LinPlug
Virtual Instruments

# CRX4

CrX4
User Manual


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Many thanks to the helping hands of Colin Bennett, Frank Neumann, Jacky Ligon, Kelvin Russell, Nico Herz, Patrick Robert and Timothée Crépin!

# Welcome

Thank you for purchasing a CrX4 license or trying the CrX4 demo.

The CrX4 is a sample-based software synthesizer, but no sampler (more on this soon). It is designed for creating music on your personal computer, both on Mac and Windows PC.

The CrX4's key features 3 different sample based generators which “eat a sample” and create some new sound from it. Though you can play back a sample as it was recorded, this means missing the potential of CrX4. To get you started and inspire your own creativity CrX4 comes with a selection of high quality presets in a wide range of styles, an easy-to-use one-page interface, two user-programmable stereo filters, an enormous range of processing and modulation options including a powerful arpeggiator, as well as a sophisticated effects section.

We believe that the CrX4 is an exceptional instrument because of its unique audio processing capabilities, which result from the fact that we at LinPlug design most of our audio modules from scratch, sometimes following paths no one else would even consider. We hope you get a lot of yet unheard sounds using the CrX4 sample synthesizer and that it becomes an integral part of your music-making.

The LinPlug team, June 2012

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# Installation

### Installation on Mac

After downloading the LinPlug CrX4 for Mac you will find a file named "CrX4 Installer nnn.dmg" (or "CrX4 Demo Installer nnn.dmg" if you just try the demo) located in your download folder. “nnn” is the actual version number, for example “100”.
Most Mac will mount the disk image automatically. If not, please double-click this file to open the image.
Then double-click the installer program which will guide you through the installation process. The plugin file for CrX4 and the factory presets will be placed in the directory for virtual instruments on your Mac.

The next time you start your host software the LinPlug CrX4 will be listed in the AU and VST effects plugin list.

The installation is always only for the current user; if you want to use the plugin with different users on your computer, each user must run its own installation.

### Installation on PC

After downloading the LinPlug CrX4 for PC you will find a file named "CrX4 Installer nnn.exe" (or "CrX4 Demo Installer nnn.exe" if you just try the demo) located in your download folder. “nnn” is the actual version number, for example “100”.
Start this program and the installer will guide you through the installation process. Make sure you choose the correct plug-in directory so that your host software can find the CrX4. Refer to your host software's manual if you are unsure about where this plug-in directory is located.
The plugin file CrX4 32.dll (if you choose the 32 bit version) or CrX4.dll (for the 64 bit version) and the factory presets will be placed in the chosen directory. The next time you start your host software the LinPlug CrX4 will be listed in the VST effects plugin list.

The installation is always only for the current user; if you want to use the plugin with different users on your computer, each user must run its own installation (however, you can choose the same installation location).

**Common to Mac and PC**

The first time the LinPlug CrX4 is started a Serial Number edit box will be visible on the Setup page. It reads "Enter Serial here" in red letters. Copy/Paste the serial number you have received into this edit box. If the serial number has not been entered or it has been entered incorrectly, the LinPlug CrX4 will remain in demo mode.

If you have any questions regarding the installation of LinPlug CrX4 please contact our support team at:
http://www.linplug.com/support/support.htm.

# Features

- 4 Generator modules with 5 types of Generators: Time Sampler, Wavetable Sampler and Loop Sampler as well as an Oscillator and Noise Oscillator.
- Generator FM and AM options.
- Time Sampler Generator with real-time control, separate time-stretching and pitch-shifting.
- Wavetable Sampler, a unique Generator that offers wavetable-like operation using any sample.
- Loop Sampler Generator with individually modulatable loop points and start point.
- Classic Oscillator with many waveforms for analog-style synthesis.
- Noise Oscillator with many filter options
- 2 analog-style multimode stereo filters with modulatable cutoff frequency, resonance, filter type and envelope depth.
- Several envelopes for controlling Amplitude and Filter Cutoff as well as an assignable Modulation Envelope.
- 4 independent LFOs with various waveforms, tempo-sync capabilities and one-shot-mode.
- LFOs have adjustable delay, attack, symmetry and phase setting
- 10 slot Modulation Matrix with 23 sources and more than 50 destinations
- Fully recognizes Velocity, Aftertouch, Pitch bend , Mod-Wheel and various other MIDI controllers
- A sophisticated effects section containing 12 effects including

various Delays, Chorus, Phaser, Filter, Reverb, Flanger, Gator, Stereo Enhancer, Parametric EQ and Crusher.
- Mono/Polyphonic Portamento/Glide featuring “Fingered” mode, switchable constant Time/constant Rate and Auto-Bend Modes.
- 32-voice polyphony (CPU and preset dependent).
- Adjustable voice limit (Mono...12, all).
- Supports AU and VST hosts on Mac OS X and PC.
- Supported audio formats include WAV and AIFF up to 24bit/96kHz.
- Sample accurate timing, full automation and settings are saved with your song.

# Overview

The CrX4 is a 32 note-polyphonic VST sample-based synthesizer with some extraordinary features. The instrument includes various Generators, Filters, Effects and Modulation modules.

The design of the CrX4 can be divided into 4 main sections: Generator, Filter, Effects and Modulation. Furthermore there are various general settings, a bank/preset browser and a setup page.

Audio signals are created by a Generator that gets triggered from your host software (DAW software), which might come from track or being played life from your MIDI Controller (Keyboard, Guitar etc).

The output of the various Generators can be combined in several ways. The signals can be mixed together proportionately or the outputs of Generator 1 and 3 can be used to modulate the frequency or amplitude of Generators 2 and 4 respectively.
This AM or FM increases the harmonic spectrum of the modulated Generator producing very interesting, harmonically-rich results. At this point the signals can also be detuned and thickened using the Spread control.

The output of the Generator section is then routed through the Filter section, consisting of two individual filters. The filter modifies the harmonic spectrum of the signal. Each filter includes an envelope for controlling the filters Cutoff parameter, but other parameters of the filter can be modulated through the Modulation Matrix.
The filters can be either used in parallel or in serial; when in parallel the filters output is sent to effects 1 and 2 respectively. When in serial, the

output of filter 1 is send to filter 2 and the output of filter 2 is sent to the effect 1.

Following the Filter section is the CrX4's Effects section which contains 6 independent effects processors. A wide range effects processors are available including a three types of delay, a chorus, a phaser, a filter, a reverb, a flanger, a gate, a stereo enhancer, a parametric EQ and a bit-reduction/sample-rate reduction distortion.
Effect 1 is following Filter 1 and Effect 2 is following Filter 2, when the filters are used in parallel, the output is mixed together and then goes through Effects 3, 4, 5 and 6 which are in series. When the filters are used in serial, all effects are processed in serial too.

The Modulation section contains the instrument's Envelopes, LFOs, Arpeggiator and Modulation Matrix. At various points throughout the CrX4's signal path you can modulate the processing parameters using the various controls found in the instrument's Modulation section.
The available modulation include 6 envelopes, 4 LFOs, a Modulation Matrix "patchbay" and the arpeggiator. Independent from this every MIDI Controllers can also be used to modulate any of the CrX4's parameters and some can control the Modulation Matrix (in example the Modulation Wheel).

# Operation / Controls

The LinPlug CrX4 dials and sliders are operated in a linear manner, so just move your mouse up/down to modify a control.

Holding down the ALT key while clicking on a control changes the selected control's value a minimum step upwards (when clicking in the upper half of the control) or a minimum step downwards (when clicking in the lower half of the control).

Holding down the CTRL key (Windows) or COMMAND key (Mac) while clicking on a control sets the control to its default value (e.g. for Volume controls it sets the control's value to 0 dB).

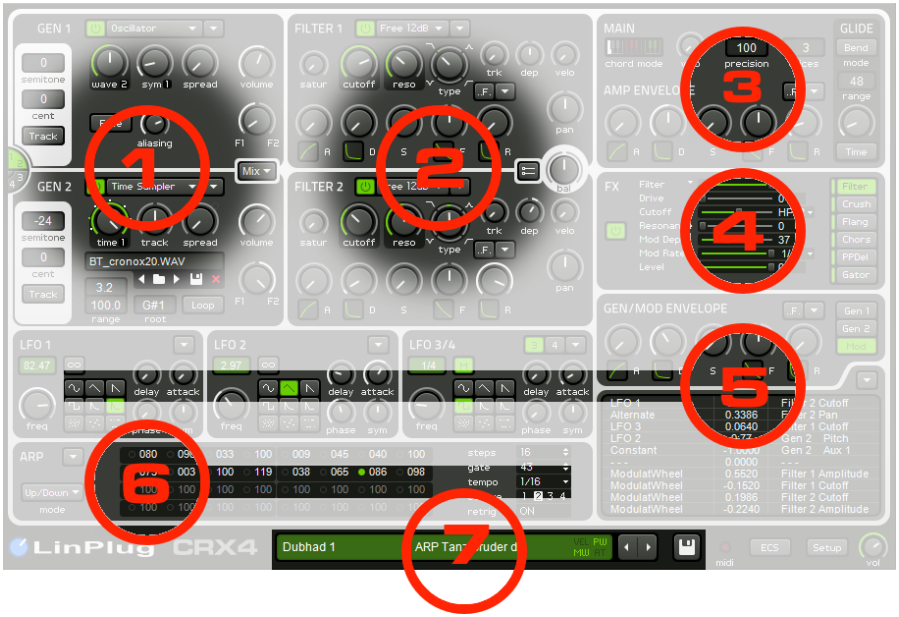
Holding down the SHIFT key while changing a control's value enables finer control values to be set.

Double clicking once in a Modulation Matrix slot sets the value of the slot to 0.00. Double clicking in the same slot a second time resets the slot to its previous value.

All Controls can be controlled using external MIDI messages. To do this you need to use the LinPlug CrX4's ECS which is described in detail later in this manual.

# User Interface Sections

The user interface of the CrX4 is a major overhaul from its predecessor CronoX 3. It has been redesigned in order to make using it easier and more streamlined. A major difference is that all relevant edits are on a single page now. The idea behind this is to give the user direct access to the instrument's most commonly used controls.




The CrX4's Main panel can be divided into 7 sections:

1. Generator
2. Filter
3. Main (including Glide)
4. Effects
5. Modulation (LFO, Envelopes and Matrix)
6. Arpeggiator
7. Preset Browser

# Generator

The Generator section is located on the upper left of the instrument's Main

There are two controls, which affect both the upper and lower Generator simultaneously: The Generator Switch and the Cross-Modulation Switch.


The Generator Switch

The half-round switch on the very left between the upper and lower part of the Generator section allows to switch between the most used Generators 1 and 2 and the less often used Generators 3 and 4. The large light indicates which Generators are edited, while the smaller light indicates when at least one of the currently not visible Generators are used. This is giving you a hint that there is more making up the sound than is currently visible in the Generators section.

## The Cross-Modulation Switch

The Mix, AM and FM button determine the output destination of Generators 1 and 3 respectively. While we explain it here for Generator 1, the same applies for Generator 3. When the Mix button is selected the output of Generators 1 is mixed with the other generators output.
The AM (Amplitude Modulation) setting enables the amplitude of Generator 2 to be modulated by Generator 1. This type of modulation can be used to produce rich and complex waveforms.
The FM (Frequency Modulation) setting allows the frequency of Generator 2 to be modulated by Generator 1. This type of modulation is great for producing metallic, bell-like tones.

In case of AM or FM, the Generator 1 is operating in mono, so if a stereo sample is used in the Loop Sampler Generator as modulation source, then only the left channel is used.

The Generator Controls

The upper and lower part in this section are apart from the just mentioned two controls absolutely identical. The respective controls in each Generator are partly the same and partly depending on the type of Generator used:

## Common Controls on Top

Each Generator also has its own On/Off switch located to the left of the module's menu. If you don't want to use one of the Generators it's best to switch it off as this conserves CPU resources.

Next is a Menu which allows to select the generator type. There are 5 different available within the CrX4: Time Sampler, Wavetable Sampler, Loop Sampler, Oscillator and Noise Oscillator.

Finally there is a Edit Helper Menu which offer functions to copy and paste one generators settings to a different generator and to init the settings of a generator.


Common controls on the Left

Each Generator module contains controls for Semitone, and Cent. Semitone sets the Generator pitch in semitones. A wide range covering multiple octaves up or down is available: -60 to +60 semitones (thats -5 to +5 octaves).
Cent sets the oscillator pitch in cents (a semitone is equal to 100 cents). A range of -100 to +100 cents is available.

The Track button determines whether the Generator tracks the pitch of incoming note messages. If Track is switched off the frequency of the Generator depends on the Semitone and Cent settings only and is the same whatever note is played.

Common controls on the Right

The Volume dial is used to set the output level of the Generator. If the Generator is being used for either AM or FM then this parameter controls the intensity of the modulation.

The setting of the Bal (“Filter Balance”) dial determines the proportion of the signal that is sent to Filter 1 and Filter 2. Turning the dial all the way to the right sends all of the oscillator's output to Filter 2, while turning it all the way to the left sends all of the output to Filter 1.
Note that when using AM of FM modulation, this control in Generator 1 (or Generator 3) is disabled (greyed out).

## Generator Spread

Though this parameter is not in all Generators it is in three of them: Time Sampler, Wavetable and Oscillator.


Spread is the “polyphonic unison” of CrX4, the detuning of stacked Generators. The Spread dial is used to set the degree of detuning. When moved from the leftmost position the dial gradually detunes five of the currently selected Generators to produce a thick and fat sound. This does not affect polyphony (however it does use more CPU resources). The range is Off (thats 0 cent) to 50 cent. To make sure you not miss a very small detuning (when the dial is almost, but not yet at its leftmost position), there is a small indicator light top-right of this dial, which is lit as soon as all 5 voices are active.

## Time Sampler Generator

The Time Sampler Generator is one of the key features of the CrX4. In some ways, the Time Sampler Generator is like a conventional sampler: you load a WAV or AIFF file into the Generator and then trigger it.
It however holds just one sample and there are no velocity splits or key regions. Although only one sample is used as basic waveform for the Time Sampler Generator, what you can do with this one sample is unique. You can time-stretch it in real-time (and this time is available as modulation destination for dynamic modulation in the matrix!). You can pitch-shift it without affecting the duration. You can use key tracking to control the Time parameter, all this is allowing you to create really weird sample-based sounds!


The Time control enables you to continuously time-stretch the loaded sample in real-time. As a result, you can shorten or lengthen the sample independently of its pitch. In example, a value of 133 means that the sample is 133% of its original length. If it was originally 3 seconds in duration it becomes four seconds in duration. The Range is: 25%...3200%.

Around the Time dial there are marks at 50%, 100% (green), 200, 400, 800 and 1600%

The TimeTrack control enables you to set the duration of the sample independently of its pitch. Let's say for example, your sample's root note is C3 and that it is 4 seconds in duration. What happens to the duration of the sample when you play a C4 (one octave higher)?
This is where Time Tracking comes into play. If you set the Time Tracking control to 0, the sample duration remains at 4 seconds. If you set the Time Tracking control to 100%, the sample duration will be reduced to 2 seconds (a doubling of the frequency results in a halving of the duration, just as in the case of a conventional sampler). If you set the control to 50%, the duration will be about 3 seconds, while with a setting of -100% the sample is reversed and has a duration of 8 seconds. Range: -100%...100%

The Spread is described in the general Generator description right before this section.

Next is the Sample Name display, which not only indicates the name of the used sample, but also has a color coding: When written in white, the sample is from the CrX4 library (within the Library folder), when it is dark red it is from outside the Library (thus indicating you need to make sure it is always available at its current location as CrX4 might else not be able to relocate it). A light red written sample name indicates that the sample could not be located. As a guideline it is a good idea to save all presets to the “My Presets” folder (or another user created folder) within the Library, as this makes sure your samples are all in the Library and all you need to backup is the Library (and no other locations).

The Sample control is used for loading and unloading samples. The Load button (folder symbol) opens a dialog that lets you select a file for loading. The Previous and Next buttons allow you to traverse a list of samples. The Clear button (X symbol) is used to remove a sample from the Generator (thus freeing memory and producing no sound anymore).

The Range controls is used to set the relative start and end point of the sample. If the first (upper) value is set to 0 the sample starts right from the file’s original start point. Higher values set the start point towards the end of the sample. The same applies to the second (lower) value adjusting the end of the used region of the sample.

The Root control enables you to set the unity note of the loaded sample. If, for example, you set Root to C1 and play a C2 the sample will be played one octave above its original frequency. In the case of the Time Sampler Generator, if you wish to obtain the most natural sound then it's essential that the sample's root note is set to the same note as the one at which the sample was initially recorded. Otherwise the Generator will produce unusual effects. In many cases however, it is precisely these effects that give the CronoX its interesting and unique sounds.

The Loop switch enables a complete loop of the sample, that is, when it comes to its end it starts from the begin again. This is aprticular useful with short samples of when you shorten its time with the Time parameter.

## Wavetable Generator

The CrX4's Wavetable Generator module uses a sample to generate a wavetable. This Generator works “best” with samples which are both exactly in tune and without gaps (regions of silence). However, it might be that just something not in tune or with varying pitch results in the most interesting sound.


The Speed dial determines the playback speed of the wavetable where the red marked setting is the approximate speed of the original sample. Interesting results are usually achieved with slower playback, rather than with faster playback.

Around the Speed dial there are marks at 25%, 50%, 100% (green), 200, 400, 800 and 1600%. These represent speeds from ¼ of the original speed (duration) to 16 times the original speed.

The Speed Track dial determines whether the playback speed gets faster with higher notes (positive tracking) or slower (negative tracking). This can be used for achieving an effect similar to that found on conventional samplers where playback gets faster as pitch increases. The range is: -100%...+100%, so with negative values you can create just reverse the effect usually found on simple (or older) samplers.

The Spread is described in the general Generator description before this section.

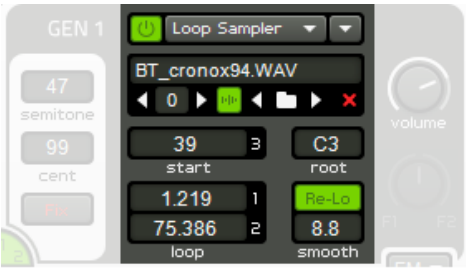
The Sample control is used for loading and unloading samples. The Load button (folder symbol) opens a dialog that lets you select a file for loading. The Previous and Next buttons allow you to traverse the samples within the folder where you last loaded a sample from.
Attention: When no sample is loaded, the Wavetable generates a sine wave and thus works like an oscillator with a sine waveform.

The Range controls (located in the low left) enable you to define a fraction of the sample to be used as a basis for the wavetable. This way you can in example exclude the begin or end of the sample or narrow the sample down to only a small part.

The Root control enables you to set the unity note of the loaded sample. If, for example, you set Center to C2 and play a C3 the sample will be played one octave above its original frequency. In the case of the Wavetable Generator, to obtain clean wavetables it's essential that the sample's root note is set to the same note as the one at which the sample was initially recorded. Otherwise the Generator will produce more or less rough, harsh sounds.

## Loop Sampler Generator

The CrX4's Loop Sampler Generator is ideally suited to looping samples in a creative way. The user interface for this Generator is divided into two parts: the Settings in the generator area and an additional Waveform window in the lower part of the GUI, which can be opened with the Display Switch in the Settings.




The Settings in the Generator window contains the following controls:

The Sample Filename shows which sample is currently loaded (in the active sample slot). Right below the filename, on the left is a number which has small arrows left and right of it. Usually you will see number 0 here, indicating you work with the first sample slot. The Loop Sampler however allows to work with many samples, though this is not the common way of using it. To work with more than one sample you can here switch through 64 individual sample slots (indexed 0 to 63).

The Load button (folder symbol) opens a dialog that lets you select a file for loading. The Previous and Next buttons allow you to traverse a list of samples. Once loaded, the sample's name is displayed to the right of the Next button. The Clear button (X symbol) is used to remove a sample from the Generator.

Below the file controls you find on the left the Start parameter (allowing to start the sample from a certain point instead of from the beginning) and the Loop-Points (Start and End), allowing you to define a part of the sample

which is looped. These three parameters can also be adjusted in the Waveform Display window allowing you to actually see these parameters right on the loaded sample.

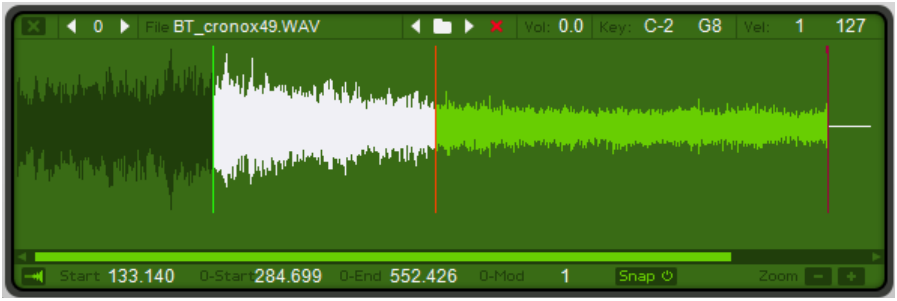
Moreover these three parameter (Start, Loop Start and Loop End) can be dynamically changed in realtime during playback of the sample. They are available as “Aux Mod 1” for the Loop Start and “Aux Mod 2” for the Loop End.

The Root control enables you to set the unity note of the loaded sample. If, for example, you set Center to C1 and play a C2 the sample will be played one octave above its original frequency. Range: C-2...G8.
The Start, Loop-Start and -End and Root parameters are per Sample, so if you use more than one sample in this Generator, each sample has its own settings. The following parameters however, are global for all samples!

The setting of the Release Loop button determines what happens in terms of sample playback after a note is released. When the Release Loop button is on, sample playback continues from within the loop even after a Note Off message is received. This means that the segment of the loop after Loop-End point never gets played. When the Release Loop button is off, sample playback ends with the segment of the loop after Loop-End point.

The Smooth (“Smoothing”) setting determines the degree of loop-smoothing when loop points are used. The maximum setting is 99.9%. A setting of 50% means that half of the loop's length is used for smoothing. Depending on the loop length, a setting between 5 and 20% should be sufficient for smooth loops even with loop points being modulated. It's best to use higher smoothing settings for shorter loops.
Please note that Smoothing cannot work sufficiently when the loop start point is the same as the sample start point.

*Settings in the Waveform Display*




The Waveform Display window shows the currently selected sample as well as the sample's start point marker (a green vertical line), the loop's start point marker (a bright red vertical line) and endpoint marker (a darker red vertical line).

Top left is a small X button to close this window (and showing the LFO and Arpeggiator edits again).

Next is the control for selecting one of the up to 64 possible samples for this generator, click and drag the number or use the arrow buttons to move up or down one sample at a time. Note: most factory presets only use a single sample, because the CrX4 is not meant to be a conventional sampler using multi samples in the first place.

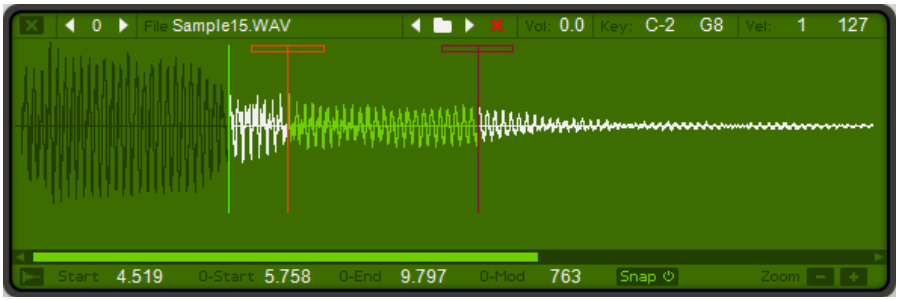
Next comes the Filename as well as the controls to browse or clear the sample. These controls are the same as in the generator edit region.

The Vol (Volume) setting adjusts the volume of the current sample.

The Key Range setting is used to determine which notes trigger a sample. If you want the Loop Sampler Generator to play more than one sample, use a different Key Range for each separate sample. In this way you can have up to sixty-four different samples triggered by different notes within one Loop Sampler Generator. If you use velocity-split samples the Key for all samples will be the same, however a different velocity range (see below) will trigger each sample.

The Velocity setting determines the velocity range in which a particular sample is triggered. Setting different velocity ranges for individual samples allows you to create expressive multisampled instruments that respond

dynamically to MIDI input. If you overlap the velocity ranges (for example, sample 1 is triggered in the 1 to 80 velocity range while sample 2 is triggered in the 50 to 127 velocity range) you create what is known as a velocity crossfade. In the crossover region (50 to 80) the volume of one sample is successively reduced, while the volume of the other sample is successively increased until only one sample is heard (below 50 and above 80, in this example). Note: the screenshots in this manual do not visualize this example, as in CrX4 you always only see one sample at a time.




The most prominent part is the sample display, showing a graphical representation of the sample. The sample data is drawn in different colors: dark green represents not-played parts of the sample (which are before the Start Point). Next is a white sample wave for normal playback and the loop region drawn in a light green color. Samples behind the loop are agin shown in white.

To adjust the start and loop point markers click on or near the vertical line and drag them forth or back. The degree to which the Loop Start and Loop End can be modulated is adjusted by clicking near the top of the loop's start point marker (the first, bright red vertical line) and dragging to the right. A small horizontal rectangle opens, indicating the maximum modulation range.

The scrollbar at the bottom of the display allows you to scroll the sample sideways when it is too long to be displayed in the window. This, of course, depends on the current magnification setting (described a few lines below).

The Reverse setting determines the direction in which the sample is played back. Normally, samples play from start to end. However, by clicking on this button sample playback is reversed.

The parameters Start, Loop-Start and Loop-End are the same as in the main generator window, as described above.

The Loop-Mod determines the degree to which the Loop Start and Loop End can be modulated from the Matrix. In the Matrix Loop Start is labeled “Aux Mod 1” and Loop End is labeled “Aux Mod 2”.

The setting of the Snap button determines whether sample loop points are restricted to zero crossing points or not. When switched on sample loop points can only be set to a zero-crossing point within the sample. This produces a smoother, more natural sound. When the Zero Crossing button is switched off, sample loop points can occur from any point within the waveform. This can be used to produce aggressive or clicky sounds.

The Waveform display's magnification is set using the plus and minus buttons at the bottom right of the display. Clicking on plus increases the details of the waveform (zooming in) while the minus shows more of the waveform (zooming out).

## Oscillator Generator

The Oscillator Generator is a not-sample-based source of sounds which allows a blend between sawtooth and pulse waveform with a number of options.


The Waveform dial sets the Generator's waveform shape. When turned all the way to the right it outputs a pulse wave. When turned all the way to the left it outputs a sawtooth wave. In intermediate positions it outputs a waveform that is a combination of the two.

The Symmetry dial affects the waveform's shape, expanding and contracting the first half of the cycle, as in the case of pulse width modulation. Symmetry can be applied to any available waveform-mix, not just pulse.

The FreeRun button is used for setting the starting point in the waveform's cycle when a new note is started. When the FreeRun button is switched off, the waveform always begins from the same starting point: the begin of the cycle. When the FreeRun button is switched on, the Oscillator runs continuously (free or not-retriggered), so that the phase of the waveform at note start is at a random point is the cycle.

## Noise Oscillator

A new oscillator in version 4 of CronoX is the Noise Oscillator. It is pretty versatile combining a noise source with two filters (right inside the generator module).


A high pass (HP) and a low pass (LP) filter allow multiple filtering scenarios which are described soon. The filters allow separate resonance for high pass and low pass. In band reject mode the remaining frequency bands below and above the band reject can be adjusted using the mix dial.

Both the operation frequency as well as the mix can be modulated.
Low Pass: To only cut the higher harmonics out of the noise you can low-pass filter the noise by keeping the HP at default minimum setting and control the LP cutoff with the LP cut parameter.

High Pass: To only remove the lower frequencies you would keep the LP filter cutoff at ots default setting (fully right) and control the HP cutoff frequency with the HP cut dial.

Band Pass: When you combine HP and LP filter and keep HP cutoff below LP cutoff you effectively have a variable width band pass filter. The passed frequencies are between the HP and the LP cutoff.

Band Reject: In the moment the HP cutoff is above the LP cutoff, the filter turns into a variable width band reject filter. In this filter mode the “Mix” parameter gets enabled to balance the harmonics above the rejected band with the harmonics below the rejected band.

In any operation you can make use of the Rough switch, which function is not obvious in most operation modes. First it is important to know that the noise filter is both able to track pitch (though it is not tuned) as well as to operate at a fixed frequency, which can be set with the semitone and cent controls left of it.
Once you tune the noise pretty low (e.g. -36 semitones) the function of the Rough switch becomes audible, changing between two different noise generation modes allowing either a normal or rather rough noise sound to be produced.

# Filters

The CrX4 contains two independent multi-mode filters. The controls for Filters 1 and 2 are located in the middle of the GUI near the top. The filters 1 and 2 are identical so they have only been described once.


To turn a filter module on or off, select the On/Off button to the right of the Filter label. An important point to note is that when a filter is turned off no filtering is applied so that the audio signal passes straight through it without being altered.

The Filter Type selector is located right next to the On/Off button. The available filter types are Standard, Free 12dB and Free 24dB. More about the available types soon.

Right of the Filter Type is again a Edit Menu with functions to copy and paste a Filters settings between Filter 1 and 2 (and also between different patches) as well as to init them.

*Standard Filter*

The CrX4's Standard filter contains 4 filter types: “12” (Low Pass 12 dB/Oct), “24” (Low Pass 24 dB/Oct), HP (High Pass 12 dB/Oct) and BP (Band Pass 24 dB/Oct). The filter type can be selected by clicking on the respective filter-type button.

*Free Filter 12dB and Free 24dB*

The CrX4’s Free filter is unique in that it is continuously adjustable over a 360 degree range dial. The dial has four “guide points” with graphical

indicators for low-pass , band-pass, high-pass and band-reject. This special filter operates as a single type or a mix of two types, depending on the dial setting. Please note that the Filter-Type can be modulated in the Matrix as well.

The CrX4's Free filter comes in two flavours: 12 and 24 dB which correspond to the Free 12dB and Free 24dB setting.

Common settings for all Filters:

Each filter has its own satur (Saturation) dial located on the far left of the filter section. The Sat dial is used to overdrive the CrX4's filters creating a saturated, distorted sound.

Cutoff is used to set the operation frequency of the filter. When using the Low Pass filters higher settings produce brighter sounds while lower settings result in darker sounds. When using the High Pass filters higher settings produce thinner, brighter sounds, while lower settings produce fatter, darker sounds, for other filter types the characteristics change accordingly with this parameter.

The reso (Resonance) dial is used to set the amount of emphasis around the cutoff frequency. Higher settings create a more pronounced peak in the signal while lower settings produce a flatter response.
Key Tracking is used to control the degree to which the filter tracks the MIDI note's frequency.

The trk (Track or tracking) is used to control the degree to which the filter tracks the note being played. So higher notes have a higher cutoff frequency, while lower notes have a lower cutoff frequency. When the dial is moved to the left the effect of filter tracking is just opposite as described.

The dep (Depth) parameter controls the Envelope Amount; it is used to set the degree to which the filter's envelope affects the Filter Cutoff. Setting Env Amt to the central (neutral) position means that the envelope has no effect on the filter while both fully right as well as fully left means that the filter is modulated by the envelope's full range (either positive, raising the cutoff or negative, reducing the cutoff).

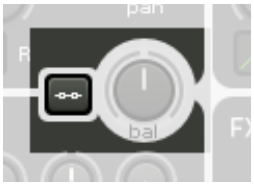
The velo (Velocity) cn be used to open the filter (raise the Cutoff) with increasing Velocity. When turned fully left the Velocity has no effect on the filter Cutoff, while turned fully right the Filter opens in accordance to how hard a note is played.

The Filter Envelope section is located below the just described filter parameters and is working just like any other envelope (see chapter Modulation / Envelopes).

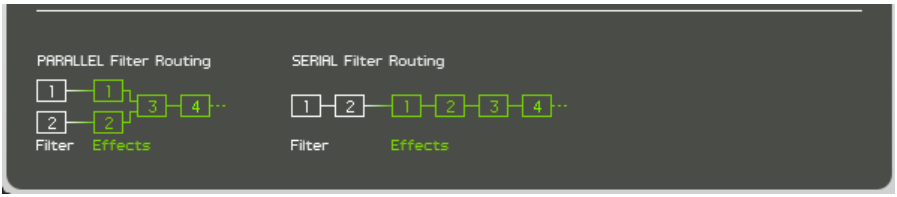
Each filter also has its own pan (Panning or Panorama) dial. This is used to position the filter's output signal within the stereo field.

Finally the balance of the filters output volume can be adjusted with the bal (Balance) dial which is located in the middle between filter 1 and 2.

Left of the pan dial is the parallel/serial switch. It allows to operate the CrX4 filters in either parallel (two parallel, independent routes for audio from the generators) or serial (where the output from the first filter is connected to the input of the second filter).




Please note that even in serial the generators allow to balance their output between filter 1 and 2. Also, when in serial, the bal (Balance) parameter of the filter has no effect and is disabled.
In Parallel the output from Filter 1 is sent to Effect 1 and the output from Filter 2 is sent to Effect 2. The outputs of Effect 1 and 2 are then merged into the input of Effect 3.
In Serial all Effects units operate in serial too. So the output of Filter 2 goes into Effect 1, the output of Effect 1 in Effect 2 and so on. This is illustrated on the setup page (see lower left of the setup page):



# The Main Section

In the Main section you find a couple of global settings: The Chord Memory, Velocity to Amplitude modulation, Precision, polyphony (Voice Limit), the Glide parameters and the main Amplitude Envelope.


## Chord Memory

The Chord (Chord Memory) function allows you to record chords and include them with the current preset. The idea behind it is, to trigger multiple notes which can be interesting sound effects, often when using the Arpeggiator to break this chord into many, successively played notes.
The Chord button has three states:

- the left state (single note), means Chord memory is Off
- the middle state (a red chord) means you are in Learn mode and can now record a simple two notes chord up to a 8 note complex chord.
- The right state (a green chord) means that Chord memory is On, turning every Note message into the chord which was previously recorded.

Note that the order in which notes are played in Learn Mode is important: the first note is taken as the root or basic note and all successive notes are stored by interval relative to this first note. For example, if you learn the chord C-E-G by actually playing the E first, the C is stored as -4 semitones and the G as +3 semitones.
This means that if you play a C note when in Play mode after recording the chord from the above example, the resulting chord will be G#-C-D#.

## Velocity to Main Volume

The Velo (Velocity) dial is used to control the degree to which the played notes Velocity influences the patch volume. If turned folly clockwise, the volume of the sound do largely depend on Velocity. When turned fully anti-clockwise the Velocity does not affect the Volume of the preset.

## Precision

The Precision control can be used to set the accuracy of the CrX4's signal generation. When the Precision control is set to less than 100% small inaccuracies are introduced at many different points in the CrX4's signal chain. This is useful if you're aiming to replicate the warmth of an old analog synthesizer.

## Voice Limit

The Voices control is used to set the number of voices (polyphony) available. The maximum polyphony is 32. A variety of settings are available for polyphony. These include Mono, 2 to 12 and All.
One thing that may be confusing is the Mono setting. It can be explained as follows. Say that you hold down one key and then press and release a second key. In the case of the Mono voice setting, the first note will sound, and then the second note sounds. When the second note is released *the first note sounds again*. This creates a pedal tone effect typical for monophonic synthesizers.

## Glide

The Glide (or Portamento) section allows you to set the CrX4's portamento parameters. Glide continuously changes the pitch from one note to the next, connecting the notes and letting you smoothly glide from one to the other.

The Glide Mode has 4 values:

- Off: no Glide is applied
- On: Glide is applied
- Held: If notes overlap then Glide is applied, however if they don't then the notes are played without Glide. This makes it possible to apply Glide only to selected notes.
- Bend: This mode allows you to apply a predetermined pitch bend to each note. The bend range is set using the Range control just below the Mode button. A bend range of -48 to +48 semitones is available.

When Glide is on, the Time/Rate dial is used to set the length of time it takes for the first note to reach that of the second note.

The Time/Rate switch below this dial has two settings: Time and Rate. They determine the manner in which the pitch of one note moves to that of the next note. When set to Time, it takes a constant amount of time to move from one note to the next. In this case it will take the same amount of time to reach the destination pitch regardless of whether the preceding notes are a semitone apart or an octave apart. When set to Rate, the amount of time it takes to move from one note to the next depends upon how far apart the two notes are. The further apart the notes, the longer it will take for the pitch of the first note to reach that of the following note.

# Effects

The CrX4 has 6 independent, simultaneously-available stereo effects modules. Effects modules 1 and 2 can be set to one of 12 different effects, while Effects modules 3 to 6 can be set to one of four different effects from these 12 (the same effect cannot be used twice in effect modules 3 to 6). All 6 effects modules are identical so they will only be described in this manual once.

The Effects Section has 6 switches on the very right, which correspond with the 6 available effects units. Each switch shows the name of the currently selected effect type for each unit. The Edited (shown) unit is lit. The small light on the left of each switch is an indicator, showing if an effects unit is currently switched on or not.

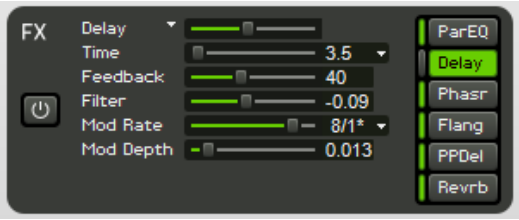
On top of the Effects section are the effects name (which can be clicked and then turns into a menu allowing you to select any of the available effect types) and a Wet slider for adjusting the amount of effect applied.
Note: The Wet control has no meaning for the Parametric EQ effect which functions as an insert effect.

On the left, below the FX label is an On/Off switch for the currently shown effect. Each effect's controls differ; they are described in detail on the following pages.

Generally, when a time or rate is displayed, the display functions as a popup menu when you click it, offering you the Sync times listed in Appendix A.

## Delay

The Delay effect can be used to create echoes and other related effects.




The Time slider is used for setting the delay time (in milliseconds). This can range from 1 ms to 680 ms and is displayed right of the slider.

The time display also functions as a Sync popup menu which can be used to sync the delay time with the current host (DAW) tempo (see Appendix A for the range of possible sync settings).

The Feedback slider allows you to adjust the number of times the signal repeats or echoes.

Also included in the Delay section is a variable low pass/high pass 6dB/Oct filter which is adjusted with the Filter slider. Negative values means a low pass filter is applied, while positive values mean a high pass filter is applied. The higher the absolute value of the Filter slider, the more the filter will modify the delayed signal.

The Mod Rate sets the rate (in Hz) at which modulation takes place. Again the rate display also functions as a Sync popup menu when you click it.

The Mod Depth slider is used to set the depth to which the delayed signal is modulated, while the Rate slider determines the modulation speed. For example, if you set a delay time of 100ms and a depth of 50%, the amount of modulation is 50% of 100ms (50 ms). In this case you'll get a delay time that varies from 100 - 50ms (50ms) up to 100 + 50ms (150ms).

When modulation is applied a stereo effect is created because both channels are modulated in opposite directions.

## St (Stereo) Delay

The Stereo delay works like the delay, but offers separate times for the left and right echo.


The Time Left and Time Right sliders are used for setting the left and right channel delay times (in milliseconds). This can range from 1 ms to 1300 ms.

The Feedback slider allows you to set the number of times the signal repeats or echoes.

The Highpass (High Pass Filter Cutoff Frequency) slider is used to set the frequency (in Hz) below which frequencies are filtered out of the signal. Higher settings produce thinner, brighter sounds, while lower settings produce fatter, darker sounds.

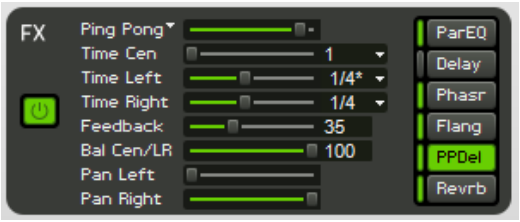
The Lowpass (Low Pass Filter Cutoff Frequency) slider is used to set the frequency (in Hz) above which frequencies are filtered out of the signal. Higher settings produce brighter sounds while lower settings result in darker sounds.

The Link L+R button (located beneath the Lowpass slider) is used to automatically match the feedback amount of the shorter delay to that of the longer delay. For example, if you set the left channel delay time to 10 ms, the right channel delay time to 100 ms and feedback to 90%, you will hear the left channel delay fade out much more quickly than the right channel delay (this is what you would expect!). However, when you press the Link button the feedback of the channel with the shorter delay time is adjusted so that the signal fades out in the same amount of time as the longer delay (thus the feedback for the shorter time is increased).

The left and right channels of the delay's output can be independently synced to the song's current tempo using the time display which also acts as a Sync popup menu (see Appendix A for the range of possible sync settings).

## Ping Pong (Delay)

The Ping Pong Delay lets the signal move from left to right and back, a bit like a game of ping pong




The Ping Pong (Delay) functions as follows: the input signal is first delayed by Time Cen amount, then it's delayed by Time Left amount and finally by the Time Right amount.
When Feedback is applied the "Time Right" signal is fed back into the left delay line, so that an alternating left-right delay is produced.

The Time Cen, Time Left and Time Right sliders are used for setting the centre, left and right channel delay times (in milliseconds). This can range from 1 ms to 1300 ms (time display also functions as a Sync menu).

The Feedback slider allows you to set the number of times the signal repeats or echoes.

The Bal Cen/LR slider is used to set the balance between the initial centre delay and the following left and right delays.

The Pan Left/Pan Right sliders are used to set the pan position of the left and right delays.
Hint: If you want the delayed signal to appear on the right side first, use the Pan controls to exchange left and right positions.

## Chorus

The Chorus effect can be used to thicken a single sound creating the impression that it contains multiple voices. The Chorus works by mixing delayed signals with the original signal.


The Time slider is used for setting the delay time. Longer times produce a chorusing effect while shorter times create a flanging effect.

The Rate slider sets the rate at which the signal is modulated.

A unique feature of the CrX4's Chorus are its Time Spread and Rate Spread parameters. Basically, Spread makes the chorus sound fatter by adding random deviations to the Time and Rate parameters. The degree of randomness depends on the spread Time and Rate parameters; setting the Spread Time and Rate to 0 cancels the effect; increasing the value of the Spread Time and Rate parameters adds additional richness and fullness to the sound. It can also make the effect sound more natural.

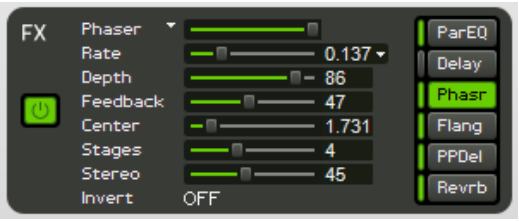
The Dry slider allows you to reduce the level of the original unprocessed (dry) signal. This is sometimes useful in achieving a fatter sound.

The Stereo slider is used to adjust the width of the stereo image. To create the maximum stereo effect move the slider all the way to the right. Note that when used in combination with other stereo enhancing effects (such as the ping pong delay) it might be desirable to set the Stereo slider to a lower value.

With the Invert button you can control whether or not the internal feedback inverts the signal or not. Inverted Signals usually sound smoother but lack lower harmonics, so depending on the desired effect the switch can used.

## Phaser

The CrX4's Phaser can be used to create swirling dynamic movement in sounds. The Phaser effect is created by automatically sweeping a series of equally spaced frequency notches up and down the audio spectrum.




The Rate slider sets the rate at which the signal is modulated.
The Rate display also word as a Sync popup menu (see Appendix A for the range of possible sync settings).

The Depth slider is used to set the depth to which the signal is modulated.

The Feedback slider is used to set the amount of internal feedback employed within the phaser. More internal feedback produces increasingly pronounced resonant peaks.

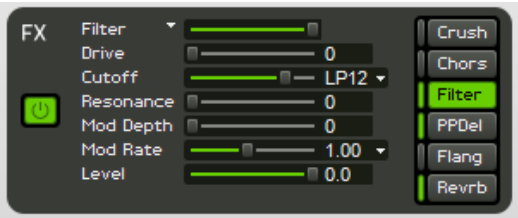
The Centre slider is used to set the frequency around which modulation occurs.

The Stages slider sets the number of stages in the phaser. Each phaser stage shifts the signal's phase by 180 degrees. The higher the CrX4's Stages setting, the more frequency notches there are in the signal and so the more pronounced is the phasing effect.

Use the Stereo control to widen the stereo image. If it's set full left the modulation on the left and right channel will be in perfect synchronization. At full right setting the left and right channel will be completely out of phase, creating an extreme stereo effect. The best (rather subtle) stereo effect is achieved with settings around the mid mark.

The Invert button allows you to invert the signal that is used to create the phasing effect. Sometimes however it can be sound better to switch it off.

## Filter




The Drive slider (Saturation) enables you to set the amount of filter drive or distortion. This can be used to create a warmer, fatter sound.

The Cutoff slider is used to set the operation frequency of the filter. The Filter Type menu right of the cutoff slider allows you to select one of four filter types:

- LP12 (Low Pass 12 dB),
- HP12 (High Pass 12 dB),
- BP12 (Band Pass 12 dB) and
- BR12 (Band Reject 12 dB).

The Resonance slider is used to set the amount of emphasis around the cutoff frequency. Higher settings create a more pronounced peak in the signal while lower settings produce a flatter response.

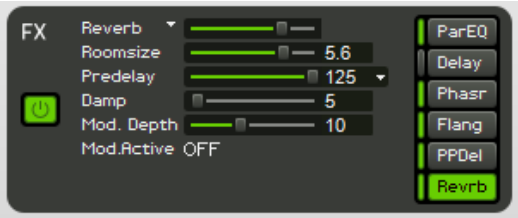
The filter's cutoff frequency can be controlled using the Mod Depth and Mod Rate controls. The Mod Depth control is used to set the depth to which the filter's cutoff frequency is modulated.
The Mod Rate slider allows you to set the rate at which the filter's cutoff frequency is modulated. The modulation rate is displayed in Hz, the display also functions as a Sync menu.

Finally there is a Level control to adjust the level after the filter, as sometimes it might be desired to reduce it a bit (especially when applying heavy Drive and/or Resonance).

## Reverb

The Reverb effect is used to add ambiance to sounds.

The Roomsize slider is used to set the size of the simulated room. The Roomsize varies from a small chamber up to a huge hall.




The Predelay slider enables you to delay the processed signal by a given amount (in milliseconds) so as to achieve a more natural reverberation. Normally, shorter predelay times are applied in the case of smaller room sizes while longer predelay times are applied in the case of larger room sizes. Range: 0 ms...125 ms.
The time display also functions as a Sync popup menu can be used to sync the predelay time with the current tempo (see Appendix A for the range of possible sync settings).

The simulated room's wall materials can be adjusted with the Damp (Damping) slider. This parameter ranges from practically loss-free reflecting walls (0% damping) up to very absorbent walls (90% damping). In practical terms, the amount of damping determines the amount of higher frequencies that are contained in the processed signal: The higher the Damp (Damping) setting, the more that higher frequencies are removed from the processed signal.

The Reverb also allows a decent modulation which is controlled with the Mod Depth slider; the effect is similar to a chorus and also suppresses a certain metallic sound which otherwise can occur in large rooms.

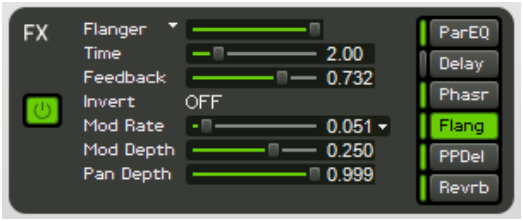
The Mod Active switch allows quick comparison of the signal with and without modulation.

## Flanger

The CrX4's Flanger can be used to create the classic flange effect produced by using two analog tape machines playing back the same signal but with small (and changing) differences in the playback speed of the machines.

The Time control defines the length of the delay line, representing the delay between the original (tape machine 1) and the delayed / wet signal (tape machine 2).

The Feedback control feeds the processed signal back to the input of the effect producing a more pronounced and richer effect.




The Invert control inverts the processed signal's phase against the original signal, giving a subtly different sound.

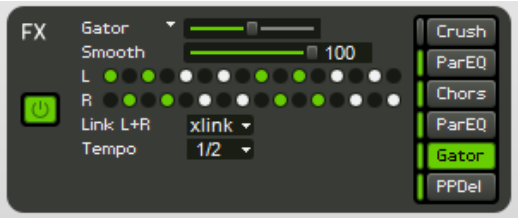
The Mod Rate control sets the speed of the flange effect (the speed of the cyclic changes of the two tape machines). This setting can be either made with the slider or set as a fraction of the song tempo using the "Sync" popup menu.

The Mod Depth control is the key parameter for determining the depth of the flange. The higher the setting, the more pronounced the effect.

The Pan Depth control is unique to the CrX4 and not normally found on flanger effects. This control allows the stereo position of the flanged signal to be modulated according to the setting of the Rate parameter.

## Gator

Gator effect is a step-controlled audio gate that can be used to create rhythmic, stuttering and pulsing effects. The effect is unique in that it separates the input signal into left and right components, each of which can be gated independently.




The Smooth control sets the envelope shape of the gate for each step value. A lower setting of the Smooth control creates a sharper envelope shape that produces a more pronounced gating effect. Increasing the value of the control “smoothes” the envelope creating a more pulsing, tremolo-like sound.

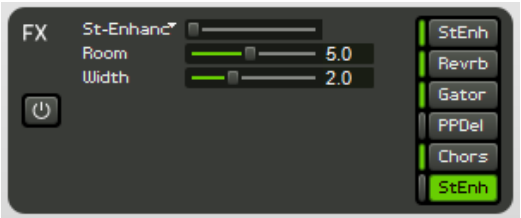
The Steps control consists of two rows of sixteen “buttons”, one for each rhythmic step of the pattern. When a button is on, the signal is passed through the effect. Alternately, when a button is off, the signal is gated. The duration of each step depends on the setting used in the Sync control (described below).

The Link control is used to set the way that the Gator’s step buttons respond to user input. This control has three settings: Off, Link and XLink. When set to “Off”, each step button can be switched on and off independently of any other button. When set to Link, the step buttons for the left and right patterns are linked together so that switching either button turns both buttons on or off. When set to XLink, the step buttons for the left and right patterns are linked together, however in this case they work in a complementary manner—when one button is on, the other will be off. In this case only one of the two left and right channel buttons can be switched on at the same time.

The Tempo control sets the duration of each step. For example, a setting of 1/16 means that each pattern step is equivalent to a 16$^{th}$ note. Note that the overall tempo at which the Gator effect operates is set in the host software.

## Stereo Enhancer

The CrX4's Stereo Enhancer can be used to increase the width of the instrument's stereo image.



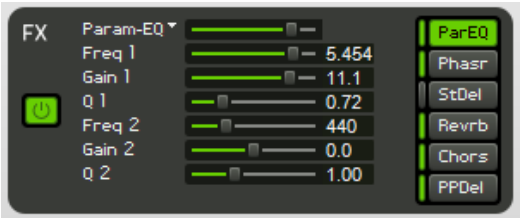

The Stereo Enhancer's Room parameter operates somewhat like a reverb adding depth to the sound. This is a difficult effect to describe so try it and see what effect it has on the sound.

Width increases the instrument's stereo separation, widening the signal.

Hint: The Stereo Enhancer works best with natural stereo samples. If applied to a signal with very strong stereo separation (for example, a signal processed with the Ping Pong delay) the Stereo Enhancer may not widen the stereo image but instead may narrow it.

## Parametric EQ

The CrX4's Parametric EQ (Equalizer) effect contains 2 independent parametric equalizer stages in series.



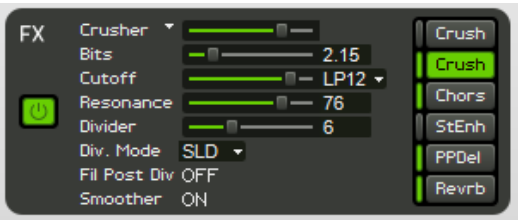

The Freq (Frequency) control sets the frequency at which the EQ operates. A range of 20 Hz to 11.000 Hz is available.

The Gain control sets the amount of gain that is applied to the selected frequency. Note that the gain can be positive or negative. A positive gain corresponds to boosting the signal while a negative gain corresponds to cutting the signal. A range of -18 dB to +18 dB is available.

The Q (Quality) controls set the bandwidth of the filter. A large value means that a wider bandwidth is affected.

**Crusher**

The CrX4's Crusher is a distortion effect that combines bit-depth and sample-rate reduction with "smoothing" algorithms allowing the resolution of the signal to be decreased, thereby making the sound rougher and noisier. This effect processor also includes a filter.




The Bits (BitCrusher) control enables you to reduce the bit depth of the output signal from oo bits (the signal is not changed) to 1.00 bits. Reducing the bit depth adds a harsh, noisy quality to the sound.

The Cutoff slider is used to set the frequency (in Hz) above which frequencies are filtered out of the signal. Higher settings produce brighter sounds while lower settings result in darker sounds. Range 40 Hz...20 kHz.

The Filter Type popup menu right of the Cutoff slider allows you to select one of four filter types: LP12 (Low Pass 12 dB), HP12 (High Pass 12 dB), BP12 (Band Pass 12 dB) and BR12 (Band Reject 12 dB).

The Resonance slider is used to set the amount of emphasis around the cutoff frequency. Higher settings create a more pronounced peak in the signal while lower settings produce a flatter response. Range: 0%...100%.

The Divider slider controls a sample-rate divider that divides the current sample-rate by the current slider setting. For example, if the current sample-rate is 44.1 kHz, then setting the Divider slider to 2, halves the sample-rate to 22.05 kHz. Ranges from 1 to 32.

When the Divider slider (described above) is set to a value other than 1, a new output sample value must be created for each group of samples in the input audio stream. For example, if the Divider slider is set to a value of 4, then four (possibly different) samples in the input stream are replaced by four samples with a single value in the output audio stream.

The Divider Mode popup menu determines how the output sample value is created from the input samples. Three options are available:

- AVG" (Average) option calculates the average of the input samples and uses this as the output sample value for each of the input samples.
- STP (Step) option takes the first sample in each group of input samples and uses this as the output sample value for each of the input samples.
- SLD (Slide) option takes the first sample in each group of input samples, interpolates between them and uses the interpolated value as the output sample value for each of the input samples.

The Fil Post Div (Filter Post Divider) button is used to set the position of the Crusher's Filter with respect to the Divider. By default, the Filter is before the Divider in the signal path. Switching this button on moves the Filter to after the Divider in the signal path.

The Smoother button allows a compressor / expander to be switched into the signal path. This reduces the overall effect of the Crusher making the sound less harsh and more "musical".

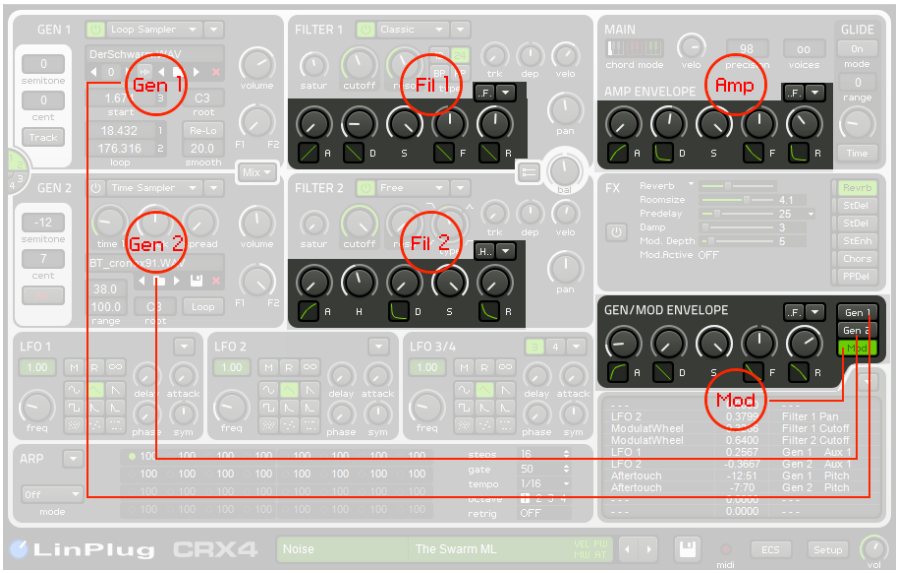
# Modulation

One of the key features of the CrX4 are its sophisticated modulation capabilities. The instrument contains 6 independent ADSFR envelopes, 4 independent LFOs (low frequency oscillators), an Arpeggiator, and a Modulation Matrix that is used to control modulation routing.

**Envelopes**

Each of the six envelopes modulates a different point in the CrX4's audio signal path:

- The Gen 1 and Gen 2 envelopes (in the modulation section) control the amplitudes of Generators 1 and 2 respectively.
- The Mod envelopes is a general-purpose modulation sources that can be used to modulate a range of destinations which can be set using the CrX4's Modulation Matrix.
- The Amp envelope controls the overall amplitude of the instrument.
- The Fil 1 and Fil 2 envelopes control the Cutoff frequency of the respective Filter.



The Envelopes are positioned in each Filter, the Main Section and the Modulation Section (Gen/Mod Envelope). All six envelopes are exactly the same. They can be of ADSFR type or of AHDSR type, which means:

ADSFR : Attack, Decay, Sustain, **Fade**, Release
(classic ADSR plus the sustain can either fade in or out)

AHDSR: Attack, **Hold**, Decay, Sustain, Release
(classic ADSR plus a Hold phase which determines a time span between end of Attack and start of Decay).

The Envelope type is switched with the Filter Type button at the top right of each envelope. This button either reads "...**F**." for the ADS**F**R or ".**H**..." for the A**H**DSR

Clicking on the Edit button at the right of the Filter Type button opens a popup menu containing the following functions: "Copy", "Paste" and "Init". The "Copy" and "Paste" functions allow current Envelope settings to be copied and pasted into any Envelope module. The Init ("Initialization") function restores the Envelope module to its default values.
Note: You can copy between different envelopes of a patch, between different patches (the copy buffer is preserved when loading new patches) and between multiple instances of CrX4 which are simultaneously open.

## Envelope Parameters

### Attack

The Attack dial determines the time it takes for the envelope to reach its maximum value. The range is 0 millisecond to 10 seconds.
If used for Amplitude, it means that the Envelope takes so long to reach the maximum Amplitude, for the Filters it takes so long to reach maximum Cutoff (or minimum Cutoff when Envelope Depth is inverted, more about this in the Filter description).

### Hold

If the AHDSR envelope is used, this dial controls the time gap between end of the Attack phase and start of the Decay phase. In classic ADSR envelopes these phases are connected, as soon as Attack is finished, Decay will start. With the Hold parameter however the envelope can remain at maximum level for a certain amount of time. The effect of that is

somewhat a bit similar to applying a compressor. The range is again 0 millisecond to 10 seconds.

Decay

The Decay dial setting determines the time it takes from the Attack peak to the Sustain value of the envelope. Range: 1 milliseconds to 10 seconds.

Sustain

The Sustain dial setting determines value at which the Decay phase ends, that can be something in the range 0 to 100%. If set to 100% it means that the envelope wont fall from its maximum value, thus the decay is effectively not taking place. A value of 0% means that the envelope is at minimum value at the end of the Decay phase.

Fade

If the ADSFR envelope is used, the Fade determines the rate at which the envelope moves from the Sustain level to either 0 (for negative Fade values) or its maximum value (for positive Fade values). A Fade setting of 0 means that the envelope remains at the Sustain level until the key is released. The more you turn the dial towards + or -, the faster it fades towards the respective destination. The fade time is in the range 16 milliseconds to 10 seconds.

Release

The Release dial is used to set the time it takes the envelope to move from the current level to 0 after the key is released (the Note ends). Range: 1 milliseconds to 10 seconds.

Phase Shape

Below each dial which controls a Time (that is Attack, Decay, Fade and Release) there is a Shape control. It determines how the respective phase is working. If it is a straight line, then the phase is working in a Linear manner; changing it results in a either logarithmic or reverse logarithmic shape. This has quite some effect, to try it we recommend you to use a sound with a not too long amplitude release and play with the shape of the release phase while listening to the results.

## LFO

The CrX4's LFO ("Low Frequency Oscillator") modules are located on the lower left of the instrument's user interface, above the Arpeggiator.


An LFO is an oscillator that generates low frequency signals that can be used to modulate one of CronoX other modules, in example the Filter Cutoff or a Generators Amplitude. The CrX4 contains 4 separate LFOs; LFO's 1 and 2 are directly accessible, LFO 3 and 4 share one area of the user interface and can be switched with the button on top of that area.

Each of the four LFOs can be used to modulate a range of destinations which are to be set using the CrX4's Modulation Matrix (see below for more information about the CrX4's Modulation Matrix).

The freq (Frequency) parameter determines the LFO's frequency (in Hz). Above the dial is a display which functions in two ways: usually it shows the frequency, but when you click it you can also select a synced tempo setting like in example 1/16$^{th}$ note.

Right next to the frequency dial are 9 buttons to directly choose any LFO waveform. To select one of the LFOs waveforms click on one of the waveform buttons available: Sine, Triangle, Ramp, Square(Pulse), Peak (logarithmic), Peak (linear) Noise, Sample and Hold and Random Pulse.

Above the waveform buttons is a button which determines the overall function mode of the LFO:

In Infinite state, which is the "normal" operation mode the LFO starts with each note independently and from its start phase (set with the Phase parameter), each voice has its own LFO's, independent from other voices and the LFO runs as long as the note sounds.

In M (Mono) mode one LFO is applied to all synth voices simultaneously, so all voices share one permanently running LFO. Moreover the LFO is synced to the song position, so if you have a 1/4th note tempo set for the LFO, it will start exactly at each 1/4th note as the song plays back.

The R (Retrigger) button slightly modifies the working of a Mono LFO in the way that the LFO is retriggered when the first note is being played. This means, as long as you have any notes still sounding a new played note wont retrigger the LFO. Only when all notes have finished their release phase and are truly finished the next note will reset the LFO to start from the begin of its cycle. This can be useful when you play notes which are not exactly on the beat but want the LFO to be in sync with the note rather than the beat.

The Single setting is a un-synced, polyphonic mode, so again each voice has its own LFO. The LFO is again started with the note, but it only runs a single cycle. This is particular useful for certain effects, in example when you use the LFO as kind of envelope.
When applying Delay, this single cycle can also happen not right at the start of the note but a bit later, depending on the actual Delay time.

This leads to the envelope of the LFO: The Delay and Attack dials. Please Note that the Phase, Delay and Attack parameters do not function if the LFO is set to Mono or Retrigger mode (because then it's a permanently running LFO).

The Delay parameter sets the time before the LFO begins running. A Delay setting of 0 means that the LFO begins operating immediately.

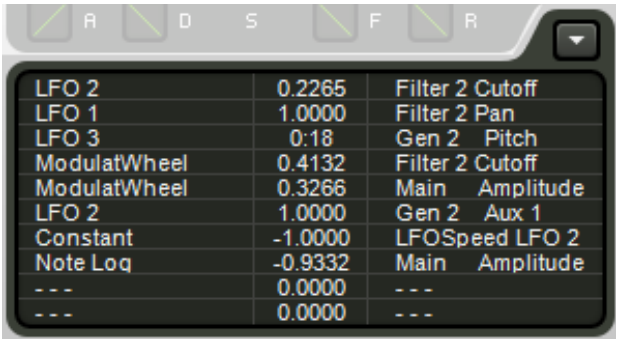
The Attack dial setting determines the length of time it takes for the LFO to reach the full modulation depth. This can be used to slowly increase the amount of modulation applied. A setting of 0 means that modulation commences immediately.

The Phase parameter sets the point in the waveform cycle at which the LFO starts. This not applies in Mono or Retrigger mode.

The Symmetry parameter can be used to distort the waveform's shape, as you might know it from oscillator waveforms.

## Modulation Matrix

The CrX4's Modulation Matrix allows you to create 10 user-defined modulation routings. 56 modulation destinations are available for modulation by 30 modulation sources (see Appendix B and C for a listing and description of all modulation sources and destinations).



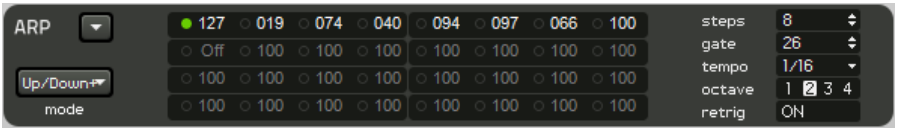

Modulation sources are shown in a column on the left of the display, while the destinations are shown on the right. The modulation amount is displayed in the middle. To change a routing click on the source or destination that you want to change. A menu will appear which lets you select the new source or destination.
To remove a modulation source or destination select the "- - -" entry in the menu. Each modulation routing can be switched on and off by double clicking on the modulation depth in the middle.

To change the modulation depth click on the amount display and move the mouse (while keeping the mouse button pressed) upwards or downwards (increasing or decreasing the value) until the desired amount has been reached. A negative modulation depth inverts the waveform of the modulation source.
This inversion is easiest to explain with an envelope as modulation source. An envelope is unipolar, so when you apply it with a positive depth of in example 1.000 the modulation will raise the destination parameter. With a negative depth it will lower the destination parameter.

The modulation of Pitch has a special display for modulation depth. The example above shows a modulation depth of 18 cents (see last third row of the Modulation Matrix). This means that the Generator 2's Pitch is modulated to a depth of 0 semitones and 18 cents.

## Arpeggiator

The CrX4's Arpeggiator allows you to create user-defined arpeggios. Arpeggios are chords that are played as separate successive notes or broken chords. With the CrX4's Arpeggiator you can control the way the arpeggio is played in numerous ways.




Right next to the Arp (Arpeggiator) label you find the editing menu which allows you to init the arpeggiator or copy/paste settings into another preset or even save/load its settings for future use. This way you can build an entire library of your own Arpeggiator presets if you wish.

The Arpeggiator Mode defines how the Arpeggiator functions. Several options are available:

- Off: Switches the Arpeggiator completely off.

- Mod-Only: In this mode the Arpeggiator is Off and does not influence chords (or single notes) being played. However, the Arpeggiator is available as a Modulation Source in the Modulation Matrix as if it were switched on. Using the Arpeggiator in the Modulation Matrix is like having an LFO with up to 32 individually definable steps.

- Up, Down, Up/Down, Up/Down+, Down/Up, and Down/Up+: These modes play typical arpeggiator patterns or arpeggios which, as described above, are the notes of the chord played successively instead of simultaneously.
  In Up mode the chord notes are played in ascending order starting from lowest note. In Down mode, the playback sequence is reversed with chord notes being played in descending order starting from highest note. In UpDown mode chord notes are played from lowest to highest and then from highest to lowest. In DownUp mode this pattern is reversed. A “+” sign after the mode type indicates that the highest and lowest notes of the chord are played twice. For example, in the case of UpDown mode the chord C-E-G would be arpeggiated as C-E-G-E and then repeated. In the case of Up/Down+ mode, the chord would be arpeggiated as C-E-G-G-E-C and then repeated.

- Random: In this mode the notes of the chord are played in a random, arbitrary order.

- Chord: In this mode the Arpeggiator does not play the chord as separate notes but instead plays the chord in rhythmic phrases defined by the other parameters.

- AsPlayed: In this mode notes are played by the Arpeggiator in the order that the Note On messages were received by the instrument, or more simply, in the way that the chord was actually played (time wise).

Step Display

The Step Display contains the Arpeggiator's 32 step values and is the heart of the module. This is where the rhythmic patterns of the Arpeggiator are defined.

As we said above, the CrX4's Arpeggiator breaks a chord into separate notes of equal length (defined by the Tempo) parameter) and plays them sequentially. In the Step Display each note step can be given a different velocity value, rests can be inserted into the pattern and notes can be tied together to form notes with a different length.

Within the Step Display, each step can have its own velocity value ranging from 1 to 127. Off means that no note value is defined for the step so that a pause or rest is created in the arpeggiator pattern. Tie means that consecutive steps are bound together creating a longer note duration.

Returning to the C-E-G chord example presented above, step values of 127, 127, Off, 100, Tie, 30, Off, Tie would result in the following sequence of notes (assuming a 1/16 Tempo setting and the Arpeggiator being in Up mode):
Firstly, note C would be played with maximum velocity and duration 1/16$^{th}$. Then note E would be played the same way. Next there would be a 1/16$^{th}$ duration pause, followed by the note G played with a velocity of 100 and a note duration of 1/8$^{th}$ (as the following step is tied to this step). Then the note C would be played with a velocity of 30 and a duration of 1/16$^{th}$ length. Finally, there would be a 1/8$^{th}$ pause.
Note that a Tie after an Off is the same as placing an Off behind an Off. Both result in a longer pause.

Also note that the arpeggio will vary so that when it returns to step one it will now play an E with velocity of 127 and 1/16th duration; that's because the chord has 3 notes while the pattern contains 4 steps. In this case the arpeggiator will play C-E-G-C followed by E-G-C-E and then G-C-E-G before starting with the first pattern again. This is very useful for some rhythmic variations.

The Steps parameter allows you to define how many of the available 32 steps are actually used for a particular arpeggio. Note that wile most arpeggios may have 8, 16, 24 or 32 steps for rhythmic variation a few more or less, in example 7, 14 or 15 steps can be amazingly interesting.

The setting of the Gate defines the actual duration of each note. While the Tempo setting (described next) determines the time subdivision of each arpeggiator step, the Gate parameter determines how much of this time subdivision that the note is on and how much it is off.
For example, with the Gate set at 100, the note is the full step length. A middle setting of 50 means that the note plays for half of the time (for example if the Tempo parameter was set to 1/16th then in this case the note would have an actual duration equivalent to a 1/32nd note).
Note that the effect of shorter Gate values is only prominent with sounds that have a short release time.

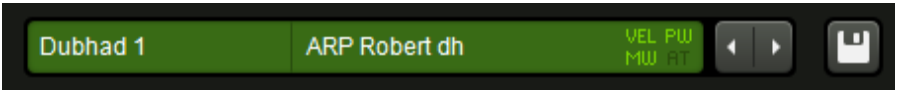
The Tempo popup menu allows you to set the note subdivision of the individual arpeggiated notes. For example, when Tempo is set to 1/16, playing a C-E-G chord in Up mode will play all the chord's notes at 1/16th note subdivisions.

The 4 Octave buttons to the left of the Step Display extend the arpeggiated note range regardless of the octave in which the note was originally played. For example, setting the Octave to 2 means that the notes of the chord will be played in the octave in which the chord was originally played, and also in the octave above. This can be extended up to 4 octaves.

The setting of the retrig (Retrigger) switch determines whether or not a new chord will restart the Arpeggiator. If Retrigger is activated and there is a gap between two consecutive chords, the Arpeggiator will restart when the second chord is played. If Retrigger is deactivated the Arpeggiator will continue onto the next step when a new chord is played.

# Preset Browser

The Preset Browser section is located on the bottom center of the main panel. It consists of several separate controls: The Bank/Preset display, the Modulation Info, the Previous/Next switches and the Save Button.




The leftmost part is the Bank/Preset Display, it shows the name of the current bank on the left and the current preset on the right. Whenever a preset is loaded using this control or the Previous/Next switches, the preset name is updated with the name of the loaded preset and the bank name with the name of the bank from which the preset is loaded.

By default the Preset Browser points to the factory presets installed with the CrX4. Presets can be changed in five ways:

- A new preset can selected by opening the bank or preset selector (by clicking either the bank or preset name, more on this soon)
- The respective previous or next preset in a bank can be loaded by clicking the Previous or Next switches located to the right of the Bank/Preset display.
- The respective previous or next preset in a bank can be loaded by pressing the left or right arrow key on your computer keyboard. This only works when your host software (daw) allows plugins to receive these keys.
- You can send a MIDI program change or bank change command to CrX4. This option can be disabled on the setup page.
- You can select the preset in your host software plugin preset selector (when your host software supports such selector). This option can be disabled on the setup page.

Usually, to select a new preset you may click on the bank name or on the preset name. The response is slightly different: When clicking on the preset name, almost the full user interface of CrX4 becomes a large list with all presets from the current bank; once you selected one of these, the user interface returns to its normal appearance.
When you click on the bank name, the whole GUI becomes a large list of available banks. Once you selected a bank, the GUI will switch to a large list of presets in this – just chosen – bank. Again, once you selected a

preset the user interface returns to normal.


Note that the currently loaded bank or preset is displayed in a different color in the bank or preset list to allow you to spot it. Moreover, if you want to cancel the selection and stick with the current preset, just click on the Bank / Preset display once more (the same you used to open the list).

The Save button finally allows you to save the current settings as a new preset; the CrX4 will default to the “My Presets” bank within the Factory Library. Any WAV or AIFF files that are currently loaded will also be saved into My Presets (or another user-specified directory).

## ECS (Easy Controller Setup)

The ECS (Easy Controller Setup) control makes it simple to control the CrX4 from an external MIDI controller (either hardware or software). This function is also often called MIDI-Learn.

To access the ECS section click on the ECS button which is located on the lower right of the CrX4’s front panel. Clicking on the ECS button opens a popup menu containing the following items: Off, Learn, Clear, Clear All, Load and Save.

To use the CrX4's ECS feature, proceed as follows. Click on the ECS button and then select "Learn" from the popup menu. Select a CrX4 parameter with the mouse by clicking on it and then send some MIDI messages to the CrX4 from your MIDI controller. When done, click on "Off". That's all there is to it! From now on you can change the selected parameter with the chosen controller.
In addition to this, more than one controller can be defined to change a particular parameter. In fact, you can define up to 128 parameter-controller-combinations. This does not depend on the type of controller you have nor the particular MIDI Control Change messages it sends.

Troubleshooting: If CrX4 is not responding to a controller it is most likely that your host software (DAW) is not allowing the MIDI CC Messages to be send to CrX4; please consult your host software documentation about how to enable MIDI CC being send to a instrument plugin.

ECS settings can be saved and restored using the Load and Save functions found in the menu that pops up when you click the ECS button. Please note that CrX4 always remember what it learned without the need to save that. However, when you have multiple setups you use (e.g. Studio and Stage), you might find the Save / Load useful to have different assignments for the respective setup.

In addition, a single controller assignment can be cleared using the Clear menu entry. To do this, select "Clear" from the ECS popup menu (the ECS light goes on) and move control that you wish to be cleared (de-assigning it from the MIDI Control Change message it is currently controlled by). Don't forget to switch off the Clear function by clicking the "Off" button after you have finished!

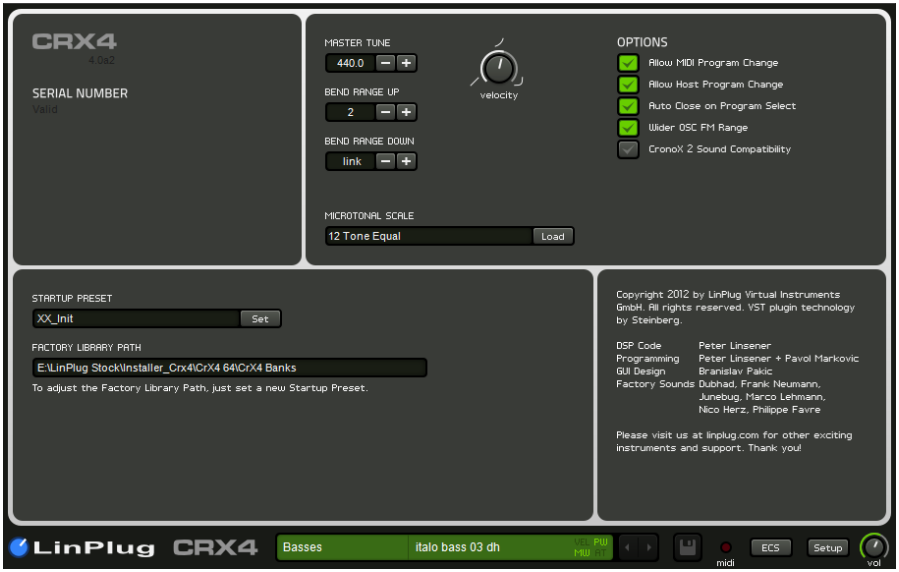
The "Clear All" menu item clears all controller-parameter assignments at once. After this function has been executed, CrX4 does not change parameters depending on MIDI CC messages anymore. To also suppress the effect of MIDI program change / bank change messages please check the respective options in the general CrX4 Setup.

## Master Volume

The Volume control sets the overall CrX4's volume within a wide range. Please note that CrX4 has an internal limiter that not allows overall output level beyond about +12 dB.

# Setup

The CrX4's Setup panel can be accessed by clicking on the Setup button at the lower right of the instrument. The Setup panel contains various controls for setting global parameters as well as several other miscellaneous controls. Several master controls have been located here to make the main edit page less crowded, and also so that they are not changed accidentally while the CrX4 is in use.

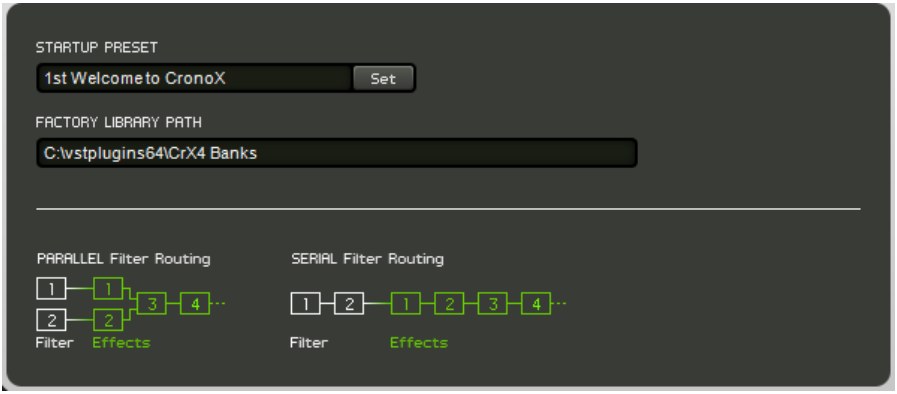



## Registration

On the upper left you find the information about which version you are running as well as the Serial Number input field. Please enter your serial number (the one you got after your order is fulfilled) in the field labeled "Enter Serial here". Once the full version of the instrument is unlocked the serial number edit box is no longer editable but shows "Valid" as in the example above.
**Please keep your serial in a safe place as it's your primary proof of ownership and may be required for support, updates and special offers.**

## Library Location / Startup Patch

When you install CronoX the Library (presets consisting of the parameter settings and the samples) are placed in a default location. On PC that is in the same folder where you installed CronoX, on Mac it is "/Library/Application Support/LinPlug".
However. If you for some reason want to place the library in a different location you can do so and point CronoX to the library manually by choosing a preset from the new location:




Click on the Set button next to the Startup preset name and navigate to a preset that CronoX should load upon startup. This not only defines your initial patch that is loaded when you open a new CronoX but also defines at which location CronoX should look for the rest of the factory library. The path to the factory library is shown below the startup preset and you will see how it adjusts to the startup preset when you change it.

## Options

The Options are located in the upper right of the Settings panel


Master Tune is used to set the overall tuning of the CrX4 if no microtuning file is loaded. Tuning can be set from 415 Hz to 466 Hz.

Bend Range Up is used to set the CrX4's response to pitch bend messages in the upwards direction. Bend Range can be set from 0 to 24 semitones.

Bend Range Down is used to set the CrX4's response to pitch bend messages in the downwards direction. Bend Range can be set from 0 to 24 semitones. Note that if the “link” setting is chosen, the Bend Range for downwards bending is the same as for upwards bending.

The Velocity Curve dial is located on the right of the MasterTune control. This control allows one of ten different velocity responses to be set. These range from linear through to an extreme exponential velocity response.

The Microtonal Scale control enables the CrX4 to be tuned to tunings other than Equal Temperament. See Appendix D for a complete description of how to use TUN files to set the CrX4’s scale tuning.

The “Allow MIDI Program Change” option can be used to suppress CrX4 to respond to program change messages received as MIDI data from the host software (your DAW software). The default setting is On.

The “Allow Host Program Change” is similar, but allows or suppresses the host to change a program (patch) in CrX4. The default is again On.

Auto Close on Program Select is usually On and means that when you selected a patch in the Patch Select window, that the window automatically closes (and thus returns to the normal Edit Window). You may switch this Off in case you want to try multiple presets successively.

The Wider OSC FM Range either switches the new CrX4 FM (Frequency Modulation) range of the generators On (more sonic possibilities) or Off (compatibility with CronoX 3 and CronoX 2 patches).

There is a further compatibility option: “CronoX 2 Sound compatibility”, which allows the CrX4 to have the characteristic harsh sound of the CronoX 2 oscillators and filters (among a few other smaller adjustments to make the sound compatible).
This option is automatically set when you load a CronoX 2 preset.

# Glossary

AM: AM or Amplitude Modulation is a process where the amplitude of one oscillator (the carrier) is controlled by another (the modulator). When the frequency of the modulator is periodic and below the audio range (less than 20 Hz) tremolo is produced. When the modulation frequency is within the audio range metallic overtones are produced.

Amplifier: A signal processing device that changes the amplitude, and hence the volume, of a signal.

Effect: A signal processing device that changes some aspect of the input signal. An enormous number of different effect types are available. These include Chorus (which produces a thickening of the signal), Delay (adding echoes to the signal) and Distortion (which changes the shape of the waveform usually adding overtones).

Envelope: A time-varying signal used to control the development of another signal after it has been triggered. Envelopes are often used for controlling a signal's amplitude or filter's frequency. The shape of the envelope is determined by the number of control parameters. Usually four parameters are available: Attack Time, Decay Time, Sustain Level and Release Time.

Filter: A signal processing device that suppresses or filters out specific parts of a signal's frequency spectrum. Numerous types of filter are used in audio synthesis. These include Low Pass, High Pass, Band Pass and Notch.

FM: FM or Frequency Modulation is a process where the frequency of one oscillator or filter (the carrier) is controlled by another (the modulator). When the frequency of the modulator is periodic and below the audio range (less than 20 Hz) vibrato is produced. When the modulation frequency is within the audio range, Frequency Modulation is produced.

LFO: An LFO or Low Frequency Oscillator is a periodic signal source (usually below audio frequency range) used to modulate another module's parameter. An LFO can be used for a variety of effects including vibrato (by modulating the pitch) and tremolo (by modulating the volume).

Modulation Matrix: A signal junction where a source signal can be patched so that it controls a destination signal. The CrX4's Modulation Matrix is used for tasks such as modulating an oscillator's amplitude by an LFO.

Oscillator: A signal source that generates a periodic waveform at a given frequency.

Ring Modulation: The process of combining two audio signals by multiplication. Ring Modulation produces sidebands but suppresses both the carrier and modulating frequencies.

Noise: Specifically White Noise is a signal which contains equal energy over its frequency range, compared to other types of noise, white noise has a bright sound.

# MIDI Implementation Chart

| | | | |
|---|---|---|---|
| Product: | LinPlug CronoX | Version 4.x | Date: 5.June 2012 |
| **Manufacturer** | | **LinPlug Virtual Instruments GmbH** | |

| **Function** | **Transmitted** | **Recognized** | **Remarks** |
|---|---|---|---|
| Basic Channel | | | |
| Default | no | no | |
| Changed | no | no | |
| Mode | | | |
| Default | no | Omni | |
| Changed | no | no | |
| Note Number | | | |
| | no | **yes** | |
| True Voice | no | no | |
| Velocity | | | |
| Note On | no | **yes** | |
| Note Off | no | no | |
| Aftertouch | | | |
| Poly (Key) | no | **yes** | |
| Mono (Channel) | no | **yes** | |
| Pitch Bend | no | **yes** | |
| Control Change | no | **yes** | |
| Program Change | no | **yes** | |
| System Exclusive | no | no | |
| System Common | | | |
| Song Position | no | no | |
| Song Select | no | no | |
| Tune Request | no | no | |
| System Realtime | | | |
| Clock | no | no | |
| Commands | no | no | |
| Aux Messages | | | |
| Local On/Off | no | no | |
| All Notes Off | no | **yes** | |
| Active Sensing | no | no | |
| System Reset | no | **yes** | |

# Appendix A: Tempo Sync Settings

Tempo Sync is available

Off, 1/2, 1/2T, 1/4*, 1/4, 1/4T, 1/8*, 1/8, 1/8T, 1/16*, 1/16, 1/16T, 1/32*, 1/32, 1/32T.

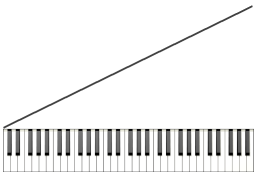
Note: T stands for Triplet and * stands for a dotted note. In the case of a dotted note, the note duration is equal to 1.5 times its original undotted value.

# Appendix B: Modulation Matrix Sources

Two types of modulation source are available: unipolar and bipolar. Unipolar modulation sources increase the modulation destination's value in a single direction (e.g. the ModWheel), while bipolar modulation sources both increment and decrement the modulations destination value (e.g. an LFO).

| | |
|---|---|
| "---" | No modulation source is selected. |
| Note Log | The note being played with exponential response. The modulation value follows the frequency of theplayed note (bipolar). |

| | |
|---|---|
| Note Lin | The note being played with a linear response. The modulation value follows the note number (bipolar). |



| | |
|---|---|
| Velocity | The MIDI note-on velocity information. The harder the key is hit, the higher the modulation value (unipolar). |
| Aftertouch | The Aftertouch, also sometimes called Pressure value (either Mono or Poly, whatever your keyboard supports) is used as modulation source. Your MIDI keyboard must support this. If this doesn't work it is likely that your keyboard has no aftertouch (unipolar). |
| Pitch Wheel | The value of the Pitch-Wheel is taken as modulation source, maybe it makes sense to reduce the Pitch Wheel range on the Settings page to 0 when using the Pitch Wheel as modulation source. The Pitch Wheel is bipolar |
| Modulation Wheel | The MIDI modulation wheel (MIDI CC 1) (unipolar ). This one is mainly used to control the morphing. Thought it might make sense to use it in the modulation matrix. |
| Breath Controller | MIDI CC 2 (unipolar). |
| Foot Controller | MIDI CC 4 (unipolar). |

| | |
|---|---|
| Expression Contr. | MIDI CC 11 (unipolar). |
| LFO 1 | LFO 1 (bipolar). |
| LFO 2 | LFO 2 (bipolar). |
| LFO 3 | LFO 3 (bipolar). |
| LFO 4 | LFO 4 (bipolar). |
| GenEnvelope 1, 2 | The envelope of Generator 1, 2. Generator envelopes control the respective Generator, however if the Generator is not used, or it makes sense within the preset to do so, the envelope can be used as a modulation source (unipolar). |
| ModEnvelope | The ModEnvelope is an envelope that has no fixed destination and can be routed to any available modulation destination via the Matrix (unipolar). |
| Fil1, 2Envelope | The envelope of the Filters. These envelopes control the respective Filter Cutoff, however if it makes sense within the preset to do so, the envelope can be used as a modulation source (unipolar). |
| Amp Envelope | The Main Amplitude envelope. This envelope controls the overall output Volume, however it can be used as a modulation source as well (unipolar). |
| Glide Curve | The Glide or portamento envelope is used as a modulation source (unipolar). |
| Arpeggiator | The Arpeggiator. |
| Alternate | The Alternate modulation source changes between values of 1 and -1 for each note. This is useful for modulation effects such as auto-panning (bipolar). |
| Constant | The Modulation Amount is used as a constant modulation value (unipolar). |

# Appendix C: Modulation Matrix Destinations

"---" No modulation destination is selected.

Note: All 4 Generators offer the same modulation destinations in the Matrix, so we only describe them once:

Gen Amplitude The amplitude of the Generator, used for in example tremolo or to fade in or out a part of the sound independently from the main volume.

Gen Pitch The pitch of the Generator, used in example for vibrato or variable detuned voices or special effects.

Gen AuxMod 1 The destination of AuxMod depends on the type of Generator that is currently loaded into the respective Generator's slot. The available destinations are marged on the user interface with number 1 next to the parameter and are as follows:

| | |
|---|---|
| Loop-Sampler: | Loop-Start |
| Wavetable Sampler: | Speed |
| Time-Sampler: | Time |
| Noise: | Cutoff (both LP and HP) |
| Generator: | Symmetry (Pulsewidth) |

Gen AuxMod 2 The destination of AuxMod depends on the type of Generator that is currently loaded into the respective Generator's slot. The available destinations are marked on the user interface with number 2 next to the parameter and are as follows:

| | |
|---|---|
| Loop-Sampler: | Loop-End |
| Wavetable Sampler: | <not used> |
| Time-Sampler: | <not used> |
| Noise: | Mix (only in Band-Reject) |
| Generator: | Waveform |

Gen Balance Balance of the Signal being sent to Filter 1 and Filter 2.

SampleStart This destination is only applied when a Loop-Sampler is loaded, it then modulates the startpoint of the sampe playback.

Note: The Filters 1 and 2 offer the same modulation options

| | |
|---|---|
| Filter Saturation | The Amount of Saturation which is applied at the filter input. |
| Filter Cutoff | Cutoff frequency of the Filter, often used with an LFO to create filter sweeps, with the Modulation Wheel to open or close the filter during playing or with Velocity to simulate an acoustic instrument's response to harder played notes. |
| Filter Resonance | Resonance (Emphasis) of the Filter, a not as obvious effect as modulating the Cutoff. |
| Filter Env-Depth | The Amount of the Filter Envelope actually applied to the Filter Cutoff. |
| Filter Type | This only works with the Free-Filter, the Filter Type is modulated. |
| Filter Pan | The output pan position of the Filter. |
| Filter Amplitude | The output volume of the Filter. |
| Main Ampli | Overall amplitude of Crx4. This destination is always directly controlled by the Amplitude Envelope but also available in the Matrix to apply Key-Scaling or LFO's or for special efects. |
| Main Pitch | Overall pitch of all Generators. Often used for vibrato or drum sounds where the pitch drops quickly at the start of the sound. You can also use Glide for certain overall pitch effects. |
| Matrix Depth | Intensity of the first four entries (line 1 to 4) in the Modulation Matrix, often used with the ModWheel as source to control a specific modulation parameter. For Vibrato one would have in example line 1 of the Matrix read<br>LFO 0:00 Main Pitch<br>and another Line would be<br>Modulation Wheel 2:00 Matrix Depth 1<br>for a 2 semitones Mod-Wheel controlled Vibrato. |

| | |
|---|---|
| LFO Speed | Speed of one of the four LFOs, this allows tempo changes of the LFO to be modulated by in example another LFO, Envelope or MIDI controller. Another example is Key Lin as source which makes the LFO run faster with higher notes. |

All Envelopes can be modulated the same way

| | |
|---|---|
| Env Attack | The Attack Time of the Envelope. |
| Env Hold | The Hold Time of the Envelope. Please note that this has no effect when an Envelope of type ADSFR is selected (no Hold Phase) or when the Hold parameter is at Null! So to make the particular modulation have an effect a minimum Hold time must already exist in the Envelope. |
| Env Decay | The Decay Time of the Envelope. |
| Env Sustain | The Sustain Level of the Envelope. |
| Env Release | The Release Time of the Envelope. |

# Appendix D: Using TUN files in the CrX4

By Jacky Ligon

## About Microtuning

Microtuning makes it possible for musicians and composers to change the underlying pitch scales of musical instruments, whereby they may explore and compose with many different types of ethnic, historical and contemporary alternative intonation systems. Microtuning musical instruments enables musicians to use unique sounding scales which may have pitches lying between the notes of our familiar Western 12 tone equal tempered scale.

These alternative intonation systems and methods of microtuning musical instruments to pitches found in the cracks of the Western 12 Tone Equal Temperament, are one of the things that gives the music of such places as Bali, India, Africa, Thailand, Turkey and the Middle East a special sonic quality, but is also something that is of immeasurable value to contemporary acoustic and electronic musicians and composers, who may require a more broad palette of pitches for their music.

The quest for creating beautiful and musically useful intonation systems has been a perpetual process of discovery and debate amongst musical theorists, mathematicians and musicians going back to early history. Quite often the reasons for microtuning musical instruments may involve improving the consonant intervals of a tuning-system for more euphonious sounding harmonies, as well as offering a wider variety of choices for melody. Microtuning an instrument can sometimes mean there may be less, or more, than 12 tones in an octave, or even that the octave itself may be stretched or compressed. Microtuning is a vast musical frontier, rich with historical lore, music and an infinity of exciting musical possibilities for the adventurous sonic explorer.

## Creating TUN Microtuning Files with Scala

Scala is a freeware musical software utility developed by Manuel Op de Coul in the Netherlands, which can be used for the creation and analysis of historical, ethnic and contemporary microtunings. A powerful capability of Scala is that it enables the user to create the proprietary tuning data

required for microtuning a wide range of hardware and software synthesizers and samplers.

Scala may also be used to create the TUN format microtuning files needed to explore microtunings with this software instrument. The Scala home page is at: http://www.huygens-fokker.org/scala/

## Specifying the Reference Frequency of a Microtuning

One of the powerful capabilities of the TUN format and Scala is the ability to specify the frequency and MIDI-note number for the pitch base of a microtuning. This becomes a very important consideration when one is using a number of different synthesizers and wishes to keep them in all tune with a given base frequency.

It is a common requirement for musicians and composers to be able to specify concert pitches such as A440 Hz (MIDI-Note 69) or C261.6256 Hz (MIDI-Note 60) as a reference pitch for a microtuning, however, the flexibility of the TUN format enables one to specify this frequency arbitrarily, so that any base frequency may be assigned to any MIDI-note number. In Scala this important parameter is called the Reference Frequency.

Being able to specify a particular MIDI-note number on the MIDI controller and its associated Reference Frequency, provides a way to map a microtuning to a common base pitch, making it easier to navigate the instrument when the intonation system may have more or less than 12 tones per octave, or where one may need to map the notes of a microtuning to fall on certain physical keys.

## Important Note

When musicians use TUN microtuning files with this software instrument, the above mentioned mapping properties will override the Master Tune setting, which is set to a default of 440 Hz (found on the Setup page). Normally when one is using the default 12 Tone Equal Temperament tuning, the Master Tune setting can be used to set pitch offsets around the standard concert pitch of A440 Hz, however, when one has specified another pitch base for a microtuning when creating TUN files in Scala, these settings will determine the actual Reference Pitch for the intonation system being used.