USER MANUAL

_PIGMENTS

ARTURIA

_The sound explorers

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Thank you for purchasing Pigments!

This manual covers the features and operation of Arturia's **Pigments**, the latest in a long line of powerful virtual instruments.

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

Special Messages

Specifications Subject to Change:

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

IMPORTANT:

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

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

EPILEPSY WARNING – Please Read Before Using Pigments

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

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

Precautions to Take During Use

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

Introduction

Congratulations on your purchase of Arturia Pigments!

We'd like to thank you for purchasing Pigments, our flagship software instrument. Where the soft synths of our V Collection are meant to bring you spot-on emulations of the world's most coveted hardware synths, Pigments is a different beast altogether. First of all, it offers extreme versatility thanks to its multiple synthesis engines: Analog, Sample, Wavetable, Harmonic, and Modal. You can mix and match two of these types at the same time; then, the additional Utility engine is always present, offering a sub-oscillator, sampled "noise" sources, and external audio input.

Our latest iteration, Pigments 6, is a modern sound designer's paradise. Between factory Presets and the ability to create your own, it addresses every sonic scenario and musical role imaginable: cinematic soundscapes, dance music, experimental and ambient electronica, special effects, evolving and shimmering beds, not to mention a plethora of patches sure to please keyboard players in any musical genre from pop to R&B to progressive rock. While Pigments leans towards contemporary and cutting-edge sounds, there is no shortage of material that evokes classic synthesizers.

Add an intuitive modulation system with drag-and-drop assignment and sources from the familiar to the exotic, a powerful sequencer/arpeggiator, and breathtaking audio FX, and you have a tool of limitless creative potential. Pigments is, as some of our users have aptly put it, "the everything synthesizer."

Arturia has a passion for excellence, and Pigments is no exception. Listen to the sounds; tweak a few controls; skim through the features, or dive as deep as you like; you will never reach the bottom of it. We are confident that Pigments will prove to be an invaluable companion as you sail the waters of your imagination.

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

Musically yours,

The Arturia team

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1. WELCOME TO PIGMENTS 6

1.1. What is Pigments?

Pigments is Arturia's flagship software instrument, with the power to create any sound – from the best mix-ready modern presets to deep custom sound design. Pigments' approach to synthesis is as intricate as it is accessible, with the flexibility to suit both music production pros and musicians who simply want to find evocative, inspiring sounds for their next project. With a vibrant interface, multiple synthesis engines, dual filters, incredible modulation possibilities and quality effects - there is no better place to craft epic, high-resolution, surgically-precise and hard-hitting sounds.

1.1.1. Why use Pigments?

Pigments represents the state of the art in a leading-edge, modern synthesis platform. Whether you describe your craft as music production, sound design, composing, or something else entirely, Pigments provides an end-to-end solution for shaping your sonic vision. It combines a powerful six-engine architecture with advanced filters, effects, color-coded modulations, and generative sequencing for a creative experience that is simply without limit.

With versatility at its core, Pigments inspires with accurate emulations of acoustic sounds, completely original abstract synthesis, and everything in between. Some users have called it "the everything synthesizer" and we think the description fits.

Therefore, while many software instruments are defined by a unique sonic profile or identifiable character, Pigments goes beyond this - offering a virtually bottomless well of creative expression that you will grow into, not out of.

1.1.2. Structure of Pigments

The core of Pigments consists of two main sound engine slots, each of which can host five types of engines: virtual Analog, Wavetable, Sample-based (which also features a granular synthesis mode), Harmonic (our take on additive synthesis), and as of Pigments 6, a new Modal engine that employs cutting-edge physical modeling. These are supplemented by a Utility engine that adds two noise generators (though "noise" in Pigments includes a wide range of creative transients and other sounds), external audio input, and yet another virtual analog oscillator ideal for use as a sub-oscillator.

All this feeds dual filters that can be routed in series or parallel, with each filter offering a choice of 11 types. Effects power is plentiful, with two insert areas holding up to three effects each plus an auxiliary bus with another three effects. There are 19 choices of effect type per slot.

As for modulation, you can drag and drop sources from the dedicated overview strip to virtually any parameter. Sources beyond the "usual suspects" (envelopes, LFOs, velocity, aftertouch, and so on) include our unique multi-point Functions (complex curves and shapes), several Random value generators including a new voice-allocation-based mode, and even "Combinators" that blend the results of other sources.

Rounding out the feature set is a sophisticated generative sequencer that also functions as an arpeggiator. It can deal with unusual step lengths and even supports different step lengths for different tracks at the same time: e.g. pitch, velocity, and octave. Generative scales and probability-based features can help create wonderful musical surprises.

Of course, Pigments invites you to create your own sounds. But you can explore its power and versatility by browsing 1,571 immediately rewarding Presets, then expand upon these offerings even more by visiting the Arturia Sound Store, directly from within the Pigments Preset Browser.

Pigments runs both as a stand-alone instrument on Windows and macOS and as a VST/AU/AAX plug-in within your DAW. It has easy MIDI learn functionality for hands-on control of most parameters, and when used as a plug-in, allows parameter automation for greater creative control.

1.2. A brief history of Pigments

When Pigments originally launched in late 2018, it was a big step in a new direction for Arturia. Pigments was our first virtual instrument that was *not* an emulation of a classic hardware instrument. The multiple sound engines in Pigments made it a powerhouse for everything from classic synth patches to experimental sound design. Film, TV, and video game composers embraced it.

In Pigments 2, we answered that call with a sample-based sound engine that complemented the original Virtual Analog and Wavetable engines and opened the door to granular synthesis. We also added MPE (MIDI Polyphonic Expression) to support the growing number of controllers that offer per-note performance gestures such as aftertouch, key X and Y position, and glide.

Pigments 3 upped the ante with a Harmonic sound engine that brought additive synthesis to the table, letting you craft complex spectral timbres not achievable by other means. Then, a Utility engine with its own tab provided a sub-oscillator with supplemental analog waveforms as well as two creative noise sources. Pigments 3.5 added the ability to cross-modulate the two main synthesis engines with one another, plus a new set of distortions.

Highlights of Pigments 4 included two new effects (Super Unison and Shimmer), and one new filter type (MS-20 filter). We added the ability to drag-and-drop modulation sources directly to their destinations. We expanded the content, from vocal samples to sung phrases to acoustic instruments to wavetables. Pigments 4 also saw the introduction of the Play View with simplified controls.

Pigments 5 added multi-core CPU support, processing of external audio input, the aforementioned generative sequencing, and even more sonic content.

1.3. Pigments 6

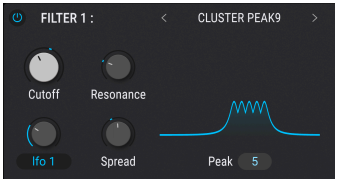
Now, version 6 delivers the most advanced Pigments yet. It truly represents all of Arturia's most creative and ambitious thinking in one product. Its highlights include:

1.3.1. Modal engine

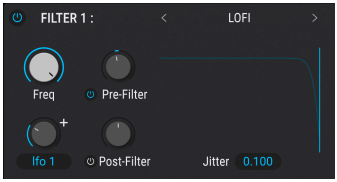
The new Modal engine uses physical modeling to generate sounds based on the properties of imaginary resonating objects. The "Resonator" is further enhanced by two "Exciters": One for the initial transients or "collisions" of another object; the other for ongoing friction and excitement of harmonics.

1.3.2. Expanded and revamped Filter section

Two new filter types increase the already broad options in Pigments' dual-filter section.



The Cluster filter type



The LoFi filter type

The Cluster filter accomplishes fine sonic sculpting by applying multiple peaks (up to 5) with adjustable Spread between them. The LoFi filter adds a pleasant retro or grungy quality via downsampling, but without the usual buildup of distortion that can happen when multiple notes are played.

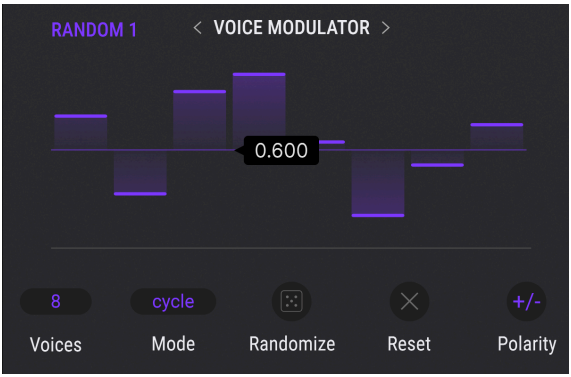
Filter selection has been reorganized with all filter types selectable in a new hierarchal menu. Filters that have variations (e.g. low-pass, high-pass, or band-pass; as well as different slopes) are neatly stacked in submenus to make finding the perfect filter quicker than ever.

The Multi-Mode filter, always a staple of Pigments, is now called the Classic Filter and has been expanded with Digital and Analog modes. Digital mode reflects the original behavior. Analog mode both makes resonance sound truer to classic analog synths, and prevents low-end loudness loss.

1.3.3. New Vocoder effect

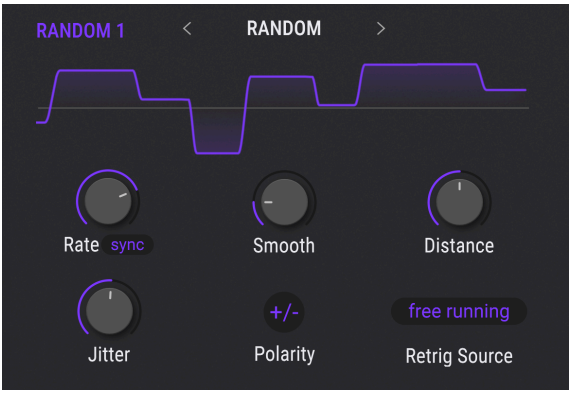
Pigments' vocoder lets you imprint the characteristics of a wide variety of sources onto the instrument's final output. You can inject everything from robotic vocal textures to avant-garde bass timbres into your patches, or modulate your sound with audio such as a percussion loop for a rhythm that truly "speaks."

1.3.4. New modulation sources in Random tab



The Voice Modulator is a new type of Random modulation source. It generates a new user-defined value each time Pigments' engine asks for a synth voice (e.g. because an incoming MIDI note is received). You can click the "dice" icon to randomize these values, or drag the vertical bars to determine them precisely. The Voice Modulator is especially good at adding new life to each note played, in the spirit of classic analog synths. Filter cutoff is an obvious destination for it, but that's just the beginning!

A second new Random source type is simply called "Random":

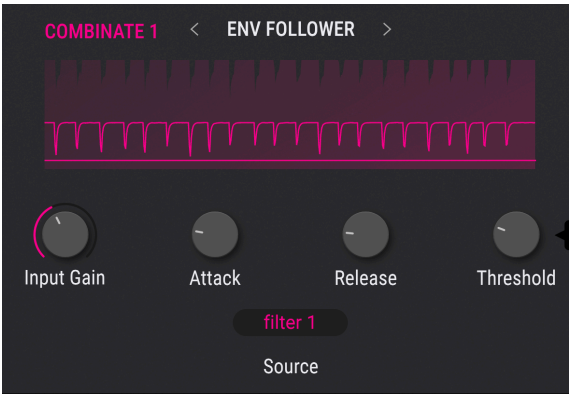


This offers the most-requested parameters for controlled chaos: distance between random value steps, timing variance between them (jitter), smoothing, optional tempo sync, and more.

1.3.5. Granular scanning in Sample engine

The Granular mode of the Sample engine has long offered the ability to chop samples into fine audio "grains" then rearrange and reshape them. Now, the **Scan** knob lets you change the position of a moving "play head" across the grain stream. This is especially useful for time-stretching effects.

1.3.6. Envelope follower



Residing in the Combinate section of the Modulation sources, this lets you "tap" the signal from a variety of places in the Pigments signal chain (such as engine or filter outputs), then track its amplitude and turn that into modulation data you can assign to any destination.

1.3.7. New Presets in Pigments 6

One hundred new Presets by some of the best and brightest sound designers in the world have been created for Pigments 6, and have their own Bank in the Preset Browser alongside banks for historical versions. There are 53 new wavetables in the Wavetable engine; 97 new samples have been recorded for the Sample engine.

1.3.8. Assisted Preset Browsing

How often have you been playing a synth and thought "I'd like something a lot like this patch, but a little different, with more this and less that"? Thanks to machine learning algorithms, Pigments 6 can suggest exactly such a list based on the current Preset. It will also suggest tagged Presets, expansion banks, and more based on your text string searches.

1.4. Pigments 6 summary of features

- New Modal physical modeling engine
- New Classic version 2, Cluster, and LoFi filter types
- Streamlined filter selection via hierarchal menu
- New Vocoder effect
- Voice Modulator value generator in Random modulation choices
- Envelope Follower in Combinator modulation choices
- Granular mode in Sample engine can now Scan backward and forward through graintables
- Easier browsing for Spectrums in Harmonic engine
- 100 new factory Presets
- Real-time Preset recommendation as you search
- 53 new wavetables and 97 new samples
- Cleaner looking browsers for sequencer patterns, Function types, and other menu-driven choices across Pigments
- Numerous user interface and workflow improvements

Of course, the features that made previous versions of Pigments so powerful are all on hand. These include the simplified Play view for accessing the most important parameters for performance; the generative sequencer with one-click pattern generation; dark and light themes for the interface; granular synthesis in the Sample engine; dedicated Unison and Modulator sections for each engine; drag-and-drop assignment of modulation sources to destinations; quick presets in areas such as LFOs, functions, and effects; quantizable modulation of pitch-based parameters; tempo sync in the Sequencer/Arpeggiator and all time-based modulations; cross-modulation between the main sound engines; massive FX power with three buses able to host three effect types each; flexible FX routing; microtuning; support for MPE (MIDI polyphonic expression); and much, much more.

We've listed a lot of features here but have still only scratched the surface of the capabilities of this formidable instrument. Throughout all the versions, we enjoyed developing Pigments so much that we had to keep reminding ourselves that this was work! Pigments is at once a playground, a factory, and a sonic universe all its own.

And now ... Arturia Pigments 6.

2. ACTIVATION AND FIRST START

2.1. System requirements

You can use Pigments as a stand-alone instrument or as a plug-in for your favorite DAW (Digital Audio Workstation) in Audio Units, AAX, VST2, or VST3 formats. Pigments works on computers that meet these minimum specifications:

Windows 10 or later (64-bit)

- 4 GB RAM; 3.4 GHz CPU
- 3GB free hard disk space
- OpenGL 2.0 compatible GPU

macOS 11 or later

- 4 GB RAM; 3.4 GHz CPU or Apple Silicon (M series) CPU
- 3GB free hard disk space
- OpenGL 2.0 compatible GPU (includes Apple Silicon)

> ! Note that the above are *minimum* specs for Pigments to run. The more powerful your computer is, the more polyphony and performance you will enjoy.

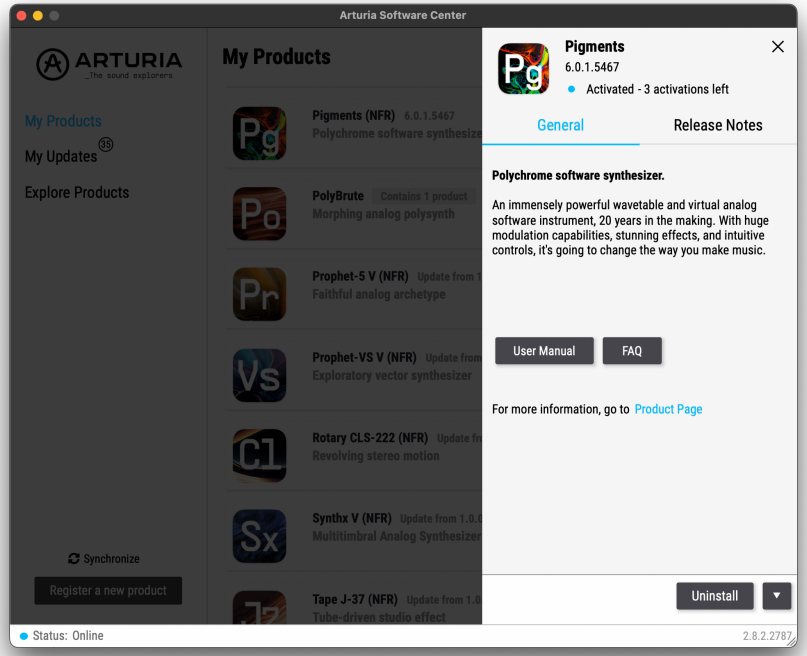
2.2. Register, activate, and install Pigments

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

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

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

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



This image of Arturia Software Center shows Pigments already installed

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

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

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

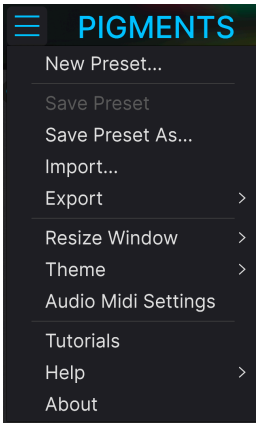
2.3. Initial setup for stand-alone use

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

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

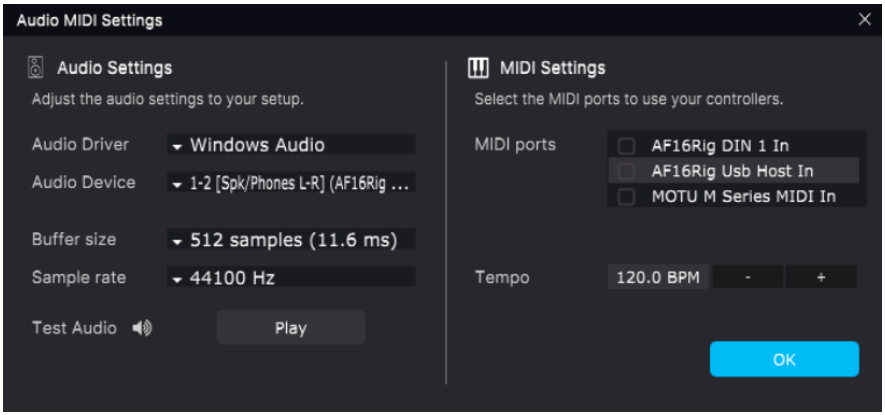
2.3.1. Audio and MIDI settings: Windows

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



Pigments Main Menu

Click on **Audio Midi Settings** to open the following window. This works in the same way on both Windows and macOS, although the names of the devices available to you will depend on the hardware you are using. Remember, this option is only available (and needed) in the standalone version of Pigments.



Starting from the top, you have the following options:

- **Driver:** Selects which audio driver will handle playback of Pigments. This can be your computer's internal driver, a generic ASIO driver, or an external soundcard or interface driver. The name of your hardware interface(s) may appear in the field below, depending on your selection.

- **Device** Selects the audio hardware through which you will hear Pigments.

- **Output Channels** lets you select which of the available outputs will be used to route audio out. If you only have two outputs, this selection box will not be shown. If you have more than two, you can select a specific pair of outputs.

- The **Buffer Size** menu lets you select the size of the audio buffer your computer uses to calculate sound. The latency in milliseconds is displayed after the buffer size setting.

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

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

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

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

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

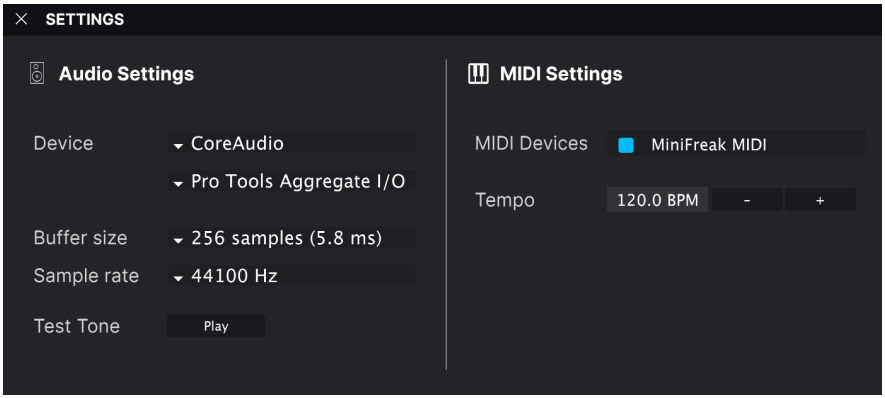
- **Test Tone** sends a short test tone when you click the **Play** button, to help you troubleshoot audio issues. You can use this feature to confirm that the instrument is routed correctly through your audio interface and that audio is playing back where you expect to hear it (your speakers or headphones, for example).

- The **MIDI Devices** area will display any MIDI devices you have connected to your computer (if any). Click the check box to accept MIDI from the device(s) you want to use to control the instrument. You can select multiple MIDI devices at once with the checkboxes.

! In standalone mode, Pigments listens for all MIDI channels, so there's no need to specify a channel.

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

2.3.2. Audio and MIDI settings: macOS



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

2.3.3. Using Pigments as a plug-in

Pigments' interface looks the same in plug-in mode as in stand-alone mode.

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

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

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

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

2.4. Playing Pigments for the first time

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

If you haven't done so already, launch Pigments as a plug-in or as a stand-alone instrument. If you have a MIDI controller set up, use it to play some notes on Pigments. You might first need to activate your MIDI controllers in the MIDI Settings (see above). You can also use your mouse to play the on-screen keyboard or use the keys of your computer keyboard.

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

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

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

3. OVERVIEW AND USER INTERFACE

In this chapter, we'll go over the main areas of the user interface surrounding the central controls for the Play, Synth, Sequencer, and FX sections (which will be covered in their own chapters). These are:

Section	Description
Upper Toolbar [p.23]	Contains main menu and buttons that access Pigments' operating screens
Modulation Overview [p.32]	Horizontal display of all modulation sources
Side Panel Settings [p.34]	Global and preset-level settings, MPE controls, MIDI functions, and tutorials
Lower Toolbar [p.41]	Parameter descriptions and various utility functions

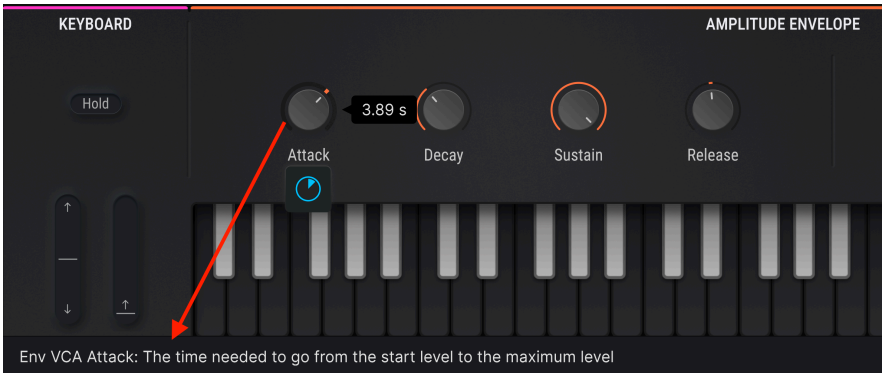
3.1. Common control behaviors

All Arturia virtual instruments share some common control behaviors to make editing sounds easier. These behaviors are common across the instrument in the Play, Synth, FX, and Sequencer views.

3.1.1. Value pop-ups

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

3.1.2. Parameter descriptions



Operating or hovering on any control displays its name and a brief description of its function in the left corner of the lower toolbar [p.41].

3.1.3. Fine adjustment

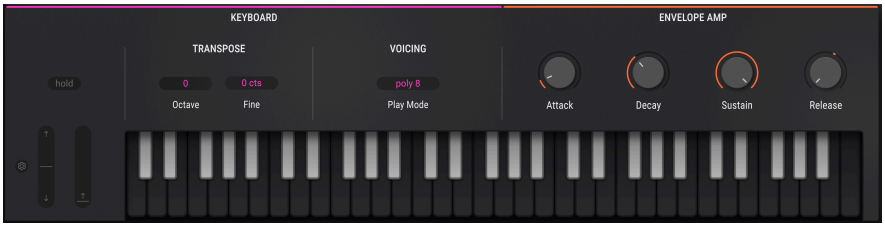
Hold the right mouse button or Control key while dragging on any knob to adjust it more slowly. This helps when you want to dial in precise values.

3.1.4. Double-click for default

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

3.2. Virtual keyboard location

Most of our software instruments have an onscreen keyboard which can be used to play a sound without the need for an external MIDI device. Pigments is no exception [p.72], and its keyboard is available in Play view [p.61], in other views when the **Keyboard** tab is selected in the bottom half of the window, and in the Preset Browser [p.45].



Pigments' onscreen keyboard as it appears in the Play view

Clicking near the bottom edge of the key results in a higher velocity note; clicking near the top produces a soft velocity.

3.2.1. Playing from a computer keyboard

Notes corresponding to keys on the computer keyboard

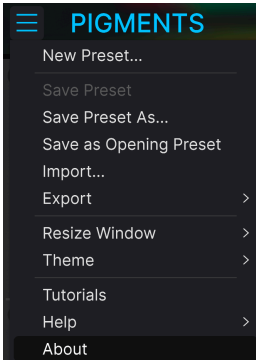
You can play an octave plus a ninth in the key of *C* using a standard QWERTY keyboard, according to the diagram above. In addition, the **Z** key shifts the pitch range an octave down and the **X** key shifts it an octave up.

! This feature always works when Pigments is used in stand-alone mode, but may work differently in a DAW with Pigments run as a plug-in. You may need to adjust your DAW's settings accordingly.

3.3. The Upper Toolbar

The toolbar that runs along the top edge of the instrument provides access to many useful features. Let's look at them in detail, from left to right.

3.3.1. Main Menu



The Main menu is accessed by clicking the three horizontal lines in the left corner of the upper tool bar. Here, you can access important preset management and configuration functions.

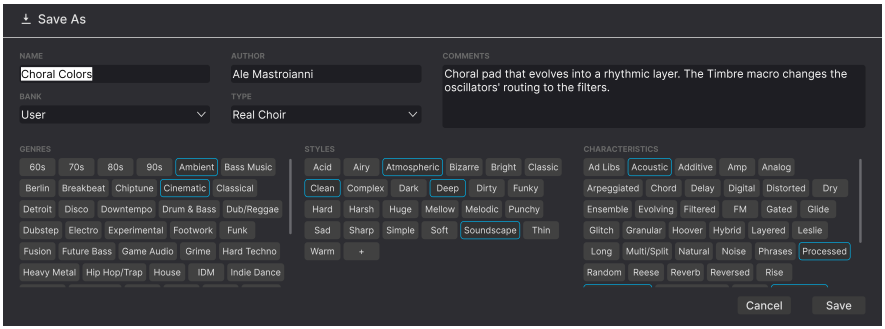
3.3.1.1. New Preset

This creates an entirely new Preset with default settings. (These include Engine 1 set to Wavetable and Engine 2 set to Sample, plus a single filter set to Multimode.)

3.3.1.2. Save Preset

This option is greyed-out on factory Presets, which cannot be overwritten. On a user Preset, it will overwrite any changes you have made.

3.3.1.3. Save Preset As…



The Save As window

When you select this option a window appears where you can enter information about the preset. In addition to naming it you can enter the Author name, select a Bank and Type, select tags that describe the sound, and even create your own Bank, Type, and Styles. This information can be read by the preset browser and is useful for searching the preset banks later.

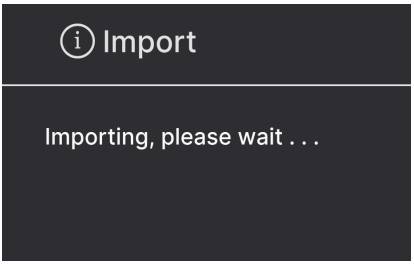
You can also enter text in the Comments field, which is handy for providing a more detailed description.

3.3.1.4. Save as Opening Preset

This option is only available when Pigments is used as a plug-in. It causes the current Preset to automatically load when you insert Pigments on a track in your DAW.

3.3.1.5. Import...

This command lets you import a file that was originally exported by Pigments. It can be either a single preset, an entire bank of presets, or a playlist. Presets are stored in the *.pgtx* format, while playlists are given the extension *.playlist*.



The Import Preset standby

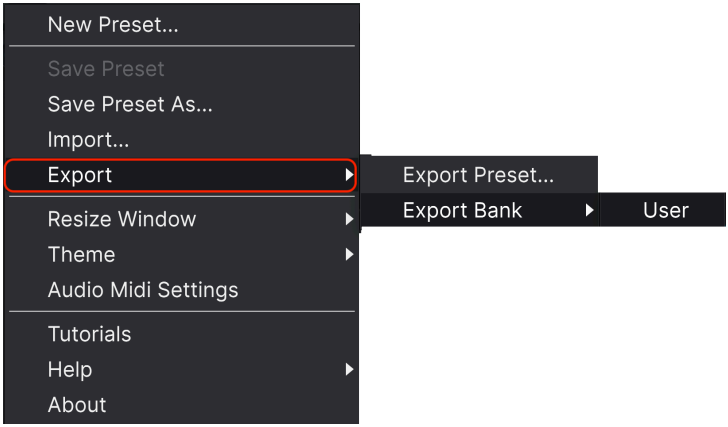
The above standby message will display, along with a dialogue box from your computer's OS to navigate to the file you want to import.

3.3.1.6. Export

The Export menu has several options for exporting files from Pigments. These let you share your sounds and playlists with other users. You could also use these options to transfer files to another computer.

Export Preset and Export Bank

You can export a single preset using the **Export Preset** command. The default path to these files will appear in the window, but you can create a folder at another location if you like.

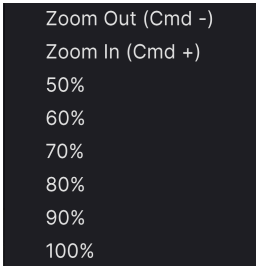


The Export Preset option

On the other hand, the **Export Bank** option can be used to export an entire bank of sounds from the instrument, which is useful for backing up or sharing presets.

3.3.1.7. Resize Window

The Pigments window can be resized from 50% to 200% of its original size without any visual artifacts. On a smaller screen such as a laptop you may want to reduce the interface size so it doesn't dominate the display. On a larger screen or a second monitor you can increase the size to get a better view of the controls and graphics. The controls work the same at any zoom level but the smaller ones can be harder to see at the smaller magnification values.



The Resize Window menu

3.3.1.8. Theme

The theme option selects between classic (dark) and light backgrounds for Pigments. Depending on your preference, you can use the light theme during the day, and use the dark theme when working in the dark or during the night.

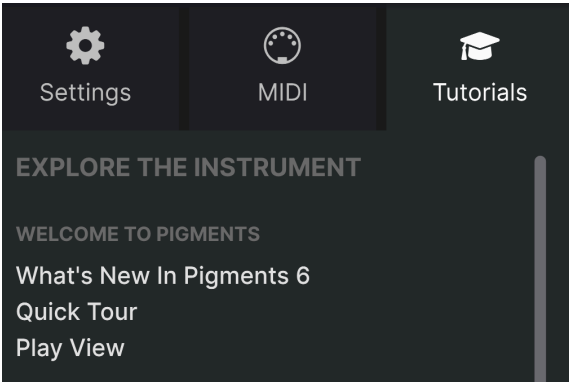
3.3.1.9. Audio MIDI Settings

Here you manage the way the instrument transmits sound and receives MIDI. See Audio and MIDI settings [p.16] in chapter 2 for full details about this.

> ! This option only appears when Pigments is used as a stand-alone instrument. When used as a plug-in, your DAW handles audio and MIDI settings via its preferences, project, or setup menus.

3.3.1.10. Tutorials

Selecting one of these options will open the right side panel and lead you on a comprehensive tour of the features of Pigments, created by one of our talented sound designers, Gustavo Bravetti.



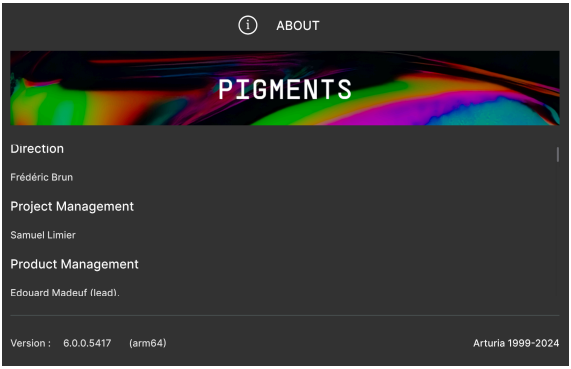
For example, the "Sound Generator – Introduction" tutorial will walk you through the different windows of the synth, and the "Modulations" tutorials explain how to assign a modulation to a parameter. Follow the instructions at each step and the tutorial will advance automatically to the next step.

> ♪ The Tutorials load their own Presets, so a warning message will remind you to save any edits before you begin.

3.3.1.11. Help

This menu contains links to both this user manual and FAQs on Arturia's website.

3.3.1.12. About

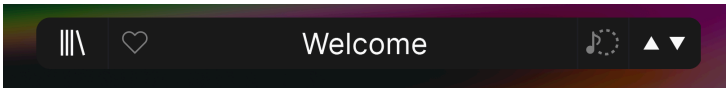


Scroll through the About display to see names of everyone who worked on Pigments

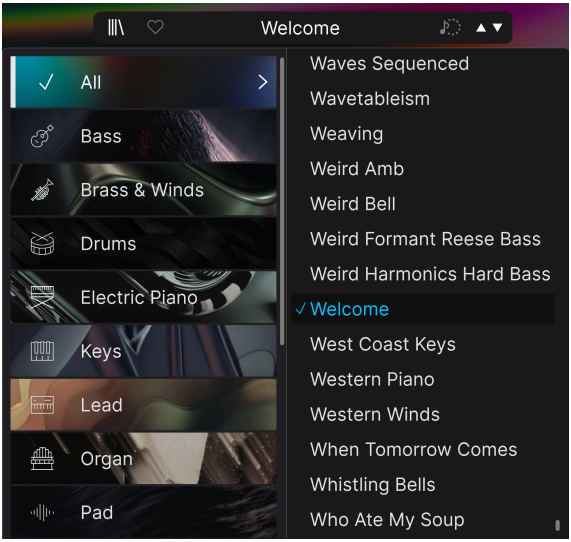
This option displays the software version of Pigments along with the designer credits. Click anywhere inside the Pigments application and this window will close.

3.3.2. Preset Browser overview

The Preset browser can be opened by clicking the toolbar button that has four upright lines.



Clicking directly on the Preset name opens a drop-down contextual menu, where you can select Presets by type:



You can step through the Presets serially using the up and down arrows, or click the musical note icon to view a list of Presets similar [p.47] to the current one. Learn more about this window in the Preset Browser [p.45] chapter.

3.3.3. Play view button

When the **Play** button near the upper right of the screen is engaged, the new simplified Play View [p.61] is displayed.

The Play View as it appears in Pigments 6

This is a streamlined view of the essential controls in Pigments, and contains simplified controls for:

- Both main synth Engines and the Utility Engine
- The Filters
- Dry/Wet for insert effects (FX A and FX B)
- Send, return, and effect selections for Aux FX
- "Rainbow" visualizer of the harmonic spectrum of notes played
- Virtual keyboard with amplitude envelope
- Macro controls [p.33], which actually appear in every view in Pigments
- Preset browsing

Chapter 5 is dedicated to the Play View [p.61].

3.3.4. Synth Panel Button

This displays the main synth panel of Pigments, containing many more controls than the Play view.

When Synth mode is selected there are five main sections in the top half of the Pigments window:

1. Engine 1 tab [p.73]
2. Engine 2 tab [p.73]
3. Utility Engine Tab [p.139]
4. Filter section [p.148]
5. Filter Routing/Amp Mod section [p.164]

Each of those sections contains its own features and parameters. Details are found in the chapters ahead.

3.3.5. FX Panel Button

When the FX button is clicked the left side of the window displays the FX section. It contains:

- FX: Bus A tab
- FX: Bus B tab
- FX: Aux Bus tab

These tabs are displayed vertically, with each able to hold up to three independent effects that can be routed in various ways. The FX A tab is shown fully populated in the image above. More details are found in the chapter dedicated to effects [p.169].

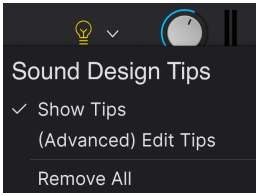
Note also that the on/off button next to the FX button in the Upper Toolbar can be used to engage or bypass all effects at once, without losing any of their settings.

3.3.6. Seq Button

There is a powerful pattern generator housed beneath the Seq mode button [p.195]. It has two modes: Step Sequencer and Arpeggiator.

As with the FX, the adjacent on/off button in the Upper Toolbar can turn the Sequencer/Arpeggiator on or off without losing any settings and without you needing to engage that view.

3.3.7. Sound Design Tips view



Accessed by the "light bulb" icon, the Sound Design Tips feature serves two main purposes:

- It identifies parameters and parameter ranges the sound designer enjoyed the most while developing the selected preset.
- It allows you to define and draw attention to your own favorite parameters and parameter ranges within your original presets.

Select any Factory preset and hover the cursor over the light bulb in the upper tool bar, between the Seq tab and the Master Volume control.

As you hover over this button the center strip will change to a yellow box with text that provides information about the selected preset. You might also see yellow outlines around certain parameters; these are the ones for which an optimal range was defined by the sound designer.

Select *(Advanced) Edit Tips* from the above menu, and you will notice the presence of lit bulbs in various sections of Pigments, depending on where the sound designer of the current Preset inserted tips. Each one of these bulbs invites you to explore the parameters in those sections, which will be both instructive and fun.

The main "light bulb" button may already be lit, which means that Sound Design Tips has been enabled globally for all presets. To toggle Sound Design Tips on and off, click the button. There's more information about using this innovative feature here [p.209].

3.3.8. Master Volume and Gear Icon

To the right of the light bulb icon is the master volume control for Pigments. Click and drag the knob to select a value within the range of +6 to -70 dB. Double-click the knob to reset the value to -12.0 dB.

A small pair of VU meters can be found to the right of the master volume knob. These meters become orange when signal reaches -12 dB and turn red when 0 dB (clipping) is reached. The peak indicators remain lit for 0.5 seconds.

> ♪ The master volume knob also responds to incoming MIDI CC 7 messages by default.

The icon shaped like a gear at the upper right corner opens the side panel [p.34], which contains tabs for MIDI channel settings, a powerful MIDI Learn mode, the Tutorials, and more.

3.4. The Modulation Overview

Pigments' powerful modulation overview

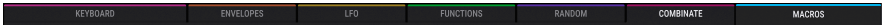
In the Synth, FX, and Sequencer views, the center section of Pigments displays a labeled row of 24 modulation sources and real-time animation of their actions. These are useful in a lot of ways:

- You can drag-and-drop a modulation source directly to its destination control in the Pigments interface. Hovering over that destination will then display a pop-up of depth amounts for any source(s) modulating it, and you can quickly edit modulation amounts from it.
- When you begin to drag a source, all knobs for eligible destination parameters appear outlined in grey rings.
- When you hover a destination, you can hear the effect of the modulator on that destination set to 25%. If you release, the modulation is kept, and if you move your mouse, preview stops.
- To set up a modulation route using one of those Mod sources, click its name. The Mod target view [p.215] will appear in place of the Modulation overview, along with a list of all active mod routes in addition to the one you are setting up.
- When you hover over one of the Mod source names, a brightly colored ring will appear around the control of any parameters being modulated by that source.
- When you hover over a parameter that is being modulated by one or more sources, those sources will be illuminated in the Modulation overview row.

- As you hover over a parameter control a small + icon will appear. Click it to open the Mod source view [p.214], with 24 sliders that are used to adjust and/or activate the mod routes that affect the selected parameter.

Details about setting up modulation routes can be found here [p.213]. There's also a chart that explains what it means when the outlines and colors around a knob change [p.229].

3.5. Mod Source Groups



Below the Modulation overview are six tabs which select different groups of modulation sources. After a tab is selected the bottom portion of the Pigments window will display a subset of mod sources, which can then be edited and adjusted in a multitude of ways. Each edit made to these mod sources will affect the destinations to which they have been assigned in the Modulation overview.

Some of the modulation sources are quite simple, such as the virtual keyboard and wheels on the MIDI tab. Others are capable of great complexity, such as the Functions. Each mod source can be routed to one or more parameters, and any parameter can be the target of multiple sources.

Click the links below to learn more about the various Mod source groups.

- Keyboard tab [p.232]
- Envelopes [p.237]
- LFOs [p.239]
- Functions [p.242]
- Random [p.248]
- Combinate [p.256]

3.6. Macro controls

These four controls have source panes in the Modulation Overview row, are always on, and can quickly alter the sound by affecting multiple other parameters at once. The great thing about a Macro control is that it can be assigned to an external MIDI control, meaning you can alter multiple parameters with a single motion.

Assigning a parameter to a Macro is easy: Click one of the panes M1 - M4 and select the destinations the same way you would for any other mod source [p.213], such as an LFO or an envelope.

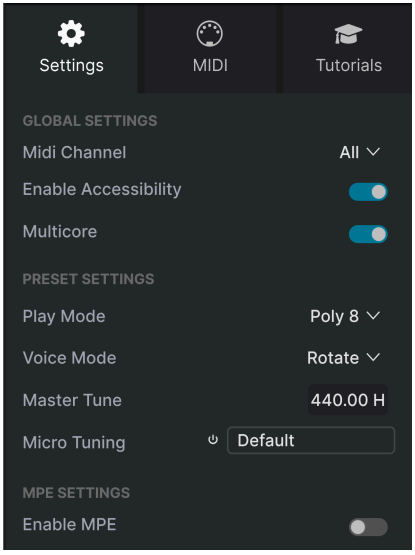
♪ You can double-click to type in Macro names under each control, so their labels may be different from one Preset to the next.

3.7. Side Panel Settings

Access the side panel by clicking the gear-shaped icon at the top right of the Pigments window.

3.7.1. Settings tab

Click **Settings** to access a drop-down menu where you can set the global MIDI receive channel (this applies instrument-wide to all Presets)and make settings for features including microtuning and MPE (MIDI Polyphonic Expression).



3.7.1.1. Global Settings

These settings are instrument-wide and remain the same regardless of Preset. They are:

- **MIDI Channel:** Selects the MIDI channel(s) on which Pigments will receive MIDI input. You can select a particular channel, or choose "All" for Omni Mode.
- **Enable Accessibility:** This gives your computer's system-level accessibility tools for differently abled persons access to Pigments.
- **Multicore:** Takes advantage of multi-core CPUs (e.g. Intel Core or Apple M series), maximizing efficiency performance by running different processes within Pigments on different cores where possible.

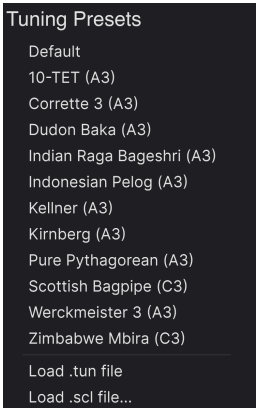
3.7.1.2. Preset Settings

These settings are saved at the Preset level, as their name implies. They are:

- **Play Mode:** Limits the polyphony of Pigments to conserve CPU resources. There are also two monophonic options:
    - Mono: Envelopes retrigger upon every note played.
    - Legato: Envelopes only retrigger if previous note is released before a new note is played.
- **Voice Mode:** Determines how voices are allocated once a new note is played.
    - Rotate: New notes played will always use a new voice. If all voices are playing, an older voice will be stolen.
    - Reassign: When a voice is used to play a note once, that same voice will be reassigned each time you play that note again.

> ♪ When using a long release patch and selecting Reassign, repeating the same note will always use the same voice, and it will cut the release tail before its end (similarly to monophonic behavior). When selecting Rotate, repeating the same note will always use a new voice, and will let all voice releases play as long as the polyphony limit isn't reached. To sum up, Rotate sounds more natural, but it is more CPU intensive with long release patches.

- **Master tune:** Sets the pitch of middle *A*, which is 440 Hz by default.
- **Microtuning:** Turns microtuning on and off. The following menu selects microtuning and world tuning presets.



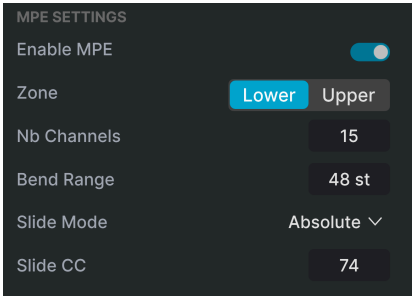
♪ Pigments now supports MTS-ESP compatibility. If you're using an MTS-ESP master in your session, the microtuning settings will be replaced with MTS-ESP settings. As shown in the menu, TUN and Scala tuning files are also supported.

♪ Note that when the Sample engine is selected for either primary engine tab [p.73], the root note selected in the Edit mode of the engine overrides the root note of the scales as shown in the above microtuning menu. This setting is described in the tune subsection [p.104] in Chapter 9.

3.7.1.3. MPE Settings

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

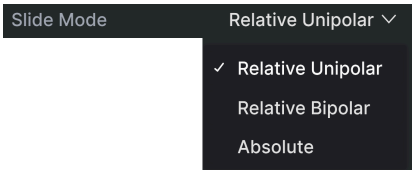
♪ Examples of MPE controllers include the Haken Continuum, ROLI Seaboard, and Keith McMillen KBoard.



The MPE controls are as follows:

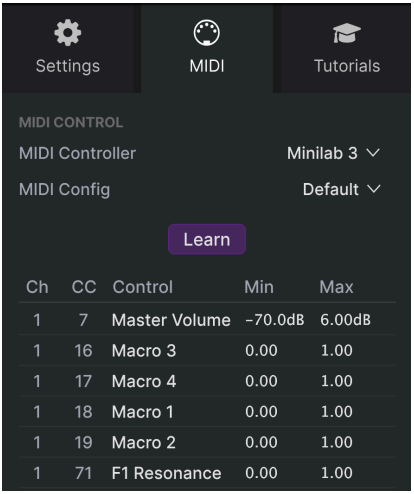
- **Enable MPE:** Turns MIDI Polyphonic Expression mode on and off.
- **Zone:** If an MPE-capable controller can be split into lower and upper zones, this selects which zone sends the MPE messages.
- **No. Channels:** Sets the maximum number of MIDI channels (and therefore simultaneous notes) on which MPE messages may be sent.
- **Bend Range:** Sets the maximum pitch bend range of each note, up to 96 semitones (48 by default). This should be set to the same value as on your hardware MPE controller.
- **Slide Mode:** Determines how the slide (sliding your finger toward or away from you on the Y axis of a key) is handled.
    - *Relative Unipolar*: No matter where the key is initially pressed, the first value sent to Macro 1 will be 0. Then the value will increase if you slide your finger away from you on the key or decrease if you slide it towards you.
    - *Relative Bipolar*: No matter where the key is initially pressed, the first value sent to Macro 1 will be 64. Then the value will increase if you slide your finger away from you on the key or decrease if you slide it towards you.
    - *Absolute*: The actual position of your finger is sent to Macro 1 within Pigments.
- **Slide CC:** Selects the MIDI CC number used to send the slide information. By default, this is 74 but you can change it. When MPE is enabled, all the controls that listen to the selected CC will no longer receive it.

A note about Slide Mode



As of version 5, Pigments has a new trick up its sleeve. If your MIDI controller does not support MPE but does have polyphonic aftertouch, Pigments interprets that poly-aftertouch as Slide, then sends the message to Macro 1 [p.33].

3.7.2. MIDI tab



Click the **MIDI** tab in the side panel to access MIDI functions, including Learn capabilities for assigning physical controls to parameters onscreen.

3.7.2.1. Assigning and unassigning controls

MIDI Learn mode as it appears in the Synth view

Click the **Learn** button. You will see MIDI-assignable controls outlined in purple. Click on one, now move a control on your MIDI controller, and you will see the onscreen control turn red to indicate it has been assigned. It's that simple.

You might start by mapping an expression pedal to master volume, a couple of knobs to the Filter cutoffs, or buttons to the Preset selection arrows. But that's only the beginning of the possibilities.

Right-click (or control-click) a red-outlined control to remove the assignment. MIDI control assignments are saved at the Preset level, so you can have different setups for different Presets.

3.7.2.2. The controllers list

The list in the MIDI tab shows which MIDI channel(s) and CCs are controlling each parameter.

Ch	CC	Control	Min	Max
1	7	Master Volume	-70.0dB	6.00dB
-	-	Macro 3		
1	17	Macro 4	0.00	1.00
1	18	Macro 1	0.00	1.00
-	-	Macro 2		
1	71	F1 Resonance	0.00	1.00
1	72	Env VCA Relea...	0.001s-m	20.0s-ms
1	73	Env VCA Attack	0.00ms-s	20000ms
1	74	F1 Cutoff	20.0Hz	20000Hz
1	75	Env VCA Decay	0.001s-m	20.0s-ms
1	76	F2 Cutoff	20.0Hz	20000Hz
1	77	F2 Resonance	0.00	1.00

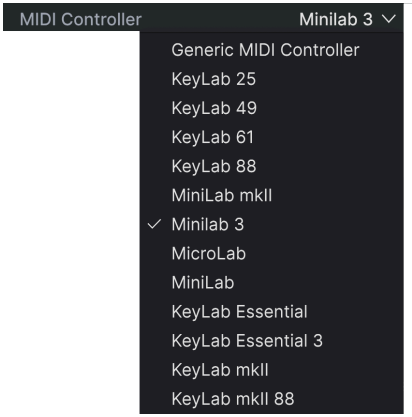
3.7.2.3. Minimum and maximum values

It's often useful to set a physical control to change less than full range of the parameter even though you sweep it through its full travel. This is useful for keeping a volume level, filter cutoff, or LFO depth (for example) in a desired musical range.

In the list of assignments beneath the **MIDI** tab, drag up and down on any Min or Max value (third and fourth columns) to change it. It is possible to set the maximum lower than the minimum; if you do, this reverses the polarity of the physical controller; turning it up will turn the parameter down.

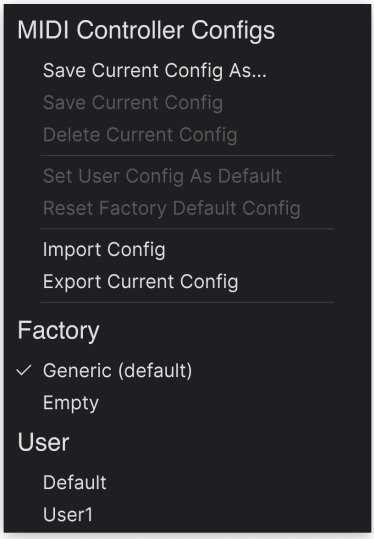
In the case of switch-type parameters which have binary values positions (On or Off, Linear or Exponential, etc.), those would normally be assigned to buttons on your controller. But it is possible to toggle those with a fader or another control if you like.

3.7.2.4. MIDI Controller Menu



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

3.7.2.5. MIDI Config Menu



Below the MIDI controller menu is another drop-down where you can manage different sets of MIDI maps for controlling Pigments from MIDI hardware. You can save/save-as the current MIDI assignment setup or delete it, import a configuration file, or export the currently active one.

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

Two options in this menu are especially powerful:

- **Default:** Gives you a starting point with predetermined controller assignments
- **Empty:** Removes the assignments of all controls

3.7.2.6. Reserved MIDI CC numbers

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

- Pitch-bend
- Modulation wheel (CC 01)
- Expression controller (CC 11)
- Sustain (CC 64)
- All Notes Off (CC 123)
- Aftertouch

All other MIDI CC numbers may be used to control any assignable parameter in Pigments.

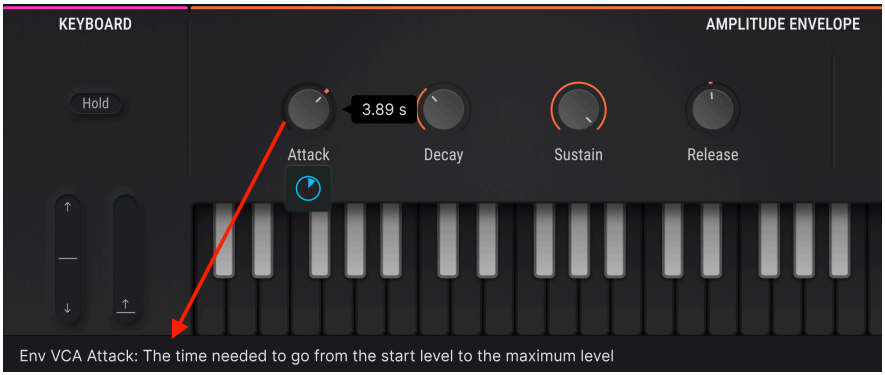
3.7.3. Tutorials tab

Clicking this tab accesses the in-app tutorials. This is the same as selecting Tutorials [p.26] from the Main Menu.

3.8. The Lower Toolbar

The lower toolbar is home to several utility features we want to make sure you don't miss.

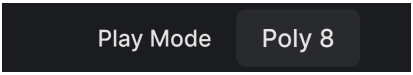
3.8.1. Parameter description



At the left hand side of the lower toolbar you will see a readout showing the name and a brief description of the control you are modifying. The value of that parameter will be shown near the control itself as you move it.

3.8.2. Play Mode

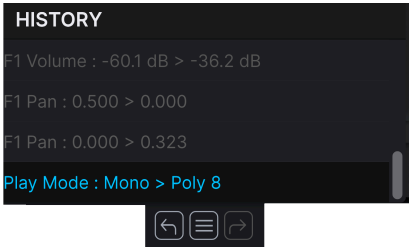
This menu simply determines the polyphony. It also duplicates the Mono and Legato options found in the Preset Settings [p.35] in the side panel.



Play Mode sets Polyphony

One reason to adjust Polyphony is to conserve computer CPU resources, but you may have other musical reasons for limiting the voice count.

3.8.3. Undo, Redo, and History



The Undo, History, and Redo buttons

When designing sounds, it's all too easy to overshoot the sweet spot for one or more controls, then wonder how to get back to where you were. Like all Arturia plug-ins, Pigments offers comprehensive Undo, Redo, and History functions so that you always have a trail of "breadcrumbs" back.

3.8.3.1. Undo

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

3.8.3.2. Redo

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

3.8.3.3. History

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

3.8.4. CPU meter

The CPU meter is used to monitor how much of your computer's resources Pigments is using. The CPU meter will rise as more voices are used, for example, when using the Unison Voice features [p.95].

3.8.4.1. Panic

Hover over the CPU meter and it becomes the Panic button. Click it to send an All-Sounds-Off command to resolve stuck MIDI notes or other issues.

3.8.5. Resize handle

Grab and drag the diagonal lines at the lower right corner to resize the Pigments window. When you release the mouse, the window will snap to the closest size available in the Resize Window [p.25] option of the main menu [p.23].

3.8.6. Maximize View button

If you resize the Pigments window and some of its parameters are pushed outside the viewable range of your display, you may see an icon with diagonal arrows on the far right side of the lower toolbar.

The Maximize View button may appear in the lower right corner

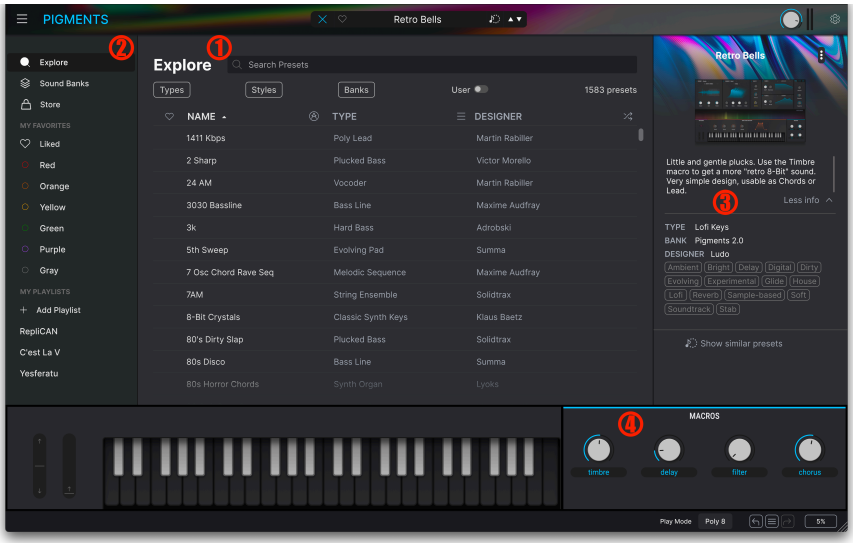
Click it, and Pigments will resize and re-center the window, making the most of your available screen space.

4. THE PRESET BROWSER

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

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

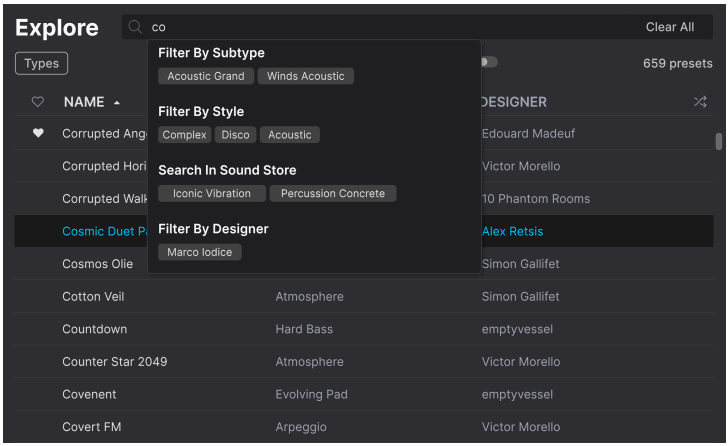
The browser has four main areas:



Number	Area	Description
1.	Search and Results [p.46]	Search Presets with text strings, and by tags for Type and Style
2.	Sidebar [p.52]	Manage Banks, Favorites, and Playlists
3.	Preset info [p.54]	Summary of Bank and Tags, Designer name, and description info for current Preset
4.	Macro knobs [p.57]	Knobs that change multiple parameters with one control movement

4.1. Search and Results

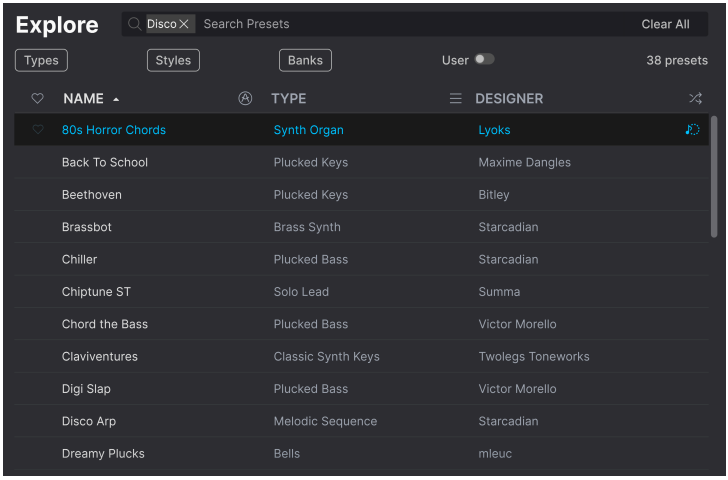
Click on the Search field at the top and enter any search term. The Results list beneath shows all Presets that fit your search. Click the X icon at right to clear your search terms.



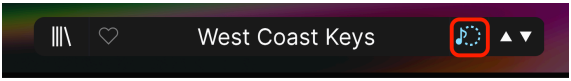
The inset window shows real-time suggestions based on your search string

Notice a couple of things going on in the above example. In response to typing the letters "co," the main results list displays Presets with "co" somewhere in the name. Also, the inset window that appears below the search bar dynamically updates other venues where "co" is relevant. In this case, those are Subtypes, Styles, banks available in the Arturia Sound Store, and so on.

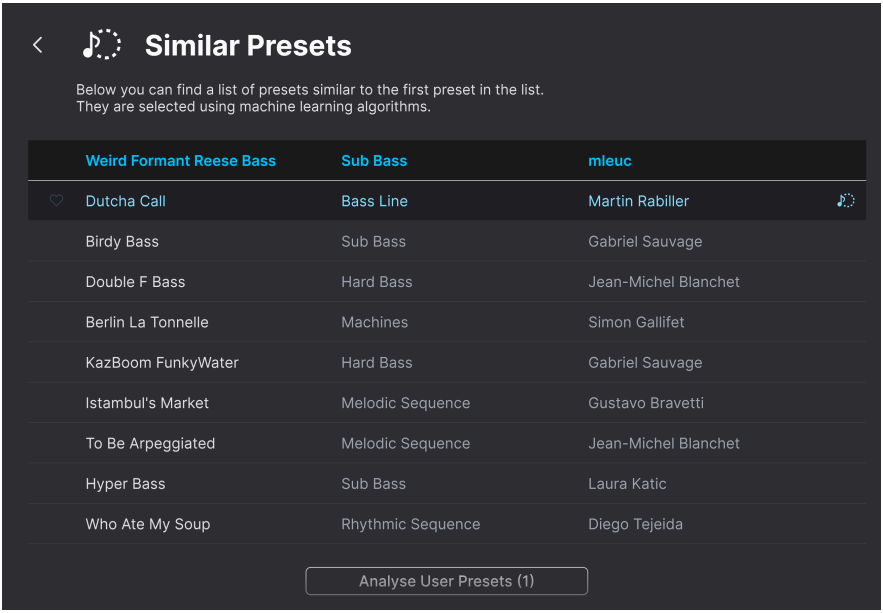
Click on any of the tags in this inset window to jump to the corresponding destination. For example, if you click on the *Disco* tag, you'll get a list of all Presets that have that tag:



4.1.1. Similar Presets function



As of Pigments 6, a couple of machine-learning Preset recommendation functions are on offer. Click the musical note icon to locate Presets that sound similar to the currently selected Preset. You can find it in the main Preset name bar as shown above, at the bottom of the Preset info section [p.54], or to the right of any Preset line in the resulting list:



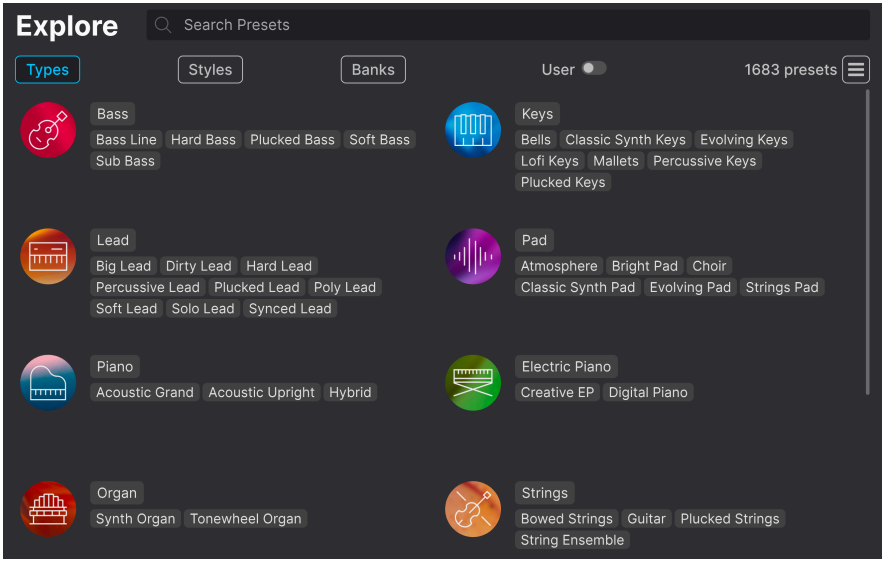
This combs through the factory Presets to generate the list. To find similarities with user Presets, click the **Analyse User Presets** button at the bottom of the list. You will see a confirmation dialogue. Depending on the number of user Presets you have, the process can take a few minutes, but it runs in the background so you can continue using Pigments. Notice the Similar Presets icon at the right of "Dutcha Call." Click it to generate a *new* list of similar Presets with Dutcha Call as the basis. This works for any highlighted Preset in the list.

4.2. Using Tags as a filter

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

4.2.1. Types and Subtypes

Types are broad categories of instruments. Each has further subtypes that get more specific (bowed vs. plucked strings, for example). These appear under the broader Types.



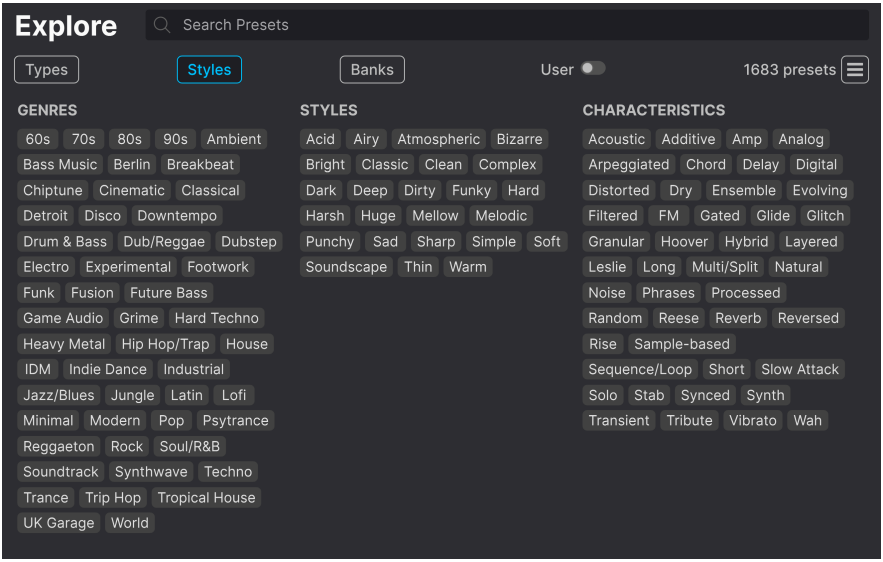
Click any Type or Subtype tag, and the results will show only Presets that match that tag. You can also select multiple tags using Cmd-click (macOS) or Ctrl-click (Windows). For example, if you aren't sure whether the Pad Preset you're looking for was tagged with the subtype "Atmosphere" or "Bright Pad", select both to broaden the search.

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

4.2.2. Styles

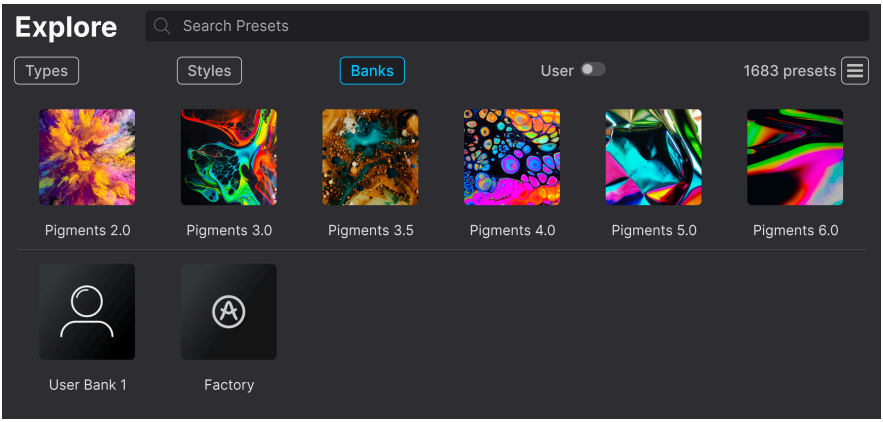
Styles refine your search according to even more detailed musical attributes. Accessed by the **Styles** button, this area has three further subdivisions:

- *Genres*: Identifiable musical genres such as decades, Trance, Techno, Synthwave, Disco, etc.
- *Styles*: General "vibe" such as Atmospheric, Dirty, Clean, Complex, Mellow, etc.
- *Characteristics*: Sonic attributes such as Analog, Evolving, Distorted, Dry, Rise, etc.



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

4.2.3. Banks



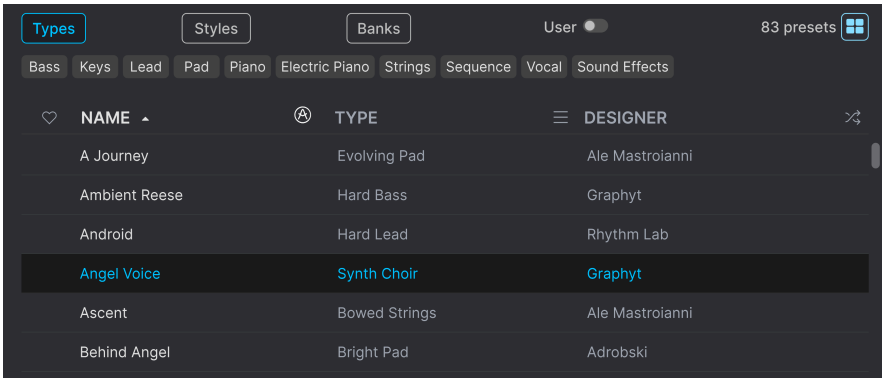
Factory banks in Pigments 6 include Presets from the current and previous versions

Next to the **Types** and **Styles** buttons is the **Banks** button, which lets you do your search (using all the methods above) within the factory or user banks.

Here or in any search view, you can toggle the **User** switch to search only within User banks. Sound designers with a large portfolio are sure to find this handy!

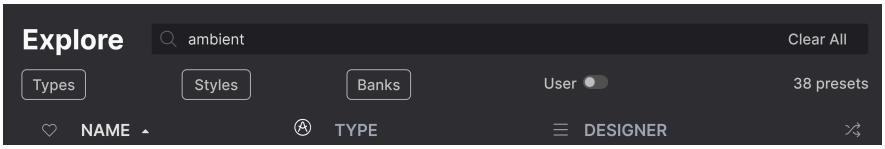
4.3. Search Results window

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



Search results displayed beneath Type tags

4.3.1. Sorting the Preset order



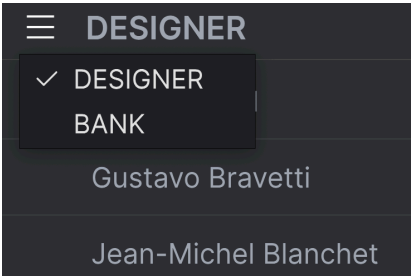
Click the **NAME** header in first column of the Results list to sort Presets in ascending or descending alphabetical order.

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

Click the **Arturia logo** to the left of **TYPE** to bring factory-featured Presets to the top of the list. These will appear just under any Presets you have liked [p.51].

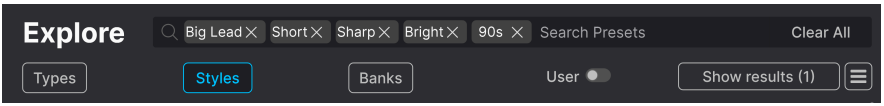
Click the **User** toggle switch to restrict your search to Presets in user banks.

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



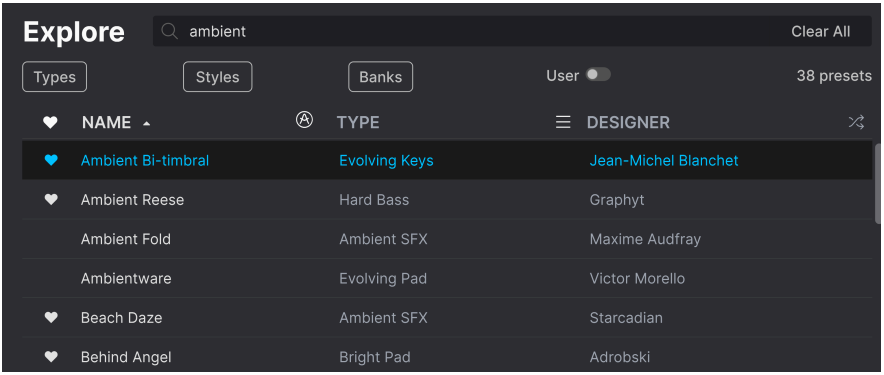
4.3.2. Clearing tags

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

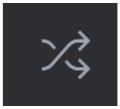


4.3.3. Liking Presets

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



4.3.3.1. Shuffle Presets



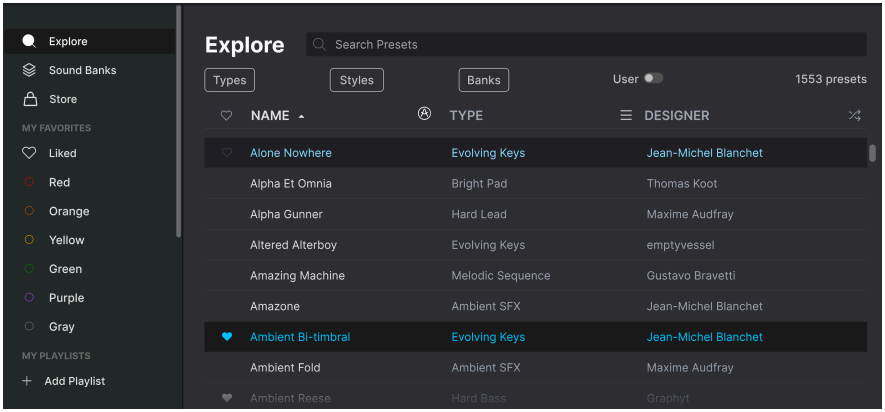
Clicking the "crossed arrows" button randomly reorders the Presets. This can be useful for finding something you like when your search results are a long list that takes time to scroll through – it might bring a killer Preset to the top. Shuffle mode is a toggle, so clicking it again will restore your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

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

4.4. Sidebar

The leftmost section of the Preset Browser determines what is displayed in the Search and Results [p.46] section.

The topmost option is **Explore**:



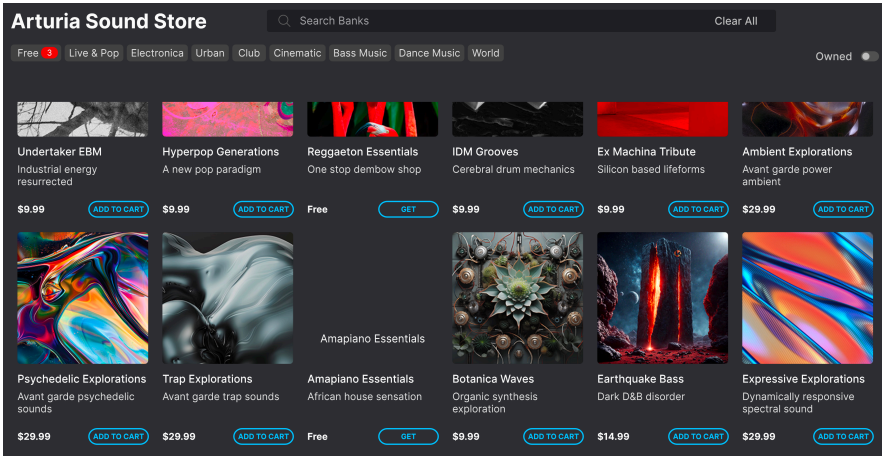
The **Explore** section is the default, letting you search the current bank of Presets loaded into Pigments as we did in the previous section.

4.4.1. Sound Banks

Clicking **Sound Banks** brings up a window with all of the currently available Sound Banks, starting with the Factory bank. User banks appear next to it, and can be deleted, renamed, or exported by right-clicking them.

You can also add a user image in .png format to further personalize your user banks. Right-click on the desired User bank icon, then select *Import image* from the pop-up menu that appears. This menu also offers options to delete, rename, and export User banks.

4.4.2. Store



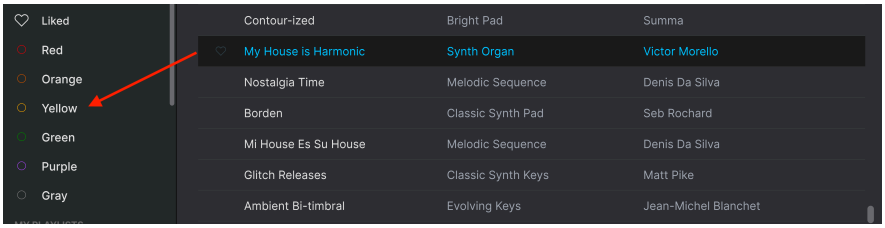
Here, you can download both free and paid banks from the Arturia Sound Store, right from within Pigments. You can search according to text strings and tags, and the **Owned** toggle will only display banks you've already acquired.

4.4.3. My Favorites

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

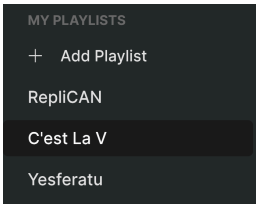
To decide which colors you'd like to display, hover over **My Favorites** and click **Edit**. Then use the toggle switches to select which colors you'd like to see or hide, then click **Done**.

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



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

4.4.4. My Playlists

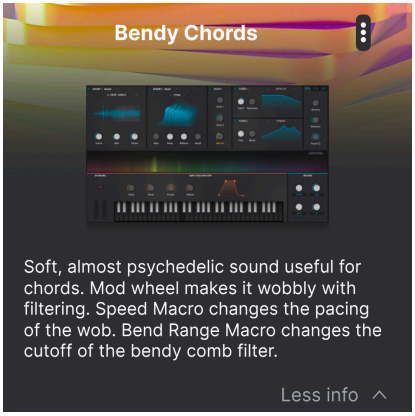


The bottom part of the sidebar displays any Playlists you have created or imported. Playlists are a very powerful management tool for set lists for gigs. Learn more about them in the Playlists section [p.58] below.

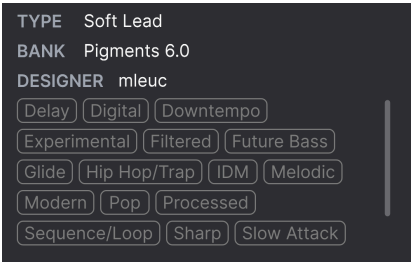
> ! If you don't see anything here, it is because you haven't created any Playlists yet. Head to the Playlists [p.58] section at the end of this chapter to find out how.

4.5. Preset Info section

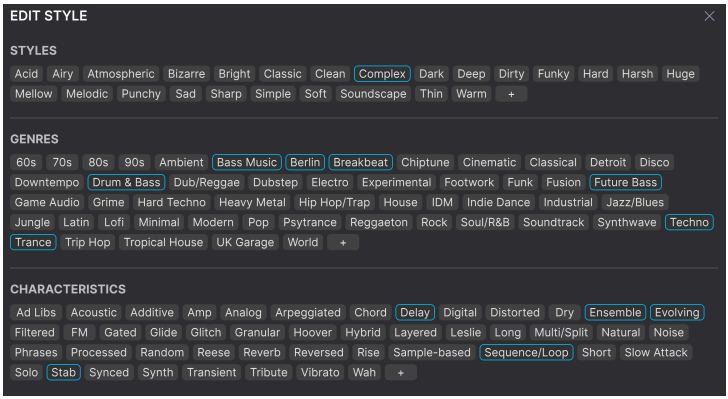
The right side of the browser window gives a brief description of each Preset.



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



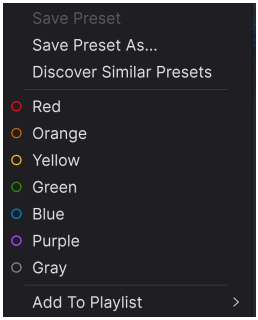
Here, you can change the Type and Bank via pull-down menus, enter a Designer name, and click the + sign to add or delete Styles. When you click this icon, the results area is occupied by an edit list in which you can select and deselect Styles, Genres, and Characteristics:



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

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

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

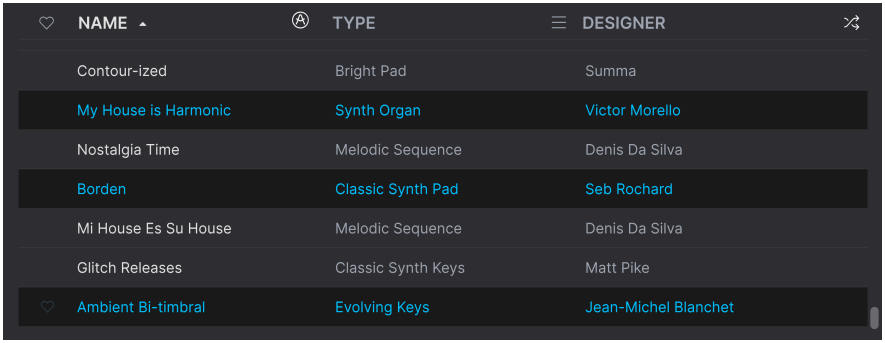


Options include *Save*, *Save As*, *Delete Preset*, and *Add to Playlist*, complete with an option to create a new Playlist [p.58]. (You cannot overwrite or delete factory Presets, so the Save and Delete options appear for user Presets only.) The *Discover Similar Presets* [p.47] can be triggered from this menu as well.

The dots with color icons allow you to add the Preset to a particular group of Favorites, which is described above.

4.5.1. Editing info for multiple presets

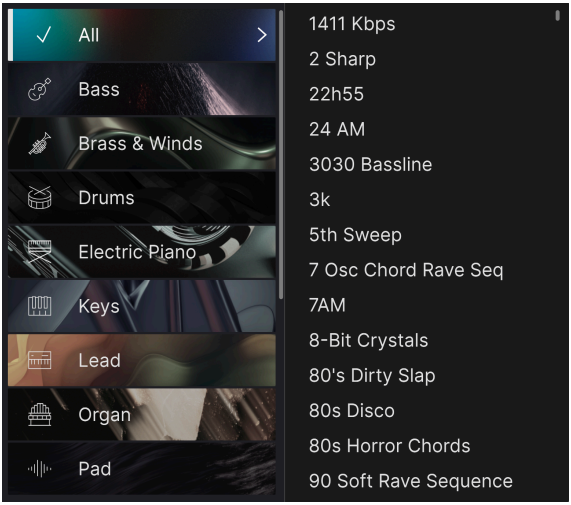
If you'd like to move several Presets to a different bank while preparing for a performance, or enter a single comment for several Presets at the same time, it's easy to do. Simply hold command (macOS) or ctrl (Windows) and click the names of the Presets you want to change in the Results list. Then enter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



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

4.6. Preset selection: other methods

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



Below this are options that correspond to the Type tags. Each of these brings up a submenu of all Presets of its Type.

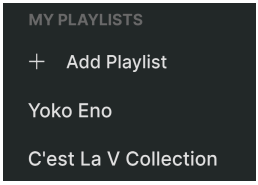
If you have an active search by Type and/or Style, the up/down arrows to the right of the Preset name will step through only the results that conform to your search.

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

4.7. Macro knobs

These are simply duplicates of the Macro knobs available across other views in Pigments.

4.8. Playlists

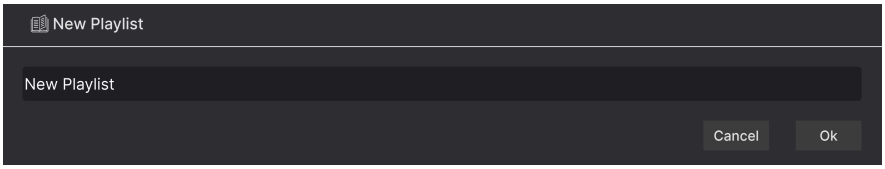


Playlists offer a powerful way to collect Presets into different groups for different purposes, such as a set list for a particular performance or a batch of Presets related to a particular studio project. Within a Playlist, Presets can be reordered and grouped into Songs, a handy addition to a set list.

The subheading *My Playlists* appears after the **My Favorites** section in the Sidebar. When you first start using Pigments, you'll have no Playlists yet – but it's very easy to create one!

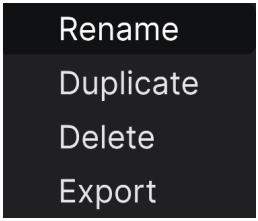
4.8.1. Create your first Playlist

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



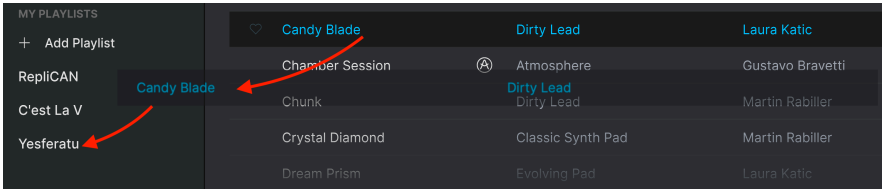
Once you've entered a name, that Playlist will now appear in the **My Playlists** section of the sidebar. You can create as many Playlists as you like.

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



4.8.2. Add a Preset

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

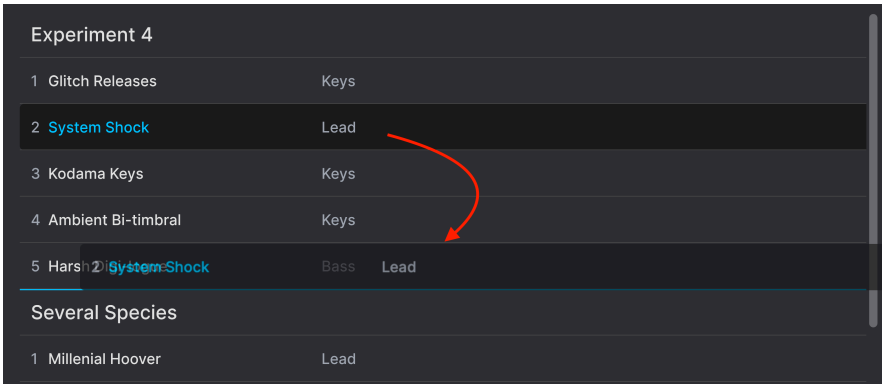


Dragging a preset to a Playlist

To view the contents of a Playlist, click on the Playlist name.

4.8.3. Re-order the Presets

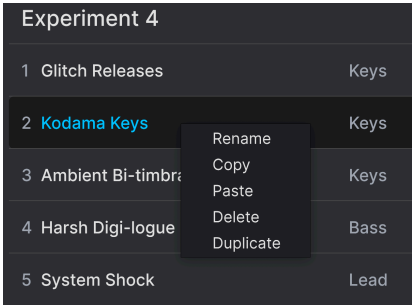
Presets may be reorganized within a Playlist. For example, to move a Preset from slot 3 to slot 4, drag and drop the Preset to the desired location.



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

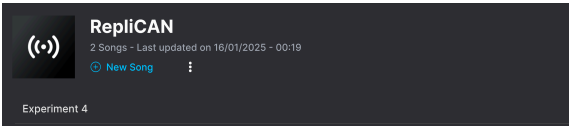
4.8.4. Remove a Preset

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



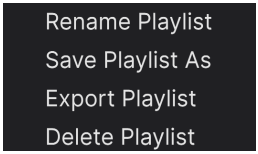
This menu also includes **Rename**, **Copy**, **Paste**, and **Duplicate** options. More management options are described below.

4.8.5. Song and Playlist Management



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

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



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

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

5. THE PLAY VIEW

The Play view is a simplified interface designed for exactly what its name says: *playing*. It provides a core group of essential controls for playing and editing Presets, without getting into deeper functions that might be distracting, especially for synth beginners.

Every control in the Play view has a counterpart in the Synth view (or the FX view in the case of FX levels), so if you move a control and then switch views, you will then see that change on the other.

5.1. Upper section

Let's divide the Play View into upper, middle, and lower sections. The upper section contains the following control areas:

The upper section of the Play View

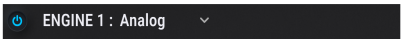
Number	Name	Description
1.	Engine 1	Essential controls for sound Engine 1
2.	Engine 2	Essential controls for sound Engine 2
3.	Utility Engine	Essential controls for the Utility Engine
4.	Filters	Essential controls for both Filters
5.	Effects	Essential controls for FX A, FX B, and the Aux FX bus

! If a control is greyed-out, this is because whatever section it resides in in the more complex Synth or FX views is turned off.

What can you do in the upper section? Let's take a look.

5.1.1. Turn Sections On and Off

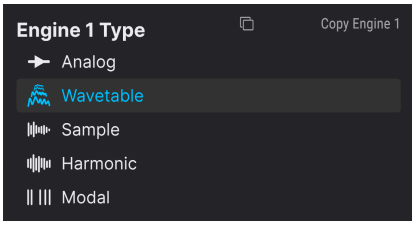
Notice that the upper left corner of any section, for example, Engine 1, has an on/off icon, like so:



On the FX tabs, the icon is directly above their names. Each of these lets you turn its section on or off wholesale, without losing any of the settings in the Play View or in the deeper Synth and FX views.

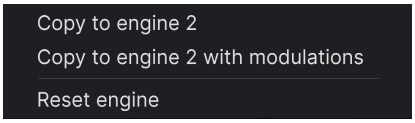
5.1.2. Select the engine type

For Engines 1 and 2, you get a choice of four synthesis types. Click on the Engine name to display the menu. It is identical for main Engines 1 and 2.



These engines are detailed in depth in their respective chapters but we will go over the basic functions here.

5.1.2.1. Engine copy



From the engine selection menu, engines 1 and 2 let you copy either engine to its counterpart's spot. The menu lets you copy just the engine settings, the settings plus all modulation assignments [p.213] currently affecting their parameters, or reset the engine's settings to its default values.

5.1.3. Analog engine controls

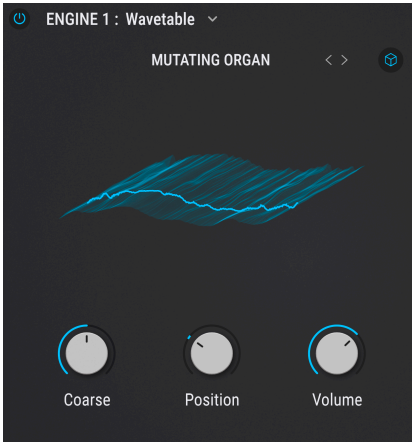
Pigments' Analog engine is a three-oscillator beast!

In its Play View interface, the controls work as follows:

- **< >:** These select the waveform choices for each oscillator
- **Coarse:** Sets the tuning in semitones of all three oscillators together; this preserves any tuning differences between the individual oscillators as set in the Synth view
- **FM Amount:** Applies FM to oscillators 1 and 2
- **Volume:** Sets overall output volume of all three oscillators to the Filters; this preserves any volume differences set between them in the Synth View

5.1.4. Wavetable engine controls

Developed by PPG in the early 1980s, wavetable synthesis used digitally-stored waveforms. Sound patches contained a series of waves, called a "table," that a sort of sonic pointer could scan through. The position of that pointer could then be modulated, resulting in harmonic motion not possible with the subtractive analog synthesizers of the day.

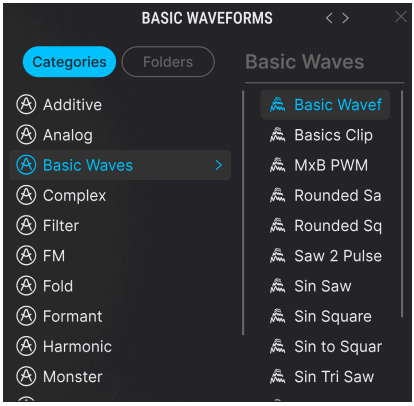


Further controls in the Wavetable engine's play view are:

- **2D/3D Toggle:** The circular icon at the upper right toggles the display between 2D view and 3D view of the waveforms.
- **Coarse:** Sets the tuning of the Wavetable Engine in semitones.
- **Position:** Determines the position of the "pointer" along the wavetable. (Remember, this can be a modulation destination!)
- **Volume:** Sets output volume of the Wavetable Engine to the Filters.

5.1.4.1. Wavetable browser

You can select the wavetable with the < > icons, or click its name above the display to bring up a wavetable browser:



5.1.5. Sample engine controls

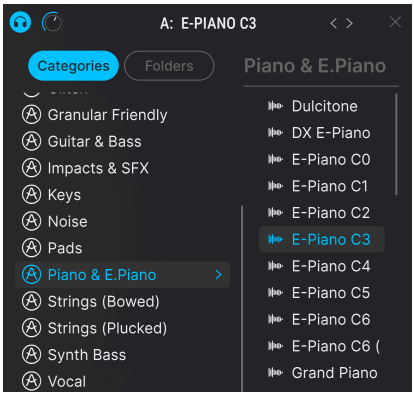
The Sample Engine in Pigments has six slots. You can populate each with a choice of too many samples to count, making for some truly thick, complex, and even bizarre sounds.

Use the < > icons to step through the samples, or click the name of the sample to bring up a sample browser. The letter at the beginning of the name corresponds to the slot into which you're loading the sample: A through F. In the Play view, you can only load samples into the slot that is selected in the more complex Synth view [p.101].

The Knob controls are:

- **Coarse:** Sets the tuning of the Sample Engine in semitones.
- **Start:** Determines the start position from which the sampled waveform is played back, as represented by a white line in the visualizer display
- **Volume:** Sets output of the Sample engine to the Filters.

5.1.5.1. Sample browser

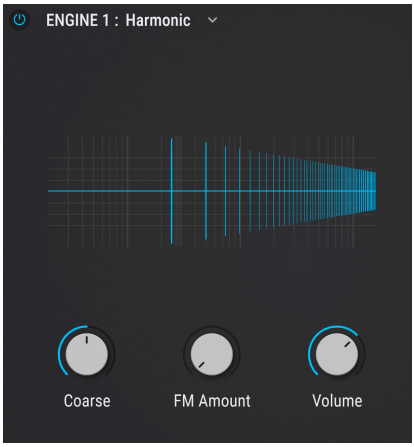


The sample browser contains a **Categories** tab for Factory samples and a **Folders** tab for imported folders.

The headphones icon and accompanying volume control at the upper left of the browser allow you to audition samples by single-clicking on a name. Double-click the name to load the sample.

5.1.6. Harmonic engine controls

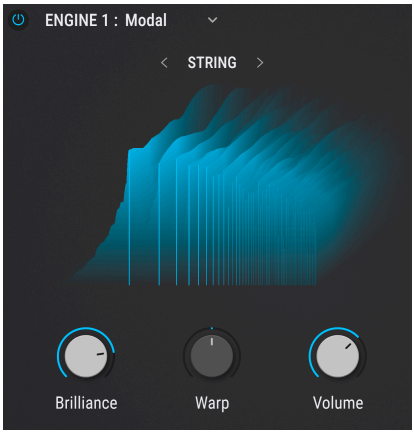
Much of traditional synthesis is *subtractive*. You start with a complex waveform full of harmonics and then filter out what you don't want. *Additive* synthesis is the opposite: You add up individual sine waves (a pure sine wave has no harmonics of its own) until you have a precise harmonic profile. The Play interface of Pigments' Harmonic Engine lets you easily visualize that process.



You must explore the deeper controls [p.117] (in the Synth view) to do more with the actual behavior of the harmonics, but here's what the simplified ones in Play View do:

- **Coarse:** Sets the tuning of the Harmonic Engine in semitones.
- **FM Amount:** Determines the amount of Frequency Modulation (or Phase Modulation, if that is what's set in the Synth view).
- **Volume:** Sets overall output of the Harmonic Engine to the Filters.

5.1.7. Modal engine controls

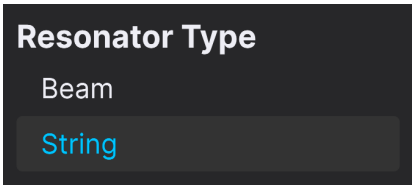


Pigments' Modal engine employs a type of physical modeling synthesis based on the properties of a resonating object (String or Beam) that is struck, plucked, or bowed. The end result is a harmonically interesting sound with attack and decay characteristics independent of the usual approach of an ADSR envelope. (However, the ENV AMP modulation source – a traditional VCA envelope – can add this.)

In the Play view, the simple controls adjust the sound of this resonating object.

- **Brilliance:** Increases the volume of progressively higher harmonics (partials)
- **Warp:** Expands or compresses the group of partials relative to the fundamental; bipolar knob
- **Volume:** Adjusts the overall output level of the Modal engine

5.1.7.1. Resonator type



Select between String and Beam object types with the left/right arrows or by clicking on the name bar to pop up the menu shown above.

5.1.8. Utility engine controls

The Utility engine combines two sample-based noise sources with a single virtual analog oscillator, which we call a sub-oscillator because it works really well in that application and you don't have to tie up of the main Engines. But it's a full-range audio oscillator; you're not restricted to sub-bass.

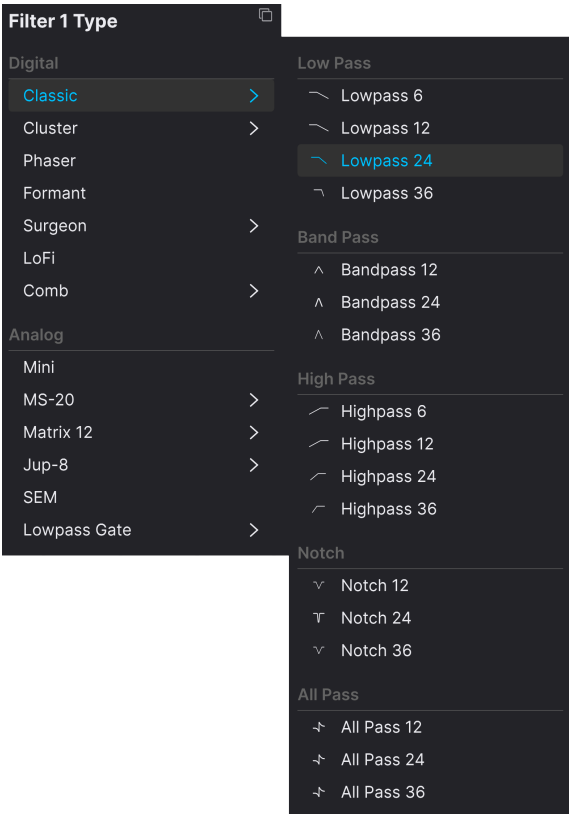
The controls in the Play view are simply volumes for each of the noise sources plus the oscillator. If you mouse over a knob, its on/off button will appear, as shown with **Noise 1** above. As of Pigments 5, you can replace the second noise source with audio input from an external source [p.141] such as a track in your DAW or live input on your recording interface. If this is set in the Synth view, the Noise 2 knob here is labeled **Audio In** instead.

As we'll see in the next chapter [p.139], the "noise" sources really cover a lot of ground such as transients, nature sounds, industrial sounds, and much more.

5.1.9. Filter controls

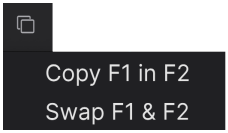
Pigments offers two identical Filters, described in depth in the Filters [p.148] chapter.

The types cover precise models of filters on classic synths as well as some creations of our own. You select the types with the < > icons or by clicking the name bar to display this hierarchical menu:



Which knob controls appear depends on the Filter type selected, but you will see Cutoff and Resonance quite commonly. Check out the Filter Types and Modes [p.152] for detailed descriptions of all the types and what they sound like.

5.1.9.1. Filter copy



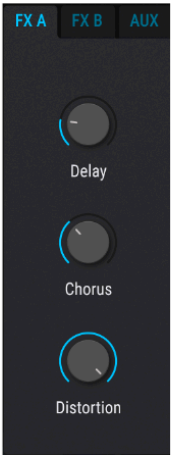
The **Copy/Swap** option (double-document icon) in the filter selection menu allows you to copy all the settings of the Filter you're working with into the other, or swap the two with a single operation.

> ♪ In case you are wondering, the filters can be routed in series or parallel, but those controls are not in the Play view. They're here [p.164].

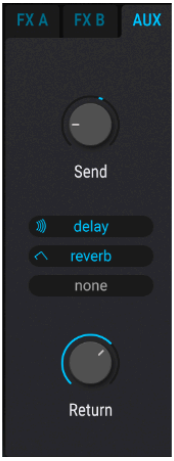
5.1.10. Effects controls

The Play View gives you very simple controls over effects, essentially letting you adjust the amount – as once you have your effects selection and settings dialed, this is what you would most want to adjust in performance.

Select a bus by clicking its tab. As mentioned earlier, you can also bypass an entire bus (without losing any settings) by using the on/off icons.



For insert FX busses A and B, each knob controls the dry/wet balance of the effects as arranged top to bottom in the corresponding tab [p.169].

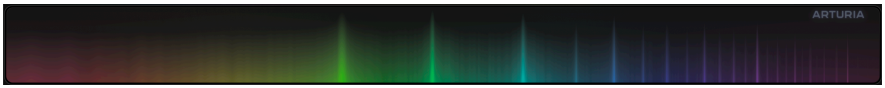


For the Aux FX, which are send-based, the knobs control send and return levels for the entire Aux bus. The icons in the center of the stack are bypasses for each individual effect. It also allows you to see the FX chain inserted into the Aux bus.

> ♪ You cannot choose or change the positions of effects in the Play View. That is done on the FX page [p.169].

5.2. Middle section

The middle section is a visualizer that performs real-time animation of the frequency response of any notes currently being played.

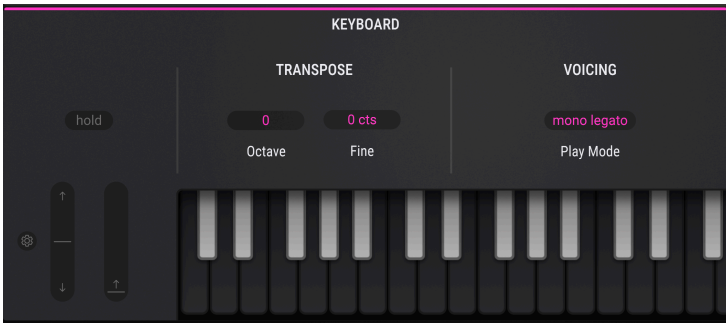


A rainbow goes from red at the lowest end of the frequency spectrum of visible light to violet at the highest. (Hence the terms “infrared” and “ultraviolet” for light our eyes can’t see.) We chose to stick with that progression of color for the audio spectrum, going from red for bass frequencies to violet for high treble. The vertical height of each band of color represents its amplitude.

5.3. Lower section

The lower third of the Play View contains the virtual keyboard, pitch-bend and modulation wheels, controls for the VCA amplitude envelope, and the Macro controls [p.33] present across multiple views.

5.3.1. Keyboard and controls



The leftmost section is home to pitch-bend and modulation wheels, plus the **Hold** button, which keeps notes held when selected. This is ideal when you are editing sounds or sequences but don't want to keep your fingers on a keyboard or your foot on a sustain pedal.

On the virtual keyboard, clicking near the front edge of the key results in a higher velocity value; clicking near the back of the key produces a softer one.

5.3.2. Amplitude Envelope

These knobs control Envelope 1, which is always wired to the VCA of Pigments. The VCA controls the output level just upstream of the Filters, and preserves any volume differences between individual Sound Engines, oscillators, sample engine slots, and the like.

Play a note, and a circular puck will glide along the envelope visualizer, representing the exact time position of the envelope. The volume will change according to it.

5.4. A note on modulation

Modulation assignments cannot be made in the Play View. Instead, you need to be in the Synth, FX, or Sequencer views. We cover modulation assignment fully in chapter 12, Modulation routings [p.213].

6. INTRODUCTION TO SOUND ENGINES

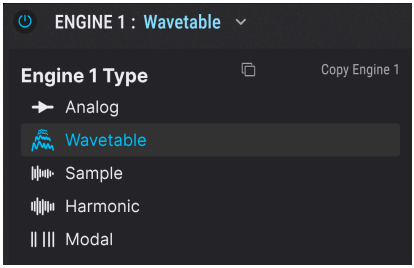
Clockwise from top left: core controls for Analog, Wavetable, Sample, Utility, Modal, and Harmonic engines

Hybrid cars have both gas and electric engines, and the better ones offer the best of both worlds: power and economy. Even exotic supercars such as the McLaren Artura (cool name, almost) have gone hybrid to much fanfare. Pigments is a hybrid supercar among synths, with five main engine types, of which you can use any two at the same time. In addition, a Utility engine is a third sound source with its own tab and available alongside the other two tabs.

This chapter will cover how to select the sound engines as well as features they all have in common. Chapters 7-12 are devoted to the details and parameters of each engine type.

6.1. Selecting an engine

You can select a sound engine from the Play or Synth views. Go to one of the two main engine tabs and click on the engine name or downward carat. The current engine type will be displayed in blue text.



Click on a selection to choose that engine for the current tab. The types are:

Engine Name	Description
Analog engine [p.79]	Virtual analog synthesis with basic waveforms plus FM
Wavetable engine [p.85]	Wavetable synthesis with extended audio-rate modulations

Engine Name	Description
Sample engine [p.101]	Six sample slots with multiple mapping options and granular features
Harmonic engine [p.117]	Additive synthesis with up to 512 partials
Modal engine [p.127]	Physical modeling with string and beam resonator types

♪ You can have any combination of engines, or two of the same kind, between the two main tabs. Changing engine types on a tab will not affect the tuning settings.

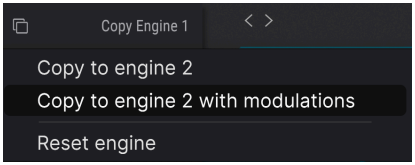
The Utility engine [p.139] has its own tab, which is always present in the Play and Synth views. It features two noise sources, one of which can be switched to an external audio input, plus an additional virtual analog oscillator.

6.1.1. Engine on/off buttons

Each engine has an on/off button in its tab. Turning it off mutes the engine while saving all of its settings. This is useful for soloing the other engine(s) while working.

6.1.2. Engine copy

This function is useful if you'd like to copy the work you've done from one engine to another and then make modifications, or if you'd simply like a temporary backup of something interesting while you keep working in the current engine. From the engine selection menu, click the double-document icon to see these options:



The menu lets you copy just the engine settings, the settings plus all modulation assignments [p.213] currently affecting their parameters, or reset the engine's settings to its default values.

6.2. Output section (all engines except Utility)

Every sound engine except for the Utility engine has an output section with two knobs at its upper right corner.

6.2.1. Filter Mix knob

This controls the balance by which the engines send audio to Pigments' two filters. All the way counterclockwise, it sends signal only to Filter 1; all the way clockwise, only to Filter 2. At 12 o'clock, the signal is going to both filters evenly.

The master Filter routing control [p.164] can have an impact here. If Filters 1 and 2 are routed in series at all, the output of Filter 1 will pass through Filter 2 to some degree.

6.2.2. Volume knob

This knob simply controls the overall output volume of the engine. When using the Sample, Wavetable, or Harmonic engine, this will include the Modulator (modulation oscillator) if its own volume knob is turned up.

♪ When performing cross modulation [p.144] between two engines, you can turn the volume of the source engine down to hear its effects on the destination engine only.

6.3. Engine Tune

Tuning controls for the Analog engine in Pigments

The controls in this section are available in the Synth view, and adjust the tuning for the selected main engine. The Coarse and Fine knobs affect the overall tuning of the *entire* engine (all three oscillators in the Analog engine, all wavetable positions in the Wavetable engine, and so on).

6.3.1. Coarse Tune

Turn this knob to tune the engine chromatically (i.e., in semitones). For the Analog, Wavetable, Harmonic, and Modal engines, the range is +/- 60 semitones (five octaves). For the Sample engine, the range is +/- 36 semitones (three octaves).

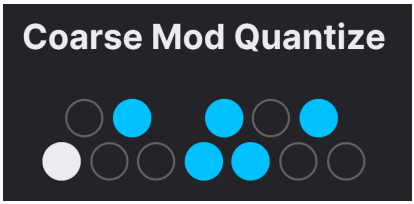
> Hold Shift while adjusting the Coarse tuning knob to snap the value to octaves.

6.3.2. Fine Tune

This control adjusts the tuning in smaller increments (0.008, or 8/1000ths of a semitone). The range is +/- 1 semitone. Hold the Control key or right-click while turning the Fine knob for even smaller tuning increments of 0.001.

6.3.3. Mod Quantize

As with most Pigments parameters, tuning can be modulated by any source. What's unique here is the ability to modulate the pitch according to the notes you want to hear. The Quantize Mod feature will filter out the pitches you don't want the modulation source to produce.



To view this feature, hover on the **Q** icon next to the Coarse control. To select specific notes, click the circles on "mini-keyboard."

A lit (blue) circle indicates an active note. Click the circles to make notes active or inactive. The first note on the mini-keyboard cannot be disabled because it's the root. Though the keyboard looks to be in the key of *C*, Quantize Mod transposes the intervals relative to whatever notes you play.

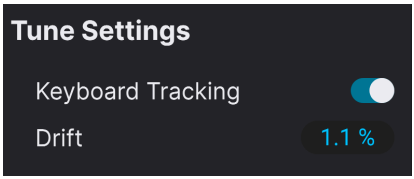
> ♪ The Mod Quantize feature only affects the modulation output when a source is routed to the Coarse tuning parameter of the selected engine. It does not stop incoming MIDI notes from being recognized.

6.3.4. Filter (Sample engine only)

Tuning controls for the Sample engine

The Filter knob in the Sample Engine's tuning section controls a dual low-pass / high-pass filter. At 12 o'clock , the filter lets all signals pass through without any effect. Turning the knob clockwise increasingly high-pass filters the loaded samples whereas turning the knob counter-clockwise increasingly low-pass filters the samples. Use this to brighten or darken the sound of your samples.

6.3.5. Tune settings



All engine types offer keyboard tracking in the tune settings; the Analog engine also has Drift

Click the three-slider icon next to the word TUNE to open the small Tune Settings menu.

6.3.5.1. Keyboard Tracking

When Keyboard Tracking is engaged, the engine follows the note played on keyboard. If Keyboard Tracking is disengaged, the engine will play *C3* regardless of the note pressed. Only the Coarse and Fine parameters have an effect on the pitch if Keyboard Tracking is disengaged.

6.3.5.2. Drift (Analog engine only)

The Drift parameter adjusts the amount of variation that happens in the tuning and phase of each oscillator every time a new note is played. The effect can be very subtle, or it can imitate the sound of old, unstable analog oscillators. At zero, the tuning and phase of all three oscillators are matched. Drag up or down on the number field to change the value.

7. THE ANALOG ENGINE

The Pigments Analog engine

The Analog engine in Pigments is a three-oscillator virtual analog synthesizer focused on traditional waveforms and subtractive synthesis. Many Arturia virtual instruments emulate a specific classic synth; here, the idea is to provide a "best of all analog worlds" synth with pristine sound quality.

> Before we begin, note that all "engine" chapters (7-12) explain controls and use screenshots from the engines as they appear in the Synth view, not the simpler Play view [p.61].

7.1. Oscillators

The three oscillators are mostly the same, but there are also some important distinctions. Here are charts of the parameters for each oscillator.

7.1.1. Oscillator 1

Control	Description
Coarse Tune	Adjusts the tuning of the oscillator in semitones
Sync	Hard-syncs the wave cycle of Oscillator 2 to Oscillator 1 for sharp and precise timbres
Waveform	Use the buttons to select Sine, Triangle, Saw, Ramp, or Square
Width	Alters the pulse width of the triangle or square waveforms
Volume	Adjusts the output volume of Osc 1 relative to the other oscillators
FM	Applies frequency modulation (FM) from the modulation section to Oscillator 1

7.1.2. Oscillator 2

Control	Description
Coarse Tune	Adjusts the tuning of the oscillator in semitones
Fine Tune	Fine-tunes of the oscillator in Hz or fractions of a semitone
Keyboard icon	Determines if the oscillator pitch tracks the MIDI note number or remains fixed (unless modulated)
Waveform	Use the buttons to select Sine, Triangle, Saw, Ramp, or Square. The window acts as an oscilloscope=
Width	Alters the pulse width of certain waveforms (triangle and square only)
Volume	Adjust the output volume of Osc 1 relative to the other oscillators
FM	Applies frequency modulation (FM) from the modulation section to Oscillator 2

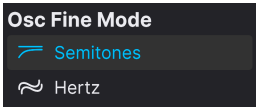
7.1.3. Oscillator 3

Control	Description
Coarse Tune	Adjusts the tuning of the oscillator in semitones
Fine Tune	Fine-tunes of the oscillator in Hz or fractions of a semitone
Keyboard icon	Determines if the oscillator pitch tracks the MIDI note number or remains fixed (unless modulated).
Waveform	Use the buttons to select Sine, Triangle, Saw, Ramp, or Square. The window acts as an oscilloscope.
Width	Alters the pulse width of certain waveforms (triangle and square only).
Volume	Adjusts the output volume of the oscillator relative to the other oscillators

Hold Shift while adjusting the Coarse tuning knob in any Oscillator to snap the value to octaves.

7.1.3.1. Fine tuning modes

The Fine Tune knobs in oscillators 2 and 3 have drop-down menus that show two options.



- **Semitones**: Variance from the coarse tuning setting is set in decimal fractions of a semitone
- **Hertz**: Variance from the coarse tuning setting is set in Hz (cycles per second)

7.2. Analog Unison section

At the lower left of the Analog engine section is a versatile unison generator. In general, unison on synthesizers triggers multiple voices when you play a single note. Here, there are three modes for doing this: Unison, Chord, and Super. Note the on/off button that bypasses this section while retaining its settings.

7.2.1. Unison mode

This is the sort of unison detune found in many polyphonic analog synthesizers of the past. All of the unison voices are centered around a single note and tuned above and below that pitch as the detuning amount is increased.

- **Voices**

Selects the number of voices (up to 8) that will be triggered by a single MIDI note.

- **Detune**

Controls the pitch distance between the voices in cents, with a maximum range of one octave (+/- 6 semitones from the center). Additional voices will fill in the space between the two extremes.

If the Unison Voices parameter is set to an even number (2, 4, 6, or 8), all voices will be tuned above or below the center pitch. If the Unison Voices parameter is set to an odd number (3, 5, or 7), one of the voices will remain at the center pitch and all others will be tuned above and below the center. It is also possible to set non-integer values; this will interpolate between these two behaviors.

- **Stereo**

As the value increases the stereo spread of the unison voices will increase. Additional voices will fill in the space between the two extremes.

7.2.2. Chord mode

In the Unison Chord mode, the pitch of the unison voice will be quantized in semitones to match one of 12 classic chord shapes. The greater the number of unison voices used, the richer the chord will be.

- **Voices**

Selects the number of voices that will be triggered by a single MIDI note. Up to 8 voices may be used.

- **Chord**

Use the knob to select one of the 12 chord shapes.

As the Unison value increases, more voices will be added above the root pitch. However, some of the more complex chords will require more voices in order to be fully represented. For example, the *5* and *Oct* chords only require two voices for every note to be present (though you can use more). On the other hand, the *6/9* chord requires four voices for the entire chord to be heard.

- **Stereo**

As the value increases the stereo spread of the unison voices will increase. Additional voices will fill in the space between the two extremes.

7.2.3. Super mode

This unison detune voice mode lets you beef up your oscillator in the style of the famous "JP" supersaw.

- **Mix**

Sets the mix of Unison voices.

- **Detune**

Controls the pitch distance between the voices in cents, with a maximum range of one octave (+/- 6 semitones from the center). Additional voices will fill in the space between the two extremes.

- **Stereo**

As the value increases the stereo spread of the unison voices will increase. Additional voices will fill in the space between the two extremes.

7.3. Noise section

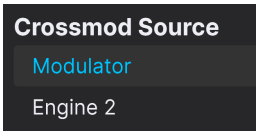
A noise source can be useful in many ways when building a sound. Depending on the modulation settings, it can help add breathiness to a pad, provide a gritty character to a bass, or put a "chiff" on the attack of a sound.

The noise source in Pigments is very flexible, and can produce many different "colors" of noise ranging from Red (low-pass filter applied) to White (no filter) to Blue (high-pass filter applied). Use the **Color** control the dial in the precise tonality of the noise source, and the **Volume** knob below it to adjust the level.

7.4. Modulator

This modulation component affects only Oscillators 1 and 2. The knob on the right crossfades between Osc 3 and Noise as the modulation source. These can in turn apply FM to oscillators 1 and 2 of the Analog engine.

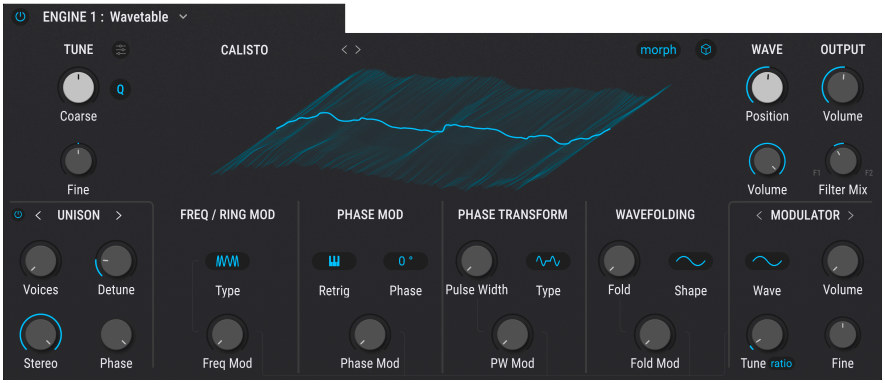
7.4.1. Modulator source



The Modulator has a further choice, which you access with the arrows or by clicking on the name to bring up the above menu. You can either modulate the current engine using the above Osc3/Noise knob, or the other primary engine (but not the Utility engine).

The controls that appear in place of the Modulator are different depending on the type of engine used as the modulation source, so we cover this in its own mini-chapter on Engine cross modulation [p.144].

8. THE WAVETABLE ENGINE



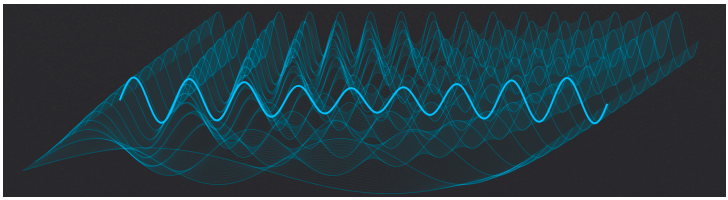
The Pigments Wavetable engine

Wavetable synthesis was pioneered by Wolfgang Palm's PPG Wave synthesizers in the 1980s. A *wavetable* is a group of single-cycle digital waveforms, each a little bit different from the one before it. By moving a "pointer" between positions on the wavetable – or modulating it – a musician could achieve harmonic complexity and motion not possible with subtractive synthesis. The Wavetable engine in Pigments offers:

- Up to 256 waveforms/positions in each wavetable
- Each position holds a waveform containing 2,048 samples
- Any modulation source can be used to select waveforms from the wavetable (i.e. modulate the Position parameter), including synced LFOs
- Transition between waveforms/positions can be instantaneous or gradual (morphed)

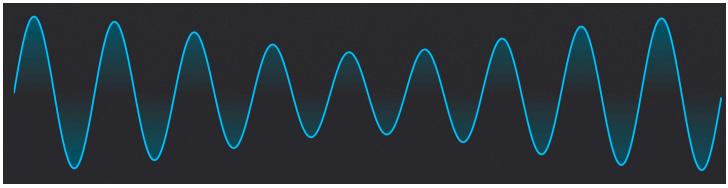
8.1. Wavetable Visualizer

The Wavetable engine type has a Visualizer that shows the wavetables in two or three dimensions. The wavetable positions can transition smoothly or incrementally as the Position control is turned; just toggle the Morph button.



The Wavetable visualizer in 3D view

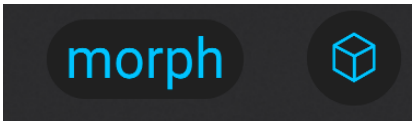
You can also click-drag inside the Wavetable viewer window to change the wavetable position. The Position control will turn as you do this. But depending on the wavetable, it may be harder to see what is happening when Morph is Off and the Wavetable viewer is set to 3D.



The Wavetable visualizer in 2D view

The 3D view has the advantage of showing you all the different waveforms in the current table. Whereas the 2D view shows one wave at a time, it will show the effects of all the different wave-sculpting options the Wavetable engine offers.

8.2. Morph and View buttons



The Wavetable Morph button

Transitions between wavetable positions will occur smoothly when the Morph feature is enabled. When it is disabled the transitions will be immediate. This is how the wavetable will behave whether you are adjusting the Position knob with the cursor or modulating [p.213] it.

To enable or disable Morph, toggle the Morph button. When the button is outlined in blue, it is active.

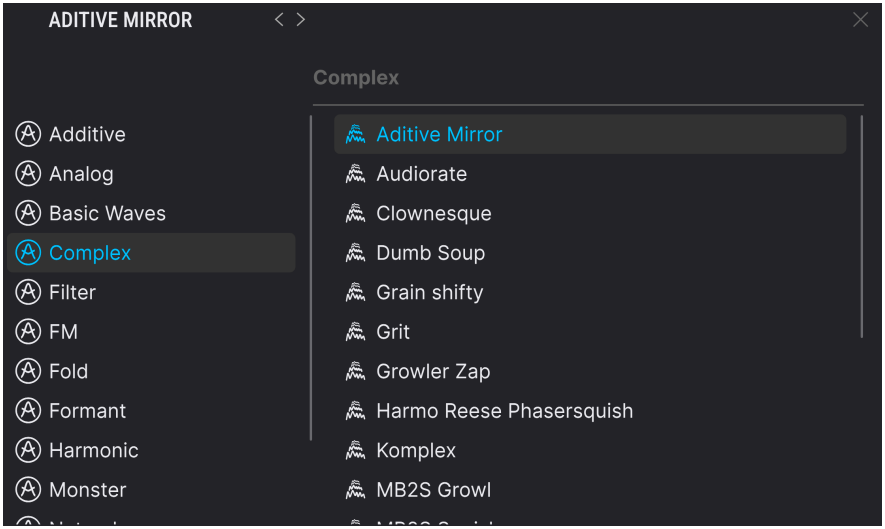
To the right of the Morph button is a small icon that toggles that main wavetable viewer between 2D and 3D views.

8.3. Wavetable browser

Use the previous/next arrows on the right side of the wavetable name to step through wavetables. This will cross into an adjacent wavetable bank when the first or last wavetable of the current bank has been reached.

For a deeper dive, click the wavetable name and make a selection from one of the wavetable banks using the Wavetable browser. The current selection will be highlighted.

Use the Wavetable browser to import one or more wavetables [p.98]



Pigments 6 offers 53 new wavetables, plus our best wavetables from previous versions

8.3.1. Selecting wavetables

The left column shows the wavetable folders. Factory folders are displayed with Arturia's logo in their tabs. These cannot be deleted.

Scroll up and down to view the wavetables inside the current bank. There are two ways to select a wavetable:

- A single click selects a wavetable without closing the browser window, which allows you to audition wavetables one after the other.
- If you find the one you want to keep, double-click its name and the browser window will close.

You can also select a different bank on the left side and then audition or choose a wavetable from that bank the same way.

To close the browser window, click the X at the upper right corner.

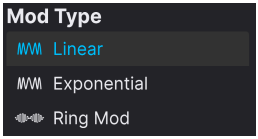
8.4. Frequency and Ring Modulation

The FM provided by the Wavetable engine is similar to what is found in modular analog synthesizers. Linear and exponential modulation are available, as is ring modulation. Your ears will be the best judge of which type produces the desired results.

The source for the FM is the Wavetable Modulator in the lower right corner of the Wavetable engine window. Follow the link for a full explanation of the Wavetable Modulator [p.96].

8.4.1. Modulation Type

To choose a modulation type, click the icon in the center of the pane to open a pop-up menu.



- *Linear*: The Linear FM type stays more in tune at shallow modulation depths.
- *Exponential*: The Exponential FM type goes out of tune as soon as the modulation depth is increased.
- *Ring Mod:* Applies ring modulation to the signal, which has the ability to remove the source signal and leave only the byproducts (sidebands) of modulation.

The **Freq Mod/Ring Mod** knob controls the amount of FM or ring modulation applied to the engine.

> ♪ Linear is easier to tame, Exponential is more wild, and Ring Mod is the most clangorous of all. The BBC famously used a ring modulator to create the voice of the menacing Daleks for the TV series *Doctor Who*.

8.5. Phase Modulation

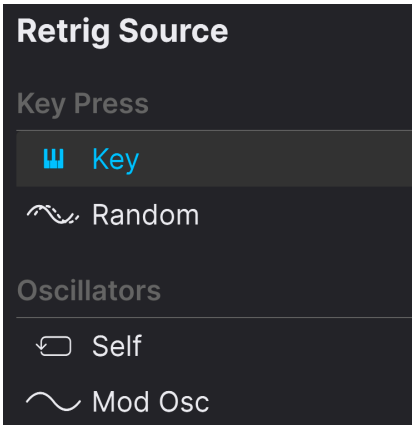
Phase modulation (PM) is like a form of FM synthesis, only with some important distinctions:

- Only one algorithm is used (the classic two-operator stack)
- The carrier wave can be almost any shape
- The modulator has multiple waveform options [p.97]

8.5.1. What PM does

The phase of the source wave is modulated to follow the amplitude of the target wave. The peak amplitude and frequency of the source wave are maintained, but as the amplitude of the target wave change, the phase and harmonic content of the source wave change as well.

8.5.2. Phase Retrigger source



This parameter lets you choose which source will reset the wavetable phase. To select one of the options, click the name field to open a menu or click one of the arrows on either side of the name.

Option	Description
Key	Each incoming MIDI note resets the wavetable phase
Random	The wavetable is reset to a random phase on each incoming MIDI note
Self	The wavetable phase resets at a rate defined by the main Coarse and Fine Tune parameters
Mod Osc	The wavetable phase resets each time the phase of the Wavetable Modulator resets to 0

8.5.3. Phase mod settings

The **Phase Mod** knob controls the amount of phase modulation from the additional mod oscillator, or the other engine (cross-mod).

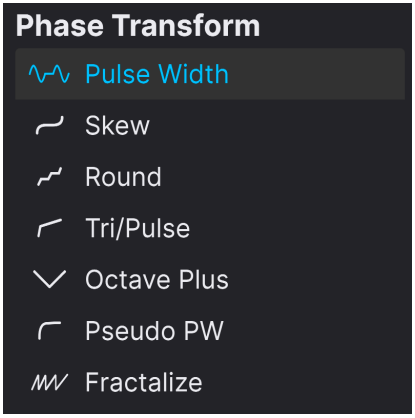
The Phase Mod section also has a numerical field that determines the initial phase of the Wavetable engine. Adjust by dragging up or down. This is not available when *Random* is selected as the Retrigger source.

8.6. Phase Transform

Phase transformation (more commonly called phase distortion) changes the shape of a waveform according to one of seven modulator waves, which are known as Types in Pigments. Think of a mirror in a carnival funhouse: when you look in it, you see your image reflected according to the shape of the mirror. It's still *you*, but it has transformed.

8.6.1. Transformation options

Click the waveform field icon to select a type of transformation.



The remap curves for each Target wave are based on the way they affected a sine wave, so the results will vary when the input (original) waveform is more complex. This chart summarizes what they *tend* to do:

Source Name	Description
Pulse Width	Adds subtle to sharp harmonic edge on most waves
Skew	Works with most waveforms: peaks are spread to the left and right, leaving a valley
Round	The source is influenced by a semi-square; it could gain valleys and/or plateaus
Tri/Pulse	Takes the middle of the waveform and stretches it to the left

Source Name	Description
Octave Plus	Part of source wave is miniaturized on the right; some harmonics are emphasized
Pseudo PW	Stretches the whole waveform to the left and leaves a gap on the right
Fractalize	Creates up to 8 copies of the whole waveform, from smaller to larger

♪ To see the waveform transformation clearly, use the 2D view of the wavetable visualizer.

8.6.2. Pulse Width knob

The knob to the left of the selection displays the name of the transformation type and controls the amount of transformation being applied. For a good illustration of what is happening, try the following examples:

1. Select the Default preset, which has the Wavetable engine and the Basic Waveforms wavetable active.
2. Disable the Morph feature in the Wavetable parameter set.
3. Select the Skew waveform as your Source.
4. Start with the Position control set to the first Wavetable position (the Sine wave).
5. Hold a note and slowly increase the PD Amount. Harmonics will be added gradually to the Sine wave as its amplitude peaks are skewed to the left and right.
6. Now, repeat the process by first returning the amount to 0 and selecting different waveforms on the wavetable using the Position control. Then, turn the amount up again and hear the effect of the same transformation applied to different waveforms.

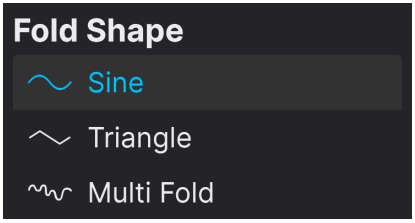
8.6.3. Phase Mod knob

The knob at the bottom of the Phase Transformation section allows you to modulate the Phase Transform parameter with the Wavetable engine's Modulator [p.96].

8.7. Wavefolding

If you have played one of Arturia's Brute synthesizers then you may already be familiar with wavefolding. Rather than folding the original wave back on top of itself, Pigments uses a selectable waveform and "folds" it downward onto the peaks of the current wavetable to create increasingly complex, unique waveforms.

8.7.1. Fold Shape



As in other sections, click the blue oval icon and a drop-down menu will appear, offering three options for the "folder" wave.

8.7.2. Fold Amount knob

The knob to the left of the shape oval controls the amount of wavefolding applied. Try the following:

- Select the Default preset, which has the Wavetable engine and the Basic Waveforms wavetable active.
- Disable the Morph feature in the Wavetable parameter set.
- Select the third Wavetable position using the Position control (the Sawtooth wave).
- Hold a note and slowly increase the Wavefolding Amount. The harmonics of the Sawtooth wave will sweep through the harmonic series.
- Try the experiment again with a different Wavefolding Shape. A similar sweep happens, but the sound is very different.
- Now select a more complex wavetable and repeat the experiment. The results will vary with different wavetables and Wavefolding Shapes.

8.7.3. Fold Mod knob

This control modulates the wavefolder parameter with the additional modulation oscillator [p.96].

8.8. Wavetable/Output section

This section determines the starting point and volume of the selected wavetable.

8.8.1. Wavetable Position

Use this control to select the starting position within the wavetable. It may be helpful to switch between the 2D and 3D [p.86] views of the waveforms to gain an overview of the options. When the 3D view is selected the blue lines represent the original wavetable positions. The green line shows the current position, including the intermediate ("morphed") positions.

8.8.2. Wavetable Volume

The lower volume knob determines the output level of the wavetable itself, upstream of processing covered in this section.

8.8.3. Output

The upper volume knob sets the output level of the entire Wavetable engine into the filters, accounting for all wavefolding, transformation, and others, and the additional mod oscillator (which can be routed in the audio path).

8.8.4. Filter Mix

This controls the balance of the engine output sent to Filter 1 versus Filter 2.

8.9. Wavetable engine tune

The controls in this section adjust the overall tuning for the Wavetable engine voices. See the Common Features section in Chapter 6 for details about the tuning controls [p.76].

8.10. Wavetable Unison mode

Unison mode allows you to trigger as many as eight Wavetable voices with a single MIDI note. The available modes are identical to those in the Analog Engine's unison mode [p.81], except for the addition of the **Phase** knob here.

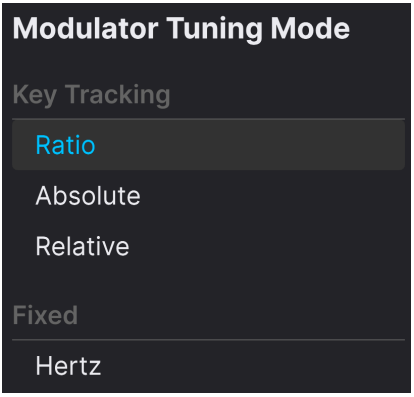
When Phase is set to 1.00, there is no difference in the sound (all voices have random phases). Set to 0.00, all voices begin with the exact same phase. The latter sounds more punchy, but also more digital and less natural.

Like the Analog engine, the Wavetable Unison section has alternate Chord [p.82] and Super [p.82] modes. They work like those in the Analog engine.

8.11. Modulation Oscillator

Playing a similar role to the Modulator [p.83] in the Analog engine, this section provides a source for the additional modulations added by the bottom knobs in each of the previous sections – notice the lines on the user interface connecting them all. Its direct output is also available, so it can be used as a second oscillator or a noise source.

8.11.1. Modulator tuning



Use the Modulator coarse tuning control to set the chromatic pitch center of the modulation. Click the blue icon next to the Tuning knob to select one of four tuning modes:

Tuning method	Description
Ratio	Sets the tune mode to key tracking in harmonic ratios
Absolute	Sets the tune mode to chromatic key tracking
Relative	Sets a chromatic offset to the tuning of the Wavetable oscillator (range: +/- 3 octaves)
Fixed (Hz)	Sets the tune mode to fixed frequency in Hertz

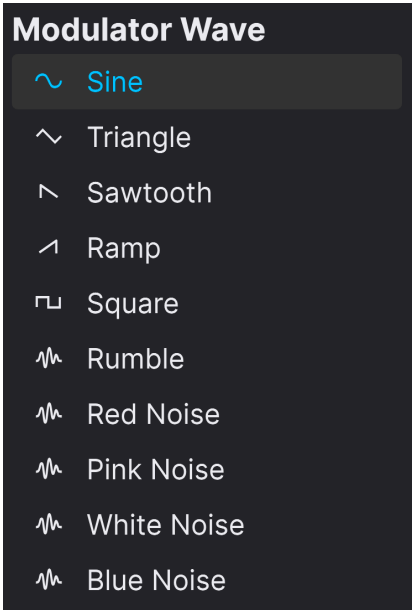
8.11.2. Modulator Fine Tune knob

To nudge the pitch of the Modulator up or down a bit, use the Fine tuning knob. Its range is +/- 1 semitone.

8.11.3. Modulator Volume knob

Increasing this parameter allows the direct output of the Modulator to be blended with that of the Wavetable oscillator.

8.11.4. Modulator Wave



Ten waveforms are available as sources for the Modulator: 5 simple waveforms and 5 noise sources with different colors (filtering).

Waveform	Description
Sine	Classic, pure sinusoidal modulation source
Triangle	Similar to Sine, except it rises/falls in a linear fashion and spends less time at the extremes
Sawtooth	Starts positive and falls
Ramp	Inverse sawtooth: starts negative and rises
Square	Spends half its time at maximum positive and half at maximum negative
Blue Noise	High-pass filter applied to random noise
White Noise	Unfiltered noise containing all frequencies
Pink Noise	Low-pass filter applied to random noise
Red Noise	Low-pass filter applied more heavily to random noise
Rumble	Only the lowest noise frequencies are allowed to pass

8.11.5. Other engine as alternate modulation source

Click the "Modulator" banner at the top of this section (or use the arrows) to select the other main engine as a source of cross-modulation for the Wavetable engine you're currently working with, like so:

This provides even deeper modulation possibilities because the behavior of the entire source engine is relevant. We cover this in detail in the mini-chapter on Engine Cross Modulation [p.144] (chapter 13).

8.12. Supplement: Loading your own wavetables

Pigments also allows you to load your own wavetables, which leads to limitless possibilities for wave source material. The wavetables must meet certain criteria, which we will explain in this section.

To load wavetables, select **Folders**, then click the **Add Folder** button at the top right of the Wavetable Browser. After your wavetable folder has been imported it will show up at the bottom of the bank list.

In order to import an individual wavetable or sample (.wav) you first need to select a non-factory wavetable bank. Otherwise the Load Wavetable button will not be available. This button will appear to the right of the Add Folder button.

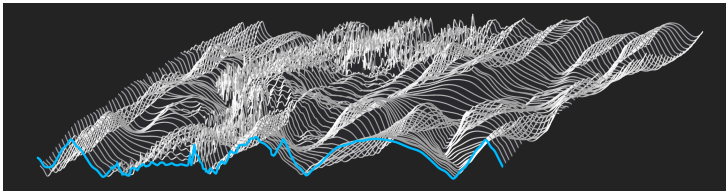
You can also drag and drop individual wavetable files into the engine, but these will not appear in the browser. To ensure your wavetables are organized and accessible in the browser, always use the **Add Folder** procedure.

8.12.1. Wavetable Requirements

When you start experimenting with your own wavetables, here are some guidelines that will help achieve the best results:

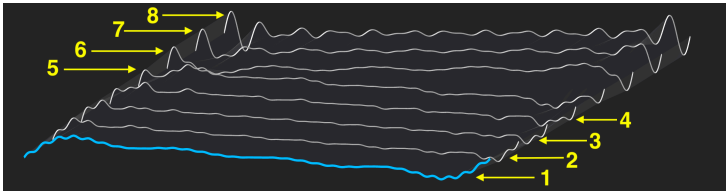
- 2,048 samples per single-cycle waveform (i.e. position)
- Maximum of 256 positions

You can also load in a regular .wav file and Pigments will parse it into a wavetable for you. The first 2,048 samples will be placed in position 1, the second 2,048 samples will be placed in position 2, and so on, until the maximum of 256 positions has been filled. Only the first 524,288 samples will be used (256 x 2,048 = 524,288).



A WAV file parsed into 256 positions as a wavetable.

If you load a file shorter than 524,288 samples, Pigments will only divide it into as many positions as is necessary to "use up" those samples. For example, a file containing only 16,384 samples would be divided into eight positions (8 X 2,048 = 16,384). This leaves you with fewer positions to move between using modulation sources, but that's not necessarily a bad thing. You could use a modulation source, for example, to switch rapidly between the positions for a dramatic pulsating effect.



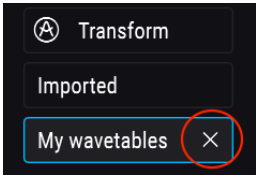
Using only 8 positions of a wavetable.

Remember, the wavetables can morph between the positions, move through them sequentially, or jump around depending on the setting of the Morph button and the modulation sources that you choose.

> ♪ A 256-frame wavetable has exactly 524,288 samples. Some audio editors such as Audacity can display the exact number of samples in the file. A tool like that is also handy for carving out sections of larger samples and placing them end-to-end to create your own wavetable. For best results, stick with a total number of samples that's an integer multiple of 2,048.

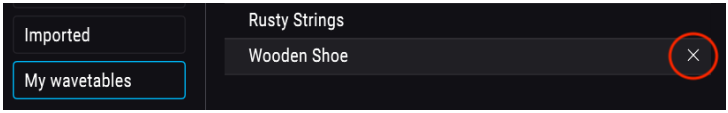
8.12.2. Delete a wavetable bank

To delete a wavetable bank, click the 'X' that appears when the cursor hovers over its name. A window will appear and ask you to confirm this process so you don't delete a bank accidentally.



8.12.3. Delete a wavetable

To delete a single wavetable, click the 'X' that appears when the cursor hovers over its name inside the wavetable bank. A window will appear and ask you to confirm this process so you don't delete a wavetable accidentally.



! Deleting wavetables or banks is difficult to undo and could cause one or more presets to load improperly or not at all. You may delete user wavetables only; no X will appear for factory wavetables.

8.12.4. Restoring a deleted item

If the wavetable or wavetable folder that you deleted still reside elsewhere on your computer, then the deletion process can be reversed. This is because the import process makes a copy of these items and places them inside certain Pigments-specific folders on your computer.

For example, if you load a preset and it gives you a message like this:

... then click the Locate button and navigate to the wavetable or folder you need to restore. After loading in the missing item, be sure to save the preset again. It should load properly after that.

You can also tell Pigments to skip that sample by clicking the Ignore button. The preset will load and then you can locate a substitute sample, if you like. Be sure to save the preset that way, though, or Pigments will show the Missing Sample error message again the next time the preset is selected.

9. THE SAMPLE ENGINE

The Pigments Sample engine

The sample Engine in Pigments has everything you need to manipulate samples in fun and musically interesting ways. Beyond traditional sample playback, Pigments' Sample engine also includes granular synthesis features that allow you to create complex textures using straightforward controls. Let's dive in!

9.1. Six samples per engine

Each Sample engine has six slots (A-F) available for samples. These are visible in the preview windows under the waveform display. To add a sample to an empty slot or load a new sample into an occupied slot, click its preview window at the bottom of the Sample Viewer [p.103]. Then select a sample using the methods described in the next two sections.

9.2. Sample selection

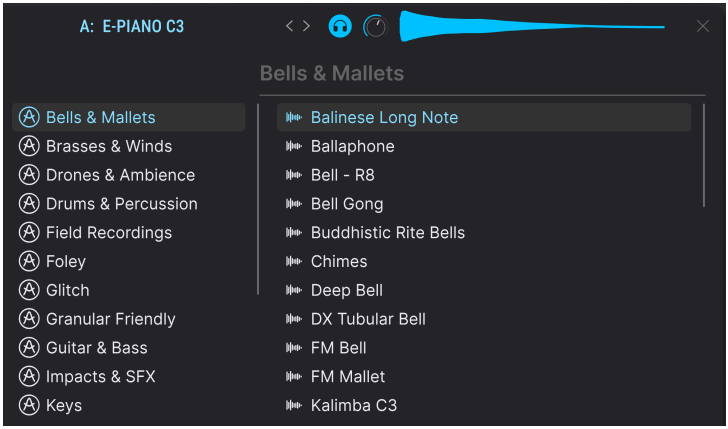
There are three ways to load samples:

1. Use the arrows on the right side of the Sample name for adjacent choices. This will cross into an adjacent sample bank when the first or last sample of the current bank has been reached.
2. Click the sample name and make a selection from one of the Factory samples banks using the sample browser. The current selection will be highlighted.
3. Use the sample browser to import from a different source.

All three methods are available regardless of whether the Main, Edit, or Map mode button is selected.

9.3. Sample browser

Click on the sample name in the viewer to open the sample browser.



9.3.1. Sample audition

You can pre-audition (cue) a sample right inside the browser before deciding to load it into the engine.

- Click the headphone icon at the top of the right column to enable auditioning.
- The knob to the headphone icon's right controls the cue volume.
- Select any sample from the list to hear a preview.
- The preview will play until you select a different sample or click the headphone icon again to disable auditioning.

9.3.2. Selecting samples

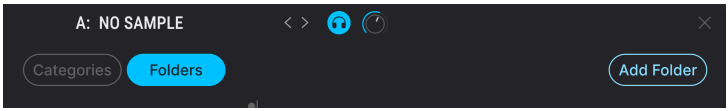
The left column shows the Sample banks. Factory banks are displayed with Arturia's logo in their tabs. These cannot be removed or deleted.

Scroll up and down to view the samples inside the current bank. There are a number of ways to select and audition samples.

- A single click selects a sample without closing the browser window, which allows you to audition samples one after the other.
- Scrolling with your computer's up/down arrows will audition the next or previous sample in the list.
- Scrolling with the arrows in the browser window will step through the list, with audition playback.
- If you find the one you want to keep, double-click its name and the sample will load into the engine. The browser window will close.

You can also select a different bank on the left side and then choose a sample from that bank the same way.

9.3.3. Importing samples



You can also import folders of custom samples (.wav or .aiff files) into Pigments by clicking the waveform icon at the lower right. Once imported, they will show up in a folder called *Imported* in the browser's left column.

Imported files may be in WAV or AIFF format, 16 or 24 bits, and at sample rates from 44.1kHz to 192kHz. The maximum sample duration is limited only by the amount of RAM in your computer.

To close the browser window, click the X or use your Escape key.

9.4. Sample Viewer

The Sample Viewer displays the waveform of the currently loaded sample. Use the **Main**, **Edit**, and **Map** mode buttons to access the settings for the active sample.

Here's a quick description of each mode:

- **Main:** The default setting for the Sample Viewer. When it is selected the Granular controls are visible under the Sample Viewer. Only the area of the waveform between the Trim Start / Stop markers is shown.
- **Edit:** Tuning, playback direction, loop functions, mix settings, and utilities specific to the Sample engine are available under the Sample Viewer when Edit Mode [p.104] is selected. This is where the Trim Start / Stop markers are set.
- **Map:** Keyboard / velocity range, sample selection methods, and playback behavior can be selected in Map mode [p.107]. The features shown under the Sample Viewer are different depending on the selected Sample Map mode. Only the area of the waveform between the Trim Start / Stop markers is shown.

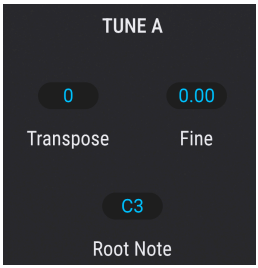
9.5. Editing your samples

To edit your loaded sample, click the Edit button at the top right of the screen to switch the Sample Viewer to Edit mode:

Here you can make changes that affect the samples independently, such as Tuning, Playback and Mix. You can also define which part of a sample plays back by moving the trim and loop markers [p.106]. Trim (start/stop) markers are vertical lines with triangular handles at the top; loop markers have the handles at the bottom.

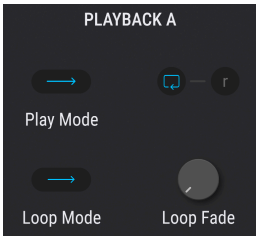
Select the sample you want to edit by clicking its preview window (A-F), and then adjust the following parameters as needed:

9.5.1. Tune section



- **Transpose:** Transposes the selected sample by +/- 36 semitones.
- **Fine:** Fine-tunes the selected sample by +/- 1 semitone in 1-cent increments.
- **Root Note:** Sets the root note of the selected sample.

9.5.2. Playback section



- **Play Mode:** Selects the playback mode for the samples: Normal (forward) or Reverse (backward).
- **Loop:** Toggles looping on and off. When active, Loop Start / End markers appear at the bottom of the Sample Viewer to help you set your points. These are different from the Trim Start / Stop markers shown above; see the next section for descriptions.
- **Release**: When the **r** button is engaged, the sample keeps looping during the envelope release phase. When inactive, the sample exits its loop as the release phase begins.
- **Loop Mode:** This field is inactive until Loop is enabled. The drop-down menu offers two options: *Forward* or *F&B* (forward and backward, also known as "ping-pong" looping).
- **Loop Fade:** This item is inactive until Loop is enabled. It creates a crossfade using content before the loop start. The loop size is unaffected. The length of the Fade is reduced if it exceeds the loop size or is longer than the section between Trim Start and Loop Start. Note that Loop Fade is only possible when Loop Mode = Forward.

9.5.3. Mix and Slot sections

- **Gain:** Adjusts the gain level of the currently selected sample slot. This can help balance the levels between the active samples.
- **Pan:** Sets the pan position of the sample slot in the stereo field.
- **Copy:** The double-document icon lets you copy the current sample to another sample slot. Use this to set up different settings for the same sample.
- **Reset:** The circles-and-arrows icon resets the sample to its default state. This is useful if tweaking parameters has produced an undesirable sound and you want to start over.
- **Clear:** The trash can icon removes the sample from the selected slot and resets all related parameters. You'll be asked to confirm the choice before it happens.

9.5.4. Snap button

Just above the sample edit display is the **Snap** button. When active (outlined in blue), this causes all trim and loop markers [p.106] to snap to their nearest zero crossing points, i.e. the closest place that the waveform is at an amplitude of zero. This helps to avoid pops, clicks, and other unwanted sonic artifacts. It also makes single-cycle sounds more accurate. With stereo samples, a tolerance is applied because true zero crossing points can be rare or nonexistent.

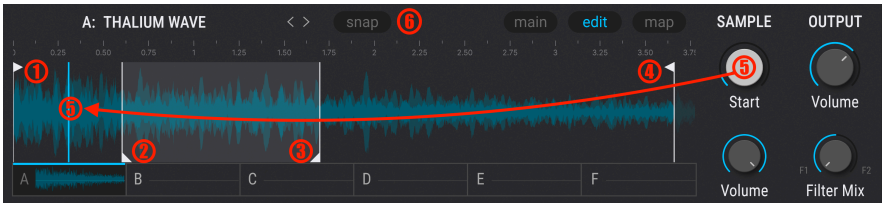
9.5.5. How loading samples affects these parameters

When you load a new sample into an existing slot (A-F) or use the Reset function described above, Pigments applies certain rules to keep things organized and make your editing workflow easier.

- MIX parameters (Gain and Pan) are never reset.
- Transpose, Fine, Play Mode, and Release are never reset.
- Root note does not change unless:
    - The sample's .wav file contains root note information.
    - Map Mode [p.107] is set to *KeyMap* or *KeyVeloMap*.
- Trim points, loop points, Loop on/off status, Loop Mode, and Loop fade are set according to metadata in the sample's .wav file. If the file has no metadata, these parameters are not reset.

9.5.6. Markers and loops

You can graphically edit the overall sample start and stop points (trim) as well as the loop points, right on the Sample Viewer itself.

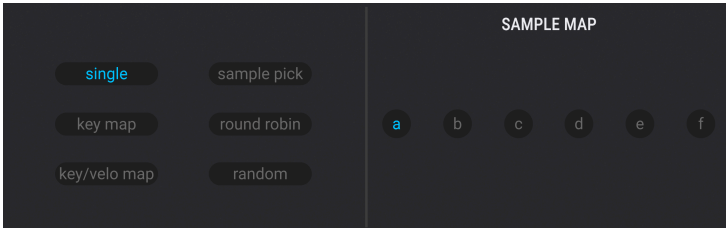


Number	Name	Description
1	Trim Start marker	Playback start boundary. Click-drag this marker at the top of the Sample Viewer to adjust. Also sets the visible range for the Main and Map mode views. Might not be reached depending on Loop and Sample/Grain Start settings.
2	Loop Start marker	Sets the beginning point for the loop when Loop mode is active. Click-drag this marker at the bottom of the Sample Viewer to adjust.
3	Loop End marker	Sets the end point for the loop when Loop mode is active. Click-drag this marker at the bottom of the Sample Viewer to adjust.

Number	Name	Description
4	Trim Stop marker	Playback stop boundary. Click-drag this marker at the top of the Sample Viewer to adjust. Also sets the visible range for the Main and Map mode views. Might not be reached depending on Loop and Sample/Grain Start settings.
5	Sample/ Grain Start	Determines the point at which the sample begins playback when triggered, relative to the positions of the Trim Start / Stop markers. It can be located inside or outside the loop, and may occupy the same position as one of the Trim markers.
6	Snap	This function snaps edits to the closest zero crossing point. This helps to avoid clicks and pops, for a cleaner sound more quickly.

Note that if **Loop Fade** is active, grey triangular arcs will slope downward from your loop points to your trim points.

9.6. Map Mode



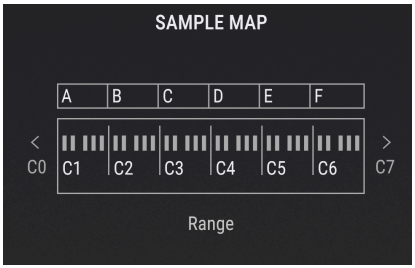
Map mode determine how the loaded samples will be triggered. Begin by selecting a sample slot with buttons A-F on the right, then chose an option on the left. The controls on the right will change depending on your choice. Above are the controls for single mode:

Here are brief descriptions of the six options; for a few visual examples, see the section below this chart.

9.6.1. Single

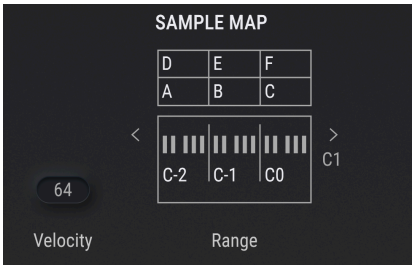
The currently selected sample is played across the entire keyboard and velocity range.

9.6.2. Key Map



The six sample slots are mapped across the keyboard. If a sample slot is empty then the sample before it is stretched across an extra octave. If the first two sample slots are empty, for example, then the first filled slot is stretched across the lower octaves. Click the arrows on the right side of the Map mode window to transpose the Map range up or down by octaves.

9.6.3. Key/Velo Map

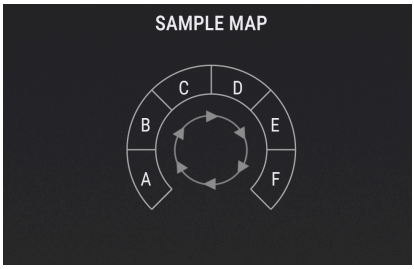


The filled sample slots are mapped across 3 octaves and 2 layers of velocity. The Velocity value sets the cross-switch point. See below the chart for three examples.
The right side of the Map mode window displays the Range and Velocity split points above the range selector. Use the arrows to transpose the Map range up or down by octaves.

9.6.4. Sample Pick

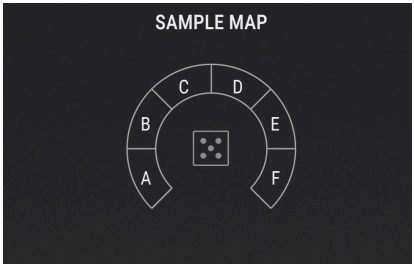
The filled sample slots are evenly mapped across the range of the Sample Pick knob on the right side of the Map mode window. A sample is selected when a voice is triggered, and the engine does not switch voices if the knob position changes while that sample is playing. A different sample can be triggered by the next MIDI note.
Hover on the Sample Pick knob to reveal the Mod Assignment symbol (the + sign).

9.6.5. Round Robin



The filled sample slots are played in circular order. When the Granular section is switched on, each grain plays a new sample based on the round-robin order.

9.6.6. Random



Samples are picked randomly on each key press among the filled slots. When the Granular section is switched on, each grain plays a new randomly selected sample.

9.7. Sample engine tune

The controls in this section adjust the overall tuning for the Sample engine voices. It works similarly to the tuning sections in the other engines, with an important addition. The **Filter** knob adds low-pass or high-pass filtering to the sample itself, ahead of any other processing. Turn it counterclockwise to lower the low-pass cutoff or clockwise to raise the high-pass cutoff. At 12 o'clock, no filtering is applied.

9.8. Sample/Output section

Here, the left column of knobs controls the samples proper, while the right pertains to the sample engine overall.

9.8.1. Sample/Grain section

- **Start:** Sets the start point of the sample (or grain) to be played, relative to the distance between the Trim Start and Trim End markers. This appears as a vertical blue line on the sample visualizer. Your selection here is also used as the reference for triggering grains when the Granular section is switched on.
- **Volume:** Sets the volume of the sample (or grain) to be played.

9.8.2. Output section

- **Volume:** Sets the overall volume of the sample engine output.
- **Filter Mix:** Crossfades the output of the engine between Filters 1 and 2. At 12 o'clock, equal level is sent to both filters.

9.9. Granular mode

Pigments' sample engine features a sophisticated granular synthesis mode

Turning on Granular mode lets you control the Granular synthesizer features of the Sample engine. When this section is switched off, the Sample engine acts as a traditional sample playback engine.

In *granular synthesis*, a sample is chopped up into a usually large number of tiny bits with adjustable sizes and envelope shapes. These "grains" can then be played back in different orders and altered in a number of creative ways.

The top row of controls adjusts the main characteristics of the grains.

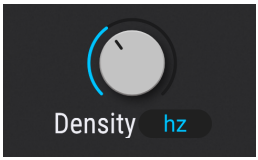
9.9.1. Scan

New as of Pigments version 6, the **Scan** knob lets you change the position of a moving "play head" across the grain stream, similarly to how you might change the start point of a conventional sample. This is especially useful for time-stretching (or time-compressing) effects. It's best to experiment with this and listen to the results, but here are the basic waypoints to be aware of:

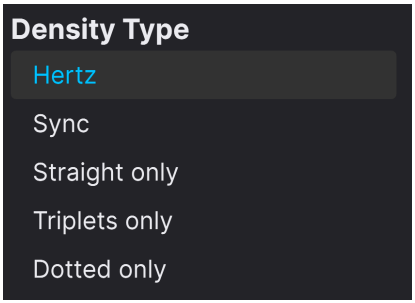
- At 12 o'clock, no scanning is applied.
- At positive values, the start point moves forward in time.
- At negative values, the start point moves backward in time.
- At +/- 100%, scan speed is equivalent to the speed of grain playback. Other percentages increase or decrease the scanning speed relative to playback.

9.9.2. Density

The **Density** knob sets the rate at which new grains are generated.



Click on the blue oval to select the rhythmic type for this playback: free-running in Hertz or three tempo-synced options. This displays the following pop-up menu:

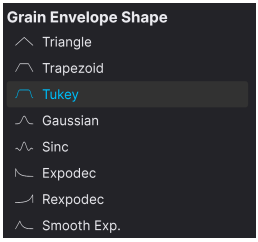


Hertz allows you to determine the number of grains generated every second. For example, at 1 Hz, one grain will be generated every second.

> ♪ To learn granular synthesis, use a low density setting so it's easier to hear what's happening.

9.9.3. Grain Shape

The **Shape** (third) knob sets the envelope shape of the grain, which can have a big impact on its sound. Click on the shape icon itself to bring up the following menu:

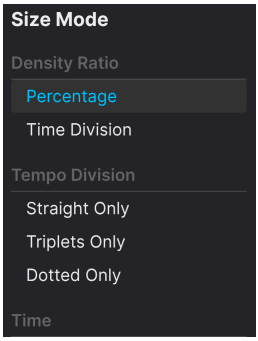


The grain shape selections

The pop-up menu shown above selects the overall grain shape while the knob shapes it further. The knob position is graphically reflected in the blue oval.

9.9.4. Grain Size

The **Size** knob on the right sets the duration of the grain. Depending on the mode selected in the pop-up menu, the knob adjusts the size as a function of:



- *Percentage:* A percentage of the maximum grain size (100%)
- *Time Division:* A time-based ratio of the currently set Density
- *Straight Only:* Tempo sync, straight values only
- *Triplets Only:* Tempo, triplet values only
- *Dotted Only:* Tempo, dotted values only
- *Time:* Absolute time value in milliseconds

> ♪ Grains can overlap. This is an important part of the character of granular synthesis. To have more control on this, a grain limit parameter helps you set the maximum number of grains that can overlap. It is also one of the main ways to limit CPU usage in case of high densities.

9.9.5. Randomizers

The **lower row** of knobs, most with pop-up menus accessed by clicking their adjacent blue buttons/icons, randomize a variety of grain playback behaviors. The chart below details their functions:

Control	Description	Pop-Up Options
Start	Grains are generated randomly before, after, or both, before and after the playhead position	Before, After, Both
Pitch	Randomizes the pitch of grains	Up, Down, Both

Control	Description	Pop-Up Options
Density	Randomizes the Density setting	More Dense, Less Dense
Direction	Adjusts the ratio of backwards to forwards playback of grains in the grain cloud	N/A
Size	Randomizes the grains' Size setting	Shorter, Longer, Both
Stereo Pan/ Width	Pan: grains are randomly placed in the stereo field. Width: randomized grains are placed in the stereo field. If no randomization is active, all grains are center-panned even with Width at max amount.	Pan, Width
Volume	Adds randomness to the volume of the grains as they play	N/A

9.10. Sample engine Unison/Shaper

Directly below the Tune controls is the Unison/Shaper section – where the Unison controls for the Analog and Wavetable engines reside.

Clicking the name at the top will bring up this menu of Shaper types:

The **Unison**, **Chord**, and **Super** modes work identically to those in the Wavetable engine, so we won't rehash those here. However, the Sample engine gets three new tools of its own in this department.

9.10.1. Resonator

This resonator effect consists of six bandpass filters in parallel that can be tuned to specific frequencies, thereby resulting in some very interesting textures. The first filter is tuned according to the Tune section as well as the note played on the keyboard. In granular mode, the pitch of the resonator follows the pitch of the grains, even with random pitch involved. The remainder of the filters are tuned in a harmonic relationship with the first filter.

- **Coarse:** Sets the fundamental tuning of the resonator.
- **Wet/Dry:** Sets mix between dry sound and sound processed by the resonator.
- **Resonance:** Sets the resonance / decay of the resonator.
- **Inharm:** When set to 0 (middle position), the resonator filters the harmonics of the pitch of the sample/grain. When set to a value higher than 0, the resonant tones are more sparse, while in the contrary values under 0 will bring it close together. When the resonant tones of the high order filters are no longer a multiple of the pitch of the grain/sample, this can lead to bell-type sounds or metallic kind of inharmonicity.

9.10.2. BitCrush

This option reduces sampling rate and/or bit depth to produce a popular "lo-fi sampler" sound. Or, it can go far beyond that and make the sample nearly unrecognizable

- **Decimate:** Reduces the sampling rate of the effected sound.
- **Bit Depth:** Reduces the bit depth of the sound.
- **Key Track:** When switched on, the Decimate value follows the keyboard pitch being played.

9.10.3. Modulation

This option provides Linear FM (through-zero) and Ring modulation.

- **Freq Mod:** Sets the amount of through-zero frequency modulation.
- **Ring Mod:** Sets the amount of ring modulation.

> ♪ Note that the Modulator [p.116] described directly below is used as a source of modulation for this effect. Therefore changing the pitch or the waveform of the Modulator will alter the frequency and ring modulation effects.

9.11. Modulator Oscillator

This section provides a modulator oscillator that can be used along with the Sample engine, as well as the option to use the other main engine as the modulation source.

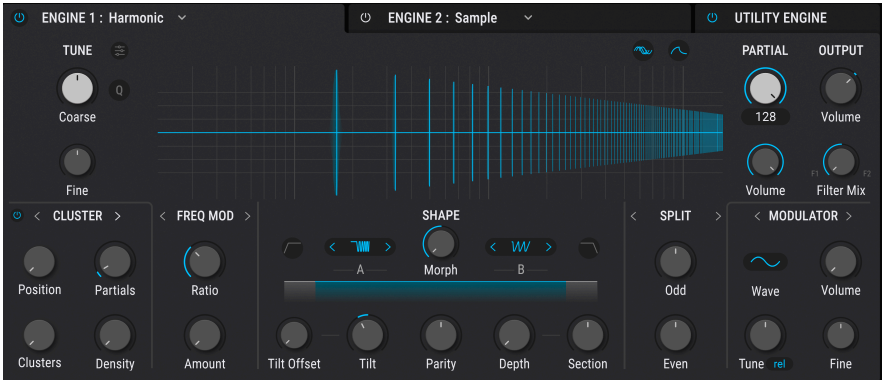
Its behavior and parameters are identical to Wavetable Engine's Modulator [p.96], so refer to that section for details.

9.11.1. Other engine as alternate modulation Source

Click the **Modulator** banner or the arrows at the top of to select the other Main engine as a source of cross-modulation for the Sample engine. We cover this in detail in the mini-chapter on Engine Cross Modulation [p.144] (Chapter 13).

10. THE HARMONIC ENGINE

Much of traditional synthesis is *subtractive*. That is, you start with a complex waveform full of harmonics and then filter out what you don't want. *Additive* synthesis is the opposite: You add up individual sine waves (a pure sine wave has no harmonics) until you have a precise harmonic profile.



The Pigments Harmonic engine

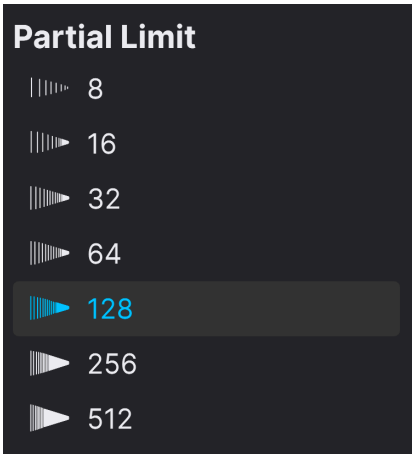
Additive synthesis deals with the building blocks of what our ears hear on a fundamental level. It also used to be the exclusive realm of high-priced hardware synths like the Synclavier or one-of-a-kind experimental instruments such as the Bell Labs Alles. The Harmonic engine in Pigments brings the power of additive synthesis to you. The resulting spectrum is displayed in the viewer in the top center of the engine, with controls below it and to either side.

10.1. Tune and Output sections

These work much like their companion sections in the previously discussed engines. See Chapter 6, Introduction to Sound Engines [p.73], for details.

10.2. Partials section

Any sound can be broken down into sine waves consisting of a fundamental pitch, then a series of harmonics or *partials* above that fundamental. Pigments lets you create tones with up to 512 partials.



The drop-down Partials Limit menu deployed

10.2.1. Partials Knob

Turning this knob clockwise will increase the number of partials in the sound, in progressively decreasing volume by default.

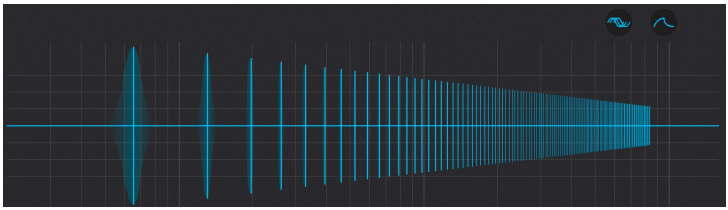
10.2.2. Partials Volume

This increases the overall volume of the partials but not that of the Modulator [p.126] even if its own volume is turned up. Fractional values decrease the volume of the highest-pitched partial in the series.

10.2.3. Partials Limit

The drop-down shown above sets an upper limit on the number of partials brought in by the Partials knob, saving computer CPU resources. Experimenting with just a few partials (8 or 16) can also be great for learning additive synthesis.

10.2.4. Partials viewer



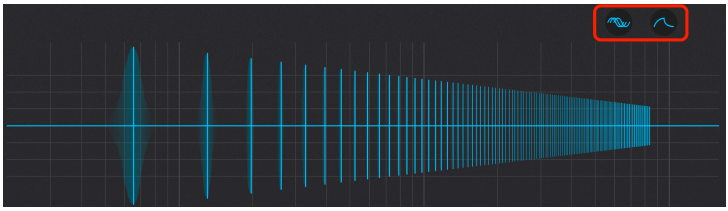
The partials viewer

The central viewer shows the overall distribution of partials in real time as you play. The horizontal axis is pitch; the vertical axis is volume.

In addition, the vertical axis shows the stereo panning of partials as determined by the Imaging Section [p.123]: above the center line is to the left; below the center line is to the right.

10.2.4.1. Random Phase and Smooth buttons

On the top right of the Partials viewer are two buttons. The one on the left is the Random Phase button.



Partials viewer with Random Phase and Smooth buttons outlined in red

As it name implies, **Random Phase** randomizes the phase of the partials, which can enrich or thicken the sound depending on the Partials mix. To its right is the **Smooth** button. When this is active, partials that are changing in amplitude (due to modulation) do so more gradually.

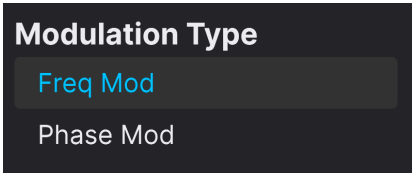
10.3. Frequency and Phase Mod section

You can apply either Frequency or Phase Modulation to the partial series generated by the Harmonic engine. Both are controlled from this section. The source for either is the Modulator [p.126], and the intensity of modulation is then adjusted by the **Amount** knob.

10.3.1. Ratio knob

Partials are multiples of the frequency of the fundamental pitch. This knob does the initial math, as it were. The range of values is -1.00 to 5.00.

10.3.2. Modulation type selection



Clicking on the name banner or arrows at the top of this section lets you apply either FM or phase modulation from the

10.4. Shape section

This area lets you superimpose *spectrums*, or frequency profiles, on the "raw" partial series, further sculpting its sound. Pigments lets you apply two Spectrums to the partials (with 12 choices for each) and even morph between them.

What's a frequency profile? Functionally, it's like multi-point EQ curve that notches out multiple frequencies according to its shape.

10.4.1. Spectrum menus

You can select one of 12 spectrum shapes for slots A and B. You can then morph smoothly between A and B.

Click on either of the Spectrum icons to bring up the above menu. Or, use the <> arrows on each to browse through the spectra serially.

10.4.2. Section knob

This shifts the position of the spectrum over the partial series, which changes the partials that it affects.

10.4.3. Morph knob

This knob morphs continuously between spectrum slots A and B, with the resulting spectrum shown in the graphic immediately above. The "valleys" in the graphic represent frequency cuts.

> Remember, you can modulate the Morph knob using one or more of Pigments' modulation sources [p.232].

10.4.4. Depth knob

This knob controls how much the spectrum affects the frequencies of the partial series relative to its Section and Morph settings.

10.4.5. High-pass and low-pass filters

Both the high- and low-pass filters applied to a 50/50 morph of the spectrums

Notice the highpass and lowpass icons at left and right of the spectrum drop-downs. The left icon applies a highpass filter. Frequencies below those affected by the Spectrum will decrease in volume.

The right icon applies a lowpass filter. Frequencies above those affected by the Spectrum will decrease in volume. Both may be used at once, and are helpful for focusing on only the frequencies within the Spectrum's range.

> ♪ Spectrums are great for vowel-like sounds. Turning or modulating the Morph knob can produce changing vowels, like "ee-ah-ow."

10.4.6. Tilt knob

Adjusts the steepness of the frequency response slope.

10.4.7. Tilt Offset knob

Changes the partial at which the slope begins.

10.4.8. Parity knob

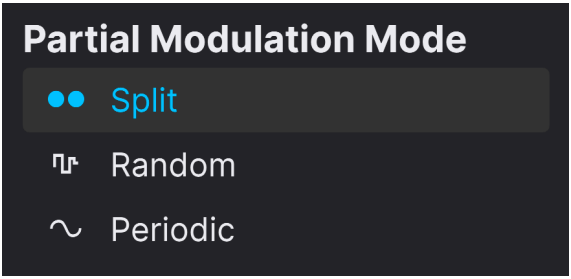
This changes the proportion of odd-numbered and even-numbered multiples in the partial series. (Remember that we said partials are multiples of the fundamental.) You can have all odds, all evens, or any mix in between.

10.5. Imaging section

Pigments' Harmonic engine takes things to the next level by letting you pan different partials across the stereo field. This can result in wide, immersive, fascinating sounds. The imaging section is a pane of controls identified by a title banner that says either *Split*, *Periodic*, or *Random* (referring to its selectable modulation modes).

10.5.1. Imaging modulation mode

This section is headed by a banner labeled *Split*, *Random*, or *Periodic*, depending on which one of these modes you select using the arrows or this drop-down menu:



The knobs below change depending on your selection:

- **Split**: Manual panning of odd and even partials.
  - *Odd*: Pans the odd partials left and right.
  - **Even**: Pans the even partials left and right.
- **Random**: Randomly pans individual partials.
  - *Rate*: Sets the speed at which partials are randomly panned.
  - *Depth*: Sets the intensity of random panning applied.
- **Periodic**: Pans clusters of partials across the left and right channels.
  - *Periods*: Sets the size of the clusters.
  - *Depth*: Sets the amount of offset from the center stereo position for the clusters.

10.6. Partial shaper section

At the lower left of the Harmonic engine area of Pigments is an area titled WINDOW by default, but this is one of three modes for further modulating and altering the balance of partials in your sound. The other two are CLUSTER and SHEPARD, and each changes the knobs you see in the section somewhat. This is basically the equivalent of the Unison/Shaper section for the Harmonic engine, but what it does is very different than the corresponding sections in the other engines.

10.6.1. Window

As the name implies, this lets you set a given window within the partial series, then adjust its volume and/or apply FM from the Modulator [p.126].

The parameters are:

- **Position**: Sets where the window begins in terms of the lowest-pitched partial.
- **Win Size**: Sets the width of the window, i.e. how high it extends.
- **FM**: Applies FM from the Modulator to the partials within the window only.
- **Gain**: Changes the volume of the partials within the window only.

10.6.2. Cluster

This brings partials within an adjustable window closer together, changing their frequency and resulting harmonic differences from subtle to drastic.

The parameters are:

- **Position**: Selects the lowest partial of the starting cluster.
- **Clusters**: Sets the width of the window, which determines how many clusters there will be.
- **Partials**: Sets the number of partials per cluster.
- **Density**: Determines how much the partials' frequency will shift towards the starting point of their cluster.

♪ For the most traditionally musical results, try Density values at or near 25%, 50%, and 100%.

10.6.3. Shepard

"Shepard's tone" refers to an audio illusion in which a complex sound seems to be eternally rising or falling in pitch even though its base frequency is unchanged – sort of like if M.C. Escher were a synthesist. This mode in Pigments can create that illusion and affect the timbre in other creative ways. It does this by shifting the frequency of each partial towards the next higher partial

Again, it can do this within a certain window. The parameters are:

- **Position**: Sets the base partial of the window.
- **Win Size**: Sets the width of the window as in the other two modes.
- **Phi**: Determines the amount of frequency shift towards the next partial up, within the window.
- **Gain**: Adjusts the volume of the partials within the window.

> ♪ To create the Shepard's tone illusion, modulate the Phi parameter with a slow LFO set to a ramp waveform. Set the Phi knob to 0.500 and modulation depth to 0.50 for the best results.

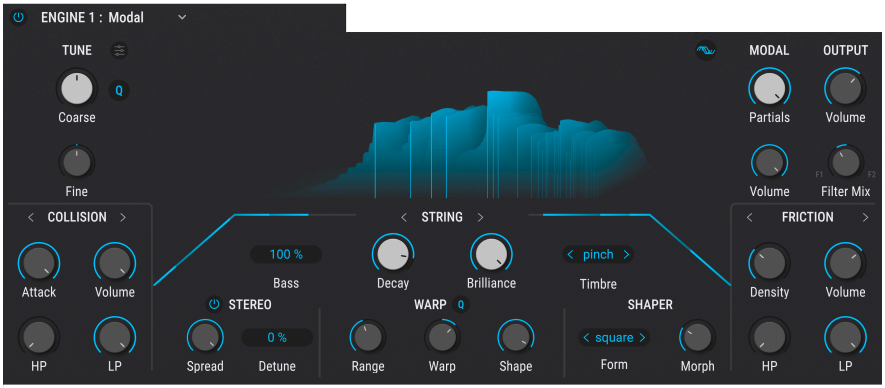
10.6.4. Modulator Section

The Harmonic engine's Modulator, or modulation oscillator, is a source of FM and Phase Modulation for the Partial Shaper [p.124] (when in Window mode) as well as the Gain in the Ratio section [p.120].

It works much like its counterparts in the Sample [p.116] and Wavetable [p.96] Engines, including the ability to substitute the other main engine as a modulation source.

> ♪ A note on volume: If this knob is turned up in the Harmonic Engine's Modulator, the output of the modulation oscillator will be audible next to the partials from the Harmonic engine. This means you could use it as an extra layer or sub-oscillator if you like. The Volume knob does not affect the oscillator's role as a modulation source for the Window mode or Ratio.

11. THE MODAL ENGINE



The Pigments Modal engine

The Modal engine is new as of Pigments 6. It employs *physical modeling*, which is a form of synthesis based on physical properties of vibrating acoustic objects. The two main object types are a beam (think of a vibrating length of metal or wood) and a string. We call that object the *Resonator*, and it is the core of the Modal engine.

If you think about a guitar string, drum head, or pitched percussion like a bar on a xylophone, there can be no vibration without an initial "collision" or interaction with another object such as a pick, mallet, finger, etc. This is what the *Collision Exciter* in the Modal engine does. It works together with the *Friction Exciters*, which modifies the Resonator behavior by modeling ongoing interaction with an external object. Think of bowing a violin string, rubbing the edge of a glass half filled with water, or scraping a piano string to visualize this.

The Friction and Collision Exciters are summed together, and their output sets in motion the *Resonator*. The Resonator is actually a bank of bandpass filters that can create different harmonic profiles with great precision.

> ♪ There are many different applications for physical modeling, with various hardware and software synths approaching it differently. Unlike some, the Modal engine in Pigments does not precisely model acoustic sources such as a guitar string, vibraphone bar, or air flowing through an organ pipe. Instead, it seeks to generate interesting sounds in a way that departs from well-known synthesis methods like analog subtractive, wavetable, sampling, and the like.

11.1. Modal engine tuning sections

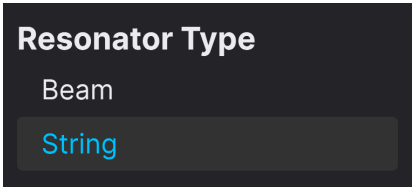
The Modal engine's tuning section works much like those in the other engines, with Coarse and Fine adjustments (again, hold Shift while turning the Coarse knob to snap the tuning to octaves) as well as keyboard tracking and the ability to quantize any modulation received by the Coarse tuning to selected musical notes.

11.2. Resonator section

The Resonator section

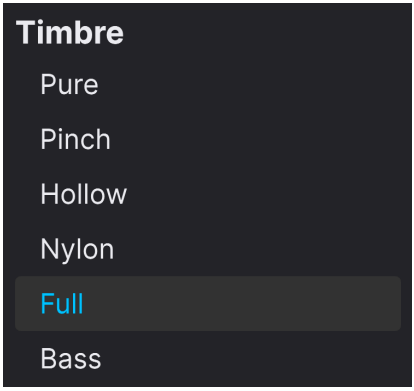
As mentioned, this is the heart of the Modal engine, where you set up the type of resonating object. Under the hood, the Resonator is really a complex set of band-pass filters, which can create a complex profile of non-contiguous harmonics.

First, you can select the Beam or String Resonator type by clicking on the name at top center, or with the < > arrows:



Then, the four primary controls are across the top row:

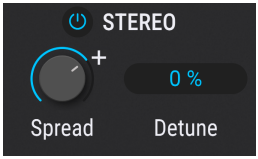
- **Bass:** Sets the volume of the fundamental harmonic of the Resonator
- **Decay:** Sets the duration of the "ringing out" of the Resonator
- **Brilliance:** Increases the volume and resonance of higher partials
- **Timbre:** Chooses from six overall harmonic profiles of the Resonator



The Timbre profiles are simply different balances of partials above the fundamental. **Decay** is similar to the decay phase of an ADSR envelope, and finite even at its maximum value and with a note held. **Brilliance** is basically a treble tone control that applies to all the Timbre options.

11.2.1. Stereo Spread

Turning this section on spreads alternating harmonics across the stereo picture, resulting in a wider, more spacious sound.



- **Spread:** Adjusts the amount to which harmonics are panned relative to each other
- **Detune:** Detunes the left-panned and right-panned harmonics relative to each other

Slight amounts of detuning add a chorus-like effect; large amounts can get woozy! Detune is also heard even with Spread set to zero; it pitches odd-numbered partials up and even-numbered partials down.

11.2.2. Warp

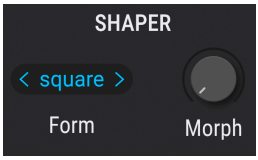
This section shifts the entire distribution of the partials across the frequency spectrum. This can result in inharmonic, dissonant, or metallic sounds reminiscent of ring modulation, but can also be quantized for more musical results.

- **Warp:** Expands or compresses the group of partials relative to the fundamental; bipolar knob
- **Range:** Sets the first harmonic below which partials are no longer warped
- **Shape:** Subtly alters the shape of the warp, affecting individual partials within it
- **Q (quantize):** Snaps warped partials to the harmonic series

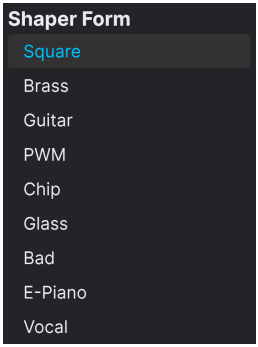
> ♪ That **Q** button is your best friend for keeping things pleasant. It locks every warped harmonic to the closest position in the *harmonic series*. That ensures that every harmonic is an integer multiple of the fundamental pitch – a musical interval.

11.2.3. Shaper

The Shaper performs even more sculpting on the Resonator, and applies to the partials after the results of Warping. It's similar to the spectrums [p.121] in the Harmonic engine in that it morphs between two frequency profiles, but with simplified controls.



The Shaper **Form** menu selects among nine options, each of which is actually a *pair* of frequency profiles.



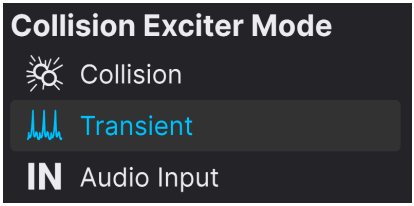
In fact, each option is a different pair of "masks," or overlays in which some harmonics are completely muted and others are allowed to pass.

The **Morph** knob then crossfades smoothly between one mask and another.

11.3. Collision/Transient Exciter

When you initially pluck a string or strike an object to make it vibrate, your action affects both the first moment of sound and the ongoing vibrations of the resonating object. The Collision/Transient exciter, located at the lower left of the Modal engine, provides fine-grained control over this.

The central name bar (or arrows) selects the Exciter type:



11.3.1. Collision

The Collision mode of the Exciter produces an attack transient similar to the pluck of a string, a stick on a drum, or a mallet on a pitched percussion instrument. It excites all the harmonics equally, subject to differences created by the Warp [p.130] and Shaper [p.130] sections of the Resonator.

- **Attack:** Multiples and spreads the exciter "hits" to soften the attack
- **Volume:** Sets the volume of the collision transient *only*
- **HP:** Sets the cutoff of a high-pass filter that applies to the collision transient *only*
- **LP:** Sets the cutoff of a low-pass filter that applies to the collision transient *only*

The shape of the collision is a downward sawtooth. The Attack knob then adds delayed copies of this collision with a ramp-shaped amplitude envelope. Set at minimum, this gives you a sharp "blip" at the beginning of the sound. At higher settings, attack is smoothed out across the earlier part of the Resonator's decay phase. This can sound like a quick bowing, strumming, or trill (as when a pianist quickly alternates two fingers on the same note).

11.3.2. Transient

The Transient mode of the Exciter uses samples specifically tailored to excite the harmonics that occur at the beginning of the Resonator's sound. The sample choices are simplified and of fixed duration:

- **Volume:** Adjusts the level of the transient sample *only*
- **Tune:** Tunes the transient sample up or down in decimal fractions of a semitone

11.3.2.1. Transient keyboard tracking

The keyboard icon in this section enables keyboard tracking. When off, the transient sample will play at its default pitch regardless of the MIDI note played. When engaged, the pitch follows your playing.

This has impact on how the harmonics are excited. With key tracking off, the intensified partials during the attack/collision time are the same no matter the pitch you play. With key tracking on, the intensified partials follow the pitches you play. It seems intuitive that the former would sound more "natural" or "acoustic" while the latter would sound more "synthetic," but the opposite is actually true here.

11.3.3. Audio Input

The final mode of the Collision/Transient exciter modifies the Resonator via an external audio input.

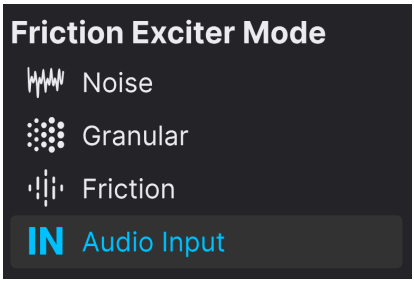
Where does the external audio come from? Audio input functions when Pigments is used as a plug-in. Use your DAW's sidechain routing function to route audio from the desired track into Pigments. The method varies from one DAW to another, so consult your DAW's documentation. The Input Level meters display the level of the incoming audio. The further controls are simple:

- **Volume:** Sets the overall volume of the Friction Exciter
- **HP:** Applies a high-pass filter to the exciter, with the cutoff following the note pitch
- **LP:** Applies a low-pass filter to the exciter, with the cutoff linked to the HP frequency

> ♪ The process going on is much like a vocoder. The spectrum of the incoming audio "imprints" onto that of the Resonator. In vocoder terms, the audio input signal is like a modulator whereas the Resonator is the carrier – though it's important to know that the Collision Exciter does *not* apply audio-rate modulation. Experiment with audio input sources such as a drum loop, vocal, or chords played on a synth to get familiar with the creative possibilities of the Collision Exciter.

11.4. Friction Exciter

Besides striking, the motion of rubbing or scraping an acoustically vibrating object with another object can affect the harmonics and change the sound. That is what we mean by *friction* here, and what the Friction Exciter does. Begin by selecting a mode from the name bar or with the <> arrows.



The four modes of the Friction Exciter

The four choices represent a variety of "abrasive" sources with which to "scrape" the Resonator.

> ♪ Bowing a violin is a common example of friction excitement. The unmistakable sound of *Doctor Who*'s TARDIS box appearing and vanishing was created by scraping a house key across the bass strings of a piano, then processing the result through feedback.

11.4.1. Friction

Friction mode generates impulses that excite the harmonics of the Resonator. It's good for adding interesting and non-linear brightness to the sound.

- **Density:** Adjusts the rate of impulse generation in Hz (see below)
- **Volume:** Sets the overall volume of the Friction Exciter
- **HP:** Applies a high-pass filter to the exciter, with the cutoff following the note pitch
- **LP:** Applies a low-pass filter to the exciter, with the cutoff linked to the HP frequency

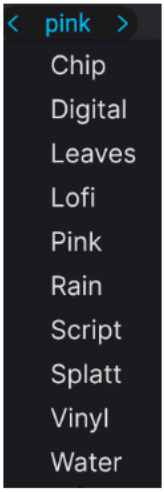
Density is in fact controlling more than a simple rate. It's a macro of parameters that also includes randomization of the volume of the impulses and randomization of the rate itself (a.k.a. jitter). Musically speaking, you can expect the following results:

- Low Density settings: Steady, regular impulses; a brightness/sharpness boost
- Medium Density settings: More random amplitude and rate; "unsettled" sound
- High Density settings: Disruption of the sound akin to digital noise or FM

11.4.2. Noise

Noise mode excites the harmonics via looping noise samples which are optimized for the best musical effects on the Resonator.

The **Sample** field displays a menu for selecting the noise option:



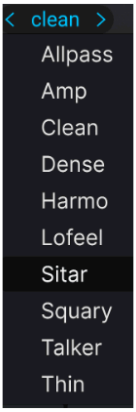
Then, the three remaining knobs work as in Friction mode:

- **Volume:** Sets the overall volume of the Friction Exciter
- **HP:** Applies a high-pass filter to the exciter, with the cutoff following the note pitch
- **LP:** Applies a low-pass filter to the exciter, with the cutoff linked to the HP frequency

11.4.3. Granular

Granular mode of the Friction Exciter applies some fixed values to a subset of the settings in the Granular [p.111] of the Sample engine. If you are unfamiliar with granular synthesis, now is a good time to review that section of the Sample engine chapter. However, it is not necessary to know granular synthesis to understand that *very* broadly speaking, the Granular Exciter is like the Friction Exciter except with much more potential variance in the impulses.

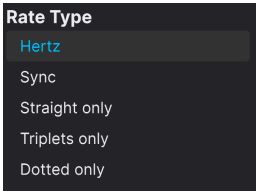
The process begins with selecting a sample type for the source of the grains.



- **Volume:** Adjusts the volume of the Granular exciter
- **Tune:** Offsets the base pitch of the grain-source sample in decimal fractions of a semitone

11.4.3.1. Rate and rate sync

The **Rate** knob sets the speed at which new grains are generated. It can be set to do so freely in Hz or sync to your project tempo. Click on the blue field beneath the knob to show the menu.



♪ Try modulating the Granular Exciter mode rate with an LFO, Function, or Random modulation source to add rhythm, liveliness, or unpredictability.

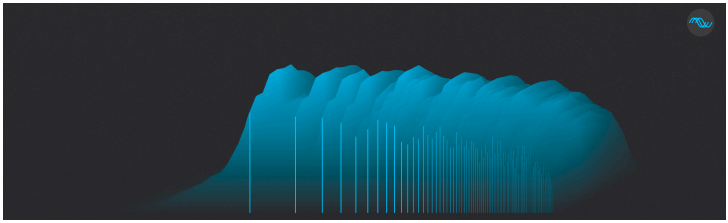
11.4.4. Audio In

Similarly to the Collision/Transient exciter, the Friction exciter can apply real-time audio input as the source of the harmonic excitement.

Audio input is available when Pigments is used as a plug-in and can receive a sidechain signal from another track. Consult your DAW's documentation for details about routing. The remaining controls function in the familiar way:

- **Volume:** Sets the overall volume of the exciter
- **HP:** Applies a high-pass filter to the exciter, with the cutoff following the note pitch
- **LP:** Applies a low-pass filter to the exciter, with the cutoff linked to the HP frequency

11.5. Modal Visualizer



Vertical axis is amplitude; horizontal shows frequency

The Modal engine has a central Visualizer that shows amplitude along the Y-axis and frequency on its X-axis. The solid blue vertical lines represent individual partials. The animated waves that spread out from these lines depict the real-time results of the excitement processes' effects on the Resonator.

11.5.1. Phase randomizer

The small triple-waveform icon at the upper right corner of the Visualizer randomizes the phase of each partial generated by the Modal engine. This is mainly useful for getting a less repetitive character. When on, each note played will sound a bit different. When off, the sound is more focused.

12. THE UTILITY ENGINE

The Utility engine combines a single virtual analog oscillator (recommended for use as a sub-oscillator) with two sample-based "Noise" sources. We put that in quotes because they do a lot more than noise, as we'll see momentarily.

The Pigments Utility engine

The beauty of the Utility engine is that it's always there in its own tab, regardless of what you have in the two primary engine tabs. It can be used at the same time as either or both of them, or turned off via its on/off icon.

12.1. Noise Sources

These two identical sound sources go far beyond the capabilities of the Noise section in the Analog engine. Each has an identical set of independent controls.

They use samples of various noises, ambiences, transients, nature and machine sounds, vinyl record crackles, and many more sonic tidbits. You can use either or both, with or without the oscillator.

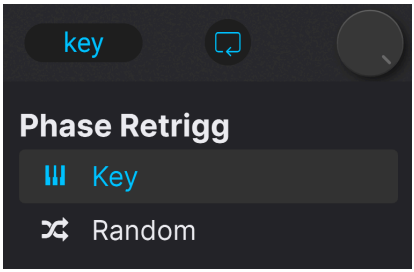
12.1.1. Noise browser

Click the name above the center area of either Noise 1 or Noise 2 to bring up a special browser dedicated to these samples.

Select categories in the left column, then click a sample from the right column to load it. Double-click the sample name or click the X to close the browser. You may then step through samples with the left and right arrows.

12.1.2. Phase retrigger

This toggle affects how the sample start point is triggered. There are two options.



- **Key**: The sample starts from the beginning every time a new key is played.
- **Random**: The sample start time is slightly randomized.

> ♪ The Random setting will avoid the flanging effect that can occur when a sample is played polyphonically with key tracking disabled.

12.1.3. Keyboard tracking

With the keyboard-icon button enabled, the noise sample will pitch up and down when played from a keyboard. When it is disabled, the sample plays at its recorded pitch regardless of which key is struck.

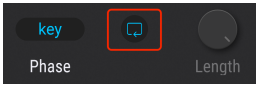
12.1.4. Tune

This knob pitches the sample up or down in fractions of a semitone, with a maximum range of +/-36 semitones (three octaves) in either direction.

12.1.5. Noise filter

Each Noise source has a dedicated filter. Turning the knob counterclockwise from 12 o'clock reduces the cutoff frequency of a lowpass filter. Turning it clockwise from there increases the cutoff of a highpass filter. At 12 o'clock position, there is no filtering.

12.1.6. Loop button



The Noise samples normally play in one-shot mode, but they will loop continuously if this button is engaged.

12.1.7. Length knob

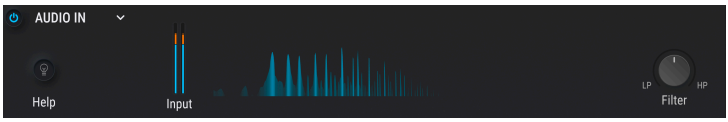
This knob controls the duration of the sample in one-shot mode. At maximum, the sample will play all the way to its endpoint. At minimum, you might not hear anything! When the Loop Button is engaged, this knob is greyed-out.

12.1.8. Output Section

As in other engines, a **Filter Mix** knob controls the Noise sources' routing balance between Filter 1 and Filter 2 (Pigments' main Filters, not the dedicated ones described above). Each Noise source also has an independent **Volume** knob.

> ♪ Note that there is no overall output control for the Utility engine. You balance the volumes of the Oscillator, Noise 1, and Noise 2 with their respective knobs. This actually provides a lot of creative control!

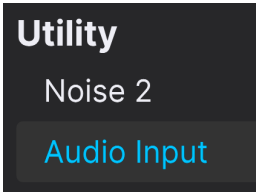
12.1.9. External audio input



Left to right: Audio In selected in noise source 2, input meters with overload indicators, audio spectrum display, and Filter mix control

Noise source 2 can be switched to an input for processing external audio, such as from another track in your project, through Pigments' filters and FX.

Audio input functions when Pigments is used as a plug-in. First, select *Audio Input* instead of noise from the drop-down menu on the left:



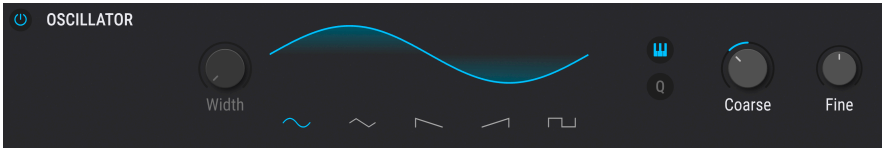
Now, use your DAW's sidechain routing function to route audio from the desired track into Pigments. The method varies from one DAW to another, so consult your DAW's documentation.

The central visualizer displays the spectrum of the incoming audio.

Other controls, such as the LP/HP filter, Filter Mix, and Volume, work as they do for the Noise sources.

12.2. Oscillator

The bottom strip of the Utility engine controls a virtual analog oscillator. By default, coarse tuning comes up at -12 semitones (an octave down). However, it has a full pitch range of +/-36 semitones, so you can use it for anything.



> Note: The Keyboard tracking icon in this section affects this oscillator only. The noise sources [p.139] each have their own keyboard tracking toggle.

12.2.1. Wave

These option buttons provide:

- Sine
- Triangle
- Saw (downward)
- Ramp (upward saw)
- Square

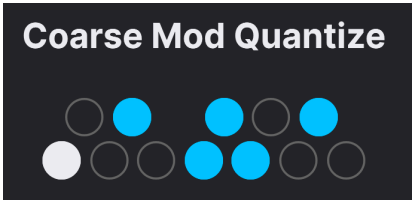
12.2.2. Width

This controls the pulse width of the triangle and square waveforms and can vary their timbre dramatically. If neither of those waveforms is selected, it is greyed-out.

12.2.3. Coarse Tune

Tunes the oscillator in semitones.

12.2.3.1. Mod quantize



As in the other sound Engines, coarse tuning can be modulated by any source, and you can conform this to the specific notes you want to hear – click a circle to enable/disable the note. The **Q** icon enables this feature.

12.2.4. Fine Tune

Fine-tunes the oscillator in non-integer fractions of semitones.

12.2.5. Keyboard Tracking

When the keyboard-icon button is lit, oscillator pitch follows notes played on a controller keyboard.

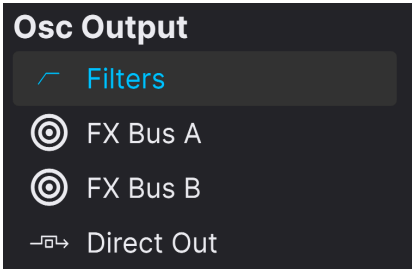
12.3. Output Section

The output section in the Utility engine features separate volume knobs for each noise source and the oscillator.

- **Filter Mix:** Balances the Utility engine Oscillator's output between Filters 1 and 2.
- **Volume:** Overall output volume of each noise source to the Filters.

12.3.1. Oscillator Output Knob

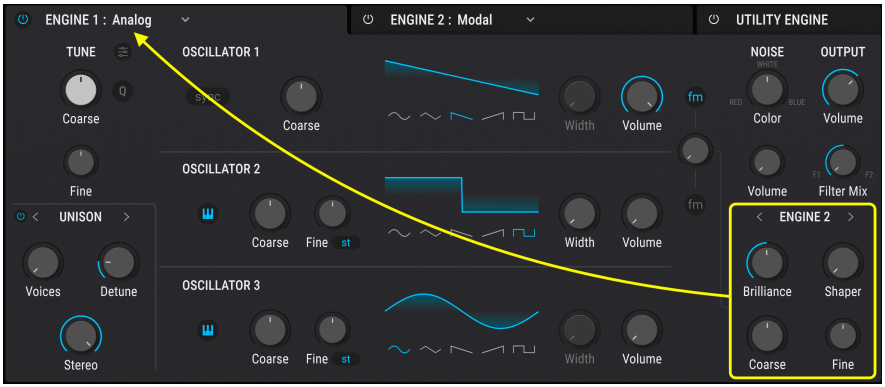
The master output volume knob for the oscillator is special. It has a pop-up menu to determine its output routing. The choices are:



- *Filters*: Through either or both filters according to the position of the Filter Mix knob.
- *FX Bus A*: To FX bus A only, bypassing the filters.
- *FX Bus B*: To FX bus B only, bypassing the filters.
- *Direct Out*: Bypasses all filters and FX.

Hence, the **Filter Mix** knob is only relevant if "Filters" is selected from this menu.

13. ENGINE CROSS MODULATION



As we have seen in each engine's individual chapters, the audio output of either primary engine can be used as a modulation source for the other. There are two exceptions: The Utility engine does not participate in cross-modulation, and in the Modal engine, the Friction Exciter [p.134] occupies the space where the Modulator section is in the other engine types. The Modal engine can be a *source* of modulation for other engines, but it cannot receive modulation from another engine itself.

Click on the **Modulator** banner, which is at the lower right pane of any engine (or use the arrows on either side) to switch from the "native" modulator to the other engine as a modulation source.

The **Modulator** header will change to **ENGINE 2** if you're working in engine 1, and vice-versa. In other words, the engine whose tab is currently *not* selected is the source, and the selected engine is the destination. The source engine must be turned on in order to provide modulation, but the Volume knob in its Output section does not affect the modulation amount.

The tricky thing here is that the controls in this section affect the *other* engine, and they change depending on which type of engine is being used in that slot as the modulation source. Let's break it all down.

13.1. Analog engine as mod source

- **Coarse:** Sets the overall coarse pitch of the other engine. (Mirrors the Coarse knob in the other Engine's Tuning section.)
- **Fine:** Sets the overall fine pitch of the other engine. (Mirrors the Fine knob in the other Engine's Tuning section.)
- **Noise:** Adds noise to the modulating signal. (Mirrors the Volume knob in the other Engine's Noise section.)
- **FM Amount:** Mirrors the Modulation Amount knob shared by the other Engine's oscillators 1 and 2. If the destination engine is also Analog, this can interact with its own Modulation Amount knob in interesting and extreme ways.

13.2. Wavetable engine as mod source

- **Coarse:** Sets the overall coarse pitch of the other engine. (Mirrors the Coarse knob in the other engine's Tuning section.)
- **Fine:** Sets the overall fine pitch of the other engine. (Mirrors the Fine knob in the other engine's Tuning section.)
- **Position:** Sets the wavetable position in the other engine. (Mirrors that Engine's Position knob.)
- **Ellipse Icon with Arrows:** Selects the wavetable from the other engine doing the modulating.

13.3. Sample engine as mod source

- **Coarse:** Sets the overall coarse pitch of the other engine. (Mirrors the Coarse knob in the other engine's Tuning section.)
- **Fine:** Sets the overall fine pitch of the other engine. (Mirrors the Fine knob in the other engine's Tuning section.)
- **Start:** Sets the sample start position in the other engine. (Mirrors that Engine's Start knob.)
- **Ellipse Icon with Arrows:** Selects samples serially. (Mirrors the sample browser in the other engine; works only for the selected sample slot.)

13.4. Harmonic engine as mod source

- **Coarse:** Sets the overall coarse pitch of the other engine. (Mirrors the Coarse knob in the other engine's Tuning section.)
- **Fine:** Sets the overall fine pitch of the other engine. (Mirrors the Fine knob in the other engine's Tuning section.)
- **FM Amount:** Sets the overall modulation amount.
- **Ratio:** Sets the ratio of additive partials. (Mirrors the Ratio Amount knob in the other engine.)

13.5. Modal engine as mod source

- **Coarse:** Sets the overall coarse pitch of the other engine. (Mirrors the Coarse knob in the Modal engine's Tuning section.)
- **Fine:** Sets the overall fine pitch of the other engine. (Mirrors the Fine knob in the Modal engine's Tuning section.)
- **Amount:** Sets the overall modulation amount; mirrors the Shaper **Morph** knob.
- **Brilliance:** Adjusts the brightness of the Modal engine's output. (Mirrors the Brilliance knob in the Modal engine.)

13.6. Useful cross-mod techniques

We will round out this mini-chapter with a few useful things to know when using cross-modulation between the engines.

13.6.1. Mixing in the source engine

It is possible to use the source engine for modulation and hear its audio in the final output at the same time – simply turn up the Volume knob in the source engine's Output section. This can make for some interesting and sometimes dissonant sonic qualities.

13.6.2. Modulation routings follow the knobs

As we have seen, controls in the destination Engine's ENGINE 1/2 section are mirrors of certain controls in the source engine. Therefore, if any knob is being modulated [p.213] by a source in the center strip, that modulation will appear in both the source and destination Engines.

13.6.3. Two cross-mods at once

We know what you're thinking: Can both engines 1 and 2 cross-modulate one another at the same time? Yes, but be careful with this, because the results can get wild and messy very quickly!

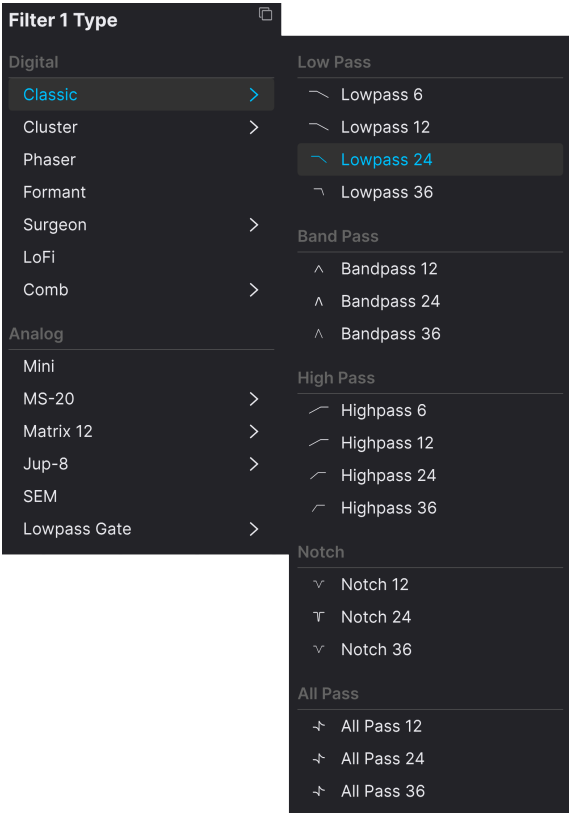
14. THE FILTERS

The two most important ingredients of its sound are the oscillators and the filters. Some synthesists would argue that given any decent oscillator or tone source, a filter can be *more* crucial for building a sound with character.Filters need to be able to tame the oscillators or make them even more wild, depending on what will serve your music best.

With that in mind, Arturia provides a broad assortment of our favorite filter types in the Filter section of Pigments. They will help you sculpt the sound of each preset you create into something unique.

14.1. Filter selection menu

Pigments has two independent, identical Filters that can be adjusted and configured in many ways. As of Pigments version 6, we have reorganized how you select filters into a "one-stop shop" hierarchical menu:



The Classic filter type with its submenu of passmodes and slopes

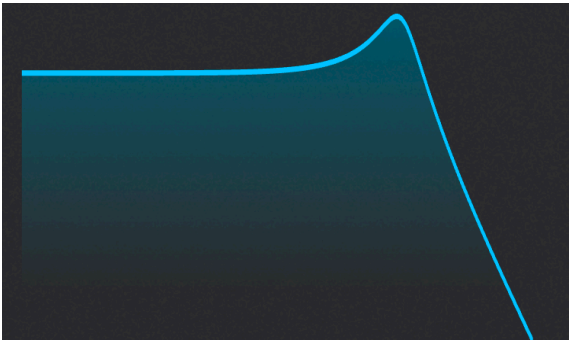
The first thing to notice is that some filters on the left have a submenu on the right. This is where you select different passmodes (low-pass, high-pass, etc.) for that filter, as well as different slopes (12dB-per-octave, 24dB-per-octave, etc.).

Notice also the broad "Digital" and "Analog" categories in the left column. The Digital filters do not necessarily *sound* digital in a harsh or unpleasant way; the term simply distinguishes them as all-purpose filters that can sound pristine and precisely sculpt the incoming sound. On the other hand, the Analog filters are more targeted emulations of classic synthesizer filters, as implied by their names.

14.2. Common filter features

All filter types have certain features and operations in common.

14.2.1. Filter visualizer



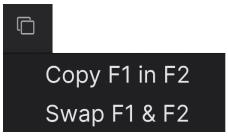
Each filter has a graphical visualizer that displays its settings. When you make a change to the cutoff frequency or resonance, for example, you will see an equivalent change take place in the Filter View window.

In general, you can also click inside this window and drag the cursor to make changes:

- Drag left and right to change the cutoff frequency, and
- Drag up and down to adjust the amount of resonance.

Dragging may change different parameters for certain filter types, but you will always see the corresponding knob move at the same time.

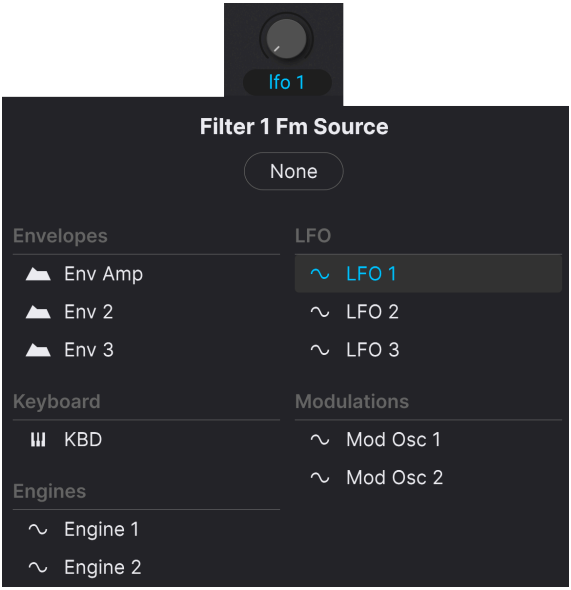
14.2.2. Copying and swapping filters



Changing the order of the filters can make a huge difference in the sound when the filters are being run partially or entirely in series. In the Filter Type menu are options letting you copy the current filter to the other or swap the position of the filters as you have them set up.

14.2.3. Filter FM

Each parameter of each filter can be modulated by multiple sources [p.232] within Pigments and/or by external MIDI sources. The knob at the lower left of either Filter has a menu-display icon below it. From this menu, you can select the source:



Then, turn the knob to adjust the amount. If one or more options are greyed-out, they are not available for the selected filter type. Note that if the filter type does not allow FM, the knob is replaced by an amount knob for keyboard tracking.

♪ With the analog modeled filters, you can apply audio-rate modulation to the filter cutoff from the engines' Modulator sections or output.

14.2.4. Filter Volume and Pan

Use the **Volume** knobs to adjust the level of the selected filter relative to the other filter. When the filters are fully in series, the volume of Filter 1 will feed entirely into Filter 2, which means that if the volume of Filter 2 is very low then changes made to Filter 1 may not be heard. (It can also result in a delicious distortion being fed to Filter 2.)

> ♪ If Filters 1 and 2 are 100% in series and Filter 2 volume is at zero, no audio signal will be heard.

Each filter can also be panned to its own position in the stereo field. The final result will depend on whether the filters are routed in series, parallel, or some combination of the two.

> ♪ If Filters 1 and 2 are placed in series and panned to the opposite extremes (Filter 1 hard left, Filter 2 hard right, or vice versa), no audio signal will be heard from Filter 1.

14.2.5. Filter Bypass

Each filter has an on/off button in the upper left corner which will put the filter into Bypass mode and allow the raw signal from the sound engine to be heard. However, if the filters are 100% in series the raw audio from the first filter will still pass through the second filter. Turning a filter off does not lose any of its settings.

14.3. Filter Types and Modes

Below, we will go over all the filter types. The charts detail the settings they do not necessarily have in common.

14.3.1. Classic

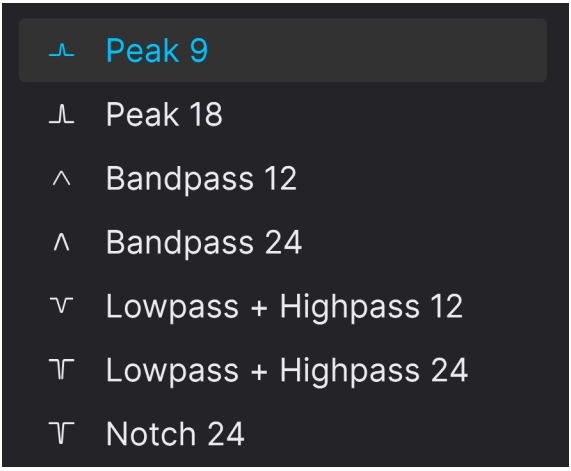
This filter model is unique to Pigments. Via the main selection menu [p.148], it offers a total of 17 different combinations of passmodes and slopes.

Pigments' Classic filter

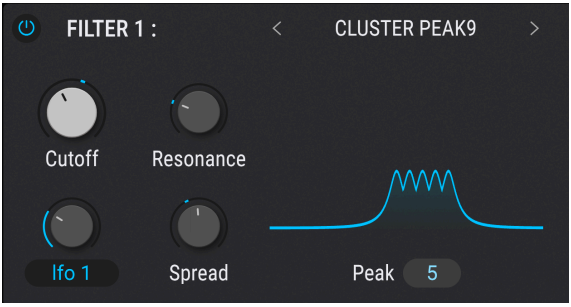
Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced
Resonance	Emphasizes a peak near the cutoff frequency
Drive	Applies distortion to the filter input
Digital/ Analog	Adjusts the resonance behavior to be clean (digital) or nonlinear (analog) – different from the Digital and Analog categories in the filter menu

14.3.2. Cluster

Cluster filters are also called multi-peak filters, and cover a total of seven options via the submenu:



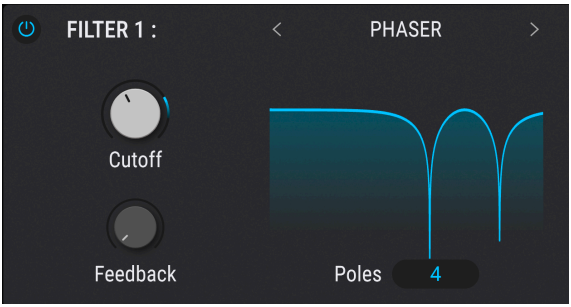
The Peak, Bandpass, and Notch varieties all allow you to select from one to five peaks or notches. The Lowpass + Highpass types are, as the name suggests, a simple combination of these two types of filters.



Parameter	Description
Cutoff	Sets the center frequency around which all bands/peaks/notches are boosted or cut
Resonance	Adjusts the height/depth of the peaks/notches in the amplitude domain
Spread	Varies the distance between the peaks, notches, or lowpass/highpass bands
Peak	Numerical field selects the number of peaks, notches, or passbands

14.3.3. Phaser Filter

This filter is based upon an audio effect that has made frequent appearances in popular music since the 1960s. It is similar to a comb filter in that it uses a series of peaks and notches to process the input signal, which are usually then modulated with an LFO. This phaser also allows you to define the number of peaks (poles) that will be used.



Parameter	Description
Cutoff	Sets the frequency range of the peaks and notches
Feedback	Emphasizes the strength of the peaks and notches
Poles	Sets the number of peaks and notches to be used: minimum = 2; maximum = 12

14.3.4. Formant

Arguably the most powerful filter in existence is the human speech anatomy. The Formant filter allows you to generate and modify a wide range of vowel-like sounds and then apply them to the input signal.

Parameter	Description
Freq Shift	Sets the frequency range of the filter effect
Morph	Shifts the relationships between the resonant peaks of the filter
Q Factor	Emphasizes the strength of the resonant peaks
Blend	Controls the amount of the unprocessed audio signal relative to the filtered signal

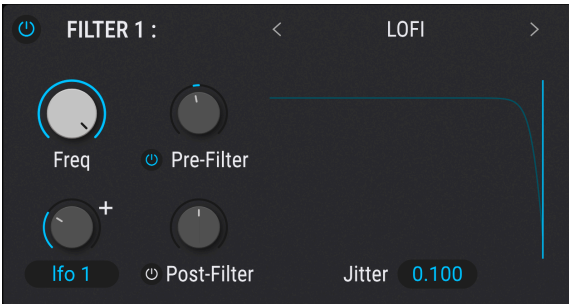
14.3.5. Surgeon

This is an extremely steep filter (64dB-per-octave) with four Modes available – low-pass, high-pass, notch, and band-pass – via its submenu in main the filter selection menu.

Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced
Spread	Only available when Mode = Notch or BP. Controls the width and depth of the affected zone

14.3.6. LoFi

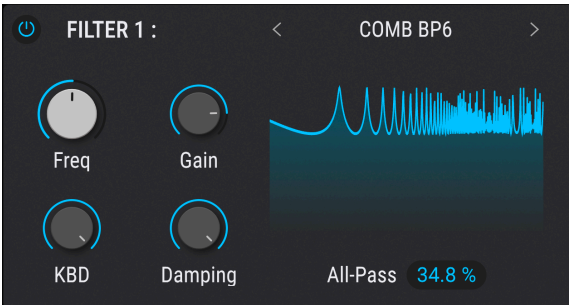
The LoFi filter seeks to add a pleasant grungy quality to the sound via downsampling. The intended effect is not as drastic as what a bit-crusher might do (though the distortion in Pigments' effects section has one of those). Notably, the amount of distortion doesn't build up when more notes are played, but instead stays consistent.



Parameter	Description
Frequency	Sets the downsampling frequency of the lo-fi effect, as well as the cutoff frequencies of the pre- and post-filters
Jitter	Higher values add further variations in the downsampling frequency
Modulation amount (with menu)	Sets amount of filter FM from source selected in menu
Pre-filter on/off	Engages or bypasses the pre-downsampling filter
Pre-filter frequency	Shifts the cutoff frequency of the pre-downsampling filter
Post-filter on/off	Engages or bypasses the post-downsampling filter
Post-filter frequency	Shifts the cutoff frequency of the post-downsampling filter

14.3.7. Comb

A comb filter is created by adding a delayed version of the input signal to itself, which results in a series of reinforced and cancelled harmonics. On a visualizer or graph, these resemble the teeth of a comb. Pigments' Comb filter includes a feedback loop that is especially good at producing sustained sounds such as plucked strings. From the submenu, low-pass, high-pass, band-pass, and feed-forward modes are available.



Parameter	Description
Freq	Sets the delay time of the copied signal
Gain	Emphasizes the strength of the peaks and notches
Kbd	Adjusts keyboard tracking amount
Damping	Defines an overall damping (lowpass-like) frequency
All-Pass	Defines the all-pass frequency

14.3.8. Mini

This selection is modeled after what is undoubtedly the synthesizer world's most famous filter: the iconic 24dB-per-octave ladder filter design that took the world by storm in the 1960s and '70s.

Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced
Resonance	Emphasizes a peak of frequencies around the cutoff frequency
Modulation amount (with menu)	Sets amount of filter FM from source selected in menu
Drive	Variable overdrive for filter input

14.3.9. MS-20

This is a replica of the filter in a famous, compact patchable synth, as emulated by our MS-20 V software synth. There are two modes available in the selection submenu: low-pass with a 12dB slope and high-pass with a 6dB slope.

Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced
Resonance	Emphasizes a peak of frequencies near the cutoff frequency
Modulation amount (with menu)	Sets amount of filter FM from source selected in menu

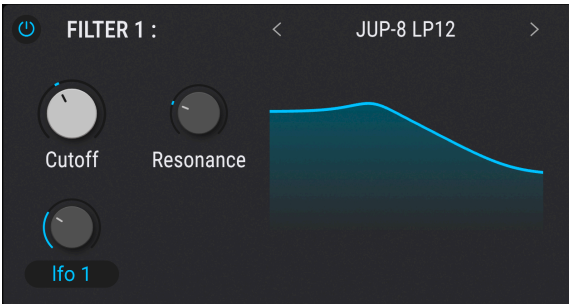
14.3.10. Matrix 12

There isn't a synthesizer enthusiast in the world who hasn't drooled at the thought of owning the flagship of all Oberheim synthesizers, the Matrix 12. We have cherry-picked a bunch of its outstanding filters from our Matrix-12 V software synth. Note the seven different operating modes/slopes available in the submenu.

Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced; or the center frequency in bandpass and notch modes
Resonance	Emphasizes a peak of signal information around the cutoff or center frequency
Modulation amount (with menu)	Sets amount of filter FM from source selected in menu

14.3.11. Jup-8

In the early 1980s, a renowned instrument maker from Japan released a programmable polyphonic synthesizer that has since become one of the most sought-after vintage synths. The Jup-8 filter type models its lowpass filter, and adds two slope options via the submenu: 12dB and 24dB.

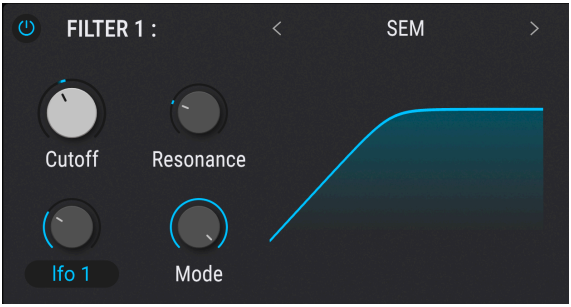


The Jup-8 filter has 12dB and 24dB per octave modes and has the following parameters.

Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced
Resonance	Emphasizes a peak of frequencies that are near the cutoff frequency
Modulation amount (with menu)	Sets amount of filter FM from source selected in menu

14.3.12. SEM

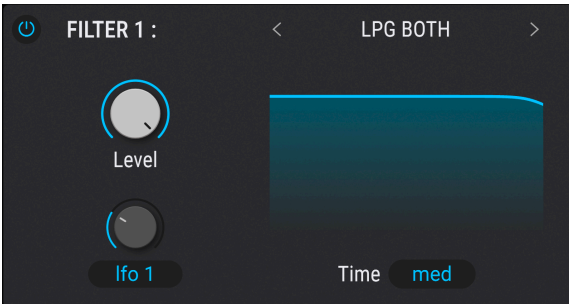
One of the most popular analog filters of all time was found in an unassuming little white box known as the SEM (Synthesizer Expansion Module), which was produced by Oberheim in the 1970s and '80s. This is a true state-variable filter, with a dedicated knob for morphing from low-pass to notch to high-pass. With the Mode knob set all the way counter-clockwise, the SEM becomes a band-pass filter.



Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced
Resonance	Emphasizes a peak of frequencies around the cutoff frequency
Modulation amount (with menu)	Sets amount of filter FM from source selected in menu
Mode	Smoothly morphs through lowpass, notch, and highpass modes; bandpass mode at minimum

14.3.13. LowPass Gate

A lowpass gate is a type of filter that can act as a type of voltage controlled amplifier. The LowPass Gate in Pigments provides some extra options: It can act as a traditional lowpass gate, as an actual VCA, or both a lowpass gate and a VCA at the same time, via making a selection in the submenu.



The Lowpass Gate works by having a cutoff frequency so low that audible signals are not heard when the filter is closed. Modulating the cutoff frequency with an envelope generator can then cause the gate to open and close like a VCA, thereby letting audio through. Early synthesis pioneers discovered that using a filter in this way can result in great tuned-percussion sounds like hand drums, congas, or steel drums. A famous U.S. West Coast synth designer used a Vactrol to design such a circuit.

Parameter	Description
Level	Used to manually open and close the filter/gate.
Time	Sets the decay time of the Vactrol gate.
Modulation amount (with menu)	Sets amount of filter FM from source selected in menu

♪ When modulating the Level with a very fast decaying envelope, the effect is very noticeable, especially in Both mode. In general, traditional vactrol-based gates can open quickly but decay slowly, and this is modeled in Pigments. The decay time depends on the selected mode and is slower in "Both" mode than in VCA mode.

15. FILTER ROUTING AND OUTPUT SECTION

This is the final stage of the audio signal. There are only five controls, but they offer a lot of flexibility.

> ♪ Each control in this section can be a modulation destination. We will learn more about how to make assignments in the Modulation Routings [p.213] chapter.

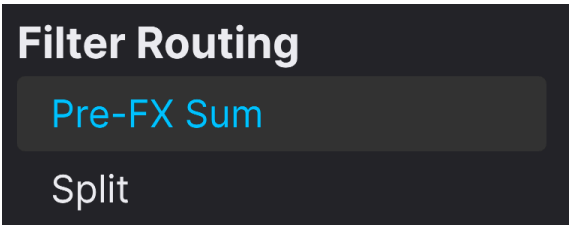
15.1. Filter Routing

sum indicates that filters 1 and 2 are in series

This filter control allows you to determine whether the filters run in Series [p.165] as a pre-FX sum, in Parallel [p.165], or some combination [p.166] of the two. To change the balance between filters, move the filter routing knob.

> ♪ The specific parameters of the different filters are described in the Filters chapter [p.148].

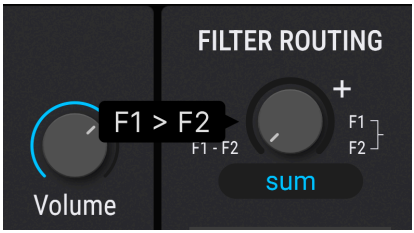
15.1.1. Filter routing drop-Down menu



Below the **Filter Routing** knob is a pup-up menu with two choices that determine how the filters send their signals to the FX busses.

- **Pre-FX Sum**: Both filter signals are summed to feed to the FX section, according to its own Bus A/B routing.
- **FX Split**: Offers the option to send the output of Filter 1 to FX Bus A and Filter 2 to FX Bus B; or send Filter 1 to FX Bus B and Filter 2 to FX Bus A.

15.1.2. Filters in series

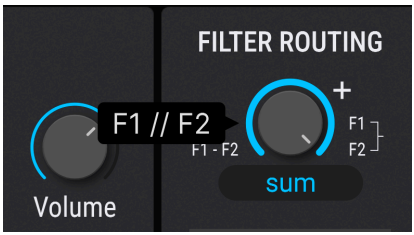


Filters 1 and 2 can be placed in series, which means the output of Filter 1 is fed directly into the input of Filter 2. This allows for incredibly precise filtering of a single signal – especially given all the different filter types offered in Pigments!

To achieve this, drag the **Filter Routing** knob counterclockwise. When the cursor reaches the lowest possible Filter Routing setting the value displayed will change to **F1 -> F2** as shown above. This means the filters are fully in series.

> ♪ If Filters 1 and 2 are placed in series and panned to the opposite extremes (Filter 1 hard left, Filter 2 hard right, or vice versa), no audio signal will be heard from Filter 1. Also, if Filters 1 and 2 are 100% in series and the Filter 2 volume is at zero, no audio signal will be heard at all, even if the filters are bypassed.

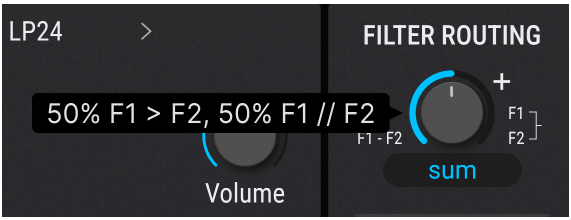
15.1.3. Filters in parallel



The filters can also be placed in parallel, which allows the individual character of each filter to be applied separately and to appear independently at the outputs.

To achieve this, drag the **Filter Routing** knob clockwise when in SUM mode. When the cursor reaches the highest possible Filter Routing setting the value displayed will change to **F1//F2** as shown above. This means the filters are fully in parallel.

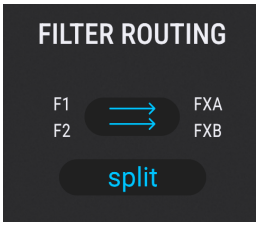
15.1.4. Blending parallel and series



To create a blend of both the series and parallel filter routings, drag the **Filter Knob** to a position midway between its limits. When the Filter Routing setting is anything other than fully clockwise or fully counter-clockwise, the value displayed will change to something like **70% F1 -> F2, 30% F1 // F2** as shown above. The displayed percentages will be different depending on the value you select.

♪ There are hundreds of intermediate settings between series and parallel because this value can be fine-tuned by right-clicking or holding the Control key and dragging the cursor.

15.1.5. Sum versus Split modes



The filter blend knob is not available in FX Split mode

When **Sum** is selected from the pop-up menu, both filter signals are summed to feed to the FX section, according to its own Bus A/B routing.

When **Split** is selected instead, Filter 1 is hardwired to FX bus A and Filter 2 to FX bus B. This *forces* them to run in parallel only. That is why the balance knob disappears.

! The lesson is, the Sum/Split options are *not* equivalent to choosing serial or parallel routing! Given the screen graphics, it's possible to think they are.

15.1.5.1. Split reverse

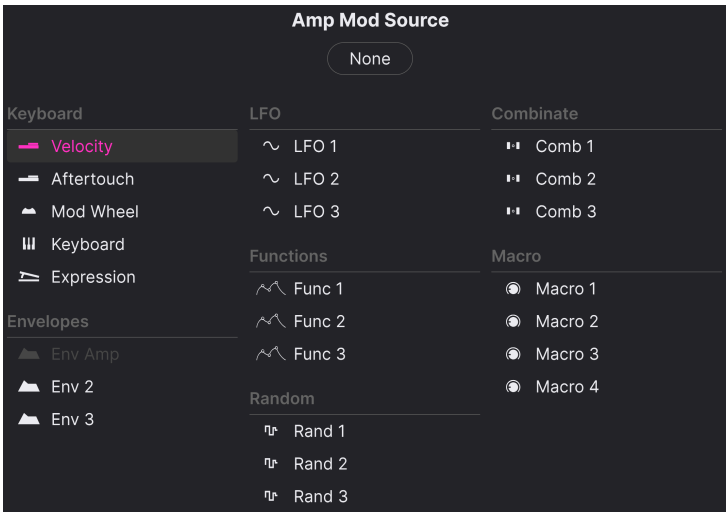
When Split is selected, click on the blue oval to reverse the routing. The arrows will cross over, and now Filter 1 will be routed to FX bus B and Filter 2 to FX bus A. Click again to return to "normal" split routing.

15.2. VCA section

15.2.1. Amp Mod

The output level of each Preset may be modulated by any one of 24 sources: velocity, an LFO, the Modulation Wheel, or one of the more esoteric sources such as a Function Generator or Combinator.

15.2.1.1. Amp Mod sources



Amp Mod sources

To select one of the Amp Mod sources, click the drop-down menu above the Amount control. A checkmark will indicate the current selection. To make a different selection, click the name of the source you would like to use. The menu will close once the selection is made. (Note that Env VCA is greyed-out because it is always hardwired to the output level anyway).

To close the menu without changing the current selection, click anywhere else inside Pigments.

15.2.1.2. Amp Mod amount

Use the knob above the Amp Mod source pop-up to set the amount of amplitude modulation that will be introduced by the source. When the Amount is at 0 (fully counter-clockwise) no modulation will occur to this parameter, and the Preset will always be capable of maximum amplitude.

For example, select the Default preset, which has the Amp Mod source set to Velo (Velocity) and the Amount set to zero. Then do the following:

- Play the same note repeatedly at different velocities. There will be no change in the output level.
- While playing a consistently low-velocity note, increase the Amount. The output level will decrease.
- Leave the Amount control at 1.00 (maximum modulation range) and play notes at a velocity of 127 (maximum)
- Double-click the Amount control to reset it to 0.00 (no modulation range). Max velocity will produce the same output level as when the Amount was set to 1.00.

> ♪ When the Amount is at 0, velocity and other sources might still be modulating oscillator volume or filter settings, for example, so a zero value here does not mean the sound will remain at a constant output level.

Remember also that since there is a Mod ring around the control, it is possible to modulate the Amp Mod amount with another source. For example, you could use keyboard velocity to increase the amount of LFO being applied to the amplitude.

15.2.2. Voice Pan and Send Level

Use the **Voice Pan** control to set the default stereo position of the preset. All triggered voices will start from this position unless a modulation is active.

The **Send Level** knob determines the level at which the sound of the Preset will be passed to the Aux Bus effects chain. It shares the setting of the Send control [p.174] on the FX tab [p.169]; moving one will also edit the other.

16. EFFECTS

FX tabs are selected vertically on the left, with interfaces for each effect in that tab populating from left to right

A good set of audio processing effects is the final polish for your music. This is accomplished through the judicious use of chorus, compression, delay, reverb, and EQ. Effects can also rough things up by adding distortion, bitcrushing, wavefolding, or even some radical EQ settings. And to tie everything together, many effects can be synchronized to the tempo of your song.

Pigments offers three sets of identical effect chains that can be routed in several ways. Each effect chain itself contains three effects processors, for a total of nine effects that can be applied to your sound.

On top of that, everything is MIDI-assignable, and many parameters can be modulated by Pigments' many modulation sources [p.232].

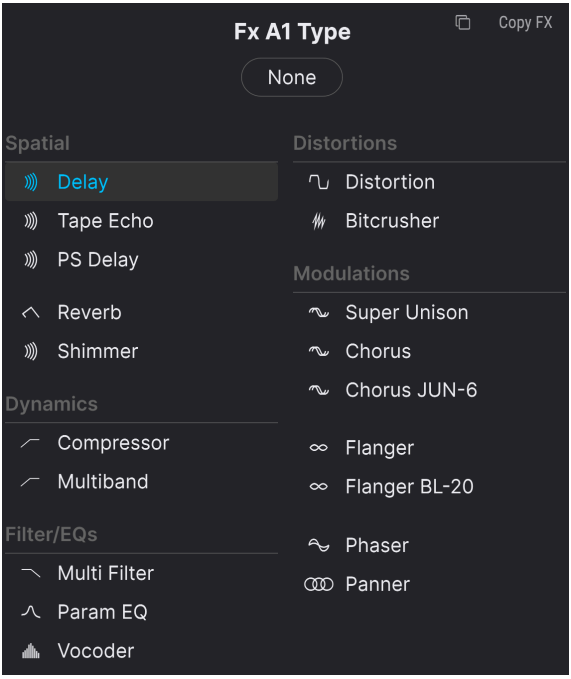
16.1. Common FX features

First, let's survey the features and infrastructure all effects have in common. Each effect chain – FX A, FX B, and Aux – is accessed by selecting its tab. Each tab has three subdivisions, with each of those containing an independent effect processor identical to the others.

Any one of the effects can be placed in any order within an effect chain. For example, if you want EQ → Chorus → Reverb, Reverb → Chorus → EQ, or any possible combination of any of the effects in any order, it can be done. This allows for over 2,500 possible combinations within a single effects bus.

16.1.1. FX selection

To select an effect within an FX tab, click its name field inside its subdivision of the tab. A menu will open and reveal the list of 16 available effects, with the current selection outlined.

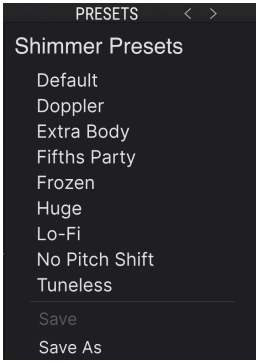


The FX selection menu

Choose the effect you want and the menu will close. You can also keep the current selection; just click the name field again (or anywhere else in the Pigments window) and the menu will close.

16.1.2. Effect presets

Each effect type has factory presets, plus the ability to store and recall your own creations. So if there's one you'd like to "borrow" to see how it works with another Pigments preset, it couldn't be simpler. First, save the edits you've made so you can recall them later. Then click the Presets field inside the effect window and select the one you'd like to audition.



The preset menu for each FX type will be different; this one is for the Shimmer effect

If the factory preset is "almost but not quite" what suits the current project, make a few tweaks and use the Save As feature. Give it a name and it will show up in the User preset area. To delete any non-factory preset, click the X next to its name. to delete it. You will be prompted to confirm.

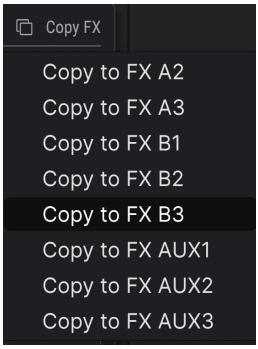
16.1.3. Effect and bus bypass (on/off switches)

All effects have an on/off switch, letting you bypass the effect. When an effect is switched off (bypassed), audio signals will still pass through that effect, but will not be processed. This makes it easy to A/B your wet (effected) and dry (unaffected) signals.

The Pigments busses also have on/off switches. Switching a bus off means that an incoming signal will not be sent through the rest of the bus.

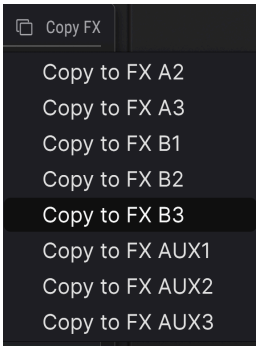
When an effect or bus is switched off, the controls are dimmed and greyed out to make it clear that it is not active. However, it is still possible to make edits to the controls.

16.1.4. Swapping effects



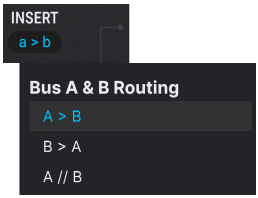
It's easy to experiment with how the sound is affected when the order of the effects is changed. Hover on the effect name in the vertical list in any bus and a four-arrow icon will appear. Drag it to any other blue oval in the vertical lists on any bus. The effect at the destination will swap into the original position of the effect you drag.

16.1.4.1. Copy FX



You can also copy any individual effect to a different slot. Click the double-document icon in the FX type menu for a drop-down of available slots. Copying overwrites the effect in the destination slot; it doesn't swap into the original's position.

16.2. Bus A/B routing



Each effects bus is powerful, but they become even more so when their potential is combined. Bus effects A and B may be routed in series, reverse series, or parallel, by selecting the desired configuration in the Bus A/B Routing section at the very upper left of the Effects view. There are three options

- **Series (A>B):** The signal from Bus A flows into and through Bus B, and from there to the outputs.
- **Reverse series (B>A):** The signal from Bus B flows into and through Bus A, and from there into the outputs.
- **Parallel (A//B):** The signals from Bus A and Bus B flow independently into the outputs.

This setting is not available if Split [p.166] is selected in the Filter Routing panel of the Synth view.

When one of the two series configurations is selected, it is possible to have as many as six effects sculpting your sound at the same time, one after the other.

In addition to that, the FX Aux bus [p.174] can be processing the same signal in parallel to the A/B buses. It has three identical subdivisions too, so there are lots of options.

16.2.1. Bus A and B volume

Use these controls to balance the output of Insert FX buses A and B relative to each other. The behavior is different depending on the configuration:

- **Series:** If the output of FX Bus A is overdriving the input of FX Bus B, reduce its output level and compensate for the reduction by increasing the output of FX Bus B. When the two buses are in reverse series order, reduce the output of B to avoid overdriving A, etc.
- **Parallel:** The output levels of FX buses A and B are independent, so reducing one will not affect the sound of the other.

16.3. FX Aux bus

The FX Aux bus has three effect slots that are identical to those ins FX buses A and B, so everything that you can do with one of those buses, you can do here. The differences is, where buses A and B operate as insert effects, the aux bus uses send-and-return routing. Send and return knobs appear here and in the Play view [p.70], as well as a Send Level knob in the main Synth view.

16.3.1. Aux bus send

The Send control of the Aux Bus determines the level at which any active voices will be sent to the FX Aux bus. It is the same parameter controlled by the Send Level knob [p.168] in the Output section [p.164] of the Synth tab; moving this one will also edit that one. It is identified as the Voice Send Level in the lower tool bar.

16.3.2. Aux bus Return

Use the Aux Bus Return control to balance the output of the FX Aux bus relative to FX buses A and B.

> ♪ There will be no sound output if all three of the FX buses have their output volumes set to zero (-70.0 dB). To hear a dry signal, select the None setting for all active effects or change the Dry/Wet balance to 100% dry for each effect.

16.3.3. Pre/Post FX switch

The blue oval above the send and return knobs toggles the aux bus pre- or post- buses A and B. This allows applying send effects to sound that has already been processed with insert (A and B) effects. Prior to Pigments 5, the Aux bus was pre-FX only. With the Post option, it's easier to use the Aux bus for the final polish on the sound after buses A and B have crafted its main personality.

16.4. Effect types and parameters

Effects in Pigments are organized into six types, as shown in the FX type menu: Spatial (delays and reverbs), Dynamics, Filter/EQs, Distortions, and Modulations. This next section covers all the parameters of each of the 19 effect types available as of Pigments version 6. New as of Pigments 6 is the Vocoder [p.184] effect.

16.4.1. Delay

The Delay effect

A delay can increase the spaciousness of a sound by providing echoes within the stereo field. It can also be used as a rhythmic counterpoint to accentuate a groove. This effect supports full stereo thanks to its stereo in, stereo out design.

Control	Description
Dry/Wet	Controls the balance between the input signal and the delayed signal
Time / Time Div	Changes the length of the delay, with synced and asynchronous options
Fine	Lets you fine-tune the delay time (set by the Time / Time Dev. knob) with +/- 30ms of delay time. The default 12:00 position provides 0ms delay. Turning the knob clockwise adds to the overall delay time whereas turning counter-clockwise reduces from the delay time.
Feedback	Adjusts how many times the delay will repeat
HP Freq	Higher values cause increased reduction of low-frequency content with each echo
LP Freq	Higher values cause increased reduction of high-frequency content with each echo

Control	Description
Stereo Width	Higher values increase the distance between the left and right iterations of the echoes
Ping Pong	Toggles alternating left/right echoes with exact rhythmic spacing

16.4.2. Tape Echo

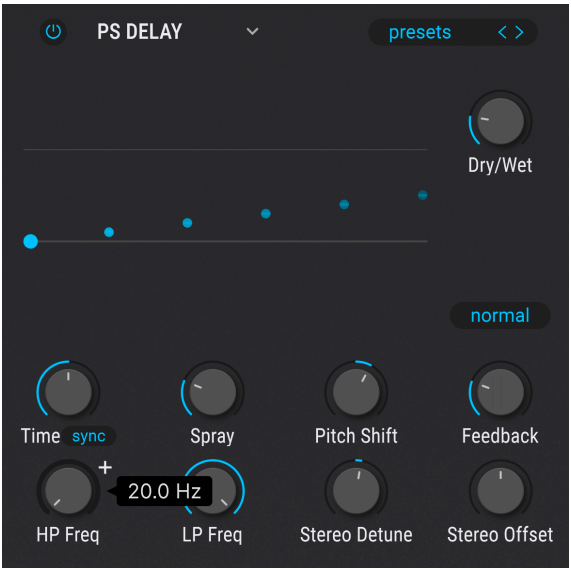
The Tape Echo effect

Tape Echo is an effect similar to the Delay effect (described above) except that the effect traditionally relies on analog tape loops. The Tape Echo effect within Pigments models the analog warmth and tape saturation to create a fantastic analog-style delay that is different from the other Delay effect described above.

Control	Description
Dry/Wet	Controls the balance between the input signal and the echoed signal
Input Vol	Adjusts the incoming signal to achieve varying amounts of analog saturation (or even distortion) which is then repeated.
Time / Time Div	Changes the length of the delay, with synced and asynchronous options
Fine	Lets you fine-tune the delay time (set by the Time / Time Dev. knob) with +/- 30ms of delay time. The default 12:00 position provides 0ms delay. Turning the knob clockwise adds to the overall delay time whereas turning counter-clockwise reduces from the delay time.
Intensity	Sets the feedback amount of the delayed signal.

Control	Description
Stereo Width	Higher values increase the distance between the left and right iterations of the echoes
Ping Pong	Toggles alternating left/right echoes with exact rhythmic spacing

16.4.3. Pitch Shifting Delay



The Pitch-Shifting Delay effect

This effect is like an analog delay, but with control over how the delayed signal shifts in pitch relative to the incoming signal.

Control	Description
Time / Time Div.	Sets delay time, with drop-down options for syncing to straight, triplets, or dotted values.
Dry/Wet	Controls the balance between the input signal and the delayed signal
Stereo Offset	Offsets the delayed signal in the stereo picture
Harmonize Mode	Button selects Normal, Octave Up, or Octave Down
Feedback	Controls how much of the delayed signal feeds back into the effect to be delayed again.
Stereo Detune	Detunes the delayed signal relative to the incoming signal
Pitch Shift	Adjusts the amount that the delayed signal is pitch-shifted relative to the incoming signal
Spray	Adds jitter to the delay time
HP Freq	Controls the cutoff of a highpass filter that affects the delayed signal only
LP Freq	Controls the cutoff of a lowpass filter that affects the delayed signal only

16.4.4. Reverb

The Reverb effect

A Reverb effect creates a large number of echoes that gradually fade or "decay". It simulates how the input would sound in a room or a large space.

Control	Description
Dry/Wet	Controls the balance between the input signal and the reverberated signal
Input LP	Reduces the high-frequency content before processing
Input HP	Scoops out the low-frequency content before processing
Pre-delay	Sets the amount of time before the input signal is affected by the reverb
Decay	Determines the length of time the reverb effect will last
Size	Adjusts the size of the room: counter-clockwise is smaller, clockwise is larger
Damping	Controls the rate at which the high frequencies decay
MS Mix	Adjusts the reverb from mono to an increasingly wide stereo space

16.4.5. Shimmer

Shimmer is a reverb with a couple of twists: a feedback loop that feeds the output into a pitch shifter, and a ducking control so you can sidechain the reverb off the input signal.

The Shimmer effect

Control	Description
Dry/Wet	Controls the balance between the input signal and the reverberated signal
Pitch Shift	Sets the pitch shift amount in semitones
Feedback	Adjusts the level of the signal fed into the pitch shifter
Size	The size of the virtual reverb room
Modulation	Sets the amount of modulation applied to the reverberated signal
HP Freq	Sets cutoff of the input highpass filter
LP Freq	Sets cutoff of the input lowpass filter
Ducking	Applies sidechain to the reverb output based on the input signal
Stereo Width	Varies the width of the reverb signal from mono to wide stereo
Harmonize Mode button	Sets the range at which the pitch-shifted signal relates to the input: Normal, Octave Up, or Octave Down

16.4.6. Compressor

The Compressor effect

A compressor is generally used to help maintain a consistent level of sound, though there are many other ways to use one.

For example, it can keep the attack transients of a sound from overloading the input of the next effect. It can also help a sound which would normally decay quickly not to fade away as quickly.

Control	Description
Dry/Wet	Controls the balance between the input signal and the compressed signal
Threshold	Sets the level where compression will begin
Ratio	Determines the amount of compression to be applied once the threshold is reached
Makeup	Enables automatic control of the output level
Attack	Adjusts the speed with which the compression will be applied once the threshold is reached
Release	Sets the release curve of the compressor
Output Gain	Use this to compensate for changes in volume if compression settings lower the output gain
Reduction meter	Provides visual feedback about the amount of compression being applied to the sound

16.4.7. Multiband

The Multiband Compressor effect

Being able to compress different parts of the frequency spectrum separately is a key technique in modern music production. Pigments' Multi-Band Compressor offers up to 3 independent bands and expansion of quiet signals as well as compression of loud ones.

Central to its operation are the three bar-shaped columns. These represent the threshold and ratio of each band. The upper bars control compression; the lower bars, expansion.

Control	Description
Threshold	Drag the top or bottom of a bar to adjust the point at which the compression (or expansion) starts working

16.4.8. Multi Filter

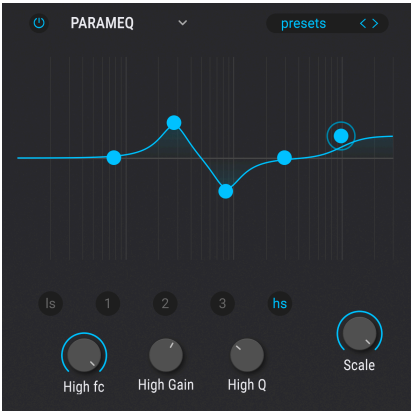
The Multi Filter effect

As if having two incredible filters weren't enough, Pigments provides yet another in the FX section. It has all of the essentials in 12- , 24-, and 36 dB/octave forms, each with lowpass, highpass, and bandpass options. Both comb filter types are available here, too: CombFB (Feedback) and CombFF (Feedforward).

Use this effect to carve out or emphasize harmonics in the final sound. And don't forget that you can modulate anything with anything!

Control	Description
Dry/Wet	Controls the balance between the input signal and the effected signal
Freq / Comb Freq	Sets corner frequency/frequencies for the filter: 20-20kHz (LP/HP/BP) or 20-2kHz (CombFB/FF)
Q	Increases or decreases the amount of emphasis at the corner frequency / frequencies
Mode	Chooses the filter type: lowpass, highpass, bandpass, notch, comb feedforward, or comb feedback
Slope	Click the field and drag up/down to select the filter steepness (LP/HP/BP only)

16.4.9. Param EQ



The Parametric EQ

Pigments offers a five-band fully parametric equalizer. An equalizer (EQ) selectively amplifies or attenuates frequencies in the frequency spectrum. A parametric EQ allows you to adjust the range that will be affected by its frequency bands (i.e., the Q, or width).

Many parametric EQs take the easy way out and use shelving EQs for the lowest and highest frequency ranges, but Pigments allows you to adjust the Q for all 5 frequency bands.

The circles in the picture correspond to the controls below the curve visualizer. The circles may be dragged around, which adjusts the frequency and the gain of the selected band at the same time. A right-click on the circle will adjust the width of that band as you drag the cursor up and down.

You can also select a particular EQ band by clicking on its tab below the curve visualizer.

Control	Description
Curve visualizer	Provides visual image of EQ curves
Low / Peak X / High fc (frequency)	Sets center frequency of band: Low 50-500 Hz; mids 40-20kHz; High 1k-10kHz
Low / Peak X / High gain	Each control adjusts the gain of its EQ band
Low / Peak X / High Q	Sets width of band: Low / High range: 0.100 - 2.00; Peak X ranges 0.100 - 15.0
Scale	Controls the gain of all EQ stages at the same time
Ratio	Drag inside of a bar to adjust the amount of compression for that band. Increasing ratios are depicted by denser horizontal lines, until the bar turns blue at maximum

Control	Description
Band On/ Off Icons	The high and/or low bands may be switched off, resulting in a 2 or 1-band compressor/expander
Low-Mid Crossover	Drag on this field, located above the low band, to change the crossover point between the low and mid bands
Mid-High Crossover	Drag on this field, located above the high band, to change the crossover point between the mid and high bands
Above/ Below Toggle	This drop-down above the mid band selects whether the bars for both compression and expansion (Abv&Blw), or just the bars for compression (Above Only) are displayed
Input	Sets the Multi-Band Compressor's overall input gain
Amount	Sets the overall compression/expansion while preserving the ratio and threshold differences between the bands
Attack	Sets the time it takes for the compressor/expander to "grab" the signal once a threshold is reached
Release	Sets the time it takes for the compressor/expander to "let go" of the signal once the signal falls beneath the threshold
Band Outputs	Each band has its own output level control to the master bus. This is also called makeup gain
Main Output	Located at right, the main Output knob governs the overall makeup gain while preserving the difference in output between the bands

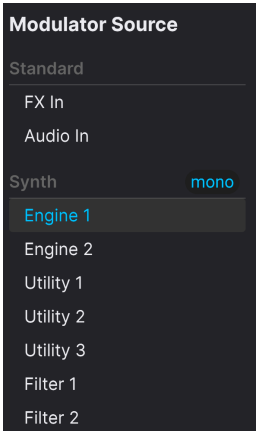
! Using a ratio below 1:1 on the expansion bands can add a *huge* amount of unexpected gain, overwhelming loudspeakers and ears.

16.4.10. Vocoder

The Vocoder effect

A vocoder imparts the envelope and formant characteristics of one signal (the modulator) onto another (the carrier) using an array of band-pass filters. Using a vocal as the modulator and synthesizer as the carrier, for example, is how pioneering electronic musicians like Kraftwerk created their signature robot voice effects. In Pigments' vocoder, the carrier is the Vocoder input signal. This means that part of your vocoded signal could include effects (e.g., delay) applied in the FX chain upstream of the Vocoder.

For the modulator signal, is a choice via a pop-up menu:



The Modulator selection menu in the Vocoder

The rest of the parameters are as follows.

Control	Description
Dry/Wet	Controls the balance between the input signal and the effected signal
Mode	Pop-up menu: Vintage, Modern, Dirty
Enhance	Smooths the carrier signal spectrum for better intelligibility
Bands	Sets the number of bandpass filters applied (more = increased detail)
Low bound	Numerical field; cutoff frequency of lowest vocoder band
High bound	Numerical field; cutoff frequency of highest vocoder band
Bandwidth	Sets the width of the filter passbands
Formant	Applies formant-shifting to the carrier; adjust for vowel-like character
Decay	Sets decay time of envelope followers that control the bandpass filters
Gate	Minimum amplitude of signal needed to open a filter band; like a threshold
Sibilance	Emphasizes "S" sounds to improve intelligibility
Freq Tilt	Adjusts the decay time of all bands relative to their cutoff frequencies

16.4.11. Distortion

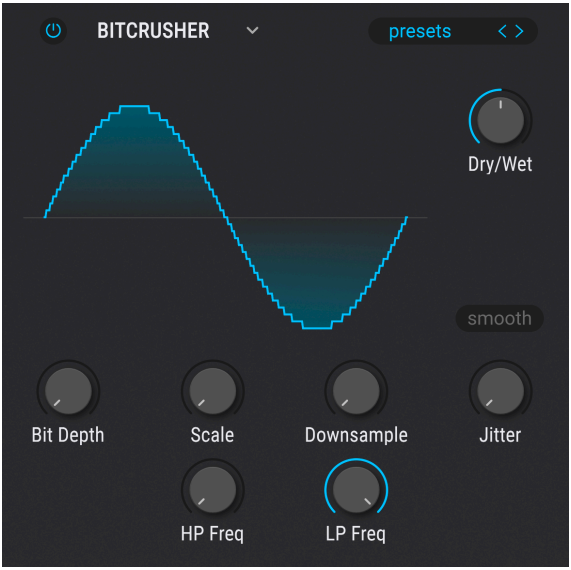
The Distortion effect

Distortion in Pigments goes far beyond the typical fuzz pedal effect, though it can certainly do that. Thirteen new algorithms cover everything from soft clipping to analog tape saturation to wavefolding. There's also an integrated multimode filter that can be routed pre- or post-distortion.

Control	Description
Dry/Wet	Controls the balance between the input signal and the distorted signal
Drive	Sets the distortion amount
Auto	Engages automatic gain compensation to avoid undesired loud peaks
Type	Pop-up menu to select algorithm type
Out Gain	Use this to compensate for increased output gain caused by the other settings
Filter on/off	Toggles integrated filter in or out
Filter menu	Pop-up selects filter passmode and slope
Cutoff	Adjusts cutoff/center frequency of integrated filter
Resonance	Adjusts resonance of integrated filter
Slope button	Selects the filter steepness, 12, 24, or 36dB-per octave
Routing	Places filter pre- or post-distortion
Dark	Adds a fixed low-pass filter post-distortion

♪ The Dark filter is independent of the integrated filter, with a cutoff frequency of 6kHz and a slope of 12dB per octave.

16.4.12. Bitcrusher



The BitCrusher effect

This bit-reducing effect offers several ways to deconstruct the sound. As the number of bits used to express the sound is reduced, details will gradually disappear.

Downsampling is another form of audio entropy that can provide just the right measure of de-evolution to your sound. As the sample rate is reduced, aliasing is introduced in the higher harmonics, which can produce sub-harmonics as well. For a truly lo-fi experience, the sample rate can be reduced to as low as 1/80th of the original.

Control	Description
Dry/Wet	Controls the balance between the input signal and the crushed signal
Bit Depth	Reduces the number of bits used to render gradations in amplitude. Range: 1.50 to 16.0 bits
Downsample	Divides the sample rate used to represent the signal. Range: 1.00x to 80.0x
Scale	Increases bit quantization precision at lower volumes
Jitter	Adds randomness to the downsampling frequency
Smooth	Activates a gentler mode of bit-crushing
HP Freq	Sets cutoff of the input highpass filter
LP Freq	Sets cutoff of the input lowpass filter

16.4.13. Super Unison

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

> Super Unison processes the output of all voices, saving a lot of CPU usage. It might sound a bit different from regular unison in some situations.

The Super Unison effect

Control	Description
Dry/Wet	Controls the balance between the input signal and the unisoned signal
Voices	Sets the number of unison voices
Detune	Determines the detuning amount
Rate	Adjusts the speed of modulation applied to the detuning
Stereo Width	Adjusts the spread of the voices across the stereo picture
Retrig	When engaged, the voices' phase are reset when a key is pressed
HP Freq	Controls the cutoff of a highpass filter that affects the processed signal only
LP Freq	Controls the cutoff of a lowpass filter that affects the processed signal only

16.4.14. Chorus

The Chorus effect

A Chorus effect is similar to a flanger, except the range of the delay time prior to modulation is longer than that of a flanger. This results in a more subtle but still very interesting effect.

Control	Description
Dry/Wet	Controls the balance between the input signal and the chorused signal
Delay	Sets the amount of delay applied to the input signal
Depth	Controls the depth of the chorus
Rate	Adjusts the speed of the chorus
Feedback	Adjusts the amount of chorused signal that is fed back into the effect
Voices	Selects the number of delay lines the chorus will use, with a different starting phase for each voice
Square	Toggles modulation LFO between sine and square waveforms
Stereo	Switches the chorus between mono and stereo output

16.4.15. Chorus JUN-6

The JUN-6 Chorus effect

A popular Japanese synthesizer used a chorus effect to fatten up its single oscillator. This sound has become sought after in its own right, and this effect models it perfectly.

Control	Description
Dry/ Wet	Controls the mix of dry and chorused signals
Rate	A pop-up selects whether the rate is in absolute Hz or syncs to binary, dotted, or triplets values relative to master tempo
Depth	The depth of the chorus effect in milliseconds
Phase	The phase of the chorused signal relative to the dry signal

♪ Use two JUN-6 choruses in FX Busses A and B with different phase settings for a super wide stereo image.

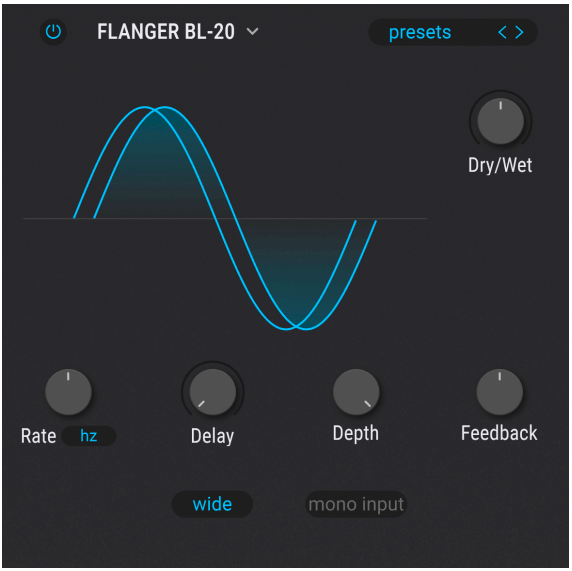
16.4.16. Flanger

The Flanger effect

Flanging works by mixing two identical signals together, with one signal delayed by a small and gradually changing period. This produces a swept "comb filter" effect.

Control	Description
Dry/Wet	Controls the balance between the input signal and the flanged signal
Delay	Adjusts the length of the delay, which changes the harmonic content
Depth	Sets the modulation depth
Rate	Controls the modulation rate for the delay time, including sync and freerun options
Feedback	Adds feedback for a harsher or "ringing" sound. Maximum is 99% to avoid runaway feedback
LP Freq	Use this to define the amount of high-frequency content that will enter the flanger effect
HP Freq	This determines the amount of low-frequency content that the flanger effect will receive
Negative	Changes flanger feedback to subtractive rather than additive
Stereo	Will switch the flanger output between mono and stereo
Triangle	Toggles the modulation LFO between sine and triangle waveforms

16.4.17. BL-20 Flanger

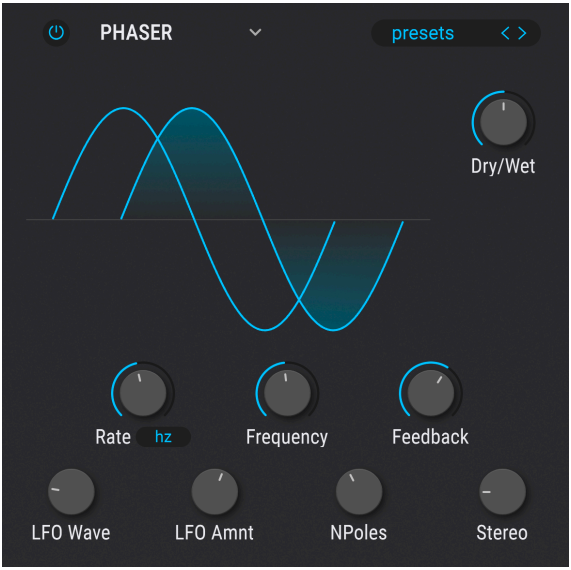


The BL-20 Flanger effect

This emulates the sound of the Bel BF-20, a rare flanger from the 1970s. Its sound is achieved by modulating a delayed version of your signal using an LFO.

Control	Description
Rate	Rate of the LFO that modulates the delayed signal. A pop-up selects whether the rate is in absolute Hz or syncs to binary, dotted, or triplet values relative to master tempo
Dry/Wet	Controls the mix of dry and flanged signals
Delay	Adjusts the audible depth of the flange effect
Feedback	Sometimes called regeneration, this adjusts the amount of effected signal feeding back into the flanger.
Depth	Adjusts the depth of the LFO that modulates the delayed signal
Wide	Provides a wider stereo image by inverting the phase of the LFO modulating the right channel
Mono Input	When engaged, optimizes the flanger for processing a monaural signal

16.4.18. Phaser



The Phaser effect

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

Control	Description
Dry/Wet	Controls the balance between the input signal and the phase-shifted signal
Frequency	Sets the harmonic center for the modulation effect
Feedback	Controls the amount of phaser resonance
LFO Wave	Selects one of six modulation waveforms: Sine, Triangle, Saw, Ramp, Square, Sample & Hold
LFO Amnt	Determines the depth of the modulation effect
Rate	Controls the speed of the phaser effect, with sync options and without
N Poles	Determines the steepness of the filter frequency response
Stereo	Gradually changes the phaser from mono to stereo output

16.4.19. Panner

The Stereo Pan effect

This is an LFO-driven effect that moves the signal from left to right in the stereo field. It can move the signal left and right ever-so-slightly from center, or it can swing wider and wider until it covers the entire range. It can also refrain from panning low-frequency signals, creating a sense of stability in the bass.

Control	Description
Mono Bass	When engaged, low frequencies will not be panned
Cutoff	Selects the frequency below which panning stops when Mono Bass is engaged.
Amount	Controls the amount of deviation from center
Rate	A drop-down menu selects whether the rate is in absolute Hz or syncs to binary, triplets, or dotted values relative to master tempo
Invert Button	Inverts the LFO output, thus changing the "direction" of panning
Natural/ Linear Toggle	Natural mode balances the dry and panned signals; in Linear mode you hear the panned signal only

17. SEQUENCER AND ARPEGGIATOR

The full Sequencer/Arpeggiator window in Sequencer mode

The importance of step sequencers and arpeggiators in today's music cannot be overstated. There's something inspiring and intriguing about them to creators and their audiences; the way the rhythm and sound interact over time makes the music seem multi-dimensional, at times transcendent.

The Sequencer/Arpeggiator in Pigments achieves an artful balance between user input and the spontaneous generation of data. Pigments allows your music to evolve as you direct the process as much or as little as you like.

> ♪ Perhaps no song has done more to cement the sequencer into history than "I Feel Love" by Donna Summer. Producer Giorgio Moroder used an analog step sequencer to craft its iconic bass line.

The basic operation of the Sequencer/Arpeggiator is visually intuitive:

- Rows are tracks [p.198] that determine pitch and other sonic attributes.
- Columns are steps in the pattern.
- Slide the bar in any cell up or down to change the value for that track at that step.

You can also "paint" values for adjacent steps within the same track.

- Click inside the value bar for one of the steps and drag the cursor horizontally across that track.
- If you accidentally cross over into another track, don't worry; as long as you hold the mouse button the only values that will change are those within the original track.

> ♪ If you are working without a MIDI controller – like on a laptop while traveling - you can keep the sequence running as you adjust it by using the Hold button [p.233] in the Keyboard tab. This can be viewed at the same time as the Sequencer.

17.1. Sequencer features

First, let's have a look at the features in Sequencer mode. *Most* of these are shared with Arpeggiator mode unless otherwise noted. Features exclusive to the Arpeggiator mode are detailed in their own section [p.206] towards the end of the chapter.

Left to right: on/off button, mode selection, and padlock icon

17.1.1. MIDI Output

Pigments outputs MIDI so that any patterns generated by the Sequencer or Arpeggiator can drive other virtual instruments or hardware instruments connected to your DAW via a MIDI interface.

17.1.2. On/Off button

This mirrors the button next to the **Seq** selection in the upper toolbar, and turns the entire Sequencer/Arpeggiator on or off without losing any of its settings. Graphics in the main grid disappear in the off position, but reappear at their most recent values when turned back on.

17.1.3. Seq/Arp Mode Selection

Select the desired mode by choosing the Sequencer or Arpeggiator button. Playback will begin with the first incoming MIDI note. To stop playback, make sure any sustain pedals or Hold buttons on your controller are disengaged, then let go of the note(s). To prevent a Sequence or Arpeggio from launching when a note is played or received, ensure the Sequencer/Arpeggiator is turned off.

17.1.4. Seq/Arp Lock

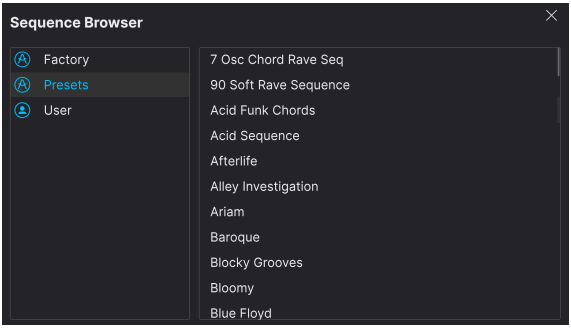
When engaged, the padlock icon shown above ensures the Seq/Arp patterns and other settings remain the same even if you change Presets. This is very useful if you like the groove you've created and want to find the perfect sound for it.

17.1.5. Pattern clear

The eraser icon just to the right of the pattern name (see next image below) resets all steps on all tracks [p.198] to their default values.

17.1.6. Sequencer pattern browser (Sequencer mode only)

In previous versions of Pigments, the sequencer pattern was saved as part of the overall sound Preset. By popular demand, Pigments 5 has added the ability to treat patterns as separate entities you can save and recall regardless of Preset.



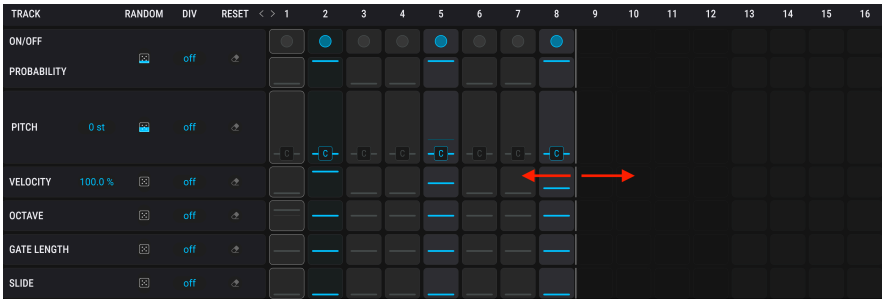
Patterns are organized into three categories:

- **Factory:** All factory Sequencer patterns in Pigments, including Init pattern.
- **Presets:** Any Patterns that have been saved as part of an overall sound Preset.
- **User:** All user-created patterns.

You can step through patterns serially using the left and right arrows, or click the disk icon to save a pattern you have created – a dialogue box asking you for a name will pop up. All pertinent Sequencer settings are saved, not just the pattern data. Click the pattern name to open the pattern browser. Of course, you can still save a given pattern as part of the Preset, and it will be there in the Sequencer when you select that Preset.

17.1.7. Pattern Length

The maximum length of a pattern is 16 steps. But this can be adjusted to any value between 1 and 16 steps, so when combined with the various tempo sync options, some very interesting time signatures can be achieved.



To change the length of the entire pattern, click and hover on the vertical grey line at the end of the last step in the pattern. The cursor pointer will change into a left/right arrow. Next, move the line horizontally and release it at the desired step length.

There's also a way to set each track to an independent length. This feature is called Polymetry [p.202].

17.1.8. Tracks

The largest section of the Seq/Arp window has six parallel tracks, each of which represents a different type of data that can be manipulated and sent by the Arpeggiator or the Sequencer, whichever is active.

Here's a quick breakdown of what each track contains.

17.1.8.1. On/Off and Probability

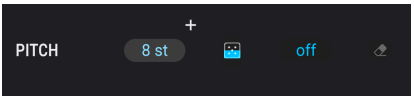
The on/off button in each column can simply silence the corresponding step in the pattern.

The Probability parameter allows you to introduce a level of uncertainty in the likelihood that a given step will play back when it is reached. If you always want a certain step to trigger, set this parameter to 100%. If you want silence at that step every time, set its Trigger Probability value to 0% or just turn the step off.

17.1.8.2. Pitch (Sequencer only)

Each step in the Pitch track can have its own semitone value within a one-octave range. There is a separate track for the octave value, as described in the next section.

By default the Pitch values conform to a chromatic scale (12 notes). You can conform the available values to specific musical scales in the Scales [p.205] menu.



Drag up or down on the numerical field to the right of the word PITCH to transpose the *entire track* in semitones.

Note that this parameter can be a modulation destination and applies upstream of any scale [p.205] you have applied. This means you can modulate the transposition but still stay within your scale.

♪ The Pitch track is not available in Arpeggiator mode because pitch values are defined by incoming MIDI data. Sequencer mode displays pitches relative to the key of *C*, but the sequence will transpose to whatever note you play on a controller. If you play more than one note at a time, the sequence will play polyphonically up to the number of voices allocated via the Play Mode [p.42] setting.

17.1.8.3. Velocity

Each step of the Velocity track can have a different value between 1 and 127. The result can be affected by an incoming MIDI note combined with the setting of the velocity percentage.

Drag up or down in the **Percentage** field of the track to adjust the balance of incoming MIDI velocity to each step's velocity.

- At 0%, only MIDI input velocity is used, and is applied on all steps.
- At 100%, only velocity as set for each step is used.
- At values in between, a ratio is applied.

♪ Since you can use velocity as a modulation source for lots of things other than the volume of notes, this track offers a lot of creative possibilities.

17.1.8.4. Octave

Each step of the Octave track can be set to a value within the range of +/- 2 octaves. The pitch value has its own track, as described in the previous section.

17.1.8.5. Gate Length

Individual steps within the sequence can have different Gate Length times by adjusting this parameter. The range is from 5% of the full step (very short) to 400%, which will make the note sustain for four full steps.

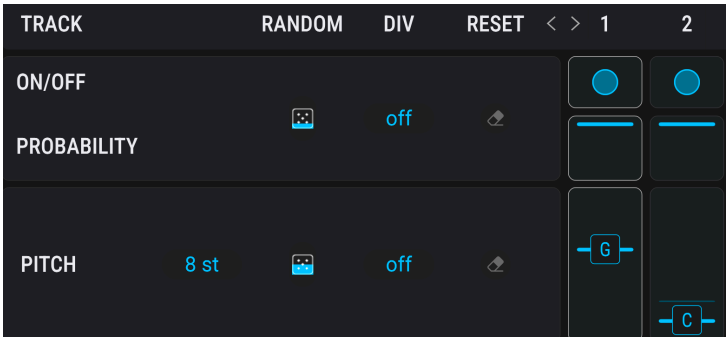
The result can be affected by the Play Mode setting in the lower tool bar. For example, if the Play Mode is set to Poly 16, any notes longer than 100% of the step value will continue to sustain until their Gate Length has been reached. But if the Play Mode is set to Mono or Legato, any notes longer than 100% of the step value will be cut off if one of the later steps triggers before the Gate Length duration for the original step has been reached. This is similar to what happens when a mono lead sound is played in a legato manner.

17.1.8.6. Slide

This controls the speed at which the pitch value of the current step will transition from the pitch value of the preceding step.

The Slide time is always expressed in milliseconds (ms).

17.1.8.7. Other track settings



Each track has a handful of further settings. A couple of them have to do with randomness created by the Generation [p.203] section, which we haven't gotten to yet. But we know you're looking at them so we'll give brief descriptions here.

Random: Click the dice icon on a track to generate an entirely new set of random values for all steps in that track. Drag up or down on the dice icon sets the amount of randomness applied to that track.

Div: This is a simple rate divider for each track. Click here to bring up a menu that divides the overall rate [p.201] from half to one-sixteenth.

Reset: The "eraser" icon resets all steps in the track to their default values. Remember, you have the History [p.42] menu if you hit this one by accident!

Rotation: The left-right arrows to the left of the first step shift steps horizontally, by one step for each click. For example, clicking right in a 16-step sequence would turn step 1 into step 2, and so on, all the way until the final step becomes the new step 1.

Random lock: Hover over a column number to view a padlock icon (as with step 2 in the screenshot). Locking this will disable any randomness created in the Generation section for that step.

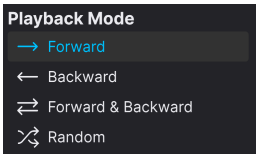
17.1.8.8. Shift-drag to edit entire track

Holding Shift while dragging the value bar for one of the steps in any track will change the values of *all* the steps in that track. They will keep their proportions to each other until any steps reach the minimum or maximum value. Keep dragging, and those steps will remain at minimum or maximum while the other steps "catch up."

17.1.9. Playback settings

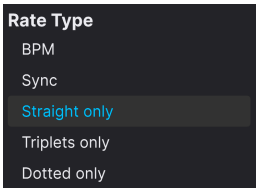
Also shared by Sequencer and Arpeggiator modes are the Playback settings, which govern overall pattern behavior.

17.1.9.1. Playback mode



Click on the **Mode** menu to change the order in which the steps are played. The options are forward, backward, continuous forward and backward (the pattern "bounces" when it reaches the beginning or end), and random order.

17.1.9.2. Rate and tempo sync



The rate of the Sequencer/Arpeggiator can free-run or sync to your project tempo. Click the box under the Rate knob to see the options:

- **BPM:** Absolute beats per minute, independently of your host/project tempo
- **Sync:** Either a division or a multiple of musical bars relative to your DAW tempo, with the knob sweeping through straight, triplet, and dotted feels
- **Straight only:** Rate knob only applies even rhythmic subdivisions of musical bars
- **Triplet only:** Three eighth-notes are played in the space of one quarter-note
- **Dotted:** A pair of eighth-notes played as a dotted eighth then a sixteenth (the ratio of their duration is 75/25%).

17.1.9.3. Swing

Swing is often described as a "behind the beat" rhythmic feel, and Pigments has a range of 50 to 75 percent, which you change by dragging up or down on the number. Fifty percent represents a "straight" feel.

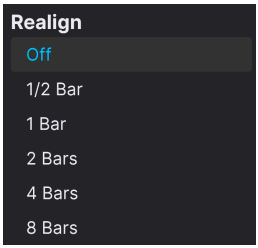
17.1.9.4. Polymetry

Polymetry mode enables separate step lengths for each track

Click the **Polymetry** button to enter Polymetric mode. Instead of one vertical handle [p.197] to set the pattern length, you can now access separate handles for each track.

The positions of each of these handles means that the pattern will reset to step 1 at different times with respect to that row's attribute (pitch, probability, etc.). This lets you mix things up so that a given step may sometimes play at a different octave, have or not have a slide, and so forth. This can be a powerful tool for making sequences more varied and less robotic sounding.

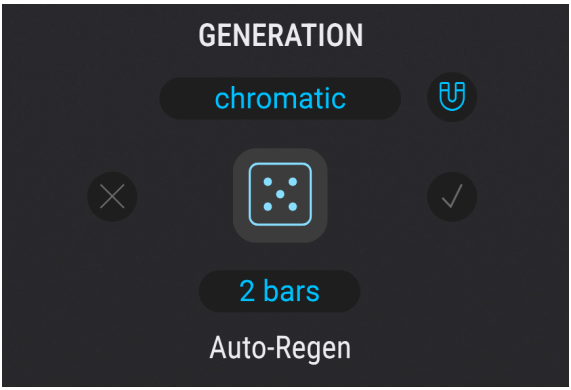
17.1.9.5. Reset



The lengths you choose for each track can loop that way *ad infinitum*. But you can also instruct the tracks to reset to their beginnings (realign) after a certain amount of time if you like. Click on the **Reset** field to set the number of steps at which the pattern will "realign" to step 1. This works both with and without Polymetry.

17.1.10. Generation section

As if you weren't having enough fun already, the Generation settings are more fun than a barrel of monkeys and their typewriters. They effectively allow one-click pattern creation in both the Sequencer and Arpeggiator modes. We used to call this the Randomizer section – and randomness certainly is available – but our philosophy is that *you* control exactly how much chaos applies.



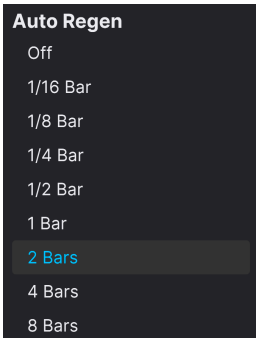
As we mentioned when introducing track settings [p.200], each track can generate random data, independently of the other tracks and within the boundaries you set. In addition to the per-track controls, you can configure randomization to occur across all tracks at a certain time, via the Auto-Regen [p.204] setting.

17.1.10.1. Regen button

Click the large dice icon in the Generation section to spawn a new set of random values for tracks. You can limit the range of randomness per track using the smaller dice icons [p.200] located in each track. If a track's randomness is set at zero, Regen will not affect that track.

You can click the Regen (regeneration) icon at any time whether the sequence is running or stopped.

17.1.10.2. Auto Regen



Clicking the name field below the large dice icon brings up the menu shown above. This sets a time interval at which the Sequencer/Arpeggiator will generate a new set of random values. The selection you make here will delay randomization for up to eight musical bars, or accelerate it by up to 1/16 of a bar. This sheds some light on why we call this the "Generation" section: between this setting and the randomness adjustments per track, you can craft patterns that border on truly generative music, never quite playing the same phrase twice. This is the equivalent of "rolling the dice" to see what values will appear.

17.1.10.3. Clear random values

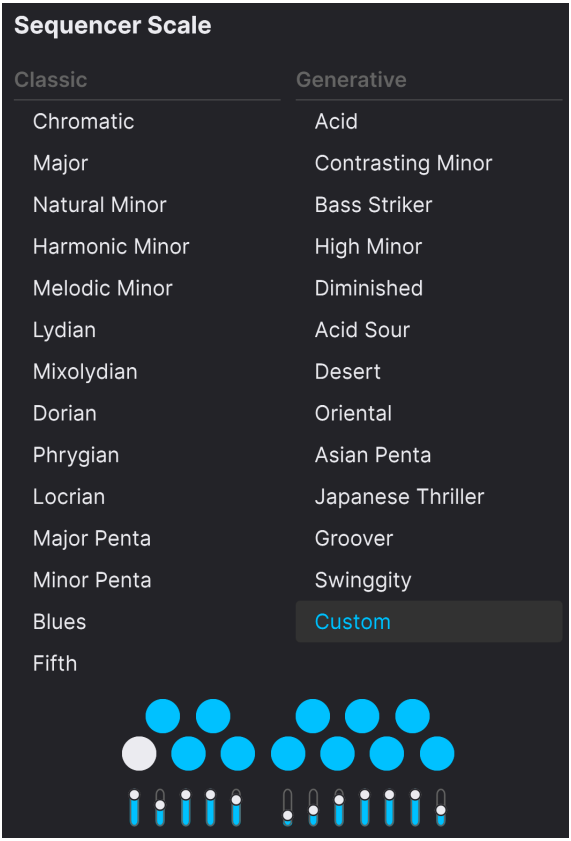
The large **X** icon clears any random values that have been generated. Unlike the eraser icons in each track, it does *not* return all steps to their default values, instead preserving the original pattern before randomness was applied.

17.1.10.4. Apply random values

If you'd like to make a randomly-generated set of values a permanent part of the pattern, click the "checkmark" icon. The current values will become the defaults for the pattern, and the ones stored if you save the pattern in the browser [p.197].

17.1.11. Sequencer scales (Sequencer mode only)

A powerful musical tool is exclusive to the Sequencer mode. You can conform the Pitch track to a number of scales by clicking on the name field ("Chromatic" by default) and selecting from the following menu:



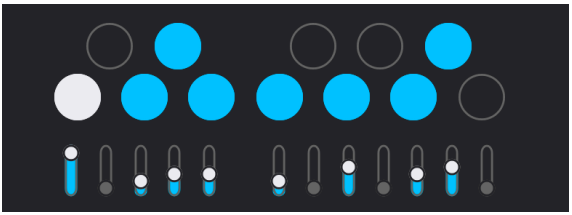
The *Classic* scales are from traditional music theory. The *Generative* scales are designed to work excellently in combination with the Generation section's randomizing power, especially in modern electronic music contexts.

At the bottom of the scale menu is an interface that lets you edit any scale. The root note (white) is always active. Other active notes are lit in blue; inactive notes are grey. The sliders below each note adjust the probability that note will be generated when you click the Regen button or an Auto-Regen cycle begins.

17.1.11.1. Snap to scale

The button that looks like a magnet causes all values in the Pitch track to snap to notes in the currently selected scale. When it is active, notes generated randomly by Regen (manual or auto) are also constrained to the active scale.

17.1.11.2. Custom scales



Select *Custom* from the Generative scales to create your own scale using the above interface. This set of controls can also edit any existing scale. If you save the sequencer pattern (or overall Preset), your Custom settings will be saved, too.

> ♪ Here's how to think of the relationship between the note sliders and the dice icon in the Pitch track [p.200], which governs overall pitch randomness. That dice icon increases the odds that at any step, a different note is going to be played than the one you've chosen for the step. Then, in terms of *what* that alternate note is going to be, the individual sliders here give each note in the selected scale an advantage or disadvantage. It's like a prize drawing: The winning ticket is chosen blindly out of a hat, but you could guarantee a win by purchasing every available ticket, which is like raising a note's slider all the way. On the other hand, you can't win if you don't play, which is like lowering a note's slider all the way. As we said, controlled chaos.

For reference, there is a chart of the scales and their notes [p.208] at the end of this chapter.

17.2. Arpeggiator mode

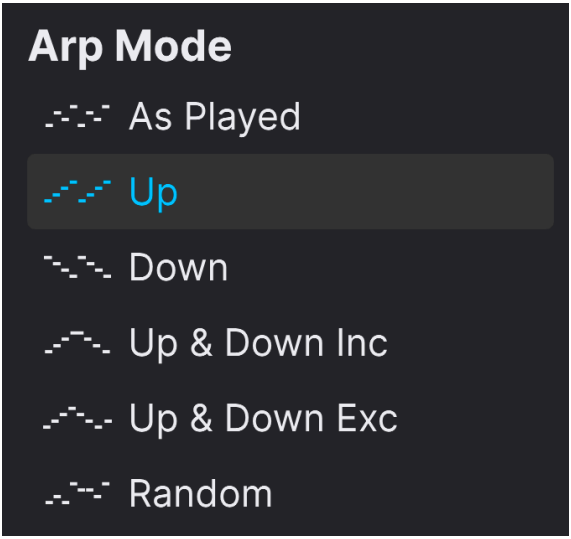
Here, we'll examine the features exclusive to the arpeggiator.

An arpeggio is basically an outline of a chord; rather than hearing all of the notes at once, they are delivered in series. Many great pieces of music have arpeggios at their core, from Bach's *Prelude 1 in C Major* to Eddie Van Halen's hammer-on segment in *Eruption*.

In some ways an arpeggiator is more improvisational than a step sequencer, because you can decide on the spur of the moment to change which notes the arpeggio will produce by changing which notes you are holding, and how many. If only one note is held it will be repeated; when more notes are held the arpeggiator will alternate between them.

17.2.1. Arpeggiator playback patterns

When Arp mode is selected the Sequencer Pitch track is greyed-out. In place of the Sequencer pattern bar are playback controls:



Arpeggiator playback mode menu

The six pattern options work as follows:

- *As Played:* Note order follows the order in which you pressed keys
- *Up:* Note order ascends in pitch
- *Down:* Note order descends in pitch
- *Up & Down Inclusive:* Note order ascends and descends, with the highest and lowest notes repeated
- *Up & Down Exclusive:* Note order ascends and descends, with the highest and lowest notes *not* repeated
- *Random:* A random note order is generated based on played keys

17.2.2. Chord arpeggiation

A form of Chord arpeggiation is available when the Unison Chord mode [p.82] has been activated for one or both Engines. When a single note is held the chord will be repeated; when two or more notes are held the arpeggiator will alternate between different transpositions of the same chord.

17.3. Sequencer scales charts

As a reference, here are the pitches for each scale in Sequencer mode; 1 is the root note.

17.3.1. Classic scales

Scale	Pitch results
Chromatic	All 12 notes
Major	1, 2, 3, 4, 5, 6, maj7
Natural Minor	1, 2, b3, 4, 5, #5, dom7
Harmonic Minor	1, 2, b3, 4, 5, #5, maj7
Melodic Minor	1, 2, b3, 4, 5, 6, maj7
Dorian	1, 2, b3, 4, 5, 6, dom7
Phrygian	1, #1, b3, 4, 5, #5, dom7
Lydian	1, 2, 3, b5, 5, 6, maj7
Mixolydian	1, 2, 3, 4, 5, 6, dom7
Locrian	1, #1, b3, 4, b5, b6, dom7
Major Pentatonic	1, 2, 3, 5, 6
Minor Pentatonic	1, b3, 4, 5, dom7
Blues	1, b3, 4, b5, 5, dom7
Fifth	1, 5

17.3.2. Generative scales

Scale	Pitch results
Acid	1, #1, b3, 4, 5, b6, dom7
Contrasting Minor	1, 2, b3, 4, 5, b6, dom7
Acid Sour	1, #1, 4, 5, dom7
Bass Striker	1, #1, b3, 4, 5, b6, dom7
High Minor	1, b3, 4, 5, b6, dom7
Diminished	1, b3, b5, 6
Desert	1, #1, 3, 4, 5, dom7
Groover	1, 2, b3, 3, 4, 5, 6, dom7
Asian Pentatonic	1, 2, 3, 5, 6
Custom	User programmable

18. SOUND DESIGN TIPS

Sound Design Tips is a new feature by Arturia that makes its debut in Pigments. It is intended to function both as an aid for non-expert synth users and as a time-saver for experts. It does this by indicating the controls and parameter ranges the sound designer enjoyed most while creating the selected preset.

Our hope is that the Sound Design Tips feature will facilitate your experience with Pigments in one of two ways:

- Relieve the fear of "messing up the sound" of the presets for newcomers.
- More experienced users will be able to zero in on the controls that provide the quickest and best results. (Pigments does have quite a few parameters available! Hundreds, actually.)

Whether novice, expert, or something in-between, anyone can use Sound Design Tips for their own presets in the same way our sound designers have. Whenever you find inspiration in a particular set of controls, you can leave the virtual equivalent of a Post-It note to yourself by highlighting those parameters and ranges that inspire you most. This is handled through an option in the Sound Design Tips menu called Edit Tips [p.210], which is detailed later in this chapter.

18.1. Using Sound Design Tips

You may have noticed a light bulb icon in the upper tool bar:

Clicking it activates the Sound Design Tips feature.

There are two levels of Sound Design Tips, accessed via a pop-up menu [p.210] seen when you click the light bulb.

When you choose to enable the Advanced tips, the light bulb icon is filled in yellow (dark mode), or purple (light mode).

18.2. Information display

Hover over the light bulb, and the Modulation Overview area changes into an information display like the one shown above.

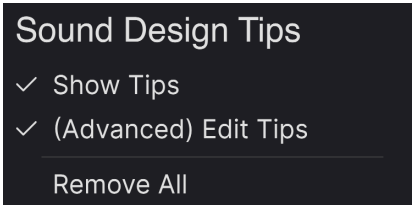
In the rest of the Pigments interface, if Advanced Edit Tips is ticked, other light bulb icons will appear next to the controls that the designer of that Preset thought were good for tweaking.

18.2.1. Some visual cues

When the Sound Design Tips feature is active (i.e., the bulb is lit), the area around any controls for which a range was set will be surrounded by a thin yellow outline. A portion of the mod ring around the control will be outlined in yellow also.

The yellow outline does not always completely surround the mod ring. The point of it is to show the minimum and maximum values that are considered the best for that control in the context of that Preset. Sometimes, that may be only a portion of the control's full range.

18.3. Advanced Edit Tips



There are two options: Show Tips and (Advanced) Edit Tips. A check mark next to one of both options indicates which of those selections are active.

- **Show Tips** is the setting that toggles when the light bulb button is clicked. If the check mark is removed, the light bulb goes dark, and vice versa.
- **(Advanced) Edit Tips** is the one that allows you to add, adjust, and remove Sound Design Tips for individual controls.

The third option, **Remove All**, will do exactly what it says: it will remove all Sound Design Tips from the current preset. A confirmation window will ask you if that's what you really want to do, so there's little danger of doing it accidentally.

When (Advanced) Edit Tips is enabled there will be a few changes in every area affected by the Sound Design Tips feature.

A lit light bulb lets you know at a glance that it is possible to edit existing Sound Design Tips and add new ones.

When Edit Tips is active there are two other changes next to each control with an active Sound Design Tip. As you can see, in addition to the yellow outline around the control area a smaller yellow light bulb has appeared near the control.

The small light bulb serves two purposes:

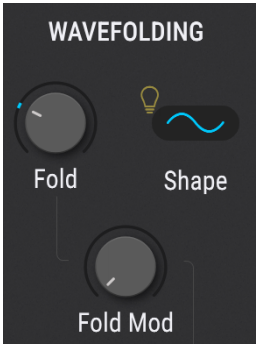
- It's a button that toggles the Sound Design Tips feature for that control
- It's also a visual aid that helps locate controls with an active Sound Design Tip. In addition to the controls you can see, they will also appear on the tabs of a hidden Engine or Mod Source group, or the button of a modulation route in the center strip, to indicate an active Sound Design Tip in that location.

There are also two yellow markers that have appeared inside or around the mod ring of the control. These markers indicate the minimum and maximum limits of the optimal range.

If you decide you prefer a different minimum/maximum range for the control, the markers can be moved by editing the Sound Design Tips settings [p.212].

18.3.1. Add and remove tips

When the Sound Design Tips feature is enabled you may sometimes see a slightly dimmer bulb when the cursor hovers over a control that doesn't currently have an active Sound Design Tip.



Click the dimmer bulb and then a Sound Design Tip range can be added to this control as well.

18.3.2. Editing tips

Once the Sound Design Tips feature is active for a control, **left click** on its mod ring and drag the marker to set the maximum value. Likewise, **right click** on the mod ring to set the minimum value. The center of the knob still controls the parameter, so you can verify the ideal range limits while setting them.

♪ Be sure to leave the smaller light bulb lit if you want the optimal range to be visible when Sound Design Tips feature is active.

19. MODULATION ROUTINGS

The power, flexibility, and variety of the modulation features in Pigments are nearly limitless. The entire lower half of the instrument is dedicated to the modulation assignments and sources [p.232], which allows you to personalize your presets until they are perfect for your project.

And yet for all this power, once you have learned a few of the main concepts behind the design you will see that the modulation sections are actually very easy to use. A simple tweak here or there could inspire an entirely new project!

Pigments offers three methods [p.218] of assigning and editing modulations to accommodate your most intuitive way of working. As of Pigments 4, a new method is the simplest yet: drag and drop [p.218]. First, let's cover some modulation basics.

19.1. Understanding the modulation section

The modulation section of Pigments is basically a software "patch bay" that enables you to route one or more sources to one or more destinations. Twenty-four different sources are available, each of which can be routed to as many destinations in the Synth or FX tabs as you like.

Some of the modulation sources are hardware controls (Velocity, Aftertouch, the Modulation Wheel, MIDI note number); some are linked to traditional synth parameters (LFOs, Envelopes); some are complex (Functions); some are unpredictable (the Random generators); and some are combinations of all of the above (Macros, Combinate).

Each modulation route has its own sidechain modulator available as well, which opens up additional avenues of precision and control.

> ! Modulation assignments cannot be made in the Play view [p.61], which displays the rainbow spectrum visualizer in place of the modulation overview [p.32]. Instead, you need to be in the Synth, FX, or Sequencer views.

19.1.1. Center Strip: three views

The center strip of Pigments has three different appearances depending on the task you select: the Modulation overview [p.32], the Mod source view [p.214], or the Mod target view [p.215].

19.1.1.1. The Modulation Overview

This is how the center strip will look most of the time. The other two views are visible only when specific edits are being made to the modulation routes.

Modulation sources are located in a single strip across the middle of the window. This strip provides an overview of the various modulation routes:

The Modulation overview windows always show the modulation activity for each source while it is happening. If it's an LFO, for example, you'll see a moving outline of the LFO waveform; trigger an envelope, and its shape will be traced in the appropriate window.

If the source is stationary like the Mod wheel or Aftertouch, you will see the level graphic rise and fall as the value is changed. And if the window has a grey line at its bottom or middle, that source is not being used in a modulation route.

19.1.1.2. The Mod source view

Hover over a control and notice the small " + " icon that appears.

Click that + icon and the center strip will display the Mod Source view.

This view reveals the active mod sources for that parameter, each with an amount and a slider. Inactive sources for the selected destination are grey. The sliders can be used to adjust existing mod amounts or to activate new modulation routes, at which point they will take on a color that is related to their Mod source group.

When a slider is moved away from the center position, one of the following appears below the slider:

- **Sidechain**: click this to add a sidechain [p.227], a second mod source to enhance the selected source
- The name of an existing sidechain and its level. Click either field to change its setting.

To exit the Mod source view, click an empty area outside the center strip, the X at the far right, or use the Escape key on your keyboard.

For more information about using the Mod source view, click here [p.219].

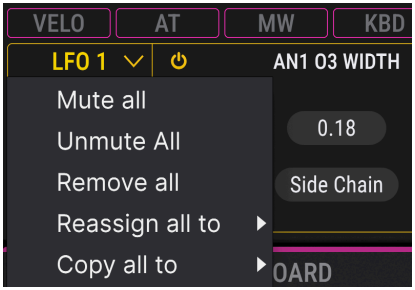
19.1.1.3. The Mod target view

For detailed editing of a modulation route, click the name of the modulation source in the Modulation overview window. (The name will briefly change to "Assign" as you hover over it.) You can also click these names from inside the Mod source view.

The middle strip will become a brightly outlined bar containing the details about each mod routing, including the destination, any existing sidechains, and how much of each has been enabled.

Notice that all 24 of the mod target colors are still visible along the top and the currently selected one is filled in with solid color. You can quickly switch to another mod target by clicking on its thin, colorful box along the top.

Clicking the arrow next to the modulator thumbnail brings up a number of very useful options:



- **Mute All** immediately switches off (mutes) all of the modulation targets currently being displayed
- **Unmute All** un-mutes any modulation targets that are currently switched off
- **Remove All** clears all of the modulation targets that are currently displayed
- **Reassign All To** moves all of the currently displayed targets to any of the available modulation pages

To exit the Mod target view, click an empty area outside the center strip, the X at far right, or use the Escape key on your computer keyboard.

For more information about using the Mod target view, click here [p.221]. For information about sidechains, click here [p.227].

19.1.2. Visual Cues

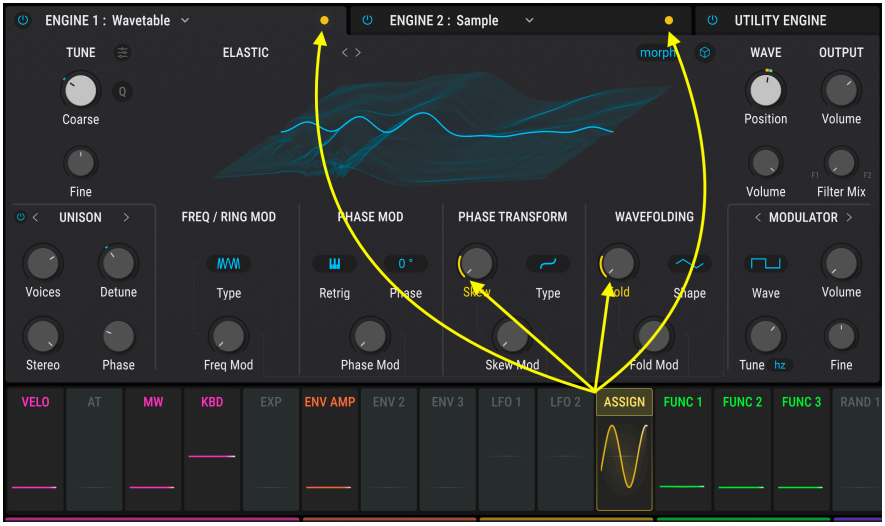
Pigments makes it easy to see what sources are modulating what destinations at any time. And, since we're French and therefore love fashion, we've color-coordinated types of modulation sources so that matching colors show up on their destinations.

Mod Source Group	Modulation Sources	Color
MIDI	Virtual keyboard, Pitch/Mod wheels, Expression pedal	Pink
Envelopes	Envelopes 1, 2, and 3	Orange
LFO	LFOs 1, 2, and 3	Amber
Functions	Functions 1, 2, and 3	Green
Random	Turing, Sample & Hold, and Binary value generators	Purple
Combinate	Combinates 1 and 2	Magenta
Macros	Macro knobs 1, 2, 3, and 4	Light Blue

Here are some ways to discover assigned modulation destinations.

19.1.2.1. Hover Over a Source

Hover over any source in the Modulation Overview, and three things happen:



LFO3 is shown modulating the Skew and Fold knobs in Engine 1, and that there are destinations in Engines 1 and 2.

- A collar ("mod ring") in the source color appears around any assigned destination control, showing the modulation range relative to that control's base setting.
- Dots in the same color appear on any Engine tabs in which one or more controls have destinations for that source, letting you know if something you can't see at the moment is being modulated.

19.1.2.2. Hover Over a Destination

Likewise, you can hover over a destination, and little knobs appear below that control, matching the colors of the source groups that are modulating it. Here, we see that Filter 1's cutoff is being modulated by a Function (green) and a Macro (blue). (These pie-like knobs are active controls that adjust modulation amounts, which we'll learn more about in Modulation Quick Edit [p.226].)

Filter 1 cutoff is shown to be modulated by a Function (green) and a Macro (blue)

But *which* Function and Macro in each group? Those are highlighted in the Modulation overview:

We can see it's Function 1 and Macro 1. Hovering over a "pie chart" will highlight its source exclusively. But there's still a little more going on here. Randomizer 1 is also showing up. Look again at the "pie charts" below the destination control:

The purple segment indicates something in Function 1 is modulated by Randomizer 1

See that tiny arc of purple riding on the outside of the circle? That's another mod ring – it shows that something in the Function is being modulated by a Randomizer. Like with many sophisticated synths, modulation sources in Pigments can be destinations of other sources at the same time. But let's not get ahead of ourselves.

> ♪ The Macros tab is always lit because those controls are visible no matter which Mod source group tab has been selected.

19.2. Working with Modulations

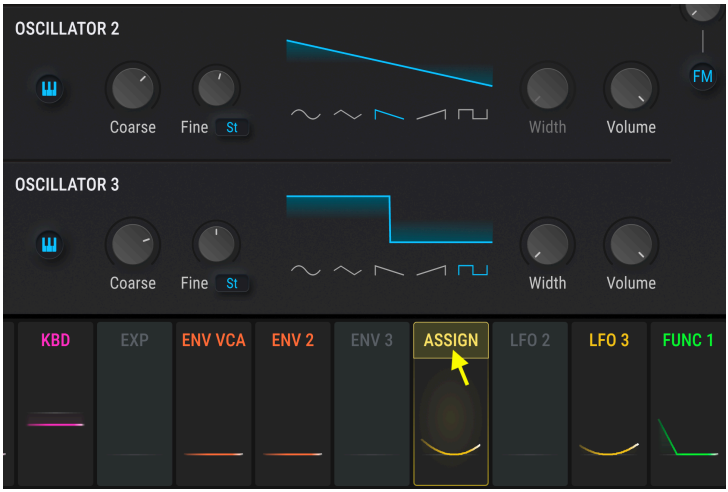
There are three ways to create a modulation routing, and the one you should choose depends on what you want to do.

- If you tend to think in terms of "source to destination," the most intuitive and direct method is Drag and Drop [p.218].
- To assign several sources to the same destination, use the Mod Source view [p.219].
- To assign the same destination to several sources, and/or to set up sidechains, use the Mod Target view [p.221].

19.2.1. Method 1: drag and drop

As of version 4, Pigments supports simple drag-and drop creation of modulation routings. In this example, we will assign LFO1 (which starts out unassigned) to the Pulse Width of Oscillator 2 of the Analog Engine.

1. Click into LFO1's box in the Modulation Overview, then hover over the name at the top. It will change to "Assign."



2. Click and hold on "Assign," then drag LFO 1 to the desired destination control. Note that as you drag, all eligible modulation destinations are outlined by grey collars.

3. Release the mouse button. The assignment is made. The quick-edit knob will remain visible until you mouse away from the control.

19.2.2. Method 2: Mod Source view

This method uses sliders to accomplish two purposes at the same time: they can adjust the levels of existing mod routes and also create new mod routes by simply moving a slider. This allows you to try multiple combinations of mod sources and quickly assess how their combined influences affect a single parameter.

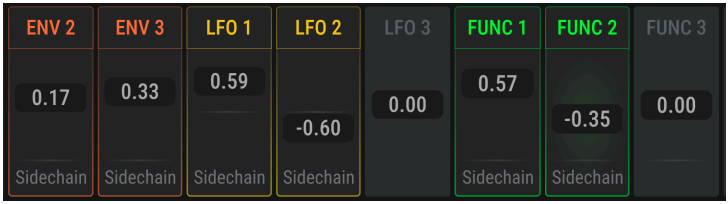
19.2.2.1. Selecting a parameter

To access the Mod source view for a certain parameter, hover over that control (you may have to click first).

Click the " + " and you will be taken into the Mod source view.

19.2.2.2. Adding/editing a mod

Once you are inside the Mod source view, the sources in the Modulation Overview will display value sliders. Each of these sliders is bipolar and can be set to a value between -1.00 and 1.00 in increments of 0.01, which covers the entire available modulation range.

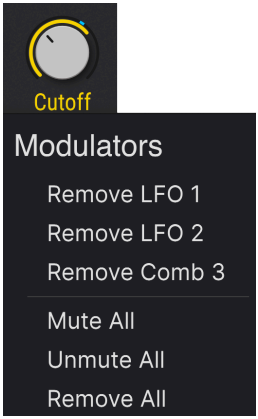


When the values are at zero the Mod source boxes are grey. As the values move away from zero the windows gain the color [p.215] of their modulation source type. "Sidechain" at the bottom means a Sidechain [p.227] can be added; if one exists, its name and level appear. Click one of those fields to change its setting.

19.2.2.3. Removing a mod

There are several ways to remove a mod within the Mod source view. One way is to double-click the fader in the center strip area. The modulation value will be reset to zero and the corresponding Mod source window will become black again.

The other two methods will open a list of Modulators for the selected parameter that looks like this:



To open this list, hover over the control and do one of the following things:

- Right-click on the small " + " icon that appears near the control
- Right-click on the name of the control, or anywhere inside the control area

Once you see the list, left-click on the Modulator you would like to remove from the list. If you want to eliminate all of the mod routes for this control at the same time, click *Remove All*. You can also *Mute All* to stop the modulations without removing the routings.

> ♪ Opening the list of Modulators with a right-click will also open the Mod Source view in the center strip area.

19.2.2.4. Exit the Mod Source view

There are several ways to exit the Mod source view. Depending on where you want to go next, you can

- click the " + " icon that got you there in the first place
- click anywhere else outside the Mod source view
- press the Escape key on your computer keyboard
- click the name of any Mod source in the center area.

The last option will take you to the Mod target view, which is handy if you want to set up a SideChain for one of the modulation routes you were editing.

19.2.3. Method 3: Mod Target view

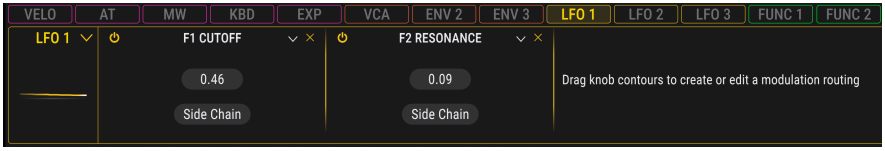
This method allows greater precision over the impact a single modulation source will have on multiple destinations.

19.2.3.1. Selecting a Source

When you'd like to create a modulation route by using the Mod target view, the first thing to do is to select a source by clicking on its name in the Modulation overview.

Once the Mod source is selected, two major visual changes happen:

- An information display replaces the Modulation overview window. It will list any existing mod routes, their sidechains, and their amounts. The list will grow to the right as new mod routes are added.



- The mod rings around the controls reveal the destinations and modulation amounts related to that source, in the corresponding color.

In fact, knob controls offer many visual cues as to their modulation status, which are covered further in the section on knob states [p.229] towards the end of this chapter. The most obvious indicator, though, is the colors of the mod rings. If their color matches the color of the outlines when you're in Mod Target view, then they are being modulated by one or more of the sources you selected.

> ♪ Some target destinations might be located on the FX tab or Seq tab, but they will be listed in the Mod target view window. You can switch freely between the Synth, FX, and Seq tabs to set up additional Mod routes without leaving the Mod target view.

After a mod source has been selected you can do two things with the controls outside the Mod Target view window:

- Click and drag the center of a knob to change the value of the parameter itself.
- Edit the amount of modulation you want to apply to the parameter using the mod ring.

19.2.3.2. Adding and Editing targets

When in Mod Target view, locate the parameter you want the Mod source to modulate and then hover on its mod ring. A thin line will appear around the knob with a color that matches the outline around the Mod target view area. Also, the cursor will become an up/down arrow to show you which direction to move the cursor as you edit the value.

Next, click the mod ring and drag up or down until you have achieved the desired amount of modulation. As the amount is increased a thicker line will appear, with a starting point that matches the setting of the parameter control. This line indicates the modulation range that is being applied to the parameter.

The way the modulation range is represented will be different depending on the nature of the Mod source. If the Mod source moves only positively or negatively, like Aftertouch or an Envelope, that is called a *unipolar* modulation source. In this case the modulation range will grow in only one direction from the setting of the parameter control.

An LFO being used as a unipolar mod

But if the Mod source moves both positively *and* negatively, that is called a *bipolar* modulation source. In this case the modulation range will grow in both directions from the setting of the parameter control.

An LFO being used as a bipolar mod

♪ Some modulation sources in Pigments, such as LFOs and Functions, can be set as unipolar or bipolar. To learn how to do this for a specific source, search for its name in the Modulation Sources [p.232] chapter.

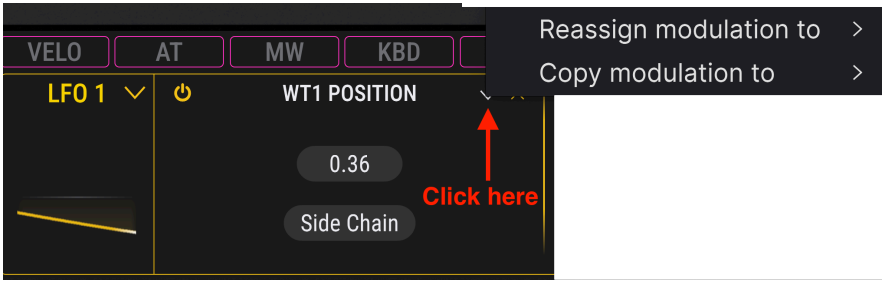
You can keep adding routings using this method, with no limit on the number, until the desired result has been achieved.

However, when the number of mod routes becomes too long to view them all at one time, you can use the grey scroll bar at the bottom of the Mod target view to access the other mod routes, like so:

19.2.3.3. Reassigning sources

A source may be reassigned using the drop-down menu carat next to a destination's name when in Mod Target View.

> ! By "reassign," we mean that the job of modulating the current destination(s) is handed off to a new source, *not* that the current source is assigned to a new destination.



Two operations are available:

- **Reassign modulation to:** This selects a new source for the destination and disconnects the current source from its destination.
- **Copy modulation to:** As above, but does not disconnect the current source; two sources will now be modulating the same destination.

Both options open a large vertical submenu showing all modulation sources.

19.2.3.4. Muting a mod routing

It's possible to "mute" a modulation route inside the Mod target view without deleting it; just click the on/off button to the left of the destination's name.

> ♪ Muting and unmuting modulations is very handy if you'd like to work on some other aspect of a sound you're designing, without the distraction of say, the filter constantly sweeping.

19.2.3.5. Removing a mod target

There are several ways to remove the effect a modulation route is having on a target parameter.

To neutralize the mod route but still keep it inside the Mod target view, do one of two things:

- Double-click inside the modulation ring and the mod value will reset to zero.
- Click inside the modulation ring and drag the amount down to zero manually.

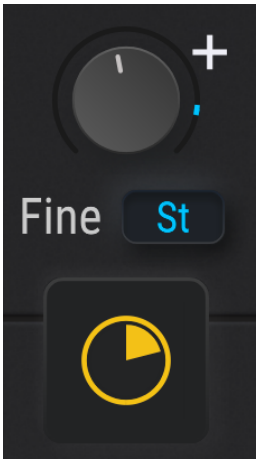
To completely remove the mod from within the Mod target view, click the 'X' that is visible to the right of the SideChain.

19.2.3.6. Exit the Mod Target view

To exit the Mod target view, click an empty area outside the center strip. You can also use the Escape key on your computer keyboard.

19.2.4. Modulation Quick Edit

As of Pigments 4, Modulation Quick Edit makes adjusting modulation amounts for an already-assigned destination much easier, mainly because you do not have to go into the Modulation Source or Target views to do so. Under certain conditions, mini knobs or "pie charts" as we call them, appear underneath a control. You might see just one ...



... or you might see many, depending on how many sources are modulating that destination.

When will you see these?

- When hovering over a destination control (that has active modulation sources) *and* not already being in Mod Source or Target views.
- When using drag and drop [p.218].

The colors correspond to the modulation source types.

Hovering over one of these little discs highlights the specific source in the Modulation Overview. Hovering also displays a pop-up showing the modulation source name and value:

You can drag inside a disc to adjust the modulation depth. This works with both unipolar and bipolar sources.

19.2.5. Sidechains

Most people who've worked with mixing consoles or DAWS are familiar with sidechains. In music production, a sidechain is often used to route audio as a control signal to a processor or plug-in that's processing *other* audio. A popular (cliché?) example is how EDM producers sidechain the kick drum into a compressor placed on most of the other tracks to create a breathing or pumping effect – with each kick drum hit, the compressor reduces the level of the other tracks.

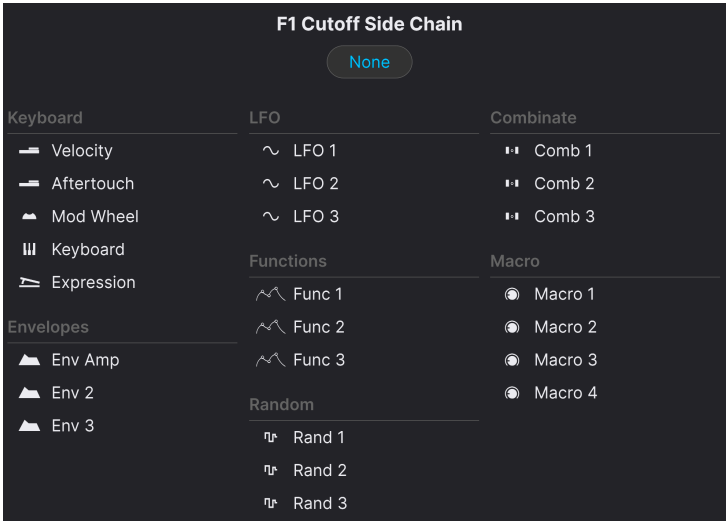
In the case of modulation routings, the sidechain is a way to use a second modulation source to influence the main modulation source as it affects the destination parameter.

A simple example would be using the Mod wheel to increase the amount of an LFO that has been routed to oscillator pitch, etc. A more complex application could be to use a Randomizer source to increase the amount of an LFO at unpredictable times.

A modulation destination as shown in Mod Target view

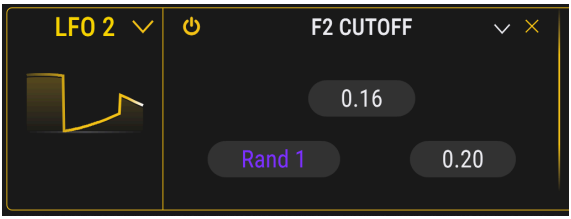
After a mod routing is created, the first thing you see in the Mod Target view is the name of the destination, the amount of the modulation, the Sidechain field, and the X used to delete the mod route, as shown above.

To select a source for the sidechain, click the Side Chain field. The following menu will appear:



The modulation sidechain menu

Once a selection is made the menu will close and an additional value field will appear to the right of the sidechain source field, like so:



To set the value for the sidechain, click and drag the number inside the new field. Values run positively from 0.00 to 1.00. The SideChain operates within the modulation range that has been set, which means that a sidechain value of 1.00 will not exceed the maximum modulation amount you have defined for the mod route.

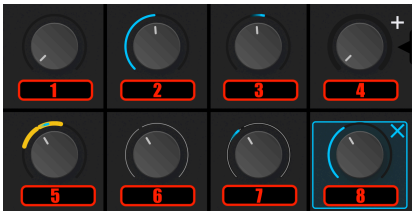
To mute a Side Chain, double-click its level to reset it to zero. You can save the preset that way and the sidechain selection will be preserved. To remove a Side Chain, open the Side Chain menu and select "None."

19.3. More on Modulation – Useful Tips

Modulation in Pigments is a deep rabbit hole indeed. Here are a few more useful items of information to speed your workflow and help avoid confusion.

19.3.1. Basic knob states

The knobs and mod rings show different colors and graphics depending on what is being done. The graphic and table below are meant as a reference for the most common knob appearances and what they indicate.



Eight basic knob states in Pigments

Number	Appearance	Meaning	Cause(s)
1.	Dark ring around knob	No modulation assigned; knob base value at O, minimum, or default	You have not adjusted the knob and/or it is set this way in the Preset
2.	Knob ring is partly or all light blue	No modulation assigned; knob base value other than O, minimum, or default	Still no modulation assigned but knob has been adjusted either by you or Preset settings
3.	Knob ring shows moving or static marker in light blue	At least one modulation source is assigned to this parameter	You have assigned a modulation source
4.	Plus sign to upper right of knob; pop-up value displayed;	Knob may have modulation source assigned by clicking plus sign	Hovering over knob center
5.	Part or all of knob ring is color of a mod source	Mod source of matching color has been assigned to that knob	Hovering over source in Modulation Overview or Quick Edit pop-up controls below knob; Ring will change color when you hover over multiple assigned sources
6.	Light grey ring, no marker	Knob is eligible as mod destination; no assignments yet	Clicking on source in Modulation Overview; click-dragging it towards destination knob
7.	Light grey ring, static or moving marker	Knob is eligible as mod destination; one or more mod sources already assigned to it	Clicking on source in Modulation Overview; click-dragging it towards destination knob

Number	Appearance	Meaning	Cause(s)
8.	Blue box around knob with X at upper right	Knob is ready to have source assigned by moving source slider in modulation overview	Clicking the + sign from state 4; or click the X to abandon the assignment

This table does not cover every possible permutation of knob states. For example, states 4 and 5 will combine if a modulation source has been assigned to a knob and you first hover over the knob, then the quick edit control that appears below the knob.

19.3.2. Display of modulation ranges

There are times when the mod ring won't show a modulation range (i.e. the thicker mod ring), or perhaps not display its full range. There are three symptoms of this:

- **Mod Target view:** The Source has been selected, the modulation route is visible, and the mod ring is lit, but it is dim all the way around.
- **Modulation Overview** or **Mod Source view:** Hovering the cursor on the Mod source shows nothing around the target knob, even though the modulation route has a non-zero amount.
- Hovering the cursor on the target parameter knob *does* illuminate the Mod source in the center area, but not the other way around.

These symptoms have the same cause and can be easily remedied. The reason this happens is simple: a modulation route is only effective within the operational range of the target parameter. So if the parameter value is too high or too low, the result is that the modulation effect has been pushed partially or entirely out of range.

For example, if a Filter cutoff is almost all the way "open" but an LFO's positive phase is hitting it at full depth, this will happen:

The solution is to adjust the parameter value until you can see the full modulation range. You may also want to consider reducing the modulation amount, depending on the results you hope to achieve.

19.3.3. How bipolar mod sources affect mod ranges

It can be confusing at first to work with a bipolar Mod source such as an LFO. Let's work through an example using the Default preset.

1. Select the Default preset
2. Select the LFO tab from the Mod source groups
3. Note that the Engine 1 Coarse tune control has a value of 0 (it's in the 12:00 position)
4. Click the LFO 1 Mod source in the Modulation overview window
5. Hover over the Engine 1 Coarse tune control.
6. Notice that the mod ring gained a yellow outline, and the cursor became an up/down arrow.
7. Click on the mod ring and increase the modulation amount by dragging upward.
8. Notice the value of the mod inside the Mod target view window as it changes. Set it to 0.50 (50%).
9. By now the yellow ring has grown to surround the entire mod ring, and the blue marker is traveling the entire range.
10. Now increase the mod amount to 1.00 (100%) while watching the yellow ring. It will not grow larger.
11. Return the mod amount to 0.50 (50%).
12. Now turn the Engine 1 Coarse tune control fully counter-clockwise to a value of -60.
13. Notice that the upper edge of the mod range has moved to the 12:00 position.
14. Now increase the mod amount to 1.00 (100%) while watching the yellow ring.
15. As this is happening the right edge will expand to fill the available space around the mod ring.

So, what just happened? Let's break it down.

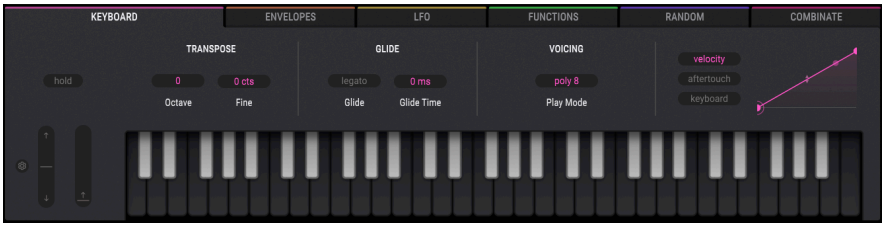
- Any parameter can be modulated over its entire range.
- The range of a parameter is equivalent to a full modulation range of +/- 1.0.
- The Engine 1 Coarse tune can be tuned -/+ 60 semitones.
- For now, think of the Engine 1 Coarse tune value of 0 as being at 50%, or 0.5.
- With the modulation amount at 100%, the mod range causes the LFO to swing +/- 50%, or from 0-100%.
- When the Engine 1 Coarse tune is at its minimum (-60), think of that as a value of 0%, or 0.00.
- When the Engine 1 Coarse tune is set to -60, a modulation amount of 1.00 (100%) is needed in order to modulate it from 0-100% (i.e. to the opposite extreme of +60).

20. MODULATION SOURCES

This chapter will describe the nature of each Modulation source. These are found in the bottom third of the Pigments user interface, each on its own tab and color-coded. See the previous chapter to learn how to set up and use the Modulation Routings [p.213].

20.1. Keyboard tab

Here, the virtual keyboard contains a few more features than in the Play view [p.61].



The Pigments virtual keyboard in the Synth view

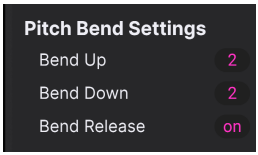
Click on a virtual key to hear the currently selected sound. You can also drag the cursor across the keys to hear a glissando. Clicking near the bottom edge of the key results in a higher velocity note; clicking near the top produces a soft velocity.

20.1.1. Pitch and Mod wheels

Located to the left of the virtual keyboard are the Pitch and Mod wheels. These wheels may be dragged up and down with your mouse. As you do they will perform the functions they have been assigned elsewhere in the user interface. They will also respond to the appropriate MIDI controller input.

The pitch wheel will return to zero when it is released; the modulation wheel will stay at its current location until moved.

20.1.1.1. Pitch-bend settings



Click the gear icon next to the Pitch wheel to open the settings menu. Bend range can be set independently for Up and Down. For example, the upward bend can be set to +2 semitones and the downward bend can be set to -36 semitones. Whammy-bar solos are now within your reach!

If **Bend Release** is on, pitch-bend will affect the release phase of the envelopes. If it's off, the release phase of envelopes for any sound will not be affected by the pitch-bend wheel.

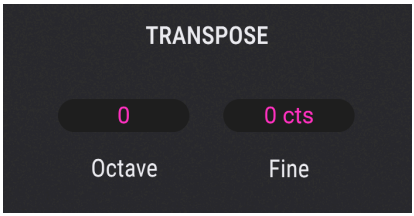
> Having release OFF is very useful when bending sounds with long releases, like cinematic downers. As soon as you release the keys, the bend action will stop.

20.1.2. Hold button

The Hold button does the same thing that a sustain pedal does, and also affects the Sequencer/Arpeggiator:

- **Sequencer mode:** Once triggered, the sequence will keep playing as long as Hold mode is active.
- **Arpeggiator mode:** As long as a MIDI note is active, pressing other keys will add new notes to the arpeggio. When all notes are released, the next ones will start a new arpeggio.

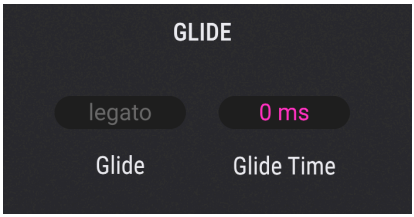
20.1.3. Transpose



These numerical fields transpose the pitch in octaves (Coarse) and cents (Fine). They affect the pitches played by the onscreen keyboard as well as what is heard in response to incoming MIDI notes.

> Note that the Octave parameter shifts the incoming MIDI notes, so changing it only affects new notes played. The Fine control, on the other hand, operates at the sound engine level. It can even be a modulation destination, allowing you (for example) to create vibrato by modulating it with an LFO.

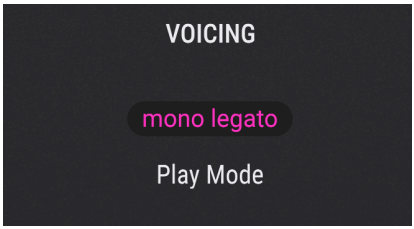
20.1.4. Glide



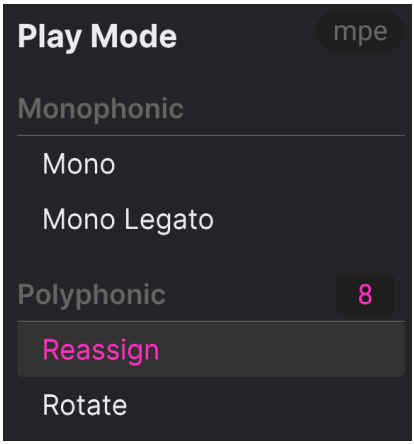
Glide is also called portamento, and means that you hear a pitch sweep between notes as you play. Two parameters are relevant here.

- **Glide Time:** Sets the time it takes for one note to glide to the next, in milliseconds. The maximum time is 10 seconds.
- **Legato:** If this is engaged, only notes played legato will glide. Otherwise, notes always glide.

20.1.5. Voicing settings



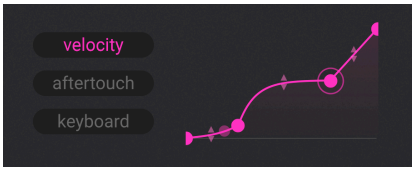
Clicking on the field in this section brings up a menu for monophonic and polyphonic playing options.



- *Mono:* Monophonic mode; Pigments plays one note at a time.
- *Mono Legato:* Monophonic mode; envelopes do not retrigger if notes are played legato.
- *Reassign:* Polyphonic mode; when a voice is used to play a note once, that same voice will be reassigned each time you play that note again.
- *Rotate:* Polyphonic mode; new notes played will always use a new voice. If all voices are playing, an older voice will be stolen.

In the polyphonic modes, a number field is available to limit the maximum voices. This mirrors the options in the Play Mode menu of the lower toolbar [p.41]. Note also the **mpe** button in the menu. This is a duplicate of the MPE on/off toggle in the side panel, and enables MIDI Polyphonic Expression [p.36].

20.1.6. Keyboard curves section



Pigments can set independent curves for three different performance gestures: velocity, aftertouch, and keyboard tracking from low to high. All three are part of the Keyboard mod source group on the left side of the Modulation Overview.

The first and last breakpoints of these curves cannot be moved left or right, but you can drag them up or down to invert the curves if you like. You can also add up to two points anywhere in the middle by clicking, then adjust the curves between all four points by dragging the up/down arrows in the middle of the curve segments. Any sort of curve can be achieved, from exponential to linear to logarithmic. The modulation curves in the Functions [p.242] work in a similar way, and we provide a more detailed description of the curve editing process there.

To remove a curve breakpoint, right-click on it.

20.2. Envelopes tab

20.2.1. Env 1: hardwired to amp

Envelope 1 always controls the amp/VCA (which affects overall output volume) but you can still use it as a source for other mod routes if you like. The Retrig Source is fixed on the *poly kbd* option.

20.2.2. Envelope parameters

With the exception of the fixed Gate Source for Envelope 1, the parameters for all three envelopes are identical. Some of the parameters on the top and bottom rows are closely related, so we'll jump around the controls a bit as we describe them.

Control	Description
Attack	Sets the amount of time it takes for the envelope to reach its peak value (1 msec to 20.0 seconds)
Att Curve	Adjusts the attack slope between -20.0 (Logarithmic) and 20.0 (Exponential); 0.00 = Linear
Decay	Sets the time it takes the envelope to decay from its peak to the sustain level (0.001-20.0 seconds)
Dec Curve	Adjusts the decay slope between -20.0 (Exponential) and 20.0 (Logarithmic); 0.00 = Linear
Release Link	Links Decay / Release times to Decay knob, and links Decay / Release curves as described here [p.238]
Sustain	Sets the target level for the Decay value, where the envelope will rest until the note is released
Retrig Source	Selects the source to trigger/retrigger the envelope (Envs 2 & 3 only)
Release	After note-off, determines the amount of time the envelope will take to fade to zero
ADR button	Toggles envelope mode between ADSR and ADR behavior; more information here [p.238]

♪ Use the Control + Click combination to fine-tune the value of a parameter. Double-click a control to reset its value to the default. You can also drag on the envelope breakpoints in the visualizer to adjust the Attack, Decay, Sustain, and Release.

20.2.3. Release Link buttons

Located just to the left of the **Release** knob in each envelope, these chainlink icons lock Release to Decay, in terms of both slope and duration. Move the Decay knob and the Release knob moves with it. Likewise, drag the second breakpoint in the envelope graph horizontally and you'll see both knobs move in sync. The Release knob itself is greyed-out and does not operate directly.

20.2.4. ADR versus ADSR

First, the terms: ADR means Attack, Decay, Release; ADSR means Attack, Decay, Sustain, Release.

When ADR mode is active, the envelope response is different from an ADSR in the following ways:

- The ADR envelope does not jump to the Release stage when the key is released; it will always move through the full Decay time unless the envelope is retriggered.
- The Sustain level is merely the transition point between the Decay and Release stages; it does not serve as a plateau where the envelope will rest while the key is engaged.

> ♪ All of the envelopes in Pigments are capable of audio-rate performance. This improves their precision even when assigned to a non-audio destination such as a filter cutoff.

20.3. LFO tab

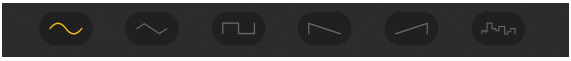
LFO stands for Low Frequency Oscillator, which is the most common source of modulations such as vibrato and tremolo in synthesizers. Think of it as a cycling up-and-down rhythm, which can do all manner of things depending on the destination(s) it's modulating.

The parameters for all three LFOs are identical:

Parameter	Description
Waveform	Adjusts waveform: Sine->Triangle->Square->Sample & Hold
Symmetry	Phase distortion that makes the positive and negative phases of the LFO wave more or less alike
Rate	Controls the speed of the LFO, with selectable sync [p.241] options
Phase	Shifts the starting point of the LFO waveform
KeyTrack/Fade/ Smooth	Three different adjustments for LFO response; see below [p.240]
Retrig Source	Selects the source [p.240] that will trigger/retrigger the LFO
Polarity button	Toggles the LFO between positive-only (unipolar) and positive-and-negative (bipolar) operation.

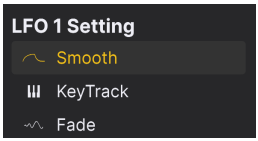
20.3.1. LFO Waveforms

Just above the LFO waveform display is a horizontal selection of waveforms.



Click on one of the waveforms to select it for the LFO. Left to right, the waveform options are sine, triangle, square, saw, ramp, and sample-and-hold.

20.3.2. KeyTrack/Fade/Smooth

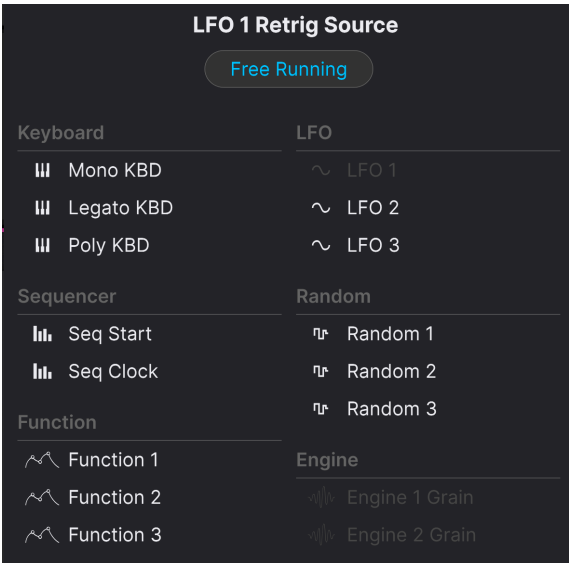


The button and pop-up menu under this knob allow you to select one of three types of adjustments to the LFO response.

Parameter	Description	Range
KeyTrack	Enables the LFO rate to increase/decrease according to MIDI note number.	+/-200%
Fade	Controls how long it takes for the LFO to reach its maximum amplitude.	.001-20.0 sec
Smooth	Allows you to flatten the peaks and soften the edges of the LFO waveform.	0-4.00 sec

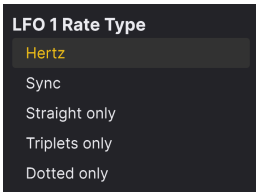
20.3.3. LFO Retrig Source

Clicking on this button brings up the following menu:



Here, you can select the source that causes the LFO to retrigger. That is, to start from the beginning of its phase. Note that the Engine 1 and 2 Grain options are available only when the Sample engine is selected as Engine 1 and/or 2, and its Granular mode is turned on.

20.3.4. LFO tempo sync



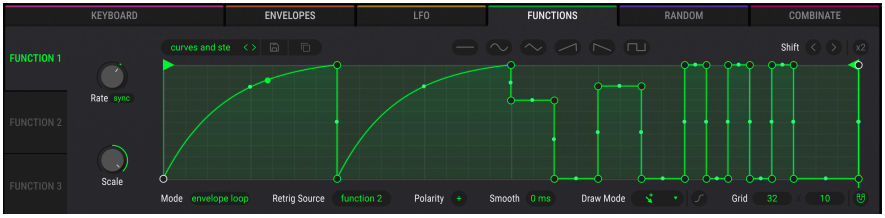
The LFOs in Pigments can free-run or sync to your project tempo in your DAW. Click next to the **Rate** knob to bring up the above menu.

- *Hertz:* LFO rate free-runs in Hz
- *Sync:* LFO rate knob sweeps through Straight, Triplet, and Dotted rhythmic values
- *Straight only:* LFO rate is an even division or multiple of a musical bar
- *Triplets only:* Like Straight, but with the beat subdivided in three equal parts
- *Dotted only:* Like Straight, but with the beat subdivided in two parts: the first is 3 times the duration of the second.

> ♪ Triplets give a waltz-like feel to the beat even if the song is not in waltz time. On the other hand, dotted notes provide a "swing" character.

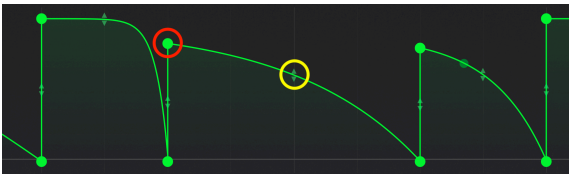
20.4. Functions tab

Pigments provides three Function generators, each of which is capable of creating very complex modulation shapes. All three can be doing entirely different things at the same time. What is a function? Whatever you want it to be – kind of like an envelope and an LFO had a baby, which then got superpowers from outer space.



Each Function can contain up to 72 points, with independent levels and different curves between each point.

20.4.1. Breakpoints and grab handles



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

Creating your own Function shapes begins with two simple tools: *breakpoints* and *grab handles*. A *breakpoint* is a point at which the curve can change direction or steepness. Between any two breakpoints is a *grab handle* that you can drag to change the shape or intensity of the curve between those two points. Leaving a handle in mid-position would create a more or less straight line between points. Dragging it as far as it will go in a direction generally creates a steep "knee" shape.

These tools let you surgically craft any modulation shape as the Function output.

20.4.1.1. Adding, deleting, and moving breakpoints

Left-click on the Function graph to add a breakpoint. Double-click on the point to delete it (or right-click then select "Delete point" from the pop-up). Drag the point around to move it. A Function can contain up to 72 breakpoints including the first and final ones.

To delete multiple points, make a multiple selection using Command-click-drag (macOS) or Ctrl-click-drag (Windows). Then, use your backspace/delete key, or right click and select "Delete selected points" from the resulting pop-up.

20.4.1.2. Changing the shape of a curve

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

20.4.2. Draw Modes

The Draw Mode tools help you draw and edit functions. The menu options are as follows:

- *Free:* Creates a single point and lets you free-drag it between its neighboring points
- *Steps:* Draws discreet steps as you drag the cursor
- *Ramp Up:* Creates a ramp with two points
- *Ramp Down:* Creates a sawtooth (reverse ramp) with two points

When using the line, ramp, or saw tools, a single click will create a single segment. Click-dragging will generate a shape or curve the length of multiple segments.

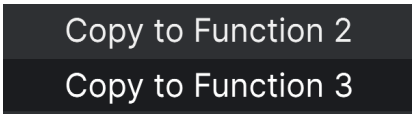
The **Curve** button to the right of the Draw Mode menu toggles a more curved, gradual shape of any line segment of the Function that is *not* a straight line. Experiment with this on a simple Function first, and watch the segments change shape.

The **Magnetize** button (magnet icon at far lower right) engages "snapping" to the Grid [p.246] when editing points to make precise editing easier. Switch this function off if you would like to edit freely without the automatic snapping of the edit points.

> As of Pigments 6, the length of each step is set with the horizontal grid size [p.246].

20.4.3. Copy between Functions

If you have drawn Function that you would like to copy to one of the other available functions slots, the process is very easy. Simply click the double-document icon next to the Presets button:

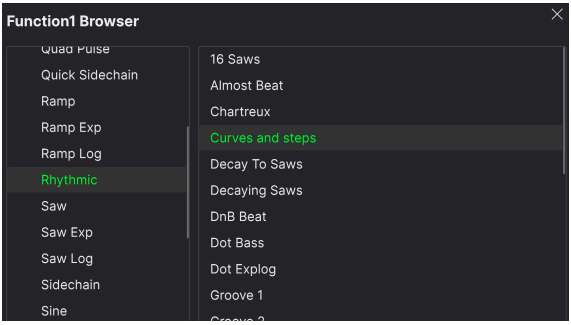


Doing so opens a menu allowing you to duplicate the function to any of the other function slots. For example, if you're on Function 1, the buttons for Functions 2 and 3 are available. Click one and the transfer is instantaneous. You can then select the target Function to confirm the transfer.

This is a handy feature, useful for making quick backups or slight alterations between functions so as to give them complementary settings.

20.4.4. Function presets

Click the Presets field and a browser of Function presets will open. Arturia has provided some interesting Functions that you can use or adapt as needed.

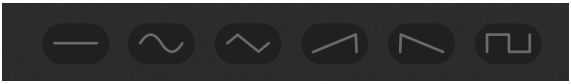


Whether you've made changes or created a new Function from scratch, you can save them as your own by selecting the Save or Save As options. You can't overwrite a factory preset, but you can alter them as much as you like and use the Save As option.

After saving a new preset it will appear in the preset list when it is opened. After that point you can use the *Save As* option. If you retain the name of the existing Function Preset, it is replaced.

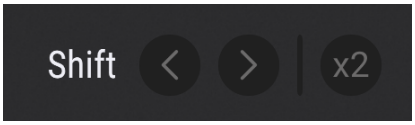
You can delete a user preset from the list by clicking the trash bin icon across from its name.

20.4.4.1. Basic function shapes



Clicking any of these buttons will reset the function to one of the six basic shapes/waveforms. This can be useful as a starting point. If you hit one accidentally, you can always use the Undo feature [p.42] to restore the Function you were working on.

20.4.5. Shift and multiplier



Click the arrows to shift the Function forward or backward in time. One click moves the Function one space left or right on the Grid [p.246]. The **x2** button duplicates all breakpoints and curves *within* the existing grid space. Effectively, this makes the Function proceed at twice the rate..

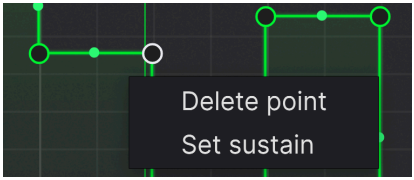
20.4.6. Play Mode

At the lower left of the Function area is the Mode menu.

Value	Description
Loop	Once triggered, the Function will loop until another trigger resets it. Retrig Source chooses Trigger.
One-Shot	The Function runs once when triggered. The Retrig Source chooses the trigger source.
Envelope	Function acts as envelope generator (see below)
Envelope Loop	Function acts as envelope generator with looped segment (see below)

20.4.6.1. The sustain point

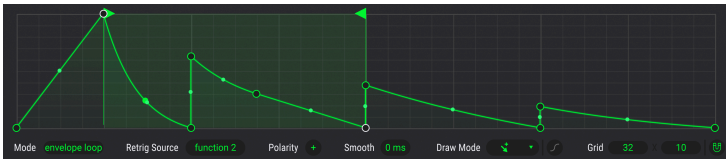
The two Envelope modes add a *sustain point* to the function. When the Function is triggered by a MIDI note-on command, for example, the Function proceeds through the points in the Envelope until it reaches the Sustain point. It then holds there until the corresponding note-off is received.



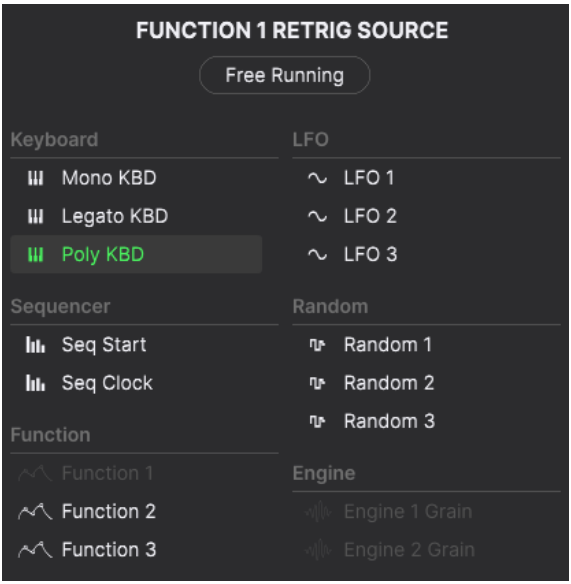
The sustain point is one breakpoint in the Function. To choose it, right-click on the desired point when in one of the envelope Play modes. Then, choose "Set sustain" from the pop-up menu.

20.4.6.2. Envelope loop markers

If *Envelope Loop* is selected, upon note-on the function will proceed to a loopable section, then repeat that section until the note-off is received. The loopable section can be adjusted (to neighboring breakpoints) using draggable markers:



20.4.7. Retrig Source



Click on the Retrig Source Field to open a menu of sources that cause the Function to retrigger. As with the LFO retrigger sources, the Engine 1 and 2 Grain options are available only when the Sample engine is selected as Engine 1 and/or 2, and its Granular mode is turned on.

20.4.8. Function Polarity

Click the **Polarity** button to toggle between unipolar and bipolar operation. In the former, the Function sends positive modulation values only. In Bipolar mode, it sends positive and negative values on either side of the "zero crossing" center line.

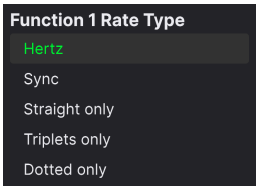
20.4.9. Smooth

This parameter smooths the transition between the segments of a Function by adding a smoothing filter to the Function output.

20.4.10. Grid size

The background grid can make it easier to relate creating or editing a Function to rhythm or tempo. The left field selects the number of horizontal grid spaces and the right the vertical number. Then, the magnet icon causes function breakpoints to snap to the nearest grid when being dragged.

20.4.11. Function Rate and tempo sync



As with the LFOs [p.241], the Rate of each function can free-run in Hertz or be synced to tempo. The options are identical to those for the LFOs.

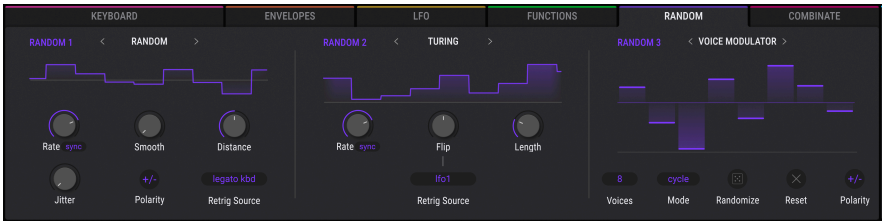
20.4.12. Function Scale

Finally, the **Scale** knob adjusts the overall output of the Function while preserving its internal value relationships between breakpoints and along segments and curves. Remember, in the end it's only modulation value we're creating here! What a Function "sounds" like depends on the parameters on the receiving end of the modulation!

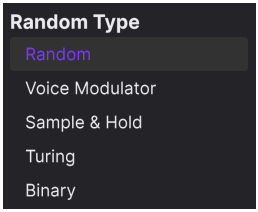
> Since **Scale** is a bipolar knob, it can also invert the entire output shape of the Function!

20.5. Random tab

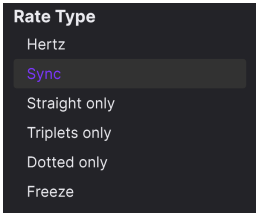
These serve as modulation sources that generate a series of random output values. If you want unpredictable burbling in some aspect of your sound, this is where to find it.



Randomizers 1, 2, and 3 each contain a drop-down menu letting you select one of five different randomization generators: Random, Voice Modulator, Turing, Sample & Hold, and Binary.

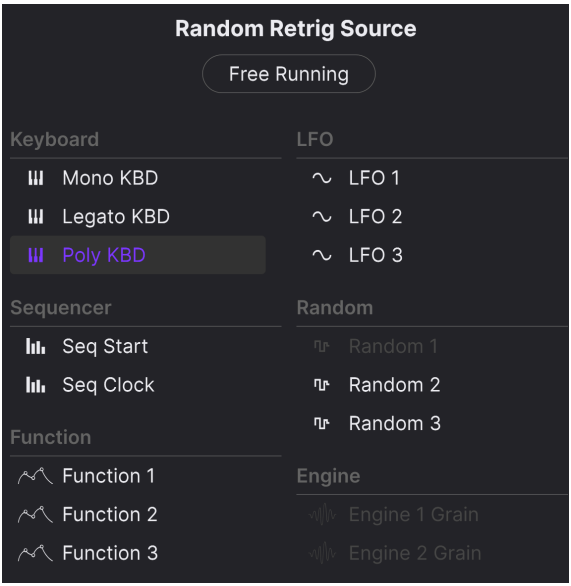


20.5.1. Rate and tempo sync



Like other time-based modulation sources in Pigments, all Random generators (except the Voice Modulator [p.251]) have a Rate adjustment that can free-run in Herz or synchronize to your project tempo according to straight, dotted, or triplet values.

20.5.2. Retrigger sources



Likewise, all generators except the Voice Modulator offer the now-familiar menu to select a source that retriggers them to start at the beginning of their cycle.

Now, let's take each Random generator type one at a time.

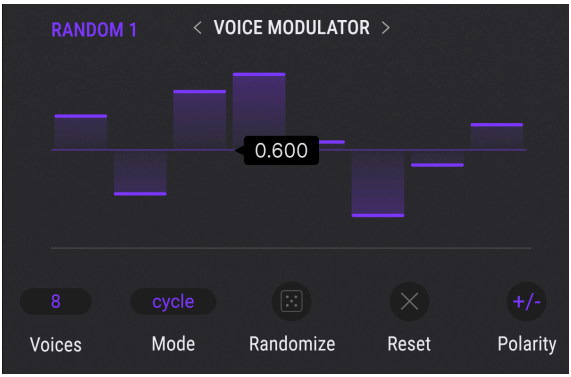
20.5.3. Random

This general-purpose random value generator is meant to be straightforward to use.

Parameter	Description
Rate	Adjusts the rate of value generation with tempo sync options
Smooth	Smooths the transition between values; higher settings show more curved shapes in the visualizer
Distance	Increases or decreases the spread between the minimum and maximum possible values
Jitter	Adds variance to the timing of the randomly generated values
Polarity	Toggles unipolar (positive values only) or bipolar (positive and negative values) operation
Retrig Source	Selects the retrigger source [p.249] as described above

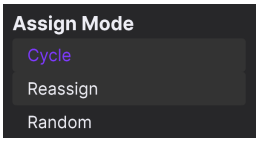
Thanks to the **Smooth** knob, you can create random but smooth-curved (as opposed to stepped) modulations, which was not possible prior to Pigments 6.

20.5.4. Voice Modulator



This very cool new (Pigments 6) generator outputs a new value each time Pigments triggers a voice (usually because you, the sequencer/arpeggiator, or a DAW track plays a MIDI note). For example, you could assign it to filter cutoff to hear a different amount of brightness with each successive note, or to a pan position to bounce a sound around the stereo field. You could also use it to create "dispersion" or drift-like behavior of any destination parameter, mimicking the behavior of aged analog synths.

Drag the bar of a Modulator step up or down to set its value. The **Mode** parameter determines how voices relate to Modulator steps:



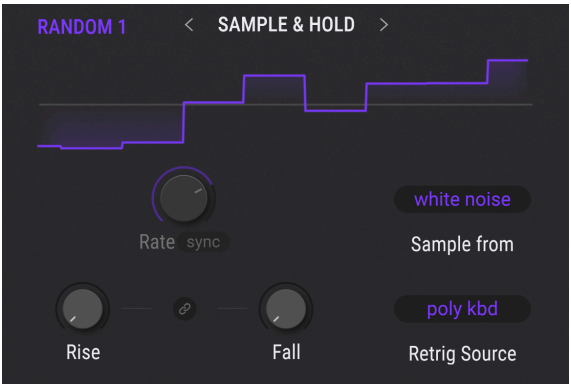
- *Cycle:* Each new voice advances the Voice Modulator one step
- *Reassign:* If a note has been played before, the Modulator uses the step already used for that note; if it has not, it advances to the next step
- *Random:* Each new note grabs a random step from the Modulator cycle

The rest of the parameters work as follows:

Parameter	Description
Voices	Sets the number of steps in the Modulator, from 1 to 8
Randomize	Clicking the "dice" icon sets random values for all Modulator steps
Reset	Click the X icon to zero out all Modulator step values
Polarity	Toggles unipolar or bipolar sending of values

> To understand the difference between Cycle and Reassign modes, try the "Jaws theme" test: Play two adjacent chromatic notes. In Cycle mode, you will see successive Modulation steps highlighted. In Reassign mode, this will alternate between just two steps.

20.5.5. Sample & Hold

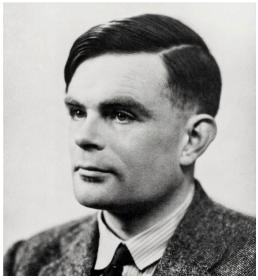


This term refers to sampling a source (most often a white noise waveform) at time intervals, then applying that value to a modulated destination.

Parameter	Description
Sample from	Selects the impulse to provide the values that are sampled at random
Retrig Source	Chooses the retrigger source [p.249] as described above
Rise	Sets the time it takes to transition into the next value
Fall	Determines the time it takes for a value to return to zero
Link	Connects the rise and fall values; Rise control adjusts both
Rate	Sets rate of output value generation, with menu for tempo-sync options

♪ Familiar applications of sample-and-hold are reminiscent include a sound in early sci-fi movies meant to convey that "the computer is thinking;" this burbling can also be heard at the beginning of the song "Welcome Back My Friends" by Emerson, Lake, and Palmer.

20.5.6. Turing



Named for British mathematician Alan Turing, who solved enemy codes that helped the Allies win World War II, the Turing generator produces control values that can be completely random, or locked into loops that repeat with a degree of predictability. The length of a cycle can be anywhere from one to 64 steps, depending on the combined settings of the Flip and Length parameters.

Parameter	Description
Rate	Adjusts the rate of value generation with tempo sync options
Flip	Sets the likelihood of "mirror image" output and length (details below)
Length	Adjusts the length of the cycle
Retrig Source	Chooses the retrigger source [p.249] as described above

20.5.6.1. What does Flip do?

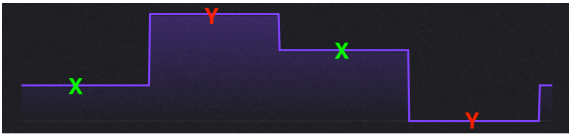
The **Flip** parameter sets up the probability that a particular output will be both inverted and reversed. To take an example, let's look at the output of the Turing generator when Length = 2.

%	Length	Output 1	Output 2	Output 3	Output 4	Output 5
0.00	2	x	y	x	y	x
50.0	n/a	random (0-1)	random (0-1)	random (0-1)	random (0-1)	random (0-1)
100	2+2	0+x	0+y	1-x	1-y	0+x

In somewhat more musical terms, this table means that:

- At 0.00% the values of steps 1 and 2 alternate indefinitely.
- At 100% the values of steps 1 and 2 will be mirrored and inverted. The cycle length is doubled from 2 to 4 (vertical mirror), and the values are inverted when measured from 0 and 1 (horizontal mirror relative to 0.50).
- At 50% the values of steps 1 and 2 are completely random. The term "cycle" is used loosely, as the next two values may or may not repeat either of the previous values. The length of the cycle is difficult to discern unless you hover over the Flip control.

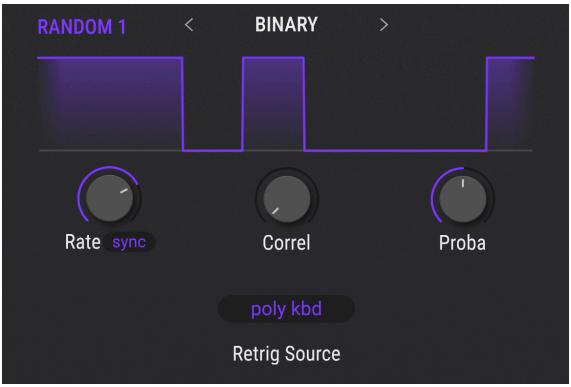
Flip values of 0.00% and 100% are easier to understand: complete rigidity or total fluidity. The following graphic may help visualize what happens at a Flip value of 50%.



The output of step 1 is (0 + 0.25) = 0.25, and the output of step 2 is (0 + 0.99) = 0.99; the output of step 3 is (1.0- 0.25) = 0.75, and the output of step 4 is (1.0 - 0.99) = 0.01.

Another way to think about it is this: Flip values of 0.00% and 100% result in cycles that are very predictable in output and length, but Flip values between 0.01% and 99.9% will result in various degrees of random output and length.

20.5.7. Binary

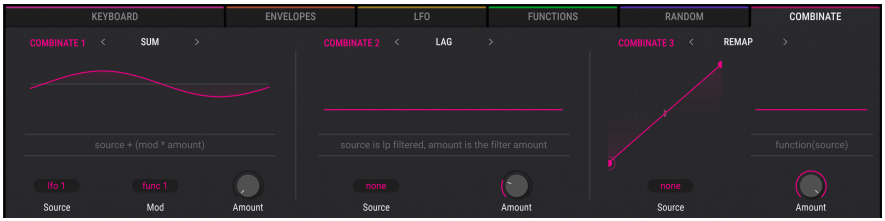


"Binary" connotes a black-and-white, either-or duality (i.e., ones and zeros). But what are the chances you'll end up with one *or* the other at any given moment? That's what the Binary generator lets you do: adjust the predictability of the outcome.

Parameter	Description
Rate	Adjusts the rate of value generation with tempo sync options
Proba	Adjusts the probability that the output will be 1
Correl	Correl (correlation) affects the chances of two successive output values being the same. At a value of 0, only the Proba parameter is active. At a value of 1, the output at time *t+1* is guaranteed to be exactly the same as the one at time *t*.
Retrig Source	Chooses the retrigger source [p.249] as described above

20.6. Combinate tab

A Combinator generates a modulation source based on *combining* modulation sources. Pigments provides three of these mathematical marvels for use as modulation sources.



The Combinate tab

There are nine Combinator types, which have the following parameters in common:

Parameter	Description	Range
Source	The modulation source being affected	24 options
Mod	The modulation source or process doing the affecting	24 options; not present on Lag, Threshold, Offset, and Remap types
Type	Decides the math process that will be applied	9 options
Amount	Controls how much the Mod affects the Source	0.00 - 1.00 in steps of 0.001

If you're familiar with frequency modulation (FM) synthesis, an analogy is that the *Source* parameter is like the carrier and the *Mod* parameter is like the modulator. Except, this is about modulators modulating other modulators.

Confused yet? Let's try this:

1. Start with the Default preset.

2. Select the Combinate tab.

3. In Combinate 1, set Source to LFO 1 (Sine) and Mod to LFO 2 (Sawtooth).

4. Type = Sum by default and the Amount is at 0.500. Set Amount to maximum (1.00).

5. On the LFO tab, change the Rate of LFO 2 to 1/4. This will make the effects more obvious.

6. Return to the Combinate tab.

7. Slowly adjust the Amount from 1.00 to 0.00 and watch the waveform. Lower amounts decrease the impact of the Sawtooth wave, as seen in the smaller spikes that eventually disappear into the Sine wave.

8. Return the Amount to 1.00 and observe the waveform: the Sine peak is first, then the Sawtooth.

9. Select the next Type (Difference) and observe: now the Sawtooth peak is first, then the Sine. Mathematically the results are at opposite extremes, as are the results here.

10. Return the Amount to 1.00 and select Type: Multiply, then Type: Divide. The differences in the math processes are even more extreme, and though the results are too technical to describe, we think you'll agree that the output waveforms are equally complex and useful.

11. Select Type: Crossfade. This one's easy: with the Amount at 1.00 only the Mod input passes through, and so the result is a Sawtooth wave. At a value of 0.00 only the Source input passes through, and so the result is a Sine wave.

12. Select Type: Lag. (Notice that the Mod input is hidden.) Lag causes a "rounding" effect on the peaks and valleys of the Source input.

13. For this example, select LFO 2 as the Source. The results will be more obvious with the Sawtooth wave.

14. Adjust the Amount from 1.00 to 0.00 and back. The Sawtooth will gradually appear fully formed, and then gradually be rounded until the waveform is almost entirely squashed.

15. We'll go through the rest of the example with LFO 2 as the Source.

16. Set Amount to zero, and select Type: Threshold.

17. Notice that the lower half of the Sawtooth wave does not rise above the Threshold level.

18. Increase the Amount and observe the results as more of the Sawtooth falls below the Threshold.

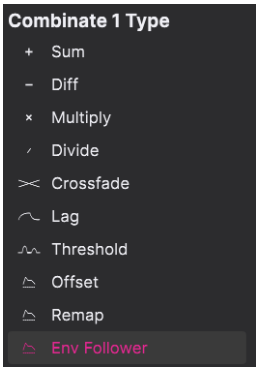
19. Set Amount to zero, and select Type: Offset.

20. Adjust the Amount from 0.00 to 1.00 and observe: The lowest levels of the Sawtooth waveform are slowly offset until the entire waveform exists in positive territory, and eventually becomes a flat line at the maximum level.

♪ LFO 2 is actually set to a Triangle wave, but since its Symmetry setting is at minimum, the actual output is a Sawtooth wave.

20.6.1. Combinate Types

The formulas used to calculate each Type are displayed in a pop-up menu when you click the Type button:



The following chart displays how each formula combines two modulation sources.

Type	Formula
Sum	Source + (Mod * Amount)
Diff	Source - (Mod * Amount)
Multiply	Source * Mod * Amount + Source * (1 - Amount)
Divide	Source / (Amount + Mod)
Crossfade	Amount crossfades Source and Mod
Lag [p.259]	Source is LP filtered; Amount is the filter amount
Threshold	Source if > threshold, otherwise = threshold
Offset	Offsets Source by Amount
Remap [p.259]	Imposes a function-like curve on the source
Envelope Follower [p.13]	Tracks a selectable input source to combine modulations

♪ The output of the equations is not allowed to exceed the values of -1.00 and +1.00.

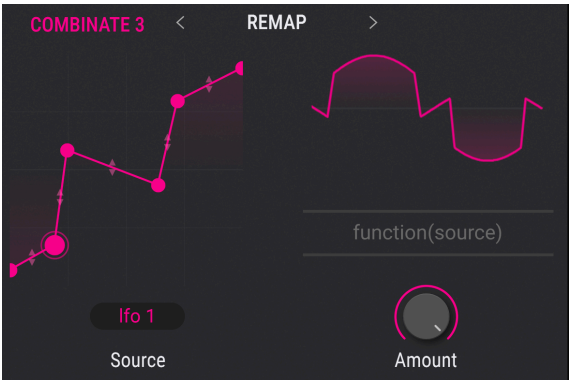
20.6.2. Lag

Here are some details to keep in mind about the Lag process:

- When input is received from a source and the Amount value is 0.00, all changes of the input are instant.
- If the Amount value is 0.500 (50%) it takes 500ms to reach 99% of the source's amplitude.
- If the Amount value is 1.00 (100%) it takes 5 seconds to reach 99% of the source's amplitude.

20.6.3. Remap

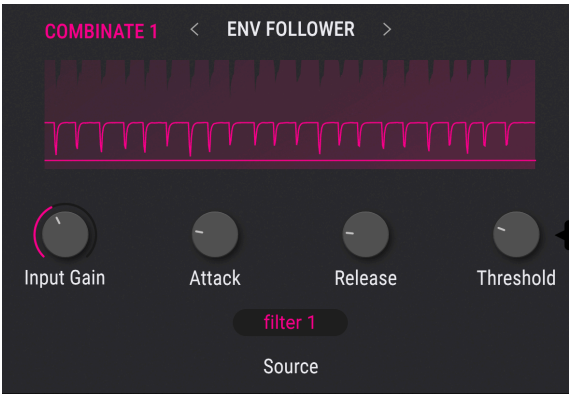
The Remap type of the Combinator is also special in that it has a user-editable curve that works like those in the Functions [p.242]: you can click to add breakpoints and grab the handles between them to change the shape of the curve segment. The overall curve you create here then imposes itself on the source, more or less so depending on the setting of the **Amount** knob.



The remap curve is at left; to the right is its effect on a sine wave

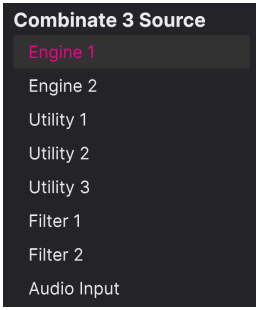
The Remap type lacks a **Mod** selection because the curve you create simply *is* the Modulator. In the screen shot above, we've created a multi-point modulation curve. As the Source, LFO1 is just generating a simple sine wave. But as you can see from the output on the right, the result is a recurring but unusual shape. As with any other modulation source, that shape can affect any parameter in Pigments by dragging the corresponding Combinator from the center strip to the desired parameter.

20.6.4. Envelope Follower



New in Pigments 6, the Envelope Follower merits its own brief section here. You may be familiar with this type of effect as a pedal bass players use, but it has many more applications. An envelope follower tracks the volume envelope of an audio source, then turn that into a modulation value you can map to any destination simply by assigning the Combinator.

Via the **Source** menu, you can "tap" the signal from a variety of points in Pigments. That serves as the envelope to be followed.



Then, the other parameters are "stompbox" simple:

Parameter	Description
Input Gain	Adjusts the input level of the tracked signal into the follower
Threshold	Sets the threshold above which the follower translates incoming signal into modulation output
Attack	Sets the time it for the follower to generate output once threshold is reached; increased values smooth the modulation signal
Release	Adjusts the time for modulation output to return to zero once input falls below threshold

20.7. Macros

Macros are four unipolar knobs that can be assigned any number of modulation routings, including sidechains.

Put more simply, a Macro lets you turn multiple knobs by turning *one* knob.

Macros work like any other modulation source, so you can set up routings [p.213] for them using the same procedures.

- In the Modulation overview, select M1 to choose Macro 1 as a Mod source, M2 for Macro 2, etc. Then to construct mod routes, use the Mod target view method [p.221]. This may be the preferred method, since one of the best uses of a Macro is to control multiple parameters from a single source. You can also set up SideChains [p.227] for each of the mod routes while you're at it.
- When you want a Macro to be one of several Mod sources affecting a single parameter, use the Mod source view method [p.219].

Double-click in the name field below each Macro knob to enter a custom name.

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