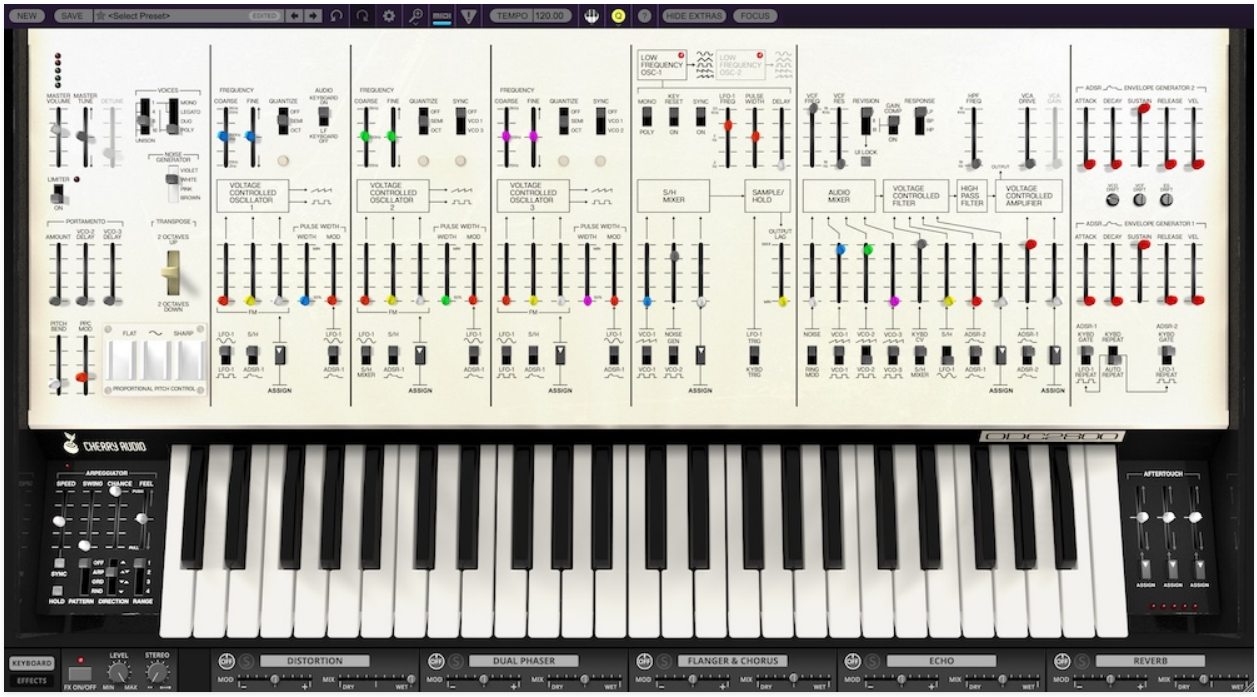
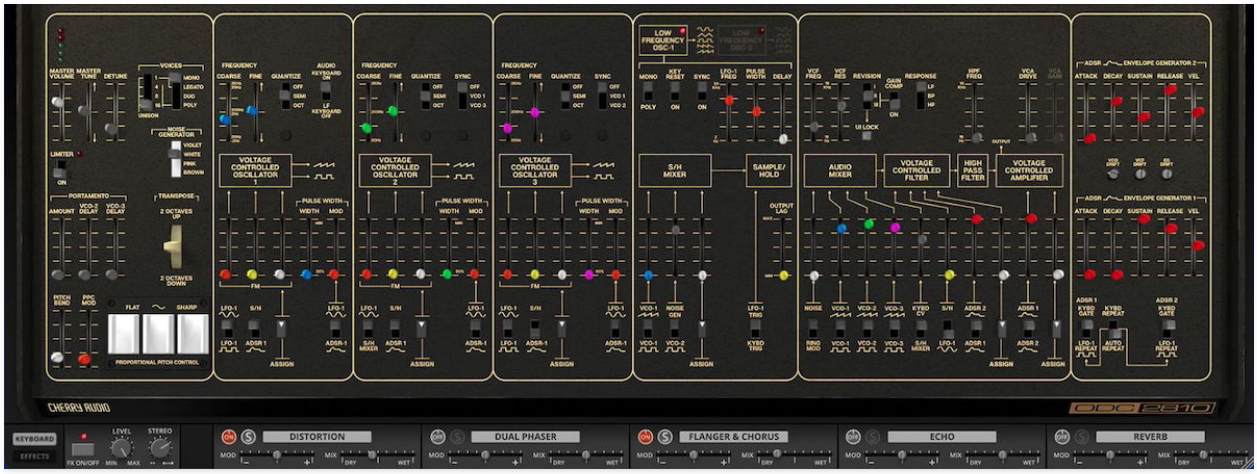


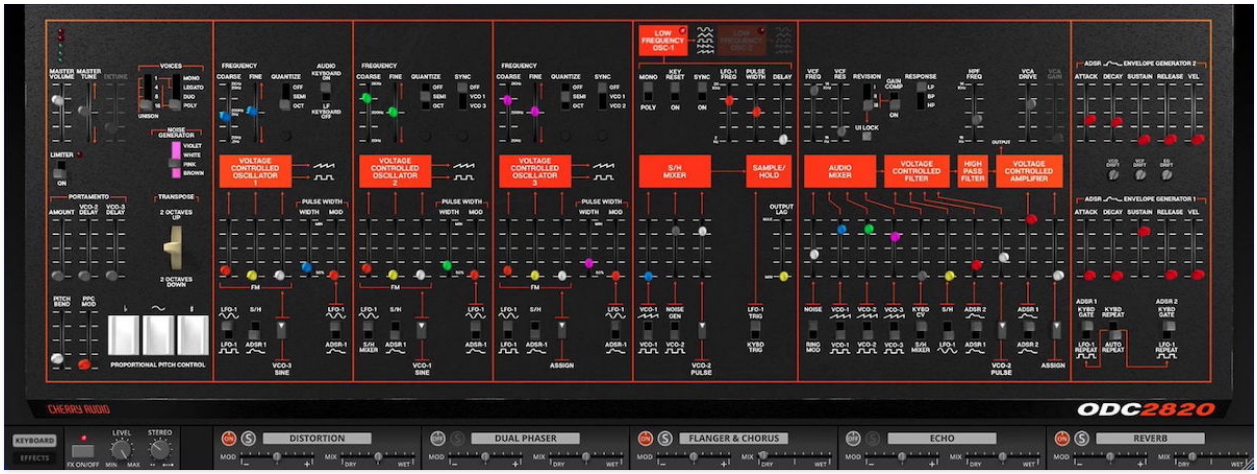
Welcome to ODC 2800!

In the 1970s, a select few analog monophonic synthesizers stood at the pinnacle of success, their unique sounds and features inspiring a world of musicians in rock, jazz, and beyond. As usual for such successes, other companies moved to get in on the action with their own designs. Interestingly, if you compare those imitators' feature sets, one thing becomes obvious: the synthesizer they were imitating most closely was *not* the ubiquitous Minimoog... it was the **ARP Odyssey**.

The Odyssey took the music world by storm in 1972, and never went out of production through ARP's entire history, even as the original white-panel Mk I version (the ARP Model 2800) gave way in 1975 to the black-and-gold Mk II (Model 2810), followed in its turn by the black-and-orange Mk III (Model 2820) in 1978. Each of the three versions had its own unique sound, with

new voltage-controlled filter designs and new performance features, and many have been the arguments over which version is "best." Wouldn't it be wonderful to have access to all three?





Cherry Audio's ODC 2800 starts out as a faithful emulation of the ARP Odyssey, including a choice of all three filter circuits. In classic Cherry Audio fashion, we then take the design even further, preserving the Odyssey sound while adding a third VCO, more envelope functionality, an extra LFO, expanded noise and portamento options, extensive aftertouch control, a powerful arpeggiator, built-in effects... and up to 16-note polyphony.

How To Use This Manual

We've organized this manual as a series of short sections, each covering a particular feature or function set. When relevant, you'll find inline links to other section to make crossreferencing easy, and each section will end with a quick link to the next.

Like every other synthesizer ever made, the Odyssey was laid out for quick and intuitive use, not for making it easy to write a manual without jumping

around a lot. For that reason, when we go through the plugin, we'll order things conceptually rather than literally read the panel from left to right. We're going to quickly cover the basic functions available in the **Top Toolbar**, then dive into the architecture of ODC 2800 – first the actual audio path, then control and modulation features, and finally the many cool extras the plugin has to offer.

Technical Assistance

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

https://forums.cherryaudio.com/

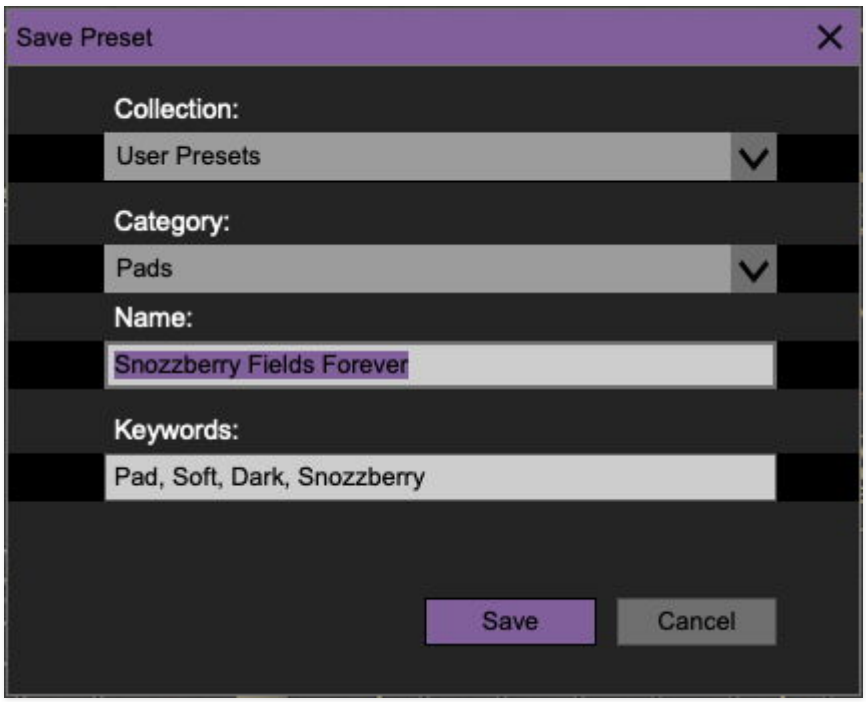
... or you can communicate directly with our helpful, handy, and devastatingly fashionable tech support staff at the link below.

https://cherryaudio.kayako.com/

Let's get started!

The **Top Toolbar** is the dark purple strip at the top of the ODC 2800 interface. From here, you can load, save, and create sound presets. It also contains utility functions such as undo/redo, UI zoom and *Focus* controls, show or hide a lower tray containing the keyboard and effects, 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.

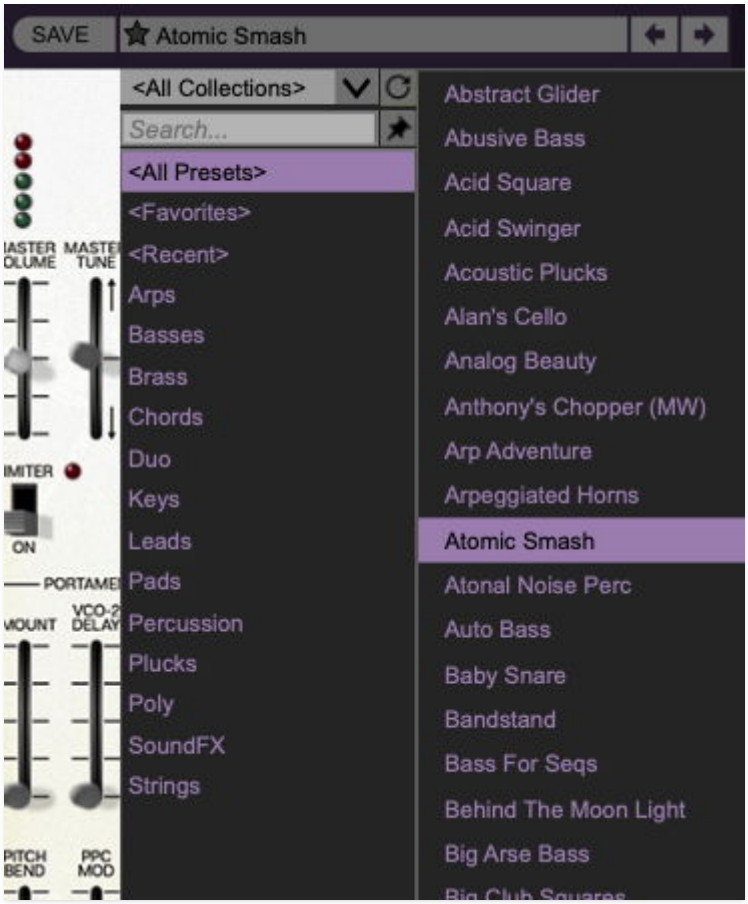


Save- Use this to save patches. There are a couple of levels of hierarchy:

- **Collection**- This is the top level of organization, and contains entire "sets" of presets. The *ODC 2800 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 collection, click in the *Collection* text field (where it says *User Presets* above) and type a name. User-created sounds can be freely saved to any collection; we like to keep 'em separated for organizational purposes.
- **Categories**- Within each collection are a number of sound *categories*. As with collections, you're free to create as many categories as you like. To

create a category, click in the *Category* text field of the *Save* dialog window and type a new category name.

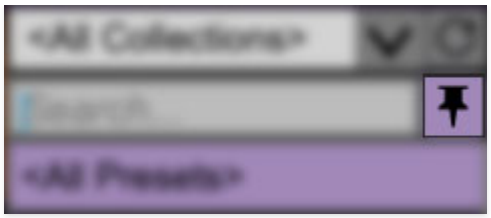
- **Patch**- A patch is an individual sound. To save a patch, simply type the name in the *Name* field and click *Save*.
- **Keywords**- You can add descriptive words such as “bass,” “lead,” “spaceship,” etc., to patches to make them appear when terms are typed in the *Search* field. Use commas to separate multiple keyword entries.



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

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

- **<All Presets>** will show presets from all collections and categories.
- **<Recent>** displays recently used presets.
- **Refresh**- This is the circular arrow button to the right of the downward arrow; clicking this checks the Cherry Audio server for new or updated presets.



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

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

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

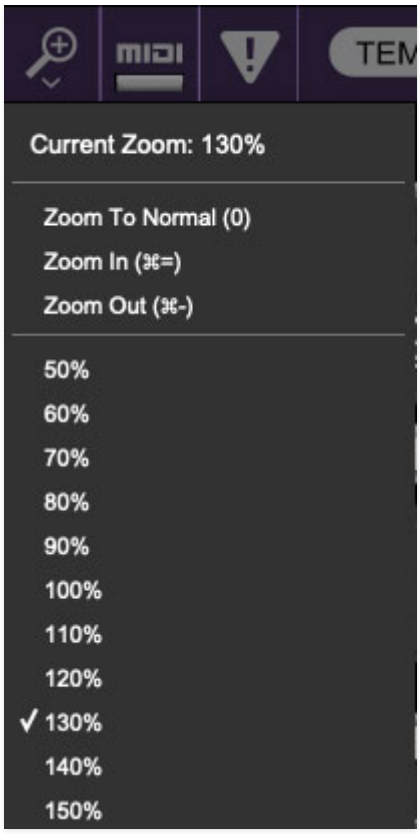
Settings- This is where user preferences for user interface, audio interfaces, user account, and more are configured. See the **Settings** section for full information.

Importing Presets with drag-and-drop

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

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

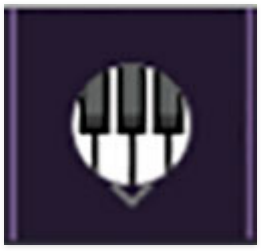
Compressed ZIP files containing multiple sounds can also be drag and dropped onto the UI. This works the same as with single sounds, but instead of the Save Preset dialog, you'll see the Import Preset Collection dialog. The presets will be added as a new collection and available in the categories for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



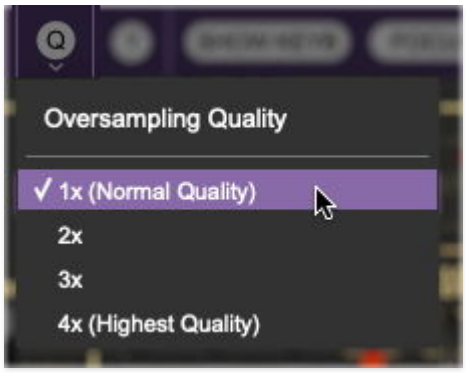
Zoom Magnifying Glass- Click to resize the ODC 2800 interface. Selecting *100%* returns the user interface to native size.

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 the **QWERTY Musical Typing Keyboard (MTK)** section.

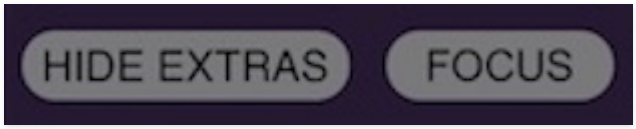


Q (Oversampling Quality) - The Q button sets ODC 2800's internal oversampling rate; the higher the setting, the better audio fidelity will be, with the caveat that more computer processing power will be required.

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, ODC 2800's internal processing runs at 96 kHz, and is then reduced back to 48kHz at the output stage.

As an extreme case, if the current DAW/instrument sample rate setting is 192 kHz and oversampling is set to 4x, ODC 2800's internal processing will run at 768 kHz. On a fairly new and powerful computer, this will produce mind-blowing sound quality; on an older computer, the sound quality will be just as good, right up until the CPU melts down through the enclosure, the table, the floor, and the Earth's crust.



? (Help)- Clicking this launches your web browser and opens this help document. (But you're reading this already, so you may ask yourself, "Well... how did I get here?")

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 ODC 2800's Arpeggiator and Aftertouch panels.

Focus- 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 ODC 2800's view to roughly twice its normal size within the current window. Unlike the *Zoom* "magnifying glass" function, *Focus* doesn't affect the current window size.

In *Focus* mode, 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.

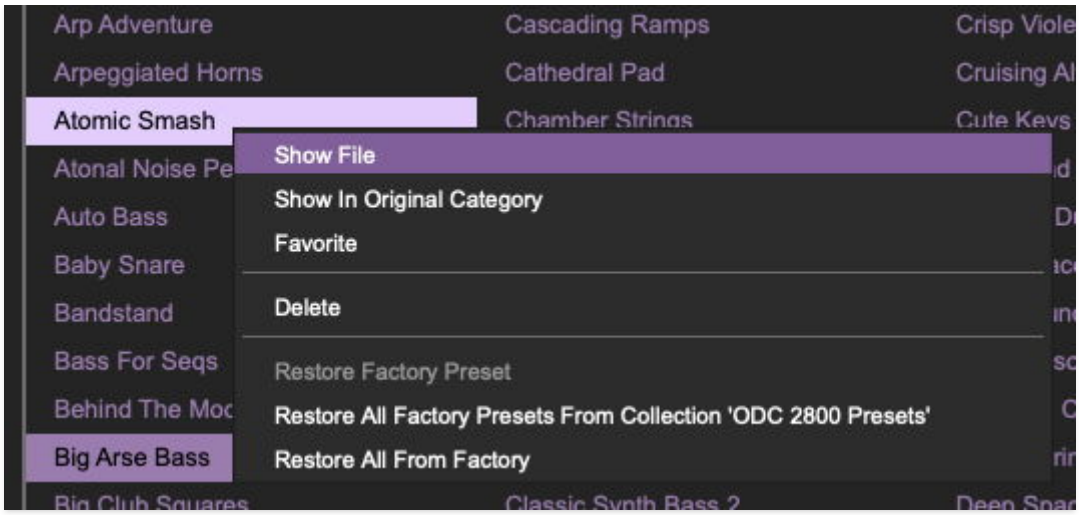
Using *Focus* mode couldn't be easier – just click the *Focus* button the top menu bar. To return to standard view, click the button (which now says *Reset*) again.

About ODC 2800 logo badge - Clicking the badge just above the high end of the keyboard will display an About window, showing the version number and current registered user ID.

Maximize and Touchscreen (Windows only)

Users can click or tap on the Maximize button in the upper-right corner on compatible Windows devices to make ODC 2800 fullscreen. Maximize is particularly useful with touchscreen monitors and gesture-capable tablet devices such as Surface Pro.

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 'ODC 2800 Presets'- If any patches from the "factory" ODC 2800 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 ODC 2800 bank mentioned above is the only factory bank, so this function and the *Restore All Factory Presets From 'ODC 2800 Presets'* above have the same effect.

The first big difference you'll notice between ODC 2800 and an original Odyssey is the addition of a third **Voltage Controlled Oscillator (VCO).** This immediately opens up a whole new realm of sound options – and if you're feeling purist, you can always elect to not use it. (So *there*.)

These VCOs are accurate models of vintage ARP oscillators, whose waveforms are rich with lovely-sounding imperfections. However, each VCO has one or more added features for more convenience, more flexibility, or both.

Coarse- Sets the fundamental frequency of the oscillator, displayed in Hz. The VCO frequencies range from around 20 Hz to 2 kHz. The exception is VCO 1, which has a wider frequency range when the *Audio* switch is set to LF Keyboard Off (see below).

Fine- You can tweak the VCO's pitch up and down with this slider, by 5.40 semitones – a bit over a 5th. The resolution here is in increments of *cents* (0.01 semitone).

Quantize- Here's a feature that Odyssey users would have loved! Rather than trying to tune each VCO precisely by dragging the *Coarse* slider over its full range, you have the option of setting it to jump by semitones or octaves.

Audio (*VCO 1 only*)- This switch lets you set VCO 1 to play notes at appropriate pitches from a keyboard, or to turn keyboard control off for drones or control signals at set frequencies. When *LF Keyboard Off* is set, the Coarse control ranges from about 0.2 Hz to about 20 Hz, turning VCO 1 into a second LFO when needed. (Well, actually a *third* LFO in ODC 2800 - unlike the original, the software has two **Low-Frequency Oscillators**.)

Note that just like an original Odyssey, the VCOs output two waveforms at once: rising sawtooth (ramp) and pulse. Which waveform you hear is chosen at the **Audio Mixer** inputs.

Sync *(VCO 2 and VCO 3 only)*- When turned on, the VCO is forced to restart its wave cycle based on the wave cycle of one of the other two VCOs. When two VCOs are not quite in tune, or out of phase, this forced reset turns the synced VCO's waveform into something more complex, with lots of extra harmonic content. Modulating the frequency of the control oscillator causes the harmonic content to shift over time, creating a powerful sweep sound. The main melody of The Cars' "Let's Go" is a great example of this.

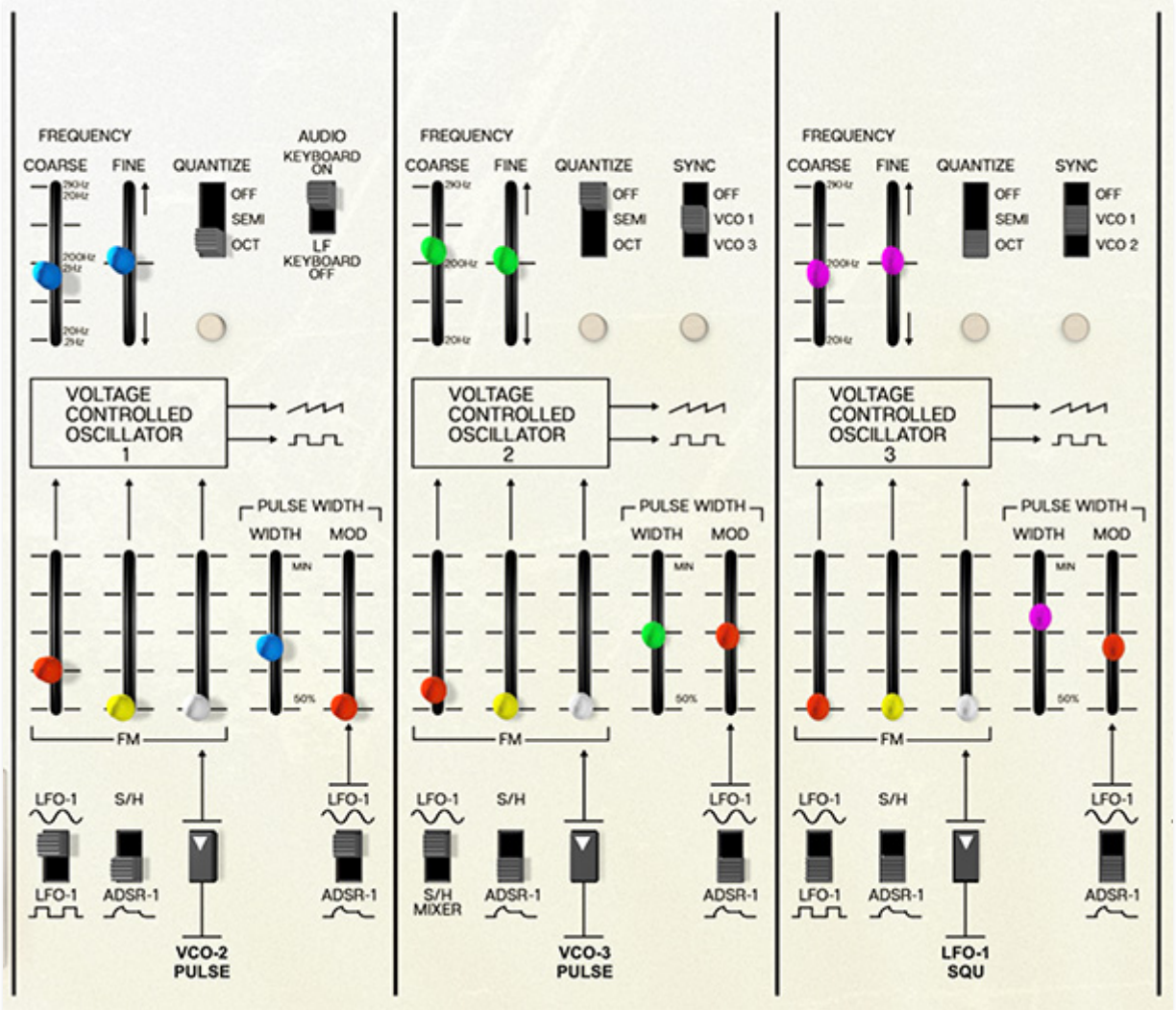
FM- stands for *frequency modulation*, and these three sliders control how much FM is applied to the VCO from other sources. Depending on the modulation source, this can produce everything from wah and vibrato (FM

using envelopes or LFOs) to drastic changes in timbre (FM using other VCOs, also called *cross modulation*).

Note that cross modulation is unique to ODC 2800; this wasn't possible on the original Odyssey because there were no routings in place to make it happen. Not a problem here, though!

Each VCO has its own set of default FM sources for the first two sliders:

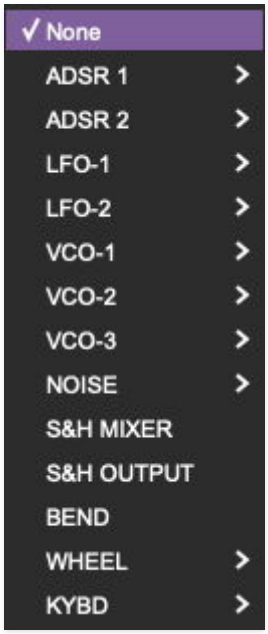
- *VCO 1 FM 1* can use **LFO** 1's sine wave or square wave output
- *VCO 1 FM 2* can be **Sample/Hold** or **ADSR** 1
- *VCO 2 FM 1* can be LFO 1's sine wave output or the **S/H Mixer** output
- *VCO 2 FM 2* can be S/H or ADSR 1
- *VCO 3 FM 1* and *VCO 3 FM 2* offer the same options as VCO 1



The original Odyssey's unique sound partly stems from having so many FM options. Both of its VCOs had the same options as shown on the first two

sliders, plus an expression pedal input (which you can easily recreate with a **MIDI controller**).

The third slider is freely assignable to a wide variety of control signals. Click the *Assign* button to bring up the **Modulation Source Menu**, which is detailed in its own subsection of this User Guide:



Note that on VCO 2, the menu selection will be preset to the S&H Output, but all other VCOs have no preset choices on the Modulation Source Menu.

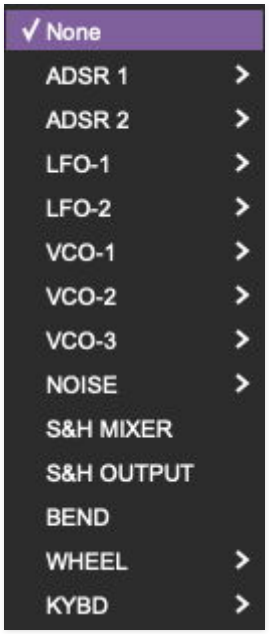
Pulse Width- A pulse wave has a *pulse width* or *duty cycle*, a measure of how much of the wave cycle is "up" and how much it's "down". A conventional square wave has a 50% duty cycle, and changing it causes the harmonic content of the waveform to change. Duty cycles higher than 50% have progressively fewer low harmonics, until at 100% the wave disappears – it's "all up", which is just a DC signal rather than a waveform!

The *Width* control in ODC 2800 defaults to 50% (square wave) and can be increased to a very narrow but still musical 97%.

The *Mod* slider controls how much an external modulation source changes the pulse width over time. *Pulse width modulation* (*PWM*) causes a shifting harmonic structure that sounds quite different than what's produced with sync. A switch below the slider lets you select LFO 1's sine wave or ADSR 1 as the modulation source.

The output of all three VCOs are sent to the Audio Mixer for relative level control, then on to the filters and amplifier.

When you click an *ASSIGN* button anywhere on the ODC 2800 front panel, you will be presented with the **Modulation Source Menu**, a pop-up menu that looks like this:



The Modulation Source Menu lets you choose from the following sources:

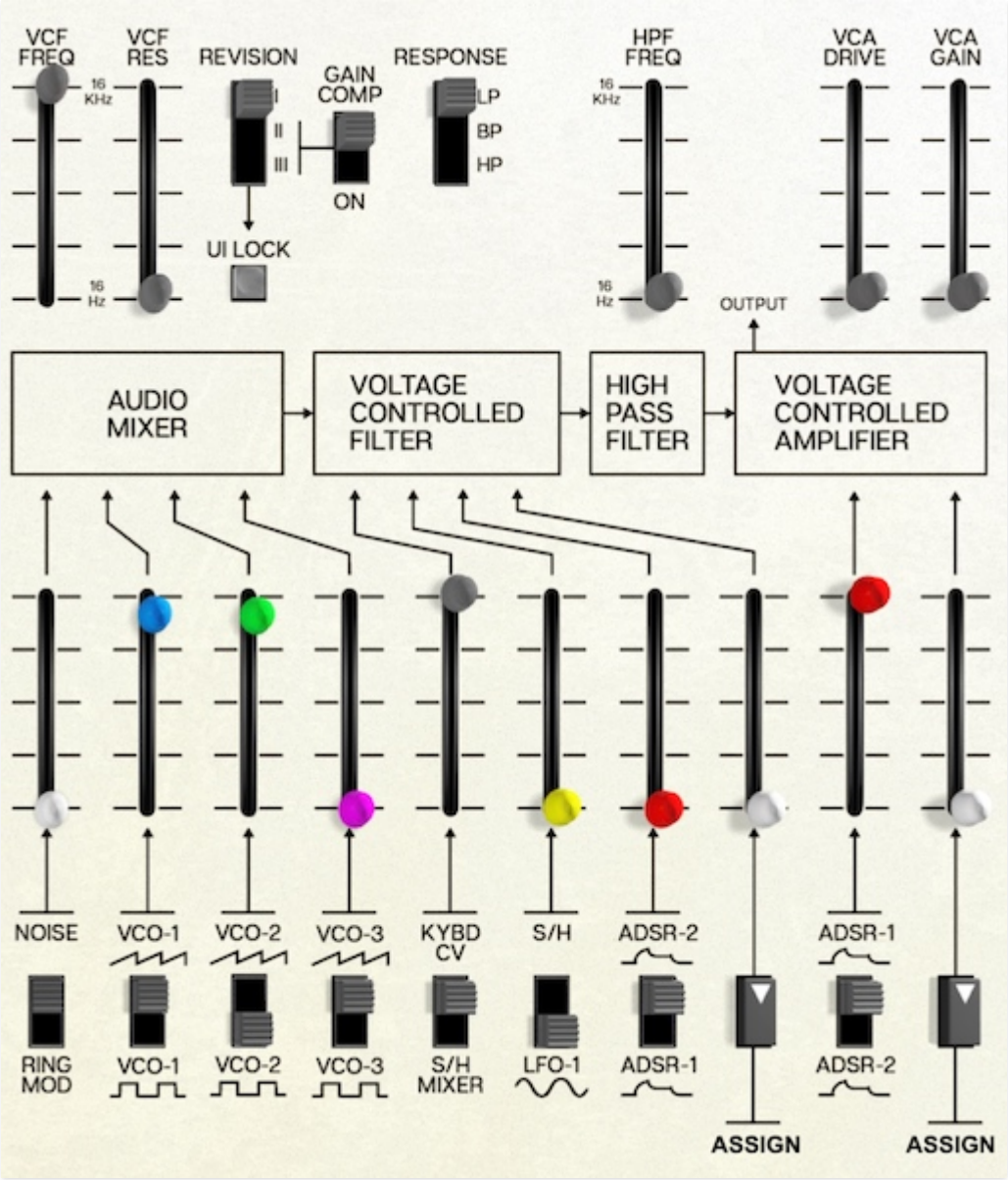
- Positive or negative output from ADSR 1 or ADSR 2
- Sine, Triangle, Square, Sawtooth, or Ramp (rising sawtooth) from either of the two LFOs
- Sawtooth, Pulse, or Sine outputs from any of the three VCOs
- Violet, White, Pink, Brown, or Red Noise
- The S/H Mixer, Sample / Hold Output, or Pitch Bend
- Positive or negative output from the Modulation Wheel or Keyboard CV

Many of the sources on the popup menu have submenus that pop up for more choices. Some of these will offer more options than are normally available on the front panel, including sine wave outputs from the VCOs and a **Red** noise option.

The Modulation Menu is the same for every *Assign* button on ODC 2800, with one exception: the **Aftertouch Controls**, whose destination choices are outlined in that section.

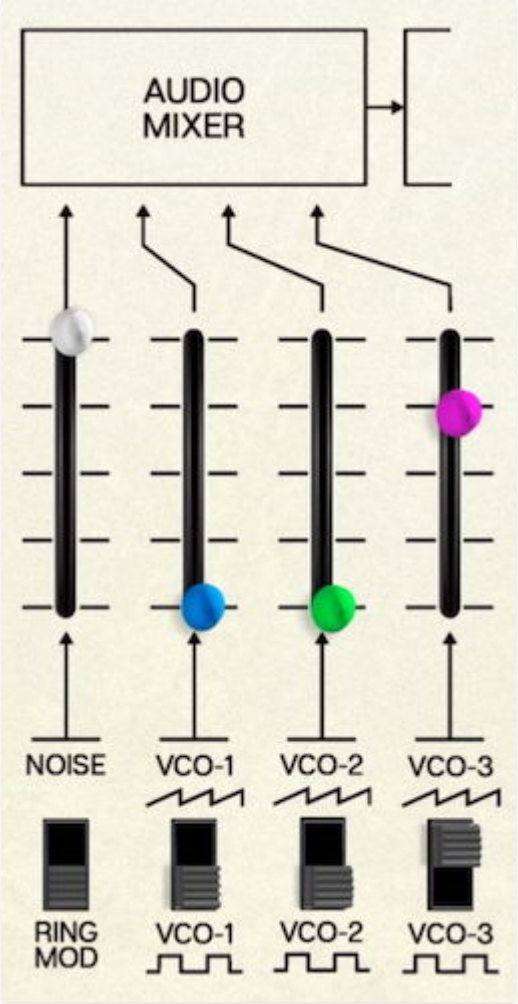
Note that whenever a modulation routing is assigned in this way, the **ASSIGN** label underneath the button will be replaced with a label showing

the selected source or destination, so you don't have to pop open the menu to see what you've assigned.



The largest section of ODC's front panel is devoted to the rest of the audio chain after the VCO waveforms are selected and modulated. In this section, we take the VCO outputs through:

- The **Audio Mixer**, where their relative levels are set and modulated
- The **Voltage Controlled Filter** (**VCF**), where their frequency response (timbre) is modulated
- The **High Pass Filter** (**HPF**), a second variable filter for further tonal shaping
- The **Voltage Controlled Amplifier** (**VCA**), which controls overall signal level over time.



The **Audio Mixer** does just that: it brings together the signals from the three VCOs at levels you select. Of course, because this is a synthesizer and not a traditional mixing console, you can modulate these levels using **MIDI control** to produce an ever-changing mix.

The Audio Mixer brings together four input signals:

- Either the **Noise Generator** or the Ring Modulator
- VCO 1
- VCO 2
- VCO 3

For each of the VCOs, you can select either the sawtooth or pulse wave.

The **Ring Modulator** is an audio source created by (funnily enough!) *ring modulation* of VCO 1 and VCO 2. Ring modulation is a form of amplitude modulation, where if a signal of frequency f_1 is combined with a frequency f_2, the ring modulator outputs two new frequencies: (f_1 + f_2) and (f_1 – f_2).

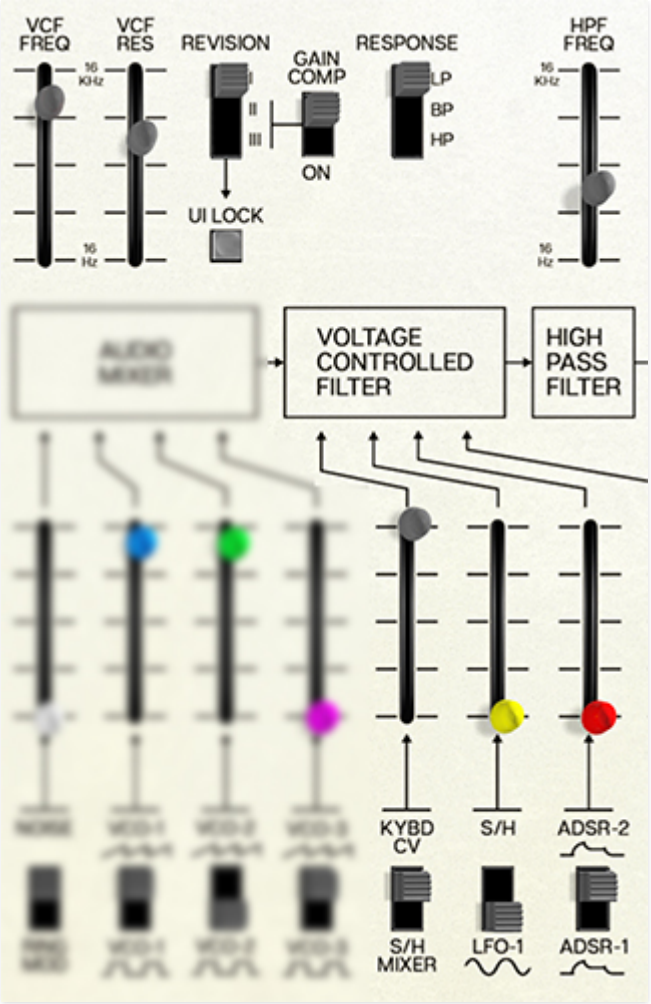
Since these frequencies are being linearly added and subtracted (rather than exponentially, as with pitch), the resulting frequencies usually have no harmonic relationship to the inputs! This produces metallic, ringing inharmonic tones that can add a powerful extra something to a sound... or reduce it to a clanging pile of what guitarists (who inexplicably *love* ring modulation stompboxes) call "*gonk*".

The mixed audio signal is routed to the **Voltage Controlled Filter** (**VCF**).

The Odyssey's filter section is a primary reason for its unique character, as well as a source of confusion for buyers new to the synth. That's because over the course of its lifetime, the Odyssey sported three different **Voltage Controlled Filter** (**VCF**) designs, resulting in three (sometimes radically) different tonalities.

Rather than making everyone argue over which one is best for which application, ODC 2800 includes all of them:

- The first Odyssey (Model **2800**), commonly called the **Mk I**, was built from (roughly) 1972 to 1975. These Odysseys are recognizable for their white front panels. The filter in the Mk I was called the **4023**, and it was a 2-pole (12 dB/octave) state-variable filter – a type that became much more famous in 1975, when Tom Oberheim included his own version in the Synthesizer Expander Module (SEM). The 4023 is prized for its rough and raw character, with a lot of snarl and grit, although some users point out its noisier sound.
- The Odyssey **Mk II** (Model **2810**, with tweaked models up to 2815) was a transitional model in many ways. Over its product run, several important upgrades and new features were introduced that would come together in the Mk III – including two different filter designs. The VCF most closely associated with the black-and-gold Mk II was the **4035**. This was a 4-pole (24 dB/octave) transistor ladder filter in the Moog style... in fact, a bit *too much* in the Moog style, as Moog politely informed ARP. The Moog ladder filter was patented, and ARP elected to avoid legal entanglements by changing the design. ODC 2800 lets you try this filter without having a lawyer on call; while it won't make the Odyssey sound like a Moog, it does have the solid low end and sweet resonance of a ladder filter, which pairs well with the ARP VCOs.
- The final Odyssey, the **Mk III** (Model **2820**, with variants up to 2823), was released in 1978 and built until the company folded in 1981. Perhaps the most familiar-looking Odyssey thanks to its striking black-and-orange color scheme, it used the filter that ARP created to replace the ladder design in the Mk II. This 4-pole filter, the **4075**, was renowned for its highly stable behavior and exceptionally clean sound, with noise and distortion levels largely unheard of in synthesizers at the time.



The main VCF controls are at the upper left.

VCF Freq- The *cutoff frequency* of the filter, ranging from 2 Hz to well over 20 kHz (the front panel markings are in honor of the original Odyssey, whose filter could be quite treble-deficient in some revisions).

VCF Res- The filter *resonance*, which will have a very different character with each filter type. In particular, the Mk I filter has a very "snarly" sound at very high resonances, vs. a sweeter resonant peak for the Mk II and Mk III.

Revision- This sets which of the three filter circuits (described above) is active. Click the switch to move back and forth between I, II, and III. At most filter settings, the tonal change will be instantly audible, particularly when jumping between the 2-pole Mk I and the 4-pole designs.

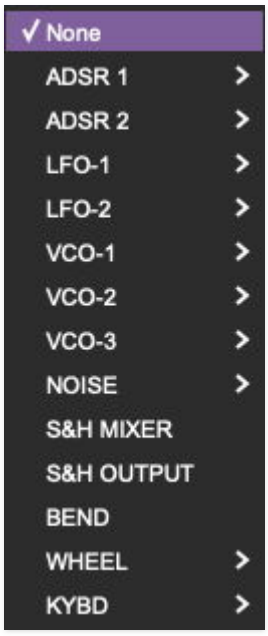
UI Lock- As a visual reference, when the Revision is changed, the front panel graphics all change to reflect **the look of the three different Odyssey designs** that used the three different filters. If you like a particular look because it's easier for you to read (or you just like the aesthetics), click *UI Lock* to keep it from changing when you change Revisions – or change patches to one with a different Revision.

Gain Comp- This switch compensates for the loss of gain at low frequencies that you'll hear in filters II and III when the resonance is cranked up. The original hardware has design limitations that result in this gain loss – the software lets you cheat a little and get it back.

Response- Oh, did we forget to mention that unlike the original Odyssey, ODC 2800 has a *multimode* filter? Oops, silly us. Click the switch to change the original lowpass design to a bandpass or highpass filter.

Modulation inputs- Below and to the right of the primary filter controls, there are four sliders to mix different control signals that modulate the cutoff frequency:

- *Input 1* is switchable between Keyboard CV and the **Sample/Hold Mixer**. Keyboard CV causes the filter cutoff to track the notes you play; when set to 100%, you can play the filter's resonant peak when it's cranked up to the point of self-oscillation, producing its own sine wave at the cutoff frequency.
- *Input 2* is switchable between the Sample/Hold and a sine wave from **LFO 1.**
- *Input 3* is switchable between the two **ADSR Envelope Generators**. Traditionally ADSR 2 is used to control filter cutoff, so it's the default setting.
- *Input 4* is assignable to a variety of control signals. Click the *Assign* button to bring up the **Modulation Source Menu**, which is detailed in its own subsection of this User Guide:

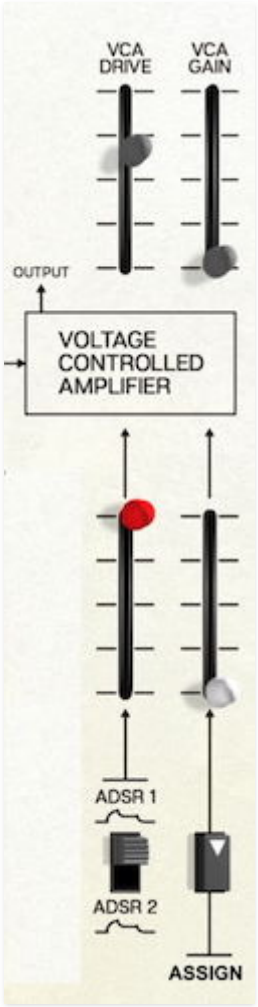


HPF Freq- At the top right of the filter section, this slider controls the cutoff frequency of ODC 2800's **highpass filter** (**HPF**). This filter has a very gentle 1-pole (6 dB/octave) slope; it's non-resonant and can't be modulated directly (i.e., without assigning **MIDI control**). It can roll off excessive low end, turning the lowpass VCF into a sort of bandpass filter, or just tame unruly bass.

Having two filters in series was almost unheard of when it was introduced in the Odyssey, and was yet another way in which it stood out from the competition. This feature isn't discussed often, but it can be an unsung hero, either on the original Odyssey or in ODC 2800.

After passing through the two filters, the signal travels to the VCA for loudness control.

The **Voltage Controlled Amplifier** (**VCA**) is the last stage of the audio path. Here, the overall loudness of the signal is controlled before it's fed to the output.



The controls for the VCA are quite straightforward.

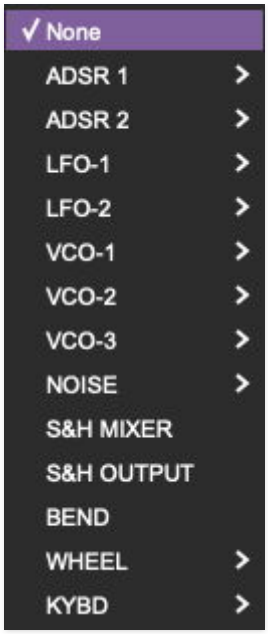
VCA Drive- This feature was first seen on the KORG reissue of the ARP Odyssey, designed in cooperation with David Friend (engineer on the team that created the original Odyssey) and released with the blessing of the Alan R. Pearlman Foundation in 2015. It overdrives the VCA for a more aggressive, distorted timbre. While the hardware simply provided VCA Drive as an on/off switch, ODC 2800 allows you to dial in the amount, from gentle warmth to heavy saturation. Yummy!

VCA Gain- This sets the maximum output level of the VCA, and therefore of the instrument. Normally you'd have this set to 0, which seems counterintuitive until you remember that all synthesizers are silent until you play a note or otherwise turn up the level! Note that the *VCA Gain* slider is grayed out and unused whenever the *Voices* are set to a number higher than

1. When playing monophonically, however, you can turn up the VCA Gain for drones that you can then play with to create changing textures.

Modulation inputs- The VCA has two sources for amplitude modulation:

- Input 1 lets you choose between ADSR 1 and ADSR 2. Traditionally, ADSR 1 is the default modulation source for loudness and ADSR 2 is used for cutoff frequency, but there's no reason you can't flip those around if you wanted to. You do you.
- Input 2 is freely assignable. Click the *Assign* button to bring up the **Modulation Source Menu**, which is detailed in its own subsection of this User Guide:



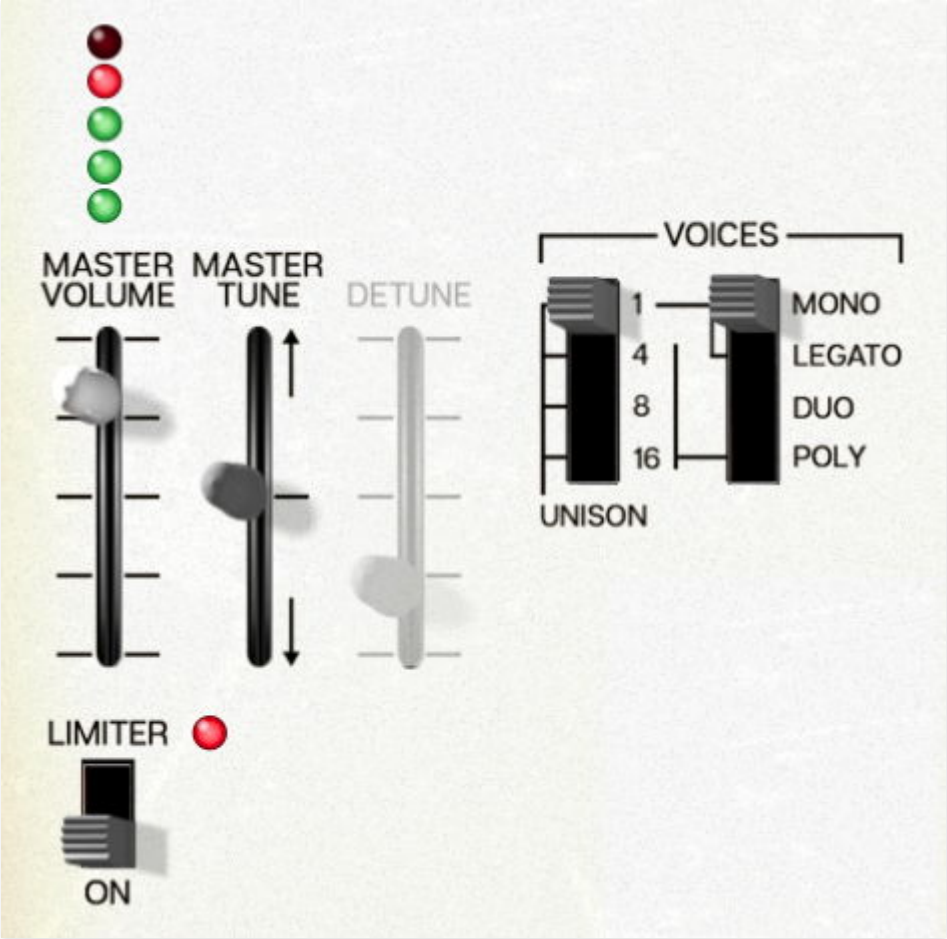
This brings us to the end of the audio path, but there are a few more audio-related controls to discuss, as well as our our first look at modulation control in ODC 2800. Time to trek back to the far left of the front panel...

The Master Section is the collection of controls you'll find at the far left of the front panel. It collects several important functions that you'd find handy to have in easy reach with your left hand as you play. Some of these will be familiar to users of the original Odyssey, and others are unique to ODC 2800.

From the top left, these features include:

- Master Volume, Master Tune, Detune
- Voices (polyphony and unison controls)
- Noise Generator
- Portamento
- Transpose
- Pitch bend and modulation controls, including Proportional Pitch Control

We'll take a closer look at these functions now.



The top row of the Master Section has controls for ODC 2800's global volume, tuning, and polyphony.

Master Volume- This slider is accompanied by a 5-segment LED ladder meter to show you when your signal is clipping.

Limiter- When switched on, the Limiter will help keep very loud sounds from clipping. The red LED lights when it's taking effect. It's still possible to overload ODC 2800's outputs even with the Limiter on, but you have to try pretty hard. (Hint: Try maxing out the *Master Volume* while playing Mono with 16-voice Unison...)

Master Tune- With a range of ±7 semitones, Master Tune lets you align ODC 2800 with other instruments that might be tuned to a different pitch.

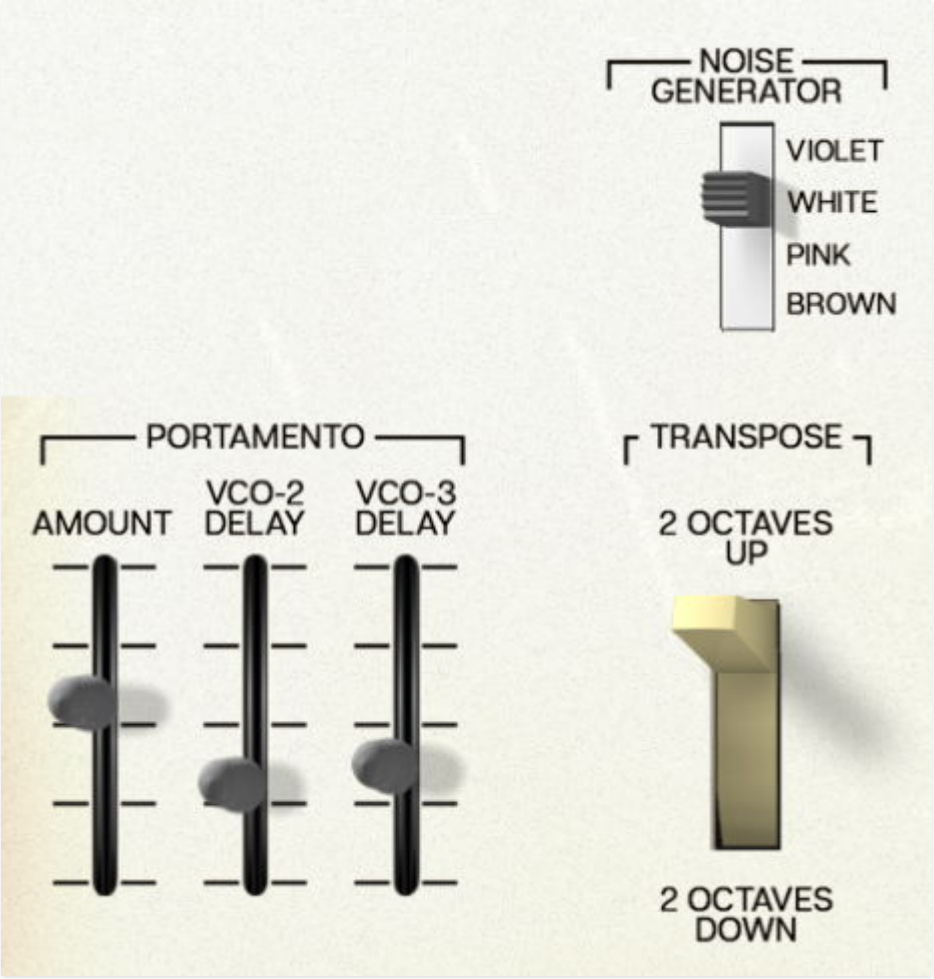
Detune- This slider is grayed out unless *Unison* is engaged. Then it controls the amount of detuning between the unison voices that are played when you press a key. The setting ranges from 0.00% (no detune) to 100% (very thick detune). Even at its highest settings, *Detune* doesn't devolve into out-of-tune tone clustering, but the very highest settings should be used with care.

Unison- This switch selects whether playing a single key triggers 1, 4, 8, or 16 voices. While it's probably tempting to pile all 16 voices, you'll often find

that 4 or 8 will give you the power you need without overwhelming the rest of your track or mix. Unison settings take effect when in Mono or Legato mode (see below).

Voices- These switches let you set up how many voices ODC 2800 will play when you press a key, and how the instrument will react to different playing styles.

- *Mono*: When set to Mono, ODC 2800 will retrigger the envelopes as each key is pressed, giving each note the full articulation of the envelopes until the next note is played. This setting is called *multiple triggering*.
- *Legato*: In Legato mode, playing a note and then playing another note while still holding the first note (legato playing) will not retrigger the envelopes, even though the pitch will change. This is called *single triggering*.
- *Duo*: This setting emulates the *duophonic* capability of the original Odyssey. A monophonic synthesizer with the ability to play a second note was practically unheard of at the time, and musicians had a great time exploring this intriguing way to create harmonies.
    - When *Duo* is selected, all three VCOs will play the same pitch as long as you play monophonically. However, when you hit a second note above the one you're holding, VCO 2 will jump to that new pitch. It will still be going through the same filter and amplifier as the other VCOs, resulting in a combination of polyphonic pitch and monophonic *articulation* (note shaping) that's referred to nowadays as *paraphonic* behavior.
    - Note that like the original Odyssey's keyboard, the *lowest* note being played controls all three VCOs, the VCF, VCA, etc. VCO 2 will play its own pitch if a second note is played above the first note. Playing a second note below the first will cause that note to become the "primary" note.
- *Poly*: This setting lets you play ODC 2800 with up to 16-voice polyphony. That's a trick that's definitely not something the original could do!



The **Noise Generator** adds unpitched audio (noise) into the audio path as an input to the **Audio Mixer**. You can use noise to add grit and grime, create sound effects like wind and surf, or define the character of the signal being created by the **Sample and Hold**.

Since the amount of noise is set and modulated in the Mixer, this switch simply selects the *color* of the noise.

While noise does contain a mixture of all frequencies at once, it's often useful (from an engineering standpoint or a musical/aesthetic one) to adjust the balance between low and high frequencies, accentuating one or the other. We describe the frequency balance of noise by assigning it a color.

White noise is an equal mixture of all frequencies. *Pink noise* has its frequency balance shifted slightly toward the lows, producing a less "hissy" noise that works well with the human ear. These two types of noise were and are the most popular for electronic music applications, and nearly every analog synthesizer will offer one, the other, or a choice of both, as the original Odyssey did.

ODC 2800 takes the options a bit farther. *Violet noise* has a strong emphasis on high frequencies, with very little low-end content at all. Conversely, *brown noise* is almost all low frequencies. A fifth option, *red noise* (with a tonal balance between pink and brown), is available as a control source in the Assign modulation menu.

Portamento (or *glide*) is the slow change of pitch between two notes when one is played after the other. For example, if a violinist plays a note, moves their hand to a new position, then plays another note, there is no portamento. Contrariwise, if a violinist plays a note while sliding their hand up or down the neck, the shifting pitch is what we'd call portamento.

- *Amount*: The time for ODC 2800 to change pitch from one note to the next. This setting ranges from 0.00 ms to 2000 ms (two seconds). The time remains constant for narrow or wide pitch intervals, so a glide of 3 semitones will take the same amount of time as a glide of 2 octaves. The latter glide will cover a lot more pitch difference in the same time, so it will sound "faster".
- *VCO-2 Delay* and *VCO-3 Delay*: These settings slow down the portamento for VCO 2 and VCO 3. This produces the effect of VCO 1 jumping between pitches at the set Amount, with VCO 2 and VCO 3 slowly moving to "catch up". Large *VCO Delay* amounts can stretch the total time for a pitch shift to 45 seconds or more.

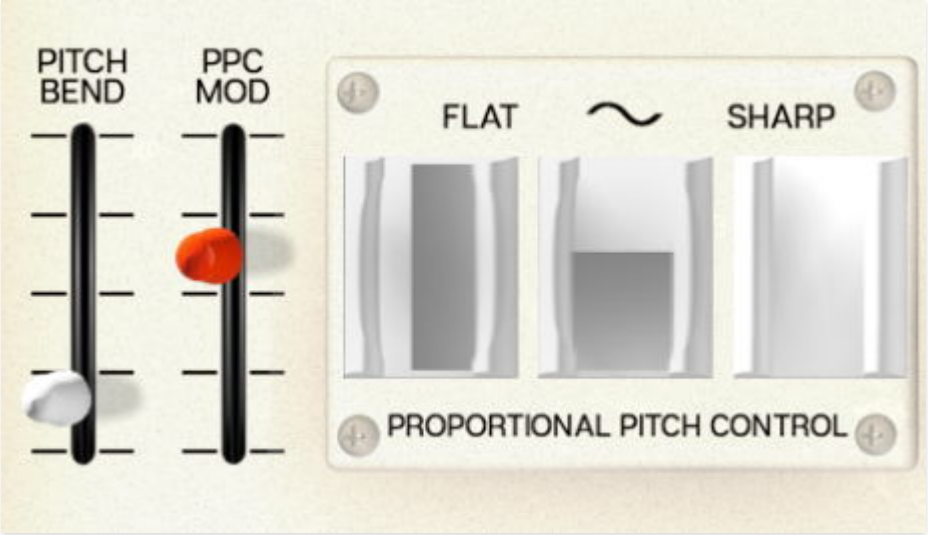
One thing to note about ODC 2800's portamento: it's "smart", an innovation used on Yamaha's famed **CS-80** polyphonic synthesizer. When you play a note and then another note, the previous note's pitch is assigned to the new voice before the portamento begins, so the glide sounds very natural as you play, with glide between notes and chords feeling very natural. On other polysynths, once a note was released, the voice card would sit at that note and glide from there when it was next played – which might have been five notes earlier (on a 6-voice synth) or even more! When that happened, glides would be flying in all directions with no apparent pattern to them, making for a random and messy sound.

TL;DR – ODC 2800 doesn't do that. Try it for yourself, by playing a chord with one hand and a melody with the other.

And if you're wondering how this "smart" portamento relates to authentic ARP polyphonic synthesizers? Well, remember that ARP never made one. (The Chroma doesn't count – it was still a nonworking prototype when ARP shut down.) Since there's no historical precedent for polyphonic portamento

in an ARP synthesizer, we figured we could put in any kind of portamento we wanted... and we thought this one was really slick. So there you go.

Transpose- This switch is straight off the original Odyssey. Flicking it to jump up or down by 2 octaves while playing was and is a common soloing trick. Map it to a MIDI controller to make it available to your playing technique!



Proportional Pitch Control (**PPC**) was a new form of left-hand expression control that was introduced on a number of ARP synthesizers in the mid-1970s, including the Odyssey. It was created to answer musicians' requests for a more fluid and expressive way to bend pitch than the awkward knob that had been common on the Mk I and most Mk II Odysseys.

PPC, which was a stock feature on the Mk III and an optional retrofit for earlier models, consisted of three rubberized pressure pads. The player rested three fingertips on them while playing the keys with the other hand. Pressing down on the left pad with the ring finger caused a down (flat) bend, pressing the right pad with the index finger caused an up (sharp) bend, and pressing the center pad with the middle finger added modulation (vibrato, indicated with a sine wave graphic).

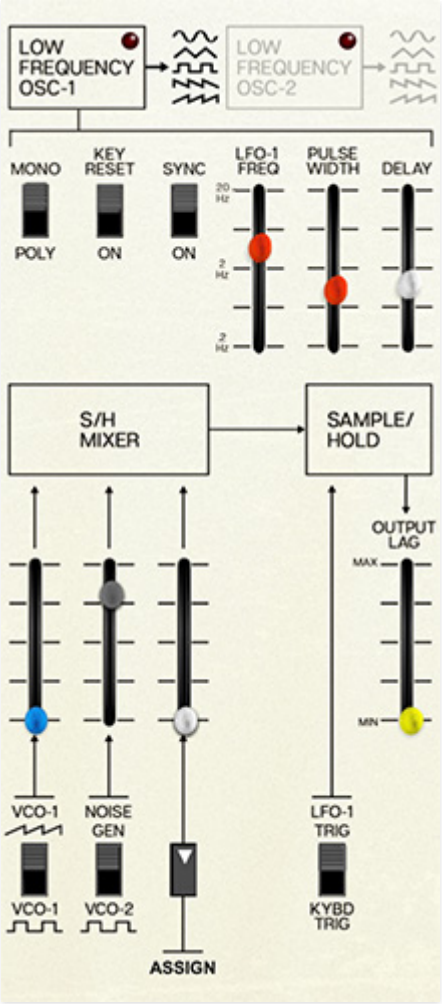
This was a very unusual way to control a synth. While some players never took to it, others loved it, and it became a valued feature and frequently-installed retrofit to older Odysseys. In fact, PPC was so popular that when the Odyssey's smaller sibling the Axxe added it, users of the older Axxe demanded a retrofit even though there was no room for three pads on older Axxes' front panels. The solution? A single PPC pad with a 3-way switch to control what it was doing!

Naturally, you can't press your fingers against your computer monitor to make ODC 2800's PPC controls work, but they do change shading to indicate that the instrument is receiving pitch bend or modulation (MIDI CC 1) data. This comes in the form of dark gray "level meters": right to left for down bend, bottom to top for modulation, and left to right for up bend. The screenshot above shows a moderate amount of modulation and a nearly-100% down bend.

The associated control sliders are:

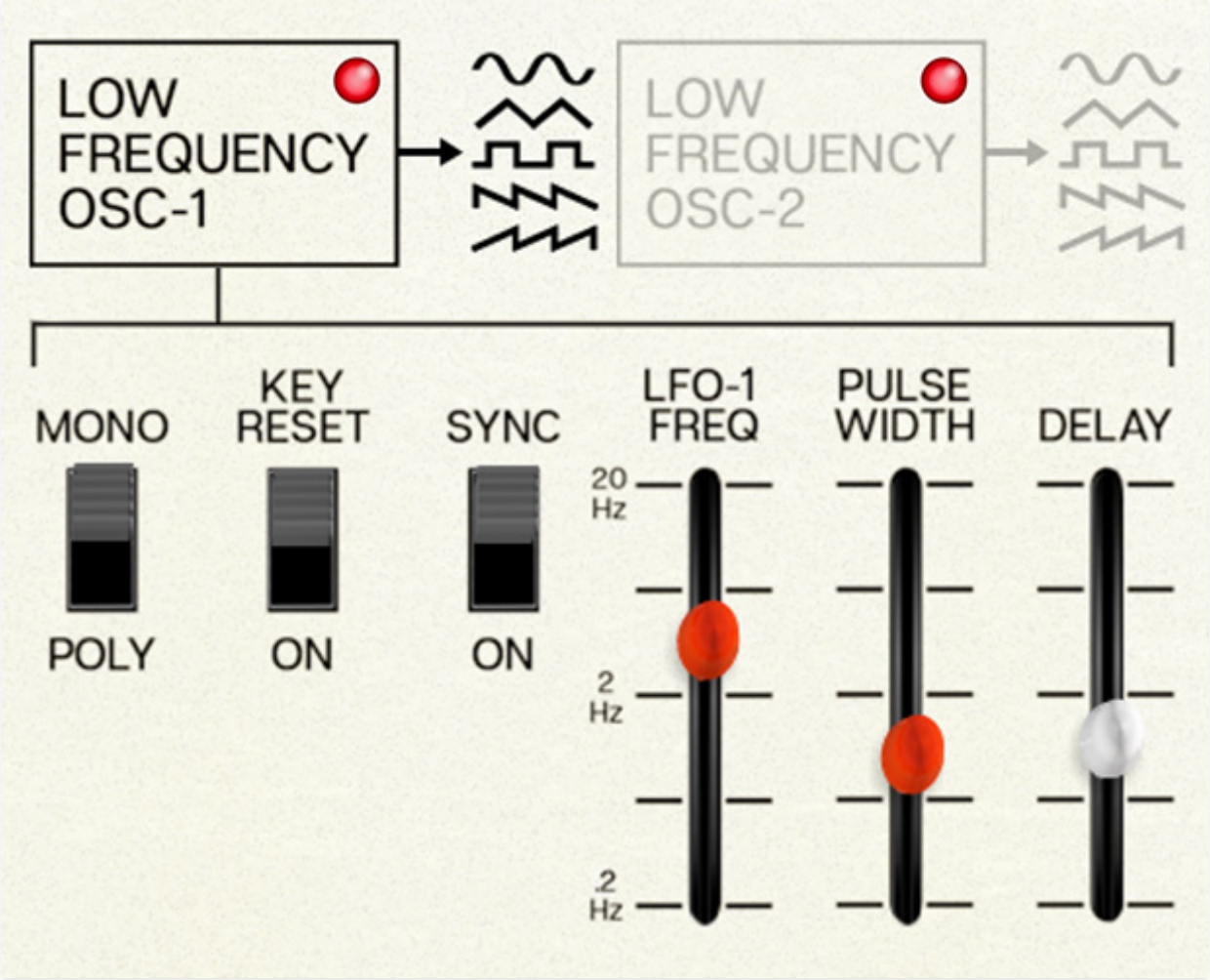
- *Pitch Bend*: Sets the full range of the pitch bend control, from 0 to ±12 semitones. The default is ±2 semitones, a full step up or down.
- *PPC Mod*: Controls how strong the modulation signal is for a given amount of pressure on the Modulation pad. Higher values turn relatively small Modulation movements into very heavy vibrato.

As of this writing, there are no generic MIDI controllers with PPC pads on them, which is a pity: it's a very nuanced way to add bends and vibrato to soloing. Of course, ODC 2800 will follow MIDI Pitch Bend and Mod Wheel (CC 1) messages from any controller you have connected, and the two sliders let you set the response to your taste for each patch.



The **Center Section** of the ODC 2800 front panel holds two important modulation sources, both of which contributed heavily to the Odyssey's unique sound:

- Two **Low-Frequency Oscillators** (LFOs)
- **Sample and Hold**



In the early years of modular synthesis, designers and artists were divided on the idea of a **Low-Frequency Oscillator** (**LFO**). Some felt that it was better to simply have more VCOs that could be used as LFOs when needed, while others preferred the idea of the LFO as a purpose-built modulation source. Both approaches have their merits, but on the "dedicated LFOs rule" side of things, ARP's 2600 and Odyssey were among the first self-contained analog synthesizers to feature LFOs.

The original Odyssey had a single LFO with a single control (*LFO Frequency*) and sine and square wave outputs. ODC 2800 greatly expands your LFO options by offering two identical LFOs with five output waveforms – sine, triangle, pulse (not square), ramp, and sawtooth. They also include new features, common to analog synths that came along years later, that are much appreciated by today's synthesists.

LFO Select- Click on the labeled box to select which LFO you want to edit. Each box also has an LED that flashes at the current *LFO Frequency*.

Mono/Poly- This switch becomes important when playing ODC 2800 polyphonically. It lets you choose whether there's a single LFO waveform

common to all voices being played, or whether each voice has its own separate LFO that isn't necessarily locked in phase to those on other voices. A Mono setting is good for adding consistent vibrato or trills to melodies and harmonies, while a Poly setting creates a richer and more animated sound for chords.

Key Reset- Sets whether or not the LFO waveform retriggers when a key is pressed.

Sync- Sets whether the LFO Frequency is set in Hertz (Hz; cycles per second) or in bar/beat divisions.

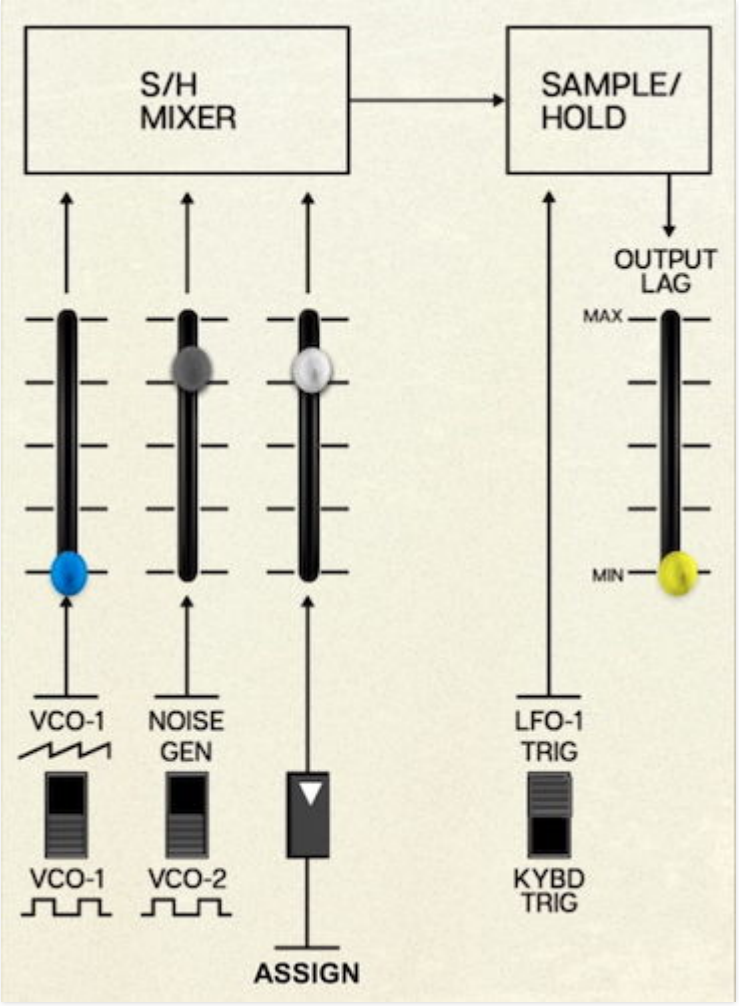
LFO Freq- The rate of the LFO, ranging from 0.2 Hz to 20 Hz, just like the original.

Pulse Width- One of the nice things about using a pulse wave rather than a square is that it can have pulse width control, from extremely narrow/mostly low (5%) through square (50%, the default) to extremely narrow/mostly high (95%). This lets you create syncopations and choppy rhythmic elements.

Delay- Sometimes it's nice for an LFO modulation to gradually get bigger from zero when a note is played. The Delay control lets you set such a delay, from 0.0 to 3.0 seconds.

While ODC 2800 retains the original Odyssey's front-panel sliders and assignment switches for LFO 1 sine or pulse waves, the other waveforms are accessible from the **Modulation Source Menu**:

It's always helpful to check this menu and all its popup submenus whenever you're wondering, "I wonder how to access this?" There's a lot of flexibility hidden in that menu – you just have to know to look for it.



Sample/Hold was a common option for modular synthesizers from the very beginning, but ARP popularized its use on smaller synthesizers like the 2600 and Odyssey. To understand its significance – and learn enough about it to use it effectively – we'll answer a few basic questions about it.

What does it do?

A *sample and hold* does exactly what it says on the label: it *samples* an incoming voltage, usually one that is varying rapidly, and *holds* that voltage level at its output until it's time to sample and hold again. The results can cover a wide range of applications, and depend on two things:

- What signal is being sampled, and
- How the circuit is triggered to take another sample and hold it until the next one.

What do we use it for?

By far the most common use of a sample and hold is to sample a noise generator, and trigger the circuit to resample based on either

- the rate of an oscillator, or
- pressing a note on the keyboard.

This samples a constantly-changing input, and holds "snapshots" of whatever voltage it happens to be at the moment the LFO cycle starts or a key is pressed, until the next LFO cycle or keypress. In other words, a sample and hold is the most common way to create a *random* voltage, either clocked to an LFO or taken whenever you play a note.

At lower LFO frequencies, this produces the rapidly-changing pitch effect often associated with computers in old sci-fi movies. At higher frequencies, it produces a very specific sort of frequency modulation.

When triggered with a keypress, sample and hold can modulate one or more elements of a sound so that it's slightly different with every note you play. This adds a touch of lively variety and interest to melodies, etc.

How does this one work?

The Sample/Hold on ODC 2800 actually isn't a lot different than the one on the original Odyssey.

S/H Mixer- Up to three input signals, two of them found on the original hardware, are sent to the *S/H Mixer* and blended to form the sampled signal.

- Input 1 can either be the sawtooth or pulse wave from VCO 1
- Input 2 can either be the noise generator or the pulse wave from VCO 2
- Input 3 (exclusive to the software) is freely assignable from the pop-up modulation menu.

For "classic" random voltages, just set Input 2 to the Noise Generator and feed it through the S/H Mixer alone. However, if you select different waveforms for multiple inputs, especially if Input 1 is set to use the VCO 1 sawtooth while VCO 1 is being run in low-frequency (LF) mode, you can generate some very interesting repeating patterns.

LFO 1/KYBD TRIG- The Sample/Hold is then triggered by one of two sources: either LFO 1 or key presses.

Output Lag- Before the Sample/Hold output voltage is made available as a modulator, you have the option to feed it through a *lag processor*, which slows down the movement from voltage to voltage so it doesn't happen instantaneously. Think of it as working like Glide – which is simply a lag

processor applied to the control voltage sent by the keyboard – but can be applied to any sort of modulation voltage.

One more question:

How do you write it?

When looking at the front panel and then reading the user manual for the ARP Odyssey, then doing the same for many other synthesizers, you couldn't be blamed for asking: is it "Sample/Hold", "sample and hold", "Sample and Hold", "Sample & Hold", or "Sample-Hold"? And do you abbreviate it "S-H", "S&H", "S+H", or "S/H"?

The answer is "Yes, all of the above." While everyone disagrees on how to write it (the Odyssey itself does it three or four different ways), everyone agrees on what it does – and it let the Odyssey, and now ODC 2800, do things most other synthesizers couldn't.

Envelope Generators are used to create individual events that begin, continue, and end in a predictable way. The Odyssey's two envelopes were used to shape changes in pitch, pulse width, filter cutoff, and volume, and ODC 2800 builds on this with envelopes that offer more control and routing flexibility than the original.

The Odyssey differentiated its two envelopes by their number of stages. It had one **AR** (Attack/Release) envelope and one **ADSR** (Attack/Decay/Sustain/Release) envelope. ODC 2800's two Envelope Generators are both ADSRs, with sliders for:

- **Attack**: The time it takes from pressing the key to reaching peak level. Because so much of a sound's timbre relies on the transient that begins the note, setting *Attack* to be very fast (like a drum hit) or slow (like bowing a string) does a lot to define "what kind of a sound" is being played.
- **Decay**: The time it takes from reaching peak level to drop to the *Sustain* level. If the *Sustain* level is set lower than the peak level, the *Decay* time is the "other half" of the transient; short *Decays* can simulate sharp

sounds like claves, and longer *Decays* suggest the ringing of a drum head or an undamped plucked string.

- **Sustain**: The level at which the sound sustains after the *Decay* is over, set as a percentage of the peak level. 100% eliminates the level change in the *Decay*, and 0% prevents the sound from sustaining.
- **Release**: The time it takes from releasing the key until the envelope returns to zero.

Attack, Decay, and Release all have a time range of 5 ms to 4000 ms (4 seconds).

Vel- The original Odyssey's keyboard wasn't dynamically sensitive, but ODC 2800 adds the ability for envelopes to respond to MIDI Velocity messages for each key played. This can be set from 0% (no sensitivity) to 100% (very dynamic sensitivity).

Below the sliders are switches to determine how each envelope is triggered.

Each ADSR can respond to **KYBD GATE** (playing a note on the keyboard, the usual way you play a synth) or **LFO 1 REPEAT**, where envelopes are triggered by **LFO 1**.

The *Repeat* function can be set to **KYBD REPEAT,** where the retriggering envelopes are only activated while at least one key is held down, or **AUTO REPEAT**, where the envelopes retrigger constantly and playing notes simply changes their pitch.

Note that the LFO 1 settings apply to how *LFO 1 Repeat* affects playback, especially in *Poly* mode. For example, setting the LFO to *Mono* will cause the envelopes of all notes held down to retrigger at the same time, whereas setting it to *Poly* will have each envelope retrigger on its own, out of sync with the others. Experiment with the Voices set to 4, 8, or 16, and hear how repeating notes respond to play (using voice stealing to stop some notes while starting others). You'll find that while 16 might get a little crazy, you can quickly get great results with 4.

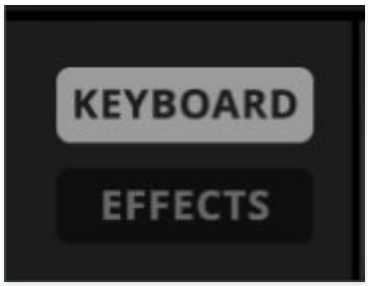
Drift

In between the two sets of ADSR sliders, you'll find a set of three small **Drift** trimpots.

These controls allow you to add a bit of drift – an instability in voltage output over time, which was part of why vintage analog synths had a "living, breathing" character to them. The controls are:

- **VCO DRIFT**: Adds pitch variation to the VCOs, ranging from 0 to 20.00 cents. This can "thicken" polyphonic playing, as well as providing slightly different tuning to subsequent notes. While it's tempting to grab two-fisted chords with *VCO Drift* turned all the way up, more subtle settings will lend themselves to melodies and simpler chords/intervals.
- **VCF DRIFT**: Adds variability to the keyboard tracking of the VCF, from 0 to 20.00 cents. This is especially noticeable when using keyboard tracking on the VCF when its resonance is self-oscillating, but can also add small changes in brightness for each note, a much more subtle effect than *VCO Drift*.
- **EG DRIFT**: Controls the drift in Envelope Generator times, making each note slightly different from others in terms of its envelope response.

ODC 2800 contains a set of five modulatable Effects to supplement the emulation of the Odyssey. In order to make these effects' user interfaces large enough to be comfortable to work with, ODC 2800 makes use of this little button, found at the bottom left corner of the instrument window:



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

This includes controls for the **Arpeggiator** and **Aftertouch** modulation, to the left and right of the keys.

Note that even in Keyboard View, some controls for the Effects are accessible under the keys.

Setting the button to EFFECTS brings up the *Effects View*:

This supplements the controls under the keyboard with detailed parameters for each of the five **Effects** processors.

Arpeggiators have been a staple of electronic music for decades; one of the very first arpeggiators (perhaps *the* very first?) appeared on the Elgam Carousel, an Italian auto-accompaniment keyboard for organ players. Because the term "arpeggiator" hadn't been coined yet, it was called "Crazy Hands"!

Arpeggiators turn chords (groups of held keys) into patterns of held notes, played in rhythm. This can produce a variety of fascinating and exciting melodic effects. With the advent of complex digital control, the primitive arpeggiators of the mid-1970s have evolved into an entire subculture of arpeggiator designs, each with its own unique functions and options.

ODC 2800's arpeggiator features a good range of musical options, managed via the following controls:

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

Sync- Engaging the *Sync* control locks arpeggio timing to master tempo. When engaged, the *Speed* slider changes from a rate in Hz to note values

ranging from 1/64th note triplet to 8 beats. When using the ODC 2800 standalone version, the Arpeggiator uses the *Tempo* in the top toolbar. When it's used as a plug-in inside a DAW, it syncs to the DAW tempo.

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

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

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

Hold- Press this button to keep the arpeggio going even when all keys are released. You can clear the current arpeggiation and replace it with a new one simply by releasing all keys, then playing a new chord. The arpeggiation will continue until *Hold* is turned off. This function, often called *Latch*, is a useful one to assign to a pedal or button for live use.

Mode switch-

- **OFF**- Arpeggiator is disabled. The LED at top left flashes at the current tempo when the Arpeggiator is enabled.
- **ARP**- Plays notes according to the *Direction* control setting.
  - *Up*: Held notes sound from lowest to highest.
  - *Up/Down*: Held notes sound from lowest to highest and back down to lowest.
  - *Down/Up*: Held notes sound from highest to lowest and back up to highest.
  - *Down*: Held notes sound from highest to lowest.
- **ORD**- Plays the notes in the order they are pressed, dependent on current *Direction* setting.
  - *Up*: Notes sound in original order played.
  - *Up/Down*: Notes sound in original order played, followed by reverse order played.

- *Down/Up*: Notes sound in reverse order played, followed by original order played.
- *Down*: Notes sound in the reverse order they were played.

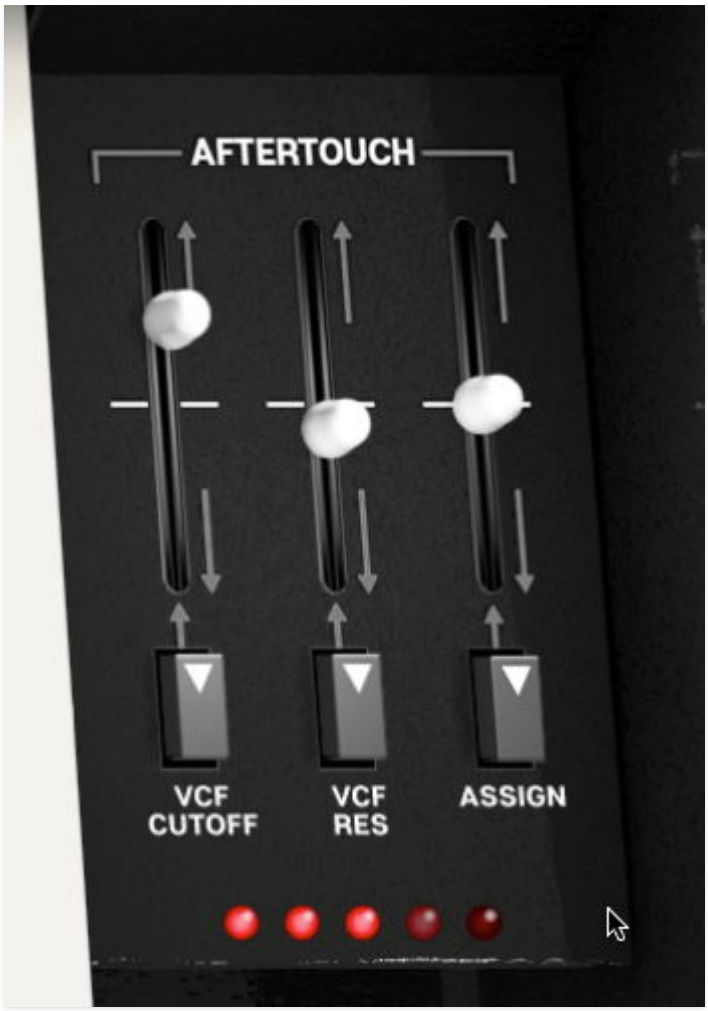
- **RND**- Plays held notes in random order.

Direction- The *Direction* control functionality varies a bit depending on the current position of the Mode switch as follows:

- **In ARP Mode**: Selects *Up*, *Up/Down*, *Down/Up*, or *Down* note playback.
- **In ORD Mode**: See *Order* section above.
- **In RND Mode**: *Direction* is grayed out and doesn't influence the arpeggiation.

Range- Selects how many octaves the pattern will play before repeating, from 1 (just the notes held) to 4 (the notes held, but repeated over three octaves above the held notes).

Note that the difference between *Up/Down* and *Down/Up* is much easier to hear when the *Range* is set to 3 or 4. Play a single note and hear where the arpeggio starts.



Aftertouch is a term coined by Yamaha to describe the touch sensitivity of its earliest synthesizers. They used the names *initial touch* for velocity and *after touch* for what was commonly called *pressure*. The massive popularity of the Yamaha DX7 led to the word "aftertouch" becoming the most popular generic name for this type of modulation control.

A *pressure sensor* (called a *touch sensor* by ARP, a *force sensor* or *force bar* by Moog, etc.) is a device that runs along the width of a keyboard, under the keys. When the player pushes down on a key after playing a note, the sensor sends a control voltage that gets higher as the player presses harder.

The first synthesizer with a pressure sensor was the **ARP Soloist**, soon replaced by the more reliable **ARP Pro Soloist**. It quickly became a vital element in the keyboard rigs of many musicians, with a sound and feature set that were highly sought after. (How highly? So highly that Cherry Audio made a software version – and there was much rejoicing! Yaaaay!)

Pressure sensitivity was a much-appreciated adjunct to, or replacement for, other forms of note modulation like pitch benders or modulation wheels. Remember that at the time (and even today), many synthesizers were

stacked on top of organs or acoustic or electric pianos – still the primary instrument for most pop keyboardists. A pressure sensor meant that instead of playing with the right hand and working the wheels with the left hand, you could add modulation in a very natural way with the hand that was actually playing the notes, freeing up the other hand – left *or* right – to play your other keyboards.

From the very beginning, instruments with pressure sensors offered many different ways the sensor could affect the timbre. For example, the Pro Soloist had a row of six switches, each of which assigned a different sort of modulation to the touch sensor, and the **Sequential Circuits Prophet T8** offered a choice of seven destinations with an overall Amount knob.

In keeping with this tradition of aftertouch flexibility, ODC 2800 makes it easy to assign up to 3 aftertouch modulations at once, each with its own destination and positive/negative scaling.

Click the *Assign* button under any slider to bring up the **Aftertouch Modulation Menu**:

Unlike the **Modulation Source Menu** accessed from other *Assign* buttons on the front panel, this menu contains modulation *destinations* to be controlled by aftertouch. From the menu and submenus, you can assign any of the following destinations:

- *Volume*
- *VCF Cutoff*
- *VCF Resonance*

- *Pitch*, *Pulse Width*, or *Volume* of any of the three VCOs
- *Rate* or *Pulse Width* of either of the two LFOs
- *VCO vibrato*, modulated by either of the two LFOs
- *Pulse Width vibrato*, modulated by either of the two LFOs
- *VCF vibrato*, modulated by either of the two LFOs
- *VCA tremolo*, modulated by either of the two LFOs

This modulation adjustment can be either positive (pressure turns the modulation *up* from its preset value) or negative (pressure turns the modulation *down* from its preset value).

As noted previously, the ASSIGN label underneath the button is replaced with a label showing the selected destination.

One last thing: there are actually *two* different types of aftertouch, and ODC 2800 supports them both, depending on whether your controller transmits them.

- *Monophonic Aftertouch* (**monoAT**), called *Channel Pressure* in the MIDI specification, originated with the **ARP Soloist** and was featured on hundreds of other synthesizers that came after it. In monoAT, there's a single sensor placed under the keybed that reaches from the lowest to the highest note. It's activated when you press down on *any* key, and the pressure on one key will affect the sound for *all* keys being played at any given time.

  For a monophonic synth, monoAT is obviously not a limitation at all. On polyphonic synths, a single aftertouch modulation for all notes isn't any more "limiting" than having only one mod wheel or pitch bender for the whole keyboard, and players have been composing and performing with it happily for over 50 years now.
- *Polyphonic Aftertouch* (**polyAT**), called *Key Pressure* in the MIDI spec, was pioneered* on the **Yamaha GX1** and **CS-80** in the 1970s, appeared on a few synths like the **Yamaha DX1** and the **Sequential Circuits Prophet-T8** at the dawn of the MIDI era in the early 1980s, was quickly abandoned (largely for technical reasons) by all but a stubborn few companies like **Ensoniq** and **GEM**, and was out of production and virtually forgotten by the 1990s.

  Recently, new technologies have helped polyAT make a big comeback on

the keyboards of instruments and controllers like the **ROLI Seaboard**, **Linnstrument**, **ASM Hydrasynth**, and **Waldorf Iridium**. A polyAT keyboard has a sensor under *each* key, so that you can vary the pressure and change the sound on individual notes while leaving other notes alone.

ODC 2800 will respond to monophonic aftertouch and polyphonic aftertouch, provided your USB/MIDI controller is capable.

(*We're not counting the **clavichord** and **orphica** from the 1600s because for those instruments -- and the **Mellotron**! -- polyAT was an accidental side effect that wasn't very good for the instrument if you did it too much.)

As far back as the 1960s, it wasn't at all uncommon for keyboardists to run their outputs through effects, either guitar pedals or studio rackmount gear. That's why ODC 2800 comes with a set of five built-in **Effects**.

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

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

FX On/Off- Bypasses the entire Effects chain

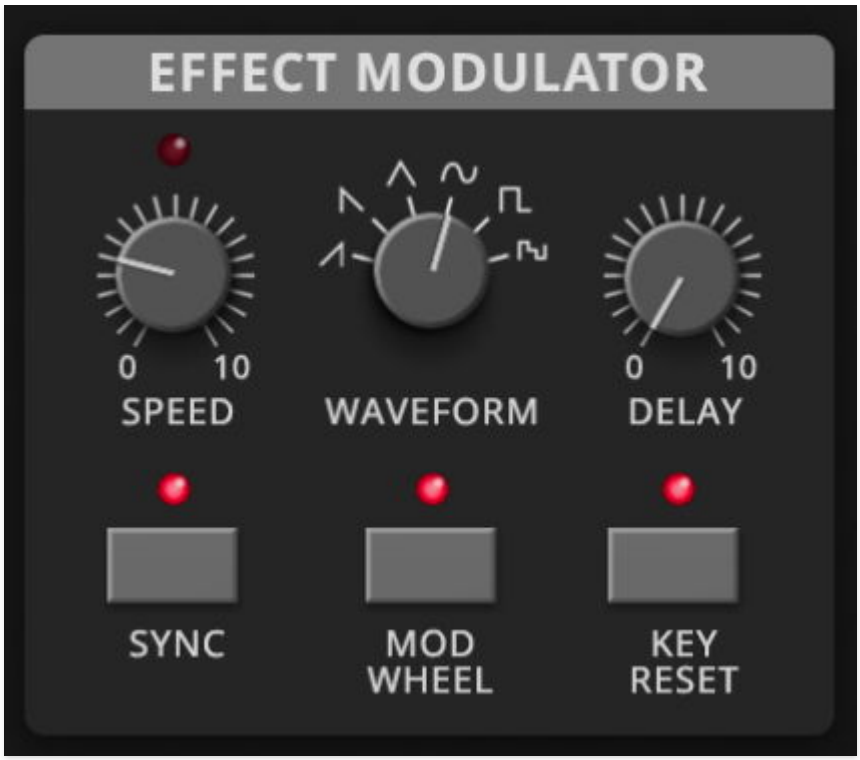
Level- Adjusts the level of the entire Effects chain

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

Next, each of the five Effects has the following controls:

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

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



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

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

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

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

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

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

Distortion

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

The Distortion has four different modes:

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

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

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

Dual Phaser

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

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

- **Speed**- phaser rate, from 0.01 Hz to 8 Hz, or 8 beats to 1/64th triplet when the **Sync** switch in the lower left corner is On
- A switch lets you choose between synchronizing both Speeds to Phaser 1, or letting the two *free run* independently.
- **Depth**- Amount of the phaser effect
- **Stages**- How many allpass filters are active in each phaser circuit. Each pair of stages creates one sweepable frequency notch, so fewer stages

result in a gentler phasing, while more stages produce more aggressive phasing.

  - Phaser 1 can choose between 4 and 8 stages (2 or 4 notches)
  - Phaser 2 can choose between 6 and 12 stages (3 or 6 notches)

- **Resonance**- This adds resonance to give a sharper and more hollow sound.

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

Flanger & Chorus

These are two of the most popular effects making use of very short time delays, modulated by an LFO. Flanging mixes a dry signal with one delayed by (in this case) between 1.0 and 13 ms, creating a *comb filter* effect.

Chorusing uses time delays in the 30 ms neighborhood to thicken a sound and simulate the sound of multiple sources rather than just one.

Flanger controls include:

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

Chorus controls include:

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

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

Echo

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

The Echo offers a choice of three modes:

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

Controls include:

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

Reverb

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

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

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

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

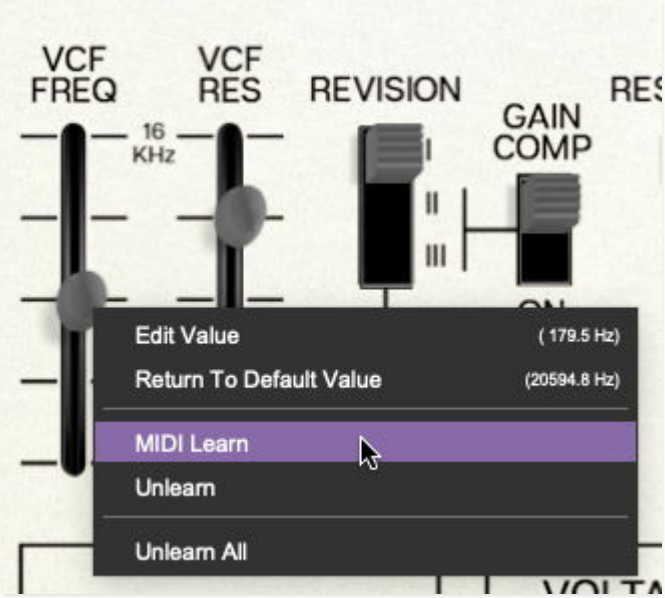
Assigning internal and external hardware controls adds a whole new dimension of control and musicality to patches, and it's really easy to do. The **MIDI Tab** is where all controller assignments can be viewed and tweaked, and we'll go through all of its parameters and functions. We recommend reading this whole section to best take advantage of ODC 2800's full array of MIDI control assignment possibilities.

First, though, we'll give you a quick look at how to assign an external hardware controller to an ODC 2800 control using MIDI Learn, so you can get started with basic MIDI control while you're learning the fancy stuff.

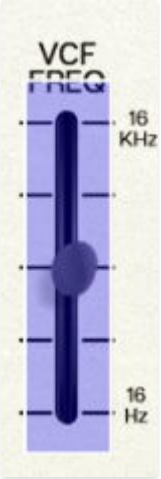
Quick and easy controller assignment

In this example, we'll assign a hardware slider/knob control to the *VCF Frequency* slider.

Begin by right-clicking on the *VCF Freq* slider and selecting *MIDI Learn,* as shown here:



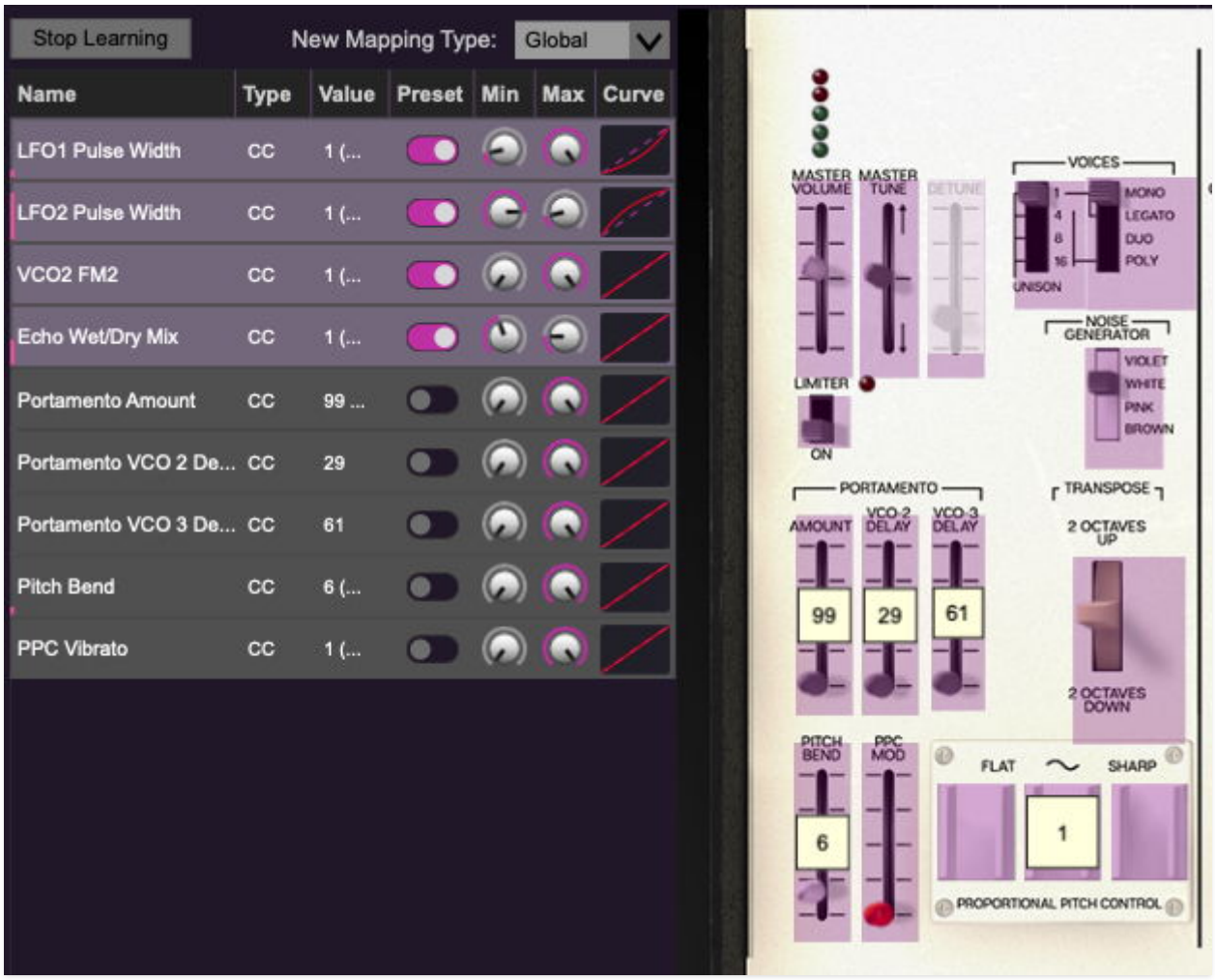
A transparent purple overlay appears over the slider, indicating that it's in MIDI Learn mode:



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 ODC 2800 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:

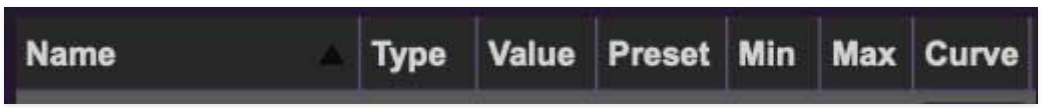
MIDI Learn button- This is almost exactly the same as enabling MIDI Learn mode by right-clicking a control. Click the *MIDI Learn* button to enter learn mode (all controls turn purple). Unlike right-clicking on specific knobs, where ODC 2800 automatically exits controller assignment mode, clicking the *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 ODC 2800:

- **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.
- **Key**- This allows keys of the computer QWERTY keyboard to act as button controls for ODC 2800'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.

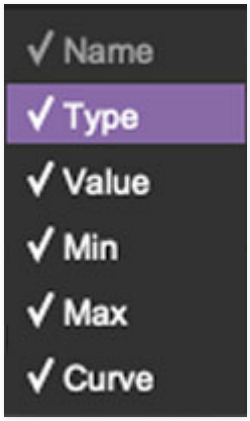
Max- Sets a limit on the highest value any automation control can set a mapped controller to. This actually recalibrates the range of the automation controller to the remaining parameter range.

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.

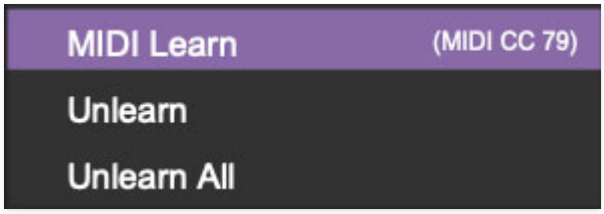
Curve - These allow the customization of how incoming MIDI CC controls affect the movement of ODC 2800's onscreen controls, ranging from exponential to linear to logarithmic curves.

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:

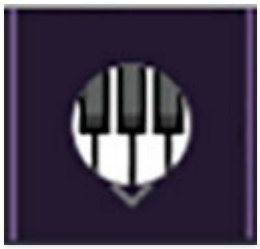


It offers the following operations:

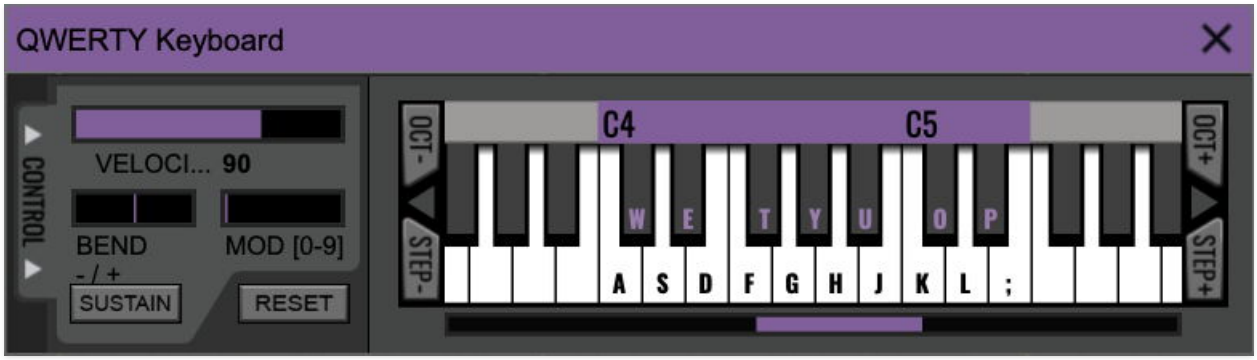
MIDI Learn- This is used to change the controller assigned to a particular parameter.

Unlearn- Deletes the selected automation parameter.

Unlearn All- Deletes all controller assignments for the patch. ODC 2800 will display a warning dialog prior to deletion in order to thwart potential unlearn-related disasters.



ODC 2800 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 ODC 2800 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 ODC 2800'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.

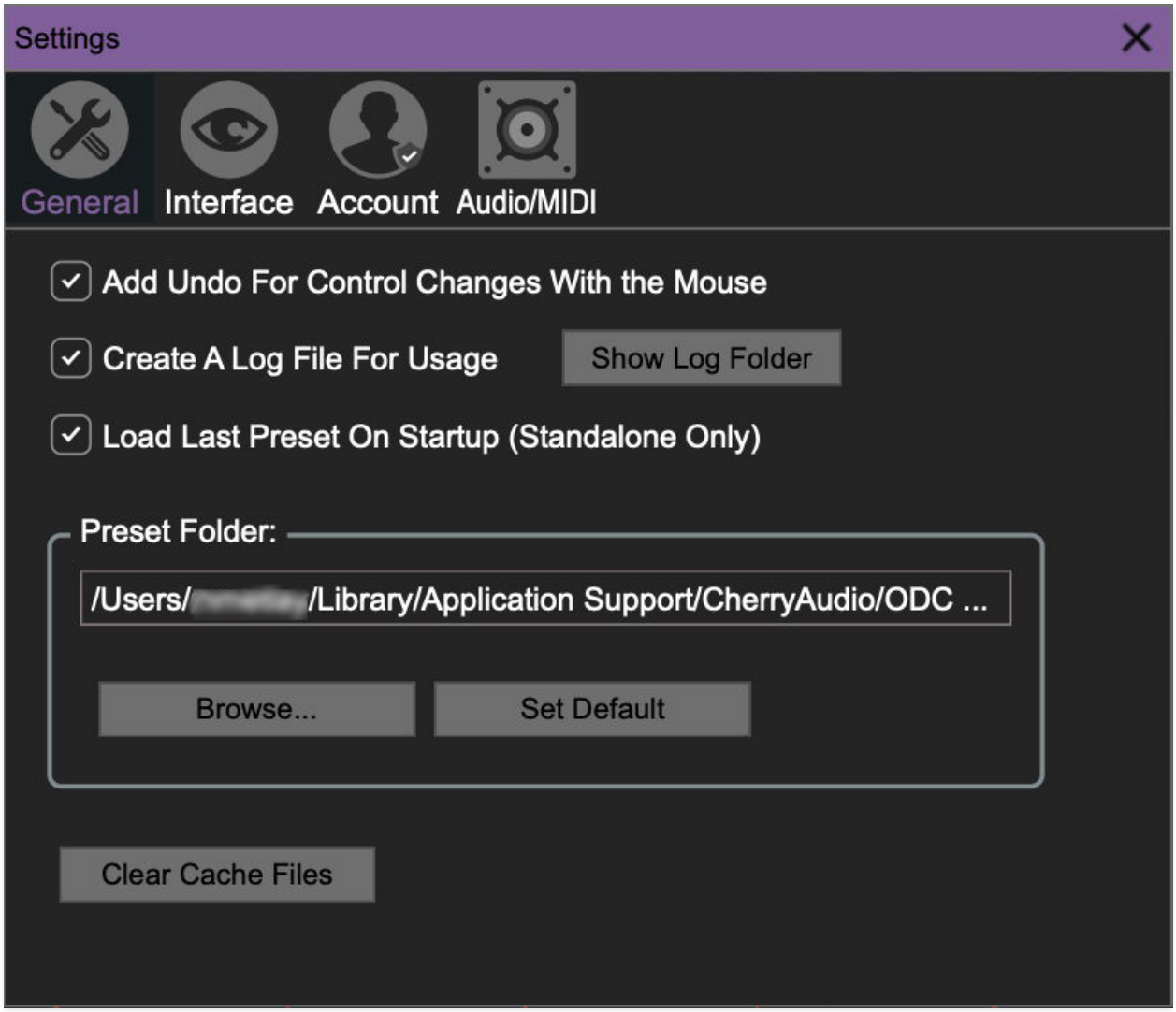
Sustain- The *Sustain* button mimics the functionality of a standard sustain pedal. Click the [TAB] key to engage sustain, or [SHIFT]+[TAB] to lock it. The *Sustain* button can also be engaged by mouse clicking it.

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

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 ODC 2800) Audio/MIDI.

General

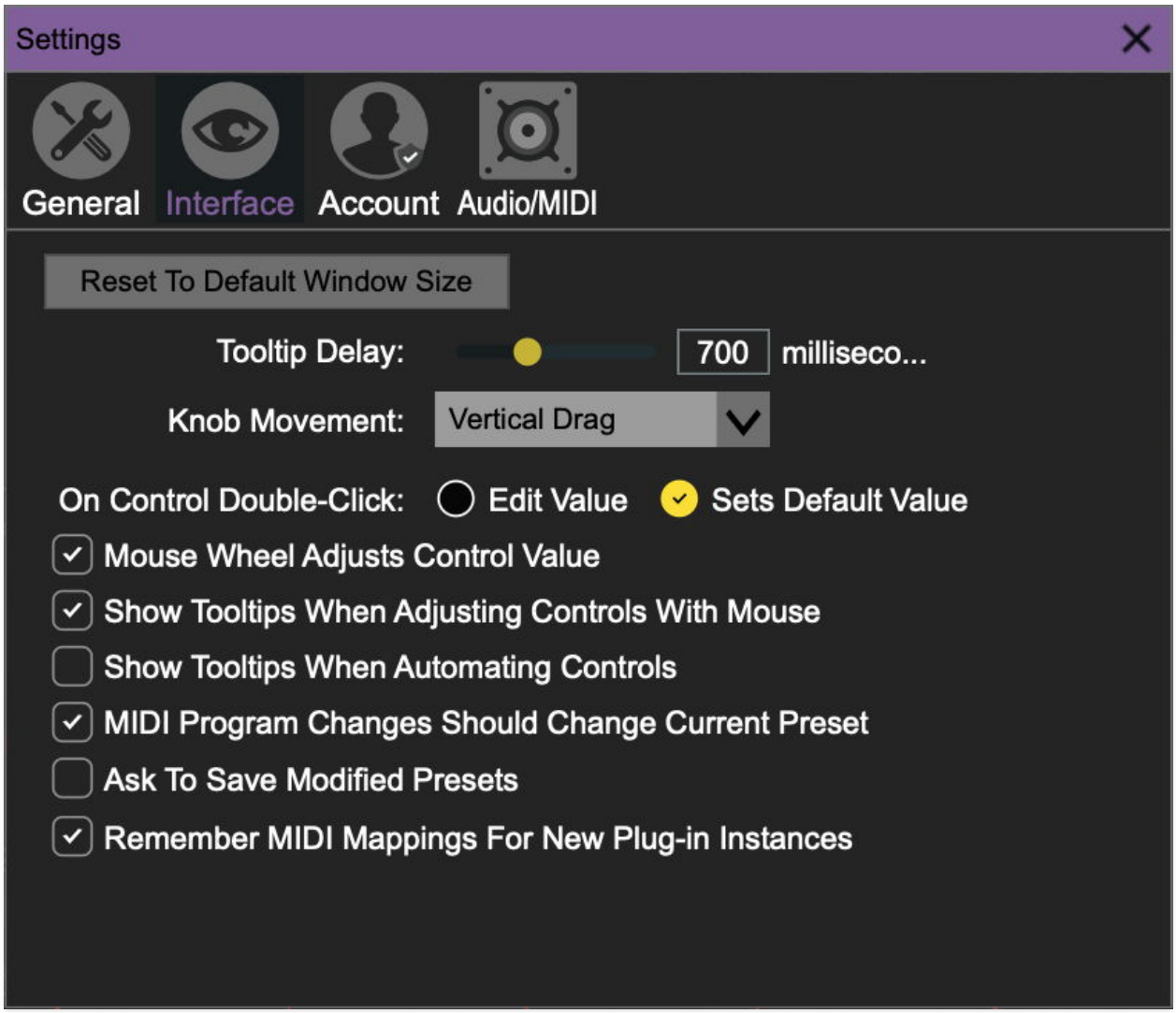


- **Add Undo For Control Changes With the Mouse**- Enabling this allows undo of knob/slider/button adjustments. You'll want this on if you want the

ability to undo all aspects of patch editing and programming.

- **Create A Log File For Usage-** This creates a text doc of all of ODC 2800'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 ODC 2800 log file docs.
- **Load Last Preset On Startup (Standalone Only)**- Automatically loads the last preset used when ODC 2800 standalone version is started.
- **Preset Folder-** Displays the current location of ODC 2800'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



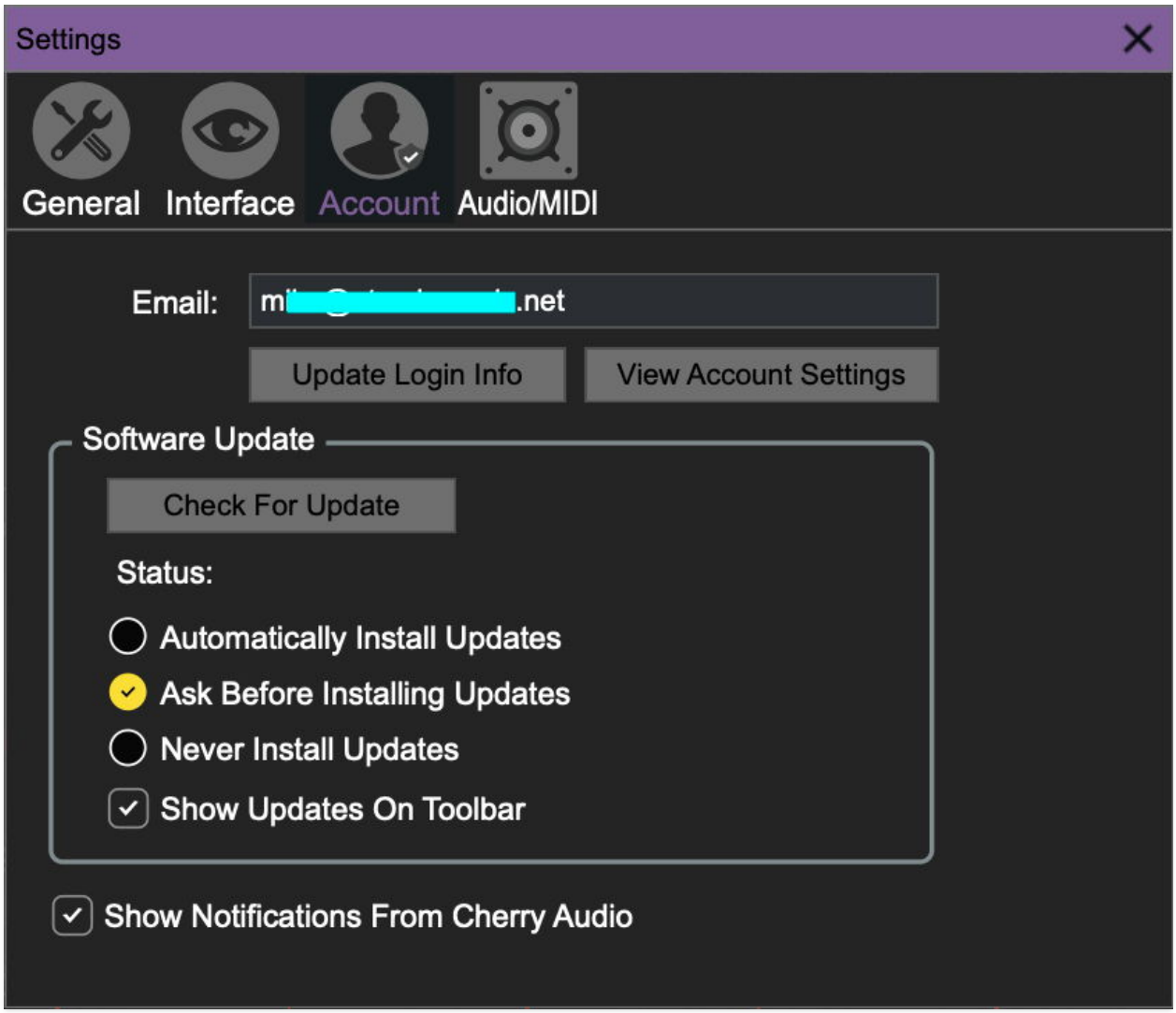
Allows customization of ODC 2800's user interface settings.

- **Reset To Default Window Size-** Resets the ODC 2800 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 ODC 2800 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, ODC 2800 remembers all global MIDI Tab controller settings.

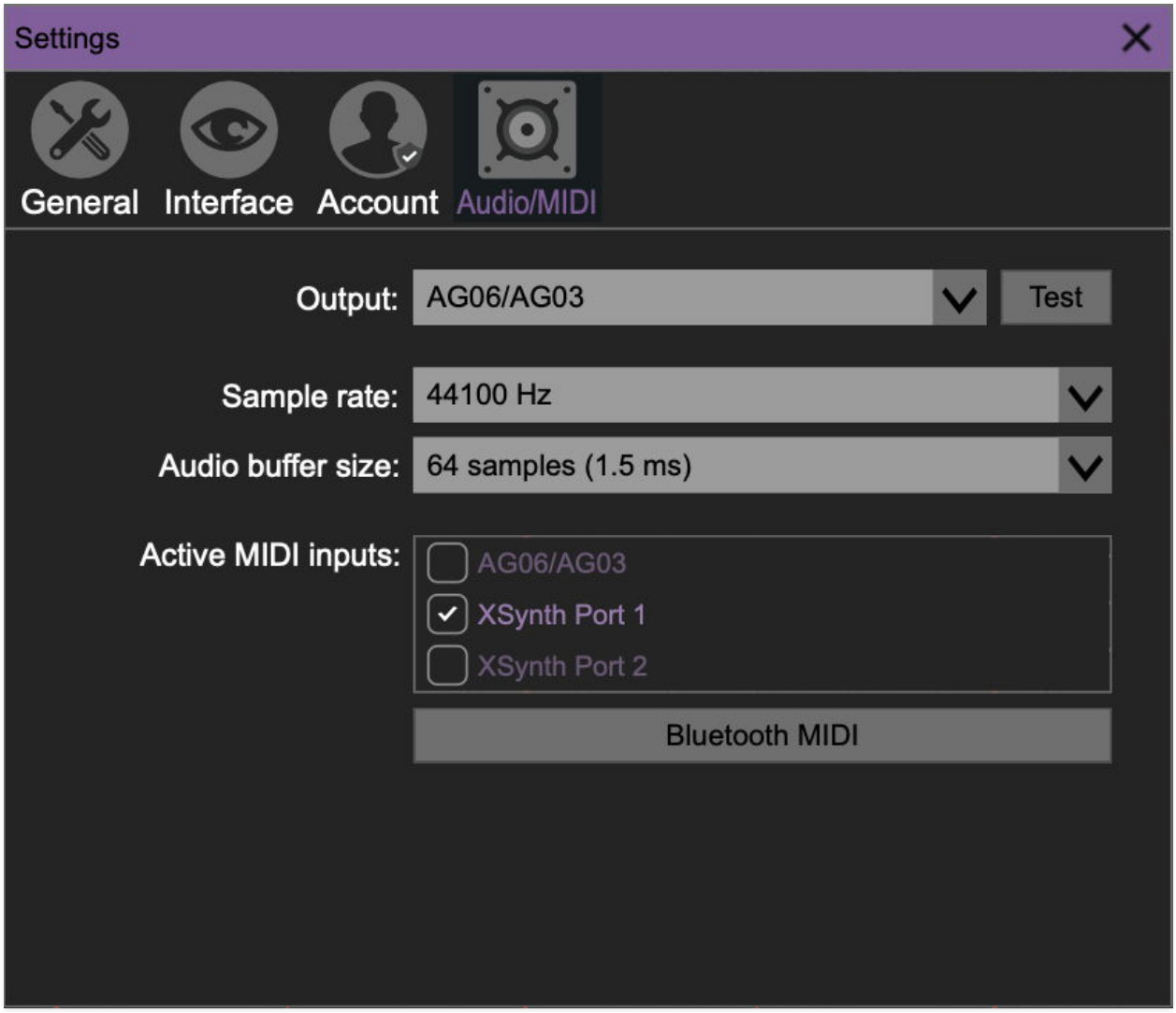
Account



Settings for your personal login information and account.

- **Email**- Displays the email address of the current login.
- **Update Login Info**- No, this isn't where you sign up to keep informed of news and tour dates for jazz/rock fusion superstar, and monumental Odyssey player, Herbie Hancock. (That would be **here**.) Clicking this opens the same email and password login screen you'll see when initially launching ODC 2800.
- **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 ODC 2800 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 ODC 2800.

- **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!)