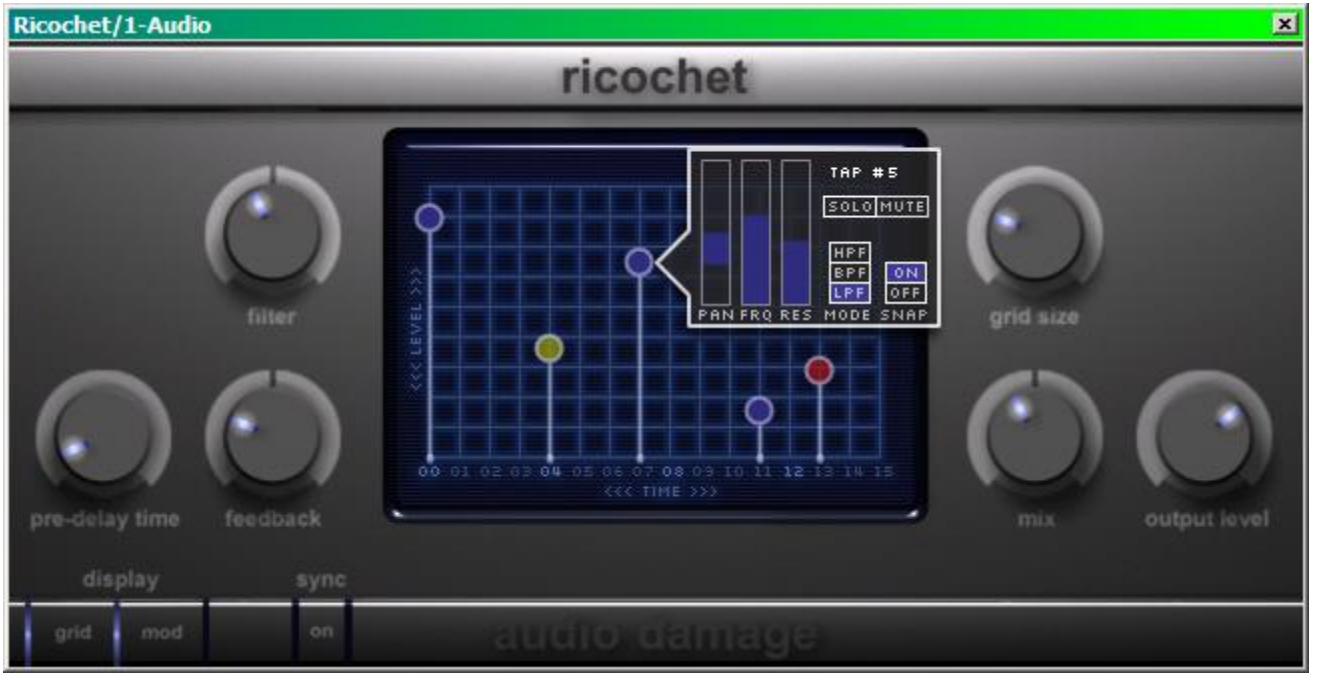
Ricochet User's Guide
Audio Damage, Inc.
Release 1.0



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Introduction

Thank you for purchasing Ricochet, Audio Damage's multi-tap delay plug-in. Ricochet combines a sophisticated and novel multi-tap delay architecture with a simple user interface. Ricochet includes an EQ-like input filter, separate resonant multi-mode filters on each of its five output taps, and a chorus processor. Ricochet can create a wide variety of effects from simple delays and filters to stereo choruses and ping-pong delays, complex rhythmic repeats, simple reverberation, and more. Ricochet syncs to the tempo of your host digital audio workstation (DAW) software and fully supports parameter automation.

Ricochet is provided as both a VST and an AudioUnit plug-in for Windows and MacOS X. The MacOS X version is a Universal Binary, compatible with both Intel- and Motorola-based Macs.

System Requirements

To use Ricochet, you'll need a Steinberg VST-compatible host application which conforms to the VST 2.0 specifications, and a computer capable of running it. For the AudioUnit version of Ricochet, you'll need an application capable of hosting AudioUnit plug-ins, and a computer capable of running it. The following specifications represent minimum requirements.

For use with Microsoft Windows:

- Windows XP or Vista
- 512 MB RAM
- Pentium III 600 MHz CPU
- High Color S-VGA Display

For use with Apple Macintosh:

- Mac OS X version 10.4 or newer
- 512 MB RAM
- Motorola G4/G5 or Intel CPU
- Display capable of "thousands of colors"

Installation

Double-click the Ricochet Installer icon and follow the instructions. During the installation process the installer will ask you to enter your registration code. Your registration code uniquely identifies your purchase, and you will need it if you need to reinstall your plug-in (for example, after upgrading to a new computer). Keep a copy of the code in a safe location and please don't share it with your friends. We're delighted if you like our products so much that you want to share them, but please ask your friends to buy their own copy so that we can keep making new products.

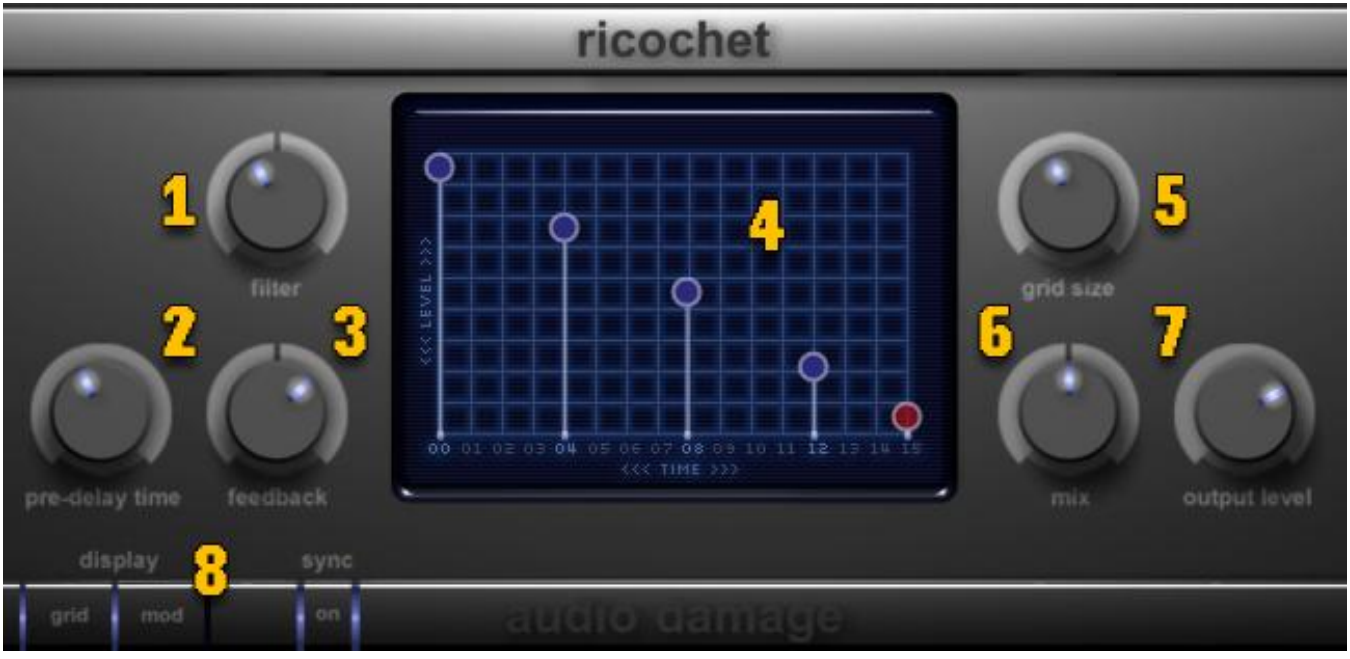
To un-install from OS X, simply delete the plug-in from your VST folder, which is usually located at `/Library/Audio/Plug-Ins/VST/`, and your AudioUnits folder, which is located at `/Library/Audio/Plug-Ins/Components/`. To un-install from Windows, simply delete the plug-in from your VST folder, which is usually located at `C:\Program Files\Steinberg\VstPlugins`.

Operation

Ricochet can be used in either a stereo or mono context in your host DAW software. If you use a stereo input, the left and right channel separation of the input signal is preserved in the output signal (assuming that some amount of the unprocessed signal is present in the output; see the description of the **MIX** knob below). Ricochet can be used either as an insert effect or a send/return effect; in the latter case rotate the **MIX** knob fully clockwise so that none of the dry signal is added in the return signal.

Ricochet's knobs respond to vertical mouse-pointer movements; that is, click on a knob and drag upwards and downwards to rotate the knob. If you're using the VST version of Ricochet, your host software may override this behavior. You will discover that the current value of the knob's parameter is displayed in a pop-up indicator when you click on a knob.

Here is a screenshot of Ricochet, followed by detailed descriptions of its controls.



1. Filter

The **FILTER** knob controls a filter that the input signal passes through before entering the pre-delay. The filter is not a simple fixed-response tone control, but instead is an equalizer-like pair of shelving filters, one low-cut filter and one high-cut filter. The **FILTER** knob is bidirectional. At its center "12 o'clock" position, the filters have a flat response and do not affect the sound of the signal. As you rotate the knob anti-clockwise, the high-cut filter removes an increasing amount of the signal's higher frequencies. Conversely, as you rotate the knob clockwise from the center position, the low-cut filter removes an increasing amount of the signal's lower frequencies. In simpler terms, the **FILTER** knob makes the sound darker or duller as you rotate it counterclockwise, and brighter or thinner as you rotate it clockwise.

Note that the **FILTER** knob controls the *amount* that the low- or high-cut filter reduces the signal's frequency content. This differs from the behavior of most filter knobs, which usually control the *range* over which the filter reduces the signal's frequency by changing the corner frequency of the filter. You can change the corner frequencies of Ricochet's filters with the **FILTER FREQUENCY** sliders found on the modulation display, which you invoke by clicking the **MOD** button in the lower-left corner of Ricochet's window. You may find that you need to adjust one of the **FILTER FREQUENCY** sliders at the same time you're using the **FILTER** knob to dial in the sonic character you're seeking.

2. Pre-Delay Time

Ricochet contains two delays in series: a simple pre-delay followed by the main delay with its five output taps. The **PRE-DELAY TIME** knob sets the length of the first delay. If the **SYNC** switch at the bottom of Ricochet's window is off, the pre-delay time is set in units of milliseconds. If the **SYNC** switch is on, the pre-delay time is calculated from the current tempo of your host sequencer and the **PRE-DELAY TIME** knob operates in metrical units. For example, setting the **PRE-DELAY TIME** knob to "1/8" will produce a delay time equal to an eighth-note's duration, regardless of the current tempo of your song. In either case the delay time is displayed as you move the knob. The pre-delay has a maximum length of 4 seconds.

Since the pre-delay comes before Ricochet's main, multi-tapped delay line, the effective delay time of any of Ricochet's output taps depends upon the settings of the **PRE-DELAY TIME** knob, the **GRID SIZE** knob, and the position of the tap's control dot.

3. Feedback

The **FEEDBACK** knob controls how much of the delayed signal is fed back into Richochet's input. With no feedback, each of Ricochet's five output taps will produce a single delayed copy of the input signal. Feedback sends some amount of the delayed signal(s) back into Ricochet's input, producing a decaying series of copies.

Like the **FILTER** knob, the **FEEDBACK** knob is bidirectional, and causes different things to happen depending on the direction that you rotate it. At its center position, no feedback happens and the knob has no effect. If you rotate the knob clockwise, an increasing amount of the pre-delay's output is fed back into Ricochet's input. None of the signals from the output taps is fed back. If you rotate the knob anti-clockwise, the opposite happens: an increasing amount of the signals from the output taps (all of them) is fed back into the plug-in's input, and none of the pre-delay's output is fed back directly. As you'll see when you move the **FEEDBACK** knob, these modes of operations are referred to as "Echo" and "Reverb" respectively. Since the Echo mode produces simple repetitions of the input signal before it passes through the multi-tap delay line, it is useful for producing discrete echo effects. The Reverb mode recirculates all of the delayed signals that emerge from the multi-tap delay and hence can produce reverberation-like accumulations of delayed sounds.

If you've been paying close attention, a question may now arise in your mind: what happens if the pre-delay time is zero and the Echo mode is employed? Wouldn't that create a feedback loop with zero delay time? Good question and the answer is yes, it would. However, this isn't terribly useful, so Ricochet has a special trick for just this situation. If the pre-delay time is zero and you rotate the **FEEDBACK** knob clockwise to engage the Echo mode, the pre-delay's output is *not used* for the feedback signal. Instead, a hidden, extra tap on the main delay line is used for the feedback signal. This tap's delay time is permanently fixed at $1/4^{th}$ of the time set with the **GRID SIZE** knob. (Much more information about the Grid Size knob and the output taps lies ahead, so keep reading.)

In both modes, the **FEEDBACK** knob has a maximum value of unity gain. This permits delayed signals to repeat many times before fading out. However, if any of the tap output filters have high resonance settings, the feedback signal can become louder and louder. As always, be careful of your ears when monitoring the output of your DAW.

4. Tap Dots

The five circles on Ricochet's grid display, called the tap dots, control the delay time and output level (or volume) of the five taps on Ricochet's main delay. In brief, moving the dot left and right changes the tap's delay time and moving it up and down changes its output level. Click on the dots and drag them with your mouse to move them around.

The horizontal position of a tap dot expresses the tap's delay time relative to its horizontal location on the grid, and as a fraction of the time represented by the grid. This time is set by the ***GRID SIZE*** knob. If the tap dot is at the far left side of the grid, its delay time is zero. If the tap dot is at the horizontal center of the grid—that is, the position marked "08" at the bottom of the grid, or halfway across the grid—its delay time is half of the time set by the Grid Size knob. If the tap dot is at the far right of the grid, at the position marked "15", the tap's delay time is 15/16 of the time set by the Grid Size knob. Why 15/16? Because the Grid Size knob sets the time represented by the grid to simple subdivisions of a measure (when the ***SYNC*** switch is turned on). 15/16 is the last sixteenth of that unit of time; 16/16 is the same as the first position of the next unit of that time, and hence a value that can be covered by other settings of the tap time and pre-delay time[1].

The vertical position of a tap dot determines how much of that tap's output signal is present in the plug-in's output—that is, it sets the volume of the tap. If the tap dot is at the bottom of the grid, the tap will be silent (or nearly so). As you move the tap dot towards the top of the grid, the tap signal becomes louder. The vertical position also determines how much of the tap's output is sent back to the input of Ricochet if the ***FEEDBACK*** knob is rotated anti-clockwise to engage the "reverb" feedback mode.

There are several other parameters associated with each tap. The controls for these parameters are tucked away in a small panel which pops up when you right-click on a tap dot with the mouse. If you're using a mouse with only one button, hold down the CTRL key on your keyboard while clicking to bring up the panel. The panel will stay open until you dismiss it by either right-clicking again on the tap, or right-clicking on a different tap to invoke its panel. The panel looks like this (see next page):

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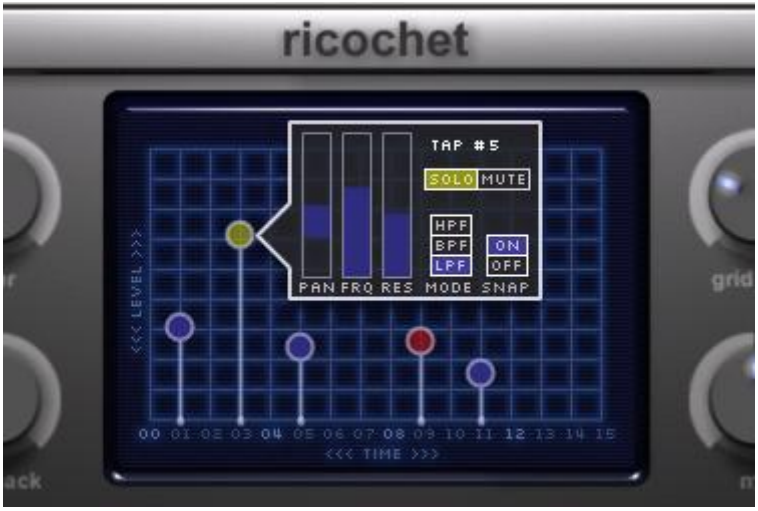
[1] If you find this confusing, it might help to think of it this way: a TR-style drum machine has 16 buttons representing 16 steps in a pattern. The first button is labeled "1" and it represents the step which starts at the beginning of the pattern. The last button is labeled "16" and represents the step which starts 15/16ths of the way through the pattern, because there's still 1/16th of the pattern's time left when that step begins. There is no 17th button because it would have to represent the first step of the next pattern. Since Ricochet is a delay and not a drum machine, its 16 "steps" are numbered 0-15 because they represent delay times with a value of zero or greater.



On the left of the panel are three vertical sliders, labeled **PAN**, **FRQ**, and **RES**. Click and drag on them to move them up and down.

The **PAN** slider moves the tap's output between Ricochet's left and right output channels. Move the slider upwards (from its center position) to move the tap's output towards the right, move it downwards to move the tap's output to the left. Obviously if you're using Ricochet in a mono-output context, the **PAN** slider has no effect.

Each of Ricochet's output taps has a multi-mode, two-pole, resonant filter. These filters operate separately (and independently of the filters controlled by the **FILTER** knob). The **FRQ** slider sets the operating frequency of the filter. Moving the slider upwards increases the filter's frequency. The audible effect of increasing the filter's cutoff frequency depends upon the current response mode of the filter, low-, band-, or high-pass.

The **RES** slider sets the amount of resonance of the tap's filter. Moving the slider upwards increases the resonance. A higher amount of resonance causes the filter to emphasize or amplify signals near its operating frequency. High resonance values will produce a whistling or ringing sound when the filter's low-pass or high-pass modes are used. When the band-pass mode is active, the resonance control effectively sets the width of the frequency band that the filter allows to pass; higher values make the band narrower.

The **MODE** switch to the right of the sliders chooses the response mode of the filter. The modes are:

- **LPF**: low-pass filter. This mode causes the filter to attenuate or reduce signal frequencies higher than its operating frequency (set by the **FRQ** slider) and pass unchanged signals lower than its operating frequency. Low-pass filters are the most commonly used filters in synthesizers and effects processors.

- **HPF**: high-pass filter. This mode causes the filter to attenuate signal frequencies lower than its operating frequency and pass unchanged signals higher than its operating frequency.

- **BPF**: band-pass filter. This mode causes the filter to attenuate signal frequencies higher and lower than its operating frequency, and pass signals near its operating frequency.

Click on the abbreviated name to change the filter's response mode.

The ***SNAP*** switch at the right of the panel determines how the tap dot moves horizontally when you drag it with the mouse. If the ***SNAP*** switch is on, the tap dot will jump from one vertical grid line to the next as you move it; that is, it will snap to the nearest line. This lets you easily set the tap times to rhythmically useful values, since the grid lines divide the delay time into 16 units. If the ***SNAP*** switch is off, the tap dot can be moved freely within the grid. The ***SNAP*** switch has no effect on the vertical movement of the tap dot.

The ***SOLO*** and ***MUTE*** buttons near the top right of the panel behave like the solo and mute controls on a mixer. If you click on the ***SOLO*** button, you will hear only that tap's signal in Ricochet's output. Only one tap can be soloed at a time. If one tap's ***SOLO*** button is turned on and you click on a different tap's ***SOLO*** button, the first tap's ***SOLO*** button will be turned off. The ***MUTE*** button silences a tap. More than one tap can be muted. The ***SOLO*** button takes precedence over the ***MUTE*** button; you can solo a muted tap without first un-muting it. The solo and mute status of the taps is reflected by the color of the tap dots. A muted tap has a red dot and a soloed tap has an olive dot.

Text indicating which tap, 1 through 5, appears at the upper right of the popup panel. This numbering does not affect the order of the taps along the delay line; for example, there's no reason that tap #3 has to have a longer delay time than taps 1 and 2. The reference numbers for the taps are only useful if you're examining automation data for the plug-in.

5. Grid Size

The ***GRID SIZE*** knob sets the maximum time of Ricochet's main, multi-tap delay. If the ***SYNC*** switch at the bottom of Ricochet's window is off, the grid size is set in units of milliseconds. If the ***SYNC*** switch is on, the grid size is calculated from the current tempo of your host sequencer and the ***GRID SIZE*** knob operates in simple fractions of the duration of one measure. In either case the delay time is displayed as you move the knob. The values available when the ***SYNC*** switch is on are ¼, ½, 1, and 2. For example, setting the ***GRID SIZE*** knob to "1/2" will set the grid size to half a measure. If you then move one of the tap control dots to the position marked "04", that tap will have a delay time equal to an eighth-note's duration (assuming that the pre-delay time is zero), regardless of the current tempo of your song, because 4/16 equals ¼, and ¼ times ½ equals an eighth[2].

Now that we've examined all of the controls that determine the actual delay time for the output taps, let's reconsider how they all fit together. The Pre-delay Time knob controls sets the *shortest* time that the signal will be delayed, since the pre-delay comes before the main multi-tap delay. Like the pre-delay parameter of a reverb processor, the Pre-delay Time knob creates an offset between the original signal and the onset of the processed signal. The Grid Size knob sets the length of the main multi-tap delay, and hence the range of delay times available for the output taps. The positions of the tap dots determine the locations of the output taps along the main delay, and hence the delay times of the outputs. These times are added to the pre-delay time.

This means that you can create changes in Ricochet's overall effect simply by rotating the Pre-delay Time and Grid Size knobs. Each of these knobs effectively changes the delay times of all of the output taps. Rotating the Pre-Delay Time knob moves all of the taps while maintaining their delay times relative to each other, since the pre-delay comes before the main delay and hence its time is added to the times of the taps. On the other hand, rotating the Grid Size knob increases or decreases the delay times of the output taps relative to each other, since the effective delay time of a tap is represented by the tap's dot's position on the grid and rotating the knob changes the size of the grid.

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[2] Don't panic if you do not consider math to be your strongest skill. You'll find that you can turn on Ricochet's ***SYNC*** switch and forget about fractions altogether since the delay times are automatically calculated for you and Ricochet's grid size is deliberately restricted to simple divisions of a measure. You'll also notice that the positions on the grid marked 00, 04, 08, and 12 are highlighted as a gentle reminder that these positions will tend to produce the most rhythmically pleasing delay times.

The maximum delay length for any of the tap outputs is four seconds. This means that the 2-measure setting of the **GRID SIZE** knob is mostly useful at tempos above 120bpm, since two measures equals four seconds at this tempo.

6. Mix

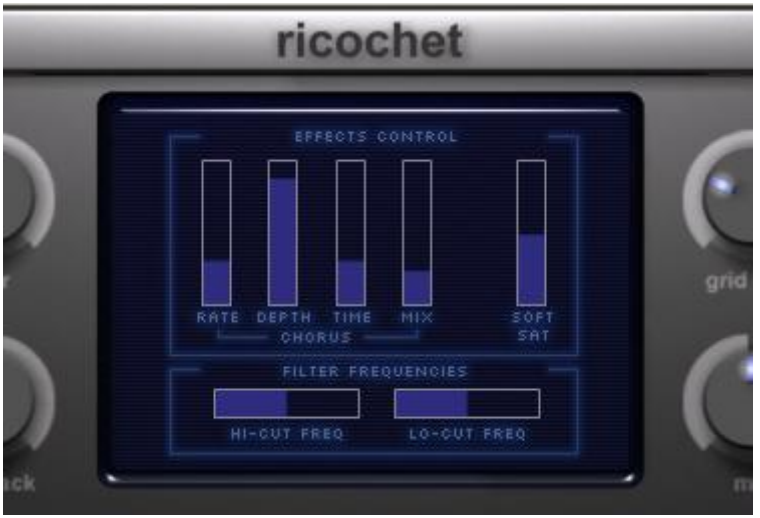
The **MIX** knob controls the relative amounts of the original, unprocessed (dry) signal and the processed (wet) signal in Ricochet's output. Use this knob to control the overall amount of the effect. When the knob is rotated fully anti-clockwise, you'll hear only the original signal. As you rotate the knob clockwise, the amount of wet signal increases and the amount of dry signal decreases. At the center "12 o'clock" position, there is an equal amount of wet and dry signal in the output. If you rotate the knob fully clockwise, you'll hear only the processed signal.

7. Output Level

The **OUTPUT LEVEL** knob adjusts the overall loudness of Ricochet’s output. It affects the unprocessed and processed signals equally. As you rotate the knob clockwise, Ricochet’s output becomes louder. Use this knob to either tame excessively loud signals (which can be produced with high settings of the feedback knob) or to boost quiet signals (which can be produced with filter settings that remove most of the input signal). The control has a range of -40dB, which will silence all but the loudest signals, to +6dB, which will apply a gentle amount of amplification.

8. Chorus, Saturation, and Filter Controls

Ricochet has a chorus processor in addition to its delays. The chorus processor can be used to thicken the delayed sound and make it more spacious. The controls for the chorus processor are found on the Effects Control panel which appears when you click the **MOD** button near the lower-left corner of Ricochet’s window.



The **RATE** slider sets the speed with which the chorus effect is modulated (changed) by a low-frequency oscillator (LFO). As you move this slider upwards the modulation rate increases. The **RATE** control has a range of 0.05 to 1Hz. Note that if the **DEPTH** slider (described next) is set to zero, you won't hear any change in the output when you move the **RATE** slider.

The **DEPTH** slider determines how much the chorus effect is modulated by the LFO. At its lowest setting, the LFO has no effect and the chorus process acts like a short delay. As you move the **DEPTH** slider upwards the modulation amount increases and chorus process has a more noticeable effect. You may find that you have to adjust the **RATE** and **DEPTH** sliders together, e.g. a lower **DEPTH** setting might work better with a high **RATE** setting and vice-versa.

The **TIME** slider sets the length of the delay used to create the chorus effect. Moving the **TIME** slider upwards increases the delay time. The slider has a range of 5 to 25msec. The lowest settings can create flanging or comb-filtering effects; higher settings create chorus and doubling effects.

The **MIX** slider controls the amount of the chorus effect that is added to Ricochet's output. If the **MIX** slider is at its lowest position the chorus effect is silenced. As you move the slider upwards the chorus effect becomes louder. Note that the **MIX** slider does not reduce the level of the signal not processed by the chorus. At the highest setting of the **MIX** slider, the chorused and non-chorused signals are combined in equal amounts.

The **SOFT SAT** slider controls the amount of soft-saturation distortion created within Ricochet's feedback path. The distortion section has two purposes: first, it prevents feedback signals from growing without limit; second, it imparts a variable amount of analog-like distortion. This distortion can help repeated signals seem to break up or decay and become less distinct. Moving the slider upwards increases the amount of distortion.

The Filter Frequency sliders at the bottom of the panel, labeled **HI-CUT FREQ** and **LO-CUT FREQ**, control the corner frequencies of the two shelving filters present in Ricochet's input section. The gains of these shelving filters are controlled by the **FILTER** knob, described above. Moving the frequency sliders towards the right increases the corner frequency of the associated filter. The low-cut filter frequency slider has a range of 20 to 10kHz and the high-cut filter slider has a range of 50 to 2kHz. Note that you won't hear anything when you move these sliders if the **FILTER** knob isn't in the appropriate position. The **FILTER** knob must be rotated anti-clockwise from its center position for the high-cut filter to have any effect, and rotated clockwise from center for the low-cut filter to have any effect. Note that the locations of the sliders reflect their correspondence to directions of rotation of the Filter knob: the **HI-CUT FREQ** slider is on the left, and the high-cut filter is active when the Filter knob is rotated towards the left, whereas the low-cut filter is active when the knob is rotated towards the right.

Click the **GRID** button at the lower-left corner of Ricochet's window to switch back to the main delay display.

MIDI Controllers

The VST version of Ricochet responds to MIDI continuous controller messages. You can use hardware MIDI controllers, such as MIDI slider boxes or the knobs found on some MIDI keyboards, to adjust Ricochet's parameters.

Ricochet has a simple "MIDI Learn" mode for assigning its controls to MIDI controllers. To assign a control to a MIDI controller:

- First, hold down the SHIFT and CTRL keys on your PC's keyboard, or SHIFT and CMD keys if you're using a Mac, and click once on the control. A white box will be drawn around the control to indicate that it is ready to learn which MIDI controller it will be assigned to.

- Next, move the MIDI controller to send a continuous controller message—turn the knob, press the button, move the slider, whatever is appropriate.

- The white square will disappear. Now the control will move when you manipulate the MIDI controller.

Ricochet waits until it has received two consecutive continuous controller messages with the same controller number before it makes an assignment. This filters out extraneous data sent by some MIDI controllers. If you are assigning a button or switch on a MIDI controller, you may have to press or move the switch twice before Ricochet recognizes the controller and assigns it to the desired control.

To assign a different MIDI controller to a control, repeat the same procedure using a different controller.

To cancel MIDI Learn mode without assigning a controller, hold down the SHIFT and CTRL keys (SHIFT and CMD keys on a Mac) and click in any empty area in Ricochet's window (i.e., don't click on another control). The white box will disappear.

To remove a MIDI controller assignment from a control, SHIFT and CTRL keys, (SHIFT and CMD keys on a Mac) click on the control once so that the white box appears, then click again on the same control.

If you assign a MIDI controller to a tap dot, the MIDI controller will move the dot vertically but not horizontally. In other words, you can use a MIDI controller to change a tap's output level but not its delay time.

Ricochet’s MIDI controller assignments apply to all presets and instances of Ricochet, in all host applications that you use. The MIDI assignments are stored in a special file on your hard drive. The contents of this file are read when Ricochet is loaded by your host. If you have two or more instances of Ricochet in use at once, any MIDI assignments you make will not be propagated to the other instances until the next time that your host loads the plug-ins.

The AudioUnit version does not provide the same MIDI assignment features as the VST version. Almost all AudioUnit hosts provide their own mechanism for assigning MIDI controllers to parameters, so it would be redundant for us to implement MIDI controller assignments in the plug-in itself. Consult the documentation for your AudioUnit host to learn how to use its MIDI features.

Automation

All of Ricochet's parameters can be automated using your host's automation features. Consult your host's documentation for information on how to use these features.

And Finally...

Thanks again for purchasing Ricochet. We make every effort to ensure your satisfaction with our products, and want you to be happy with your purchase. Please write support@audiodamage.com if you have any questions or comments.