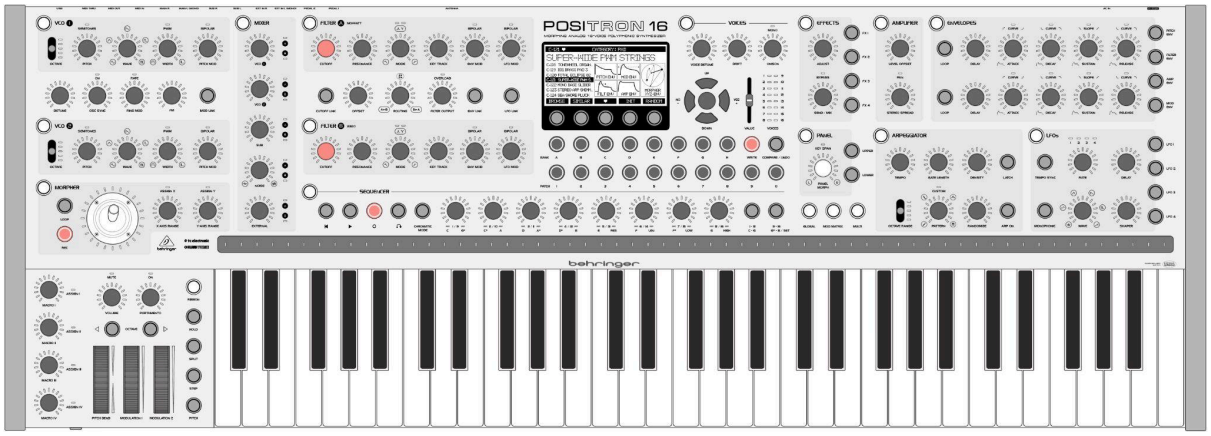
User Manual



Positron 16

Analog 16-Voice Polyphonic Morphing Synthesizer with 2 VCOs, Sub Oscillator, Noise,
2 Multi-Mode Filters, 4 DADSR Envelopes and 4 LFOs per Voice,
Morpher Joystick, Ribbon Controller, 61-Key Polyphonic Aftertouch Keyboard,
16-Step Sequencer, Arpeggiator, 16-Channel Modulation Matrix and 4 Effect Engines

Designed with

HEINA KROON

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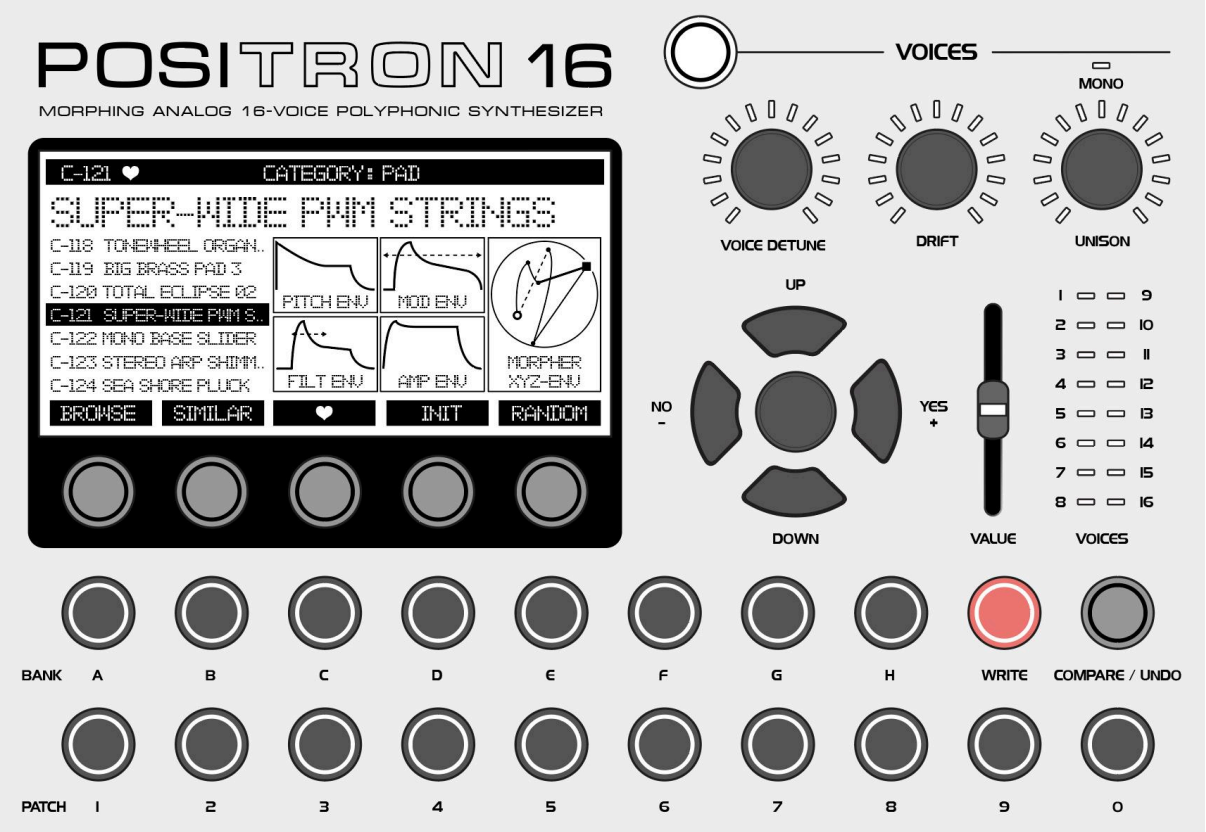
Getting Started

Thank you for choosing the Positron 16! This synthesizer is a state-of-the-art performance and sound design instrument that will inspire you to make great music for years to come.

The Positron 16 has been designed to be both easy to use, as well as incredibly powerful and flexible. The most commonly used features all have dedicated controls on the frontpanel, while additional functions are available on each section's Setting screen. By pressing the white button for a section, the display will show the settings screen for that section. This means any additional features are just a button away.

The big display is placed in the center of the frontpanel for easy viewing.



To the right is a set of buttons for Yes +, No -, Up and Down, as well as the rotary Data encoder for changing values. The Data encoder can also be pressed to confirm an action. Next to that is a Value slider that allows you to quickly change values instead of stepping through them with the +/- buttons or the Data encoder.

Below the screen are 5 Soft buttons that change functionality depending on the page view.

This system makes navigating the features and settings of the Positron 16 both quick and intuitive, even though it is a very complex instrument.

Key Features

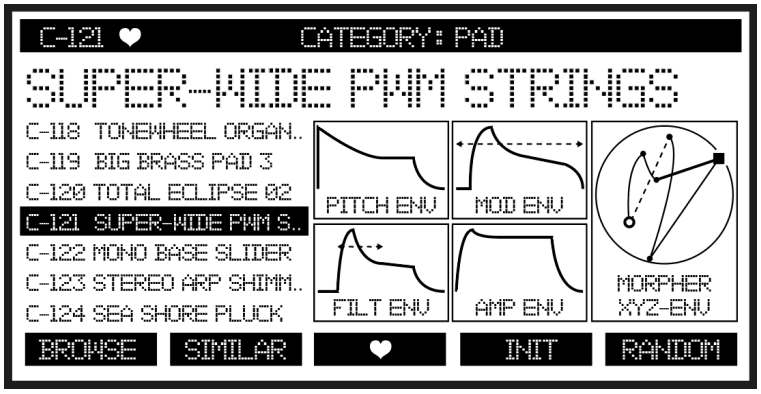
The key features of the Positron 16 polyphonic morphing analog performance synthesizer are listed below.

- 16-voice multi-timbral analog performance synthesizer
- Two analog 3340 oscillators per voice
- Two analog multi-mode filters per voice: a Moffatt solid-state 2-pole filter and a 3320 switchable 2-pole/4-pole filter
- Sub oscillator with 3 waveforms
- Noise generator with white and pink noise
- Stereo amp for true stereo patches
- Four 5-stage DADSR envelopes
- Four 6-waveform LFOs
- Unison mode
- Keyboard split and doubling
- Morpher joystick with dedicated XYZ-envelope
- Panel morphing of all continuous parameters
- Full-width Ribbon controller
- Versatile arpeggiator
- 16-slot modulation matrix
- 1024 patch memories
- 16-step analog-style sequencer with dedicated controls
- 5-octave semi-weighted keyboard with polyphonic aftertouch
- Two switch/continuous footpedal inputs (pedals not included)
- CV antenna input for Theremin-like playing (antenna not included)
- Four balanced audio outputs
- Stereo input for external audio
- MIDI control over DIN and USB
- CV/Gate/Clock sockets

Loading and Saving Patches

The Positron 16 has been designed to be a performance instrument, so loading and saving patches is quick and easy.

The default view on the big display shows the current patch with the name in big letters for easy viewing. The Patch Number and Category are shown in the header bar above the name.



Below the current patch name is a list of the adjacent patches, making them easy to see and select using the Up / Down buttons or the rotary Data encoder. Load the selected patch by pressing the Yes + button to the right of the encoder, or by pressing down the encoder itself.

You can continue to scroll through all the patches in the bank by using the Data encoder or the Value slider, or you can press the Browse Soft button under the display to go to the Patch Library.

To quickly access any stored patch, use the black Bank buttons to select Bank A to H. Then use the black Patch buttons below to choose the Patch number 001 to 128 to load that patch. For single and double digit patch numbers, you can just enter the required number(s) - like ‘3’ or ‘29’ - and then press the Yes + button next to the Data encoder.

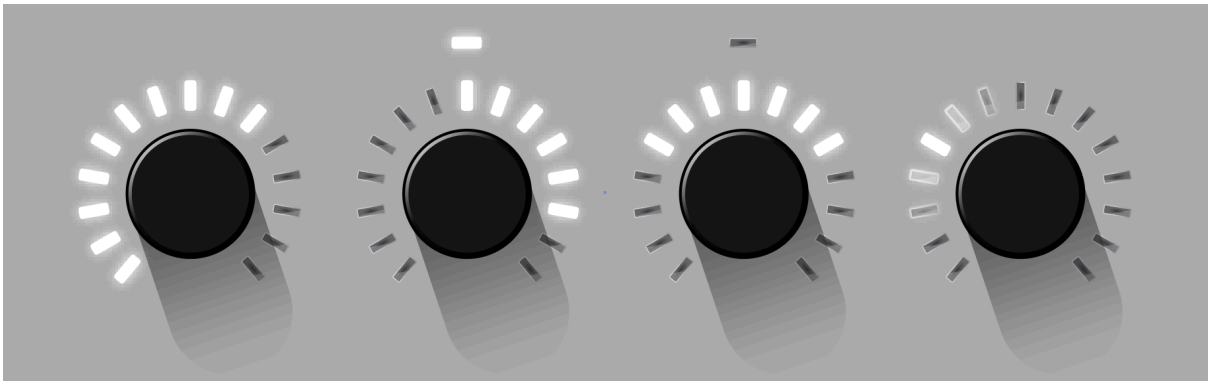
Saving a patch is just as easy: press the red Write button to enter the Save Patch screen, where you can give it a new name, change its Bank and/or Patch number, add it to a Category and/or the ❤ Favorite list.

To start making new sounds from an initialized patch, press the Init Soft button. You can also get randomized patches by pressing the Random Soft button to enter the Randomize screen.

Types of Frontpanel Controls

We have made sure that the controls used for the Positron 16 are both intuitive and easy to use.

LED Encoders



The main type of control on the frontpanel is the endless LED encoder. It works similar to a regular potentiometer knob, but instead of using a painted marker showing its position, it's using the ring of LEDs around the control to highlight the selected value.

This makes sure that all the rotary controls show the current values when a patch is loaded, and you don't have to worry about using a 'Catch' or 'Jump' function to get the control to show what you're actually listening to, like for old potentiometer knobs.

Additionally, since the values are shown by lighting up the ring of LEDs, the same encoder can easily control and show different types of values, like simple levels, directional left or right levels, range spans from a center point or even gradual morphing values.

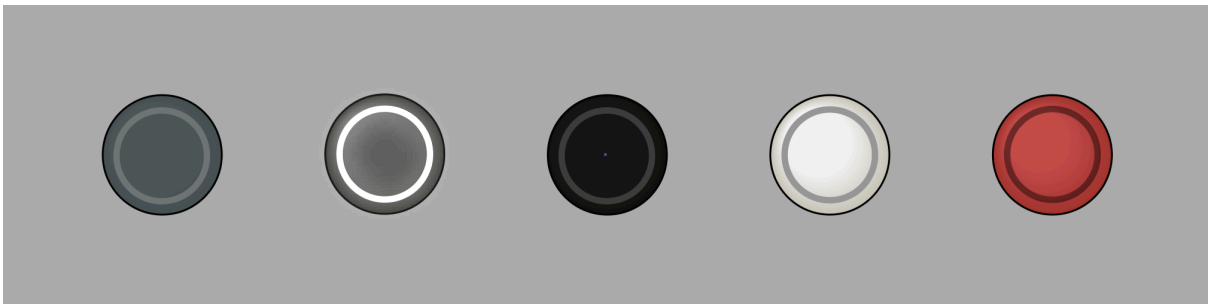
The LED encoders also have a push-to-click function, so they can work as buttons. For the Positron 16, this is often used to switch modes for the LED encoder, or to activate a related feature. The status of the click is shown with an additional LED, typically above the control.

These LED encoders have been put to good use on the Positron 16, making sure that as soon as you load a new patch, the frontpanel shows you exactly what the values are for all the controls.

In addition to the regular black LED encoders, there are also a few in different colors, as outlined below:

- Red encoders are used for the filter cutoff controls, to make sure you'll always find the most impactful sound parameters quickly.
- A white encoder is used for the Panel morph feature, to make this powerful function stand out. The same white color is also used for the Morpher joystick.

LED Buttons

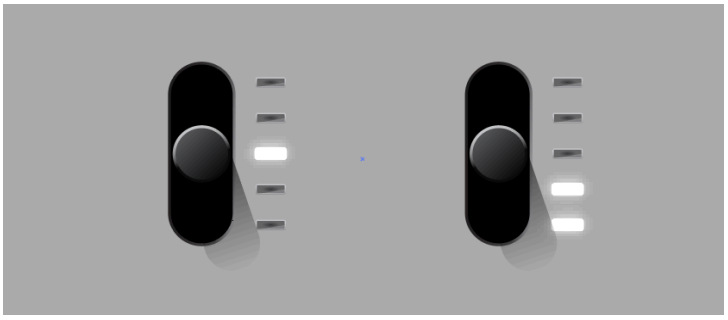


The second most common control on the frontpanel is the LED button. It's a regular round push button with a LED ring to highlight its status: if the LED is lit, the function the button controls is switched on.

The buttons come in a few different colors, with dark gray being the default one. Here's a quick rundown of the rest:

- Black buttons are used for patch selection, allowing you to select the bank and preset you want quickly.
- White buttons represent section settings, which means you're always just a button away from any setting screen.
- Red buttons are used for functions that will alter the data you've saved, like writing a patch to memory or starting a recording.

LED Flip Switches



The LED Flip switch is another type of control that is designed specifically for quickly changing stepped values.

It's used as the Octave selector for the VCOs and for selecting the span of octaves for the Arpeggiator.

Instead of having the mechanical position of the switch indicate its value, the LED Flip switch uses a column of LEDs next to the Flip switch. By flipping the momentary switch upwards or downwards, the LED indicators change to show the new value, while the Flip switch immediately returns to its middle position.

This is very convenient, since it allows you to quickly switch to a new value without even looking at the control. Just flip the switch upwards twice and you know that the value is now 2 steps higher than before.

LED Joystick

The Morpher Joystick (see Page 40 for more details) is one of the controls that stands out the most on the Positron 16 frontpanel.

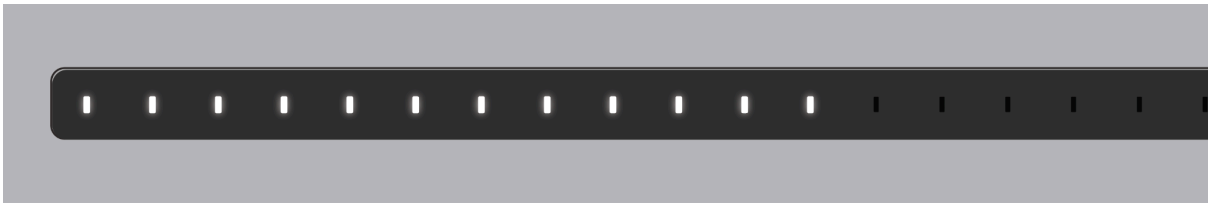
The LED Joystick used in the Morpher section functions very much like a regular joystick and controls values in two dimensions, X and Y.

What sets it apart is the ring of LEDs that surrounds the control. These LEDs highlight the current value of the Morpher function, regardless of the current position of the joystick itself.

This means that when the Morpher envelope is running through its values to modulate your sound, the ring of LEDs highlight what is happening in real time.

Being a physical control, the joystick won't follow the current value as shown by the LEDs, so as soon as you move the joystick the value jumps to its new physical position.

LED Ribbon Controller



If you detect a trend in the types of frontpanel controls, then you're right: LEDs. Case in point: the LED Ribbon controller.

This intuitive control sits above the keyboard and is adorned with LEDs - one for each semitone (61 in total, matching the 5-octave keybed). The LEDs light up when you touch the Ribbon controller to show the current position. It can be set to either continuous or stepped.

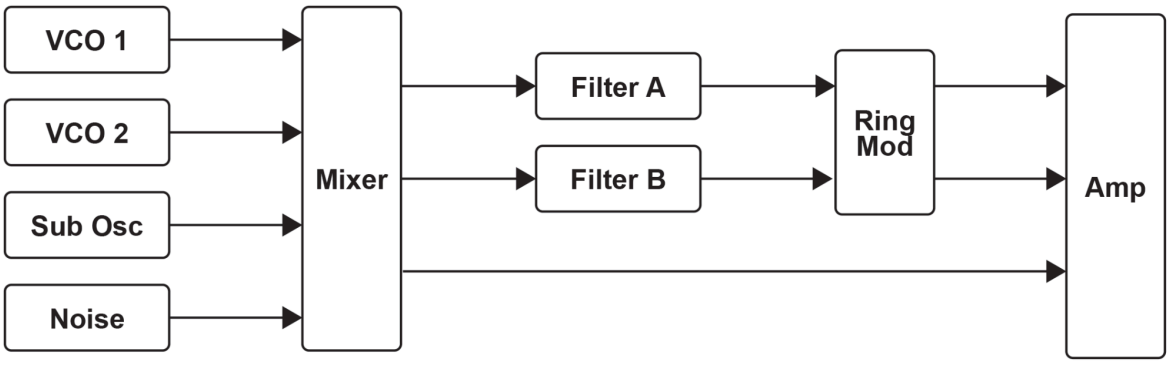
It also has a split function so it can work as two independent controllers at the same time.

Read more about the Ribbon controller on Page 53.

Programming your own sounds

Now that you have a grasp of the controls, it's time to start making your own patches and sounds.

Thanks to the logical layout of the frontpanel, it's easy to get started. In true analog synth tradition, the controls are grouped into sections that represent the components that make up the signal flow of a subtractive synthesizer.



It all starts with the oscillator, where the waveforms are generated that make up the sound. There are two identical oscillators (see Page 10), each capable of generating a range of different waveforms. They also have controls for additional features, like a ring modulator, for adding extra harmonics to your sound.

Next, the oscillators are routed to the Mixer (see Page 18), where they are mixed together with a sub oscillator and a noise source.

The sound is then passed through the twin analog filters (see Page 21) that shape your sounds in a range of interesting and creative ways.

After that, the sound comes to the amplifier (see Page 28), where you set the overall loudness.

Finally, you have the effects section (see Page 31), where a huge range of high-quality digital effects are available for that final touch.

There are more to explore, like the unison features in the Voices section (see Page 45), the Panel morphing (see Page 43) and the powerful Morpher joystick (see Page 40), but more on that later.

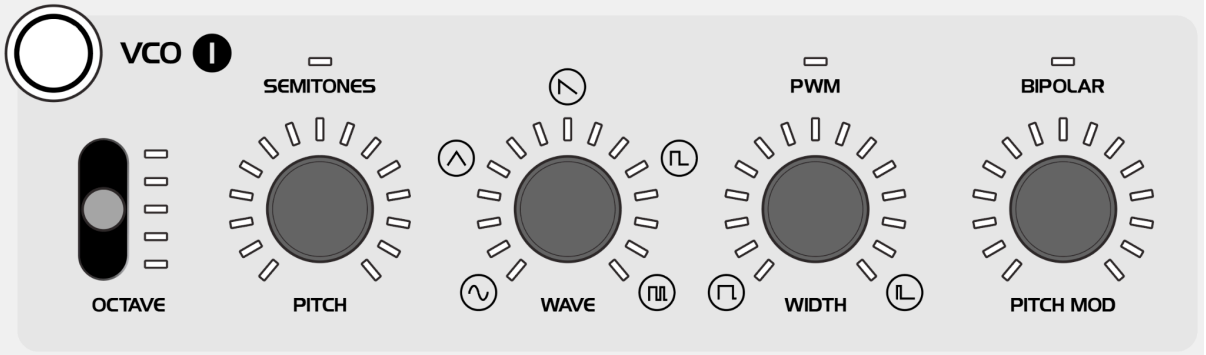
The important part is to explore and have fun. You can't break the synth by programming it, so try things out and see what works and what you like! Just remember to save the sounds you come up with for later use.

Let's go through each section in more detail.

Oscillators

The Positron 16 features two fully analog Voltage Controlled Oscillators (VCOs) per voice. They are based on the classic 3340 chip that has been used in many vintage instruments like the Prophet 5, the Oberheim OB-Xa, the Roland Jupiter 6 and the MemoryMoog.

In addition to the two VCOs, there's a Sub oscillator available in the Mixer (see Page 18).



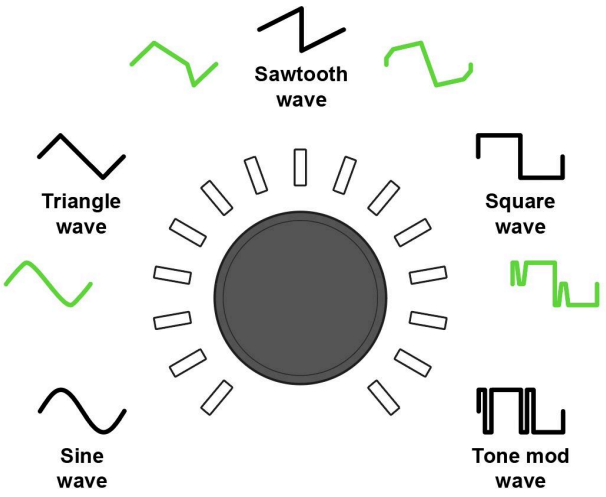
Both VCO 1 and 2 have identical controls.

Each VCO has an Octave switch for transposing the sound 1 or 2 octaves up or down. Use this control to set the range for your sound, be it a rumbling bass or a searing lead.

The Pitch control encoder sets the pitch of the VCO within a ±12 semitone range. By clicking the encoder, the pitch controller changes from continuous to semitone stepped, as indicated by the LED above the Pitch control. This gives you the ability to either step through the semitones for setting up 5ths or 7ths, or sweep continuously over two octaves like on an old vintage synth.

At the far right is the Pitch Mod encoder, which sets the range of the Pitch modulation source set on the VCO Page 1 settings screen. This can be used for vibrato effects when an LFO is the modulation source.

Oscillator Waveforms



The Wave encoder is one of the most important controllers in the VCO section. It crossfades between the 5 available waveforms: sine, triangle, sawtooth, square and tone mod waves.

It's valuable to spend a moment familiarizing yourself with each waveform's character so that you can choose the ones that are right for your patch. The **sine** wave has a pure sound without any overtone harmonics, while the **triangle** wave has the same deep sound but with a bit more harmonics. The **sawtooth** wave

has a rich buzzy character with a lot of overtone content and the **square** wave combines that buzz with a deep fundamental tone. The **tone mod** wave is essentially a folded square wave, and has a more metallic character.

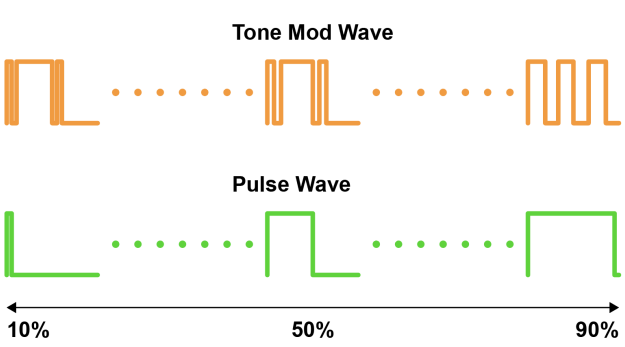
Each waveform is more suitable for certain types of sounds, like sawtooth waves for brass and string sounds, and triangle and square for deep bases. And with the smooth transition between each waveform, an almost endless number of sounds can be produced just with a single oscillator.

The Wave controller can also be set to switch between the waveforms in discrete steps instead of fading, by changing its settings on the VCO Settings Page 2 screen. This is useful when it's important to get a pure version of a waveform (like for FM sounds, see Page 14), with nothing else blended in.

Pulse Width Modulation

The Width control works in tandem with the square and tone mod waves. With the control fully left the wave cycle is at 10%, and with it fully right it is at 90%. The tonal character for pulse width modulation on the square wave is a thin nasal sound at the extremes. For the tone mod wave, there are more complex overtone harmonics at play, but it retains its strong fundamental so you won't lose the deep bass component of the wave form.

The PW Cycle Range can be configured on the corresponding VCO Settings Page 2.



Pressing down on the Width controller enables Pulse Width Modulation (PWM) as indicated by the LED above the control. In this mode, the Width control sets the range of the PWM, which is modulated by the modulation source set on the Page 2 settings screen. By setting this to an LFO, you can achieve a rich chorus-like sound from a single VCO.

VCO Settings

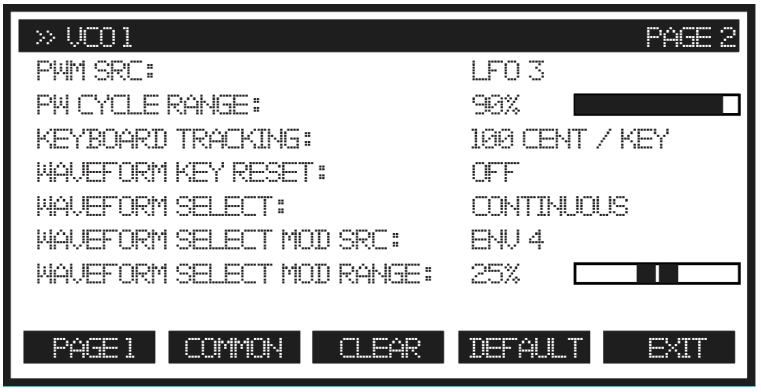
Press the white VCO button to open the respective VCO's Settings page on the display.

On this page you can set the VCOs Pitch Mod source, as well as how much the monophonic Channel Aftertouch, Modulation Wheel 1 and 2 are affecting the Pitch Mod.

The Polyphonic Aftertouch can be set to directly affect the pitch of each voice, from 0 to ±24 semitones, which gives you very expressive control over each key's pitch bend.

There are also a couple of settings for the Pitch Envelope (see Page 35). You can set the range in semitones, from 0 to 24, as well as the Pitch Envelope modulation mode. Use the Bipolar mode to have the Pitch Envelope modulate the pitch both up and down from the default pitch of the VCO. The Unipolar mode restricts the modulation to either up or down.

By pressing the Page 2 Soft button below the display (or the white VCO button twice), you get to the second VCO Settings page.



Here you can specify the modulation source for the PWM, for example one of the LFOs for generating rich lush sounds.

You can also change the range of the PW Wave Cycle, from its default 90% to a full 100%, which would produce silence at PW values of 0 and 100. This can be useful to introduce rhythmic effects using the PWM control.

Next, we can set the level of keyboard tracking. By default, it is 100 cents (1 semitone) per key, but you can use other values for non-tonal sounds, or microtuning effects. Also, a slightly increased or decreased keyboard tracking value can help emulate the less-than-perfect tracking of old classic oscillators, for a more vintage feel.

The Waveform key reset feature lets you determine if you want the oscillator waveforms to always restart at key press. The default value of Off is how most analog oscillators work, but sometimes you want to control the phase of the oscillator waveform in order to produce the same attack for the sound at each key press. This can be particularly useful for bass sounds.

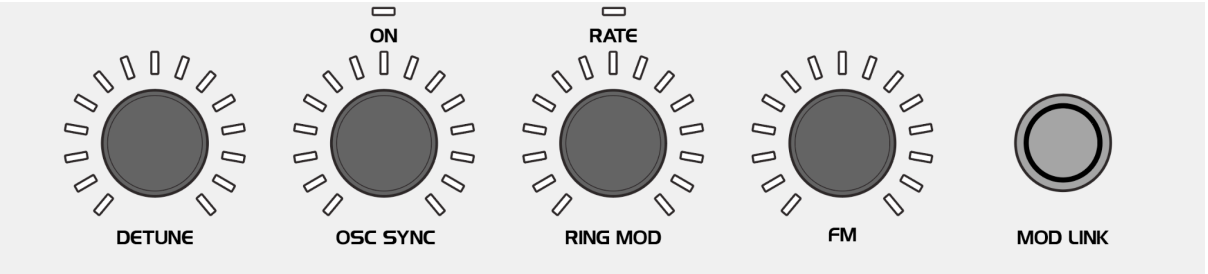
The Waveform Select mode can be switched to Continuous (default), having the Wave control encoder fade between the waveform, or to Stepped, where the waveforms never blend together. The Stepped mode can be useful if you want to make sure you've got a pure version of a waveform, which might be handy for FM sounds.

Finally, we have a Waveform Select Mod Source, that allows you to modulate the waveform selection using an envelope, LFO or any other modulation source. The amount of this modulation is set using the Waveform Select Mod Range value.

VCO 1 and 2 have identical VCO Settings pages, accessible via their white VCO buttons.

Common VCO Controls

Between the controls for VCO 1 and VCO 2 is a separate row of Common VCO controls that affect both VCOs simultaneously, or link certain features.



First, we have the Detune control. This encoder offsets the two VCOs pitches to produce anything from gentle waveform beating to rich chorus-like effects, or - if set to extreme - some atonal, out-of-tune sounds.

The Osc Sync control enables you to synchronize the waveform cycle of VCO 2 (follower) to the cycle of VCO 1 (leader). By pressing down on the Osc Sync encoder you enable Oscillator sync, as indicated by the LED above the control. By turning the Osc Sync encoder to the left or right, you can control the polarity of the VCO 1 waveform, for distinctly different sync sounds.

If you modulate the pitch of VCO 2, the classic tearing sync sound can be achieved, but you can also create more subtle timbral changes for rich evolving sounds. Try modulating the Osc Sync polarity with a slow LFO or envelope for interesting changes in the character of your sound.

The Ring Mod control sets the output level from the Ring modulator. The sound of the Ring mod is generated by taking the combined output from the two Filter channels (see Page 21) and multiplying it with the audio output of the allocated LFO, as set on the Common VCO Settings page (see Page 15). By pressing down the encoder, you can switch to control the rate of that LFO. The rate is further controlled by the allocated Envelope, also set at the Common VCO Settings page.

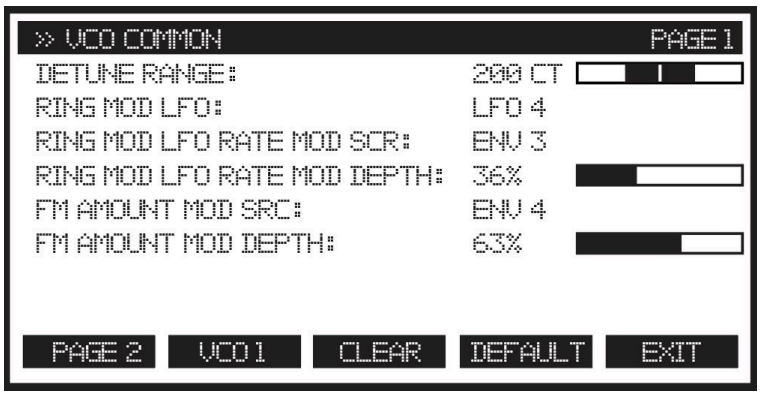
This is a very flexible and musical setup, as it allows you to use the mixed and filtered sound as the input, giving you a lot of options. For example, you could introduce noise in the mixer (see Page 18), which - at lower rates of the LFO and the attack and decay from the allocated envelope - will create organic breathing-sounding effects in the style of the Yamaha CS-80. You can also introduce an external audio signal in the mixer to essentially turn the Positron 16 into the world's biggest Ring modulator effect pedal. Additionally, changing the waveshape for the allocated LFO will greatly affect the sound coming from the Ring modulator, giving you even more options.

The FM control sets the level of Frequency modulation of VCO 2 (carrier) by VCO 1 (modulator). Use FM for producing rich metallic sounds, like bells or dissonant effects. The amount of FM is also controlled by the FM Amount Modulator (see Common VCO Settings below).

The Mod Link button links the Pitch Mod controls between VCO 1 and VCO 2. As soon as you turn the Pitch Mod control for one VCO, the other VCO's control turns as well. This is great for setting things like vibrato equally for both VCOs.

Common VCO Settings

Press either of the white VCO buttons and then the Common Soft button (or just press either of the white VCO buttons three times) to enter the Common VCO Settings page on the display.



Here you can set the range for the Detune control, adjustable from 50 to 500 cents. This means that at a maximum value, you can detune the two VCOs into a perfect fifth (albeit at half a semitone off).

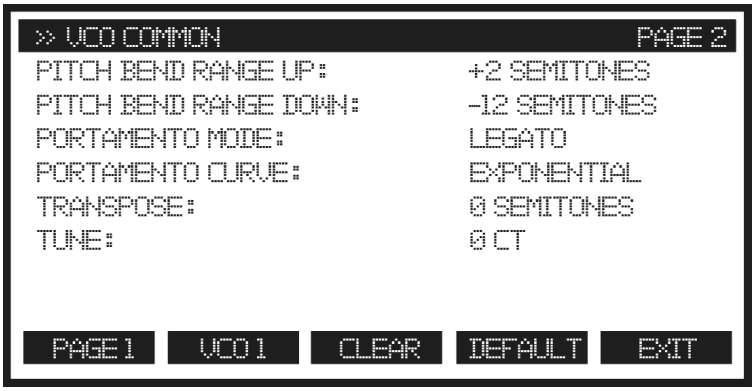
For the Ring Modulator, you can allocate an LFO to use as the Ring Mod LFO. The output of this LFO is converted to an analog audio signal before entering the Ring modulator circuit. You can also specify the Ring Mod Rate Modulation source, which will affect the rate of the Ring mod LFO, as well as the depth of that mod source. This allows you to create very musical Ring Mod effects using any available modulation source, like envelopes, LFOs, Modulation Wheels, Ribbon Controller and more.

Please note that the output of the Ring mod is in mono-only, and blended with the output sent to the Stereo Amp. Setting the Ring mod at full level will generate a mono signal source for the Stereo Amp section.

The FM Amount control also has its own dedicated Modulation source. This is especially useful for creating clangy or dissonant attacks that fade out into more harmonious tones by using one of the envelopes as the Modulation source, for example. There is also an FM Amount Mod Depth value, to specify how strongly this modulation should affect the FM level.

Additional Common VCO Settings

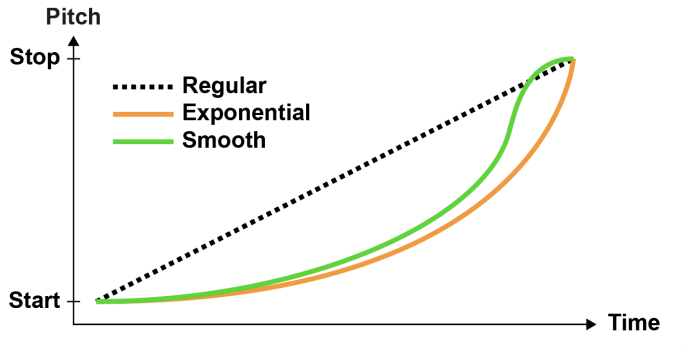
Press the Page 2 Soft button to go to the second VCO Common Settings page.



Here, you can set the range of the Pitch Bend Wheel. It can have different ranges of up to 24 semitones in either direction, allowing you to have expressive whole tone bends upwards and deep octave bends downwards, for example.

This page is also where you configure your Portamento settings. First, you have the Portamento Mode, where you can switch between Normal - where the effect is always on when enabled by the Portamento control (see Page 55), and Legato - where the effect is only heard for overlapping notes, when the Portamento is switched on.

You can also define the curve used for the Portamento glide between notes, where Linear glides the notes at a fixed rate, as set by the Portamento encoder, and Exponential increases the rate towards the end of the glide, see graph below.

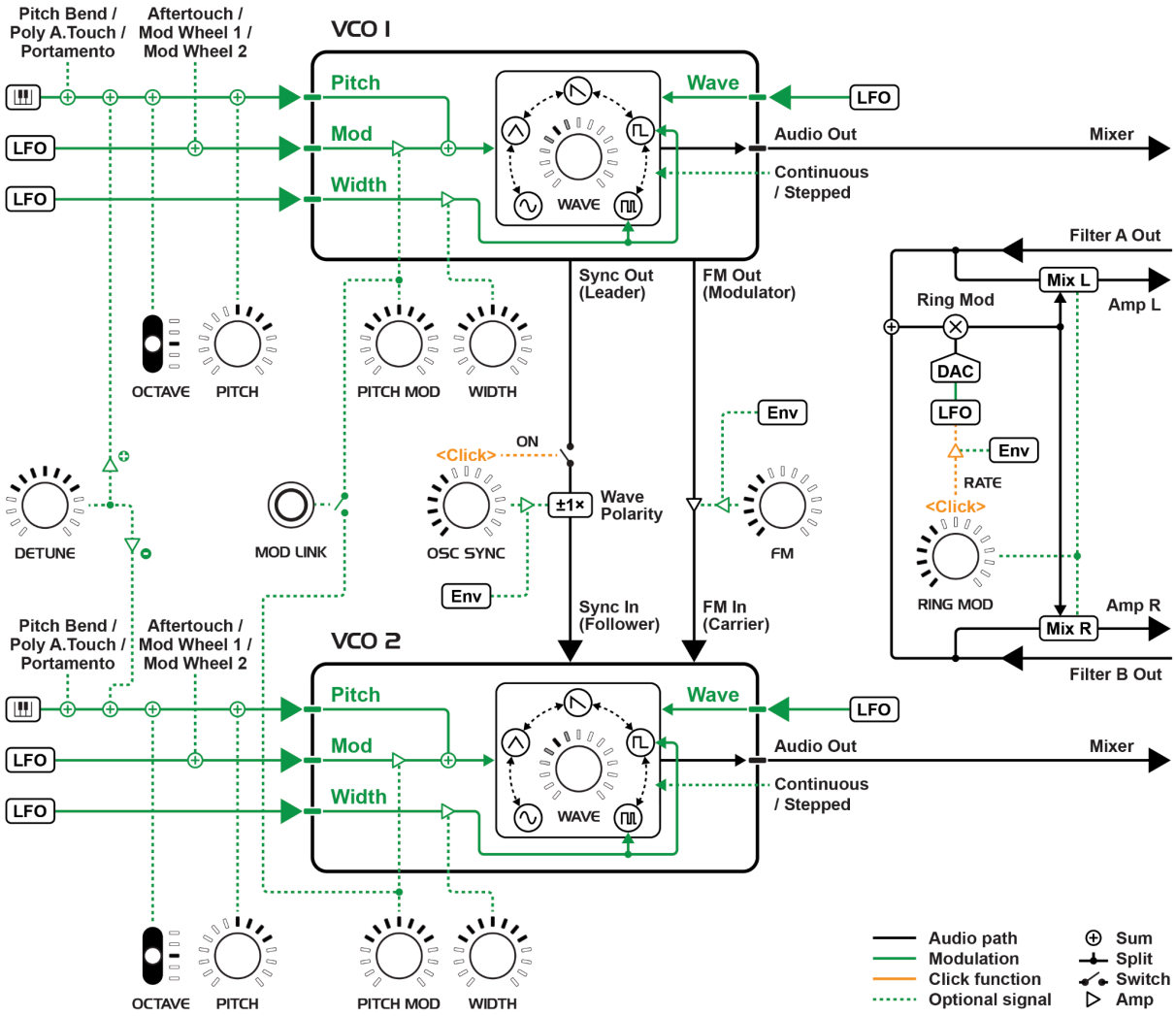


There's also a Smooth curve option, where the rate starts slow, gradually increases, but slows down again before reaching the final pitch. This curve can be very musical for solo playing and polyphonic Portamento alike.

Finally, you can set the overall transposition of your patch, in semitones, and fine tune it in cents.

VCO Architecture Overview

Below is a diagram showing the pathways of the two VCOs as well as the Common VCO controls.

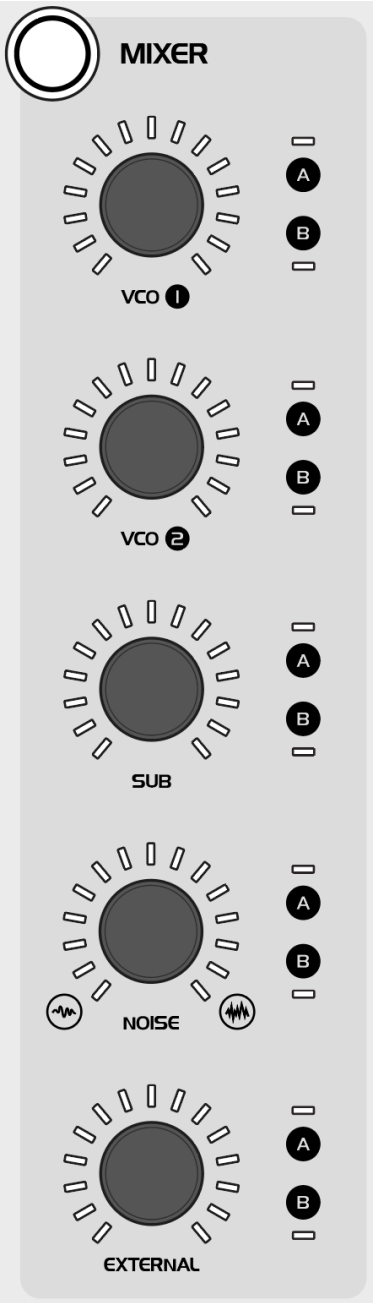


Note: The modulation sources LFO and Env refer to whatever modulation source has been selected in the Settings pages.

Note: Even though the controls for the Ring modulator are located in the Common VCO section, the circuit is actually placed after the Filter channel outputs.

Mixer

The Mixer is used to mix the different sound sources before sending them on to the twin filters. The Mixer consists of 5 separate channels, each routable to either Filter A, Filter B, both or none (bypassing the filters all together).



The controls for VCO 1 and VCO 2 are identical. Turning the encoder clockwise increases the VCO level, and pressing down on the encoder switches the routing between Filter A, Filter B, Filter A & B and none. The current routing is highlighted by the LEDs next to the labels for Filter A and Filter B.

The Sub control sets the level for the Sub oscillator. The Sub oscillator follows the pitch of VCO 1, and can be set to 1 or 2 octaves below VCO 1's pitch. By pressing the white Mixer button you enter the Mixer Settings on the display (see Page 19), where you can set the octave of the sub oscillator as well as its waveform.

Pressing down on the encoder switches the routing of the Sub oscillator between Filter A, Filter B, Filter A & B and none, as indicated by the LEDs next to the Filter labels.

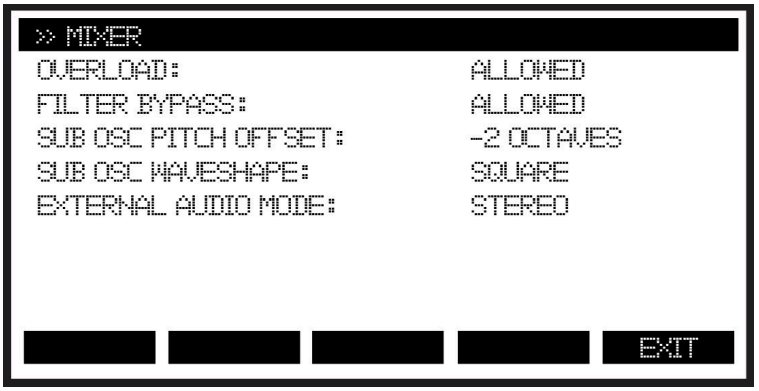
The Noise control sets the level of either white or pink noise. Turn it clockwise beyond 12 o'clock to increase the level of white noise, for a high-frequency sizzling sound. If you instead turn it below 12 o'clock you'll add pink noise, which has more low frequency content. Again, pressing down on the encoder switches the routing of the noise to Filter A, Filter B, Filter A & B or none.

The final control is the External encoder, which sets the level of any external sound that has been plugged into the Ext Input sockets on the rear panel (see Page 63). The external sound source can be in mono or stereo.

Note: Stereo sounds are automatically routed with the left channel to Filter A and the right to Filter B. If you want to route the External audio manually, you need to set the Ext audio to Mono in the Mixer Settings - or make sure to only use a mono cable plugged into Ext Input L (Mono). Then, pressing down on the encoder switches the routing between Filter A, Filter B, Filter A & B and none.

Mixer Settings

Pressing the white Mixer button opens the Mixer Settings on the display.



On this page you can enable signal overload in the mixer, which allows for a more saturated sound at high levels. Disabling this feature will make sure the signals in the mixer never overload, resulting in a cleaner sound.

You can also enable or disable Filter bypass. When disabled, the routing for mixer sources will only switch between Filter A, Filter B and Filter A & B. If you want to be able to route certain sources past the filters, keep this enabled. This can be very useful for when you're using the filters in bandpass or highpass mode, as it will allow you to keep bass frequencies from the Sub oscillator intact even when sweeping the filters.

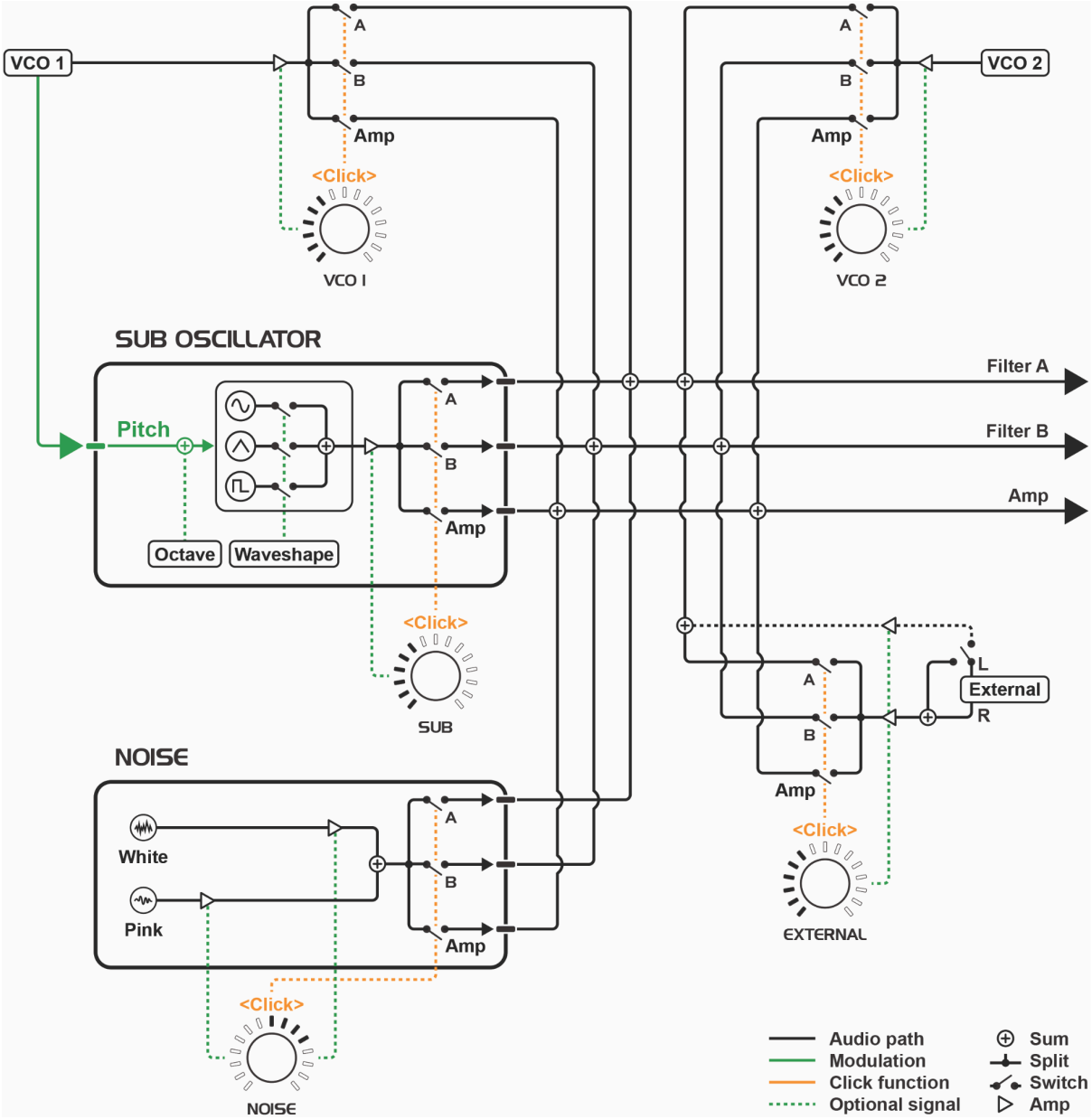
The Sub oscillator settings allows you to specify the Pitch offset to either -1 or -2 octaves below the pitch of VCO 1. You can also select the Sub oscillator waveform, which will give different tonal characteristics, from soft (sine) to deep (triangle) or powerful (square).

Finally, you can choose if the External audio source should be kept in stereo (if the external sound is indeed a stereo signal) or summed to mono.

Note: When using an External audio source in stereo, the left channel will be routed to Filter A and the right channel to Filter B. To allow the external audio to be manually routed, make sure it is in Mono.

Mixer Architecture Overview

Below is a diagram showing the Mixer signal paths.



Note: When the External audio setting is set to Stereo, the left channel will be routed to Filter A and the right channel to Filter B, as indicated by the two lit Filter channel LEDs. You can only route the External audio manually when it is set to Mono.

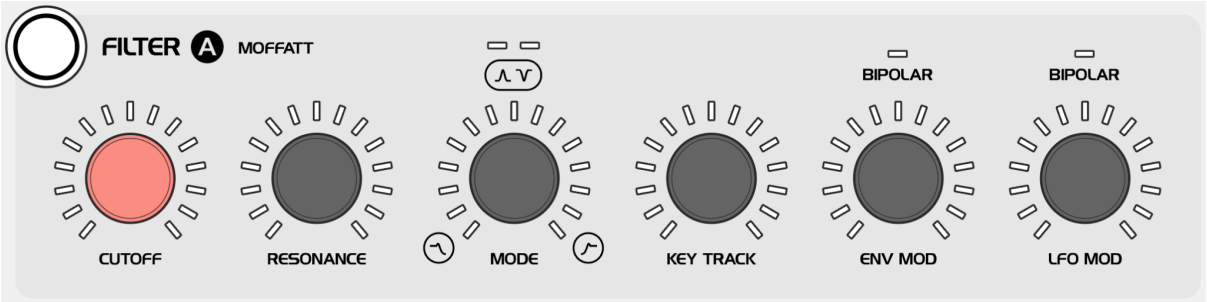
Multi-Mode Filters

The Positron 16 comes with two Filter channels, each featuring a multi-mode analog filter, that can be run both in parallel and in series. This setup is incredibly powerful, and allows for a lot of creative experimentation. You could easily lose track of time designing complex and powerful filter configurations.

Don't worry though: the filter section is also very easy to use. Just stick to the main controls for each filter, like cutoff, resonance and envelope modulation, and you won't feel intimidated by all the options.

Filter A Moffatt

The first filter, Filter A, is a Moffatt solid state filter, famous for its characteristic bite despite being 'just' a 2-pole filter design. It's known from the Behringer Neutron semi-modular Eurorack synth.



The red Cutoff control sets the cutoff frequency for the filter. Turn the control clockwise to increase the frequency from 20Hz to around 16kHz. The filter Cutoff controls have been made red to make them extra visible, which allows you to always find and tweak one of the most important characteristics of your sound.

The Resonance control sets the level of resonance at the cutoff frequency, creating a more distinct sound. By turning the control fully clockwise, the filter will enter self-oscillation and produce a constant sine wave at the cutoff frequency - even without any audio input.

The Mode control fades between 3 of the modes: from lowpass to highpass, via a bandpass or notch mode. Press down the Mode encoder to switch between the two options; the two LEDs above the control show which mode that is active.

See Page 23 for illustrations on the different filter modes.

Next, the Key Track control determines the amount of key follow for the cutoff frequency. At fully counterclockwise, there is no Key tracking, and at fully clockwise there is 100% Key tracking - allowing the filter to perfectly follow the pitch of the oscillators.

Lowpass

Bandpass

Notch

Hipass

The Env Mod control sets the level of modulation of the cutoff frequency by the dedicated Filter Envelope (see Page 35). At fully clockwise the Filter Envelope is fully affecting the cutoff. By pressing down the Env Mod encoder, it switches to a bipolar control, as indicated by the LED above the encoder. Now, turning the control below 12 o'clock will introduce negative modulation by the Filter Envelope, while turning it above 12 o'clock will give positive modulation.

Lastly, the LFO Mod control works in the same way as the Env Mod controller, but for LFO modulation of the cutoff frequency. You can select which LFO is used as a modulation source by pressing the white Filter button to enter the Filter settings screen on the display.

Filter B 3320

The second filter, Filter B, consists of a CoolAudio V3320 filter chip. It is based on the well-known CEM3320 chip from the early 1980s that was used in a huge range of classic vintage synthesizers like the Oberheim OB-Xa, the Sequential Pro-One and the Elka Synthex. Its rich and warm tone perfectly complements the more modern-sounding Moffatt circuit in Filter A.

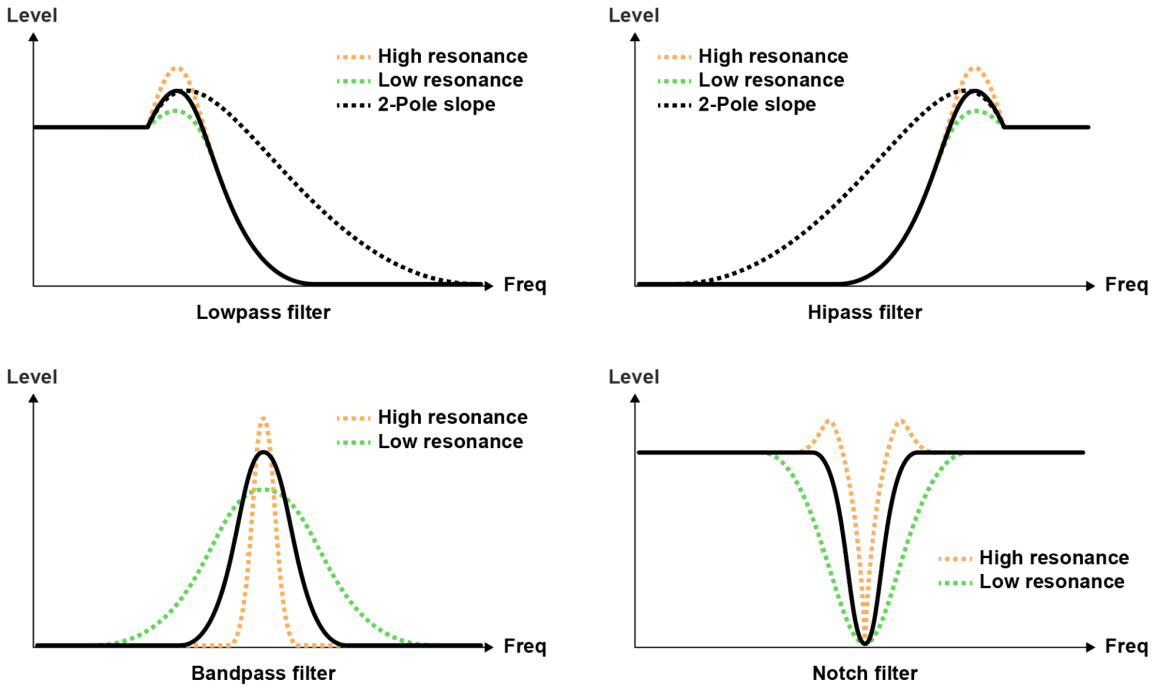
The controls for Filter A and B are identical, so Filter B has the same 6 encoders for controlling its cutoff frequency, resonance, filter mode, key tracking, envelope and LFO modulation.

For Filter B, pressing the white Filter Edit button to enter Filter B Settings on the display allows you to switch the 3320 filter between the default 2-pole slope and the more dramatic 4-pole slope for the low- and highpass modes, by setting the Filter Mode Switch value to 'Stepped 4-pole'.

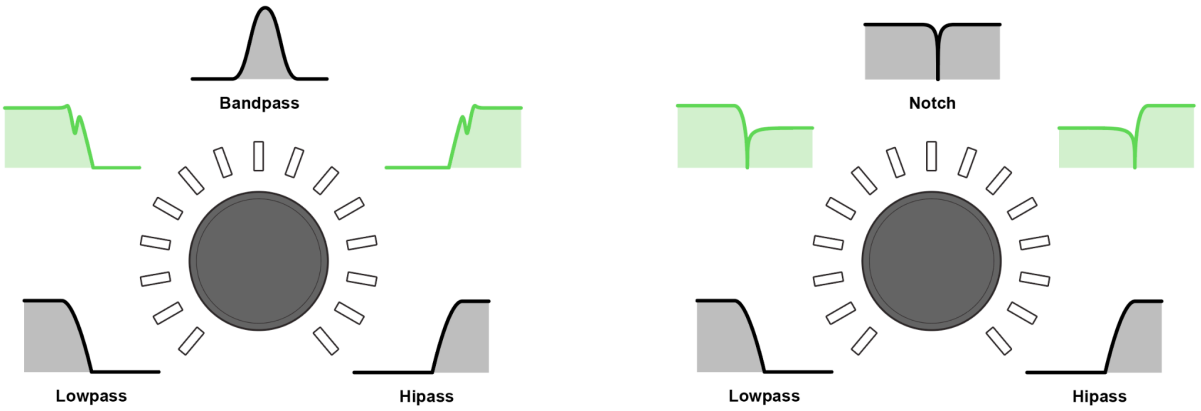
Please note that if you use the 4-pole slopes, the 3320 filter can no longer fade between lowpass, bandpass/notch and highpass modes. Instead, it will switch between the different modes without any crossfading. This is because the 4-pole modes use up all 4 filter stages in the chip, so it's not possible to use 2 lowpass and 2 highpass stages simultaneously and then fade between their respective output signals.

Filter Frequency Responses

The filter modes on the Positron 16 allow for complex filter setups. Below are a few illustrations on how the frequency response varies depending on the filter mode, resonance and morphing position.



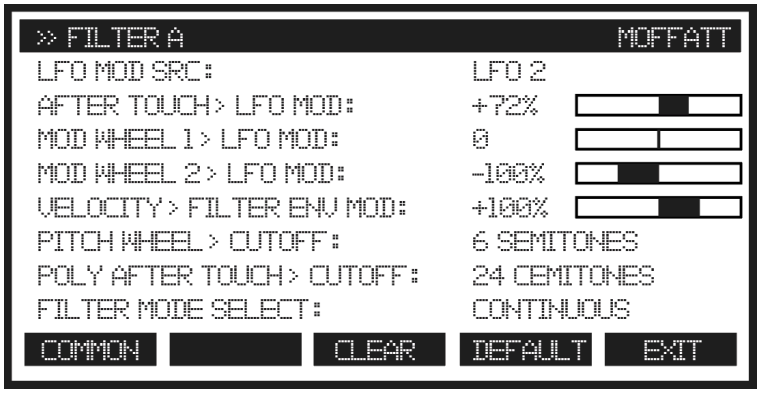
Filter responses for the 4 different filter modes



Filter mode morphing from Lowpass to Hipass, with Bandpass and Notch settings

Filter Settings

Pressing either of the white Filter buttons opens the corresponding Filter Settings page in the display, showing additional features.



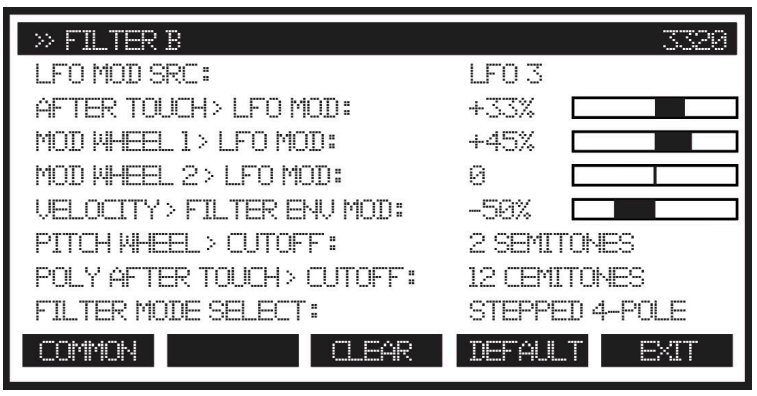
On this page you can set the Modulation source for the Filter LFO control, as well as specify the amount that Channel Aftertouch, Modulation Wheel 1 and 2 affects the LFO Mod amount.

You can also set how much keyboard Velocity should affect the Filter Envelope modulation. This can be used to create very musical responses to your keyboard playing, emulating how many acoustic instruments sound brighter when played more strongly.

Next, we have the range for the Pitch Wheel modulation of the Filter Cutoff. Use this to make the sound brighter when bending the tones upwards - or, if you prefer, the opposite.

Similarly to the Pitch Bend modulation, the Polyphonic Aftertouch modulation allows you to affect the Filter Cutoff using the polyphonic aftertouch, for precise control of each note's brightness.

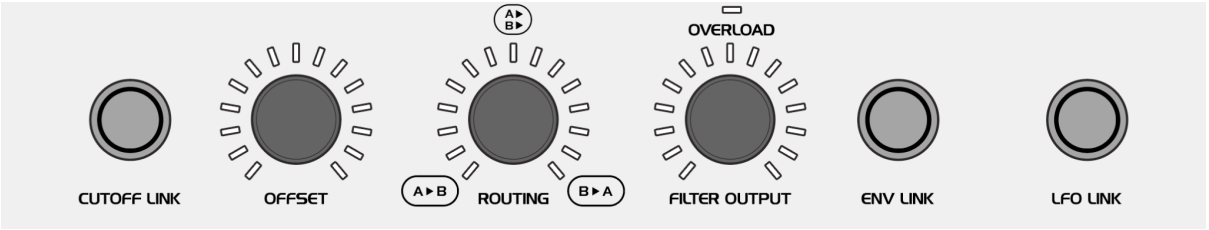
Finally, you can also switch the Filter Mode control to work either continuously (default), crossfading between the lowpass, bandpass/notch and highpass modes, or discretely, switching between them without fading.



Note: Filter B has 3 options: 'Continuous 2-pole', 'Stepped 2-pole' and 'Stepped 4-pole'.

Common Filter Controls

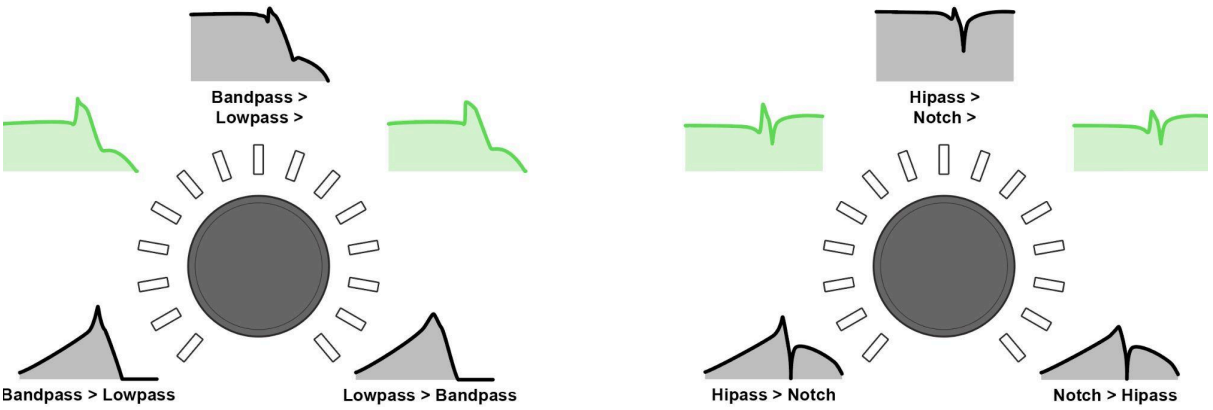
In between the two filter channels are the Common Filter Controls, that - similar to the Common VCO Controls - affect both filters or link them together.



The Cutoff Link button links the cutoff controls for the two filters, so that if you turn one of the Cutoff controls, the other filter's cutoff control will follow. This is very convenient if you want to sweep both filters at the same time without having to use both your hands.

The Offset control sets the frequency offset between the two filters. It's especially handy when used together with the Cutoff Link feature, as it allows you to spread the two filters apart by tweaking just one control. This produces a different effect than just sweeping the filters in sync, as Filter A sweeps up while Filter B sweeps down. By simultaneously sweeping the filter Cutoff and tweaking the Offset control, you can create very complex filter movements.

The two filter channels can be routed in a multitude of ways by using the Routing control. At the full counterclockwise position, Filter A is routed into Filter B in a serial routing. By turning the control clockwise, the filter channels are crossfaded into a parallel routing, and then, at full clockwise position, Filter B is fed into Filter A, in another serial configuration.



The Filter Routing is a crossfade control, so it can achieve very interesting results with the two filter outputs blending in complex ways.

Note: When the Filter Routing is set to fully serial (A > B or B > A), the Filter output signal to the Stereo Amplifier will be in mono, since only the last filter output is routed to the amplifier.

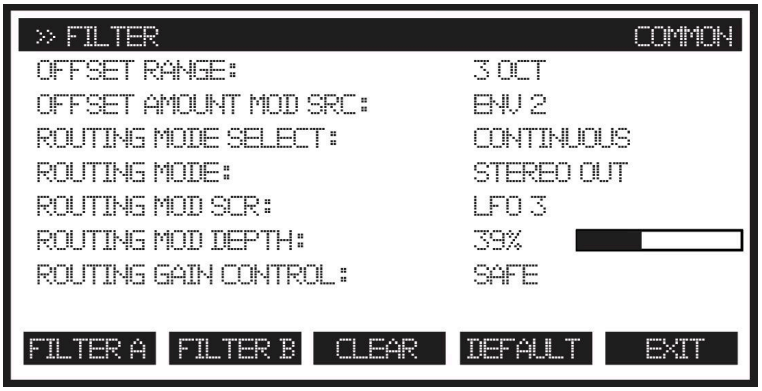
The Filter Output control sets the level of the two filter channels before they are sent on to the amplifier (see Page 28). By default, the signals are set to not clip, but by pressing down

the encoder you can enable the Overload feature, as indicated by the LED above the control. Now, turning the Filter Output encoder fully clockwise will introduce overload for the filter signals, resulting in a richer and - depending on the signal - a possibly dirtier distorted sound.

The Env Link button links the Env Mod controls between Filter A and B, so that if you turn one Env Mod control, the other Env Mod control moves in sync. The LFO Link button works in a similar way to the Env Link button, but for the LFO Mod controls.

Common Filter Settings

By pressing the white Filter A or Filter B button twice, you enter the Common Filter Settings on the display.



This page allows you to specify the Cutoff Offset range from 1 to 4 octaves. In addition, you can select a modulation source for the Offset control, in order to automate its movement, which can result in some very creative effects.

You can also choose whether the Filter Routing control should be Continuous (default) or Stepped.

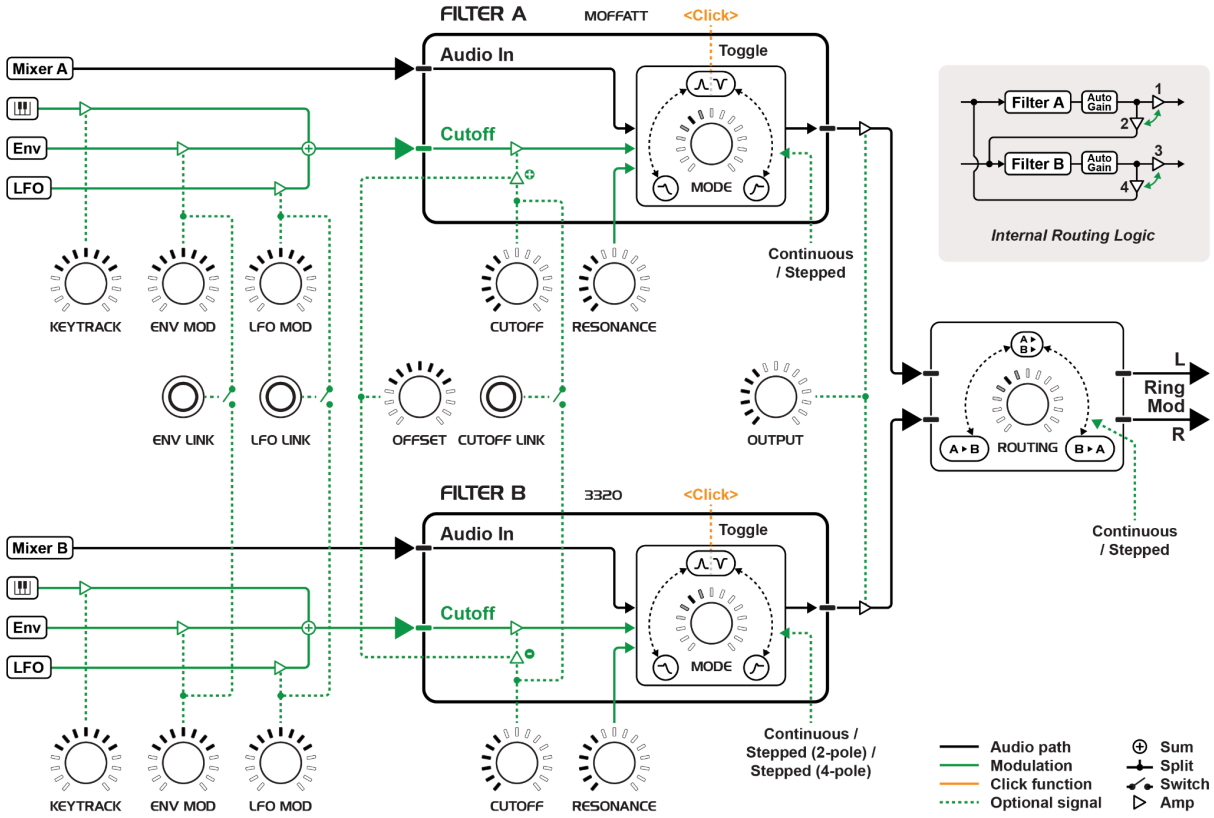
Next, you have the Routing mode setting, where you decide if the output of the two filter channels should be kept in Stereo (default) or summed to Mono. Keeping it as a Stereo output allows for true stereo sounds - as long as you also keep the Filter Routing at anything else but full Serial mode, and the Amplifier (see Page 28) in stereo mode.

There's an option to select a modulation source for the Routing control, which, again, can result in very musical effects. Try using Keyboard Velocity or Polyphonic Aftertouch for fine control over the overall filter sound. The Routing Mod Depth value sets the amount for this modulation source

Finally, you can select the type of gain staging you want to use for feedback control of the filter signals when they're in a feedback loop. Choose 'Safe' (default) for transparent gain control and a clean output. Choose 'Dynamic' for more punch in transients and a soft saturation. Choose 'Off' to disable the gain control completely for a hands-off analog modular-style response. Please watch your ears and speaker cones with this one!

Filters Architecture Overview

Below is a diagram showing the pathways of the two Filter channels as well as the Filter routing options.



Note: The modulation sources LFO and Env refer to whatever modulation source has been selected in the Settings pages.

Note: When the Filter Routing is set to fully serial (A > B or B > A), the Filter output signal to the Stereo Amplifier will be in mono.

Amplifier

Each voice has a stereo amplifier at the end of the signal chain, taking the outputs from the filter section (potentially mixed with the output from the Ring modulator), as well as the bypassed signals from the Mixer. If the Filter Routing is anything but fully clockwise or counterclockwise, and the Filter Routing Mode is set to Stereo, the two signals from the filters are sent to the left and right input of the stereo amp.

The first control is the Level Offset encoder, that either increases or decreases the output level depending on whether turned clockwise or counterclockwise from the center position. Use this to set the overall loudness of your patch, and to make sure its output is similar to that of other patches.

The second control is the Stereo Spread encoder. This sets how wide the two channels of the amp are panned left and right. Turn it clockwise to increase the stereo width of your patch, and counterclockwise to reduce it. At a fully counterclockwise position, the sound has been reduced to a mono signal.

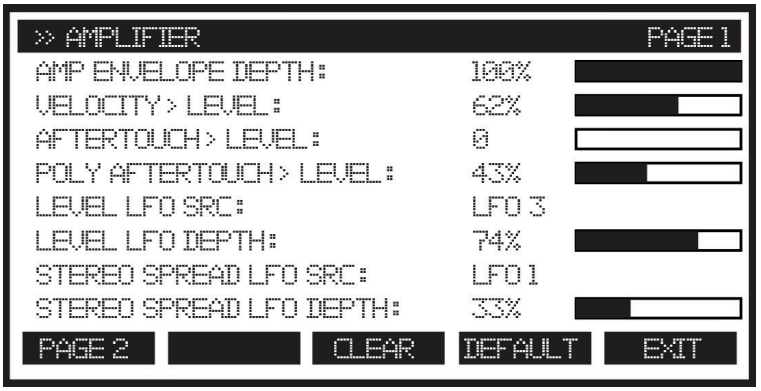
By pressing down on the encoder, you enable Pan mode, indicated by the LED above the control. Now, the encoder pans the signal in the stereo field. Please note that if the stereo spread is set to maximum, panning won't have an audible effect. Try lowering the stereo spread to make the sound occupy a smaller part of the stereo field, allowing it to be panned.

Careful use of Stereo Spread and Pan allows for precise placement of your sound.

The level, stereo spread and panning can all be modulated by setting modulation sources and levels in the Amplifier Settings screen.

Amplifier Settings

Pressing the white Amplifier button opens the Amplifier Settings page on the display.



This page allows you to set the Amp Envelope Depth, which determines how much the Amplifier Envelope (see Page 35) affects the overall level of your sound.

You can also specify the amount that Keyboard Velocity and Channel Aftertouch affects the volume. This can be very helpful when emulating acoustic instruments, or when you want dynamic control over your sound. The Polyphonic Aftertouch > Level setting works in the same way as the Channel Aftertouch setting, but on a per-note basis.

You can also select an LFO to modulate the level for tremolo effects. The LFO source and depth can be set. Similarly, an LFO can also be set to affect the stereo spread.

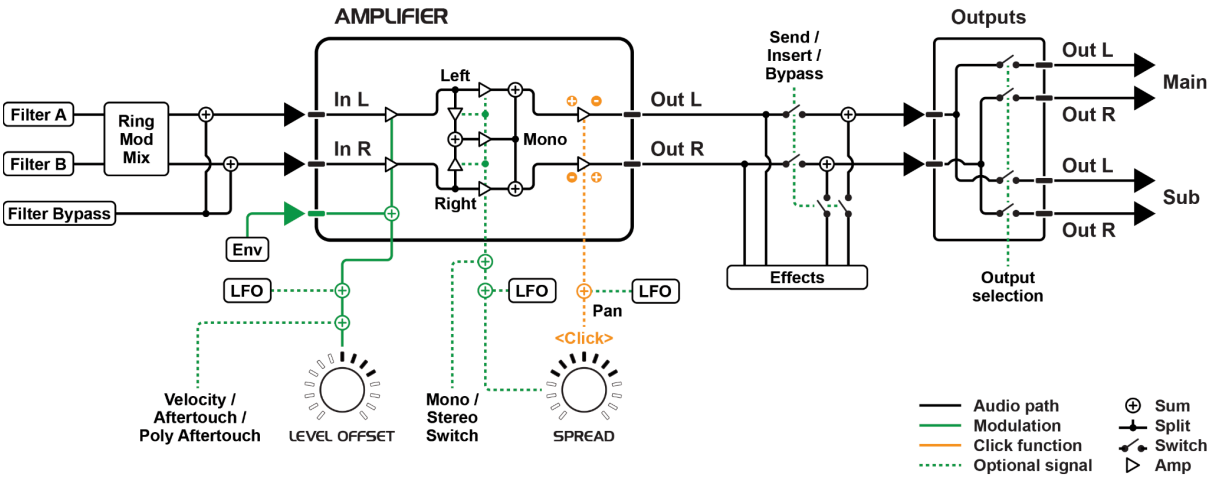
On Amplifier Settings Page 2, you can specify an LFO for modulating the pan position, and its modulation depth, for some interesting Leslie-like effects.

In addition to the modulation settings, the Amplifier mode can be switched between Transparent and Punchy. This is most noticeable at low levels, like during the slow attack or release phases of the Amplifier Envelope. Choose the mode that works best for your sound.

The stereo input for the Amplifier can be summed to mono for the amplifier, if you want to have your sound in mono. This mode still allows you to pan the mono signal within the stereo field. When in Mono mode, the Pan LED for the Stereo Spread control is always lit.

Amplifier Architecture Overview

Below is a diagram showing the pathways of the stereo Amplifier as well as the Effects block routing and the dual stereo outputs.



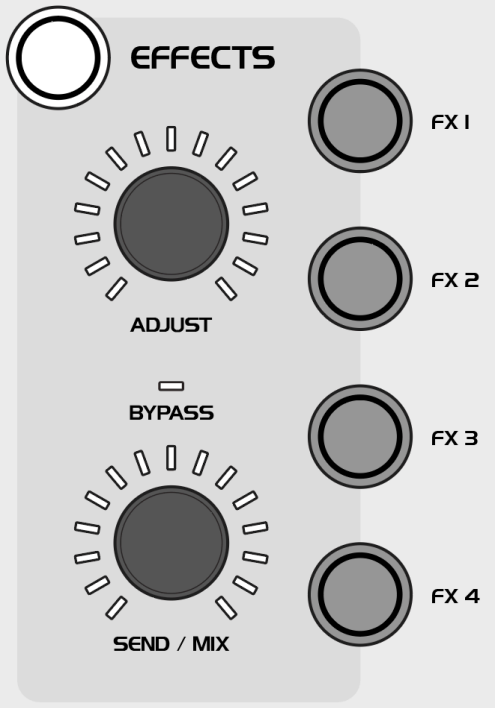
Note: The modulation source LFO refers to the modulation source that has been selected in the Settings pages.

Note: The Ring Mod, Effects and Outputs settings are not configured in the Amplifier. Signal paths shown for context.

Effects

The Positron 16 comes with built-in digital effects that can be applied after the amplifier stage.

There are 4 separate engines, each capable of running sophisticated effects like reverbs, delays, chorus, flanger, amp simulations, digital filters and more (see Page 33).



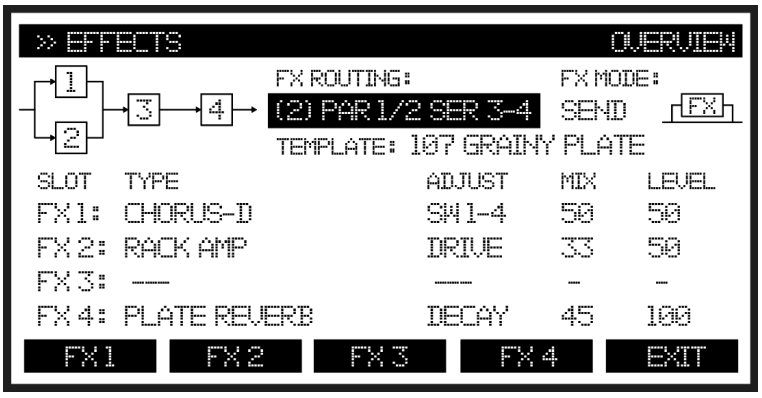
Each effect engine has its own dedicated button, labelled FX 1, FX 2, FX 3 and FX 4. By pressing on one of these buttons, you enter the edit page for that effect, making editing the effects a breeze.

There is an Adjust control that affects a predetermined main parameter for each type of effect, see list of available effects on Page 33.

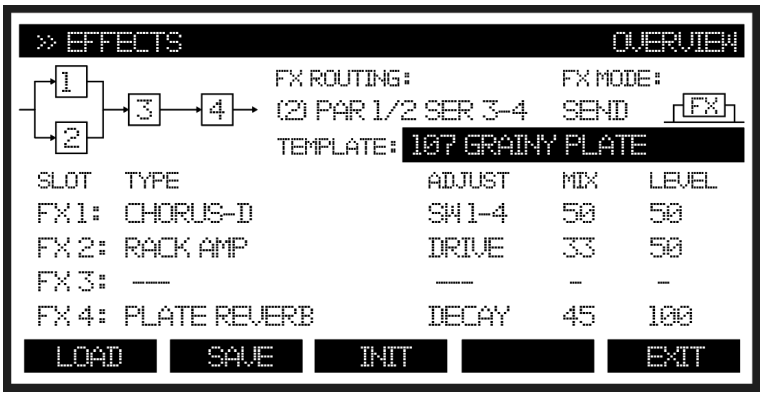
The Send/Mix control sets the level of the send signal into the effects chain if used in Send mode, or the mix level of the effects chain if used in Mix mode. By pressing down on the encoder you can bypass all the effects. This is very convenient if you want to quickly disable all the effects for a sound, for instance in a studio session.

Effects Settings

Pressing the white Effects button opens the Effects Overview page, where you can select the effects routing (see Page 34 for all routing options), switch between Send and Mix mode and select what effect to allocate to each engine.



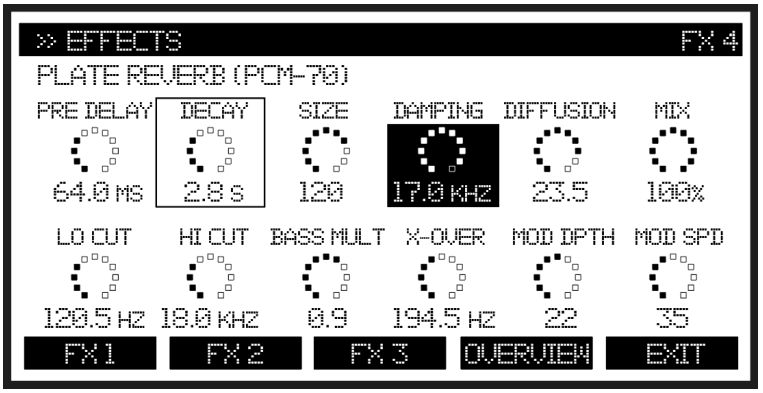
A full setup of effects routing, effects selection/settings and Send/Mix mode can be saved as a template.



This is very convenient for reusing favourite effects setups in different patches, without having to manually copy all the settings over from one patch to another.

Edit Effects

You can edit an effect by pressing the corresponding FX button for the engine that has the effect allocated. You will be presented with a screen of up to 12 parameters, displayed as rotary encoder values.



The Adjust control parameter for the effect is highlighted with an outline, while the currently selected parameter is highlighted with an inverted background.

Adjust the value of the selected parameter by using the Data encoder or the Value slider next to the display. You can also step through the values one by one with the + and - buttons.

You can always tweak the value of the currently selected effect by turning the Adjust controller, even when another parameter is selected. This gives you the ability to change two effect parameters at the same time.

List of Effects

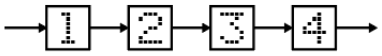
#	Name	Description	Device Inspiration	Type	Adjust
1	TC-DeepVRB	TC Deep Reverb	TC Hall of Fame*	Reverb	Decay
2	AmbVerb	Ambient Reverb	Lexicon 480L	Reverb	Decay
3	RoomRev	Room Reverb	Lexicon 480L	Reverb	Decay
4	VintageRev	Vintage Room Reverb	EMT250	Reverb	Decay
5	HallRev	Hall Reverb	Lexicon 480L	Reverb	Decay
6	ChamberRev	Chamber Reverb	Lexicon 480L	Reverb	Decay
7	PlateRev	Plate Reverb	Lexicon PCM-70	Reverb	Decay
8	RichPltRev	Rich Plate Reverb	Lexicon 480L	Reverb	Decay
9	GatedRev	Gated Reverb	Lexicon 300/480L	Reverb	Decay
10	Reverse	Reverse Reverb	Lexicon 300/480L	Reverb	Time
11	ChorusVerb	Chorus & Reverb	Lexicon PCM-70	Reverb	Decay
12	DelayVerb	Delay & Reverb	Lexicon PCM-70	Reverb	Decay
13	FlangVerb	Flange & Reverb	Lexicon PCM-70	Reverb	Decay
14	MidasEQ	Midas Equaliser	Midas ProX*	Processing	Level
15	Enhancer	Enhancer	SPL Vitalizer	Processing	Level
16	FairComp	Fair Compressor	Fairchild 670	Processing	Comp
17	MulBndDist	Multi-Band Distortion	Midas ProX*	Processing	Level
18	RackAmp	Rack Amplifier	Tech 21 SansAmp	Processing	Level
19	EdisonEX1	Stereo Imaging	Edison EX-1	Processing	Width
20	Auto Pan	Auto-Panning	Behringer X32*	Processing	Speed
21	NoiseGate	Noise Gate	Midas ProX*	Processing	Level
22	Delay	Delay	Behringer X32*	Delay	Time
23	3TapDelay	3-Tap Delay	Behringer X32*	Delay	Time
24	4TapDelay	4-Tap Delay	Behringer X32*	Delay	Time
25	T-RayDelay	Tel-Ray Delay	Tel-Ray Delay	Delay	Time
26	DecimDelay	Decimator Delay	Decimator Delay	Delay	Time
27	ModDlyRev	Mod, Delay & Reverb	Lexicon PCM-70	Delay	Time
28	Chorus	Chorus	Behringer X32*	Creative	Speed
29	Chorus-D	Chorus D	Roland Dimension D	Creative	Speed
30	Flanger	Flanger	Behringer X32*	Creative	Speed
31	Phaser	Phaser	Behringer X32*	Creative	Speed
32	MoodFilter	Mood Filter	Moog Type Filter	Creative	Cutoff
33	DualPitch	Dual Pitch Shifter	Eventide	Creative	Pitch
34	Vintage Pitch	Dual Pitch Shifter	Eventide	Creative	Pitch
35	RotarySpkr	Rotary Speaker	Leslie	Creative	Speed

** Direct algorithms from the hardware devices designed by Music Group companies.*

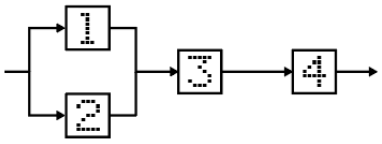
Effect Routing Options

The different options for routing the 4 effect blocks are outlined below.

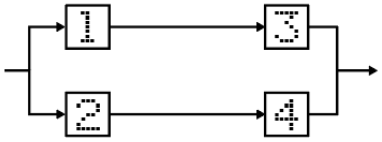
1: Serial 1-2-3-4



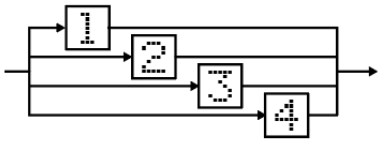
2: Parallel 1/2 Serial 3-4



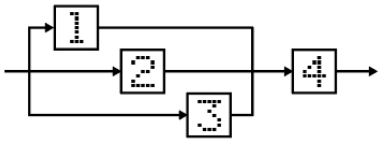
3: Parallel 1/2 Parallel 3/4



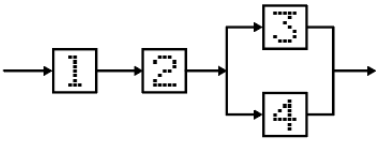
4: Parallel 1/2/3/4



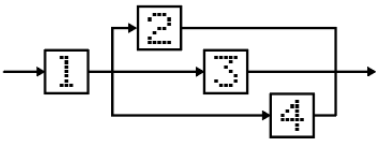
5: Parallel 1/2/3 Serial 4



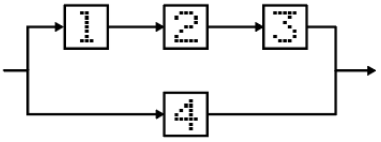
6: Serial 1-2 Parallel 3/4



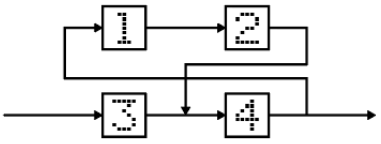
7: Serial 1 Parallel 2/3/4



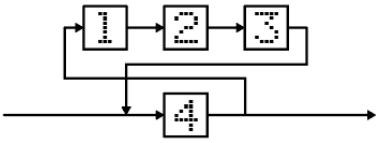
8: Parallel (Serial 1-2-3)/4



9: Serial 3-4 Feedback 4(1-2)



10: Serial 4 Feedback 4(1-2-3)



These routings allow for a lot of flexibility when configuring your effects.

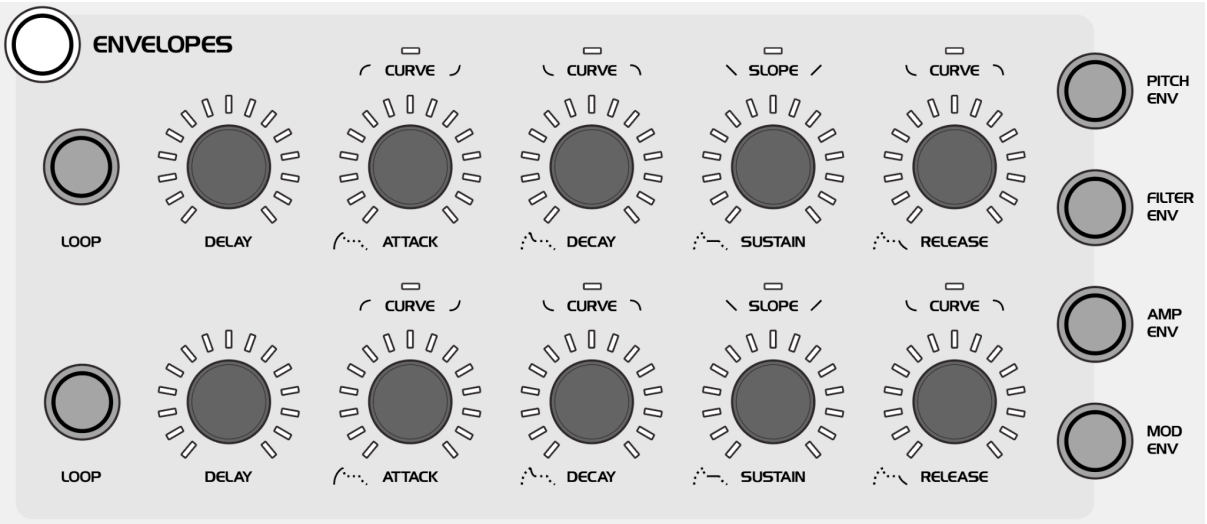
For instance, you could have a delay and an overdrive amp run in parallel and then put through a flanger and a reverb (Routing 2).

Alternatively, you could set up a chorus and a reverb that is fed back to the reverb after being passed through a pitch shifter and EQ (Routing 9) for a nice shimmer reverb effect.

Envelopes

Positron 16 features 4 separate 5-stage DADSR envelopes per voice.

There are two independent sets of Envelope controls. They correspond to the two active Envelope Select buttons on the right of the Envelope section. The top row of controls are linked to the top-most active Envelope Select button, while the bottom row of controls are linked to the bottom-most active Envelope Select button. This arrangement allows you to change the values of 2 separate envelopes at the same time.



The Loop button enables the Envelope Loop function. Click and hold the button to define what stages of the envelope should be included in the loop. You could for instance have the Delay, Attack and Decay stages part of your Envelope loop. This would make the envelope go through those 3 stages continuously while a key is pressed.

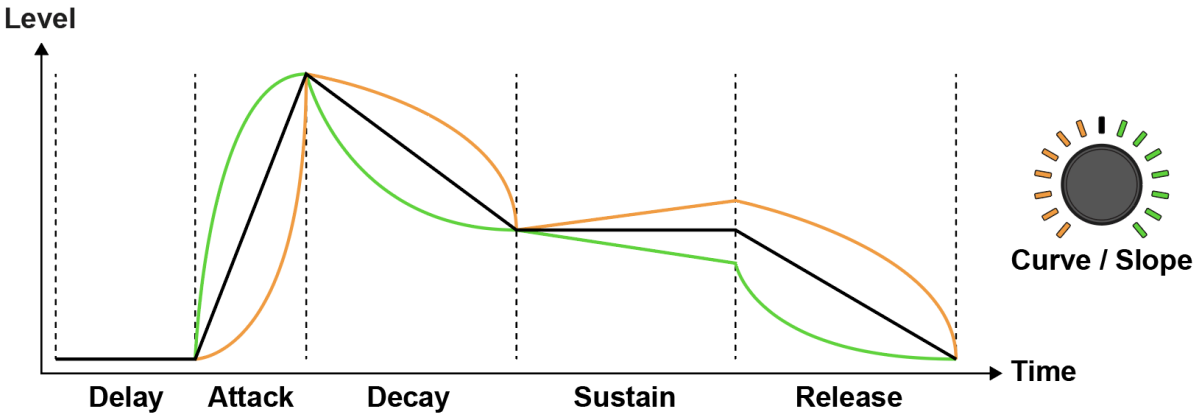
Note: The Sustain stage is ignored when Loop mode is engaged.

The Delay control sets the amount of time before the Attack stage starts. At full counter-clockwise, there is no delay, and at full clockwise, there's maximum delay (10 seconds).

The Attack control sets the time used for the Attack stage of the envelope. It ranges from 0 - 10 seconds. By pressing down the encoder, you switch the control to affect the curve for this stage. The LED above the control highlights that you're in Curve mode for the control. At full counter-clockwise, the Attack curve is logarithmic and at full clockwise it is exponential. This allows you to create a huge number of different attack behaviors for your envelope.

The Decay control works similar to the Attack control, with the same time range (0 - 10 seconds), and pressing down on the control enters Curve mode for the Decay stage. With the control full counter-clockwise the Decay curve is exponential, and with it full clockwise it is logarithmic.

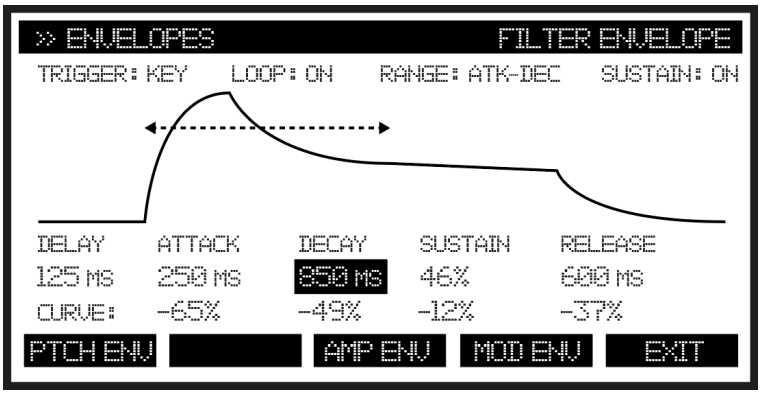
The Sustain control controls the level of the Sustain stage. Pressing down the encoder enters Slope mode, and lets you set a positive (control full clockwise) or negative (control full counter-clockwise slope for the Sustain stage.



The final control is the Release encoder, which sets the Release time for the envelope, ranging from 0 - 10 seconds. Pressing down on the encoder toggles the control to Curve mode, allowing you to set the slope from exponential (full counter-clockwise) to logarithmic (full clockwise).

Envelope Settings

Pressing the white Envelope button opens the Envelope Settings screen on the display.



Here, you can see a graphical representation of the selected envelope, with all its values in a table below the graph. Select what envelope to view by pressing the corresponding Soft button under the display.

At the top of the page is shown the Trigger event for the envelope, which is set to Key by default but can be changed to Key Off, one of the LFOs or by the Sequencer (see Page 50).

Here you can also see if Loop is enabled, and what range of stages the loop is using. The current Loop range is also illustrated in the Envelope graph as a double-headed arrow.

Finally, the page shows if the Sustain stage is enabled (default) or disabled. Note: Sustain is automatically skipped if the envelope is in Loop mode.

LFOs

There are 4 high-performance LFOs per voice, each with a cycle rate ranging from 10s to audio rate.

Just like for the Envelopes, there are 4 LFO Select buttons to the right of the LFOs section. However, the controls are only linked to one LFO at the time, highlighted by the active LFO Select button.

The Tempo Sync button makes sure the LFO is synchronized with either the internal clock from the Arpeggiator (see Page 47), MIDI/USB clock or the analog Clock from the input socket on the rear panel.

Next we have the Rate control. If Tempo Sync is off, this sets the actual rate of the LFO. If Tempo Sync is active, it controls the divisions of the tempo. Above the Rate control are 4 LEDs, flashing in sync with each of the 4 LFOs. This gives you a quick view of all the LFO signals in a single place.

The Delay control sets the initial delay from key press to when the LFO signal is faded in. This is a great feature to use for solo patches, as it can make the performance really expressive.

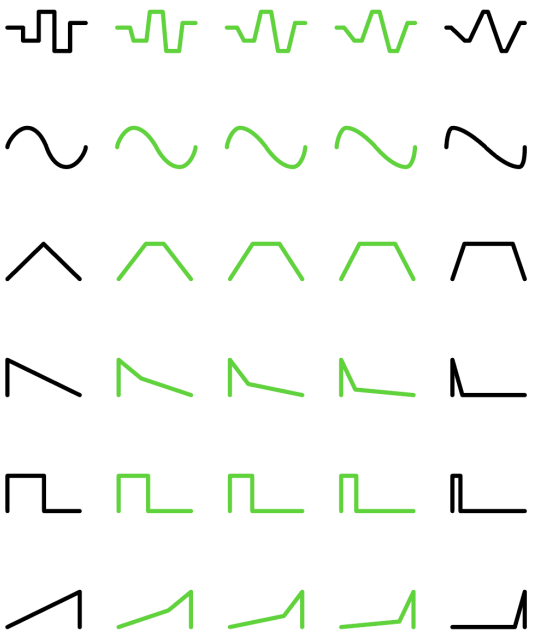
If you press the Monophonic button, all voices will sync their individual LFO phases so that it acts as one global LFO. This is useful for emulating older polyphonic synths that often only

had one global LFO, so regardless of when you pressed the keys, all voices would have their LFO modulation in sync.

The Wave control sets the waveform for the LFO. There are 6 different waveforms to choose from: Sample & Hold, Sine, Triangle, Sawtooth, Square and Ramp. By default, the waveforms fade from one to the other as you turn the control, but this can be changed in the LFO Settings (see Page 39).

Finally, we have the Shaper control. This is a really powerful feature that can transform the LFO waveshape that you've selected with the Wave control. It works in different ways for different waveshapes:

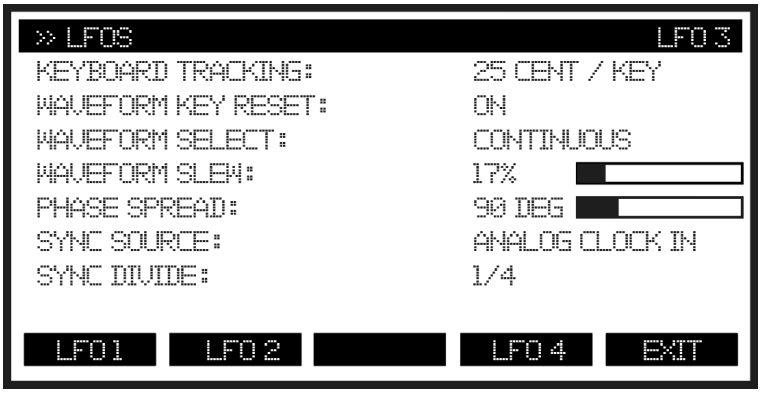
- For the Sample & Hold it introduces slew so that the random steps become gradually smoother the more you turn the control clockwise.
- For the Sine wave, it affects the pulse width, so that at full clockwise position the sine has transformed into a soft sawtooth-like wave.
- For the Triangle wave, it introduces more clipping the more you turn the control clockwise, ending up with a slanted square wave.
- For the Sawtooth, Square and Ramp waveshapes, turning the control clockwise affects the pulse width, morphing the sawtooth and ramp waves into sharktooth waves, and the square into a pulse wave.



LFO Settings

Clicking on the white LFO button opens the LFO Settings page on the display.

Here, you can set the amount of Keyboard tracking per key in cents, allowing for the LFO to track - or just gradually track - the keyboard. This can really bring the LFO modulation to life for your patch, and is especially dramatic with the LFO used by the Ring modulation (see Page 15).



Similarly to the VCOs, the LFOs can also have their phases reset on each key press, to make sure the modulation always starts at the same place. Leave this feature off if you want to keep each voice have its own individual LFO phase, for more complex modulation effects.

The Waveform Select parameter allows you to select either Continuous for crossfading or Stepped for switching between the waveforms.

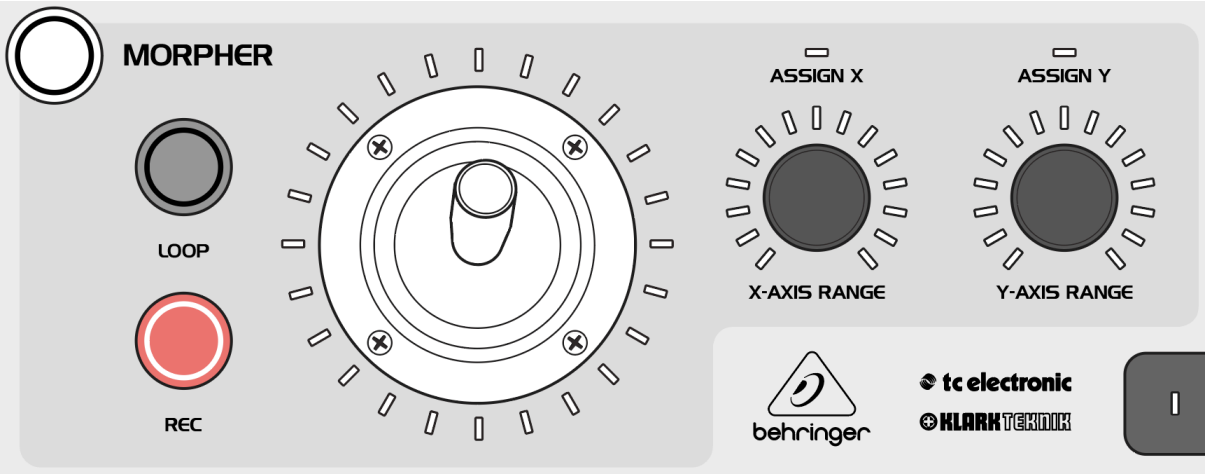
Waveform Slew sets the amount of smoothness for the selected waveform, to get softer versions of all the wave shapes. This is useful for tweaking the shape of the modulation to fit the current patch.

The Phase Spread parameter determines the amount of spread between each voice's LFO waveform. This can give the modulation a more diffuse effect, which is especially useful for when the LFO is used to modulate the stereo image or panning of the patch.

The final 2 parameters are Sync Source and Sync Divide. The former sets the source for the Tempo Sync button and allows you to choose from Internal (Arpeggiator tempo), MIDI, USB MIDI and Analog Clock. The Sync Divide sets the clock division of the incoming tempo. This is also controlled by the Rate encoder when the LFO is in Tempo Sync mode.

Morpher

One of the most exciting controls on the Positron 16 is the Morpher Joystick.



This seemingly simple control has almost unlimited potential for creative expression.

The main control in this section is of course the white Morpher joystick. The position of the joystick sends the X and Y coordinates as values to the X-axis and Y-axis respectively. The current position is also highlighted by the LEDs in the LED-ring surrounding the joystick. This is especially useful when using the XYZ-envelope (see below).

The range of each axis can be set by the dedicated Range controls, to the right of the joystick. By turning the Range controls clockwise,you increase the range, and by turning them counterclockwise, the range is decreased. By clicking the Range control, you enter the Assign mode, as highlighted by the LED above the control. Now, you can turn any continuous control on the frontpanel to assign up to 4 parameters to that axis. The Morpher Settings display (see below) also shows the selected destinations.

To the left of the Morpher joystick are the XYZ-envelope buttons.

Press the Loop button to enable looping of the XYZ-envelope. When enabled, the envelope will repeat continuously and function like a very complex and powerful LFO. When disabled, the envelope is only run once for each time it’s triggered.

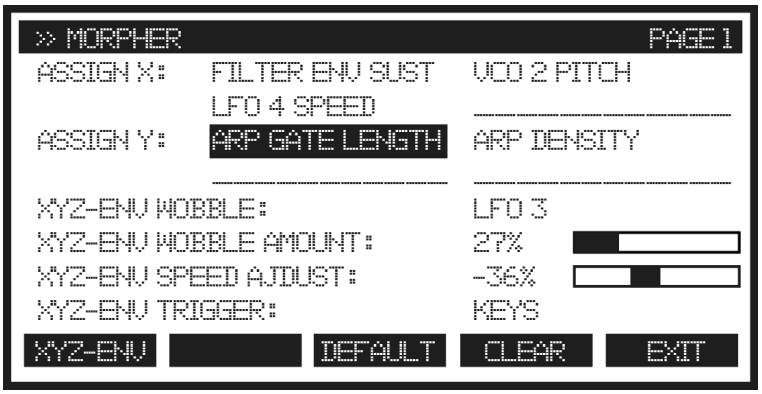
If you press the Loop button twice, it will mute the XYZ-envelope and the button will flash to indicate that the Mute-function is active.

The red Rec button is used for starting a recording of a XYZ-envelope. Press it to engage recording, and move the Morpher joystick in the desired pattern. Press the Rec button again to stop the recording. The XYZ-envelope will now trigger each time a key is pressed, or - if the Loop button is switched on - continuously like an LFO.

To erase the XYZ-envelope press the Rec button twice without moving the Morpher joystick.

Morpher Settings

Pressing the white Morpher button opens the Morpher Settings screen on the display.



Here, you can set up to 4 modulation destinations for the X-axis and the Y-axis of the Morpher. This means the Morpher joystick can function as a 2-dimensional macro controller, allowing you to change the values of up to 8 modulation destinations at the same time, which is incredibly powerful and will allow for some very creative effects.

The next 4 settings relate to the XYZ-envelope:

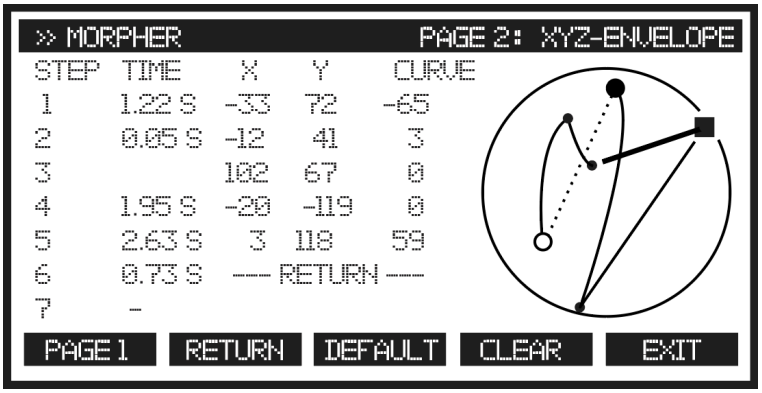
You can define a mod source for how much the XYZ-envelope should ‘wobble’ or diverge from the programmed path. Using an LFO or similar cyclic mod source allows you to have the signal from the XYZ-envelope appear more irregular and organic.

The amount of wobble can also be defined, for fine control of this effect.
Next, you can tweak the overall speed of the XYZ-envelope by changing the XYZ-envelope Speed Adjust value. A positive value will speed up the envelope while a negative value will slow it down.

Finally, XYZ-trigger sets when the XYZ-envelope should start. The default is Keys, which triggers the envelope for each keypress, just like the 4 DADSR envelopes, but you can also have it triggered by touching the Ribbon Controller (see Page 53), by the Sequencer (see Page 50) - either controlled by the Play button or retriggered each step - or by one of the LFOs.

You can also set the XYZ-envelope Trigger to Off, if you want to disable the envelope all together and only use the Morpher joystick as a manual macro controller. This won’t delete any saved XYZ-envelope so you can later enable it again by changing the Trigger from Off to one of the trigger sources mentioned above.

The XYZ-envelope page shows the Morpher's XYZ-envelope graph.



There are up to 7 steps in the XYZ-envelope and each step is listed to the left of the screen, with values for Time, X and Y coordinates and Curve.

Time is simply the duration of the step, set in seconds. The higher the value the longer it will take for the steps to complete.

The X and Y coordinates represent the position of the joystick for the step. This is where the actual values that the Morpher joystick sends to the mod destinations are determined.

The Curve sets the amount of 'bend' for the step, either positive or negative. This allows you to have other types of curves than just linear from one point to the other.

Finally, you can set the end-point of the XYZ-envelope to any step by pressing the Return Soft button while that stage is highlighted, to create shorter and less complex envelopes.

To the right of the Steps table is a graphical representation of the XYZ-envelope in a circular diagram.

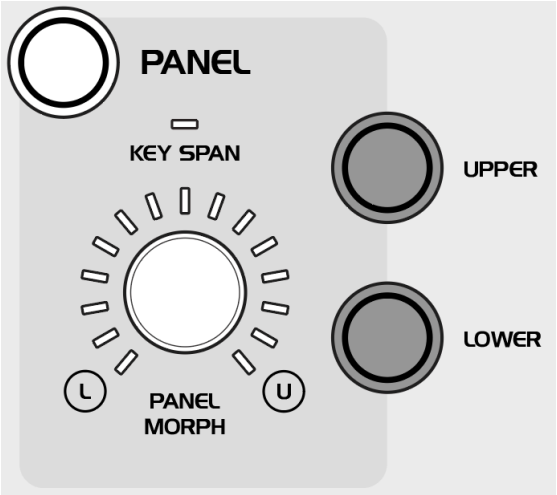
The first step position, Step 1, is symbolized by a small open circle, and each step after that is shown as a small dot.

The last step, highlighted in the table as – RETURN –, is marked with a small filled circle. The line back to Step 1 is dotted.

The current step you're editing is highlighted with a filled square.

Panel Morphing

The Panel section is one of the most powerful aspects of the whole frontpanel. It allows you to set up two separate patch variations (Panel sets) called Upper and Lower and then morph between all the different continuous values for each of them.



To the right of the section there are two black Panel set buttons called Upper and Lower. These let you toggle between the Upper and Lower sets by pressing the inactive one.

Each Panel set has its own set of values for all the continuous controls on the frontpanel. This means you basically have two separate patches available for each preset.

Note: Button and switches are not included in the Panel sets.

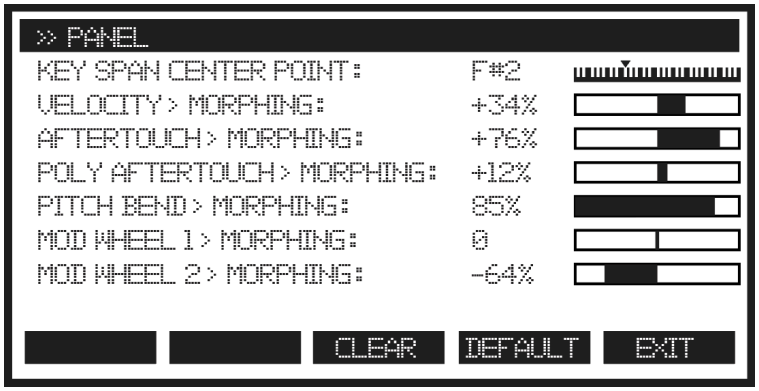
The white Panel Morph encoder allows you to sweep between the Upper and Lower panel sets. This simple control can completely change the character of your patch and transform it into something else entirely. Many of the factory presets use this feature to full effect.

By clicking on the Panel Morph encoder you enter the Key Span mode, as indicated by the LED above the control. Now, the Upper and Lower panel sets are set to the top and the bottom of the keyboard range, and available at the same time. The Panel Morph encoder now controls the keyboard fade range, where at its maximum clockwise position, the whole 5-octave range is gradually morphing from the Upper to the Lower panel sets. At its full counterclockwise position, there's a sharp jump between the two panel sets at the crossover point, as defined in the Panel Settings (see below).

Don't let the simplicity of these controls fool you. They are incredibly powerful, both as a sound design tool and for performances. And remember: the Panel Morph control can be used as a modulation destination in the Mod Matrix (see Page 59), which means that you can automate the Panel morphing using anything from LFOs, envelopes, Ribbon controller, expression pedal, the sequencer and more.

Panel Settings

Pressing the white Panel button opens the Panel Settings page on the display, allowing you to configure the behavior of the Panel morphing feature.



First, you can set the center point for the Key Span mode of the Panel Morphing, as mentioned above. While the cursor is highlighting the value of the Key Span Center Point, press a key on the keyboard to define a new center point.

The Key Span Center Point will act as the 50% middle ground between the Upper and Lower panel sets. When the Panel Morph control is full counterclockwise, it will define the split point between the Upper and Lower Panel sets.

Next, we have a set of modulation sources for controlling the Panel Morphing:

- Velocity, bidirectional
- Aftertouch, bidirectional
- Polyphonic Aftertouch, bidirectional
- Pitch Bend Wheel (always bidirectional)
- Modulation Wheel 1, bidirectional
- Modulation Wheel 2, bidirectional

By setting a range for any of these modulation sources, you can control the Panel Morphing dynamically without having to patch it in using the Modulation Matrix (see Page 59).

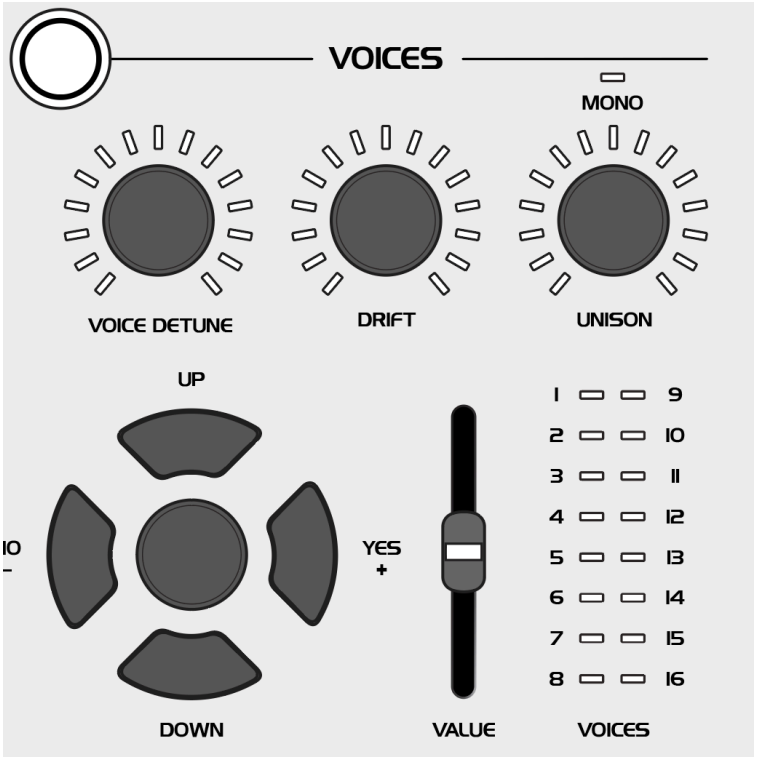
This is one of those features where the main limitation is your own imagination. Try using velocity to dynamically morph between a slow evolving pad and a bright one with a sharp attack.

Or why not set the polyphonic aftertouch to sweep from a boomy center panned sound to a fizzling ultrawide one, with full control per key?

You could also dedicate one of the modulation wheels to have full performance control over the exact morphing position between two similar Panel sets, for creating detailed musical nuances while playing.

Voices

The Voices section handles global voice allocation and unison modes, as well as parameter drift.



The Voice Detune control sets the amount of detune between the voices. This works both for fully polyphonic patches and Unison patches, and can add anything from a vintage feel or a rich chorus effect to the sound of a synthesizer in dire need of repair.

Next, we have the Drift control. This sets the amount of parameter drift for a range of aspects of your sound, including the pitch of the oscillators, the cutoff frequencies, envelope times and LFO rates. This varies between key presses or across the keyboard range - or both, and can be set up using the Voices Settings screen, see below.

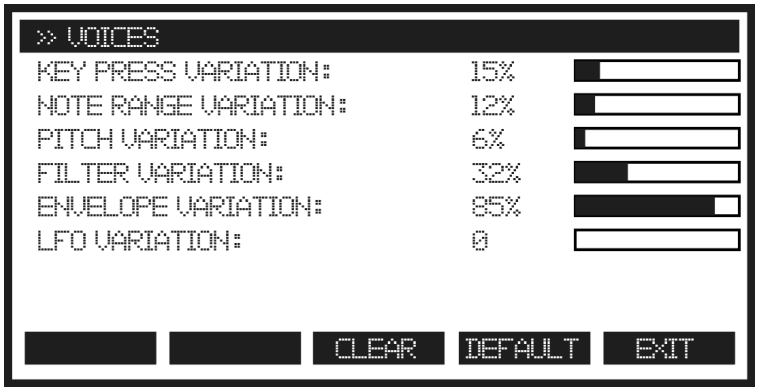
The Unison encoder controls the number of voices that are played in unison per key press. As you turn the control clockwise, the number of LEDs that light up tells you how many voices are played in unison: 2, 3, 4, 8 or 16. Combine this feature with the Voice Detune for some seriously thick sounds.

Clicking on the Unison encoder switches the patch to monophonic mode, so that only one note can be played at a time. Turn the Unison control to set how many voices should be triggered together, from a single voice all the way up to the full stack of 16 - for hyper-stacked 32 VCO leads and basses!

Below the Unison control are the 16 LEDs that show what voices are currently played.

Voices Settings

Press the white Voices button to enter the Voices Settings screen on the display.



This is where you define the amount of Drift variation per Key Press event, as well as the Drift variation across the keyboard range.

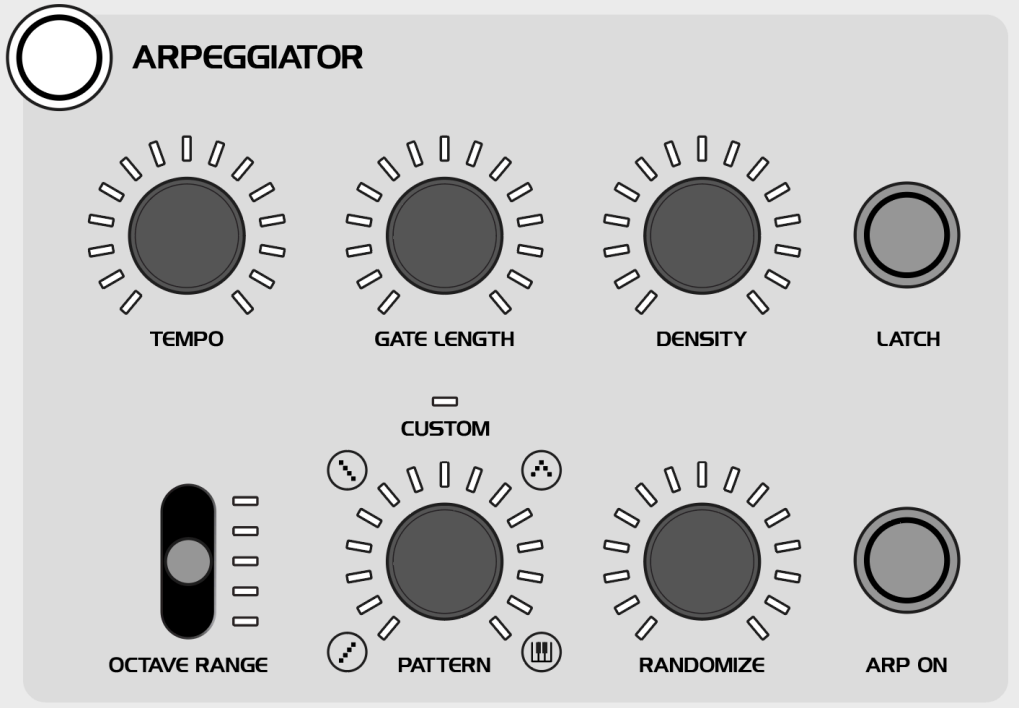
These settings create slightly different effects, with Key Press variations mimicking the behaviour of old vintage polyphonic synths, where each key press often resulted in a slightly different pitch, filter cutoff or envelope behaviour.

The Note range variation is more targeted at mimicking old monophonic synths, where the keyboard tracking wasn't always perfect, resulting in the pitch going slightly flat or sharp at the end of the keyboard range.

Next, you can set the individual variation amounts for Pitch of the oscillators, Filter cutoff and resonance, Envelope times and LFO rates. These values let you control the strength of the Drift control, and gives you the option of having it affect one set of parameters more than others. Use this to set up your favourite kind of randomness, or the one that best fits the patch.

Arpeggiator

The Positron 16 comes with a very musical arpeggiator that allows you to play complex runs using just a single hand. When enabled, the Arpeggiator takes the currently played chord and splits it up to automatically create note runs (arpeggios).



The Arpeggiator comes with a set of logical controls that makes it very easy and quick to use.

First, we have the Tempo control, that sets - you guessed it - the tempo for the Arpeggiator. This also controls the Internal tempo for the patch, which is used by the LFOs (if tempo synced to Internal tempo), and the Sequencer (see Page 50).

The Gate Length encoder controls the length of the notes played by the Arpeggiator. At full clockwise position, the notes are played fully legato with no gaps between steps.

The Density control defines the probability of notes being played. At full clockwise position, all the notes defined by the selected pattern (see below) are played. At full counterclockwise, there's only a 1 in 5 chance that any particular note is played, resulting in a much more sparse pattern. Use this to create instant variations for the selected pattern, while keeping the overall feel of the arpeggio.

The last control on the top row is the Latch button. When activated, the arpeggio pattern keeps playing even when you release the keys. Press the key again to switch if the Latch-function. This is very useful when you want to play complex chords, as you can use both your hands to set a chord and then move your hands to the next position while the Arpeggiator keeps playing.

The Octave Range flip switch allows you to define the range of octaves that the Arpeggiator will use for the selected pattern. The LED column next to the flip switch shows the currently selected octave range, from 1 to 5. A value of 5 means that the arpeggio pattern is played across the full keyboard range, for really wide note runs.

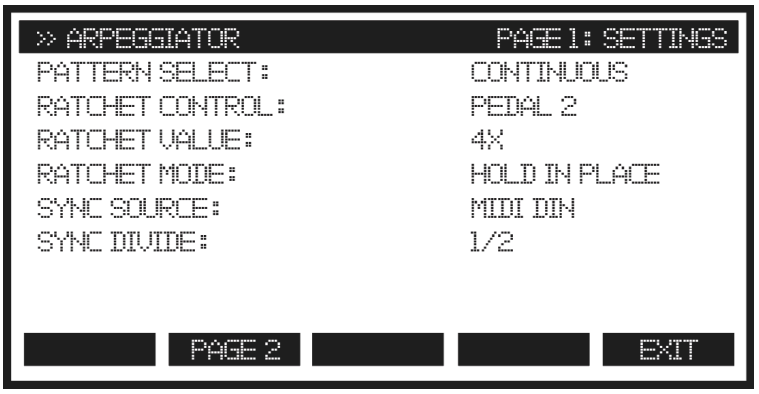
The Pattern encoder is one of the most important controls in the Arpeggiator section. With this, you select one of the 4 patterns to use. Select from Up, Down, Up-Down and As-Played. The control is seamlessly morphing between the patterns, which results in creative blends of the two adjacent patterns. Use this together with the Randomize control (see below) for some truly powerful tweaks of the overall arpeggio pattern.

Clicking on the Pattern encoder enables the Custom Pattern mode, and the Custom Pattern page view is shown on the display (see Page 49).

Finally, we have the Arp On button, which controls if the Arpeggiator is active or not. This means you can have a complex Arpeggiator setup configured, ready to go by the push of a button.

Arpeggiator Settings

Pressing the white Arpeggiator button enters the Arpeggiator Settings screen on the display.



This is where you can set whether the Pattern control should morph between patterns or discretely step between them.

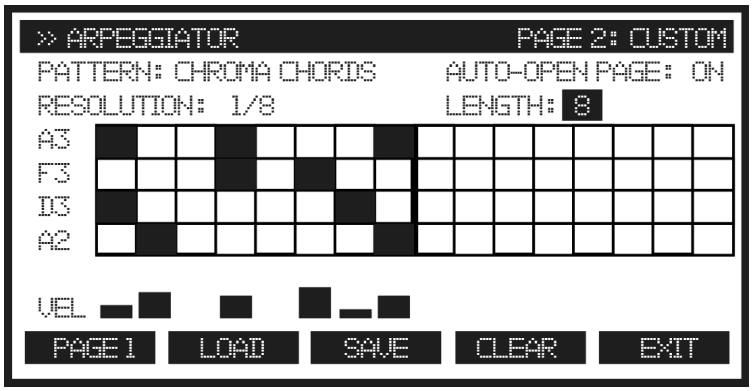
You can also set up a Ratchet Control, for dynamically splitting note values when engaged. If you allocate this to a switch pedal, you can engage ratcheting momentarily just by pressing the pedal. This allows for very musical performances and can help break the risk of monotony from endless repeating arpeggiator patterns. Other possible values for this setting are velocity, polyphonic aftertouch and the Ribbon controller.

The Ratchet Value sets the fraction of notes that should result when ratcheting is engaged. A value of 2x halves the note values, for example from quarter notes to eighth notes.

The Ratched Mode defines how the ratcheting feature should behave. A value of Continuous will ratchet any steps as long as the control is engaged. A value of Hold in Place will hold the pattern at the note when ratcheting, creating a more obvious break in the pattern.

Finally, we have the Sync Source and Sync Divide settings. This is where you set the source for the External tempo, and the relative tempo used by the Arpeggiator.

Arpeggiator Custom Pattern Settings



The Custom Pattern can be viewed as a sort of blend between an arpeggiator and a step sequencer. The first 4 notes you play on the keyboard appear as rows with up to 16 steps. A filled square represents an active step, where a note will be played. This allows for very musical and complex patterns to be created and controlled by what notes you play.

Each step can have its Velocity defined as well, for additional expressivity.

Above the grid pattern is the Resolution of the pattern, for instance quarter notes. Change this to suit the speed you want the pattern to have in relation to the current Internal tempo.

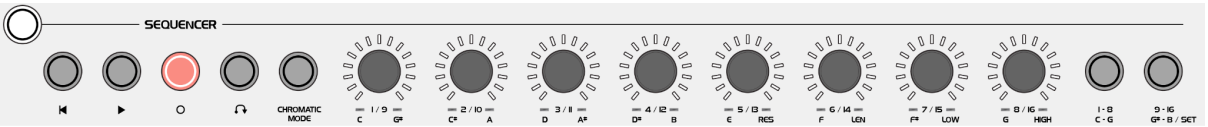
The Length of the pattern can also be set, to anything from 1 to 16 steps. The end step is highlighted in the pattern grid by a thick line.

At the top, below the header bar, is the name of the current Custom pattern. You can save and load Custom patterns which allows you to reuse your favorites on any new patches you create.

Finally, we have a setting for whether the Custom pattern page should automatically open on the display whenever you select the Custom pattern using the Pattern control.

Sequencer

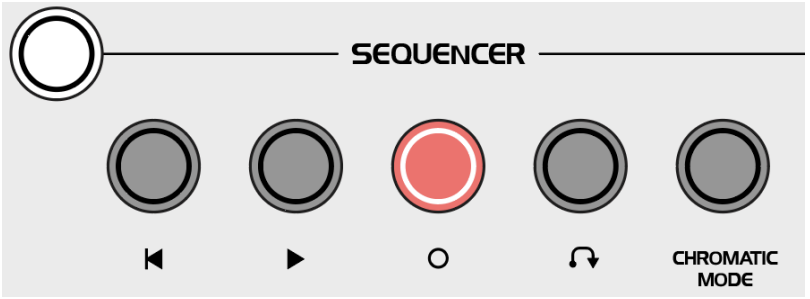
The Positron 16 comes with an analog-style 16-step sequencer for creating musical phrases that can be looped continuously or triggered by pressing the keys.



The section consists of two main parts: the controller buttons and the step encoders.

Controller Buttons

There are 5 buttons in this part of the section; 4 of them are for controlling playback and recording, and the last one for entering the Chromatic Mode (see Page 51).



The Reset button resets the sequence to step 1. Use this to restart the sequence before it reaches the end step.

The Play button starts the sequencer when active and stops it when inactive.

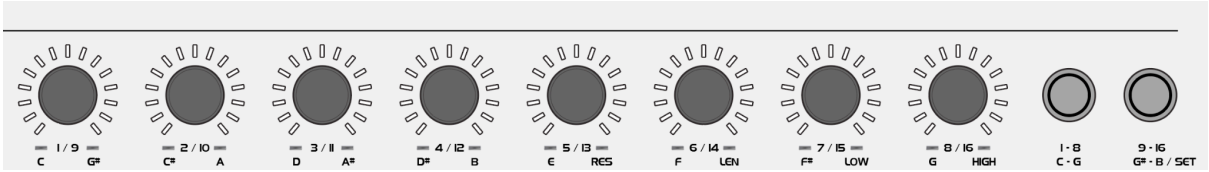
The Record button activates recording of a new sequence. By default, the recording is in step input mode. For each key you press on the keyboard, a new step is recorded in the sequence. Once it reaches the end step (see Sequencer Settings on Page 51), it will loop back to the start so that you can continue to record steps until you're happy.

If you press the Play button while in Record mode, the input mode changes to live input. The sequencer starts playing and you can press keys in time with the metronome click generated by the sequencer.

The Skip button jumps a step, which can be used for creating interesting rhythmic effects.

Step Encoders

The 8 Step encoders controls and displays the values for each of the 16 steps.



The sequence steps through the encoders in two blocks of 8 steps, highlighting which block is currently shown with the 1-8 and 9-16 buttons to the right. Each Step encoder also has two step LEDs below the control, marking the current step number.

In addition to using the Sequencer as a single 16-step sequence, you can also split it into 2 parallel sequences of up to 8 steps each. This allows you to program interesting duophonic sequences. Each sequence row can have its own step length, for creative poly-rhythmic effects. See more under Sequencer Settings below.

Chromatic Mode

Press the Chromatic Mode button to the left of the Step encoders to enter Chromatic Mode. This changes the behavior of the sequencer from a regular 16 (or 8x2) step sequencer to a chromatic probability tool for generating randomized phrases.

Step encoders 1-12 now represent probabilities for the 12 semitones in a chromatic scale. By turning any of the encoders clockwise, you increase the probability that this particular note will be played.

Once you press the Play button, the Sequencer starts generating a randomized stochastic pattern based on the values set for the 12 semitones.

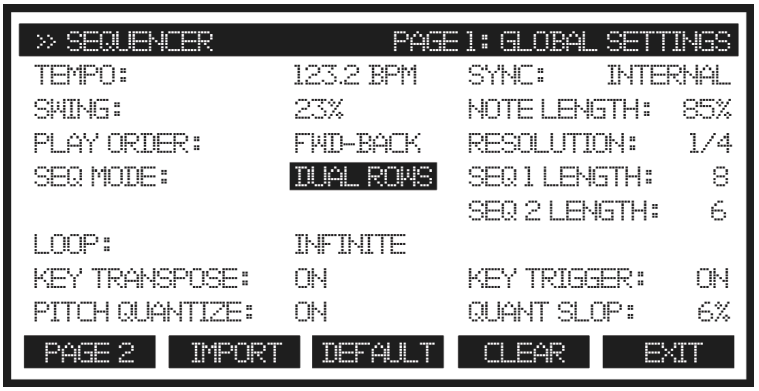
The last 4 Step encoders 13-16 controls the amount of rests in the sequence, the probability of longer notes, and the note range.

Sequencer Settings

Press the white Sequencer button to enter the Sequencer Settings screen on the display.

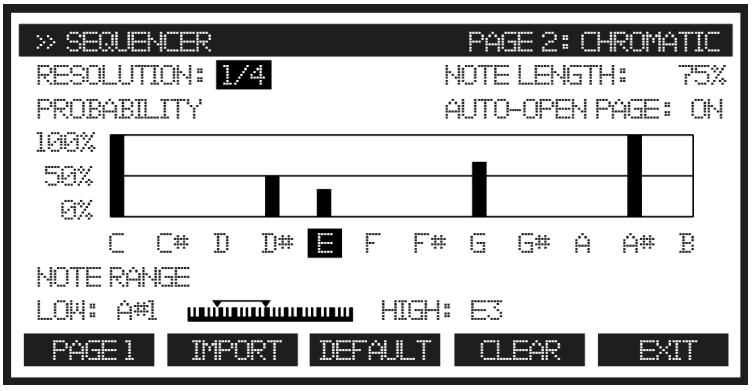
The first page gives you an overview of all the settings, including the Tempo (as controlled by the Tempo encoder in the Arpeggiator section), Sync for the tempo, Swing percentage, Note Length, Play Order (Forward, Backward, Forward-Backward or Random), Resolution as well as the Sequencer mode (1x16 or 2x8 steps) and the respective sequencer lengths in number of steps.

You can also define if the sequence(s) should loop infinitely or be one-shot, or just loop a set number of times.



There are also settings for having the sequencer follow the notes played on the keyboard for instant transpositions, have the sequences triggered by key down, quantize the pitch defined by the encoders and define how much random slop should be added to quantized notes, for a more human - or broken machine - feel.

Press the Page 2 Soft button to enter the Chromatic Mode Settings screen.

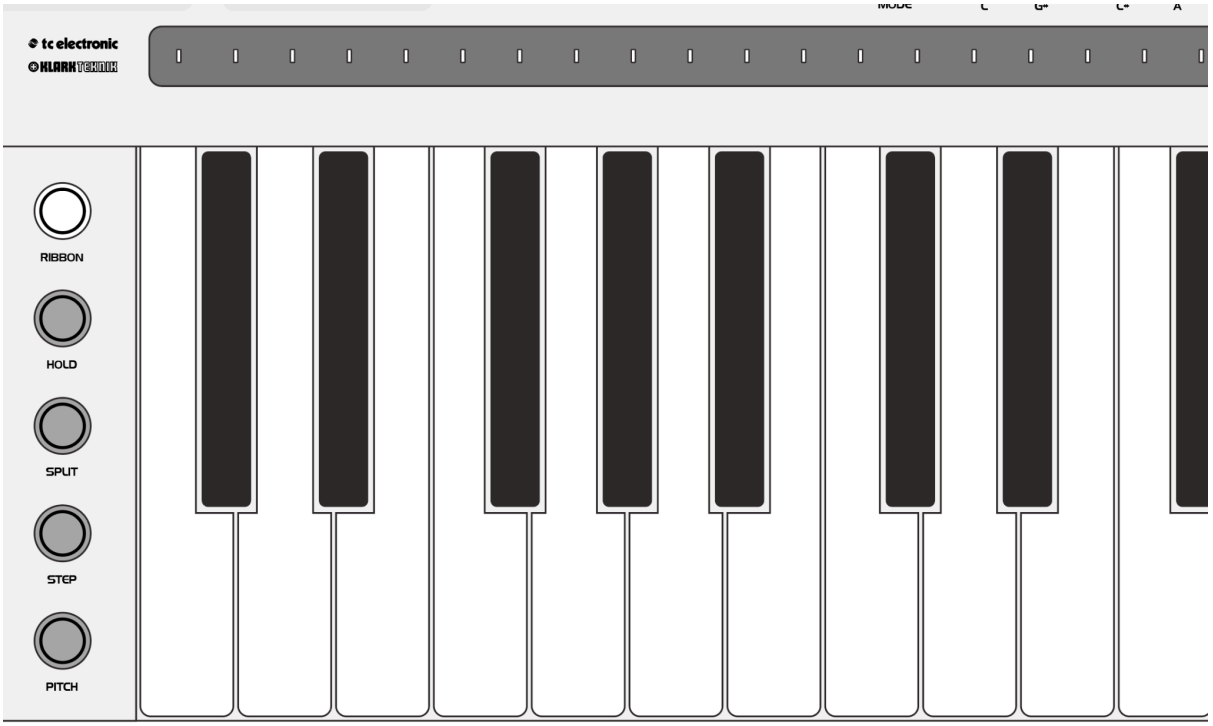


Here, you can set a specific Resolution for the Chromatic Mode, and average Note Length and specify if this settings page should open automatically when pressing the Chromatic Mode button in the Sequencer.

There's a graphical representation of the probability settings for each semitone, with an indicator for which note that is currently being triggered, as well as the defined note range.

Ribbon Controller

Above the keyboard is a Ribbon controller with LED-indicators, that can be used as a modulation source.



Each semitone on the keyboard is represented by its corresponding LED, which lights up to indicate the pitch of the point of the Ribbon controller you're touching.

To the left of the keyboard is a set of buttons for controlling the functions of the Ribbon controller.

The Hold button keeps the latest value active even after you let go of the Ribbon controller. Use this when controlling pitch to avoid having the tone rapidly changing as soon as you release the Ribbon controller.

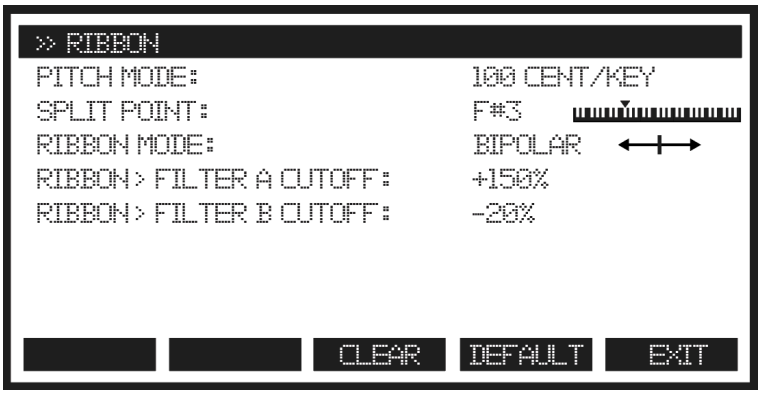
The Split button divides the Ribbon controller into two separate zones, each capable of generating its own control signal. This is very useful for duophonic playing when set in Pitch mode, for instance.

The Step button quantizes the output signal from the Ribbon controller into semitone steps. Again, this is very convenient when using the Ribbon controller in Pitch mode to make sure you’re always playing clean notes. Disable this for Theremin and Ondes Martenot-style playing with free sliding between notes and expressive manual vibratos.

The Pitch button sets the Ribbon controller to pitch control, allowing you to play notes on it like a keyboard. If the Step button is disabled (see above) you can create very expressive and organic-sounding melodies that go beyond the hard quantization of the keyboard.

Ribbon Controller Settings

By pressing the white Ribbon button you enter the Settings screen on the display.



Here, you can tweak the pitch tracking for the Pitch mode, if you prefer to have it go slightly sharp or flat at the end points.

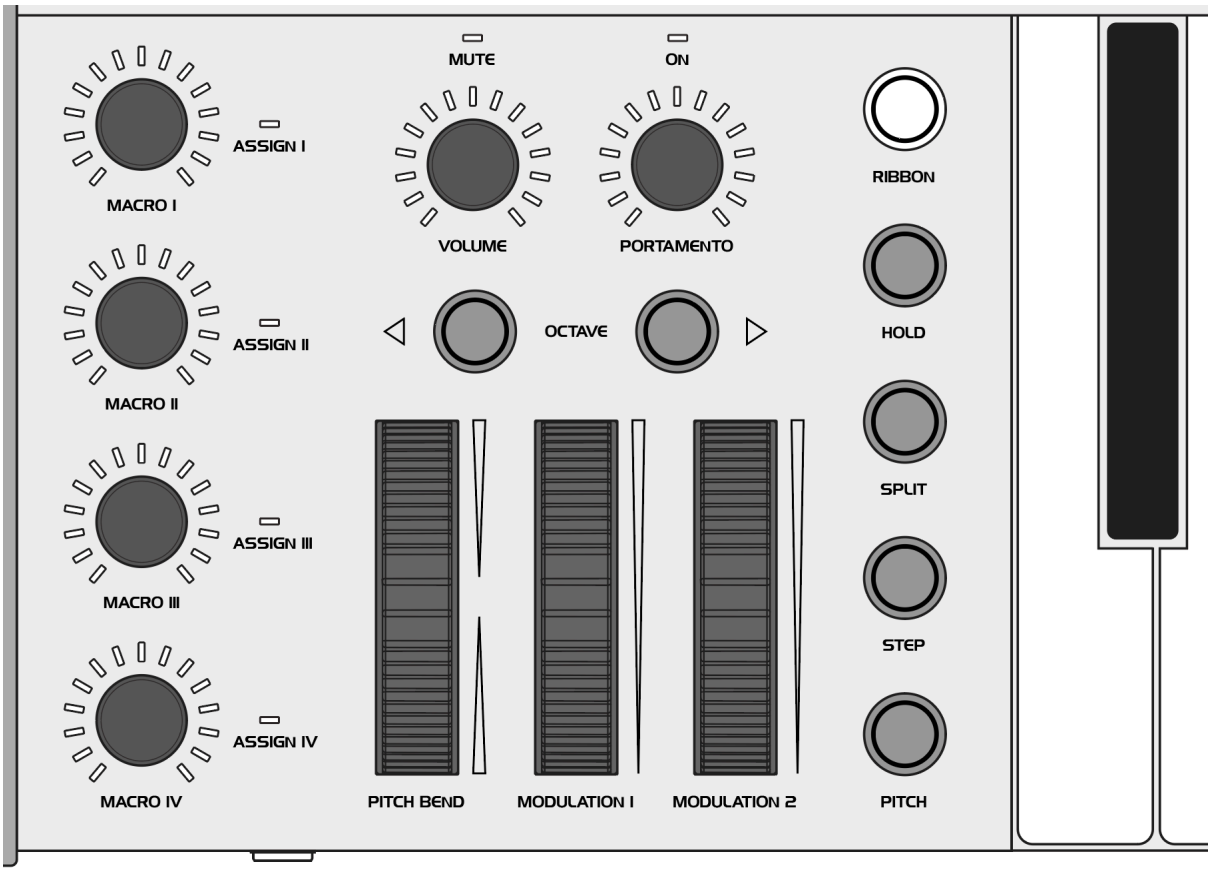
You can also set the Split point for the Split mode, although that can also be done by pressing and holding the Split key until it flashes and then strike a key on the keyboard. The corresponding LED on the Ribbon controller will flash to indicate the new split point.

The Ribbon mode defines how the point of contact is interpreted for modulation. In Linear Mode, the control values go linearly from the bottom of the Ribbon controller to the top. In Bipolar Mode, the point of contact becomes the neutral zero-modulation point and any movement downwards from there will create negative values and any movement up will create positive ones.

You can also set the respective modulation amounts for the two filters, either positive or negative. This can be used to have the filters sweep in different directions with a simple movement on the Ribbon controller.

Controller Section

To the left of the keyboard you find the Controller section, with the three wheels and a set of extra encoders and buttons.



The Pitch bend wheel is spring loaded so that it always returns to its neutral point at the center. Use this wheel to create expressive pitch bends when playing solo lines. The bend range can be set individually for the up and down direction in the VCO Common Settings (see Page 15).

There are two identical Modulation wheels, Modulation 1 and Modulation 2. They are not spring loaded and stay in position when released. Each Modulation wheel is freely assignable as a modulation source in the many modulation slots or the powerful Modulation Matrix (see Page 59).

Above the wheels are the two Octave buttons for transposing the keyboard up or down one or two octaves. The Octave buttons are lit when transposed one octave and flash when transposed two octaves. This gives the keyboard an impressive extended range of 9 octaves, from C-1 to C8.

At the top of the Controller section are two encoders. First, we have the Volume control, for setting the overall level for your output. This is stored per patch, and the volume level is indicated by the LED collar. By pressing the encoder you mute the sound of the synth, and the LED above the encoder is lit to indicate if the sound is muted. This is useful both for

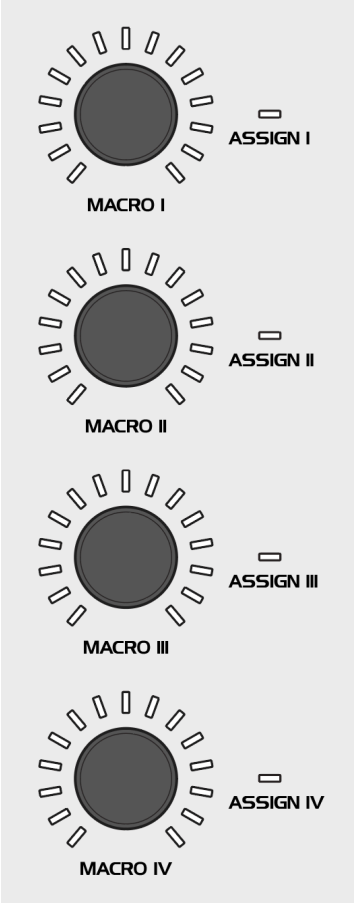
stage and studio work, when you temporarily need to cut the sound from the synth, without tweaking any of the levels. The Mute state is not stored with the patch.

Next to the Volume encoder is the Portamento control, for allowing the pitch to glide between notes you play. You press the encoder to engage the effect and the encoder value determines the Portamento time. The higher the value, the slower the glide between notes.

Portamento settings are available on the second page of the Common VCO Settings (see Page 16)

Macro Controls

To the left in the Controller section are 4 Macro controls, named Macro I, II, III and IV. These can be used to control multiple variables at the same time, giving you powerful control over your sound with just 4 encoders.



By pressing down on a Macro control encoder, you enter its Assign mode and the corresponding Assign LED lights up. All the continuous controls on the frontpanel now start flashing. Any continuous controls you move will be assigned to this Macro control. You can determine the range for a control by how much you turn it, and the range is indicated by that encoder's LED collar. Press the Macro control encoder again to exit Assign mode, and the Macro control is ready for use.

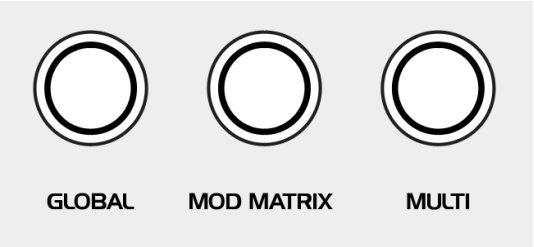
Up to 10 target encoders can be assigned to a single Macro control, which means you can tweak up to 40 variables in real time using the 4 Macro controls. Once all 10 slots for a Macro control have been filled, you cannot assign any more frontpanel controls to it, unless you first remove one of the already allocated ones (see below for removing allocated controls).

To see what controls are allocated to a specific Macro control, enter its Assign mode and note which frontpanel encoder controls that have ranges set for them, as displayed by their respective LED collars. Press the Macro control again to exit Assign mode.

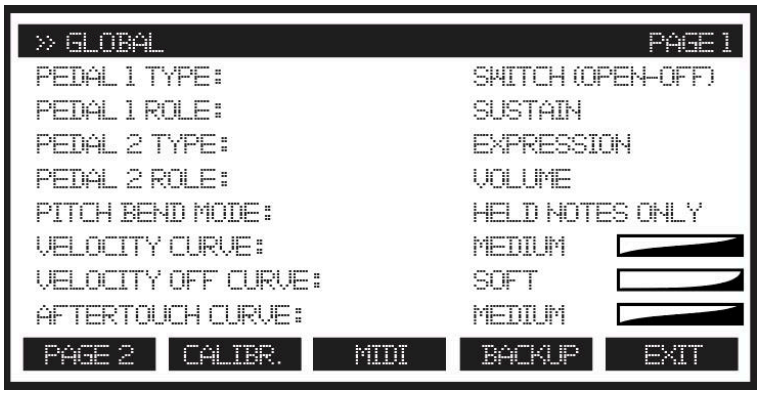
To remove an allocated control, enter Assign mode for the Macro control you want to edit and reduce the range to zero for the control you want to remove. Press the Macro control again to exit Assign mode.

Global Settings

There are a collection of settings that affect the overall instrument and not just the patch you're currently using. These can be found under the Global Settings page.



Press the white Global button to enter Global Settings on the display.



On Page 1, you can define what pedals you are using (see Page 63). Each Pedal input can be set up to use either a switch or expression pedal, with selectable polarity for the switch pedals. The expression pedal range can be defined on the Calibration page (see below). The Role for each pedal can also be defined, like Sustain or Sostenuto for switch pedals and Volume or Expression for expression pedals.

Next, you can specify the behaviour of the Pitch Bend wheel. Set it to All notes for bending all notes, including the release tails after you've lifted the keys, or set it to Held Notes Only which will only bend notes that are still held by the keys.

After that, you have the velocity curves for the keyboard. This allows you to tweak the response of the keybed to better fit your playing style. You can choose from Soft, Medium or Hard velocity curves for both Note On and Off Velocity separately - or set it to OFF to disable either of the Note On and Off Velocities. A small graph next to the value illustrates the chosen curve across the range.

You can also set a curve for the aftertouch response of the keyboard to either Soft, Medium or Hard. This affects both channel and polyphonic aftertouch. Use this setting to adjust the aftertouch response to better work with your playing style.

Press the Page 2 Soft button to view the next page of Global settings.

On this page you can Local to On (default) or Off. This setting determines whether the keyboard should trigger the internal sounds of the synth. Leave this on for most situations, since you probably want to be able to play your synth with your keyboard.

This feature is handy, however, if you're using the Positron 16 as the master MIDI keyboard for your DAW. You often get loops where the key press information is sent from the keyboard to your DAW over MIDI and then back again through MIDI Out from your DAW to your Positron 16. With Local On, you get double-triggered notes which might sound weird and will use up twice the polyphony. With Local Off, only the notes sent via MIDI through your DAW will trigger the sounds on your Positron 16.

Here, you can also set the brightness level for the frontpanel LEDs, to adjust to the ambient lighting so that the LEDs aren't too bright or dim. The lowest level is 10%, so you can't switch the lights off completely. This is because all the different controllers on the frontpanel need to use their LEDs to display their status values.

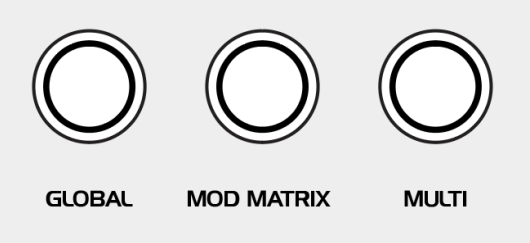
The Wheel Lights option allows you to set how the Pitch Bend and Modulation wheels use their backlighting. You can choose from Off, Proportional or On. The value Proportional means that the wheel backlighting increases with the output value of the wheel, so the more you turn the wheel the brighter it gets.

Next, you can set the brightness and contrast for the main display. This allows you to finetune it to work with the ambient lighting in your studio or on stage.

Finally, you can set the speed for the built-in fan. It can be Off, Off (Auto) or a fixed value. Off (Auto) means that the fan is off, unless the internal temperature rises too much, in which case it switches on for a while to cool down the circuit boards and protect them from damage.

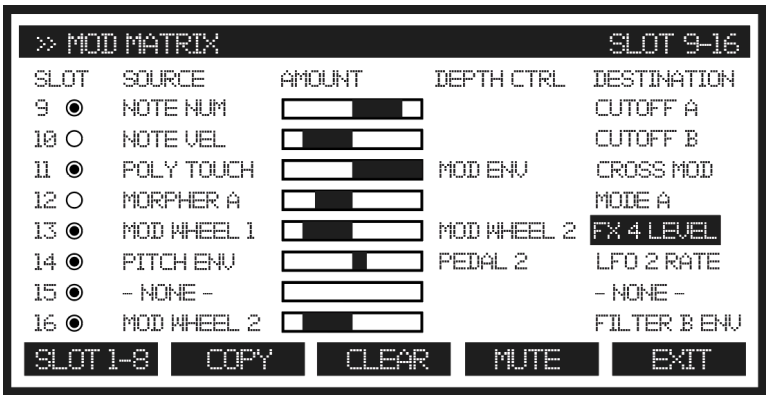
Modulation Matrix

Press the white Mod Matrix button to enter the screen for the powerful Modulation Matrix.



The Modulation Matrix is where you can set up modulation sources like physical controls (keyboard, Ribbon controller, Mod Wheels, pedals etc) or signal generators (envelopes, LFOs, sequencers etc) to affect a range of destinations. Almost every aspect of a patch can be set as a destination for a slot in the Modulation Matrix.

Each row on the Mod Matrix screen represents a modulation slot, with a Modulation Source (see Page 60), Mod Amount, Depth Control and Destination (see Page 61). Switch between Slot 1-8 and 9-16 with the Soft button below the display.



The Mod Source is generating the modulation signal, and it's routed to a Mod Destination that you want it to affect. The Amount value determines how strong the modulation from the Source to the Destination should be, and the Depth Control is an additional Mod Source that affects the Mod slot's Amount. This is convenient for having one of the Mod wheels control the amount of vibrato, for example.

The Soft buttons allow you to copy and paste values from one slot to another, for quickly setting up complex modulations, and each slot also has a Mute function, for temporarily switching off the output from that slot. This can be very helpful when figuring out complex modulation setups. The circle next to the Mod slot number indicates if a slot is active (filled circle) or muted (empty circle). By long-pressing the Mute button for a slot, you instead Solo it, by muting all other slots. This is perfect for isolating a single modulation path to examine its effect in more detail.

Overall, the Modulation Matrix transforms your Positron 16 from a regular polyphonic synth to an incredibly flexible modular synth, where the main limitation is your own imagination!

Mod Matrix Sources

- Pitch Bend
- Mod Wheel 1
- Mod Wheel 2
- Pedal 1
- Pedal 2
- CV Note
- CV Antenna
- Ribbon Controller
- Ribbon Controller Zone 2 (If split)
- Joystick X
- Joystick Y
- Macro I
- Macro II
- Macro III
- Macro IV
- Channel Aftertouch
- Poly Aftertouch
- LFO 1
- LFO 1 Unipolar
- LFO 1 Fade
- LFO 2
- LFO 2 Unipolar
- LFO 2 Fade
- LFO 3
- LFO 3 Unipolar
- LFO 3 Fade
- LFO 4
- LFO 4 Unipolar
- LFO 4 Fade
- Pitch Envelope
- Filter Envelope
- Amp Envelope
- Mod Envelope
- Note Number
- Chord Note Numbers
- Note Velocity
- Note Release Velocity
- Sequencer
- Sequencer Row 2 (If split)
- Voice Number
- Unison Voice Number

Mod Matrix Destinations

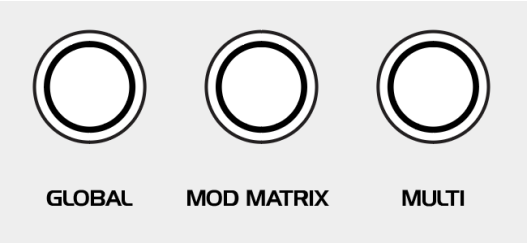
VCO 1 Octave
VCO 2 Octave
VCO 1+2 Octave
VCO 1 Pitch
VCO 2 Pitch
VCO 1+2 Pitch
VCO 1 Fine
VCO 2 Fine
VCO 1+2 Fine
VCO 1 Wave
VCO 2 Wave
VCO 1+2 Wave
VCO 1 Width
VCO 2 Width
VCO 1+2 Width
VCOs Detune
Osc Sync Polarity
Ring Mod Amount
Ring Mod Rate
FM Amount
Mixer VCO 1 Level
Mixer VCO 2 Level
Mixer Sub Osc Level
Mixer Noise Level (Bipolar)
Mixer Ext Audio Level
Filter A Cutoff
Filter B Cutoff
Filter A+B Cutoff
Filter A Resonance
Filter B Resonance
Filter A+B Resonance
Filter A Mode
Filter B Mode
Filter A+B Mode
Filter Offset
Filter Routing
Filter Output
Amp Level Offset
Amp Env Depth
Amp Spread
Amp Pan

Pitch Env Delay
Filter Env Delay
Amp Env Delay
Mod Env Delay
All Env Delay
Pitch Env Attack
Filter Env Attack
Amp Env Attack
Mod Env Attack
All Env Attack
Pitch Env Attack Curve
Filter Env Attack Curve
Amp Env Attack Curve
Mod Env Attack Curve
Pitch Env Decay
Filter Env Decay
Amp Env Decay
Mod Env Decay
All Env Decay
Pitch Env Decay Curve
Filter Env Decay Curve
Amp Env Decay Curve
Mod Env Decay Curve
Pitch Env Sustain
Filter Env Sustain
Amp Env Sustain
Mod Env Sustain
All Env Sustain
Pitch Env Sustain Slope
Filter Env Sustain Slope
Amp Env Sustain Slope
Mod Env Sustain Slope
Pitch Env Release
Filter Env Release
Amp Env Release
Mod Env Release
All Env Release
Pitch Env Release Curve
Filter Env Release Curve
Amp Env Release Curve
Mod Env Release Curve

LFO 1 Rate
LFO 2 Rate
LFO 3 Rate
LFO 4 Rate
LFO 1 Delay
LFO 2 Delay
LFO 3 Delay
LFO 4 Delay
LFO 1 Wave
LFO 2 Wave
LFO 3 Wave
LFO 4 Wave
LFO 1 Shaper
LFO 2 Shaper
LFO 3 Shaper
LFO 4 Shaper
Arp Tempo
Arp Gate Length
Arp Density
Arp Pattern
Arp Randomize
Panel Morph
Voice Detune
Voice Unison
Drift
Mod Slot 1 Depth
Mod Slot 2 Depth
Mod Slot 3 Depth
Mod Slot 4 Depth
Mod Slot 5 Depth
Mod Slot 6 Depth
Mod Slot 7 Depth
Mod Slot 8 Depth
Mod Slot 9 Depth
Mod Slot 10 Depth
Mod Slot 11 Depth
Mod Slot 12 Depth
Mod Slot 13 Depth
Mod Slot 14 Depth
Mod Slot 15 Depth
Mod Slot 16 Depth
FX 1-4 Params
FX 1-4 Levels

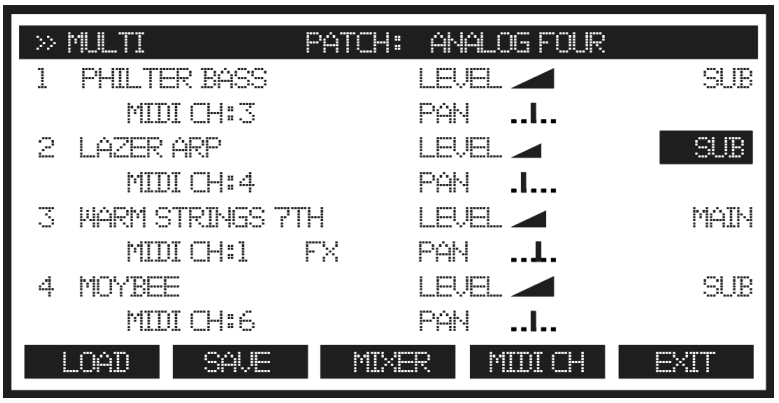
Multi Mode

The Positron 16 Multi Mode gives you the option of playing and controlling your synth multi-timbrally, with up to 4 different patches at once, for complex soundscapes and MIDI arrangements.



Press the Multi button to enter the Multi Mode on the display.

Here, you can load up to 4 different patches that can each have their own MIDI channel for multitimbral performances.



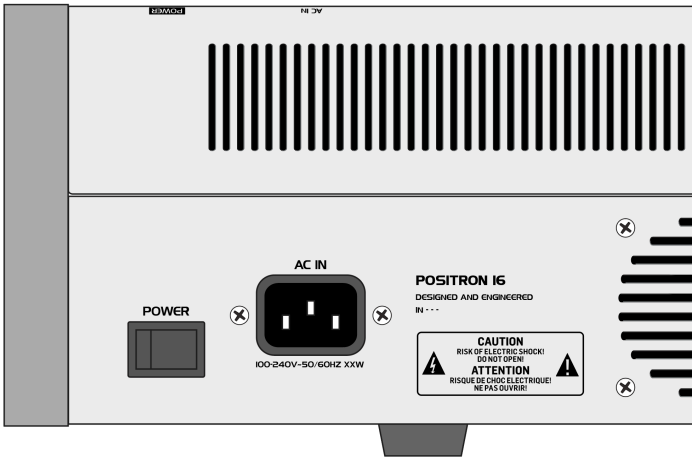
Each of the 4 slots have its own volume level and pan, allowing you to set up complex mixes. You can also specify which of the 4 slots that will use the inbuilt effects, and which of the two stereo outputs it will be allocated to.

The whole setup can be stored as a Multi patch for easy recall later.

Backpanel Connections

The Positron 16 comes fully equipped with a full range of audio and MIDI connectors, together with additional CV/Gate/Clock connectors for analog gear.

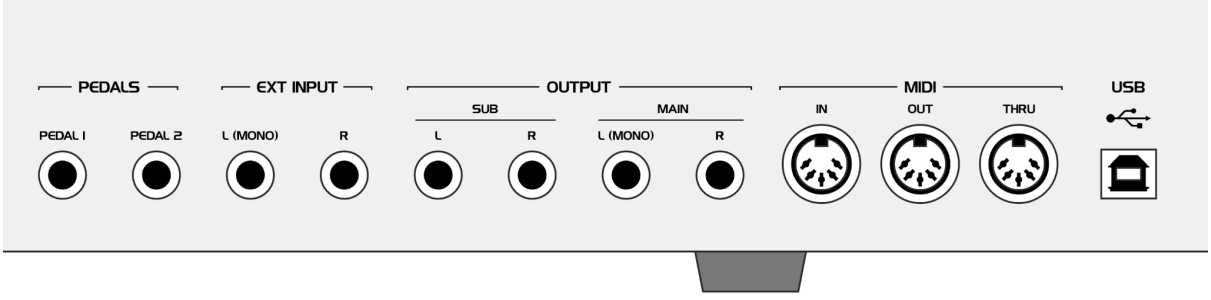
To the left is the power switch and the power cable socket, using a standard IEC mains connector.



The internal power supply accepts incoming voltages in the range of 100-240V, 50-60Hz. This makes it easy to use the Positron 16 all across the world, regardless of type of voltage available.

To the right on the backpanel, there are the USB and MIDI sockets, for digital communication with your DAW or other musical instruments.

The USB socket of type B connects to your computer, for connecting with your DAW or other musical software, as well as for updating your firmware using the SynthTribe application.



The three 5-pin DIN MIDI sockets are for connecting your Positron 16 with other electronic instruments and controllers. It allows you to play and control other synths and drum machines from the Positron 16 keyboard, and/or to control the Positron 16 from an external sequencer or play it with another keyboard, MIDI guitar or other MIDI controller.

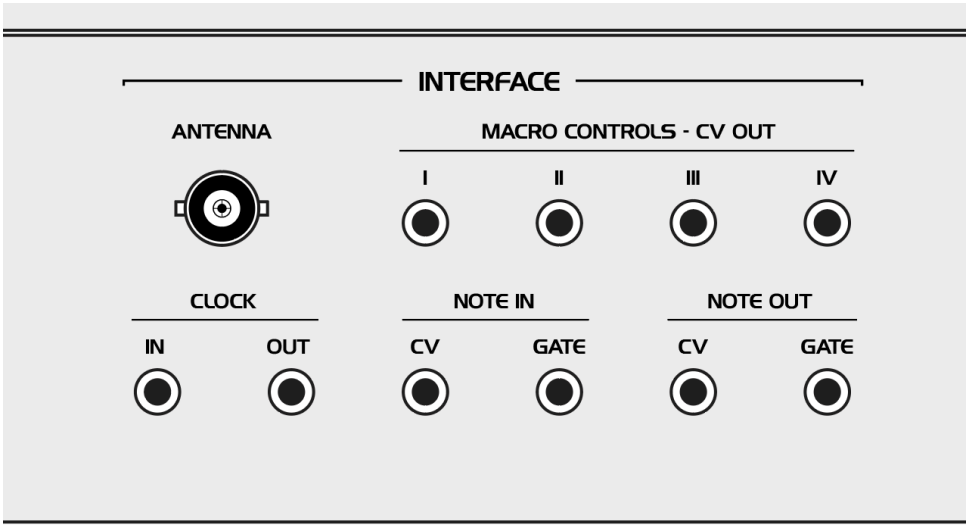
Any data that comes in through the MIDI In socket is automatically passed on to the MIDI Thru socket, to allow for daisy-chaining of multiple devices.

There are two separate pairs of balanced audio outputs: the Main L (Mono) and R sockets are the default outputs for the sound of your Positron 16. Connect them to your mixer, audio interface or amplifier.

The Sub L and R sockets are useful for when you are using your Positron 16 in Multi Mode (see the Multi Mode section on Page 62), where you can decide on which audio output each part in the Multi-patch should use. This is very handy for separating certain patches to be processed independently from the rest of the sounds.

The Ext Input sockets L (Mono) and R are used for routing external sound sourced into the synthesizer engine of the Positron 16 (see the Mixer section on Page 18). This allows you to add extra sound textures to your patch, essentially functioning as a third oscillator, or to use the filter, modulation and effect sections as a powerful special effects unit.

There are two identical inputs for external pedals (optional) - you can use either switch pedals or expression pedals. These can be set up in the Global section (see Page 57) and used for things like sustain, volume control or filter sweeps. Each pedal is also available as a modulation source in the Modulation Matrix (see Page 59).



To the left of the audio sockets, there is an Interface section. This is where you can find the CV and Gate sockets, for connecting the Positron 16 to analog and/or modular gear. There's a pair of CV and Gate sockets for Note In and Note Out. These are monophonic only, so cannot be used to send or receive chords.

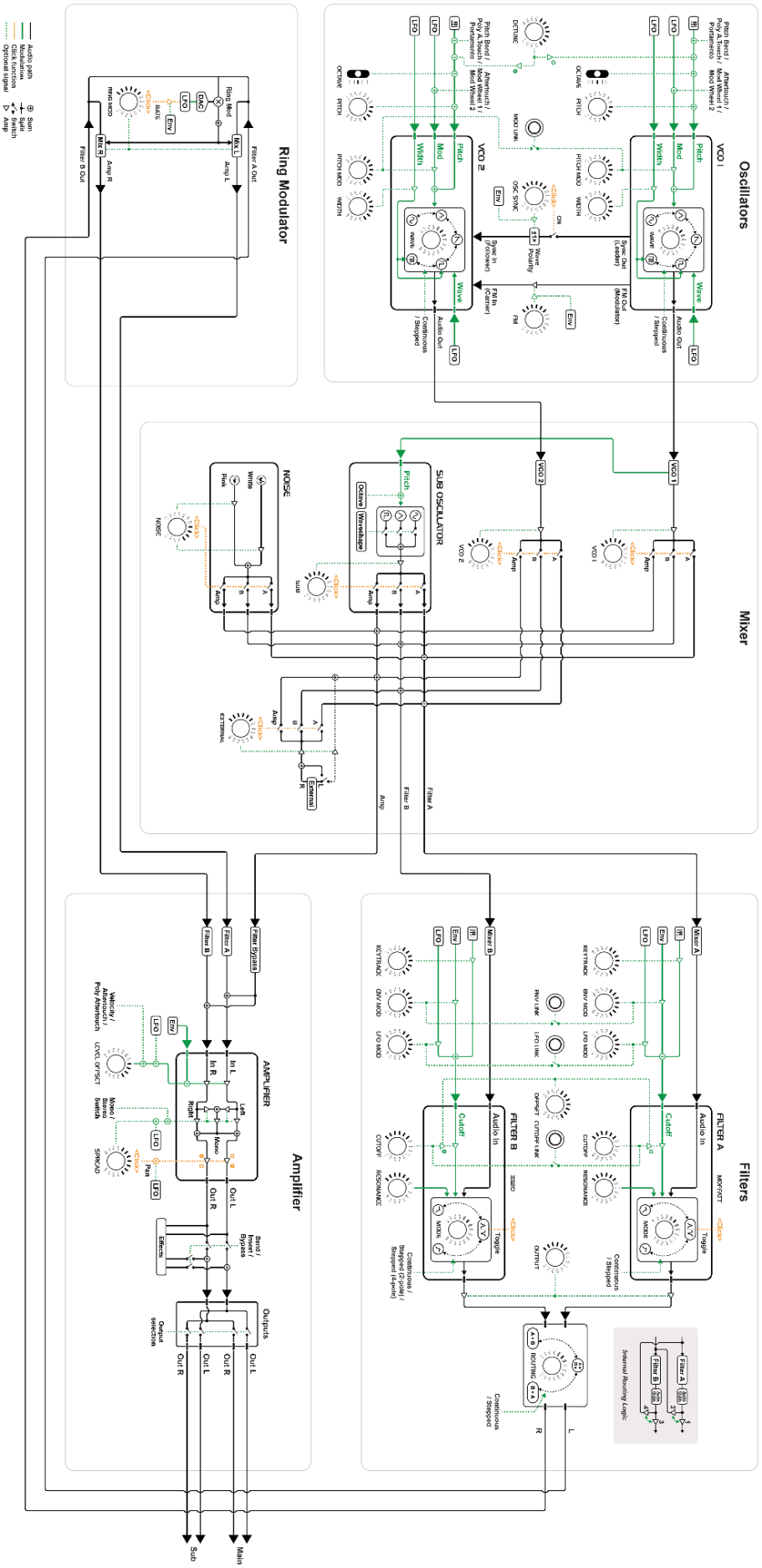
There is also a Clock In and Out sockets, for synchronization to external analog gear like drum machines, sequencers etc.

Furthermore, each of the 4 Macro controls (see Page 56) has its own dedicated CV output. This is very convenient for controlling the sound of external instruments of modular setups from the Controller Section, potentially allowing the Positron 16 to become the central controller for your whole studio.

Lastly, there's a BNC antenna connector, that will fit any standard BNC antenna (optional) and will generate a CV signal based on how close you move your hand next to the antenna.

This allows you to create Theremin-style playing effects, where the position of your hand determines the pitch of your patch, or to modulate anything else, like filter sweeps, oscillator pulse width, arpeggiator pattern or what else you can think of. The CV Antenna is available in the Modulation Matrix (see Page 59) as a modulation source, for maximal flexibility.

Voice Architecture Overview



*** Design Concept ***

Glossary

AC: Alternating current.

ADSR: Attack, Decay, Sustain and Release stage envelope.

Aftertouch: The control signal from pressure applied to the keys of the keyboard after it has been struck

Amplifier: A circuit that amplifies a signal to an higher level

Analog: Signals that look similar to the original. In audio electronics, it refers to signals that are directly generated from audio signals, or generating audio signals from electronic signals. Often regarded as warmer and richer than digital sound signals.

Arpeggiator: A function that breaks up a chord into its individual notes and plays them in a sequence.

Attack time: The time it takes for an envelope to rise from 0 to 100 during the Attack stage of the envelope.

Attenuate: Reducing the level of a signal - the opposite of amplifying.

Automate: To record and/or play back control signals

Balanced Audio: An audio connection with 3 wires for phase-cancelling and improved signal-to-noise ratio.

Bank: A set of program patches.

Bass: Low audio frequencies, below 250Hz.

BPM: Beats per minute, a tempo measurement.

Cent: A hundred (1%) of a semitone.

Chorus: The effect of multiple simultaneous voices playing the same note, slightly out of tune. It produces a thick rich sound.

Clock: A pulse signal used to set a tempo of a particular function.

Control Voltage (CV): An analog voltage signal used to control a parameter.

Cross fading: The fading in of a sound source while simultaneously fading out another.

Cutoff: The frequency at which a filter's slope is beginning to take effect. Can be accentuated by increasing the resonance level for the filter.

Cycle: A complete repetition of a sound wave. The smallest possible unit of a timbre.

DAC: Digital to Analog Converter. Converts a digital signal into an analog one.

Data: Information that is stored digitally.

DAW: Digital Audio Workstation, a software program filling the functions of a recording studio.

dB: Decibel, a unit for measuring sound levels, on a logarithmic scale.

Decay time: The time it takes for an envelope to fall from 100 to the Sustain level during the Decay stage of the envelope.

Default: The preset value for a feature or function.

Delay: An audio effect that delays part of the audio signal to generate echo effects.

Delay time: The time it takes before the Attack stage starts after a key has been pressed for a DADRS envelope.

Detune: To place a sound slightly out of tune in reference to another sound. Produces a rich chorus effect.

Distortion: An overdriven signal that shows signs of compression and added overtone content. Often used in a musical context to add character to a sound.

Effect: An audio process that alters the sound in creative ways.

Effects send: Sending part of an audio signal to an effects chain for processing.

Effects return: Mixing the return from an effects chain back into the original.

Envelope: An envelope generator is used to produce a control signal that varies over time while a key is being pressed. Often used to affect filter cutoff and audio levels of a sound.

Exponential: An accelerating increase of a signal over time.

Expression pedal: A pedal that produces a varying control voltage depending on its position. Often used to control volume of filter cutoff of a sound.

Fader: A control that fades a signal when moved to its minimum position.

Feedback: The looping back of a signal onto itself. Can produce very high signal levels.

Filter: A circuit that removes or alters the frequency content of a signal. There are a multitude of different filter types.

FM: Frequence Modulation. To modulate the frequency of a signal with the frequency of another signal. Can produce a lot of extra overtones in the signal output.

Gate: A binary signal used to switch a feature on or off. Generated by pressing a key on a keyboard.

Glide: The glide of pitch from one note to another. Also known as Portamento.

Global: Settings that affect the whole of a device and not just a particular patch.

Harmonics: Overtones in an audio signal.

Hz: Hertz, a measurement of pitch. 1 Hz is equal to one cycle per second.

Hipass: High pass filter, a filter that removes low frequencies from a signal.

Insert: Plugging an effect directly into a signal path instead of using a send/return loop.

Keyboard: Keys arranged in octaves. For playing pitched sounds.

Key track: Keyboard tracking. A control signal that tracks the pitch of the keys on a keyboard.

kHz: Kilohertz, 1000 Hz.

Level: The magnitude of a sound source or control signal.

LFO: Low Frequency Oscillator, a device that produces a repeating control voltage. Often used for vibrato and tremolo effects.

Linear: A straight and even increase or decrease of a signal over time.

Loop: Repeating a signal or group of events over and over.

Lowpass: Low pass filter, a filter that removes high frequencies from a signal.

MIDI: Musical Instrument Digital Interface, a protocol for sending and receiving primarily note data, but also controller data and MIDI SysEx information like patch data.

MIDI clock: A digital clock signal over MIDI for synchronization of instruments, sequencers and other equipment.

Mixer: A device or circuit for mixing several signals together.

Modular synthesizer: A synthesizer built from individual modules, like oscillator, filter, amplifier and envelope modules.

Modulation: Using a control signal to modify the function of a feature.

Modulation matrix: Mod matrix, a setup of slots for routing modulation sources to one or more modulation destinations. A very flexible way to set up complex modulation schemes.

Modulation wheel: Mod wheel, a controller wheel for affecting one or more parameters in real time.

Mono: A single sound signal. Compare stereo, with two signals (left & right)

Monophonic: A device that only allows you to play one note at a time.

Mute: Silencing of an audio signal.

Noise: A high-frequency random signal.

Note priority: Specifying what note will be played if more keys are pressed than the number of available voices. Typically either last note, highest note or lowest note.

Octave: A range of 12 semitones. The doubling of a note's frequency.

Oscillator: An electronic sound source that produces a range of different waveforms.

Oscillator sync: A way of restarting the phase of an oscillator (follower) by using the phase of another oscillator (leader). This can force the follower to restart its waveform before it has completed a full wave cycle, resulting in a different sound.

One shot: A single control signal event that does not repeat.

Output: The audio or control signal sent from a device.

Overtone: Frequency component in a sound that is higher than the main fundamental frequency.

Pan: The placement of an audio signal in the stereo field.

Parameter: Setting that can be changed.

Patch: The stored data that makes up a sound.

Phase: The relative starting point of a wave cycle.

Pink noise: Noise with more bass content than white noise.

Pitch: The tonal value of a sound.

Pitch bend wheel: Pitch bend, a controller that bends the pitch of a note that is being played.

Pole: A stage in a filter design. More poles results in a steeper cutoff slope. Typically 2-pole or 4-pole.

Polyphonic aftertouch: Similar to regular channel aftertouch, but with a separate control signal generated for each key. This allows for precise control of the sound on a per-note basis.

Polyphony: The number of voices that can be played simultaneously.

Portamento: A way to let notes glide from one pitch to another while playing.

Preset: A factory made program or patch that comes built into a device.

Program: A complete setup of all editable variables. See Patch.

Pulse wave: An asymmetrical square wave. Part of the result of Pulse Width Modulation (PWM).

PWM: Pulse Width Modulation. The manipulation of the width of a pulse wave. Produces a rich chorus-like sound.

Rate: The speed of a feature or function.

Release time: The time it takes for an envelope signal to go from the Sustain level down to 0 at the release of the key. The final stage of an ADSR envelope.

Release velocity: The speed at which a key is released. The higher the value, the faster it has been released. Can be used to control the release of a sound.

Resonance: Emphasis of the cutoff frequency in a filter. High levels of resonance can cause a filter to self-oscillate, which produces a sine wave at the frequency of the cutoff.

Reverb: A room emulation effect, for placing a sound source in a virtual space.

Sawtooth wave: A ramp wave that goes from high to low. Produces a rich buzzy sound.

Semitone: A half-step on the chromatic scale. There are 12 semitones in an octave.

Sequencer: A device that stores and plays back a series of notes at a given tempo.

Self-oscillation: A filter with its resonance level so high that it produces a sound even without any input signal.

Signal flow: The path of a signal through a device or circuit.

Sine wave: A pure mathematical waveform that only produces a single fundamental harmonic. Produces a soft pure sound.

Slew: A signal that is set to glide from one value to another.

Sostenuto pedal: A pedal that sustains already held notes, but won't sustain any notes that are pressed after the sostenuto pedal has been engaged. Compare Sustain pedal.

Square wave: A symmetrical pulse wave, where the up and down states are of equal length. Produces a hollow slightly buzzy sound.

Step: A discrete stage of a sequence.

Stereo: Two audio sources placed left and right.

Sub oscillator: An oscillator that produces a sound below the frequency of the main oscillator(s).

Subtractive synthesis: The basis of analog synthesis, where one starts with a harmonically rich waveform and filters out (subtract) unwanted content.

Sustain level: The level an envelope stays on while the key is being pressed, after having gone through the delay, attack and decay stages.

Sustain pedal: A foot switch used for sustaining played notes even when releasing the keys. Compare Sostenuto pedal.

Sync: Synchronisation, keeping two or more clock signals or other rhythmic features in time with each other.

SysEx: A MIDI message for transmitting device specific information, like patches or parameters.

Tempo: The speed of a device or feature. Typically measured in BPM (Beats per Minute).

Timbre: The tone characteristics of a sound, made up of the number, frequency and levels of its partials/overtones.

Transpose: Increasing or decreasing the pitch of a sound in semitone increments.

Tremolo: A cyclic variation of volume, compared to vibrato for pitch.

Trigger: To activate a function or feature, for instance: key triggered.

Tune: To adjust the pitch of an instrument or device until it reaches the desired pitch.

Unison: Multiple voices played together. Produces a rich chorus-like sound, especially if each voice is slightly detuned.

USB: Universal Serial Bus, a digital protocol for transmitting digital information between devices. Often used to connect a device to a computer.

VCO: Voltage controlled amplifier, an analog oscillator with an analog control signal. It is often regarded to sound warmer and richer than a digitally controlled oscillator (DCO).

Velocity: The speed a key is pressed at. The higher the value, the faster it has been hit. Often used to affect the brightness or loudness of a sound.

Vibrato: The cyclic variation of pitch, compared with tremolo for volume.

Voice: The sound being produced when the full signal chain is triggered: oscillators, filter and amplifier.

Waveform: A repeating cyclic signal used both for producing sound (oscillator) or control voltages (LFO). A waveform can have many different shapes that produce different timbres if audible.

Wavelength: The full cycle of a waveform.