USER MANUAL

PIGMENTS
Polychrome Software Synthesizer

ARTURIA®
YOUR EXPERIENCE·YOUR SOUND

Special Thanks

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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.

Introduction

Congratulations on your purchase of Arturia's Pigments!

We'd like to thank you for purchasing Pigments, our latest virtual instrument and heir apparent to the role of Best. Synth. Ever.

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!

1.1. The second page of a new chapter

When Pigments was originally launched in late 2018, it was a big step in a new direction for Arturia. Pigments was the first virtual instrument that was *not* an emulation of an existing piece of classic hardware. It was an entirely new creation, an exciting synthesizer that brought new sonic colors into the world with its mind-bogglingly powerful modulation matrix connected to fantastic-sounding oscillators, filters, and effects.

It had features were at once familiar and unique: there were oscillators, but with an astounding assortment of waveshaping tools; there were filters, but their power and precision were unparalleled; there were envelopes, but they were more flexible than any you may have encountered. These things coupled with the modulation matrix made Pigments a monster synth and users embraced and loved it.

As users got to know Pigments, we began to hear consistent requests for *more*. More sound engines. More filters. More effects. And more ways to connect and modulate these effects. Users wanted more so they could push their sound design and we are only too happy to deliver more with version Pigments 2.0!

We have added a new Sample-based engine that opens the door to sample playback and granular synthesis. We have added unison modulation capabilities to the virtual analog engine and a low-pass gate. We have made many updates to the Sequencer and FX sections, including a new Tape Delay effect. We have even added the ability to use MPE-based instruments to get high resolution hands-on control over all the amazing features. This barely scratches the surface but you get the idea: we have made the monster synth even more powerful. Spend a few minutes listening to the presets and exploring the menus and you will know this description barely scratches the surface.

Pigments runs both as a standalone instrument on Windows and Mac OS X and as a plug-in in all major formats inside your DAW. It has easy MIDI learn functionality for hands-on control of most parameters, and as a plug-in also allows parameter automation for greater creative control.

1.2. Features of Pigments

Here is an overview of the features you have at your disposal with Pigments:

- Three voice engine types: Analog, Wavetable and Sample/Granular
- Analog engine features
    - Three oscillators per voice with multiple waveforms
    - Variable pulse width (Triangle, Square)
    - Hard sync (Osc 2->1)
    - Quantizable modulation of pitch
    - Variable noise source
    - Programmable random oscillator pitch and phase
    - Frequency Modulation (FM)
    - Three Modes (Classic, Chord and Super)
- Wavetable engine features
    - Browse/select preset wavetables or use your own
    - Morph or jump between wavetable positions
    - Quantizable modulation of pitch
    - Three Unison modes (Classic, Chord, Super)
    - FM (Linear or Exponential)
    - Phase Modulation
    - Phase Distortion
    - Wavefolding
    - Variable Modulator with ten wave sources and three tuning modes
- Sample/Granular engine features
    - Provides both sample playback and Granular synthesis functionality
    - Browse/select preset samples or use your own
    - Quantizable modulation of pitch
    - Three Unison modes (Classic, Chord, Super)
    - Loads up to six samples
    - Six sample selection modes
    - Powerful sample editing and looping functions
    - Lowpass / highpass filter
    - Advanced granular functions with randomize options
    - Variable Modulator with ten wave sources and three tuning modes
- Dozens of continuously variable filter types, including
    - Three analog filter models: Mini, SEM, M12
    - LowPass Gate filter
    - BP/LP/HP, Notch, Comb, Phaser and Formant types, plus combinations
    - 6 dB/octave to 64 dB/octave options
    - Most filters have variable resonance, can self-oscillate
    - Filter FM with selectable sources
    - Stereo panning per filter with modulation capabilities
    - Series or parallel routing with hundreds of intermediate gradations

- A nearly unlimited number of modulation sources and destinations
    - Unique modulation sources such as Turing, Binary, Functions, and Combinate
    - Four definable, assignable Macro sources for complex, simultaneous modulations
    - 3 syncable LFO sources with flexible shapes, phases, trigger sources, and polarity
    - Three highly adjustable envelopes, two of which can be looped/triggered by over a dozen sources
- Flexible modulation of final output stage, including level and voice panning
- Powerful step sequencer and arpeggiator
- An arsenal of studio-quality effects
    - 3 multi-FX chains, with up to 3 simultaneous effects each, for a total of 9 simultaneous FX
    - Chorus/flange/phaser, reverb, delay, EQ, distortion, filter, wavefolder, and more
- Independent up/down pitch bend ranges (+/- 36 semitones)
- MIDI-assignable parameter control
- The Sound Design Tips feature draws attention to certain parameters and their optimal ranges
- Preset browser can filter by Type, Style, Name, etc.

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

And now ... Arturia's Pigments.

2.1. System requirements

Pigments works on computers that meet these minimum specifications:

Windows 7 or later (64bit)

- 4 GB RAM; 2.5 GHz CPU
- 1GB free hard disk space
- OpenGL 2.0 compatible GPU

macOS 10.10 or later

- 4 GB RAM; 2.5 GHz CPU
- 1GB free hard disk space
- OpenGL 2.0 compatible GPU

You can use the stand-alone version of Pigments or use it within 64-bit DAWs as an Audio Units, AAX, VST 2.4 or VST 3 instrument.

2.2. Activate the Pigments license

Once Pigments has been installed, the next step is to activate your license for the software.

This is a simple process that involves a different software program: the Arturia Software Center.

2.2.1. The Arturia Software Center (ASC)

If you have not already installed the ASC, please go to this web page:

Arturia Updates & Manuals

The Arturia Software Center is at the top of the list. Once you've located it, download the version of the installer that you need for your system (macOS or Windows).

Follow the installation instructions and then:

- Launch the Arturia Software Center (ASC)
- Log into your Arturia account
- Scroll down to the My Products section of the ASC
- Click the Activate button

That's all there is to it!

2.3. Initial setup

2.3.1. Audio and MIDI settings: Windows

At the top left of the Pigments application window is a pull-down menu. It contains various setup options. Initially you will need to go to this menu and choose the Audio Settings option to get MIDI flowing in and sound flowing out.

You will then see the Audio MIDI settings 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.
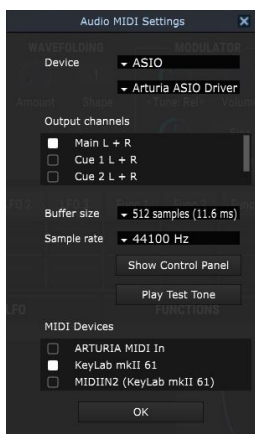
Starting from the top you have the following options:

- **Device** lets you choose which audio driver you want to use to route sound out of the instrument. This might be your computer's own driver like Windows Audio, or an ASIO driver. The name of your hardware interface may appear in this field.

- **Output Channels** lets you select which of the available outputs will be used to route audio out. If you only have two outputs, only two will appear as options. 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. A smaller buffer means lower latency between pressing a key and hearing the note. A larger buffer means a lower CPU load as the computer has more time to think, but can result in a small latency. Find the optimum buffer size for your system. A fast, modern computer should easily be able to operate at 256 or 128 sample buffer size without creating pops or clicks in the sound. If you are getting clicks, try raising the buffer a little. The latency is displayed on the right hand side of this menu.

- 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 the capability of your audio interface hardware though even most computers' own hardware can operate at up to 48kHz which is perfectly fine. Higher sample rates use more CPU power so unless you have a good reason to go up to 96kHz, then 44.1k or 48k is usually fine.

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

- **Play Test Tone** helps you to troubleshoot audio issues by confirming whether sound can be heard through the correct device.

- Your connected MIDI devices will appear in the **MIDI Devices** area. Click the check box to accept MIDI from the device you want to use to trigger the instrument. In standalone mode, Pigments listens for all MIDI channels so there's no need to specify a channel. You can specify more than one MIDI device at once.

2.3.2. Audio and MIDI settings: macOS

The process is very similar to initial setup for Windows and the menu is accessed in the same way. The difference is that macOS uses CoreAudio to handle audio routing and the audio device selection is made in the second dropdown menu. Apart from that, the options work the same way as described in the Windows section.
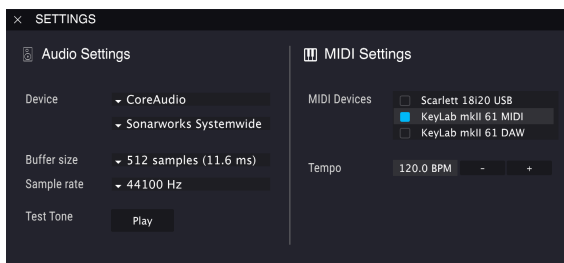
2.3.3. Pigments as a plug-in

Pigments comes in VST, VST3, AU and AAX plug-in formats for use in all major DAW software such as Cubase, Logic, Pro Tools, and so on. You can load it as a plug-in instrument and its interface and settings work the same way as in standalone mode, with a couple of differences.

- The instrument will now synchronize to your DAW's host tempo/bpm rate, when tempo is a factor.
- You can automate numerous parameters using your DAW's automation system.
- You can use more than one instance of Pigments in a DAW project. In standalone mode you can only use one at once.
- Any additional audio effects your DAW has available may be used to process the sound, including delay, chorus, filters, etc.
- You can route Pigments' audio outputs freely inside your DAW using the DAW's own audio routing system.

3. OVERVIEW OF FEATURES

Pigments has a phenomenal set of features, and in this chapter we'll provide an overview of what each one does. We think you'll be amazed by the power and versatility of this instrument.

Yet for all its power, the layout of this synthesizer is very intuitive. That will always be the main focus of every Arturia product: to maximize your creativity while remaining easy to use.

> ♪: The specific operation of each feature will be covered in other chapters.

3.1. Virtual keyboard location

Most of our software instruments have a virtual keyboard which can be used to play a sound without the need for an external MIDI device. Pigments has one too [p.158], and it is available when the MIDI tab is selected in the bottom half of the window.

3.2. The upper tool bar

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

3.2.1. Preset management

The preset management features can be found by clicking the Arturia or Pigments logos in the top left hand corner of the window.

3.2.1.1. Save Preset

> ⚠ !: This option will overwrite the active preset with any changes you have made. If you want to keep the source preset also, use the Save As option instead. For information about this see the next section [p.14].
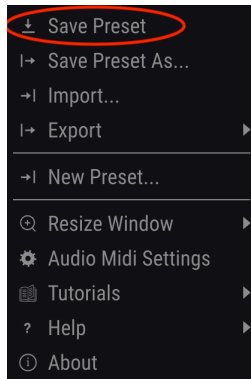
> ⚠ ♪: The factory presets cannot be altered. If you want to keep the changes you've made to one of those you must use the Save As option.

3.2.1.2. Save Preset As...

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.

The Save As window

3.2.1.3. 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**.

After selecting this option the default path to these files will appear in the window, but you can navigate to the folder you prefer to use.
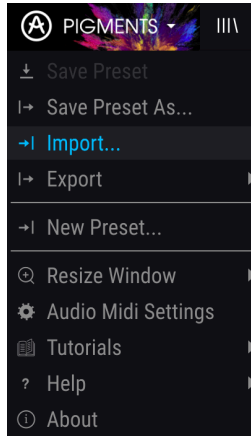
The Import Preset window

3.2.1.4. Export menu

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

Export Preset

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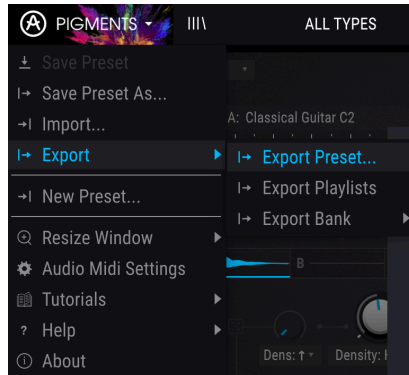
The Export Preset option

Export All Playlists

Playlists allow you to select which sounds to use for a particular gig or session. With this command you can export all of your playlists and import them into another computer that also has Pigments installed.
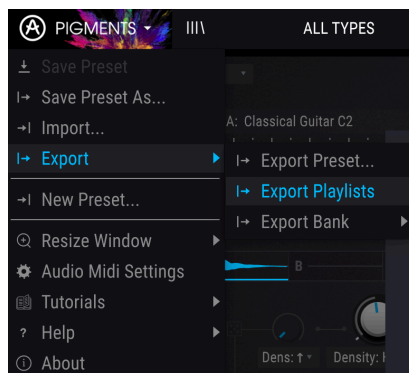
The Export All Playlists option

Export Bank

This option can be used to export an entire bank of sounds from the instrument, which is useful for backing up or sharing presets.
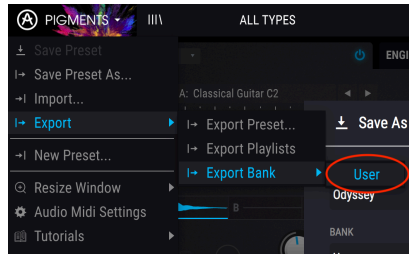
Selecting a Bank to export

3.2.1.5. New Preset...

This option sets all parameters to their default settings. Use this as a "clean slate" if you wish to start designing sounds from scratch.

3.2.2. Configuration

To access the configuration options, click the Arturia or Pigments logos in the top left hand corner of the window. They are listed below the preset management options.

3.2.2.1. 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.
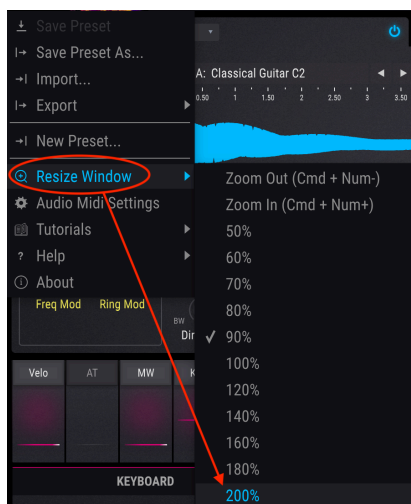
The Resize Window menu

3.2.2.2. Maximize View

There's an automatic window-resizing feature called Maximize View that will only appear in the lower tool bar [p.31] under certain circumstances. Details are found here [p.35].

3.2.2.3. Audio Settings

Here you manage the way the instrument transmits sound and receives MIDI. See Audio and MIDI settings [p.9] for full details on this.

3.2.3. Additional Resources

To access these helpful resources, click the Arturia or Pigments logos in the top left hand corner of the window. They are listed below the configuration options.

3.2.3.1. Tutorials

Selecting one of these options will lead you on a tour of the features of this amazing instrument. Each tutorial will give step-by-step descriptions of how to make the most of the Pigments features.
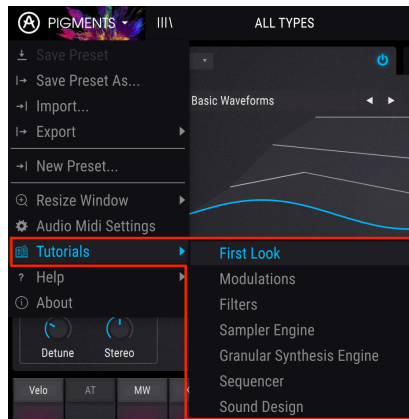
For example, the "First Look" tutorial will walk you through the different windows of the synth, and the "Modulations" tutorial explains how to assign a modulation to a parameter. Follow the instructions at each step and the tutorial will advance automatically to the next step.

> ♪: The edit buffer must be cleared in order to launch one of the tutorials, so a warning message will remind you to save your edits before you begin the tour.

3.2.3.2. About

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

3.2.4. Preset browser overview

The Preset browser can be opened by clicking the toolbar button that has four upright lines. The Filter, name field and left / right arrows located in the upper toolbar can assist with preset selection.

The Preset browser button is circled

There are four preview windows that aid in visual identification of presets as they are selected: one for each Engine and one for each Filter.
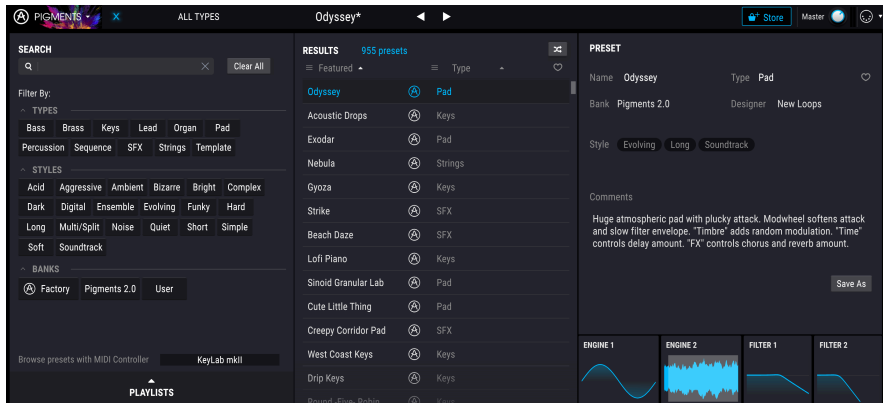
The full Preset Browser window

More details about this window are found in the Preset Browser [p.36] chapter.

3.2.4.1. Browse with MIDI controller

At the bottom of the Preset browser window on the left side is a field labeled Browse with MIDI Controller. It will configure Pigments to work with an Arturia controller so you can browse the preset search results without having to map any controllers to those functions.
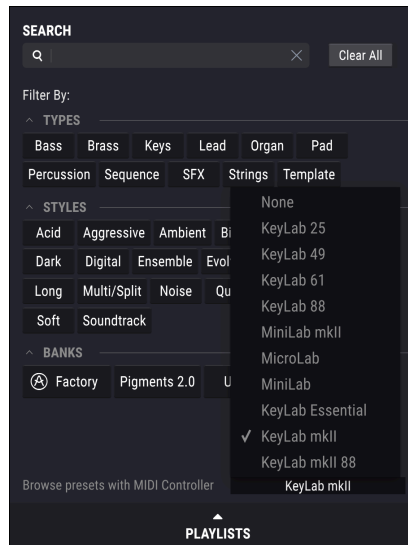
Pigments will detect which Arturia controller you are using and will be configured automatically to enhance the preset browsing experience. Refer to the documentation for your controller to learn more.

If you want to defeat this feature, click the menu window and select None.

3.2.5. Synth mode button

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

- Engine 1 tab [p.45]
- Engine 2 tab [p.45]
- Filter section [p.87]
- The Filter Routing/Amp Mod section [p.97]

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

3.2.6. FX mode button

When the FX button is clicked the upper half of the window displays the FX section. It contains:

- FX: Bus A tab
- FX: Bus B tab
- FX: Send Bus tab

Each of those tabs holds up to 3 independent effects that can be routed in various ways. Details are found in the FX chapter [p.102].

3.2.7. Seq mode button

There are two powerful pattern generators housed beneath the Seq mode button [p.124]: a Step Sequencer and an Arpeggiator.

3.2.7.1. Step Sequencer

Pigments offers a 16-step sequencer in which specific data can be entered, or you can set random pattern generation percentages for parameters such as Pitch, Octave, Velocity, Gate Length, and Slide time. You can even toy with the Trig Probability value for each step in the sequence.

Each parameter track can be set to an independent length (Polyrhythm), and you can specify the number of bars the current settings will be retained before they are randomized again. It's crazy stuff, and the chances that any two sequences will be exactly the same are, well, entirely under your control. There's a more detailed description of the Step Sequencer features here [p.137].

3.2.7.2. Arpeggiator

An arpeggiator allows you to hold down one or more notes and hear those notes played back, one after the other. When a single note is held it will be repeated; when two or more notes are held the arpeggiator will alternate between the notes.

The Step Sequencer and the Arpeggiator have very similar features, except that with an Arpeggiator the Pitch values are defined by which keys you hold down. Octave jumps can still be defined and randomized, so the arpeggios can be as crazy as you want them to be. Follow this link to more information about the Arpeggiator [p.136].

There's a form of Chord arpeggiation too, when the Unison Chord mode [p.51] has been activated for one or both Engines. More details about the Chord modes are available here [p.137].

3.2.8. Sound Design Tips view

Pigments is our first software instrument to offer this feature, and we're really excited about it. 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. This is the Sound Design Tips button.

As you hover over this button you will see smaller light bulbs pop up in various locations, and the center strip will reveal 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.
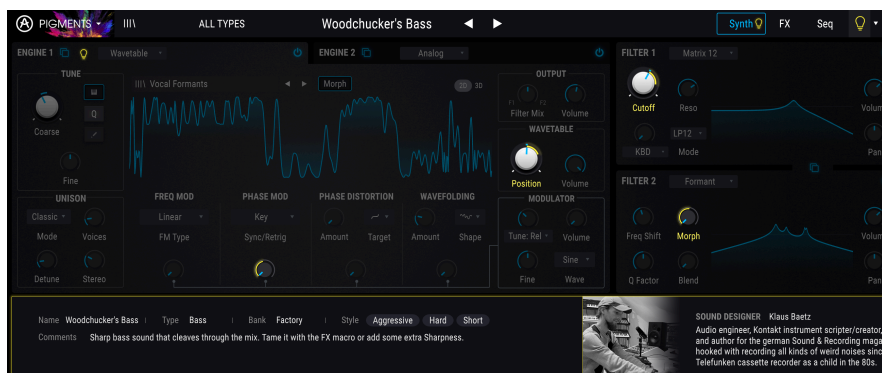
Notice also the presence of lit bulbs on the Synth and FX mode buttons in the upper tool bar, on both Engine tabs, and on the Envelopes tab below the center section. Each one of these bulbs invites you to explore the parameters in those sections, which will be both instructive and a lot of fun!

The Sound Design Tips button may already be lit, which means that Sound Design Tips has been enabled globally (i.e., 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.139].

3.2.9. Master Volume

This 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 clip indicators remain lit for 0.5 seconds.

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

3.2.10. MIDI Learn assignment

The MIDI plug icon at the far right side of the upper toolbar places the instrument into MIDI learn mode. MIDI-assignable parameters will be shown in purple, which means you can map physical controls to those destinations inside the instrument. A typical example might be to map a physical expression pedal to the Master Volume control, or buttons on a controller to the Preset selection arrows so you can change the preset from your hardware keyboard.

MIDI Learn mode (top section)

In the image above the Master Volume control is red. That means it has already been assigned to an external MIDI control. It can be reassigned [p.27], though.

Note that there are MIDI-assignable parameters inside each of the Mod source groups [p.158] also.

MIDI Learn mode (Envelopes tab)

3.2.10.1. Assigning / unassigning controls

If you click on a purple area you'll put that control into learning mode. Move a physical knob, fader, or button and the target goes red, indicating that a link has been made between the hardware control and the software parameter. There's a popup window that displays which two things are being linked and an Unassign button that will disconnect the two.

LFO 1 Waveform control selected and assigned

You can also right-click on a control to unassign it.

3.2.10.2. Min / Max value sliders

There are also minimum and maximum value sliders ("Min" and "Max") that you can use to restrict the range of the parameter response to something other than 0–100%. For example you might want the master volume slider to move within the range of 30–90%. If you made this setting (Min set to 0.30 and Max set to 0.90) your physical knob would be unable to alter the volume lower than 30% or higher than 90%, no matter how far you turned it. This is very useful for making sure you can't accidentally make the sound too quiet or too loud when performing.

In the case of switches which only have two 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.

3.2.10.3. Relative control option

The final option in this window is a check box labelled "Is Relative". It is intended for use with a specific type of control: one which sends only a few values to indicate the direction and speed at which a knob is turning, as opposed to sending a full range of values in a linear fashion (0-127, for example).

To be specific, a "relative" knob will send values 61-63 when turned in a negative direction and values 65-67 when turned in a positive direction. The turn speed determines the parameter response. Refer to the documentation of your hardware controller to see if it has this capability. If so, be sure to switch this parameter on when setting up its MIDI assignments.

When configured this way, movements of the physical control (usually a knob) will change the software parameter by starting at its current setting, rather than being an "absolute" control and snapping it to some other value as soon as you start to move it.

This can be a great feature when controlling things like volume, filter, or effect controls, since you won't usually want them to jump noticeably from their current setting when they are modified.

3.2.10.4. 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.

3.2.11. MIDI controller configuration

There's a small arrow at the far right hand side of the toolbar that opens the MIDI controller configurations menu. This allows you to manage the different sets of MIDI maps you may have set up for controlling the instrument's parameters from MIDI hardware. You can copy 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.
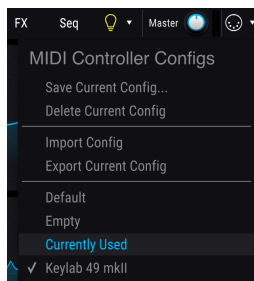
There are several options shown in the graphic above:

- **Default** gives you a starting point with predetermined controller assignments
- **Empty** removes the assignments of all controls
- **Currently Used** will be selected automatically whenever an assignment is changed
- The **check mark** indicates that the KeyLab mkII configuration is currently active.

3.3. The Modulation overview window

The center section of Pigments displays a labeled row of 24 modulation sources. These are useful in a lot of ways:

- To set up a modulation route using one of those Mod sources, click its name. The Mod target view [p.145] 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, the windows under those sources will be illuminated in the Modulation overview window.
- As you hover over a parameter control a small " + " icon will appear. Click it to open the Mod source view [p.144], 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.143]. There's also a chart that explains what it means when the outlines and colors around a knob change [p.148].

3.4. Mod source groups

Below the Modulation overview are 6 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.158]

This includes pitch bend range, micro tuning, glide parameters, and other settings.

- Envelopes [p.163]

- LFOs [p.164]

- Functions [p.165]

- Random [p.170]

- Combinate [p.173]

The Macro controls are a group of modulation sources that are always visible. They are described in the next section.

3.5. Macro controls

These four controls provide a quick way to alter the sound of a preset. The great thing about a Macro control is that it can be assigned to an external MIDI control, which allows that control to alter as many parameters as you want with a single motion.

Assigning a parameter to a Macro is easy: Click one of the four M boxes above the knobs (M1 for Macro 1, etc.) and select the destinations the same way you would for any other mod source [p.143], such as an LFO or an envelope.

> ♪: Names can be entered under each Macro control, so their labels may be different from one preset to the next.

3.6. The lower toolbar

At the very bottom of the Pigments window there are some great features we want to make sure you don't miss.

3.6.1. 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.

The current value of a parameter can be shown without editing it; just hover the cursor over the related control and the value will appear nearby.
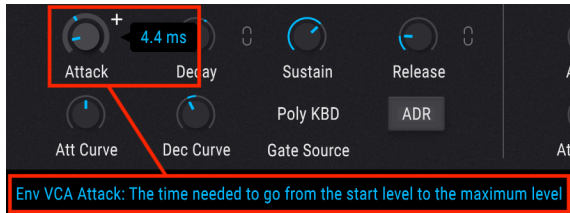
Displaying the current control's value and description

3.6.2. MPE Support

Pigments supports MIDI Polyphonic Expression (MPE). This exciting addition to the MIDI protocol allows a multi-dimensional controller to send polyphonic expressive controls (like pitch bend or modulation) on a per-note basis. This is done by using separate MIDI Channels to carry each note's expressive data separately, that can then be parsed by synthesizers like Pigments.
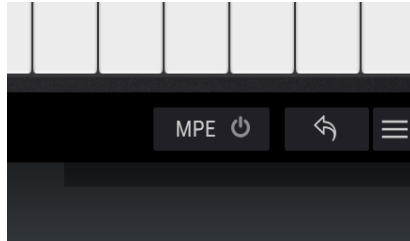
The MPE button

MPE support can be switched on and off by clicking the power icon next to the MPE button in the lower toolbar. Click the MPE label to reveal the MPE Configuration panel:
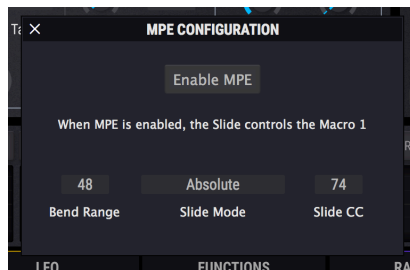
The MPE Configuration panel

Here you can set the following:

- **Enable/Disable** - This is the same as clicking the power icon next to the MPE button.
- **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 what is used on your hardware MPE controller.
- **Slide Mode** - Determines how the slide (sliding your finger toward or away from you on the same key) is handled.
  - When set to *Absolute*, the actual position of your finger is sent to Macro 1 within Pigments.
  - When set to *Relative Bipolar*, no matter where the key has been initially pressed, the first value sent by the keyboard will be 64 (again, appearing as Macro 1 within Pigments). Then the value will increase if your finger slides away from you on the key or decrease if your finger slides closer to you.
  - When set to *Relative Unipolar*, no matter where the key has been initially pressed, the first value sent by the keyboard will be 0 (again, appearing as Macro 1 within Pigments). Then the value will increase if your finger slides away from you on the key or decrease if your finger slides closer to you.
- **Slide CC** - Select the MIDI CC number used to send the slide information. By default, this is 74 but you can change it. Note that when MPE is enabled, all the controls that listen to the selected CC will not receive it anymore.

3.6.3. Undo/Redo Controls

Pigments includes Undo and Redo controls to make it easy to help you step through your edits and hear the changes that you've made. To make things even easier, there is a Undo/Redo History button (located between the Undo and Redo buttons) lists the changes and lets you multiple Undo or Redo jumps.
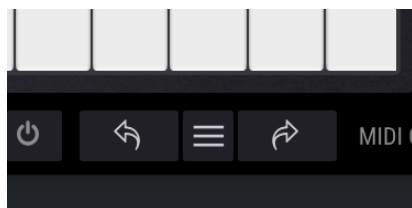
The Undo, History, and Redo buttons

3.6.4. MIDI Channel setting

This window indicates the current MIDI Channel setting. Click on it and it will expand to show the full range of available values (All, 1-16).
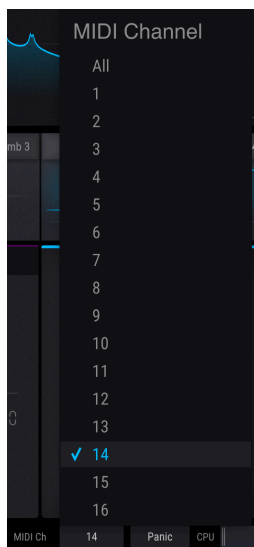
The check mark indicates the currently selected MIDI channel number.

3.6.5. Panic button

The Panic button can be pressed to reset all MIDI signals in the event of stuck notes or other issues.

3.6.6. CPU meter

The CPU meter is used to monitor how much of your computer's CPU is being used by the instrument. The CPU meter will rise as more voices are used, such as when using the Unison Voice features [p.62].

3.6.7. The Maximize view feature

If you set Pigments to a higher magnification value and some of its parameters are pushed outside the viewable range of your display, you might see a couple of blue arrows show up on the far right side of the lower tool bar.

The Maximize View button is visible on the right side

This is the Maximize View button. What it does is provide a quick way to resize the window without having to use the pull-down menu in the upper left corner. When you click this button Pigments will make the most of the available screen space by re-centering the Pigments window and expanding it downward toward the bottom of your display.

But if you still can't see everything at the same time then you may want to select a smaller magnification value using the Resize Window feature in the pull-down menu [p.18]. Naturally there's a balance to be struck: Resizing the Pigments window can prevent the need to scroll the window up and down, but it also may be harder to read some of the smaller text.

4. THE PRESET BROWSER

The preset browser is how you search, load and manage sounds in Pigments. It has a couple of different views but they all access the same banks of presets.

To access the search view, click the browser button (the icon looks a bit like books on a library shelf).
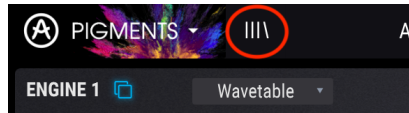
The Preset Browser button

4.1. Searching presets

The Search screen has a number of sections. By clicking on the Search field at the top left you can quickly enter any search term to filter the preset list by patch name. The Results column is updated to show the results of your search. Press the Clear Filters button in the Search field to clear the search.
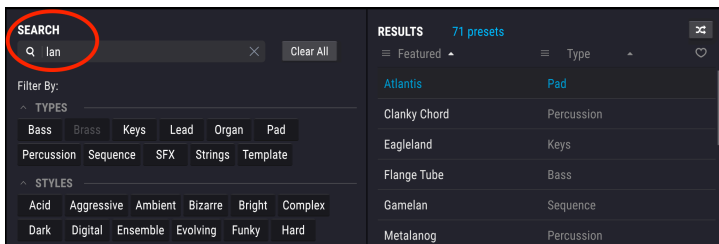
Filter by typing text in the Search field

In the example above the letters "l", "a", and "n" were typed into the Search field. This selects all presets that have those three letters next to eachother in the preset name.

4.2. Using tags as a filter

You can also search using different tags. So for example by clicking on the Keys option in the Types field you can show only presets that match that tag.
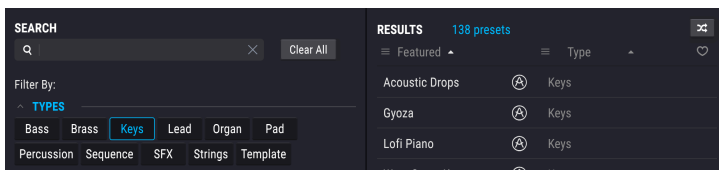
You can also select more than one Type by holding Cmd (macOS) or Ctrl (Windows) and then clicking the desired Types. For example, if you aren't sure whether the preset you're looking for was tagged with Keys or Pad, select both to broaden the search.
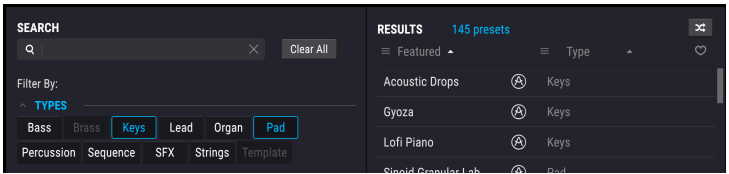
Results columns can be inverted by clicking the arrow buttons to the right of their titles (Featured, Type, etc.).

> ♪: The tag fields (Types, Styles, etc.) can be shown or hidden by using the small -/+ buttons on the left side of their title fields.

You can use multiple search fields to perform narrower searches. So by entering a text search and also specifying the Type and Styles options you will see only the presets that match those exact criteria. Deselect any tag in any area to remove that criteria and widen the search without having to go back and start again.
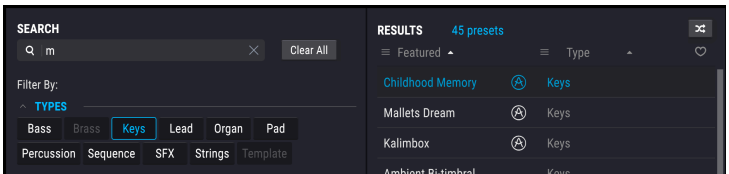
4.3. Tag category windows

The Tag category windows may be collapsed and expanded using the -/+ buttons near their names.
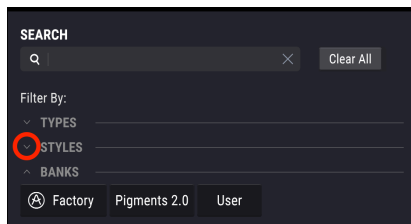
Tag category windows closed
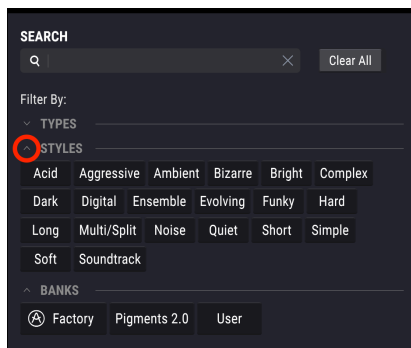
Characteristics window open

4.4. Search Results window

Click the options menu button in the first Results column to specify whether you want to view the presets by **Featured** or by **Name**. Click the sort arrow to reverse the alphabetical order.
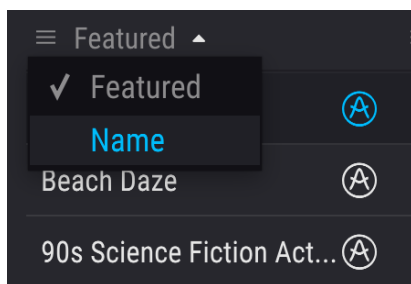
Similarly, click the options menu button in the second Results column to order its display results by **Type**, **Designer**, or **Bank** tags. Click the sort arrow to reverse the alphabetical order.
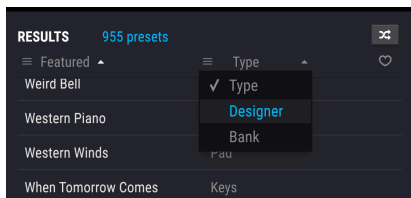
As you explore and create presets you can mark them as Favorites by clicking the heart next to their names. And then later you can click on the heart icon and put all of your favorites at the top of the Results list.
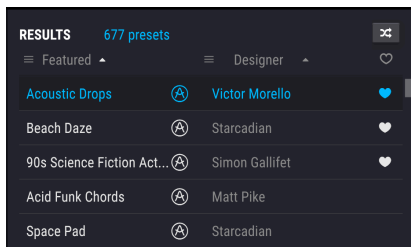
Use as many of the sorting and filtering features as you need and you will find the exact sound you want every time.

4.5. The Preset Info section

The right side of the browser window shows specific information about each preset. The information for User presets may be changed here: Name, Type, Favorite, etc.

To make the desired changes you can type in the name fields, select/deselect Types, or use one of the pull-down menus to change the Bank or Type. You can even add new Styles by clicking the + sign at the end of that list. Click Save when you are done.
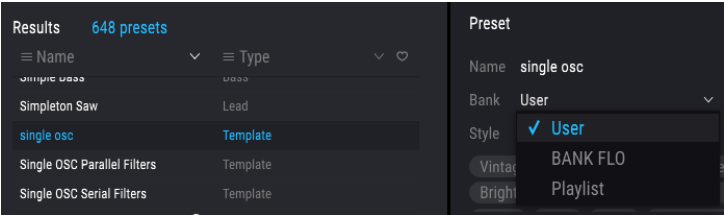
Select a new Bank for the preset
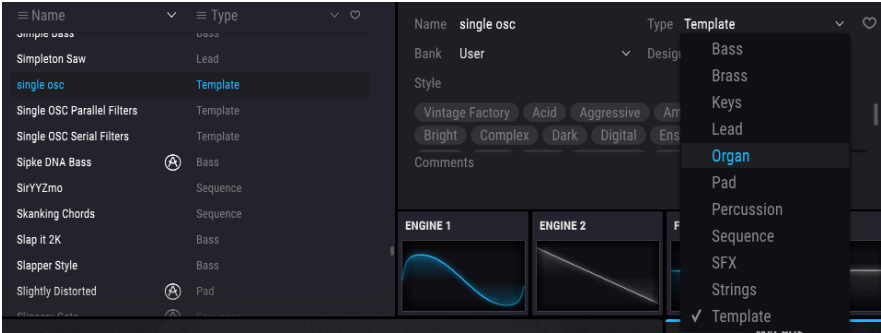
Select a new Type, add Comments, and click Save

4.5.1. Edit information 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 the Control key (Command key for macOS) 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 click Save.
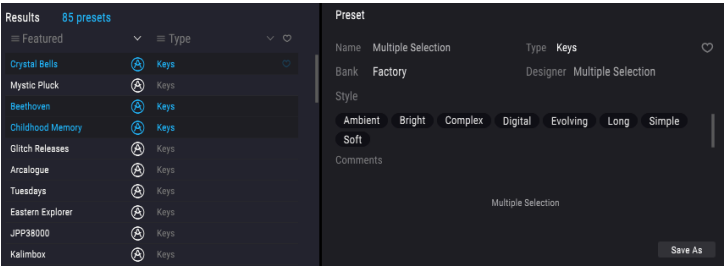
♪: If you want to alter the information for a Factory preset you must first use the Save As command to re-save it as a User preset. After this the Info section will gain Edit and Delete buttons at the bottom of the window.

4.6. Preset selection: other methods

The pull-down menu to the right of the Search menu provides a different way to select presets. The first option in this menu is called Filter, and it will display the presets that fit the search terms you used in the Search field. So if you searched for the word **Be** in the main search area, the results of that search will appear here.
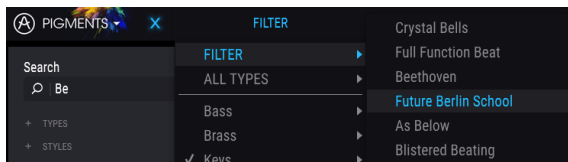
Filter results may differ based on Search criteria

Similarly, if you previously selected **Types: Sequence** and **Styles: Aggressive** in the Search field you would see the results of that search in this area instead.
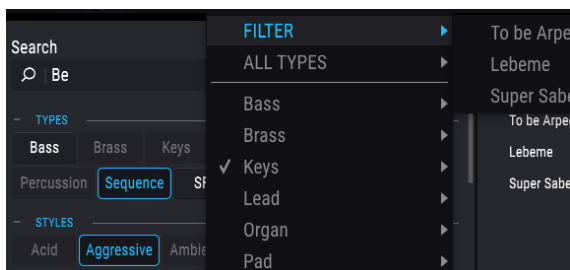
Filter results may differ based on Search criteria

Selecting the All Types option in the pull-down menu will bypass the Search criteria and show the entire list of presets.

The Types below the line also ignore the Search criteria and display the presets based on their Type: *Bass, Brass, FM,* and so on.
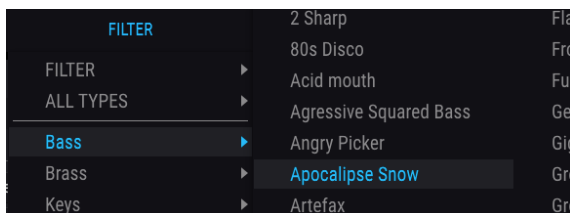
Selecting a preset by its Type

Clicking on the name field in the center of the toolbar will show you a list of all available presets. The list will also take into account any selections you have made in the Search field. So if you have pre-selected a Type such as "Keys" this shortcut menu will only show you presets that match that tag.
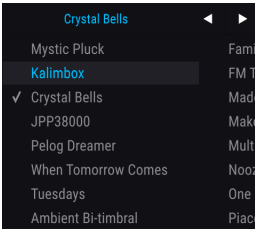
The left and right arrows in the toolbar cycle up and down through the preset list: either the full list, or the filtered list that resulted from the use of one or more search terms.

4.7. Playlists

In the lower left corner of the Preset Browser window is a feature titled Playlists. This is used 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.

4.7.1. Add a playlist

To create a playlist, click anywhere inside the field at the bottom:
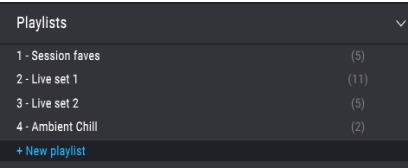
Give the playlist a name and it will appear in the Playlists menu. You can rename the playlist at any time; just click the pencil icon at the end of its row.

4.7.2. Add a preset

You can use all of the options in the Search window to locate the presets you want to have in your playlist. Once you have found the right preset, click and drag it onto the playlist name.
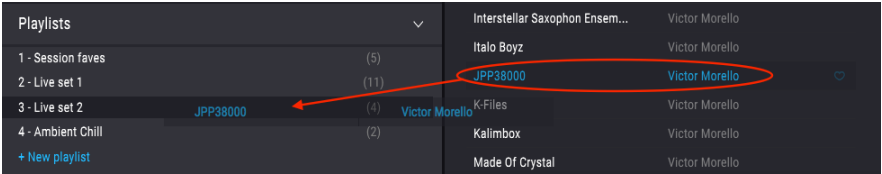
Click and drag from the Search Results list onto one of the playlists

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

4.7.3. Re-order the presets

Presets may be reorganized within a playlist. For example, to move a preset from slot 1 to slot 3, drag and drop the preset to the desired location.
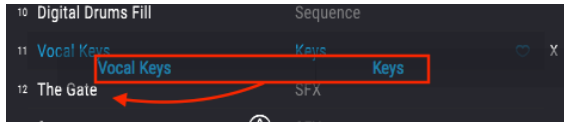
Click and drag from the Search Results list onto one of the playlists

This will cause the other presets to be bumped up in the list to accommodate the new location of the preset being moved.

4.7.4. Remove a preset

To delete a preset from a playlist, click the x at the end of the preset row.
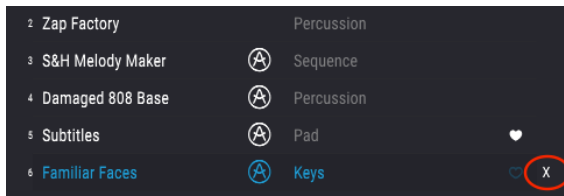
Click the X to remove a preset from a playlist

4.7.5. Delete a playlist

To delete an entire playlist, click the x at the end of the playlist row. This will only delete the playlist; it will not delete any of the presets inside the playlist.
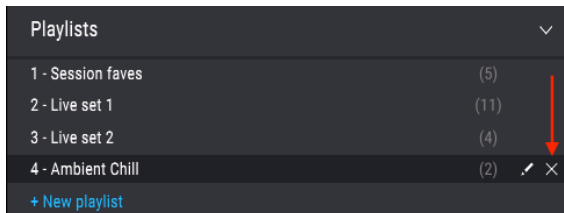
Click the X to delete a playlist

5. THE ENGINE TYPES

Imagine an automobile with an engine so powerful that it can transport you anywhere you want to go within minutes. Now imagine that same automobile with three engines of similar power, each with its own characteristics and capabilities. And then you discover that these engines are so perfectly designed and integrated that you're able to use any two of them at the same time! There would be no destination beyond your reach.

Arturia's Pigments has three independent engines of equivalent power and style, able to transport your creative endeavors into realms unknown. And as with the automotive analogy, you can use any two of them at the same time, inside a single preset.

Let's look under the hood of Pigments (or "hoods", if you will) and learn about these amazing sonic engines.

5.1. Common Engine features

The following Engine tab features are shared by both the Analog, Wavetable and Sample engine types, so we'll cover them in this section of the manual. To learn about features that are specific to only one of those Engines, see the Analog engine [p.52], Wavetable engine [p.56] and Sample engine [p.71] sections.

5.1.1. Engine menu

Click here to reveal a menu that displays the Engine types (Analog, Wavetable or Sample). The current engine type will be outlined in blue. Make a selection and the menu will close.
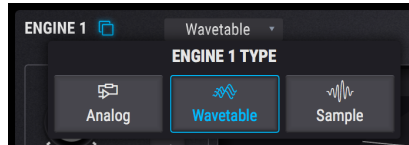
5.1.2. Copy Engines

If you'd like to copy the work you've done from one Engine to the other and then make some modifications, for example, or you'd simply like to have a temporary backup of something interesting while you continue your sonic experiments, there are two options. Click the double-document icon next to the Engine number and a menu will present those options to you.
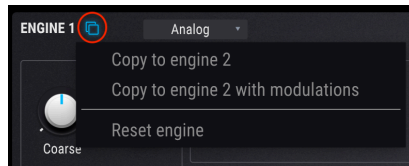
> ♪: The copy process could cause the Engine type to be changed, depending on the current settings of the source and destination tabs. But the original oscillator settings will be preserved until the edited preset has been stored to memory.

5.1.2.1. Copy to Engine X

This choice will copy the oscillator settings, including the Engine type and the Output settings, from one Engine tab to the other. However, this Copy procedure will preserve the oscillator-specific modulation routes that already exist on the other Engine tab.

This option is useful if you want to duplicate the oscillator settings and then detune the two Engine tabs slightly, for example. It's a quick way to make a great sound even fatter. However, if you have used modulation settings to affect the oscillators you may want to choose the next option.

5.1.2.2. Copy to Engine X with modulations

This option will copy all of the Engine tab settings, including the Engine type and the Output settings, from one Engine tab to the other. The difference with this option is that it also copies all of the oscillator-specific modulation routes. This could be the better option if the modulation settings are having a significant impact on the oscillators.

5.1.2.3. Reset engine

This option will clear all settings and reinitialize the engine to its default state.

5.1.3. Engine On/Off button

It's easy to construct some very complex presets when both Engine tabs are layered together. If you'd like to isolate one of the Engines to adjust its settings, all you have to do is click the On/Off button for the other Engine tab. It isn't necessary to select the other tab first.

When the visible contents of a tab are gray, that Engine has been muted. To re-enable an Engine tab, click the Engine On/Off button again. The text and icons are lit when an Engine is active, so you'll know at a glance whether that is the case or not.

5.1.4. Engine Tune

The controls in this section adjust the tuning for the selected Engine. This means different things depending on the Engine type:

- Analog engine: A change in the coarse/fine tuning affects all three oscillators simultaneously.
- Wavetable engine: A change in the coarse/fine tuning affects all positions of the selected wavetable.
- Sample engine: A change in the coarse/fine tuning affects all loaded samples simultaneously.

5.1.4.1. Coarse tune

Turn this knob to tune the engine chromatically (i.e., in semitones). For the Analog and Wavetable engines, the range is +/- 60 semitones (5 octaves); for the Sample engine, the range is +/- 36 semitones (3 octaves).

5.1.4.2. Quantize Mod

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

To enable this feature, click the Q button next to the Coarse control. To select specific notes, click the pencil icon to reveal the pop-out "mini-keyboard." All 12 notes in the chromatic scale will be active by default:

A lit key indicates an active note. To deactivate a note, click once to make it dark. To activate a note that is inactive, click once and it will become lit. The first note on the mini-keyboard cannot be disabled (it's the root note).

The Quantize Mod feature determines the modulation output intervals relative to the key of C. So if you want the result to be a harmonic minor scale, you will need to select the notes of a C harmonic minor scale on the mini-keyboard:

After this is done, any incoming MIDI note will trigger a harmonic minor scale using the trigger note as the root note of the scale (i.e, the tonic). For example, if you play an Eb, you'll hear an Eb harmonic minor scale, and so on.

Another thing to realize about the quantization is that it may seem "lumpy" at first when one or more notes on the Mod Quantize keyboard are disabled. Consider this example, using the Mod wheel as the modulation input and a modulation amount of 0.11 (an octave):

CC #1 value	Chromatic scale	Harmonic minor scale
0-10	C	C
11-20	C#	C
21-30	D	D
31-39	D#	D#
40-49	E	D#
50-59	F	F
60-69	F#	F
70-79	G	G
80-89	G#	G#
90-98	A	G#
99-108	A#	B
109-118	B	B
119-127	C	C

As you can see, while the pitch would change between the values of 10 and 11 in a Chromatic scale, for example, it remains the same for the harmonic minor scale. This is the result of quantization: certain ranges of values will produce no change until the next allowable output is reached. It's the same with an LFO or any other modulation source: The values will be reached, but they may not be evenly spaced.

Follow this link to learn how to set up modulation routes [p.143].

5.1.4.3. Fine tune

This control adjusts the tuning in smaller increments (0.008, or 8/1000ths of a semitone). The range is +/- 1 semitone.

5.1.4.4. Key Track

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

5.1.4.5. Drift (Analog engine only)

The Drift knob 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 make the sound completely unpredictable. You can also remove this from any preset and save it that way instead.

5.1.4.6. Filter (Sample engine only)

The Filter knob controls a dual low-pass / high-pass filter. At its default "12:00" position, 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 brighten or darken the sound of your samples.

5.1.5. Unison Mode

Unison mode allows you to trigger as many as 8 voices with a single MIDI note. The voices can then be detuned from one another and spread across the stereo field, all in definable amounts.

> ♪: Increasing the number of Unison Voices also increases the impact Pigments has on the CPU of your computer.

Three different Unison modes are available: Classic, Chord and Super. Click the menu inside the Unison parameter box and make a selection by clicking the desired option:
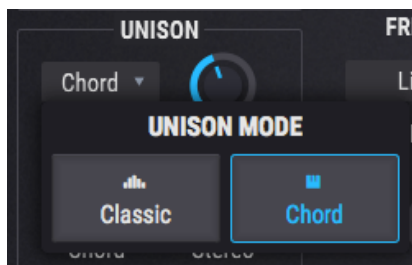
5.1.5.1. Classic mode

This is the sort of unison detune mode 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. Pigments offers some interesting twists to that concept, though.

- **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.

•	**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.

5.1.5.2. Chord mode

With the Unison Chord feature 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 Voices 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 2 voices for every note to be present (though you can use more). On the other hand, the 6/9 chord requires a minimum of 4 voices for every note in the chord to be present (though you can use fewer, if you like).

•	**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.

> ♪: Each Unison Detune voice will be equally affected by the various waveform transformation and modulation processes (Wavefolding, Phase Distortion, etc.)

5.1.5.3. 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.

5.2. The Analog engine

If there's anything Arturia knows how to do well, it is to emulate the characteristics and behavior of the most beloved analog synthesizers of all time. And with the Pigments Analog engine we have taken the favorite features of all of those synthesizers and included them here in one instrument.

5.2.1. Analog Engine Tuning

A change in the coarse/fine tuning affects all three oscillators simultaneously. See the Common Features section for details about the tuning controls [p.47].

5.2.2. Analog Unison Mode

Unison mode allows you to trigger as many as eight voices with a single MIDI note. The voices can then be detuned from one another and spread across the stereo field, all in definable amounts. See the Common Features section for details about the Unison controls [p.50].

5.2.3. Oscillators

The Analog engine offers a triple-oscillator design similar to the most famous analog synthesizer ever produced. True to form, similarities exist in the features of each oscillator, but there are also some important distinctions. We'll look at Osc 1 on its own and then describe Osc 2 and Osc 3 together.

5.2.3.1. Osc 1

Control	Description
Sync	Hard sync the wave cycle of Oscillator 2 to Oscillator 1 for interesting timbres.
FM	Applies frequency modulation (FM) from the modulation section to Oscillator 1.
Coarse Tune	Adjusts the tuning of the oscillator in semitones without affecting the other oscillators.
Waveform	Use the buttons to select Sine, Triangle, Saw, 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.

5.2.3.2. Osc 2

Control	Description
Key	Determines if the oscillator pitch tracks the MIDI note number or remains fixed (unless modulated).
FM	Applies frequency modulation (FM) from the modulation section to Oscillator 2.
Coarse Tune	Adjusts the tuning of the oscillator in semitones without affecting the other oscillators.
Fine Tune	Allows fine-tuning of the oscillator without affecting the other oscillators.
Waveform	Use the buttons to select Sine, Triangle, Saw, 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.

5.2.3.3. Osc 3

Control	Description
Key	Determines if the oscillator pitch tracks the MIDI note number or remains fixed (unless modulated).
Coarse Tune	Adjusts the tuning of the oscillator in semitones without affecting the other oscillators.
Fine Tune	Allows fine-tuning of the oscillator without affecting the other oscillators.
Waveform	Use the buttons to select Sine, Triangle, Saw, 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.

5.2.4. Analog Output section

5.2.4.1. Analog Filter Mix

This control determines whether the output of the Engine will be routed through Filter 1, Filter 2, or some mixture of both. When rotated fully counter-clockwise the Engine output is routed directly into Filter 1; when rotated fully clockwise the Engine output is routed directly into Filter 2. The master Filter routing control [p.97] can have an impact here, too: if Filters 1 and 2 are routed in series at all, the output of Filter 1 will pass through Filter 2 to some degree.

5.2.4.2. Analog Output Volume

This knob controls the output volume of all three oscillators and the noise source. It can be used to adjust the volume of the current Engine tab relative to the other Engine tab.

5.2.5. 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.

5.2.5.1. A source of many colors

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 this control the dial in the precise tonality of the noise source.

5.2.5.2. Noise Volume

If you'd like to blend a bit of noise with the output of the Analog engine, increase the level of this parameter. The noise level may be modulated by any number of sources, of course.

5.2.6. Modulation

This modulation component affects only Oscillators 1 and 2. It has a variable source that crossfades between Osc 3 and the Noise source.

5.2.6.1. Modulation Amount

Increasing the value of this control above zero will introduce modulation to Osc 1 and Osc 2. The higher the amount, the more extreme the modulation will be.

5.2.6.2. Modulation Source

When set fully counter-clockwise the modulation source becomes the pure waveform from Osc 3. In this case its range can be from 1 Hz (cycle per second) to 20kHz, depending on the Key tracking, Coarse, and Fine tune settings of Osc 3.

When set fully clockwise the modulation source is 100% noise. Noise modulation is affected by the "color" of the Noise source. A fully "blue" noise will introduce mostly high-frequency modulation, while a fully "red" noise will provide mostly low-frequency modulation.

> ♪: Each Engine tab can be set to its own Engine type. So you can have two Analog engines, two Wavetable engines, or one of each on different tabs.

5.3. The Wavetable engine

Arturia's expertise not only includes the emulation of existing instruments, but also enhancing them in ways that could not have been realized with the technology of the time. This is true of every Arturia V instrument, and it is no less true of our new Wavetable engine.

Wavetable synthesis offers a lot of interesting options that an ordinary oscillator cannot provide:

- Up to 256 positions exist in each wavetable
- Each position holds a waveform containing 2048 samples
- Any modulation source can be used to select waveforms from the wavetable, including synced LFOs
- The transition between the waveforms can be instantaneous or gradual (i.e., 'morphed')

Pigments also allows you to load your own wavetables [p.58], which means the possibilities are limitless. The wavetables must meet the criteria defined in that section, though.

5.3.1. Wavetable Selection menu

There are three ways to select a new wavetable. All involve the Wavetable name field.

1. Use the previous/next arrows on the right side of the wavetable name for adjacent choices. This will cross into an adjacent wavetable bank when the first or last wavetable of the current bank has been reached.
2. Click the wavetable name and make a selection from one of the Factory wavetable banks using the Wavetable Browser. The current selection will be highlighted.
3. Use the Wavetable Browser to import one or more wavetables [p.58] from a different source.

5.3.2. Wavetable Browser

If you click on the wavetable name in the Wavetable viewer [p.61] a window will open to display the Wavetable Browser.
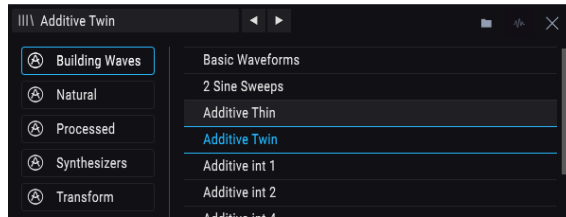
5.3.2.1. Selecting wavetables

The left column shows the wavetable 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 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 .

You can also import individual wavetables and entire banks of wavetables [p.58].

5.3.2.2. Morph (or don't)
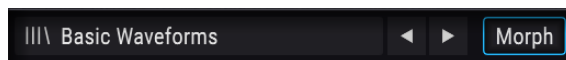
The Wavetable Morph button

The transitions between the 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 control with the cursor or modulating the Position parameter from one of the modulation sources [p.143].

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

5.3.2.3. Load original wavetables

There are two methods you can use when importing your own wavetables: Load a bank or load a wavetable. To do either one, click on the wavetable name to open the Wavetable Browser.

Load a bank

To load an entire folder of wavetables, click the folder icon inside the Wavetable Browser window.
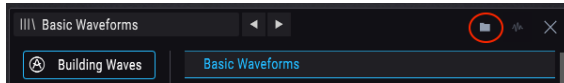
The Wavetable Bank Import button

After your wavetable folder has been imported it will show up at the bottom of the bank list, below the Factory banks and the Imported bank. (We'll explain that bank next.)
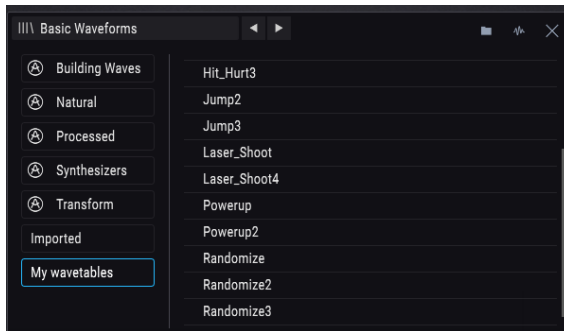
Load a wavetable

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.
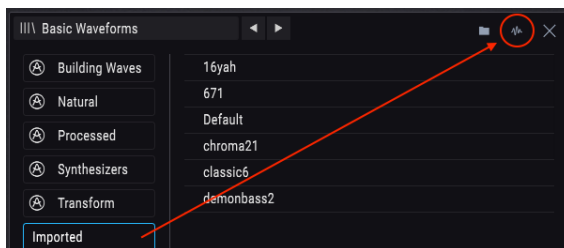
Select a User bank and then click the Wavetable Import button (circled in red)

Click this button and navigate to the folder that contains the wavetable or sample you would like to import. After it has been imported it will appear inside the wavetable list for the bank you selected.

You can choose to add the wavetable to the Imported bank or to one of your own banks. Just select the one you want to use before you click the Wavetable Import button.

> ♪: If you're going to be importing several wavetables for a particular project or from a particular source, you can create an empty folder for them first by clicking the Wavetable Bank Import button and then using the New Folder button supplied by your computer's operating system. Then add your wavetables to that folder one at a time using the Wavetable Import button.

5.3.2.4. Wavetable requirements

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

- 2048 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 2048 samples will be placed in position 1, the second 2048 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 * 2048 = 524288).

It's OK to import a sample that is shorter than 524,288 samples. Here's an example of what will happen if you do.

The following picture shows a sample that contains only 10,240 samples.
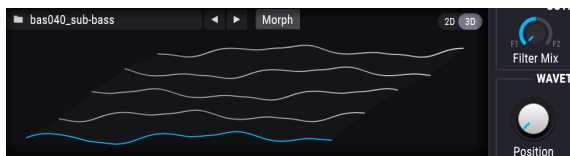
Pigments has divided that sample into 5 positions of 2048 samples each (10240 / 2048 = 5).

So is this a bad thing? Not necessarily. For example, you can set up an LFO to modulate between the first and third positions in the wavetable, like so:

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.

Follow this link to learn how to set up modulation routes [p.143].

♪: 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.

5.3.2.5. Delete a wavetable bank

!: The following process is difficult to undo and could cause one or more presets not to load properly or at all.

If you want to delete one of your wavetable banks, 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.
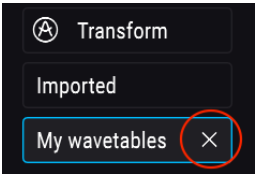
5.3.2.6. Delete a wavetable

!: The following process is difficult to undo and could cause one or more presets not to load properly or at all.

If you want to delete one of your wavetables, 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.
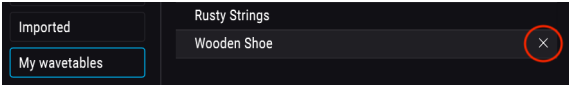
5.3.2.7. Restoring a deleted item

If the wavetable or wavetable folder that you deleted still reside elsewhere on your computer, then the "delete" 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:
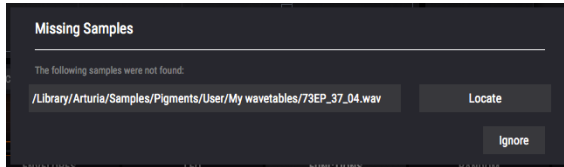
... then click the Locate button and navigate to the wavetable or folder you need to restore. After loading in the missing item, be sure to save the preset again. It should load properly after that.

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.

5.3.3. Oscilloscope / Wavetable viewer

The Wavetable engine type contains a window that shows the wavetables in two or three dimensions (2D or 3D [p.61]). The wavetable positions can transition smoothly or incrementally as the Position control is turned; just toggle the Morph button.

You can also click/drag inside the Wavetable viewer window to change the wavetable position. The Position control will also 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.

5.3.3.1. 2D / 3D views

There's a small button in the upper right corner of the Wavetable viewer window that toggles the view between 2D and 3D. Each view provides a different perspective of the wavetable contents, so you may want to switch between the 2D and 3D views when building a sound to take advantage of what each view has to offer.

What the 2D view offers that the 3D view does not is the ability to see the selected waveform change its shape as the various "wave-mangling" options are applied: Phase Mod, Phase Distortion, Wavefolding, etc. Sometimes when all of this is going on the presets can be as beautiful to watch as they are to hear, as mesmerizing visually as aurally.

However, only one waveform is visible at one time with the 2D view. To see a graphic representation of all the available waveforms in the wavetable, switch to 3D view. The Position options will make more sense then.

When in 3D view, the grey lines indicate the original wavetable positions. A blue line will highlight which of the positions is currently active, including the intermediate ("morphed") positions.

5.3.4. Wavetable Engine Tune

The controls in this section adjust the overall tuning for the Wavetable engine voices. See the Common Features section for details about the tuning controls [p.47].

5.3.5. Wavetable Unison Mode

Unison mode allows you to trigger as many as 8 Wavetable voices with a single MIDI note. The voices can then be detuned from one another and spread across the stereo field. See the Common Features section for details about the Unison controls [p.50].

5.3.6. Frequency Modulation (Freq Mod, or FM)

The FM provided by the Wavetable engine type is similar to what is found in modular analog synthesizers. There are two types available: Linear and Exponential. Your ears will be the best judge of which type produces the desired results.

The source for this 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.69].

5.3.6.1. FM Type

To choose an FM type, click the name field to open a menu or click one of the arrows on either side of the name.
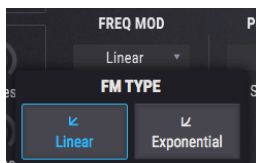
5.3.6.2. FM Mod

This control provides additional modulation from the Wavetable Modulator [p.69].

5.3.7. Phase Modulation (PM)

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

- Only one algorithm is used (the classic 2-operator stack)
- The carrier wave can be almost any shape, since you can import your own wavetables [p.58]
- The modulator has multiple waveform options [p.70]

Depending on the source and target waves, the results can be similar to the synthesis methods used in Arturia's DX 7 V or Synclavier V instruments.

5.3.7.1. 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 is changed, the phase and harmonic content of the source wave change as well.

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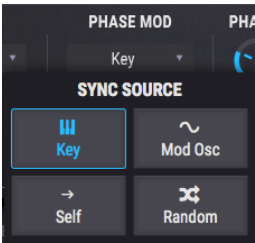
This parameter lets you choose which source will reset the wavetable phase. To select one of the options, click the name field to open a menu or click one of the arrows on either side of the name.

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

5.3.7.3. PM Mod

This control regulates the amount of phase modulation being caused by the Wavetable Modulator [p.69].

5.3.8. Phase Distortion (PD)

Phase Distortion (PD) is a method of warping a source waveform according to a framework defined by one of six modulator waves, which are known as Targets. But don't think of the Target as a destination the source will be forced to reach, but rather as a potentially interesting "transformation" which is applied to the waveform itself.

There are two analogies that may help illustrate what PD does to a source wave:

- Think of a mirror in a carnival fun-house: when you look in it, you see your image reflected according to the curves built into the mirror.
- For the astronomically-minded, consider the gravitational lensing which occurs when light from a distant galaxy passes through the gravitational field of a black hole on the way to your telescope. The final images are indeed of the original light source, but a significant force has reshaped them during the journey!

These analogies are not perfect, but hopefully they provide a glimpse of the powerful tool PD can be in shaping the sound of a wavetable.

5.3.8.1. What PD does

Technically speaking, what is happening is that the target wave amplitude controls the phase position of the source wave. Put another way, as the Amount is increased the amplitude positions within the source wave are shifted in time. The resultant 'warping' is both visual and aural. Each Target is a single-cycle waveform, which allows all modulations to occur within the original wave cycle of the source wave. This maintains the original pitch.

A 50% square wave presents a special case, because in some combinations the phase distortion can only be detected within a narrow set of conditions. The reason is fairly straightforward: Since a square wave has mostly maximum and minimum amplitude values for all of its phase positions, then nearly all phase distortions will end with those same amplitudes for the positive and negative phases. With the simpler target waves the only discernible differences will be at the point where the slope of the square wave changes direction. The more complex target waves will produce mostly changes in the pulse width of the square wave.

For example, with Target 1 the bulk of the modulation occurs in the last 10-15% of the parameter range, though it begins to affect the sound at about the 60% point. Results are more dramatic with Targets 3-6, but they are practically nonexistent with Target 2.

5.3.8.2. PD Amount

This parameter controls the amount of Phase Distortion (PD) being applied to the wavetable. 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. Verify that the PD Target = 1
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. Select a different PD Target and repeat the experiment on the Sine wave. This will illustrate how different Targets affect the same waveform.
7. Starting with PD Target = 1 again, set the PD Amount to maximum
8. Turn the Position control to the second, third, and fourth Wavetable positions. The identical distortion has been applied to the Triangle, Sawtooth, and Square waves, respectively, with end results that will vary depending on the source wave.
9. Return the Position control to the second Wavetable position and sweep the PD Amount from minimum to maximum. Do the same for the third and fourth Wavetable positions. The visual and aural transformations will vary as the distortion is applied to the Triangle, Sawtooth, and Square waves, respectively.
10. Now select a more complex wavetable and repeat the experiment. The results will vary with different wavetables and PD Targets.

5.3.8.3. PD Target

The remap curves for each Target wave are based on the way they affected a sine wave, so the results will vary when the source waveform is more complex. But what they tend to do is:

Target	Name	Description
1	Skew	Works with most waveforms: peaks are spread to the left and right, leaving a valley
2	Round	The source is influenced by a semi-square; it could gain valleys and/or plateaus
3	Tri/Pulse	Takes the middle of the waveform and stretches it to the left
4	Octave Plus	Part of source wave is miniaturized on the right; some harmonics are emphasized
5	Pseudo PW	Stretches the whole waveform to the left and leaves a gap on the right
6	Fractalize	Creates up to 8 copies of the whole waveform, from smaller to larger

5.3.8.4. PD Mod

This control provides additional modulation from the Wavetable Modulator [p.69].

5.3.9. Wavefolding

If you have worked with one of Arturia's Brute synthesizers then you are already familiar with the concept of wavefolding as described in their manuals. But what is different here is that 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.

5.3.9.1. Wavefolding Amount

This parameter controls the amount of wavefolding being applied to the wavetable. For a good illustration of what is happening, try the following example:

- 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 with 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.

5.3.9.2. Wavefolding Shape
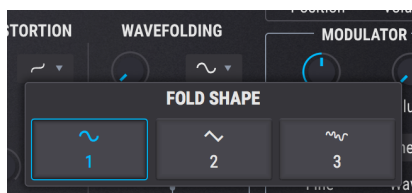
Click the name of the Wavefolding Shape and a drop-down menu will appear, from which a selection may be made. Another selection method is to click the left/right arrows on either side of the name.

5.3.9.3. Wavefolding Mod

This control provides additional modulation from the Wavetable Modulator [p.69].

5.3.10. Wavetable Output section

5.3.10.1. Wavetable Filter mix

This control determines whether the output of the Engine will be routed through Filter 1, Filter 2, or some mixture of both. When rotated fully counter-clockwise the output runs entirely through Filter 1; when rotated fully clockwise tthe output runs entirely through Filter 2.

5.3.10.2. Wavetable Output Volume

This knob controls the output volume of the Wavetable and the Modulator, if it is being used as an additional oscillator. Use this parameter to adjust the volume of the current Engine tab relative to the other Engine tab.

5.3.11. Wavetable section

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

The selection of the wavetable itself is accomplished through the Selection menu [p.56], either by using the previous/next arrows [p.56] or the Wavetable Browser [p.57].

5.3.11.1. 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.61] renderings 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.

5.3.11.2. Wavetable Volume

This control determines the output level of the wavetable.

5.3.12. Wavetable Modulator

This section provides the source for the Mod parameters found inside each of the waveshaping functions of the Wavetable engine. Its direct output is available, so it also can be used as a second oscillator or a noise source.
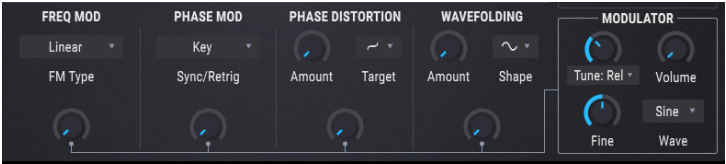
> ♪: The waveform of the Modulator is not affected when one of the Wavetable oscillator Mod controls is increased. This is because the Modulator is providing the modulation for those functions, and is not intended to modulate itself.

5.3.12.1. Modulator Tuning

Use the Modulator coarse tuning control to set the chromatic pitch center of the modulation. Use the left/right arrows to select one of the three tuning modes, which are described in the chart below.

Tuning method	Description
Relative	Chromatic offset to the tuning of the Wavetable oscillator (range: +/- 3 octaves)
Absolute	Chromatic tuning independent of the Wavetable oscillator (range: +/- 3 octaves). It will follow changes in note number, pitch wheel values, and glide settings.
Hertz (Hz)	Independent tuning, set in Hz (range: 20.0 - 3,000 Hz). Does not change with note number, pitch wheel, or glide.

5.3.12.2. Modulator Fine tune

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

> ♪: Hold the Control key or right-click while turning the knob for even finer adjustment.

5.3.12.3. Modulator Volume

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

5.3.12.4. Modulator Wave

Ten waveforms are available as sources for the Modulator: 5 simple waveforms and 5 noise sources of various "colors".

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

5.4. The Sample engine

Arturia has a very long history of building high quality sample-based instruments. All that know-how is distilled down into the Sample engine within Pigments. It has everything you need to manipulate samples in fun and musically interesting ways. The team did not want to simply stop at traditional sample playback, however. Pigment's Sample engine includes granular synthesis features that allow you to make really interesting "granular" textures and sounds using straightforward controls. Let's dive in!

5.4.1. Six samples per engine

Each Sample engine has six slots available for samples (A-F). 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.73]. Then select a sample using the methods described in the next two sections.

5.4.2. Sample Selection

There are three ways to load samples:

1. Use the previous/next 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 wavetable 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.

5.4.3. Sample Browser

Click on the sample name in the Sample Viewer to open the Sample Browser.
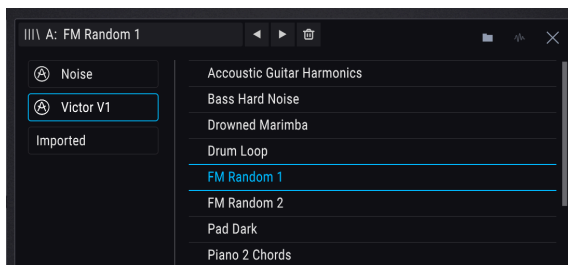
5.4.3.1. Selecting Samples

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 two ways to select a sample:

- A single click selects a sample without closing the browser window, which allows you to audition samples 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 sample from that bank the same way.

To close the browser window, click the X.

5.4.4. 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.74] 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.77]. 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.

5.4.5. Editing your Samples

To edit your loaded sample, click the Edit button at the top right of the screen.

Clicking this button switches 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 Start / Stop markers at the top of the Sample Viewer.

> ♪: Only the sample data between the Trim Start / Stop markers is shown in Main and Map modes and in the preview windows. The entire sample is always visible in Edit mode.

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

- **Transp:** 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.

- **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.

- **Loop Mode:** This field is dark until Loop is enabled. The drop-down menu offers two options: "Forward" or "F&B" (forward & backward, also known as "ping pong" looping).

- **Loop Fade:** This control is dark 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.

- **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:** Opens a menu that allows you to copy the current sample to another sample slot. Use this to set up different settings for the same sample.

- **Clear:** Empties the sample slot and resets all related parameters. You'll be asked to confirm the choice before it happens.

5.4.5.1. Markers and loops
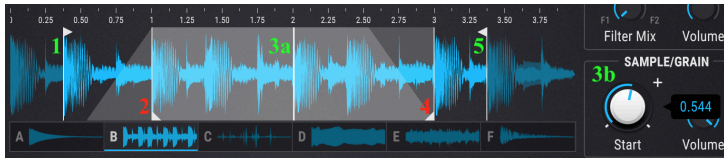
Note: The grey trapezoidal area indicates the Loop Fade settings. See the description in the previous section.

#	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.
3a	Sample/ Grain Start point	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.
3b	Sample/ Grain Start control	Adjusts the position of the Sample/Grain Start marker. It is not a fixed position; it is relative to the distance between the Trim Start and Trim Stop markers.
4	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.
5	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.

Sample/Grain Start point: more details

When a sample or grains are triggered, the Sample/Grain Start point value determines the position in the sample from which playback begins. The value range is from 0.00 to 1.00 in increments of 0.001.

But this is not a fixed position; it is relative to the distance between the Trim Start and Trim Stop markers. So when one of the markers is moved, the Sample/Grain Start marker moves too (assuming it's not at either extreme). Its position is adjusted proportionately as the distance between the Start / Stop markers is changed.

For example, if the distance between these two markers is 6 seconds and the Sample/ Grain Start value is 0.500, then the sample or grains will start playing at a position that is halfway between the two markers (i.e., 3 seconds after the Trim Start marker). If the distance between those markers is reduced to 4 seconds then the sample/grain playback moves to a position that is *two* seconds after the Trim Start marker. In other words, it maintains a position that is halfway between the two markers.

5.4.6. Map mode

> ♪: Only the sections of the waveform between the Trim Start / Stop markers are shown in Map mode.

Map mode buttons: These buttons determine how the loaded samples will be played. Here are brief descriptions of the six options; for a few visual examples, see the section below this chart.

Mode	Description
Single	The currently selected sample is played across the entire keyboard and velocity range.
Key Map	The 6 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 (C) 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.
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.
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 over the Sample Pick knob to reveal the Mod Assignment symbol (the '+' sign).
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. The right side of the Map mode window shows an example graphic, as no additional controls are needed.
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. The right side of the Map mode window shows an example graphic, as no additional controls are needed.

5.4.6.1. Map mode examples

The Preview windows indicate which sample is being triggered within a map, either according to its position in the zone/velocity range or when it is selected by other criteria. It may help to refer to those while trying these examples.

Single

This is always the view for the Single Map mode, whether the sample slots are full or empty. Click a sample slot selector button to specify which sample is active for the Sample engine.

Key Map

Key Map with all sample slots full

This view can change quite a bit depending on the number of full sample slots. With all 6 slots full,

- Slot A MIDI note range is from C-2 to B1
- Slots B-E each occupy one octave
- Slot F MIDI note range is from C6 to C8

Key Map with two sample slots empty

In this example slots C and E are empty.

- Slot A MIDI note range is from C-2 to B0
- Slots B and D each occupy two octaves
- Slot F MIDI note range is from C5 to C8

Key/Velo Map
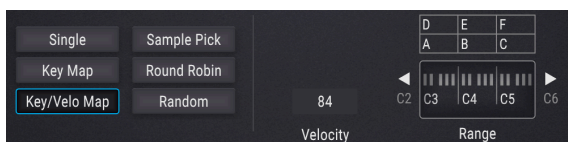
Key/Velo Map with all sample slots full

This is the map that changes the most, depending on the number of full sample slots. With all 6 slots full,

- Sample slots are stacked vertically; the bottom row is the lower-velocity range.
- The Velocity value is the cross-switch point between the lower and higher velocity ranges.
- Slots A and D occupy the same range (C-2 to B3). Velocity determines which will be triggered.
- Slots B and E occupy the same octave (C4 to B4). Velocity determines which will be triggered.
- Slots C and F occupy the same range (C5 to C8). Velocity determines which will be triggered.

Let's look at an example where two sample slots have not been loaded with samples.
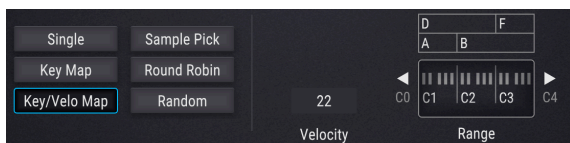
Key/Velo Map with sample slots C and E empty

In this example slots C and E are empty. It looks strange, but it actually opens up some interesting possibilities.

- Slots A and D occupy the range from C-2 to B1. Velocity determines which will be triggered.
- Slots B and D occupy the range from C2 to B2. So you can cross-switch between A and D or B and D depending on the MIDI note you play.
- Slots B and F occupy the range from C3 to C8. So you can cross-switch between B and D or B and F depending on the MIDI note you play.

Here's another example.
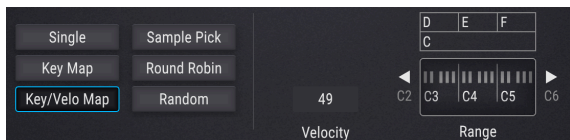
Key/Velo Map with sample slots A and B empty

In this example slots A and B are empty. This leaves sample slot C as the sole occupant of the lower velocity range, and you can switch between it and samples D, E, and F depending on the MIDI note you play.

- Slots C and D occupy the range from C-2 to B3. Velocity determines which will be triggered.
- Slots C and E occupy the range from C4 to B4. Velocity determines which will be triggered.
- Slots C and F occupy the range from C5 to C8. Velocity determines which will be triggered.

Sample Pick

♪: This Map mode can be modulated. Hover over the knob and a 'plus' sign appears in the upper right corner. For more information see the Modulation overview [p.143].
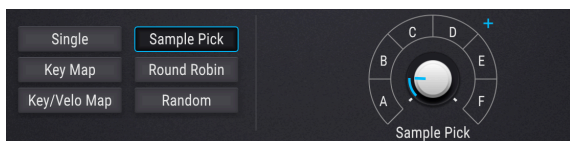
Sample Pick Map with all sample slots full and "mod +" visible

This view can change quite a bit depending on the number of full sample slots. With all 6 slots full,

- Any sample slot can be accessed by the knob or a modulation route
- Only one sample slot can be triggered per MIDI note, but other notes can trigger different samples as they are selected.
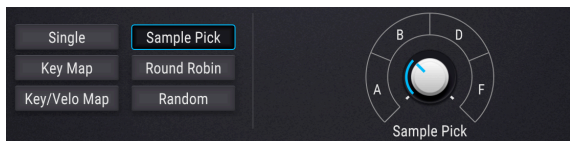
In this example slots C and E are empty, and will be skipped as the Sample Pick control is turned or modulated. Otherwise the behavior is the same as described above, only with four samples instead of six.

Round Robin
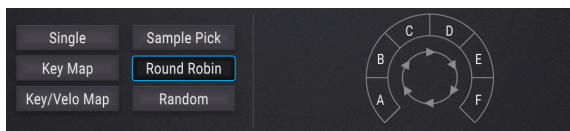
When all 6 slots are full the Round Robin mode cycles from A through F and repeats that order.
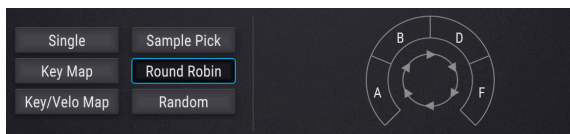
In this example slots C and E are empty, and will be skipped as the Round Robin cycles through the active sample slots.

Random
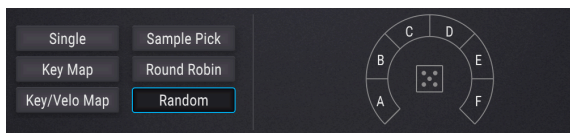
When all 6 slots are full the Random mode has all six at its disposal and might select any one of them when a note is triggered.
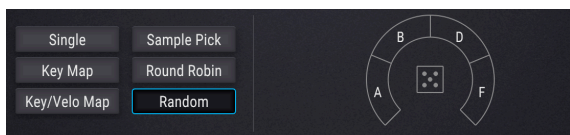
In this example slots C and E are empty, so the Random mode can only select from one of the four available samples. But your guess is as good as ours as to which one will be triggered.

5.4.7. Sample Engine Tune

The controls in this section adjust the overall tuning for the Sample engine voices. See the Common Features section for details about the tuning controls [p.47].

5.4.8. 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. 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.

5.4.9. Granular Section

This section 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.

1. **Random Density** - Adds randomness to the Density parameter. The drop-down menu lets you decide if grains are randomly added or taken away.

2. **Density Type** - Sets how often grains are generated. Use the drop-down menu to specify whether the grain generation rate is tied to cycles per second (Hertz) or tempo-synced values (binary, dotted or triplet).

3. **Direction** - Sets the play direction of the grains being played. The default clockwise position plays the samples forward, the counter-clockwise position plays them backward, and the center position sets a 50/50 probability of forward and backward playback.

4. **Random Pitch** - Sets the amount of pitch randomization, from 0 to 3 octaves. The drop-down menu lets you select whether the random pitches will be below, above, or both below and above the initial pitch.

5. **Random Start** - Sets a randomized offset from the Start point for each grain. The drop-down menu lets you select whether this offset is before, after, or both before and after the initial start point. The initial starting position is set with the Start knob in the Sample/Grain section.

6. **Grain Envelope Shape** - The drop-down menu provides eight shape options for the Grain Envelope. Results are determined by the position of the Shape knob (described next).

7. **Shape** - Defines the amplitude envelope of each grain using various functions (shapes). The knob controls a continuously variable parameter that modifies the characteristics of the shape and can produce results from "smooth" to "clicky".

8. **Grain Size** - Defines the length of each grain. The drop-down menu lets you select between Absolute (1ms to 1 second), tempo synchronized time (binary, dotted or triplet) or by ratio (a division of the current Density value that was calculated for the grain).

9. **Random Size** - Adds randomness to the size of each grain (as set using the size parameter described above). The drop-down menu lets you determine whether values are larger, smaller or both larger and smaller than the defined size value.

10. **Limit** - Sets a maximum number of grains that can overlap, from 3 to 256.

11. **Random Stereo (Pan or Width)** - The drop-down menu offers two targets for randomization: **Pan** affects only the stereo position of the grains; **Width** adds a random offset between Left and Right for Random Size, Random Pitch and Random Start.

12. **Random Volume** - Introduces random volume fluctuations to the level of each grain. Note that the maximum volume of the grain is controlled by the Volume knob in the Sample/Grain section.

5.4.10. Shaper Mode

Directly below the Tune controls is the Shaper Mode section. Click the small arrow at the top to select from five different sound shaping options.

5.4.10.1. None

This setting bypasses any sound shaping of the sample engine.

5.4.10.2. Unison

Unison mode allows you to trigger as many as 8 voices with a single MIDI note. The voices can then be detuned from one another and spread across the stereo field. See the Common Features section for details about the Unison controls [p.50].

5.4.10.3. 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.
- **Q** - 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.

5.4.10.4. BitCrush

This option reduces sampling rate and/or bit depth to produce a popular "bit crushed" sound.

- **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.

5.4.10.5. 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 section is used as a source of modulation for this effect. Therefore changing the pitch or the waveform of the Modulator will change the frequency and ring modulation effects.

5.4.11. Output Section

- **Filter Mix** - Determines whether the output of this engine will be sent to Filter 1 (fully counterclockwise), Filter 2 (fully clockwise) or a mix of both (the center positions).
- **Volume** - Sets the output of the Sample engine.

5.4.12. Modulator Oscillator

This section provides a modulator oscillator that can be used along with the Sample engine.

5.4.12.1. Modulator Oscillator Tuning

Use the Modulator coarse tuning control to set the chromatic pitch center of the modulation. Use the left/right arrows to select one of the three tuning modes, which are described in the chart below.

Tuning method	Description
Relative	Chromatic offset to the tuning of the Wavetable oscillator (range: +/- 3 octaves)
Absolute	Chromatic tuning independent of the Wavetable oscillator (range: +/- 3 octaves). It will follow changes in note number, pitch wheel values, and glide settings.
Hertz (Hz)	Independent tuning, set in Hz (range: 20.0 - 3,000 Hz). Does not change with note number, pitch wheel, or glide.

5.4.12.2. Modulator Oscillator Fine tune

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

> ♪: Hold the Control key or right-click while turning the knob for even finer adjustment.

5.4.12.3. Modulator Oscillator Volume

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

5.4.12.4. Modulator Oscillator Wave

Ten waveforms are available as sources for the Modulator: 5 simple waveforms and 5 noise sources of various "colors".

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

6. THE FILTERS

A synthesizer can have all the crazy features you want, but the two most critical components are the oscillators and the filters. You need a great starting point (the oscillators), and Pigments provides the beefiest and most versatile oscillators you are likely to encounter in the virtual world.

Of equal importance are the filters, which can make or break the sound. They 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 is proud to provide 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.

6.1. Common Filter features

Pigments provides two independent, identical filters that can be adjusted and configured in many ways. Since each filter contains the same parameters we will cover them all at once.

6.1.1. Filter View window

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

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.

> ♪: Each parameter of each filter can be modulated by multiple sources within Pigments and/or by external MIDI sources.

6.1.2. Filter Volume

Use this control 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.

6.1.3. Filter Pan

Each filter can be panned to its own position in the stereo field with this control. 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.

6.1.4. Filter Type menu

Click in the Filter Type field for a drop-down menu that lists the available filter types. After a selection is made the menu will close.
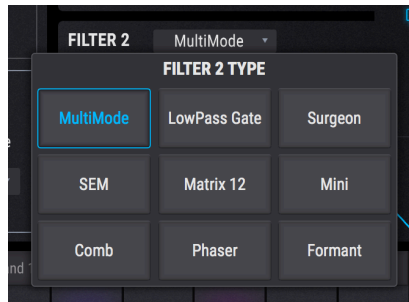
Most of the filter types have several modes of operation such as LP (lowpass), HP (highpass), BP (bandpass), and other options. We'll cover each of these below in Filter Types and Modes [p.90].

6.1.5. Filter Bypass

Each filter has a button in the upper right corner which will put the filter into Bypass mode and allow the raw signal from the voice 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.

6.1.6. Filter edit row

Immediately below the Filter View window [p.87] is the section where the various controls for each filter type will appear as they are selected. We'll describe the controls for each filter type below.

6.1.7. Copying and Swapping Filters
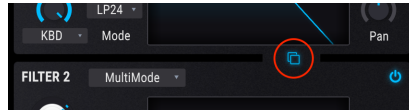
Changing the order of the filters can make a huge difference in the sound when the filters are being run partially or entirely in series. Click this button to access three options letting you copy Filter 1 to Filter 2, copy Filter 2 to Filter 1, or swap the position of the filters as you have them set up now.

6.1.8. Series, Parallel, or shades of both
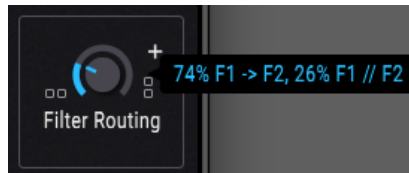
The Filter Routing controls are located in the Filter Routing/Amp Mod section [p.97].

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, which is then fed to the outputs.

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

It's also possible to create a blend of both the series and parallel filter routings. See Filter routing [p.97] for a full description of these controls.

6.2. Filter Types and Modes

> ♪ : You can use the Control + drag method to fine-tune the setting of most parameters.

6.2.1. MultiMode

This analog filter model is unique to Pigments. It offers 12 different Modes, including low pass, high pass, band pass, and notch filters. Each filter is available in 12-, 24-, and 36 dB/octave slopes. It is an incredibly powerful sound-sculpting tool!
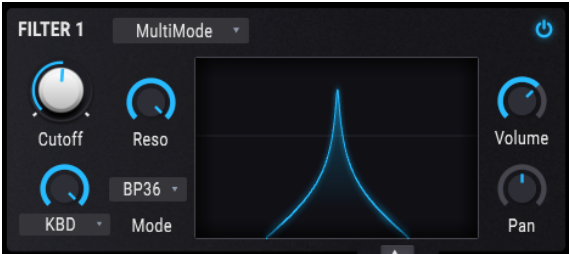
Pigments's MultiMode filter

Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced
Resonance	Emphasizes the cutoff frequency
FM Source	Click the name for a menu and make a selection. Knob becomes grey with "No FM" option
FM Amount	Controls the amount of Frequency Modulation applied to the filter from the selected source
Mode	Select from 12 options, including LowPass, HighPass, Notch, BandPass (12-, 24-, or 36 dB/oct)

6.2.2. 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. We have reproduced it here in all of its multi-mode glory.

Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced
Resonance	Emphasizes the cutoff frequency
FM Source	Click the name for a menu and make a selection. Knob becomes grey with 'No FM' option
FM Amount	Controls the amount of Frequency Modulation applied to the filter from the selected source
Mode	Changes the mode from BandPass into various shades of LowPass, Notch, and HighPass filtering

Arturia's SEM V also models the oscillators and every other feature of this beloved synth (and then some). Take a look on our website to learn more.

6.2.3. 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've cherry-picked a bunch of its outstanding analog filters and included them in Pigments.

Parameter	Description
Cutoff	Sets the frequency at which the audio signal will begin to be emphasized or reduced
Resonance	Emphasizes the cutoff frequency
FM Source	Click the name for a menu and make a selection. Knob becomes grey with "No FM" option
FM Amount	Controls the amount of Frequency Modulation applied to the filter from the selected source
Mode	Select one of over a half-dozen of our favorite Matrix 12 V filter models

Arturia's Matrix-12 V models the oscillators and every other feature of this highly sought-after synthesizer, including its modulation matrix. We also added a lot of impossible features, as we always do. Our website has the details here.

6.2.4. Mini

This selection is modeled after what is undoubtedly the world's most famous filter: the iconic 24 dB/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 the cutoff frequency
FM Source	Click the name for a menu and make a selection. Knob becomes grey with 'No FM' option
FM Amount	Controls the amount of Frequency Modulation applied to the filter from the selected source
Drive	Simulates the technique of running the output signal back into an external input connector

Arturia's Mini V models the oscillators and every aspect of this classic synth, and also includes many features that the original engineers never dreamed. You'll find all the details on our website.

6.2.5. Surgeon
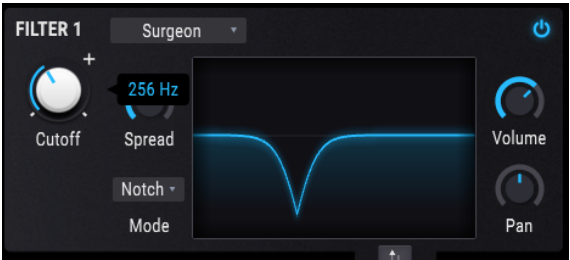
This is an extremely steep filter (64 dB/octave) with several Modes available.

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
Mode	Four options: LP, HP, Note, and BP. Click the Mode window for a menu and make a selection.

6.2.6. Comb

A comb filter is derived by adding a delayed version of the input signal to itself, which results in a series of reinforced and cancelled harmonics.

Parameter	Description
Freq	Sets the frequency range of the peaks and notches
Gain	Emphasizes the strength of the peaks and notches
KBD	Adjusts the amount of keyboard tracking for the filter frequency
Mode	Feedback, Feedforward (inverts the filter, turning peaks into plateaus and valleys into notches)

6.2.7. 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 harmonic 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

6.2.8. Formant

Arguably the most powerful filter in existence is the human speech apparatus. The Formant filter allows you to generate and modify a wide range of "vowel" 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

6.2.9. LowPass Gate
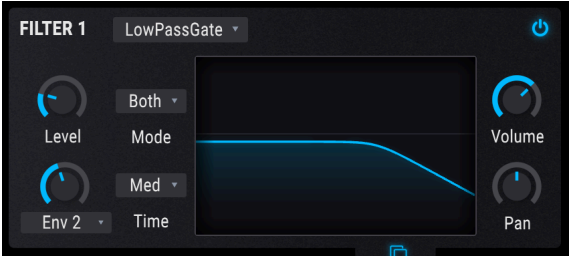
A lowpass gate is a type of filter that can act as a type of voltage controlled amplifier. It works by having a cutoff frequency that is so low that audible signals are not heard when the filter is "closed." Modulating the cutoff frequency with an envelope generator can then cause the "gate" to open 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.

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.

Parameter	Description
Level	Used to manually open and close the filter/gate.
Modulation Amount	Controls the amount of modulation applied to the level knob from your chosen Modulation Source (see below).
Modulation Source	Selects the modulation source used to control the Level knob. The Modulation Amount knob becomes grey when "None" is selected.
Mode	This drop-down menu can configure Pigments' LowPass Gate to work as a traditional VCA, a LowPass Filter or both.
Time	This parameter sets how quickly the LowPass gate closes after a short impulse for control input with options including "Fast" "Medium" and "Slow." This setting modifies the characteristics of the modeled vactrol and can impart different sonic characteristics on to your signal.

♪: When modulating the Level parameter 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.

7. FILTER ROUTING/AMP MOD 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 modulated. Hover the cursor over one of them and click the small " + " icon that appears, then use the mod strip sliders to set the modulation levels.

7.1. Filter routing

Filters 1 and 2 are in series

This filter control allows you to determine whether you want the filters to be placed in Series [p.98], in Parallel [p.98], or some combination [p.99] of the two. To change the configuration and the balance, click the filter routing knob and drag the cursor up and down.

Filter 2 is in Bypass mode

Filter 1 is in Bypass mode

> ♪: The specific parameters of the filters themselves are described in the Filters chapter [p.87].

7.1.1. 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.

To achieve this, click the filter routing knob and drag the cursor downward. 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.

7.1.2. 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, click the filter routing knob and drag the cursor upward. 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.

7.1.3. Blending Parallel and Series
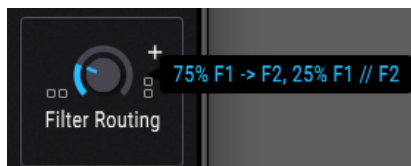
It's also possible to create a blend of both the series and parallel filter routings. The relative percentages of series and parallel routings will be displayed as the value is changed.

To achieve this, click the filter routing knob and drag the cursor up or down. When the Filter Routing setting is anything other than fully clockwise or fully counter-clockwise, the value displayed will change to something like **75% F1 -> F2, 25% 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 holding the Control key and dragging the cursor.

7.1.4. Swap Filter order

When the filters are placed entirely or partially in series, changing the order in which the audio passes through the filters can make a huge difference in the sound. The Swap Filters button [p.89] is located between Filters 1 and 2 in the Filter section. Click that button to place the Filter 1 settings into the Filter 2 slot, and vice versa.

> ♪: If Filters 1 and -2 are 100% in series and Filter 2 volume is at zero, no audio signal will be heard. This is true even if Filter 2 is bypassed.

7.2. VCA section

7.2.1. Amp Mod

The output level of each preset may be modulated by any one of almost 2 dozen sources: Velocity, an LFO, the Mod Wheel, or one of the more esoteric sources (like the *Turing* or *Sample & Hold* generators on the Rand 1-3 tabs).

7.2.1.1. Source
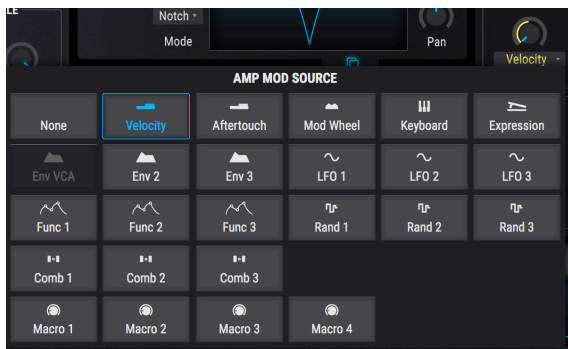
Filters 1 and 2 are in series

To select one of the Amp Mod sources, click the window above the Amount control. A menu will open, and a check mark 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.

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

7.2.1.2. Amount

Use this control 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.

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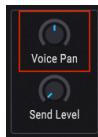
Use this control to set the default stereo position of the preset. All triggered voices will start from this position unless a modulation is active.

7.2.3. Voice Send Level
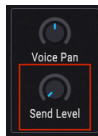
This knob determines the level at which any active voices will be passed to the Send Bus effects chain. It shares the setting of the Send control [p.108] on the FX tab [p.102]; moving one will also edit the other.

8. THE EFFECTS TAB

Having a good set of audio processing effects can help provide the final polish for your music. This is accomplished through the judicious use of chorus, compression, delay, reverb, and EQ, among other things. Effects can also help rough things up a bit 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 is well-stocked in this department! It 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 synthesizer features such as envelopes and LFOs (pro tip: look for the Mod rings! [p.150])

8.1. Common FX features

8.1.1. Bus/Send tabs
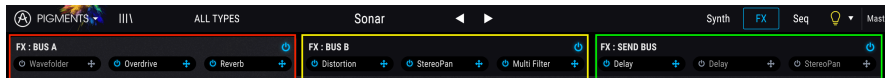
Filters 1 and 2 are in series

Each effect chain is accessed by selecting its tab. Each tab has three subdivisions, with each of those containing an independent effect processor identical to the others.

The beauty of this arrangement is that any one of the thirteen 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 2500 possible combinations within a single effects bus. And there are three effects buses, two of which can be routed in series, or you can route all three in parallel. The possibilities are staggering!

8.1.2. FX Type 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 available effects, with the current selection outlined.
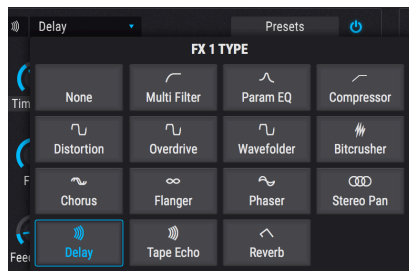
Filters 1 and 2 are in series

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.

8.1.3. 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

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 under the factory presets. You can keep refining your own presets and then use either the Save feature or the Save As feature, depending on whether you want to keep the original User preset or not.

If there's a non-factory preset you decide you don't like, click the X next to its name to delete it. A window will open and ask you to confirm the process so you don't accidentally delete a preset.
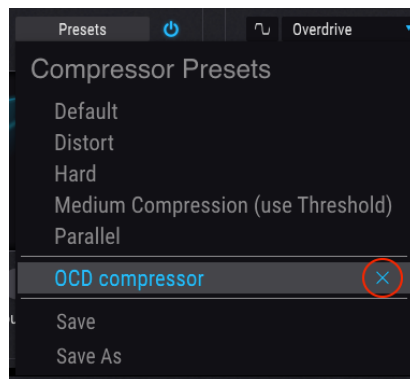
8.1.4. Effect and Bus bypass (on/off switches)

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 on 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.

8.1.5. Change FX order

It's easy to experiment with how the sound is affected when the order of the effects are changed. All you have to do is click the blue 4-way arrow icon of the effect you want to move and drag it where you want it.

8.1.5.1. Swap within an FX bus

You can drag the effect to a different slot within the same effect bus:
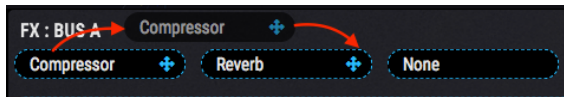
You'll also see the effect switch from one FX tab subdivision to another as you drag it to its new location. When the cursor is released the change will be made.

#### 8.1.5.2. Swap between FX buses

You can drag the effect to a slot within a different effect bus:
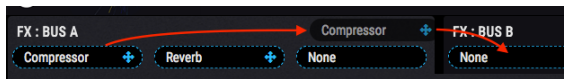
You'll also see the effect switch from one FX tab to another as you drag it to its new location. When the cursor is released the change will be made.

8.2. 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 in parallel, by selecting the desired configuration in the Bus A/B Routing section on the right hand side.
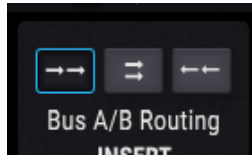
When one of the two series configurations is selected, it is possible to have as many as six effects sculpting your sound at the same time, one after the other.

In addition to that, the FX Send bus [p.105] 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.

8.2.1. Series

The signal from Bus A flows into and through Bus B, and from there to the outputs.

8.2.2. Parallel

The signals from Bus A and Bus B flow independently into the outputs.

8.2.3. Reverse series

The signal from Bus B flows into and through Bus A, and from there into the outputs.

Each effect will be described in its own section later in this chapter.

8.3. FX Send tab
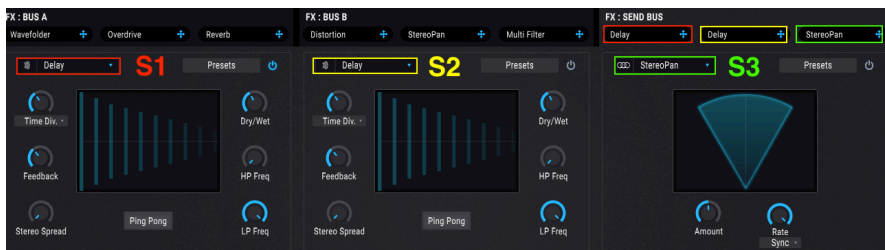
The FX Send tab has three effect modules that are identical to those inside FX buses A and B, so everything that you can do with one of those buses you can do with this one.

Each effect will be described in its own section later in this chapter.

8.4. FX Configurations

These diagrams may help you visualize the way the Pigments effects are laid out.

### 8.4.1. Two in Series, one in Parallel
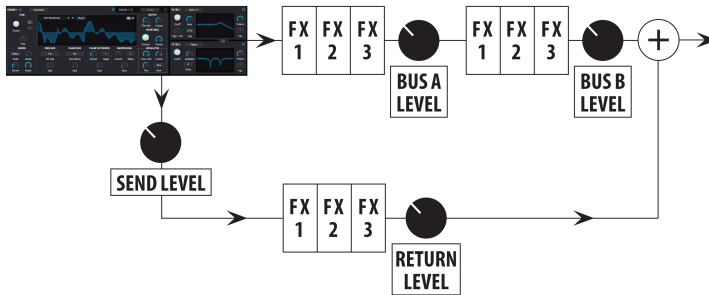
The Send/Return bus is parallel to insert buses A and B, which are in series

This graphic represents the FX configuration when one of the two in-series routing options [p.105] is selected for FX Buses A and B (*series* or *reverse series*).

The signal flows from the output of the Engines, filters, and Amp stages into the A/B buses and the Send FX bus at the same time. With this configuration A and B are in one of the series arrangements (A->B or B->A), while the same signal is sent in parallel through the Send FX bus.

Think of it as a 6+3 arrangement: up to 6 effects with A and B in a row, and up to 3 effects in the Send FX bus. Their outputs are mixed together at the final stage.

8.4.2. Three in Parallel
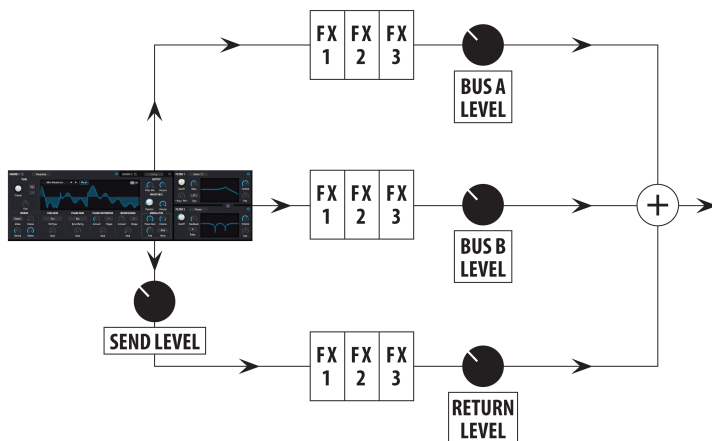
All three FX buses are in parallel

This graphic represents the FX configuration when the parallel routing option [p.105] is selected for FX Buses A and B.

The signal flows from the output of the Engines, filters, and Amp stages into the A/B buses and the Send FX bus at the same time. With this configuration all three FX buses are in parallel, so there is a maximum of 3 effects in a row. Their outputs are mixed together at the final stage.

8.5. Effects Insert/Send sections

These sections give you the final say on how much of the effected signals from each FX Bus will be heard at the outputs.

8.5.1. Bus A/B Volume controls

Use these controls to balance the output of FX buses A and B relative to each other and the FX Send bus. 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.

> ♪: When FX buses A and B are in series, nothing will be heard from either bus if the output volume of one of those is set to zero (-70.0 dB).

8.5.2. Send Bus Send control

The Send control of the Send Bus determines the level at which any active voices will be sent to the FX Send bus. It is the same parameter controlled by the Send Level knob [p.101] in the Output section [p.97] 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.

8.5.3. Send Bus Return control

Use the Send Bus Return control to balance the output of the FX Send 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.

8.6. Effects list

Effect	Description
None	Bypasses this effect stage
Multi Filter	Filter with multiple types and slopes, some with resonance
Param EQ	5-band fully parametric EQ
Compressor	Popular peak-taming processor with all the options and a level meter
Distortion	Adds a crispy edge or complete crunch to the sound; more tube-like than Overdrive
Overdrive	Adds fuzz to the sound, with tone control; more of a "solid-state" sound than Distortion
Wavefolder	Folds the peaks of input waveforms downward
BitCrusher	Bit depth reduction with a range of 16-bit to 1.50 bits, with wide sample rate reduction options
Chorus	Classic, sweet pitch effect, capable of serious wobble
Flanger	Metallic pitch effect with many tonal adjustments and sync options
Phaser	Sweeping swirl effect
Stereo Pan	Moves the sound left/right with definable depth, rate, and sync options
Delay	Repeat the input signal with adjustable time, fine tuning, tone, stereo width, ping-pong, and sync options
Tape Echo	Analog modeled tape delay effect with adjustable time, fine tuning, intensity, stereo width, ping-pong, and sync options
Reverb	Provides spaciousness ranging from small room to large hall

8.7. Effect parameters

> **♪**: To set up modulation routes quickly, hover over a parameter control and click the small " + " icon that appears. The mod strip will reveal a row of sliders that can enable each source to add modulation to the selected parameter.

8.7.1. 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
Slope	Click the field and drag up/down to select the filter steepness (LP/HP/BP only)

8.7.2. Param Eq
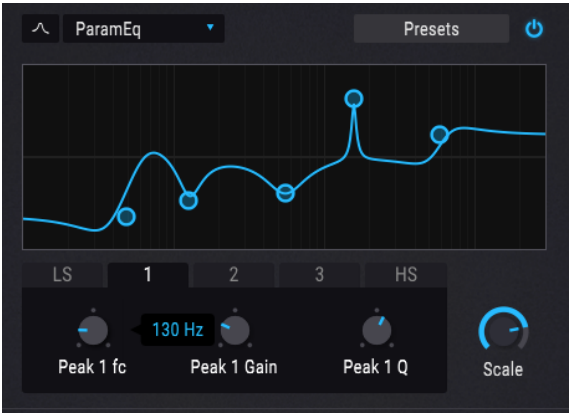
The Parametric EQ

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

8.7.3. Compressor
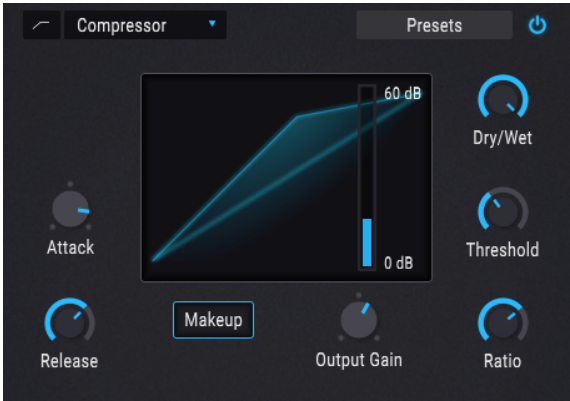
The Compressor effect

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 effected 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

8.7.4. Distortion

The Distortion effect

Distortion adds anything from a crispy edge to a complete crunch to the sound. Its character is more like that of a tube amplifier.

Control	Description
Dry/Wet	Controls the balance between the input signal and the effected signal
Drive	Sets the distortion amount
Out Gain	Use this to compensate for increased output gain caused by the other settings

8.7.5. Overdrive

The Overdrive effect

The Overdrive effect will add a certain "fuzziness" to the sound. The tone control will adjust the brightness of the outut. This is modeled after a "solid-state" circuit.

Control	Description
Dry/Wet	Controls the balance between the input signal and the effected signal
Drive	Sets the overdrive amount
Tone	Adjusts the high frequencies of the sound, smoothing it or adding a harsher edge
Level	Use this to compensate for increased output gain caused by the other settings

8.7.6. Wavefolder

The Wavefolder effect

Wavefolding takes the peaks of the input waveforms and folds them downward, which contributes a unique form of high-frequency content to the sound.

Control	Description
Dry/Wet	Controls the balance between the input signal and the effected signal
Drive	Adjusts the strength of the wavefolding effect
Out Gain	Use this to compensate for increased output gain as Drive level is increased
Type	Toggles between Sine or Hard wavefolding shapes

8.7.7. BitCrusher
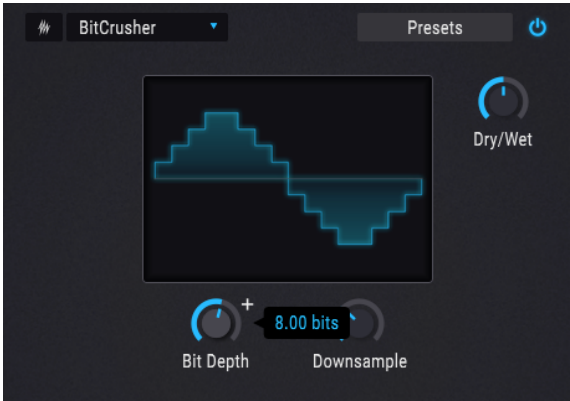
The BitCrusher effect

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 effected signal
Bit Depth	Reduces the number of bits used to render gradations in amplitude. Range: 1.50 to 16.0 bits
Downsample	Lowers the sample rate used to represent harmonic content. Range: 1.00x to 80.0x

8.7.8. 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 effected signal
Delay	Sets the amount of delay applied to the input signal
Depth	Controls the depth of the chorus
Frequency	Adjusts the speed of the chorus
Feedback	Controls feedback level
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

8.7.9. 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 effected 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

8.7.1O. 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 effected 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

8.7.11. Stereo Pan

The StereoPan 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.

Control	Description
Amount	Controls the amount of deviation from center
Rate	Sets the rate at which the stereo motion will occur, with freerun and sync options

8.7.12. Delay

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 effected 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
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

8.7.13. Tape Delay

Tape Delay is an effect similar to the Delay effect (described above) except that the effect traditionally relies on analog tape loops to create the sound. The Tape Delay effect within Pigments models the analog looping and distortion circuitry to create a fantastic analog-style delay that can be very different from the other Delay effect described above.

Control	Description
Dry/Wet	Controls the balance between the input signal and the effected 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.
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

8.7.14. 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 effected 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

9. THE SEQUENCER TAB

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.

Unfortunately, there is always the risk that the interactions of human and machine might fall into the rut of 'sameness', unless the tools at the artist's disposal are diverse and deep. But they must remain uncomplicated, to allow creativity to flow freely.

To that end, with its Arpeggiator and Sequencer 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.

9.1. Arp/Seq shared features

9.1.1. Arp/Seq mode selection

Select the desired mode by choosing either the Arp button or the Seq button. Playback will begin with the first incoming MIDI note. To stop playback, make sure the Hold button is set to Off and then let go of the note(s). To prevent a Sequence or Arpeggio from launching when a note is played or received, click the Off button.

> ♪: One feature not shared by the Arpeggiator and Sequencer is the top track: The Sequencer has a definable pitch value for every step, but the Arpeggiator does not. This is because the pitch of each Arpeggiator step is defined by you: the notes played on a keyboard controller, MIDI notes from a track of your DAW, etc.

9.1.2. Pattern length

The maximum length of a pattern is 16 steps. But the length can be adjusted to any value between 1 and 16 steps, so when combined with the various tempo sync options and the clever use of a calculator, some very interesting time signatures can be achieved.

To change the length of the entire pattern, hover the cursor over the thick grey line at the end of the last step in the pattern. The cursor pointer will change into a left/right arrow.

Next, click the line and pull it to the left or right, depending on the length of the current pattern. When you've reached the desired step boundary, release the cursor.
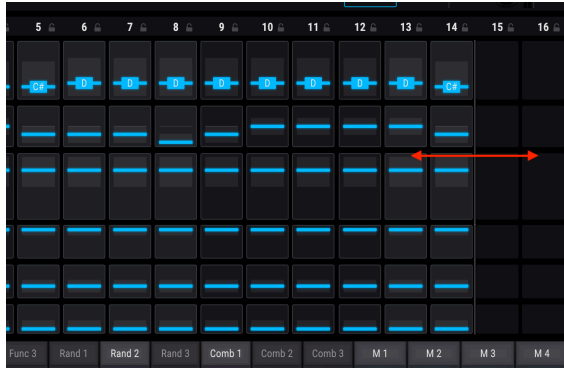
There's also a way to set each track to an independent length. This feature is called PolyRhythm mode [p.133].

9.1.3. Tracks

The largest section of the Arp/Seq 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.

9.1.3.1. Pitch (Seq 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 (i.e., 12 notes). These values can be filtered by selecting one of 15 Scales [p.138].

> ♪: The Pitch track is not available in Arp mode, because pitch values are defined by incoming MIDI data. So instead of a Random/Reset window, this track displays the Arpeggiator Mode menu. It contains six options that determine the note order for the Arpeggiator.

9.1.3.2. 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.

9.1.3.3. 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 "As Played" parameter in the Velocity Random/Reset window [p.129].

9.1.3.4. Trig Probability

It is possible to introduce a level of uncertainty with the Trigger Probability parameter, which determines 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%.

9.1.3.5. 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.

9.1.3.6. Slide

This parameter is also known as "slew." It controls the speed at which the pitch value of the current step will transition from the pitch value of the preceding step.

For example, if Step 2 contains a C and Step 3 contains both a G and a Slide value of 50.0%, it will take 50% of Step 3 for the pitch to rise from C to G. If the Slide value for Step 3 is 100%, it will take all of Step 3 for the pitch to rise from C to G. The length of the Slide is not affected by Gate Length values >100%; the target pitch will be reached prior to the onset of Step 4.

One other thing to know: If Step 2 did not contain a note in the previous example, the Slide value for Step 3 would be irrelevant. There would be nothing to slide *from* in that case.

9.1.4. Editing a track

To edit a single value inside a specific point in a track, click somewhere inside the value bar for that cell and then drag the value up and down.

The next two sections describe ways to edit the data for many steps very quickly.

9.1.4.1. Drag cursor across track

It is possible to "paint" the values for a number of adjacent steps within the same track. To do so, click inside the value bar for one of the steps and drag the cursor horizontally across that track. Dragging the cursor at a downward angle within the track will enter progressively lower values, etc.

If you accidentally cross over into one of the other tracks, don't worry; as long as you're holding down the mouse button the only values that will change are those within the original track.

> ♪: The results when dragging the cursor across the Pitch track will be filtered by the Scale parameter [p.129] (Sequencer only).

9.1.4.2. Proportional edit to entire track

Let's say, for example, that you like the way the velocity increases from Steps 1 through 16, but you want that entire crescendo to end at the maximum value of 127. To do this, press Shift on your computer keyboard and then click the value bar for one of the steps inside that track (preferably the 'hottest' one, for this example). While still holding the cursor down, drag upward until the note with the highest velocity reaches the top of its value bar. This will perform a proportional edit to the entire track at once, raising the velocity values of every note in the track.

> ♪: Be sure that you click one of the value bars in the row *after* holding the Shift button. If you click a value bar first and then press the Shift button you will only edit on the value of the step on which you clicked.

On the Pitch track, the proportional edit will conform to the Scale parameter selection [p.129] (Sequencer only).

9.1.5. Random / Reset column

As if you weren't having enough fun already, there's an entire column of boxes that contains more fun than a barrel of monkeys and their typewriters. Let's take a look at the Random / Reset column.

9.1.5.1. Random / Reset common features

The first thing the tracks have in common is their ability to generate random data within the boundaries you set. In addition to the per-track controls, you can pre-configure the randomization to happen for all tracks at a certain time within a bar, at the bar boundary, or at multiples of the bar boundary. Plus you can click the Randomize Regen button and scramble the data instantly, at any time. Talk about random!

Reset track

To start a track from a "plain vanilla" state, click its Reset button. The value bars for every step in that track will be reset to their defaults.

Set Randomize amount

Each track has an adjustable Randomize setting, with values ranging from 0.00% (do not randomize) to 100% (full-range randomization). Click and drag inside the dice (or the arrows next to them) to the set the amount of randomization you will allow to happen.

If a track ends up with random data values that you want to keep, click the Apply button located in the Randomize section.

Remember that you can use the Control key or right-click for finer adjustment of the Randomize amounts. It's like having dice with 1000 sides for each track; every time you roll the dice, you might get any one of a sexnonagintillion combinations (that's a 1 followed by 96 zeros.) That's more than the number of visible particles in the universe, dark matter aside.

Well actually, that's the number for the Sequencer. The Arpeggiator has one less randomizer, so we only provide a trenonagintillion options there. If you know more than 1,000 combinations of MIDI notes, though, you could exceed the options for the Sequencer. You are The Randomizer.

9.1.5.2. Random / Reset: per-track features

Two of the tracks have additional features located inside their Random / Reset windows that affect the data within the tracks.

Pitch track: Scale (Seq only)

The Scale menu contains 15 choices that will filter the randomization results for the Pitch track. The Scale selection will also allow only particular chromatic intervals to be selected when the cursor is dragged across the Pitch track [p.127], or when the entire track is edited proportionately [p.127].

The bottom of the menu contains a "Scale Editing" display. This display shows the notes used in the selected scale along with the corresponding weights for each note when randomly generated ("strong" weighting means notes are frequently generated where as "weak" means notes are created less often; "neutral" is in between the strong and weak settings). Note that this display is greyed out and not editable when selecting 14 of the preset scales—it simply shows notes in the scale along with their weighting. The display is only active and editable when the "Custom" scale option is selected.

At the end of this chapter there is a chart of the scales and the notes they contain. [p.138]

Pitch track: Transpose (Seq only)

The Pitch track also contains a Transpose knob that allows you to easily transpose the entire sequence by up to +/- 24 semitones. Like so many other parameters in Pigments, this knob can be modulated to provide interesting and sometimes unexpected musical results. Note that selected scales (from the Scale menu) still apply when transposing notes, meaning that the transposed notes will snap to the nearest applicable note.

Velocity track: As Played

What this setting does is govern whether the velocity values contained in the Velocity track will use the exact values stored in each step, or scale them according to the velocity of the note that triggered the pattern.

For example, if all of the steps in the pattern have a velocity value of 64 and the "As Played" value is set to 0.00%, it won't matter how hard or soft you play the keys: the pattern will always play each note at a velocity of 64. However, if the trigger note for the pattern is at a velocity of 100 and the "As Played" value is set to 1.00%, the pattern will play each note at a velocity of 100.

Similarly, if the pattern velocities have a "V" shape (high to low to high velocities) and the "As Played" value is set to 0.00%, the "V" values will always be used when those steps are reached. But with an "As Played" value of 1.00%, the "V" will be ignored.

Intermediate values of velocity will give different results depending on incoming values, those contained by the pattern, and the number of simultaneous notes being played. It can be quite expressive and interesting as the math runs its course.

9.1.6. Lock Columns

The Reverb effect

If you find the results of the randomization to be *too* chaotic, or if part of Sequence or Arpeggiation is good and you don't want it to change, you can lock that section down so that randomization will not be applied. To do this, simply click any of the lock icons above each column. When a column is locked, randomization will not be applied to any of the parameter values within that column. Note that the steps and values can still be edited when a column is locked; only randomization is prevented.

9.1.7. Randomize section

These two controls were designed to allow you to wreak as much havoc as you like with the pattern settings. They will scramble the data of each step in proportion to the Randomize settings for each track. So if any of those settings are at 0.00, no randomization can happen. If nothing happens when either of these controls does their thing, try raising the Randomize value for one or more of the tracks.

9.1.7.1. Randomize Regen

When you want to shake things up, click the Randomize Regenerate button (Regen). This is the equivalent of "rolling the dice" to see what values will be entered by chance.

"Chance" is under your control to some extent, though. The higher the Randomize settings are for each track, the less predictable the results will be.

And if you want some tracks to stay as they are before you click the Regen button, set their Randomize values to 0.00.

9.1.7.2. Applying Randomized values

If you have found something you like through random Regen, you can click the Apply button to convert the random value into the regular value of the parameter. When this is done the random value is set to O so that you hear exactly the same sequence before and after clicking the button.

9.1.7.3. Seq Auto Regen

A pattern can never be longer than 16 steps...but you can make it seem longer using the Sequencer Auto Regen setting. The selection you make here will delay randomization for up to 8 bars, after which the data in the tracks can change anywhere from a little to a lot.

Randomization can also happen as often as twice in one bar by selecting an Auto Regen setting of 1/2 bar. Whichever setting you choose, once the Auto Regen boundary has been reached the tracks will be randomized according to their Randomize settings.
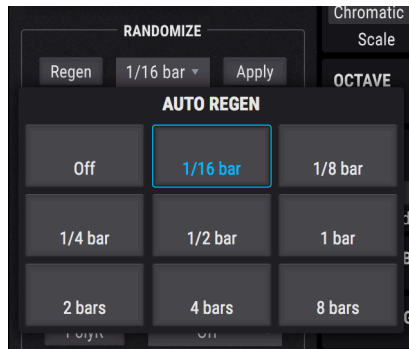
The Reverb effect

9.1.8. Rate section: Sync, Swing, and Hold

Patterns can freerun, or they can be synchronized to your DAW by using one of the Sync settings. The options are BPM (freerun), Sync binary, Sync triplet, and Sync dotted.

BPM stands for "beats per minute", and when this option is used the tempo can be set to any value between 30 and 300 BPM.

Each of the Sync options have distinct values that range between 1/2 note and 1/64th note durations. The triplet options are shown with a 't' in the value window near the knob (1/2.t, 1/4.t, etc.) and the dotted options are shown with a 'd' (1/2.d, 1/4.d, etc.).

9.1.8.1. Swing percentage

If a pattern seems too "stiff" or mechanical, try increasing the Swing percentage. This parameter can gradually change a pattern from straight eighth notes (50%) to a pure triplet feel (66.7%) to a dotted eighth/sixteenth note pair (75%), with every possible level of "shuffle feel" between those values.

If you've studied music theory, you'll recognize the two extremes instantly this way:
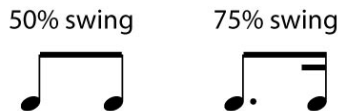
The Swing can be adjusted in 1/10th of a percent from 50.0 all the way through to 75.0%. Pigments is a precision groove machine.

9.1.8.2. Modulation of the Arp/Seq rate

Hover over the Rate control and notice the blue " + " icon. Click once on the " + " and every modulation source that can affect the Seq/Arp Rate is shown (which could be any or all of them). The slider can be used to activate a mod route, set its amount, and adjust the amount of any pre-existing modulation routes.

Follow this link to learn how to set up modulation routes [p.143].

9.1.8.3. The Hold button

The Hold button does the same thing that a sustain pedal does:

- **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.

9.1.9. Polyrhythm mode

This feature is an interesting way to generate melodic and rhythmic combinations you might never have considered otherwise.

9.1.9.1. What is PolyRhythm mode?

Usually all of the tracks within a pattern will be the same length (9 steps, 16 steps, etc.). When this is the case, if a Slide only happens once in a pattern it must wait until the pattern loops before it happens again.

But with the PolyRhythm feature you can specify a different time signature for each data track! This could mean you'd have as many as six tracks of different lengths all happening at the same time. The interactions of the various parameters could become even more interesting that way.

9.1.9.2. The PolyR button

Click the PolyR button to activate or deactivate PolyRhythm mode. When it is active the button is outlined in blue, and when it is not active the button is grey.

There are other visual clues, too: when PolyRhythm mode is not active the track boundaries are represented by a single grey line. But when you click the PolyR button the first time, that single grey line will become segmented. This indicates that the track lengths are now independent.

When this is the case, you can grab any one of the track end boundaries and set it to any length between 1 and 16 steps.
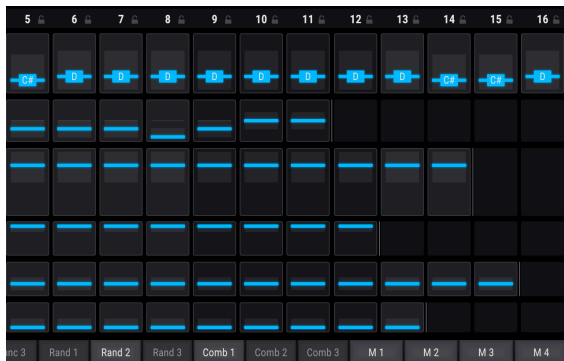
Another thing that happens when the PolyR button is toggled, if the lengths are different for one or more tracks, is that the tracks will change to their assigned lengths, then all to the same length, then back to different lengths, etc.

♪: The length of the Pitch track determines the pattern length when polyrhythm is disabled.

9.1.9.3. Realign

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 (i.e., realign) after a certain amount of time if you like. The options are 1/2 bar, 1 bar, 2 bars, 4 bars, or 8 bars.

9.1.1O. MIDI Output

Pigments includes a MIDI Output so that any of the patterns generated by the Seq/Arp sections can be sent to control any other virtual instrument. This can open up a lot of interesting options for sound design or to breathe life into old virtual instruments.

9.2. Arpeggiator (Arp)

> ♪: The Octave, Velocity, Trig Probability, Gate Length, and Slide track features are shared by the Arpeggiator and the Sequencer, and have been described at the beginning of this chapter [p.124]. The same is true of the Randomize [p.130], Rate [p.132], and Polyrhythm [p.133] features. The focus of this section will be the features that are unique to the Arpeggiator.

An arpeggio is basically an outline of a chord; rather than hearing all of the notes at once, they are delivered at different times. 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. The creative possibilities are endless.

9.2.1. Arp modes

When Arp mode is selected the Sequencer Pitch track is hidden, along with its Random / Reset window. In its place a drop-down menu allows you to make a selection from six different response patterns for the arpeggiator.
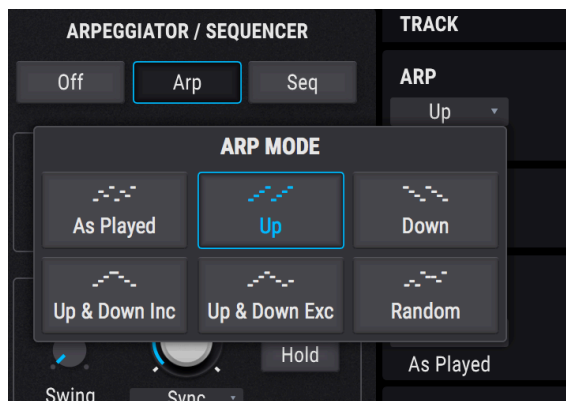
Arp Mode menu

From left to right the options are:

Mode	Description
As Played	Held notes will be arpeggiated in the same order they were played.
Up	Notes are played back in ascending order. New notes are inserted into the arpeggio as they are played.
Down	Notes are played back in descending order. New notes are inserted into the arpeggio as they are played.
Up & Down Inclusive	Held notes are played back in ascending order and then descending order. The highest and lowest notes are triggered twice and then the direction is reversed.
Up & Down Exclusive	Held notes are played back in ascending order and then descending order. The highest and lowest notes are triggered only once and then the direction is reversed.
Random	Held notes are played back in random order.

9.2.2. Chord arpeggiation

There's a form of Chord arpeggiation at your disposal when the Unison Chord mode [p.51] has been activated for one or both Engines. Similar to the monophonic behavior, 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.

9.3. Sequencer (Seq)

♪: The Octave, Velocity, Trig Probability, Gate Length, and Slide track features are shared by the Arpeggiator and the Sequencer, and have been described at the beginning of this chapter [p.124]. The same is true of the Randomize [p.130], Rate, and Polyrhythm [p.133] features. The focus of this section will be the features that are unique to the Sequencer.

9.3.1. Pitch

9.3.1.1. Pitch track: the Random / Reset window

The capabilities of the Random / Reset windows for each track are described here [p.128]. The randomization results for the Pitch track are further shaped by the selection of a Scale (read the next section).

♪: When Arp is selected the Pitch track and its Random / Reset window are hidden.

9.3.1.2. The Scale menu

The Pitch track values conform to the 12 tones in the chromatic scale by default. But the results of the various editing and randomization features can be shaped by selecting one of the following scales in the Scale menu.
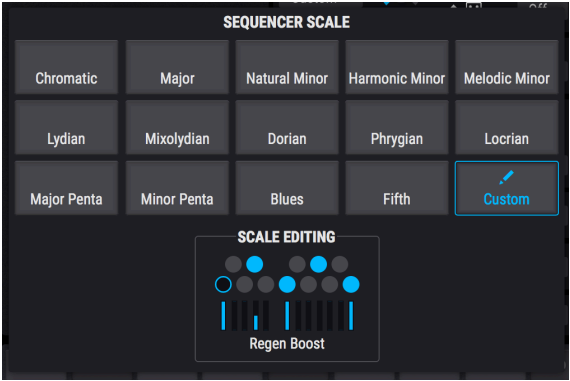
Arp Mode menu

Scale	Pitch results
Chromatic	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Major	0, 2, 4, 5, 7, 9, 11
Natural Minor	0, 2, 3, 5, 7, 8, 10
Harmonic Minor	0, 2, 3, 5, 7, 8,11
Melodic Minor	0, 2, 3, 5, 7, 9, 11
Dorian	0, 2, 3, 5, 7, 9, 10
Phrygian	0, 1, 3, 4, 5, 7, 8, 10
Lydian	0, 2, 4, 6, 7, 9, 11
Mixolydian	0, 2, 4, 5, 7, 9, 10
Locrian	0, 1, 3, 5, 6, 8, 10
Major Pentatonic	0, 2, 4, 7, 9
Minor Pentatonic	0, 3, 5, 7, 10
Blues	0, 3, 5, 6, 7, 10
Fifth	0, 5
Custom	[User's Choice]

1O. 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:

- Relative newcomers could learn synthesis faster through a diminished fear of "messing up the sound" of the presets when adjusting the controls.
- 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.14O], which is detailed later in this chapter.

1O.1. Using Sound Design Tips

You may have noticed an unusual image in the upper tool bar:
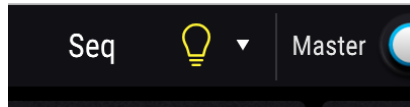
That "light bulb" is actually a button that activates the Sound Design Tips feature. When you hover over the bulb or click it, the bulb will turn yellow. But so will other sections inside Pigments:
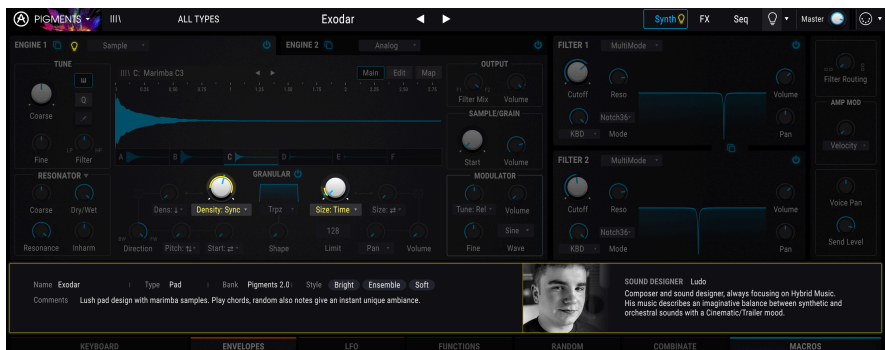
As you can see, a description of the current preset has been displayed in the center strip, and certain parameters are illuminated. These are the controls that were chosen ahead of time to produce the most interesting results for that preset. We'll describe how to put this feature to work for you in the sections ahead.

You can also use the drop-down menu to toggle Sound Design Tips on and off, but there are a couple of options in that menu so we'll cover that in a later section [p.14O].

10.1.1. The 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.

Notice that the yellow outline does not always completely surround the mod ring. What this does is show the minimum and maximum values that are considered the most useful for that control, which sometimes may be only a portion of the control range.

Your tastes may vary, though, so you can always edit those and save those changes as a new preset [p.14].

10.2. Edit Tips

There's an arrow pointing downward on the right side of the light bulb in the upper tool bar. This arrow will open the Sound Design Tips menu.
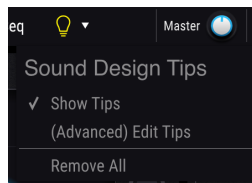
There are two options: Show Tips and (Advanced) Edit Tips. A check mark next to one of both options indicates which of those selections are active.

- **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. The first is that a gear symbol will appear next to the Sound Design Tips button in the upper tool bar.
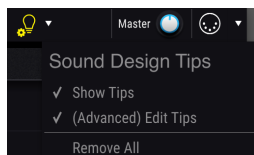
The gear symbol lets you know at a glance that it is possible to edit existing Sound Design Tips and add new ones.

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.142].

10.2.1. Add/Remove Sound Design 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.
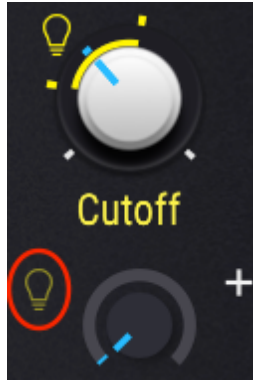
Click the dimmer bulb and then a Sound Design Tip range can be added to this control as well.

10.2.2. Editing Sound Design 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.

11. MODULATION ROUTINGS

The power, flexibility, and variety of the modulation features available in Pigments are nearly limitless. The entire lower half of the instrument is dedicated to the modulation routes, 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!

11.1. 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. 24 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, Mod wheel, Note number); some are linked to traditional synth parameters (LFOs, Envelopes); some are complex (Functions); some are unpredictable (Turing, Sample & Hold); 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.

11.1.1. Center strip: three views

The center strip of Pigments has three different appearances depending on the task you select: the Modulation overview [p.143], the Mod source view [p.144], or the Mod target view [p.145].

11.1.1.1. 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.

11.1.1.2. The Mod source view

Hover over a control and notice the small " + " icon that appears.
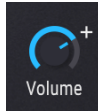
Now click one of the " + " icons: the center strip will display the Mod source view.

This view reveals every possible mod source for that parameter, each with an amount and a slider. Since no mod routes are active yet for the selected control, all amounts are zero and all slider caps are grey. The sliders can be used to adjust existing mod amounts or to activate new modulation routes, at which point they will gain 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:

- **SC**: click this to add a SideChain [p.156], 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 or use the Escape key on your keyboard.

For more information about using the Mod source view, click here [p.150].

11.1.1.3. The Mod target view

For detailed editing of a modulation route, click the name of the modulation source in the Modulation overview window. You can also click the names from inside the Mod source view.
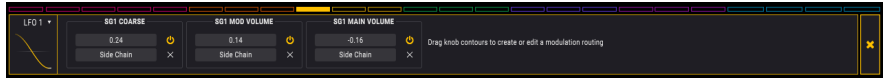
The middle strip will become a brightly outlined bar containing the details about each mod routing, including the destination, the SideChain, and how much of each has been enabled.

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:
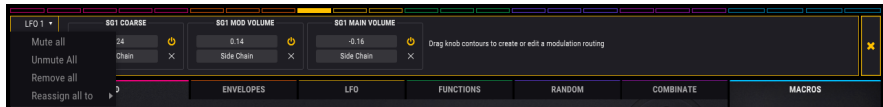
- **Mute All** immediately switches off (mutes) all of the modulation targets currently being displayed
- **Unmute All** un-mutes any modulation targets that are currently switched off
- **Remove All** clears all of the modulation targets that are currently displayed
- **Reassign All To** moves all of 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 or click the "X" on the far right side of the Mod target view. You can also use the Escape key on your keyboard.

For more information about using the Mod target view, click here [p.152]. For information about SideChains, click here [p.156].

11.1.2. Visual cues: Mod routes

If you see colored graphics in a Modulation overview window, that means its Mod source has been routed to at least one Mod target. Some of these graphics may be moving on their own (LFOs, for example), and some may only move when a note is triggered (such as an Envelope). Others may have a colorful line that only moves when a control is activated, such as the Expression pedal. Sources that have not yet been used in a mod route display only a grey line.

11.1.2.1. Mod route color scheme

You can know at a glance when a parameter is being modulated and exactly what mod sources are doing the modulating. This is possible because of the consistent use of color throughout the Pigments instrument.

Here are some instances of the color identification scheme employed by Pigments:

- When the cursor passes over a parameter that is the target of one or more modulation routes, or

- when you are in the Mod target view and using a mod ring [p.152] to edit the amount of a modulation, or

- when you are adjusting a slider in the Mod source view [p.150]...

...then you will see that the color of the source, the mod source group where it resides, and the target itself all utilize the same color.

For example, let's say that there is one harried parameter that is the target of every mod source at the same time. The Modulation overview window would look like this as you hover over the control for that parameter:

As you can see, there are certain groups of Mod sources that glow in similar colors. These sources are part of a larger set known as a Mod source group [p.158]. Their settings can be viewed and edited by selecting one of the tabs immediately below the Modulation overview windows.

Also, when a Mod source group is selected, the top of its tab is lit with a color that matches the windows of the mod sources it contains. For example, in the picture below the Combinate tab has been selected, and its tab is lit with the same color as the Combinate 1 and Combinate 2 windows immediately above the tab.
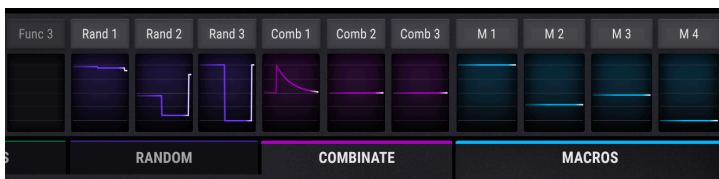
> ♪: The Macros tab is always lit because those controls are visible no matter which Mod source group tab has been selected.

Here's a list of the color coding for all of the modulation sources and their groups:

Mod source group	Modulation Sources	Color
MIDI	Virtual keyboard, Pitch/Mod wheels, Expression pedal	Magenta
Envelopes	Envelopes 1, 2, and 3	Orange
LFO	LFOs 1, 2, and 3	Yellow
Functions	Functions 1, 2, and 3	Green
Random	Turing, Sample & Hold, and Binary value generators	Blue Violet
Combinate	Combinates 1 and 2	Red Violet
Macros	Macro knobs 1, 2, 3, and 4	Aqua

11.1.2.2. Hover, select, edit: how the knobs change

The knobs and mod rings show different colors and graphics depending on what is being done. The graphic and table below provide the necessary explanations.

State	View	Source selected?	Conditions	Description
1	All	n/a	No modulation	Zero value (minimum or middle position [not pictured])
2	All	n/a	No modulation	Mod ring shows non-zero value as solid color
3	All	n/a	1 or more modulations	Thin marker (static or moving) in mod ring
4	All	n/a	Hover on knob center	Knob cap becomes a brighter grey; value appears
5	3	**Yes**	Hover on mod ring	Mod ring and mod range glow slightly
6	3	**Yes**	Hover on mod ring (mod = O)	Mod ring lit by thin, glowing line in source color
7	3	**Yes**	Hover on target (mod ≠ O)	Mod ring has thin line in source color; mod range = thick line (but see note [p.149])
8	1, 2	*No*	Hover on source	Target mod ring glows with source color, unless...(see note [p.149])
9	1, 2	*No*	Hover in knob area	Shows a small " + " icon that activates Mod source view
1O	2	*No*	Select small " + " icon	Small " + " icon is blue, knob area is outlined

Key to table contents

- View 1: Modulation overview
- View 2: Mod source view
- View 3: Mod target view
- n/a: not applicable

♪: LFOs are bipolar by default, so as you increase the modulation amount its range will grow in both directions from the current position of the parameter knob. If you want the modulation to go only above or below the current parameter value, set the Unipolar feature to On in the LFO settings. There's more information about LFOs and other modulation sources in the next chapter [p.158].

11.1.2.3. Why the mod ring won't show a mod range

There are times when the mod ring won't show a modulation range, 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 window** 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.

Good news! These symptoms have the same underlying 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.

And so the solution is to adjust the parameter value until you are able to see the full modulation range. You may also want to consider reducing the modulation amount, depending on the results you hope to achieve.

11.2. Working with modulations

There are two ways to create a modulation route, and the one you should choose depends on what you want to do.

- If you want to set up several modulation routes with multiple sources targeting the same parameter and don't want to work with SideChains at the moment, use the Mod source view (see the next section).
- If you want to set up one or more modulation routes using a single Mod source to target multiple parameters, and you also want to set up SideChains for the modulation routes, use the Mod target view [p.152].

11.2.1. Method 1: 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.

11.2.1.1. Selecting a parameter

To access the Mod source view for a certain parameter, move the cursor into the area where the control for that parameter is found. You will see a small " + " icon appear near the control:
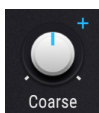
Click the " + " and you will be taken into the Mod source view.

11.2.1.2. Adding/Editing a mod

Once you are inside the Mod source view, the 24 windows from the Modulation overview will have sliders that supersede the moving LFOs, etc. Each of these sliders can be set to a value between -1.00 and 1.00, in increments of 0.01, which covers the entire available modulation range for the modulation route.

When the values are at zero the Mod source windows are black. As the values move away from zero the windows gain the color of their Mod source group [p.158]. SC means a SideChain [p.156] can be added; if one exists, its name and level appear. Click one of those fields to change its setting.

11.2.1.3. 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:
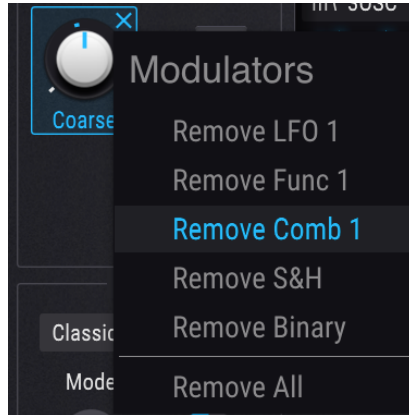
To open this list, Hover over the control and do one of the following things:

- 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.

> ♪: Opening the list of Modulators with a right-click will also open the Mod Source view in the center strip area.

11.2.1.4. 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.

11.2.2. Method 2: Mod target view

This method allows greater precision over the impact one particular Mod source will have over multiple parameters.

11.2.2.1. 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 changes occur to the Pigments interface:

- A black rectangle with a brightly colored outline will take the place of the Modulation overview window. It will list any existing mod routes, their SideChains, and their amounts. The list will grow as new mod routes are added.
- The mod rings around the controls above the center area will reveal the target parameters and modulation amounts related to that source. The visual cues are listed in great detail here [p.148], but the most obvious indicator will be the colors of the mod rings. If their color matches that of the outline around the Mod target view, they have a mod route that uses the Mod source 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, and
- Edit the amount of modulation you want to apply to the parameter using the mod ring.

11.2.2.2. Adding/Editing targets

The same procedure is used to edit the amount of an existing modulation route or to add a new route.

First, 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 normally 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.
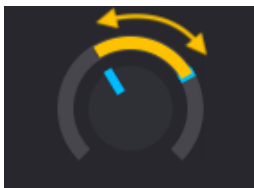
An LFO being used as a unipolar mod

But if the Mod source normally moves both positively *and* negatively, like an LFO or a Function can (under certain conditions), 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

> ♪: It is possible to make a bipolar Mod source become unipolar. To learn how to do this for a specific source, search for its name in the Modulation Sources chapter [p.158].

You can keep adding mod routes using this method until the desired result as been achieved. There's no limit on the number of mod routes you can add.

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.
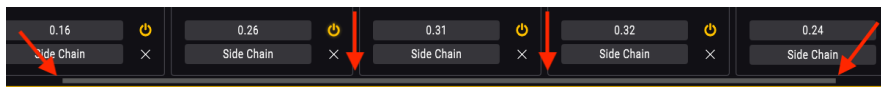
11.2.2.3. Understanding modulation ranges

You may not be able to see the high and/or low modulation limits around a mod ring depending on two factors:

- the setting of the parameter control, and

- the width of the modulation range.

The quick fix is to alter the setting of one or both of those two factors: move the parameter control, or reduce the modulation range.

For a more detailed explanation, see this section: Why the mod ring won't show a mod range [p.149].

11.2.2.4. 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 O (it's in the 12:OO 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 O.5O (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.OO (100%) while watching the yellow ring. It will not grow larger.
11. Return the mod amount to O.5O (50%).
12. Now turn the Engine 1 Coarse tune control fully counter-clockwise to a value of -6O.
13. Notice that the upper edge of the mod range has moved to the 12:OO position.
14. Now increase the mod amount to 1.OO (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 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).

11.2.2.5. Muting a mod route

It's possible to "mute" a modulation route inside the Mod target view without deleting it; just click on the parameter name in the list and it will become greyed out. This indicates that it is inactive.

But if you decide you like the preset better without that mod route, you'll need to "mute" that mod route permanently. You can do this by removing the mod route from the Mod target list and storing the preset that way. Otherwise the mod route will become unmuted again when the preset is recalled.

See the next section to learn how to remove a Mod target.

11.2.2.6. 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.

11.2.2.7. SideChains

The Pigments modulation section has an innovative option that can be applied to modulation routings: SideChains.

Most people who've worked with mixing consoles are familiar with the use of a sidechain to connect a signal processor to a track: Incoming audio is routed through the signal processor before it goes anywhere else in the console (EQ, effect sends, etc.).

In the case of a modulation routing, the SideChain provides 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 the Binary generator to increase the amount of an LFO at unpredictable times.

After a mod routing is created, the first thing you see in the Modulation overview is the name of the destination, the amount of the modulation, the letters "SC" (the abbreviation for SideChain), and the "X" you would use to delete the mod route.

To select a source for the SideChain, click the SC field. A menu will appear, and the current SideChain source will be outlined, if there is one.
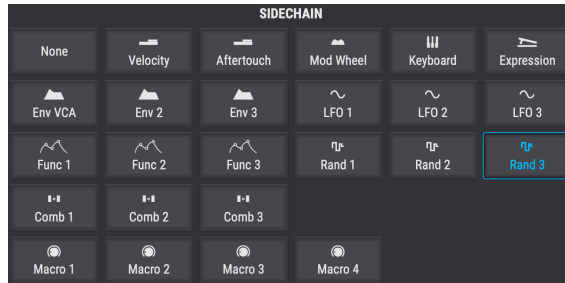
An LFO being used as a bipolar mod

Once a selection is made the menu will close and an additional value field will appear between the SC source and the "X".

To set the value for the SideChain, click and drag the number inside the mod route. 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.

For example, let's say that your modulation source is an LFO that has been routed to the oscillator Fine Tune value in an amount of 0.25. If your SideChain is the Mod wheel, and the SideChain value is 1.00, you will not hear any modulation taking place until the Mod wheel moves higher than zero. As the Mod wheel value is increased, the LFO depth will increase. Once the wheel has reached its maximum throw, the LFO will be modulating the full amount that was set (0.25).

In another example with the same components, if the modulation amount is 0.25 and the Mod wheel is at 50% of its throw, the LFO depth will be approximately 0.125 (half of the modulation range).

To mute a SideChain, 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 SideChain, open the SideChain menu and select "None". The SideChain source will disappear.

11.2.2.8. 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 keyboard.

12. MODULATION SOURCES

This chapter will describe the nature of each Modulation source. See the previous chapter to learn how to set up and use the Modulation Routings [p.143].

12.1. The Mod source groups

12.1.1. Keyboard tab

12.1.1.1. The virtual keyboard
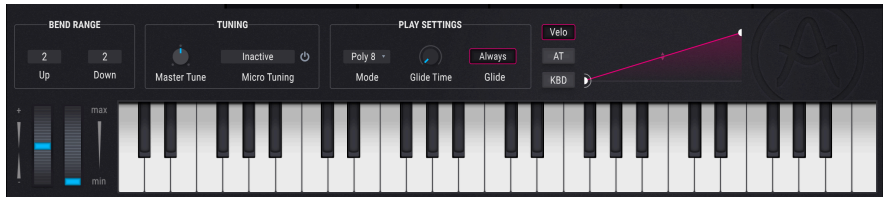
The Pigments virtual keyboard

The virtual keyboard is available when the MIDI tab is selected in the bottom half of the window. With it you can play a sound without the need for an external MIDI device. Simply 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 front edge of the key results in a higher velocity note; clicking near the back of the key produces a soft velocity.

12.1.1.2. Pitch and Mod wheels
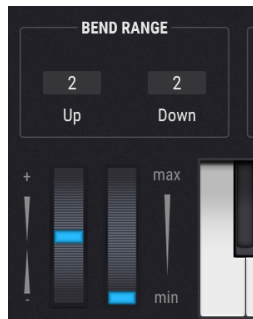
Located to the left of the virtual keyboard are the Pitch and Mod wheels. These wheels may be dragged up and down with your mouse. As you do they will perform the functions they have been assigned elsewhere in the user interface. They will also respond to the appropriate MIDI controller input.

The pitch wheel will return to zero when it is released; the modulation wheel will stay at its current location until moved.

12.1.1.3. Bend Range

The pitch 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.

12.1.1.4. Tuning section
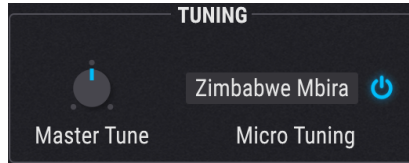
Master Tune

The default is A=440 Hz, but with this control you can adjust the master tuning of Pigments from 400-480 Hz. Hold [Ctrl] and drag the knob to adjust the tuning in 0.1 increments. Double-click to reset.

Micro Tuning

Pigments expands your musical arsenal by providing the tuning standards of many cultures. Enable the Micro Tuning section and use the drop-down menu to select one of the 12 presets, or import your own in the .scl or .tun file format.

12.1.1.5. Keyboard Play Mode

Pigments allows a maximum polyphony of 32 voices. A higher voice count is also more CPU-intensive, so Pigments lets you specify the number of voices it will use. This setting is stored independently with each preset, so you can limit one preset to 4 voices and another to 16, depending on the needs of the preset.
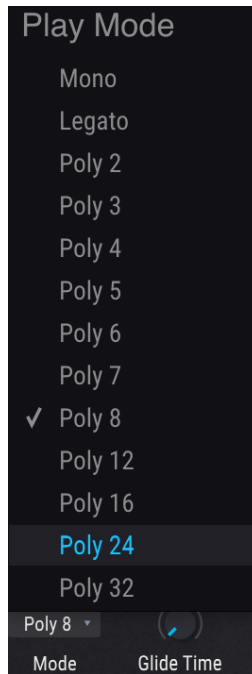
Options include Mono, Legato, and lots of polyphonic settings ranging from 2 to 32 voices. A check mark indicates the currently selected Play Mode setting.

12.1.1.6. Glide
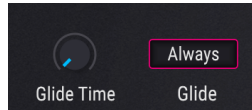
When the Glide feature is active the pitch will change gradually between two played notes. To add Glide to your preset, turn the Glide Time knob to a number higher than 0.00. The values range from 0.001 to 10.0 seconds.

The Always button

This button toggles between two different Glide behaviors:

- Always (button outlined in blue)

The pitch will always glide from one note to the next, even if the notes are played in a staccato fashion.

- Legato (button is grey)

The pitch between notes will only glide if the first note has not been released when the second note is played. This works best for monophonic playing, unless all notes in each chord are triggered and released at the exact instant.

The Time knob

This knob controls the amount of time it takes to change the pitch from one note to another.

Notice also that when you hover over the Time knob a small " + " icon appears nearby. If you click this icon it will open the Mod source view [p.150]. You can use any Mod source to modulate the Glide time.

12.1.1.7. Keyboard curves
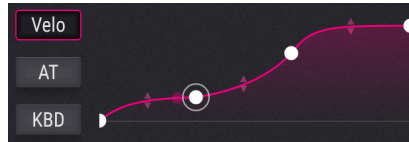
Pigments provides three configurable curve settings for the keyboard:

- **Velo:** Velocity curve
- **AT:** Aftertouch
- **KBD:** Keyboard

The first two allow you to match the response of the input keyboard to your playing style; the third provides a mod source that tracks the keyboard from left to right. All three are part of the Keyboard mod source group on the left side of the center strip.

The first and last points of these curves can't be moved left or right, but you can drag them up or down to invert the curves if you like. You can also add two points anywhere in the middle, and then adjust the curves between all four points by dragging the up/down arrows. Any sort of curve can be achieved, from exponential to linear to logarithmic.

Click the desired button on the left to select its curve for editing. The curves are stored per preset.

12.1.2. Envelopes tab

12.1.2.1. Env 1: hardwired to VCA...

...but you can still use it as a source for other mod routes if you like. Gate source is fixed on Poly KBD option and can't be changed.

12.1.2.2. Env 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.163]
Sustain	Sets the target level for the Decay value, where the envelope will rest until the note is released
Gate Source	Selects the source to trigger/retrigger the envelope (Env 2+3 only; Env 1 Gate Source is fixed)
Release	After note-off, this determines the amount of time the envelope will take to fade to zero
Release Link	Same behavior as the other link button: links Decay / Release times, curves as described here [p.163]
ADR button	Toggles envelope mode between ADSR and ADR behavior; more information here [p.164]

> ♪: Use the Control + Click combination to fine-tune the value of a parameter. Double-click a control to reset its value to the default.

12.1.2.3. Release Link buttons

There are two of these buttons: one by the Decay knob and another by the Release knob. What they do is link the Decay time and the Release time to the Decay knob, which controls them both. The Release is greyed out to indicate that it cannot be adjusted when the two parameters are linked.

Also, when Release Link mode is active, the Decay curve knob also adjusts the Release curve. Otherwise the Release curve is always exponential.

12.1.2.4. ADR vs. ADSR

First, the terms: ADR means Attack, Decay, Release; ADSR means Attack, Decay, Sustain, Release.

When ADR mode is active (button is outlined) 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.

12.1.3. LFO tab

LFO stands for Low Frequency Oscillator. The parameters for all three LFOs are identical:

Parameter	Description
Waveform	Adjusts waveform: Sine->Triangle->Square->Sample & Hold
Symmetry	Changes the distances between the maximum/minimum amplitudes of the waveform
Rate	Controls the speed of the LFO, with selectable sync options
Phase	Shifts the starting point of the LFO waveform
KeyTrack/Fade/Smooth	Three very different adjustments for LFO response; see below [p.164]
Reset Source	Selects the source that will trigger/retrigger the LFO
Unipolar button	When positive or negative LFO modulation is preferred to bipolar modulation, click this.

12.1.3.1. KeyTrack/Fade/Smooth

The left/right arrows 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

12.1.4. Functions tab

Pigments provides three Function generators, each of which is capable of creating very complex modulation sources. And all three can be doing entirely different things at the same time.

Each Function can contain up to 64 points, with independent levels and different curves between each point.

First we'll list all of the sections of the Function window and give basic details, and then we'll dive into the fun stuff of learning how to create your own Functions.

Parameter	Description	Range
Function view	This window shows all points and the curves between them	Simple to complex!
Function X	Select one of the three Functions	Function 1-3
Rate	Choose one of four sync options, including freerun (Hz)	Hertz, Binary, Triplets, Dotted
Bipolar	Toggle between Bipolar and Unipolar Function modes	On (Bipolar), Off (Unipolar)
Mode Selector	Sets how current function operates	LFO, Envelope
Play Mode [p.168]	*[When LFO Mode is selected:]* Decide if Function runs once, many times, or always	One, Loop, Run
Envelope Mode [p.169]	*[When Envelope Mode is selected:]* Switches looping on/off and sets start/end points	Loop, Start, End
Gate Source [p.169]	Set trigger/retrigger source for One or Loop Play modes	13 options; Run mode = None [p.168]
Copy to [p.167]	Copy settings between Functions	Fct 1-3
Presets [p.168]	Select a factory preset or save/recall your own	(unlimited)
Draw Mode	Selects tool used to draw or edit function	Edit, Line, Ramp, Saw
Magnetize	Show/hide grid lines and "snaps" Function point to grid	On, Off
Regen [p.169]	Generate randomness within the Function	0.00 to 1.00 in steps of 0.001
Point	Select a specific point within the Function	Up to 64 points
Time	Shift the location of the selected point	(Depends on location of points)
Level	Set the amplitude of the selected point	0.00 to 1.00 in steps of 0.006

Follow the links for additional information for those items. Let's spend some time learning how to create a Function.

12.1.4.1. Adding/removing a point

Start with the Default preset and select the Functions tab. You should see Function 1 selected, and it should be a straight line which descends from left to right.

Now click anywhere within the Function view window. Another point will be added where you clicked. You can add up to a total of 64 points to the Function.

To **delete** a point, right-click it. To delete muliple points, click and drag with the right mouse button.

12.1.4.2. Move a point

To change the location of a point within a Function, click its circle and drag it. You can move it up or down to adjust its level. Drag it to the left or right to change its time within the Function. A point can not be dragged beyond the location of the points on either side.

12.1.4.3. Changing a curve

Start with the Default preset and select the Functions tab. You should see Function 1 selected, and it should be a straight line which descends from left to right.

Now add a point somewhere in the middle of the Function view window. It needs to be far enough away from the first and last points to allow the curves to be seen.

Now drag the point to a level of about 0.300 (as viewed in the Level window on the right side). It needs to be low enough compared to the first point to recognize the changes to the curves as they happen.

Notice that between the points, in the middle of the lines that connect them, are up/down arrows. Grab one of these arrows and gradually move it all the way up. The line will warp until it reaches the top of the Function view window, at which time it will become completely squared off. This means that after the Function progresses in time from point 1 to point 2, the change in level will be instantaneous.

Likewise in the opposite direction: drag the up/down arrows down and observe a similar but inverse warping effect. When the line reaches the bottom of the Function view window it will be squared off.

12.1.4.4. Drawing tools
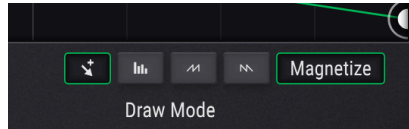
The drawing tools are located at the bottom right of the Function display and help you draw and edit functions. The buttons (from left to right) are as follows:

- **Edit** - Creates a single point
- **Draw Line** - Creates a line with two points
- **Draw Ramp** - Creates a ramp with two points
- **Draw Saw** - Creates a sawtooth (reverse ramp) with two points

When using any of the "draw" tools (line, ramp or saw), a single click will create a single segment. Click-dragging will generate a curve the length of multiple segments.

The curves between points can be adjusted by dragging on the up/down arrows at the midpoint of each line segment. However, you won't be able to adjust the curve between two points that are at exactly the same level.

The **Magnetize** button engages "snapping" to the nearest vertical line 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.

To **delete** a point in the function display, simply right-click it.

12.1.4.5. Copy between Functions

If you have drawn a function that you would like to copy to one of the other available functions slots, the process is very easy. Simply click the blue copy icon next to the Presets button:
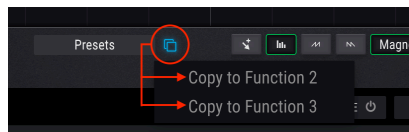
Doing so opens a menu allowing you to duplicate the function to any of the other function slots. For example, if you're on Function 1, the buttons for Functions 2 and 3 are available. Click one and the transfer is instantaneous. You can then select the target Function to confirm the transfer.

This is a handy feature, useful for making quick backups or slight alterations between functions so as to give them complementary settings.

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12.1.4.6. Working with Function presets

Click the Presets field and a list 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 option to store any changes you make to that preset, or use Save As to give the preset another name.

You can delete an original preset from the list by clicking the X across from its name.

12.1.4.7. Play Mode

Note that this mode is only visible when *LFO* is selected in the Mode drop-down menu.

Parameter	Description
One	The Function runs once when triggered. The Gate Source chooses the trigger source.
Loop	Once triggered, the Function will loop until another trigger resets it. Gate Source chooses Trigger.
Run	Function starts when preset is selected and loops freely, ignoring all triggers. See Play Mode = Run [p.168].

12.1.4.8. Play Mode = Run

When the Play Mode Run button is selected, the Gate Source setting is forced to a value of None. This is because the Run setting allows the selected Function to loop freely without being reset by a trigger source. As a result a Gate Source is not allowed, so a Gate Source value cannot be selected.

12.1.4.9. Envelope Mode

Note that this mode is only visible when *Envelope* is selected in the Mode drop-down menu.

Envelope mode adds a point with the letter "S" to the Function. This is the Sustain point. 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. Then:

- if Loop is off, after the note is released the Function proceeds to the end of the Envelope.
- if Loop is enabled, the Function cycles from the Start point to the End point until the note is released. Then the Function proceeds to the end of the Envelope.

The Sustain point can be dragged up or down, left or right, to any position between two points. Points can be added or removed on either side of the Sustain point, but it cannot be removed.

Parameter	Description
Loop	This button switches envelope looping on and off
Start	This sets the start point of the loop within the function
End	This sets the end point of the loop within the function

12.1.4.10. Gate Source

A value for Gate Source is only available with the Play Mode is set to One or Loop. Click the name field to open a menu and make a choice. A check mark indicates the current selection.

12.1.4.11. Regen

To adjust the value of the Regen icon, click and drag the cursor up and down. The "dice" graphic will fill up as you do, which increases the amount of randomness applied to the amplitude of each dot within the Function. When the cursor is released, the new Function replaces the old one and the dice will be emptied.

12.1.5. Random tabs

The Random tabs (labeled *Rand 1*, *Rand 2*, and *Rand 3*) each contain a drop-down menu letting you select one of three different random function generators: Turing, Sample & Hold, and Binary.

12.1.5.1. Turing

The Turing function generator is a source that produces random control values. They can be completely random, or they can be locked into loops that repeat every cycle. The length of a cycle can be anywhere from 1 to 64 steps, depending on the combined settings of the Flip and Length parameters.

Parameter	Description	Range
Flip	The likelihood of "mirror image" output and length	0.00-100%
Length	The length of the cycle	1-32 (1-64 if Filp = 100%)
Rate	Choose one of four sync options, including freerun (Hz)	Hertz, Binary, Triplets, Dotted

What does Flip do?

The Flip parameter sets up the probability that a particular output will be both inverted and reversed.

As 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

And that table means…what?

- 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 50% are easier to understand: complete rigidity or total fluidity. The following graphic may help visualize what happens at a Flip value of 100%.
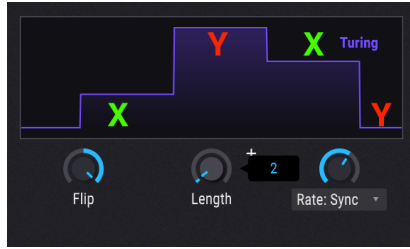
The output of step 1 is (O + O.25) = O.25, and the output of step 2 is (O + O.99) = O.99; the output of step 3 is (1.O- O.25) = O.75, and the output of step 4 is (1.O - O.99) = O.O1.

Another way to think about it is this: Flip values of O.OO% and 100% result in cycles that are very predictable in output and length, but Flip values between O.O1% and 99.9% will result in various degrees of random output and length.

Or if you prefer, imagine a bell curve: the midpoint (5O.O%) is completely random, and as you move toward either extreme the results are decreasingly random.

12.1.5.2. Sample and Hold

This term is more well known, but we've incorporated some very unusual features in this random function generator!

Parameter	Description	Range
Source	Selects the impulse to provide the values that are sampled at random	23 options
Trigger	New values are sampled when triggers are received from this source	13 options
Rise	Sets the time it takes to transition into the next value	O.OO-4.OO seconds
Fall	Determines the time it takes for a value to return to zero	O.OO-4.OO seconds
Link	Connects the rise and fall values; Rise control adjusts both	On, Off
Rate	Choose one of four sync options, including freerun (Hz)	Hertz, Binary, Triplets, Dotted

12.1.5.3. Binary

Yes, binary means a black-and-white, all-or-nothing mathematical approach (i.e., ones and zeros). But what are the chances that 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	Range
Proba	Adjusts the probability that the output will be 1	0.00 - 1.00 in steps of 0.001
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*.	0.00 - 1.00 in steps of 0.001
Rate	Choose one of four sync options, including freerun (Hz)	Hertz, Binary, Triplets, Dotted

12.1.6. Combinate tab

A Combinate function is used to generate a modulation source based on the interactions of one or two other modulation sources. Pigments provides two of these mathematical marvels for use as a modulation source.

The best way to understand how this works will be to provide a simple example. But first, here's a list of the parameters.

Parameter	Description	Range
Source	The parameter being affected	23 options
Mod	The parameter doing the affecting	23 options. Hidden for certain Types
Type	Decides the math process that will be applied	8 options
Amount	Controls how much the Mod affects the Source	0.00 - 1.00 in steps of 0.001

Let's try this out.

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.

1. Notice that the lower half of the Sawtooth wave does not rise above the Threshold level.
2. Increase the Amount and observe the results as more of the Sawtooth falls below the Threshold.
3. Set Amount to zero, and select Type: Offset.
4. 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.

12.1.6.1. Combinate formulas

The formulas used to calculate each Type are displayed in the Combinate windows:

But it may be helpful to view them all in a single chart to see how each formula differs from the others:

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.175]	Source is LP filtered; Amount is the filter amount
Threshold	Source if > threshold, otherwise = threshold
Offset	Offsets Source by Amount
Remap	Remaps source to output through a function table

> ♪: The output of the equations is not allowed to exceed the values of -1.00 and +1.00.

12.1.6.2. 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.

12.1.6.3. Sources: Polyphonic or mono

Just in case you're curious: If one of the sources is polyphonic, then the output is polyphonic. Otherwise the output can be mono.

12.2. Macros

Macros are four unipolar knobs that can be assigned any number of modulation routings, including SideChains. The Macro can then be assigned to an incoming MIDI message and adjusted by a hardware control on your controller keyboard.

You can set up a modulation route for a Macro the same way you set up mod routes any other Mod source:

- 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.152]. 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.156] 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.150].

Double-click below the Macro knob to enter a name.

13.1. Master group

Parameter	Non-VST parameter	Description
MasterVolume		Output volume of the instrument
Macro1		Macro controls can modulate multiple parameters simultaneously.
Macro2		
Macro3		
Macro4		

13.2. Modulation Source groups

13.2.1. MIDI

Parameter	Non-VST parameter	Description
Glide		
Glide Mode		
BendUp		
BendDown		

13.2.2. Envelopes (VCA, Env 2, Env 3)

Parameter	Non-VST parameter	Description
Env Attack		The time needed to go from the start level to the maximum level
Env Decay		The time needed to go from the maximum level to the sustain level
Env Sustain		The amplitude at which the envelope will be kept while the gate source is active
Env Release		The time it takes for the envelope to go back to O after the gate source is stopped.
Env AttackCurve		The shape of the attack segment, from exponential to logarithmic, linear in between
Env DecayCurve		The shape of the decay segment, from exponential to logarithmic, linear in between
Env ReleaseLink		Links the Release segment to the Decay segment, both for duration and slope
	Env VCA Gate Source	The source that triggers the VCA envelope. It is hardwired to the incoming MIDI notes.
	Env 2, 3 Gate Source	The source that triggers the envelope.
Env Mode		When set to ADR, the gate length is ignored and the envelope runs its entire ADR cycle when triggered

13.2.3. LFOs (1, 2, and 3)

Parameter	Non-VST parameter	Description
LFO Frequency		The frequency at which the LFO runs, in hertz
LFO Tempo Div		The number of beats the LFO takes for a period
	LFO Sync Rate Type	Select tempo-synchronized or unsynchronized rates for the LFO
LFO Waveform		A continuous waveform morph from sine to tri to square. The phase moves to keep a 0 crossing point at the start
LFO Symmetry		Stretches the waveform to provide more shapes. It can generate sawtooths, or do pulse width type of shapes.
LFO Polarity		Sets whether the LFO output is centered (bipolar) or only positive (unipolar)
	LFO Setting	Select a modifier on the LFO waveform
LFO Initial Phase		Sets the phase where the LFO is retriggered. 0 means it resets on a rising edge, zero-crossing point
LFO Smooth		Smoothes the LFO waveform using Low Pass filtering.
LFO KeyTrack		Modifies the rate of the LFO based on the Keyboard source.
LFO Fade		Applies a fade-in envelope on LFO retrigger

13.2.4. Functions (1, 2, and 3)

Parameter	Non-VST parameter	Description
Function Rate		The frequency at which the function runs, in hertz
Function Tempo Div		The number of beats the function takes for a full cycle
	Function Rate Type	Select tempo-synchronized or unsynchronized rates for the function
Function Bipolar		Sets whether the function output is centered (bipolar) or only positive (unipolar)

13.2.5. Random (Turing, Sample & Hold, Binary)

Parameter	Non-VST parameter	Description
Turing Flip		Sets the probability for the sequence to evolve. At O it never changes, at 50% it's fully random. At 100% it flips each time the loop repeats.
Turing Length		Sets the length of the sequence. It also impacts the range of values that can be attained. More steps, more values.
Turing Unsync Rate		The frequency at which the Turing module runs, in hertz
Turing Sync Rate		The number of beats the Turing module takes for a period
	Turing Sync Rate Type	Select tempo-synchronized or unsynchronized rates for the Turing module
	S&H Source	Selects the source for the Sample & Hold module
S&H RiseTime		When the new value is higher than the previous, sets the time it takes to fade to the new one
S&H FallTime		When the new value is lower than the previous, sets the time it takes to fade to the new one
S&H LinkTimes		Links Rise and Fall times
	S&H Trigger	Selects the trigger for the Sample & Hold module
S&H Unsync Rate		The frequency at which the Sample & Hold module runs, in hertz
S&H Sync Rate		The number of beats the Sample & Hold module takes for a period
	S&H Sync Rate Type	Select tempo-synchronized or unsynchronized rates for the Sample & Hold module
Binary Proba		The probability to get a O or 1. Lower values provide more O's.
Binary Correl		The probability to stay on the current value. High values means each new outcome is more likely to be identical to the current value.
Binary Unsync Rate		The frequency at which the Binary module runs, in hertz
Binary Sync Rate		The number of beats the Binary module takes for a period
	Binary Sync Rate Type	Select tempo-synchronized or unsynchronized rates for the Binary module

13.3. Engines 1 and 2

13.3.1. Wavetable

Parameter	Non-VST parameter	Description
Engine Bypass		Deactivate Engine 1. It will not be processed, and will not produce any sound.
Engine Wavetable Main Vol		Sets the volume of the wavetable oscillator
Engine Wavetable Mod Vol		Sets the volume of the Modulator
Engine Wavetable Coarse		Sets the pitch of the wavetable oscillator.
	Wavetable Quantized Mod	When active, the modulation of the pitch will be quantized
	Wavetable Quantized Scale	Select which intervals are allowed when receiving a modulation on Coarse Tune.
Engine Wavetable Fine		Fine tuning of the wavetable oscillator
Engine Wavetable Position		Scan through the currently selected wavetable
	Wavetable Morph	When active, smoothly morphs between waves in the wavetable
	Wavetable Modulator Wave	Sets the Modulator waveform
	Wavetable Mod Tuning Mode	Sets the tuning behavior of the Modulator. Relative to the Wavetable Oscillator or Absolute, or independent of the keyboard

Parameter	Non-VST parameter	Description
Engine Wavetable Mod Coarse		Sets the coarse tune of the Modulator. Final tuning depends on the Tuning Mode that is selected
Engine Wavetable Mod Freq		Sets the frequency generated by the Modulator.
Engine Wavetable Mod Fine		Sets the fine tune of the Modulator
Engine Wavetable FM Amount		Sets the amount of Frequency Modulation from the Modulator on the Wavetable Oscillator
Engine Wavetable FM Type		Sets the type of Frequency Modulation that is used. Either Linear or Exponential.
Engine Wavetable PM Amount		Sets the amount of phase modulation from the Modulator on the Wavetable Oscillator
Engine Wavetable Sync Source		Defines what resets the oscillator phase. Can be used to retrigger the phase on each key, or to do Hard Sync effects
Engine Wavetable Phase Distortion		Sets the amount of phase distortion, morphing towards Target
Engine Wavetable Ph Dist Mod		Sets the amount of phase distortion modulation from the Modulator
	Wavetable Ph Dist Target	Sets the Target for phase distortion
Engine Wavetable Fold Amount		Sets the amount of wavefolding on the wavetable. It creates richer harmonics
Engine Wavetable Fold Mod		Sets the amount of wavefolding modulation from the Modulator
	Wavetable Fold Shape	Selects the shape for the wavefolding modulator
Engine Wavetable Unison Mode		Selects a mode for the Unison, either classic detuning or chord generation
Engine Wavetable Unison Voices		Sets the number of voices for the Unison
Engine Wavetable Unison Detune		Sets the detuning between unison voices
Engine Wavetable Unison Stereo		Sets the stereo spread of unison voices
Engine Wavetable Unison Chord		Selects which chord is used for the Unison

13.3.2. Analog

Parameter	Non-VST parameter	Description
Engine Analog Coarse		Sets the pitch of the Analog Oscillator
	Analog Quantized Mod	When active, the modulation of the pitch will be quantized
	Analog Quantized Scale	Select which intervals are allowed when receiving a modulation on Coarse Tune.
Engine Analog Fine Tune		Fine tuning of the Analog Oscillator
Engine Analog Drift		Adds randomness to the pitch of each voice. It makes chords wider
Engine Analog O1 Coarse		Sets the pitch of the first Oscillator
Engine Analog O2 Coarse		Sets the pitch of the second Oscillator
Engine Analog O3 Coarse		Sets the pitch of the third Oscillator
	O1 Sync	When active, oscillator 2 is hard sync'ed to the frequency of oscillator 1
	Analog O2 Key	When active, the second Oscillator follows the key that is pressed
	Analog O3 Key	When active, the third Oscillator follows the key that is pressed
Engine Analog O2 Fine		Fine tuning of the second oscillator
Engine Analog O3 Fine		Fine tuning of the third oscillator
	Engine Analog O1 Wave	Choose a waveform for the first oscillator. Triangle and Square waves provide Width control.
	Engine Analog O2 Wave	Choose a waveform for the second oscillator. Triangle and Square waves provide Width control.
	Engine Analog O3 Wave	Choose a waveform for the third oscillator. Triangle and Square waves provide Width control.

Parameter	Non-VST parameter	Description
Engine Analog O1 Width		Pulse Width for Square waveform, Saw>Tri>Ramp for Triangle waveform.
Engine Analog O2 Width		Pulse Width for Square waveform, Saw>Tri>Ramp for Triangle waveform.
Engine Analog O3 Width		Pulse Width for Square waveform, Saw>Tri>Ramp for Triangle waveform.
Engine Analog O1 Volume		Controls the volume of this oscillator
Engine Analog O2 Volume		Controls the volume of this oscillator
Engine Analog O3 Volume		Controls the volume of this oscillator
Engine Volume		The output volume of the Engine
Engine Filter Mix		Sets whether Engine will be sent to the first or second filter. When filters are in series you can still send to the second filter.
Engine Analog Noise Source		This is a tonal control for the noise source. Red has more low frequency, white is wide spectrum, blue has more highs
Engine Analog Noise Volume		Controls the volume of the noise source
Engine Analog Mod Source		A mix of Osc 3 and the Noise source to be used as a FM source for VCO 1 and 2 and in the Mini, M-12 and SEM filters
Engine Analog Mod Amount		The amount of the Mod Source for Frequency Modulation of VCO 1 and 2.

13.4. Filters 1 and 2

Parameter	Non-VST parameter	Description
F(n) On/Off		Bypasses the filter. When off, sound goes through it, only affected by the output Volume and Pan of the filter
	F(n) Type	Selects the type of filter. Classic, Virtual Analog filters or more unusual modes (Surgeon, Comb,...)
F(n) Cutoff		Sets the cutoff frequency of the filter.
F(n) Resonance		Sets the resonance of the filter
F(n) SEM Mode		A continuous mix between Low Pass and High Pass. Lowest value is a bandpass.
	F(n) M12 Mode	Select the filter mode for the Matrix 12 filter.
	F(n) MultiFilter Mode	Select the filter mode for the Multimode filter.
F(n) Drive		Adds overdrive of the filter input, creating harmonics
	F(n) Surgeon Mode	Select the filter mode for the Surgeon filter.
F(n) Spread		Sets the spread between the LPF and HPF of the Surgeon filter.
	F(n) Comb Mode	Select the mode for the Comb filter, Feedback or Feedforward.
F(n) Comb Freq		Sets the frequency of the Comb filter. Technically, the delay between the signal and the phased copy.
F(n) Comb Gain		Sets the gain of the Comb filter. Technically, the volume of the phased copy.
F(n) Comb Keytrack		The amount of keyboard tracking of the Comb filter
	F(n) N Poles	The number of poles in the Phaser

Parameter	Non-VST parameter	Description
F(n) Feedback		The amount of feedback in the Phaser.
F(n) Frequency Shift		The base frequency for the formant filter
F(n) Morph		This control morphs between different vowels.
F(n) Q Factor		How much the peaks of the vowels are emphasized
F(n) Blend		Blends some dry signal with the filtered signal
	F(n) FM Source	Selects the Frequency Modulation source for the filter
F(n) FM Amount		Sets the amount of Frequency Modulation from the FM source
F(n) Volume		Output volume of the filter
F(n) Pan		Pan of the filter

13.5. The Filter Routing/Amp Mod section

Parameter	Non-VST parameter	Description
Filter Routing		A continuous blend from series to parallel for the filters. Filter 1 goes into Filter 2 in series.
Amp Mod Amount		Modulates the voice volume. At O, the voice is at max volume. When raised, the modulation source has effect
	Amp Mod Source	Select a source to modulate the Amplitude
Voice Pan		A pan control for each voice. Modulate it with a polyphonic source for interesting voice panning effects
Voice Send Level		The send level for the Send FX Bus. This is a polyphonic control, so you can have independent FX send for each voice.

13.6. The FX tab

Parameter	Non-VST parameter	Description
	Bus A & B Routing	
FX(n) Bypass		
	FX(n) Type	
FX(n) Dry/Wet		
FX(n) Reverb Predelay		
FX(n) Reverb Decay		
FX(n) Reverb Damping		
FX(n) Reverb LowPass Freq		
FX(n) Reverb HighPass Freq		
FX(n) Reverb Size		
FX(n) Reverb Output MS Mix (Stereo)		
FX(n) ParamEq LowShelf fc		
FX(n) ParamEq LowShelf Gain		
FX(n) ParamEq LowShelf Q		
FX(n) ParamEq Peak 1 fc		
FX(n) ParamEq Peak 1 Gain		
FX(n) ParamEq Peak 1 Q		
FX(n) ParamEq Peak 2 fc		
FX(n) ParamEq Peak 2 Gain		
FX(n) ParamEq Peak 2 Q		
FX(n) ParamEq Peak 3 fc		
FX(n) ParamEq Peak 3 Gain		
FX(n) ParamEq Peak 3 Q		
FX(n) ParamEq HighShelf fc		
FX(n) ParamEq HighShelf Gain		
FX(n) ParamEq HighShelf Q		
FX(n) ParamEq Scale		
FX(n) Wavefolder Drive		
FX(n) Wavefolder Output Gain		

Parameter	Non-VST parameter	Description
	FX(n) Wavefolder Overload	
	FX(n) Wavefolder Type	
FX(n) Distortion Drive		
FX(n) Distortion Output Gain		
FX(n) Overdrive Drive		
FX(n) Overdrive Tone		
FX(n) Overdrive Level		
FX(n) Chorus Fix Delay		
FX(n) Chorus Depth		
FX(n) Chorus1 Frequency		
FX(n) Chorus Feedback		
FX(n) Chorus Stereo Mode		
	FX(n) Chorus Voices	
FX(n) Chorus LFO Shape		
FX(n) Phaser Frequency		
FX(n) Phaser N Poles		
FX(n) Phaser Feedback		
	FX(n) Phaser LFO Wave	
FX(n) Phaser LFO Amount		
FX(n) Phaser Rate Unsynced		
FX(n) Phaser Rate Synced		
	FX(n) Phaser Sync Rate Type	
FX(n) Phaser Stereo		
FX(n) Delay Time		
FX(n) Delay Synced		
	FX(n) Delay Rate Type	
FX(n) Delay Feedback		
FX(n) Delay HighPass fc		
FX(n) Delay LowPass fc		
FX(n) Delay Stereo Spread		
FX(n) Delay Stereo Mode		
FX(n) Multi Filter Mode		
FX(n) Filter Frequency		
FX(n) Filter Q		
FX(n) Filter Slope		

Parameter	Non-VST parameter	Description
FX(n) StereoPan Amount		
FX(n) StereoPan Rate Unsynced		
FX(n) StereoPan Rate Synced		
	FX(n) StereoPan Sync Rate Type	
FX(n) Flanger MinDelay		
FX(n) Flanger Depth		
FX(n) Flanger Rate		
FX(n) Flanger Sync Rate		
	FX(n) Flanger Sync Rate Type	
FX(n) Flanger Feedback		
FX(n) Flanger Feedback Polarity		
FX(n) Flanger Stereo		
FX(n) Flanger LowPass fc		
FX(n) Flanger HighPass fc		
FX(n) Flanger LFO Waveform		
FX(n) BitCrusher Bit Depth		
FX(n) BitCrusher Downsample		
FX(n) Compressor Threshold		
FX(n) Compressor Ratio		
FX(n) Compressor Attack		
FX(n) Compressor Release		
FX(n) Compressor Auto Make up		
FX(n) Compressor OutputGain		
	FX(n) Compressor OutGainReduction	
Bus A Volume		
Bus B Volume		
Bus Send Volume		

13.7. Arpeggiator/Sequencer parameters

Parameter	Non-VST parameter	Description
ArpSeq Swing		
	ArpSeq Rate Sync Type	
ArpSeq Unsync Rate		
ArpSeq Sync Rate		
ArpSeq Hold		
ArpSeq PolyRhythm		
	ArpSeq Realign	

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