

# Crystallizer

Granular Echo Synthesizer

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## User's Guide

Version 5 : For Mac and Windows



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Figure 1: The Crystallizer GUI and Tweak Menu

While the cover page of this manual defines Crystallizer as a Granular Echo Synthesizer, we think of it more as an incredibly creative, powerful, new granular-pitch-splice-forward/backward-echo-plus-space-drive-shimmer-accumulator-effect-device.

As you can see, we've found it difficult to sum up what Crystallizer does in a succinct fashion. That's because Crystallizer is a special kind of tool; the culmination of an insane amount of programming hours, head-scratching, listening, and tweaking to achieve the perfect results. But to truly explain why Crystallizer is unlike anything else, a little history lesson is in order.

### *Gather 'round!*

A bunch of years ago the brains behind Soundtoys (formerly Wave Mechanics) worked for a little company called Eventide in the swamps of New Jersey (yes, there are swamps). While there, these geniuses created the now world-famous H-3000 Harmonizer® which contained a new type of algorithm they called Reverse Shift. That new algorithm remained largely unused until a sound designer by the name of Andrew Schlesinger had a realization. Andrew found that by using the algorithm, coupled with generous feedback and delay, one could create lush "Crystal-Like" echoes and shimmering effects that sounded absolutely incredible, especially on guitar.

And so, a preset was created for the H-3000 titled "Crystal Echoes" which has subsequently been used by hundreds of artists and producers on countless albums.

Fast-forward to the present-day. With Crystallizer you now have an updated and more powerful device capable of generating (and truthfully surpassing) the same quality of effect created by the very same guys who conceptualized the original.

What Crystallizer does essentially is that it grabs a "slice" of stereo or mono audio coming in from the input and plays it back (either forward or in reverse) with the ability to shift the pitch of the audio slice (4) octaves up, or (4) octaves down. It also includes the ability to delay the playback of the audio by up to (2) seconds and most importantly use regeneration or "Recycle" to feed the output back into the input allowing you to create some radical and beautiful effects on all sorts of input signals.

Additionally, a set of hidden "Tweak" parameters (okay, we'll show you where to find them) allow you to further mutate the signal for endless sonic possibilities. Crystallizer, due to its uniqueness, is a plugin that simply begs to be tweaked and played with.



Figure 2: Crystallizer's Main GUI

## INPUT AND OUTPUT LEVEL

The Input and Output level controls are used to (you guessed it) either boost or attenuate the input or output of Crystallizer. The default setting of the controls approximates "unity gain" (what goes in comes out the same level) and should provide the best overall "normal" sound quality when set to these levels.

It is important to note that the input and output level only affects the shifted signal and leaves the dry signal unchanged. This approach is slightly different than that of some other plug-ins and allows for the user to control the crystallization effect's audio level separate from the unaffected signal.

The LED-style indicators located beneath the Input and Output knobs provide a visual display of the input and output signal levels. The yellow LED indicates that the signal is 6dB below clipping. The red LED indicates maximum signal level, and possible audible clipping (which you may or may not wish to have as part of your sound).



Figure 3: Output LED indicating maximum signal level

## MIX

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The Mix control is used to set the balance between the shifted sounds created by Crystallizer (wet) and the dry (or unaffected) signal. The Mix control provides a convenient means of setting just the right balance between the dry and wet audio and is especially useful when Crystallizer is used as an insert effect.

If you are using Crystallizer on an Aux Send/Return configuration, you may want to leave the mix at 100% and use the fader on the return to control the amount of the effected sound.

## PITCH

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The Pitch control allows you to adjust the pitch of the effect signal up or down (3) octaves, (6 octave total range) with the maximum values being +3600/-3600. The readout is in “cents” and the values increment in (1) cent intervals. Adjusting the Pitch control up by 100 cents will result in a half step change higher, or decrease by 100 for one semitone lower. You can also use this control to get slight detuning effects by setting the Pitch value to say + or - 10, or set the pitch between notes, i.e. +750, between a 5th and 6th.

## SPLICE

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The Splice control determines the length of the section of audio that is captured and played back. The values are in milliseconds and the range of knob is from 0-2050ms (a little over 2 seconds)

Setting a short Splice length, say below 30ms, will result in minimal delay time and will play back that very short splice rapidly. The resulting effect, most likely, will not have a discernible pitch and be somewhat metallic sounding. Using short splices can produce some very cool effects, not only on non-pitched percussive sounds but also for pitched sources as well. To achieve an effect sound that retains the pitch information of the source material, it is advised to keep the Splice control somewhere above 30ms. This is especially true as you add more pitch shift.

Setting the Splice control to a high value of say, 300ms or greater will result in a section of the input signal being “grabbed” and played back each 300ms and pitch shifted to the amount set by the Pitch knob. In addition, there will be approximately the same amount of delay (300ms) inserted between the original audio and the onset of the effect as each new slice is taken.

## SPLICE (continued)

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As another example, if you set the Splice control to 1000ms, Crystallizer will be looking to grab a slice of audio every 1000ms and there will be approximately a 1000ms (1 second) delay before the effect sound is played back.

Remember though that the delay time within the spliced section is being modulated so the actual onset of the playback may not be exactly 1000ms and depending on when your input signal occurs within the 1000ms “grab” will also affect how and when the playback will occur.

The influence that the Splice control has to an audio signal is easier heard than explained in words. We strongly recommend that you experiment with differing Splice lengths on a variety of sources. As you change the Splice value you will hear how the audio is being captured and played back. Also, try experimenting with forward and reverse modes, using the Delay and Recycle controls to hear how both alter the nature of the effect.

## DELAY

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This control allows you to insert a specific amount of delay between the original signal and the effected signal. This delay is not modulated and is fixed to the value that you set. It is added to any delay that might be inherent based on the Splice setting. The delay range is: 0-2050ms (milliseconds).

## RECYCLE

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The Recycle knob is essentially a feedback control, allowing you to send the output of the effect signal back into the input at varying amounts. Turning the control up will generate repeating, spiraling pitch effects and depending on the setting, the Pitch knob can create upward or downward spirals.

The longer the splice, the longer the time between repeats (adding Delay can also increase the space between each repeat). Using a Splice of say 500ms and above, along with a Pitch setting of 1200 and a decent amount of recycle will create sounds similar to the classic “Crystal Echoes” hardware preset.

## THRESHOLD

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Ok, so we are going a little out of order here but there is a reason. Before we can really discuss the way the Gate/Duck knob works you need to know that the setting of the Threshold control defines when the Gate/Duck action occurs. The Threshold control allows you to define a specific level (as in loudness) that the input must reach before the Gate/Duck begins to take effect. As long as the level of the input signal is above the Threshold level, the Gate/Duck will be “on” and activated. As soon as the level of the input signal falls below the Threshold setting the Gate/Duck is turned “off” and de-activated.

The LED ring around the Threshold knob displays the level of the input signal providing a visual cue to how the input level is changing. This allows you to easily set the Threshold level to a setting that will provide the type of results you want. At the extremes of the function, the lowest Threshold setting would cause the Gate/Duck action to always be on, and conversely the highest Threshold would prevent the Gate/Duck from ever engaging

Utilizing the Threshold knob along with the Gate/Duck control (described next) allows a wide range of control over the way Crystallizer responds to the dynamic content of your source material. Your threshold settings will be very program dependent; there is no right or wrong setting to this control.

## GATE/DUCK

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Alright, now back to that Gate/Duck knob. This dual-purpose control allows you to either “duck” (dynamically lower the level of the affected signal) when the original sound is above the setting of the Threshold knob, or, Gate the effected signal (dynamically increase the volume of the effected signal) when the original signal is above the Threshold setting.

A simple way to hear how the Gate/Duck function works is to set the Pitch to 1200, Splice to 500, Delay to 500 and Recycle to around 11 o'clock or so. This will create a repeating echo one octave above the original signal that becomes increasingly higher in pitch with each repeat.

The 12 o'clock position on the Gate/Duck knob is the “off” position at which no Gate or Ducking will be employed. As you turn the knob clockwise you will add “Ducking” to the effected signal, decreasing the level of the echoes as long as the input signal is above the Threshold. If you turn it all the way up, the effect will totally disappear until the input signal drops below the set Threshold value. This ends up being a very effective way to have the effect “move out of the way” while you are playing and then reappear when you stop.

Turning the knob counter-clockwise works in a manner inverse to the Duck function. As you crank the knob counter clockwise you will progressively lower the level of the effect and as you turn it all the way



## GATE/DUCK (continued)

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to the left, the level of the effect signal will be set to zero as long as the input signal is below the Threshold.

As the input signal moves above the Threshold the wet signal will reappear and remain present as long as the input signal remains above the set Threshold. We can use Gate/Duck creatively by creating swirly, echo wash effects that will only appear when you hit a loud note. By setting the relative level of the effect signal from full on to full off you can have the effect signal just drop by various amounts in the Duck mode and in Gate mode you can set the effect to always be heard somewhat but when you play louder the effect will come full on.

In the Tweak Menu you will find two additional controls, Attack and Release, that are used to define how fast or slow the Gate/Duck action takes place. These controls are discussed in detail starting on page 13.

## FORWARD/REVERSE

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Forward/Reverse is a very easy control to explain. When this switch is in the “Forward” setting the effect signal is played back normally (forward). When the switch is set to “Reverse”, the effect signal is played back in reverse (backwards). Keep in mind that any pitch shifting will be imparted on the effect signal regardless of the Forward/Reverse setting. Using the reverse function along with longer Splice settings and with the Recycle turned up will result in a thick and swirling reverse echo.

## MIDI SYNC

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Switching the MIDI Sync button to “on” locks Crystallizer to incoming MIDI clock information. You will also notice that the Splice and Delay control readouts will change from milliseconds to note values. This allows you to select specific note lengths and have the effect stay in sync with the MIDI clock. Keep in mind that the Splice will be forced to restart at each downbeat based on the selected note length, similar to how oscillator sync works in a synthesizer (in simple terms this means that your splice cannot be longer than the downbeat).

## TWEAK BUTTON

Pressing the Tweak button will open Crystallizer's slide-out Tweak Menu, providing access to a new set of parameters that provide the ability to tweak Crystallizer even further.

The Tweak Menu that appears (see Figure 5) contains several additional controls which we will discuss individually starting on the next page.



Figure 4: The Tweak Button: your key to more Awesomeness



Figure 5: Crystallizer's Tweak Menu Control Layout

## PITCH OFFSET

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The Pitch Offset control allows you to add additional detuning to the signal but will detune the left channel down and the right channel up by the selected amount. So, whatever the setting of the main Pitch control, the value set on the Pitch Offset will subtract the selected amount from the pitch of the left channel and add the selected amount to the pitch of the right channel.

This can be very useful for creating thick stereo detune effects. If you set the main Pitch control to '0' and set the Pitch Offset to say '11', the left side will be tuned flat by 11 cents and the right side will be tuned sharp by 11 cents. The range of the Pitch Offset control is 4 octaves (or +/- 4800 cents) regardless of where the Pitch control is set. So you could conceivably have the left channel shifted down 4 octaves and the right side shifted up 4 octaves.

## SPLICE OFFSET

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The Splice Offset control only affects the right side signal. As you turn the knob clockwise it starts to shorten the right side splice length by the percentage shown in the numerical readout. A setting of 25.0 indicates that the right side will have a splice length 25% shorter than the left side. A setting of 50.0 means that the right splice length will be 50% or 1/2 of the left side. A splice setting of 100 indicates that the right side will be 1/100th of the left side splice length.

With longer settings on the Splice control you can get some really interesting stereo effects from varying the Splice Offset and creating different splice lengths in the left and right channels.

## DELAY OFFSET

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The Delay Offset control works much like the Splice Offset and also only affects the right side signal. As you turn the knob clockwise it starts to shorten the right side delay length by the percentage shown in the numerical display. A setting of 25.0 indicates that the right side will have a splice length 25% shorter than the left side. A setting of 50.0 means that the right splice length will be 50%, and so on, same as with Splice Offset.

Varying the Delay Offset allows you to modify and enhance stereo effects by creating different delay values for the right and left channels.

## SMOOTHING

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The variable position Smoothing knob controls how fast or slow the crossfade will be between splices in Crystallizer's delays. This crossfading behavior has the effect of making the transitions between splices much smoother and less abrupt. At higher settings, the Smoothing control can impart a very ethereal or washy feeling to the echoes.

At the minimum setting for this control (20ms) a 20 millisecond crossfade is being applied to any changes in the delay signal. Higher settings on the Smoothing control will result in longer crossfades.

## LOW CUT

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The Low Cut knob controls a 12db per octave highpass filter and allows you to reduce the low frequencies of the effect signal based on the frequency setting of the knob.

The range of this control is from 1.00Hz to 5000Hz. As you turn the knob up and increase the frequency, the audio content below the frequency value will be eliminated.

## HIGH CUT

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The High Cut knob controls a 12db per octave lowpass filter and allows you to reduce high frequency content. The range of the knob is from 20 kHz at the highest setting and 500 Hz at the lowest. As you turn the control down (counter-clockwise) the frequency decreases and more of the high end of the effect signal will be eliminated.

Using the Low and High Cut filters together allows you to create various types of bandpass filters. Keep in mind that these filters do not apply to the dry (unprocessed) signal.

## ATTACK

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The Attack control is used in conjunction with the Gate/Duck control and allows you to adjust how quickly or slowly the effected signal is gated or ducked when the input level passes the set Threshold.

The faster (lower) the setting of the Attack knob, the faster the effect signal will be ducked as the input signal passes the Threshold level setting. The slower (higher) the value of the Attack knob, the slower the effect signal will be ducked or gated as the input signal passes above the Threshold setting.

This allows you to change the level of the effect very quickly with short Attack settings or to have the effected signal slowly drop in volume with longer Attack times. It is important to keep in mind that with longer Attack times the input signal has to be held above the Threshold level long enough for the signal to slowly fade out. If the input signal is rapidly going above and below the Threshold setting the response of the Ducking or gating will be too slow to respond. In this case you would need to lower the Attack time (so, speed it up) so it can react more quickly.

## RELEASE

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The Release control is used in conjunction with the Gate/Duck control and allows you to adjust how quickly or slowly the effected signal returns to its “normal” level once the input level drops below the setting of the Threshold knob.

The Release control is dependent on the Threshold setting much like with the Attack control. With Ducking, the Release time determines how quickly or slowly the effect signal will “come back up” to its normalized level. With Gating, the Release time will determine how quickly or slowly the signal will “drop back down” to the level set on the Gate knob. In both cases the Release is engaged once the input signal drops below the Threshold setting.

Again, keep in mind that longer Release times result in a slower change in the level of the effect signal. In most cases you will want to tweak both the Attack and Release times based on the dynamics of the input signal.

## FEEDBACK MODE

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Feedback Mode defines how multiple repeats in the feedback loop will appear in the stereo field. There are three options available: Mixed, Dual, and Ping-Pong.

**Mixed** - In Mixed mode both the left and right channels of the feedback signal are mixed and can be heard in both the left and right channels. Turning up the Recycle setting and adding some Delay Offset can yield a more diffused sound with this setting.

**Dual** - In Dual mode the feedback path for the left and right channels are independent; they are not blended together and appear in their own respective channels.

**Ping-Pong** - When Ping-Pong mode is selected the repeats will alternate between the left and right channels; ping-ponging back and forth with each successive repeat.

The three Feedback Mode options available to select from can have a very pronounced effect on Crystallizer's echo pattern, even without changing the parameters of any other control. Experiment with this control and notice the changes that occur in the stereo field in each mode.

## DUCKING MODE

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Crystallizer gives you custom dynamic control by letting you select Out, Feedback, or Both. Out or Output mode ducks or gates the initial effected signal before it hits feedback.

Feedback mode ducks or gates only the Feedback, and Both, well, ducks or gates both. Once you get a grasp on the way each mode reacts, you can get some distinctively different effects than possible with only one mode. Play, experiment, be weird.

## SUPPORT INFORMATION

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Now that you've taken the time to learn all about Crystallizer, have fun, experiment, and make greatness! If our plug-ins helped you take your production to the next level, let us know, we'd love to hear from you and what you were able to create with our software.

If along the way however you should run into any hiccups or anything unexpected, we offer free technical support for all registered users.

Our FAQ contains many helpful answers. you can find it at:

**<http://support.soundtoys.com>**

If you need further support you can find our Customer Support contact form at:

**<https://www.soundtoys.com/forms/support>**

You can also reach our support staff by e-mail at:

**[support@soundtoys.com](mailto:support@soundtoys.com)**

If neither of those options work for you, our office can be reached via telephone at:

**1-800-COOL-EFX**

*Please* have the following information available to help assist our support team:

- The product version and serial number
- The version number of your audio system (e.g ProTools 11.2.1, Cubase 8.0.5, Logic 10.2.0, Cakewalk Sonar X3)
- Your interface/hardware (e.g. Mbox Pro, Apogee Quartet, RME Fireface, etc.)
- Your computer and operating system info (e.g. MacPro with OS X 10.9.5, Windows 7 SP1, Windows 8.1, etc.)
- A detailed description of the problem

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