add body to pads without sounding distorted. Crank Fuzz on a Lead sound to make it snarl.

Dual Phaser

Phase shifters were everywhere in the ’70s, and the legendary Mu-Tron Bi-Phase set the standard. The Dual Phaser brings that same rich, sweeping character times two.

Each phaser has its own controls, but you can sync them together or let them run wild independently.

Controls (per phaser):

- **Speed** – Sweep rate (0.01 Hz–8 Hz, or tempo-synced from 1/64T to 8 beats).
- **Depth** – Intensity of the phasing effect.
- **Stages** – Number of filters in the phaser circuit. More stages = deeper, more pronounced sweeps.
  - Phaser 1: 4 or 8 stages.
  - Phaser 2: 6 or 12 stages.
- **Resonance** – Emphasizes the notches for sharper, more hollow tones.
- **Mix** – Balances between Phaser 1 and Phaser 2. This can be controlled by the Effect Modulator.
- **Sync** - the **Sync switch** determines whether the two phaser stages run free and independent or whether one is locked to (synchronized with) the other:
  - **Off** (unsynced):
    Each phaser has its own LFO running freely. This means they can drift in and out of alignment, creating evolving, swirling movement and complex stereo textures.
  - **On** (synced):
    The second phaser's sweep is locked to the first. Instead of moving independently, both phasers cycle together, so you get a more unified, rhythmic phase motion. This setting is tighter and more predictable, useful when you want a consistent pulse or groove.

Tip: Try syncing both phasers at different stage settings (e.g., 4 vs. 12) for complex, evolving sweeps.

Flanger & Chorus

These two modulation effects use short delays to create movement and depth. Flanging mixes dry and very short-delayed signals for a sweeping “jet plane” comb-filter sound. Chorus uses slightly longer delays to thicken tones, simulating multiple instruments playing together.

Flanger Controls:

- **Speed** – LFO rate of the sweep (0.01 Hz–8 Hz, or tempo-synced).

- **Depth** – Amount of sweep applied.
- **Delay** – Sets the base delay time (1–13 ms). Shorter = brighter notches.
- **Resonance** – Boosts the notches, producing the classic jet-flange effect.

Chorus Controls:

- **Speed** – LFO rate of the sweep (0.01 Hz–8 Hz, or tempo-synced).
- **Depth** – Amount of sweep applied.
- **Waveform** – Shape of the LFO (sine, triangle, saw, ramp). Each yields a different flavor of movement.

Shared Control:

- **Mix** – Balances Flanger and Chorus. This can be controlled by the Effect Modulator.

Tip: Use a slow, shallow chorus on Brass to add width without getting in the way, or crank up flanging on a lead synth for ’70s sci-fi vibe.

Envelope Filter

The Envelope Filter is a triggered modulation effect. Every time you play a key, it generates a filter sweep. Unlike a traditional envelope follower that reacts to signal volume, this one gives you consistent, predictable sweeps. Great for auto-wah effects, synth zaps, and funky textures.

Envelope Section:

- **Shape** – Pick an envelope contour (ramp, triangle, square, etc.). Shapes determine how the filter cutoff moves over time. Square acts more like an LFO.
- **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 – Duration of the envelope sweep. Short = snappy; long = slow evolving.
- **Envelope Amount** – Sets how far the filter cutoff moves in response to the envelope.

Filter Section:

- **Cutoff** – Base frequency of the filter. The envelope adds/subtracts from this point.
- **2-Pole / 4-Pole** – Choose slope steepness: 2-pole = smoother; 4-pole = sharper. This can be controlled by the Effect Modulator.
- **Resonance** – Boosts frequencies at the cutoff, making sweeps more dramatic.
- **Drive** – Adds gain before the filter for extra grit and presence.

Other Controls:

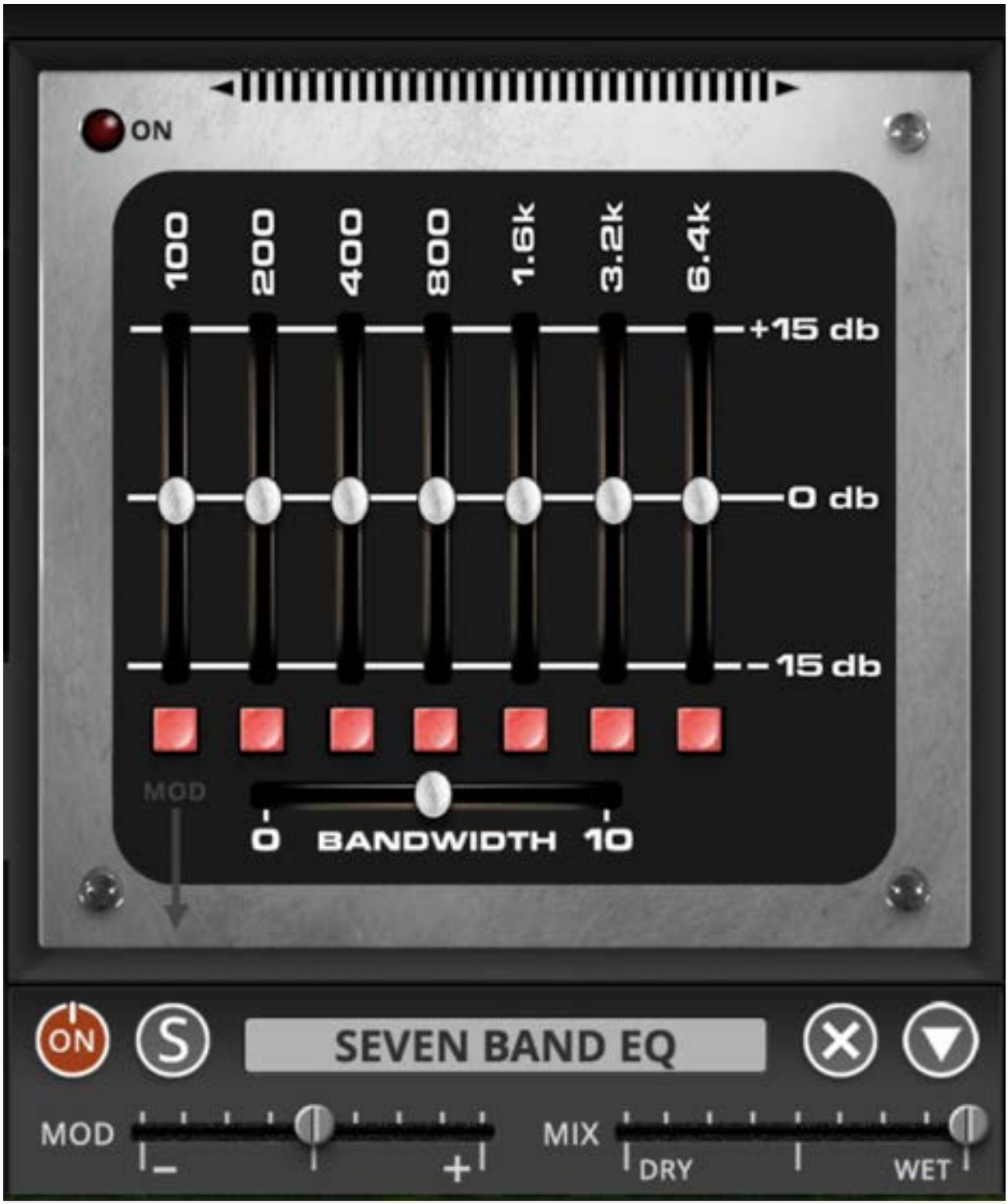
- **Gain (Trimmer)** – Balances the output level.
- **MOD Slider** – Adjusts how much modulation is applied.
- **MIX Slider** – Balances dry vs. processed.

Tip: Set a long ramp-up shape with high resonance on Strings for dramatic sweeps that evolve with each note, or go short and snappy for funky auto-wah leads.

Tip 2: Filters on Filters

You don’t have to trigger the Envelope Filter with an envelope at all. Just leave the sensitivity low and it becomes a fixed filter instead. This essentially gives you an extra paraphonic filter that you can apply to a single sound, or drop in the global FX chain for the whole mix. Stack it with the synth's built-in filters, and the multiple filters line up in series to carve out shifting bands of tone. This technique is an excellent way to shape formant-like textures,

focus a patch more narrowly, or travel to new sonic realms the synth never imagined.



Seven Band EQ

Equalization is one of the most fundamental tools in shaping sound, and the **Seven Band EQ** makes it straightforward and musical. Modeled after classic graphic equalizers, this effect lets you boost or cut seven key frequency

ranges to sculpt tone, tame problem areas, or bring out character in any sound.

Controls:

- **Frequency Bands (100, 200, 400, 800, 1.6k, 3.2k, 6.4k Hz)** – Each vertical slider boosts or cuts its band by up to ±15 dB. Push up to emphasize, pull down to reduce.
  - **100 Hz** – Sub-bass and low-end weight. This can be controlled by the Effect Modulator.
  - **200 Hz** – Warmth or muddiness.
  - **400 Hz** – Body and thickness (or boxiness if overdone).
  - **800 Hz** – Midrange punch.
  - **1.6 kHz** – Presence and edge.
  - **3.2 kHz** – Clarity and attack.
  - **6.4 kHz** – Brightness and air.
- **Bandwidth** – Adjusts how wide or narrow each band's effect is. Lower values = broader, smoother curves. Higher values = tighter, more surgical adjustments.

As with all other effects, the **Seven Band EQ** can be modulated, opening the door to rhythmic tone-shaping or evolving filter-like sweeps across multiple bands.

Tip: Use gentle boosts or cuts across a few bands for natural tone shaping. For example, trimming a little **200 Hz** mud while boosting **3.2 kHz** clarity on Brass. Or crank up **100 Hz** and **6.4 kHz** together to give synth basses thump and sparkle.

Ring Modulator

Ring modulation is the sound of science fiction ray guns, metallic clangs, and otherworldly textures. By multiplying your signal with an internal oscillator, it creates sum and difference frequencies that often sound inharmonic, robotic, or downright alien. The **Ring Modulator** gives you full control over how wild (or subtle) things get.

Controls:

- **Gain** – Adjusts the input level sent into the modulator. Higher gain means a stronger, more pronounced effect. This can be controlled by the Effect Modulator.
- **Range (High/Low)** – Switches the oscillator's frequency range. Low is better for tremolo-like modulation; High ventures into bell tones and metallic territory.
- **Freq** – Sets the frequency of the carrier oscillator. Lower settings = slow, throbbing tremolo. Higher = clangorous sidebands.
- **Wave** – Selects the oscillator's waveform: sine for smooth, or square for harsher, edgier modulation.
- **Rate** – Controls oscillator speed when in Low range (essentially tremolo rate). Syncs to tempo when **Sync** is enabled.
- **Amount** – Sets the depth of modulation, from subtle shimmer to total signal disintegration.
- **Drive** – Adds gain and harmonic grit after the modulation stage, thickening or dirtying up the output.

Tip: For classic sci-fi flying saucer tones, set **Range** to High, pick a sine wave, and crank **Freq** into the audio range. For more musical use, try Low range with Rate synced to tempo and it becomes a tempo-locked tremolo that adds groove without going completely alien.

Lushverb

If you want your sounds to swim in ambience, **Lushverb** is your go-to. As the name suggests, it’s built for wide, dreamy reverberation that can be subtle and supportive or massive and enveloping. With tone-shaping filters and built-in modulation, it excels at everything from natural roominess to lavish, evolving textures.

Where **Galactic Reverb** reaches for infinite, cosmic expanses, **Lushverb** focuses on silky smoothness and animated depth. It's the kind of reverb that enhances synths, vocals, and pads by wrapping them in a glowing halo.

Controls:

- **Predelay** – Time before the reverb kicks in. Short gives an immediate wash. Longer gives a clearer separation between dry sound and reverb bloom. This can be controlled by the Effect Modulator.
- **Early Reflections** – Shapes the very first echoes you hear when a sound bounces off walls. Low settings keep things tight and intimate, like you’re in a smaller space. Higher values push those reflections further forward, adding presence, punch, and a sense of real room before the tail blooms. Great for adding dimension without always using longer decay times.
- **Decay** – Sets the length of the reverb tail, from short ambience to cavernous sustain. Can be modulated. This can be controlled by the Effect Modulator.
- **Highpass / Lowpass** – Trim low-end rumble or high-end fizz in the reverb signal to keep mixes clean.
- **Damp** – Determines how much brightness is lost over time. Higher values give tails that darken as they fade.
- **Mod Rate / Mod Depth** – Add movement to the reverb tail by modulating its delay lines. Subtle settings = gentle shimmer; extreme settings create chorus-like animation.
- **Sync** – Locks modulation to host tempo for rhythmic effects.
- **Mod Switch (Predelay/Decay)** – Chooses whether modulation applies to the Predelay or Decay parameter.

Tip:
For ambient pads, set a long **Decay**, roll off some lows with the **Highpass**, and add a touch of **Mod Depth** for evolving atmospherics. For tighter mixes, use shorter **Predelay** and keep **Decay** moderate, adding just enough **Damp** to sit naturally under the dry sound.

Lo-Fi

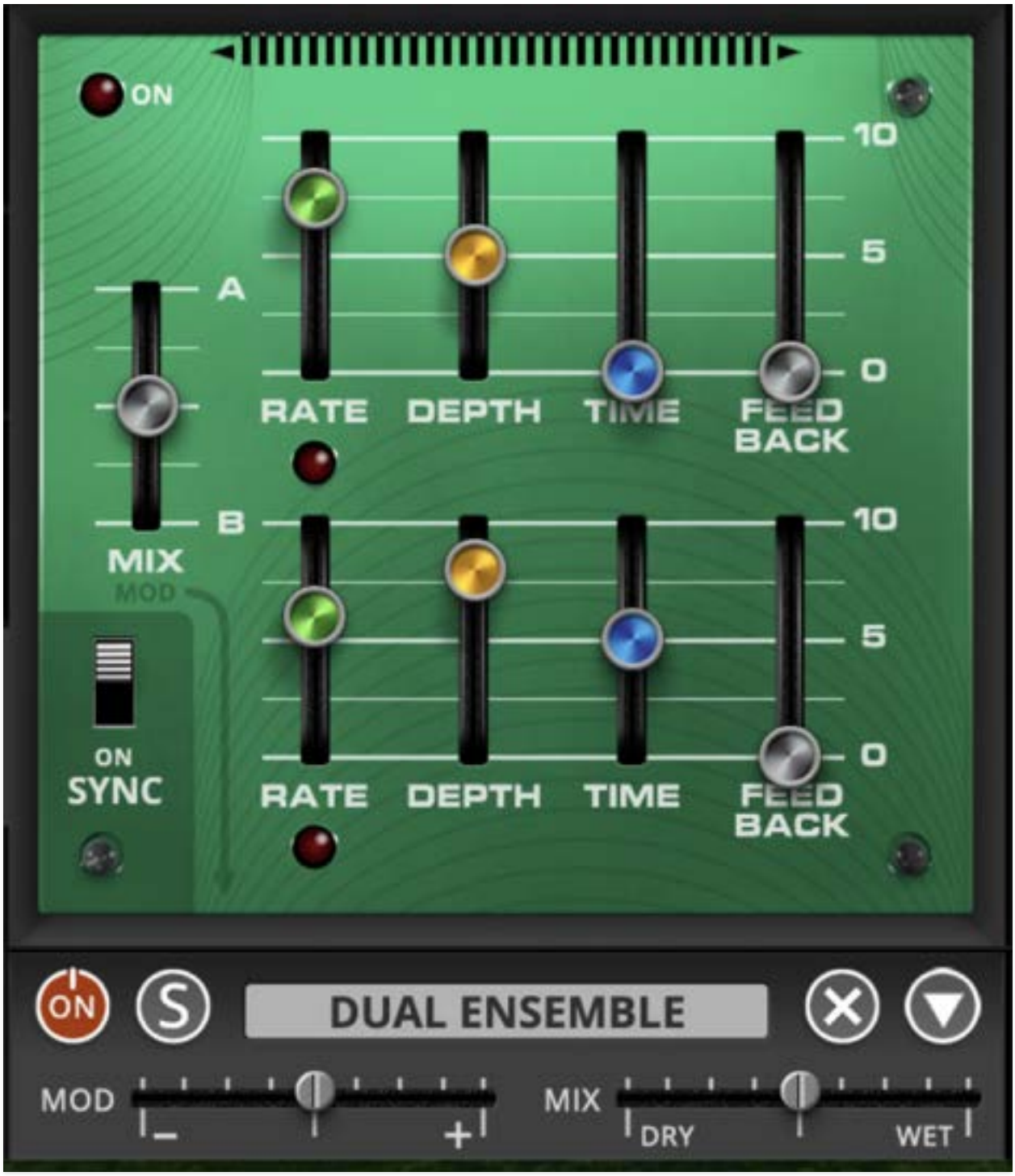
Sometimes perfection is the enemy of vibe. **Lo-Fi** is designed to rough up your sound with the kinds of imperfections that make old recordings feel warm and gritty. From dusty vinyl crackle to wobbly tape warble, this effect can take pristine synth tones and throw them straight into the basement of a 1970s record store.

Controls:

- **Vinyl** – Adds record-like crackle and pops. Higher settings = more frequent, louder artifacts.
- **Wow** – Simulates the slow pitch drift of a warped record or stretched tape.
- **Flutter** – Adds faster, jittery pitch variations, like a worn cassette transport.
- **Hiss** – Introduces broadband noise, reminiscent of tape or cheap electronics.
- **Hum** – Injects mains hum into the signal, with a switch for **50 Hz / 60 Hz** to match regional power noise flavors. This can be controlled by the Effect Modulator.
- **Random (center knob)** – Introduces unpredictable fluctuations across the effect parameters, enhancing the chaotic, analog feel.
- **Noise Gate** – To help keep the grit under control, Lo-Fi includes a **Gate**. Think of it as an automatic volume control. It lets your instrument through when you're playing, and slams the door shut when things go quiet, keeping hiss, hum, and crackle from hanging around between notes.
  - **Enable Button**: Switches the gate on and off.
  - **ATT (Attack)**: How quickly the gate opens when you play a note. A fast attack gives you sharp, immediate entrances; a slower attack eases the noise in more gently.
  - **REL (Release)**: How quickly the gate closes after the sound drops below the threshold. A short release cuts noise instantly. A longer release lets things fade more naturally.

  Gate Tip: When using long-decay sounds (especially with reverb or delay), you might hear "chatter," a sputtering, open-close-open stutter as the gate struggles to decide whether the tail is loud enough to keep. If that happens, try increasing the **Release** for smoother fades, or dial back your effect tails slightly. A touch of balance here makes the difference between vintage character and sounding like a broken speaker.

Lo-Fi Tip: For subtle retro flavor, add a touch of **Wow** and **Hiss** to synth pads. For full-on grit, crank **Vinyl** and **Hum** and let the **Random** knob do its thing. It's great for lo-fi hip-hop or downtempo textures that need a worn, nostalgic character.



Dual Ensemble

The lush, swirling sound of ensemble effects is a hallmark of vintage string machines and poly synths. The **Dual Ensemble** effect gives you two fully independent ensemble units for everything from subtle shimmer to deep, swirling motion.

Controls (for each Ensemble A & B):

- **Rate** – Sets the speed of the modulation (how fast the pitch/phase shifts). Slow adds gentle drift; fast adds warbly motion.
- **Depth** – Controls how far the pitch is detuned by the modulation. Low adds subtle thickening; high adds seasick wobble.
- **Time** – Adjusts the base delay time of the effect. Longer times = looser, more chorus-like feel; shorter times = tighter, phase-like coloration.
- **Feedback** – Feeds the delayed signal back into itself for resonance and more pronounced movement.

Shared Control:

- **Mix** – Balances between Ensemble A and Ensemble B. Use it to layer two different modulation speeds and depths for a rich, evolving chorus. This can be controlled by the Effect Modulator.

Tip: For classic string-machine shimmer, set both ensembles with slow **Rates** and low **Depths**, then balance them with the **Mix** slider. For a more psychedelic wash, give one ensemble a slow, deep drift and the other a faster, shallower variation. The interaction creates a lush, animated stereo field.

Note: If you're torn between **Dual Ensemble** and **Chorus/Flanger**, think of it this way: Ensemble excels at smooth, swirling textures with a vintage string-machine flavor, while Chorus/Flanger covers more dramatic sweeps, jet whooshes, and thicker doubling effects.

Dual Delay

Why settle for one echo when you can have two? The **Dual Delay** lets you run two independent delay lines side by side for everything from tight rhythmic interplay to wide, spacious echoes. Each delay has its own controls, and you can sync them to tempo, run them free, or send them bouncing across the stereo field in ping-pong mode.

Controls (per Delay Line 1 & 2):

- **Time** – Sets the delay length. With **Sync** engaged, times lock to tempo divisions; in **Free Run** they're adjustable in milliseconds.
- **Feedback** – Determines how many repeats occur. Low = quick slapback; high = long echoes or self-oscillation.
- **Damp** – Applies high-frequency damping to the repeats, making them darker and more natural as they fade.

Shared Controls:

- **Mix (1/2)** – Balances between Delay 1 and Delay 2. This can be controlled by the Effect Modulator.
- **Sync/Free Run Switch** – Toggles between tempo-synced and free-running time modes.
- **Spread** – Adjusts stereo spacing of the delays. Low = centered echoes; high = wide, panned echoes.
- **Ping-Pong** – Sends repeats alternating left and right for a classic stereo bounce.

Tip: For rhythmic complexity, set Delay 1 to dotted eighths and Delay 2 to quarters, then spread them wide for instant "U2-style" echo textures. For ambient sound design, keep both delays long, add plenty of **Damp**, and engage **Ping-Pong** for endless stereo wash.

Note: If you're wondering whether to reach for **Dual Delay** or **Digital Delay**, here's the difference: Digital Delay is quick and straightforward, with classic single-line flavors (digital, ping-pong). Dual Delay offers more flexibility, stereo interplay, and rhythmic layering. This is great when you want echoes to become part of the composition.

Compressor

Compression is a powerful tool for shaping the dynamics of your synths. It can make basses hit harder, leads sit firmly in a mix, and pads feel more even and controlled. The Compressor keeps things simple, with just the essential controls you need to add punch, presence, or smoothness to your patches. It operates with a fixed threshold of –12 dB and built-in auto makeup gain, ensuring consistent levels without extra balancing work, making it very plug-and-play. Dial in Attack and Release to taste, push the

Input until you like what you hear, and you’re good. There's no need to trouble with gain staging or threshold hunting.

Controls:

- **Ratio (slider at top)** – Sets how much the signal is reduced once it passes the threshold. Lower ratios (4:1) create gentle smoothing. Higher ratios (12:1, 20:1) give firm control.
- **Input** – Adjusts how much signal is pushed into the compressor. More input equals more compression.
- **Output** – Balances the overall level after compression so the processed signal matches or exceeds the bypassed sound.
- **Attack** – Controls how quickly the compressor reacts, measured in milliseconds (ms). Fast is tight and snappy; slow allows more of the transient bite through.
- **Release** – Sets how quickly the compressor recovers, measured in milliseconds (ms). Fast = punchier feel; slow = smoother, sustained leveling.
- **VU Meter** – Shows how much gain reduction is being applied, so you can see the effect as well as hear it.
- **Auto Makeup Gain** – One common side effect of compression is that the overall signal level can drop as peaks are reduced. Normally you’d compensate for this with an Output (or Makeup Gain) control, nudging the level back up by ear. The Compressor effect saves you that step by including built-in auto makeup gain that you can switch on or off. With it on, as you increase compression, it automatically boosts the signal so your processed sound stays roughly as loud as the uncompressed version. The benefit is that you can focus on shaping punch and dynamics without constantly juggling output levels, making the Compressor faster and more intuitive to use.

Compressor Specs:

- Input: -20dB to +20dB
- Output: -20dB to +20dB
- Attack: .1ms to 200ms
- Release: 5ms to 3000ms
- Detector HP: 100Hz

- Threshold: -12dB
- Soft Knee (-3dB below threshold)

Tip: For synth bass, use a medium **Attack** and fast **Release** to keep the low end solid without losing punch. On pads, slower **Attack** and **Release** settings even out the dynamics, giving you a warm, flowing texture that sits perfectly under leads and arpeggios.

Note: the Compressor is the one effects unit that does not utilize the Effect Modulator, and has no mapping applied to it.

BBD Flanger

Flanging is all about mixing a signal with a very short, modulated delay, creating swooshing comb-filter effects. The **BBD Flanger** nails the character of vintage bucket-brigade analog units, known for their warm, slightly gritty sound compared to pristine digital models. This makes it ideal for thickening synths, adding movement to pads, or creating the classic jet plane sweep.

Controls:

- **Speed** – Sets the LFO rate that modulates the delay time. Slow is good for gradual sweeps; fast is good for rapid, shimmering motion. This can be controlled by the Effect Modulator.
- **Intensity** – Adjusts how much the LFO affects the delay time. Subtle settings are good for gentle movement; higher is good for deeper sweeps.
- **Manual** – Manually offsets the flanger's delay time. Use it to set the starting point of the sweep or to park the flanger for static comb-filter tones.
- **Feedback** – Feeds part of the output back into the input. Low gives a smooth, subtle flange. High gives a resonant, metallic sweep with a signature jet-like sound.
- **Sync** – Locks the modulation rate to host tempo for time-synced sweeps.

Tip: For classic "jet whoosh" effects, set **Feedback** high, **Speed** slow, and **Intensity** deep. For subtler chorus-like thickening, keep **Intensity** low, **Manual** slightly offset, and a bit of **Feedback**.

Note: If you're deciding between **BBD Flanger** and **Flanger/Chorus**, here's the distinction: BBD Flanger delivers darker, warmer, more organic sweeps. This is perfect for vintage-style movement. Flanger/Chorus offers cleaner, brighter modulation and the flexibility to switch into chorus mode.

DCO Chorus

Inspired by the legendary stereo chorus of the Juno-60, the DCO Chorus adds rich, swirling movement to analog pads and is great for beefing up textures with that classic 80s spread. The Juno-60's original chorus gave its single-oscillator engine a depth and width that made it a hallmark of synthpop and electronic music.

Controls:

I – The first mode gives a rich chorus effect, adding width and shimmer. It's ideal for thickening pads, strings, and other sounds. This can be controlled by the Effect Modulator.

II – The second mode intensifies the chorus effect by increasing the modulation speed by 70%. It great for lush textures, or anything where you want the synth to bloom.

I + II – Both modes engaged simultaneously. This third variation was a feature of the Juno-60 (pressing both buttons) and became a go-to trick for an unmistakably intense chorus. The modulation speed is faster, the depth shallower, and it uses a sine wave instead of a triangle wave.

Noise Level (knob) – Adds a subtle analog-style noise floor to the effect chain, helping the chorus feel less digital and more lived–in.

Tip: For a warm pad with some movement, set mode II, dial Noise Level low, and let the chorus breathe. Want your lead to spread? Use I + II, pull Noise Level up a bit, then stack a subtle delay behind it for full ’80s width.

Panner

The Panner effect brings life and movement to your patch in the stereo field. Use it to animate a wandering pad, give your lead a swirling stereo motion, or simply place layers dynamically across the stereo field. By controlling how your sound moves left-to-right, how wide the sway is, and how quickly it sweeps, you can turn a static sound into a living soundscape. To trigger the Panner, press a key on the keyboard. If you continue to down a key (or keys), pressing other keys won't retrigger the effect.

Controls:

Rate (Min → Max) – Sets the speed of the movement across the stereo field. Lower settings slow down the pan sweep; higher settings make the motion rapid and rhythmic. This can be controlled by the Effect Modulator.

Width (Min → Max) – Determines how far the sound moves from left to right. At minimum the motion is subtle; at maximum it spans the full stereo spectrum.

Offset (Left ↔ Right) – Lets you set the starting point or bias of the movement. Move towards “Left” to start or favor the left side; move towards “Right” to start/favor the right.

Shape – Selects the modulation waveform used for panning (sine, triangle, saw, square). Different shapes give different character to the movement.

Smoothing (Hard ↔ Soft) – Controls how quickly the panning transitions occur: “Hard” gives abrupt jumps or sharp movement, “Soft” smoothens the glide between positions.

Mode Switch (Manual / ON / Trig Once / Trig ON) –

- **Manual**: Panning follows the Offset knob only – no automatic sweep.
- **ON:** Continuous automated panning according to Rate, Width, Shape, and Offset.
- **Trig Once**: On receiving a trigger event (i.e. pressing a key on the keyboard), the panning sweep runs once and then stops. In this mode, the Attack knob is active.
- **Trig ON**: On receiving trigger events, panning restarts automatically each time a key is pressed (if no other keys are currently held down). In this mode, the Attack knob is active.

Attack (Min → Max) – Active when Mode is set to Trig Once or Trig On. Sets how quickly the panning sweep begins after the trigger. Short values give an immediate sweep. Longer values ease in gradually.

SYNC (Off / On) – When ON, the Rate control syncs to the synth's own tempo setting (in standalone mode) or if used in a DAW, to the project tempo. When OFF, Rate is freely set in Hz.

Tip: For a slowly drifting stereo pad, set Width relatively high, Rate low (around 1 – 2), Shape to triangle, Mode to ON, and Smoothing to Soft. If you want a lead that jumps left-right on each note trigger, switch to Mode to Trig

Once, set Attack short, Width high, Rate moderate, and tie the trigger to your note-on event for dramatic stereo hops.

Pulser

The Pulser effect is a flexible 16-/32-step gate/sequencer built to inject rhythmic motion into sustained sounds or static patches. Think of it as a live, programmable tremolo, stutter or step-gate engine that sits on the end of

your signal chain and chops or paces your synth voice, turning pads, leads or drones into patterns that rhythmically pulsate with life.

Controls:

Attack (0-10) — Determines how hard the gate opens at each step. Lower values give sharp, abrupt cuts. Higher values soften the entrances so the gating effect is smoother and less choppy.

Sustain (0-10) — Sets how long the gate stays open during each active step. At maximum sustain, the silence holds for the length of the step.

Length (Min → Max) — Sets the number of active steps in the sequencer. In Single mode this runs from 2 –16 steps.In x32 mode the total length doubles (up to 32 steps).

Playback (Single / Dual / x32) —

- Single: Runs one sequencer of up to 16 steps.
- Dual: Enables two independent 16-step sequences running simultaneously (so you can layer or offset patterns).
- x32: Runs a single sequence of up to 32 steps (essentially the 16-step engine doubled).

Speed (Min → Max) — Controls the rate at which the sequence advances. Higher values make faster step changes; lower values slow things down for broad rhythmic movement. This can be controlled by the Effect Modulator.

Direction switch (▶ / ◀) — Determines playback direction: forward (▶) or reverse (◀). Reverse mode can yield unexpected textures, especially when gating sustained patches.

Sync (Off / On) — When ON, the Speed parameter locks to your host tempo or internal clock; when OFF, Speed is free-running.

16 Step Buttons — Each button corresponds to one step in the sequence. Clicking a button toggles the gate on that step (active) or off (muted). A lit button means the signal passes; unlit means the gate is closed for that step.

Tip:

For a dramatic stutter effect, set Length to approximately 8, Speed moderate (so each step aligns with a 16th-note), Attack low for crisp gate opens, Sustain around mid for choppy rhythm. Use the forward direction. On the other hand, for evolving drone motion, try Length = 16, Speed = slow, Attack = high, Sustain = long, Direction = reverse, and use Sync = Off so the pattern drifts free of the tempo grid.

Power Tip: Rhythmic Crossfire

The Pulser becomes even more powerful when you use it in multiple effect lanes. Try assigning different Pulser settings to the VCF and BPF with one running a short, percussive 8-step pattern, and the other a slower 16-step pulse. Set the VCF layer’s playback to forward and the BPF to reverse, then balance them with the Master Balance control.

The result is a hypnotic interplay of gated rhythms weaving in and out of each other. This is great for creating Berlin-school sequences, rhythmic ambient beds, or anything that needs motion without a drum track.

For bonus chaos, switch one Pulser to Dual mode and the other to x32, and let the overlapping cycles drift naturally out of sync.

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 DS=2's full array of MIDI control assignment possibilities.

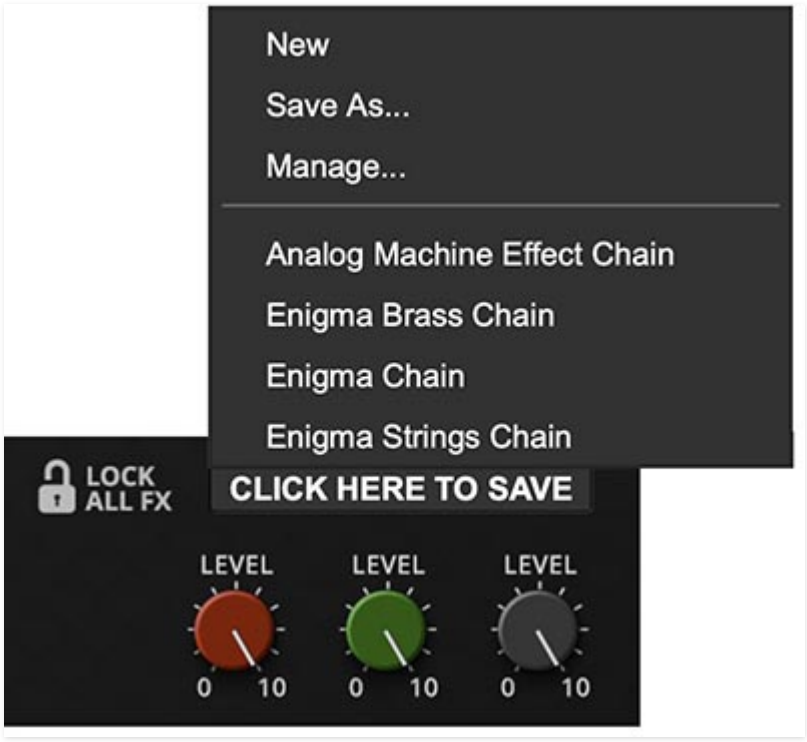
First, though, we'll give you a quick look at how to assign an external hardware controller to a DS-2 control using MIDI Learn, so you can get started with basic MIDI control while you're learning the fancy stuff.

Quick and easy controller assignment

In this example, we'll assign a hardware slider/knob control to the *Cutoff* parameter in the Synthesizer section.

Begin by right-clicking on the *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 DS-2 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:

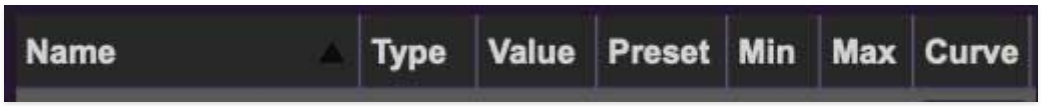
MIDI Learn button- This is almost exactly the same as enabling MIDI Learn mode by right-clicking a control. Click the *MIDI Learn* button to enter learn mode (all controls turn purple). Unlike right-clicking on specific knobs, where DS-2 automatically exits controller assignment mode, clicking the *MIDI 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 DS-2:

- **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. DS-2 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 DS-2'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.

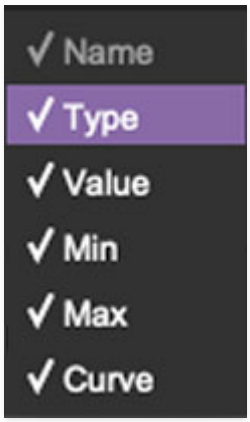
Max- Sets a limit on the highest value any automation control can set a mapped controller to. This actually recalibrates the range of the automation controller to the remaining parameter range.

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.

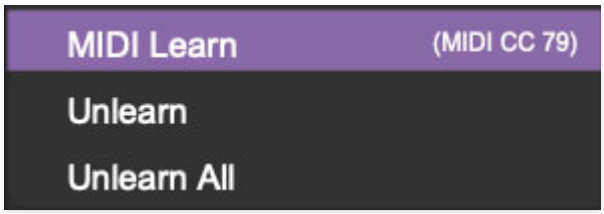
Curve- These allow the customization of how incoming MIDI CC controls affect the movement of DS-2's onscreen controls, ranging from exponential to linear to logarithmic curves.

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:

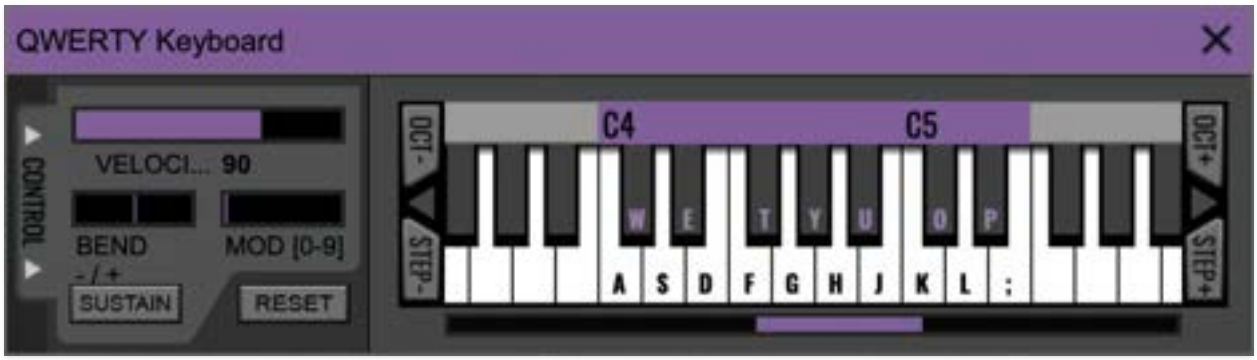
MIDI Learn- This is used to change the controller assigned to a particular parameter.

Unlearn- Deletes the selected automation parameter.

Unlearn All- Deletes all controller assignments for the patch. DS-2 will display a warning dialog prior to deletion in order to thwart potential unlearn-related disasters.

QWERTY Musical Typing Keyboard (MTK)

DS-2 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 DS-2 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 DS-2'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.

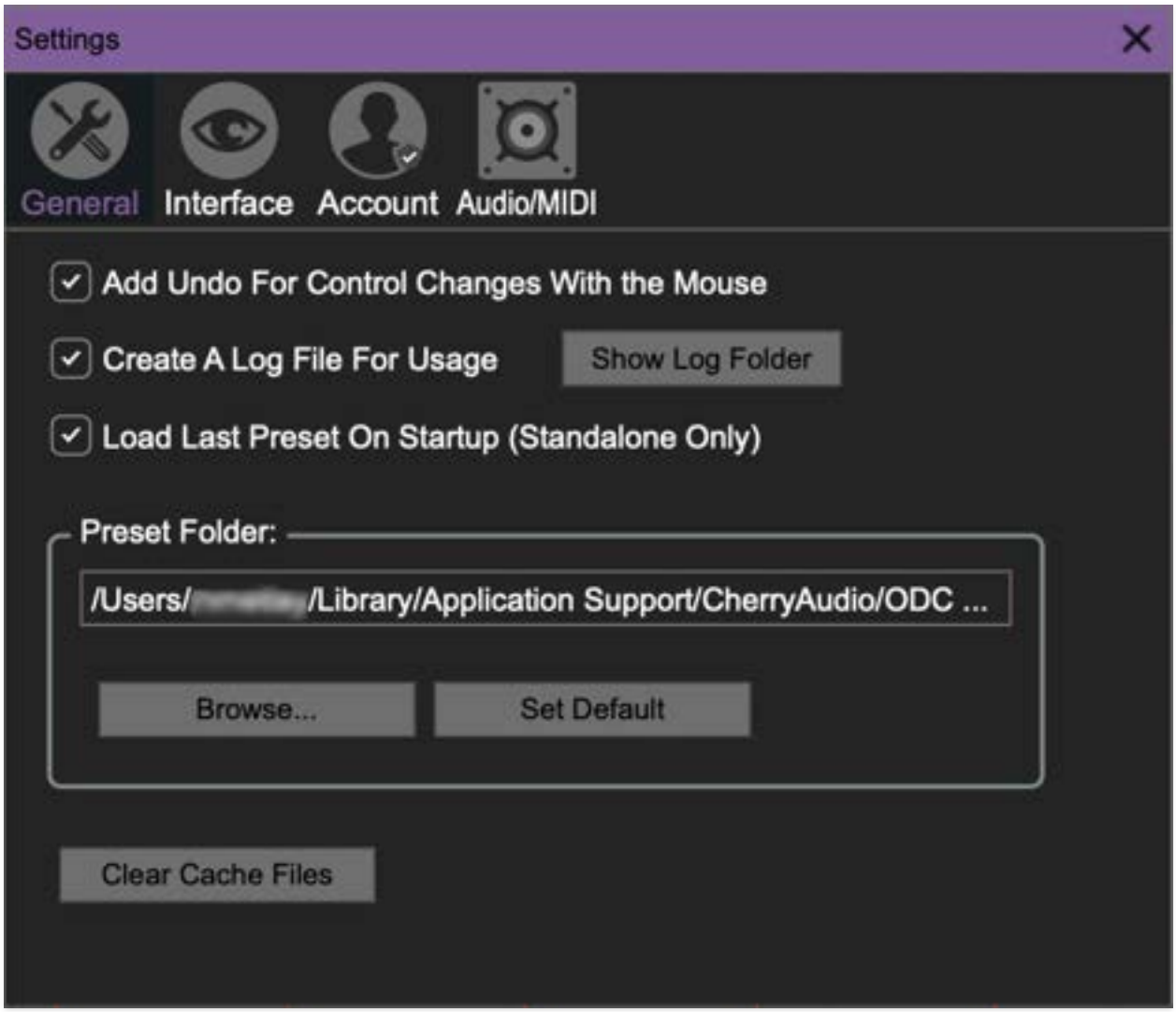
Reset- Initializes all MTK parameters including keyboard range and control parameters.

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!

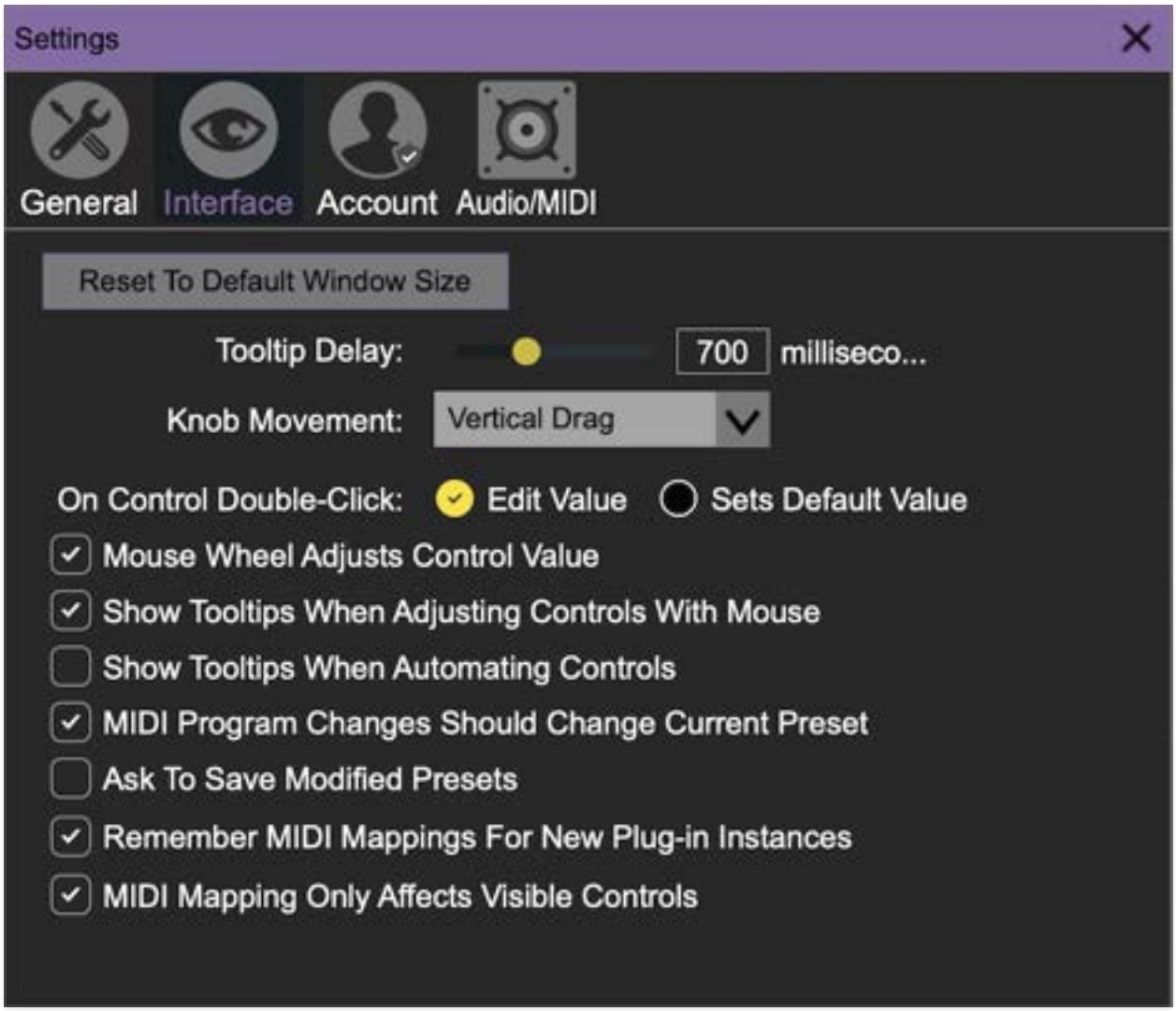
The Settings tabs are: General, Interface, Account, and (on the standalone version of DS-2) Audio/MIDI.

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 DS-2'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 DS-2log file docs.
- **Load Last Preset On Startup (Standalone Only)**- Automatically loads the last preset used when DS-2 standalone version is started.
- **Preset Folder-** Displays the current location of DS-2'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



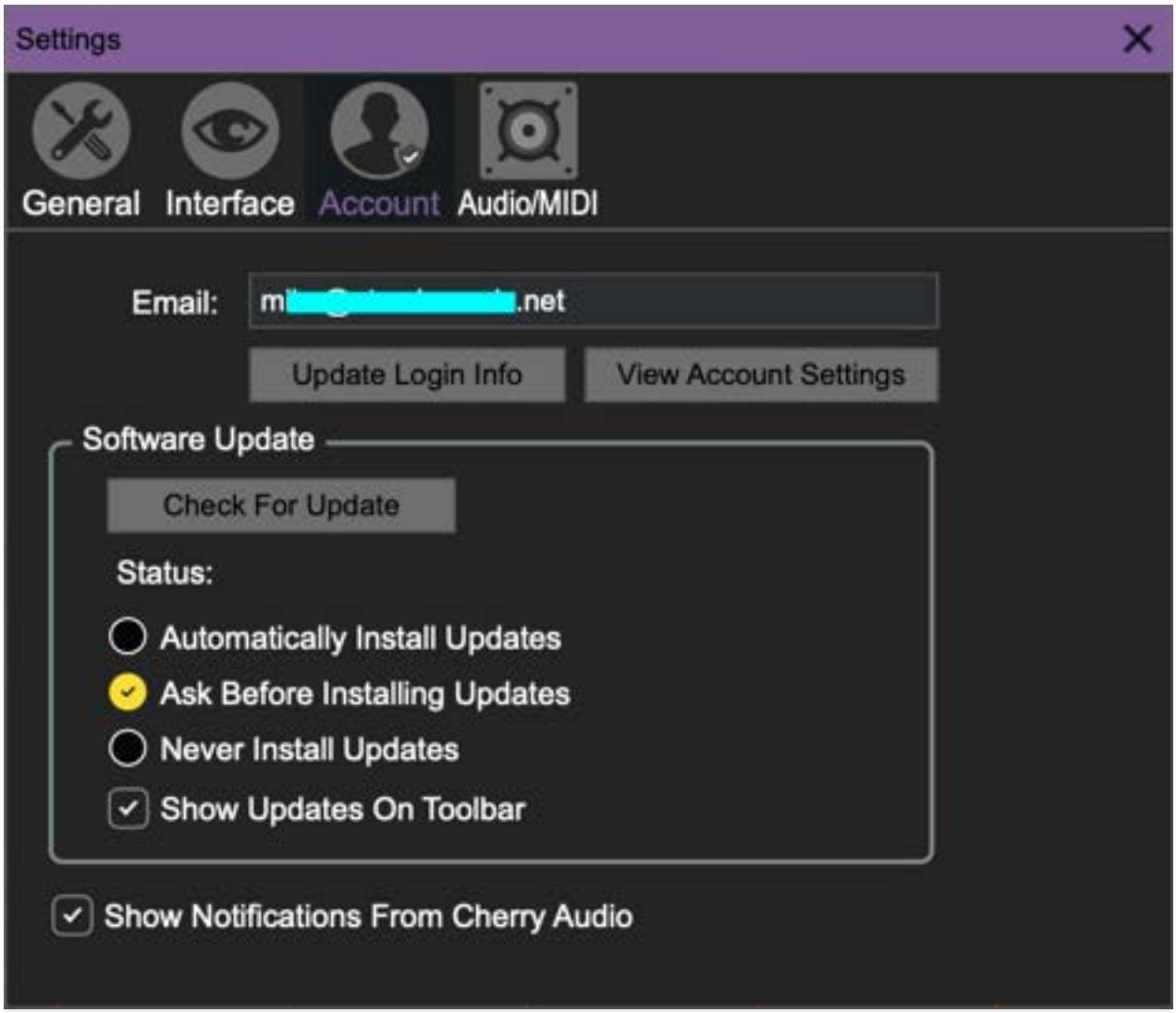
Allows customization of DS-2's user interface settings.

- **Reset To Default Window Size-** Resets the DS-2 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 DS-2 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, DS-2 remembers all global MIDI Tab controller settings.
- **(NEW) MIDI Mapping Only Affects Visible Controls-** this option allows users to assign the same physical control of a controller and MIDI CC to identical functions in both upper and lower layers. When enabled, only the currently displayed layer will respond to adjustments, enabling users to easily switch between layers and independently modify parameters such as cutoff and ADSR with a single set of controls.

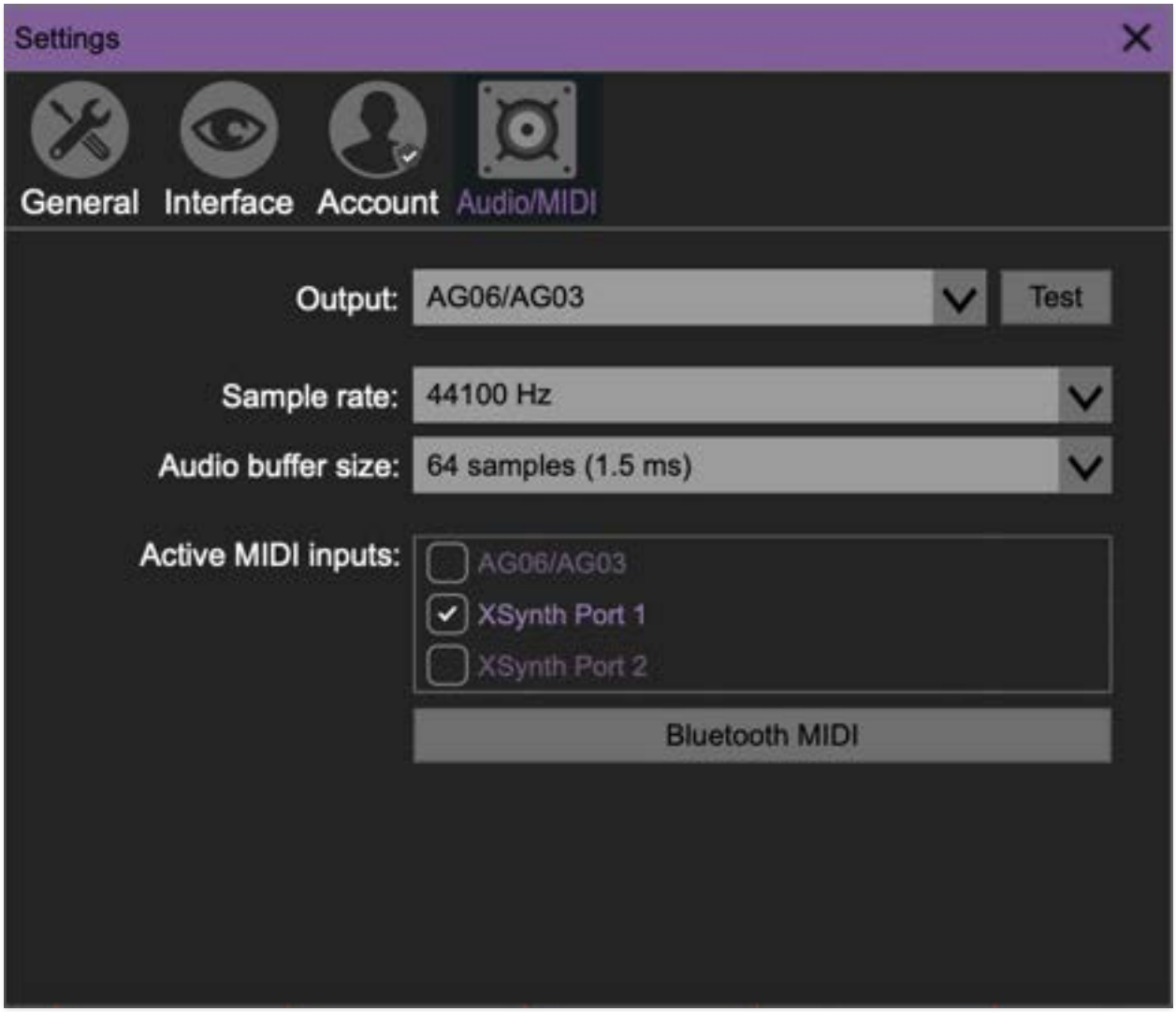
Account



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 DS-2.
- **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 DS-2 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 DS-2**.**

- **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!)