

Liquid User's Guide

Audio Damage, Inc.

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Introduction

Thank you for purchasing Liquid, Audio Damage's through-zero flanger plug-in. Liquid recreates classic tape-flanging effects with a vintage feel not present in most contemporary hardware or software flangers. Liquid can be used on single instruments or entire mixes to create everything from subtle stereo double-tracking effects to extreme whooshes through musical space.

Liquid 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 Liquid, 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 Liquid, 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 10.3.9 or newer
- 512 MB RAM
- Motorola G4/G5 or Intel CPU
- Display capable of "thousands of colors"

Installation

Double-click the Liquid 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`.

The Tao of Flanging

The effect known as flanging originated in the late 1960s, back when music was recorded on magnetic tape handled by large machines rather than on magnetic discs in computers. To create doubled vocal effects, the same recording was played on two different tape decks with their outputs mixed together. Since the two decks started playing at slightly different times, the signal from one deck was delayed slightly with respect to the other. This created a doubled vocal effect without requiring the vocalist to sing the same vocal part again.

Someone noticed—probably by accident—that if the two recordings were started at very nearly the same time an interesting timbral effect resulted. The two signals were not heard separately but as a filtered version of the original recording. This form of filtering created by delaying a copy of a signal by a fixed amount and mixing it with the original signal, is called *comb filtering* because it creates a series of deep notches in the signal's frequency spectrum which someone once thought was reminiscent of a comb. The effect became even more interesting if one tape deck was slowed down slightly, causing the relative time of delay between the two signals to vary slightly. One could slow down a tape deck simply by pressing a finger or two on the flange of one of the reels of tape; hence the term *flanging* was coined to describe the effect.

(If you're getting bored with this history lesson, you can skip ahead to the Operation section below. This material will not be on the exam.)

Everyone thought flanging was a very cool effect, but it was cumbersome to create. You needed two copies on tape of whatever signal you wanted to use, you needed two tape decks, and you needed a good deal of patience. Obviously using it on stage was out of the question. Hence electronic imitations of tape-based flanging were invented.

The first such invention was the *phase shifter*. Phase shifters used a special form of analog filter called an *all-pass* filter which creates a very short delay whose length is dependent on the frequency of the signal. This delay time was much shorter than the several milliseconds of delay needed for flanging, but it was enough to create a couple of notches in the frequency spectrum and hence a vague approximation of flanging. It was an interesting enough effect in its own right that it remains popular to this day, particularly when used with guitar or electric piano. If you'd like to add a phase shifter to your effects arsenal, Audio Damage has a fine phase-shifting plug-in called Phase Two. Phase Two is a meticulous software recreation of the Mu-Tron Bi-Phase, one of the most famous and sought-after phase shifters.

Some years later, with the advent of analog bucket-brigade delay (BBD) circuits, it became possible to create a real-time flanger. A BBD chip could be used to create the necessary delay time of a few milliseconds, and a

low-frequency oscillator (LFO) could be used to change the delay time slightly to create the effect of someone dragging their fingers on the tape-reel flange. Later digital delays were substituted for the BBD chips, with results of debatable virtue. Flangers became available as rack-mount studio hardware, stomp boxes for guitarists, and (some years later) software plug-ins.

Note, however, that there's a fundamental difference between using a single delay line to create flanging and using two tape decks: with a single delay line, the relative delay time between the two signals will never reach zero. Any form of electronic delay circuit has at least a very small delay time. The term *through-zero flanging* refers to the phenomenon when flanging is created in such a manner that the relative delay time reaches—and passes through—zero, creating negative delay times. (A negative delay time sounds like something from a science-fiction story, but it simply means that the relative delay time between the two signals has changed; that is, the tape deck that used to be behind has caught up with, and passed, the other tape deck.) Through-zero flanging is more difficult to create, but can produce different and more dramatic effects than the single-delay flanging that we of the post-tape era have become accustomed to.

Liquid uses two varying delay lines to create true through-zero flanging. The two delay lines are changed in opposite directions to produce positive, negative, and zero relative delay times. Liquid also applies a gentle amount of filtering to the delayed signals to reduce the metallic-sounding harshness often associated with flangers based on digital delays (either hardware- or software-based delays).

So why is flanging associated with jet airplanes? It could be because the sound from the engine travels in two paths: one straight to the listener's ear, and one that bounces off the surface of the runway. The bounced sound takes slightly longer to reach the ear, so a short relative delay time is created, producing comb filtering. Or it could be because we all heard the prominent use of flanging in the song "Jet" by Paul McCartney & Wings one too many times.

Operation

Liquid can be used in a mono, stereo, or mono-to-stereo context. In a stereo context, no summing of the input channels happens and the left and right channels are processed independently. Liquid should usually be used as an insert effect, since its operation depends upon its internal mixing of the unprocessed and processed signals.

Here is a screenshot of Liquid, followed by detailed descriptions of its controls. Flanging is certainly a “turn the knobs until it sounds good” effect, so feel free to experiment first and return to this manual when you’d like a little more insight into how Liquid operates.



1. Manual

The **MANUAL** knob sets the relative delay time between the two delays in Liquid. If set at the center “12 o’clock” position, both delays are set to the same time and there will be little audible effect on the signal. As you rotate the knob away from this position, one delay’s time is increased while the other is decreased. The **MANUAL** knob is useful for creating fixed comb-filtering effects or for adding an offset to Liquid’s modulation oscillator (described below). It’s also a great target for controlling with your host sequencer’s automation features; you can create dramatic flanging sweeps that peak in conjunction with musical climaxes.

The effect of this knob is symmetric; rotating it counter-clockwise from the center position produces much the same sonic result as rotating it clockwise. This is because the same *relative* delay time is created in both directions. Rotating the knob from one side, past the center point, to the other side creates the through-zero flanging effect as the relative delay time decreases and passes through zero. The range of this knob is -5 to +5 msec.

2. Rate

The **RATE** knob controls the speed or frequency of Liquid's modulation oscillator. This oscillator varies the relative delay times of the two delay lines, producing a familiar up-and-down flanging effect. As you rotate the knob clockwise the modulation rate increases. Slow modulation rates are useful for creating timbral changes over a measure or more; fast modulation rates are useful for chorus-like effects. The range of this knob is 0.02Hz (one cycle every 50 seconds) to 10Hz (ten cycles per second).

Note that if the **DEPTH** knob is set at zero, the modulation oscillator has no effect and you won't hear anything change when you rotate the rate knob.

3. Depth

The **DEPTH** knob controls how much the modulation oscillator varies the delay times. When it is rotated fully counter-clockwise, the modulation oscillator has no effect. As you rotate the knob clockwise, the modulation oscillator changes the delay times by an increasing amount. The modulation oscillator is bipolar, that is, it varies the relative delay time above and below the time set with the manual knob. If the **MANUAL** knob is set at its center position, the cycles of the modulation oscillator will change the relative delay time from zero to a positive value, back to zero, below zero to a negative amount, back to zero, and so on.

4. Feedback

The **FEEDBACK** knob mixes the delayed signal back into the input of the delay lines. This increases the size of the peaks and notches in the comb-filter frequency response created by the delay lines, producing a more pronounced flanging effect. As you rotate the knob clockwise, the amount of signal fed back is increased. Note that some combinations of a high feedback setting and certain input material may produce nearly self-oscillating ringing, loud signals, and/or some distortion. If you find this unpleasant, back off on the **FEEDBACK** knob and/or reduce the level of the signal entering Liquid.

5. Invert

The **INVERT** switch, when depressed and illuminated, inverts the phase or polarity of the feedback signal. This produces a slightly different tonal effect which is most apparent when the **FEEDBACK** knob is turned up fairly high. To change the state of the **INVERT** switch, click on it with the mouse.

6. Offset

The **OFFSET** knob applies a small additional amount of delay to the delay lines used by Liquid's right channel. This produces a wide stereo field and also enhances the flanging effect. This knob has no effect when Liquid is used in a mono-in/mono-out context, but can be used to "stereoize" a mono signal in a mono-in/stereo-out context.

If you're experienced with mixing audio, this description of the **OFFSET** knob should be setting off small alarm bells. Yes, it's an effect that intrinsically depends upon a stereo output and may or may not produce desirable results if you mix to mono. If you're going to lose sleep over this, leave the **OFFSET** knob at zero.

7. Power

The **POWER** light illuminates to indicate that your computer's CPU is receiving adequate electrical power.

8. Time Indicator

The time indicator above the **MANUAL** knob reflects the relative delay time created by the two delay lines. If the indicator is at its center position, the delay times are equal. The combined effect of the **MANUAL** knob and the modulation oscillator determines the position of the indicator, and hence provides a visual representation of their interaction. It's also just fun to watch.

MIDI Controllers

The VST version of Liquid 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 Liquid's parameters.

The VST version of Liquid 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.

Liquid 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 Liquid 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 Liquid'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.

Liquid's MIDI controller assignments apply to all presets and instances of Liquid, 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 Liquid is loaded by your host. If you have two or more instances of Liquid 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 Liquid'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 Liquid. 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.